

CHAPTER

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FUEL

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CHAPTER 28 FUEL

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28-EFFECTIVE PAGES			28-00-00 (cont)			28-10-00 (cont)		
1 thru 10	AUG 01/2016		217	Feb 01/2015		503	Feb 01/2016	
28-CONTENTS			218	Feb 01/2015		504	Feb 01/2016	
1	Feb 01/2016		219	Feb 01/2016		505	Feb 01/2016	
2	Feb 01/2016		220	Feb 01/2015		506	Feb 01/2015	
3	Feb 01/2016		221	Feb 01/2015		507	Feb 01/2016	
4	Feb 01/2016		222	Feb 01/2015		508	Feb 01/2016	
5	Feb 01/2016		223	Feb 01/2015		509	Feb 01/2015	
6	Feb 01/2016		224	Feb 01/2015		510	Feb 01/2015	
7	Feb 01/2016		225	Feb 01/2015		28-10-01		
8	Feb 01/2015		226	Feb 01/2016		201	Feb 01/2015	
28-00-00			227	Feb 01/2016		202	Feb 01/2015	
1	Feb 01/2016		228	Feb 01/2016		203	Feb 01/2015	
2	Feb 01/2016		229	Feb 01/2015		204	Feb 01/2015	
3	Feb 01/2016		230	Feb 01/2015		205	Feb 01/2015	
4	Feb 01/2016		231	Feb 01/2015		206	Feb 01/2015	
5	Feb 01/2016		232	Feb 01/2015		207	Feb 01/2015	
6	Feb 01/2016		233	Feb 01/2015		208	Feb 01/2015	
7	Feb 01/2016		234	Feb 01/2015		209	Feb 01/2015	
8	Feb 01/2016		28-10-00			210	Feb 01/2015	
28-00-00			1	Feb 01/2016		211	Feb 01/2015	
201	Feb 01/2015		2	Feb 01/2015		212	Feb 01/2015	
202	Feb 01/2015		3	Feb 01/2016		213	Feb 01/2015	
203	Feb 01/2015		4	Feb 01/2016		214	Feb 01/2015	
204	Feb 01/2015		5	Feb 01/2016		215	Feb 01/2015	
205	Feb 01/2015		6	Feb 01/2015		216	Feb 01/2015	
206	Feb 01/2016		7	Feb 01/2015		217	Feb 01/2015	
207	Feb 01/2016		8	Feb 01/2016		218	Feb 01/2015	
208	Feb 01/2016		9	Feb 01/2016		219	Feb 01/2015	
209	Feb 01/2015		10	Feb 01/2016		220	Feb 01/2015	
210	Feb 01/2015		11	Feb 01/2016		221	Feb 01/2015	
211	Feb 01/2015		12	Feb 01/2016		222	Feb 01/2015	
212	Feb 01/2015		13	Feb 01/2015		223	Feb 01/2015	
213	Feb 01/2015		14	Feb 01/2015		224	Feb 01/2015	
214	Feb 01/2015		28-10-00			225	Feb 01/2015	
215	Feb 01/2015		501	Feb 01/2015		226	Feb 01/2015	
216	Feb 01/2015		502	Feb 01/2016		227	Feb 01/2015	

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28-10-01	(cont)		28-10-03			28-10-05		
228	Feb 01/2015		401	Feb 01/2016		601	Feb 01/2015	
229	Feb 01/2015		402	Feb 01/2015		602	Feb 01/2015	
230	Feb 01/2015		403	Feb 01/2015		28-10-06		
231	Feb 01/2015		404	Feb 01/2016		201	Feb 01/2016	
232	Feb 01/2015		405	Feb 01/2016		202	Feb 01/2016	
233	Feb 01/2015		406	Feb 01/2016		203	Feb 01/2016	
234	Feb 01/2015		407	Feb 01/2015		204	Feb 01/2016	
235	Feb 01/2015		408	BLANK		205	Feb 01/2016	
236	Feb 01/2015		28-10-03			206	Feb 01/2016	
237	Feb 01/2015		601	Feb 01/2016		207	Feb 01/2016	
238	Feb 01/2015		602	Feb 01/2016		208	Feb 01/2016	
239	Feb 01/2015		28-10-03			209	Feb 01/2016	
240	Feb 01/2015		801	Feb 01/2016		210	Feb 01/2016	
241	Feb 01/2015		802	Feb 01/2015		28-10-06		
242	Feb 01/2015		803	Feb 01/2015		601	Feb 01/2016	
243	Feb 01/2015		804	Feb 01/2016		602	Feb 01/2016	
244	BLANK		805	Feb 01/2016		603	Feb 01/2016	
28-10-01	Config 1		806	Feb 01/2015		604	BLANK	
601	Feb 01/2015		28-10-04			28-10-07		
602	Aug 01/2015		201	Feb 01/2015		201	Feb 01/2015	
603	Feb 01/2015		202	Feb 01/2015		202	Feb 01/2015	
604	Feb 01/2015		203	Feb 01/2015		203	Feb 01/2015	
605	Feb 01/2015		204	Feb 01/2015		204	Feb 01/2015	
606	Feb 01/2015		205	Feb 01/2015		205	Feb 01/2015	
28-10-02			206	BLANK		206	BLANK	
201	Feb 01/2015		28-10-05			28-10-07		
202	Feb 01/2015		201	Feb 01/2015		601	Feb 01/2015	
203	Feb 01/2015		202	Feb 01/2015		602	Feb 01/2015	
204	Feb 01/2015		203	Feb 01/2015		28-10-08		
205	Feb 01/2015		204	Feb 01/2015		201	Feb 01/2015	
206	Feb 01/2015		205	Feb 01/2015		202	Feb 01/2015	
207	Feb 01/2015		206	BLANK		203	Feb 01/2015	
208	BLANK		28-10-05			204	Feb 01/2015	
28-10-02			501	Feb 01/2015		28-10-08		
601	Feb 01/2015		502	Feb 01/2015		601	Feb 01/2015	
602	BLANK					602	Feb 01/2015	

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28-10-09			28-10-13			28-11-00		
201	Feb 01/2015		401	Feb 01/2015		601	Feb 01/2016	
202	Feb 01/2015		402	Feb 01/2015		602	Feb 01/2016	
203	Feb 01/2015		28-10-14			28-11-01		
204	Feb 01/2015		201	Feb 01/2015		201	Feb 01/2016	
28-10-09			202	Feb 01/2015		202	Feb 01/2016	
601	Feb 01/2015		203	Feb 01/2015		203	Feb 01/2016	
602	Feb 01/2015		204	Feb 01/2015		204	Feb 01/2016	
28-10-11			205	Feb 01/2015		205	Feb 01/2016	
201	Feb 01/2016		206	BLANK		206	BLANK	
202	Feb 01/2016		28-10-14			28-11-02		
203	Feb 01/2016		401	Feb 01/2015		601	Feb 01/2016	
204	Feb 01/2016		402	Feb 01/2015		602	Feb 01/2016	
205	Feb 01/2016		28-10-15			603	Feb 01/2016	
206	Feb 01/2015		201	Feb 01/2015		604	Feb 01/2016	
207	Feb 01/2016		202	Feb 01/2015		605	Feb 01/2016	
208	Feb 01/2016		203	Feb 01/2015		606	Feb 01/2016	
209	Feb 01/2015		204	Feb 01/2015		28-11-03		
210	BLANK		28-10-16			601	Feb 01/2016	
28-10-11			201	Feb 01/2015		602	Feb 01/2016	
601	Feb 01/2015		202	Feb 01/2015		603	Feb 01/2016	
602	Feb 01/2016		203	Feb 01/2015		604	Feb 01/2016	
28-10-12			204	Feb 01/2015		605	Feb 01/2016	
201	Feb 01/2015		205	Feb 01/2015		606	Feb 01/2016	
202	Feb 01/2015		206	Feb 01/2015		28-11-04		
203	Feb 01/2015		207	Feb 01/2015		401	Feb 01/2016	
204	Feb 01/2015		208	Feb 01/2015		402	Feb 01/2016	
205	Feb 01/2015		209	Feb 01/2015		403	Feb 01/2016	
206	BLANK		210	Feb 01/2015		404	Feb 01/2016	
28-10-13			211	Feb 01/2015		405	Feb 01/2016	
201	Feb 01/2015		212	Feb 01/2015		406	Feb 01/2016	
202	Feb 01/2015		213	Feb 01/2015		407	Feb 01/2015	
203	Feb 01/2015		214	Feb 01/2015		408	Feb 01/2016	
204	Feb 01/2015		28-10-16			409	Feb 01/2015	
205	Feb 01/2015		401	Feb 01/2015		410	Feb 01/2016	
206	BLANK		402	Feb 01/2015		411	Feb 01/2016	
						412	Feb 01/2016	

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28-11-04 (cont)			28-11-06 (cont)			28-20-00 Config 3 (cont)		
413	Feb 01/2016		203	Feb 01/2016		5	Feb 01/2016	
414	Feb 01/2016		204	Feb 01/2016		6	Feb 01/2016	
415	Feb 01/2016		205	Feb 01/2016		7	Feb 01/2016	
416	Feb 01/2016		206	Feb 01/2016		8	Feb 01/2016	
417	Feb 01/2016		207	Feb 01/2016		9	Feb 01/2016	
418	Feb 01/2016		208	Feb 01/2016		10	Feb 01/2016	
419	Feb 01/2015		209	Feb 01/2015		11	Feb 01/2016	
420	Feb 01/2016		210	Feb 01/2016		12	Feb 01/2016	
28-11-05			211	Feb 01/2015		13	Feb 01/2016	
401	Feb 01/2016		212	Feb 01/2016		14	Feb 01/2016	
402	Feb 01/2016		28-20-00 Config 1			15	Feb 01/2016	
403	Feb 01/2016		1	Feb 01/2016		16	Feb 01/2016	
404	Feb 01/2016		2	Feb 01/2016		17	Feb 01/2016	
405	Feb 01/2016		3	Feb 01/2016		18	Feb 01/2016	
406	Feb 01/2016		4	Feb 01/2016		19	Feb 01/2016	
407	Feb 01/2016		5	Feb 01/2016		20	Feb 01/2016	
408	Feb 01/2015		6	Feb 01/2016		21	Feb 01/2016	
409	Feb 01/2016		7	Feb 01/2016		22	Feb 01/2016	
410	Feb 01/2015		8	Feb 01/2016		23	Feb 01/2016	
411	Feb 01/2016		9	Feb 01/2016		24	Feb 01/2016	
412	Feb 01/2016		10	Feb 01/2016		25	Feb 01/2016	
413	Feb 01/2016		11	Feb 01/2016		26	BLANK	
414	Feb 01/2016		12	Feb 01/2016		28-20-00		
415	Feb 01/2016		13	Feb 01/2016		101	Feb 01/2016	
416	Feb 01/2016		14	Feb 01/2016		102	Feb 01/2015	
417	Feb 01/2016		15	Feb 01/2016		103	Feb 01/2015	
418	Feb 01/2016		16	Feb 01/2016		104	Feb 01/2015	
419	Feb 01/2016		17	Feb 01/2016		105	Feb 01/2015	
420	Feb 01/2016		18	Feb 01/2016		106	Feb 01/2015	
421	Feb 01/2016		19	Feb 01/2016		107	Feb 01/2016	
422	Feb 01/2016		20	Feb 01/2016		108	Feb 01/2016	
423	Feb 01/2016		28-20-00 Config 3			109	Feb 01/2016	
424	BLANK		1	Feb 01/2016		110	Feb 01/2016	
28-11-06			2	Feb 01/2016		111	Feb 01/2016	
201	Feb 01/2016		3	Feb 01/2016		112	Feb 01/2016	
202	Feb 01/2016		4	Feb 01/2016		113	Feb 01/2016	

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28-20-00 (cont)			28-20-00			28-20-03 (cont)		
114	Feb 01/2016		801	Feb 01/2015		214	Feb 01/2016	
115	Feb 01/2016		802	Feb 01/2015		215	Feb 01/2016	
116	Feb 01/2016		803	Feb 01/2015		216	Feb 01/2016	
117	Feb 01/2016		804	Feb 01/2015		217	Feb 01/2016	
118	Feb 01/2016		805	Feb 01/2015		218	Feb 01/2016	
119	Feb 01/2016		806	Feb 01/2015		219	Feb 01/2016	
120	Feb 01/2016		28-20-01			220	Feb 01/2016	
121	Feb 01/2016		201	Feb 01/2015		221	Feb 01/2016	
122	Feb 01/2016		202	Feb 01/2015		222	Feb 01/2016	
123	Feb 01/2016		203	Feb 01/2015		223	Feb 01/2016	
124	Feb 01/2016		204	Feb 01/2016		224	Feb 01/2016	
125	Feb 01/2016		28-20-02			225	Feb 01/2016	
126	Feb 01/2016		201	Feb 01/2016		226	Feb 01/2016	
127	Feb 01/2016		202	Feb 01/2016		227	Feb 01/2016	
128	Feb 01/2016		203	Feb 01/2016		228	Feb 01/2016	
28-20-00			204	Feb 01/2016		229	Feb 01/2016	
501	Feb 01/2015		205	Feb 01/2015		230	Feb 01/2016	
502	Feb 01/2015		206	Feb 01/2015		231	Feb 01/2016	
503	Feb 01/2015		207	Feb 01/2016		232	Feb 01/2016	
504	BLANK		208	Feb 01/2016		28-20-05		
28-20-00 Config 1			209	Feb 01/2016		201	Feb 01/2015	
501	Feb 01/2016		210	BLANK		202	Feb 01/2015	
502	Feb 01/2016		28-20-03			203	Feb 01/2015	
28-20-00 Config 1			201	Feb 01/2016		204	Feb 01/2015	
601	Feb 01/2016		202	Feb 01/2016		205	Feb 01/2015	
602	Feb 01/2016		203	Feb 01/2016		206	BLANK	
603	Feb 01/2016		204	Feb 01/2016		28-20-06		
604	Feb 01/2016		205	Feb 01/2015		201	Feb 01/2015	
28-20-00 Config 2			206	Feb 01/2016		202	Feb 01/2015	
601	Feb 01/2016		207	Feb 01/2016		203	Feb 01/2015	
602	Feb 01/2016		208	Feb 01/2016		204	BLANK	
603	Feb 01/2016		209	Feb 01/2015		28-20-07		
604	Feb 01/2016		210	Feb 01/2016		101	Feb 01/2016	
605	Feb 01/2016		211	Feb 01/2016		102	Feb 01/2015	
606	BLANK		212	Feb 01/2016		103	Feb 01/2015	
			213	Feb 01/2016		104	Feb 01/2015	

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28-20-07	(cont)		28-20-07	(cont)		28-20-08		
105	Feb 01/2015		226	Feb 01/2015		101	Feb 01/2015	
106	Feb 01/2015		227	Feb 01/2015		102	Feb 01/2015	
107	Feb 01/2015		228	Feb 01/2015		28-20-08		
108	Feb 01/2015		229	Feb 01/2015		201	Feb 01/2015	
109	Feb 01/2016		230	Feb 01/2015		202	Feb 01/2015	
110	Feb 01/2016		231	Feb 01/2015		203	Feb 01/2015	
111	Feb 01/2016		232	Feb 01/2015		204	Feb 01/2015	
112	Feb 01/2016		233	Feb 01/2015		205	Feb 01/2015	
113	Feb 01/2016		234	BLANK		206	Feb 01/2015	
114	BLANK		28-20-07			207	Feb 01/2015	
28-20-07			401	Feb 01/2015		208	Feb 01/2015	
201	Feb 01/2015		402	Feb 01/2016		209	Feb 01/2015	
202	Feb 01/2015		403	Feb 01/2016		210	Feb 01/2015	
203	Feb 01/2015		404	Feb 01/2015		28-20-09		
204	Feb 01/2015		405	Feb 01/2016		201	Feb 01/2015	
205	Feb 01/2015		406	BLANK		202	Feb 01/2015	
206	Feb 01/2015		28-20-07			203	Feb 01/2015	
207	Feb 01/2015		501	Feb 01/2016		204	BLANK	
208	Feb 01/2015		502	Feb 01/2016		28-20-10		
209	Feb 01/2015		503	Feb 01/2016		201	Feb 01/2015	
210	Feb 01/2015		504	Feb 01/2016		202	Feb 01/2015	
211	Feb 01/2015		505	Feb 01/2016		203	Feb 01/2015	
212	Feb 01/2015		506	Feb 01/2016		204	Feb 01/2015	
213	Feb 01/2015		507	Feb 01/2016		28-20-11		
214	Feb 01/2015		508	Feb 01/2016		201	Feb 01/2015	
215	Feb 01/2015		28-20-07 Config 1			202	Feb 01/2015	
216	Feb 01/2015		501	Feb 01/2016		203	Feb 01/2015	
217	Feb 01/2015		502	Feb 01/2016		204	Feb 01/2015	
218	Feb 01/2015		503	Feb 01/2016		28-20-12		
219	Feb 01/2015		504	Feb 01/2016		401	Feb 01/2015	
220	Feb 01/2015		505	Feb 01/2016		402	Feb 01/2015	
221	Feb 01/2015		506	Feb 01/2016		403	Feb 01/2015	
222	Feb 01/2015		507	Feb 01/2016		404	Feb 01/2015	
223	Feb 01/2015		508	Feb 01/2016		405	Feb 01/2015	
224	Feb 01/2015					406	BLANK	
225	Feb 01/2015							

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28-20-12			28-20-17			28-20-17 (cont)		
501	Feb 01/2015		101	Feb 01/2015		234	Feb 01/2015	
502	Feb 01/2015		102	Feb 01/2015		235	Feb 01/2015	
503	Feb 01/2015		28-20-17			236	Feb 01/2015	
504	Feb 01/2015		201	Feb 01/2015		28-20-17		
28-20-13			202	Feb 01/2015		801	Feb 01/2015	
201	Feb 01/2015		203	Feb 01/2015		802	Feb 01/2015	
202	Feb 01/2015		204	Feb 01/2015		803	Feb 01/2015	
203	Feb 01/2015		205	Feb 01/2016		804	BLANK	
204	Feb 01/2015		206	Feb 01/2016		28-20-18		
205	Feb 01/2015		207	Feb 01/2016		201	Feb 01/2016	
206	Feb 01/2015		208	Feb 01/2016		202	Feb 01/2016	
207	Feb 01/2015		209	Feb 01/2015		203	Feb 01/2016	
208	Feb 01/2015		210	Feb 01/2015		204	Feb 01/2016	
28-20-14			211	Feb 01/2015		205	Feb 01/2016	
201	Feb 01/2015		212	Feb 01/2015		206	Feb 01/2015	
202	Feb 01/2015		213	Feb 01/2015		207	Feb 01/2016	
203	Feb 01/2015		214	Feb 01/2015		208	Feb 01/2016	
204	Feb 01/2015		215	Feb 01/2015		209	Feb 01/2016	
205	Feb 01/2015		216	Feb 01/2015		210	BLANK	
206	Feb 01/2015		217	Feb 01/2015		28-20-19		
207	Feb 01/2015		218	Feb 01/2015		201	Feb 01/2015	
208	Feb 01/2015		219	Feb 01/2015		202	Feb 01/2015	
209	Feb 01/2015		220	Feb 01/2015		203	Feb 01/2015	
210	Feb 01/2015		221	Feb 01/2015		204	Feb 01/2015	
28-20-15			222	Feb 01/2015		205	Feb 01/2015	
201	Feb 01/2015		223	Feb 01/2015		206	Feb 01/2015	
202	Feb 01/2015		224	Feb 01/2015		207	Feb 01/2015	
203	Feb 01/2015		225	Feb 01/2015		208	Feb 01/2015	
204	Feb 01/2015		226	Feb 01/2015		209	Feb 01/2015	
28-20-16			227	Feb 01/2015		210	Feb 01/2015	
201	Feb 01/2015		228	Feb 01/2015		211	Feb 01/2015	
202	Feb 01/2015		229	Feb 01/2015		212	Feb 01/2015	
203	Feb 01/2015		230	Feb 01/2015		213	Feb 01/2015	
204	Feb 01/2015		231	Feb 01/2015		214	Feb 01/2015	
205	Feb 01/2015		232	Feb 01/2015		215	Feb 01/2015	
206	Feb 01/2015		233	Feb 01/2015		216	BLANK	

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28-20-20			28-20-30 (cont)			28-21-01 (cont)		
201	Feb 01/2015		208	Feb 01/2015		203	Feb 01/2016	
202	Feb 01/2015		209	Feb 01/2015		204	Feb 01/2016	
203	Feb 01/2015		210	Feb 01/2015		205	Feb 01/2016	
204	Feb 01/2015		211	Feb 01/2015		206	Feb 01/2016	
28-20-21			212	Feb 01/2015		207	Feb 01/2016	
201	Feb 01/2015		213	Feb 01/2015		208	Feb 01/2016	
202	Feb 01/2015		214	Feb 01/2015		209	Feb 01/2016	
203	Feb 01/2015		215	Feb 01/2015		210	Feb 01/2016	
204	Feb 01/2015		216	Feb 01/2015		28-40-00 Config 1		
28-20-23			217	Feb 01/2015		1	Feb 01/2016	
201	Feb 01/2016		218	Feb 01/2015		2	Feb 01/2016	
202	Feb 01/2016		219	Feb 01/2015		3	Feb 01/2016	
203	Feb 01/2016		220	Feb 01/2015		4	Feb 01/2016	
204	Feb 01/2016		221	Feb 01/2015		5	Feb 01/2016	
205	Feb 01/2016		222	Feb 01/2015		6	Feb 01/2016	
206	Feb 01/2016		223	Feb 01/2015		7	Feb 01/2016	
207	Feb 01/2016		224	BLANK		8	Feb 01/2016	
208	Feb 01/2016		28-21-00			28-40-00 Config 2		
28-20-25			1	Feb 01/2016		1	Feb 01/2016	
201	Feb 01/2016		2	Feb 01/2015		2	Feb 01/2016	
202	Feb 01/2016		3	Feb 01/2015		3	Feb 01/2016	
28-20-26			4	Feb 01/2015		4	Feb 01/2016	
401	Feb 01/2015		28-21-00			5	Feb 01/2016	
402	Feb 01/2015		501	Feb 01/2015		6	Feb 01/2016	
403	Feb 01/2015		502	Feb 01/2015		7	Feb 01/2016	
404	Feb 01/2015		503	Feb 01/2015		8	Feb 01/2016	
405	Feb 01/2015		504	Feb 01/2015		9	Feb 01/2016	
406	BLANK		505	Feb 01/2016		10	Feb 01/2016	
28-20-30			506	Feb 01/2016		28-40-00 Config 1		
201	Feb 01/2015		507	Feb 01/2016		101	Feb 01/2016	
202	Feb 01/2015		508	Feb 01/2016		102	Feb 01/2016	
203	Feb 01/2015		509	Feb 01/2016		103	Feb 01/2015	
204	Feb 01/2015		510	Feb 01/2016		104	Feb 01/2016	
205	Feb 01/2015		28-21-01			105	Feb 01/2016	
206	Feb 01/2015		201	Feb 01/2016		106	Feb 01/2016	
207	Feb 01/2015		202	Feb 01/2016		107	Feb 01/2016	

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28-40-00 Config 1 (cont)			28-40-01 (cont)			28-40-06		
108	Feb 01/2016		207	Feb 01/2016		201	Feb 01/2015	
109	Feb 01/2016		208	Feb 01/2016		202	Feb 01/2015	
110	Feb 01/2016		209	Feb 01/2016		203	Feb 01/2015	
111	Feb 01/2016		210	Feb 01/2016		204	BLANK	
112	Feb 01/2016		211	Feb 01/2016		28-40-07		
113	Feb 01/2016		212	Feb 01/2015		201	Feb 01/2015	
114	BLANK		213	Feb 01/2015		202	Feb 01/2015	
28-40-00 Config 2			214	BLANK		203	Feb 01/2015	
101	Feb 01/2015		28-40-02			204	BLANK	
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103	Feb 01/2015		202	Feb 01/2015		201	Feb 01/2015	
104	Feb 01/2015		203	Feb 01/2015		202	Feb 01/2015	
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106	Feb 01/2015		205	Feb 01/2015		204	BLANK	
107	Feb 01/2015		206	Feb 01/2015		28-40-09		
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109	Feb 01/2015		201	Feb 01/2016		402	Feb 01/2015	
110	Feb 01/2015		202	Feb 01/2016		28-41-00		
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112	BLANK		204	Feb 01/2016		2	Feb 01/2015	
28-40-00			205	Feb 01/2016		3	Feb 01/2015	
201	Feb 01/2016		206	Feb 01/2016		4	BLANK	
202	Feb 01/2016		28-40-04			28-41-00		
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205	Feb 01/2016		203	Feb 01/2015		503	Feb 01/2016	
206	Feb 01/2016		204	Feb 01/2015		504	BLANK	
207	Feb 01/2016		205	Feb 01/2015		28-41-00 Config 1		
208	Feb 01/2016		206	BLANK		501	Feb 01/2015	
28-40-01			28-40-05			502	BLANK	
201	Feb 01/2016		201	Feb 01/2016		28-41-01		
202	Feb 01/2016		202	Feb 01/2016		201	Feb 01/2015	
203	Feb 01/2016		203	Feb 01/2015		202	Feb 01/2015	
204	Feb 01/2016		204	BLANK		203	Feb 01/2015	
205	Feb 01/2016					204	Feb 01/2015	
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A = Added, R = Revised, D = Deleted, O = Overflow, C = Customer Originated Change

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209	Feb 01/2015							
210	BLANK							
28-42-00								
1	Feb 01/2015							
2	Feb 01/2015							
28-42-00								
501	Feb 01/2015							
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503	Feb 01/2016							
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505	Feb 01/2015							
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507	Feb 01/2015							
508	Feb 01/2015							
28-42-00	Config 1							
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208	Feb 01/2015							

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GENERAL - DESCRIPTION AND OPERATION

1. General

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

- A. The aircraft fuel system consists of three subsystems: storage, distribution, and indicating. Storage includes integral tanks, sumping, vent system, and continuous scavenging. Distribution includes tank refueling/defueling, engine and APU fuel supply, and a manifold fuel drain. Indicating includes fuel quantity gauging and dipsticks, and caution indications for fuel system parameters. (Figure 1)

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

- B. The aircraft fuel system consists of three subsystems: storage, distribution, and indicating. Storage includes integral tanks, fuselage tanks, sumping, vent system, and continuous scavenging. Distribution includes tank refueling/defueling, engine and APU fuel supply, and a manifold fuel drain. Indicating includes fuel quantity gauging and dipsticks, and caution indications for fuel system parameters.
- C. The auxiliary fuel tank system vent, fill, and feed lines are equipped with breakaway self-sealing coupling assemblies that will close and prevent fuel spillage if a catastrophic line fracture should occur.

WJE ALL

2. Storage

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

- A. Fuel is stored in three integral tanks; left main, center, and right main. A series of flapper valves incorporated into two flow baffles, near the inboard end of each main tank, creates a reservoir. The reservoir provides a head of fuel around the tank pumps during all normal maneuvers and aircraft attitude changes.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

- B. Fuel is stored in three integral tanks; left main, center, and right main. Additional fuel is stored in fuselage tanks to be transferred to the center wing tank when space is available. A series of flapper valves incorporated into two flow baffles, near the inboard end of each main tank, creates a reservoir. The reservoir provides a head of fuel around the tank pumps during all normal maneuvers and aircraft attitude changes.

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

- C. Sumping of tanks is accomplished by manually operated sump drain valves located in the low point of each tank. A continuous scavenging system prevents water from accumulating in tank low points, where it could cause a corrosion problem.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

- D. Sumping of tanks is accomplished by manually operated sump drain valves located in the low point of each tank. A continuous scavenging system in the integral fuel tanks prevents water from accumulating in tank low points, where it could cause a corrosion problem. Fuselage tanks are not equipped with a scavenging system.

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

- E. The fuel vent system permits equalization of pressure differential in the tanks that is created during refueling/defueling or maneuvering of the aircraft. The system is designed to prevent siphoning or spilling of fuel during normal flight or ground maneuvers.

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WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

- F. The fuel vent system permits equalization of pressure differential in the tanks that is created during refueling/ defueling or maneuvering of the aircraft. The system is designed to prevent siphoning or spilling of fuel during normal flight and ground operation. The auxiliary fuel tank cavities are vented to the atmosphere through an independent system.

WJE ALL

3. Distribution

- A. Refueling/defueling is accomplished through a single point refueling station, located approximately midspan on the right wing leading edge. One pressure refueling adapter and the necessary controls are accessible through access doors. Defueling is accomplished through the refueling adapter by ground suction equipment or by using aircraft boost pumps to move fuel through the lines.

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

- B. Engine fuel supply from the tanks to the engines is accomplished by tank boost pumps through lines direct to the engines. The right and left main tank-to-engine fuel feed lines are interconnected by a crossfeed line and a crossfeed valve.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

- C. Engine fuel supply from the integral tanks to the engines is accomplished by tank boost pumps through lines direct to the engines. The right and left main tank-to-engine fuel feed lines are interconnected by a crossfeed line and a crossfeed valve. Fuel from the fuselage tank is transferred simultaneously to the center wing tank when a float switch indicates that space is available.

WJE ALL

- D. APU fuel supply is accomplished by a branch line from the right engine fuel supply line.
- E. On aircraft with inboard refueling installed, the fuel lines terminate at the inboard end of the main tanks. This puts warmer fuel at the inner end, and drives the cooler fuel outboard, thus reducing formation of wing frost and ice from supercooled fuel.
- F. The standard fuel management schedule has the center tank fuel burning first, then the main tanks burning down.
- G. On aircraft with alternate fuel burn system installed, the option is given for burning fuel from the center and main tanks in an alternating schedule to reduce the amount of cold fuel in the main tanks upon landing. A fuel transfer switch is provided at the wing refueling panel to permit fuel transfer from the center tank.

(ALTERNATE FUEL BURN, SUBJECT 28-21-00)

4. Indicating

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

- A. The primary means of measuring tank fuel is a capacitance-type indicating system. Digital displays are provided in the flight compartment and at the refueling station to indicate individual tank fuel quantity. Dipsticks mounted in the tank bottom provide a secondary means of determining fuel quantity while the aircraft is on the ground.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

- B. The primary means of measuring tank fuel is a capacitance-type indicating system. Digital displays are provided in the flight compartment and at the refueling station to indicate individual tank fuel quantity. Dipsticks mounted in the tank bottom provide a secondary means of determining fuel quantity while the aircraft is on the ground. The fuselage fuel tank is not equipped with dipsticks.

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- C. Engine inlet fuel pressure low lights provide flight compartment indication of low pump discharge pressure.
- D. On aircraft with center tank boost pump low pressure indication system installed, pressure switches are connected to each of the center fuel tank boost pumps, which activates the center fuel pressure low and master caution indications.

(CENTER FUEL TANK PUMP LOW PRESSURE INDICATION - DESCRIPTION AND OPERATION, PAGEBLOCK 28-41-00/001)

- E. On aircraft with center tank boost pump low pressure indication system installed, the system is inhibited during the landing mode by actuation of the flaps. When the flaps pass the 6 degree proximity sensor, the circuit is cut by actuation of the flap inhibit relay . The inhibit circuit works in conjunction with the alternate fuel burn system.

CENTER FUEL TANK PUMP LOW PRESSURE INDICATION - DESCRIPTION AND OPERATION, PAGEBLOCK 28-41-00/001

(ALTERNATE FUEL BURN, SUBJECT 28-21-00)

- F. On aircraft with low fuel level indication system installed, a float switch is installed in each of the left and right main fuel tanks. Under a low fuel level condition, the fuel level low and master caution indications will be activated. (LOW FUEL LEVEL WARNING INDICATION, SUBJECT 28-42-00)

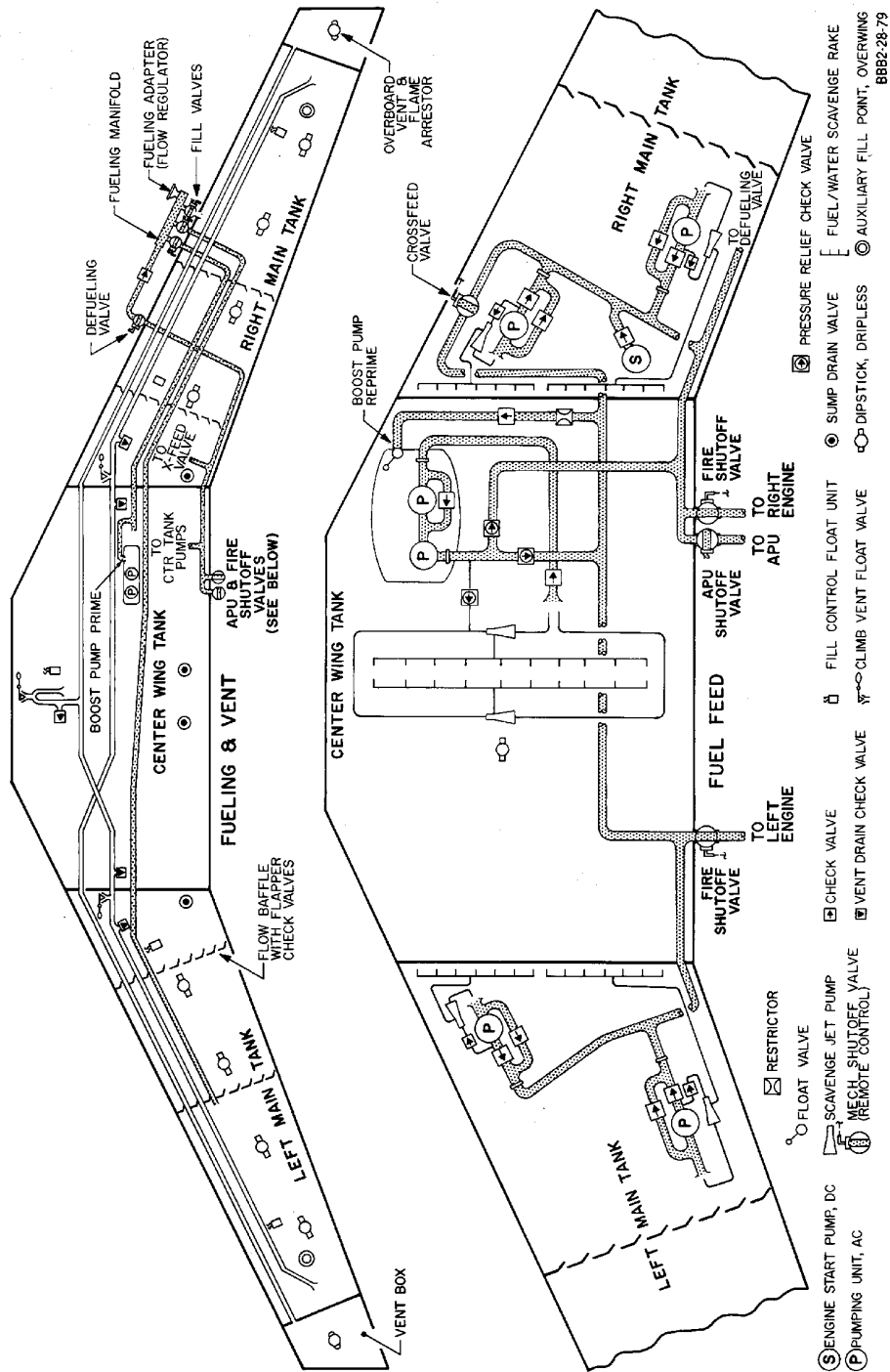
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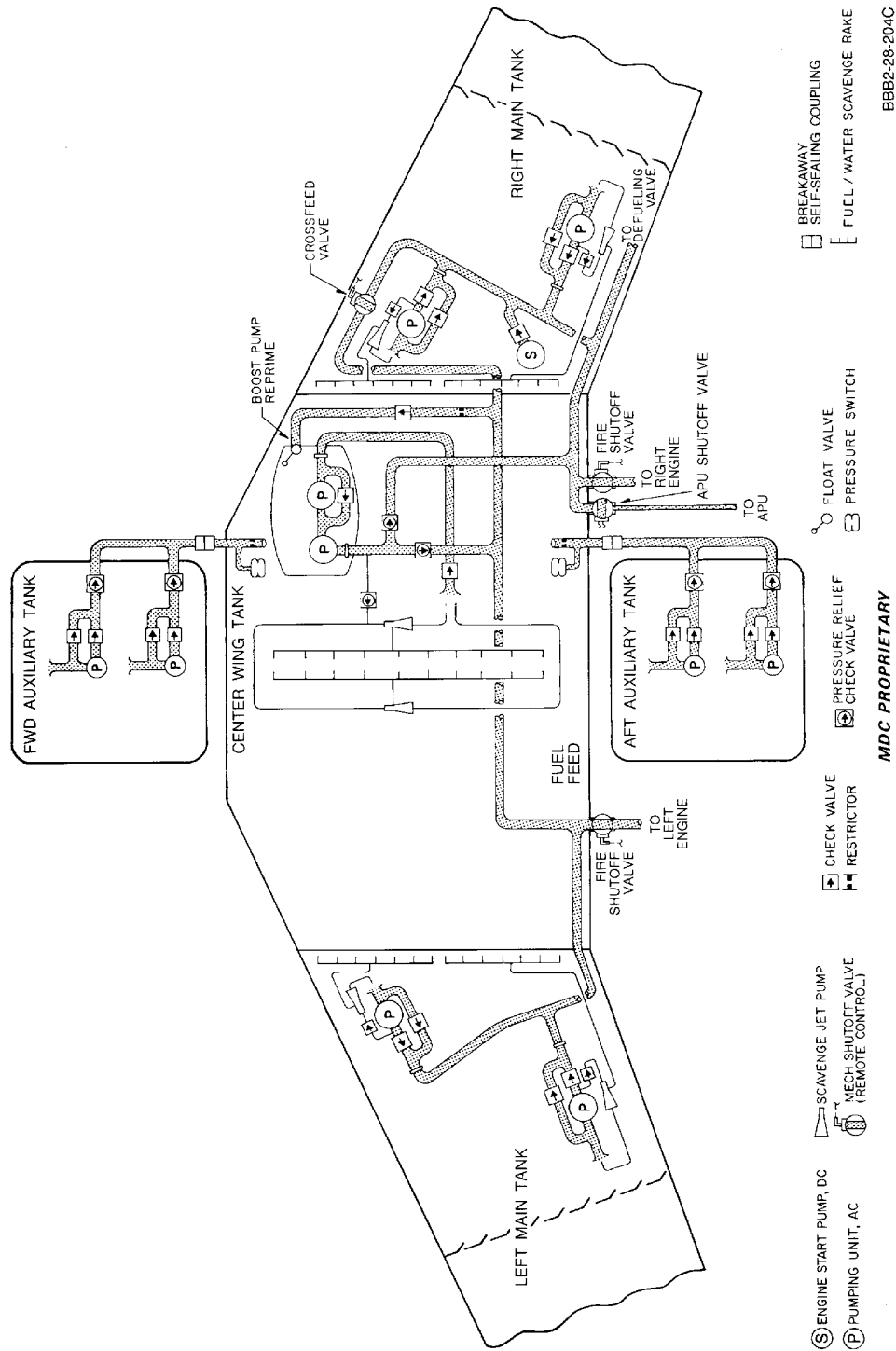


Fuel System -- Schematic
Figure 1/28-00-00-990-801 (Sheet 1 of 5)

EFFECTIVITY
 WJE 415-427, 429, 863-866, 868, 869, 871, 872, 875,
 876, 886, 887, 891, 893; WO/SB 28-53,54,58,59

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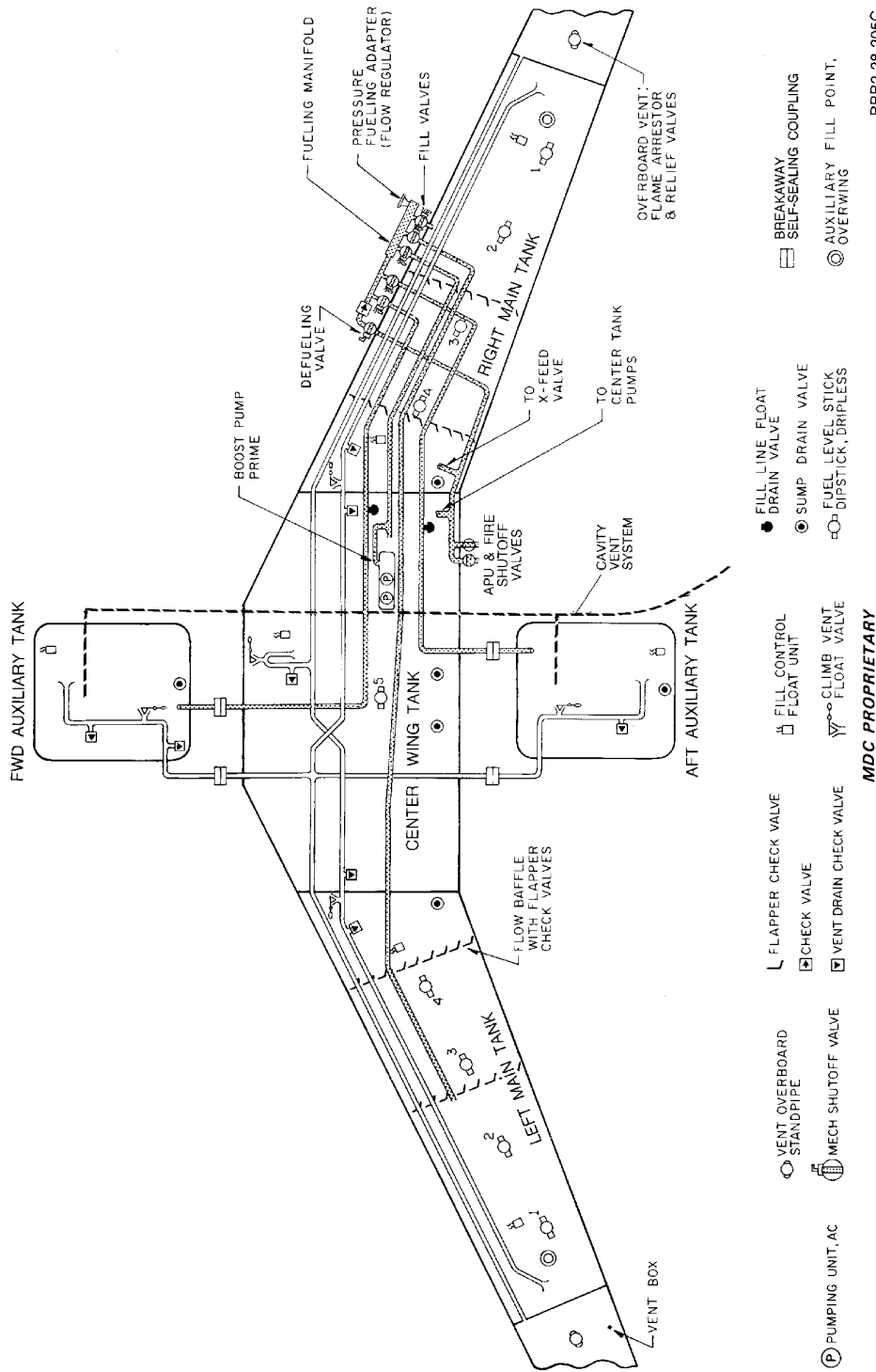


Fuel System -- Schematic
Figure 1/28-00-00-990-801 (Sheet 2 of 5)

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

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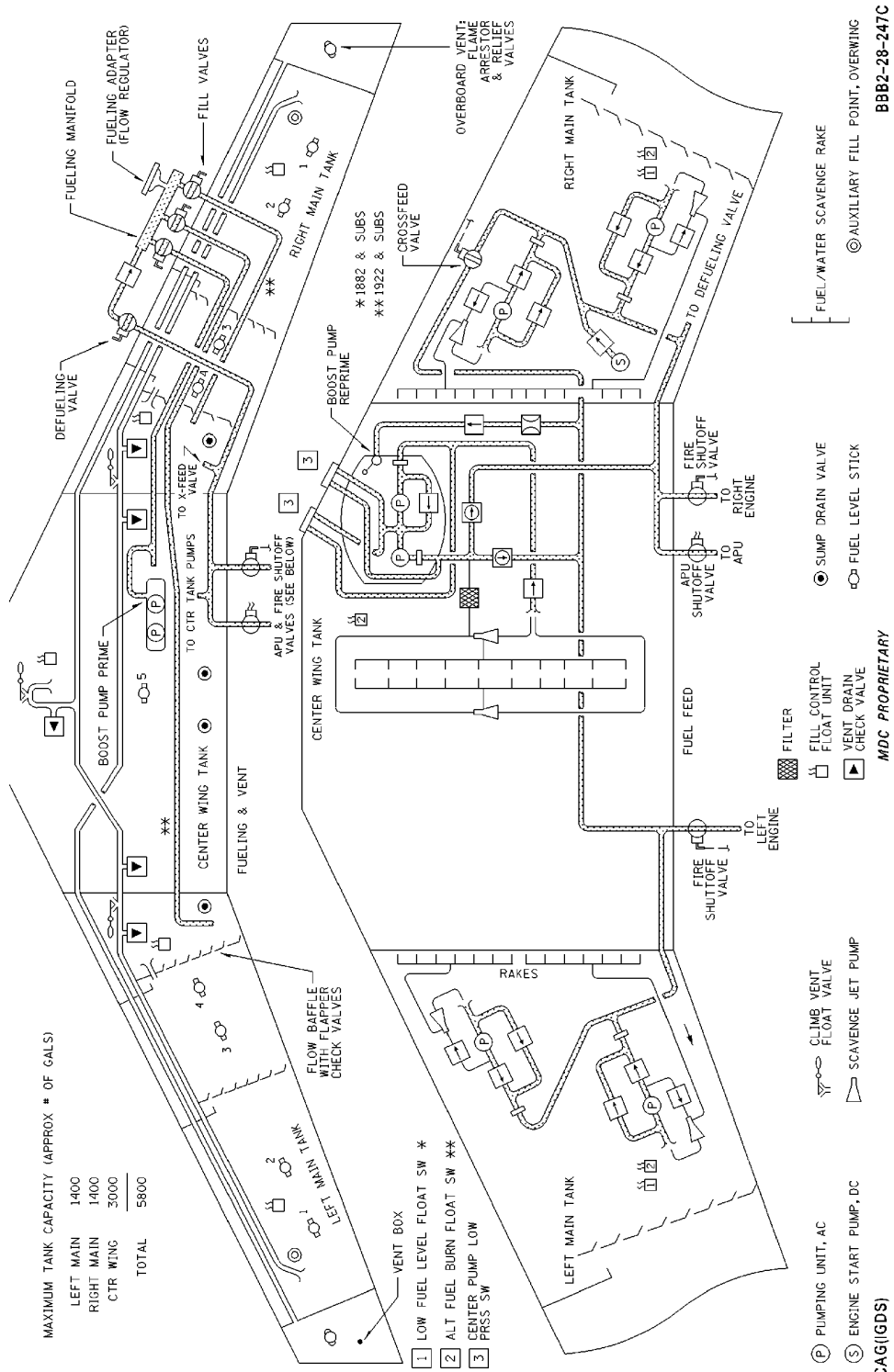
Fuel System -- Schematic
 Figure 1/28-00-00-990-801 (Sheet 3 of 5)

EFFECTIVITY
 WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
 880, 881, 883, 884, 892; before incorp. of SB 28-53,
 54, 58, 59

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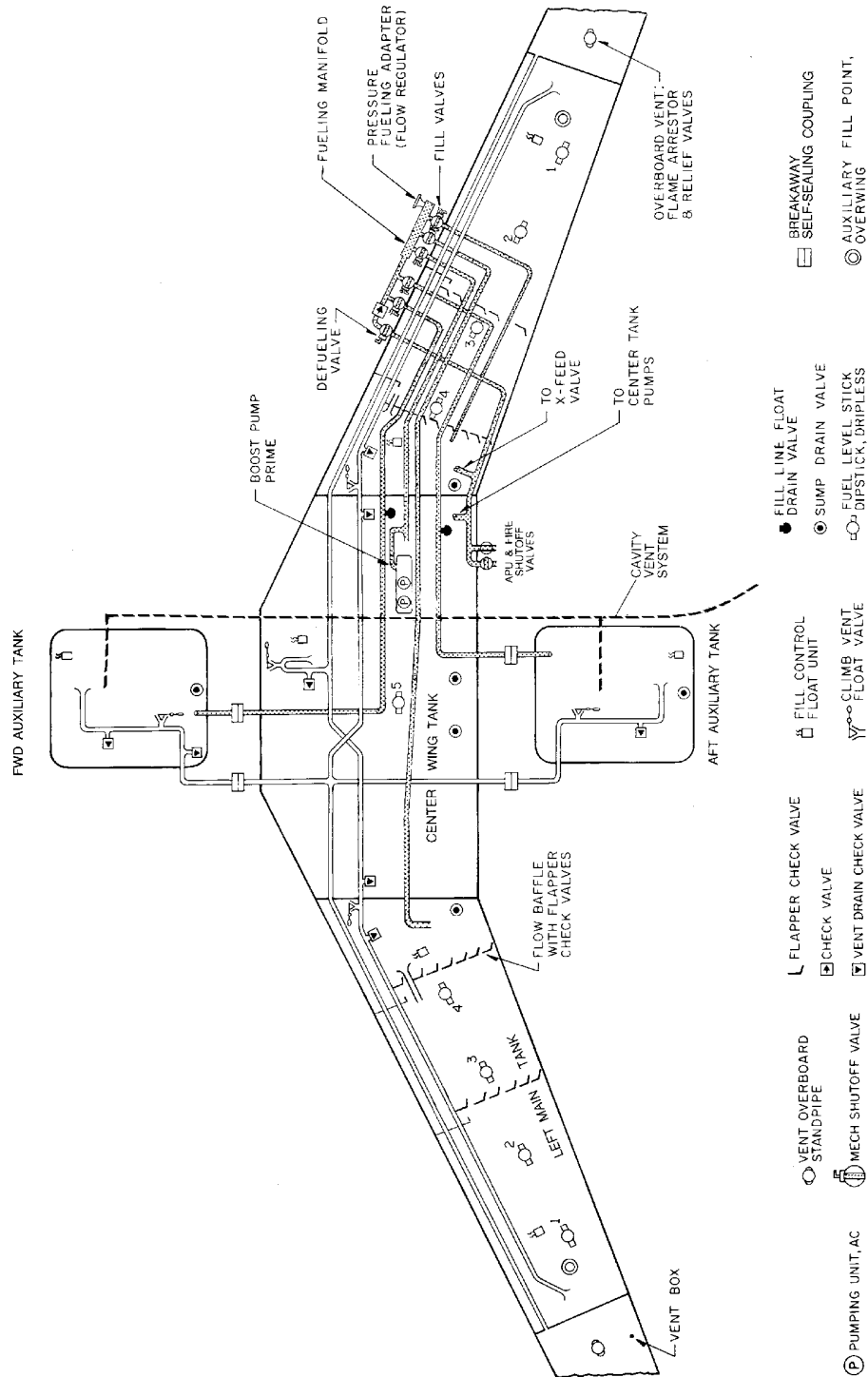


Fuel System -- Schematic
Figure 1/28-00-00-990-801 (Sheet 4 of 5)

EFFECTIVITY
WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893; W/SB 28-53,54,58,59

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BBB2-28-259A

Fuel System -- Schematic
Figure 1/28-00-00-990-801 (Sheet 5 of 5)

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 880, 881, 883, 884, 892; before incorp. of SB 28-53,54, 58, with SB 28-59 incorp.

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GENERAL - MAINTENANCE PRACTICES

1. General

WARNING: OBSERVE ALL LOCAL AND FACILITY SAFETY REGULATIONS WHEN PERFORMING FUEL SYSTEM MAINTENANCE.

WARNING: DO NOT USE SAFETY WIRE TO SECURE ANY UNIT OR FITTING WITHIN FUEL TANKS. SAFETY WIRE ENDS CAN BECOME POINTS OF ELECTROSTATIC DISCHARGE.

WARNING: DO NOT USE LOCKWIRE, SAFETY CABLES OR COTTER PINS IN THE FUEL TANKS OR FOR HARDWARE RETENTION OF COMPONENTS OR EQUIPMENT INSTALLED IN FUEL TANKS. STATIC DISCHARGES FROM THE LOCKWIRE, SAFETY CABLES OR COTTER PINS CAN CAUSE FIRES OR EXPLOSIONS. LOCKWIRE, SAFETY CABLES AND COTTER PINS CAN BE USED IF THEY ARE CONTAINED INSIDE THE HOUSING OF AN EXPLOSION PROOF, TANK MOUNTED COMPONENT, AND MUST BE INSTALLED ACCORDING TO THE APPLICABLE BOEING DESIGN, REPAIR AND MAINTENANCE DOCUMENTATION. THIS WILL HELP PREVENT INJURY TO PERSONS AND DAMAGE TO THE AIRCRAFT.

- A. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the following. Careful adherence to these instructions will aid in maintaining a functional and trouble-free system.

NOTE: Whenever a maintenance task is being performed on a fuel tank internal component, inspect the adjacent areas and installations for general security and condition.

- (1) The above warning is a Critical Design Configuration Control Limitation (CDCCL) procedure. For important information on CDCCLs, refer to Airworthiness Limitation Precautions (GENERAL - MAINTENANCE PRACTICES, 28-00-00/201).

- B. Check condition and replace, if necessary, seals, gaskets, O-rings, and Gask-O-Seals, removed during maintenance. (Paragraph 7.)
- C. Seal fuel tank access doors and fuel probe cover plates in accordance with procedures in Paragraph 9..
- D. Check condition of electrical bond of fuel pipes, surfaces, attaching hardware and components, removed/installed during maintenance. For general procedures concerning electrical bonding of fuel tank components, refer to the ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01.

2. Airworthiness Limitation Precautions

WARNING: OBEY THE MANUFACTURER'S PROCEDURES WHEN YOU DO MAINTENANCE THAT CAN AFFECT A CDCCL. IF YOU DO NOT FOLLOW THE PROCEDURES, IT CAN INCREASE THE RISK OF A FUEL TANK IGNITION SOURCE.

- A. Critical Design Configuration Control Limitations (CDCCLs) for Fuel Tanks

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- (1) Design features that are CDCCLs are defined and controlled by Special Federal Aviation Regulation (SFAR) 88, and can be found in appendix B of the Special Compliance Item (SCI) document. CDCCLs are a means of identifying certain design configuration features intended to preclude a fuel tank ignition source for the operational life of the aircraft. CDCCLs are mandatory and cannot be changed or deleted without the approval of the FAA office that is responsible for the aircraft model Type Certificate, or applicable regulatory agency. A critical fuel tank ignition source prevention feature can exist in the fuel system and its related installation or in systems that, if a failure condition were to develop, can interact with the fuel system in such a way that an unsafe condition will develop without this limitation. Strict adherence to configuration, methods, techniques, and practices as prescribed is required to make sure that the CDCCL is complied with. Use of parts, methods, techniques or practices not contained in the applicable CDCCL must be approved by the FAA office that is responsible for the aircraft model Type Certificate, or applicable regulatory agency.
- (2) CDCCLs found in the Aircraft Maintenance Manual (AMM) are identified by a step, which includes the information that follows:
 - (a) The above (warning, caution or step) is a CDCCL procedure. For important information on CDCCLs, refer to Airworthiness Limitation Precautions (GENERAL - MAINTENANCE PRACTICES, 28-00-00/201).

WARNING: OBEY THE MANUFACTURER'S PROCEDURES WHEN YOU DO MAINTENANCE THAT CAN AFFECT AN ALI. IF YOU DO NOT FOLLOW THE PROCEDURES, IT CAN INCREASE THE RISK OF A FUEL TANK IGNITION SOURCE.

B. Airworthiness Limitation Instructions (ALIs) for Fuel Tanks

- (1) Inspection tasks that are Airworthiness Limitation Instruction (ALI)s are defined and controlled by SFAR 88, and can be found in appendix C of the SCI document. These ALIs identify inspection tasks related to fuel tank ignition source prevention which must be done to maintain the design level of safety for the operational life of the aircraft. These ALIs are mandatory and cannot be changed or deleted without the approval of the FAA office that is responsible for the aircraft model Type Certificate, or applicable regulatory agency. Strict adherence to methods, techniques and practices as prescribed is required to make sure the ALI is complied with. Use of methods, techniques or practices not contained in these ALIs must be approved by the FAA office that is responsible for the aircraft model Type Certificate, or applicable regulatory agency.
- (2) ALIs found in the AMM are identified by a step, which includes the information that follows:
 - (a) The above (warning, caution or note) is an ALI procedure. For important information on ALIs, refer to Airworthiness Limitation Precautions (GENERAL - MAINTENANCE PRACTICES, 28-00-00/201).

3. **Equipment and Materials**

NOTE: Equivalent substitutes may be used instead of the following listed items:

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 201

Name and Number	Manufacturer
Alodine 1200 chemical coating DPM 1453-1	Commercially available

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Table 201 (Continued)

Name and Number	Manufacturer
Bonding Meter BCD M-1	BCD Electronics Ltd. Suite 200 Still Creek Rd. Burnaby, B.C., Canada V5C 6C6
Bonding Meter, Avtron T477W	Avtron Aerospace Headquarters 7900 East Pleasant Valley Road Cleveland, Ohio 44131-5529
Petrolatum VV-P-236 (DPM 675)	
Sealant PR-1422 B-2 (DPM 2292-2)	Products Research Co.
Solvent, hand wipe cleaner DPM 6410	Monsanto Company St. Louis, MO
473-13 Coating, Fuel Vapor Barrier (Brushing) (DPM 3430-1) or (Spraying) DPM 3430-2	Akzo Nobel Aerospace Coatings, Inc. Waukegan, IL; Treviso Italy
Explosion-proof lights	
Airline mask and respirator	
Coveralls, cotton	
Hair covers	
Tape, Masking (DMS 1297)	
Heater-blower exhaustor explosion proof	
Air mover explosion proof	
Assorted caps, covers, and plugs	
Shoe covers	
Air source 90-pound line pressure	
Pro Seal 501 adhesive with Pro Seal 501A Accelerator (DPM 2091)	

4. Fire and Safety Practices

NOTE: Repair of tank components that can be made from outside a tank does not require complete defueling and purging of the tank. Defueling is only required to the extent that the fuel level be below the component being repaired. This does not preclude observance of all other pertinent safety procedures.

WARNING: MAKE CERTAIN THAT WHEEL WELL SPOT LIGHTS ARE OFF BEFORE PERFORMING ANY WORK IN MAIN GEAR WHEELWELL/WING ROOT AREA.

WARNING: WHEN PERFORMING MAINTENANCE ON FUEL LINES EXTERNAL TO FUEL TANKS, MAKE CERTAIN THAT FIRE HANDLE IS PULLED, AND THAT BOTH FIRE HANDLE AND PNEUMATIC CROSSFEED LEVERS ARE TAGGED.

- A. Perform fuel system maintenance only in areas which permit free movement of fire fighting and other emergency equipment.
- B. Maintenance area selected shall not be upwind of any building in which fuel vapor may accumulate, or any open flame or spark producing equipment.
- C. Remove all spark producing items such as electrically powered tools, vacuum cleaners, and electronic test equipment from the airplane and vapor hazard area.
- D. Use only explosion proof lights and air driven tools in fuel tanks.

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E. Connect grounding cable to an approved ground and to each main landing gear.

CAUTION: PERSONNEL SHALL CONTACT STATIC DISCHARGE PLATE BEFORE EACH TANK ENTRY.

- F. Equip all maintenance stands with a personnel static discharge plate of copper zinc, or zinc coated metal firmly bolted or welded to the stand.
- G. Ground maintenance stands to the aircraft and to an approved ground.
- H. Ground air mover to aircraft and to same ground as aircraft.
- I. Support air mover to prevent exhaust from impinging on any object; static electrical charge buildup can result.
- J. Ensure that no high frequency radio transmitters shall be operated within 200 feet (60.96 m) and that no radar equipment shall be operated within 400 feet (121.92 m) of the aircraft during fuel system maintenance or while fuel tanks are open.

WARNING: FUEL VAPOR IN TANKS MAY BE TOO RICH TO IGNITE WHEN TANKS ARE INITIALLY OPENED; HOWEVER, VAPOR CONCENTRATION WILL PASS THROUGH AN EXPLOSIVE MIXTURE LEVEL DURING TANK VENTILATION. VAPOR MIXTURES TOO LEAN TO IGNITE, IF ALLOWED TO ACCUMULATE IN AN UNVENTILATED SPACE, CAN FORM AN EXPLOSIVE MIXTURE.

CAUTION: TANKS MUST BE PURGED TO SAFE ATMOSPHERIC CONDITION, BELOW LOWER EXPLOSIVE LIMITS, AS DETERMINED BY QUALIFIED PERSONNEL USING FUEL VAPOR MEASURING EQUIPMENT. CONSULT LOCAL AUTHORITY OR REGULATORY AGENCY.

- K. Air ventilate fuel wetted tanks until fuel vapor concentration is determined to be below lower explosive limit before initial entry. (Figure 202 or Figure 203)
- L. Never start or stop heater-blower exhaustor while air hose is inside tank.
- M. Use only clean lint-free cotton clothing with nonspark producing zippers or buttons when entering fuel tanks.
- N. Remove all sharp or metal objects from pockets before entering tanks.
- O. Do not permit personnel to enter fuel tanks until fuel vapor concentration is determined to be within firesafe range.
- P. Do not permit personnel to enter fuel tanks without fresh air breathing equipment until vapor concentration level is determined to be safe to breathe as determined by requirements of local authority or regulatory agency.

WARNING: PERSONNEL SHALL BE IMMEDIATELY EVACUATED FROM TANKS WHENEVER UNSAFE VAPOR LEVELS ARE DETECTED AND SHALL NOT REENTER UNTIL TANKS ARE AGAIN DETERMINED TO BE SAFE.

- Q. Periodic samplings of tank atmosphere must be taken while tank work is in progress to monitor vapor concentration Paragraph 4.K. and Paragraph 4.P.. Continuous ventilation using suction type air movers must be maintained while tank work is in progress.
- R. Prior to personnel entering fuel tanks, insert air mover suction hose into furthest corner of fuel tank and continue ventilation until requirements of Paragraph 4.K. are achieved.
- S. Always use properly maintained and inspected airline breathing equipment when entering tanks not known to be health safe.
- T. Explosion proof blower supplying breathing masks shall be positioned upwind of tank openings: Breathing air must not be permitted to be contaminated with fuel vapor.

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WARNING: UNDER NO CIRCUMSTANCE SHALL BLOWER ATTENDANT LEAVE BLOWER UNATTENDED, EXCEPT TO ASSIST PERSONNEL FROM TANK SHOULD BLOWER FAILURE OCCUR; AN UNINTERRUPTED AIR SUPPLY MUST BE MAINTAINED UNTIL PERSONNEL ARE CLEAR OF TANK AND MASKS ARE REMOVED.

- U. Station an attendant at blower to assure that fresh uncontaminated air is continuously supplied to mask.
- V. Station one man at tank entrance to observe personnel within tank for any indication of distress.
- W. Continue to provide adequate ventilation at all times during tank maintenance.

WARNING: USE ONLY FILTERED SHOP/COMPRESSED AIR TO OPERATE AIR-DRIVEN TOOLS WHEN YOU DO WORK IN A FUEL TANK, MAKE SURE YOU USE ONLY FILTERED SHOP/COMPRESSED AIR TO OPERATE AIR-DRIVEN TOOLS AND VACUUMS. DO NOT USE DRY NITROGEN OR OTHER INERT GASSES. THIS WILL HELP PREVENT DEATH AND INJURY TO PERSONS.

- X. Use filtered shop/compressed air to operate air-driven tools and vacuums while working inside fuel tanks.

5. Preventing Contamination of Tanks

WARNING: DO NOT WEAR NYLON OR OTHER SYNTHETIC COVERALLS AS THEY WILL GENERATE STATIC ELECTRICITY.

- A. Personnel should wear clean, lint-free, cotton coveralls, hair covers, and shoe covers when entering tanks. Cuffs of pants should be cleaned to remove any dirt or lint.

CAUTION: USE EXTREME CARE WHEN WORKING IN CENTER TANK TO PREVENT DAMAGE TO CROSSFEED LINE.

- B. All equipment brought into tanks should be free of dirt and dust. Thoroughly clean air ducts used for ventilation, internally and externally. All equipment used for ventilation or purging should be equipped with adequate filters. Exercise every precaution to prevent contamination of fuel tanks at all times while tanks are open. Close all tanks when work is not in progress to prevent entrance of dirt, dust, or other foreign matter. Vacuum clean all fuel tanks in which extensive work has been accomplished. Also vacuum open tanks known to be contaminated to remove all foreign material.
- C. When lines are disconnected and/or components are removed, provide suitable protection to prevent foreign material from entering lines or components. This can be done by using caps or covers. When electrical connectors are disconnected, provide caps or other suitable protection to prevent entry of fuel, moisture, or other foreign matter.
- D. Clean up spilled fuel immediately to prevent entry into adjacent areas of aircraft, which could result in future false fuel leak reports.

6. Preparing Fuel Tank for Entry

- A. Fuel system controls should be in the following positions before starting maintenance.

Table 202

Control	Location	Position
FUEL X FEED lever	Pedestal	OFF
Throttle levers	Pedestal	OFF
FUEL TANKS PUMP switches	Overhead panel	OFF
ENG START PUMP switch	Overhead panel	OFF

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Table 202 (Continued)

Control	Location	Position
APU MASTER switch	Overhead panel	OFF
BATT switch	Overhead panel	OFF
Fire control levers	Pilot's instrument panel	Normal
Tank fill valve switches	Refueling / defueling panel	CLOSED
POWER switch	Refueling / defueling panel	OFF.

B. Defuel tank in which work is to be accomplished . Drain residual fuel through sump drain valve. Drain fuel lines as required. (DEFUELING - SERVICING, PAGEBLOCK 12-11-01/301)

C. Close all fill valves. Tag fill valves as follows:

WARNING: DO NOT OPEN VALVE UNTIL MAINTENANCE IS COMPLETED. TANK DEFUELED.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

D. Open the applicable circuit breakers and install safety tags:

LEFT CONSOLE, GROUND SERVICE BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
		B1-21	WING & NACELLE FLOOD LIGHTS

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP
WJE 415-427, 429, 861-866, 868, 869, 871-874, 891			
U	41	B1-2	ENGINE IGNITION RIGHT
U	42	B1-1	ENGINE IGNITION LEFT
WJE ALL			
Z	38	B1-107	GROUND REFUEL
Z	39	B1-292	COCKPIT WHITE FLOOD LIGHTS

LOWER EPC, GENERATOR BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 412, 414; WJE 873, 874 POST MD80-30-071 OR POST MD80-30-078			
		B1-1219	LEFT OVERWING HEATER
WJE 412, 414; WJE 873, 874 POST MD80-30-078 OR POST MD80-30-071			
		B1-1218	RIGHT OVERWING HEATER

LOWER EPC, MISCELLANEOUS LEFT DC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 412, 414			
M	29	B1-1227	OVERWING HTR SYS CNTRL L

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WJE 412, 414 (Continued)

OVERHEAD BATT DIR BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 401-409, 411, 412, 414-427, 429, 861-866, 868, 869, 871-881, 883, 884, 886, 887, 891-893			
B	16	B1-106	GROUND REFUELING
WJE 410			
B	17	B1-106	GROUND REFUELING

OVERHEAD EMERGENCY DC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 401-409, 411, 412, 414-427, 429, 861-866, 868, 869, 871-881, 883, 884, 886, 887, 891-893			
A	15	B1-479	CAPT & F/O WHITE FLOOD LIGHTS
WJE 410			
A	16	B1-479	CAPT & F/O WHITE FLOOD LIGHTS
WJE 401-409, 411, 412, 414-427, 429, 861-866, 868, 869, 871-881, 883, 884, 886, 887, 891-893			
B	8	B10-7	VHF COMM-1
WJE 410			
B	9	B10-7	VHF COMM-1
WJE ALL			

UPPER EPC, AIR CONDITIONING - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	12	B1-655	CARGO COMPARTMENT HEATER PHASE A
J	13	B1-656	CARGO COMPARTMENT HEATER PHASE B
J	14	B1-657	CARGO COMPARTMENT HEATER PHASE C

UPPER EPC, ENGINE - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
K	26	B1-424	LEFT ENGINE IGNITION

UPPER EPC, ENGINE - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
L	26	B1-425	RIGHT ENGINE IGNITION

UPPER EPC, FUEL

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	17	B1-822	FUEL QUANTITY POWER TRANSFER

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

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UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, LEFT RADIO DC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 401-404, 406, 412, 414, 417, 419, 421, 423, 865, 869, 871, 872, 875-879, 881, 883			
G	16	B10-176	VHF COMM-3

WJE ALL

UPPER EPC, LIGHTS - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
K	10	B1-727	STROBE
K	11	B1-98	LOWER ANTI-COLLISION
K	13	B1-14	LEFT WING LANDING LIGHT CONTROL

UPPER EPC, LIGHTS - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
L	11	B1-99	UPPER ANTI-COLLISION
L	13	B1-16	RIGHT WING LANDING LIGHT CONTROL

UPPER EPC, RIGHT RADIO AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 405-411, 416, 420, 422, 424-427, 429, 861, 862, 868, 873, 874, 880, 881, 883, 884, 891-893			
F	4	B10-294	WEATHER RADAR IND

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F	5	B10-295	WEATHER RADAR XCVR
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UPPER EPC, RIGHT RADIO DC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
G	5	B10-44	VHF COMM-2

WARNING: DO NOT CLOSE THIS CIRCUIT BREAKER. THIS CIRCUIT BREAKER MUST REMAIN OPEN UNTIL FUEL TANK MAINTENANCE IS COMPLETED.

E. Disconnect battery and tag as follows:

WARNING: FUEL TANK MAINTENANCE IN PROGRESS, DO NOT CONNECT.

F. Tag external power receptacle as follows:

WARNING: FUEL TANK MAINTENANCE IN PROGRESS, DO NOT CONNECT EXTERNAL POWER.

G. Remove tank access door(s) and check for presence of undrained fuel. Remove undrained fuel with suction hose or sponge.

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H. Start heater-blower exhauster, insert air hose, and continue purging until desired vapor concentration is achieved. Maximum permissible temperature is 90°C (194°F).

7. Check Seals, Gaskets, O-rings, and Gask-O-Seals

WARNING: WHITE PETROLATUM IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN WHITE PETROLATUM IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT BREATHE THE MIST.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- A. Check condition and replace, if necessary, seals, gaskets, O-rings, and Gask-O-Seals, removed during maintenance. Lubricate, as necessary, with Petrolatum (VV-P-236), or equivalent, to prevent cutting or tearing O-rings or seals during assembly.
- B. Seals, gaskets, O-rings, and Gask-O-Seals are shown on Figure 204, with part numbers and component locations.

8. Prepare Fuel Tank for Exit

A. Clean the Fuel Tank

WARNING: REMOVE ALL MAINTENANCE ITEMS, AND UNWANTED MATERIAL FROM THE FUEL TANK BEFORE YOU CLOSE IT. EQUIPMENT, TOOLS, LOOSE PARTS, OR CONTAMINATION CAN CAUSE DAMAGE TO THE FUEL SYSTEM. UNWANTED FLAMMABLE MATERIALS ARE POSSIBLE IGNITION SOURCES. AN IGNITION SOURCE IN A FUEL TANK CAN CAUSE A FIRE OR EXPLOSION.

- (1) Each time you go into a fuel tank you must examine the fuel tank very carefully before you close it.
- (2) Remove all equipment used to perform maintenance (for example, tools, solvent, containers, plugs, brushes, and other equipment).

NOTE: Keep a written record of all the tools, equipment, material, and persons when they go into and go out of the fuel tank. Before you close the fuel tank, make sure the record shows there are no unwanted items in the tank.

- (3) Use a cotton wiper to clean any unwanted solvents, liquids or grease.

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WARNING: GROUND ALL OF THE EQUIPMENT AND HOSES THAT YOU USE IN THE FUEL TANK. IF YOU DO NOT GROUND ALL OF THE EQUIPMENT AND HOSES, AN EXPLOSION CAN OCCUR. INJURIES TO PERSONNEL AND DAMAGE TO EQUIPMENT CAN OCCUR.

WARNING: ONLY USE SHOP AIR OR BOTTLED AIR AS THE SOURCE OF GAS TO POWER AIR DRIVEN EQUIPMENT. GASES OTHER THAN SHOP OR BOTTLED AIR CAN REMOVE OXYGEN FROM A CLOSED AREA. IF YOU GO INTO A CLOSED AREA WITHOUT ENOUGH OXYGEN , YOU CAN BECOME UNCONSCIOUS OR IT CAN KILL YOU.

- (4) Only use shop air or bottled air as a gas source for air-driven tools. Do not use nitrogen, oxygen, carbon dioxide (CO₂) or any other non-air source of gas.
- (5) Use an air driven vacuum to remove unwanted particles and pieces of used sealant.

B. Inspect Fuel Tank

- (1) Examine all repairs, sealants and finishes to make sure they are correct and complete.

WARNING: REMOVE ALL CONTAMINATION, UNWANTED PARTICLES, AND MATERIALS FROM THE FUEL TANK. UNWANTED MATERIALS CAN COLLECT IN THE FUEL TANK. THIS CAN CAUSE A BLOCKAGE, OR CAUSE THE SYSTEM TO OPERATE INCORRECTLY. MATERIALS CAN BE AN IGNITION SOURCE. THIS CAN CAUSE A FIRE OR EXPLOSION.

- (2) Make sure these components are free from unwanted material or objects:
 - (a) Fuel and water drain holes and paths
 - (b) FQIS components
 - (c) AIRPLANES WITH A HYDROMECHANICAL FUEL SCAVENGE SYSTEM:
 - 1) Fuel scavenge system components.
- (3) Check maintenance area for any damage to in-tank components, bonding jumpers or structure.
 - (a) Repair any problems that you find.
- (4) Do a final inspection of the fuel tank to make sure you removed all unwanted materials and equipment.

NOTE: Make sure the necessary approved persons do an inspection of the tank before you close it.

- (5) Do a check of the record to make sure no unwanted items remain in tank.

9. Sealing of Access Doors and Fuel Probe Cover Plates

CAUTION: DO NOT APPLY LUBRICANT TO SCREWS OR INNER SURFACE OF ACCESS DOOR.

- A. Sealing fuel tank access doors and fuel probe cover plates should be accomplished in accordance with following procedures. (Figure 205 or Figure 206) and (Figure 207)

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CAUTION: FOR FUEL TANK ACCESS DOORS, THE CONDUCTIVE AND NON CONDUCTIVE PATH DESIGN WHICH INCLUDES SPECIFIC SURFACE TREATMENTS, SEALANTS, SEALING PROCEDURES, SEALS, O-RINGS, FASTENER TYPES, MATERIALS, CONDUCTIVE RUBSTRIPS, INTERFERENCE FIT FASTENERS, AND COATINGS MUST BE MAINTAINED PER OEM DESIGN DATA WHICH INCLUDES BOEING DESIGN DRAWINGS OR THE BOEING SRM OR THE BOEING AMM OR BOEING APPROVED REPAIRS OR ANY COMBINATION OF THESE.

- (1) The above caution is a CDCCL procedure. For important information on CDCCLs, refer to Airworthiness Limitation Precautions (GENERAL - MAINTENANCE PRACTICES, 28-00-00/201).

WARNING: WHITE PETROLATUM IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN WHITE PETROLATUM IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT BREATHE THE MIST.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (2) LUBRICATION

Apply coat of petrolatum anti-seize lubricant, VV-P-236, to mechanical seal on access door.

WARNING: LOW VISCOSITY POLYSULFIDE SEALANT IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOW VISCOSITY POLYSULFIDE SEALANT IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW VISCOSITY POLYSULFIDE SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

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(WARNING PRECEDES)

CAUTION: DO NOT ALLOW SEALANT TO PENETRATE DOME NUTS. SEALANT IN THE DOME NUTS WILL PERMIT THE DOME NUTS TO BE FORCED LOOSE AND PERMIT FUEL TO LEAK.

- (3) Install and torque the access panel screws as follows: (Figure 207)
 - (a) Put the access door in the fuel tank opening and start all screws in channel nuts a minimum of two rotations.
 - (b) Apply PR-1422, Class B (or equivalent) sealant to mating counter sunk area of each screw. Ensure that sealant does not get on screw threads
 - (c) Torque the screws alternately from side to side in the sequence shown to minimum torque as follows:
 - 1) For 1/4 inch screws, torque 80 in-lb (9 N·m) to 100 in-lb (11 N·m).
 - 2) For 5/16 inch screws, torque 140 in-lb (16 N·m) to 160 in-lb (18 N·m).
 - (d) Torque screws again to applicable torque.
 - (e) After 5 minutes for sealant to extrude from under screw head and torque the screws again.
- (4) Install the masking tape around the inner and outer circumference of the area between the fuel tank access door and the fuel tank skin.

WARNING: LOW VISCOSITY POLYSULFIDE SEALANT IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOW VISCOSITY POLYSULFIDE SEALANT IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW VISCOSITY POLYSULFIDE SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: SEALANT REMOVER SOLVENT IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN SEALANT REMOVER SOLVENT IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET SEALANT REMOVER SOLVENT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

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(WARNING PRECEDES)

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THESE HAZARDOUS AGENTS.

- (5) Seal butt gap between access door and wing skin with PR-1422, Class B, (or equivalent) sealant. Fill and fair sealant flush to low with wing skin and access door. Remove excess sealant using clean cotton cloth dampened with solvent (hand wipe cleaner, DPM 6410).

- (a) Remove and discard masking tape.

B. Center Tank Forward Secondary Vapor Barrier Seal Installation. (Figure 201)

NOTE: Following procedure is applicable for fuel tank forward access doors located below passenger compartment floor.

WARNING: SEALANT REMOVER SOLVENT IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN SEALANT REMOVER SOLVENT IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET SEALANT REMOVER SOLVENT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THESE HAZARDOUS AGENTS.

- (1) Using solvent (hand wipe cleaner, DPM 6410) and plastic scraper, remove old seal.
- (2) Make certain that faying surfaces of tank bulkhead, access door, and seal are dry and free of dust, dirt, grease, oil, fuel, or other foreign matter.

WARNING: SILICONE PRIMER IS AN AGENT THAT IS FLAMMABLE, POISONOUS, AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS LISTED BELOW WHEN SILICONE PRIMER IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET SILICONE PRIMER IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

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TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THESE HAZARDOUS AGENTS.

- (3) If bare metal is exhibited, apply thin brush coat of Alodine 1200 (chemical coating DPM 1453-1) to faying surfaces of tank bulkhead and access door. Allow to dry for approximately 30 minutes. (Figure 205 or Figure 206)
 - (a) Mix P/S 501 base and P/S 501A accelerator adhesive, 100 parts by weight of base with 30 parts by weight of the accelerator.

WARNING: ADHESIVE IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN ADHESIVE IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET ADHESIVE IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (4) Apply a thin uniform layer of the mixed adhesive to the vapor barrier seal surface.
- (5) Center barrier seal over access door and press in place.
- (6) Using wood or plastic squeegee, extrude all air bubbles and excess adhesive from between faying surfaces of tank bulkhead/access door and seal.

WARNING: SEALANT REMOVER SOLVENT IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN SEALANT REMOVER SOLVENT IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET SEALANT REMOVER SOLVENT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THESE HAZARDOUS AGENTS.

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(WARNING PRECEDES)

CAUTION: USE ONLY A CLEAN COTTON CLOTH. DO NOT PUT THE CLOTH INTO THE CLEANER CONTAINER. DO NOT LET CONTAMINATION FROM A DIRTY CLOTH GO BACK INTO THE CLEANER CONTAINER.

- (7) Using clean cotton wiper and solvent (hand wipe cleaner, DPM 6410), remove all excess adhesive extruded from between seal and bulkhead/access door and from area around seal.

NOTE: After application of the secondary vapor barrier, allow 1 hour for the adhesive to set (flash off) before the primary vapor barrier is applied.

- (8) Perform the primary vapor seal coating: (FUEL TANKS - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-01/201 paragraph 12.k)

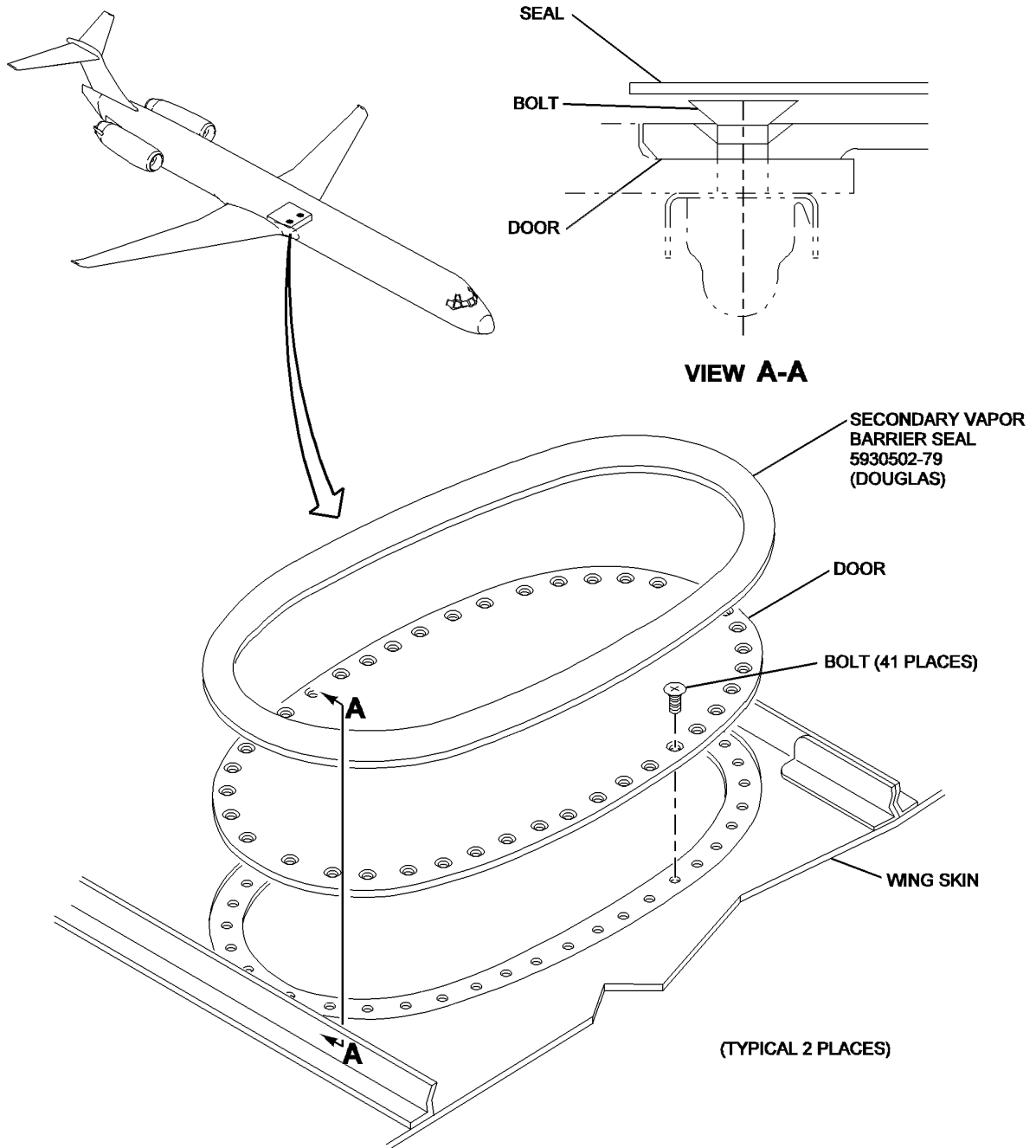
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**Center Tank Forward Secondary Vapor Barrier Seal Installation
Figure 201/28-00-00-990-836**

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10. Fuel Tank Piping Electrical Bonding

A. Do electrical bonding of fuel tank piping.

- (1) Prior to removing band clamps, or support clamps, mark location of clamps on fuel tank piping.

NOTE: Band clamps must be installed in same position as removed. This permits clearance between band clamp and shroud or coupling.

- (2) Prepare mating surfaces of fuel tank piping surface(s) and clamp(s). (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)

CAUTION: BAND CLAMPS AND SUPPORT CLAMPS SHALL BE INSTALLED SO AS NOT TO CRUSH OR DAMAGE FUEL TANK PIPING.

CAUTION: BONDING JUMPERS SHALL BE INSTALLED SO THAT THERE IS NO MECHANICAL INTERFERENCE WITH OPERATION OF ADJACENT MOVABLE COMPONENTS.

- (3) Install band clamp on fuel piping if required. (Figure 208)
- (4) Install support clamp on fuel piping. Make certain aluminum foil wrap is adhered on base, and not damaged. (Figure 209)
- (5) Do electrical bond check of the fuel tank piping surface(s) and Clamp(s). (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)

11. Inspection/Check Grounded-Base Fuel System Piping Clamps

A. Check Grounded-Base Fuel System Piping Clamps

NOTE: The grounded-base clamp is used to secure the component (fuel system piping) in position and provide an electrostatic bond (ground path) from the fuel system component to the underlying clip, bracket or structure.

- (1) Check grounded-base clamp prior to installation as follows:

NOTE: It is not recommended to recondition or overhaul a grounded-base clamp.

- (a) If clamp is damaged (cracked, exhibiting cold rolling at fasteners, deformed, etc.), or bonding strip is debonded or exhibiting delamination from clamp base, clamp base should be rejected as unserviceable.
- (b) If clamp strap internal surface exhibits wear (flat lobes or feathered edges), or strap is damaged (cracked, exhibiting cold rolling at fasteners, deformed, etc.) clamp strap should be rejected as unserviceable.
- (c) If black substance (aluminum oxide) is present on clamp, clean clamp with clean rough cloth.
- (d) Measure inner diameter of clamp. (Figure 210)

B. Check Installation of Grounded-Base Fuel System Piping Clamps

- (1) Check installed grounded-base clamp as follows:

- (a) Proper fitting clamp should have aluminum foil strip held within width of base so that strip will not protrude. Clamp base and strap should support pipe sufficiently, but not tightly, against base so as to provide bond path between component and underlying structure.
- (b) If aluminum foil strip around base is damaged (cracked, protruding, torn, etc.) or black substance is observed to be extruding from between clamp and component or underlying structure, serviceability of clamp should be further evaluated by removing clamp.
- (c) If clamp base is damaged (cracked, exhibiting cold rolling at fasteners, deformed, etc.), and bonding strip exhibits conditions as stated in Paragraph 11.A.(1)(a), clamp base should be rejected as unserviceable.

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- (d) If clamp strap can be moved axially on pipe by applying slight finger pressure in one direction or other to cause strap to slide on pipe, or strap is damaged (cracked, exhibiting cold rolling at fasteners, deformed, etc.), clamp should be rejected as unserviceable.
- (e) Minor hardware (screws, washers, nuts, clipnuts, nutplates, etc.) exhibiting corrosion should be replaced.

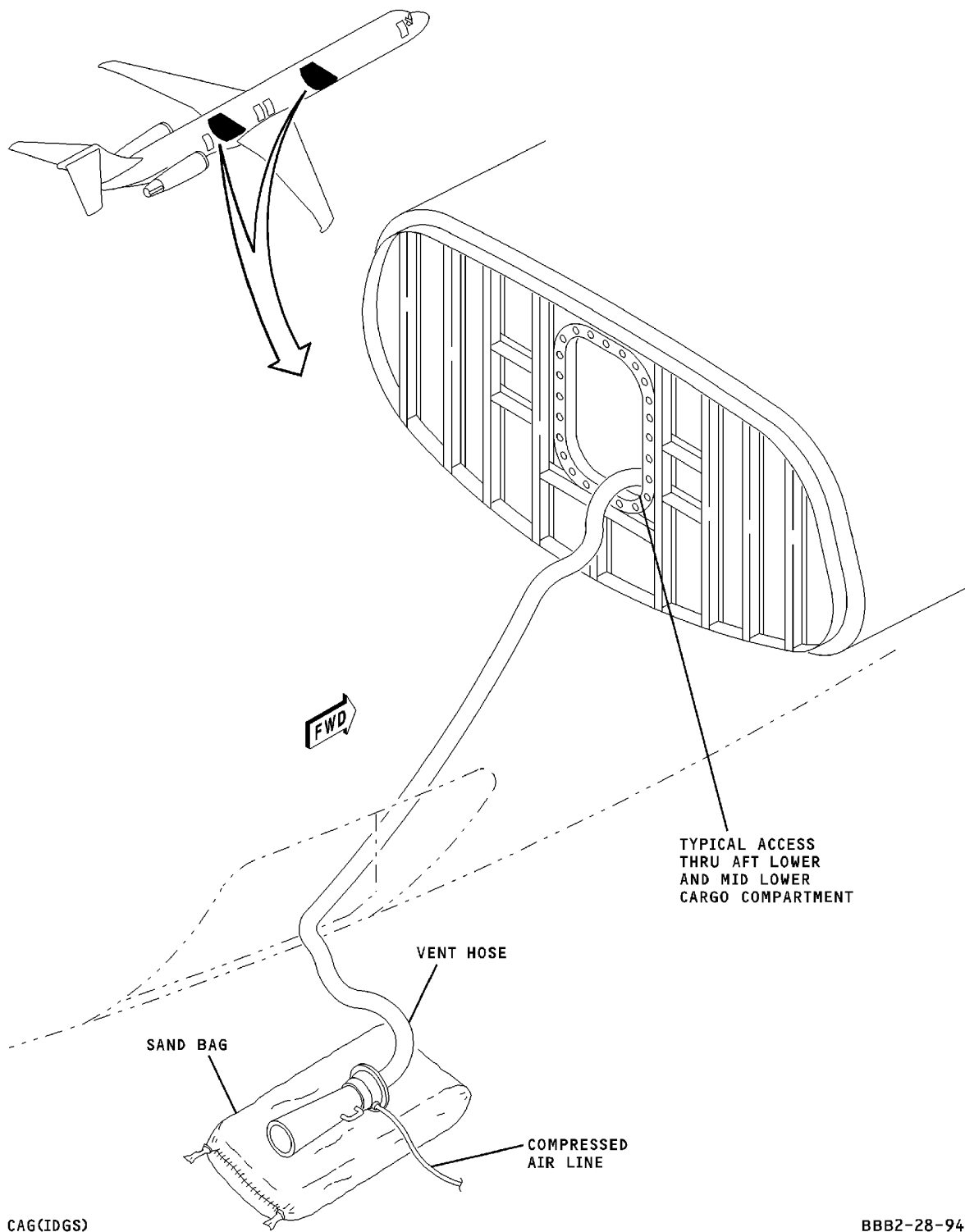
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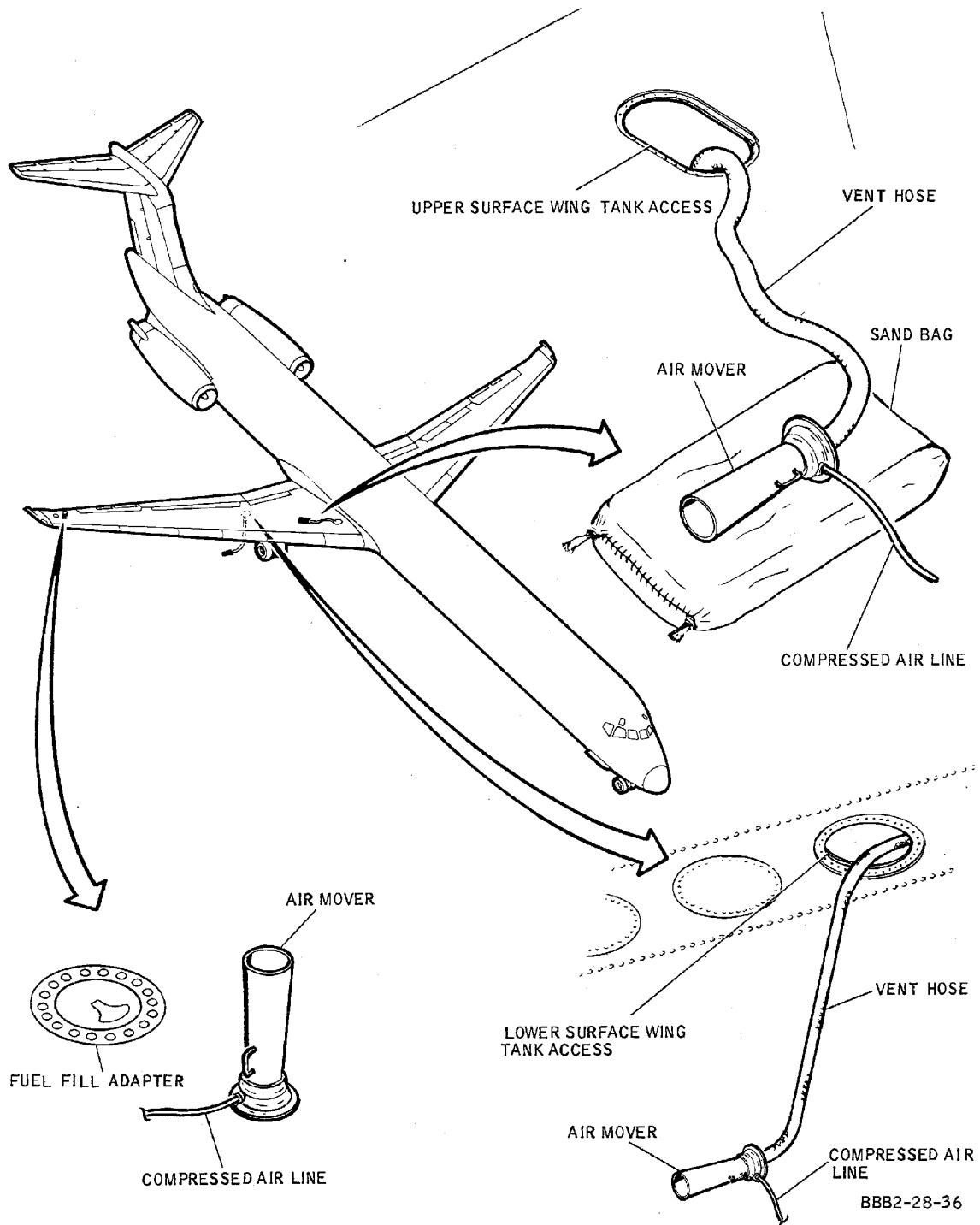


**Fuselage Fuel Tanks Venting
Figure 202/28-00-00-990-821**

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WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

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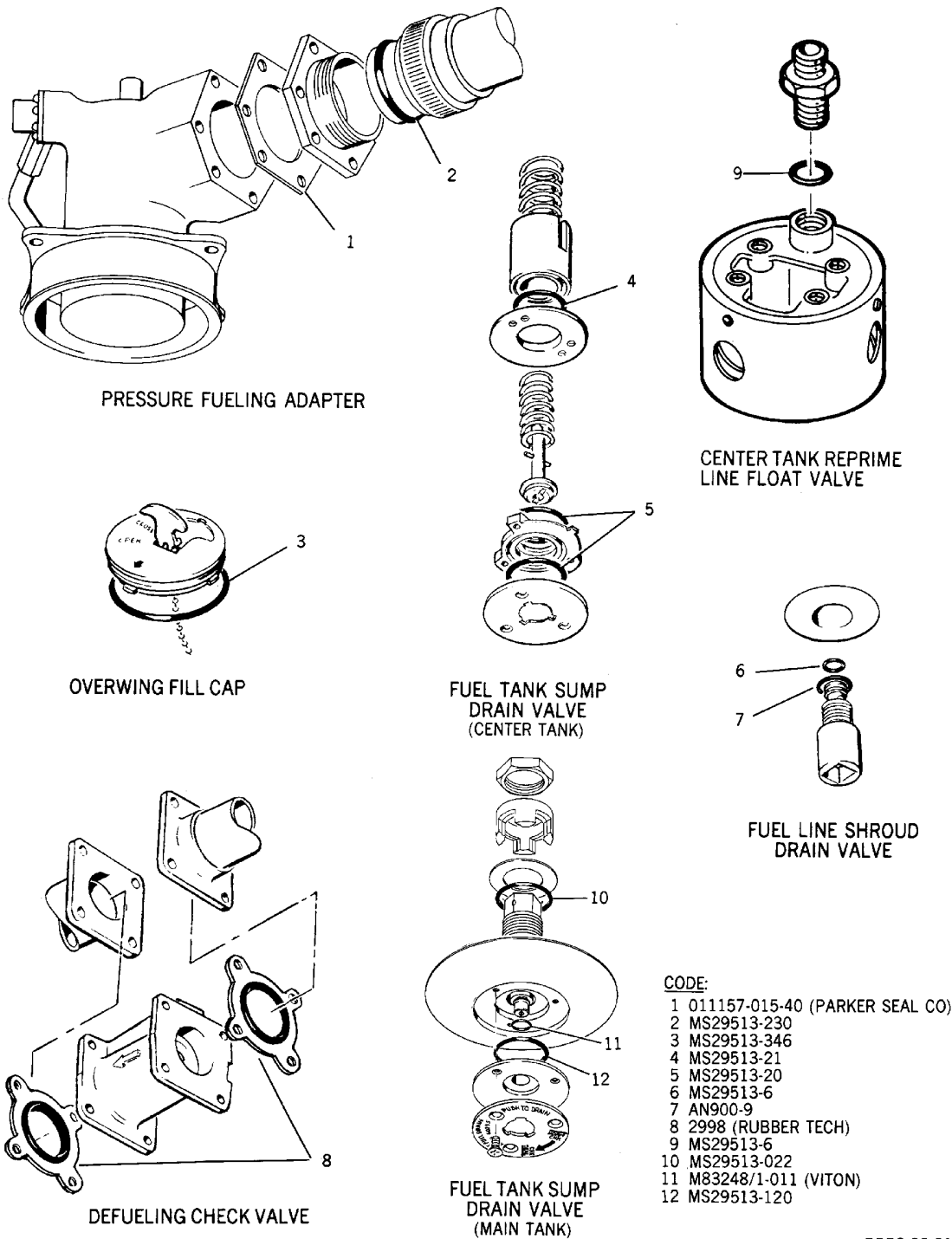
Integral Fuel Tank Venting
Figure 203/28-00-00-990-823

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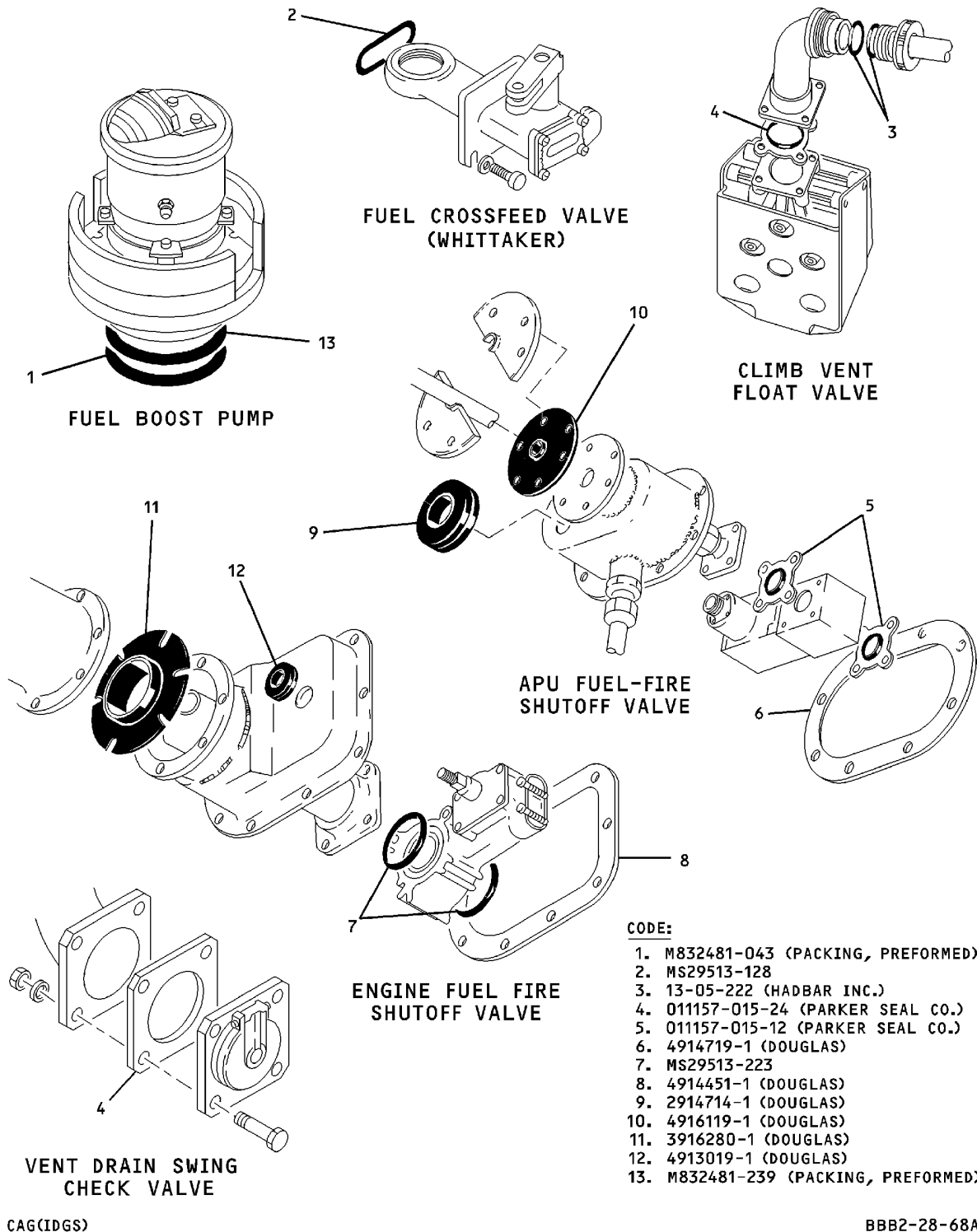
**O-ring, Gasket, and Seal Installation
Figure 204/28-00-00-990-824 (Sheet 1 of 9)**

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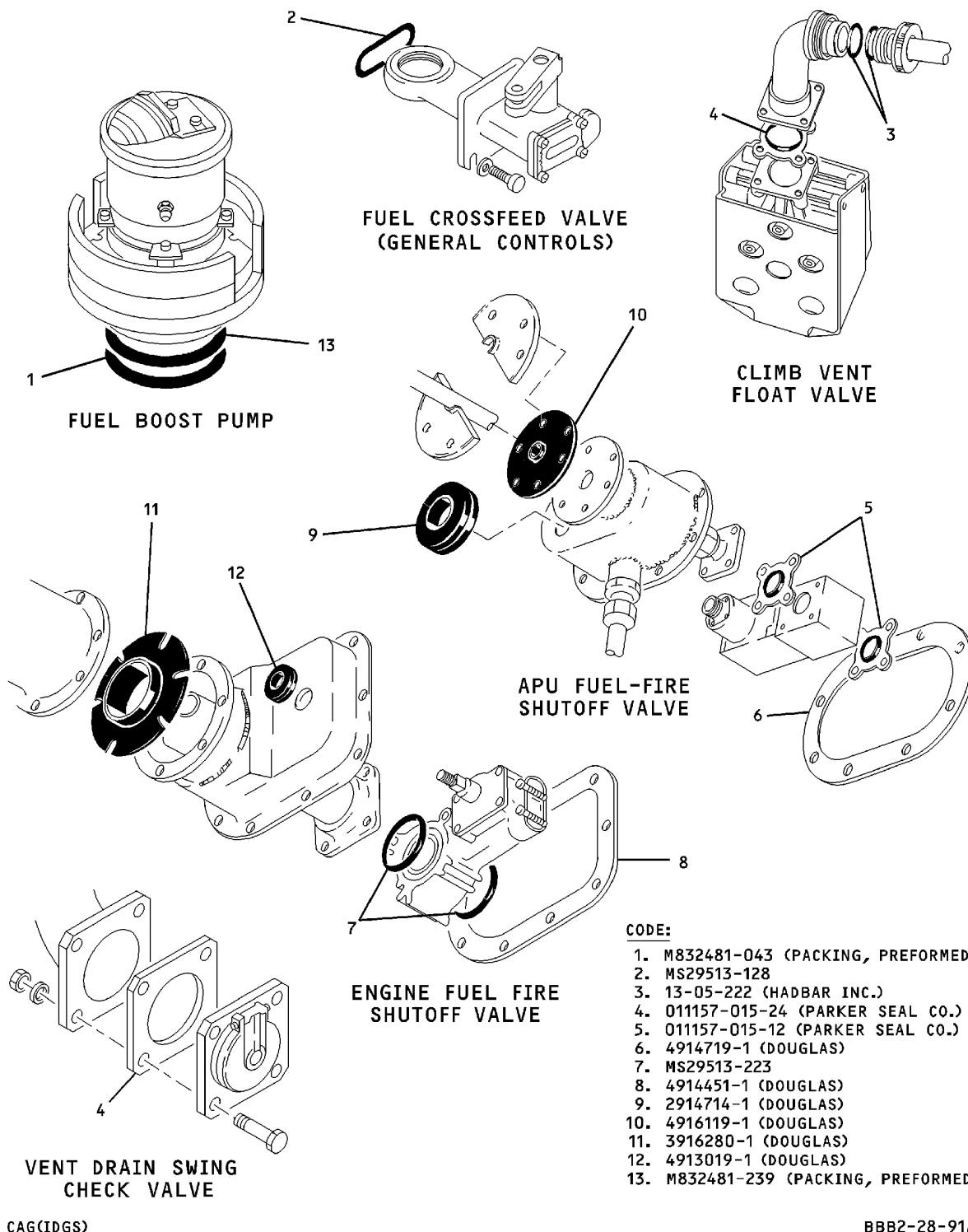
**O-ring, Gasket, and Seal Installation
Figure 204/28-00-00-990-824 (Sheet 2 of 9)**

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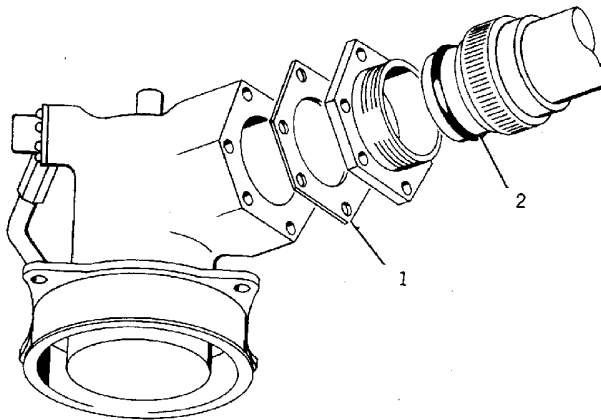
**O-ring, Gasket, and Seal Installation
Figure 204/28-00-00-990-824 (Sheet 3 of 9)**

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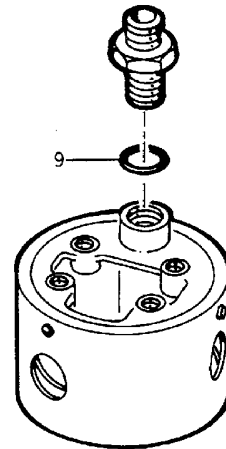
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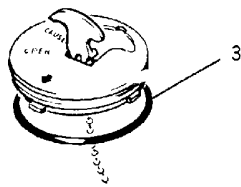
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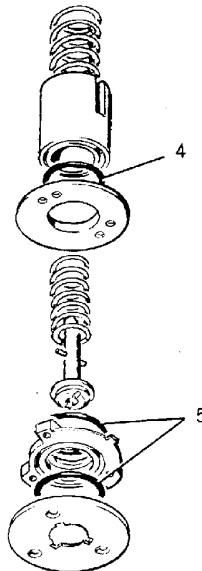
PRESSURE FUELING ADAPTER



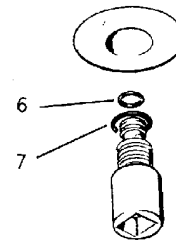
**CENTER TANK REPRIME
LINE FLOAT VALVE**



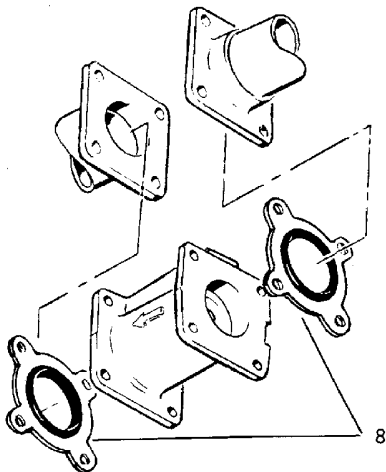
OVERWING FILL CAP



**FUEL TANK SUMP
DRAIN VALVE**



**FUEL LINE SHROUD
DRAIN VALVE**



DEFUELING CHECK VALVE

CODE:

- 1 011157-015-40 (PARKER SEAL CO)
- 2 MS29513-230
- 3 MS29513-346
- 4 MS29513-21
- 5 MS29513-20
- 6 MS29513-6
- 7 AN900-9
- 8 2998 (RUBBER TECK)
- 9 MS29512-6

BBB2-28-33B

**O-ring, Gasket, and Seal Installation
Figure 204/28-00-00-990-824 (Sheet 4 of 9)**

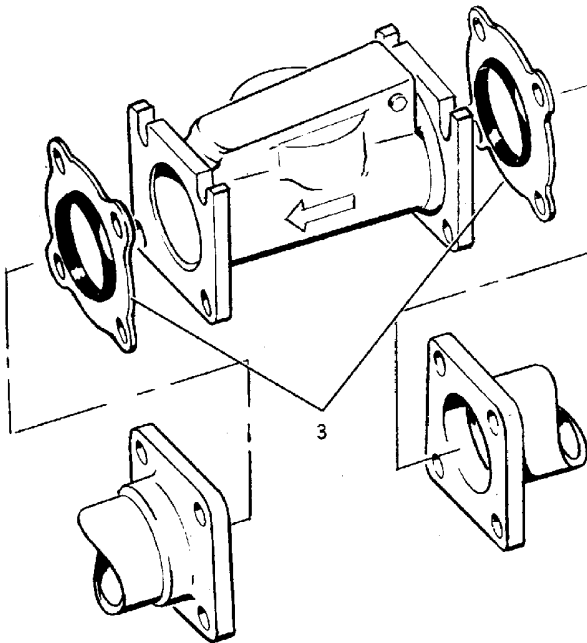
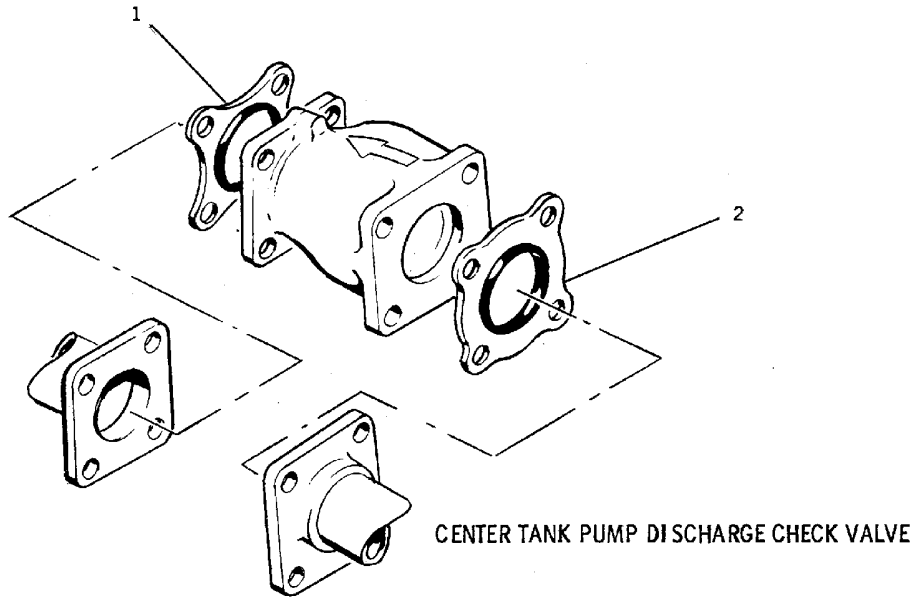
EFFECTIVITY
WJE 875-879

28-00-00

TP-80MM-WJE

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CENTER TANK PUMP SUCTION CHECK VALVE

- CODE:**
1 011157-015-24 (PARKER SEAL CO.)
2 2998 (RUBBER TECK)
3 011157-015-32 (PARKER SEAL CO.)

BBB2-28-35

**O-ring, Gasket, and Seal Installation
Figure 204/28-00-00-990-824 (Sheet 5 of 9)**

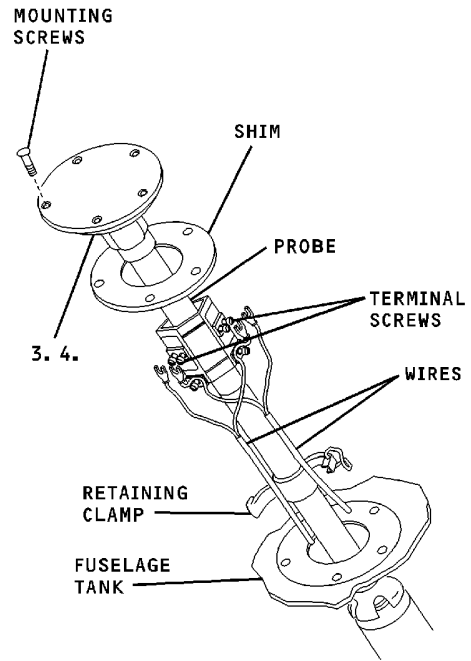
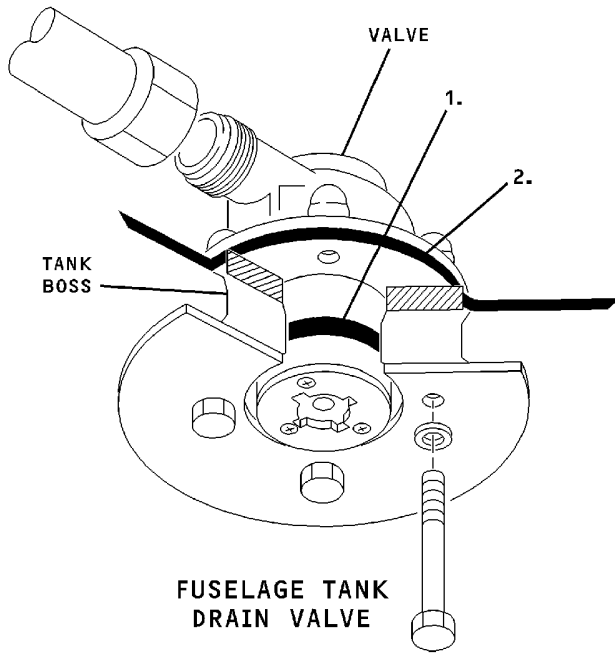
EFFECTIVITY
WJE ALL

TP-80MM-WJE

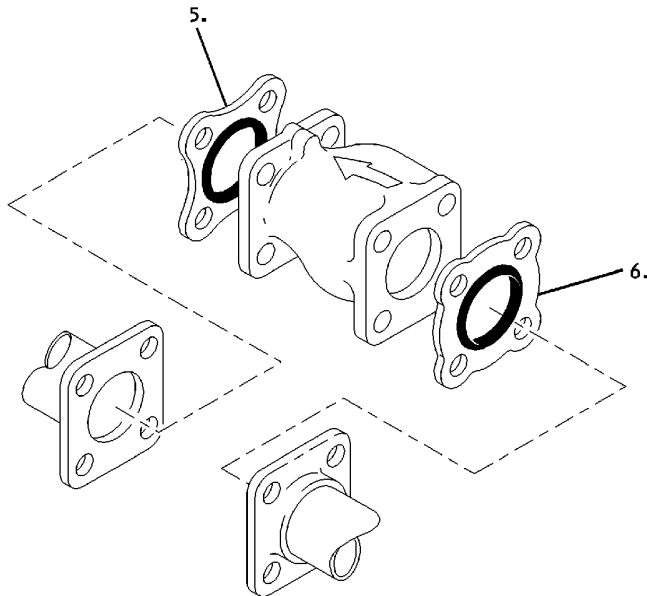
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**TYPICAL FUSELAGE TANK
PROBE INSTALLATION**



**FUSELAGE TANK PUMP
DISCHARGE CHECK VALVE**

CODE:

- 1. MS29513-223
- 2. MS29513-240
- 3. MS29513-244
- 4. 4892944-115 (DOUGLAS)
- 5. 011157-015-24 (PARKER SEAL CO)
- 6. 2998 (RUBBER TECH)

CAG(IDGS)

BBB2-28-265

**O-ring, Gasket, and Seal Installation
Figure 204/28-00-00-990-824 (Sheet 6 of 9)**

EFFECTIVITY

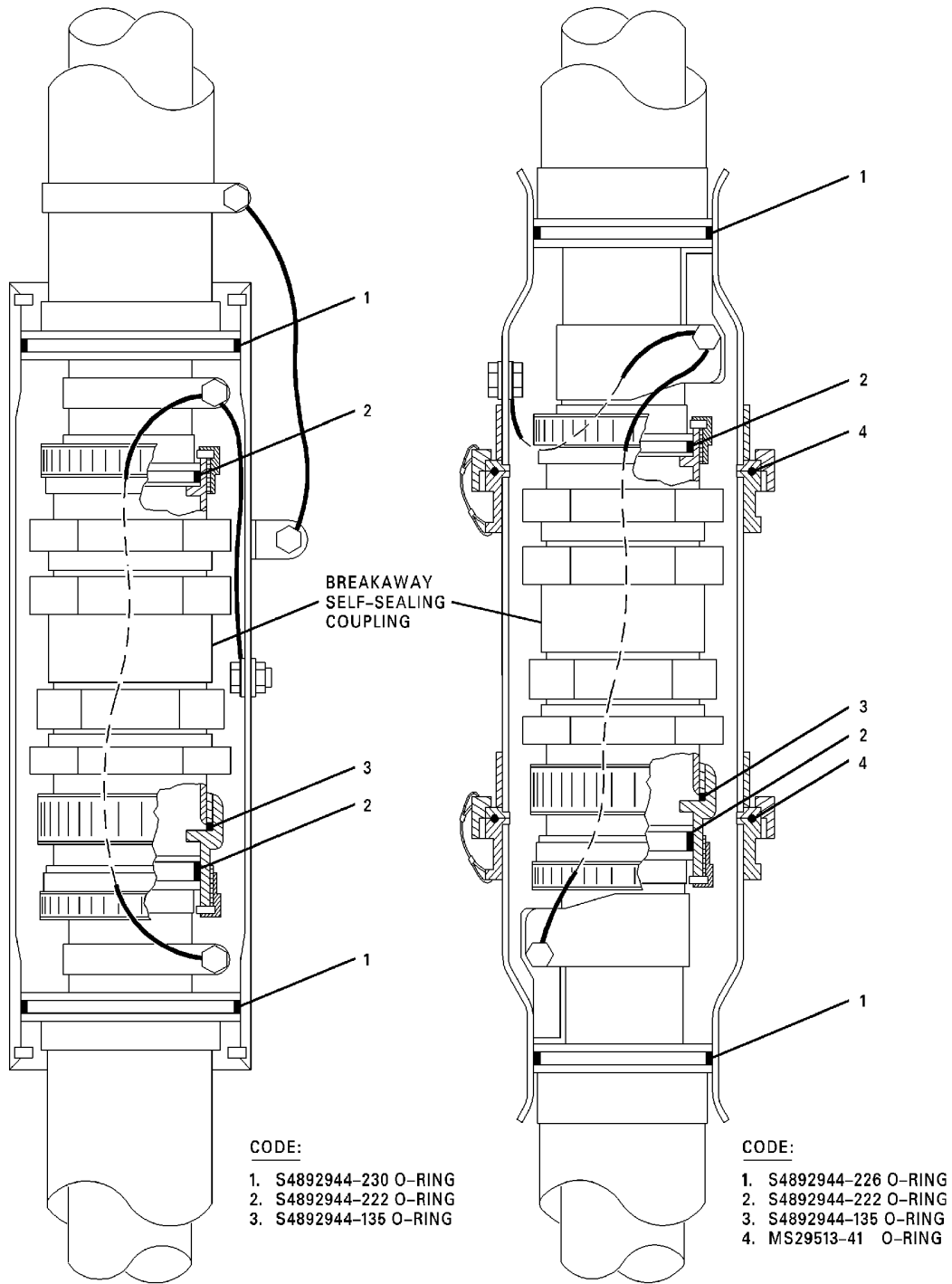
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

TP-80MM-WJE

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CAG(IGDS) **FWD FUSELAGE SHROUD
TANK INTERCONNECT**

**AFT FUSELAGE SHROUD
TANK INTERCONNECT**

BBB2-28-95A

**O-ring, Gasket, and Seal Installation
Figure 204/28-00-00-990-824 (Sheet 7 of 9)**

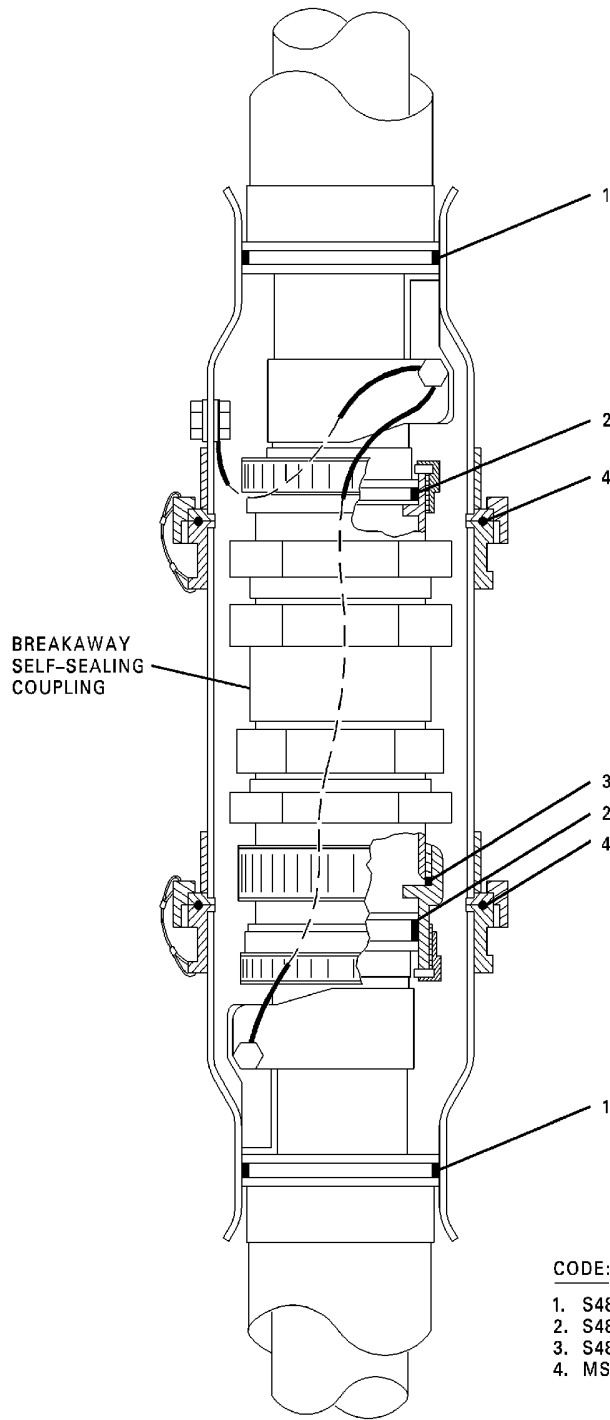
EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

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CODE:

- 1. S4892944-226 O-RING
- 2. S4892944-222 O-RING
- 3. S4892944-135 O-RING
- 4. MS29513-41 O-RING

CAG(IGDS)

**AFT FUSELAGE SHROUD
TANK INTERCONNECT**

BBB2-28-266

**O-ring, Gasket, and Seal Installation
Figure 204/28-00-00-990-824 (Sheet 8 of 9)**

EFFECTIVITY

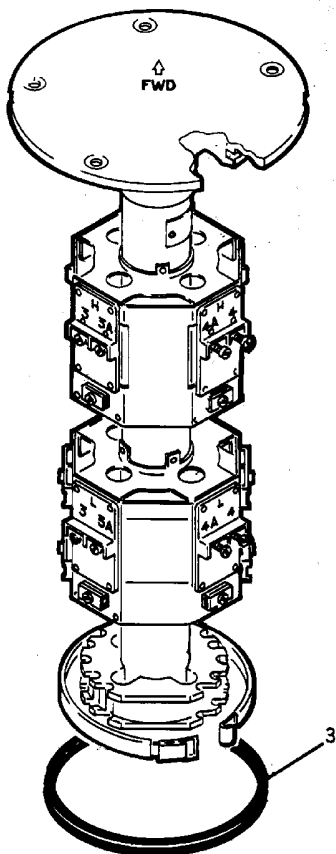
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

TP-80MM-WJE

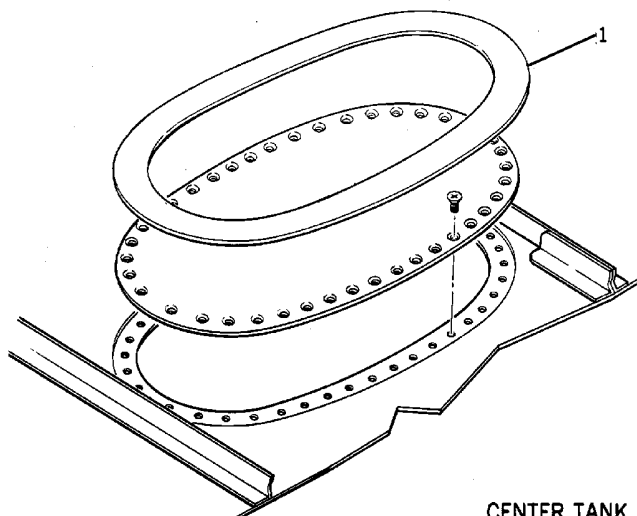
28-00-00

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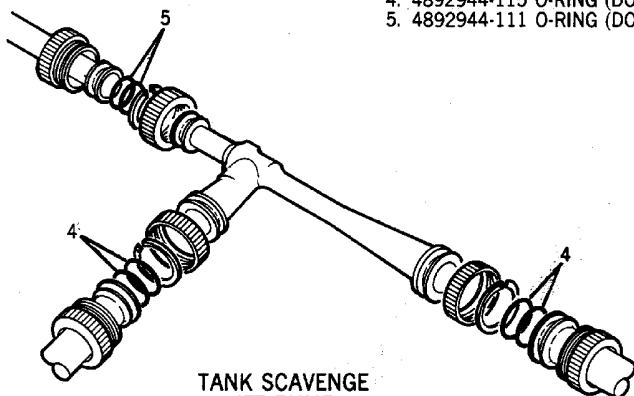


**FAULT ISOLATION
JUNCTION**

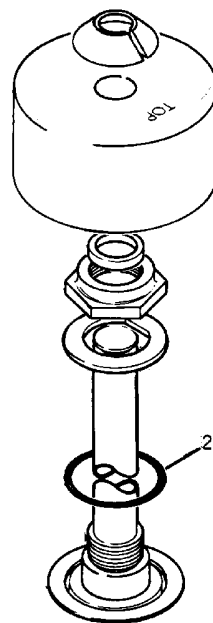


**CENTER TANK
VAPOR BARRIER SEAL**

1. 5930502-79 SEAL (DOUGLAS)
2. S-142C557-7 O-RING (PARKER SEAL CO.)
3. MS29513-244 O-RING
4. 4892944-115 O-RING (DOUGLAS)
5. 4892944-111 O-RING (DOUGLAS)



**TANK SCAVENGE
JET PUMP**



**MAGNETIC DRIPLESS
FUEL MEASURING STICK**

BBB2-28-61B

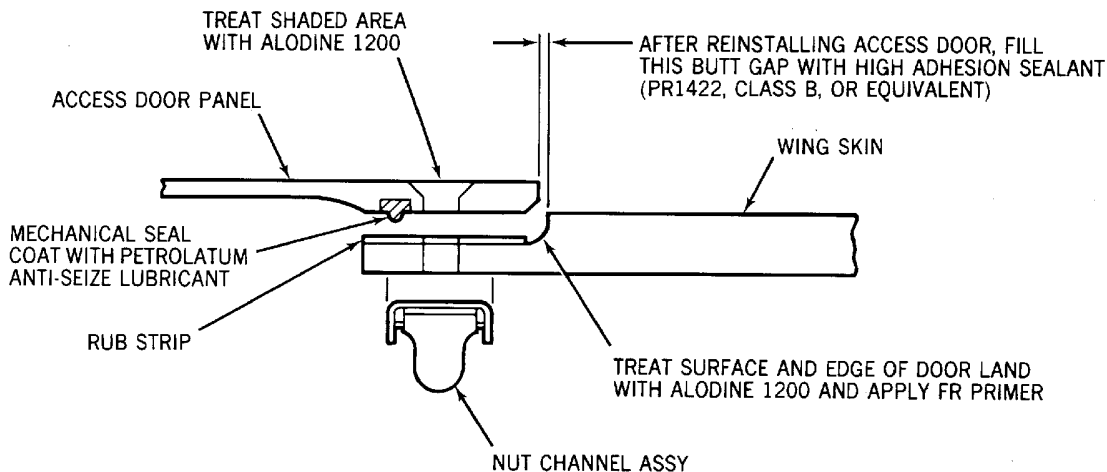
**O-ring, Gasket, and Seal Installation
Figure 204/28-00-00-990-824 (Sheet 9 of 9)**

EFFECTIVITY
WJE ALL

TP-80MM-WJE

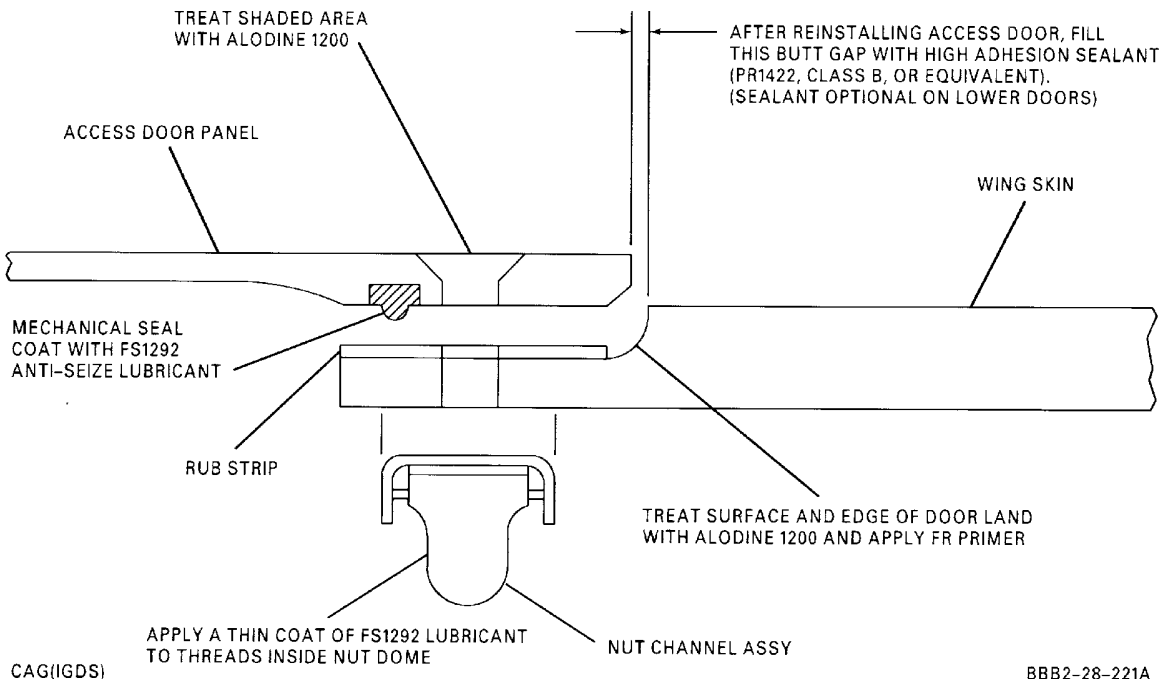
28-00-00

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BBB2-28-85

**Integral Fuel Tank Access Door Doublers Corrosion Preventive Coating
Figure 205/28-00-00-990-825**



CAG(IGDS)

BBB2-28-221A

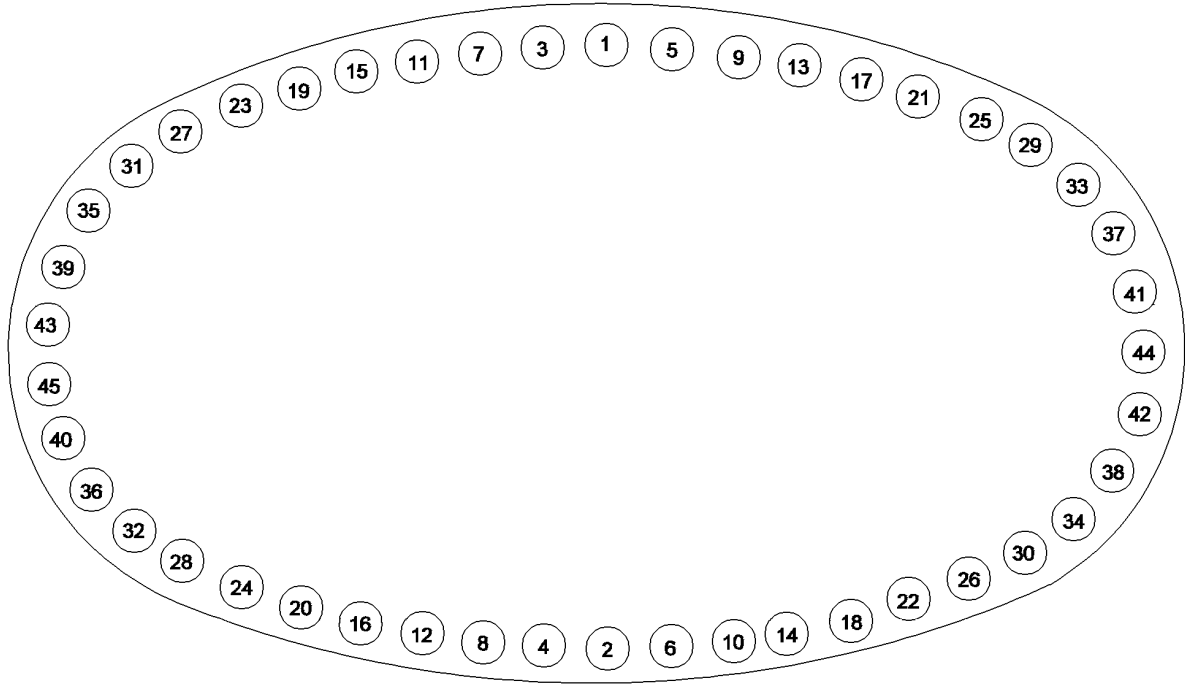
**Integral Fuel Tank Access Door Doublers Corrosion Preventive Coating
Figure 206/28-00-00-990-826**

EFFECTIVITY
WJE ALL

28-00-00

TP-80MM-WJE

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BBB2-28-868
S000657629V2

Torquing Sequence - Access Door
Figure 207/28-00-00-990-827

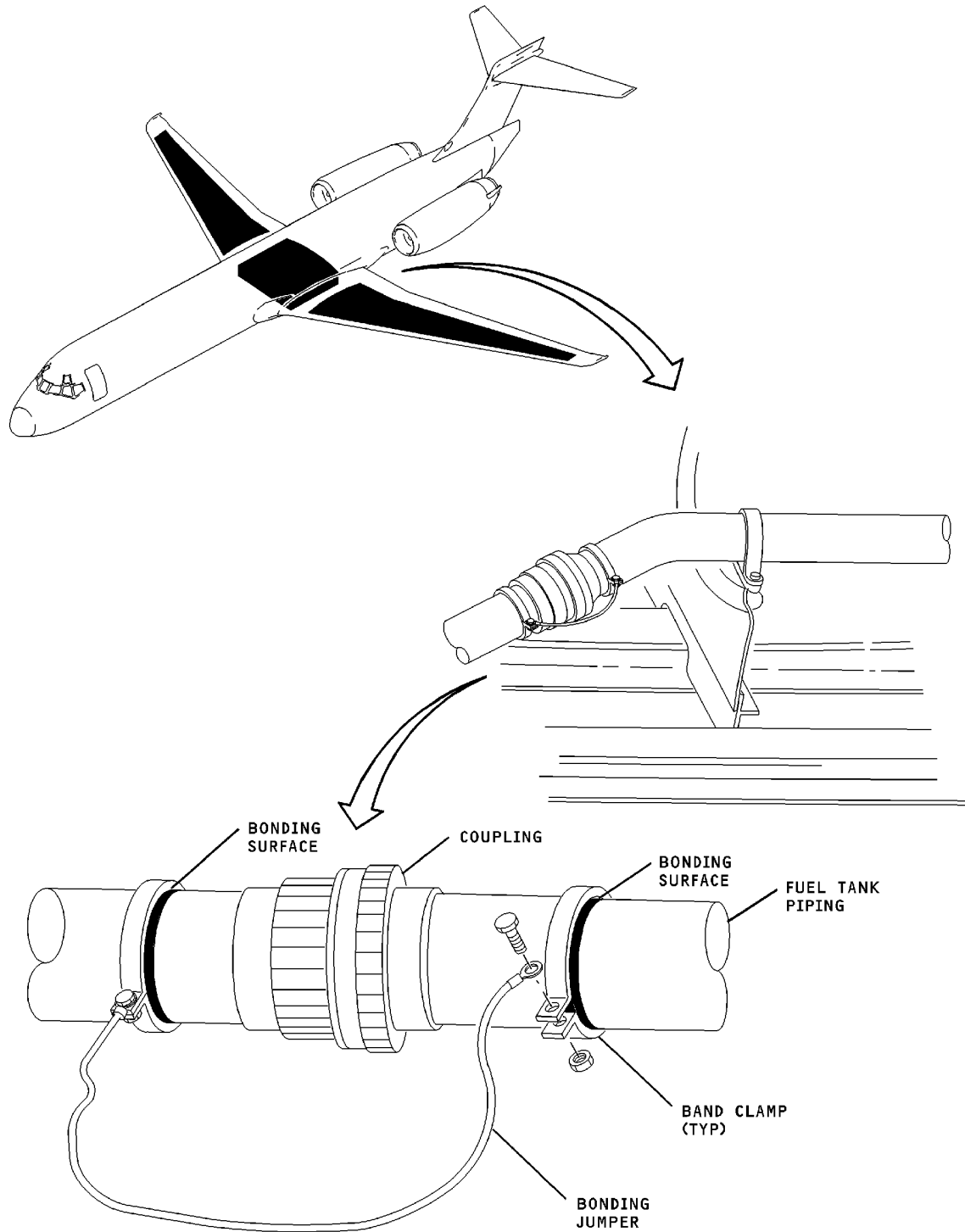
EFFECTIVITY
WJE ALL

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CAG(IGDS)

BBB2-28-356A

Fuel Tank Piping Band Clamp - Installation
Figure 208/28-00-00-990-828

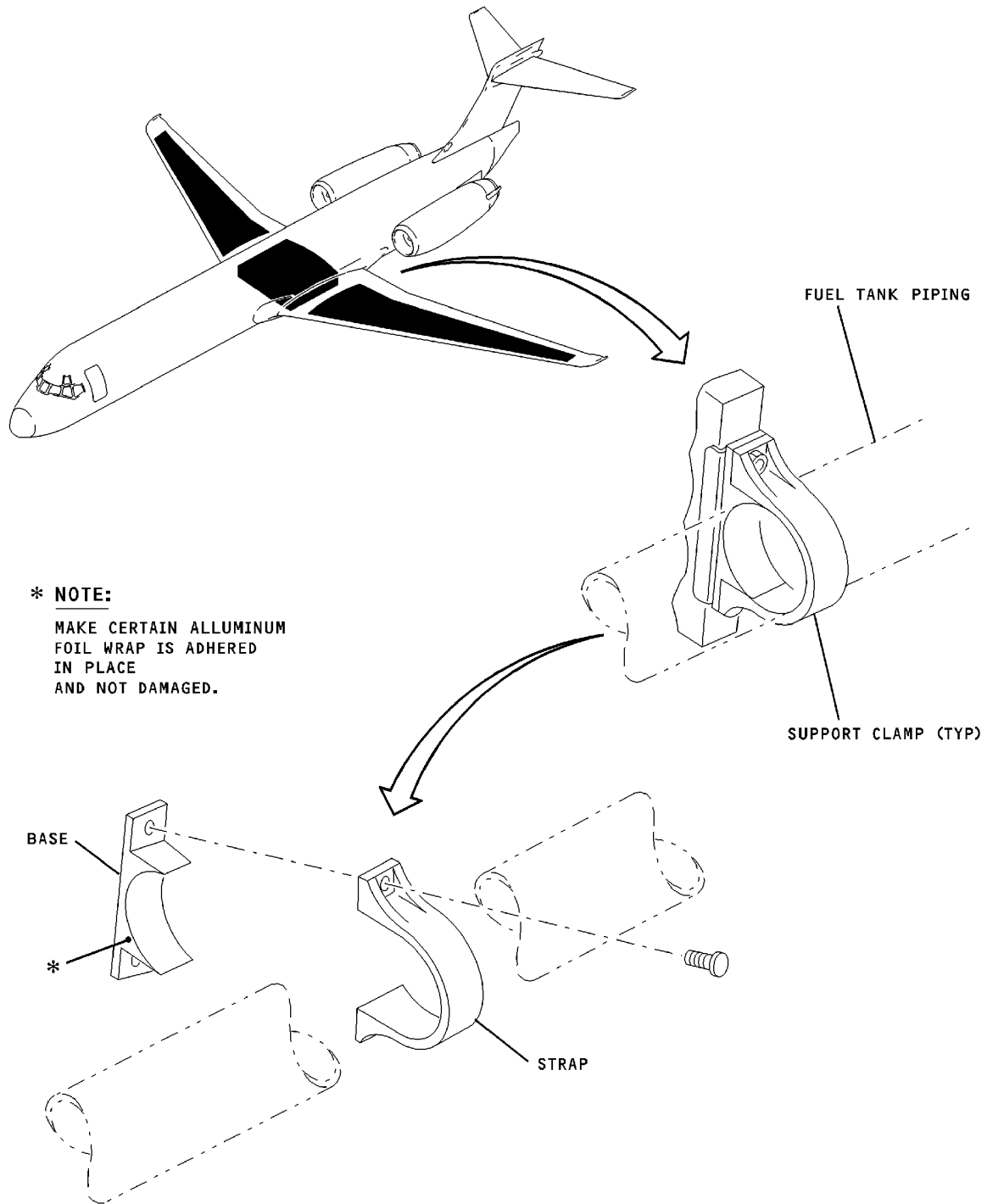
EFFECTIVITY
WJE ALL

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CAG(IGDS)

BBB2-28-357A

Fuel Tank Piping Support Clamp - Installation
Figure 209/28-00-00-990-829

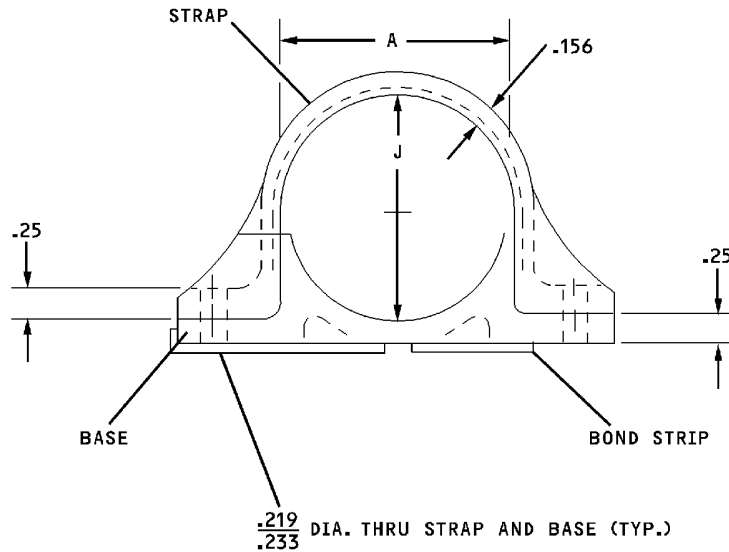
EFFECTIVITY
WJE ALL

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CLAMP DASH No.	COMPONENT O.D. (Inches)	"A" (Inches)	"J" (Inches)
-24	1.50	1.500	1.469
-32	2.00	2.000	1.970
-40	2.50	2.500	2.469

TOLERANCES: 2 PLACES = +/- .03 AND 3 PLACES = +/- .05.

CAG(IGDS)

BBB2-28-361

Bonded-Base Clamp - Check Figure 210/28-00-00-990-833

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STORAGE - DESCRIPTION AND OPERATION

1. General

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893; before incorp. of SB 28-49

- A. The storage system consists of the integral fuel tanks, which include tank sumping, the continuous scavenging system, and the vent system.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

- B. The fuel storage system consists of the integral fuel tanks which include tank sumping, the continuous scavenging system and the vent system. Forward and aft fuselage tanks contain additional fuel which is automatically transferred to the center integral tank when space is available.

WJE ALL

2. Fuel Tanks and Tank Sumping

- A. Integral Fuel Tanks. (Figure 1 or Figure 2 or Figure 3)

- (1) The aircraft has three integral tanks: right main, left main, and center tank. For integral tank capacities, refer to FUEL, CHAPTER 28. The tanks are formed by the front and rear spars, the upper and lower wing panels, and sealed bulkheads on each end. Each main tank has an integral reservoir at the inboard end. The reservoir is formed by closing the second and sixth inboard bulkheads with flapper valves. These valves permit fuel to flow inboard but prevent fuel from flowing outboard away from the boost pumps in a wing-low attitude or other similar situation. The retained fuel provides a head of fuel to keep the boost pumps submerged at all normal flight attitudes and during all normal maneuvers.
- (2) The primary means of tank internal sealing is a close-tolerance metal-to-metal fit. Sealant is used for bead seals, dams, and faying seals. Corrosion protection is provided by a polyurethane covering on the bottom and lower 4 inches (101.6 mm) of the tank sidewalls.
- (3) The upper exterior surface of the center tank is coated with an epoxy coating that acts as a fuel vapor barrier to prevent any fuel vapor seepage through the upper tank skin into fuselage compartments. Tank access doors are covered with a coating cemented to the upper surface of the tank.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

- B. Fuselage Fuel Tank

- (1) The forward fuselage fuel tank is located forward of the center wing tank in the forward cargo compartment. The aft fuselage fuel tank is located aft of the center fuel tank in the forward section of the aft cargo compartment.
- (2) The forward and aft fuel tanks each have a bladder type cell of Vithane material installed within a fuel and vapor tight cavity of standard aircraft construction.
- (3) Each fuselage fuel tank cavity consists of three structural sections bolted together, however the complete assembly cannot be installed through the cargo door and one section must be detached to permit installation or removal. The complete cavity installed in the fuselage with appropriate sealing is attached to the fuselage structure by a system of links and hangers.

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WJE ALL

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WJE ALL

C. Sump Drain Valves. (Figure 4 or Figure 5 or Figure 6)

- (1) The tank sump drain valves are a tool-operated, dual-poppet types, and are internally mounted in the lower wing skin. The valves are located in the lower inboard portion of the tanks to allow the draining of sediment, moisture, and/or residual fuel from the tanks. Pickup pipes are connected to the center tank drain valves. The pipe inlets are above the bottom of the tank. Extension cones for the center tank valves extend the valve cover down to a point slightly above and inside the lower fuselage skin. The valves are accessible through access doors in the fuselage skin.
- (2) The outer poppet may be externally removed, and replaced, without draining the tank. The inner poppet may also be removed externally, but the tank must be drained to do so. The valve housing is removed from within the tank after defueling.
- (3) The outer poppet is housed in, and positioned by, the inner poppet. A spring inside the inner poppet normally holds the outer poppet on the seat. A pin pressed through a drilled hole in the outer poppet stem acts as a cam follower and rides against the cam portion of the inner poppet. The face of the outer poppet is slotted so a screwdriver or special tool may be used to operate the valve. The poppets are retained in the housing by individual seats. The center portion of the valve cover is open and has three equally spaced notches that allow for tool operation of the valve.
- (4) Normally, the tool slot in the outer poppet is aligned with the normal position on the cover plate. In this position, both poppets will be seated. Rotating the outer poppet counterclockwise to check outer seal position, forces the inner poppet up and exposes the outer seal. To drain the sump, the outer poppet should be depressed. This will force the inner poppet off the seat and allow tank sediment to drain overboard. After removing the drain tool, the return springs will reseal the poppets and the drainage will cease.

NOTE: The low profile main tank drain valves have poppets identified opposite to the arrangement in the center tank drain valves and the CHECK SEAL operation is clockwise, otherwise the operations of the poppets in the two sump drain valves are similar.

D. Overwing Fill Adapter

- (1) There are two overwing fill adapters, one in each wing. They are flush-mounted in the upper wing skin inboard of the wingtip vent boxes. The adapters are used for servicing the main tanks when pressure fueling equipment is not available. The adapter consists of a pressure-sealed cap attaching chain, tank adapter, and filler screen.
- (2) Both filler caps are the same. Each cap has a recess for the handle. The closed and open positions are marked. There is also an arrow on the cap for indexing to a V mark on the adapter flange. To remove the cap, lift the handle and rotate counterclockwise. The cap may then be lifted off. To install the cap, reverse the procedure.

3. Fuel Vent System

(Figure 7 or Figure 8 or Figure 9)

A. Description

- (1) The vent system is provided to prevent overboard fuel spillage during ground or flight maneuvers. The system also prevents tank overpressure during filling and maintains pressure differential between the tank and ambient pressure, within allowable limits, for all aircraft flight conditions.

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- (2) Each main tank is connected by a vent line to a vent box located in the opposite wingtip. A standpipe containing a flame arrester and integral pressure vent and vacuum vent relief valves is incorporated in each box to prevent over-board spillage. Each main tank has two vent inlets: an open bellmouth at the outboard end and a climb vent float valve at the inboard end. There is a high point in the vent line at the inboard end. Each main tank vent line also has two vent drain swing check valves; one is located outboard of the high point and the other in the center tank. The center tank has a single bellmouth vent opening and a climb vent float valve which connects to the left-hand main vent line.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

- (3) The air cavity between the forward and aft fuselage cells and enclosing compartment is vented and drained overboard through a separate vent line and drain system below each fuselage tank.

WJE ALL

B. Vent Drain Swing Check Valves

- (1) The vent drain swing check valve provides a means for fuel trapped in the vent lines to drain back into the tanks. The valve consists of a spring-loaded flapper, and a valve body. When the fuel level in the vent line is approximately 1 inch (25.4 mm) higher than the fuel level in the tank, the spring-loaded flapper in the drain valve is overcome, opening the passage and permitting fuel in the line to drain back into the tank.

C. Climb Vent Float Valves

- (1) The climb vent float valve provides tank venting when the bellmouth is submerged. The float valve consists basically of a weighted float connected to a flapper. The float is enclosed in a perforated cage.

D. Vent System Operation

- (1) When the aircraft is level laterally, the open bellmouth in the tank is above the fuel level. The climb vent float valve is submerged and closed. As the aircraft rotates into a climb attitude, the climb vent float valve opens to provide tank venting. The open bellmouth is submerged as the climb angle increases. Fuel then enters the vent pipe but outward flow is prevented by the high point in the vent line. Small amounts of fuel enter the vent lines during aircraft taxi and climb and can enter the vent boxes during subsequent aircraft attitude changes. When the fuel level in the vent lines is approximately 1 inch (25.4 mm) higher than the fuel level in the tank, the vent drain swing check valve opens and the fuel in the line drains back into the tank.

4. Continuous Scavenging

A. Description

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893; before incorp. of SB 28-49

- (1) The continuous scavenging system prevents water accumulation within each tank by pumping water-laden fuel from tank low points and discharging it towards boost pump inlet. The system consists of jet pumps, check valves, scavenge rakes, and filters. The left main and right main tanks each have two jet pumps located fore and aft in the inboard end of each tank. These pumps tap pressurized fuel from the forward and aft boost pumps. The center tank has two jet pumps located at approximate center of the tank.

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WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

- (2) The continuous scavenging system prevents water accumulation within each tank by pumping water-laden fuel from tank low points and discharging it towards boost pump inlet. The system consists of jet pumps, check valves, and scavenge rakes. The left main and right main tanks each have two jet pumps located fore and aft in the inboard end of each tank. These pumps tap pressurized fuel from the forward and aft boost pumps. The center tank has two jet pumps located at approximate center of the tank. The forward and aft fuselage tanks have no scavenge system.

WJE ALL

- (3) A jet pump check valve is installed in the jet pump primary line, in the left and right main tanks, to prevent air entry into the engine supply line during suction-feed operation.
- (4) The jet pump check valve is a normally closed check valve. It consists basically of a flapper in a valve body. Pressurized fuel from the boost pump opens the flapper and allows the fuel to pass through the valve. When the fuel flow stops, the flapper closes to prevent possible air from the empty tank from entering the engine feed system.
- (5) The tank scavenge jet pump is basically a nozzle and venturi. The flow from the boost pump tap line through the nozzle section creates a suction in the venturi, drawing the fuel from the tank rake line that is connected to a fitting on the side of the jet pump.

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893; before incorp. of SB 28-49

- (6) On some aircraft, and aircraft with SB 28-38 incorp., scavenging system filters are installed in the jet pump primary line, in the left and right main tanks and the center tank. The filter prevents debris and/or contaminants from clogging the jet pumps.

WJE ALL

B. Operation

- (1) When a boost pump in a particular tank is operating, the associated jet pump draws fuel and water mixture from the tank through the rakes in the tank low points. This fuel/ water mixture is discharged toward the boost pump inlet, where it is picked up and pumped into the engine supply system.

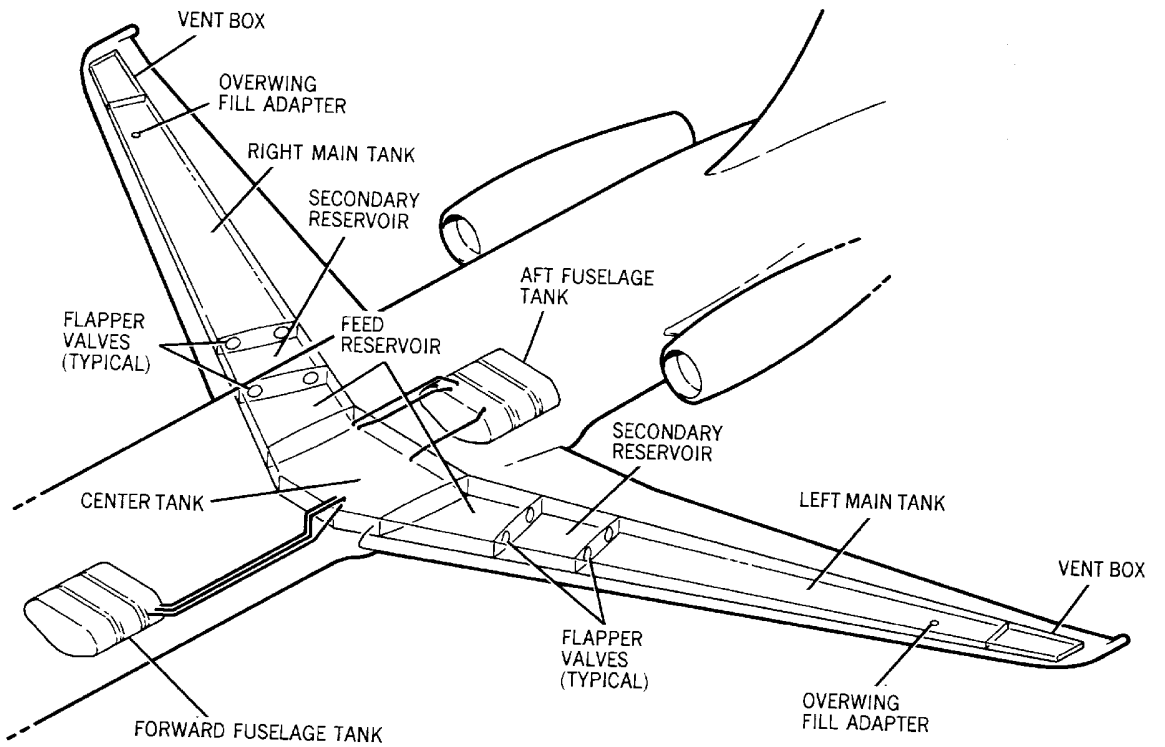
EFFECTIVITY
WJE ALL

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BBB2-28-96

Fuel Tanks -- Schematic
Figure 1/28-10-00-990-802

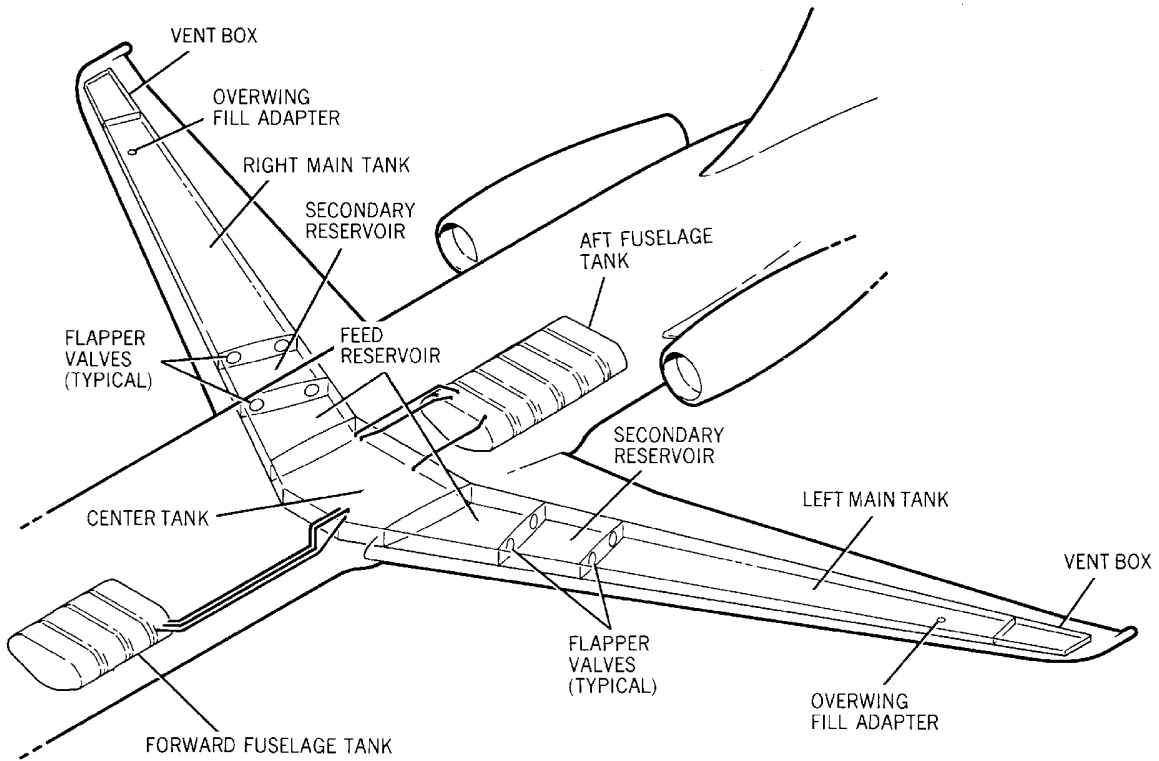
EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 873, 874, 877-881,
883, 884, 892

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BBB2-28-180

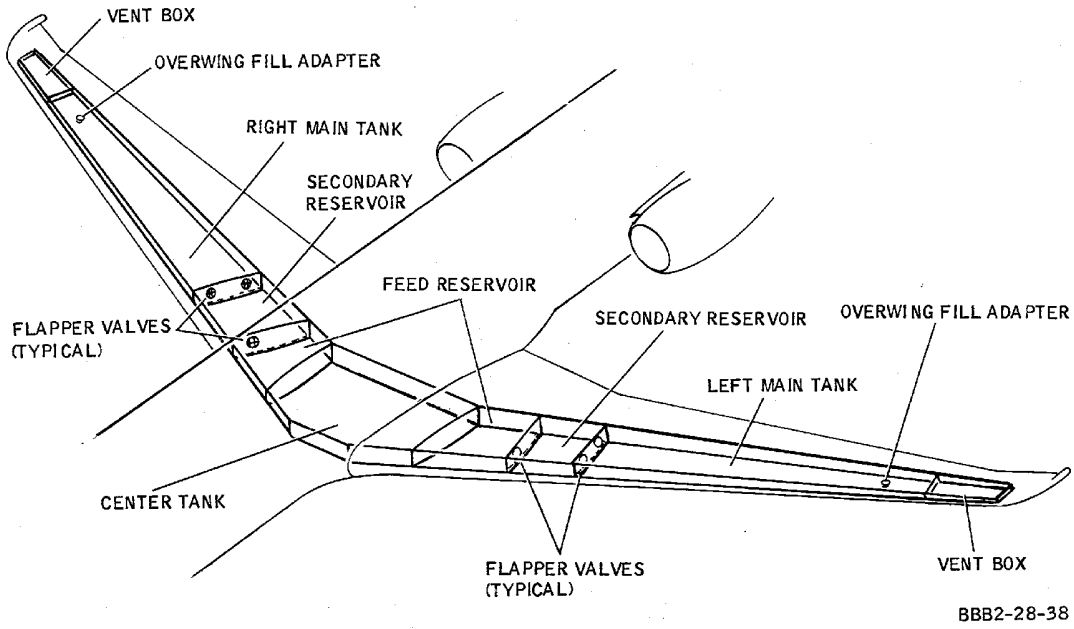
Fuel Tanks -- Schematic
Figure 2/28-10-00-990-803

EFFECTIVITY
WJE 861, 862

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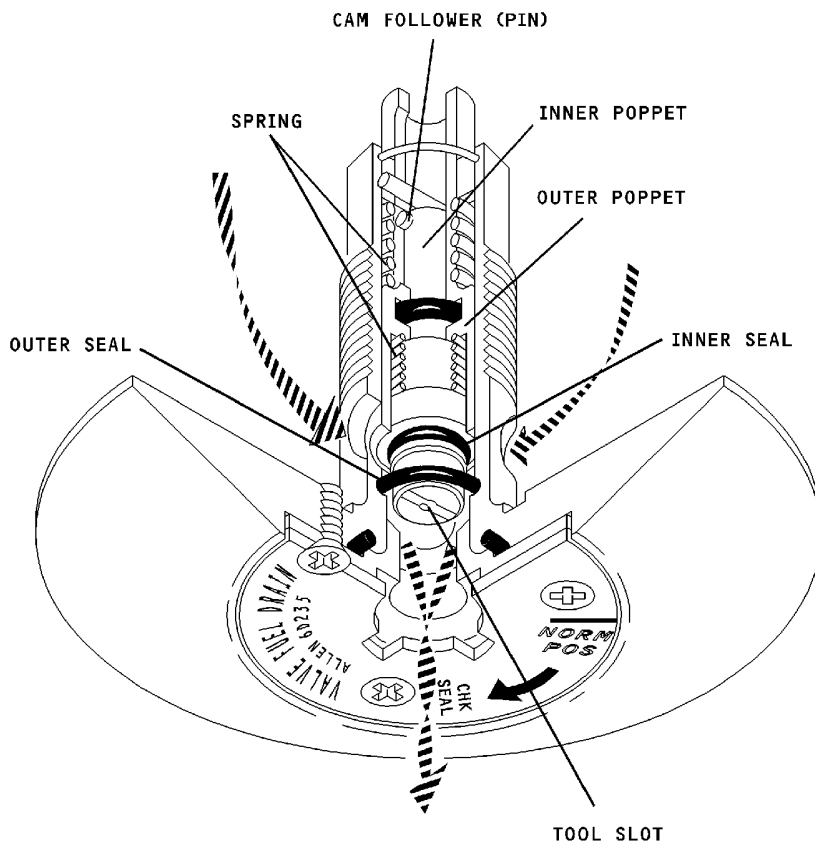
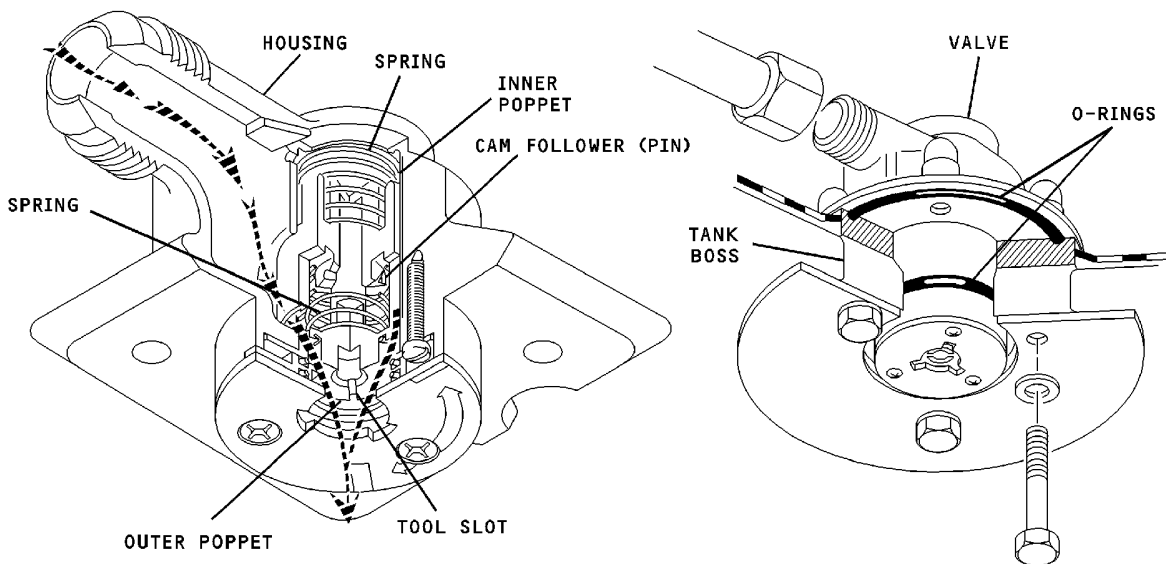
Fuel Tanks -- Schematic
Figure 3/28-10-00-990-805

EFFECTIVITY
WJE ALL

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CAG(IGDS)

BBB2-28-97A

Fuel Tank Sump Drain Valves
Figure 4/28-10-00-990-806

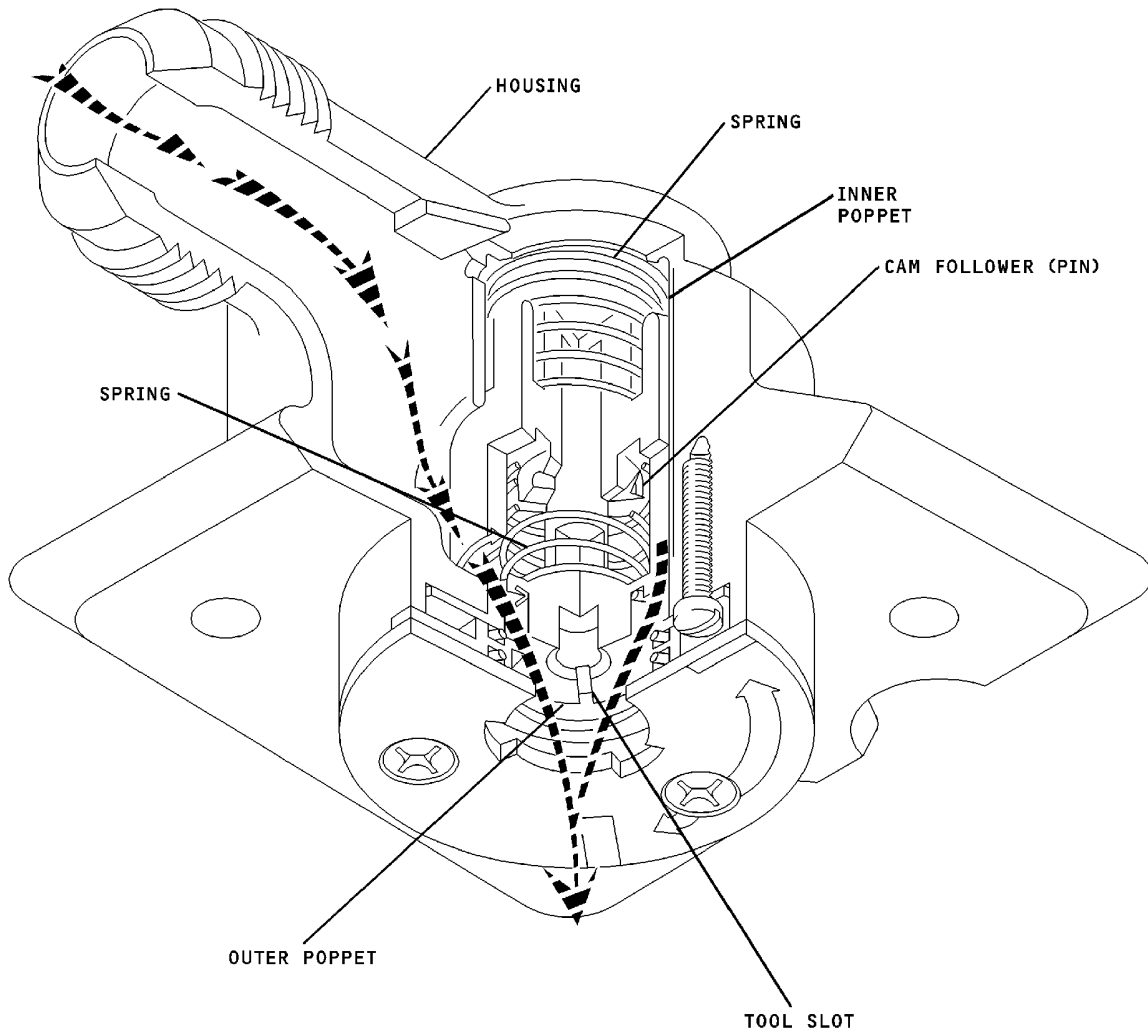
EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

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CAG(IGDS)

BBB2-28-39A

**Center Tank Sump Drain Valve -- Schematic
Figure 5/28-10-00-990-807**

EFFECTIVITY

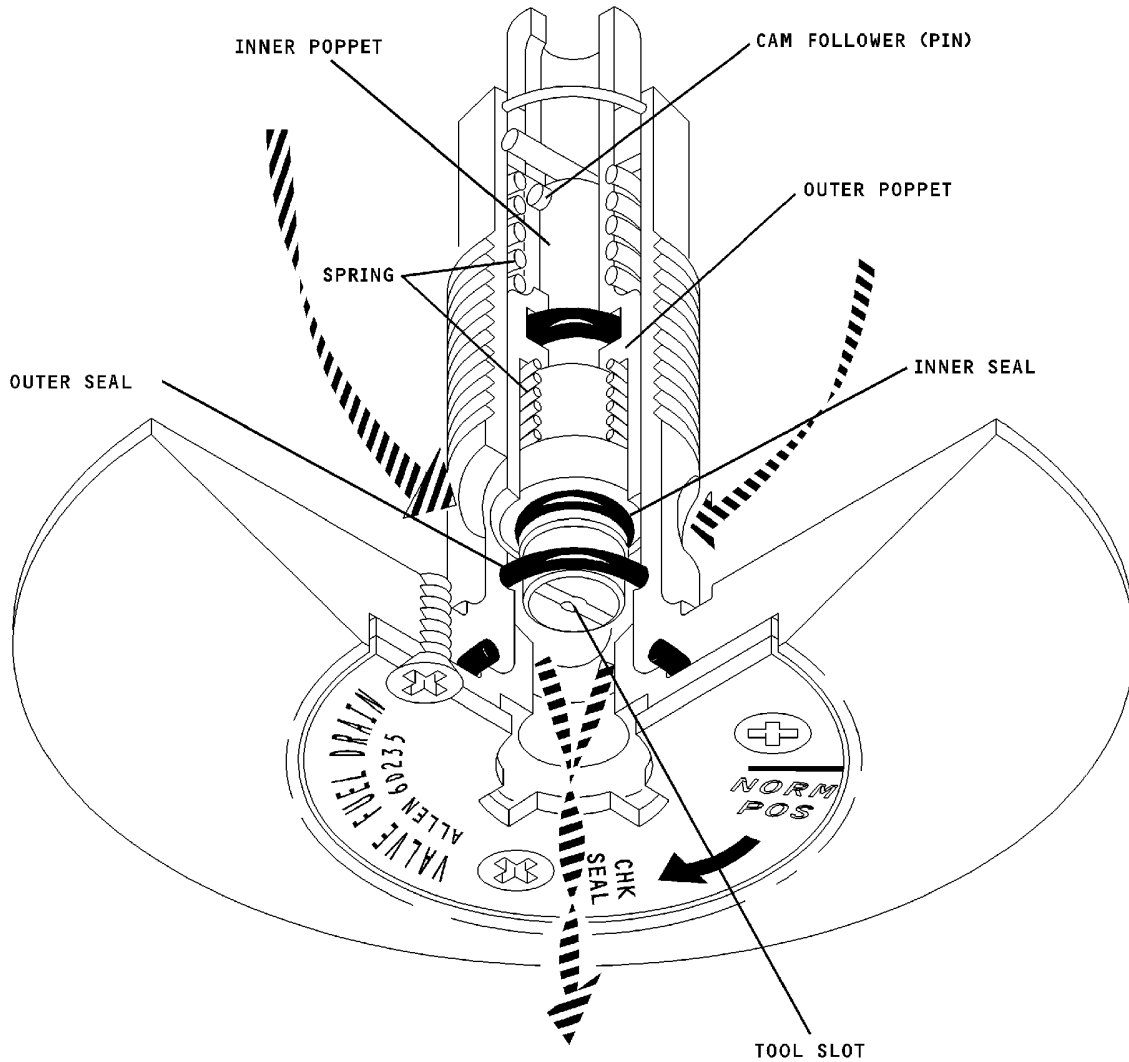
WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893; before incorp. of SB 28-49

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CAG(IGDS)

BBB2-28-82A

Main Tanks Sump Drain Valve -- Schematic
Figure 6/28-10-00-990-808

EFFECTIVITY

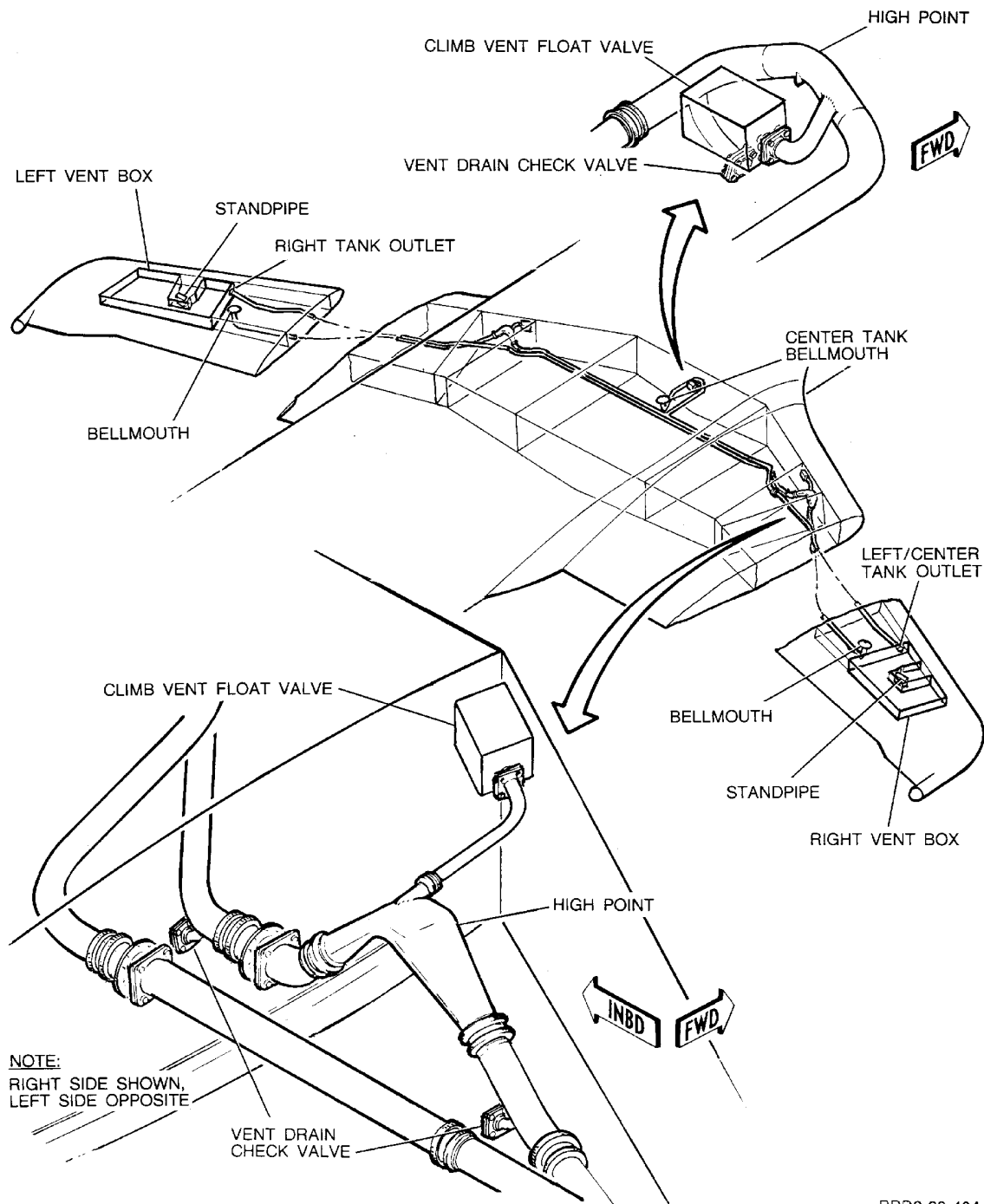
WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893; before incorp. of SB 28-49

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BBB2-28-40A

**Fuel Tank Vent System -- Schematic
Figure 7/28-10-00-990-809**

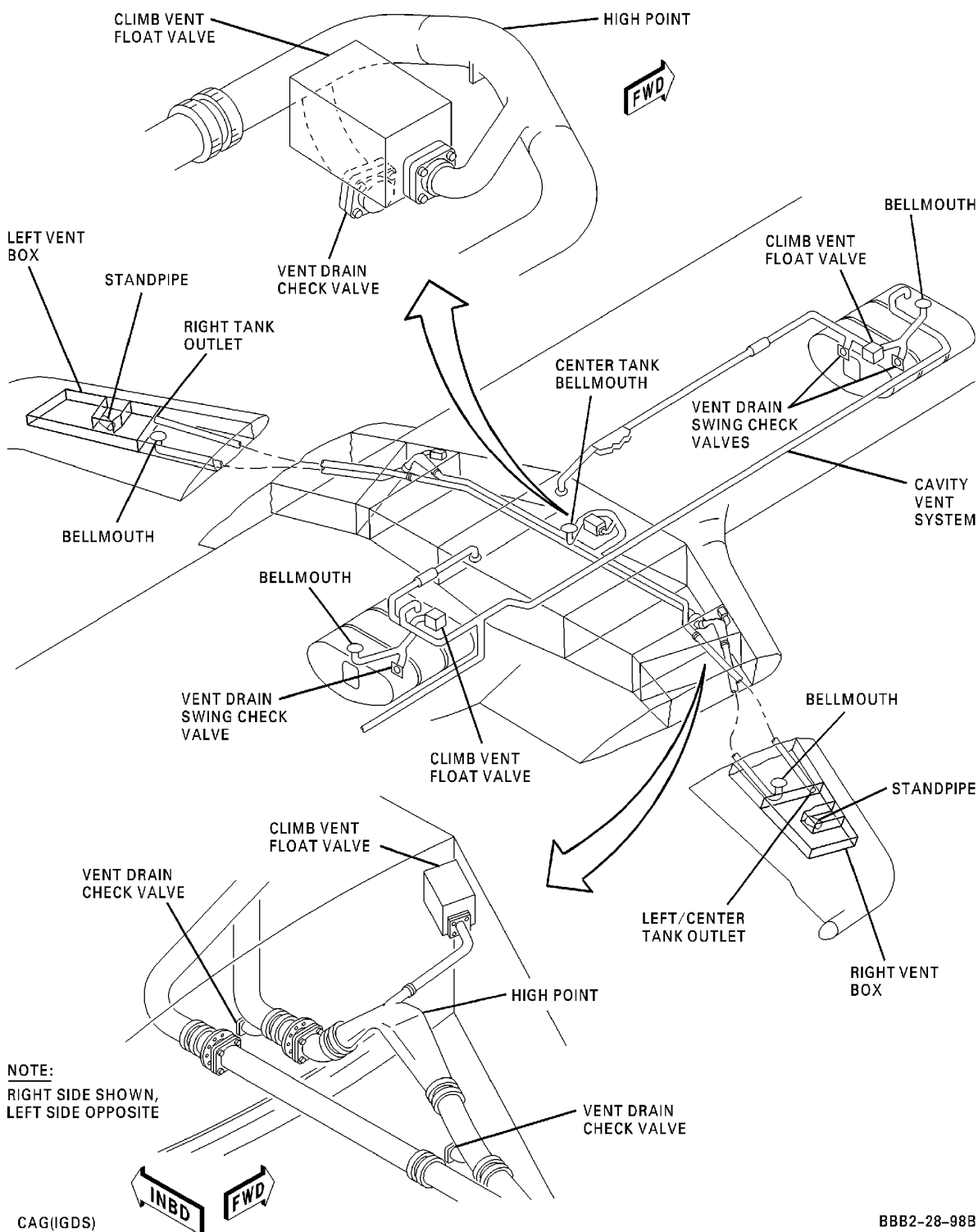
EFFECTIVITY
WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 876, 886, 887, 891, 893; before incorp.
of SB 28-49

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Fuel Tank Vent System -- Schematic
Figure 8/28-10-00-990-810

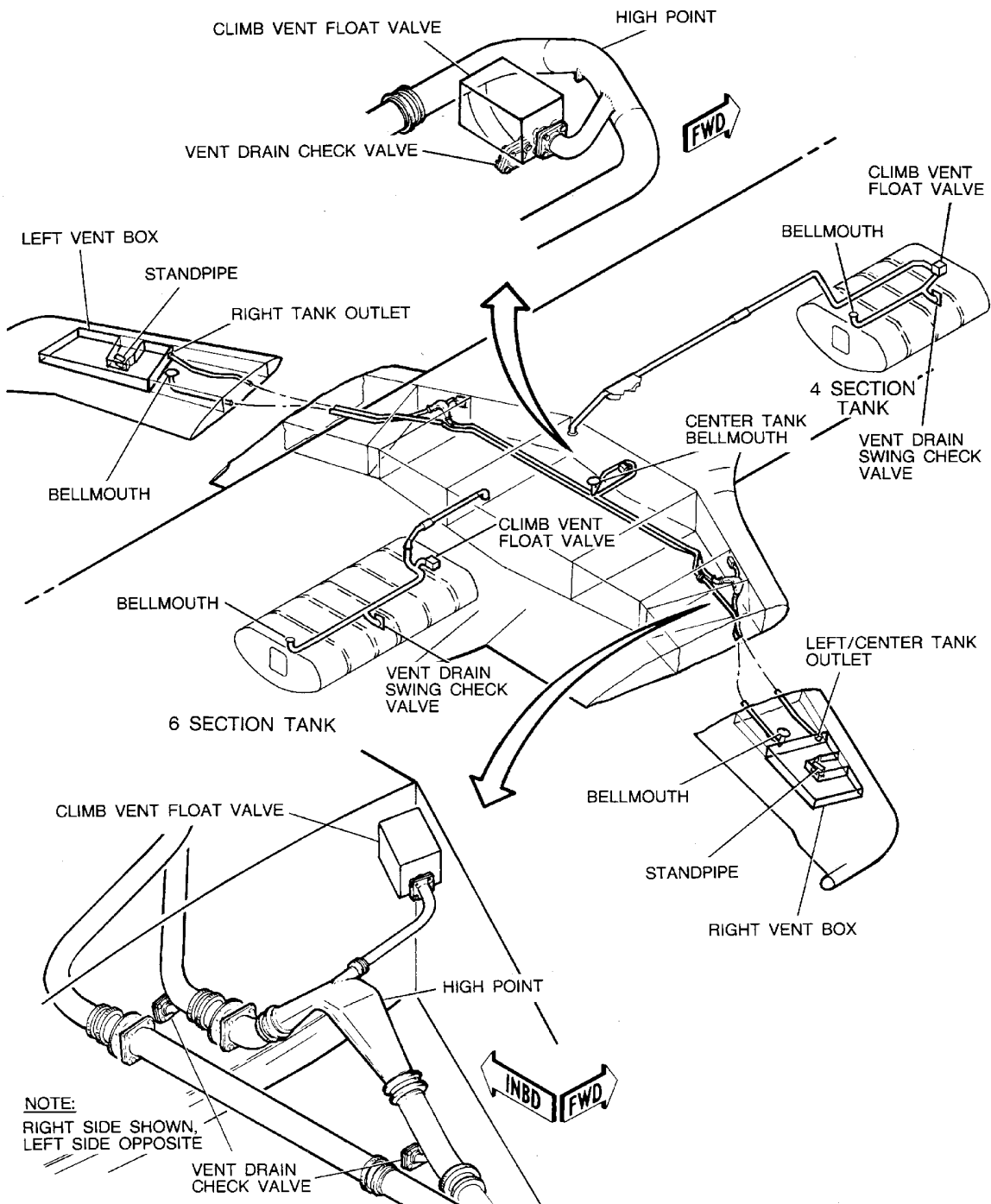
EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 873, 874, 877-881,
883, 884, 892

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BBB2-28-181A

**Fuel Tank Vent System -- Schematic
Figure 9/28-10-00-990-811**

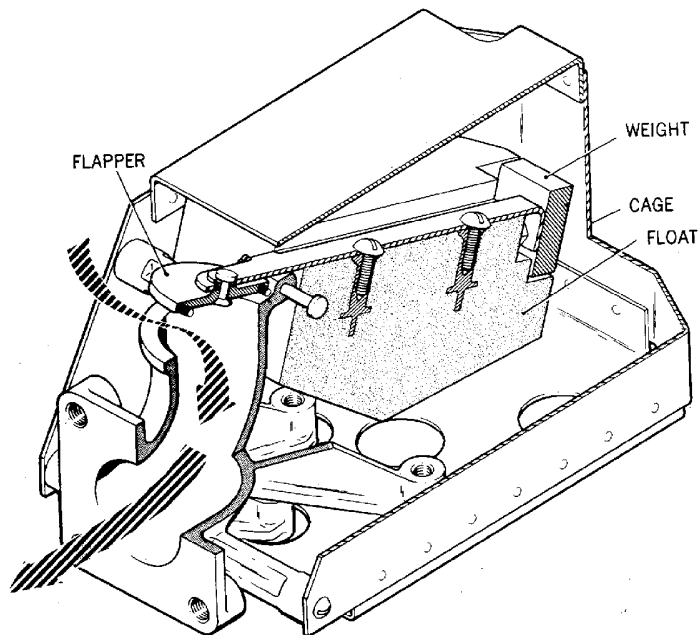
EFFECTIVITY
WJE 861, 862

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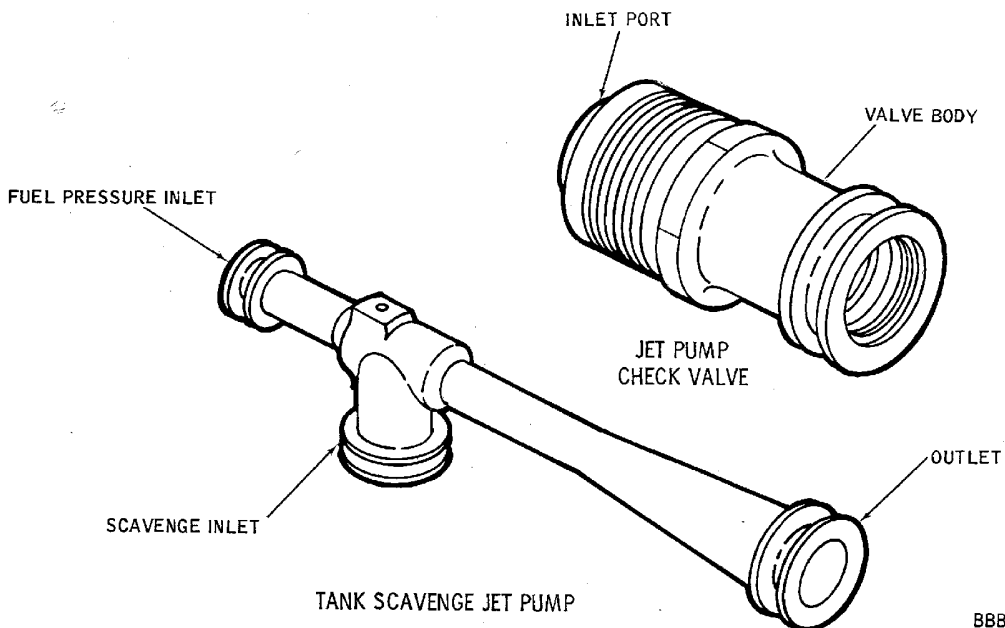
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BBB2-28-41

Climb Vent Float Valve -- Schematic
Figure 10/28-10-00-990-813



BBB2-28-42

Continuous Scavenging System -- Components
Figure 11/28-10-00-990-814

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PRESSURE TEST OF FUEL VENT SYSTEM - ADJUSTMENT/TEST

1. General

- A. This procedure does a pressure test of the fuel vent system. The test is performed on the left wing, right wing, and center tank vent systems.
- B. Before any maintenance is performed on fuel system, personnel should read and thoroughly understand the following. Careful adherence to these instructions will aid in maintaining a functional and trouble-free system.

NOTE: Whenever a maintenance task is being performed on a fuel tank internal component, inspect the adjacent areas and installations for general security and condition.

WARNING: OBSERVE ALL LOCAL AND FACILITY SAFETY REGULATIONS WHEN PERFORMING FUEL SYSTEM MAINTENANCE.

WARNING: DO NOT USE LOCKWIRE, SAFETY CABLES OR COTTER PINS IN THE FUEL TANKS OR FOR HARDWARE RETENTION OF COMPONENTS OR EQUIPMENT INSTALLED IN FUEL TANKS. STATIC DISCHARGES FROM THE LOCKWIRE, SAFETY CABLES OR COTTER PINS CAN CAUSE FIRES OR EXPLOSIONS. LOCKWIRE, SAFETY CABLES AND COTTER PINS CAN BE USED IF THEY ARE CONTAINED INSIDE THE HOUSING OF AN EXPLOSION PROOF, TANK MOUNTED COMPONENT, AND MUST BE INSTALLED ACCORDING TO THE APPLICABLE BOEING DESIGN, REPAIR AND MAINTENANCE DOCUMENTATION. THIS WILL HELP PREVENT INJURY TO PERSONS AND DAMAGE TO THE AIRCRAFT.

- C. Perform all fire and safety practices as given in GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201.

(1) The above warning is a CDCCL procedure. For important information on CDCCLs, refer to Airworthiness Limitation Precautions (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201).

2. Equipment and Materials

WARNING: FUEL VAPOR IN TANKS MAY BE TOO RICH TO IGNITE WHEN TANKS ARE INITIALLY OPENED; HOWEVER, VAPOR CONCENTRATION WILL PASS THROUGH AN EXPLOSIVE MIXTURE LEVEL DURING TANK VENTILATION. VAPOR MIXTURES TOO LEAN TO IGNITE, IF ALLOWED TO ACCUMULATE IN AN UNVENTILATED SPACE, CAN FORM AN EXPLOSIVE MIXTURE.

CAUTION: TANK MUST BE PURGED TO SAFE ATMOSPHERIC CONDITION, BELOW LOWER EXPLOSIVE LIMITS, AS DETERMINED BY QUALIFIED PERSONNEL USING FUEL VAPOR MEASURING EQUIPMENT. CONSULT LOCAL AUTHORITY OR REGULATORY AGENCY.

NOTE: Equivalent substitutes may be used instead of the following listed items:

Table 501

Name and Number	Manufacturer
Clamp * P/N TBD	The Boeing Company
Block * P/N TBD	The Boeing Company
Plug adapter P/N T3071-250-2	The Boeing Company
Plug P/N T3071-150-2	
Removable nut P/N T15-250	

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Table 501 (Continued)

Name and Number	Manufacturer
Retainer ring P/N M1214-250	
Regulated air supply (0-10 PSI)	
Pressure gauge (0-10 PSI)	
Red streamers (safety tags)	
NOTE: * TBD is "To Be Determined".	

3. Pressure Test of Fuel Vent System

A. Preparation

- (1) Defuel and drain left wing, right wing, and center fuel tanks. (DEFUELING, SUBJECT 12-11-01).

WJE 412, 414, 422, 424, 429, 875-879

- (2) Open fuel tank access panels that follow. (WING ZONES AND ACCESS DOORS - DESCRIPTION AND OPERATION, PAGEBLOCK 06-21-00/001 Config 1 or WING ZONES AND ACCESS DOORS - DESCRIPTION AND OPERATION, PAGEBLOCK 06-21-00/001 Config 2) (WING CENTER SECTION ZONES AND ACCESS DOORS - DESCRIPTION AND OPERATION, PAGEBLOCK 06-22-00/001)
 - (a) Left wing access panel 1379C for vent system inlet.
 - (b) Right wing access panel 1478C for vent system inlet.
 - (c) Left wing access panel 1303C for vent system drain valve and climb-vent valve.
 - (d) Right wing access panel 1409C for vent system drain valve and climb-vent valve.
 - (e) Center tank access panel 2301C for climb-vent valve and vent drain valve.
 - (f) Center tank access panel 1333C for vent drain valve.
 - (g) Center tank access panel 1436C for vent drain valve.
 - (h) Center tank access panel 2301C for forward and aft auxiliary fuel tank vent pipe connections if applicable.

WJE 401-412, 414-421, 423, 425-427, 861-866, 868, 869, 871-874, 876, 878-881, 883, 884, 886, 887, 891-893

- (3) Open fuel tank access panels that follow. (WING ZONES AND ACCESS DOORS - DESCRIPTION AND OPERATION, PAGEBLOCK 06-21-00/001 Config 2) (WING CENTER SECTION ZONES AND ACCESS DOORS - DESCRIPTION AND OPERATION, PAGEBLOCK 06-22-00/001)
 - (a) Left wing access panel 1379C for vent system inlet.
 - (b) Right wing access panel 1478C for vent system inlet.
 - (c) Left wing access panel 1303C for vent system drain valve and climb-vent valve.
 - (d) Right wing access panel 1409C for vent system drain valve and climb-vent valve.
 - (e) Center tank access panel 2301C for climb-vent valve and vent drain valve.
 - (f) Center tank access panel 1333C for vent drain valve.
 - (g) Center tank access panel 1436C for vent drain valve.
 - (h) Center tank access panel 2301C for forward and aft auxiliary fuel tank vent pipe connections if applicable.

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- (4) Make fuel tanks safe per GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201. Make sure all applicable safety precautions, and warnings are performed.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (5) Make sure all these applicable fuel system circuit breakers are opened and tagged to prevent operation of fuel system.

LOWER EPC, DC

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
------------	------------	---------------	-------------

WJE 410, 411, 417, 419, 871, 872, 875-879

M	37	B1-1007	ALT FUEL BURN
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LOWER EPC, ENGINE - LEFT DC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
------------	------------	---------------	-------------

WJE 405, 407-409, 411, 416, 420, 422, 424-427, 429, 861, 862, 868, 873, 874, 880, 881, 883, 884, 891-893

S	33	B1-141	LEFT INLET FUEL PRESS LOW CAUTION
S	34	B1-181	LEFT FUEL TEMP

WJE ALL

S	35	B1-122	LEFT FUEL FILTER PRESS DROP CAUTION
S	36	B1-49	LEFT FUEL HEAT ON ADVISORY

WJE 401-405, 409, 412, 414, 861, 862, 873, 874, 880, 881, 883, 884, 892, 893

S	38	B1-903	AUXILIARY FUEL XFER A CONTROL
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WJE 401-404, 410, 412, 414, 877-879

S	39	B1-903	AUXILIARY FUEL XFER A CONTROL
---	----	--------	-------------------------------

LOWER EPC, ENGINE - RIGHT DC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
------------	------------	---------------	-------------

WJE 405, 407-409, 411, 416, 420, 422, 424-427, 429, 861, 862, 868, 873, 874, 880, 881, 883, 884, 891-893

T	33	B1-142	RIGHT INLET FUEL PRESS LOW CAUTION
T	34	B1-182	RIGHT FUEL TEMP

WJE ALL

T	35	B1-123	RIGHT FUEL FILTER PRESS DROP CAUTION
T	36	B1-50	RIGHT FUEL HEAT ON ADVISORY

WJE 401-405, 409, 412, 414, 861, 862, 873, 874, 880, 881, 883, 884, 892, 893

T	38	B1-904	AUXILIARY FUEL XFER B CONTROL
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WJE 410, 877-879

T	39	B1-904	AUXILIARY FUEL XFER B CONTROL
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LOWER EPC, XFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
------------	------------	---------------	-------------

WJE 407, 408, 410, 411, 417, 419, 421, 423, 869, 871, 872, 875-879

S	41	B1-1002	LOW FUEL LEVEL
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WJE 407, 408, 410, 411, 417, 419, 421, 423, 869, 871, 872, 875-879 (Continued)

(Continued)

LOWER EPC, XFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 405, 409, 861, 862, 873, 874, 880, 881, 883, 884, 892, 893			
S	42	B1-905	AUXILIARY FUEL PUMP PRESS LOW FWD & AFT
WJE 407, 408, 410, 411, 417, 419, 421, 423, 869, 871, 872, 875-879			
T	41	B1-994	CENTER FUEL LOW PRESSURE
WJE ALL			

UPPER EPC, ENGINE - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
K	27	B1-75	LEFT FUEL FLOW
K	28	B1-47	FUEL HEAT LEFT CONTROL
K	28	B1-294	FUEL HEAT LEFT TIMER

UPPER EPC, ENGINE - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
L	27	B1-76	RIGHT FUEL FLOW
L	28	B1-48	FUEL HEAT RIGHT CONTROL
L	29	B1-295	FUEL HEAT RIGHT TIMER

UPPER EPC, FUEL

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	17	B1-822	FUEL QUANTITY POWER TRANSFER

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893			
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C
H	27	B1-910	AFT AUX TANK FUEL XFR B A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893			
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C

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WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893 (Continued)

(Continued)

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

B. Left Wing and Center Tank Vent System Pressure Test

WARNING: MAKE SURE THAT ALL FUEL TANKS ARE GROUNDED TO PREVENT ELECTROSTATIC DISCHARGE BUILD UP AND POSSIBLE EXPLOSION OF REMAINING FUEL VAPORS. THIS WILL PREVENT DEATH OR SERIOUS INJURY TO PERSONNEL AND DAMAGE TO EQUIPMENT.

- (1) Cap or block closed left wing and center tank vent system valves and lines that follow: (Figure 501)

NOTE: Make sure that each cap or block has a red streamer attached of sufficient length to extend out of the fuel tank.

- (a) Left wing tank vent inlet:
 - 1) Disconnect left tank vent system pipe inlet assembly at outboard end of vent pipe assembly. (Figure 501)
 - 2) At open end of vent pipe assembly, move Gamah sleeve away from flange.
 - 3) Install removable nut, P/N T15-250, and retainer ring, P/N M1214-250 on open end of vent pipe assembly.
 - 4) Install plug, P/N T3071-250-2, on removable nut with retainer ring attached to open end of vent pipe assembly.
- (b) Left wing vent pipe drain valve:
 - 1) Install clamp tool to close valve.
- (c) Left wing climb-vent valve:
 - 1) Install block tool to close.
- (d) Center tank vent inlet:
 - 1) Disconnect center tank vent system elbow assembly, P/N 3912898-X, from forward pipe assembly.
 - 2) On forward pipe assembly, move Gamah sleeve away from flange.
 - 3) Install removable nut, P/N T15-250, and retainer ring, P/N M1214-250 on open end of center tank vent pipe.
 - 4) Install plug, P/N T3071-250-2, on open end of center tank vent pipe assembly with removable nut and retainer ring attached.
- (e) Center tank climb-vent valve:
 - 1) Install block tool to close valve.

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- (f) Center tank vent drain valve (near 121 bulkhead):
 - 1) Install clamp tool to close valve.
 - (g) Center tank vent drain valve (near climb-vent valve):
 - 1) Install clamp tool to close valve.
 - (2) Install adapter plug in right wing vent box port.
 - (3) Connect regulated air supply to right wing vent box exit port plug. Make sure that pressure gauge that reads 0 to 10 PSIG is attached.
 - (4) Apply 5 PSIG (maximum) air pressure to left wing and center tank vent system. Use pressure gauge to read 5 PSIG.
 - (5) Close air delivery source to vent system. There should be no leakage.
 - (6) Note decay on pressure gauge from 5 PSIG. If pressure gauge drops after 5 minutes, find source of leak.
 - (7) Check each pipe/component and joint in left wing and center tank vent system located in left wing, center tank, and right wing for leakage. Use leak test solution to find source of leak.
 - (8) Identify all leakage paths.
 - (9) Slowly release pressure from left wing and center tank vent system.
 - (10) Repair all leaks. (PAGEBLOCK 28-10-01/201)
 - (11) After repair, do steps (1) through (9) again.
- C. Job Close Up Left Wing and Center Tank Vent System
- (1) Disconnect regulated air supply from left wing vent box exit ports.
 - (2) Remove adapter plug from left wing vent box exit ports.
 - (3) Remove caps or blocks from following:
 - (a) Left wing tank vent inlet:
 - 1) Remove removable nut, P/N T15-250, retainer ring, P/N M1214-250 and plug T3071-250-2.
 - 2) Reconnect inlet to vent system using two new o-ring seals, P/N S4892944-230.
 - (b) Left wing tank drain valve.
 - (c) Left wing climb-vent valve.
 - (d) Center tank drain valve (near 121 bulkhead).
 - (e) Left wing tank vent inlet:
 - 1) Remove removable nut, P/N T15-250, retainer ring, P/N M1214-250 and T3071-250-2 plug.
 - 2) Reconnect inlet to vent system using two new o-ring seals, P/N S4892944-230.
 - (f) Center tank vent inlet:
 - 1) Remove removable nut, P/N T15-250, retainer ring, P/N M1214-250 and T3071-250-2 plug.
 - 2) Reconnect inlet to vent system using two new o-ring seals, P/N S4892944-230.
 - (g) Center tank climb-vent valve.
 - (h) Center tank vent drain valve (near 121 bulkhead).
 - (i) Center tank vent drain valve (near climb-vent valve).
 - (j) Reconnect, if applicable:

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- 1) Forward auxiliary fuel tank vent pipe joint at right wing vent pipe.
 - a) Remove plug, P/N T3071-150-2.
 - (k) Remove tools used unless required in next procedure.
 - (l) Make sure area is clean.
- D. Right Wing Vent System Pressure Test

WARNING: MAKE SURE THAT ALL FUEL TANKS ARE GROUNDED TO PREVENT ELECTROSTATIC DISCHARGE BUILD UP AND POSSIBLE EXPLOSION OF REMAINING FUEL VAPORS. THIS WILL PREVENT DEATH OR SERIOUS INJURY TO PERSONNEL AND DAMAGE TO EQUIPMENT.

- (1) Cap or block closed right wing tank vent system valves and lines that follow: (Figure 501)

NOTE: Make sure that each cap or block has a red streamer attached of sufficient length to extend out of the fuel tank.

- (a) Right wing tank vent inlet:
 - 1) Disconnect right wing tank vent system pipe inlet assembly from outboard end of vent pipe assembly. (Figure 501)
 - 2) At open end of vent pipe assembly, move Gamah sleeve away from flange.
 - 3) Install removable nut, P/N T15-250, and retainer ring, P/N M1214-250 on open end of vent pipe assembly.
 - 4) Install plug, P/N T3071-250-2, on removable nut with retainer ring attached at open end of vent pipe assembly.
- (b) Right wing tank vent drain valve:
 - 1) Install clamp tool to close valve.
- (c) Right wing climb-vent valve:
 - 1) Install block tool to close.
- (d) Right wing drain valve in center tank (near 121 bulkhead):
 - 1) Install clamp tool to close valve.

WJE 401-412, 414-427, 429, 861-866, 868, 869, 871-881, 883, 884, 891-893

- (e) Forward auxiliary fuel tank vent pipe joint at right wing vent pipe, if applicable.
 - 1) Disconnect auxiliary tank vent at joint closest to wing vent.
 - 2) Install plug, P/N T3071-150-2.
- (f) Aft auxiliary fuel tank vent pipe joint at right wing vent pipe, if applicable.
 - 1) Disconnect auxiliary tank vent at joint closest to wing vent.
 - 2) Install plug, P/N T3071-150-2.

WJE ALL

- (2) Install adapter plug to left wing vent box exit port.
- (3) Connect regulated air supply to left wing vent box exit port plug. Make sure that pressure gauge is used that reads 0 to 10 PSIG and attached.
- (4) Apply 5 PSIG (maximum) air pressure to right wing vent system. Use pressure gauge to read 5 PSIG.
- (5) Close air delivery source to vent system. There should be no leakage.

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- (6) Note decay on pressure gauge from 5 PSIG. If pressure gauge drops in 5 minutes, find source of leak.
 - (7) Check each pipe/component and joint in right wing vent system located in left wing, center tank, and right wing for leakage. Use leak test solution to find source of leak.
 - (8) Identify all leakage paths.
 - (9) Slowly release pressure from right wing tank vent system.
 - (10) Repair all leaks. (PAGEBLOCK 28-10-01/201)
 - (11) After repair, do steps (1) through (9) again.
- E. Job Close Up for Right Wing Vent System
- (1) Disconnect regulated air supply from right wing vent box exit ports.
 - (2) Remove adapter plug from right wing vent box exit ports.
 - (3) Remove caps or blocks from following:
 - (a) Right wing tank vent inlet:
 - 1) Remove removable nut, P/N T15-250, retainer ring, P/N M1214-250 and T3071-250-2 plug.
 - 2) Reconnect inlet to vent system using two new O-ring seals, P/N S4892944-230.
 - (b) Right wing tank drain valve.
 - (c) Right wing climb-vent valve.
 - (d) Center tank drain valve (near 121 bulkhead).
 - (e) Center tank vent inlet:
 - 1) Remove removable nut, P/N T15-250, retainer ring, P/N M1214-250 and T3071-250-2 plug.
 - 2) Reconnect inlet to vent system using two new O-ring seals, P/N S4892944-230.
 - (f) Center tank climb-vent valve.
 - (g) Center tank vent drain valve (near 121 bulkhead).
 - (h) Center tank vent drain valve (near climb-vent valve).

WJE 401-412, 414-427, 429, 861-866, 868, 869, 871-881, 883, 884, 891-893

- (i) Reconnect, if applicable:
 - 1) Forward auxiliary fuel tank vent pipe joint at right wing vent pipe.
 - a) Remove plug, P/N T3071-150-2.
 - b) Reconnect vent pipe using two new O-ring seals, P/N S4892944-222.
 - 2) Aft auxiliary fuel tank vent pipe joint at right wing vent pipe.
 - a) Remove plug, P/N T3071-150-2.
 - b) Reconnect vent pipe using two new O-ring seals, P/N S4892944-222.

WJE ALL

- (4) Remove tools and equipment. Clean area.
- F. Close access panels that follow:
- (1) Left wing access panel 1379C for vent system inlet.
 - (2) Right wing access panel 1478C for vent system inlet.
 - (3) Left wing access panel 1303C for vent system drain valve and climb-vent valve.

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- (4) Right wing access panel 1409C for vent system drain valve and climb-vent valve.
 - (5) Center tank access panel 2301C for climb-vent valve and vent drain valve.
 - (6) Center tank access panel 1333C for vent drain valve.
 - (7) Center tank access panel 1436C for vent drain valve.
 - (8) Center tank access panel 2301C for forward and aft auxiliary fuel tank vent pipe connections if applicable.
- G. Return aircraft to required configuration.

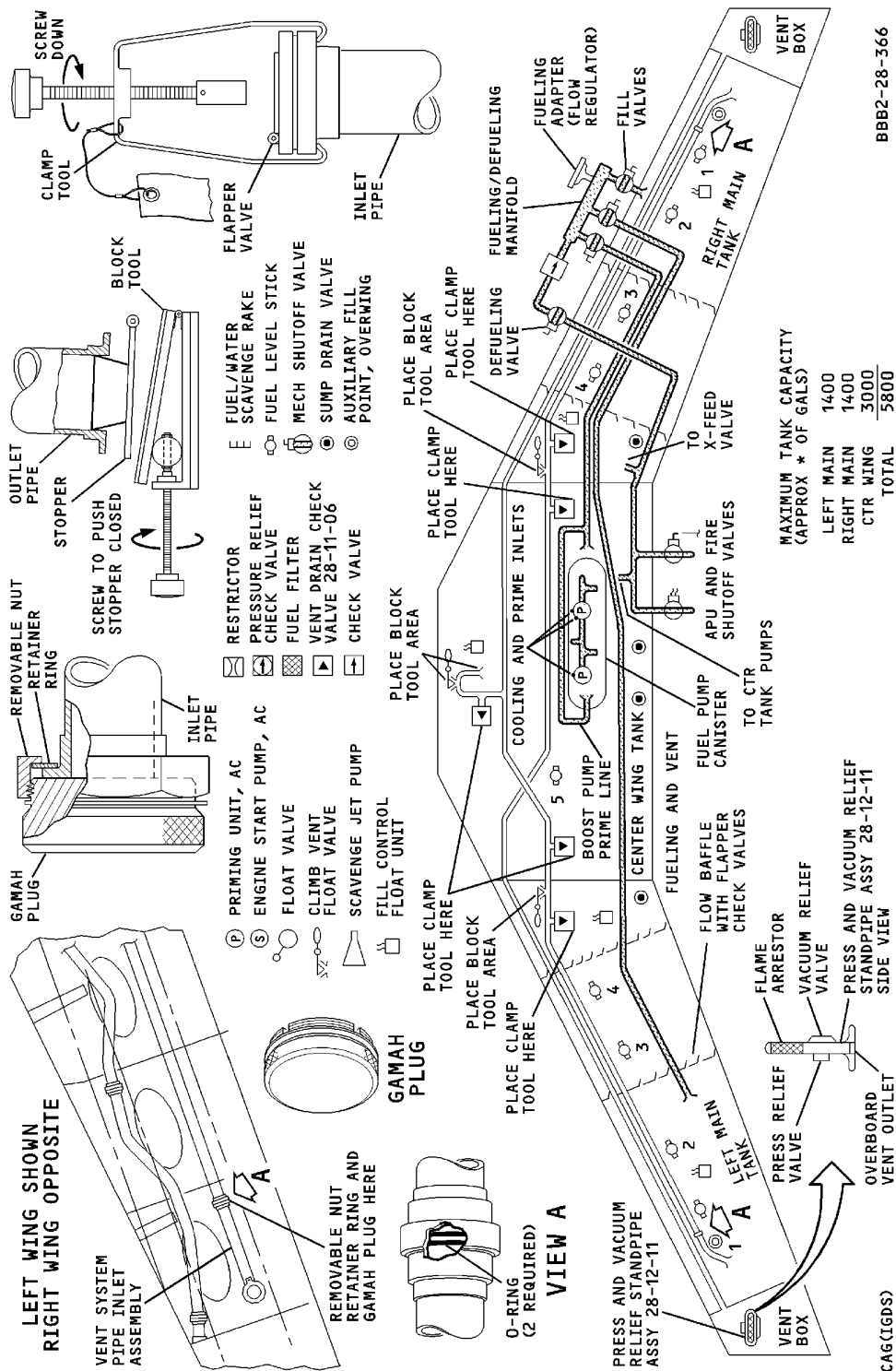
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**Vent System Pressure Test Tool Installation
Figure 501/28-10-00-990-801**

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FUEL TANKS - MAINTENANCE PRACTICES

1. General

- A. This maintenance practice includes:
- Detection test for microbial contamination
 - Cleaning/painting fuel tanks
 - Approved repairs for fuel tanks.
 - Microbial growth removal - manual removal method
 - Microbial growth removal - pressure washer method
- B. See Figure 203 for flowchart of microbial growth program.
- C. Detection test for microbial contamination
- (1) Fuel samples from each tank are tested by microbial detection kit or laboratory standard test. Positive results for microbial contamination require action for biocide treatment to physically removing growth in fuel tanks.
 - (2) Follow instructions supplied with detection kits closely. Variations in fuel sample and ability of detection kits to consistently measure level of microbial growth make it important to retest if detection test shows microbial contamination. Do not compare test results between different types of detection kits.
 - (3) These are recommended test kits:
 - (a) Easicult Combi
 - (b) MicrobMonitor2
 - (c) Fuelstat Resinae
 - (d) Fuelstat Resinae Plus
 - (e) HY-LITE Jet A1
 - (f) HY-LITE 2
- D. Biocide treatment
- (1) If detection test is positive for microbial contamination you add biocide to kill microbial growth. These two biocide fuel additives are certified by airframe and engine manufactures:
 - (a) Biobor JF
 - (b) Kathon FP 1.5
 - (2) Biobor JF and Kathon FP 1.5 have not been approved in some geographic areas. Consult with local regulatory agency for approved status. Additives have special handling precautions.
 - (3) Biobor JF
 - (a) Fuel metering injection is preferred method of adding biocide to fuel tanks.
 - (b) Biocide should be used at rate of 270 ppm (parts per million) for an effective sterilization treatment.
 - (c) Do not use metering setting greater than 1000 ppm. At high concentrations Biobor in presence of water can crystallize out.
 - (d) Do not premix Biobor concentrate into small quantities of fuel first and then add to fuel tanks.
 - (e) Biobor JF containers should be protected from water. Containers should be capped tightly when not in use. Discard Biobor container if solids are present.
 - (4) Kathon FP 1.5

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- (a) Fuel metering injection is preferred method of adding biocide to fuel tanks.
 - (b) Kathon should be used at rate of 100 ppm (parts per million) for an effective sterilization treatment.
 - (c) Do not use metering setting greater than 1000 ppm.
- E. Microbial growth removal
- (1) There are two methods to remove microbial growth:
 - (a) Remove microbial growth - manual method
 - (b) Remove microbial growth - pressure washer method
 - (2) If detection test for microbial growth shows heavy contamination, then you must go into tanks to remove microbial growth. Do not wait too long to remove contamination. You expose tank structure and components to higher probability of corrosion. If you find corrosion, refer to SRM (51-23-0) for applicable repair procedure.
- F. Contamination in fuel tanks and structural corrosion can result from presence of microorganisms, which live and multiply at interface of fuel and water. Corrosion Prevention Manual (CPM) 20-62-00 Preventative Methods, gives more information about microbial growth and microbial growth prevention program.
- G. All areas to be sealed should be thoroughly cleaned immediately before sealant application. Cleaned area should be restricted to size that can be kept clean until sealant is applied. When it is necessary to blow compressed air on an area that has no-leakage requirement, compressed air that has been properly filtered to remove any oil, water, or other contaminant should be used. Water trap filters should not be used.
- H. Sealing should be planned well in advance. Incorrect use of sealants may require repetition of sealing procedures. Consider that some sealing compounds have short application time after being mixed with their accelerators.
- NOTE:** Tack-free and cure times are reduced if temperature of applied sealant or surrounding air is maintained above 21°C (70°F) and extended if lower temperatures exist.
- I. Metal surfaces should have minimum temperature of 21°C (70°F) before sealant may be applied. Best results will be obtained when surfaces are at temperature between 27°C (80°F) and 49°C (120°F). Approved means should be used to warm parts or structure when ambient temperature is below minimum temperature.
- J. If necessary to mark repair areas, use felt tip markers. Grease pencils should not be used. Marks should be removed with solvent or water and area dried before applying sealant.
- K. Classification of small leaks around integral fuel tank skin fasteners may be found in Structural Repair Manual, Chapter 51-23-1, Page 1. Temporary repair of these leaks will be found in Structural Repair Manual, Chapter 51-23-0, Page 1.

2. Equipment and Materials

A. Equipment

NOTE: Equivalent substitutes may be used instead of following listed items:

NOTE: It is possible that some materials in Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use materials, make sure types, quantities, and applications of materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

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Table 201

Name and Number	Manufacturer
MicrobMonitor2 (microbial growth detection kit)	ECHA Microsiology, UK
Easicult Combi (microbial growth detection kit)	Orion Diagnostica, Finland or Metalworking Chemical & Equipment Co., Inc, NY, USA
Fuelstat (microbial growth detection kit)	Conidia Bioscience LTD. TW, USA
Fuelstat Resinae Plus (microbial growth detection kit)	Conidia Bioscience LTD. TW, USA
HY-LITE Jet A1 Fuel Test Kit or HY-LITE 2	Merck KGaA Frankfurterstrasse 250 Darmstadt, D-64293 Germany
Portable hydrant cart - AC	Hammonds
Syringe - hypodermic	Commercially available
Biocide-Biobor JF (DPM 5356)	Commercially available
Gloves, chemical resistant	Commercially available
Respirator-full face-supplied, air type, U.S. Bureau of Mines approved	Commercially available
Rubber pants, boots, and jacket with hood	Commercially available
Airpowered sealant gun 250	Semco-Div. of Products Research and Chemical Corp.
Retainer (2-1/2) (6)(8)(12) ounces	Semco-Div. of Products Research and Chemical Corp.
Cartridges- plastic (polyethylene) (250-C2-1/2) (250-C6) (250-C8) (250-C12)	Semco-Div. of Products Research and Chemical Corp.
Plunger 250-P Standard	Semco-Div. of Products Research and Chemical Corp.
Nozzles assorted sizes	Semco-Div. of Products Research and Chemical Corp.
Spatulas (filleting tools) Kit No. 11798-500 (contains 3 tools packaged in case holder)	Semco-Div. of Products Research and Chemical Corp.
Heat curing equipment	
Wipers, cotton, cleaning, Type 1 Class A	Commercially available
Wipers Cleaning DMS 51820 T1A1	
Pad Abrasive Nylon Web DPM 3427	
Brush - Paint soft bristle (pure china or oxhair)	
Magic Marker (felt tip marker)	Speedry Products Inc.
Plastic scraper	
Scale	
Goggles, chemical safety	Commercially available

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Table 201 (Continued)

Name and Number	Manufacturer
Inconel Lockwire 0.032 in NASM20995N32, DPM 684	Not specified
Corrosion Resistant Steel Lockwire 0.032 in NASM20995C32, DPM 5865	Not specified
High pressure spray equipment Model 2BW	Hill Mfg Co.
Scotch Tape 1-inch, white No. 250	Minnesota Mining & Manufacturing Co.
Suction equipment	
Steam cleaner or pressure pot	
Safety can, 5 gallon with spout	
Alcohol, Isopropyl	Commercially available
New fuel sample container, dust free, glass or fuel resistant plastic	
Biobor JF, biocide	
Kathon FP 1.5, biocide	
Funnel, plastic	Commercially available

B. Sealants, Coating, and Cleaners

NOTE: Equivalent substitutes may be used instead of following listed items:

NOTE: It is possible that some materials in Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use materials, make sure types, quantities, and applications of materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 202

Material	Manufacturer	Mixing Ratio (Parts by Weight)
PR-1422B-2 or PR-1435 with accelerator (DPM 2292-2)	Products Research Co.	100 (base) to 13.5 (accelerator)
Coating- Polyurethane 823-707 base 910-702 catalyst DMS QPL 1850 Rev. C, Type 1 020-707 reducer DMS QPL 1850 Rev. C, Type 2	De Soto Inc.	4 (base) to 1 part catalyst to 1 part reducer-for brush application 4 (base) to 1 part catalyst (allow to sit 30 minutes) and add 5 parts reducer-for spray application
Solvent, hand wipe cleaner DPM 6410	Monsanto Company St. Louis, MO	
Cleaner, hand wipe DPM 6380-1		
Coating fuel vapor barrier brushing DPM 3430-1 or, coating fuel vapor barrier spraying DPM 3430-2		

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Table 202 (Continued)

Material	Manufacturer	Mixing Ratio (Parts by Weight)
Cleaner OXSOLV II DPM 6190		
Solvent, Douglas #2, P-D-680 (Stoddard) (DPM 518)		
Cleaner, # A-18 Super bee 210 (DPM 5216)	Cee Bee Chemical Co.	1 (detergent) to 4 (water)
Adhesive, Pro Seal 501 (DPM 2091)	Products Research & Chem. Corp., Glendale, CA.	

3. Detection Test for Microbial Contamination

A. You must wear protective equipment when you clean, sample and test for microbial growth. Protective equipment includes following:

- (1) Eye protection
- (2) Clean fuel resistant gloves
- (3) Clean protective outerwear.

B. Fuel sample for microbial detection test.

(1) Do these steps to clean fuel sampling equipment:

- (a) Mix solution of one part tap water to three to four parts isopropyl alcohol.
- (b) Clean these items with alcohol solution
 - 1) Sump drain tool
 - 2) Sump drain container
 - 3) Fuel sample container (if reused)
- (c) Air dry fuel sampling equipment.
- (d) Rinse fuel sampling equipment with fuel to remove any residue alcohol.
- (e) Protect containers from contamination.

(2) Do these steps to clean sump drain area:

- (a) Wear new fuel resistant gloves.
- (b) Mix solution of one part water to three to four parts alcohol, B00130.
- (c) Thoroughly clean exterior area of fuel sump drain with alcohol solution.
- (d) Air dry fuel sampling equipment.
- (e) Wipe sump area with fuel to remove any residue alcohol.
- (f) Repeat for each sump drain.

(3) Do these steps to collect fuel sample:

NOTE: Each sample must be collected separately for each fuel tank and stored in separate sample containers.

- (a) Use fuel sump drain to get fuel/water sample.
- (b) Pour fuel from sump drain into fuel sample container.
- (c) Make sure sample contains some visible water (free water) and some fuel.
- (d) Do not add any additives, such as food coloring, to fuel sample.

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- (e) Label each sample with date, aircraft and fuel tank identification.
 - (f) Protect fuel samples from contamination.
 - (g) Clean fuel sampling equipment again before you collect new sample for next tank.
 - (h) Deliver fuel samples to test area.
- C. Microbial detection test.
- (1) Use one of these approved test kits to test fuel samples:
 - (a) Easicult Combi
 - (b) MicrobMonitor2
 - (c) Fuelstat Resinae
 - (d) HY-LITE Jet A1
 - (e) HY-LITE 2
 - (2) Follow all instructions supplied with test kit.
 - (3) For Easicult Combi, test free water in fuel sample only.
 - (4) Monitor test results for up to four days (up to 6 days if sample is not in an incubator).
 - (5) Use test kit supplied chart to analyze level of contamination.
 - (6) Record test results.
- D. Test results. (Figure 201)
- (1) If initial test results show microbial contamination, then do these steps for all tanks:
 - (a) Within 10 days (after receipt of test results) collect new fuel sample and do detection test again.
 - (b) Use test kit supplied chart to analyze level of contamination.
 - (2) If retest confirms heavy levels of microbial contamination, then do these steps for all fuel tanks:
 - (a) Within 10 days (after receipt of test results) do these steps:
 - 1) Microbial growth removal.
 - 2) Biocide treatment of fuel tanks.
 - 3) Examine fuel tank structure for corrosion.
 - (b) After 30 days, collect new fuel sample and do detection test again.
 - (c) Make record of completed maintenance in microbial growth detection log.
 - (3) If retest confirms medium microbial contamination, then do these steps for all tanks:
 - (a) Within 10 days (after receipt of test results) do biocide treatment of fuel tanks.
 - (b) After 10 days, collect new fuel sample and do detection test again.
 - (c) Make record of completed maintenance in microbial growth detection log.
 - (4) If retest confirms negligible levels of microbial contamination, continue to monitor the fuel tanks per the scheduled inspection interval.

4. **Biocide Treatment of Fuel Tanks - Metered Fuel Injection (Preferred Method)**

A. General

- (1) This method uses metered fuel injection cart to add biocide to fuel tanks as you refuel aircraft.
- (2) It is recommended to do this procedure with minimum fuel load (after flight, before fuel servicing). It is not necessary to defuel aircraft before you start biocide treatment.
- (3) Use one of these biocide treatments:

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- (a) Biobor JF, Hammonds.
 - (b) Kathon FP 1.5 Biocide, Rohm and Hass Company.
- B. Prepare aircraft for fuel tank treatment.
- (1) It is recommended to do this procedure with minimum fuel load (fuel load after flight , prior to fuel servicing).
 - (2) Prepare for manual pressure refuel operation. (PRESSURE REFUELING - SERVICING, PAGEBLOCK 12-11-07/301)
 - (3) Prepare fuel metering injection cart.
 - (a) Bond and attach injection cart to refuel servicing equipment.
- C. Handling biocide additives.

WARNING: AVIATION TURBINE FUEL BIOCIDES ARE AN AGENT THAT IS FLAMMABLE, POISONOUS, AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN AVIATION TURBINE FUEL BIOCIDES ARE USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET AVIATION TURBINE FUEL BIOCIDES IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

CAUTION: DO NOT PUT LARGE CONCENTRATIONS OF BIOCIDES IN FUEL TANKS. LARGE CONCENTRATIONS CAN MAKE SALT PARTICLES THAT CAN CAUSE CORROSION.

- (1) Use this protective gear during maintenance with biocide fuel additives:
 - Eye protection.
 - Fuel resistant gloves.
 - Protective outerwear.
 - (2) If you spill biocide, then do these steps:
 - (a) Immediately contain spill area.
 - (b) Use cotton wiper and water to clean area.
 - (c) Use correct procedures to dispose of material.
- D. Calculate metered injection setting. (Figure 201)
- (1) Determine which fuel tanks need biocide treatment.

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- (2) Complete table A to calculate metered injection settings for each tank.
NOTE: Use table A, B and C to calculate metered injection settings. Table D and E are calculations for an example tank.
 - (3) Record onboard fuel quantity for each tank (column B).
 - (4) Determine how much fuel is necessary in each tank (minimum 1/3 full).
 - (5) Record desired fuel quantity for each tank (column A).
 - (6) Subtract desired fuel (A) by fuel to add (C) to calculate fuel to add.
 - (7) Record fuel to add or subtract for each tank (column C).
 - (8) Divide desired fuel (A) by fuel to add (C) to calculate concentration multiplier.
 - (9) Record concentration multiplier for each tank (column D).
 - (10) Determine maximum concentration in PPM for type of biocide used (table C).
 - (11) Record maximum concentration for each tank (column E).
 - (12) Multiply Biocide PPM (E) by multiplier (D) to calculate metered injection setting.
 - (13) Record metered injection setting for each tank (column F).
 - (14) Do not use metered injection setting greater than 1000 PPM.
- E. Add biocide to fuel tanks. (Figure 201)
- CAUTION:** IF THE MAXIMUM CONCENTRATION OF BIOCIDES IS EXCEEDED, CONTACT THE ENGINE MANUFACTURER TO FIND OUT IF THE AIRCRAFT MUST BE DEFUELED TO REDUCE THE CONCENTRATION OF BIOCIDES.
- CAUTION:** FOR BIOBOR JF; DO NOT EXCEED THE MAXIMUM CONCENTRATION OF BIOCIDES FUEL ADDITIVE TO THE FUEL TANKS. LARGE CONCENTRATION OF BIOCIDES FUEL ADDITIVE CAN MAKE SALT DEPOSITS IN THE FUEL TANKS.
- (1) Do not exceed maximum concentration limits of biocide (table C).
 - (2) Calibrate metering equipment to correct metered injection setting (table A).
NOTE: Refuel each tank individually if metered injection settings are different.
 - (3) Open valve to allow metering equipment to operate.
 - (4) Begin manual pressure refuel operation. (PRESSURE REFUELING - SERVICING, PAGEBLOCK 12-11-07/301)
 - (5) Stop refuel operation at desired fuel quantity (table A).
 - (6) Do these steps again for all tanks that will receive biocide treatment.
- F. Biocide treatment for fuel tanks.
- (1) It is not necessary to drain tanks after biocide is added.
 - (2) Recommended concentrations of biocide can be safely burned in engines.
 - (3) Keep biocide treatment in fuel tanks for required time.

Table 203

Time required for biocide treatment to remain in fuel tanks.	
Biobor JF	72 hours (minimum)
Kathon FP 1.5	24 hours (minimum) *

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Table 203 (Continued)

NOTE: * In some cases, more than 24 hours are necessary to kill all of microbial growth.

- (4) After biocide treatment time requirement, Return-to-Service (RTS).
- (5) Do these steps after 25 flight hours or at next overnight maintenance opportunity:
 - (a) Replace engine fuel filters.
 - (b) Replace Auxiliary Power Unit (APU) fuel filters. (LOW-PRESSURE FUEL FILTER - MAINTENANCE PRACTICES, PAGEBLOCK 49-30-05/201)

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METERED INJECTION SETTING - FUEL TANK REQUIREMENTS						
	A	B	C	D	E	F
FUEL TANK	DESIRED FUEL QTY (MINIMUM 1/3 FULL)	ONBOARD FUEL QTY	FUEL TO ADD	CONCENTRATION MULTIPLIER	BIOCIDE MAXIMUM CONCENTRATION (PPM) (SEE TABLE B)	METERED INJECTION SETTING
LEFT MAIN						
RIGHT MAIN						
CENTER						

TABLE A

METERED INJECTION SETTING - CALCULATIONS					
FUEL TO ADD		CONCENTRATION MULTIPLIER		METERED INJECTION SETTING	
DESIRED FUEL	A	DESIRED FUEL	A	BIOCIDE TREATMENT (PPM)	E
- ON BOARD FUEL	- B	÷ FUEL TO ADD	÷ C	X MULTIPLIER	X D
FUEL TO ADD	C	MULTIPLIER	B	METERED INJECTION SETTING	F

TABLE B

BIOCIDE TREATMENT MAXIMUM CONCENTRATION	
BIOBOR JF	270 PARTS PER MILLION BY WEIGHT
KATHON FP1.5	100 PARTS PER MILLION BY WEIGHT

TABLE C

BBB2-28-376
S0000178176V1

Metered Injection Setting
Figure 201/28-10-01-990-808 (Sheet 1 of 2)

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METERED INJECTION SETTING - EXAMPLE						
	A	B	C	D	E	F
FUEL TANK	DESIRED FUEL QTY (MINIMUM 1/3 FULL)	ONBOARD FUEL QTY	FUEL TO ADD	CONCENTRATION MULTIPLIER	BIOCIDE MAXIMUM CONCENTRATION (PPM)	METERED INJECTION SETTING
EXAMPLE TANK (LBS/KGS)	12,000	8000	4000	3	BIOBOR JF = 270	800 PPM
					KATHON FP 1.5 = 100	300 PPM

TABLE D

METERED INJECTION SETTING - EXAMPLE CALCULATIONS		
FUEL TO ADD	CONCENTRATION MULTIPLIER	METERED INJECTION SETTING
$\begin{array}{r} \text{DESIRED FUEL} \quad 12,000 \\ - \text{ON BOARD FUEL} \quad - 8000 \\ \hline \text{FUEL TO ADD} \quad 4000 \end{array}$	$\begin{array}{r} \text{DESIRED FUEL} \quad 12,000 \\ \div \text{FUEL TO ADD} \quad \div 4000 \\ \hline \text{MULTIPLIER} \quad 3 \end{array}$	$\begin{array}{r} \text{BIOCIDE TREATMENT (PPM)} \quad 270 \\ \times \text{MULTIPLIER} \quad \times 3 \\ \hline \text{METERED INJECTION SETTING} \quad 800 \end{array}$

TABLE E

BBB2-28-378
S0000178177V1

Metered Injection Setting
Figure 201/28-10-01-990-808 (Sheet 2 of 2)

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5. Biocide Treatment of Tanks - Overwing Fill Ports (Alternate Method)

A. General

- (1) If metered fuel injection equipment is not available, biocide treatment can be added into fuel tanks through overwing ports.
- (2) Biocide treatment must be calculated and added to fuel tanks.
- (3) After biocide treatment is added to main tanks, treated fuel must be transferred to other tanks.

B. Prepare fuel distribution for biocide treatment.

- (1) Make sure onboard fuel load is within these limits.
 - (a) Minimum - approximately 1/3 total fuel capacity.
 - (b) Maximum - approximately total fuel capacity for inboard and outboard main tanks.
 - (c) If it is necessary, add fuel to main tanks to make sure minimum fuel quantity is available.
- (2) Transfer all onboard fuel evenly between left and right main tanks. (FUEL LOADING - SERVICING, PAGEBLOCK 12-11-03/301)

C. Prepare overwing fill ports for biocide treatment.

WARNING: DO NOT OPERATE THE HF COMMUNICATION SYSTEM OR THE WEATHER RADAR DURING FUELING OPERATIONS. A FIRE OR EXPLOSION CAN OCCUR.

WARNING: DO NOT CONNECT A HEADSET AND DO NOT TOUCH CONNECTIONS TO THE AIRPLANE DURING ATMOSPHERIC ELECTRICAL ACTIVITY OR STRONG RADIATIVE FIELDS. LIGHTNING STRIKE AND HIGH DISCHARGE CURRENTS CAN CAUSE SEVERE INJURY.

WARNING: MAKE CERTAIN THAT FUEL SUPPLY UNIT IS GROUNDED AND CABLES TO AIRCRAFT GROUNDING CONNECTORS ARE PROPERLY CONNECTED. THIS CAN PREVENT A FIRE HAZARD FROM ELECTRICAL STATIC DISCHARGE. FIRE CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Connect grounding cable from approved earth ground to approved electrical ground point on aircraft (static ground).

WARNING: BE VERY CAREFUL WHEN YOU WALK OR DO WORK ON THE TOP AREAS OF THE WINGS. THE SURFACES ARE SLICK AND SLIPPERY. IF YOU ARE NOT CAREFUL, INJURY TO PERSONS CAN OCCUR.

- (2) Do these steps to make spill containment barrier around overwing fill port:
 - (a) Position sheet of plastic around overwing fill port.
 - (b) Use sandbags to hold down plastic.
 - (c) Adjust sheet to make spill containment barrier.

D. Handling biocide additives.

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WARNING: AVIATION TURBINE FUEL BIOCIDE IS AN AGENT THAT IS FLAMMABLE, POISONOUS, AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN AVIATION TURBINE FUEL BIOCIDE IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET AVIATION TURBINE FUEL BIOCIDE IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

CAUTION: DO NOT PUT LARGE CONCENTRATIONS OF BIOCIDE IN FUEL TANKS. LARGE CONCENTRATIONS CAN MAKE SALT PARTICLES THAT CAN CAUSE CORROSION.

- (1) During maintenance with biocide fuel additives, wear these protective equipment items:
 - (a) Eye protection
 - (b) Fuel resistant gloves
 - (c) Protective outerwear
 - (2) If you spill biocide, then do these steps:
 - (a) Immediately contain spill area.
 - (b) Use cotton wiper and water to clean area.
 - (c) Use correct procedures to dispose of biocide material.
- E. Calculate amount of biocide to add to fuel. (Figure 202)
- (1) Use applicable table A, B, C, or D to calculate amount of biocide to add to fuel main tanks.
 - (2) Record fuel quantity (lbs/kgs) for left main (column A).
 - (3) Multiply fuel quantity by applicable value (column B) to determine correct amount of biocide to add to left main.
 - (4) Record biocide quantity (fl. oz/ml or gals/liters) for left main (columns C and D).
 - (5) Do these steps again for right main.
- F. Add biocide to fuel tanks. (Figure 202)

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CAUTION: IF THE MAXIMUM CONCENTRATION OF BIOCIDES IS EXCEEDED, CONTACT THE ENGINE MANUFACTURER TO FIND OUT IF THE AIRCRAFT MUST BE DEFUELED TO REDUCE THE CONCENTRATION OF BIOCIDES.

CAUTION: FOR BIOBOR JF; DO NOT EXCEED THE MAXIMUM CONCENTRATION OF BIOCIDES FUEL ADDITIVE TO THE FUEL TANKS. LARGE CONCENTRATION OF BIOCIDES FUEL ADDITIVE CAN MAKE SALT DEPOSITS IN THE FUEL TANKS.

- (1) Do not exceed maximum concentration limits of limits of biocide.
- (2) Pour correct amount of biocide for single tank into approved metal container.

CAUTION: KEEP ALL LOOSE OBJECTS AWAY FROM FILL PORT. REMOVE ALL OBJECT FROM YOUR POCKETS (PENS, CIGARETTES, LIGHTERS ETC.) BEFORE OPENING FILL CAP. IF OBJECT DOES FALL INTO FUEL TANK, FIND AND REMOVE OBJECT IMMEDIATELY. UNWANTED OBJECTS IN FUEL TANK CAN CAUSE DAMAGE TO TANK EQUIPMENT.

- (3) Open overwing fill port for left main.
 - (4) Install funnel in overwing fill port.
 - (5) Pour biocide into fuel tank.
 - (6) Install overwing fill cap.
 - (7) Repeat these steps for right main.
 - (8) Remove equipment used to add biocide to overwing fill port.
- G. Distribute biocide treatment fuel to other fuel tanks.
- (1) Prepare aircraft to transfer fuel.
 - (2) Transfer fuel from left and right main tanks to center tank. (FUEL LOADING - SERVICING, PAGEBLOCK 12-11-03/301)
- H. Put aircraft back to usual condition.
- (1) Disconnect grounding cable from aircraft to earth ground.
- I. Biocide treatment for fuel tanks.
- (1) It is not necessary to drain tanks after biocide is added.
 - (2) Recommended concentration of biocide can be safely burned in engines.
 - (3) Keep biocide treatment in fuel for required time. (Table 203)
 - (4) Do these steps after 25 flight hours or at next overnight maintenance opportunity:
 - (a) Replace engine fuel filters.
 - (b) Replace APU fuel filters. (LOW-PRESSURE FUEL FILTER - MAINTENANCE PRACTICES, PAGEBLOCK 49-30-05/201)

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OVERWING FILL PORT BIOCIDES QUANTITY

BIOBOR JF (LBS)				
	A	B	C	D
FUEL TANK	FUEL QTY (LBS)*	BIOCIDE MAXIMUM CONCENTRATION**	BIOCIDE QTY (FL. OZ)	BIOCIDE QTY (U.S. GALS)
LEFT MAIN		0.004		
RIGHT MAIN		0.004		
EXAMPLE TANK	28,000 LBS	0.004	112 FL. OZ	0.87 U.S. GALS
NOTE* MINIMUM FUEL QUANTITY - 1/3 OF TOTAL FUEL CAPACITY				
NOTE** TO CALCULATE FLUID OUNCE OF BIOBOR JF REQUIRED TO GIVE MAXIMUM CONCENTRATION OF 270 PPM, MULTIPLY POUNDS OF FUEL IN FUEL TANK BY 0.004				

TABLE A

BIOBOR JF (KGS)				
	A	B	C	D
FUEL TANK	FUEL QTY (KGS)*	BIOCIDE MAXIMUM CONCENTRATION**	BIOCIDE QTY (MILLILITERS)	BIOCIDE QTY (LITERS)
LEFT MAIN		0.257		
RIGHT MAIN		0.257		
EXAMPLE TANK	12,700 KGS	0.257	3260 MILLILITERS	3.3 LITERS
NOTE* MINIMUM FUEL QUANTITY - 1/3 OF TOTAL FUEL CAPACITY				
NOTE** TO CALCULATE FLUID OUNCE OF BIOBOR JF REQUIRED TO GIVE MAXIMUM CONCENTRATION OF 270 PPM, MULTIPLY KILOGRAMS OF FUEL IN FUEL TANK BY 0.257				

TABLE B

BBB2-28-375A
S0000178349V2

Add Biocide to Overwing Fill Port
Figure 202/28-10-01-990-809 (Sheet 1 of 2)

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KATHON (GALLONS)				
	A	B	C	D
FUEL TANK	FUEL QTY (GALLONS)*	BIOCIDE MAXIMUM CONCENTRATION***	BIOCIDE QTY (GALLONS) ****	BIOCIDE QTY (FL. OZ) *****
LEFT MAIN		0.0001		
RIGHT MAIN		0.0001		
EX. 1	1,400 GALS	0.0001	0.140 GALS	17.9 FL. OZ
EX. 2	9266 LBS X 0.141=1307 GALLONS NOTE **	0.0001	0.131 GALS	16.7 FL. OZ
NOTE* MINIMUM FUEL QUANTITY IS 1/3 OF TANK FUEL CAPACITY				
NOTE** MULTIPLY FUEL QTY (LBS) X 0.141 CONVERSION FACTOR = FUEL QTY (GALLONS)				
NOTE*** MAXIMUM CONCENTRATION IS 100 PPM DIVIDED BY 1,000,000 PPM = 0.0001				
NOTE**** A (GALLONS) X B = BIOCIDE QTY (GALLONS)				
NOTE***** C BIOCIDE QTY (GALLONS) X 128 = BIOCIDE QTY (FL. OZ)				
NOTE***** 1. ONE GALLONS = 128 FLUID OUNCES. 2. WORSE CASE FUEL DENSITY IS 7.1 POUNDS PER GALLON. USE CONVERSION FACTOR 0.141 TO ENSURE BIOCIDE CONCENTRATION DOES NOT EXCEED 100 PPM. EX: 9400 POUNDS (LBS) X 0.141 = 1325 GALLONS. 3. EACH MAIN FUEL TANK HAS A MAXIMUM VOLUME OF APPROXIMATELY 1400 GALLONS. USE THE TANK FUEL QUANTITY (LBS) X 0.141 = GALLONS. EX: 3950 LBS X 0.141 = 557 GALLONS.				

TABLE C

KATHON (LITERS)				
	A	B	C	D
FUEL TANK	FUEL QTY (LITERS)*	BIOCIDE MAXIMUM CONCENTRATION***	BIOCIDE QTY (LITERS) ****	BIOCIDE QTY (MILLILITERS)*****
LEFT MAIN		0.0001		
RIGHT MAIN		0.0001		
EX. 1	5,300 LITERS	0.0001	0.530 LITERS	530 MILLILITERS
EX. 2	4500 KGS X 1.18=5310 LITERS NOTE **	0.0001	0.531 LITERS	531 MILLILITERS
NOTE* MINIMUM FUEL QUANTITY IS 1/3 OF TANK FUEL CAPACITY				
NOTE** MULTIPLY FUEL QTY (KGS) X 1.18 CONVERSION FACTOR = FUEL QTY (LITERS)				
NOTE*** MAXIMUM CONCENTRATION IS 100 PPM DIVIDED BY 1,000,000 PPM = 0.0001				
NOTE**** A (LITERS) X B = BIOCIDE QTY (LITERS)				
NOTE***** C BIOCIDE QTY (LITERS) X 1000 = MILLILITERS				
NOTE***** 1. ONE LITER = 0.85 KILIGRAMS (KGS). 2. WORSE CASE FUEL DENSITY IS 0.85 KGS PER LITER. USE CONVERSION FACTOR 1.18 TO ENSURE BIOCIDE CONCENTRATION DOES NOT EXCEED 100 PPM. EX: 4600 KILOGRAMS (KGS) X 1.18 = 5428 LITERS. 3. EACH MAIN FUEL TANK HAS A MAXIMUM VOLUME OF APPROXIMATELY 5300 LITERS. USE THE TANK FUEL QUANTITY (KGS) X 1.18 = LITERS. EX: 1825 KGS X 1.18 = 2154 LITERS.				

TABLE D

BBB2-28-380
S0000215876V1

**Add Biocide to Overwing Fill Port
Figure 202/28-10-01-990-809 (Sheet 2 of 2)**

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6. Microbial Growth Fuel Tank Inspection

A. General

- (1) If detection test for microbial confirms heavy contamination, then entry is required to remove microbial growth. First step is inspection to determine extend of microbial contamination. Do not wait to remove contamination, this exposes tank structure and components to higher probability of corrosion. If corrosion exists, refer to Structural Repair Manual (SRM) for applicable repair procedure.
- (2) Microbes become attached to fuel tank structure in areas where water collects, usually at bottom surfaces of tanks.
- (3) If tanks are wet with fuel, fungus is black, smooth, moist material. When tanks are dry, fungus is solid material on tanks surfaces. Solid material can have light brown color when it is dry.
- (4) There are several methods to remove microbial growth. If area that is contaminated is small, use wipers dampened with alcohol or brush to remove growth. If contamination is large (manual removal is not practical), use hot water pressure washer to remove microbial growth. If pressure is used, remove all of tank fuel quantity components (water scavenge and fuel scavenge jet pumps). Use care not to damage fuel tank sealant. When finished, make sure all water is removed from tank and tank is completely dried.
- (5) Cleaning procedures does not kill microbial contamination. cleaning procedures are used to physically remove debris by heavy microbial contamination. After debris is removed, fuel tanks must be treated with biocide for full biocide treatment to kill remaining microbials. (Table 203)
- (6) Fuel tank structure contains flow holes and drain tubes through wing stringers. These drain passages allow fuel and water to drain to sump drains at lowest area of fuel tank. Keep holes and tubes clear of unwanted material. If flow holes or drain tubes become blocked, prior drainage of fuel and water will not occur.

B. Prepare for inspection.

WARNING: CAREFULLY DO ALL OF THE SAFETY PROCEDURES TO PREPARE TO GO INTO THE FUEL TANK. IF YOU DO NOT OBEY THE SAFETY PROCEDURES, YOU CAN CAUSE AN EXPLOSION. AN EXPLOSION WILL CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

- (1) Defuel applicable fuel tank(s). (DEFUELING - SERVICING, PAGEBLOCK 12-11-01/301)
- (2) Prepare for fuel tank entry. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- (3) Make sure fuel tank has sufficient flow of air.

WARNING: PUT ON AN APPROVED RESPIRATOR AND PROTECTIVE CLOTHING BEFORE YOU GO INTO A FUEL TANK THAT HAS MICROBIAL GROWTH CONTAMINATION. DO NOT BREATHE AIR THAT HAS MICROBIAL GROWTH RESIDUE. DO NOT GET THE MICROBIAL GROWTH ON YOUR SKIN. HEALTH PROBLEMS CAN OCCUR. MICROBIAL CONTAMINATION CAN CAUSE INJURIES TO PERSONNEL.

- (4) Put on this protective gear to prevent contact with microbial growth:
 - (a) Respirator, half face canister style with microbial growth.
 - (b) Eye protection.
 - (c) Fuel resistant gloves.
 - (d) Saranex suit.
 - (e) Neoprene boots.

C. Inspect fuel tank(s) for microbial contamination:

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- (1) Visually inspect for microbial growth:
 - (a) If fuel tanks is wet with fuel, growth is black, smooth, moist material.
 - (b) If tank is dry, growth is solid material on tank surfaces. Solid material can have light brown color when it is dry.
- (2) Inspect these areas for microbial growth:
 - (a) Bottom of tank.
 - (b) Lower surfaces of wing structure (stringers, spars, ribs, etc.).
 - (c) Top surface of tubing.
 - (d) Flow holes and drain tubes for blockage.
 - (e) Fuel quantity components.
 - (f) Fuel scavenge system.
 - (g) Water scavenge system.
 - (h) Areas where water is possibly trapped.
- (3) Determine which method to use to clean fuel tank(s):
 - (a) If contamination area is small, use manual removal method for microbial growth removal. (Paragraph 7.)
 - (b) If contamination area is large or in area inaccessible, use pressure washer method for microbial growth removal. (Paragraph 8.)

7. Microbial Growth Removal - Manual Removal Method

A. Prepare to remove microbial growth.

- (1) Do this procedure after microbial growth fuel tank inspection. (Paragraph 6.)

WARNING: CAREFULLY DO ALL OF THE SAFETY PROCEDURES TO PREPARE TO GO INTO THE FUEL TANK. IF YOU DO NOT OBEY THE SAFETY PROCEDURES, YOU CAN CAUSE AN EXPLOSION. AN EXPLOSION WILL CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

- (2) Prepare fuel tank for tank entry. (PAGEBLOCK 28-00-00/201)

WARNING: MAKE SURE THAT THERE IS A GOOD FLOW OF AIR IN THE FUEL TANK WHERE YOU WILL REMOVE THE MICROBIAL GROWTH. A GOOD FLOW OF AIR WILL PREVENT THE BUILD-UP OF ISOPROPYL ALCOHOL FUMES. ISOPROPYL ALCOHOL IS FLAMMABLE AND POISONOUS. INJURIES TO PERSONNEL CAN OCCUR.

