CHAPTER

20

STANDARD PRACTICES

AIRFRAME

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STANDARD PRACTICES - AIRFRAME

1. Scope

A. This chapter gives information on standard maintenance practices. The subjects given are applicable to all maintenance task.

2. Definition

A. The data given in this chapter is given in two sections for easy location of information. For general maintenance data not given below refer to Chapter 51-00-00. A brief description of the sections is given below.

B. The first section gives maintenance practices for airframe hardware it gives information about the following:

- Health and safety precautions
- Torque data
- Safety locking
- Packings and back up rings
- Repairs to tubing
- Use of locktite
- Tubing hose and fluid fittings
- Bearings

C. The second section gives information about general procedures for work on electrical and electronic systems as follows:

- Wire bundles
- Electrical bonding
- The inspection of electrical components.

D. The information given in this chapter is general and does not replace information given in specific maintenance practices.

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HEALTH AND SAFETY PRECAUTIONS - DESCRIPTION AND OPERATION

1. General

Certain consumable materials, if used incorrectly, can be dangerous. When consumable materials are used always obey to all the manufacturer's safety precautions given in the safety card either supplied by the material manufacturer or written on the container. The information given below lists groups of materials with the applicable safety precautions in the form of a warning. The warnings listed in this chapter are only part of the information you can find in the material safety card and they do not supersede the warnings given by the manufacturer.

2. Precautions for Consumable Materials

MATERIAL	INSTRUCTIONS/SAFETY PRECAUTIONS
A. HYDRAULIC FLUID. B. PAINT C. SYNTHETIC-LUBRICATION OIL D. AMMONIUM BIFLUORIDE. E. DE-ICING FLUID.	BE CAREFUL WHEN YOU USE THE MATERIAL: – PUT ON SAFETY GOGGLES AND PROTECTIVE CLOTHING. IF YOU GET THE MATERIAL IN YOUR EYES OR ON YOUR SKIN. – FLUSH YOUR EYES WITH WATER FOR AT LEAST 15 MINUTES. – CLEAN YOUR SKIN WITH SOAP AND WATER. – GET MEDICAL HELP. THE MATERIAL IS DANGEROUS. IT CAN CAUSE DAMAGE TO YOUR EYES AND SKIN.

MATERIAL	INSTRUCTIONS/SAFETY PRECAUTIONS
A. METHYL ALCOHOL B. METHYL-ETHYL-KETONE (MEK).	BE CAREFUL WHEN YOU USE THE MATERIAL: – PUT ON SAFETY GOGGLES AND PROTECTIVE CLOTHING. – DO NOT BREATHE THE GAS – DO THE WORK IN AN AREA WHICH HAS A GOOD FLOW OF AIR. IF YOU GET THE MATERIAL ON YOUR SKIN OR IN YOUR EYES: – FLUSH YOUR EYES OR SKIN WITH WATER FOR AT LEAST 15 MINUTES. – GET MEDICAL HELP. IF YOU ACCIDENTLY DRINK THE MATERIAL: – DRINK WATER. – GET MEDICAL HELP. THE MATERIAL IS POISONOUS AND HIGHLY FLAMMABLE.

MATERIAL	INSTRUCTIONS/SAFETY PRECAUTIONS
A. ACETONE B. SOLVENT - ETHYL ACETATE. C. ISOPROPYL ALCHOHOL D. TOLUENE E. WHITE SPIRIT	BE CAREFUL WHEN YOU USE THE MATERIAL: – PUT ON SAFETY GOGGLES AND PROTECTIVE CLOTHING. – DO NOT BREATHE THE GAS. – DO THE WORK IN AN AREA WHICH HAS A GOOD FLOW OF AIR. IF YOU GET THE MATERIAL IN YOUR EYES OR ON YOUR SKIN: – FLUSH YOUR EYES OR SKIN WITH WATER FOR AT LEAST 15 MINUTES. – GET MEDICAL HELP. IF YOU GET ACCIDENTALLY DRINK THE MATERIAL: – FLUSH YOUR MOUTH WITH WATER. – GET MEDICAL HELP. THE MATERIAL IS POISONOUS AND HIGHLY FLAMMABLE.

MATERIAL	INSTRUCTIONS/SAFETY PRECAUTIONS
A. SEALING COMPOUND	BE CAREFUL WHEN YOU USE THE SEALING COMPOUND: – PUT ON SAFETY GOGGLES AND PROTECTIVE CLOTHING. – DO NOT BREATHE IN THE GAS (OR DUST). – DO THE WORK IN AN AREA WHICH HAS A GOOD FLOW OF AIR. IF YOU GET SEALING COMPOUND IN YOUR EYES OR ON YOUR SKIN: – FLUSH YOUR EYES WITH WATER FOR AT LEAST 15 MINUTES. – CLEAN YOUR SKIN WITH SOAP AND WATER. – GET MEDICAL HELP. IF YOU ACCIDENTALLY EAT THE SEALING COMPOUND: – GET MEDICAL HELP. THE SEALING COMPOUND IS POISONOUS AND HIGHLY FLAMMABLE IT GIVES OFF POISONOUS GAS WHEN IT BECOMES HOT

MATERIAL	INSTRUCTIONS/SAFETY PRECAUTIONS
A. NITRIC ACID	BE CAREFUL WHEN YOU USE THE NITRIC ACID: – PUT ON SAFETY GOGGLES AND PROTECTIVE CLOTHING. – DO NOT BREATHE IN THE GAS. – DO THE WORK IN AN AREA WHICH HAS A GOOD FLOW OF AIR. IF YOU GET NITRIC ACID IN YOUR EYES OR ON YOUR SKIN: – FLUSH YOUR EYES OR SKIN WITH WATER FOR AT LEAST 15 MINUTES. – GET MEDICAL HELP. IF YOU ACCIDENTALLY DRINK OR EAT NITRIC ACID: – FLUSH YOUR MOUTH WITH WATER. – DRINK WATER. – PUT YOURSELF IN A HALF SITTING POSITION. – GET MEDICAL HELP. IF THE AFFECTED PERSON DOES NOT BREATHE APPLY ARTIFICIAL RESPIRATION. IF YOU GET NITRIC ACID ON YOUR CLOTHES DISCARD THEM. THE NITRIC ACID IS POISONOUS AND CAN CAUSE CORROSION, KEEP IT AWAY FROM SOLVENTS OR OTHER FLAMMABLE MATERIALS. A FIRE BY CHEMICAL REACTION CAN OCCUR.

MATERIAL	INSTRUCTIONS/SAFETY PRECAUTIONS
A. HYDROGEN PEROXIDE B. CHROMIC ACID C. AMMONIUM NITRATE	BE CAREFUL WHEN YOU USE THE MATERIAL: – PUT ON SAFETY GOGGLES AND PROTECTIVE CLOTHING. – DO NOT BREATHE THE GAS OR DUST. – DO THE WORK IN AN AREA WHICH HAS A GOOD FLOW OF AIR. IF YOU GET THE MATERIAL IN YOU EYES OR ON YOUR SKIN: – FLUSH YOUR EYES OR SKIN WITH WATER FOR AT LEAST 15 MINUTES. – GET MEDICAL HELP. IF YOU ACCIDENTLY DRINK OR EAT THE MATERIAL: – FLUSH YOUR MOUTH WITH WATER. – DRINK WATER. – PUT YOURSELF IN A HALF SITTING POSITION. – GET MEDICAL HELP. THE MATERIAL IS POISONOUS. KEEP IT AWAY FROM OTHER FLAMMABLE MATERIALS. A FIRE BY CHEMICAL REACTION CAN OCCUR.

MATERIAL	INSTRUCTIONS/SAFETY PRECAUTIONS
A. HYDROFLUORIC ACID B. IRIDITE POWDER C. ALODINE 1200 D. ALODINE	BE CAREFUL WHEN YOU USE THE MATERIAL: – PUT ON SAFETY GOGGLES AND PROTECTIVE CLOTHING. – DO NOT BREATHE THE GAS OR DUST. – DO THE WORK IN AN AREA WHICH HAS A GOOD FLOW OF AIR. IF YOU GET THE MATERIAL IN YOUR EYES OR ON YOUR SKIN: – FLUSH YOUR EYES OR SKIN WITH WATER FOR AT LEAST 15 MINUTES. – GET MEDICAL HELP. IF YOU ACCIDENTALLY DRINK OR EAT THE MATERIAL: – FLUSH YOUR MOUTH WITH WATER. – DRINK WATER. – PUT YOURSELF IN A HALF SITTING POSITION. – GET MEDICAL HELP. IF YOU GET THE MATERIAL ON YOUR CLOTHES DISCARD THEM. THE MATERIAL IS POISONOUS AND CAN CAUSE CORROSION. KEEP IT AWAY FROM OTHER FLAMMABLE MATERIALS. A FIRE BY CHEMICAL REACTION CAN OCCUR.

MATERIAL	INSTRUCTIONS/SAFETY PRECAUTIONS
A. TRICHLOROETHANE	BE CAREFUL WHEN YOU USE THE TRICLOROETHANE: – PUT ON SAFETY GOGGLES AND CLOTHING. – DO NOT BREATHE THE GAS. – DO THE WORK IN AN AREA WHICH HAS A GOOD FLOW OF AIR. IF YOU ACCIDENTALLY BREATHE THE GAS KEEP AWAKE. IF YOU GET TRICHLOROETHANE IN YOUR EYES OR ON YOUR SKIN: – FLUSH YOUR EYES WITH WATER FOR AT LEAST 15 MINUTES – CLEAN YOUR SKIN WITH SOAP AND WATER. – GET MEDICAL HELP. IF YOU ACCIDENTALLY DRINK OR EAT TRICHLOROETHANE: – FLUSH IN YOUR MOUTH WITH WATER – DRINK WATER. – GET MEDICAL HELP. THE TRICHLOROETHANE IS POISONOUS, IT GIVES OFF A POISONOUS GAS WHEN IT BECOMES HOT.

MATERIAL	INSTRUCTIONS/SAFETY PRECAUTIONS
A. BATTERY B. ELECTROLYTE	DO NOT GET BATTERY ELECTROLYTE ON YOUR SKIN OR IN YOUR EYES. – PUT ON SAFETY GOGGLES AND PROTECTIVE CLOTHING. – MAKE SAFE ANY SPILLED ELECTROLYTE WITH A 3 PER CENT SOLUTION OF ACETIC ACID OR A 10 PER CENT SOLUTION OF BORIC ACID. – CLEAN THE AREA WITH WATER. – GET MEDICAL HELP IF YOU GET ELECTROLYTE DEPOSITES IN YOUR EYES OR ON YOUR SKIN. – BATTERY ELECTROLYTE CAN CAUSE CORROSION. INJURY TO PERSONS AND/OR DAMAGE TO EQUIPMENT CAN OCCUR.

3. Precautions for Miscellaneous Materials

A. Titanium

CAUTION: DO NOT USE CADMIUM PLATED TOOLS ON TITANIUM PARTS. IF PARTS ARE INSTALLED WHERE THE TEMPERATURE IS MORE THAN 260 DEGREES FAH. SMALL CADMIUM DEPOSITS WILL REACT WITH THE TITANIUM AND CAUSE BRITTLENESS AND CRACKING.

CAUTION: DO NOT USE CADMIUM PLATED FASTENERS ON TITANIUM PARTS.

B. Mercury

CAUTION: DO NOT USE THERMOMETERS OR OTHER TEST EQUIPMENT WHICH CONTAINS MERCURY ON THE AIRPLANE.

(1) Mercury, by the amalgamation process can penetrate any break in the surface finish of a metal structural element. The mercury will cause embrittlement of the metallic structure and can cause rapid failure of structural members under load. Once started there is no known method of stopping the process.

(2) If a mercury spillage occurs the area must be cleaned thoroughly by suction and all material must be removed. If necessary all equipment and structure around the spillage must be removed to make sure that all material is removed.

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TORQUE DATA - MAINTENANCE PRACTICES

1. General

A. This page block gives the standard practices for torque loading nut and bolt combinations. Specific data for torque locating is given in individual maintenance tasks. Where not specified, the torque values have to be extracted from a standardtorque table.

B. Before final assembly make a check of the effectiveness of locking devices of self locking nuts in this way:

- Screw the nut onto the bolt until a minimum of three bolt threads are clear of the locking mechanism of the nut.
- Use a torque wrench to measure the torque necessary to unscrew the nut.
- If the torque value is less than the value given in Table 201 replace the nut.

C. When it is necessary to torque tighten from the bolt head, first measure the torque required to turn the bolt inside its fitting. This value must be added to the specified torque value.

D. When it is necessary to align a locking hole for installation of a locking device tighten the nut to the minimum value and increase the torque until the holes align. If the holes will not align before the maximum torque limit it will be necessary to add washers or shims as necessary to obtain the correct value.

2. Use of Torque Wrenches

A. Always set the required torque value on a calibration tool before use. If a calibration tool is not available use only certified equipment.

B. Always give a smooth, even pull on the wrench. When the correct torque value is set it should be possible to continue to tighten the nut. If the nut stops suddenly it can be because it has reached the end of the available thread on the bolt.

C. When it is necessary to use an adapter on the drive end of the wrench use the datashown in the standard torque table to extrapolate the required wrench setting.

3. Standard Torque Values

A. Minimum breakaway torque values for nut and bolt combination are given in Table201.

BOLT SIZE	MINIMUM BREAKAWAY TORQUE VALUE
8-32	ref. to NOTE 1
10-32	ref. to NOTE 1
1/4-28	ref. to NOTE 1
5/16-24	6.5 Inch-Pounds
3/8-24	9.5 Inch-Pounds
7/16-20	14.0 Inch-Pounds
1/2-20	18.0 Inch-Pounds
9/16-18	24.0 Inch-Pounds
5/8-18	32.0 Inch-Pounds
3/4-16	50.0 Inch-Pounds
7/8-14	70.0 Inch-Pounds
1-14	92.0 Inch-Pounds

Table 201: MINIMUM BREAKAWAY TORQUE VALUE

NOTE 1: Test nut for minimum breakaway torque by attempting to insert amatching bolt by hand. Do not use nuts that can be tightened down withfingers after the locking action engages bolt or stud.

NOTE 2: Replace nuts which fall below values shown for unscrewing nut from bolts

B. Standard torque values for nut and bolt combination are given in InternationalStandards if not otherwise specified in the Maintenance Manual procedures.

SAFETY LOCKING - MAINTENANCE PRACTICES

1. General

A. Safety locking has three main functions:

- It stops parts from becoming loose
- It holds parts in a fixed postion in relation to other parts e.g. shut off cocks used for isolation of systems for maintenance
- It shows if a component or control has been used e.g. emergency selector levers or switches.

B. The types of general locking described below are as follows:

- Installation of lockwire
- Installation of cotter (split) pins
- Installation of locking clips in turnbuckles.

C. Specific data for other types of safety locking are described in the individual maintenance practices.

2. Installation of Lockwire (Ref. Fig. 201)

A. The most commonly used type of wire is as follows:

- 0.32 in. diameter incone safety wire for general locking
- 0.020 in. diameter soft copper wire for indication or safety equipment locking
- 0.062 in. diameter corrosion resistant steel wire for high strength locking

When you remove a component always remember the size and type of wire used and the method of locking used for assembly. Safety wire is not used in fuel tanks because of the possibility of static electrical discharge.

B. Two methods of safetying are in general use:

(1) Single strand lockwire:

- For use with indication wire on safety equipment or controls/switches
- Where a series of screws or bolts will be safetied in a geometric pattern (e.g. a square or triangle)
- Where access makes double strand locking impractical.

(2) Double strand lockwire for most applications where the number of items to be safetied is three or less. Special pliers can be used to tighten the two strands of wire evenly.

C. General procedures for the use of lockwire are as follows:

- Remove all pieces of the old lockwire from the component
- Use only new lockwire, never use lockwire more than once
- Do not use damaged lockwire
- Do not hold the wire too tightly or twist the wire excessively
- Do not pull the wire around sharp corners
- Make sure that the direction of installation of the wire tightens the bolt (nut, screw)
- Do not loosen or overtighten parts to improve safety wire hole location
- Do not drill additional safety wire holes
- When you cut the end of the safety wire leave approximately 6 twists of wire
- Bend the end of the wire to stop injury to persons or interference with other parts
- Never use more than 24 inches of lockwire for a multiple group of parts

3. Installation of Cotter Pins (Ref. Fig. 202)

A. General procedures for the installation of cotter pins are as follows:

- Always use new cotter pins. Never use a cotter pin more than once
- Always use accepted torque tightening techniques for the alignment of cotter pin holes (Refer to 20-10-01).
- Safety castellated nuts in one of the two ways shown in Fig. 202 .
- Always use the largest diameter cotter pin possible for the hole size. The minimum acceptable sizes are given in Fig. 202.
- Do not use cadmium plated pins in locations where they can contact fuel, hydraulic oil or synthetic oil

4. Installation of Locking Clips in Turnbuckles (Ref. Fig. 203)

A. General procedures for the installation of locking clips in turnbuckles are as follows:

- Screw the cable ends evenly into the turnbuckle body until the adjustment is correct and the ends are in safety
- Always use a new locking clip
- Align the locking channel in the cable end with the channel in the body and push the straight end of the clip into the body of the turnbuckle
- Push the hook clip into the center of the turnbuckle body
- Pull the hook shoulder by hand to make sure that the clip is engaged fully.

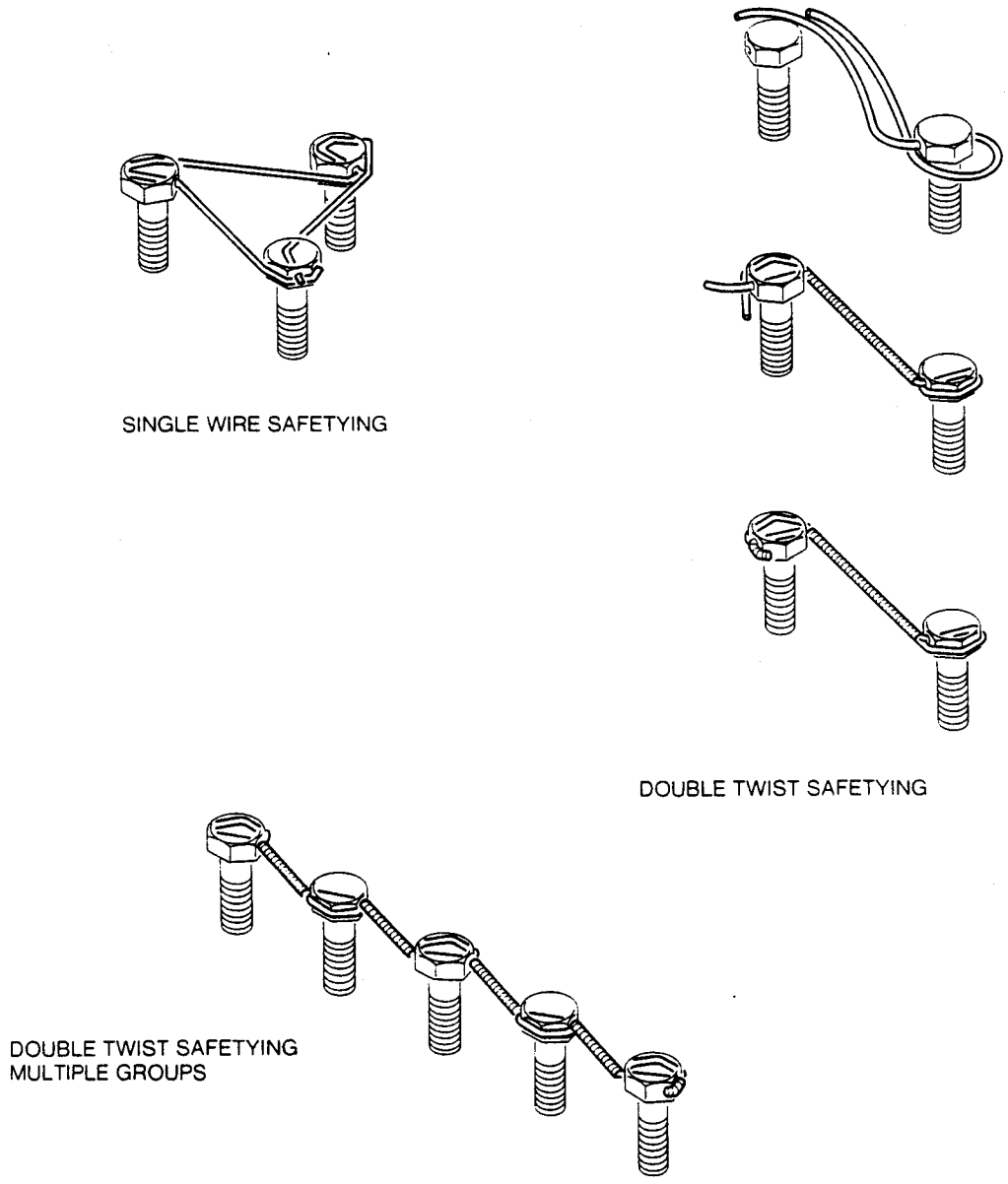

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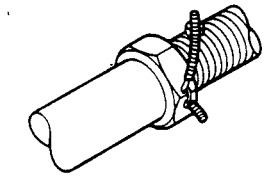
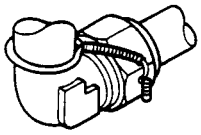
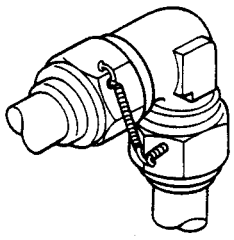
Fig. 201 - Safety Wiring (Sheet 1 of 2)



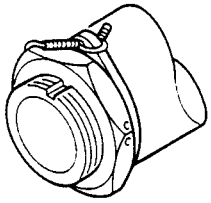
ROD END AND KEY LOCK



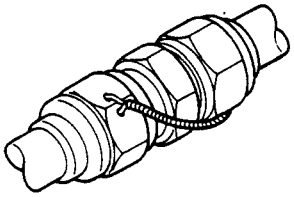
SINGLE "B" NUT
CONNECTION TO ELBOW



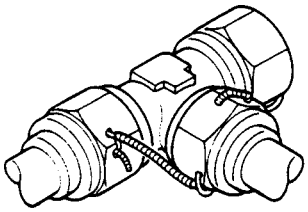
ELBOW FITTING



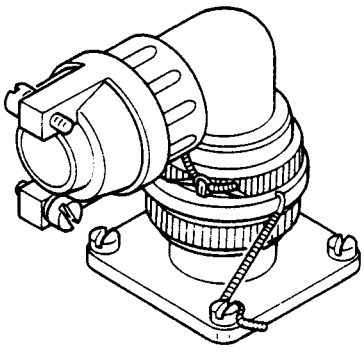
SAFETY LOCK WASHER



UNION FITTING



TEE FITTING



ELECTRICAL CONNECTION

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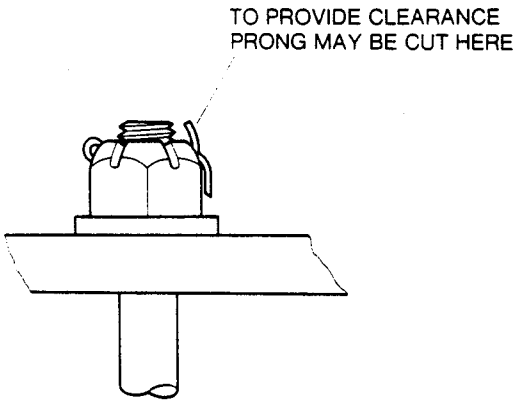
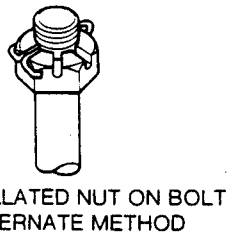
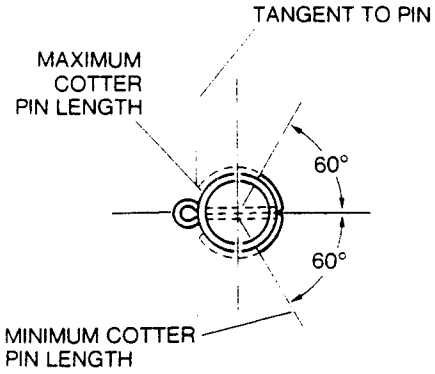
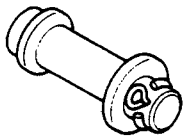
Fig. 201 - Safety Wiring (Sheet 2 of 2)









NOTE: ALL DIMENSIONS IN INCHES

THREAD SIZE	MINIMUM PIN SIZE
6	.028
8	.044
10	.044
1 4	.044
5 16	.044
3 8	.072
7 16	.072
1 2	.072
9 16	.086
5 8	.086
3 4	.086
7 8	.086
1	.086
1 1 8	.116
1 1 4	.116
1 3 8	.116
1 1 2	.116