- (3) Make sure fuel tank has sufficient flow of air.

WARNING: PUT ON AN APPROVED RESPIRATOR AND PROTECTIVE CLOTHING BEFORE YOU GO INTO A FUEL TANK THAT HAS MICROBIAL GROWTH CONTAMINATION. DO NOT BREATHE AIR THAT HAS MICROBIAL GROWTH RESIDUE. DO NOT GET THE MICROBIAL GROWTH ON YOUR SKIN. HEALTH PROBLEMS CAN OCCUR. MICROBIAL CONTAMINATION CAN CAUSE INJURIES TO PERSONNEL.

- (4) Put on this protective gear to prevent contact with microbial growth:
 - (a) Respirator - Half face canister style respirators (minimum).
 - (b) Fuel and alcohol resistant gloves.
 - (c) Eye protection.
 - (d) Saranex suit.

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- (e) Neoprene boots.
- B. Remove Microbial Growth - Manual Method
- (1) Go into fuel tank. (PAGEBLOCK 28-00-00/201)
 - (2) Use fiber brush to loosen contamination.
 - (3) Apply isopropyl alcohol to clean lint free wiper.
 - (4) Use minimum amount of isopropyl alcohol that is necessary.
 - (5) Use cotton wiper to remove microbial growth.
 - (6) Put any used cotton wipers in plastic bag to reduce isopropyl alcohol vapor in tank.
 - (7) Use an air hose or wire to make sure flow hole areas are free of unwanted material.
 - (8) Use air hose with nozzle (90 psi maximum) to blow any material from inlet screen on water and fuel scavenge pumps.
 - (9) Do visual check of fuel tank structure for corrosion.
 - (a) If you find corrosion, then repair damage. (SRM 57)
 - (10) Close fuel tank. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
 - (11) Do biocide treatment of fuel tanks. (Paragraph 4.)
 - (12) Put aircraft back to usual condition.
- 8. Microbial Growth Removal - Pressure Washer Method**
- A. Hot water pressure washer precautions.
- (1) When cleaning fuel tank with pressure washer, do the following:
 - (a) Person in fuel tank must have these items for protection:
 - 1) Heat protective gloves.
 - 2) Waterproof outer gloves.
 - 3) Waterproof coat and pants.
 - 4) Waterproof and heat protective hood.
 - 5) Full face mask.
 - 6) Protective gear to protect against breathing or touching microbial growth.
 - 7) Hot water line that closes automatically when you release it ("deadman" control switch).
 - (b) Fuel tank observer must monitor person in tank for signs of health problems related to overheating.
 - (c) Use air movers to have good flow of air in tanks.
 - (d) While you clean, continue to move air through tank.
 - (e) To prevent damage, remove tank fuel quantity system components.
 - (f) Make sure to use correct pressure washer technique:
 - 1) Use spray of approximately 100 psi maximum at tank surface.
 - 2) Keep time you point nozzle at one position to minimum.
 - 3) Move spray through an area at approximately 6 in. (152 mm) per second.
 - 4) Many fast passes are better than one slow pass.
NOTE: This loosens the joint.
 - 5) Do not point spray at feathered edge of seal compound.

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- (g) If you put heat or water pressure on sealant for long time, you can damage sealant.
- B. Prepare tank for hot water pressure washing.

(1) Do this procedure after microbial growth fuel tank inspection. (Paragraph 6.)

WARNING: CAREFULLY DO ALL OF THE SAFETY PROCEDURES TO PREPARE TO GO INTO THE FUEL TANK. IF YOU DO NOT OBEY THE SAFETY PROCEDURES, YOU CAN CAUSE AN EXPLOSION. AN EXPLOSION WILL CAUSE INJURIES TO PERSONNEL, AND DAMAGE TO EQUIPMENT.

(2) Prepare to go into fuel tank.

(3) Put on this protective gear to prevent contact with microbial growth:

WARNING: PUT ON AN APPROVED RESPIRATOR AND PROTECTIVE CLOTHING BEFORE YOU GO INTO A FUEL TANK THAT HAS MICROBIAL GROWTH CONTAMINATION. DO NOT BREATHE AIR THAT HAS MICROBIAL GROWTH RESIDUE. DO NOT GET THE MICROBIAL GROWTH ON YOUR SKIN. HEALTH PROBLEMS CAN OCCUR. MICROBIAL CONTAMINATION CAN CAUSE INJURIES TO PERSONNEL.

(4) Put on this protective gear to prevent contact with microbial growth:

- (a) Respirator - Half face canister style respirators (minimum).
- (b) Fuel and alcohol resistant gloves.
- (c) Eye protection.
- (d) Saranex suit.
- (e) Neoprene boots.

(5) Remove these components for tank(s) to be cleaned:

- (a) Fuel quantity probes. (FUEL QUANTITY PROBES - MAINTENANCE PRACTICES, PAGEBLOCK 28-40-01/201)
- (b) Fuel scavenge jet pumps. (TANK SCAVENGE JET PUMP - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-12/201)

(6) Put protective cover on these fuel system components and attach REMOVE BEFORE FLIGHT TAG:

- (a) Fuel pump.
- (b) Scavenge and water ejector pump inlets.

C. Pressure wash fuel tank.

(1) Put on this protective gear to protect against hot water pressure spray:

- (a) Respirator - Full face canister style respirators (minimum).
- (b) Heat protective gloves.
- (c) Waterproof outer gloves.
- (d) Waterproof pants, coat and boots.
- (e) Waterproof and heat protective hood.

(2) Use pressure washer to clean fuel tank:

- (a) Start at outboard end of tank.
- (b) Hold nozzle at distance between 6 in. (152 mm) and 10 in. (254 mm) from tank surface.
- (c) Position nozzle at 45° angle to tank surface.
- (d) Point nozzle in direction of access opening and drain valve opening.

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- (e) Continue to clean in direction of drain valve opening and access opening.
 - (f) Only use enough spray to remove microbial growth.
 - (g) Use short bursts, not continuous flow.
 - (h) Move loose microbial growth and any unwanted material to inboard end of tank and out of openings.
 - (i) Complete pressure washing of fuel tank.
- (3) After you pressure wash fuel tank, do these steps:
- CAUTION:** MAKE SURE THAT YOU REMOVE ALL OF THE WASTE PARTICLES AFTER YOU CLEAN THE FUEL TANK. THE UNWANTED MATERIAL CAN CAUSE A BLOCKAGE OF THE EJECTOR AND SCAVENGE PUMPS. PARTICLES CAN STOP THE OPERATION OF THESE SYSTEMS.
- (a) Use an air hose with nozzle (90 psi maximum) to blow any material from inlet screen on water and fuel scavenge pumps.
 - (b) Use an air hose or wire to make sure flow hole areas are free of loosened microbial growth or unwanted material.
 - (c) For outboard main tanks, make sure that drain hole in midspar web is clear.
- (4) Repeat these steps to pressure wash remaining tanks as necessary.
- D. Restore fuel tank
- (1) Remove water from fuel tank:
 - (a) Continue to have good flow of air until tank is dry.
 - (b) Use air-powered vacuum cleaner to remove water.
 - (c) Mop up any water that remains with cotton wiper.
 - (2) Do check of fuel tank for damage:
 - (a) Do visual check of fuel tank structure for corrosion.
 - 1) If you find corrosion, then repair damage. (SRM 57)
 - (b) Do visual check for missing or damaged fuel tank sealant.
 - 1) If there is damage, repair sealant.
 - (c) Do visual check for missing or loose fuel tank protective finish (topcoat).
 - 1) If there is loose finish, apply corrosion resistant finish (topcoat).
- E. Put aircraft back to its usual condition.
- (1) Remove fuel tank cleaning equipment and material.
 - (2) Install these components:
 - (a) Fuel quantity probes. (FUEL QUANTITY PROBES - MAINTENANCE PRACTICES, PAGEBLOCK 28-40-01/201)
 - (b) Fuel scavenge jet pumps. (TANK SCAVENGE JET PUMP - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-12/201)
 - (3) Remove protective covers from these fuel system components:
 - (a) Fuel pumps.
 - (b) Water scavenge systems.
 - (c) Fuel scavenge systems.
 - (4) Close fuel tank. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

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- (5) Do biocide treatment of fuel tanks. (Paragraph 4.)

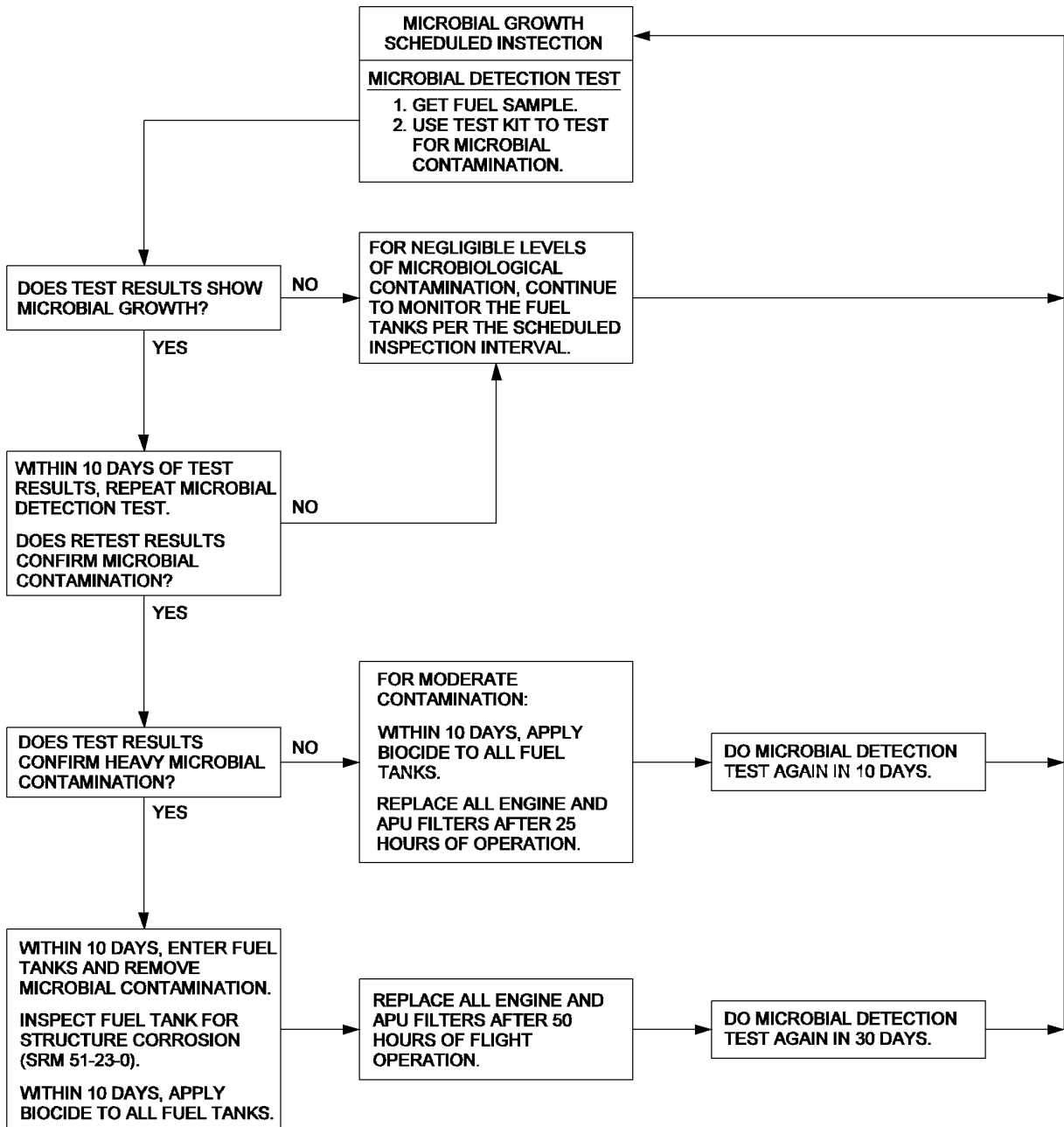
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NOTE: IF DETECTION TEST SHOWS MICROBIAL GROWTH, THEN DO SCHEDULED INSPECTION TEST MORE OFTEN.

BBB2-28-377B
S0000178782V3

MICROBIAL GROWTH PROGRAM
Figure 203/28-10-01-990-810

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9. Check Fuel Tank for Contamination

A. Check for Contamination

- (1) Using microbial test kit, COM-4806, put fuel sample in two bottles using hypodermic syringe.
- (2) Examine fuel samples for change in color after 48 hours.

NOTE: If fuel samples change colors, fuel has some contamination.

CAUTION: REMOVE MICROBES AND FUNGUS FROM TANKS AS SOON AS POSSIBLE. MICROBES AND FUNGUS CAN CAUSE CORROSION TO FUEL TANK STRUCTURE AND COMPONENTS.

- (3) Defuel applicable tank. (DEFUELING - SERVICING, PAGEBLOCK 12-11-01/301)
- (4) Prepare fuel tank for entry. (PAGEBLOCK 28-00-00/201)
- (5) Enter tank and check surfaces for material that has different color.

NOTE: Fungus and microbes are in hydrocarbon fuels, which become attached to bottom surfaces of tanks.

NOTE: Material usually has brown or black color.

- (6) Check top surfaces of tubing and bottom of tank.
- (7) Fill tanks to approximately 10% of capacity before putting biocide in tank.

WARNING: AVIATION TURBINE FUEL BIOCIDES ARE AN AGENT THAT IS FLAMMABLE, POISONOUS, AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN AVIATION TURBINE FUEL BIOCIDES ARE USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET AVIATION TURBINE FUEL BIOCIDES IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

CAUTION: DO NOT PUT LARGE CONCENTRATIONS OF BIOCIDES IN FUEL TANKS. LARGE CONCENTRATIONS CAN MAKE SALT PARTICLES THAT CAN CAUSE CORROSION.

- (8) Add biocide to fuel in maximum concentration of 270 parts per million (ppm) by weight using calibrated injection equipment.
- (9) If calibrated injection equipment is not available, determine quantity of biocide required for each tank as follows:
 - (a) Determine quantity of Biobor JF biocide required using Biocide Concentration Formula. (Figure 204).

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- (b) For each tank, add required quantity of biocide to approximately two gallons of fuel in clean, five gallon safety can, with flexible spout.
- (c) Mix contents in safety can, add two more gallons of fuel and mix thoroughly.
- (d) Static bond safety can to wing before opening overwing fuel adapter or equivalent opening. Add contents of safety can to designated fuel tank through open adapter. Close adapter or opening after addition of safety can contents is completed.

CAUTION: PROTECT WING SURFACE FROM PHYSICAL DAMAGE AND ENSURE THAT PROVISION IS MADE TO PROTECT AGAINST PERSONNEL SLIPPAGE.

- (e) Transfer fuel between two tanks to assure proper mixing, maintaining tanks between 10 and 60 percent filled.
 - (f) Perform transfer of fuel with alternate tanks until all tanks and interconnecting lines have been treated with properly mixed fuel.
- (10) Disconnect fuel lines at engine and pump fuel into large container.
 - (11) Place caps on fuel lines.
 - (12) Fill tanks until tanks are full with fuel and biocide.
 - (13) Leave fuel and biocide in tank for minimum of 72 hours.
 - (14) Defuel tank. (DEFUELING - SERVICING, PAGEBLOCK 12-11-01/301)
 - (15) Prepare tank for entry. (PAGEBLOCK 28-00-00/201)
 - (16) Check for structural corrosion caused by fungus and microbes.

NOTE: If tanks are wet with fuel, fungus is black, smooth, moist material. If tanks are dry, fungus is solid material on tank surfaces having light brown color. Fungus is usually found on bottom lower panel of wing and adjacent areas where water collects.

- (17) Remove caps from fuel lines and connect fuel lines to engine.

10. Clean Fuel Tank Contamination

A. Clean Contamination

WARNING: OBEY ALL APPLICABLE PRECAUTIONS WHEN YOU CLEAN FUEL TANK WITH STEAM. INJURIES FROM STEAM OR DAMAGE TO FUEL TANK CAN EASILY OCCUR.

CAUTION: DO NOT USE DETERGENTS TO REMOVE FUNGUS FROM TANK SURFACES. USING DETERGENTS WILL CAUSE MICROBES AND FUNGUS TO INCREASE IN OTHER LOCATIONS.

- (1) Following precautions should be thoroughly understood before steam cleaning tanks:
 - (a) Person must wear fuel resistant gloves, full face mask, and rubber hood.
 - (b) Use steam line that closes automatically when valve is released (line with "dead man" valve).
 - (c) Person outside of tank (spotter) must look for signs of dangerous conditions.
 - (d) Air movers must be used to provide good air flow in tanks.
 - (e) Move air constantly through tank during cleaning to decrease steam concentration.
 - (f) Keep time you point steam at one position to minimum, moving steam through an area at approximately 6 inches per second.
- NOTE:** More fast passes are better than one slow pass.
- (g) Do not point steam at feathered edge of seal compound. This will loosen joint.

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- (2) Steam clean tanks to remove fungus and microbes. Paragraph 11.C.

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$$\text{FL. OZ. OF BIOBOR JF} = F \cdot Q \cdot \left(1 - \frac{C}{235}\right)$$

WHERE: F = QUANTITY OF FUEL

IF FUEL IN TANK CONTAINS BIOBOR, F = FUEL ADDED (SERVICED).
IF FUEL IN TANK CONTAINS NO BIOBOR, F = TOTAL FUEL AFTER SERVICED.

Q = 0.0035 WHEN F IS IN POUNDS OR
0.0226 WHEN F IF IN GALLONS.

C = CONCENTRATION OF BIOBOR JF IN
PPM BY WEIGHT OF FUEL FROM SERVICE TRUCK OR HYGRANT SYSTEM.

BBB2-28-270A
S0006536056V2

Biocide Concentration Formula
Figure 204/28-10-01-990-802



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11. Cleaning/Painting Fuel Tanks

WARNING: MOST CLEANING COMPOUNDS HAVE A LOW FLASH POINT AND ARE DANGEROUS FIRE HAZARDS. PROVIDE PROTECTIVE EQUIPMENT AND ADEQUATE VENTILATION FOR ALL PERSONNEL BEFORE ANY CLEANING OPERATION IS STARTED. ALL CLEANING SOLVENTS ARE HARMFUL TO SKIN. DO NOT USE CLEANING SOLVENTS TO REMOVE SEALANT FROM SKIN. USE COMMERCIAL, WATERLESS HAND CLEANERS.

A. Types of Cleaning Compounds. (Paragraph 2.)

NOTE: Periodic inspection, cleaning, and repair of integral fuel tanks is necessary to maintain integrity of wing structure and to ensure proper continued functioning of fuel handling system. Since corrosion can result from fuel supplies that are contaminated with water and microorganisms, cleaning procedure has been developed to permit frequent and rapid tank cleaning, in addition to standard method of tank cleaning with detergents.

NOTE: Steam cleaning using water only may be accomplished in eight hours or less, and is recommended at 1000 hour maintenance check intervals. Detergent cleaning, which achieves tank sterilization and thorough cleanup, requires more than eight hours, and is recommended at overhaul periods or when severe fuel contamination conditions exist.

(1) Solvent Type, Light-Duty

- (a) This is light naphtha material that evaporates rapidly and is best suited for cleaning operations involving removal of slight deposits of dirt or surface contamination. It is safe for use on primed or painted surfaces and should be applied with light, quick, wiping action without any scrubbing.

(2) Solvent Type, Heavy-Duty

- (a) This is cleaner used to remove heavy deposits of dirt, grease, or contamination. This type of cleaner should be applied with stiff brush or heavy cloth, using heavy scrubbing action.

B. Using Cleaning Compounds

CAUTION: USE SCRAPERS THAT WILL NOT DAMAGE TANK SURFACE.

- (1) Scrape off as much old sealant as possible from parts to be sealed.

WARNING: P-D-680 TYPE 1 SOLVENT IS AN AGENT THAT IS FLAMMABLE AND POISONOUS. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN P-D-680 TYPE 1 SOLVENT IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET P-D-680 TYPE 1 SOLVENT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

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WARNING: SEALANT REMOVER SOLVENT IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN SEALANT REMOVER SOLVENT IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET SEALANT REMOVER SOLVENT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (2) Select right cleaner or combination of cleaners for job. If combination of cleaners is required, use in proper sequence.

CAUTION: USE ONLY CLEAN COTTON CLOTH. DO NOT CONTAMINATE CLEANER BY DIPPING CLOTH INTO CLEANER OR ALLOWING EXCESS TO RUN BACK INTO FRESH SUPPLY.

- (3) Pour cleaner on cloth and wring out excess.
- (4) Apply cleaner lightly or vigorously, as required by surface to be cleaned.
- (5) Clean only as large an area as can be properly protected from contamination until sealant can be applied.
- (6) Wipe area dry before cleaner evaporates and leaves deposits.
- (7) Change both cleaning and drying cloths frequently so contamination from cloths does not occur.

C. Steam Cleaning of Tanks

- (1) Prepare tank for entry. (PAGEBLOCK 28-00-00/201)
- (2) Remove fuel quantity probes.
- (3) Seal fuel level control pilot valves, fuel level control pilot and selector, and fuel transfer level control pilot valve with plastic covers, or remove components.
- (4) Plug all open fuel pipes and electrical connectors in tank area.
- (5) Place suction hose intake in inboard end of tank.

CAUTION: DETERGENTS ARE NOT USED WITH THIS PROCEDURE.

CAUTION: DO NOT EXCEED 100 PSIG (690.0 KPA) NOZZLE PRESSURE WHEN CLEANING TANKS WITH POLYURETHANE 823-707 COATING.

- (6) Using small capacity steam cleaner or pressure pot capable of projecting fluid at nozzle pressure of 50 to 75 psig (345 to 517.5 kPa) at 140°F to 160°F (60°C to 71°C), clean tanks as follows:

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- (a) Apply suction to suction hose.
- (b) Beginning with outboard portion of tank and holding spray nozzle 6 to 12 inches (15 to 30 cm) from surface, steam clean interior using spray to move contaminants in an inboard direction so they may be removed with suction hose.

NOTE: Primary areas of wing tank contamination are four inboard bays of left and right wing tanks.

- (c) Should any bacteria residue be encountered, scrape off with soft brush or nonmetallic scraper (or equivalent).

NOTE: If any bacteria residue was encountered, tanks should be sprayed with warm detergent (DPM 5216) Paragraph 11.C., followed by warm high pressure spray rinse Paragraph 11.D..

- (d) Clean fuel transfer piping surfaces but do not spray steam directly into pump inlets or electrical connectors. Use 45 and 90 degree (1.79 and 1.57 rad) spray heads with extensions as required to clean all structural surfaces.
 - (e) Remove water from tanks after steam cleaning by suction hose and by wiping with clean cotton cloths, including upper wing skin surfaces and stringers. Use ventilation to ensure complete drying.
 - (f) Check cleaned areas for corrosion, Boeing tank coating, and sealant integrity. Repair as required. (SRM, Chapter 51).
- (7) When tanks are drained and before water has started to dry on interior tank surfaces, wipe tanks dry with clean cotton lint-free cloths. Air-dry tanks with blowers connected to outboard panel door accesses. Ensure that air is oil free. Filter air through four layers of cheesecloth, or equivalent, fastened over each blower outlet. Change filters every 4 to 6 hours during drying operation.
- (8) After tank has been cleaned, rinsed, and thoroughly dried, check adhesion of sufficient areas of coating to ensure complete integrity of coating of entire tank. Polyurethane tank coating may be checked visually for blistering. Check adhesion of 823-707 coating as follows:
- (a) Apply strip of 1 inch white Scotch No. 250 tape across scribed area and press down firmly by hand exerting approximately 4 pounds (1.8 kg) of pressure.
 - (b) Grasp tape by one end and remove with an abrupt motion, maintaining an angle of approximately 90 degrees between tape and surface. Carefully check area for removal of coating from metal.
- NOTE: Close visual examination is required to detect adhesion failures on heavy films of coating that will not lift with tape test. These areas must be removed using micarta scrapers to lift and peel coating. Films of coating that have evidence of moisture or fuel penetration discoloration, corrosion, blistering, etc., must be removed and replaced.
- (c) Surface treat and recoat scribed, corroded, or damaged area(s). (SRM, Chapter 51)
- NOTE: Use of fuel additive such as Biobor JF Biocide, or Phillips MB55 anti-icing additive is recommended for first fueling after cleaning. Fuel additives should be used in accordance with engine manufacturers recommendations.

D. Detergent Cleaning of Tanks

NOTE: Detergent cleaning of tanks inhibits future bacteria growth since thin film of residue is left after rinsing.

- (1) Prepare tanks for entry. (PAGEBLOCK 28-00-00/201)
- (2) Remove fuel quantity probes.

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- (3) Seal fuel level control pilot valves, fuel level control pilot and selector, and fuel transfer level control pilot valve with plastic covers, or remove components.
- (4) Plug all open fuel pipes and electrical connectors in tank area.
- (5) Place suction hose intake in inboard end of tank.

WARNING: LIQUID DETERGENT IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN LIQUID DETERGENT IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LIQUID DETERGENT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

CAUTION: DO NOT EXCEED 100 PSIG (690.0 KPA) NOZZLE PRESSURE WHEN CLEANING TANKS WITH POLYURETHANE 823-707 COATING.

CAUTION: HIGH PRESSURE WATER SPRAY RINSE CLEANING SHOULD NOT BE USED ON TANKS COATED WITH POLYURETHANE 823-707 MATERIAL DUE TO POSSIBLE DAMAGE TO COATING.

- (6) Using small capacity steam cleaner or pressure pot capable of projecting fluid at nozzle pressure of 50 to 75 psig (345 to 517.5 kPa at 140°F to 160°F (60°C to 71°C) and cleaner (DPM 5216), starting at outboard end of tank and proceeding inboard, clean tanks as follows:
 - (a) Apply suction to suction hose.
 - (b) Open cleaner feed valve and apply cleaning solution to all tank surfaces. Permit cleaning solution to run off, then visually check area for cleanliness. Ensure that natural fuel traps and recesses are adequately cleaned. Repeat cleaning if necessary.
 - (c) Before proceeding to next section of tank, close cleaner valve and rinse area with clean, hot water. Ensure that detergent cleaning materials have been flushed inboard to drain holes.
- (7) Thoroughly rinse each tank section with large volumes (approximately 300 gallons (1135 liters) per tank) of clean tap water. Rinse tank sections before cleaning solution has started to dry.
- (8) Tanks will accumulate considerable water. In addition to normal drainage through fuel sump drain holes, use small-capacity suction pump to assist in removal of water.
- (9) When each tank has been cleaned, rinsed, and drained by sections, check tanks thoroughly and ensure that all contamination and cleaning materials have been removed.

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- (10) When tanks are drained and before water has started to dry on interior tank surfaces, wipe tanks dry with clean cotton lint-free cloths. Air-dry tanks with blowers connected to outboard panel door accesses. Ensure that air is oil free. Filter air through four layers of cheesecloth, or equivalent, fastened over each blower outlet. Change filters every 4 to 6 hours during drying operation.
 - (11) Wait 30 minutes, then spray rinse tanks. (Paragraph 11.D.)
- E. High Pressure Spray Rinse Cleaning of Tanks
- (1) Prepare tank for entry. (PAGEBLOCK 28-00-00/201)
 - (2) Remove fuel quantity probes.
 - (3) Seal fuel level control pilot valves, fuel level control pilot and selector, and fuel transfer level control pilot valve with plastic covers, or remove components.
 - (4) Plug all open fuel pipes and electrical connectors in tank area.
 - (5) Place suction hose intake in inboard end of tank.

CAUTION: HIGH PRESSURE WATER SPRAY RINSE CLEANING SHOULD NOT BE USED ON TANKS COATED WITH POLYURETHANE 823-707 MATERIAL DUE TO POSSIBLE DAMAGE TO COATING.

- (6) Using high pressure spray equipment and warm water (temperature of water not to exceed 140°F (60°C), spray clean tanks as follows:
 - (a) Apply suction to suction hose.
 - (b) Beginning with outboard portion of tank and holding spray nozzle 6 to 12 inches (15 to 30 cm) from surface, spray clean interior using spray to move contaminants in an inboard direction so they may be removed with suction hose.
- (7) When tanks are drained and before water has started to dry on interior tank surfaces, wipe tanks dry with clean cotton lint-free cloths. Air-dry tanks with blowers connected to outboard panel door accesses. Ensure that air is oil free. Filter air through four layers of cheesecloth, or equivalent, fastened over each blower outlet. Change filters every 4 to 6 hours during drying operation.
- (8) After tank has been cleaned, rinsed and thoroughly dried, check adhesion of sufficient areas of coating to ensure complete integrity of coating of entire tank. Polyurethane tank coating may be checked visually for blistering. Check adhesion of 823-707 coating as follows:
 - (a) Apply strip of 1 inch white Scotch No. 250 tape across scribed area and press down firmly by hand exerting approximately 4 pounds of pressure.
 - (b) Grasp tape by one end and remove with an abrupt motion, maintaining an angle of approximately 90 degrees between tape and surface. Carefully check area for removal of coating from metal.
 - (c) Whenever adhesion failures are observed, continue tape testing all edges of coating perpendicular to coating edge, pulling away from bared area.

NOTE: Close visual examination is required to detect adhesion failures on heavy films of coating that will not lift with tape test. These areas must be removed using micarta scrapers to lift and peel coating. Films of coating that have evidence of moisture or fuel penetration discoloration, corrosion, blistering, etc., must be removed and replaced.

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- (d) Surface treat and recoat scribed, corroded, or damaged area in accordance with standard practices in Structural Repair Manual, Chapter 51.

NOTE: Use of fuel additive such as Biobor JF Biocide, or Phillips MB55 anti-icing additive is recommended for first fueling after cleaning. Fuel additives should be used in accordance with engine manufacturers recommendations.

12. Approved Repairs Fuel Tanks

CAUTION: FUEL TANK STRUCTURE - THE CONDUCTIVE AND NON CONDUCTIVE PATH DESIGN WHICH INCLUDES SPECIFIC SURFACE TREATMENTS, SEALANTS, SEALING PROCEDURES, FASTENER TYPES, AND COATINGS MUST BE MAINTAINED PER OEM DESIGN DATA WHICH INCLUDES BOEING DESIGN DRAWINGS OR THE BOEING SRM OR THE BOEING AMM OR BOEING APPROVED REPAIRS OR ANY COMBINATION OF THOSE.

- A. The above caution is a CDCCL procedure. For important information on CDCCLs, refer to Airworthiness Limitation Precautions, (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201).

- B. Weighing Sealant and Accelerator, Bulk Form

WARNING: LOW VISCOSITY POLYSULFIDE SEALANT IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOW VISCOSITY POLYSULFIDE SEALANT IS USED.

- GAS/AIR MIXTURE MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW VISCOSITY POLYSULFIDE SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS MSDS FOR:

- MORE PRECAUTIONARY DATA.
 - APPROVED SAFETY EQUIPMENT.
 - EMERGENCY MEDICAL AID.
 - TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.
- (1) Weigh sealant and accelerator accurately. Scales should be accurate to 1 percent. A balance scale, used with calibrated weights, is most desirable for various quantities of sealant and accelerator.
 - (2) Balance scale and compensate for weight of container before proceeding with weighing and mixing operation.
 - (3) Weigh desired amount of base sealing compound.
 - (4) Weigh required amount of accelerator for weight of base sealing compound used.

NOTE: Preweighed sealant kits do not require weighing of sealant and accelerator when entire quantity is to be mixed and used. All accelerator should be removed from container.

- C. Mixing Accelerator into Sealant

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WARNING: LOW VISCOSITY POLYSULFIDE SEALANT IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOW VISCOSITY POLYSULFIDE SEALANT IS USED.

- GAS/AIR MIXTURE MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW VISCOSITY POLYSULFIDE SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (1) Stir accelerator thoroughly to smooth, uniform consistency. Do not use accelerator that is dried out, flaky, or lumpy.
- (2) Add accelerator to base sealing compound and distribute evenly throughout sealant with spatula. There must be no appreciable time interval between addition of accelerator and beginning of mixing operation.
- (3) Mix sealant in mixing machine from 3 to 5 minutes. Scrape sides and bottom of sealant container, and, at least once during mixing period, sealant must be scraped from mixing tool or paddle back into container.

NOTE: Too rapid or prolonged stirring of base sealing compound and accelerator should be avoided because heat buildup in mixture will shorten normal application time of mixed sealant.

- (4) Mix sealant and accelerator at temperatures between 18°C to 29°C (65°F to 85°F).
- (5) Remove air from mixed sealant with air-removing equipment.
- (6) After mixing, sealant should be stored as directed in Paragraph 12.D., unless sealant is to be used immediately.

D. Storing Mixed Sealant

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WARNING: LOW VISCOSITY POLYSULFIDE SEALANT IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOW VISCOSITY POLYSULFIDE SEALANT IS USED.

- GAS/AIR MIXTURE MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW VISCOSITY POLYSULFIDE SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (1) Immediately after mixing, load sealant into polyethylene tubes and place on dry ice or into adequate quick freezer until needed. Elapsed time between adding sealant accelerator to base sealant and placing mixed sealant under refrigeration should not exceed 15 minutes. Mixed sealants may be stored at -23°C (-10°F) or lower, after initial quick freezing.

NOTE: Mixed silicone sealants should not be stored on dry ice. Adequate isolation between dry ice and silicone sealants should be kept to prevent sponging of sealant. Silicone sealants should be stored at -62.2°C (-80°F) or lower after initial quick freezing.

- (2) Mixed sealant removed from cold storage should be used on first-in first-out basis.

E. Handling Mixed Sealants

WARNING: LOW VISCOSITY POLYSULFIDE SEALANT IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOW VISCOSITY POLYSULFIDE SEALANT IS USED.

- GAS/AIR MIXTURE MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW VISCOSITY POLYSULFIDE SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

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- (1) Thaw sealant tubes removed from refrigeration by blowing compressed air on tubes. Do not use heated air to thaw sealant because heat will accelerate cure and shorten application time.
- (2) When more than one tube of frozen sealant, other than silicone sealant, is removed from refrigeration, tubes must be placed in suitable container packed with dry ice and carried to job. Tubes that have been kept frozen may be returned to refrigeration
- (3) Do not apply sealant to metal that is colder than 21°C (70°F). For better adhesion and less flowout of applied sealant while curing, warm metal to temperature between 26°C to 38°C (79°F to 100°F).

NOTE: Tack-free and cure times are reduced when temperature of applied sealant or surrounding air is maintained above 21°C (70°F) and extended when lower temperatures exist.

- (4) Discard sealant that becomes too stiff to apply or to work readily.
- (5) Do not use sealant on faying surface applications unless sealant has just been removed from refrigerated storage for first time, or unless freshly mixed.

F. Curing Mixed Sealants

WARNING: LOW VISCOSITY POLYSULFIDE SEALANT IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOW VISCOSITY POLYSULFIDE SEALANT IS USED.

- GAS/AIR MIXTURE MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW VISCOSITY POLYSULFIDE SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (1) Cure applied sealants at temperatures between 16°C to 49°C (60°F to 120°F).

CAUTION: IF HEATED AIR IS APPLIED TO INSIDE OF INTEGRAL FUEL TANKS, AIR SHOULD BE FILTERED TO REMOVE MOISTURE AND DIRT.

- (2) To increase temperature so that it will be within limits, use infrared lamps, heated air applied to outside of sealed structure, or heating pads. Do not apply heat to any faying surface sealant installation until all work is completed.

G. Sealing Requirements

- (1) All seals must be continuous within sealed area.
- (2) All surfaces to which sealant is applied must be completely free from any moisture.

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- (3) Use clean warm air, heat lamps, heating pads, or other approved means when rapid drying or fast curing is necessary. Do not exceed temperature limits.
- (4) Check that all preliminary operations have been completed before sealant is applied.
- (5) See Paragraph 2. for materials.

H. Faying Surface Seal

WARNING: LOW VISCOSITY POLYSULFIDE SEALANT IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOW VISCOSITY POLYSULFIDE SEALANT IS USED.

- GAS/AIR MIXTURE MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW VISCOSITY POLYSULFIDE SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS MSDS FOR:

- MORE PRECAUTIONARY DATA.
 - APPROVED SAFETY EQUIPMENT.
 - EMERGENCY MEDICAL AID.
 - TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.
- (1) Use only freshly mixed sealant or sealant that has just been removed from refrigeration for first time. Extrude sealant in ribbons or bands on one of faying surfaces. Spread sealant uniformly over one entire faying surface. Use sufficient amount of sealant so that when installation is made, sealant extrudes from faying surfaces of parts being joined. Work out all air bubbles.
 - (2) To pack voids, cracks, crevices, or joggles, apply enough sealant before joining parts to completely fill void, joggle, etc., and show extruded sealant when parts are installed.
 - (3) Always use fasteners to hold faying surface sealed parts in place during assembly. Shifting of parts after they have been joined will break seal.

I. Fillet Seal

WARNING: LOW VISCOSITY POLYSULFIDE SEALANT IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOW VISCOSITY POLYSULFIDE SEALANT IS USED.

- GAS/AIR MIXTURE MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW VISCOSITY POLYSULFIDE SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

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WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (1) Install fillet seal by spreading sealant along seam. Before proceeding to next increment, work applied portion of fillet with spatula to fill all voids in seam and to eliminate as many air bubbles as possible. Examine fillet for any remaining air bubbles and, if bubbles exist, fill with fresh sealant. Make cavities large enough to permit easy filling with fresh sealant.
- (2) When heavy fillet is required, it must be applied in layers. Apply each layer as specified in Paragraph 12.I.(1).

J. Sealing Fuel Tanks (Internal)

- (1) Prepare applicable fuel tank for entry. (PAGEBLOCK 28-00-00/201)
- (2) Strip old sealant from leak path. (Paragraph 11.E.(1))
- (3) Chamfer edge of sealant to approximately 45 degree angle in sealant removal area.

WARNING: LOW VISCOSITY POLYSULFIDE SEALANT IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOW VISCOSITY POLYSULFIDE SEALANT IS USED.

- GAS/AIR MIXTURE MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW VISCOSITY POLYSULFIDE SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (4) Apply sealant to area to be repaired.

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WARNING: INTEGRAL FUEL TANKS SEALING COMPOUND (POLYSULFIDE SEALANT B1/2 AND B2) IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN INTEGRAL FUEL TANKS SEALING COMPOUND IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET INTEGRAL FUEL TANKS SEALING COMPOUND IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (5) As soon as possible, when brushing will not disturb sealant, apply topcoat. (SRM, Chapter 51-22-01)

NOTE: Topcoat may be applied over sealants at any time during basic sealant period after sealant has become tack-free. Tank may be fueled at any time after topcoat is no longer tacky, provided basic sealant-curing period has been observed.

CAUTION: DO NOT EXCEED 49°C (120°F) DURING CURING PROCESS.

- (6) Allow time for curing sealant (PR-1435), 12 hours at 21°C to 49°C (70°F to 120°F).

K. Repair Damage To Primary Fuel Vapor Barrier

NOTE: The following procedure is applicable to the fuel tank forward access doors located below the passenger compartment floor.

- (1) Feather broken edges of coating.

WARNING: SEALANT REMOVER SOLVENT IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN SEALANT REMOVER SOLVENT IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET SEALANT REMOVER SOLVENT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

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(WARNING PRECEDES)

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

CAUTION: USE ONLY CLEAN COTTON CLOTH. DO NOT CONTAMINATE CLEANER BY DIPPING CLOTH INTO CLEANER OR ALLOWING EXCESS TO RUN BACK INTO FRESH SUPPLY.

- (2) Clean all surfaces, using solvent (hand wipe cleaner, DPM 6410).
- (3) Apply primary vapor barrier on tank access as follows:(Figure 205)
 - (a) Prepare surface for the primary vapor barrier as follows:

WARNING: HAND WIPE CLEANER SEALANT REMOVER SOLVENT IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN HAND WIPE CLEANER SEALANT REMOVER SOLVENT IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET HAND WIPE CLEANER SEALANT REMOVER SOLVENT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS OR TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THESE HAZARDOUS AGENTS.

- 1) Moisten cleaning wipers with hand wipe cleaner and clean all surfaces to be coated.

NOTE: Do not allow the solvents to evaporate dry on the surfaces.

- 2) Wipe dry with clean cleaning wipers.
- 3) Fully abrade area with an abrasive nylon web pad.

NOTE: Do not abrade the mylar vapor barrier.

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WARNING: OXSOLV II CONCENTRATE CLEANER IS AN AGENT THAT IS FLAMMABLE, EXPLOSIVE, POISONOUS, AN ASPHYXIANT, AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN OXSOLV II CONCENTRATE CLEANER IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET OXSOLV II CONCENTRATE CLEANER IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS OR TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THESE HAZARDOUS AGENTS.

- 4) Clean all remaining abrasive material residue with OXSOLV II cleaner and wipe dry with a cleaning wipers.
- (b) Apply primary vapor barrier as follows (brush application):
- 1) Fully mix or shake the base material before adding the catalyst.
NOTE: Always add all of the catalyst to all of the base material. Never the reverse, or gelation of the material will occur.
NOTE: Do not try to mix a thin mixture for a brush on application.
 - 2) Let the catalyzed mixture chemically react for 3 to 5 minutes before using.
NOTE: The usable pot life of the catalyzed mixture, stored in a closed container at $75 \pm 5^{\circ}\text{F}$ ($24 \pm 3^{\circ}\text{C}$) is 30 to 35 minutes. Pot life will shorten in direct relation to an increase of room temperature and/or an increase in batch size.
 - 3) Use a paint brush (pure china or oxhair), to apply a brush coat of fuel vapor barrier (brushing) coating to difficult areas prior to full surface area application.
 - 4) Let the area dry for a minimum of 2 hours at room temperature.
 - 5) Apply two more thick, smooth brush coats of material (allow 30 minutes minimum between coats).
NOTE: The surface film must be continuous, unbroken, free of brush bristles, craters, pinholes and voids.
NOTE: The maximum dry film thickness does not apply to runs, sags, roughness, edges and areas around fasteners.
 - 6) The material must have to have a dry film thickness of 0.005 in. (0.127 mm) to 0.015 in. (0.381 mm).
 - 7) Make sure that the applied material is fully cured before the floor or protective covers are installed with one of the methods that follow:
 - a) Room temperature (air dry) - 16 hours minimum.

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CAUTION: THE MAXIMUM TEMPERATURE WHICH CAN BE USED TO CURE THE SEALANT IS 120°F (49°C).

- b) Force cure - Allow to air dry for approximately 30 minutes then apply a heat source of approximately 120 degrees F (49 degrees C) for approximately 3 hours.

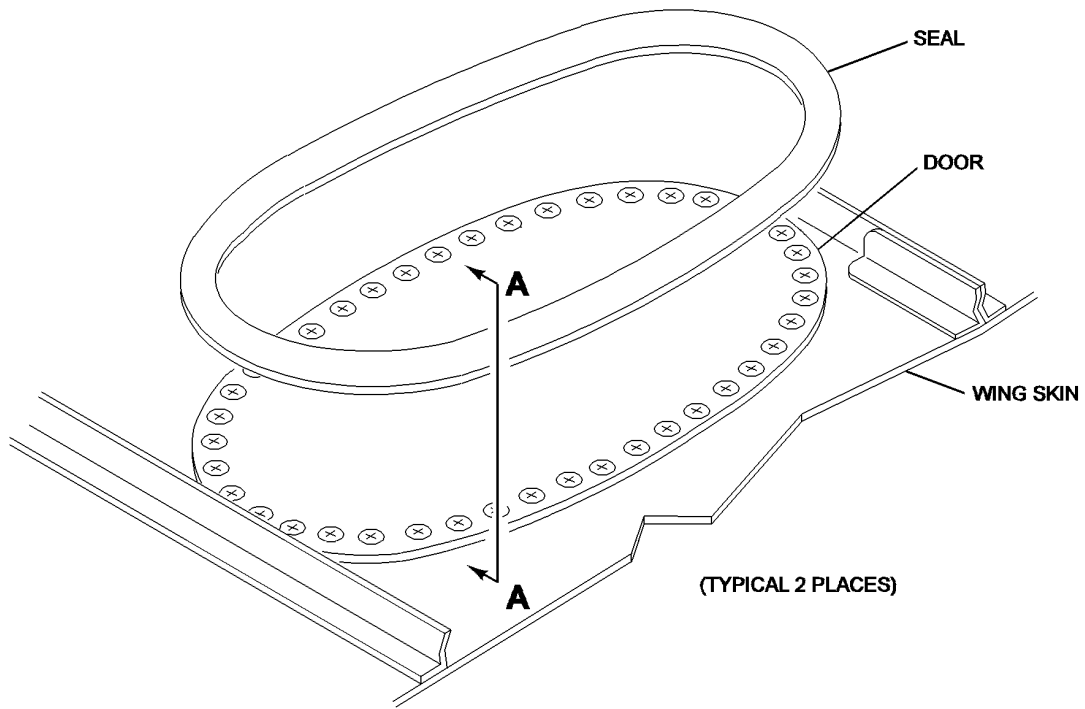
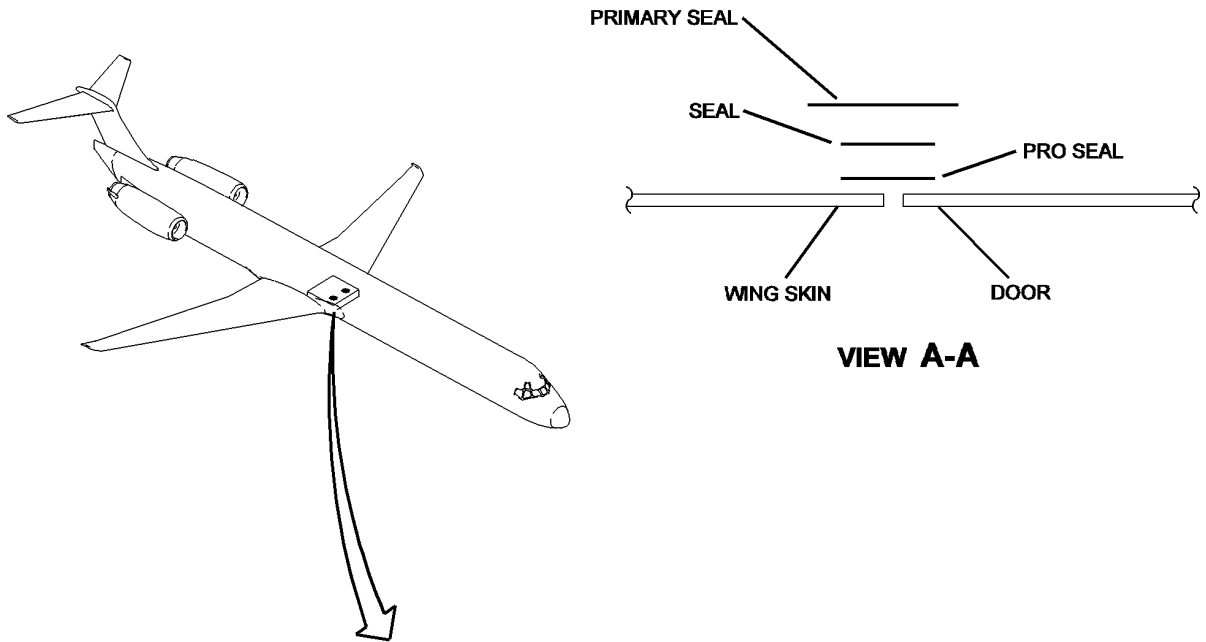
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BBB2-28-401A
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Center Fuel Tank Access Door Vapor Barrier - Installation
Figure 205/28-10-01-990-816

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FUEL TANKS - CHECK

1. General

- A. This check provides a method for check and classification of fuel leaks in the wing integral fuel tanks. For location and repair of fuel leaks, refer to Structural Repair Manual, Chapter 51-23-0, Page 1.
- B. It is important that each fuel leak be carefully evaluated, and a thorough investigation of the area surrounding the fuel leak be made, since the information will be valuable later in making an effective repair. Classification of fuel leaks which occur is necessary to differentiate between those leaks that constitute a flight safety hazard requiring immediate repair, and those which can be deferred until the aircraft is scheduled for other maintenance. The size of the wetted area around the exterior leak, in a given period of time, is a fairly accurate way to classify the amount of fuel leakage.
- C. Fuel leaks are classified into four groups: (A) slow seep, (B) seep, (C) heavy seep, and (D) running leak. (Figure 601) A slow seep is defined as a leak in which fuel wets the exterior area not over 1.5 inches (38.1 mm) in diameter. A seep is a leak in which fuel wets the exterior area from 1.5 to 4 inches (38.1 to 101.6 mm) in diameter. In each of these cases, the fuel shall not run, flow, drip, or have a resemblance to any of these conditions. These leaks shall be monitored frequently to ensure that they remain within the group (A) and (B) classifications. A heavy seep is a leak where the fuel appears to spread very slowly to cover an area from 4 to 6 inches (101.6 to 152.4 mm) in diameter, but does not run, flow, or drip. A running leak is a leak in which fuel is dripping or running from the exterior structure, or spreads beyond 6 inches (152.4 mm) in diameter.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 601

Name and Number	Manufacturer
Solvent, cleaner DPM 6380-4	BBA Fiberweb, Simpsonville, SC
Wipers, cotton cleaning, Type I, Class A	Commercially available
Brush, stiff bristle	
Leak detection powder Eldorado Product LD-4 DPM 6109-1	PPG (PRC-DeSoto), International, Inc. Sealants, Adhesives & Coatings Div. Glendale, CA

3. Leak Detection

- A. Cleaning

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1590, CLEANER/SOLVENT/HANDWIPE (DPM 6380-4)

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(WARNING PRECEDES)

HAZMAT 1000, REFER TO MSDS

- (1) Pour solvent, cleaner DPM 6380-4 over stiff bristle brush until brush is saturated.
- (2) Using brush, scrub and wash suspected leak area.
- (3) Using clean cotton cloths, wipe area dry.

NOTE: Cleaning and drying the suspected leak area removes existing fuel contamination so proper leak evaluation can be performed.

B. Leak Detection

- (1) Make certain that tank is full of fuel.
- (2) Make certain that suspected leak area is clean. (Paragraph 3.A.)

WARNING: LEAK DETECTION POWDER IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN LEAK DETECTION POWDER IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LEAK DETECTION POWDER IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE DUST.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (3) Apply (talcum, dyed red #491) leak detection powder, if necessary, over suspected leak area. (Figure 602)

NOTE: The dyed powder will turn a bright red when contacted by fuel.

- (4) After 15 minutes, check size of wetted area, and determine classification of leak. (Figure 601)
- (5) Analyze leak and perform such action as required Table 602, Figure 603.

Table 602 Leakage Location and Repair Action

Leakage location	Group A	Group B	Group C	Group D
	Slow Seep (Up to 1.5 in. (38.1 mm) dia.	Seep 1.5 to 4 in. (38.1 to 152.4 mm) dia.	Heavy Seep 4 to 6 in. (101.6 to 152.4 mm) dia.	Running Leak 6 inches (152.4 mm) dia. or more
Areas of upper and lower skin surfaces from Wing Station Xrs 137.750 outboard to 477.350.	1	1	2	3

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Table 602 Leakage Location and Repair Action (Continued)

Leakage location	Group A	Group B	Group C	Group D
Areas of upper and 1 2 3 3 lower skin surfaces from Wing Station Xrs 137.750 inboard to edge of wing fillet.	1	2	3	3
Enclosed areas of upper skin surface from edge of wing fillet to centerline RH and LH sides.	4	4	4	4
Enclosed areas of lower skin surface from edge of antenna fairing to centerline RH and LH sides.	2	3	3	3
Areas of front spar web from Wing Station Xrs 477.350 inboard to fuselage.	2	3	3	3
Areas of front spar web from fuselage to centerline RH and LH sides.	4	4	4	4
Areas of rear spar web from Wing Station Xrs 477.350 inboard to 137.750.	1	2	3	3
Areas of rear spar web from Wing Station Xrs 137.750 inboard to centerline RH and LH sides.	2	3	3	3
Tank closing bulkhead at Wing Station Xrs 477.350.	2	3	3	3
Structural cracks and piping installations.	4	4	4	4
Action Required				
1	No repair action required. Frequent inspections must be made to ensure that leak does not progress.			
2	No immediate repair required. Frequent inspection must be made to ensure that leak does not progress. Repair must be accomplished at first scheduled overnight maintenance facility.			
3	Immediate repair required.			
4	Immediate repair required to a no-leak category prior to further flight.			

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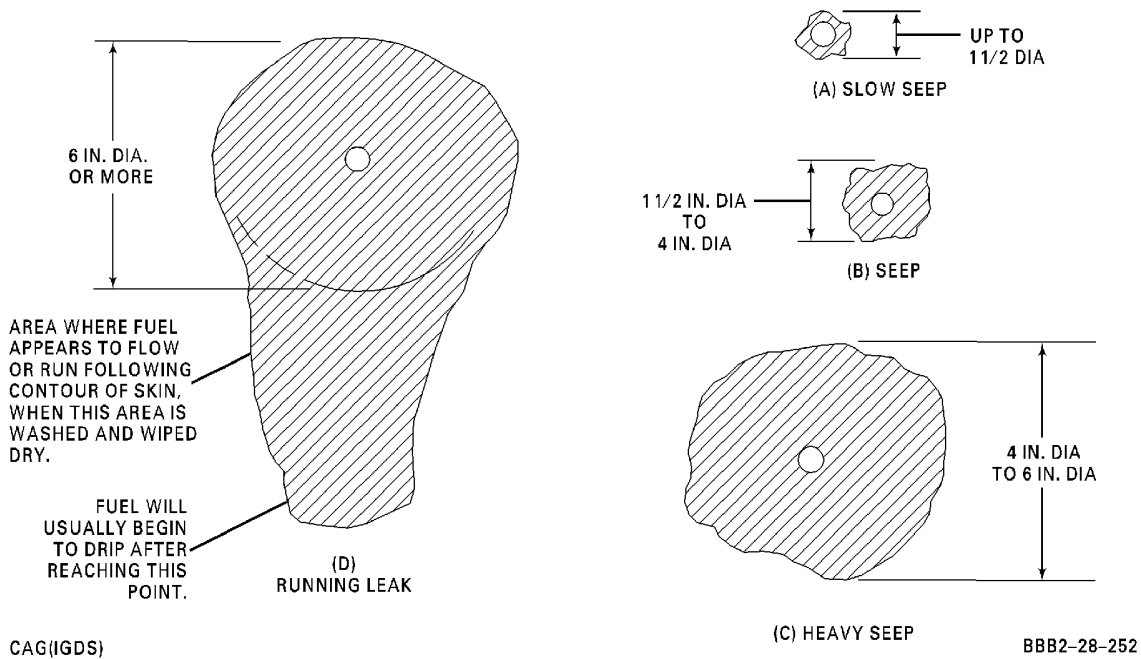
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Table 602 Leakage Location and Repair Action (Continued)

Leakage location	Group A	Group B	Group C
NOTE: Thoroughly investigate any type of fuel leak occurring at spar webs, tank bulkhead ends, and other areas for possible structural cracks. Leaks occurring because of structural cracks must be repaired immediately, and before further flight.			
NOTE: Leaks developing at piping, piping fittings, and other equipment shall be repaired before further flight.			
NOTE: Some leaks are caused by structural and installation failure, and not by sealant discrepancies. They cannot be repaired by applying more sealant; therefore, they shall be subjected to an appropriate repair.			
NOTE: All fuel leaks, regardless of classification, shall be repaired when extensive maintenance is performed, or at time of next overhaul.			



**Integral Fuel Tank Leak Classification
Figure 601/28-10-01-990-804**

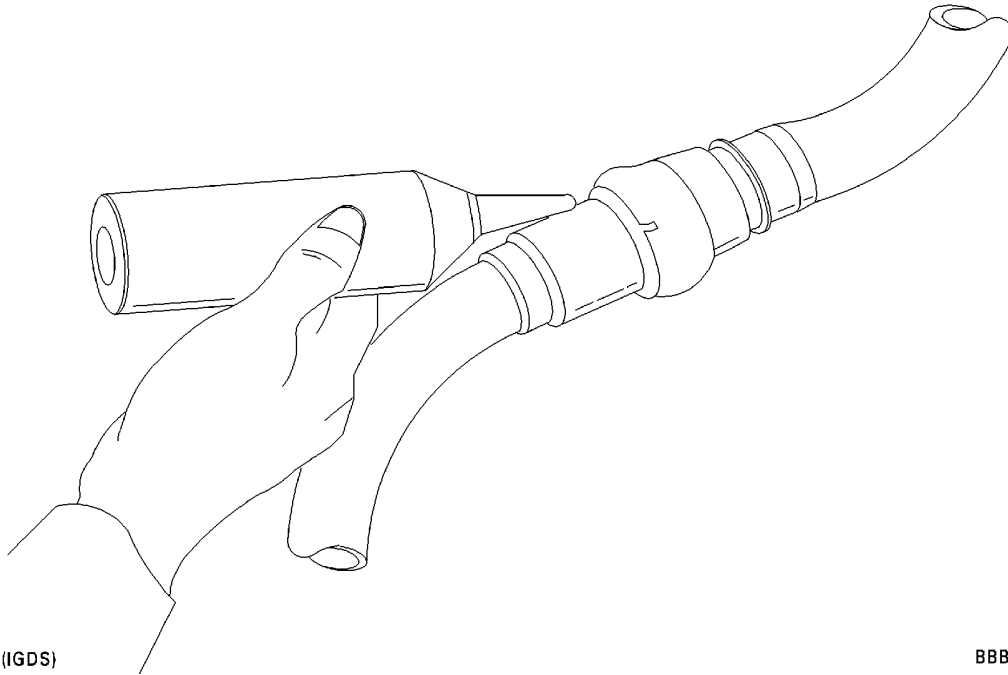
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CAG(IGDS)

BBB2-28-253

Leak Detection Powder Application (Typical)
Figure 602/28-10-01-990-805

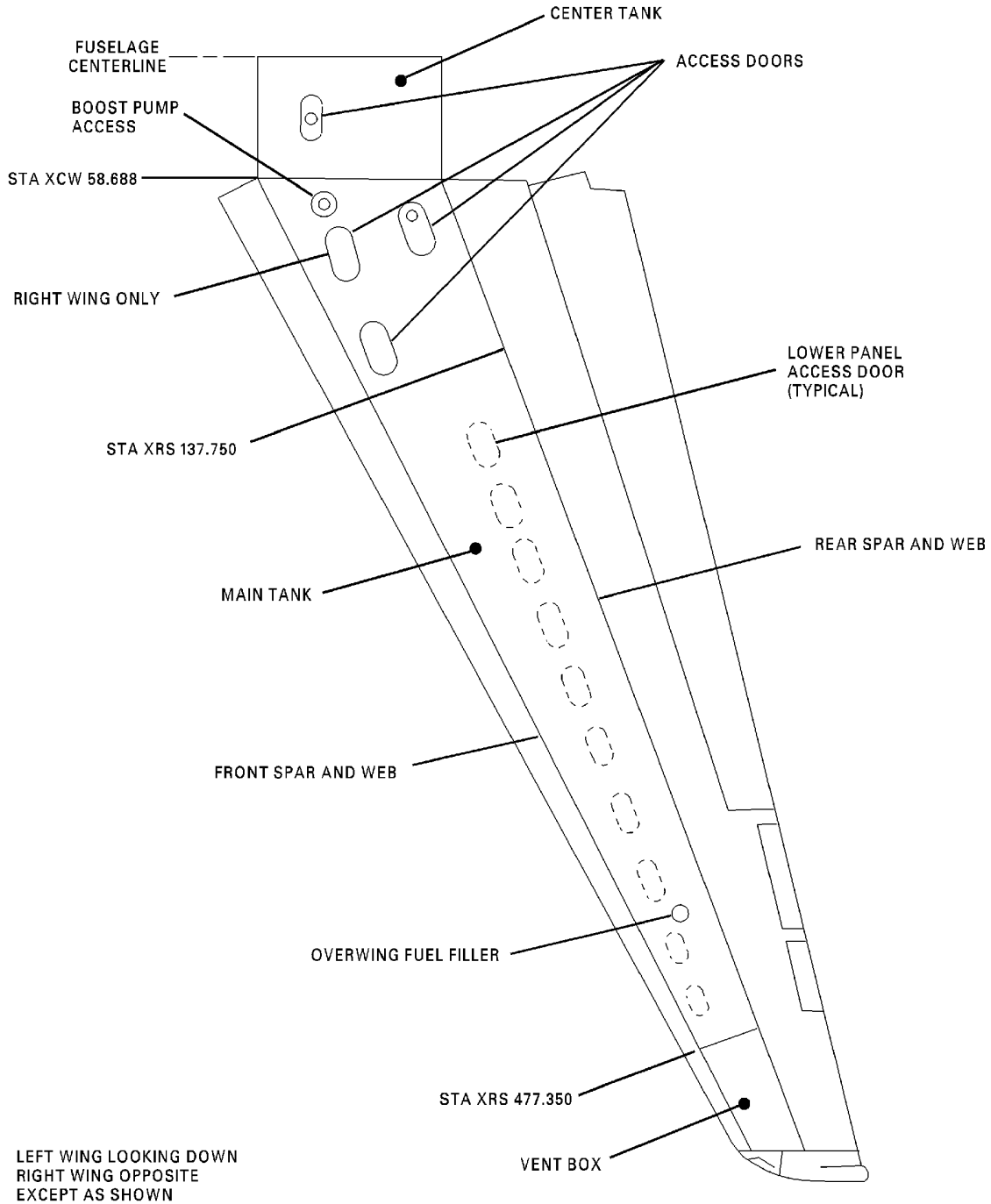
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CAG(IGDS)

BBB2-28-254

**Wing Integral Fuel Tanks
Figure 603/28-10-01-990-806**

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FLAPPER CHECK VALVES - MAINTENANCE PRACTICES

1. General

- A. The flapper check valves are located in the two closing bulkheads in the inboard end of each main tank, which forms the tank reservoir. Each bulkhead has large round flapper valves located near the center and small rectangular flappers located along the lower edge.
- B. Access to the flapper check valves is as follows:

Table 201

Location	Access
Bulkhead 91.00 left wing right wing	1307C 1410C
Bulkhead 189.00 left wing right wing	1311C (Ref. NOTE) 1414C (Ref. NOTE)
<u>NOTE:</u> Fault isolation probe may remain attached to access door during removal. If wires are not disconnected from probe, use care not to damage wires.	

- C. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices. (PAGEBLOCK 28-00-00/201)

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 202

Name and Number	Manufacturer
Retaining compound MIL-S-46163 Grade R DPM 6082-5	Loctite Corp. Newington, CT
Primer MIL-S-22473 Grade T DPM 6081	Loctite Corp. Newington, CT
Cotton Cloth, lint-free	

3. Removal/Installation Flapper Check Valve

- A. Remove Flapper
 - (1) Prepare applicable wing tank for entry. (PAGEBLOCK 28-00-00/201)

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WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (2) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	17	B1-822	FUEL QUANTITY POWER TRANSFER

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (3) Remove access door.
 (4) Remove flapper.
 B. Install Flapper

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

CAUTION: DO NOT LET THE PRIMER OR THE RETAINING COMPOUND ENTER THE AREA BETWEEN THE FLAPPER HINGE-POINTS AND THE BOLT. THE RETAINING COMPOUND OR THE PRIMER CAN DECREASE THE FREE MOVEMENT OF THE FLAPPER.

- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

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UPPER EPC, FUEL

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	17	B1-822	FUEL QUANTITY POWER TRANSFER

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (2) Install small flapper, as follows:
- (a) Place flapper in position and install bolt.

WARNING: LOCKING & RETAINER COMPOUNDS PRIMER/CATALYST IS AN AGENT THAT IS FLAMMABLE, POISONOUS, AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOCKING & RETAINER COMPOUNDS PRIMER/CATALYST IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOCKING & RETAINER COMPOUNDS PRIMER/CATALYST IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

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(WARNING PRECEDES)

- (b) Wet cotton cloth with primer (MIL-S-22473, Grade T) and wipe bolt threads clean. Leave thin coat of primer on threads and allow to dry.

WARNING: ANAEROBIC SEALING LOCKING COMPOUND IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN ANAEROBIC SEALING LOCKING COMPOUND IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET ANAEROBIC SEALING LOCKING COMPOUND IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (c) Apply thin coat of retaining compound (MIL-S-46163, Grade R) to bolt threads.
- (d) Install washer and nut.
- (3) Install large flapper, as follows:
 - (a) Place flapper in position and install bolt.
 - (b) Install washer and nut.
 - (c) Peen bolt end to retain nut.
- (4) Check flapper leakage per Paragraph 4..
- (5) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	17	B1-822	FUEL QUANTITY POWER TRANSFER

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C

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UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

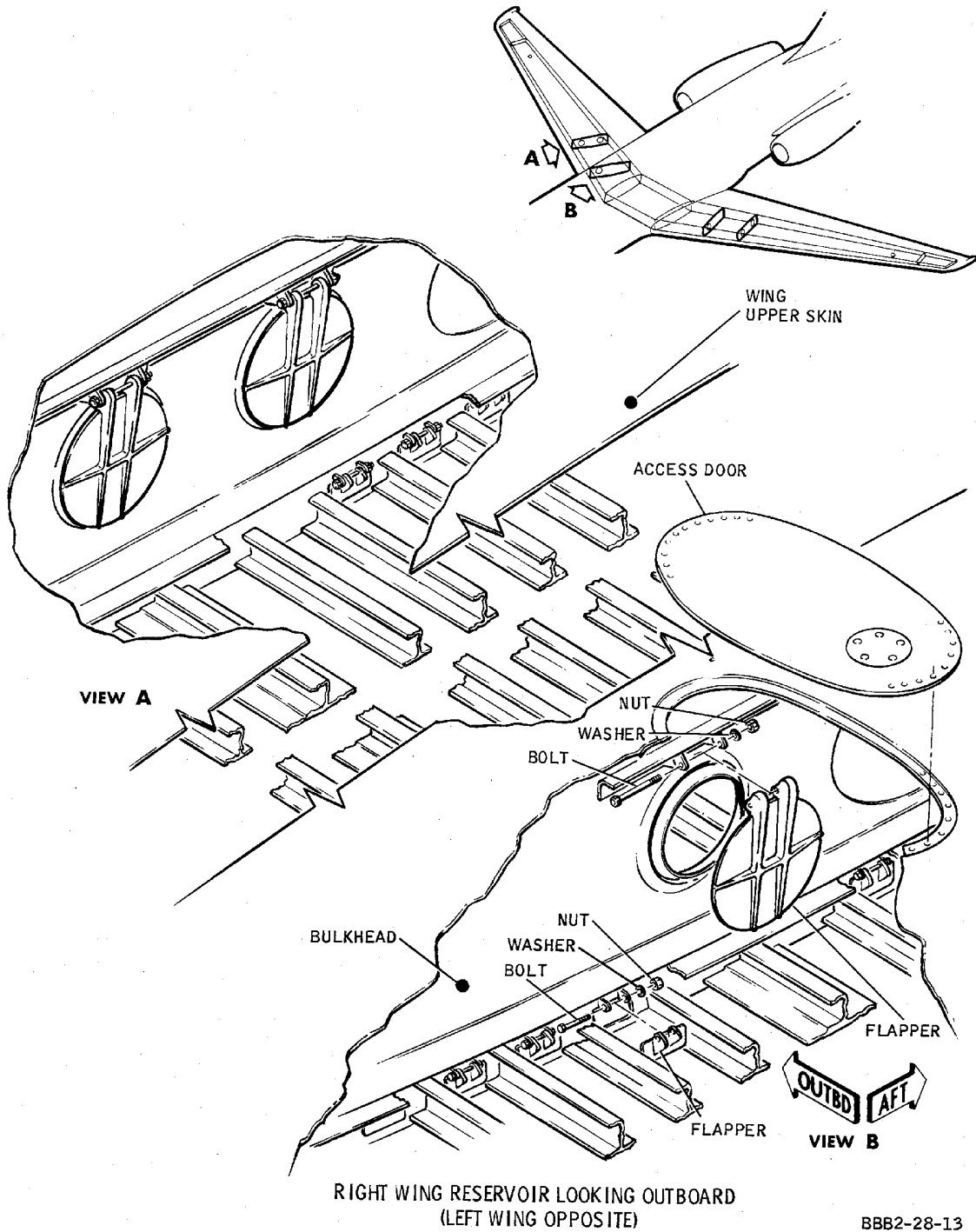
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Flapper Check Valve -- Removal/Installation
Figure 201/28-10-02-990-801

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4. Check Flapper Check Valves

A. Check Flapper Leakage, Bulkhead 91.00

- (1) With applicable main tank defueled, fill section of reservoir inboard of bulkhead 91.00 with fuel, through access opening in top of tank, to a level 2 to 3 inches (51 to 76 mm) above flapper to be checked.
- (2) Observe fuel level in reservoir. Level should not drop more than 1 1/4 inches (31.75 mm) per minute if fuel level started above large flapper. Level should not drop more than 3/4 inch (19 mm) per minute if fuel level started above small flappers but below large flappers.

B. Check Flapper Leakage, Bulkhead 189.00

- (1) With applicable main tank defueled, fill section of reservoir inboard of bulkhead 91.00 2nd section inboard of bulk-head 189.00 with fuel, through access openings in top of tank, to a level approximately 3 to 4 inches (76 to 101 mm) below inboard access.

NOTE: Fuel level should be maintained approximately even between the two sections.

- (2) Observe fuel level in reservoir. Level should not drop more than 1 1/4 inches (31.75 mm) in 5 minutes.

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AIRCRAFT MAINTENANCE MANUAL
FLAPPER CHECK VALVE - INSPECTION/CHECK

1. General

A. This procedure contains MSG-3 task card data.

TASK 28-10-02-211-801

2. Detailed Inspection of the Flapper Check Valves

NOTE: This procedure is a scheduled maintenance task.

A. References

Reference	Title
28-00-00 P/B 201	GENERAL - MAINTENANCE PRACTICES

B. Prepare for the Flapper Check Valves Detailed Inspection

SUBTASK 28-10-02-840-001

- (1) Make sure left and right wing fuel tanks are open and are safe for maintenance. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

SUBTASK 28-10-02-010-001

- (2) Open access panels.

C. Flapper Check Valves Detailed Inspection

SUBTASK 28-10-02-211-001

- (1) Do a detailed inspection of each large, round flapper valve and each small rectangular flapper valve for:
 - (a) Proper retention by the hinge bolt.
 - (b) Cracks or damage.
 - (c) Corrosion.
 - (d) Free movement of the valve flapper.
 - (e) Proper seating of the valve flapper.

D. Job Close-up

SUBTASK 28-10-02-840-002

- (1) Restore the left and right wing fuel tanks to normal configuration after maintenance. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

SUBTASK 28-10-02-410-001

- (2) Close access panels.

SUBTASK 28-10-02-942-001

- (3) Remove all the tools and equipment from the work area. Make sure the area is clean.

————— **END OF TASK** —————

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SUMP DRAIN VALVE - REMOVAL/INSTALLATION

1. General

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

- A. The fuel tank sump drain valves are located in the bottom skin of the fuel tanks. There is one low profile valve mounted in the inboard end of each main tank. The two center tank valves have extension cones attached which must be removed for access to the poppet valves.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

- B. The fuel tank sump drain valves are located in the bottom skin of the fuel tanks. There is one valve flush mounted in the inboard end of each main tank. The two center tank valves have extension cones attached which must be removed for access to the poppet valves. Fuselage fuel tanks have one sump drain valve located in bottom aft area of each tank near the cavity and access doors.

WJE ALL

- C. The pans to which cones are attached are held to the tank skin by attaching bolts for housings. The pans are removed by first removing cones to permit access to housing bolt heads. Access to nuts is from inside of the tank. The pan is indexed to the wing skin by means of a rivet head in the skin. The cone has an uneven hole pattern for indexing.
- D. After removal of the cone assemblies, the removal procedures for all valves are identical except as noted. The valves are removed from inside the tank.
- E. Access to the valves are as follows:

Table 401

Tank	Access
Left Main	1307C
Right Main	1410C
Center (left side)	1333C
Center (right side)	1436C
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892	
Forward Fuselage	Mid Cargo Door
Aft Fuselage	Aft Cargo Door
WJE ALL	

- F. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201).

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

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Table 402

Name and Number	Manufacturer
Sump drain tool V-799	Service Support Systems
Sump drain tool 4298-1	Kaiser
Sump drain tool 700200-1	Hydraulic Research
Sealant (PR-1422) DPM 2292-2	Courtaulds Aerospace Inc. Glendale, CA

3. Removal/Installation Fuel Tank Sump Drain Valve

A. Remove Sump Drain Valve

- (1) Close crossfeed valve.
- (2) Prepare applicable tank for entry. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (4) If required, remove cone.
- (5) Disconnect drain line, as required.
- (6) Remove valve. Retain spacer and nut if removing valve from wing tank.

B. Install Sump Drain Valve

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WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (2) Make certain that all old sealant is removed from tank skin, and valve or spacer if applicable.

WARNING: LOW VISCOSITY POLYSULFIDE SEALANT IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOW VISCOSITY POLYSULFIDE SEALANT IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW VISCOSITY POLYSULFIDE SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

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(WARNING PRECEDES)

- (3) Apply (PR-1422) sealant to faying surfaces of housing and tank, or valve, spacer, and skin if applicable.

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

- (4) Install valve. Tighten nut to 24 to 26 foot-pounds (288 to 312 inch-pounds) (32.5 to 35.3 N·m) torque (wing tanks only).

WJE ALL

- (5) Apply sealant around base of nut and interface of nut and valve housing (center tank only) if applicable.
- (6) Connect drain line (center and fuselage tanks only) if applicable.
- (7) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

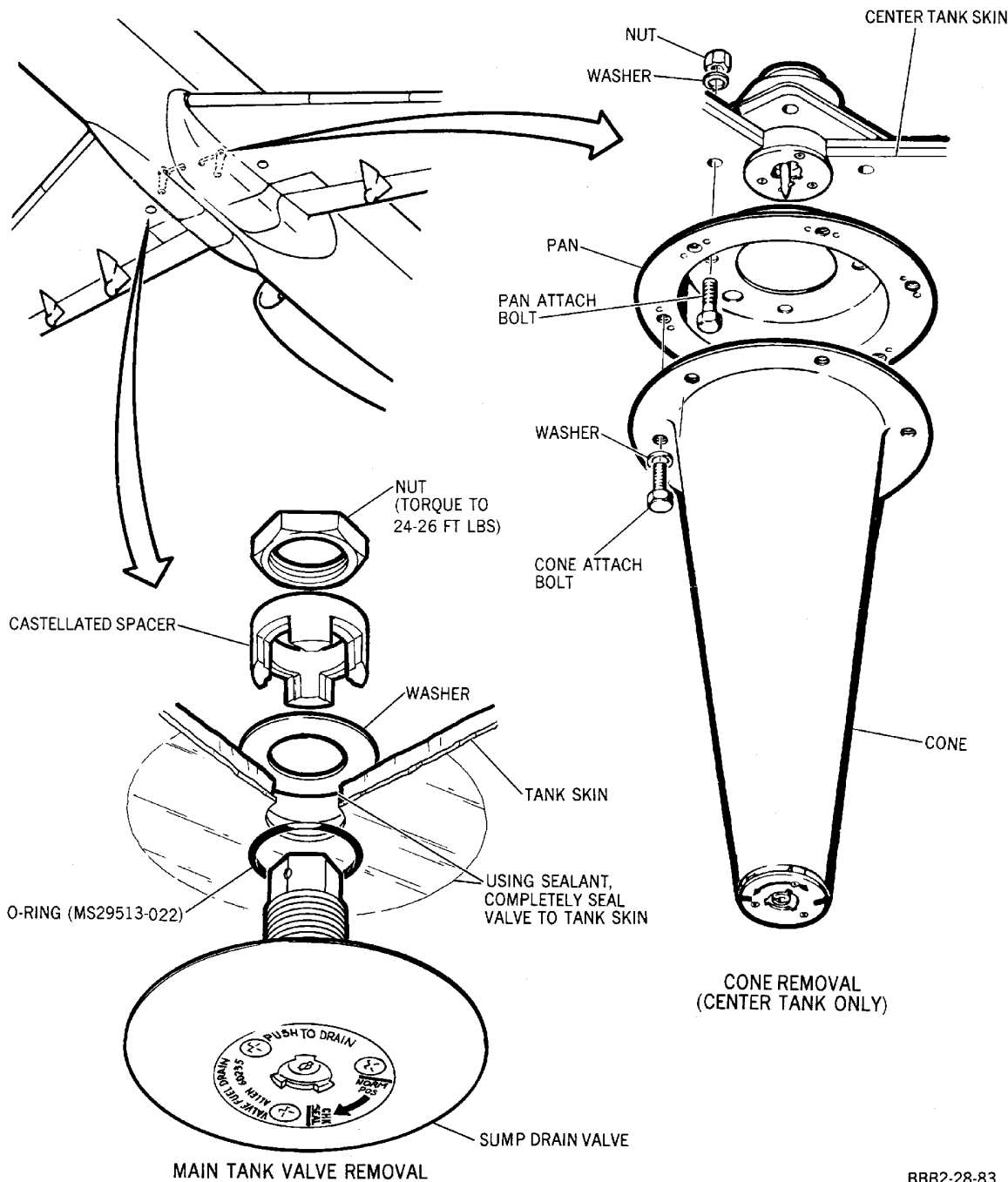
- (8) Test primary (outer) and secondary (inner) poppet seals for leakage. (SUMP DRAIN VALVES - CHECK, PAGEBLOCK 28-10-03/601)

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BBB2-28-83

**Sump Drain Valve -- Removal/Installation
Figure 401/28-10-03-990-804**

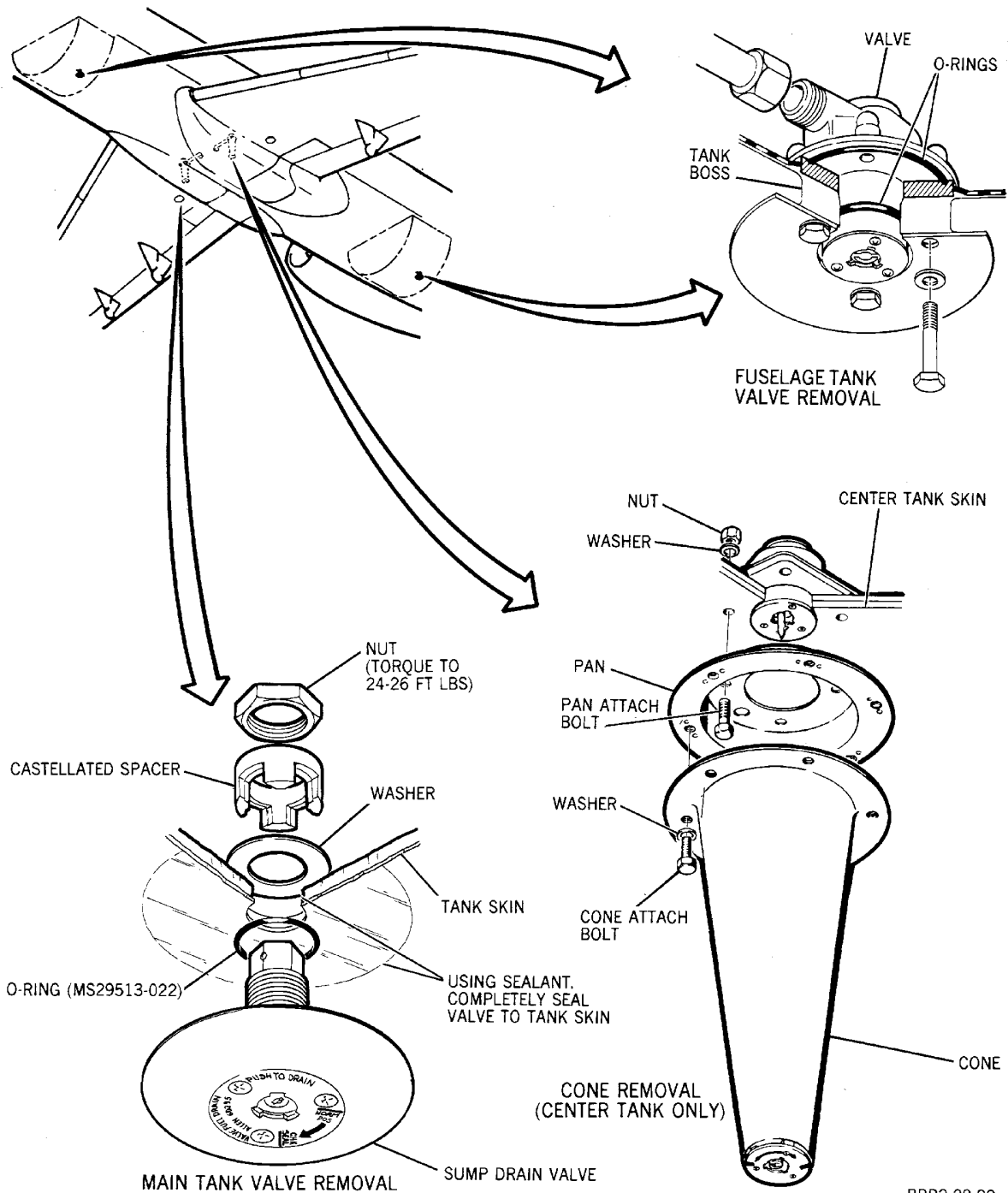
EFFECTIVITY
WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 876, 886, 887, 891, 893

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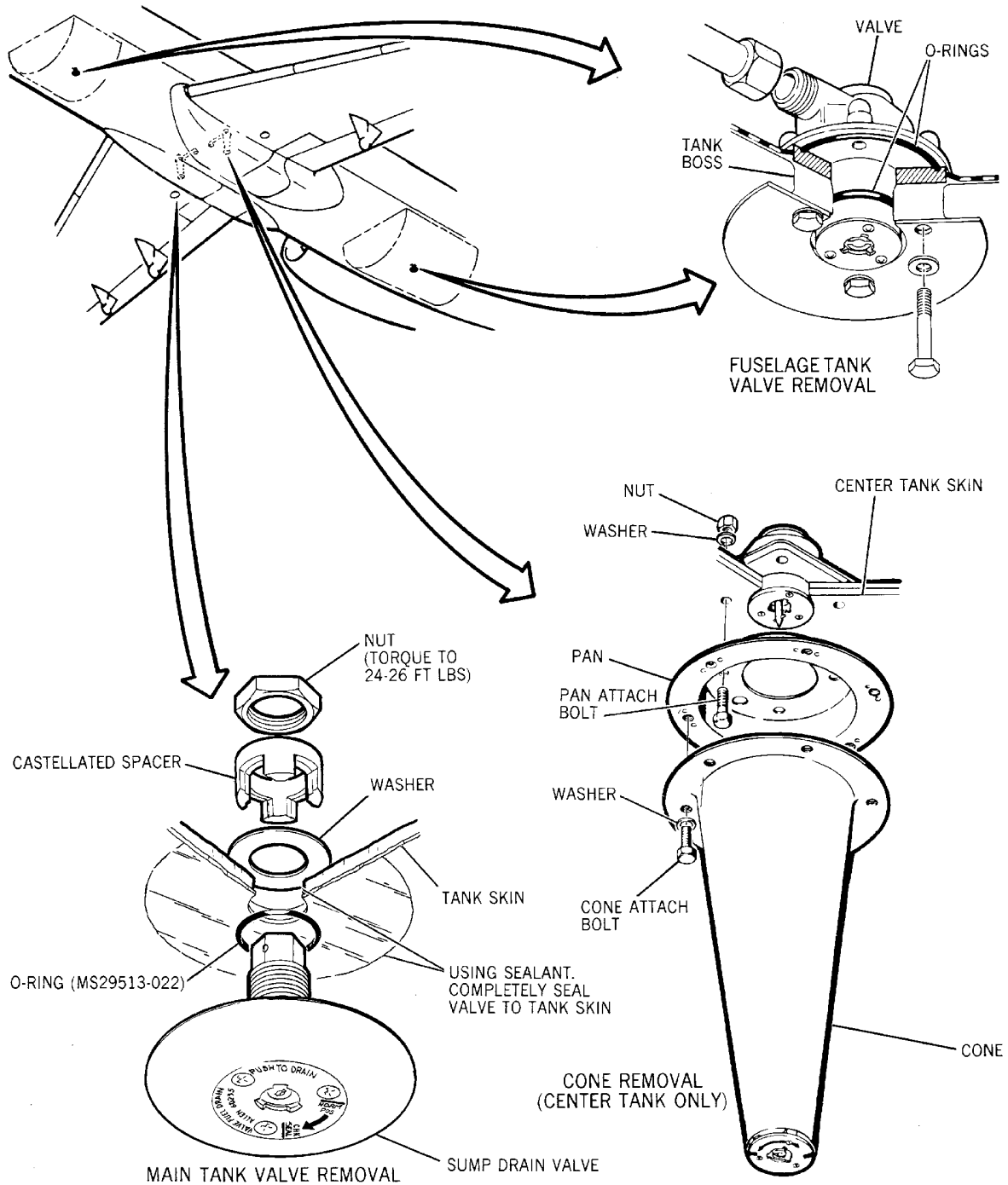
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**Sump Drain Valve -- Removal/Installation
Figure 402/28-10-03-990-806**

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 873, 874, 877-881,
883, 884, 892

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BBB2-28-182

**Sump Drain Valve -- Removal/Installation
Figure 403/28-10-03-990-808**

EFFECTIVITY
WJE 861, 862

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SUMP DRAIN VALVES - CHECK

1. General

- A. The following procedures provide information for checking the primary (outer) and secondary (inner) poppet seals for leakage.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items.

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 601

Name and Number	Manufacturer
Sump drain tool V-799	Service Support Systems
Sump drain tool 4298-1	Kaiser Aerospace & Electronics Corp.
Sump drain tool 700200-1	Hydraulic Research & Mfg. APCO & Filter Division

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

3. Check - Center and Fuselage Tank Valves

- A. Check Primary (Outer) Poppet for Leaks

- (1) Insert sump drain tool into drain valve slot.

NOTE: Slot should be aligned with NORM POS position on nameplate.

- (2) Turn slot counterclockwise to primary (outer) seal check position. No leakage is allowed.
 (3) Push slot (primary/outer poppet) up into housing. Fuel should flow (if fuel in tank is above valve).
 (4) Release pressure on slot (poppet). Fuel flow should stop. No leakage is allowed.

NOTE: It is normal for small amount of dripping to occur until fuel has drained from sump drain.

- (5) Turn slot clockwise to normal position.

- B. Check Secondary (Inner) Poppet for Leaks

- (1) With slot in normal position, raise primary (outer) poppet slightly using sump drain tool. No fuel flow or leakage is allowed.
 (2) Release pressure on poppet.

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

4. Check - Main Tank Valves

NOTE: The low profile main tank drain valves have poppets identified opposite to the arrangement in the center tank drain valves.

- A. Check Secondary (Inner) Poppet for Leaks

- (1) Insert sump drain tool into drain valve slot.

NOTE: Slot should be aligned with NORM POS position on nameplate.

- (2) Push poppet up into housing. Fuel should drain.

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WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893 (Continued)

- (3) Release pressure on slot (poppet). Fuel flow should stop. No leakage is allowed.
- B. Check Primary (Outer) Poppet Seal for Leaks
- (1) Turn slot clockwise to CHECK SEAL position to check primary (outer) seal. No leakage is allowed.
 - (2) Release slot for automatic return to NORM POS position.

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SUMP DRAIN VALVE - APPROVED REPAIRS

1. General

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

- A. After removal of the cone, attached to only the center tank sump drain valves, the removal procedures for primary (outer) poppets may be accomplished without defueling the tanks. Removal of the secondary (inner) poppets requires defueling and draining of the applicable tank. Removal of the poppets is accomplished from outside the tank. Caution should be exercised when removing primary (outer) and secondary (inner) poppet retainers, as both retainers have compressed springs behind them.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

- B. After removal of the cone, attached to only the center tank sump drain valves, the removal procedures for all primary (outer) and secondary (inner) poppets are identical. Removal of the primary (outer) poppets may be accomplished without defueling the tanks. Removal of the secondary (inner) poppets requires defueling and draining of the applicable tank. Removal of the poppets is accomplished from outside the tank. Caution should be exercised when removing primary (outer) and secondary (inner) poppet retainers, as both retainers have compressed springs behind them.

WJE ALL

- C. Before any maintenance is performed on the fuel system, personnel should read and understand thoroughly the GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items.

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 801

Name and Number	Manufacturer
Sump drain tool V-799	Service Support Systems
Sump drain tool 4298-1	Kaiser
Sump drain tool 700200-1	Hydraulic Research & Mfg. Co. APCO & Filter Division
Petrolatum VV-P-236 DPM 675	

3. Approved Repairs - Center Tank Valve

- A. Remove Primary (Outer) Poppet Seal. (Figure 801)

- (1) Remove cone, if applicable.
- (2) Remove nameplate.

WARNING: POPPET IS SPRING-LOADED.

- (3) Remove primary (outer) poppet retainer. Remove and discard O-ring from primary poppet retainer.

NOTE: Primary poppet and poppet spring will slide out when the poppet retainer is removed.

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WARNING: POPPET IS SPRING-LOADED.

- (4) Remove primary (outer) poppet retainer. Remove and discard O-ring from primary poppet retainer.
- (5) Remove primary (outer) poppet and spring.

B. Install Primary (Outer) Poppet Seal

- (1) Install spring.
- (2) Install primary (outer) poppet with cam follower pin against cam.

WARNING: WHITE PETROLATUM IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN WHITE PETROLATUM IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT BREATHE THE MIST.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (3) Install poppet retainer with new O-rings lubricated with petrolatum (VV-P-236).
- (4) Install nameplate.
- (5) Install cone, if applicable.

C. Remove Secondary (Inner) Poppet Seal

- (1) Close crossfeed valve.
- (2) Defuel and drain applicable tank.
- (3) Remove primary (outer) poppet. (Paragraph 3.A.)

WARNING: POPPET IS SPRING LOADED.

- (4) Remove secondary (inner) poppet retainer.
- (5) Remove secondary (inner) poppet and spring. Discard O-ring.

D. Install Secondary (Inner) Poppet Seal

- (1) Install spring and secondary (inner) poppet.

WARNING: WHITE PETROLATUM IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN WHITE PETROLATUM IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT BREATHE THE MIST.

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(WARNING PRECEDES)

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (2) Install retainer with new O-ring lubricated with petrolatum (VV-P-236).
- (3) Install primary (outer) poppet. (Paragraph 3.B.)

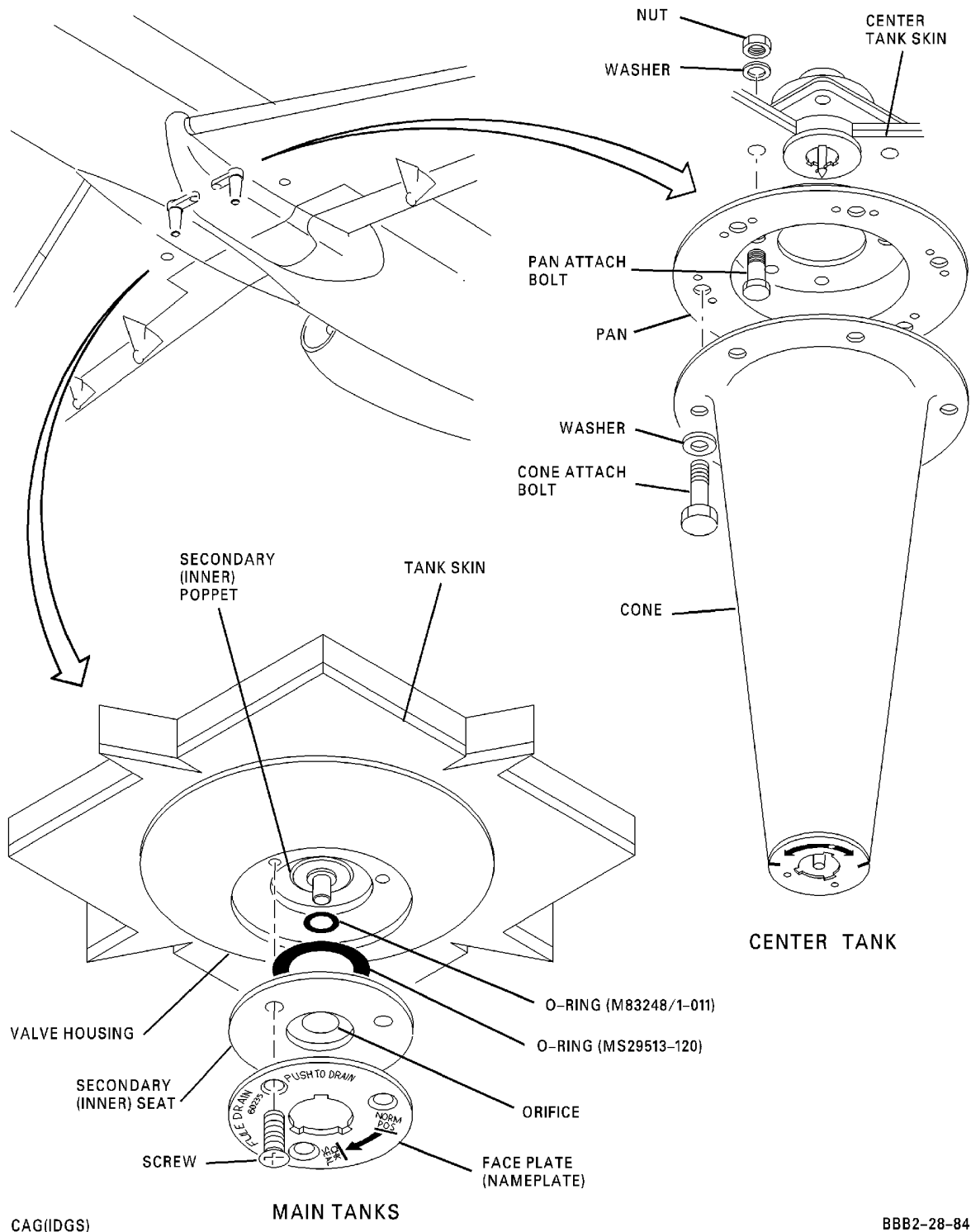
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**Sump Drain Valve -- Approved Repairs
Figure 801/28-10-03-990-801 (Sheet 1 of 2)**

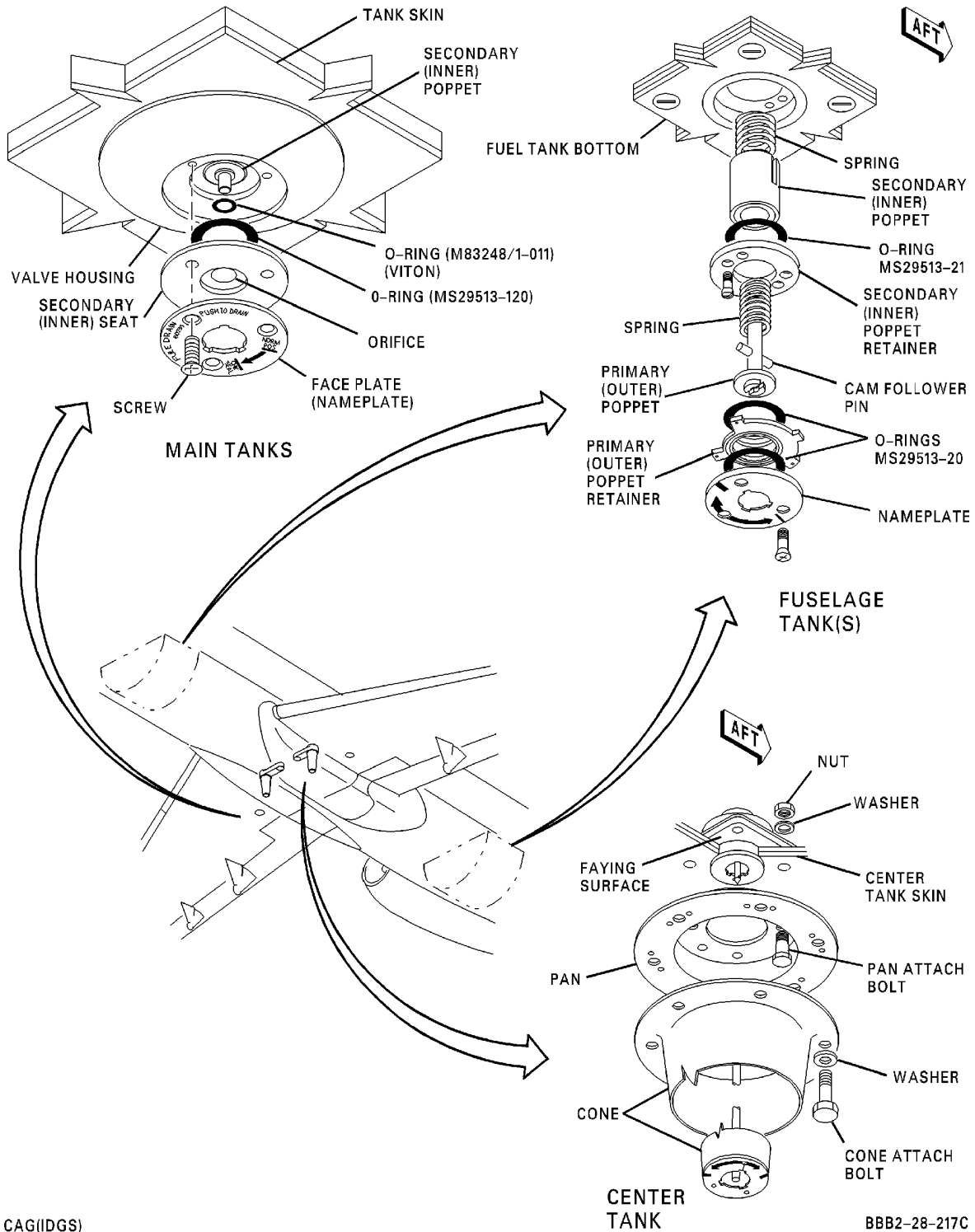
EFFECTIVITY
WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 876, 886, 887, 891, 893

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**Sump Drain Valve -- Approved Repairs
Figure 801/28-10-03-990-801 (Sheet 2 of 2)**

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

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4. Approved Repairs - Main Tank Valve

NOTE: The low profile main tank drain valves have the poppets identified opposite to the arrangement in the center tank drain valves.

A. Remove Secondary (Inner) Poppet Seal

- (1) Remove nameplate. Retain screws. Poppet will drop down exposing O-ring. Valve will still be sealed off by primary seal.
- (2) Remove and discard O-ring.

B. Install Secondary (Inner) Poppet Seal

WARNING: WHITE PETROLATUM IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN WHITE PETROLATUM IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT BREATHE THE MIST.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (1) Install new O-ring lubricated with petrolatum (VV-P-236).
- (2) Install nameplate with three screws. Torque screws to 10 inch-pounds (1.12 N·m).

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OVERWING FILL ADAPTER - MAINTENANCE PRACTICES

1. General

- A. There is one overwing fill adapter located in the upper surface of each tank near the wingtip inboard of the vent box. All components can be removed externally if the fuel level is below the resultant tank opening. The adapter has an index mark on the forward edge which serves as a guide for installing the filler cap. Screen may be removed separately or with the adapter as an assembly.
- B. The removal and installation procedures for the left and right fill adapters are identical.
- C. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices. (PAGEBLOCK 28-00-00/201)

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed item.

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 201

Name and Number	Manufacturer
Sealant PR-1422 DPM 2292-2	Courtaulds Aerospace Inc. Glendale, CA
Barrier material, greaseproof, waterproof (MIL-B-121 Type 1 Grade A, Class 1 Polykraft 1 DPM 678	Bell Fiber Products, Div. of Bell Packaging Corp. Columbus, GA
Tape, Adhesive Polyethylene Polyken #827 DPM 871-2	Tyco Adhesives Mansfield, MA
Leak detection powder Eldorado Product LD-4 DPM 6109-1	PPG (PRC-DeSoto), International, Inc. Sealants, Adhesives & Coatings Div. Glendale, CA.
Wipers, cleaning DPM 1820 T1A2	A & A Wiping Co. (A. Sobelman, Inc.) Los Angeles, CA

3. Removal/Installation

- A. Remove Fill Adapter
 - (1) Defuel applicable tank.
 - (2) Remove fill adapter.
- B. Remove the applicable overwing filler cap (1) as follows (Figure 202):
 - (1) Pull tab (2) up and out from recess in overwing filler cap (1).
 - (2) Turn tab (2) CCW (Counterclockwise) to unlock overwing filler cap (1).
 - (3) Remove overwing filler cap (1) from overwing adapter assembly (4).

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- (4) Disconnect strap (5) from clip (6).
- (5) Put greaseproof, waterproof, barrier material on overwing adapter assembly (4).
 - (a) Attach greaseproof, waterproof, barrier material with polyethylene masking tape to keep contamination out of tank.

C. Install Fill Adapter

CAUTION: USE DROP CLOTH UNDER ADAPTER. MAKE CERTAIN THAT NO SEALANT IS LEFT IN TANK TO CLOG FUEL LINES.

- (1) Clean faying surfaces. (PAGEBLOCK 28-10-01/201)

WARNING: LOW VISCOSITY POLYSULFIDE SEALANT IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOW VISCOSITY POLYSULFIDE SEALANT IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW VISCOSITY POLYSULFIDE SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (2) Apply (PR 1422) sealant to faying surfaces. (PAGEBLOCK 28-10-01/201)
- (3) Remove drop cloth.
- (4) Install adapter with adapter index mark (8) facing forward.

D. Install applicable overwing filler cap (1) as follows (Figure 202):

- (1) Remove protective material from overwing adapter assembly (4).
- (2) Attach strap (5) to clip (6).
- (3) Make sure that tab (2) of overwing filler cap (1) is in unlocked position.
- (4) Align overwing filler cap (1) with overwing adapter assembly (4).
 - (a) Make sure that alignment arrow (7) on overwing filler cap (1) aligns with index mark (8).
- (5) Put overwing filler cap (1) into overwing adapter assembly (4).
 - (a) Make sure that overwing filler cap (1) is flush with overwing adapter assembly (4).
- (6) Turn tab (2) CW (Clockwise) to lock overwing filler cap (1).
- (7) Push tab (2) down into recess on overwing filler cap (1).

E. Do a leak test as follows:

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- (1) Refuel applicable main tank to FULL.

NOTE: The sealant must be hard before tank is filled.

- (2) Do a leak check of overwing screen adapter as follows:

- (a) Clean area with a clean cloth

WARNING: LEAK DETECTION POWDER IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN LEAK DETECTION POWDER IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LEAK DETECTION POWDER IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE DUST.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (b) Follow manufacturers instructions and apply leak detection powder to area around over wing screen adapter.

- 1) The color of leak detection powder will change to dark red in 1 minute or less after it touches fuel.

- a) No leakage is permitted.

WARNING: LIQUID OR SPRAY CLEANER IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN LIQUID OR SPRAY CLEANER IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LIQUID OR SPRAY CLEANER IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

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(WARNING PRECEDES)

- (3) Remove leak detection powder from aircraft with liquid or spray cleaner and white clean, cotton wipers.
- (4) Remove all tools and equipment from work area. Make sure area is clean.
- (5) Close and lock applicable fuel filler cap.

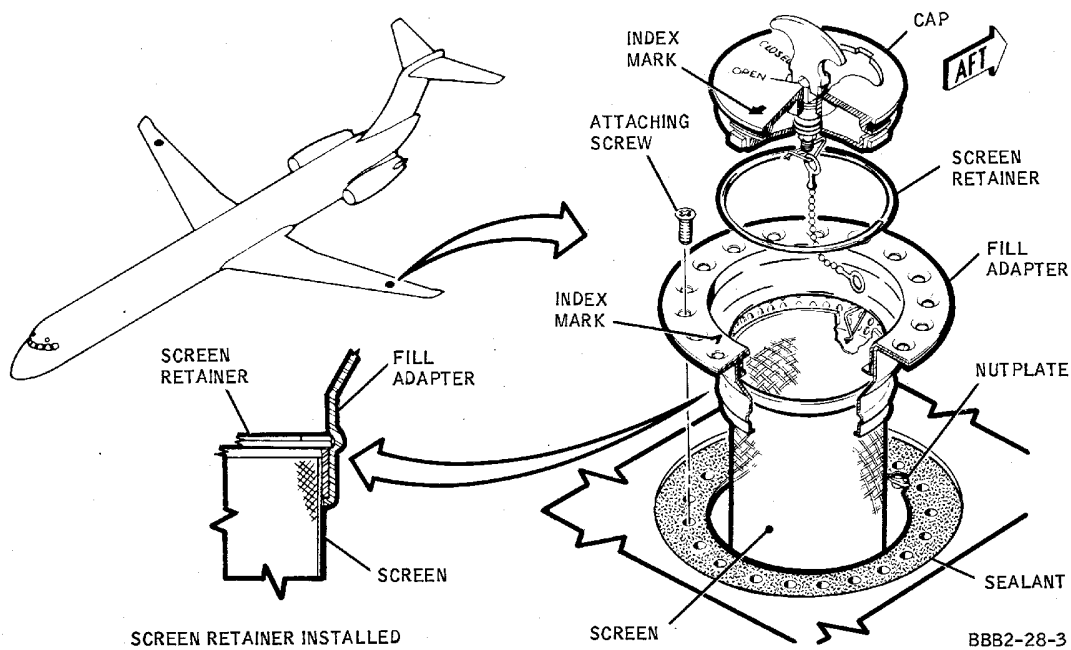
4. Approved Repairs

A. Remove Screen

- (1) Defuel applicable tank.
- (2) Remove cap.
- (3) Remove screen retainer.
- (4) Remove screen.

B. Install Screen

- (1) Install screen.
- (2) Install screen retainer.
- (3) Install cap in fill adapter with index marks aligned.



Overwing Fill Adapter -- Removal/Installation
Figure 201/28-10-04-990-801

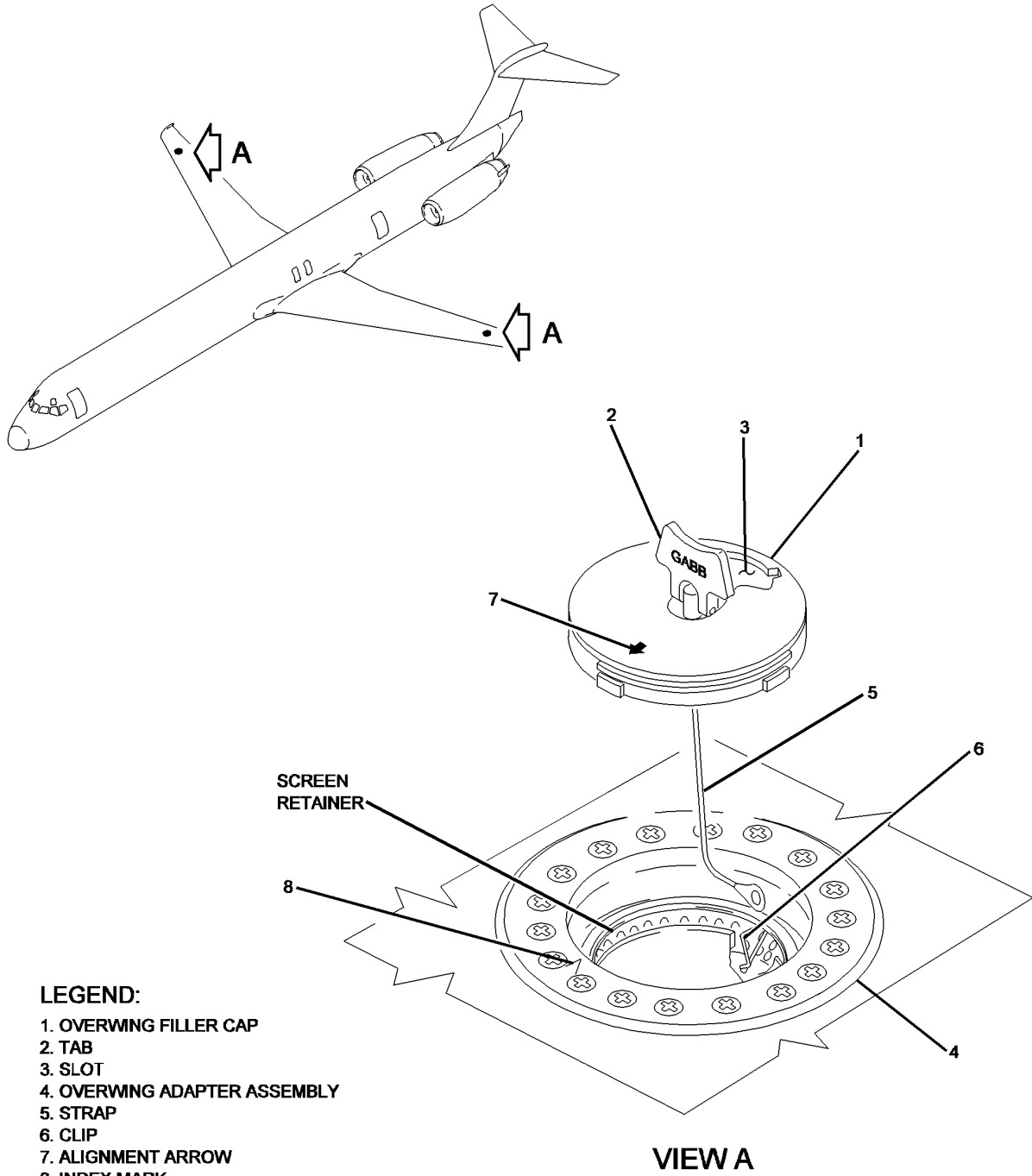
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LEGEND:

- 1. OVERWING FILLER CAP
- 2. TAB
- 3. SLOT
- 4. OVERWING ADAPTER ASSEMBLY
- 5. STRAP
- 6. CLIP
- 7. ALIGNMENT ARROW
- 8. INDEX MARK

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**Overwing Filler Cap - Removal/Installation
Figure 202/28-10-04-990-802**

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SCAVENGE CHECK VALVE - MAINTENANCE PRACTICES

1. General

- A. This procedure has the removal and installation instructions for the center and wing tank scavenge pump check valves and the reprime line check valve.
- B. The center tank scavenge check valve is located in the scavenge line just to the right of aircraft centerline.
- C. The center tank reprime check valve is located in the reprime line to the right of the center line. Direction of flow is indicated by an arrow on the valve body.
- D. The right and left tank scavenge check valves are located in the scavenge lines, inboard of the forward and aft pump volutes, in each wing.
- E. The valves can be installed only one way as the threads on the upstream end are larger diameter than the downstream end.
- F. The center tank valves are accessible through access door 1436C located in the upper inboard wing surface.
- G. The right wing tank valve is accessible through access door 1456C located on the lower inboard wing surface.
- H. The left wing tank valve is accessible through access door 1357C located in the lower inboard wing surface.
- I. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices. (PAGEBLOCK 28-00-00/201)

2. Removal/Installation Scavenge Check Valve

- A. Remove Valve. (Figure 201 and Figure 202)
 - (1) Defuel the tank in which work is to be accomplished. (FUEL SYSTEM REPLENISHING, SECTION 12-11)
 - (2) Prepare fuel tank for entry. (PAGEBLOCK 28-00-00/201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

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UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

(4) Remove valve.

(a) Disconnect both fuel lines from the check valve. Install a protective cap on the open lines.

B. Install Valve.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

(2) Install center tank check valve. Figure 201

(a) Remove the protective caps. Position the check valve.

NOTE: Downstream fitting end of valve has smaller diameter threads. This end connects to tee.

(b) Install o-ring to check valves on the scavenge lines.

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- (c) Connect and tighten both fuel lines to the check valve.
- (3) Install wing tank check valves. (Figure 202)
 - (a) Remove the protective caps. Position the check valve.

NOTE: Downstream fitting end of valve has smaller diameter threads. This end connects to tee.
 - (b) Connect and tighten both fuel lines to the check valve.

CAUTION: BEFORE INSTALLING ACCESS DOOR, PERFORM FINAL CHECK TO MAKE CERTAIN THAT ALL TOOLS, RAGS, HARDWARE, ETC. HAVE BEEN REMOVED FROM TANK.

- (4) Install access door.
- (5) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

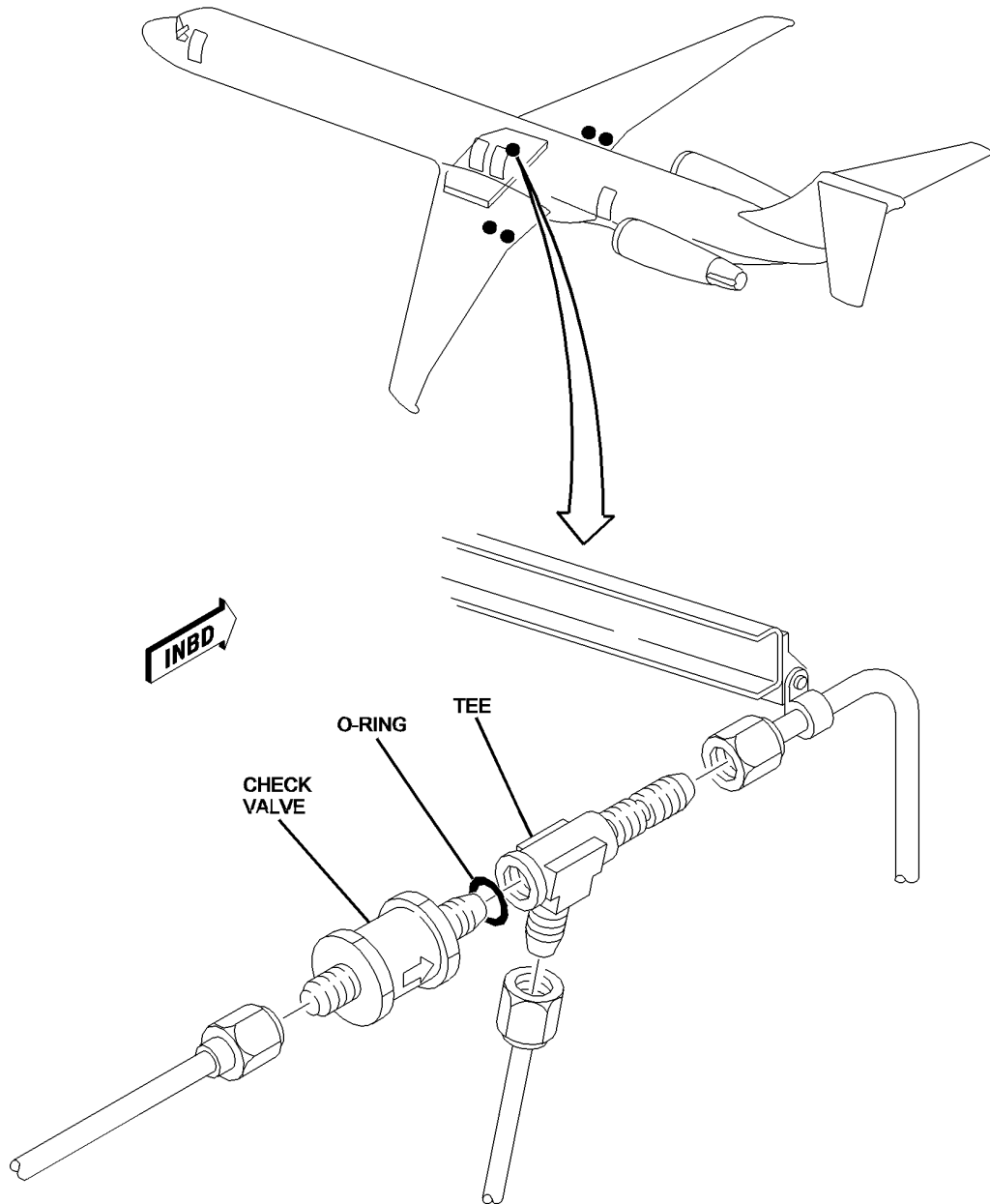
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Scavenge Check Valve -- Removal/Installation
Figure 201/28-10-05-990-801

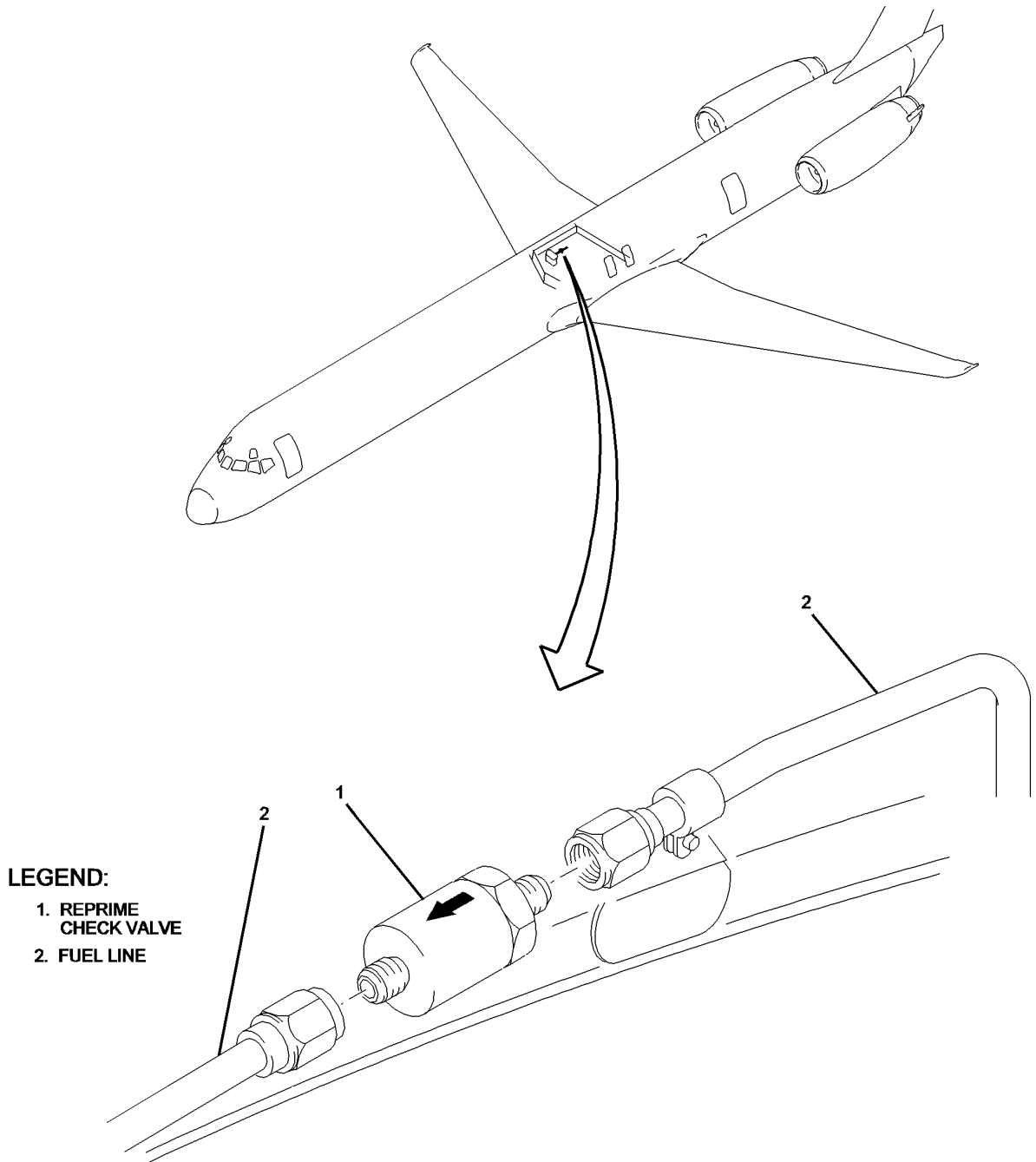
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**Reprime Line Check Valve
Figure 202/28-10-05-990-802**

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SCAVENGE CHECK VALVE - ADJUSTMENT/TEST

1. General

A. This procedure contains MSG-3 task card data.

TASK 28-10-05-720-802

2. Functional Check of the Center Fuel Tank Scavenge Check Valve

NOTE: This procedure is a scheduled maintenance task.

A. References

Reference	Title
28-00-00 P/B 201	GENERAL - MAINTENANCE PRACTICES
28-10-05 P/B 201	SCAVENGE CHECK VALVE - MAINTENANCE PRACTICES

B. Prepare for a Functional Check of the Center Fuel Tank Scavenge Check Valve

SUBTASK 28-10-05-840-007

(1) Make sure center fuel tank is open and safe for maintenance. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

SUBTASK 28-10-05-010-004

(2) Open access panel.

SUBTASK 28-10-05-020-004

(3) Remove scavenge check valve. (SCAVENGE CHECK VALVE - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-05/201)

C. Center Fuel Tank Scavenge Check Valve Functional Check

SUBTASK 28-10-05-510-002

(1) Send scavenge check valve to shop for functional check.

D. Job Close-up

SUBTASK 28-10-05-420-004

(1) Install serviceable scavenge check valve. (SCAVENGE CHECK VALVE - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-05/201)

SUBTASK 28-10-05-840-008

(2) Restore the center fuel tank to normal configuration after maintenance. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

SUBTASK 28-10-05-410-004

(3) Close access panel.

SUBTASK 28-10-05-942-004

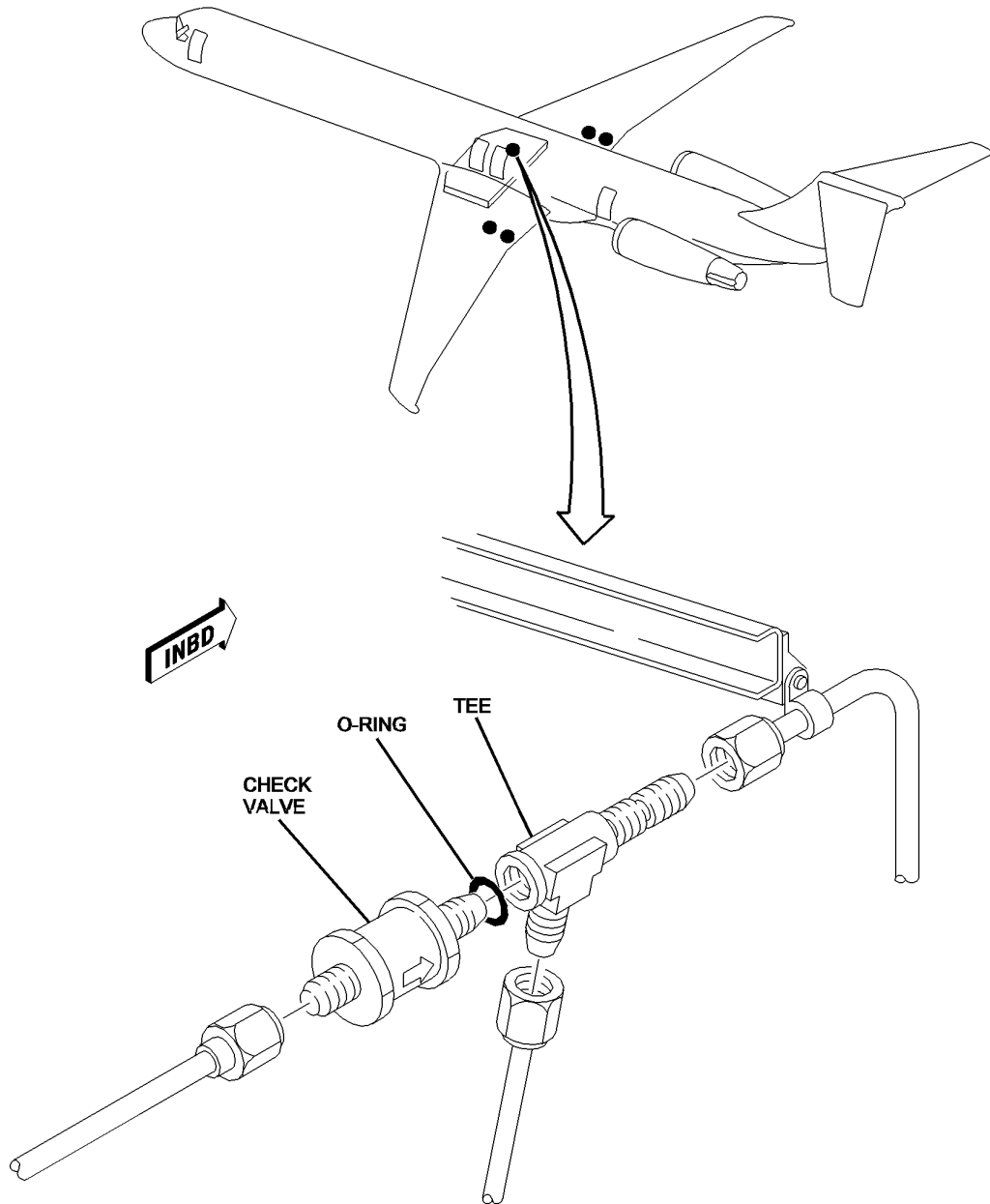
(4) Remove all the tools and equipment from the work area. Make sure the area is clean.

———— **END OF TASK** ————

<p>EFFECTIVITY WJE ALL</p>	<p>TP-80MM-WJE</p>
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CENTER TANK SCAVENGE CHECK VALVE
Figure 501/28-10-05-990-805

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SCAVENGE CHECK VALVE - INSPECTION/CHECK

1. General

A. This procedure contains MSG-3 task card data.

TASK 28-10-05-211-801

2. Detailed Inspection of the Wing Fuel Tank Scavenge Check Valves

NOTE: This procedure is a scheduled maintenance task.

A. References

Reference	Title
28-00-00 P/B 201	GENERAL - MAINTENANCE PRACTICES
28-10-05 P/B 201	SCAVENGE CHECK VALVE - MAINTENANCE PRACTICES

B. Prepare for the Wing Fuel Tank Scavenge Check Valves Detailed Inspection

SUBTASK 28-10-05-840-001

(1) Make sure left and right wing fuel tanks are open and are safe for maintenance. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

SUBTASK 28-10-05-010-001

(2) Open access panels.

SUBTASK 28-10-05-020-001

(3) Remove check valves. (SCAVENGE CHECK VALVE - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-05/201)

C. Wing Fuel Tank Scavenge Check Valves Detailed Inspection

SUBTASK 28-10-05-211-001

(1) Do a detailed inspection of the check valve to make sure: (Figure 601)

- (a) There are no cracks or damage.
- (b) There is no corrosion.
- (c) There is freedom of movement.

D. Job Close-up

SUBTASK 28-10-05-420-001

(1) Install serviceable check valves. (SCAVENGE CHECK VALVE - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-05/201)

SUBTASK 28-10-05-840-002

(2) Restore the left and right wing fuel tanks to normal configuration after maintenance. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

SUBTASK 28-10-05-410-001

(3) Close access panels.

SUBTASK 28-10-05-942-001

(4) Remove all the tools and equipment from the work area. Make sure the area is clean.

———— **END OF TASK** ————

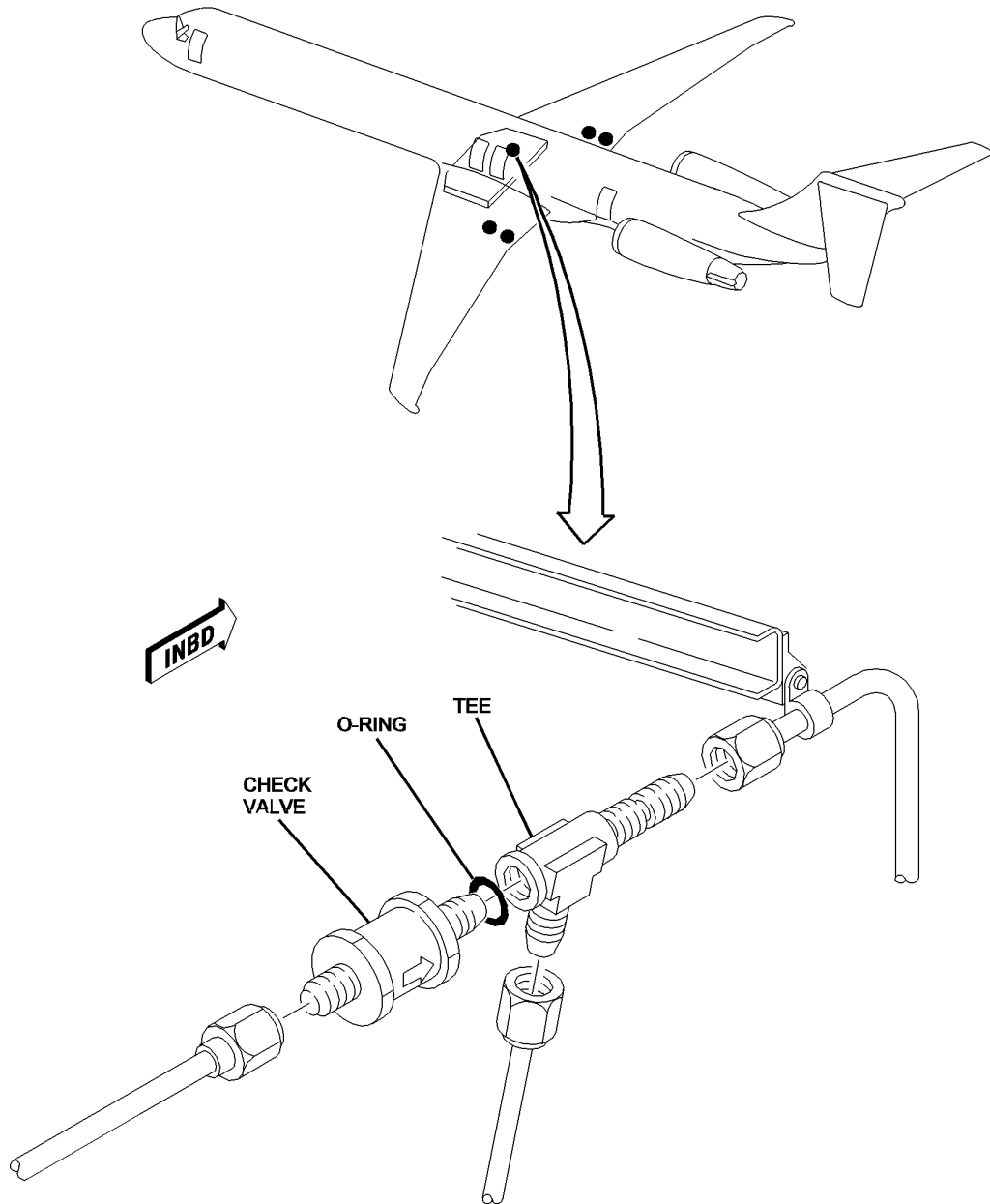
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WJE ALL

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Scavenge Check Valves - Detailed Inspection
Figure 601/28-10-05-990-803

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CLIMB VENT FLOAT VALVE - MAINTENANCE PRACTICES

1. General

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

- A. The three climb vent float valves are located, one in each vent line in the inboard end of each main fuel tank and one in the vent line in the center tank.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

- B. The fuel storage system contains five vent valves. Two climb vent float valves are located, one in each vent line in the inboard end of each main fuel tank and one in the vent line in the center tank. One valve is located in the forward end of the aft fuselage tank and one valve is located in the aft end of the forward fuselage tank.

WJE ALL

- C. Access to the main fuel tank vent valves is through doors located on upper wing surfaces.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

Access to fuselage fuel tank vent valves is through tank cavity and cell access doors.

WJE ALL

Table 201

Tank	Access
Left Main	1307C
Right Main	1410C
Center (Left Side)	1333C
Center (Right Side)	1436C
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892	
Aft Fuselage	Aft Cargo Door
Forward Fuselage	Mid Cargo Door

- D. Removal procedures for both main fuel tank vent valves are identical. Removal procedures for fuselage fuel tank vent valves are similar.

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

- E. Removal procedures for all valves are identical.

WJE ALL

- F. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

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Table 202

Name and Number	Manufacturer
Petrolatum VV-P-236 DPM 675	
Sealant PR-1422B 1/2 DPM 2292-2	Products Research Co.

3. Removal/Installation Main Tank Climb Vent Float Valve

A. Remove Valve (Figure 201 or Figure 202)

- (1) Close crossfeed valve.

CAUTION: DO NOT ROTATE ENGINE FIRE HANDLES. THIS RESULTS IN RELEASE OF FIRE EXTINGUISHING AGENT, AND REQUIRES REPLACEMENT OF FIREX CARTRIDGES AND BOTTLES.

- (2) Pull left or right engine fire handle (on main instrument panel) completely out.

NOTE: This also closes pneumatic crossfeed valve.

- (3) Check that APU fuel fire shutoff valve is closed (only if right tank is to be defueled).
- (4) Prepare applicable tank for entry. (PAGEBLOCK 28-00-00/201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (5) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893

H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A, B, & C
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UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893

J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

EFFECTIVITY
WJE ALL

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WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893 (Continued)

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (6) Unscrew coupling nut 3 to 4 turns.
- (7) Slide sleeve back, using nut for extra leverage, until nut is against flange.
- (8) Perform Paragraph 3.A.(6) and Paragraph 3.A.(7) until sleeve is completely free of flange.
- (9) Remove valve from bracket.
- (10) Remove pipe and Gask-O-Seal from valve.

B. Install Valve

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893

H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A, B, & C
---	----	--------	---

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893

J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

EFFECTIVITY
WJE ALL

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WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893 (Continued)

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

(2) Install pipe and new Gask-O-Seal on valve.

WARNING: LOW VISCOSITY POLYSULFIDE SEALANT IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOW VISCOSITY POLYSULFIDE SEALANT IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW VISCOSITY POLYSULFIDE SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (3) Install new seals lubricated with (VV-P-236) Petrolatum on both pipes.
- (4) Install valve loosely on bracket.
- (5) Manually check valve float for freedom of movement.
- (6) Slide sleeve over both flanges and seals.
- (7) Check sleeve for positive lock insert.
- (8) Thread coupling nut on sleeve until nut butts against sleeve shoulder.

NOTE: Handtight pressure is sufficient. Sleeve will then tend to turn with nut when nut is turned.

(9) Tighten bolts attaching valve to bracket.

WARNING: WHITE PETROLATUM IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN WHITE PETROLATUM IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT BREATHE THE MIST.

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(WARNING PRECEDES)

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (10) Secure coupling with (PR 1422B 1/2) sealant in compliance with locking procedure. (PAGEBLOCK 28-20-19/201)
- (11) Push left or right engine fire handle (on main instrument panel) completely in. Do not rotate.
- (12) Manually open pneumatic crossfeed valve.
- (13) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893

H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C
---	----	--------	--

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893

J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

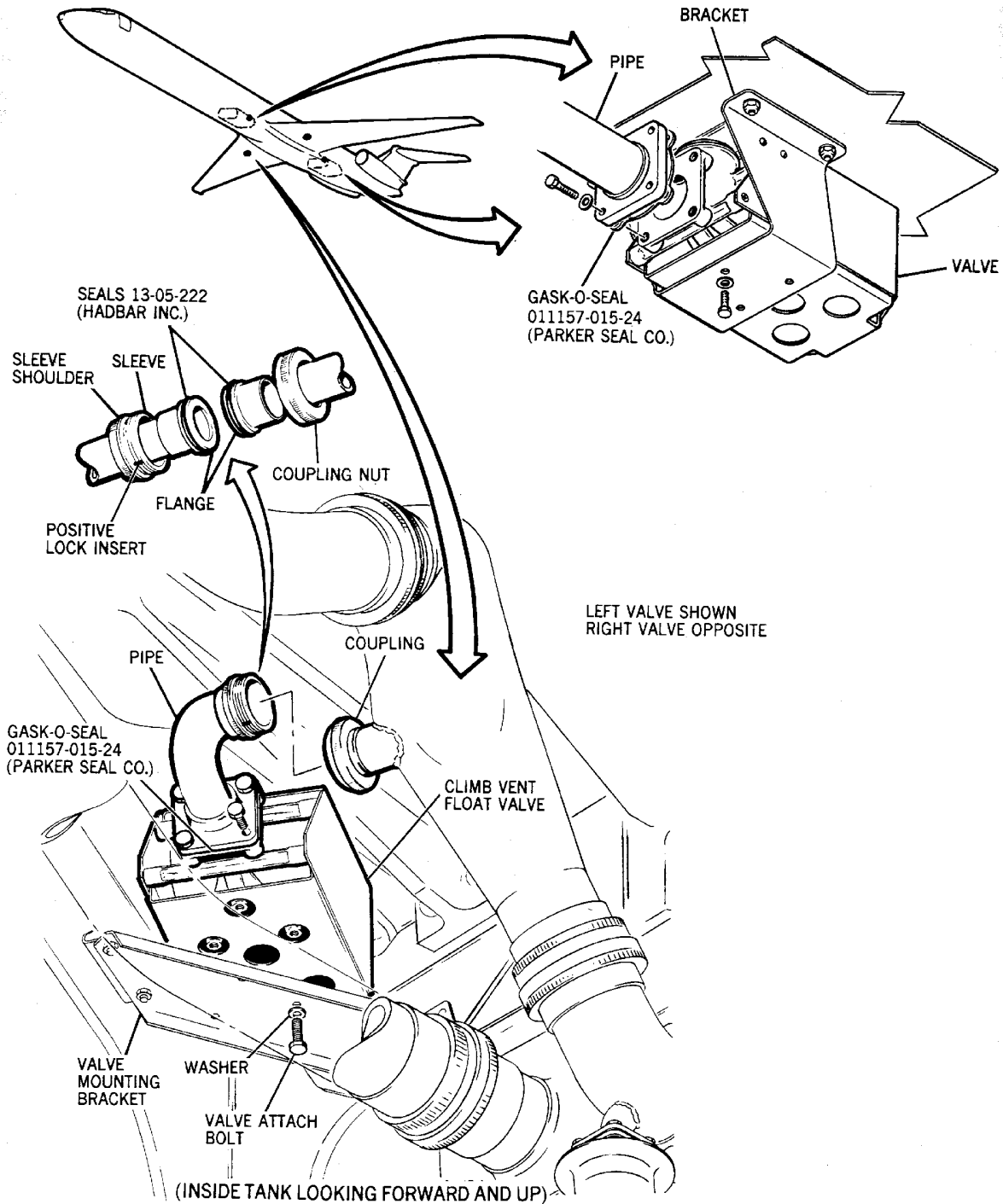
EFFECTIVITY
WJE ALL

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BBB2-28-100

**Climb Vent Float Valve -- Removal/Installation
Figure 201/28-10-06-990-801**

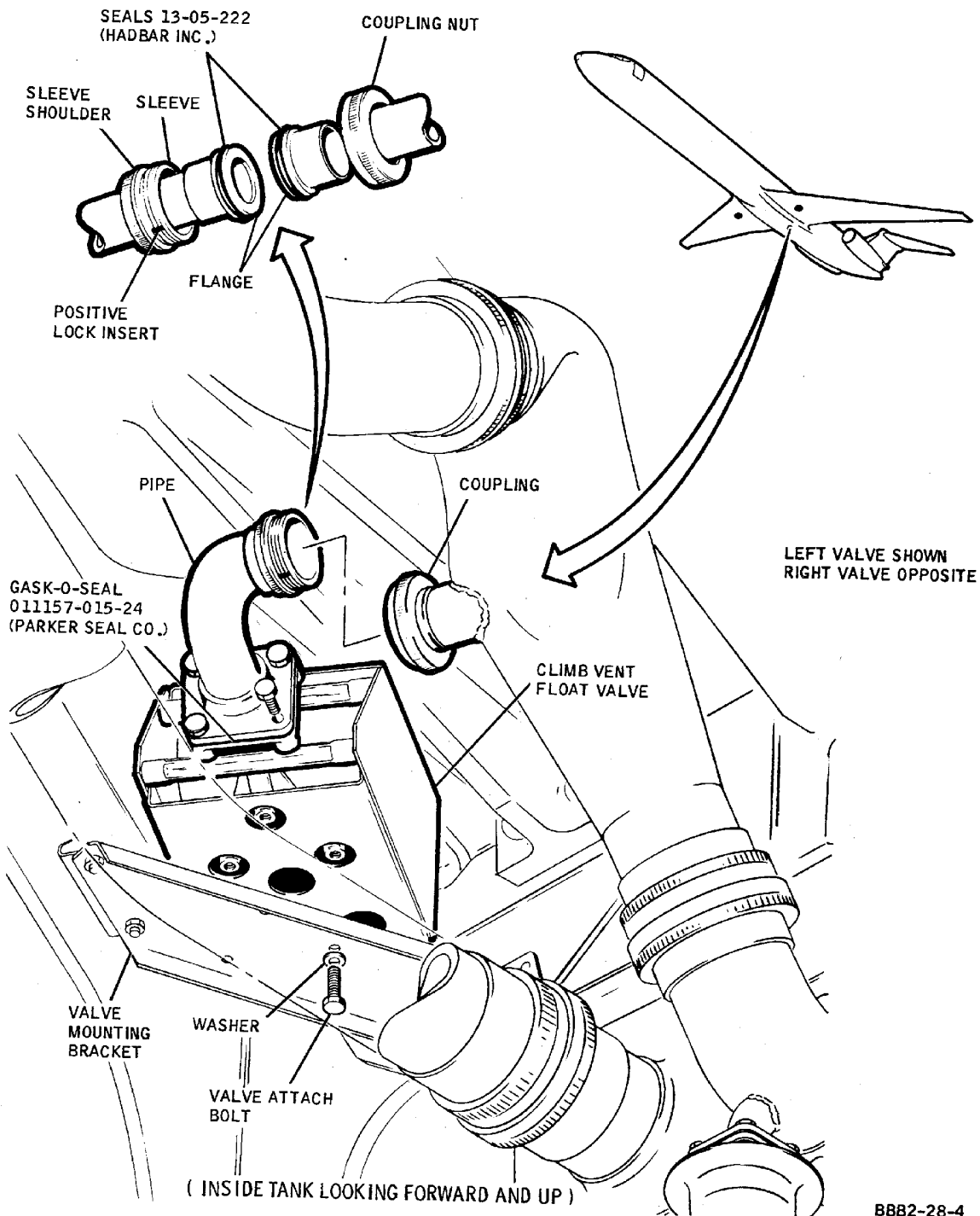
EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

28-10-06

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**MD-80
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B882-28-4

Climb Vent Float Valve -- Removal/Installation
Figure 202/28-10-06-990-802

EFFECTIVITY
WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 876, 886, 887, 891, 893

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4. Removal/Installation Fuselage Tank Vent Float Valve

A. Remove Valve

- (1) Prepare applicable tank for entry. (PAGEBLOCK 28-00-00/201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (2) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893

H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C
---	----	--------	--

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893			
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (3) Remove bolts attaching pipe to valve.
- (4) Remove screws securing valve to bracket.
- (5) Remove valve and Gask-O-Seal from bracket.

B. Install Valve

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WJE ALL

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WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893

H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C
---	----	--------	--

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893

J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (2) Install pipe and new Gask-O-Seal on valve.
- (3) Install valve loosely in bracket.
- (4) Tighten bolts attaching valve to bracket.
- (5) Manually check valve float for freedom of movement.
- (6) Install fuel tank cell access door.

CAUTION: PERFORM FINAL CHECK TO MAKE CERTAIN THAT ALL TOOLS, RAGS, HARDWARE, ETC, HAVE BEEN REMOVED FROM TANK.

- (7) Install fuel tank cavity access door.

EFFECTIVITY
WJE ALL

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(8) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893

H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A, B, & C
---	----	--------	---

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893

J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

EFFECTIVITY
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**MD-80
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CLIMB VENT FLOAT VALVE - INSPECTION/CHECK

1. General

A. This procedure contains MSG-3 task card data.

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

TASK 28-10-06-211-801

2. Detailed Inspection of the Climb Vent Float Valve

A. Prepare for the Climb Vent Float Valve Detailed Inspection

SUBTASK 28-10-06-010-002

(1) Open access panels.

B. Climb Vent Float Valve Detailed Inspection

SUBTASK 28-10-06-211-002

(1) Do a detailed inspection of the climb vent float valve to make sure: (Figure 601)

(a) There are no cracks or damage.

(b) There is no corrosion.

(c) The float seats properly.

(d) The float is properly attached.

(e) The float moves freely.

C. Job Close-up

SUBTASK 28-10-06-410-002

(1) Close access panels.

SUBTASK 28-10-06-942-002

(2) Remove all the tools and equipment from the work area. Make sure the area is clean.

———— **END OF TASK** ————

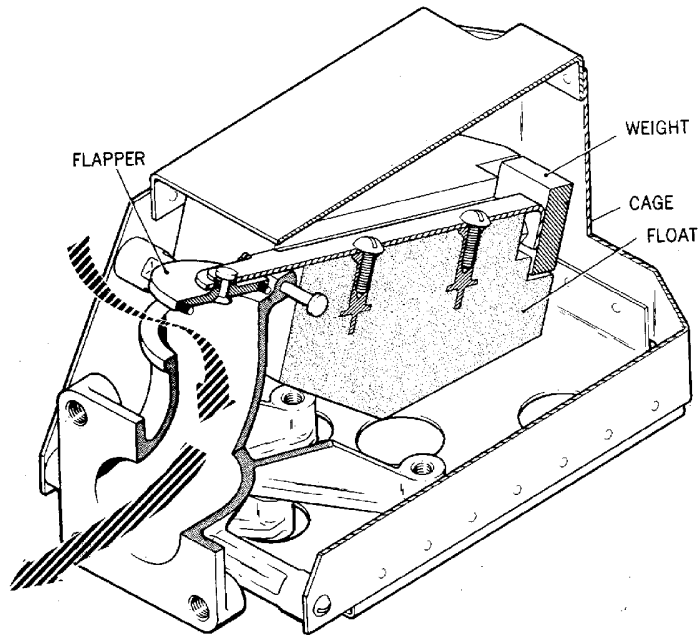
EFFECTIVITY
WJE ALL

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BBB2-28-41

Climb Vent Float Valve - Detailed Inspection
Figure 601/28-10-06-990-804

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

TASK 28-10-06-211-803

3. Detailed Inspection of the Climb Vent Float Valve

NOTE: This procedure is a scheduled maintenance task.

A. References

Reference	Title
28-10-06 P/B 201	CLIMB VENT FLOAT VALVE - MAINTENANCE PRACTICES

B. Prepare for the Climb Vent Float Valve Detailed Inspection

SUBTASK 28-10-06-010-003

- (1) Open access panels.

SUBTASK 28-10-06-020-003

- (2) Remove valve. (CLIMB VENT FLOAT VALVE - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-06/201)

C. Climb Vent Float Valve Detailed Inspection

SUBTASK 28-10-06-211-003

- (1) Do a detailed inspection of the climb vent float valve to make sure: (Figure 602)
 - (a) There are no cracks or damage.
 - (b) There is no corrosion.
 - (c) The float seats properly.
 - (d) The float is properly attached.

EFFECTIVITY
WJE ALL

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WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 (Continued)

(e) The float moves freely.

D. Job Close-up

SUBTASK 28-10-06-420-003

(1) Install serviceable climb vent float valve. (CLIMB VENT FLOAT VALVE - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-06/201)

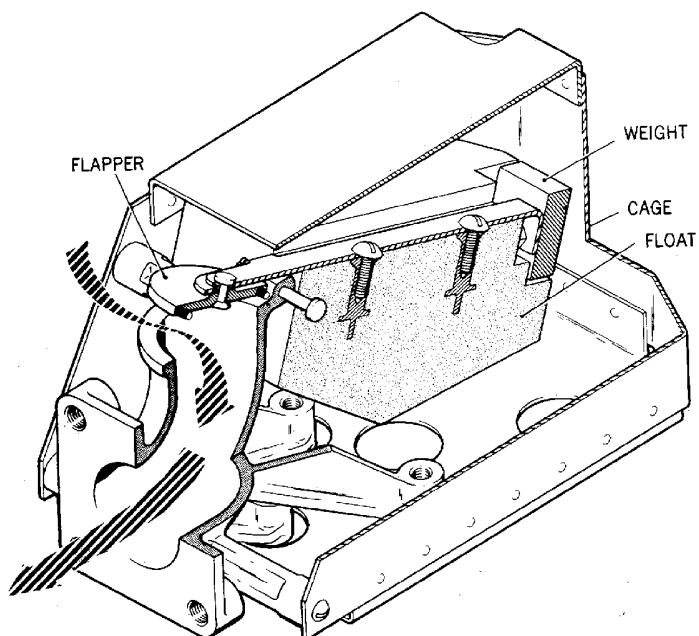
SUBTASK 28-10-06-410-003

(2) Close access panels.

SUBTASK 28-10-06-942-003

(3) Remove all the tools and equipment from the work area. Make sure the area is clean.

————— END OF TASK —————



BBB2-28-41

Climb Vent Float Valve - Detailed Inspection
Figure 602/28-10-06-990-806

EFFECTIVITY
WJE ALL

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ARRESTOR-FLAME - MAINTENANCE PRACTICES

1. General

- A. A standpipe containing a flame arrestor and integral pressure and vacuum vent relief valves is incorporated in each vent box to prevent over-board spillage, and to allow the internal tank pressure to adjust.
- B. There is one flame arrestor in each vent box of the left and right wing.
- C. Access to the flame arrestor is through the upper wing surface fuel tank access cover.
- D. Removal/Installation procedures are the same for the left and right wing fuel tank flame arrestor. The flame arrestors are interchangeable.
- E. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices. (PAGEBLOCK 28-00-00/201)

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 201

Name and Number	Manufacturer
Sealant (PR 1422 B-1/2) DMS 2082	Courtaulds Aerospace Inc. Sealants, Adhesives & Coatings Glendale, CA

3. Removal/Installation Flame Arrestor

- A. Remove Flame Arrestor
 - (1) Close fuel crossfeed valve, as applicable.

CAUTION: DO NOT ROTATE ENGINE FIRE HANDLES. THIS RESULTS IN RELEASE OF FIRE EXTINGUISHING AGENT, AND REQUIRES REPLACEMENT OF FIREX CARTRIDGES AND BOTTLES.

- (2) Pull left or right engine fire handle (on main instrument panel) completely out, as applicable.
- (3) Prepare tank for entry. (PAGEBLOCK 28-00-00/201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (4) Open the applicable circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

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(Continued)

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (5) Remove upper wing surface fuel tank access cover 1323C (left wing fuel tank), or 1426C (right wing fuel tank), as applicable.
- (6) Remove screws, washers, and nuts from flame arrestor and standpipe, and remove flame arrestor. (Figure 201)

B. Install Flame Arrestor

- (1) Make certain that fuel crossfeed valve is closed, as applicable.

CAUTION: DO NOT ROTATE ENGINE FIRE HANDLES. THIS RESULTS IN RELEASE OF FIRE EXTINGUISHING AGENT, AND REQUIRES REPLACEMENT OF FIREX CARTRIDGES AND BOTTLES.

- (2) Check that left or right engine fire handle (on main instrument panel) is pulled completely out, as applicable.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Make sure that these applicable circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

EFFECTIVITY
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UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

(4) Place flame arrestor into standpipe, and install screws, washers, and nuts. (Figure 201)

WARNING: INTEGRAL FUEL TANKS SEALING COMPOUND (POLYSULFIDE SEALANT B1/2 AND B2) IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN INTEGRAL FUEL TANKS SEALING COMPOUND IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET INTEGRAL FUEL TANKS SEALING COMPOUND IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

(5) Apply (PRC1422 B-1/2) sealant. (Figure 201)

(6) Install fuel tank access cover. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

CAUTION: DO NOT ROTATE ENGINE FIRE HANDLES. THIS RESULTS IN RELEASE OF FIRE EXTINGUISHING AGENT, AND REQUIRES REPLACEMENT OF FIREX CARTRIDGES AND BOTTLES.

(7) Remove the safety tags and close the applicable circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

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UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (8) Place left or right engine fire handle (on main instrument panel), in normal operating position, as applicable.

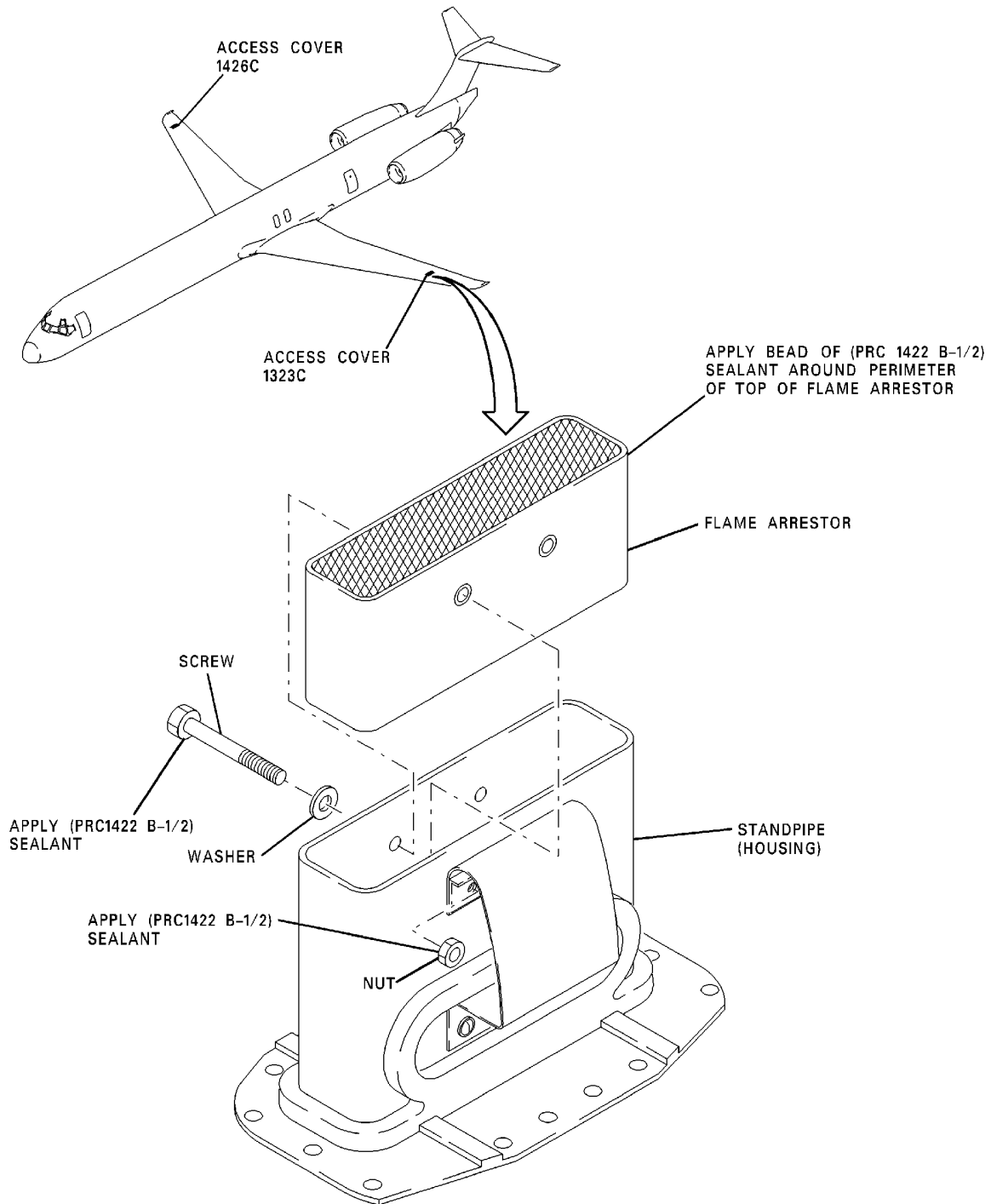
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CAG(IGDS)

BBB2-28-312

Arrestor-Flame - Removal/Installation
Figure 201/28-10-07-990-801

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FLAME ARRESTOR - INSPECTION/CHECK

1. General

A. This procedure contains MSG-3 task card data.

TASK 28-10-07-211-801

2. Detailed Inspection of the Flame Arrestor

NOTE: This procedure is a scheduled maintenance task.

A. References

<u>Reference</u>	<u>Title</u>
28-00-00 P/B 201	GENERAL - MAINTENANCE PRACTICES
28-10-07 P/B 201	ARRESTOR-FLAME - MAINTENANCE PRACTICES

B. Prepare for the Flame Arrestor Detailed Inspection

SUBTASK 28-10-07-840-001

(1) Make sure left and right wing fuel tanks are open and are safe for maintenance. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

SUBTASK 28-10-07-010-001

(2) Open access panels.

SUBTASK 28-10-07-020-001

(3) Remove flame arrestor. (ARRESTOR-FLAME - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-07/201)

C. Flame Arrestor Detailed Inspection

SUBTASK 28-10-07-211-001

(1) Do a detailed inspection of the flame arrestor to make sure: (Figure 601)

- (a) There are no cracks or damage.
- (b) There is no corrosion.
- (c) It is correctly attached.

D. Job Close-up

SUBTASK 28-10-07-420-001

(1) Install flame arrestor.

SUBTASK 28-10-07-840-002

(2) Restore the left and right wing fuel tanks to normal configuration after maintenance. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

SUBTASK 28-10-07-410-001

(3) Close access panels.

SUBTASK 28-10-07-942-001

(4) Remove all the tools and equipment from the work area. Make sure the area is clean.

———— **END OF TASK** ————

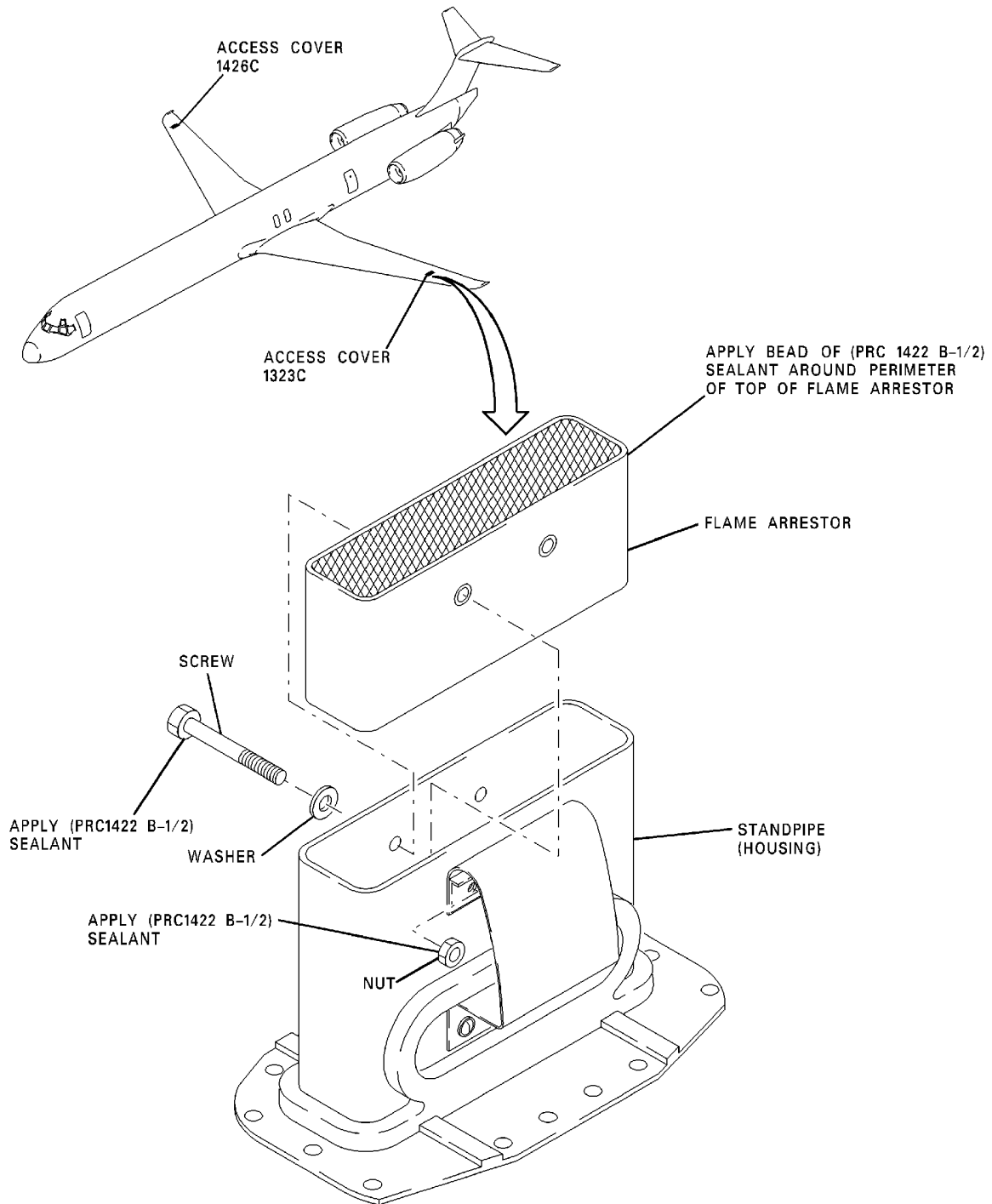
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CAG(IGDS)

BBB2-28-312

Flame Arrester - Detailed Inspection
Figure 601/28-10-07-990-802

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VALVE-VENT PRESSURE RELIEF - MAINTENANCE PRACTICES

1. General

- A. A standpipe containing integral pressure and vacuum vent relief valves is incorporated in each vent box to prevent over-board spillage, and to allow the internal tank pressure to adjust.
- B. There is one vent pressure relief valve in each vent box of the left wing and right wing fuel tanks.
- C. Access to the vent pressure relief valve is through the upper wing surface fuel tank access cover.
- D. The Removal/Installation procedures are the same for the left wing and right wing fuel tank vent pressure relief valves. The vent pressure relief valves are interchangeable.
- E. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices. (PAGEBLOCK 28-00-00/201)

2. Removal/Installation Vent Pressure Relief Valve

- A. Remove Vent Pressure Relief Valve.

(1) Close fuel crossfeed valve, as applicable.

CAUTION: DO NOT ROTATE ENGINE FIRE HANDLES. THIS RESULTS IN RELEASE OF FIRE EXTINGUISHING AGENT, AND REQUIRES REPLACEMENT OF FIREX CARTRIDGES AND BOTTLES.

(2) Pull left or right engine fire handle (on main instrument panel) completely out, as applicable.

(3) Prepare applicable tank for entry. (PAGEBLOCK 28-00-00/201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Open the applicable circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

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UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (5) Remove upper wing surface fuel tank access cover 1223C (left wing fuel tank), or 1426C (right wing fuel tank), as applicable.
- (6) Remove flame arrestor from standpipe. (PAGEBLOCK 28-10-07/201)
- (7) Remove screws, washers, crowns, and nuts from vent pressure relief valve and spring, and remove vent pressure relief valve (molded flapper) from standpipe. (Figure 201)

B. Install Vent Pressure Relief Valve

- (1) Make certain that fuel crossfeed valve is closed, as applicable.

CAUTION: DO NOT ROTATE ENGINE FIRE HANDLES. THIS RESULTS IN RELEASE OF FIRE EXTINGUISHING AGENT, AND REQUIRES REPLACEMENT OF FIREX CARTRIDGES AND BOTTLES.

- (2) Check that left or right engine fire handle (on main instrument panel) is pulled completely out, as applicable.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Make sure that the following applicable circuit breakers are open and tagged:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (4) Place vent pressure relief valve (molded flapper) into standpipe, and Install valve on spring. (Figure 201)

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- (5) Install flame arrestor. (PAGEBLOCK 28-10-07/201)
- (6) Install fuel tank access cover. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

CAUTION: DO NOT ROTATE ENGINE FIRE HANDLES. THIS RESULTS IN RELEASE OF FIRE EXTINGUISHING AGENT, AND REQUIRES REPLACEMENT OF FIREX CARTRIDGES AND BOTTLES.

- (7) Remove the safety tags and close the applicable circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (8) Place left or right engine fire handle (on main instrument panel) in normal operating position.

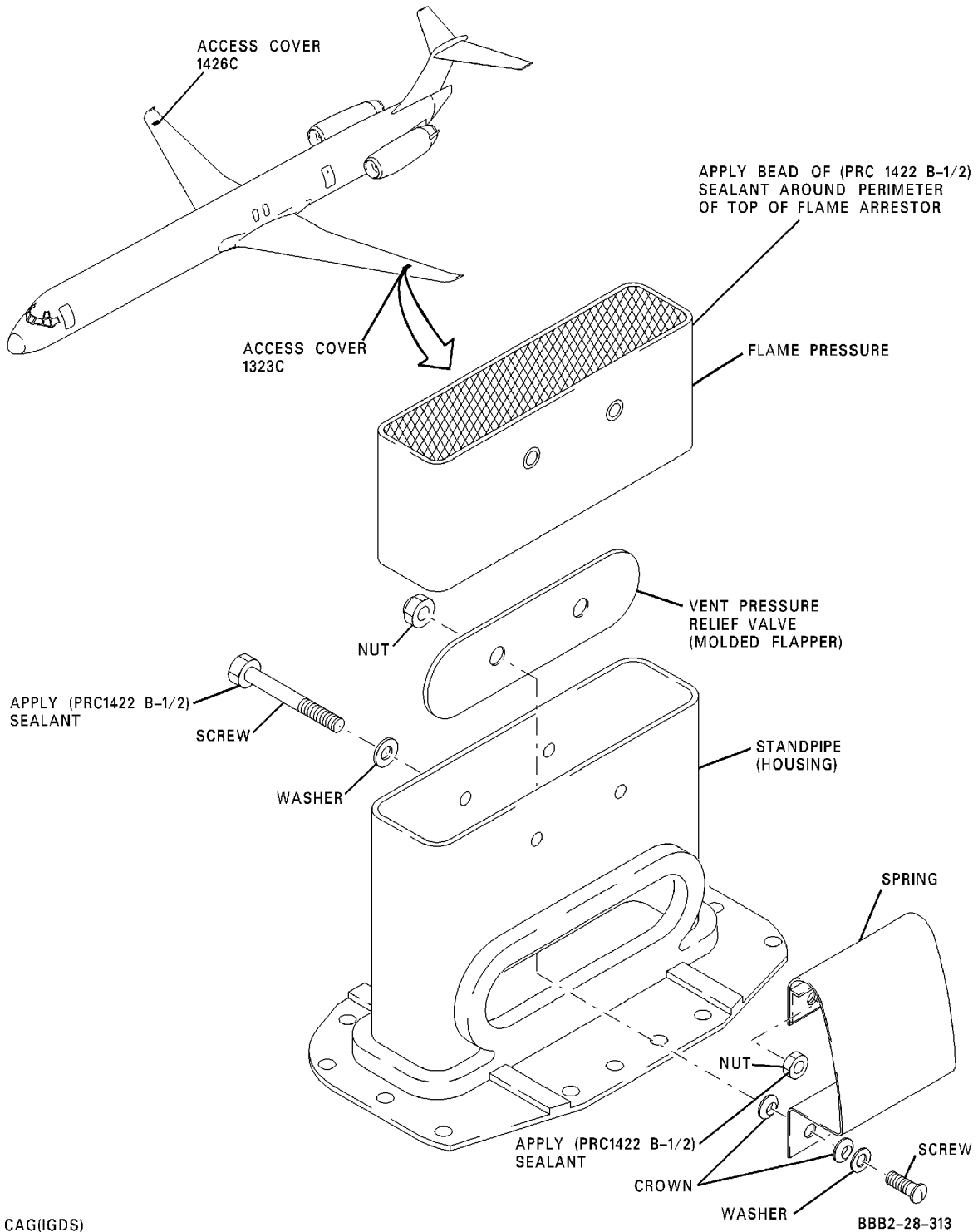
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Valve-Vent Pressure Relief - Removal/Installation
Figure 201/28-10-08-990-801

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VENT PRESSURE RELIEF VALVE - INSPECTION/CHECK

1. General

A. This procedure contains MSG-3 task card data.

TASK 28-10-08-211-801

2. Detailed Inspection of the Vent Pressure Relief Valve

NOTE: This procedure is a scheduled maintenance task.

A. References

<u>Reference</u>	<u>Title</u>
28-10-08 P/B 201	VALVE-VENT PRESSURE RELIEF - MAINTENANCE PRACTICES

B. Prepare for the Vent Pressure Relief Valve Detailed Inspection

SUBTASK 28-10-08-010-001

(1) Open access panel.

SUBTASK 28-10-08-020-001

(2) Remove valve. (VALVE-VENT PRESSURE RELIEF - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-08/201)

C. Vent Pressure Relief Valve Detailed Inspection

SUBTASK 28-10-08-211-001

- (1) Do a detailed inspection of the vent pressure relief valve to make sure: (Figure 601)
- (a) There are no cracks or damage.
 - (b) There is no corrosion.
 - (c) There is freedom of movement.
 - (d) There is no blockage.

SUBTASK 28-10-08-210-001

(2) Inspect housing (standpipe) and flame arrestor for general condition.

D. Job Close-up

SUBTASK 28-10-08-420-001

(1) Install serviceable valve. (VALVE-VENT PRESSURE RELIEF - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-08/201)

SUBTASK 28-10-08-410-001

(2) Close access panel.

SUBTASK 28-10-08-942-001

(3) Remove all the tools and equipment from the work area. Make sure the area is clean.

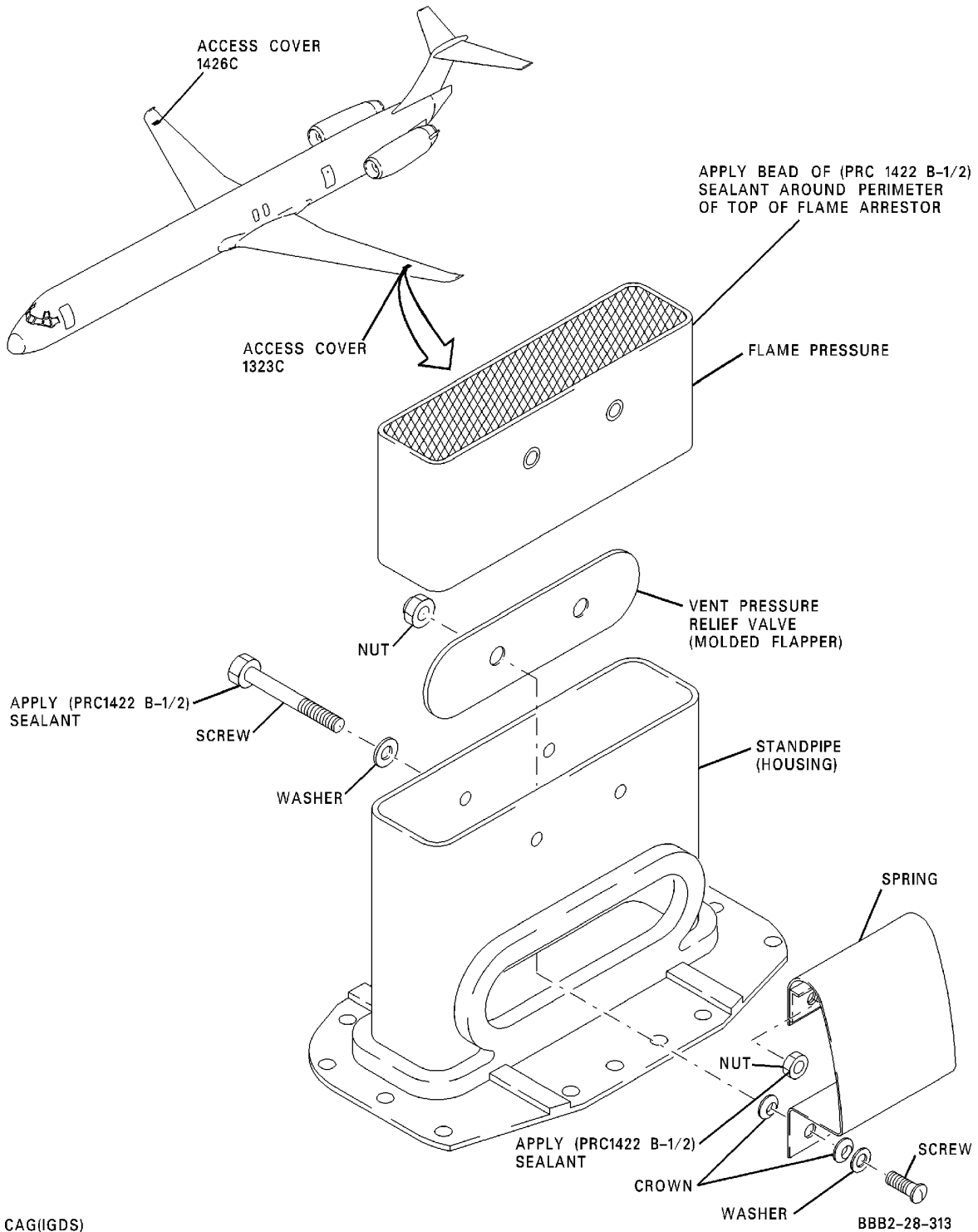
————— **END OF TASK** —————

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CAG(IGDS)

**Vent Pressure Relief Valve - Detailed Inspection
Figure 601/28-10-08-990-802**

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VALVE-VENT VACUUM RELIEF - MAINTENANCE PRACTICES

1. General

- A. A standpipe containing a flame arrestor and integral pressure and vacuum vent relief valves is incorporated in each vent box to prevent over-board spillage, and to allow the internal tank pressure to adjust.
- B. There is one vent vacuum relief valve in each vent box of the left and right fuel tanks.
- C. Access to the vent vacuum valve is through the upper wing surface fuel tank access cover.
- D. The Removal/Installation procedures are the same for the left wing and right wing fuel tank vent vacuum relief valves. The vent vacuum relief valves are interchangeable.
- E. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices. (PAGEBLOCK 28-00-00/201)

2. Removal/Installation Vent Vacuum Relief Valve

- A. Remove Vent Vacuum Relief Valve

- (1) Close fuel crossfeed valve, as applicable.

CAUTION: DO NOT ROTATE ENGINE FIRE HANDLES. THIS RESULTS IN RELEASE OF FIRE EXTINGUISHING AGENT, AND REQUIRES REPLACEMENT OF FIREX CARTRIDGES AND BOTTLES.

- (2) Pull left or right engine fire handle (on main instrument panel) completely out, as applicable.
- (3) Prepare applicable tank for entry. (PAGEBLOCK 28-00-00/201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (4) Open the applicable circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

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UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (5) Remove upper wing surface fuel tank access cover 1223C (left wing fuel tank), or 1426C (right wing fuel tank), as applicable.
- (6) Remove screws, washers, nuts, and support plate from vent vacuum relief valve (molded disk) and spring, and remove vent vacuum relief valve from standpipe. (Figure 201)

B. Install Vent Vacuum Relief Valve

- (1) Make certain that fuel crossfeed valve is closed, as applicable.

CAUTION: DO NOT ROTATE ENGINE FIRE HANDLES. THIS RESULTS IN RELEASE OF FIRE EXTINGUISHING AGENT, AND REQUIRES REPLACEMENT OF FIREX CARTRIDGES AND BOTTLES.

- (2) Check that left or right engine fire handle (on main instrument panel) is completely out, as applicable.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Make sure that the applicable circuit breakers is open and has safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (4) Install vent vacuum relief valve (molded disk) on spring, and place valve on standpipe; install screws, washers, and support plate on standpipe.

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- (5) Install fuel tank access cover.(GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

CAUTION: DO NOT ROTATE ENGINE FIRE HANDLES. THIS RESULTS IN RELEASE OF FIRE EXTINGUISHING AGENT, AND REQUIRES REPLACEMENT OF FIREX CARTRIDGES AND BOTTLES.

- (6) Remove the safety tags and close the applicable circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (7) Place left or right engine fire handle (on main instrument panel) in normal operating position.

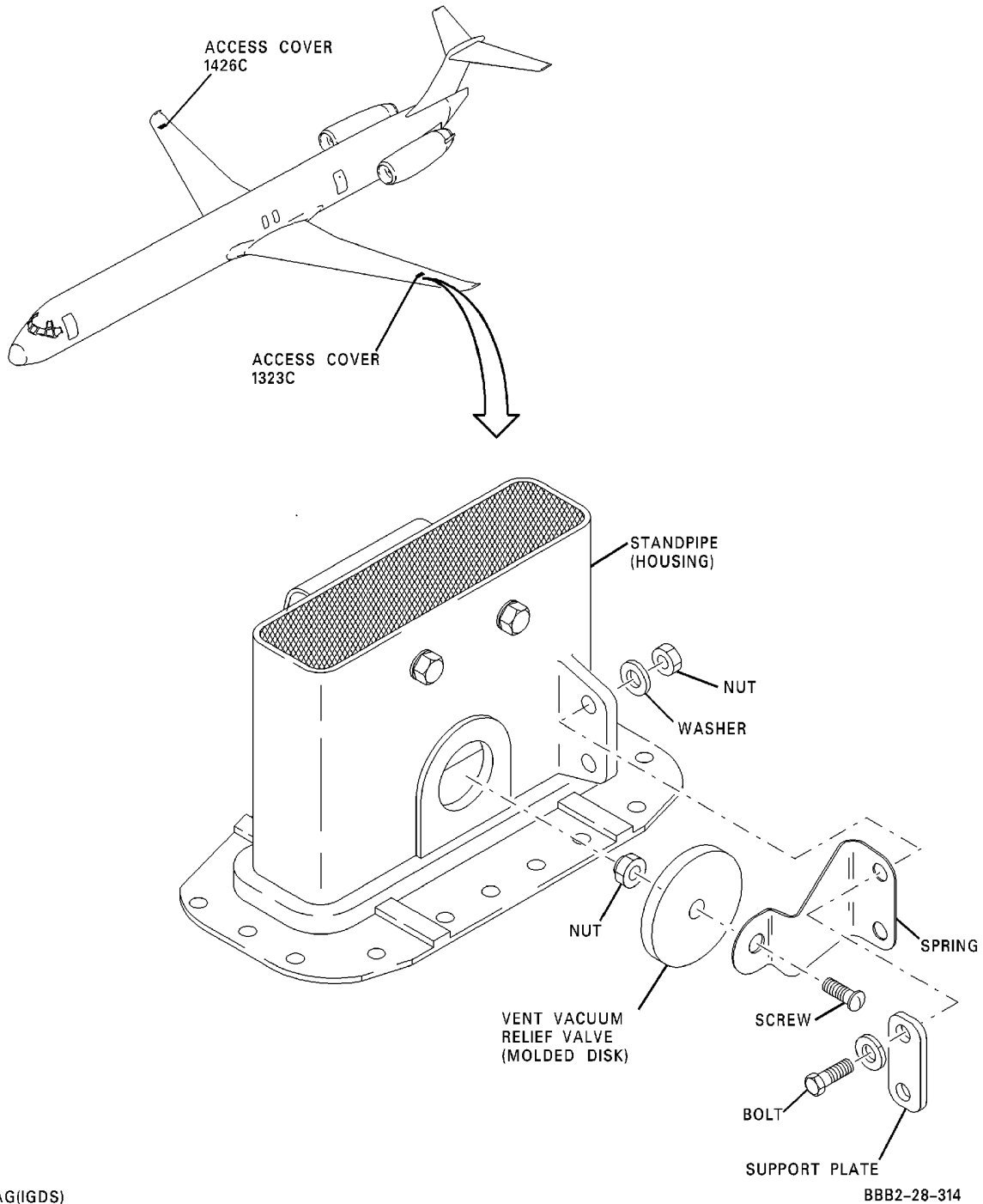
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Valve-Vent Vacuum Relief - Removal/Installation
Figure 201/28-10-09-990-801

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VENT VACUUM RELIEF VALVE - INSPECTION/CHECK

1. General

A. This procedure contains MSG-3 task card data.

TASK 28-10-09-211-801

2. Detailed Inspection of the Vent Vacuum Relief Valve

NOTE: This procedure is a scheduled maintenance task.

A. References

<u>Reference</u>	<u>Title</u>
28-10-09 P/B 201	VALVE-VENT VACUUM RELIEF - MAINTENANCE PRACTICES

B. Prepare for the Vent Vacuum Relief Valve Detailed Inspection

SUBTASK 28-10-09-010-001

(1) Open access panel.

SUBTASK 28-10-09-020-001

(2) Remove valve. (VALVE-VENT VACUUM RELIEF - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-09/201)

C. Vent Vacuum Relief Valve Detailed Inspection

SUBTASK 28-10-09-211-001

(1) Do a detailed inspection of the vent pressure relief valve to make sure: (Figure 601)

(a) There are no cracks or damage.

(b) There is no corrosion.

(c) There is freedom of movement.

(d) There is no blockage.

SUBTASK 28-10-09-210-001

(2) Inspect housing (standpipe) and flame arrestor for general condition.

D. Job Close-up

SUBTASK 28-10-09-420-001

(1) Install serviceable valve. (VALVE-VENT VACUUM RELIEF - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-09/201)

SUBTASK 28-10-09-410-001

(2) Close access panel.

SUBTASK 28-10-09-942-001

(3) Remove all the tools and equipment from the work area. Make sure the area is clean.

————— **END OF TASK** —————

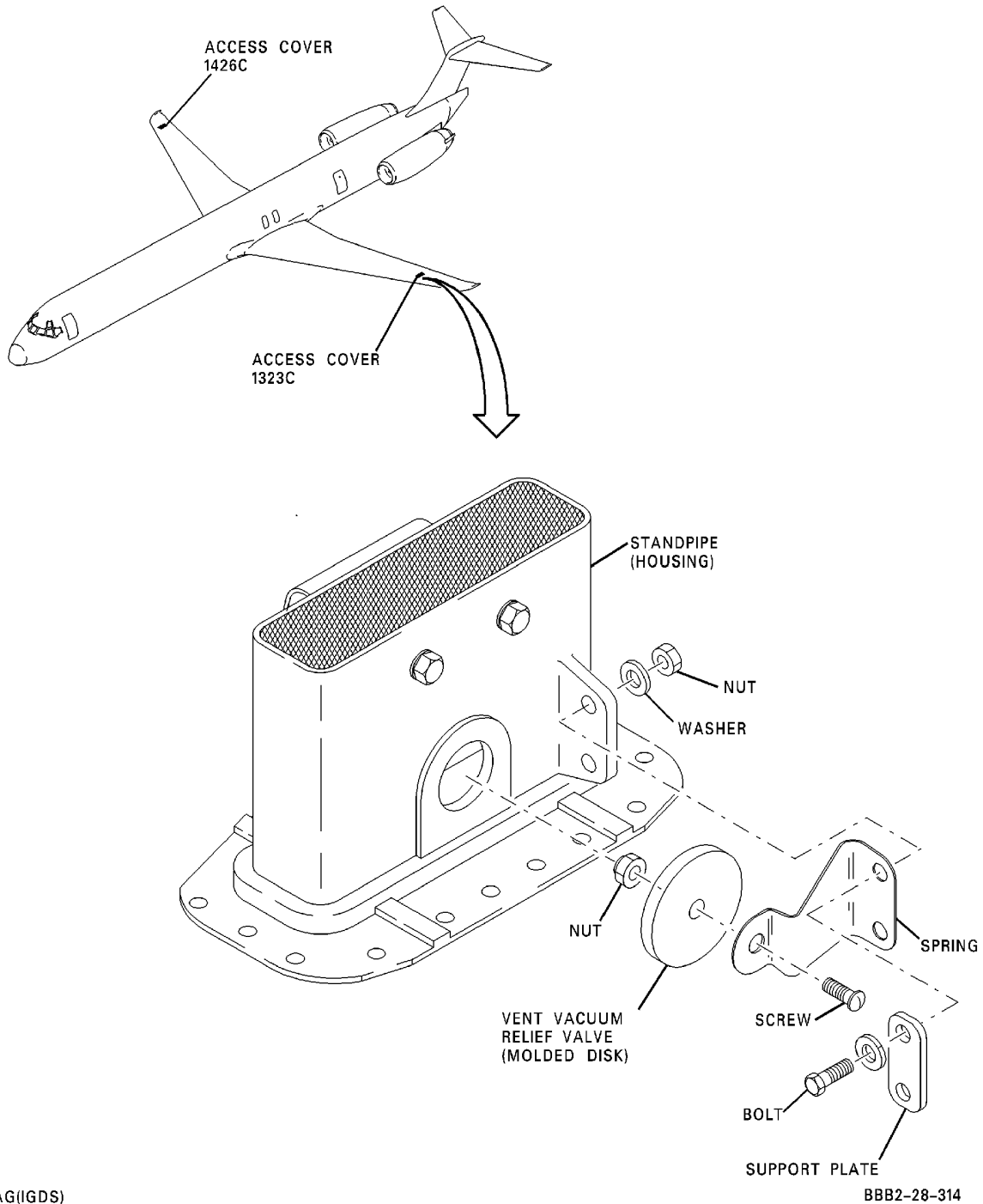
EFFECTIVITY
WJE ALL

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Vent Vacuum Relief Valve - Detailed Inspection
Figure 601/28-10-09-990-802

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VENT DRAIN SWING CHECK VALVE - MAINTENANCE PRACTICES

1. General

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

- A. The vent drain swing check valves are located, one in each vent line, in the inboard end of each main fuel tank outboard of the high point in the vent line and two in the vent lines in the center tank. Two vent drain swing check valves are located in the forward fuselage fuel tank vent line, one inside the tank vent fitting and one forward in the tank. One vent drain swing valve is located in the aft fuselage fuel tank vent line approximately center of tank.

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

- B. The vent drain swing check valves are located, one in each vent line, in the inboard end of each main fuel tank outboard of the high point in the vent line and two in the vent lines in the center tank.

WJE ALL

- C. Access to the valves are as follows:

Table 201

Tank	Access
Left Main	1307C
Right Main	1410C
Center (Left Side)	1333C
Center (Right Side)	1436C
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892	
Forward Fuselage	Mid Cargo Door
Aft Fuselage	Aft Cargo Door
WJE ALL	

- D. Removal procedures for all valves are identical.
- E. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201.

2. Removal/Installation Vent Drain Swing Check Valve

- A. Remove Valve (Figure 201 or Figure 202 or Figure 203 or Figure 204 or Figure 205)
 - (1) Close crossfeed valve.

CAUTION: DO NOT ROTATE ENGINE FIRE HANDLES. THIS RESULTS IN RELEASE OF FIRE EXTINGUISHING AGENT, AND REQUIRES REPLACEMENT OF FIREX CARTRIDGES AND BOTTLES.

- (2) Pull left or right engine fire handle (on main instrument panel) completely out.

NOTE: This also closes pneumatic crossfeed valve.

- (3) Check that APU fuel fire shutoff valve is closed (only if right tank is to be defueled).
- (4) Prepare applicable tank for entry. (PAGEBLOCK 28-00-00/201)

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WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (5) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893

H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C
---	----	--------	--

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893

J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (6) Remove valve. Discard Gask-O-Seal.

B. Install Valve

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

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UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893			
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893			
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (2) Install valve using new Gask-O-Seal.
NOTE: Install swing check valve with hinge on top.
- (3) Manually check swing check valve for freedom of movement.
- (4) Push left or right engine fire handle (on main instrument panel) completely in. Do not rotate.
- (5) Manually open pneumatic crossfeed valve.
- (6) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

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(Continued)

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893			
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893			
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

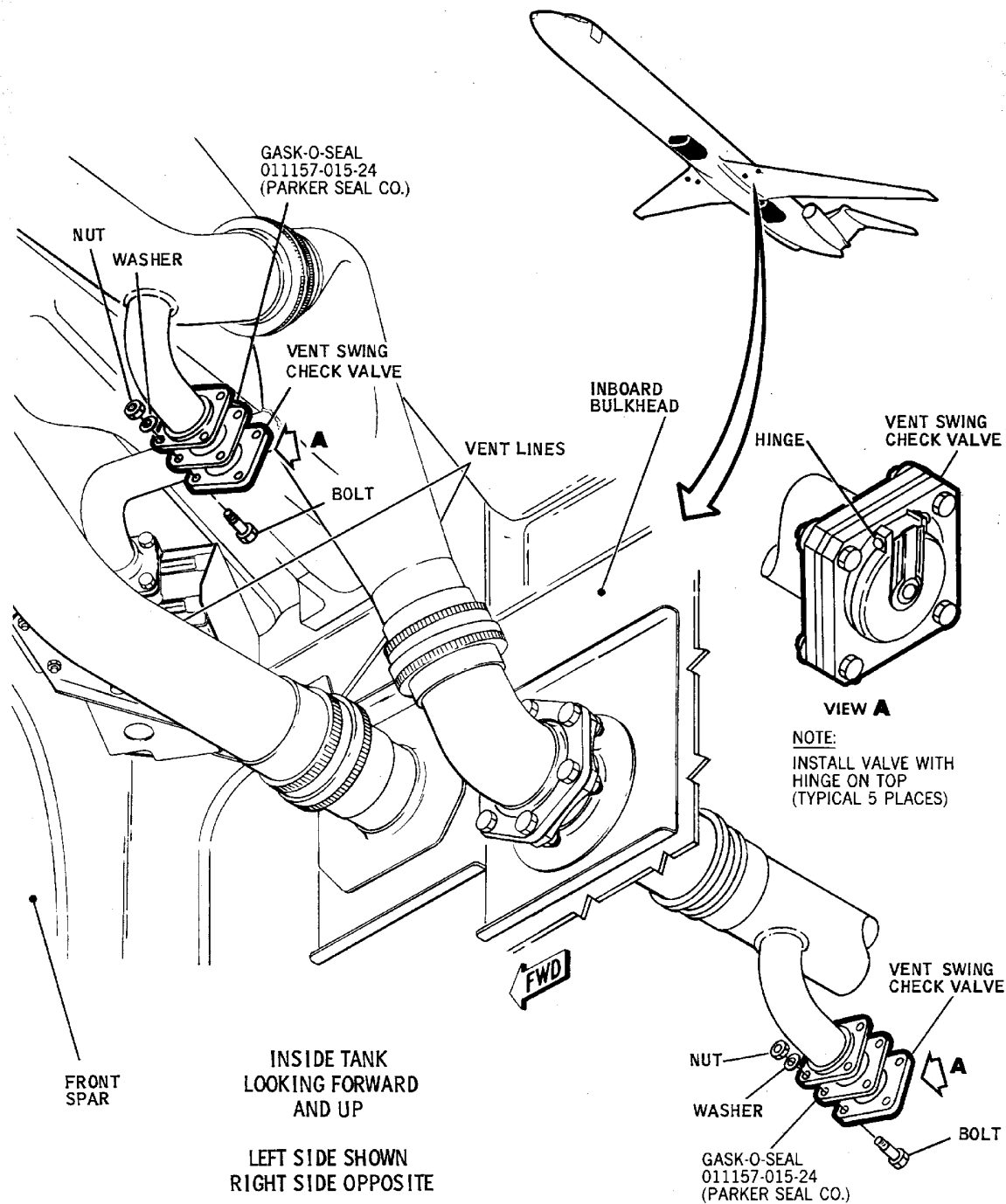
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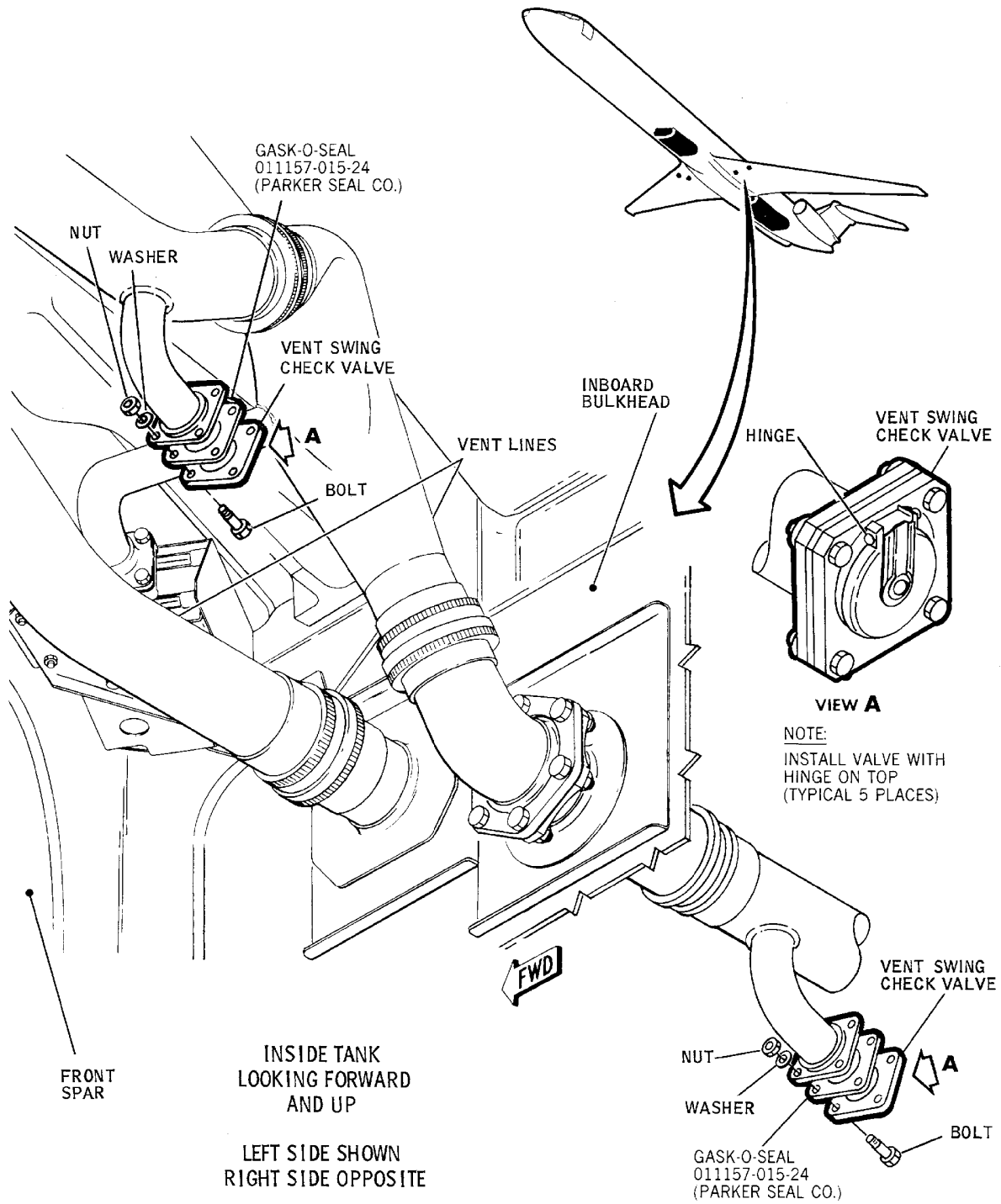
**Vent Drain Swing Check Valve -- Removal/Installation
Figure 201/28-10-11-990-801**

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 873, 874, 877-881,
883, 884, 892

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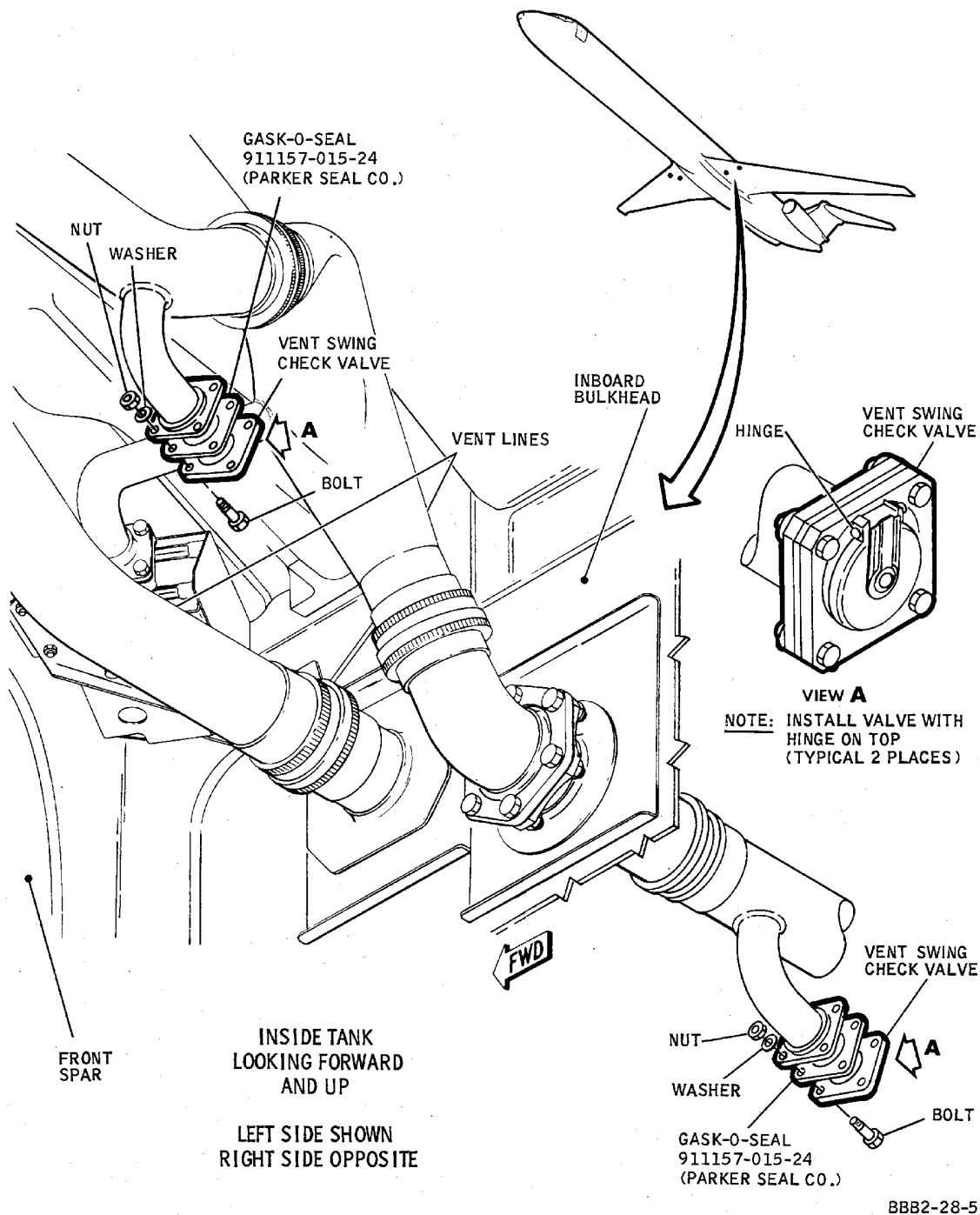
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**Vent Drain Swing Check Valve -- Removal/Installation
Figure 202/28-10-11-990-802**

EFFECTIVITY
WJE 861, 862

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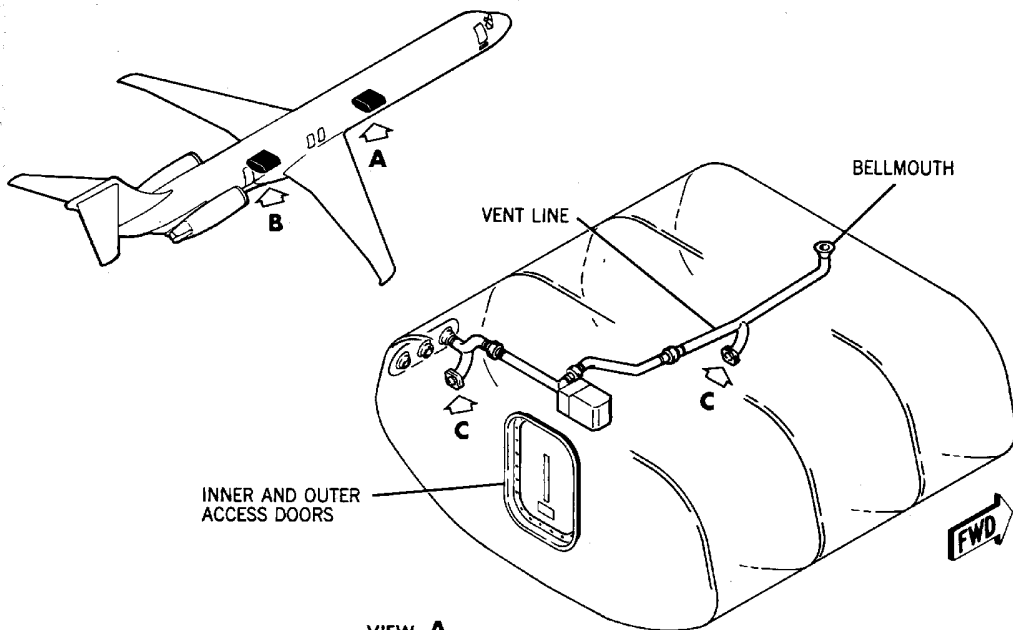


Vent Drain Swing Check Valve -- Removal/Installation
Figure 203/28-10-11-990-807

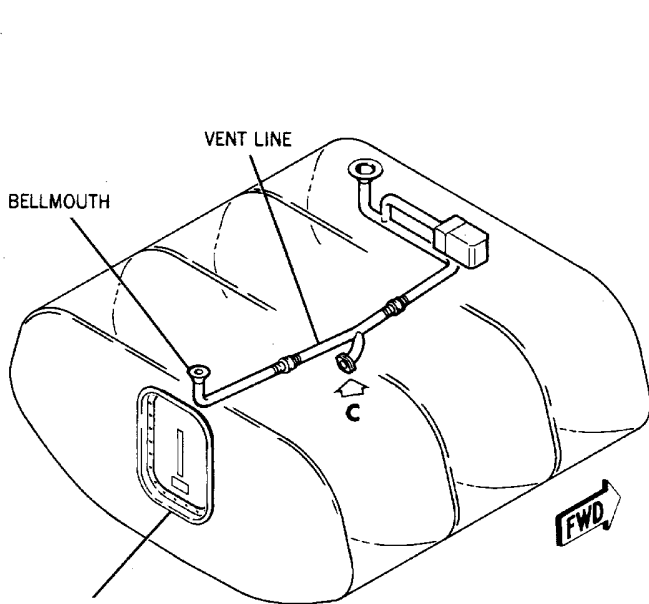
EFFECTIVITY
WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 876, 886, 887, 891, 893

28-10-11

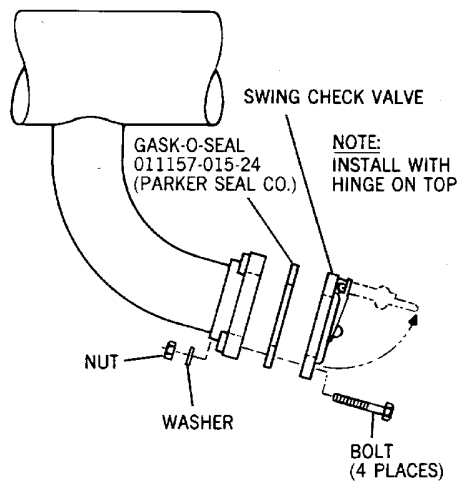
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**VIEW A
FORWARD FUSELAGE TANK**



**VIEW B
AFT FUSELAGE TANK**



**VIEW C
DRAIN CHECK VALVE**

BBB2-28-120

**Vent Drain Swing Check Valve -- Removal/Installation
Figure 204/28-10-11-990-804**

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 873, 874, 877-881, 883, 884, 892

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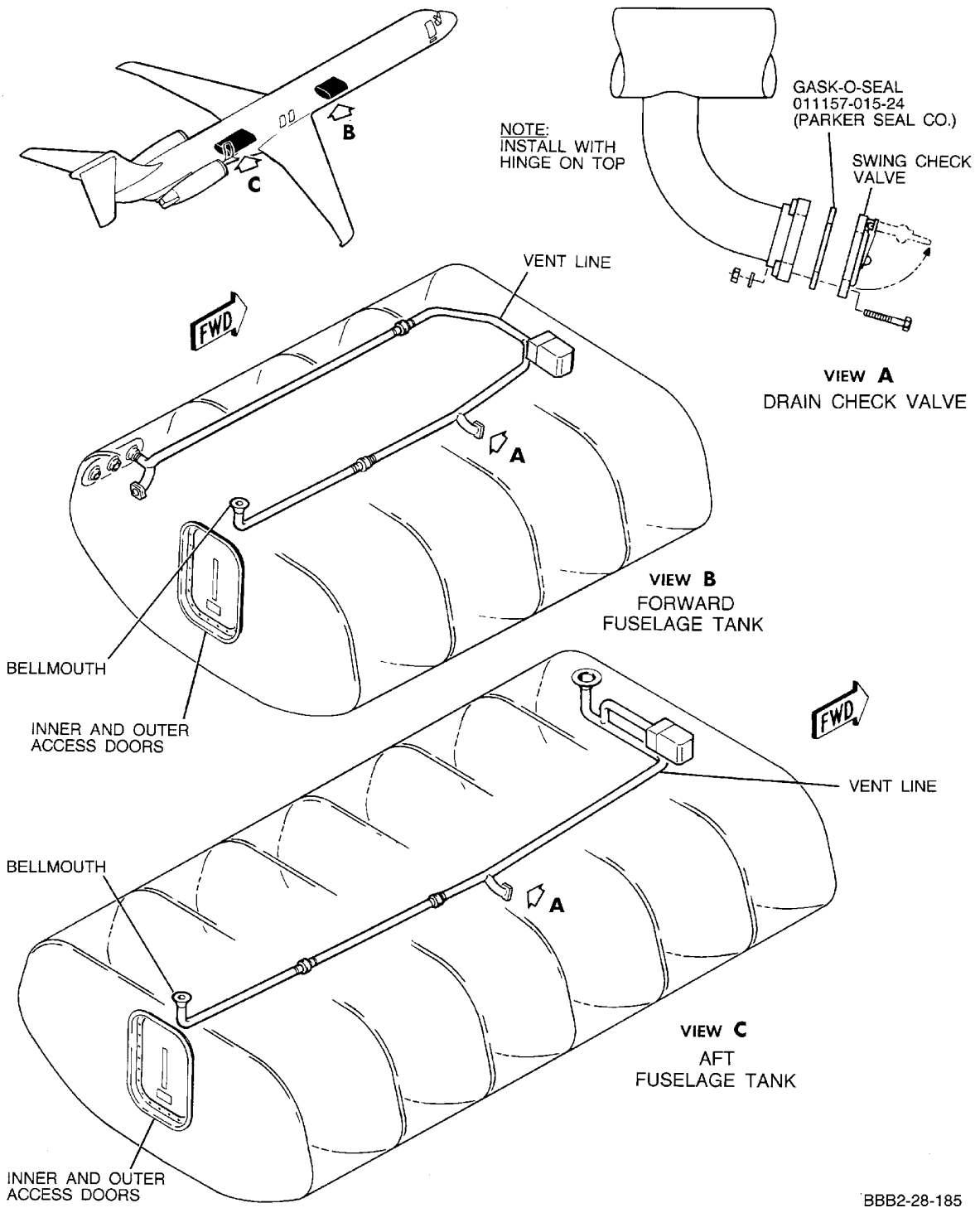
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**Vent Drain Swing Check Valve -- Removal/Installation
Figure 205/28-10-11-990-805**

EFFECTIVITY
WJE 861, 862

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VENT DRAIN SWING CHECK VALVE - INSPECTION/CHECK

1. General

- A. This procedure contains MSG-3 task card data.

TASK 28-10-11-211-801

2. Detailed Inspection of the Vent Drain Swing Check Valve

NOTE: This procedure is a scheduled maintenance task.

A. References

<u>Reference</u>	<u>Title</u>
28-00-00 P/B 201	GENERAL - MAINTENANCE PRACTICES
28-10-11 P/B 201	VENT DRAIN SWING CHECK VALVE - MAINTENANCE PRACTICES

B. Prepare for the Vent Drain Swing Check Valve Detailed Inspection

SUBTASK 28-10-11-840-001

- (1) Prepare tank for entry. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

NOTE: Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the instructions, warnings and cautions. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

SUBTASK 28-10-11-010-001

- (2) Open access panels.

C. Vent Drain Swing Check Valve Detailed Inspection

SUBTASK 28-10-11-211-001

- (1) Do a detailed inspection of the valve to make sure that the: (VENT DRAIN SWING CHECK VALVE - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-11/201)
- (a) Hinge pin is properly retained.
 - (b) Flapper seats properly and is not damaged.
 - (c) Flapper moves freely and does not stick.
 - (d) Valve is not corroded.

SUBTASK 28-10-11-210-001

- (2) Check for general condition and security.

D. Job Close-up

SUBTASK 28-10-11-840-002

- (1) Restore fuel tank to normal configuration. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

SUBTASK 28-10-11-410-001

- (2) Close access panels.

SUBTASK 28-10-11-942-001

- (3) Remove all the tools and equipment from the work area. Make sure the area is clean.

————— **END OF TASK** —————

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WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

TASK 28-10-11-211-803

3. Detailed Inspection of the Auxiliary Tank Vent Drain Swing Check Valve

NOTE: This procedure is a scheduled maintenance task.

A. References

Reference	Title
28-00-00 P/B 201	GENERAL - MAINTENANCE PRACTICES
28-10-11 P/B 201	VENT DRAIN SWING CHECK VALVE - MAINTENANCE PRACTICES

B. Prepare for the Auxiliary Tank Vent Drain Swing Check Valve

SUBTASK 28-10-11-840-005

- (1) Prepare tank for entry. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

NOTE: Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the instructions, warnings and cautions. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

SUBTASK 28-10-11-010-003

- (2) Open structure door.
- (3) Open cell door.

C. Auxiliary Tank Vent Drain Swing Check Valve Detailed Inspection

SUBTASK 28-10-11-211-003

- (1) Do a detailed inspection of the valve to make sure that the: (VENT DRAIN SWING CHECK VALVE - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-11/201)
 - (a) Hinge pin is properly retained.
 - (b) Flapper seats properly and is not damaged.
 - (c) Flapper moves freely and does not stick.
 - (d) Valve is not corroded.

SUBTASK 28-10-11-210-003

- (2) Check for general condition and security.

D. Job Close-up

SUBTASK 28-10-11-840-006

- (1) Restore fuel tank to normal configuration. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

SUBTASK 28-10-11-410-003

- (2) Close cell door.
- (3) Close structure door.

SUBTASK 28-10-11-942-003

- (4) Remove all the tools and equipment from the work area. Make sure the area is clean.

————— **END OF TASK** —————

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TANK SCAVENGE JET PUMP - MAINTENANCE PRACTICES

1. General

- A. This maintenance practice provides removal/installation for the tank scavenge jet pump. The tank scavenge jet pumps are located, two in the inboard end of each main fuel tank and one on each side of the centerline in the center tank.
- B. Access to the pumps is as follows:

Table 201

Tank	Access
Left Main	1307C
Right Main	1410C
Center (Left Side)	1333C
Center (Right Side)	1436C

- C. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices. (PAGEBLOCK 28-00-00/201)

2. Removal/Installation Tank Scavenge Jet Pump

A. Remove Pump

- (1) Close crossfeed valve.

CAUTION: DO NOT ROTATE ENGINE FIRE HANDLES. THIS RESULTS IN RELEASE OF FIRE EXTINGUISHING AGENT, AND REQUIRES REPLACEMENT OF FIREX CARTRIDGES AND BOTTLES.

- (2) Pull left or right engine fire handle (on main instrument panel) completely out.

NOTE: This also closes pneumatic crossfeed valve.

- (3) Check that APU fuel fire shutoff valve is closed (only if right tank is to be defueled).
- (4) Prepare applicable tank for entry. (PAGEBLOCK 28-00-00/201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (5) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

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UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (6) Remove center tank pumps as follows:
 - (a) Disconnect bonding strap.
 - (b) Disconnect flexible couplings. (PAGEBLOCK 28-20-19/201) Discard O-rings.
 - (c) Remove pump and retaining clamp from bracket.
 - (d) Remove pump retaining clamp and bonding clamp from pump.
- (7) Remove left or right tank pumps as follows:
 - (a) Disconnect flexible couplings. (PAGEBLOCK 28-20-19/201) Discard O-rings.
 - (b) Remove pump with retaining clamps from bracket.
 - (c) Remove pump retaining clamps, bonding clamp, and bonding strap from pump.

B. Install Pump

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

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UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (2) Prepare mating surfaces of jet pump, bonding clamp and retaining clamp. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
- (3) Install center tank pumps as follows:
 - (a) Install pump retaining clamp and bonding clamp on pump.
 - (b) Install pump and retaining clamp on bracket.
 - (c) Using new O-rings, connect flexible couplings. (PAGEBLOCK 28-20-19/201)
 - (d) Connect bonding strap.
NOTE: Place terminal lug under head of screw. Do not allow screw to turn during installation.
- (4) Install left and right tank pumps as follows:
 - (a) Install pump retaining clamps, bonding clamp, and bonding strap on pump.
 - (b) Install pump and retaining clamps on bracket.
NOTE: Place terminal lug between nylon clamp and bracket. Do not permit lug to turn during installation.
 - (c) Using new O-rings, connect flexible couplings (PAGEBLOCK 28-20-19/201).
- (5) Do electrical bond check of jet pump, bonding clamp and retaining clamp. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
- (6) Push left or right engine fire handle (on main instrument panel) completely in. Do not rotate.
- (7) Manually open pneumatic crossfeed valve.
- (8) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

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UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

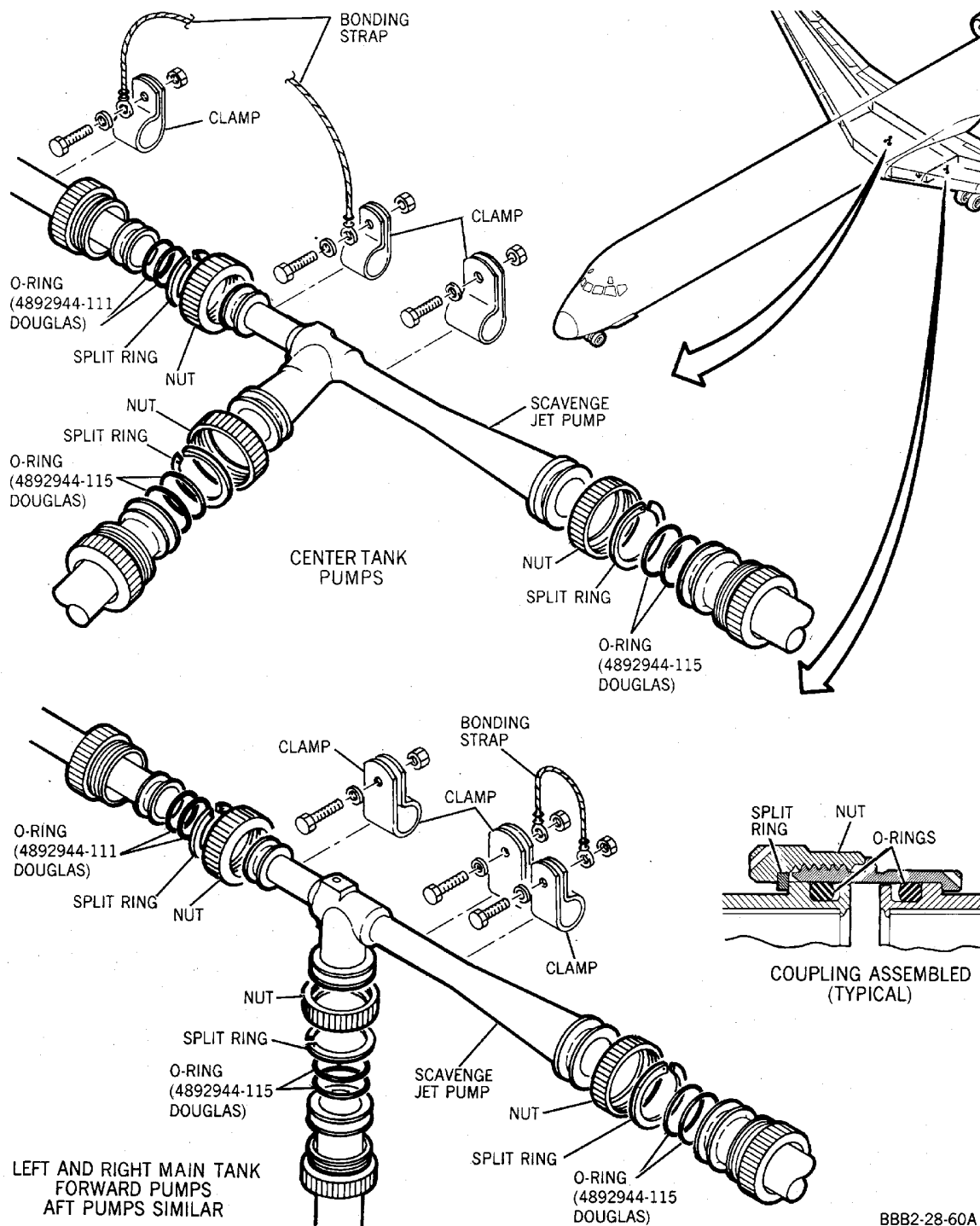
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BBB2-28-60A

Tank Scavenge Jet Pump -- Removal/Installation
Figure 201/28-10-12-990-801

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WING TANK CONTINUOUS SCAVENGING SYSTEM FILTER - MAINTENANCE PRACTICES

1. General

- A. This maintenance practice provides removal/installation for the continuous scavenging system filter. The filters are installed in the continuous scavenging system. There are two filters each in the left and right wing fuel tanks, one at each of the four jet pumps.
- B. Access to the filters is as follows:

Table 201

Tank	Access
Left Main	1307C
Right Main	1410C

- C. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items.

Table 202

Name and Number	Manufacturer
Small ultrasonic cleaner	
Water - distilled Water - demineralized De-ionized water DPM 3487	
Isopropyl alcohol DPM 530	
Ultrasonic cleaner (DIR-LUM 603) DPM 5668	Blue Wave Ultrasonics
Locking device PCTFE rod 0.125 inch diameter (Fed Spec L-P-410a) or equivalent.	Commercially available

3. Removal/Installation Continuous Scavenging System Filter

- A. Remove Filter. (Figure 201)
 - (1) Close crossfeed valve.

CAUTION: DO NOT ROTATE ENGINE FIRE HANDLES. THIS RESULTS IN RELEASE OF FIRE EXTINGUISHING AGENT, AND REQUIRES REPLACEMENT OF FIREX CARTRIDGES AND BOTTLES.

- (2) Pull left or right engine fire handle (on main instrument panel) completely out.

NOTE: This also closes pneumatic crossfeed valve.

- (3) Check that APU fuel fire shutoff valve is closed (only if right tank is to be defueled).
- (4) Prepare applicable tank for entry. (PAGEBLOCK 28-00-00/201)

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WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (5) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (6) Remove clamps.
 (7) Disconnect fuel lines from filter and remove filter.

B. Install Filter

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

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UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (2) To use the continuous scavenge system filter again, clean the filter element. (Paragraph 4.)

CAUTION: MAKE CERTAIN THAT FILTER FUEL FLOW ARROW POINTS TOWARD JET PUMP.

- (3) Position filter between pipes and connect fuel lines.
- (4) Install retaining clamps.
- (5) Push left or right engine fire handle (on main instrument panel) completely in. Do not rotate.
- (6) Manually open pneumatic crossfeed valve.
- (7) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

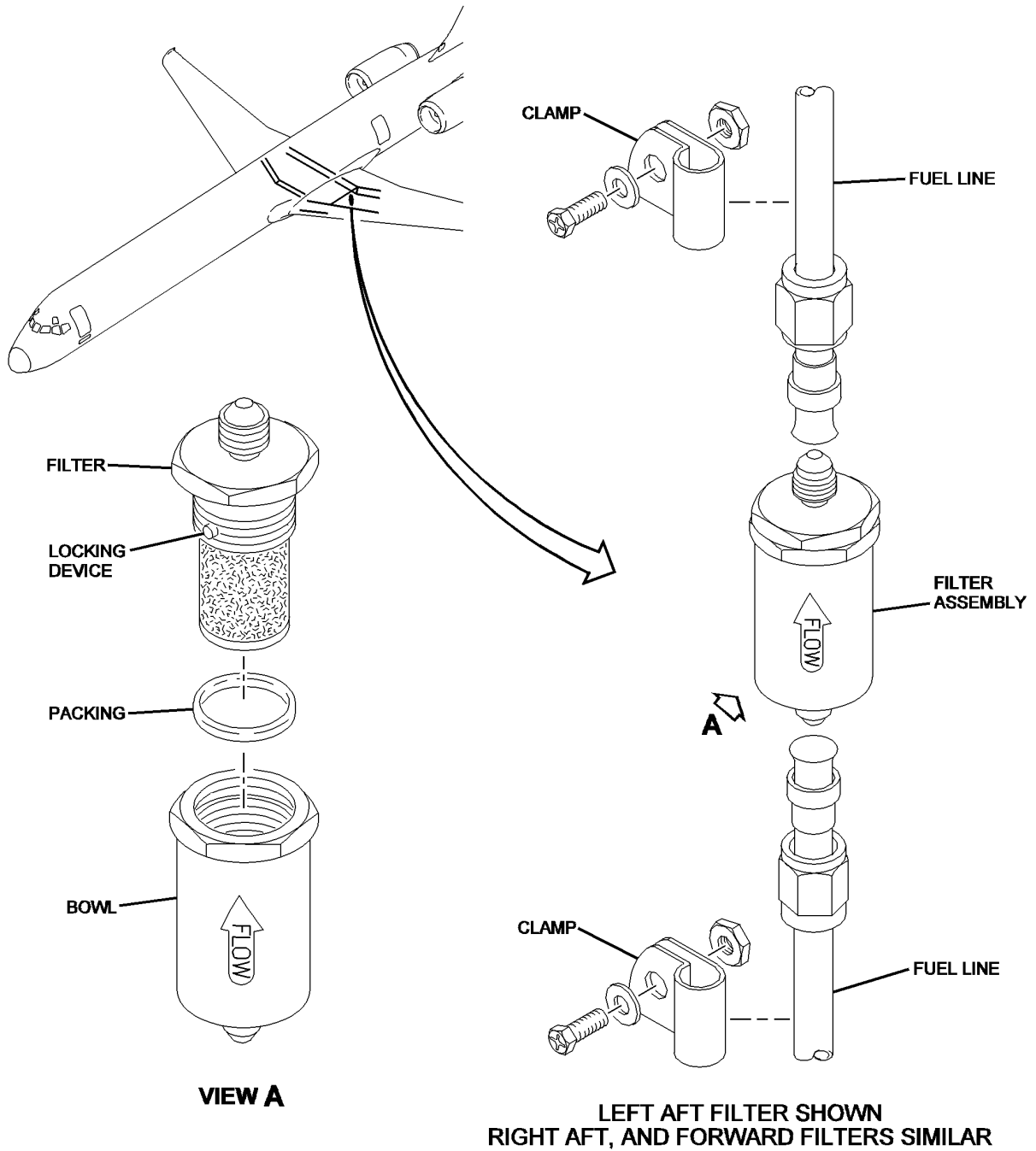
<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

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BBB2-28-215A
S0008536240V2

**Wing Tank Filter -- Removal/Installation
Figure 201/28-10-13-990-801**

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4. Cleaning Continuous Scavenging System Filter

A. Clean Filter

- (1) Remove filter. (Paragraph 3.A.)
- (2) Carefully remove the filter assembly from the bowl. Remove and discard packing from filter assembly. (Figure 201)
 - (a) Flush filter and bowl with ultrasonic cleaner using water. Dry with low pressure air.
 - (b) Do a detailed visual inspection of the filter assembly as follows:
 - 1) Make sure that all unwanted material is removed from the filter assembly.
 - 2) With a 10X glass examine the wire mesh screen of the filter for damage and unwanted material.
 - 3) Do a check of the threaded connections of the filter assembly. If threads or filter screen are damaged replace the filter assembly.
 - 4) Make sure the locking pellet is approximately 0.010 in. (0.25 mm) above the thread.
 - a) If the locking pellet needs to be replaced, use a pick to remove the damaged lock pellet from the filter assembly (head).
 - b) Cut a lock device pellet that fills the installation hole and extends above the major thread diameter approximately 0.010 in. (0.25 mm).
 - c) Insert the locking pellet into the filter assembly (head) installation hole.
NOTE: The typical PCTFE or equivalent thread locking device locks the threads of the filter bowl to the filter assembly (head).
 - 5) Install new packing (MS29513-118) on the filter assembly.
 - (c) Do a detailed visual inspection of the bowl as follows:
 - 1) Make sure that all unwanted material is removed from the bowl.
 - 2) Do a check of all thread connections on the bowl. If threads are damaged, replace the bowl.
- (3) Install the filter assembly into the bowl. Make sure that a resistance is felt before the bottom of the filter assembly touches the top of the bowl.
 - (a) If no restriction is felt, remove the filter assembly and replace the thread locking device.
- (4) Install the continuous scavenge filter assembly. (Paragraph 3.B.)

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WING TANK CONTINUOUS SCAVENGING SYSTEM FILTER - REMOVAL/INSTALLATION

1. General

- A. This procedure contains MSG-3 task card data.

TASK 28-10-13-902-801

2. Clean the Tank Scavenge Filters

NOTE: This procedure is a scheduled maintenance task.

A. **References**

<u>Reference</u>	<u>Title</u>
28-00-00 P/B 201	GENERAL - MAINTENANCE PRACTICES
28-10-13 P/B 201	WING TANK CONTINUOUS SCAVENGING SYSTEM FILTER - MAINTENANCE PRACTICES

B. **Prepare for the Tank Scavenge Filters Cleaning**

SUBTASK 28-10-13-840-001

- (1) Make sure left and right wing fuel tanks are open and safe for maintenance. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

SUBTASK 28-10-13-010-001

- (2) Open access panels.

C. **Tank Scavenge Filters Cleaning**

SUBTASK 28-10-13-902-001

- (1) Clean filters. (WING TANK CONTINUOUS SCAVENGING SYSTEM FILTER - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-13/201 Figure 401)

D. **Job Close-up**

SUBTASK 28-10-13-840-002

- (1) Restore the left and right wing fuel tanks to normal configuration after maintenance. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

SUBTASK 28-10-13-410-001

- (2) Close access panels.

SUBTASK 28-10-13-942-001

- (3) Remove all the tools and equipment from the work area. Make sure the area is clean.

———— **END OF TASK** ————

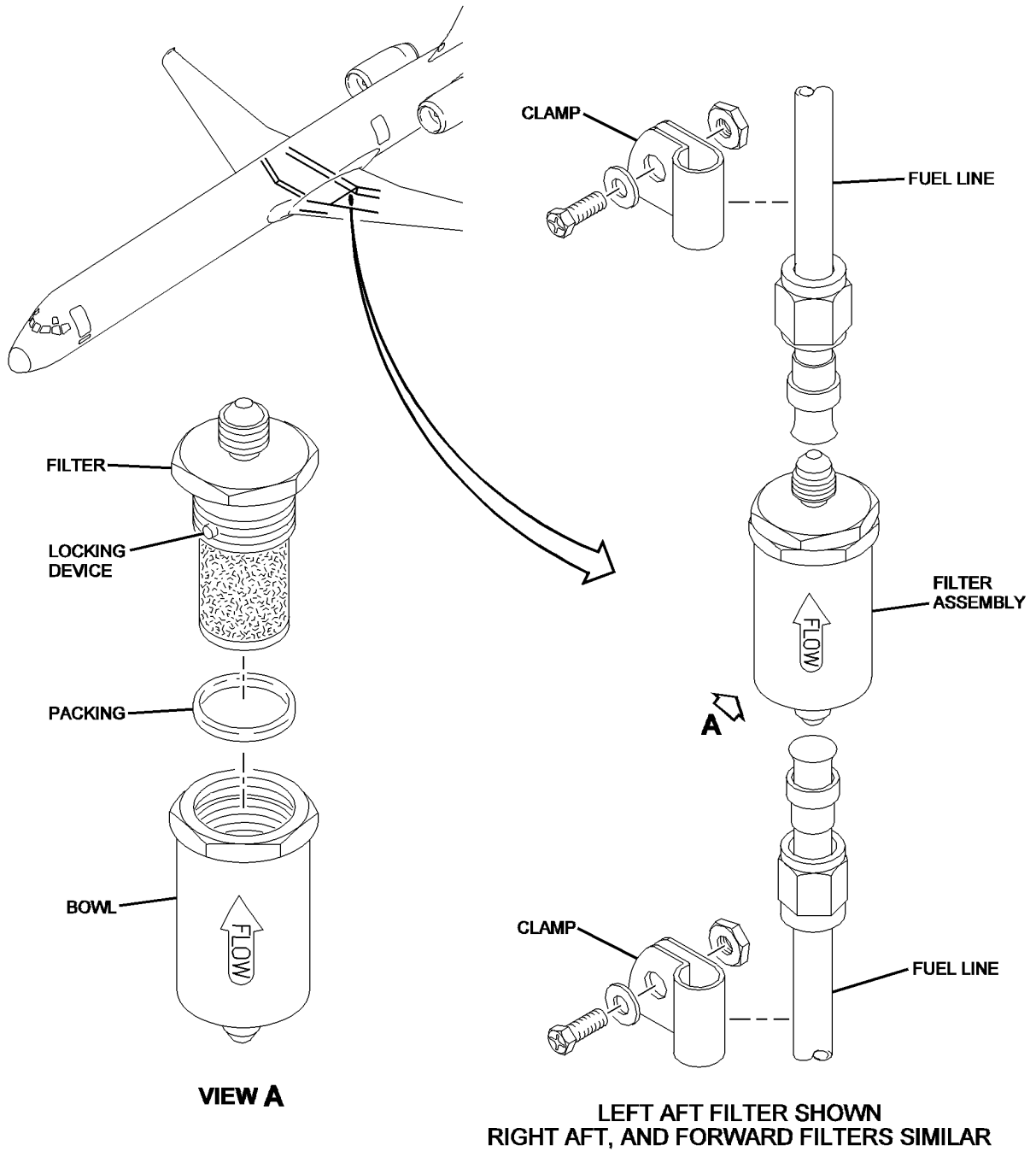
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**Tank Scavenge Filters - Cleaning
Figure 401/28-10-13-990-802**

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CENTER TANK CONTINUOUS SCAVENGING SYSTEM FILTER - MAINTENANCE PRACTICES

1. General

- A. This maintenance practice provides removal/installation for the continuous scavenging system filter. The filter is installed at the jet pump in right side of the center wing tank.
- B. Access to the filters is as follows:

Table 201

Tank	Access
Center (Right Side)	1436C

- C. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items.

Table 202

Name and Number	Manufacturer
Small ultrasonic cleaner	
De-ionized water, DPM 3487	
Demineralized water, DPM 3487	
Distilled water	
Locking device PCTFE rod 0.125 inch diameter (Fed Spec L-P-410a) or equivalent.	Commercially available

3. Removal/Installation Continuous Scavenging System Filter

- A. Remove Filter. (Figure 201)
 - (1) Close crossfeed valve.

CAUTION: DO NOT ROTATE ENGINE FIRE HANDLES. THIS RESULTS IN RELEASE OF FIRE EXTINGUISHING AGENT, AND REQUIRES REPLACEMENT OF FIREX CARTRIDGES AND BOTTLES.

- (2) Pull left or right engine fire handle (on main instrument panel) completely out.

NOTE: This also closes pneumatic crossfeed valve.

- (3) Check that APU fuel fire shutoff valve is closed.
- (4) Prepare applicable tank for entry. (PAGEBLOCK 28-00-00/201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (5) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

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UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (6) Remove clamps.
- (7) Disconnect fuel lines from filter and remove filter.

B. Install Filter

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

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UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (2) To use the continuous scavenge system filter again, clean the filter element. (Paragraph 4.)

CAUTION: MAKE CERTAIN THAT FILTER FUEL FLOW ARROW POINTS TOWARD JET PUMP.

- (3) Position filter between pipes and connect fuel lines.
- (4) Install retaining clamps.
- (5) Push left or right engine fire handle (on main instrument panel) completely in. Do not rotate.
- (6) Manually open pneumatic crossfeed valve.
- (7) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

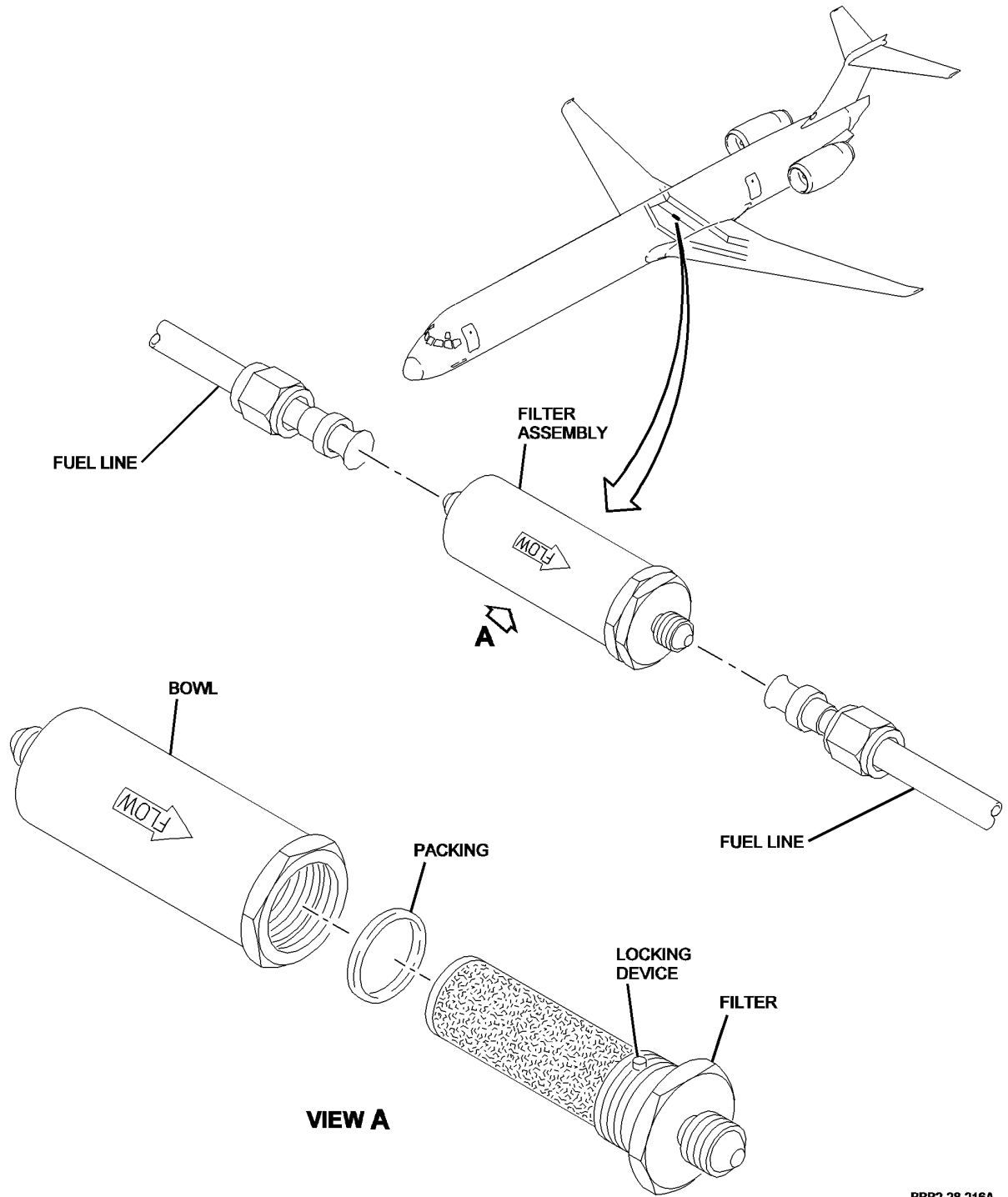
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BBB2-28-216A
S0006536250V2

Center Tank Filter -- Removal/Installation
Figure 201/28-10-14-990-801

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4. Cleaning Continuous Scavenging System Filter

A. Clean Filter

- (1) Remove filter. (Paragraph 3.A.)
- (2) Carefully remove the filter assembly from the bowl. Remove and discard packing from filter assembly. (Figure 201)
 - (a) Flush filter and bowl with ultrasonic cleaner using water. Dry with low pressure air.
 - (b) Do a detailed visual inspection of the filter assembly as follows:
 - 1) Make sure that all unwanted material is removed from the filter assembly.
 - 2) With a 10X glass examine the wire mesh screen of the filter for damage and unwanted material.
 - 3) Do a check of the threaded connections of the filter assembly. If threads or filter screen are damaged replace the filter assembly.
 - 4) Make sure the locking pellet is approximately 0.010 in. (0.25 mm) above the thread.
 - a) If the locking pellet needs to be replaced, use a pick to remove the damaged lock pellet from the filter assembly (head).
 - b) Cut a lock device pellet that fills the installation hole and extends above the major thread diameter approximately 0.010 in. (0.25 mm).
 - c) Insert the locking pellet into the filter assembly (head) installation hole.

NOTE: The typical PCTFE or equivalent thread locking device locks the threads of the filter bowl to the filter assembly (head).

 - 5) Install new packing (MS29513-118) on the filter assembly.
- (c) Do a detailed visual inspection of the bowl as follows:
 - 1) Make sure that all unwanted material is removed from the bowl.
 - 2) Do a check of all thread connections on the bowl. If threads are damaged, replace the bowl.
- (3) Install the filter assembly into the bowl. Make sure that a resistance is felt before the bottom of the filter assembly touches the top of the bowl.
 - (a) If no restriction is felt, remove the filter assembly and replace the thread locking device.
- (4) Check filter flow through fitting end (against flow) by applying dry air at 5 psi (34.5 kPa) to body end of filter (with flow).
 - (a) Replace filter if clogged or deteriorated.
- (5) Install the continuous scavenge filter assembly. (Paragraph 3.B.)

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CENTER TANK CONTINUOUS SCAVENGING SYSTEM FILTER - REMOVAL/INSTALLATION

1. General

A. This procedure contains MSG-3 task card data.

TASK 28-10-14-902-801

2. Clean the Tank Scavenge Filter

NOTE: This procedure is a scheduled maintenance task.

A. References

<u>Reference</u>	<u>Title</u>
28-00-00 P/B 201	GENERAL - MAINTENANCE PRACTICES
28-10-14 P/B 201	CENTER TANK CONTINUOUS SCAVENGING SYSTEM FILTER - MAINTENANCE PRACTICES

B. Prepare for the Tank Scavenge Filter Cleaning

SUBTASK 28-10-14-840-001

(1) Make sure center fuel tank is open and safe for maintenance. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

SUBTASK 28-10-14-010-001

(2) Open access panel.

C. Tank Scavenge Filter Cleaning

SUBTASK 28-10-14-902-001

(1) Clean filter. (CENTER TANK CONTINUOUS SCAVENGING SYSTEM FILTER - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-14/201 Figure 401)

D. Job Close-up

SUBTASK 28-10-14-840-002

(1) Restore center fuel tank to normal configuration after maintenance. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

SUBTASK 28-10-14-410-001

(2) Close access panel.

SUBTASK 28-10-14-942-001

(3) Remove all the tools and equipment from the work area. Make sure the area is clean.

———— **END OF TASK** ————

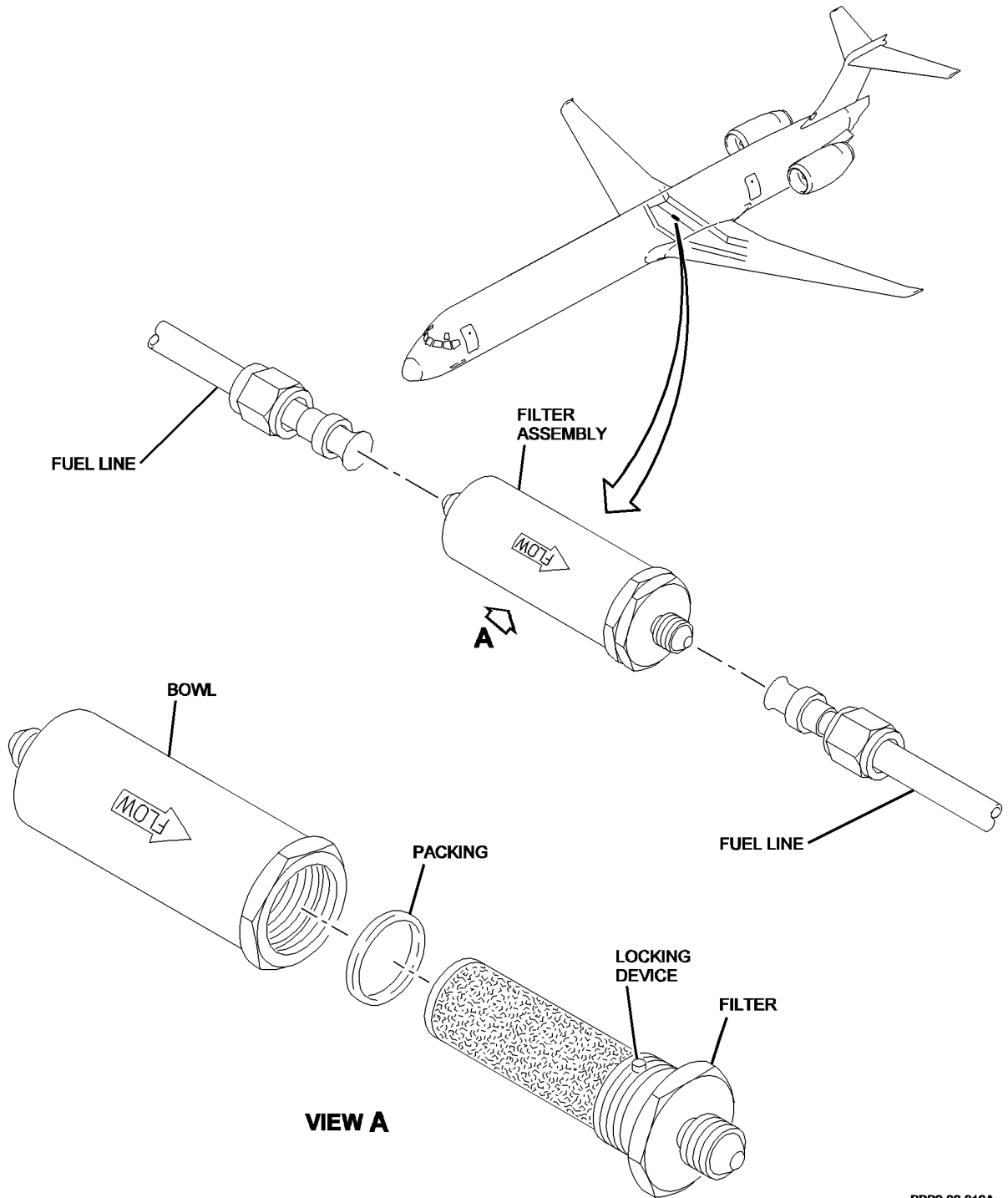
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Tank Scavenge Filter - Cleaning
Figure 401/28-10-14-990-802

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WING FUEL TANK VENT PIPE INLET ASSEMBLY - MAINTENANCE PRACTICES

1. General

- A. The fuel vent inlet pipe assembly is located in the left wing and right wing fuel tanks between left wing stations Xrs=445.200 and Xrs=477.350 and wing stations Xrs=-445.200 and Xrs=-477.350. The bellmouth end is located at the outboard wing high point. A spacer is attached to the bellmouth to ensure that a uniform clearance is maintained between the upper wing skin and the vent opening.
- B. The fuel vent inlet assembly is electrically bonded to the wing structure by a grounded-base attachment clamp. The contact surfaces for the grounded-base clamp has been stripped to the parent metal and coated with alodine to form an electrically conductive path. The structural bracket surface is spot faced and alodine treated in the same manner. The conductive path must be maintained.
- C. There are two electrical resistance factors that must be adhered to when maintaining the wing fuel vent system.
 - New component installation and component reinstallation requires 2.5 milliohms maximum resistance between each interface in the bond path.
 - When an in-service continuity test is accomplished, 100 milliohms maximum resistance for the component to ground at the land area for the tank access cover is required.
- D. Bonding surface maintenance and the bonding test are in accordance with procedures in GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201.
- E. Grounded-base clamp maintenance is in accordance with procedures in GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 201

Name and Number	Manufacturer
Petrolatum VV-P-236 DPM 675	
Course cloth, clean	Locally available

3. Removal/Installation Wing Fuel Tank Vent Pipe Inlet Assembly

- A. Preparation for Removal
 - (1) Defuel the left wing, right wing and center fuel tanks, and drain the applicable tank to be opened. (DEFUELING, SUBJECT 12-11-01)
 - (2) Open the fuel tank panel to gain access to the left wing (1379C) or right wing (1478C) vent system inlet, as applicable.
 - (3) Depuddle and make the fuel tank safe. (PAGEBLOCK 28-00-00/201)
- B. Remove the Vent Pipe Inlet Assembly. (Figure 201)

NOTE: The sequence in which the removal steps are accomplished is flexible.

 - (1) Disconnect the inlet pipe assembly from the inboard pipe assembly.
 - (2) Push the sleeve inboard and remove the two flange O-ring seals. Discard the seals.

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- (3) Mark the pipe assembly where the grounded-base attachment clamp is installed, if not already clearly defined by the alodine coloration.
- (4) Remove the grounded-base attachment clamp at the bellmouth end.
- (5) Remove the inlet pipe assembly, the two seals, the grounded-base attachment clamp, and minor hardware from the fuel tank.

C. Preparation for Installation

- (1) Examine the inlet pipe assembly to be installed to ensure:
 - (a) The pipe has no damage.
 - (b) The pipe surface is alodined at the attachment clamp contact location.
 - (c) The spacer is installed on the bellmouth tab.
- (2) Clean the following surfaces:
 - (a) The connector coupling sleeve inner area.
 - (b) The pipe end flange grooves.
 - (c) The structural bracket clamp base interface.
 - (d) The inlet pipe assembly electrically conductive surface.
- (3) Determine the serviceability of the grounded-base clamp. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- (4) Examine and determine that the attaching hardware for serviceability.
- (5) Install a new O-ring seal on the inlet pipe assembly flange.
- (6) Install a new O-ring seal on the inboard pipe assembly flange.

WARNING: WHITE PETROLATUM IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN WHITE PETROLATUM IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT BREATHE THE MIST.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (7) Apply a light coat of Petrolatum on both O-ring seals.

D. Install the Vent Pipe Inlet Assembly. (Figure 201)

NOTE: The sequence in which the installation steps are accomplished is flexible.

- (1) Position the vent inlet pipe assembly between the inboard pipe and the outboard bracket. Slide the connector sleeve over the inlet pipe assembly flange O-ring seal.

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- (2) Install the grounded-base clamp on the bellmouth end of the inlet pipe assembly with the attachment screws and washers. Ensure the spacer contacts the wing upper surface and that the clamp base is aligned with the alodined pipe surface before tightening the attachment hardware.
 - (3) Install and hand tighten the connector nut.
- E. Bond Test of the Vent Pipe Inlet Assembly
- (1) Accomplish an electrical bonding test of the installed component. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- F. Job Close-up
- (1) Remove tools and equipment from the work area.
 - (2) Inspect the work area for FOD, and clean the area of all foreign objects and contaminants. Remove all debris from the work area.
 - (3) Install the tank access door. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
 - (4) Accomplish a leak test of the tank access door.