MM_201002-202

Fig. 202 - Use of Cotter Pins

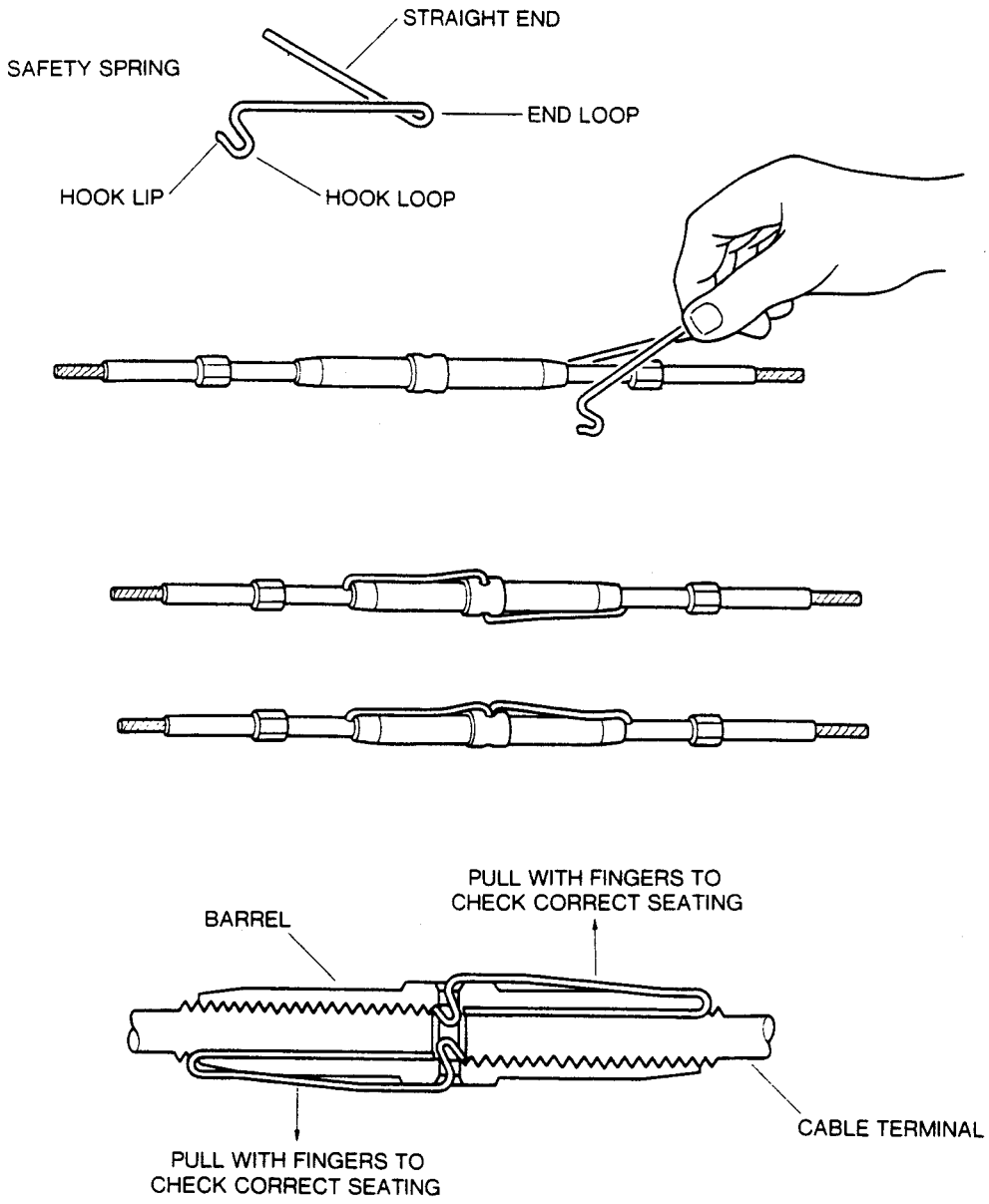


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Fig. 203 - Locking Pins for Turnbuckles

PACKING AND BACK-UP RINGS - MAINTENANCE PRACTICES

1. General

CAUTION: BE CAREFUL WHEN YOU HANDLE PACKINGS AND BACK-UP RINGS:

- AVOID CONTAMINATION BY FOREIGN MATTER, MATERIALS OR CHEMICALS
- KEEP THE WORK AREA CLEAN
- WASH DUST AND DIRT FROM PARTS WITH STODDARD SOLVENT BEFORE YOU INSTALL PACKINGS
- CLEAN HANDS AND TOOLS THOROUGHLY
- PUT PACKINGS ON CLEAN LINT FREE CLOTH OR PAPER BEFORE ASSEMBLY
- AVOID CONTAMINATION OF FLUIDS AND LUBRICANTS WHEN HANDLING PACKINGS

LEAKAGE AND SYSTEM FAILURE CAN OCCUR.

A. Packing grooves are in areas with a high standard of surface finish. Damage to the surface finish can cause faulty sealing and result in functional failure.

B. Do not use hardened steel, pointed or sharp edge tools. Use tools made from soft metals e.g. brass or aluminium, when you work with packings.

C. Examine tools often. Tool surfaces must be well rounded, polished and free from burrs.

D. When you open fluid lines always use a container to catch the fluid. If you spill fluid clean the surface with a suitable solvent and a lint free cloth.

NOTE: For installation of packings and back-up rings on fluid fittings refer to 20-10-06.

2. Packings - Installation Precautions

A. Do the steps that follow every time you install a packing:

(1) Make sure that the packing material is correct for the system fluid (Refer to Table 201).

(2) Examine each packing before use. Packings must be free from distortion, blemishes, abrasions, mold flash, cuts or punctures.

(3) Examine the packing grooves for defects.

(4) Install the packing into the groove with no distortion. Where necessary lubricate the packing and the threads of the fitting to reduce distortion.

(5) Use correct torque tightening techniques on assembly.

3. Back-up Rings - Installation (Ref. Fig. 201)

A. In some installations back-up rings are used to support packings. They stop deformation on the packing and decrease bypass leakage. Do the steps that follow each time you install a back-up ring:

(1) Before installation examine the back-up ring to make sure there is no damage or distortion.
(2) Lubricate the rings with system fluid.
(3) Install the back-up rings by hand if possible. Do not use sharp tools.
(4) Make sure that the scarfed ends are installed at different positions around the circumference of the seal groove.

4. Storage of Packings

A. Store packings in heat sealed packages in a cool place until ready for use. The packages must be marked with the identification and cure date of the packings. Avoid the following problems during the storage and handling of packings.

(1) Incorrect stacking of parts which cause distortion of the packing.
(2) Compression and flattening caused by storage below heavy parts.
(3) Holes caused by staples used to attach identification tags.
(4) Deformation caused by storage on nails or pegs.
(5) Contamination from adhesive tape used directly in contact with the packings.

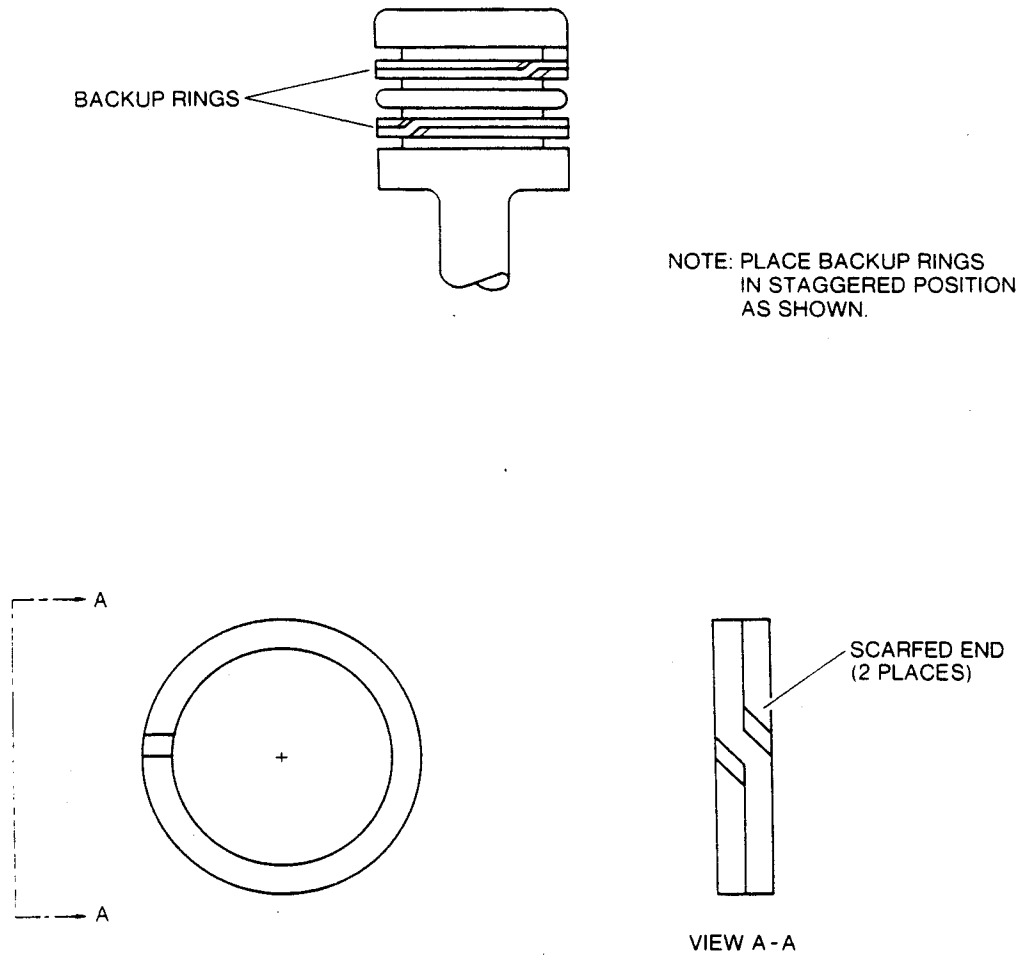

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Fig. 201 - Packing and Back-up Ring - Installation

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TUBING - MAINTENANCE PRACTICES

1. General

A. The report that follows gives information on the inspection and repair of tubing using Permaswage inserts. For further information refer to latest revision of Permaswage Operations Manual.

B. This page block contains the following maintenance practices:

- Application
- Tool Component Description
- Tool Preparation and Operational Instruction
- Tubing Preparation, Insertion
- Marking and Limitation, and Inspection of Swaged Joint
- Tubing Repair Techniques
- Tube Cutting and Deburring
- User Maintenance Inspection Plan for Swage Tooling.

WARNING: THE TOOLING DESCRIBED HEREIN IS SUBJECTED TO EXTREME HIGH FORCES DURING SWAGING OPERATION. IMPROPER USE MAY RESULT IN TOOL FAILURE AND/OR PERSONAL INJURY.

2. Applications

A. The following Tables 201 and 202 list the swage fitting and tubing material combinations and recommended standard tube wall thickness. Both tables may be used as a guide in swage applications.

B. Fitting and Tubing Material Combinations

(1) Table 201 offers the fitting and tubing material combinations as follows:

BASIC FITTING MATERIAL	BASIC TUBING MATERIALS *
21-6-9 CRES Per AMS5656	21-6-9 CRES Per AMS 5561
	304 1/8 HD CRES Per MIL-T-6845
	3AL-2.5V CWSR TI Alloy Per AMS 4944
	6061-T6 AL Alloy Per MIL-T-7081
304L or 316L CRES Per QQ-S-763	304 1/8 HD CRES Per MIL-T-6845
	321 1/8 HD CRES Per MIL-T-8808
Commerical Pure Titanium Per AMS4921	3AL-2.5V CWSR TI Alloy Per AMS4944
6061-T6 AL Alloy Per QQ-A-225/8	6061-T6 AL Alloy Per MIL-T-7081

* NOTES:

Min. CRES tube yeld 75,000 psi required.

Min. Titanium Alloy yeld 95,000 psi required.

Min. Aluminum Alloy yeld 35,000 psi required.

Table 201 - Recommended Fitting and Tubing Material Combination

MM_201005-T201

C. Recommended Standard Tube Walls

(1) The following table outlines the standard tube walls available.

TUBE MATERIAL	MAX RATED PRESSURE (psi)	TUBE SIZE									
		3/16	1/4	5/16	3/8	1/2	5/8	3/4	1	1-1/4	1-1/2
21-6-9	3000	.016	.016	.020	.020	.026	.032	.039	.052	.063	—
21-69	2000	—	—	—	—	—	—	—	—	—	.054
304 1/8 HD	3000	.016	.020	.020	.028	.035	.042	.058	.065	—	—
304 1/8 HD	1500	—	—	—	—	—	—	—	—	.049	.065
321 1/8 HD	3000	—	0.28	.028	.035	.042	.058	.065	.083	—	—
3AL-2.5V CWSR	3000	.016	.016	.016	.019	.026	.032	.039	.051	.063	
3AL-2.5V CWSR	2000	—	—	—	—	—	—	—	—	—	.054
6061-T6	1500	—	.035	.035	.035	.035	—	—	—	—	—
6061-T6	1000	.020	.020	.028	.028	.035	.035	.035	.049	—	—
6061-T6	500	—	—	—	—	—	—	—	—	.035	.035

MM_201005-T202

Table 202 - Recommended Standard Tube Walls

3. Tool Component Description (Refer to Fig. 201)

A. Body Assembly (Power Unit and Strut)

(1) The power unit (6) is a hydraulic actuator that converts hydraulic pressure of 5,500 ±250 psi to a linear travel and force sufficient to swage the fittings. Spring return action opens the dies and returns the piston when the hydraulic pressure is released.

(2) When advanced upward against the yoke assembly (1), the knurled nut (4), on the body assembly (2 and 6) aligns and restricts spreading of the yoke assembly (1), during the swaging cycle.

B. Quick Disconnect

(1) The quick disconnect (5), located at the bottom of the power unit (6), is used to connect the hydraulic hose coming from the pump.

C. Head Assembly

(1) The swage head assembly consists of a lower die holder assembly (3) which houses the lower die half and the yoke assembly (1), which houses the upper die half of the swage die set.

D. Yoke Assembly

(1) The upper die half is mounted in the yoke assembly (1). When the piston rod drives the lower die holder assembly (3), into contact with the upper die half,

the linear force of the piston rod is converted to radial swaging force as the upper and lower dies are closed over the fitting.

E. Die Holder Assembly

(1) The die holder assembly (3), is used to mount the lower die half. Action of the piston rod on the die holder assembly moves it vertically within the yoke assembly (1). As the die holder moves, the lower die half mates with the upper die half mounted in the yoke assembly (1). As the piston rod continues its travel, the die halves are forced to close, or swage, the enclosed fitting. Vertical movement of the die holder (3), is guided by the yoke assembly (1), and retained by the die holder ball detents riding in slots in the yoke assembly (1).

F. Die Set

(1) The two die halves make a die set. The dies have longitudinal alternating slots which allow the dies to contract radially when a force is applied to the die holder assembly.

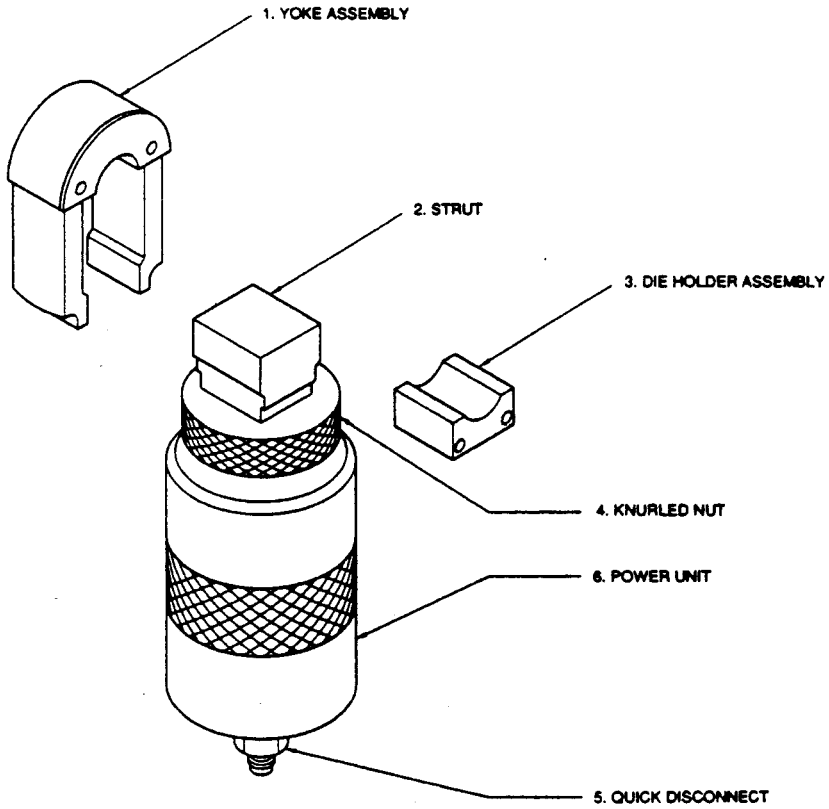

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Fig. 201 - Swage Tool Assembly

4. Tool Preparation and Operation Instruction (Refer to Fig. 202)

A. Swaging Tool Preparation for Operation

STEP	OPERATION	PRECAUTION	POTENTIAL PROBLEM
(1)	Check if die is properly installed in yoke and die holder assembly (Figure 202).	The tapered end of dies must be on the side of the yoke and die holder which is black.	Improperly installed dies will produce an unsatisfactory swage, requiring fitting to be cut off the tube.
(2)	Insert die holder into yoke assembly (Figure 202).	The die holder must be inserted so that the black face and silver face are matched with those on the yoke. **Remember: silver to silver, black to black.**	If the die holder is installed backward it will produce and unsatisfactory swage, requiring the fitting replacement.
(3)	Slide strut portion of power unit into yoke assembly and snug up knurled nut (Figure 202)	Make sure the nut is snug finger tight against the yoke. After snugging up the knurled nut make sure that the clearance between the lower angle of the yoke and strut has been taken up. If there is some clearance lift up on the yoke to remove clearance and retighten the knurled nut. **THIS IS CRITICAL. CHECK TWICE.**	**Failure to completely snug the knurled nut could cause the yoke assembly to fail and result in injury during the swage cycle.**
(4)	Connect the pressure source to the disconnect at the base of tool (Figure 202)	Yoke assembly must be attached to strut per steps 1 thru 3 before pressurizing the swaging tool.	Operating tool without head assembly securely in place will damage the spring return located within the power unit.
AIR BLEED PROCEDURE:		(Required prior to putting into service, hose replacement, erratic operation of tooling and/or overhaul).	
(5)	Set swaging tool at a lower elevation than the hydraulic power supply.	Make sure swage tool is lower than the hydraulic power sypply.	Setting swage tool above the hydraulic supply will prevent air from bleeding from tool.
(6)	Actuate swaging tool.	Apply at least 1000 psi.	
(7)	Exhaust or release pressure to zero after each actuation		
(8)	Perform steps 6 and 7 at least three times.	Perform at least several cycles.	Air will not bleed from cylinder if tool is not cycled.
(9)	Back off knurled nut and remove swage head assembly		
(10)	Remove die holder assembly from yoke.		

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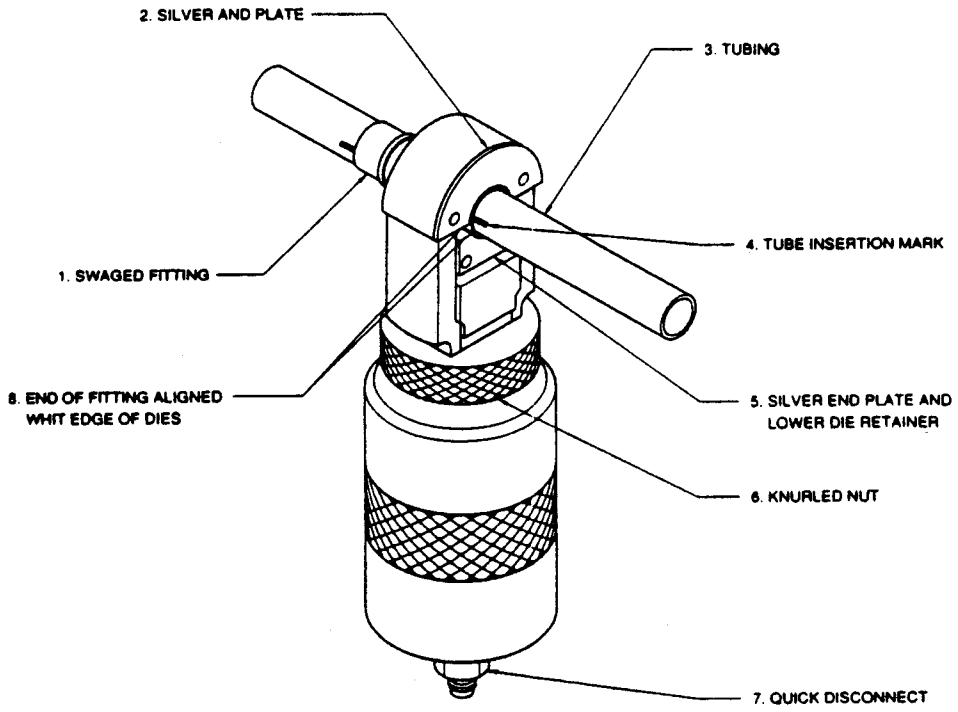
B. Swaging Tool Operating Instructions

STEP	OPERATION	PRECAUTION	POTENTIAL PROBLEM
(1)	Select the desired size of swaging tool. Connect the pressure line from the hydraulic supply to the disconnect half at the base of tool (Figure 202).	Match swage tool to fitting size.	Too small a tool will not fit over fitting. Too large a tool will cause improper swaging.
(2)	Square, deburr, and mark tube ends.	See Para 5., steps A. and B.	
(3)	Slide yoke over the fitting to be swaged with silver side of yoke assembly closed to the end of the fitting to be swaged (Figure 202)	Silver side of yoke must mate with the end of fitting to be swaged.	If silver side of yoke is not mated with end of fitting to be swaged, it will produce an unsatisfactory swage, resulting in rejection of the joint.
(4)	Insert die holder into yoke assembly so that silver face of die holder assembly corresponds with silver side of yoke (Figure 202)	Silver side of yoke and die holder must mate with end of fitting to be swaged. **Remember: silver to silver, black to black.**	If silver side and die holder do not mate, an unsatisfactory swage will be produced, resulting in rejection.
(5)	Install strut portion of power unit in swage head assembly. Snug up knurled nut hand tight (Figure 202).	Make sure the nut is snug (finger tight) against the yoke. After snugging up the knurled nut, make sure that the clearance between the lower angle of the yoke and the strut has taken up. If there is some clearance, lift up on the yoke to remove clearance and retighten the knurled nut. **THIS IS CRITICAL. CHECK TWICE.**	**Failure to completely snug the knurled nut could cause the yoke assembly to fail and result in injury during swage cycle.**
(6)	Position the fitting over the tube insertion mark so that some portion of the mark is visible.	The tube must be positioned properly into fitting.	Insufficient or too much tube insertion in the fitting will result in rejection of the joint.
(7)	Move the tool along the tubing towards the center of the fitting until the end stops make light contact with the end of the fitting. Then back off the tool slightly until the end stops are approximately .030 inches from the fitting end.	Visually re-verify that some portion of the insertion mark is visible with some portion of the mark covered by the fitting. Also verify there is a small gap between the end stops and fitting and being swaged.	If the end stops are not near the end of the fitting, it may result in insufficient swage length, resulting in a defective swage joint.
(8)	Maintain tool in this position while applying hydraulic pressure of 5,500 ± 250 psi.	**CAUTION:** Do not overpressurize. Do not underpressurize. **WARNING: Normal precautions should be taken by the swage tool operator to avoid direct body alignment with the swage head's direction of driving force and the immediate rear of the power unit.**	Overpressurization will put undue stresses on the swaging tool. Underpressurization may result in only partial closure of the dies, and hence, inadequate reduction of the fitting diameter.
(9)	Release pressure.		If pressure is not released the dies remain closed making it impossible to remove the tool from the fitting.
(10)	Loosen the knurled nut and remove power unit from head assembly.		

MM_201005_T2



MM_201005-202

Fig. 202 - Swage Tool and Fitting

5. Tubing Preparation, Insertion Marking and Limitations, and Inspection of Waged Joints

A. Tube End Preparation

(1) Square and deburr tube ends to be within 1/2° of square to the tube centerline. Chamfering of inner nad outeer cut edges of the cut is required to avoid damaging the silicone seal.

NOTE: Inspect tubing to assure that there are no longitudinal scratches in the fitting swage area.

B. Tube Insertion Marking

(1) Tube insertion length is assured by using the proper marking tool (Figure 203) with a .300 inch marking band width. When using the tool, position the lip stop, as indicated in the sketch (below), over the end of the tube to be swaged. With a felt tip pen, ink, or any other suitable marking media, mark the tube, using the slot as a guide, in two places 180° apart. Make sure the total width of the mark is made on the tube.

NOTE: Marking pens containing CHLORIDE cannot be used on titanium tubing.

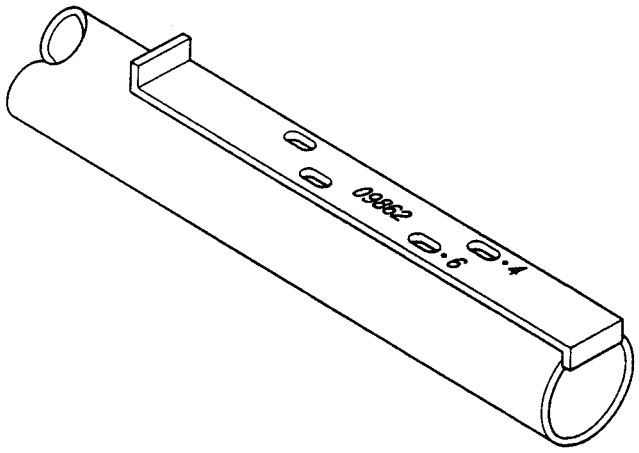


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Fig. 203 - Tube Insertion Marking

C. Alternate Marking Method

(1) If the appropriate marking tool is not available, use Table 203 below to determine the location and width of the marking band. See Figure 204 for example.

MM_201005-T203

TUBE SIZE	FITTING SIZE	MINIMUM TUBE INSERTION	MAXIMUM TUBE INSERTION
3/16″	(-03)	.472	.772
1/4″	(-04)	.615	.915
5/16″	(-05)	.655	.955
3/8″	(-06)	.690	.990
1/2″	(-08)	1.193	1.493
5/8″	(-10)	1.233	1.533
3/4″	(-12)	1.303	1.603
1″	(-16)	1.448	1.748
1-1/4″	(-20)	1.550	1.850
1-1/2″	(-24)	1.675	1.975

Table 203 - Tube Insertion Marking

MM_201005-204

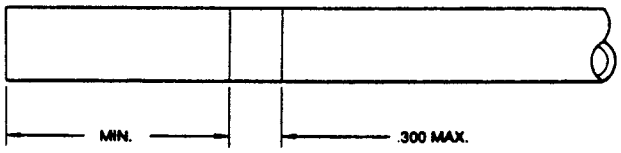
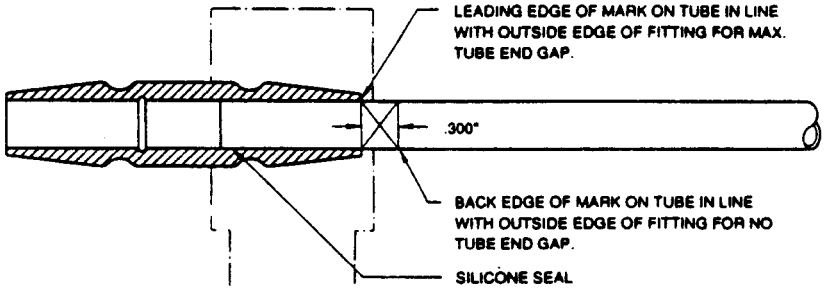


Fig. 204 - Alternate Marking Method

D. Tube/Fitting Installation (Straights)

(1) Utilizing .300" tube end gap tolerance with union fittings.



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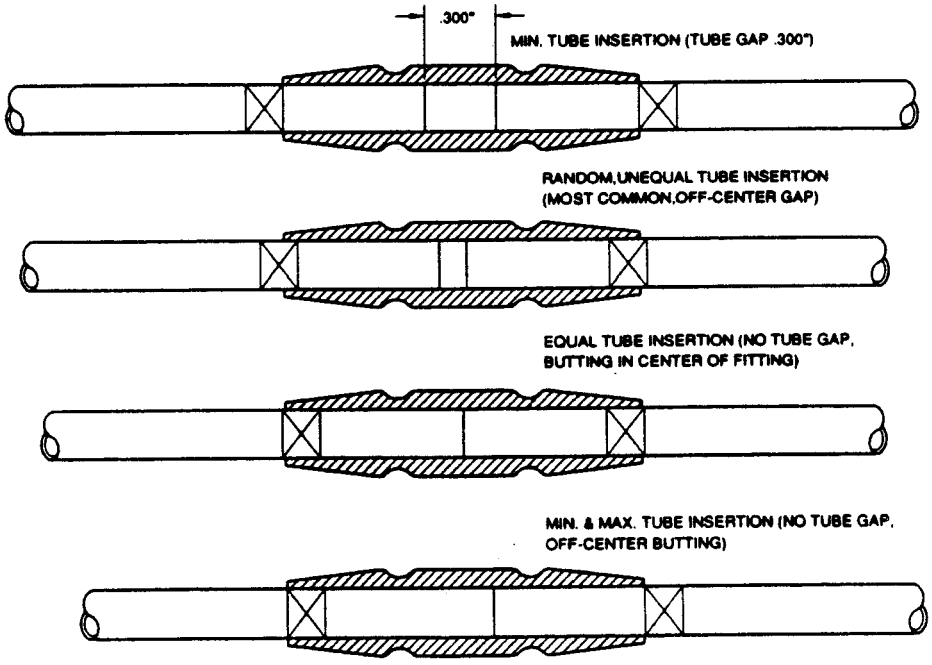
(2) Acceptable Limits of Tube Insertion into Union.



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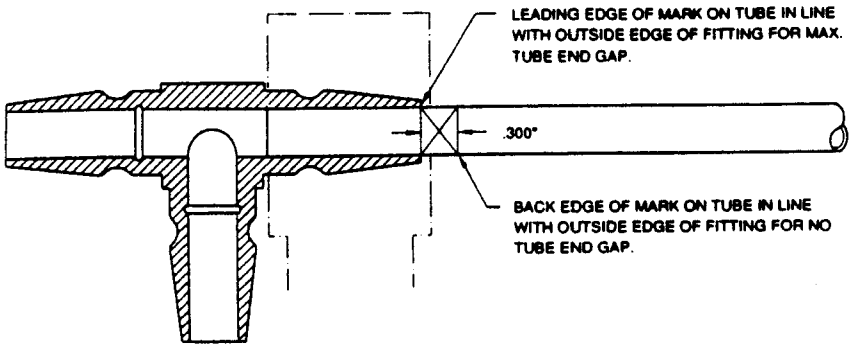
E. Tube/Fitting Installation (Shapes and Separables)

(1) Utilizing .300" tube end gap tolerance on Permanent Shapes and Permanent/ Separable Combination Fittings.

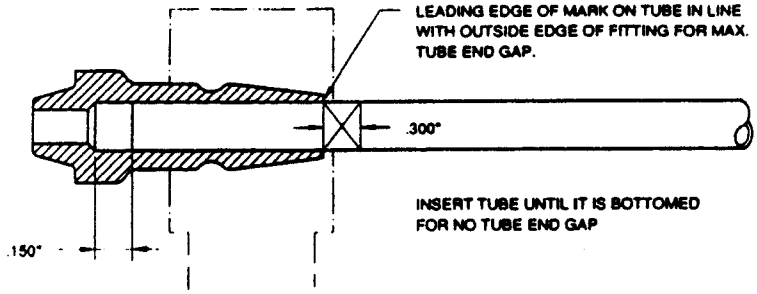
(2) The following installation instruction is applicable to shapes in the form of elbows, tees and crosses, including shaped reducers:



MM_201005-204C

(3) Utilizing .150" tube end gap tolerance on separable sleeve and union fittings.

(4) The following tube installation instruction is applicable to MS and AN separable fittings, male and female:

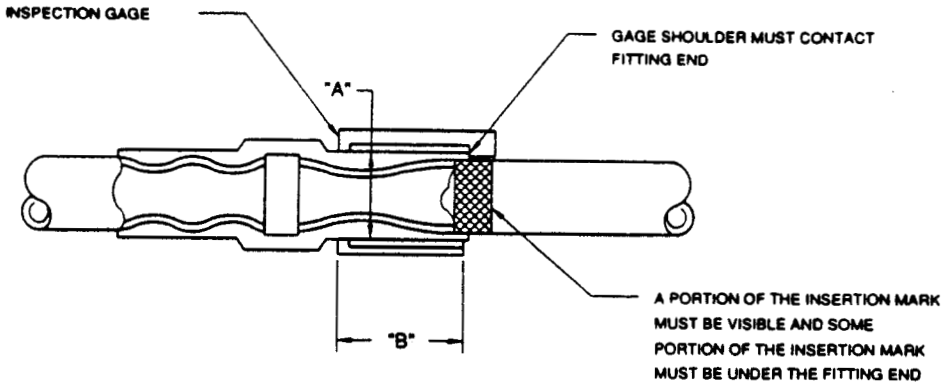


MM_201005-204D

F. Inspection of Swaged Joint

(1) Inspect the fitting using the appropriate size inspection gage to ensure an adequately swaged outside diameter of the fitting and a sufficient length of the swaged portion of the fitting. In the absence of a proper gage, the swaged fitting shall meet the dimensional requirements of Table 204.

NOTE: The die segment produces longitudinal ridges on the swaged fitting. Dimensional checks of the fitting's outside diameter must be performed in the area between these ridges.



Tube Dia. (In.)		Min. Swaged Lgth. "B" Dim. (In.)	Max. Swaged Dia. "A" Dim. (In.)
3/16"	(-03)	.340	.247
1/4"	(-04)	.460	.315
5/16"	(-05)	.500	.381
3/8"	(-06)	.530	.447
1/2"	(-08)	1.020	.606
5/8"	(-10)	1.020	.735
3/4"	(-12)	1.020	.863
1"	(-16)	1.160	1.144
1-1/4"	(-20)	1.406	1.390
1-1/2"	(-24)	1.420	1.680

MM_201005-T204

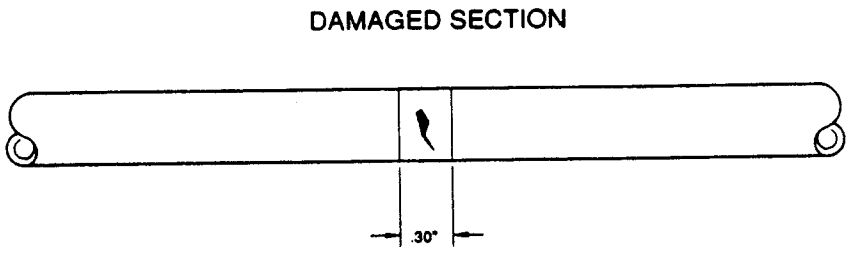
Table 204 - Swage Dimensions (In.)

6. Tubing Repair Techniques

A. Six basic types of tube assembly failures lend themselves to permanent repair using swage techniques. The failure modes and the recommended repair methods for each are as follows:

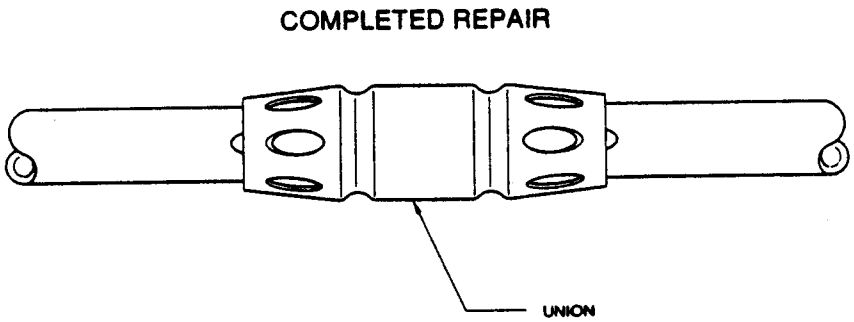
(1) Type 1: Pin hole or circumferential Crack in Tubing

MM_201005-204E



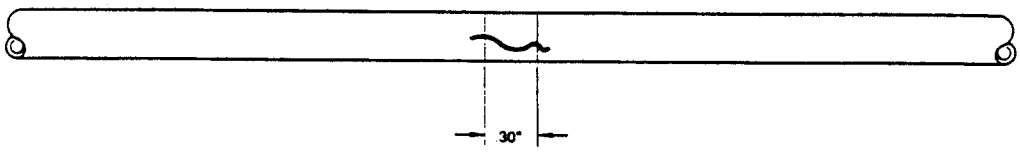
(a) Make one or two cuts as necessary to enable removal of damaged section. If two cuts are required, the distance between them shall not exceed 0.30 inch. If this measurement is exceeded, go to repair method 2.

MM_201005-204F



(2) Type 2: Longitudinal crack in tubing in excess of .30 inch

DAMAGED SECTION



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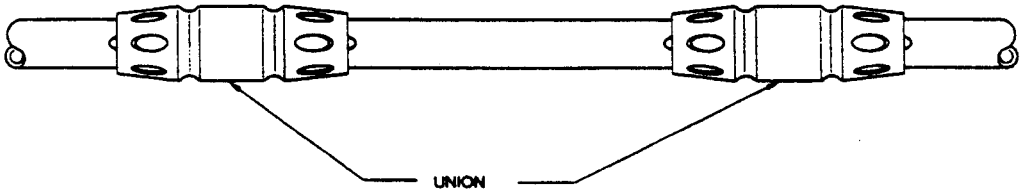
(a) Make two (2) cuts to enable removal of damaged section. The cuts should be made only after a fit-check has been made to assure swaging tool accessibility in the area to be swaged.

(b) Remove damaged section and duplicate or follow procedure on next page for determining tube installation length.

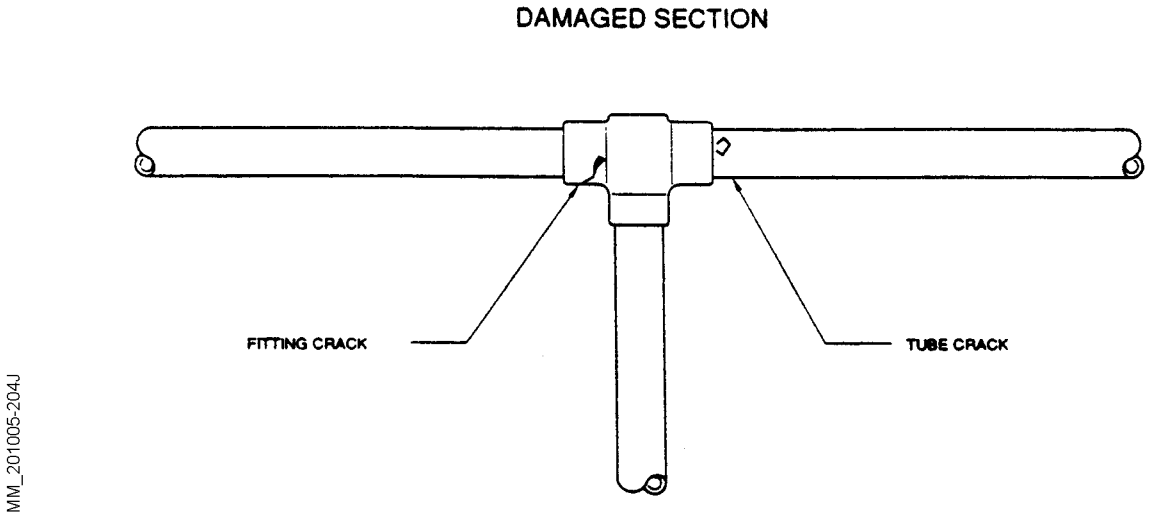
(c) Swage replacement section into tubing under repair, using two (2) tube-to-tube unions.

COMPLETED REPAIR



MM_201005-204H

(3) Type 3: Leaking tee or elbow



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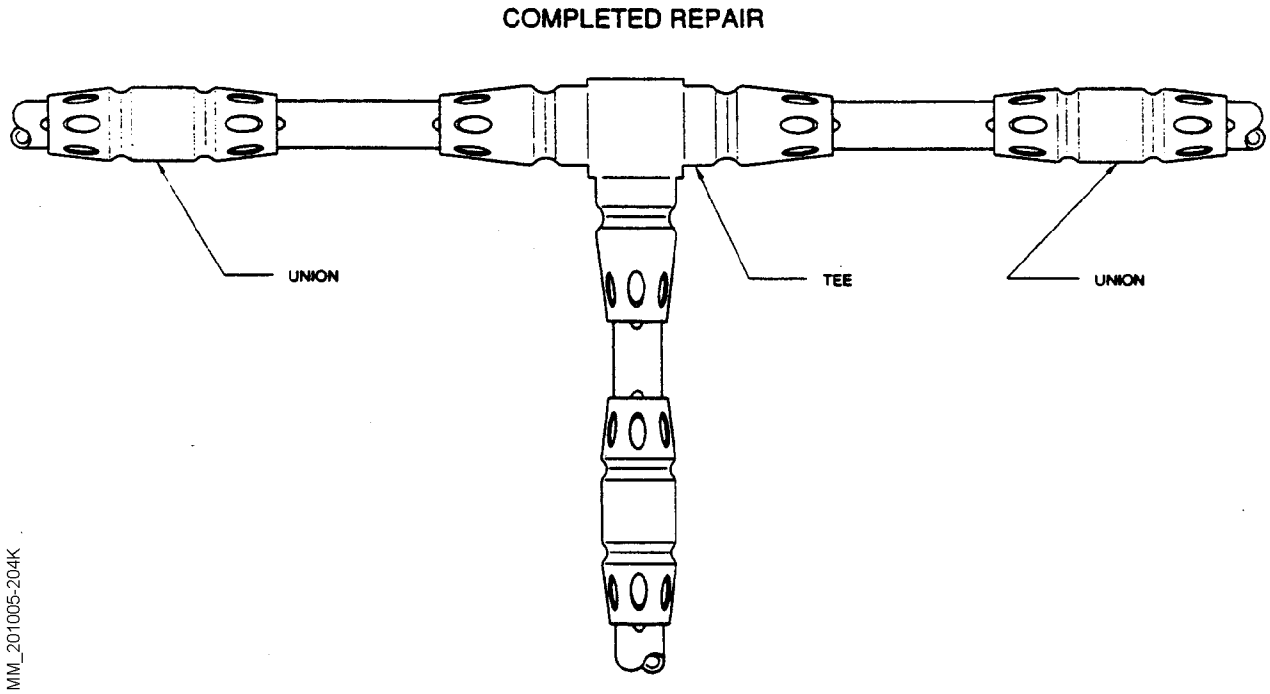
(a) Cut out defective tee or elbow. The cuts should only be made after a fit-check has been made to assure swaging tool accessibility in the area to be swaged.
(b) Duplicated tubing sections for each branch.
(c) Swage spliced sections to tee or elbow.
(d) Connect each splice section to tubing under repair, using tube-to-tube union.



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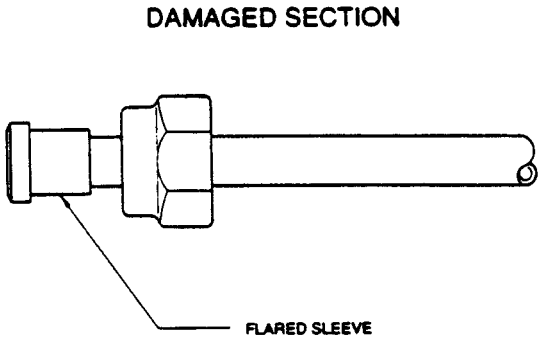
(4) Type 4: Leaking fitting end, flared



MM_201005-204L

(a) Refer to the Table 205 to determine cut-off lengths for flared separable end replacements.
(b) Measure and cut off the length shown in Figure 205.
(c) The use of these cut-off values permits the salvage of the line without the need for splicing new tubing into the line.
(d) The bottming of a flared sleeve onto the cut tube end then duplicates the original overall length of the assembly.

SIZE	"L" = ± .010
03	.282
04	.275
05	.275
06	.226
08	.243
10	.204
12	.234
16	1.647
20	1.035
24	1.045

MM_201005-T205

Table 205 - Cut-Off Lengths - Flare Fittings

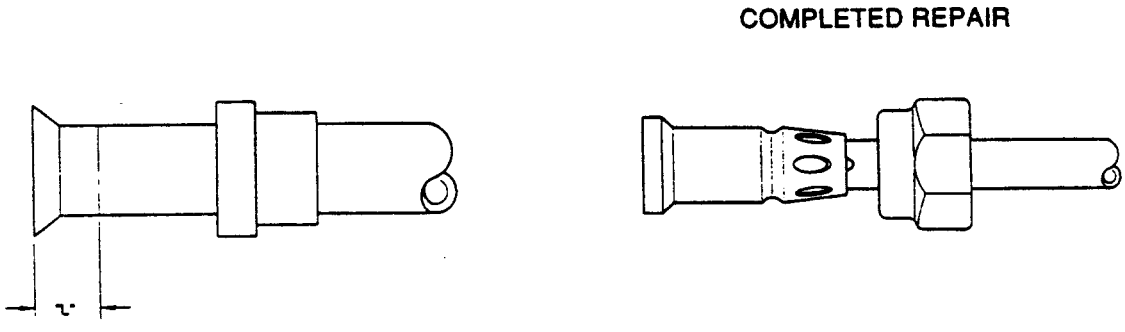


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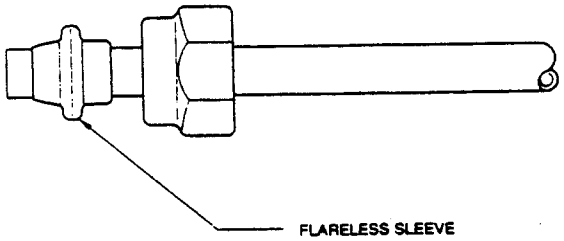
Fig. 205

(5) Type 5: Leaking end fitting-flareless



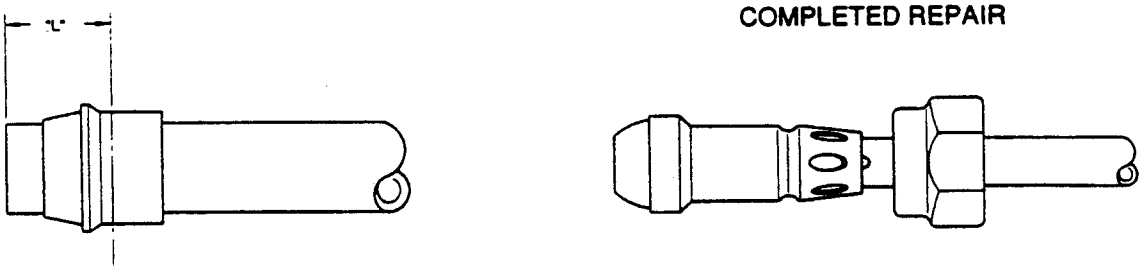
MM_201005-205A

(a) Refer to the Table 206 to determine cut-off lengths for flareness separable end replacements.
(b) Measure and cut off as shown in Figure 206.
(c) The use of these cut-off values permits the salvage on the line without the need for splicing new tubing into the line.
(d) The bottoming of a flareless sleeve onto the cut tube end then duplicates the original overall length of the assembly.

SIZE	"L" = ± .010
03	.532
04	.541
05	.557
06	.508
08	.588
10	.600
12	.628
16	2.110
20	1.506
24	1.576

MM_201005-T206

Table 206 - Cut Off Lengths - Flareless Fittings



MM_201005-206

Fig. 206

(6) Type 6A: Damaged Lipseal Fitting or Fitting Attachment

Butt-Welded or Internally Swaged

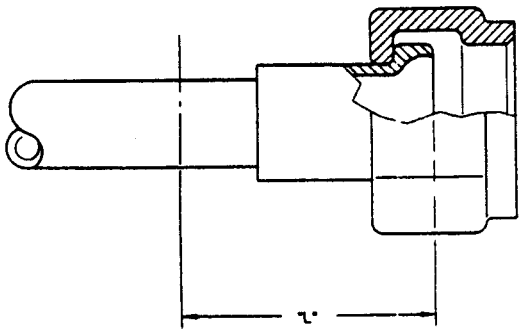
(a) Replacement of butt-welded and internally swaged female lipseal assemblies in sizes -3 thru -16.

SIZE	"L" = ± .010
-3	.940
-4	.970
-5	.995
-8	1.075588
-10	1.120
-12	1.120
-16	1.120

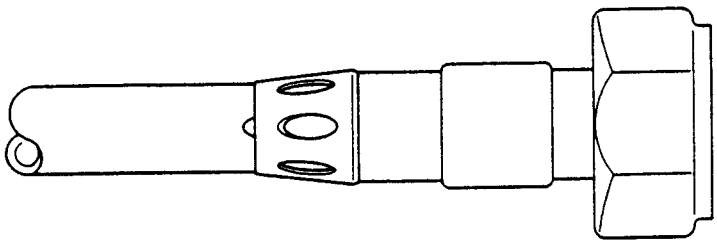
MM_201005-T206A

(b) Cut off damaged fitting at a distance "L" from the sealing surface as shown.
(c) Select proper size of lipseal assembly.
(d) Slide tube end into the lipseal assembly unit it butts against the internal shoulder.

DAMAGED FITTING



COMPLETED REPAIR



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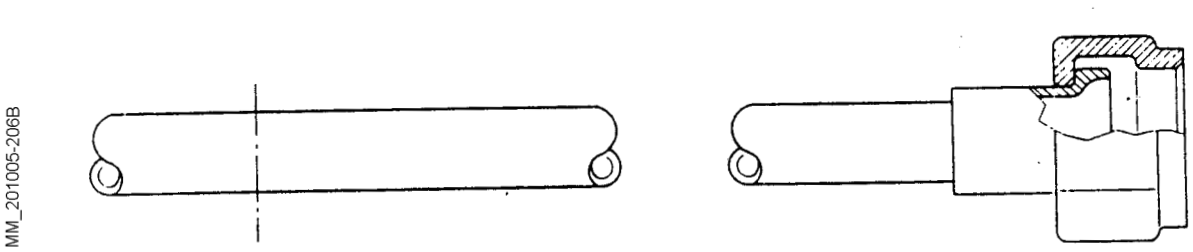
(7) Type 6B: Damaged Lipseal Fitting or Fitting Attachment

(a) Replacement of internally swaged and butt-welded female assemblies in sizes 20 and 24 also, applicable to replacement of externally swaged female assemblies in all sizes.