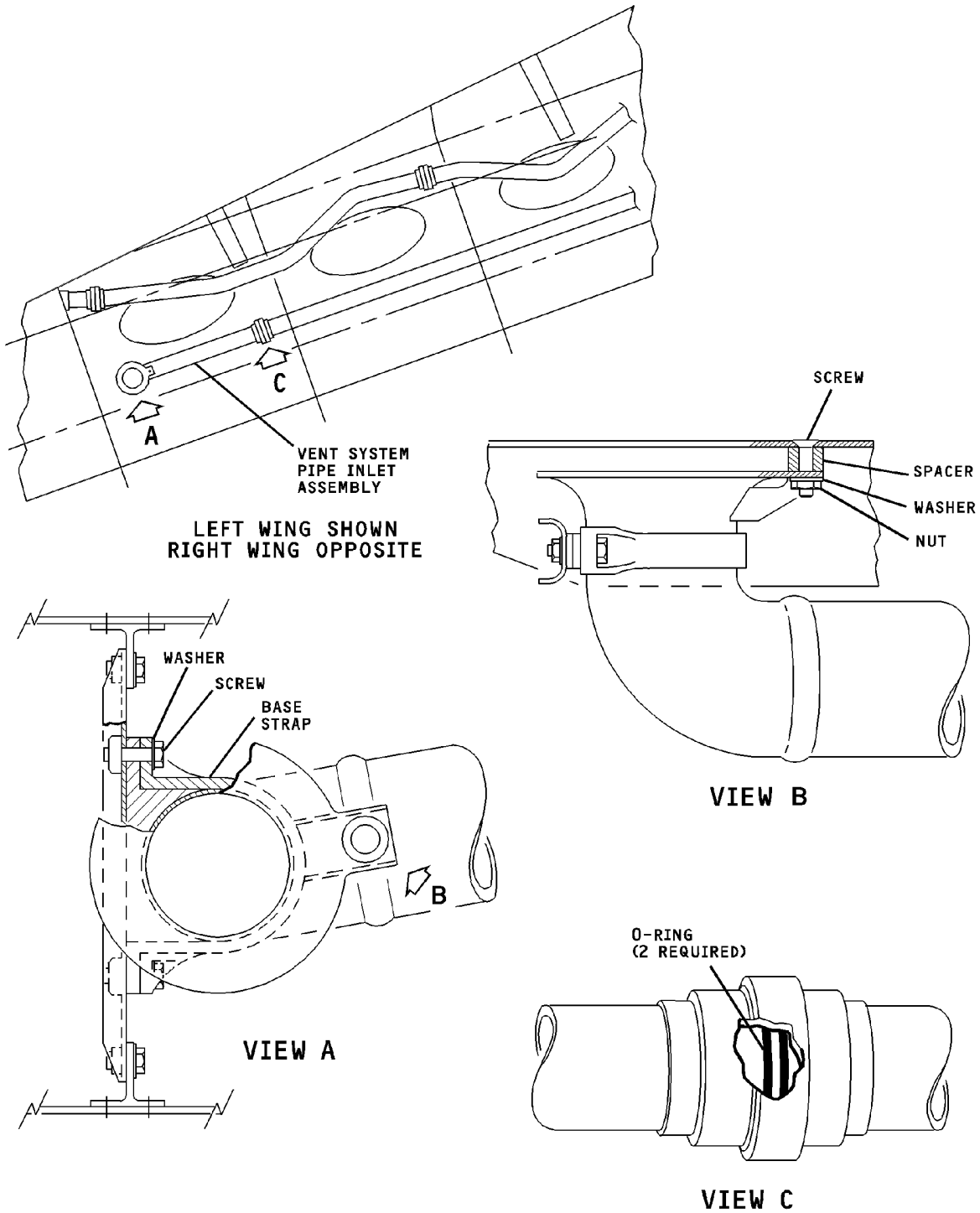
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Wing Fuel Tank Vent Pipe Inlet Assembly - Removal/Installation
Figure 201/28-10-15-990-801

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MANIFOLD ASSEMBLY, FUEL TANK SCAVENGE - MAINTENANCE PRACTICES

1. General

A. This procedure has the instructions that follow:

- Removal/installation main fuel tank scavenge manifold assemblies. (Paragraph 3.)
- Removal/installation center fuel tank scavenge manifold assemblies. (Paragraph 4.)
- Cleaning of the main and center fuel tank scavenge manifold assemblies. (Paragraph 5.)

2. Equipment and Material

NOTE: Equivalent substitutes may be used instead of the following listed items:

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 201

Name and Number	Manufacturer
Cap, Plastic unthreaded Circular Connector DPM 1931-1	
Cap, Protective, Polyvinyl Chloride DPM 2696	
Threaded polyethylene protective cap (MS Fittings) DPM 5607	
Adhesive, Epoxy DPM 3279	Lord Corp. Fountain Valley, CA.
Adhesive, Epoxy DPM 3279-3	Lord Corp. Fountain Valley, CA.
Wipers, cleaning (Type 1, Class A, Grade 1) DMS 1820	
320 grit sandpaper	
Polysulfide Sealant. DMS 2082 MIL-S-8802 B-1/2	

3. Removal/Installation of the Main Fuel Tank Scavenge Manifold Assembly

- A. Before maintenance is done on the fuel system, make sure that personnel read and fully understand the fuel system maintenance practices. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- B. Make the fuel system safe for maintenance. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- C. Prepare the applicable main fuel tank for entry. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

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WARNING: JET FUELS A, A-1 OR B (JP-4 OR -5 FUEL) ARE AGENTS THAT ARE FLAMMABLE, EXPLOSIVE, POISONOUS, AND IRRITANTS. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN JET FUELS A, A-1 OR B (JP-4 OR -5 FUEL) ARE USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET JET FUELS A, A-1 OR B (JP-4 OR -5 FUEL) IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THESE HAZARDOUS AGENTS.

D. Open applicable panels to get access to manifold. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

E. Removal of the Main Fuel Tank Scavenge Manifold Assembly

(1) Remove applicable main fuel tank forward scavenge manifold assembly as follows: (Figure 201)

- (a) Disconnect the scavenge manifold nut from the ejector. (TANK SCAVENGE JET PUMP - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-12/201)
- (b) Remove and discard the O-rings.
- (c) Remove all attaching screws, washers, clamps and bonding jumper.
- (d) Remove the forward manifold from the fuel tank.
- (e) Install protective caps on manifold assembly and ejector.
- (f) If necessary, remove the two attach clamps from the applicable fuel tank scavenge manifold for installation on the new manifold.
- (g) If necessary, remove the screw, nut, and bonding jumper from the bonding clamp from the applicable fuel tank scavenge manifold for installation on the new manifold.

(2) Remove main fuel tank aft scavenge manifold assembly as follows: (Figure 202)

- (a) Disconnect the manifold B-nut from the union.
- (b) Put a DPM 2932 plug on the manifold assembly and union.
- (c) Remove all attaching screws, washers, clamps and bonding jumper.
- (d) Remove the aft manifold from the fuel tank.
- (e) If necessary, remove the attaching clamps from the applicable fuel tank scavenge manifold(s) for installation on the new manifold.
- (f) If necessary, remove the screw, nut, and bonding jumper from the bonding clamp from the applicable fuel tank scavenge manifold(s) for installation on the new manifold.

F. Installation of the Main Fuel Tank Scavenge Manifold Assembly

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WARNING: JET FUELS A, A-1 OR B (JP-4 OR -5 FUEL) ARE AGENTS THAT ARE FLAMMABLE, EXPLOSIVE, POISONOUS, AND IRRITANTS. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN JET FUELS A, A-1 OR B (JP-4 OR -5 FUEL) ARE USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET JET FUELS A, A-1 OR B (JP-4 OR -5 FUEL) IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

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- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THESE HAZARDOUS AGENTS.

- (1) Make sure the fuel system is safe for maintenance. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- (2) Make sure applicable fuel tank access panels are open. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- (3) Install applicable main fuel tank forward scavenge manifold assembly as follows: (Figure 201)
 - (a) Prepare the area on the scavenge manifold section, mount bracket and attaching clamps for electrical bond. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
 - (b) Remove the protective caps from the manifold and ejector.
 - (c) Install two new "O" rings, one on manifold nut and one on ejector.
 - (d) Install the three mounting clamps and bonding jumper on the scavenge manifold assembly .
 - 1) Make sure that the terminal lug on the bonding jumper is installed between the clamp and the bracket.
 - (e) Install the bonding clamp on the scavenge manifold assembly in the area prepared for the electrical bond.
 - (f) Align and install manifold assembly in fuel tank with clamps, screws, and bonding jumper.
 - 1) Do not let the terminal on the bonding jumper turn while the screw (11) is tightened.
 - (g) Do an electrical bond check of two clamps and bonding jumper. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
 - (h) Connect the scavenge manifold nut to ejector. (TANK SCAVENGE JET PUMP - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-12/201)
 - (i) Make sure that the clearance between all the manifold pickups and the fuel tank surface is 0.015 +0.030 / -0.000 in. (0.381 +0.762 / -0.000 mm).
 - 1) If the dimension in the above step cannot be met, do the steps that follow:

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- a) Remove the applicable pickup.
- b) Clean the applicable rake with 320 grit sandpaper.

WARNING: INTEGRAL FUEL TANKS SEALING COMPOUND (POLYSULFIDE SEALANT B1/2 AND B2) IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN INTEGRAL FUEL TANKS SEALING COMPOUND IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET INTEGRAL FUEL TANKS SEALING COMPOUND IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THESE HAZARDOUS AGENTS.

- c) Install a new pickup in its position with DMS 2082 and keep a dimension of 0.015 +0.030 / -0.000 in. (0.381 +0.762 / -0.000 mm)
- (4) Install applicable main fuel tank aft scavenge manifold assembly as follows: (Figure 202)
 - (a) Remove the protective caps from scavenge manifold assembly and union.
 - (b) Prepare the area on the scavenge manifold section, bracket and clamps for electrical bond. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
 - (c) Align and install scavenge manifold assembly in fuel tank with clamps, nuts, screws and jumper.
 - 1) Make sure that the terminal lug on the bonding jumper is installed between the clamp and the bracket.
 - (d) Connect nut to the union.
 - (e) Do an electrical bond check of two clamps and bonding jumper. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
 - (f) Make sure that the clearance between all the manifold pickups and the fuel tank surface is 0.015 +0.030 / -0.000 in. (0.381 +0.762 / -0.000 mm).
 - 1) Remove the applicable pickup.
 - 2) Clean the applicable rake with 320 grit sandpaper.

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WARNING: INTEGRAL FUEL TANKS SEALING COMPOUND (POLYSULFIDE SEALANT B1/2 AND B2) IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN INTEGRAL FUEL TANKS SEALING COMPOUND IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET INTEGRAL FUEL TANKS SEALING COMPOUND IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THESE HAZARDOUS AGENTS.

- 3) Install a new pickup in its position with DMS 2082 and keep a dimension of 0.015 +0.030 / -0.000 in. (0.381 +0.762 / -0.000 mm)
- (5) Close applicable panels removed to gain access to manifold. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

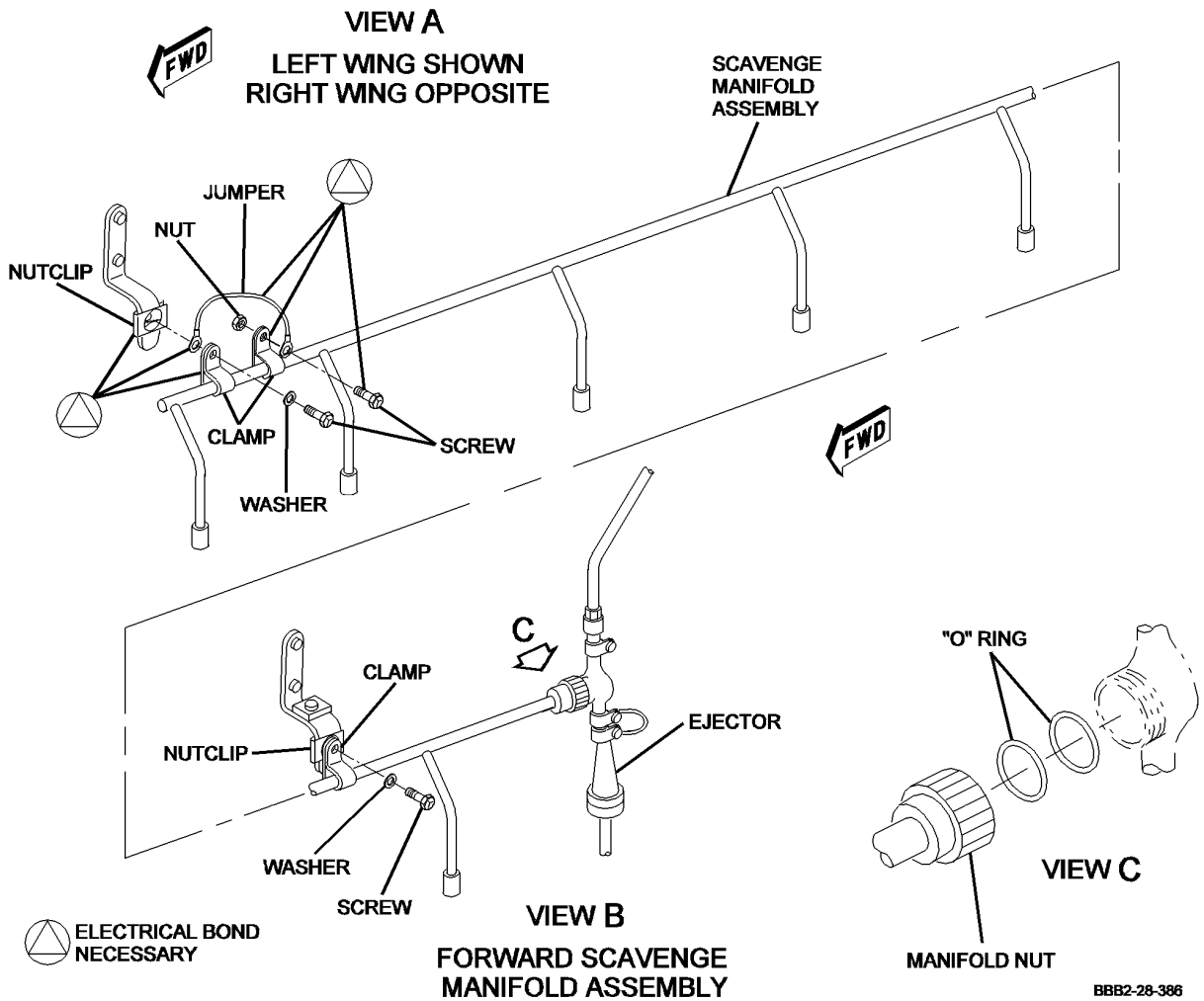
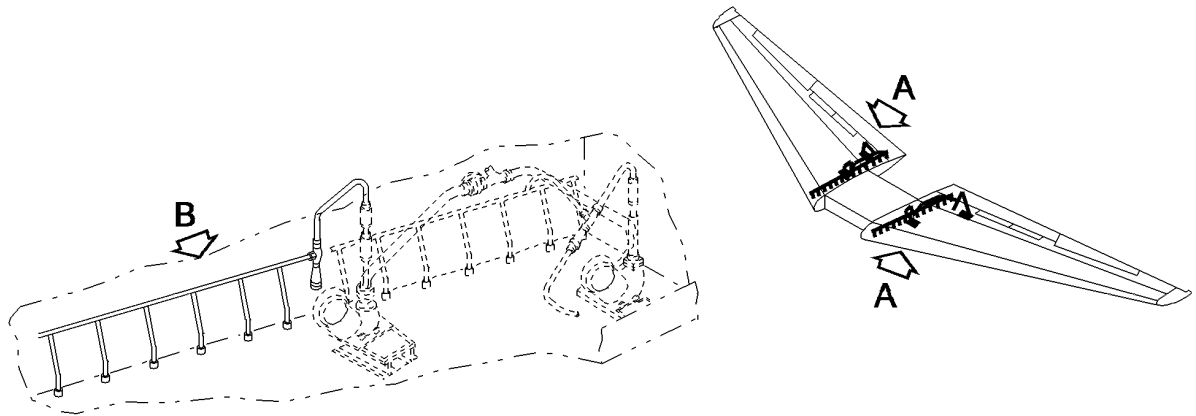
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**Forward Scavenge Manifold Assembly
Figure 201/28-10-16-990-801**

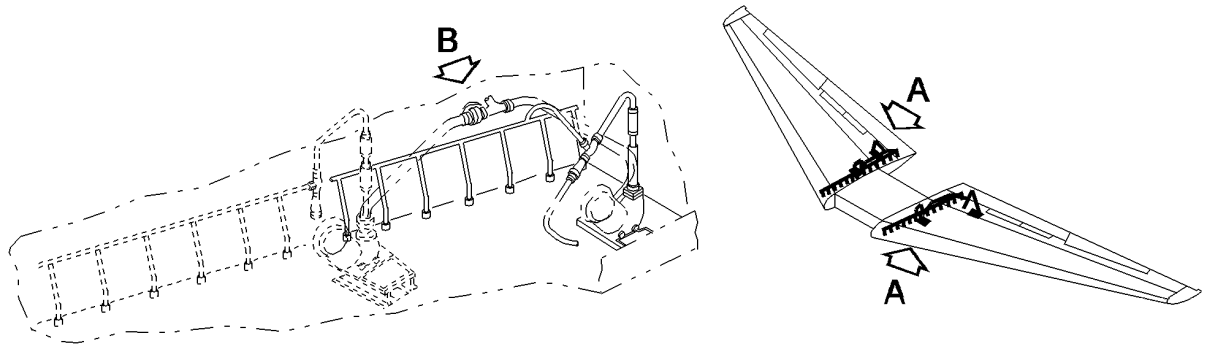
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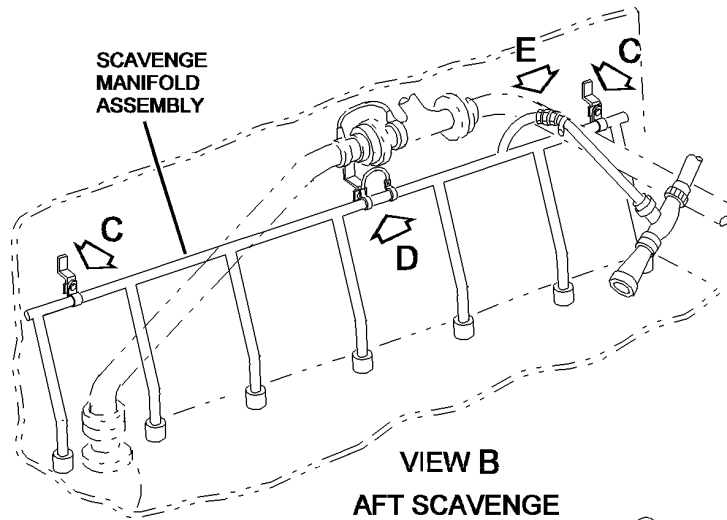
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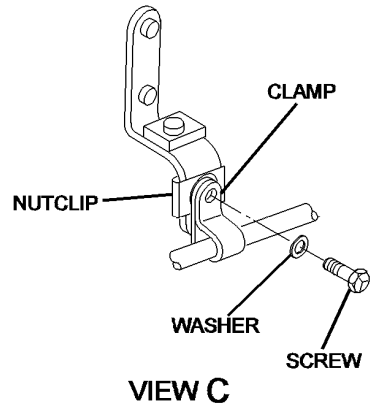
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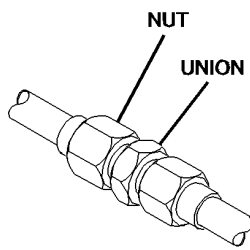
VIEW A
LEFT WING SHOWN
RIGHT WING OPPOSITE



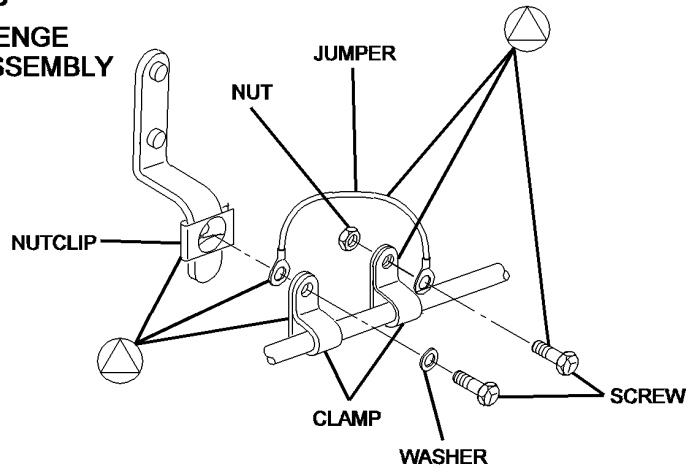
VIEW B
AFT SCAVENGE
MANIFOLD ASSEMBLY



VIEW C



VIEW E



VIEW D

 ELECTRICAL BOND
NECESSARY

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S0000228529V1

**Aft Scavenge Manifold Assembly
Figure 202/28-10-16-990-802**

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4. Removal/Installation of the Center Fuel Tank Scavenge Manifold Assembly

A. Job- setup center fuel tank scavenge manifold assembly removal.

- (1) Before maintenance is done on the fuel system, make sure that personnel read and fully understand the fuel system maintenance practices. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- (2) Remove the over-wing emergency exits. (OVERWING EMERGENCY EXIT DOORS - REMOVAL/INSTALLATION, PAGEBLOCK 52-21-00/401)
- (3) Remove the applicable passenger seats between F.S. 883 -1041 right and left side. (PASSENGER SEATS - MAINTENANCE PRACTICES, PAGEBLOCK 25-23-00/201)
- (4) Remove the applicable cabin floor panels between F.S. 883 -1041 to get access to the center fuel tank. (FLIGHT AND PASSENGER COMPARTMENT FLOOR PANELS - MAINTENANCE PRACTICES, PAGEBLOCK 53-20-01/201)
- (5) Make the fuel system safe for maintenance. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- (6) Prepare the center fuel tank for entry. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

WARNING: JET FUELS A, A-1 OR B (JP-4 OR -5 FUEL) ARE AGENTS THAT ARE FLAMMABLE, EXPLOSIVE, POISONOUS, AND IRRITANTS. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN JET FUELS A, A-1 OR B (JP-4 OR -5 FUEL) ARE USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET JET FUELS A, A-1 OR B (JP-4 OR -5 FUEL) IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THESE HAZARDOUS AGENTS.

- (7) Open access panels 2301C and 2302C to gain access to manifold. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

B. Removal of the Center Fuel Tank Scavenge Manifold Assembly

- (1) Remove applicable center fuel tank scavenge manifold assembly (1) as follows: (Figure 203, Figure 204)

NOTE: Removal of the left and right side scavenge manifold assemblies are the same unless noted differently.

- (a) Disconnect the scavenge manifold nut (2) from the ejector (3).
- (b) Remove and discard the two packings (4) .

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- (c) Put an DPM 1931-1 protective cap on the ejector (3).
 - (d) Remove the screw (5) and bonding jumper (6) from the mounting clamp (7).
 - (e) Remove the four screws (8) and washers (9) from the four mounting clamps (10).
 - (f) Remove the applicable scavenge manifold assembly (1) from the aircraft.
 - (g) Install protective caps on manifold assembly and union.
 - (h) If necessary, remove the clamps (7) and (10) from the applicable fuel tank scavenge manifold(s) for installation on the new manifold. (View D)
 - (i) If necessary, remove the screw (11), nut (12), and bonding jumper (6) from the bonding clamp (13) from the applicable fuel tank scavenge manifold(s) for installation on the new manifold. (View C)
- C. Installation of the Center Fuel Tank Scavenge Manifold Assembly
- (1) Job- setup center fuel tank scavenge manifold assembly installation.
 - (a) Make sure the over-wing emergency exits are removed. (OVERWING EMERGENCY EXIT DOORS - REMOVAL/INSTALLATION, PAGEBLOCK 52-21-00/401)
 - (b) Make sure the applicable passenger seats between F.S. 883 -1041 right and left side are removed. (PASSENGER SEATS - MAINTENANCE PRACTICES, PAGEBLOCK 25-23-00/201)
 - (c) Make sure the applicable cabin floor panels between F.S. 883 -1041 to get access to the center fuel tank. are removed. (FLIGHT AND PASSENGER COMPARTMENT FLOOR PANELS - MAINTENANCE PRACTICES, PAGEBLOCK 53-20-01/201)
 - (d) Make the fuel system safe for maintenance. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

WARNING: JET FUELS A, A-1 OR B (JP-4 OR -5 FUEL) ARE AGENTS THAT ARE FLAMMABLE, EXPLOSIVE, POISONOUS, AND IRRITANTS. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN JET FUELS A, A-1 OR B (JP-4 OR -5 FUEL) ARE USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET JET FUELS A, A-1 OR B (JP-4 OR -5 FUEL) IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THESE HAZARDOUS AGENTS.

- (e) Make sure access panels 2301C and 2302C are open. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

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- (2) Install applicable center fuel tank scavenge manifold assembly (1) as follows: (Figure 203, Figure 204)
 - (a) Prepare the area on the scavenge manifold assembly (1), where the clamps for the bonding jumper (6) are to be installed for the electrical bond. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
 - (b) Prepare the mounting bracket, where the clamp for the bonding jumper is to be installed for the electrical bond. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
 - (c) Install the scavenge manifold assembly as follows:
 - 1) Install the four mounting clamps (11) and one mounting clamp (8) on the scavenge manifold assembly (1).
 - 2) Install the bonding clamp (14) on the scavenge manifold assembly (1) in the area prepared for the electrical bond.
 - 3) Attach the bonding jumper (6) to the bonding clamp (13) with a screw (11) and nut (12).
 - 4) Remove the protective caps from the fuel tank scavenge manifold assembly (1) and ejector (3).
 - 5) Install two new "O" rings (4) . (TANK SCAVENGE JET PUMP - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-12/201)
 - 6) Connect the scavenge manifold assembly (1) to the ejector (3).
 - 7) Attach the scavenge manifold assembly (1) to the aircraft structure with four mounting clamps (12), screws (8), and washers (10). (View D)
 - a) Make sure that the clearance between all the manifold pickups and the fuel tank surface is 0.015 +0.030 / -0.000 in. (0.381 +0.762 / -0.000 mm). (View E)
 - b) If the dimension in the above step cannot be met, do the steps that follow:
 - <1> Remove the applicable pickup.
 - <2> Clean the applicable rake with 320 grit sandpaper

WARNING: INTEGRAL FUEL TANKS SEALING COMPOUND (POLYSULFIDE SEALANT B1/2 AND B2) IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN INTEGRAL FUEL TANKS SEALING COMPOUND IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET INTEGRAL FUEL TANKS SEALING COMPOUND IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

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(WARNING PRECEDES)

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THESE HAZARDOUS AGENTS.

<3> Install a new pickup in its position with DPM 2082 and keep a dimension of 0.015 +0.030 / -0.000 in. (0.381 +0.762 / -0.000 mm)

- 8) Put the bonding jumper (6) below the bonding/attach clamp (13) and attach to the aircraft structure with a screw (11), washer (12), and nut (13).
 - a) Do not let the terminal on the bonding jumper (6) turn while the screw (11) is tightened.
- 9) Do an electrical bond check of the bonding jumper and the two attach clamps. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)

D. Job Close-up - Center Fuel Tank Right Side Scavenge Manifold Assembly Installation

- (1) Remove all the tools and equipment from the work area. Make sure that the area is clean.
- (2) Install the access panels 2301C and 2302C. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- (3) Install the applicable cabin floor panels between F.S. 883 -1041. (FLIGHT AND PASSENGER COMPARTMENT FLOOR PANELS - MAINTENANCE PRACTICES, PAGEBLOCK 53-20-01/201)
- (4) Install the applicable passenger seats between F.S. 883 -1041 right and left side. (FLIGHT AND PASSENGER COMPARTMENT FLOOR PANELS - MAINTENANCE PRACTICES, PAGEBLOCK 53-20-01/201)
- (5) Install the over-wing emergency exits. (OVERWING EMERGENCY EXIT DOORS - REMOVAL/INSTALLATION, PAGEBLOCK 52-21-00/401)

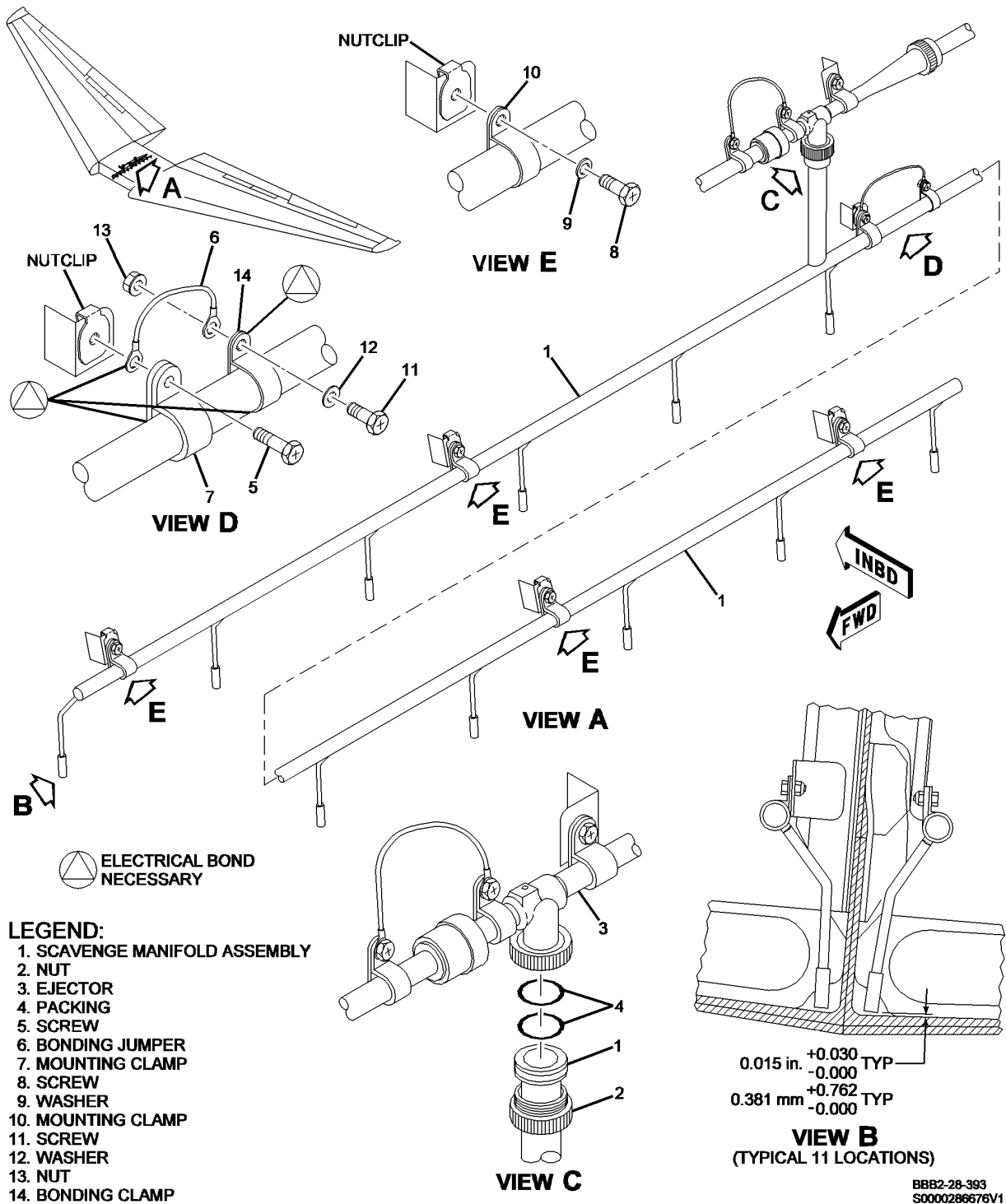
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**Center Fuel Tank Left Scavenge Manifold Assembly
Figure 203/28-10-16-990-803**

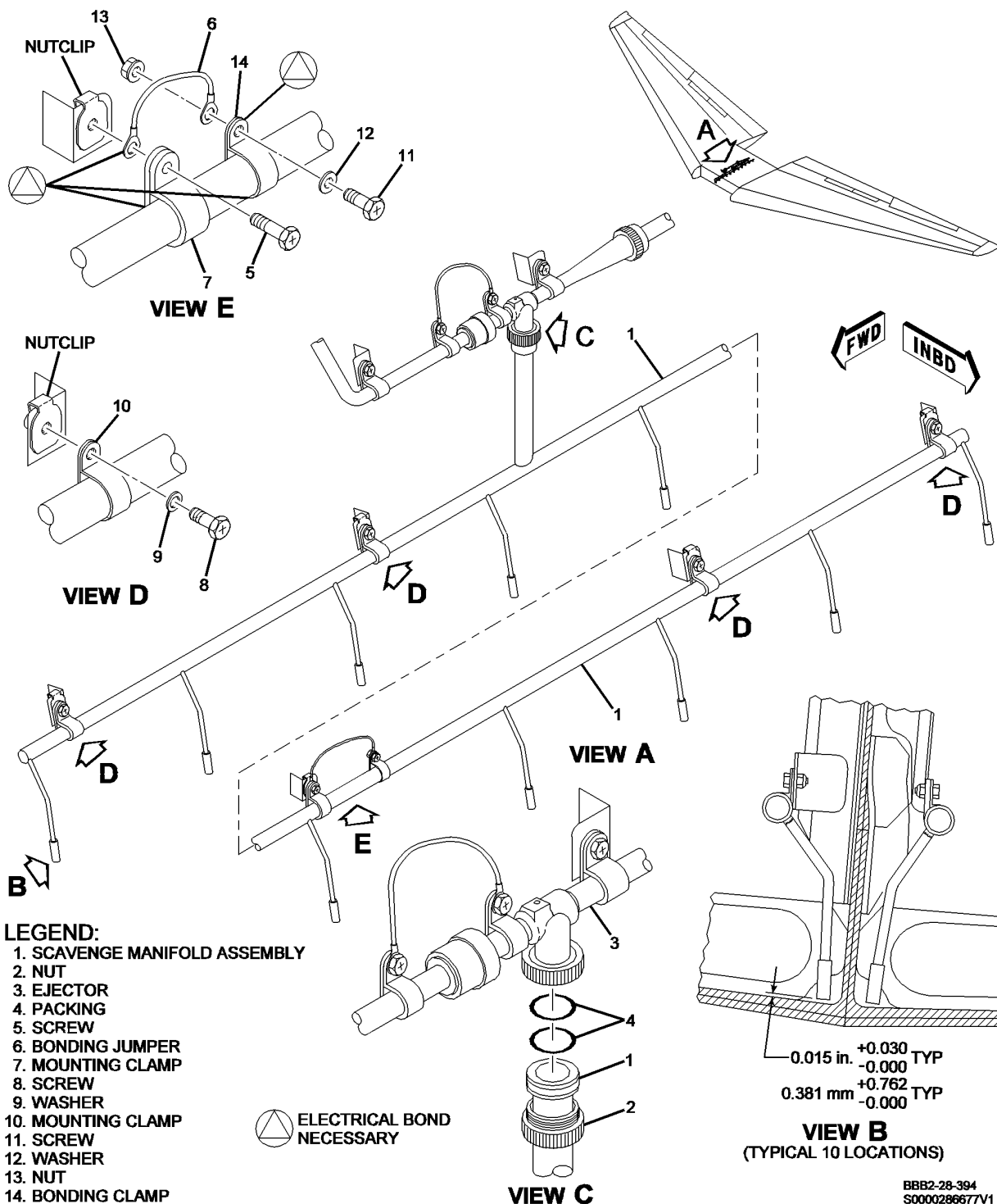
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**Center Fuel Tank Right Scavenge Manifold Assembly
Figure 204/28-10-16-990-804**

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5. Cleaning of the Main and Center Fuel Tank Scavenge Manifold Assembly

A. Main and Center Fuel Tank Scavenge Manifold Assembly Cleaning

- (1) Remove the applicable manifold assembly from the aircraft. (Paragraph 3.E. or Paragraph 4.)
- (2) Clean the applicable fuel scavenge manifold assembly as follows:
 - (a) Apply shop air to each pickup nozzle in manifold to remove all unwanted material from the manifold assembly.
 - (b) Examine each tube of the manifold assembly to make sure that they are clean.
 - (c) If the manifold assembly cannot be cleaned with shop air, replace it. (Paragraph 3.F. or Paragraph 4.C.)
- (3) Install the applicable manifold assembly. (Paragraph 3.F. or Paragraph 4.C.)

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SCAVENGE RAKES - REMOVAL/INSTALLATION

1. General

A. This procedure contains MSG-3 task card data.

TASK 28-10-16-902-801

2. Clean the Scavenge Rakes

NOTE: This procedure is a scheduled maintenance task.

A. References

Reference	Title
28-00-00 P/B 201	GENERAL - MAINTENANCE PRACTICES
28-10-16 P/B 201	MANIFOLD ASSEMBLY, FUEL TANK SCAVENGE - MAINTENANCE PRACTICES

B. Prepare for the Scavenge Rakes Cleaning

SUBTASK 28-10-16-840-001

(1) Make sure left, center and right fuel tanks are open and are safe for maintenance. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

SUBTASK 28-10-16-010-001

(2) Open access panels.

SUBTASK 28-10-16-020-001

(3) Remove left and right fuel tank rakes. (MANIFOLD ASSEMBLY, FUEL TANK SCAVENGE - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-16/201)

(4) Remove center fuel tank rakes.

C. Scavenge Rakes Cleaning

SUBTASK 28-10-16-902-001

(1) Clean left and right fuel tank rakes. (MANIFOLD ASSEMBLY, FUEL TANK SCAVENGE - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-16/201)

(2) Clean center fuel tank rakes.

(a) Apply shop air to each pickup nozzle in manifold to remove all unwanted material from the manifold assembly.

(b) Examine each tube of the manifold assembly to make sure that they are clean.

D. Job Close-up

SUBTASK 28-10-16-420-001

(1) Install serviceable left and right fuel tank rakes. (MANIFOLD ASSEMBLY, FUEL TANK SCAVENGE - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-16/201)

(2) Install serviceable center fuel tank rakes.

SUBTASK 28-10-16-840-002

(3) Restore the left, center and right fuel tanks to normal configuration after maintenance. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

SUBTASK 28-10-16-410-001

(4) Close access panels.

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SUBTASK 28-10-16-942-001

- (5) Remove all the tools and equipment from the work area. Make sure the area is clean.

———— **END OF TASK** ————

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WJE ALL

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FUSELAGE FUEL TANK CAVITY - INSPECTION/CHECK

1. General

A. This procedure contains MSG-3 task card data.

TASK 28-11-00-210-801

2. General Visual Inspection of the Auxiliary Fuel Tank Cavity

NOTE: This procedure is a scheduled maintenance task.

A. **References**

Reference	Title
12-11-01	DEFUELING
12-11-03	FUEL LOADING
28-00-00 P/B 201	GENERAL - MAINTENANCE PRACTICES
28-11-04 P/B 401	FORWARD FUSELAGE FUEL TANK CELL - REMOVAL/INSTALLATION
28-11-05 P/B 401	AFT FUSELAGE FUEL TANK CELL - REMOVAL/INSTALLATION

B. **Prepare for the Auxiliary Fuel Tank Cavity General Visual Inspection**

SUBTASK 28-11-00-840-001

- (1) Prepare tank for maintenance. (DEFUELING, SUBJECT 12-11-01GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

SUBTASK 28-11-00-210-001

- (2) Check bladder has not collapsed.

SUBTASK 28-11-00-020-001

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

- (3) Remove forward fuselage fuel tank cell. (FORWARD FUSELAGE FUEL TANK CELL - REMOVAL/INSTALLATION, PAGEBLOCK 28-11-04/401)
- (4) Remove aft fuselage fuel tank cell. (AFT FUSELAGE FUEL TANK CELL - REMOVAL/INSTALLATION, PAGEBLOCK 28-11-05/401)

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

C. **Auxiliary Fuel Tank Cavity General Visual Inspection**

SUBTASK 28-11-00-210-002

- (1) Inspect fuel bladder for damage and general condition.
- (2) Inspect the fuel cell cavity for corrosion and structural damage.

D. **Job Close-up**

SUBTASK 28-11-00-420-001

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

- (1) Install forward fuselage fuel tank cell. (FORWARD FUSELAGE FUEL TANK CELL - REMOVAL/INSTALLATION, PAGEBLOCK 28-11-04/401)

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

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WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892 (Continued)

- (2) Install aft fuselage fuel tank cell. (AFT FUSELAGE FUEL TANK CELL - REMOVAL/INSTALLATION, PAGEBLOCK 28-11-05/401)

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

SUBTASK 28-11-00-840-002

- (3) Return tank to normal configuration. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201 FUEL LOADING, SUBJECT 12-11-03)

SUBTASK 28-11-00-942-001

- (4) Remove all the tools and equipment from the work area. Make sure the area is clean.

———— **END OF TASK** ————

TASK 28-11-00-211-801

3. Detailed Inspection of the Auxiliary Fuel Cell Cavity Link and Hanger Assemblies

A. Auxiliary Fuel Cell Cavity Link and Hanger Assemblies Detailed Inspection

SUBTASK 28-11-00-211-001

- (1) Perform a detailed visual inspection of the forward fuel cell cavity links, hangers, and adjacent structure for corrosion, installations, security, condition and other irregularities.
- (2) Perform a detailed visual inspection of the aft fuel cell cavity links, hangers, and adjacent structure for corrosion, installations, security, condition and other irregularities.

B. Job Close-up

SUBTASK 28-11-00-942-002

- (1) Remove all the tools and equipment from the work area. Make sure the area is clean.

———— **END OF TASK** ————

EFFECTIVITY

**WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892**

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FUSELAGE FUEL TANK CELL - MAINTENANCE PRACTICES

1. General

- A. The following procedures are applicable to bladder-type fuel cells of Vithane construction.
- B. This quick-cure (air cure) method of repair is intended for repairing minor damage to fuel cells without removing the cell from tank cavity.
- C. Only air-cured inside patches are used in this procedure. A 3-inch (76.2mm) diameter patch will normally fit all permitted air cure repair situations.
- D. Before any maintenance is performed on the fuel system, personnel should read and understand thoroughly the GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 201

Name and Number	Manufacturer
Container (at least 1 quart (1 liter))	Commercially available
Brush, paint, 1 inch	Commercially available
Foam, polyethylene (DMS 1954, Class 1, Grade 4101)	
Cloth, emery, 120-grit	Commercially available
*Cement, repair, air cure, Vithane fuel cells, 82C32 kit (DPM 5202)	Engineered Fabrics Corp. Rockmart, GA
Fabric, repair, quick cure, Vithane fuel cells; 3604N (nylon) or 491 (polyester) (DPM 5202-1)	Engineered Fabrics Corp. Rockmart, GA
Solvent, MPK blend; Ardrox 5529 (DMS 2458)	Chemetall Oakite, La Mirada, CA
Wipers, cotton, lint-free, (DMS 1820, Type 1, Class A, Grade 1)	Commercially available
<u>NOTE:</u> *Kit 82C32 consists of premeasured 1/2 pint cans of base cement and crosslinker.	

3. Precautions

- A. The following precautions must be observed when working in or around a fuel cell.
 - (1) Do not step on, or otherwise unnecessarily apply pressure to, creases or folds in fuel cell material.
 - (2) When entering fuel cell:
 - (a) Protect fuel cell surfaces by placing appropriate sized foam cushions on all working surfaces.
 - (b) Remove street shoes, or wear shoe coverings that completely envelope entire footwear.
 - (c) Periodically examine interior of fuel cell for any foreign materials, hardware, or tools. Keep fuel cell clean at all times.
 - (d) Wear clean, cotton coveralls that have no exposed buttons, snaps, or rivets.

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877, 880, 881, 883, 884, 892

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- (e) Remove all tools, sharp objects, ball-point pens, knives, or scribes from pockets. All tools must be carried in zippered canvas bags which have foam cushion lining on bottom.
- (f) Ensure that all vaporproof lights are equipped with rubber bumpers on each end, and do not have hooks or hangers. Do not use bare, unshielded light fixtures while working in or on fuel cells.
- (g) Only those parts, materials, and tools for immediate use should be taken into fuel cell.
- (h) Only authorized personnel are to enter fuel cells.
- (i) Use all precautions to prevent spillage of any fluids taken into fuel cell. All spills must be reported, and immediately cleaned up.

4. Approved Repairs Fuselage Fuel Tank Cell

A. Limitations for Quick Cure (Air Cure) Repair

NOTE: Only an inside patch is required for the air cure procedure.

- (1) Damage to fuel cell must fall within the following limitations:
 - (a) Holes, punctures, cuts up to 0.5 inch (12.7 mm) largest dimension.
 - (b) Abraded areas up to 2.0 inches (50.8 mm) diameter where fabric is not damaged.
 - (c) Missing coating, up to 2.0 inches diameter (50.8 mm) diameter where fabric is not damaged.
 - (d) Loose edges may be trimmed, provided a 0.5 inch (12.7 mm) lap or seam is maintained.

B. Surface Preparation

- (1) Cut patch from repair fabric. Patch is to extend minimum of 1.0 inch (25.4 mm) beyond damaged area.

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1588, SOLVENT/MPK BLEND (DMS QPL 2458)

HAZMAT 1000, REFER TO MSDS

- (2) Using MPK blend solvent (DMS 2458) and lint-free cotton wiper, clean area approximately 1 foot (0.3 meter) around damaged area.

CAUTION: EXERCISE CARE TO AVOID DAMAGING AREA BY EXCESSIVE ABRASION.

- (3) Abrade surface of cell and cementing surface of patch using emery cloth (120-grit) sufficiently to remove gloss. Prepare an area on cell 1/2 inch (12.7 mm) beyond patch in all directions.

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1588, SOLVENT/MPK BLEND (DMS QPL 2458)

HAZMAT 1000, REFER TO MSDS

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877,
880, 881, 883, 884, 892

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(WARNING PRECEDES)

- (4) Using MPK blend solvent (DMS 2458) and lint-free cotton wiper, clean abraded area more than once.

C. Mixing Instructions for Cement

NOTE: Do not mix the repair cement until ready for use.

CAUTION: NEVER MIX KITS OF CEMENT WHICH ARE AT TEMPERATURE BELOW 70°F (21.1°C). IF CEMENT HAS BEEN REFRIGERATED, ALLOW TO STAND, WITH LID ON, UNTIL IT REACHES 70°F (21.1°C) BEFORE MIXING.

- (1) Repair cement comes as a kit consisting of two 1/2 pint containers: base cement (part 1), and crosslinker (part 2).

WARNING: AIR CURE REPAIR CEMENT IS AN AGENT THAT IS FLAMMABLE, EXPLOSIVE, POISONOUS, AN IRRITANT, AND A SENSITIZER. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN AIR CURE REPAIR CEMENT IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET AIR CURE REPAIR CEMENT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

CAUTION: MIX WHOLE CONTAINERS. ANY ATTEMPT TO MIX SMALLER BATCHES WILL RESULT IN OFF-RATIO CONDITION.

- (2) Thoroughly blend contents of crosslinker (part 2) into base cement (part 1) for approximately 5 minutes.

CAUTION: DO NOT RAPIDLY STIR OR SHAKE FINAL MIXTURE, SINCE THIS WILL INDUCE AIR BUBBLES.

- (3) Usable pot life of catalyzed material, store in closed container, is 20 to 30 minutes. Pot life varies with temperature and humidity, but can be extended to maximum by keeping container covered between applications.

D. Repair Procedure.

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877,
880, 881, 883, 884, 892

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WARNING: AIR CURE REPAIR CEMENT IS AN AGENT THAT IS FLAMMABLE, EXPLOSIVE, POISONOUS, AN IRRITANT, AND A SENSITIZER. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN AIR CURE REPAIR CEMENT IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET AIR CURE REPAIR CEMENT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (1) Apply one uniform brush coat of mixed repair cement to cell surface (covering only prepared area). Allow cement to dry for 10 to 15 minutes.

CAUTION: DO NOT USE FIRST CONTAINER OF MIXED CEMENT TO MIX SECOND BATCH. NEVER DILUTE CEMENT WITH ANY SOLVENT IN AN ATTEMPT TO EXTEND ITS POT LIFE.

- (2) Apply second coat of mixed repair cement over first coat. Allow cement to dry for 10 to 15 minutes.

NOTE: If the cement becomes too thick to brush on smoothly, discard and mix a new batch of cement.

- (3) Apply third uniform coat of mixed repair cement over second coat.

NOTE: Proceed immediately to next step.

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1588, SOLVENT/MPK BLEND (DMS QPL 2458)

HAZMAT 1000, REFER TO MSDS

- (4) Dip repair fabric in MPK blend solvent (DMS 2458), and shake out excess solvent.
- (5) Carefully center patch, and lay on wet cement. Smooth out with relatively dry brush, removing all entrapped air.

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877,
880, 881, 883, 884, 892

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WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1391, CEMENT/REPAIR/AIR CURE (VITHANE FUEL CELLS)

HAZMAT 1000, REFER TO MSDS

- (6) Apply final uniform coat of mixed repair cement over repair patch from center out. Spread cement approximately 0.125 inch (3.175 mm) beyond patch, but not beyond abraded area.
- (7) Allow repair to air cure for 6 hours minimum at 70°F (21.1°C) before moving tank or exposing repaired area to fuel.

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877,
880, 881, 883, 884, 892

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FORWARD FUSELAGE FUEL TANK - CHECK

1. General

- A. This maintenance practice is concerned with the pressure tight integrity of the forward fuselage fuel tank cavity (structural container), fuel cell (bladder), and the interconnecting piping. Extreme caution must be exercised in the performance of this check to prevent excessive pressure and possible damage to the fuel cell.
- B. This test is accomplished by introducing clean dry air into both the fuel cell and the cavity to establish a stabilized 0.50 psi pressure differential. The fuel cell and cavity pressure is then monitored to observe a pressure decay, if any, which will indicate the presence of leakage. There is no allowable leakage for the fuel cell and tank cavity during this test.
- C. The forward auxiliary fuel tank pipe connections to the cavity are on the left side (aft) between stations 579 and 598.
- D. Strict compliance with safety precautions contained in GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201, and all local safety precautions are required during the performance of these procedures.
- E. Drain fuel shroud system each time a fuel line has been disconnected, to drain any fuel left from removal/installation of a fuel line. This will prevent false leakage indications.
- F. A fitting is provided on the lower portion of the fuel cell structural door as an aid in predetermining source of fuel leakage from the fuel cell area. Periodically the cap should be removed to check for evidence of fuel. Presence of fuel indicates that a leak exists in cavity between the cell door and structural door.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

Table 601

Name and Number	Manufacturer
Regulated air supply	Commercially available
Manual shutoff valve (2 each)	Commercially available
Pressure gage 0-10 psig (0-69 kPa)	Commercially available
Test adapter fill/vent opening (2 required)	Locally manufactured
Safety water column 5.25 psi (35.7 kPa) maximum	Commercially available or locally manufactured
Test plug transfer opening	Locally manufactured
Pressure gage 0-5 psig (0-34.5 kPa)	Commercially available
Safety water column 2.8 psi (19.3 kPa) maximum	Commercially available or locally manufactured
Heat shrinkable tubing (AMS3636)	Rayclad Tube Redwood, City, CA
Heat gun	Commercially available

3. Forward Fuselage Fuel Tank Check

- A. Check Forward Fuselage Fuel Tank
 - (1) Preparation for leak check:
 - (a) Defuel and drain forward fuselage and center tanks. (DEFUELING, SUBJECT 12-11-01)
 - (b) Remove applicable floor panels for access to fuel tank (Ref. 53-21-01).

EFFECTIVITY WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 880, 881, 883, 884, 892
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- (c) Remove interconnecting fuel fill, transfer, and vent pipes, shroud drain lines, and associated shrouds from fuel tank. (FUSELAGE FUEL TANK CAVITY - MAINTENANCE PRACTICES, PAGEBLOCK 28-11-06/201)

B. Leak Check

- (1) Install fill/vent test adapter plug to fill fitting, and connect manual shutoff valve and regulated air supply. (Figure 601)
- (2) Install fill/vent test adapter plug to vent fitting, and connect 0-10 psig (0-69 kPa) pressure gage and safety water column 5.25 psi (35.7 kPa) maximum. (Figure 601)
- (3) Install transfer test plug in transfer pipe opening. (Figure 602)
NOTE: Ensure that aft auxiliary tank cavity vent is disconnected from forward auxiliary tank vent prior to conducting test.
- (4) Open regulated air supply and manual shutoff valve; pressurize fuel cell to 4.0-5.0 psig (27.6-34.5 kPa).
- (5) Momentarily depress sump drain valve poppet and verify air flow.
- (6) Verify no air flows from cavity drain valve (or cavity vent).
- (7) Close air supply and manual shutoff valve; disconnect air hose.
- (8) Allow air pressure in fuel cell to stabilize for 15 minutes; monitor pressure gage for indication of pressure decay. Pressure decrease shall be 0 psig (0 kPa) in 30 minutes.
- (9) Open manual shutoff valve and decrease pressure in fuel cell to 3.0-3.5 psig (20.7-22.4 kPa).
- (10) While maintaining 3.0-3.5 psig (20.7-22.4 kPa) air pressure in fuel cell, connect manual shutoff valve and regulated air supply to tank cavity drain (or cavity vent).
- (11) Connect 0-5 psig (34.5 kPa) pressure gage and safety water column 2.80 psi (19.3 kPa) maximum to tank cavity vent (or tank cavity drain).

CAUTION: THE CAVITY PRESSURE MUST NOT EXCEED THE FUEL CELL (BLADDER) PRESSURE. FAILURE TO OBSERVE THIS REQUIREMENT WILL RESULT IN SEVERE DAMAGE TO THE FUEL CELL (BLADDER).

- (12) Open regulated air supply and manual shutoff valve; pressurize tank cavity to 2.0-2.5 psig (13.8-17.3 kPa).
- (13) Close air supply and manual shutoff valve.
- (14) Allow air pressure in fuel cell and cavity to stabilize for 15 minutes; monitor pressure gage for indication of pressure decay. Pressure decrease shall be 0 psig (0 kPa) in 30 minutes.
- (15) While maintaining air pressure in fuel cell, slowly open manual shutoff valve and deplete pressure in tank cavity.
- (16) After tank cavity pressure gage reads 0 psig (0 kPa), slowly open manual shutoff valve and deplete pressure in fuel cell.
- (17) Disconnect and remove all test equipment and adapters.
- (18) Connect interconnecting fuel fill, cavity drain, cavity vent, transfer, and vent pipes, shroud drain lines, and associated shrouds to fuel tank. (FUSELAGE FUEL TANK CAVITY - MAINTENANCE PRACTICES, PAGEBLOCK 28-11-06/201)
- (19) Perform shroud drain system leak check. (SHROUDED FUEL FEED LINES - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-17/201)
- (20) Install applicable floor panels (Ref. 53-20-01).

EFFECTIVITY

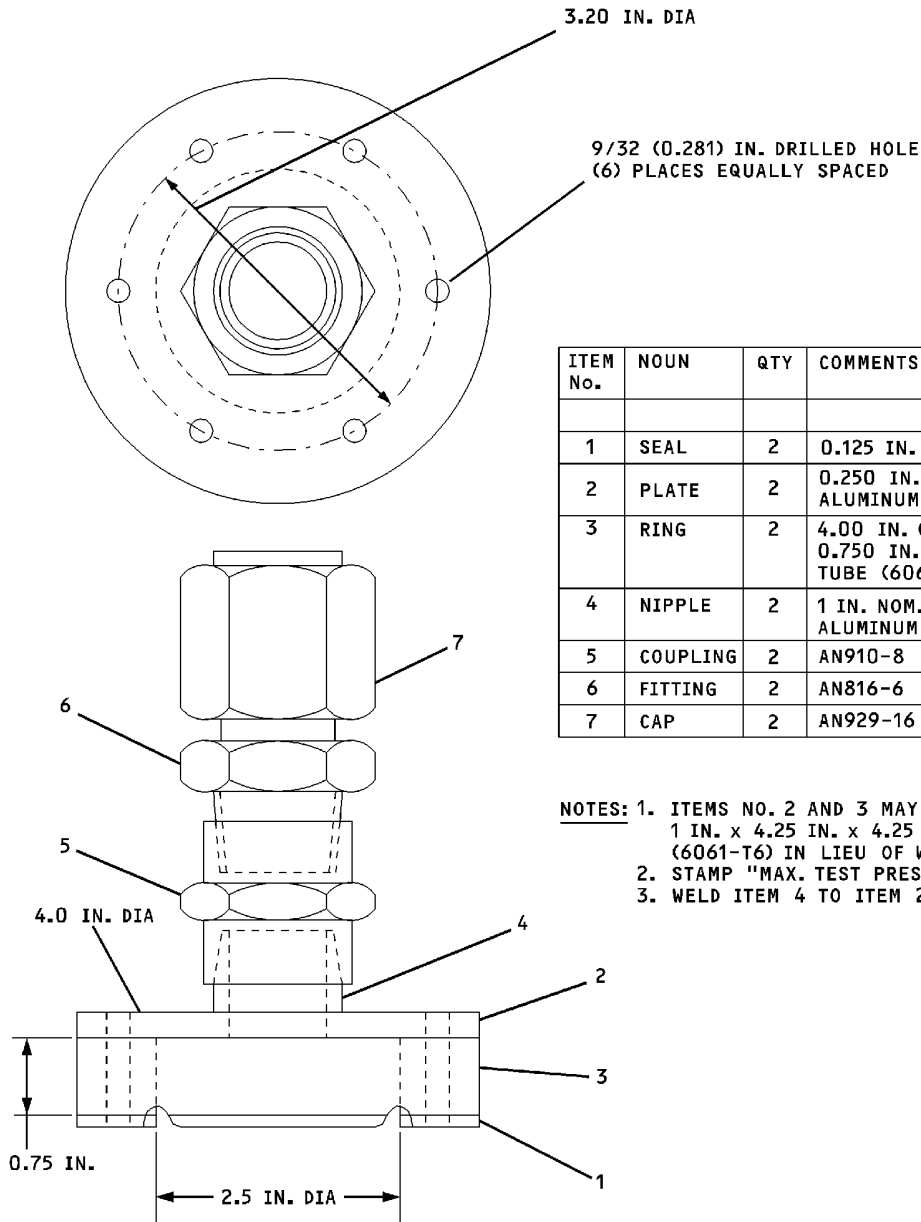
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
880, 881, 883, 884, 892

TP-80MM-WJE

28-11-02

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ITEM No.	NOUN	QTY	COMMENTS
1	SEAL	2	0.125 IN. NEOPRENE SHEET
2	PLATE	2	0.250 IN. x 4.25 IN. x 4.25 IN. ALUMINUM PLATE (6061-T6)
3	RING	2	4.00 IN. O.D. x 0.750 WIDE x 0.750 IN. WALL ALUMINUM TUBE (6061-T6)
4	NIPPLE	2	1 IN. NOM. CLOSE, SCH. 40 ALUMINUM (6061-T6)
5	COUPLING	2	AN910-8
6	FITTING	2	AN816-6
7	CAP	2	AN929-16

NOTES: 1. ITEMS NO. 2 AND 3 MAY BE MACHINED FROM 1 IN. x 4.25 IN. x 4.25 IN. ALUMINUM BAR (6061-T6) IN LIEU OF WELDING TWO PIECES.
2. STAMP "MAX. TEST PRESSURE 55 PSI"
3. WELD ITEM 4 TO ITEM 2. MUST BE LEAK TIGHT.

CAG(IGDS)

BBB2-28-363

**Fill/Vent Test Adapter Ring
Figure 601/28-11-02-990-801**

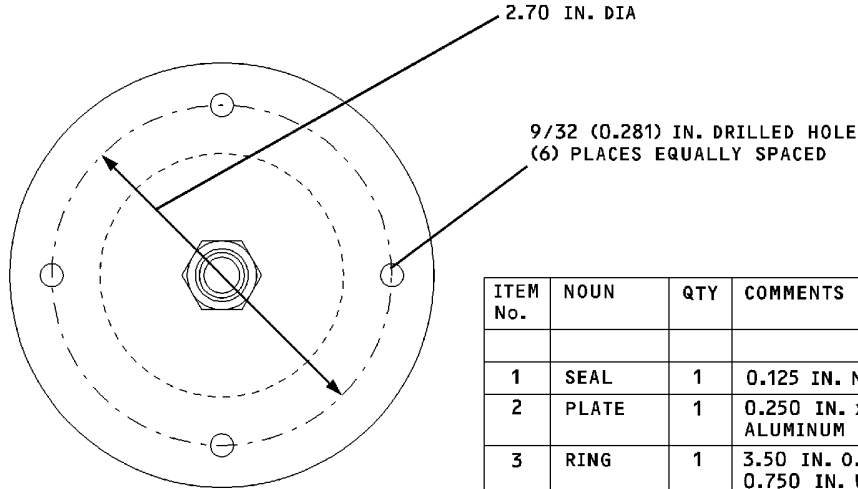
EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 880, 881, 883, 884, 892

TP-80MM-WJE

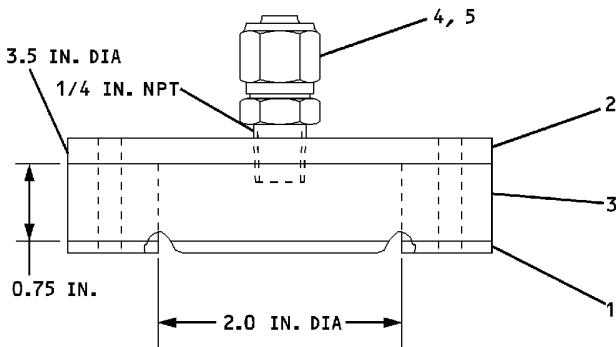
28-11-02

MD-80 AIRCRAFT MAINTENANCE MANUAL



ITEM No.	NOUN	QTY	COMMENTS
1	SEAL	1	0.125 IN. NEOPRENE SHEET
2	PLATE	1	0.250 IN. x 3.75 IN. x 3.75 IN. ALUMINUM PLATE (6061-T6)
3	RING	1	3.50 IN. O.D. x 0.750 WIDE x 0.750 IN. WALL ALUMINUM TUBE (6061-T6)
4	FITTING	1	AN816-4-4J
5	CAP	1	AN929-4J

NOTES: 1. ITEMS NO. 2 AND 3 MAY BE MACHINED FROM 1 IN. x 3.75 IN. x 3.75 IN. ALUMINUM BAR (6061-T6) IN LIEU OF WELDING TWO PIECES.
2. STAMP "MAX. TEST PRESSURE 55 PSI"



CAG(IGDS)

BBB2-28-364

**Transfer Test Adapter Plug
Figure 602/28-11-02-990-802**

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 880, 881, 883, 884, 892

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MD-80 AIRCRAFT MAINTENANCE MANUAL

4. Installation of Heat Shrinkable Tubing

A. Install Heat Shrinkable Tubing

- (1) Prior to connecting pipe, slip heat shrinkable tubing over open end of vent line (Figure 603).
- (2) Connect pipe to fitting and tighten to required torque value (PAGEBLOCK 20-10-13/201).

CAUTION: DO NOT DIRECT HEAT GUN ON ADJACENT BLANKETS, EQUIPMENT OR STRUCTURE. PROTECT THESE ITEMS BY SHIELDING OR COVERING WITH ALUMINUM FOIL. USE HEAT REFLECTORS WHERE POSSIBLE.

- (3) Position heat shrinkable tubing, and heat to 250°F to 300°F (121.1°C to 148.9°C) with heat gun for approximately 30 seconds, or until tube has shrunk snugly around pipe.

EFFECTIVITY

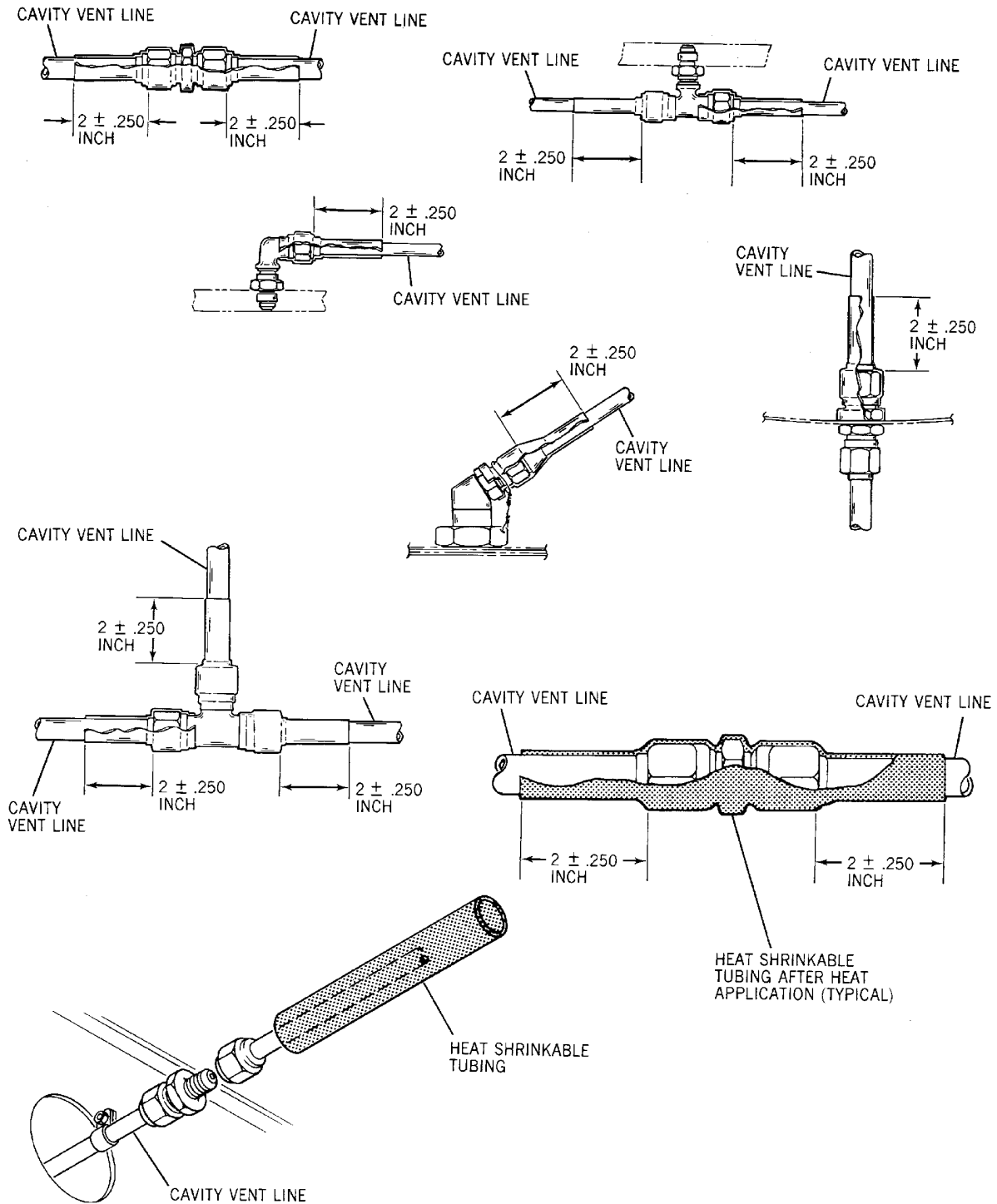
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880, 881, 883, 884, 892

TP-80MM-WJE

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**MD-80
AIRCRAFT MAINTENANCE MANUAL**



BB82-28-112

Heat Shrinkable Tubing - Installation
Figure 603/28-11-02-990-806

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
880, 881, 883, 884, 892

TP-80MM-WJE

28-11-02

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MD-80 AIRCRAFT MAINTENANCE MANUAL

AFT FUSELAGE FUEL TANK - CHECK

1. General

- A. This maintenance practice is concerned with the pressure tight integrity of the aft fuselage fuel tank cavity (structural container), fuel cell (bladder), and the interconnecting piping. Extreme caution must be exercised in the performance of this check to prevent excessive pressure and possible damage to the fuel cell.
- B. This test is accomplished by introducing clean dry air into both the fuel cell and the cavity to establish a stabilized 0.50 psi pressure differential. The fuel cell and cavity pressure is then monitored to observe a pressure decay, if any, which will indicate the presence of leakage. There is no allowable leakage for the fuel cell and tank cavity during this test.
- C. The aft auxiliary fuel tank pipe connections to the cavity are on the top (forward) near station 1022.
- D. Strict compliance with safety precautions contained in GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201, and all local safety precautions are required during the performance of these procedures.
- E. Drain fuel shroud system each time a fuel line has been disconnected, to drain any fuel left from removal/installation of a fuel line. This will prevent false leakage indications.
- F. A fitting is provided on the lower portion of the fuel cell structural door as an aid in predetermining source of fuel leakage from the fuel cell area. Periodically the cap should be removed to check for evidence of fuel. Presence of fuel indicates that a leak exists in cavity between the cell door and structural door.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

Table 601

Name and Number	Manufacturer
Regulated air supply	Commercially available
Manual shutoff valve (2 each)	Commercially available
Pressure gage 0-10 psig (0-69 kPa)	Commercially available
Test adapter fill/vent opening (2 required)	Locally manufactured
Safety water column 5.25 psi (35.7 kPa) maximum	Commercially available or locally manufactured
Test plug transfer opening	Locally manufactured
Pressure gage 0-5 psig (0.34.5 kPa)	Commercially available
Safety water column 2.8 psi (19.3 kPa) maximum	Commercially available or locally manufactured
Heat shrinkable tubing (AMS3636)	Rayclad Tube Redwood City, CA
Heat gun	Commercially available

3. Aft Fuselage Fuel Tank Check

- A. Check Aft Fuselage Fuel Tank
 - (1) Preparation for leak check:
 - (a) Defuel and drain aft fuselage and center tanks. (FUSELAGE FUEL TANK CELL - MAINTENANCE PRACTICES, PAGEBLOCK 28-11-01/201)
 - (b) Remove applicable floor panels for access to fuel tank. (FLIGHT AND PASSENGER COMPARTMENT FLOOR PANELS, SUBJECT 53-20-01)

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 880, 881, 883, 884, 892

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- (c) Remove interconnecting fuel fill, transfer, and vent pipes, shroud drain lines, and associated shrouds from fuel tank. (FUSELAGE FUEL TANK CAVITY - MAINTENANCE PRACTICES, PAGEBLOCK 28-11-06/201)

B. Leak Check

- (1) Install fill/vent test adapter plug to fill fitting, and connect manual shutoff valve and regulated air supply (Figure 601).
- (2) Install fill/vent test adapter plug to vent fitting, and connect 0-10 psig (0-69 kPa) pressure gage and safety water column 5.25 psi (35.7 kPa) maximum (Figure 601).
- (3) Install test plug in transfer pipe opening (Figure 602).
- (4) Open regulated air supply and manual shutoff valve; pressurize fuel cell to 4.0-5.0 psig (27.6-34.5 kPa).

NOTE: Ensure that forward auxiliary tank cavity vent is disconnected from aft auxiliary tank cavity vent prior to conducting test.

- (5) Momentarily depress sump drain valve poppet and verify air flow.
- (6) Verify no air flows from cavity drain valve (or cavity vent).
- (7) Close air supply and manual shutoff valve; disconnect air hose.
- (8) Allow air pressure in fuel cell to stabilize for 15 minutes; monitor pressure gage for indication of pressure decay. Pressure decrease shall be 0 psig (0 kPa) in 30 minutes.
- (9) Open manual shutoff valve and decrease pressure in fuel cell to 3.0-3.5 psig (20.7-22.4 kPa).
- (10) While maintaining 3.0-3.5 psig (20.7-22.4 kPa) air pressure in fuel cell, connect manual shutoff valve and regulated air supply to tank cavity drain (or cavity vent).
- (11) Connect 0-5 psig (0-34.5 kPa) pressure gage and safety water column 2.80 psi (19.3 kPa) maximum to tank cavity vent (or tank cavity drain).

CAUTION: THE CAVITY PRESSURE MUST NOT EXCEED THE FUEL CELL (BLADDER) PRESSURE. FAILURE TO OBSERVE THIS REQUIREMENT WILL RESULT IN SEVERE DAMAGE TO THE FUEL CELL (BLADDER).

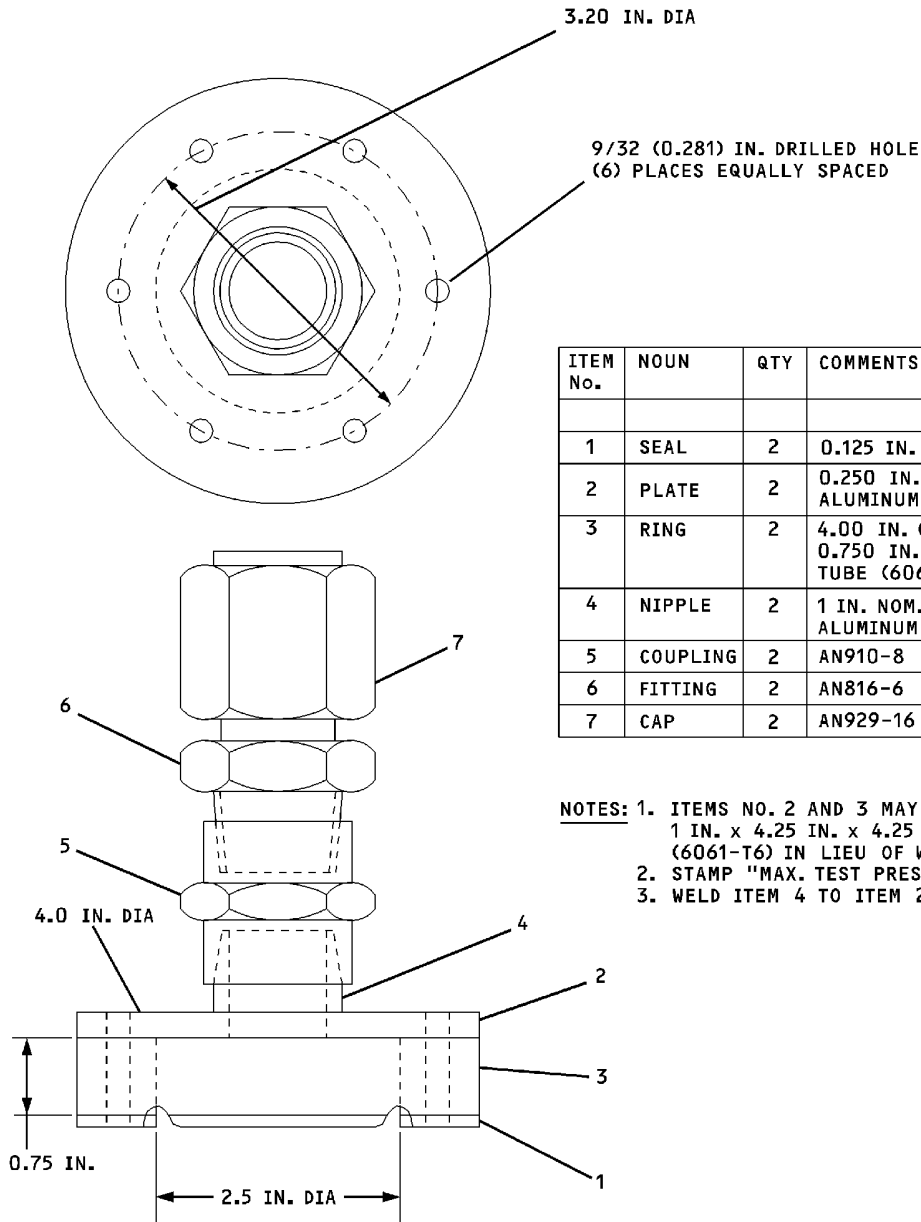
- (12) Open regulated air supply and manual shutoff valve; pressurize tank cavity to 2.0-2.5 psig (13.8-17.3 kPa).
- (13) Close air supply and manual shutoff valve.
- (14) Allow air pressure in fuel cell and cavity to stabilize for 15 minutes; monitor pressure gage for indication of pressure decay. Pressure decrease shall be 0 psig (0 kPa) in 30 minutes.
- (15) While maintaining air pressure in fuel cell, slowly open manual shutoff valve and deplete pressure in tank cavity.
- (16) After tank cavity pressure gage reads 0 psig (0 kPa), slowly open manual shutoff valve and deplete pressure in fuel cell.
- (17) Disconnect and remove all test equipment and adapters.
- (18) Connect interconnecting fuel fill, cavity drain, cavity vent, transfer, and vent pipes, shroud drain lines, and associated shrouds to fuel tank (FUSELAGE FUEL TANK CAVITY - MAINTENANCE PRACTICES, PAGEBLOCK 28-11-06/201).
- (19) Perform shroud drain system leak check. (SHROUDED FUEL FEED LINES - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-17/201)
- (20) Install applicable floor panels. (FLIGHT AND PASSENGER COMPARTMENT FLOOR PANELS, SUBJECT 53-20-01)

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
880, 881, 883, 884, 892

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ITEM No.	NOUN	QTY	COMMENTS
1	SEAL	2	0.125 IN. NEOPRENE SHEET
2	PLATE	2	0.250 IN. x 4.25 IN. x 4.25 IN. ALUMINUM PLATE (6061-T6)
3	RING	2	4.00 IN. O.D. x 0.750 WIDE x 0.750 IN. WALL ALUMINUM TUBE (6061-T6)
4	NIPPLE	2	1 IN. NOM. CLOSE, SCH. 40 ALUMINUM (6061-T6)
5	COUPLING	2	AN910-8
6	FITTING	2	AN816-6
7	CAP	2	AN929-16

NOTES: 1. ITEMS NO. 2 AND 3 MAY BE MACHINED FROM 1 IN. x 4.25 IN. x 4.25 IN. ALUMINUM BAR (6061-T6) IN LIEU OF WELDING TWO PIECES.
2. STAMP "MAX. TEST PRESSURE 55 PSI"
3. WELD ITEM 4 TO ITEM 2. MUST BE LEAK TIGHT.

CAG(IGDS)

BBB2-28-363

**Fill/Vent Test Adapter Plug
Figure 601/28-11-03-990-801**

EFFECTIVITY

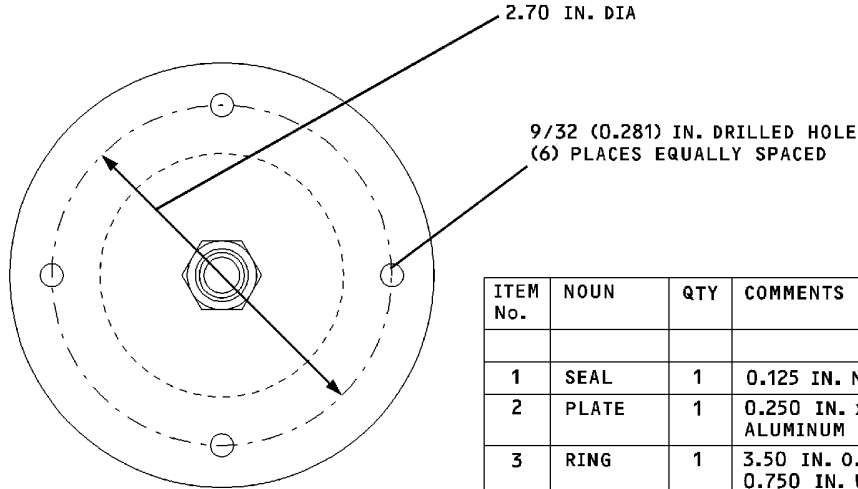
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 880, 881, 883, 884, 892

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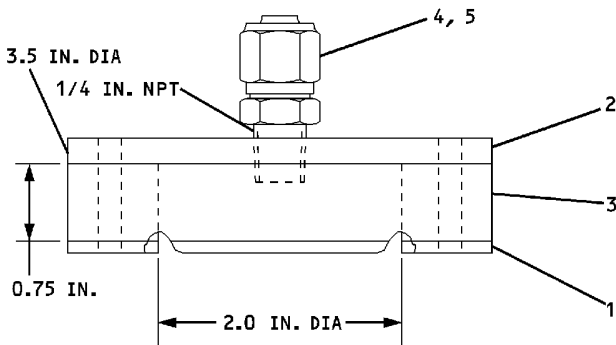
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MD-80 AIRCRAFT MAINTENANCE MANUAL



ITEM No.	NOUN	QTY	COMMENTS
1	SEAL	1	0.125 IN. NEOPRENE SHEET
2	PLATE	1	0.250 IN. x 3.75 IN. x 3.75 IN. ALUMINUM PLATE (6061-T6)
3	RING	1	3.50 IN. O.D. x 0.750 WIDE x 0.750 IN. WALL ALUMINUM TUBE (6061-T6)
4	FITTING	1	AN816-4-4J
5	CAP	1	AN929-4J

NOTES: 1. ITEMS NO. 2 AND 3 MAY BE MACHINED FROM 1 IN. x 3.75 IN. x 3.75 IN. ALUMINUM BAR (6061-T6) IN LIEU OF WELDING TWO PIECES.
2. STAMP "MAX. TEST PRESSURE 55 PSI"



CAG(IGDS)

BBB2-28-364

**Transfer Test Adapter Plug
Figure 602/28-11-03-990-802**

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 880, 881, 883, 884, 892

TP-80MM-WJE

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4. Installation of Heat Shrinkable Tubing

A. Install Heat Shrinkable Tubing

- (1) Prior to connecting pipe, slip heat shrinkable tubing over open end of vent line (Figure 603).
- (2) Connect pipe to fitting and tighten to required torque value (PAGEBLOCK 20-10-13/201).

CAUTION: DO NOT DIRECT HEAT GUN ON ADJACENT BLANKETS, EQUIPMENT OR STRUCTURE. PROTECT THESE ITEMS BY SHIELDING OR COVERING WITH ALUMINUM FOIL. USE HEAT REFLECTORS WHERE POSSIBLE.

- (3) Position heat shrinkable tubing, and heat to 250° F to 300°F (121.1°C to 148.9°C) with heat gun for approximately 30 seconds, or until tube has shrunk snugly around pipe.

EFFECTIVITY

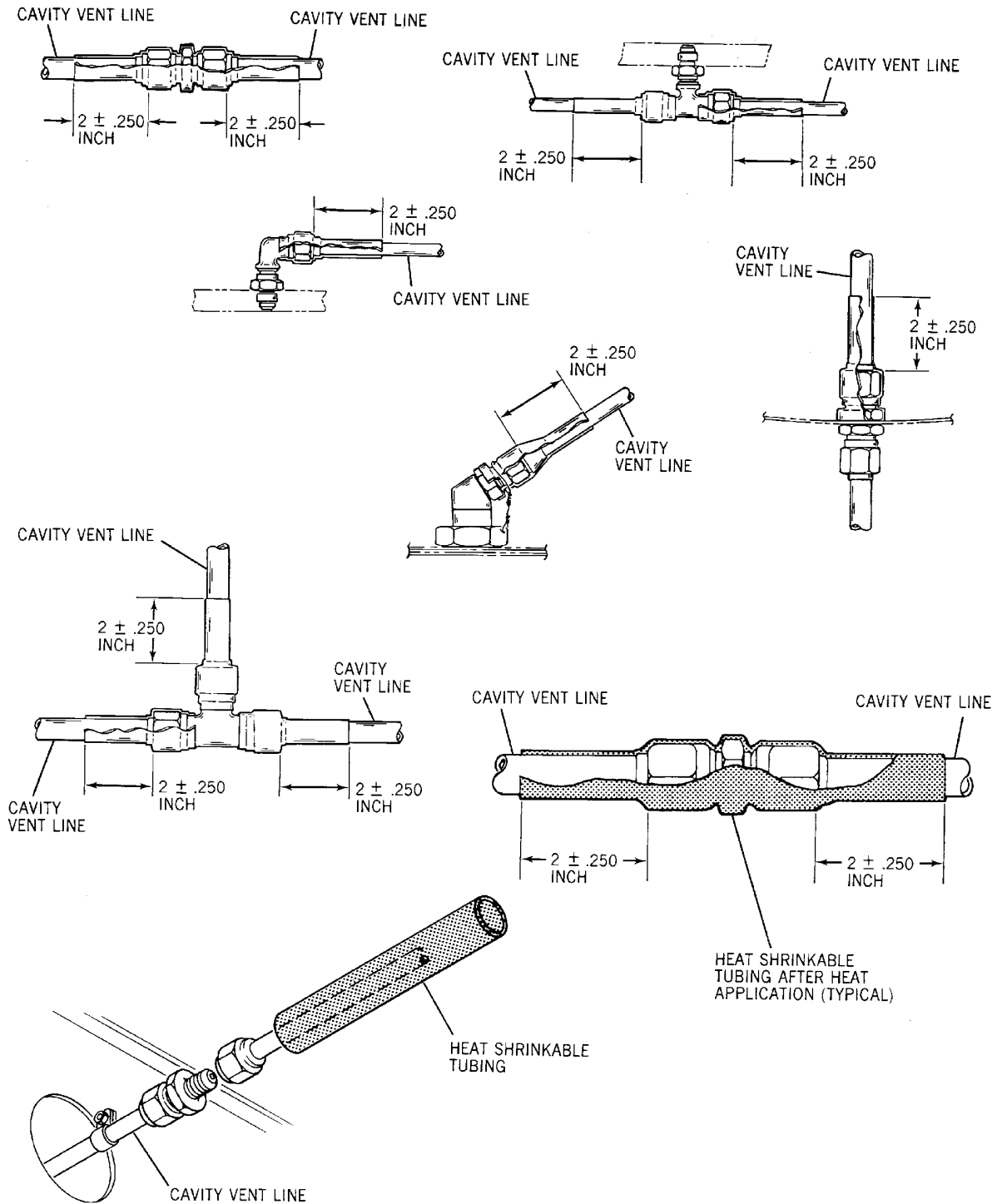
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
880, 881, 883, 884, 892

TP-80MM-WJE

28-11-03

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**MD-80
AIRCRAFT MAINTENANCE MANUAL**



BB82-28-112

Heat Shrinkable Tubing - Installation
Figure 603/28-11-03-990-803

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
880, 881, 883, 884, 892

28-11-03

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MD-80 AIRCRAFT MAINTENANCE MANUAL

FORWARD FUSELAGE FUEL TANK CELL - REMOVAL/INSTALLATION

1. General

- A. This maintenance practice is concerned with removal/installation of the forward fuselage tank fuel cell. The tank is located in a pressurized area (forward section of the mid lower cargo compartment). Extreme care must be exercised in the performance of this maintenance practice to prevent damage to the fuel cell.
- B. Access to the forward fuselage tank is through panels in the cabin floor forward of the main wing spar and also through the mid lower cargo compartment door to the cavity and cell door openings.

WARNING: STRICT COMPLIANCE WITH THE SAFETY PRECAUTIONS CONTAINED IN GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201, AND ALL LOCAL SAFETY PRECAUTIONS IS REQUIRED TO PREVENT SEVERE DAMAGE TO EQUIPMENT AND DEATH OR INJURY TO PERSONNEL.

- C. Figure 401 , Figure 402, Figure 403 illustrate the removal and installation of the fuselage fuel system components in disassembly and removal order. Lacing stations called out in Figure 403 are arbitrarily assigned and intended for ease of identification only.
- D. Drain fuel line shroud system each time a fuel line has been disconnected, to drain any fuel left from removal/installation of fuel line. This will prevent a false indication of leakage at a later time.

NOTE: During component removal, components may be removed with lines and/or brackets attached to facilitate removal. Several components may be removed as a group if desired. Note installed position of lines and brackets and attaching hardware to ensure correct position and use of items during component installation.

CAUTION: DO NOT DIRECT HEAT GUN ON ADJACENT BLANKETS, EQUIPMENT OR STRUCTURE. PROTECT THESE ITEMS BY SHIELDING OR COVERING WITH ALUMINUM FOIL. USE HEAT REFLECTORS WHERE POSSIBLE.

- E. The forward fuselage fuel tank cavity vent line and drain line connectors are covered with heat shrink tubing. The tubing should be of sufficient length to completely cover the connector and approximately 2 inches (50.8 mm) of the line. Before connecting the connectors, slide the tubing onto the line. Connect and tighten the connector; then position the tubing over the connector and using heat gun 250°F to 300°F (121.1°C to 148.9°C) shrink tubing in place until snug around connector and line.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 401

Name and Number	Manufacturer
Nylon cord, 5/32 inch	Commercially available
Heat-shrinkable irradiated polyolefin tubing, 3/16 inch	Rayclad Tubes, Inc. Redwood City, CA
Talc, powdered U.S.P. Grade Talc (1) DPM 379-1	
Pump installation and removal tool, 63-0486-1	Nash Engineering Co. South Norwalk, CT

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

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Table 401 (Continued)

Name and Number	Manufacturer
Detergent, Alumatloy-P DPM 966	Cee Bee-P Chemical Co. Downey, CA
Torque wrench as required (0 to 1100 inch-pounds)	Commercially available
Heat gun	Commercially available
Tape, adhesive, PPP-T-60, Type 4, Class 1, cloth backed, waterproof	
Sealant, PR-1422B 1/2 DPM 2292-2	Products Research Co.
Petrolatum, VV-P-236 DPM 675	Accessory Products Co.

3. Remove Forward Fuel Cell

NOTE: A fitting is provided on the lower portion of the fuel tank cavity door as an aid in predetermining source of fuel leakage from the fuel cell area. Periodically the cap should be removed to check for evidence of fuel. Presence of fuel indicates that a leak exists in space between the cell door and the cavity door.

A. Preparation for Removal

- (1) Prepare applicable tank for entry. (PAGEBLOCK 28-00-00/201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (2) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

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UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (3) Disconnect all sources of electrical power from aircraft.
- (4) Remove cabin floor panels as required.
- (5) Disconnect and cap cavity vent fitting. (Figure 401)
- (6) Remove probe access doors and remove probes. (Figure 402)
- (7) Remove fuel transfer pumps.
(PAGEBLOCK 28-20-18/201).
- (8) Remove cell flange retaining screws in fuel probe openings. (Figure 401)
- (9) Remove primary poppet of sump and cavity drain valves SUMP DRAIN VALVE - REMOVAL/INSTALLATION, PAGEBLOCK 28-10-03/401 and FUEL LINE SHROUD DRAIN VALVE - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-15/201, leaving valves open during purging operation.

WARNING: AIRPLANE CLEANER IS AN AGENT THAT IS POISONOUS, CARCINOGENIC, AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN AIRPLANE CLEANER IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET AIRPLANE CLEANER IN THE EYES, ON THE SKIN, OR ON YOUR EYES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

CAUTION: USE EXTREME CARE TO PREVENT SPILLAGE OF DETERGENT SOLUTION ON TANK EXTERIOR SURFACES OR SURROUNDING STRUCTURE. IMMEDIATELY REMOVE ANY SPILLAGE USING SOFT COTTON CLOTH AND FRESH WATER. DO NOT PERMIT SPRAY NOZZLE TO CONTACT SHELL OR APPLY FULL NOZZLE PRESSURE DIRECTLY TO EDGE OF ANY SEALANT.

- (10) Insert spray nozzle into cell through fuel probe openings and apply detergent spray solution (one part Alumaloy-P to 5 parts water) to cell interior surfaces and to installed fuel system components.
- (11) Apply clean warm fresh water spray to cell interior until evidence of detergent no longer appears at cavity and sump drains.
- (12) Remove fuel tank cavity and cell access doors.

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
877-881, 883, 884, 892

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- (13) Purge and air ventilate fuel cell. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- (14) Remove shoes and remove all sharp or metal objects from pockets.
- B. Remove Forward Fuselage Tank Fuel Components
- NOTE:** Each removed component shall be immediately checked for presence of detergent and cleaned as required. Retain all removed components for installation; all seals and seal washers should be replaced with new parts.
- CAUTION:** IMMEDIATELY REMOVE ALL DISCONNECTED COMPONENTS FROM CELL AND TANK TO PREVENT DAMAGE TO FUEL CELL.
- (1) Remove transfer line and brackets to volute housing elbow.
 - (2) Remove fill line and support bracket.
 - (3) Remove vent line section with attached vent drain swing check valve and bracket as one unit.
 - (4) Remove upper vent line and climb vent float valve as one unit.
 - (5) Remove climb vent float valve bracket.
 - (6) Remove climb vent float valve bracket mounting studs.
 - (7) Remove sump drain valve and drain line support bracket as one unit.
 - (8) Remove sump drain valve drain line mounting stud.
 - (9) Remove transfer pumps volute housing bolts and remove volute housing with check valves as one unit.
 - (10) Remove volute housing support.
 - (11) Remove volute housing support mounting studs.
 - (12) Disconnect aft vent line Gamah coupling and stanchion bracket support straps. Remove aft vent line.
 - (13) Disconnect forward vent line support straps from stanchion brackets.
 - (14) Remove forward portion of vent line with attached vent drain swing check valve and bellmouth support with bellmouth as one unit.
 - (15) Remove bellmouth support mounting studs.
 - (16) Disconnect breakaway electrical connections; pull lanyards. (Figure 402)
 - (17) Remove electrical feedthrough receptacle mounting plate.
 - (18) Remove electrical feedthrough wiring pan bolts.
 - (19) Disconnect float switch and conduit from mounting bracket and remove feedthrough pan, conduit and switch, and transfer pump wire harness as one unit through pan opening in top of tank.
 - (20) Disconnect fuel quantity feedthrough connections inside cell and remove bolts securing cell to feedthrough fitting.
 - (21) Disconnect compensator electrical connections and remove compensator from aft stanchion brackets.
 - (22) Remove bolts securing cell mounting pads for vent, fill, and transfer support brackets.
 - (23) Remove support stanchions and stanchion unions.
 - (24) Remove seals and seal retainers from upper and lower stanchion studs. Note locations and amounts of hardware on stanchion studs for installation.
 - (25) Remove interconnector bolts.

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
877-881, 883, 884, 892

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C. Remove Fuel Cell From Forward Tank Cavity

CAUTION: USE ONLY ROUND-NOSED DIAGONAL CUTTERS FOR CUTTING LACES.

- (1) Remove lacing at station 4.

NOTE: Before removing cell, pad all lower stanchion studs with suitable soft material to prevent damage to cell during removal.

CAUTION: NOTE INSTALLED LOCATION OF EACH CORD TO FACILITATE CELL INSTALLATION. RETAIN CORDS FOR EXAMPLES WHEN MAKING UP NEW CORDS FOR CELL INSTALLATION.

- (2) Fold fuel cell forward and progressively remove lacing at each station until all lacing is removed. (Figure 403)

- (3) Fold fuel cell and secure fold with tape. (Figure 403)

NOTE: Cloth backed adhesive tape may be used to wrap and hold fuel cell in folded shape for removal.

- (4) Position folded cell diagonally across tank access opening and remove through cavity access door. (Figure 403)

- (5) Remove all traces of detergent from cavity interior and cavity vent using clean cotton cloth and fresh water.

EFFECTIVITY

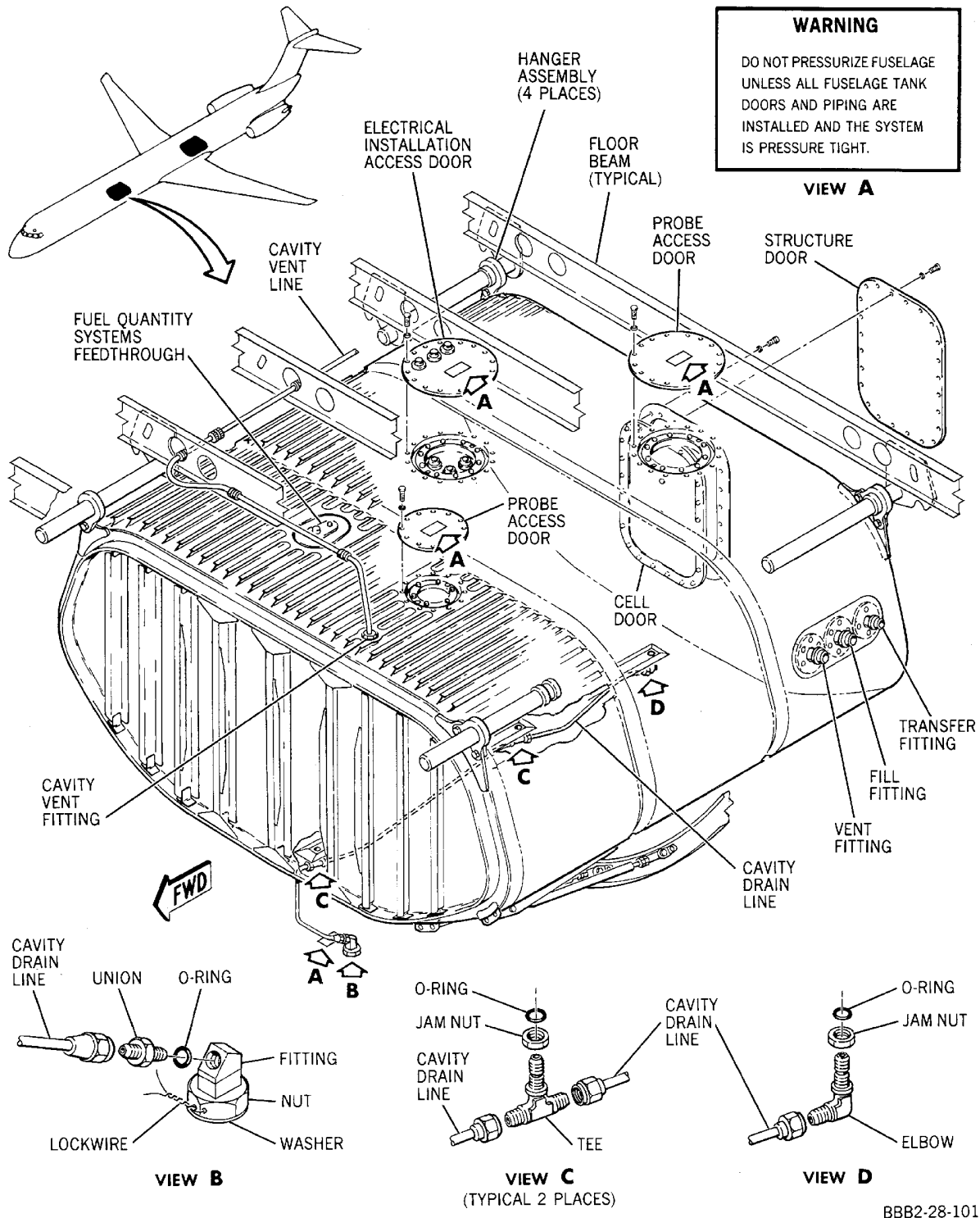
WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
877-881, 883, 884, 892

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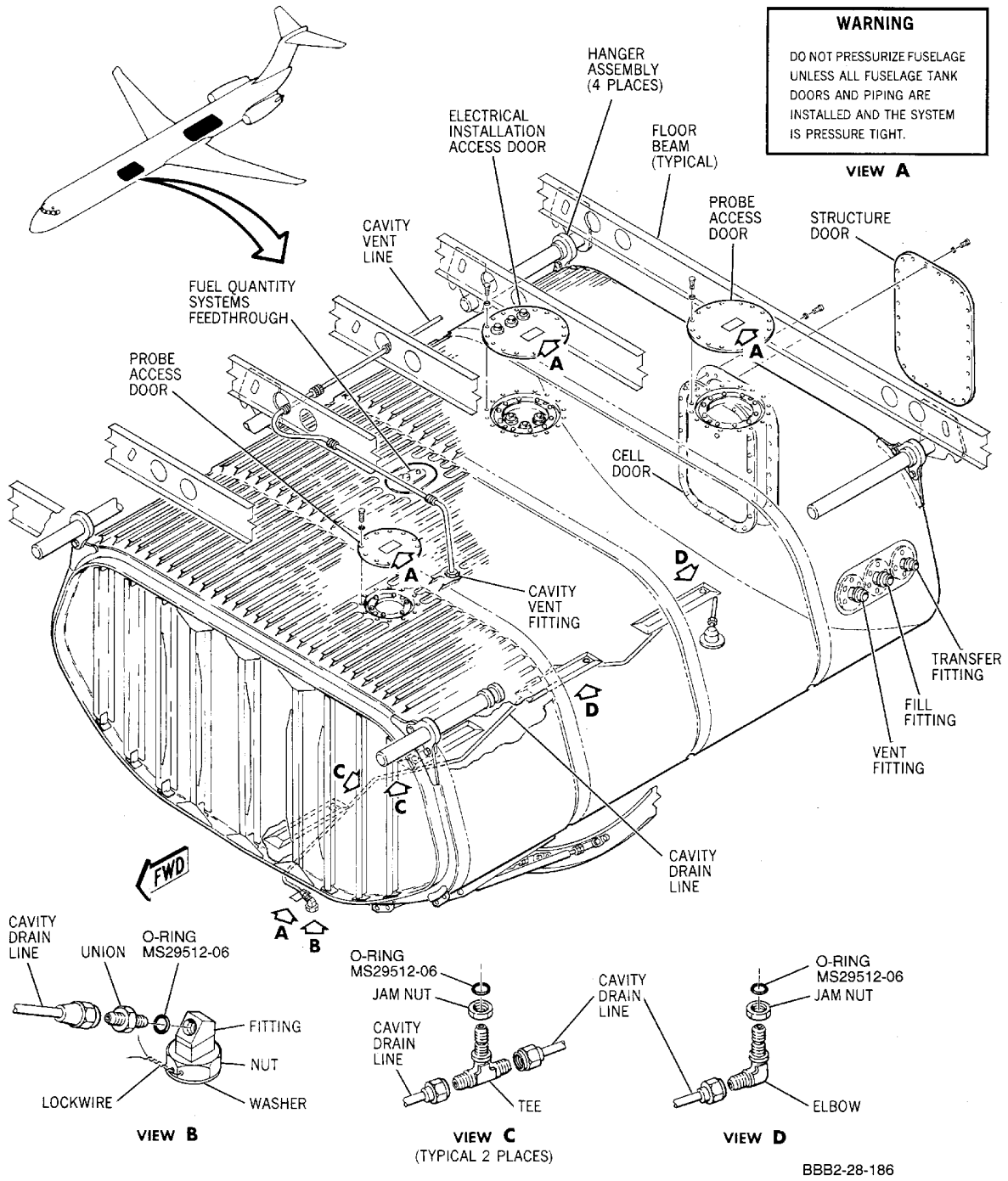
**Forward Fuselage Fuel Tank -- External Components
Figure 401/28-11-04-990-801 (Sheet 1 of 2)**

BBB2-28-101

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 874, 877-881, 883,
884, 892

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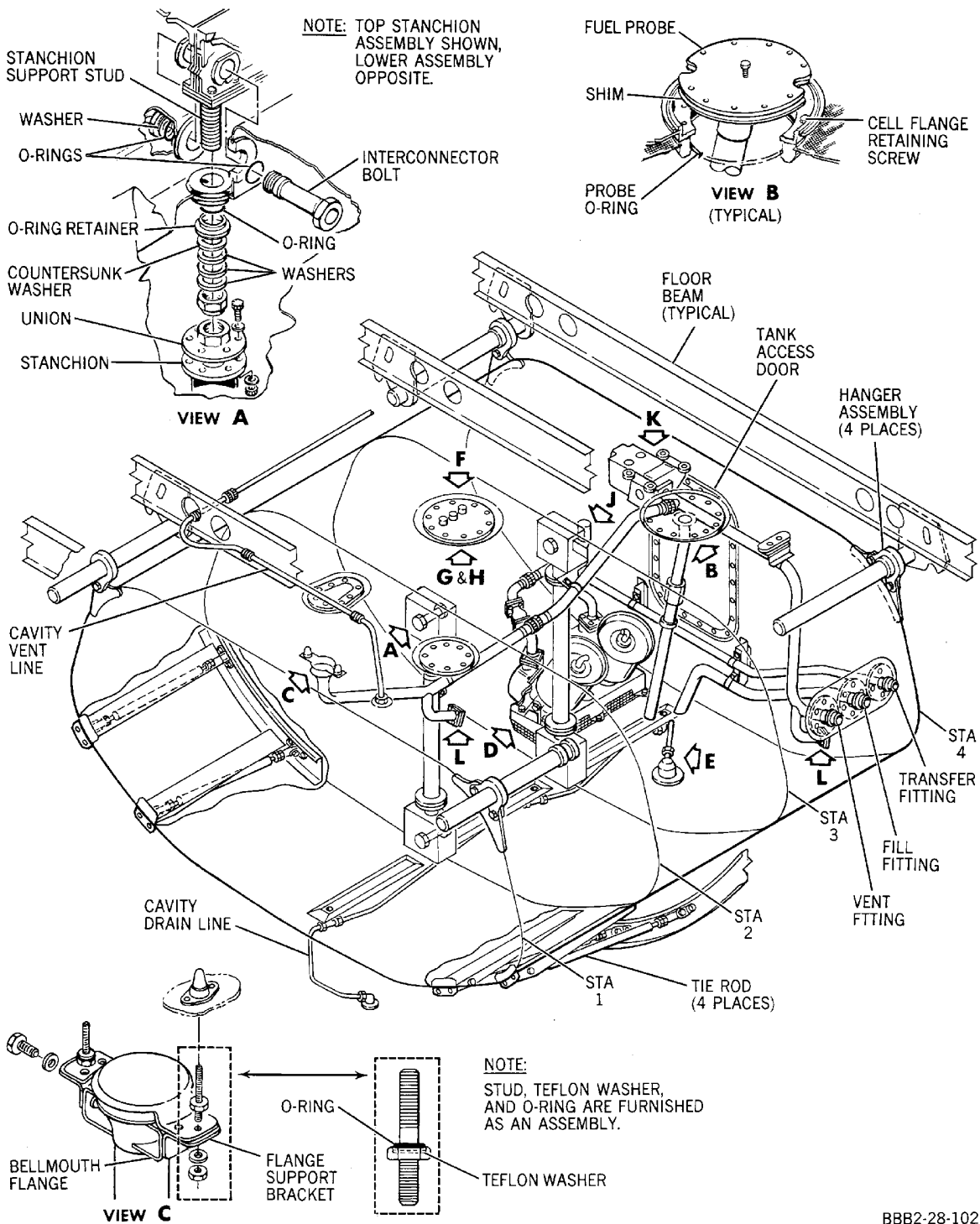
**Forward Fuselage Fuel Tank -- External Components
Figure 401/28-11-04-990-801 (Sheet 2 of 2)**

EFFECTIVITY
WJE 861, 862

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Forward Fuselage Fuel Tank -- Internal Components
Figure 402/28-11-04-990-802 (Sheet 1 of 5)

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 874, 877-881, 883, 884, 892

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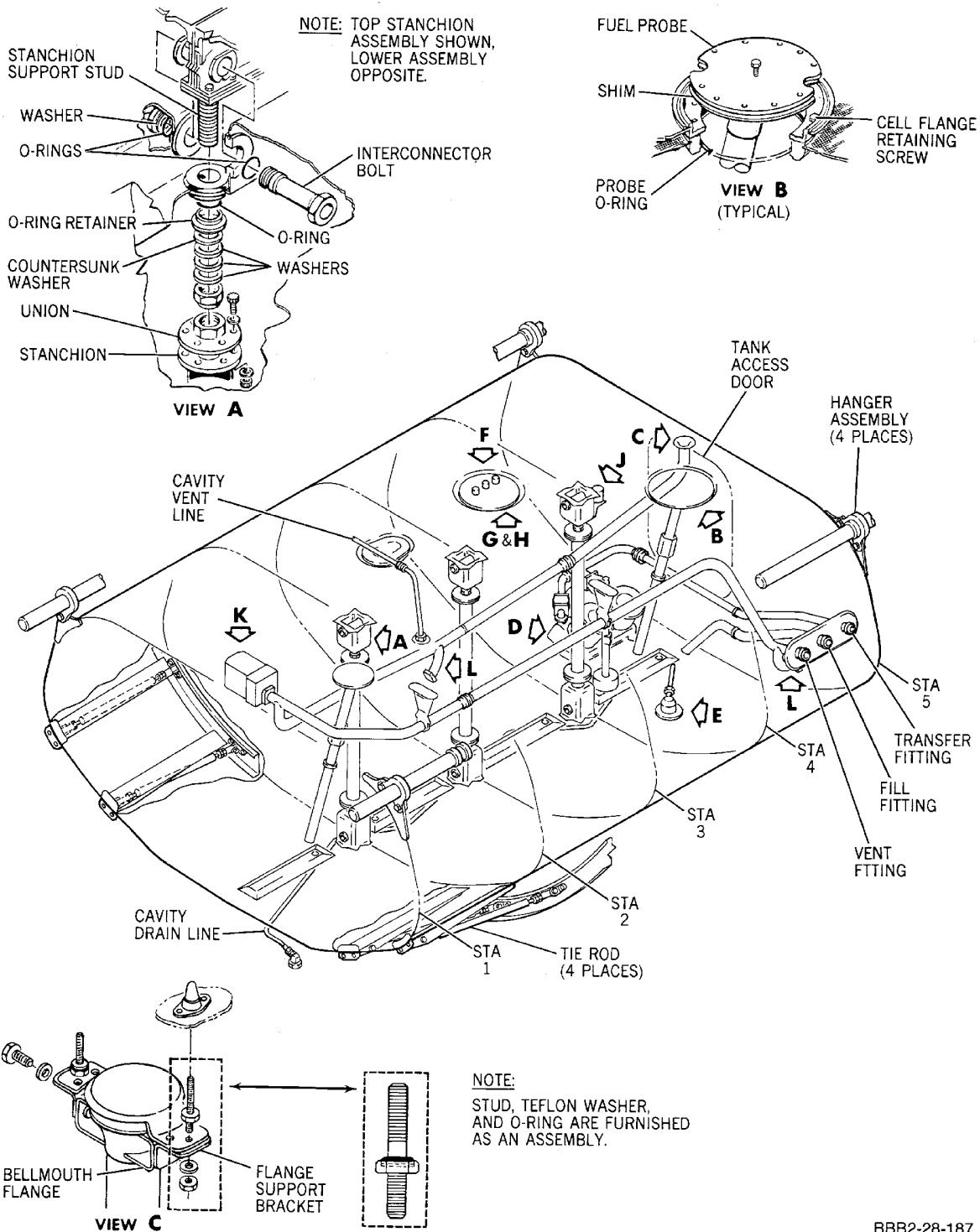
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Forward Fuselage Fuel Tank -- Internal Components
Figure 402/28-11-04-990-802 (Sheet 2 of 5)

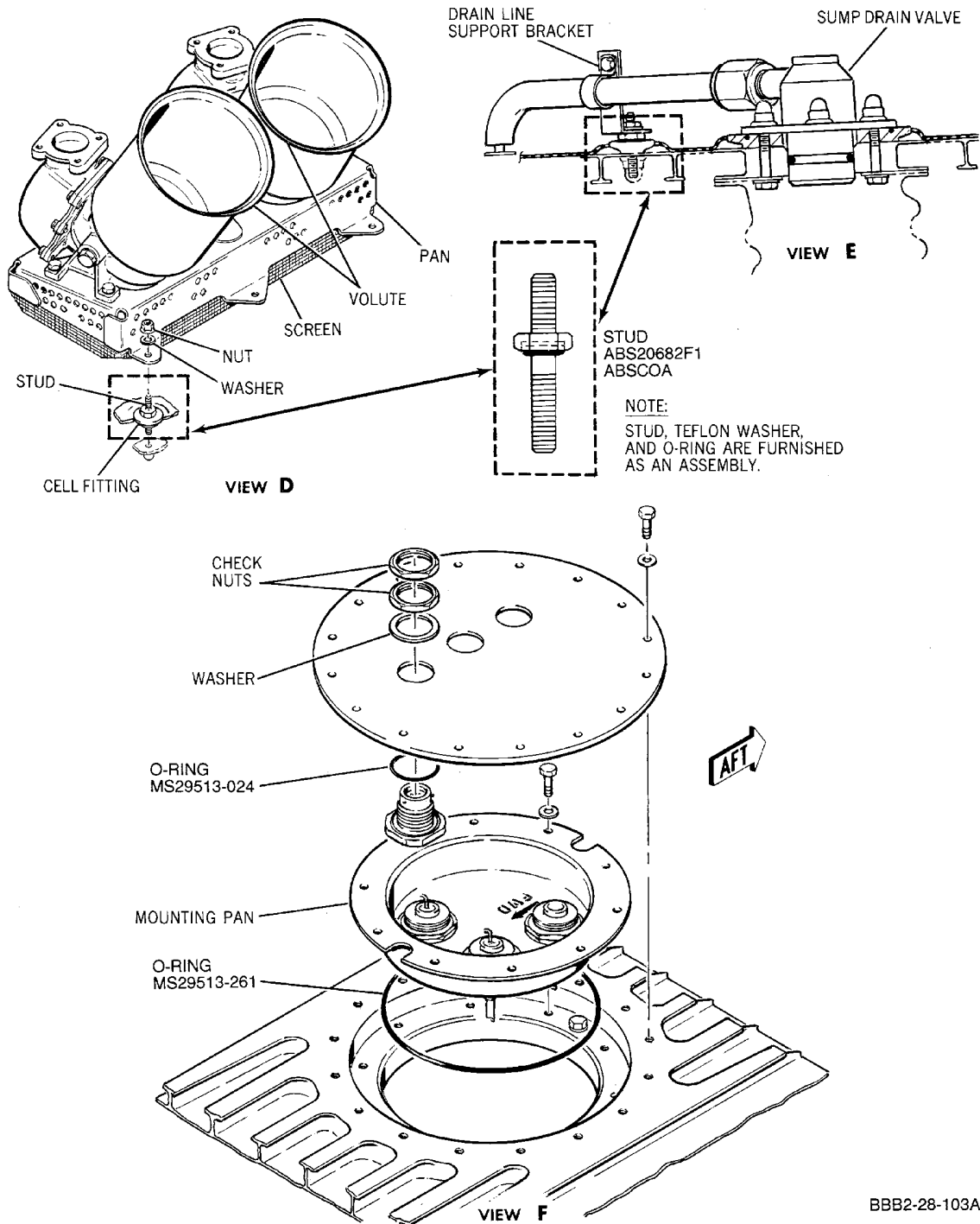
EFFECTIVITY
WJE 861, 862

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BBB2-28-103A

**Forward Fuselage Fuel Tank -- Internal Components
Figure 402/28-11-04-990-802 (Sheet 3 of 5)**

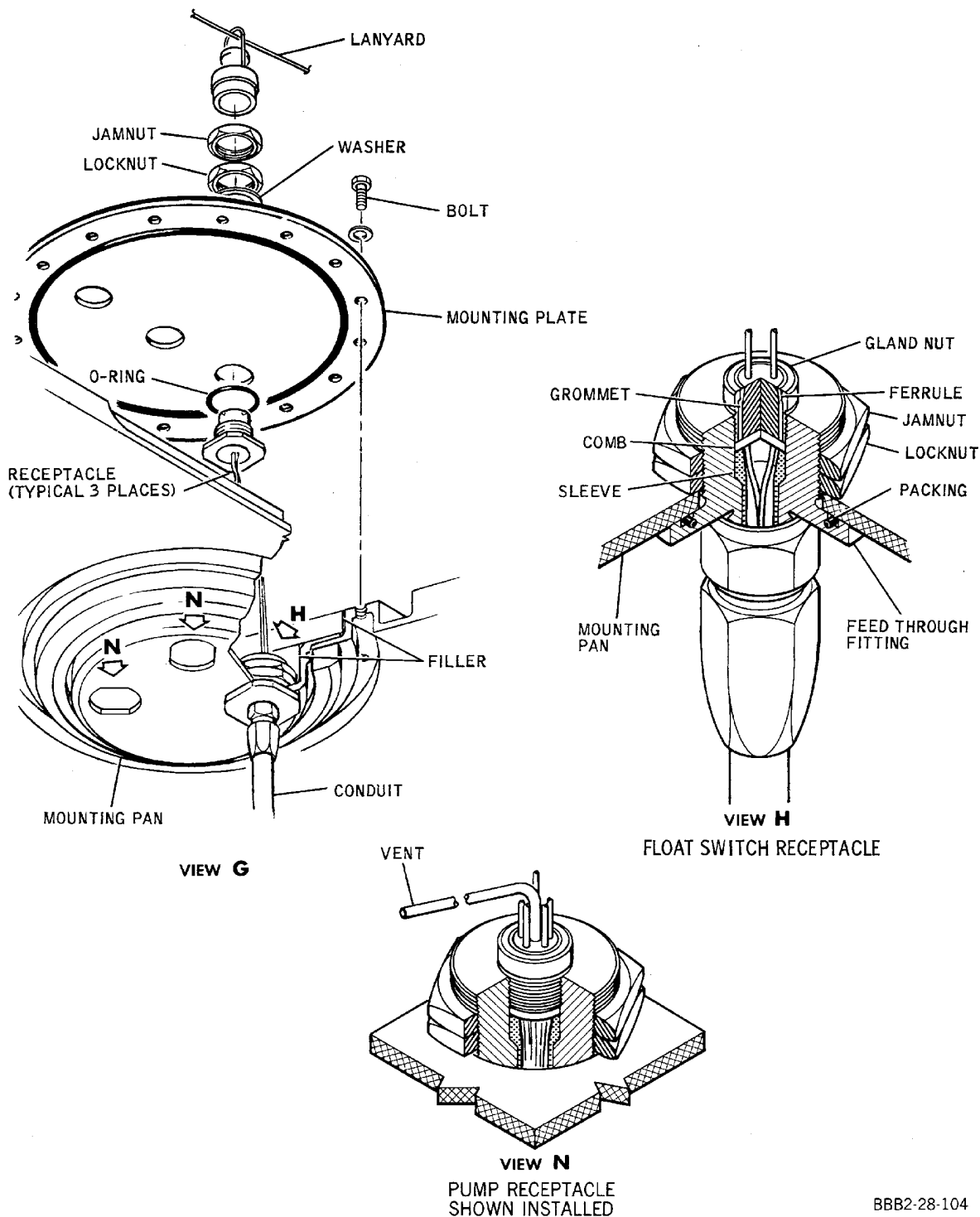
EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
877-881, 883, 884, 892

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BBB2-28-104

**Forward Fuselage Fuel Tank -- Internal Components
Figure 402/28-11-04-990-802 (Sheet 4 of 5)**

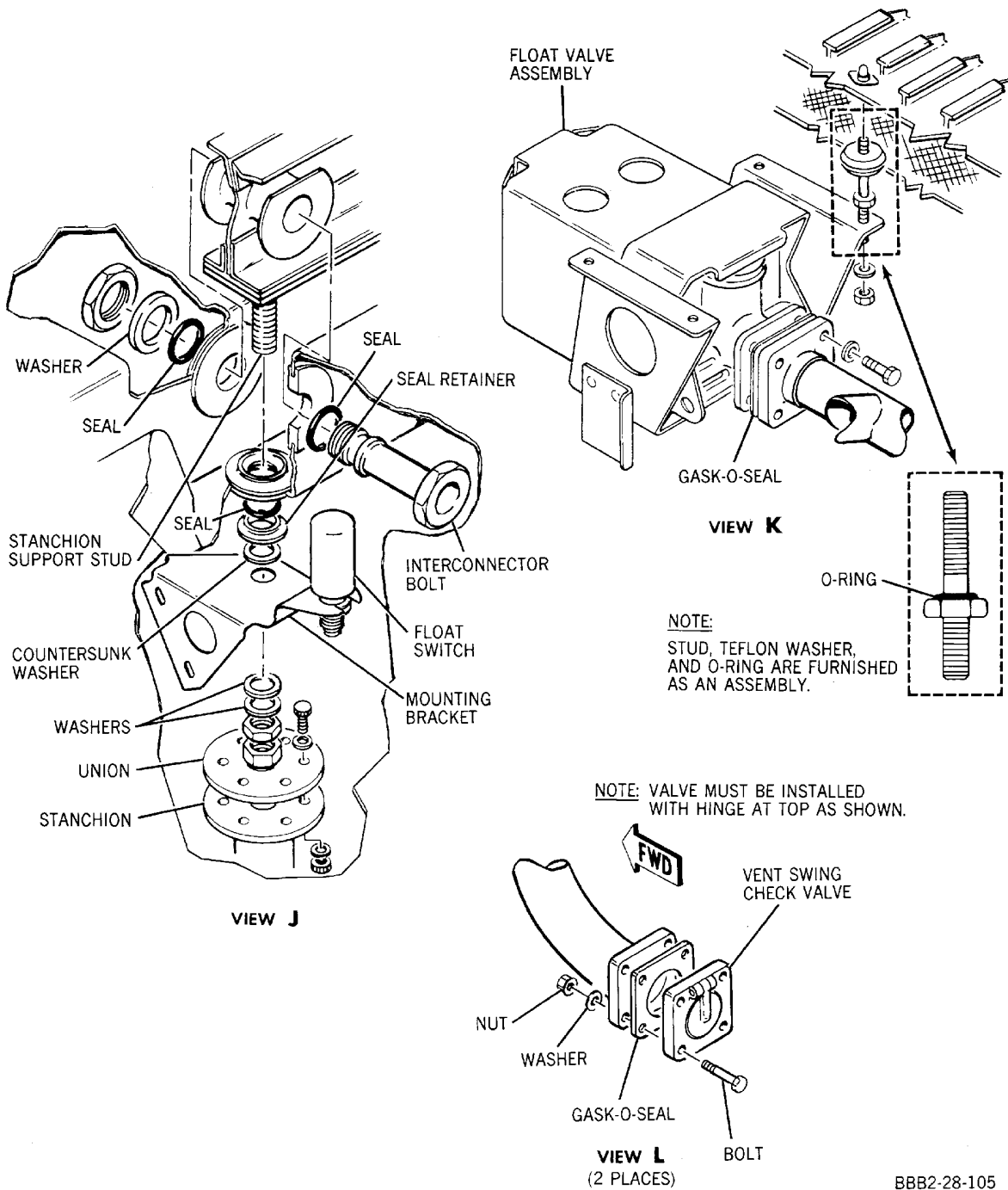
EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
877-881, 883, 884, 892

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BBB2-28-105

**Forward Fuselage Fuel Tank -- Internal Components
Figure 402/28-11-04-990-802 (Sheet 5 of 5)**

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
877-881, 883, 884, 892

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4. Install Forward Fuselage Fuel Cell

A. Preparation for Installation

- (1) Make certain that tank cavity is dry, clean, and free of foreign objects.
- (2) Dust all tank cavity sealant surfaces with liberal amounts of powdered talc.
- (3) Visually examine fuel cell to ensure that cell is undamaged and that cell interior is clean and free of foreign objects.

NOTE: Wrinkling is permissible providing the cell material cannot be folded over onto itself, or can be easily pushed down onto the structure, or worked out by redistribution of the cell material.

- (4) Prepare lacing cord by placing three to four inch length of 3/16 inch (4.76 mm) diameter heat shrinkable tubing over each end of nylon cord. Allow approximately 3/8 inch (9.53 mm) of tubing to extend beyond end of cord before heat shrinking tubing to cord.
- (5) Immediately prior to installing cell in tank cavity, liberally dust exterior of cell with powdered talc to reduce friction between fuel cell and cavity during installation.

B. Install Fuel Cell

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

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UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (2) Fold fuel cell and insert cell into tank cavity. (Figure 403)

NOTE: Cloth backed adhesive tape may be used to wrap and hold fuel cell in folded shape during installation.

- (3) Unfold cell and position cell flanges over component mounting stud bosses. (Figure 402)

NOTE: Make certain that all protective material has been removed from stanchion studs.

- (4) Distribute cell material evenly throughout tank cavity.

- (5) Install lacing at station No. 1. (Figure 403)

CAUTION: ALTHOUGH LACING WILL NORMALLY BE ACCOMPLISHED BY PASSING CORD ALTERNATELY THROUGH HANGERS AND FERRULES, BREAK SEQUENCE WHEN NECESSARY TO PREVENT SIDE LOADING OF FERRULE AND DAMAGE TO CELL. (FIGURE 403)

- (6) Install lacing at both sides of station No. 2; continue to distribute cell material evenly throughout cavity as lacing progresses.

- (7) Using new seals, install upper and lower interconnector bolts. Tighten nuts to torque of 700(±35) inch-pounds (78.4(±4) N·m).

CAUTION: MAKE CERTAIN THAT LACING CORD DOES NOT DROOP INTO GAP BETWEEN INTERCONNECTOR BOLT CELL FLANGE AND STRUCTURE MATING SURFACES.

- (8) Install lacing at both sides of station No. 3; continue to distribute cell material evenly throughout cavity as lacing progresses. (Figure 403)

CAUTION: ALTHOUGH LACING WILL NORMALLY BE ACCOMPLISHED BY PASSING CORD ALTERNATELY THROUGH HANGERS AND FERRULES, BREAK SEQUENCE WHEN NECESSARY TO PREVENT SIDE LOADING OF FERRULE AND DAMAGE TO CELL. (FIGURE 403)

- (9) Install lacing at station No. 4. (Figure 403)

- (10) Install cell flange retaining screws at probe access openings. (Figure 402) Tighten screws to torque of 25(±5) inch-pounds (3(±0.6) N·m).

C. Install Forward Fuselage Tank Fuel Components

- (1) Install seals and seal retainers on upper and lower stanchion support studs. Install other hardware in location and amounts as noted in Paragraph 3.B.(24).

- (2) Tighten stanchion support stud nuts to torque of 50(±5) foot-pounds (600(±60) inch-pounds) (68(±6.8) N·m).

NOTE: O-ring retainer is not contacted by the stanchion support stud nut washers, and is free to rotate on O-ring.

- (3) Install stanchion unions on upper and lower stanchion support studs. Adjust unions equal distance from stud nuts (approximately 1/4 inch (6.4 mm)), so stanchion just slips into place between unions. Make certain that flanges on stanchions and unions are electrically bonded.

- (4) Install stanchion on lower union.

- (5) Turn upper stanchion union on support stud to just contact stanchion. Turn union either way to line up with closest holes in stanchion.

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

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- (6) Install stanchion on upper union.
- (7) Install vent line bellmouth attaching studs. Tighten studs to torque of 50(±5) inch-pounds (6(±0.6) N·m).
- (8) Install bellmouth bracket. Tighten nuts to torque of 50(±5) inch-pounds (6(±0.6) N·m).
- (9) Install bellmouth and forward section of vent line with attached vent drain swing check valve.
- (10) Install bolts securing cell to fuel quantity feedthrough fitting. Tighten bolts to torque of 50(±5) inch-pounds (6(±0.6) N·m) and connect fuel quantity probe wiring plugs.
- (11) Install compensator on aft stanchion brackets and attach electrical connections.
- (12) Install transfer pump wire harness, float switch and conduit with attached electrical feedthrough pan, through pan opening in top of fuel tank.
- (13) Install electrical feedthrough wiring pan bolts. Tighten bolts to torque of 50(±5) inch-pounds (6(±0.6) N·m).
- (14) Install electrical feedthrough receptacle mounting plate. Tighten bolts to torque of 50(±5) inch-pounds (6(±0.6) N·m).
- (15) Install float switch to aft stanchion mounting bracket. Tighten mounting nut to torque of 230 to 260 inch-pounds (26 to 30 N·m).
- (16) Prepare the area on the volute support mounting studs and volute support for electrical bond. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
NOTE: Electrical bond at least two of the five mounting studs.
- (17) Install volute support mounting studs. Tighten studs to torque of 50(±5) inch-pounds (6(±0.6) N·m).
- (18) Install volute support. Tighten nuts to torque of 50(±5) inch-pounds (6(±0.6) N·m).
- (19) Prepare the area on the volute support and pumping unit for electrical bond. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
NOTE: Electrical bond at least two of the mounting pads for each pump.
- (20) Install volute housing with attached check valves as one unit. Tighten volute bolts to torque of 50(±5) inch-pounds (6(±0.6) N·m).
- (21) Install climb vent float valve bracket mounting studs. Tighten studs to torque of 50(±5) inch-pounds (6(±0.6) N·m).
- (22) Install vent line, fill line and transfer line.

WARNING: LOW VISCOSITY POLYSULFIDE SEALANT IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOW VISCOSITY POLYSULFIDE SEALANT IS USED.

- GAS/AIR MIXTURE MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW VISCOSITY POLYSULFIDE SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

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(WARNING PRECEDES)

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS MSDS FOR:

- MORE PRECAUTIONARY DATA.
 - APPROVED SAFETY EQUIPMENT.
 - EMERGENCY MEDICAL AID.
 - TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.
- (23) Lock all in-tank Gamah couplings with PR-1422 1/2 sealant. (FLEXIBLE FUEL LINE COUPLINGS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-19/201)
- (24) Prepare the area on the clamps and jumper for electrical bond on the vent line, fill line and transfer line. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
- (25) Install bolts securing cell mounting pads for vent, fill, and transfer lines support brackets. Tighten bolts to torque of 50(±5) inch-pounds (6(±0.6) N·m).
- (26) Install jumper at the Gamah couplings on the vent line and transfer line.
- (27) Do an electrical bond check of mounting studs/volute support and volute support/pumping unit and vent line, fill line and transfer line clamps and jumpers. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
- (28) Install sump drain valve. Tighten bolts to torque of 50(±5) inch-pounds (6(±0.6) N·m).
- (29) Install drain line support bracket mounting stud. Tighten stud to torque of 50(±5) inch-pounds (6(±0.6) N·m).
- (30) Install drain line support bracket.
- (31) Remove cap and connect cavity vent fitting. (Figure 401)
- (32) Connect electrical breakaway fittings to receptacles at top of electrical feedthrough plate.

WARNING: WHITE PETROLATUM IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN WHITE PETROLATUM IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
 - USE IN AN AREA OPEN TO THE AIR.
 - CLOSE THE CONTAINER WHEN NOT USED.
 - DO NOT BREATHE THE MIST.
- WARNING:** REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS MSDS FOR:
- MORE PRECAUTIONARY DATA.
 - APPROVED SAFETY EQUIPMENT.
 - EMERGENCY MEDICAL AID.
 - TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.
- (33) Clean bonding surface of probe and access opening, lubricate probe O-ring with (VV-P-236) petrolatum. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- (34) Insert probe, with new shim, partially into access opening and connect wires.
- (35) Install probe. Tighten probe access door screws to torque of 50(±5) inch-pounds (6(±0.6) N·m). (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
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- (36) Vacuum clean cell interior carefully and install fuel cell access door. Tighten cell door bolts to torque of 50(±5) inch-pounds (6(±0.6) N·m).
- (37) Install cavity structure door. Tighten structure door bolts to torque of 50(±5) inch-pounds (6(±0.6) N·m).
- (38) Install fuel transfer pumps.
(PAGEBLOCK 28-20-18/201)
- (39) Install primary poppet of sump and cavity drain valves SUMP DRAIN VALVE - REMOVAL/INSTALLATION, PAGEBLOCK 28-10-03/401 and FUEL LINE SHROUD DRAIN VALVE - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-15/201.
- (40) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

WARNING: IF LEAK OR DISCREPANCY IS DISCOVERED, STOP SERVICING IMMEDIATELY.

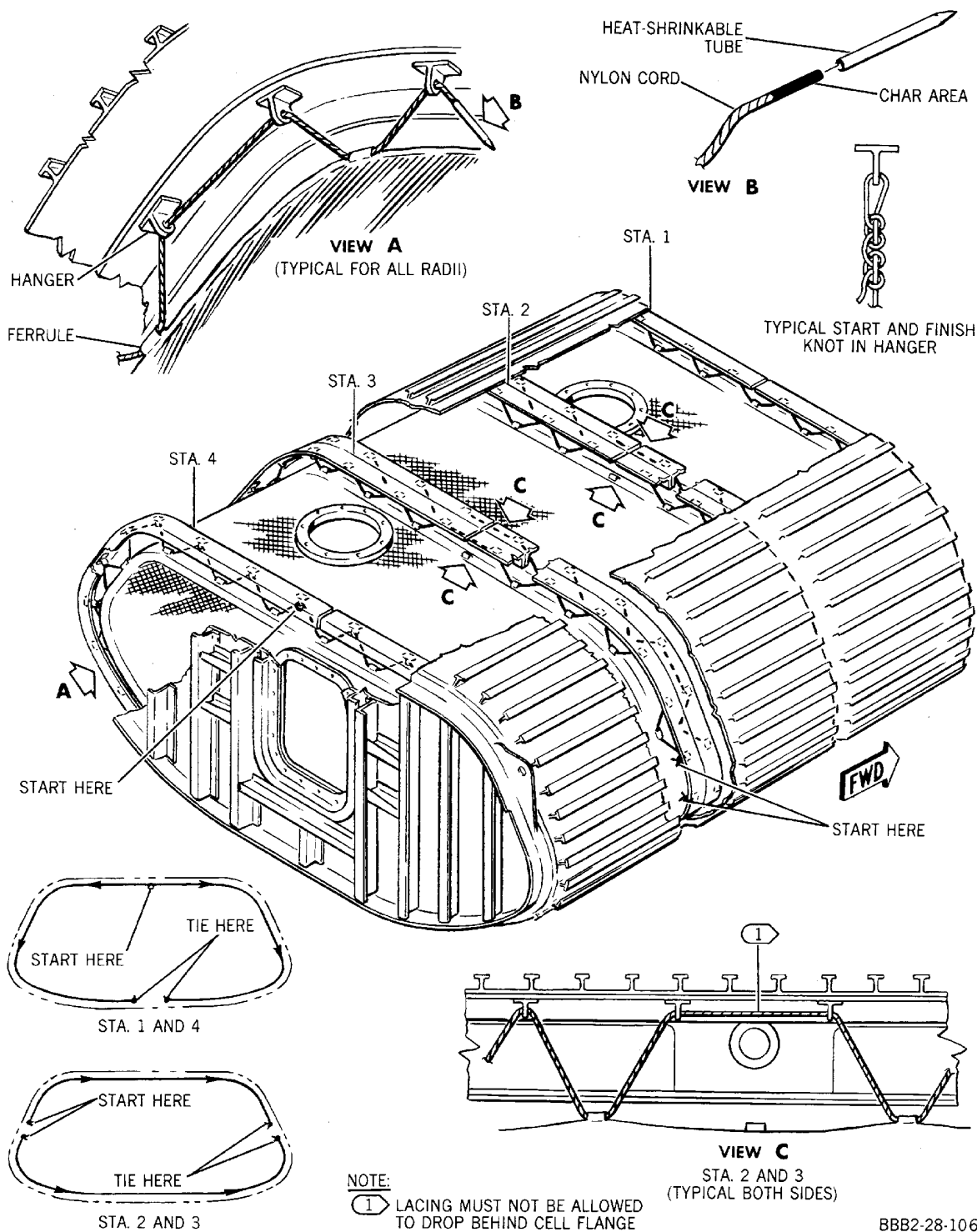
- (41) Service fuselage fuel tank. (FUEL LOADING - SERVICING, PAGEBLOCK 12-11-03/301)
- (42) Install passenger compartment floor panels.

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

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Forward Fuselage Fuel Cell -- Removal/Installation
Figure 403/28-11-04-990-803 (Sheet 1 of 3)

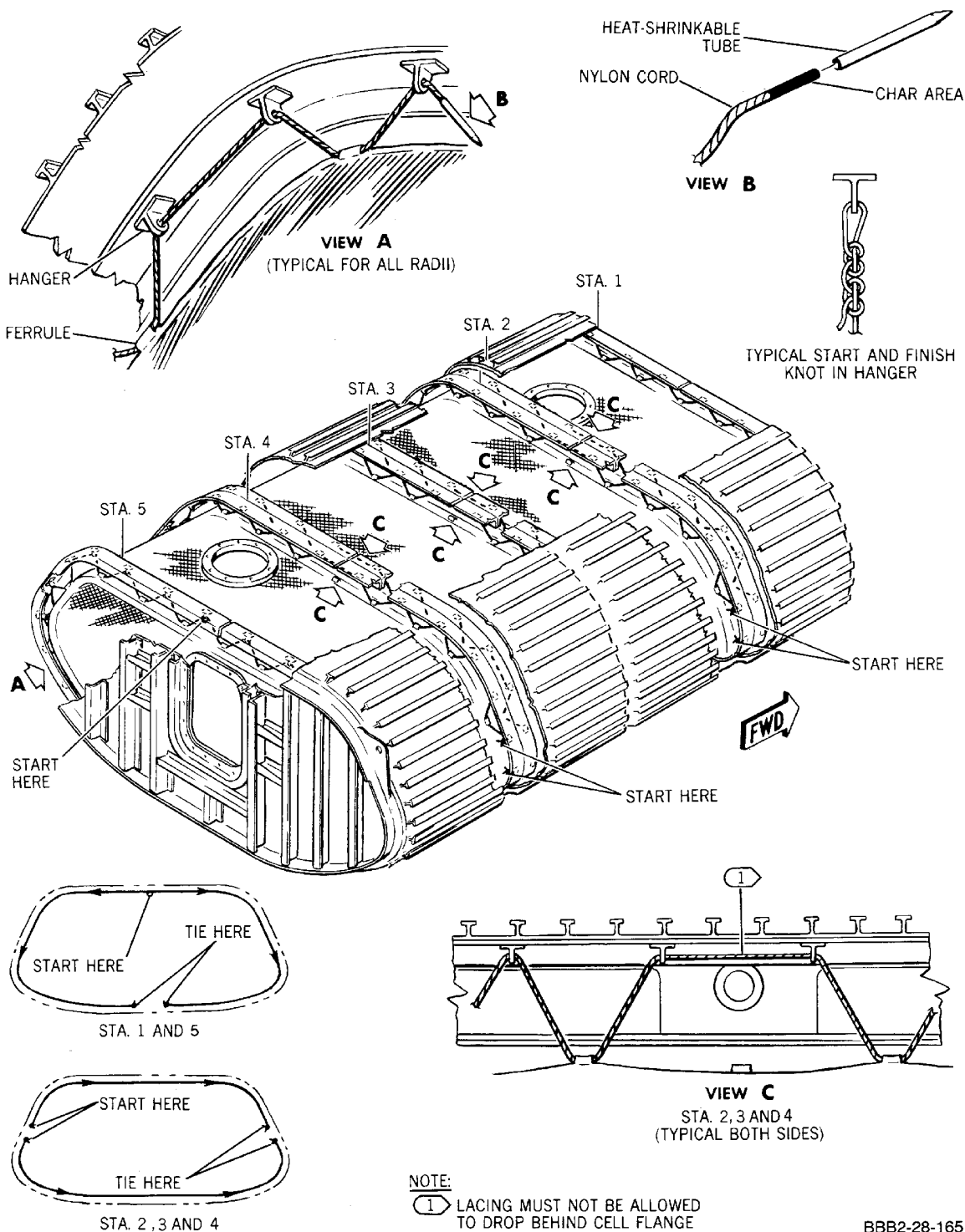
EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 874, 877-881, 883,
884, 892

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**Forward Fuselage Fuel Cell -- Removal/Installation
Figure 403/28-11-04-990-803 (Sheet 2 of 3)**

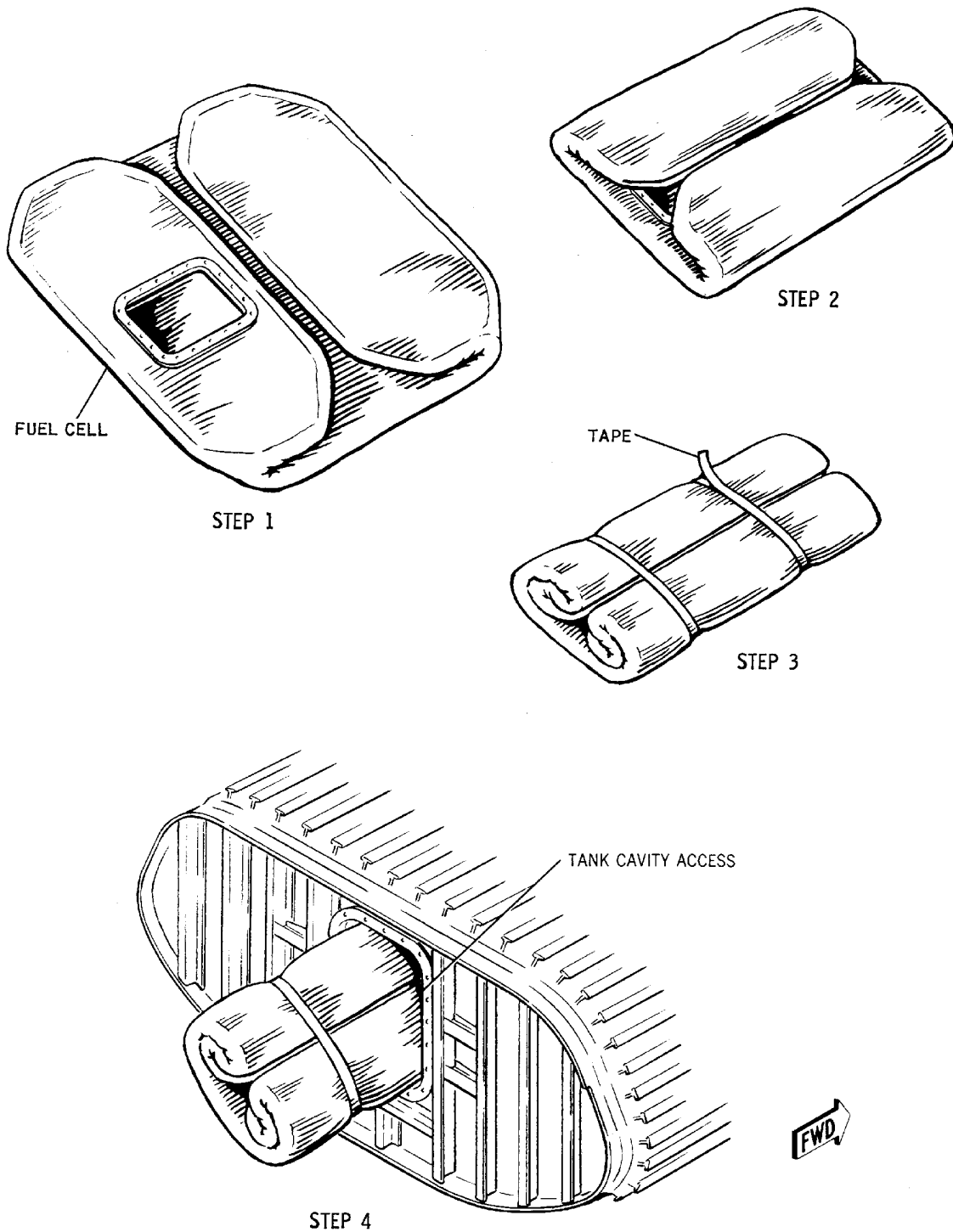
EFFECTIVITY
WJE 861, 862

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Forward Fuselage Fuel Cell -- Removal/Installation
Figure 403/28-11-04-990-803 (Sheet 3 of 3)

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
877-881, 883, 884, 892

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AFT FUSELAGE FUEL TANK CELL - REMOVAL/INSTALLATION

1. General

WJE 401-405, 409, 410, 412, 414, 874, 877-881, 883, 884, 892

- A. This maintenance practice is concerned with the removal and installation of the aft fuselage tank fuel cell. The tank is located in the pressurized area (forward portion of the aft lower cargo compartment). Extreme care must be exercised in the performance of this maintenance practice to prevent damage to the fuel cell.

WJE 861, 862

- B. This maintenance practice is concerned with the removal and installation of the aft fuselage fuel tank cell which consists of two separate units. One cell half is located forward and one is located aft of the tank cavity bulkhead. Each fuel cell half can be replaced individually if required. Extreme care must be exercised in the performance of this maintenance practice to prevent damage to the fuel cell.

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

- C. Access to the aft fuselage tank is through panels in the cabin floor aft of the main wing spar and also through the lower aft cargo compartment door to the tank cavity and cell door openings.

WARNING: STRICT COMPLIANCE WITH THE SAFETY PRECAUTIONS CONTAINED IN GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201, AND ALL LOCAL SAFETY PRECAUTIONS IS REQUIRED TO PREVENT SEVERE DAMAGE TO EQUIPMENT AND DEATH OR INJURY TO PERSONNEL.

- D. Figure 401, Figure 402, Figure 403 or Figure 404, illustrate the removal and installation of the aft fuselage tank fuel system components in disassembly and removal order. Lacing stations called out in Figure 403 or Figure 404 are arbitrarily assigned and intended for ease of identification only.
- E. Drain fuel line shroud system each time a fuel line has been disconnected, to drain any fuel left from removal/installation of fuel line. This will prevent a false indication of leakage at a later time.

NOTE: During component removal, components may be removed with lines and/or brackets attached to facilitate removal. Several components may be removed as a group if desired. Note installed position of lines and brackets and attaching hardware to ensure correct position and use of items during component installation.

CAUTION: DO NOT DIRECT HEAT GUN ON ADJACENT BLANKETS, EQUIPMENT OR STRUCTURE. PROTECT THESE ITEMS BY SHIELDING OR COVERING WITH ALUMINUM FOIL. USE HEAT REFLECTORS WHERE POSSIBLE.

- F. The aft fuselage fuel tank cavity vent line and drain line connectors are covered with heat shrink tubing. The tubing should be of sufficient length to completely cover the connector and approximately 2 inches (50.8 mm) of the line. Before connecting the connectors, slide the tubing onto the line. Connect and tighten the connector; then position the tubing over the connector and using heat gun 250°F to 300°F (121.1°C to 148.9°C) shrink tubing in place until snug around connector and line.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

EFFECTIVITY

**WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
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Table 401

Name and Number	Manufacturer
Nylon cord, 5/32 inch	Commercially available
Heat-shrinkable irradiated polyolefin tubing, 3/16 inch	Rayclad Tubes, Inc. Redwood City, CA
Talc, powdered U.S.P. Grade Talc (1) DPM 379-1	
Pump installation and removal tool, 63-0486-1	Nash Engineering Co. South Norwalk, CT
Detergent, Alumaloy-P DPM 966	Cee Bee-P Chemical Co. Downey, CA
Torque wrench as required (0 to 1100 inch-pounds)	Commercially available
Heat gun	Commercially available
Tape, adhesive, PPP-T-60, Type 4, Class 1, cloth backed, waterproof	
Sealant, PR-1422B 1/2 DPM 2292-2	Products Research Co.
Petrolatum, VV-P-236 DPM 675	Accessory Products Co.

3. Remove Aft Fuel Cell

WJE 861, 862

NOTE: For fuel tank maintenance purposes the fuel cell and internal components will be treated as a single unit. If only a single cell half is to be replaced, those components located at the internal bulkhead and which affect both forward and aft tank sections must be removed.

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

NOTE: A fitting is provided on the lower portion of the fuel tank cavity door as an aid in predetermining source of fuel leakage from the fuel cell area. Periodically the cap should be removed to check for evidence of fuel. Presence of fuel indicates that a leak exists in space between the cell door and the cavity door.

A. Preparation for Removal

- (1) Prepare applicable tank for entry. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (2) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

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(Continued)

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

WARNING: VAPOR FROM OPEN FUSELAGE FUEL TANKS IS COMBUSTIBLE. DEACTIVATE EMERGENCY BATTERY PACK FOR OVERWING EVACUATION LIGHTS BY REMOVING BATTERY PACK PRIOR TO MAINTENANCE ON AFT FUSELAGE FUEL TANK.

- (3) Remove battery pack from overwing emergency evacuation lights.
(PAGEBLOCK 33-53-00/401)
- (4) Disconnect all sources of electrical power from aircraft.
- (5) Remove cabin floor panels as required.
- (6) Disconnect and cap cavity vent fittings. (Figure 401)
- (7) Remove probe access doors and remove probes. (Figure 402)
- (8) Remove fuel transfer pumps.
(PAGEBLOCK 28-20-18/201)
- (9) Remove cell flange retaining screws in fuel probe openings. (Figure 402)
- (10) Remove primary poppet of sump and cavity drain valves SUMP DRAIN VALVE - REMOVAL/INSTALLATION, PAGEBLOCK 28-10-03/401, and FUEL LINE SHROUD DRAIN VALVE - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-15/201, leaving valves open during purging operation.

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

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WARNING: AIRPLANE CLEANER IS AN AGENT THAT IS POISONOUS, CARCINOGENIC, AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN AIRPLANE CLEANER IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET AIRPLANE CLEANER IN THE EYES, ON THE SKIN, OR ON YOUR EYES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

CAUTION: USE EXTREME CARE TO PREVENT SPILLAGE OF DETERGENT SOLUTION ON TANK EXTERIOR SURFACES OR SURROUNDING STRUCTURE. IMMEDIATELY REMOVE ANY SPILLAGE USING SOFT COTTON CLOTH AND FRESH WATER. DO NOT PERMIT SPRAY NOZZLE TO CONTACT SHELL OR APPLY FULL NOZZLE PRESSURE DIRECTLY TO EDGE OF ANY SEALANT.

- (11) Insert spray nozzle into cell through fuel probe openings and apply detergent spray solution (one part Alumaloy-P to 5 parts water) to cell interior surfaces and to installed fuel system components.
 - (12) Apply clean warm fresh water spray to cell interior until evidence of detergent no longer appears at cavity and sump drains.
 - (13) Remove fuel tank cavity and cell access doors.
 - (14) Purge and air ventilate fuel cell. (PAGEBLOCK 28-00-00/201)
 - (15) Remove shoes and remove all sharp or metal objects from pockets.
- B. Remove Aft Fuselage Tank Fuel Components

NOTE: Each removed component shall be immediately checked for presence of detergent and cleaned as required. Retain all removed components for installation; all seals and seal washers should be replaced with new parts.

WJE 401-405, 409, 410, 412, 414, 874, 877-881, 883, 884, 892

- (1) Remove sump drain valve and drain line support bracket as one unit.

NOTE: Immediately remove all disconnected components from cell and tank to prevent damage to fuel cell.

WJE 861, 862

- (2) Remove aft sump drain valve and drain line support bracket as one unit.

NOTE: Immediately remove all disconnected components from cell and tank to prevent damage to fuel cell.

WJE 401-405, 409, 410, 412, 414, 874, 877-881, 883, 884, 892

- (3) Remove sump drain valve drain line mounting pad.

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
877-881, 883, 884, 892

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WJE 861, 862

- (4) Remove aft sump drain valve drain line mounting pad.

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

- (5) Remove transfer pumps volute housing bolts, disconnect Gamah coupling and remove volute housing with check valves as one unit.
- (6) Remove volute housing support.
- (7) Remove volute housing support mounting studs.
- (8) Disconnect Gamah coupling and aft vent line support strap from stanchion bracket.
- (9) Remove aft portion of vent line and bellmouth support with bellmouth as one unit.
- (10) Remove bellmouth support mounting studs.

WJE 401-405, 409, 410, 412, 414, 874, 877-881, 883, 884, 892

- (11) Disconnect Gamah coupling and center vent line support straps from stanchion bracket.

WJE 861, 862

- (12) Disconnect Gamah coupling and center vent line support straps from stanchion brackets.
- (13) Remove internal bulkhead access door and fairleads.

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

- (14) Remove center portion of vent line with attached vent drain swing check valve as one unit.
- (15) Remove forward portion of vent line with climb vent float valve as one unit.

WJE 861, 862

- (16) Remove forward sump drain valve and drain line support brackets as one unit.

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

- (17) Remove climb vent float valve bracket.
- (18) Remove climb vent float valve bracket mounting studs.
- (19) Disconnect fill line support strap from stanchion and remove fill line.

WJE 401-405, 409, 410, 412, 414, 874, 877-881, 883, 884, 892

- (20) Disconnect transfer line support strap from stanchion and remove transfer line.

WJE 861, 862

- (21) Disconnect transfer line support straps from stanchions and remove transfer line.

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

- (22) Disconnect breakaway electrical connections; pull lanyards. (Figure 402)
- (23) Remove electrical feedthrough receptacle mounting plate.
- (24) Remove electrical feedthrough wiring pan bolts.
- (25) Disconnect float switch and conduit from mounting bracket and remove feedthrough pan, conduit and switch, and transfer pump wire harness as one unit through pan opening in top of tank.
- (26) Remove transfer, fill, and drain lines elbows, retaining flanges, inlet/outlet pipes and internal connectors.
- (27) Disconnect fuel quantity feedthrough connections inside cell and remove bolts securing cell to feedthrough fitting.

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
877-881, 883, 884, 892

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- (28) Disconnect compensator electrical connections and remove compensator from aft stanchion brackets.
- (29) Remove support stanchions and stanchion unions.
- (30) Remove seals and seal retainers from upper and lower stanchion studs. Note locations and amounts of hardware on stanchion studs for installation.

WJE 401-405, 409, 410, 412, 414, 874, 877-881, 883, 884, 892

- (31) Remove interconnector bolts.

WJE 861, 862

- (32) Remove interconnector bolts and fuel connector.

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

C. Remove Fuel Cell From Aft Fuel Tank Cavity

WJE 861, 862

NOTE: Each fuel cell half may be removed individually, if necessary, but the maintenance procedures are similar. Work from the aft station to the forward station in the respective tank cavity.

WJE 401-405, 409, 410, 412, 414, 874, 877-881, 883, 884, 892

- (1) Remove lacing at station 4.

NOTE: Use only round-nosed diagonal cutters for cutting laces.

NOTE: Before removing cell, pad all lower stanchion studs with suitable soft material to prevent damage to cell during removal.

WJE 861, 862

- (2) Remove lacing at applicable aft station.

NOTE: Use only round-nosed diagonal cutters for cutting laces.

NOTE: Before removing cell, pad all lower stanchion studs with suitable soft material to prevent damage to cell during removal.

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

- (3) Fold fuel cell forward and progressively remove lacing at each station until all lacing is removed. (Figure 403 or Figure 404)

NOTE: Note installed location of each cord to facilitate cell installation. Retain cords for examples when making up new cords for cell installation.

- (4) Fold fuel cell and secure fold with tape. (Figure 403 or Figure 404)

NOTE: Cloth backed adhesive tape may be used to wrap and hold fuel cell in folded shape for removal.

- (5) Position folded cell diagonally across tank access opening and remove through cavity access door. (Figure 403 or Figure 404)

- (6) Remove all traces of detergent from cavity interior and cavity vent using clean cotton cloth and fresh water.

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
877-881, 883, 884, 892

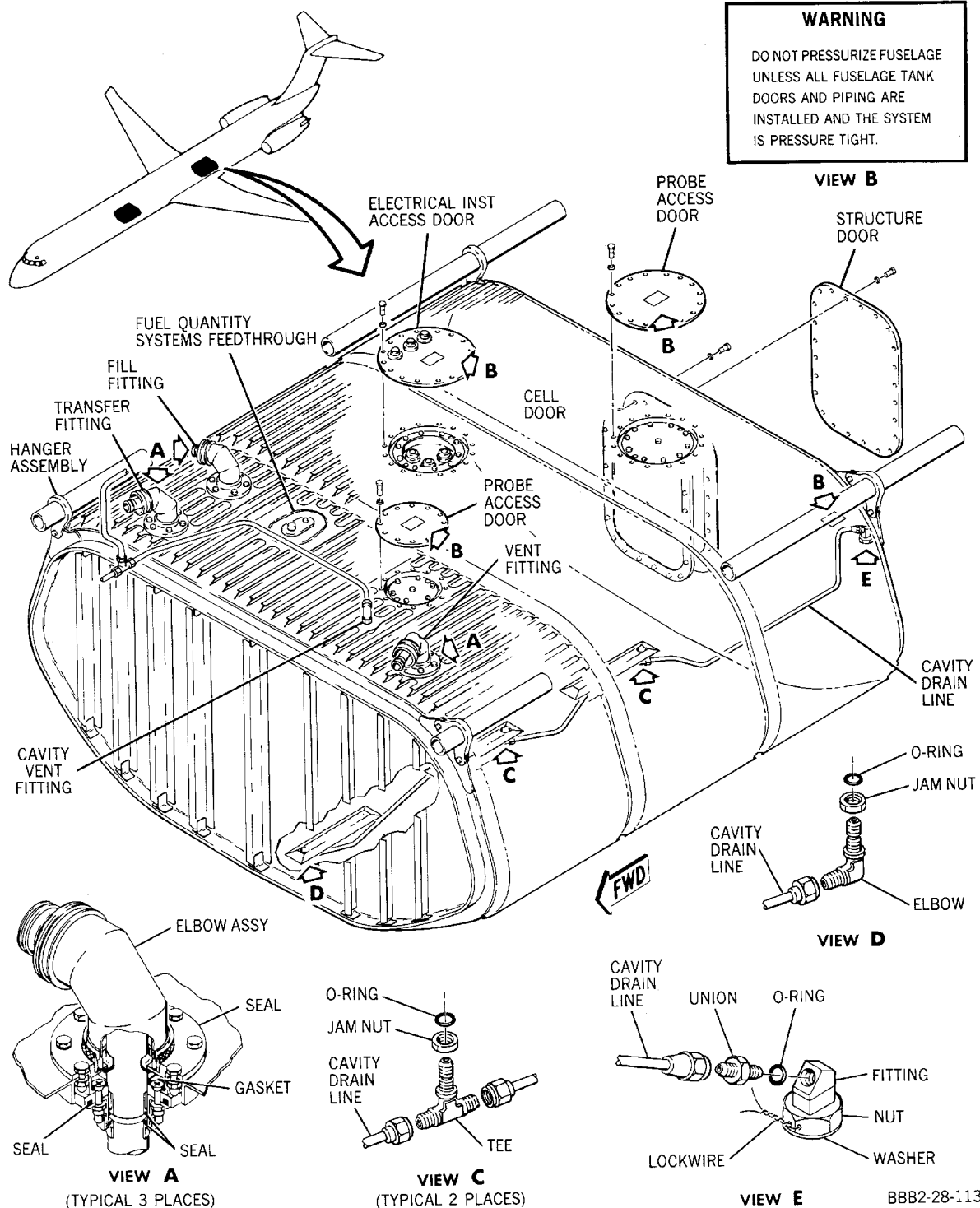
TP-80MM-WJE

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WARNING
DO NOT PRESSURIZE FUSELAGE UNLESS ALL FUSELAGE TANK DOORS AND PIPING ARE INSTALLED AND THE SYSTEM IS PRESSURE TIGHT.



**Aft Fuselage Fuel Tank -- External Components
Figure 401/28-11-05-990-801 (Sheet 1 of 2)**

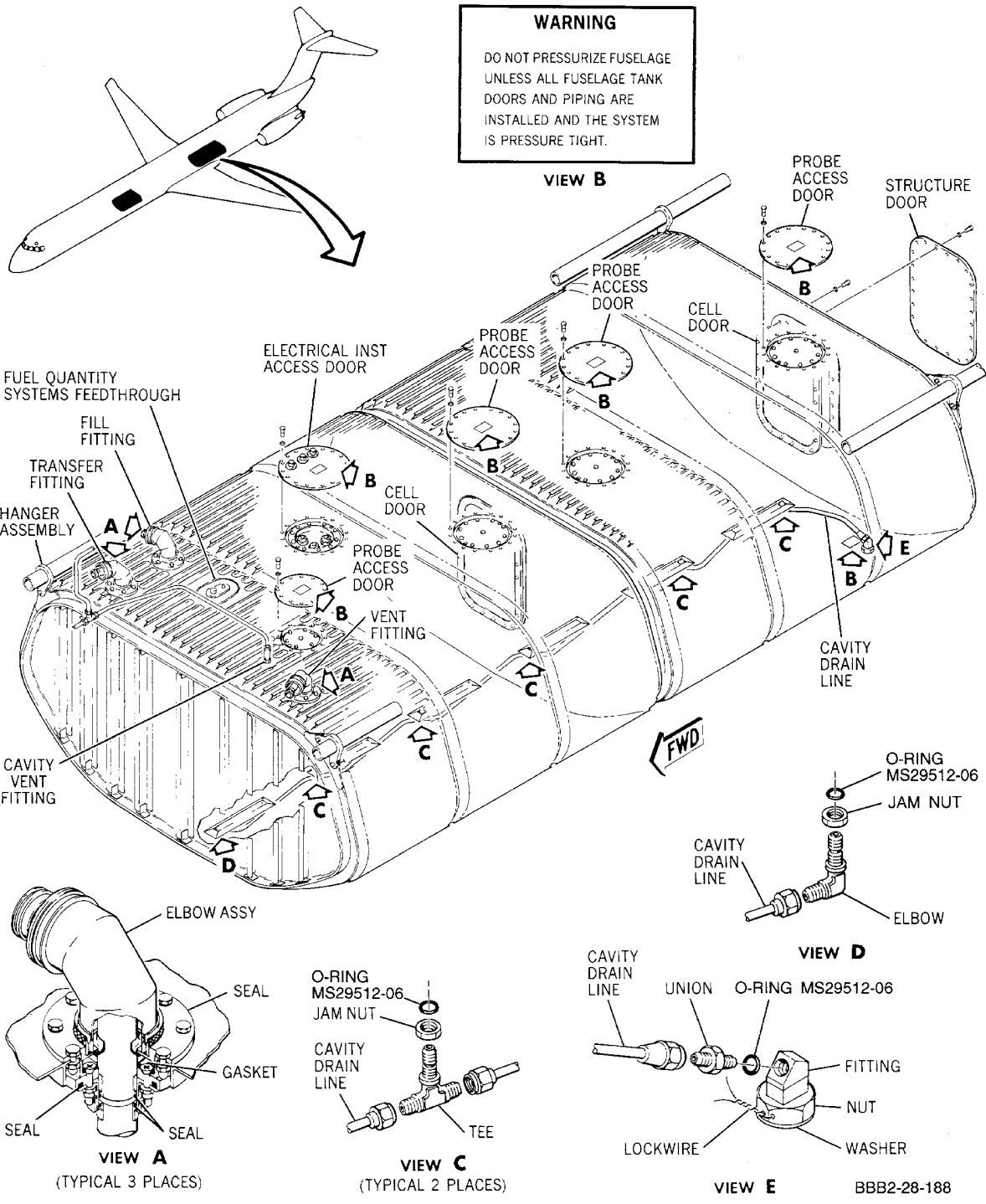
EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 874, 877-881, 883, 884, 892

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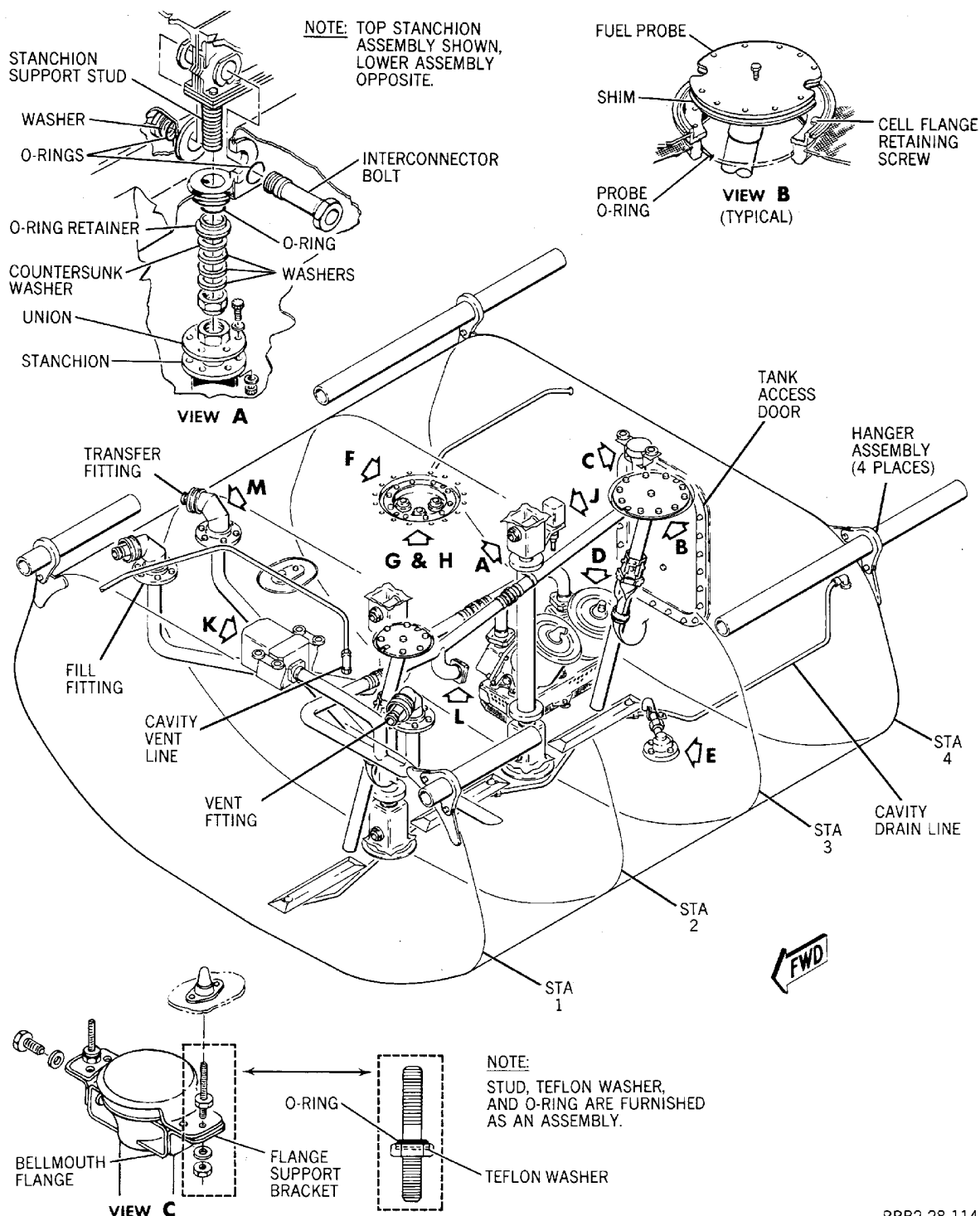
**Aft Fuselage Fuel Tank -- External Components
Figure 401/28-11-05-990-801 (Sheet 2 of 2)**

EFFECTIVITY
WJE 861, 862

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**Aft Fuselage Fuel Tank -- Internal Components
Figure 402/28-11-05-990-804 (Sheet 1 of 5)**

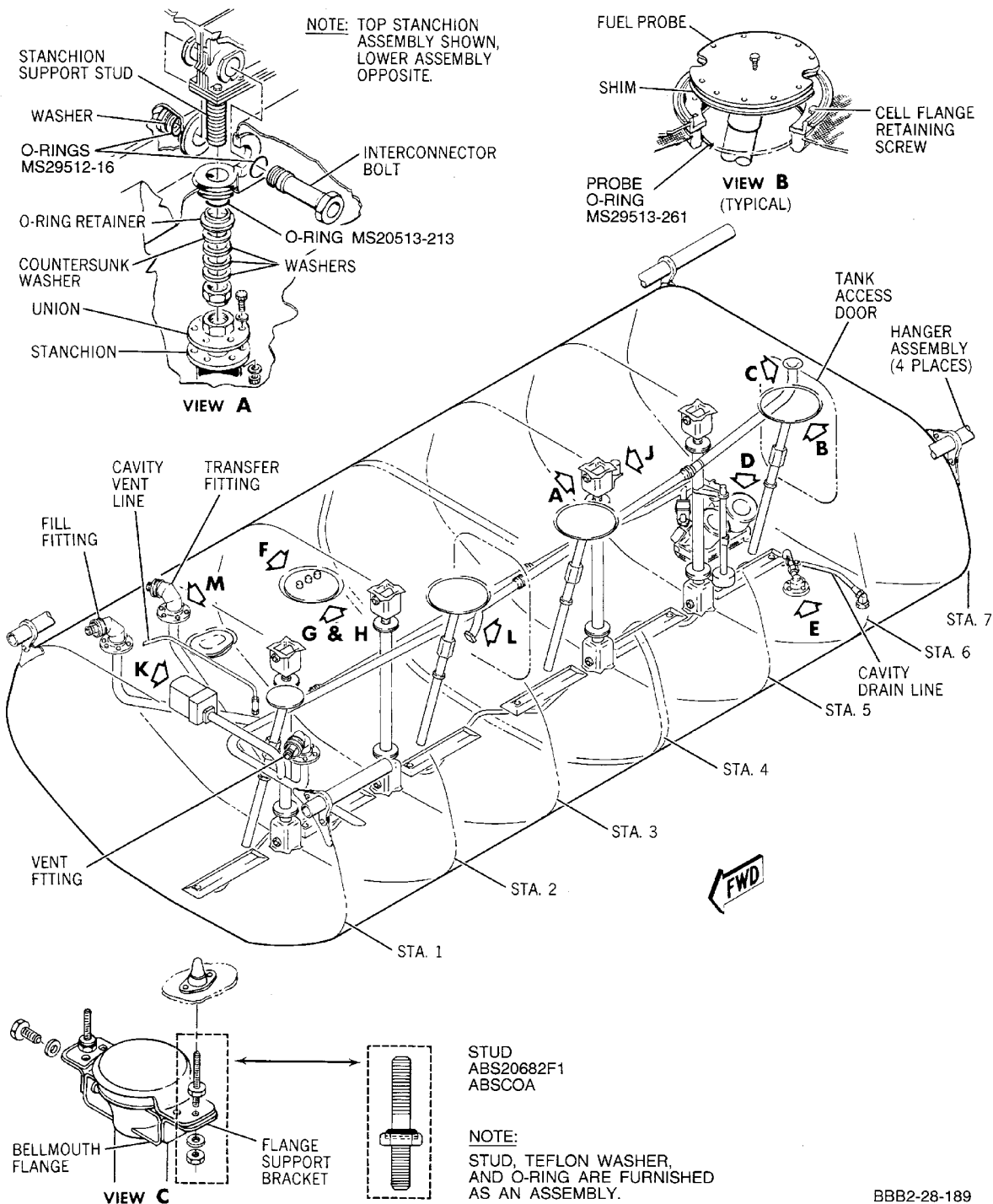
EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 874, 877-881, 883,
884, 892

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BBB2-28-189

Aft Fuselage Fuel Tank -- Internal Components
Figure 402/28-11-05-990-804 (Sheet 2 of 5)

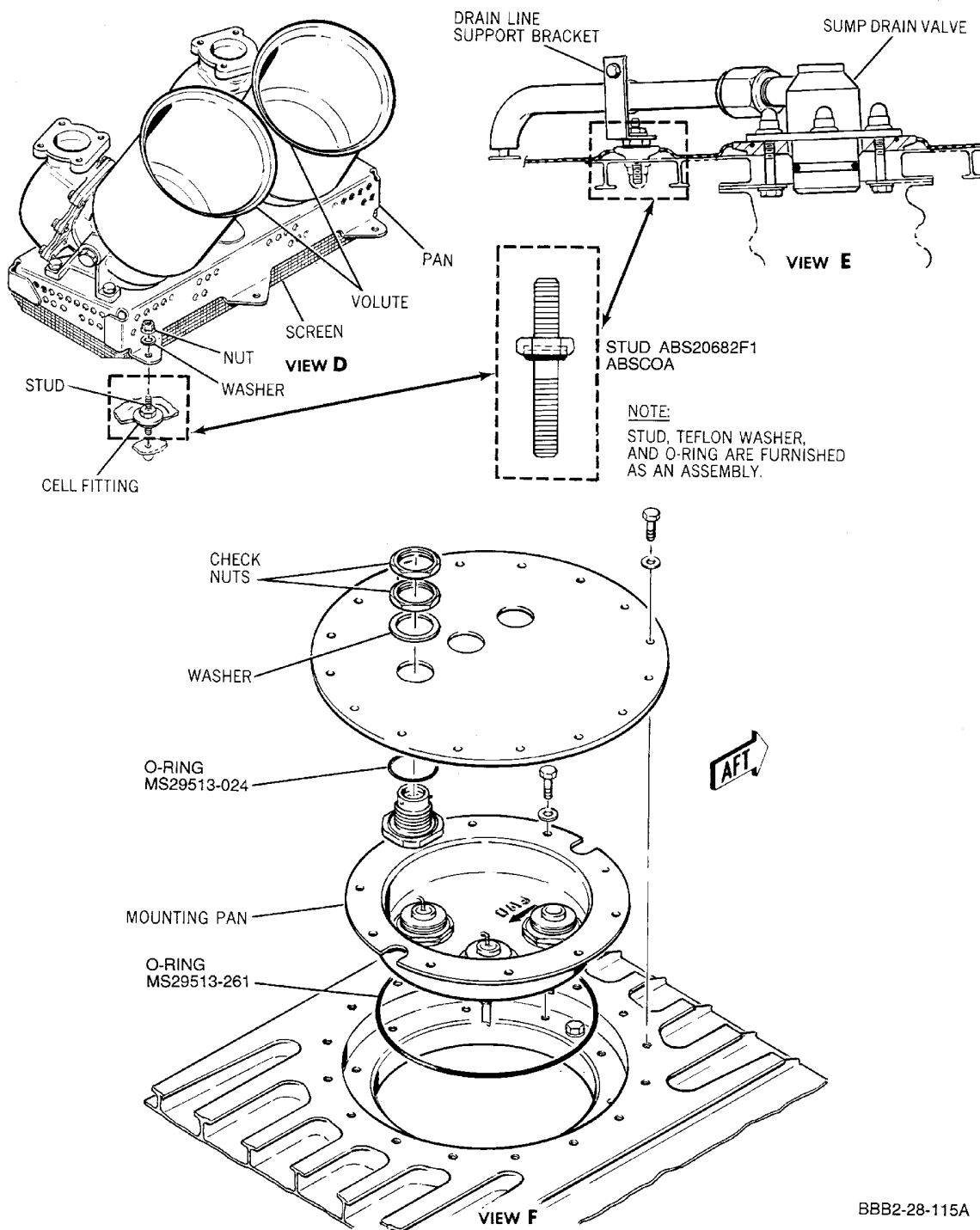
EFFECTIVITY
WJE 861, 862

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BBB2-28-115A

**Aft Fuselage Fuel Tank -- Internal Components
Figure 402/28-11-05-990-804 (Sheet 3 of 5)**

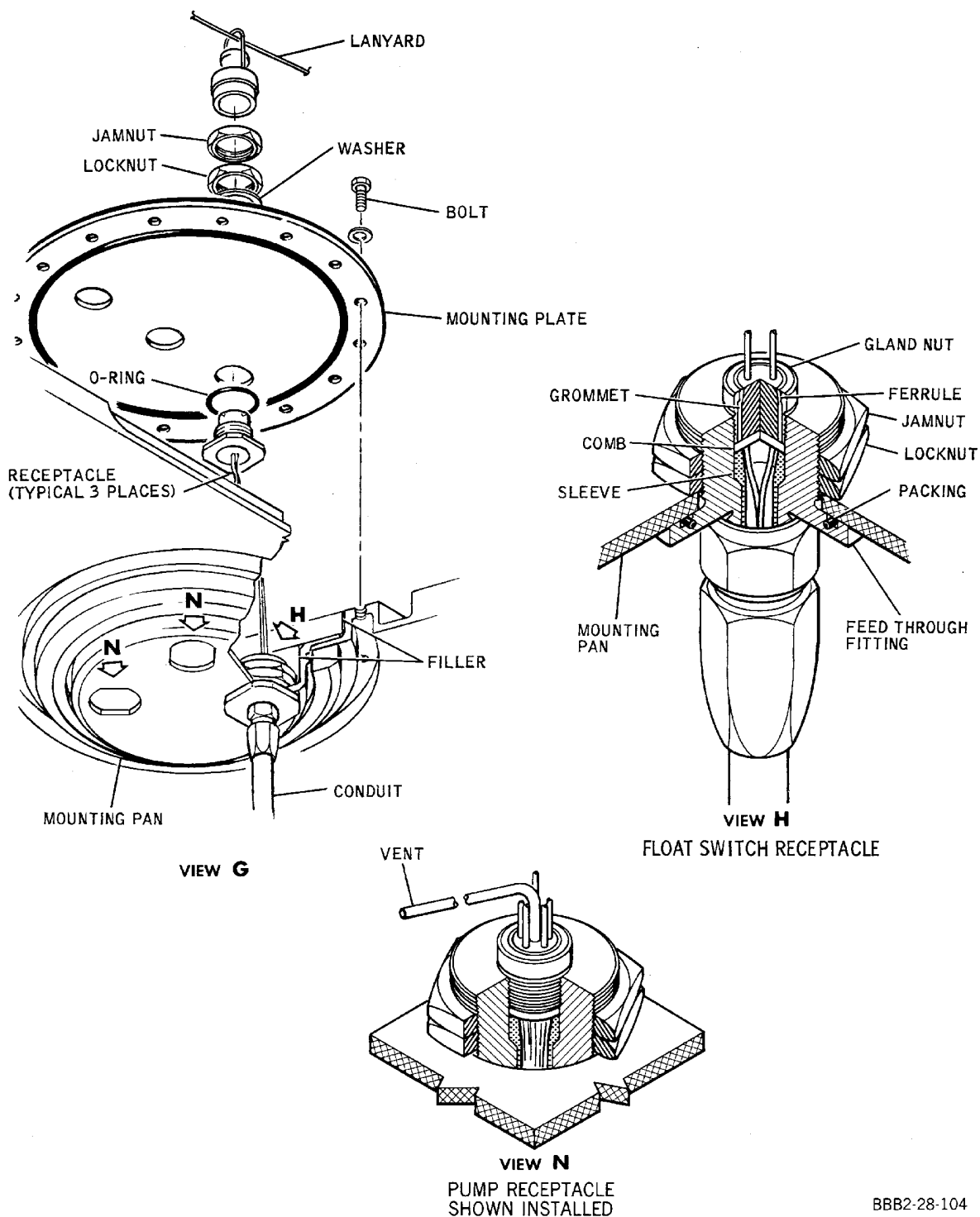
EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
877-881, 883, 884, 892

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Aft Fuselage Fuel Tank -- Internal Components
Figure 402/28-11-05-990-804 (Sheet 4 of 5)

BBB2-28-104

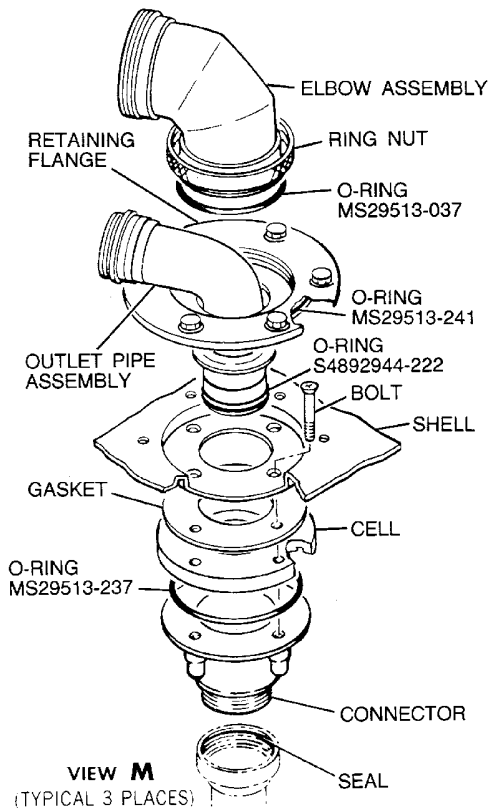
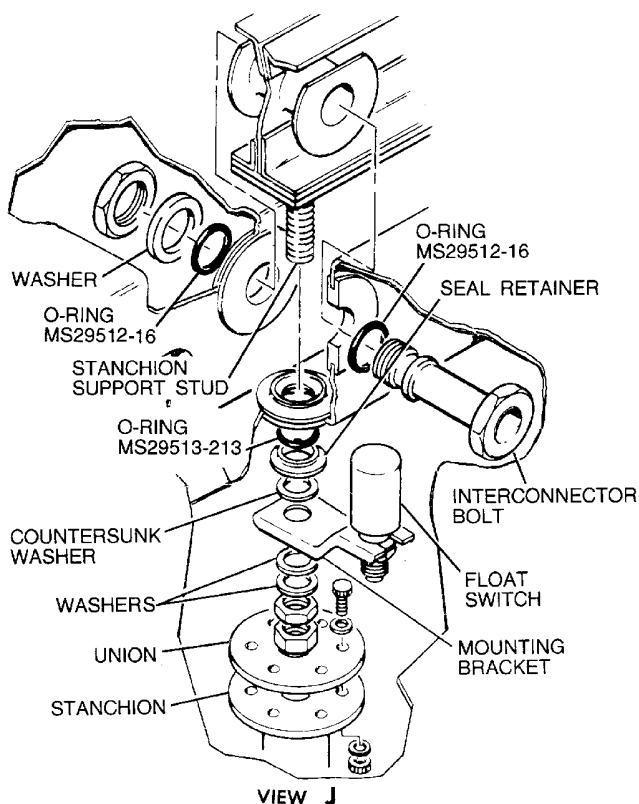
EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
877-881, 883, 884, 892

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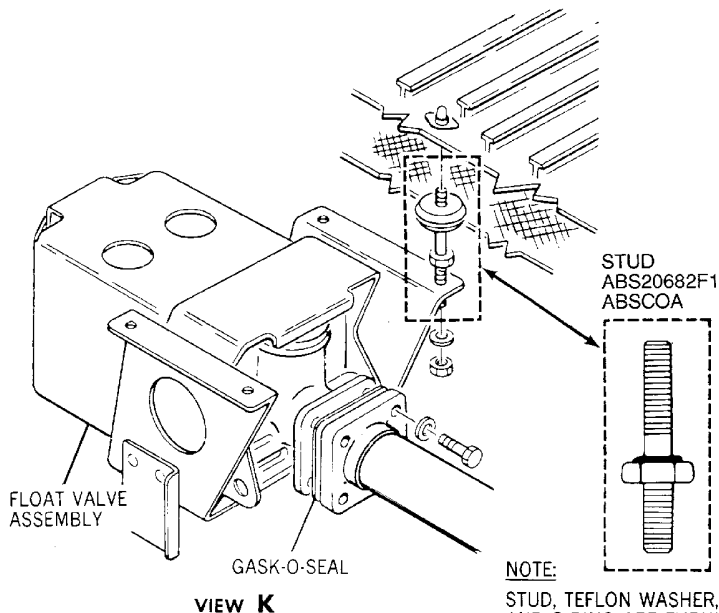
TP-80MM-WJE

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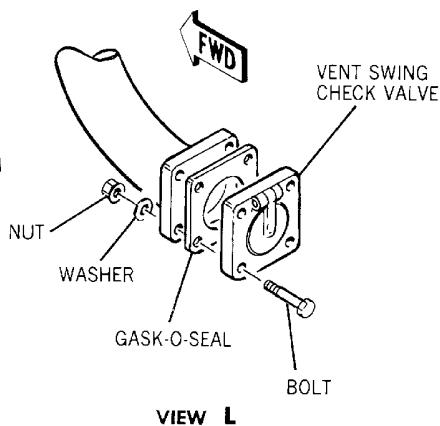
**MD-80
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NOTE: VALVE MUST BE INSTALLED WITH HINGE AT TOP AS SHOWN.



NOTE:
STUD, TEFLON WASHER, AND O-RING ARE FURNISHED AS AN ASSEMBLY.



BBB2-28-117A

**Aft Fuselage Fuel Tank -- Internal Components
Figure 402/28-11-05-990-804 (Sheet 5 of 5)**

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

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4. Install Aft Fuselage Fuel Cell

A. Preparation for Installation

WJE 861, 862

NOTE: If only one fuel cell half is to be installed, make certain that all conditions for installation are maintained in the opposite fuel cell half.

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

- (1) Make certain that tank cavity is dry, clean, and free of foreign objects.
- (2) Dust all tank cavity sealant surfaces with liberal amounts of powdered talc.
- (3) Visually examine fuel cell to assure that cell is undamaged and that cell interior is clean and free of foreign objects.

NOTE: Wrinkling is permissible providing the cell material cannot be folded over onto itself, or can be easily pushed down onto the structure, or worked out by redistribution of the cell material.

- (4) Prepare lacing cord by placing three to four inch length of 3/16 inch (4.76 mm) diameter heat shrinkable tubing over each end of nylon cord. Allow approximately 3/8 inch (9.53 mm) of tubing to extend beyond end of cord before heat shrinking tubing to cord.
- (5) Immediately prior to installing cell in tank cavity, liberally dust exterior of cell with powdered talc to reduce friction between fuel cell and cavity during installation.

B. Install Fuel Cell

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

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(Continued)

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (2) Fold fuel cell and insert cell into tank cavity. (Figure 403 or Figure 404)

NOTE: Cloth backed adhesive tape may be used to wrap and hold fuel cell in folded shape during installation.

- (3) Unfold cell and position cell flanges over component mounting stud bosses. (Figure 402)

NOTE: Make certain that all protective material has been removed from stanchion studs.

- (4) Distribute cell material evenly throughout tank cavity.

WJE 401-405, 409, 410, 412, 414, 874, 877-881, 883, 884, 892

- (5) Install lacing at station No. 1. (Figure 403)

WJE 861, 862

- (6) Install lacing at forward station. (Figure 404)

WJE 401-405, 409, 410, 412, 414, 874, 877-881, 883, 884, 892

CAUTION: ALTHOUGH LACING WILL NORMALLY BE ACCOMPLISHED BY PASSING CORD ALTERNATELY THROUGH HANGERS AND FERRULES, BREAK SEQUENCE WHEN NECESSARY TO PREVENT SIDE LOADING OF FERRULE AND DAMAGE TO CELL.

- (7) Install lacing at both sides of station No. 2; continue to distribute cell material evenly throughout cavity as lacing progresses. (Figure 403)

WJE 861, 862

CAUTION: ALTHOUGH LACING WILL NORMALLY BE ACCOMPLISHED BY PASSING CORD ALTERNATELY THROUGH HANGERS AND FERRULES, BREAK SEQUENCE WHEN NECESSARY TO PREVENT SIDE LOADING OF FERRULE AND DAMAGE TO CELL.

- (8) Install lacing at both sides of next aft station; continue to distribute cell material evenly throughout cavity as lacing progresses. (Figure 404)

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

- (9) Using new seals, install upper and lower interconnector bolts. Tighten nuts to torque of 700(±35) inch-pounds (78.4(±3.9) N·m).

WJE 401-405, 409, 410, 412, 414, 874, 877-881, 883, 884, 892

CAUTION: MAKE CERTAIN THAT LACING CORD DOES NOT DROOP INTO GAP BETWEEN INTERCONNECTOR BOLT CELL FLANGE AND STRUCTURE MATING SURFACES.

- (10) Install lacing at both sides of station No. 3; continue to distribute cell material evenly throughout cavity as lacing progresses. (Figure 403)

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

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WJE 861, 862

CAUTION: MAKE CERTAIN THAT LACING CORD DOES NOT DROOP INTO GAP BETWEEN INTERCONNECTOR BOLT CELL FLANGE AND STRUCTURE MATING SURFACES.

- (11) Install lacing at both sides of next aft station; continue to distribute cell material evenly throughout cavity as lacing progresses. (Figure 404)

WJE 401-405, 409, 410, 412, 414, 874, 877-881, 883, 884, 892

CAUTION: ALTHOUGH LACING WILL NORMALLY BE ACCOMPLISHED BY PASSING CORD ALTERNATELY THROUGH HANGERS AND FERRULES, BREAK SEQUENCE WHEN NECESSARY TO PREVENT SIDE LOADING OF FERRULE AND DAMAGE TO CELL.

- (12) Install lacing at station No. 4. (Figure 403)

WJE 861, 862

CAUTION: ALTHOUGH LACING WILL NORMALLY BE ACCOMPLISHED BY PASSING CORD ALTERNATELY THROUGH HANGERS AND FERRULES, BREAK SEQUENCE WHEN NECESSARY TO PREVENT SIDE LOADING OF FERRULE AND DAMAGE TO CELL.

- (13) Install lacing at aft station of applicable cavity. (Figure 404)
- (14) Install internal bulkhead fuel connector and interconnector bolts.

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

- (15) Install cell flange retaining screws at probe access openings. (Figure 402) Tighten screws to torque of 25(\pm 5) inch-pounds (3(\pm 0.6) N·m).

C. Install Aft Fuselage Tank Fuel Components

- (1) Install seals and seal retainers on upper and lower stanchion support studs. Install other hardware in location and amounts as noted in paragraph B., step (24).
- (2) Tighten stanchion support stud nuts to torque of 50(\pm 5) foot-pounds (600(\pm 60) inch-pounds (68(\pm 6.8) N·m).

NOTE: O-ring retainer is not contacted by the stanchion support stud nut washers, and is free to rotate on O-ring.

- (3) Install stanchion unions on upper and lower stanchion support studs. Adjust unions equal distance from stud nuts (approximately 1/4 inch (6.4 mm)), so stanchion just slips into place between unions. Make certain that flanges on stanchions and unions are electrically bonded.
- (4) Install stanchion on lower union.
- (5) Turn upper stanchion union on support stud to just contact stanchion. Turn union either way to line up with closest holes in stanchion.
- (6) Install stanchion on upper union.
- (7) Install, transfer, fill, and drain lines internal connectors, inlet/outlet pipes, retaining flanges and elbows.

WJE 861, 862

- (8) Install support stanchions at applicable stations. Tighten stanchion union bolts to torque of 50(\pm 5) inch-pounds (6(\pm 0.6) N·m).

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

- (9) Install bolts securing cell to fuel quantity feedthrough fitting. Tighten bolts to torque of 50(\pm 5) inch-pounds (6(\pm 0.6) N·m) and connect fuel quantity probe wiring plugs.

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
877-881, 883, 884, 892

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- (10) Install climb vent float valve bracket mounting studs. Tighten studs to torque of 50(±5) inch-pounds (6(±0.6) N·m).
- (11) Install climb vent float valve support bracket. Tighten nuts to torque of 50(±5) inch-pounds (6(±0.6) N·m).
- (12) Install compensator on aft stanchion brackets and attach electrical connections.

WJE 861, 862

- (13) Install forward sump drain valve and drain line with support brackets as one unit.
- (14) Install compensator on stanchion brackets and attach electrical connections.

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

- (15) Install vent line bellmouth attaching studs. Tighten studs to torque of 50(±5) inch-pounds (6(±0.6) N·m).
- (16) Install bellmouth bracket. Tighten nuts to torque of 50(±5) inch-pounds (6(±0.6) N·m).
- (17) Install bellmouth and aft section of vent line with attached vent drain swing check valve.
- (18) Install transfer pumps and float switch wiring disconnect mounting pan at top of tank. (Figure 402)
- (19) Install transfer pumps and float switch feedthrough fittings in mounting pan. Tighten lock and jamnuts to torque of 200 inch-pounds (22.6 N·m).
- (20) Install transfer pump wire harness, float switch and conduit with attached electrical feedthrough pan, through pan opening in top of fuel tank.
- (21) Install electrical feedthrough wiring pan bolts. Tighten bolts to torque of 50(±5) inch-pounds (6(±0.6) N·m).
- (22) Install electrical feedthrough receptacle mounting plate. Tighten bolts to torque of 50(±5) inch-pounds (6(±0.6) N·m).
- (23) Install float switch to aft stanchion mounting bracket. Tighten mounting nut to torque of 230 to 260 inch-pounds (26 to 30 N·m).
- (24) Install sump drain valve. Tighten bolts to torque of 50(±5) inch-pounds (6(±0.6) N·m).

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- (25) Install internal bulkhead access door and fairleads.
- (26) Install float switch to stanchion mounting bracket. Tighten mounting nut to torque of 230 to 260 inch-pounds (26 to 30 N·m).
- (27) Install aft sump drain valve. Tighten bolts to torque of 50(±5) inch-pounds (6(±0.6) N·m).

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- (28) Install drain line support bracket mounting stud. Tighten stud to torque of 50(±5) inch-pounds (6(±0.6) N·m).
- (29) Install drain line support bracket.
- (30) Prepare the area on the volute support mounting studs and volute support for electrical bond. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
NOTE: Electrical bond at least two of the five mounting studs.
- (31) Install volute support mounting studs. Tighten studs to torque of 50(±5) inch-pounds (6(±0.6) N·m).
- (32) Install volute support. Tighten nuts to torque of 50(±5) inch-pounds (6(±0.6) N·m).

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
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- (33) Prepare the area on the volute support and pumping unit for electrical bond. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)

NOTE: Electrical bond at least two of the mounting pads for each pump.

- (34) Install volute housing with attached check valves as one unit. Tighten volute bolts to torque of 50(±5) inch-pounds (6(±0.6) N·m).

WARNING: LOW VISCOSITY POLYSULFIDE SEALANT IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOW VISCOSITY POLYSULFIDE SEALANT IS USED.

- GAS/AIR MIXTURE MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW VISCOSITY POLYSULFIDE SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (35) Lock all in-tank Gamah coupling with PR-1422 1/2 sealant. (PAGEBLOCK 28-20-19/201)
- (36) Prepare the area on the clamps and jumper for electrical bond on the transfer line. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
- (37) Install jumper at the Gamah coupling on the transfer line.
- (38) Do an electrical bond check of mounting studs/volute support and volute support/pumping unit, and transfer line clamp to clamp at the Gamah coupling. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
- (39) Remove cap and connect cavity vent fitting. (Figure 401)
- (40) Connect electrical breakaway fittings to receptacles at top of electrical feedthrough plate.
- (41) Clean bonding surface of probe and access opening, lubricate probe O-ring with petrolatum. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- (42) Insert probe, with new shim, partially into access opening and connect wires.
- (43) Install probe. Tighten probe access door screws to torque of 50(±5) inch-pounds (6(±0.6) N·m).
- (44) Vacuum clean cell interior carefully and install fuel cell access door. Tighten cell door bolts to torque of 50(±5) inch-pounds (6(±0.6) N·m). (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- (45) Install cavity structure door. Tighten structure door bolts to torque of 50(±5) inch-pounds (6(±0.6) N·m).
- (46) Install fuel transfer pumps.
(PAGEBLOCK 28-20-18/201)

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
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- (47) Install primary poppet of sump and cavity drain valves SUMP DRAIN VALVE - REMOVAL/INSTALLATION, PAGEBLOCK 28-10-03/401, and FUEL LINE SHROUD DRAIN VALVE - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-15/201.
- (48) Install battery pack for overwing emergency evacuation lights. (PAGEBLOCK 33-53-00/401)
- (49) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (50) Perform check of aft fuselage fuel tank and cavity.

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 880, 881, 883, 884, 892
(PAGEBLOCK 28-11-03/601)

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

WARNING: IF LEAK OR DISCREPANCY IS DISCOVERED, STOP SERVICING IMMEDIATELY.

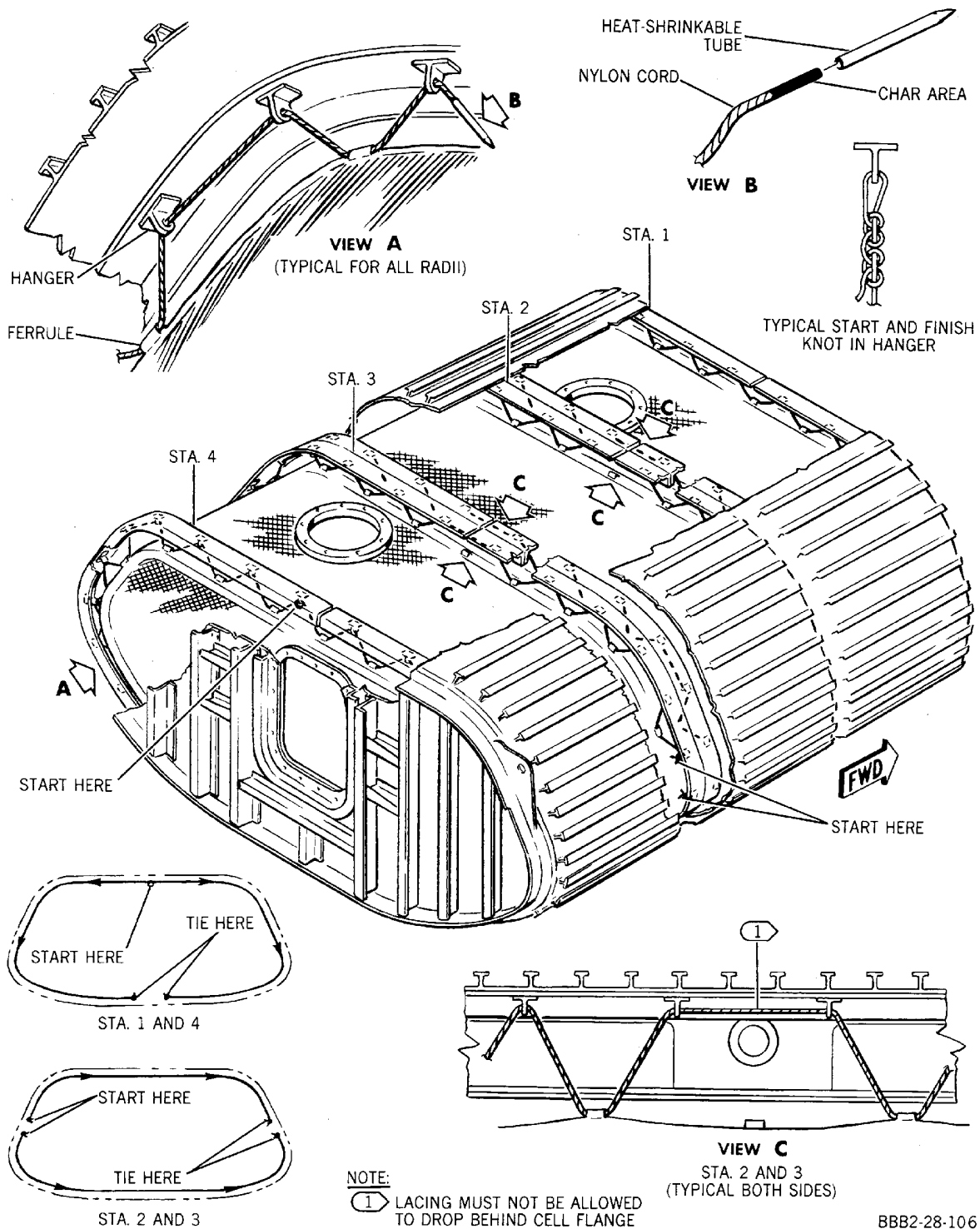
- (51) Service fuselage fuel tank. (FUEL LOADING - SERVICING, PAGEBLOCK 12-11-03/301)
- (52) Install passenger compartment floor panels.

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

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Aft Fuselage Fuel Cell -- Removal/Installation
Figure 403/28-11-05-990-807 (Sheet 1 of 2)

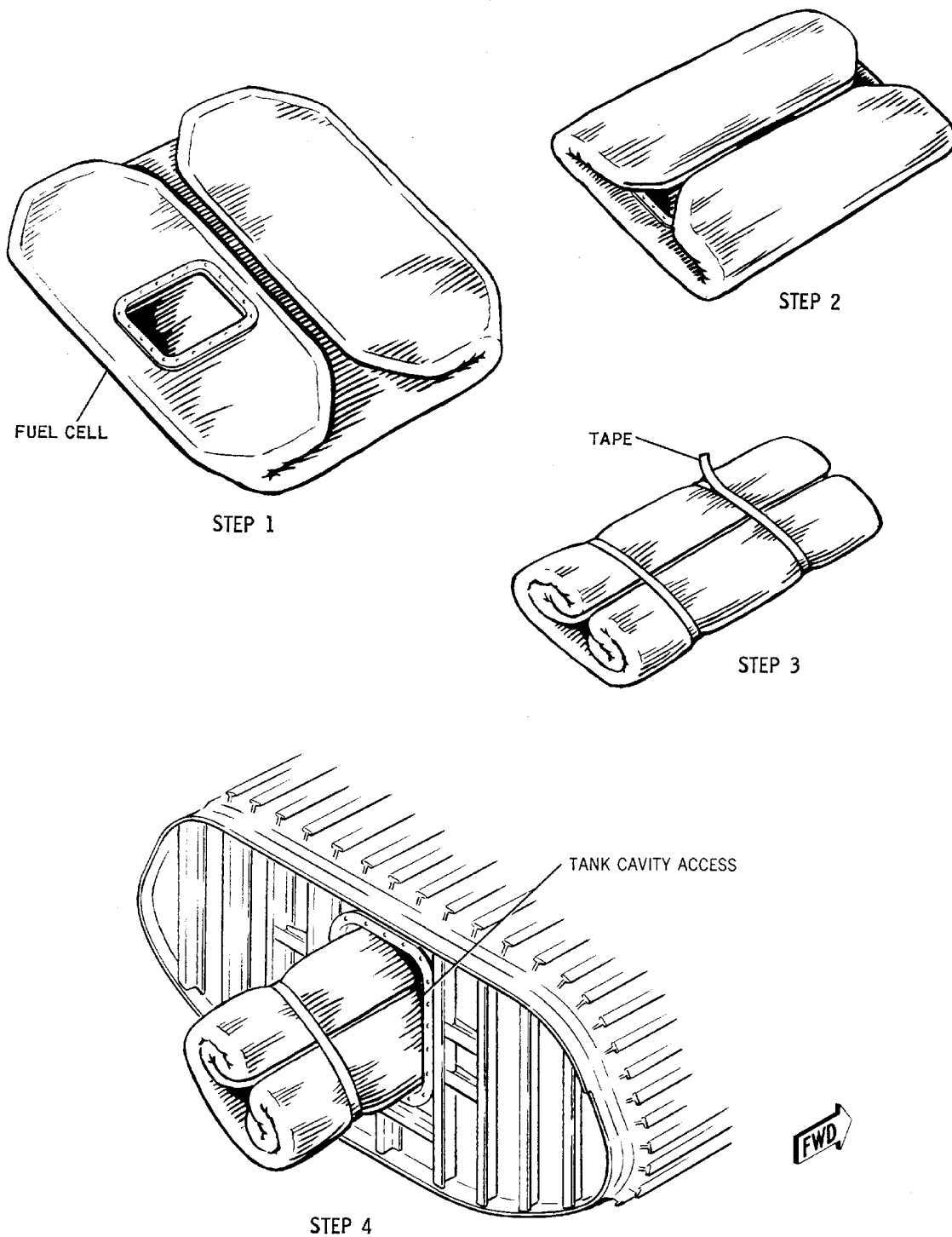
EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 874, 877-881, 883,
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Aft Fuselage Fuel Cell -- Removal/Installation
Figure 403/28-11-05-990-807 (Sheet 2 of 2)

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 874, 877-881, 883,
884, 892

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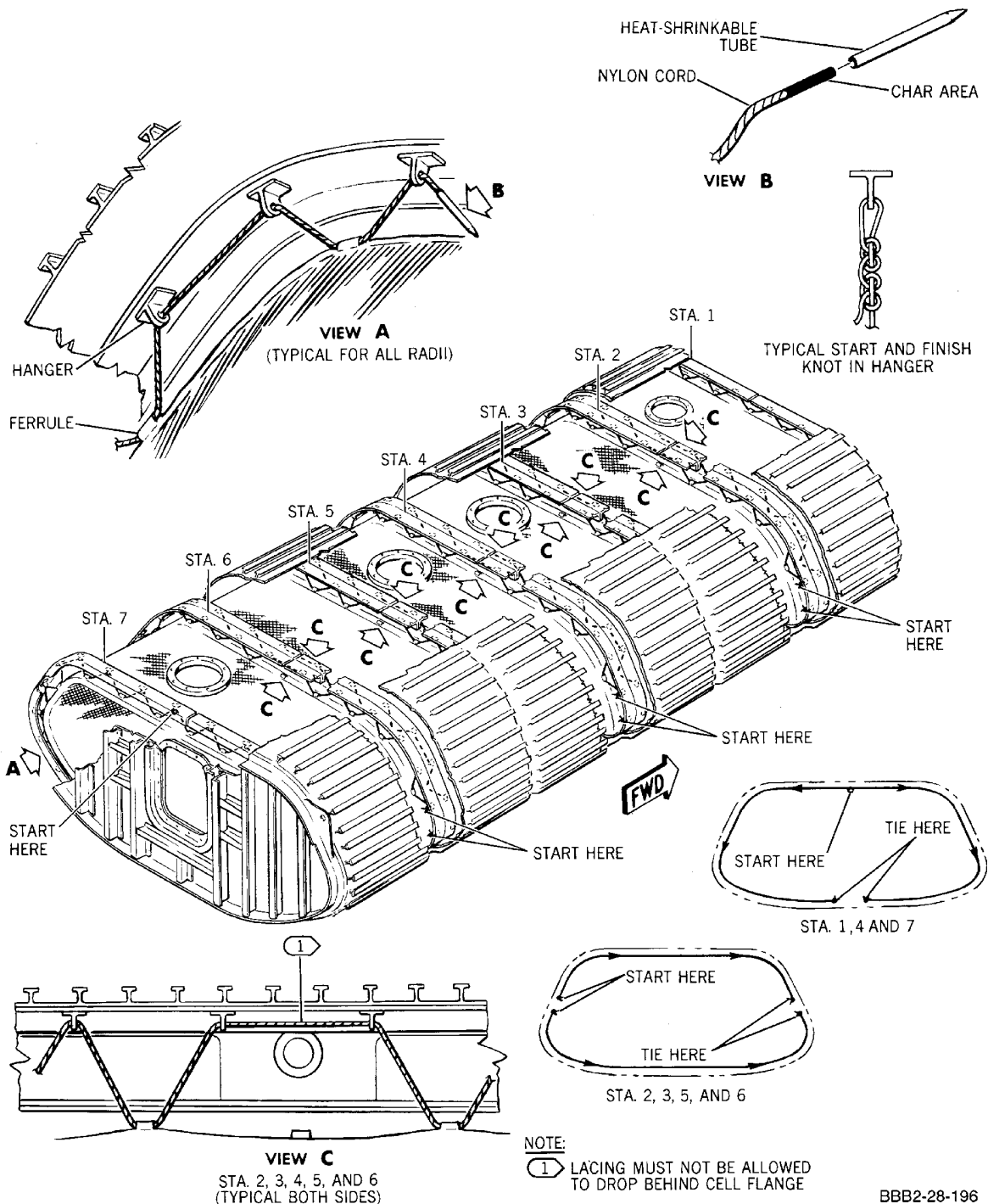
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Aft Fuselage Fuel Tank Cells -- Removal/Installation
Figure 404/28-11-05-990-809 (Sheet 1 of 2)

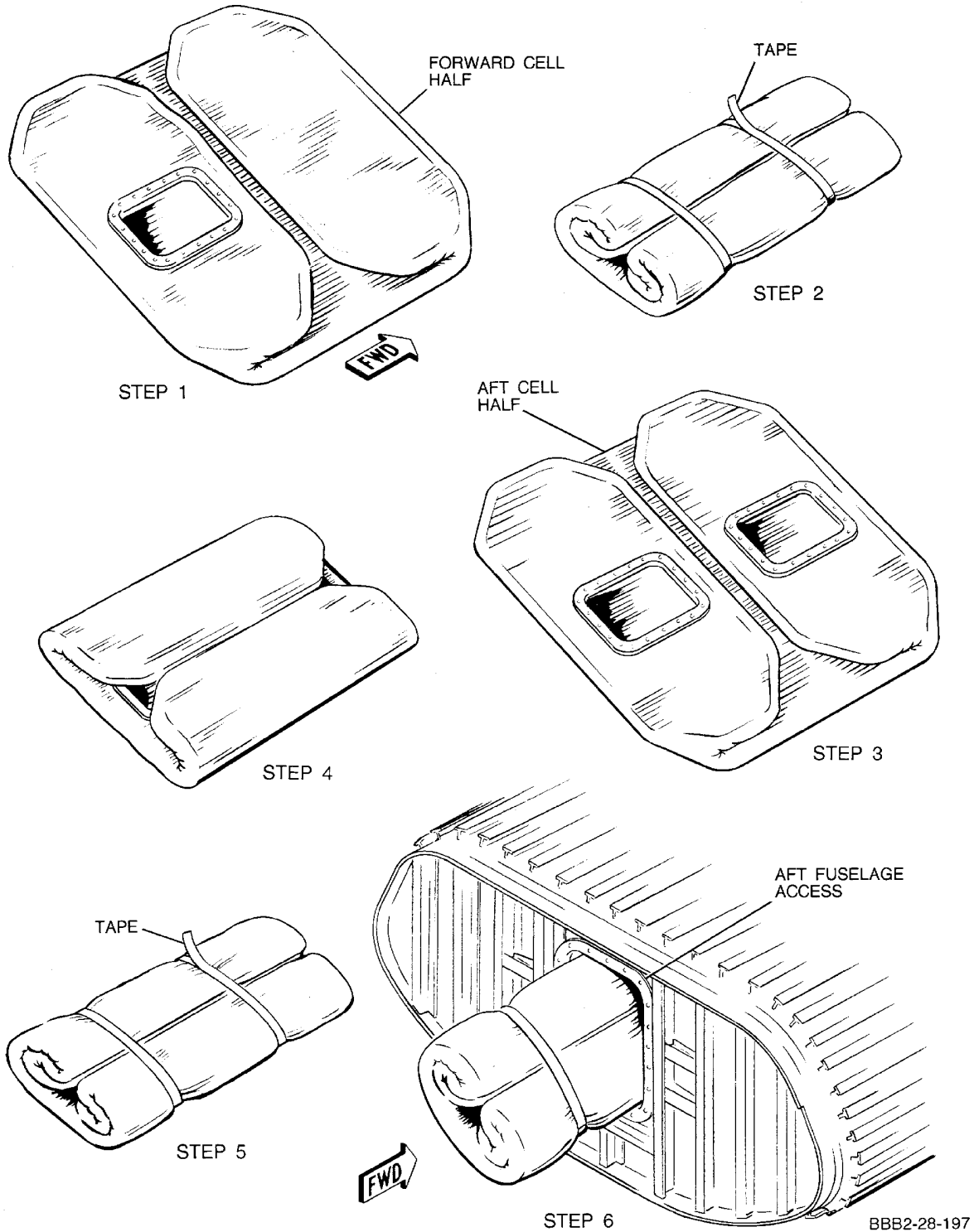
EFFECTIVITY
WJE 861, 862

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Aft Fuselage Fuel Tank Cells -- Removal/Installation
Figure 404/28-11-05-990-809 (Sheet 2 of 2)

EFFECTIVITY
WJE 861, 862

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FUSELAGE FUEL TANK CAVITY - MAINTENANCE PRACTICES

1. General

- A. The following procedures provide instructions for installation and use of handling tools to permit fuselage fuel tank cavity to be moved for inspection/check and/or repair of aircraft structure in areas made inaccessible by tank installation. Deviation from these procedures may be dictated by individual circumstances.
- B. The forward tank is located in the pressurized area (fwd section of the mid lower cargo compartment). The aft tank is located in the pressurized area (forward portion of the aft lower cargo compartment).
- C. Access to the tanks is through panels in the cabin floor and cargo compartment ceiling, above the respective tank and through corresponding cargo compartment doors.

WARNING: STRICT COMPLIANCE WITH THE SAFETY PRECAUTIONS CONTAINED IN GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201, AND ALL LOCAL SAFETY PRECAUTIONS IS REQUIRED TO PREVENT SEVERE DAMAGE TO EQUIPMENT AND INJURY OR DEATH OF PERSONNEL.

- D. Drain the fuel line shroud system any time fuel line has been disconnected, to drain any fuel remaining from removal/installation of fuel line. This will prevent a false indication of leakage at a later time.

CAUTION: DO NOT DIRECT HEAT GUN ON ADJACENT BLANKETS, EQUIPMENT, OR STRUCTURE. PROTECT THESE ITEMS BY SHIELDING OR COVERING WITH ALUMINUM FOIL. USE HEAT REFLECTORS WHERE POSSIBLE.

- E. The fuselage fuel tank cavity vent line and drain line connectors are covered with heat shrink tubing. The tubing should be of sufficient length to completely cover the connector and approximately 2 inches (50.8 mm) of the line. Before connecting the connectors, slide the tubing onto the line. Connect and tighten the connector; then position the tubing over the connector and using heat gun 250°F to 300°F (121.1°C to 148.9°C) shrink tubing in place until snug around connector and line.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 201

Name and Number	Manufacturer
Wedges, hardwood	Local manufacture
Scrapers, non-metallic	Local manufacture
Wipers, cotton, lint-free	Commercially available
Solvent, hand wipe cleaner DPM 6410	Monsanto Company St. Louis, MO
Sealant, PR-1422 B-2 DMS 2082	
Heat gun	Commercially available

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
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3. Removal/Installation Fuselage Fuel Tank Cavity

A. Remove Tank Cavity

- (1) Defuel and drain applicable fuselage tank. (DEFUELING, SUBJECT 12-11-01)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (2) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

WARNING: VAPOR FROM OPEN FUSELAGE FUEL TANKS IS COMBUSTIBLE. DEACTIVATE EMERGENCY BATTERY PACK FOR OVERWING EVACUATION LIGHTS BY REMOVING BATTERY PACK PRIOR TO MAINTENANCE ON AFT FUSELAGE FUEL TANK.

- (3) Remove battery pack from overwing emergency evacuation lights if required. (PAGEBLOCK 33-53-00/401)
- (4) Disconnect all sources of electrical power from aircraft.
- (5) Remove cargo compartment bulkhead adjacent to tank.
- (6) Disconnect shroud drain lines.
- (7) Remove fill, vent, and transfer line shrouds.
- (8) Disconnect fill, vent, and transfer lines.

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
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- (9) Remove sump drain valve boot.
- (10) Disconnect cavity drain lines.
- (11) Disconnect cavity vent lines.
- (12) Disconnect bonding straps.
- (13) Remove tie rods. Identify tie rods to permit installation in same position during tank installation.
- (14) Remove tank internal fuel system components FORWARD FUSELAGE FUEL TANK CELL - REMOVAL/INSTALLATION, PAGEBLOCK 28-11-04/401 or AFT FUSELAGE FUEL TANK CELL - REMOVAL/INSTALLATION, PAGEBLOCK 28-11-05/401 as applicable.
- (15) Remove fuel tank Vithane cell FORWARD FUSELAGE FUEL TANK CELL - REMOVAL/INSTALLATION, PAGEBLOCK 28-11-04/401 or AFT FUSELAGE FUEL TANK CELL - REMOVAL/INSTALLATION, PAGEBLOCK 28-11-05/401 as applicable.
- (16) Remove flange attaching bolts attaching aft tank section to adjacent forward sections. Note type, length, location, number of washers, and direction of insertion of fasteners to permit proper installation during tank installation.
- (17) Using wooden wedges, carefully separate aft and adjacent forward tank sections.
- (18) Install skid below tank section.
- (19) Disconnect tank segment from tank hangers.
- (20) Lower tank segment onto skid.

CAUTION: MOVE, OR REMOVE, AS NECESSARY, DISCONNECTED FUEL LINES AND ELECTRICAL WIRING TO PREVENT DAMAGE DURING TANK MOVEMENT.

- (21) Move tank segment aft as necessary.

NOTE: It will be necessary to remove tank aft segment from fuselage to provide space for removal of the forward tank segments.

- (22) Using skids as necessary, detach and remove remaining tank forward segments as outlined for aft segment.

B. Install Tank Cavity

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

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UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

WARNING: SEALANT REMOVER SOLVENT IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN SEALANT REMOVER SOLVENT IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET SEALANT REMOVER SOLVENT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THESE HAZARDOUS AGENTS.

- (2) Make certain that all tank segment attach flanges and bolt holes are free of sealant. Use non-metallic scrapers, cotton wipers, and solvent (hand wipe cleaner, DPM 6410) as necessary for cleaning.
- (3) Install skids as required.
- (4) Slide forward tank segments into position.
- (5) Raise tank segments until hanger bolts can be installed.
- (6) Install hanger bolts.
- (7) Remove forward skid section.
- (8) Install tie rods in positions noted during removal.
- (9) Move aft tank segment into position.

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874, 877-881, 883, 884, 892

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WARNING: LOW VISCOSITY POLYSULFIDE SEALANT IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOW VISCOSITY POLYSULFIDE SEALANT IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW VISCOSITY POLYSULFIDE SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (10) Apply faying surface seal of (PR-1422 B-2) sealant to mating flanges of forward and aft tank segments. (Figure 205)
- (11) Mate aft tank segment with forward tank segments.

WARNING: LOW VISCOSITY POLYSULFIDE SEALANT IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOW VISCOSITY POLYSULFIDE SEALANT IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW VISCOSITY POLYSULFIDE SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (12) Apply (PR-1422 B-2) sealant on inside of attaching flange bolt holes. Build up small fillet of sealant at and around holes on side from which bolts are to be inserted. (Figure 205) Apply sealant on both sides of all washers. Apply sufficient sealant to insure that sealant will be extruded during final fastener tightening. (Figure 205)

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
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- (13) Install bolts. Tighten sufficiently to extrude excess sealant and obtain metal-to-metal contact. After minimum of five minutes, retighten bolts.

WARNING: LOW VISCOSITY POLYSULFIDE SEALANT IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOW VISCOSITY POLYSULFIDE SEALANT IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW VISCOSITY POLYSULFIDE SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (14) If required, apply fillet seal of (PR-1422 B-2) sealant between mating flanges and rib web. (Figure 205)
- (15) Install hanger bolts.
- (16) Remove aft skid section.
- (17) Install tie rods in positions noted during removal.
- (18) Install fuel tank Vithane cell FORWARD FUSELAGE FUEL TANK CELL - REMOVAL/INSTALLATION, PAGEBLOCK 28-11-04/401 and AFT FUSELAGE FUEL TANK CELL - REMOVAL/INSTALLATION, PAGEBLOCK 28-11-05/401.
- (19) Install tank internal fuel system components FORWARD FUSELAGE FUEL TANK CELL - REMOVAL/INSTALLATION, PAGEBLOCK 28-11-04/401 and AFT FUSELAGE FUEL TANK CELL - REMOVAL/INSTALLATION, PAGEBLOCK 28-11-05/401.
- (20) Connect bonding strap.
- (21) Connect cavity drain lines.
- (22) Connect cavity vent lines.
- (23) Install sump drain valve boot.
- (24) Connect fill, vent, and transfer lines.
- (25) Install fill, vent, and transfer line shrouds.
- (26) Connect shroud drain lines.
- (27) Install battery pack for overwing emergency evacuation lights, if required. (PAGEBLOCK 33-53-00/401)
- (28) Install cargo compartment bulkhead.

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
877-881, 883, 884, 892

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(29) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

EFFECTIVITY

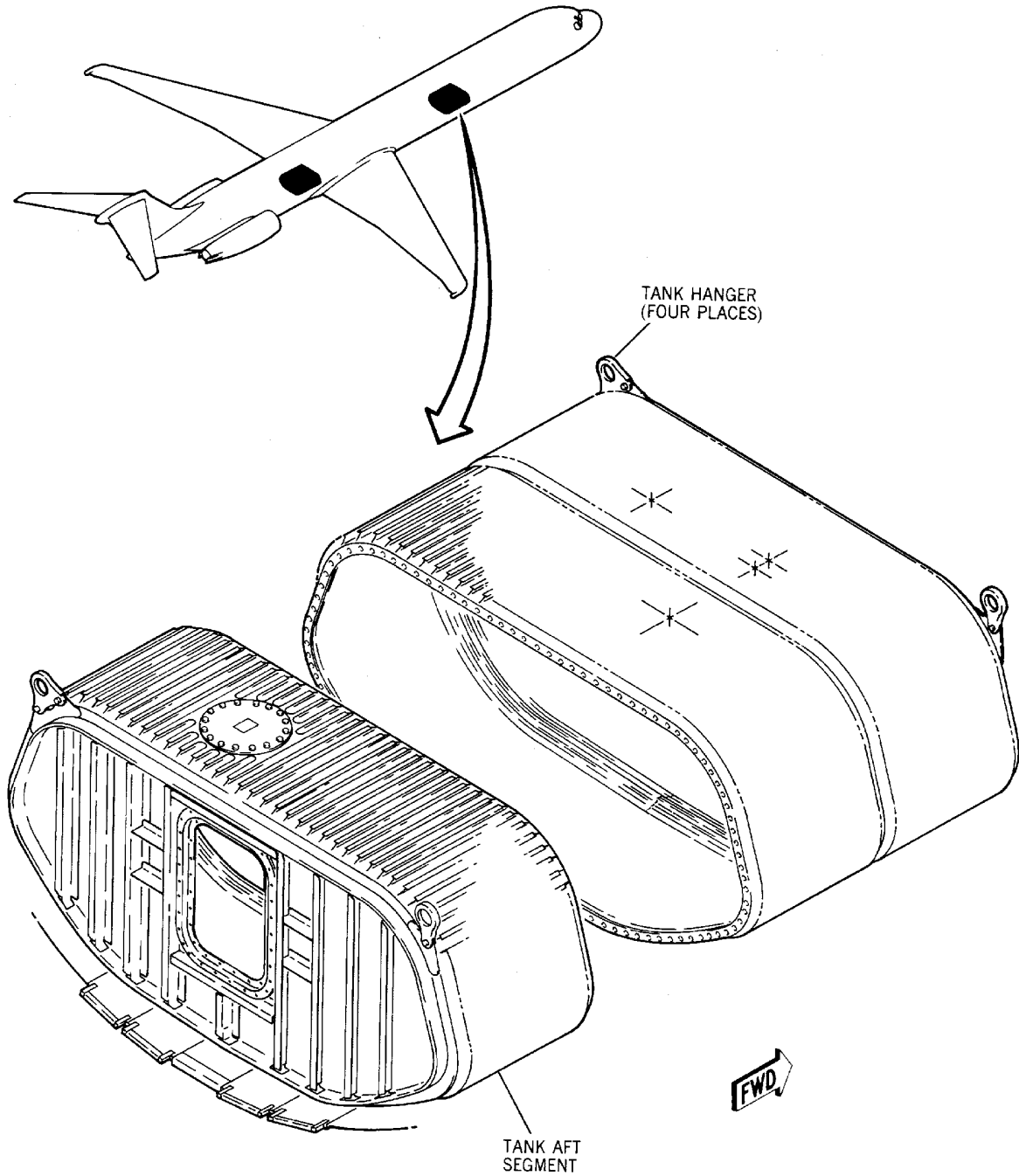
WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
877-881, 883, 884, 892

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BBB2-28-122

Forward Fuselage Tank Cavity -- Removal/Installation
Figure 201/28-11-06-990-801

EFFECTIVITY

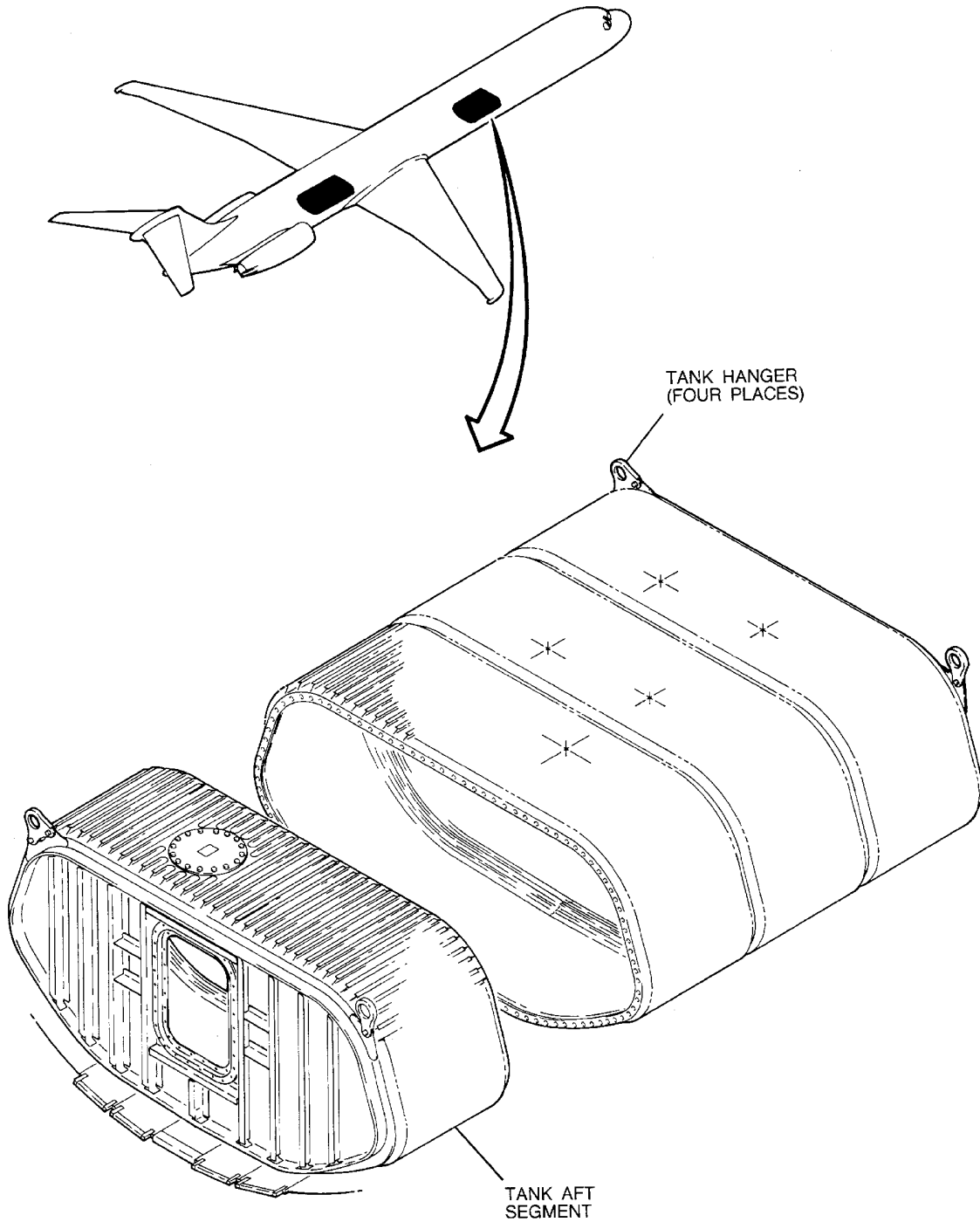
WJE 401-405, 409, 410, 412, 414, 874, 877-881, 883,
884, 892

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BBB2-28-190

Forward Fuselage Tank Cavity -- Removal/Installation
Figure 202/28-11-06-990-802

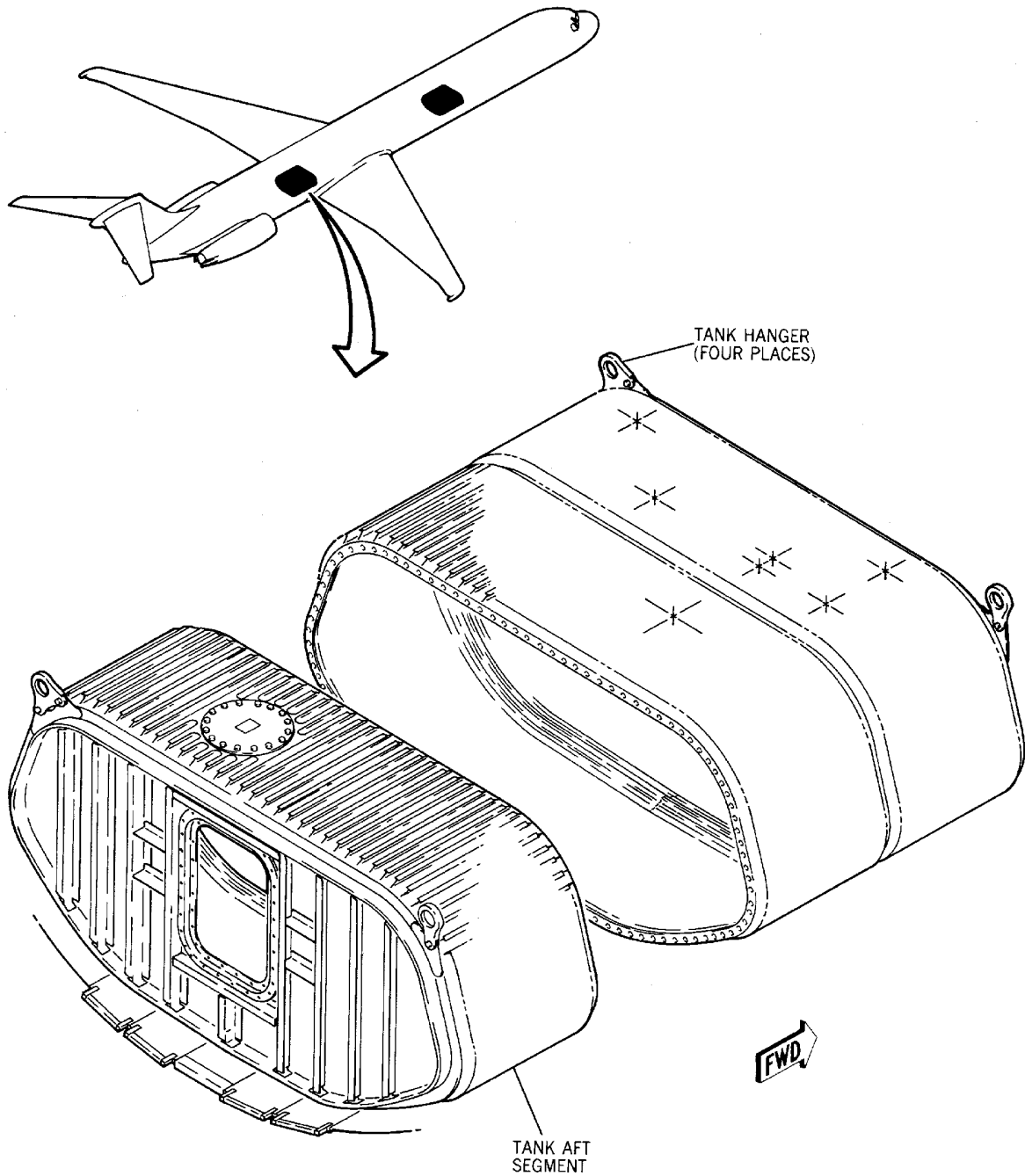
EFFECTIVITY
WJE 861, 862

TP-80MM-WJE

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BBB2-28-121

Aft Fuselage Tank Cavity -- Removal/Installation
Figure 203/28-11-06-990-803

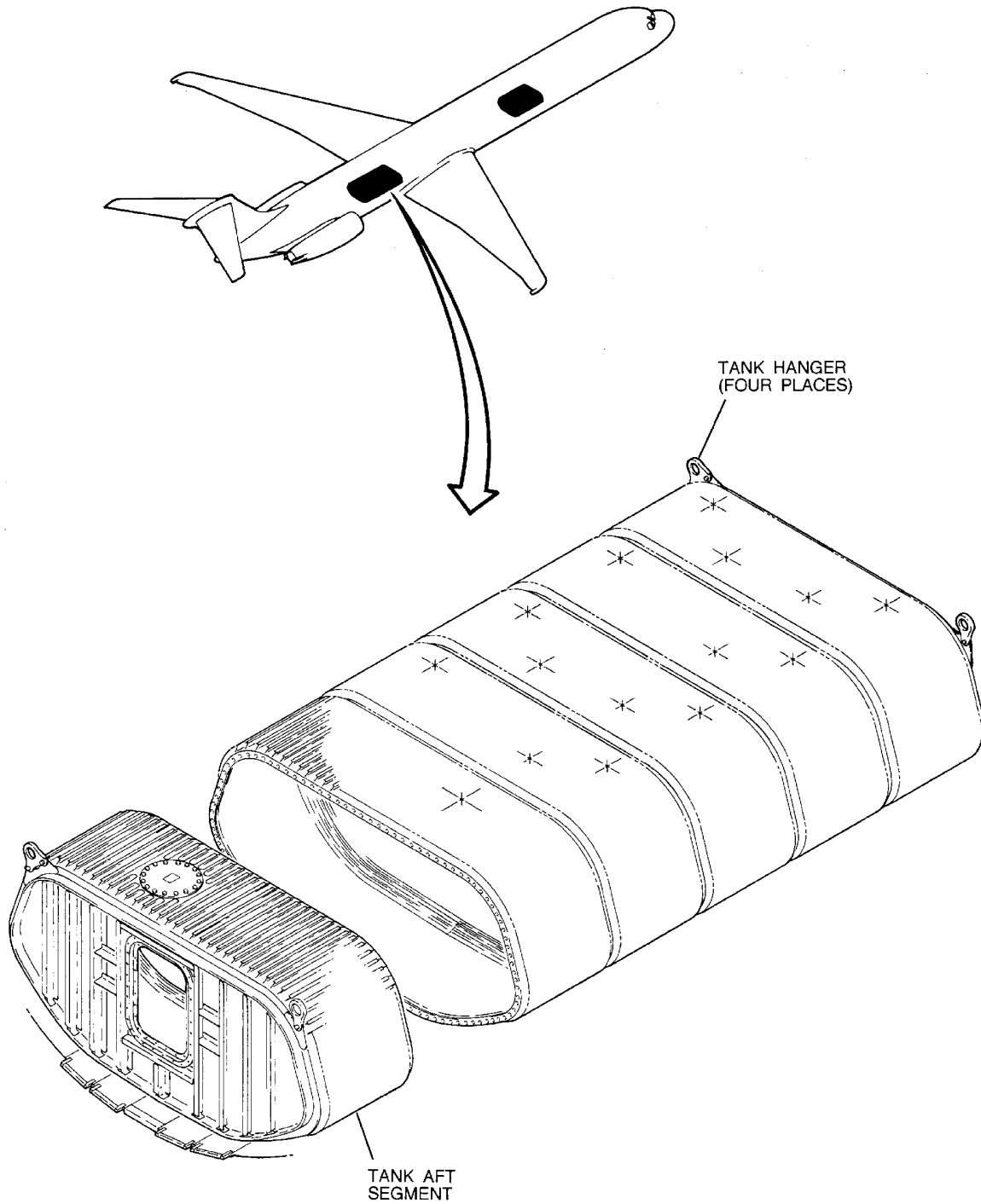
EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 874, 877-881, 883,
884, 892

TP-80MM-WJE

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BBB2-28-191

Aft Fuselage Tank Cavity -- Removal/Installation
Figure 204/28-11-06-990-804

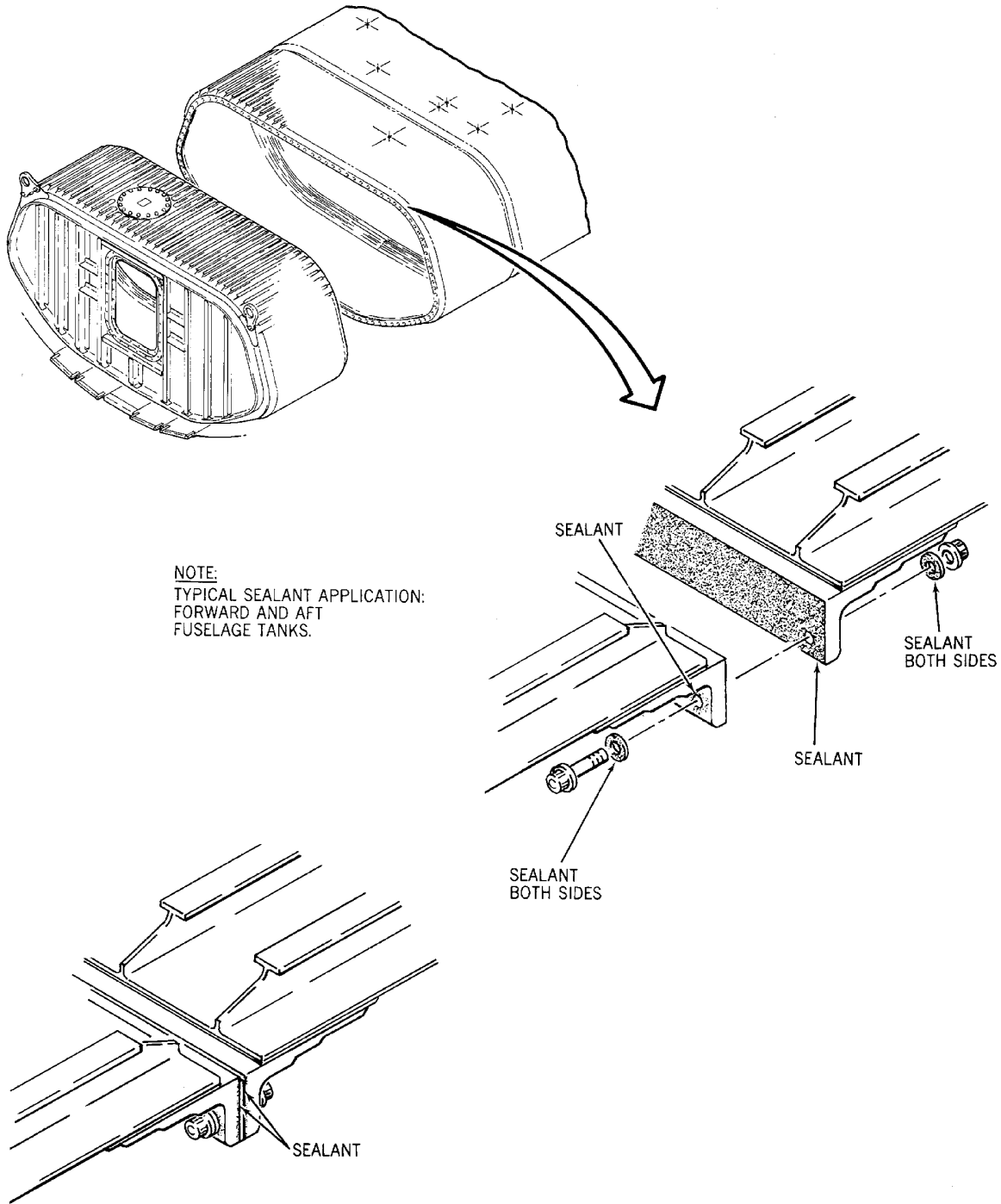
EFFECTIVITY
WJE 861, 862

TP-80MM-WJE

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BBB2-28-123A

Tank Cavity Sealing
Figure 205/28-11-06-990-806

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
877-881, 883, 884, 892

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DISTRIBUTION - DESCRIPTION AND OPERATION

1. General

- A. The fuel distribution system is divided into fill, defueling, and feed. The fill system is concerned with distribution and control of fuel from fueling adapter to tanks. The system consists of a single-point pressure fueling and regulating adapter located approximately midspan in the right wing leading edge; three electrically operated, float switch-controlled fuel fill valves, one for each tank, inboard of the adapter and behind a fueling control panel; and necessary lines to carry fuel to tanks. The fueling control panel contains the panel electric power switch, power indicating light, Load Selector Display Unit (LSDU) with test switch and override switch, master refuel switch, fill valve control switches, and a manual electric override switch. Two ground service interphone jacks are also installed on the panel. Gravity fueling may be accomplished through each overwing fill adapter located in the upper surface of the wings near the tip. Grounding jacks are located aft of each fill adapter.
- B. Defueling is accomplished through an adapter and a defueling valve located inboard of the fueling control panel in a line connecting to right main tank fuel boost pump pressure line.
- C. The fuel feed system consists of six fuel boost pumps (two single pumps for each main tank and two series-mounted pumps for the center tank), necessary check valves, a crossfeed valve, two engine fuel fire shutoff valves, and an APU fuel fire shutoff valve. Fuel is supplied to the engine and the APU through shrouded lines. The shroud system has a drain valve located on the lower right side of the fuselage aft of the wheelwell. A start pump is also installed in the right main tank to provide starting fuel pressure to engines and/or APU when AC power is not available.
- D. A center tank pump reprime system provides reprime fuel for the center tank boost pumps. The system taps the left tank boost pump pressure line fuel and diverts it to the center tank pump volute to maintain reprime fuel level.

WJE 872; WJE 406-408, 415, 416, 418, 420-427, 429, 863-866, 868, 869, 886, 887, 891, 893 POST MD80-28-058

- E. The alternate fuel burn system, provides an automated alternate fuel burn sequence by use of float switches in the main and center fuel tanks when the center tank boost pump switches are in the AUTO position.

(ALTERNATE FUEL BURN - DESCRIPTION AND OPERATION, PAGEBLOCK 28-21-00/001)

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

2. Description

- A. Pressure Fueling Adapter
 - (1) The pressure fueling adapter connects the ground fueling and defueling equipment to the airplane pressure fueling system. The adapter is located approximately midspan in the right wing leading edge. The adapter consists of a housing, piston, pressure regulating valve, and a spring-loaded regulating ring.
- B. Fuel Fill Valves
 - (1) The three fuel tank fill valves are dc motor-operated, gate-type valves. The valves are line-mounted inboard of the pressure fueling adapter and behind the fueling control panel. Each valve consists of a housing, motor, gear train actuator, roller and arm, manual override lever, slotted blade, and a thermal relief valve. DC power to operate the valves is supplied from the 28-volt airplane battery through the battery direct bus on the overhead circuit breaker panel, or, if APU or external power is available, through the dc transfer bus on the lower main circuit breaker panel.
- C. Fuel Fill Control Float Switch

EFFECTIVITY

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

TP-80MM-WJE

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- (1) The fuel fill control float switches are float-operated magnetic switches. Each switch assembly consists of a hermetically sealed glass-enclosed switch, two float-supported magnets, and perforated aluminum shell.
- (2) DC power to operate the switches is supplied from the 28-volt airplane battery direct bus in the overhead circuit breaker panel, or, if APU or external power is available, through the dc transfer bus on the lower main circuit breaker panel.

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893 POST MD80-28-226

- (3) An in-line fuse is installed in the applicable float switch wire that is external of the fuel tank. The purpose of the fuse is to prevent the ignition of the fuel fumes in a fuel tank caused by a short.

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893 POST MD80-28-228

D. Ground Fault Interrupter (GFI) Relay

- (1) Each center tank GFI relay gives protection from frictional heating or sparking that may develop from fuel pump failure caused by the pump running in an empty tank if the normal shutoff command is delayed or as a result of control system failures.

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

E. Load Selector Display Unit (LSDU)

- (1) The Load Selector Display unit provides the fuel load preselect capability for partial fueling of the fuel tanks. The LSDU digitally displays individual tank quantities and preselected quantities. Selector knobs, one beneath each fuel select display, are used to select desired fuel loads. Load quantity is set by pulling out the respective selector knob, turning knob to desired quantity on display readout, then pushing knob in to normal position.

F. Fuel Boost Pumps

- (1) There are six fuel boost pumps in the fuel distribution system. The main tank pumps are located, two in each tank, in the feed reservoir, at the inboard end of each main tank. The center tank pumps are located in a container in the right side of the center tank. A line from the center tank fuel fill line carries fuel into the pump container to provide priming fuel for the center tank pumps. A second line which utilizes boost pump fuel pressure acts as a reprime line to refill the pump container during flight. A float type shutoff valve in the line shuts off the reprime fuel when the container is full. A flapper-type check valve prevents air from being drawn into the fuel line if the center tank fuel level is below the prime outlet. All pumps are accessible through access doors located in the upper wing skin above each pump. Each of the four main tank pumps is mounted in a volute attached to the structure in the bottom of the tank. The two center tank pumps are mounted in series in a double volute attached to the structure in the right side of the center tank. Each pump is retained in the volute by a locking ring which is a part of the pump assembly and remains with the pump during removal and installation. All pumps are identical submersion-type pumps. Each pump consists basically of a motor, centrifac impeller, vapor pump and housing. Power for the pumps is 3-phase, 115-volt AC supplied through the AC bus on the upper main circuit breaker panel in the flight compartment. The boost pump switches are located on the fuel tank section of the forward overhead switch panel. In case of an overheated pump, thermal protection is provided by nonresettable thermal protectors, one for each power phase.

EFFECTIVITY

**WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 876, 886, 887, 891, 893**

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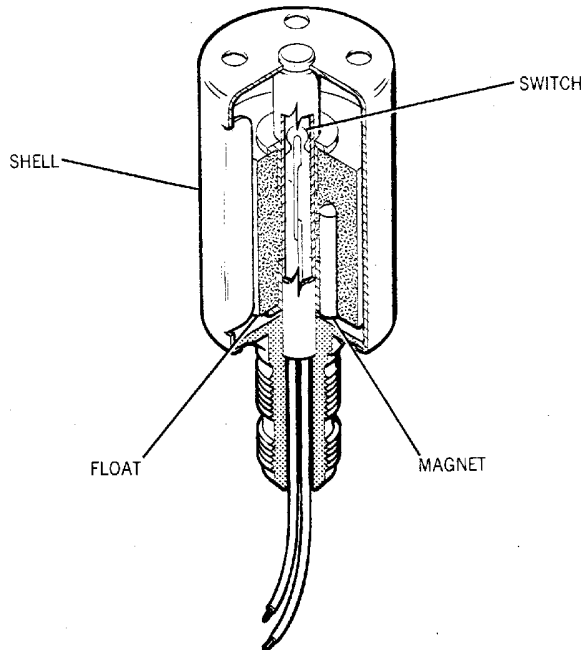
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- (2) The volute consists of a guide and housing assembly, two locking lugs, and three index pins. Each tank volute has two poppet-type valves installed in the housing. One valve acts as a reverse flow check valve; the other as a bypass valve. The center tank volute has one poppet-type valve in the housing functioning as a bypass valve. The index pins are installed in the volute with differing radii to prevent incorrect indexing of pump to volute. The volute receives and mounts the pump. The locking ring on the pump housing locks the pump in position in the volute. A special tool is used to remove and install the pumps.
- G. Engine Start Pump
- (1) The engine start pump, located in the right main tank reservoir, supplies fuel to the engine and/or the APU when normal boost pump pressure is not available. The pump is mounted in a volute attached to the bottom structure of the tank. The pump is retained in the volute by means of a locking ring, which is part of the pump assembly and remains with the pump during installation and removal. The pump consists basically of a 28-volt dc motor, an impeller, and a housing. Power is supplied from a circuit breaker on the dc transfer bus on the lower main circuit breaker panel through a start pump switch on the lower left side of the overhead switch panel in the flight compartment.
 - (2) The volute consists basically of a guide and housing assembly, two locking lugs, and three index pins. The index pins are installed in the volute with differing radii to prevent incorrect indexing of the pump to the volute. The volute receives and mounts the pump. The locking ring on the pump housing locks the pump in position in the volute. A special tool is used to remove and install the pump.
- H. Fuel Crossfeed Valve
- (1) The fuel crossfeed valve is a semi-submerged, manually operated, plug-in gate-type valve. The valve is located in the crossfeed line with the valve housing attached to the aft face of the right wing front spar. The valve body, with sliding blade, may be removed from the housing from outside the tank. The valve is operated from the cockpit by a cable and drum arrangement connected to the fuel crossfeed control lever located on the control pedestal in the flight compartment.
 - (2) The valve assembly consists of a slotted blade, valve arm roller, valve shaft, and valve operating arm. The blade is slotted for the mating roller of the arm to work in. The roller moves on an arm secured to the valve operating shaft. The shaft is rotated by the operating arm. The valve shaft rotates 90 degrees from the open to the closed position of the blade. The blade is normally seated (closed) between two spring-loaded ring seals. When the blade is pulled into the upper portion of the valve body, fuel is allowed to flow through manifold.
- I. Engine Fuel Fire Shutoff Valve
- (1) The two engine fuel fire shutoff valves are manually operated gate-type valves. There is one valve in each engine fuel supply line aft of the wing rear spar. The valves are operated by the fire control handles in the flight compartment. The valve consists of a valve body, valve arm, and slotted blade.
 - (2) An arrow on the end of the shaft relates the valve position to the open and closed positions marked on the valve adapter plate. The valve handle is indexed to the valve shaft by means of a pin in the shaft.
 - (3) A line thermal relief valve relieves excess pressure buildups due to thermal expansion of trapped fuel. The relief valve opens at 65 psi to bleed pressure around blade of closed valve. The valve reseats at 40 psi minimum. The valve is relieved into the tank.
- J. APU Fuel Fire Shutoff Valve

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- (1) The APU fuel fire shutoff valve is located in the APU fuel supply line inboard of the right engine fuel fire shutoff valve on the right wing rear spar. The valve controls the fuel supply to the APU. The valve consists basically of a solenoid-operated plunger which slides in and out of a passage in the valve body. Power is 28-volt dc supplied from a dc battery bus circuit breaker on the overhead circuit breaker panel.
- K. Center Tank Reprime Line Float Valve
- (1) The center tank reprime line float valve is a float-operated needle valve. The valve shuts off reprime line fuel to the center tank pump container when the container is full.
 - (2) The float valve consists of a housing, a float and needle valve assembly, and a metal can enclosure. The float and needle assembly consists of a float, a float arm, and a needle valve. The needle valve attaches to one end of the float arm and is self-aligning to the seat. The other end of the arm is attached to the float. A stop pin prevents the float from moving the arm past the valve closed position. A protrusion on the needle valve prevents it from becoming misaligned with the seating port. A stop heel on the bottom of the float restricts the float movement and aids in preventing the needle valve from being completely withdrawn from the seating port. The can enclosure is attached to the housing. There are three fill and drain holes in the side of the can.
- L. Center Tank Reprime Line Check Valve
- (1) The center tank reprime line check valve is a normally closed check valve. It consists basically of a flapper in a valve body. Pressurized fuel opens the flapper and allows the fuel to pass through the valve. When the fuel flow stops, the flapper closes.