DAMAGED FITTING

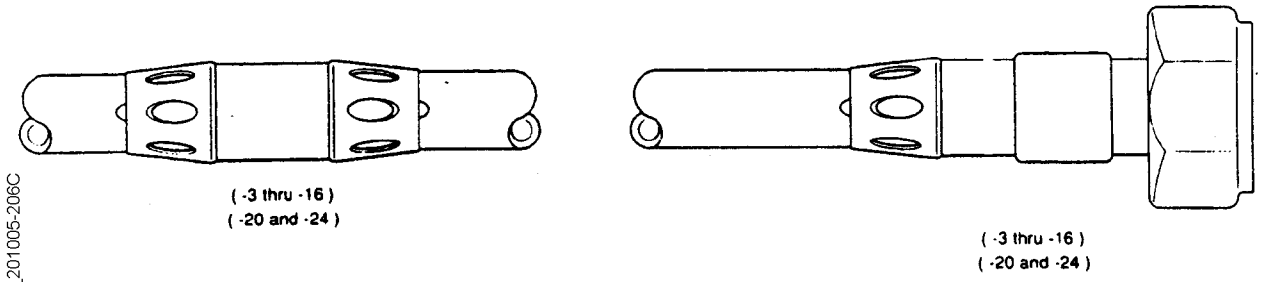


MM_201005-206B

(b) Cut off damaged end fitting at a point convenient of swage tool access.

(c) Make repair using tubing splice with a permanent union and a replacement.

COMPLETED REPAIR

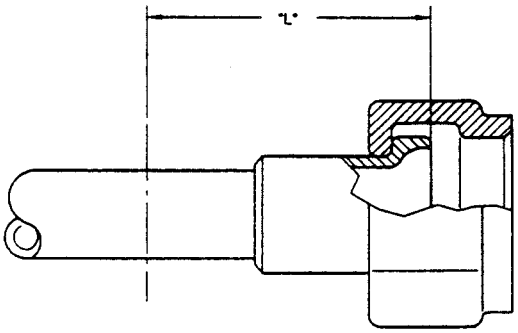


MM_201005-206C

(8) Type 6C: Damaged Lipseal Fitting or Fitting Attachment

(a) Replacement of butt-welded reducer female assemblies.

DAMAGED FITTING



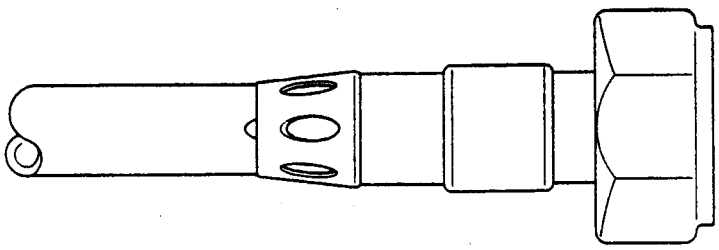
End 1	End 2	"L" (in.) = ± 10
04	03	.850
05	04	.857
06	04	.857
08	04	.857
08	06	.872
10	06	.887
10	08	.943
12	06	1.007
12	10	1.008
16	08	1.073
16	10	1.103
16	12	1.033

MM_201005-T206B

(b) Cut off damaged fitting at a distance "L" from the sealing surface as shown.

(c) Select proper size of lipseal assembly.

COMPLETED REPAIR

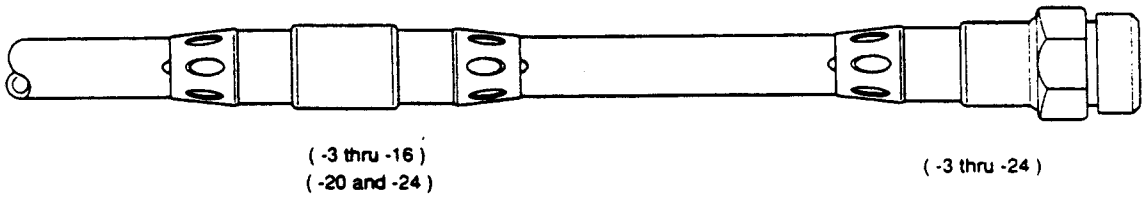


MM_201005-206D

(9) Type 6D: Damaged Lipseal Fitting or Fitting Attachment

(a) Replacement of internally swaged, butt-welded or externally swaged male threaded lipseal connectors.

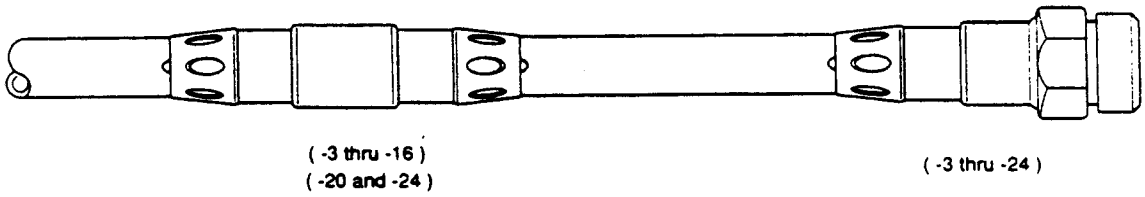
COMPLETED REPAIR



MM_201005-206F

(b) Make repair using tubing splice with permanent union and replacement lipseal adapter.

COMPLETED REPAIR



MM_201005-206F

(10) Cut-off location at tube bends

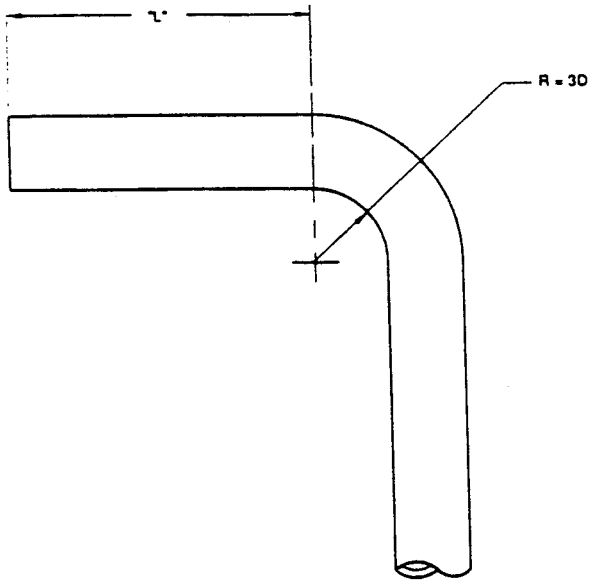
(a) Use the following illustration and table in order to determine the minimum straight tube length to a bend.

(b) It is not advisable to perform the swaging process if the straight tube length available is less than the prescribed minimum.

SIZE	* "L" (In)
3/16	.600
1/4	.740
5/16	.780
3/8	.816
1/2	1.318
5/8	1.358
3/4	1.428
1	1.573
1-1/4	1.675
1-1/2	1.800

MM_201005-T207

Table 207 - Cut-Off to Bend Lengths



MM_201005-207

Fig. 207

NOTE: The repair section must also conform to the following requirements for bend location distances.

7. Tube Cutting, Cutter Replacement and Deburring Procedures

A. This section will deal with techniques associated with tube cutting and deburring. The following procedures are recommended to assure a proper connection.

(1) Cutting

(a) Mark tube for cutting.

(b) Select the appropriate chipless cutter for the respective tube size (see product catalog).

(c) Inspect cutter, ratchet should operate freely.

(d) Open cutter wheel clear by turning drive screw until it clears the tube (Figure 209).

(e) Close cutter head to accept tubing and locate in cutting position (Figure 209).

(f) Tighten drive screw until light contact is made by cutter wheel on tube. Then torque 1/8 to 1/4 turn.

CAUTION: DO NOT OVERTORQUE. IN SOFT TUBING A LARGE BURR WILL RESULT. IN HARD TUBING, THE CUTTER WHEEL WILL EXPERIENCE EXCESSIVE WEAR OR BREAKAGE.

(g) Rotate ratchet handle through the arc of clearance is a noticeable ease of rotation.

(h) Torque drive screw 1/8 to 1/4 turn.

(i) Repeat step (f) and (g) until cut has been completed.

NOTE: Lubricate ratchet, rollers, and cutter wheel regularly with light machine oil to ensure ease of operation.

(2) Cutter Wheel Replacement (if required)

(a) Disassembly

The following steps apply in disassembling the chipless cutter tool:

1) Tighten drive screw (Figure 209) until cutter pivot pin becomes accessible.

2) Remove cutter pivot pin and cutter wheel will easily slide out.

(b) Reassembly

The following steps apply in reassembling the chipless tube cutter tool:

1) Slide new cutter wheel into place and secure with pivot pin.

2) Lubricate with light machine oil.

MM_201005-208

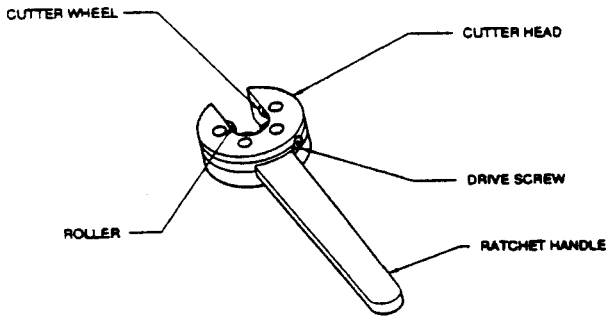


Fig. 208 - Chipless Cutter

MM_201005-209

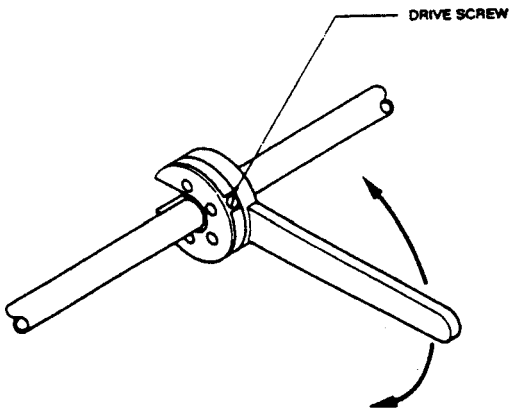


Fig. 209 - Chipless Cutter Cutting Tube

(3) Deburring Tube End After Cut-off

The following procedure applies in deburring the cut-off on the tube end:

(a) Select the appropriate deburring tool and stem subassembly.

(b) Lubricate the stem with common lubricants.

(c) Insert the stem subassembly into the cutter of the tool. With the plunger depressed, screw the stem into the plunger until it is bottomed, finger tight.

(d) Check for proper operation.

(e) Hold tube with one hand, depress plunger of deburring tool, and insert elastic plug into tube end. Release plunger to allow elastic plug to expand and seal the tube.

(f) While holding the tube with one hand, rotate the knurled body in a clockwise direction while applying slight pressure on the cutter. Continue to rotate until the tube end is deburred.

CAUTION: EXCESSIVE DEBURRING WILL CAUSE TOO DEEP A CHAMFER ON THE TUBE ID AND IS TO BE AVOIDED.

(g) Without depressing plunger, ease the tool from the tube until the first ridge of the plug is exposes. Wipe off the end of the tube and plug.

(h) If the tube has not been properly deburred, push the tool back into the tubing. Repeat step g, c, f.

(i) If the tube has been properly deburred, pull the tool completely free of the tubing.

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FLEXIBLE HOSES AND FLUID FITTINGS - MAINTENANCE PRACTICES

1. General

A. Flexible hoses are used on the airplane mainly in areas of high vibration, for connection between moving and stationary parts or for connection of parts which require frequent connection and disconnection.

B. Fluid line fittings used on the airplane can be with jamnuts or without and can have a combination of packing methods. The main methods are described below.

C. When it is necessary to disconnect a hose or fitting obey the safety precautions given in the maintenance practices for the appropriate system.

2. Standard Maintenance Procedures

A. Put blanking caps on all line ends and fluid fittings when they are disconnected to prevent system contamination.

B. Before you connect a hose make sure it is clean. If a hose does not have a protective cover clean it before use.

C. Do not install hoses in tension. Adjust the position of the hose, end fitting or component to give the correct installation.

D. Only use the correct hose. Never install a hose with a different part number to the one removed.

E. Make sure that installed hoses are not twisted. Some hoses have an installation line to show that they are correctly installed.

F. Make sure that installed hoses are clear of the surrounding structure or other components and no wear can occur in all positions of operation.

3. Removal/Installation of Hose Assemblies

A. Removal

(1) Depressurize the appropriate system and drain it if necessary.
(2) Disconnect the line ends of the hose and cap the line ends and fittings.
(3) Remove any clamps from the hose.
(4) Remove the hose from the location in the airplane.

B. Installation

(1) Remove the caps from the line ends and fittings.
(2) Install the hose and connect the line ends.
(3) Make sure that the hose is installed correctly (Refer to Para. 2 above).
(4) Tighten the line ends in accordance with the torque values given in Table 201 below.
(5) Do a leak check of the hose.

MM_201006-T201

TORQUE LIMITS (lbf. in.)			
HOSE SIZE	TUBING OD	MIN	MAX
-3	3/16	20	100
-4	1/4	70	120
-5	5/16	85	180
-6	3/8	100	250
-8	1/2	210	420
-10	5/8	300	480
-12	3/4	500	850
-16	1	700	1150
-20	1-1/4	-	-
-24	1-1/2	-	-

Table 201 - Torque Values for Hoses

4. Installation of Fluid Line Fittings (Ref. Fig. 201)

A. Install fluid fitting with nut and packing (View A).

(1) Screw the nut onto the fitting until the nut is clear of the thread relief (packing groove).
(2) Lubricate the packing with system fluid.
(3) Install the packing into the thread relief.
(4) Screw the fitting into the port of the applicable component until the packing causes a slight resistance to movement.
(5) Loosen the fitting by not more than one turn to align the fitting.
(6) Tighten the nut to the specified torque loading.

B. Install fluid fitting with nut, back-up ring and packing (Ref. Fig. 201)

(1) Screw the nut onto the fitting until the nut is clear of the thread relief.

(2) Install the back-up ring into the thread relief (if the ring is leather install it so that the smooth side is next to the packing).

(3) Lubricate the packing with system fluid and install it in the thread relief next to the back-up ring.

(4) Turn the nut onto the back-up ring until the back-up ring is in the recess of the nut and the packing is against the first thread of the lower part of the fitting.

(5) Screw the fitting into the port of the applicable component until the packing is in contact with the component face and align the fitting.

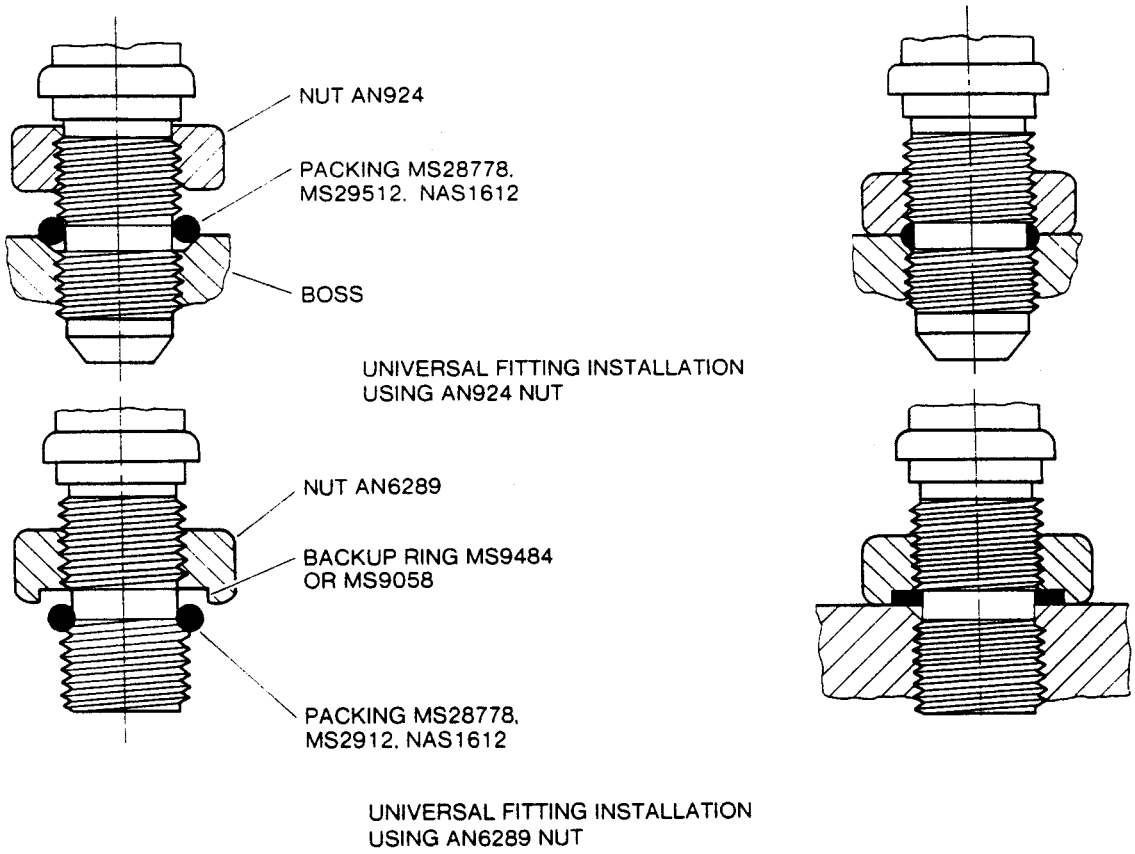
(6) Tighten the nut to the applicable torque loading.

NOTE: Slight extrusion of the back-up ring is acceptable.

C. Install standard type fitting

(1) Lubricate the packing and install it in the packing groove of the fitting.

(2) Install the fitting into the component and tighten it to the applicable torque loading.



MM_201006-201

Fig. 201 - Fluid Fittings - Installation

5. Crimping - TNT8 Machine (Refer to Fig. 202)

A. Procedure

(1) Cut the pipe and deburr the cut section.

(2) After cutting the pipe, insert the fitting making sure that the pipe is completely inserted. This can be checked through the check hole, located on the fitting body.

(3) Using the suitable tool diameter caliper insert the fitting / pipe assembly into the TNT8 Machine and apply pressure according to table listed values (attached to TNT8 machine documents).

CAUTION: FOR CORRECT OPERATION FOLLOW THE INSTRUCTIONS GIVEN INTO TNT8 CRIMPING MACHINE.

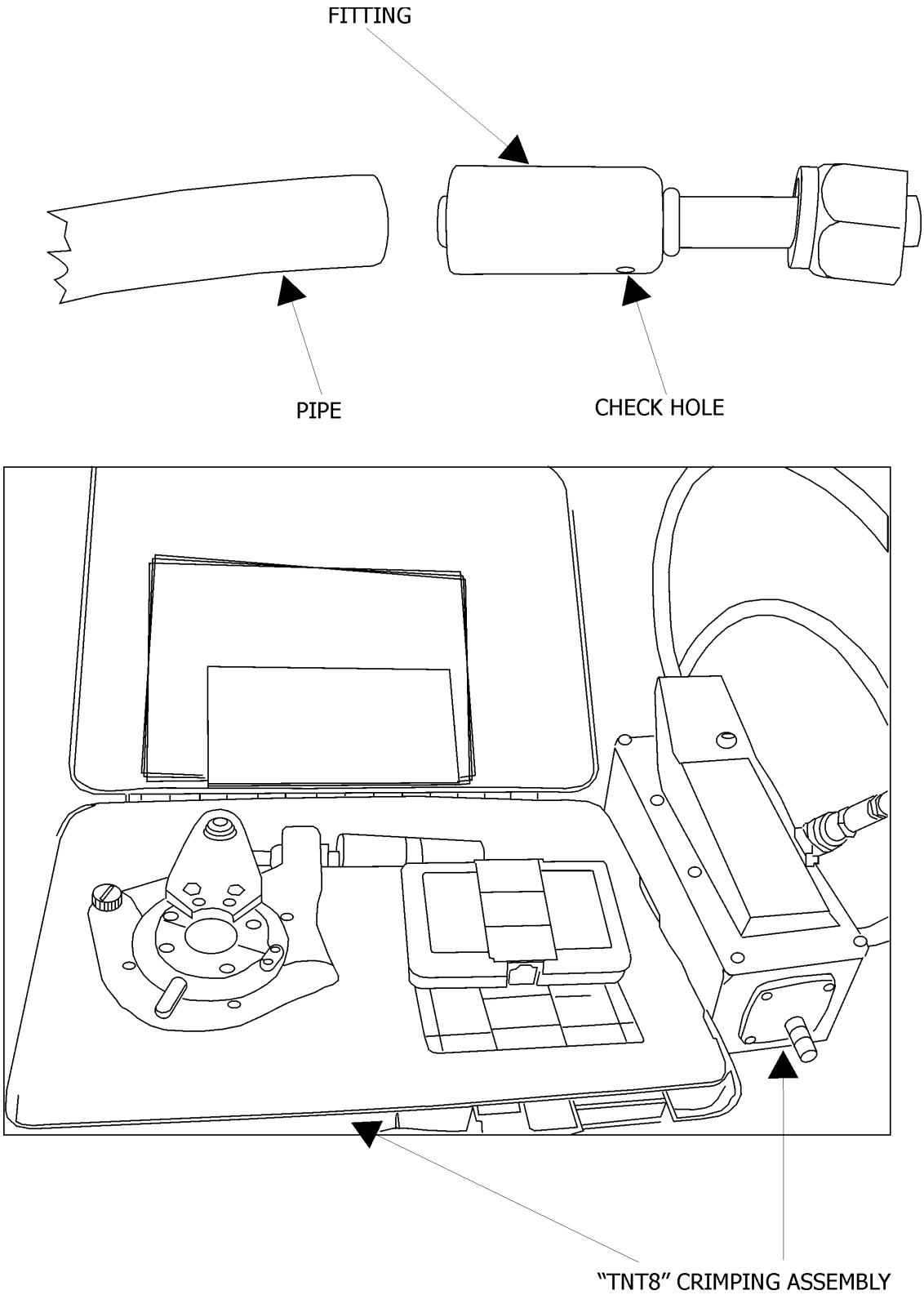


Fig. 202 - Crimping - TNT(Machine

BEARINGS - MAINTENANCE PRACTICES

1. Removal/Installation of Bearings (Ref. Fig. 201, 202 and 203)

   A. Remove the bearing complete with its support bracket or housing from the airframe (if it is necessary to remove rivets refer to the SRM).

   B. Push the worn bearing from the housing with a suitable pressing tools (Fig. 201).

      NOTE: There are many different pushing and pulling tools, an example is given in Fig. 201.

   C. Examine the housing for damage and distortion, in particular examine the condition of the internal surface of the bearing hole. Repair or replace as necessary.

      WARNING: BE CAREFUL WHEN YOU USE THE CONSUMABLE MATERIAL. OBEY THE SAFETY PRECAUTIONS GIVEN IN 20-00-01.

      CAUTION: DO NOT LET CLEANER GO INTO THE BEARING. LACK OF LUBRICATION WILL CAUSE BEARING FAILURE.

   D. Clean the outer surface of the bearing and the inner surface of the hole in the housing with cleaner (TT-M-261) and a lint free cloth.

      CAUTION: DO NOT LET LOCTITE GO INTO THE BEARING. DAMAGE TO AND EVENTUAL FAILURE OF THE BEARING CAN OCCUR.

   E. Apply a thin coat of Loctite to the inside of the hole and the interfaying surface of the bearing (Refer to 20-10-04).

   F. Using suitable pushing tools to push the bearing into position (Ref. Fig. 201).

   G. Stake the bearing in position with a tool similar to the one shown in Fig. 202. If the original housing is used make sure the new stakes are between the original marks.