BBB2-28-43

**Fuel Fill Control Float Switch -- Schematic
Figure 1/28-20-00-990-806**

EFFECTIVITY

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 876, 886, 887, 891, 893

TP-80MM-WJE

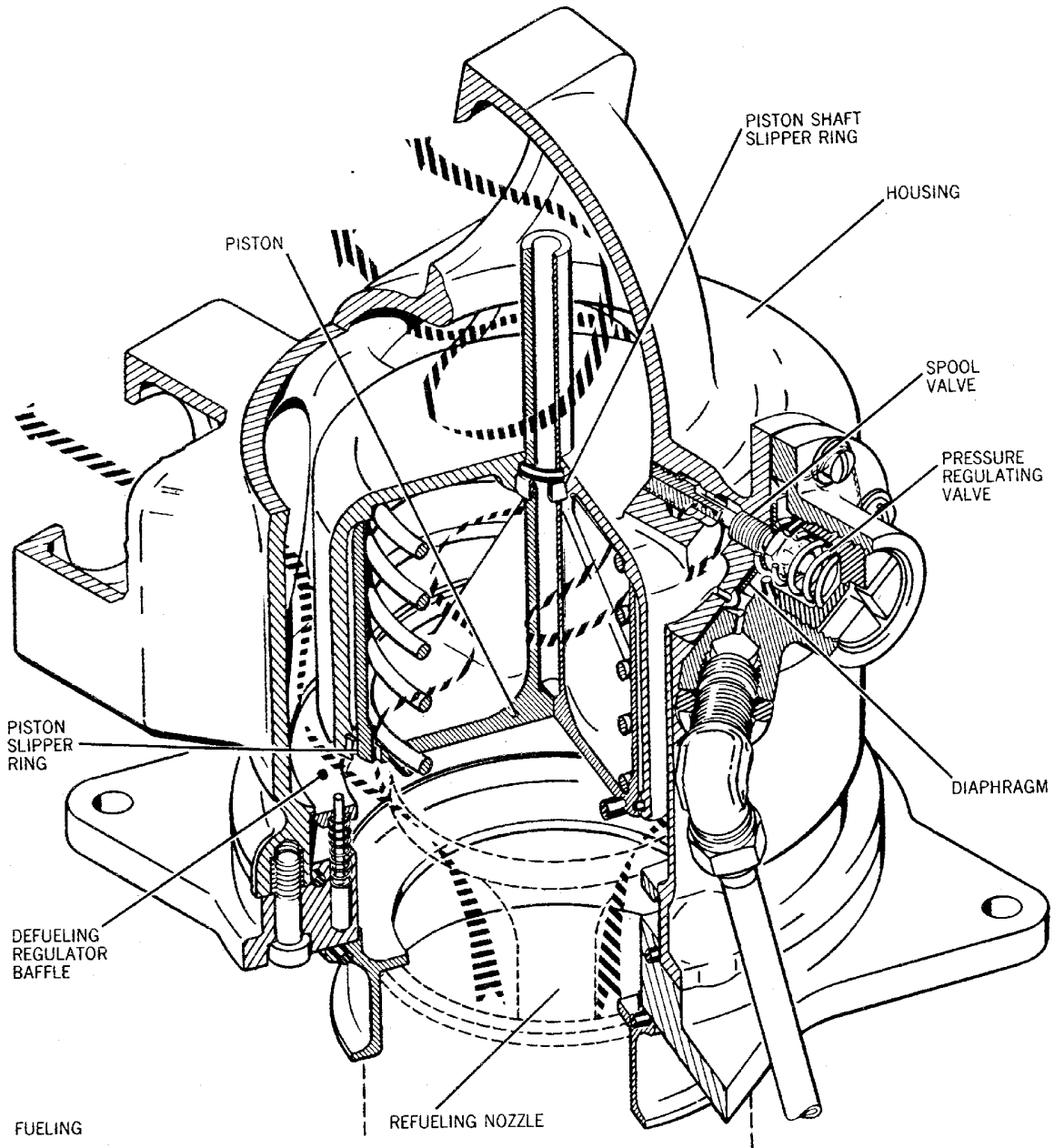
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BBB2-28-46

Pressure Fueling Adapter -- Schematic
Figure 2/28-20-00-990-807

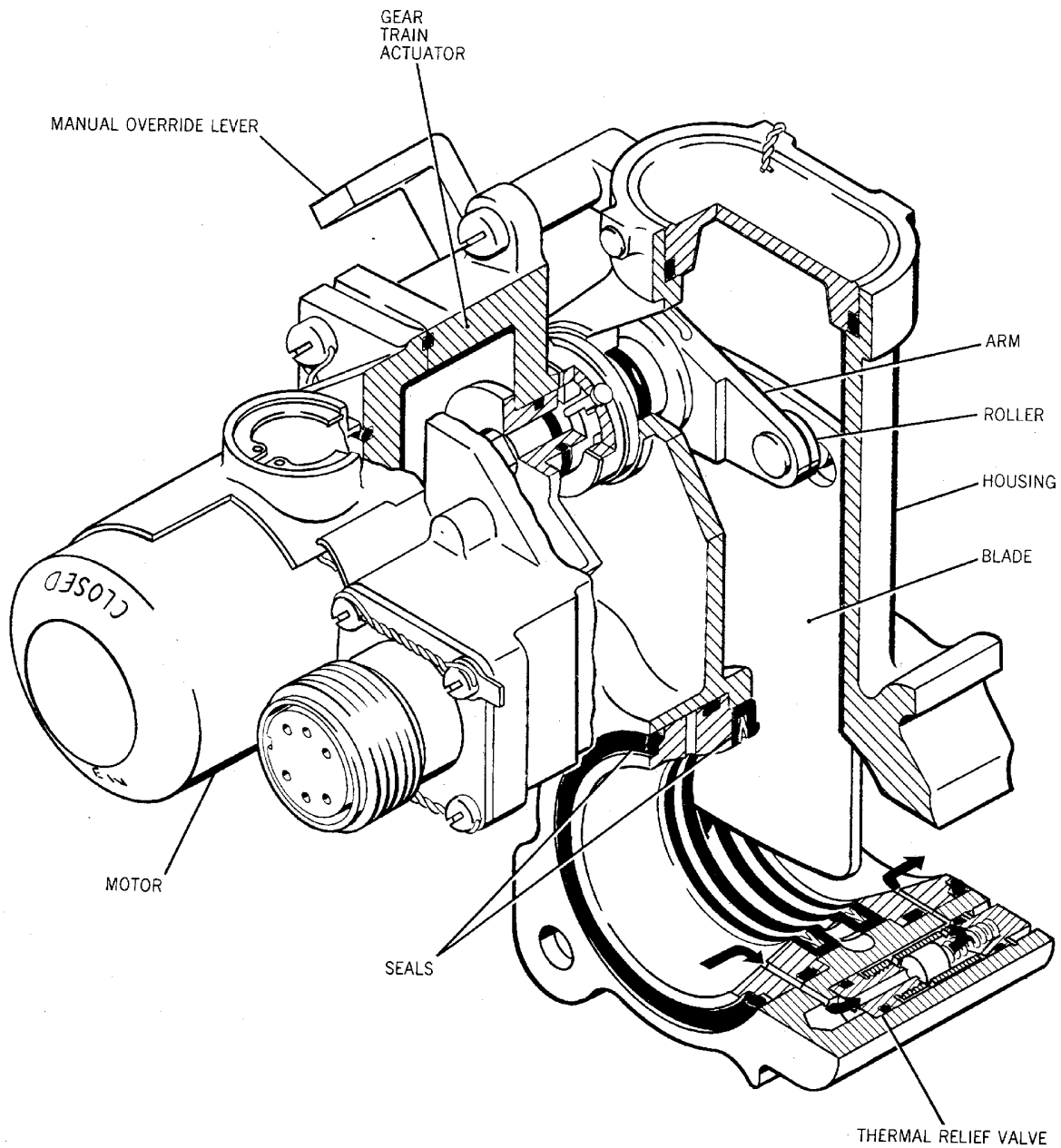
EFFECTIVITY
WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 876, 886, 887, 891, 893

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**Fuel Fill Valves -- Schematic
Figure 3/28-20-00-990-808**

EFFECTIVITY

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 876, 886, 887, 891, 893

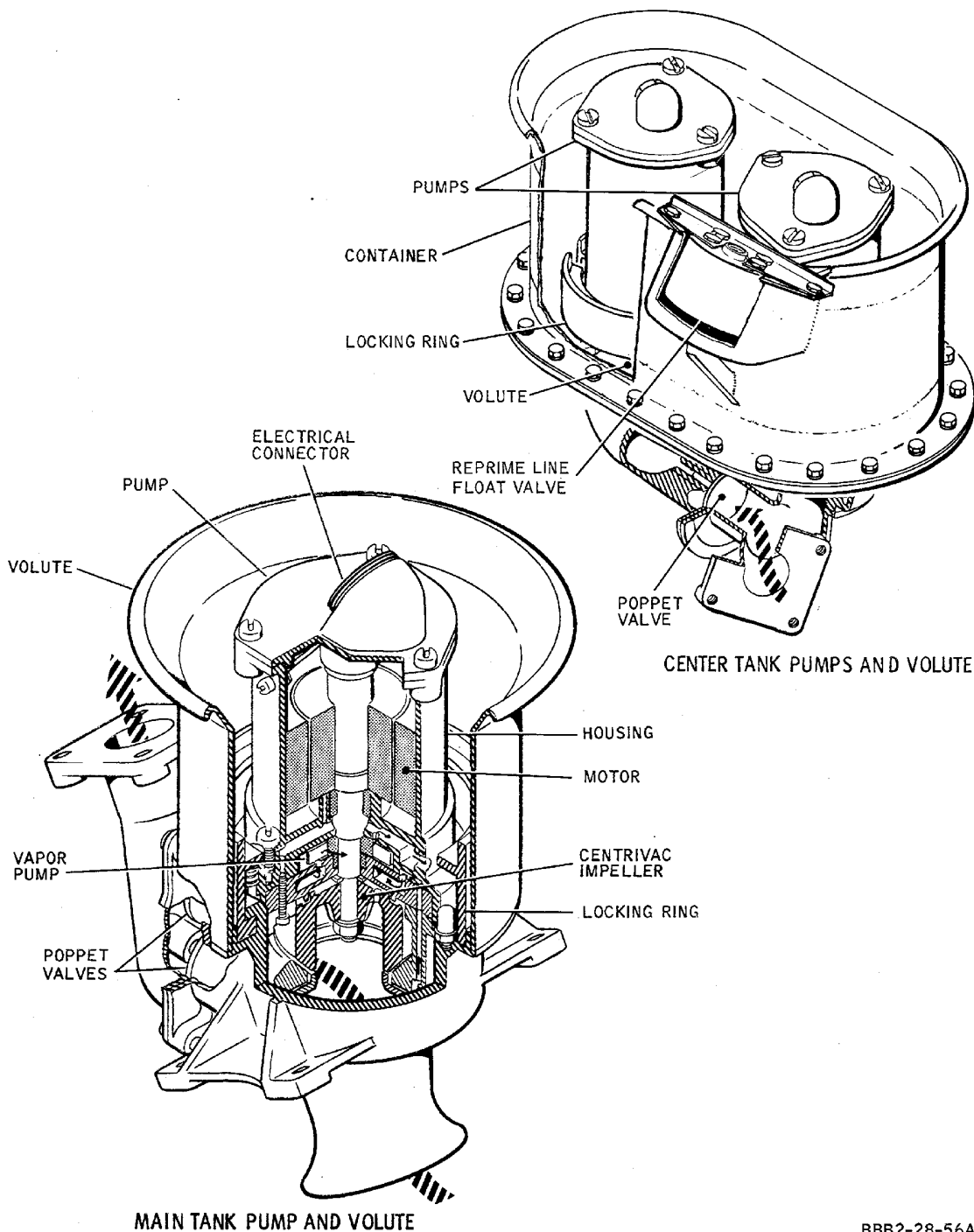
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BBB2-28-56A

**Fuel Boost Pump and Volute -- Schematic
Figure 4/28-20-00-990-809**

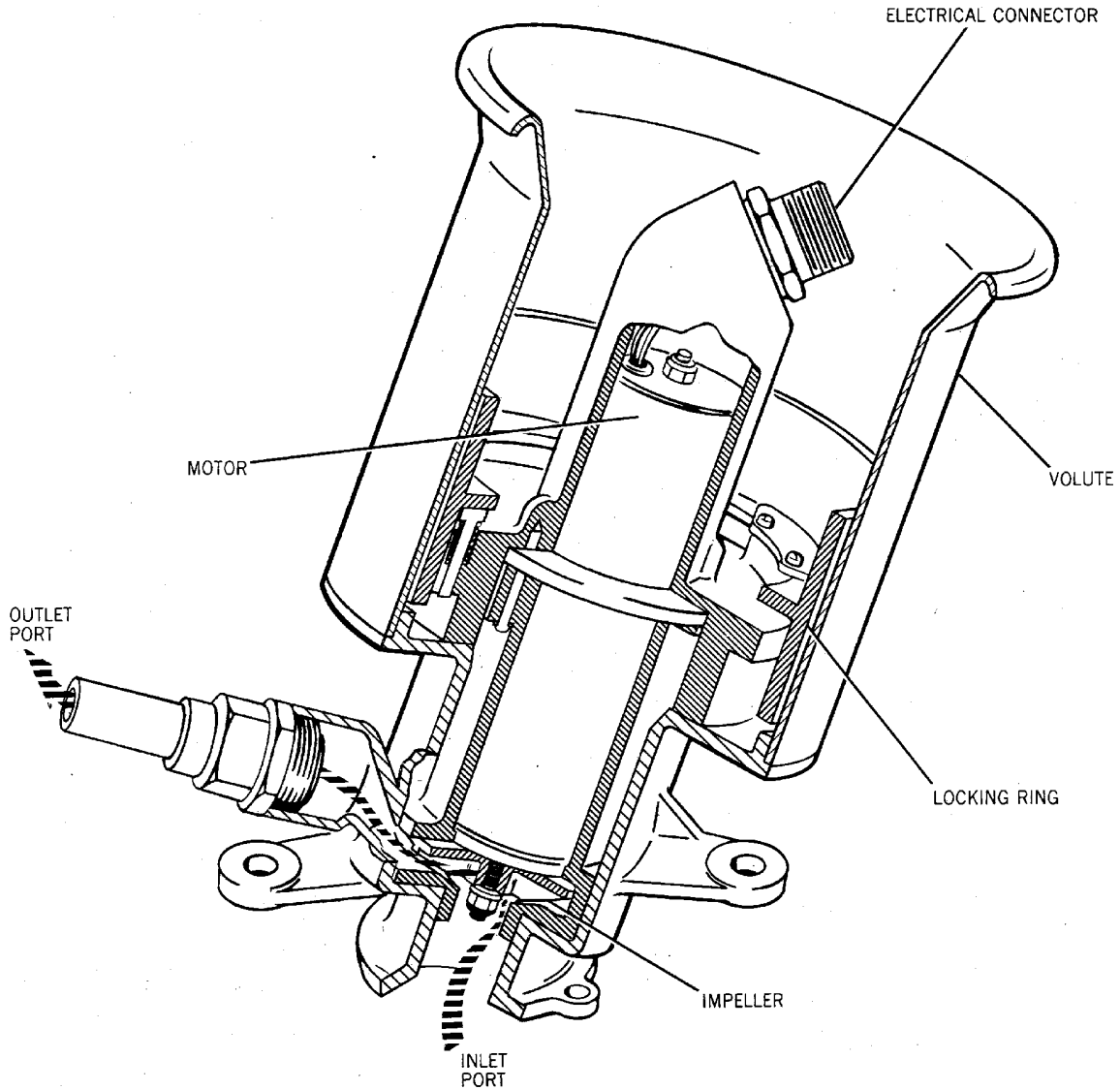
EFFECTIVITY
WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 876, 886, 887, 891, 893

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**Engine Start Pump -- Schematic
Figure 5/28-20-00-990-810**

EFFECTIVITY

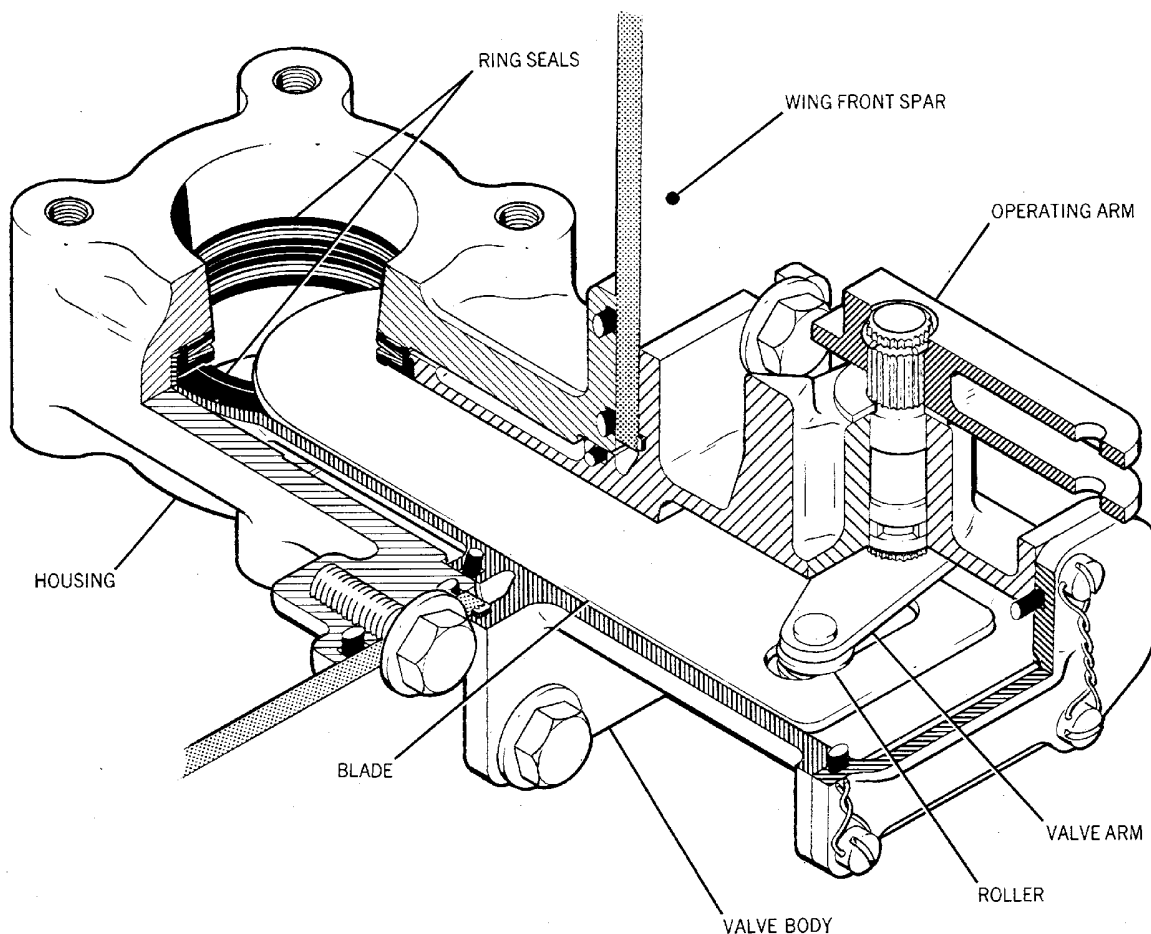
WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 876, 886, 887, 891, 893

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BBB2-28-50

**Fuel Crossfeed Valve -- Schematic
Figure 6/28-20-00-990-811**

EFFECTIVITY

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 876, 886, 887, 891, 893

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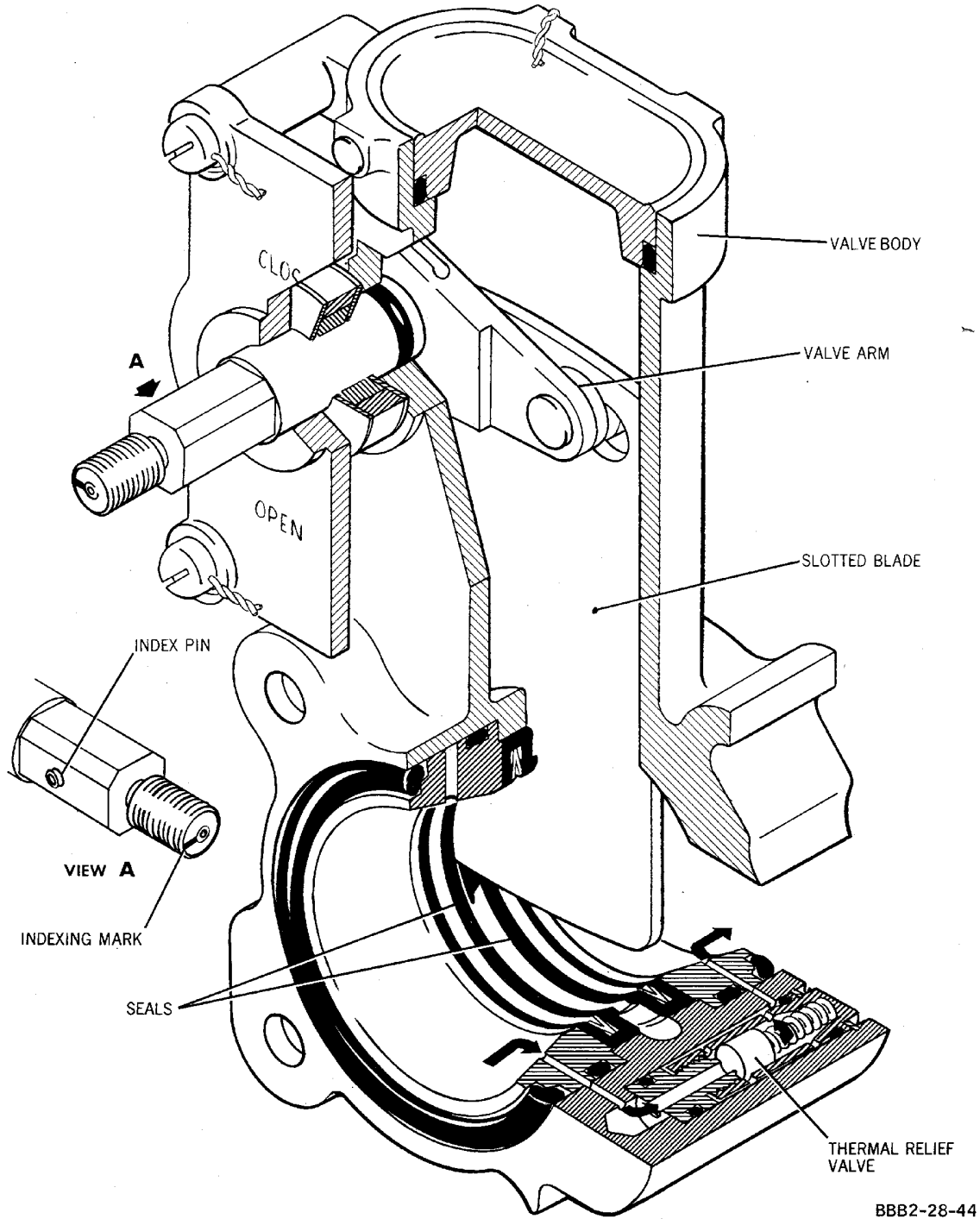
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Engine Fuel Fire Shutoff Valve -- Schematic
Figure 7/28-20-00-990-812

EFFECTIVITY

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 876, 886, 887, 891, 893

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3. Operation

A. Fueling

- (1) When the fueling control panel is energized, fill valve switches placed in the automatic position, and fuel select on the Load Selector Display Unit (LSDU) positioned at a quantity more than the existing tank load, the fill valves will open automatically. Fuel then is allowed to pass through pressure fueling adapter into fueling manifold, through fill valves into respective tank fill lines. When the selected quantity is indicated on the LSDU fuel quantity indicator, a signal is sent to the selector which, in turn, through deenergizing a relay, causes the appropriate fill valve to close. The fill valve may also be closed at any time before the preselected quantity is reached by means of the fill switch. If full tanks are desired, and the fuel select is not set at a quantity less than full, the fill valves will be closed automatically by the fuel fill control float switches installed in each tank. Tank quantity is monitored on the LSDU fuel quantity indicator. If power is not available for fueling operations, the valves can be opened and closed manually. The fuel quantity can be monitored by means of the magnetic dripless fuel measuring sticks located in the bottom of each tank.

B. Defueling

- (1) Defueling by the suction method utilizes the fueling manifold and the fill valves. Fuel is sucked from the individual tank through the tank fill line and open fill valve, into the fueling manifold and out the pressure fueling adapter. The boost pump method utilizes the fueling manifold, the defueling valve, and the tank fuel boost pumps. Fuel is pumped from the individual tank by one or more tank boost pumps through the feed system lines, the defueling manifold, the defueling shutoff valve, into the fueling manifold, and out the pressure fueling adapter. The suction method is best suited to defuel tanks down to maximum fuel quantities allowable with full aircraft loads. The boost pump method permits defueling to a much lower level than that of the suction method. Defueling progress may be monitored by means of the LSDU fuel quantity indicators, or, if power is not available, by means of the magnetic dripless fuel measuring sticks.

C. Fuel Feed

- (1) Fuel feed is accomplished by pumping fuel from a main tank into the feed line, through an engine fuel fire shutoff valve and shrouded line to the engine. A crossfeed valve permits fuel to be supplied to both engines from either main tank. Fuel from the center tank is pumped directly to both engine feed lines. During engine starting, fuel is supplied to the engine by a tank mounted boost pump in the corresponding main tank for the engine to be started. If ac ground power is not available, right engine start pressure is supplied by the battery powered dc start pump located in the right main tank. The start pump will also supply starting fuel pressure to the left engine through the crossfeed valve.
- (2) With both boost pumps in each main tank turned on and both center tank pumps turned on, the greater pressure created by the series-mounted center pumps overrides the fuel pressure from the main tank pumps. As a result, fuel from the center tank is used first with the main tank pumps acting as backup pumps. When the center tank is exhausted, the main tanks automatically supply pressure to the corresponding engine.

D. Pressure Fueling Adapter

EFFECTIVITY

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 876, 886, 887, 891, 893

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- (1) Locking the pressure fueling nozzle in place in the adapter mouth raises the piston slightly. The fuel under pressure enters the adapter mouth and pushes the piston further up into the adapter body cavity. This increases the size of the passage between the piston and the body and permits a larger volume of fuel to flow up past the piston and regulator ring into the passage to the fueling manifold. Overpressure is prevented by a pressure-regulating spool valve. This valve consists of a diaphragm connected to a sliding spool which operates in a small opening between the adapter cavity and the outlet passage. Pressurized fuel passes through small ports in the bottom of the piston, up through another small port in the top of the housing, and past the spool valve into the outlet chamber where the fuel exerts pressure against the spring-loaded valve diaphragm. From here the fuel passes out through the adapter outlet into the fill system. If an over-pressure condition occurs, the diaphragm moves against the spring. This action moves the spool valve into the port, which results in a reduction of passage area. As the area reduces, the pressure inside the piston body builds up until the combination of the spring pressure and the internal piston pressure exceeds the upward pressure from the fueling nozzle. The piston then moves downward, reducing the fuel inlet area. This reduces the pressure to the fueling system. Normal operating pressure for the fuel fill system is 0 to 50 psi (0 to 345 kPa). The regulator (pressure fueling adapter), when subjected to inlet pressure of 50-150 psi (345-1035 kPa), restricts flow and maintains outlet port pressure at 45-50 psi (310.5-345 kPa) during all flow conditions above 150 gallons (367.8 liters) per minute.
- (2) During defueling, the reverse pressure of the fuel being drawn through the adapter by the defueling equipment forces the spring-loaded regulating ring down. This increases the passage area around the base of the piston and increases the defueling rate.

E. Fuel Fill Valves

- (1) The motor, through a gear train actuator, moves the slotted blade in the housing. Movement of the blade up into the housing allows fuel to flow; movement of the blade down into the fuel stream shuts off the flow. The manual override lever permits manual manipulation of the blade. The housing of the valve is marked to indicate the open and closed positions of the valve. The manual override lever acts as a pointer for this function. The thermal relief valve relieves into the tank at 65 psig (448.5 kPa) maximum and closes at 40 psig (276 kPa) minimum.

F. Fuel Fill Control Float Switches

- (1) Vertical movement of the float as a result of the rise of the fuel surrounding the switch causes the switch to open when the fuel is at, or above, the operating level of the switch.

G. Fuel Boost Pumps

- (1) Fuel enters the inlet port in the bottom of the volute. From here it is picked up by the centrivac impeller, which centrifugally separates any gas and vapor bubbles from the fuel. The bubbles are channeled to the vapor pump where, by means of a mated rotor and casing, the bubbles are collected and compressed into near liquid form. The near liquid vapor is then discharged back into the fuel feed system. Some fuel is circulated within the pump for pump cooling.
- (2) Both main tank volute poppet valves act as a reverse flow check valve to prevent fuel from flowing back into the tank. One valve is slotted and acts as a bypass relief. The center tank volute poppet valve bypasses fuel to the forward pump when the aft pump is not operating.
- (3) The thermal protection switches open individually in response to an overheat condition in any of one or more phases of the motor electrical circuit.
- (4) The locking ring on the pump housing is turned by means of a special tool until the ring is against the stops in the volute housing. The locking lugs then snap into position to lock the pump into the volute. The pump is removed from the volute by using the same tool and reversing the installation procedures.

H. Engine Start Pump

EFFECTIVITY

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 876, 886, 887, 891, 893

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- (1) Fuel is picked up from the tank through the inlet port in the bottom of the volute by the impeller. The fuel is discharged through the outlet port into the start pump line which leads through a check valve into the main fuel feed line. The check valve prevents reverse flow of fuel through the start pump.
 - (2) The locking ring on the pump housing is turned by means of the special tool until the ring is against the stops in the volute housing. The locking lugs then snap into position to lock the pump into the volute. The pump is removed from the volute by using the same tool and reversing the installation procedure.
- I. Engine Fuel Fire Shutoff Valve
- (1) The gate valve is normally open. To shut off the engine fuel supply, the respective fire shutoff lever in the cock-pit is pulled, causing the valve cable drum to rotate. This rotates the valve arm and forces the slotted blade downward into the fuel stream until it cuts off the fuel flow through the valve ports.
- J. APU Fuel Fire Shutoff Valve
- (1) The solenoid is energized through the APU master switch on the overhead switch panel. This opens the valve permitting fuel, pressurized either by the tank boost pumps or the engine start pump, to reach the APU. The valve is closed by deenergizing the solenoid. This is done through any one of three switches. Normal closing of the valve is accomplished by placing the APU master switch in the off position. Emergency shutdown is accomplished through either the fire control switch on the overhead switch panel or the fire shutoff switch on the APU external control panel aft of the APU compartment in the underside of the aft fuselage.
- K. Center Tank Reprime Line Float Valve
- (1) When the pump container is less than full (below the float level in the float valve) the float is down, which results in the needle valve being unseated. This action permits pump fuel pressure to fill the pump container. When the container is full, fuel enters the float valve causing the float to rise, reseating the needle valve and shutting off the fuel flow into the container.
- L. Center Tank Reprime Line Check Valve
- (1) Pressurized fuel from the boost pump opens the flapper and allows the fuel to pass through the valve. When the fuel flow stops, the flapper closes to prevent possible air from entering the engine feed system if the center tank fuel level is below the prime outlet.

EFFECTIVITY

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 876, 886, 887, 891, 893

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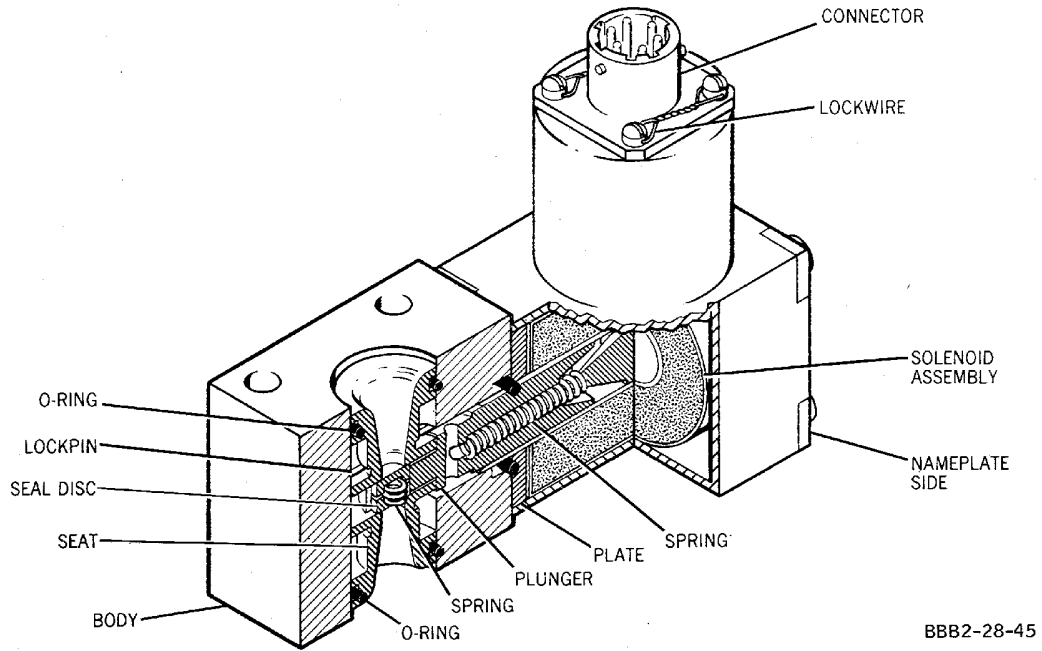
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**APU Fuel Shutoff Valve -- Schematic
Figure 8/28-20-00-990-813**

EFFECTIVITY

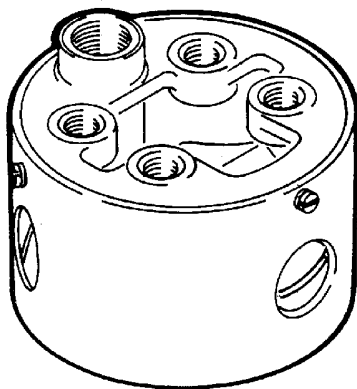
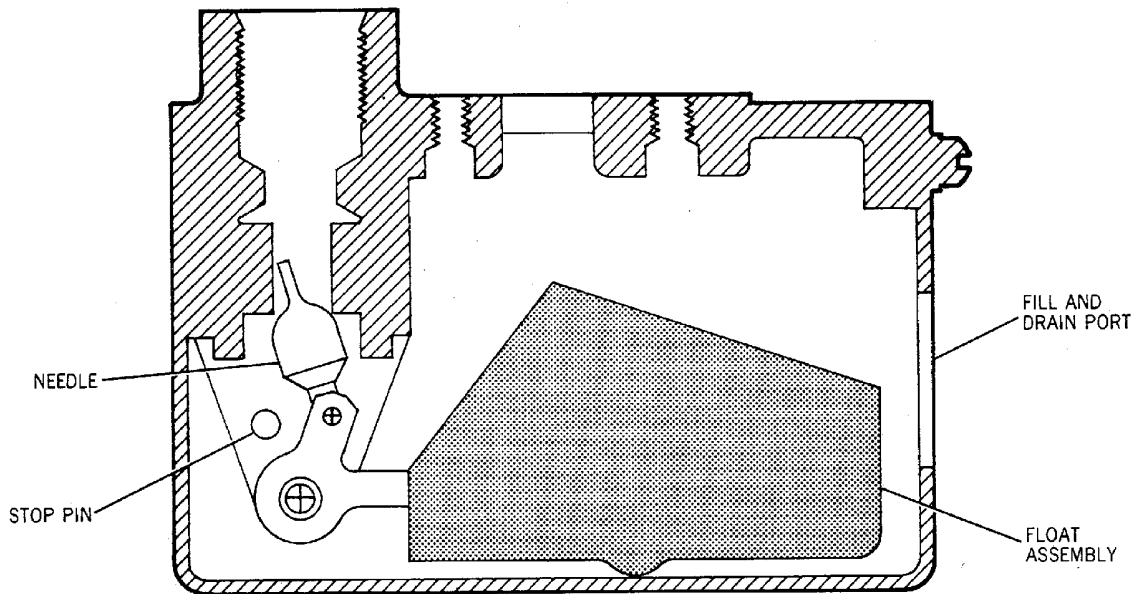
WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 876, 886, 887, 891, 893

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BBB2-28-59

**Center Tank Reprime Line Float Valve -- Schematic
Figure 9/28-20-00-990-814**

EFFECTIVITY

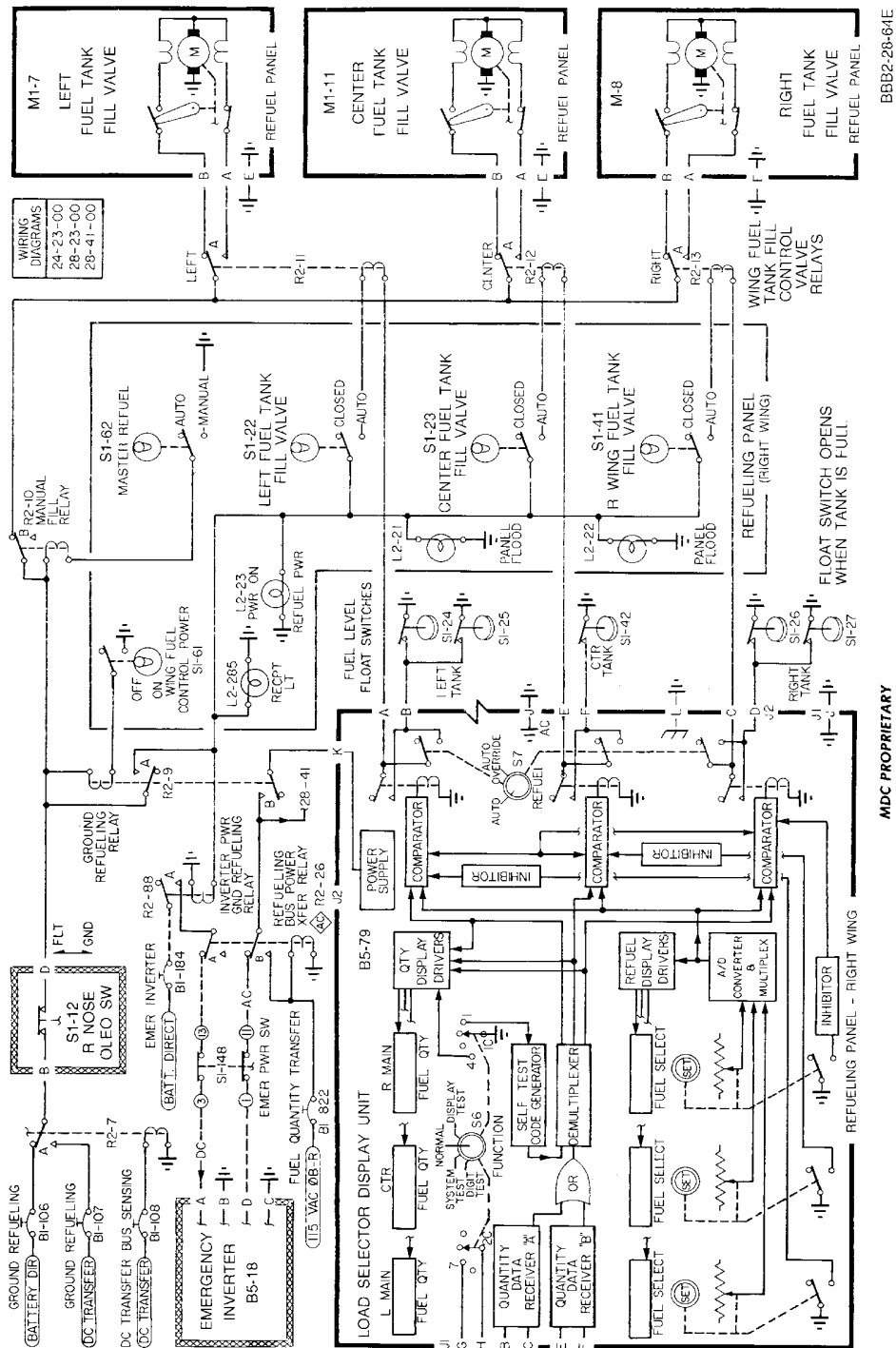
WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 876, 886, 887, 891, 893

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BBB2-28-64E

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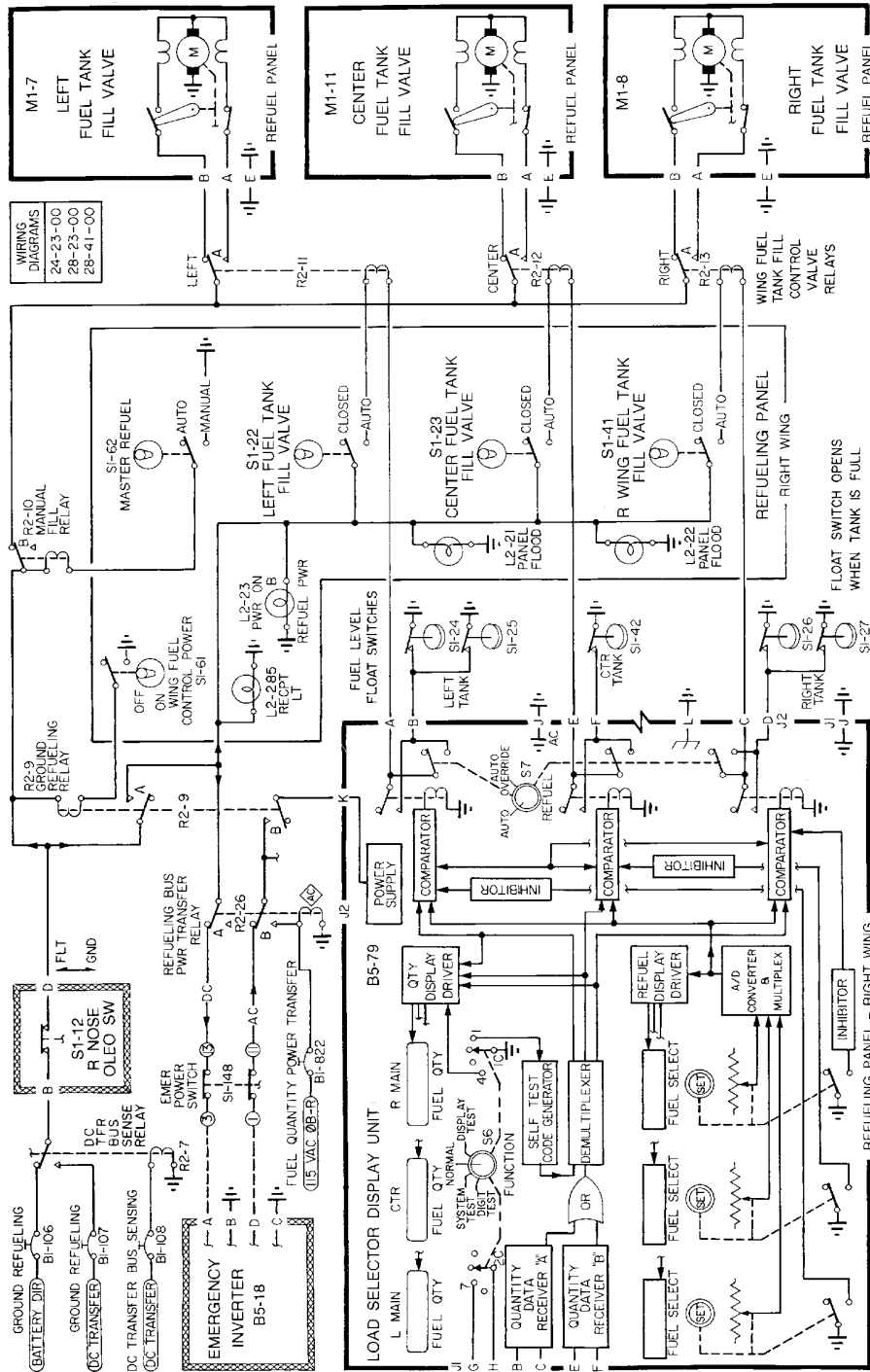
Refuel & Quantity Preselect -- Schematic
Figure 10/28-20-00-990-815 (Sheet 1 of 2)

EFFECTIVITY
WJE 886, 887, 893

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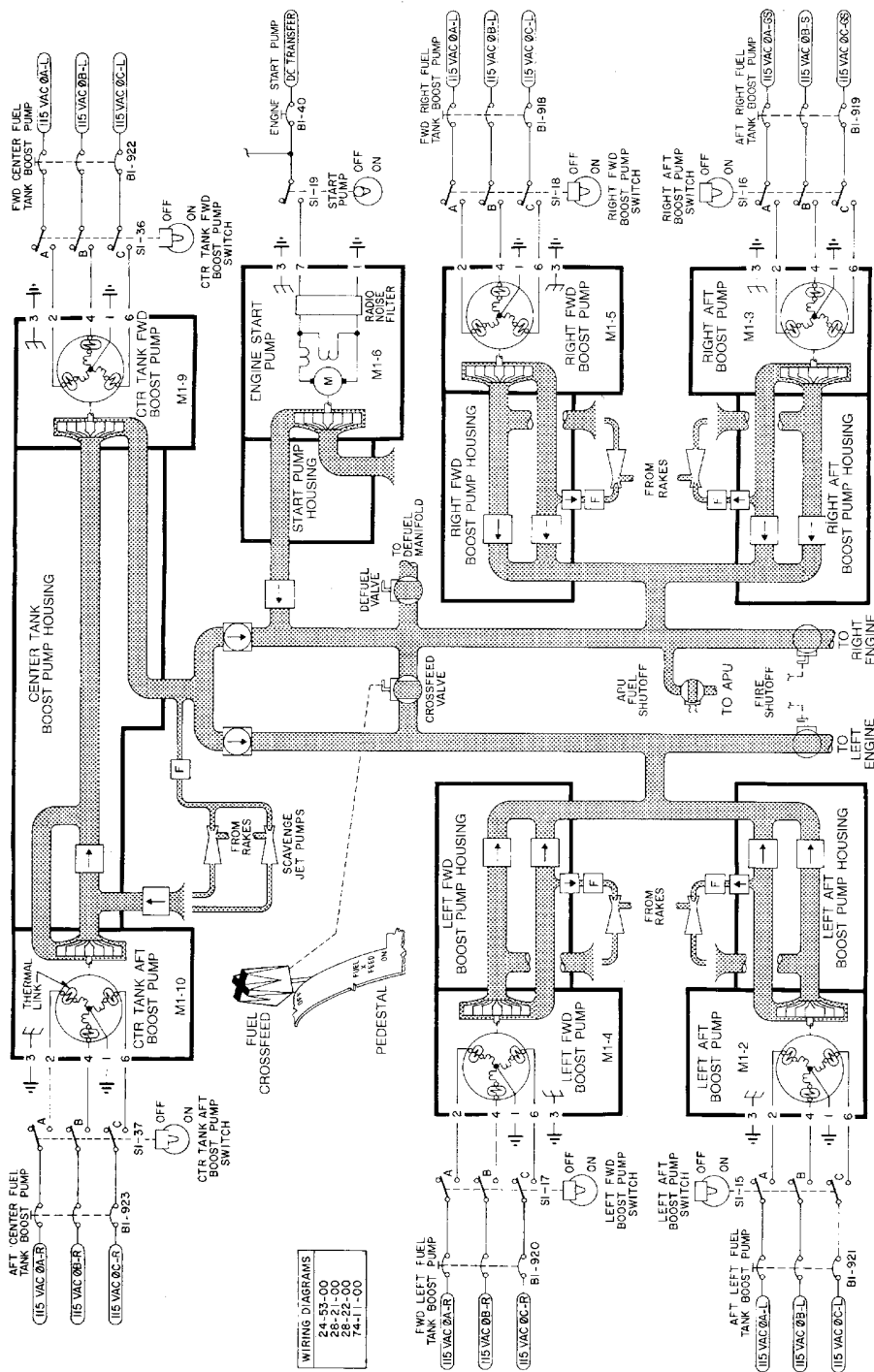
Refuel & Quantity Preselect -- Schematic
Figure 10/28-20-00-990-815 (Sheet 2 of 2)

EFFECTIVITY
WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 876, 891

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Fuel Boost Pumps -- Schematic
Figure 11/28-20-00-990-816 (Sheet 1 of 3)

WIRING DIAGRAMS
24-53-00
28-21-00
28-22-00
74-11-00

BBE2-28-139D

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EFFECTIVITY

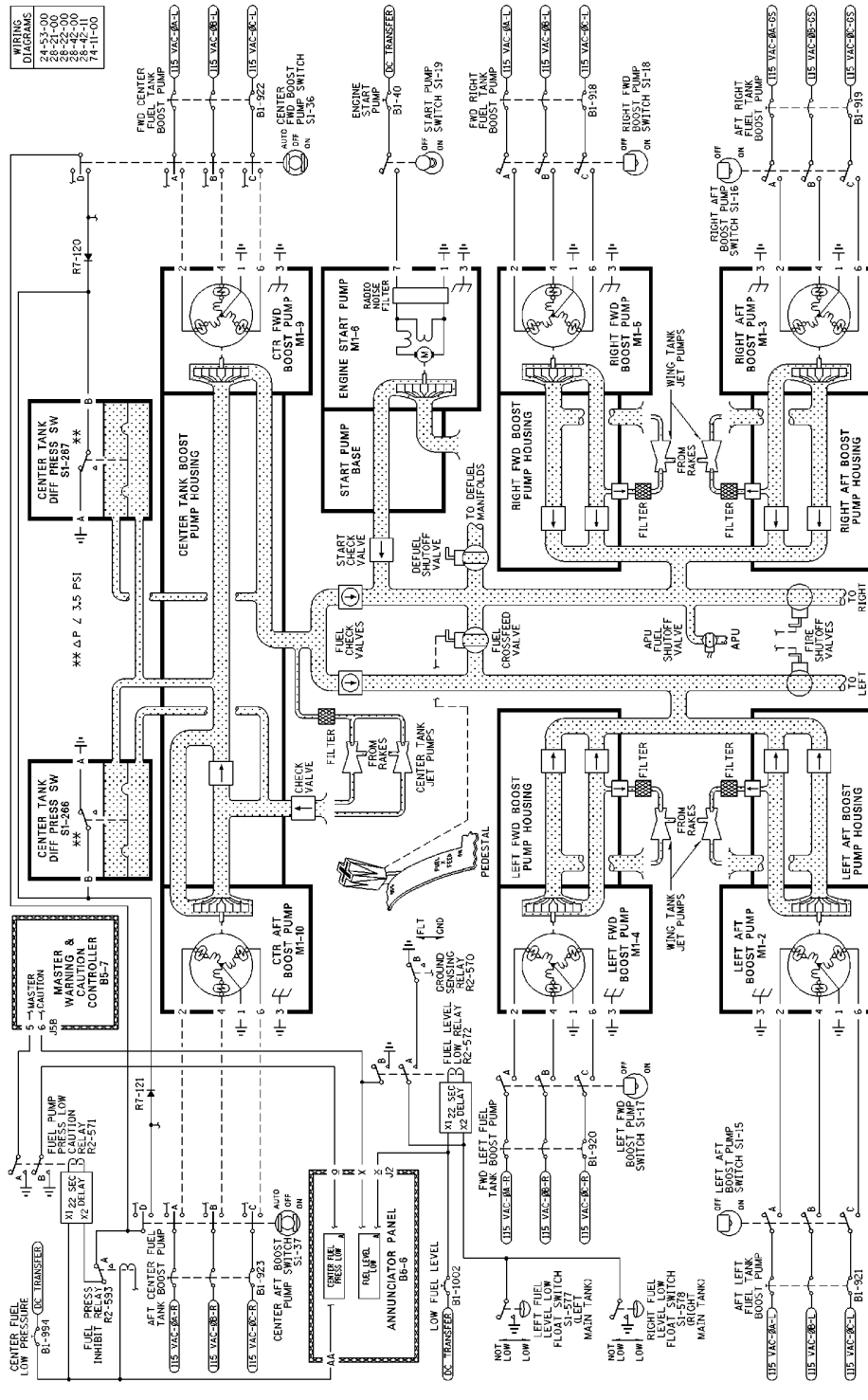
WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893; without SB 28-53, 54, 58, 63

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BBB2-28-2468

MDC PROPRIETARY

CAG(IGDS)

Fuel Boost Pumps -- Schematic
Figure 11/28-20-00-990-816 (Sheet 2 of 3)

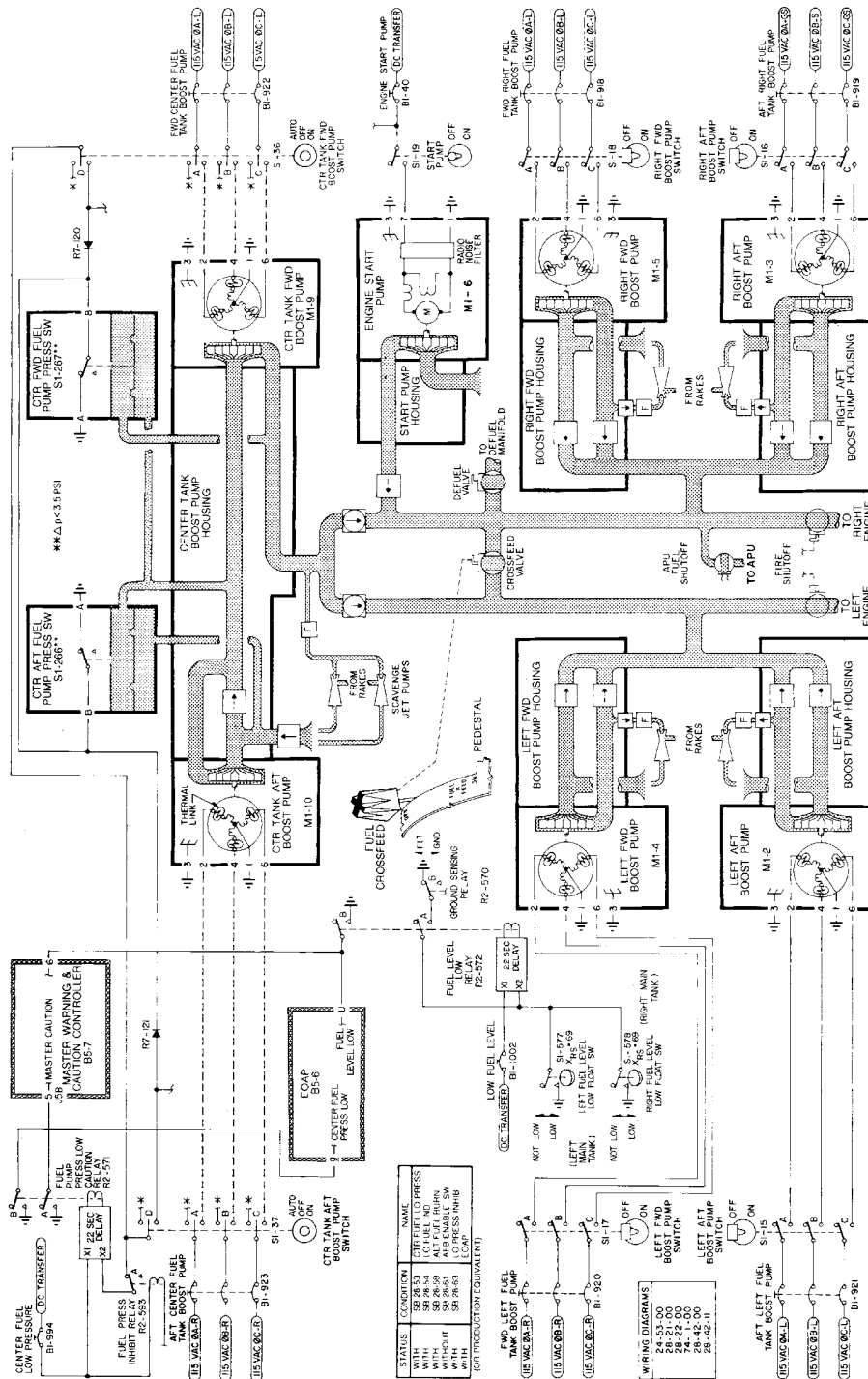
EFFECTIVITY
WJE 416, 420, 422, 424-427, 429, 868, 886, 887, 891, 893; with SB 28-53, 54, 58, 63

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MDC PROPRIETARY

EFFECTIVITY
WJE 415, 417-419, 421, 423, 863-866, 869, 871, 872, 875, 876; with SB 28-53, 54, 58, 63

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DISTRIBUTION - DESCRIPTION AND OPERATION

1. General

- A. The fuel distribution system is divided into fill, defueling, and feed. The fill system is concerned with distribution and control of fuel from fueling adapter to tanks. The system consists of a single-point pressure fueling and regulating adapter located approximately midspan in the right wing leading edge; three (five on aircraft with fuselage tanks) electrically operated, float switch-controlled fuel fill valves, one for each tank, inboard of the adapter and behind a fueling control panel; and necessary lines to carry fuel to tanks. The fueling control panel contains the panel electric power switch, power indicating light, Load Selector Display Unit (LSDU) with test switch and override switch, master refuel switch, fill valve control switches, and a manual electric override switch. Two ground service interphone jacks are also installed on the panel. Gravity fueling may be accomplished through each overwing fill adapter located in the upper surface of the wings near the tip. Grounding jacks are located aft of each fill adapter.
- B. Defueling is accomplished through an adapter and a defueling valve located inboard of the fueling control panel in a line connecting to right main tank fuel boost pump pressure line.
- C. The fuel feed system consists of six fuel boost pumps (two single pumps for each main tank and two series-mounted pumps for the center tank), necessary check valves, a crossfeed valve, two engine fuel fire shutoff valves, and an APU fuel fire shutoff valve. Fuel is supplied to the engine and the APU through shrouded lines. The shroud system has a drain valve located on the lower right side of the fuselage aft of the wheelwell. A start pump is also installed in the right main tank to provide starting fuel pressure to engines and/or APU when ac power is not available.
- D. A center tank pump reprime system provides reprime fuel for the center tank boost pumps. The system taps left tank boost pump pressure line fuel and diverts it to the center tank pump volute to maintain reprime fuel level.
- E. Some aircraft, and aircraft with SB 28-58 incorp., have an alternate fuel burn system installed. (ALTERNATE FUEL BURN - DESCRIPTION AND OPERATION, PAGEBLOCK 28-21-00/001)

2. Description

- A. Pressure Fueling Adapter
 - (1) The pressure fueling adapter connects the ground fueling and defueling equipment to the aircraft pressure fueling system. The adapter is located approximately midspan in the right wing leading edge. The adapter consists of a housing, piston, pressure regulating valve, and a spring-loaded regulating ring.
- B. Fuel Fill Valves
 - (1) The three (five on aircraft with fuselage tanks) fuel tank fill valves are dc motor-operated, gate-type valves. The valves are line-mounted inboard of the pressure fueling adapter and behind the fueling control panel. Each valve consists of a housing, motor, gear train actuator, roller and arm, manual override lever, slotted blade, and a thermal relief valve. Dc power to operate the valves is supplied from the 28-volt aircraft battery through the battery direct bus on the overhead circuit breaker panel, or, if APU or external power is available, through the dc transfer bus on the lower main circuit breaker panel.
- C. Fuel Fill Control Float Switch
 - (1) The fuel fill control float switches are float-operated magnetic switches. Each switch assembly consists of a hermetically sealed glass-enclosed switch, two float-supported magnets, and perforated aluminum shell.
 - (2) DC power to operate the switches is supplied from the 28-volt aircraft battery direct bus in the overhead circuit breaker panel, or, if APU or external power is available, through the dc transfer bus on the lower main circuit breaker panel.

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

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WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-226

- (3) An in-line fuse is installed in the applicable float switch wire that is external of the fuel tank. The purpose of the fuse is to prevent the ignition of the fuel fumes in a fuel tank caused by a short.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-228

D. GFI Relay

- (1) Each center and auxiliary tank GFI relay gives protection from frictional heating or sparking that may develop from fuel pump failure caused by the pump running in an empty tank if the normal shutoff command is delayed or as a result of control system failures.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

E. Load Selector Display Unit (LSDU)

- (1) The Load Selector Display unit provides the fuel load preselect capability for partial fueling of the fuel tanks. The LSDU digitally displays individual tank quantities and preselected quantities. Selector knobs, one beneath each fuel select display, are used to select desired fuel loads. Load quantity is set by pulling out the respective selector knob, turning knob to desired quantity on display readout, then pushing knob in to normal position.

F. Fuel Boost Pumps

- (1) There are six fuel boost pumps in the fuel distribution system. The main tank pumps are located, two in each tank, in the feed reservoir, at the inboard end of each main tank. The center tank pumps are located in a container in the right side of the center tank. A line from the center tank fuel fill line carries fuel into the pump container to provide priming fuel for the center tank pumps. A second line which utilizes boost pump fuel pressure acts as a reprime line to refill the pump container during flight. A float type shutoff valve in the line shuts off the reprime fuel when the container is full. A flapper-type check valve prevents air from being drawn into the fuel line if the center tank fuel level is below the prime outlet. All pumps are accessible through access doors located in the upper wing skin above each pump. Each of the four main tank pumps is mounted in a volute attached to the structure in the bottom of the tank. The two center tank pumps are mounted in series in a double volute attached to the structure in the right side of the center tank. Each pump is retained in the volute by a locking ring which is a part of the pump assembly and remains with the pump during removal and installation. All pumps are identical submersion-type pumps. Each pump consists basically of a motor, centrifac impeller, vapor pump and housing. Power for the pumps is 3-phase, 115-volt ac supplied through the ac bus on the upper main circuit breaker panel in the flight compartment. The boost pump switches are located on the fuel tank section of the forward overhead switch panel. In case of an overheated pump, thermal protection is provided by nonresettable thermal protectors, one for each power phase.
- (2) The volute consists of a guide and housing assembly, two locking lugs, and three index pins. Each tank volute has two poppet-type valves installed in the housing. One valve acts as a reverse flow check valve; the other as a bypass valve. The center tank volute has one poppet-type valve in the housing functioning as a bypass valve. The index pins are installed in the volute with differing radii to prevent incorrect indexing of pump to volute. The volute receives and mounts the pump. The locking ring on the pump housing locks the pump in position in the volute. A special tool is used to remove and install the pumps.

G. Engine Start Pump

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

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- (1) The engine start pump, located in the right main tank reservoir, supplies fuel to the engine and/or the APU when normal boost pump pressure is not available. The pump is mounted in a volute attached to the bottom structure of the tank. The pump is retained in the volute by means of a locking ring, which is part of the pump assembly and remains with the pump during installation and removal. The pump consists basically of a 28-volt dc motor, an impeller, and a housing. Power is supplied from a circuit breaker on the DC transfer bus on the lower main circuit breaker panel through a start pump switch on the lower left side of the overhead switch panel in the flight compartment.
 - (2) The volute consists basically of a guide and housing assembly, two locking lugs, and three index pins. The index pins are installed in the volute with differing radii to prevent incorrect indexing of the pump to the volute. The volute receives and mounts the pump. The locking ring on the pump housing locks the pump in position in the volute. A special tool is used to remove and install the pump.
- H. Fuel Crossfeed Valve
- (1) The fuel crossfeed valve is a semi-submerged, manually operated, plug-in gate-type valve. The valve is located in the crossfeed line with the valve housing attached to the aft face of the right wing front spar. The valve body, with sliding blade, may be removed from the housing from outside the tank. The valve is operated from the cockpit by a cable and drum arrangement connected to the fuel crossfeed control lever located on the control pedestal in the flight compartment.
 - (2) The valve assembly consists of a slotted blade, valve arm roller, valve shaft, and valve operating arm. The blade is slotted for the mating roller of the arm to work in. The roller moves on an arm secured to the valve operating shaft. The shaft is rotated by the operating arm. The valve shaft rotates 90 degrees from the open to the closed position of the blade. The blade is normally seated (closed) between two spring-loaded ring seals. When the blade is pulled into the upper portion of the valve body, fuel is allowed to flow through manifold.
- I. Engine Fuel Fire Shutoff Valve
- (1) The two engine fuel fire shutoff valves are manually operated gate-type valves. There is one valve in each engine fuel supply line aft of the wing rear spar. The valves are operated by the fire control handles in the flight compartment. The valve consists of a valve body, valve arm, and slotted blade.
 - (2) An arrow on the end of the shaft relates the valve position to the open and closed positions marked on the valve adapter plate. The valve handle is indexed to the valve shaft by means of a pin in the shaft.
 - (3) A line thermal relief valve relieves excess pressure buildups due to thermal expansion of trapped fuel. The relief valve opens at 65 psi (448.5 kPa) to bleed pressure around blade of closed valve. The valve reseats at 40 psi (276.0 kPa) minimum. The valve is relieved into the tank.
- J. APU Fuel Fire Shutoff Valve
- (1) The APU fuel fire shutoff valve is located in the APU fuel supply line inboard of the right engine fuel fire shutoff valve on the right wing rear spar. The valve controls the fuel supply to the APU. The valve consists basically of a solenoid-operated plunger which slides in and out of a passage in the valve body. Power is 28-volt dc supplied from a dc battery bus circuit breaker on the overhead circuit breaker panel.
- K. Center Tank Reprime Line Float Valve
- (1) The center tank reprime line float valve is a float-operated needle valve. The valve shuts off reprime line fuel to the center tank pump container when the container is full.

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

TP-80MM-WJE

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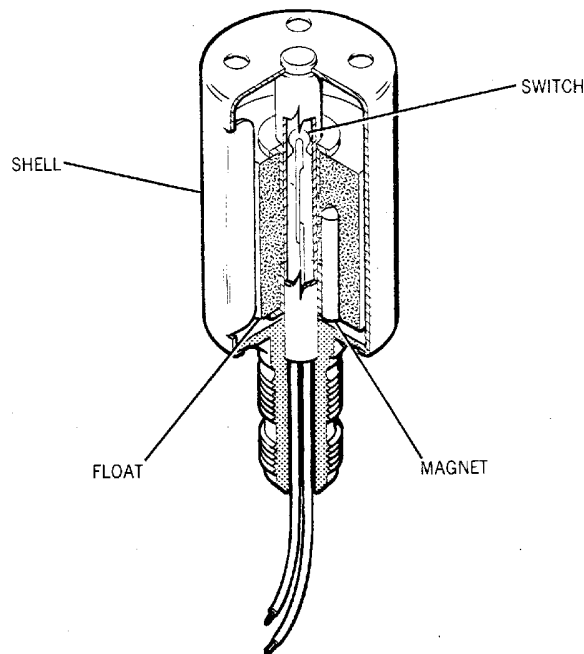
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- (2) The float valve consists of a housing, a float and needle valve assembly, and a metal can enclosure. The float and needle assembly consists of a float, a float arm, and a needle valve. The needle valve attaches to one end of the float arm and is self-aligning to the seat. The other end of the arm is attached to the float. A stop pin prevents the float from moving the arm past the valve closed position. A protrusion on the needle valve prevents it from becoming misaligned with the seating port. A stop heel on the bottom of the float restricts the float movement and aids in preventing the needle valve from being completely withdrawn from the seating port. The can enclosure is attached to the housing. There are three fill and drain holes in the side of the can.
- L. Center Tank Reprime Line Check Valve
- (1) The center tank reprime line check valve is a normally closed check valve. It consists basically of a flapper in a valve body. Pressurized fuel opens the flapper and allows the fuel to pass through the valve. When the fuel flow stops, the flapper closes.



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Fuel Fill Control Float Switch -- Schematic
Figure 1/28-20-00-990-857

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

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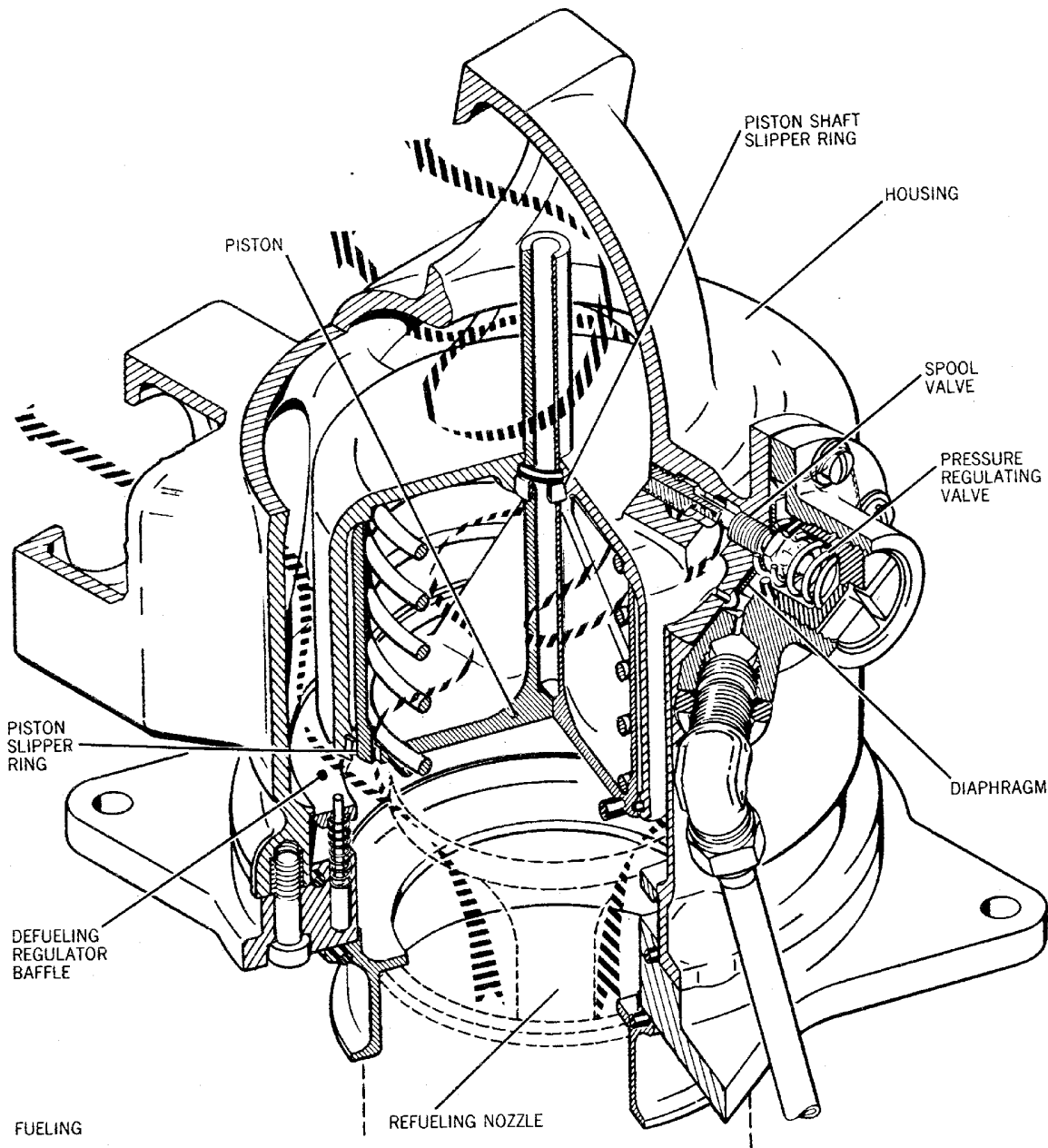
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Pressure Fueling Adapter -- Schematic
Figure 2/28-20-00-990-858

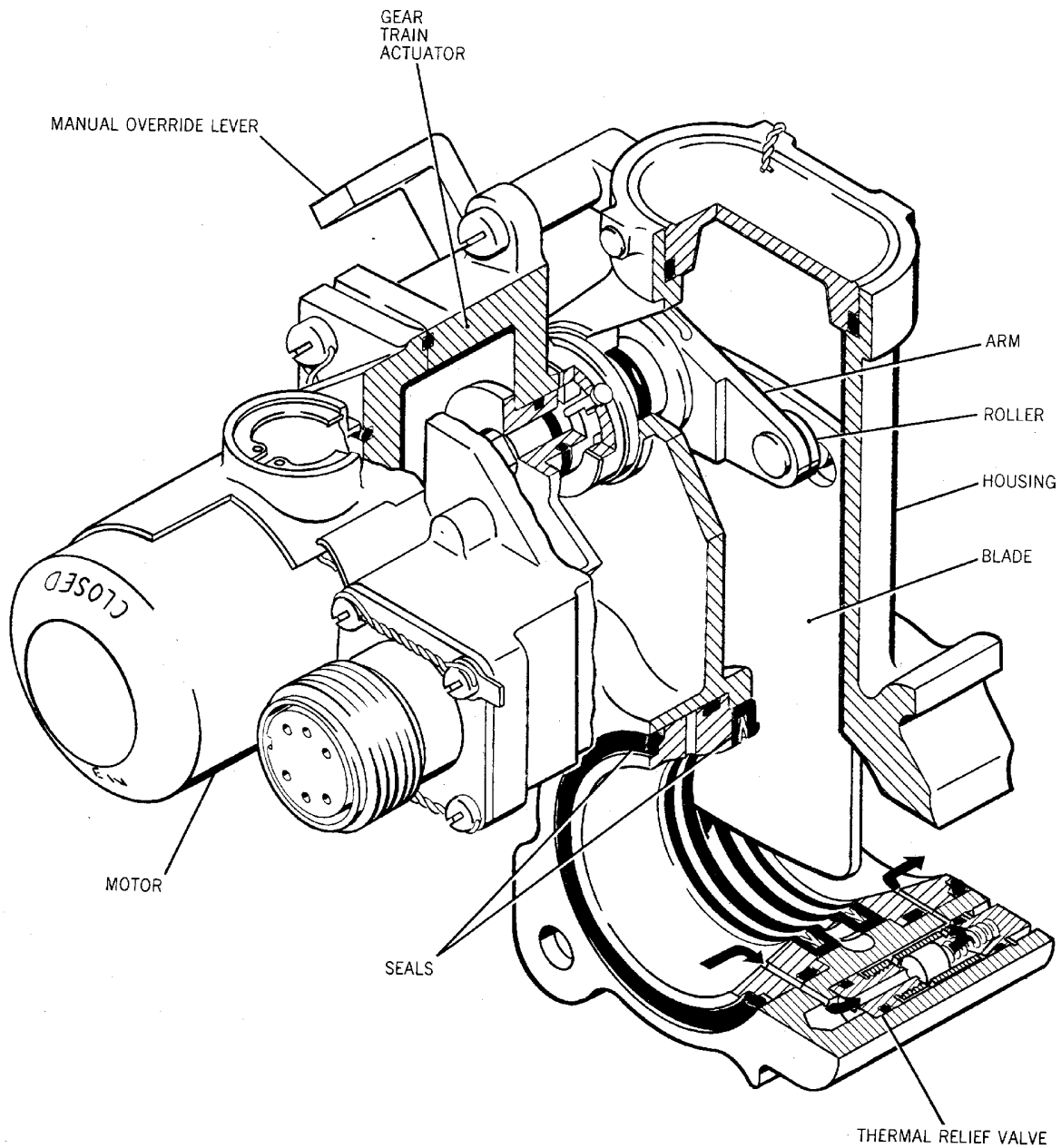
EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

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Fuel Fill Valves -- Schematic
Figure 3/28-20-00-990-859

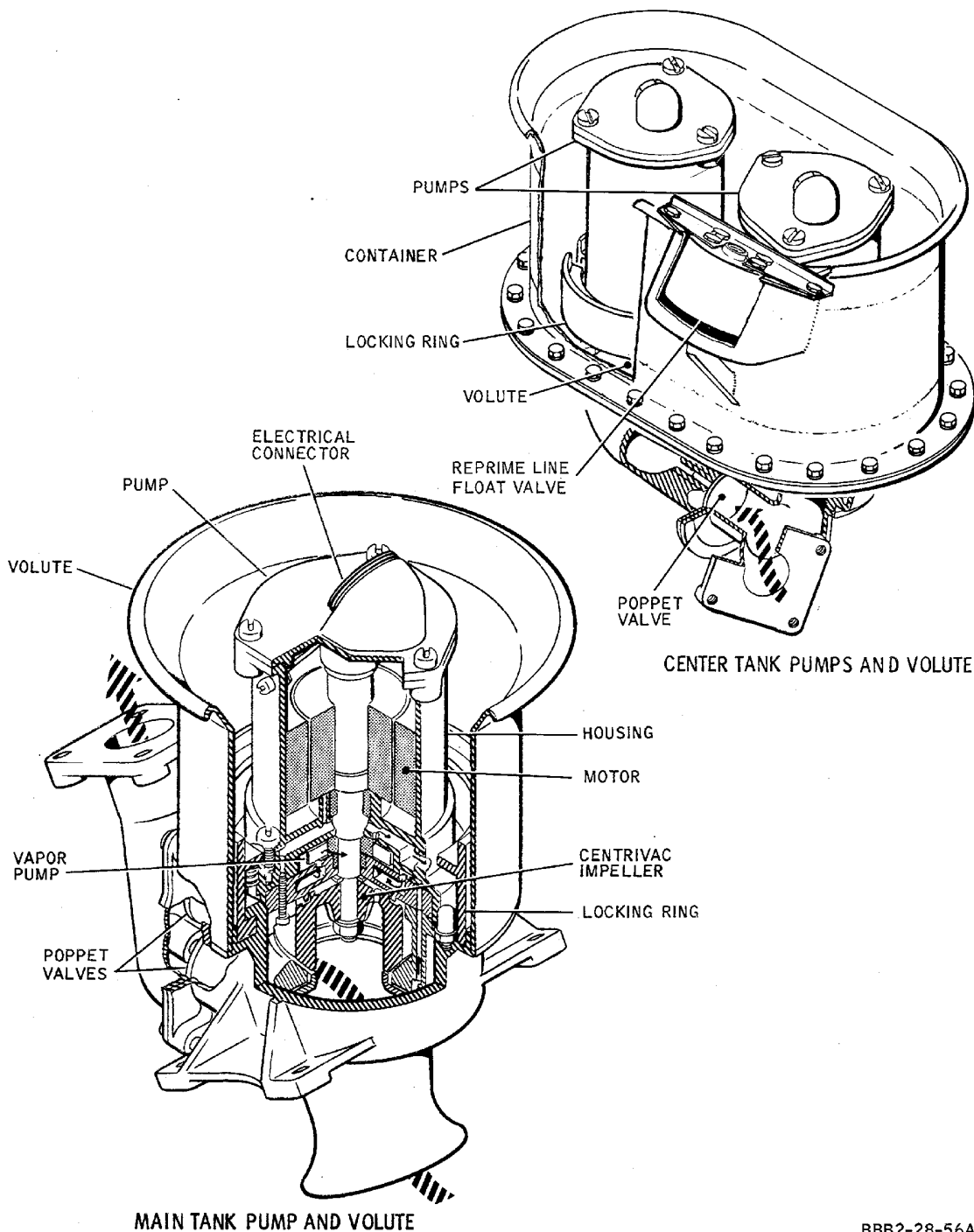
EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

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**Fuel Boost Pump and Volute -- Schematic
Figure 4/28-20-00-990-860**

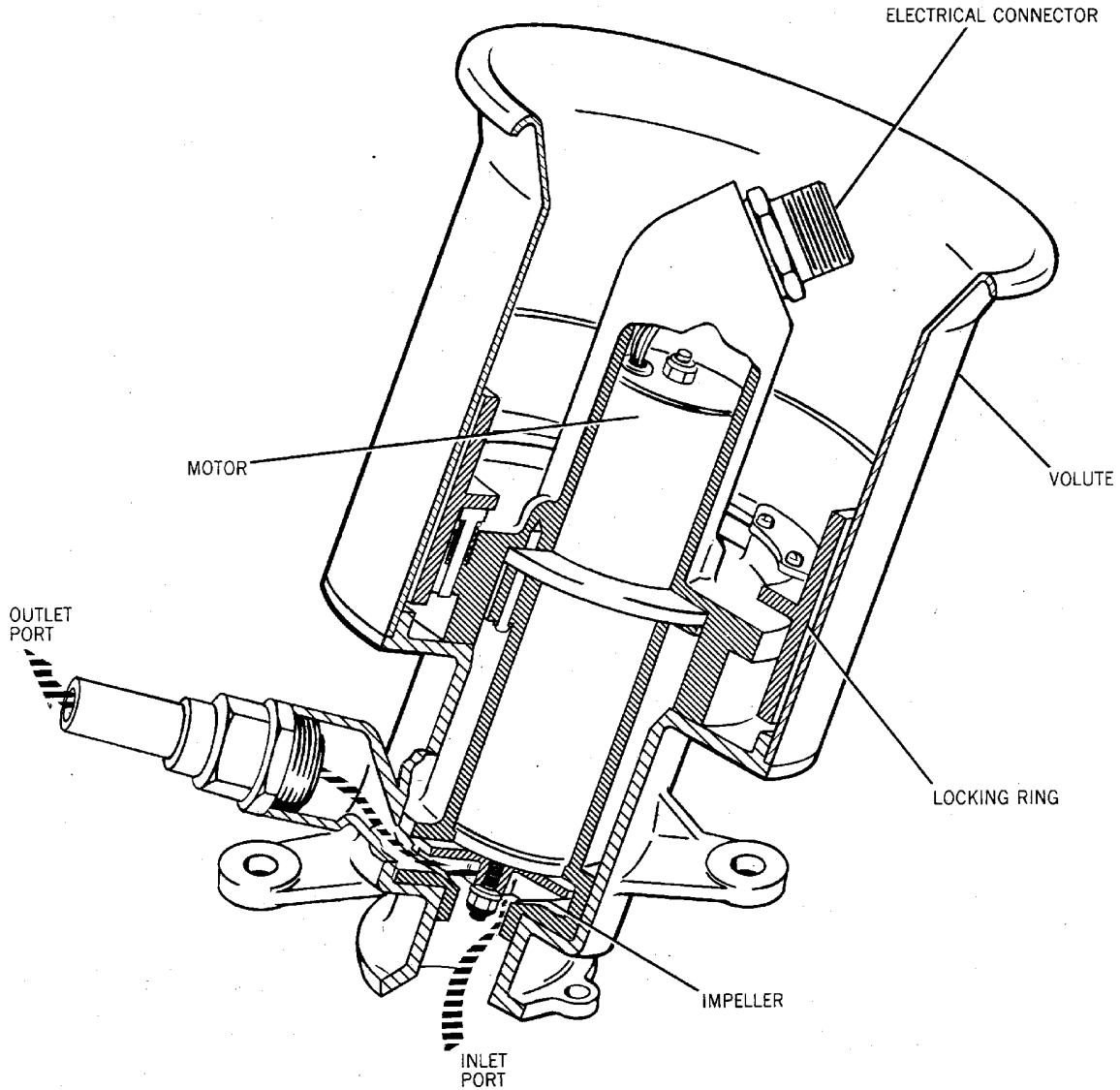
EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

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**Engine Start Pump -- Schematic
Figure 5/28-20-00-990-861**

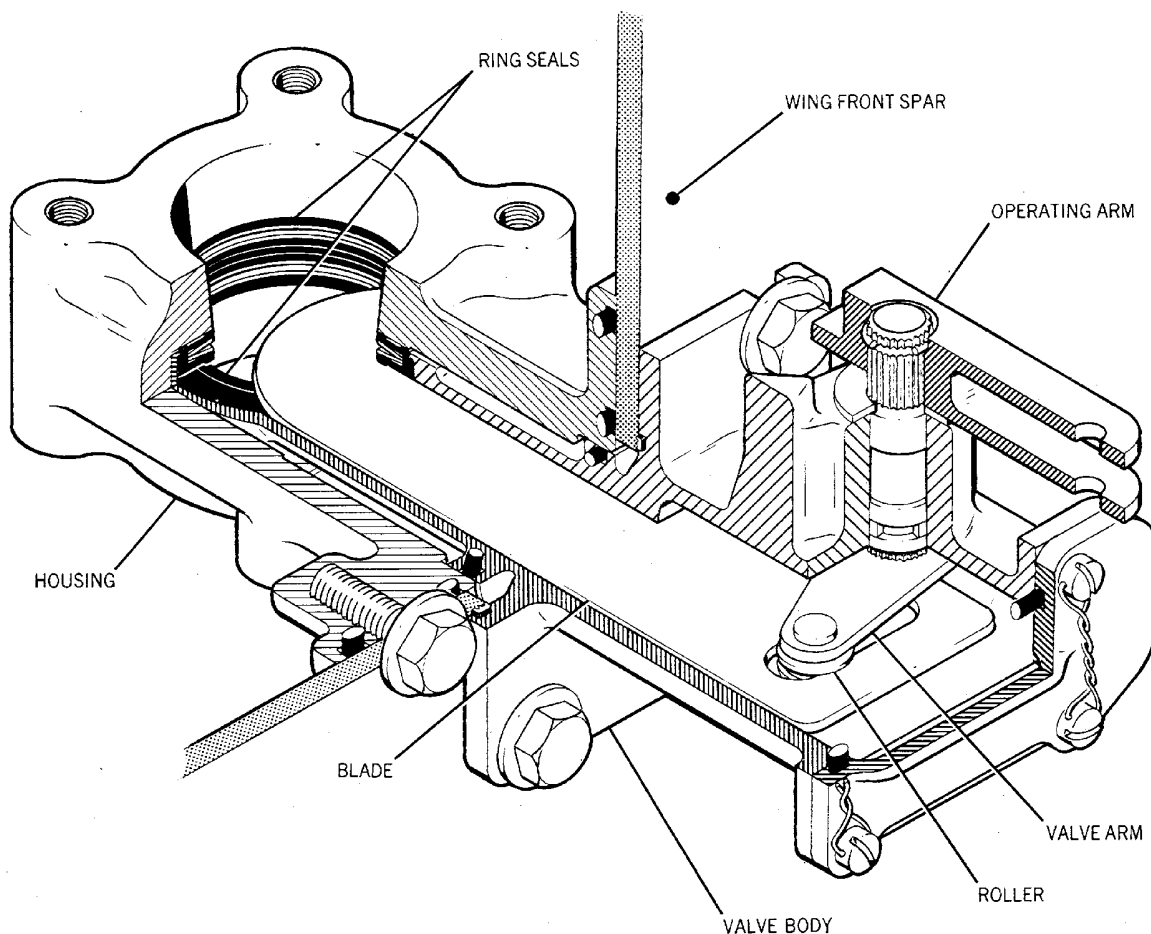
EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

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Fuel Crossfeed Valve -- Schematic
Figure 6/28-20-00-990-862

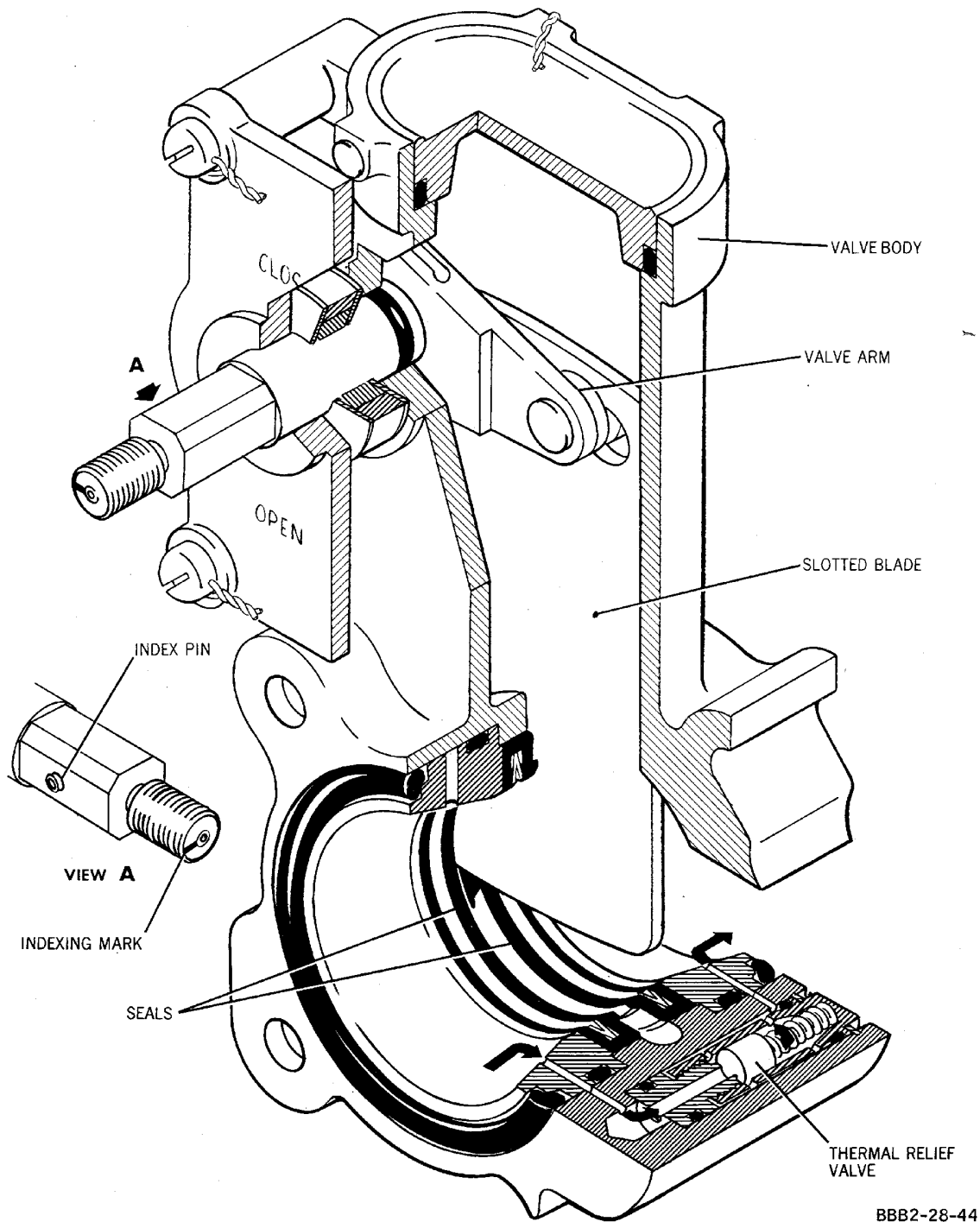
EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

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Engine Fuel Fire Shutoff Valve -- Schematic
Figure 7/28-20-00-990-863

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

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3. Operation

A. Fueling

- (1) When the fueling control panel is energized, fill valve switches placed in the automatic position, and fuel select on the Load Selector Display Unit (LSDU) positioned at a quantity more than the existing tank load, the fill valves will open automatically. Fuel then is allowed to pass through pressure fueling adapter into fueling manifold, through fill valves into respective tank fill lines. When the selected quantity is indicated on the LSDU fuel quantity indicator, a signal is sent to the selector which, in turn, through deenergizing a relay, causes the appropriate fill valve to close. The fill valve may also be closed at any time before the preselected quantity is reached by means of the fill switch. If full tanks are desired, and the fuel select is not set at a quantity less than full, the fill valves will be closed automatically by the fuel fill control float switches installed in each tank. Tank quantity is monitored on the LSDU fuel quantity indicator. If power is not available for fueling operations, the valves can be opened and closed manually. The fuel quantity can be monitored by means of the magnetic dripless fuel measuring sticks located in the bottom of each tank.

B. Defueling

- (1) Defueling by the suction method utilizes the fueling manifold and the fill valves. Fuel is sucked from the individual tank through the tank fill line and open fill valve, into the fueling manifold and out the pressure fueling adapter. The boost pump method utilizes the fueling manifold, the defueling valve, and the tank fuel boost pumps. Fuel is pumped from the individual tank by one or more tank boost pumps through the feed system lines, the defueling manifold, the defueling shutoff valve, into the fueling manifold, and out the pressure fueling adapter. The suction method is best suited to defuel tanks down to maximum fuel quantities allowable with full aircraft loads. The boost pump method permits defueling to a much lower level than that of the suction method. Defueling progress may be monitored by means of the LSDU fuel quantity indicators, or, if power is not available, by means of the magnetic dripless fuel measuring sticks.

C. Fuel Feed

- (1) Fuel feed is accomplished by pumping fuel from a main tank into the feed line, through an engine fuel fire shutoff valve and shrouded line to the engine. A crossfeed valve permits fuel to be supplied to both engines from either main tank. Fuel from the center tank is pumped directly to both engine feed lines. During engine starting, fuel is supplied to the engine by a tank mounted boost pump in the corresponding main tank for the engine to be started. If ac ground power is not available, right engine start pressure is supplied by the battery powered dc start pump located in the right main tank. The start pump will also supply starting fuel pressure to the left engine through the crossfeed valve.
- (2) With both boost pumps in each main tank turned on and both center tank pumps turned on, the greater pressure created by the series-mounted center pumps overrides the fuel pressure from the main tank pumps. As a result, fuel from the center tank is used first with the main tank pumps acting as backup pumps. When the center tank is exhausted, the main tanks automatically supply pressure to the corresponding engine.

D. Pressure Fueling Adapter

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

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- (1) Locking the pressure fueling nozzle in place in the adapter mouth raises the piston slightly. The fuel under pressure enters the adapter mouth and pushes the piston further up into the adapter body cavity. This increases the size of the passage between the piston and the body and permits a larger volume of fuel to flow up past the piston and regulator ring into the passage to the fueling manifold. Overpressure is prevented by a pressure-regulating spool valve. This valve consists of a diaphragm connected to a sliding spool which operates in a small opening between the adapter cavity and the outlet passage. Pressurized fuel passes through small ports in the bottom of the piston, up through another small port in the top of the housing, and past the spool valve into the outlet chamber where the fuel exerts pressure against the spring-loaded valve diaphragm. From here the fuel passes out through the adapter outlet into the fill system. If an over-pressure condition occurs, the diaphragm moves against the spring. This action moves the spool valve into the port, which results in a reduction of passage area. As the area reduces, the pressure inside the piston body builds up until the combination of the spring pressure and the internal piston pressure exceeds the upward pressure from the fueling nozzle. The piston then moves downward, reducing the fuel inlet area. This reduces the pressure to the fueling system. Normal operating pressure for the fuel fill system is 0 to 50 psi (0 to 345 kPa). The regulator (pressure fueling adapter), when subjected to inlet pressure of 50-150 psi (345-1035 kPa), restricts flow and maintains outlet port pressure at 45-50 psi (310.5-345 kPa) during all flow conditions above 150 gallons (367.8 liters) per minute.
- (2) During defueling, the reverse pressure of the fuel being drawn through the adapter by the defueling equipment forces the spring-loaded regulating ring down. This increases the passage area around the base of the piston and increases the defueling rate.

E. Fuel Fill Valves

- (1) The motor, through a gear train actuator, moves the slotted blade in the housing. Movement of the blade up into the housing allows fuel to flow; movement of the blade down into the fuel stream shuts off the flow. The manual override lever permits manual manipulation of the blade. The housing of the valve is marked to indicate the open and closed positions of the valve. The manual override lever acts as a pointer for this function. The thermal relief valve relieves into the tank at 65 psig (448.5 kPa) maximum and closes at 40 psig (276 kPa) minimum.

F. Fuel Fill Control Float Switches

- (1) Vertical movement of the float as a result of the rise of the fuel surrounding the switch causes the switch to open when the fuel is at, or above, the operating level of the switch.

G. Fuel Boost Pumps

- (1) Fuel enters the inlet port in the bottom of the volute. From here it is picked up by the centrivac impeller, which centrifugally separates any gas and vapor bubbles from the fuel. The bubbles are channeled to the vapor pump where, by means of a mated rotor and casing, the bubbles are collected and compressed into near liquid form. The near liquid vapor is then discharged back into the fuel feed system. Some fuel is circulated within the pump for pump cooling.
- (2) Both main tank volute poppet valves act as a reverse flow check valve to prevent fuel from flowing back into the tank. One valve is slotted and acts as a bypass relief. The center tank volute poppet valve bypasses fuel to the forward pump when the aft pump is not operating.
- (3) The thermal protection switches open individually in response to an overheat condition in any of one or more phases of the motor electrical circuit.
- (4) The locking ring on the pump housing is turned by means of a special tool until the ring is against the stops in the volute housing. The locking lugs then snap into position to lock the pump into the volute. The pump is removed from the volute by using the same tool and reversing the installation procedures.

H. Engine Start Pump

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

TP-80MM-WJE

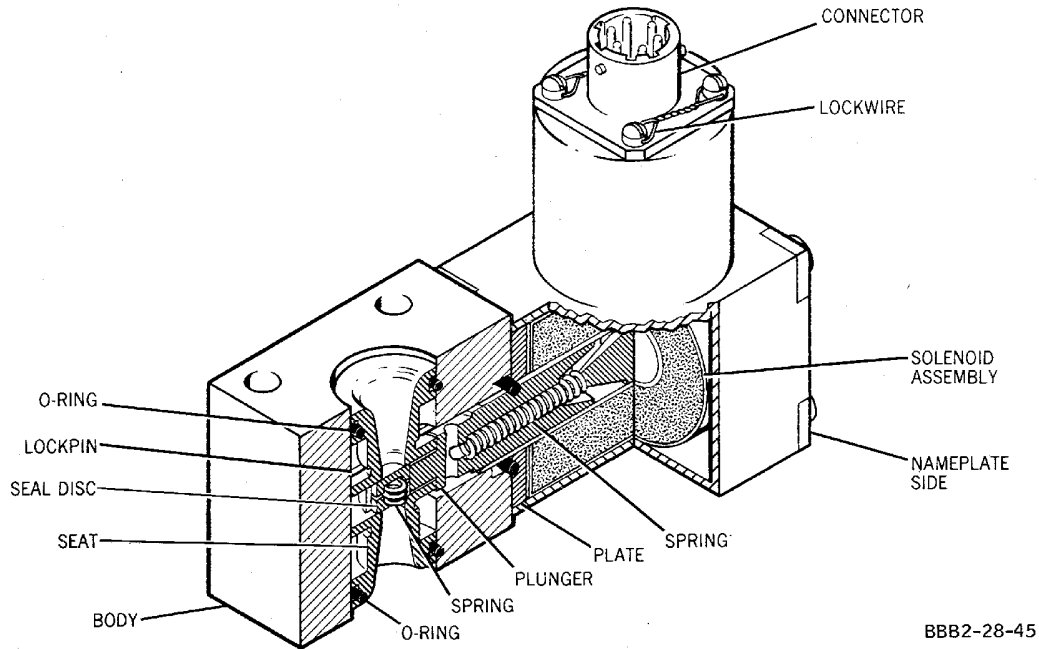
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- (1) Fuel is picked up from the tank through the inlet port in the bottom of the volute by the impeller. The fuel is discharged through the outlet port into the start pump line which leads through a check valve into the main fuel feed line. The check valve prevents reverse flow of fuel through the start pump.
 - (2) The locking ring on the pump housing is turned by means of the special tool until the ring is against the stops in the volute housing. The locking lugs then snap into position to lock the pump into the volute. The pump is removed from the volute by using the same tool and reversing the installation procedure.
- I. Engine Fuel Fire Shutoff Valve
- (1) The gate valve is normally open. To shut off the engine fuel supply, the respective fire shutoff lever in the cock-pit is pulled, causing the valve cable drum to rotate. This rotates the valve arm and forces the slotted blade downward into the fuel stream until it cuts off the fuel flow through the valve ports.
- J. APU Fuel Fire Shutoff Valve
- (1) The solenoid is energized through the APU master switch on the overhead switch panel. This opens the valve permitting fuel, pressurized either by the tank boost pumps or the engine start pump, to reach the APU. The valve is closed by deenergizing the solenoid. This is done through any one of three switches. Normal closing of the valve is accomplished by placing the APU master switch in the off position. Emergency shutdown is accomplished through either the fire control switch on the overhead switch panel or the fire shutoff switch on the APU external control panel aft of the APU compartment in the underside of the aft fuselage.
- K. Center Tank Reprime Line Float Valve
- (1) When the pump container is less than full (below the float level in the float valve) the float is down, which results in the needle valve being unseated. This action permits pump fuel pressure to fill the pump container. When the container is full, fuel enters the float valve causing the float to rise, reseating the needle valve and shutting off the fuel flow into the container.
- L. Center Tank Reprime Line Check Valve
- (1) Pressurized fuel from the boost pump opens the flapper and allows the fuel to pass through the valve. When the fuel flow stops, the flapper closes to prevent possible air from entering the engine feed system if the center tank fuel level is below the prime outlet.

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**APU Fuel Shutoff Valve -- Schematic
Figure 8/28-20-00-990-864**

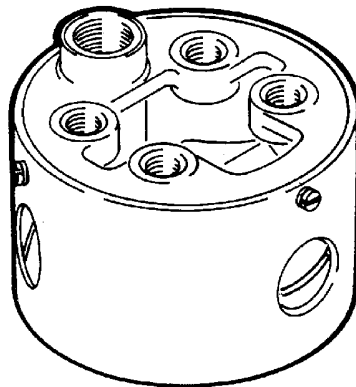
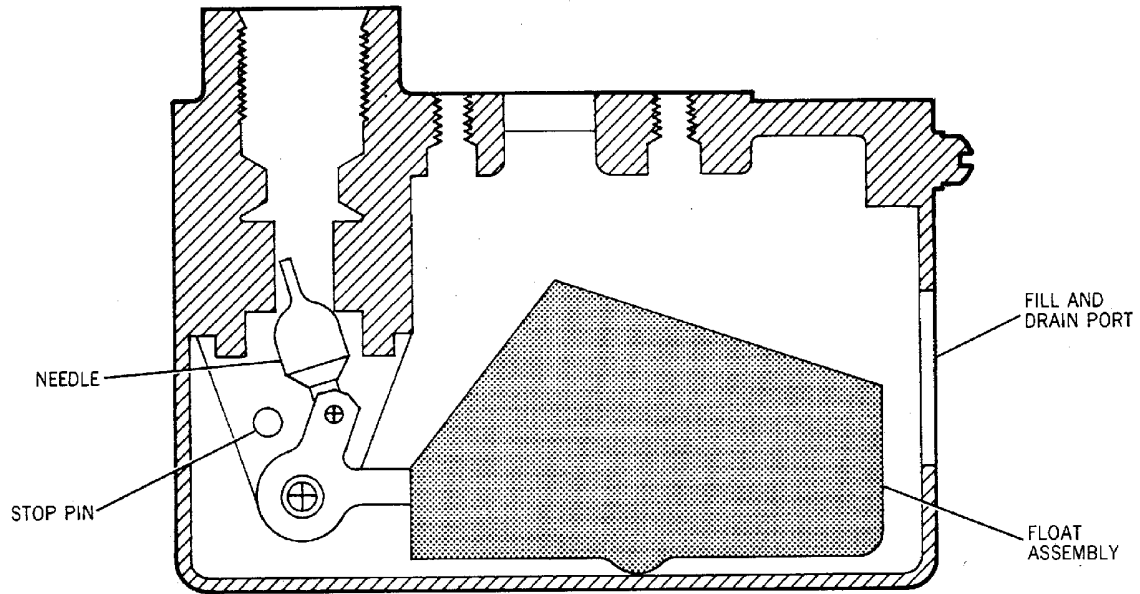
EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

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Center Tank Reprime Line Float Valve -- Schematic
Figure 9/28-20-00-990-865

EFFECTIVITY

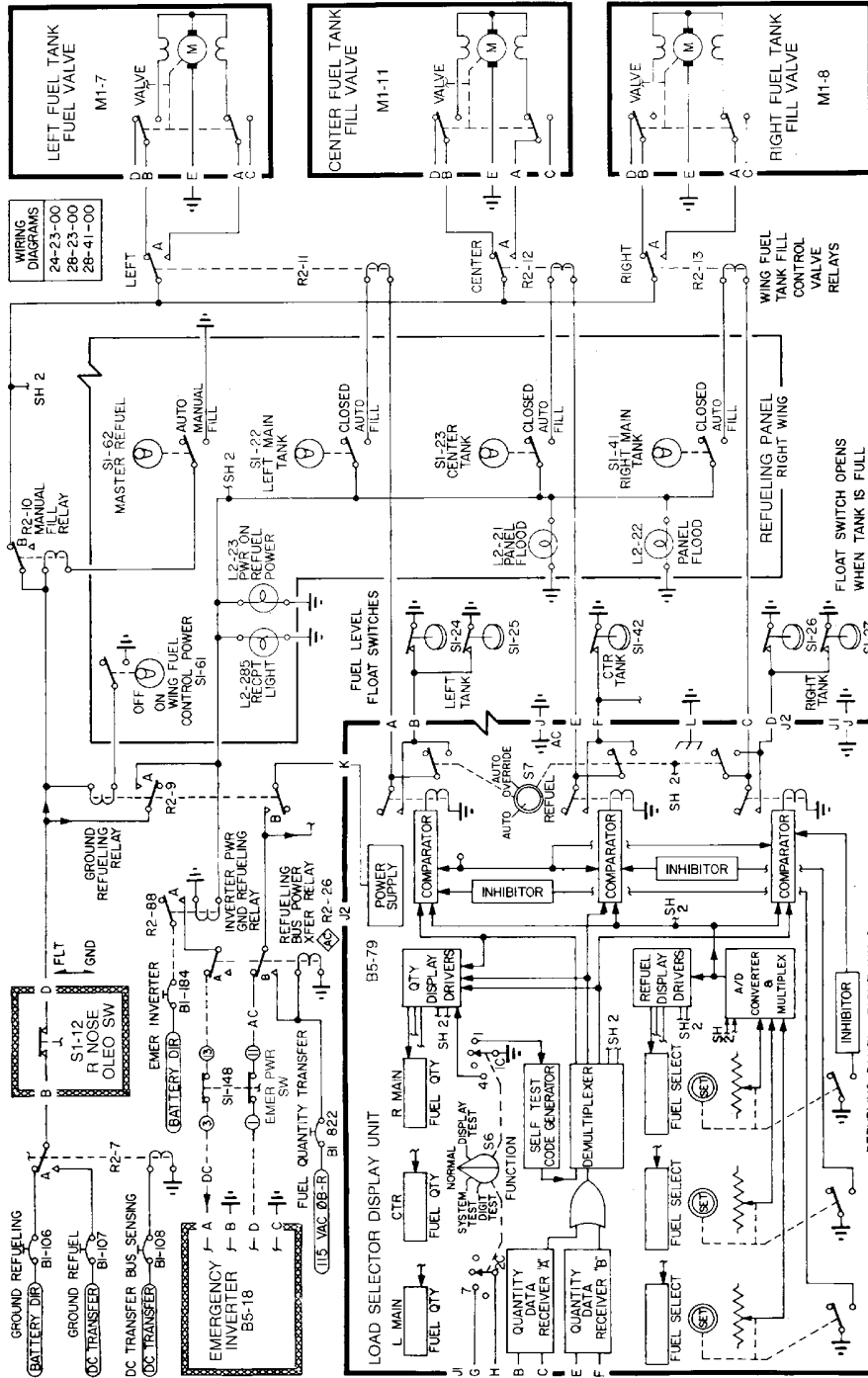
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

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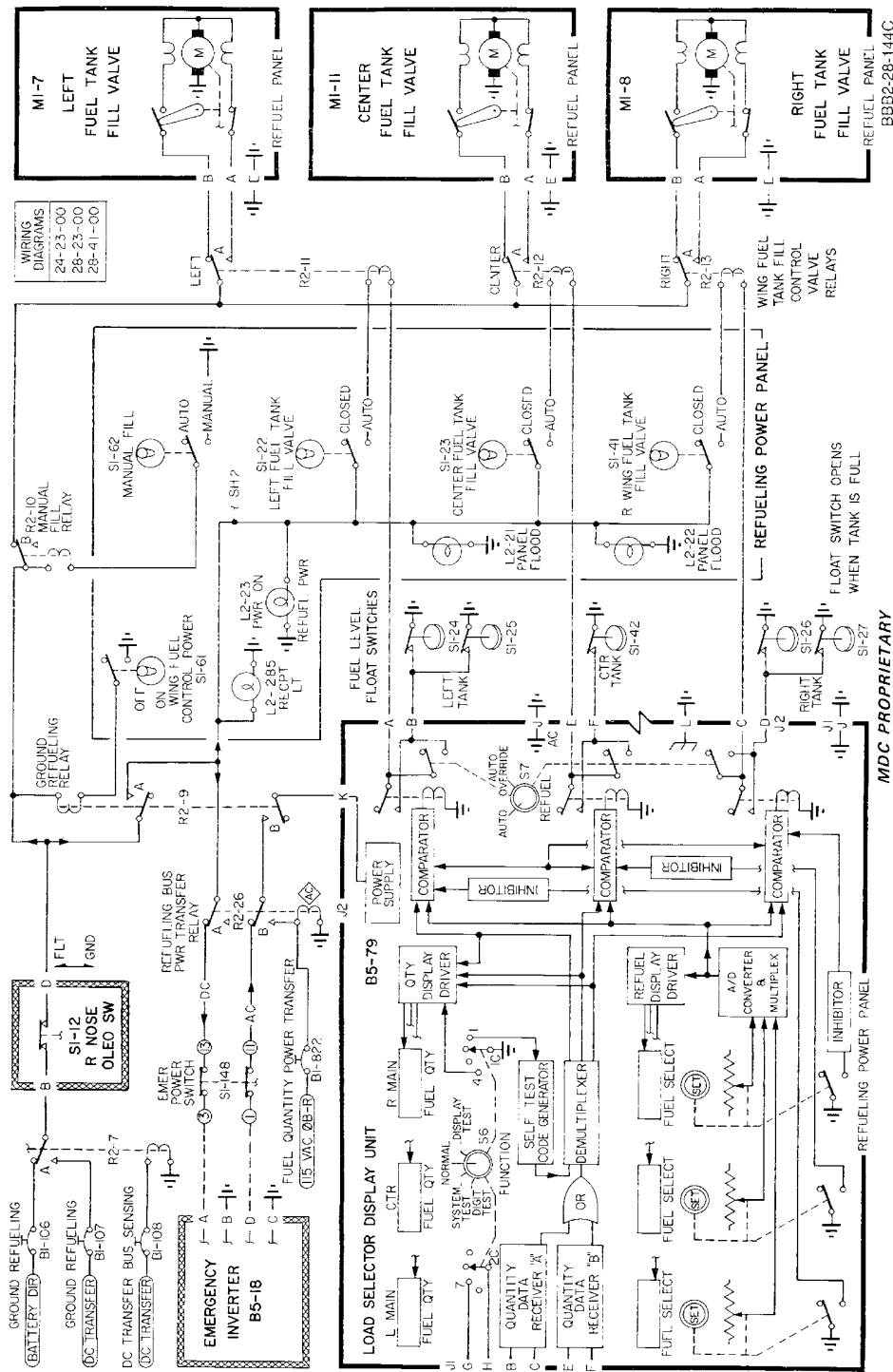
Refuel & Quantity Preselect -- Schematic
Figure 10/28-20-00-990-866 (Sheet 1 of 2)

EFFECTIVITY
WJE 861, 862

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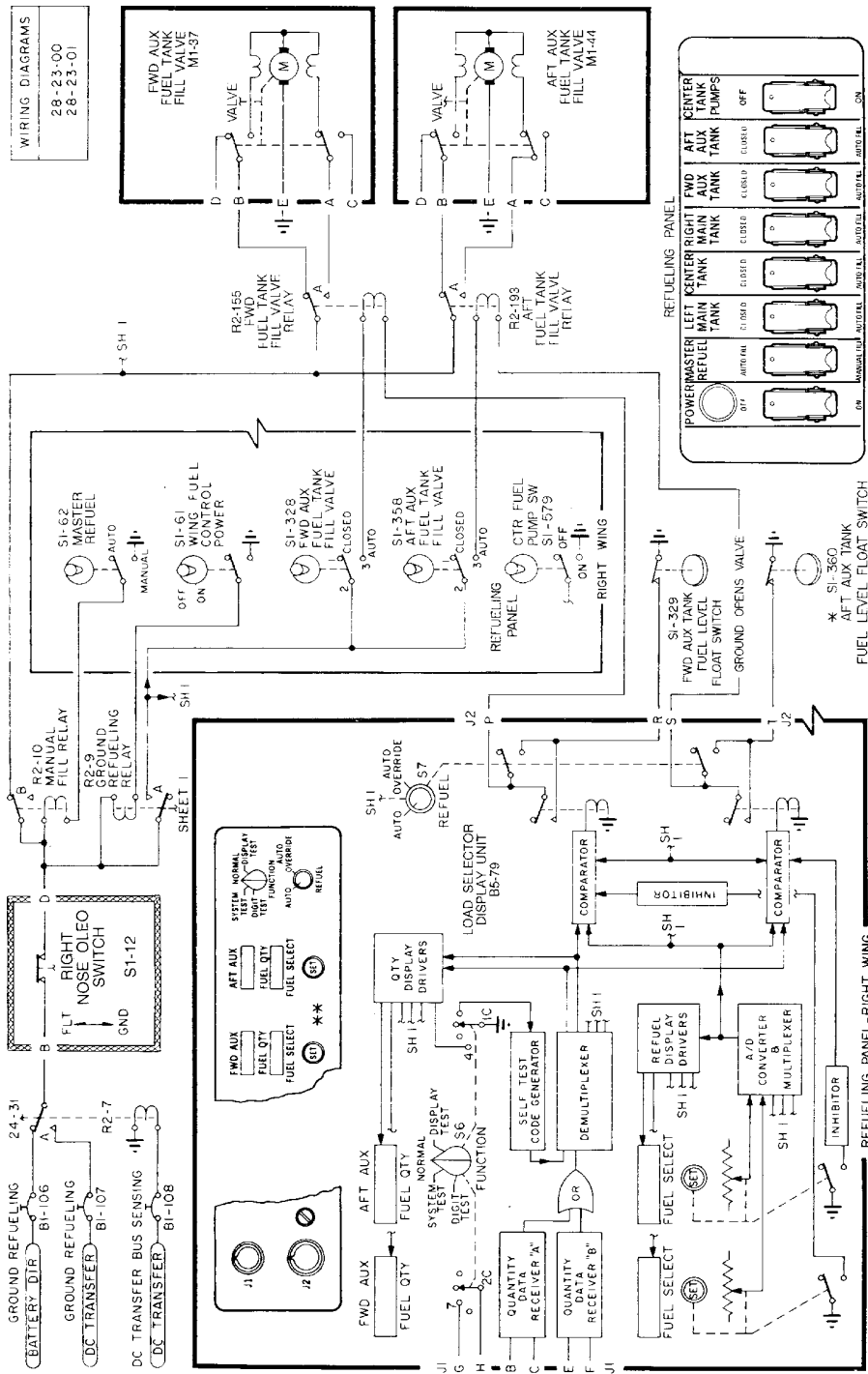
**Refuel & Quantity Preselect -- Schematic
Figure 10/28-20-00-990-866 (Sheet 2 of 2)**

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 873, 874, 877-881,
883, 884, 892

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WIRING DIAGRAMS
28-23-00
28-23-01

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MDC PROPRIETARY

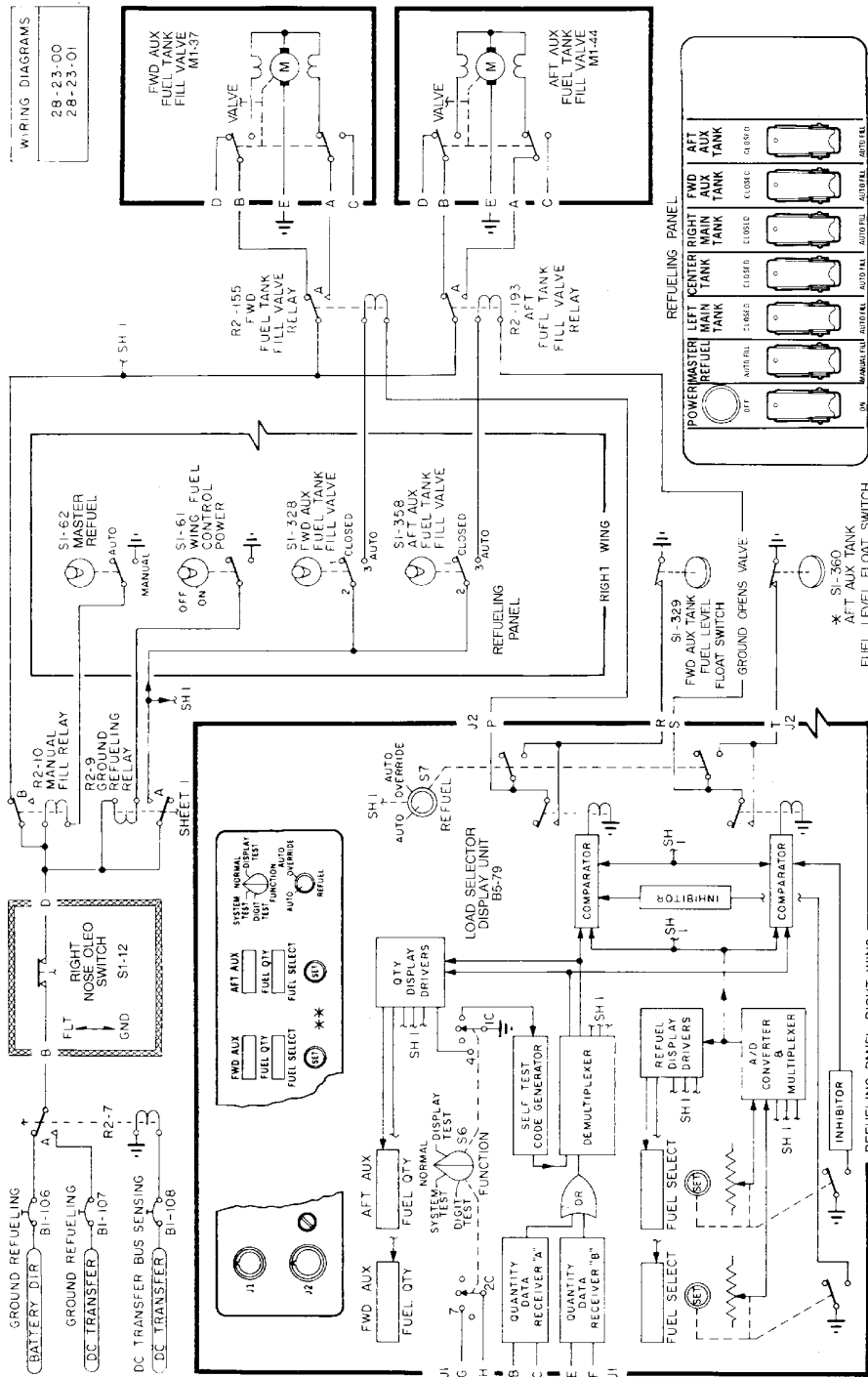
Auxiliary Refuel & Quantity Preselect -- Schematic
Figure 11/28-20-00-990-867 (Sheet 1 of 2)

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892; with SB 28-61

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WIRING DIAGRAMS
28-23-00
28-23-01

BBB2-28-166C

MDC PROPRIETARY

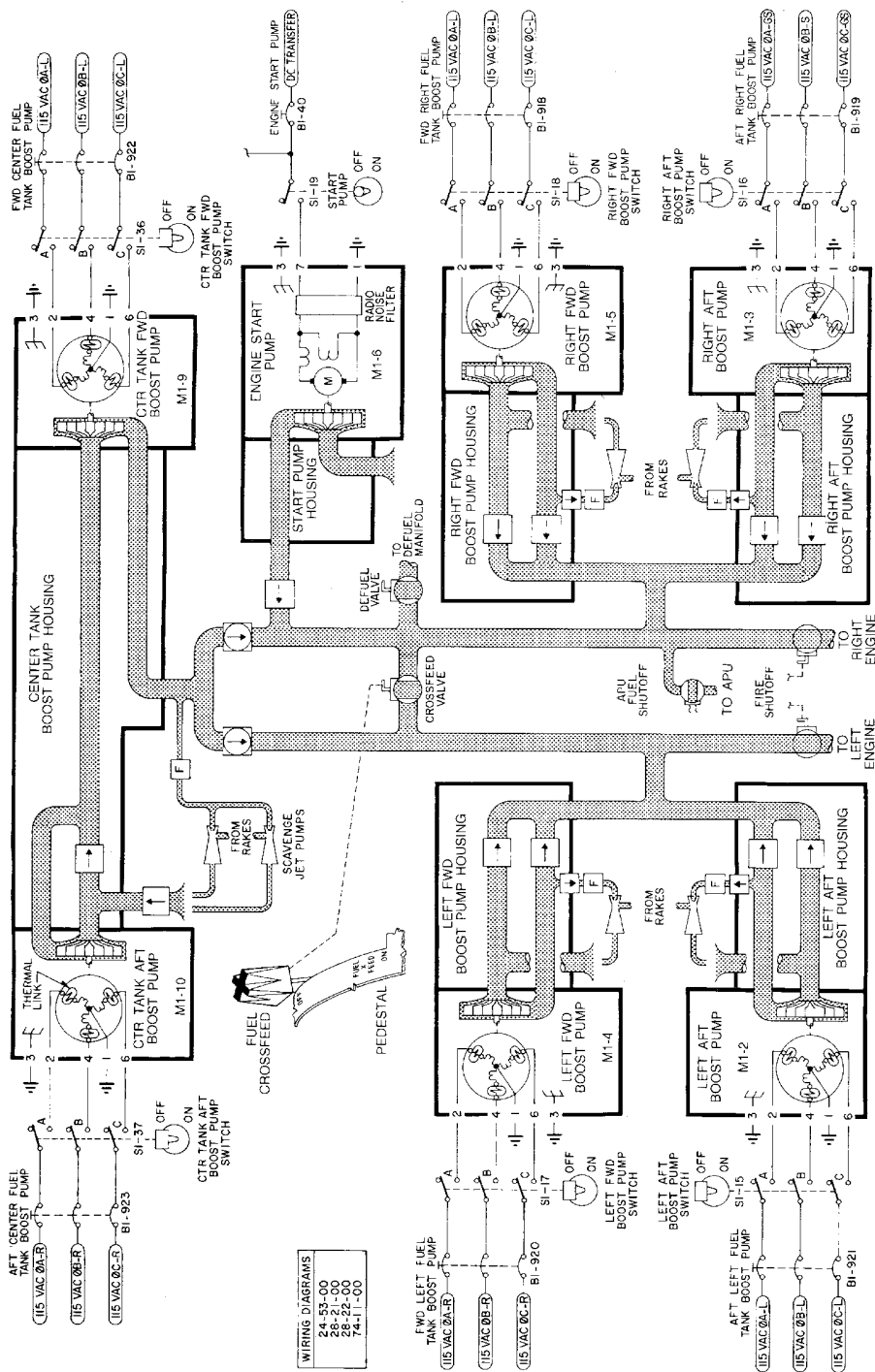
Auxiliary Refuel & Quantity Preselect -- Schematic
Figure 11/28-20-00-990-867 (Sheet 2 of 2)

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892; without SB 28-61

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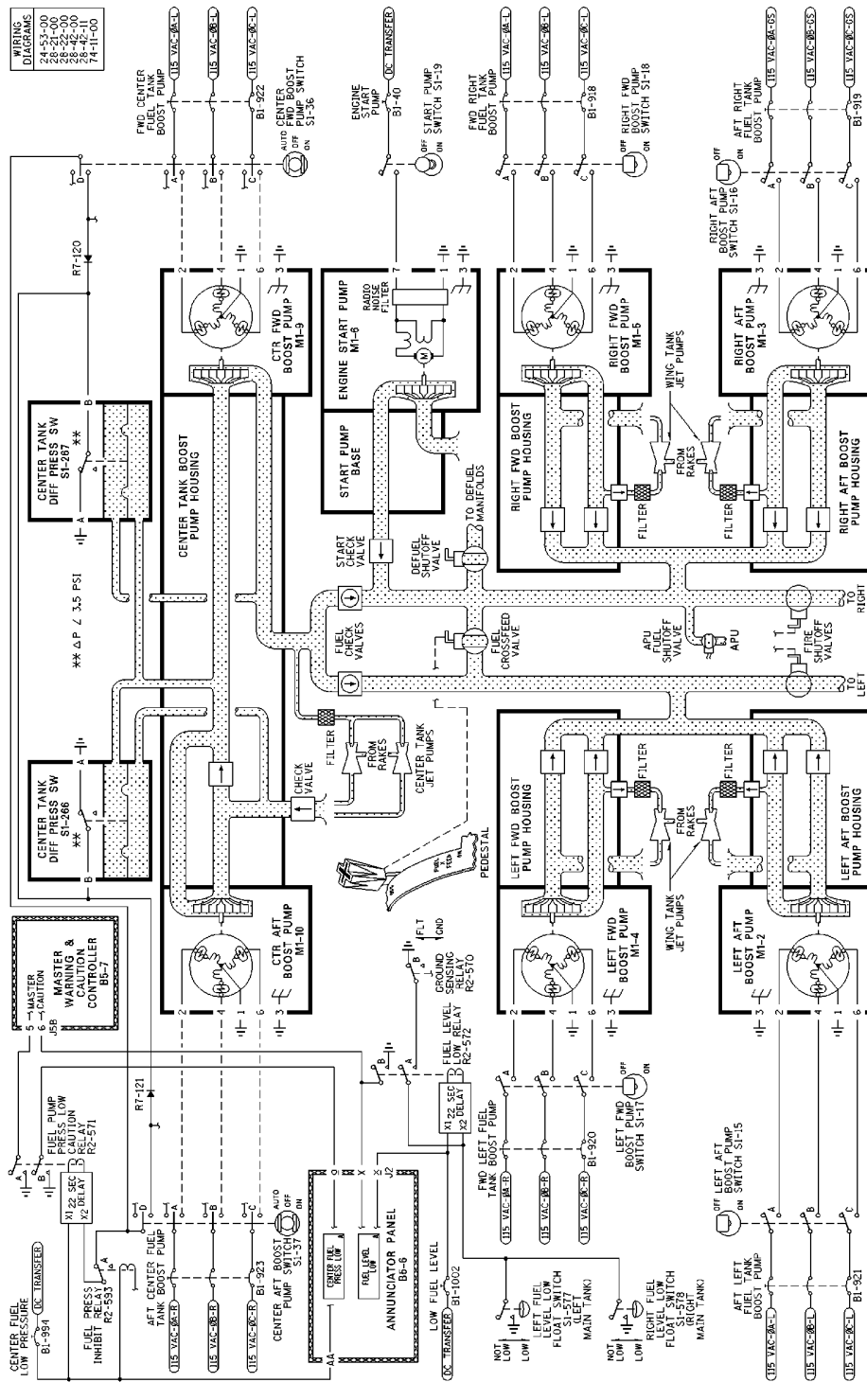
Fuel Boost Pumps -- Schematic
Figure 12/28-20-00-990-868 (Sheet 1 of 4)

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892; without SB 28-53, 54, 58, 63

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Fuel Boost Pumps -- Schematic
Figure 12/28-20-00-990-868 (Sheet 2 of 4)

EFFECTIVITY
WJE 861, 862; with SB 28-53, 54, 58, 63

TP-80MM-WJE

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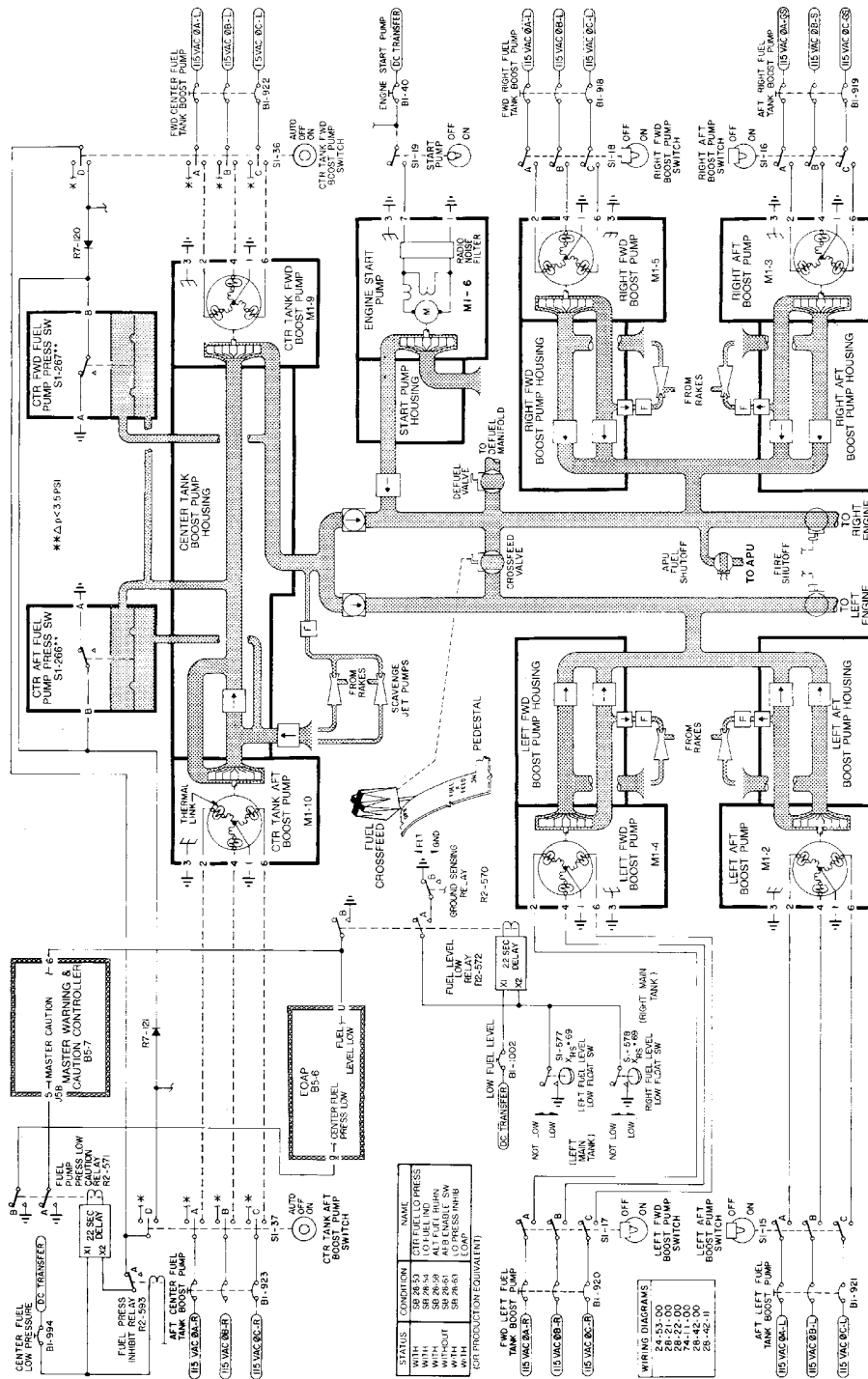
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Fuel Boost Pumps -- Schematic
Figure 12/28-20-00-990-868 (Sheet 3 of 4)

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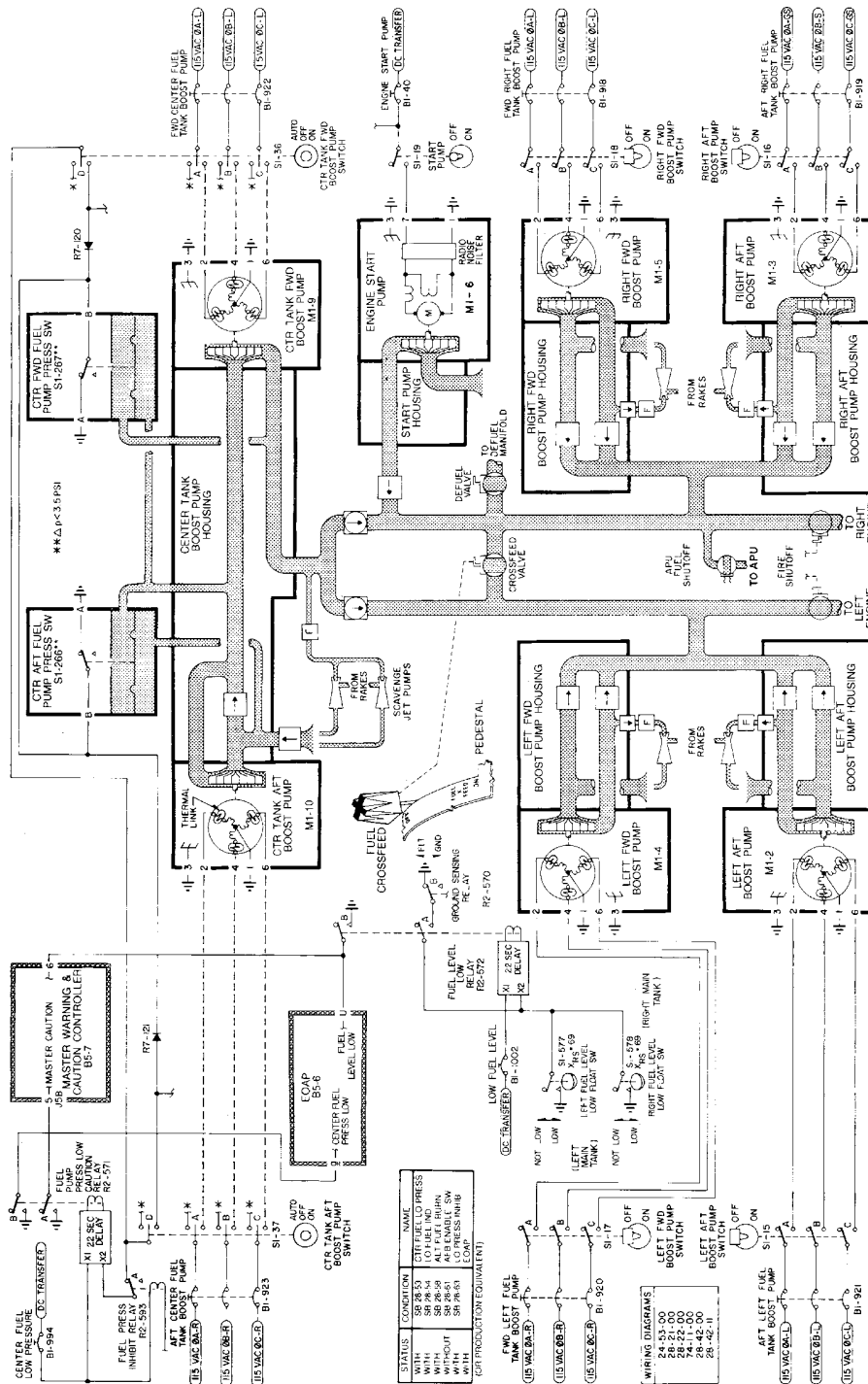
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EFFECTIVITY
WJE 405, 409, 410, 880, 881, 883, 884; without SB
28-53, 54, 58, 63

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Fuel Boost Pumps -- Schematic
Figure 12/28-20-00-990-868 (Sheet 4 of 4)

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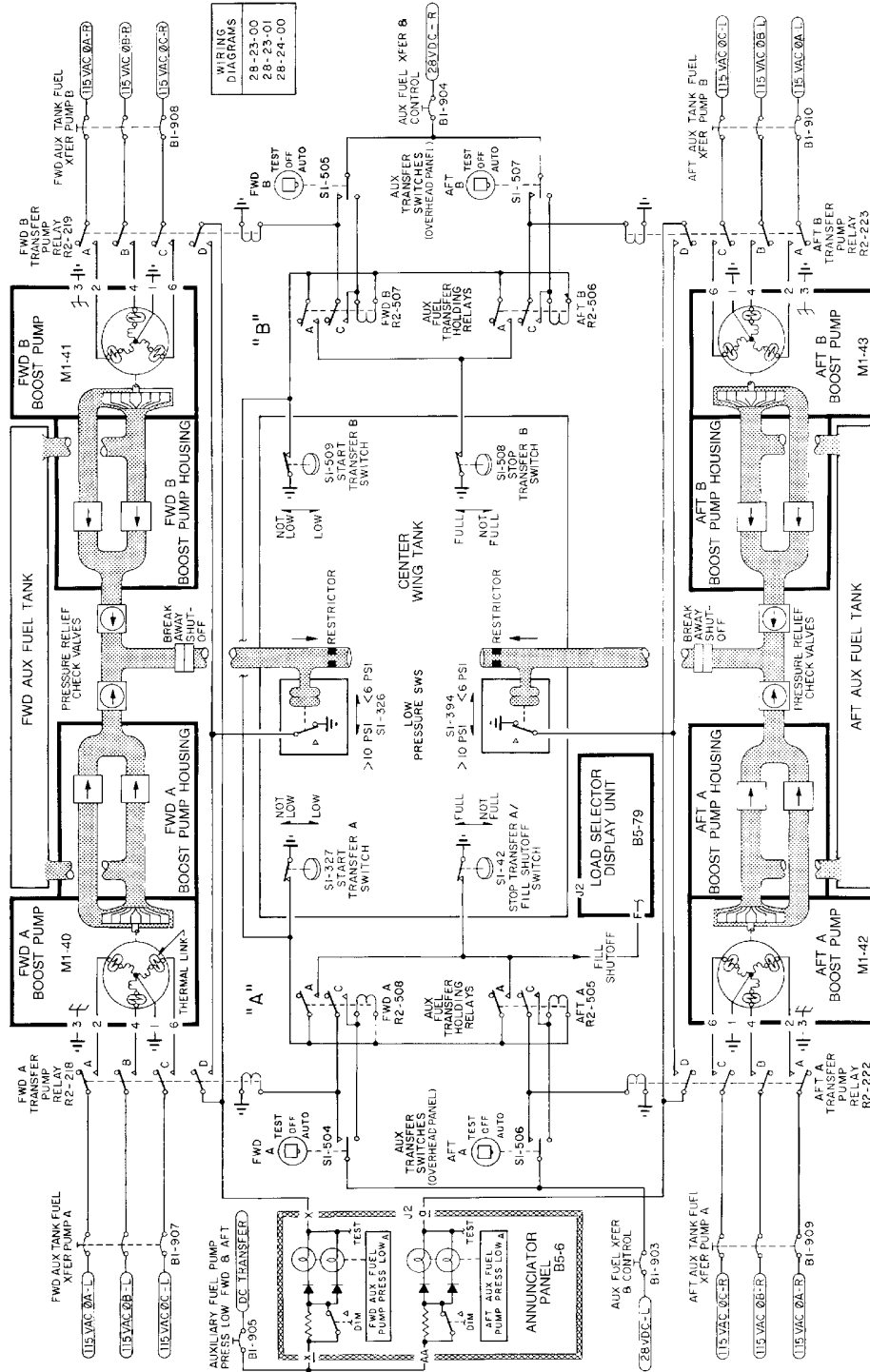
EFFECTIVITY
WJE 401-404, 412, 414, 873, 874, 877-879, 892; with
SB 28-53, 54, 58, 63

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Auxiliary Fuel Transfer -- Schematic
Figure 13/28-20-00-990-869 (Sheet 1 of 2)

BBB2-28-203A

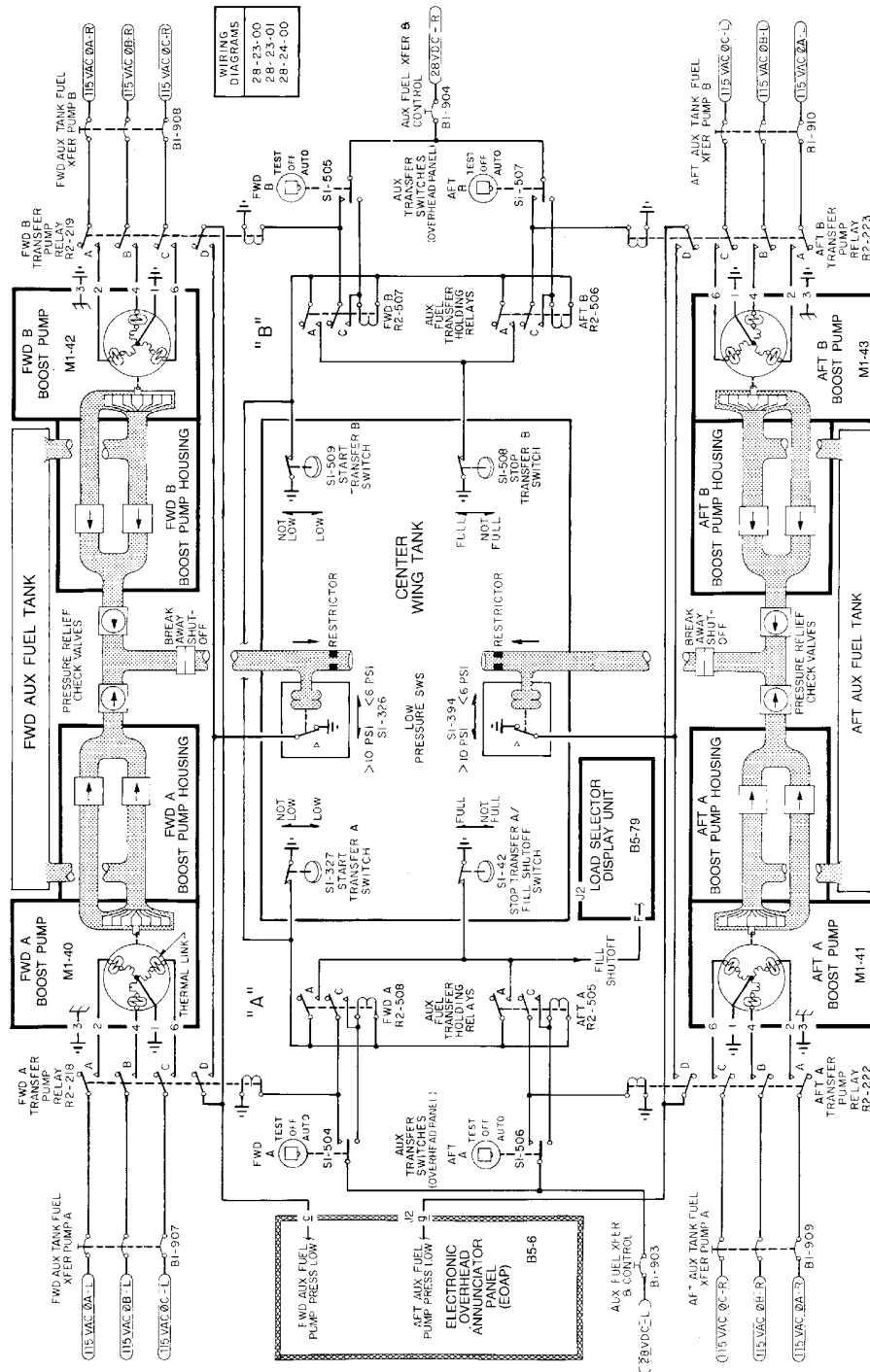
MDC PROPRIETARY

EFFECTIVITY
WJE 405, 409, 410, 861, 862, 873, 874, 877-881, 883, 884, 892

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Auxiliary Fuel Transfer -- Schematic
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EFFECTIVITY
WJE 401-404, 412, 414

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FUEL SYSTEM - TROUBLESHOOTING

1. Troubleshooting

- A. Check for each engine fuel supply fault indication, and if the fault indication shows, then do the appropriate fault isolation procedure. Included are:
- Engine Fuel Supply Fault Isolation Procedures. (Table 102)

WJE ALL POST MD80-28-228

- CENTER FUEL PRESS LOW (EOAP) OR CENTER FUEL PRESS LO (Indication) Fault Isolation
- Indication is shown and a fault is present with Fuel Boost Pump Switch ON or AUTO in the Flight Deck and the center tank is not empty. (Table 103)
- CENTER FUEL PRESS LOW (EOAP) OR CENTER FUEL PRESS LO (Indication) Fault Isolation
- Indication is shown and a fault is present with Fuel Boost Pump Switch OFF in the Flight Deck. (Table 104)

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-228

- FWD AUX FUEL PRESS LOW (Indication) Fault Isolation
- Indication is shown and a fault is present with FWD AUX TRANS Switch A and B in the AUTO position and the center tank is not empty. (Table 105)
- FWD AUX FUEL PRESS LOW (Indication) Fault Isolation
- Indication is shown and a fault is present with FWD AUX TRANS Switch A and B in the OFF position. (Table 106)

WJE ALL POST MD80-28-228

- L or R INLET FUEL PRESS LO (Indication) Fault Isolation
- Indication is shown and a fault is present. (Table 107)

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-228

- FWD AUX FUEL PRESS LOW (EOAP) or NO FWD AUX FUEL PRESS LO (Indication) Fault Isolation
- Indication does not appear or indication stays on during routine maintenance (preflight) checks. (Table 108)

WJE ALL

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

Table 101

Name and Number	Manufacturer
Multimeter/Digital	Not Specified

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3. Troubleshooting

A. Engine Fuel Supply Fault Isolation Procedures.

Table 102 ENGINE FUEL SUPPLY (Fault Isolation)

Indication	Isolation Procedure	Correction
1. Fuel boost/transfer pump or system circuit breaker(s) open.	If yes, >troubleshoot fuel pump electrical circuit per FUEL BOOST PUMPS - TROUBLESHOOTING, PAGEBLOCK 28-20-07/101, and the system circuit per the appropriate wiring diagram.	a. Repair/replace electrical circuit/wiring, as required. b. Replace appropriate fuel boost pump, as required, per FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201.
2. Fuel feed pressure indicator (if installed) comes on or flickers, or engine INLET FUEL PRESS LOW light comes on or flickers; or, simultaneous fuel usage occurs from center tank and a main fuel tank.	If yes, >troubleshoot center tank fuel boost pump volute suction check valve operation (there are spring-loaded flapper valves, and sliding poppet valves in the volute housing) per FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201. Determine condition of center tank fuel boost pump volute suction check valve.	a. Replaced defective suction check valve or replace volute. (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201)
3. Test operation of fuel crossfeed and transfer system.	Troubleshoot each discrepancy or malfunction as required, based on the information provided during inspection and test.	a. After all subsequent repair actions, test crossfeed fuel operations and transfer. (DISTRIBUTION - ADJUSTMENT/TEST, PAGEBLOCK 28-20-00/501) b. If no further discrepancy or malfunction is evident, return the aircraft to service.

WJE ALL POST MD80-28-228

B. Engine Fuel Supply (Indication) Fault Isolation Procedures.

Table 103 CENTER FUEL PRESS LOW (EOAP) OR LO (Indication) Fault Isolation

Indication	Isolation Procedure	Correction
CENTER FUEL PRESS LOW or LO indication is shown and a fault is present with Fuel Boost Pump Switch ON or AUTO in the Flight Deck and the center tank is not empty.	Check the applicable Center Tank Fwd or Aft Boost Pump Circuit Breakers (C/B) and determine if the C/B's are tripped open. >If the Fwd or Aft Boost Pump C/B are tripped open, then do the Troubleshooting Fuel Boost/Transfer Pump Tripped Open Circuit Breaker procedure. (FUEL BOOST PUMPS - TROUBLESHOOTING, PAGEBLOCK 28-20-07/101 and WDM 28-21-00)	

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WJE ALL POST MD80-28-228 (Continued)

Table 103 CENTER FUEL PRESS LOW (EOAP) OR LO (Indication) Fault Isolation (Continued)

Indication	Isolation Procedure	Correction
	>If the Center Tank Fwd or Aft Fuel Boost Pump Circuit Breaker are not tripped open, then continue.	
	<p>Check the applicable Center FWD or AFT Boost Pump Ground Fault Interrupter Relay and determine if the applicable Ground Fault Interrupter Relay is tripped to the OPEN position.</p> <p>>If the Center FWD or AFT Boost Pump Ground Fault Interrupter Relay is tripped to the OPEN position, then do the Troubleshooting Center Tank Fuel Boost Pump Tripped Open Ground Fault Interrupter Relay procedure. (FUEL BOOST PUMPS - TROUBLESHOOTING, PAGEBLOCK 28-20-07/101)</p> <p>>If the Center FWD or AFT Boost Pump Ground Fault Interrupter Relay is not tripped OPEN then, continue.</p>	
	<p>If a CENTER FUEL PRESS LOW or LO indication is shown and a fault is present when using the REFUEL Switch on the refueling panel then, do the L or R INLET FUEL PRESS LOW or LO indication fault isolation procedure. (Table 107)</p> <p>If a CENTER FUEL PRESS LOW or LO indication is shown and a fault is present when using the Fuel Pump Switch in the flight deck, then continue.</p>	
	Check for 115 VAC on terminals 5, 6, and 7 at Terminal Strip S-10 for the Center Fwd Boost Pump M1-9 and terminals 2, 3, and 4 at Terminal Strip S-10 for the Center Aft Boost Pump M1-10 with the applicable CTR FWD or CTR AFT Pump Switch ON or AUTO in the flight deck.	

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WJE ALL POST MD80-28-228 (Continued)

Table 103 CENTER FUEL PRESS LOW (EOAP) OR LO (Indication) Fault Isolation (Continued)

Indication	Isolation Procedure	Correction
	<p>>If you do not find 115 VAC at terminal 5, 6, and 7 at terminal strip S-10 for the Center Fwd Boost Pump M1-9 or terminal 2, 3, and 4 for the Center Aft Boost Pump M1-10.</p> <p>> If you find 115 VAC on terminals 5, 6, and 7 at Terminal Strip S-10 for the Center Fwd Boost Pump M1-9 and terminals 2, 3, and 4 at Terminal Strip S-10 for the Center Aft Boost Pump M1-10, then continue.</p>	<p>Replace or repair the wiring between the applicable Center Fwd Boost Pump M1-9 or Center Aft Boost Pump M1-10 to its applicable Center Fwd Boost Pump GFI Relay R2-1494 or Center Aft boost pump GFI Relay R2-1495. Also replace or repair the wiring between the applicable Center Fwd Boost Pump GFI Relay R2-1494 or Center Aft boost pump GFI Relay R2-1495 to its circuit breaker. (WDM 28-21-00)</p>
	<p>Put the CTR FWD and CTR AFT Pump Switch to the OFF position.</p>	
	<p>Do continuity checks for the applicable Center Fwd Boost Pump GFI Relay R2-1494 between terminals 2LA and 6LA, 1LX and 5LX, 1LA and 5LA or the applicable Center Aft Boost Pump GFI Relay R2-1495 between terminals 4LA and 8LA, 3LX and 7LX, 3LA and 7LA. (WDM 28-21-00)</p> <p>>If you find continuity at Terminal Strip S30-236 on the applicable Center Fwd Boost Pump GFI Relay R2-1494 or Center Aft boost pump GFI Relay R2-1495.</p> <p>>If you do not find continuity at Terminal Strip S30-236 on the applicable Center Fwd Boost Pump GFI Relay R2-1494 or Center Aft boost pump GFI Relay R2-1495, then continue.</p>	<p>Replace the applicable Center Fwd Boost Pump GFI Relay R2-1494 or Center Aft boost pump GFI Relay R2-1495. (GROUND FAULT INTERRUPTER - REMOVAL AND INSTALLATION, PAGEBLOCK 28-20-07/401)</p>
	<p>Turn the CTR FWD or CTR AFT Boost Pump Switch ON one at a time, make sure that the L or R INLET FUEL PRESS LOW indication does not stay on with the applicable CTR FWD or CTR AFT Boost Pump Switch ON.</p>	

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WJE ALL POST MD80-28-228 (Continued)

Table 103 CENTER FUEL PRESS LOW (EOAP) OR LO (Indication) Fault Isolation (Continued)

Indication	Isolation Procedure	Correction
	<p>>If the L or R INLET FUEL PRESS LO indication stays on with the CTR FWD or CTR AFT Boost Pump Switch ON, then do the steps that follow.</p> <p>Check the applicable CTR FWD or CTR AFT Boost Pump flexible conduit for visible damage or evidence of arcing.</p> <p>>If you find the CTR FWD or CTR AFT Boost Pump flexible conduit damaged or it shows evidence of arcing.</p> <p>>If you do not find the CTR FWD or CTR AFT Boost Pump flexible conduit damaged or shows evidence of arcing, then continue.</p>	<p>Replace the applicable CTR FWD or CTR AFT Boost Pump flexible electrical conduit assembly and boost pump as required. (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201)</p>
	<p>Check for continuity on applicable Center Fwd Boost Pump M1-9 Connector P1-529 pins 2, 4 and 6 in to their related terminals 5, 6 and 7 at Terminal Strip S3-10 (Sta. XFS 30) or Center Aft Boost Pump M1-10 Connector P1-530 pins 2, 4 and 6 in to their related terminals 4, 3 and 2 at Terminal Strip S3-10. (WDM 28-21-00)</p> <p>>If you do not find continuity on pins 2, 4 and 6 in Connector P1-529 or Connector P1-530 to their related terminals on Terminal Strip S3-10.</p> <p>>If you find continuity on pins 2, 4 and 6 in Connector P1-529 or Connector P1-530 to their related terminals on Terminal Strip S3-10, then continue.</p>	<p>Replace the applicable flexible electrical Connector P1-529 on the Center Fwd Boost Pump M1-9 or Connector P1-530 on Center Aft Boost Pump M1-10. (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201)</p>
	<p>Check applicable Center Fwd Boost Pump M1-9 Connector P1-529 pins 2, 4, and 6 or Center Aft Boost Pump M1-10 P1-530 pins 2, 4, and 6 for a short to ground. (WDM 28-21-00)</p>	

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WJE ALL POST MD80-28-228 (Continued)

Table 103 CENTER FUEL PRESS LOW (EOAP) OR LO (Indication) Fault Isolation (Continued)

Indication	Isolation Procedure	Correction
	<p>>If you find the applicable Center Fwd Boost Pump M1-9 Connector P1-529 pins 2, 4, and 6 or Center Aft Boost Pump M1-10 P1-530 pins 2, 4, and 6 shorted to ground.</p> <p>>If you do not find the applicable Center Fwd Boost Pump M1-9 Connector P1-529 pins 2, 4, and 6 or Center Aft Boost Pump M1-10 Connector P1-530 pins 2, 4, and 6 shorted to ground, then continue.</p>	<p>Replace the applicable Center Fwd Boost Pump M1-9 Connector P1-529 or Center Aft Boost Pump M1-10 Connector P1-530 flexible electrical Conduit Assembly. (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201)</p>
	<p>>Check applicable Center Fwd Boost Pump M1-9 Connector P1-529 or Center Aft Boost Pump M1-10 Connector P1-530 for a short between pins 3, 1, 6, 4 and 2. (WDM 28-21-00)</p> <p>>If you find a short between pins 3, 1, 6, 4 and 2 on the Center Fwd Boost Pump M1-9 Connector P1-529 or Center Aft Boost Pump M1-10 Connector P1-530.</p> <p>>If you do not find a short between pins 3, 1, 6, 4 and 2 on the Center Fwd Boost Pump M1-9 Connector P1-529 or Center Aft Boost Pump M1-10 Connector P1-530, then continue.</p>	<p>Replace the applicable Center Fwd Boost Pump M1-9 Connector P1-529 or Center Aft Boost Pump M1-10 P1-530 flexible electrical Conduit Assembly. (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201)</p>
	<p>Check and make sure that there is 115 VAC on applicable Center Aft Boost Pump Switch S1-37 pin A2 or Center Fwd Boost Pump Switch S1-36 pin A2.(WDM 28-25-11)</p> <p>>If you do not find 115 VAC on applicable Center Aft Boost Pump Switch S1-37 pin A2 or Center Fwd Boost Pump Switch S1-36 pin A2.</p> <p>>If you find 115 VAC on applicable Center Aft Boost Pump Switch S1-37 Pin A2 or Center Fwd Boost Pump Switch S1-36 pin A2, then continue.</p>	<p>Repair the electrical circuit/wiring, as required. (WDM 28-25-11)</p>

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WJE ALL POST MD80-28-228 (Continued)

Table 103 CENTER FUEL PRESS LOW (EOAP) OR LO (Indication) Fault Isolation (Continued)

Indication	Isolation Procedure	Correction
	<p>Check and make sure that there is 115 VAC on applicable Center Aft Boost Pump GFI Relay R2-1495 pin X1 or Center Fwd Boost Pump GFI Relay R2-1494 pin X1 with the CTR FWD or CTR AFT Pump Switch ON in the Flight Deck. (WDM 28-25-11)</p> <p>> If you do not find 115 on applicable Center Aft Boost Pump GFI Relay R2-1495 pin X1 or Center Fwd Boost Pump GFI Relay R2-1494 pin X1.</p> <p>>If fault continues.</p> <p>> If you find 115 VAC on applicable Center Aft Boost Pump GFI Relay R2-1495 pin X1 or Center Fwd Boost Pump GFI Relay R2-1494 pin X1, continue.</p>	<p>Repair the electrical circuit/wiring, as required. (WDM 28-25-11)</p> <p>Replace applicable Center Fwd Boost Pump Switch S1-36 or Center Aft Boost Pump Switch S1-37. (WDM 28-25-11)</p>
<p>WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-058 AND POST MD80-28-228; WJE 410, 411, 417, 419, 871, 872, 875-879 POST MD80-28-228</p>		
	<p>Check and make sure that there is 115 VAC at applicable Auto center Fwd Boost Pump Relay R2-578 pin A2 or Auto Center Aft Boost Pump Relay R2-579 pin A2 with the applicable CTR FWD or CTR AFT Pump Switch ON in the Flight Deck. (WDM 28-25-11)</p> <p>>If there is no 115 VAC at applicable Auto Center Fwd Boost Pump Relay R2-578 pin A2 or Auto Center Aft Boost Pump Relay R2-579 pin A2.</p> <p>>If fault continues</p> <p>>If there is 115 VAC at applicable Auto Center Fwd Boost Pump Relay R2-578 pin A2 or Auto Center Aft Boost Pump Relay R2-579 pin A2, then continue.</p>	<p>Repair the electrical circuit/wiring, as required. (WDM 28-25-11)</p> <p>Replace applicable Center Fwd Boost Pump Switch S1-36 or Center Aft Boost Pump Switch S1-37. (WDM 28-25-11)</p>

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WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-058 AND POST MD80-28-228; WJE 410, 411, 417, 419, 871, 872, 875-879 POST MD80-28-228 (Continued)

Table 103 CENTER FUEL PRESS LOW (EOAP) OR LO (Indication) Fault Isolation (Continued)

Indication	Isolation Procedure	Correction
	<p>Check and make sure that there is 115 VAC at applicable Auto Center Fwd Boost Pump Relay R2-578 pin A1 or Auto Center Aft Boost Pump Relay R2-579 pin A1 with the applicable CTR FWD or CTR AFT Pump Switch in AUTO in the Flight Deck. (WDM 28-25-11)</p> <p>>If there is no 115 VAC at applicable Auto Center Fwd Boost Pump Relay R2-578 pin A1 or Auto Center Aft Boost Pump Relay R2-579 pin A1.</p>	<p>Repair the electrical circuit/wiring, as required. (WDM 28-25-11)</p>
WJE ALL POST MD80-28-228		
	<p>>If fault continues.</p>	<p>Replace applicable Center Fwd Boost Pump Switch S1-36 or Center Aft Boost Pump Switch S1-37. (WDM 28-25-11)</p>
WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-058 AND POST MD80-28-228; WJE 410, 411, 417, 419, 871, 872, 875-879 POST MD80-28-228		
	<p>>If there is 115 VAC on the applicable Auto Center Fwd Boost Pump Relay R2-578 pin A1 or Auto Center Aft Boost Pump Relay R2-579 pin A1, then continue.</p>	
WJE 401-409, 412, 414, 416, 418, 420, 421, 423, 424, 426, 429, 861, 862, 869, 874, 880, 881, 883, 884, 886, 887, 891 POST MD80-28-061 AND POST MD80-28-228; WJE 410, 411, 417, 419, 871, 872, 875-879 POST MD80-28-228		
	<p>Check and make sure that there is 115 VAC on applicable Center Aft Boost Pump GFI Relay R2-1495 pin X1 or Center Fwd Boost Pump GFI Relay R2-1494 pin X1 with the CTR Fuel Pump Switch S1-579 (Refueling Panel) in the ON position. (WDM 28-25-11)</p>	
WJE ALL POST MD80-28-228		
	<p>> If you do not find 115 VAC on applicable Center Aft Boost Pump GFI Relay R2-1495 pin X1 or Center Fwd Boost Pump GFI Relay R2-1494 pin X1.</p> <p>> If you find 115 VAC on applicable Center Aft Boost Pump GFI Relay R2-1495 pin X1 or Center Fwd Boost Pump GFI Relay R2-1494 pin X1, then continue.</p>	<p>Repair the electrical circuit/wiring, as required. (WDM 28-25-11)</p>

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WJE ALL POST MD80-28-228 (Continued)

Table 103 CENTER FUEL PRESS LOW (EOAP) OR LO (Indication) Fault Isolation (Continued)

Indication	Isolation Procedure	Correction
WJE 401-409, 412, 414, 416, 418, 420, 421, 423, 424, 426, 429, 861, 862, 869, 874, 880, 881, 883, 884, 886, 887, 891 POST MD80-28-061 AND POST MD80-28-228; WJE 410, 411, 417, 419, 871, 872, 875-879 POST MD80-28-228		
	<p>Check and make sure that there is 28 VDC at applicable Center Fwd Boost Pump Control Relay R2-583 pin X1 or Center Aft Boost Pump Control Relay R2-582 pin X1. (WDM 28-25-11)</p> <p>>If you do not find 28 VDC at applicable Center Fwd Boost Pump Control Relay R2-583 pin X1 or Center Aft Boost Pump Control Relay R2-582 pin X1.</p> <p>If you find 28 VDC at applicable Center Fwd Boost Pump Control Relay R2-583 pin X1 or Center Aft Boost Pump Control Relay R2-582 pin X1.</p> <p>>If fault continues.</p>	<p>Repair electrical circuit/wiring between applicable Center Fwd Boost Pump Control Relay R2-583 or the Center Aft Boost Pump Control Relay R2-582 to the CTR Fuel Pump Switch S1-579. (WDM 28-25-11)</p> <p>Replace applicable Center Fwd Boost Pump Control Relay R2-583 or the Center Aft Boost Pump Control Relay R2-582. (WDM 28-25-11)</p> <p>Replace the CTR Fuel Pump Switch S1-579. (WDM 28-25-11)</p>
WJE ALL POST MD80-28-228		
	>If fault continues, then continue to do the steps that follow.	
	<p>Do a Functional Test of the Center Tank Fuel Feed System.</p> <p>>If the Center Fwd Boost pump M1-9 or the Center Aft Boost Pump M1-10 fails to operate.</p> <p>>If the Center Fwd Boost pump M1-9 or the Center Aft Boost Pump M1-10 operates and fault continues.</p> <p>>If the Center Fwd Boost pump M1-9 or the Center Aft Boost Pump M1-10 continues to not operate and fault continues do the steps that follow.</p>	<p>Replace the applicable Fwd boost pump M1-9 or Center Aft boost Pump M1-10. (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201)</p> <p>Replace the Fuel Pump Pressure Low Relay R2-571. (WDM 28-24-00)</p>
	Do a check of the electrical circuit/wiring for a short to ground from the Center Pump Pressure Low Caution Relay R2-571 to the Master Warning and Caution Controller B5-7. (WDM 28-24-00)	

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WJE ALL POST MD80-28-228 (Continued)

Table 103 CENTER FUEL PRESS LOW (EOAP) OR LO (Indication) Fault Isolation (Continued)

Indication	Isolation Procedure	Correction
	<p>>If you find a short to ground from the Center Pump Pressure Low Caution Relay R2-571 to the Master Warning and Caution Controller B5-7.</p> <p>>If the fault continues.</p>	<p>Repair or replace the electrical circuit/wiring as required. (WDM 28-24-00)</p> <p>Replace the applicable Fuel Pressure Differential Switch S1-266 or Fuel Pressure Differential Switch S1-267. (FUEL PRESSURE DIFFERENTIAL SWITCHES - MAINTENANCE PRACTICES, PAGEBLOCK 28-41-01/201)</p>
WJE 405, 406, 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 875-879 POST MD80-28-228		
	If the fault continues.	Replace the Electronic Overhead Annunciator Panel.
WJE ALL POST MD80-28-228		
	If the fault continues do the steps that follow.	
	<p>Do an examine of the Center Tank Gas Extraction Check Valve for freedom of flapper movement and general damage.</p> <p>>If the Center Tank Gas Extraction Check Valve is damaged or worn.</p> <p>>If the Center Tank Gas Extraction Check Valve is not damaged or worn, then continue.</p>	<p>Replace the Center Tank Gas Extraction Check Valve. (CHECK VALVE, EXTRACTION SYSTEM - REMOVAL/INSTALLATION, PAGEBLOCK 28-20-26/401)</p>
	<p>Do an examine of the two Center Tank Pump Discharge Check Valves for wear and general damage (broken spring).</p> <p>>If the Center Tank Pump Discharge Check Valves is worn or damaged.</p> <p>>If the fault continues.</p>	<p>Replace the applicable Center Tank Pump Discharge Check Valve. (CENTER TANK PUMP DISCHARGE CHECK VALVES - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-11/201)</p> <p>Replace the applicable Center Tank Boost Pump Volute. (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201)</p>

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WJE ALL POST MD80-28-228 (Continued)

Table 104 CENTER FUEL PRESS LOW (EOAP) OR LO (Indication) Fault Isolation

Indication	Isolation Procedure	Correction
CENTER FUEL PRESS LOW or LO indication is shown and a fault is present with Fuel Boost Pump Switch OFF in the Flight Deck.	<p>Do a check at Connector P1-2272 (Sta. 148) for 28 VDC on pins F, G, U and P with the Center FWD and AFT Fuel Boost Pump Switches in the OFF position. (WDM 28-25-11)</p> <p>>If you find 28 VDC at Connector P1-2272 on pins F, G, U, and P.</p> <p>>If you do not find 28 VDC at Connector P1-2272 on pins F, G, U, and P, then continue.</p>	Replace applicable S1-37 Center Fwd Boost Pump Switch or S1-36 Center Aft Boost Pump Switch. (WDM 28-25-11)
WJE 401-409, 412, 414, 416, 418, 420, 421, 423, 424, 426, 429, 861, 862, 869, 874, 880, 881, 883, 884, 886, 887, 891 POST MD80-28-061 AND POST MD80-28-228; WJE 410, 411, 417, 419, 871, 872, 875-879 POST MD80-28-228		
	<p>Do a check for 28 VDC at Connector P1-1334 on pins H and F with the Refueling Panel Pump Control Switch in the OFF position. (WDM 28-25-11)</p> <p>>If you find 28 VDC at Plug P1-1334 on pins H and F.</p> <p>>If you do not find 28 VDC on pins H and F at Connector P1-1334, then continue.</p>	Replace Refueling Panel Pump Control Switch S1-579. (WDM 28-25-11)
WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-058 AND POST MD80-28-228; WJE 410, 411, 417, 419, 871, 872, 875-879 POST MD80-28-228		
	<p>Check and make sure that there is no continuity between terminals A1 and A2, B1 and B2, C1 and C2, and D1 and D2 on applicable Boost Pump Control Relay R2-582 or R2-583 with the Center FWD and AFT Fuel Boost Pump Switches in the OFF position. (WDM 28-25-11)</p> <p>>If you find continuity between terminal A1 and A2, B1 and B2, C1 and C2, and D1 and D2 on applicable Boost Pump Control Relay R2-582 or R2-583.</p> <p>>If you do not find continuity on applicable Boost Pump Control Relay R2-582 or R2-583 between terminal A1 and A2, B1 and B2, C1 and C2, and D1 and D2, then continue.</p>	Replace applicable Boost Pump Control Relay R2-582 or Boost Pump Control Relay R2-583. (WDM 28-25-11)

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WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893
POST MD80-28-058 AND POST MD80-28-228; WJE 410, 411, 417, 419, 871, 872, 875-879 POST MD80-28-228
(Continued)

Table 104 CENTER FUEL PRESS LOW (EOAP) OR LO (Indication) Fault Isolation (Continued)

Indication	Isolation Procedure	Correction
WJE ALL POST MD80-28-228		
	<p>Check pin X1 for 115 VAC at applicable Center Fwd R2-1494 or Center Aft R2-1495 Boost Pump Ground Fault Interrupter (GFI) with the Center FWD and AFT Fuel Boost Pump Switches in the OFF position. (WDM 28-25-11)</p> <p>>If you find 115 VAC on X1 at applicable Center Fwd R2-1494 or Center Aft R2-1495 Boost Pump Ground Fault Interrupter.</p> <p>>If you do not find 115 VAC on X1 on Center Fwd R2-1494 or Center Aft R2-1495 Boost Pump Ground Fault Interrupter, then continue.</p>	<p>Repair electrical circuit/wiring, as required. (WDM 28-25-11)</p>
	<p>Check and make sure that there is no continuity between A1 and A2, B1 and B2, C1 and C2, and 11 and 12 on applicable Center FWD R2-1494 or Center AFT R2-1495 Boost Pump Ground Fault Interrupter (GFI) with the Center FWD and AFT fuel boost pump switches in the OFF position. (WDM 28-25-11)</p> <p>>If you find continuity between A1 and A2, B1 and B2, C1 and C2, and 11 and 12 on applicable Center FWD R2-1494 or Center AFT R2-1495 Boost Pump Ground Fault Interrupter.</p>	<p>Replace applicable Center FWD R2-1494 or Center AFT R2-1495 Boost Pump Ground Fault Interrupter. (GROUND FAULT INTERRUPTER - REMOVAL AND INSTALLATION, PAGEBLOCK 28-20-07/401)</p>
	<p>>If you do not find continuity between A1 and A2, B1 and B2, C1 and C2, and 11 and 12 on applicable Center FWD R2-1494 or Center AFT R2-1495 Boost Pump Ground Fault Interrupter, then continue.</p>	
	<p>Do the Functional Test of the Fuel Feed System. (DISTRIBUTION - ADJUSTMENT/TEST, PAGEBLOCK 28-20-00/501)</p>	

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WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-228

Table 105 FWD AUX FUEL PRESS LOW (Indication) Fault Isolation

Indication	Isolation Procedure	Correction
<p>FWD AUX FUEL PRESS LOW indication is shown and a fault is present with FWD AUX TRANS Switch A and B in the AUTO position and the center tank is not empty.</p>	<p>Check the applicable Fwd Aux Tank Fuel Transfer pump A or Fwd Aux Tank Fuel Transfer Pump B Circuit Breakers (C/B) and determine if the circuit breakers are tripped open.</p> <p>>If the applicable Fwd Aux Tank Fuel Transfer Pump A or Fwd Aux Tank Fuel Transfer Pump B C/B's are tripped open, then do the troubleshooting procedure for a Fuel Boost/Transfer Pump tripped open circuit breaker. (FUEL BOOST PUMPS - TROUBLESHOOTING, PAGEBLOCK 28-20-07/101, and WDM 28-21-00)</p> <p>>If the applicable Fwd Aux Tank Fuel Transfer Pump A or Fwd Aux Tank Fuel Transfer Pump B C/B's are not tripped open, then continue.</p>	
	<p>Check the applicable Aux Tank Fuel Transfer Pump A Ground Fault Interrupter (GFI) Relay R2-1501 or the Fwd Aux Tank Fuel Transfer Pump B Relay R2-1500 and determine if the GFI Relay is tripped to the OPEN position.</p> <p>>If the applicable Aux Tank Fuel Transfer Pump A Ground Fault Interrupter (GFI) Relay R2-1501 or Fwd Aux Tank Fuel Transfer Pump B Ground Fault Interrupter (GFI) Relay R2-1500 are tripped to the OPEN position, then do the troubleshooting procedure for a Fwd Aux Tank Fuel Transfer Pump Tripped OPEN Ground Fault Interrupter Relay. (FUEL BOOST PUMPS - TROUBLESHOOTING, PAGEBLOCK 28-20-07/101 and WDM 28-21-00)</p> <p>>If the applicable Aux Tank Fuel Transfer Pump A Ground Fault Interrupter Relay R2-1501 or the Fwd Aux Tank Fuel Transfer Pump B Ground Fault Interrupter Relay R2-1500 are not tripped then, continue.</p>	

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WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-228 (Continued)

Table 105 FWD AUX FUEL PRESS LOW (Indication) Fault Isolation (Continued)

Indication	Isolation Procedure	Correction
	<p>Check and make sure that there is 28 VDC at pin 2 on the applicable Fwd Aux Tank Transfer Pump A Switch S1-504 or Fwd Aux Tank Transfer Pump B Switch S1-505. (WDM 28-24-00)</p> <p>> If you do not find 28 VDC at pin 2 on the applicable Fwd Aux Tank Transfer Pump A Switch S1-504 or Fwd Aux Tank Transfer Pump B Switch S1-505.</p> <p>>If you find 28 VDC at pin 2 on the applicable Fwd Aux Tank Transfer Pump A Switch S1-504 or Fwd Aux Tank Transfer Pump B Switch S1-505, then continue.</p>	<p>Repair or replace electrical circuit/wiring as required. (WDM 28-24-00)</p>
	<p>Check and make sure that there is 28 VDC at X1 on the applicable Fwd Aux Fuel Transfer Holding Relay R2-508 or Fwd Aux Fuel Transfer Holding Relay R2-507 with the applicable Fwd Aux Tank Transfer pump A or Fwd Aux Tank Transfer pump B switch in the AUTO position. (WDM 28-24-00)</p> <p>>If you do not find 28 VDC at X1 on applicable Fwd Aux Fuel Transfer Holding Relay R2-508 or Fwd Aux Fuel Transfer Holding Relay R2-507.</p> <p>>If fault continue.</p> <p>>If you find 28 VDC at X1 on applicable Fwd Aux Fuel Transfer Holding Relay R2-508 or Fwd Aux Fuel Transfer Holding Relay R2-507, then continue.</p>	<p>Replace the applicable Fwd Aux Tank Transfer Pump A Switch S1-504 or Fwd Aux Tank Transfer Pump B Switch S1-505. (WDM 28-24-00)</p> <p>Repair or replace electrical circuit/wiring as required. (WDM 28-24-00)</p>
	<p>Check and make sure that there is 115 VAC at X1 on the applicable Fwd Aux Tank Fuel Transfer Pump A GFI Relay R2-1501 or Fwd Aux Tank Fuel Transfer Pump B GFI Relay R2-1500 when Fwd Aux Tank Transfer pump A or Fwd Aux Tank Transfer pump B switch are in the TEST position. (WDM 28-24-00)</p>	

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WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-228 (Continued)

Table 105 FWD AUX FUEL PRESS LOW (Indication) Fault Isolation (Continued)

Indication	Isolation Procedure	Correction
	<p>>If you do not find 115 VAC at X1 on the applicable Fwd Aux Tank Fuel Transfer Pump A GFI Relay R2-1501 or Fwd Aux Tank Fuel Transfer Pump B GFI Relay R2-1500.</p> <p>>If you find 115 VAC at X1 on the applicable Fwd Aux Tank Fuel Transfer Pump A GFI Relay R2-1501 or Fwd Aux Tank Fuel Transfer Pump B GFI Relay R2-1500, then continue.</p>	<p>Repair or replace electrical circuit/wiring as required. (WDM 28-24-00)</p>
	<p>Put the Fwd Aux Tank Transfer pump A or Fwd Aux Tank Transfer pump B switch (one at a time) in the TEST position, then monitor the Fuel Quantity Display to verify that fuel is transferred from the Fwd Aux Tank to the Center Tank.</p> <p>>If there is no fuel transfer from the Fwd Aux Tank to the Center Tank.</p> <p>>If fault continues, check the applicable Fwd Aux Tank Fuel Transfer Pump A M1-40 or Fwd Aux Tank Fuel Transfer Pump B M1-41 flexible electrical connector for damage or visible evidence of arcing. (WDM 28-24-00)</p> <p>>If you find damage or visible evidence of arcing to the applicable Fwd Aux Tank Fuel Transfer Pump A M1-40 or Fwd Aux Tank Fuel Transfer Pump B M1-41 flexible electrical connector.</p> <p>>If fault continue.</p> <p>>If there is fuel transfer from the Fwd Aux Tank to the Center Tank, then continue.</p>	<p>Repair or replace electrical circuit/wiring as required. (WDM 28-24-00)</p> <p>Replace the applicable flexible conduit for the Fwd Aux Tank Fuel Transfer Pump A M1-40 or Fwd Aux Tank Fuel Transfer Pump B M1-41. (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201)</p> <p>Replace the applicable Aux Tank Fuel Transfer Pump A Ground Fault Interrupter Relay R2-1501 or the Fwd Aux Tank Fuel Transfer Pump B Relay R2-1500. (GROUND FAULT INTERRUPTER - REMOVAL AND INSTALLATION, PAGEBLOCK 28-20-07/401)</p>

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WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-228 (Continued)

Table 105 FWD AUX FUEL PRESS LOW (Indication) Fault Isolation (Continued)

Indication	Isolation Procedure	Correction
	<p>Check and make sure that the wire between terminal 6 on the Terminal Strip S3-369 and pin 11 on the applicable Fwd Aux Tank Fuel Transfer Pump A GFI Relay R2-1501 or Fwd Aux Tank Fuel Transfer Pump B GFI Relay R2-1500 is not shorted to ground. (WDM 28-24-00)</p> <p>>If you find a short to ground between terminal 6 on the Terminal Strip S3-369 and pin 11 on the applicable Fwd Aux Tank Fuel transfer pump A GFI Relay R2-1501 or the Fwd Aux Tank Fuel Transfer Pump B GFI Relay R2-1500.</p> <p>>If you do not find a short to ground between terminal 6 on the Terminal Strip S3-369 and pin 11 on the applicable Fwd Aux Tank Fuel Transfer Pump A GFI Relay R2-1501 or the Fwd Aux Tank Fuel Transfer Pump B GFI Relay R2-1500, then continue.</p>	<p>Repair or replace electrical circuit/wiring as required. (WDM 28-24-00)</p>
	<p>Check the wiring between pin 12 on the Fwd Aux Tank Fuel Transfer Pump A GFI Relay R2-1501 and pin 40 on the Master Warning Caution Controller R5-419A for a short to ground or applicable Fwd Aux Tank Fuel Transfer Pump B GFI Relay R2-1500 and pin 9 on the Master Warning Caution Controller R5-419B for a short to ground. (WDM 28-24-00)</p> <p>>If you find a short to ground.</p> <p>>If you no not find a short to ground.</p>	<p>Repair or replace electrical circuit/wiring as required. (WDM 28-24-00)</p> <p>Replace the applicable Master Warning Caution Controller R5-419A or R5-419B. (WDM 28-24-00)</p>

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WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-228 (Continued)

Table 106 FWD AUX FUEL PRESS LOW (Indication) Fault Isolation

Indication	Isolation Procedure	Correction
<p>FWD AUX FUEL PRESS LOW indication is shown and a fault is present with FWD AUX TRANS Switch A and B in the OFF position.</p>	<p>Do a check on applicable pin I* and K* at Receptacle R5-1311 (Sta. 246) for 28 VDC with Fwd Aux Tank Transfer Pump Switch A in the OFF position or applicable pin G* and H* at Receptacle R5-1311 for 28 VDC with Fwd Aux Tank Transfer Pump Switch B in the OFF position. . (WDM 28-24-00)</p> <p>>If you find 28 VDC at applicable pin I* and K*, or G* and K* at Receptacle R5-1311.</p> <p>>If fault continue.</p> <p>>If you do not find 28 VDC at pin I* and K*, or G* and K* at Receptacle R5-131, then continue.</p>	<p>Replace applicable Fwd Aux Tank Transfer Pump A Switch S1-504 or Fwd Aux Tank Transfer Pump A Switch B S1-505. (WDM 28-24-00)</p> <p>Repair electrical circuit/wiring, as required. (WDM 28-24-00)</p>
	<p>Check pin X1 for 28 VDC on applicable Fwd Aux Fuel Transfer Holding Relay R2-507 or R2-508 with the Fwd Aux Tank A and B Transfer Pump switches in the OFF position. (WDM 28-24-00)</p> <p>>If you find 28 VDC at pin X1 on applicable Fwd Aux Fuel Transfer Holding Relay R2-507 or R2-508.</p> <p>>If you do not find 28 VDC at pin X1 on applicable Fwd Aux Fuel Transfer Holding Relay R2-507 or R2-508, then continue.</p>	<p>Repair electrical circuit/wiring, as required. (WDM 28-24-00)</p>
	<p>Check pin X1 for 28 VDC at applicable Fwd Aux Tank Fuel Transfer Pump A GFI Relay R2-1500 or Fwd Aux Tank Fuel Transfer Pump B GFI Relay R2-1501 with Fwd Aux Tank Transfer Pump A and B switches in the OFF position. (WDM 28-24-00)</p> <p>>If you find 28 VDC at pin X1 at applicable Fwd Aux Tank Fuel Transfer Pump A GFI Relay R2-1500 or Fwd Aux Tank Fuel Transfer Pump B GFI Relay R2-1501.</p>	<p>Repair electrical circuit/wiring, as required. (WDM 28-24-00)</p>

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Table 106 FWD AUX FUEL PRESS LOW (Indication) Fault Isolation (Continued)

Indication	Isolation Procedure	Correction
	<p>>If you do not find 28 VDC at pin X1 at applicable Fwd Aux Tank Fuel Transfer Pump A GFI Relay R2-1500 or Fwd Aux Tank Fuel Transfer Pump B GFI Relay R2-1501, then continue.</p>	
	<p>Check and make sure that there is no continuity between A1 and A2, B1 and B2, and C1 and C2 on applicable Aux Fuel Transfer Holding Relay A R2-508 or Fwd Aux Fuel Transfer Holding Relay B R2-507 with the Fwd Aux Tank Transfer Pump A and B Switches in the OFF position. (WDM 28-24-00)</p> <p>>If you find continuity between A1 and A2, B1 and B2, and C1 and C2 on applicable Fwd Aux Fuel Transfer Holding Relay A R2-508 or Fwd Aux Fuel Transfer Holding Relay B R2-507.</p> <p>>If you do not find continuity between A1 and A2, B1 and B2, and C1 and C2 on applicable Fwd Aux Fuel Transfer Holding Relay A R2-508 or Fwd Aux Fuel Transfer Holding Relay B R2-507, then continue.</p>	<p>Replace the applicable Fwd Aux Fuel Transfer Holding Relay A R2-508 or Fwd Aux Fuel Transfer Holding Relay B R2-507. (WDM 28-24-00)</p>
	<p>Do a test of the applicable Fwd Aux Fuel Transfer Pump A GFI R2-1501 or Fwd Aux Fuel Transfer Pump B GFI R2-1500 Relay. (FUEL BOOST PUMP, GROUND FAULT INTERRUPTER (GFI)-ADJUSTMENT/TEST, PAGEBLOCK 28-20-07/501)</p> <p>>If the test of the applicable Fwd Aux Fuel Transfer Pump A GFI R2-1501 or Fwd Aux Fuel Transfer Pump B GFI R2-1500 Relay fails, then continue.</p>	
	<p>>Check the wiring for a short to ground between pin 12 on applicable Fwd Aux Tank Fuel Transfer Pump A GFI Relay R2-1501 or Fwd Aux Tank Fuel Transfer Pump B GFI Relay 1501 and pin 40 at the Master Warning Caution Controller R5-419A . (WDM 28-24-00)</p> <p>>If you find short to ground.</p> <p>>If you do not find short to ground.</p>	<p>Repair electrical circuit/wiring, as required. (WDM 28-24-00)</p> <p>Replace the Master Warning Caution Controller R5-419A. (WDM 28-24-00)</p>

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Table 107 L or R INLET FUEL PRESS LO (Indication) Fault Isolation

Indication	Isolation Procedure	Correction
<p>L or R INLET FUEL PRESS LO indication is shown and a fault is present.</p>	<p>Check the applicable left Fwd Fuel Tank Boost Pump B1-920 C/B, left Aft Fuel Tank Boost Pump B1-921 C/B, right Fwd Fuel Tank Boost Pump B1-918 C/B or right Aft Fuel Tank Boost Pump B1-919 C/B and determine if the circuit breakers are tripped to the open position. (WDM 28-21-00)</p> <p>>If the applicable left Fwd Fuel Tank Boost Pump B1-920 C/B, left Aft Fuel Tank Boost Pump B1-921 C/B, right Fwd Fuel Tank Boost Pump B1-918 C/B, or right Aft Fuel Tank Boost Pump B1-919 C/B, has tripped open, then do the troubleshooting procedure for a Fuel Boost/Transfer Pump tripped open Circuit Breaker. (FUEL BOOST PUMPS - TROUBLESHOOTING, PAGEBLOCK 28-20-07/101 and WDM 28-21-00)</p> <p>>If the applicable left Fwd Fuel Tank Boost Pump B1-920 C/B, left Aft Fuel Tank Boost Pump B1-921 C/B, right Fwd Fuel Tank Boost Pump B1-918 C/B, or right Aft Fuel Tank Boost Pump B1-919 C/B, are not tripped to the open position, then continue.</p>	
	<p>Open the applicable left Fwd Fuel Tank Boost Pump M1-40 C/B B1-920, or left Aft Fuel Tank Boost Pump M1-2 C/B B1-921, or right Fwd Fuel Tank Boost Pump M1-5 C/B B1-918, or right Aft Fuel Tank Boost Pump M1-3 C/B B1-919. (WDM 28-21-00)</p>	
	<p>Remove the applicable left Fwd Fuel Tank Boost Pump M1-40, or left Aft Fuel Tank Boost Pump M1-2, or right Fwd Fuel Tank Boost Pump M1-5, or right Aft Fuel Tank Boost Pump M1-3. (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201 and WDM 28-21-00)</p>	

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Table 107 L or R INLET FUEL PRESS LO (Indication) Fault Isolation (Continued)

Indication	Isolation Procedure	Correction
	<p>Check the flexible electrical connector for damage or visible evidence of arcing on the applicable left Fwd Fuel Tank Boost Pump M1-40, or left Aft Fuel Tank Boost Pump M1-2, or right Fwd Fuel Tank Boost Pump M1-5, or right Aft Fuel Tank Boost Pump M1-3. (WDM 28-21-00)</p> <p>>If you find damage or visible evidence of arcing to the applicable flexible electrical connector on the left Fwd Fuel Tank Boost Pump M1-40, or left Aft Fuel Tank Boost Pump M1-2, or right Fwd Fuel Tank Boost Pump M1-5, or right Aft Fuel Tank Boost Pump M1-3.</p> <p>>Install the applicable left Fwd Fuel Tank Boost Pump M1-40, or left Aft Fuel Tank Boost Pump M1-2, or right Fwd Fuel Tank Boost Pump M1-5, or right Aft Fuel Tank Boost Pump M1-3. (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201 and WDM 28-21-00)</p> <p>>If the flexible electrical connector is not damaged or has evidence of arcing for the applicable left Fwd Fuel Tank Boost Pump M1-40, or left Aft Fuel Tank Boost Pump M1-2, or right Fwd Fuel Tank Boost Pump M1-5, or right Aft Fuel Tank Boost Pump M1-3, then continue.</p>	<p>Replace the flexible electrical connector for the applicable left Fwd Fuel Tank Boost Pump M1-40, or left Aft Fuel Tank Boost Pump (M1-2, or right Fwd Fuel Tank Boost Pump M1-5, or right Aft Fuel Tank Boost Pump M1-3. (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201 and WDM 28-21-00)</p>
	<p>Check for continuity from terminals 2, 3 and 4 of the applicable Connector P1-526 (left Fwd boost pump M1-4) at terminal S3-302, or P1-524 (left Aft boost pump M1-2) at terminal S3-1, or P1-527 (right Fwd boost pump M1-5) at terminal S3-91 or P1-525 (right Aft Boost pump M1-3) at terminal S3-2. (WDM 28-21-00)</p>	

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Table 107 L or R INLET FUEL PRESS LO (Indication) Fault Isolation (Continued)

Indication	Isolation Procedure	Correction
	<p>>If you do not find continuity.</p> <p>>Install the applicable left Fwd Fuel Tank Boost Pump M1-40, left Aft Fuel Tank Boost Pump M1-2, right Fwd Fuel Tank Boost Pump M1-5, or right Aft Fuel Tank Boost Pump M1-3. (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201 and WDM 28-21-00)</p> <p>>If you find continuity, then continue.</p>	<p>Replace the applicable flexible electrical connector assembly P1-526 (left Fwd boost pump M1-4), or P1-524 (left Aft boost pump M1-2), or P1-527 (right Fwd boost pump M1-5) or P1-525 (right Aft Boost pump M1-3). (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201 and WDM 28-21-00)</p>
	<p>Check the contacts 2, 3 and 4 for a short to ground on the applicable Connector P1-526 (left Fwd boost pump M1-4) at terminal S3-302 or P1-524 (left Aft boost pump M1-2) at terminal S3-1 or P1-527 (right Fwd boost pump M1-5) at terminal S3-91 or P1-525 (right Aft Boost pump M1-3) on terminal S3-2. (WDM 28-21-00)</p>	
	<p>>If you find a short to ground on contacts 2, 3, or 4 on the applicable Connector P1-526 (left Fwd boost pump M1-4), or P1-524 (left Aft boost pump M1-2), or P1-527 (right Fwd boost pump M1-5), or P1-525 (right Aft Boost pump M1-3).</p> <p>>Install the applicable left Fwd Fuel Tank Boost Pump M1-40, left Aft Fuel Tank Boost Pump M1-2, right Fwd Fuel Tank Boost Pump M1-5, or right Aft Fuel Tank Boost Pump M1-3. (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201 and WDM 28-21-00)</p>	<p>Replace the applicable flexible electrical connector assembly P1-526 (left Fwd boost pump M1-4), or P1-524 (left Aft boost pump M1-2), or P1-527 (right Fwd boost pump M1-5), or P1-525 (right Aft Boost pump M1-3). (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201)</p>

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Table 107 L or R INLET FUEL PRESS LO (Indication) Fault Isolation (Continued)

Indication	Isolation Procedure	Correction
	<p>>If you do not find a short to ground on contacts 2, 3, or 4 on the applicable Connector P1-526 (left Fwd boost pump M1-4), or P1-524 (left Aft boost pump M1-2), or P1-527 (right Fwd boost pump M1-5), or P1-525 (right Aft Boost pump M1-3), then continue.</p>	
	<p>Check for a short between contacts 2, 3 and 4 on the applicable Connector P1-526 (left Fwd boost pump M1-4) or P1-524 (left Aft boost pump M1-2) or P1-527 (right Fwd boost pump M1-5) or P1-525 (right Aft Boost pump (M1-3). (WDM 28-21-00)</p> <p>>If you find a short between contacts 2, 3 and 4 on the applicable Connector P1-526 (left Fwd boost pump M1-4) or P1-524 (left Aft boost pump M1-2) or P1-527 (right Fwd boost pump M1-5) or P1-525 (right Aft Boost pump (M1-3).</p> <p>>Install the applicable left Fwd Fuel Tank Boost Pump M1-40, left Aft Fuel Tank Boost Pump M1-2, right Fwd Fuel Tank Boost Pump M1-5, or right Aft Fuel Tank Boost Pump M1-3. (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201 and WDM 28-21-00)</p> <p>>If you do not find a short between contacts 2, 3 and 4 on the applicable Connector P1-526 (left Fwd boost pump M1-4) or P1-524 (left Aft boost pump M1-2) or P1-527 (right Fwd boost pump M1-5) or P1-525 (right Aft Boost pump (M1-3), then continue.</p>	<p>Replace the applicable flexible electrical connector assembly P1-526 for pump M1-4, or P1-524 for pump M1-2, or P1-527 for pump M1-5 or P1-525 for pump M1-5. (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201)</p>

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Table 107 L or R INLET FUEL PRESS LO (Indication) Fault Isolation (Continued)

Indication	Isolation Procedure	Correction
	<p>Turn the applicable Left Main Tank or Right Main Tank Fuel Boost Pump ON (one at a time) and make an aural check that the boost pump operates at its related access door.</p> <p>LEFT MAIN TANK:</p> <ul style="list-style-type: none"> • Left Fwd Fuel Tank Boost Pump (M1-40) behind access door 1303C. • Left Aft Fuel Tank Boost Pump (M1-2) behind access door 1307C <p>RIGHT MAIN TANK:</p> <ul style="list-style-type: none"> • Right Fwd Fuel Tank Boost Pump (M1-5) behind access door 1409C. • Right Aft Fuel Tank Boost Pump (M1-3) behind access door 1410C. <p>>If the applicable left Fwd Fuel Tank Boost Pump (M1-40), left Aft Fuel Tank Boost Pump (M1-2), right Fwd Fuel Tank Boost Pump (M1-5), or right Aft Fuel Tank Boost Pump (M1-3) does not operate.</p>	<p>Replace the applicable left Fwd Fuel Tank Boost Pump (M1-40), left Aft Fuel Tank Boost Pump (M1-2), right Fwd Fuel Tank Boost Pump (M1-5), or right Aft Fuel Tank Boost Pump (M1-3). (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201 and WDM 28-21-00)</p>

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Table 108 FWD AUX FUEL PRESS LOW (EOAP) or NO FWD AUX FUEL PRESS LO (Indication) Fault Isolation

Indication	Isolation Procedure	Correction
<p>FWD AUX FUEL PRESS LOW (EOAP) or NO FWD AUX FUEL PRESS LO indication does not appear or FWD AUX FUEL PRESS LOW (EOAP) or NO FWD AUX FUEL PRESS LO indication stays on during routine maintenance checks (preflight).</p>	<p>Put the Fwd Aux Tank Transfer Pump A or Fwd Aux Tank Transfer Pump B switch (one at a time) in the TEST position, then monitor the Fuel Quantity Display to verify that fuel is transferred from the Fwd Aux Tank to the Center Tank. (FUEL TRANSFER PUMP - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-18/201)</p> <p>>If there is no fuel transfer from the Fwd Aux Tank to the Center Tank, then continue.</p>	

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Table 108 FWD AUX FUEL PRESS LOW (EOAP) or NO FWD AUX FUEL PRESS LO (Indication) Fault Isolation (Continued)

Indication	Isolation Procedure	Correction
	<p>Check the applicable Fwd Aux Tank Fuel Transfer Pump A Circuit Breaker B1-907 or Fwd Aux Tank Fuel Transfer Pump B Circuit Breaker B1-908 and determine if the circuit breaker are tripped to the open position.</p> <p>>If the Fwd Aux Tank Fuel Transfer Pump A C/B or Fwd Aux Tank Fuel Transfer Pump B C/B is tripped open, then do the troubleshooting procedure for a Fuel Boost/Transfer Pump tripped Open Circuit Breaker. (FUEL BOOST PUMPS - TROUBLESHOOTING, PAGEBLOCK 28-20-07/101)</p> <p>>If the applicable Fwd Aux Tank Fuel Transfer Pump A C/B B1-907 or Fwd Aux Tank Fuel Transfer Pump B C/B B1-908 is not tripped to the open position, then continue.</p>	
	<p>Check the applicable Fwd Aux Tank Fuel Transfer Pump A Ground Fault Interrupter Relay R2-1501 or the Fwd Aux Tank Fuel Transfer Pump B Relay R2-1500 and determine if the Ground Fault Interrupter Relay is tripped to the OPEN position.</p> <p>>If the applicable Fwd Aux Tank Fuel Transfer Pump A Ground Fault Interrupter Relay R2-1501 or the Fwd Aux Tank Fuel Transfer Pump B Ground Fault Interrupter Relay R2-1500 is tripped to the OPEN position then do the troubleshooting procedure for a FWD Aux Tank Fuel Transfer Pump Tripped OPEN Ground Fault Interrupter Relay. (FUEL BOOST PUMPS - TROUBLESHOOTING, PAGEBLOCK 28-20-07/101 and WDM 28-24-00)</p> <p>>If the Fwd Aux Tank Fuel Transfer Pump A Ground Fault Interrupter (GFI) Relay R2-1501 or the Fwd Aux Tank Fuel Transfer Pump B Relay R2-1500 is not tripped OPEN, then continue.</p>	

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Table 108 FWD AUX FUEL PRESS LOW (EOAP) or NO FWD AUX FUEL PRESS LO (Indication) Fault Isolation (Continued)

Indication	Isolation Procedure	Correction
	<p>Check and make sure that there is 28 VDC at pin 2 on the applicable Fwd Aux Tank Transfer Pump A Switch S1-504 or Fwd Aux Tank Transfer Pump B Switch S1-505. (WDM 28-24-00)</p> <p>> If you do not find 28 VDC at pin 2 on applicable Fwd Aux Tank Transfer Pump A Switch S1-504 or Fwd Aux Tank Transfer Pump B Switch S1-505.</p> <p>>If you find 28 VDC at pin 2 on applicable Fwd Aux Tank Transfer Pump A Switch S1-504 or Fwd Aux Tank Transfer Pump B Switch S1-505, then continue.</p>	<p>Repair or replace electrical circuit/wiring as required. (WDM 28-24-00)</p>
	<p>Check pin X1 for 28 VDC at applicable Fwd Aux Tank Fuel Transfer Pump A GFI Relay R2-1500 or Fwd Aux Tank Fuel Transfer Pump B GFI Relay R2-1501 with Fwd Aux Tank Transfer Pump A and B switches in the TEST position.</p> <p>>If you do not find 28 VDC at applicable Fwd Aux Tank Fuel Transfer Pump A GFI Relay R2-1500 or Fwd Aux Tank Fuel Transfer Pump B GFI Relay R2-1501.</p> <p>>If fault continue.</p> <p>>If you do not find 28 VDC at applicable Fwd Aux Tank Fuel Transfer Pump A GFI Relay R2-1500 or Fwd Aux Tank Fuel Transfer Pump B GFI Relay R2-1501, then continue.</p>	<p>Repair or replace electrical circuit/wiring as required. (WDM 28-24-00)</p> <p>Replace the applicable Fwd Aux Tank Transfer Pump A Switch S1-504 or Fwd Aux Tank Transfer Pump B Switch S1-505. (WDM 28-24-00)</p>
	<p>Do a functional check of the Fwd Aux Tank Fuel Feed System. (FUEL TRANSFER PUMP - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-18/201)</p> <p>> If the Fwd Aux Tank Fuel Feed System fails to transfer fuel from the Fwd Aux Tank to the Center Tank, then continue.</p>	

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Table 108 FWD AUX FUEL PRESS LOW (EOAP) or NO FWD AUX FUEL PRESS LO (Indication) Fault Isolation (Continued)

Indication	Isolation Procedure	Correction
	<p>Do a check of the flexible electrical conduit assembly for damage or evidence of arcing on the applicable Fwd Aux Tank Fuel Transfer Pump A (M1-40) or Fwd Aux Tank Fuel Transfer Pump B (M1-41). (WDM 28-24-00)</p> <p>>If you find damage or evidence of arcing on the flexible electrical conduit assembly for applicable Fwd Aux Tank Fuel Transfer Pump A (M1-40) or Fwd Aux Tank Fuel Transfer Pump B (M1-41).</p> <p>>If the Fwd Aux Tank Fuel Feed System continues to not transfer fuel from the Fwd Aux Tank to the Center Tank, then continue.</p>	<p>Replace the applicable electrical flexible conduit assembly for the Fwd Aux Tank Fuel Transfer Pump A (M1-40) or Fwd Aux Tank Fuel Transfer Pump B (M1-41) . (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201 and WDM 28-24-00)</p>
	<p>Do a check of the circuit for short to ground between terminal 6 on Terminal Strip S3-369 to Pin 11 on the applicable Fwd Aux Tank Fuel Transfer Pump A GFI R2-1501 or Fwd Aux Tank Fuel Transfer Pump B GFI R2-1500.(WDM 28-24-00)</p> <p>>If you find a short to ground between terminal 6 at Terminal Strip S3-369 to Pin 11 on Fwd Aux Tank Fuel Transfer Pump A GFI R2-1501 or Fwd Aux Tank Fuel Transfer Pump B GFI R2-1500.</p> <p>>If you do not find a short to ground between terminal 6 at Terminal Strip S3-369 to Pin 11 on Fwd Aux Tank Fuel Transfer Pump A GFI R2-1501 or Fwd Aux Tank Fuel Transfer Pump B GFI R2-1500, then continue.</p>	<p>Repair or replace electrical circuit/wiring as required. (WDM 28-24-00)</p>
	<p>Check the electrical circuit for short to ground. from pin 12 at the Fwd Aux Tank Fuel Transfer Pump A GFI R2-1501 or Fwd Aux Tank Fuel Transfer Pump B GFI R2-1500 to Pin 40 on the Master Warning Caution Controller R5-419A.(WDM 28-24-00)</p>	

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Table 108 FWD AUX FUEL PRESS LOW (EOAP) or NO FWD AUX FUEL PRESS LO (Indication) Fault Isolation (Continued)

Indication	Isolation Procedure	Correction
	<p>>If you find a short to ground from Pin 12 at the Fwd Aux Tank Fuel Transfer Pump A GFI R2-1501 or Fwd Aux Tank Fuel Transfer Pump B GFI R2-1500 to Pin 40 on the Master Warning Caution Controller R5-419A.</p> <p>>If you do not find a short to ground from Pin 12 at the Fwd Aux Tank Fuel Transfer Pump A GFI R2-1501 or Fwd Aux Tank Fuel Transfer Pump B GFI R2-1500 to Pin 40 on the Master Warning Caution Controller R5-419A.</p>	<p>Repair or replace electrical circuit/wiring as required. (WDM 28-24-00)</p> <p>Replace the Master Warning Caution Controller R5-419A. (WDM 28-24-00)</p>
	>If fault continue.	Replace the Fwd Aux Fuel Pump Pressure Switch S1-326. (WDM 28-24-00)

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4. Simultaneous Fuel Consumption (Fuel Imbalance Condition) - Fault Isolation Test

A. Equipment And Materials

NOTE: Some materials in the Equipment and Materials list may not be permitted to be used in your location. Persons in each location must make sure they are permitted to use these materials. All persons must obey all applicable federal, state, local, and provincial regulations for their location.

Equipment	Manufacturer
Gauges (2), 0-100 psig, fluid pressure measuring gauge.	
Hoses (2) and AN standard connection (2), to connect gauge to FCU fuel feed line.	

B. Perform Fault Isolation Test

- (1) Transfer fuel to tanks at a quantity necessary to operate the pumps.
- (2) Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices. (PAGEBLOCK 28-00-00/201)
- (3) Disconnect fuel feed line at each engine fuel supply hose.
- (4) Connect gauges to pressure line from tanks in each engine fuel supply hose. During the troubleshooting, gauges will be numbered according to the engine position.
- (5) Place FUEL XFEED lever in OFF position.
- (6) Perform the following test and register the pressure readings at each condition:

Condition	Gauge 1	Gauge 2
AFT & FWD LEFT PUMPS OFF		
AFT & FWD RIGHT PUMPS ON		

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Condition		Gauge 1	Gauge 2
AFT & FWD CTRL PUMPS	OFF		
AFT & FWD LEFT PUMPS	ON		
AFT & FWD RIGHT PUMPS	OFF		
AFT & FWD CTRL PUMPS	OFF		
AFT & FWD LEFT PUMPS	OFF		
AFT & FWD RIGHT PUMPS	OFF		
AFT & FWD CTRL PUMPS	ON		
AFT & FWD LEFT PUMPS	ON		
AFT & FWD RIGHT PUMPS	ON		
AFT & FWD CTRL PUMPS	ON		

- (7) If any of the test shows pressure lower than 12 psi nominal for the left and right AFT and FWD pumps, or lower than 30 psi nominal for the central AFT and FWD, trouble shoot those pumps as follows:
- (a) Switch the non faulted pump off.
 - (b) Switch the fwd faulted pump on and the aft faulted pump off and record pressure.
 - 1) If the pressure is low then trouble shoot fwd faulted pump.
 - 2) If fault continues, trouble shoot electrical system associated to the fwd faulted pump (power feed, phases, popped circuit breakers). (INSPECTION INSTRUCTIONS FOR STANDARD WIRING INSTALLATIONS, SWPM 20-00-06, WIRING INSTALLATION - MAINTENANCE PRACTICES, SWPM 20-10-01)
 - (c) Switch the fwd faulted pump off and the aft faulted pump on and record pressure.
 - 1) If the pressure is low then trouble shoot aft faulted pump.
 - 2) If fault continues, trouble shoot electrical system associated to the aft faulted pump (power feed, phases, popped circuit breakers). (INSPECTION INSTRUCTIONS FOR STANDARD WIRING INSTALLATIONS, SWPM 20-00-06, WIRING INSTALLATION - MAINTENANCE PRACTICES, SWPM 20-10-01)
 - (d) If fault continues trouble shoot check valve between fwd and aft central main pump.
 - (e) If fault continues, swap fwd and aft pumps. The remaining possibilities are a leaking/not closing check valve in the volute assembly or a cracked housing.
 - 1) If fault stays with pump position faulted earlier, check for a leaking/not closing volute check valve or a cracked housing.
 - 2) If the fault follows the pump, replace the faulted pump. (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201)

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DISTRIBUTION - ADJUSTMENT/TEST

1. General

- A. This test should be performed when a functional test of the fuel feed (distribution) system is required.
- B. While performing this test, once fuel feed manifold has been pressurized and fuel boost pumps are selected OFF, left and right engine inlet fuel pressure low lights may take approximately two minutes to come on when engines are not running.
- C. Fuel can transfer through the main tank boost pump volutes at a maximum rate of 0.5 gallons (1.9 liters) per minute per each volute in the tank. The allowable maximum fuel transfer rate per each tank is 500 pounds (226.8 kg) per hour. No fuel transfer is permitted into the center tank through the boost pump volute.

2. Adjustment/Test Fuel Feed System

A. Test Right Main Tank Fuel Feed System to Both Engines

- (1) Place both FUEL shutoff levers, located on center pedestal, in OFF position.
- (2) Place FUEL XFEED lever, located on center pedestal, in OFF position.
- (3) Make certain both fire control handles, located on upper instrument panel, are in normal (full in) position.

WARNING: DO NOT OPERATE A FUEL PUMP IN AN EMPTY FUEL TANK. PROLONGED DRY RUNNING OF A FUEL PUMP IN AN EMPTY TANK CAN DEGRADE INTERNAL PUMP COMPONENTS AND INCREASE THE RISK OF DEVELOPING A FUEL TANK IGNITION SOURCE.

- (4) Place FUEL TANKS RIGHT AFT PUMPS switch, located on overhead switch panel in ON position; R INLET FUEL PRESS LOW light, located on annunciator panel should go off.

NOTE: L INLET FUEL PRESS LOW light should be on.

NOTE: Pump operation should be continuously monitored to ensure a pump does not run dry.

NOTE: If it is necessary to leave a pump operating unattended, it must be assured that there is sufficient fuel in the respective tank to ensure the pump(s) will not run dry.

NOTE: Pump should be turned off once the low pressure indication illuminates or the desired fuel quantity is indicated.

- (5) Place FUEL TANKS RIGHT AFT FUEL PUMPS switch in OFF position.

NOTE: L INLET FUEL PRESS LOW light should be on.

- (6) When R INLET FUEL PRESS LOW light comes on, place FUEL TANKS RIGHT FWD FUEL PUMPS switch in ON position; R INLET FUEL PRESS LOW light should go off.

NOTE: L INLET FUEL PRESS LOW light should be on.

- (7) Place FUEL XFEED lever in ON position; L INLET FUEL PRESS LOW light should go OFF.

- (8) Place FUEL TANKS RIGHT FWD FUEL PUMPS switch in OFF position; R and L INLET FUEL PRESS LOW lights should come on.

- (9) Place FUEL XFEED lever in OFF position.

B. Test Left Main Tank Fuel Feed System to Both Engines

- (1) Place both FUEL shutoff levers, located on center pedestal, in OFF position.
- (2) Place FUEL XFEED lever, located on center pedestal, in OFF position.
- (3) Make certain both fire control handles, located on upper instrument panel, are in normal (full in) position.

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WARNING: DO NOT OPERATE A FUEL PUMP IN AN EMPTY FUEL TANK. PROLONGED DRY RUNNING OF A FUEL PUMP IN AN EMPTY TANK CAN DEGRADE INTERNAL PUMP COMPONENTS AND INCREASE THE RISK OF DEVELOPING A FUEL TANK IGNITION SOURCE.

- (4) Place FUEL TANKS LEFT AFT PUMPS switch, located on overhead switch panel in ON position; L INLET FUEL PRESS LOW light, located on annunciator panel should go off.

NOTE: R INLET FUEL PRESS LOW light should be on.

NOTE: Pump operation should be continuously monitored to ensure a pump does not run dry.

NOTE: If it is necessary to leave a pump operating unattended, it must be assured that there is sufficient fuel in the respective tank to ensure the pump(s) will not run dry.

NOTE: Pump should be turned off once the low pressure indication illuminates or the desired fuel quantity is indicated.

- (5) Place FUEL TANKS LEFT AFT FUEL PUMPS switch in OFF position.

NOTE: R INLET FUEL PRESS LOW light should be on.

- (6) When L INLET FUEL PRESS LOW light comes on, place FUEL TANKS LEFT FWD FUEL PUMPS switch in ON position; L INLET FUEL PRESS LOW light should go off.

NOTE: R INLET FUEL PRESS LOW light should be on.

- (7) Place FUEL XFEED lever in ON position; R INLET FUEL PRESS LOW light should go OFF.

- (8) Place FUEL TANKS LEFT FWD FUEL PUMPS switch in OFF position; R and L INLET FUEL PRESS LOW lights should come on.

- (9) Place FUEL XFEED lever in OFF position.

- (10) Place FUEL TANKS LEFT FWD PUMPS switch in OFF position; L INLET FUEL PRESS LOW light should come on.

C. Test Center Tank Fuel Feed System to Both Engines

- (1) Place FUEL TANKS FWD CTR FUEL PUMPS switch in ON position; both R and L INLET FUEL PRESS LOW lights should go off.

- (2) Place FUEL TANKS FWD CTR FUEL PUMPS switch in OFF position; both R and L INLET FUEL PRESS LOW lights should come on as pressure decays.

WARNING: DO NOT OPERATE A FUEL PUMP IN AN EMPTY FUEL TANK. PROLONGED DRY RUNNING OF A FUEL PUMP IN AN EMPTY TANK CAN DEGRADE INTERNAL PUMP COMPONENTS AND INCREASE THE RISK OF DEVELOPING A FUEL TANK IGNITION SOURCE.

- (3) Place FUEL TANKS AFT CTR FUEL PUMPS switch in ON position; both R and L INLET FUEL PRESS LOW lights should go off.

NOTE: Pump operation should be continuously monitored to ensure a pump does not run dry.

NOTE: If it is necessary to leave a pump operating unattended, it must be assured that there is sufficient fuel in the respective tank to ensure the pump(s) will not run dry.

NOTE: Pump should be turned off once the low pressure indication illuminates or the desired fuel quantity is indicated.

- (4) Place FUEL TANKS AFT CTR FUEL PUMPS switch in OFF position; both R and L INLET FUEL PRESS LOW LIGHTS should come on as pressure decays.

D. Test Crossfeed Fuel Operations and Transfer

- (1) Place FUEL XFEED lever, located on center pedestal, in OFF position.

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- (2) Fuel quantity in center wing tank should be approximately 1000 to 5000 pounds (454 to 2268 kg). Note fuel quantity in left and right main tanks, center wing tank and totalizer quantity. Left and right main tanks should not be full.

WARNING: DO NOT OPERATE A FUEL PUMP IN AN EMPTY FUEL TANK. PROLONGED DRY RUNNING OF A FUEL PUMP IN AN EMPTY TANK CAN DEGRADE INTERNAL PUMP COMPONENTS AND INCREASE THE RISK OF DEVELOPING A FUEL TANK IGNITION SOURCE.

- (3) Place both FUEL TANKS CTR PUMPS switches, located on overhead switch panel, in ON position and operate for 30 minutes.

NOTE: Pump operation should be continuously monitored to ensure a pump does not run dry.

NOTE: If it is necessary to leave a pump operating unattended, it must be assured that there is sufficient fuel in the respective tank to ensure the pump(s) will not run dry.

NOTE: Pump should be turned off once the low pressure indication illuminates or the desired fuel quantity is indicated.

- (4) Place both FUEL TANKS CTR PUMPS switches to OFF position and note fuel quantity in left and right main tanks and center wing tank.

NOTE: Maximum allowable fuel increase in left and right main tank quantities is 250 pounds (113.6 kg) for each tank.

- (5) Note fuel quantity in left and right main tanks, center wing tank and totalizer quantity. Right main tank and center wing tank should not be full.

- (6) Place FUEL TANKS LEFT AFT and both FUEL TANKS CTR PUMPS switches in ON position and operate for three minutes, then place both FUEL TANKS CTR PUMPS switches to OFF and continue to operate left aft pump for 30 minutes.

- (7) Place FUEL TANKS LEFT AFT PUMPS switch to OFF position and note left and right main tank and center wing tank fuel quantities.

NOTE: There shall be no allowable increase in center wing tank fuel quantity. Maximum allowable fuel increase in right main tank quantity is 50 pounds (23 kg).

- (8) Note fuel quantity in left and right main tanks, center wing tank and totalizer quantity. Left main tank and center wing tank should not be full.

- (9) Place FUEL TANKS RIGHT AFT PUMPS switch in ON position and operate for 30 minutes.

- (10) Place FUEL TANKS RIGHT AFT PUMPS switch to OFF position and note left and right main tank and center wing tank fuel quantities.

NOTE: There shall be no allowable increase in center wing tank or left main tank fuel quantity.

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DISTRIBUTION - CHECK

1. General

- A. This check is concerned with the pressure tight integrity of the fuel line shrouds and shroud drain lines. A check for possible obstruction within the shrouds and shroud drain lines is also presented.
- B. The fuel line shroud and drain system is provided with a series of interconnecting drain lines, which drain overboard at three separate locations. Two lines running aft drain overboard through open shroud drain outlets, one located on each side and aft of APU, forward of tailcone, and one closed push to drain valve, located aft of right main gear wheel (Figure 601). Presence of fuel at drained valve can indicate a ruptured fuel line or loose connection.
- C. The check is accomplished by pressurizing the fuel line shroud and shroud drain system to 5 psi (34.5 kPa) using clean dry air, observing that air flows freely through the shrouds and shroud drain lines to all drain line connections, and observing the test pressure decay rate for indication of excessive leakage.
- D. Strict compliance with safety precautions contained in GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201, and all local safety precautions is required during the performance of this check.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following items:

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 601

Name and Number	Manufacturer
Pressure gage 0-10 psi	
Clean dry air source	
Bubble fluid DPM 6045	

3. Route and Pressure Check Shroud and Drain System

A. Route Check Shrouds and Drains

- (1) Disconnect and plug shroud drain line at each engine fire shutoff valve shroud. (Figure 601)
- (2) Disconnect and plug shroud drain line connection at the A.P.U. fire shutoff valve. (Figure 601)
- (3) Plug right drain mast outlets aft of station No. 4.
- (4) Plug one outlet opening at left drain mast fitting. Connect pressure gage and clean dry air pressure source to other outlet opening.

CAUTION: DO NOT PRESSURIZE THE SHROUD SYSTEM MORE THAN 5.0 PSI (34.5 KPA). TOO MUCH PRESSURE CAN CAUSE DAMAGE TO THE SHROUD SYSTEM AND THE FUEL PIPING.

- (5) Pressurize shroud drain system to 5 psi (34.5 kPa).

NOTE: Temporarily disconnect, or unplug, as applicable, then reconnect or plug connections called out in following Paragraph 3.A.(6) through Paragraph 3.A.(12). Pressurize system after completing step.

EFFECTIVITY

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

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- (6) Unplug or disconnect each drain line at station No. 1 (Figure 601). Air shall flow freely from each drain line.
 - (7) Unplug drain line at APU fire shutoff valve shroud; air shall flow freely from the drain line.
 - (8) Disconnect each drain line at stations No. 2 and No. 3 in turn; air shall flow freely from the drain lines at stations No. 2 and No. 3 and from shrouds at station No. 3.
 - (9) Disconnect shroud drain lines at station No. 4; air shall flow freely from both the APU shroud and shroud drain line connections.
 - (10) Unplug right drain mast connection at station No. 4; air shall flow freely from mast.
 - (11) Depress shroud drain valve; air shall flow freely from the valve.
 - (12) Remove plugs and connect lines disconnected in Paragraph 3.A.(1), Paragraph 3.A.(2), and Paragraph 3.A.(3).
 - (13) Remove plugs and pressure connections installed in Paragraph 3.A.(4).
- B. Pressure Check Shroud and Drain System
- (1) Accomplish Paragraph 3.A.(1) through Paragraph 3.A.(4).

CAUTION: DO NOT PRESSURIZE THE SHROUD SYSTEM MORE THAN 5.0 PSI (34.5 KPA). TOO MUCH PRESSURE CAN CAUSE DAMAGE TO THE SHROUD SYSTEM AND THE FUEL PIPING.

- (2) Pressurize shroud and drain system to 5 psi (34.5 kPa); close valve and disconnect air supply.
- (3) Observe pressure gage; pressure decay shall not exceed 2 psi (13.8 kPa) in 5 minutes.

NOTE: If pressure decay is within acceptable limits, continue test at asterisk (*) items. If decay rate is not acceptable, continue steps in sequence.

- (4) Connect air supply and pressurize shroud and drain system to 5 psi (34.5 kPa).

WARNING: LEAK TEST BUBBLE FLUID IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN LEAK TEST BUBBLE FLUID IS USED.

- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LEAK TEST BUBBLE FLUID IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THESE HAZARDOUS AGENTS.

- (5) In turn, apply bubble fluid to each shroud and drain line connection.
- (6) Repair leaks as required.
- (7) * Remove plugs and connect left engine, right engine, and APU fuel fire shutoff valve shroud drain lines.
- (8) * Remove air source and test equipment.
- (9) * Remove plugs from right mast outlets aft of station No. 4.

EFFECTIVITY

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 876, 886, 887, 891, 893

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- (10) * Remove plug from outlet at left drain mast fitting.

EFFECTIVITY

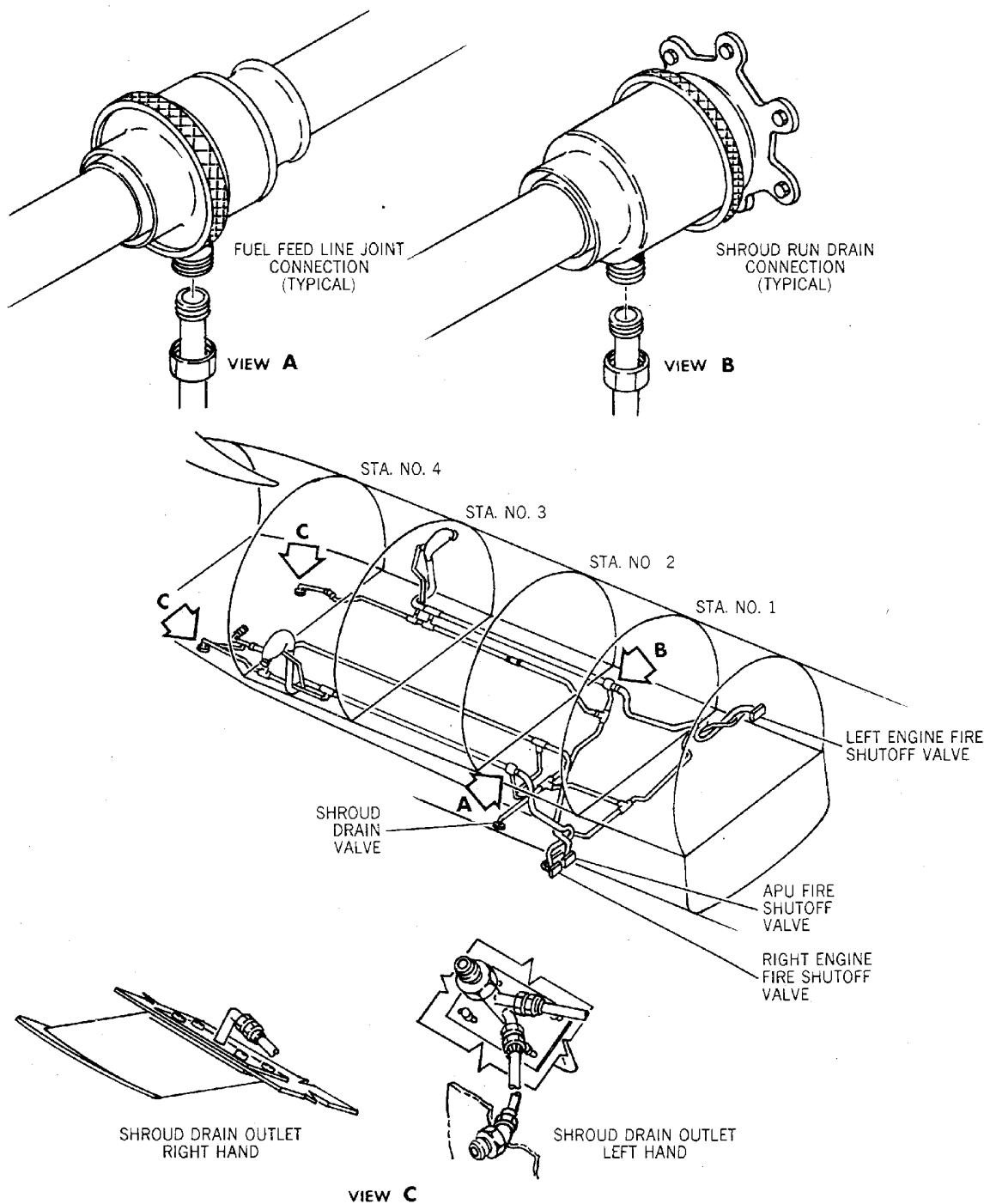
**WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 876, 886, 887, 891, 893**

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BBB2-28-31A

**Fuel Line Shroud and Drain Test Points
Figure 601/28-20-00-990-801**

EFFECTIVITY

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

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DISTRIBUTION - CHECK

1. General

- A. This check is concerned with the freedom from obstruction and pressure tight integrity of the fuel line shrouds and shroud drain lines. An air flow check for possible obstruction in the cavity vent lines is also provided.
- B. The fuel line shroud and drain system is provided with a series of interconnecting drain lines which drain overboard at five separate locations. Two lines running aft drain overboard through open shroud drain outlets, one located on each side and aft of APU, forward of tailcone. Three closed push-to-drain valves are located on the bottom of the fuselage; one below the wing leading edge area and one below each fuselage fuel tank area (Figure 601). Presence of fuel at a drain valve can indicate a ruptured fuel line or loose connection.
- C. The shrouds check is accomplished by pressurizing the fuel line shroud and shroud drain system to 5 psig using clean dry air, observing that air flows freely through the shrouds and shroud drain lines to all drain line connections, and observing the test pressure decay rate for indication of excessive leakage. A similar procedure is utilized to check the cavity vent lines.
- D. Strict compliance with safety precautions contained in GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201, and all local safety precautions is required during the performance of this check.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following items:

NOTE: Some materials in the Equipment and Materials list may not be permitted to be used in your location. Persons in each location must make sure they are permitted to use these materials. All persons must obey all applicable federal, state, local, and provincial regulations for their location.

Table 601

Name and Number	Manufacturer
Pressure gage 0-10 psi	Commercially available
Clean dry air source	Locally available
Heat shrinkable tubing	Rayclad Tube Redwood City, Calif.

3. Check Distribution

A. Route and Leak Check Shrouds and Drains

NOTE: Accomplish steps with asterisk (*) if only a pressure check is required.

- (1) * Disconnect shroud drain line at slant pressure panel aft of center wing fuel tank. Plug open end of tube; cap union.
- (2) * Disconnect shroud drain line from tee attached to center wing tank shroud drain lines above front spar. Cap open end of drain line.
- (3) * Connect pressure gage and 0 to 60 psi (0 to 414 kPa) clean dry air pressure to open end of tee.

CAUTION: DO NOT PRESSURIZE THE SHROUD SYSTEM MORE THAN 5.0 PSI (34.5 KPA). TOO MUCH PRESSURE CAN CAUSE DAMAGE TO THE SHROUD SYSTEM AND THE FUEL PIPING.

- (4) * Slowly apply 5 psig (34.5 kPa) air pressure to shroud drain system.
- (5) Disconnect shroud drain line from union at aft fuselage tank fill pipe fitting and check for free airflow from fitting.

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

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- (6) Disconnect shroud drain line from tee at aft fuselage tank transfer pipe fitting and check for free airflow from fitting.
- (7) * Disconnect shroud drain line from tee at aft fuselage tank vent pipe fitting and check for free airflow from fitting.
- (8) * Plug open end of tee disconnected in Paragraph 3.A.(7).
- (9) * Connect fill and transfer pipe drain lines disconnected in Paragraph 3.A.(5) and Paragraph 3.A.(6).
- (10) Disconnect shroud drain lines from vent, fill, and transfer pipe fittings located on side of forward fuselage tank in sequence. Air shall flow freely from each fuel tank fitting.
- (11) Connect all three lines disconnected in Paragraph 3.A.(10).
- (12) * Close air supply valve and check for indication of pressure drop for a period of five minutes. Pressure drop shall be zero psig.
- (13) * Repair leaks as required.
- (14) * Open air supply valve and vent system pressure to zero psig.
- (15) * Remove plug installed in open end of tee in Paragraph 3.A.(8) and connect shroud drain line to vent fitting tee.
- (16) * Remove air supply installed in Paragraph 3.A.(3) and connect shroud drain line to tee.
- (17) * Remove plug installed in Paragraph 3.A.(1) and connect shroud drain line to union on slant pressure panel.
- (18) * Disconnect and plug shroud drain lines at right and left engine shutoff valves and APU fire shutoff valve located on rear spar.
- (19) * Attach 0 to 60 psig (0 to 414 kPa) clean dry regulated air supply to one outlet opening in left hand drain mast.
- (20) * Plug remaining openings in left and right hand drain masts.
- (21) * Plug left and right hand vapor removal tube shroud drain line fittings located inboard of pylons.
- (22) * Slowly apply 5 psig (34.5 kPa) air pressure to left drain mast fitting.

CAUTION: TEMPORARILY DISCONNECT OR UNPLUG, AS APPLICABLE, SHROUD DRAIN LINES CHECKED IN STEPS (23) THROUGH (31). PRESSURIZE DRAIN SYSTEM TO 5 PSIG (35 KPA) AFTER COMPLETING EACH STEP.

- (23) Unplug in sequence, left and right engine fuel shutoff valve drain lines and APU fire shutoff valve drain line. Air shall flow freely from each open drain line.
- (24) Disconnect in sequence, left and right hand drain line forward of pressure bulkhead and at right hand drain mast. Air shall flow freely from each open line.
- (25) Disconnect in sequence, left hand fuel drain shroud drain lines located in left hand wheelwell (three places). Air shall flow freely from each open line.
- (26) Disconnect in sequence, right hand fuel shroud drain lines located in right hand wheelwell (three places). Air shall flow freely from each open line.
- (27) Disconnect in sequence, APU fuel shroud drain lines located aft of pressure bulkhead on right side (three places). Air shall flow freely from each open drain line.
- (28) Disconnect in sequence, left and right hand drain line located inboard of pylons. Air shall flow freely from each open drain line.
- (29) Unplug or disconnect fuselage tank fill pipe shroud drain line located top right hand forward side of aft tank. Air shall flow freely from open line.

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

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- (30) Disconnect electrical feedthrough drain lines in sequence, located on front spar, right and left sides (six places). Air shall flow freely from each open drain line.
- (31) Depress in sequence, drain valves located in skin on bottom of fuselage (three places). Air shall flow freely from each open drain valve.
- (32) * Close air supply valve with drain system pressurized to 5 psig (35 kPa) and remove air source. Check that pressure decrease shall not exceed 2 psig (13.8 kPa) in 5 minutes.
- (33) * Remove plugs and connect left engine, right engine, and APU fuel fire shutoff valve shroud drain lines.

CAUTION: DO NOT PRESSURIZE THE SHROUD SYSTEM MORE THAN 5.0 PSI (34.5 KPA). TOO MUCH PRESSURE CAN CAUSE DAMAGE TO THE SHROUD SYSTEM AND THE FUEL PIPING.

- (34) * Pressurize shroud and drain system to 5 psig (35 kPa). Use bubble fluid to leak check shrouds and drain line connections.

NOTE: Some air will escape from the shroud at control lever grommet.

- (35) * Repair leaks as required.
- (36) * Vent system to 0 psig (0 kPa). Remove air source and test equipment.
- (37) * Unplug and connect lines opened in Paragraph 3.A.(20) and Paragraph 3.A.(21).

B. Leak Test Cavity Vent Lines

CAUTION: DO NOT PRESSURIZE FUSELAGE DURING CAVITY VENT LINES TEST. PRESSURE WILL ENTER OPEN VENT FITTINGS AND DAMAGE FUEL TANK CELLS.

- (1) Disconnect forward fuselage fuel tank cavity vent line at tank elbow. Cap elbow fitting.

NOTE: Heat shrinkable tubing must be removed in order to disconnect vent lines.

- (2) Disconnect aft fuselage fuel tank cavity vent line at tank elbow. Cap elbow fitting.

CAUTION: FAILURE TO DISCONNECT FUEL TANK CAVITY VENT LINES WILL RESULT IN DAMAGE TO FUEL TANK CELL WHEN AIR PRESSURE IS APPLIED TO FITTING AT FUSELAGE PRESSURE BULKHEAD.

- (3) Disconnect cavity vent line from union on aft side of fuselage pressure bulkhead.
- (4) Attach 0 to 60 psi (0 to 414 kPa) air supply to disconnected union on pressure bulkhead, open valve and make certain that air flows freely from open vent lines disconnected in Paragraph 3.B.(1) and Paragraph 3.B.(2).
- (5) Close air supply valve and plug both open vent lines disconnected in Paragraph 3.B.(1) and Paragraph 3.B.(2).
- (6) Slowly pressurize cavity vent lines to 5 psig (34.5 kPa) and check for indications of pressure decay for 5 minutes. Pressure drop shall be zero.

CAUTION: HEAT SHRINKABLE TUBING MUST BE INSTALLED ON FUEL TANK CAVITY VENT LINE FITTINGS LOCATED IN FUSELAGE PRESSURIZED AREA.

- (7) Depressurize cavity vent line and connect fittings to fuselage pressure bulkhead, aft fuel tank cavity and forward fuel tank cavity.

EFFECTIVITY

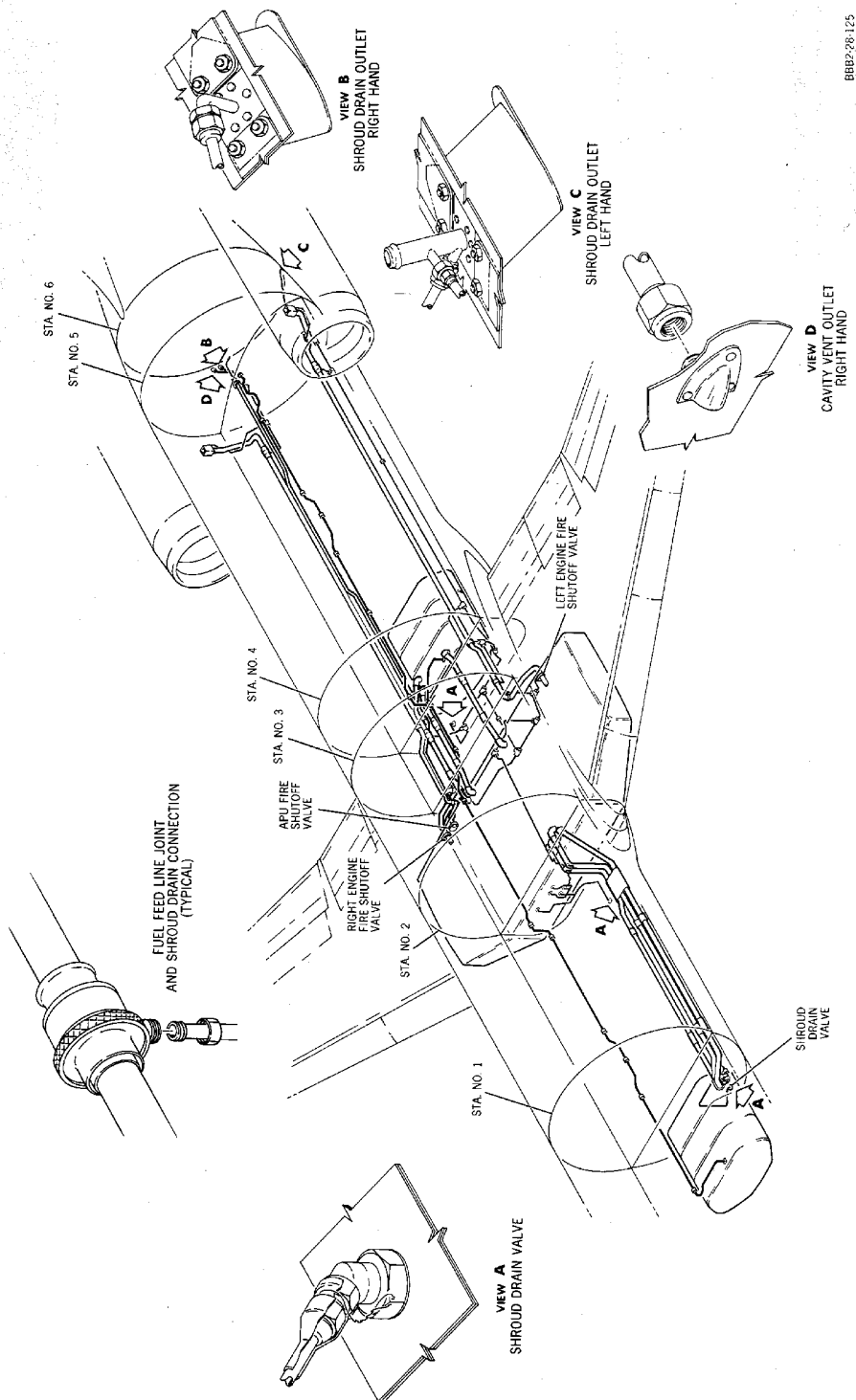
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

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Fuel Line Shroud and Test Points Figure 601
Figure 601/28-20-00-990-805 (Sheet 1 of 2)

EFFECTIVITY

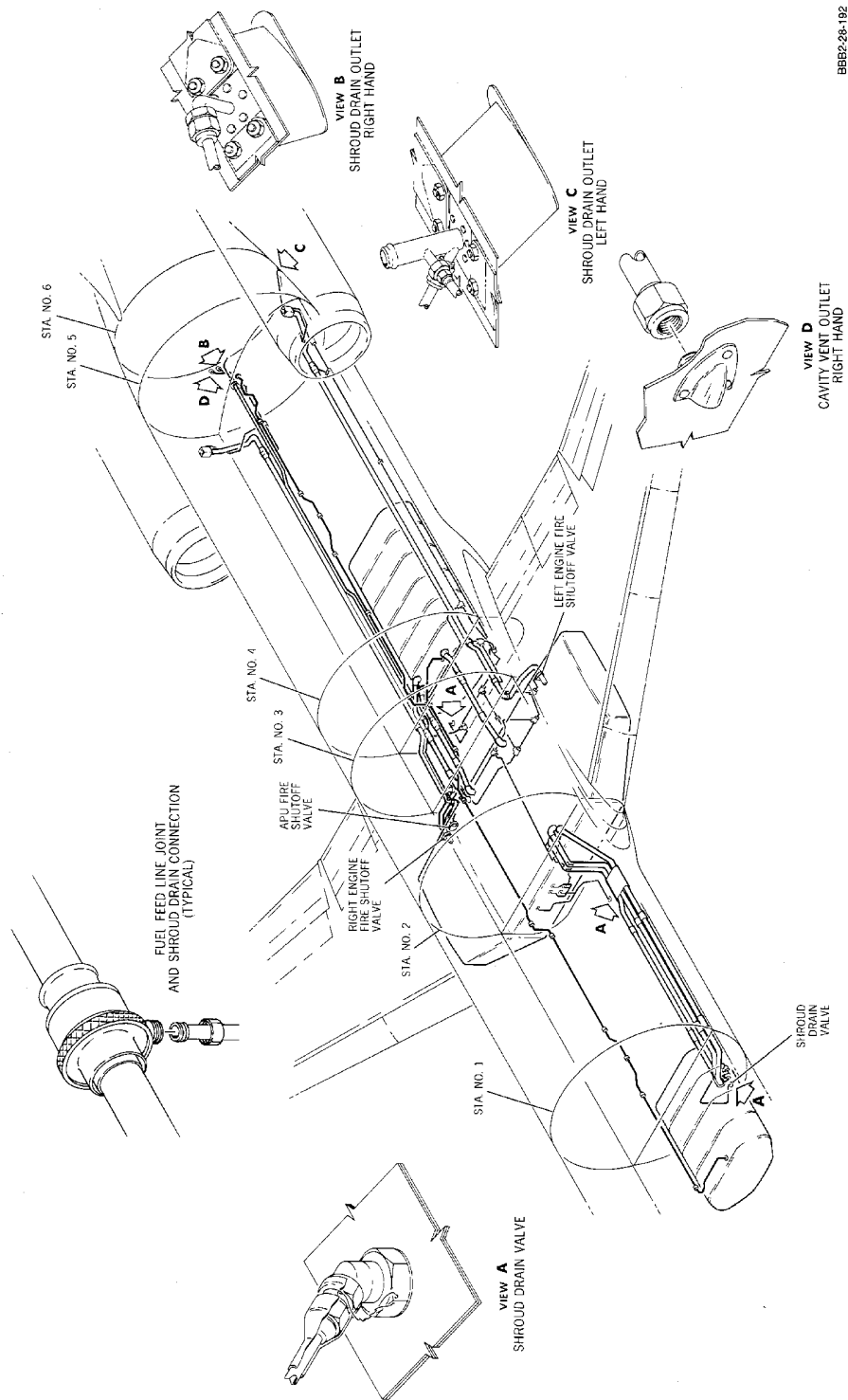
WJE 401-405, 409, 410, 412, 414, 873, 874, 877-881,
883, 884, 892

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**Fuel Line Shroud and Test Points Figure 601
Figure 601/28-20-00-990-805 (Sheet 2 of 2)**

EFFECTIVITY
WJE 861, 862

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DISTRIBUTION - ADJUSTMENT/TEST

1. General

A. This procedure contains MSG-3 task card data.

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

TASK 28-20-00-720-801

2. Functional Check of the Fuel Shroud System

NOTE: This procedure is a scheduled maintenance task.

A. References

Reference	Title
28-20-00 P/B 601 Config 1	DISTRIBUTION - CHECK

B. Consumable Materials

NOTE: Equivalent replacements are permitted for the items that follow.

NOTE: It is possible that some materials in the Consumable Materials chart cannot be used for some or all of the necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Reference	Description	Specification
B60047	Fluid - Bubble	DPM 6045 (MIL-PRF-25567)

C. Prepare for the Fuel Shroud System Functional Check

SUBTASK 28-20-00-840-001

(1) Prepare aircraft. (DISTRIBUTION - CHECK, PAGEBLOCK 28-20-00/601 Config 1)

D. Fuel Shroud System Functional Check

SUBTASK 28-20-00-720-001

(1) Route and pressure check shroud and drain system. Use bubble fluid, B60047.
(DISTRIBUTION - CHECK, PAGEBLOCK 28-20-00/601 Config 1)

E. Job Close-up

SUBTASK 28-20-00-840-002

(1) Restore aircraft. (DISTRIBUTION - CHECK, PAGEBLOCK 28-20-00/601 Config 1)

SUBTASK 28-20-00-942-001

(2) Remove all the tools and equipment from the work area. Make sure the area is clean.

————— END OF TASK —————

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

TASK 28-20-00-720-803

3. Functional Check of the Fuel Shroud System

NOTE: This procedure is a scheduled maintenance task.

A. References

Reference	Title
28-20-00 P/B 601 Config 2	DISTRIBUTION - CHECK

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Config 1
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WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 (Continued)

B. Prepare for the Fuel Shroud System Functional Check

SUBTASK 28-20-00-840-005

- (1) Prepare aircraft. (DISTRIBUTION - CHECK, PAGEBLOCK 28-20-00/601 Config 2)

C. Fuel Shroud System Functional Check

SUBTASK 28-20-00-720-003

- (1) Route and leak check shrouds and drains. (DISTRIBUTION - CHECK, PAGEBLOCK 28-20-00/601 Config 2)

D. Job Close-up

SUBTASK 28-20-00-840-006

- (1) Restore aircraft. (DISTRIBUTION - CHECK, PAGEBLOCK 28-20-00/601 Config 2)

SUBTASK 28-20-00-942-003

- (2) Remove all the tools and equipment from the work area. Make sure the area is clean.

————— **END OF TASK** —————

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IN-TANK VENT AND FUEL PIPE ASSEMBLY - REPAIR

1. General

- A. This section has the instructions for the permanent repair of an in-tank vent and fuel pipe assembly.
- B. These repair instructions are applicable to any fuel pipe assembly (vent and fuel) within the aircraft fuel tanks. The term fuel line is used in general for both in-tank vent or fuel pipe assembly.
- C. This repair is applicable to repair one damaged area only. If fuel line has multiple damaged areas, multiple applications of this repair procedure may be done. Repair is only applicable on a straight pipe section.
- D. This repair meets the design certification basis of the aircraft and requires no special inspection, other than normal maintenance to satisfy damage tolerance requirements.
- E. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices in (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201).

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items.

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 801

REFERENCE	DESIGNATION
Solvent, cleaning handwipe (DPM 6380-4)	
Deburring tool	Not specified
Sealant, PR-1422 B2 DMS QPL 2082	PRC-DeSoto International 5430 San Fernando Road P.O. Box 1800 Glendale, CA 91203
Isopropyl alcohol (DPM 530)	Commercially available
Cotton cloth, lint free (DMS 1820)	American Fiber & Finishing Boston MA
Repair material sheet 6061-T6 AL sheet	
Repair material tube 6061-T4 AL tube (WW-T-700/6, type 1, temp T4)	
Primer, fluid resistant (DMS 1786) (DPM 2232-7)	
Protective coating Alodine 1200S DPM 1453-1	Commercially available

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Table 801 (Continued)

REFERENCE	DESIGNATION
Clamp NAS1924, BACC10JB or MS21920	

3. Permanent Repair of an In-Tank Vent and Fuel Pipe Assembly

A. Job Set-up - Permanent Repair of an In-Tank Vent and Fuel Pipe Assembly

- (1) Make sure that the fuel system is safe for maintenance. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- (2) At the applicable fuel line, loosen the clamps or support brackets as necessary to get access for the inspection of the damaged area.
NOTE: Damaged area can extend beneath the clamps or support brackets that is not easily seen.
- (3) Do an inspection of the damaged area on the fuel line with the damage criteria limits that follow:
 - Maximum Diameter for Holes: 40% of fuel pipe Outer Diameter (O.D.)
 - Maximum Length for Cracks and Punctures: 25% of fuel pipe total length
 - Maximum Width for Cracks and Punctures: 0.100 in. (2.540 mm).
 - (a) If the damaged area is not within the damage criteria limits for repair, replace the vent or fuel line.

B. Procedure - Permanent Repair of an In-Tank Vent and Fuel Pipe Assembly(Figure 801)

- (1) For damaged area that is cracked, stop-drill the two ends of the cracked area to 0.25 in. (6.35 mm). For damage area that has a hole or punctured damage, route-out the hole or punctured area from 0.063 in. (1.600 mm) to 0.100 in. (2.540 mm) width.
 - (a) Clean the rework area with deburring tool.
 - (b) Do a penetrant inspection of the rework area to make sure that the damage area is completely removed. (Non-Destructive Testing Standard Practice Manual (NDTSPM), Chapter 8)

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1107, PRIMER/FR (DMS QPL 1786)

HAZMAT 1000, REFER TO MSDS

- (c) Touch up stop-drill holes or routed slot with Multicolored Conversion (MC) coating followed by Fluid Resistant Primer (DMS 1786) per SRM CH-51 Volume 2.
- (2) Fabricate the doubler (1) with 6061-T6 AL sheet or 6061-T4 AL tube material as applicable for the repair area.

NOTE: Overall length, width, diameter and thickness is defined by the repair area.

- (a) Cut the doubler (1) to fit around the damaged area, formed and fitted to the rework area with a minimum of 1 in. (25 mm) overlap in all directions beyond the damaged area.
- (b) The doubler (1) must be formed to fit tightly to the outer diameter contour of the fuel line.

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- 1) It is preferred that the doubler (1) wrap around at least half of the fuel line circumference.

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1714, ALODINE #1200S CHEMICAL FILM PREMIXED LIQUID BRUSH (DPM 1453-5)

HAZMAT 1000, REFER TO MSDS

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1107, PRIMER/FR (DMS QPL 1786)

HAZMAT 1000, REFER TO MSDS

- (3) Clean and apply alodine 1200S (DPM 1453-1) and Primer (DMS 1786) to the doubler (1) and rework surface on the fuel line. (Refer to SRM 51-10-03 and ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1590, CLEANER/SOLVENT/HANDWIPE (DPM 6380-4)

HAZMAT 1000, REFER TO MSDS

- (a) Use a clean lint-free cotton wiper made moist with cleaning solvent (DPM 6380-4) to remove all unwanted material on surface of the doubler (1) and rework area on the fuel line.
- (b) Immediately use a clean dry lint-free cotton wiper and wipe dry the solvent from the doubler (1) and rework area on the fuel line.

NOTE: Do not let the solvent air dry on the rework surfaces.

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1117, COMPOUND/INTEGRAL FUEL TANKS SEALING (DMS QPL 2082 B1/2 AND B2)

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(WARNING PRECEDES)

HAZMAT 1000, REFER TO MSDS

- (4) Apply a layer of sealant (PR-1422, B2) or equivalent to the mating surfaces of the doubler (1) and around the rework area on the fuel line.
- (a) Avoid the application of too much sealant near the hole, crack or puncture on the rework area. This will prevent the sealant to go inside the fuel line and cause a significant blockage.

NOTE: A small amount of sealant inside the fuel line is permitted.

- (5) Install the doubler (1) loosely to the rework area on the fuel line with the applicable clamps.

NOTE: Size and number of clamps are defined by the repair area.

- (a) Clamps must be installed not less than 0.20 in. (5.08 mm) from the two ends of the doubler (1).
- (b) Clamps must be installed not more than 3 in. (76 mm) between each clamp.
- (c) Tighten the clamps carefully. Make sure that the doubler (1) does not move on the fuel line.
- 1) Immediately remove unwanted sealant from around the doubler (1) that is squeezed out.
- (d) Cut the end of the clamp strap if it extends more than 0.25 in. (6.35 mm) past the worm drive.

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1117, COMPOUND/INTEGRAL FUEL TANKS SEALING
(DMS QPL 2082 B1/2 AND B2)

HAZMAT 1000, REFER TO MSDS

- (e) Apply sealant (PR-1422, B-2) to the clamp worm drives and strap ends, make sure they are completely encapsulated.
- (f) Allow sealant to cure for 36 hours at 70°F (21°C) or 8 hours at 125°F (52°C) before you continue to the next step.

- (6) Prepare the faying surfaces of the doubler (1) and pipe for electrical bonding. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)

NOTE: It is not necessary to prepare the entire circumference of the pipe for electrical bonding.

- (7) Do a bond test of the doubler (1) to the fuel line. The maximum resistance is 0.0025 ohms. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
- (a) Do the electrical bonding again if maximum resistance is more than the limits. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

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(WARNING PRECEDES)

Hazardous Material Warnings

HAZMAT 1002, ALODINE 1200 COATING (DPM 1453)

HAZMAT 1000, REFER TO MSDS

- (8) If necessary, apply alodine 1200S (DPM 1453-1) and prime to all unfinished areas.
 - (9) Install the applicable clamps and support brackets in position that was removed for the repair procedure.
 - (a) Make sure that the clamps and support brackets are not over-tightened and that no preload condition exist to the fuel line.
 - (10) At each maintenance check where the applicable fuel tank is opened, do a check of the repaired in-tank vent and fuel pipe assembly.
 - (a) Do a check for sealant deterioration, doubler that is loose, and clamps that are loose. If necessary, do this repair again.
- C. Job Close-up - Permanent Repair of an In-Tank Vent and Fuel Pipe Assembly
- (1) Remove all the tools and the equipment from the work area. Make sure that the area is clean.