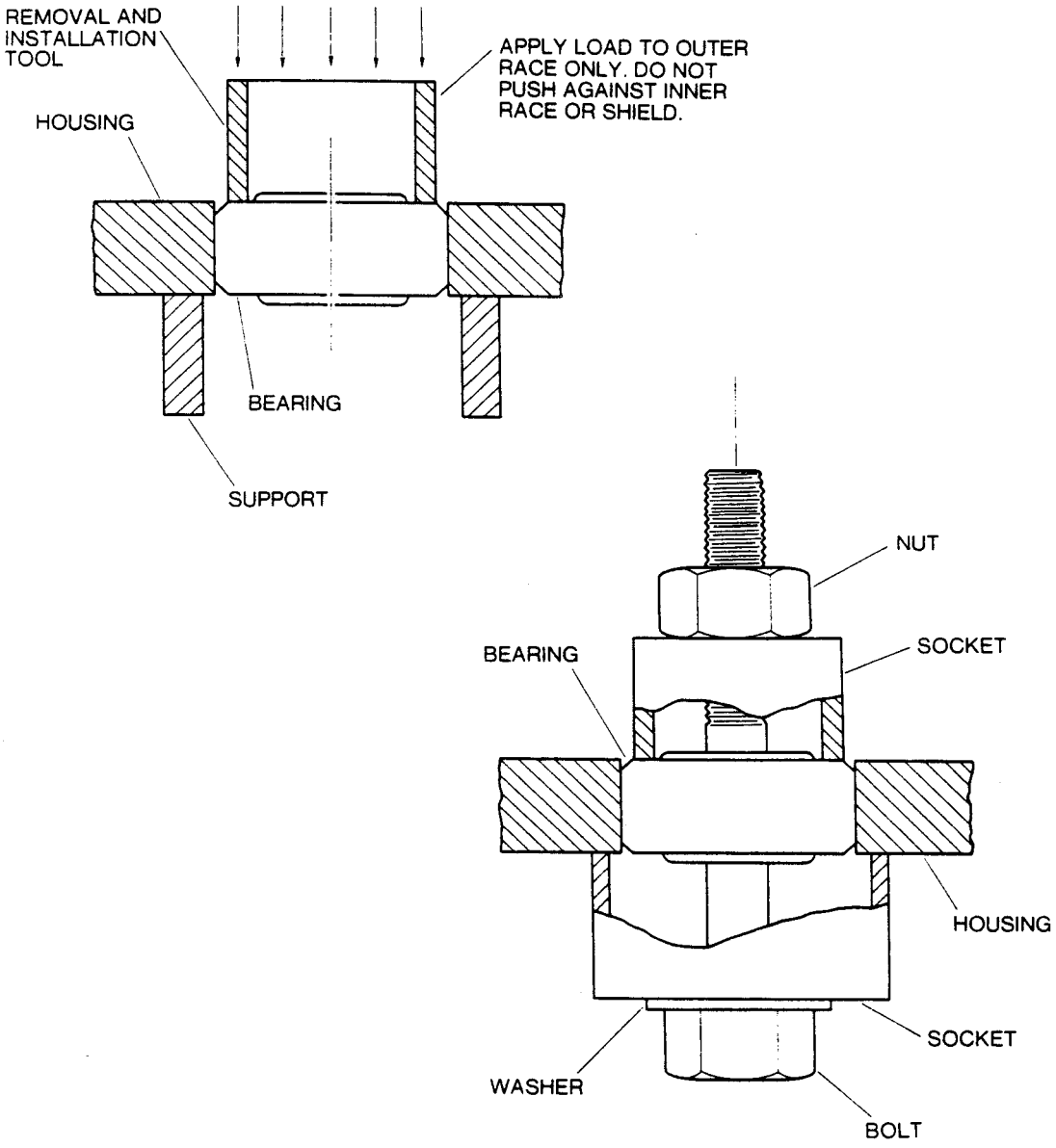
      NOTE: If there is not a bearing retaining flange on the other side of the housing the bearing must be staked on both sides (Ref. Fig. 203).

   H. Install the bearing housing or bracket on the airplane.

      NOTE: If a new bracket or housing is installed it can be necessary to require alignment checks (Refer to the SRM).

CENTER THE BEARING CAREFULLY IN THE HOUSING. THE BEARING MUST NOT BE AT AN ANGLE IN THE HOLE.

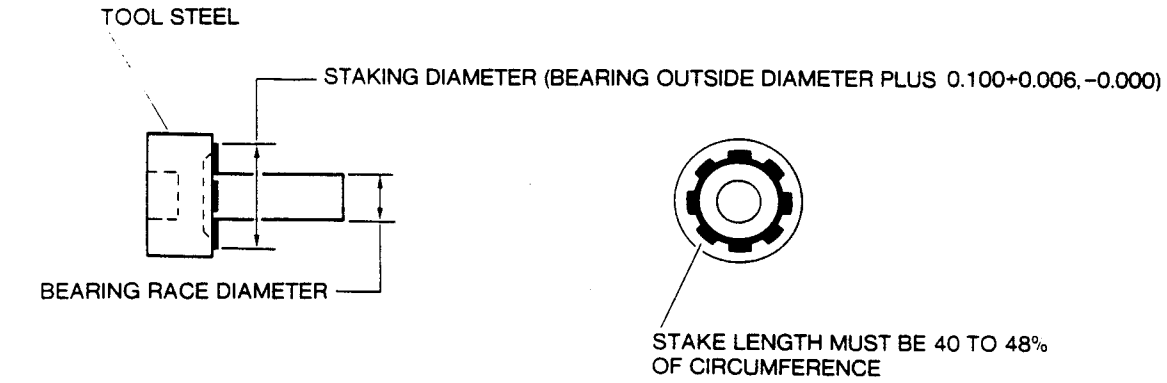
APPLY THE INSTALLING LOAD TO OUTER RACE OF THE BEARING.



PRESSING TOOL FOR REMOVAL OR INSTALLATION

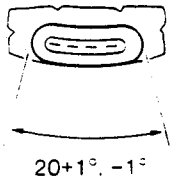
MM_201008-201

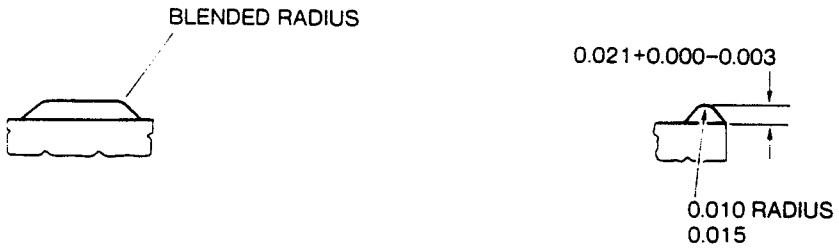
Fig. 201 - Bearing Pushing Tools (Typical)



NOTE: ALL DIMENSIONS ARE IN INCHES

BEARING OUTSIDE DIAMETER	NUMBER OF STAKES
UP TO 0.734	4
0.735 TO 0.984	6
0.985 TO 1.234	8
1.235 TO 1.690	10
1.691 TO 1.984	12





STAKE DETAIL

MM_201008-202

Fig. 202 - Staking Tool - Typical

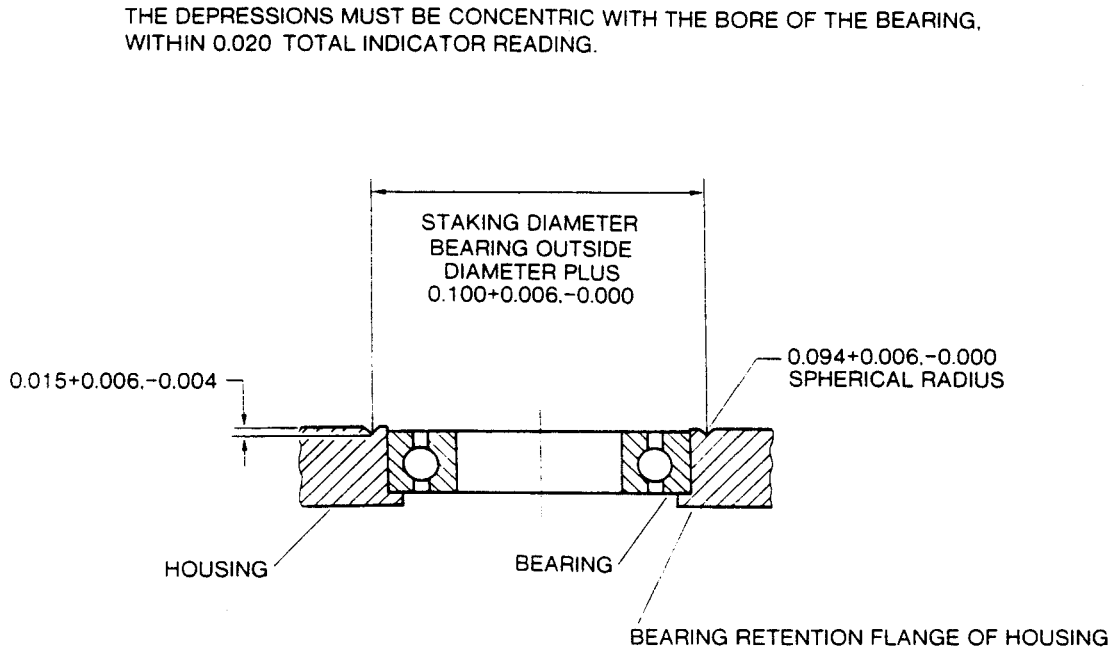


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Fig. 203 - Bearing Support - For Staking

WIRE BUNDLES - MAINTENANCE PRACTICES

1. General

A. This page block gives general information about the maintenance and repair of electrical wires.

B. When possible replace any damaged wire with a new piece of wire. Replacement wires must be the size and type specified in the wiring manual. If wire damage is limited to the outer cover only they can be repaired as follows.

CAUTION: DO NOT SPLICE, SOLDER OR TAPE WIRE UNLESS YOU ARE SURE THAT IT WILL NOT AFFECT THE SYSTEM OPERATION. IF THE EXACT SPECIFICATION OF WIRE IS NOT AVAILABLE DO NOT USE A DIFFERENT SPECIFICATION. BURNT WIRE OR SYSTEM FAILURE CAN OCCUR.

2. Wire Repairs

A. Braided nylon insulated wire

(1) Clean the damaged area with aliphatic naphta (Material N° 02-001).
(2) Lay damaged and loose nylon braiding as evenly as possible over the damaged area.
(3) Put vinyl tape around the wire making sure that the layers of tape overlap by 1/2 the tape width. The layer of tape must cover the damage and extend a further 1/2 inch each side of the damaged area.
(4) Tie both ends of the tape with nylon cord and apply a thin layer of clear laquer to the knots.
(5) For small gage wires it is only necessary to use the vinyl tape.

B. Chromel - Alumel Thermocouple Wire (Ref. Fig. 201)

(1) Clean the damaged area with aliphatic naphta (Material N° 02-001).
(2) Lay damaged fiberglass covering as evenly as possible over the damaged area.
(3) Put a double layer of glass fabric tape (Permacel EE - 3343) around the damaged area making sure that the tape overlaps by 1/2 the tape width. The layer of tape must extend at least one inch each side of the damaged area. The maximum repair area must be no more than 3 ½ inches.
(4) Use a heat gun or lamp to cure the tape for 30 minutes at a temperature of 320 degrees Fah (160 degrees Cel). Use a sheet of flame resistant tissue to stop overheating of adjacent wires.
(5) The ends of the outer insulation which have been cut for installation must be tied with cord as shown in figure 201.

C. Splicing electrical wires (Ref. Fig. 202)

NOTE: Spliced wire connections must only be used in extreme cases. Use only approved splice barrels and crimping equipment.

(1) Remove the insulation from the wire so that the uninsulated wire fits exactly into the splice barrel.
(2) If the splice does not have an integral insulation sleeve put an insulating sleeve over the wire end.
(3) Install the splice barrel onto the wire end and use approved crimping equipment to crimp the splice.
(4) Put the insulating sleeve over the splice and attach it to the splice.

NOTE: If a loose sleeve is used tie the ends. If a heat shrink sleeve is used apply heat to the sleeve to shrink it onto the splice.

D. Installation of terminal connectors (Ref. Fig. 202)

(1) Remove the insulation from the wire so that the uninsulated wire fits exactly into the terminal barrel.

NOTE: Make sure the wire does not come out of the barrel far enough to touch the terminal post or bolts, nuts and washers used for installation.

(2) If the terminal does not have integral insulation put an insulating sleeve over the wire.
(3) Use crimping equipment supplied by the terminal manufacturer to attach the terminal to the wire.
(4) Tie or heat shrink the insulating sleeve to the terminal.

3. Removal/Installation of Wires

A. General procedures for the installation of wires in a bundle are as follows:

(1) Replace wires with the same wire specification given in the wiring manual.
(2) When you replace a wire or when an existing wire is allocated to a different function the wire must be given a new identification label.
(3) Make sure you install the wire with no crossovers, twists or kinks.
(4) Do not attach wiring to tubes which contain flammable fluids or oxygen. Support the wires above and away from tubing with approved clamps.
(5) Protect wires from contamination by fluids in areas where fluid can be trapped.
(6) Keep wires away from high temperature areas or protect them from the effects of heat.
(7) Install grommets or pressure seals where wires go through cutouts or holes in the airplane structure before you install the wires.
(8) If you remove a wire from a pressure seal and do not replace it install nylon filler rods to stop leaks.
(9) Lubricate the wires with a small amount of petrolatum water before you push them through pressure seals.

(10) Make sure that the wire is long enough for the following:
- To install terminal fittings
- To give free movement to equipment which is installed on shock mounts.
- To stop strain on wiring and wire supports.
- To give enough movement in the wire to make drip and service loops.

CAUTION: DO NOT CHANGE THE LENGTH OF CO-AXIAL CABLE ASSEMBLIES FOR EASE OF INSTALLATION. COAXIAL CABLES MUST BE A FIXED LENGTH FOR CORRECT OPERATION OF ELECTRONIC EQUIPMENT.

(11) Make drip loops so that fluid which falls from the loop will not fall onto equipment. When moisture resistant connectors are installed drip loops are not necessary.

(12) Keep the minimum bend radius for wires to 10 times the outside diameter of the wire.

4. Binding of Wire Groups, Sleeves and Tape (Ref. Fig. 203)

A. Tie wire groups or bundles at intervals of not more than 12 inches. Insulation sleeves and identification sleeves must be tied at each end approximately 1/4 inch from the end of the sleeve. Ties must not be made so that the cord will cut the sleeve or the wire insulation. Never use the cord to attach a wire bundle to a support.

NOTE: If heat shrink insulation tubing is used it is not necessary to tie the ends.

B. In areas where the operating temperature is 200 degrees Fah (93.3 degrees Cel) or less ties can be made with waxed twine. In areas with a temperature of more than 200 degrees Fah (93.3 Cel) make the ties with fiberglass cord. Make ties with a clove hitch tied with a square knot as shown in figure 203. Apply clear laquer to seal the knots.

C. In certain applications plastic tie wraps can be used in place of twine ties.

D. Attach wire bundles to structural members or support brackets with suitable cable clamps figure 204 shows a typical application.

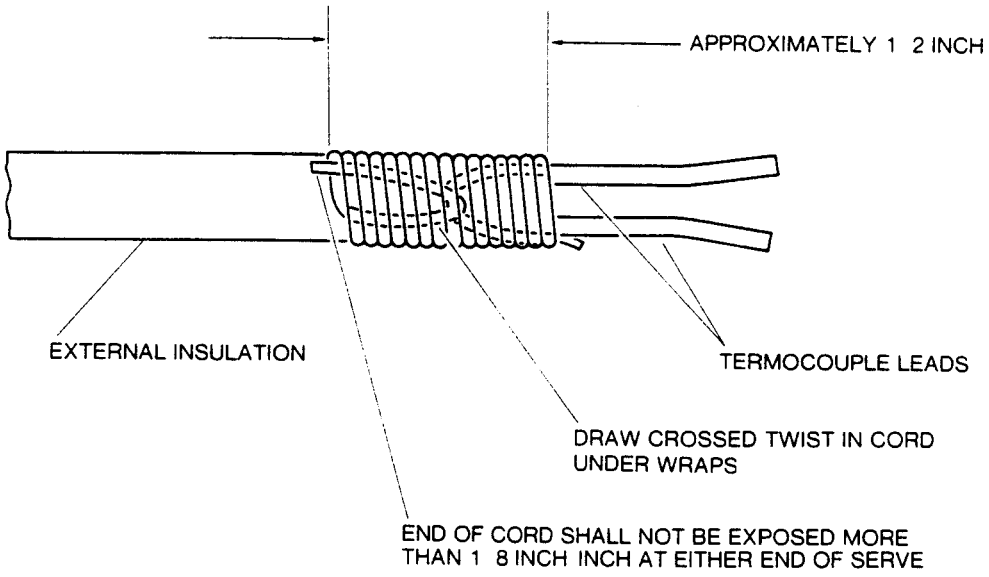

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Fig. 201 - Thermocouple Leads - Maintenance Practices

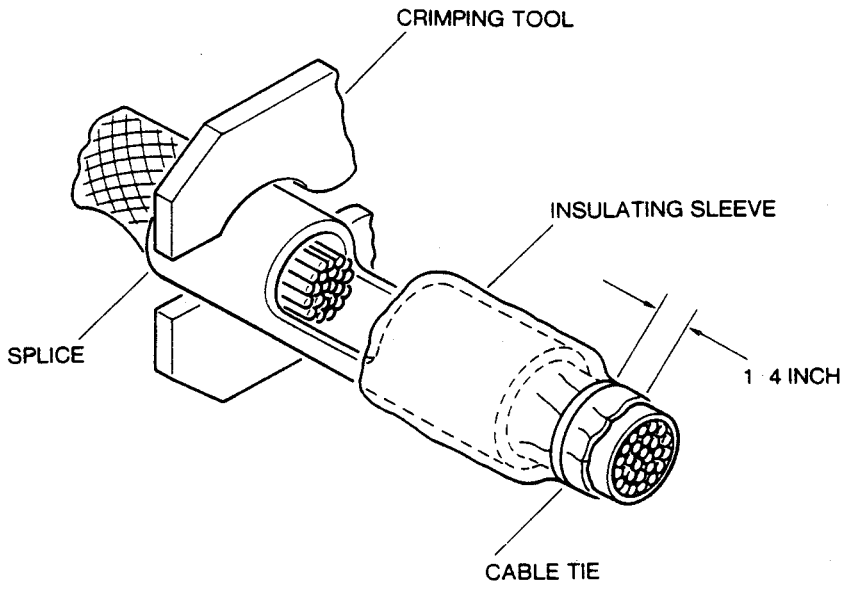

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Fig. 202 - Electrical Wire - Splice Joint

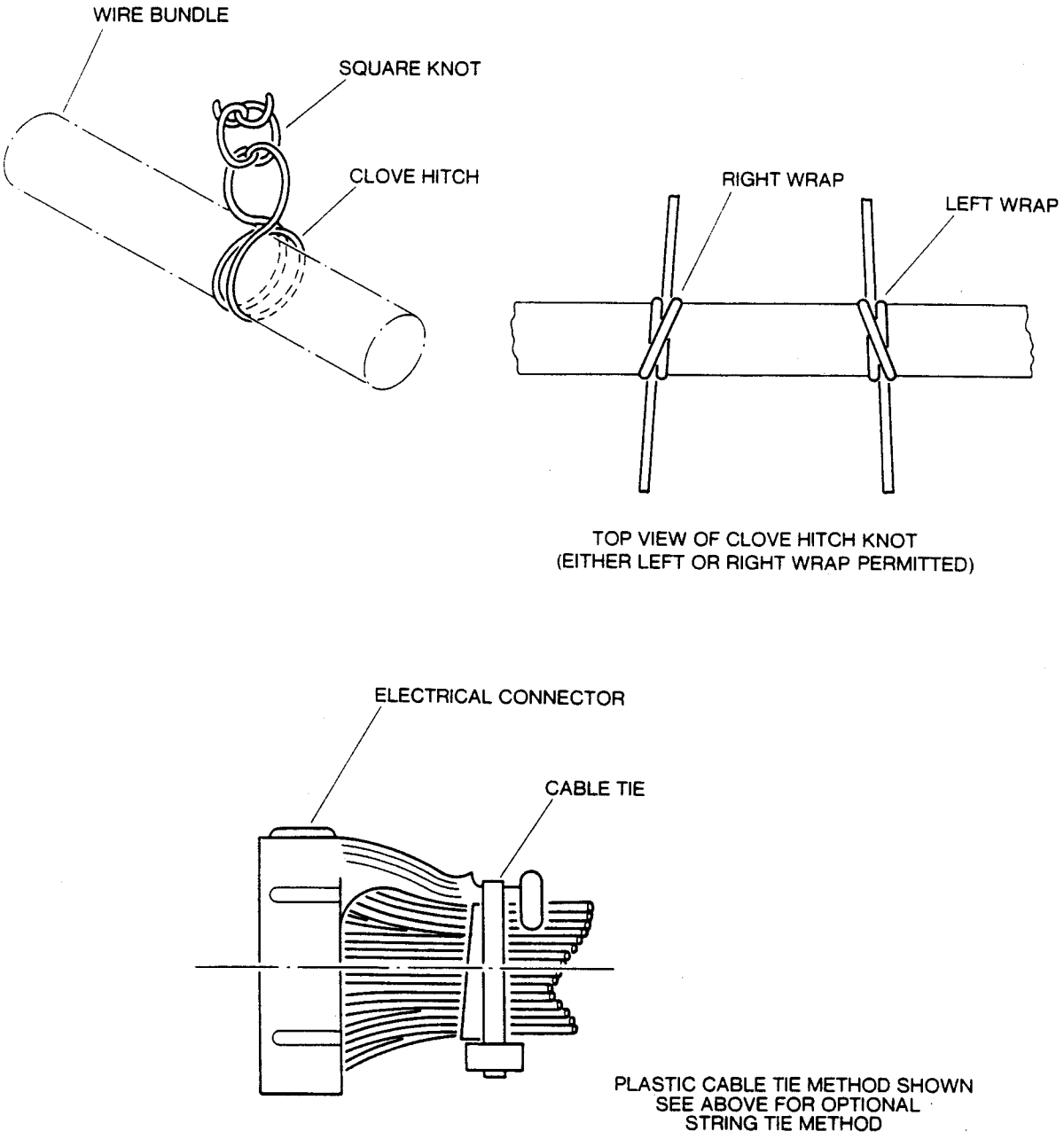

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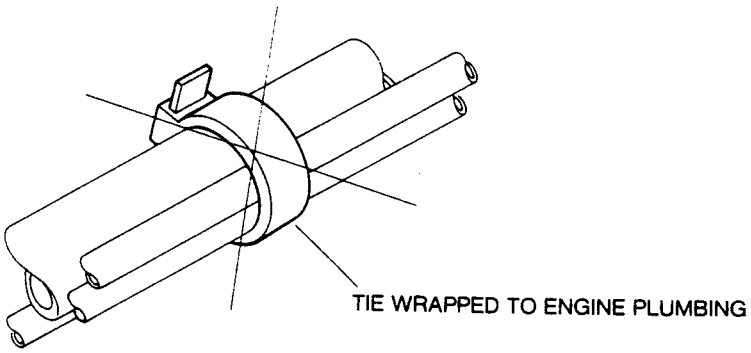
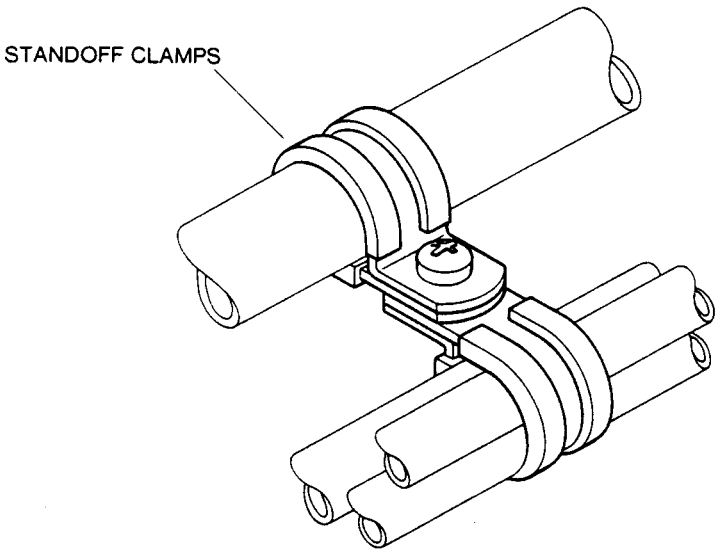
Fig. 203 - Binding Ties - Installation



NOT CORRECT



CORRECT

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Fig. 204 - Cable Clamps - Installation

ELECTRICAL BONDING - MAINTENANCE PRACTICES

1. Bonding Requirements

NOTE: The following Electrical Bonding Checks must be performed using a Milliohmeter (RCP2-JE) or equivalent.

A. Current path return bonds

(1) Current path return bonding completes the ground return path to the battery and the airplane generator source for all electrical and avionic equipment. The bond is made with standard airplane wire. The band must be made to primary structure only. When equipment is case grounded current return can be done by direct bonding of mating surfaces and through the mounting hardware.

NOTE: Refer to 51-80-00 for structural bonding requirements.

(2) Resistance values for different component groups are given in Table 201 below. These values do not supersede values given in individual page blocks. If any installation does not agree with the maximum values given by direct surface bonding a bonding jumper must be installed.

Equipment to be Bonded	Resistance Value (Ohms)	Resistance Value in service (Ohms)
Starter-Generator to Engine Frame	0.0025	0.0025
All Electrical and Electronic Equipment Ground Return to Primary Structure	0.0025	0.0025
Battery Box to Primary Structure	0.0025	0.0025
Engine to Nacelle Structure	0.0025	0.0030 - 0.0040
Radio Racks and Shelves to Primary Structure	0.0025	0.0025
Wing to Fuselage Primary Structure	0.0025	0.0025
Rivet Skin Joints and Breaks	0.003 Across Joint	0.003 Across Joint
Structural Joints or Breaks	0.003 Across Joint	0.003 Across Joint
RF1 Noise Filter	0.0025 Across Joint	0.0025 Across Joint

Table 201 - Current Path Return Bonds

B. RF and Static Bonds

(1) All electrical and electronic equipment and/or components must be installed with a continuous low resistance path from the equipment mounting structure to the airplane primary structure.

(2) All metallic pipes, tubes and hoses in fluid systems must be bonded to the basic structure.

(3) Resistance values for typical equipment and areas for RF static bonding are given in Table 202 below.

Equipment to be Bonded	Resistance Value (Ohms)	Resistance Value in Service (Ohms)
Antenna Base	0.010	
Baggage Compartment Door	0.005	
Control Surface - Aileron	0.005	0.010
Rudder	0.0025	0.060
Elevator	0.005	0.060
TrimTabs	0.005	
Flaps	0.005	0.010
Removable cowls (Fastener Mounting	0.005	0.035 - 0.050
Access and Inspection Panels	0.005	0.070
Nacelle	0.0025	0.080
Static Wicks	0.0005	0.100
Honeycomb Panel Assemblies	0.005	

Table 202 - RF and Static Bonds

(4) All control surfaces and flaps must have a bonding jumper across each hinge. A piano type hinge does not require additional bonding if the bond across the hinge is inside the limit.

C. Shock Hazard and Lightning Protection Bonds

(1) If the bond resistance is less than the limits in A. and B. above part of the requirement for shock hazard and lightning bond has been done.

(2) Additional requirements for shock hazard and lightning protective bonds are given in Table 203 below.

Equipment to be Bonded	Resistance Value (Ohms)	Resistance Value in Service (Ohms)
Hydraulic Cylinders	0.01	
Instruments	0.01	
Oxygen Cylinders	0.01	
Metallic tubing	0.10	
Metallic Ducting	0.005	
Fuel Filler	0.005	
Fuel Vents	0.005	
Wing Tie Down and Grounding Point	0.003	
Electronic Equipment Below Radio Frequency	0.01	
Control Cables and Rods to Movable Surface oEquipmentr	0.01	

Table 203 - Shock Hazard and Lightning Protection Bonds

D. General precautions for bonding are as follows:

(1) Bonded connections must be in a protected area close to access panels or doors for ease of installation.

(2) Do not bond components to the structure through other parts. Always bond direct to the structure.

(3) Make sure the leads are as short as possible.

(4) Make sure the leads do not stop correct operation of moving parts.

(5) Clean all bonding surfaces before installation of the joint.

(6) Use only self locking nuts in bonded joints.

(7) Do not make RF current returns through magnesium alloy parts.

(8) Do not use soldered joints on parts that move or vibrate.

(9) Bonding attachments must not affect the integrity of the airframe structure.

(10) Non-metallic or dry film lubricated nutplates must not be used for bonding applications e.g. antenna installation.

(11) AC and DC electrical ground returns must be connected separately.

(12) Where possible multiple bonding or dual system grounds to the same point on the structure are not possible.

2. Typical Bonding Methods

A. The bonding methods that follow will in most applications make a bonding joint which will agree with the limits in the Tables above:

(1) Bolted bond jumper installation

(a) Make bolted installations as shown in Fig. 201 and 202. Make the connections with the types of screw shown unless specifically told otherwise in a maintenance procedure.

(2) Riveted or bolted skin bond

(a) Normally a riveted or bolted skin joint will be inside the limits given above.

(b) If the normal joint bond is not in the limit the procedure given in Fig. 203 and 204 will give a satisfactory bond.

(3) Riveted or bolted angle bond

(a) Normally a riveted or bolted angle joint will be inside the limits given below:

– Normal resistance value across the joint less than 0.005 ohms
– Resistance for a current return path of less than 0.0025 ohms

(b) If the resistance value is not in the limit the procedure given in Fig. 205 will give a satisfactory bond.

(c) An alternative method to (b) above is to install bonding jumpers between each secondary structure and the primary structure.

(4) Bonding of tubes

(a) Normally a correctly installed tube with correct clamping arrangements will be inside the limit above.

(b) If the resistance value is above the limit given use one or more of the methods given in Fig. 206 and 207 to give a satisfactory bond.

(5) Bonding of access panels

(a) Normally a correctly installed panel will be inside the limit given in Table 202 above.

(b) If the resistance value is more than the limit use one of the two methods given in Fig. 208 and 209 to give a satisfactory bond.

(6) Bonding of antenna installations

(a) Normally a correctly installed antenna will be inside the limit given in Table 202 above.

(b) If the resistance value is more than the limit use one of the methods that follow to give a satisfactory bond:

1) Make sure that all mating surfaces of the antenna mounting are clean and free from paint and insulating material.

2) Use the methods given in Fig. 2011, 202 and 210 to give a satisfactory bond.

3. Bonding Surface Preparation

A. Make sure that all mating surfaces which affect the electrical bonding are clean and free from corrosion.

B. Clean steel and aluminium surfaces as follows:

- Remove heavy to mild deposits with 400 - 600 grade emery cloth or equivalent sand paper
- Remove mild or medium deposits with abrasive pads
- For mild deposits on steel surfaces use aluminium oxide, paper or cloth, steel wool or a steel or monel wire brush
- Use aluminium wool on aluminium surfaces only
- Clean with solvent (PD 680) and a lint free cloth.

C. Clean magnesium surfaces as follows:

CAUTION: DO NOT USE STEEL WOOL, STAINLESS STEEL WOOL OR ALUMINIUM WOOL TO CLEAN MAGNESIUM ALLOYS. PARTICLES OF THESE PRODUCTS CAN CAUSE CORROSION OF THE ALLOYS.

- Remove deposits with abrasive pads (Plastic)
- Remove heavy deposits with a stainless steel or monel wire brush
- Remove medium to mild deposits with 400 - 600 grade emery cloth or an equivalent fine sandpaper and/or aluminium oxide paper or cloth.
- Clean the areas with solvent (PD 680) and a lint free cloth.

4. Surface Finish

A. Replace all surface finish in accordance with the instructions given in Chapter 51-00-00.

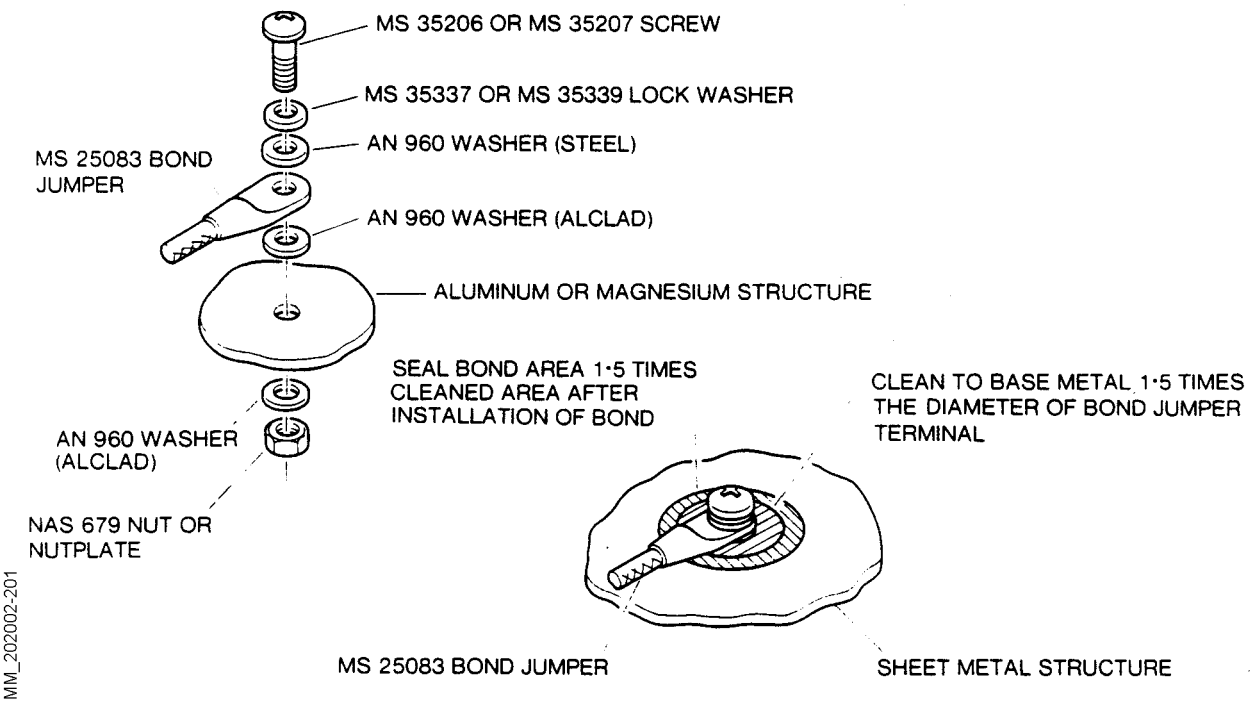

Fig. 201 - Bonding Jumper Installation - Aluminium and Magnesium Alloys

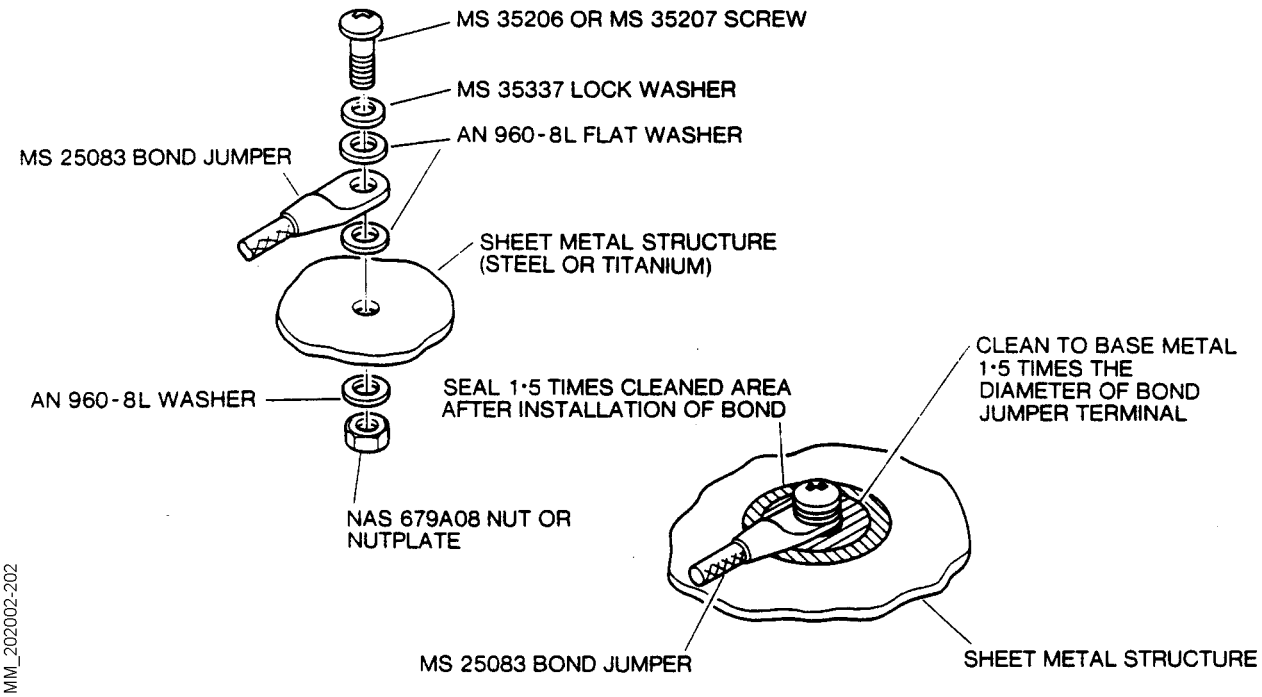

Fig. 202 - Bonding Jumper Installation - Steel and Titanium Alloys

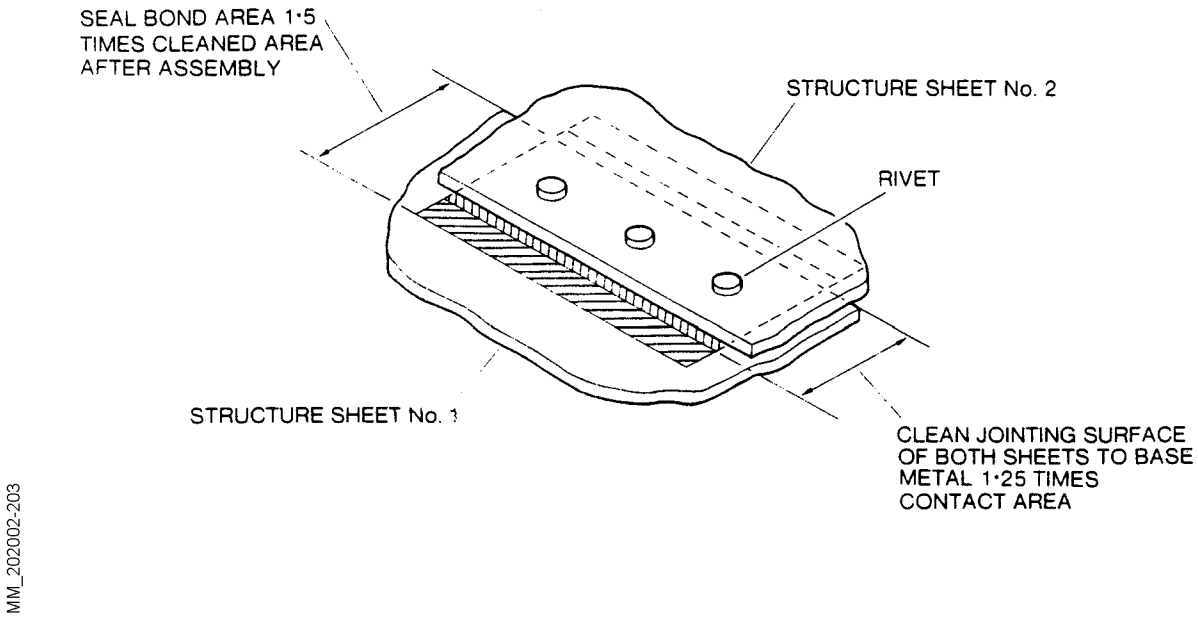

Fig. 203 - Bonding Repair for Riveted Sheet Metal Construction

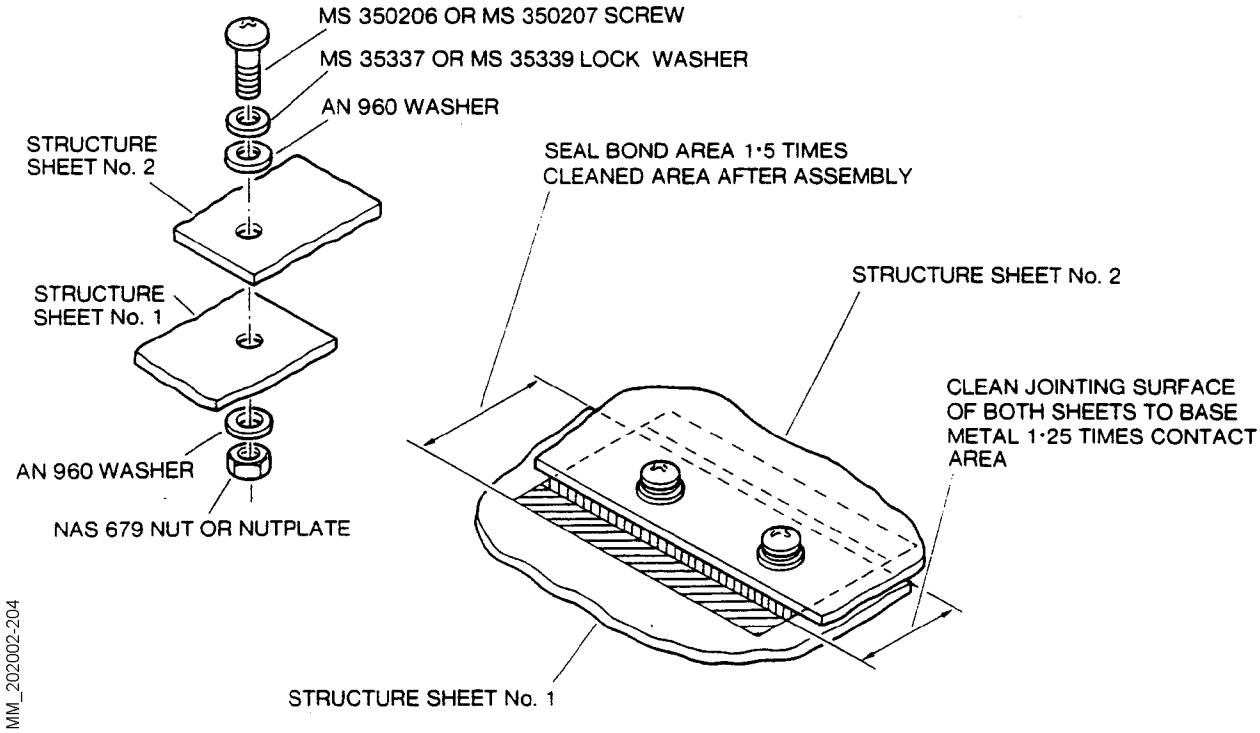

Fig. 204 - Bonding Repair for Screwed Sheet Metal Construction

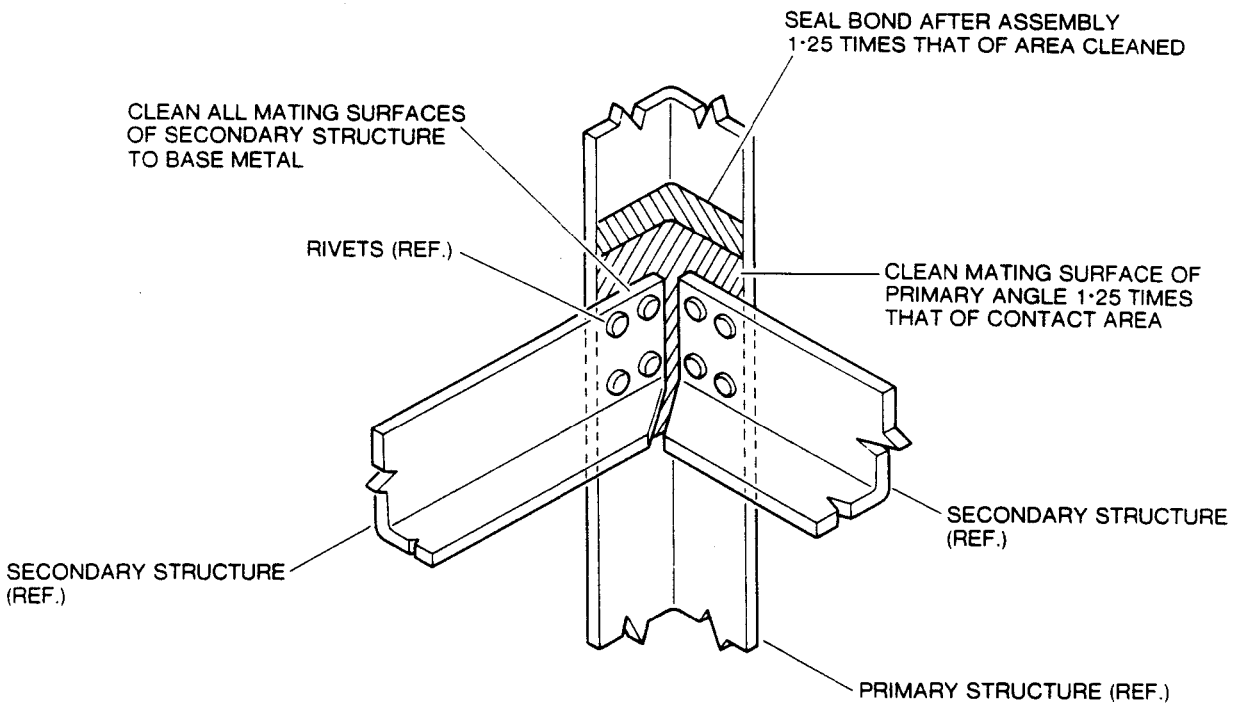

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Fig. 205 - Bonding Repair for Bracket or Angle Construction