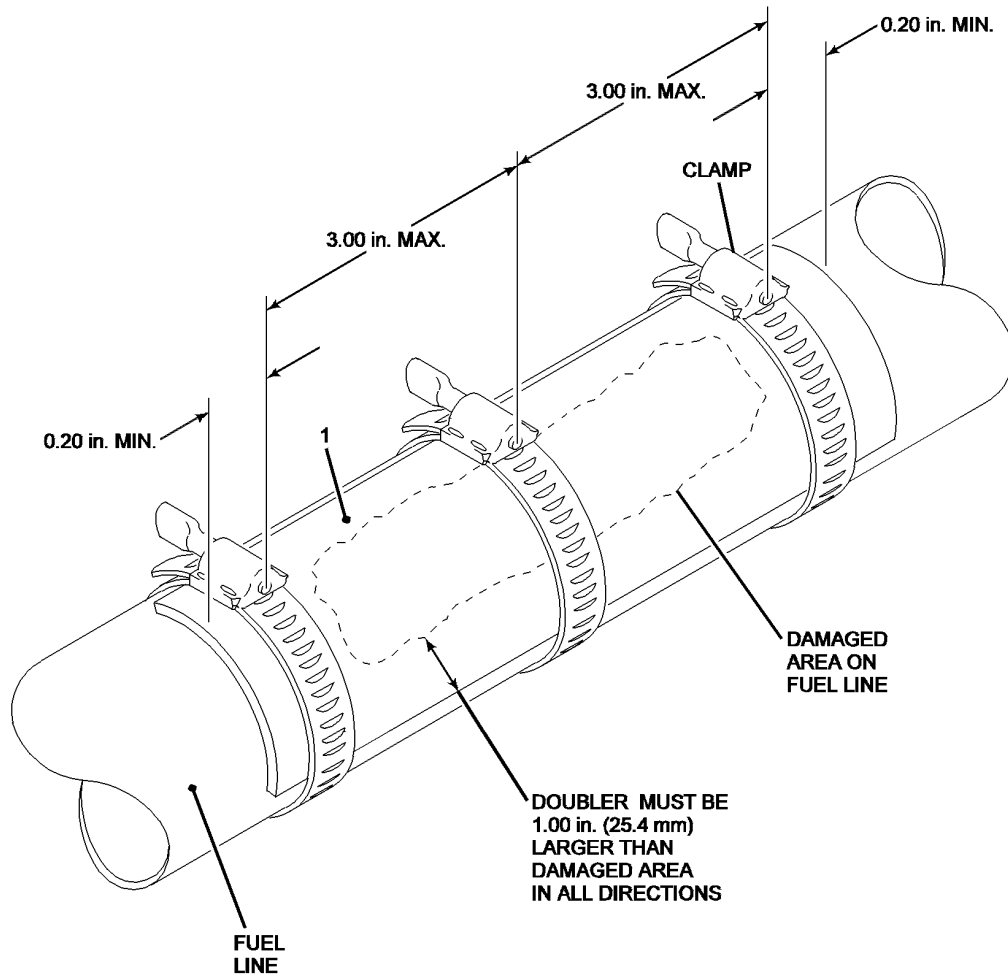
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LEGEND:
1. DOUBLER

BBB2-28-423
S0000408202V1

**Permanent Repair of an In-Tank Vent and Fuel Pipe Assembly
Figure 801/28-20-00-990-870**

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PRESSURE FUELING ADAPTER - MAINTENANCE PRACTICES

1. General

- A. There is one single-point pressure fueling adapter for servicing the fuel tanks. The adapter is located in the right wing leading edge. Access is through a forward swinging hinged access door in the lower surface of the leading edge skin.
- B. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices. (PAGEBLOCK 28-00-00/201)

2. Removal/Installation Pressure Fueling Adapter

A. Remove Adapter

WARNING: MAKE SURE THE SLATS DO NOT ACCIDENTALLY OPERATE. ACCIDENTAL OPERATION OF THE SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Depressurize hydraulic system. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 29-00-00/201)

WARNING: DO NOT OPERATE FLAP/SLAT CONTROL LEVER, MAINTENANCE BEING PERFORMED ON FUEL SYSTEM COMPONENTS INSTALLED ON WING SPAR. INADVERTENT OPERATION OF FLAP/SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (2) Install "DO NOT OPERATE" Placard on FLAP/SLAT control lever.
- (3) Close fuel fill valves.
- (4) Close defueling valve.
- (5) Check that fueling control panel power switch is off.
- (6) Manually depress check valve in center of adapter nozzle to drain any residual fuel from adapter and lines.
- (7) Disconnect fuel line. Discard O-ring.
- (8) Remove fueling adapter attach bolts and remove adapter from airplane.
- (9) If required, remove fuel line adapter from fueling adapter. Discard gask-o-seal.

B. Install Adapter

WARNING: MAKE SURE THE SLATS DO NOT ACCIDENTALLY OPERATE. ACCIDENTAL OPERATION OF THE SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Make certain hydraulic system is depressurized. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 29-00-00/201)

WARNING: DO NOT OPERATE FLAP/SLAT CONTROL LEVER, MAINTENANCE BEING PERFORMED ON FUEL SYSTEM COMPONENTS INSTALLED ON WING SPAR. INADVERTENT OPERATION OF FLAP/SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (2) Make certain "DO NOT OPERATE" placard is installed on FLAP/SLAT control lever.
- (3) If required, install fuel line adapter on fueling adapter using new gask-o-seal.
- (4) Place adapter in position and install attach bolts. Do not tighten at this time.
- (5) Using new O-ring, connect fuel line.
- (6) Tighten adapter attach bolts.

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- (7) Remove tag from FLAP/SLAT control lever.

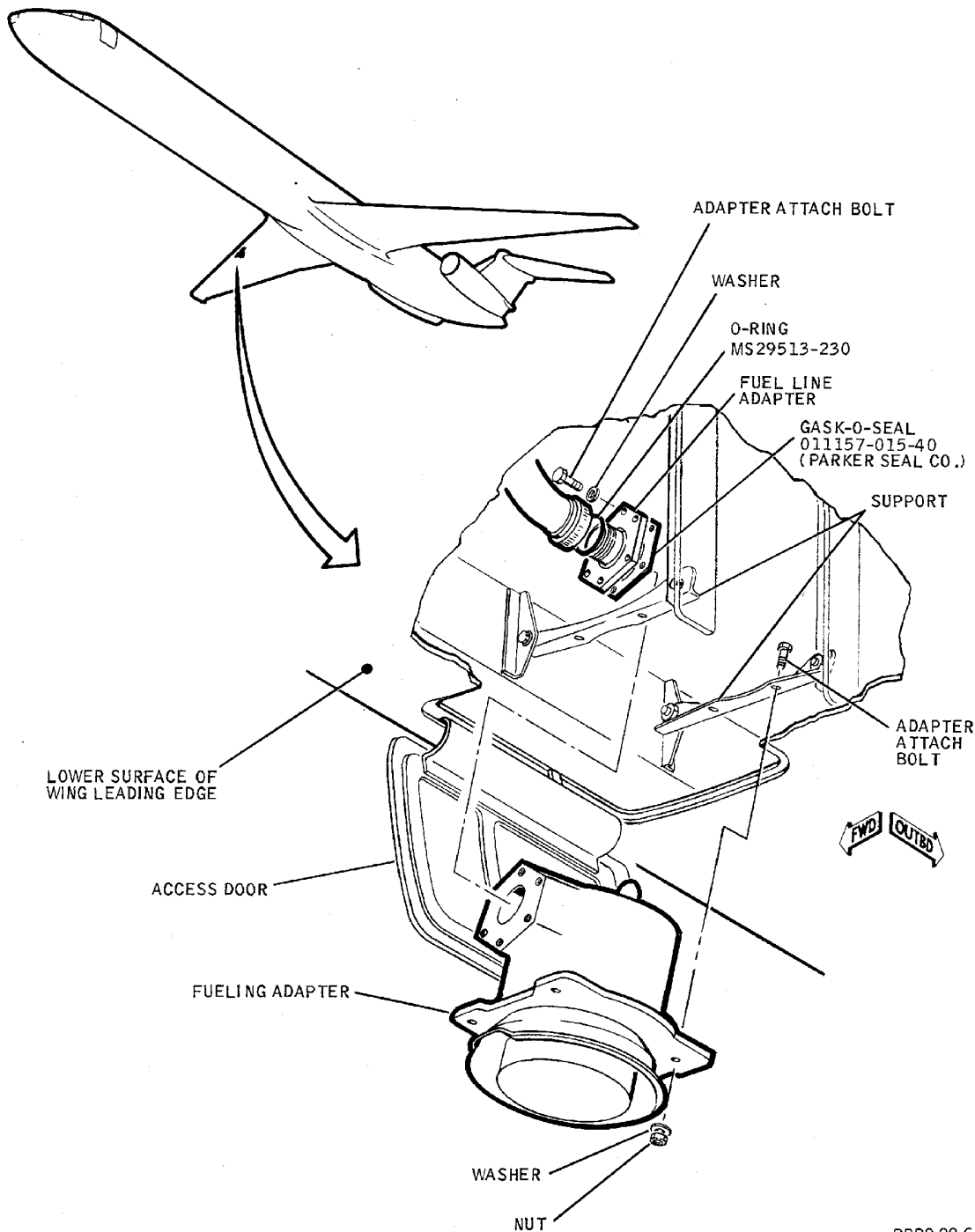
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BB82-28-6A

**Pressure Fueling Adapter -- Removal/Installation
Figure 201/28-20-01-990-801**

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3. Check Pressure Fueling Adapter

A. Check Adapter

- (1) Check that fill and defueling valves are closed.
- (2) Connect pressure fueling hose to adapter and pressurize lines.
- (3) Check for fuel leaks around adapter mating surfaces. No leakage is allowed.
- (4) Open fill valves manually.
- (5) Check that fuel is entering each tank by using fuel quantity gages or magnetic dripless fuel measuring sticks.

4. Pressure Fueling Adapter Flange - Removal/Installation

A. Remove Pressure Fueling Adapter

- (1) Close all fuel valves.
- (2) Close defueling valve.
- (3) Check that POWER switch on REFUELING PANEL is in OFF position.

WJE 401-411, 415-427, 429, 861-866, 868, 869, 871-881, 883, 884, 886, 887, 891-893 PRE DC9-28-219

- (4) Remove cap from flange.

WJE ALL

- (5) Drain fuel from pressure regulator and fuel manifold into appropriate container.
- (6) Mark flange position on pressure regulator for installation.
- (7) Disconnect cap retention device from flange.

CAUTION: CARE MUST BE TAKEN WHEN REMOVING FLANGE ATTACH SCREWS. FLANGE RETAINS SPRING LOADED POPPET (PISTON).

CAUTION: CARE MUST BE TAKEN WHEN REMOVING FLANGE SCREWS, TO PREVENT DAMAGE TO THREADS IN PRESSURE REGULATOR FLANGE.

- (8) Carefully remove (6) screws attaching flange.
- (9) Remove flange and packing; discard packing.

NOTE: The poppet (piston) and spring can be removed, if necessary.

B. Install Pressure Fueling Adapter

- (1) Check that poppet (piston) and spring are installed in pressure regulator.
- (2) Using new packing, align and orient flange on pressure regulator as marked per Paragraph 4.A.(6).

CAUTION: CARE MUST BE TAKEN WHEN INSTALLING FLANGE SCREWS, TO PREVENT DAMAGE TO THREADS IN PRESSURE REGULATOR FLANGE.

- (3) Install flange using (6) screws.
- (4) Connect cap retention device to flange.
- (5) Perform leak check. (Paragraph 3.)

WJE 401-411, 415-427, 429, 861-866, 868, 869, 871-881, 883, 884, 886, 887, 891-893 PRE DC9-28-219

- (6) Install cap on flange.

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FUEL FILL VALVES - MAINTENANCE PRACTICES

1. General

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

- A. The three fuel fill valves, one for each tank, are located behind the fueling control panel, in the right wing leading edge. Access is gained by lowering the fueling control panel. Removal procedures for all valves are identical. The valve actuating motor may be removed separately from the valve.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

- B. The three (five on aircraft with fuselage tanks) fuel fill valves, one for each tank, are located behind the fueling control panel, in the right wing leading edge. Access is gained by lowering the fueling control panel. Removal procedures for all valves are identical. The valve actuating motor may be removed separately from the valve.

WJE ALL

- C. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed item:

Table 201

Name and Number	Manufacturer
Inconel Lockwire 0.032 in NASM20995N32, DPM 684	Not specified
Corrosion Resistant Steel Lockwire 0.032 in NASM20995C32, DPM 5865	Not specified

3. Removal/Installation Fuel Fill Valves

- A. Remove Valve

WARNING: MAKE SURE THE SLATS DO NOT ACCIDENTALLY OPERATE. ACCIDENTAL OPERATION OF THE SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Depressurize hydraulic system. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 29-00-00/201)

WARNING: DO NOT OPERATE FLAP/SLAT CONTROL LEVER, MAINTENANCE BEING PERFORMED ON FUEL SYSTEM COMPONENTS INSTALLED ON WING SPAR. INADVERTENT OPERATION OF FLAP/SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (2) Install "DO NOT OPERATE" Placard on FLAP/SLAT control lever.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
Z	38	B1-107	GROUND REFUEL

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OVERHEAD BATT DIR BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 401-409, 411, 412, 414-427, 429, 861-866, 868, 869, 871-881, 883, 884, 886, 887, 891-893			
B	16	B1-106	GROUND REFUELING
WJE 401-409, 411, 412, 414, 875-881, 883, 884, 886, 887			
B	17	B1-913	ELECTRONIC CLOCK
WJE 410			
B	17	B1-106	GROUND REFUELING
WJE 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 886, 887			
B	18	B1-913	ELECTRONIC CLOCK

WJE ALL

- (4) Defuel left or right wing tank to 2,200 lbs. (1000 kgs) or less.
NOTE: The center wing tank should have no more than 15,000 lbs. (6803.8 kgs).
- (5) Manually open fill valve.
- (6) Manually depress check valve in center of pressure fueling adapter, to drain residual fuel.
NOTE: Hold suitable container under adapter to catch any residual fuel.
- (7) Cut the lockwire and disconnect electrical connector.
- (8) Remove two outboard bolts. Keep nuts, washers and bolts.
- (9) Loosen two inboard bolts.
- (10) Remove valve.

B. Install Valve

WARNING: MAKE SURE THE SLATS DO NOT ACCIDENTALLY OPERATE. ACCIDENTAL OPERATION OF THE SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Make certain hydraulic system is depressurized. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 29-00-00/201)

WARNING: DO NOT OPERATE FLAP/SLAT CONTROL LEVER, MAINTENANCE BEING PERFORMED ON FUEL SYSTEM COMPONENTS INSTALLED ON WING SPAR. INADVERTENT OPERATION OF FLAP/SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (2) Make certain "DO NOT OPERATE" placard is installed on FLAP/SLAT control lever.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
Z	38	B1-107	GROUND REFUEL

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OVERHEAD BATT DIR BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
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WJE 401-409, 411, 412, 414-427, 429, 861-866, 868, 869, 871-881, 883, 884, 886, 887, 891-893

B	16	B1-106	GROUND REFUELING
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WJE 401-409, 411, 412, 414, 875-881, 883, 884, 886, 887

B	17	B1-913	ELECTRONIC CLOCK
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WJE 410

B	17	B1-106	GROUND REFUELING
---	----	--------	------------------

WJE 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 886, 887

B	18	B1-913	ELECTRONIC CLOCK
---	----	--------	------------------

WJE ALL

- (4) Place valve in position.
 - (a) Install two outboard bolts and the kept nuts and washers.
- (5) Tighten all four bolts.
- (6) Examine the electrical connector(s) and receptacle(s) for damage and unwanted material. (ELECTRICAL CONNECTORS - MAINTENANCE PRACTICES, SWPM 20-31-00)
- (7) Connect electrical connector and safety with lockwire. (LOCKWIRE SAFETYING - MAINTENANCE PRACTICES, PAGEBLOCK 20-10-18/201)

WJE ALL POST MD80-28-213

- (8) Examine the refueling manifold surface, bonding jumper, and attaching hardware for damage and electrical bonding. For general procedures concerning electrical bonding of fuel components refer to the ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01. (Figure 202)

WJE ALL

- (9) Remove tag from FLAP/SLAT control lever.
- (10) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
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Z	38	B1-107	GROUND REFUEL
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OVERHEAD BATT DIR BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
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WJE 401-409, 411, 412, 414-427, 429, 861-866, 868, 869, 871-881, 883, 884, 886, 887, 891-893

B	16	B1-106	GROUND REFUELING
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WJE 401-409, 411, 412, 414, 875-881, 883, 884, 886, 887

B	17	B1-913	ELECTRONIC CLOCK
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WJE 410

B	17	B1-106	GROUND REFUELING
---	----	--------	------------------

WJE 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 886, 887

B	18	B1-913	ELECTRONIC CLOCK
---	----	--------	------------------

EFFECTIVITY
WJE ALL

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WJE ALL

- (11) Perform Adjustment/Test Paragraph 5. following each valve replacement.

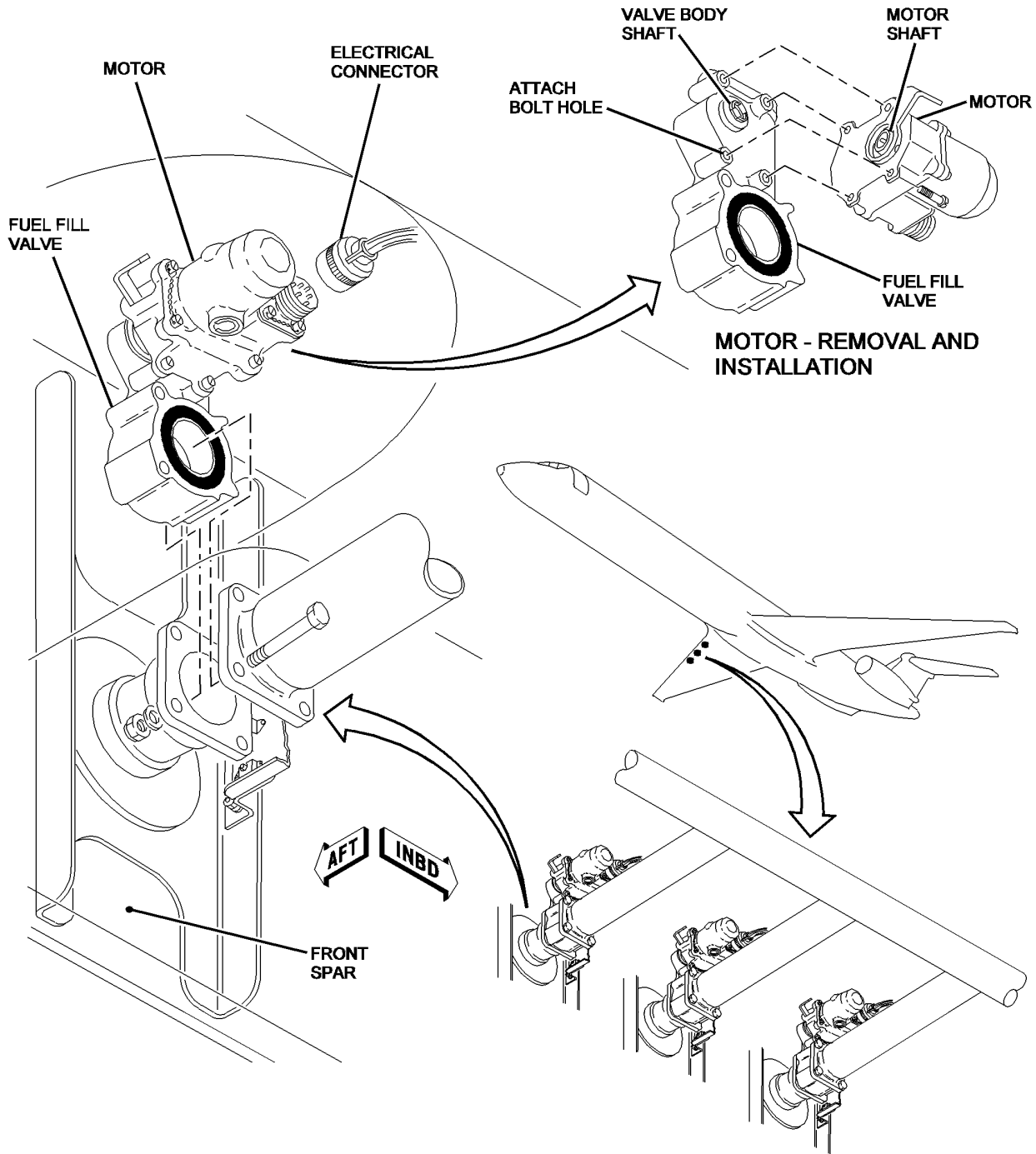
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WJE ALL

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BBB2-28-271B
S0006536398V2

Fuel Fill Valves -- Removal/Installation
Figure 201/28-20-02-990-802

EFFECTIVITY
WJE ALL

28-20-02

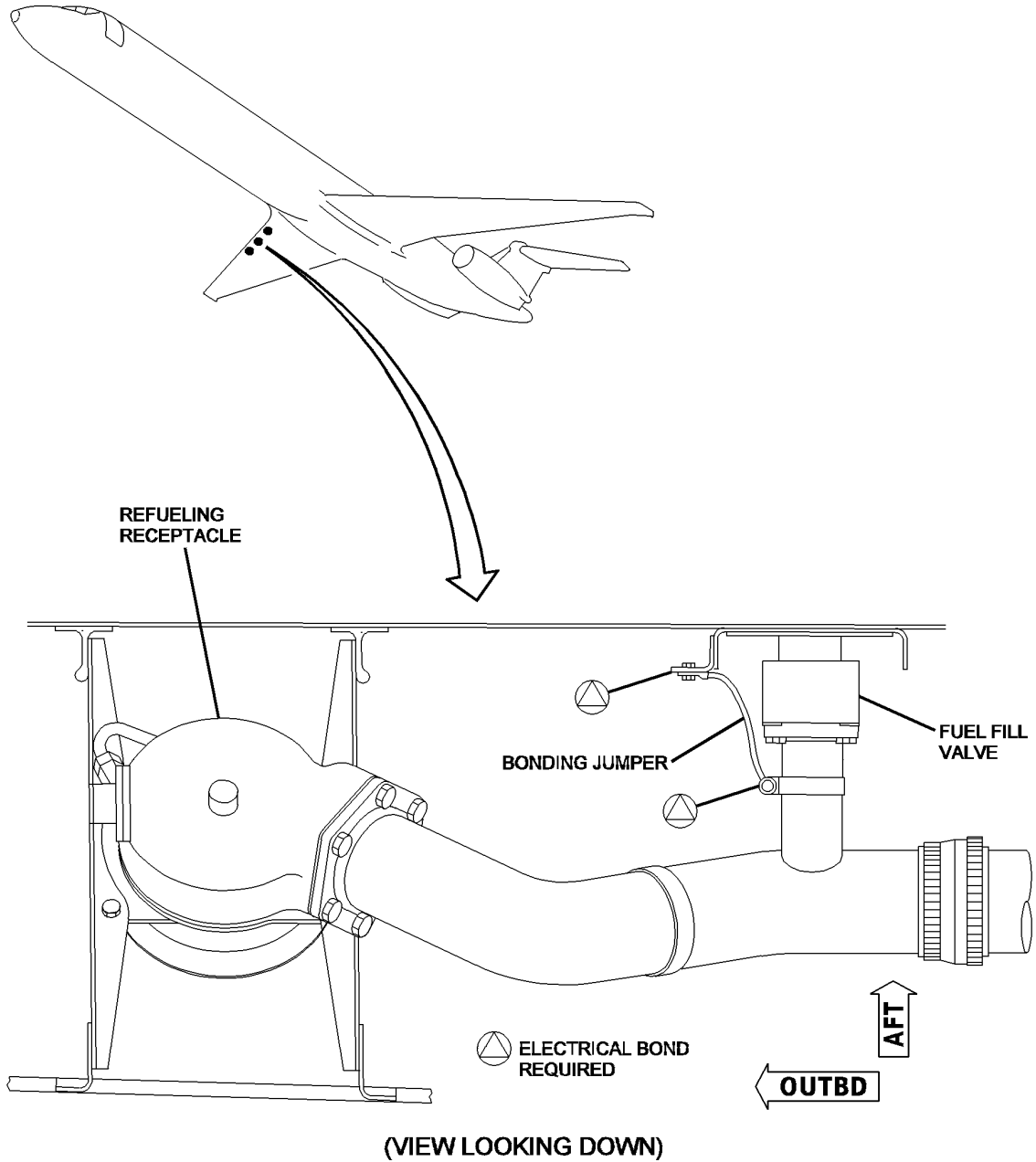
TP-80MM-WJE

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BBB2-28-424
S0000407418V1

Clamp and Bonding Jumper Assembly - Installation
Figure 202/28-20-02-990-803

EFFECTIVITY
WJE ALL POST MD80-28-213

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4. Approved Repairs

A. Remove Actuating Motor

WARNING: MAKE SURE THE SLATS DO NOT ACCIDENTALLY OPERATE. ACCIDENTAL OPERATION OF THE SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Depressurize hydraulic system. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 29-00-00/201)

WARNING: DO NOT OPERATE FLAP/SLAT CONTROL LEVER, MAINTENANCE BEING PERFORMED ON FUEL SYSTEM COMPONENTS INSTALLED ON WING SPAR. INADVERTENT OPERATION OF FLAP/SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (2) Install "DO NOT OPERATE" Placard on FLAP/SLAT control lever.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
Z	38	B1-107	GROUND REFUEL

OVERHEAD BATT DIR BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
------------	------------	---------------	-------------

WJE 401-409, 411, 412, 414-427, 429, 861-866, 868, 869, 871-881, 883, 884, 886, 887, 891-893

B	16	B1-106	GROUND REFUELING
---	----	--------	------------------

WJE 401-409, 411, 412, 414, 875-881, 883, 884, 886, 887

B	17	B1-913	ELECTRONIC CLOCK
---	----	--------	------------------

WJE 410

B	17	B1-106	GROUND REFUELING
---	----	--------	------------------

WJE 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 886, 887

B	18	B1-913	ELECTRONIC CLOCK
---	----	--------	------------------

WJE ALL

- (4) Cut the lockwire and disconnect electrical connector.
 - (a) Remove four motor attached screws.
- (5) Remove motor.

B. Install Actuating Motor

WARNING: MAKE SURE THE SLATS DO NOT ACCIDENTALLY OPERATE. ACCIDENTAL OPERATION OF THE SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Make certain hydraulic system is depressurized. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 29-00-00/201)

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WARNING: DO NOT OPERATE FLAP/SLAT CONTROL LEVER, MAINTENANCE BEING PERFORMED ON FUEL SYSTEM COMPONENTS INSTALLED ON WING SPAR. INADVERTENT OPERATION OF FLAP/SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (2) Make certain "DO NOT OPERATE" placard is installed on FLAP/SLAT control lever.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
Z	38	B1-107	GROUND REFUEL

OVERHEAD BATT DIR BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
------------	------------	---------------	-------------

WJE 401-409, 411, 412, 414-427, 429, 861-866, 868, 869, 871-881, 883, 884, 886, 887, 891-893

B	16	B1-106	GROUND REFUELING
---	----	--------	------------------

WJE 401-409, 411, 412, 414, 875-881, 883, 884, 886, 887

B	17	B1-913	ELECTRONIC CLOCK
---	----	--------	------------------

WJE 410

B	17	B1-106	GROUND REFUELING
---	----	--------	------------------

WJE 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 886, 887

B	18	B1-913	ELECTRONIC CLOCK
---	----	--------	------------------

WJE ALL

- (4) Index motor shaft with valve body shaft.
- (5) Rotate motor to align attaching holes.
- NOTE:** If holes do not align, shafts should be disengaged and motor rotated 180 degrees. Perform Paragraph 4.B.(4) and Paragraph 4.B.(5).
- (6) Install motor.
- (a) Install four motor attach screws.
- (7) Connect electrical connector and safety with lockwire. (LOCKWIRE SAFETYING - MAINTENANCE PRACTICES, PAGEBLOCK 20-10-18/201)
- (8) Remove tag from FLAP/SLAT control lever.
- (9) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
Z	38	B1-107	GROUND REFUEL

OVERHEAD BATT DIR BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
------------	------------	---------------	-------------

WJE 401-409, 411, 412, 414-427, 429, 861-866, 868, 869, 871-881, 883, 884, 886, 887, 891-893

B	16	B1-106	GROUND REFUELING
---	----	--------	------------------

EFFECTIVITY
WJE ALL

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WJE 401-409, 411, 412, 414-427, 429, 861-866, 868, 869, 871-881, 883, 884, 886, 887, 891-893 (Continued)

(Continued)

OVERHEAD BATT DIR BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 401-409, 411, 412, 414, 875-881, 883, 884, 886, 887			
B	17	B1-913	ELECTRONIC CLOCK
WJE 410			
B	17	B1-106	GROUND REFUELING
WJE 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 886, 887			
B	18	B1-913	ELECTRONIC CLOCK

WJE ALL

5. Adjustment/Test Fuel Fill Valves

A. Test Valve

- (1) Place POWER switch, located on fueling control panel, in ON position.
 - (2) Place MASTER REFUEL switch in AUTO FILL position.
 - (3) Place REFUEL switch in AUTO OVERRIDE position.
 - (4) Place tank switch corresponding to fill valve being tested in AUTO FILL position.
 - (5) Visually check that fill valve manual control lever is in open position.
 - (6) Open defueling valve and turn on right main or center tank boost pumps. Observe valve for presence of fuel leaks, and fuel quantity gage for positive indication of fuel transfer.
- NOTE: Do not use boost pumps in tank associated with fill valve under test.
- (7) Place tank switch in CLOSED position. Check that manual control lever indicated that fill valve is closed.
 - (8) Turn off boost pumps.
 - (9) Place REFUEL switch in AUTO position.
 - (10) Place POWER switch in OFF position.
 - (11) Place defuel valve lever in closed position and safety with lockwire. (LOCKWIRE SAFETYING - MAINTENANCE PRACTICES, PAGEBLOCK 20-10-18/201)

NOTE: If valve is used frequently, safetying of handle may be eliminated at operator's discretion.

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FUEL FILL CONTROL FLOAT SWITCH - MAINTENANCE PRACTICES

1. General

WJE ALL POST MD80-28-226

- A. For the main and center fuel tanks an in-line fuse is installed in the applicable fuel fill control float switch that is external of the fuel tank. The purpose of the fuse is to prevent the ignition of the fuel fumes in a fuel tank caused by a short of the float switch wires outside the tank do to incompatible power. For removal and installation of the in-line fuse (TERMINAL BLOCKS - MAINTENANCE PRACTICES, SWPM 20-20-02).

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

- B. The seven fuel fill control float switches are located; two in each main tank, one in the center wing tank and one each in the forward and aft auxiliary fuselage tanks. The transfer switch is located in the center wing tank. Switch identification and access are as follows:

Table 201

Component	Identification	Access
Float switch	Left outboard	1367C
Float switch	Left inboard	1303C
Float switch	Right outboard	1466C
Float switch	Right inboard	1409C
Float switch	Center	1436C
Float switch	Forward fuselage fuel tank	
Float switch	Aft fuselage fuel tank	

NOTE: For aircraft equipped with electrical feedthrough drains, fuel leakage allowed is limited to 2 fl. oz. (59 cc) in 24 hours. Aircraft not equipped with feedthrough drains are allowed no fuel leakage.

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

- C. The five fuel fill control float switches are located two in each main tank, and one in the center tank. Switch identification and access are as follows:

Table 202

Component	Identification	Access
Float switch	Left outboard	1367C
Terminal strip	S3-3	1120C
Float switch	Left inboard	1303C
Terminal strip	S3-302	1160C
Float switch	Right outboard	1466C
Terminal strip	S3-4	1231C
Float switch	Right inboard	1409C
Terminal strip	S3-2	1236C
Float switch	Center	1436C

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WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893 (Continued)

Table 202 (Continued)

Component	Identification	Access
Terminal strip	S3-5	Access panel 5107C (fwd cargo compt.)
<p>NOTE: For aircraft equipped with electrical feedthrough drains, fuel leakage allowed is limited to 2 fl. oz. (59 cc) in 24 hours. Aircraft not equipped with feedthrough drains are allowed no fuel leakage.</p>		

WJE ALL

- D. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

Table 203

Name and Number	Manufacturer
Pen, marking, large chisel point, green #479B, Major Marker	Major Line, Inc. Anaheim, CA
Sleeving material DMS 2109 Type 1	
Sleeving material DMS 2379 Type 4	

3. Removal/Installation Fuel Fill Control Float Switch

- A. Remove Main Tank Float Switch

- (1) Close crossfeed valve.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (2) Open these circuit breakers and install safety tags:

LOWER EPC, DC

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
------------	------------	---------------	-------------

WJE 410, 411, 417, 419, 871, 872, 875-879

M	37	B1-1007	ALT FUEL BURN
---	----	---------	---------------

WJE ALL

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
------------	------------	---------------	-------------

Z	38	B1-107	GROUND REFUEL
---	----	--------	---------------

EFFECTIVITY
WJE ALL

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OVERHEAD BATT DIR BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
------------	------------	---------------	-------------

WJE 401-409, 411, 412, 414-427, 429, 861-866, 868, 869, 871-881, 883, 884, 886, 887, 891-893

B	16	B1-106	GROUND REFUELING
---	----	--------	------------------

WJE 410

B	17	B1-106	GROUND REFUELING
---	----	--------	------------------

WJE ALL

- (3) Remove applicable main fuel tank access door. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- (4) Remove the access panel for the applicable terminal strip.

WJE ALL PRE MD80-28-226

- (5) Disconnect the power terminal from terminal strip and ground terminal from ground stud.

WJE ALL POST MD80-28-226

- (6) Disconnect the power terminal from the in-line fuse and the ground terminal from the ground stud.

WJE ALL

- (7) Remove the necessary string ties from the float switch wires.
- (8) Cut terminals from wire ends.

WJE ALL POST MD80-28-226

- (9) Remove the sleeve material from the float switch power wire.

WJE ALL

- (10) Loosen gland nut on spar feedthrough fitting. Move the gland nut back on the float switch wires.
- (11) Remove ferrule, sealing grommet, comb and sleeve from feedthrough fitting.
- (12) Move the gland nut, ferrule, grommet, comb and sleeve off the float switch wires.
- (13) Remove the sleeve.
- (14) Attach a waxed string to the end of the float switch wires, of sufficient length, to reach from terminal strip and ground stud to main tank float switch, through conduit.
NOTE: The string will be used to pull wires back through conduit during switch installation.
- (15) Disconnect conduit from float switch in tank.
- (16) Remove the two screws attaching float switch bracket to mounting bracket.
- (17) Pull float switch and bracket out of tank, at same time pulling wires through the conduit.
- (18) Remove the waxed string from the float switch wires.
- (19) Tie both ends of the waxed string to adjacent structure to prevent inadvertent removal of string.

CAUTION: DO NOT GRIP SWITCH SHELL DURING REMOVAL. USE WRENCH FLAT PROVIDED AT BASE OF SWITCH.

- (20) Remove the retaining nut holding fuel tank float switch to the bracket.
- (21) Move retaining nut, washer, and bracket off of the float switch wires.

B. Install Main Tank Float Switch

EFFECTIVITY
WJE ALL

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- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
------------	------------	---------------	-------------

WJE 410, 411, 417, 419, 871, 872, 875-879

M	37	B1-1007	ALT FUEL BURN
---	----	---------	---------------

WJE ALL

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
------------	------------	---------------	-------------

Z	38	B1-107	GROUND REFUEL
---	----	--------	---------------

OVERHEAD BATT DIR BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
------------	------------	---------------	-------------

WJE 401-409, 411, 412, 414-427, 429, 861-866, 868, 869, 871-881, 883, 884, 886, 887, 891-893

B	16	B1-106	GROUND REFUELING
---	----	--------	------------------

WJE 410

B	17	B1-106	GROUND REFUELING
---	----	--------	------------------

WJE ALL

- (2) Prepare the applicable main tank fuel fill control float switch and bracket for electrical bonding. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
- (3) Put float switch wires through bracket and attaching hardware.

CAUTION: DO NOT GRIP SWITCH SHELL DURING REMOVAL. USE WRENCH FLAT PROVIDED AT BASE OF SWITCH.

- (4) Tighten nut attaching float switch to bracket.
- (5) Do an electrical bond check of main tank float switch at the bracket. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
- (6) Tie waxed string to float switch wire ends.
- (7) Pull the float switch wires through conduit with the waxed string.
- (8) Attach float switch bracket with switch to mounting bracket.
- (9) Do an electrical bond check of main tank float switch at the mounting bracket. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
- (10) Attach conduit to float switch.
- (11) Remove the waxed string.
- (12) Remove slack from wires in conduit by gently pulling on wire ends at terminal end.
- (13) Mark wires with narrow band at a distance of 1.50 ± 0.25 in. (38 ± 6 mm) from forward edge of spar fitting. Use green marker or equivalent.
- (14) Move the sleeve, comb and grommet over the float switch wires. Make sure that the green band is visible at the forward edge of the grommet.
- (15) Move sleeve into feedthrough fitting.
- (a) Make sure the sleeve does not protrude from the spar feedthrough fitting.
- (16) Move ferrule and gland nut over the float switch wires.
- (17) Insert comb, grommet, and ferrule into the sleeve.

EFFECTIVITY
WJE ALL

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- (18) Install the gland nut into the feedthrough fitting and tighten.
(a) Make sure that the green band is visible at the edge of the grommet.

WJE ALL PRE MD80-28-226

CAUTION: PROVIDE SUFFICIENT SLACK IN WIRES TO PREVENT SHARP BENDS, CHAFING, PRELOADING OF WIRES.

- (19) Cut the float switch wires to the correct length to reach the terminal strip and ground stud.

WJE ALL POST MD80-28-226

CAUTION: PROVIDE SUFFICIENT SLACK IN WIRES TO PREVENT SHARP BENDS, CHAFING, PRELOADING OF WIRES.

- (20) Cut the float switch wires to the correct length to reach the in-line fuse and ground stud.

WJE ALL

- (21) Install a new power terminal on the power wire and a new ground terminal on the ground wire. (TERMINALS - MAINTENANCE PRACTICES, SWPM 20-20-01)

WJE ALL POST MD80-28-226

- (22) Install sleeving material DMS 2109 Type 1 or DMS 2379 Type 4 on the power wire, from the spar feedthrough fitting to the power terminal. (WIRING INSTALLATION - MAINTENANCE PRACTICES, SWPM 20-10-01)

- (a) Replacement or repair of wiring or sleeving from the fuse to tank penetration point must have DMS 2109 or DMS 2379 Type 4 sleeving installed per (TERMINALS - MAINTENANCE PRACTICES, SWPM 20-20-01).

NOTE: The above step is a Critical Design Configuration Control Limitation (CDCCL) procedure. For important information on CDCCLs, refer to the Airworthiness Limitations Precautions (GENERAL, SUBJECT 28-00-00).

WJE ALL PRE MD80-28-226

- (23) Connect the power terminal to terminal strip and ground terminal to ground stud. (GENERAL INSTALLATIONS HARDWARE - MAINTENANCE PRACTICES, SWPM 20-20-03)

WJE ALL POST MD80-28-226

- (24) Connect the power terminal to the in-line fuse and the ground terminal to the ground stud. (GENERAL INSTALLATIONS HARDWARE - MAINTENANCE PRACTICES, SWPM 20-20-03)

- (a) A replacement fuse must be the same type and rating of CTN fuse part number 65053-219, install with TERMINAL BLOCKS - MAINTENANCE PRACTICES, SWPM 20-20-02.

NOTE: The above step is a Critical Design Configuration Control Limitation (CDCCL) procedure. For important information on CDCCLs, refer to the Airworthiness Limitations Precautions (GENERAL, SUBJECT 28-00-00).

WJE ALL

- (25) Install the access panel for the applicable terminal strip.
(26) Close applicable main fuel tank door. ()
(27) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC

Row Col Number Name

WJE 410, 411, 417, 419, 871, 872, 875-879

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WJE ALL

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WJE 410, 411, 417, 419, 871, 872, 875-879 (Continued)

(Continued)

LOWER EPC, DC

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
M	37	B1-1007	ALT FUEL BURN

WJE ALL

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
Z	38	B1-107	GROUND REFUEL

OVERHEAD BATT DIR BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
------------	------------	---------------	-------------

WJE 401-409, 411, 412, 414-427, 429, 861-866, 868, 869, 871-881, 883, 884, 886, 887, 891-893

B	16	B1-106	GROUND REFUELING
---	----	--------	------------------

WJE 410

B	17	B1-106	GROUND REFUELING
---	----	--------	------------------

WJE ALL

- C. Remove Center Fuel Tank Float Switch

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Open the applicable circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893

H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A, B, & C
---	----	--------	---

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
------------	------------	---------------	-------------

WJE ALL

J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

EFFECTIVITY
WJE ALL

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(Continued)

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893			
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

WJE ALL

- (2) Open center tank access doors. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- (3) Remove applicable terminal strip access panel.

WJE ALL PRE MD80-28-226

- (4) Disconnect the power terminal to from terminal strip and ground terminal from ground stud.

WJE ALL POST MD80-28-226

- (5) Disconnect the power terminal from the in-line fuse and the ground terminal from the ground stud.

WJE ALL

- (6) Remove the necessary string ties from the float switch wires.
- (7) Cut terminals from wire ends.

WJE ALL POST MD80-28-226

- (8) Remove the sleeve material from the float switch power wire.

WJE ALL

- (9) Loosen the gland nut on the spar feedthrough fitting. Move the gland nut back on the float switch wires.
- (10) Remove the ferrule, sealing grommet, comb and sleeve from feedthrough fitting.
- (11) Move the gland nut, ferrule, grommet, comb and sleeve off the float switch wires.
- (12) Attach a waxed string to the end of the float switch wires, of sufficient length, to reach from the terminal strip and ground stud to the center tank float switch, through the conduit.
NOTE: The string will be used to pull the wires back through the conduit during the float switch installation.
- (13) Disconnect the conduit from the center tank float switch.
- (14) Remove the two screws attaching the float switch bracket to the mounting bracket.
- (15) Pull the center tank float switch and the bracket out of the tank, at the same time pulling the float switch wires through the conduit.
- (16) Remove the waxed string from the float switch wires.
- (17) Tie both ends of the waxed string to adjacent structure to prevent inadvertent removal of string.

CAUTION: DO NOT GRIP SWITCH SHELL DURING REMOVAL. USE WRENCH FLAT PROVIDED AT BASE OF SWITCH.

- (18) Remove the retaining nut holding the fuel tank float switch to the bracket.
- (19) Move the retaining nut, washer and bracket off of the float switch wires.

D. Install Center Tank Float Switch

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WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure the applicable circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893

H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C
---	----	--------	--

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893

J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

WJE ALL

- (2) Prepare the center tank fuel fill control float switch and bracket for electrical bonding. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
- (3) Put float switch wires through the bracket and attaching hardware.
- (4) Tighten nut attaching float switch to bracket.
- (5) Do an electrical bond check of center tank fuel fill control float switch at the bracket. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
- (6) Tie waxed string to the float switch wire ends.
- (7) Pull the float switch wires through the conduit with the waxed string.
- (8) Attach the float switch bracket to the mounting bracket with the two screws.
- (9) Do an electrical bond check of center tank fuel fill control float switch at the bracket. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
- (10) Attach conduit to float switch.
- (11) Remove the waxed string.
- (12) Remove the slack from wires in the conduit by gently pulling on the wire ends at terminal end.
- (13) Mark wires with narrow band at a distance of 1.50 ±0.25 in. (38 ±6 mm) from forward edge of spar fitting. Use green marker or equivalent.

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- (14) Move the sleeve, comb and grommet over the float switch wires. Make sure that the green band is visible at the forward edge of the grommet.
- (15) Move sleeve into feedthrough fitting.
 - (a) Make sure the sleeve does not protrude from the spar feedthrough fitting.
- (16) Move the ferrule and gland nut over the float switch wires.
- (17) Insert the comb, grommet and ferrule into the sleeve.
- (18) Install the gland nut into the feedthrough fitting and tighten.
 - (a) Make sure that the green band is visible at the edge of the grommet.

WJE ALL PRE MD80-28-226

CAUTION: PROVIDE SUFFICIENT SLACK IN WIRES TO PREVENT SHARP BENDS, CHAFING, PRELOADING OF WIRES.

- (19) Cut the float switch wires to the correct length to reach the terminal strip and ground stud.

WJE ALL POST MD80-28-226

CAUTION: PROVIDE SUFFICIENT SLACK IN WIRES TO PREVENT SHARP BENDS, CHAFING, PRELOADING OF WIRES.

- (20) Cut the float switch wires to the correct length to reach the in-line fuse and ground stud.

WJE ALL

- (21) Install a new power terminal on the power wire and a new ground terminal on the ground wire. (TERMINALS - MAINTENANCE PRACTICES, SWPM 20-20-01)

WJE ALL POST MD80-28-226

- (22) Install sleeving material DMS 2109 Type 1 or DMS 2379 Type 4 on the power wire, from the spar feedthrough fitting to the power terminal. (WIRING INSTALLATION - MAINTENANCE PRACTICES, SWPM 20-10-01)
 - (a) Replacement or repair of wiring or sleeving from the fuse to tank penetration point must have DMS 2109 or DMS 2379 Type 4 sleeving installed per (TERMINALS - MAINTENANCE PRACTICES, SWPM 20-20-01).

NOTE: The above step is a Critical Design Configuration Control Limitation (CDCCL) procedure. For important information on CDCCLs, refer to the Airworthiness Limitations Precautions (GENERAL, SUBJECT 28-00-00).

WJE ALL PRE MD80-28-226

- (23) Connect the power terminal to terminal strip and the ground terminal to ground stud. (GENERAL INSTALLATIONS HARDWARE - MAINTENANCE PRACTICES, SWPM 20-20-03)

WJE ALL POST MD80-28-226

- (24) Connect the power terminal to the in-line fuse and the ground terminal to the ground stud. (GENERAL INSTALLATIONS HARDWARE - MAINTENANCE PRACTICES, SWPM 20-20-03)
 - (a) A Replacement fuse must be the same type and rating of CTN fuse part number 65053-219, install with (TERMINAL BLOCKS - MAINTENANCE PRACTICES, SWPM 20-20-02).

NOTE: The above step is a Critical Design Configuration Control Limitation (CDCCL) procedure. For important information on CDCCLs, refer to the Airworthiness Limitations Precautions (GENERAL, SUBJECT 28-00-00).

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- (25) Close center tank access covers. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- (26) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893

H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C
---	----	--------	--

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893

J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

- E. Remove Fuselage Tank Float Switch
 - (1) Defuel applicable fuselage tank.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (2) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

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WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 (Continued)

(Continued)

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

WARNING: VAPOR FROM OPEN FUSELAGE FUEL TANKS IS COMBUSTIBLE. DEACTIVATE EMERGENCY BATTERY PACK FOR OVERWING EVACUATION LIGHTS BY REMOVING BATTERY PACK PRIOR TO MAINTENANCE ON AFT FUSELAGE FUEL TANK.

- (3) Remove battery pack from overwing emergency evacuation lights (PAGEBLOCK 33-53-00/401), for aft fuselage tank.
- (4) Disconnect breakaway electrical connections; pull lanyard.
- (5) Remove washers, locknut, and jamnuts from receptacle on mounting plate and remove mounting plate from top of tank cavity.
- (6) Remove cargo compartment forward bulkhead panel.
- (7) Remove fuselage tank aft cavity door and inner cell door.
- (8) Remove gland nut, ferrule, grommet, and comb from feedthrough fitting and slide back on wires.
- (9) Remove retaining nuts from feedthrough fitting and withdraw fitting, wires, and receptacles from electrical housing.

CAUTION: DO NOT GRIP SWITCH SHELL DURING REMOVAL. USE WRENCH FLAT PROVIDED AT BASE OF SWITCH.

- (10) Disconnect float switch and conduit from mounting bracket and remove switch, wires, conduit, fitting and receptacle from tank as one unit, through tank cavity door.

F. Install Fuselage Tank Float Switch

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

EFFECTIVITY
WJE ALL

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WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 (Continued)

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

- (2) Prepare the applicable fuselage fuel fill control float switch and bracket for electrical bonding. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
- (3) Thread float switch wires through washers and retaining nut.
- (4) Pull wires through conduit with string.
- (5) Do an electrical bond check of auxiliary/fuselage fuel fill control float switch at the bracket. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)

CAUTION: DO NOT GRIP SWITCH SHELL DURING INSTALLATION. USE WRENCH FLAT PROVIDED AT BASE OF SWITCH.

- (6) Attach float switch to mounting bracket. Torque nut to 230 to 260 inch-pounds (26 to 30 N·m).
- (7) Attach conduit to float switch fitting. Torque conduit nut to 230 to 260 inch-pounds (26 to 30 N·m).
- (8) Insert float switch wires through feedthrough fitting in electrical housing pan.
- (9) Attach conduit to feedthrough fitting and torque nut to 230 to 260 inch pounds (26 to 30 N·m).
- (10) Remove slack from wires in conduit by gently pulling on wire ends at receptacle end.

CAUTION: ALLOW SUFFICIENT SLACK IN WIRES TO PREVENT SHARP BENDS, PRELOADING OR CHAFING OF WIRES.

- (11) Mark wires with a narrow stripe of green lacquer at a distance of 1 1/4 to 1 3/4 inches (32 to 45 mm) from top of feedthrough fitting.
- (12) Slide comb and sealing grommet over wires. Position grommet so that green stripe is visible at top edge of grommet.
- (13) Slide ferrule and gland nut over wires.
- (14) Insert comb, grommet, and ferrule into feedthrough fitting. Push wire slack into conduit.
- (15) Cut wires to proper length to provide a distance of 12 inches (305 mm) from top of gland nut to bottom of receptacle after potting.

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WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 (Continued)

- (16) Screw gland nut into fitting. Tighten nut.
NOTE: Green stripe should still be visible at edge of sealing grommet.
- (17) Check for proper 12 inch (305 mm) spacing, then attach and pot receptacle on wire ends.
- (18) Install receptacle in electrical housing mounting plate.
- (19) Install mounting plate on electrical housing and connect electrical breakaway connections.

CAUTION: BEFORE INSTALLING DOORS, MAKE CERTAIN THAT ALL TOOLS, RAGS, HARDWARE, ETC., HAVE BEEN REMOVED FROM TANK.

- (20) Install fuselage cell and structure doors.
- (21) Install battery pack for overwing emergency evacuation lights (PAGEBLOCK 33-53-00/401), for aft fuselage tank.
- (22) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

WJE ALL

4. Adjustment/Test Fuel Level Shutoff Switches

- A. Test Fuel Level Shutoff Switches
 - (1) Place all fuel fill valves to CLOSE position, located at LSDU on right wing forward leading edge.
 - (2) Place fill control power switch to ON position.
 - (3) Connect pressure refueling nozzle to refueling adapter.
 - (4) Apply 50 psi maximum fuel pressure to refueling adapter.
 - (5) Place AUTO/AUTO OVERRIDE SELECTOR to override position.

EFFECTIVITY WJE ALL

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(6) Place applicable fill valve(s) to FILL position.

NOTE: If the high level shutoff switches are to be tested in one main wing tank, refuel the opposite tank to maintain relative balance of wing loading.

(7) Place applicable fill valve(s) to CLOSE position when high level shutoff occurs.

(8) Disconnect pressure refueling nozzle from refueling adapter.

B. Record Following Information:

(1) Applicable fuel tank quantity on LSDU. (Figure 204 or Figure 205)

(2) Applicable fuel tank quantity on CDU. (Figure 204 or Figure 205)

(a) Place fill control switch to OFF position.

1) Using hydrometer, determine and record specific gravity of representative fuel sample.

2) Use data obtained in Paragraph 4.B.(1) and Paragraph 4.B.(2) to determine quantity for fuel tank(s) being tested.

3) Use fuel quantity(ies) obtained in Paragraph 4.B.(2)(a)1) and the graphs that follow to determine appropriate shutoff level(s) as applicable.

(Figure 206 or Figure 207)

(Figure 208 or Figure 209)

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

(Figure 210 or Figure 211)

(Figure 212)

(Figure 213)

WJE ALL

NOTE: Allowable tolerances are specified on graph.

(Figure 206 or Figure 207)

(Figure 208 or Figure 209)

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

(Figure 210 or Figure 211)

(Figure 212)

(Figure 213)

WJE ALL

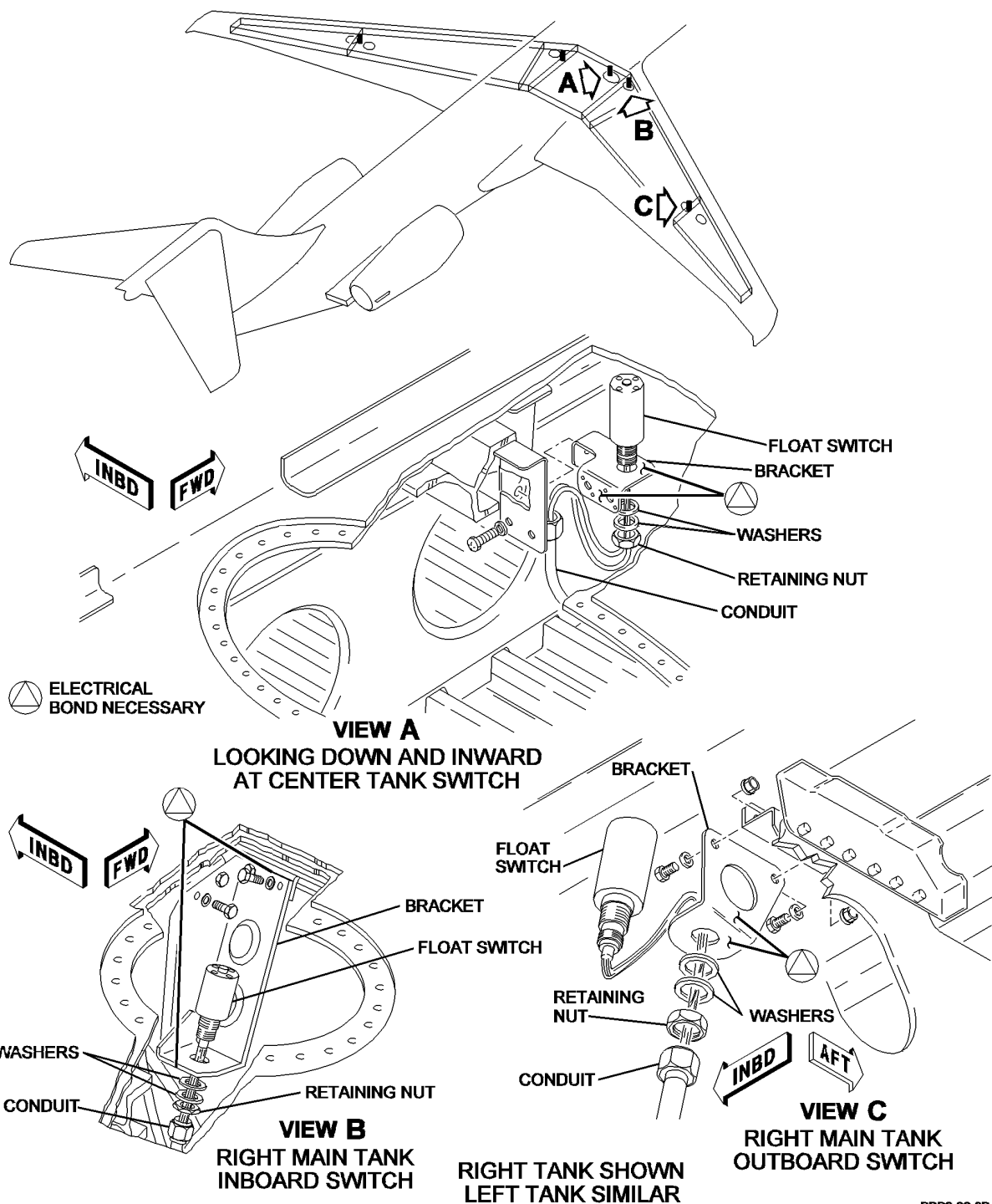
EFFECTIVITY
WJE ALL

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BBB2-28-8B
S0006536411V2

Fuel Fill Control Float Switch -- Removal/Installation
Figure 201/28-20-03-990-801 (Sheet 1 of 3)

EFFECTIVITY

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 876, 886, 887, 891, 893

TP-80MM-WJE

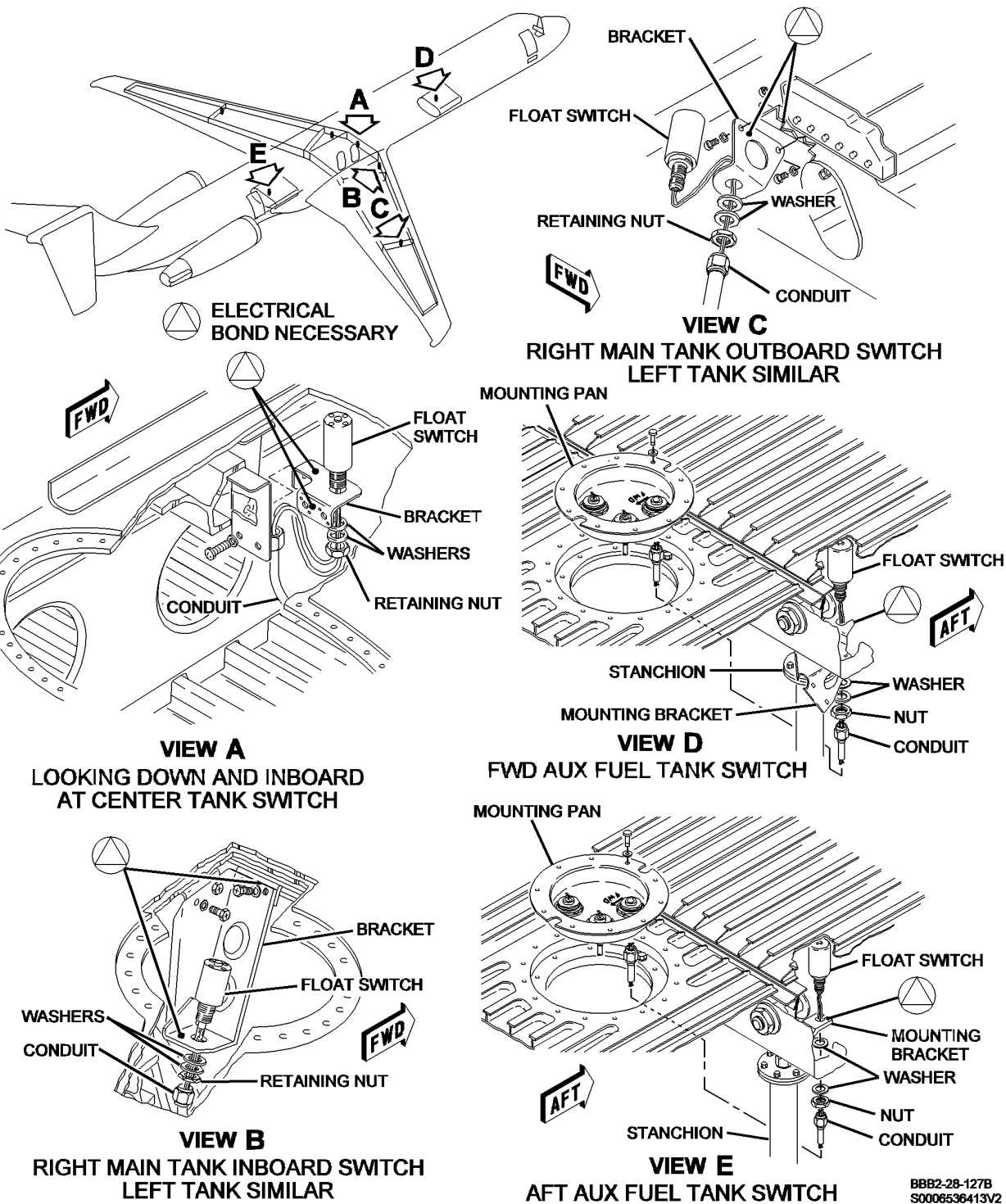
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BBB2-28-127B
S0006536413V2

Fuel Fill Control Float Switch -- Removal/Installation
Figure 201/28-20-03-990-801 (Sheet 2 of 3)

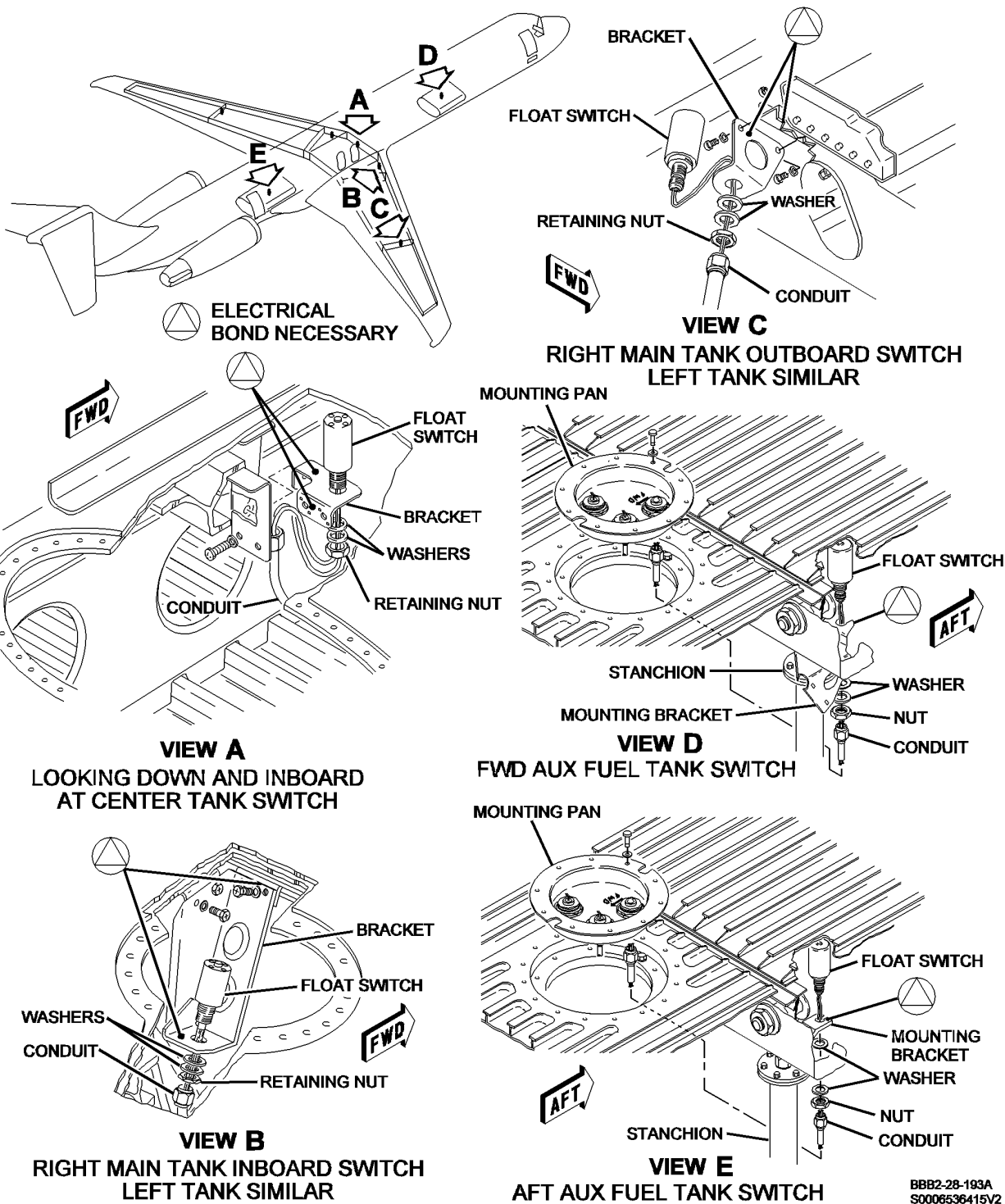
EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 873, 874, 877-881,
883, 884, 892

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BBB2-28-193A
S0006536415V2

Fuel Fill Control Float Switch -- Removal/Installation
Figure 201/28-20-03-990-801 (Sheet 3 of 3)

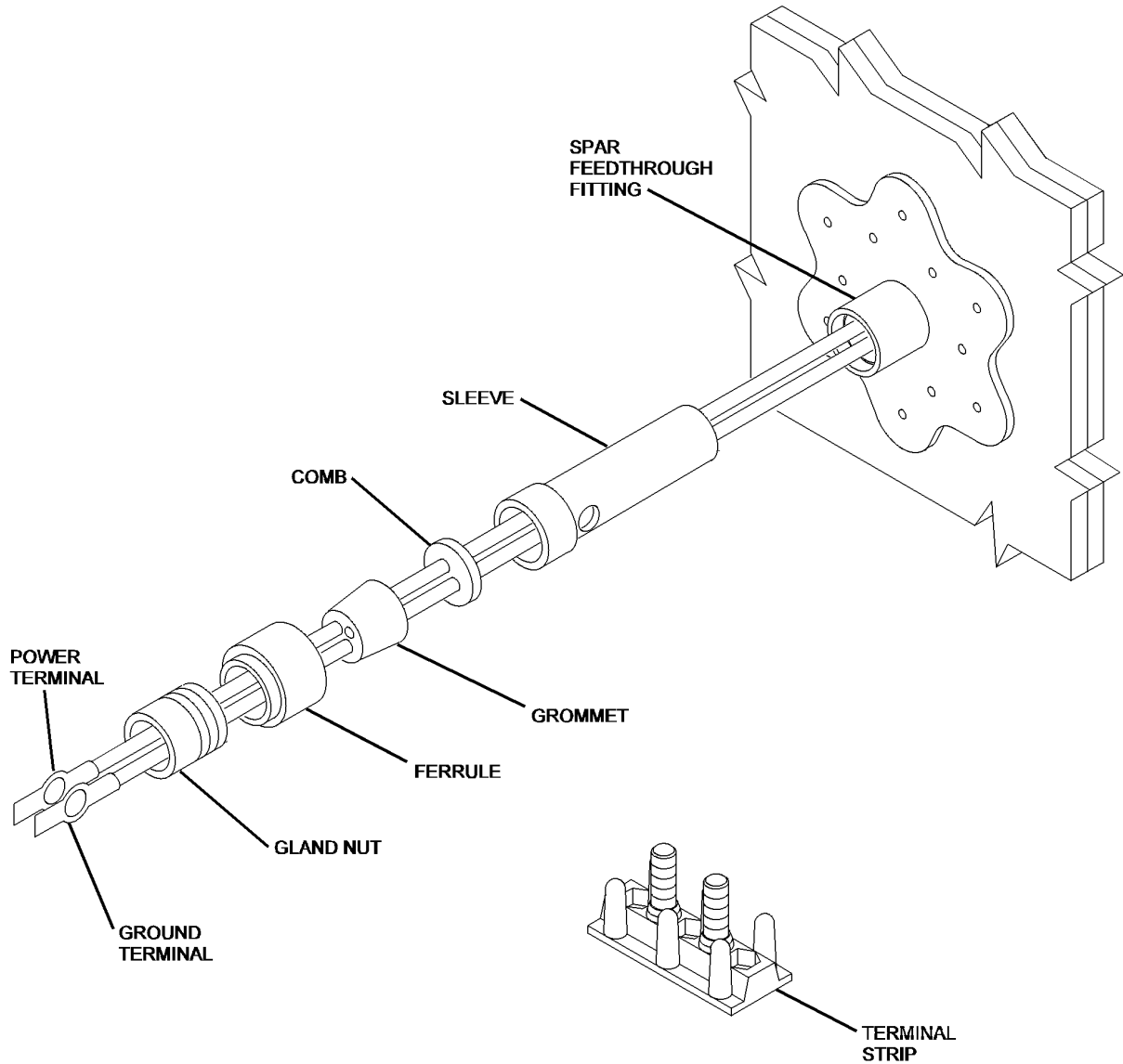
EFFECTIVITY
WJE 861, 862

28-20-03

TP-80MM-WJE

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BBB2-28-398A
S0000331529V2

Fuel Fill Control Float Switch Electrical Feedthrough -- Removal/Installation
Figure 202/28-20-03-990-802 (Sheet 1 of 3)

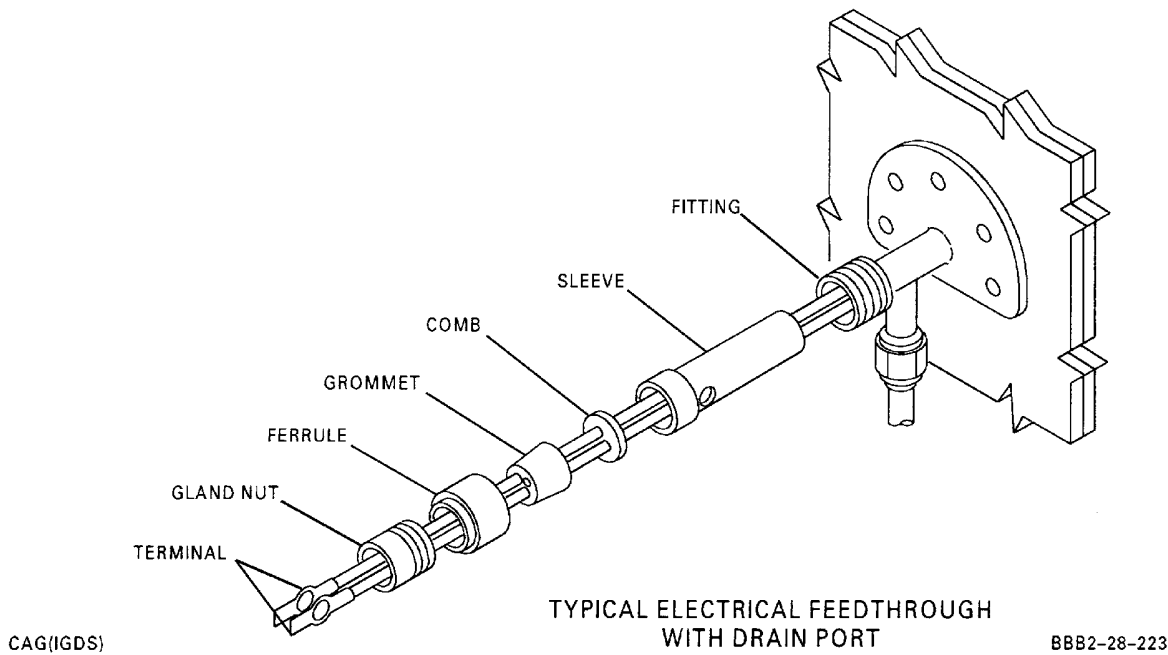
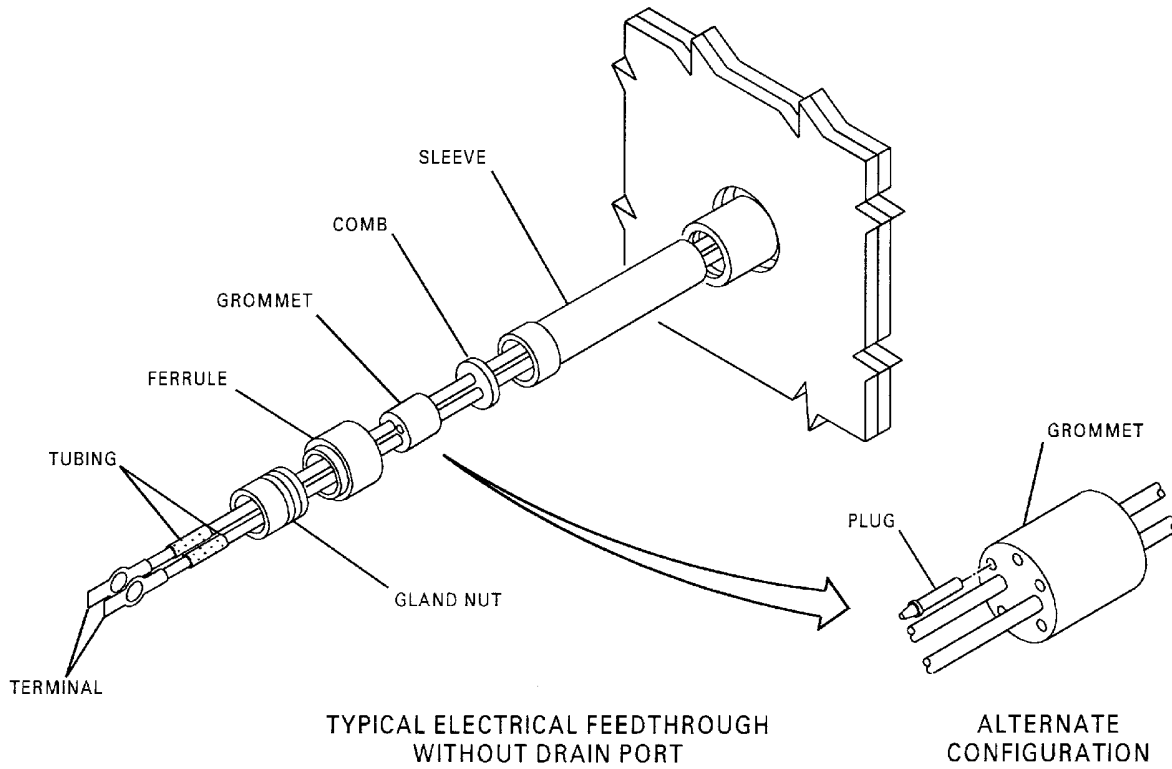
EFFECTIVITY
WJE ALL PRE MD80-28-226

TP-80MM-WJE

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**Fuel Fill Control Float Switch Electrical Feedthrough -- Removal/Installation
Figure 202/28-20-03-990-802 (Sheet 2 of 3)**

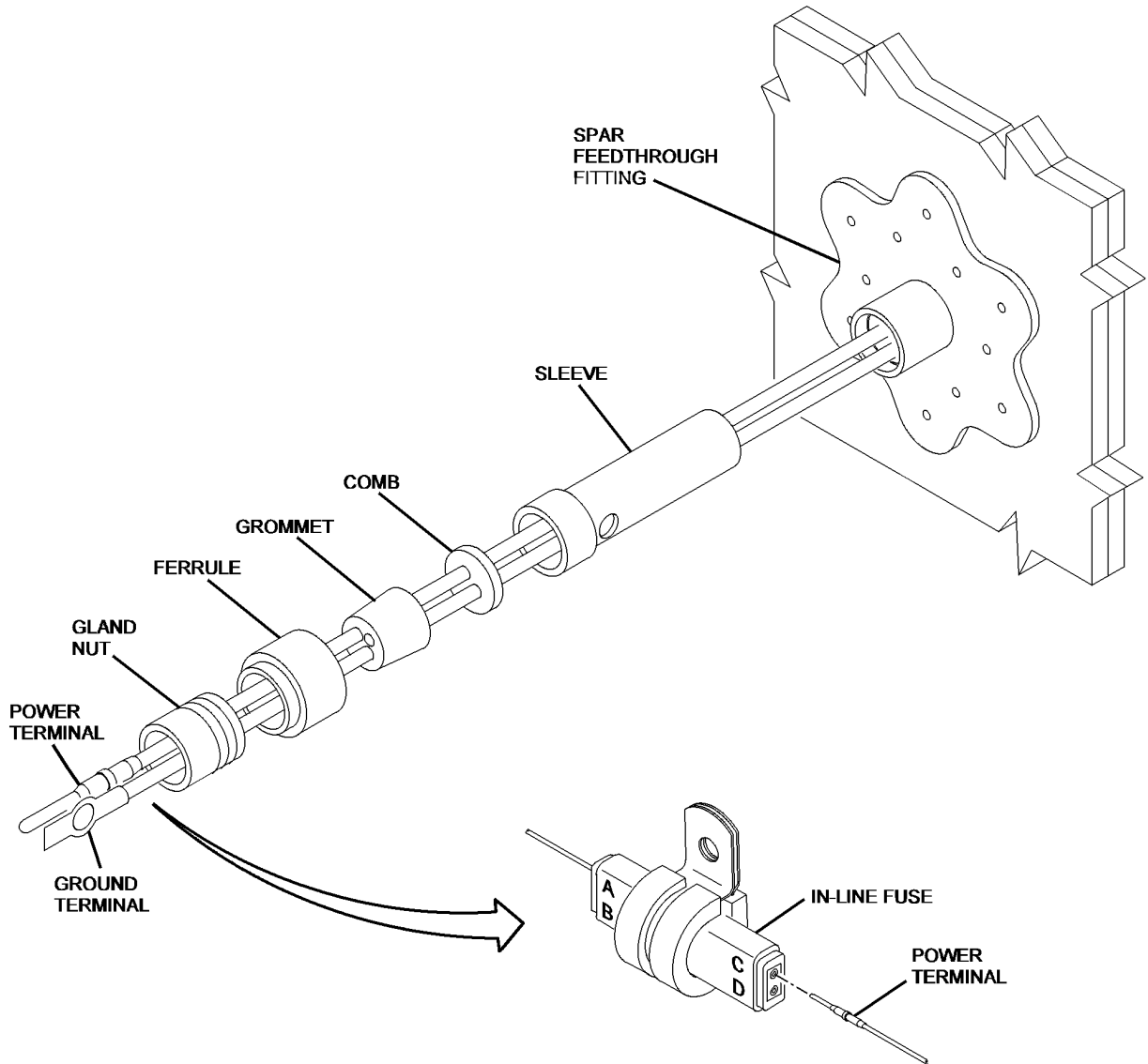
BBB2-28-223

EFFECTIVITY
WJE ALL

TP-80MM-WJE

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BBB2-28-397A
S0000331455V2

**Fuel Fill Control Float Switch Electrical Feedthrough -- Removal/Installation
Figure 202/28-20-03-990-802 (Sheet 3 of 3)**

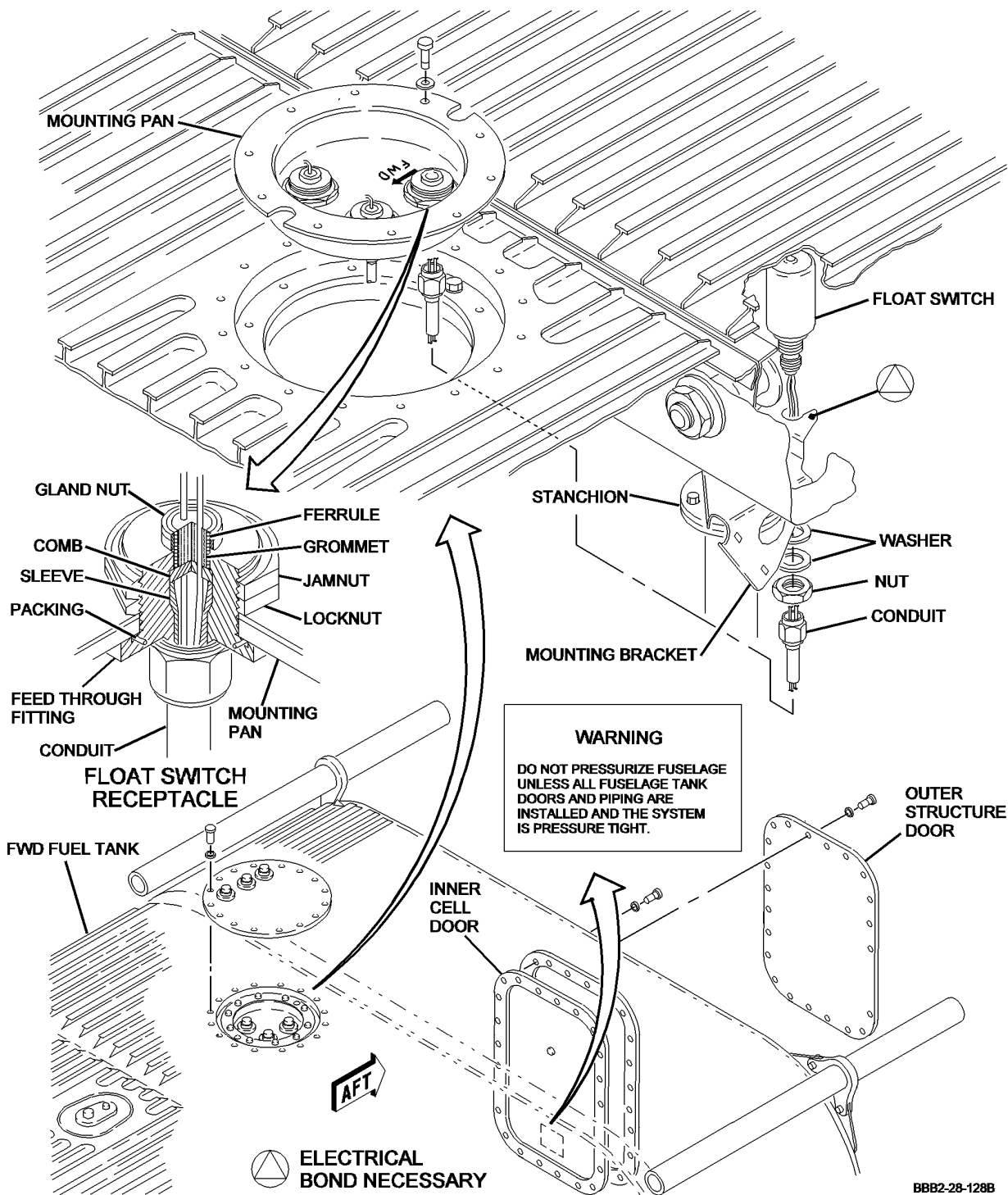
EFFECTIVITY
WJE ALL POST MD80-28-226

TP-80MM-WJE

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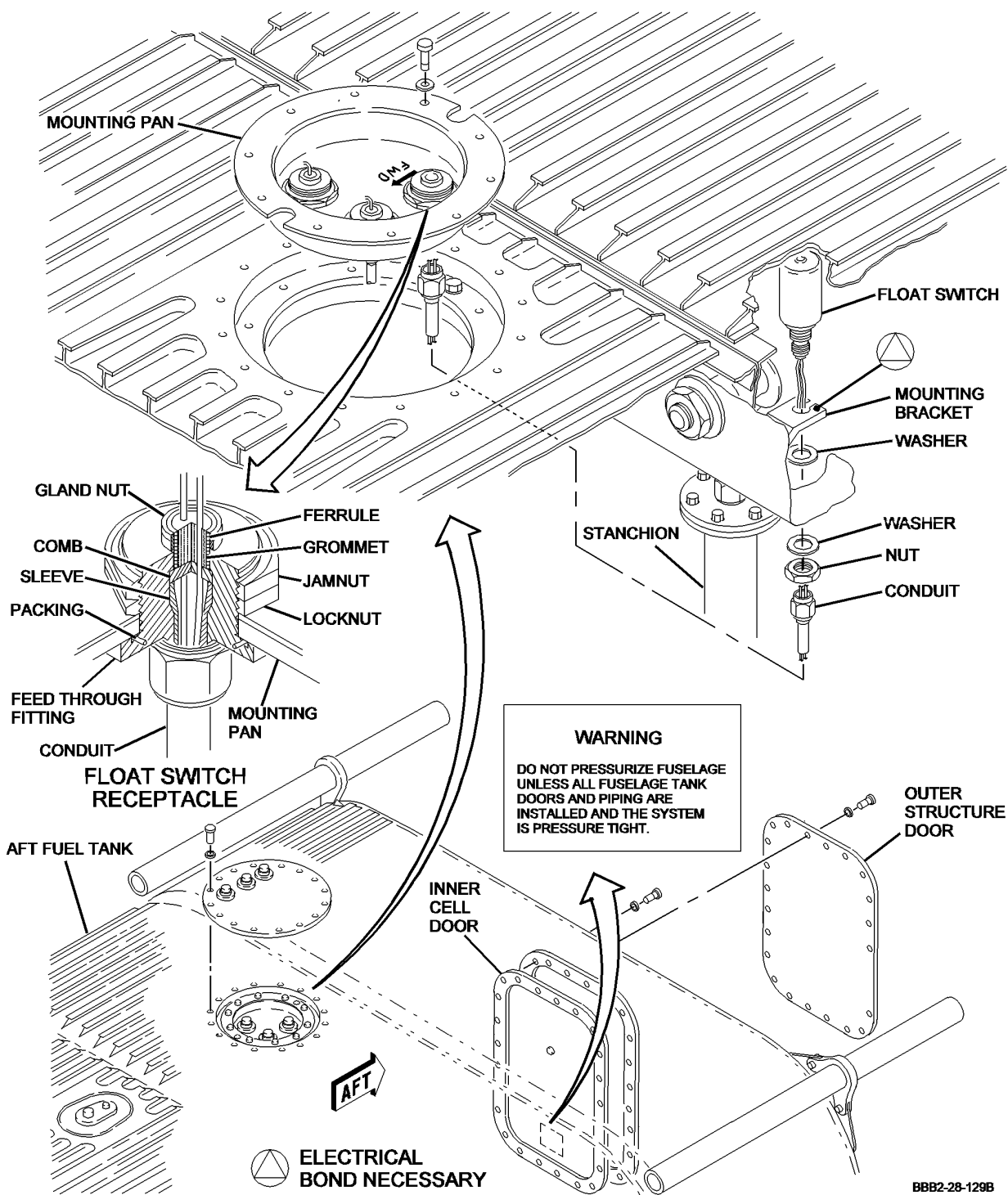
**Forward Fuselage Tank Fuel Fill Control Float Switch -- Removal/Installation
Figure 203/28-20-03-990-803 (Sheet 1 of 2)**

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

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BBB2-28-128B
S0006536428V2

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**Forward Fuselage Tank Fuel Fill Control Float Switch -- Removal/Installation
Figure 203/28-20-03-990-803 (Sheet 2 of 2)**

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

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BBB2-28-129B
S0006536429V2

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FUELING RECORD SHEET THREE TANK FUEL QUANTITY GAGE SYSTEM

AIRPLANE NO. _____	: AIRLINE _____	: A/C ATTITUDE _____	: ° PITCH _____	: ° ROLL _____	
DRY TANK READINGS:					
COCKPIT DISPLAY UNIT	LEFT MAIN TANK	RIGHT MAIN TANK	CENTER TANK	TOTALIZER	GROSS WT
LOAD SELECTOR DISPLAY UNIT	_____	_____	_____	_____	_____
FAULT ISOLATION TEST:					
CDU SYSTEM TEST A	_____	_____	_____	_____	_____
B	_____	_____	_____	_____	_____
LSDU SYSTEM TEST	_____	_____	_____	_____	_____
REFUELING PANEL:					
FUEL SELECTOR SETTINGS	_____	_____	_____	_____	_____
LSDU FUEL QTY DISPLAY READINGS (AT FUEL SELECTOR SHUTOFF)	_____	_____	_____	_____	_____
FUEL LEVEL SHUT-OFF:	_____	_____	_____	_____	_____
COCKPIT DISPLAY UNIT	_____	_____	_____	_____	_____
LOAD SELECTOR DISPLAY UNIT	_____	_____	_____	_____	_____
SUMMATION OF THE TANK READINGS					
TEMP _____ ° F	_____	_____	_____	_____	_____
SPECIFIC GRAVITY					
FOR FUEL LEVEL SHUT OFF CAPACITIES					
(SEE 28-20-03/PAGE 201 FIGURES 204, 205, 206, AND 207 AS APPLICABLE)					
COMPUTED DIFFERENCE	_____	_____	_____	_____	_____
COCKPIT DISPLAY UNIT S/N	_____	_____	_____	_____	_____
LOAD SELECTOR DISPLAY UNIT S/N	_____	_____	_____	_____	_____
STANDARD ELECTRONIC MODULE S/N	_____	_____	_____	_____	_____

BBB2-28-324A
S0006536440V2

**Refueling Record Sheet 3 Tank Fuel Quantity Gage System
Figure 204/28-20-03-990-804**

EFFECTIVITY WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

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FUELING RECORD SHEET FIVE TANK FUEL QUANTITY GAGE SYSTEM

AIRCRAFT FUSELAGE NO. _____	AIRLINE: _____	A/C ATTITUDE: _____	° PITCH _____	° ROLL _____	
DRY TANK READINGS:	LEFT MAIN	RIGHT MAIN	CENTER	FWD. AUX.	AFT AUX.
COCKPIT DISPLAY UNIT	_____	_____	_____	_____	_____
LOAD SELECTOR DISPLAY UNIT	_____	_____	_____	_____	_____
FAULT ISOLATION TEST:					
CDU SYSTEM TEST	A _____	_____	_____	_____	_____
	B _____	_____	_____	_____	_____
LSDU SYSTEM TEST	_____	_____	_____	_____	_____
REFUELING PANEL:					
FUEL SELECTOR SETTINGS	_____	_____	_____	_____	_____
LSDU FUEL QTY DISPLAY READINGS (AT FUEL SELECTOR SHUTOFF)	_____	_____	_____	_____	_____
FUEL LEVEL SHUT-OFF:					
COCKPIT DISPLAY UNIT	_____	_____	_____	_____	_____
LOAD SELECTOR DISPLAY UNIT	_____	_____	_____	_____	_____
FULL LEVEL SHUT-OFF CAPACITIES (SEE 28-20-03/201, FIGURES 204, 205, 206, 207 AS APPLICABLE)	_____	_____	_____	_____	_____
COMPUTED DIFFERENCE	_____	_____	_____	_____	_____
SUMMATION OF TANK READINGS	_____	_____	_____	_____	_____
TEMP _____ ° F	SPECIFIC GRAVITY _____				
COCKPIT DISPLAY UNIT S/N _____	STANDARD ELECTRONIC MODULE S/N _____				
LOAD SELECTOR DISPLAY UNIT S/N _____	AUX FUEL QTY. IND. S/N _____				

BBB2-28-329A
S0006536430V2

**Refueling Record Sheet 5 Tank Fuel Quantity Gage System
Figure 205/28-20-03-990-806**

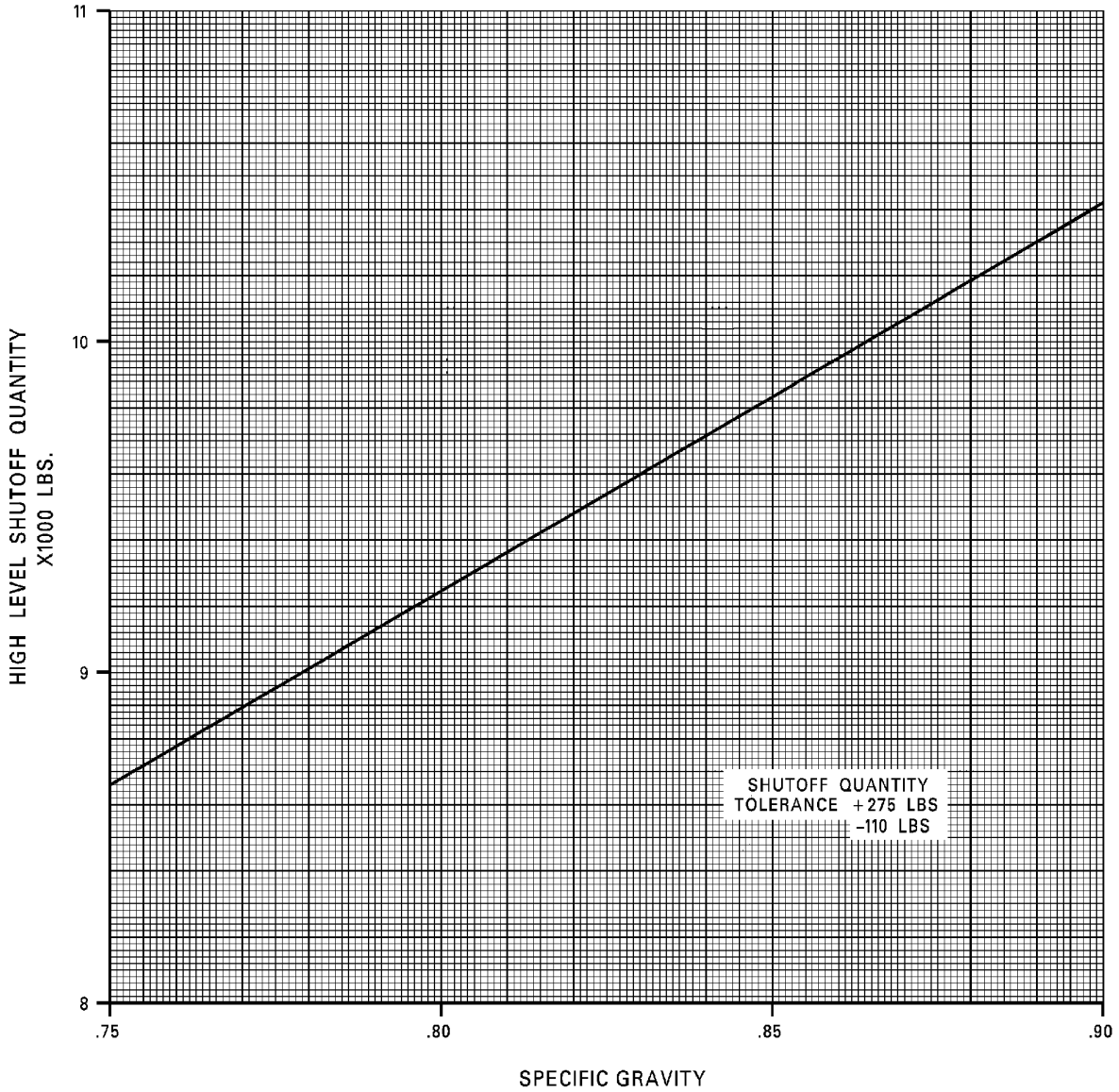
EFFECTIVITY WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

TP-80MM-WJE

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**HIGH LEVEL SHUTOFF QUANTITIES
LEFT AND RIGHT WING TANKS**



CAG(IGDS)

BBB2-28-325

High Level Shutoff Quantities - Left and Right Wing Tanks Shutoff Quantity Tolerance (Lbs)
Figure 206/28-20-03-990-807

EFFECTIVITY
WJE ALL

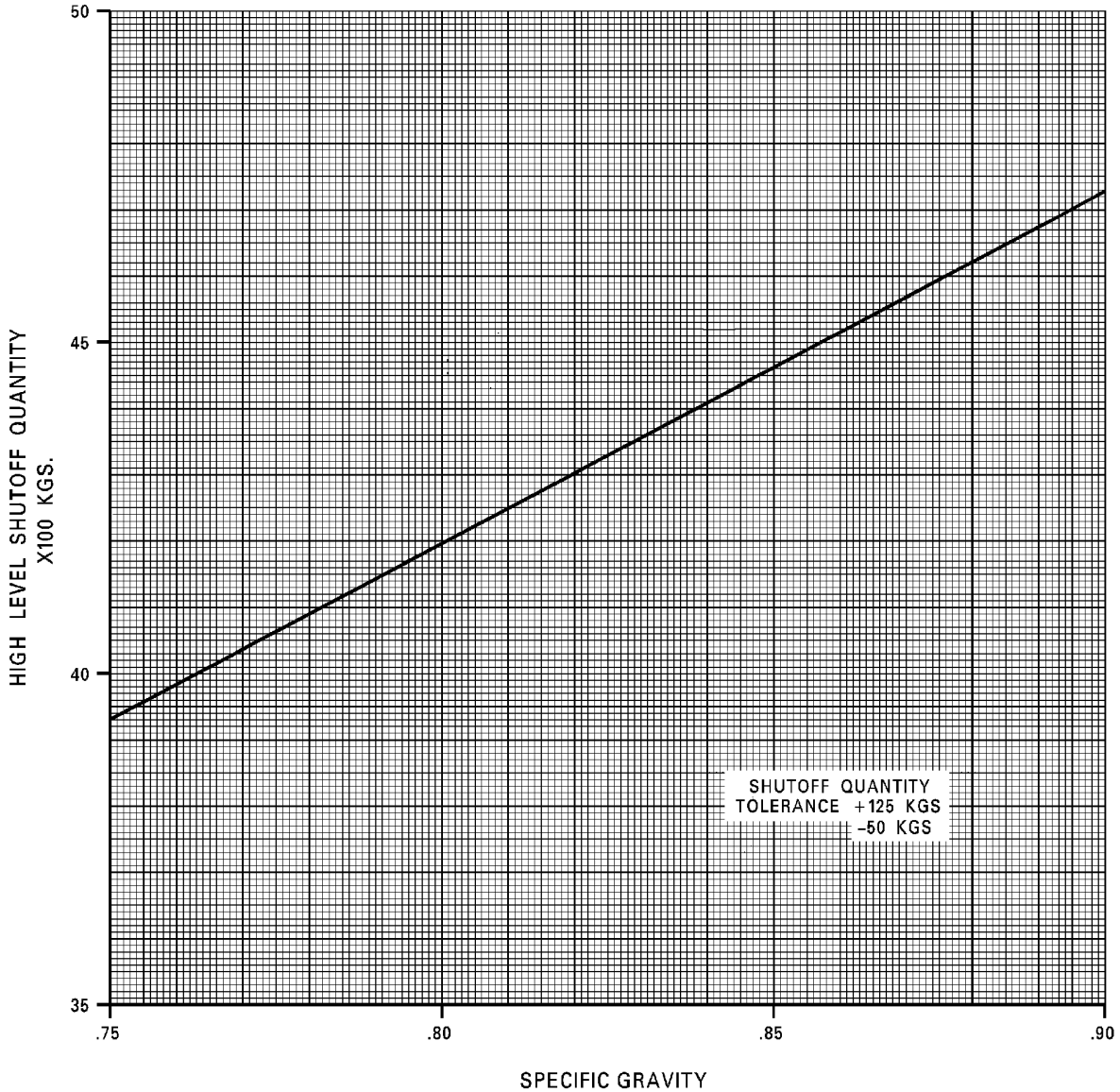
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**HIGH LEVEL SHUTOFF QUANTITIES
LEFT AND RIGHT WING TANKS**



CAG(IGDS)

BBB2-28-326

High Level Shutoff Quantities - Left and Right Wing Tanks Shutoff Quantity Tolerance (Kgs)
Figure 207/28-20-03-990-808

EFFECTIVITY
WJE ALL

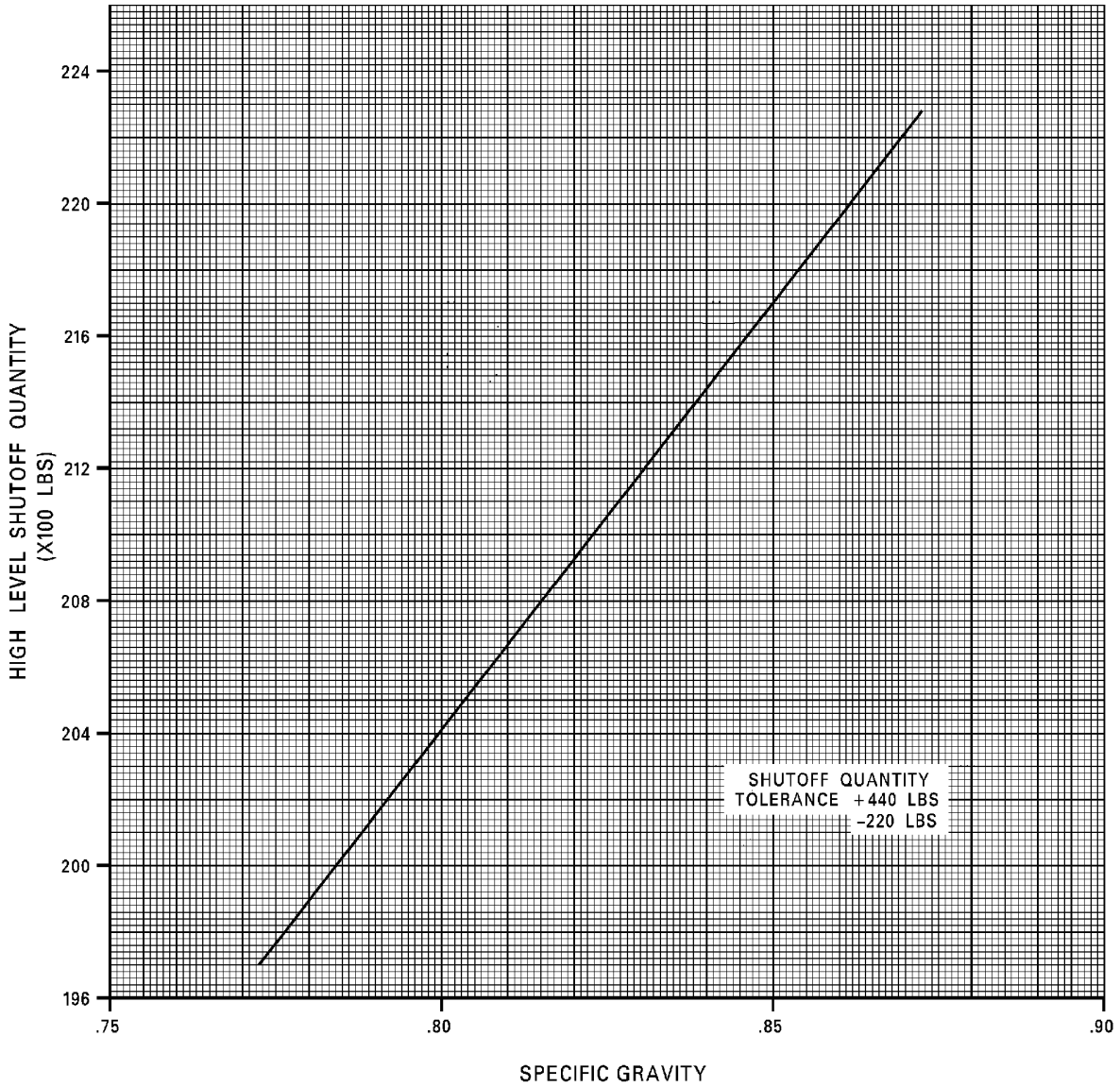
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**HIGH LEVEL SHUTOFF QUANTITIES
CENTER WING TANK**



CAG(IGDS)

BBB2-28-327

High Level Shutoff Quantities - Center Wing Tank Shutoff Quantity Tolerance (Lbs)
Figure 208/28-20-03-990-809

EFFECTIVITY
WJE ALL

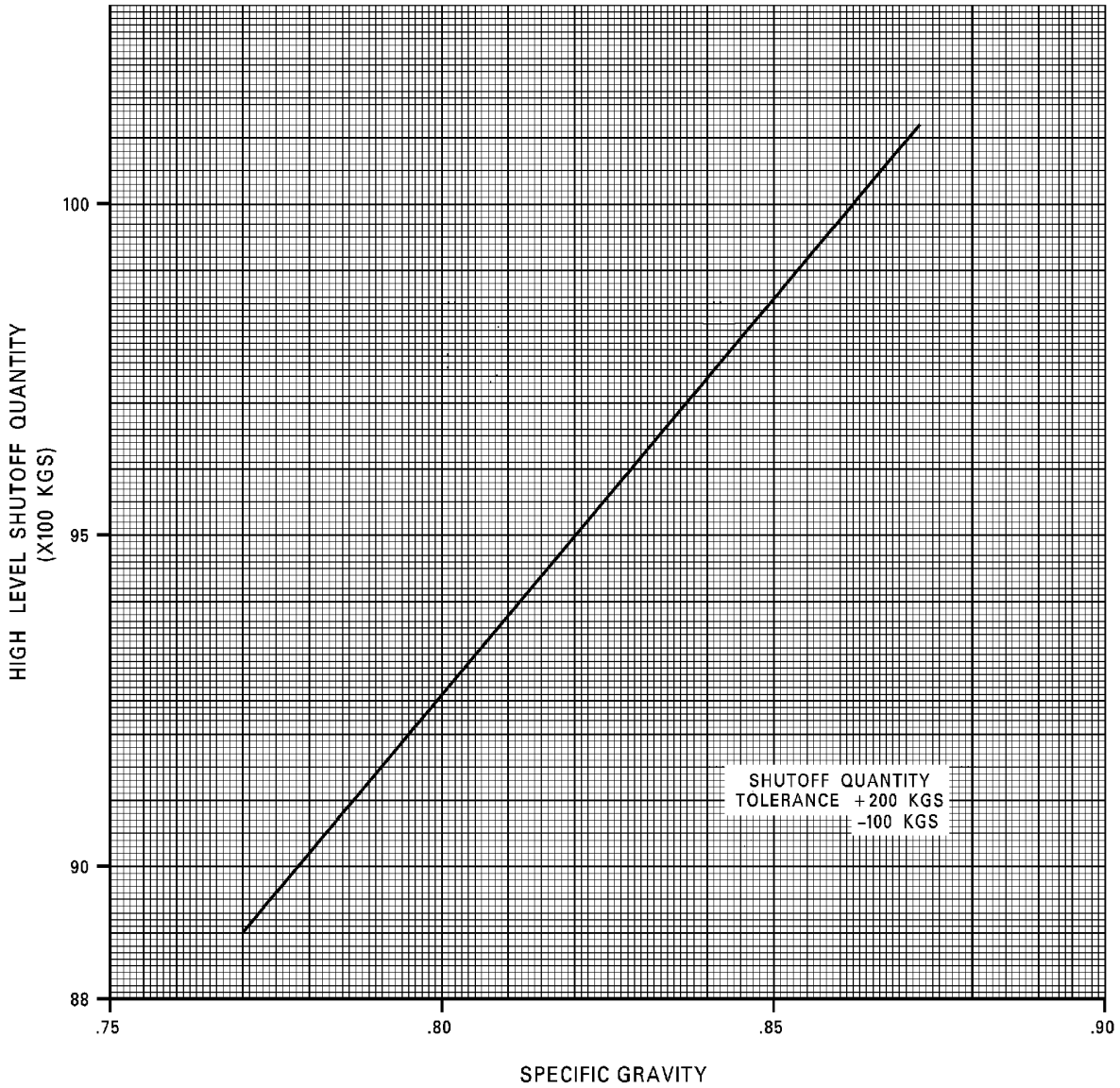
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**HIGH LEVEL SHUTOFF QUANTITIES
CENTER WING TANK**



CAG(IGDS)

BBB2-28-328

**High Level Shutoff Quantities - Center Wing Tank Shutoff Quantity Tolerance (Kgs)
Figure 209/28-20-03-990-810**

EFFECTIVITY
WJE ALL

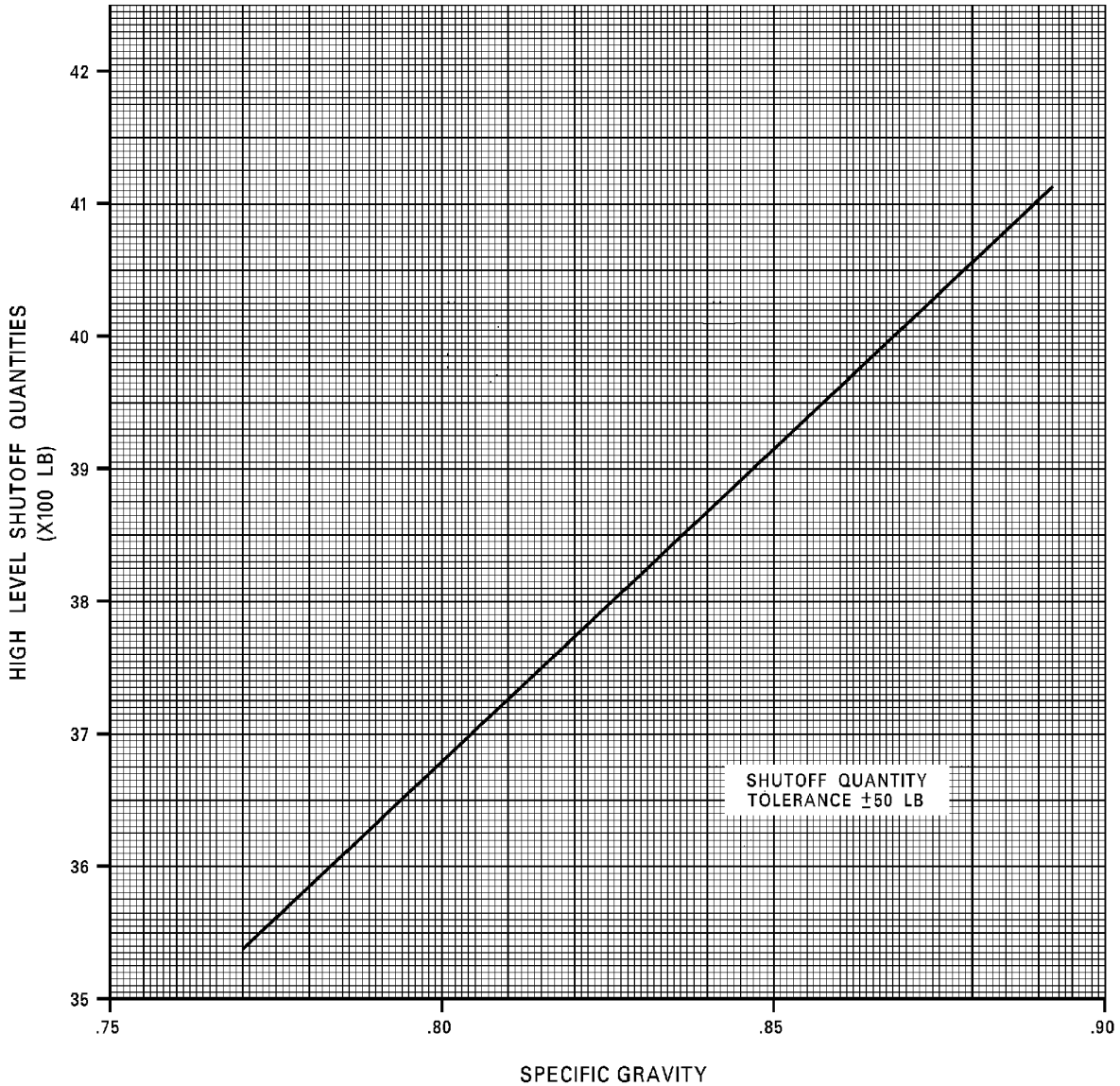
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**HIGH LEVEL SHUTOFF QUANTITIES
FWD AND AFT AUXILIARY
FUEL TANK (565 GAL)**



CAG(IGDS)

BBB2-28-330

**High Level Shutoff Quantities - FWD and AFT Auxiliary Tank (565 GAL) Shutoff Quantity Tolerance (Lbs)
Figure 210/28-20-03-990-813**

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

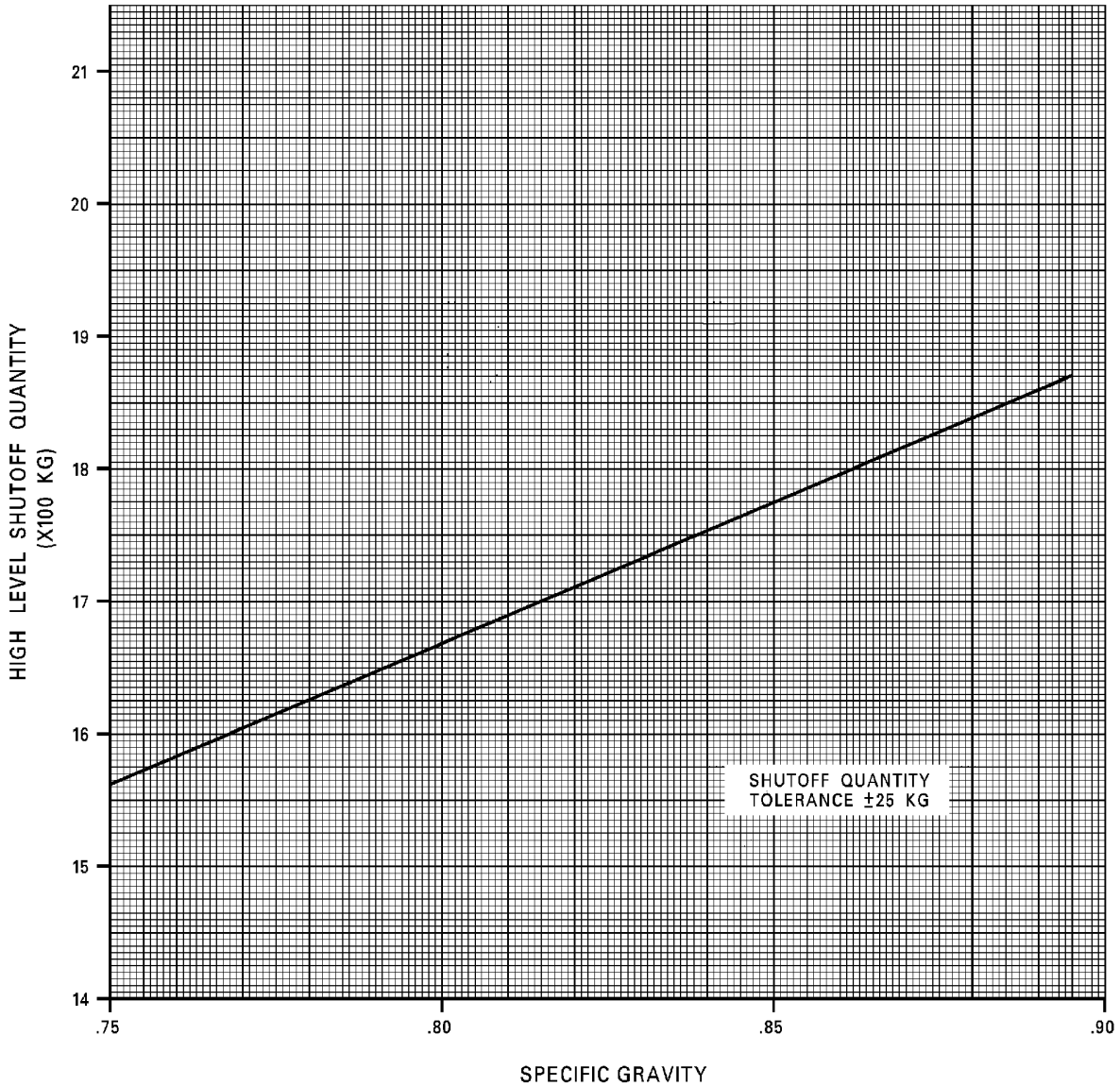
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**HIGH LEVEL SHUTOFF QUANTITIES
FWD AND AFT AUXILIARY
FUEL TANK (565 GAL)**



CAG(IGDS)

BBB2-28-331

High Level Shutoff Quantities - FWD and AFT Auxiliary Tank (565 GAL) Shutoff Quantity Tolerance (Kgs)

Figure 211/28-20-03-990-814

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

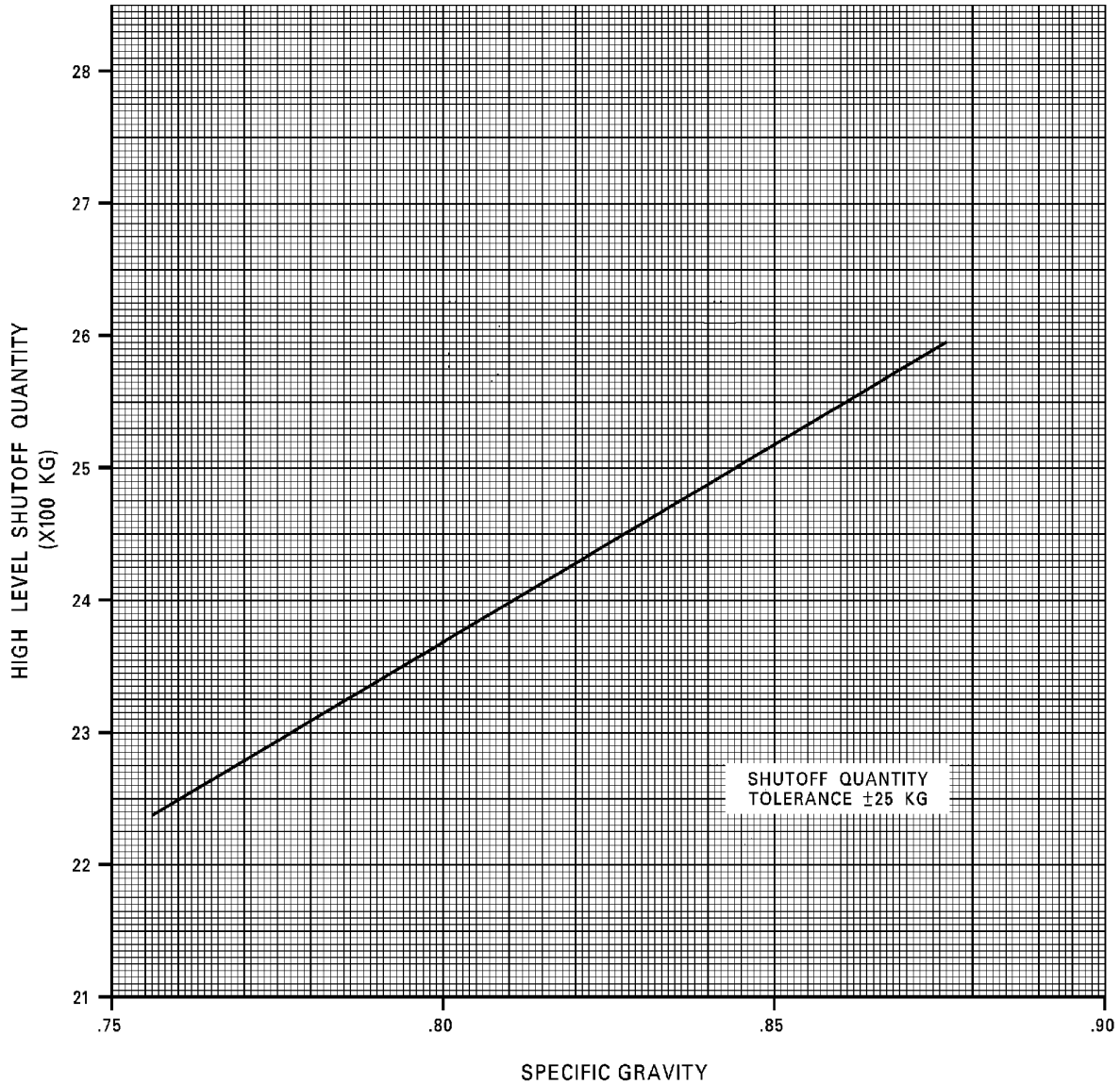
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**HIGH LEVEL SHUTOFF QUANTITY
780 GALLON AUXILIARY
FUEL TANK**



CAG(IGDS)

BBB2-28-332

**High Level Shutoff Quantity - Auxiliary Fuel Tank (780 GAL) Shutoff Quantity Tolerance (Kgs)
Figure 212/28-20-03-990-815**

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

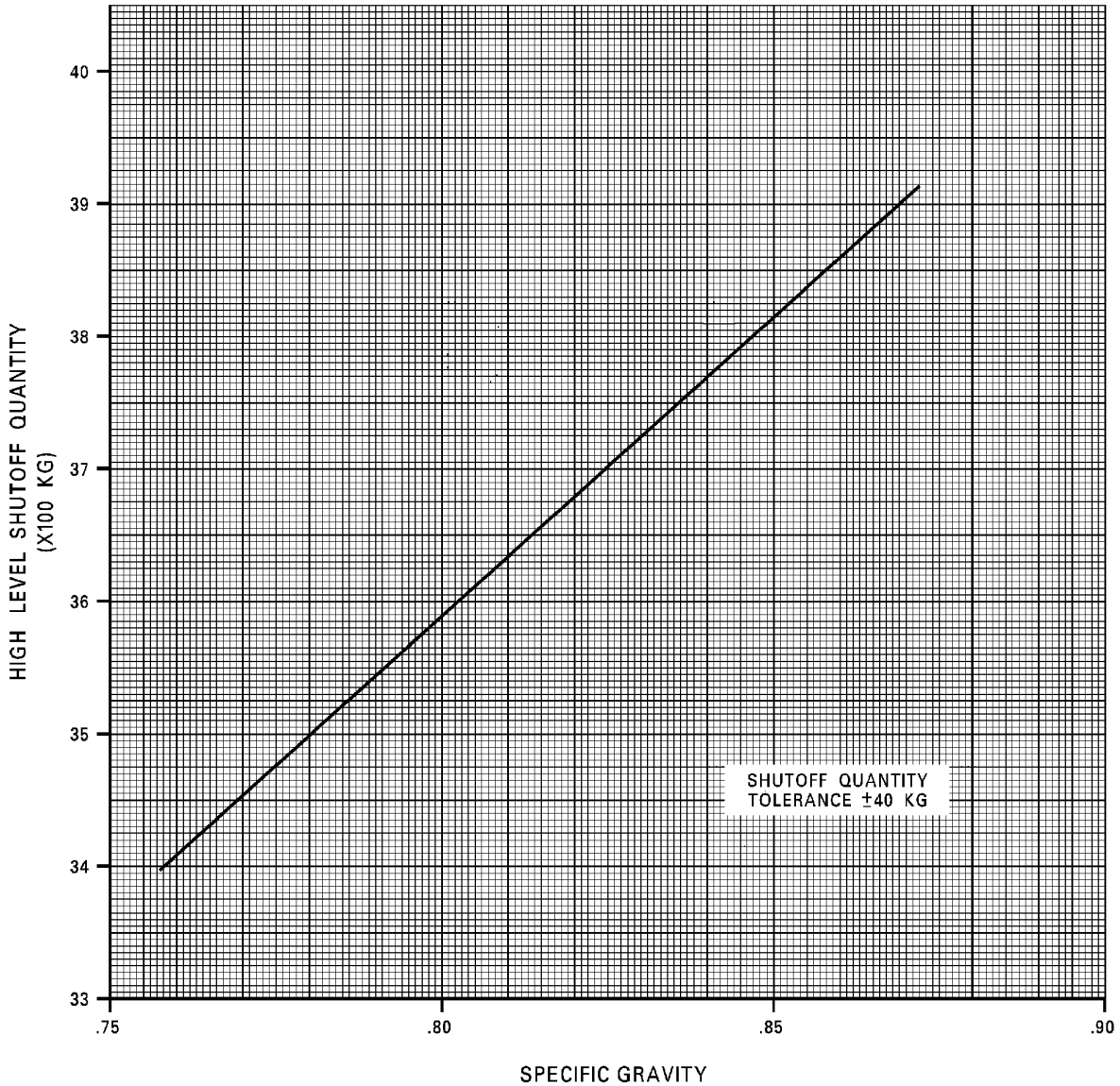
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**HIGH LEVEL SHUTOFF QUANTITY
1180 GALLON AUXILIARY
FUEL TANK**



CAG(IGDS)

BBB2-28-333

**High Level Shutoff Quantities - Auxiliary Fuel Tank (1180 GAL) Shutoff Quantity Tolerance (Kgs)
Figure 213/28-20-03-990-816**

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

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DEFUELING SHUTOFF VALVE - MAINTENANCE PRACTICES

1. General

- A. The defueling shutoff valve is located in the right wing leading edge, inboard of the refueling control panel.
- B. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices. (PAGEBLOCK 28-00-00/201)

2. Removal/Installation Defueling Shutoff Valve

- A. Remove valve

WARNING: MAKE SURE THE SLATS DO NOT ACCIDENTALLY OPERATE. ACCIDENTAL OPERATION OF THE SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Depressurize hydraulic system. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 29-00-00/201)

WARNING: DO NOT OPERATE FLAP/SLAT CONTROL LEVER, MAINTENANCE BEING PERFORMED ON FUEL SYSTEM COMPONENTS INSTALLED ON WING SPAR. INADVERTENT OPERATION OF FLAP/SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (2) Install "DO NOT OPERATE" Placard on FLAP/SLAT control lever.
- (3) Defuel right main tank to below level of defueling shutoff valve.
- (4) Close crossfeed valve.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (5) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

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WJE ALL

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UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

(6) Remove two bottom bolts.

WARNING: PLACE SUITABLE CONTAINER UNDER VALVE TO CATCH RESIDUAL FUEL.

(7) Loosen two top bolts and remove valve.

NOTE: Adjacent line clamps may be loosened to permit movement of lines to free valve for removal.

B. Install Valve

WARNING: MAKE SURE THE SLATS DO NOT ACCIDENTALLY OPERATE. ACCIDENTAL OPERATION OF THE SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(1) Make certain hydraulic system is depressurized. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 29-00-00/201)

WARNING: DO NOT OPERATE FLAP/SLAT CONTROL LEVER, MAINTENANCE BEING PERFORMED ON FUEL SYSTEM COMPONENTS INSTALLED ON WING SPAR. INADVERTENT OPERATION OF FLAP/SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(2) Make certain "DO NOT OPERATE" placard is installed on FLAP/SLAT control lever.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

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UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (4) Install valve.
- (5) Check that all fuel fill valves are closed.
- (6) Manually open defueling shutoff valve.
- (7) Remove tag from FLAP/SLAT control lever.
- (8) Remove the safety tags and close these circuit breakers:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (9) Place both FUEL TANKS RIGHT PUMPS switches in ON position.
- (10) Observe valve and connections for presence of fuel leaks.
- (11) Place both FUEL TANKS RIGHT PUMPS switches in OFF position.
- (12) Bleed off pressure in defueling line by opening any one fuel fill valve.
- (13) Close respective fuel fill valve.
- (14) Place defuel valve lever in closed position and safety with lockwire. (LOCKWIRE SAFETYING - MAINTENANCE PRACTICES, PAGEBLOCK 20-10-18/201)

NOTE: If valve is used frequently, safetying of handle may be eliminated at operator's discretion.

- (15) Tighten line clamps as applicable.
- (16) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

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UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

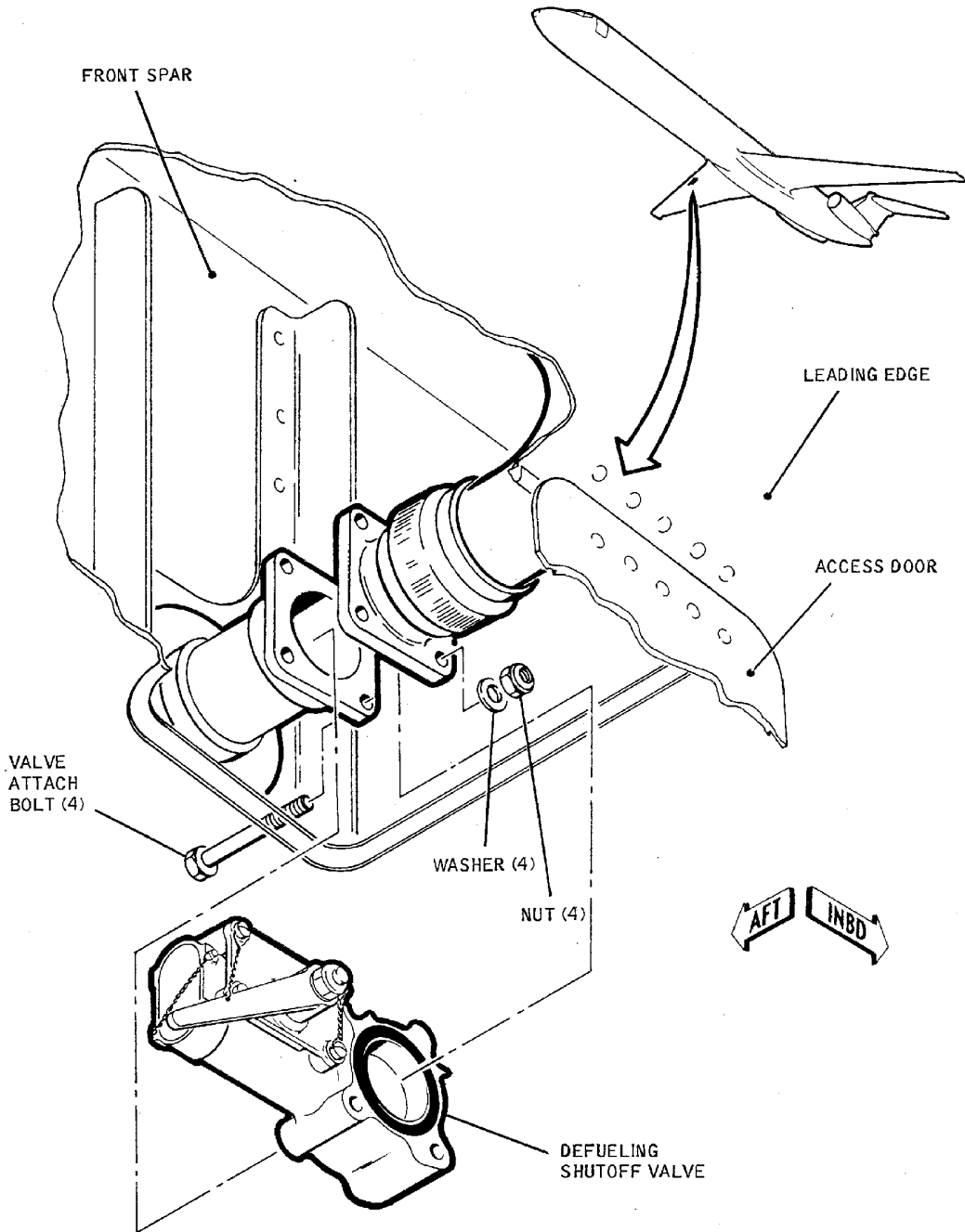
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Defueling Shutoff Valve -- Removal/Installation
Figure 201/28-20-05-990-801

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DEFUELING CHECK VALVE - MAINTENANCE PRACTICES

1. General

- A. The defueling check valve is located in the right wing leading edge, outboard of the defueling valve.
- B. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices. (PAGEBLOCK 28-00-00/201)

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed item:

NOTE: Some materials in the Equipment and Materials list may not be permitted to be used in your location. Persons in each location must make sure they are permitted to use these materials. All persons must obey all applicable federal, state, local, and provincial regulations for their location.

Table 201

Name and Number	Manufacturer
Inconel Lockwire 0.032 in NASM20995N32, DPM 684	Not specified
Corrosion Resistant Steel Lockwire 0.032 in NASM20995C32, DPM 5865	Not specified

3. Removal/Installation Defueling Check Valve

- A. Remove Valve

WARNING: MAKE SURE THE SLATS DO NOT ACCIDENTALLY OPERATE. ACCIDENTAL OPERATION OF THE SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Depressurize hydraulic system. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 29-00-00/201)

WARNING: DO NOT OPERATE FLAP/SLAT CONTROL LEVER, MAINTENANCE BEING PERFORMED ON FUEL SYSTEM COMPONENTS INSTALLED ON WING SPAR. INADVERTENT OPERATION OF FLAP/SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (2) Install "DO NOT OPERATE" Placard on FLAP/SLAT control lever.
- (3) Check that defueling shutoff valve is closed.

WARNING: PLACE SUITABLE CONTAINER UNDER CHECK VALVE TO CATCH RESIDUAL FUEL.

- (4) Remove valve and seals.

- B. Install Valve

WARNING: MAKE SURE THE SLATS DO NOT ACCIDENTALLY OPERATE. ACCIDENTAL OPERATION OF THE SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Make certain hydraulic system is depressurized. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 29-00-00/201)

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WARNING: DO NOT OPERATE FLAP/SLAT CONTROL LEVER, MAINTENANCE BEING PERFORMED ON FUEL SYSTEM COMPONENTS INSTALLED ON WING SPAR. INADVERTENT OPERATION OF FLAP/SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (2) Make certain "DO NOT OPERATE" placard is installed on FLAP/SLAT control lever.
- (3) Manually check valve for freedom of movement.
- (4) Install valve with new seals.

NOTE: Valve is marked with a flow direction arrow. Valve should be installed with arrow pointing outboard.

- (5) Close all fuel fill valves.
- (6) Manually open defueling shutoff valve.
- (7) Place both FUEL TANKS CTR PUMPS switches in ON position.
- (8) Observe defueling check valve connections for presence of leaks.
- (9) Observe that fuel pressure low light is off.
- (10) Place both FUEL TANKS CTR PUMPS switches in OFF position.
- (11) Manually close defueling shutoff valve. Safety handle in closed position with lockwire. (LOCKWIRE SAFETYING - MAINTENANCE PRACTICES, PAGEBLOCK 20-10-18/201)

NOTE: If valve is used frequently, safetying of handle may be eliminated at operator's discretion.

- (12) Remove tag from FLAP/SLAT control lever.

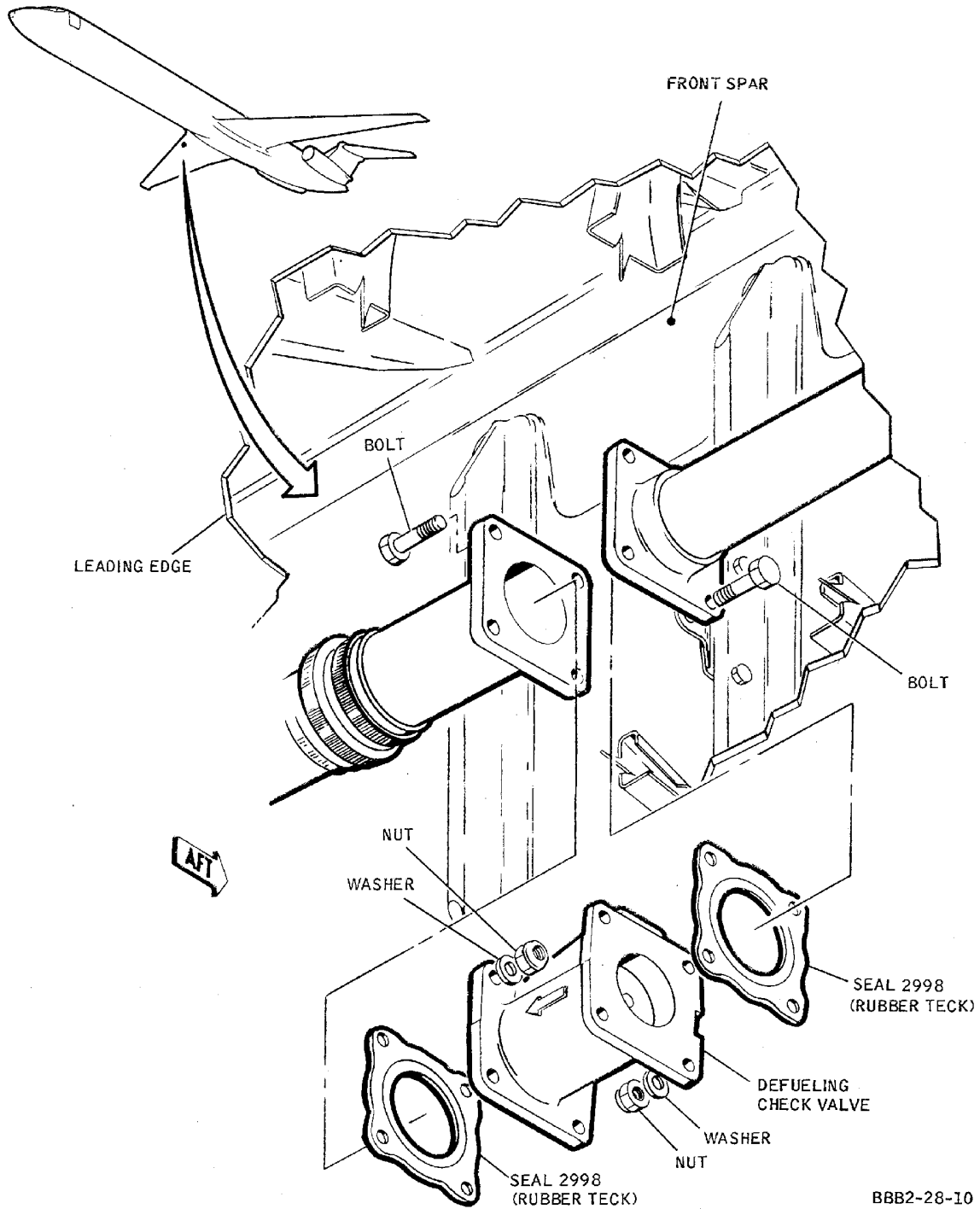
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WJE ALL

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Defueling Check Valve -- Removal/Installation
Figure 201/28-20-06-990-801

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FUEL BOOST PUMPS - TROUBLESHOOTING**

1. General

- A. This intent of this procedure is to identify the wiring faults in the fuel boost/transfer pump circuit. Included are:
- Troubleshooting Fuel Boost/Transfer Pump Tripped Open Circuit Breaker.

WJE ALL POST MD80-28-228

- Troubleshooting Center Tank Fuel Boost Pump Tripped Open Ground Fault Interrupter Relay

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-228

- Troubleshooting Fwd Aux Tank Fuel Transfer Pump Tripped Open Ground Fault Interrupter Relay

WJE ALL

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

Table 101

Name and Number	Manufacturer
Multimeter/Digital	Not Specified

3. Troubleshooting Fuel Boost/Transfer Pump Tripped Open Circuit Breaker

A. Fuel Boost Pumps Continuity Check

- (1) Verify it is safe to reset the circuit breaker(s) by following this troubleshooting procedure. Fault(s) that resulted in circuit breaker trip must be isolated and corrected prior to reset if the fault(s) occurred inside the fuel tank or adjacent to any fuel tank wall.
 - (a) The above step is an Airworthiness Limitation Instruction (ALI) procedure. For important information on Airworthiness Limitation Instructions (ALIs), refer to Airworthiness Limitation Precautions (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201).
- (2) Using a digital multimeter, check electrical continuity and resistance from the noted terminal strip/connector as shown for each pump.

NOTE: This resistance check can be accomplished with all pump wiring connected at the terminal strip or connector.
- (3) For the applicable boost pump, use the tables that follow and check for continuity and a satisfactory circuit resistance reading.

NOTE: The resistance must fall within the given "Range Values" in the tables and the difference between the highest phase reading and the lowest phase reading must fall within the "Max Variance Range" in the tables.

CAUTION: DO NOT RESET A TRIPPED FUEL PUMP CIRCUIT BREAKER UNTIL THE FOLLOWING TROUBLESHOOTING PROCEDURES HAVE BEEN COMPLETED. THIS WILL HELP PREVENT DAMAGE TO THE PUMP AND/OR ITS WIRING.

- (4) If both readings are within limits, the circuit breaker can be put in the CLOSED position and the normal troubleshooting can continue.
- (5) If one or both of the readings are not within limits, the applicable circuit breaker can not be closed and the boost pump must be removed before further troubleshooting. (PAGEBLOCK 28-20-07/201)

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WJE ALL

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- (a) If the readings are higher than the limits, inspect the electrical connectors on the conduit and the fuel pump. Make sure the electrical connectors do not have bent, broken, melted or burnt pins or sockets, unwanted material, or signs of melting, arcing and overheating. Examine the conduit electrical connector insert material for cracks, splits or cuts. No damage is permitted. Clean all unwanted material from connectors to make sure of a good connection. If the connectors do not show any noted above, connect the fuel pump electrical connector to the conduit electrical connector and reinstall or replace the fuel pump (PAGEBLOCK 28-20-07/201). Reset the circuit breaker. If the circuit breaker trips again, check the pump, wiring, switch, relay or circuit breaker.

NOTE: Bent, broken, burnt pins or sockets, signs of melting, arcing or overheating are not permitted on the electrical connectors.

- (b) If the readings are lower than the limits, there is a shorted winding. Replace the boost/ transfer pump. (PAGEBLOCK 28-20-07/201)

Left Tank Fwd Pump M1-4 (Terminal S3-302)		
Measurement point	Range Value	Max Variance Value
S3-302 Term 2 to Term 3	3.9 to 6.1 ohms	0.7 ohms
S3-302 Term 2 to Term 4	3.9 to 6.1 ohms	0.7 ohms
S3-302 Term 3 to Term 4	3.9 to 6.1 ohms	0.7 ohms
S3-302 Term 2 to Ground	2.1 to 3.7 ohms	0.4 ohms
S3-302 Term 3 to Ground	2.1 to 3.7 ohms	0.4 ohms
S3-302 Term 4 to Ground	2.1 to 3.7 ohms	0.4 ohms

Left Tank Aft Pump M1-2 (Terminal S3-1)		
Measurement point	Range Value	Max Variance Value
S3-1 Term 2 to Term 3	3.9 to 6.1 ohms	0.7 ohms
S3-1 Term 2 to Term 4	3.9 to 6.1 ohms	0.7 ohms
S3-1 Term 3 to Term 4	3.9 to 6.1 ohms	0.7 ohms
S3-1 Term 2 to Ground	2.1 to 3.7 ohms	0.4 ohms
S3-1 Term 3 to Ground	2.1 to 3.7 ohms	0.4 ohms
S3-1 Term 4 to Ground	2.1 to 3.7 ohms	0.4 ohms

Right Tank Fwd Pump M1-5 (Terminal S3-91)		
Measurement point	Range Value	Max Variance Value
S3-91 Term 2 to Term 3	3.9 to 6.1 ohms	0.7 ohms
S3-91 Term 2 to Term 4	3.9 to 6.1 ohms	0.7 ohms
S3-91 Term 3 to Term 4	3.9 to 6.1 ohms	0.7 ohms
S3-91 Term 2 to Ground	2.1 to 3.7 ohms	0.4 ohms
S3-91 Term 3 to Ground	2.1 to 3.7 ohms	0.4 ohms
S3-91 Term 4 to Ground	2.1 to 3.7 ohms	0.4 ohms

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Right Tank Aft Pump M1-3 (Terminal S3-2)		
Measurement point	Range Value	Max Variance Value
S3-2 Term 2 to Term 3	3.9 to 6.1 ohms	0.7 ohms
S3-2 Term 2 to Term 4	3.9 to 6.1 ohms	0.7 ohms
S3-2 Term 3 to Term 4	3.9 to 6.1 ohms	0.7 ohms
S3-2 Term 2 to Ground	2.1 to 3.7 ohms	0.4 ohms
S3-2 Term 3 to Ground	2.1 to 3.7 ohms	0.4 ohms
S3-2 Term 4 to Ground	2.1 to 3.7 ohms	0.4 ohms

Center Tank Aft Pump M1-10 (Terminal S3-10)		
Measurement point	Range Value	Max Variance Value
S3-10 Term 2 to Term 3	3.9 to 6.1 ohms	0.7 ohms
S3-10 Term 2 to Term 4	3.9 to 6.1 ohms	0.7 ohms
S3-10 Term 3 to Term 4	3.9 to 6.1 ohms	0.7 ohms
S3-10 Term 2 to Ground	2.1 to 3.7 ohms	0.4 ohms
S3-10 Term 3 to Ground	2.1 to 3.7 ohms	0.4 ohms
S3-10 Term 4 to Ground	2.1 to 3.7 ohms	0.4 ohms

Center Tank Fwd Pump M1-9 (Terminal S3-10)		
Measurement point	Range Value	Max Variance Value
S3-10 Term 5 to Term 6	3.9 to 6.1 ohms	0.7 ohms
S3-10 Term 5 to Term 7	3.9 to 6.1 ohms	0.7 ohms
S3-10 Term 6 to Term 7	3.9 to 6.1 ohms	0.7 ohms
S3-10 Term 5 to Ground	2.1 to 3.7 ohms	0.4 ohms
S3-10 Term 6 to Ground	2.1 to 3.7 ohms	0.4 ohms
S3-10 Term 7 to Ground	2.1 to 3.7 ohms	0.4 ohms

Fwd Fuse Aux Tank Pump M1-35 (Connector R5-1120)		
Measurement point	Range Value	Max Variance Value
R5-1120 Pins A to B	3.9 to 6.1 ohms	0.7 ohms
R5-1120 Pins A to C	3.9 to 6.1 ohms	0.7 ohms
R5-1120 Pins B to C	3.9 to 6.1 ohms	0.7 ohms
R5-1120 Pins A to D	2.1 to 3.7 ohms	0.4 ohms
R5-1120 Pins B to D	2.1 to 3.7 ohms	0.4 ohms
R5-1120 Pins C to D	2.1 to 3.7 ohms	0.4 ohms

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Fwd Fuse Aux Tank Pump M1-40 (Connector R5-1129)		
Measurement point	Range Value	Max Variance Value
R5-1129 Pins A to B	3.9 to 6.1 ohms	0.7 ohms
R5-1129 Pins A to C	3.9 to 6.1 ohms	0.7 ohms
R5-1129 Pins B to C	3.9 to 6.1 ohms	0.7 ohms
R5-1129 Pins A to D	2.1 to 3.7 ohms	0.4 ohms
R5-1129 Pins B to D	2.1 to 3.7 ohms	0.4 ohms
R5-1129 Pins C to D	2.1 to 3.7 ohms	0.4 ohms

Fwd Fuse Aux Tank Pump M1-41 (Connector R5-1130)		
Measurement point	Range Value	Max Variance Value
R5-1130 Pins A to B	3.9 to 6.1 ohms	0.7 ohms
R5-1130 Pins A to C	3.9 to 6.1 ohms	0.7 ohms
R5-1130 Pins B to C	3.9 to 6.1 ohms	0.7 ohms
R5-1130 Pins A to D	2.1 to 3.7 ohms	0.4 ohms
R5-1130 Pins B to D	2.1 to 3.7 ohms	0.4 ohms
R5-1130 Pins C to D	2.1 to 3.7 ohms	0.4 ohms

Aft Fuse Aux Tank Pump M1-42 (Connector R5-1131)		
Measurement point	Range Value	Max Variance Value
R5-1131 Pins A to B	3.9 to 6.1 ohms	0.7 ohms
R5-1131 Pins A to C	3.9 to 6.1 ohms	0.7 ohms
R5-1131 Pins B to C	3.9 to 6.1 ohms	0.7 ohms
R5-1131 Pins A to D	2.1 to 3.7 ohms	0.4 ohms
R5-1131 Pins B to D	2.1 to 3.7 ohms	0.4 ohms
R5-1131 Pins C to D	2.1 to 3.7 ohms	0.4 ohms

Aft Fuse Aux Tank Pump M1-43 (Connector R5-1132)		
Measurement point	Range Value	Max Variance Value
R5-1132 Pins A to B	3.9 to 6.1 ohms	0.7 ohms
R5-1132 Pins A to C	3.9 to 6.1 ohms	0.7 ohms
R5-1132 Pins B to C	3.9 to 6.1 ohms	0.7 ohms
R5-1132 Pins A to D	2.1 to 3.7 ohms	0.4 ohms
R5-1132 Pins B to D	2.1 to 3.7 ohms	0.4 ohms
R5-1132 Pins C to D	2.1 to 3.7 ohms	0.4 ohms

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4. Troubleshooting Center Tank Fuel Boost Pump Tripped Open Ground Fault Interrupter Relay

A. Fuel Boost Pump Tripped Open Ground Fault Interrupter (GFI) Relay Check

- (1) Verify it is safe to reset the GFI by following this troubleshooting procedure. Fault(s) that resulted in GFI trip must be isolated and corrected prior to reset if the fault(s) occurred inside the fuel tank or adjacent to any fuel tank wall.
 - (a) The above step is an Airworthiness Limitation Instruction (ALI) procedure. For important information on Airworthiness Limitation Instructions (ALIs), refer to Airworthiness Limitation Precautions. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- (2) Position controls as follows:

Control	Location	Position
Crossfeed Lever	Center pedestal	OFF
Fuel Shutoff Levers (both engines)	Center pedestal	OFF
Start Pump Switch	Overhead Switch Panel	OFF
Fuel Boost Pump Switches	Overhead Switch Panel	OFF

- (3) Open this access panel: (FUSELAGE ZONES - DESCRIPTION AND OPERATION, PAGEBLOCK 06-24-00/001)

Number	Name / Location
4501A	E & E Compartment

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (4) Open these applicable circuit breakers and install safety tags:

UPPER EPC, FUEL - LEFT AC BUS

Row	Col	Number	Name
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

Row	Col	Number	Name
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C

- (5) Do the tripped open Center Tank Ground Fault Interrupter (GFI) Relay fault isolation check of the Center Tank Forward Boost Pump (M1-9) or Center Tank Aft Boost Pump (M1-10) as follows:

NOTE: The ground fault interrupter relay is tripped to the open position when the RESET indicator is up and the white band on the pop-up indicator is shown.

- (a) Disconnect the applicable Fwd Center Tank Boost Pump (M1-9) 115 VAC wires at terminal 5, 6, and 7 from Terminal Strip S3-10 or Aft Center Tank Boost Pump (M1-10) 115 VAC wires at terminal 2, 3, and 4 from Terminal Strip S3-10. (Table 102, Table 103, and WDM 28-21-00)

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WJE ALL POST MD80-28-228 (Continued)

Table 102 Center Tank Fwd Boost Pump (M1-9) Electrical Connector Location

Center Tank Fwd Boost Pump (M1-9) Boost Pump GFI Relay R5-1494	
From:	To:
Electrical & Equipment Compartment Aft Left Equipment Bay Sta. 180	Right Wing Sta. XFS -30.00
Boost Pump GFI Relay R5-1494 Connector / Pin C1	S3-10 Term 5
Boost Pump GFI Relay R5-1494 Connector / Pin B1	S3-10 Term 6
Boost Pump GFI Relay R5-1494 Connector / Pin A1	S3-10 Term 7

Table 103 Center Tank Aft Boost Pump (M1-10) Electrical Connector Location

Center Tank Aft Boost Pump (M1-10) Boost Pump GFI Relay R5-1495	
From:	To:
Electrical & Equipment Compartment Aft Left Equipment Bay Sta. 180	Right Wing Sta. XFS -30.00
Boost Pump GFI Relay R5-1495 Connector / Pin C1	S3-10 Term 2
Boost Pump GFI Relay R5-1495 Connector / Pin B1	S3-10 Term 3
Boost Pump GFI Relay R5-1495 Connector / Pin A1	S3-10 Term 4

- (b) Reset the applicable Fwd Center Tank Boost Pump GFI Relay R5-1494 or Aft Center Tank Boost Pump GFI Relay R5-1495 as follows:

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- 1) Make sure that these circuit breakers are open and have safety tags:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C

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WJE ALL POST MD80-28-228 (Continued)

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C

- 2) Push the RESET indicator at the top of the applicable Fwd Center Tank Boost Pump GFI Relay R5-1494 or Aft Center Tank Boost Pump GFI Relay R5-1495.
 - a) Make sure that the RESET Indicator stays down and the white band on the indicator is not shown.
- 3) Remove the safety tags and close these circuit breakers:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C

WARNING: DO NOT OPERATE A FUEL PUMP IN AN EMPTY FUEL TANK. PROLONGED DRY RUNNING OF A FUEL PUMP IN AN EMPTY TANK CAN DEGRADE INTERNAL PUMP COMPONENTS AND INCREASE THE RISK OF DEVELOPING A FUEL TANK IGNITION SOURCE.

- (c) Put the applicable CTR FWD PUMPS or CTR AFT PUMPS switch to the ON position.
 - 1) If the applicable Fwd Center Tank Boost Pump GFI Relay R5-1494 or Aft Center Tank Boost Pump GFI Relay R5-1495 trips OPEN, then repair or replace its 115 VAC wiring between the applicable Fwd Center Tank Boost Pump GFI Relay R5-1494 and Terminal Strip S3-10 or Aft Center Tank Boost Pump GFI Relay R5-1495 and Terminal Strip S3-10. (Table 102, Table 103, and WDM 28-21-00)
 - 2) If the applicable Fwd Center Tank Boost Pump GFI Relay R5-1494 or Aft Center Tank Boost Pump GFI Relay R5-1495 does not trip open, then replace the applicable Fwd Center Tank Fuel Boost Pump (M1-9) or Aft Center Tank Fuel Boost Pump (M1-9) and its flexible electrical conduit assembly. (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201, and WDM 28-21-00)
- (d) Check and make sure that there is 115 VAC at Terminal Strip S30-236 on terminal 1LA, 1LX, and 2LA for the Fwd Center Tank Boost Pump GFI Relay R5-1494 circuit or terminal 3LA, 3LX, and 4LA for the Aft Center Boost Pump GFI Relay R5-1495 circuit. (WDM 28-21-00)
 - 1) If you do not find 115 VAC at terminal strip S30-236 on terminal 1LA, 1LX, and 2LA for the Fwd Center Tank Boost Pump GFI Relay R5-1494 or terminal 3LA, 3LX, and 4LA for the Aft Center Boost Pump GFI Relay R5-1495 then, repair or replace the applicable 115 VAC wiring between GFI Relay R5-1494 and Terminal Strip S30-236 or GFI Relay R5-1495 and Terminal Strip S30-236. (WDM 28-21-00)
 - 2) If you find 115 VAC at terminal strip S30-236 on terminal 1LA, 1LX, and 2LA for the Fwd Center Tank Boost Pump GFI Relay R5-1494 or 3LA, 3LX, and terminal 4LA for the Aft Center Boost Pump GFI Relay R5-1495, then do the steps that follow:

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WJE ALL POST MD80-28-228 (Continued)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- a) Open these applicable circuit breakers and install safety tags:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C

- b) Push the RESET indicator at the top of the applicable Fwd Center Tank Boost Pump GFI Relay R5-1494 or Aft Center Tank Boost Pump GFI Relay R5-1495.
- c) Remove the safety tags and close these applicable circuit breakers:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C

WARNING: DO NOT OPERATE A FUEL PUMP IN AN EMPTY FUEL TANK. PROLONGED DRY RUNNING OF A FUEL PUMP IN AN EMPTY TANK CAN DEGRADE INTERNAL PUMP COMPONENTS AND INCREASE THE RISK OF DEVELOPING A FUEL TANK IGNITION SOURCE.

- (e) Put the applicable CTR FWD PUMPS or CTR AFT PUMPS switch to the ON position.
- 1) If the applicable Fwd Center Tank Boost Pump GFI Relay R5-1495 or Aft Center Tank Boost Pump Relay R5-1495 trips OPEN, then replace the applicable Fwd Center Tank Boost Pump GFI Relay R5-1495 or Aft Center Tank Boost Pump Relay R5-1495. (GROUND FAULT INTERRUPTER - REMOVAL AND INSTALLATION, PAGEBLOCK 28-20-07/401)
 - 2) If the applicable Fwd Center Tank Boost Pump GFI Relay R5-1495 or Aft Center Tank Boost Pump Relay R5-1495 trips does not trip, then do the next step.
- (f) Do a visual examination of the applicable Fwd Center Tank Boost Pump (M1-9) or Aft Center Tank Boost Pump (M1-10) flexible electrical connector for general damage and evidence of arcing.(Table 102, Table 103, and WDM 28-21-00)

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WJE ALL POST MD80-28-228 (Continued)

- 1) If you find damage or evidence of arcing to the Fwd Center Tank Boost Pump (M1-9) or Aft Center Tank Boost Pump (M1-10) flexible electrical conduit assembly then, replace the applicable Fwd Center Tank Boost Pump (M1-9) flexible electrical conduit assembly or Aft Center Tank Boost Pump (M1-10) flexible electrical conduit assembly. (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201, and WDM 28-21-00)
- 2) If you do not find damage or evidence of arcing to the Fwd Center Tank Boost Pump (M1-9) or Aft Center Tank Boost Pump (M1-10) flexible electrical conduit assembly then, replace the applicable Fwd Center Tank Boost Pump (M1-9) or Aft Center Tank Boost Pump (M1-10) assembly. (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201)

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-228

5. Troubleshooting Fwd Aux Tank Fuel Transfer Pump Tripped Open Ground Fault Interrupter Relay

A. Fwd Aux Tank Fuel Transfer Pump Tripped Open Ground Fault Interrupter (GFI) Relay Check

- (1) Verify it is safe to reset the GFI by following this troubleshooting procedure. Fault(s) that resulted in GFI trip must be isolated and corrected prior to reset if the fault(s) occurred inside the fuel tank or adjacent to any fuel tank wall.
 - (a) The above step is an Airworthiness Limitation Instruction (ALI) procedure. For important information on Airworthiness Limitation Instructions (ALIs), refer to Airworthiness Limitation Precautions. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- (2) Position controls as follows:

Control	Location	Position
Crossfeed Lever	Center pedestal	OFF
Fuel Shutoff Levers (both engines)	Center pedestal	OFF
Start Pump Switch	Overhead Switch Panel	OFF
Fuel Boost Pump Switches	Overhead Switch Panel	OFF
Forward Aux Trans Switches	Overhead Switch Panel	OFF
Aft Aux Trans Switches	Overhead Switch Panel	OFF

- (3) Open this access panel: (FUSELAGE ZONES - DESCRIPTION AND OPERATION, PAGEBLOCK 06-24-00/001)

Number	Name / Location
4501A	E & E Compartment

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WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (4) Open these applicable circuit breakers and install safety tags:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

- (5) Do the tripped open Fwd Aux Tank Ground Fault Interrupter (GFI) Relay fault isolation check of the Fwd Aux Tank Transfer Pump A (M1-40) or the Fwd Aux Tank Transfer Pump B (M1-41) as follows:

NOTE: The ground fault interrupter is tripped to the open position when the RESET indicator is up and the white band on the pop-up indicator is shown.

- (a) In the mid cargo compartment, disconnect the applicable Fwd Aux Tank Transfer Pump A (M1-40) Connector P1-1129 from Receptacle R5-1129 or Fwd Aux Tank Transfer Pump B (M1-41) Connector P1-1130 from Receptacle R5-1130. (Table 104, Table 105, and WDM 28-24-00)

Table 104 Fwd Aux Tank Transfer Pump A (M1-40) Electrical Connector Locator

Fwd Aux Tank Transfer Pump A (M1-40) Transfer pump GFI R5-1501	
From:	To:
Mid Cargo Compartment Sta. 565	Mid Cargo Compartment Sta. 565
Transfer Pump GFI R5-1501 Connector / P1-1129	Fwd Aux Tank Fuel Transfer Pump A Receptacle / R5-1129

Table 105 Fwd Aux Tank Transfer Pump B (M1-41) Electrical Connector Locator

Fwd Aux Tank Transfer Pump B (M1-41) Transfer pump GFI R5-1500	
From:	To:
Mid Cargo Compartment Sta. 565	Mid Cargo Compartment Sta. 565
Transfer Pump GFI R5-1500 Connector / P1-1130	Fwd Aux Tank Fuel Transfer Pump B Receptacle / R5-1130

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- (b)) Reset the applicable Fwd Aux Tank Transfer Pump A GFI Relay R5-1501 or Fwd Aux Tank Transfer Pump B GFI Relay R5-1500 as follows:

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- 1) Make sure that these circuit breakers are open:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

- 2) Push the RESET indicator at the top of the applicable Fwd Aux Tank Transfer Pump A GFI Relay R5-1501 or Fwd Aux Tank Transfer Pump B GFI relay R5-1500.
- a) Make sure that the RESET Indicator stays down and the white band on the indicator is not shown.

- 3) Remove the safety tags and close these circuit breakers:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

WARNING: DO NOT OPERATE A FUEL PUMP IN AN EMPTY FUEL TANK. PROLONGED DRY RUNNING OF A FUEL PUMP IN AN EMPTY TANK CAN DEGRADE INTERNAL PUMP COMPONENTS AND INCREASE THE RISK OF DEVELOPING A FUEL TANK IGNITION SOURCE.

- (c) Put the applicable FWD AUX TRANS A or FWD AUX TRANS B switch to the AUTO position.
- 1) If the Fwd Aux Tank Transfer Pump A GFI Relay R5-1501 or Fwd Aux Tank Transfer Pump B GFI Relay R5-1500 trips OPEN, then repair or replace the wiring between the applicable Fwd Aux Tank Transfer Pump A GFI Relay R5-1501 and connector P1-1129 or Fwd Aux Tank Transfer Pump B GFI Relay R5-1500 and connector P1-1130. (Table 104, Table 105, and WDM 28-24-00)

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- 2) If the Fwd Aux Tank Transfer Pump A GFI Relay R5-1501 or Fwd Aux Tank Transfer Pump B GFI Relay R5-1500 does not trip open, then replace the applicable Fwd Aux Tank Transfer Pump A (M1-40) or Fwd Aux Tank Transfer Pump B (M1-40) and its electrical conduit assembly. (FUEL TRANSFER PUMP - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-18/201, and WDM 28-24-00)
- (d) Check and make sure that there is 115 VAC at Terminal Strip S30-238 on terminal 1LA, 1LX, and 2LA for the Fwd Aux Tank Transfer Pump A GFI Relay R5-1501 or at Terminal Strip S30-238 on terminal 3LA, 3LX, and 4LA for the Fwd Tank Transfer Pump B GFI Relay R5-1500. (WDM 28-24-00)
- 1) If you do not find 115 VAC at terminal strip S30-238 on terminal 1LA, 1LX, 2LA for the Fwd Aux Tank Transfer Pump A GFI Relay R5-1501 or on terminal 3LA, 3LX, 4LA for the Fwd Tank Transfer Pump B GFI Relay R5-1495, then repair or replace its applicable 15 VAC wiring between Fwd Aux Tank Transfer Pump A GFI Relay R5-1501 and terminal strip S30-238 or Fwd Tank Transfer Pump B GFI Relay R5-1495 and terminal strip S30-238. (WDM 28-24-00)
 - 2) If you find 115 VAC at terminal strip S30-238 on terminal 1LA, 1LX, 2LA for the Fwd Aux Tank Transfer Pump A GFI Relay R5-1501 or terminal 3LA, 3LX, 4LA for the Fwd Tank Transfer Pump B GFI Relay R5-1495, then do the steps that follow:

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- a) Open these applicable circuit breakers and install safety tags:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

- b) Push the RESET indicator at the top of the applicable Fwd Aux Tank Transfer Pump A GFI Relay R5-1501 or Fwd Aux Tank Transfer Pump B GFI Relay R5-1500.
- c) Remove the safety tags and close these circuit breakers:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

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WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-228 (Continued)

WARNING: DO NOT OPERATE A FUEL PUMP IN AN EMPTY FUEL TANK. PROLONGED DRY RUNNING OF A FUEL PUMP IN AN EMPTY TANK CAN DEGRADE INTERNAL PUMP COMPONENTS AND INCREASE THE RISK OF DEVELOPING A FUEL TANK IGNITION SOURCE.

- (e) Put the applicable FWD AUX TRANS A or FWD AUX TRANS B switch to the AUTO position.
 - 1) If the applicable Fwd Aux Tank Transfer Pump A GFI Relay R5-1501 or Fwd Aux Tank Transfer Pump B GFI Relay R5-1500 trips OPEN, then replace the applicable Fwd Aux Tank Transfer Pump A GFI Relay R5-1501 or Fwd Aux Tank Transfer Pump B GFI Relay R5-1500. (GROUND FAULT INTERRUPTER - REMOVAL AND INSTALLATION, PAGEBLOCK 28-20-07/401)
 - 2) If the applicable Fwd Aux Tank Transfer Pump A GFI Relay R5-1501 or Fwd Aux Tank Transfer Pump B GFI Relay R5-1500 does not trip OPEN, then do the next step.
- (f) Do a visual examination of the applicable Fwd Aux Tank Transfer Pump A (M1-40) or Fwd Aux Tank Transfer Pump B (M1-41) flexible electrical connector for general damage and evidence of arcing. (Table 104, Table 105, and WDM 28-24-00)
 - 1) If you find damage or evidence of arcing to the applicable Fwd Aux Tank Transfer Pump A (M1-40) or the Fwd Aux Tank Transfer Pump B (M1-41) flexible electrical conduit assembly, then replace the applicable Fwd Aux Tank Transfer Pump A (M1-40) flexible electrical conduit assembly or the Fwd Aux Tank Transfer Pump B (M1-41) electrical flexible conduit assembly. (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201, and WDM 28-24-00)
 - 2) If you do not find damage or evidence of arcing to the applicable Fwd Aux Tank Transfer Pump A (M1-40) or the Fwd Aux Tank Transfer Pump B (M1-41) flexible electrical conduit assembly then, replace the applicable Fwd Aux Tank Transfer Pump A or the Fwd Aux Tank Transfer Pump B assembly. (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201)

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FUEL BOOST PUMPS - MAINTENANCE PRACTICES

1. General

- A. The six fuel boost pumps are removed through access doors in the upper inboard surface of the wing. Pumps may be removed without completely defueling the tanks. Removal procedures for all tanks are identical. Installation procedures for the right forward fuel boost pump volute is different from the other five volutes. (Figure 202)
- B. Access to pumps is as follows:

Table 201

Item	Access Door
Left Main Tank	
Forward pump	1303C
Aft pump	1307C
Center Tank	1436C
Right Main Tank	
Forward pump	1409C
Aft pump	1410C

CAUTION: DO NOT REPAIR FUEL PUMP FLEXIBLE CONDUIT OR REPLACE FUEL PUMP CONDUIT ELECTRICAL CONNECTOR ON AIRCRAFT.

- C. Procedures for removal of electrical conduit from fuel tanks are similar for fuel boost pumps, and engine start pumps.
- D. For general procedures concerning electrical bonding of fuel tank components, refer to the ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01.
- E. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items.

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 202

Name and Number	Manufacturer
Pump installation and removal tool 63-0486-1	Eaton Aerospace
Fuel boost pump removal and installation tool 217323-1	Argo Tech
Spanner wrench 260135	Agencies Tool Center
Torque wrench (200-300 inch pounds range)	

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Table 202 (Continued)

Name and Number	Manufacturer
Sealant PR 1422 B-2 or PR 1422 B1/2 DPM 2292-2	PRC-DeSoto International, Inc. 11601 United Street Mojave, CA 93501
Petrolatum, VV-P-236	
Torque Strip Fuel Tank Integral Coating DMS 1850-1C	PRC-DeSoto International, Inc. 11601 United Street Mojave, CA 93501
Tape, Lacing & Tying Type 2, Finish C, Size 3 DPM 731-6	

3. Removal/Installation Fuel Boost Pumps

A. Remove Pump

CAUTION: CARE MUST BE EXERCISED TO NOT ALLOW DEBRIS TO FALL INTO THE TANK DURING REMOVAL OF THE PUMP.

- (1) Close crossfeed valve.
- (2) Defuel applicable tank to below level of pump access door.

NOTE: Defuel the main tank to 3000 pounds or less to replace either center tank boost pumps and the forward main tank boost pump. Defuel tank to 2000 pounds or less to replace the aft main tank boost pump.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Open these applicable circuit breakers and install safety tags

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

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UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (4) Remove access door.
- (5) Engage fingers of pump installation and removal tool with locking ring on pump. (Figure 201)
- (6) Rotate tool counterclockwise against stop.

CAUTION: DO NOT DISCONNECT ELECTRICAL CONNECTOR BEFORE REMOVAL OF PUMP FROM TANK. CARE MUST BE EXERCISED IN HANDLING PUMP WIRING.

- (7) Lift tool with pump out of tank.

CAUTION: ROUND CONNECTOR NUT AND HOSE HEX NUT MUST NOT BE DISTURBED. KEEP PLUG AND RECEPTACLE DRY AND FREE OF CONTAMINATION. IF PLUG AND INSERTS BECOME WET WITH FUEL, CLEAN AND DRY IMMEDIATELY WITH SOFT, CLEAN COTTON CLOTH, DRY AIR, OR OTHER SUITABLE MEANS.

- (8) Disconnect electrical connector (square nut).

NOTE: Slight rotation of pump receptacle, conduit and connector may occur due to clearance between "D" shaped base of pump receptacle and mating hole in pump casting.

B. Install Pump

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these applicable circuit breakers is open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

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UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

CAUTION: CARE MUST BE EXERCISED TO NOT ALLOW DEBRIS TO FALL INTO THE TANK DURING INSTALLATION OF THE PUMP.

- (2) Make sure electrical connector has no bent, broken, or burnt pins or sockets, or unwanted material, or evidence of arcing or overheating. Bent, broken, burnt pins or sockets or evidence of arcing or overheating are not allowed. Clean any unwanted material from connectors as necessary to ensure a good connection.

CAUTION: ROUND CONNECTOR NUT AND HOSE HEX NUT MUST NOT BE DISTURBED. KEEP PLUG AND RECEPTACLE DRY AND FREE OF CONTAMINATION. IF PLUG AND INSERTS BECOME WET WITH FUEL, CLEAN AND DRY IMMEDIATELY WITH SOFT, CLEAN COTTON CLOTH, DRY AIR, OR OTHER SUITABLE MEANS.

- (3) Connect electrical connector to pump. Tighten square nut to torque of 250 to 275 inch-pounds (28.0 to 30.8 N·m).

NOTE: During torquing of square nut slight rotation of pump receptacle, conduit and connector may occur. Clearance between "D" shaped based hole in pump casting may allow a few degrees rotation of receptacle.

- (a) Inspection of the pump connector/torquing is to be witnessed by second individual. If a second individual is not available, recheck the torque and confirm by applying a torque stripe every time a pump connector is installed.
 - (b) The above step is a Critical Design Configuration Control Limitation (CDCCL) procedure. For important information on CDCCLs, refer to Airworthiness Limitation Precautions (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201).
- (4) Ensure boost pump and volute mating surfaces are clean. Clean surfaces if necessary.
- (5) Engage fingers of pump installation and removal tool with locking ring on pump. (Figure 201)
- (6) Wet O-ring on base of pump with petrolatum to prevent cutting or scratching during installation. This step is not necessary if fuel level in tank is high enough to wet seal during installation.
- (7) Engage index pins in volute (rotate tool to seat).
- (8) Push down and rotate tool clockwise to lock pump in place.

CAUTION: MAKE SURE ELECTRICAL CONDUIT IS NOT KINKED. A KINKED CONDUIT MAY DAMAGE THE CONDUIT AND CAUSE INTERNAL WIRES TO SHORT WHICH CREATES AN UNSAFE CONDITION INSIDE THE FUEL TANK.

- (9) Lift tool out, do an inspection of electrical conduits to make sure they are not kinked.

CAUTION: BEFORE INSTALLING ACCESS DOOR, PERFORM FINAL CHECK TO MAKE CERTAIN THAT ALL TOOLS, RAGS, AND HARDWARE, ETC. HAVE BEEN REMOVED FROM TANK.

- (10) Install access door as follows: (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
 - (a) Start screw in door.

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WARNING: LOW VISCOSITY POLYSULFIDE SEALANT IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOW VISCOSITY POLYSULFIDE SEALANT IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW VISCOSITY POLYSULFIDE SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (b) Apply small bead of sealant (PR 1422 B-2) to door countersink or underside of screw head.
 - (c) Tighten screw.
 - (d) Wipe off any excess sealant that may extrude from under screw head.
- (11) After completion of procedures requiring access to left and right main tanks, install access door, and perform following step:
- (a) Fill fuel tank to full and perform leak check for fuel tank access. (FUEL TANKS - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-01/201)
- (12) Test operation of applicable pump Paragraph 4.A..
- (13) Remove the safety tags and close these applicable circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

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<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

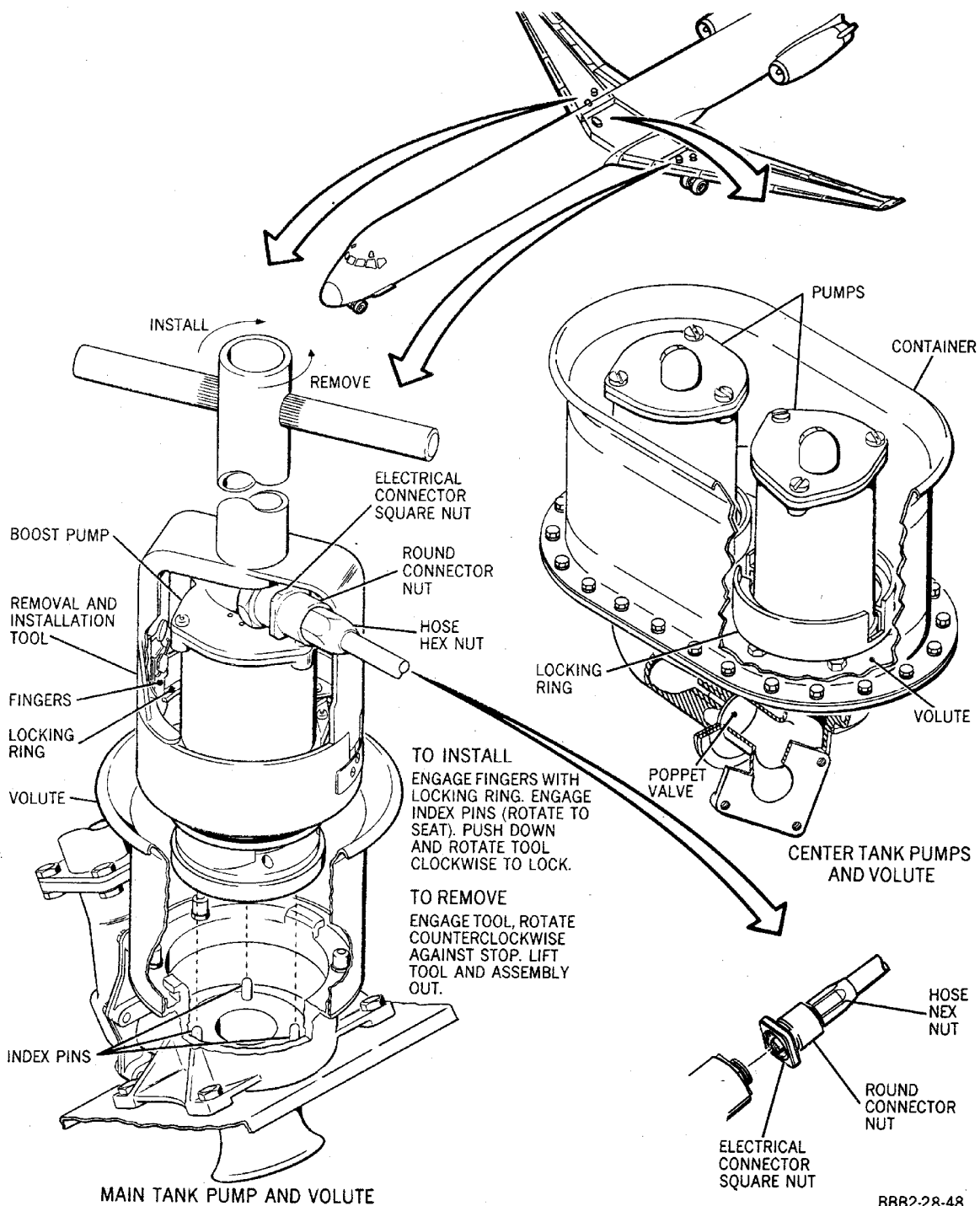
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BBB2-28-48

Pump Removal -- Tool Operation
Figure 201/28-20-07-990-801

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4. Adjustment/Test Fuel Boost Pumps

A. Test Fuel Boost Pump

- (1) Make certain that throttle is in idle position.
- (2) Make certain that fuel shutoff lever is in OFF position.
- (3) Energize applicable AC bus as shown below, for pump to be checked. (ELECTRICAL POWER, CHAPTER 24)

Table 203

Fuel Tank Boost Pump	AC Bus
Right Forward	Left
Right Aft	Ground Service
Left Forward	Right
Left Aft	Left

WARNING: DO NOT OPERATE A FUEL PUMP IN AN EMPTY FUEL TANK. PROLONGED DRY RUNNING OF A FUEL PUMP IN AN EMPTY TANK CAN DEGRADE INTERNAL PUMP COMPONENTS AND INCREASE THE RISK OF DEVELOPING A FUEL TANK IGNITION SOURCE.

- (4) Place applicable FUEL TANKS PUMPS switch located on forward overhead switch panel in ON position.

NOTE: Pump operation should be continuously monitored to ensure a pump does not run dry.

NOTE: If it is necessary to leave a pump operating unattended, it must be assured that there is sufficient fuel in the respective tank to ensure the pump(s) will not run dry.

NOTE: Pump should be turned off once the low pressure indication illuminates or the desired fuel quantity is indicated.

- (5) LOW PRESS light on annunciator panel should go off.

NOTE: If fuel boost pump test is positive, additional testing is not required.

5. Removal/Installation Fuel Pump Electrical Conduit

A. Remove Conduit

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C

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UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (2) Prepare applicable fuel tank for entry. (PAGEBLOCK 28-00-00/201)
- (3) Remove applicable fuel pump. (Paragraph 3.A.)
- (4) Locate fuel pump electrical wire sealing grommet, at front spar of right and left wing fuel tanks.
- (5) Remove wiring clamps and remove tape back to nearest terminal block.
- (6) Remove wires from terminal studs; cut fuel pump wires at terminals.
- (7) Remove gland nut, vent tube, ferrule, sealing grommet, comb, and sleeve from sealing grommet assembly.
- (8) Disconnect flexible conduit from fitting inside fuel tank.
- (9) Remove conduit clamps and remove conduit from fuel tank.

B. Install Conduit

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these applicable circuit breakers is open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

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UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (2) Feed electrical wires through fuel tank fitting and connect conduit to fitting; tighten conduit nut to torque value of 200 inch-pounds (22 N·m); hold conduit while tightening nut to prevent twisting of conduit.
- (3) Install clamps starting at pump end of conduit.
- (4) Install sleeve, comb, grommet, ferrule, vent tube, and gland nut on electrical wires; install plugs at two lower holes in grommet.
- (5) Pull electrical wires taut and position grommet 1.25 to 1.75 inches (32 to 44 mm) from edge of tank fitting to farther edge of grommet. Mark position of grommet on electrical wires with colored lacquer. (Figure 202)
- (6) With sleeve and comb positioned in fuel tank fitting, push electrical wires into conduit maintaining grommet at position marked on wires; position ferrule over grommet and screw gland nut into fitting; marks on wires should be visible at end of grommet when installation is completed.
- (7) Route electrical wires from sealing grommet assembly to nearest terminal board; trim wires to length and install terminals. (WIRING INSTALLATION - MAINTENANCE PRACTICES, SWPM 20-10-01) (TERMINALS - MAINTENANCE PRACTICES, SWPM 20-20-01)
- (8) Connect terminals to appropriate terminal studs and ground wires to aircraft structure.
- (9) Install lacing & tying tape (DPM 731-6) on electrical wires from sealing grommet assembly to terminal board. (WIRING INSTALLATION - MAINTENANCE PRACTICES, SWPM 20-10-01)
- (10) Install clamps on electrical wires.

CAUTION: MAKE SURE ELECTRICAL CONDUIT IS NOT KINKED. A KINKED CONDUIT MAY DAMAGE THE CONDUIT AND CAUSE INTERNAL WIRES TO SHORT WHICH CREATES AN UNSAFE CONDITION INSIDE THE FUEL TANK.

- (11) Do an inspection of electrical conduits to make sure they are not kinked.
- (12) Energize aircraft electrical busses. (ELECTRICAL POWER, CHAPTER 24)
- (13) Install fuel tank access door. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- (14) Fill fuel tank and check for fuel leakage at sealing grommet.
- (15) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

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UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (16) Test operation of applicable pump. (Paragraph 4.A.)

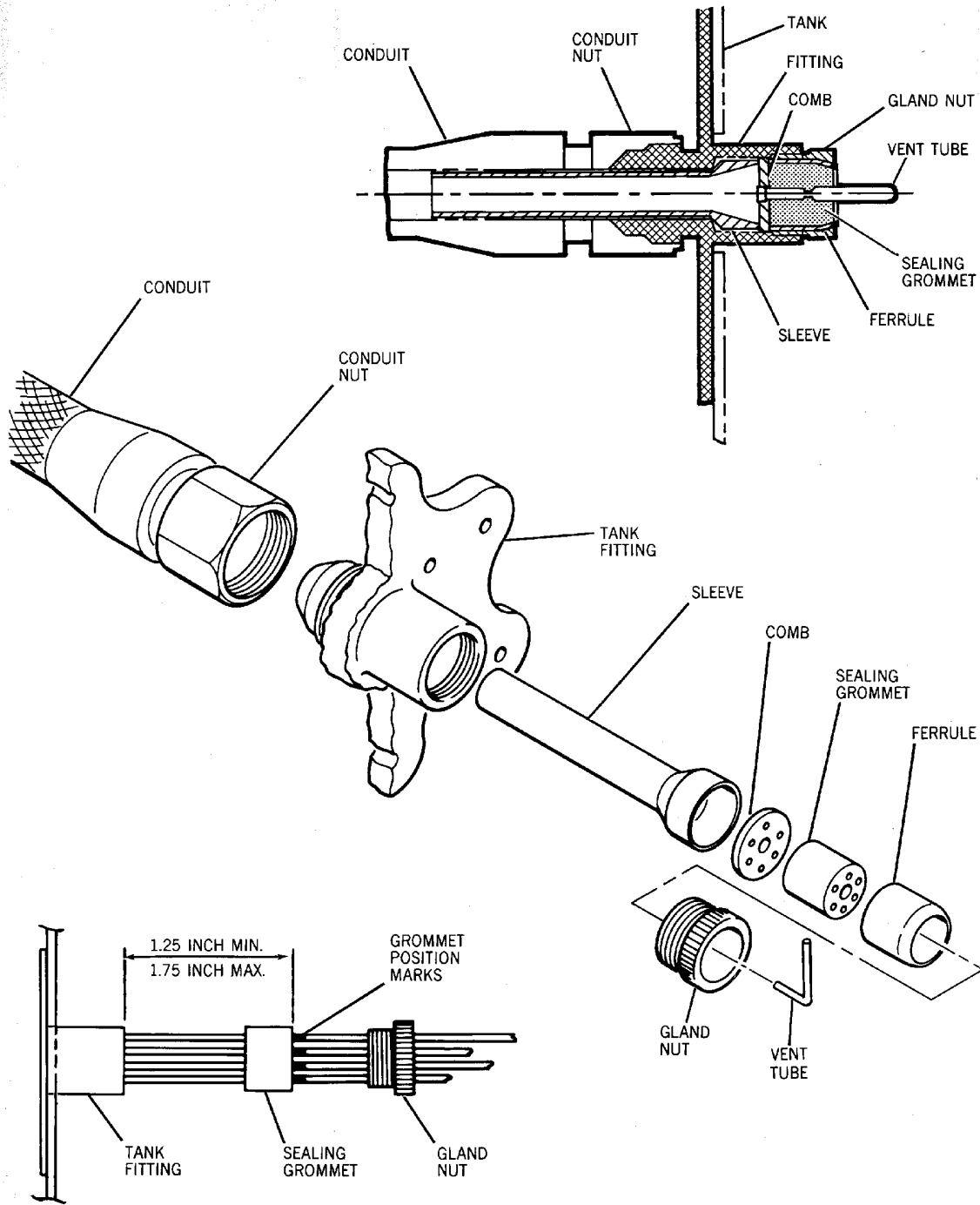
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Typical Fuel Tank Sealing Grommet
Figure 202/28-20-07-990-802

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6. Check Fuel Pump Electrical Connector

A. Check Electrical Connector

- (1) If one or more pump circuit breakers trip open after one reset, place affected pump control switch in OFF position.
- (2) Remove applicable pump. (Paragraph 3.A.)
- (3) Disconnect pump electrical connector.
- (4) Check electrical connector and mating connector for evidence of arcing or overheating.
- (5) Clean connector or replace connector/conduit as necessary to insure good connections. (Paragraph 5.A.)
- (6) Install pump. (Paragraph 3.B.)

7. Removal/Installation Volute

A. Remove Volute (Applicable to All Volutes Except Right Main Tank Forward Volute and Center Main Tank Forward Volute) (Figure 203 or Figure 204)

- (1) Close crossfeed valve.
- (2) Defuel applicable tank. (PAGEBLOCK 28-00-00/201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Open these applicable circuit breakers and install safety tags

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (4) Remove applicable access door.
- (5) Remove applicable left tank forward, left tank aft, center tank aft, or right tank aft fuel boost pump. (Paragraph 3.A.)

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- (6) Remove applicable boost pump volute as follows:
 - (a) Remove bolts and washers attaching Gask-O-Seal and flange to boost pump volute.
 - (b) Remove and discard Gask-O-Seal.
 - (c) Disconnect fuel lines tee fitting.
 - (d) Install protective caps and plugs on open fuel lines.
 - (e) Remove mount bolts and washers from base of boost pump volutes.

NOTE: The mount bolts for the aft volutes are a different size than the mount bolts for the forward volutes.

- (f) Remove boost pump volute from screen assembly.
 - (g) Install protective closure cap on open fuel lines.
 - (h) Remove nut and tee fitting. Retain tee fitting and nut for installation into new volute.
 - (i) Remove and discard packing.
- B. Remove volute (Applicable to Right Main Tank Forward Volute) (Figure 203 or Figure 204)
- (1) Close crossfeed valve.
 - (2) Defuel right main tank. (PAGEBLOCK 28-00-00/201)
 - (3) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (4) Remove access door.
- (5) Remove right tank forward fuel boost pump. (Paragraph 3.A.)
- (6) Remove right tank forward fuel boost pump volute as follows:
 - (a) Remove bolts and washers attaching Gask-O-Seal and flange to boost pump volute.
 - (b) Remove and discard Gask-O-Seal.

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- (c) Disconnect three fuel manifold connections.
- (d) Loosen bolts securing fuel manifold to center tank bulkhead support.
- (e) Disconnect fuel lines from tee fitting.
- (f) Install protective caps and plugs on open fuel lines.
- (g) Remove mount bolts and washers from base of boost pump volute.
- (h) Remove boost pump volute from screen assembly. Retain the three washers between screen assembly and pump flange at aft attach point for installation.
- (i) Install protective closure cap on open fuel lines.
- (j) Remove nut and tee fitting.
- (k) Remove and discard packing. Retain tee fitting and nut for installation into new volute.

C. Remove Volute (Applicable to Center Tank Forward Volute) (Figure 205)

- (1) Close crossfeed valve.
- (2) Defuel applicable tank. (PAGEBLOCK 28-00-00/201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (4) Remove applicable access door.
- (5) Remove center tank forward fuel boost pumps. (Paragraph 3.A.)
- (6) Remove center tank forward volute as follows:
 - (a) Disconnect fill line from elbow.

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- (b) Remove elbow and packing from container. Discard packing.
 - (c) On fill line, remove nut, washer, bolt and clamp.
 - (d) On inlet line, remove four bolts, washers and seal. Discard seal.
 - (e) On outlet line, remove four bolts, washers and seal. Discard seal.
 - (f) Remove ten bolts and washers from container. Remove container and center tank boost pump volute as one assembly.
 - (g) Remove fourteen nuts, washers and screws from container and remove container from flange.
 - (h) Remove twelve screws and washers from flange. Remove flange and gasket from center tank boost pump volute. Discard gasket.
 - (i) Remove eight screws and washers from base of center tank boost pump volute. Remove volute and inlet gasket from manifold. Discard gasket.
 - (j) Install protective caps on open fuel lines and manifolds.
- D. Install Volute (Applicable to All Volutes Except Right Main Tank Forward Volute and Center Main Tank Forward Volute)

WARNING: TAG AND SAFETY CIRCUIT BREAKERS.

- (1) Make sure that these applicable circuit breakers is open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (2) Make sure volute and attaching structure mating surfaces are clean. Clean surfaces if necessary.
- (3) Prepare mating surface between screen assembly and fuel boost pump volute for electrical bond. To ensure proper electrical bonding, refer to ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01.

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- (4) Install applicable left tank forward, left tank aft, center tank aft, or right tank aft fuel boost pump volute as follows:
- (a) Remove protective plug from new volute.
 - (b) Install nut on tee fitting.
 - (c) Install new packing on tee fitting.

WARNING: WHITE PETROLATUM IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN WHITE PETROLATUM IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT BREATHE THE MIST.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (d) Lightly lubricate new packing with petrolatum antiseize lubricant.
- (e) Install tee fitting into new volute. The tee fitting must be aligned with small fuel lines.
- (f) Tighten nut to lock tee fitting into position.
- (g) Install volute to screen assembly using mount bolts and washers. Tighten mount bolts.

NOTE: The mount bolts for the aft volutes are a different size than the mount bolts for the forward volutes.

- (h) Remove caps and plugs from open fuel lines.
- (i) Connect fuel lines to tee fitting.
- (j) Install one new Gask-O-Seal between flange and boost pump volute.
- (k) Install bolts and washers into flange and tighten bolts.
- (l) Do an electrical bond check of applicable boost pump volute and screen assembly. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)

- (5) Install applicable boost pumps (all pumps except right main tank forward and center main tank forward). (Paragraph 3.B.)

E. Install Volute (Right Main Tank Forward Volute)

WARNING: TAG AND SAFETY CIRCUIT BREAKERS.

- (1) Make sure that these applicable circuit breakers is open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

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UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (2) Ensure volute and attaching structure mating surfaces are clean. Clean surfaces if necessary.
- (3) Prepare mating surface between the screen assembly and fuel boost pump volute for electrical bond. To ensure proper electrical bonding, refer to ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01.
- (4) Install right tank forward fuel boost pump volute as follows:
 - (a) Remove protective plug from new volute.
 - (b) Install nut on tee fitting.
 - (c) Install new packing on tee fitting.

WARNING: WHITE PETROLATUM IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN WHITE PETROLATUM IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT BREATHE THE MIST.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (d) Lightly lubricate new packing with petrolatum antiseize lubricant.

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- (e) Install tee fitting into new volute.
NOTE: The tee fitting must be aligned with small fuel lines.
 - (f) Tighten nut to lock tee fitting into position.
 - (g) Install volute to screen assembly using mount bolts and washers.
NOTE: Make sure that the three washers between the screen assembly and pump flange at aft attach point are positioned prior to installing the aft mount bolt.
 - (h) Remove caps and plugs from open fuel lines.
 - (i) Connect fuel lines to tee fitting.
 - (j) Install one new Gask-O-Seal between flange and boost pump volute.
 - (k) Install bolts and washers into flange and tighten bolts.
 - (l) Do an electrical bond check of applicable boost pump volute and screen assembly. Maximum allowable resistance measurement is 0.0025 ohm. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
 - (m) Connect and tighten three fuel manifold connections.
 - (n) Tighten fasteners securing fuel manifold to center tank bulkhead support.
 - (o) Make sure that all manifolds have minimum 3/32 inch clearance between manifold and adjacent structure (stringer 5).
 - (p) If necessary, adjust pipes to obtain required clearance or refer to ENGINE FUEL SUPPLY LINE SUPPORT - APPROVED REPAIRS, PAGEBLOCK 28-20-17/801.
 - (q) If necessary, remove and modify slot attached holes of center tank bulkhead support from 1/2 inch to 5/8 inch ENGINE FUEL SUPPLY LINE SUPPORT - APPROVED REPAIRS, PAGEBLOCK 28-20-17/801, or install new support.
- (5) Install right main tank forward boost pump. (Paragraph 3.B.)
- F. Install Volute (Center Main Tank Forward Volute)
- (1) Make sure that these circuit breakers are closed:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

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UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (2) Ensure volute and attaching structure mating surfaces are clean. Clean surfaces if necessary.
- (3) Prepare mating surface between the container and flange for electrical bond. To ensure proper electrical bonding, refer to ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01.
- (4) Install center tank forward boost pump volute as follows:
 - (a) Remove protective caps from fuel manifolds.
 - (b) Install two gaskets on center tank boost pump volutes.
 - (c) Install center tank boost pump on flange with twelve washers and screws.
 - (d) Position inlet gaskets on center tank boost pump volutes and install volutes on manifold assembly with eight washers and screws.
 - (e) Position container on flange and install fourteen screws, washers and nuts.
NOTE: The center tank boost pump volutes, container and flange are installed as one assembly.
 - (f) Position container to tank structure and install ten washers and bolts.
 - (g) Do an electrical bond check of container and tank structure. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
 - (h) Position seal on outlet line and install line on center tank boost pump volute with four washers and bolts.
 - (i) Position seal on inlet line and install line on line on center tank boost pump volute with four washers and bolts.
 - (j) Install packing on elbow and install elbow on container.
 - (k) Install fill line to elbow.
 - (l) Install clamp to fill line with bolt, washer and nut.
- (5) Install center main tank forward boost pumps. (Paragraph 3.B.)

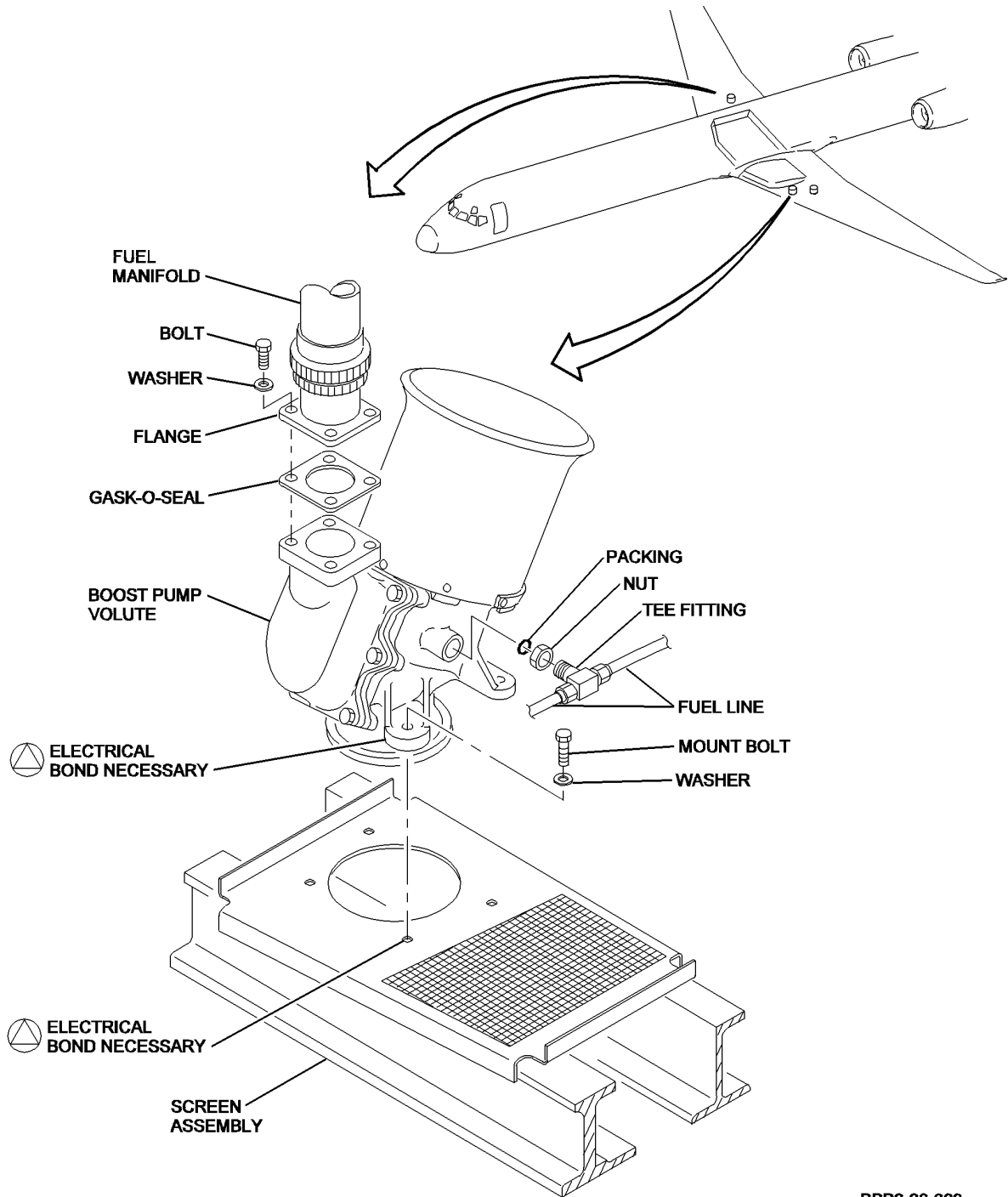
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Fuel Boost Pump Volute - Removal/Installation
Figure 203/28-20-07-990-803

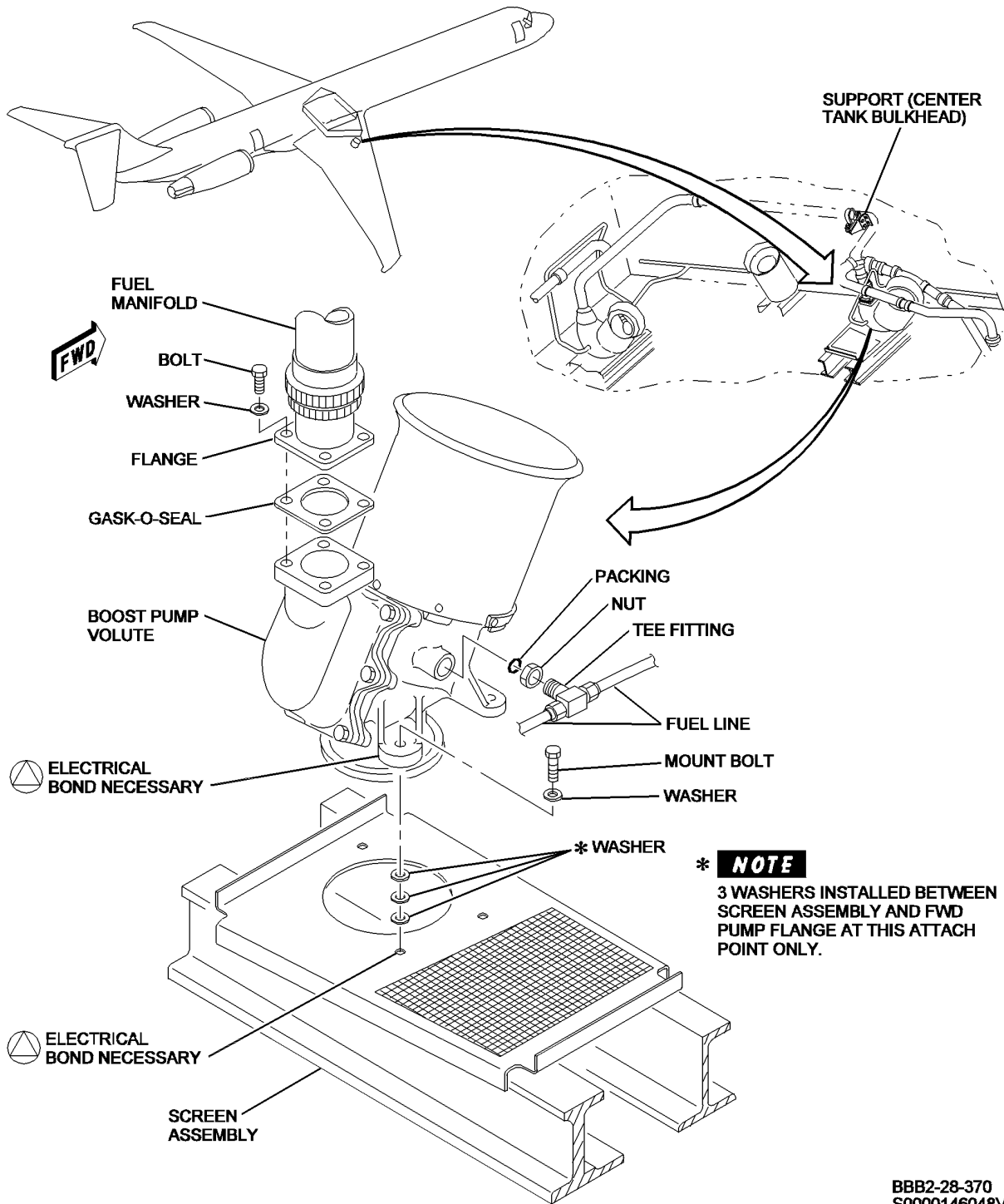
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**Fuel Boost Pump Volute (R/H Tank Fwd) Removal/Installation
Figure 204/28-20-07-990-804**

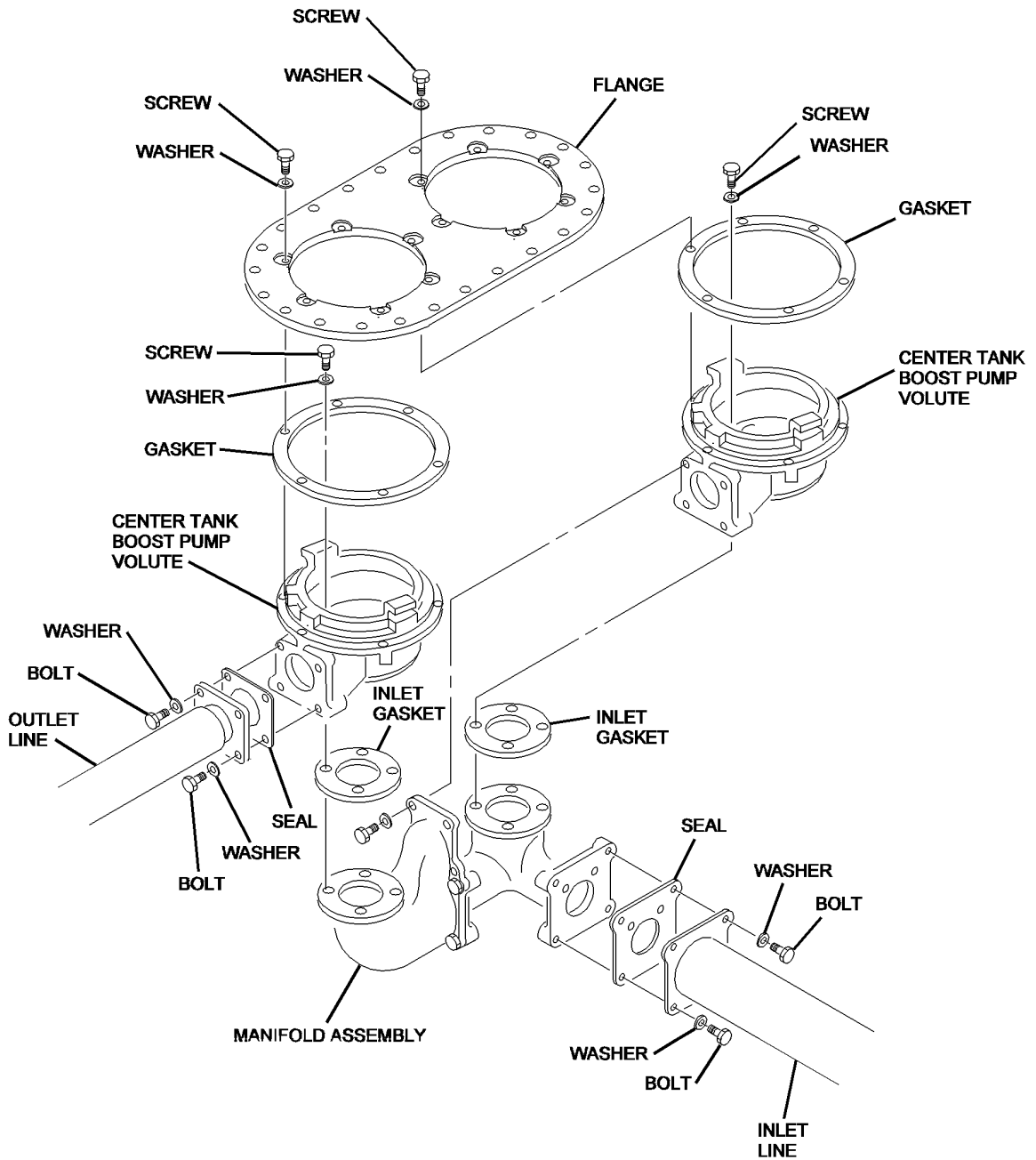
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**Fuel Boost Pump Volute (Center Tank Fwd) Removal/Installation
Figure 205/28-20-07-990-805 (Sheet 1 of 2)**

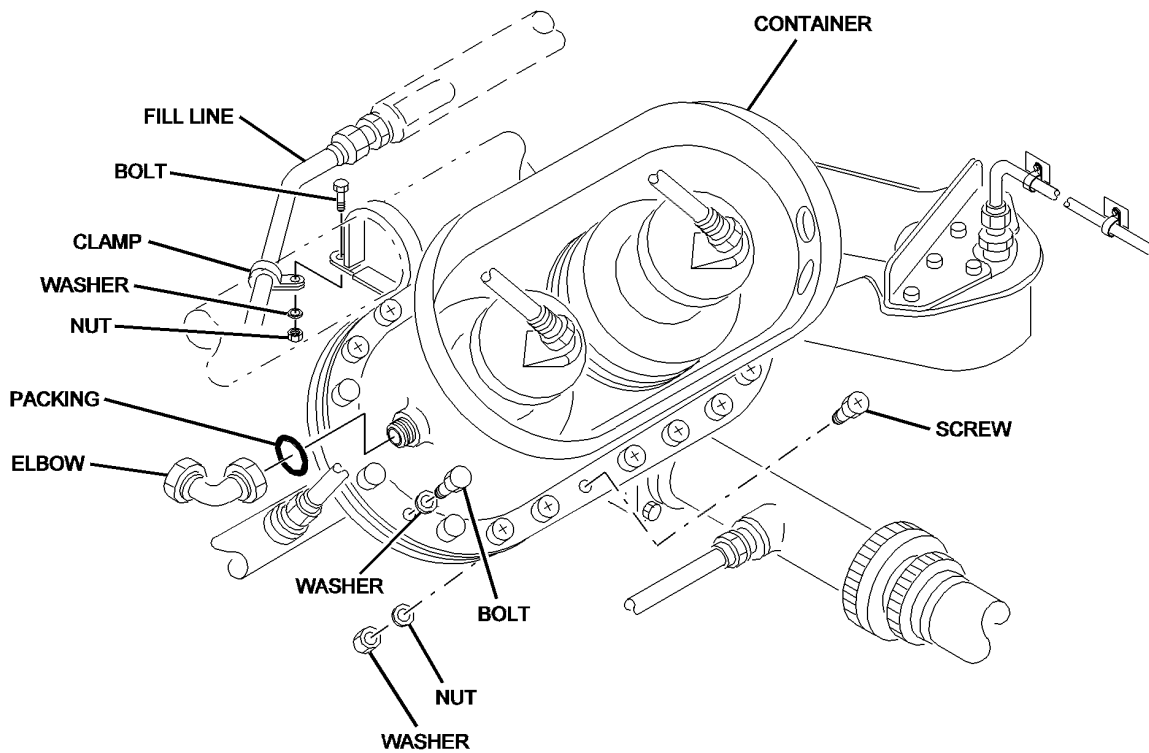
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Fuel Boost Pump Volute (Center Tank Fwd) Removal/Installation
Figure 205/28-20-07-990-805 (Sheet 2 of 2)

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8. Removal/Installation Left Forward Fuel Boost Pump Fuel Feed Pipe

A. Remove Fuel Boost Pump Fuel Feed Pipe

- (1) Close crossfeed valve.
- (2) Prepare left main fuel tank for entry. (PAGEBLOCK 28-00-00/201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (4) Remove applicable left main fuel tank access door.(GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- (5) Remove the two nuts (2), washers (3), screws (4) and the strap (5) from the bracket (7). (Figure 206)
- (6) Loosen the two nuts (8) on the bracket (7) and slide bracket (7) away from the fuel boost pump fuel feed pipe (1) and remove the base (6).
- (7) Remove the nut (9), screw (10), jumper (11) and clamp (12) from the fuel boost pump fuel feed pipe (1).
- (8) Remove the four bolts (13) and washers (14) that attaches the fuel boost pump fuel feed pipe (1) to the boost pump.
- (9) Disconnect the fuel boost fuel feed pipe (1) from the fuel crossfeed tee assembly (16).
- (10) Remove and discard the gasket (15).
- (11) Remove and discard the two packings (17).
- (12) Install protective caps in the boost pump outlet and the fuel crossfeed tee assembly (16).

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B. Install Fuel Boost Pump Fuel Feed Pipe

- (1) Make sure crossfeed valve is closed.
- (2) Make sure applicable access door is open. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (4) Remove the protective caps from the boost pump outlet and the fuel crossfeed tee assembly (16). (Figure 206)
- (5) Prepare the fuel boost pump fuel feed pipe (1), clamp (12), jumper (11), strap (5), and base (6) for electrical bonding. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
- (6) Examine the boost pump outlet and fuel crossfeed tee assembly (16) for damage and unwanted material.
- (7) Install a new gasket (15) on the boost pump end of the fuel boost pump fuel feed pipe (1).
- (8) Install two new packings (17) on the fuel crossfeed tee end of the fuel boost pump fuel feed pipe (1).
- (9) Loosely connect the fuel boost pump fuel feed pipe (1) to the fuel crossfeed tee assembly (16).
- (10) Attach the fuel boost pump fuel feed pipe (1) to the boost pump with the four bolts (13) and washers (14).
- (11) Tighten the flex coupling that attaches the fuel boost pump fuel feed pipe (1) to the fuel crossfeed tee assembly (16).

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- (12) Install the clamp (12) and jumper (11) with the screw (10) and nut (9).
- (13) Position the base (6) on the bracket (7) and slide the bracket (7) against the fuel boost pump fuel feed pipe (1) and tighten the two nuts (8).
- (14) Install the strap (5) on the fuel boost pump fuel feed pipe (1) with the two screws (4), washers (3) and nuts (2).
- (15) Do an electrical bond check of the fuel boost pump fuel feed pipe (1), clamp (12), jumper (11), strap (5) and base (6). (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
- (16) Install fuel tank access door(s). (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- (17) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

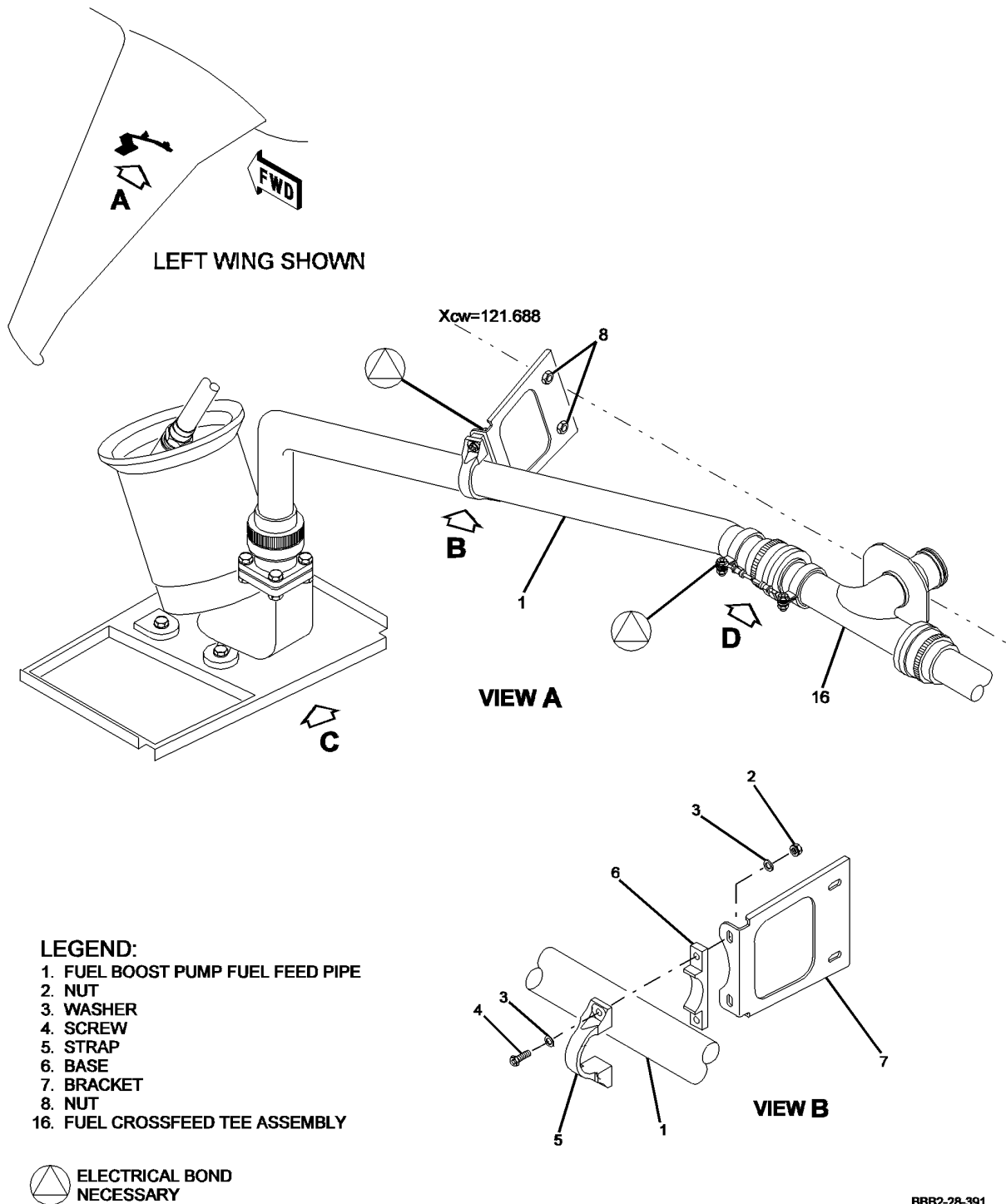
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Fuel Boost Pump Fuel Feed Pipe - Removal/Installation
Figure 206/28-20-07-990-806 (Sheet 1 of 2)

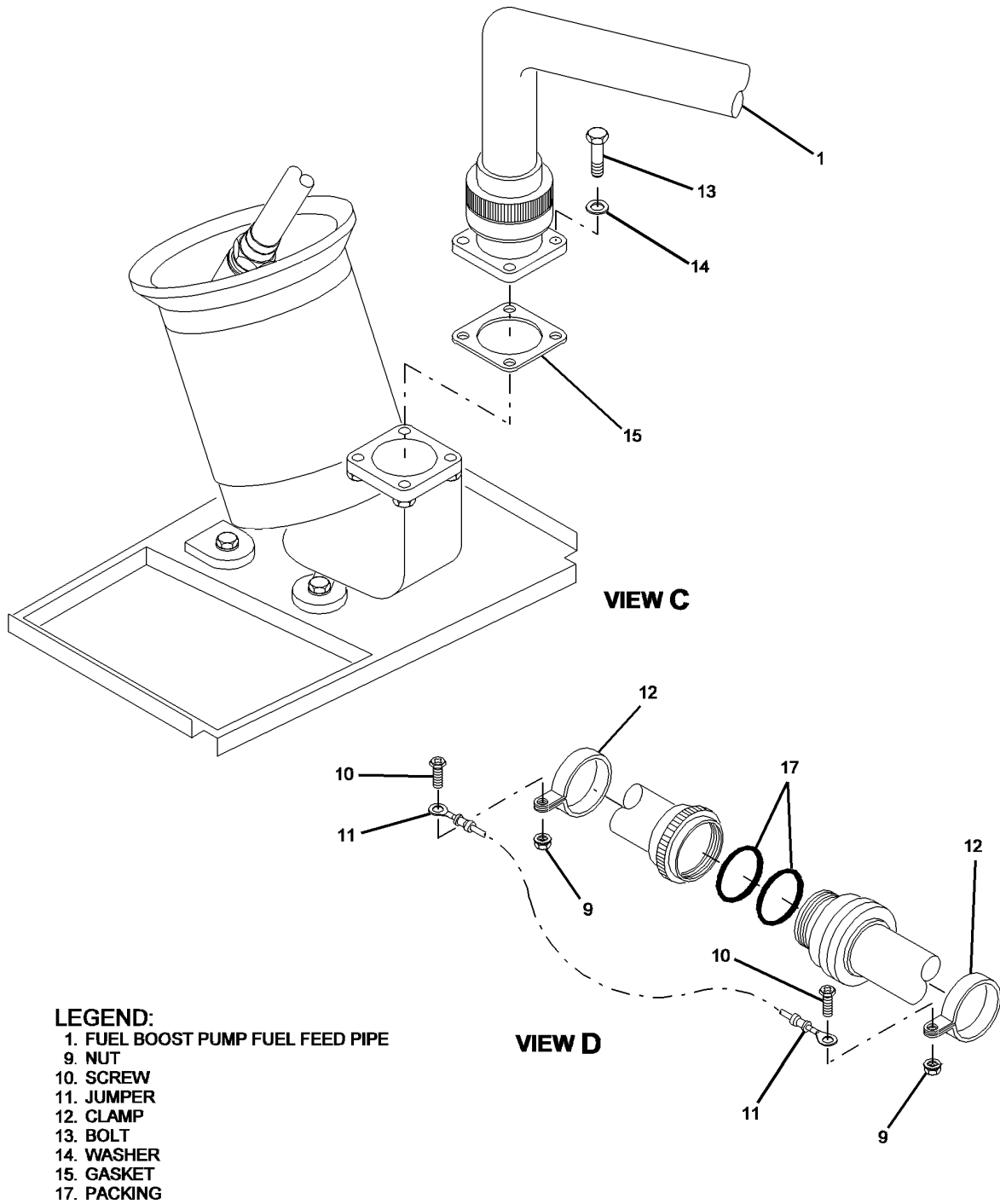
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S0000275397V1

Fuel Boost Pump Fuel Feed Pipe - Removal/Installation
Figure 206/28-20-07-990-806 (Sheet 2 of 2)

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9. Removal/Installation Single Pump Discharge Manifold

A. Remove Discharge Manifold

- (1) Close crossfeed valve.
- (2) Defuel applicable tank. (PAGEBLOCK 28-00-00/201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Open these applicable circuit breakers and install safety tags

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (4) Remove access door.
- (5) Remove fuel discharge tube from volute discharge manifold.
- (6) Remove discharge manifold from volute. Discard discharge tube seal and manifold gasket.

B. Install Discharge Manifold

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these applicable circuit breakers is open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

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UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

CAUTION: DO NOT USE METAL SCRAPER TO CLEAN SEALANT FROM DISCHARGE MANIFOLD AND VOLUTE HOUSING. MATING SURFACES CAN BE DAMAGED AND CAUSE LEAKAGE.

- (2) Use a non-metallic scraper to remove all sealant from mating surfaces of discharge manifold and volute housing.

WARNING: LOW VISCOSITY POLYSULFIDE SEALANT IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOW VISCOSITY POLYSULFIDE SEALANT IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW VISCOSITY POLYSULFIDE SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (3) Apply approximately a 0.06 inch (1.52 mm) diameter bead of sealant (PR 1422 B-2) along both sides of the discharge manifold gasket (P/N 216825).

NOTE: Faster curing sealant PR 1422 B1/2 may be used to minimize aircraft ground time.

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- (4) Before sealant cures, place gasket onto the volute housing.
- (5) Place new discharge tube seal (P/N 011157-015-25) in position, then place discharge manifold onto volute housing.
- (6) Install attach screws and washers. Tighten screws to torque of 25 to 30 inch-pounds (2.83 to 3.39 N·m). Wipe off any excess sealant that may extrude from mated joint.
NOTE: Allow sealing compound to cure for 8 hours minimum at 110 to 135°F (43.3 to 54.4°C). If faster curing sealant is used, adjust cure time as required.
- (7) Connect fuel discharge tube to discharge manifold.

CAUTION: BEFORE INSTALLING ACCESS DOOR, PERFORM FINAL CHECK TO MAKE CERTAIN THAT ALL TOOLS, RAGS, AND HARDWARE, ETC. HAVE BEEN REMOVED FROM TANK.

- (8) Install fuel tank access door(s). (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- (9) Remove the safety tags and close these applicable circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

10. Flushing Blocked Fuel System Check Valves

A. Flush Check Valves

- (1) Make certain that receiving fuel tank is not full: 6000 pounds (2721.6 kg) or less for left or right tanks: 15,000 pounds (6803.9 kg) or less for center tank.

CAUTION: DO NOT RAPIDLY OPEN AND CLOSE DEFUEL VALVE DURING FUEL TRANSFER. PRESSURE SPIKES COULD DAMAGE FUEL SYSTEM.

- (2) Open defuel valve and crossfeed valve if transferring from center tank or left tank, and corresponding receiving tank refuel valve/valves.

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- (3) Turn on one fuel boost pump for left or right tanks, or both pumps for center tank. Transfer/recirculate fuel for one minute.

NOTE: Stop fuel transfer when left or right tank quantity exceeds 9000 pounds (4082.3 Kg), or when center tank quantity exceeds 20,000 pounds (9071.8 kg).

- (4) Turn off fuel boost pump(s).
- (5) Perform Paragraph 10.A.(3) and Paragraph 10.A.(4) for other fuel boost pumps as required.

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GROUND FAULT INTERRUPTER - REMOVAL AND INSTALLATION

1. General

- A. This section provides Removal/Installation procedures for the fuel pump Ground Fault Interrupter (GFI) relays.

NOTE: The above step is a Critical Design Configuration Control Limitation (CDCCL) procedure. For important information on CDCCLs, refer to the Airworthiness Limitations Precautions (GENERAL, SUBJECT 28-00-00).

- B. The GFI relays are located in the Electrical/Electronics compartment.
C. Use only a Boeing approved part to replace an unserviceable GFI relay.

2. Removal/Installation Ground Fault Interrupter (GFI) Relays

- A. Remove Center Line Tank Pump GFI Relays (Figure 401)

- (1) Gain access to Electrical/Electronics compartment by opening access door 4501A.
(a) Center line pump GFI relays are located on the AFT left radio rack.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (2) Open these circuit breakers and install safety tags:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C

- (3) Remove the four nuts and washers and remove the GFI relay.

- B. Install Center Line Tank Pump GFI Relays (Figure 401)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C

- (2) Position GFI relay and install the four washers and nuts.

- (3) Close access door 4501A.

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- (4) Remove the safety tags and close these circuit breakers:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C

- (5) Perform GFI relay Adjustment/Test. (FUEL BOOST PUMP, GROUND FAULT INTERRUPTER (GFI)-ADJUSTMENT/TEST, PAGEBLOCK 28-20-07/501)

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-228

- C. Remove Auxiliary Tank Pump GFI Relays (Figure 402)

- (1) Gain access to Electrical/Electronics compartment by opening access door 4501A.
 (a) Auxiliary tank pump GFI relays are located on the AFT right radio rack.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (2) Open these circuit breakers and install safety tags:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C
H	27	B1-910	AFT AUX TANK FUEL XFR B A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

- (3) Remove the three bolts, lock washers, washers and remove the GFI relay and spacers.

- D. Install Auxiliary Tank Pump GFI Relays (Figure 402)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C
H	27	B1-910	AFT AUX TANK FUEL XFR B A,B, & C

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WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-228 (Continued)

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

- (2) Position GFI relay and spacers and install the three washers, lock washers and bolts.
- (3) Close access door 4501A.
- (4) Remove the safety tags and close these circuit breakers:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C
H	27	B1-910	AFT AUX TANK FUEL XFR B A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

- (5) Perform GFI relay Adjustment/Test. (FUEL BOOST PUMP, GROUND FAULT INTERRUPTER (GFI)-ADJUSTMENT/TEST, PAGEBLOCK 28-20-07/501)

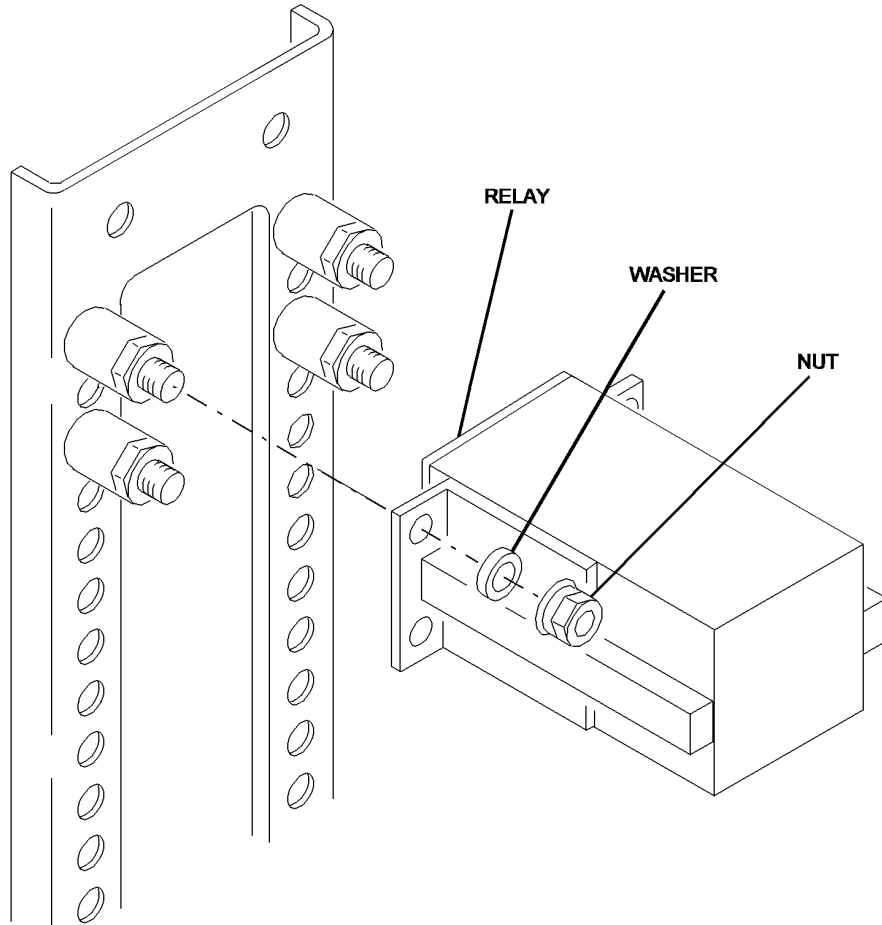
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TYPICAL

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**Ground Fault Interrupter - Removal/Installation
Figure 401/28-20-07-990-807**

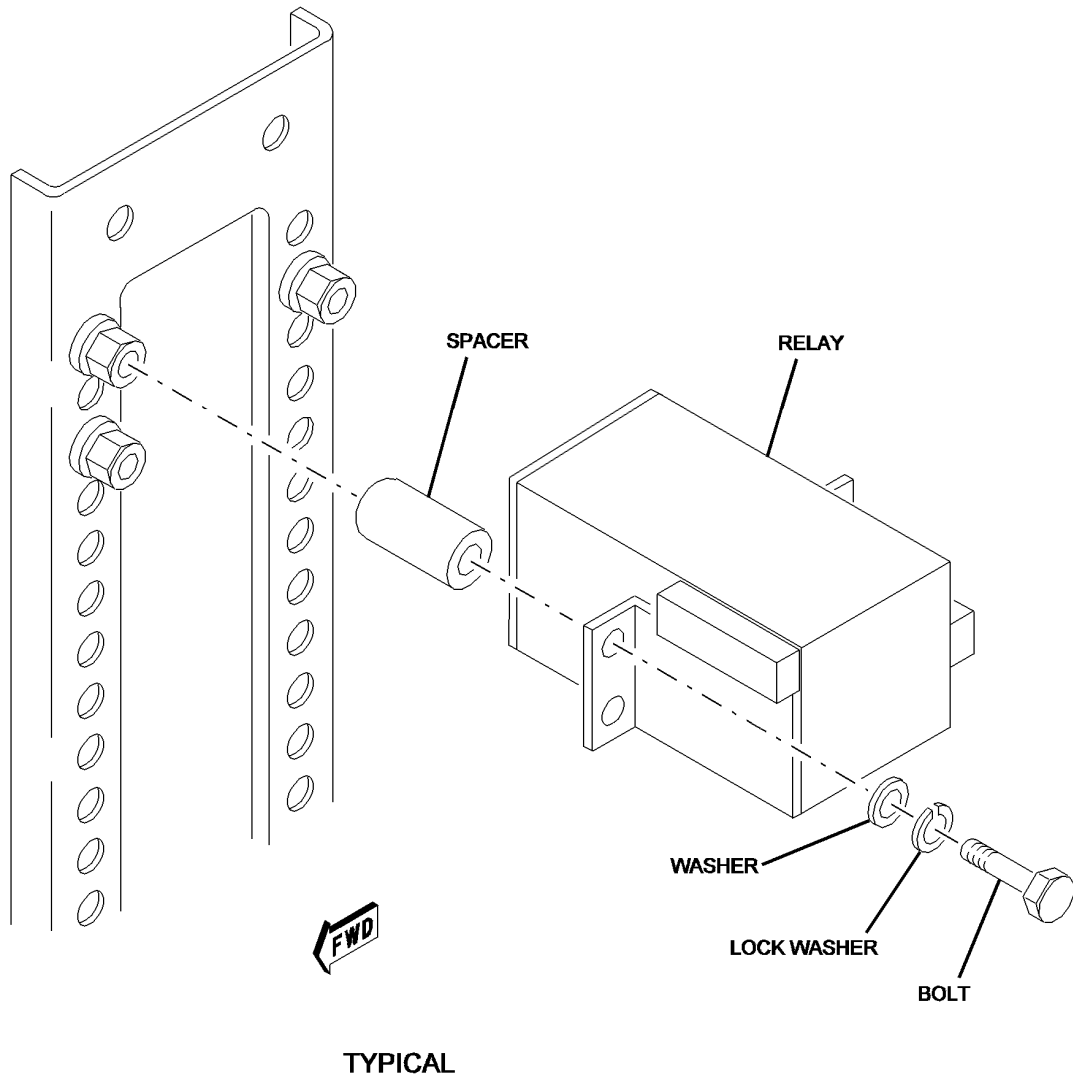
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S0000403672V1

Ground Fault Interrupter - Removal/Installation
Figure 402/28-20-07-990-808

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877-881, 883, 884, 892 POST MD80-28-228

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FUEL BOOST PUMP, GROUND FAULT INTERRUPTER (GFI)-ADJUSTMENT/TEST

1. General

- A. This procedure has the Ground Fault Interruption (GFI) adjustment/test instructions. Included are:
- Center Tank GFI Adjustment/Test

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-228

- Aux Tank GFI Adjustment/Test.

WJE ALL POST MD80-28-228

NOTE: The above is an Airworthiness Limitation Instruction (ALI) procedure. For important information on Airworthiness Limitation Instruction (ALIs), refer to Airworthiness Limitation Precautions (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

2. Fuel Boost Pump Ground Fault Interrupter (GFI)-Adjustment/Test

A. Aircraft Preparation

- (1) Make sure the center tank has a minimum of 1200 lb (544.31 kg) and not more than 11,500 lb (5216.31 kg) of fuel.
- (2) Make certain that throttle is in idle position.
- (3) Make sure the flap/slat handle is in the UP/RET detent.
- (4) Position controls as follows:

Control	Location	Position
Crossfeed Lever	Center pedestal	OFF
Fuel Shutoff Levers (both engines)	Center pedestal	OFF
Start Pump Switch	Overhead Switch Panel	OFF
Fuel Boost Pump Switches	Overhead switch panel	OFF
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-228		
Forward Aux Trans Switches	Overhead switch panel	OFF
Aft Aux Trans Switches	Overhead switch panel	OFF
WJE ALL POST MD80-28-228		

B. Center Tank Ground Fault Interrupter (GFI) Test

WARNING: DO NOT OPERATE A FUEL PUMP IN AN EMPTY FUEL TANK. PROLONGED DRY RUNNING OF A FUEL PUMP IN AN EMPTY TANK CAN DEGRADE INTERNAL PUMP COMPONENTS AND INCREASE THE RISK OF DEVELOPING A FUEL TANK IGNITION SOURCE.

- (1) Put both CTR FWD PUMP and CTR AFT PUMP switches on the cockpit FUEL TANKS panel to the ON position.

WJE 405, 406, 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 875-879 POST MD80-28-228

- (a) Make sure that the CENTER FUEL PRESS LO and MASTER CAUTION indications are off.

NOTE: A 22 second delay is built into the circuit to prevent false signals.

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WJE 401-404, 407-409, 411, 412, 414, 416, 420, 422, 424-427, 429, 861, 862, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-228

- (b) Make sure that the CENTER FUEL PRESS LOW and MASTER CAUTION indications are off.

NOTE: A 22 second delay is built into the circuit to prevent false signals.

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- (2) Do the center forward boost pump GFI Relay test as follows:
 - (a) Push and release the TEST button at the top of the center forward boost pump GFI Relay.
 - 1) Make sure that the RESET Indicator on the GFI relay comes up and the white band is shown.

WJE 405, 406, 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 875-879 POST MD80-28-228

- 2) Make sure that CENTER FUEL PRESS LO and MASTER CAUTION indications come on in approximately 22 seconds.

NOTE: NOTE: The CENTER FUEL PRESS LO alert and MASTER CAUTION indication shows when a single center fuel tank boost pump has failed or has been shut off.

WJE 401-404, 407-409, 411, 412, 414, 416, 420, 422, 424-427, 429, 861, 862, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-228

- 3) Make sure that CENTER FUEL PRESS LOW and MASTER CAUTION indications come on in approximately 22 seconds.

NOTE: NOTE: The CENTER FUEL PRESS LOW alert and MASTER CAUTION indication shows when a single center fuel tank boost pump has failed or has been shut off.

WJE ALL POST MD80-28-228

- (b) Put the CTR AFT PUMP switch to the OFF position.

WJE 405, 406, 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 875-879 POST MD80-28-228

- 1) Make sure that the CENTER FUEL PRESS LO and MASTER CAUTION indications go off.

WJE 401-404, 407-409, 411, 412, 414, 416, 420, 422, 424-427, 429, 861, 862, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-228

- 2) Make sure that the CENTER FUEL PRESS LOW and MASTER CAUTION indications go off.

WJE ALL POST MD80-28-228

- (c) Reset the center forward boost pump GFI Relay as follows:
 - 1) Put the CTR FWD PUMP switch to the OFF position.
 - 2) Push the RESET indicator at the top of the GFI Relay.
 - 3) Make sure that the RESET Indicator stays down and the white band on the indicator is not shown.

WJE 405, 406, 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 875-879 POST MD80-28-228

- 4) Make sure that the CENTER FUEL PRESS LO and MASTER CAUTION indications stay off.

EFFECTIVITY
WJE ALL POST MD80-28-228

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WJE 401-404, 407-409, 411, 412, 414, 416, 420, 422, 424-427, 429, 861, 862, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-228

- 5) Make sure that the CENTER FUEL PRESS LOW and MASTER CAUTION indications stay off.

WJE ALL POST MD80-28-228

- (d) Put the CTR FWD PUMP switch to the ON position.

WJE 405, 406, 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 875-879 POST MD80-28-228

- 1) Make sure that CENTER FUEL PRESS LO and MASTER CAUTION indications come on in approximately 22 seconds.

WJE 401-404, 407-409, 411, 412, 414, 416, 420, 422, 424-427, 429, 861, 862, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-228

- 2) Make sure that CENTER FUEL PRESS LOW and MASTER CAUTION indications come on in approximately 22 seconds.

WJE ALL POST MD80-28-228

- (e) Put the CTR AFT PUMP switch to the ON position.

WJE 405, 406, 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 875-879 POST MD80-28-228

- 1) Make sure that CENTER FUEL PRESS LO and MASTER CAUTION indications go off.

WJE 401-404, 407-409, 411, 412, 414, 416, 420, 422, 424-427, 429, 861, 862, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-228

- 2) Make sure that CENTER FUEL PRESS LOW and MASTER CAUTION indications go off.

WJE ALL POST MD80-28-228

- (3) Do the center aft boost pump GFI Relay test as follows:

- (a) Push and release the TEST button at the top of the center aft boost pump GFI Relay.

- 1) Make sure that the RESET Indicator on the GFI comes up and the white band on the indicator is shown.

WJE 405, 406, 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 875-879 POST MD80-28-228

- 2) Make sure that CENTER FUEL PRESS LO and MASTER CAUTION indications come on in approximately 22 seconds.

WJE 401-404, 407-409, 411, 412, 414, 416, 420, 422, 424-427, 429, 861, 862, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-228

- 3) Make sure that CENTER FUEL PRESS LOW and MASTER CAUTION indications come on in approximately 22 seconds.

WJE ALL POST MD80-28-228

- (b) Put the CTR FWD PUMP switch to the OFF position.

WJE 405, 406, 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 875-879 POST MD80-28-228

- 1) Make sure that the CENTER FUEL PRESS LOW and MASTER CAUTION indications go off.

EFFECTIVITY
WJE ALL POST MD80-28-228

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TP-80MM-WJE

MD-80 AIRCRAFT MAINTENANCE MANUAL

WJE 401-404, 407-409, 411, 412, 414, 416, 420, 422, 424-427, 429, 861, 862, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-228

- 2) Make sure that the CENTER FUEL PRESS LOW and MASTER CAUTION indications go off.

WJE ALL POST MD80-28-228

- (c) Reset the center aft boost pump GFI Relay as follows:

- 1) Put the CTR AFT PUMP switch to the OFF position.
- 2) Push the RESET indicator at the top of the GFI Relay.
- 3) Make sure that the RESET Indicator stays down and the white band on the indicator is not shown.

WJE 405, 406, 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 875-879 POST MD80-28-228

- 4) Make sure that the CENTER FUEL PRESS LO and MASTER CAUTION indications stay off.

WJE 401-404, 407-409, 411, 412, 414, 416, 420, 422, 424-427, 429, 861, 862, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-228

- 5) Make sure that the CENTER FUEL PRESS LOW and MASTER CAUTION indications stay off.

WJE ALL POST MD80-28-228

- (d) Put the CTR AFT PUMP switch to the ON position.

WJE 405, 406, 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 875-879 POST MD80-28-228

- 1) Make sure that CENTER FUEL PRESS LO and MASTER CAUTION indications come on in approximately 22 seconds.

WJE 401-404, 407-409, 411, 412, 414, 416, 420, 422, 424-427, 429, 861, 862, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-228

- 2) Make sure that CENTER FUEL PRESS LOW and MASTER CAUTION indications come on in approximately 22 seconds.

WJE ALL POST MD80-28-228

- (e) Put the CTR FWD PUMP switch to the ON position.

WJE 405, 406, 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 875-879 POST MD80-28-228

- 1) Make sure that the CENTER FUEL PRESS LO and MASTER CAUTION indications go off.

WJE 401-404, 407-409, 411, 412, 414, 416, 420, 422, 424-427, 429, 861, 862, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-228

- 2) Make sure that the CENTER FUEL PRESS LOW and MASTER CAUTION indications go off.

WJE ALL POST MD80-28-228

- (4) Put both CTR FWD PUMP and CTR AFT PUMP switches on the cockpit FUEL TANKS panel to the OFF position.

WJE 405, 406, 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 875-879 POST MD80-28-228

- (a) Make sure that the CENTER FUEL PRESS LO and MASTER CAUTION indications go off.

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WJE ALL POST MD80-28-228

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MD-80 AIRCRAFT MAINTENANCE MANUAL

WJE 401-404, 407-409, 411, 412, 414, 416, 420, 422, 424-427, 429, 861, 862, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-228

- (b) Make sure that the CENTER FUEL PRESS LOW and MASTER CAUTION indications go off.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-228

C. Aux Tank Ground Fault Interrupter (GFI) Test

- (1) Make sure that the center fuel tank quantity is below 11,500 lbs.

NOTE: The center fuel tank quantity must remain below 11,500 lbs when you do the GFI test.

- (2) Make sure that the aircraft is on the ground (not on jacks) and the ground sense mechanism is in the ground mode.

WARNING: DO NOT OPERATE A FUEL PUMP IN AN EMPTY FUEL TANK. PROLONGED DRY RUNNING OF A FUEL PUMP IN AN EMPTY TANK CAN DEGRADE INTERNAL PUMP COMPONENTS AND INCREASE THE RISK OF DEVELOPING A FUEL TANK IGNITION SOURCE.

- (3) Do the FWD AUX TRANS A pump GFI Relay test as follows:

NOTE: Two persons are necessary to complete ground fault interrupter (GFI) relay test.

- (a) Set and hold the FWD AUX TRANS A switch in the TEST position.

- 1) Make sure that the FWD AUX FUEL PRESS LOW indication comes on momentarily and then goes out.
- 2) Make sure that the FUEL QTY indicator for the CTR tank shows an increase of fuel and you can hear an audible sound from the transfer pump.

- (b) Continue to hold the FWD AUX TRANS A switch in the TEST position and do the steps that follow:

- 1) Push and release the TEST button at the top of the FWD AUX TRANS A pump GFI Relay.
- 2) Make sure that the RESET Indicator on the GFI comes up and the white band on the indicator is shown.
- 3) Make sure that the FWD AUX FUEL PRESS LOW indication stays off.
- 4) Monitor the FUEL QTY indicator for one minute, make sure that the fuel quantity in the CTR tank does not show an increase of fuel and no audible sound is heard from the transfer pump.

- (c) Release the FWD AUX TRANS A switch.

- 1) Make sure the FWD AUX TRANS A switch moved to the OFF position.
- 2) Make sure that the FWD AUX FUEL PRESS LOW indication stays off.

- (d) Reset the FWD AUX TRANS A pump GFI Relay as follows:

- 1) Push the RESET indicator at the top of the GFI Relay.
- 2) Make sure that the RESET Indicator stays down and the white band on the indicator is not shown.
- 3) Make sure that the FWD AUX FUEL PRESS LOW indication stays off.

- (e) Set and hold the FWD AUX TRANS A switch in the TEST position.

- 1) Make sure that the FWD AUX FUEL PRESS LOW indication comes on momentarily and then goes out.

EFFECTIVITY
WJE ALL POST MD80-28-228

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WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-228 (Continued)

- 2) Make sure that the FUEL QTY indicator for the CTR tank shows an increase of fuel and you can hear an audible sound from the transfer pump.
- (f) Release the FWD AUX TRANS A switch.
 - 1) Make sure the FWD AUX TRANS A switch moved to the OFF position.

WARNING: DO NOT OPERATE A FUEL PUMP IN AN EMPTY FUEL TANK. PROLONGED DRY RUNNING OF A FUEL PUMP IN AN EMPTY TANK CAN DEGRADE INTERNAL PUMP COMPONENTS AND INCREASE THE RISK OF DEVELOPING A FUEL TANK IGNITION SOURCE.

- (4) Do the FWD AUX TRANS B pump GFI Relay test as follows:

NOTE: Two persons are necessary to complete ground fault interrupter (GFI) relay test.

- (a) Set and hold the FWD AUX TRANS B switch in the TEST position.
 - 1) Make sure that the FWD AUX FUEL PRESS LOW indication comes on momentarily and then goes out.
 - 2) Make sure that the FUEL QTY indicator for the CTR tank shows an increase of fuel and you can hear an audible sound from the transfer pump.
- (b) Continue to hold the FWD AUX TRANS B switch in the TEST position and do the steps that follow:
 - 1) Push and release the TEST button at the top of the FWD AUX TRANS B pump GFI Relay.
 - 2) Make sure that the RESET Indicator on the GFI comes up and the white band on the indicator is shown.
 - 3) Make sure that the FWD AUX FUEL PRESS LOW indication stays off.
 - 4) Monitor the FUEL QTY indicator for one minute, make sure that the fuel quantity in the CTR tank does not show an increase of fuel and no audible sound is heard from the transfer pump.
- (c) Release the FWD AUX TRANS B switch.
 - 1) Make sure the FWD AUX TRANS B switch moved to the OFF position.
 - 2) Make sure that the FWD AUX FUEL PRESS LOW indication stays off.
- (d) Reset the FWD AUX TRANS B pump GFI Relay as follows:
 - 1) Push the RESET indicator at the top of the GFI Relay.
 - 2) Make sure that the RESET Indicator stays down and the white band on the indicator is not shown.
 - 3) Make sure that the FWD AUX FUEL PRESS LOW indication stays off.
- (e) Set and hold the FWD AUX TRANS B switch in the TEST position.
 - 1) Make sure that the FWD AUX FUEL PRESS LOW indication comes on momentarily and then goes out.
 - 2) Make sure that the FUEL QTY indicator for the CTR tank shows an increase of fuel and you can hear an audible sound from the transfer pump.
- (f) Release the FWD AUX TRANS B switch.
 - 1) Make sure the FWD AUX TRANS B switch moved to the OFF position.

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WJE ALL POST MD80-28-228

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WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-228 (Continued)

WARNING: DO NOT OPERATE A FUEL PUMP IN AN EMPTY FUEL TANK. PROLONGED DRY RUNNING OF A FUEL PUMP IN AN EMPTY TANK CAN DEGRADE INTERNAL PUMP COMPONENTS AND INCREASE THE RISK OF DEVELOPING A FUEL TANK IGNITION SOURCE.

(5) Do the AFT AUX TRANS A pump GFI Relay test as follows:

NOTE: Two persons are necessary to complete ground fault interrupter (GFI) relay test.

- (a) Set and hold the AFT AUX TRANS A switch in the TEST position.
 - 1) Make sure that the AFT AUX FUEL PRESS LOW indication come on momentarily and then goes out.
 - 2) Make sure that the FUEL QTY indicator for the CTR tank shows an increase of fuel and you can hear an audible sound from the transfer pump.
- (b) Continue to hold the AFT AUX TRANS A switch in the TEST position and do the steps that follow:
 - 1) Push and release the TEST button at the top of the AFT AUX TRANS A pump GFI Relay
 - 2) Make sure that the RESET Indicator on the GFI comes up and the white band on the indicator is shown.
 - 3) Make sure that the AFT AUX FUEL PRESS LOW indication stays off.
 - 4) Monitor the FUEL QTY indicator for one minute, make sure that the fuel quantity in the CTR tank does not show an increase of fuel and no audible sound is heard from the transfer pump.
- (c) Release the AFT AUX TRANS A switch.
 - 1) Make sure the AFT AUX TRANS A switch moved to the OFF position.
 - 2) Make sure that the AFT AUX FUEL PRESS LOW indication stays off.
- (d) Reset the AFT AUX TRANS A pump GFI Relay as follows:
 - 1) Push the RESET indicator at the top of the GFI Relay.
 - 2) Make sure that the RESET Indicator stays down and the white band on the indicator is not shown.
 - 3) Make sure that the AFT AUX FUEL PRESS LOW indication stays off.
- (e) Set and hold the AFT AUX TRANS A switch in the TEST position.
 - 1) Make sure that the AFT AUX FUEL PRESS LOW indication come on momentarily and then goes out.
 - 2) Make sure that the FUEL QTY indicator for the CTR tank shows an increase of fuel and you can hear an audible sound from the transfer pump.
- (f) Release the AFT AUX TRANS A switch.
 - 1) Make sure the AFT AUX TRANS A switch moved to the OFF position.

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WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-228 (Continued)

WARNING: DO NOT OPERATE A FUEL PUMP IN AN EMPTY FUEL TANK. PROLONGED DRY RUNNING OF A FUEL PUMP IN AN EMPTY TANK CAN DEGRADE INTERNAL PUMP COMPONENTS AND INCREASE THE RISK OF DEVELOPING A FUEL TANK IGNITION SOURCE.

(6) Do the AFT AUX TRANS B pump GFI Relay test as follows:

NOTE: Two persons are necessary to complete ground fault interrupter (GFI) relay test.

- (a) Set and hold the AFT AUX TRANS B switch in the TEST position.
 - 1) Make sure that the AFT AUX FUEL PRESS LOW indication come on momentarily and then goes out.
 - 2) Make sure that the FUEL QTY indicator for the CTR tank shows an increase of fuel and you can hear an audible sound from the transfer pump.
- (b) Continue to hold the AFT AUX TRANS B switch in the TEST position and do the steps that follow:
 - 1) Push and release the TEST button at the top of the AFT AUX TRANS A pump GFI Relay.
 - 2) Make sure that the RESET Indicator on the GFI comes up and the white band on the indicator is shown.
 - 3) Make sure that the AFT AUX FUEL PRESS LOW indication stays off.
 - 4) Monitor the FUEL QTY indicator for one minute, make sure that the fuel quantity in the CTR tank does not show an increase of fuel and no audible sound is heard from the transfer pump.
- (c) Release the AFT AUX TRANS B switch.
 - 1) Make sure the AFT AUX TRANS B switch moved to the OFF position.
 - 2) Make sure that the AFT AUX FUEL PRESS LOW indication stays off.
- (d) Reset the AFT AUX TRANS B pump GFI Relay as follows:
 - 1) Push the RESET indicator at the top of the GFI Relay.
 - 2) Make sure that the RESET Indicator stays down and the white band on the indicator is not shown.
 - 3) Make sure that the AFT AUX FUEL PRESS LOW indication stays off.
- (e) Set and hold the AFT AUX TRANS B switch in the TEST position.
 - 1) Make sure that the AFT AUX FUEL PRESS LOW indication come on momentarily and then goes out.
 - 2) Make sure that the FUEL QTY indicator for the CTR tank shows an increase of fuel and you can hear an audible sound from the transfer pump.
- (f) Release the AFT AUX TRANS B switch.
 - 1) Make sure the AFT AUX TRANS B switch moved to the OFF position.

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WJE ALL POST MD80-28-228

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FUEL BOOST PUMP, GROUND FAULT INTERRUPTER - ADJUSTMENT/TEST

1. General

- A. This procedure has the GFI adjustment/test instructions for task card use. Included is:
- Operational check of the GFI.

TASK 28-20-07-710-802

2. Operational Check of the Ground Fault Interrupters

A. Prepare for the Ground Fault Interrupter Operational Check

SUBTASK 28-20-07-940-001

- (1) Make sure the center tank has a minimum of 1200 lb (544.31 kg) and not more than 11,500 lb (5216.31 kg) of fuel.
- (2) Make certain that throttle is in idle position.
- (3) Make sure the flap/slat handle is in the UP/RET detent.
- (4) Position controls as follows:

Control	Location	Position
Crossfeed Lever	Center pedestal	OFF
Fuel Shutoff Levers (both engines)	Center pedestal	OFF
Start Pump Switch	Overhead Switch Panel	OFF
Fuel Boost Pump Switches	Overhead switch panel	OFF
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-228		
Forward Aux Trans Switches	Overhead switch panel	OFF
Aft Aux Trans Switches	Overhead switch panel	OFF
WJE ALL POST MD80-28-228		

B. Center Tank Ground Fault Interrupter (GFI) Operational Check

SUBTASK 28-20-07-710-001

WARNING: DO NOT OPERATE A FUEL PUMP IN AN EMPTY FUEL TANK. PROLONGED DRY RUNNING OF A FUEL PUMP IN AN EMPTY TANK CAN DEGRADE INTERNAL PUMP COMPONENTS AND INCREASE THE RISK OF DEVELOPING A FUEL TANK IGNITION SOURCE.

- (1) Put both CTR FWD PUMP and CTR AFT PUMP switches on the cockpit FUEL TANKS panel to the ON position.

WJE 405, 406, 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 875-879 POST MD80-28-228

- (a) Make sure that the CENTER FUEL PRESS LO and MASTER CAUTION indications are off.

NOTE: A 22 second delay is built into the circuit to prevent false signals.

EFFECTIVITY
WJE ALL POST MD80-28-228

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- (b) Make sure that the CENTER FUEL PRESS LOW and MASTER CAUTION indications are off.

NOTE: A 22 second delay is built into the circuit to prevent false signals.

WJE ALL POST MD80-28-228

SUBTASK 28-20-07-710-002

- (2) Do the center forward boost pump GFI relay test as follows:

- (a) Push and release the TEST button at the top of the center forward boost pump GFI relay.
 - 1) Make sure that the RESET Indicator on the GFI relay comes up and the white band is shown.