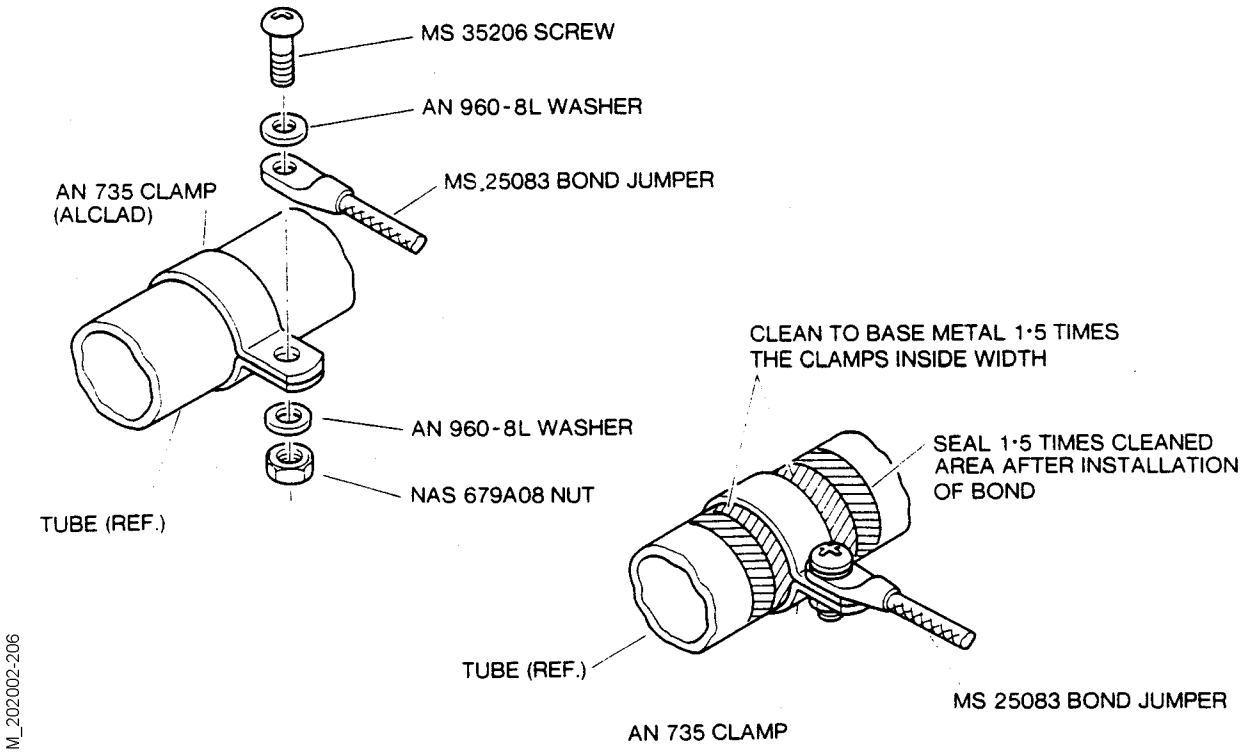

Fig. 206 - Bonding of Tubes to Structure

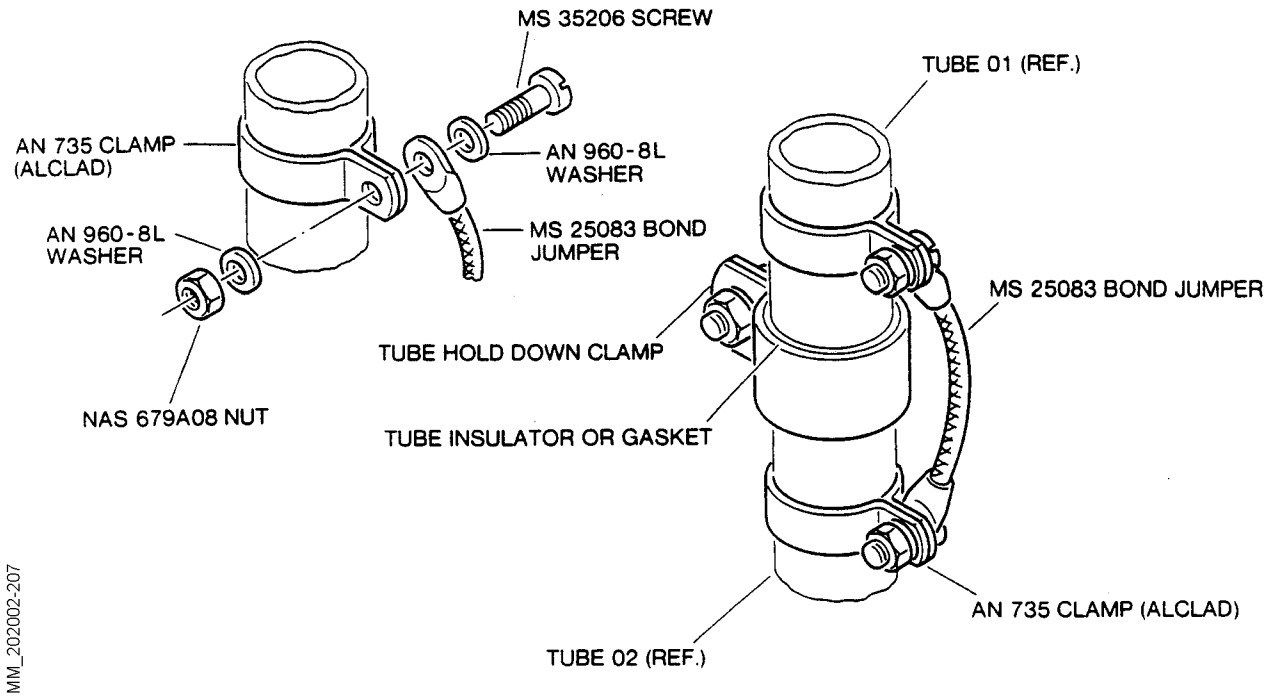

Fig. 207 - Bonding of Tubes for Continuity

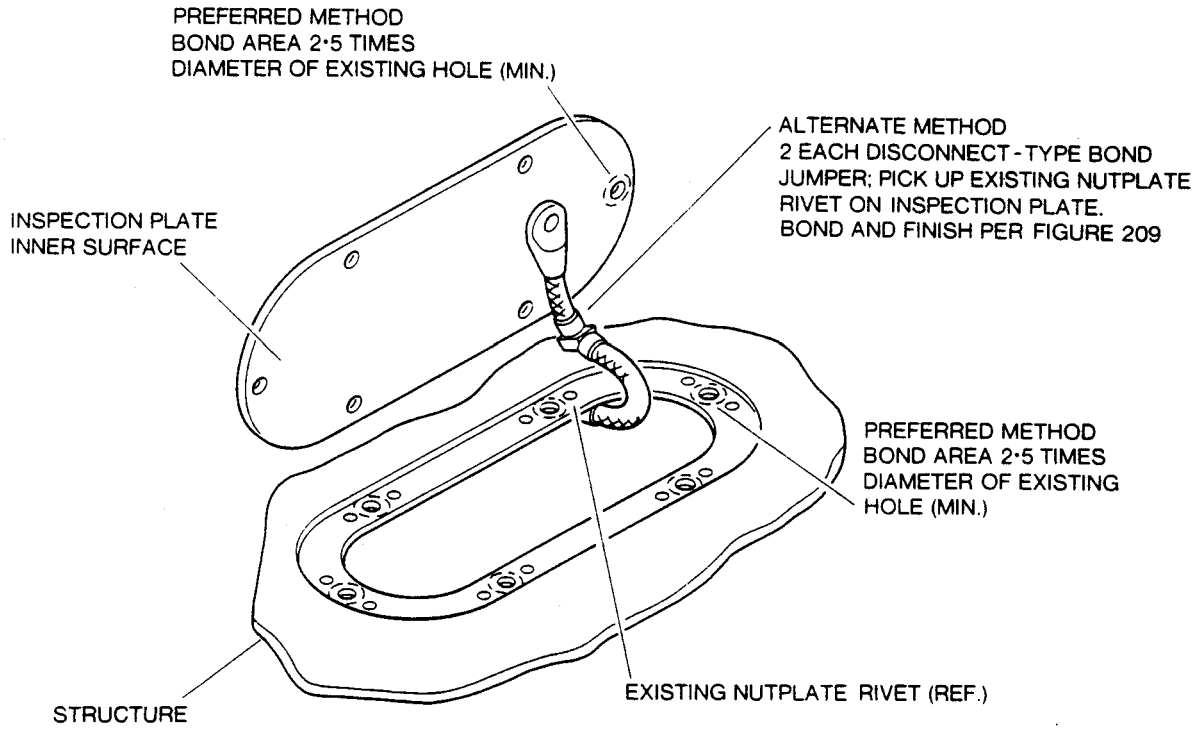

Fig. 208 - Access/Inspection Panel - Bonding

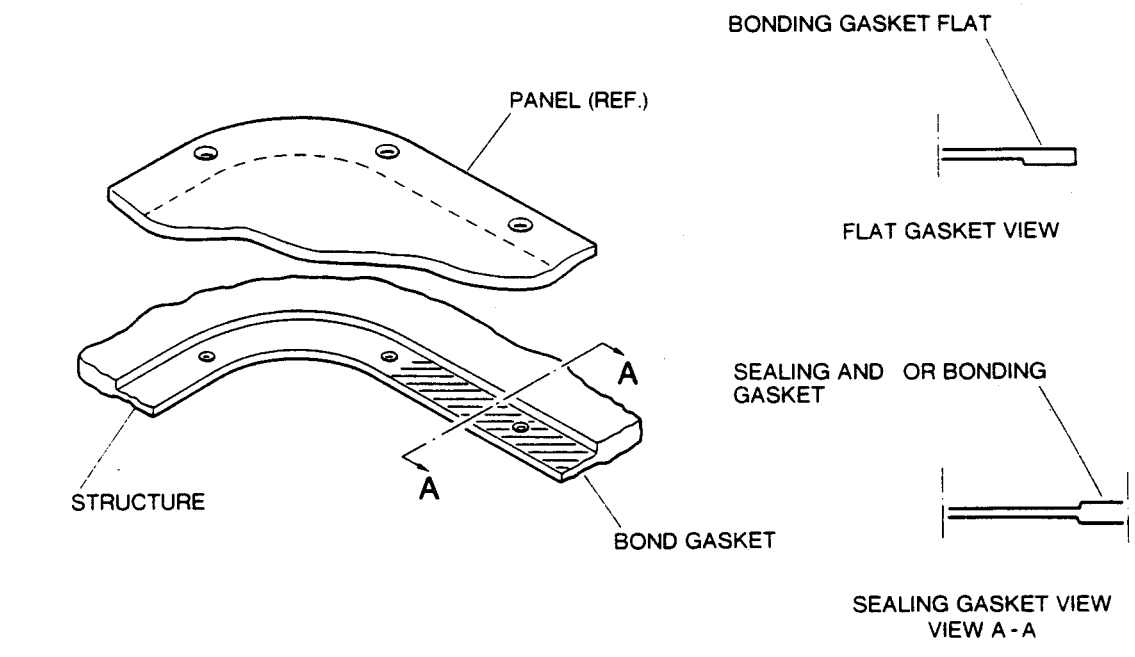

Fig. 209 - Access Panels with Gasket - Bonding

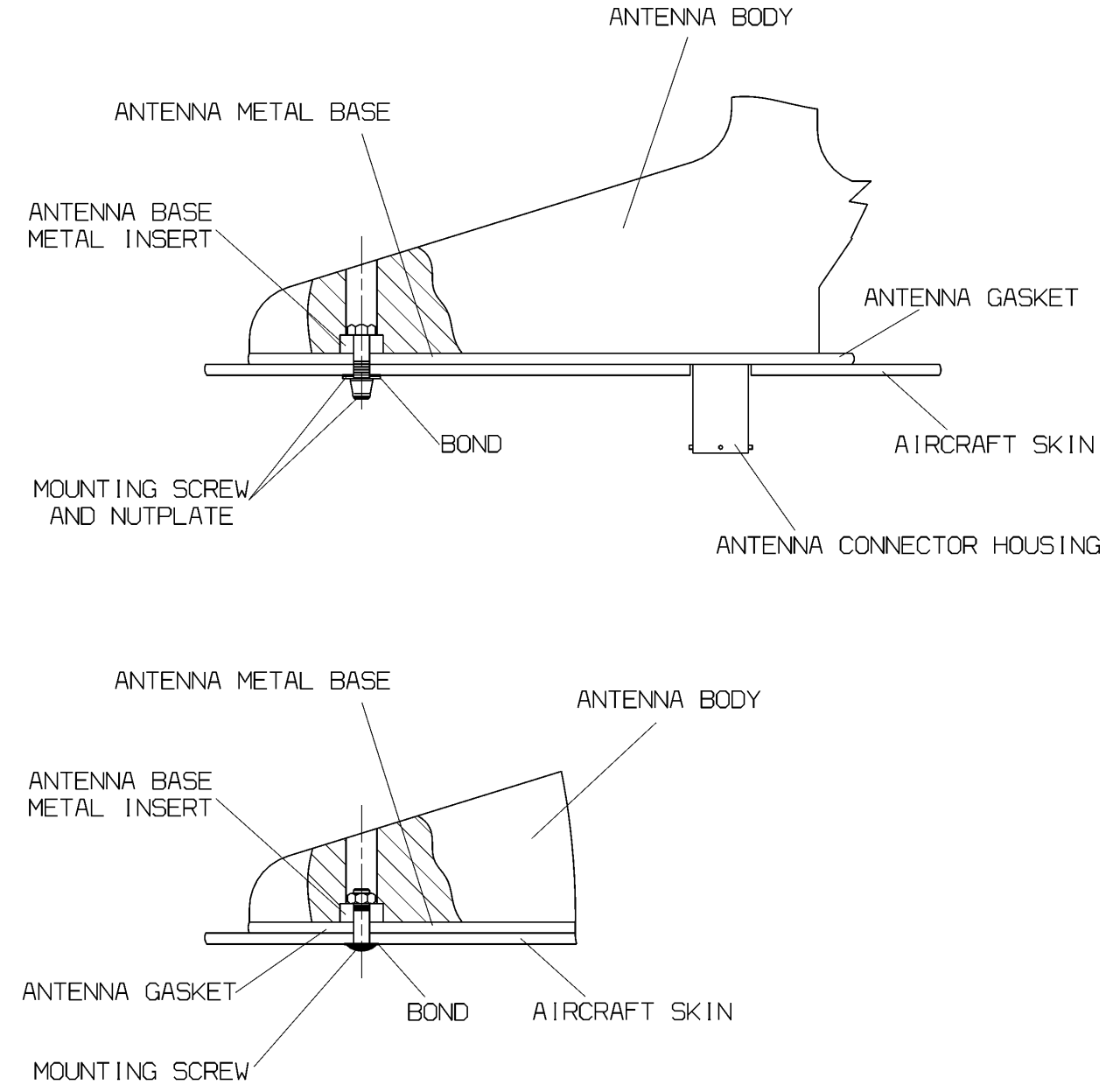

Fig. 210 - Antenna Bonding - Typical

5. Electrical Bonding Between Control Surfaces and Main Structure - Inspection

NOTE: The following Electrical Bonding Checks must be performed using a Milliohmeter (RCP2-JE) or equivalent.

NOTE: This topic give the information about the procedure to be applied for the check of the electrical bonding measure between the control surfaces and the aircraft structure (battery ground).

NOTE: The tables reported above is indicative only for assembly of parts and shall not be assumed as limit value for bonding check during aircraft inspection.

A. Procedure

NOTE: The procedure contains the following inspection checks:

- Check electrical bonding between the horn of the L.H. elevator and battery ground.
- Check electrical bonding between the horn of the L.H. elevator and battery ground
- Check electrical bonding between the static wick mounting plate installed on the traling edge of the rudder horn and the battery ground.
- Check electrical bonding between the balancing mass in the rudder horn and the battery ground.
- Visual Inspection of bonding jumper between the horizontal stabilizer and the vertical stabilizer.
- Visual Inspection of bonding jumper between the elevator and horizontal stabilizer.

(1) Check bonding between PIN G106 (battery ground) and Tail-cone / Vertical Stabilizer (Refer to Fig. 212).
   (a) Put a Warning Notice in the flight compartment.
   (b) Set the battery switch to OFF.
   (c) Put the access platform in position on the left side of the rear fuselage to access to the baggage compartment.
   (d) Disconnect the battery quick - disconnect from receptacle.
   (e) Put the access platform in position on the right side of the vertical stabilizer.
   (f) Connect the milliohmeter between the pin G106 (battery ground)(Refer to Fig. 211) and the metallic plate (1) that is installed between the tail cone and the vertical stabilizer.
   (g) Measure and record the resistence value. The measured value shall be less than 1,5 milliohm.

(2) Perform a visual inspection of bonbing jumper between the elevator and the horizontal stabilizer, for general condition and safety of installation; if necessary use an endoscope (Refer to Fig. 213 left elevator hinges are shown the right ones are identical).

(3) Perform a visual inspection of bonbing jumper between the vertical stabilizer and the rudder for general condition and safety of installation; if necessary use an endoscope(Refer to Fig. 214).

(4) Check bonding between PIN G106 (battery ground) and the left /right elevators (Refer to Fig. 215).

(a) Connect the milliohmeter between the pin G106 (battery ground)(Refer to Fig. 211) and the metallic cover (1) installed on the horn of the right elevator.

(b) Measure and record the resistence value. The measured value shall be less than 50 milliohm.

(c) Connect the milliohmeter between the pin G106 (battery ground)(Refer to Fig. 211) and the metallic cover (2) installed on the horn of the left elevator.

(d) Measure and record the resistence value. The measured value shall be less than 50 milliohm.

(5) Check bonding between PIN G106 (battery ground) and rudder (Refer to Fig. 216).

(a) Connect he milliohmeter between the pin G106 (battery ground)(Refer to Fig. 211) and the static wick mounting plate installed on the trailing edge of the rudder.

(b) Measure and record the resistence value.

(c) Connect the milliohmeter between the pin G106 (battery ground)(Refer to Fig. 211) and the balancing mass in the rudder horn.

(d) Measure and record the resistence value. The measured value shall be less than 100 milliohm.

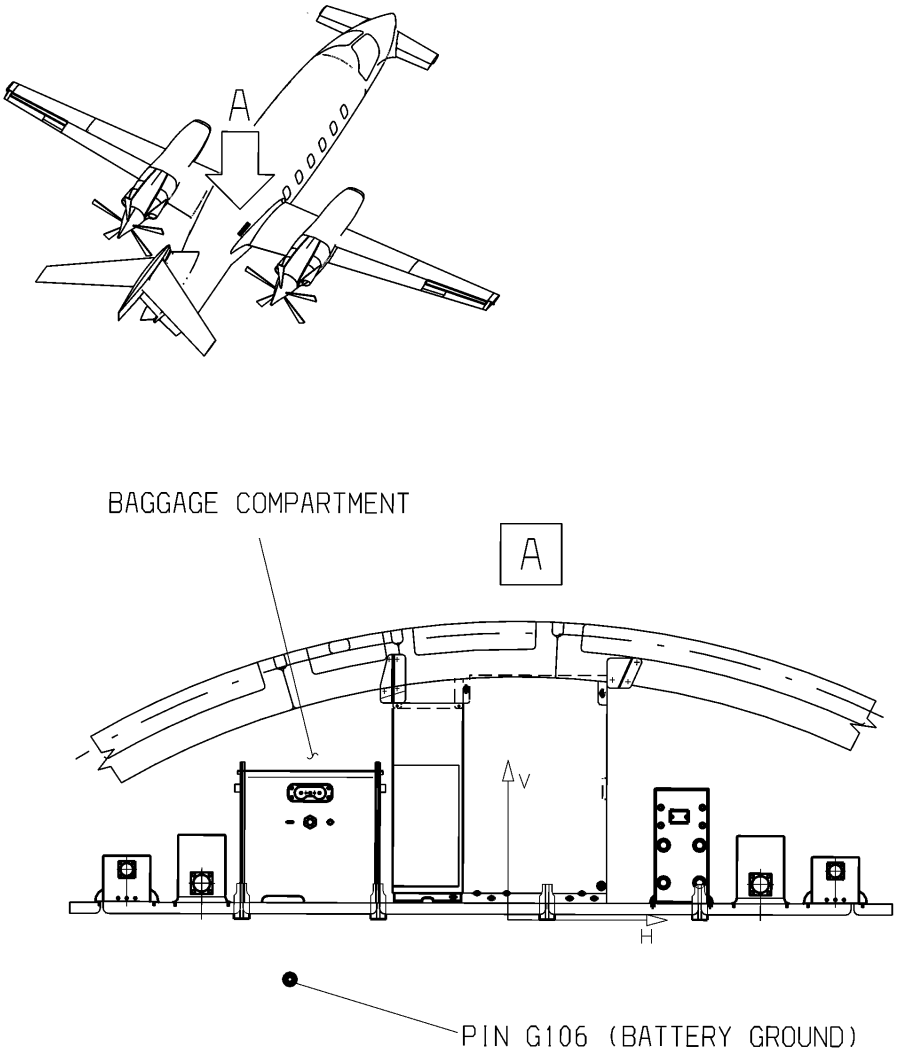

Fig. 211 - Pin G106 (Battery Ground)

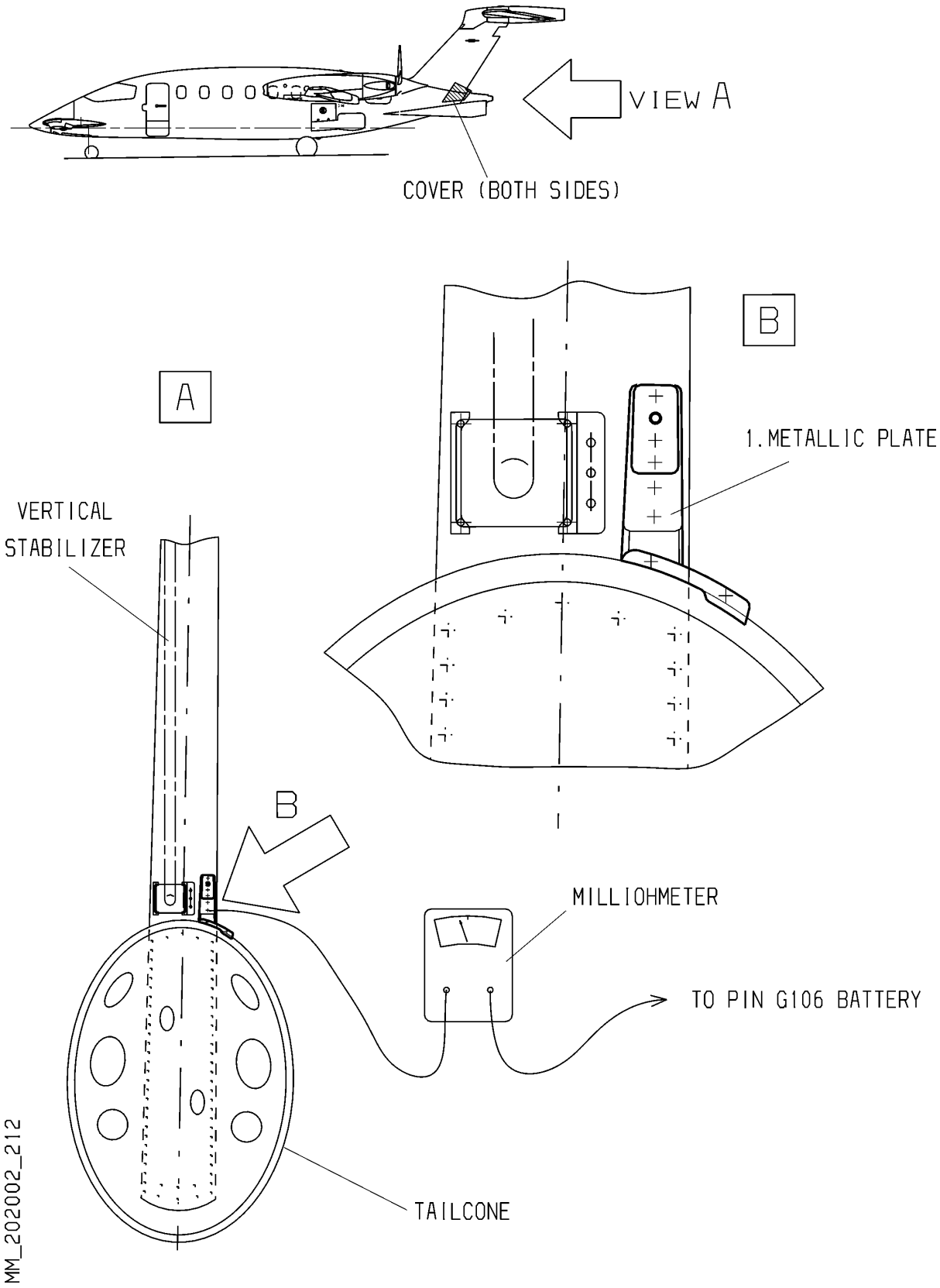

Fig. 212 - Pin G106 Battery - Tail-cone / Vertical Stabilizer Bonding Check

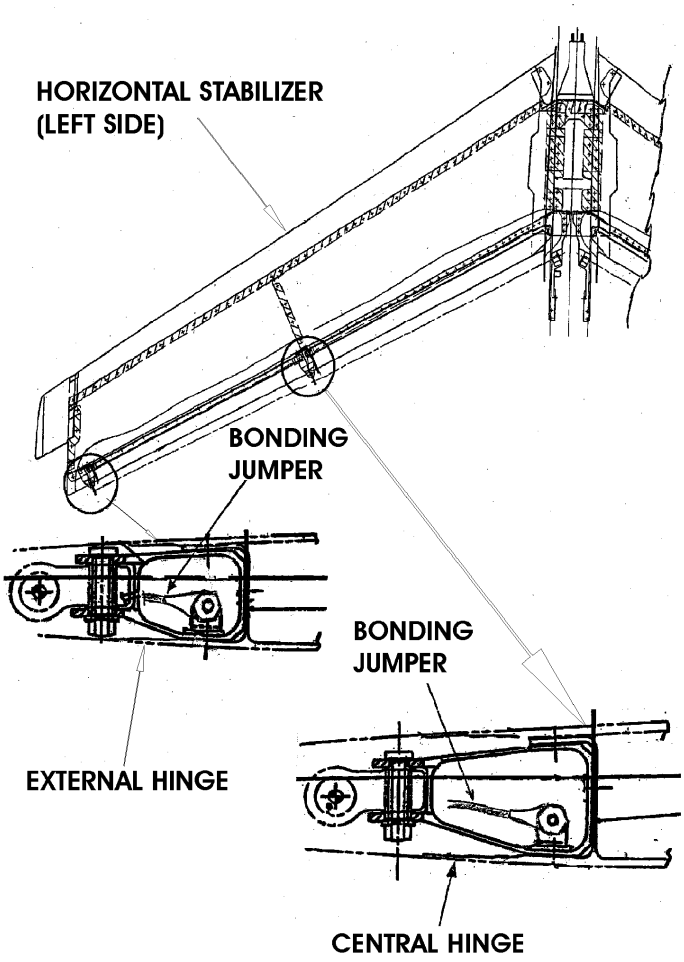

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Fig. 213 - Elevator / Horizontal Stabilizer Bonding Jumper Inspection

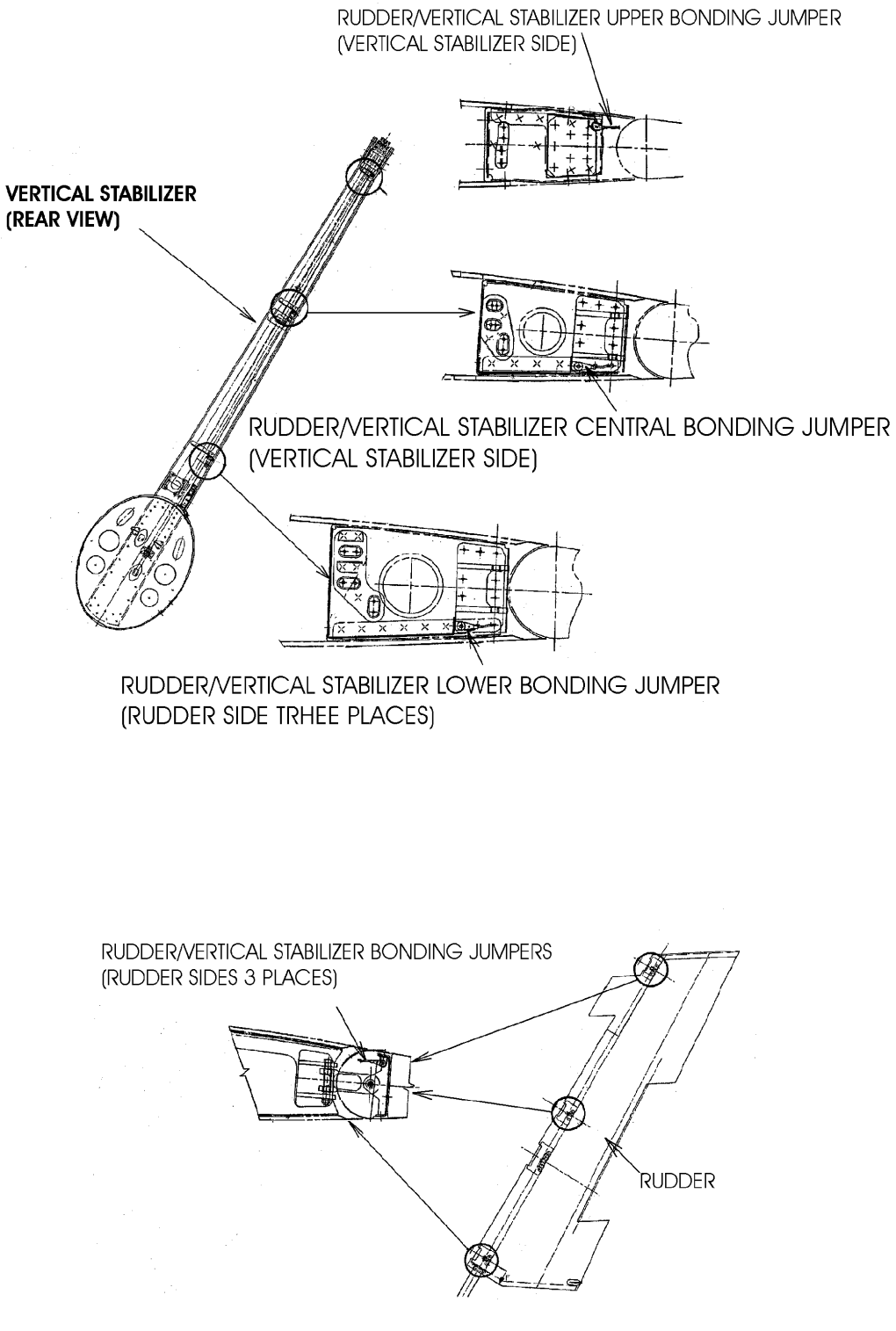

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Fig. 214 - Vertical Stabilizer / Rudder Bonding Jumper Inspection

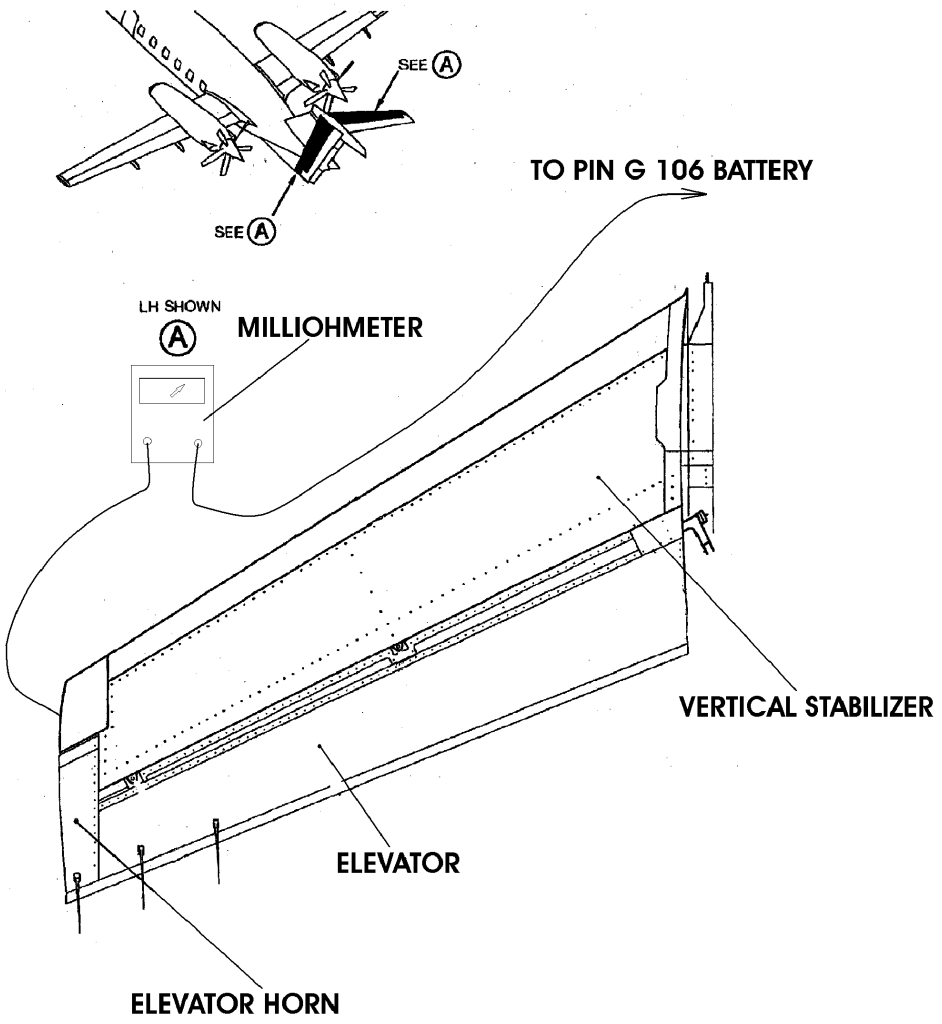

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Fig. 215 - Pin G106 Battery - Left / Right Elevators Bonding Check

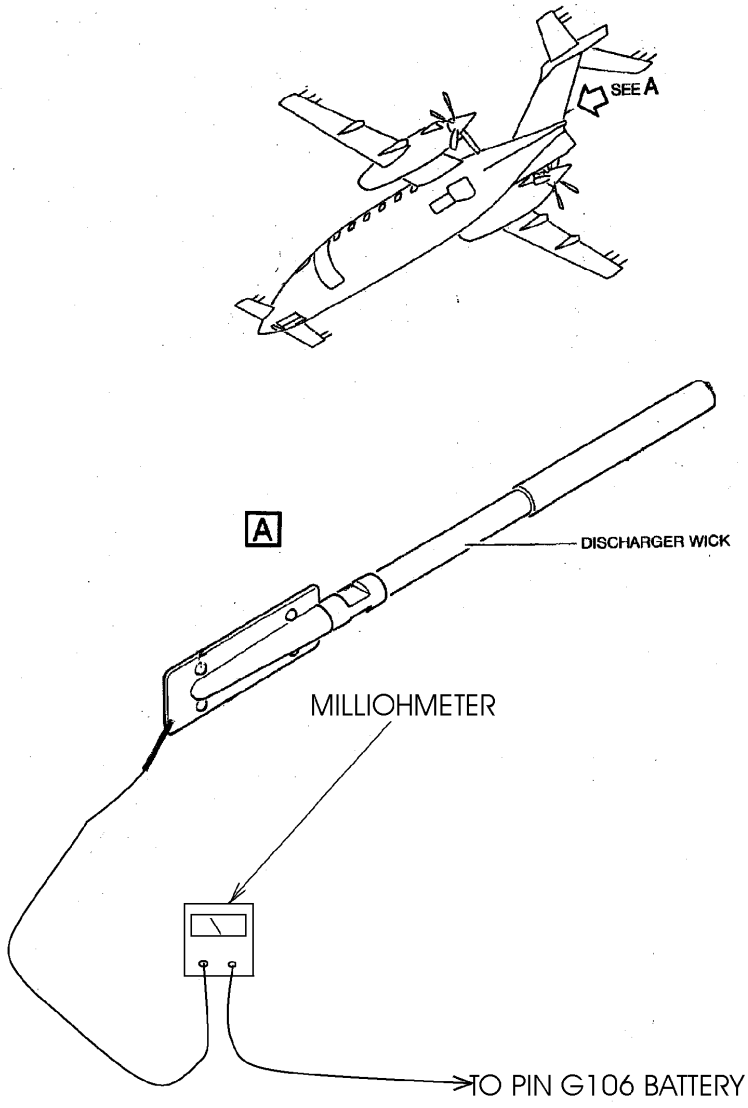

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Fig. 216 - PIN G106 Battery - Rudder Bonding Check

6. Flap Track / Wing Bonding Jumpers - Removal (Ref. Fig. 217)

A. Fixtures, Test and Support Equipment

Warning Notices	Not Specified

B. Referenced Information

Maintenance Manual Chapter 06-00-00
Maintenance Manual Chapter 12-00-00
Maintenance Manual Chapter 20-20-02
Maintenance Manual Chapter 24-00-00
Maintenance Manual Chapter 27-00-00
Maintenance Manual Chapter 28-00-00
Maintenance Manual Chapter 57-10-00

C. Procedure

NOTE: The flap track / wing bonding jumpers are installed on each outboard flap track. The removal procedure is identical for all flap tracks / wing bonding jumpers.

WARNING: BE CAREFUL WHEN YOU USE MEK. OBEY THE HEALTH AND SAFETY INSTRUCTIONS GIVEN IN CHAPTERS 20-00-00 AND 28-00-00.

(1) Set the flap to DN position (Refer to 27-50-00).
(2) Remove the electrical power from the airplane (Refer to 24-00-00).Open, tag and safety the FLAPS PWR circuit breaker located on the copilot Circuit breaker panel.
(3) De-fuel the airplane to a minimum of 100 Lbs. reading on the Multi Function Display (MFD) (Refer to 12-00-00).
(4) Place a Warning Notice in the flight compartment to tell persons not apply electrical power.
(5) Remove the Flap Track Fairing.
(6) Remove the wing access panel (632GB for gain the access to the RH outboard flap trach / wing bonding jumper inside wing attachment, 632 BB for gain the access to the RH inboard flap trach / wing bonding jumper inside wing attachment, 532GB for gain the access to the LH outboard flap trach / wing bonding jumper inside wing attachment, 532 BB for gain the access to the LH inboard flap trach / wing bonding jumper inside wing attachment) (Refer to 06-00-00 and 57-10-00).
(7) Ventilate the wing fuel tank with a warm air blower in order to remove fuel vapor.
(8) Remove the bolt (1), nut (3) and washer (2) that connect a bonding jumper terminal end to the flap track (8).
(9) Remove the bolt (5), nut (7) and washer (6) that connect the other bonding jumper terminal end to the wing
(10) Remove the flap track / wing bonding jumper (4).

7. Flap Track / Wing Bonding Jumpers - Installation(Ref. Fig. 217)

A. Fixtures, Test and Support Equipment

Lint free cloth	Not Specified

B. Materials

Protection Coat	MIL-L-6806
Conductive adhesive	01-007
Sealant	PR 1440A2
Methyl-Ethyl-Ketone (MEK)	02-009

C. Referenced Information

Maintenance Manual Chapter 06-00-00
Maintenance Manual Chapter 12-00-00
Maintenance Manual Chapter 20-20-02
Maintenance Manual Chapter 24-00-00
Maintenance Manual Chapter 27-00-00
Maintenance Manual Chapter 28-11-00
Maintenance Manual Chapter 57-10-00

D. Procedure

NOTE: The flap track / wing bonding jumpers are installed on each outboard flap track. The Installation procedure is identical for all flap tracks / wing bonding jumpers.

WARNING: BE CAREFUL WHEN YOU USE MEK. OBEY THE HEALTH AND SAFETY INSTRUCTIONS GIVEN IN CHAPTERS 20-00-00 AND 28-11-00.

(1) Remove any recidual material and clean the wing internal and external surface around the hole.
(2) Check if the protection coat of wing hole inner surface is undamaged, otherwise apply an ALODINE 1200 protection coat.
(3) Remove any recidual material and clean the flap track surface around the hole.
(4) Check if the protection coat of flap track hole inner surface is undamaged, otherwise apply an ALODINE 1200 protection coat.
(5) Prepare the bonding contact at both flap track holes ends: a cleaned surface of 13.5 millimeters diameter around the contact hole is required.Clean the mating surfaces with methyl-ethyl-ketone (MEK), allow to dry, then apply a conductive adhesive KS4008 or equivalent.
(6) Prepare the bonding contact surfaces on the wing lower skin: a cleaned surface of 13.5 millimeters diameter around the contact hole is required. Clean the mating surfaces with methyl-ethyl-ketone (MEK), allow to dry, then apply a conductive adhesive KS4008 or equivalent.

(7) Connect a flap track / wing bonding jumper terminal end to the wing with bolt (5), washer (6) and nut (7).

(8) Connect the other flap track / wing bonding jumper terminal end to the flap track with bolt (1), washer (2) and nut (3).

(9) Check the installed bonding connection jumper for resistence (Refer to 20-20-02).

(10) Apply a MIL-L-6806 protection coat on the bonding jumper terminal connections and claned surronding areas.

(11) At the inside wing fuel tank, clean the area surronding the installed nut (7) with methyl-ethyl-ketone (MEK).

(12) Apply a coat of PR1440A2 sealant on and around the installed nut (7) then allow the required curing time.

(13) Check that no foreign object has been left inside the wing tank.

(14) Install the wing access panel previously removed (Refer to 06-00-00 and 57-10-00).

(15) Install the Flap Track Fairing.

(16) Remove a Warning Notice in the flight compartment to tell persons not apply electrical power.

(17) Restore the electrical power from the airplane (Refer to 24-00-00).Remove the safety tag and close the FLAPS PWR circuit breaker on the copilot Circuit breaker panel.

(18) Retract the flap surface to UP position.

(19) Refuel the airplane and check for absence of any leakage at the wing skin installed bonding connection.

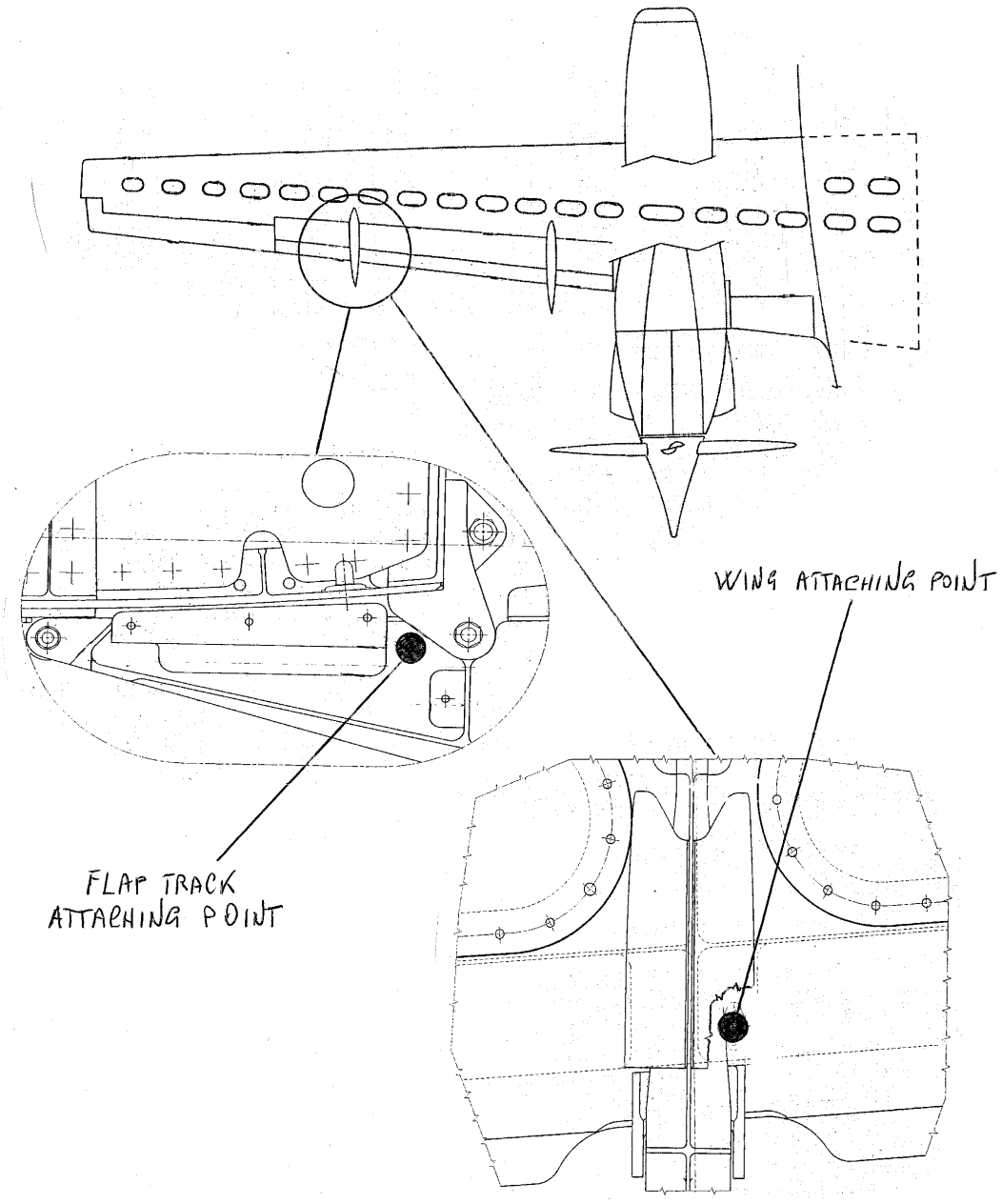


Fig. 217 - Flap Track / Wing Bonding Jumpers - Removal / Installation (Sheet 1 of 2)

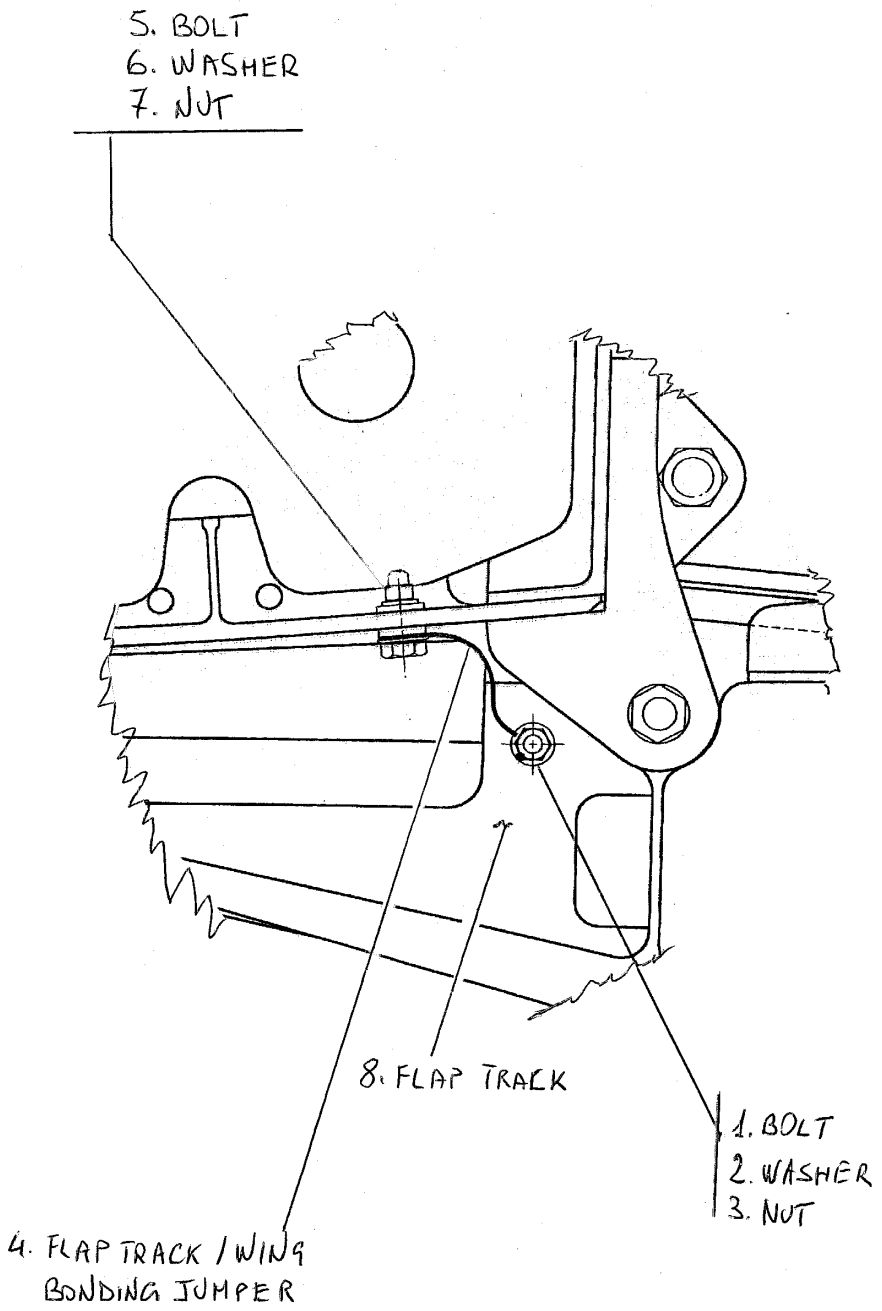


Fig. 217 - Flap Track / Wing Bonding Jumpers - Removal / Installation (Sheet 2 of 2)

8. Engine Mount - Electrical Contrinuity Checks. (Ref. Fig. 218)

A. Fixtures, Test and Support Equipment

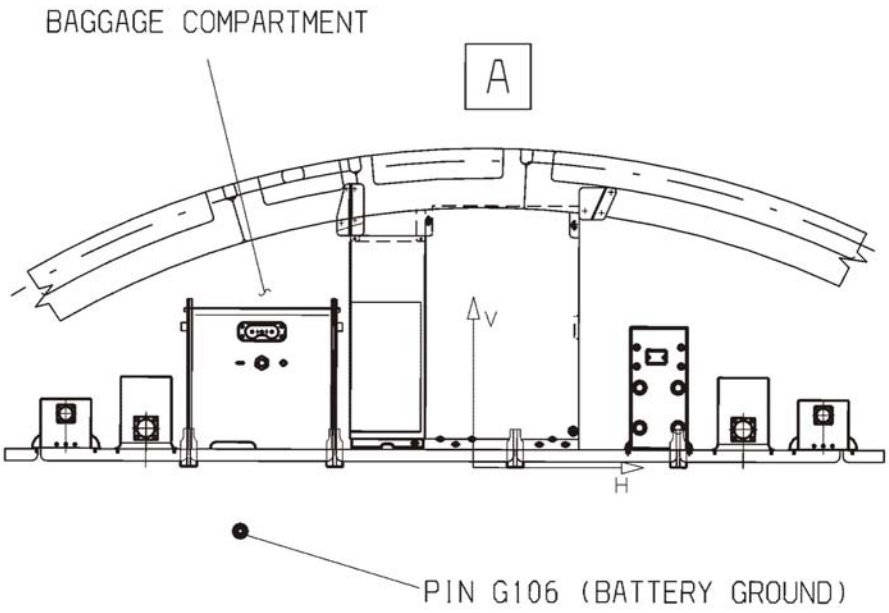
Milliohmeter	RCP2-JE or equivalent

B. Procedure

NOTE: The procedure contains the following inspection checks:

- Check electrical continuity between the Engine Mount and PIN G106 (battery ground).
- Check electrical continuity between the Engine Mount and Forward Firewall.
- Check electrical continuity between the Engine Mount and Rear Firewall.

(1) Put a Warning Notice in the flight compartment.
(2) Set the battery switch to OFF.
(3) Put the access platform in position on the LH/RH wing to access to engine nacelle panels.
(4) Remove all engine nacelle panels (Refer to 06-00-00).
(5) Disconnect the battery quick - disconnect from receptacle.
(6) Connect the milliohmeter between the pin G106 (battery ground) and the Engine Mount (1) as shown in figure.
(7) Measure and record the resistence value. The measured value shall be maximun 2,5 milliohm.
(8) Connect the milliohmeter between the Engine Mount (1) and the Forward Firewall (2) as shown in figure.
(9) Measure and record the resistence value. The measured value shall be maximun 5 milliohm.
(10) Connect the milliohmeter between the Engine Mount (1) and the Rear Firewall (3) as shown in figure.
(11) Measure and record the resistence value. The measured value shall be maximun 5 milliohm.
(12) Connect the battery quick - connect to receptacle.
(13) Remove a Warning Notice in the flight compartment.
(14) Install all engine nacelle panels (Refer to 06-00-00).



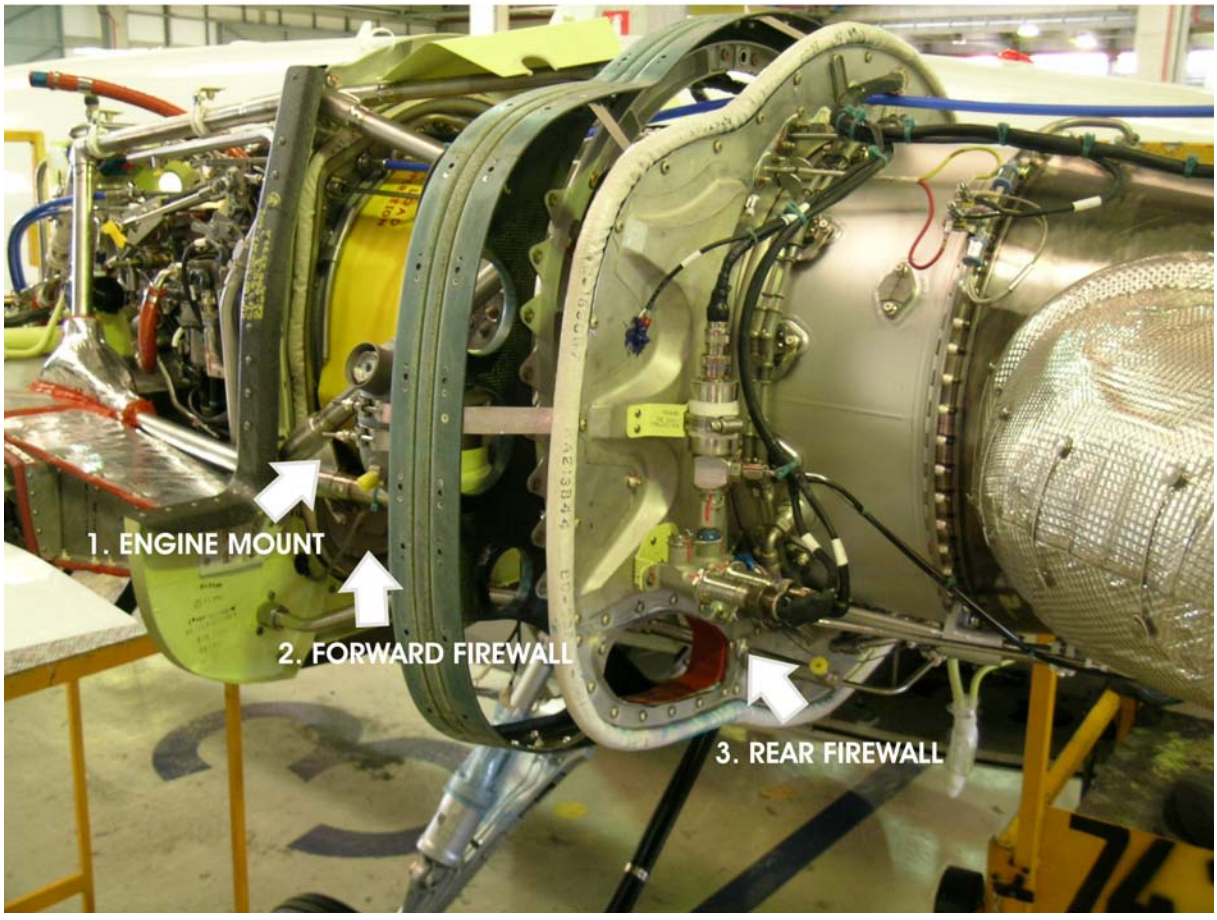


Fig. 218 - Engine Mount - Electrical Contrinuity Checks