WJE 405, 406, 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 875-879 POST MD80-28-228

- 2) Make sure that CENTER FUEL PRESS LO and MASTER CAUTION indications come on in approximately 22 seconds.

NOTE: NOTE: The CENTER FUEL PRESS LO alert and MASTER CAUTION indication shows when a single center fuel tank boost pump has failed or has been shut off.

WJE 401-404, 407-409, 411, 412, 414, 416, 420, 422, 424-427, 429, 861, 862, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-228

- 3) Make sure that CENTER FUEL PRESS LO and MASTER CAUTION indications come on in approximately 22 seconds.

NOTE: NOTE: The CENTER FUEL PRESS LO alert and MASTER CAUTION indication shows when a single center fuel tank boost pump has failed or has been shut off.

WJE ALL POST MD80-28-228

- (b) Put the CTR AFT PUMP switch to the OFF position.

WJE 405, 406, 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 875-879 POST MD80-28-228

- 1) Make sure that the CENTER FUEL PRESS LO and MASTER CAUTION indications go off.

WJE 401-404, 407-409, 411, 412, 414, 416, 420, 422, 424-427, 429, 861, 862, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-228

- 2) Make sure that the CENTER FUEL PRESS LOW and MASTER CAUTION indications go off.

WJE ALL POST MD80-28-228

- (c) Reset the center forward boost pump GFI relay as follows:

- 1) Put the CTR FWD PUMP switch to the OFF position.
- 2) Push the RESET indicator at the top of the GFI relay.
- 3) Make sure that the RESET Indicator stays down and the white band on the indicator is not shown.

WJE 405, 406, 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 875-879 POST MD80-28-228

- 4) Make sure that the CENTER FUEL PRESS LO and MASTER CAUTION indications stay off.

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WJE ALL POST MD80-28-228

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WJE 401-404, 407-409, 411, 412, 414, 416, 420, 422, 424-427, 429, 861, 862, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-228

- 5) Make sure that the CENTER FUEL PRESS LOW and MASTER CAUTION indications stay off.

WJE ALL POST MD80-28-228

- (d) Put the CTR FWD PUMP switch to the ON position.

WJE 405, 406, 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 875-879 POST MD80-28-228

- 1) Make sure that CENTER FUEL PRESS LO and MASTER CAUTION indications come on in approximately 22 seconds.

WJE 401-404, 407-409, 411, 412, 414, 416, 420, 422, 424-427, 429, 861, 862, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-228

- 2) Make sure that CENTER FUEL PRESS LOW and MASTER CAUTION indications come on in approximately 22 seconds.

WJE ALL POST MD80-28-228

- 3) Put the CTR AFT PUMP switch to the ON position.

WJE 405, 406, 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 875-879 POST MD80-28-228

- 4) Make sure that CENTER FUEL PRESS LO and MASTER CAUTION indications go off.

WJE 401-404, 407-409, 411, 412, 414, 416, 420, 422, 424-427, 429, 861, 862, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-228

- 5) Make sure that CENTER FUEL PRESS LOW and MASTER CAUTION indications go off.

WJE ALL POST MD80-28-228

- (3) Do the center aft boost pump GFI relay test as follows:

- (a) Push and release the TEST button at the top of the center aft boost pump GFI relay.

- 1) Make sure that the RESET Indicator on the GFI comes up and the white band on the indicator is shown.

WJE 405, 406, 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 875-879 POST MD80-28-228

- 2) Make sure that CENTER FUEL PRESS LO and MASTER CAUTION indications come on in approximately 22 seconds.

WJE 401-404, 407-409, 411, 412, 414, 416, 420, 422, 424-427, 429, 861, 862, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-228

- 3) Make sure that CENTER FUEL PRESS LOW and MASTER CAUTION indications come on in approximately 22 seconds.

WJE ALL POST MD80-28-228

- (b) Put the CTR FWD PUMP switch to the OFF position.

WJE 405, 406, 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 875-879 POST MD80-28-228

- 1) Make sure that the CENTER FUEL PRESS LOW and MASTER CAUTION indications go off.

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- 2) Make sure that the CENTER FUEL PRESS LOW and MASTER CAUTION indications go off.

WJE ALL POST MD80-28-228

- (c) Reset the center aft boost pump GFI relay as follows:

- 1) Put the CTR AFT PUMP switch to the OFF position.
- 2) Push the RESET indicator at the top of the GFI relay.
- 3) Make sure that the RESET Indicator stays down and the white band on the indicator is not shown.

WJE 405, 406, 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 875-879 POST MD80-28-228

- 4) Make sure that the CENTER FUEL PRESS LO and MASTER CAUTION indications stay off.

WJE 401-404, 407-409, 411, 412, 414, 416, 420, 422, 424-427, 429, 861, 862, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-228

- 5) Make sure that the CENTER FUEL PRESS LOW and MASTER CAUTION indications stay off.

WJE ALL POST MD80-28-228

- (d) Put the CTR AFT PUMP switch to the ON position.

WJE 405, 406, 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 875-879 POST MD80-28-228

- 1) Make sure that CENTER FUEL PRESS LO and MASTER CAUTION indications come on in approximately 22 seconds.

WJE 401-404, 407-409, 411, 412, 414, 416, 420, 422, 424-427, 429, 861, 862, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-228

- 2) Make sure that CENTER FUEL PRESS LOW and MASTER CAUTION indications come on in approximately 22 seconds.

WJE ALL POST MD80-28-228

- (e) Put the CTR FWD PUMP switch to the ON position.

WJE 405, 406, 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 875-879 POST MD80-28-228

- 1) Make sure that the CENTER FUEL PRESS LO and MASTER CAUTION indications go off.

WJE 401-404, 407-409, 411, 412, 414, 416, 420, 422, 424-427, 429, 861, 862, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-228

- 2) Make sure that the CENTER FUEL PRESS LOW and MASTER CAUTION indications go off.

WJE ALL POST MD80-28-228

- (4) Put both CTR FWD PUMP and CTR AFT PUMP switches on the cockpit FUEL TANKS panel to the OFF position.

WJE 405, 406, 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 875-879 POST MD80-28-228

- (a) Make sure that the CENTER FUEL PRESS LO and MASTER CAUTION indications go off.

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WJE 401-404, 407-409, 411, 412, 414, 416, 420, 422, 424-427, 429, 861, 862, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-228

- (b) Make sure that the CENTER FUEL PRESS LOW and MASTER CAUTION indications go off.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-228

C. Aux Tank Ground Fault Interrupter (GFI) Operational Check

SUBTASK 28-20-07-940-002

- (1) Make sure that the center fuel tank quantity is below 11,500 lbs.

NOTE: The center fuel tank quantity must remain below 11,500 lbs when you do the GFI test.

- (2) Make sure that the aircraft is on the ground (not on jacks) and the ground sense mechanism is in the ground mode.

WARNING: DO NOT OPERATE A FUEL PUMP IN AN EMPTY FUEL TANK. PROLONGED DRY RUNNING OF A FUEL PUMP IN AN EMPTY TANK CAN DEGRADE INTERNAL PUMP COMPONENTS AND INCREASE THE RISK OF DEVELOPING A FUEL TANK IGNITION SOURCE.

- (3) Do the FWD AUX TRANS A pump GFI relay test as follows:

NOTE: Two persons are necessary to complete ground fault interrupter (GFI) relay test.

- (a) Set and hold the FWD AUX TRANS A switch in the TEST position.
- 1) Make sure that the FWD AUX FUEL PRESS LOW indication comes on momentarily and then goes out.
 - 2) Make sure that the FUEL QTY indicator for the CTR tank shows an increase of fuel and you can hear an audible sound from the transfer pump.
- (b) Continue to hold the FWD AUX TRANS A switch in the TEST position and do the steps that follow:
- 1) Push and release the TEST button at the top of the FWD AUX TRANS A pump GFI relay.
 - 2) Make sure that the RESET Indicator on the GFI comes up and the white band on the indicator is shown.
 - 3) Make sure that the FWD AUX FUEL PRESS LOW indication stays off.
 - 4) Monitor the FUEL QTY indicator for one minute, make sure that the fuel quantity in the CTR tank does not show an increase of fuel and no audible sound is heard from the transfer pump.
- (c) Release the FWD AUX TRANS A switch.
- 1) Make sure the FWD AUX TRANS A switch moved to the OFF position.
 - 2) Make sure that the FWD AUX FUEL PRESS LOW indication stays off.
- (d) Reset the FWD AUX TRANS A pump GFI relay as follows:
- 1) Push the RESET indicator at the top of the GFI relay.
 - 2) Make sure that the RESET Indicator stays down and the white band on the indicator is not shown.
 - 3) Make sure that the FWD AUX FUEL PRESS LOW indication stays off.
- (e) Set and hold the FWD AUX TRANS A switch in the TEST position.
- 1) Make sure that the FWD AUX FUEL PRESS LOW indication comes on momentarily and then goes out.

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WJE ALL POST MD80-28-228

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WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-228 (Continued)

- 2) Make sure that the FUEL QTY indicator for the CTR tank shows an increase of fuel and you can hear an audible sound from the transfer pump.
- (f) Release the FWD AUX TRANS A switch.
 - 1) Make sure the FWD AUX TRANS A switch moved to the OFF position.

WARNING: DO NOT OPERATE A FUEL PUMP IN AN EMPTY FUEL TANK. PROLONGED DRY RUNNING OF A FUEL PUMP IN AN EMPTY TANK CAN DEGRADE INTERNAL PUMP COMPONENTS AND INCREASE THE RISK OF DEVELOPING A FUEL TANK IGNITION SOURCE.

- (4) Do the FWD AUX TRANS B pump GFI relay test as follows:

NOTE: Two persons are necessary to complete ground fault interrupter (GFI) relay test.

- (a) Set and hold the FWD AUX TRANS B switch in the TEST position.
 - 1) Make sure that the FWD AUX FUEL PRESS LOW indication comes on momentarily and then goes out.
 - 2) Make sure that the FUEL QTY indicator for the CTR tank shows an increase of fuel and you can hear an audible sound from the transfer pump.
- (b) Continue to hold the FWD AUX TRANS B switch in the TEST position and do the steps that follow:
 - 1) Push and release the TEST button at the top of the FWD AUX TRANS B pump GFI relay.
 - 2) Make sure that the RESET Indicator on the GFI comes up and the white band on the indicator is shown.
 - 3) Make sure that the FWD AUX FUEL PRESS LOW indication stays off.
 - 4) Monitor the FUEL QTY indicator for one minute, make sure that the fuel quantity in the CTR tank does not show an increase of fuel and no audible sound is heard from the transfer pump.
- (c) Release the FWD AUX TRANS B switch.
 - 1) Make sure the FWD AUX TRANS B switch moved to the OFF position.
 - 2) Make sure that the FWD AUX FUEL PRESS LOW indication stays off.
- (d) Reset the FWD AUX TRANS B pump GFI relay as follows:
 - 1) Push the RESET indicator at the top of the GFI relay.
 - 2) Make sure that the RESET Indicator stays down and the white band on the indicator is not shown.
 - 3) Make sure that the FWD AUX FUEL PRESS LOW indication stays off.
- (e) Set and hold the FWD AUX TRANS B switch in the TEST position.
 - 1) Make sure that the FWD AUX FUEL PRESS LOW indication comes on momentarily and then goes out.
 - 2) Make sure that the FUEL QTY indicator for the CTR tank shows an increase of fuel and you can hear an audible sound from the transfer pump.
- (f) Release the FWD AUX TRANS B switch.
 - 1) Make sure the FWD AUX TRANS B switch moved to the OFF position.

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WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-228 (Continued)

WARNING: DO NOT OPERATE A FUEL PUMP IN AN EMPTY FUEL TANK. PROLONGED DRY RUNNING OF A FUEL PUMP IN AN EMPTY TANK CAN DEGRADE INTERNAL PUMP COMPONENTS AND INCREASE THE RISK OF DEVELOPING A FUEL TANK IGNITION SOURCE.

(5) Do the AFT AUX TRANS A pump GFI relay test as follows:

NOTE: Two persons are necessary to complete ground fault interrupter (GFI) relay test.

- (a) Set and hold the AFT AUX TRANS A switch in the TEST position.
 - 1) Make sure that the AFT AUX FUEL PRESS LOW indication come on momentarily and then goes out.
 - 2) Make sure that the FUEL QTY indicator for the CTR tank shows an increase of fuel and you can hear an audible sound from the transfer pump.
- (b) Continue to hold the AFT AUX TRANS A switch in the TEST position and do the steps that follow:
 - 1) Push and release the TEST button at the top of the AFT AUX TRANS A pump GFI relay.
 - 2) Make sure that the RESET Indicator on the GFI comes up and the white band on the indicator is shown.
 - 3) Make sure that the AFT AUX FUEL PRESS LOW indication stays off.
 - 4) Monitor the FUEL QTY indicator for one minute, make sure that the fuel quantity in the CTR tank does not show an increase of fuel and no audible sound is heard from the transfer pump.
- (c) Release the AFT AUX TRANS A switch.
 - 1) Make sure the AFT AUX TRANS A switch moved to the OFF position.
 - 2) Make sure that the AFT AUX FUEL PRESS LOW indication stays off.
- (d) Reset the AFT AUX TRANS A pump GFI relay as follows:
 - 1) Push the RESET indicator at the top of the GFI relay.
 - 2) Make sure that the RESET Indicator stays down and the white band on the indicator is not shown.
 - 3) Make sure that the AFT AUX FUEL PRESS LOW indication stays off.
- (e) Set and hold the AFT AUX TRANS A switch in the TEST position.
 - 1) Make sure that the AFT AUX FUEL PRESS LOW indication come on momentarily and then goes out.
 - 2) Make sure that the FUEL QTY indicator for the CTR tank shows an increase of fuel and you can hear an audible sound from the transfer pump.
- (f) Release the AFT AUX TRANS A switch.
 - 1) Make sure the AFT AUX TRANS A switch moved to the OFF position.

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WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-228 (Continued)

WARNING: DO NOT OPERATE A FUEL PUMP IN AN EMPTY FUEL TANK. PROLONGED DRY RUNNING OF A FUEL PUMP IN AN EMPTY TANK CAN DEGRADE INTERNAL PUMP COMPONENTS AND INCREASE THE RISK OF DEVELOPING A FUEL TANK IGNITION SOURCE.

(6) Do the AFT AUX TRANS B pump GFI relay test as follows:

NOTE: Two persons are necessary to complete ground fault interrupter (GFI) relay test.

- (a) Set and hold the AFT AUX TRANS B switch in the TEST position.
 - 1) Make sure that the AFT AUX FUEL PRESS LOW indication come on momentarily and then goes out.
 - 2) Make sure that the FUEL QTY indicator for the CTR tank shows an increase of fuel and you can hear an audible sound from the transfer pump.
- (b) Continue to hold the AFT AUX TRANS B switch in the TEST position and do the steps that follow:
 - 1) Push and release the TEST button at the top of the AFT AUX TRANS A pump GFI relay.
 - 2) Make sure that the RESET Indicator on the GFI comes up and the white band on the indicator is shown.
 - 3) Make sure that the AFT AUX FUEL PRESS LOW indication stays off.
 - 4) Monitor the FUEL QTY indicator for one minute, make sure that the fuel quantity in the CTR tank does not show an increase of fuel and no audible sound is heard from the transfer pump.
- (c) Release the AFT AUX TRANS B switch.
 - 1) Make sure the AFT AUX TRANS B switch moved to the OFF position.
 - 2) Make sure that the AFT AUX FUEL PRESS LOW indication stays off.
- (d) Reset the AFT AUX TRANS B pump GFI relay as follows:
 - 1) Push the RESET indicator at the top of the GFI relay.
 - 2) Make sure that the RESET Indicator stays down and the white band on the indicator is not shown.
 - 3) Make sure that the AFT AUX FUEL PRESS LOW indication stays off.
- (e) Set and hold the AFT AUX TRANS B switch in the TEST position.
 - 1) Make sure that the AFT AUX FUEL PRESS LOW indication come on momentarily and then goes out.
 - 2) Make sure that the FUEL QTY indicator for the CTR tank shows an increase of fuel and you can hear an audible sound from the transfer pump.
- (f) Release the AFT AUX TRANS B switch.
 - 1) Make sure the AFT AUX TRANS B switch moved to the OFF position.

———— **END OF TASK** ————

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ENGINE START PUMP - TROUBLE SHOOTING

1. General

A. The intent of this procedure is to identify the wiring faults in the engine start pump circuit prior to resetting the circuit breaker.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

Table 101

Name and Number	Manufacturer
Multimeter	Not Specified

3. Trouble Shooting - Engine Start Pump Tripped Circuit Breaker

A. Engine Start Pump Tripped Circuit Breaker Check

(1) Open access panel (1244C).

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1045, JET FUEL B (JP-4 FUEL)

HAZMAT 1742, JET FUEL JP-4 (DPM 387)

HAZMAT 1044, JET FUELS A AND A-1 (JP-5 FUEL)

HAZMAT 1000, REFER TO MSDS

(2) If any flammable fluids or vapors are found, thoroughly clean the area and correct the source of the leakage.

CAUTION: DO NOT RESET A TRIPPED ENGINE START PUMP CIRCUIT BREAKER UNTIL THE FOLLOWING TROUBLESHOOTING PROCEDURES HAVE BEEN COMPLETED. THIS WILL HELP PREVENT DAMAGE TO THE PUMP AND/OR ITS WIRING.

(3) Verify it is safe to reset the circuit breaker by following this troubleshooting procedure. Fault(s) that resulted in circuit breaker trip must be isolated and corrected prior to reset, if the faults occurred inside the fuel tank or adjacent to any fuel tank wall.

NOTE: The above step is an Airworthiness Limitation Instruction (ALI) procedure. For important information on Airworthiness Limitation Instructions (ALIs), refer to Airworthiness Limitation Precautions. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Make sure that this circuit breaker is open and has safety tag:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

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- (5) Do a check of the wires from the terminal strip S3-2 to engine start pump switch, S1-19 as follows: (WDM 28-22-00)
- (a) Make sure that engine start pump switch, S1-19, is in the OFF position.
 - (b) At terminal strip S3-2 locate the wire that goes to the engine start pump switch, S1-19. Disconnect both engine start pump wires from terminal strip S3-2.
 - (c) With a multimeter, check the wires going from S3-2 to S1-19. Make sure that the wires are not closed to ground. (GENERAL MAINTENANCE PRACTICES - ELECTRICAL, SWPM 20-00-09).
 - 1) If the wires are closed to ground, repair wiring. (WIRING INSTALLATION - MAINTENANCE PRACTICES, SWPM 20-10-01, SHIELDING - MAINTENANCE PRACTICES, SWPM 20-10-02, WIRING SEPARATION AND INSTALLATION - (MD-80 ONLY), SWPM 20-11-00)
 - (d) If wiring is good, remove engine start pump. (ENGINE START PUMP - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-08/201)
- (6) Examine engine start pump electrical connector P1-528 for the following: (WDM 28-22-00)
- (a) Examine the contacts, connector for evidence of connector contact displacement, arcing or overheating.
 - (b) At connector P1-528, using a multimeter check the wiring in connector pin 7. Make sure that pin 7 is not closed to ground.
- CAUTION:** DO NOT REPAIR FUEL PUMP FLEXIBLE CONDUIT OR REPLACE FUEL PUMP CONDUIT ELECTRICAL CONNECTOR ON AIRCRAFT.
- 1) If damage is found or pin 7 is closed to ground, replace conduit/wire assembly. (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201)
- (c) If conduit wiring and connector is good, connect wires at the terminal strip S3-2.
- (7) Install the engine start pump. (ENGINE START PUMP - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-08/201)
- NOTE:** The above steps are an Airworthiness Limitation Instruction (ALI) procedure. For important information on Airworthiness Limitation Instructions (ALIs), refer to Airworthiness Limitation Precautions. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- NOTE:** If the circuit breaker trips after engine start pump replacement and test, perform normal troubleshooting per operator standard practices.
- (8) Close access panel (1244C).

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ENGINE START PUMP - MAINTENANCE PRACTICES

1. General

- A. The engine start pump, located in the right main tank, is accessible through access door 1410C located in upper inboard wing surface.
- B. For general procedures concerning electrical bonding of fuel tank components. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
- C. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201.
- D. Removal/Installation procedures for the engine start pump electrical conduit are provided in maintenance practices. (PAGEBLOCK 28-20-07/201)

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

Table 201

Name and Number	Manufacturer
Pump installation and removal tool 63-0486-1	Eaton Aerospace
Fuel Boost pump removal and installation tool 217323-1	Argo Tech
Torque wrench (200 to 300 inch-pound range)	
Caps, polyethylene DPM 5607	
Plugs DPM 2932	
Petrolatum/White DPM 675	
Torque Strip Fuel Tank Integral Coating DMS 1850-1C	PRC-DeSoto International, Inc. 11601 United Street Mojave, CA 93501

3. Removal/Installation Engine Start Pump

- A. Remove Pump
 - (1) Close crossfeed valve.
 - (2) Defuel right main tank to below level of access door.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

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UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

CAUTION: CARE MUST BE EXERCISED TO NOT ALLOW DEBRIS TO FALL INTO THE TANK DURING REMOVAL OF THE PUMP.

- (4) Remove access door 1410C.
- (5) Engage fingers of pump installation and removal tool with locking ring on pump. (Figure 202)
- (6) Rotate tool counterclockwise against stop.

CAUTION: DO NOT DISCONNECT ELECTRICAL CONNECTOR BEFORE REMOVING PUMP FROM TANK. CARE MUST BE EXERCISED IN HANDLING PUMP WIRING.

- (7) Lift pump installation and removal tool with engine start pump out of start pump base and tank.

CAUTION: ROUND CONNECTOR NUT AND HOSE HEX NUT MUST NOT BE DISTURBED. KEEP PLUG AND RECEPTACLE DRY AND FREE OF CONTAMINATION. IF PLUG AND INSERTS BECOME WET WITH FUEL, CLEAN AND DRY IMMEDIATELY WITH SOFT, CLEAN COTTON CLOTH, DRY AIR, OR OTHER SUITABLE MEANS.

- (8) Disconnect electrical connector (square nut).

B. Install Pump

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (2) Do a visual check of fuel boost pump electrical connector and mating electrical connector as follows:

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- (a) Make sure electrical connector has no bent, broken, or burnt pins or sockets, or unwanted material, or evidence of arcing or overheating. Bent, broken, burnt pins or sockets or evidence of arcing or overheating are not allowed. Clean any unwanted material from connectors as necessary to ensure a good connection.

CAUTION: ROUND CONNECTOR NUT AND HOSE HEX NUT MUST NOT BE DISTURBED. KEEP PLUG AND RECEPTACLE DRY AND FREE OF CONTAMINATION. IF PLUG AND INSERTS BECOME WET WITH FUEL, CLEAN AND DRY IMMEDIATELY WITH SOFT, CLEAN COTTON CLOTH, DRY AIR, OR OTHER SUITABLE MEANS.

- (3) Connect electrical connector to pump. Tighten square nut to torque of 250 to 275 inch-pounds (28.0 to 30.8 N·m).

NOTE: During torquing of square nut slight rotation of pump receptacle, conduit and connector may occur. Clearance between "D" shaped based hole in pump casting may allow a few degrees rotation of receptacle.

- (a) Inspection of the pump connector/torquing is to be witnessed by second individual. If a second individual is not available, recheck the torque and confirm by applying a torque stripe to the connector every time a pump connector is installed.
- (b) The above step is a Critical Design Configuration Control Limitation (CDCCL) procedure. For important information on CDCCLs, refer to Airworthiness Limitation Precautions (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201).
- (4) Ensure start pump and start pump base mating surfaces are clean. Clean surfaces if necessary.

CAUTION: CARE MUST BE EXERCISED TO NOT ALLOW DEBRIS TO FALL INTO THE TANK DURING INSTALLATION OF THE PUMP.

- (5) Engage fingers of pump installation and removal tool with locking ring on pump. (Figure 202)
- (6) Install access door 1410C.
- (7) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

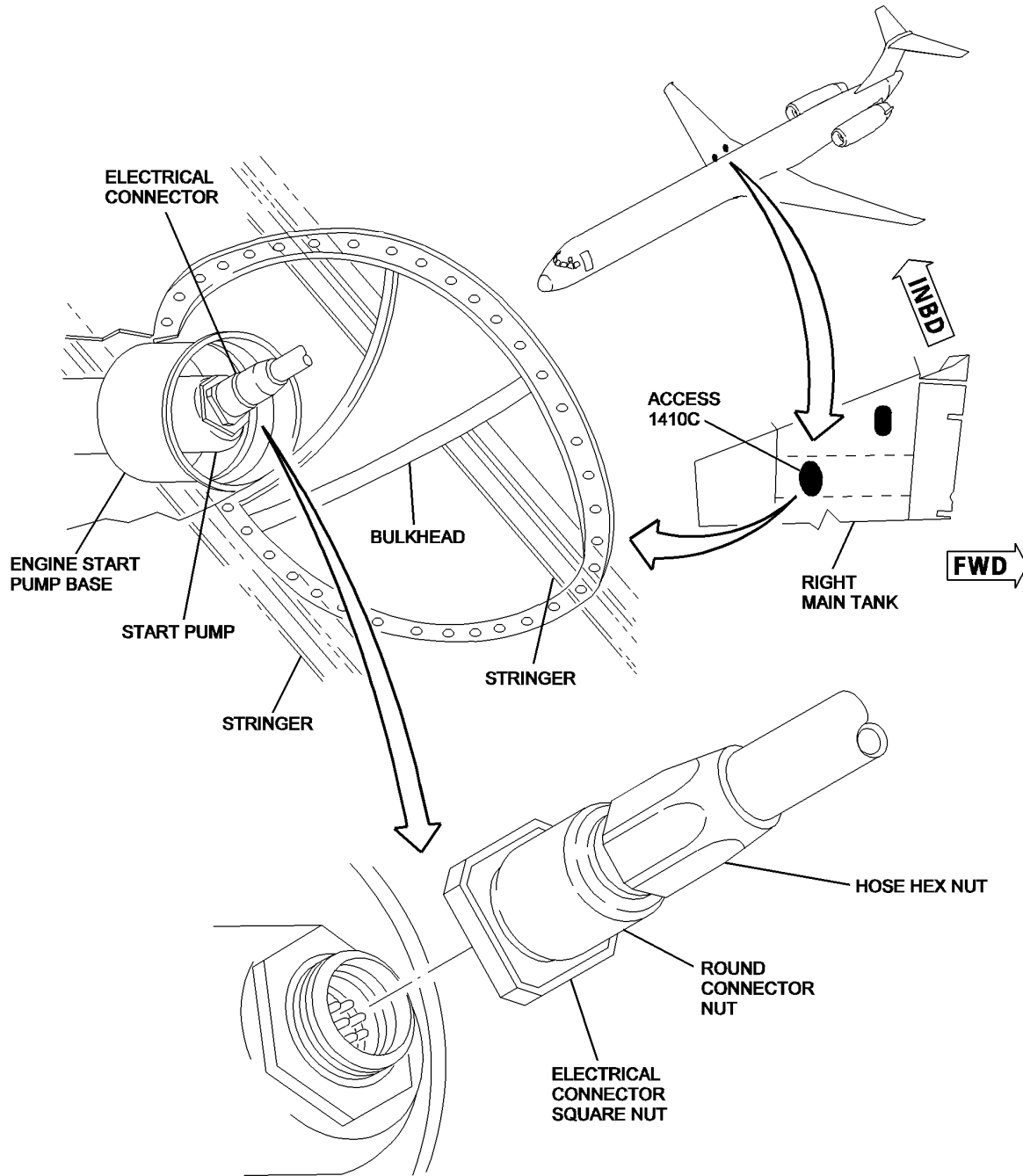
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Engine Start Pump -- Removal/Installation
Figure 201/28-20-08-990-801

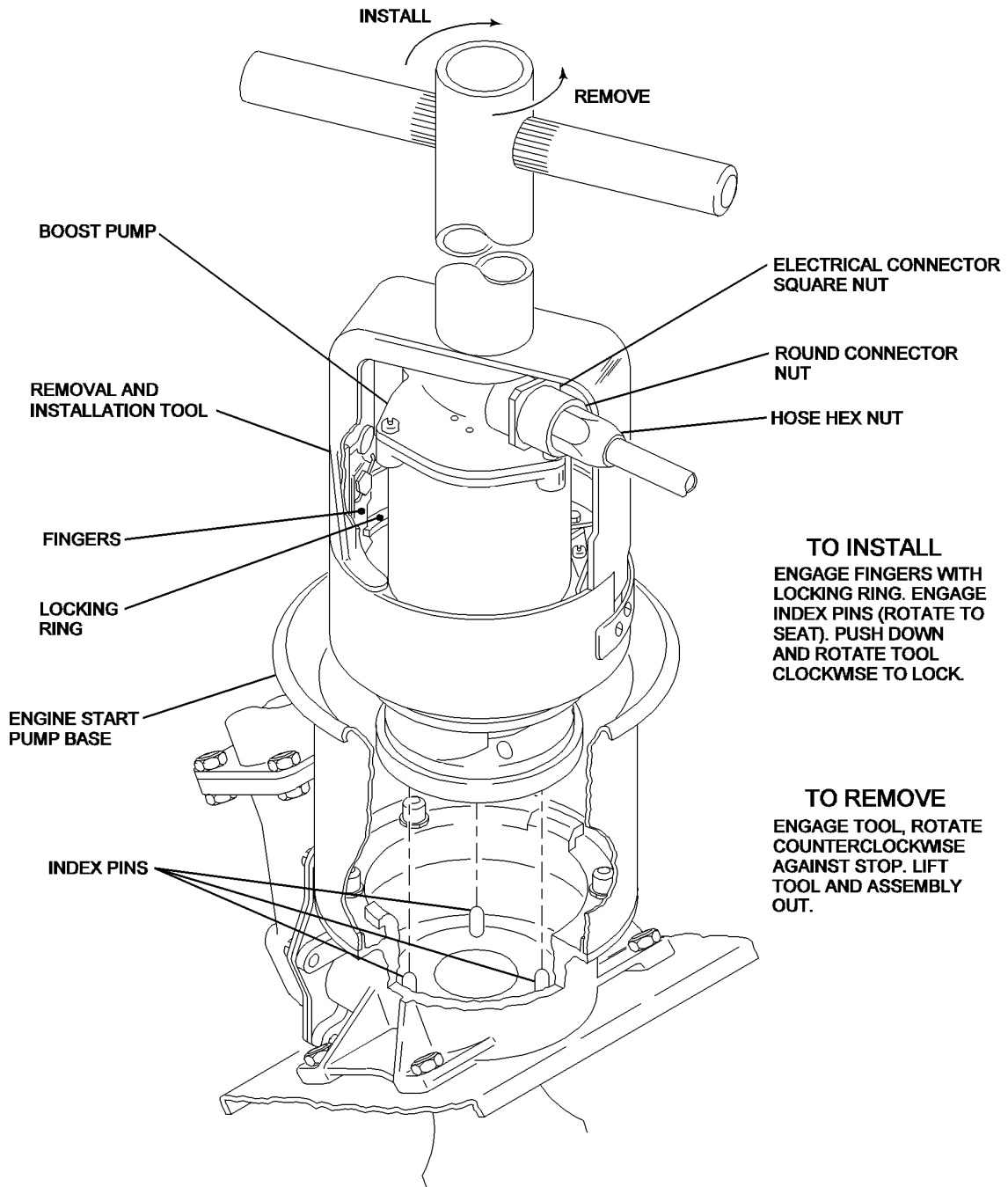
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TO INSTALL
ENGAGE FINGERS WITH LOCKING RING. ENGAGE INDEX PINS (ROTATE TO SEAT). PUSH DOWN AND ROTATE TOOL CLOCKWISE TO LOCK.

TO REMOVE
ENGAGE TOOL, ROTATE COUNTERCLOCKWISE AGAINST STOP. LIFT TOOL AND ASSEMBLY OUT.

BBB2-28-383
S0000225133V1

**Tool Placement -- Fuel Pump Removal/Installation
Figure 202/28-20-08-990-802**

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4. Adjustment/Test Engine Start Pump

A. Test Start Pump

CAUTION: FUEL TANK MUST CONTAIN MINIMUM OF 350 LBS (159 KG) OF FUEL BEFORE STARTING TEST TO PREVENT DAMAGE TO PUMP.

CAUTION: TO PROLONG SERVICE LIFE, DO NOT OPERATE PUMP IN EXCESS OF A DUTY CYCLE OF 30 SECONDS ON, 30 SECONDS OFF, DURING TEST.

- (1) Make certain that right fuel shutoff lever, located on center pedestal, is in off position.
- (2) Make certain that crossfeed valve is closed.

WARNING: DO NOT OPERATE A FUEL PUMP IN AN EMPTY FUEL TANK. PROLONGED DRY RUNNING OF A FUEL PUMP IN AN EMPTY TANK CAN DEGRADE INTERNAL PUMP COMPONENTS AND INCREASE THE RISK OF DEVELOPING A FUEL TANK IGNITION SOURCE.

- (3) Place ENG START PUMP switch, located on overhead switch panel, in ON position. R INLET FUEL PRESS LOW light should go off.

NOTE: Pump operation should be continuously monitored to ensure a pump does not run dry.

NOTE: If it is necessary to leave a pump operating unattended, it must be assured that there is sufficient fuel in the respective tank to ensure the pump(s) will not run dry.

NOTE: Pump should be turned off once the low pressure indication illuminates or the desired fuel quantity is indicated.

- (4) Place ENG START PUMP switch in OFF position. R INLET FUEL PRESS LOW light should come on.

NOTE: If the R. INLET FUEL PRESS. LOW LIGHT does not come on, open the crossfeed valve to relieve pressure.

5. Removal/Installation Engine Start Pump Base

A. Remove Engine Start Pump Base

- (1) Close crossfeed valve.
- (2) Defuel applicable tank. (PAGEBLOCK 28-00-00/201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Open these applicable circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

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UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (4) Remove access door.
- (5) Remove engine start pump. Paragraph 3.
- (6) Remove engine start pump base (1) as follows: (Figure 203)
 - (a) Disconnect pressure port fuel line (2) from union (3).
 - (b) Install protective caps and plugs to open ports.
 - (c) Remove three bolts (4) and washers (5) from engine start pump base (1).
 - (d) Remove bolt (6) and washer (7).

NOTE: Identify bolt (6) for installation. Bolt (6) is shorter than other three mount bolts (4).

- 1) Remove engine start pump base (1) from structural surface bracket.

- (e) Remove union (3) from engine start pump base (1).

- 1) Remove and discard packing (8) from union (3).

B. Install Engine Start Pump Base

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (2) Install engine start pump base as follows: (Figure 203)
 - (a) Prepare mating surface between engine start pump and structural surface bracket for electrical bond. To ensure proper electrical bonding, refer to ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01.

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WARNING: WHITE PETROLATUM IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN WHITE PETROLATUM IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT BREATHE THE MIST.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (b) Lubricate new packing (8) with petrolatum antiseize lubricant (DPM 675).
- 1) Install packing (8) on union (3).
- (c) Install union (3) on engine start pump base (1).
- (d) Install engine start pump base (1) to structural surface bracket with three washers (5) and bolts (4).
- (e) Install washer (7) and bolt (6) to engine start pump base (1).
- NOTE: As identified in removal bolt (6) is shorter than other three mount bolts (4).
- (f) Remove protective caps and plugs from open ports.
- (g) Connect pressure port fuel line (2) to union (3).
- (h) Do an electrical bond check of engine start pump base (1) and structural bracket surface. Maximum allowable resistance measurement is 0.0025 ohm. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
- (3) Install engine start pump. Paragraph 3.

CAUTION: BEFORE INSTALLING ACCESS DOOR, PERFORM FINAL CHECK TO MAKE CERTAIN THAT ALL TOOLS, RAGS, AND HARDWARE, ETC. HAVE BEEN REMOVED FROM TANK.

- (4) Install access door.
- (5) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

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UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (6) Test start pump. Paragraph 4.

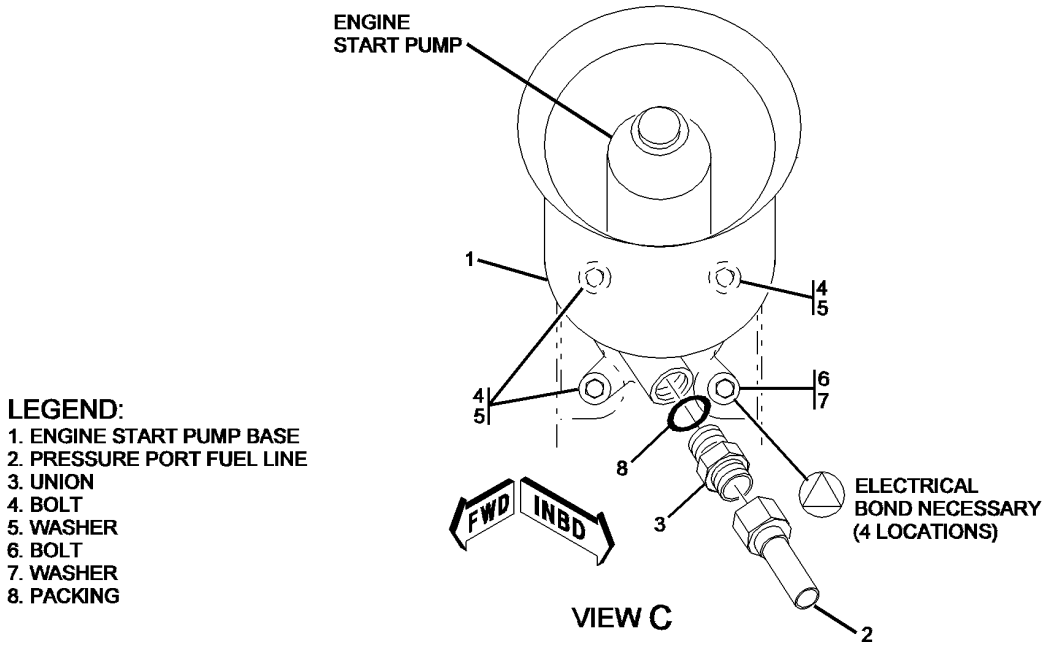
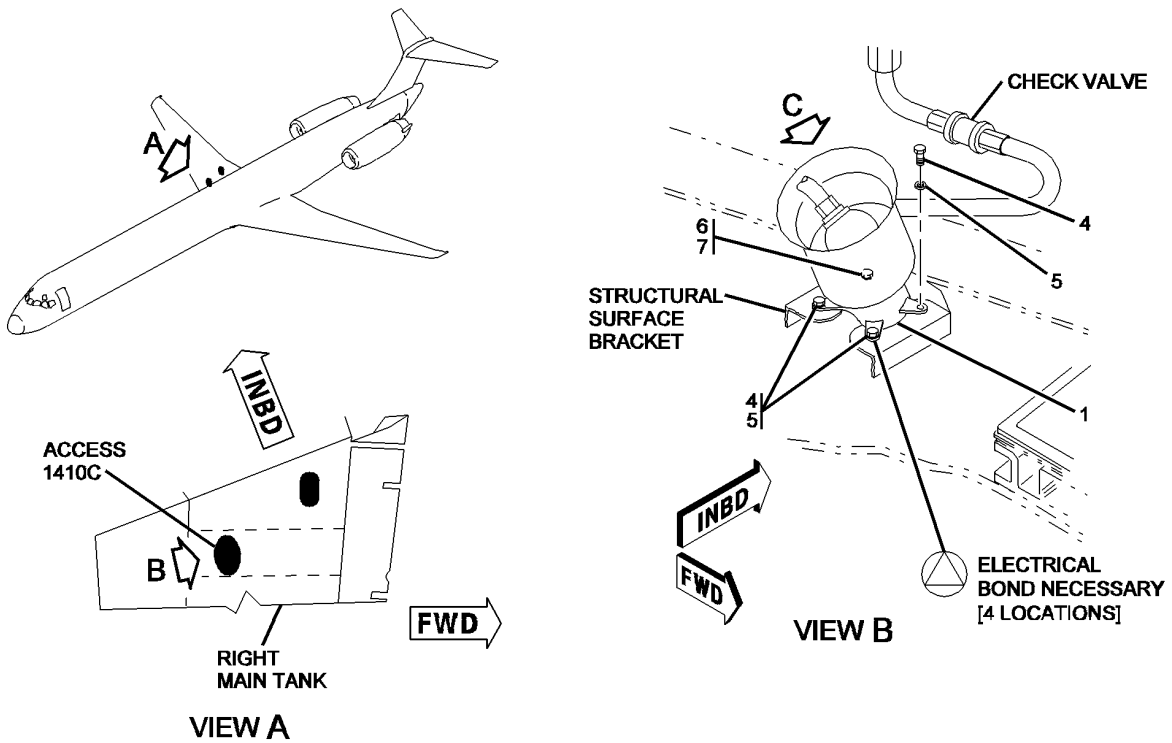
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- LEGEND:**
- 1. ENGINE START PUMP BASE
 - 2. PRESSURE PORT FUEL LINE
 - 3. UNION
 - 4. BOLT
 - 5. WASHER
 - 6. BOLT
 - 7. WASHER
 - 8. PACKING

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**Engine Start Pump Base - Removal/Installation
Figure 203/28-20-08-990-803**

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ENGINE START PUMP CHECK VALVE - MAINTENANCE PRACTICES

1. General

- A. There is one engine start pump check valve located in the inboard end of the right main tank. The valve is located in the start pump line directly below the pressure line which runs from the aft main pump to the crossfeed line.
- B. Removal of the valve is through access door 1410C, located in upper inboard wing surface.
- C. For general procedures concerning electrical bonding of fuel tank components, refer to the ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01.
- D. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices (PAGEBLOCK 28-00-00/201).

2. Removal/Installation Engine Start Pump Check Valve

A. Remove Valve

- (1) Close crossfeed valve.
- (2) Prepare right main tank for entry. (PAGEBLOCK 28-00-00/201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (4) Remove valve.

B. Install Valve

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

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UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (2) Manually check valve for freedom of movement.
- (3) Place valve in position and secure lines to valve.

CAUTION: BEFORE INSTALLING ACCESS DOOR, PERFORM FINAL CHECK TO MAKE CERTAIN THAT ALL TOOLS, RAGS, HARDWARE, ETC. HAVE BEEN REMOVED FROM TANK.

- (4) Install access door.
- (5) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

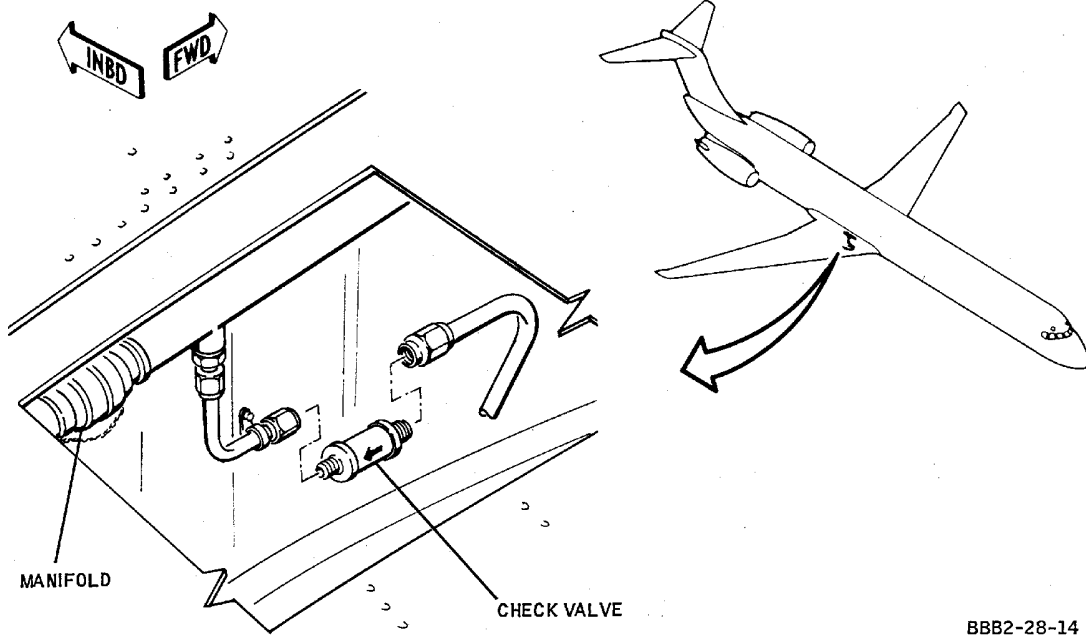
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Engine Start Pump Check Valve -- Removal/Installation
Figure 201/28-20-09-990-801

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CENTER TANK PUMP SUCTION CHECK VALVE - MAINTENANCE PRACTICES

1. General

- A. The center tank pump suction check valve is located in the pump suction line in the aft section of the center tank just to the right of aircraft centerline. The valve has an index pin on the upstream end.
- B. The valve is accessible through access door 2302C located in the upper inboard wing surface.
- C. Procedures for electrical bonding of fuel tank components is located in the ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01.
- D. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices (PAGEBLOCK 28-00-00/201).

2. Removal/Installation Center Tank Pump Suction Check Valve

A. Remove Valve

- (1) Defuel each main tank to 1250 lbs. (567 KGS) or less.
- (2) Prepare center tank for entry (PAGEBLOCK 28-00-00/201).

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (4) Remove valve. Discard Gask-O-Seals.

B. Install Valve

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WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (2) Manually check valve for freedom of movement.
 (3) Install valve with new Gask-O-Seals.

NOTE: Index pin on valve is inboard.

CAUTION: BEFORE INSTALLING ACCESS DOOR, PERFORM FINAL CHECK TO MAKE CERTAIN THAT ALL TOOLS, RAGS, HARDWARE, ETC. HAVE BEEN REMOVED FROM TANK.

- (4) Install access door.
 (5) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C

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UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

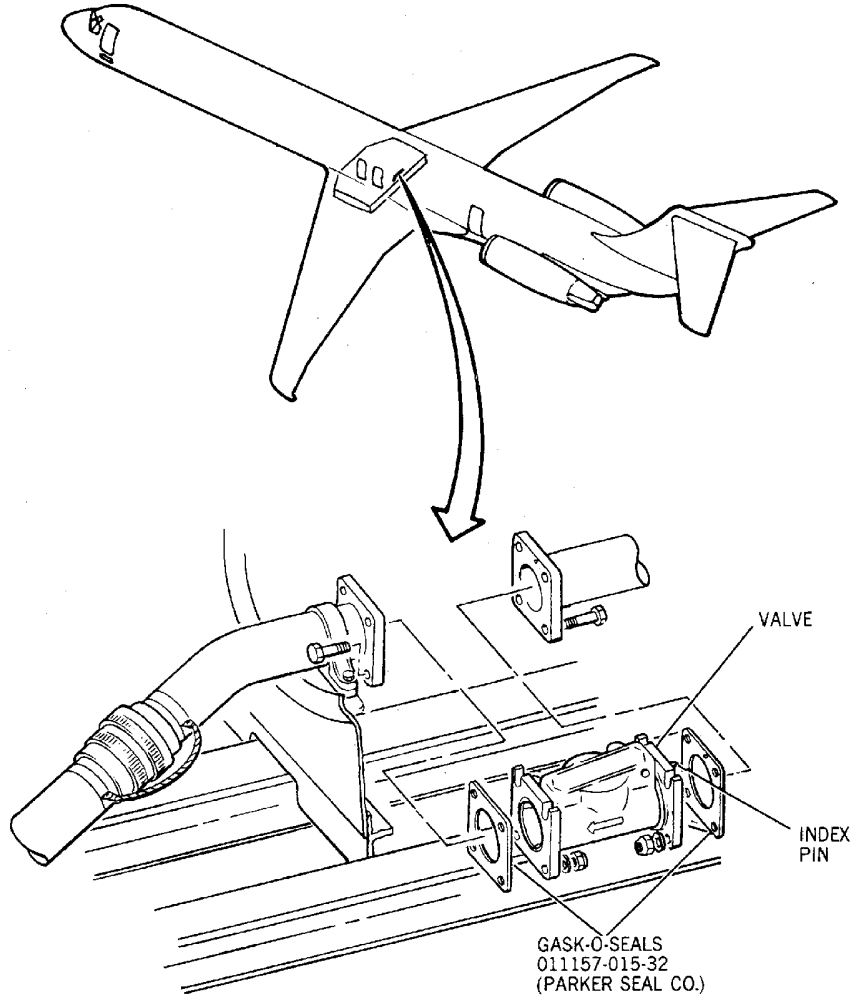
<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

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Center Tank Pump Suction Check Valve -- Removal/Installation
Figure 201/28-20-10-990-801

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CENTER TANK PUMP DISCHARGE CHECK VALVES - MAINTENANCE PRACTICES

1. General

- A. There are two center tank pump discharge check valves located in the aft section of the center tank just to the right of aircraft centerline. One valve is located in each of the pump discharge lines downstream of the tee. Direction of flow is indicated by an arrow on the valve body.
- B. Access to the valves is through access door 1436C located in the upper inboard wing surface.
- C. For general procedures concerning electrical bonding of fuel tank components, refer to the ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01.
- D. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices. (PAGEBLOCK 28-00-00/201)

2. Removal/Installation Center Tank Pump Discharge Check Valves

A. Remove Valve

- (1) Close applicable engine fuel fire shutoff valve.
- (2) Check that APU fuel fire shutoff valve is closed.
- (3) Defuel each main tank to 1250 lbs. (567 kgs) or less.
- (4) Prepare center tank for entry. (PAGEBLOCK 28-00-00/201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (5) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (6) Remove valve. Discard seal and Gask-O-Seal.

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B. Install Valve

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (2) Check valve for freedom of movement.
 (3) Install valve (flow arrow pointing aft) using new seal and Gask-O-Seal. Install seal at outlet end of check valve.

CAUTION: BEFORE INSTALLING ACCESS DOOR PERFORM FINAL CHECK TO MAKE CERTAIN THAT ALL TOOLS, RAGS, HARDWARE, ETC. HAVE BEEN REMOVED FROM TANK.

- (4) Install access door.
 (5) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

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UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

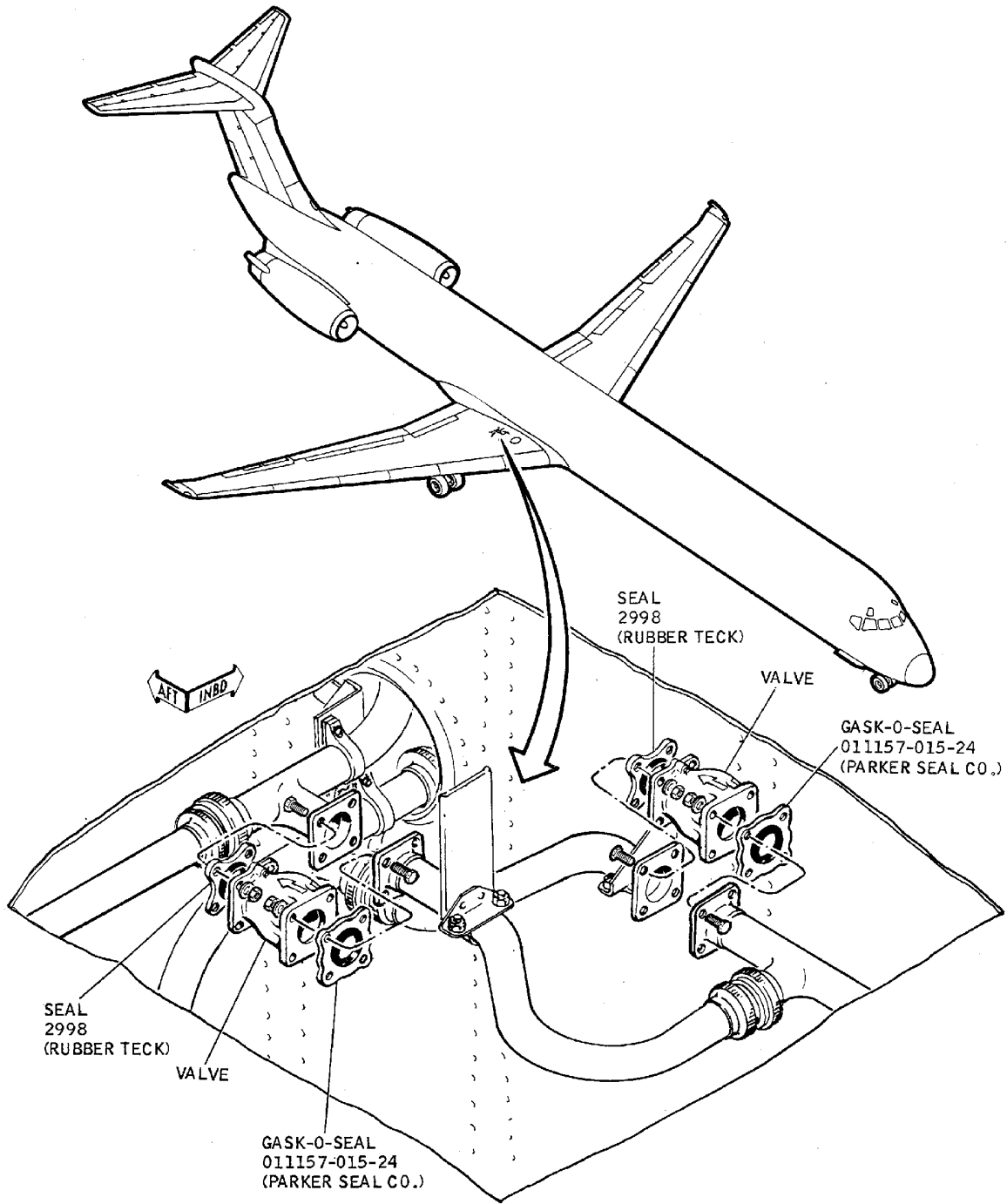
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BBB2-28-16

Center Tank Pump Discharge Check Valve -- Removal/Installation
Figure 201/28-20-11-990-801

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FUEL CROSSFEED VALVE - REMOVAL/INSTALLATION

1. General

- A. The fuel crossfeed valve is located on the forward face of the right wing front spar near the inboard end. Access to the valve is through access door 1244C, located on lower inboard area of wing leading edge.
- B. No rigging of the valve cable system is necessary, if the rigging was satisfactory before valve removal, and the rigging was not disturbed during valve removal and installation.
- C. For general procedures concerning electrical bonding of fuel tank components, refer to the ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01.
- D. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201).

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed item:

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 401

Name and Number	Manufacturer
Petrolatum, VV-P-236 DPM 675	Accessory Products Co.

3. Removal/Installation Fuel Crossfeed Valve

- A. Remove Valve

WARNING: MAKE SURE THE SLATS DO NOT ACCIDENTALLY OPERATE. ACCIDENTAL OPERATION OF THE SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Depressurize hydraulic system. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 29-00-00/201)

WARNING: DO NOT OPERATE FLAP/SLAT CONTROL LEVER, MAINTENANCE BEING PERFORMED ON FUEL SYSTEM COMPONENTS INSTALLED ON WING SPAR. INADVERTENT OPERATION OF FLAP/SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (2) Install "DO NOT OPERATE" Placard on FLAP/SLAT control lever.
- (3) Close engine fuel fire shutoff valves.
- (4) Check that APU fuel fire shutoff valve is closed.
- (5) Defuel each main tank to 1700 lbs. (771.8 kgs.) or less.
- (6) Open crossfeed valve.

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WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (7) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (8) Disconnect pushrod.
(9) Remove valve. Discard O-ring.

B. Install Valve

NOTE: Housings and valves must be of the same manufacturer. Intermixing of valve from one manufacturer and housing from another manufacturer will not work.

WARNING: MAKE SURE THE SLATS DO NOT ACCIDENTALLY OPERATE. ACCIDENTAL OPERATION OF THE SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Make certain hydraulic system is depressurized.(GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 29-00-00/201)

WARNING: DO NOT OPERATE FLAP/SLAT CONTROL LEVER, MAINTENANCE BEING PERFORMED ON FUEL SYSTEM COMPONENTS INSTALLED ON WING SPAR. INADVERTENT OPERATION OF FLAP/SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (2) Make certain "DO NOT OPERATE" placard is installed on FLAP/SLAT control lever.

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WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

WARNING: LOW VISCOSITY POLYSULFIDE SEALANT IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOW VISCOSITY POLYSULFIDE SEALANT IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW VISCOSITY POLYSULFIDE SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (4) Lubricate seal on valve flange with Pertolatum (VV-P-236).

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- (5) Using new O-ring, install valve.
- (6) Connect pushrod. Install cotter pin.
- (7) Push left or right engine fire handle (on main instrument panel) completely in. Do not rotate.
- (8) Manually open pneumatic crossfeed valve.
- (9) Remove tag from FLAP/SLAT control lever.
- (10) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

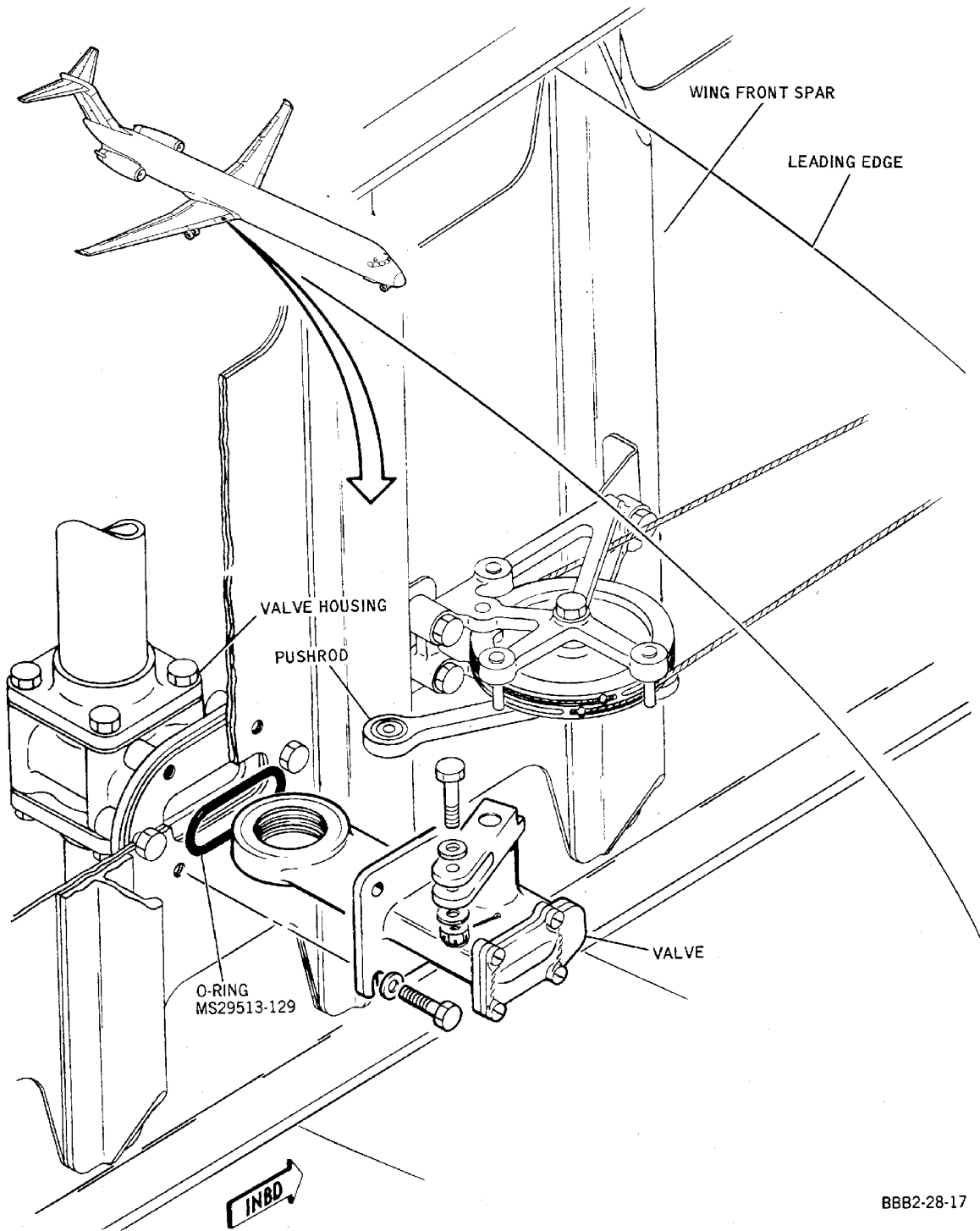
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BBB2-28-17

Fuel Crossfeed Valve -- Removal/Installation
Figure 401/28-20-12-990-801

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FUEL CROSSFEED VALVE - ADJUSTMENT/TEST

1. General

- A. The fuel crossfeed valve control lever is located on the forward side of the center control pedestal. The valve actuating drum is accessible through access door in the right wing leading edge near the inboard end. The turnbuckles are in the forward cargo compartment, below the center of the main cabin compartment floor.
- B. The rig pin must not bind in rig pin hole. If any force is required to insert or remove the rig pin, the cables must be rerigged, within tolerances, to eliminate the binding. Do not stretch cables to align holes. The rig pin used in this procedure has a length of 3 inches (76.2 mm) and a diameter of 1/4 inch (6.35 mm).
- C. The number and letter enclosed by the hexagon shaped symbol shown in Figure 501 correspond to cable run numbers and segment letters listed in Table 502.
- D. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

NOTE: Some materials in the Equipment and Materials list may not be permitted to be used in your location. Persons in each location must make sure they are permitted to use these materials. All persons must obey all applicable federal, state, local, and provincial regulations for their location.

Table 501

Name and Number	Manufacturer
Tensiometer T5-2006-115	Pacific Scientific
Rig pin RP-1	
Spring scale 0-20 pounds	

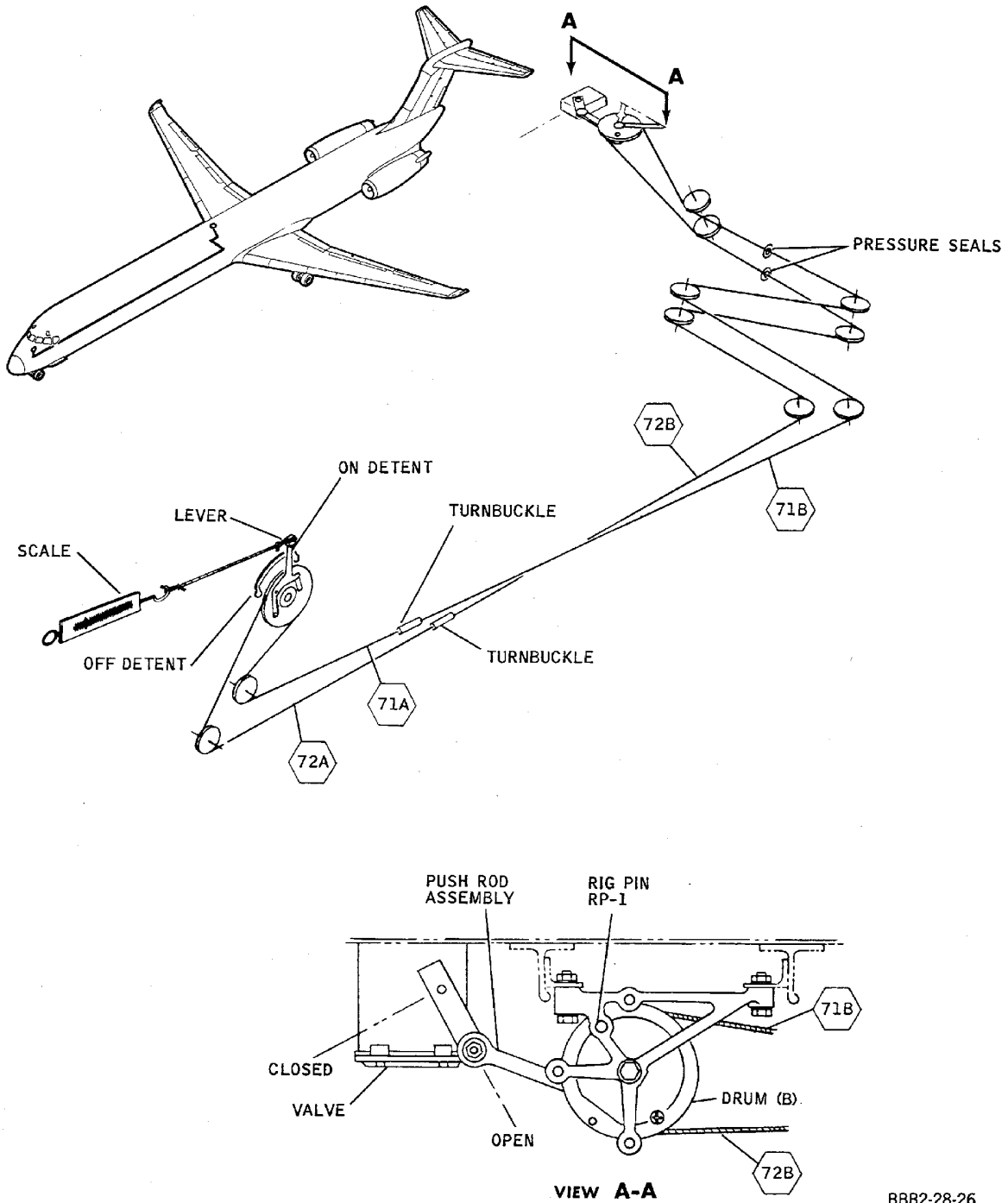
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**Fuel Crossfeed Control System Rigging Diagram
Figure 501/28-20-12-990-803**

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3. Adjustment/Test Crossfeed Valve

A. Adjust Lever

WARNING: MAKE SURE THE SLATS DO NOT ACCIDENTALLY OPERATE. ACCIDENTAL OPERATION OF THE SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Depressurize hydraulic system. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 29-00-00/201)

WARNING: DO NOT OPERATE FLAP/SLAT CONTROL LEVER, MAINTENANCE BEING PERFORMED ON FUEL SYSTEM COMPONENTS INSTALLED ON WING SPAR. INADVERTENT OPERATION OF FLAP/SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (2) Install "DO NOT OPERATE" Placard on FLAP/SLAT control lever.
- (3) Place lever in on position detent.
- (4) Install rig pin RP-1 through bracket and drum (B).
- (5) Differentially adjust turnbuckles to obtain a rig load of 15 pounds at 70°F (6.8 kg at 21.1°C) (Figure 502) and rig pin can be freely removed from drum without binding.
- (6) Test operation. (Paragraph 3.B.)
- (7) Safety turnbuckles with clips.
- (8) Remove tag from FLAP/SLAT control lever.

B. Test Valve

- (1) Place lever in off position detent. Valve should be in off position.
- (2) Return lever to open position detent. Valve should be in on position.
- (3) Attach spring scale to lever knob and check force required to move lever. Force required to move lever from any position should not exceed 16 pounds (7.2 kg).

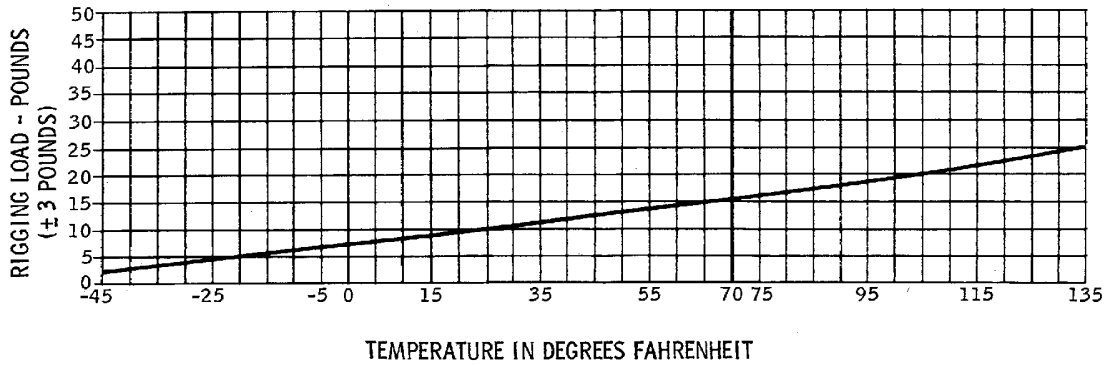
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Fuel Crossfeed Cable Tension Chart Figure 502/28-20-12-990-804

4. Cable Assemblies

- A. Cable run numbers and segment letters listed below correspond to the callouts in hexagonal symbol in Figure 501.

Table 502 Fuel Crossfeed Valve Cable Run Numbers

Function	Cable Run Numbers	Segment Letter
Fuel crossfeed valve off	71	A
	71	B
Fuel crossfeed valve on	72	A
	72	B

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ENGINE FUEL FIRE SHUTOFF VALVE - MAINTENANCE PRACTICES

1. General

- A. The two engine fuel fire shutoff valves are located on the aft faces of the left and right wing rear spars. Each valve is accessible through the corresponding main gear strut opening.
- B. Removal and installation procedures for both valves are identical. No rigging of cable system is required after valve installation if cable rigging has not been disturbed. (If adjustment is necessary, refer to Chapter 76.)
- C. For general procedures concerning electrical bonding of fuel tank components, refer to the ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01.
- D. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices. (PAGEBLOCK 28-00-00/201)

WARNING: MAKE CERTAIN THAT LANDING GEAR CONTROL LEVER IS IN DOWN POSITION, ALL LANDING GEAR GROUND LOCKPINS ARE INSTALLED, AND MAIN GEAR DOORKEEPERS ARE INSTALLED. THIS WILL HELP PREVENT INJURY TO PERSONS AND DAMAGE TO THE AIRCRAFT.

- E. Drain fuel line shroud system any time fuel line has been disconnected to drain any fuel left from removal/installation of fuel line. This will prevent a false indication of leakage at a later date.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

NOTE: NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 201

Name and Number	Manufacturer
Sealant, low adhesion PR-1428 or PR-1773 B-1/2 or PR-1773 B-2 DMS 2410	Products Research & Chemical Corp.
Solvent, hand wipe cleaner DPM 6410	Monsanto Company St. Louis, MO
Plastic scraper	
Suitable container (3 US gals.(2.498 Imp. gals.)(11.355 liters) minimum)	

3. Removal/Installation Engine Fuel Fire Shutoff Valve

- A. Remove Valve (Figure 201)

WARNING: MAKE SURE THE SLATS DO NOT ACCIDENTALLY OPERATE. ACCIDENTAL OPERATION OF THE SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Depressurize hydraulic system. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 29-00-00/201)

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WARNING: DO NOT OPERATE FLAP/SLAT CONTROL LEVER DURING MAINTENANCE OF FUEL SYSTEM COMPONENTS INSTALLED IN THE WING FRONT SPAR AREA. INADVERTENT OPERATION OF THE FLAPS AND/OR SLATS COULD CAUSE INJURY TO PERSONNEL AND DAMAGE TO THE AIRCRAFT.

- (2) Install "DO NOT OPERATE" Placard on FLAP/SLAT control lever.
- (3) Close crossfeed valve.
- (4) Defuel fuel tanks to below indicated levels:

Table 202

Main tank corresponding to side from which shutoff valve is being removed.	1250 pounds (567 kilograms)
Center wing tank	12,900 pounds (5851 kilograms)
Opposite main tank	1250 pounds (567 kilograms)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (5) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (6) Disconnect lever from cable fitting.
- (7) Remove lever from valve.
- (8) Disconnect drain line from shroud.

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- (9) Remove retainer and slide seal aft.
- (10) Remove shroud mounting bolts and slide shroud aft on fuel line.

CAUTION: PLACE CONTAINER UNDER FITTING TO CATCH RESIDUAL FUEL.

- (11) Disconnect fuel line and remove valve.
- (12) Remove and discard shroud gasket.
- (13) Remove grommet from shroud and discard.

B. Install Valve

WARNING: MAKE SURE THE SLATS DO NOT ACCIDENTALLY OPERATE. ACCIDENTAL OPERATION OF THE SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Make certain hydraulic system is depressurized. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 29-00-00/201)

WARNING: DO NOT OPERATE FLAP/SLAT CONTROL LEVER DURING MAINTENANCE OF FUEL SYSTEM COMPONENTS INSTALLED IN THE WING FRONT SPAR AREA. INADVERTENT OPERATION OF THE FLAPS AND/OR SLATS COULD CAUSE INJURY TO PERSONNEL AND DAMAGE TO THE AIRCRAFT.

- (2) Make certain "DO NOT OPERATE" placard is installed on FLAP/SLAT control lever.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

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WARNING: SEALANT REMOVER SOLVENT IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN SEALANT REMOVER SOLVENT IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET SEALANT REMOVER SOLVENT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

(4) Using solvent (handwipe cleaner DPM 6410), clean old sealant from shroud, lever and valve.

WARNING: LOW ADHESION SEALANT IS AN AGENT THAT IS POISONOUS. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN LOW ADHESION SEALANT IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW ADHESION SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

(5) Install new grommet in shroud and apply fillet of sealant around grommet. (Figure 201)

(6) Position new shroud gasket on shroud plate.

(7) Place valve with O-rings, in position and connect fuel line.

(8) Temporarily install lever on valve shaft.

(9) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

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UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (10) Check that fuel shutoff lever is in off position.
- (11) Check that engine fire shutoff valve is open.
- (12) Place corresponding FUEL TANKS AFT and FWD PUMPS switches in ON position.
- (13) Observe that applicable engine INLET FUEL PRESS LO annunciator light is off.
- (14) Check engine fire shutoff valve and connections for leakage.
- (15) Place FUEL TANKS AFT and FWD PUMPS switches in OFF position.
- (16) Slide shroud forward.

WARNING: LOW ADHESION SEALANT IS AN AGENT THAT IS POISONOUS. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN LOW ADHESION SEALANT IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW ADHESION SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS MSDS FOR:

- MORE PRECAUTIONARY DATA.
 - APPROVED SAFETY EQUIPMENT.
 - EMERGENCY MEDICAL AID.
 - TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.
- (17) Apply sealant to keyway in lever and install lever on valve, making certain that arrow on valve shaft is pointing toward and in line with lever.
 - (18) Fill cavity in lever at end of valve shaft with sealant. Install washer and nut.

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- (19) Connect lever to cable fitting. Install new cotter pin.
- (20) Install shroud.
- (21) Pressure test shroud assembly after sealant cures. (SHROUDED FUEL FEED LINES - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-17/201)
- (22) Connect drain line.
- (23) Remove tag from FLAP/SLAT control lever.
- (24) Test valves. (Paragraph 4.)

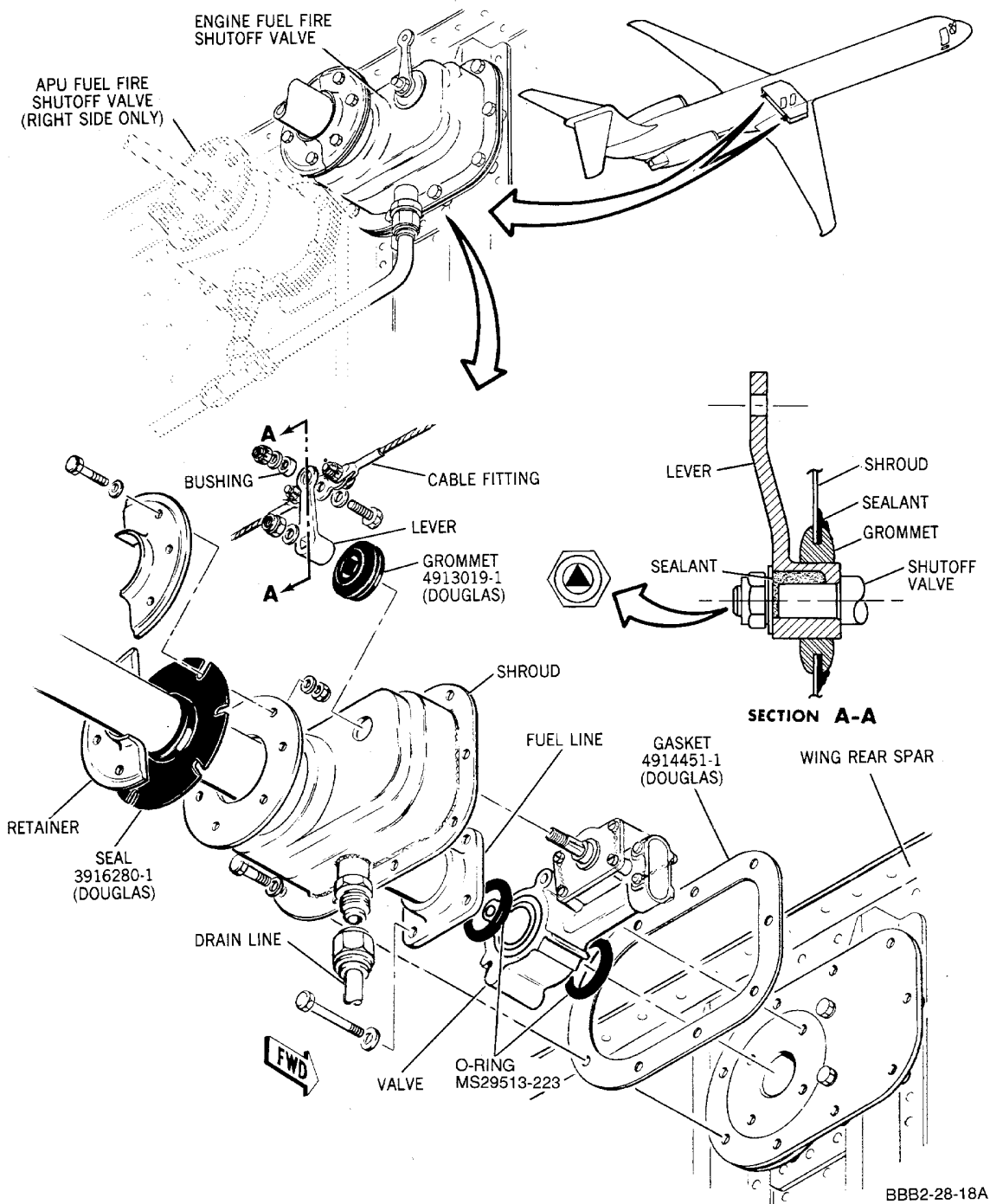
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**Engine Fuel Fire Shutoff Valve - Removal/Installation
Figure 201/28-20-13-990-801**

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4. Adjustment/Test Engine Fuel Fire Shutoff Valve

A. Test Valve

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
X	41	B1-95	FIRE EXTINGUISHING CONTROL BOTTLE 1
X	42	B1-96	FIRE EXTINGUISHING CONTROL BOTTLE 2

- (2) Position controls as follows:

Table 203

Control	Location	Position
Fuel Crossfeed lever	Center pedestal	OFF
Fuel Shutoff levers	Center pedestal	OFF

CAUTION: DO NOT ROTATE ENGINE FIRE HANDLES. THIS RESULTS IN RELEASE OF FIRE EXTINGUISHING AGENT, AND REQUIRES REPLACEMENT OF FIREX CARTRIDGES AND BOTTLES.

- (3) Pull left and right engine fire handles (on main instrument panel) completely out. Do not rotate.

NOTE: This also closes pneumatic crossfeed valve.

- (4) Check that L INLET FUEL PRESS LOW and R INLET FUEL PRESS LOW indications appear.
- (5) Place CTR FUEL TANK AFT PUMP and FWD PUMP switches in ON position.
- (6) Check that L INLET FUEL PRESS LOW and R INLET FUEL PRESS LOW indications remain for minimum of 30 seconds.
- (7) Push left and right engine fire handles (on main instrument panel) completely in. Do not rotate.
- (8) Check that L INLET FUEL PRESS LOW and R INLET FUEL PRESS LOW indications disappear.
- (9) Place CTR FUEL TANK AFT PUMP and FWD PUMP switches in OFF position.
- (10) Manually close pneumatic crossfeed valve.
- (11) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
X	41	B1-95	FIRE EXTINGUISHING CONTROL BOTTLE 1
X	42	B1-96	FIRE EXTINGUISHING CONTROL BOTTLE 2

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APU FUEL FIRE SHUTOFF VALVE - MAINTENANCE PRACTICE

1. General

- A. The APU fuel fire shutoff valve is located on the aft face of the right wing rear spar inboard of the right engine fuel fire shutoff valve. The valve is accessible through the right main gear strut opening.
- B. For general procedures concerning electrical bonding of fuel tank components, refer to the ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01.
- C. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices. (PAGEBLOCK 28-00-00/201)
- D. Drain fuel line shroud system any time fuel line has been dis-connected; to drain any fuel left from removal/installation of fuel line. This will prevent a false indication of leakage at a later date.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 201

Name and Number	Manufacturer
Sealant, low adhesion PR-1428 or PR-1773 B-1/2 or PR-1773 B-2 DMS 2410	Products Research & Chem. Corp.
Solvent, hand wipe cleaner DPM 6410	Monsanto Company St. Louis, MO
Plastic scraper	
Suitable container (5 US gal. (4.16 Imp. gal.) (18.93 liters) minimum)	
Main gear door safety lock 4916793 -1 (on ground) -501 (on jacks)	Douglas Aircraft Co.

3. Removal/Installation APU Fuel Fire Shutoff Valve

- A. Remove Valve

WARNING: MAKE SURE THE SLATS DO NOT ACCIDENTALLY OPERATE. ACCIDENTAL OPERATION OF THE SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Depressurize hydraulic system. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 29-00-00/201)

WARNING: DO NOT OPERATE FLAP/SLAT CONTROL LEVER DURING MAINTENANCE OF FUEL SYSTEM COMPONENTS INSTALLED IN THE WING FRONT SPAR AREA. INADVERTENT OPERATION OF THE FLAPS AND/OR SLATS COULD CAUSE INJURY TO PERSONNEL AND DAMAGE TO THE AIRCRAFT.

- (2) Install "DO NOT OPERATE" Placard on FLAP/SLAT control lever.
- (3) Close crossfeed valve.
- (4) Defuel fuel tanks to below indicated levels:

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Table 202

Main tank corresponding to side from which shutoff valve is being removed.	1250 pounds (567 kilograms)
Center wing tank	12,900 pounds (5851 kilograms)
Opposite main tank	1250 pounds (567 kilograms)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

WARNING: DOORKEEPERS MUST BE INSTALLED WHEN PERSONNEL ARE WORKING IN WHEEL WELLS.

- (5) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

OVERHEAD BATTERY BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	21	B1-291	APU CONTROL

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (6) Disconnect electrical connector.
 (7) Disconnect drain line from shroud.
 (8) Remove retainer and slide seal aft.
 (9) Remove shroud mounting bolts and slide shroud aft on fuel line.

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CAUTION: PLACE CONTAINER UNDER FITTING TO CATCH RESIDUAL FUEL.

- (10) Disconnect fuel line.

NOTE: A low-pressure fuel line or test panel connection may be opened in APU area to provide line venting for faster draining.

- (11) Remove valve. Discard Gask-O-Seals.
 (12) Remove and discard shroud gasket.
 (13) Remove grommet from shroud and discard.

B. Install Valve

WARNING: MAKE SURE THE SLATS DO NOT ACCIDENTALLY OPERATE. ACCIDENTAL OPERATION OF THE SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Make certain hydraulic system is depressurized. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 29-00-00/201)

WARNING: DO NOT OPERATE FLAP/SLAT CONTROL LEVER DURING MAINTENANCE OF FUEL SYSTEM COMPONENTS INSTALLED IN THE WING FRONT SPAR AREA. INADVERTENT OPERATION OF THE FLAPS AND/OR SLATS COULD CAUSE INJURY TO PERSONNEL AND DAMAGE TO THE AIRCRAFT.

- (2) Make certain "DO NOT OPERATE" placard is installed on FLAP/SLAT control lever.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THESE HAZARDOUS AGENTS.

- (3) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

OVERHEAD BATTERY BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	21	B1-291	APU CONTROL

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C

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(Continued)

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

WARNING: SEALANT REMOVER SOLVENT IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN SEALANT REMOVER SOLVENT IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET SEALANT REMOVER SOLVENT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (4) Clean old sealant from shroud and valve with solvent (hand wipe cleaner, DPM 6410).
- (5) Install new grommet in shroud.
- (6) Position new shroud gasket on shroud plate.

CAUTION: PRIOR TO INSTALLATION, OBSERVE UPSTREAM SEAL DISC BY VIEWING INTO INLET PORT WITH VALVE CLOSED. UPSTREAM SEAL DISC SHOULD HAVE HOLE IN IT.

- (7) Using new Gask-O-Seals install shutoff valve.
- (8) Connect fuel line.
- (9) Connect electrical connector.

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- (10) If APU has been replaced, perform maintenance operational check of APU fire shutoff solenoid valve. (Paragraph 4.)

NOTE: APU fire shutoff solenoid valve operational check should be accomplished at APU change, prior to installation of the APU.

- (11) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

OVERHEAD BATTERY BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	21	B1-291	APU CONTROL

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (12) Check that fuel shutoff lever is in OFF position.

CAUTION: DO NOT PLACE APU MASTER SWITCH TO START.

- (13) Place APU MASTER switch in RUN position to open APU fire shutoff valve.
 (14) Place RIGHT FUEL TANK AFT and FWD PUMPS switches in ON position.

NOTE: If AC power is not available, ENG START PUMP switch may be used to test APU fire shutoff valve.

- (15) Check APU fire shutoff valve and connections for leakage.
 (16) Place AFT and FWD PUMPS switches in OFF position.

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WARNING: LOW ADHESION SEALANT IS AN AGENT THAT IS POISONOUS. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN LOW ADHESION SEALANT IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW ADHESION SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (17) Install shroud seal grommet with sealant.
- (18) Connect drain line.
- (19) Remove tag from FLAP/SLAT control lever.

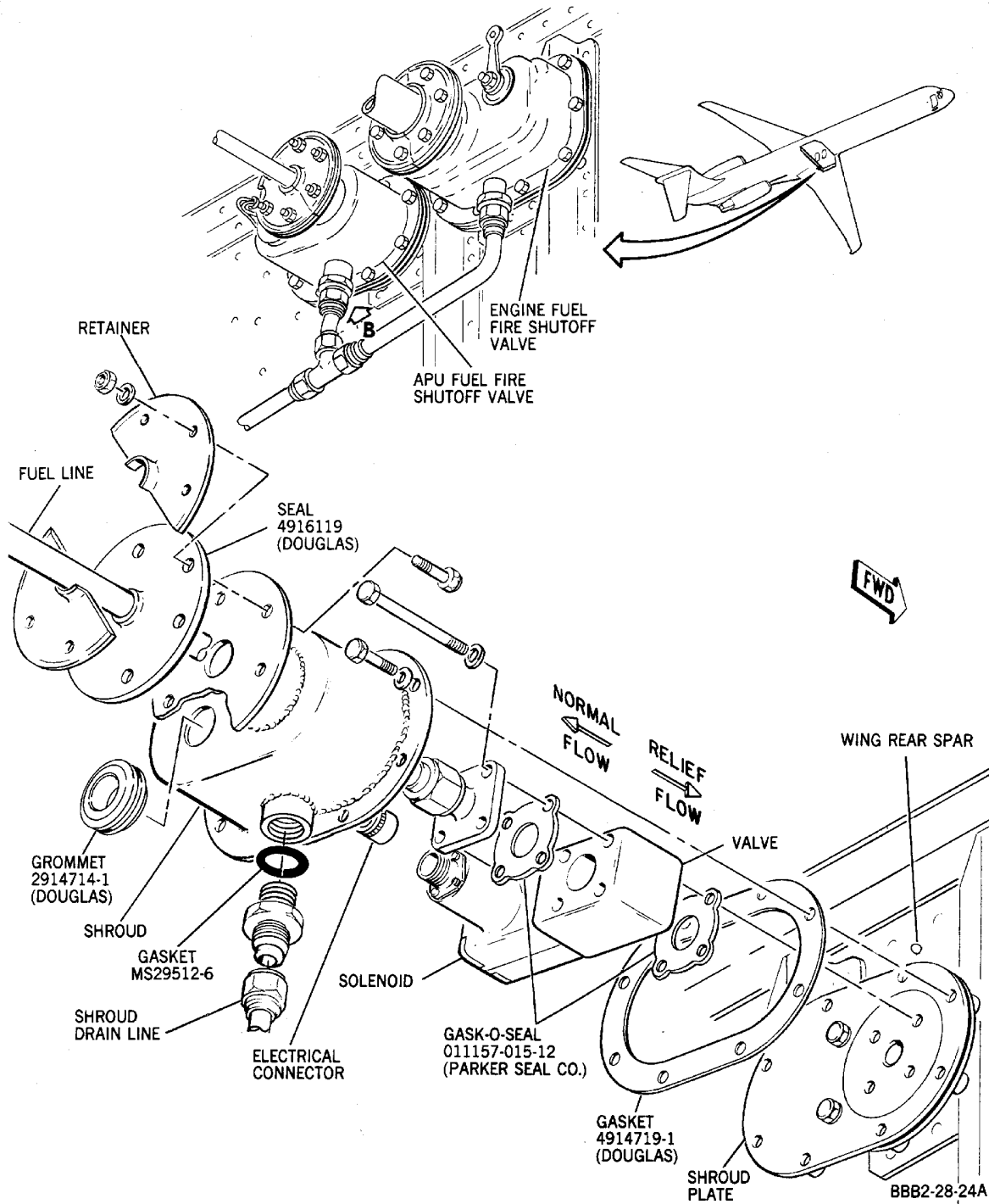
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APU Fuel Fire Shutoff Valve -- Removal/Installation
Figure 201/28-20-14-990-801

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4. Check APU Fuel Fire Shutoff Valve

A. Check APU Fuel Fire Shutoff Solenoid Valve

- (1) Perform an operational maintenance check of APU fuel fire shutoff solenoid valve as follows:
 - (a) Provide five gallon (18.93 liters) container to catch fuel that will exit from APU fuel supply line (Figure 201).
 - (b) Connect suitable drain hose from open end of APU fuel supply line and route to fuel container.
 - (c) Attach source of 115 VAC, 400 cycle, 3-phase power to external power receptacle and check that power is available to battery bus circuit.
 - (d) Make sure that these circuit breakers are closed:

OVERHEAD BATTERY BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	21	B1-291	APU CONTROL

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (e) Place RIGHT AFT PUMP (boost) switch (located on forward overhead switch panel) to ON position.

CAUTION: DO NOT PLACE APU MASTER SWITCH TO START.

- (f) Check that APU FIRE CONT switch (located on forward overhead switch panel) is in NORM position.
- (g) Place BATT switch to ON position.
- (h) Place APU master switch (located on forward overhead switch panel) to RUN position. Observe that fuel flows freely from shutoff valve into container.
- (i) Place APU master switch to OFF position. Observe that fuel flow stops.
- (j) Place BATT switch to OFF position.
- (k) Place RIGHT AFT PUMP switch to OFF position.
- (l) Remove drain hose from APU fuel supply line.
- (m) Disconnect source of 115 VAC, 400 cycle, 3-phase power from external power receptacle.

5. Approved Repairs APU Fuel Fire Shutoff Valve

A. Remove Solenoid

WARNING: MAKE SURE THE SLATS DO NOT ACCIDENTALLY OPERATE. ACCIDENTAL OPERATION OF THE SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

CAUTION: APU FUEL FIRE SHUTOFF VALVE SOLENOID ASSEMBLY PLUNGER AND SEALS CONTAIN LOADED SPRINGS, SMALL LOCKING PINS AND LAPPED SEAL DISCS WHICH ARE EASILY LOST. IT IS RECOMMENDED THAT APU SHUTOFF VALVE BE REMOVED AND REPLACED AS A UNIT.

- (1) Depressurize hydraulic system. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 29-00-00/201)

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WARNING: DO NOT OPERATE FLAP/SLAT CONTROL LEVER DURING MAINTENANCE OF FUEL SYSTEM COMPONENTS INSTALLED IN THE WING FRONT SPAR AREA. INADVERTENT OPERATION OF THE FLAPS AND/OR SLATS COULD CAUSE INJURY TO PERSONNEL AND DAMAGE TO THE AIRCRAFT.

- (2) Install "DO NOT OPERATE" Placard on FLAP/SLAT control lever.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Open this circuit breaker and install safety tag:

OVERHEAD BATTERY BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	21	B1-291	APU CONTROL

- (4) Disconnect electrical connector.
- (5) Disconnect drain line from shroud.
- (6) Remove retainer and slide seal aft.
- (7) Remove shroud mounting bolts and slide shroud aft on fuel line.
- (8) Remove solenoid.

B. Install Solenoid

WARNING: MAKE SURE THE SLATS DO NOT ACCIDENTALLY OPERATE. ACCIDENTAL OPERATION OF THE SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Make certain hydraulic system is depressurized. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 29-00-00/201)

WARNING: DO NOT OPERATE FLAP/SLAT CONTROL LEVER DURING MAINTENANCE OF FUEL SYSTEM COMPONENTS INSTALLED IN THE WING FRONT SPAR AREA. INADVERTENT OPERATION OF THE FLAPS AND/OR SLATS COULD CAUSE INJURY TO PERSONNEL AND DAMAGE TO THE AIRCRAFT.

- (2) Make certain "DO NOT OPERATE" placard is installed on FLAP/SLAT control lever.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THESE HAZARDOUS AGENTS.

- (3) Make sure that this circuit breaker is open and has safety tag:

OVERHEAD BATTERY BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	21	B1-291	APU CONTROL

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WARNING: SEALANT REMOVER SOLVENT IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN SEALANT REMOVER SOLVENT IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET SEALANT REMOVER SOLVENT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (4) Clean old sealant from shroud and valve with solvent (hand wipe cleaner, DPM 6410).
- (5) Install new grommet in shroud.
- (6) Install solenoid.
- (7) Connect electrical connector.

WARNING: LOW ADHESION SEALANT IS AN AGENT THAT IS POISONOUS. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN LOW ADHESION SEALANT IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW ADHESION SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIERS MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (8) Install shroud. Seal grommet with sealant.
- (9) Connect shroud drain line.
- (10) Remove tag from FLAP/SLAT control lever.
- (11) Remove the safety tag and close this circuit breaker:

OVERHEAD BATTERY BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	21	B1-291	APU CONTROL

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FUEL LINE SHROUD DRAIN VALVE - MAINTENANCE PRACTICES

1. General

- A. Maintenance practices consist of removal/installation and check of the drain valve.
- B. The drain valve is located in the fuel line shroud drain line.
- C. For general procedures concerning electrical bonding of fuel tank components, refer to the (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01).
- D. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices. (PAGEBLOCK 28-00-00/201)

2. Equipment and Materials

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 201

Name and Number	Manufacturer
Petrolatum, VV-P-236 DPM 675	Accessory Products Co.
1/2-inch drive extension	

3. Removal/Installation Fuel Line Shroud Drain Valve

- A. Remove Drain Valve

CAUTION: HOLD A SUITABLE CONTAINER UNDER VALVE TO CATCH FUEL.

- (1) Depress square valve stem to drain residual fuel.
- (2) Insert a 1/2-inch drive socket extension in valve body by pushing on stem with extension.
- (3) Unscrew valve.

- B. Install Drain Valve

WARNING: WHITE PETROLATUM IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN WHITE PETROLATUM IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT BREATHE THE MIST.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (1) Check O-rings on valve body and valve stem for condition. Replace with new O-rings lubricated with Petrolatum (VV-P-236) as necessary.

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- (2) Install valve.

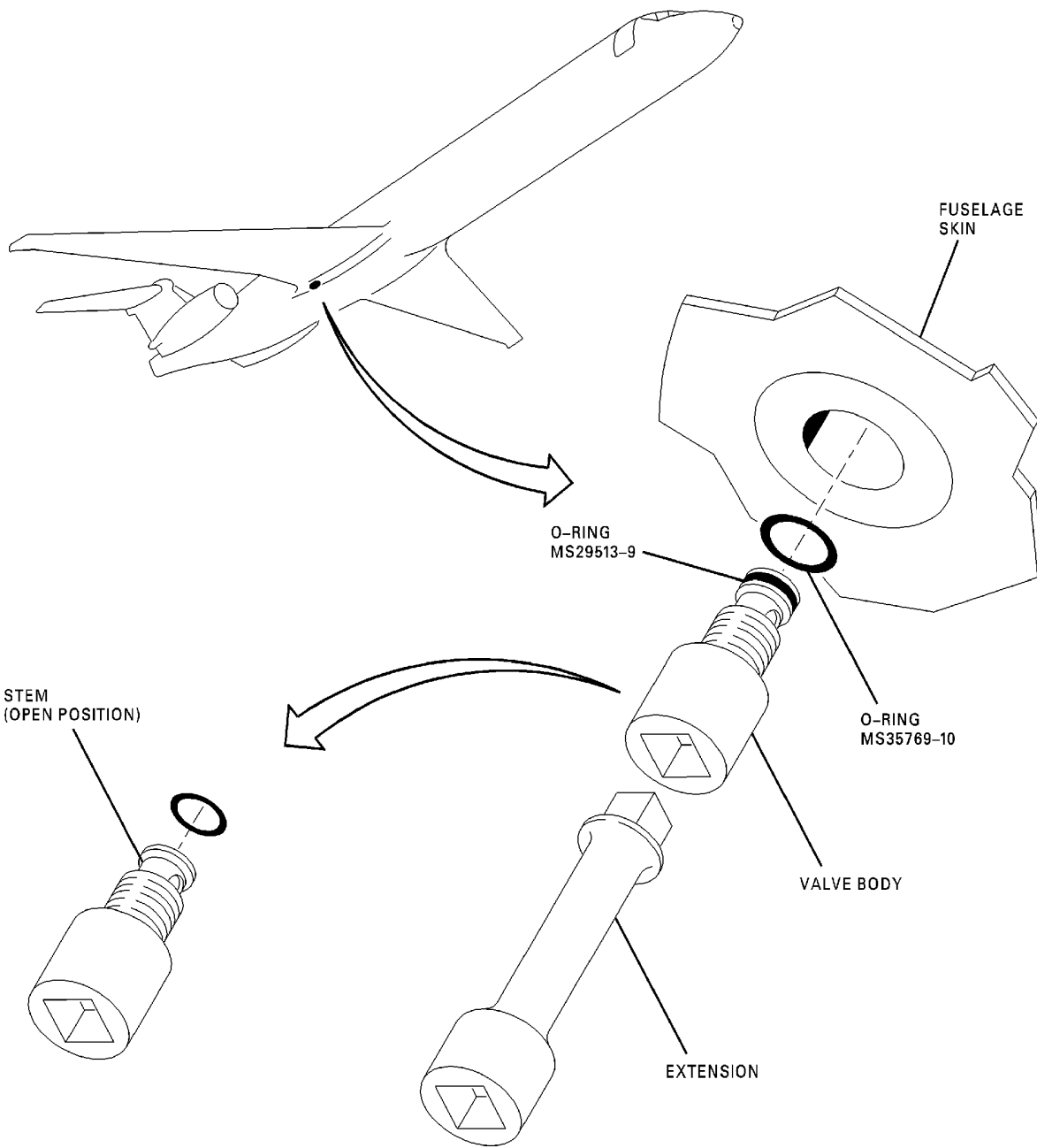
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NOTE: FUEL LINE SHROUD DRAIN AND CAVITY DRAIN VALVES ARE IDENTICAL

VIEW A
FUEL LINE SHROUD DRAIN VALVE

CAG(IGDS)

BBB2-28-25A

Fuel Line Shroud Drain Valve -- Removal/Installation
Figure 201/28-20-15-990-801

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4. Check Fuel Line Shroud Drain Valve

A. Check Valve Stem

- (1) Check valve stem for signs of leakage. No leakage allowed.

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APU SHROUDED FUEL FEED LINE ELBOW - MAINTENANCE PRACTICES

1. General

- A. This maintenance practice provides removal/installation for the APU shrouded fuel feed line elbow which is attached between the APU enclosure and the aft pressure bulkhead.
- B. For general procedures concerning electrical bonding of fuel tank components, refer to the (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01).
- C. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the General Maintenance Practices. (PAGEBLOCK 28-00-00/201)
- D. For general procedures concerning fuel line couplings, refer to FLEXIBLE FUEL LINE COUPLINGS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-19/201.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 201

Name and Number	Manufacturer
Petrolatum VV-P-236 (DPM 675)	
Inconel Lockwire 0.032 in NASM20995N32, DPM 684	Not specified
Corrosion Resistant Steel Lockwire 0.032 in NASM20995C32, DPM 5865	Not specified

3. Removal/Installation APU Shrouded Fuel Line Elbow

- A. Remove Fuel Line (Figure 201).
 - (1) Make certain that APU MASTER switch (on overhead switch panel) is in OFF position to close APU fire shutoff valve.
 - (2) Check that all fuel boost pumps are off.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

OVERHEAD BATTERY BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	21	B1-291	APU CONTROL

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UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (4) Remove shroud drain lines.
- (5) Remove O-rings and cover line ends and drain line fittings.
- (6) Remove clamps and grounding strips connecting shroud end to shroud (both ends).
- (7) Loosen clamp attaching elbow to structure.
- (8) Disconnect shroud coupling nuts from fittings on pressure bulkhead and APU enclosure.
- (9) Slide both shroud ends toward elbow.
- (10) Disconnect end of fuel ground straps next to elbow.
- (11) Disconnect fuel line couplings at pressure bulkhead and APU enclosure.
- (12) Remove elbow (shrouds and fuel lines).
- (13) Disconnect shroud coupling nuts from elbow shroud.
- (14) Remove shrouds from elbow shroud.
- (15) Disconnect fuel lines from fuel line elbow.
- (16) Remove fuel line elbow from shroud elbow.
- (17) Grasping shrouds by coupling nuts, separate tubes by pulling apart.
- (18) Remove all O-rings and split rings from parts.

B. Install Fuel Line

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

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OVERHEAD BATTERY BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	21	B1-291	APU CONTROL

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (2) Make certain that APU fuel shutoff valve is closed.

WARNING: WHITE PETROLATUM IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN WHITE PETROLATUM IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT BREATHE THE MIST.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (3) Using VV-P-236 petrolatum, lightly coat all O-rings and split rings.
- (4) Install new O-rings and split rings on parts.
- (5) Slide shroud end couplings over shroud ends.
- (6) Slide shroud couplings over shrouds.
- (7) Slide shrouds into shroud ends.

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- (8) Slide fuel line elbow into shroud elbow.
NOTE: The shortest straight end of the fuel line elbow is connected to the bent fuel line going to the APU enclosure.
- (9) Assemble fuel lines to fuel elbow. Do not tighten.
- (10) Attach shroud coupling nuts to shroud elbow. Do not tighten.
- (11) Push shroud ends over shrouds toward elbow.
- (12) Position elbow, and loosely attach to structure with clamp.
NOTE: The bent line goes to the APU enclosure.
- (13) Attach fuel lines. Adjust all couplings and lines for best fit. Safety all couplings with lockwire. (PAGEBLOCK 28-20-19/201) (LOCKWIRE SAFETYING - MAINTENANCE PRACTICES, PAGEBLOCK 20-10-18/201).
- (14) Attach fuel line ground straps.
- (15) Loosely attach shroud and shroud end couplings.
NOTE: Rotate bent line shroud for best fit of couplings which will give maximum clearance to fuel line.
- (16) Install drain lines. Safety shroud end couplings with lockwire. (LOCKWIRE SAFETYING - MAINTENANCE PRACTICES, PAGEBLOCK 20-10-18/201)
- (17) Tighten shroud and shroud end couplings. Shroud couplings to elbow shall be hand tight only. Safety all couplings with lockwire. (LOCKWIRE SAFETYING - MAINTENANCE PRACTICES, PAGEBLOCK 20-10-18/201)
- (18) Install clamps and grounding strips connecting shroud ends to shroud (both ends).
- (19) Tighten clamp attaching elbow to structure.
- (20) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

OVERHEAD BATTERY BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
B	21	B1-291	APU CONTROL

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C

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(Continued)

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

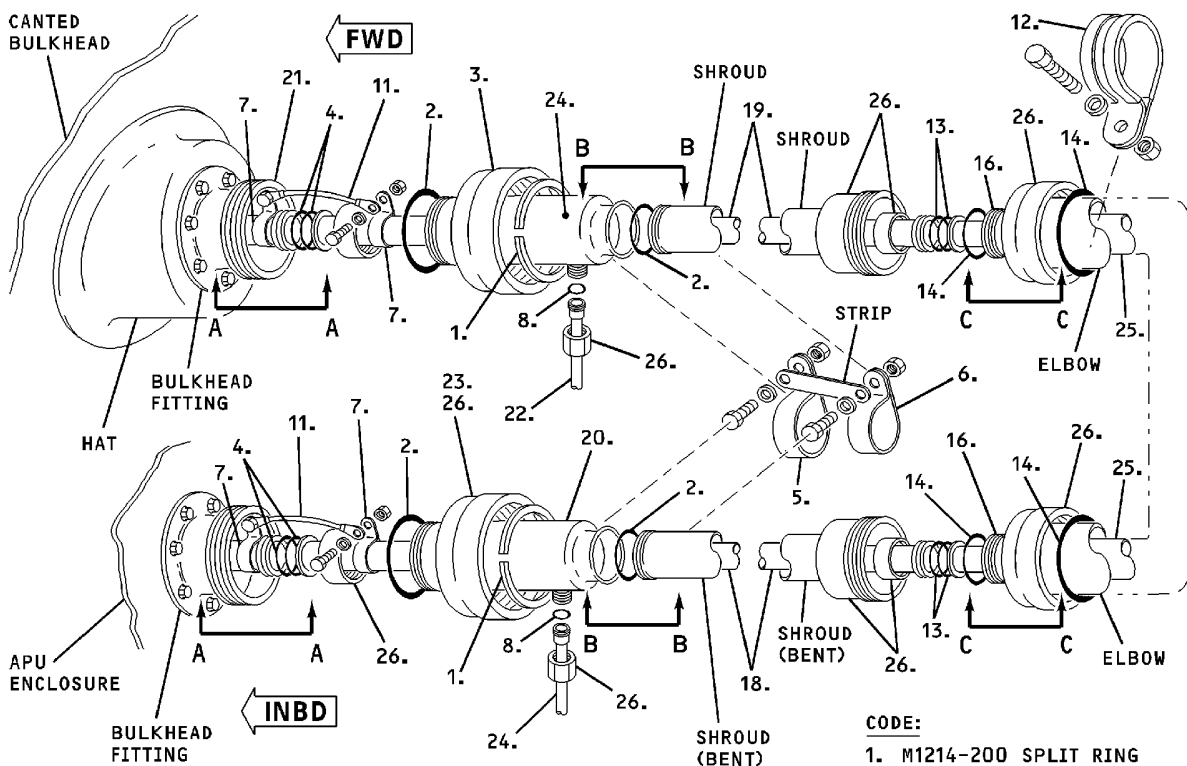
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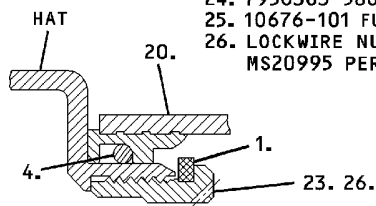
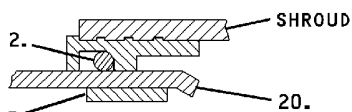
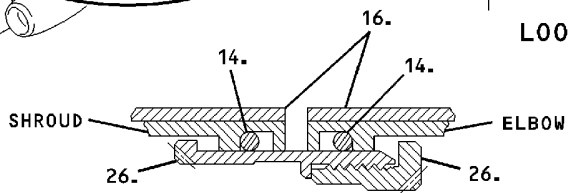
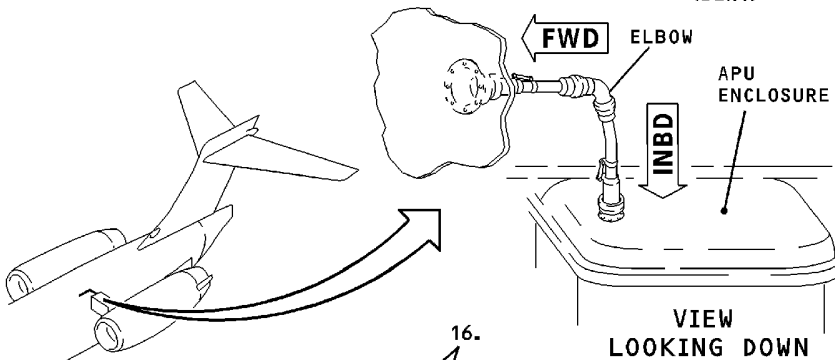
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CODE:

1. M1214-200 SPLIT RING
2. 13-05-215 O-RING
3. T15-200 NUT
4. 13-05-113 O-RING
5. AN735D22 CLAMP
6. AN735D16 CLAMP
7. AN735-8 CLAMP
8. 13-05-111 O-RING
9. 13-05-32 O-RING
10. 13-05-226 O-RING
11. MS25083-1883 JUMPER
12. 57913536-20 CLAMP
13. 13-05-030 O-RING
14. 13-05-028 O-RING
15. 13-05-219 O-RING
16. T14-125 SLEEVE
17. 250042 SHROUD
18. 10676-5 FUEL LINE (BENT)
19. 10676-1 FUEL LINE
20. 5010 SHROUD END
21. 5009 CONNECTOR
22. 7956363-587 DRAIN LINE
23. 5011 CONNECTOR
24. 7956363-586 DRAIN LINE
25. 10676-101 FUEL LINE
26. LOCKWIRE NUT WITH MS20995 PER DPS 3.651



CAG(IDGS)

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APU Shrouded Fuel Feed Line Elbow - Removal/Installation
Figure 201/28-20-16-990-801

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FUEL FEED LINES - TROUBLE SHOOTING

1. Trouble Shooting

NOTE: Check fuselage fuel tank cavity and fuel line shroud drains for fuel leakage by depressing square valve stem to drain fuel.

NOTE: Each fuel drain line that is equipped with a push-to-drain type valve is not to exceed 2 fl. oz. (59 cc) of fuel per drain line, within a (24) hour period of time.

NOTE: The accumulation of fuel leakage of two (2) ounces or less in a 24 hour period can be considered acceptable for continued operation. If fuel leakage is more than two (2) fluid ounces (59 CC) in a twenty four (24) hour period, correct the problem before flight.

NOTE: You can do a check of the leakage for more than or less than 24 hours of time. To do so, adjust the permitted leakage rate in proportion to the quantity of the time change. For example: .9 fl. oz. (26.6 cc) in 12 hours would be considered serviceable.

Table 101 FUEL IN FORWARD SHROUD DRAIN LINE (OUTLET AFT OF WHEEL WELL, RIGHT SIDE OF FUSELAGE)

Possible Causes	Isolation Procedure	Correction
FUEL IN FORWARD SHROUD DRAIN LINE (OUTLET AFT OF WHEEL WELL, RIGHT SIDE OF FUSELAGE)		
(1) Leaking engine or APU fuel fire shutoff valve	Disconnect shroud drain line at valve shroud, Check for evidence of fuel. If fuel present, slide shroud clear. Pressurize fuel line with boost pump. Locate leak.	Replace leaking valve seals or valve as necessary.
(2) Leaky coupling at aft bulkhead in wheel well	Disconnect shroud drain line at coupling. Check for evidence of fuel. If fuel present, slide shroud clear. Pressurize fuel line with boost pump. Locate leak.	Replace seals or re-swage coupling as necessary. (DUCTS, CLAMPS, AND COUPLINGS - MAINTENANCE PRACTICES, PAGEBLOCK 20-10-11/201)

Table 102 FUEL LEAK FROM AFT SHROUD DRAIN LINE OUTLETS (AFT FUSELAGE OUTBOARD OF APU) AND DRAIN MASTS

Possible Causes	Isolation Procedure	Correction
B. FUEL LEAK FROM AFT SHROUD DRAIN LINE OUTLETS (AFT FUSELAGE OUTBOARD OF APU) AND DRAIN MASTS		
(1) Leaking welded joint	Disconnect drain line at shroud. Check for evidence of fuel. If fuel present, slide shroud clear. Pressurize fuel line with boost pump. Locate leak.	Repair leak. (Table 101)
C. RH FORWARD FUEL BOOST PUMP FEED MANIFOLD SEGMENT DOES NOT HAVE MINIMUM 3/32 INCH CLEARANCE FROM WING STRINGER #5, OR EXHIBITS EVIDENCE OF CONTACT WITH STRINGER #5.		
(1) Pipe damage		Evaluate damage per OHM 20-10-17
(2) Vertical fuel pipe assembly between volute (housing) assembly and fuel feed manifold assembly has loose couplings, permitting too much vertical movement of the pipe assembly.	Inspect pipe couplings.	Tighten upper and lower vertical fuel pipe assembly couplings. Check volute for proper installation. Refer to FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201

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Table 102 FUEL LEAK FROM AFT SHROUD DRAIN LINE OUTLETS (AFT FUSELAGE OUTBOARD OF APU) AND DRAIN MASTS (Continued)

Possible Causes	Isolation Procedure	Correction
(3) Manifold attachment clamps worn or loose.	Inspect clamps.	Replace or tighten manifold clamps as is required.
(4) Support bracket at stringer 5 at center fuel tank bulkhead is adjusted too high.		Adjust manifold support downward. If clearance is not in limits, modify support per ENGINE FUEL SUPPLY LINE SUPPORT - APPROVED REPAIRS, PAGEBLOCK 28-20-17/801.
(5) Stringer to manifold attach clip is damaged or bent.	Inspect stringer clip.	Replace stringer clip.
(6) Too many washers or washers installed incorrectly between volute and volute mount bracket.	Inspect volute attach bolts.	Remove or install washers as required. Check volute for proper installation. Refer to FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201.
(7) More than one gasket installed in pipe adapter attachment to volute assembly.	Inspect pipe adapter installation.	Remove additional gasket(s). Check volute for proper installation. Refer to FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201.

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SHROUDED FUEL FEED LINES - MAINTENANCE PRACTICES

1. General

A. This maintenance procedure has the instruction to do shrouded engine fuel supply line repair. Included are:

- Repair of engine shrouded fuel line (welded sleeve method)
- Interim Repair of Welded Sleeve or Damaged Line Section (Coupling Method)
- Interim Repair of Damaged Line Section (Roylyn Coupling Interim Method)
- Repair of Small Holes in APU or Engine Fuel Supply Line Shroud (Blind Rivet Method)
- Repair of Small Hole in APU or Engine Fuel Supply Line Shroud (Metal Patch and Sealant Method)

B. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices (PAGEBLOCK 28-00-00/201).

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items.

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 201

Name and Number	Manufacturer
Tube Welder (SP-330-7)	Pakco
Welding Head (Astro Arc K-1500)	Pakco, Welding Supply Co.
2% Thoriated Tungsten Electrodes (AWS - AWM Class EW-TH-2)	
Hot Air Blower Exhauster	
Borescope (12 foot penetration)	Quality Control Co.
Sealant, low adhesive PR-1428 or PR-1773 B-1/2 or PR-1773 B-2 DMS 2410	Products Research & Chemical Corp.
Aluminum Oxide Cloth (240 Grit)	
Magic Marker (Felt Tip Marker)	Speedy Products, Inc.
Solvent, hand wipe cleaner DPM 6410	Monsanto Company St. Louis, MO
Disposable Wiper (Kimwipe 900-S)	Kimberly-Clark
Argon Gas (Technical) (MIL-A-18455) DPM 150	
Helium Gas DPM 152	
Helium-Argon Gas Mixture (75% Helium 25% Argon)	
Inconel Lockwire 0.032 in NASM20995N32, DPM 684	Not specified

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Table 201 (Continued)

Name and Number	Manufacturer
Corrosion Resistant Steel Lockwire 0.032 in NASM20995C32, DPM 5865	Not specified
White Lisle Gloves (Best 346-6)	Best Mfg. Co.
Fitting (AN814-6)	
Filtered Dry Air Source (0-150 psi with shutoff valve)	
Adapter (T2174-150)	Gamah Corp.
Petrolatum (VV-P-236) DPM 675	
Clamps (AN737)	
Aluminum tubing	
Phenolic or wooden block	
Flaring tool (537F and 637F)	Imperial Brass Manufacturing Co.
Union (AN815-24C)	
Sleeve (MS20819-24C)	
Nut (AN 818-24C)	
Ring (1905-24C)	Roylyn Inc.
Collar (1902-24C)	Roylyn Inc.
Nut (1907-24C)	Roylyn Inc.
Pressure plugs (AN929-6)	
Container (5 US gals. (4.163 Imp. gals.) (18.925 liters)	
Model 207 Power Supply Model 9-1500 Weld Head	ARC Machines Inc. Pacoima, Calif. www.crcmachines.com
Advanced Color Logic Power Unit P/N 252-202 Weld Head Model 5002 Cooper Head	MK Products Inc. Irvine, Calif. www.mkproducts.com
Liburdi Dimetrics Corp. L4000 Weld Head PTW 160 Power Supply	Liburdi Dimetrics Corp. Davidson, North Carolina www.Liburdi.com

3. Repair of Engine Shrouded Fuel Line (Welded Sleeve Method)

NOTE: This repair is done with orbital tube welding equipment operated by a certified welder. One or more replacement sections of shrouded engine fuel supply line is used to make repairs.

NOTE: A sample weld is made outside of the aircraft to insure that the OTW Welding Equipment can make a satisfactory repair and establish a weld schedule for the equipment to be used.

NOTE: It is strongly recommended that the airline customer arrange for a Field Team, with the required welding equipment and trained personnel, from Boeing (Long Beach Repair and Mods Group) or the OTW Equipment Manufacturer to perform the actual welding of the fuel line in the aircraft.

A. Do the repair of the engine shrouded fuel line (Welded Sleeve Method) as follows:

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- (1) Make the fuel system safe for maintenance. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

CAUTION: DO NOT ROTATE ENGINE FIRE CONTROL HANDLE.

- (2) Pull the engine fire handles FULL out.
- (a) Make sure that the engine fuel shutoff valves are closed.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (4) Open the applicable forward engine lower nacelle cowl door to get access to the fuel bridle.

CAUTION: HOLD CONTAINER UNDER OPENING TO CATCH RESIDUAL FUEL.

- (5) Remove the fuel bridle drain plug located at bottom of bridle on the applicable engine.

CAUTION: HOLD CONTAINER UNDER OPENING TO CATCH RESIDUAL FUEL.

- (6) Depress each shroud line drain valve.
- (7) Remove the left or right wheelwell section of shrouded engine fuel supply line (1) as follows: (Figure 202 or Figure 203 or Figure 204 or Figure 205)
- (a) Remove the guard (2) with the bolts (3) screws (4), washers (5) and nuts (6). (Figure 201)
- (b) At the aft wheel well bulkhead disconnect the drain line (9) from the shroud assembly (7) as follows:
- 1) Remove and discard the lockwire from the retainer nut (8).

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- 2) Loosen the retainer nut (8).
 - 3) Disconnect the drain line (9) from the shroud assembly (7).
 - 4) Remove and discard the packing (10) from the drain line (9).
 - a) Put a protective cap on the drain line (9).
- (c) Disassemble the engine fuel supply shroud assembly (7) and engine fuel supply line (1) as follows:
- 1) Remove nut (11) and split ring (12) from the connector (13).
 - 2) Move the shroud assembly (7) forward to get access to the flexible fuel coupling.
 - a) Remove and discard the packing (14) and packing (15).
 - 3) Loosen the two nuts (16) on the sleeve (17).
 - 4) Move the sleeve (17) away from the flexible fuel coupling.
 - a) Remove and discard the two packing (18).
 - b) Retain the nuts (16), sleeve (17) and split rings for installation.
 - c) Put protective caps on the two engine supply lines (1).
- (d) In the wheel well, above the main landing gear strut, disconnect the drain line (20) from the shroud assembly (21) as follows:
- 1) Remove and discard the lockwire from the retainer nut (19) to clamp (23).
 - 2) Loosen the retainer nut (19).
 - 3) Disconnect the drain line (20) from the shroud assembly (21).
 - a) Remove and discard the packing (22).
 - b) Put a protective cap on the drain line (20).
- (e) Disassemble the engine fuel supply shroud assembly (21) and engine fuel supply line (1) as follows:
- 1) Loosen the clamp (23) that holds the flange assembly (24) and shroud assembly (21) together.
 - 2) Move the flange assembly (24) and the shroud assembly (21) apart to get access to the flexible fuel line coupling.
 - a) Remove and discard packing (15) and (25).
 - 3) Loosen the two nuts (26) on the sleeve (27).
 - 4) Move the sleeve (27) away from the flexible fuel coupling.
 - a) Remove and discard the two packings (28).
 - b) Retain the two nuts (26) and split rings for installation.
 - c) Put a protective caps on the two engine supply lines (1).
- (f) Remove and record the location of the engine fuel supply line (1) assembly attach clamps and it's associated hardware.
- (g) Remove the section of shrouded engine fuel supply line (1) from the wheelwell.

CAUTION: HOLD CONTAINER UNDER OPENING TO CATCH RESIDUAL FUEL.

- (8) Disconnect the left or right engine aft engine fuel supply flex line from the engine fuel bridle. (FUEL TUBES - MAINTENANCE PRACTICES, PAGEBLOCK 73-11-02/201)
- (9) Install the fuel bridle drain plug in the applicable engine fuel bridle.

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- (a) Safety drain plug with lockwire. (LOCKWIRE SAFETYING - MAINTENANCE PRACTICES, PAGEBLOCK 20-10-18/201)
- (10) If necessary, disconnect the left or right aft shrouded engine fuel supply line (1) from the fuel feed vapor duct assembly (29) as follows: (Figure 202 or Figure 203 or Figure 204 or Figure 205)
- NOTE: Do these steps only if damage to engine fuel supply line is aft of Sta. 1287.
- (a) Remove applicable access panels.
- 1) For access to left engine fuel feed vapor removal duct, remove panels that follow:
- Aft Left Lavatory Panel 5815C
 - Left Engine Fuel Vent Box Panel 5813C
- NOTE: The location of the vapor box access panel 5813C is behind access panel 5815C.
- 2) For access to right engine fuel feed vapor removal duct, remove panels that follow:
- Aft Right Lavatory Panel 5816C
 - Left Engine Fuel Vent Box Panel 5814C
- NOTE: Note: The location of the vapor box access panel 5814C is behind access panel 5816C.
- (b) Remove the two bolts (30) and washers (31).
- (c) Remove the four bolts (32) and washers (31).
- (d) Remove the aft shrouded engine fuel supply line (1) from the fuel feed vapor duct assembly (29).
- 1) Remove the seal assembly (33) and shims (if used).
- 2) Remove and discard packing (34) from the fuel supply line (1) flange.
- (e) Put protective caps and plugs on the fuel feed vapor duct assembly (29).
- (11) Purge the left or right shrouded engine fuel supply line (1) assembly as follows:
- (a) Connect the hot air blower-exhauster line with adapter to the shrouded engine fuel supply line (1) assembly.
- (b) Purge the engine fuel supply line (1) with hot air for 30 minutes of any fuel or fuel vapor remaining in line.
- 1) Maximum permissible air temperature is 200°F (93°C).
- (c) Continue to purge the engine fuel supply line (1) with cold air for 30 minutes of any fuel or fuel vapor remaining in line.
- (d) Remove purging equipment from the engine fuel supply line (1) assembly.
- (12) Remove the applicable aft cargo compartment panels. (LOWER CARGO COMPARTMENT PANELS - MAINTENANCE PRACTICES, PAGEBLOCK 25-52-01/201)
- (13) If necessary, disconnect the shroud drain line from the fuel shroud assembly. (Figure 202 or Figure 203 or Figure 204 or Figure 205)

CAUTION: REMOVE ALL METAL LEAVINGS OR OTHER FOREIGN MATTER.

- (14) Cut and remove the damage section of shrouded engine fuel supply line (1) as follows:

NOTE: The sections of removed engine fuel supply line can be used for the sample welds in this procedure.

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- (a) Make sure that the cut location is a straight section of shrouded engine fuel supply line (1).
- (b) Make sure that each cut is no closer than 10 inches from the end of the engine fuel supply line or to a fuselage station frame.
NOTE: Fuselage station frames are approximately 20 inches apart.
- (c) If necessary, remove and record the location of the engine fuel supply line (1) attach clamps and it's associated hardware.
- (d) If necessary, disconnect the engine fuel supply line (1) from the forward bulkhead shroud connector (13). (Figure 202 or Figure 203 or Figure 204 or Figure 205)
- (15) Cut the repair section of shrouded engine fuel supply line as follows:
 - (a) Make sure that the repair section of shrouded engine fuel supply line is of the same tube diameter, thickness and alloy type.
 - (b) Make sure that the section of shrouded engine fuel supply line (1) has the correct pipe connections necessary for the repair.
 - (c) Cut a section or sections of the shrouded engine fuel supply repair line to the same length of the removed damaged fuel supply line + 0 inches - 1/8 inches.
- (16) Prepare the engine fuel supply line (1) and repair section of engine fuel supply line for welding as follows: (Figure 206 or Figure 207)
 - (a) Make sure that the end of each engine fuel supply line sections is squarely cut $\pm 1^\circ$ and deburred.

CAUTION: REMOVE ALL METAL LEAVINGS OR OTHER FOREIGN MATTER.

- (b) Remove a section of the shroud (outer pipe) from the end of each engine fuel supply line (1) as follows:
 - 1) Measure 3.5 inches each end of the engine fuel supply line sections (inner pipe) and with a black ink felt marker put a mark on the shroud.
 - 2) At the marked locations on the engine fuel supply lines make a straight cut thru the shroud.
 - a) Make sure that you do not cut into the (inner) engine fuel supply line.
 - 3) If there are spacers (35) at the shroud cut locations of the engine fuel supply lines (1) do the step that follows: (Figure 206 or Figure 207)
NOTE: There are spacers installed that separate the two sections of pipes. The spacers are in three sections surrounding the engine fuel pipe in 12 inch lengths spaced 2.5 inch apart
 - a) If the spacers (35) at the cut shroud location is less than 3/8 inch in length no work is required.
 - b) If the spacers (35) are more than 3/8 inch in length, cut the spacers (35) so that the spacers (35) are no more than 3/8 inch from the shroud cut location
 - c) If there are no spacers (35) at the cut shroud location on the engine fuel supply line (1) no work is required.
- (c) Measure the outside diameter of the engine fuel supply line (1).
 - 1) If the engine fuel supply line outer diameter is 1.500 inches, use -505 sleeve (36) for the repair.

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- 2) If the engine fuel supply line outer diameter is 1.508 inches, use -503 sleeve (36) for the repair.

NOTE: The outside diameter of a new engine fuel supply line end is expanded to 1.508 inches +.000 -.003 for a distance of 1 3/8 inches. Use the correct sleeve to make sure that the sleeve has a tight fit on the engine fuel supply line.

- (d) Clean the shrouded engine fuel supply line (1) section and the sleeves (36) as follows:
- 1) Use a 240 grit aluminum oxide cloth (DPM 5695-7) or abrasive nylon pads (DPM 3427) to clean:
 - a) The engine fuel supply line (1) from the cut end for a distance of no less than 3 inches.
 - b) The inside and the outside of the sleeves (36).

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1488, SOLVENT/SEALANT REMOVER (DPM 6410)

HAZMAT 1000, REFER TO MSDS

- 2) Use cleaning wipers made wet with solvent (DPM 6410) to clean:
 - a) The engine fuel supply line (1) at the cut end for a distance of no less than 3 inches
 - b) The inside and the outside of the sleeve (36).
- (e) Put an index band on each engine fuel supply line (1) sections as follows:
 - 1) Measure 2 1/2 in. from the end of the engine fuel supply line (1) section.
 - 2) Make a 1/8 in. ± 1/32 wide index band with a black ink felt marker on each of the engine fuel supply line (1) sections.
- (f) Assemble the repair section of shrouded engine fuel supply line (1) for welding in the aft cargo compartment as follows:
 - 1) If the repair section of shrouded engine fuel supply line (1) includes the shroud pipe flange, install the shroud pipe flange in the bulkhead shroud connector (13) as follows(Figure 202 or Figure 203 or Figure 204 or Figure 205)

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THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1082, PETROLATUM/WHITE (DPM 675)

HAZMAT 1000, REFER TO MSDS

- a) Lubricate the new seal with petrolatum anti-seize lubricant (DPM 675).
- b) Install the seal on the shroud pipe flange.

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- c) Put the repair section of shrouded engine fuel supply line (1) with the pipe flange in the bulkhead shroud connector (13).
- 2) Put the applicable fuel shroud assembly (37) and clamps (38) on the repair section of engine shrouded fuel supply line (1).
 - a) Make sure that the fuel shroud assembly (37) are clear on the joint areas on the repair section of engine fuel supply line (1).
- 3) Put the sleeve (36) on the ends of the repair section of engine fuel supply line (1).
- 4) Put the assembled repair section of engine fuel supply line (1) in its position in-line with the shrouded engine fuel supply line (1) in the aft cargo.
 - a) If necessary, as an aid to hold the repair section of engine fuel supply line (1) in position, use the attach clamps and it's associated hardware removed for disassembly.
 - b) Make sure that the maximum distance between the end of the two sections of the engine fuel supply lines (1) is not more than 0.125 inch

CAUTION: CHECK FIT AND ALIGNMENT OF PARTS. POOR FIT WILL CAUSE INCOMPLETE WELD PENETRATION.

- c) Move each sleeve (36) centered between the index marks on the repair section of shrouded engine fuel supply line (1).

<1> Make sure there is a tight fit between the sleeves (36) and the engine fuel supply line (1) sections.

NOTE: A tight fit will allow for a proper weld connection between the sleeve and the engine fuel supply line.

- (17) Do the sample weld of engine fuel supply line (1) as follows:

NOTE: A sample weld is necessary to make sure that the weld schedule for that weld equipment can satisfactorily make a weld joint completely around the engine fuel supply line. A satisfactorily weld will have the weld bead 360 degrees on the inner diameter (ID) of the fuel supply line and 360 degrees on the outside of the weld joint without excessive weld void (concavity). Instructions on how to develop a weld schedule is contained in the OTW equipment manufacturer's operation manual.

- (a) Cut two sections of shrouded engine fuel supply line (1) approximately 8.0 in. to 12.0 in. long.

- 1) Make sure that the cut sections of engine fuel supply line (1) are the correct tube diameter, thickness and alloy type.

NOTE: The sections of removed engine fuel supply line can be used for the sample welds in this step.

- (b) Remove a section of the shroud (outer pipe) no less than 3 inches from the end of each engine fuel supply line (1).

- (c) Clean the sections of engine fuel supply inner lines (1) and its applicable sized sleeves (36) as follows:

- 1) Use a 240 grit aluminum oxide cloth (DPM 5695-7) or abrasive nylon pads (DPM 3427) to clean:

- a) The engine fuel supply line (1) from the cut end of the pipe for a distance of no less than 3 inches.

- b) The inside and the outside of each sleeve (36).

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WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1488, SOLVENT/SEALANT REMOVER (DPM 6410)

HAZMAT 1000, REFER TO MSDS

- 2) Use cleaning wipers made wet with solvent (DPM 6410) to clean:
 - a) The engine fuel supply line (1) from the cut end of the pipe for a distance of no less than 3 inches.
 - b) The inside and the outside of each sleeve (36).
- (d) Put an index band on each shrouded engine fuel supply line (1) section as follows:
 - 1) Measure 2 1/2 in. from the end of each engine fuel supply line (1) section.
 - 2) Put a 1/8 in.±1/32 wide index band with a black ink felt marker on each of the engine fuel supply line (1) sections.
- (e) Assemble the sample section of shrouded engine fuel supply inner line (1) for welding as follows:
 - 1) Put the sleeve (36) on the end of the engine fuel supply line (1).

NOTE: There must be a tight fit between the sleeve and the engine fuel supply line section. A tight fit will allow for a proper weld connection between the sleeve and the engine fuel supply line.
 - 2) Make sure that the maximum distance between the end of the two sections of the engine fuel supply lines (1) is not more than 0.125 inch.

CAUTION: CHECK FIT AND ALIGNMENT OF PARTS. POOR FIT WILL CAUSE INCOMPLETE WELD PENETRATION.

- 3) Move the sleeve (36) centered between the index marks on the sample sections of engine fuel supply line (1).
 - a) Make sure there is a tight fit between the sleeve (36) and the engine fuel supply line (1) sections.

NOTE: A tight fit will allow for a proper weld connection between the sleeve and the engine fuel supply line.
- (f) Clamp the sample engine fuel supply line (1) assembly in a condition that it will be in a stable position for the welding equipment.
- (g) Install caps or plugs on the sample engine fuel supply line (1) assembly to make the connections for the internal purge gas equipment.
- (h) Follow the manufacturer's instructions and install the welding head and equipment on the sample engine fuel supply line (1) assembly.
 - 1) Use the correct length, size and tip configuration of 2% thoriated or 2% ceriated tungsten electrodes for the weld as recommended by the OTW equipment manufacturer.
 - 2) Put the tungsten electrode in the weld head in position .050 inches from the centerline of the sleeve (36).

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- 3) If necessary, use the manufacturer's oversized tube clamps to get the tungsten electrode in the weld head to align correctly over the sleeve (36).

NOTE: The nominal outside diameter of the sleeve is 1.56 inch. The nominal outside diameter of the engine supply fuel line is 1.5 inch. Some weld equipment manufacturer's use oversized tube clamps to get the electrode in position to make a satisfactory weld.

- (i) Use a certified weld schedule and make the necessary adjustments to the weld equipment.
- 1) If there is not a certified weld schedule, follow the manufacture's equipment recommended weld schedule and make the necessary adjustments to the weld equipment.
- (j) Connect the internal purge gas equipment to the sample engine fuel supply line (1) assembly.
- 1) If necessary, make a purge dam or decrease the orifice at the purge gas exit point.

NOTE: This will help to keep a positive internal purge gas pressure.

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1108, GAS/ARGON (DPM 150)

HAZMAT 1000, REFER TO MSDS

- (k) Start the flow of the internal argon purge gas.
- 1) Refer to the weld schedule for flow time and rate of flow.
- NOTE: The weld schedule should let the purge gas flow for approximately 30 seconds per each foot of pipe length with the rate of gas flow approximately 5 to 20 cubic feet per hour (CFH).
- 2) Follow the certified weld schedule, keep a positive internal purge gas flow before and after the weld cycle.
- (l) Start the weld cycle on the sleeve (36) on the sample engine fuel supply line (1).
- (m) When the weld cycle is completed, stop 10 to 20 minutes for the weld joint temperature to decrease.
- (n) Move the weld head to the opposite side of the sleeve (36).
- 1) Make sure that the tungsten electrode on the weld head is .050 inches from the centerline of the sleeve (36).
- (o) Start the second weld cycle on the sleeve (36).
- 1) If necessary, use the manufacturer's oversized tube clamps to get the weld head to fit correctly on the sleeve (36).
- NOTE: The nominal outside diameter of the sleeve is 1.56 inch. The nominal outside diameter of the engine supply fuel line is 1.5 inch. If one side of the weld head is clamped to the sleeve, an oversized weld head clamp is necessary for a satisfactory weld.

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- 2) Refer to the weld schedule, make sure that the purge gas flows before and after the weld cycle.
- (p) Stop the purge gas flow and disconnect the purge gas lines and adapters from the sample engine fuel supply (1) line assembly.
- (q) Remove the weld head from the sample engine fuel supply line (1) assembly.
- (18) Examine the weld joint on the sample engine fuel supply line (1) assembly as follows: (Figure 206 or Figure 207)
 - (a) Use a 10x hand held magnifying lens and visually examine the outer weld for the items found in Table 202.

Table 202 Outside Visual Examination of the Engine Fuel Supply Line Weld Joint

CRITERIA	ACCEPTANCE STANDARDS
Cracks, voids, Pinholes or Visible Porosity	None
Bead Width	5/32 ± 3/64 inch
Lack of Fusion	None
Incorrect Shielding	Incorrect shielding is when the surface color of the weld is black.
Weld Concavity	Not more that 0.015 inch maximum
<u>NOTE:</u> Weld concavity is measured from the surface of the fuel pipe to the lowest of the weld.	

- (b) Prepare the sample engine fuel supply line (1) assembly for the internal visual inspection of the weld joint as follows:
 - 1) From approximately one inch from each side if the sleeve (36) make a mark on the sample engine fuel supply line (1).
 - 2) Cut and remove the section of engine fuel supply line (1) with the sleeve (3) from the sample engine fuel supply line (1) assembly.
 - 3) Cut the section of engine fuel supply line (1) with the sleeve (36) in two parts along the longitudinal centerline.
NOTE: This will give a cross section view of the weld joint. Cross section view of the weld join is necessary for the next subsequent visual examination.
 - 4) Use a 240 grit aluminum oxide cloth (DPM 5695-7) to make the longitudinal cut of the sample engine fuel supply line (1) weld joint smooth.
- (c) Visually examine the cross sections of the engine fuel supply line weld joint for the items found in Table 203.

Table 203 Inside Visual Examination of Engine Fuel Supply Line Weld Joint

CRITERIA	ACCEPTANCE STANDARDS
Cracks or Pinholes	None
Underbead Penetration	100% penetration of the weld for 360 degrees
Improper Purging	Incorrect purging of the weld bead is when the surface is rough and black in color.
Misplaced Weld Bead	None

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Table 203 Inside Visual Examination of Engine Fuel Supply Line Weld Joint (Continued)

CRITERIA	ACCEPTANCE STANDARDS
Weld Drop-through	Inner weld material through the inner line wall can be not more than 0.015 inch maximum.

- (19) Make sure that each weld joint on the engine fuel supply line sample is in the limits found in Table 202 and Table 203. (Figure 206 or Figure 207)

NOTE: The weld joints within the limits of Table 202 and Table 203 are necessary to show that the weld schedule and weld equipment used for the sample weld can make the correct weld for the engine fuel supply line repair.

- (a) If the weld joint of the sample engine fuel supply line (1) assembly is not within limits found in Table 202 and Table 203, do the steps that follow:
- 1) Find the cause of the defective weld joint and make the necessary adjustments to the weld schedule and weld equipment.
 - 2) Repeat steps Paragraph 3.A.(17) thru Paragraph 3.A.(19) as many times necessary, until the fuel supply line weld joint is correct.
 - a) Make a detailed record of the weld equipment adjustments.

NOTE: A detailed record of the OTW welding equipment adjustments that made the correct weld join on the sample fuel supply line is now the weld schedule necessary to successfully weld the repair section of the engine fuel supply line.

- (20) Weld the repair section of engine fuel supply line (1) in the aft cargo compartment as follows: (Figure 206 or Figure 207)

- (a) Connect the internal purge gas equipment to the end of the shrouded engine fuel supply line (1).
- 1) Make sure that the internal purge gas connection is as near to the repair engine fuel supply line (1) joint as possible.
 - 2) If necessary, make a purge dam or decrease the orifice at the purge gas exit point.

NOTE: This will help to keep a positive internal purge gas pressure.

- (b) Follow the manufactures instructions and install the welding head and equipment on the engine fuel supply line (1) assembly.
- 1) Use the correct length, size and tip configuration of 2% thoriated or 2% ceriated tungsten electrodes for the weld as recommended by the equipment manufacturer.
 - 2) Put the tungsten electrode on the weld head .050 inches from the centerline of the sleeve (36).
 - 3) If necessary, use the manufacturer's oversized tube clamps to get the weld head to fit correctly on the sleeve (36).

NOTE: The nominal outside diameter of the sleeve is 1.56 inch. The nominal outside diameter of the engine supply fuel line is 1.5 inch. Some weld equipment manufacturer's use oversized tube clamps to get the electrode in position to make a satisfactory weld.

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

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Hazardous Material Warnings

HAZMAT 1108, GAS/ARGON (DPM 150)

HAZMAT 1000, REFER TO MSDS

- (c) Start the flow of internal argon purge gas.
 - 1) Refer to the weld schedule for purge gas flow time and rate of flow.
 - 2) Keep a positive internal purge gas flow before and after the weld cycle.
- (d) Start the weld cycle on the repair section of engine fuel supply line (1).
- (e) When the weld cycle is completed, stop 10 to 20 minutes for the weld joint temperature to decrease.
- (f) Move the weld head to the opposite side of the sleeve (36) on the repair section of engine fuel supply line (1).
 - 1) Put the tungsten electrode on the weld head .050 inches from the centerline of the sleeve (36).
 - 2) If necessary, use the manufactures oversized tube clamps to get the weld head to fit correctly on the sleeve (36).

NOTE: The nominal outside diameter of the sleeve is 1.56 inch. The nominal outside diameter of the engine supply fuel line is 1.5 inch. Some weld equipment manufacturer's use oversized tube clamps to get the electrode in position to make a satisfactory weld.
- (g) Start the second weld cycle on the sleeve (36) of the repair section of engine fuel supply line (1).
 - 1) Refer to the weld schedule; make sure that the internal purge gas flows before and after the weld cycle.
- (h) Stop the internal purge gas flow and disconnect the purge gas lines and adapters from the engine fuel supply (1) line.
 - (i) Remove the weld head from the repair section of shrouded engine fuel supply line (1).
- (21) Examine the weld joint of the fuel supply line repair as follows: (Figure 206 or Figure 207)
 - (a) Use a 10x hand held magnifying lens and visually examine the outer weld for the items found in Table 202.
 - (b) Put a 0.24 inch. (6mm) flexible borescope into the engine fuel supply line assembly and examine the weld for the items found in Table 203.
 - (c) Make sure that each engine fuel supply line (1) weld joint is in the limits found in Table 202 and Table 203.
- (22) Do a pressure test of the repair section of engine fuel supply line (1) as follows:
 - (a) Install a CRES steel pressure cap at the aft end of the engine fuel supply line (1).
 - (b) Install a flareless tube CRES steel fitting on the forward end of the engine fuel supply line (1).
 - (c) Connect regulated clean filtered air supply with a shutoff valve to the forward end of the engine fuel supply line (1).
 - (d) Open the shutoff valve and pressurize the engine fuel supply line (1) to 130 psig (896 kPa).
 - 1) Let the pressure stabilize.

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- (e) Close the shutoff valve.
 - (f) Observe the pressure for 5 minutes.
 - 1) No pressure drop is permitted.
 - (g) Disconnect the air supply from the shutoff valve.
 - (h) Slowly open the shutoff valve to release the pressure in the engine fuel supply line (1).
 - (i) Remove the flareless tube fitting and the pressure cap from the engine fuel supply line (1).
- (23) Install the fuel shroud assembly (37) on the engine fuel supply line (1) repair section as follows: (Figure 206 or Figure 207)

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1488, SOLVENT/SEALANT REMOVER (DPM 6410)

HAZMAT 1000, REFER TO MSDS

- (a) Clean the shroud section of engine fuel supply line (1) repair from the cut end of the shroud for a distance of no less than 1 inch in length with cleaning wipers made wet with solvent (DPM 6410).
- (b) Move the fuel shroud assembly (37) on the repaired section of engine fuel supply line (1) above the center of the weld joint.
- (c) Move the clamps (38) in position on the fuel shroud assembly (37).
- (d) Tighten the two shroud clamps (38).

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1155, SEALANT/LOW ADHESION
(DMS QPL 2410; supersedes DPM 256-1)

HAZMAT 1000, REFER TO MSDS

- (e) Apply low adhesion sealing compound (DMS 2410) on each end of the shroud assembly (37).

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1488, SOLVENT/SEALANT REMOVER (DPM 6410)

HAZMAT 1000, REFER TO MSDS

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(WARNING PRECEDES)

- (f) With low lint cloth made moist with solvent, remove the remaining sealant.
- (g) Let the low adhesion sealing compound (DMS 2410) fully cure.
- (h) If removed, connect the shroud drain line to the fuel shroud assembly (37).
- (24) Install the attach clamps and its associated hardware removed on the engine fuel supply line (1).
 - (a) Do the electrical bond check if the associated hardware includes an electrical bonding jumper. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
- (25) If removed, connect the left or right aft shrouded engine fuel supply line (1) to the fuel feed vapor duct assembly (29) as follows:(Figure 202 or Figure 203 or Figure 204 or Figure 205)
 - (a) Remove protective caps and plugs on the fuel feed vapor duct assembly (29).

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1082, PETROLATUM/WHITE (DPM 675)

HAZMAT 1000, REFER TO MSDS

- (b) Lubricate new packing (34) with petrolatum antiseize (DPM 675) lubricant.
- (c) Install the packing (34) in the engine fuel supply line (1) flange.
- (d) Put new seal assembly (33) and shims (if removed) on the engine fuel supply line (1).

NOTE: The shims if used, are used to align the engine fuel supply line with the feed vapor duct assembly.

- (e) Connect the aft shrouded engine fuel supply line (1) to the fuel feed vapor duct assembly (29) with the bolts (32), bolts (30) and washers (31).

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1117, COMPOUND/INTEGRAL FUEL TANKS SEALING
(DMS QPL 2082 B1/2 AND B2)

HAZMAT 1000, REFER TO MSDS

- (f) Apply a fillet seal to the edge of the fuel feed vapor duct assembly (29) mating flange with polysulfide (DMS 2082) sealant.
- (26) Connect the applicable engine aft engine fuel supply flex line to the engine bridle. (FUEL TUBES - MAINTENANCE PRACTICES, PAGEBLOCK 73-11-02/201)
- (27) In the applicable left or right wheelwell connect the engine fuel supply line (1) section as follows: (Figure 202 or Figure 203 or Figure 204 or Figure 205)
 - (a) Remove protective caps from the engine fuel supply lines (1).

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- (b) Make sure that the nuts, split rings, and the sleeves are installed on ends of the engine fuel supply lines.

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1082, PETROLATUM/WHITE (DPM 675)

HAZMAT 1000, REFER TO MSDS

- (c) Lubricate two new packing (18) and packing (28) with petrolatum anti-seize (DPM 675) lubricant.
- (d) Install new packings (18) and (28) in the retainer assemblies. There are two retainer assemblies located at each end of the fuel supply line (1).
- (e) Put the engine fuel supply line (1) section in position in the wheelwell.
- (f) Temporality install the attach clamps and its associated hardware on the engine fuel supply line (1).
- 1) Do not make the attach clamps and its associated hardware tight at this time.
- (g) Check and make sure that the alignment of the retainer assemblies on the engine fuel supply line (1) is in limits. (FLEXIBLE FUEL LINE COUPLINGS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-19/201)
- (h) Assemble the engine fuel supply line (1) flexible fuel couplings as follows:
- 1) Flexible fuel coupling at the M/L/G wheelwell aft bulkhead:

CAUTION: MAKE CERTAIN THAT O-RINGS ARE ENTIRELY WITHIN THEIR CAVITIES. EXCESSIVE COCKING OF SLEEVE, UNDUE FORCING, OR TWISTING COULD CAUSE O-RING DAMAGE.

- a) With a light forward and rearward movement, move the sleeve (17) over the two packing's (18).
- b) Engage each nut (16) with the split rings on the sleeve (17).
- <1> Do not fully tighten the nuts (16) at this time.

- 2) Flexible fuel coupling above the main landing gear strut:

CAUTION: MAKE CERTAIN THAT O-RINGS ARE ENTIRELY WITHIN THEIR CAVITIES. EXCESSIVE COCKING OF SLEEVE, UNDUE FORCING, OR TWISTING COULD CAUSE O-RING DAMAGE.

- a) With a light forward and rearward movement, move the sleeve (27) over the two packing's (28).
- b) Engage each nut (26) with the split rings on the sleeve (27).
- c) Tighten the two nuts (26) on the retainer assembly.
- <1> Make sure that the split rings fully contact the retainer assembly.
- 3) Tighten the two nuts (16) on the retainer assembly on the flexible fuel coupling at the M/L/G wheelwell aft bulkhead.
- a) Make sure that the split rings fully contact the retainer assembly.

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- (i) Tighten the attach clamps and its associated hardware on the engine fuel supply line (1) section.
- (28) Do the leak check of the engine fuel supply line (1) as follows:
- (a) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (b) Make certain center fuel tank has approximately 3000 lbs (1360.77 kg) and left and right fuel tanks each have approximately 1500 lbs (680.38 kg) of fuel. (FUEL SYSTEMS GENERAL, SUBJECT 12-11-04, Page 301)

CAUTION: DO NOT ROTATE ENGINE FIRE CONTROL HANDLE.

- (c) Push the engine fire handles FULL in to make sure that the two engine fuel shutoff valves are open.
- (d) Place FUEL TANKS AFT CTR FUEL PUMPS switch in ON position; both R and L INLETFUEL PRESS LOW lights should go off.

NOTE: Pump operation should be continuously monitored to ensure a pump does not run dry.

NOTE: If it is necessary to leave a pump operating unattended, it must be assured that there is sufficient fuel in the respective tank to ensure the pump(s) will not run dry.

NOTE: Pump should be turned off once the low pressure indication illuminates or the desired fuel quantity is indicated.

- (e) After 5 minutes of boost pump operation, visually check the engine fuel supply line (1) connections for leakage. Included are:
- The flexible fuel couplings on the engine fuel supply lines
 - The aft engine fuel supply flex line to the engine bridle

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- The engine aft engine fuel supply flex line.
 - 1) No leakage allowed.
- (f) Place FUEL TANKS AFT CTR FUEL PUMPS switch in OFF position; both R and L INLET FUEL PRESS LOW LIGHTS should come on as pressure decays.

CAUTION: DO NOT ROTATE ENGINE FIRE CONTROL HANDLE.

- (g) Pull the engine fire handles FULL out to make sure that the two engine fuel shutoff valves are closed.
- (29) In the applicable left or right wheelwell assemble the engine fuel supply line (1) shroud assemblies as follows: (Figure 202 or Figure 203 or Figure 204 or Figure 205)
- (a) At the engine fuel line forward bulkhead shroud:

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1082, PETROLATUM/WHITE (DPM 675)

HAZMAT 1000, REFER TO MSDS

- 1) Lubricate new packing (14) and (15) with petrolatum anti-seize (DPM 675) lubricant.
- 2) Move the shroud assembly (7) aft and install packing 15 on the engine fuel supply line (1) retainer.
- 3) Install packing (14) on the shroud assembly (7) retainer.
- 4) Move the shroud assembly (7) in position in the connector (13).
- 5) Put the split ring (12) in nut (11).
- 6) Tighten nut (11).
- 7) Install drain line (9) as follows:

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1082, PETROLATUM/WHITE (DPM 675)

HAZMAT 1000, REFER TO MSDS

- a) Lubricate new packing (10) with petrolatum anti-seize (DPM 675) lubricant.
 - b) Install new packing (10) on the drain line (9).
 - c) Put the drain line into the shroud assembly (7).
 - d) Tighten retainer nut (8).
 - e) Safety the retainer nut (8) to Nut (11) with lockwire. (LOCKWIRE SAFETYING - MAINTENANCE PRACTICES, PAGEBLOCK 20-10-18/201)
- (b) At the engine fuel line forward shroud:

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WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1082, PETROLATUM/WHITE (DPM 675)

HAZMAT 1000, REFER TO MSDS

- 1) Lubricate new packing (15) and (25) with petrolatum anti-seize (DPM 675) lubricant.
- 2) Move the shroud assembly (21) aft and install packing 15 on the engine fuel supply line (1) retainer.
- 3) Move the flange assembly (24) forward and install packing 15 on the engine fuel supply line (1) retainer.
- 4) Install packing (25) inside of shroud assembly (21).
- 5) Move shroud assembly (21) and flange assembly (24) together and install clamp (23).
- 6) Install drain line (20) as follows:

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1082, PETROLATUM/WHITE (DPM 675)

HAZMAT 1000, REFER TO MSDS

- a) Lubricate new packing (22) with petrolatum antiseize (DPM 675) lubricant.
 - b) Install new packing (22) on the drain line (20).
 - c) Put the drain line into the shroud assembly (21).
 - d) Tighten retainer nut (19).
 - e) Safety the retainer nut (19) to clamp (23) with lockwire. (LOCKWIRE SAFETYING - MAINTENANCE PRACTICES, PAGEBLOCK 20-10-18/201)
- (30) Do the pressure test of the fuel shrouds assemblies and drain line connections as follows:
- (a) Connect a supply of regulated clean filtered air with a shutoff valve to the shroud drain line.
 - (b) Disconnect all the shroud drain lines at the overboard vents, and in each drain line install a flared tube CRES steel plug.
 - (c) Open the shutoff valve and pressurize the shroud drain line to 5 psi (34.5 kPa).
 - 1) Let the pressure stabilize.
 - (d) Close the shutoff valve.
 - (e) Observe the pressure for five minutes.
 - (f) The pressure must not drop more than 2 psi (13.8 kPa).
 - (g) Disconnect the air supply from the shutoff valve.

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- (h) Slowly open the shutoff valve to release the pressure in the shroud.
 - (i) Remove the shutoff valve.
 - (j) Remove the plugs from the shroud drain lines.
 - (k) Connect all the shroud drain lines.
- (31) In the applicable left or right M/L/G wheelwell install the shroud guard (2) with the bolts (3) screws (4), washers (5), and nuts (6). (Figure 201)
- (32) Close the applicable access panels.
- Aft Left Lavatory Panel 5815C
 - Left Engine Fuel Vent Box Panel 5813C
- NOTE: The location of the vapor box access panel 5813C is behind access panel 5815C.
- Aft Right Lavatory Panel 5816C
 - Left Engine Fuel Vent Box Panel 5814C
- NOTE: The location of the vapor box access panel 5814C is behind access panel 5816C.
- (33) Close the applicable sidewall panels in the aft cargo. (LOWER CARGO COMPARTMENT PANELS - MAINTENANCE PRACTICES, PAGEBLOCK 25-52-01/201)

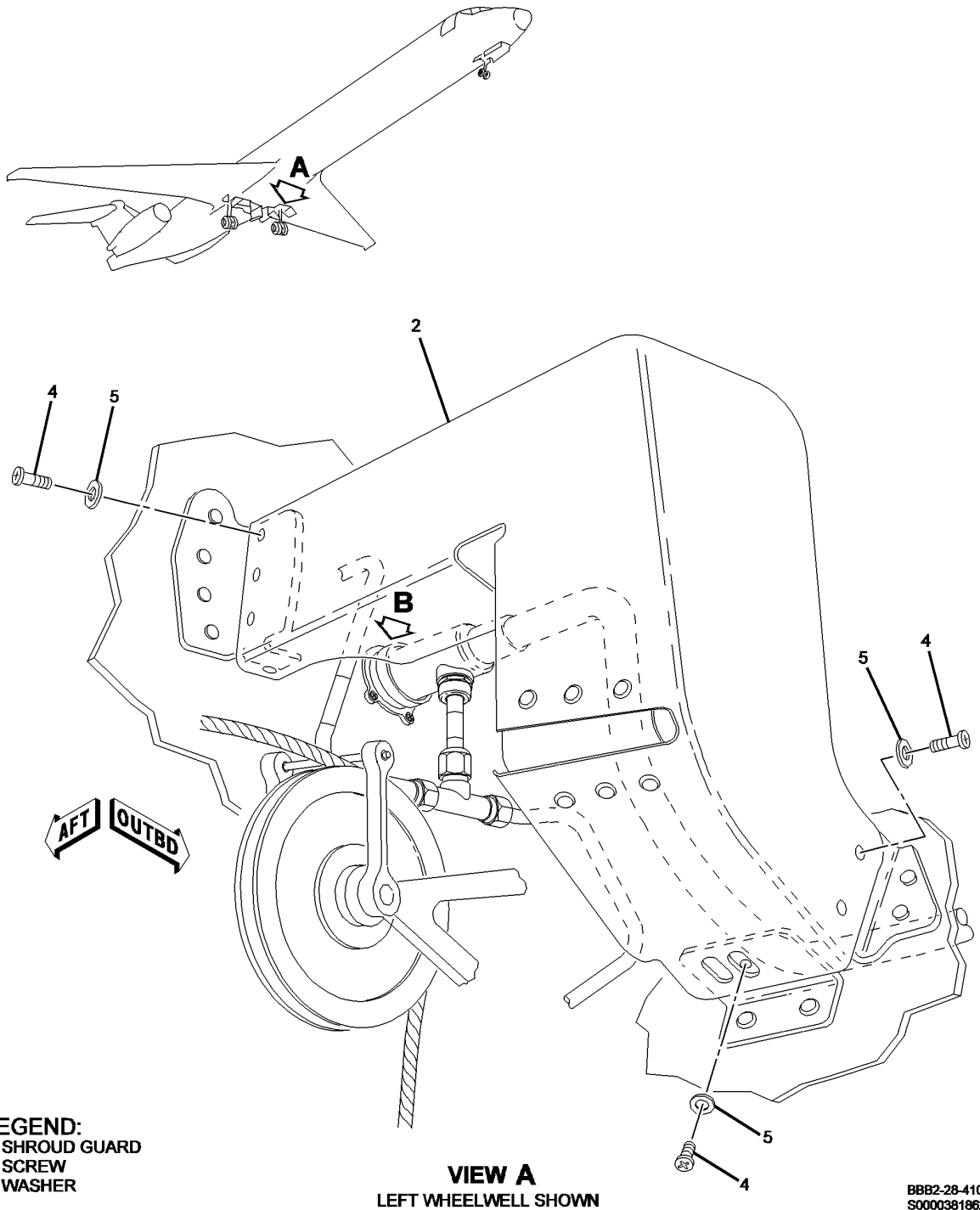
EFFECTIVITY
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Shrouded Fuel Supply Lines -- Shroud Guard
Figure 201/28-20-17-990-801 (Sheet 1 of 2)

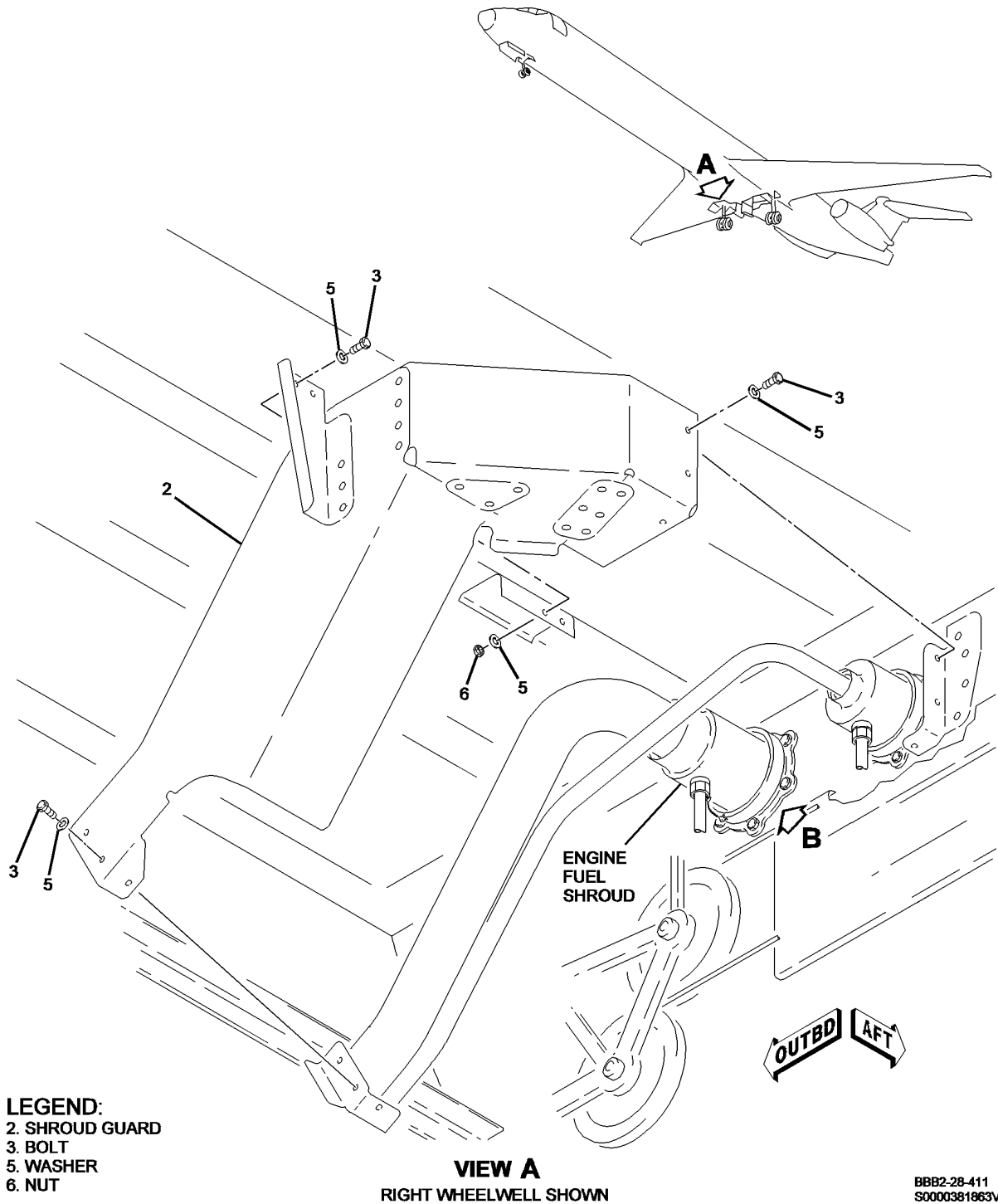
EFFECTIVITY
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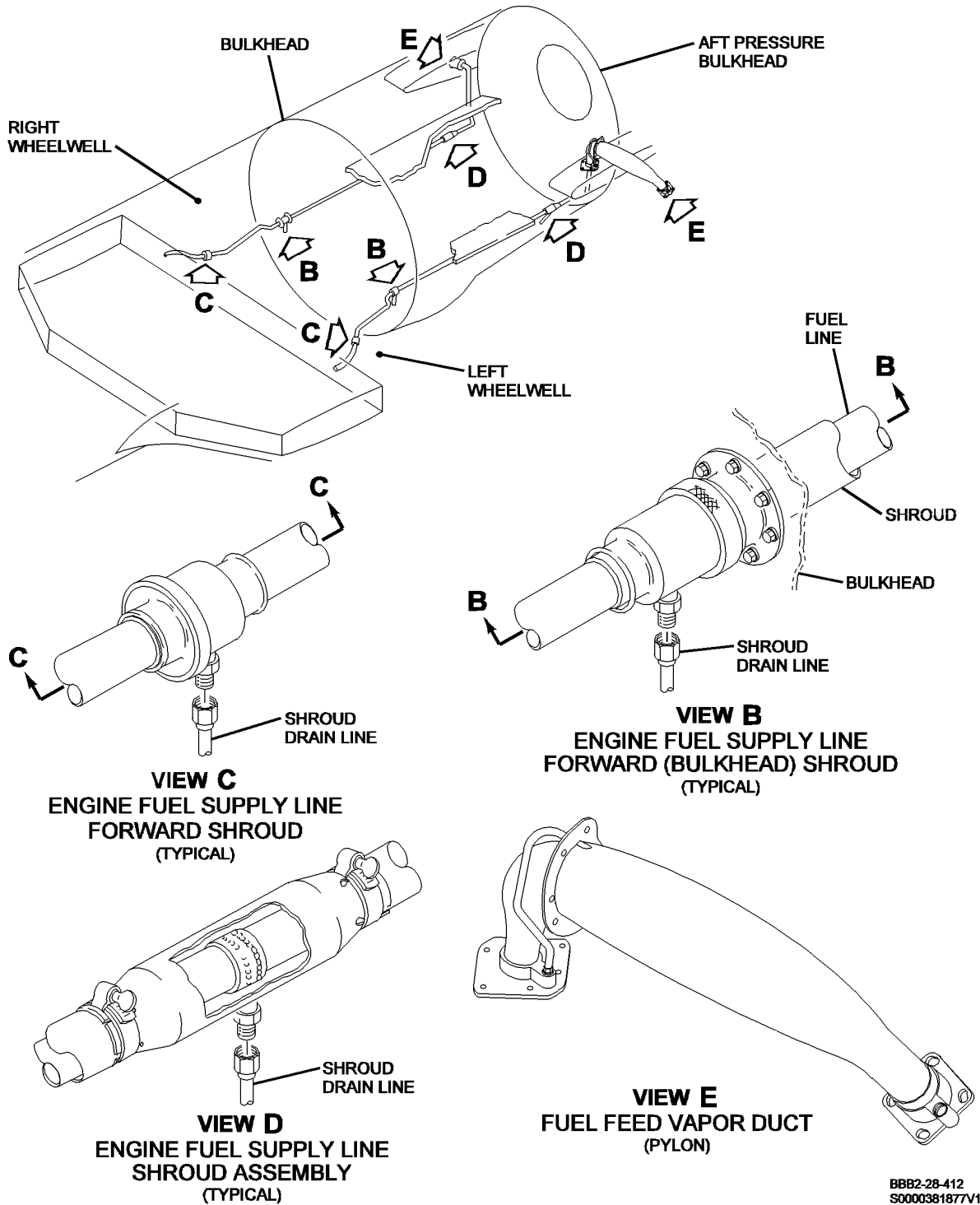


Shrouded Fuel Supply Lines -- Shroud Guard
 Figure 201/28-20-17-990-801 (Sheet 2 of 2)

EFFECTIVITY
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BBB2-28-412
S000038187V1

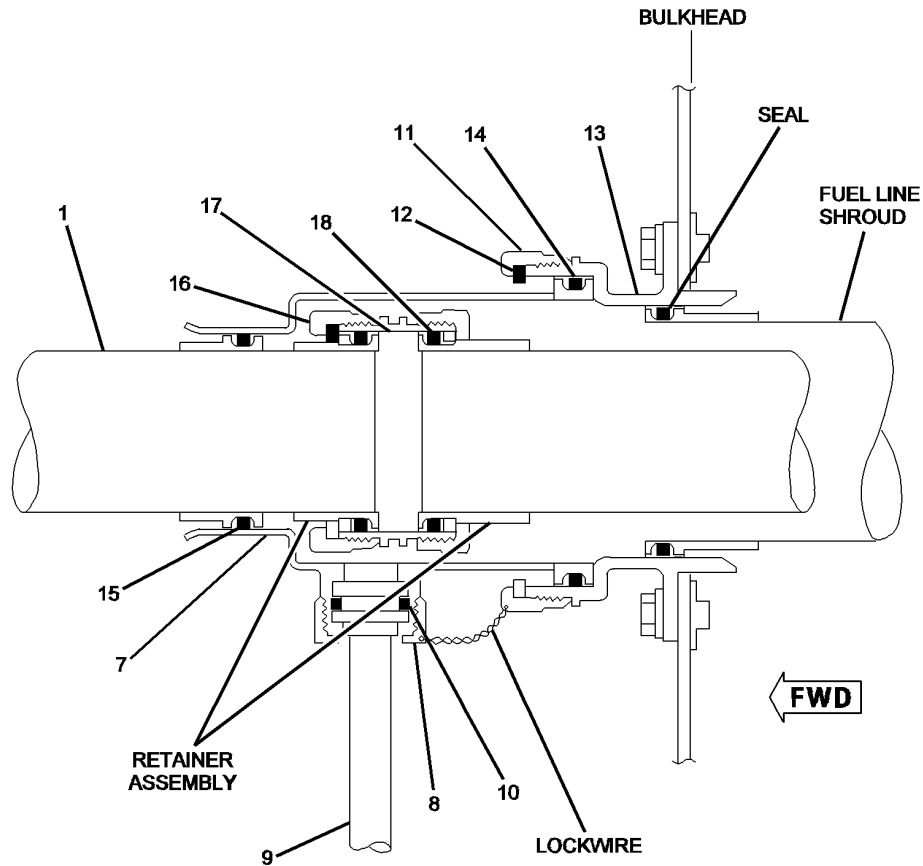
Shrouded Fuel Supply Lines -- Component Location
Figure 202/28-20-17-990-809

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LEGEND:

- 1. ENGINE FUEL SUPPLY LINE
- 7. SHROUD ASSEMBLY
- 8. RETAINER NUT
- 9. DRAIN LINE
- 10. PACKING
- 11. NUT
- 12. SPLIT RING
- 13. CONNECTOR
- 14. PACKING
- 15. PACKING
- 16. NUT
- 17. SLEEVE
- 18. PACKING

SECTION B-B
LEFT SDIE SHOWN,
RIGHT SIDE IDENTICAL

BBB2-28-413
S0000381903V1

Shrouded Fuel Supply Lines -- Shroud Assembly
Figure 203/28-20-17-990-810

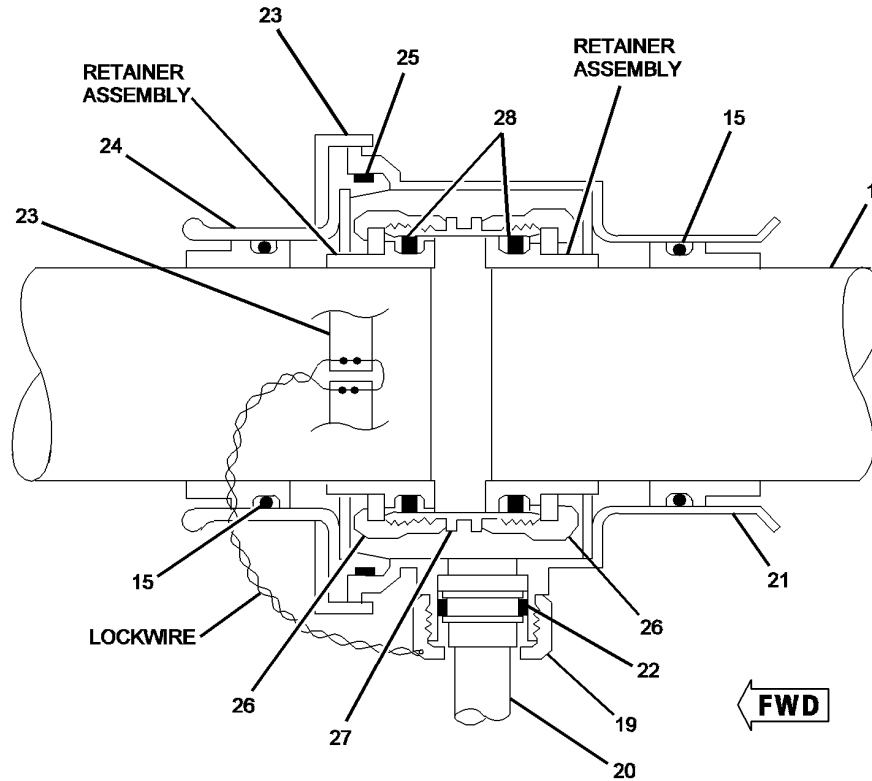
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SECTION C-C
LEFT SDIE SHOWN,
RIGHT SIDE IDENTICAL

LEGEND:

- 1. ENGINE FUEL SUPPLY LINE
- 15. PACKING
- 19. RETAINER NUT
- 20. DRAIN LINE
- 21. SHROUD ASSEMBLY
- 22. PACKING
- 23. CLAMP
- 24. FLANGE ASSEMBLY
- 25. PACKING
- 26. NUT
- 27. SLEEVE
- 28. PACKING

BBB2-28-414
S0000381911V1

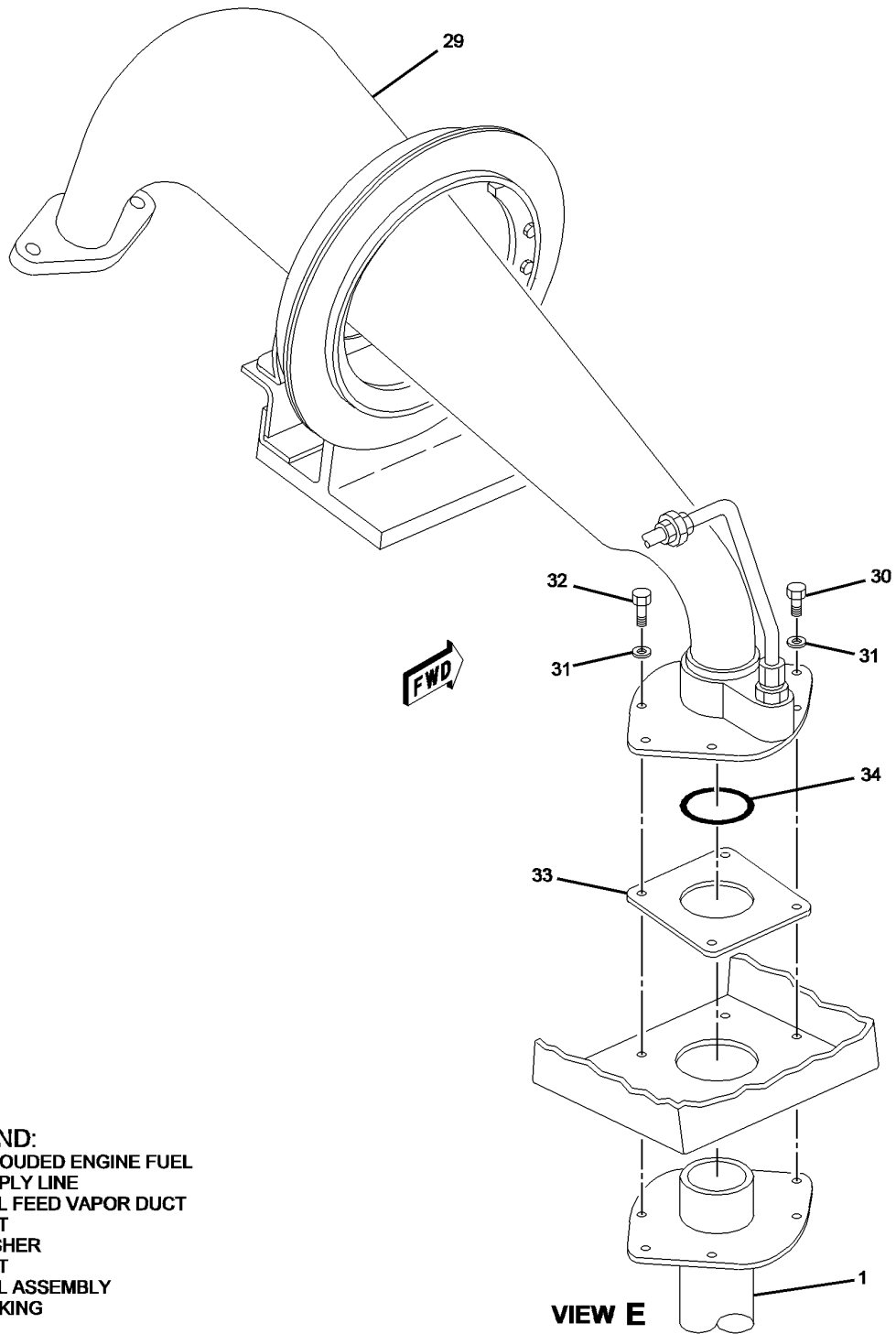
Shrouded Fuel Supply Lines -- Shroud Assembly
Figure 204/28-20-17-990-811

EFFECTIVITY
WJE ALL

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- LEGEND:**
- 1. SHROUDED ENGINE FUEL SUPPLY LINE
 - 29. FUEL FEED VAPOR DUCT
 - 30. BOLT
 - 31. WASHER
 - 32. BOLT
 - 33. SEAL ASSEMBLY
 - 34. PACKING

BBB2-28-415
S0000381914V1

**Shrouded Fuel Supply Lines -- Shroud Fuel Supply Line/Vapor Duct
Figure 205/28-20-17-990-812**

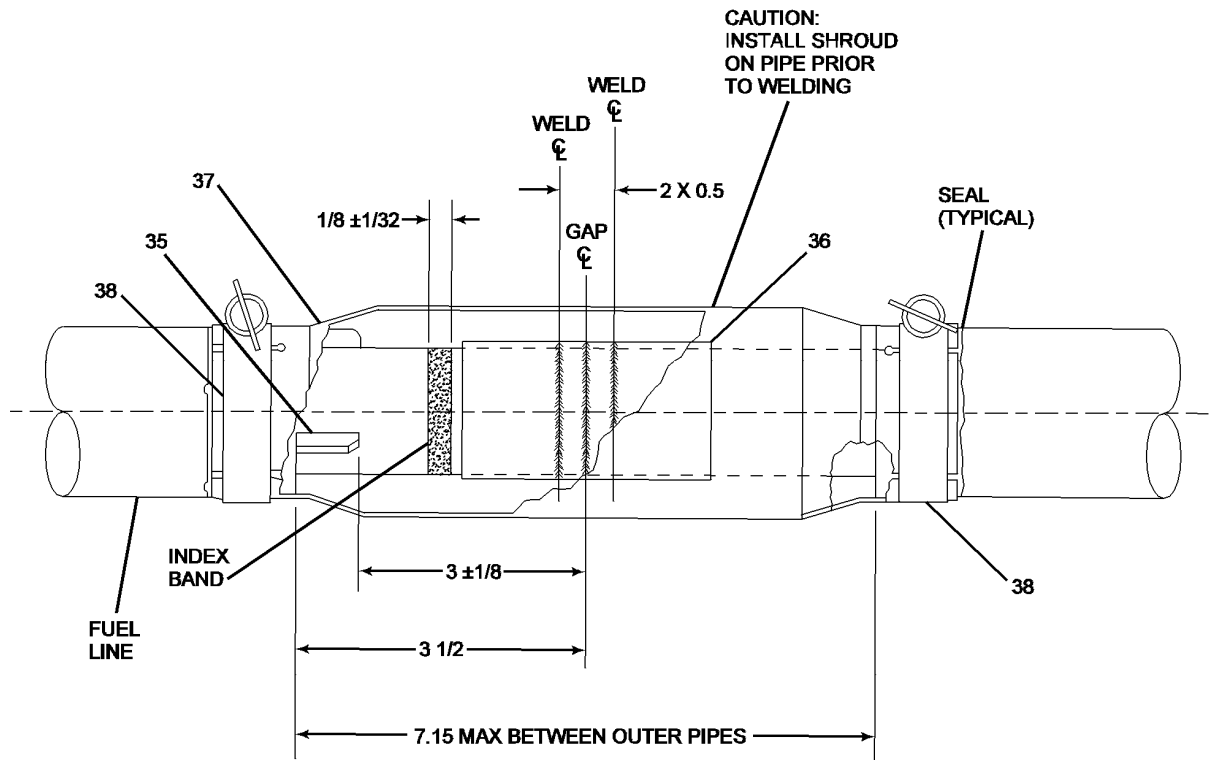
EFFECTIVITY
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TYPICAL REPAIR

- NOTE:**
1. WELDS ARE ONE INCH APART (ON ϕ)
 2. GAP ALLOWED BETWEEN TUBE ENDS: 0.0 - 0.125

LEGEND:

- 35. SPACER
- 36. SLEEVE
- 37. SHROUD ASSEMBLY
- 38. CLAMP

BBB2-28-416
S0000381915V1

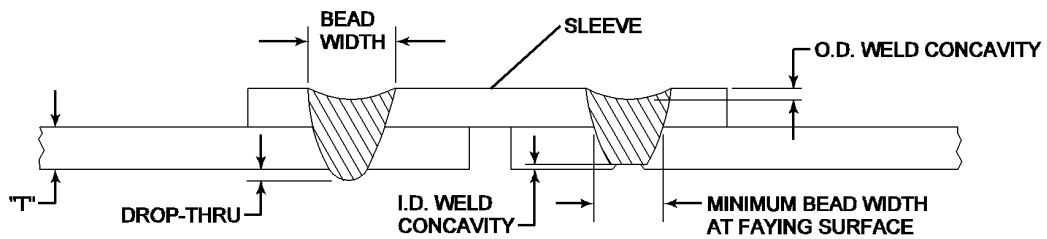
**Shrouded Fuel Supply Lines -- Fuel Feed Line Repair
Figure 206/28-20-17-990-802**

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TUBE THICKNESS (INCH)	BEAD WIDTH (INCH)	MAXIMUM DROP-THRU (INCH)	MINIMUM DROP-THRU	MAXIMUM TOTAL CONCAVITY (INCH)
0.010 - 0.028	5/32 ±3/64	0.015	VISIBLE PENETRATION 360 DEGREES	0.015

SLEEVE AND LAP JOINT WELD DIMENSIONS

BBB2-28-417
S0000381917V1

Shrouded Fuel Supply Lines -- Sleeve and Lap Joint Weld Dimensions
Figure 207/28-20-17-990-813

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ARC MACHINES, INC. MODEL 207 TUBE WELDER SCHEDULE



#	O.D.	WALL	TYPE	MAT	QTY
PRE-PURGE-POST		UP-SLOPE-DOWN	ROT—DLY CW-CCW		

LVL	PULSE	ROT	PRI-RPM-BCK
1	ON-OFF	CONT-OFF-STEP	
	TIME	PRI-AMP-BCK	PRI-PULSE-BCK
1			

LVL	PULSE	ROT	PRI-RPM-BCK
2	ON-OFF	CONT-OFF-STEP	
	TIME	PRI-AMP-BCK	PRI-PULSE-BCK
2			

LVL	PULSE	ROT	PRI-RPM-BCK
3	ON-OFF	CONT-OFF-STEP	
	TIME	PRI-AMP-BCK	PRI-PULSE-BCK
3			

LVL	PULSE	ROT	PRI-RPM-BCK
4	ON-OFF	CONT-OFF-STEP	
	TIME	PRI-AMP-BCK	PRI-PULSE-BCK
4			

LVL	PULSE	ROT	PRI-RPM-BCK
5	ON-OFF	CONT-OFF-STEP	
	TIME	PRI-AMP-BCK	PRI-PULSE-BCK
5			

LVL	PULSE	ROT	PRI-RPM-BCK
6	ON-OFF	CONT-OFF-STEP	
	TIME	PRI-AMP-BCK	PRI-PULSE-BCK
6			

DATE: _____

PREPARED BY: _____

APPROVED BY: _____

CUSTOMER: _____

NOTES: _____

JOINT DESCRIPTION: _____

MATERIAL: _____

HEAT NO: _____

WELD HEAD INFORMATION

MODEL NUMBER: _____

ARC GAS: _____ **CFH:** _____

PURGE GAS: _____ **CFH:** _____

TUNGSTEN DATA

O.D. _____ **TIP DIA.** _____

2% CERATED **2% THORIATED**

TUNGSTEN LENGTH FORMULA

$$\text{ROTOR O.D.} - \text{TUBE O.D.} \div 2 - \frac{\text{arc gap}}{2} =$$

_____ \div 2 - _____ = _____

TUNGSTEN LENGTH: _____

KEY FORMULAS

1) $\text{Tube O.D.} \times \pi = \text{Circumference}$

_____ \times 3.141 = _____

2) $\text{I.P.M.} \div \text{Circumference} = \text{RPM}$

_____ \div _____ = _____

3) $60 \text{ secs} \div \text{RPM} = \text{Time for } 360^\circ$

60 \div _____ = _____

TOTAL WELD TIME

(Time for 360° + Rot. Dly + Overlap = Total Weld Time)

_____ + _____ + _____ = _____

(Total Weld Time + No. Of Levels = Time Per Level)

_____ \div _____ = _____

BBB2-28-418
S0000381918V1

Shrouded Fuel Supply Lines -- Sample Welding Schedule Form
Figure 208/28-20-17-990-803 (Sheet 1 of 2)

EFFECTIVITY
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Date _____ Weld Schedule No. _____

Alloy: Tube _____ Fitting/Sleeve _____

Dia. X Wall: Tube _____ Fitting/Sleeve _____

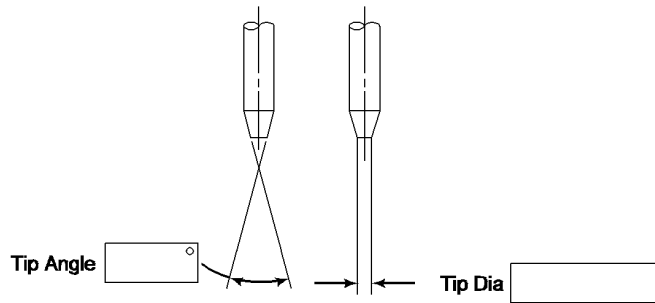
Shielding Gas: Arc _____ CFH _____ Back-Up _____ CFH _____

Tungsten Electrode: Type _____ Dia. _____ Length _____

Joint Type _____ Arc Gap _____ Start Position _____

Power Source _____ Welding Head _____

					<input type="checkbox"/> ON
Level One Current	Level Two Current	Level Three Current	Level Four Current	Rotation Delay	<input type="checkbox"/> Pulsation
					<input type="checkbox"/> OFF
					<input type="checkbox"/> ON
Level One Time	Level Two Time	Level Three Time	Level Four Time	RPM	<input type="checkbox"/> Synchronization
					<input type="checkbox"/> OFF
Pulse High Time	Pulse Low Time	Pulse Low Current	Downslope Time	Pre-Purge Time	Post Purge Time
Delay and Times are in Seconds. Current is in Amperes.					



**TUNGSTEN
ELECTRODE SHAPE**

Approved by: _____ Prepared by: _____

BBB2-28-419
S0000381919V1

**Shrouded Fuel Supply Lines -- Sample Welding Schedule Form
Figure 208/28-20-17-990-803 (Sheet 2 of 2)**

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4. Approved Repairs

A. Interim Repair Welded Sleeve or Damaged Line Section (Coupling Method)

NOTE: Line should be replaced with new line and welded per Paragraph 3.. at next maintenance period where proper welding equipment is available. It should be noted that repair be checked periodically until permanent repair is made.

- (1) Prepare sleeve or section for removal as outlined as outlined in Paragraph 3.A.(1) thru Paragraph 3.A.(6).
- (2) Cut damage section out of line leaving $2 \frac{3}{16}$ ($\pm 1/16$) (55.6 ± 1.5 mm) space between cut ends of lines after squaring and deburring ends.
- (3) Cut back shroud and spacers sufficiently to provide room for flaring lines.
- (4) Fabricate and install shroud components on fuel line. (Figure 209)

NOTE: Do not assemble or seal.

- (5) Install AN818-24C nut on each cut end of line.
- (6) Install MS20819-24C sleeves on lines.

CAUTION: ENSURE THAT FLARE SURFACE IS SMOOTH, CONCENTRIC, AND FREE OF NICKS, SCRATCHES, OR TOOL MARKS.

- (7) Flare lines carefully using flaring tool.

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1082, PETROLATUM/WHITE (DPM 675)

HAZMAT 1000, REFER TO MSDS

- (8) Lubricate threads on AN815-24C coupling with Petrolatum (VV-P-236) and connect two lines together.
- (9) Pressure test shroud line Paragraph 5.A..
- (10) Assemble seal shroud with sealant. (Figure 209)
- (11) Pressure test shroud Paragraph 5.B..

B. Interim Repair Damaged Line Section (Roylyn Coupling Interim Method)

NOTE: Line should be replaced with new line and welded per Paragraph 3.A. at next maintenance period where proper welding equipment is available. Damaged area must be within the limits of a 1/4 inch (6.3 mm) section of line.

- (1) Prepare sleeve or section for removal as outlined in Paragraph 3.A.(1) thru Paragraph 3.A.(6).
- (2) Cut damaged section out of line leaving $1/4$ ($\pm 1/16$) inch (6.3 ± 1.5 mm) space between cut ends of lines after squaring and deburring ends.
- (3) Cut back shroud and spacers sufficiently to provide room for flaring lines.
- (4) Fabricate and install shroud components on fuel line. (Figure 209)
NOTE: Do not assemble or seal.
- (5) Install 1902-24C collar and 1907-24C nut on lines.

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- (6) Install MS20819-24C sleeves on lines.

CAUTION: INSURE THAT FLARE SURFACE IS SMOOTH, CONCENTRIC, AND FREE OF NICKS, SCRATCHES, OR TOOL MARKS.

- (7) Flare lines carefully using flaring tool.

WARNING: WHITE PETROLATUM IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN WHITE PETROLATUM IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT BREATHE THE MIST.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (8) Lubricate threads on fitting with Petrolatum (VV-P-236) and connect two lines together. Use a 1905-24C ring between line ends.

- (9) Pressure test line. (Paragraph 5.A.)

WARNING: LOW ADHESION SEALANT IS AN AGENT THAT IS POISONOUS. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN LOW ADHESION SEALANT IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW ADHESION SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (10) Assemble and seal shroud with sealant. (Figure 209)

- (11) Let the sealant fully cure.

- (12) Pressure test shroud. (Paragraph 5.B.)

C. Repair of Small Holes in APU or Engine Fuel Supply Line Shroud (Blind Rivet Method)

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CAUTION: DO NOT DRILL INTO FUEL LINE LOCATED INSIDE SHROUD.

- (1) Drill hole of sufficient size to remove damaged area. Select size to meet rivet hole requirements.

NOTE: Hole not to exceed 1/4 inch (6.3 mm) in diameter.

- (2) Deburr hole.

WARNING: LOW ADHESION SEALANT IS AN AGENT THAT IS POISONOUS. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN LOW ADHESION SEALANT IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW ADHESION SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (3) Coat rivet with sealant. (FUEL TANKS - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-01/201)
- (4) Install rivet in hole.

WARNING: LOW ADHESION SEALANT IS AN AGENT THAT IS POISONOUS. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN LOW ADHESION SEALANT IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW ADHESION SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA.
- APPROVED SAFETY EQUIPMENT.
- EMERGENCY MEDICAL AID.
- TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (5) Coat head of rivet and surrounding shroud area with sealant.
- (6) Let the sealant fully cure.
- (7) Pressure test shroud. (Paragraph 5.B.)

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- D. Repair of Small Hole in APU or Engine Fuel Supply Line Shroud (Metal Patch and Sealant Method)

NOTE: The following permanent repair applies to straight sections of fuel pipe aluminum shroud with maximum hole dimensions of 3.5 inches (88.9 mm) longitudinally and 0.5 inch (12.7 mm) circumferentially.

- (1) Form available aluminum sheet to cover damaged area with approximately 1 inch (25.4 mm) overlap around edges for engine fuel line shroud and 1/2 inch (12.7 mm) overlap for APU fuel line shroud.

WARNING: SEALANT REMOVER SOLVENT IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN SEALANT REMOVER SOLVENT IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET SEALANT REMOVER SOLVENT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (2) Wipe faying surfaces of shroud and patch with solvent (hand wipe cleaner, DPM 6410). Dry with clean cotton cloth before solvent evaporates.

WARNING: LOW ADHESION SEALANT IS AN AGENT THAT IS POISONOUS. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN LOW ADHESION SEALANT IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW ADHESION SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (3) Apply sealant to faying surfaces of patch and shroud. (FUEL TANKS - MAINTENANCE PRACTICES, PAGEBLOCK 28-10-01/201) Lightly clamp patch in place with AN-737 clamps. Drill clamp screw heads and safety with lockwire. (LOCKWIRE SAFETYING - MAINTENANCE PRACTICES, PAGEBLOCK 20-10-18/201)

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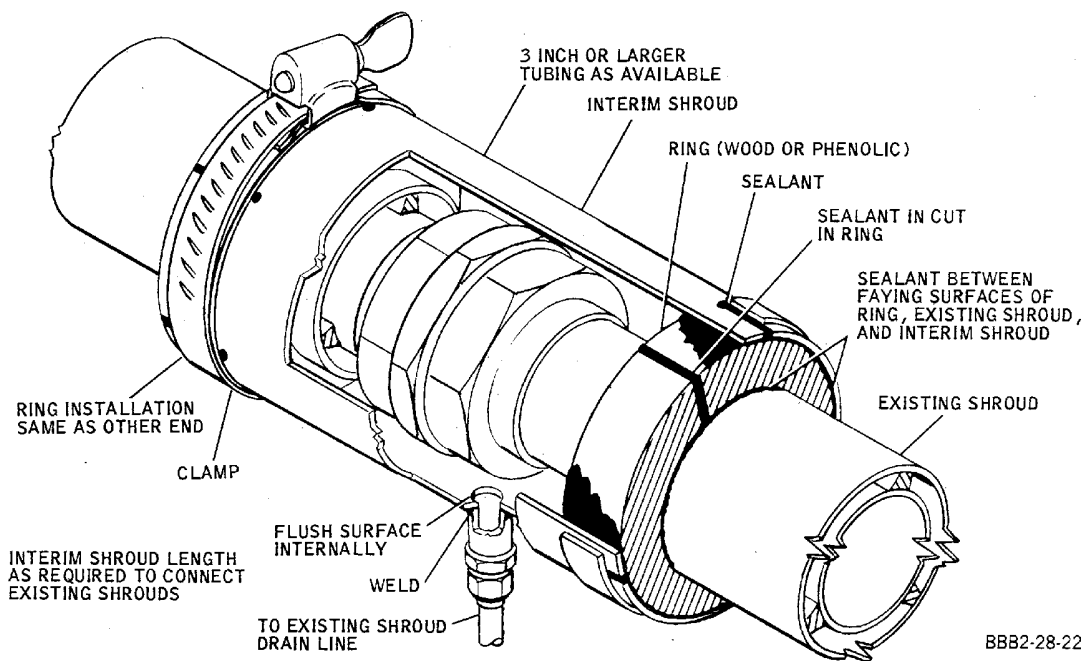
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- (4) Let the sealant fully cure.
- (5) Pressure test shroud. (Paragraph 5.B.)



Shroud Fabrication and Installation
Figure 209/28-20-17-990-804

5. Adjustment/Test

A. Pressure Test Weld

- (1) Cap upper end of aft fuel line.
- (2) Connect clean, dry air source to forward end of forward line.
NOTE: Use adapter T2174-150.
- (3) Pressurize feed line to 130 psig (897.0 kPa). Allow pressure to stabilize.
- (4) Close air supply valve.
- (5) Observe pressure over a 5-minute period. There should be no pressure drop.
- (6) Disconnect air supply from shutoff valve.
- (7) Slowly open shutoff valve to depressurize feed line.
- (8) After line is depressurized, remove remainder of test equipment from both ends of line.

B. Pressure Test Shroud on Repaired Line

- (1) Connect pressurizing equipment to shroud drain.
- (2) Disconnect shroud drain lines at overboard vents and cap with pressure caps.

CAUTION: DO NOT PRESSURIZE THE SHROUD SYSTEM MORE THAN 5.0 PSI (34.5 KPA). TOO MUCH PRESSURE CAN CAUSE DAMAGE TO THE SHROUD SYSTEM AND THE FUEL PIPING.

- (3) Pressurize shroud to 5 psig (34.5 kPa). Allow pressure to stabilize.

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- (4) Close air supply valve.
- (5) Observe pressure. Pressure should not drop more than 2 psi (13.8 kPa) in 5 minutes.
- (6) Disconnect air supply from shutoff valve.
- (7) Slowly open shutoff valve to depressurize shroud.
- (8) Remove shutoff valve and remaining test equipment.
- (9) Connect forward shroud drain line.
- (10) Connect shroud drain line or repaired section of line.
- (11) Connect aft shroud drain line in pylon.

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ENGINE FUEL SUPPLY LINE SUPPORT - APPROVED REPAIRS

1. General

- A. This section contains the repair procedure of the engine fuel supply line support. (Figure 801)
- B. The fuel supply line support is located in the RH wing fuel tank, adjacent to the forward fuel boost pump. The support is installed on the outboard side of the RH center wing bulkhead at sta 121. Access to the support is through access door 1410C.
- C. For general procedures concerning electrical bonding of fuel tank components, refer to the (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01, Page 201).
- D. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- E. The repair of this support can be accomplished if the RH forward fuel boost pump fuel feed manifold segment does not meet the required minimum 3/32 inch clearance from wing stringer number 5, or if manifold segment exhibits evidence of contact with stringer number 5. The repair of this support will enhance pipe alignment during maintenance.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Name and Number	Manufacturer
Alodine 1200 chemical coating DPM 1453	Commercially available
FR Primer DPM 2232	Commercially available

3. Approved Repairs - Repair Engine Fuel Supply Line Support

- A. Repair support as follows:
 - (1) Prepare RH wing fuel tank for entry. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
 - (2) Remove RH fuel tank access door 1410C to gain access to support.
 - (3) Remove and retain fasteners attaching clamp assembly and fuel pipe segment to support.
 - (4) Remove and retain fasteners attaching support to center wing bulkhead bracket.
 - (5) Remove support.
 - (6) Repair support by increasing adjustable slot dimension (2 places) from 1/2 inch to 5/8 inch. (Figure 801)

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1002, ALODINE 1200 COATING (DPM 1453)

HAZMAT 1706, FR PRIMER (DPM 2232-7)

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(WARNING PRECEDES)

HAZMAT 1000, REFER TO MSDS

- (7) Apply coating (Alodine 1200), and FR primer to exposed aluminum edge of support.
- B. Install support as follows:
- (1) Position support to center wing bulkhead bracket. Install and lightly tighten fasteners.
NOTE: Adjustment of support may be required to facilitate adequate clearance of fuel pipe segment to adjacent structure.
 - (2) Prior to positioning clamp assembly (base and strap) onto fuel pipe segment, check that aluminum foil wrap on base is adhered in place and that base and strap are not damaged.
 - (3) Position clamp assembly to fuel pipe segment and support. Install and tighten clamp fasteners.
 - (4) If necessary, adjust support and tighten support to bulkhead bracket. Make certain that support is installed to provide a minimum 3/32 inch clearance between forward fuel boost pump manifold segment and wing stringer number 5.
 - (5) Install fuel tank access door 1410C and seal door as required. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

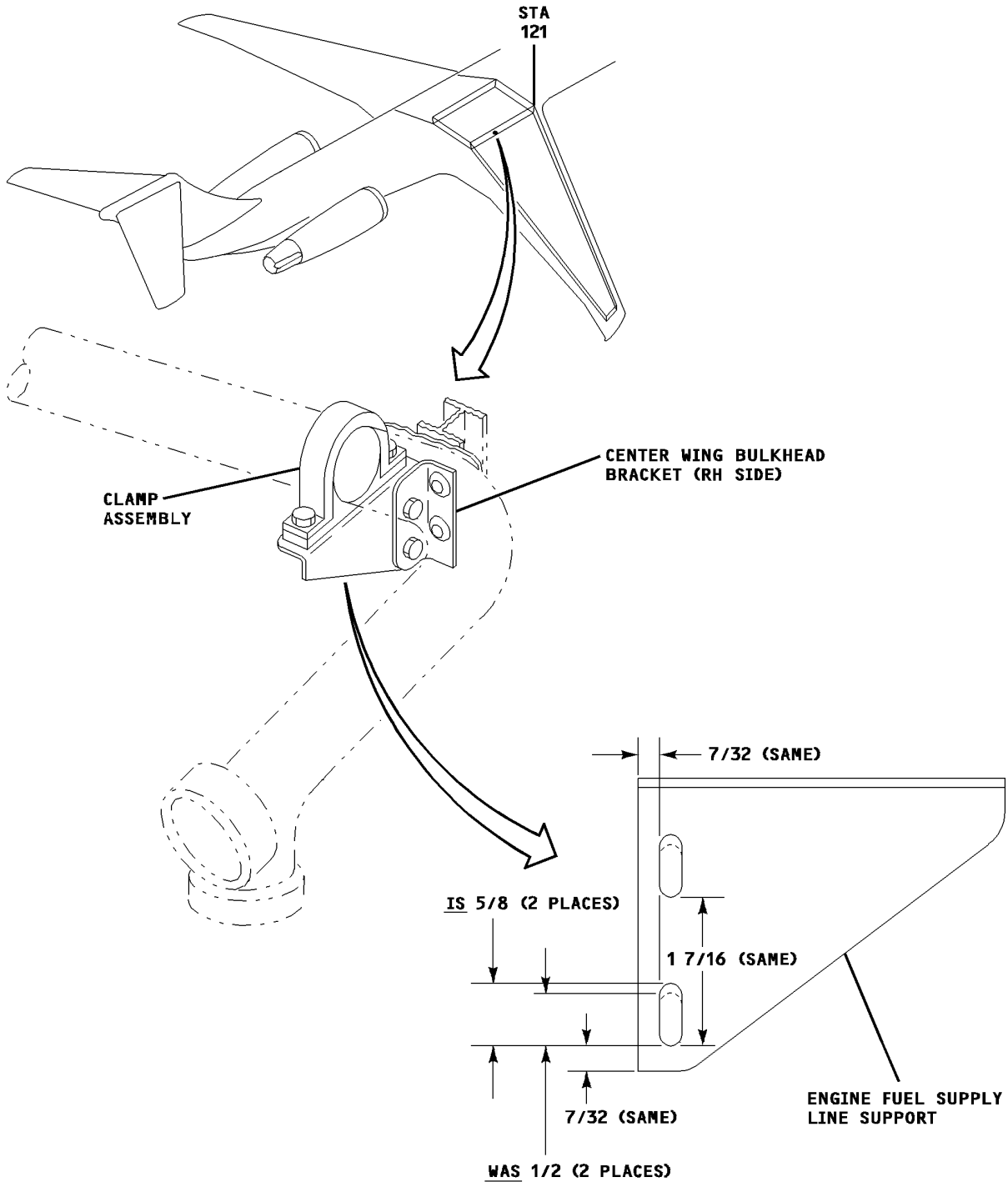
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ENGINE FUEL SUPPLY LINE SUPPORT
Figure 801/28-20-17-990-807

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FUEL TRANSFER PUMP - MAINTENANCE PRACTICES

1. General

- A. The fuel transfer pumps located in the fuselage fuel tanks are removed through the aft fuel quantity probe access door in the respective tank. The fuel quantity probe may remain attached to the access door during removal. If wires are not disconnected from the probe when access door is removed from the tank, use care to prevent damaging wires.

NOTE: The pump B is forward of the pump A on both the forward and aft auxiliary tanks.

- B. Access to tank aft fuel quantity access doors is through floor panels located left of the centerline in the aircraft passenger compartment.

CAUTION: DO NOT REPAIR FUEL PUMP FLEXIBLE CONDUIT OR REPLACE FUEL PUMP CONDUIT ELECTRICAL CONNECTOR ON AIRCRAFT.

- C. Procedures for removal of electrical conduit from fuel tanks are similar for fuel boost pumps, and engine start pumps.
- D. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201.
- E. For fuel transfer pump electrical conduit removal/installation procedures. (PAGEBLOCK 28-20-07/201)

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 201

Name and Number	Manufacturer
Pump installation and removal tool 63-0468-1	Plessey Aerospace
Sealant, PR1422 B-2 DPM 2292-2	Products Research Co.
Tester, phase voltage/rotation (Ref. Tool and Equipment Lists, 28-20-1)	Local
Torque wrench (200-300 inch pounds range)	
Wrench, spanner 260135	CTS Co., Inc.
Torque Strip Fuel Tank Integral Coating DMS 1850-1C	PRC-DeSoto International, Inc. 11601 United Street Mojave, CA 93501

3. Removal/Installation Fuel Transfer Pump

- A. Remove Pump
 - (1) Defuel applicable tank to below level of pump access door .(PAGEBLOCK 28-00-00/201)

EFFECTIVITY WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

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WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (2) Open these circuit breakers and install safety tags:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

- (3) Remove cabin floor panels.
 (4) Remove applicable fuel quantity probe access door.
 (5) Engage fingers of pump installation and removal tool with locking ring on pump Figure 201 or Figure 202 and Figure 203.
 (6) Rotate tool counterclockwise against stop.

CAUTION: DO NOT DISCONNECT ELECTRICAL CONNECTOR BEFORE REMOVAL OF PUMP FROM TANK. CARE MUST BE EXERCISED IN HANDLING PUMP WIRING.

- (7) Lift tool with pump out of tank.

CAUTION: ROUND CONNECTOR NUT AND HOSE HEX NUT MUST NOT BE DISTURBED. KEEP PLUG AND RECEPTACLE DRY AND FREE OF CONTAMINATION. IF PLUG AND INSERTS BECOME WET WITH FUEL, CLEAN IMMEDIATELY WITH SOFT, CLEAN COTTON CLOTH, DRY AIR, OR OTHER SUITABLE MEANS.

- (8) Disconnect electrical connector (square nut) from pump.

NOTE: Slight rotation of pump receptacle, conduit and connector may occur due to clearance between "D" shaped base of pump receptacle and mating hole in pump casting.

B. Install Pump

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

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- (2) Check electrical connector and mating connector for evidence of arcing or overheating. Clean connector or replace connector/conduit as necessary to ensure good connections. Refer to Paragraph 5.A., for pump electrical connector check.

CAUTION: DO NOT DISTURB ROUND CONNECTOR NUT OR HOSE HEX NUT.

- (3) Connect electrical connector to pump. Tighten square nut to torque of 250 to 275 inch-pounds (28 to 31 N·m).

NOTE: During torquing of square nut slight rotation of pump receptacle, conduit and connector may occur. Clearance between "D" shaped base of pump receptacle and mating hole in pump casting may allow a few degrees rotation of receptacle.

- (a) Inspection of the pump connector/torquing is to be witnessed by second individual. If a second individual is not available, recheck the torque and confirm by applying a torque stripe to the connector every time a pump connector is installed.
 - (b) The above step is a CDCCL procedure. For important information on CDCCLs, refer to Airworthiness Limitation Precautions (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201).
- (4) Engage fingers of pump installation and removal tool with locking ring on pump. (Figure 201 or Figure 202) (Figure 203)
 - (5) Wet O-ring on base of pump with fuel to prevent cutting or scratching during installation. This step is not necessary if fuel level in tank is high enough to wet seal during installation.
 - (6) Carefully insert tool with attached pump in tank and engage index pins in volute (rotate tool to seat).
 - (7) Push down and rotate tool clockwise to lock pump in place.

CAUTION: MAKE SURE ELECTRICAL CONDUIT IS NOT KINKED. A KINKED CONDUIT MAY DAMAGE THE CONDUIT AND CAUSE INTERNAL WIRES TO SHORT WHICH CREATES AN UNSAFE CONDITION INSIDE THE FUEL TANK.

- (8) Do not allow electrical conduit to become kinked.
- (9) Lift tool out.

CAUTION: BEFORE INSTALLING ACCESS DOORS, PERFORM FINAL CHECK TO MAKE CERTAIN THAT ALL TOOLS, RAGS, AND HARDWARE, ETC. HAVE BEEN REMOVED FROM TANK.

- (10) Install access door as follows:
 - (a) Start screw in door.

WARNING: LOW VISCOSITY POLYSULFIDE SEALANT IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOW VISCOSITY POLYSULFIDE SEALANT IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW VISCOSITY POLYSULFIDE SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

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(WARNING PRECEDES)

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (b) Apply small bead of sealant (PR1422 B-2) to door counter-sink or underside of screw head.
 - (c) Tighten screw.
 - (d) Wipe off any excess sealant that may extrude from under screw head.
- (11) Remove the safety tags and close these circuit breakers:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

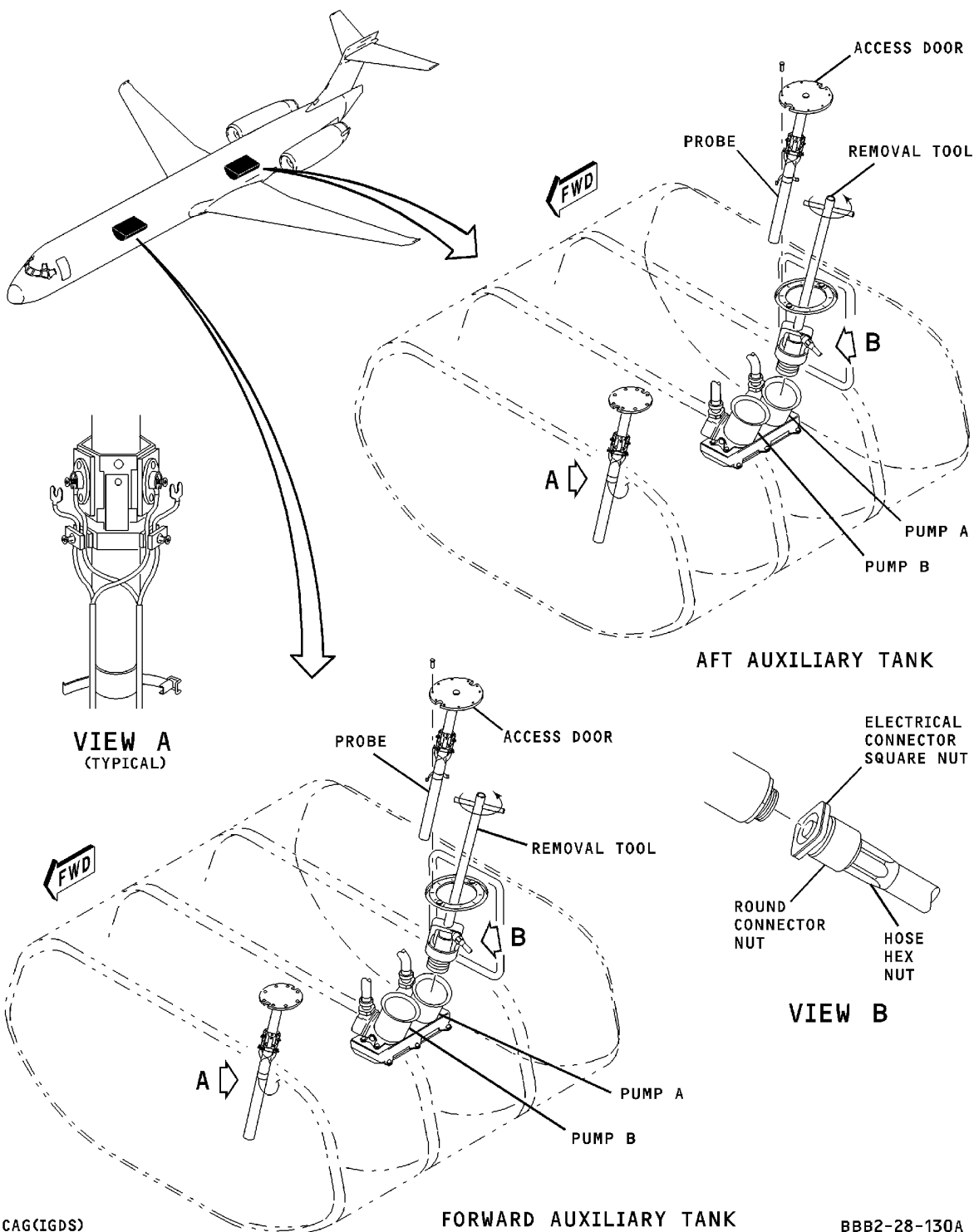
<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

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**Fuel Transfer Pump -- Removal/Installation
Figure 201/28-20-18-990-801**

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 873, 874, 877-881,
883, 884, 892

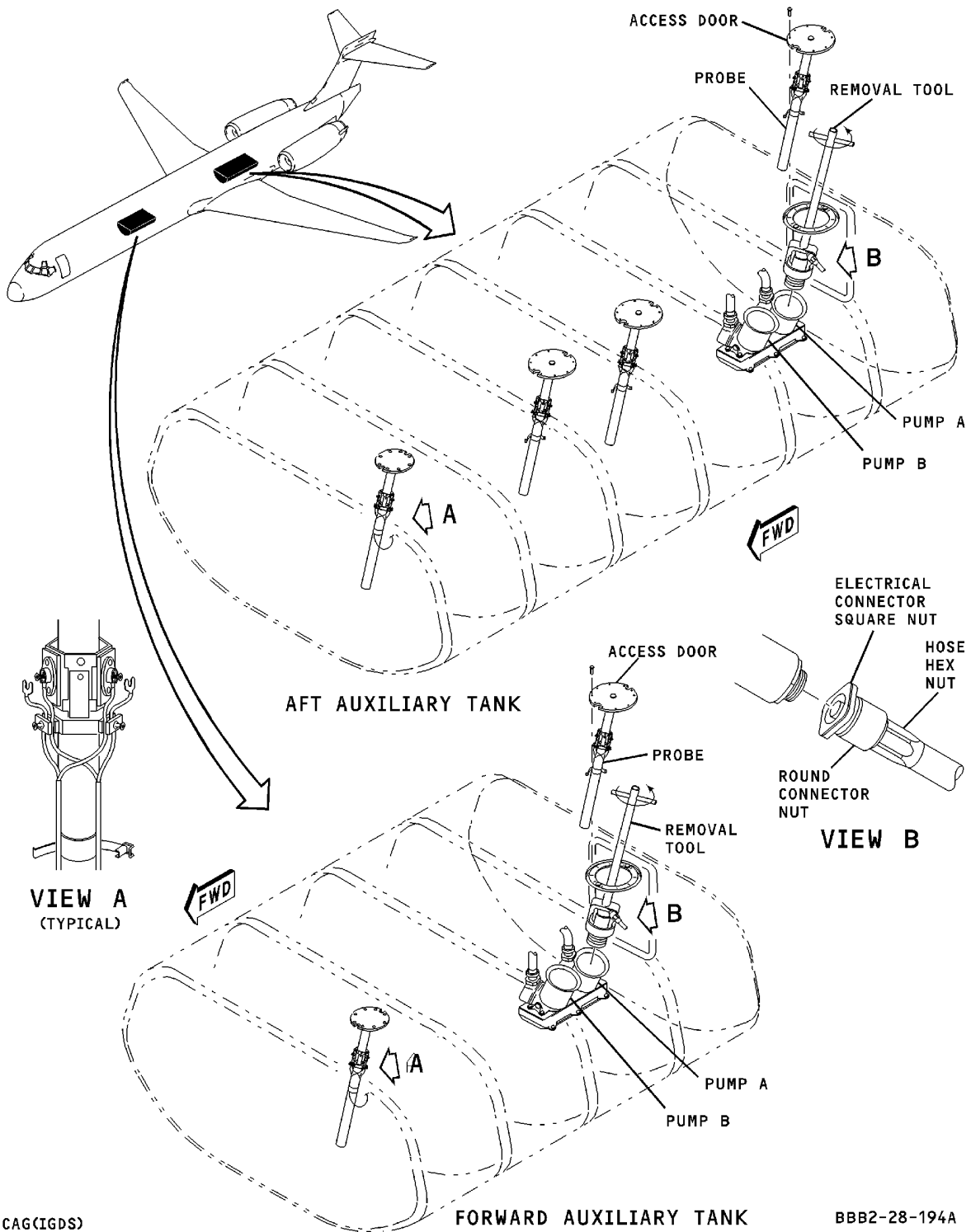
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Fuel Transfer Pump -- Removal/Installation
Figure 202/28-20-18-990-803

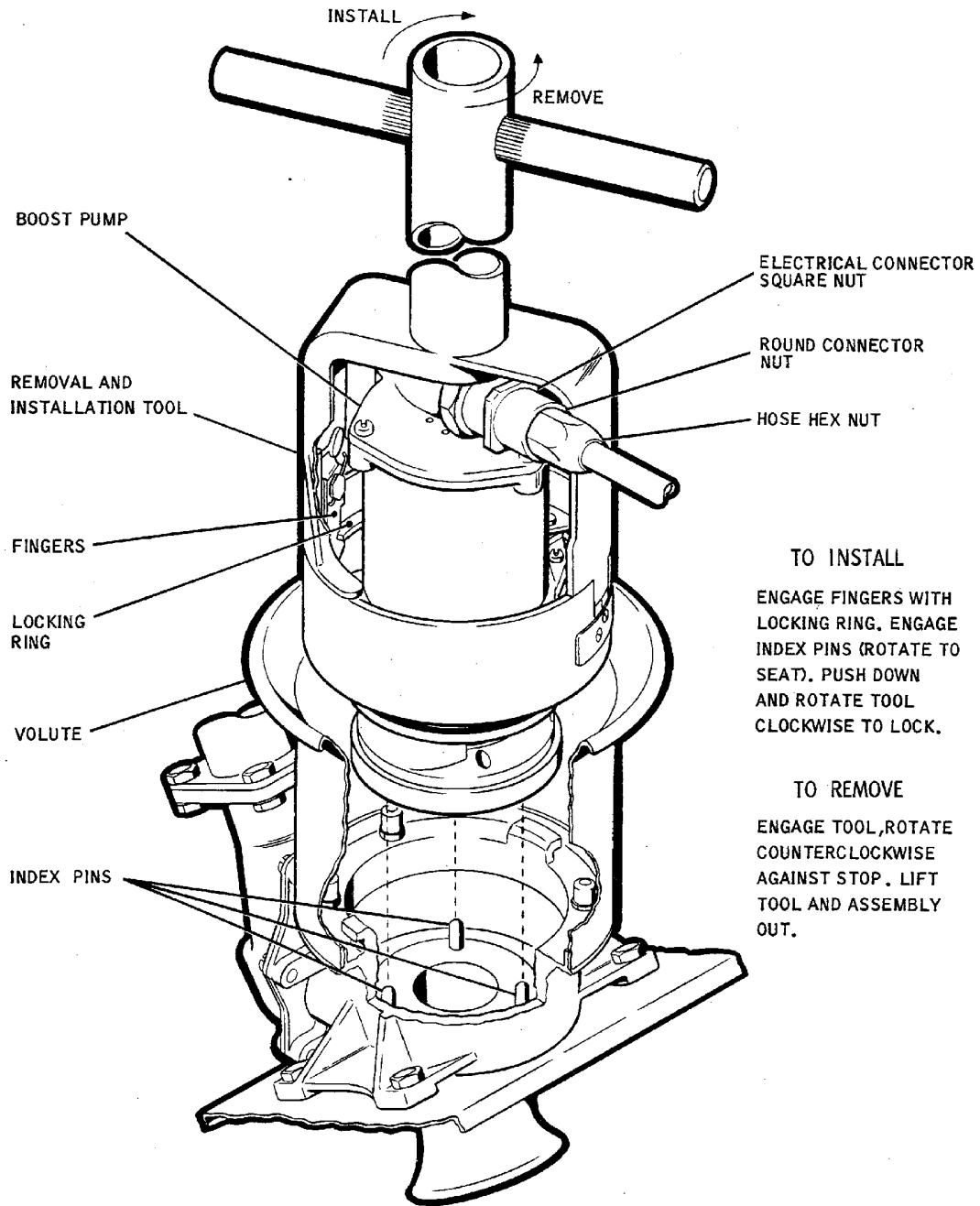
EFFECTIVITY
WJE 861, 862

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TO INSTALL

ENGAGE FINGERS WITH LOCKING RING. ENGAGE INDEX PINS (ROTATE TO SEAT). PUSH DOWN AND ROTATE TOOL CLOCKWISE TO LOCK.

TO REMOVE

ENGAGE TOOL, ROTATE COUNTERCLOCKWISE AGAINST STOP. LIFT TOOL AND ASSEMBLY OUT.

BBB2-28-11

**Pump Removal Tool -- Operation
Figure 203/28-20-18-990-802**

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

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4. Adjustment/Test Fuel Transfer Pump

NOTE: This test ensures that the fuselage fuel tank line breakaway couplings are intact and that the transfer system float switches, pumps and relays are operating properly.

A. Test Pump

- (1) The pump operation must be continuously monitored to make sure that a pump does not run dry.
- (2) If it is necessary to leave the pump while it is on, make sure that there is sufficient fuel in the tank in order for the pump not to run dry.

WARNING: DO NOT OPERATE A FUEL PUMP IN AN EMPTY FUEL TANK. PROLONGED DRY RUNNING OF A FUEL PUMP IN AN EMPTY TANK CAN DEGRADE INTERNAL PUMP COMPONENTS AND INCREASE THE RISK OF DEVELOPING A FUEL TANK IGNITION SOURCE.

- (3) The pump should be stopped when the low pressure indication comes on or the desired fuel quantity is indicated.
- (4) Make certain that center tank fuel level is 14,500 pounds (6577 kg) minimum.
- (5) Make certain that each fuselage fuel tank is full and left and right main tanks contain 3000 pounds (1360 kg) to 7800 pounds (3538 kg).
- (6) Place FWD and AFT AUX TRANS A switches in TEST position and check that corresponding AUX FUEL PUMP PRESS LOW lights come on momentarily, then go off.
- (7) Release pump switches to OFF position to prevent continued transfer of fuel.
- (8) Perform Paragraph 4.A.(6) and Paragraph 4.A.(7) for FWD and AFT AUX TRANS B switches; check for identical results.
- (9) Place both FUEL TANKS CTR PUMPS switches to ON position and begin defueling from center tank.
- (10) Place FWD and AFT AUX TRANS A and B switches to AUTO position. Check that FWD and AFT AUX FUEL PUMP PRESS LOW lights do not come on and pumps are not transferring fuel to center tank.

WJE 401-405, 409, 410, 412, 414, 873, 874, 877-881, 883, 884, 892

- (11) Continue defueling center tank until fuel level drops to 13,700 pounds (6214 kg). Fuel transfer from fuselage tanks should begin, FWD and AFT AUX FUEL PUMP PRESS LOW lights come on momentarily, then go off.

NOTE: For aircraft with 780 and 1160 gallon systems, continue defueling center tank until fuel drops to 13,500 ±900 pounds (6150 ±425 kg).

For aircraft with 1960 gallon systems, continue defueling center tank until fuel drops to 11,500 ±800 pounds (5250 ±375 kg).

WJE 861, 862

- (12) Continue defueling center tank until fuel level drops to 11,200 pounds (5080 kg). Fuel transfer from fuselage tanks should begin, FWD and AFT AUX FUEL PUMP PRESS LOW lights come on momentarily, then go off.

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- (13) Check that transfer pumps are transferring fuel by observing decrease in fuselage tanks fuel quantities.
- (14) Check that transfer pumps are transferring fuel by observing decrease in fuselage tank fuel quantity.

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- (15) Place both FUEL TANKS CTR PUMPS switches to OFF position to stop defueling from center tank.
- (16) Place FWD and AFT AUX TRANS A switches to OFF position. Make certain that fuel continues to transfer from fuselage tanks to center tank.
NOTE: Do not place all four AUX TRANS pump switches to OFF position at the same time. One pump, at least, must remain ON to keep the pump holding relays closed.
- (17) Place FWD and AFT AUX TRANS A switches to AUTO position. FWD and AFT AUX FUEL PUMP PRESS LOW lights should not come on.
- (18) Place FWD and AFT AUX TRANS B switches to OFF position. Make certain that fuel continues to transfer from both fuselage tanks to center main tank.
- (19) Place FWD and AFT AUX TRANS B switches to AUTO position. FWD and AFT AUX FUEL PUMP PRESS LOW lights should not come on.
- (20) Transfer additional fuel into center main tank from left and right main tanks until center tank fuel level reaches 19,000 pounds (8618 kg). Switch left and right AFT pump switches to OFF. Make certain that fuel transfer from left and right main tanks ceases.
- (21) When center main tank fuel level reaches 20,900 ±1350 lb (9480 ±612 kg), make certain that fuselage aux fuel transfer pumps shut off and fuel transfer from fuselage tanks ceases.

CAUTION: CONTINUED FILLING OF CENTER TANK ABOVE TRANSFER SHUTOFF LEVEL MAY CAUSE FUEL SPILLAGE FROM WING VENT BOXES.

- (22) Place FWD and AFT AUX TRANS A and B switches to OFF position.

5. Check Fuel Transfer Pump

A. Check Pump Electrical Connector

- (1) If one or more pump circuit breakers trip open after one reset, place affected pump control switch in OFF position.
- (2) Remove applicable pump. (Paragraph 3.A.)
- (3) Disconnect pump electrical connector.
- (4) Check electrical connector and mating connector for evidence of arcing or overheating.
- (5) Clean connector or replace connector/conduit as necessary to ensure good connections. (FUEL BOOST PUMPS - MAINTENANCE PRACTICES, PAGEBLOCK 28-20-07/201)
 - (a) Inspection of the pump connector/torquing is to be witnessed by second individual. If a second individual is not available, recheck the torque and confirm by applying a torque stripe to the connector every time a pump connector is installed.
 - (b) The above step is a Critical Design Configuration Control Limitation (CDCCL) procedure. For important information on CDCCLs, refer to Airworthiness Limitation Precautions (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201).
- (6) Install pump. (Paragraph 3.B.)

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FLEXIBLE FUEL LINE COUPLINGS - MAINTENANCE PRACTICES

1. General

A. The following instructions apply to fuel line couplings inside and outside of tanks.

WARNING: DO NOT USE LOCKWIRE, SAFETY CABLES OR COTTER PINS IN THE FUEL TANKS OR FOR HARDWARE RETENTION OF COMPONENTS OR EQUIPMENT INSTALLED IN FUEL TANKS. STATIC DISCHARGES FROM THE LOCKWIRE, SAFETY CABLES OR COTTER PINS CAN CAUSE FIRES OR EXPLOSIONS. LOCKWIRE, SAFETY CABLES AND COTTER PINS CAN BE USED IF THEY ARE CONTAINED INSIDE THE HOUSING OF AN EXPLOSION PROOF, TANK MOUNTED COMPONENT, AND MUST BE INSTALLED ACCORDING TO THE APPLICABLE BOEING DESIGN, REPAIR AND MAINTENANCE DOCUMENTATION. THIS WILL HELP PREVENT INJURY TO PERSONS AND DAMAGE TO THE AIRCRAFT.

B. Do not safety couplings installed inside tanks with lockwire. (LOCKWIRE SAFETYING - MAINTENANCE PRACTICES, PAGEBLOCK 20-10-18/201)

(1) The above warning is a CDCCL procedure. For important information on CDCCLs, refer to Airworthiness Limitation Precautions (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201).

C. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the General Maintenance Practices. (PAGEBLOCK 28-00-00/201)

D. The long or short sleeves and nuts that require a snap ring for assembly are red in color. The short sleeves and nuts that do not require a snap ring for assembly are green-gold in color.

NOTE: Presently installed sleeves and nuts that do not require a snap ring for assembly may be blue in color.

E. Replacement lines must be the same length as the original lines.

F. Fuel pipe couplings outside the fuel tanks are visually inspected for leakage. These couplings are not permitted to leak.

G. In-tank fuel pipe couplings are leakage tested blindly after fuel feed system components are installed and the fuel tanks are closed by accomplishing a fuel transfer test. Excessive fuel transfer rates require repair.

H. In-tank component leakage troubleshooting should be accomplished using the inspection/check procedure.

I. After a satisfactory adjustment/test is accomplished, a suction feed engine run is required to ensure the fuel feed system is capable to support engine suction feed requirements.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 201

Name and Number	Manufacturer
Petrolatum VV-P-236 DPM 675	
Brushes (Pure bristle)	Sinclair Paint Company

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Table 201 (Continued)

Name and Number	Manufacturer
DeSoto torque stripe coating Coating Polyurethane 823-707 base; 910-702 catalyst; 020-707 reducer. 4 parts base to 1 part catalyst to 1 part reducer for brush application. May be purchased as a kit. QPL 1850	DeSoto Chemical Coating Co.
Inconel Lockwire 0.032 in NASM20995N32, DPM 684	Not specified
Corrosion Resistant Steel Lockwire 0.032 in NASM20995C32, DPM 5865	Not specified
Sealant PR-1422B 1/2 DPM 2292-2	Products Research Co.
* Cover plate 4913058-1	
* Cover plate W/-6 fitting 2958992-501	
* Cover plate 4913146-1	
Gask-O-Seal 011157-015-024 (14 required)	
Gask-O-Seal 011157-015-32 (4 required)	
Flared fitting plug AN806-D6 (3 required)	
Flared fitting cap AN929-8 (2 required)	
Cap assembly 7965911-3	
O-ring seal MS29513-030 (4 required)	
NOTE: * Cover plates preceded by an asterisk can be local manufactured.	

3. Removal/Installation Flexible Fuel Line Couplings

A. Remove Coupling

- (1) Drain fuel lines and/or tanks as required. (PAGEBLOCK 28-00-00/201)
- (2) Remove safety collar from coupling if applicable.
- (3) Back off nut three to four turns.
- (4) Slide sleeve back, using nut for extra leverage, until nut is against flange.
- (5) Repeat steps (2) and (3) until sleeve is completely off nut flange.

B. Install Coupling

NOTE: The fuel line supporting clamps shall be in place and supporting the lines before the couplings are assembled. Do not tighten at this time.

WARNING: WHITE PETROLATUM IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN WHITE PETROLATUM IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT BREATHE THE MIST.

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(WARNING PRECEDES)

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (1) Lubricate sleeve inside diameter lightly with (VV-P-236) petrolatum by sliding sleeve over flange and lubricating exposed portion of sleeve.
- (2) Check alignment of lines as follows:
 - (a) Slide lines toward each other until end of flanges touch.
 - (b) Measure maximum tapered gap. Gap must not exceed tolerance given in Figure 201.
- (3) Position supporting clamps as required to obtain correct alignment of lines. Separate lines to permit O-ring installation.
- (4) Install O-rings in flange cavity, taking care not to twist or roll O-rings during installation.

NOTE: To prevent twisting and rolling, hook one side of O-ring over flange shoulder and stretch over other side.

- (5) Lightly lubricate outside diameter of O-rings.

NOTE: Do not apply excessive lubricant. Inside diameter of O-ring and flange cavity should remain dry.

- (6) Position fuel lines to obtain gap between lines as applicable (Figure 202):
 - (a) On all lines with short sleeve couplings, gap should be $1/8(\pm 1/16)$ inch (3.195(± 1.587) mm).
 - (b) On all lines with long sleeve couplings, gap should be $5/8(\pm 1/2)$ inch (15.875(± 12.7) mm).

NOTE: The long sleeve is approximately one inch longer than the short sleeve. Red colored sleeves require a red colored retainer ring.

- (7) Tighten fuel line supporting clamps.
- (8) Slide sleeve over flange until sleeve contacts entire circumference of O-ring.

CAUTION: MAKE CERTAIN THAT O-RING IS ENTIRELY WITHIN ITS CAVITY. EXCESSIVE COCKING OF SLEEVE, UNDUE FORCING, OR TWISTING COULD CAUSE O-RING DAMAGE.

- (9) With slight rocking motion, slide sleeve over O-ring.

NOTE: Gap dimensions must be held (Figure 201 and Figure 202).

- (10) Slide sleeve over second O-ring.
- (11) Turn nut onto sleeve threads.

NOTE: After initial turn, the nut will be turning over a locking insert.

- (12) Continue to turn nut until firmly tight against sleeve shoulder.

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WARNING: INTEGRAL FUEL TANK COATING IS AN AGENT THAT IS FLAMMABLE, EXPLOSIVE, CARCINOGENIC, AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN INTEGRAL FUEL TANK COATING IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET INTEGRAL FUEL TANK COATING IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

WARNING: DO NOT USE LOCKWIRE, SAFETY CABLES OR COTTER PINS IN THE FUEL TANKS OR FOR HARDWARE RETENTION OF COMPONENTS OR EQUIPMENT INSTALLED IN FUEL TANKS. STATIC DISCHARGES FROM THE LOCKWIRE, SAFETY CABLES OR COTTER PINS CAN CAUSE FIRES OR EXPLOSIONS. LOCKWIRE, SAFETY CABLES AND COTTER PINS CAN BE USED IF THEY ARE CONTAINED INSIDE THE HOUSING OF AN EXPLOSION PROOF, TANK MOUNTED COMPONENT, AND MUST BE INSTALLED ACCORDING TO THE APPLICABLE BOEING DESIGN, REPAIR AND MAINTENANCE DOCUMENTATION. THIS WILL HELP PREVENT INJURY TO PERSONS AND DAMAGE TO THE AIRCRAFT.

- (13) Safety nut on sleeve with lockwire as required only on fuel lines outside of fuel tanks. (LOCKWIRE SAFETYING - MAINTENANCE PRACTICES, PAGEBLOCK 20-10-18/201)
- (a) The above warning is a CDCCL procedure. For important information on CDCCLs, refer to Airworthiness Limitation Precautions (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201).

WARNING: LOW VISCOSITY POLYSULFIDE SEALANT IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOW VISCOSITY POLYSULFIDE SEALANT IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW VISCOSITY POLYSULFIDE SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

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(WARNING PRECEDES)

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (14) Discard coupling safety collar on all Gamah couplings inside fuel tanks (Figure 203) and lock with (PR 1422B 1/2) sealant (Figure 204).

NOTE: Locking sealant is required only on the engine fuel feed lines. Other fuel lines, such as vent, refueling, and transfer do not require sealant; only torque striping.

- (15) Check fuel line supporting clamps for tightness after couplings are assembled.

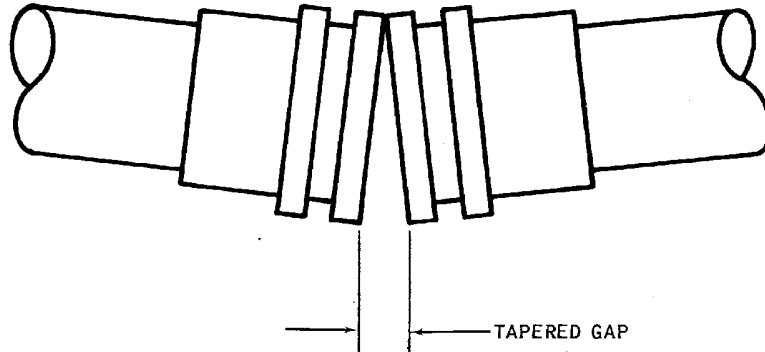
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MAXIMUM ACCEPTABLE TAPERED GAP BETWEEN FLANGES

<u>PIPING SIZE (IN INCHES)</u>	<u>TAPERED GAP (MAX)</u>
1	0.045
1-1/4	0.054
1-1/2	0.062
1-3/4	0.072
2	0.080
2-1/4	0.088
2-1/2	0.097
2-3/4	0.106
3	0.116
3-1/2	0.132
4	0.150
4-1/2	0.167
5	0.185

BBB2-28-28

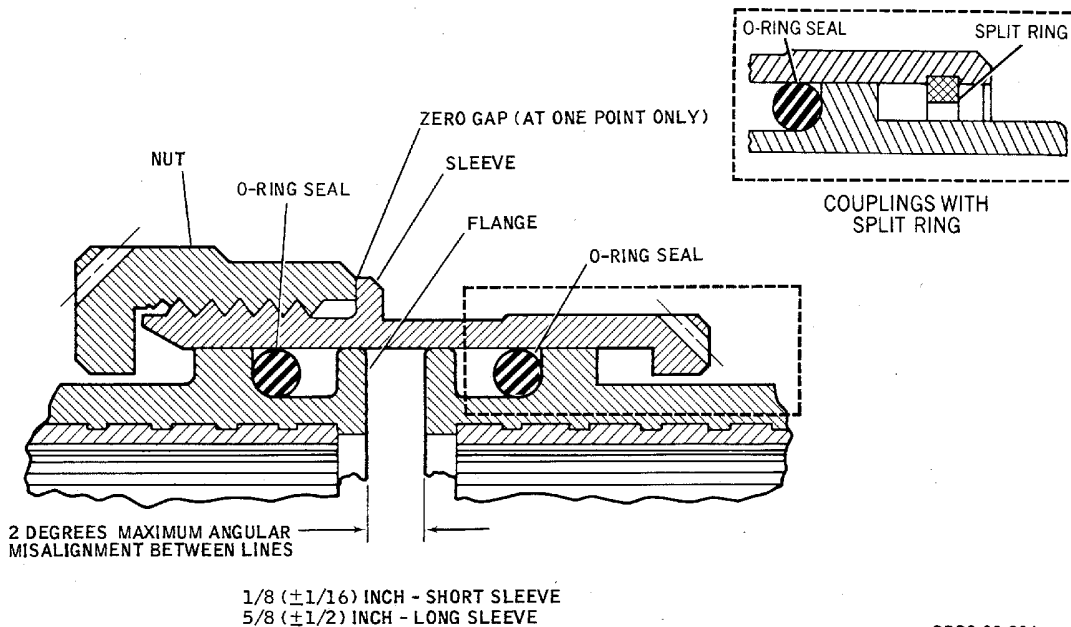
**Flexible Coupling -- Line End Tapered Gap Tolerance
Figure 201/28-20-19-990-801**

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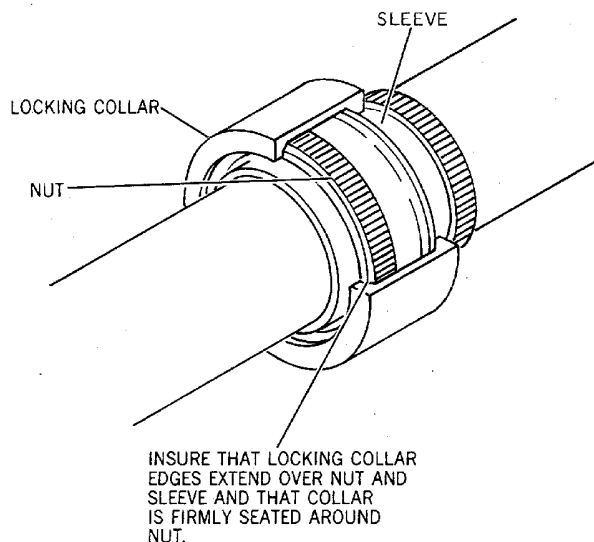
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8882-28-29A

**Flexible Coupling -- Line End Gap
Figure 202/28-20-19-990-802**



8882-28-30

**coupling Locking Collar -- Installation
Figure 203/28-20-19-990-803**

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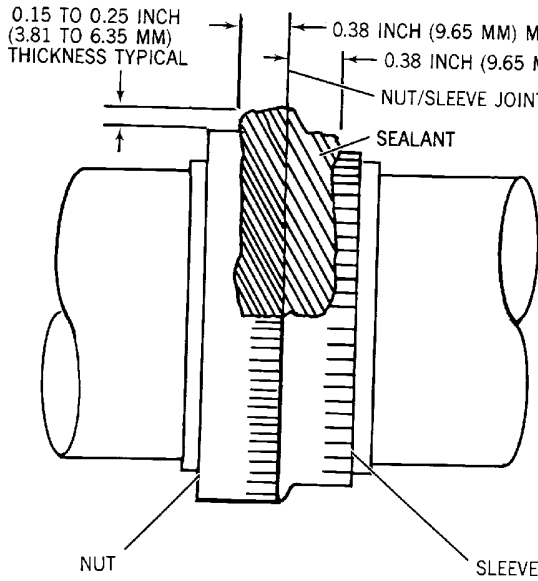
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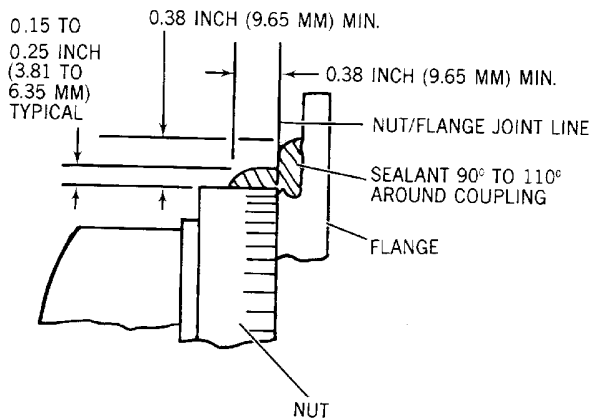
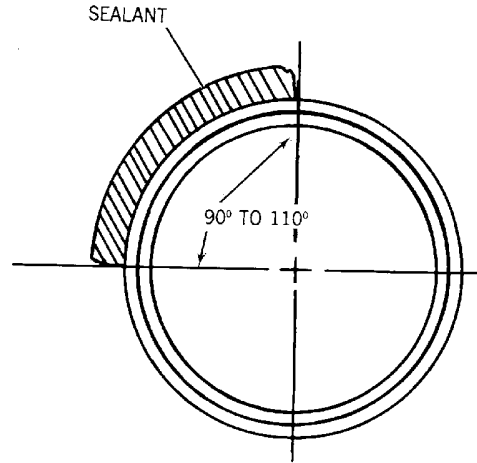
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**ALTERNATE PROCEDURE FOR LOCKING IN TANK
GAMAH COUPLINGS**



GAMAH FULL COUPLING



GAMAH HALF COUPLING

NOTE:

1. BE SURE THAT COUPLING NUT IS FIRMLY HAND TIGHT AGAINST SHOULDER OF SLEEVE OR FLANGE AS APPLICABLE
2. CLEAN EXTERIOR PORTION OF GAMAH COUPLING, USING 1,1,1 TRICHLOROETHANE (MIL-T-81533)

WARNING

1,1,1 TRICHLOROETHANE IS VAPOR TOXIC. AVOID PROLONGED OR REPEATED BREATHING OF VAPOR. AVOID CONTACT WITH SKIN AND EYES. CLEAN PARTS IN WELL-VENTILATED AREA AND USE APPROVED SAFETY EQUIPMENT.

3. APPLY PR-1422-B 1/2 SEALANT AS SHOWN.

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**Sealant Locking of Gamah Couplings
Figure 204/28-20-19-990-804**

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4. Adjustment/Test Flexible Fuel Line Couplings

A. Leak Check Flexible Couplings

- (1) Make certain center fuel tank has approximately 3000 lbs (1360.77 kg) and left and right fuel tanks each have approximately 1500 lbs (680.38 kg) of fuel. (FUEL SYSTEMS GENERAL - SERVICING, PAGEBLOCK 12-11-04/301)
- (2) Position controls in flight compartment and right wing leading edge as follows:

Table 202

Controls	Location	Position
Fuel crossfeed lever	Center control pedestal	OFF detent
Engine fire control handles	Upper instrument panel	Full in
Fuel tank fill valves	Right wing leading edge	CLOSED
APU fire control switches	Forward overhead switch panel	OFF & agent arm
Defuel valve	Right wing leading edge	Open defuel valve to pressurize defuel/refuel piping in right wing leading edge, as required.

- (3) Record fuel quantities for left, right and center fuel tanks.
- (4) Position both center tank boost pumps switches to ON.
- (5) After 5 minutes of fuel boost pump operation, visually check components outside fuel tanks for leakage. No fuel leakage allowed.
- (6) After 30 minutes of operation, position both center tank fuel boost pump switches to OFF.
- (7) Record fuel quantities for left, right and center fuel tanks.
NOTE: Increase of fuel quantity in excess of 250 lbs (113.39 kg) into either left or right fuel tanks indicates internal leakage of external fuel lines into left or right fuel tanks.
- (8) Position left aft fuel boost pump switch to ON.
- (9) After 30 minutes of operation, position left aft fuel boost pump to OFF.
- (10) Record fuel quantities for left, right and center fuel tanks.
NOTE: Increase of fuel quantity in excess of 0 lbs (0 kg) of fuel into center fuel tank and/or 50 lbs (22.67 kg) of fuel into right fuel tank indicates internal leakage of external fuel lines into center or right fuel tanks.
- (11) If in-tank fuel transfer rates exceed maximum allowable limits, perform leak check of internal flexible fuel line couplings. (Paragraph 4.A.(5))
- (12) Distribute fuel so left and right fuel tanks each contain a maximum of 1500 lbs (680.38 kg) of fuel.
- (13) Perform engine suction feed capability test as follows:
 - (a) Start left and right engines. (GENERAL - ADJUSTMENT/TEST, PAGEBLOCK 71-00-00/501 Config 1 or GENERAL - ADJUSTMENT/TEST, PAGEBLOCK 71-00-00/501 Config 8 or GENERAL - ADJUSTMENT/TEST, PAGEBLOCK 71-00-00/501 Config 7 or GENERAL - ADJUSTMENT/TEST, PAGEBLOCK 71-00-00/501 Config 5)
 - (b) After engines stabilize, place all fuel boost pump switches to OFF position.

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CAUTION: SHUTDOWN ENGINE IMMEDIATELY IF ABNORMAL PERFORMANCE OR INDICATIONS INCLUDING THOSE DUE TO FUEL STARVATION ARE EXHIBITED.

- (c) During a 5 minute test, cycle engine from idle to 75 percent (N2) three times, allowing engine to stabilize in each position of throttle movement.
- (d) After 5 minutes, place fuel boost pump switches to ON position.
- (e) Shut down engines. (GENERAL - ADJUSTMENT/TEST, PAGEBLOCK 71-00-00/501 Config 1 or GENERAL - ADJUSTMENT/TEST, PAGEBLOCK 71-00-00/501 Config 8 or GENERAL - ADJUSTMENT/TEST, PAGEBLOCK 71-00-00/501 Config 7 or GENERAL - ADJUSTMENT/TEST, PAGEBLOCK 71-00-00/501 Config 5)
- (f) If abnormal engine performance occurs due to fuel starvation perform leak check of flexible fuel line couplings. (Paragraph 4.A.(5))

5. Inspection/Check Flexible Fuel Line Couplings

NOTE: The following two test can be used in conjunction to check integrity of fuel feed system and troubleshoot excessive transfer rates for in-tank/outside components.

A. Air Pressurization Test of In-Tank Flexible Couplings

NOTE: This test performs decay test for fuel system flexible couplings to include left and right engine fuel feed systems, fuel crossfeed pipes, defuel system, center tank boost pump canister reprime system and right wing leading edge refuel pipes.

NOTE: It is acceptable to prepare only that portion of fuel system needed to facilitate check, provided end result accomplishes that portion of system check.

(1) Prepare for check as follows:

NOTE: It is acceptable to loosen/remove pipe assembly attachment clamps as required to facilitate access to fuel boost pump volute 4-bolt flanges when installing cover plate.

- (a) Disconnect left and right engine fuel supply hoses.
- (b) Install Gask-O-Seals (P/N 011157-015-24) on cover plates (P/N 4913058-1) and install cover plates on fuel supply hoses.
- (c) Disconnect left and right engine fuel vapor eductor hoses.
- (d) Install plugs (AN806-D6) on eductor hoses.
- (e) Disconnect fuel pipe adapters at wing tank fuel boost pump volute 4-bolt flanges for left FWD boost pump volute, left AFT boost pump volute, right FWD boost pump volute and right AFT boost pump volute.
- (f) Install Gask-O-Seals (P/N 011157-015-24) on cover plates (P/N 4913058-1) and install cover plates on open boost pump fuel pipes (4 places).
- (g) On aircraft with fuel scavage system installed, disconnect scavage motive tube from center fuel tank boost pump volute outlet elbow and install cap (AN929-8) on fitting.
- (h) On aircraft with inlet bubble pipe installed, disconnect center fuel tank boost pump inlet bubble pipe as follows:
 - 1) Disconnect motive tube from center tank volute outlet pipe, and install cap (AN929-8) on fitting.
 - 2) Disconnect extraction pipe from center fuel tank boost pump inlet bubble pipe extraction nipple.
 - 3) Install O-ring seals (P/N MS29513-030) on cap (P/N 7965911-3) and nipple flange.
 - 4) Install cap on nipple flange.

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- (i) Disconnect center fuel tank boost pump pipe adapters at center fuel tank boost pump volute 4-bolt flanges for inlet and outlet side at center tank boost pump volute.
 - (j) Install Gask-O-Seal (P/N011157-015-32) on modified cover plate (P/N 4913146-1) and install cover plate on open inlet pipe.
 - (k) Install Gask-O-Seal (P/N 011157-015-24) on cover plate (P/N 2958992-501) and install on open outlet pipe.
 - (l) On aircraft with reprime float valve installed, disconnect fuel line to reprime float valve and install plug (AN806-D6).
- (2) Check center tank boost pump inlet.

NOTE: Left engine, right engine and APU fuel fire shutoff valves can be opened or closed as necessary.

- (a) Make certain controls in flight compartment and right wing leading edge are as follows:

Table 203

Controls	Location	Position
Fuel crossfeed lever	Center control pedestal	OFF detent
Engine fire control handles	Upper instrument panel	Full in
Fuel tank fill valves	Right wing leading edge	CLOSED
APU fire control switches	Forward overhead switch panel	OFF & agent arm
Defuel valve	Right wing leading edge	Open defuel valve to pressurize defuel/refuel piping in right wing leading edge, as required.

- (b) Connect air pressure source to center tank boost pump volute inlet pipe.
- (c) Pressurize inlet piping to 30 PSIG and close air supply manual valve. Maintain pressure for 5 minutes, no leakage allowed.

WARNING: LEAK TEST BUBBLE FLUID IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN LEAK TEST BUBBLE FLUID IS USED.

- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LEAK TEST BUBBLE FLUID IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

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(WARNING PRECEDES)

- (d) If pressure bleed off occurs, use leak test bubble fluid to check piping for leaks. No leakage allowed.

NOTE: If bubbles show, repair leaks to piping.

- (3) Check left and right fuel feed systems.

NOTE: This test includes crossfeed, defuel and center tank boost pump canister reprime systems.

NOTE: Left engine, right engine and APU fuel fire shutoff valves can be opened or closed as necessary.

- (a) Make certain controls in flight compartment and right wing leading edge are as follows:

Table 204

Controls	Location	Position
Fuel crossfeed lever	Center control pedestal	OFF detent
Engine fire control handles	Upper instrument panel	Full in
Fuel tank fill valves	Right wing leading edge	CLOSED
APU fire control switches	Forward overhead switch panel	OFF & agent arm
Defuel valve	Right wing leading edge	Open defuel valve to pressurize defuel/refuel piping in right wing leading edge, as required.

- (b) Connect air pressure source to center tank boost pump volute outlet piping.

- (c) Pressurize outlet piping to 30 PSIG and close air supply manual valve. Maintain pressure for 5 minutes, no leakage allowed.

WARNING: LEAK TEST BUBBLE FLUID IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN LEAK TEST BUBBLE FLUID IS USED.

- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LEAK TEST BUBBLE FLUID IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (d) If pressure bleed off occurs, use leak test bubble fluid to check piping for leaks. No leakage allowed.

NOTE: If bubbles show, repair leaks to piping.

- (4) Return aircraft to serviceable condition as follows:

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- (a) Remove cover plates from left and right engine fuel supply hoses. Remove and discard Gask-O-Seals.
- (b) Install new Gask-O-Seals and connect left and right fuel supply lines.
- (c) Remove plugs from left and right engine vapor removal eductor hoses. Connect hoses to engines.
- (d) Remove flange cover plates from wing tank fuel boost pump volute 4-bolt flanges. Remove and discard Gask-O-Seals.
- (e) Install new Gask-O-Seals and connect 4-bolt flanges for left FWD, left AFT, right FWD and right AFT boost pump volutes.
 - 1) Connect/install all piping attachment clamps that were disconnected/removed to facilitate test.
- (f) Remove cover plates from center tank boost pump volute inlet and outlet pipes. Remove and discard Gask-O-Seals.
- (g) Install new Gask-O-Seals and install inlet and outlet side pipe adapters to center tank boost pump volute.
 - 1) Connect/install all piping attachment clamps that were disconnected/removed to facilitate test.
- (h) On aircraft with fuel scavage system installed, remove cap from center tank boost pump volute outlet elbow motive fitting and connect motive tube to fitting.
- (i) On aircraft with center tank boost pump bubble pipe, remove cap from motive tube fitting and connect motive tube to fitting.
 - 1) Remove cap assembly seal from center tank boost pump inlet bubble pipe extraction nipple. Remove and discard O-ring from extraction nipple.
 - 2) Install new O-ring seal on extraction nipple and connect extraction pipe.
- (j) On aircraft with reprime float valve, remove plug from float valve tube and connect tube to float valve.

B. Fuel Pressure Test of Flexible Couplings

NOTE: This pressure check tests fuel system flexible couplings outside of fuel tanks to include left and right engine fuel feed systems, APU fuel feed system and right wing leading edge refuel pipes.

NOTE: Left engine, right engine and APU fuel fire shutoff valves can be opened or closed as necessary.

- (1) Fill main tanks with a minimum of 1000 lbs. (454 kg) of fuel. (PRESSURE REFUELING - SERVICING, PAGEBLOCK 12-11-07/301)
- (2) Position controls in flight compartment and right wing leading edge as follows:

NOTE: Valve positions are suggested. Valves may be positioned as required to facilitate pressure test.

Table 205

Controls	Location	Position
Fuel crossfeed lever	Center control pedestal	OFF detent
Engine fire control handles	Upper instrument panel	Full in
Fuel tank fill valves	Right wing leading edge	CLOSED

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Table 205 (Continued)

Controls	Location	Position
APU fire control switches	Forward overhead switch panel	OFF & agent arm
Defuel valve	Right wing leading edge	Open defuel valve to pressurize defuel/refuel piping in right wing leading edge, as required.

- (3) Place all boost pump switches to ON position for a minimum of 5 minutes.
- (4) Check flexible couplings for leaks, no leakage allowed.
NOTE: If fuel leakage occurs, repair leaks to coupling.
- (5) Place all fuel boost pumps to OFF position.

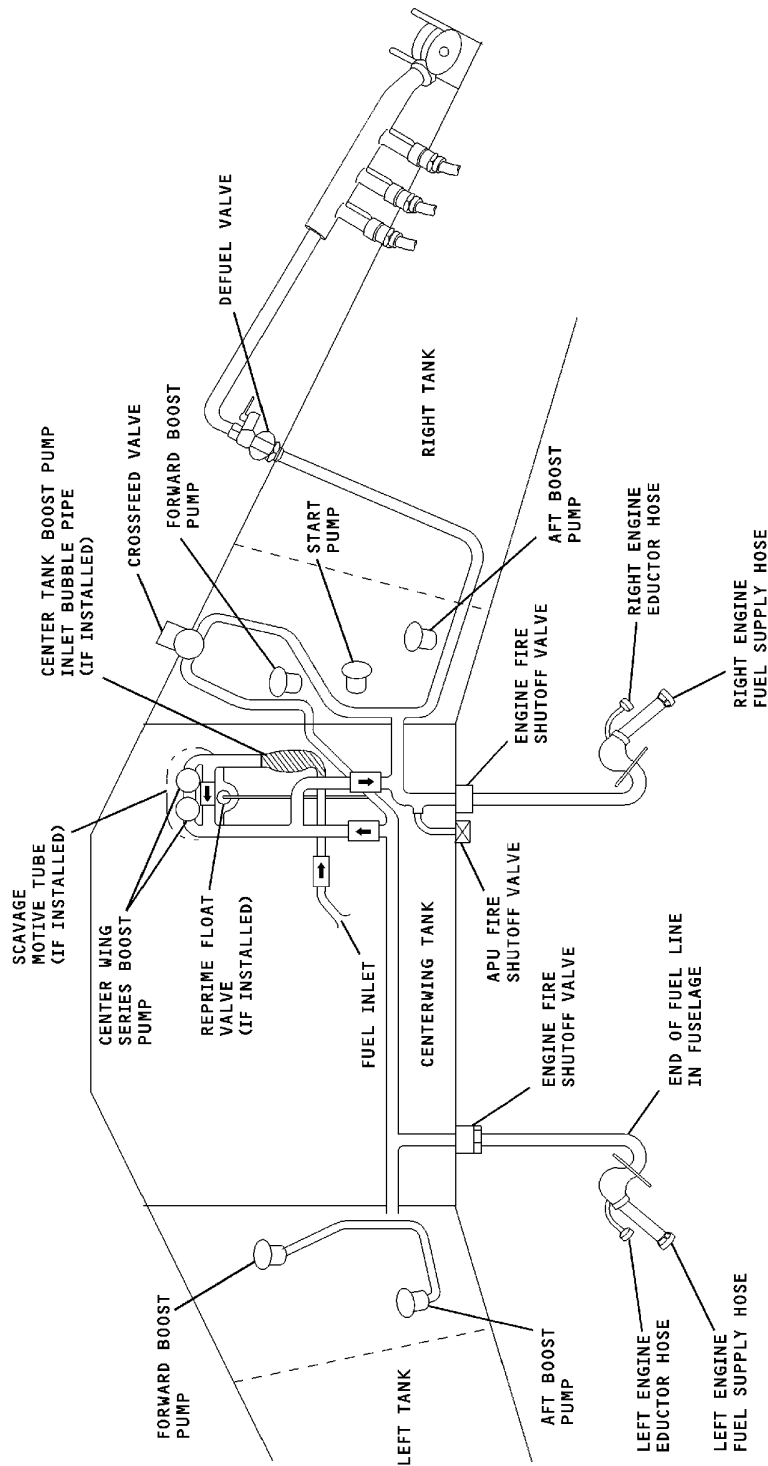
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BBB2-28-367

CAG(IGDS)

Flexible Fuel Line Couplings - Adjustment/Test
Figure 205/28-20-19-990-805

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CENTER TANK REPRIME LINE CHECK VALVE - MAINTENANCE PRACTICES

1. General

- A. There is one center tank reprime line check valve located in the right section of the center tank. The valve is located in the reprime line downstream of the tee. Direction of flow is indicated by an arrow on the valve body.
- B. Access to the valve is through access door 1436C located in the upper inboard wing surface.
- C. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

2. Removal/Installation Center Tank Reprime Line Check Valve

- A. Remove Valve

CAUTION: DO NOT ROTATE ENGINE FIRE HANDLES. THIS RESULTS IN RELEASE OF FIRE EXTINGUISHING AGENT, AND REQUIRES REPLACEMENT OF FIREX CARTRIDGES AND BOTTLES.

- (1) Pull left or right engine fire handle (on main instrument panel) completely out.

NOTE: This also closes pneumatic crossfeed valve.

- (2) Check that APU fuel fire shutoff valve is closed.
- (3) Defuel each main tank to 1250 lbs. (567 kg) or less.
- (4) Prepare center tank for entry. (PAGEBLOCK 28-00-00/201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (5) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

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UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

(6) Remove valve.

B. Install Valve

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

(2) Check valve for freedom of movement.

(3) Install valve (flow arrow pointing forward and hinge up).

CAUTION: BEFORE INSTALLING ACCESS DOOR PERFORM FINAL CHECK TO MAKE CERTAIN THAT ALL TOOLS, RAGS, HARDWARE, ETC. HAVE BEEN REMOVED FROM TANK.

(4) Install access door.

(5) Push left or right engine fire handle (on main instrument panel) completely in. Do not rotate.

(6) Manually open pneumatic crossfeed valve.

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(7) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

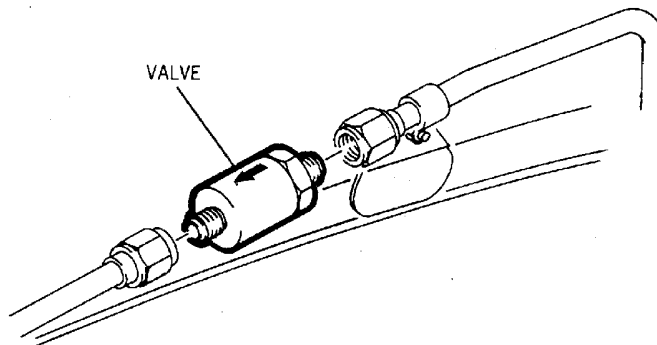
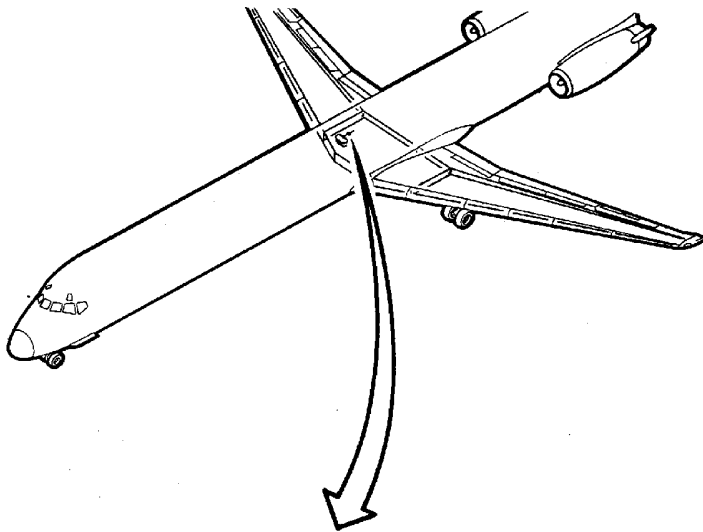
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BBB2-28-57

Center Tank Reprime Line Check Valve -- Removal/Installation
Figure 201/28-20-20-990-801

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CENTER TANK REPRIME LINE FLOAT VALVE - MAINTENANCE PRACTICES

1. General

- A. There is one center tank reprime line float valve located in the right section of the center tank. The valve is located in the pump container.
- B. Access to the valve is through access door 1436C located in the upper inboard wing surface.
- C. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

2. Removal/Installation Center Tank Reprime Line Float Valve

- A. Remove Valve

CAUTION: DO NOT ROTATE ENGINE FIRE HANDLES. THIS RESULTS IN RELEASE OF FIRE EXTINGUISHING AGENT, AND REQUIRES REPLACEMENT OF FIREX CARTRIDGES AND BOTTLES.

- (1) Pull left or right engine fire handle (on main instrument panel) completely out.

NOTE: This also closes pneumatic crossfeed valve.

- (2) Check that APU fuel fire shutoff valve is closed.
- (3) Defuel each main tank to 1250 lbs. (567 kg) or less.
- (4) Prepare center tank for entry. (PAGEBLOCK 28-00-00/201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (5) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

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UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (6) Disconnect fuel line from valve.
- (7) Remove valve with attached bracket.
- (8) Remove bracket.
- (9) Remove fitting from valve. Discard O-ring.

B. Install Valve

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (2) Check valve for freedom of movement.
- (3) Using new O-ring, install fitting on valve.
- (4) Install bracket on valve.
- (5) Install valve with bracket in pump container.

CAUTION: BEFORE INSTALLING ACCESS DOOR PERFORM FINAL CHECK TO MAKE CERTAIN THAT ALL TOOLS, RAGS, HARDWARE, ETC. HAVE BEEN REMOVED FROM TANK.

- (6) Connect fuel line.

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- (7) Install access door.
- (8) Push left or right engine fire handle (on main instrument panel) completely in. Do not rotate.
- (9) Manually open pneumatic crossfeed valve.
- (10) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

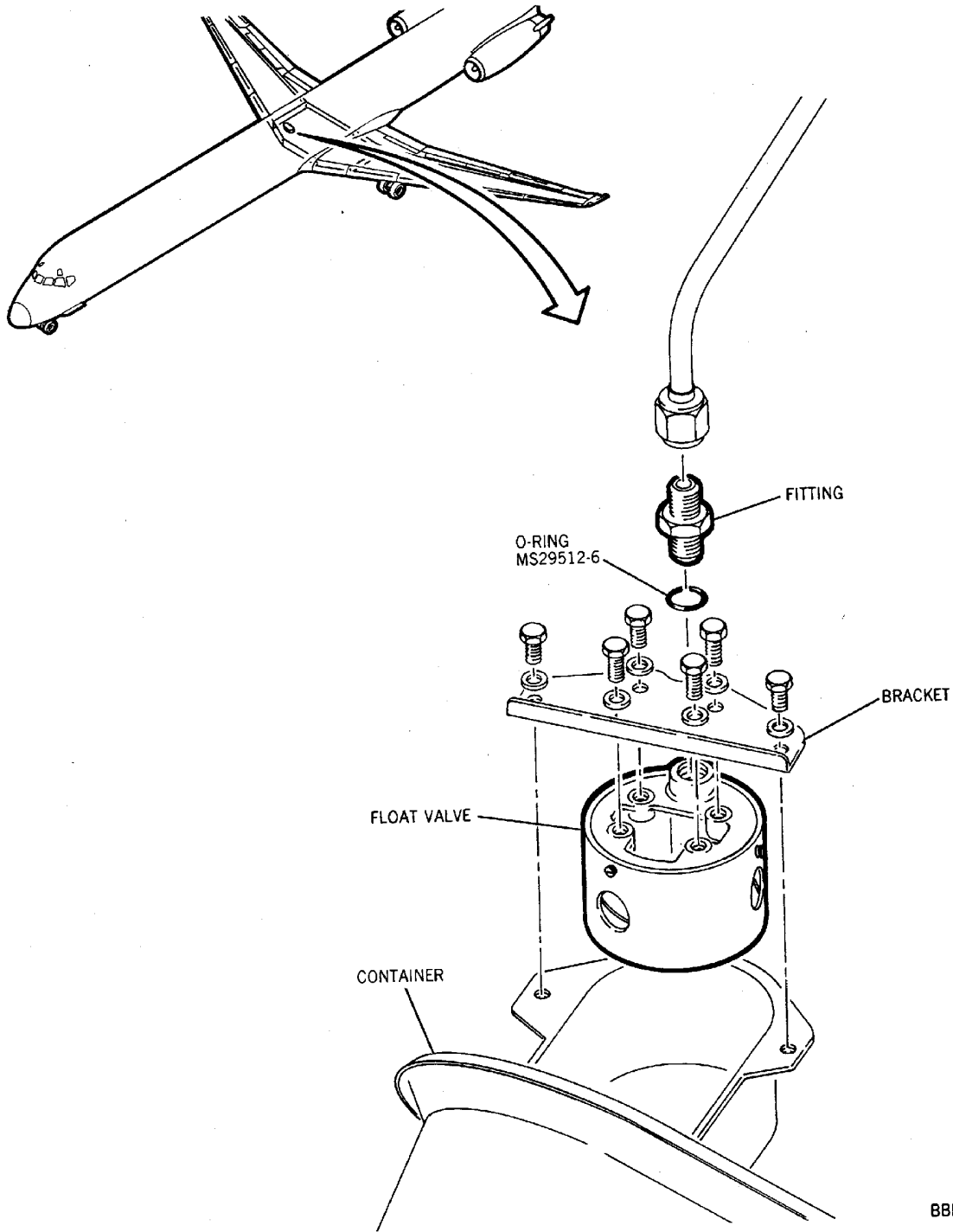
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BBB2-28-58

Center Tank Reprime Line Float Valve -- Removal/Installation
Figure 201/28-20-21-990-801

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AUXILIARY TANK FUEL LOW PRESSURE SWITCH - MAINTENANCE PRACTICES

1. General

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-226

- A. For the center fuel tank an in-line fuse is installed in the applicable fuel low pressure switch that is external of the fuel tank. The purpose of the fuse is to prevent the ignition of the fuel fumes in a fuel tank caused by a short of the pressure switch wires outside the tank do to incompatible power. For removal and installation of the in-line fuse (TERMINAL BLOCKS - MAINTENANCE PRACTICES, SWPM 20-20-02).

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

- B. The two auxiliary tank fuel low pressure switches are located in the center tank. Switch and terminal strip identification and access are as follows:

Table 201

Component	Identification	Access Door
Pressure switch	Forward tank	2301C
Terminal strip	S369-6	5138C (fwd cargo compt.)
Ground stud	4819	5138C (fwd cargo compt.)
Pressure switch	Aft tank	2302C
Terminal strip	S369-5	5138C (fwd cargo compt.)
Ground stud	4820	5138C (fwd cargo compt.)
NOTE: Fuel leakage allowed for drained electrical feedthroughs is limited to 2 fl. oz. (59 cc) in 24 hours.		

- C. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

Table 202

Name and Number	Manufacturer
Pen, marking, large chisel point, green #479B Major Marker	Major Line, Inc. Anaheim, CA
Sleeving material DMS 2109 Type 1	
Sleeving material DMS 2379 Type 4	

3. Removal/Installation Auxiliary Tank Fuel Low Pressure Switch

- A. Remove Switch
 - (1) Defuel forward auxiliary tank to less than 3/4 of tank capacity.
 - (2) Defuel aft auxiliary tank to less than 3/4 of tank capacity.
 - (3) Prepare center tank for entry. (PAGEBLOCK 28-00-00/201)

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WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

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WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (4) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 PRE MD80-28-226

- (5) Disconnect the power terminal from terminal strip and ground terminal from ground stud.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-226

- (6) Disconnect the power terminal from the in-line fuse and the ground terminal from the ground stud.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

- (7) Remove the necessary string ties from the pressure switch wires.
(8) Cut terminals from wire ends.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-226

- (9) Remove the sleeve material from the pressure switch power wire.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

- (10) Loosen gland nut on spar feedthrough fitting. Move the gland nut back on the pressure switch wires.

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

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- (11) Remove ferrule, sealing grommet, comb and sleeve from feedthrough fitting.
- (12) Move the gland nut, ferrule, grommet, comb and sleeve off the pressure switch wires.
- (13) Attach a waxed string to the end of the pressure switch wires, of sufficient length, to reach from terminal strip and ground stud to pressure switch, through conduit.
NOTE: The string will be used to pull wires back through conduit during switch installation.
- (14) Disconnect conduit from pressure switch.
- (15) Disconnect pressure line from switch.
- (16) Remove pressure switch.
- (17) Pull pressure switch out of tank, at same time pulling wires through conduit.
- (18) Remove the waxed string from the pressure switch wires.
- (19) Tie both ends of the waxed string to adjacent structure to prevent inadvertent removal of string.

B. Install Switch

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

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- (2) Prepare the applicable pressure switch and bracket for electrical bonding. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
- (3) Tie waxed string to the pressure switch wire ends.
- (4) Pull the pressure switch wires through conduit with the waxed string.
- (5) Attach pressure switch to structure.
- (6) Do an electrical bond check of applicable pressure switch at the mounting bracket. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
- (7) Attach conduit to pressure switch.
- (8) Remove the waxed string.
- (9) Remove slack from wires in conduit by gently pulling on wire ends at terminal end.
- (10) Mark wires with narrow band at a distance of 1.50 ± 0.25 in. (38 ± 6 mm) from forward edge of spar fitting. Use green marker or equivalent.
- (11) Move the sleeve, comb and grommet over the pressure switch wires. Make sure that the green band is visible at the forward edge of the grommet.
- (12) Move sleeve into feedthrough fitting.
 - (a) Make sure the sleeve does not protrude from the spar feedthrough fitting.
- (13) Move ferrule and gland nut over the pressure switch wires.
- (14) Insert comb, grommet, and ferrule into the sleeve.
- (15) Install the gland nut into feedthrough fitting and tighten.
 - (a) Make sure that the green band is visible at the edge of the grommet.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 PRE MD80-28-226

CAUTION: PROVIDE SUFFICIENT SLACK IN WIRES TO PREVENT SHARP BENDS, CHAFING, PRELOADING OF WIRES.

- (16) Cut the float switch wires to the correct length to reach the terminal strip and ground stud.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-226

CAUTION: PROVIDE SUFFICIENT SLACK IN WIRES TO PREVENT SHARP BENDS, CHAFING, PRELOADING OF WIRES.

- (17) Cut the float switch wires to the correct length to reach the in-line fuse and ground stud.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

- (18) Install a new power terminal on the power wire and a new ground terminal on the ground wire. (TERMINALS - MAINTENANCE PRACTICES, SWPM 20-20-01)
Install new terminals on wires.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-226

- (19) Install sleeving material DMS 2109 Type 1 or DMS 2379 Type 4 on the power wire, from the spar feedthrough fitting to the power terminal. (WIRING INSTALLATION - MAINTENANCE PRACTICES, SWPM 20-10-01)

NOTE: The above step is a Critical Design Configuration Control Limitation (CDCCL) procedure. For important information on CDCCLs, refer to the Airworthiness Limitations Precautions (GENERAL, SUBJECT 28-00-00).

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

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WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 PRE MD80-28-226

- (20) Connect the power terminal to terminal strip and ground terminal to ground stud. (GENERAL INSTALLATIONS HARDWARE - MAINTENANCE PRACTICES, SWPM 20-20-03)

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892 POST MD80-28-226

- (21) Connect the power terminal to the in-line fuse and the ground terminal to the ground stud. (GENERAL INSTALLATIONS HARDWARE - MAINTENANCE PRACTICES, SWPM 20-20-03)

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

- (22) Examine the fuel low pressure pump switch for leaks. No leaks are permitted.
- (23) Close applicable main fuel tank door. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- (24) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

UPPER EPC, GND SERV

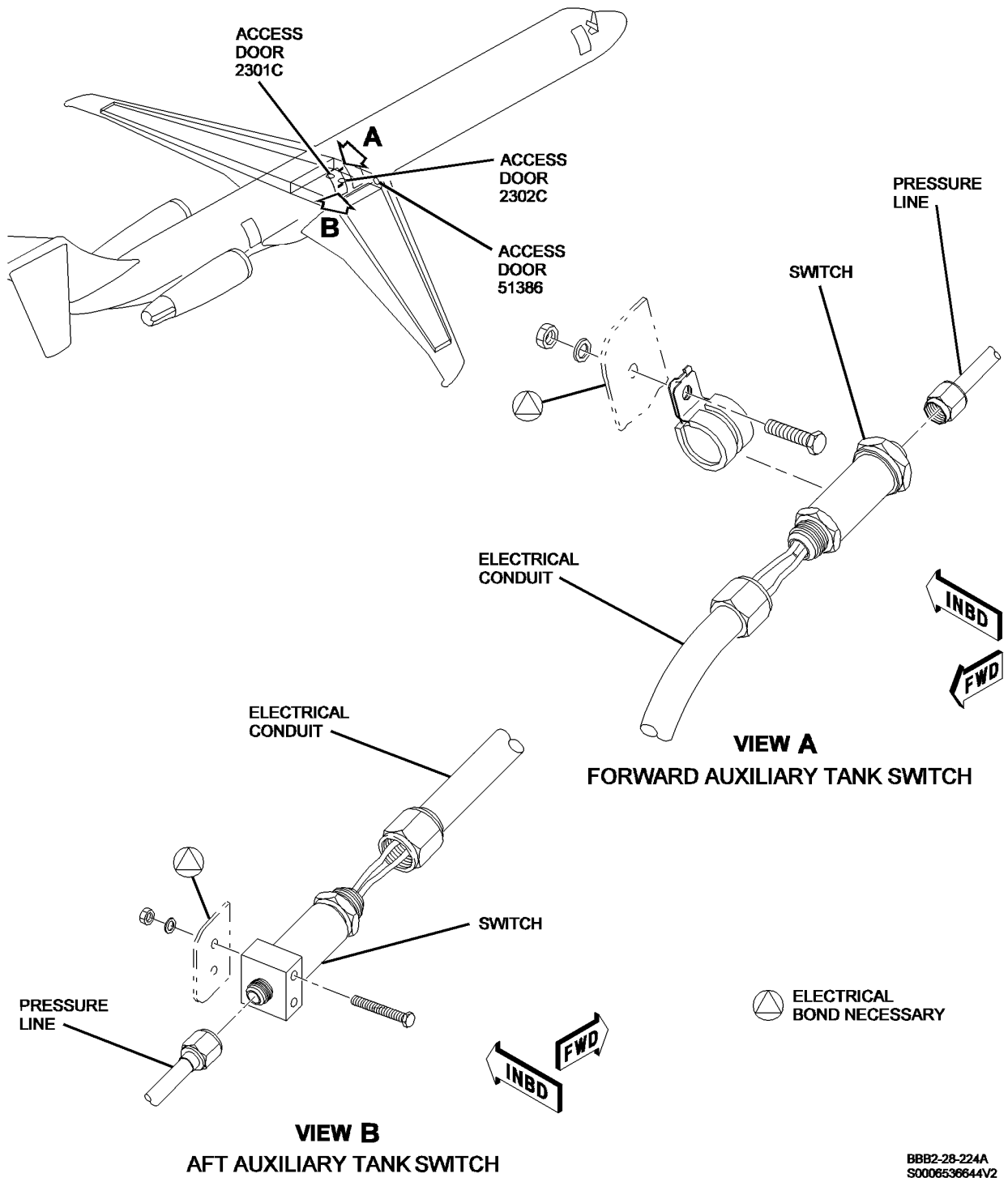
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J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

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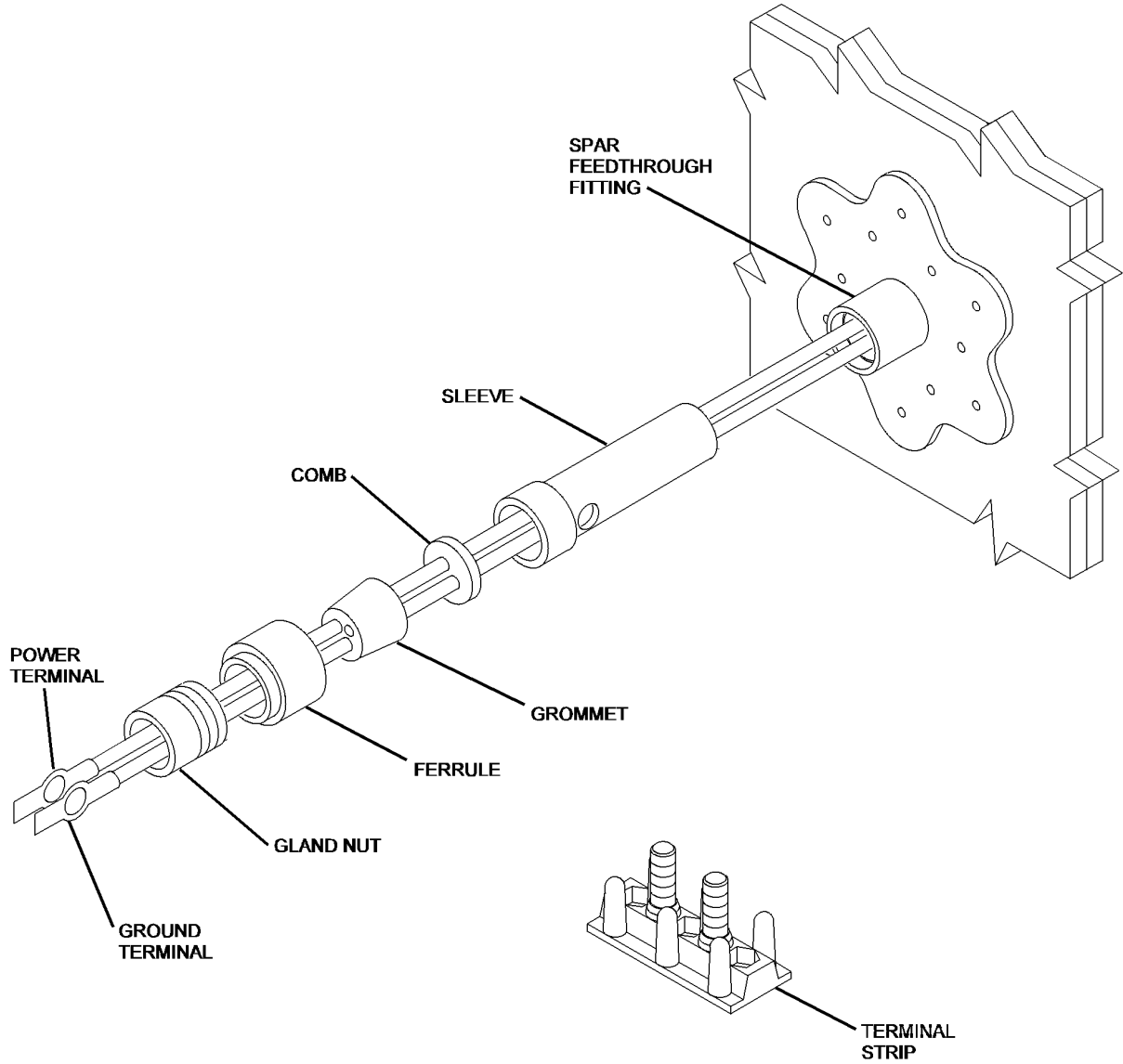
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S0008536644V2

**Auxiliary Tank Fuel Low Pressure Switch -- Removal/Installation
Figure 201/28-20-23-990-801**

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

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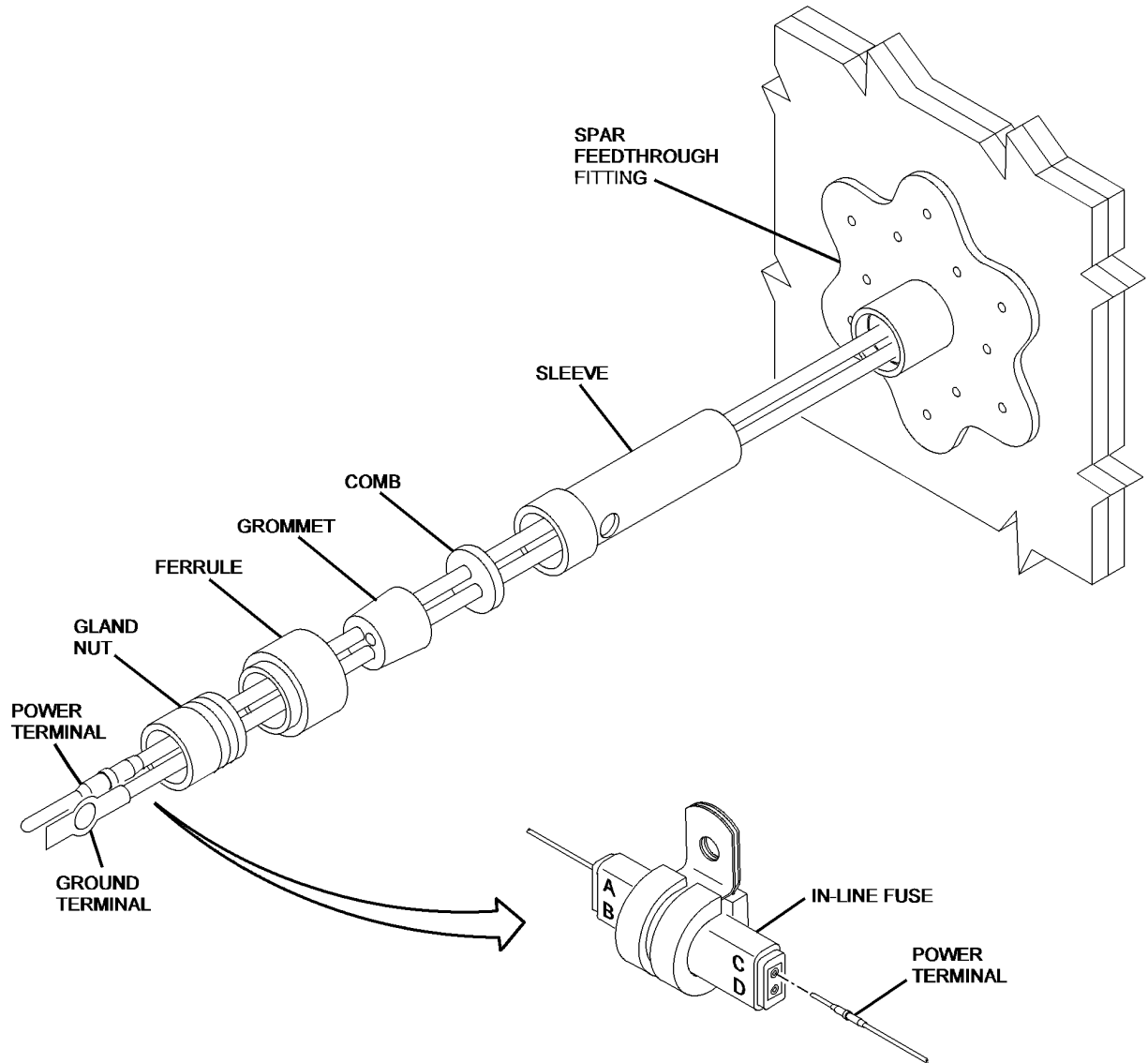
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Auxiliary Tank Fuel Low Pressure Switch Electrical Feedthrough -- Removal/Installation
Figure 202/28-20-23-990-803 (Sheet 1 of 2)

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892 PRE MD80-28-226

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BBB2-28-397A
S0000331455V2

Auxiliary Tank Fuel Low Pressure Switch Electrical Feedthrough -- Removal/Installation
Figure 202/28-20-23-990-803 (Sheet 2 of 2)

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892 POST MD80-28-226

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TEMPORARY DEACTIVATION OF AUXILIARY FUEL TANK (FORWARD OR AFT) - MAINTENANCE PRACTICES

1. General

- A. The following procedure is for the temporary deactivation of the auxiliary fuel tank system (forward or aft).
- B. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed item:

Table 201

Name and Number	Manufacturer
Inconel Lockwire 0.032 in NASM20995N32, DPM 684	Not specified
Corrosion Resistant Steel Lockwire 0.032 in NASM20995C32, DPM 5865	Not specified

3. Temporary Deactivation Auxiliary Fuel Tank System (Forward or Aft)

- A. Deactivate Auxiliary Fuel Tank System (Forward or Aft)
 - (1) Open DEFUEL VALVE to defuel and drain applicable auxiliary fuel tank.
 - (2) Open cavity drain valve and drain auxiliary fuel tank cell.
 - (3) Place applicable fuel tank FUEL FILL VALVE in closed position, and safety with lockwire. (LOCKWIRE SAFETYING - MAINTENANCE PRACTICES, PAGEBLOCK 20-10-18/201)
 - (4) Disconnect applicable electrical connector from fill valve; cap and stow electrical connector.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (5) Open the applicable circuit breakers and install safety tags for the Auxiliary Fuel Tanks that has been deactivated:

LOWER EPC, ENGINE - LEFT DC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 401-405, 409, 412, 414, 861, 862, 873, 874, 880, 881, 883, 884, 892			
S	38	B1-903	AUXILIARY FUEL XFER A CONTROL
WJE 401-404, 410, 412, 414, 877-879			
S	39	B1-903	AUXILIARY FUEL XFER A CONTROL

LOWER EPC, ENGINE - RIGHT DC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 401-405, 409, 412, 414, 861, 862, 873, 874, 880, 881, 883, 884, 892			
T	38	B1-904	AUXILIARY FUEL XFER B CONTROL
WJE 410, 877-879			
T	39	B1-904	AUXILIARY FUEL XFER B CONTROL

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

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WJE 410, 877-879 (Continued)

LOWER EPC, XFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 405, 409, 861, 862, 873, 874, 880, 881, 883, 884, 892			
S	42	B1-905	AUXILIARY FUEL PUMP PRESS LOW FWD & AFT

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892			
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C
H	27	B1-910	AFT AUX TANK FUEL XFR B A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

- (6) Placard fuel quantity indicator as applicable; FWD AUX FUEL TANK or AFT AUX FUEL TANK has been deactivated.

NOTE: Leave fuel quantity indicator active so that any fuel that may enter tank can be detected.

- (7) Perform leakage test of applicable closed fuel fill valve as follows:
- (a) Open defuel valve.
 - (b) Place FUEL TANK PUMP switch(s) in ON position to pressurize refuel manifold for at least 5 minutes.
 - (c) Open auxiliary fuel tank SUMP DRAIN VALVE and monitor for fuel leakage; no leaks should occur.
NOTE: Bladder supports under the fuel tank bladder may become saturated, and cause some residual fuel seepage.
 - (d) Monitor auxiliary tank FUEL QUANTITY indicator to ensure no fuel is received.
 - (e) Place FUEL TANK PUMP switch(s) to OFF position.
 - (f) Close DEFUEL VALVE.
 - (g) Close auxiliary fuel tank SUMP DRAIN VALVE.

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

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CHECK VALVE, EXTRACTION SYSTEM - REMOVAL/INSTALLATION

1. General

- A. This procedure has the removal/installation of the extraction system check valve. It is in the centerwing fuel tank. The extraction system check valve has a flap which permits the free flow of fuel in one direction.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed item:

NOTE: Some materials in the Equipment and Materials list may not be permitted to be used in your location. Persons in each location must make sure they are permitted to use these materials. All persons must obey all applicable federal, state, local, and provincial regulations for their location.

Table 401

Name and Number	Manufacturer
Adhesion promotor, locking #7471 MIL-S-22473, Grade T DPM 6081	Loctite Corp. Rocky Hill, CT
Cleaner, Hand wipe Brulin MP 1793 DPM 6380-1	Brulin & Company , Inc. Richmond, CA
Cleaner, Hand wipe PF Degreaser DPM 6380-3	P-T Technologies, Inc. Safety Harbor, FL
Cleaner/Solvent Handwipe DS-108F (bulk) DPM 6380-4	Dynamold Solvents, Inc. Ft. Worth, TX
Cleaner, Hand Wipe, EPA 2000 DPM 6410	Solutia, Inc. St. Louis, MO
Wipers, Cleaning DMS 1820, Type 1 Class A, Grade 1	

3. Removal/Installation of Extraction System Check Valve

- A. Remove Check Valve
- (1) Make sure that the fuel system is safe before you remove the check valve. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
 - (a) Defuel the aircraft. (DEFUELING, SUBJECT 12-11-01)
 - (2) Check that defueling shutoff valve is closed.
 - (3) Open the access panel 1436C to get to the check valve. (WING ZONES AND ACCESS DOORS, SUBJECT 06-21-00)
 - (4) Remove the two screws and four washers that attach the clamp to the bracket. (View C-C, Figure 401)
 - (a) Remove the screw and two washers to disconnect the jumper from the clamp and bracket.

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- (5) Remove the two nuts and packings from the check valve. (Figure 401)
 - (6) Remove check valve.
- B. Install Check Valve
- (1) Make certain the access panel 1436C is open. (WING ZONES AND ACCESS DOORS, SUBJECT 06-21-00)
 - (2) Manually check valve for freedom of movement. Make sure that flapper assembly can be move to open position manually and back to the closed position by spring pressure. Do not let flapper slam closed. (Figure 401)
 - (3) Install the two new packings in the grooves of the check valve.
 - (4) Install the check valve on the jet pump with a nut.
NOTE: The valve is marked with a FLOW direction arrow. The FLOW arrow should point aft.
 - (5) Prepare the surface of the clamp and bracket for an electrical bond. Refer to Standard Wiring Practice Manual (SWPM) 20-50-01.
 - (6) Install the pipe on the check valve with the nut as follows:
 - (a) Install the clamp on the pipe.
 - (b) Install the clamp on the bracket with the two screws and four washers.
 - (c) Make sure that the pipe discharge end is 0.5 in. (12.7 mm) from the tank bottom.
 - (d) Connect the jumper to the clamp and bracket with a screw and two washers.
 - (7) Do an electrical bond check of the jumper and bracket. Refer to SWPM 20-50-01.

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1025, PRIMER/CATALYST/LOCKING & RETAINER COMPOUNDS (DPM 6081)

HAZMAT 1000, REFER TO MSDS

- (8) Spray or coat the faying surface of the check valve with DPM 6081 adhesion promotor in as thin a film as possible.
 - (a) Allow to dry completely, approximately 15 minutes.
 - (b) Wipe off the DPM 6081 adhesion promotor immediately from surfaces designed to slide or rotate.

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1497, CLEANER/HANDWIPE (DPM 6380-1)

HAZMAT 1499, CLEANER/HANDWIPE (DPM 6380-3)

HAZMAT 1590, CLEANER/SOLVENT/HANDWIPE (DPM 6380-4)

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(WARNING PRECEDES)

HAZMAT 1488, SOLVENT/SEALANT REMOVER (DPM 6410)

HAZMAT 1000, REFER TO MSDS

- 1) When an excess of the compound has been used, wipe clean with DMS 1820 wiper dampened with DPM6380-1, -3, -4, or DPM 6410 handwipe solvent.
 - 2) Wipe dry with a clean dry wiper.
- (9) Close the access panel 1436C. (WING ZONES AND ACCESS DOORS, SUBJECT 06-21-00)

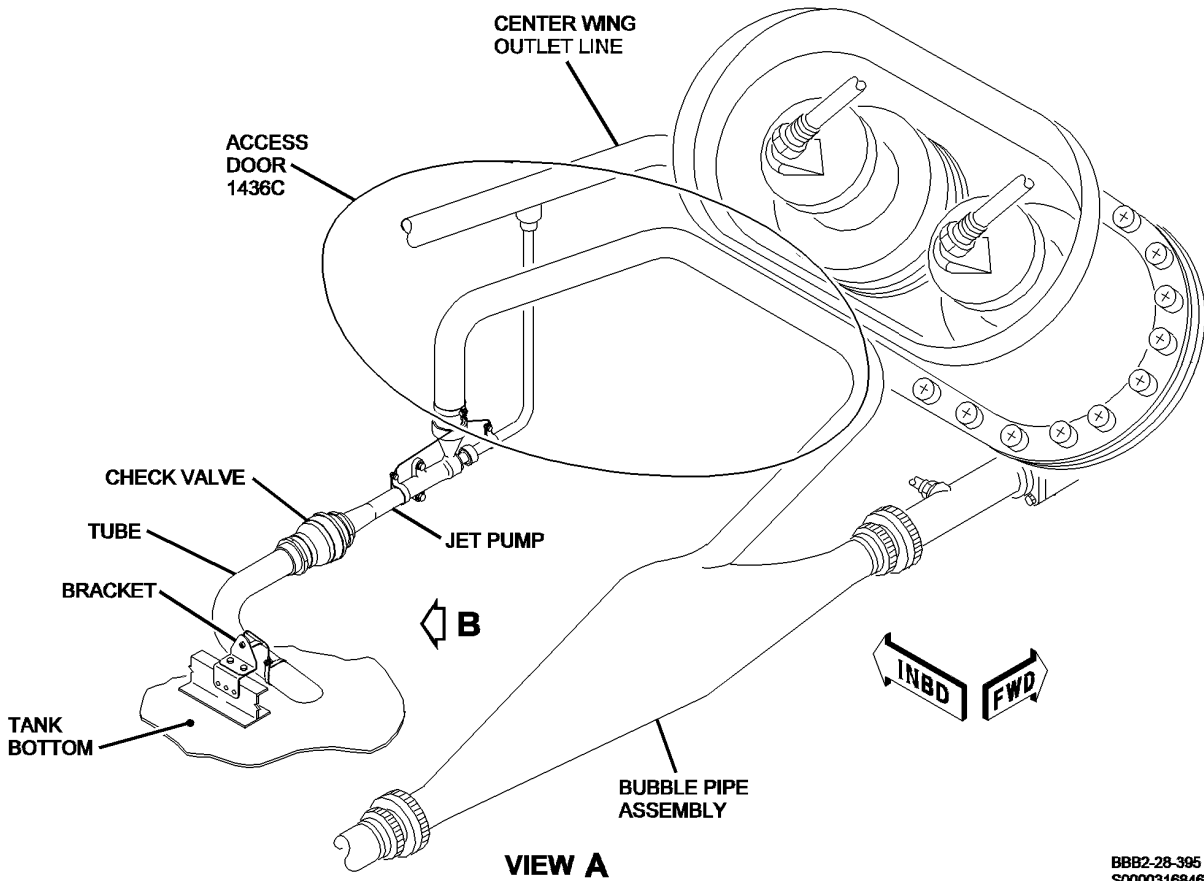
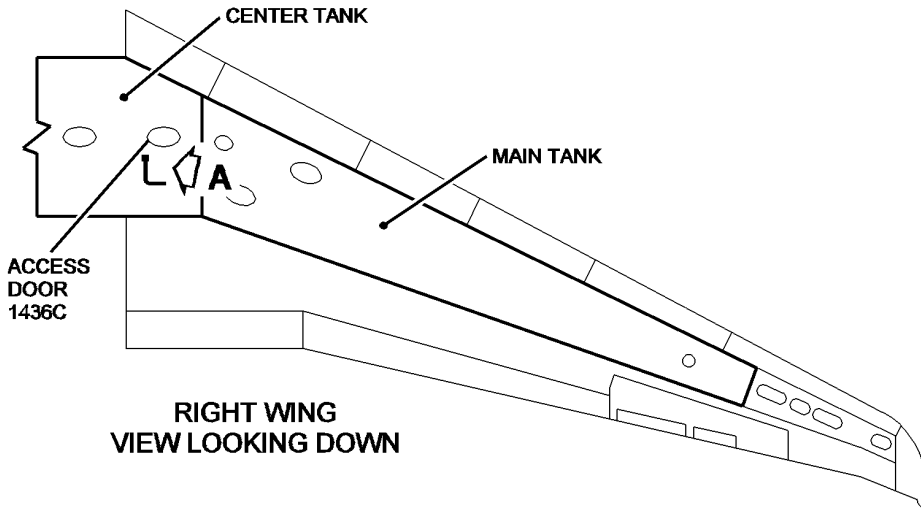
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WJE ALL

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BBB2-28-395
S0000316846V1

**Extraction System Check Valve - Removal/Installation
Figure 401/28-20-26-990-801 (Sheet 1 of 2)**

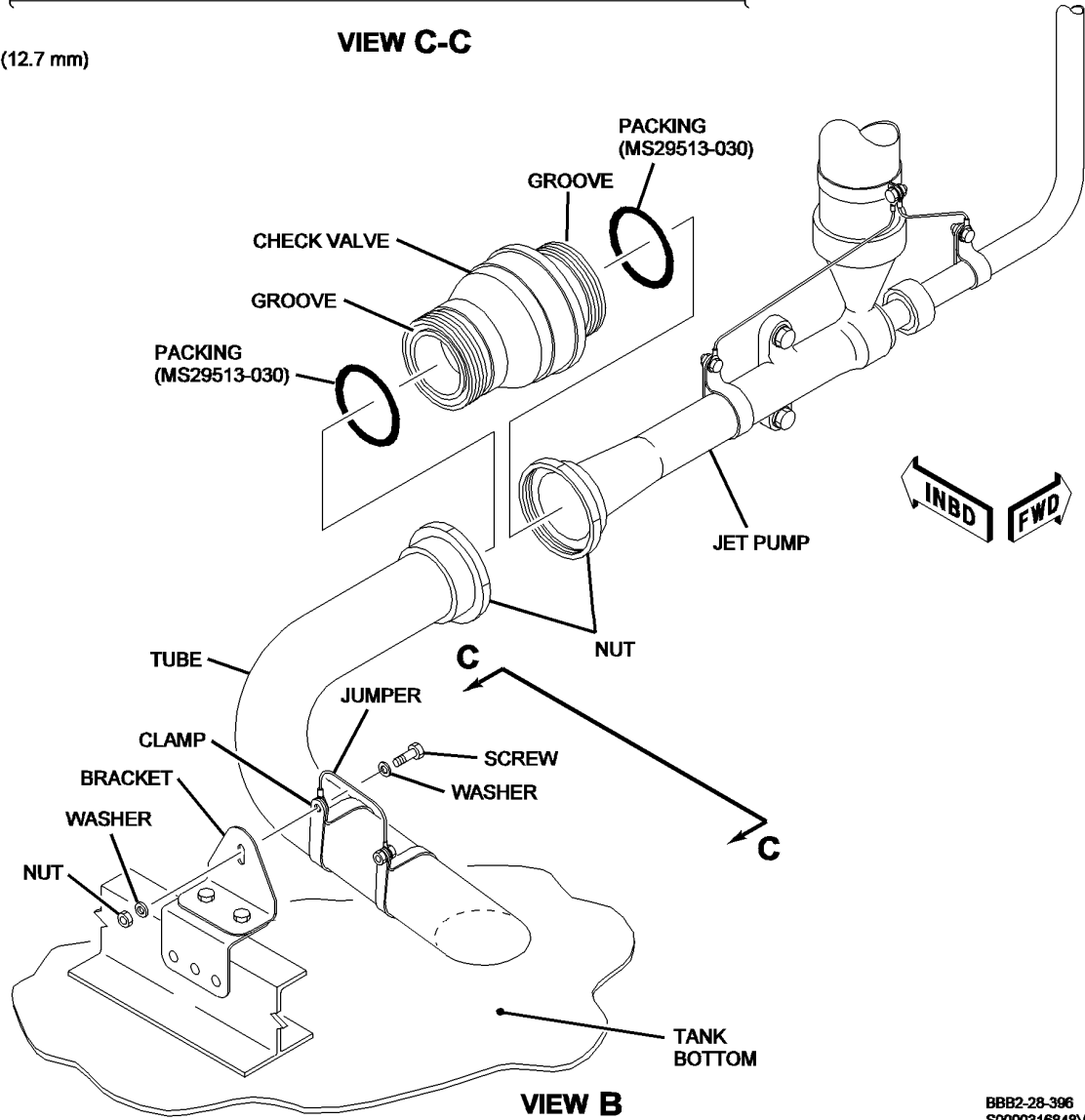
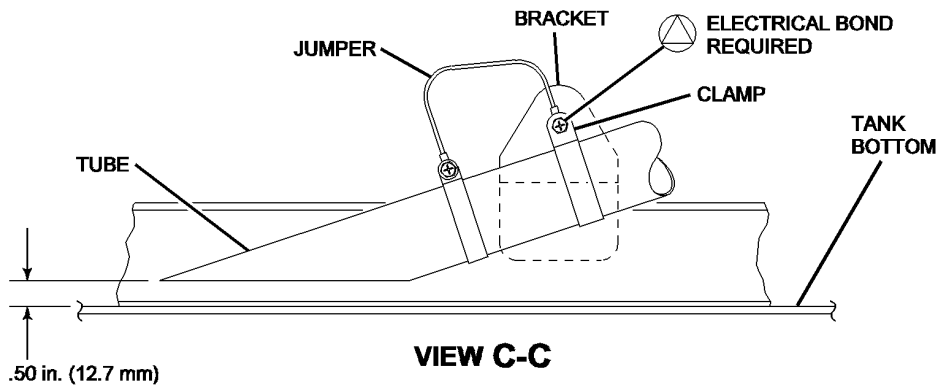
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BBB2-28-396
S0000316848V1

Extraction System Check Valve - Removal/Installation
Figure 401/28-20-26-990-801 (Sheet 2 of 2)

EFFECTIVITY
WJE ALL

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DUCT ASSEMBLY, ENGINE FUEL FEED VAPOR REMOVAL - MAINTENANCE PRACTICES

1. General

- A. These maintenance practices have the removal/installation procedures for the engine fuel feed vapor removal duct assembly and fire seal boot.
- B. The duct is located in the engine pylon, between the engine and the fuel vent box in the aircraft fuselage outboard of the aft lavatory outboard interior wall. The applicable engine and aft lavatory wall must be removed for access.
- C. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices (PAGEBLOCK 28-00-00/201).
- D. This maintenance practice includes a permanent repair procedure for a fire seal boot of an engine fuel feed vapor removal vent duct assembly. The boot can have one or more damaged areas and multiple applications of this repair procedure can be done. This repair procedure is applicable only to the fire seal boot around the engine fuel feed vapor removal vent duct assembly. Damage can be: Figure 203
 - Holes or cracks - Not more than 1.0 in. (25.4 mm) in height and 2.0 in. (50.8 mm) in length for a combined total area of 2.0 in² (1290.3 mm²).
 - If a previous repair is loose or missing, do the repair again as long as the total area for the repair or repairs is not more than 2.0 in² (1290.3 mm²).
 - Damage more than 2.0 in² (1290.3 mm²) is cause to replace the fireseal boot.
 - Previous repairs that are still in good condition are not to be included in the total damage area.
- E. The procedure for left and right duct is the same unless specified differently.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items.

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 201 Equipment and Materials

Name and Number	Manufacturer
Scraper, non-metallic DPM 6587	AC Tech Garden Grove, CA
Caps and plugs, protective NAS834	Commercially available
Cap, protective closure DPM 2865	Caplugs, LLC Buffalo, NY
Caps, protective polyvinyl chloride DPM 2696	MDI, Molded Devices, Inc. Paramount, CA
Cloth, low lint MIL-C-24671	Commercially available
Lubricant, antiseize petrolatum DPM 675 (W-P-236)	Castrol Industrial North American, Inc. Parsippany, NJ

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WJE ALL

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Table 201 Equipment and Materials (Continued)

Name and Number	Manufacturer
Blocking plate, main fuel line test A0101 Tool & Equipment Manual, Chap. 28-20-2	
Cres steel press cap, flareless tube MS21914 sizes 2 thru 32	Commercially available
Solvent, sealant remover DPM 6410	Contec, Inc. Spartanburg, SC
Sealant, polysulfide low viscosity DPM 2292-2, DMS 2082 (MIL-S-8802 B2)	Lord Corporation Indianapolis, IN
Container, rubber	Commercially available
Cleaner, hand wipe DPM 6380-1	Bruin & Company, Inc. Richmond, CA
Cleaner, hand wipe DPM 6380-3	P-T Technologies, Inc. Safety Harbor, FL
Cleaner/solvent, handwipe DPM 6380-4	BBA Fiberweb Simpsonville, SC
Solvent, MPK blend DMS 2458	
Tape, masking DPM 884-21	Minn. Mining & Mfg. Co. L.A., CA
Wipers, cleaning DMS 1820 T1A1	Nueway Laundry & Cleaners L.A. CA
Solvent, PD 680 DPM 518 (MIL-PRF-680, Type 1)	Arco Corp L.A., CA
Solvent, isopropyl alcohol DPM 530 (TT-I-735, Grade A)	Commercially available
Cheesecloth DMS 1820 T1A3	American Fiber & Finishing Boston MA
Promoter, adhesion silicone DPM 3202	PRC-DeSoto International, Inc. Glendale, CA
Paper, kraft natural DPM 640 (MIL-P-17667, Type 1)	Commercially available
Sealant, flourosilicone Dow Corning Q4-2817	

3. Removal/Installation Engine Fuel Feed Vapor Removal Duct

- A. Remove Engine Fuel Feed Vapor Removal Duct

CAUTION: DO NOT USE ABRASIVES, WIRE BRUSHES, UNAPPROVED SCRAPERS, CHIPCHASERS, PICKS, SCREWDRIVERS, BLADES, OR OTHER SUCH DEVICES TO REMOVE CURED SEALANT. THIS WILL HELP PREVENT DAMAGE TO THE COMPONENT SURFACES AND FINISHES.

- (1) Remove applicable access panels.

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- (a) For access to left engine fuel feed vapor removal duct, remove panels that follow:
 - Fuel line bubble pipe through door - 5815C
 - Fuel line bubble pipe left side - 5813C
 - (b) For access to right engine fuel feed vapor removal duct, remove panels that follow:
 - Fuel line bubble pipe through door - 5816C
 - Fuel line bubble pipe left side - 5814C
- (2) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1045, JET FUEL B (JP-4 FUEL)

HAZMAT 1044, JET FUELS A AND A-1 (JP-5 FUEL)

HAZMAT 1000, REFER TO MSDS

- (3) Disconnect the engine fuel supply hose (17) from the fuel feed vapor removal duct assembly (1) as follows: (Figure 201)

NOTE: Keep the engine fuel supply hose and the fuel vapor eductor hose clamp together,

- (a) Disconnect the fuel vapor eductor hose (21). from the fuel feed vapor removal duct assembly (1).

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- 1) Put a protective cap on the fuel vapor eductor hose (21). and fuel feed vapor removal duct assembly (1).
 - (b) Remove the four bolts (18), nuts (20), and eight washers (19) from the fuel feed vapor removal duct assembly (1) and the engine fuel supply hose (17).
 - (c) Disconnect the engine fuel supply hose (17) from the fuel feed vapor removal duct assembly (1).
 - (d) Removed the used seal (22).
NOTE: If this seal is not damaged, keep it to do the leak check of the engine fuel feed vapor removal duct assembly.
 - (e) Put a protective closure cap on the fuel feed vapor removal duct assembly (1) and the engine fuel supply hose (17).
- (4) Remove applicable engine. (GENERAL - REMOVAL/INSTALLATION, PAGEBLOCK 71-00-00/401 Config 1 or GENERAL - REMOVAL/INSTALLATION, PAGEBLOCK 71-00-00/401 Config 2)
NOTE: It is recommend that the engine fuel supply hose and fuel vapor eductor hose not be disconnected the from the engine.

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1045, JET FUEL B (JP-4 FUEL)

HAZMAT 1044, JET FUELS A AND A-1 (JP-5 FUEL)

HAZMAT 1000, REFER TO MSDS

- (5) Remove the fuel feed vapor removal duct assembly (1) as follows:

CAUTION: DO NOT USE ABRASIVES, WIRE BRUSHES, UNAPPROVED SCRAPERS, CHIPCHASERS, PICKS, SCREWDRIVERS, BLADES, OR OTHER SUCH DEVICES TO REMOVE CURED SEALANT. THIS WILL HELP PREVENT DAMAGE TO THE COMPONENT SURFACES AND FINISHES.

- (a) Use a non-metallic scraper to carefully remove and discard the old sealant from the drain line (2) fittings, and fuel feed vapor removal duct assembly (1) hardware.
- (b) Remove the drain line (2).
- (c) Install protective caps and plug on drain line (2).
- (d) Remove the four bolts (3) and washers (4) that attach the fuel feed vapor removal duct assembly (1) to the engine fuel supply line (5).
- (e) Loosen the two bolts (6) that attach the support (8) to the structure.
- (f) Remove the two bolts (9), washers (10) and nuts (11) that attach the fuel feed vapor removal duct assembly (1) flange to the support (8).
- (g) Remove the seven bolts (12) and washers (13) that attach the two fire seal boot retainers (14) to the structure.
- (h) Remove the fuel feed vapor removal duct assembly (1).
- (i) Install protective cap on the fuel feed vapor removal duct assembly (1).

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- (j) Remove and discard the seal (7) from the engine fuel supply line (5).
 - (k) Clean the fuel that spilled with a low lint cloth and discard in a nonflammable container.
- B. Install Engine Fuel Feed Vapor Removal Duct
- (1) Make sure applicable access panels are open.
 - (2) Make sure applicable engine is removed. (GENERAL - REMOVAL/INSTALLATION, PAGEBLOCK 71-00-00/401 Config 1 or GENERAL - REMOVAL/INSTALLATION, PAGEBLOCK 71-00-00/401 Config 2)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1045, JET FUEL B (JP-4 FUEL)

HAZMAT 1044, JET FUELS A AND A-1 (JP-5 FUEL)

HAZMAT 1000, REFER TO MSDS

- (4) Install the fuel feed vapor removal duct assembly (1) as follows: (Figure 201)
 - (a) Make sure the shim (16) is clean and installed.

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- (b) Remove the protective caps and plugs from the fuel feed vapor removal duct assembly (1).
- (c) Remove the protective cap from the engine fuel supply line (5).
- (d) Install a new seal (7) on the engine fuel supply line (5).

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1082, PETROLATUM/WHITE (DPM 675)

HAZMAT 1000, REFER TO MSDS

- (e) Lubricate the new packing (15) with petrolatum antiseize lubricant.
- (f) Install the packing (15) on the engine fuel supply line (5).
- (g) Align the fuel feed vapor removal duct assembly (1) with the engine fuel supply line (5) and start the four bolts (3) with the washers (4).
NOTE: Do not tighten the bolts at this time.
- (h) Align and attach the fire seal boot to the structure with the two fire seal boot retainers (14), the seven bolts (12) and washers (13).
 - (i) Make sure the fuel feed vapor removal duct assembly (1) flange is on the outboard side of the support (8).
 - (j) Install the two bolts (9), four washers (10) and nuts (11) that attach the fuel feed vapor removal duct assembly (1) flange to the support (8).
 - (k) Tighten the two bolts (6) that attach the support (8) to the structure.
 - (l) Tighten the four bolts (3).
- (m) Remove the protective caps and plugs from the drain line (2).
- (n) Install the drain line (2).
- (5) Install the main fuel line test blocking plate on the fuel feed vapor removal duct assembly (1) as follows:
 - (a) Install the used seal (22) on the fuel feed vapor removal duct assembly (1).
NOTE: If the used seal is damaged during removal, use a new seal.
 - (b) Install the blocking plate with the four bolts (18), nuts (20), and eight washers (19), used to disconnect the engine fuel supply hose (17) during the engine removal.
 - (c) Install a flareless tube, Cres steel press cap, on the small fuel line on the fuel feed vapor removal duct assembly (1).
- (6) Make sure that the applicable wing fuel tank has a minimum fuel quantity of 1000 lbs (453.59 kg).
- (7) Do a leak check of the fuel feed vapor removal duct assembly (1) as follows:

WARNING: DO NOT TURN THE ENGINE FIRE HANDLES WHILE THE HANDLES ARE PULLED OUT. IF THE HANDLES TURN, THE FIRE EXTINGUISHING AGENT IS RELEASED INTO THE ENGINE. THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO THE ENGINE.

- (a) Push the engine fire handle in for the applicable engine.

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- (b) Put the applicable fuel boost pump switch to the ON position.
- (c) Examine the fuel feed vapor removal duct assembly (1) at the vent box connection for fuel leaks for 5 minutes.
 - 1) No leaks are permitted.
- (d) Put the applicable fuel boost pump switch to the OFF position.

WARNING: DO NOT TURN THE ENGINE FIRE HANDLES WHILE THE HANDLES ARE PULLED OUT. IF THE HANDLES TURN, THE FIRE EXTINGUISHING AGENT IS RELEASED INTO THE ENGINE. THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO THE ENGINE.

- (e) Pull the applicable engine fire handle out.
- (8) Seal the fuel feed vapor removal duct assembly (1) as follows:

CAUTION: DO NOT USE ABRASIVES, WIRE BRUSHES, UNAPPROVED SCRAPERS, CHIPCHASERS, PICKS, SCREWDRIVERS, BLADES, OR OTHER SUCH DEVICES TO REMOVE CURED SEALANT. THIS WILL HELP PREVENT DAMAGE TO THE COMPONENT SURFACES AND FINISHES.

- (a) Use a non-metallic scraper, to remove all of the cured sealant from the fuel feed vapor removal duct assembly (1), drain line (2), fittings, vent box opening and vent box cover and hardware.

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1488, SOLVENT/SEALANT REMOVER (DPM 6410)

HAZMAT 1000, REFER TO MSDS

- (b) With a low lint cloth moist with sealant remover solvent, remove the remaining cured sealant.
- (c) Dry the area with a clean low lint cloth.

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1117, COMPOUND/INTEGRAL FUEL TANKS SEALING (DMS QPL 2082 B1/2 AND B2)

HAZMAT 1000, REFER TO MSDS

- (d) Encapsulate the four bolts (3), washers (4) and dome nuts that are on the inner surface of the vapor box with polysulfide sealant.
- (e) Apply a fillet seal to the edge of the fuel feed vapor removal duct assembly (1) mating flange with polysulfide sealant, that is on the inner surface of the vapor box.

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- (f) Repair all sealant on the inner and outer surfaces of the vapor box that was damaged during the removal of the fuel feed vapor removal duct assembly (1).

NOTE: This step is necessary because the fuel return to tank fitting and line is so close to the fuel feed vapor removal duct assembly.

- (9) Remove the main fuel line test blocking plate from the fuel feed vapor removal duct assembly (1) as follows:
- Remove the four bolts (18), nuts (20), and the eight washers (19) and the blocking plate.
 - Remove and discard the used seal (22).
 - Remove the cap from the small fuel line on the fuel feed vapor removal duct assembly (1). Catch the residual fuel in a rubber container.
- (10) Install the applicable engine. (GENERAL - REMOVAL/INSTALLATION, PAGEBLOCK 71-00-00/401 Config 1 or GENERAL - REMOVAL/INSTALLATION, PAGEBLOCK 71-00-00/401 Config 2)

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1045, JET FUEL B (JP-4 FUEL)

HAZMAT 1044, JET FUELS A AND A-1 (JP-5 FUEL)

HAZMAT 1000, REFER TO MSDS

- (11) Connect the engine fuel supply hose (17) from the fuel feed vapor removal duct assembly (1) as follows:

NOTE: Keep the engine fuel supply hose and the fuel vapor eductor hose clamped together.

- Remove the protective closure cap from the engine fuel supply hose (17).
 - Lubricate the new seal (22) with petrolatum antiseize lubricant.
 - Install the new seal (22) on the fuel feed vapor removal duct assembly (1).
 - Install the four bolts (18), nuts (20), and eight washers (19) on the fuel feed vapor removal duct assembly (1) and the engine fuel supply hose (17).
 - Remove the protective cap from the fuel vapor eductor hose (21).
 - Connect the fuel vapor eductor hose (21) to the fuel feed vapor removal duct assembly (1).
- (12) Do a leak check of the fuel feed vapor removal duct assembly (1) as follows:

WARNING: DO NOT TURN THE ENGINE FIRE HANDLES WHILE THE HANDLES ARE PULLED OUT. IF THE HANDLES TURN, THE FIRE EXTINGUISHING AGENT IS RELEASED INTO THE ENGINE. THIS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO THE ENGINE.

- Push the engine fire handle in for the applicable engine.
- Put the applicable fuel boost pump switch to the ON position.
- Examine the fuel feed vapor removal duct assembly (1) at the engine fuel supply hose (17) connection for fuel leaks for 5 minutes.
 - No leaks are permitted.

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(d) Put the applicable fuel boost pump switch to the OFF position.

CAUTION: DO NOT USE ABRASIVES, WIRE BRUSHES, UNAPPROVED SCRAPERS, CHIPCHASERS, PICKS, SCREWDRIVERS, BLADES, OR OTHER SUCH DEVICES TO REMOVE CURED SEALANT. THIS WILL HELP PREVENT DAMAGE TO THE COMPONENT SURFACES AND FINISHES.

(13) Install applicable access panels.

(a) For left engine fuel feed vapor removal duct, install panels that follow:

- Fuel line bubble pipe through door - 5815C
- Fuel line bubble pipe left side - 5813C

(b) For right engine fuel feed vapor removal duct, install panels that follow:

- Fuel line bubble pipe through door - 5816C
- Fuel line bubble pipe left side - 5814C

(14) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

C. Remove Engine Fuel Feed Vapor Removal Duct Fire Seal Boot

- (1) Remove applicable engine fuel feed vapor removal duct assembly (Paragraph 3.A.).
- (2) Use a Non-metallic scraper to break the bond between the engine fuel feed vapor removal duct assembly (1) and the engine fuel feed vapor removal duct fire seal boot (2) and remove the boot. (Figure 202)

D. Install Engine Fuel Vapor Removal Duct Fire Seal Boot

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WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1497, CLEANER/HANDWIPE (DPM 6380-1)

HAZMAT 1499, CLEANER/HANDWIPE (DPM 6380-3)

HAZMAT 1590, CLEANER/SOLVENT/HANDWIPE (DPM 6380-4)

HAZMAT 1588, SOLVENT/MPK BLEND (DMS QPL 2458)

HAZMAT 1000, REFER TO MSDS

CAUTION: DO NOT USE ABRASIVES, WIRE BRUSHES, UNAPPROVED SCRAPERS, CHIPCHASERS, PICKS, SCREWDRIVERS, BLADES, OR OTHER SUCH DEVICES TO REMOVE CURED SEALANT. THIS WILL HELP PREVENT DAMAGE TO THE COMPONENT SURFACES AND FINISHES.

- (1) Use a non-metallic scraper and cleaning wipers, dampened with hand wipe cleaner (DPM 6380-1/6380-3/ 6380-4 or MPK DMS 2485) solvent to remove all the old sealant from the engine fuel feed vapor removal duct assembly (1). Immediately wipe dry with a clean, dry wiper.
- (2) Use masking tape to mask off the area adjacent to the faying surface of the engine fuel feed vapor removal duct assembly (1).
- (3) Use clean cleaning wipes dampened with solvent (MIL-PRF-680, Type 1) to clean the faying surface of the engine fuel feed vapor removal duct fire seal boot (2). Then use another clean wiper dampened with isopropyl alcohol solvent to clean the faying surface of the engine fuel feed vapor removal duct fire seal boot (2) again.

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1152, PRIMER/SILICONE (DPM3202)

HAZMAT 1768, Q4-2817 FLUOROSILICONE SEALANT

HAZMAT 1000, REFER TO MSDS

- (4) Install the engine fuel feed vapor removal duct fire seal boot (2) as follows: (Figure 202)
 - (a) Use a piece of clean cheesecloth dampened with (not dripping) silicone adhesion promoter to apply a thin uniform coat (approximately 0.0005 in. (0.0127 mm) thick) to the faying surface of the engine fuel feed vapor removal duct assembly (1).
 - 1) Let the adhesion promoter air dry a minimum of 30 minutes. Make sure that the adhesion promoter is completely dry to the touch before you apply the adhesive compound.

NOTE: Some adhesion promoters are red in color, which permits easy observation of surface coverage.

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- 2) If a pink powdery film forms after the adhesion promoter is dry, use a clean, dry piece of cheesecloth to remove the film before you apply the adhesive compound.
 - 3) If the primed surface is not bonded within four hours after the adhesion promoter is dry, protect the surface with neutral kraft paper.
- (b) Put the engine fuel feed vapor removal duct fire seal boot (2) on the engine fuel feed vapor removal duct assembly (1) and move outboard to approximately 0.5 in. (12.7 mm) from the plate (3).
- (c) Use a non-metallic scraper to apply, and immediately make smooth, a uniform coat (approximately 0.01 in. (0.25 mm) to 0.03 in. (0.76 mm) thick) of flourosilicone sealant (Q4-2817) to the faying surface of the engine fuel feed vapor removal duct assembly (1).
- NOTE: The sealant begins to cure when exposed to the moisture in the air, and will develop a tack free surface "skin" in approximately 20 minutes at a temperature of 75°F (24°C) with 50% relative humidity. This skin-over time can be as short as 10 minutes during higher temperature and humidity conditions. Smoothing and parts assembly must be completed before this "skin" forms.
- (d) Move the engine fuel feed vapor removal duct fire seal boot (2) outboard and make sure the faying surfaces have full contact.
- (e) Permit the cemented assembly to air dry for a minimum of 24 hours before you touch it. A full cure (maximum adhesion strength) will be obtained after a 7 day air cure at a temperature of approximately 75°F (24°C) and 50% relative humidity. The sealant will be fully cured when no acetic acid (vinegar) odor can be detected.
- NOTE: The sealant is a one part sealant. Application of heat will not shorten the cure time.
- (f) Remove and discard the masking tape used to mask off the area adjacent to the faying surface of the engine fuel feed vapor removal duct assembly (1).
- (5) Install the engine fuel feed vapor removal duct assembly (Paragraph 3.B.).

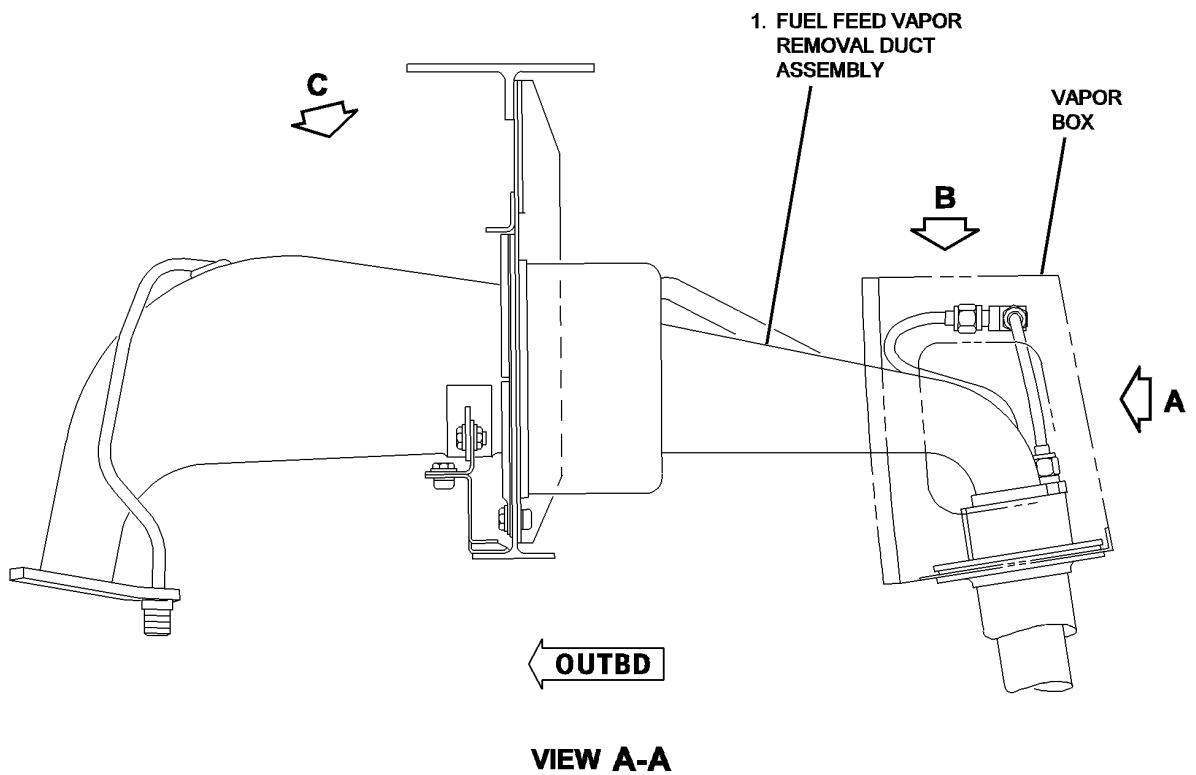
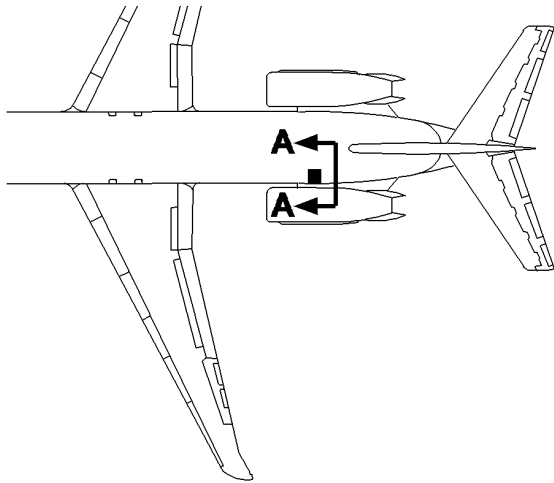
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BBB2-28-404
S0000386175V1

Duct Assembly, Engine fuel Feed Vapor Removal - Maintenance Practices
Figure 201/28-20-30-990-803 (Sheet 1 of 5)

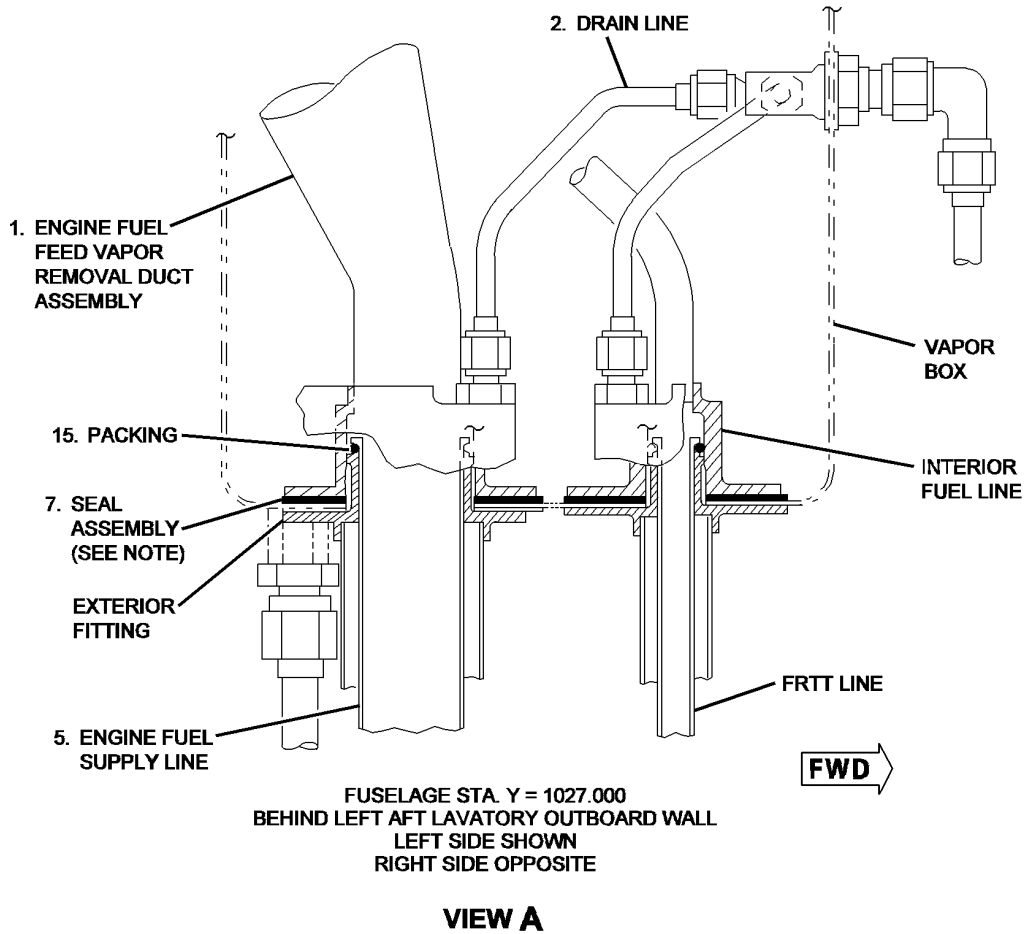
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NOTE: FILLET SEAL THE EDGE OF ENGINE FUEL VAPOR REMOVAL DUCT ASSEMBLY.

BBB2-28-405
S0000386174V1

**Duct Assembly, Engine fuel Feed Vapor Removal - Maintenance Practices
Figure 201/28-20-30-990-803 (Sheet 2 of 5)**

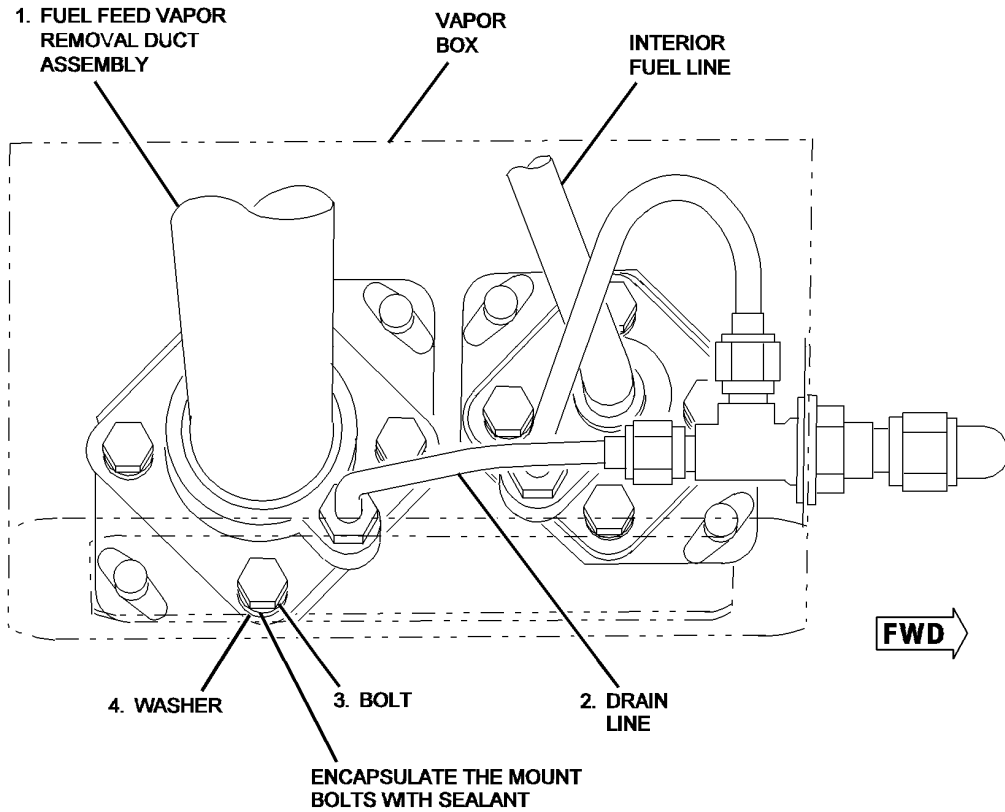
EFFECTIVITY
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VIEW B
(VIEW DOWN)

BBB2-28-406
S0000386179V1

Duct Assembly, Engine fuel Feed Vapor Removal - Maintenance Practices
Figure 201/28-20-30-990-803 (Sheet 3 of 5)

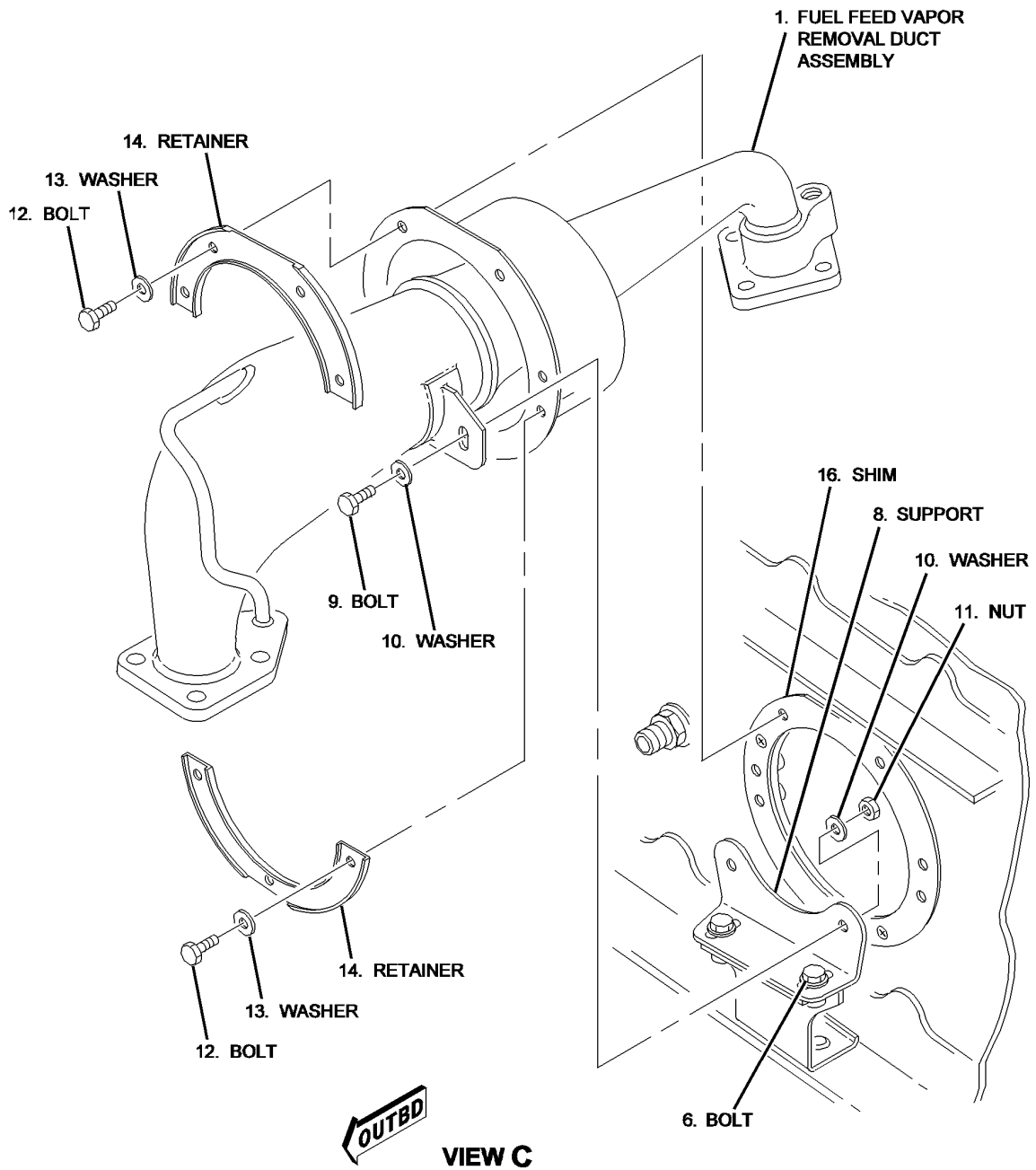
EFFECTIVITY
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BBB2-28-407
S0000366180V1

**Duct Assembly, Engine fuel Feed Vapor Removal - Maintenance Practices
Figure 201/28-20-30-990-803 (Sheet 4 of 5)**

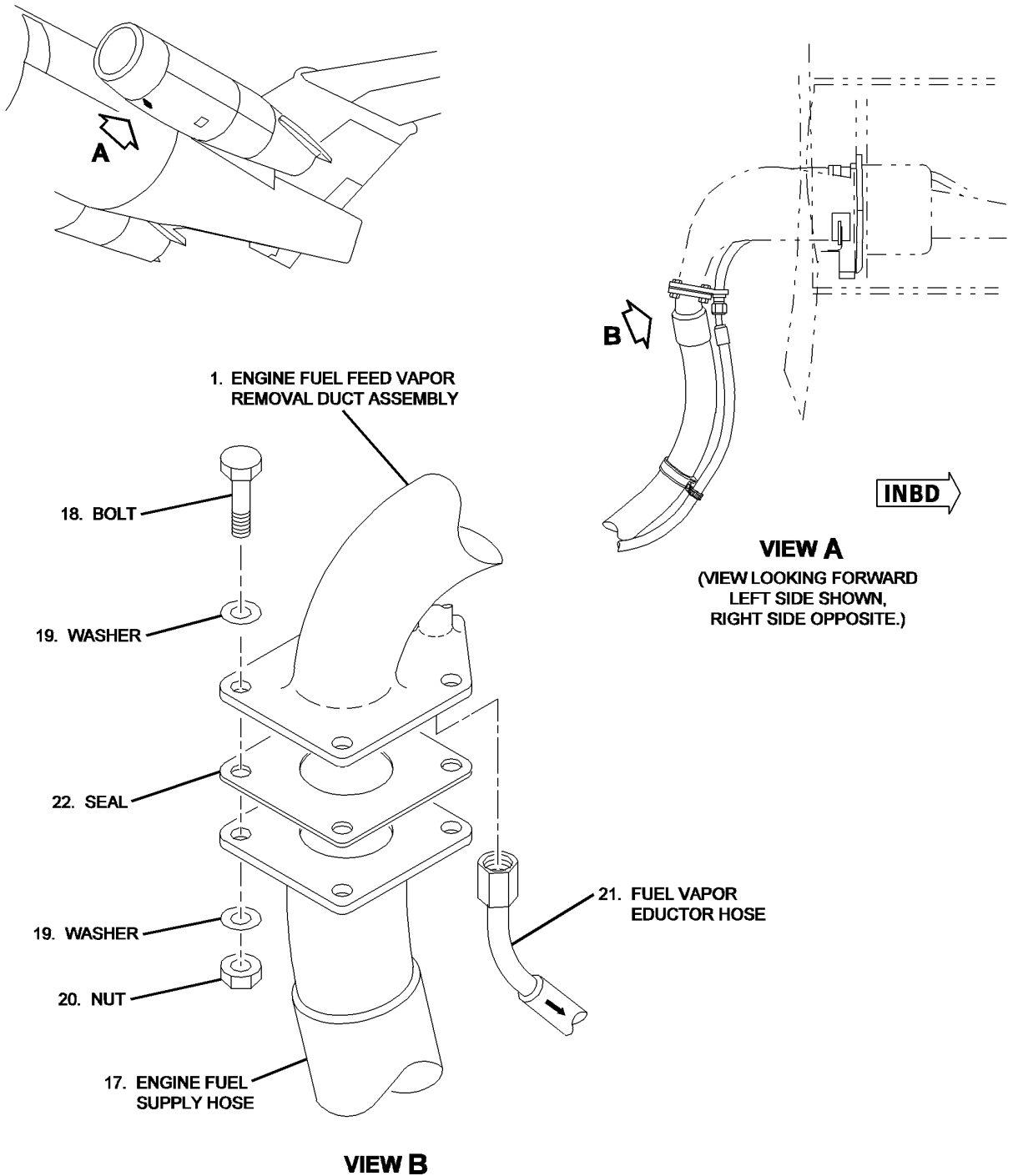
EFFECTIVITY
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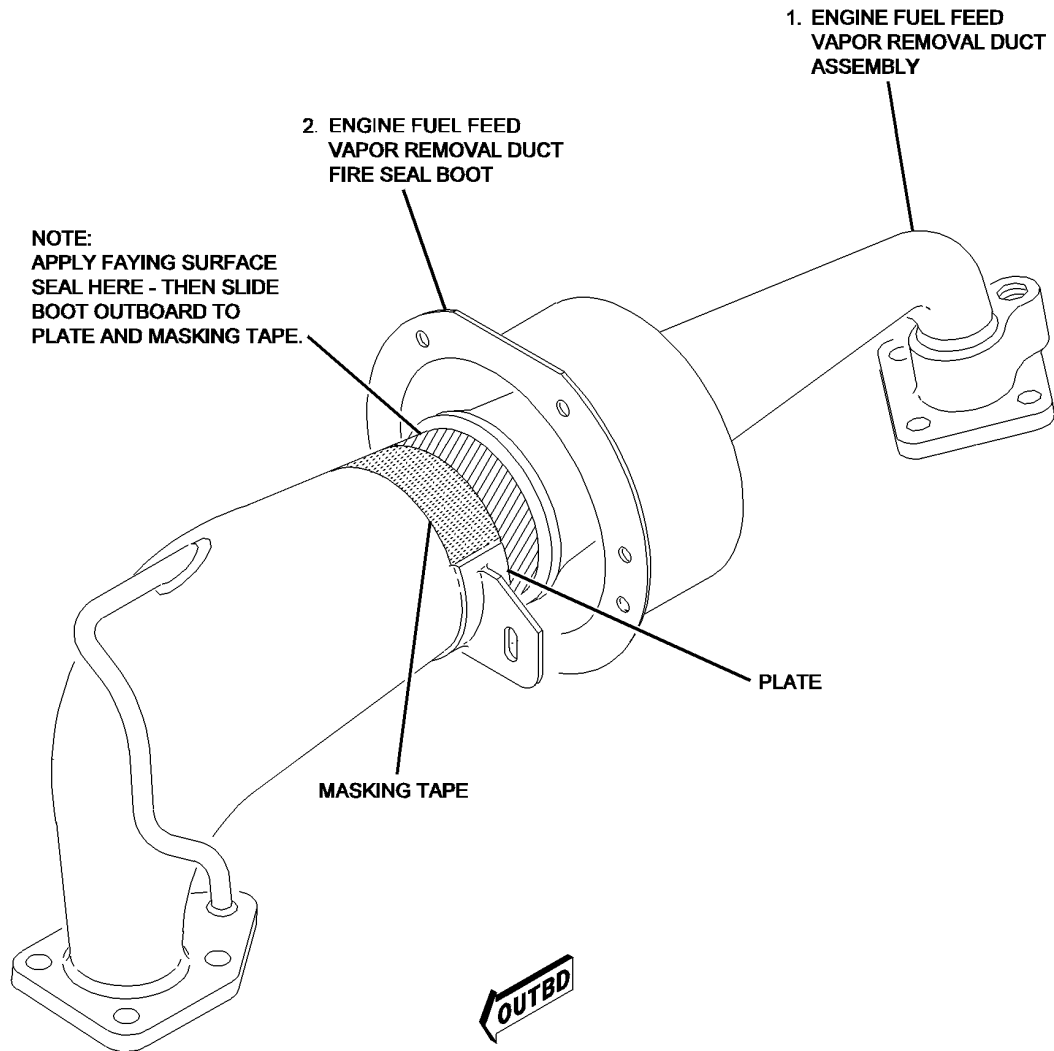
BBB2-28-408
S0000366181V1

**Duct Assembly, Engine fuel Feed Vapor Removal - Maintenance Practices
Figure 201/28-20-30-990-803 (Sheet 5 of 5)**

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BBB2-28-409
S0000366185V1

Fire Seal Boot, Engine Fuel Feed Vapor Duct - Maintenance Practices
Figure 202/28-20-30-990-804

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4. Engine Fuel Feed Vapor Removal Duct Assembly Fireseal Boot Repair

A. Repair Engine Fuel Feed Vapor Removal Duct Assembly Fireseal Boot

- (1) Remove the engine. (GENERAL, SUBJECT 71-00-00)
- (2) Find the number of patches necessary to repair the fireseal boot.
- (3) Examine the fireseal boot to find the dimension of the patches necessary for the repair.
NOTE: A damage area of 2.0 in² (1290.3 mm²) is the maximum permitted.
- (4) Make the patch from DPM 6285 tape. (Figure 203)
NOTE: A piece of spare fireseal boot can be an alternative for DPM 6285.
- (5) Apply a maximum of two layers of DPM 6285 for each patch.
- (6) The surface around the damage will be cleaned first with clean water and then with solvent as shown:
 - (a) Adhesion promoter, silicone primer or sealant must be applied in less than one hour after the surfaces are cleaned or the surfaces must have protection with clean cardboard wipers, OMS 1820, Type 1, Class A, or DPM 640 neutral kraft paper. Adhesion promoter, silicone primer or sealant must be applied on the protection surfaces in less than 24 hours after they are cleaned.

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1497, CLEANER/HANDWIPE (DPM 6380-1)

HAZMAT 1499, CLEANER/HANDWIPE (DPM 6380-3)

HAZMAT 1590, CLEANER/SOLVENT/HANDWIPE (DPM 6380-4)

HAZMAT 1488, SOLVENT/SEALANT REMOVER (DPM 6410)

HAZMAT 1548, SOLVENT/SEALANT REMOVER/HAND WIPE CLEANER (DPM 6410-1)

HAZMAT 1000, REFER TO MSDS

- (b) When solvent is specified, DPM 6380-1, DPM 6380-3, DPM 6380-4, DPM 6410 or DPM 6410-1 solvent can be used to clean and for removal of semi-cured or cured sealant. The solvent is not permitted to puddle on cured sealant fillets.
- (c) When a container is specified, use only polyethylene or polypropylene bottles (such as DPM 2795-1). A 16-ounce dimension container is recommended, while the maximum permitted dimension is a 32-ounce container. If a container is found to have damage (such as holes, cracks or breaks), then any remaining solvent must be put into a specified waste container and make the damaged container unserviceable.
- (d) Do not apply dirt and contamination when you clean the assemblies. Start at the top point on the assembly when you clean to make sure that cleaning solution will not flow onto surfaces that have been cleaned.
 - 1) Water Cleaning
 - a) Use only clean water and pour water from a container, as shown above, onto a cleaning wiper or onto the surface to be cleaned.

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- b) Use an aggressive scrubbing procedure and fully clean the area that is to be sealed. Make sure to dry off the area and use a clean dry wipe prior to the evaporation of the water. This will prevent the redeposit of contamination.
- NOTE: Cleaning wipers must be refolded or changed frequently and have a clean wiper surface to the area being cleaned.
- c) When heavy contamination is shown during the initial water cleaning operation (as shown by clouded water and residue on cleaning wipers), the water cleaning procedure must be repeated before using solvent cleaner.

2) Solvent Cleaning

NOTE: Before any solvent cleaning operation is started, consult Industrial Hygiene & Safety Services (IH&S), or customer equivalent for specific safety precautions to be observed. When using solvent cleaning compounds, protective equipment and proper ventilation must be provided for all personnel. Solvent cleaning must not be performed in confined spaces, interior areas or fuel tanks, without specific approval of IHS and Fire Services, or customer equivalents.

NOTE: Solvent cleaning compounds could be harmful to the skin and therefore must not be used to clean sealant from skin.

NOTE: Water must not be added to solvent cleaners; dangerous chemical reactions can cause damaging effects to structural components and fasteners.

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THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1497, CLEANER/HANDWIPE (DPM 6380-1)

HAZMAT 1499, CLEANER/HANDWIPE (DPM 6380-3)

HAZMAT 1590, CLEANER/SOLVENT/HANDWIPE (DPM 6380-4)

HAZMAT 1000, REFER TO MSDS

- a) Put the solvent cleaner onto a cleaning wiper. Make sure that the wiper is wet but does not drip. When DPM 6380-series is used the cleaning wiper must be moist.

NOTE: Do not put wipes into open solvent containers for wetting; this will cause the solvent to become contaminated by repeated wiper immersions.

- b) Brush the area which is to be sealed. After the area has been fully wiped using this procedure, wipe dry the surface using a clean dry wipe before the solvent cleaner dries and redeposit the contamination on the surface.

NOTE: The dimension of the area being cleaned must be restricted so that the surface can be wiped dry before the cleaner dries. When using DPM 6380-series cleaners, the surface must be permitted to dry for approximately five minutes after being wipe dried to permit residual cleaner to evaporate.

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- c) Cleaning wipers must be changed or refolded frequently so as to present a clean wiper surface to the area being cleaned.

NOTE: Compressed air must not be used for removal of solvent during last cleaning. The solvent can redeposit the contamination on the surface being cleaned if the area is not wiped dry with a clean wiper.

- (7) Use a clean OPM 3566 bristle brush and apply one layer of silicone primer on the surface(s) to be sealed. The layer of primer must extend a minimum of 1/8 inch more than the area to be sealed. Discard the brush when completed. (Figure 203)

NOTE: Silicone primer is good only when applied in a thin layer and must not be permitted to puddle on surfaces to be sealed. Such puddles and too much thick layers of silicone primer will cause defective sealant adhesion. Both the dyed (crimson) and clear silicone primes must dry to a transparent layer.

NOTE: Too much quantity of primer or moisture absorption will cause a cloudy or milky appearance, usually in less than five minutes after it is applied.

- (8) Silicone primer must be permitted to dry for a minimum of 30 minutes prior to sealant application. Longer periods to dry are recommended. Care must be used to protect the primed surfaces from contamination until the sealant is applied.

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1292, SEALANT/SILICONE (DMS QPL 1799)

HAZMAT 1000, REFER TO MSDS

- (9) Use the smallest orifice sealant nozzle and apply a thin ring of OMS 1799 sealant around the damage area (approximately 1/16 to 1/8 inch away from the edge of the damage).
- (10) Apply the patch to the damaged area. (Figure 203)

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

Hazardous Material Warnings

HAZMAT 1292, SEALANT/SILICONE (DMS QPL 1799)

HAZMAT 1000, REFER TO MSDS

- (11) Apply a thick layer of OMS 1799 sealant over the patch edges and seal the all of the perimeter to secure the patch in position. See Figure 3 for clarification. Make sure that the OMS 1799 sealant completely covers the patch and overlaps the edges of the patch by 1/16 to 1/8 inch with sealant. Tool the sealant to assure against entrapment of air. Apply pressure to make sure there is a tight seal of the patch. (Figure 203)

WARNING: USE THE HAZARDOUS MATERIAL WARNINGS GIVEN BELOW FOR THE STEPS THAT FOLLOW.

THE HAZARDOUS MATERIAL WARNINGS ARE LISTED AFTER THE INTRODUCTION SECTION IN THE FRONT OF THE AMM.

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(WARNING PRECEDES)

Hazardous Material Warnings

HAZMAT 1292, SEALANT/SILICONE (DMS QPL 1799)

HAZMAT 1000, REFER TO MSDS

- (12) If necessary, apply heat to OMS 1799 to decrease the cure time for OMS 1799. (Table 201)
(Figure 203)
- (13) Install the engine. (GENERAL, SUBJECT 71-00-00)

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HEATING TIME FOR DPM 1799						
SEALING COMPOUND	SPECIFICATION	MIXING RATIO	APPLI. ASSEM.	TACK FREE TIME (HOURS) (1)	CURE TIME ROOM TEMP. (HOURS) (1)	CURE RATE (ACCEL.)
BASE CATALYST		BASE WT. CATALYST WT.	TIME LIMIT (HOURS)			HOURS TEMP. (2)
RTV-88 (3) 9910 CATALYST	DMS 1799	$\frac{100}{10}$	2 1/2 2 1/2	10	24	$\frac{2-4}{\text{AT } 200^{\circ} \text{ F}}$
90-006 (3) 90-006-2	DMS 1799	$\frac{100}{10}$	2 2	10	24	$\frac{2-4}{\text{AT } 200^{\circ} \text{ F}}$

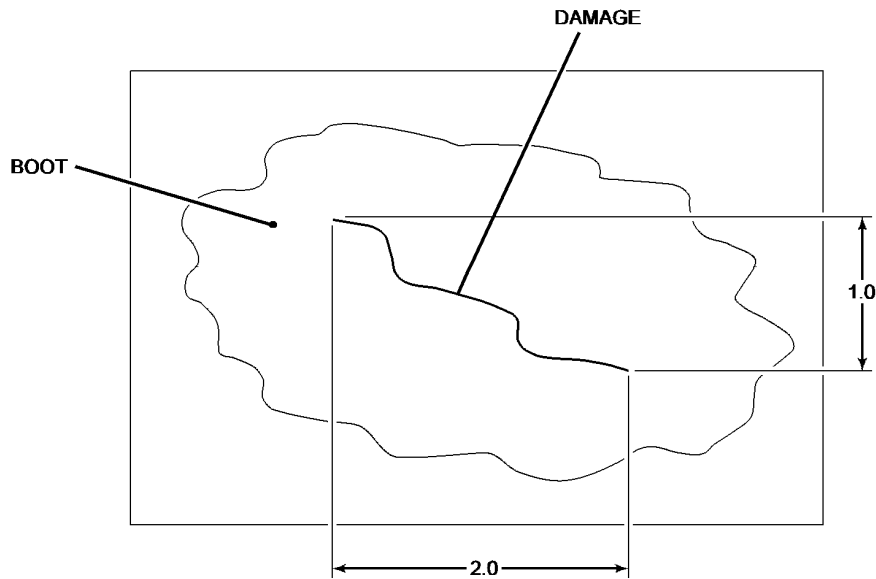


FIGURE 1: MAXIMUM DAMAGE AREA

NOTE:
DIMENSIONS ARE IN INCHES

BBB2-28-426
S0000487975V1

Engine Fuel Feed Vapor Removal Duct Assembly Fireseal Boot - Repair Figure 203/28-20-30-990-805 (Sheet 1 of 2)

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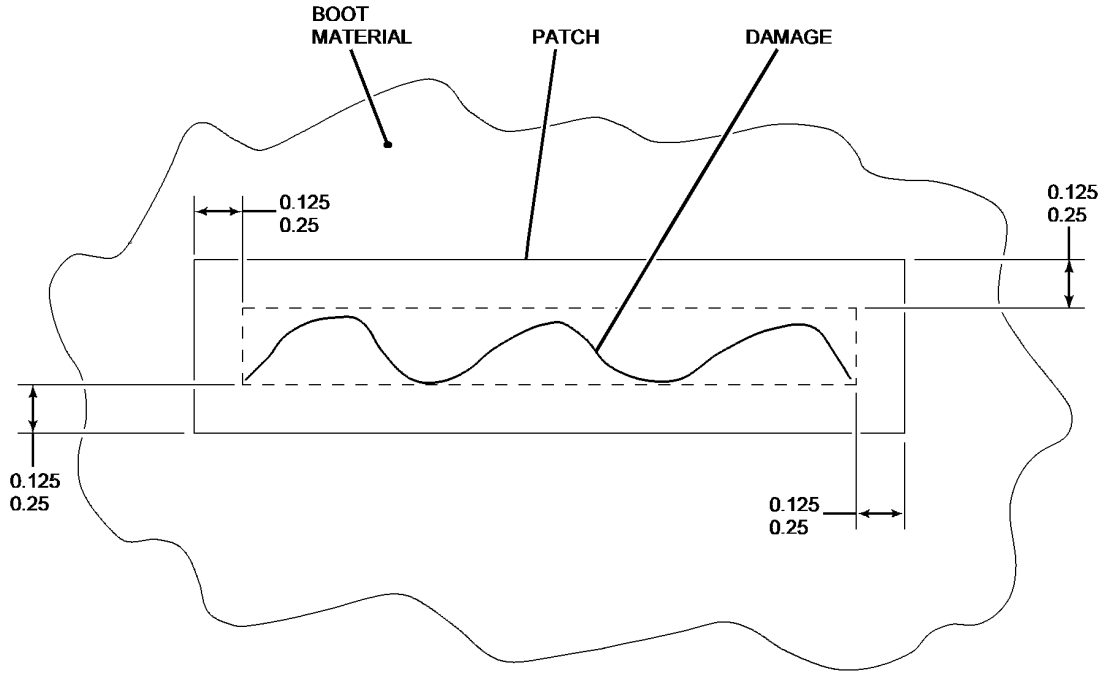
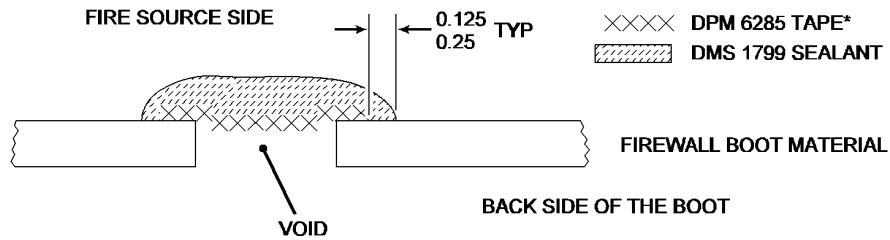


FIGURE 2: TYPICAL INSTALLATION



* APPLY A MAXIMUM OF 2 LAYERS OF DPM 6285 PER PATCH.

FIGURE 3: PATCH APPLICATION

NOTE:
DIMENSIONS ARE IN INCHES

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S0000487976V1

**Engine Fuel Feed Vapor Removal Duct Assembly Fireseal Boot - Repair
Figure 203/28-20-30-990-805 (Sheet 2 of 2)**

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ALTERNATE FUEL BURN - DESCRIPTION AND OPERATION

1. General

- A. The alternate fuel burn system provides an automated alternate fuel burn sequence by use of float switches in the main and center fuel tanks when the center tank boost pump switches are in the AUTO position.
- B. The system consists of float switches, relays that control the center tank boost pumps, and relays controlled by the float switches.
- C. Using the alternate fuel burn sequence will burn fuel from the main tanks earlier than the current burn sequence to reduce the amount of fuel in the main tanks upon landing. This will reduce the occurrence of wing upper surface ice caused by cold-soaked fuel during ground operation.

WJE 410, 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-058

- D. The alternate fuel burn sequence is as follows:

NOTE: The fuel levels indicated are approximate, and are for inflight conditions. The float switch will actuate at different levels on the ground.

- (1) All boost pumps are on. Main tank boost pump switches are positioned to ON; center tank boost pump switches are positioned to AUTO.
- (2) The greater pressure from the series-mounted center pumps override the pressure from the individual main tank pumps, causing the center tank to burn down first.
- (3) When the center tank burns down to between the 11,000 lb (4990 kg) and 9000 lb (4082 kg) level, the center tank pumps are automatically turned off, leaving only the main tank pumps operating.
- (4) When the main tanks burn down to between the 4800 lb (2177 kg) and 3800 lb (1724 kg) level (either tank), the center tank boost pumps are automatically turned back on, causing the fuel to feed from the center tank.
- (5) When the left or right main tank burns down to approximately 2500 lb (1134 kg), the low fuel level warning indication will come on.
- (6) The center tank then burns down to empty, at which time the center boost pump switches are manually positioned to OFF, returning the fuel burn system to normal, and the main tanks then burn down normally.

(LOW FUEL LEVEL WARNING INDICATION - DESCRIPTION AND OPERATION,
PAGEBLOCK 28-42-00/001)

WJE ALL

2. Description

- A. Center Boost Pump Switches

- (1) For this system, the center boost pump switches are three-position, center-off, switches, receiving power directly from the 115 vac, three-phase, left and right busses.
- (2) ON position.
 - (a) In the ON position, the switches control the center forward and aft boost pumps in the normal manner.
 - (b) The boost pumps receive power direct, and are controlled normally.
- (3) AUTO position.
 - (a) In the AUTO position, the boost pumps receive power through the alternate control relays.

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B. Fuel Float Switches

- (1) Fuel float switches are mounted on the inboard end of each main tank, near the rear spar, and near the centerline of the center tank.
- (2) Vertical movement of the float as a result of the drop of the fuel surrounding the switch causes the switch to close when the fuel is at, or below, the operating level of the switch.

C. Fuel Pump Alternate Control Relays

- (1) The alternate fuel burn mode has an alternate control relay to control each of the center tank forward and aft boost pumps when in the alternate fuel burn mode.
- (2) These relays are controlled by the center tank float switch relay.

D. Center Tank Float Switch Relay

- (1) The center tank float switch relay is controlled by the center tank float switch through the main tank float switch relay.
- (2) The center tank float switch relay controls the alternate control relays.
- (3) A 22-second delay is built into the circuit to prevent false signals due to fuel slosh.

E. Main Tank Float Switch Relay

- (1) The main tank float switch relay is controlled by the main tank float switches.
- (2) The main tank float switch relay controls the center tank float switch relay.
- (3) A 5-second delay is built into the circuit to prevent false signals due to fuel slosh.
- (4) The ground control relay provides a circuit to ground when it is in a relaxed state (airborne mode). This circuit goes through, and is connected to the control circuit of the main tank float switch relay. When the main tank float switch relay is activated, it is latched (airborne mode), preventing relay cycling.

F. Fuel Transfer Switch

- (1) A fuel transfer switch is located at the ground refueling panel in the right wing to control the center tank boost pumps during ground fuel transfer.

3. Operation

A. Center Boost Pump Switches

- (1) When the switches are positioned to ON, power from the 115 vac, three-phase, left and right busses is connected directly to the boost pumps.
- (2) When the switches are positioned to AUTO, the power is shunted through the fuel pump alternate control relays.

B. Float Switches

- (1) The center tank alternate fuel burn float switch is positioned to actuate when the center tank burns down to between 11,000 pounds (5000 kg) and 9000 pounds (4100 kg) (during flight).
- (2) The main tank alternate fuel burn float switches are positioned to actuate when the respective main tank burns down to between 4800 pounds (2200 kg) and 3800 pounds (1725 kg) (during flight).

C. Fuel Pump Alternate Control Relays

- (1) The 115 vac, three-phase, electrical power is shunted through the alternate fuel pump control relays.
- (2) The relays are controlled by the 28 vdc L/R bus, and activated when the either the fuel level is above the center tank float switch, or below either main tank float switch.

D. Center Tank Float Switch Relay

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- (1) The center tank float switch relay receives power from the 28 vdc L/R bus through the alternate fuel pump control circuit breaker.
 - (2) The center tank float switch relay is controlled by the center tank float switch through the main tank float switch relay. When the center tank float switch is open, or the main tank float switches are closed, then the relay is deactivated. When the center tank float switch is closed and the main tank float switches are open, then the relay is activated by connecting the circuit to ground.
 - (3) In the deactivated state, the center tank float switch relay grounds both alternate control relay circuits, thus powering the center tank boost pumps,
 - (4) In the activated state, the center tank float switch relay removes ground from the alternate control relay circuits, cutting power to the boost pumps.
 - (5) A 22-second delay is built into the relay to prevent false signals due to fuel slosh.
- E. Main Tank Float Switch Relay
- (1) The main tank float switch relay receives power from the 28 vdc L/R bus through the alternate fuel pump control circuit breaker.
 - (2) The main tank float switch relay is controlled by either of the main tank float switches. When both float switches are open, the relay is deactivated. When either main tank float switch is closed, the relay is activated by connecting the circuit to ground.
 - (3) In the deactivated state, the main tank float switch relay permits the center tank float switch relay circuit to be connected to ground through the center tank float switch, connecting power to the center tank boost pumps, when the switches are in the AUTO position.
 - (4) In the activated state, the main tank float switch relay cuts the circuit to the center tank float switch relay, which grounds the fuel pump alternate control relays, thereby turning on the boost pumps. The main tank float switch relay also completes the circuit to the ground control relay, which prevents the main tank float switch relay from cycling.
 - (5) A 5-second delay is built into the relay to prevent false signals due to fuel slosh.
- F. Ground Control Relay
- (1) When the main tank float switch is activated, a circuit to ground is completed through the ground control relay (in its airborne state). This effectively locks the main tank float switch relay in the activated mode, to prevent system cycling due to fuel slosh or changes in aircraft attitude.

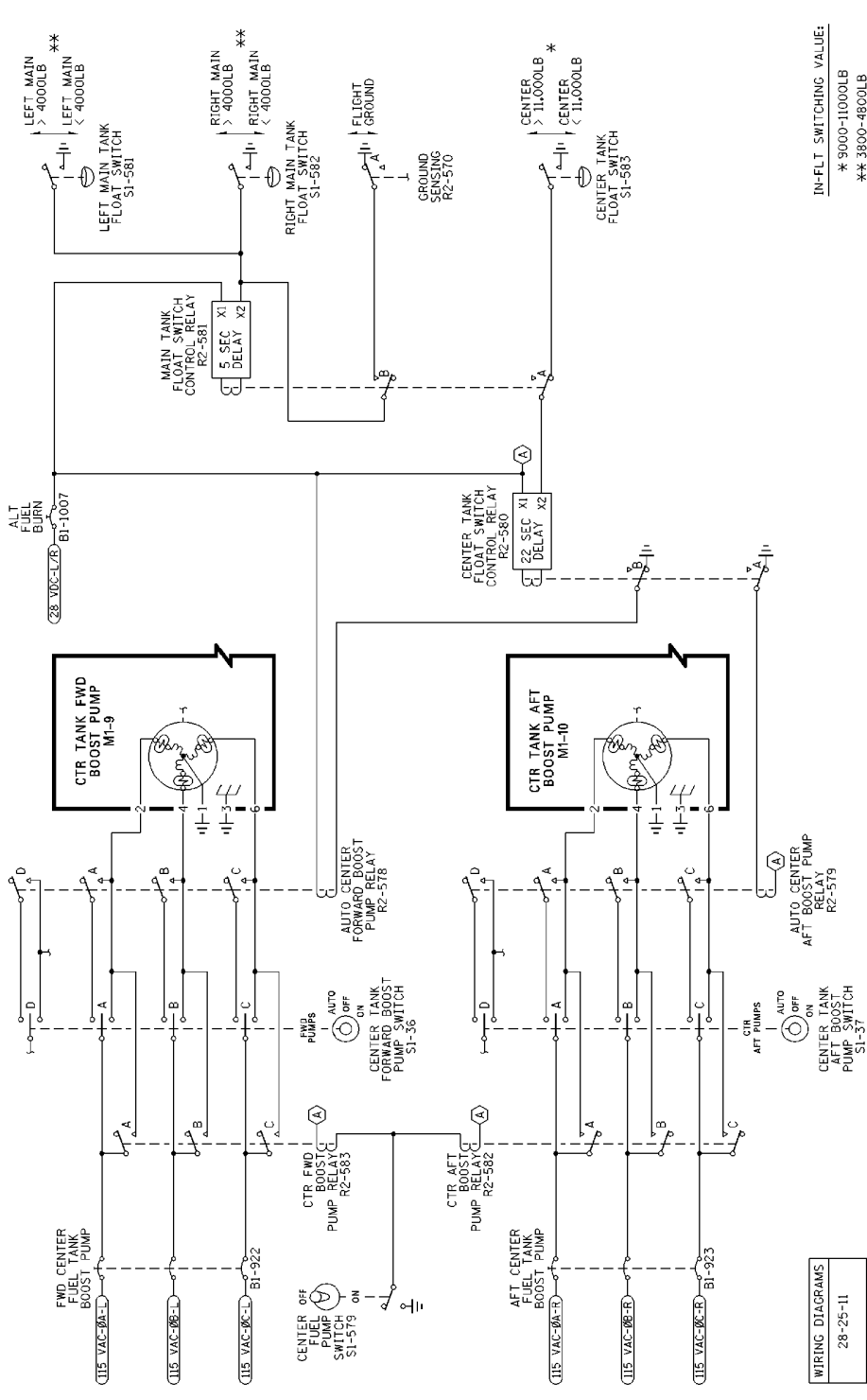
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IN-FLT SWITCHING VALUE:

- * 9000-11000LB
- ** 3800-4800LB

BBB2-28-248C

MDC PROPRIETARY

WIRING DIAGRAMS
28-25-11

CAG(IIGDS)

Alternate Fuel Burn Control -- Schematic
Figure 1/28-21-00-990-801

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ALTERNATE FUEL BURN - ADJUSTMENT/TEST

1. General

- A. The alternate fuel burn test checks that the fuel float switches in the main and center wing tanks function at the proper fuel level and that the system functions properly.
- B. The alternate fuel burn system requires that the low fuel level indication and center tank fuel boost pump low pressure systems be installed and functioning. (CENTER FUEL TANK PUMP LOW PRESSURE INDICATION - ADJUSTMENT/TEST, PAGEBLOCK 28-41-00/501 or LOW FUEL LEVEL WARNING INDICATION - ADJUSTMENT/TEST, PAGEBLOCK 28-42-00/501)
- C. The alternate fuel burn test runs as follows:
 - (1) Fuel is transferred from the center tank to the main tanks until the center tank actuation level is reached.
 - (2) Fuel is then transferred from the right main tank to the left main tank until right main tank actuation level is reached.
 - (3) Fuel is then transferred from the left main tank to the right main tank until left main tank actuation level is reached.
 - (4) In the process, proper system function is tested.
- D. The fuel transfer switch test checks the proper operation of the fuel transfer switch located on the wing refueling panel.
- E. Test procedures may be abbreviated by deletion of items marked by an asterisk (*) for in-service functional testing.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

Table 501

Name and Number	Manufacturer
Specific gravity hydrometer	Commercially available
Sump drain tool V-799	Service Support Systems
Sump drain tool 4298-1	Kaiser Aerospace & Electronics Corp.
Sump drain tool 700200-1	Hydraulic Research & Mfg. APCO & Filter Division
Drain bottle assembly, 700200-1	Accessory Products Co. Whittier, CA

3. Alternate Fuel Burn - Adjustment/Test

NOTE: Procedures marked with an asterisk (*) may be omitted for in-service functional testing of the system.

- A. Aircraft Preparation
 - (1) * Place aircraft in attitude of -1(±0.25) degree pitch and 0(±0.25) degree roll. (LEVELING, SUBJECT 08-10-00)
 - (2) Center tank pump low pressure test has been performed. (CENTER FUEL TANK PUMP LOW PRESSURE INDICATION - ADJUSTMENT/TEST, PAGEBLOCK 28-41-00/501 or LOW FUEL LEVEL WARNING INDICATION - ADJUSTMENT/TEST, PAGEBLOCK 28-42-00/501)
 - (3) Engines are installed.
 - (4) Fuel tanks are fueled to following levels:
 - (a) Left main: 5600 lb (2550 kg).

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- (b) Right main: 5600 lb (2550 kg).
- (c) Center: 11,400 lb (5200 kg).
- (5) Aircraft external power source connected.
NOTE: For in-service testing, aircraft power may be used.
- (6) Position controls as follows:

Table 502

Control	Location	Position
Crossfeed lever	Center pedestal	OFF
Fuel shutoff levers (both engines)	Center pedestal	OFF
Start pump switch	Overhead switch panel	OFF
Fuel boost pump switches	Overhead switch panel	OFF
* APU master switch ^{*[1]}	Overhead switch panel	OFF
* Battery switch ^{*[1]}	Overhead switch panel	OFF
For aircraft with low fuel pressure inhibit (SB 28-63):		
Flap/slat handle	Center pedestal	UP/RET

[1] Procedures marked with an asterisk () may be omitted for in-service functional testing of the system.

B. Alternate Fuel Burn Test

- (1) Open defueling valve, left main tank fill valve, and right main tank fill valve, located near refueling panel on right wing.
- (2) Place FUEL TANKS CTR AFT PUMPS and FWD PUMPS switches in AUTO position.
NOTE: This initiates the transfer of fuel from the center tank to the left and right main tanks.
- (3) When either L INLET FUEL PRESS LOW or R INLET FUEL PRESS LOW warning indications occur, place FUEL TANKS CTR AFT PUMPS and FWD PUMPS switches in OFF position.
- (4) * Record CTR indication on FUEL QTY indicator on main instrument panel.
NOTE: Specific gravity of fuel must be measured within 2 hours following recording of FUEL QTY indication.
- (5) Place FUEL TANKS CTR AFT PUMPS and FWD PUMPS switches in ON position.
- (6) After 50 to 100 lb (25 to 50 kg) of fuel has been removed from center tank, place FUEL TANKS CTR AFT PUMPS and FWD PUMPS switches in OFF position.
- (7) Close left main tank fill valve.
- (8) Place crossfeed lever in ON position.
- (9) Place FUEL TANKS CTR AFT PUMPS and FWD PUMPS switches in AUTO position.

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WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (10) Open this circuit breaker and install safety tag:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C

- (a) CENTER FUEL PRESS LO warning indication shall not appear.
- (11) Place FUEL TANKS LEFT AFT PUMPS and FWD PUMPS switches in ON position.
- (12) When CENTER FUEL PRESS LO warning indication appears, immediately place FUEL TANKS LEFT AFT PUMPS and FWD PUMPS switches in OFF position.
- (13) * Record L MAIN indication on FUEL QTY indicator on main instrument panel.
- NOTE:** Specific gravity of fuel must be measured within 2 hours following recording of FUEL QTY indication.
- (14) Remove the safety tag and close this circuit breaker:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (15) Open this circuit breaker and install safety tag:

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C

- (a) CENTER FUEL PRESS LO warning indication will go out immediately, and then will come on after approximately 25 seconds.
- (16) Close right main tank fill valve and open left main tank fill valve.
- (17) Place FUEL TANKS RIGHT AFT PUMPS and FWD PUMPS switches in ON position. After a short period of time, CENTER FUEL PRESS LO warning indication will go out.
- (18) When CENTER FUEL PRESS LO warning indication reappears, immediately place FUEL TANKS RIGHT AFT PUMPS and FWD PUMPS switches and FUEL TANKS CTR AFT PUMPS and FWD PUMPS switches in OFF position.
- (19) * Record R MAIN indication on FUEL QTY indicator on main instrument panel.
- NOTE:** Specific gravity of fuel must be measured within 2 hours following recording of FUEL QTY indication.

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(20) Remove the safety tag and close this circuit breaker:

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C

(21) Close defueling valve and left main tank fill valve.

(22) Perform specific gravity check of fuel. (Paragraph 3.C.)

NOTE: Specific gravity of fuel must be measured within 2 hours following recording of FUEL QTY indication.

(23) Using specific gravity determined in Paragraph 3.B.(22), check that float switches actuated within specified range as shown on: (Figure 501 or Figure 502)

C. Specific Gravity Check

(1) Measure and record specific gravity of fuel sample from right main tank as follows:

(a) Drain all water possible from sump valve using sump drain tool.

(b) Drain fuel sample from fuel sump into drain bottle.

(c) Measure specific gravity using specific gravity hydrometer.

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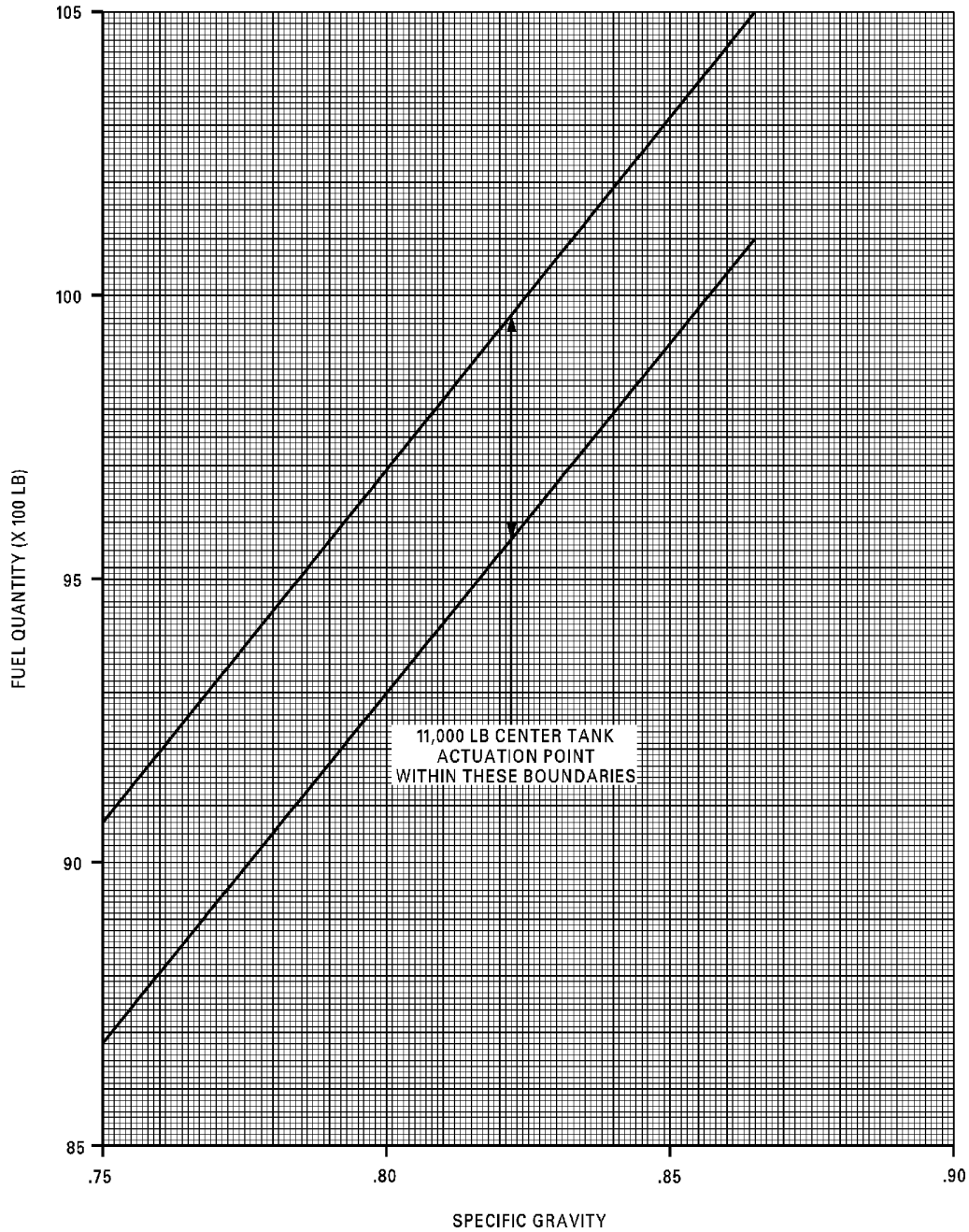
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**ALTERNATE FUEL BURN
11,000 LB FLOAT SWITCH ACTUATION
POINT - CENTER TANK**



CAG(IGDS)

BBB2-28-235B

**Alternate Fuel Burn -- Center Tank Actuation Point
Figure 501/28-21-00-990-802 (Sheet 1 of 2)**

EFFECTIVITY
WJE 401-404, 412, 414, 873-879, 886, 887, 892, 893

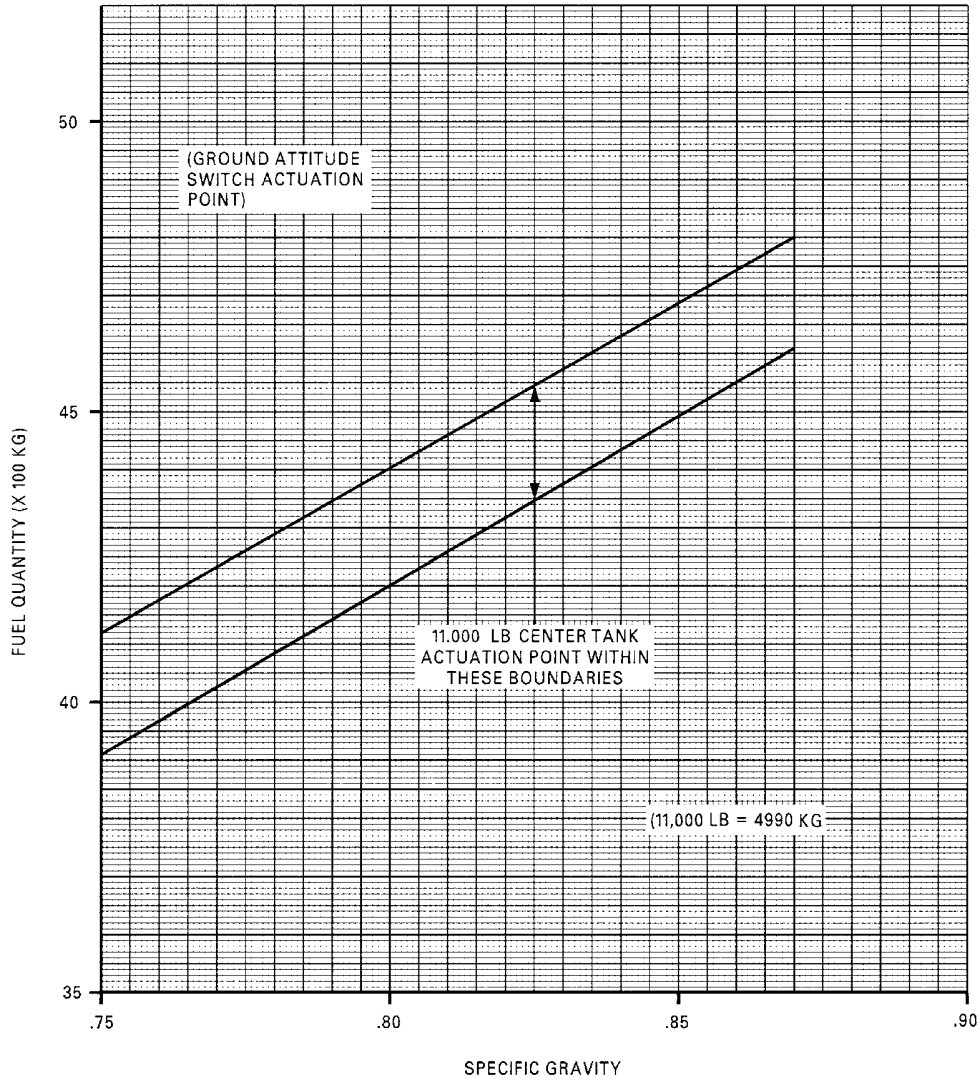
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**ALTERNATE FUEL BURN
11,000 LB FLOAT SWITCH ACTUATION
POINT - CENTER TANK**



CAG(IIGDS)

BBB2-28-236A

**Alternate Fuel Burn -- Center Tank Actuation Point
Figure 501/28-21-00-990-802 (Sheet 2 of 2)**

EFFECTIVITY

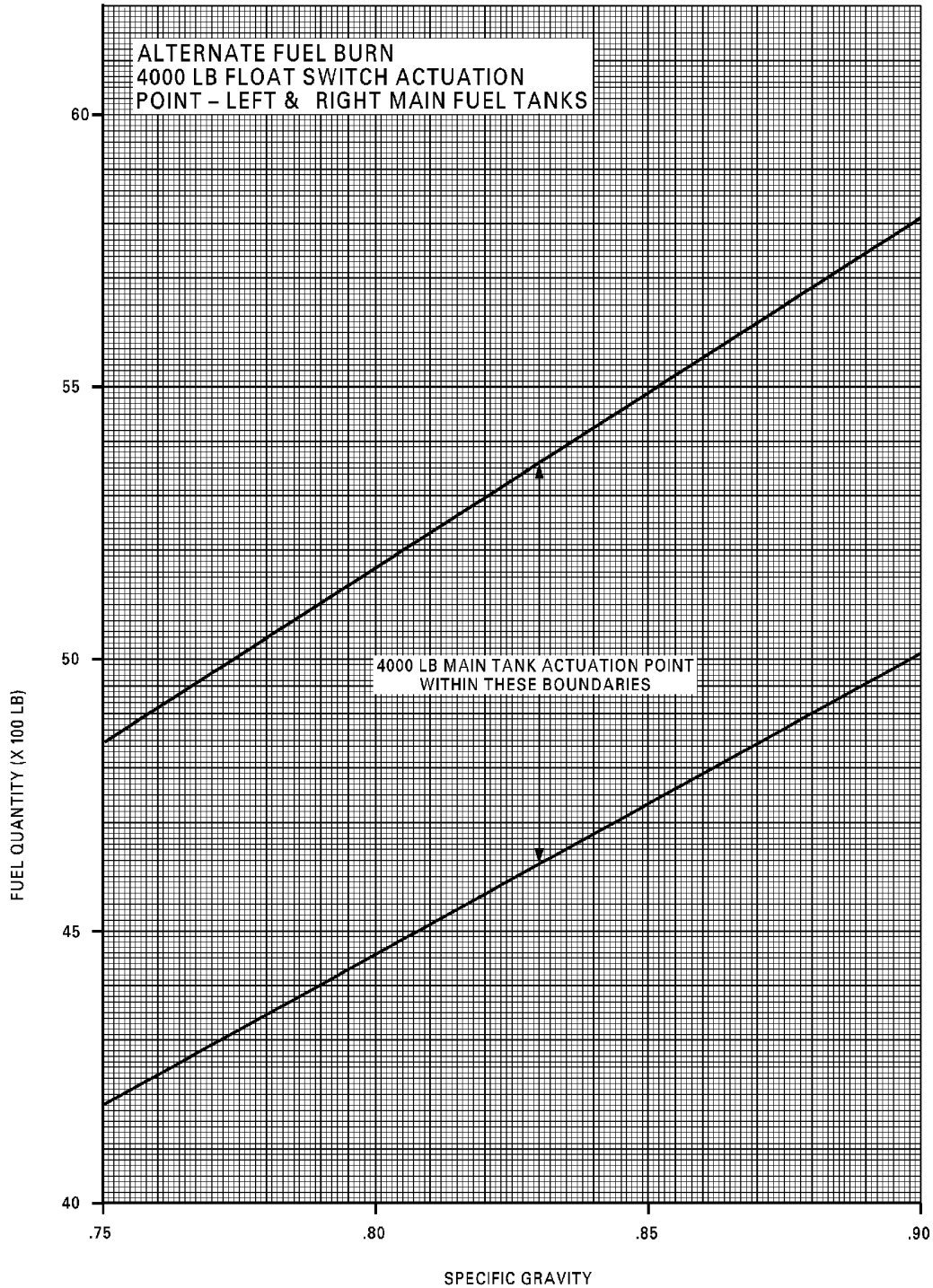
WJE 405-411, 415-427, 429, 861-866, 868, 869, 871, 872, 880, 881, 883, 884, 891

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**Alternate Fuel Burn -- Main Tank Actuation Point
Figure 502/28-21-00-990-803 (Sheet 1 of 2)**

EFFECTIVITY
WJE 873, 874, 886, 887, 892, 893

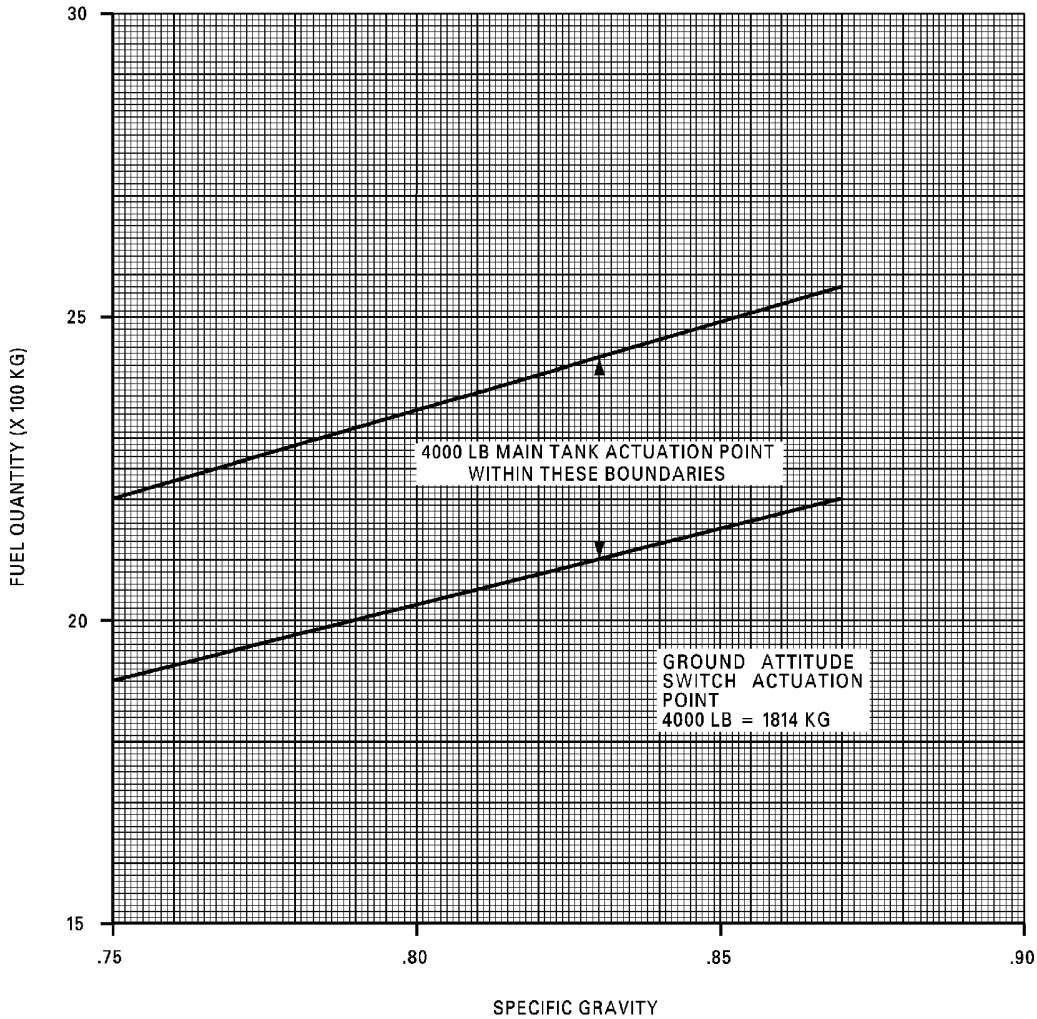
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**MD-80
AIRCRAFT MAINTENANCE MANUAL**

**ALTERNATE FUEL BURN
4000 LB FLOAT SWITCH ACTUATION
POINT - LEFT & RIGHT MAIN FUEL TANKS**



CAG(IGDS)

BBB2-28-238B

**Alternate Fuel Burn -- Main Tank Actuation Point
Figure 502/28-21-00-990-803 (Sheet 2 of 2)**

EFFECTIVITY

WJE 405-411, 415-427, 429, 861-866, 868, 869, 871, 872, 880, 881, 883, 884, 891

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WJE 410, 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414, 416, 418, 420, 421, 423, 424, 426, 429, 861, 862, 869, 874, 880, 881, 883, 884, 886, 887, 891 POST MD80-28-061 OR POST MD80-28-058; WJE 415, 422, 425, 427, 863-866, 868, 873, 892, 893 POST MD80-28-058

4. Fuel Transfer Switch - Adjustment/Test

A. Aircraft Preparation

- (1) Aircraft preparation is the same as that in paragraph 3.A., except for tank quantities as follows:
 - (a) Right main: Less than 7000 lb (3200 kg).
 - (b) Center: 1000 lb (500 kg) minimum.

B. Fuel Transfer Switch Test

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Open this circuit breaker and install safety tag:

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C

- (2) Open defueling valve, and right main tank fill valve, located near refueling panel on right wing.
- (3) Place CENTER TANK PUMPS switch on refueling panel in ON position.

WJE 401-409, 412, 414, 416, 418, 420, 421, 423, 424, 426, 429, 861, 862, 869, 874, 880, 881, 883, 884, 886, 887, 891 POST MD80-28-228 AND (POST MD80-28-061 OR POST MD80-28-058); WJE 410, 411, 417, 419, 871, 872, 875-879 POST MD80-28-228; WJE 415, 422, 425, 427, 863-866, 868, 873, 892, 893 POST MD80-28-228 AND POST MD80-28-058

- (a) Verify the CENTER FUEL PRESS LO and Master Caution are illuminated.

WJE 410, 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414, 416, 418, 420, 421, 423, 424, 426, 429, 861, 862, 869, 874, 880, 881, 883, 884, 886, 887, 891 POST MD80-28-061 OR POST MD80-28-058; WJE 415, 422, 425, 427, 863-866, 868, 873, 892, 893 POST MD80-28-058

- (4) Check that right main tank fuel quantity increases by a minimum of 100 lb/min (45 kg/min).
- (5) Place CENTER TANK PUMPS switch in OFF position.

WJE 401-409, 412, 414, 416, 418, 420, 421, 423, 424, 426, 429, 861, 862, 869, 874, 880, 881, 883, 884, 886, 887, 891 POST MD80-28-228 AND (POST MD80-28-061 OR POST MD80-28-058); WJE 410, 411, 417, 419, 871, 872, 875-879 POST MD80-28-228; WJE 415, 422, 425, 427, 863-866, 868, 873, 892, 893 POST MD80-28-228 AND POST MD80-28-058

- (a) Verify the CENTER FUEL PRESS LO and Master Caution are off.

WJE 410, 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414, 416, 418, 420, 421, 423, 424, 426, 429, 861, 862, 869, 874, 880, 881, 883, 884, 886, 887, 891 POST MD80-28-061 OR POST MD80-28-058; WJE 415, 422, 425, 427, 863-866, 868, 873, 892, 893 POST MD80-28-058

- (6) Remove the safety tag and close this circuit breaker:

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C

EFFECTIVITY
WJE ALL

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WJE 410, 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414, 416, 418, 420, 421, 423, 424, 426, 429, 861, 862, 869, 874, 880, 881, 883, 884, 886, 887, 891 POST MD80-28-061 OR POST MD80-28-058; WJE 415, 422, 425, 427, 863-866, 868, 873, 892, 893 POST MD80-28-058 (Continued)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (7) Open this circuit breaker and install safety tag:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C

- (8) Place CENTER TANK PUMPS switch in ON position.

WJE 401-409, 412, 414, 416, 418, 420, 421, 423, 424, 426, 429, 861, 862, 869, 874, 880, 881, 883, 884, 886, 887, 891 POST MD80-28-228 AND (POST MD80-28-061 OR POST MD80-28-058); WJE 410, 411, 417, 419, 871, 872, 875-879 POST MD80-28-228; WJE 415, 422, 425, 427, 863-866, 868, 873, 892, 893 POST MD80-28-228 AND POST MD80-28-058

- (a) Verify the CENTER FUEL PRESS LO and Master Caution are illuminated.

WJE 410, 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414, 416, 418, 420, 421, 423, 424, 426, 429, 861, 862, 869, 874, 880, 881, 883, 884, 886, 887, 891 POST MD80-28-061 OR POST MD80-28-058; WJE 415, 422, 425, 427, 863-866, 868, 873, 892, 893 POST MD80-28-058

- (9) Check that right main tank fuel quantity increases by a minimum of 100 lb/min (45 kg/min).
(10) Place CENTER TANK PUMPS switch in OFF position.

WJE 401-409, 412, 414, 416, 418, 420, 421, 423, 424, 426, 429, 861, 862, 869, 874, 880, 881, 883, 884, 886, 887, 891 POST MD80-28-228 AND (POST MD80-28-061 OR POST MD80-28-058); WJE 410, 411, 417, 419, 871, 872, 875-879 POST MD80-28-228; WJE 415, 422, 425, 427, 863-866, 868, 873, 892, 893 POST MD80-28-228 AND POST MD80-28-058

- (a) Verify the CENTER FUEL PRESS LO and Master Caution are off.

WJE 410, 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414, 416, 418, 420, 421, 423, 424, 426, 429, 861, 862, 869, 874, 880, 881, 883, 884, 886, 887, 891 POST MD80-28-061 OR POST MD80-28-058; WJE 415, 422, 425, 427, 863-866, 868, 873, 892, 893 POST MD80-28-058

- (11) Remove the safety tag and close this circuit breaker:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C

- (12) Close defueling valve and right main tank fill valve.

EFFECTIVITY	
WJE ALL	

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ALTERNATE FUEL BURN FLOAT SWITCHES - MAINTENANCE PRACTICES

1. General

- A. The alternate fuel burn float switches are located aft of the low fuel indicating float switches in each main and center fuel tank. Access to the switches is as follows:

Table 201

Component	Access
Center tank float switch	2302C
Left main tank float switch	1307C
Right main tank float switch	1410C
NOTE: For aircraft equipped with drained electrical feed-throughs, fuel leakage allowed is limited to 2 fl oz. (59 cc) in 24 hours. Aircraft not equipped with drained feedthroughs are allowed no fuel leakage.	

WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-226 AND POST MD80-28-058; WJE 410, 411, 417, 419, 871, 872, 875-879 POST MD80-28-226

- B. For the main and center fuel tanks an in-line fuse is installed in the applicable alternate fuel burn float switch that is external of the fuel tank. The purpose of the fuse is to prevent the ignition of the fuel fumes in a fuel tank caused by a short of the float switch wires outside the tank do to incompatible power. For removal and installation of the in-line fuse (TERMINAL BLOCKS - MAINTENANCE PRACTICES, SWPM 20-20-02).

WJE 410, 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-058

- C. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

Table 202

Name and Number	Manufacturer
Pen, marking, large chisel point, green #479B Major Marker	Major Line, Inc. Anaheim, CA
Sleeving material DMS 2109 Type 1	
Sleeving material DMS 2379 Type 4	

3. Removal/Installation Alternate Fuel Burn Float Switch

- A. Remove Float Switch
- (1) Defuel applicable tank.
 - (2) Close crossfeed valve.

EFFECTIVITY

WJE 410, 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-058

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WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Open these circuit breakers and install safety tags:

LOWER EPC, DC

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
------------	------------	---------------	-------------

WJE 410, 411, 417, 419, 871, 872, 875-879

M	37	B1-1007	ALT FUEL BURN
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WJE 410, 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-058

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
------------	------------	---------------	-------------

Z	38	B1-107	GROUND REFUEL
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OVERHEAD BATT DIR BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
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WJE 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-058

B	16	B1-106	GROUND REFUELING
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WJE 410

B	17	B1-106	GROUND REFUELING
---	----	--------	------------------

WJE 410, 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-058

- (4) Remove applicable fuel tank access door. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 PRE MD80-28-226 AND POST MD80-28-058; WJE 410, 411, 417, 419, 871, 872, 875-879 PRE MD80-28-226

- (5) Disconnect the power terminal from terminal strip and ground terminal from ground stud.

WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-226 AND POST MD80-28-058; WJE 410, 411, 417, 419, 871, 872, 875-879 POST MD80-28-226

- (6) Disconnect the power terminal from the in-line fuse and the ground terminal from the ground stud.

WJE 410, 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-058

- (7) Remove the necessary string ties from the float switch wires.
(8) Cut terminals from wire ends.

WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-226 AND POST MD80-28-058; WJE 410, 411, 417, 419, 871, 872, 875-879 POST MD80-28-226

- (9) Remove the sleeve material from the float switch power wire.

EFFECTIVITY

WJE 410, 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-058
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WJE 410, 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-058

- (10) Loosen gland nut on spar feedthrough fitting. Move the gland nut back on the float switch wires.
- (11) Remove ferrule, sealing grommet, comb and sleeve from feedthrough fitting.
- (12) Move the gland nut, ferrule, grommet, comb and sleeve off the float switch wires.
- (13) Attach a waxed string to the end of the float switch wires, of sufficient length, to reach from terminal strip and ground stud to float switch, through conduit.

NOTE: The string will be used to pull wires back through conduit during switch installation.

- (14) Disconnect the conduit from float switch.

CAUTION: DO NOT GRIP SWITCH SHELL DURING REMOVAL. USE WRENCH FLAT PROVIDED AT BASE OF SWITCH.

- (15) Remove retaining nut holding float switch to bracket.
- (16) Pull float switch out of tank, at the same time pulling wires through conduit.
- (17) Remove the waxed string from the float switch wires.
- (18) Tie both ends of the waxed string to adjacent structure to prevent inadvertent removal of string.

B. Install Float Switch

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
------------	------------	---------------	-------------

WJE 410, 411, 417, 419, 871, 872, 875-879

M	37	B1-1007	ALT FUEL BURN
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WJE 410, 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-058

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
------------	------------	---------------	-------------

Z	38	B1-107	GROUND REFUEL
---	----	--------	---------------

OVERHEAD BATT DIR BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
------------	------------	---------------	-------------

WJE 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-058

B	16	B1-106	GROUND REFUELING
---	----	--------	------------------

WJE 410

B	17	B1-106	GROUND REFUELING
---	----	--------	------------------

WJE 410, 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-058

- (2) Prepare the applicable float switch and bracket for electrical bonding. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
- (3) Put the float switch wires through bracket and attaching hardware.

EFFECTIVITY

WJE 410, 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-058

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CAUTION: DO NOT GRIP SWITCH SHELL DURING REMOVAL. USE WRENCH FLAT PROVIDED AT BASE OF SWITCH.

- (4) Tighten nut attaching float switch to bracket.
- (5) Do an electrical bond check of applicable float switch at the mounting bracket. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
- (6) Tie waxed string to the float switch wire ends.
- (7) Pull the float switch wires through conduit with the waxed string.
- (8) Attach conduit to float switch.
- (9) Remove the waxed string.
- (10) Remove slack from wires in conduit by gently pulling on wire ends at terminal end.
- (11) Mark wires with narrow band at a distance of 1.50 ± 0.25 in. (38 ± 6 mm) from forward edge of spar fitting. Use green marker or equivalent.
- (12) Move the sleeve, comb, and grommet over the float switch wires. Make sure the green band is visible at the forward edge of the grommet.
- (13) Move sleeve into feedthrough fitting.
 - (a) Make sure the sleeve does not protrude from the spar feedthrough fitting.
- (14) Move ferrule and gland nut over the float switch wires.
- (15) Insert the comb, grommet and ferrule into the sleeve.
- (16) Install the gland nut into feedthrough fitting and tighten.
 - (a) Make sure that the green band is visible at the edge of the grommet.

WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 PRE MD80-28-226 AND POST MD80-28-058; WJE 410, 411, 417, 419, 871, 872, 875-879 PRE MD80-28-226

CAUTION: PROVIDE SUFFICIENT SLACK IN WIRES TO PREVENT SHARP BENDS, CHAFING, PRELOADING OF WIRES.

- (17) Cut the float switch wires to the correct length to reach the terminal strip and ground stud.

WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-226 AND POST MD80-28-058; WJE 410, 411, 417, 419, 871, 872, 875-879 POST MD80-28-226

CAUTION: PROVIDE SUFFICIENT SLACK IN WIRES TO PREVENT SHARP BENDS, CHAFING, PRELOADING OF WIRES.

- (18) Cut the float switch wires to the correct length to reach the in-line fuse and ground stud.

WJE 410, 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-058

- (19) Install a new power terminal on the power wire and a new ground terminal on the ground wire. (TERMINALS - MAINTENANCE PRACTICES, SWPM 20-20-01)

WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-226 AND POST MD80-28-058; WJE 410, 411, 417, 419, 871, 872, 875-879 POST MD80-28-226

- (20) Install sleeving material DMS 2109 Type 1 or DMS 2379 Type 4 on the power wire, from the spar feedthrough fitting to the power terminal. (WIRING INSTALLATION - MAINTENANCE PRACTICES, SWPM 20-10-01)

EFFECTIVITY

WJE 410, 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-058

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WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-226 AND POST MD80-28-058; WJE 410, 411, 417, 419, 871, 872, 875-879 POST MD80-28-226 (Continued)

- (a) Replacement or repair of wiring or sleeving from the fuse to tank penetration point must have DMS 2109 or DMS 2379 Type 4 sleeving installed per (TERMINALS - MAINTENANCE PRACTICES, SWPM 20-20-01).

NOTE: The above step is a Critical Design Configuration Control Limitation (CDCCL) procedure. For important information on CDCCLs, refer to the Airworthiness Limitations Precautions (GENERAL, SUBJECT 28-00-00).

WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 PRE MD80-28-226 AND POST MD80-28-058; WJE 410, 411, 417, 419, 871, 872, 875-879 PRE MD80-28-226

- (21) Connect the power terminal to terminal strip and ground terminal to ground stud. (GENERAL INSTALLATIONS HARDWARE - MAINTENANCE PRACTICES, SWPM 20-20-03)

WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-226 AND POST MD80-28-058; WJE 410, 411, 417, 419, 871, 872, 875-879 POST MD80-28-226

- (22) Connect the power terminal to the in-line fuse and the ground terminal to the ground stud. (GENERAL INSTALLATIONS HARDWARE - MAINTENANCE PRACTICES, SWPM 20-20-03)

- (a) A replacement fuse must be the same type and rating of CTN fuse part number 65053-219, install with TERMINAL BLOCKS - MAINTENANCE PRACTICES, SWPM 20-20-02.

NOTE: The above step is a Critical Design Configuration Control Limitation (CDCCL) procedure. For important information on CDCCLs, refer to the Airworthiness Limitations Precautions (GENERAL, SUBJECT 28-00-00).

WJE 410, 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-058

CAUTION: BEFORE INSTALLING ACCESS DOOR, PERFORM FINAL CHECK TO MAKE CERTAIN THAT ALL TOOLS, RAGS, HARDWARE, ETC., HAVE BEEN REMOVED FROM TANK.

- (23) Install applicable fuel tank access door. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

- (24) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
------------	------------	---------------	-------------

WJE 410, 411, 417, 419, 871, 872, 875-879

M	37	B1-1007	ALT FUEL BURN
---	----	---------	---------------

WJE 410, 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-058

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
------------	------------	---------------	-------------

Z	38	B1-107	GROUND REFUEL
---	----	--------	---------------

EFFECTIVITY

WJE 410, 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-058
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OVERHEAD BATT DIR BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
------------	------------	---------------	-------------

WJE 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-058

B	16	B1-106	GROUND REFUELING
---	----	--------	------------------

WJE 410

B	17	B1-106	GROUND REFUELING
---	----	--------	------------------

WJE 410, 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-058

EFFECTIVITY

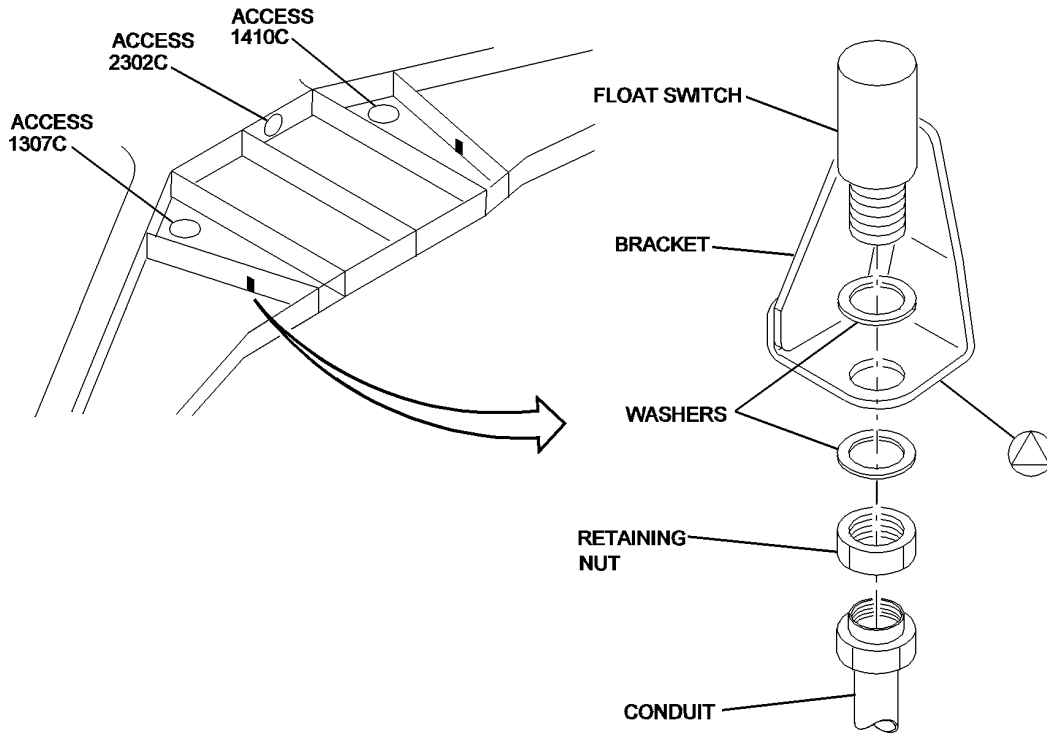
WJE 410, 411, 417, 419, 871, 872, 875-879; WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893 POST MD80-28-058

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 **ELECTRICAL
BOND NECESSARY**

BBB2-28-399
S0000331746V1

**Alternate Fuel Burn Float Switch -- Removal/Installation
Figure 201/28-21-01-990-801**

EFFECTIVITY

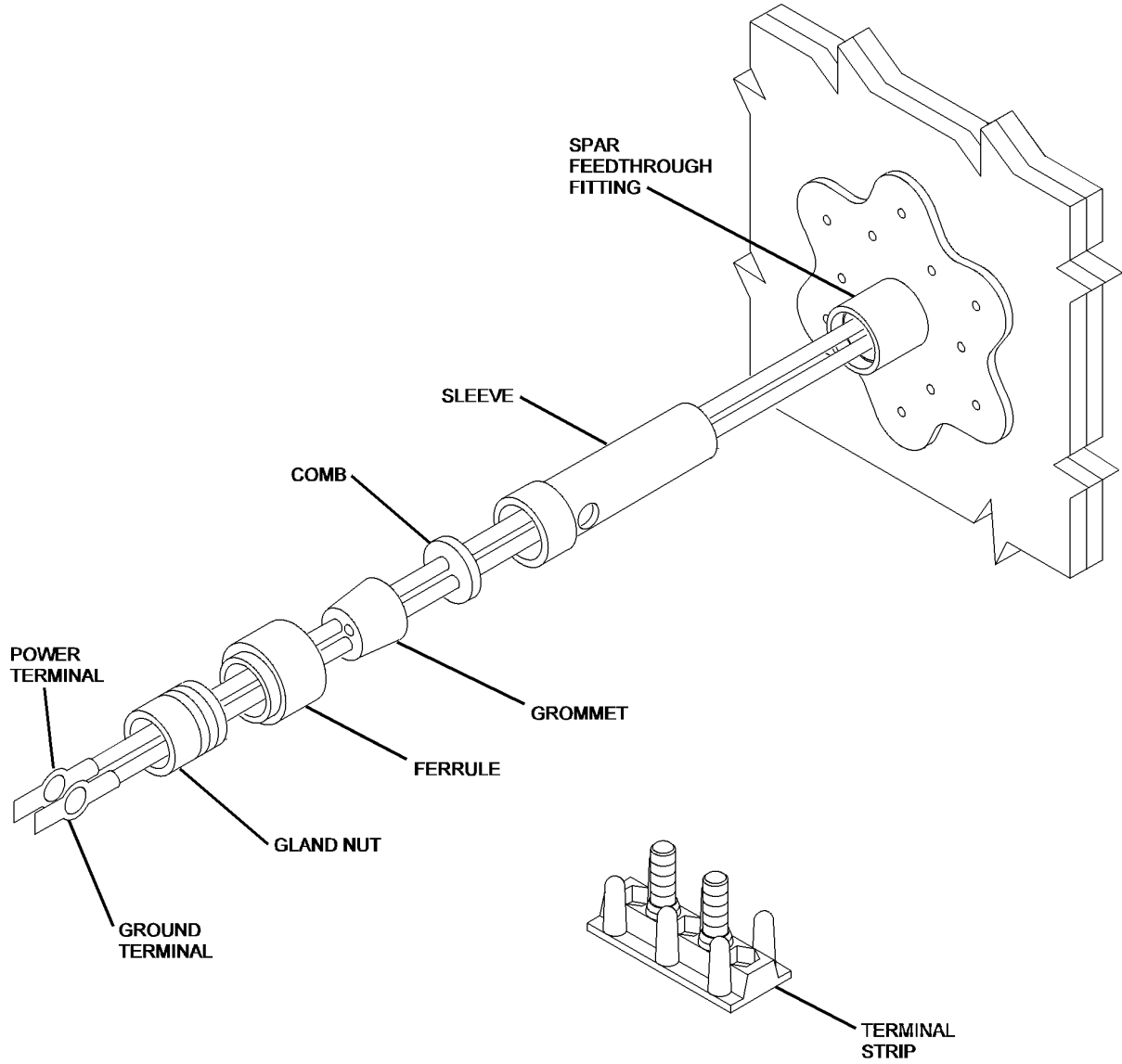
WJE 410, 411, 417, 419, 871, 872, 875-879; WJE
401-409, 412, 414-416, 418, 420-427, 429, 861-866,
868, 869, 873, 874, 880, 881, 883, 884, 886, 887,
891-893 POST MD80-28-058

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BBB2-28-398A
S0000331529V2

Alternate Fuel Fuel Burn Float Switch Electrical Feedthrough -- Removal/Installation
Figure 202/28-21-01-990-802 (Sheet 1 of 3)

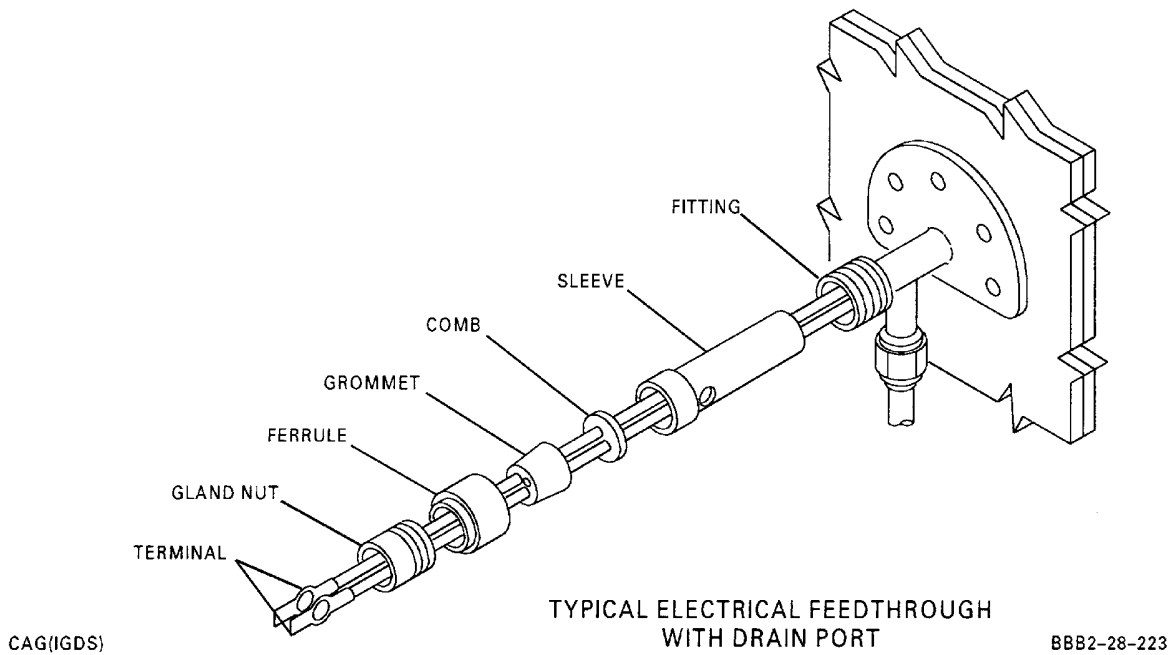
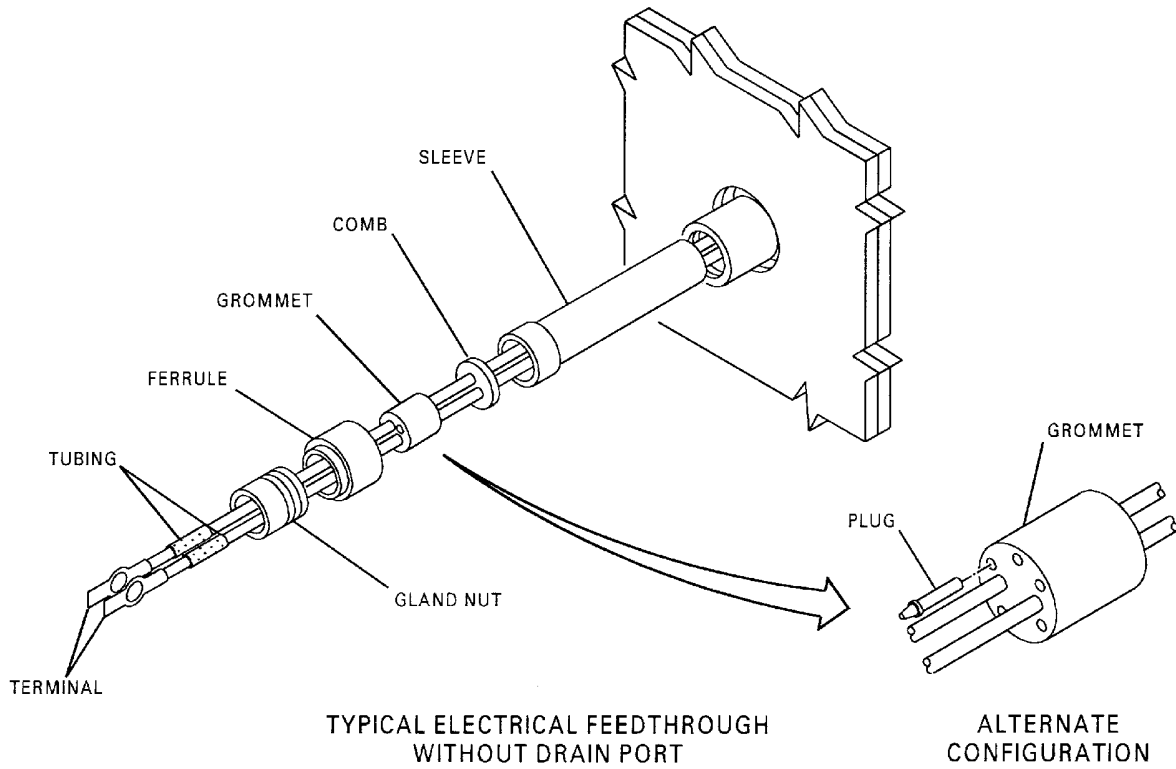
EFFECTIVITY
WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866,
868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893
PRE MD80-28-226 AND POST MD80-28-058; WJE 410,
411, 417, 419, 871, 872, 875-879 PRE MD80-28-226

TP-80MM-WJE

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**MD-80
AIRCRAFT MAINTENANCE MANUAL**



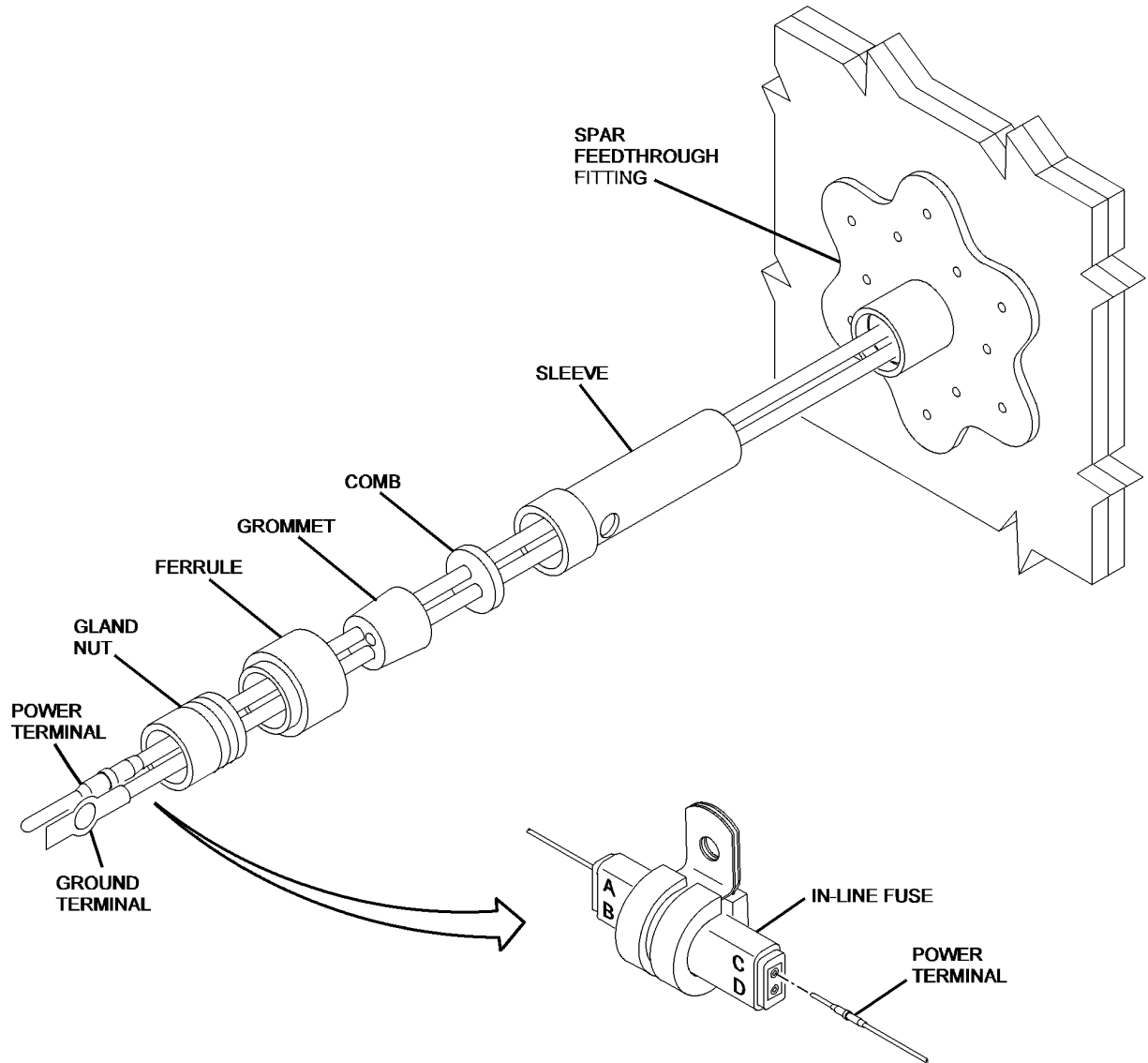
**Alternate Fuel Fuel Burn Float Switch Electrical Feedthrough -- Removal/Installation
Figure 202/28-21-01-990-802 (Sheet 2 of 3)**

EFFECTIVITY
WJE 410, 411, 417, 419, 871, 872, 875-879; WJE
401-409, 412, 414-416, 418, 420-427, 429, 861-866,
868, 869, 873, 874, 880, 881, 883, 884, 886, 887,
891-893 POST MD80-28-058

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BBB2-28-397A
S0000331455V2

Alternate Fuel Fuel Burn Float Switch Electrical Feedthrough -- Removal/Installation
Figure 202/28-21-01-990-802 (Sheet 3 of 3)

EFFECTIVITY

WJE 401-409, 412, 414-416, 418, 420-427, 429, 861-866, 868, 869, 873, 874, 880, 881, 883, 884, 886, 887, 891-893
POST MD80-28-226 AND POST MD80-28-058; WJE 410, 411, 417, 419, 871, 872, 875-879 POST MD80-28-226

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AIRCRAFT MAINTENANCE MANUAL
INDICATING - DESCRIPTION AND OPERATION

1. General

- A. The fuel quantity indication system (FQIS) is within 1.5 percent full indicator scale plus 3 percent of indicating quantity. For ground operations, the FQIS accuracy is within 0.5 percent of full indicator scale plus 1.5 percent of indicated quantity. The system does not require periodic calibration.
- B. The fuel quantity indicating system provides a means of visually monitoring fuel quantity from the flight compartment.

2. Description

- A. The fuel quantity indicating system is a standardized modular capacitance type system. The system has solid state circuitry and utilizes high frequency excitation signals for tank unit circuitry. The system consists of a Standardized Electronic Module (SEM), a Cockpit Display Unit (CDU), a Load Selector Display Unit (LSDU), fuel quantity probes, compensators, and fault isolation junction probes. Each fuel tank is gaged separately by means of capacitance probes located in the fuel tank. Each set of probes are connected to a fault isolation junction probe in the respective tank which in turn, is connected to the SEM mounted on the front spar section of the center wing tank. The SEM accepts signals from the tanks, conditions them, and delivers the signals, in the form of digital data containing fuel quantity information, to the flight compartment CDU and the right wing refueling panel mounted LSDU. The CDU and the LSDU digitally display this information in the form of fuel quantities for respective tanks. The CDU also displays total fuel quantity and airplane gross weight. The LSDU provides fuel load preselect capability. The indicating system normally operates on 115-volt, 400 cps, single-phase, ac power supplied through a circuit breaker on the right ac bus in the upper main circuit breaker panel in the flight compartment. If only battery power is available, 28-volt power is converted to 115-volt ac by an emergency inverter. There are eight fuel quantity probes in each main tank, and six in the center tank. Each tank has one compensator and one fault isolation junction. Magnetic drip-less fuel measuring sticks are mounted in the lower surface of each tank to permit manual gaging, on the ground, of the tanks. (Figure 1)
- B. Standardized Electronic Module (SEM) (Figure 1)
 - (1) The Standardized Electronic Module is a solid state signal processor which accepts signals from all of the fuel tanks, conditions them, and delivers a stream of digital data containing fuel quantity information to the CDU and LSDU. The SEM incorporates a dual power supply and dual digital microprocessor channels for redundancy. Failure of one channel will not adversely affect the redundant channel. The SEM's microprocessor provides automatic monitoring of all gage functions, and in case of failure, provides a malfunction display for the affected tank. The standby channel may then be selected to restore normal operation.
- C. Cockpit Display Unit (CDU) (Figure 1)

EFFECTIVITY

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 886, 887, 891, 893

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- (1) The Cockpit Display Unit provides a digital display of individual tank fuel quantities, total fuel quantity, and the airplane gross weight. The CDU is a solid state unit which is slaved to the SEM. The CDU receives, decodes, and displays the digital data sent by the SEM. A two position (push-in, spring-back) set knob placarded "ZFW" located on the lower right side of the CDU is provided to set zero fuel weight (ZFW) reading. The normal position of the knob is the spring-back position. To reset ZFW display, the knob is pushed in and rotated to desired reading. When the knob is pushed in the gross weight display automatically reads the zero fuel weight of the airplane. When the knob is released, it springs back to the normal position. The total fuel is added to ZFW and automatically displays the gross weight of the airplane. The CDU incorporates a channel selector and test switch placarded "TEST". The switch has two positions, A and B. The switch energizes or de-energizes the control coil of the external power switching relay to power the selected A or B channel. When the switch is depressed, the substitute capacitance circuitry of the SEM analog circuit is activated and the activated channel is checked. A three-position switch located above the gross weight selector permits checking of the compensator circuit and the system circuit separately. The switch is spring-loaded in the center or normal system operation position. Rotating the switch counterclockwise to the "S" position checks the airplane system less the tanks system. Rotating the switch clockwise to the "C" position checks the airplane system and the compensator system together. A spring-loaded switch on the left side of the CDU above the test switch checks the cockpit display. The switch is spring-loaded in the normal system operating position. Rotating the switch clockwise to the CD position checks the cockpit display circuitry of the selected channel (A or B). The incandescent digits in the CDU can be removed and replaced without removing the CDU from the instrument panel.
- D. Load Selector Display Unit (LSDU) (Figure 1)
- (1) The Load Selector Display Unit provides the fuel load preselect capability for partial fueling of the fuel tanks. The LSDU digitally displays individual tank quantities and preselected quantities. Selector knobs, one beneath each fuel select display, are used to select desired fuel loads. Load quantity is set by pulling out the respective selector knob, turning knob to desired quantity on display readout, then pushing knob in to normal position. This action also activates the fill valve. To avoid inadvertent opening of the fill valve, the above action must be initiated each time the fill valve is to be activated. A two position REFUEL control rotary switch, located on the right side of the LSDU, selects the AUTO or the AUTO OVERRIDE mode. In the AUTO position, the LSDU preselect circuit controls the partial fuel loads for the tanks and closes the fill valves at the preselected fuel level. In the AUTO OVERRIDE position, the tank fuel fill control float switches close the fill valves when the tanks are full. The LSDU incorporates a four-position function switch for built-in test equipment (BITE) purposes. The switch is spring-loaded in the NORMAL position. Rotating switch clockwise to the DISPLAY TEST position checks the display independently of the SEM. Rotating switch counterclockwise to the SYSTEM TEST position checks the system through the SEM channel. Rotating the switch further to the DIGIT TEST position checks all of the digital filaments. In the NORMAL position, the unit performs normally in response to SEM and preselect inputs.
- E. Fuel Quantity Tank Unit (Figure 2)
- (1) The fuel quantity tank units consist of two concentric metal tubes. Each unit is interchangeable with its counterpart on the opposite side of the aircraft. The tank units act as capacitors in the indicating system.
- F. Compensator (Figure 2)

EFFECTIVITY

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 886, 887, 891, 893

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- (1) The compensator compensates for variations in the fuel dielectric constant that can induce errors in the indicated fuel quantity of the tanks. There is one compensator in each tank. Each compensator consists of two concentric metal plates, which act as the components of a capacitor. When the compensator is submerged in fuel, it serves in the indicating circuit to nullify a change in the fuel dielectric constant.
- G. Fault Isolation Junction Probe (Figure 2)
- (1) The fault isolation junction probe consists of a flange-mounted probe with wire terminals. Wires from the fuel quantity tank units terminate at the junction unit. Trouble shooting of the tank units is accomplished by removing the junction unit from the tank and checking the tank unit capacitance at the wire terminations on the junction unit. There is one junction in each tank.
- H. Fuel Level Measuring Sticks
- (1) The fuel level (measuring) sticks are nonelectric, hand-operated indicators that are used to visually gage the amount of fuel in the tanks without risk of spillage. They are operated externally from beneath the wing. Each stick is contained in a flanged housing mounted inside the tank on the lower wing skin. The housing encloses the calibrated measuring stick. The measuring stick contains a magnet in the top portion. The barrel of the outer tube assembly is encircled by a doughnut-type float that contains a circular magnet inside the center opening. The float can move freely on the tube. The lower end of the fuel measuring stick is flush with the wing lower plating. The face of the stowage latch and locking cover are placarded to indicate the stowed (locked) and unlocked position. In the retracted position, the inner measuring stick is securely locked into the locking cover. The fuel measuring sticks are less accurate than the fuel quantity indicating system. The measuring sticks should be used only as an alternate means of measuring fuel quantity, or to check actual presence of fuel in the tank.
- I. Center Fuel Tank Pump Low Pressure Indication
(CENTER FUEL TANK PUMP LOW PRESSURE INDICATION - DESCRIPTION AND OPERATION, PAGEBLOCK 28-41-00/001)
- J. Low Fuel Level Indication (LOW FUEL LEVEL WARNING INDICATION - DESCRIPTION AND OPERATION, PAGEBLOCK 28-42-00/001)

EFFECTIVITY

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 886, 887, 891, 893

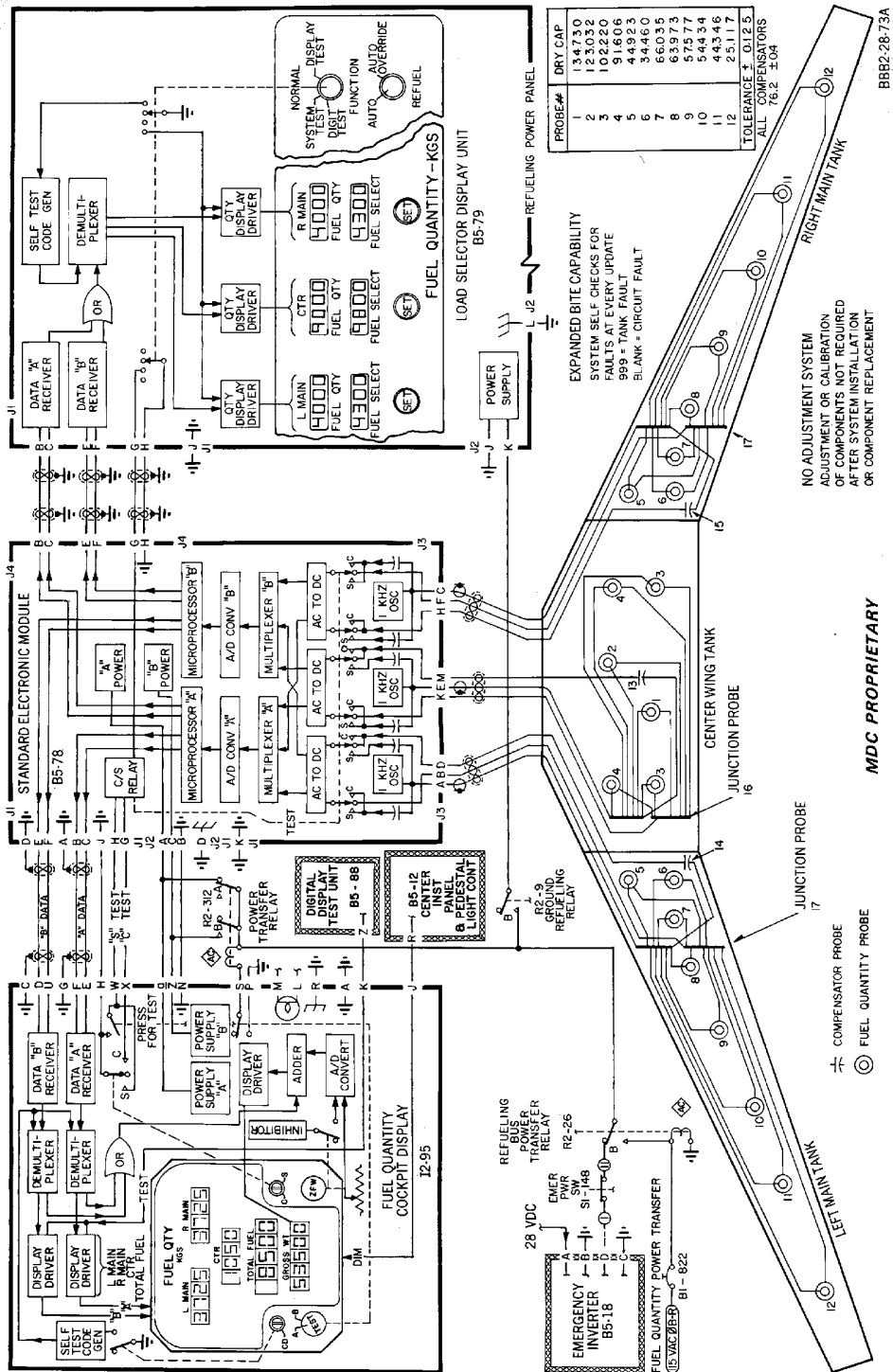
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Fuel Quantity Indicating System - Schematic
Figure 1/28-40-00-990-801 (Sheet 1 of 3)

EFFECTIVITY

WJE 406-408, 411, 415-427, 429, 866, 868, 869, 871, 872

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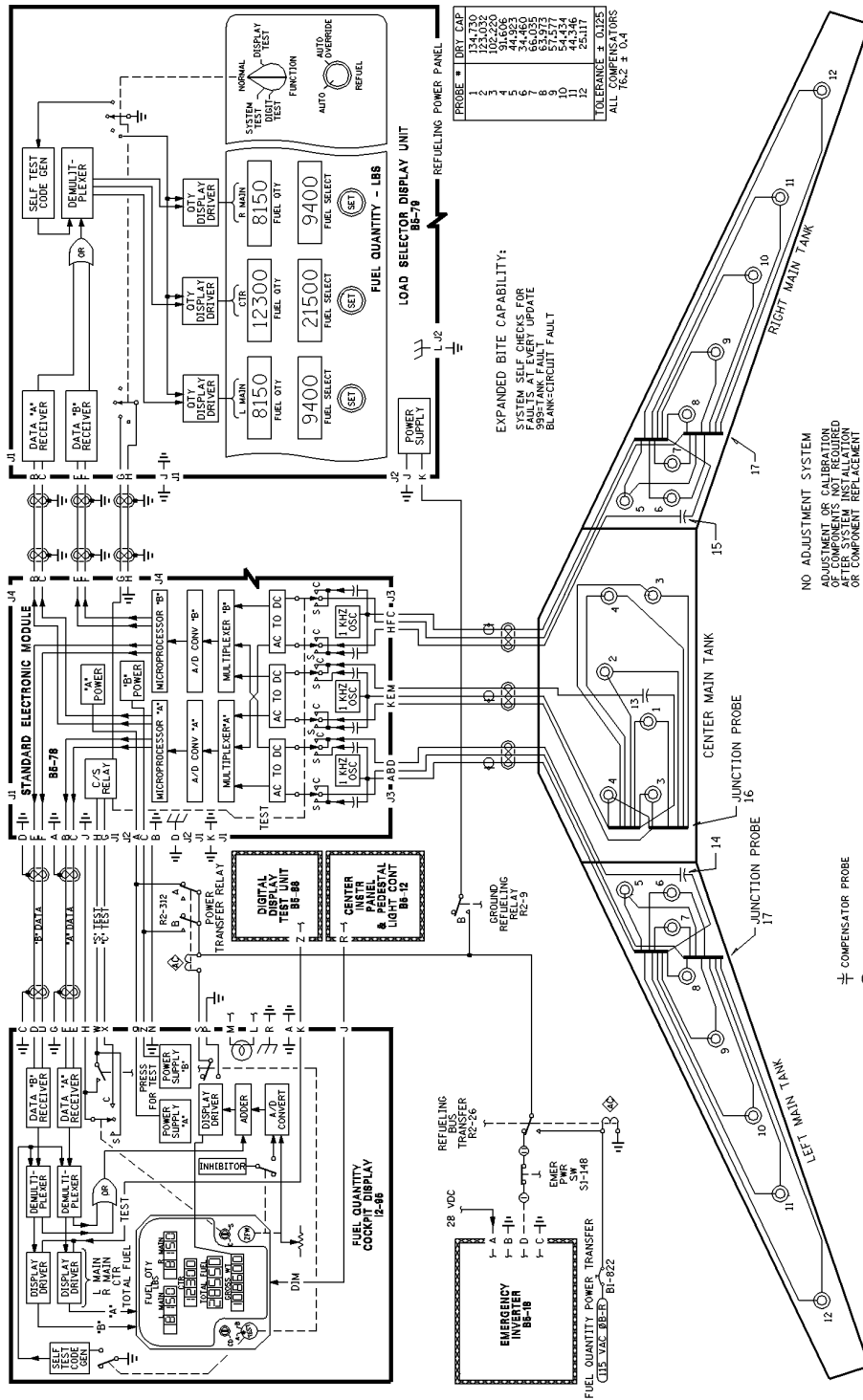
28-40-00

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BBB2-28-371
S0000146872V1

Fuel Quantity Indicating System - Schematic
Figure 1/28-40-00-990-801 (Sheet 2 of 3)

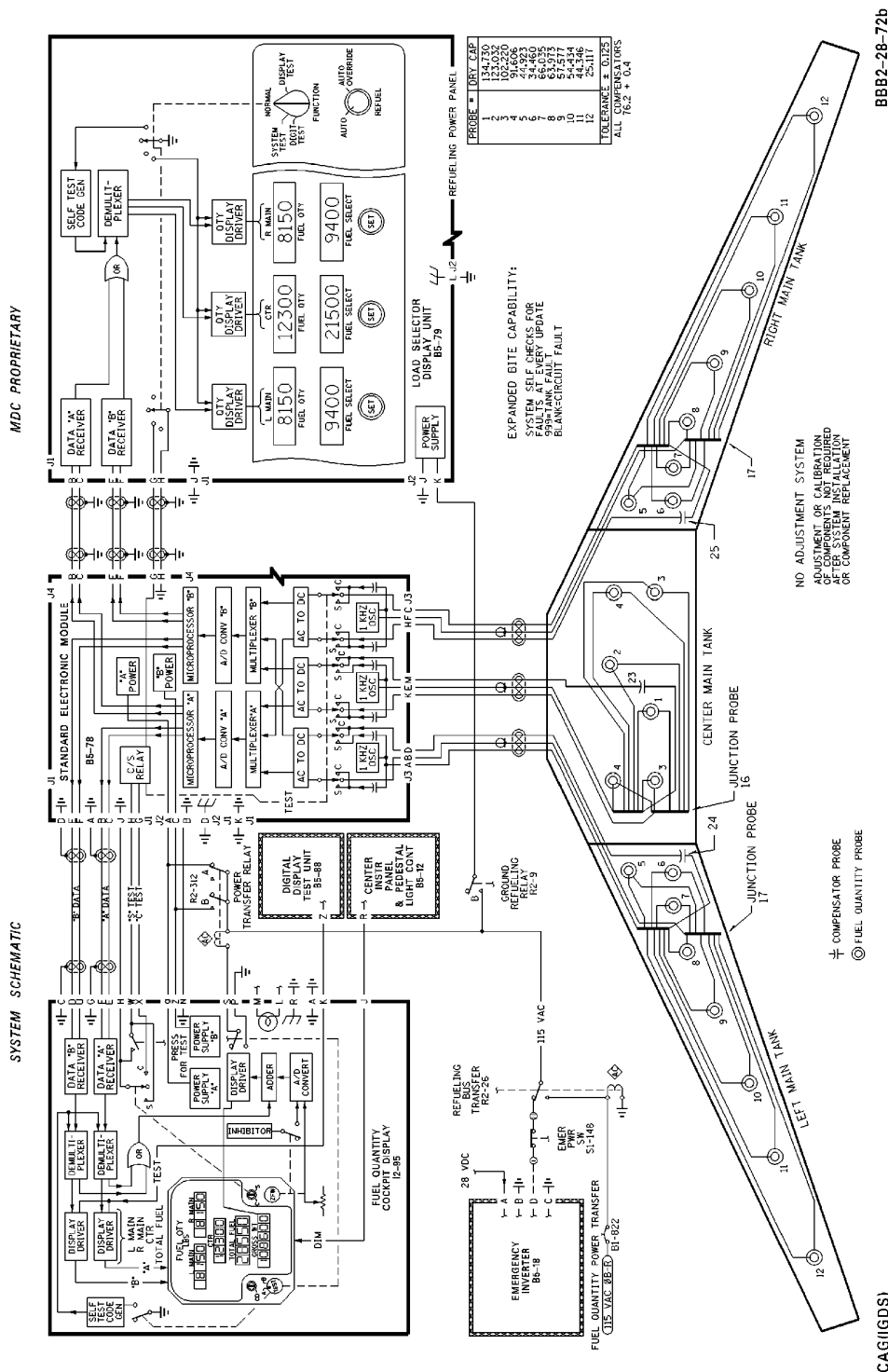
EFFECTIVITY
WJE 863-865, 891

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**Fuel Quantity Indicating System - Schematic
Figure 1/28-40-00-990-801 (Sheet 3 of 3)**

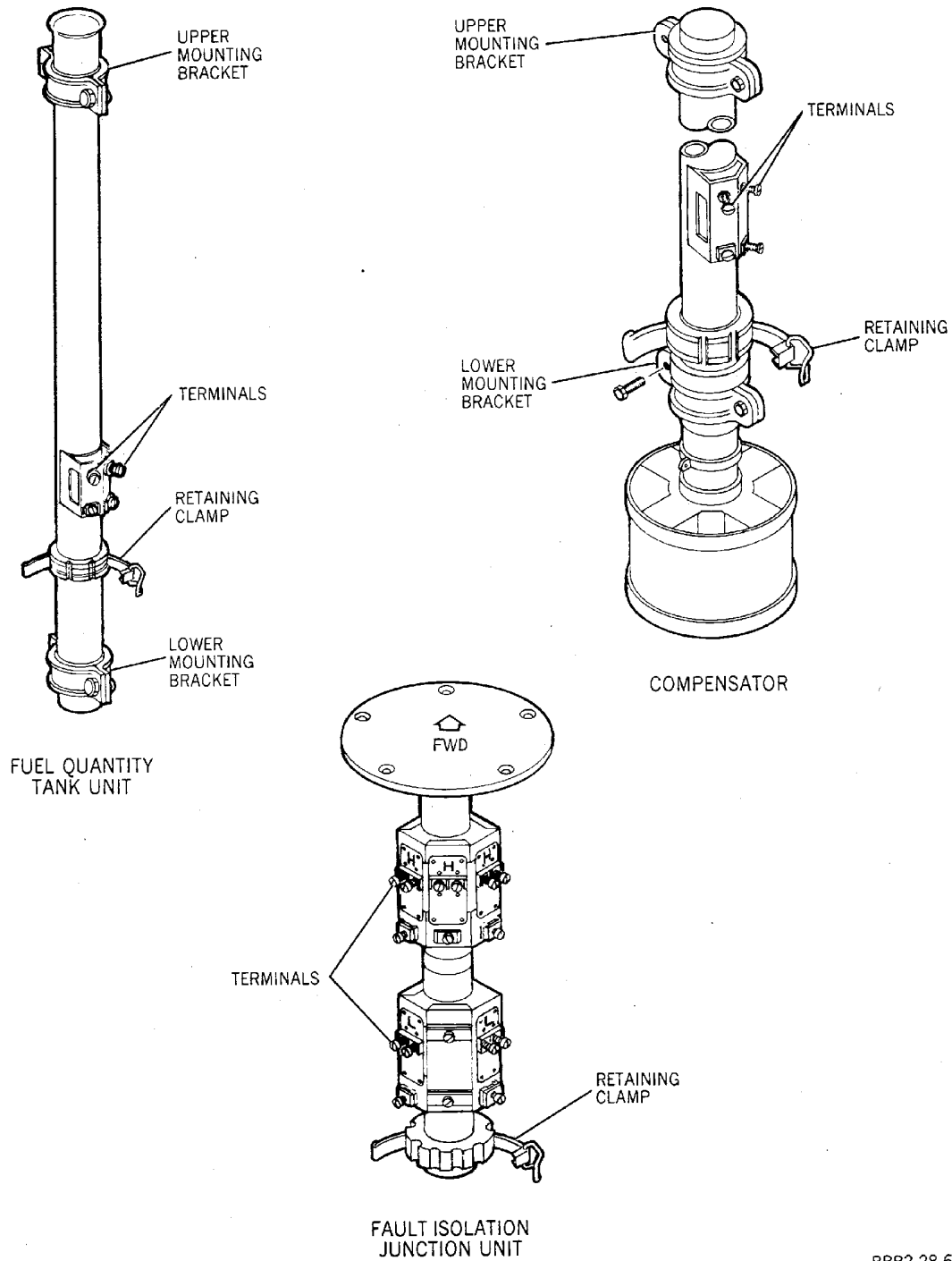
EFFECTIVITY
WJE 875, 886, 887, 893

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8882-28-63

Fuel Quantity Indicating System -- Components
Figure 2/28-40-00-990-802

EFFECTIVITY
WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 886, 887, 891, 893

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3. Operation

- A. The tank unit concentric metal tubes act as the plates of a capacitor. The units in each tank are connected in parallel. Therefore, the capacitance value of each probe is added to form the total output signal for each tank. The value of the unit capacitance is proportional to the height of the dielectric medium between the plates. Each unit measures the height of the fuel at that location, and the sum reflects the volume of fuel in the whole tank. The fuel dielectric and the fuel density have a specific relationship (known as the fuel index) that is used by the SEM circuit to convert the total fuel tank capacitance signal into a fuel weight indication. The tank circuit is the variable input to the SEM circuit. As the value of the tank unit signal varies with the depth of the fuel in the tank, the SEM circuit balances out the signal. A reference circuit is incorporated into the SEM circuit to eliminate the effect of the dielectric change of the fuel with temperature change. The variable portion of the reference circuit is the compensator in the tank. As the dielectric of the fuel changes, the tank unit signal changes, the compensator signal changes proportionally and balances out the change in the SEM circuit. Since the dielectric constant of the fuel varies directly and proportionally with the fuel temperature, the net effect is that the compensator corrects for the density changes of the fuel.
- B. Fuel quantity information from the tank units is supplied to the SEM. This information is totaled in a summing network and balanced within the SEM. As fuel is added or used, the signals to the SEM change and cause an unbalance in the network. The resultant signal is applied to the totalizer indicator until the null is reestablished. This information is processed, the circuit is rebalanced, and the resulting information is sent to the CDU and the LSDU as fuel quantity displays.
- C. The fuel measuring stick is released by depressing and turning the stowage latch center 90 degrees in either direction. Locking is accomplished in the same manner. When released from the locking cover, the measuring stick is lowered to the fuel level. At this point, the magnet attached to the upper end of the calibrated stick is within the magnetic field of the float and magnetically couples with the float. The downward travel of the fuel measuring stick is thereby stopped. The calibrations exposed on the measuring stick indicate the level of the fuel in the tank. The calibrated stick can be pulled inadvertently through the magnetic field of the float. If this is done, the calibrated stick should be pushed up until the magnetic field is reengaged.

EFFECTIVITY

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 886, 887, 891, 893

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AIRCRAFT MAINTENANCE MANUAL
INDICATING - DESCRIPTION AND OPERATION

1. General

- A. The fuel quantity indication system (FQIS) is within 1.5 percent full indicator scale plus 3 percent of indicating quantity. For ground operations, the FQIS accuracy is within 0.5 percent of full indicator scale plus 1.5 percent of indicated quantity. The system does not require periodic calibration.
- B. The fuel quantity indicating system provides a means of visually monitoring fuel quantity from the flight compartment.

2. Description

- A. The fuel quantity indicating system is a standardized modular capacitance type system. The system has solid state circuitry and utilizes high frequency excitation signals for tank unit circuitry. The system consists of a Standardized Electronic Module (SEM), a Cockpit Display Unit (CDU), a Load Selector Display Unit (LSDU), fuel quantity probes, compensators, and fault isolation junction probes. Each fuel tank is gaged separately by means of capacitance probes located in the fuel tank. Each set of probes are connected to a fault isolation junction probe in the respective tank which in turn, is connected to the SEM mounted on the front spar section of the center wing tank. The SEM accepts signals from the tanks, conditions them, and delivers the signals, in the form of digital data containing fuel quantity information, to the flight compartment CDU and the right wing refueling panel mounted LSDU. The CDU and the LSDU digitally display this information in the form of fuel quantities for respective tanks. The CDU also displays total fuel quantity and airplane gross weight. The LSDU provides fuel load preselect capability. The indicating system normally operates on 115-volt, 400 cps, single-phase, ac power supplied through a circuit breaker on the right ac bus in the upper main circuit breaker panel in the flight compartment. If only battery power is available, 28-volt power is converted to 115-volt ac by an emergency inverter. There are eight fuel quantity probes in each main tank, six in the center tank and two each in the fuselage tanks. Each tank has one compensator and one fault isolation junction. Magnetic dripless fuel measuring sticks are mounted in the lower surface of each integral tank to permit manual gaging, on the ground, of the tanks. (Figure 1)
- B. Standardized Electronic Module (SEM) (Figure 1)
 - (1) The Standardized Electronic Module is a solid state signal processor which accepts signals from all of the fuel tanks, conditions them, and delivers a stream of digital data containing fuel quantity information to the CDU and LSDU. The SEM incorporates a dual power supply and dual digital microprocessor channels for redundancy. Failure of one channel will not adversely affect the redundant channel. The SEM's microprocessor provides automatic monitoring of all gage functions, and in case of failure, provides a malfunction display for the affected tank. The standby channel may then be selected to restore normal operation.
- C. Cockpit Display Unit (CDU) (Figure 1)

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
877-881, 883, 884, 892

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- (1) The Cockpit Display Unit provides a digital display of individual tank fuel quantities, total fuel quantity, and the airplane gross weight. The CDU is a solid state unit which is slaved to the SEM. The CDU receives, decodes, and displays the digital data sent by the SEM. A two position (push-in, spring-back) set knob placarded "ZFW" located on the lower right side of the CDU is provided to set zero fuel weight (ZFW) reading. The normal position of the knob is the spring-back position. To reset ZFW display, the knob is pushed in and rotated to desired reading. When the knob is pushed in the gross weight display automatically reads the zero fuel weight of the airplane. When the knob is released, it springs back to the normal position. The total fuel is added to ZFW and automatically displays the gross weight of the airplane. The CDU incorporates a channel selector and test switch placarded "TEST". The switch has two positions, A and B. The switch energizes or de-energizes the control coil of the external power switching relay to power the selected A or B channel. When the switch is depressed, the substitute capacitance circuitry of the SEM analog circuit is activated and the activated channel is checked. A three-position switch located above the gross weight selector permits checking of the compensator circuit and the system circuit separately. The switch is spring-loaded in the center or normal system operation position. Rotating the switch counterclockwise to the "S" position checks the airplane system less the tanks system. Rotating the switch clockwise to the "C" position checks the airplane system and the compensator system together. A spring-loaded switch on the left side of the CDU above the test switch checks the cockpit display. The switch is spring-loaded in the normal system operating position. Rotating the switch clockwise to the CD position checks the cockpit display circuitry of the selected channel (A or B). The incandescent digits in the CDU can be removed and replaced without removing the CDU from the instrument panel.
- D. Load Selector Display Unit (LSDU) (Figure 1)
- (1) Description
The Load Selector Display Unit provides the fuel load preselect capability for partial fueling of the fuel tanks. The LSDU digitally displays individual tank quantities and preselected quantities. Selector knobs, one beneath each fuel select display, are used to select desired fuel loads. Load quantity is set by pulling out the respective selector knob, turning knob to desired quantity on display readout, then pushing knob in to normal position. This action also activates the fill valve. To avoid inadvertent opening of the fill valve, the above action must be initiated each time the fill valve is to be activated. A two position REFUEL control rotary switch, located on the right side of the LSDU, selects the AUTO or the AUTO OVERRIDE mode. In the AUTO position, the LSDU preselect circuit controls the partial fuel loads for the tanks and closes the fill valves at the preselected fuel level. In the AUTO OVERRIDE position, the tank fuel fill control float switches close the fill valves when the tanks are full. The LSDU incorporates a four-position function switch for built-in test equipment (BITE) purposes. The switch is spring-loaded in the NORMAL position. Rotating switch clockwise to the DISPLAY TEST position checks the display independently of the SEM. Rotating switch counterclockwise to the SYSTEM TEST position checks the system through the SEM channel. Rotating the switch further to the DIGIT TEST position checks all of the digital filaments. In the NORMAL position, the unit performs normally in response to SEM and preselect inputs.
- E. Fuel Quantity Tank Unit (Figure 2)
- (1) The fuel quantity tank units consist of two concentric metal tubes. Each unit is interchangeable with its counterpart on the opposite side of the aircraft. The tank units act as capacitors in the indicating system.
- F. Compensator (Figure 2)

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- (1) The compensator compensates for variations in the fuel dielectric constant that can induce errors in the indicated fuel quantity of the tanks. There is one compensator in each tank. Each compensator consists of two concentric metal plates, which act as the components of a capacitor. When the compensator is submerged in fuel, it serves in the indicating circuit to nullify a change in the fuel dielectric constant.
- G. Fault Isolation Junction Probe (Figure 2)
- (1) The fault isolation junction probe consists of a flange-mounted probe with wire terminals. Wires from the fuel quantity tank units terminate at the junction unit. Trouble shooting of the tank units is accomplished by removing the junction unit from the tank and checking the tank unit capacitance at the wire terminations on the junction unit. There is one junction in each tank.
- H. Fuel Level Measuring Sticks
- (1) The fuel level (measuring) sticks are nonelectric, hand-operated indicators that are used to visually gage the amount of fuel in the tanks without risk of spillage. They are operated externally from beneath the wing. Each stick is contained in a flanged housing mounted inside the tank on the lower wing skin. The housing encloses the calibrated measuring stick. The measuring stick contains a magnet in the top portion. The barrel of the outer tube assembly is encircled by a doughnut-type float that contains a circular magnet inside the center opening. The float can move freely on the tube. The lower end of the fuel measuring stick is flush with the wing lower plating. The face of the stowage latch and locking cover are placarded to indicate the stowed (locked) and unlocked position. In the retracted position, the inner measuring stick is securely locked into the locking cover. The fuel measuring sticks are less accurate than the fuel quantity indicating system. The measuring sticks should be used only as an alternate means of measuring fuel quantity, or to verify actual presence of fuel in the tank. The fuselage fuel tanks are not provided with fuel level measuring sticks.
- I. Center Fuel Tank Pump Low Pressure Indication
(CENTER FUEL TANK PUMP LOW PRESSURE INDICATION - DESCRIPTION AND OPERATION, PAGEBLOCK 28-41-00/001)
- J. Low Fuel Level Indication
(LOW FUEL LEVEL WARNING INDICATION - DESCRIPTION AND OPERATION, PAGEBLOCK 28-42-00/001)

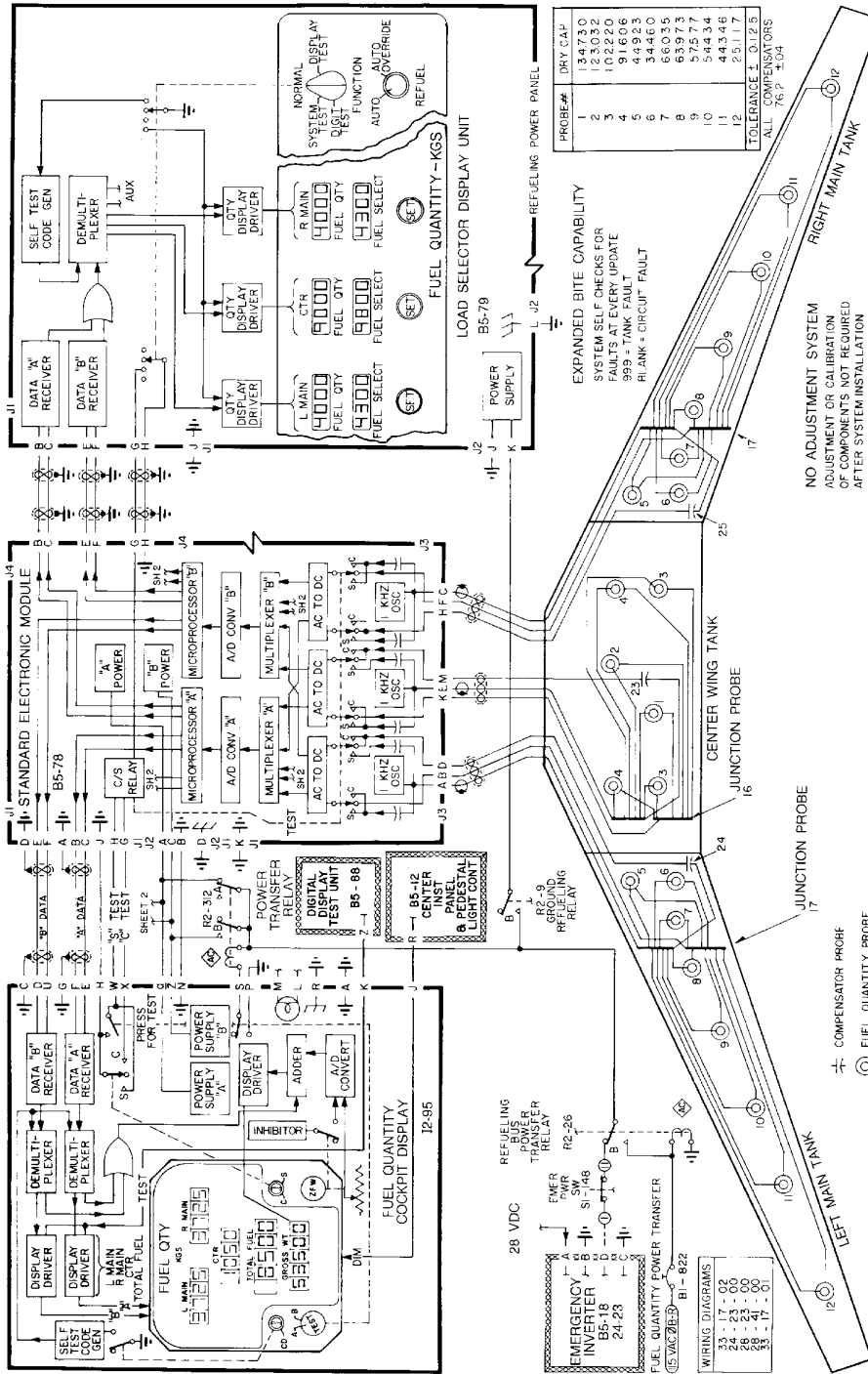
EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
877-881, 883, 884, 892

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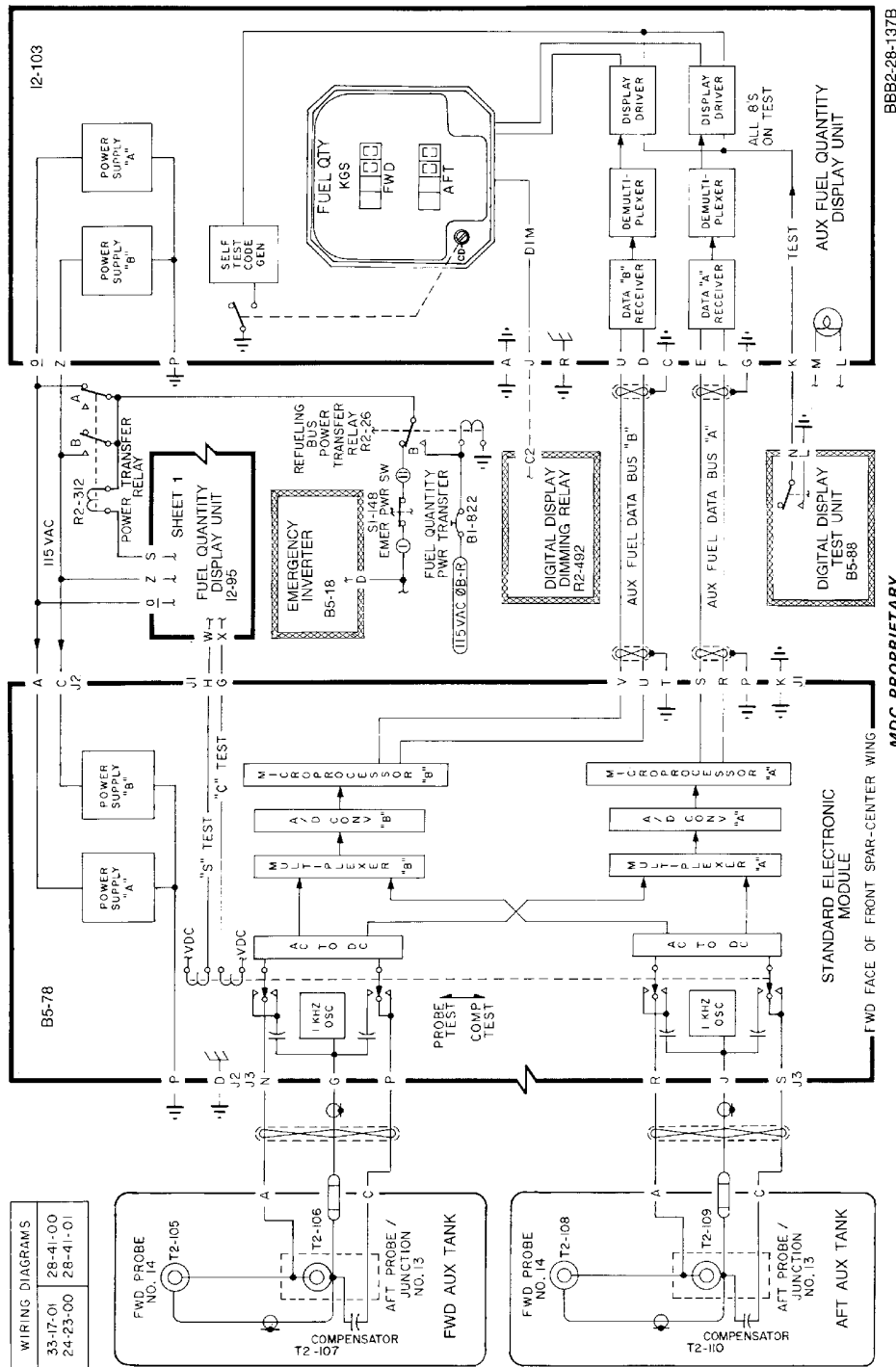
MDC PROPRIETARY

Fuel Quantity Indicating System - Schematic
Figure 1/28-40-00-990-803 (Sheet 1 of 5)

EFFECTIVITY
WJE 405, 409, 410, 861, 862, 880, 881, 883, 884

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Fuel Quantity Indicating System - Schematic
Figure 1/28-40-00-990-803 (Sheet 2 of 5)

EFFECTIVITY
WJE 405, 409, 410, 880, 881, 883, 884

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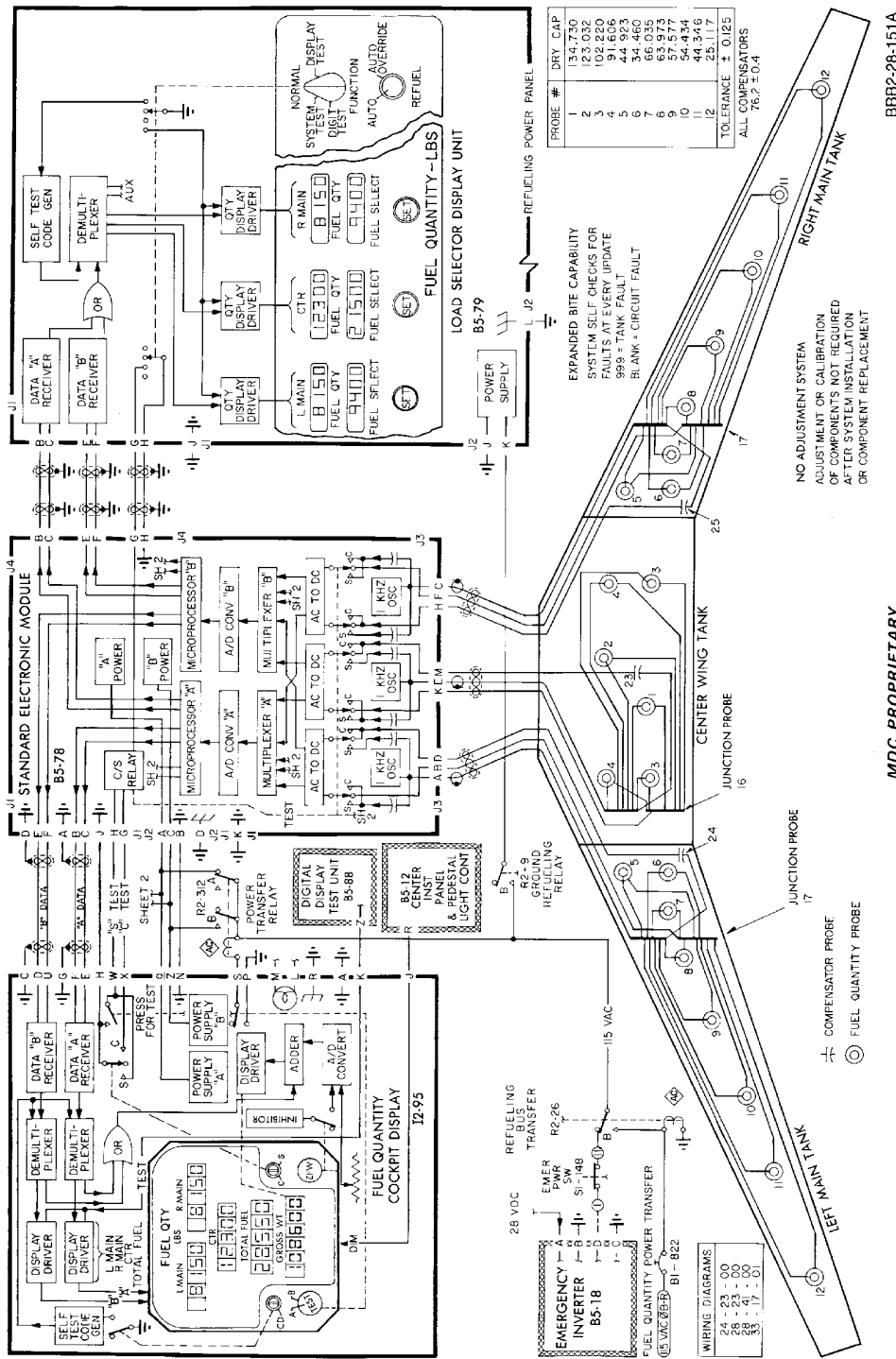
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Fuel Quantity Indicating System - Schematic
Figure 1/28-40-00-990-803 (Sheet 3 of 5)

EFFECTIVITY
WJE 401-404, 412, 414, 874, 877-879, 892

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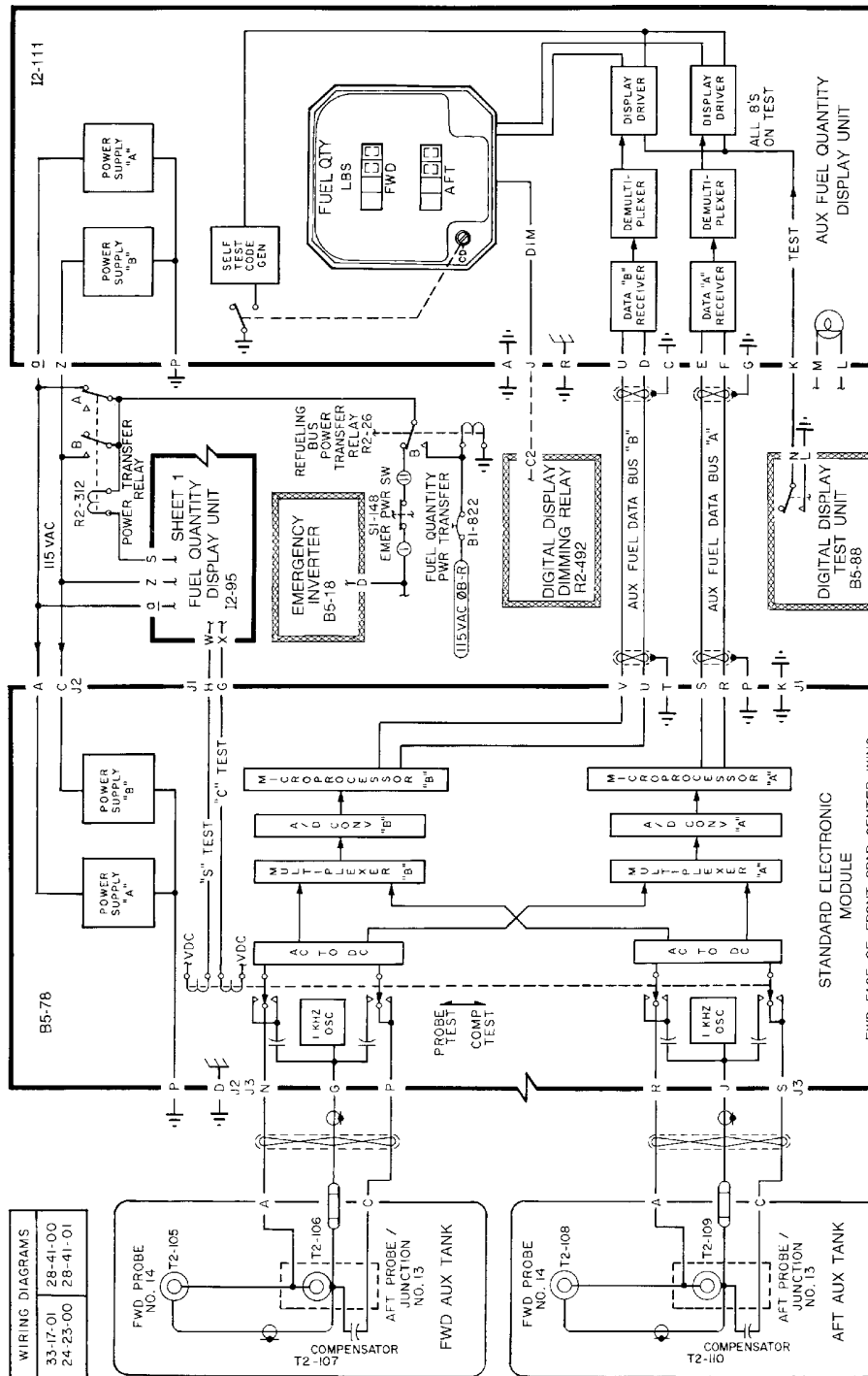
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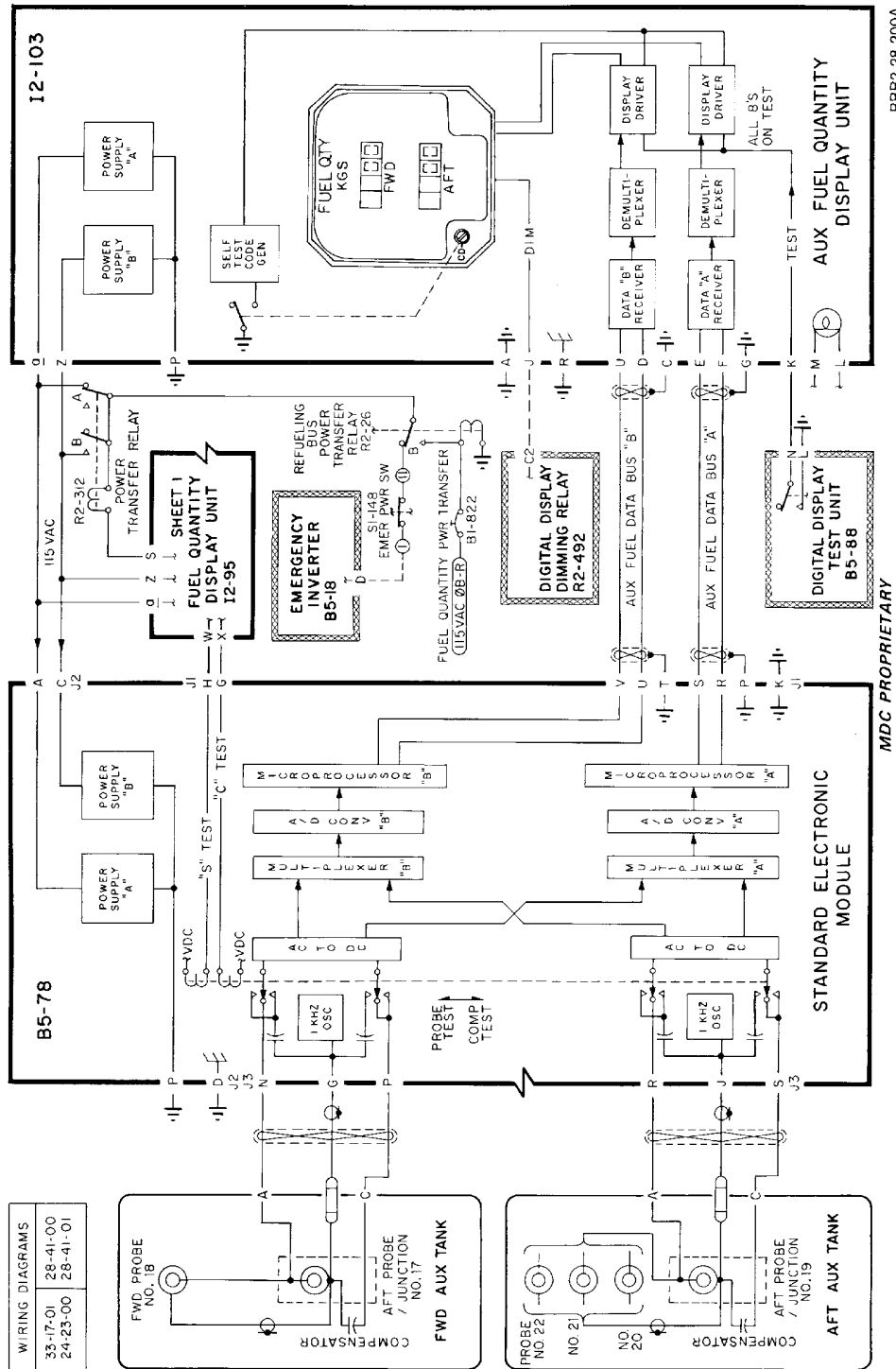
Fuel Quantity Indicating System - Schematic
Figure 1/28-40-00-990-803 (Sheet 4 of 5)

EFFECTIVITY
WJE 401-404, 412, 414, 874, 877-879, 892

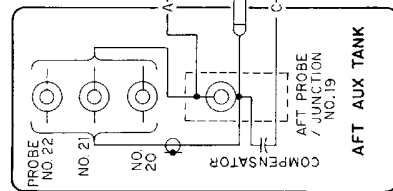
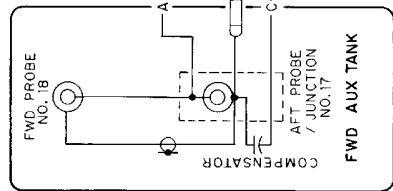
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WIRING DIAGRAMS	
33-17-01	28-41-00
24-23-00	28-41-01



Fuel Quantity Indicating System - Schematic
Figure 1/28-40-00-990-803 (Sheet 5 of 5)

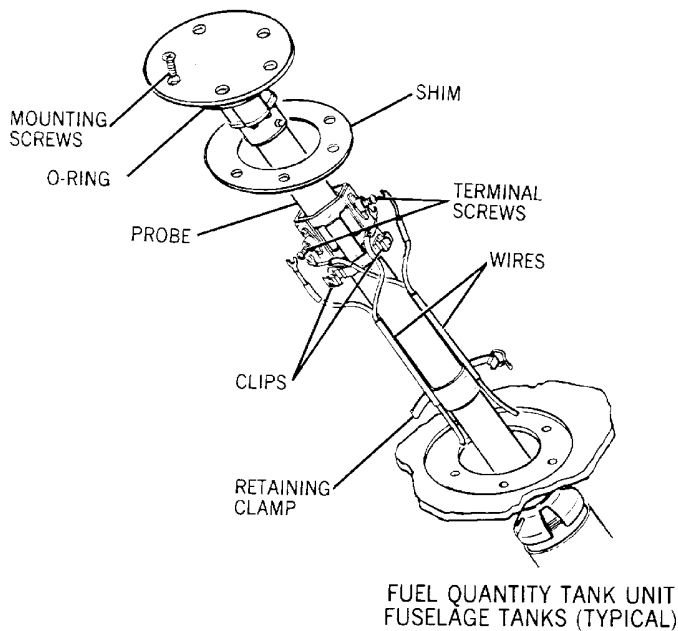
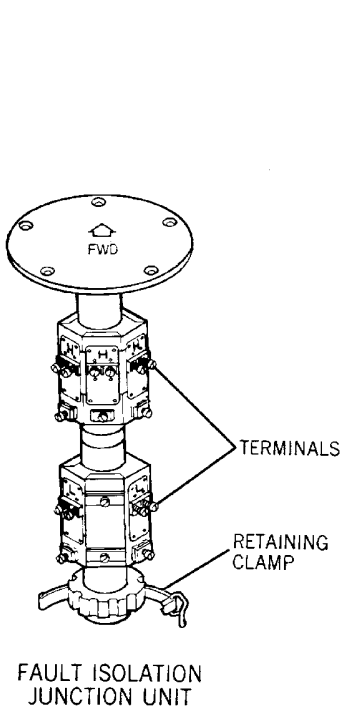
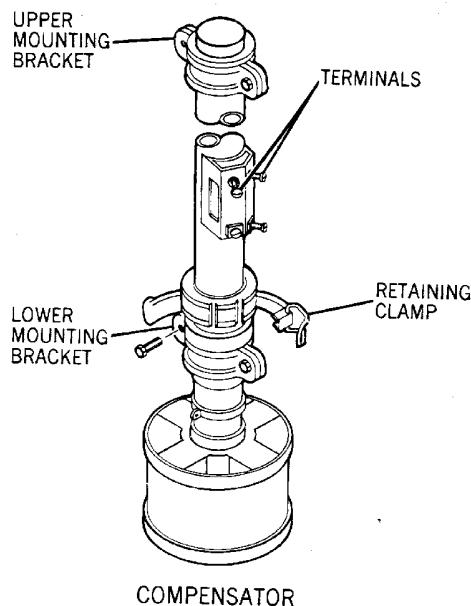
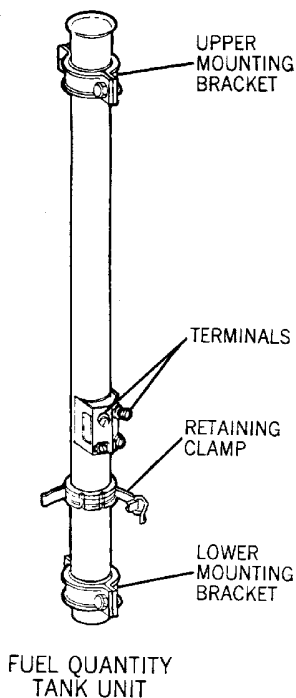
EFFECTIVITY
WJE 861, 862

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**Fuel Quantity Indicating System -- Components
Figure 2/28-40-00-990-804**

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
877-881, 883, 884, 892

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3. Operation

- A. The tank unit concentric metal tubes act as the plates of a capacitor. The units in each tank are connected in parallel. Therefore, the capacitance value of each probe is added to form the total output signal for each tank. The value of the unit capacitance is proportional to the height of the dielectric medium between the plates. Each unit measures the height of the fuel at that location, and the sum reflects the volume of fuel in the whole tank. The fuel dielectric and the fuel density have a specific relationship (known as the fuel index) that is used by the SEM circuit to convert the total fuel tank capacitance signal into a fuel weight indication. The tank circuit is the variable input to the SEM circuit. As the value of the tank unit signal varies with the depth of the fuel in the tank, the SEM circuit balances out the signal. A reference circuit is incorporated into the SEM circuit to eliminate the effect of the dielectric change of the fuel with temperature change. The variable portion of the reference circuit is the compensator in the tank. As the dielectric of the fuel changes, the tank unit signal changes, the compensator signal changes proportionally and balances out the change in the SEM circuit. Since the dielectric constant of the fuel varies directly and proportionally with the fuel temperature, the net effect is that the compensator corrects for the density changes of the fuel.
- B. Fuel quantity information from the tank units is supplied to the SEM. This information is totaled in a summing network and balanced within the SEM. As fuel is added or used, the signals to the SEM change and cause an unbalance in the network. The resultant signal is applied to the totalizer indicator until the null is reestablished. This information is processed, the circuit is rebalanced, and the resulting information is sent to the CDU and the LSDU as fuel quantity displays.
- C. The fuel measuring stick is released by depressing and turning the stowage latch center 90 degrees in either direction. Locking is accomplished in the same manner. When released from the locking cover, the measuring stick is lowered to the fuel level. At this point, the magnet attached to the upper end of the calibrated stick is within the magnetic field of the float and magnetically couples with the float. The downward travel of the fuel measuring stick is thereby stopped. The calibrations exposed on the measuring stick indicate the level of the fuel in the tank. The calibrated stick can be pulled inadvertently through the magnetic field of the float. If this is done, the calibrated stick should be pushed up until the magnetic field is reengaged.

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 874,
877-881, 883, 884, 892

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INDICATING - TROUBLE SHOOTING

1. General

- A. This section provides detailed procedures for trouble shooting the fuel quantity indicating systems and components.
- B. If insulation resistance and capacitance checks of the applicable circuit were made during trouble shooting or other maintenance and it is certain that the circuit readings still fall within the tolerances specified, it will not be necessary to repeat the checks.
- C. CDU/LSDU displays will not necessarily agree with magnetic driplless fuel measuring stick readings.
- D. Stray capacitance introduced by test equipment, cables, or switching devices should not exceed ± 0.1 pf. When reading capacitance values, be sure to account for test equipment tolerances as shown on correction cards supplied with the tester.
- E. Insulation resistance of test equipment circuits should not be less than 2,000 megohms.
- F. After fuel indicators register zero in cruise mode, a nose down attitude may allow these indicators to register up to 200 lbs (or 100 kg) of fuel in flight, descent, or on the ground.
- G. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201.

2. Equipment and Materials

NOTE: Equivalent replacements are permitted for the items that follow:

Table 101

Name and Number	Manufacturer
Harness 083-039-001	Gull Airborne Instruments Inc.
Harness 083-039-002	Gull Airborne Instruments Inc.
Harness 083-039-003	Gull Airborne Instruments Inc.
Fuel Quantity Tester GTF-2	Gull Airborne Instruments, Inc.
Adapter Harness (Tester to probe)	Local manufacture
Fuel Quantity Tester PSD 60-2R	J C Air, Inc.
Adapter Harness PSD 60-510/511	J C Air, Inc.

3. Trouble Shooting Indicating

- A. Fuel Quantity System Cockpit Fault Isolation Tests
 - (1) The fault isolation tests in Table 102 are provided for primary evaluation of the fuel quantity indicating system from the cockpit, subject to the following definitions:
 - (a) Dry tank means that the compensators are above and clear of fuel.
 - (b) Wet tank means that lower capacitor section of compensators are covered with fuel (FUEL QTY indicators read no less than 700 LBS (or 350 KGS) for the left and right tanks, and 1400 LBS (or 700 KGS) for the center tank).
 - (2) Tests should be performed in the sequence given in Table 102.

EFFECTIVITY WJE ALL	
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Table 102 Fuel Quantity System Cockpit Fault Isolation Tests

ACTION	DIGITAL READOUT	IN TOLERANCE TEST RESULTS	OUT OF TOLERANCE TEST RESULTS (PROVIDE READING)
Press ANN/DIGITAL LTS TEST button (tests incandescent lamps only)	All digits display "8"s	Lamps are OK.	Some "8"s missing; replace lamps. No display; check R2-312
Turn AB switch to both positions (channels) to determine if problem affects both channels. Note if readings are duplicated.			Give readings. A _____ B _____
System test: Depress A/B switch in affected channel (this test is same as "S" position of C/S switch)	(LBS) Each tank displays 3000(±100). TOTAL FUEL display equals sum (+0,-50) of all tank displays. or (KGS) Each tank displays 1500(±50). TOTAL FUEL display equals sum (+0,-25) of all tank displays.	CDU, SEM are OK. Fault is in tank measuring circuit	Reading: _____
Turn CD switch to CD position (this isolates CDU)	(LBS) Each tank displays 3000(±100). TOTAL FUEL display equals sum (+0,-50) of all tank displays. or (KGS) Each tank displays 1500(±50). TOTAL FUEL display equals sum (+0,-25) of all tank displays.	CDU is OK. Fault is else- where.	Reading: _____ Fault is in CDU
Wet tank: Turn C/S switch to "C" position (compensator is in system)	(LBS) Each tank displays 3000(±100). TOTAL FUEL display equals sum (+0,-50) of all tank displays. or (KGS) Each tank displays 1500(±50). TOTAL FUEL display equals sum (+0,-25) of all tank displays.	SEM, CDU, and compensator circuits are OK. Fault is in tank measuring circuit.	Reading: _____ Fault is in compensator circuit.
Dry tank: Turn C/S switch to "C" position (compensator is in system)	(LBS) Each tank displays 4050(±100). TOTAL FUEL display equals sum (+0,-50) of all tank displays. or (KGS) Each tank displays 2000(±50). TOTAL FUEL display equals sum (+0,-25) of all tank displays.	SEM, CDU, and compensator circuits are OK. Fault is in tank measuring circuit.	Reading: _____ Fault is in compensator circuit.

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B. Fault Isolation With BITE

NOTE: The fault isolation actions, displays, etc., listed in Table 103 are used in the fault isolation trees in Figure 101 and Figure 102. They are in abbreviated form to simplify use.

- (1) Isolate system faults for CDU per Figure 101 and using aircraft power.
- (2) (2) Isolate system faults for LSDU per Figure 102 with wing refueling panel power switch in ON position.

Table 103 Fault Isolation With BITE - Abbreviation Key

Abbreviation	Explanation/Action
CDU	Cockpit Display Unit
LSDU	Load Selector Display Unit (on wing refueling panel)
S	Using small screwdriver, turn C/S switch, located on lower right corner of Cockpit Display Unit (CDU) counterclockwise to S position.
C	Turn C/S switch clockwise to C position.
CD	Using small screwdriver, turn CD switch, located on lower left corner of CDU, clockwise to CD position.
8,s	All active digital displays show 8,s.
9,s	All active digital displays show 9,s.
(1500)	Applicable digital display reads 1500(±50) (KGS).
(2000)	Applicable digital display reads 2000(±50) (KGS)
3000	Applicable digital display reads 3000(±100) (LBS).
4050	Applicable digital display reads 4050(±100) (LBS).
Alt chan	Place TEST control knob located below CD switch to channel not being used (If A is being used, switch to B. If B is being used, switch to A).
Blank	Applicable digital display does not come on.
Nor dis	Displays applicable tank quantity.
Dry	Dry tank means that the compensators are above and clear of fuel.
Wet	Wet tank means that lower capacitor section of compensators are covered with fuel (FUEL QTY indicators read no less than 700 LBS (or 350 KGS) for the left and right tanks, and 1400 LBS (or 700 KGS) for the center tank.
AUTO	Position REFUEL switch on right end of LSDU to AUTO.
SYSTEM TEST	Position FUNCTION switch on right end of LSDU to SYSTEM TEST.
DISPLAY TEST	Position FUNCTION switch on right end of LSDU to DISPLAY TEST.
DIGIT TEST	Position FUNCTION switch on right end of LSDU to DIGIT TEST.

C. Check Insulation Resistance and Capacitance

NOTE: To check for and obtain the same readings as referenced in Figure 103 and Table 104, the tanks must be defueled and drained (PAGEBLOCK 28-00-00/201).

NOTE: Procedures for testing all tanks are identical except where noted.

- (1) Open FUEL QUANTITY POWER TRANSFER circuit breaker.
- (2) Disconnect system wire harness (connector J3) at Standard Electronic Module (SEM).

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WARNING: FUEL QUANTITY TEST SET ELECTRICAL POWER PLUG HAVING STRAIGHT BLADE TYPE CONTACTS MUST BE SECURED WHEN ANY FUEL TANK IS OPEN TO PREVENT HAZARDOUS ARCING IF PLUG IS INADVERTENTLY DISCONNECTED WITH FUEL VAPOR PRESENT.

- (3) Connect tester to system harness at SEM end, using test harness 083-039-001 (Figure 103, item (a)). Ground tester to aircraft.
- (4) With tester selector switch(es) in position indicated, check for insulation and capacitance readings as shown in Table 104.
- (5) If readings are as shown in Table 104, no further insulation resistance and capacitance testing is required; if not, proceed to Paragraph 3.C.(6).
- (6) Connect tester directly to spar feedthrough connectors, bypassing aircraft wire harness, using test harness 083-039-003 (Figure 103, Item (b)) and repeat Paragraph 3.C.(4). If readings are as indicated in Table 104, then aircraft harness, from standard electronic module (SEM) to spar feedthrough, is suspect of being faulty, proceed to Paragraph 3.C.(7) for further verification. If readings are not as indicated, proceed to Paragraph 3.C.(8).
- (7) Disconnect aircraft wire harness at spar feedthrough. Connect tester to (SEM) end of wire harness, using test harness 083-039-001 (Figure 103, Item (c)). Perform only the resistance function tests in Table 104. If readings are incorrect, replace aircraft wire harness and repeat Paragraph 3.C.(4).
- (8) Remove tank fault isolation junction probe (PAGEBLOCK 28-00-00/201).

Table 104 Tester Functions and Displays

SELECTOR SWITCH SETTINGS	POSITION	RESPONSE/INDICATION
POWER switch	On	POWER light comes on
DISPLAY TEST	DEPRESSED	Display: 8.8.8.8.8.8.
DISPLAY SELECT	RES (MEG)	—
RESISTANCE RANGE (MEG)	1K-10K	—
WJE 405, 409, 410, 861, 862, 873, 874, 877-881, 883, 884, 892		
RESISTANCE FUNCTION	A-B	Display: 2000
	A-C	Display: 2000
WJE 401-404, 406-408, 411, 412, 414-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893		
RESISTANCE FUNCTION	A-B	Display: 2000 or greater, or flashes
	A-C	Display: 2000 or greater, or flashes
WJE ALL		
	A-GND	Display: 2000 or greater, or flashes
	B-GND	Display: 2000 or greater, or flashes
	C-GND	Display: 2000 or greater, or flashes
CAP FUNCTION	A/C TEST UNSH	—
DISPLAY SELECT	CAP (PF)	—
CAP RANGE	1000	Display (pf): 391.0 (±1.0) (left or right tank)
		Display (pf): 645.5 (±1.5) (center tank)

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Table 104 Tester Functions and Displays (Continued)

SELECTOR SWITCH SETTINGS	POSITION	RESPONSE/INDICATION
WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893		
CAP RANGE	200	—
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892		
CAP RANGE	200	Display (pf): 178.5 (±1.0) (fwd or aft aux tank)
WJE ALL		
CAP FUNCTION	A/C TEST COMP	Display (pf): 76.3 (±0.75) (all tanks)

(9) Connect tester to fault isolation junction probe using test harness 083-039-002 (Figure 103, item (d)) and repeat Paragraph 3.C.(4). If readings are correct, aircraft wire harness from spar feedthrough to fault isolation junction probe is suspect of being faulty. If readings are incorrect, wiring in tank is suspect of being faulty. Next, proceed to the check of individual fuel quantity probes per Paragraph 3.D..

D. Check Tank Probes

- (1) Defuel and drain applicable tank (PAGEBLOCK 28-00-00/201).
- (2) Remove tank fault isolation junction probe (PAGEBLOCK 28-40-04/201).
- (3) Disconnect fuel quantity probe wires (one probe at a time) from fault isolation junction probe.

WARNING: FUEL QUANTITY TEST SET ELECTRICAL POWER PLUG HAVING STRAIGHT BLADE TYPE CONTACTS MUST BE SECURED WHEN ANY FUEL TANK IS OPEN TO PREVENT HAZARDOUS ARCING IF PLUG IS INADVERTENTLY DISCONNECTED WITH FUEL VAPOR PRESENT.

- (4) Connect harness test box (Figure 104) to tester and individual probe wires as follows:
 - (a) Connector marked Coax to tester aircraft tank units Coax "A".
 - (b) Connector marked UNSH to tester aircraft tank units UNSH "B".
 - (c) Connect alligator clip to low Z probe wire.
 - (d) Connect high Z probe wire to pushpost inside harness test box and position ferrule in fuse clip.
- (5) Check individual probe capacitance as listed in Table 105.
- (6) If capacitance values are not as listed, check wire connections at probe for faulty connections. Check individual probe capacitance.

Table 105 Capacitance of Fuel Tank Probes

TANK LOCATION	PROBE NUMBER	PROBE CAPACITANCE In Picofarads (pf) (Empty Tanks)	ALLOWABLE TOLERANCE
Center	1	134.730	±0.50
	2	123.032	±0.50
	3 (left side)	102.220	±0.50
	3a (right side)	102.220	±0.50
	4 (left side)	91.606	±0.50
	4a (right side)	91.606	±0.50

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Table 105 Capacitance of Fuel Tank Probes (Continued)

TANK LOCATION	PROBE NUMBER	PROBE CAPACITANCE In Picofarads (pf) (Empty Tanks)	ALLOWABLE TOLERANCE	
	* Compensator	76.20	±0.50	
Left and Right	5	44.923	±0.50	
	6	34.460	±0.50	
	7	66.035	±0.50	
	8	63.973	±0.50	
	9	57.577	±0.50	
	10	54.434	±0.50	
	11	44.346	±0.50	
	12	25.117	±0.50	
		* compensator (left or right tank)	76.20	±0.50
	WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892			
	Fwd or Aft Aux	13	88.45	±0.50 P.f.
		14	90.20	±0.50 P.f.
	* Compensator	76.20	±0.50 P.f.	
WJE ALL				
* Capacitance circuit of referenced compensator probe only				

E. Engine Fuel Low Pressure Light

Table 106

Possible Cause	Isolation Procedure	Correction
(1) Delay in illumination of engine fuel low pressure light during fuel boost check.	Transfer fuel from left tank to right tank to remove any air trapped in crossfeed system.	Remove and clean fuel vapor removal system eductor, mounted on forward right side of engine. Flush system with fuel to remove air.
NOTE: Delay may be caused by air trapped in fuel system which delays time required to bleed off fuel pressure after pump is turned off.		

- F. Center tank low fuel pressure indication appears on climb and/or during cruise for 10 minutes or less. Indication disappears, and center tank fuel pumps resume normal feed. This condition may be shown by either a center pump fuel low pressure indication (if installed), or by center tank fuel gage not decreasing as anticipated.

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Table 107

Possible Cause	Isolation Procedure	Correction
<p>(1) Outgassing of air and fuel vapor in inlet line to center tank fuel boost pumps greater than can be handled, causing pressure drop of boost pumps.</p>	<p>(1) Check for following:</p> <ul style="list-style-type: none"> (a) Center tank has fuel. (b) Engine fire shut-off valve handles are pushed in. (c) Both center tank boost pumps are off. (d) Center fuel low pressure indication (if installed) is off. (e) Master caution light is off. (f) Left and right engine inlet fuel pressure low lights are on. <p>(2) Position center tank fwd pump to on and check for following:</p> <ul style="list-style-type: none"> (a) Left and right engine inlet fuel pressure low indications go out immediately. (b) Ctr fuel pressure. Low indication (if installed) comes on after approx. 22 sec. <p>(3) Position center tank fwd pump to off and check for following:</p> <ul style="list-style-type: none"> (a) Ctr fuel pressure. Low indication (if installed) goes out. (b) Left and right engine inlet fuel pressure low indications come on within 2 min. <p>(4) Position center tank aft pump to on and check for following:</p> <ul style="list-style-type: none"> (a) Left and right engine inlet fuel pressure low indications go out immediately. (b) Ctr fuel pressure. Low indication (if installed) comes on after approx. 22 sec. <p>(5) Position center tank aft pump to off and check for following:</p> <ul style="list-style-type: none"> (a) Ctr fuel pressure. Low indication (if installed) goes out. (b) Left and right engine inlet fuel pressure low indications come on within 2 min. 	<p>If positive, return aircraft to service. If negative, check differential pressure switch on front spar (if installed) (LOW PRESSURE, SECTION 28-41), or repair system as required.</p>

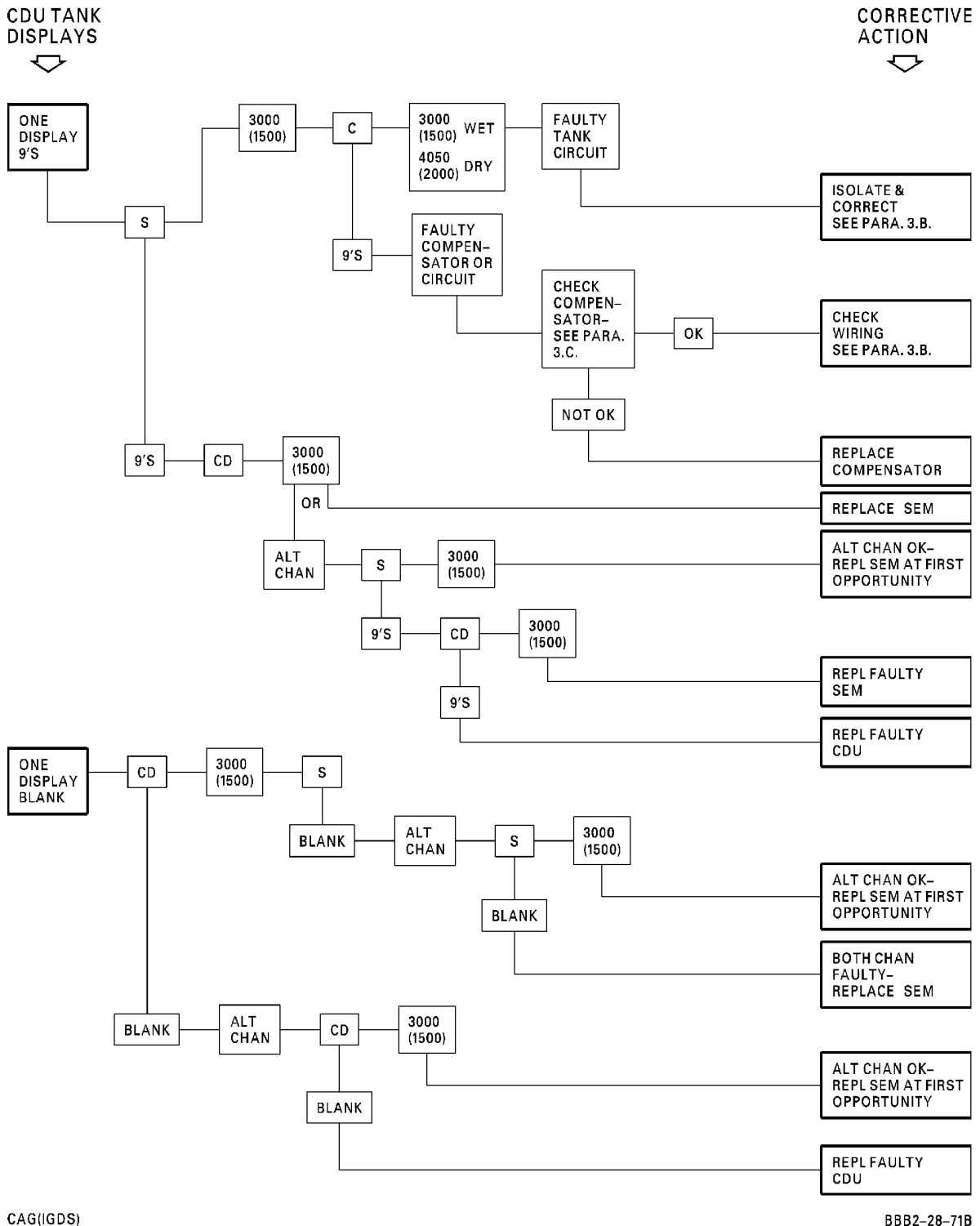
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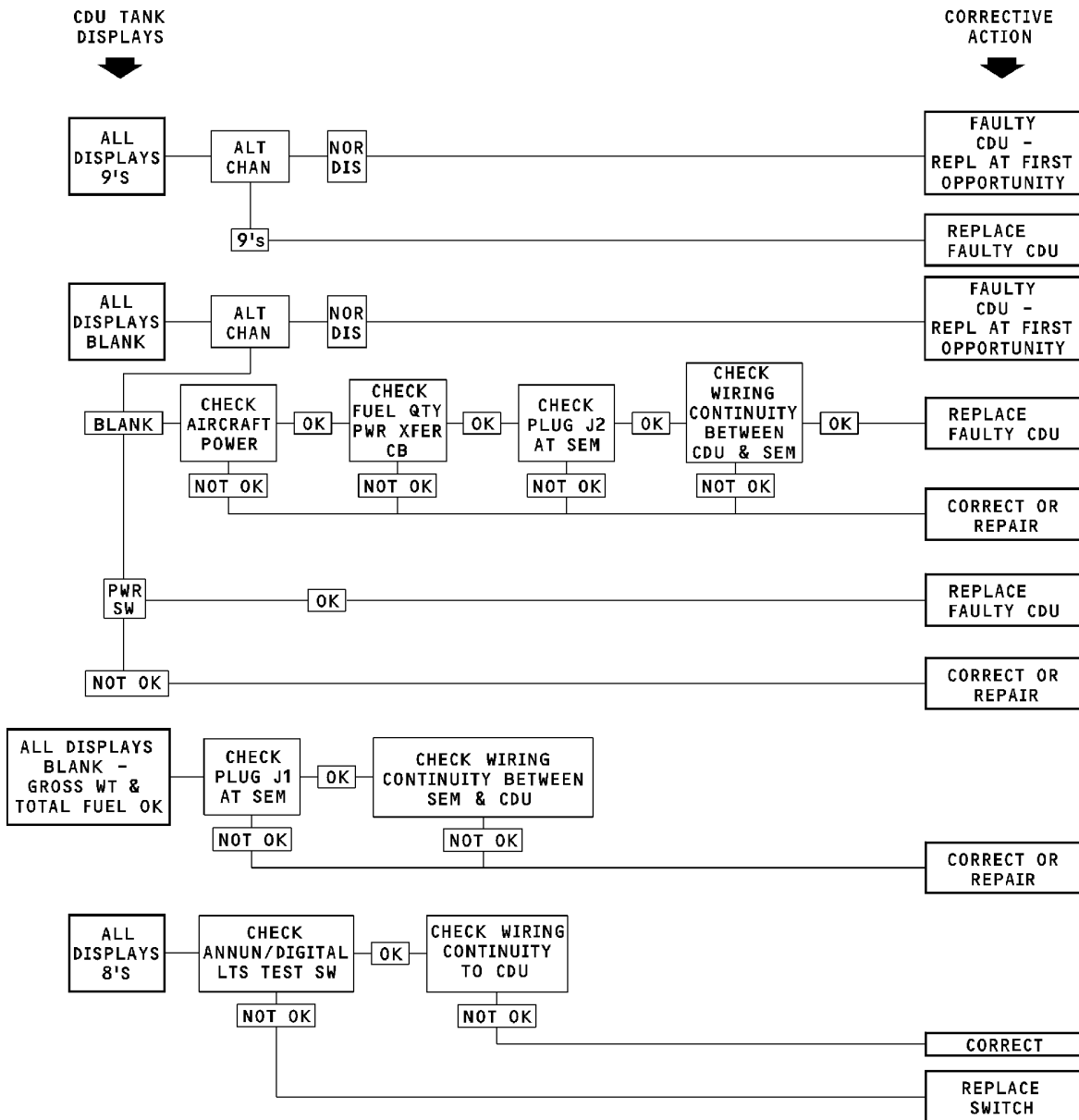
Fault Isolation Tree - CDU
Figure 101/28-40-00-990-808 (Sheet 1 of 2)

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CAG (IGDS)

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Fault Isolation Tree - CDU
Figure 101/28-40-00-990-808 (Sheet 2 of 2)

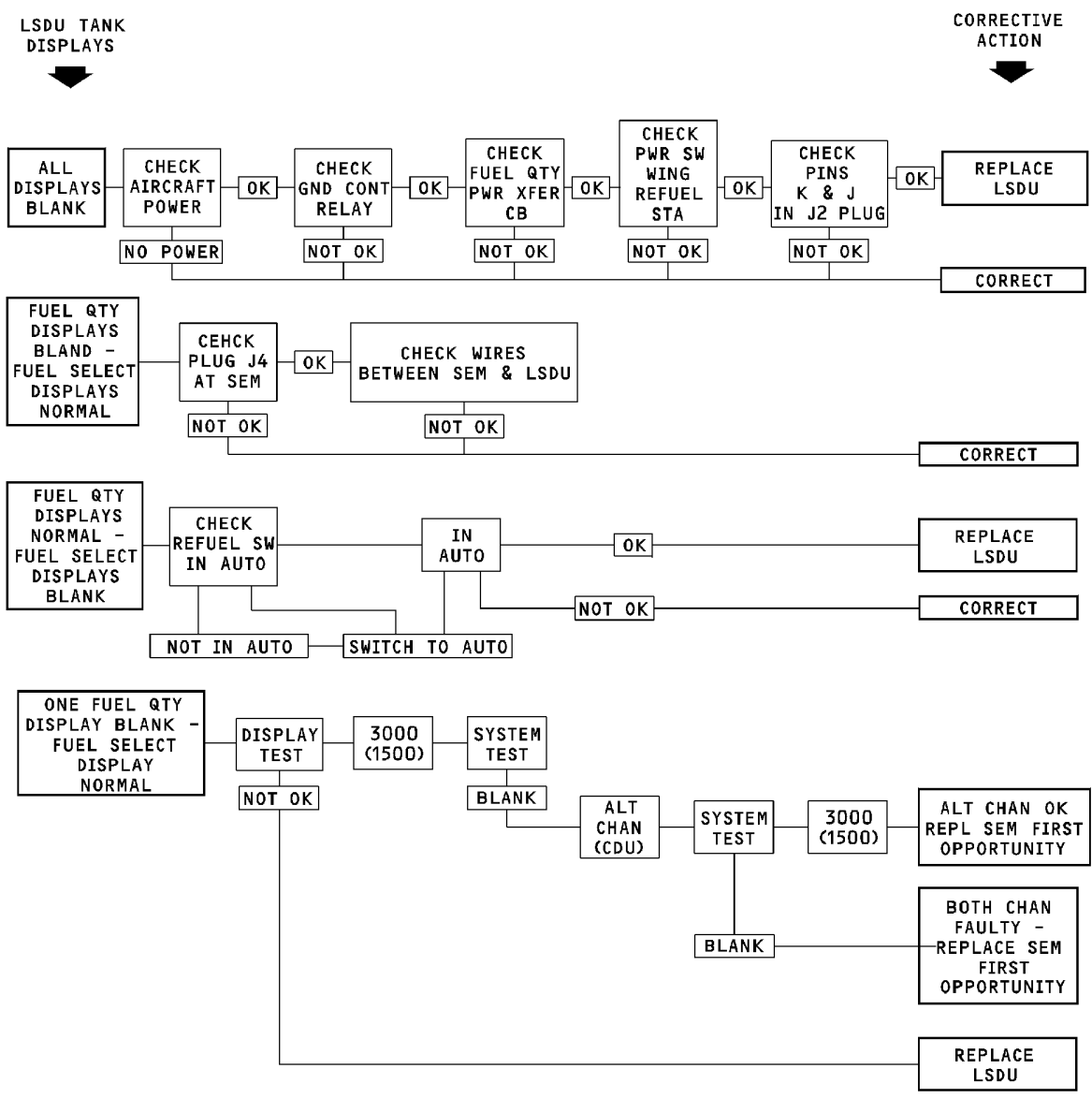
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CAG (IGDS)

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Fault Isolation Tree - LSDU
Figure 102/28-40-00-990-809 (Sheet 1 of 2)

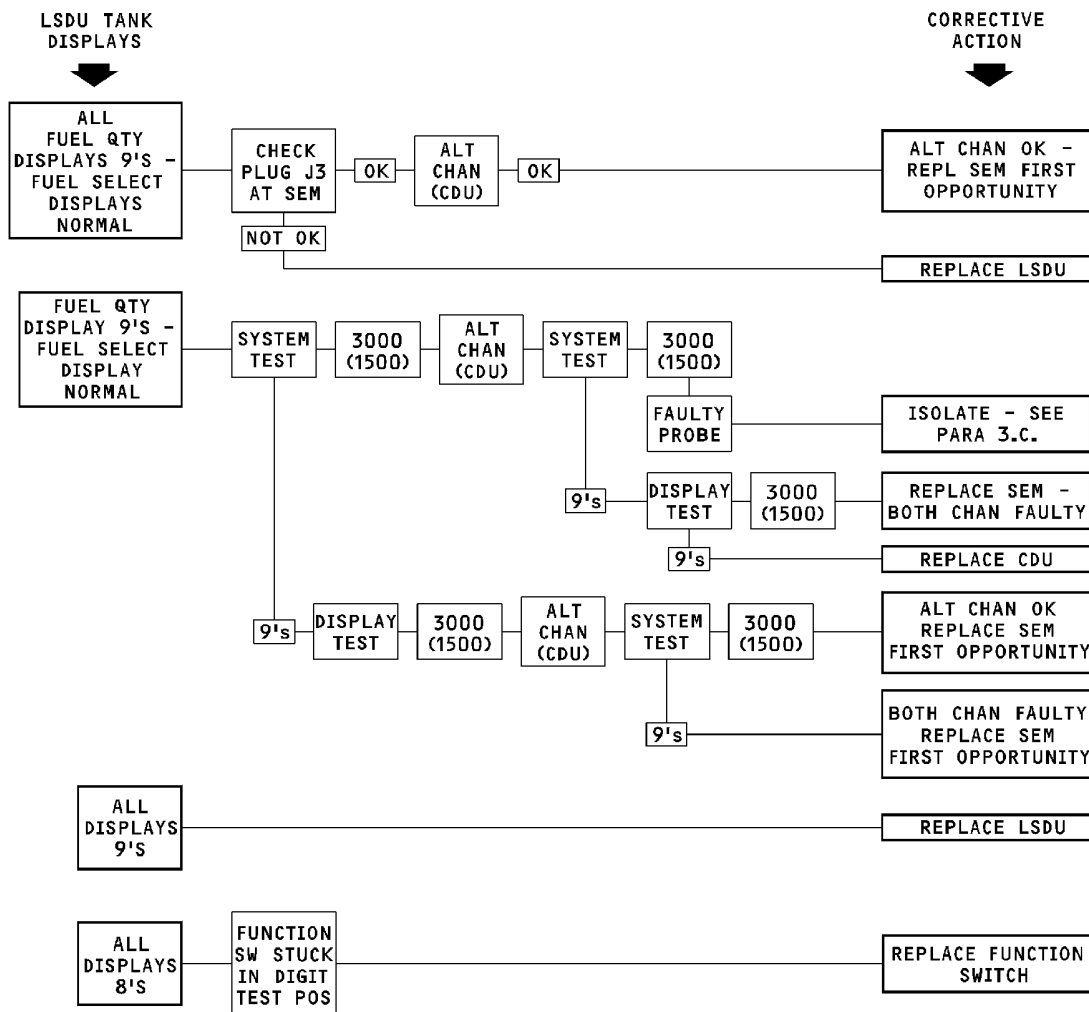
EFFECTIVITY
WJE ALL

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CAG (IGDS)

BBB2-28-260A

Fault Isolation Tree - LSDU
Figure 102/28-40-00-990-809 (Sheet 2 of 2)

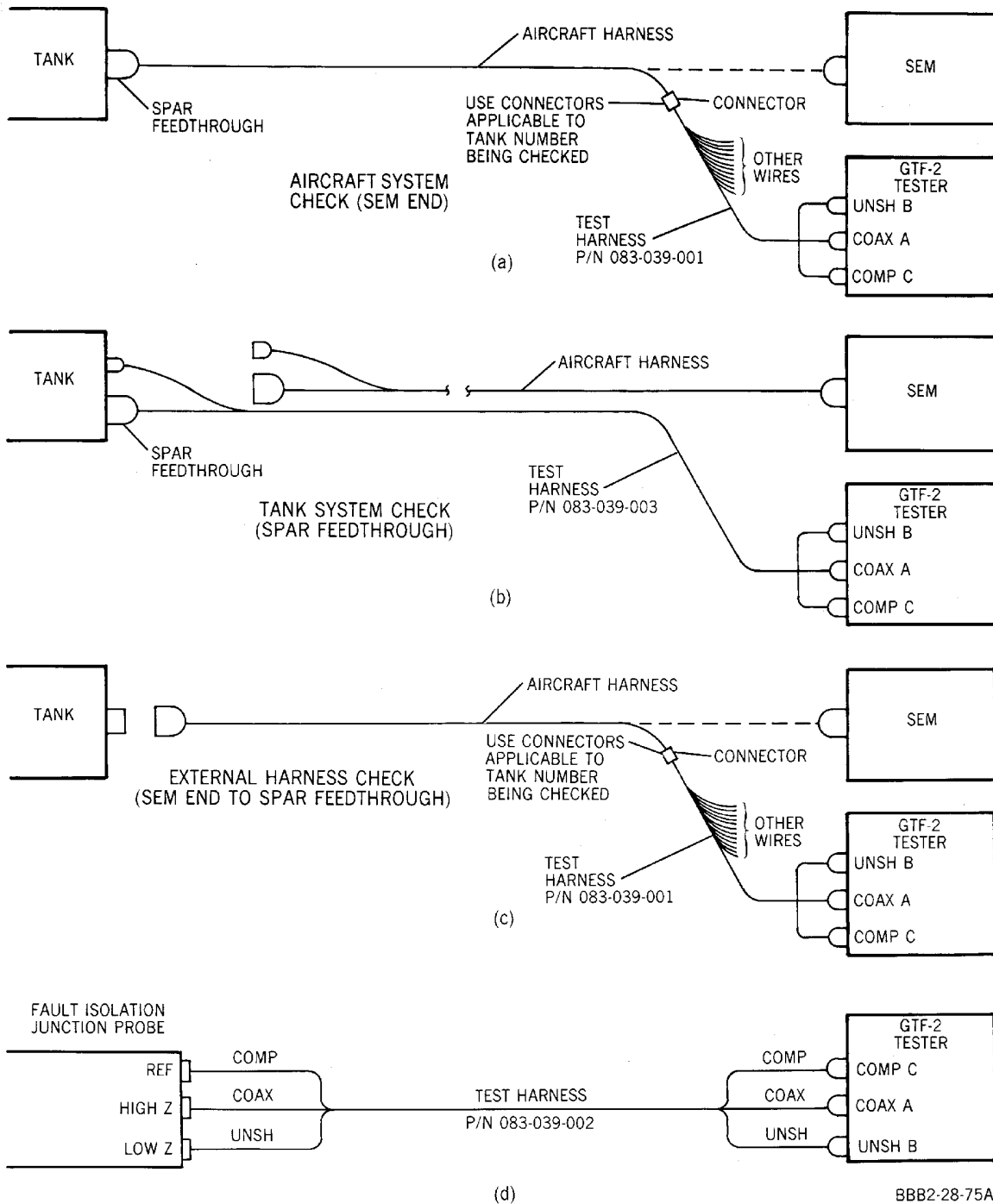
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Fuel Quantity Tester Connections
Figure 103/28-40-00-990-810

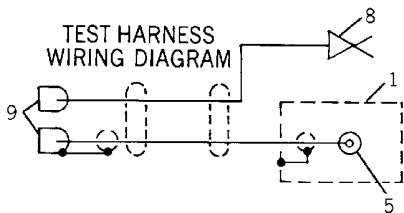
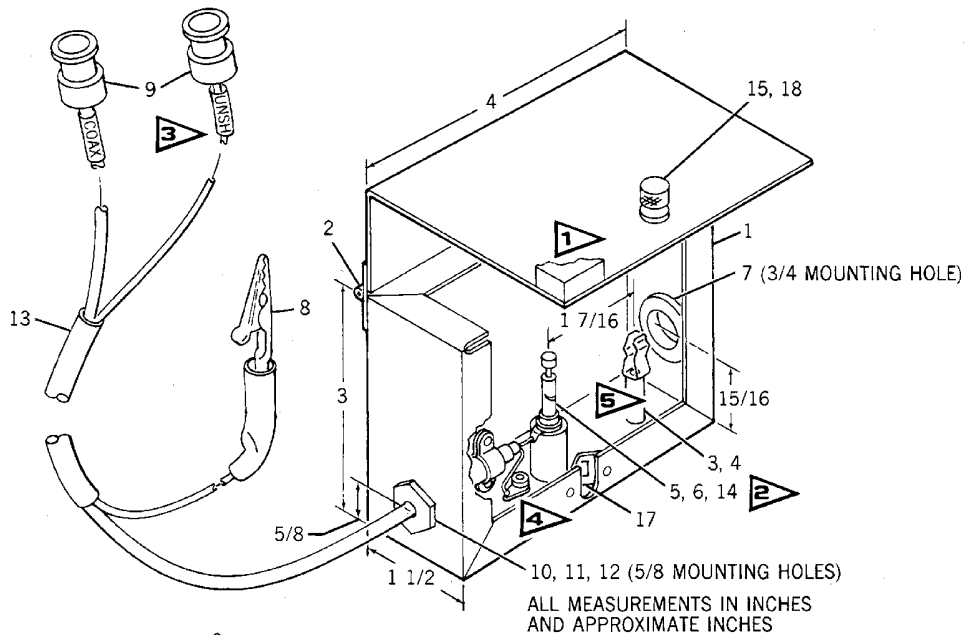
EFFECTIVITY
WJE ALL

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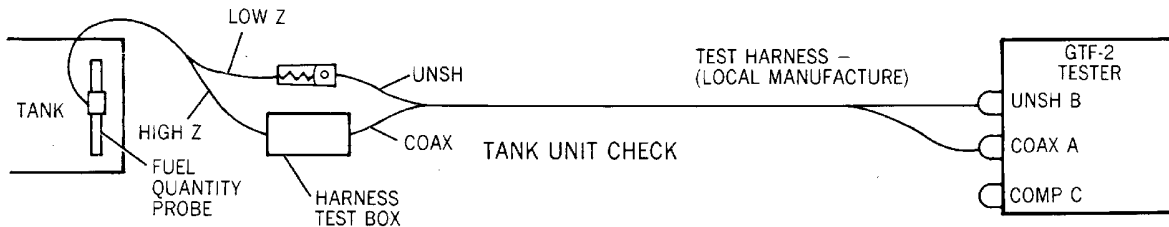
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- GENERAL NOTES:**
- 1** FELT CEMENTED TO BOX (TOP, BOTTOM, & SIDES) TO PREVENT SCRATCHING AIRCRAFT SURFACE.
 - 2** CUT THREADED SHANK POST AS REQUIRED TO FIT DEPTH OF THREADS IN STANDOFF.
 - 3** IDENTIFY CABLE AS SHOWN.
 - 4** LOCATE GROUND LUG TO SUIT. ELECTRICALLY BOND TO BOX.
 - 5** ELECTRICAL BOND.
 - 6** ASSEMBLE WITH 8-32 HARDWARE.
 - 7** ASSEMBLE WITH 4-40 HARDWARE.

MATERIAL DESCRIPTION

REF NO.	QUAN	DESCRIPTION	P/N	VENDOR
1	1	BOX	CU-341	BUD
2	1	HINGE	MS20257-2-400 (4 IN.)	
3	1	FUSE CLIP	101002	LITTELFUSE
4	1	SPACER METAL	8775	H. H. SMITH
5	1	PUSH POST	29-100R	GRAYHILL
6	1	CERAMIC STANDOFF	2607	H. H. SMITH
7	1	GROMMET	2186	H. H. SMITH
8	1	TEST CLIP	16-R	GRAYHILL
9	2	CONNECTOR	629-221-001	GULL AIRBORNE
10	1	BOX CONNECTOR	AN3064-4	
11	1	NUT	AN3066-4	
12	1	CABLE CLAMP	MS3057-4A	
13	13 FT.	WIRE	14334	J.T.T.
14	1	LUG	1412-8	H. H. SMITH
15	1	STUD	P101-421-24A	TINNERMAN
16	1	FELT	4-900(1/4 INCH)	SCOTT
17	1	CATCH	1/4 x 5 x 14	TINNERMAN
18	1	THUMB SCREW	A1663-012-1 2366	H. H. SMITH



BBB2-28-76B

**Tester Harness (Tester to Probe)
Figure 104/28-40-00-990-811**

EFFECTIVITY
WJE ALL

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INDICATING - TROUBLESHOOTING

1. General

- A. This section provides detailed procedures for trouble shooting the fuel quantity indicating systems and components.
- B. If insulation resistance and capacitance checks of the applicable circuit were made during trouble shooting or other maintenance and it is certain that the circuit readings still fall within the tolerances specified, it will not be necessary to repeat the checks.
- C. CDU/LSDU displays will not necessarily agree with magnetic driplless fuel measuring stick readings.
- D. Stray capacitance introduced by test equipment, cables, or switching devices should not exceed ± 0.1 pf. When reading capacitance values, be sure to account for test equipment tolerances as shown on correction cards supplied with the tester.
- E. Insulation resistance of test equipment circuits should not be less than 2,000 megohms.
- F. After fuel indicators register zero in cruise mode, a nose down attitude may allow these indicators to register up to 200 lbs (or 100 kg) of fuel in flight, descent, or on the ground.
- G. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

Table 101

Name and Number	Manufacturer
Fuel Quantity Tester GTF-2	Gull Airborne Instruments, Inc.
Harness 083-039-001	Gull Airborne Instruments Inc.
Harness 083-039-002	Gull Airborne Instruments Inc.
Harness 083-039-003	Gull Airborne Instruments Inc.
Harness (Tester to probe)	Local manufacture

3. Trouble Shooting Indicating

- A. Fuel Quantity System Cockpit Fault Isolation Tests
 - (1) The fault isolation tests in Table 102 are provided for primary evaluation of the fuel quantity indicating system from the cockpit, subject to the following definitions:
 - (a) Dry tank means that the compensators are above and clear of fuel.
 - (b) Wet tank means that lower capacitor section of compensators are covered with fuel (FUEL QTY indicators read no less than 700 LBS (or 350 KGS) for the left and right tanks, and 1400 LBS (or 700 KGS) for the center tank).
 - (2) Tests should be performed in the sequence given in Table 102.

Table 102 Fuel Quantity System Cockpit Fault Isolation Tests

ACTION	DIGITAL READOUT	IN TOLERANCE TEST RESULTS	OUT OF TOLERANCE TEST RESULTS (PROVIDE READING)
Press ANN/DIGITAL LTS TEST button (tests incandescent lamps only)	All digits display "8"s	Lamps are OK.	Some "8"s missing; replace lamps. No display; check R2-312

EFFECTIVITY
WJE 412, 414; without AOL 9-2608 incorp.

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Table 102 Fuel Quantity System Cockpit Fault Isolation Tests (Continued)

ACTION	DIGITAL READOUT	IN TOLERANCE TEST RESULTS	OUT OF TOLERANCE TEST RESULTS (PROVIDE READING)
Turn AB switch to both positions (channels) to determine if problem affects both channels. Note if readings are duplicated.			Give readings. A _____ B _____
System test: Depress A/B switch in affected channel (this test is same as "S" position of C/S switch)	(LBS) Each tank displays 3000(±100). TOTAL FUEL display equals sum (+0,-50) of all tank displays. or (KGS) Each tank displays 1500(±50). TOTAL FUEL display equals sum (+0,-25) of all tank displays.	CDU, SEM are OK. Fault is in tank measuring circuit	Reading: _____
Turn CD switch to CD position (this isolates CDU)	(LBS) Each tank displays 3000(±100). TOTAL FUEL display equals sum (+0,-50) of all tank displays. or (KGS) Each tank displays 1500(±50). TOTAL FUEL display equals sum (+0,-25) of all tank displays.	CDU is OK. Fault is else- where.	Reading: _____ Fault is in CDU
Wet tank: Turn C/S switch to "C" position (compensator is in system)	(LBS) Each tank displays 3000(±100). TOTAL FUEL display equals sum (+0,-50) of all tank displays. or (KGS) Each tank displays 1500(±50). TOTAL FUEL display equals sum (+0,-25) of all tank displays.	SEM, CDU, and compensator circuits are OK. Fault is in tank measuring circuit.	Reading: _____ Fault is in compensator circuit.
Dry tank: Turn C/S switch to "C" position (compensator is in system)	(LBS) Each tank displays 4050(±100). TOTAL FUEL display equals sum (+0,-50) of all tank displays. or (KGS) Each tank displays 2000(±50). TOTAL FUEL display equals sum (+0,-25) of all tank displays.	SEM, CDU, and compensator circuits are OK. Fault is in tank measuring circuit.	Reading: _____ Fault is in compensator circuit.

B. Fault Isolation With BITE

NOTE: The fault isolation actions, displays, etc., listed in Table 103 are used in the fault isolation trees in Figure 101 and Figure 102. They are in abbreviated form to simplify use.

- (1) Isolate system faults for CDU per Figure 101 and using aircraft power.

EFFECTIVITY
WJE 412, 414; without AOL 9-2608 incorp.

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- (2) (2) Isolate system faults for LSDU per Figure 102 with wing refueling panel power switch in ON position.

Table 103 Fault Isolation With BITE - Abbreviation Key

Abbreviation	Explanation/Action
CDU	Cockpit Display Unit
LSDU	Load Selector Display Unit (on wing refueling panel)
S	Using small screwdriver, turn C/S switch, located on lower right corner of Cockpit Display Unit (CDU) counterclockwise to S position.
C	Turn C/S switch clockwise to C position.
CD	Using small screwdriver, turn CD switch, located on lower left corner of CDU, clockwise to CD position.
8,s	All active digital displays show 8,s.
9,s	All active digital displays show 9,s.
(1500)	Applicable digital display reads 1500(±50) (KGS).
(2000)	Applicable digital display reads 2000(±50) (KGS)
3000	Applicable digital display reads 3000(±100) (LBS).
4050	Applicable digital display reads 4050(±100) (LBS).
Alt chan	Place TEST control knob located below CD switch to channel not being used (If A is being used, switch to B. If B is being used, switch to A).
Blank	Applicable digital display does not come on.
Nor dis	Displays applicable tank quantity.
Dry	Dry tank means that the compensators are above and clear of fuel.
Wet	Wet tank means that lower capacitor section of compensators are covered with fuel (FUEL QTY indicators read no less than 700 LBS (or 350 KGS) for the left and right tanks, and 1400 LBS (or 700 KGS) for the center tank.
AUTO	Position REFUEL switch on right end of LSDU to AUTO.
SYSTEM TEST	Position FUNCTION switch on right end of LSDU to SYSTEM TEST.
DISPLAY TEST	Position FUNCTION switch on right end of LSDU to DISPLAY TEST.
DIGIT TEST	Position FUNCTION switch on right end of LSDU to DIGIT TEST.

C. Check Insulation Resistance and Capacitance

NOTE: To check for and obtain the same readings as referenced in Figure 103 and Table 104, the tanks must be defueled and drained (PAGEBLOCK 28-00-00/201).

NOTE: Procedures for testing all tanks are identical except where noted.

- (1) Open FUEL QUANTITY POWER TRANSFER circuit breaker.
- (2) Disconnect system wire harness (connector J3) at Standard Electronic Module (SEM).

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WARNING: FUEL QUANTITY TEST SET ELECTRICAL POWER PLUG HAVING STRAIGHT BLADE TYPE CONTACTS MUST BE SECURED WHEN ANY FUEL TANK IS OPEN TO PREVENT HAZARDOUS ARCING IF PLUG IS INADVERTENTLY DISCONNECTED WITH FUEL VAPOR PRESENT.

- (3) Connect GTF-2 tester to system harness at SEM end, using test harness 083-039-001 (Figure 103, item (a)). Ground tester to aircraft.
- (4) With tester selector switch(es) in position indicated, check for insulation and capacitance readings as shown in Table 104.
- (5) If readings are as shown in Table 104, no further insulation resistance and capacitance testing is required; if not, proceed to Paragraph 3.C.(6).
- (6) Connect tester directly to spar feedthrough connectors, bypassing aircraft wire harness, using test harness 083-039-003 (Figure 103, Item (b)) and repeat Paragraph 3.C.(4). If readings are as indicated in Table 104, then aircraft harness, from standard electronic module (SEM) to spar feedthrough, is suspect of being faulty, proceed to Paragraph 3.C.(7) for further verification. If readings are not as indicated, proceed to Paragraph 3.C.(8).
- (7) Disconnect aircraft wire harness at spar feedthrough. Connect tester to (SEM) end of wire harness, using test harness 083-039-001 (Figure 103, Item (c)). Perform only the resistance function tests in Table 104. If readings are incorrect, replace aircraft wire harness and repeat Paragraph 3.C.(4).
- (8) Remove tank fault isolation junction probe (PAGEBLOCK 28-00-00/201).

Table 104 Tester Functions and Displays

SELECTOR SWITCH SETTINGS	POSITION	RESPONSE/INDICATION
POWER switch	On	POWER light comes on
DISPLAY TEST	DEPRESSED	Display: 8.8.8.8.8.8.
DISPLAY SELECT	RES (MEG)	—
RESISTANCE RANGE (MEG)	1K-10K	—
RESISTANCE FUNCTION	A-B	Display: 2000 or greater, or flashes
	A-C	Display: 2000 or greater, or flashes
	A-GND	Display: 2000 or greater, or flashes
	B-GND	Display: 2000 or greater, or flashes
	C-GND	Display: 2000 or greater, or flashes
CAP FUNCTION	A/C TEST UNSH	—
DISPLAY SELECT	CAP (PF)	—
CAP RANGE	1000	Display (pf): 391.0 (±1.0) (left or right tank)
		Display (pf): 645.5 (±1.5) (center tank)
CAP RANGE	200	—
CAP FUNCTION	A/C TEST COMP	Display (pf): 76.3 (±0.75) (all tanks)

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WJE 412, 414; with digital display LSDU

- (9) Connect GTF-2 tester to fault isolation junction probe using test harness 083-039-002 (Figure 103, item (d)) and repeat Paragraph 3.C.(4). If readings are correct, aircraft wire harness from spar feedthrough to fault isolation junction probe is suspect of being faulty. If readings are incorrect, wiring in tank is suspect of being faulty. Next, proceed to the check of individual fuel quantity probes per Paragraph 3.D..

D. Check Tank Probes

- (1) Defuel and drain applicable tank (PAGEBLOCK 28-00-00/201).
- (2) Remove tank fault isolation junction probe (PAGEBLOCK 28-40-04/201).
- (3) Disconnect fuel quantity probe wires (one probe at a time) from fault isolation junction probe.

WARNING: FUEL QUANTITY TEST SET ELECTRICAL POWER PLUG HAVING STRAIGHT BLADE TYPE CONTACTS MUST BE SECURED WHEN ANY FUEL TANK IS OPEN TO PREVENT HAZARDOUS ARCING IF PLUG IS INADVERTENTLY DISCONNECTED WITH FUEL VAPOR PRESENT.

- (4) Connect harness test box Figure 104 to GTF-2 tester and individual probe wires as follows:
 - (a) Connector marked Coax to GTF-2 aircraft tank units Coax "A".
 - (b) Connector marked UNSH to GTF-2 aircraft tank units UNSH "B".
 - (c) Connect alligator clip to low Z probe wire.
 - (d) Connect high Z probe wire to pushpost inside harness test box and position ferrule in fuse clip.
- (5) Check individual probe capacitance as listed in Table 105.
- (6) If capacitance values are not as listed, check wire connections at probe for faulty connections. Check individual probe capacitance.

Table 105 Capacitance of Fuel Tank Probes

TANK LOCATION	PROBE NUMBER	PROBE CAPACITANCE In Picofarads (pf) (Empty Tanks)	ALLOWABLE TOLERANCE
* Capacitance circuit of referenced compensator probe only			

WJE 412, 414; without AOL 9-2608 incorp.

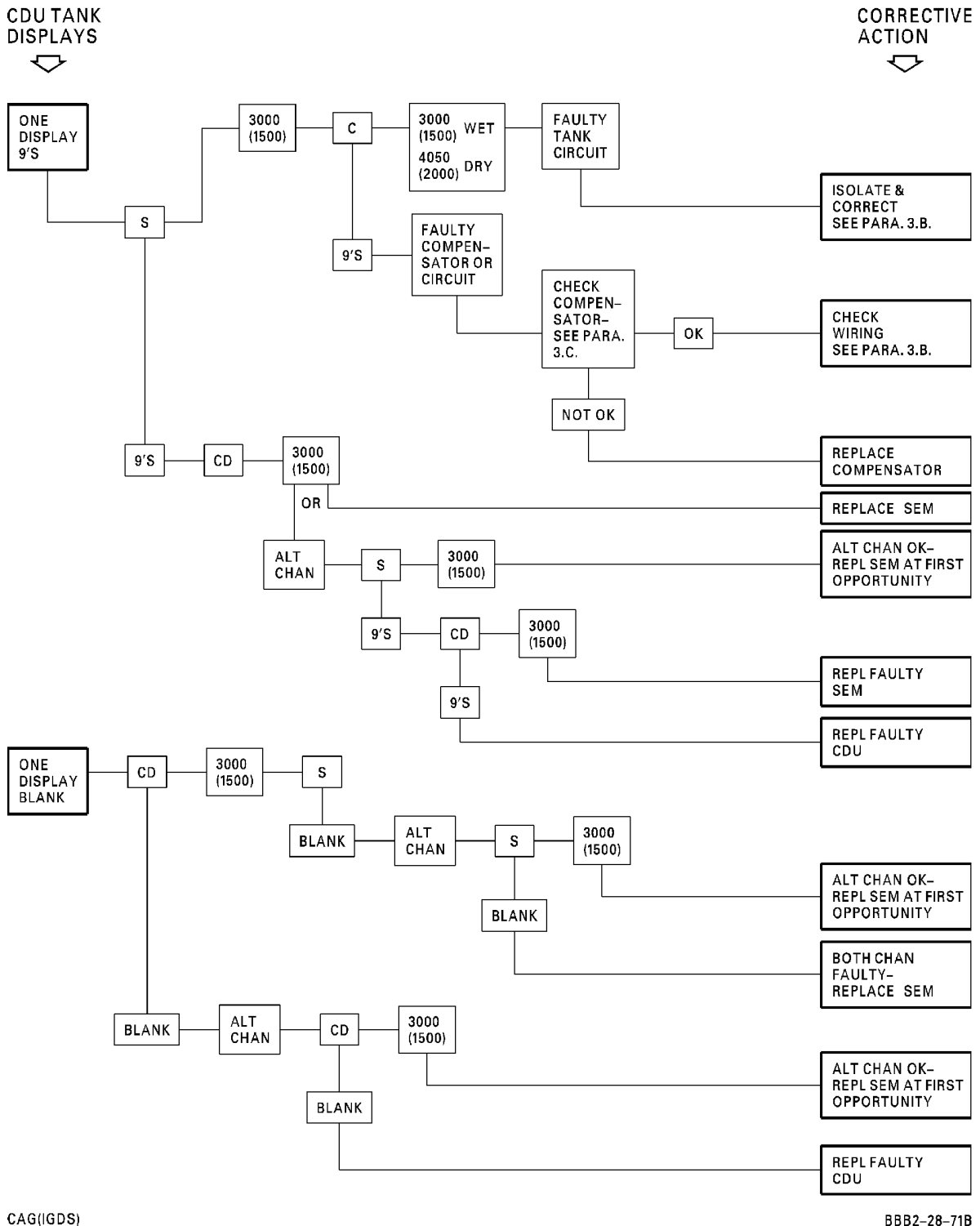
EFFECTIVITY
WJE 412, 414; without AOL 9-2608 incorp.

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Fault Isolation Tree - CDU
Figure 101/28-40-00-990-812 (Sheet 1 of 2)

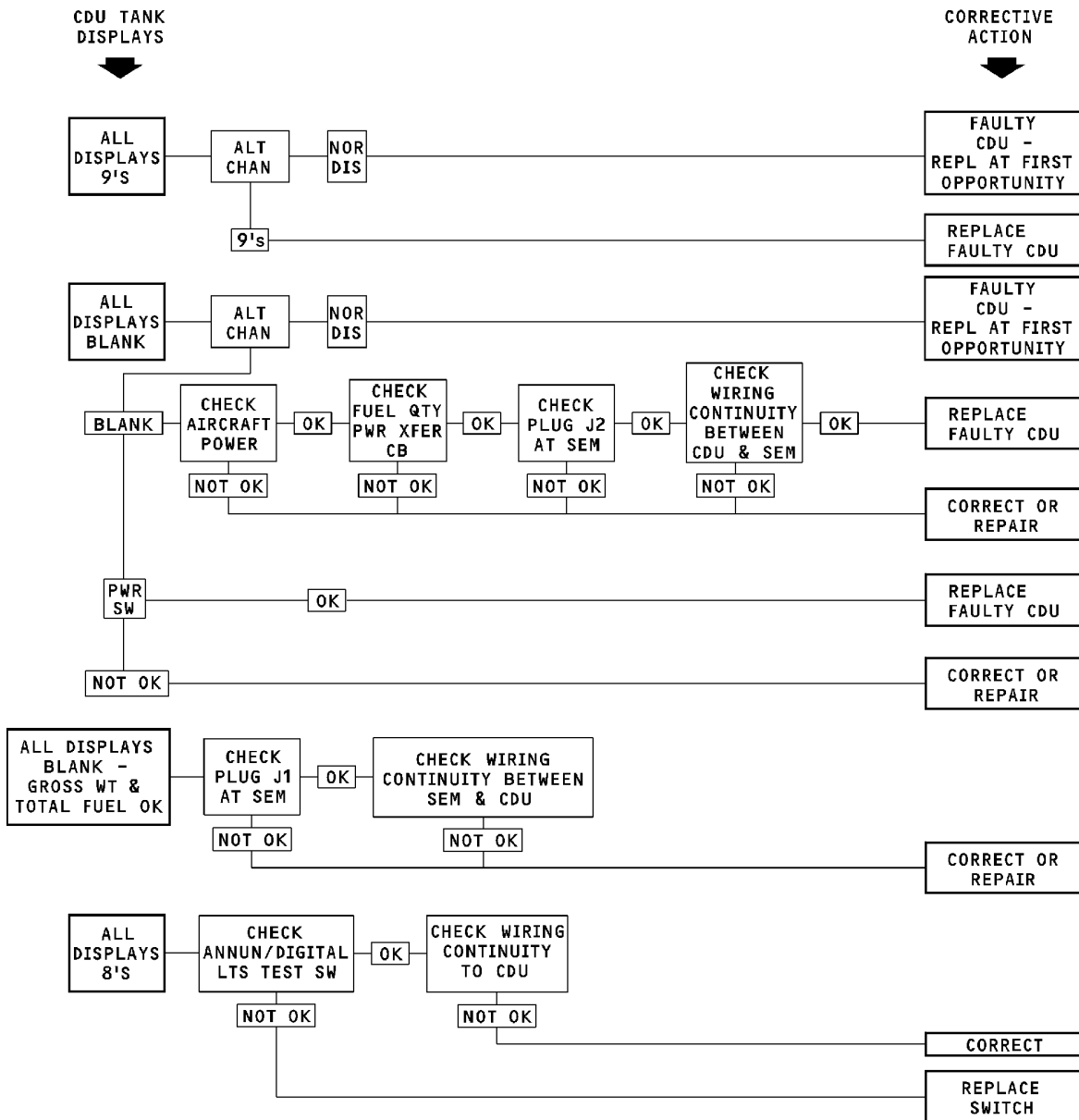
EFFECTIVITY
WJE 412, 414; without AOL 9-2608 incorp.

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CAG (IGDS)

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Fault Isolation Tree - CDU
Figure 101/28-40-00-990-812 (Sheet 2 of 2)

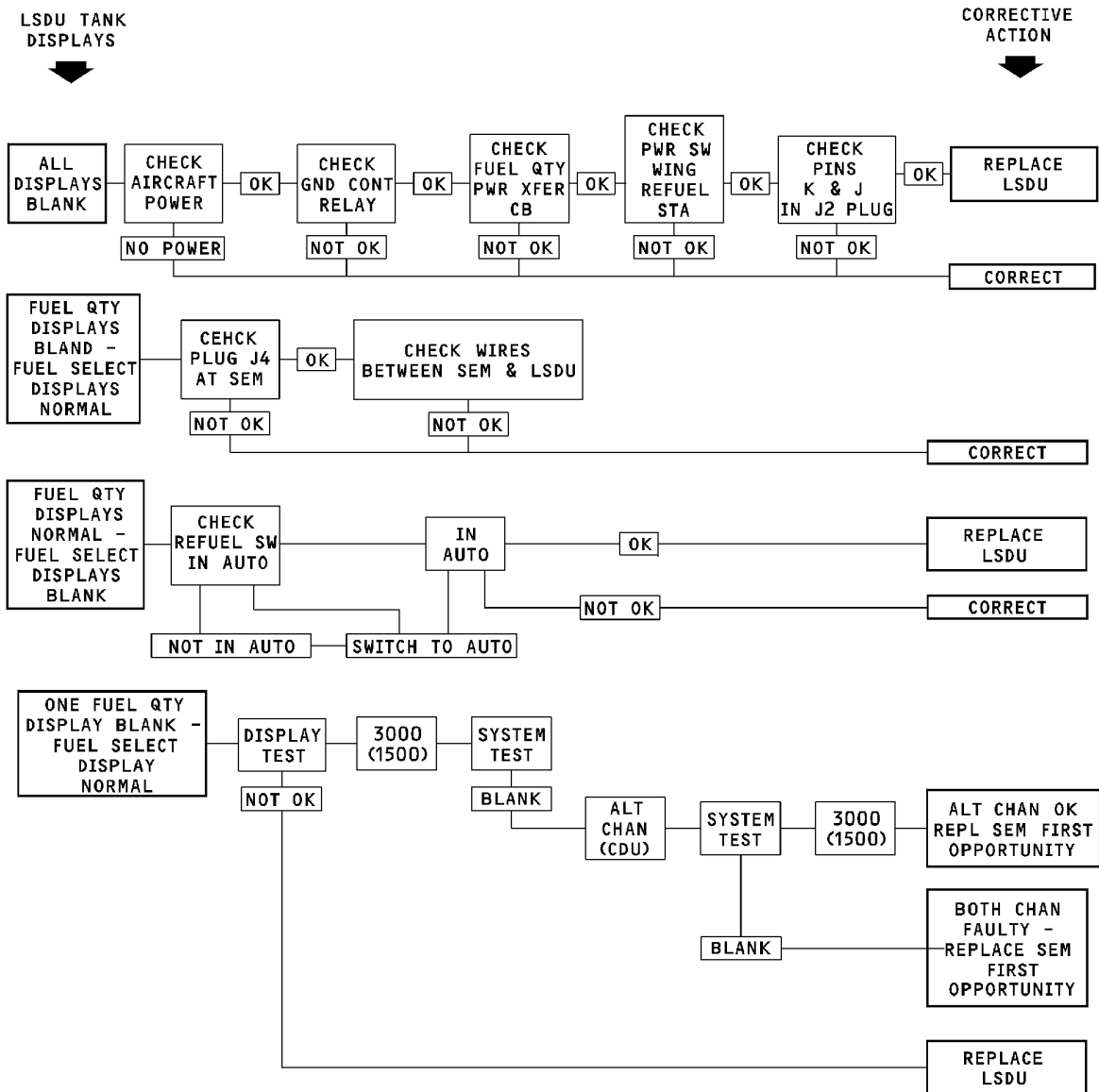
EFFECTIVITY
WJE 412, 414; without AOL 9-2608 incorp.

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CAG (IGDS)

BBB2-28-70E

Fault Isolation Tree - LSDU
Figure 102/28-40-00-990-813 (Sheet 1 of 2)

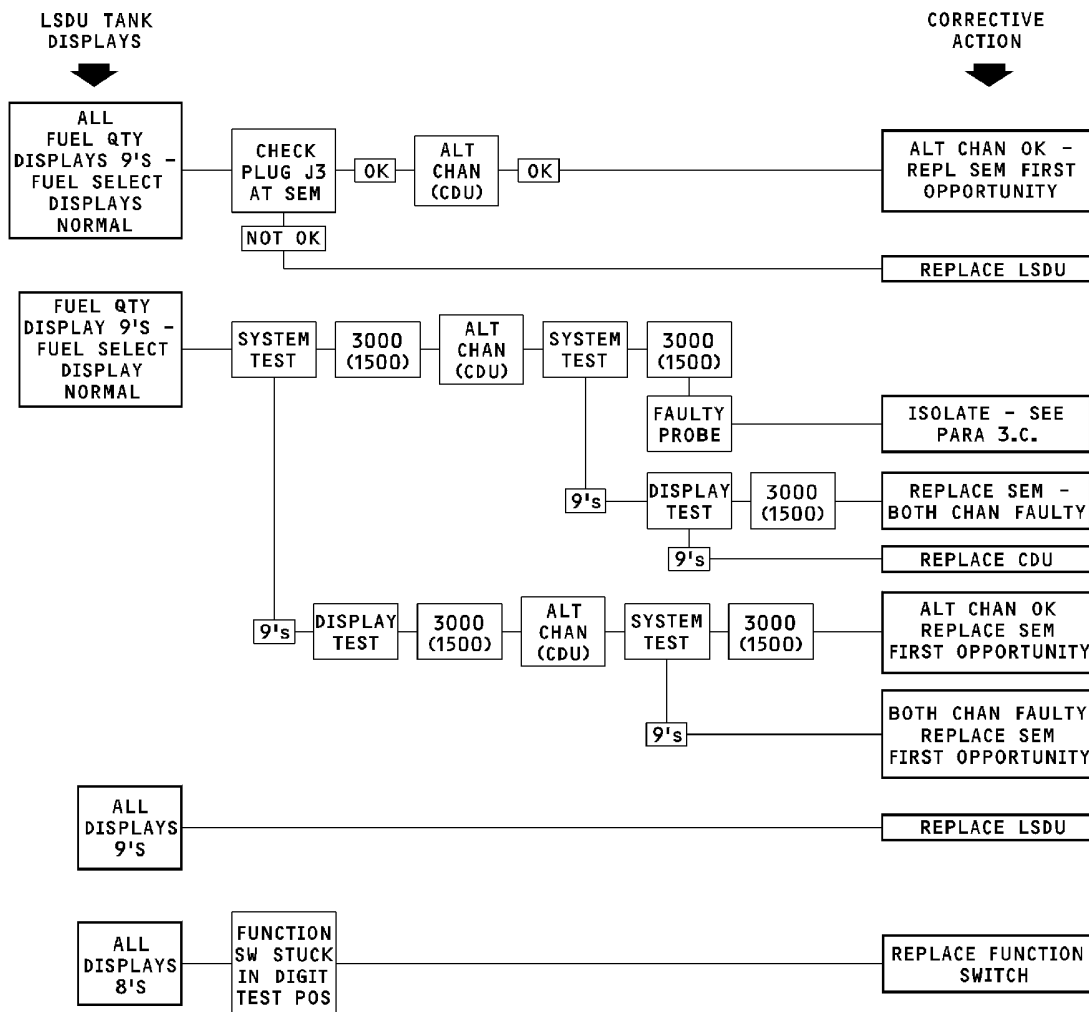
EFFECTIVITY
WJE 412, 414; without AOL 9-2608 incorp.

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CAG (IGDS)

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Fault Isolation Tree - LSDU
Figure 102/28-40-00-990-813 (Sheet 2 of 2)

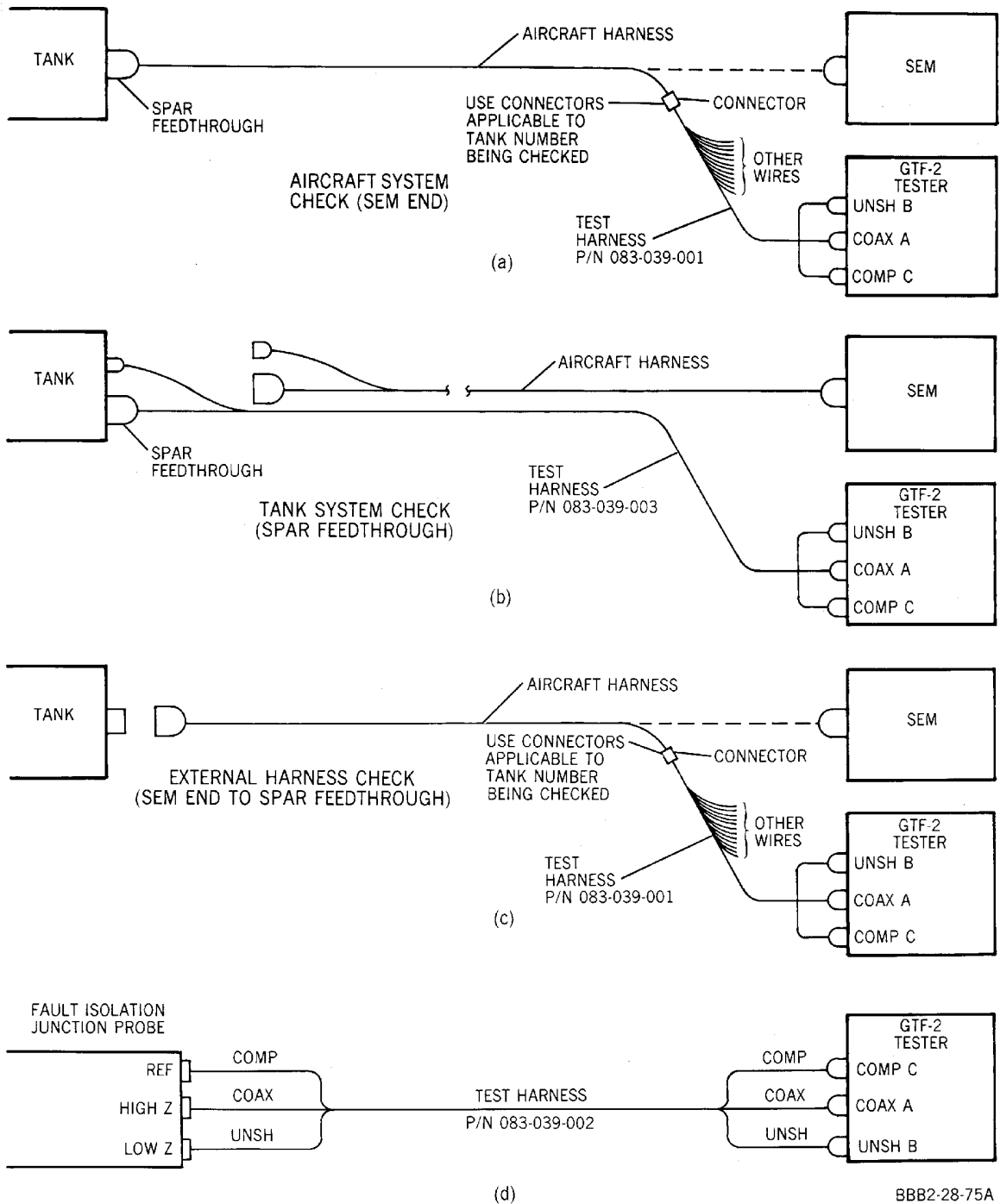
EFFECTIVITY
WJE 412, 414; without AOL 9-2608 incorp.

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Fuel Quantity Tester Connections
Figure 103/28-40-00-990-814

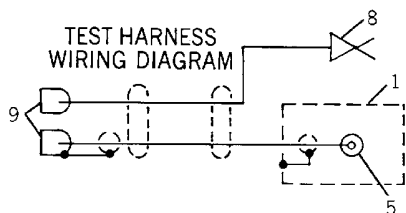
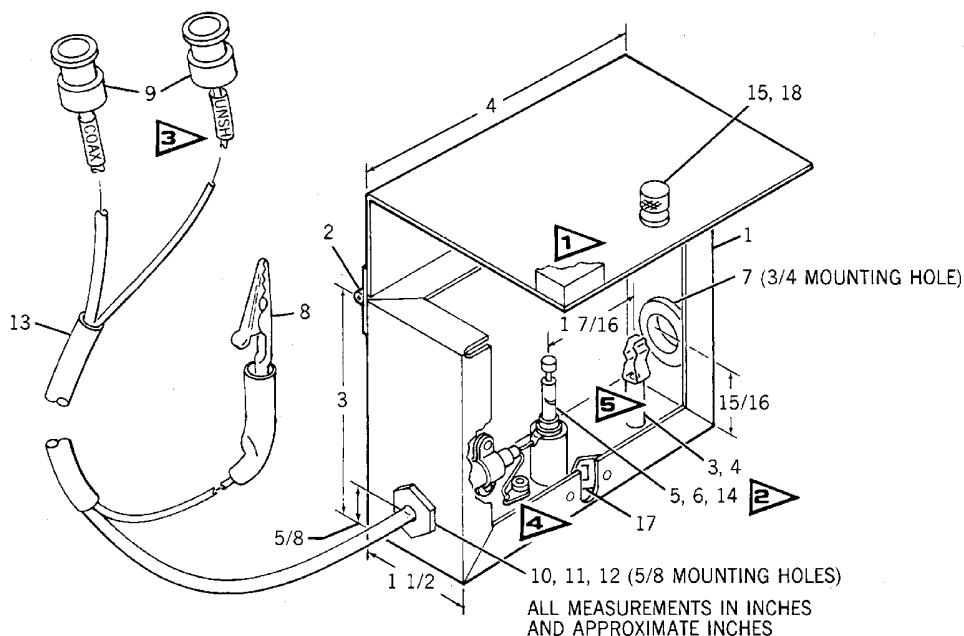
EFFECTIVITY
WJE 412, 414; without AOL 9-2608 incorp.

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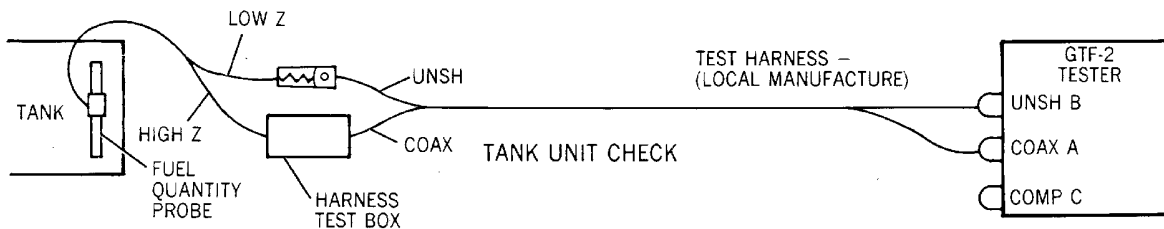
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- GENERAL NOTES:**
- 1** FELT CEMENTED TO BOX (TOP, BOTTOM, & SIDES) TO PREVENT SCRATCHING AIRCRAFT SURFACE.
 - 2** CUT THREADED SHANK POST AS REQUIRED TO FIT DEPTH OF THREADS IN STANDOFF.
 - 3** IDENTIFY CABLE AS SHOWN.
 - 4** LOCATE GROUND LUG TO SUIT. ELECTRICALLY BOND TO BOX.
 - 5** ELECTRICAL BOND.
 - 6** ASSEMBLE WITH 8-32 HARDWARE.
 - 7** ASSEMBLE WITH 4-40 HARDWARE.

MATERIAL DESCRIPTION

REF NO.	QUAN	DESCRIPTION	P/N	VENDOR
1	1	BOX	CU-341	BUD
2	1	HINGE	MS20257-2-400 (4 IN.)	
3	1	FUSE CLIP	101002	LITTELFUSE
4	1	SPACER METAL	8775	H. H. SMITH
5	1	PUSH POST	29-100R	GRAYHILL
6	1	CERAMIC STANDOFF	2607	H. H. SMITH
7	1	GROMMET	2186	H. H. SMITH
8	1	TEST CLIP	16-R	GRAYHILL
9	2	CONNECTOR	629-221-001	GULL AIRBORNE
10	1	BOX CONNECTOR	AN3064-4	
11	1	NUT	AN3066-4	
12	1	CABLE CLAMP	MS3057-4A	
13	13 FT.	WIRE	14334	J.T.T.
14	1	LUG	1412-8	H. H. SMITH
15	1	STUD	P101-421-24A	TINNERMAN
16	1	FELT	4-900(1/4 INCH)	SCOTT
17	1	CATCH	1/4 x 5 x 14	TINNERMAN
18	1	THUMB SCREW	A1663-012-1 2366	H. H. SMITH



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**Tester Harness (Tester to Probe)
Figure 104/28-40-00-990-815**

EFFECTIVITY
WJE 412, 414; with digital display LSDU

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AIRCRAFT MAINTENANCE MANUAL
INDICATING - MAINTENANCE PRACTICES

1. General

- A. The following procedures provide instructions for accomplishing a functional check of the fuel quantity indicating system.

WJE 401-405, 409, 410, 412, 414, 873, 874, 877-881, 883, 884, 892

NOTE: When an aircraft equipped for fuselage fuel tanks is operated with the fuselage tanks removed or sealed off, the SEM (Standard Electronic Module) will retain the five tank fuel display input data and during CDU (Cockpit Display Unit) testing will continue to show TOTAL FUEL display values for five tanks.

WJE ALL

2. Adjustment/Test Indicating

- A. Test Cockpit Display Unit (CDU) (Wet Or Empty Tanks)

WJE 405-411, 415-427, 429, 877-881, 883, 884

- (1) Depress ANNUN/DIGITAL LTS TEST switch on overhead panel. Fuel quantity display for each tank and TOTAL FUEL quantity should read 8888. GROSS WT display should read 88888. Release switch.

WJE 401-404, 412, 414, 861-866, 868, 869, 871-876, 886, 887, 891-893

- (2) Depress ANNUN/DIGITAL LTS TEST switch on overhead panel. Fuel quantity display for each tank and TOTAL FUEL quantity should read 88888. GROSS WT display should read 888888. Release switch.

WJE ALL

- (3) Allow system to warm up for at least 5 minutes.
(4) Rotate channel select knob, located on lower left corner of CDU, counterclockwise, to A position.

WJE 406-408, 411, 415-427, 429

- (5) Push in and rotate ZFW knob located on lower right corner of CDU until GROSS WT display reads 50,000 kilograms. Release knob. TOTAL FUEL display should read sum of L MAIN, R MAIN, and CTR displays (+0,-25) kilograms. GROSS WT display should read 50,000 plus TOTAL FUEL display.

WJE 861-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

- (6) Push in and rotate ZFW knob located on lower right corner of CDU until GROSS WT display reads 100000 pounds. Release knob. TOTAL FUEL display should read sum of L MAIN, R MAIN, and CTR displays (+0,-50) pounds. GROSS WT display should read 100000 plus TOTAL FUEL display.

WJE 401-404, 412, 414, 873, 874, 892

- (7) Push in and rotate ZFW knob located on lower right corner of CDU until GROSS WT display reads 100,000 pounds. Release knob. TOTAL FUEL display should read sum of L MAIN, R MAIN, CTR, FWD, and AFT displays (+0,-50 pounds). GROSS WT display should read 100,000 pounds plus TOTAL FUEL display.

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WJE 405, 409, 410, 877-881, 883, 884

- (8) Push in and rotate ZFW knob located on lower right corner of CDU until gross weight display reads 50,000 kilograms. Release knob. TOTAL FUEL display should read sum of L MAIN, R MAIN, CTR, FWD and AFT displays (+0,-25 kilograms). GROSS WT display should read 50,000 kilograms plus TOTAL FUEL display.

WJE ALL

WJE 406-408, 411, 415-427, 429

- (9) Push in channel selector TEST knob and hold. L MAIN, R MAIN, and CTR displays should read 1500(±50) kilograms. TOTAL FUEL display should read sum of tank displays (+0,-25) kilograms. GROSS WT display should read 50,000 plus TOTAL FUEL display. Release knob.

WJE 861-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

Push in channel selector TEST knob and hold. L MAIN, R MAIN, and CTR displays should read 3000(±100) pounds. TOTAL FUEL display should read sum of tank displays (+0,-50) pounds. GROSS WT display should read 100000 plus TOTAL FUEL display. Release knob.

WJE 401-404, 412, 414, 873, 874, 892

Push in channel selector TEST knob and hold. L MAIN, R MAIN, CTR, FWD, and AFT displays should read 3000(±100) pounds. TOTAL FUEL display should read sum of tank displays (+0,-50) pounds. GROSS WT display should read 100,000 pounds plus TOTAL FUEL display. Release knob.

WJE 405, 409, 410, 877-881, 883, 884

Push in channel selector TEST knob and hold. L MAIN, R MAIN, CTR, FWD and AFT displays should read 1500(±50) kilograms. TOTAL FUEL display should read sum of tank displays (+0,-25) kilograms. GROSS WT display should read 50,000 kilograms plus TOTAL FUEL display. Release knob.

WJE 401-405, 409, 410, 412, 414, 873, 874, 877-881, 883, 884, 892

NOTE: If aircraft FWD and AFT fuselage tanks are sealed off or not installed, the GROSS WT and the TOTAL FUEL display will be in error by the value of the two missing tanks.

WJE ALL

- (10) Using small screwdriver, rotate C/S switch, located above ZFW knob on lower right corner of CDU, counterclockwise to S position. Displays should read same as in Paragraph 2.A.(9).

WJE 406-408, 411, 415-427, 429

- (11) Rotate C/S switch clockwise to C position. L MAIN, R MAIN, and CTR displays should read 2000(±50) kilograms. TOTAL FUEL display should read sum of tank displays (+0,-25) kilograms. GROSS WT display should read 50,000 kilograms plus TOTAL FUEL display.

WJE 405, 409, 410, 877-881, 883, 884

- (12) Rotate C/S switch clockwise to C position. L MAIN, R MAIN, CTR, FWD and AFT displays should read 2000(±50) kilograms. TOTAL FUEL display should read sum of tank displays (+0,-25) kilograms. GROSS WT display should read 50,000 kilograms plus TOTAL FUEL display.

WJE 861-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

- (13) Rotate C/S switch clockwise to C position. L MAIN, R MAIN, and CTR displays should read 4050(±100) pounds. TOTAL FUEL display should read sum of tank displays (+0,-50) pounds. GROSS WT display should read 100000 pounds plus TOTAL FUEL display.

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WJE 401-404, 412, 414, 873, 874, 892

- (14) Rotate C/S switch clockwise to C position. L MAIN, R MAIN, CTR, FWD, and AFT displays should read 4050(\pm 100) pounds. TOTAL FUEL display should read sum of tank displays (+0,-50) pounds. GROSS WT display should read 100,000 pounds plus TOTAL FUEL display.

WJE ALL

WJE 405-411, 415-427, 429, 877-881, 883, 884

- (15) Rotate CD switch, located above channel selector switch on lower left corner of CDU, counterclockwise to CD position. L MAIN, R MAIN, and CTR displays should read 1500(\pm 50) kilograms. TOTAL FUEL display should read sum of tank displays (+0,-25) kilograms. GROSS WT display should read 50,000 plus TOTAL FUEL display.

WJE 401-404, 412, 414, 861-866, 868, 869, 871-876, 886, 887, 891-893

Rotate CD switch, located above channel selector switch on lower left corner of CDU, counterclockwise to CD position. L MAIN, R MAIN, and CTR displays should read 3000. TOTAL FUEL display should read sum of tank displays (+0,-50) pounds. GROSS WT display should read 100000 plus TOTAL FUEL display.

WJE ALL

NOTE: This step checks CDU display independently from the rest of the system.

WJE 401-405, 409, 410, 412, 414, 873, 874, 877-881, 883, 884, 892

WJE 405, 409, 410, 877-881, 883, 884

- (16) On captain's instrument panel, rotate CD switch on AUX FUEL CDU, counterclockwise to CD position. FWD and AFT displays should read 1500 (\pm 50) kilograms.

WJE 401-404, 412, 414, 873, 874, 892

On captain's instrument panel, rotate CD switch on AUX FUEL CDU, counterclockwise to CD position. FWD and AFT displays should read 3000 (\pm 100) pounds.

WJE 401-405, 409, 410, 412, 414, 873, 874, 877-881, 883, 884, 892

NOTE: This step checks AUX FUEL CDU display independently from the rest of the system.

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

- (17) Rotate channel selector knob clockwise to B position. Perform Paragraph 2.A.(9) through Paragraph 2.A.(15).

WJE 401-405, 409, 410, 412, 414, 873, 874, 877-881, 883, 884, 892

- (18) Rotate channel selector test knob clockwise to B position. Perform Paragraph 2.A.(9) through Paragraph 2.A.(16).

WJE ALL

- B. Test Load Selector Display Unit (Empty Tanks)

NOTE: Empty tanks means fuel quantity probes are above and clear of fuel.

- (1) Place WING FUEL CONTROL POWER switch, located on left side of refueling control panel in right wing leading edge, in ON position. Indicator light above switch should come on.

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

- (2) Place MASTER REFUEL, LEFT MAIN TANK, CENTER TANK, and RIGHT MAIN TANK switches in AUTO FILL position.

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WJE ALL

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WJE 401-405, 409, 410, 412, 414, 873, 874, 877-881, 883, 884, 892

- (3) Place MASTER REFUEL, L MAIN, CTR, R MAIN, FWD AUX, and AFT AUX switches in AUTO FILL position.

WJE 405-411, 415-427, 429, 877-881, 883, 884

- (4) Rotate REFUEL control knob, located below FUNCTION control knob, to AUTO position. All FUEL QTY displays should read 00(+25,-0) kilograms.

WJE 401-404, 412, 414, 861-866, 868, 869, 871-876, 886, 887, 891-893

- (5) Rotate REFUEL control knob, located below FUNCTION control knob, to AUTO position. All FUEL QTY displays should read 00(+50,-0) pounds.

WJE 405-411, 415-427, 429, 877-881, 883, 884

- (6) Rotate FUNCTION control knob located on right side of Load Selector Display Unit (LSDU) on refueling control panel, to DIGIT TEST position and hold. Each FUEL QTY and FUEL SELECT display located on LSDU should read 8888. Release knob.

WJE 401-404, 412, 414, 861-866, 868, 869, 871-876, 886, 887, 891-893

- (7) Rotate FUNCTION control knob located on right side of Load Selector Display Unit (LSDU) on refueling control panel, to DIGIT TEST position and hold. Each FUEL QTY and FUEL SELECT display located on LSDU should read 88888. Release knob.

WJE 405-411, 415-427, 429, 877-881, 883, 884

- (8) Rotate FUNCTION control knob to SYSTEM TEST position and hold. FUEL QTY displays should read 1500(±50) kilograms. Record quantity. Release knob.

WJE 401-404, 412, 414, 861-866, 868, 869, 871-876, 886, 887, 891-893

- (9) Rotate FUNCTION control knob to SYSTEM TEST position and hold. FUEL QTY displays should read 3000(±100) pounds. Record quantity. Release knob.

WJE 405-411, 415-427, 429, 877-881, 883, 884

- (10) Rotate FUNCTION control knob to DISPLAY TEST position and hold. All displays should read 1500(±50) kilograms. Release knob.

WJE 401-404, 412, 414, 861-866, 868, 869, 871-876, 886, 887, 891-893

- (11) Rotate FUNCTION control knob to DISPLAY position and hold. All displays should read 3000(±100) pounds. Release knob.

WJE 405-411, 415-427, 429, 877-881, 883, 884

- (12) Select FUEL SELECT quantity of 75 kilograms more than quantity recorded in Paragraph 2.B.(8) for each tank. Quantity is selected by pulling out and rotating respective SELECT knob to desired quantity.

WJE 401-404, 412, 414, 861-866, 868, 869, 871-876, 886, 887, 891-893

- (13) Select FUEL SELECT quantity of 150 pounds more than quantity recorded in Paragraph 2.B.(9) for each tank. Quantity is selected by pulling out and rotating respective SELECT knob to desired quantity.

WJE ALL

- (14) Push in respective SET knobs and observe that fuel fill valves located directly above LSDU open. This is indicated by manual valve control handle moving to OPEN position as marked on valve actuator base.

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WJE ALL

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TP-80MM-WJE

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- (15) Rotate FUNCTION control knob to SYSTEM TEST position and hold. Fill valves should remain open. Release knob.
- (16) Pull out fuel SET knobs. Fill valves should close.

WJE 405-411, 415-427, 429, 877-881, 883, 884

- (17) Set FUEL SELECT quantity of 50 kilograms more than quantity recorded in Paragraph 2.B.(8).

WJE 401-404, 412, 414, 861-866, 868, 869, 871-876, 886, 887, 891-893

- (18) Set FUEL SELECT quantity of 100 pounds more than quantity recorded in Paragraph 2.B.(9).

WJE ALL

- (19) Push in SET knobs. Respective valves should open.
- (20) Rotate FUNCTION control knob to SYSTEM TEST position and hold. Fill valves should close. Release knob.
- (21) Rotate REFUEL control knob to AUTO OVERRIDE position. FUEL SELECT display should go off. Fill valves should open.

WJE 406-408, 411, 415-427, 429

- (22) Rotate FUNCTION control knob to DISPLAY TEST position and hold. L MAIN, R MAIN, and CTR displays should read 1500 kilograms. Release knob.

WJE 405, 409, 410, 877-881, 883, 884

- (23) Rotate FUNCTION control knob to DISPLAY TEST position and hold. L MAIN, R MAIN, FWD AUX and AFT AUX displays should read 1500 kilograms. Release knob.

WJE 861-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

- (24) Rotate FUNCTION control knob to DISPLAY TEST position and hold. L MAIN, R MAIN, and CTR displays should read 3000 pounds. Release knob.

WJE 401-404, 412, 414, 873, 874, 892

- (25) Rotate FUNCTION control knob to DISPLAY TEST position and hold. L MAIN, R MAIN, FWD AUX and AFT AUX displays should read 3000 pounds. Release knob.

WJE ALL

- (26) Place WING FUEL CONTROL POWER switch in OFF position.
- C. Test Load Selector Display Unit (Wet Tanks)
- NOTE: Wet tanks means fuel quantity probes are in contact with fuel. (Fuel quantity indicators read more than zero and less than full quantity.)
- (1) Place WING FUEL CONTROL POWER switch, located on right side of refueling control panel in right wing leading edge, in ON position. Indicator light above switch should come on.

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

- (2) Place MASTER REFUEL, LEFT MAIN TANK, CENTER TANK, and RIGHT MAIN TANK switches in AUTO FILL position. Note fuel quantity for each tank as displayed on LSDU.

WJE 401-405, 409, 410, 412, 414, 873, 874, 877-881, 883, 884, 892

- (3) Place MASTER REFUEL, L MAIN, CTR, R MAIN, FWD AUX and AFT AUX switches in AUTO FILL position.

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WJE 405-411, 415-427, 429, 877-881, 883, 884

- (4) Rotate FUNCTION control knob located on right side of Load Selector Display Unit (LSDU) on refueling control panel, to DIGIT TEST position and hold. Each FUEL QTY and FUEL SELECT display located on LSDU should read 8888. Release knob.

WJE 401-404, 412, 414, 861-866, 868, 869, 871-876, 886, 887, 891-893

- (5) Rotate FUNCTION control knob located on right side of Load Selector Display Unit (LSDU) on refueling control panel, to DIGIT TEST position and hold. Each FUEL QTY and FUEL SELECT display located on LSDU should read 88888. Release knob.

WJE ALL

- (6) Rotate REFUEL control knob, located below FUNCTION control knob, to AUTO position.
- (7) Note and record fuel quantity in each tank.

WJE 405-411, 415-427, 429, 877-881, 883, 884

- (8) Select FUEL SELECT quantity of 75 kilograms more than quantity recorded in Paragraph 2.C.(7) for each tank. Quantity is selected by pulling out and rotating respective SELECT knob to desired quantity.

WJE 401-404, 412, 414, 861-866, 868, 869, 871-876, 886, 887, 891-893

- (9) Select FUEL SELECT quantity of 150 pounds more than quantity recorded in Paragraph 2.C.(7) for each tank. Quantity is selected by pulling out and rotating respective SELECT knob to desired quantity.

WJE ALL

- (10) Push in respective SET knobs and observe that fuel fill valves located directly above LSDU open. This is indicated by manual valve control handle moving to OPEN position as marked on valve actuator base.

WJE 405-411, 415-427, 429, 877-881, 883, 884

- (11) Rotate FUNCTION control knob to SYSTEM TEST position and hold. Fill valves should remain open if selection is 1429 kgs or more. Release knob.
NOTE: Fill valves should close if fuel selection is less than 1429 kgs.

WJE 401-404, 412, 414, 861-866, 868, 869, 871-876, 886, 887, 891-893

- (12) Rotate FUNCTION control knob to SYSTEM TEST position and hold. Fill valves should remain open if selection is 3150 pounds or more. Release knob.
NOTE: Fill valves should close if fuel selection is less than 3150 pounds.

WJE ALL

- (13) Pull out fuel set knobs. Fill valves should close.

WJE 405-411, 415-427, 429, 877-881, 883, 884

- (14) Set FUEL SELECT quantity for each tank of 50 kilograms more than quantity recorded in Paragraph 2.C.(7).

WJE 401-404, 412, 414, 861-866, 868, 869, 871-876, 886, 887, 891-893

- (15) Set FUEL SELECT quantity for each tank of 100 pounds more than quantity noted in Paragraph 2.C.(7).

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WJE ALL

- (16) Push in SET knobs. Respective valves should remain closed.
- (17) Rotate REFUEL control knob to AUTO OVERRIDE position. FUEL SELECT display should go off. Fill valves should open.

WJE 406-408, 411, 415-427, 429

- (18) Rotate FUNCTION control knob to DISPLAY TEST position and hold. L MAIN, R MAIN, and CTR displays should read 1500 kilograms. Release knob.

WJE 861-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

- (19) Rotate FUNCTION control knob to DISPLAY TEST position and hold. L MAIN, CTR, R MAIN, FWD AUX and AFT AUX displays should read 3000 pounds. Release knob.

WJE 405, 409, 410, 877-881, 883, 884

- (20) Rotate FUNCTION control knob to DISPLAY TEST position and hold. L MAIN, CTR, R MAIN, FWD AUX and AFT AUX displays should read 1500 kilograms. Release knob.

WJE 401-404, 412, 414, 873, 874, 892

- (21) Rotate FUNCTION control knob to DISPLAY TEST position and hold. L MAIN, CTR, R MAIN, FWD AUX and AFT AUX displays should read 3000 pounds. Release knob.

WJE ALL

- (22) Place WING FUEL CONTROL POWER switch in OFF position.

WJE ALL POST MD80-28-222 OR POST MD80-SL-28-110

D. Functional Test of Load Selector Display Unit (LSDU)

- (1) Do functional test of Load Selector Display Unit (LSDU) (empty tanks) as follows:

NOTE: Empty tanks means fuel quantity probes are above and clear of fuel.

STEP	OPERATION	VISUAL INSPECTION
On the load selector display unit (LSDU):		
1	Place the POWER switch to the ON position.	The ON indicator light comes on.
2	Place the AUTO/OVERRIDE switch to the AUTO position.	The AUTO/OVERRIDE switch is in the AUTO position.
3	Verify that LB or KG is displayed in the FUELSELECT window, and the legend on the CDU matches the LB or KG in the FUEL SELECT window.	The value LB or KG is displayed in the FUEL SELECT window and matches the value in the legend.
4	Verify that the fuel quantity indicator for each tank reads 0 lb +50, -0 (0 +23 -0 kg).	The fuel tank quantity indicator for each tank reads 0 lb +50, -0 (0 +23 -0 kg).
5	Verify that the FUEL QTY indicator reads the sum of all tanks ±100 lb (45.53 kg).	The FUEL QTY indicator reads the sum of all tanks ±100 lb (±45.53 kg).
6	Rotate FUNCTION control knob to SYSTEM TEST position and hold. All displays should read 1500(±50) kilograms. Release knob.	All displays should read 1500(±50) kilograms. Release knob.
7	Verify that after approximately 5 seconds the LSDU returns to display the original fuel quantities.	After 5 seconds the LSDU returns to display the original fuel quantities.

EFFECTIVITY WJE ALL

28-40-00

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WJE ALL POST MD80-28-222 OR POST MD80-SL-28-110 (Continued)

(Continued)

STEP	OPERATION	VISUAL INSPECTION
8	Move the POWER switch to the OFF position.	The ON indicator light goes off.

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WJE ALL

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FUEL QUANTITY PROBES - MAINTENANCE PRACTICES

1. General

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

A. The fuel quantity probes are spaced spanwise in the fuel tanks.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

B. The fuel quantity probes in the integral tanks are spaced spanwise in the upper skin of the wing. The fuselage fuel tanks have two probes each which are located fore and aft in the tank. Access to the fuselage tank probes and access doors is through panels in the passenger compartment floor.

WJE 401-412, 414-427, 429, 863-866, 868, 869, 871-881, 883, 884, 886, 887, 891-893

C. Removal and installation procedures are identical for all probes. Corresponding probes on opposite sides are interchangeable.

WJE 861, 862

D. Removal and installation procedures are identical for all probes. However, when removing forward 780 gallon fuel tank forward fuel probe, it is necessary to remove the beam stabilization intercostal located approximately at Sta. Y=503 and Y=522 at X=6.

WJE ALL

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

E. Access to probes is as follows:

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

Access to fuselage fuel tank probes is through panels in fuselage floor above the applicable tank. Remove all cabin equipment as applicable to gain access to fuel access panels. Access to integral fuel tank probes is as follows:

WJE ALL

Table 201

Item	Access Door
Left Main Tank	
No. 5	1307C
No. 6	1307C
No. 7	1307C
No. 8	1311C
No. 9	1355C
No. 10	1363C
No. 11	1367C
No. 12	1377C
Center Tank	

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Table 201 (Continued)

Item	Access Door
No. 1	1333C
No. 2	1436C
No. 3 (left)	1333C
No. 3A (right)	1436C
No. 4 (left)	1333C
No. 4A (right)	1436C
Right Main Tank	
No. 5	1410C
No. 6	1410C
No. 7	1410C
No. 8	1414C
No. 9	1454C
No. 10	1462C
No. 11	1466C
No. 12	1476C

F. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201.

2. Removal/Installation Fuel Quantity Probe

A. Remove Probe

(1) Prepare applicable fuel tank for entry. (PAGEBLOCK 28-00-00/201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C

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(Continued)

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893

H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A, B, & C
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UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893

J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

WARNING: VAPOR FROM OPEN FUSELAGE FUEL TANKS IS COMBUSTIBLE. DEACTIVATE EMERGENCY BATTERY PACK FOR OVERWING EVACUATION LIGHTS BY REMOVING BATTERY PACK PRIOR TO MAINTENANCE ON AFT FUSELAGE FUEL TANK.

- (3) Remove battery pack from overwing emergency evacuation lights. (PAGEBLOCK 33-53-00/401)

WJE 861, 862

- (4) Remove beam stabilization intercostal, Sta. Y=503 and Y=522 at X=6 to gain access to forward fuel tank probe. (Figure 204)

WJE ALL

- (5) Open clamp holding wires.
- (6) Tag and disconnect wires.

NOTE: It is not necessary to remove terminal screws completely.

- (7) Remove probe.

NOTE: Probe No. 11 (left or right side) may have washers (maximum of three) installed as spacers between probe lower attach bracket and probe clamp. Retain washers for use when installing probe.

B. Install Probe

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WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893

H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A, B, & C
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UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893

J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (2) Install probe. If applicable, install spacer washers removed in (Paragraph 2.A.(7)).

WJE 401-412, 414-427, 429, 863-866, 868, 869, 871-881, 883, 884, 886, 887, 891-893

- (3) Connect wires making certain that wires are connected to correct terminals.

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

(Table 202)

WJE 401-405, 409, 410, 412, 414, 873, 874, 877-881, 883, 884, 892

(Table 203)

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WJE 861, 862

- (4) Remove tags and connect wires making certain that wires are connected to correct terminals. (Table 204)

WJE ALL

- (5) Position wires in clamp and close clamp.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

- (6) Install the battery pack for the overwing emergency evacuation lights. (EMERGENCY LIGHTS - REMOVAL/INSTALLATION, PAGEBLOCK 33-53-00/401)

WJE 861, 862

- (7) Install beam stabilization intercostal Sta. Y=503 and Y=522 at X=6, after installation of forward fuel tank forward probe.

WJE ALL

- (8) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893

H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C
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UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893

J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

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(9) Test fuel quantity indicating system. (INDICATING, SUBJECT 28-40-00, Page 201)

NOTE: Indicating system test need be performed only for system corresponding to tank in which component was replaced.

WJE 406-408, 411, 415-427, 429, 863-866, 868, 869, 871, 872, 875, 876, 886, 887, 891, 893

Table 202 Fuel Quantity Probe Wiring Connections

TANK	PROBE NO.	WIRE NO.		
		Hi-Z TERMINAL	Lo-Z TERMINAL	
Left Main	5	1Q176B22-BL	1Q177B22WH	
	6	1Q176C22-BL	1Q177C22WH	
	7	1Q176D22-BL	1Q177D22WH	
	8	1Q176E22-BL	1Q177E22WH	
	9	1Q176F22-BL	1Q177F22WH	
	10	1Q176G22-BL	1Q177G22WH	
	11	1Q176H22-BL	1Q177H22WH	
	12	1Q176J22-BL	1Q177J22WH	
	Center	1	Q176B22-BL	Q177B22-WH
		2	Q176C22-BL	Q177C22-WH
		3 (left)	Q176D22-BL	Q177D22-WH
		3A (right)	Q176F22-BL	Q177F22-WH
4 (left)		Q176E22-BL	Q177E22-WH	
4A (right)		Q176G22-BL	Q177G22-WH	
Right Main	5	2Q176B22-BL	2Q177B22WH	
	6	2Q176C22-BL	2Q177C22WH	
	7	2Q176D22-BL	2Q177D22WH	
	8	2Q176E22-BL	2Q177E22WH	
	9	2Q176F22-BL	2Q177F22WH	
	10	2Q176G22-BL	2Q177G22WH	
	11	2Q176H22-BL	2Q177H22WH	
	12	2Q176J22-BL	2Q177J22WH	

WJE 401-405, 409, 410, 412, 414, 873, 874, 877-881, 883, 884, 892

Table 203 Fuel Quantity Probe Wiring Connections

TANK	PROBE NO.	WIRE NO.	
		Hi-Z TERMINAL	Lo-Z TERMINAL
Left Main	5	1Q176B22-BL	1Q177B22WH

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WJE 401-405, 409, 410, 412, 414, 873, 874, 877-881, 883, 884, 892 (Continued)

Table 203 Fuel Quantity Probe Wiring Connections (Continued)

TANK	PROBE NO.	WIRE NO.	
		Hi-Z TERMINAL	Lo-Z TERMINAL
	6	1Q176C22-BL	1Q177C22WH
	7	1Q176D22-BL	1Q177D22WH
	8	1Q176E22-BL	1Q177E22WH
	9	1Q176F22-BL	1Q177F22WH
	10	1Q176G22-BL	1Q177G22WH
	11	1Q176H22-BL	1Q177H22WH
	12	1Q176J22-BL	1Q177J22WH
Center	1	Q176B22-BL	Q177B22-WH
	2	Q176C22-BL	Q177C22-WH
	3 (left)	Q176D22-BL	Q177D22-WH
	3A (right)	Q176F22-BL	Q177F22-WH
	4 (left)	Q176E22-BL	Q177E22-WH
	4A (right)	Q176G22-BL	Q177G22-WH
Right Main	5	2Q176B22-BL	2Q177B22WH
	6	2Q176C22-BL	2Q177C22WH
	7	2Q176D22-BL	2Q177D22WH
	8	2Q176E22-BL	2Q177E22WH
	9	2Q176F22-BL	2Q177F22WH
	10	2Q176G22-BL	2Q177G22WH
	11	2Q176H22-BL	2Q177H22WH
	12	2Q176J22-BL	2Q177J22WH
Fwd Fus	14	Q500D22BL	Q501C22WH
Aft Fus	14	Q503D22BL	Q504C22WH
	13	(H) 13-14 TERMINAL	(H) RH-FH TERMINAL
Fwd Fus		Q500D22BL	Q500C22BL Q500B22BL
Aft Fus		Q503D22BL	Q503B22DL Q503C22BL
	13	(L) 14 TERMINAL	(L) 13-FL TERMINAL
Fwd Fus		Q501C22WH	Q501B22WH
Aft Fus		Q504C22WH	Q504B22WH
	13	(R) R TERMINAL	(R) FR TERMINAL

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WJE 401-405, 409, 410, 412, 414, 873, 874, 877-881, 883, 884, 892 (Continued)

Table 203 Fuel Quantity Probe Wiring Connections (Continued)

TANK	PROBE NO.	WIRE NO.	
		Hi-Z TERMINAL	Lo-Z TERMINAL
Fwd Fus		Q502C22WH	Q502B22RD
Aft Fus		Q505C22WH	Q505B22RD

WJE 861, 862

Table 204 Fuel Quantity Probe Wiring Connections

TANK	PROBE NO.	WIRE NO.		
Left Main	5	1Q176B22-BL	1Q177B22WH	
	6	1Q176C22-BL	1Q177C22WH	
	7	1Q176D22-BL	1Q177D22WH	
	8	1Q176E22-BL	1Q177E22WH	
	9	1Q176F22-BL	1Q177F22WH	
	10	1Q176G22-BL	1Q177G22WH	
	11	1Q176H22-BL	1Q177H22WH	
	12	1Q176J22-BL	1Q177J22WH	
	Center	1	Q176B22-BL	Q177B22-WH
		2	Q176C22-BL	Q177C22-WH
		3 (left)	Q176D22-BL	Q177D22-WH
		3A (right)	Q176F22-BL	Q177F22-WH
4 (left)		Q176E22-BL	Q177E22-WH	
4A (right)		Q176G22-BL	Q177G22-WH	
Right Main	5	2Q176B22-BL	2Q177B22WH	
	6	2Q176C22-BL	2Q177C22WH	
	7	2Q176D22-BL	2Q177D22WH	
	8	2Q176E22-BL	2Q177E22WH	
	9	2Q176F22-BL	2Q177F22WH	
	10	2Q176G22-BL	2Q177G22WH	
	11	2Q176H22-BL	2Q177H22WH	
	12	2Q176J22-BL	2Q177J22WH	
	FWD FUS	17	(H) 17-18	(H) RH-FH
			Q500E22BL	Q500B22BL
				Q500C22BL

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WJE 861, 862 (Continued)

Table 204 Fuel Quantity Probe Wiring Connections (Continued)

TANK	PROBE NO.	WIRE NO.		
	17	(L) 18	(L) 17.FL	
		Q501E22WH	Q501B22WH	
	17	(R) (R)	(R) FR	
		Q502C22WH	Q502B22RD	
	18	(H)	(L)	
		Q500E22BL	Q501E22WH	
AFT FUS	19	(H) 19-20	(H) 21-22	(H) RH-FH
		Q504H22WH	Q504J22WH	Q503B22BL
		Q503G22BL	Q503J22BL	Q503C22BL
	19	(L) 19.20.21	(L) 22 FL	
		Q504G22WH	Q504J22WH	
			Q504B22WH	
	19	(R) R	(R) FR	
		Q505C22WH	Q505B22RD	
	20	H	L	
		Q503G22BL	Q504G22WH	
	21	H	L	
		Q503H22BL	Q504H22WH	
	22	H	L	
		Q503J22BL	Q504J22WH	

WJE ALL

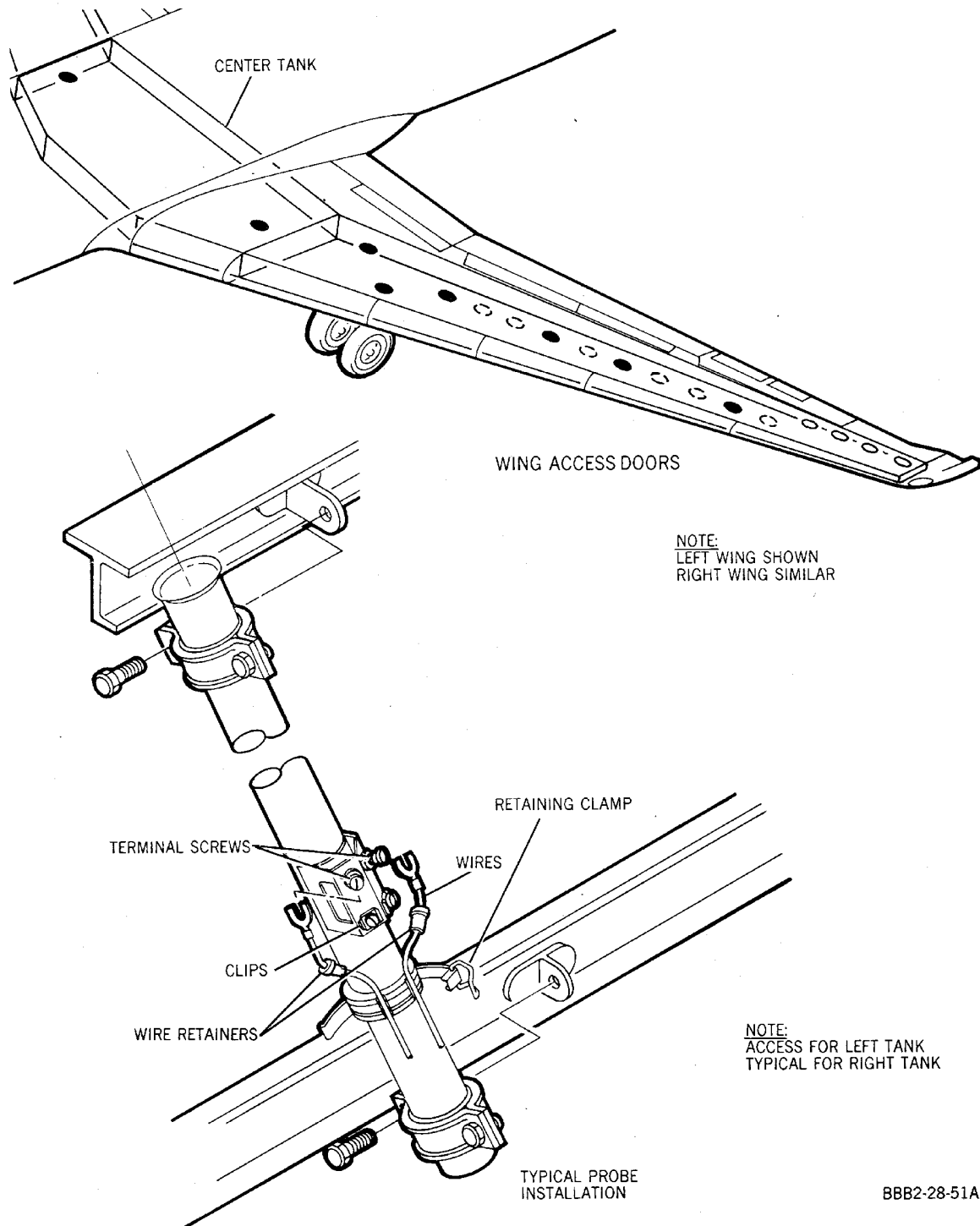
EFFECTIVITY
WJE ALL

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Fuel Quantity Probe -- Removal/Installation
Figure 201/28-40-01-990-801

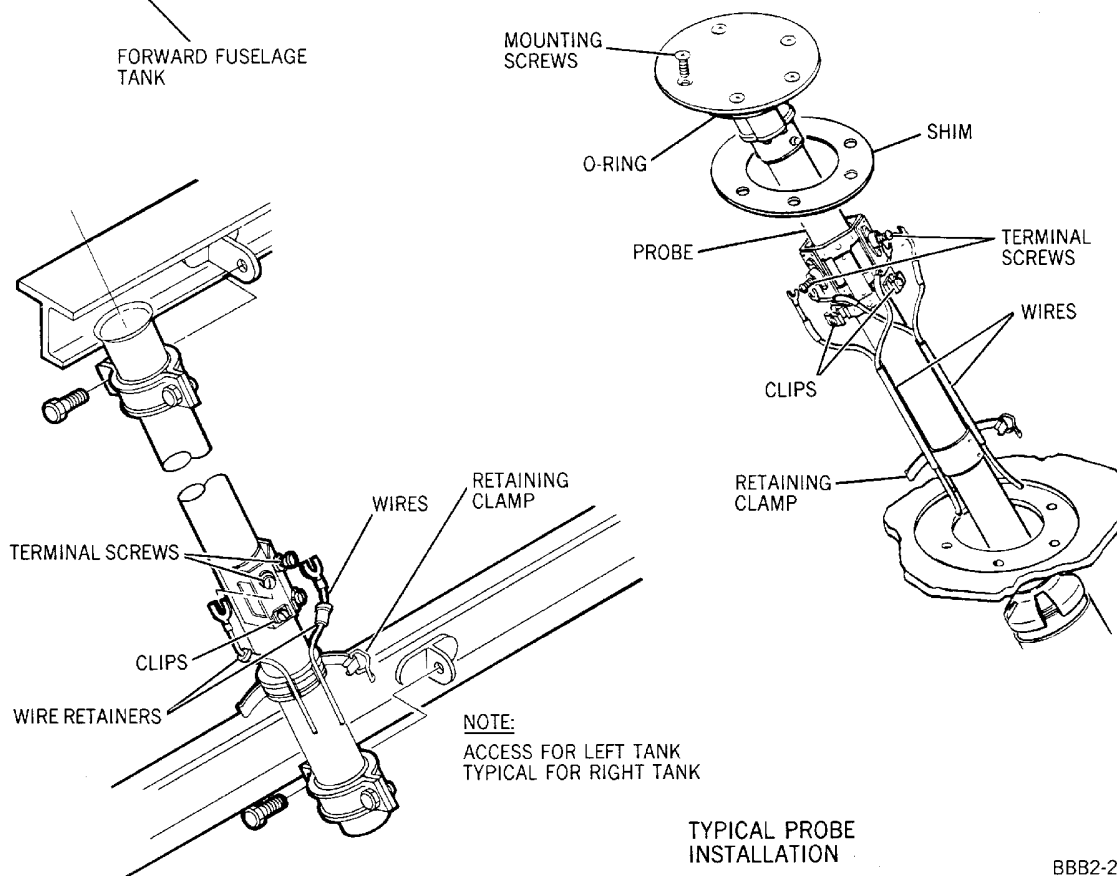
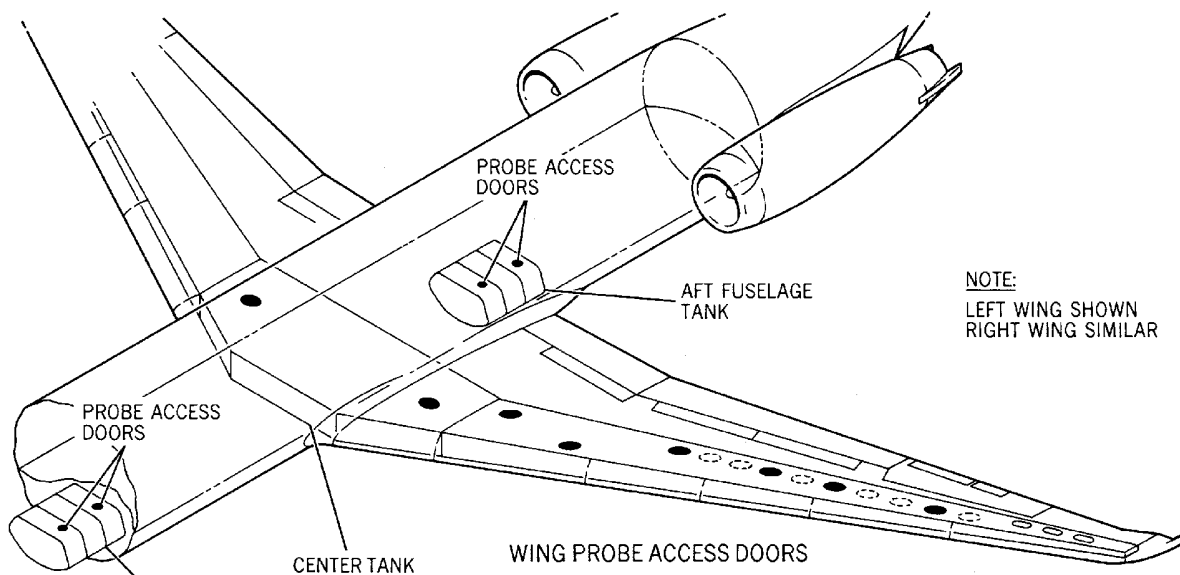
EFFECTIVITY
WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 876, 886, 887, 891, 893

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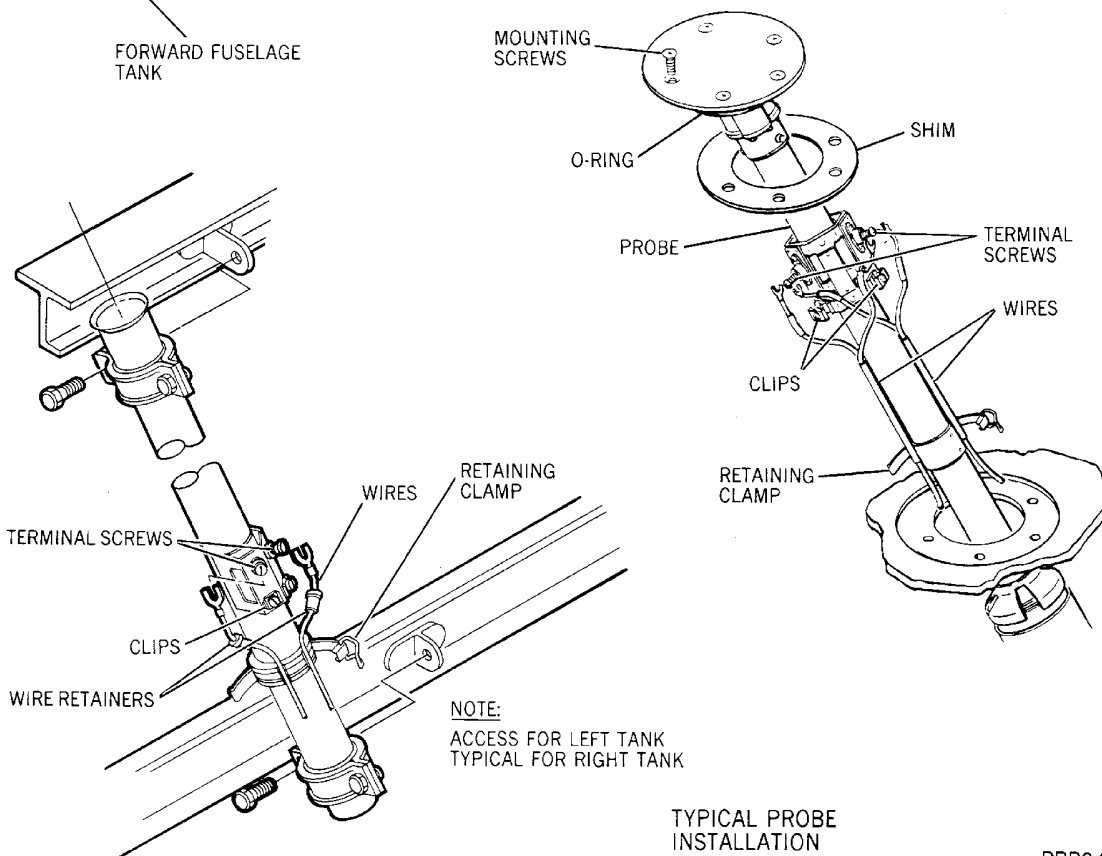
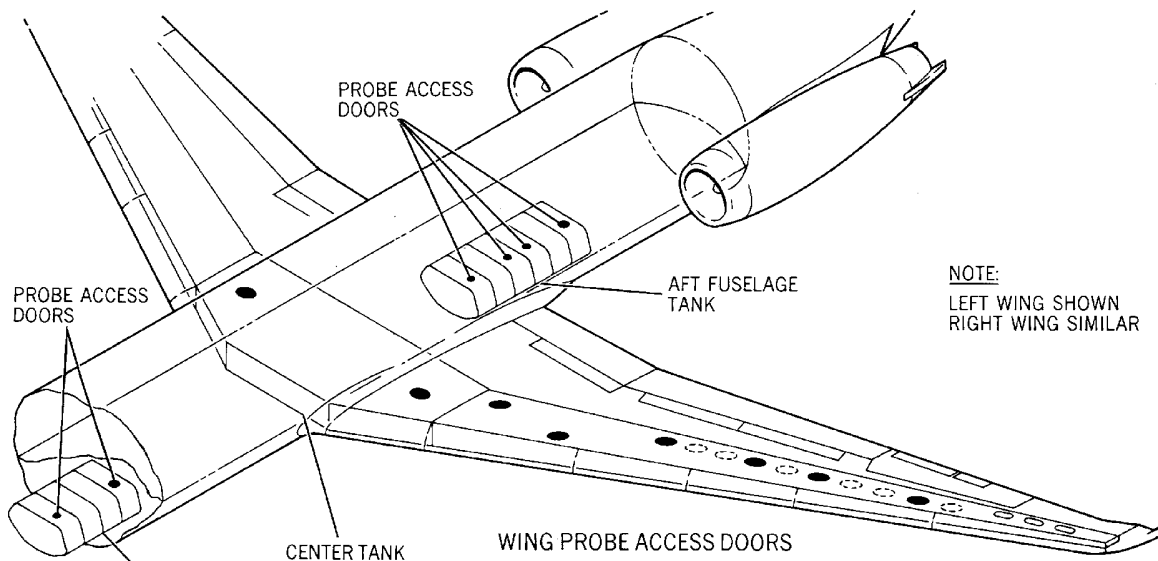
**Fuel Quantity Probe -- Removal/Installation
Figure 202/28-40-01-990-803**

EFFECTIVITY
WJE 401-405, 409, 410, 412, 414, 873, 874, 877-881,
883, 884, 892

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**Fuel Quantity Probe -- Removal/Installation
Figure 203/28-40-01-990-804**

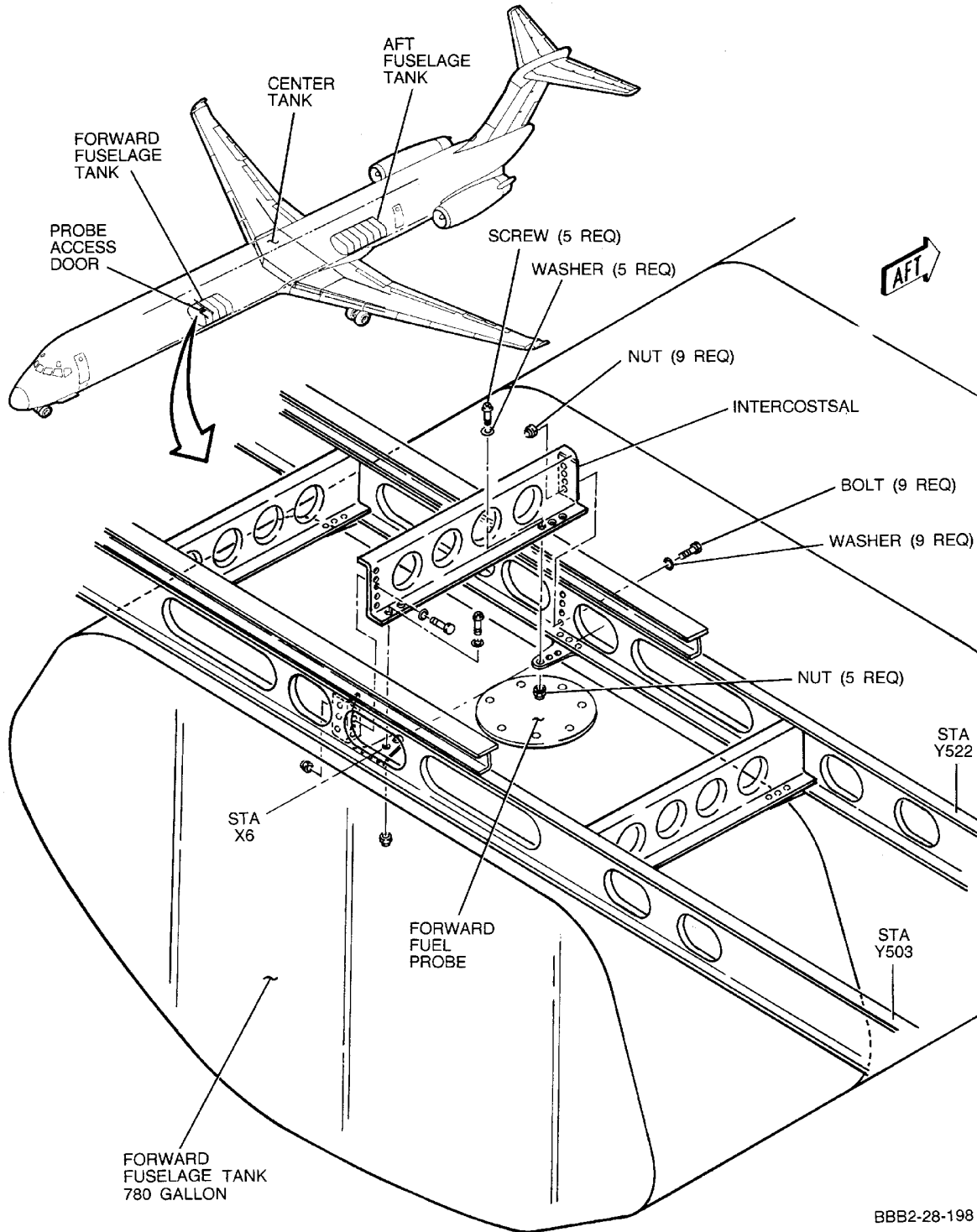
EFFECTIVITY
WJE 861, 862

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**Beam Stabilization Intercostal -- Removal/Installation
Figure 204/28-40-01-990-806**

EFFECTIVITY
WJE 861, 862

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MAGNETIC DRIPLESS FUEL MEASURING STICK - MAINTENANCE PRACTICES

1. General

- A. Magnetic driplless fuel measuring sticks are installed in the bottom of each fuel tank. The three outboard sticks in each tank are mounted in access doors. The inboard wing stick and the single center tank stick are mounted in openings in the wing bottom skin.
- B. Sticks may be removed from outside the tank without removing the housing or they may be left intact, with the housing and stick removed as an assembly. The removal procedures are identical for all sticks and can be accomplished without defueling the tanks. Tanks must be drained for housing removal. Access to housings is listed below.
- C. Access to housings is as follows:

Table 201

Item	Access Door
Left main tank Door mounted housing	
Outboard housing	1373C
Center housing	1367C
Inboard housing	1361C
Skin mounted housing	1311C
Center tank housing	1333C
Right main tank	
Door mounted housing	
Outboard housing	1472C
Center housing	1466C
Inboard housing	1460C
Skin mounted housing	1414C

- D. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices. (PAGEBLOCK 28-00-00/201)

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items.

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 202

Name and Number	Manufacturer
Torque wrench (0-100 inch-pounds)	
Petrolatum VV-P-236 DPM 675	
Sealant (PR-1422) DPM 2292-2	Products Research Co.

3. Removal/Installation Fuel Indicator Stick

- A. Remove Stick

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- (1) Press stick and rotate 90 degrees either direction to release.
 - (2) Remove snap ring retainer.
 - (3) Remove stick.
- B. Install Stick
- (1) Insert stick in housing.
 - (2) Install snap ring retainer.
 - (3) Press stick and rotate 90 degrees either direction to lock.
- C. Remove Housing
- (1) Prepare applicable fuel tank for entry. (PAGEBLOCK 28-00-00/201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (2) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (3) Remove access door with housing (outboard housings only).
- (4) Remove sealant.
- (5) Unscrew retaining nut.
- (6) Lower housing sufficiently to permit removal of float retainer. Remove retainer.
- (7) Remove float.
- (8) Remove bumper, retaining nut, and washer from housing.
- (9) Remove housing from tank.
- (10) Remove O-ring from housing. Discard O-ring.

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D. Install Housing

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (2) Remove retainer.
(3) Remove float.

WARNING: WHITE PETROLATUM IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN WHITE PETROLATUM IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT BREATHE THE MIST.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

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(WARNING PRECEDES)

- (4) Install O-ring in housing base groove. Make certain that groove, as well as O-ring, is well lubricated with Petrolatum (VV-P-236).
- (5) Install laminated washer with proper thickness to achieve required housing gap after torquing.
- (6) Insert housing partially into tank or door opening as applicable.
- (7) Place solid washer, bumper, retaining nut and float over housing.
- (8) Install float retainer.
- (9) Push housing remaining distance through opening. Make certain that O-ring snaps into groove as housing is seated into bushing.

NOTE: For center tank housing only: Make certain that tip of housing is seated in support at top of tank.

- (10) Tighten retaining nut to torque of 24-96 inch-pounds (2.9 to 10.7 N·M).
- (11) Push bumper down against threaded housing fitting.
- (12) Check that gap between tank skin and housing is .018(±.002) inch (0.457 ± 0.05 mm).

WARNING: LOW VISCOSITY POLYSULFIDE SEALANT IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOW VISCOSITY POLYSULFIDE SEALANT IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW VISCOSITY POLYSULFIDE SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

CAUTION: PREVENT FLOAT FROM TOUCHING UNCURED SEALANT. FLOAT COULD STICK TO SEALANT.

- (13) Apply sealant (PR-1422) around base of retaining nut and between housing flange and skin. (PAGEBLOCK 28-10-01/201)
- (14) Install access door with housing (door mounted housings only).
- (15) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

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UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

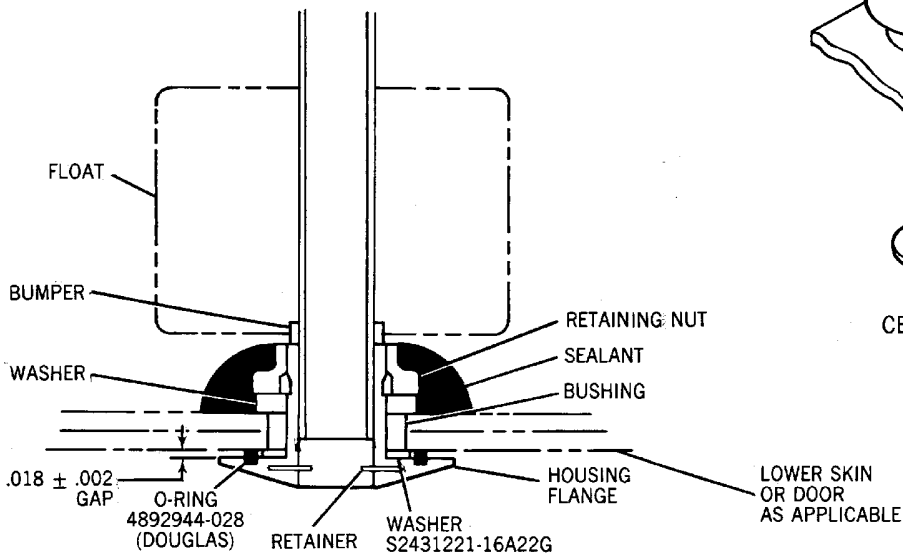
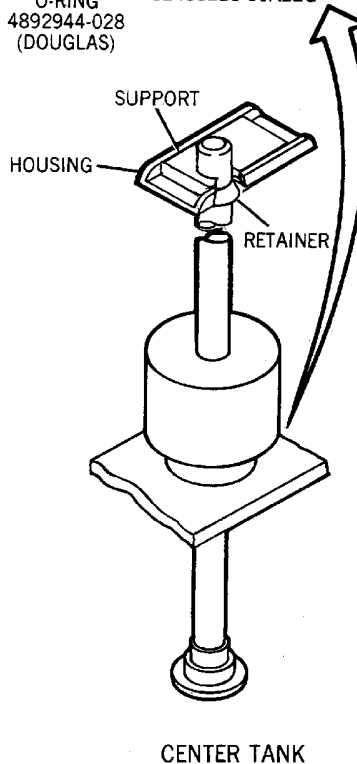
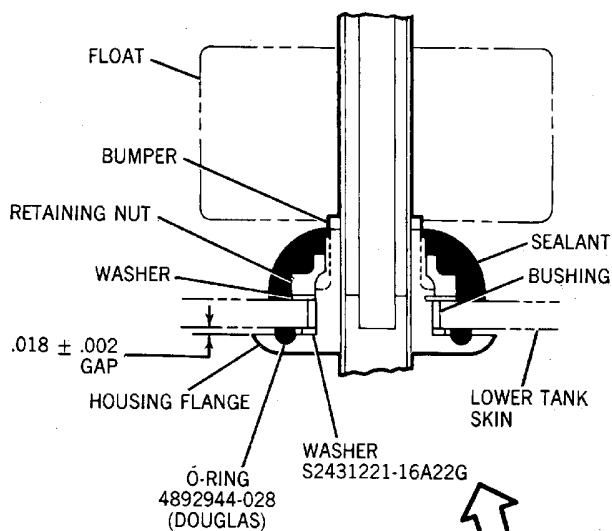
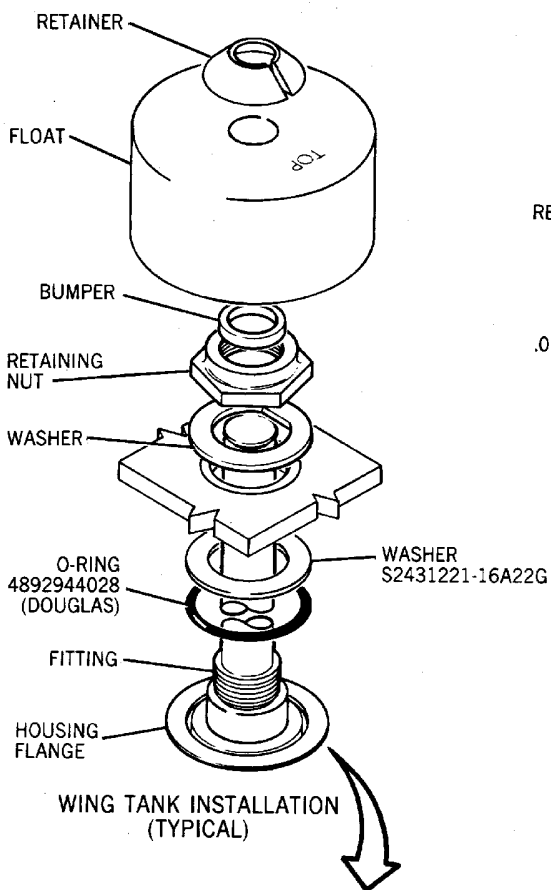
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Magnetic Dripless Fuel Measuring Sticks -- Removal/Installation
Figure 201/28-40-02-990-801

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COMPENSATOR - MAINTENANCE PRACTICES

1. General

- A. The compensators are mounted in the fuel tanks. There is one compensator in the inboard end of the left main tank and one in the inboard end of the right main tank. The center tank has one compensator located slightly to the right of the tank centerline.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

- B. Each fuselage fuel tank has one compensator attached to the rear stanchion located in the aft area of the tank near the cell and cavity door openings.
- C. Removal/installation procedures are similar for all compensators.

WJE ALL

- D. Access to compensators is as follows:

Table 201

Item	Access Door
Left main tank compensator	1307C
Center tank compensator	2302C
Right main tank compensator	1410C
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892	
Forward fuselage compensator	Mid cargo door
Aft fuselage compensator	Aft cargo door
WJE ALL	

- E. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201.

2. Removal/Installation Compensator

- A. Remove Compensator

- (1) Prepare applicable tank for entry. (PAGEBLOCK 28-00-00/201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (2) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

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(Continued)

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893			
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893			
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (3) Open clamp holding wires.
- (4) Tag and disconnect wires.

NOTE: It is not necessary to remove terminal screws completely.

- (5) Remove bolts; remove compensator with wire retaining clamp as an assembly.
- B. Install Compensator

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

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(Continued)

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893			
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893			
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (2) Connect wires to compensator. (Table 202)
- (3) Position wires under retainer clamp and close clamp.
- (4) Install compensator making certain that wires are connected to correct terminals.

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892

NOTE: On fuselage tank installations, make certain that the bottom clearance dimension of 1.50(±.12) inch (38(±3) mm) is maintained.

WJE ALL

- (5) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893			
H	25	B1-907	FWD AUX TANK FUEL XFER PUMP A PHASE A,B, & C

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WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893 (Continued)

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C
WJE 401-412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892, 893			
J	25	B1-909	AFT AUX TANK FUEL XFER PUMP A PHASE A, B, & C
J	27	B1-908	FWD AUX TANK FUEL XFER PUMP B PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (6) Test fuel quantity indicating system (INDICATING, SUBJECT 28-40-00, Page 201).

NOTE: Indicating system test need be performed only for system corresponding to tank in which component was replaced.

Table 202 Compensator Wiring Connections

TANK	WIRE NO.	
	Hi-Z TERMINAL	Lo-Z TERMINAL
Left Main	1Q176A22-BL	1Q178A22-WH
Center	Q176A22-BL	Q178A22-WH
Right Main	2Q176A22-BL	2Q178A22-WH
WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874, 877-881, 883, 884, 892		
Forward Fuselage	Q500C22-BL	Q502C22-WH
Aft Fuselage	Q503C22-BL	Q505C22-WH
WJE ALL		

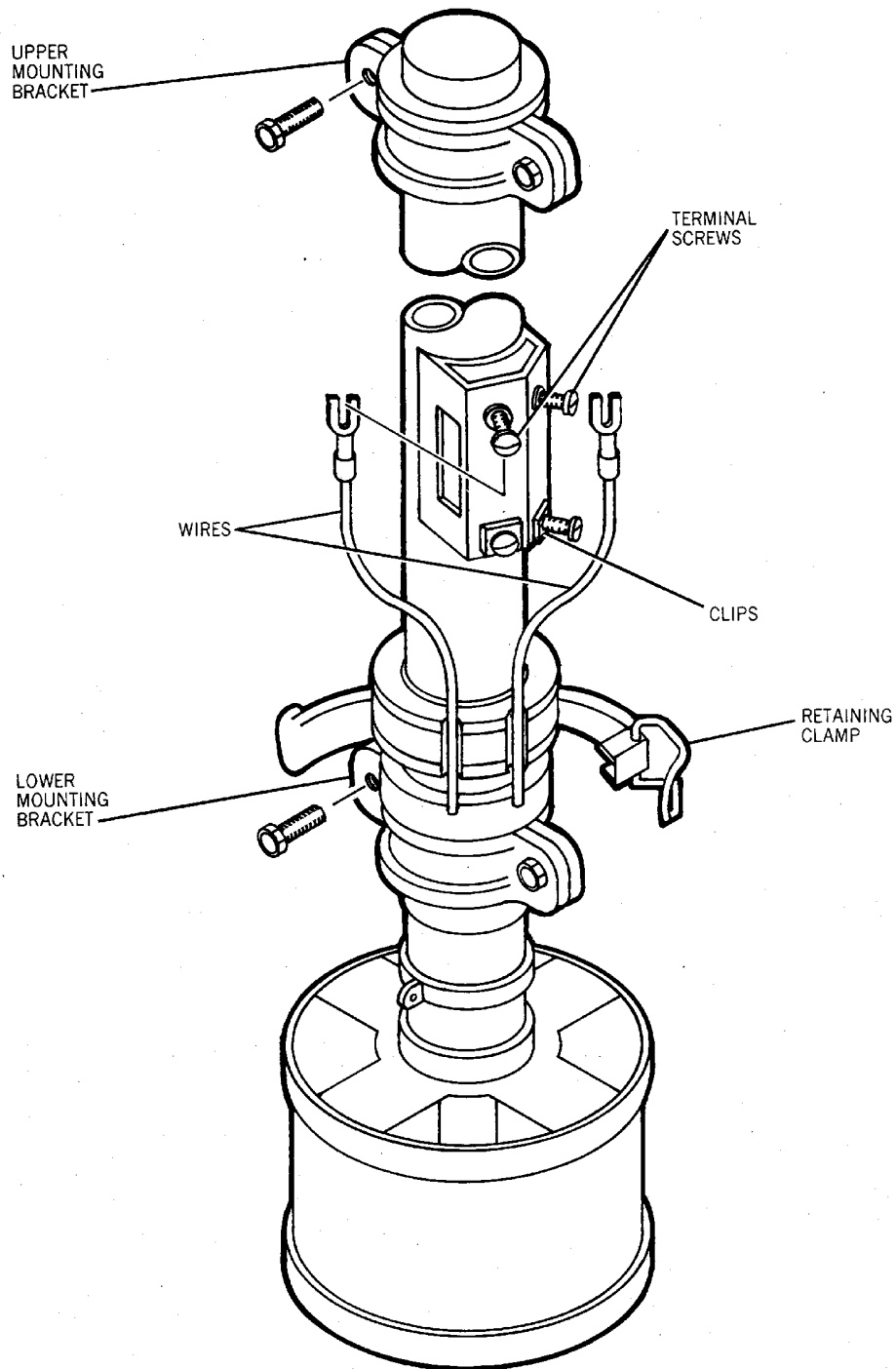
EFFECTIVITY
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BBB2-28-53

**Compensator -- Removal/Installation
Figure 201/28-40-03-990-801 (Sheet 1 of 2)**

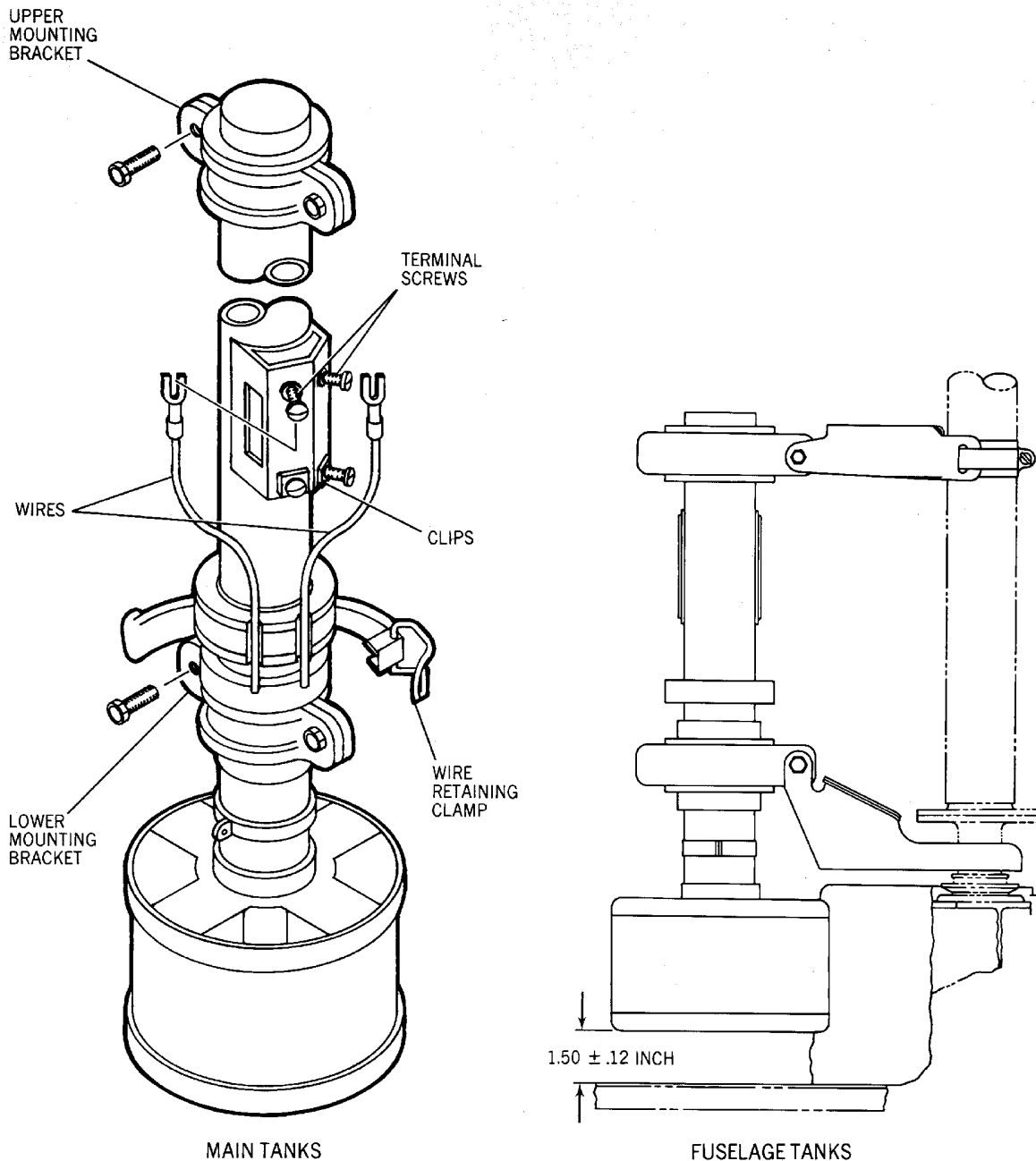
EFFECTIVITY
WJE 406-408, 411, 415-427, 429, 863-866, 868, 869,
871, 872, 875, 876, 886, 887, 891, 893

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Compensator -- Removal/Installation
Figure 201/28-40-03-990-801 (Sheet 2 of 2)

EFFECTIVITY

WJE 401-405, 409, 410, 412, 414, 861, 862, 873, 874,
877-881, 883, 884, 892

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FAULT ISOLATION JUNCTION - MAINTENANCE PRACTICES

1. General

- A. The fault isolation junctions are mounted in access doors in the upper skin of the fuel tanks. There is one junction in the left main tank, and one junction in the right main tank. The center tank has one junction in the left side. Corresponding junctions on each side of the airplane are interchangeable.
Screw holes in the attaching flanges are arranged in an uneven pattern to provide indexing for proper mounting in door opening. All junctions may be removed without completely defueling the tank as long as the fuel level is below the resultant opening in the tank.
- B. Removal/installation procedures are identical for all junctions.
- C. Access to junctions is as follows:

Table 201

Item	Access Door
Left main tank junction	1331C
Center tank junction	1333C
Right main tank	1434C

- D. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices. (PAGEBLOCK 28-00-00/201)

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed item.

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 202

Name and Number	Manufacturer
Sealant, low adhesion PR-1428 or PR-1773 B-1/2 or PR-1773 B-2 DMS 2410	Products Research and Chem. Corp.
Torque wrench (0 in-lb (0.0 N·m) - 100 in-lb (11.3 N·m) range)	

3. Removal/Installation Junction

- A. Remove Junction
 - (1) Defuel applicable tank. (PAGEBLOCK 28-00-00/201)

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WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (2) Open this circuit breaker and install safety tag:

UPPER EPC, FUEL

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	17	B1-822	FUEL QUANTITY POWER TRANSFER

- (3) Remove the attachment screws and retain.
- (4) Pull junction out of tank until wire terminals and clamp can be reached.
- (5) Open clamp holding wires.
- (6) Tag and disconnect wires.

NOTE: It is not necessary to remove terminal screws completely.

- (7) Remove junction from tank. Discard O-rings.

B. Install Junction

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that this circuit breaker is open and has safety tag:

UPPER EPC, FUEL

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	17	B1-822	FUEL QUANTITY POWER TRANSFER

- (2) Clean all foreign matter from bonding surface of tank or junction flange.
- (3) Install new O-ring on junction.
- (4) Connect wires to junction. (Table 203)
- (5) Position wires in clamp and close clamp.
- (6) Install junction using the retained screws. Torque screws to 80 in-lb (9.0 N·m) to 100 in-lb (11.3 N·m).

WARNING: LOW ADHESION SEALANT IS AN AGENT THAT IS POISONOUS. MAKE SURE ALL PERSONS OBEY THE PRECAUTIONS WHEN LOW ADHESION SEALANT IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW ADHESION SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

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(WARNING PRECEDES)

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (7) Fill gap between junction of flange edge and tank skin edge with sealant. Remove all excess sealant above tank skin line. (PAGEBLOCK 28-10-01/201)
- (8) Remove the safety tag and close this circuit breaker:

UPPER EPC, FUEL

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	17	B1-822	FUEL QUANTITY POWER TRANSFER

- (9) Check fuel quantity indicating system. (INDICATING, SUBJECT 28-40-00, Page 201)

NOTE: Indicating system test need be performed only for system corresponding to tank in which component was replaced.

Table 203 Fault Isolation Junction Wiring Connections

TANK	TERMINAL NO.	WIRE NO.	
		Hi-Z TERMINAL	Lo-Z TERMINAL
Left Main	F	1Q176L22-BL	1Q177A22-WH
	R	1Q176A22-BL	
	RF		1Q178A22-WH
	RF		1Q178B22-RD
	5	1Q176B22-BL	1Q177B22-WH
	6	1Q176C22-BL	1Q177C22-WH
	7	1Q176D22-BL	1Q177D22-WH
	8	1Q176E22-BL	1Q177E22-WH
	9	1Q176F22-BL	1Q177F22-WH
	10	1Q176G22-BL	1Q177G22-WH
	11	1Q176H22-BL	1Q177H22-WH
	12	1Q176J22-BL	1Q177J22-WH
Center	F	1Q176J22-BL	Q177A22-WH
	R	1Q176A22-BL	
	RF		Q178A22-WH
	RF		Q178B22-RD
	1	Q176B22-BL	Q177B22-WH
	2	Q176C22-BL	Q177C22-WH
	3	Q176D22-BL	Q177D22-WH
	3A	Q176F22-BL	Q177F22-WH
	4	Q176E22-BL	Q177E22-WH
	4A	Q176G22-BL	Q177G22-WH

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Table 203 Fault Isolation Junction Wiring Connections (Continued)

TANK	TERMINAL NO.	WIRE NO.	
		Hi-Z TERMINAL	Lo-Z TERMINAL
Right Main	F	2Q176L22-BL	2Q177A22-WH
	R	2Q176A22-BL	
	RF		2Q178A22-WH
	RF		2Q178B22-RD
	5	2Q176B22-BL	2Q177B22-WH
	6	2Q176C22-BL	2Q177C22-WH
	7	2Q176D22-BL	2Q177D22-WH
	8	2Q176E22-BL	2Q177E22-WH
	9	2Q176F22-BL	2Q177F22-WH
	10	2Q176G22-BL	2Q177G22-WH
	11	2Q176H22-BL	2Q177H22-WH
	12	2Q176J22-BL	2Q177J22-WH

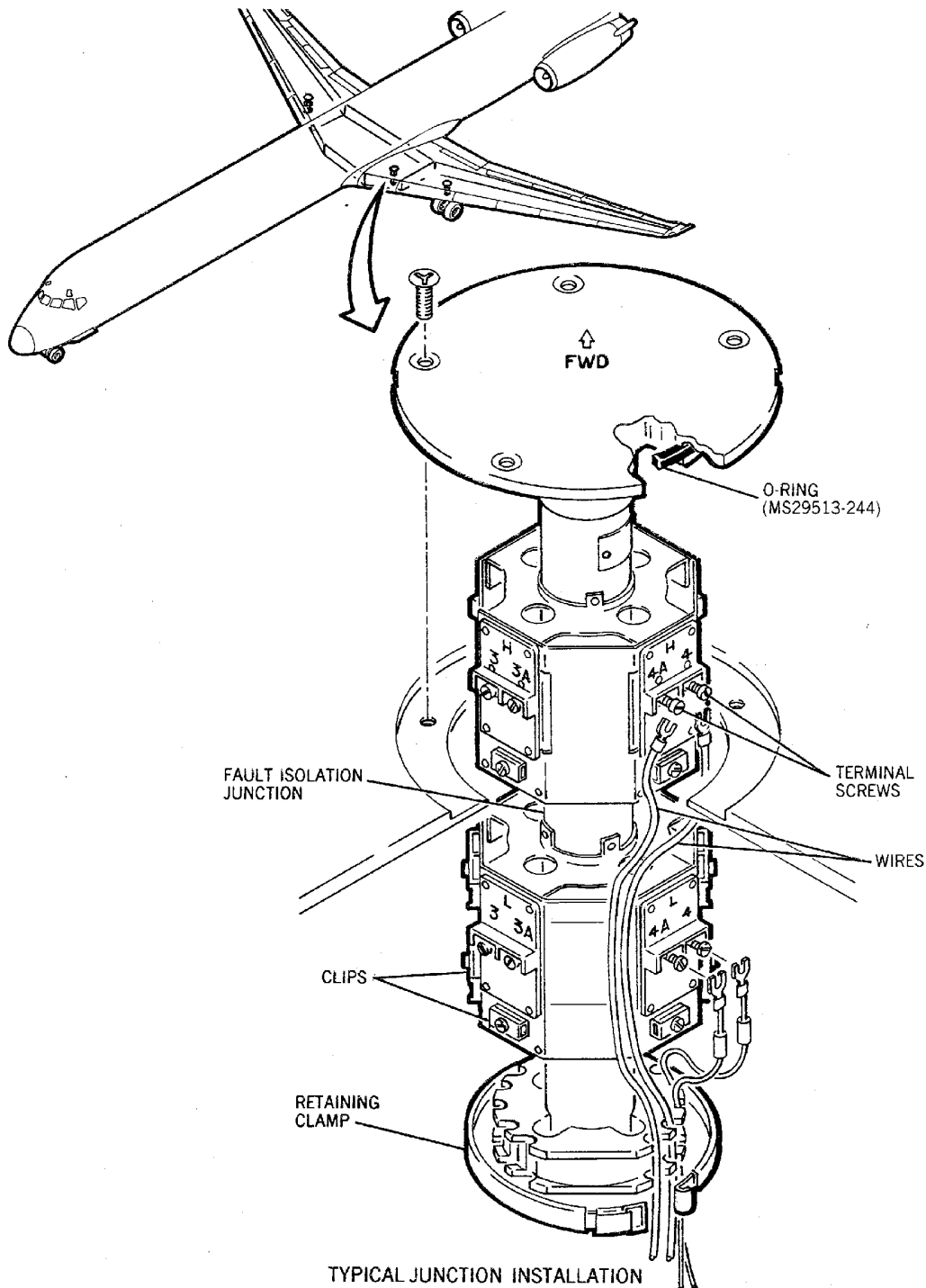
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Fault Isolation Probe -- Removal/Installation
Figure 201/28-40-04-990-801

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STANDARDIZED ELECTRONIC MODULE - MAINTENANCE PRACTICES

1. General

- A. The Standardized Electronic Module (SEM) is mounted on the left forward face of the front spar section of the center wing tank.
- B. Access to the SEM is through access door No. 5107C in the aft end of the mid cargo compartment.
- C. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices. (PAGEBLOCK 28-00-00/201)

2. Removal/Installation SEM

- A. Remove SEM

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
Z	38	B1-107	GROUND REFUEL

OVERHEAD BATT DIR BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
------------	------------	---------------	-------------

WJE 401-409, 411, 412, 414-427, 429, 861-866, 868, 869, 871-881, 883, 884, 886, 887, 891-893

B	16	B1-106	GROUND REFUELING
---	----	--------	------------------

WJE 401-409, 411, 412, 414, 875-881, 883, 884, 886, 887

B	17	B1-913	ELECTRONIC CLOCK
---	----	--------	------------------

WJE 410

B	17	B1-106	GROUND REFUELING
---	----	--------	------------------

WJE 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 886, 887

B	18	B1-913	ELECTRONIC CLOCK
---	----	--------	------------------

UPPER EPC, FUEL

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
------------	------------	---------------	-------------

WJE ALL

J	17	B1-822	FUEL QUANTITY POWER TRANSFER
---	----	--------	------------------------------

- (2) Disconnect electrical connectors.

- (3) Remove SEM.

- B. Install SEM

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
Z	38	B1-107	GROUND REFUEL

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OVERHEAD BATT DIR BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 401-409, 411, 412, 414-427, 429, 861-866, 868, 869, 871-881, 883, 884, 886, 887, 891-893			
B	16	B1-106	GROUND REFUELING
WJE 401-409, 411, 412, 414, 875-881, 883, 884, 886, 887			
B	17	B1-913	ELECTRONIC CLOCK
WJE 410			
B	17	B1-106	GROUND REFUELING
WJE 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 886, 887			
B	18	B1-913	ELECTRONIC CLOCK

WJE ALL

- (2) Install SEM.
- (3) Connect electrical connectors.
- (4) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
Z	38	B1-107	GROUND REFUEL

OVERHEAD BATT DIR BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 401-409, 411, 412, 414-427, 429, 861-866, 868, 869, 871-881, 883, 884, 886, 887, 891-893			
B	16	B1-106	GROUND REFUELING
WJE 401-409, 411, 412, 414, 875-881, 883, 884, 886, 887			
B	17	B1-913	ELECTRONIC CLOCK
WJE 410			
B	17	B1-106	GROUND REFUELING
WJE 410, 415, 417-419, 421, 423, 863-866, 869, 871, 872, 886, 887			
B	18	B1-913	ELECTRONIC CLOCK

WJE ALL

- (5) Test SEM (INDICATING, SUBJECT 28-40-00, Page 201, paragraph titled Test Cockpit Display Unit).

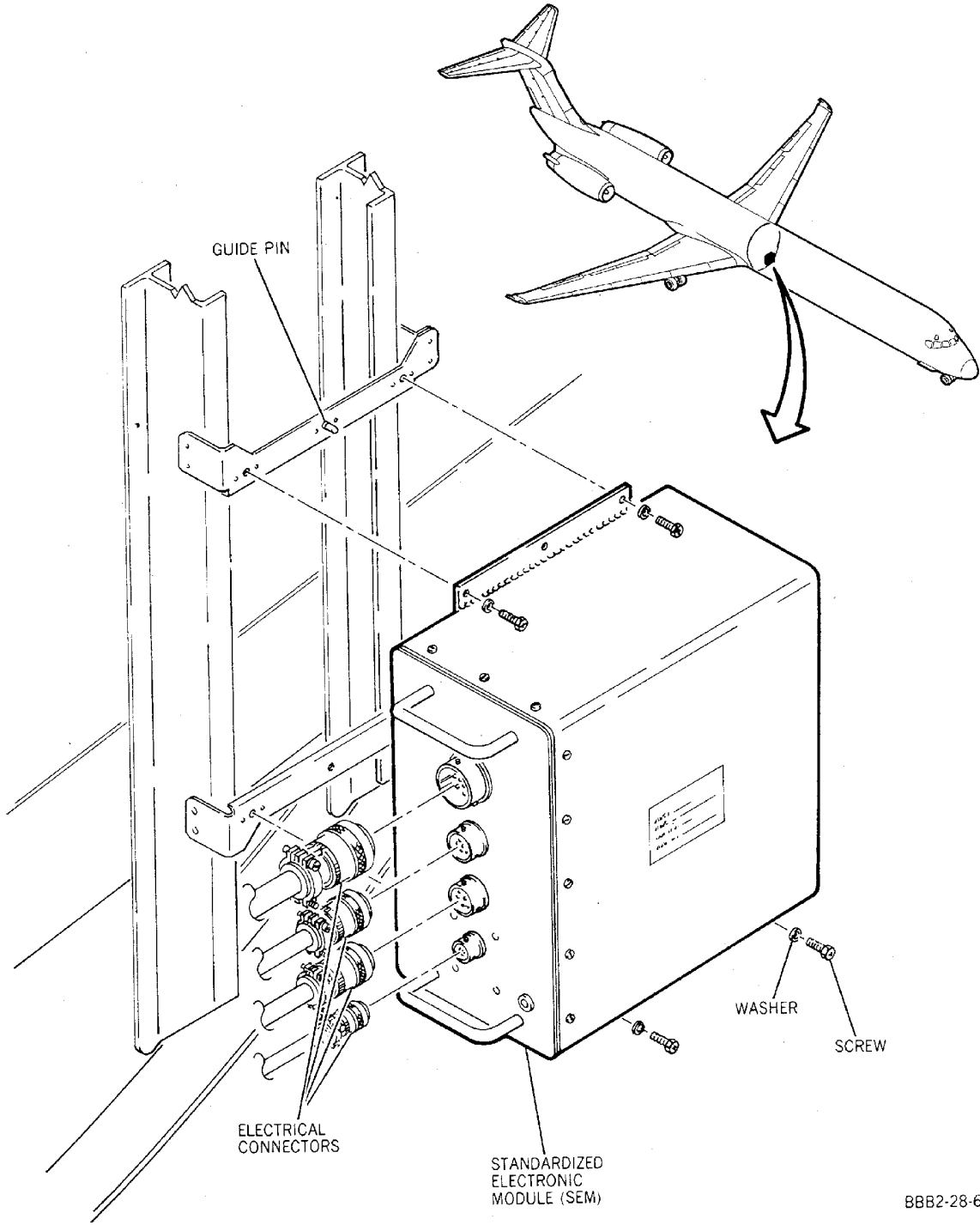
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Standardized Electronic Module (SEM) -- Removal/Installation
Figure 201/28-40-05-990-801

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DISPLAY UNIT DIGITAL LAMPS - MAINTENANCE PRACTICES

1. General

- A. Digital display lamps are located behind the display unit face. It is not necessary to remove the unit from the panel to replace lamps.
- B. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the general maintenance practices. (PAGEBLOCK 28-00-00/201)

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

Table 201

Name and Number	Manufacturer
Extraction Tool 790-306-001	Gull Airborne Instruments, Inc.

3. Removal/Installation Digital Lamps

A. Remove Lamps

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Open this circuit breaker and install safety tag:

UPPER EPC, FUEL

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	17	B1-822	FUEL QUANTITY POWER TRANSFER

- (2) Remove faceplate.

NOTE: Faceplate screws are captive.

- (3) Remove lamp. Note markings on lamp so that replacement lamp may be installed right side up.

B. Install Lamp

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that this circuit breaker is open and has safety tag:

UPPER EPC, FUEL

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	17	B1-822	FUEL QUANTITY POWER TRANSFER

- (2) Observe markings on replacement lamp. Install lamp in display unit with same side up as noted in step Paragraph 3.A.(3)3.A.(3).

- (3) Remove the safety tag and close this circuit breaker:

UPPER EPC, FUEL

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	17	B1-822	FUEL QUANTITY POWER TRANSFER

- (4) Press ANNUN/DIGITAL LTS TEST switch on overhead panel. All digital lamps should read 8. If newly installed lamp is upside down, only center horizontal light element will come on.

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- (5) If lamp is upside down, perform steps Paragraph 3.A.(1), Paragraph 3.A.(3) and Paragraph 3.B.(1) through Paragraph 3.B.(4).
- (6) Install faceplate.

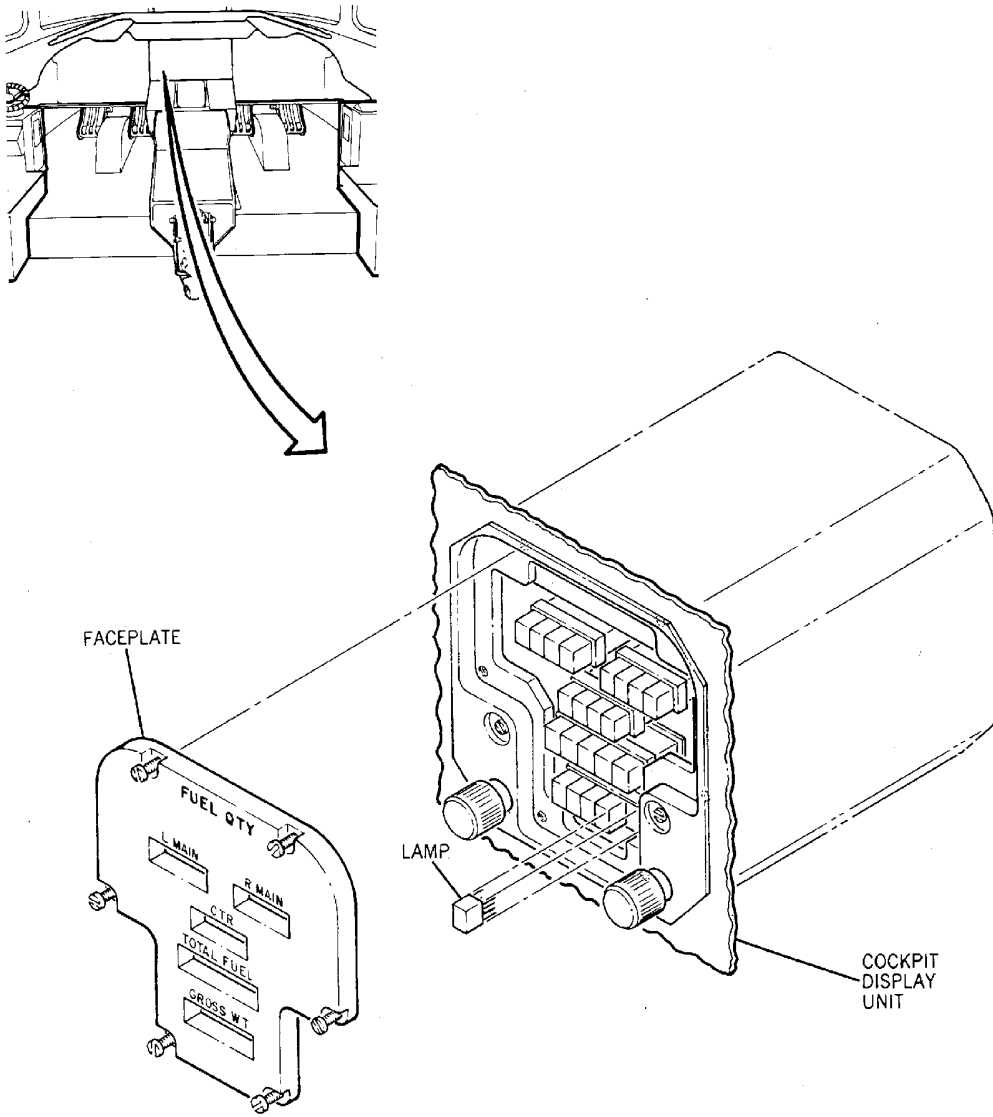
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8BB2-28-74

Digital Lamp -- Removal/Installation
Figure 201/28-40-06-990-801

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MD-80 AIRCRAFT MAINTENANCE MANUAL

COCKPIT DISPLAY UNIT - MAINTENANCE PRACTICES

1. General

- A. This maintenance practice provides removal/installation instructions for the CDU (cockpit display unit) indicator. The indicator is installed in the center instrument panel in the flight compartment.
- B. Maintenance of the indicator is limited to removal/installation.
- C. Access to the indicator and connector is at the center instrument panel in the flight compartment.
- D. CDU indicator requires no adjustments when replaced.

2. Removal/Installation Cockpit Display Unit

- A. Remove Display Unit (Figure 201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

CAUTION: BE CAREFUL WHEN YOU MOVE THE INDICATORS. DO NOT LET THE INDICATORS FALL. THIS WILL PREVENT INTERNAL DAMAGE TO THE INDICATORS.

CAUTION: DO NOT DISTURB OR LOOSEN SCREWS IN PANEL AT UPPER LEFT OR LOWER RIGHT CORNER OF COCKPIT DISPLAY UNIT.

- (1) Open this circuit breaker and install safety tag:

UPPER EPC, FUEL

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	17	B1-822	FUEL QUANTITY POWER TRANSFER

- (2) Loosen captive screws in panel at upper right corner and lower left corner of CDU until indicator can be removed without binding and remove indicator from panel.

CAUTION: TO PREVENT DAMAGE TO ELECTRICAL CONNECTOR, DO NOT USE ANY TOOL OTHER THAN PLUG PLIERS TO DISCONNECT PLUG.

- (3) Disconnect electrical connector.

- B. Install Display Unit. (Figure 201)

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that this circuit breaker is open and has safety tag:

UPPER EPC, FUEL

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	17	B1-822	FUEL QUANTITY POWER TRANSFER

- (2) Check display unit indicator for dents, cracked glass, or damaged electrical connector pins.

CAUTION: TO PREVENT DAMAGE TO ELECTRICAL CONNECTOR, DO NOT USE ANY TOOL OTHER THAN PLUG PLIERS TO CONNECT PLUG. WHEN CONNECTING PLUG, DO NOT OVERTIGHTEN.

- (3) Connect electrical connector.

NOTE: Connector plug is properly installed when no relative motion exists between plug backshell and coupling ring.

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CAUTION: EXERCISE CARE WHEN HANDLING INDICATORS, DO NOT DROP INDICATOR. INTERNAL DAMAGE COULD RESULT.

CAUTION: TO PREVENT INSTRUMENT INTERNAL AND OUTER CASE DAMAGE DO NOT OVER-TORQUE ADJUSTMENT SCREW WHEN TIGHTENING CLAMP AROUND INSTRUMENT HOUSING.

- (4) Install CDU in panel. Tighten screws in panel at upper right corner and lower left corner of CDU.
- (5) Remove tools, equipment, loose hardware, and debris from maintenance area.
- (6) Remove the safety tag and close this circuit breaker:

UPPER EPC, FUEL

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	17	B1-822	FUEL QUANTITY POWER TRANSFER

- (7) Test CDU. (INDICATING, SUBJECT 28-40-00, Page 201)

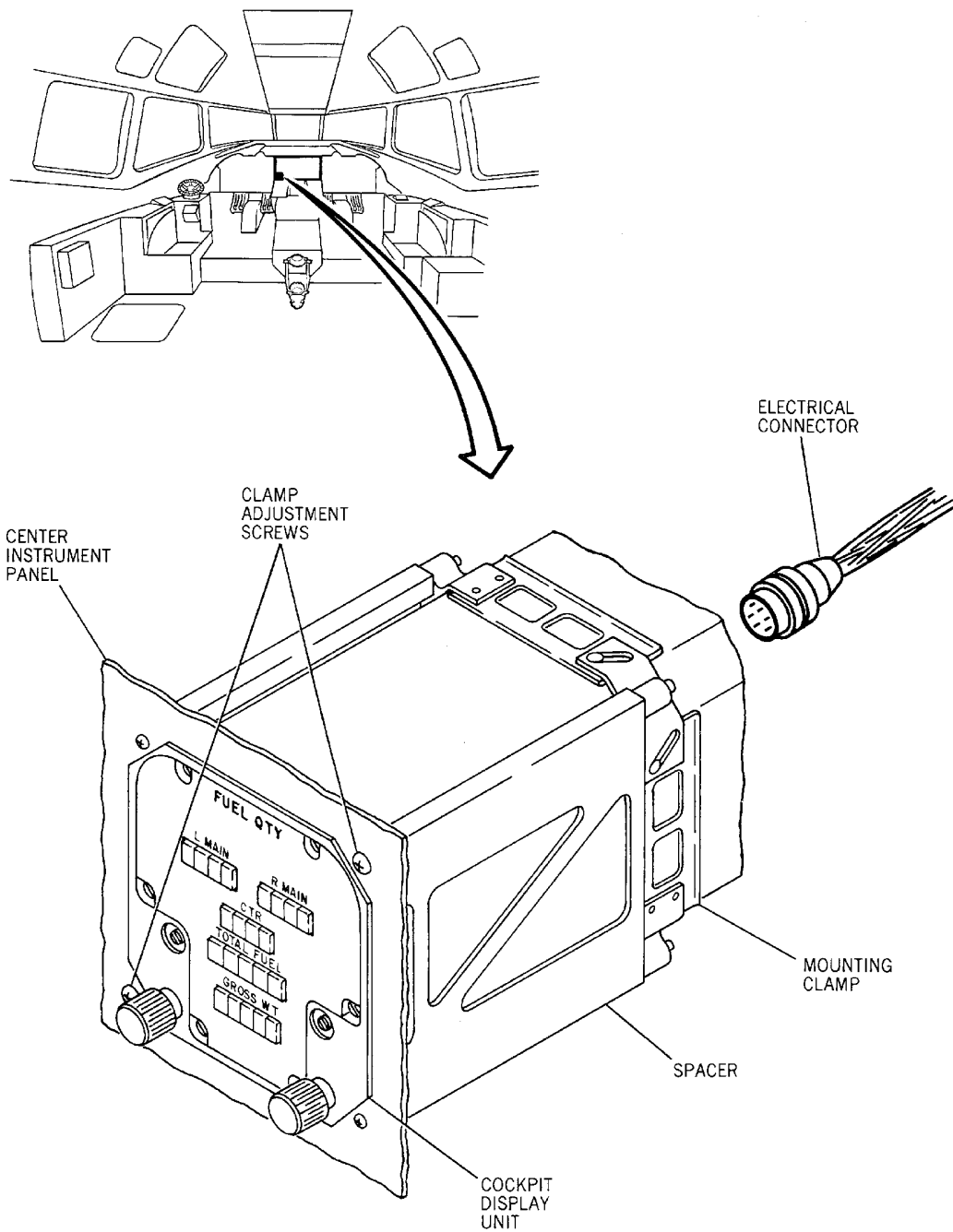
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BBB2-28-146A

Cockpit Display Unit - Removal/Installation
Figure 201/28-40-07-990-803

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LOAD SELECTOR DISPLAY UNIT - MAINTENANCE PRACTICES

1. General

- A. The Load Selector Display Unit (LSDU) is mounted in the pressure fueling compartment located inside the forward leading edge of the right wing.
- B. Access to the LSDU is through a forward swinging hinged access door in the lower surface of the right wing leading edge.
- C. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201.

2. Removal/Installation Load Selector Display Unit (LSDU)

- A. Remove LSDU. (Figure 201)

WARNING: MAKE SURE THE SLATS DO NOT ACCIDENTALLY OPERATE. ACCIDENTAL OPERATION OF THE SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Depressurize hydraulic system. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 29-00-00/201)

WARNING: DO NOT OPERATE FLAP/SLAT CONTROL LEVER, MAINTENANCE BEING PERFORMED ON FUEL SYSTEM COMPONENTS INSTALLED ON WING SPAR. INADVERTENT OPERATION OF FLAP/SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (2) Install "DO NOT OPERATE" Placard on FLAP/SLAT control lever.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Open this circuit breaker and install safety tag:

UPPER EPC, FUEL

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	17	B1-822	FUEL QUANTITY POWER TRANSFER

CAUTION: TO PREVENT DAMAGE TO ELECTRICAL CONNECTOR, DO NOT USE ANY TOOL OTHER THAN PLUG PLIERS TO DISCONNECT PLUG.

- (4) Open access door at right wing leading edge.
- (5) Loosen four captive bolts and carefully pull load selector display unit out to gain access to electrical connectors.
- (6) Disconnect electrical connectors.
- (7) Remove LSDU.
- B. Install LSDU. (Figure 201)

WARNING: MAKE SURE THE SLATS DO NOT ACCIDENTALLY OPERATE. ACCIDENTAL OPERATION OF THE SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Make certain hydraulic system is depressurized. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 29-00-00/201)

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WARNING: DO NOT OPERATE FLAP/SLAT CONTROL LEVER, MAINTENANCE BEING PERFORMED ON FUEL SYSTEM COMPONENTS INSTALLED ON WING SPAR. INADVERTENT OPERATION OF FLAP/SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (2) Make certain "DO NOT OPERATE" placard is installed on FLAP/SLAT control lever.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Make sure that this circuit breaker is open and has safety tag:

UPPER EPC, FUEL

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	17	B1-822	FUEL QUANTITY POWER TRANSFER

CAUTION: MAKE SURE THE PINS ARE ALIGNED CORRECTLY BEFORE YOU CONNECT THE ELECTRICAL CONNECTOR. IF THE PINS ARE NOT ALIGNED CORRECTLY, DAMAGE TO THE CONNECTOR CAN OCCUR.

- (4) Make sure that there is no damage or unwanted material in the electrical connectors, J1 and J2 electrical receptacles.

CAUTION: TO PREVENT DAMAGE TO ELECTRICAL CONNECTORS, DO NOT USE ANY TOOL OTHER THAN PLUG PLIERS TO CONNECT PLUG. WHEN CONNECTING PLUGS, DO NOT OVERTIGHTEN.

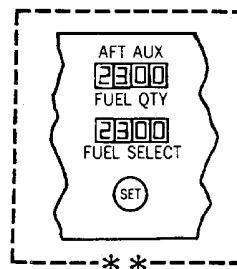
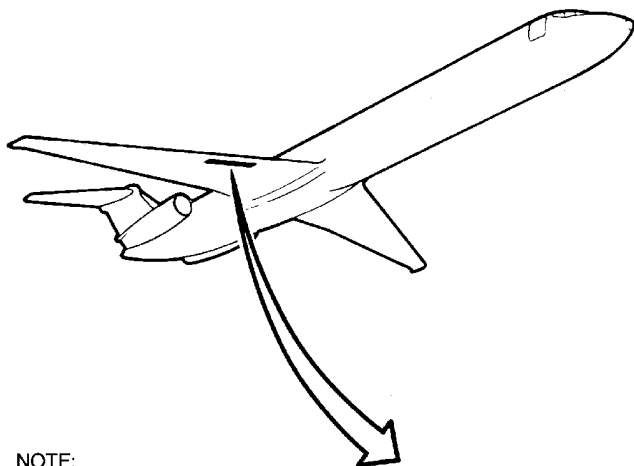
- (5) Connect load selector display unit electrical connectors and install load selector display unit.
 (6) Remove the safety tag and close this circuit breaker:

UPPER EPC, FUEL

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	17	B1-822	FUEL QUANTITY POWER TRANSFER

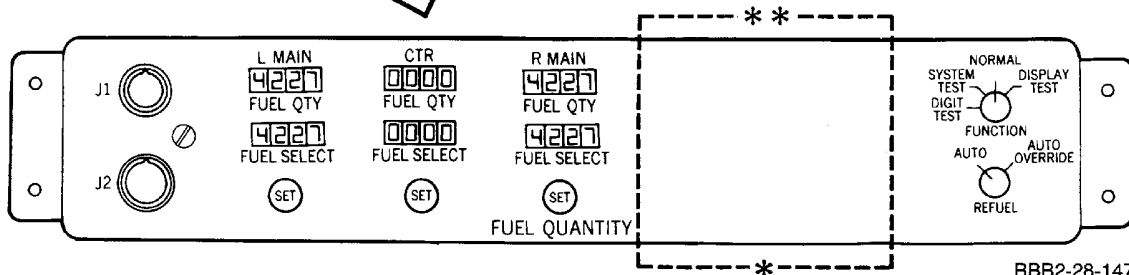
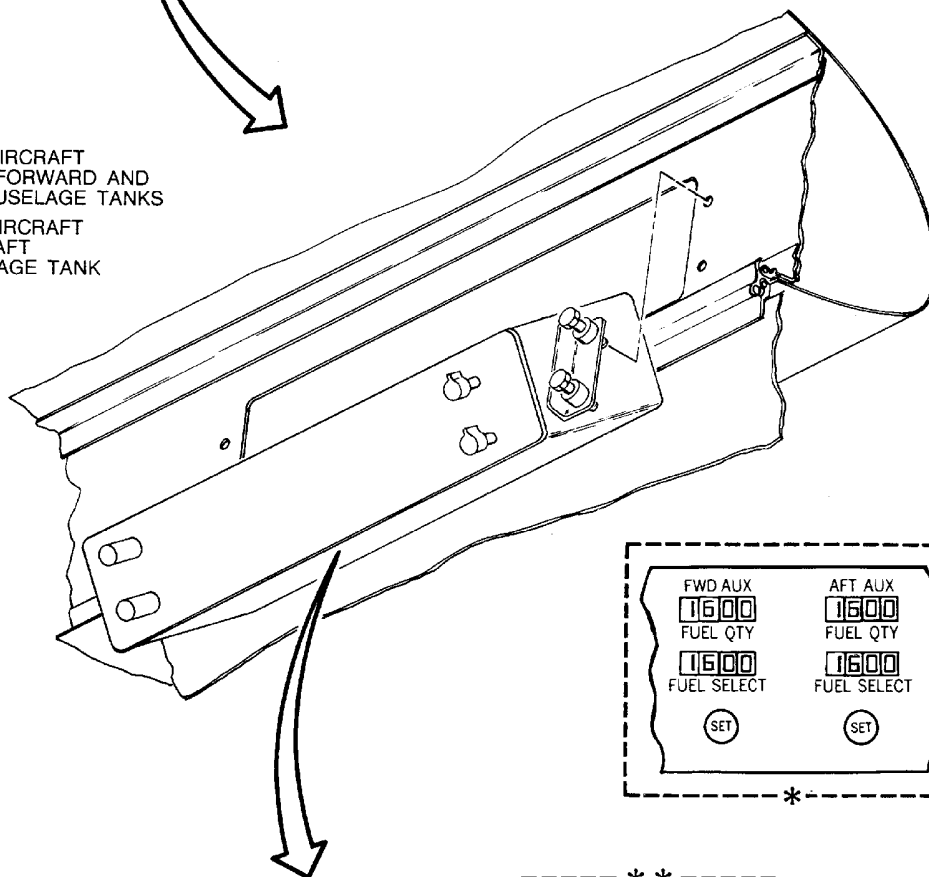
- (7) Remove tag from FLAP/SLAT control lever.
 (8) Test LSDU. (INDICATING, SUBJECT 28-40-00, Page 201, paragraph titled Test Load Selector Display Unit (Empty Tanks) or (Wet Tanks)).

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NOTE:

- * FOR AIRCRAFT WITH FORWARD AND AFT FUSELAGE TANKS
- ** FOR AIRCRAFT WITH AFT FUSELAGE TANK



Load Selector Display Unit - Removal/Installation
Figure 201/28-40-08-990-801

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(AIDS) TOTAL FUEL GENERATOR - REMOVAL/INSTALLATION

1. General

- A. The following procedures are for the removal and installation of the Airborne Integrated Data System (AIDS) total fuel generator.
- B. The AIDS total fuel generator is mounted on the left forward face of the front spar section of the center wing tank.
- C. Access to the AIDS is through access door No. 5107C in the aft end of the mid cargo compartment.

2. Removal/Installation AIDS

A. Remove AIDS

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Open this circuit breaker and install safety tag:

UPPER EPC, FUEL

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	17	B1-822	FUEL QUANTITY POWER TRANSFER

- (2) Disconnect electrical connectors.
- (3) Remove four screws and washers and remove AIDS.

B. Install AIDS

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that this circuit breaker is open and has safety tag:

UPPER EPC, FUEL

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	17	B1-822	FUEL QUANTITY POWER TRANSFER

- (2) Install AIDS using four washers and screws.
- (3) Connect electrical connectors.
- (4) Remove the safety tag and close this circuit breaker:

UPPER EPC, FUEL

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	17	B1-822	FUEL QUANTITY POWER TRANSFER

- (5) Test LSDU. (INDICATING - MAINTENANCE PRACTICES, PAGEBLOCK 28-40-00/201, Paragraph titled Test Load Selector Display Unit (Empty Tanks) or (Wet Tanks))

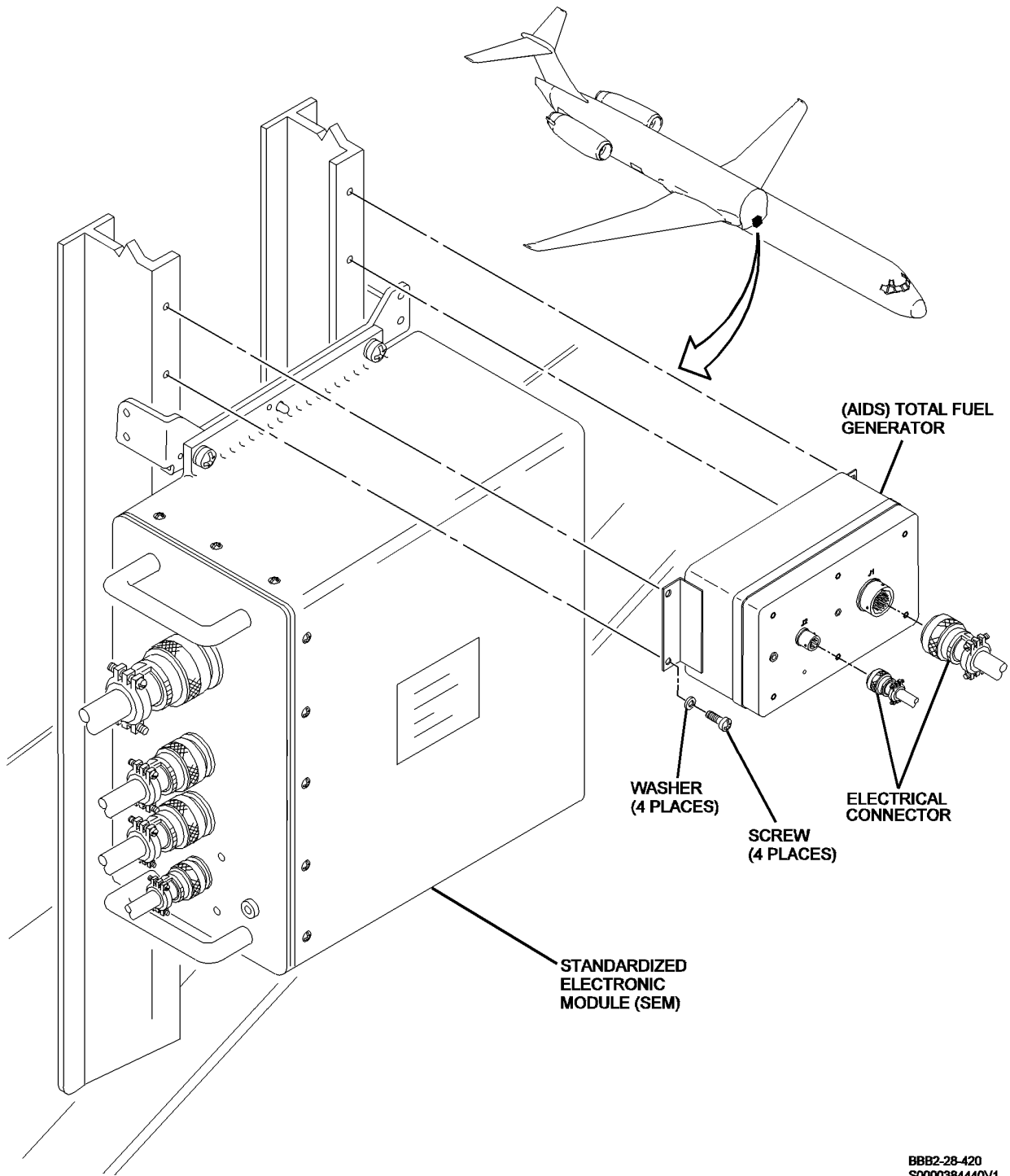
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(AIDS) Total Fuel Generator - Removal/Installation
Figure 401/28-40-09-990-801

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CENTER FUEL TANK PUMP LOW PRESSURE INDICATION - DESCRIPTION AND OPERATION

1. General

- A. The center fuel tank pump low pressure indication system permits a flight compartment caution indication should pressure drop from either of the center fuel tank boost pumps, when the pump switches are in either the ON or AUTO positions.

WJE 401-405, 407-410, 412, 414-416, 418, 420-427, 429, 861-866, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893

- B. The center fuel tank pump low pressure indication system permits a flight compartment caution indication should pressure drop from either of the center fuel tank boost pumps, when the pump switches are in the ON position.

WJE ALL

- C. The center fuel tank pump low pressure system consists of two fuel pressure differential switches mounted on the right front spar. Each switch is connected to the input and output lines of each fuel boost pump in the center fuel tank.
- D. An inhibit circuit is connected to the flap extended 6 degrees proximity switch. The switch controls a relay to deactivate the center tank pump low pressure caution indication when the aircraft is in the landing mode.

2. Description

A. Center Fuel Tank Pump Low Pressure System

- (1) The center fuel tank pump low pressure switches activate the low pressure caution indication in the flight compartment. There are two switches, one for each center tank fuel boost pump. The switches are mounted on a check valve located on the right side of the wing front spar (Figure 1).
- (2) Each switch is basically a pressure-sensing diaphragm-operated microswitch. The switches are of the plug-in type, and can be removed externally, without defueling the tank. There are no exterior fuel line connections. All fuel line connections are in the tank, and are routed to the check valve, whose purpose is to prevent fuel spillage during switch removal. The check valve is mounted on the face of the front spar on the right side.
- (3) The switches are set to open by a 7.0 psi (48.3 kPa) pressure differential on increasing pressure. The switches are set to close when the pressure differential decreases below 3.5(±0.25) psi (24.15(±1.7) kPa).
- (4) A 22-second delay is built into the circuit to prevent false signals due to fuel slosh.

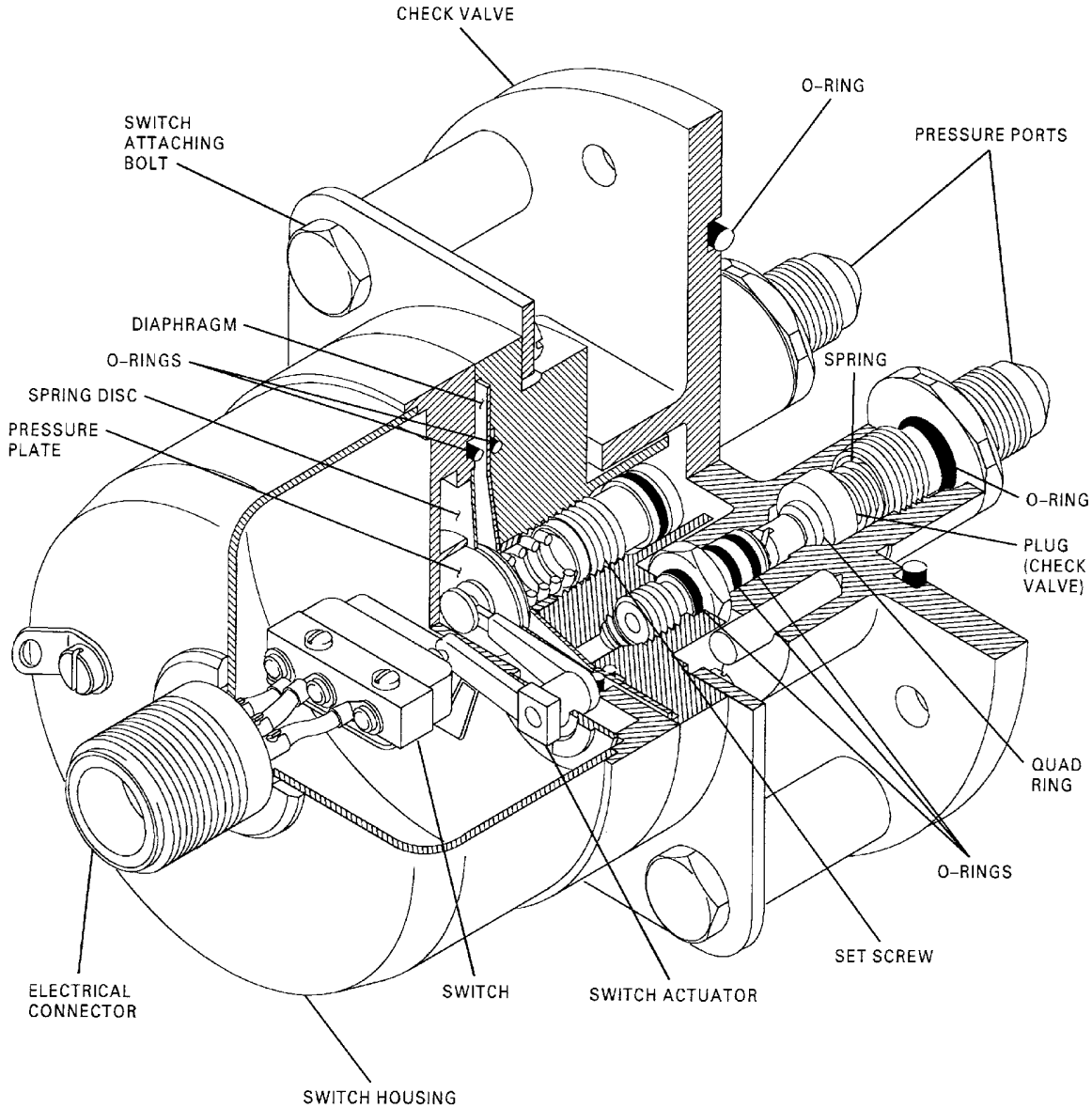
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BBB2-28-228A

Fuel Pressure Differential Switch -- Schematic
Figure 1/28-41-00-990-801

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3. Operation

A. Center Fuel Tank Pump Low Pressure System

- (1) The center fuel tank boost pumps are connected in series. The fuel goes through the aft pump, and then the forward pump. The pressures are additive.
- (2) Should one of the boost pumps malfunction, the pressure will drop, at which time the pressure switch will close. After approximately a 22-second delay, a relay will be actuated, activating the master caution and center fuel tank pump low pressure indications.
- (3) When the aircraft is in the landing sequence, and the flaps actuate the 6 degree proximity switch, a relay is powered, which cuts the circuit to the center fuel low pressure relay, thereby deactivating the master caution and center fuel tank pump low pressure indicators.

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CENTER FUEL TANK PUMP LOW PRESSURE INDICATION - ADJUSTMENT/TEST

1. General

- A. This test checks that the fuel pressure switches in the center fuel tank function properly, and that the flap inhibit function operates properly.

WJE 401-405, 407-410, 412, 414-416, 418, 420-427, 429, 861-866, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893

- B. This test checks that the fuel pressure switches in the center fuel tank function properly.

WJE ALL

- C. The test runs as follows:

- (1) Both center tank fuel boost pumps are turned on.
- (2) The forward boost pump is disabled to check system function.
- (3) The forward boost pump is then made functional, and the aft boost pump is disabled to check system function.
- (4) The flaps are operated to check the inhibit function.

WJE 401-405, 407-410, 412, 414-416, 418, 420-427, 429, 861-866, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893

- (5) Both center tank fuel boost pumps are turned off.
- (6) The forward boost pump is turned on.
- (7) The forward boost pump is disabled, and then enabled to check system function.

WJE ALL

2. Center Fuel Tank Pump Low Pressure Indication - Adjustment/Test

- A. Aircraft Preparation

- (1) Fuel center tank to minimum of 1000 lb (500 kg).
- (2) Apply electrical power to the aircraft and ensure power is available to left generator bus.

WJE 401-405, 407-410, 412, 414-416, 418, 420-427, 429, 861-866, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893

- (3) Aircraft external power source connected.

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- (4) Position controls as follows:

Table 501

Control	Location	Position
Crossfeed lever	Center pedestal	OFF
Fuel shutoff levers (both engines)	Center pedestal	OFF
FLAP/SLAT handle	Center pedestal	UP/RET
AUX HYD pump switch	Main instrument panel	OFF
Start pump switch	Overhead switch panel	OFF
Fuel boost pump switches	Overhead switch panel	OFF
APU master switch	Overhead switch panel	OFF
Battery switch	Overhead switch panel	OFF

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WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (5) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
X	41	B1-95	FIRE EXTINGUISHING CONTROL BOTTLE 1
X	42	B1-96	FIRE EXTINGUISHING CONTROL BOTTLE 2

CAUTION: DO NOT ROTATE ENGINE FIRE HANDLES. THIS RESULTS IN RELEASE OF FIRE EXTINGUISHING AGENT, AND REQUIRES REPLACEMENT OF FIREX CARTRIDGES AND BOTTLES.

- (6) Pull left and right engine fire handles (on main instrument panel) completely out.

NOTE: This also closes pneumatic crossfeed valve.

- (7) Temporarily install dummy targets over weight on wheels sensor of both main landing gears.

B. Center Fuel Tank Pump Low Pressure Indication Test

- (1) Place FUEL TANKS CTR AFT PUMPS and FWD PUMPS switches in ON position.

WJE 401-405, 407-410, 412, 414-416, 418, 420-427, 429, 861-866, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893

- (2) Place FUEL TANKS CENTER FWD PUMPS switch in ON position.

WJE ALL

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Open this circuit breaker and install safety tag:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C

After delay of approximately 25 seconds, ensure master caution and CENTER FUEL PRESS LO warning indications come on.

- (4) Remove the safety tag and close this circuit breaker:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C

Ensure master caution and CENTER FUEL PRESS LO warning indications go off.

WJE 401-405, 407-410, 412, 414-416, 418, 420-427, 429, 861-866, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893

- (5) Place FUEL TANKS CENTER FWD PUMPS switch in OFF position.

- (6) Place FUEL TANKS CENTER AFT PUMPS switch in ON position.

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WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (7) Open this circuit breaker and install safety tag:

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C

After delay of approximately 25 seconds, ensure master caution and CENTER FUEL PRESS LO warning indications come on.

- (8) Place AUX HYD switch in ON position.

WARNING: KEEP PERSONNEL AND EQUIPMENT CLEAR OF FLAPS AND SLATS.

- (9) Move FLAP/SLAT handle to 11 (degrees) position. Ensure master caution and CENTER FUEL PRESS LO warning indications go off.

NOTE: This extends flaps to 11 degrees position and slats to mid position.

- (10) Move FLAP/SLAT handle to UP/RET position. After delay of approximately 25 seconds, ensure master caution and CENTER FUEL PRESS LO warning indications come on.
- (11) Remove the safety tag and close this circuit breaker:

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C

Ensure master caution and CENTER FUEL PRESS LO warning indications go off.

WJE 401-405, 407-410, 412, 414-416, 418, 420-427, 429, 861-866, 868, 873, 874, 880, 881, 883, 884, 886, 887, 891-893

- (12) Place FUEL TANKS CTR AFT PUMPS switch in OFF position. Ensure master caution and CENTER FUEL PRESS LO warning indications do not come on.

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- (13) Place FUEL TANKS CTR AFT PUMPS and FWD PUMPS switches in OFF position. Ensure master caution and CENTER FUEL PRESS LO warning indications do not come on.
- (14) Place AUX HYD switch in OFF position.
- (15) Push left and right engine fire handles (on main instrument panel) completely in. Do not rotate.
- (16) Manually open pneumatic crossfeed valve.
- (17) Remove dummy targets from weight on wheels sensor of both main landing gears.
- (18) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
X	41	B1-95	FIRE EXTINGUISHING CONTROL BOTTLE 1
X	42	B1-96	FIRE EXTINGUISHING CONTROL BOTTLE 2

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CENTER FUEL TANK PUMP LOW PRESSURE INDICATION - ADJUSTMENT/TEST

1. General

A. This procedure contains MSG-3 task card data.

TASK 28-41-00-710-801

2. Operational Check of the Center Fuel Pressure Low Alert Inhibit System

NOTE: This procedure is a scheduled maintenance task.

A. **References**

<u>Reference</u>	<u>Title</u>
28-41-00 P/B 501	CENTER FUEL TANK PUMP LOW PRESSURE INDICATION - ADJUSTMENT/TEST

B. **Prepare for the Center Fuel Pressure Low Alert Inhibit System Operational Check**

SUBTASK 28-41-00-840-001

(1) Prepare aircraft. (CENTER FUEL TANK PUMP LOW PRESSURE INDICATION -
ADJUSTMENT/TEST, PAGEBLOCK 28-41-00/501)

C. **Center Fuel Pressure Low Alert Inhibit System Operational Check**

SUBTASK 28-41-00-710-001

(1) Do operational check. (CENTER FUEL TANK PUMP LOW PRESSURE INDICATION -
ADJUSTMENT/TEST, PAGEBLOCK 28-41-00/501)

D. **Job Close-up**

SUBTASK 28-41-00-942-001

(1) Remove all the tools and equipment from the work area. Make sure the area is clean.

———— **END OF TASK** ————

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FUEL PRESSURE DIFFERENTIAL SWITCHES - MAINTENANCE PRACTICES

1. General

- A. The fuel pressure differential switches are located on the forward face of the wing front spar on the right side. Pressure lines are attached to the check valve on the inside of the spar (inside the tank). Switch and pressure line access is listed below.

Table 201

Item	Access Door
Center forward pump switch	1267C
Switch pressure lines	1436C
Center aft pump switch	1231C
Switch pressure lines	1436C

- B. Each switch may be removed separately, or as a unit with the check valve.

NOTE: Removal of the check valve is only recommended if the switch has been removed, and it has been determined that the individual plugs (check valves) are defective.

- C. The pressure lines connected to each check valve have different diameter fittings.
- D. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

NOTE: It is possible that some materials in the Equipment and Materials List cannot be used for some or all of their necessary applications. Before you use the materials, make sure the types, quantities, and applications of the materials necessary are legally permitted in your location. All persons must obey all applicable federal, state, local, and provincial laws and regulations when it is necessary to work with these materials.

Table 202

Name and Number	Manufacturer
Sealant PR 1422 B-2	Products Research Co.
DPM 2292-2	
Petrolatum VV-P-236	
DPM 675	
Inconel Lockwire 0.032 in NASM20995N32, DPM 684	Not specified
Corrosion Resistant Steel Lockwire 0.032 in NASM20995C32, DPM 5865	Not specified

3. Removal/Installation Pressure Differential Switches

- A. Remove Switch. (Figure 201)

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WARNING: MAKE SURE THE SLATS DO NOT ACCIDENTALLY OPERATE. ACCIDENTAL OPERATION OF THE SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Depressurize hydraulic system. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 29-00-00/201)

WARNING: DO NOT OPERATE FLAP/SLAT CONTROL LEVER, MAINTENANCE BEING PERFORMED ON FUEL SYSTEM COMPONENTS INSTALLED ON WING SPAR. INADVERTENT OPERATION OF FLAP/SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (2) Install "DO NOT OPERATE" Placard on FLAP/SLAT control lever.

WJE 407, 408, 410, 411, 417, 419, 421, 423, 869, 871, 872, 875-879

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Open this circuit breaker and install safety tag:

LOWER EPC, XFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
T	41	B1-994	CENTER FUEL LOW PRESSURE

WJE ALL

- (4) Disconnect electrical connector.
- (5) Remove four bolts and washers attaching switch to check valve on spar face.
- (6) Remove switch.

B. Install Switch

WARNING: MAKE SURE THE SLATS DO NOT ACCIDENTALLY OPERATE. ACCIDENTAL OPERATION OF THE SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Depressurize hydraulic system. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 29-00-00/201)

WARNING: DO NOT OPERATE FLAP/SLAT CONTROL LEVER, MAINTENANCE BEING PERFORMED ON FUEL SYSTEM COMPONENTS INSTALLED ON WING SPAR. INADVERTENT OPERATION OF FLAP/SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (2) Make certain "DO NOT OPERATE" Placard is installed on FLAP/SLAT control lever.

WJE 407, 408, 410, 411, 417, 419, 421, 423, 869, 871, 872, 875-879

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Make sure that this circuit breaker is open and has safety tag:

LOWER EPC, XFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
T	41	B1-994	CENTER FUEL LOW PRESSURE

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WARNING: WHITE PETROLATUM IS AN AGENT THAT IS AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN WHITE PETROLATUM IS USED.

- DO NOT USE IN AREAS WHERE THERE IS HIGH HEAT, SPARKS, OR FLAMES.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT BREATHE THE MIST.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (4) Lightly lubricate O-rings on switch with Petrolatum (VV-P-236) or equivalent.

NOTE: Excessive lubricant may migrate into switch pressure orifices and freeze. The resulting plugging of the orifices may prevent the switch from operating (no cockpit annunciation) when the boost pump outlet is zero pressure.

- (5) Install switch with four attaching bolts and washers.
- (6) Connect electrical connector, and safety with lockwire. (LOCKWIRE SAFETYING - MAINTENANCE PRACTICES, PAGEBLOCK 20-10-18/201)
- (7) Examine the fuel pump differential switch for leaks. No leaks are permitted.

WJE 407, 408, 410, 411, 417, 419, 421, 423, 869, 871, 872, 875-879

- (8) Remove the safety tag and close this circuit breaker:

LOWER EPC, XFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
T	41	B1-994	CENTER FUEL LOW PRESSURE

WJE ALL

- (9) Remove tag from FLAP/SLAT control lever.
- (10) Perform fuel pump low pressure test. (Paragraph 3.E.)

C. Remove Check Valve

WARNING: MAKE SURE THE SLATS DO NOT ACCIDENTALLY OPERATE. ACCIDENTAL OPERATION OF THE SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Depressurize hydraulic system. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 29-00-00/201)

WARNING: DO NOT OPERATE FLAP/SLAT CONTROL LEVER, MAINTENANCE BEING PERFORMED ON FUEL SYSTEM COMPONENTS INSTALLED ON WING SPAR. INADVERTENT OPERATION OF FLAP/SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (2) Install "DO NOT OPERATE" Placard on FLAP/SLAT control lever.

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- (3) Defuel center tank and prepare tank for entry. (PAGEBLOCK 28-00-00/201)
- (4) Close and tag crossfeed valve.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (5) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

LOWER EPC, XFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 407, 408, 410, 411, 417, 419, 421, 423, 869, 871, 872, 875-879			
T	41	B1-994	CENTER FUEL LOW PRESSURE

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (6) If switch has not been removed, disconnect electrical connector.
- (7) Remove access door.
- (8) Remove center tank boost pumps and volute. (PAGEBLOCK 28-20-07/201)
- (9) Disconnect two pressure lines from check valve inside tank.
- (10) Remove eight attaching bolts and washers attaching check valve to spar.

D. Install Check Valve

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WARNING: MAKE SURE THE SLATS DO NOT ACCIDENTALLY OPERATE. ACCIDENTAL OPERATION OF THE SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (1) Depressurize hydraulic system. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 29-00-00/201)

WARNING: DO NOT OPERATE FLAP/SLAT CONTROL LEVER, MAINTENANCE BEING PERFORMED ON FUEL SYSTEM COMPONENTS INSTALLED ON WING SPAR. INADVERTENT OPERATION OF FLAP/SLATS CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (2) Make certain "DO NOT OPERATE" Placard is installed on FLAP/SLAT control lever.

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

LOWER EPC, XFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 407, 408, 410, 411, 417, 419, 421, 423, 869, 871, 872, 875-879			
T	41	B1-994	CENTER FUEL LOW PRESSURE

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (4) Clean all sealant and foreign matter from faying surface of spar and check valve. (PAGEBLOCK 28-10-01/201)

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WARNING: LOW VISCOSITY POLYSULFIDE SEALANT IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOW VISCOSITY POLYSULFIDE SEALANT IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW VISCOSITY POLYSULFIDE SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

- (5) Apply (PR 1422 B-2) sealant to faying surfaces of check valve and inner face of wing spar. (PAGEBLOCK 28-10-01/201)
- (6) Install check valve on spar with eight attaching bolts and washers.
- (7) Install center tank volute and boost pumps. (PAGEBLOCK 28-20-07/201)
- (8) Install access door as follows:
 - (a) Start screw in door.

WARNING: LOW VISCOSITY POLYSULFIDE SEALANT IS AN AGENT THAT IS POISONOUS AND AN IRRITANT. MAKE SURE ALL PERSONS OBEY ALL OF THE PRECAUTIONS WHEN LOW VISCOSITY POLYSULFIDE SEALANT IS USED.

- GAS/AIR MIXTURES MORE THAN THE LOWER EXPLOSIVE LIMIT (LEL) CAN CAUSE AN EXPLOSION IF HIGH HEAT, SPARKS, OR FLAMES SUPPLY IGNITION.
- USE IN AN AREA OPEN TO THE AIR.
- CLOSE THE CONTAINER WHEN NOT USED.
- DO NOT GET LOW VISCOSITY POLYSULFIDE SEALANT IN THE EYES, ON THE SKIN, OR ON YOUR CLOTHES.
- DO NOT BREATHE THE GAS.

WARNING: REFER TO THE APPLICABLE MANUFACTURER'S OR SUPPLIER'S MSDS FOR:

- MORE PRECAUTIONARY DATA
- APPROVED SAFETY EQUIPMENT
- EMERGENCY MEDICAL AID.

TALK WITH THE LOCAL SAFETY DEPARTMENT OR AUTHORITIES FOR THE PROCEDURES TO DISCARD THIS HAZARDOUS AGENT.

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(WARNING PRECEDES)

- (b) Apply small bead of (PR 1422 B-2) sealant to door countersink or underside of screw head.
- (c) Tighten screw.
- (d) Wipe off any excess sealant that may extrude from under screw head.
- (9) If switch was removed, install switch. (Paragraph 3.B.)
- (10) Remove tag and open crossfeed valve.
- (11) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
U	40	B1-40	ENGINE START PUMP

LOWER EPC, XFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 407, 408, 410, 411, 417, 419, 421, 423, 869, 871, 872, 875-879			
T	41	B1-994	CENTER FUEL LOW PRESSURE

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE ALL			
H	19	B1-918	FWD RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C
H	23	B1-921	AFT LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C
J	23	B1-920	FWD LEFT FUEL TANK BOOST PUMP PHASE A, B, & C

UPPER EPC, GND SERV

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	19	B1-919	AFT RIGHT FUEL TANK BOOST PUMP PHASE A, B, & C

- (12) Remove tag from FLAP/SLAT control lever.
- (13) Perform fuel pump low pressure test. (Paragraph 3.E.)
- E. Fuel Pump Low Pressure Test
 - (1) Perform test under following conditions:
 - (a) System is completely installed.
 - (b) Center tank has at least 1000 lb (500 kg) of fuel.
 - (c) Aircraft power is on.
 - (2) Place FUEL TANKS CTR AFT PUMPS and FWD PUMPS switches to ON.

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- (3) Open this circuit breaker:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C

- (a) CTR PRESS LO and master caution indications shall indicate after approximately 22 seconds.

- (4) Close this circuit breaker:

UPPER EPC, FUEL - LEFT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
H	21	B1-922	FWD CENTER FUEL TANK BOOST PUMP PHASE A, B, & C

- (a) CTR PRESS LO and master caution indications shall cease indicating.

- (5) Open this circuit breaker:

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C

- (a) CTR PRESS LO and master caution indications shall indicate after approximately 22 seconds.

- (6) Close this circuit breaker:

UPPER EPC, FUEL - RIGHT AC BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
J	21	B1-923	AFT CENTER FUEL TANK BOOST PUMP PHASE A,B, & C

- (a) CTR PRESS LO and master caution indications shall cease indicating.

- (7) Place CTR FUEL TANKS AFT PUMPS and FWD PUMPS switches to OFF. CTR PRESS LO and master caution indications shall not indicate.

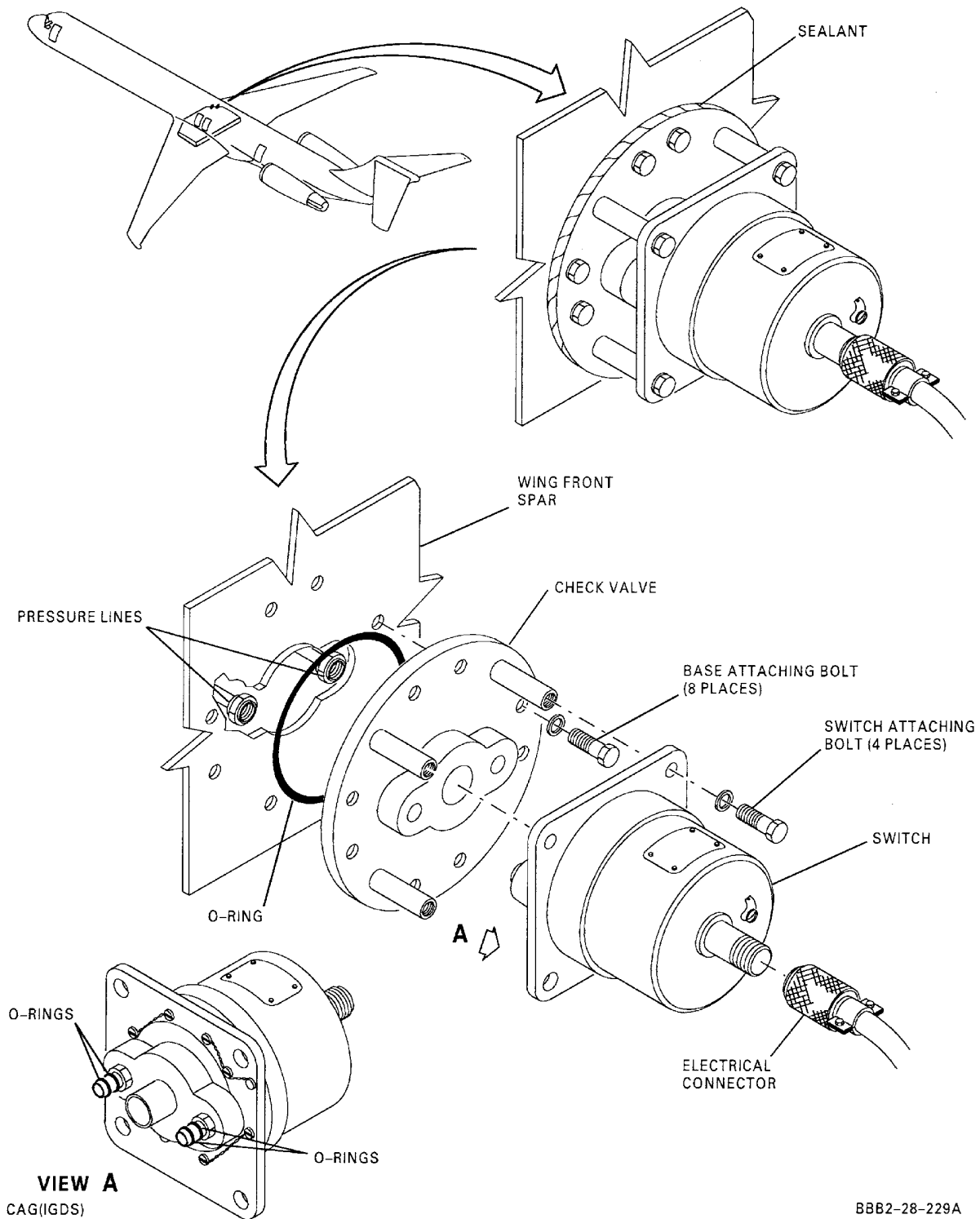
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**Fuel Pressure Differential Switch -- Removal/Installation
Figure 201/28-41-01-990-801**

B862-28-229A

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LOW FUEL LEVEL WARNING INDICATION - DESCRIPTION AND OPERATION

1. General

- A. The low fuel level warning indication system gives a flight compartment warning should low fuel level be indicated in either of the main fuel tanks.
- B. The low fuel level warning indication system consists of a fuel float switch mounted in each main wing tank, and a relay connected to the warning indication system.
- C. For aircraft without SB 28-070 incorporated, the low fuel level relay is connected to the ground control relay to provide a lock-in feature so the system, once activated, will remain activated until the aircraft is on the ground.
- D. For aircraft with SB 28-070 incorporated, the low fuel level relay is connected to the ground control relay which is non-latching with an automatic reset feature to minimize nuisance "Fuel Level Low" annunciation light illumination.
- E. For schematics integrating this system. (INDICATING - DESCRIPTION AND OPERATION, PAGEBLOCK 28-40-00/001 Config 1 or INDICATING - DESCRIPTION AND OPERATION, PAGEBLOCK 28-40-00/001 Config 2)

2. Description

- A. Low Fuel Level Float Switches
 - (1) The low fuel level float switches are located on the inboard end of each main wing tank, near the rear spar. There are two switches, one for each wing tank.
 - (2) Vertical movement of the float as a result of the drop of the fuel surrounding the switch causes the switch to close when the fuel is at, or below, the operating level of the switch.

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- (3) An in-line fuse is installed in the applicable float switch wire that is external of the fuel tank. The purpose of the fuse is to prevent the ignition of the fuel fumes in a fuel tank caused by a short.

WJE ALL

- B. Low Fuel Level Relay
 - (1) The low fuel level relay controls indications to the warning indication panel and the master warning and caution controller concerning low fuel level in the main tanks.
 - (2) The low fuel level float switch relay is controlled by power from the dc transfer bus.
 - (3) For aircraft without SB 28-070 incorporated, a 22-second delay is built into the circuit to prevent false signals due to fuel slosh.
 - (4) For aircraft with SB 28-070 incorporated, a 60-second delay is built into the circuit to prevent false signals due to fuel slosh.
- C. Ground Control Relay
 - (1) For aircraft without SB 28-070 incorporated, the ground control relay provides a circuit to ground when it is in a relaxed state (airborne mode). This circuit goes through, and is connected to the control circuit of the low fuel level relay. When the low fuel level relay is activated, it is latched (airborne mode), preventing relay cycling.
 - (2) For aircraft with SB 28-070 incorporated, the ground control relay provides a circuit to ground when it is in a relaxed state (airborne mode). This circuit goes through, and is connected to the control circuit of the low fuel level relay.

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3. Operation

A. Low Fuel Level Float Switches

- (1) The low fuel level float switches are connected in parallel, and are activated when the fuel level in either tank is below approximately 2500 lbs (1150 kg).
- (2) During fueling, the master caution and low fuel indications are activated if either of the main tanks is below approximately 2500 lbs (1150 kg). The warning indications will remain until both tanks are fueled above the activation point.
- (3) During defueling or fuel burn, should either main tank drop below approximately 2500 lbs (1150 kg), the float switch will close and latch, connecting the circuit to ground.

NOTE: The actuation level for ground condition will be different from in-flight condition.

- (4) For aircraft without SB 28-070 incorporated, a 22-second delay is built into the circuit to prevent false signals due to fuel slosh.
- (5) For aircraft with SB 28-070 incorporated, a 60-second delay is built into the circuit to prevent false signals due to fuel slosh.

B. Ground Control Relay

- (1) For aircraft without SB 28-070 incorporated, when the low fuel level float switch is activated, a circuit to ground is completed through the low fuel level relay (in its airborne state). This effectively locks the low fuel level relay in the activated mode, to prevent system cycling due to fuel slosh or changes in aircraft attitude.
- (2) For aircraft with SB 28-070 incorporated, when the low fuel level float switch is activated, a circuit to ground is completed through the low fuel level relay (in its airborne state).

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LOW FUEL LEVEL WARNING INDICATION - ADJUSTMENT/TEST

1. General

- A. This test checks the low level fuel warning indication system in the main wing tanks.
- B. The ground sensing switch on the nose landing gear is disconnected for this test, as required.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

Table 501

Name and Number	Manufacturer
Specific gravity hydrometer	Commercially available
Sump drain tool, 4298-1	Roylyn, Inc. Glendale, CA
Drain bottle assembly, 700200-1	Accessory Products Co. Whittier, CA

3. Low Fuel Level Warning Indication - Adjustment/Test

A. Aircraft Preparation

- (1) Make aircraft attitude -1(±0.25) degree pitch and 0(±0.25) degree roll. (LEVELING, SUBJECT 08-10-00)
- (2) Fuel left, right, and center fuel tanks to levels that follow:
 - (a) Left main: at least 3500 lb (1600 kg).
 - (b) Right main: at least 3500 lb (1600 kg).
 - (c) Center: less than 17,000 lb (7700 kg).
- (3) Aircraft external power source connected.
- (4) Position controls as follows:

Table 502

Control	Location	Position
Crossfeed lever	Center pedestal	ON
APU master switch	Overhead switch panel	OFF
Battery switch	Overhead switch panel	OFF

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (5) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
X	41	B1-95	FIRE EXTINGUISHING CONTROL BOTTLE 1
X	42	B1-96	FIRE EXTINGUISHING CONTROL BOTTLE 2

CAUTION: DO NOT ROTATE ENGINE FIRE HANDLES. THIS RESULTS IN RELEASE OF FIRE EXTINGUISHING AGENT, AND REQUIRES REPLACEMENT OF FIREX CARTRIDGES AND BOTTLES.

- (6) Pull left and right engine fire handles (on main instrument panel) completely out. Do not rotate.

B. Low Fuel Level Warning Indication Test

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- (1) Manually open defueling valve and center tank fill valve, located near refueling panel on right wing.
- (2) Place FUEL TANKS LEFT AFT PUMPS and FWD PUMPS switches in ON position, and reduce fuel in left main tank until FUEL LEVEL LOW warning indication comes on.
- (3) Place FUEL TANKS LEFT AFT PUMPS and FWD PUMPS switches in OFF position.
- (4) Manually close center tank fill valve and open left main tank fill valve.
- (5) Place FUEL TANKS CTR AFT PUMPS and FWD PUMPS switches in ON position. Transfer 600 lb (300 kg) of fuel from center tank to left main tank.
- (6) Manually close left main tank fill valve.
- (7) Place FUEL TANKS CTR AFT PUMPS and FWD PUMPS switches in OFF position.
- (8) Wait 5 minutes. Check that FUEL LEVEL LOW warning indication is not on.
- (9) Place crossfeed lever in OFF position.
- (10) Open center tank fill valve.
- (11) Disconnect ground sense pulley from strut linkage (on aft side of nose gear strut), and rotate pulley to flight position.
- (12) Place FUEL TANKS RIGHT AFT PUMPS and FWD PUMPS switches in ON position, and reduce fuel in right main tank until FUEL LEVEL LOW warning indication comes on.
- (13) Place FUEL TANKS RIGHT AFT PUMPS and FWD PUMPS switches in OFF position.
- (14) Manually close center tank fill valve and open right main tank fill valve.
- (15) Place FUEL TANKS CTR AFT PUMPS and FWD PUMPS switches in ON position, and fill right main tank to level of 3500 lb (1600 kg) or greater.
- (16) Check that FUEL LEVEL LOW warning indication stays on.

WJE ALL; POST SB MD80-28-070

- (17) Check that FUEL LEVEL LOW warning indication goes off.

WJE ALL

- (18) Place FUEL TANKS CTR AFT PUMPS and FWD PUMPS switches to OFF position.

WJE ALL; PRE SB MD80-28-070

- (19) Rotate ground sense pulley to ground position, and connect pulley to strut linkage (on aft side of nose gear strut). Check that FUEL LEVEL LOW warning indication goes out.

WJE ALL

- (20) Manually close defueling valve and right main tank fill valve.
- (21) Push left and right engine fire handles (on main instrument panel) completely in. Do not rotate.
- (22) Manually close pneumatic crossfeed valve.
- (23) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
X	41	B1-95	FIRE EXTINGUISHING CONTROL BOTTLE 1
X	42	B1-96	FIRE EXTINGUISHING CONTROL BOTTLE 2

EFFECTIVITY
WJE ALL

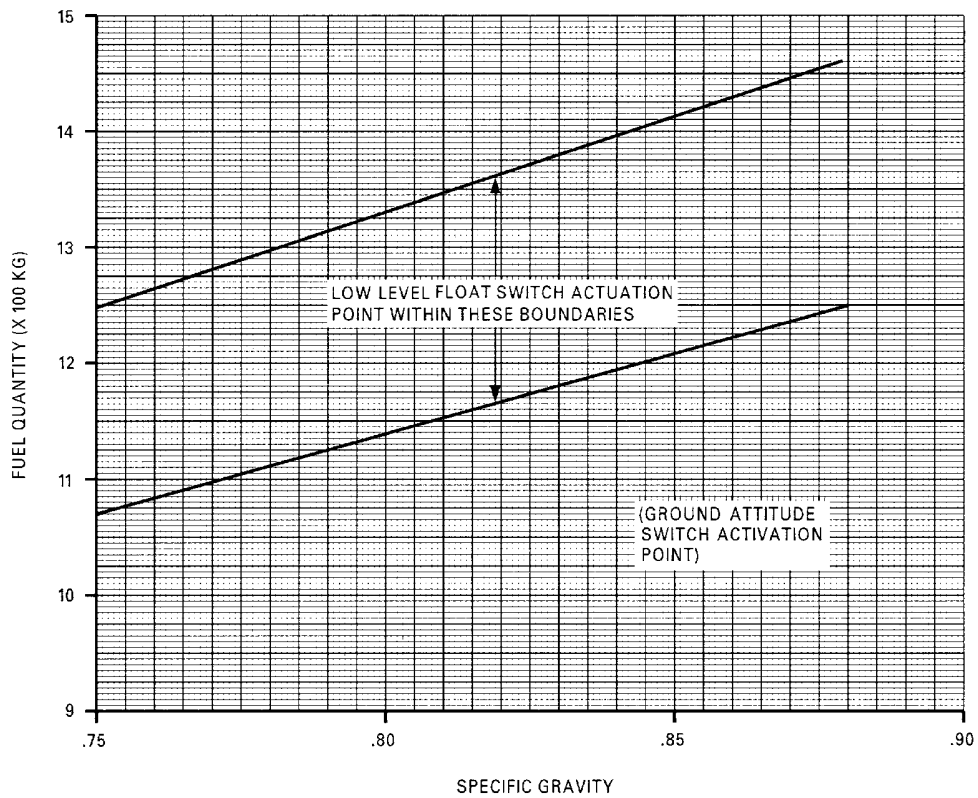
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AIRCRAFT MAINTENANCE MANUAL**

**LOW FUEL LEVEL
FLOAT SWITCH ACTUATION
POINT - LEFT & RIGHT MAIN FUEL TANKS**



CAG(I/GDS)

BBB2-28-234A

**Low Fuel Level Warning Actuation - Main Tank Actuation Point
Figure 501/28-42-00-990-801 (Sheet 1 of 2)**

EFFECTIVITY

WJE 405-411, 415-427, 429, 861-866, 868, 869, 871, 872, 880, 881, 883, 884, 891

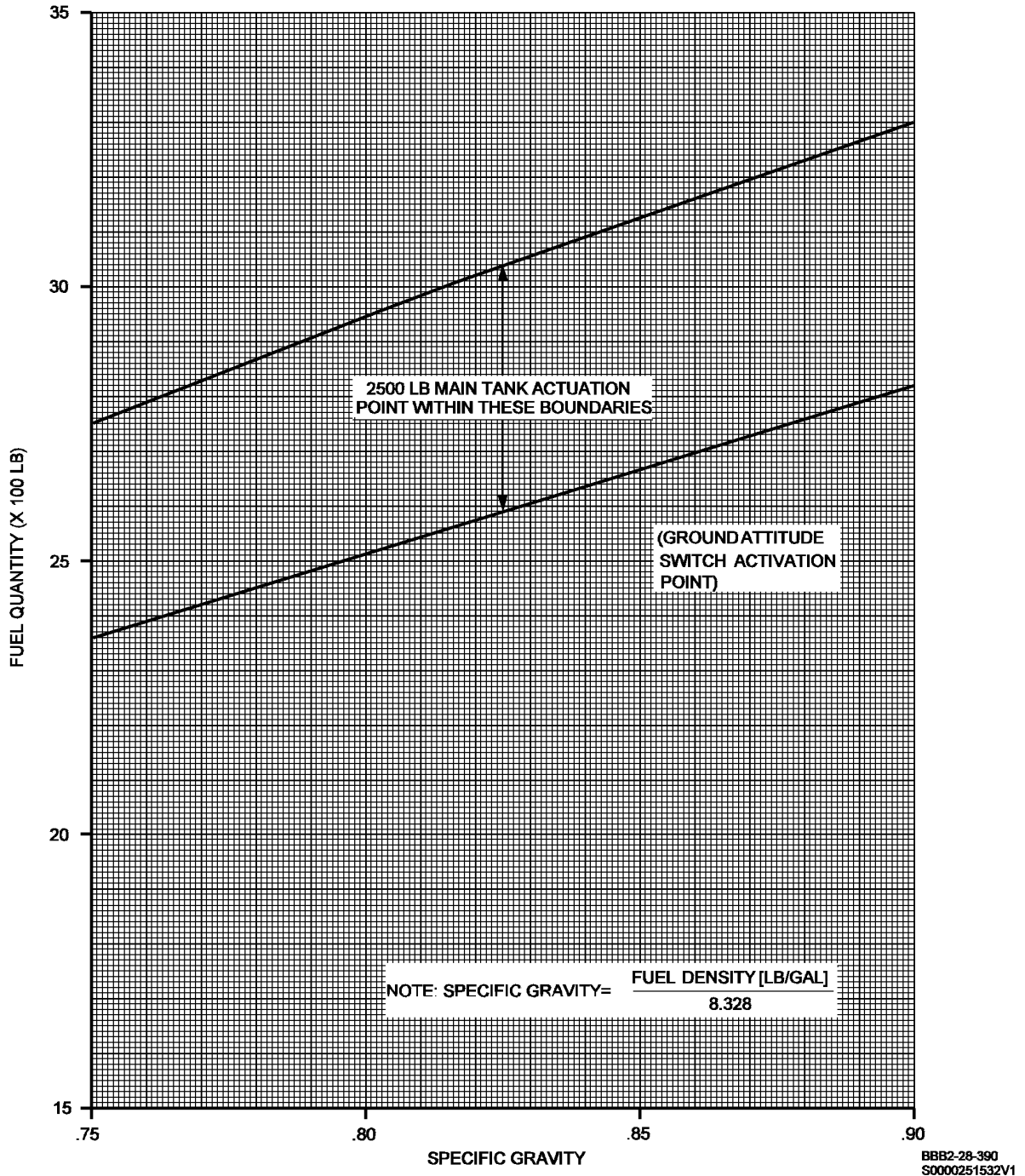
TP-80MM-WJE

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**MD-80
AIRCRAFT MAINTENANCE MANUAL**

**LOW FUEL LEVEL
2500 LB FLOAT SWITCH ACTUATION
POINT - LEFT & RIGHT MAIN FUEL TANKS**



Low Fuel Level Warning Actuation - Main Tank Actuation Point
Figure 501/28-42-00-990-801 (Sheet 2 of 2)

EFFECTIVITY
WJE ALL

28-42-00

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WJE ALL; PRE SB MD80-28-070

4. Low Fuel Level Warning Indication - Operational Check

A. Aircraft Preparation

- (1) Make aircraft attitude -1(±0.25) degree pitch and 0(±0.25) degree roll. (LEVELING, SUBJECT 08-10-00)
- (2) Fuel tanks are fueled to following levels:
 - (a) Left main: at least 3500 lb (1600 kg).
 - (b) Right main: at least 3500 lb (1600 kg).
 - (c) Center: less than 17,000 lb (7700 kg).
- (3) Aircraft external power source connected.
- (4) Position controls as follows:

Table 503

Control	Location	Position
Crossfeed lever	Center pedestal	ON
Start pump switch	Overhead switch panel	OFF
Fuel boost pump switches	Overhead switch panel	OFF
APU master switch	Overhead switch panel	OFF
Battery switch	Overhead switch panel	OFF

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (5) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
X	41	B1-95	FIRE EXTINGUISHING CONTROL BOTTLE 1
X	42	B1-96	FIRE EXTINGUISHING CONTROL BOTTLE 2

CAUTION: DO NOT ROTATE ENGINE FIRE HANDLES. THIS RESULTS IN RELEASE OF FIRE EXTINGUISHING AGENT, AND REQUIRES REPLACEMENT OF FIREX CARTRIDGES AND BOTTLES.

- (6) Pull left and right engine fire handles (on main instrument panel) completely out. Do not rotate.

NOTE: This also closes pneumatic crossfeed valve.

B. Low Fuel Level Warning Operational Check

- (1) Manually open defueling valve and center tank fill valve, located near refueling panel on right wing.
- (2) Place FUEL TANKS LEFT AFT PUMPS and FWD PUMPS switches in ON position, and reduce fuel in left main tank until FUEL LEVEL LOW warning indication comes on.
- (3) Place FUEL TANKS LEFT AFT PUMPS and FWD PUMPS switches in OFF position.
- (4) Manually close center tank fill valve and open left main tank fill valve.
- (5) Place FUEL TANKS CTR AFT PUMPS and FWD PUMPS switches in ON position. Transfer 600 lb (300 kg) of fuel from center tank to left main tank.

EFFECTIVITY
WJE ALL

28-42-00

TP-80MM-WJE

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WJE ALL; PRE SB MD80-28-070 (Continued)

- (6) Manually close left main tank fill valve.
- (7) Place FUEL TANKS CTR AFT PUMPS and FWD PUMPS switches in OFF position.
- (8) Wait 5 minutes. Check that FUEL LEVEL LOW warning indication is not on.
- (9) Place crossfeed lever in OFF position.
- (10) Manually open center tank fill valve.
- (11) Disconnect ground sense pulley from strut linkage (on aft side of nose gear strut), and rotate pulley to flight position.
- (12) Place FUEL TANKS RIGHT AFT PUMPS and FWD PUMPS switches in ON position, and reduce fuel in right main tank until FUEL LEVEL LOW warning indication comes on.
- (13) Place FUEL TANKS RIGHT AFT PUMPS and FWD PUMPS switches in OFF position.
- (14) Manually close center tank fill valve and open right main tank fill valve.
- (15) Place FUEL TANKS CTR AFT PUMPS and FWD PUMPS switches in ON position, and fill right main tank to level of 3500 lb (1600 kg) or greater.
- (16) Check that FUEL LEVEL LOW warning indication stays on.
- (17) Place FUEL TANKS CTR AFT PUMPS and FWD PUMPS switches to OFF position.
- (18) Rotate ground sense pulley to ground position, and connect pulley to strut linkage (on aft side of nose gear strut). Check that FUEL LEVEL LOW warning indication goes out.
- (19) Manually close defueling valve and right main tank fill valve.
- (20) Push left and right engine fire handles (on main instrument panel) completely in. Do not rotate.
- (21) Manually close pneumatic crossfeed valve.
- (22) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
X	41	B1-95	FIRE EXTINGUISHING CONTROL BOTTLE 1
X	42	B1-96	FIRE EXTINGUISHING CONTROL BOTTLE 2

WJE ALL; POST SB MD80-28-070

5. Low Fuel Level Warning Indication - Operational Check

A. Aircraft Preparation

- (1) Make aircraft attitude $-1(\pm 0.25)$ degree pitch and $0(\pm 0.25)$ degree roll. (LEVELING, SUBJECT 08-10-00)
- (2) Fuel tanks are fueled to following levels:
 - (a) Left main: at least 3500 lb (1600 kg).
 - (b) Right main: at least 3500 lb (1600 kg).
 - (c) Center: less than 17,000 lb (7700 kg).
- (3) Aircraft external power source connected.
- (4) Position controls as follows:

EFFECTIVITY
WJE ALL

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WJE ALL; POST SB MD80-28-070 (Continued)

Table 504

Control	Location	Position
Crossfeed lever	Center pedestal	ON
Start pump switch	Overhead switch panel	OFF
Fuel boost pump switches	Overhead switch panel	OFF
APU master switch	Overhead switch panel	OFF
Battery switch	Overhead switch panel	OFF

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (5) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
X	41	B1-95	FIRE EXTINGUISHING CONTROL BOTTLE 1
X	42	B1-96	FIRE EXTINGUISHING CONTROL BOTTLE 2

CAUTION: DO NOT ROTATE ENGINE FIRE HANDLES. THIS RESULTS IN RELEASE OF FIRE EXTINGUISHING AGENT, AND REQUIRES REPLACEMENT OF FIREX CARTRIDGES AND BOTTLES.

- (6) Pull left and right engine fire handles (on main instrument panel) completely out. Do not rotate.

NOTE: This also closes pneumatic crossfeed valve.

B. Low Fuel Level Warning Operational Check

- (1) Manually open defueling valve and center tank fill valve, located near refueling panel on right wing.
- (2) Place FUEL TANKS LEFT AFT PUMPS and FWD PUMPS switches in ON position, and reduce fuel in left main tank until FUEL LEVEL LOW warning indication comes on.
- (3) Place FUEL TANKS LEFT AFT PUMPS and FWD PUMPS switches in OFF position.
- (4) Manually close center tank fill valve and open left main tank fill valve.
- (5) Place FUEL TANKS CTR AFT PUMPS and FWD PUMPS switches in ON position. Transfer 600 lb (300 kg) of fuel from center tank to left main tank.
- (6) Manually close left main tank fill valve.
- (7) Place FUEL TANKS CTR AFT PUMPS and FWD PUMPS switches in OFF position.
- (8) Wait 5 minutes. Check that FUEL LEVEL LOW warning indication is not on.
- (9) Place crossfeed lever in OFF position.
- (10) Manually open center tank fill valve.
- (11) Place FUEL TANKS RIGHT AFT PUMPS and FWD PUMPS switches in ON position, and reduce fuel in right main tank until FUEL LEVEL LOW warning indication comes on.
- (12) Place FUEL TANKS RIGHT AFT PUMPS and FWD PUMPS switches in OFF position.
- (13) Manually close center tank fill valve and open right main tank fill valve.

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WJE ALL; POST SB MD80-28-070 (Continued)

- (14) Place FUEL TANKS CTR AFT PUMPS and FWD PUMPS switches in ON position, and fill right main tank to level of 3500 lb (1600 kg) or greater.
- (15) Check that FUEL LEVEL LOW warning indication is not on.
- (16) Place FUEL TANKS CTR AFT PUMPS and FWD PUMPS switches to OFF position.
- (17) Close defueling valve and right main tank fill valve.
- (18) Push left and right engine fire handles (on main instrument panel) completely in. Do not rotate.
- (19) Manually close pneumatic crossfeed valve.
- (20) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
X	41	B1-95	FIRE EXTINGUISHING CONTROL BOTTLE 1
X	42	B1-96	FIRE EXTINGUISHING CONTROL BOTTLE 2

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LOW FUEL LEVEL WARNING INDICATION - ADJUSTMENT/TEST

1. General

A. This procedure contains MSG-3 task card data.

TASK 28-42-00-710-801

2. Operational Check of the Fuel Level Low Alert and Latching Circuit

NOTE: This procedure is a scheduled maintenance task.

A. **References**

Reference	Title
28-42-00 P/B 501	LOW FUEL LEVEL WARNING INDICATION - ADJUSTMENT/TEST

B. **Tools/Equipment**

NOTE: When more than one tool part number is listed under the same "Reference" number, the tools shown are alternates to each other within the same airplane series. Tool part numbers that are replaced or non-procurable are preceded by "Opt:", which stands for Optional.

Reference	Description
COM-842	Drain Tools - Sump MD80-81, -82, -83, -88 Part #: V-799 Supplier: 20661
STD-1076	Hydrometer

C. **Prepare for the Fuel Level Low Alert and Latching Circuit Operational Check**

SUBTASK 28-42-00-840-001

- (1) Prepare aircraft. (LOW FUEL LEVEL WARNING INDICATION - ADJUSTMENT/TEST, PAGEBLOCK 28-42-00/501)

D. **Fuel Level Low Alert and Latching Circuit Operational Check**

SUBTASK 28-42-00-710-001

- (1) Do operational check. (LOW FUEL LEVEL WARNING INDICATION - ADJUSTMENT/TEST, PAGEBLOCK 28-42-00/501)

SUBTASK 28-42-00-280-001

- (2) Do specific gravity check as follows:
 - (a) Measure and record specific gravity of fuel sample from right main tank.
 - 1) Drain all water possible from sump valve with a sump drain tool, COM-842.
 - 2) Drain fuel sample from fuel sump into drain bottle.
 - 3) Measure specific gravity with a hydrometer, STD-1076.

SUBTASK 28-42-00-710-002

- (3) With the specific gravity found in SUBTASK 28-42-00-280-001, make sure that float switches operate within specified range. (Figure 501)

E. **Job Close-up**

SUBTASK 28-42-00-840-002

- (1) Restore aircraft. (LOW FUEL LEVEL WARNING INDICATION - ADJUSTMENT/TEST, PAGEBLOCK 28-42-00/501)

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SUBTASK 28-42-00-942-001

- (2) Remove all the tools and equipment from the work area. Make sure the area is clean.

————— **END OF TASK** —————

EFFECTIVITY
WJE ALL

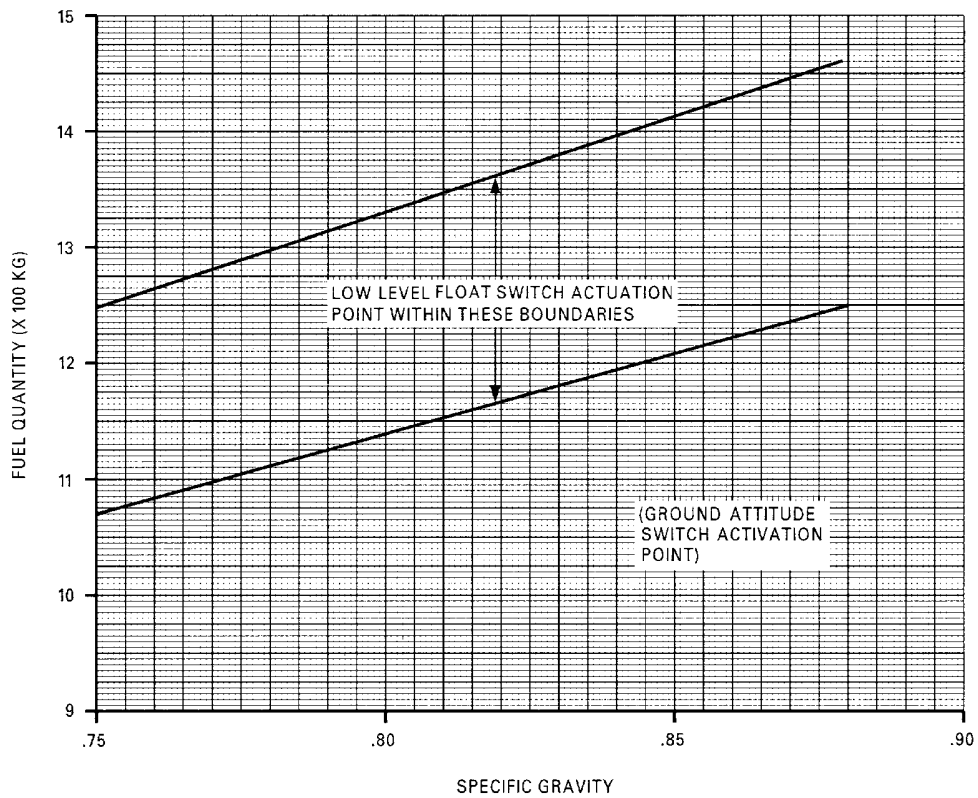
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**MD-80
AIRCRAFT MAINTENANCE MANUAL**

**LOW FUEL LEVEL
FLOAT SWITCH ACTUATION
POINT - LEFT & RIGHT MAIN FUEL TANKS**



CAG(IIGDS)

BBB2-28-234A

**Fuel Level Low Alert and Latching Circuit - Operational Check
Figure 501/28-42-00-990-802 (Sheet 1 of 2)**

EFFECTIVITY

WJE 405-411, 415-427, 429, 861-866, 868, 869, 871, 872, 880, 881, 883, 884, 891

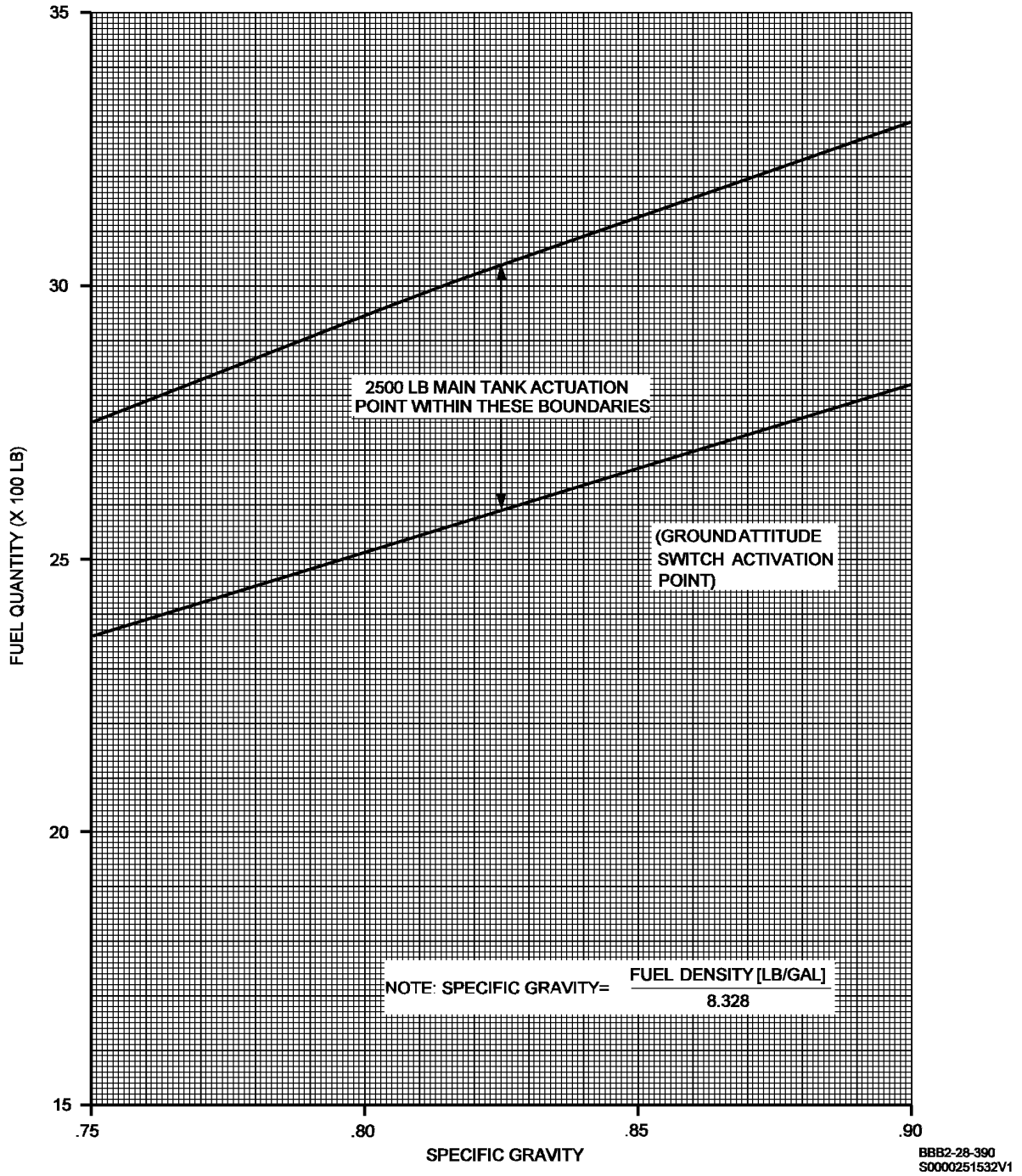
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**MD-80
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**LOW FUEL LEVEL
2500 LB FLOAT SWITCH ACTUATION
POINT - LEFT & RIGHT MAIN FUEL TANKS**



**Fuel Level Low Alert and Latching Circuit - Operational Check
Figure 501/28-42-00-990-802 (Sheet 2 of 2)**

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LOW FUEL LEVEL FLOAT SWITCHES - MAINTENANCE PRACTICES

1. General

- A. The low fuel level float switches are located in the aft end of each main fuel tank. Access to the switches is as follows:

Table 201

Component	Access
Left main tank float switch	1307C
Right main tank float switch	1410C
<p>NOTE: For aircraft equipped with drained electrical feedthroughs, fuel leakage allowed is limited to 2 fl oz. (59 cc) in 24 hours. Aircraft not equipped with drained feedthroughs are allowed no fuel leakage.</p>	

WJE ALL POST MD80-28-226

- B. For the main fuel tank an in-line fuse is installed in the applicable low fuel level float switch that is external of the fuel tank. The purpose of the fuse is to prevent the ignition of the fuel fumes in a fuel tank caused by a short of the pressure switch wires outside the tank do to incompatible power. For removal and installation of the in-line fuse (TERMINAL BLOCKS - MAINTENANCE PRACTICES, SWPM 20-20-02).

WJE ALL

- C. Before any maintenance is performed on the fuel system, personnel should read and thoroughly understand the GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201.

2. Equipment and Materials

NOTE: Equivalent substitutes may be used instead of the following listed items:

Table 202

Name and Number	Manufacturer
Pen, marking, large chisel point, green #479B Major Marker	Major Line, Inc. Anaheim, CA
Sleeving material DMS 2109 Type 1	
Sleeving material DMS 2379 Type 4	

3. Removal/Installation Low Fuel Level Float Switch

- A. Remove Float Switch
- (1) Defuel applicable tank.
 - (2) Close crossfeed valve.

EFFECTIVITY
WJE ALL

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WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (3) Open these circuit breakers and install safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
Z	38	B1-107	GROUND REFUEL

LOWER EPC, XFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 407, 408, 410, 411, 417, 419, 421, 423, 869, 871, 872, 875-879			
S	41	B1-1002	LOW FUEL LEVEL

OVERHEAD BATT DIR BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 401-409, 411, 412, 414-427, 429, 861-866, 868, 869, 871-881, 883, 884, 886, 887, 891-893			
B	16	B1-106	GROUND REFUELING
WJE 410			
B	17	B1-106	GROUND REFUELING

WJE ALL

- (4) Remove applicable access door. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)

WJE ALL PRE MD80-28-226

- (5) Disconnect the power terminal from terminal strip and ground terminal from ground stud.

WJE ALL POST MD80-28-226

- (6) Disconnect the power terminal from the in-line fuse and the ground terminal from the ground stud.

WJE ALL

- (7) Cut terminals from wire ends.

WJE ALL POST MD80-28-226

- (8) Remove the sleeve material from the float switch power wire.

WJE ALL

- (9) Loosen gland nut on spar feedthrough fitting. Move the gland nut back on the float switch wires.
- (10) Remove ferrule, sealing grommet, comb and sleeve from feedthrough fitting.
- (11) Move the gland nut, ferrule, sealing grommet, comb and sleeve off the float switch wires.
- (12) Attach a waxed string to the end of the float switch wires, of sufficient length, to reach from terminal strip and ground stud to float switch, through conduit.

NOTE: The string will be used to pull wires back through conduit during switch installation.

- (13) Disconnect the conduit from float switch.

<p>EFFECTIVITY</p> <p>WJE ALL</p>	
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CAUTION: DO NOT GRIP SWITCH SHELL DURING REMOVAL. USE WRENCH FLAT PROVIDED AT BASE OF SWITCH.

- (14) Remove retaining nut holding float switch to bracket.
- (15) Pull float switch out of tank, at same time pulling wires through conduit.
- (16) Remove the waxed string from the float switch wires.
- (17) Tie both ends of the waxed string to adjacent structure to prevent inadvertent removal of string.

B. Install Float Switch

WARNING: TAG AND USE SAFETY CLIPS TO SAFETY THE CIRCUIT BREAKERS. IF THE CIRCUIT BREAKERS ARE NOT OPENED, TAGGED, AND SAFETIED, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- (1) Make sure that these circuit breakers are open and have safety tags:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
Z	38	B1-107	GROUND REFUEL

LOWER EPC, XFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 407, 408, 410, 411, 417, 419, 421, 423, 869, 871, 872, 875-879			
S	41	B1-1002	LOW FUEL LEVEL

OVERHEAD BATT DIR BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 401-409, 411, 412, 414-427, 429, 861-866, 868, 869, 871-881, 883, 884, 886, 887, 891-893			
B	16	B1-106	GROUND REFUELING
WJE 410			
B	17	B1-106	GROUND REFUELING

WJE ALL

- (2) Prepare the applicable main tank low fuel level float switch and bracket for electrical bonding (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01) Figure 201.
- (3) Put the float switch wires through bracket and attaching hardware.

CAUTION: DO NOT GRIP SWITCH SHELL DURING REMOVAL. USE WRENCH FLAT PROVIDED AT BASE OF SWITCH.

- (4) Tighten nut attaching float switch to bracket.
- (5) Do an electrical bond check of applicable float switch at the mounting bracket. (ELECTRICAL BONDING - MAINTENANCE PRACTICES, SWPM 20-50-01)
- (6) Tie waxed string to the float switch wire ends.
- (7) Pull wires through conduit with string.
- (8) Attach conduit to float switch.
- (9) Remove the waxed string.
- (10) Remove slack from wires in conduit by gently pulling on wire ends at terminal end.
- (11) Mark wires with narrow band at a distance of 1.50 ±0.25 in. (38 ±6 mm) from forward edge of spar fitting. Use green marker or equivalent.

EFFECTIVITY WJE ALL

28-42-01

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- (12) Move the sleeve, comb, and grommet over the float switch wires. Make sure the green band is visible at the forward edge of the grommet.
- (13) Move sleeve into feedthrough fitting.
 - (a) Make sure the sleeve does not protrude from the spar feedthrough fitting.
- (14) Move ferrule and gland nut over the float switch wires.
- (15) Insert the comb, grommet and ferrule into the sleeve.
- (16) Install the gland nut into feedthrough fitting and tighten.
 - (a) Make sure that the green band is visible at the edge of the grommet.

WJE ALL PRE MD80-28-226

CAUTION: PROVIDE SUFFICIENT SLACK IN WIRES TO PREVENT SHARP BENDS, CHAFING, PRELOADING OF WIRES.

- (17) Cut the float switch wires to the correct length to reach the terminal strip and ground stud.

WJE ALL POST MD80-28-226

CAUTION: PROVIDE SUFFICIENT SLACK IN WIRES TO PREVENT SHARP BENDS, CHAFING, PRELOADING OF WIRES.

- (18) Cut the float switch wires to the correct length to reach the in-line fuse and ground stud.

WJE ALL

- (19) Install a new power terminal on the power wire and a new ground terminal on the ground wire. (TERMINALS - MAINTENANCE PRACTICES, SWPM 20-20-01)

WJE ALL POST MD80-28-226

- (20) Install sleeving material DMS 2109 Type 1 or DMS 2379 Type 4 on the power wire, from the spar feedthrough fitting to the power terminal. (WIRING INSTALLATION - MAINTENANCE PRACTICES, SWPM 20-10-01)
 - (a) Replacement or repair of wiring or sleeving from the fuse to tank penetration point must have DMS 2109 or DMS 2379 Type 4 sleeving installed per (TERMINALS - MAINTENANCE PRACTICES, SWPM 20-20-01).

NOTE: The above step is a Critical Design Configuration Control Limitation (CDCCL) procedure. For important information on CDCCLs, refer to the Airworthiness Limitations Precautions (GENERAL, SUBJECT 28-00-00).

WJE ALL PRE MD80-28-226

- (21) Connect the power terminal to terminal strip and ground terminal to ground stud. (GENERAL INSTALLATIONS HARDWARE - MAINTENANCE PRACTICES, SWPM 20-20-03)

WJE ALL POST MD80-28-226

- (22) Connect the power terminal to the in-line fuse and the ground terminal to the ground stud. (GENERAL INSTALLATIONS HARDWARE - MAINTENANCE PRACTICES, SWPM 20-20-03)
 - (a) A replacement fuse must be the same type and rating of CTN fuse part number 65053-219, install with TERMINAL BLOCKS - MAINTENANCE PRACTICES, SWPM 20-20-02.

NOTE: The above step is a Critical Design Configuration Control Limitation (CDCCL) procedure. For important information on CDCCLs, refer to the Airworthiness Limitations Precautions (GENERAL, SUBJECT 28-00-00).

EFFECTIVITY
WJE ALL

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WJE ALL

CAUTION: BEFORE INSTALLING ACCESS DOOR, PERFORM FINAL CHECK TO MAKE CERTAIN THAT ALL TOOLS, RAGS, HARDWARE, ETC., HAVE BEEN REMOVED FROM TANK.

- (23) Install access door. (GENERAL - MAINTENANCE PRACTICES, PAGEBLOCK 28-00-00/201)
- (24) Remove the safety tags and close these circuit breakers:

LOWER EPC, DC TRANSFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
Z	38	B1-107	GROUND REFUEL

LOWER EPC, XFER BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 407, 408, 410, 411, 417, 419, 421, 423, 869, 871, 872, 875-879			
S	41	B1-1002	LOW FUEL LEVEL

OVERHEAD BATT DIR BUS

<u>Row</u>	<u>Col</u>	<u>Number</u>	<u>Name</u>
WJE 401-409, 411, 412, 414-427, 429, 861-866, 868, 869, 871-881, 883, 884, 886, 887, 891-893			
B	16	B1-106	GROUND REFUELING
WJE 410			
B	17	B1-106	GROUND REFUELING

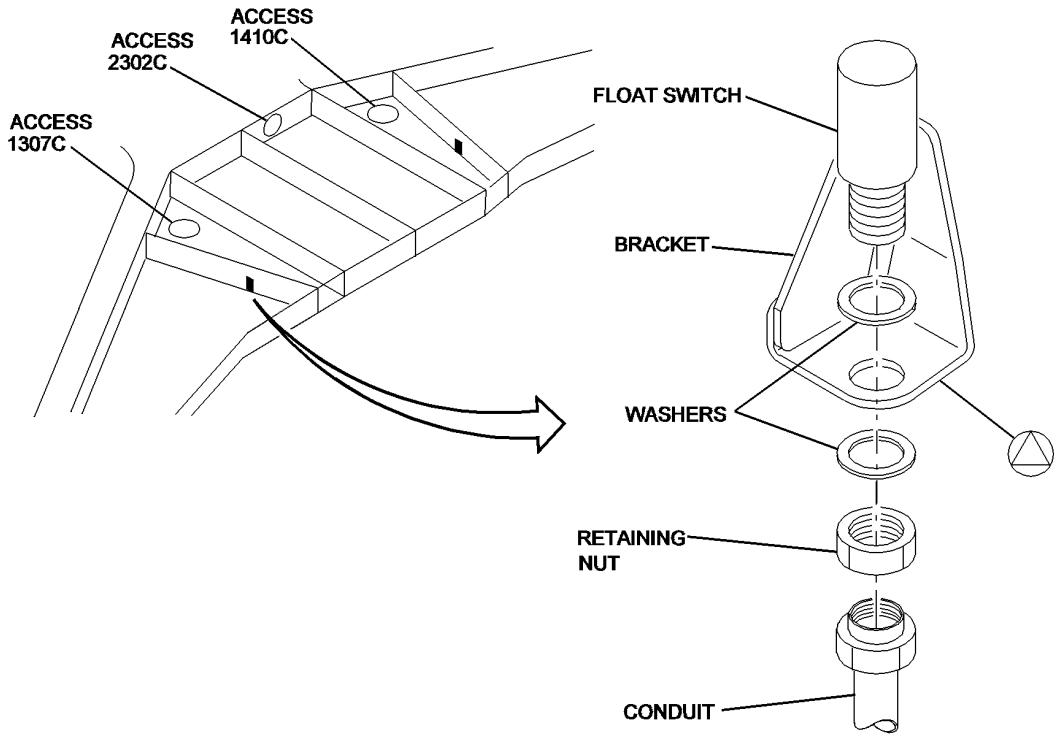
WJE ALL

EFFECTIVITY
WJE ALL

28-42-01

TP-80MM-WJE

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 ELECTRICAL BOND NECESSARY

BBB2-28-399
S0000331746V1

Low Fuel Level Float Switch -- Removal/Installation
Figure 201/28-42-01-990-801

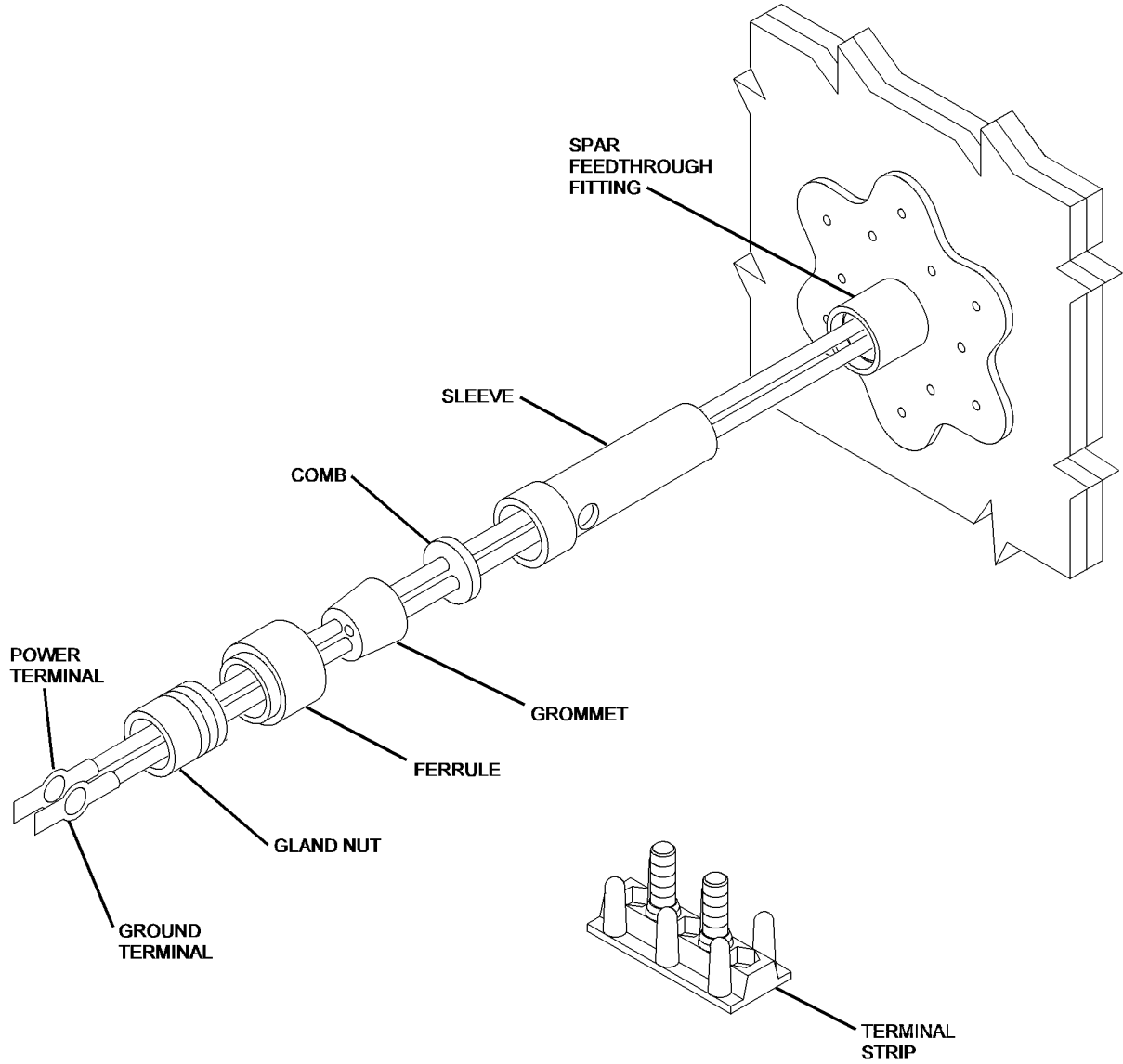
EFFECTIVITY
WJE ALL

TP-80MM-WJE

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BBB2-28-398A
S0000331529V2

Low Fuel level Float Switch Electrical Feedthrough -- Removal/Installation
Figure 202/28-42-01-990-802 (Sheet 1 of 2)

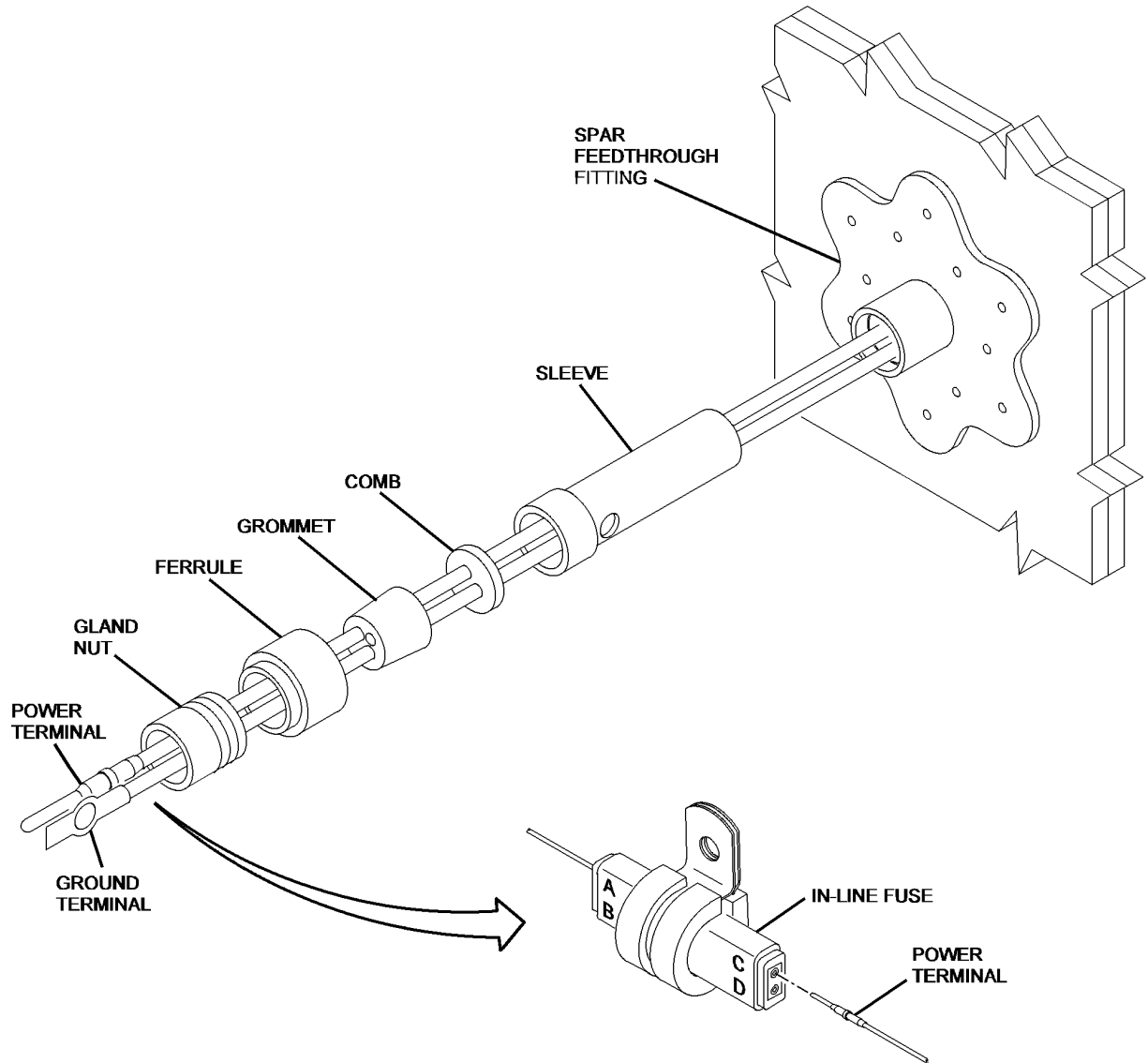
EFFECTIVITY
WJE ALL PRE MD80-28-226

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BBB2-28-397A
S0000331455V2

Low Fuel level Float Switch Electrical Feedthrough -- Removal/Installation
Figure 202/28-42-01-990-802 (Sheet 2 of 2)

EFFECTIVITY
WJE ALL POST MD80-28-226

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