CERTIFIED

Beechcraft

SERVICE

A WORLD OF SERVICE

Queen Air 65 & 80

SHOP MANUAL

LIST OF EFFECTIVE PAGES

*6-11	A4	February 16, 1962
6-12		Original
6-12A	A3	September 25, 1961
6-13	A3	September 25, 1961
6-14		Original
6-15	A3	September 25, 1961
*6-16	A4	February 16, 1962
6-16A	A3	September 25, 1961
6-17 thru 6-18	A1	July 22, 1960
6-19 thru 6-20A	A3	September 25, 1961
6-21 thru 6-25		Original
6-26	A1	July 22, 1960
6-27		Original
*6-28	A4	February 16, 1962
6-29	A1	July 22, 1960
*6-30	A4	February 16, 1962
*7-1 thru 7-2	A4	February 16, 1962
7-3		Original
*7-4	A4	February 16, 1962
7-5 thru 7-6		Original
*8-1 thru 8-5	A4	February 16, 1962

NOTE: The asterisk denotes pages in current revision.

SECTION I

Introduction

SECTION I

THE QUEEN AIR SHOP MANUAL

The Shop Manual, a new approach to commercial aircraft maintenance handbooks, replaces the Maintenance Manual and is based on a different concept. Everything in the Shop Manual is directed toward helping the experienced mechanic in his day-to-day work in the shop. Simple and repetitive maintenance and removal procedures are left out; at the same time we have tried to add key points of specialized procedures so organized that reading through many pages of descriptive text is not required to find them. We think the result is a shop manual that the mechanic can use every day. It is small in size but large in scope and usability.

As distinguished from the Queen Air Owner's Manual which contains, flight procedures servicing information and the minor maintenance that the owner needs to know, the Queen Air Shop Manual furnishes the experienced mechanic with detailed instruction and information peculiar to the BEECHCRAFT Queen Air. Illustrations, diagrams and tables are used to present complex information in a concise form. Text is kept brief while covering important points in maintenance and overhaul.

The Queen Air Shop Manual will grow as new information becomes available. Revisions will be issued whenever needed to keep information current and to add more of the type information included in the original issue.

VENDOR PUBLICATIONS

The list below contains the servicing, overhaul and parts information on various purchased components of the Queen Air which are available from the vendors of these components. These publications are available from the various manufacturers. To avoid unnecessary duplication of material, this list is provided as a guide to your own files, rather than attempting to select pertinent material from the various publications for inclusion in the Shop Manual.

In most instances, you should obtain the publications listed directly from the manufacturer or his distributor; only a few, such as the engine manuals, are available from the Service Parts Sales Division, Beech Aircraft Corporation. Those which are so available are listed in the current Publications Price List. Since a wide variety of radio equipment is available and because radio manufacturers normally supply parts and servicing manuals with each set, radio publications have not been included in the list.

VENDOR PUBLICATIONS

ENGINE

Overhaul Manual, Lycoming IGSO-480 Series Aircraft Engines #60294-4.

Operator's Manual, Lycoming IGSO-480-A1A6 #60299-10.

Parts Catalog, Model IGSO-480-A1A6 Aircraft Engine.

MAGNETO

User Operating Instructions, Bendix Aircraft Series S6 Magnetos, Form L-239-2. Scintilla Div., Bendix Aviation Corp.

Service Instructions, Bendix Aircraft Series S6 Magnetos, Form L-205-5. Scintilla Div., Bendix Aviation Corp.

Service Parts List, Bendix Aircraft Series S6 Magnetos, Form L-223-6. Scintilla Div., Bendix Aviation Corp.

Maintenance and Operation Instructions, Bendix Aircraft Series 200 Magnetos, Form L-526. Scintilla Div., Bendix Aviation Corp.

Service Parts List, Bendix Aircraft Series 200 Magnetos, Form L-528. Scintilla Div., Bendix Aviation Corp.

Service Parts List, Bendix Aircraft Series 200 Magneto Vibrator, Form L-538. Scintilla Div., Bendix Aircraft Corp.

PROPELLER

Operation and Overhaul Instructions, Hartzell HC-93Z Series. Hartzell Propeller, Inc.

HEATER

Maintenance Instruction for S-100 Series Heater #23C36, 81C06, 24C54 and 98A73. Janitrol Aircraft Div., Midland-Ross Corp.

TABLE OF CONTENTS

SECTION		PAGE
I	INTRODUCTION	1-1
	Introduction to the Shop Manual	1-1
	List of Vendor Publications	1-3
	Table of Contents	1-5
	Topical Index	1-17
II	GENERAL INFORMATION	2-1
	Dimensions of Aircraft	2-2
	Stations Diagram	2-3
	Fuselage Access Openings	2-4
	Wing Access Openings	2-5
	Fuselage and Empennage Skin Plating	2-7
	Wing Skin Plating	2-9
	Consumable Materials Chart	2-10
	Table of Thread Lubricants	2-10
	Lubrication Diagram	2-11
	Special Tools	2-12
	Ground Handling	2-13
	Jacking	2-13
	Leveling Provisions	2-13
	Hoisting the Airplane	2-13
	Towing	2-13
	Parking Brake	2-14
	Control Lock	2-14
	Anchoring and Mooring Provisions	2-14
	Servicing Instructions	2-14
	Servicing Fuel System	2-14
	Servicing Points	2-15
	Servicing Oil System	2-16

TABLE OF CONTENTS (Continued)

SECTION		PAGE
II	GENERAL INFORMATION (Cont.)	
	Servicing the Anti-icer System	2-16A
	Servicing Brakes	2-16A
	Servicing Tires	2-17
	Servicing Tubeless Tires	2-17
	Servicing Landing Gear Shock Absorber	2-17
	Servicing the Landing Gear Shimmy Dampener	2-17
	Servicing Battery	2-18
	External Power Receptacle	2-18
	Draining Pitot and Static Lines	2-19
	Servicing the Vacuum System	2-19
	Servicing Light Weight De-icer System	2-19
	Servicing Oxygen System	2-20
	Cleaning the Engine Air Filter	2-20
	Cleaning De-icer Boots	2-20
	Cleaning Plastic Windows	2-21
	Propeller Unfeathering Accumulator Servicing	2-21
III	SYSTEM MAINTENANCE	3-1
	Rigging the Aileron Control System	3-2
	Rigging the Aileron Tab	3-2
	Aileron Tab Indicator Adjustment	3-2
	Aileron Control System	3-3
	Rigging the Rudder Control System	3-4
	Rigging the Rudder Tab	3-4
	Rudder Tab Indicator Adjustment	3-4
	Rudder Control System	3-5
	Rigging the Elevator Control System	3-6
	Rigging Elevator Tab	3-6
	Elevator Tab Indicator Adjustment	3-6
	Elevator Control System	3-7

TABLE OF CONTENTS (Continued)

SECTION		PAGE
III	SYSTEMS MAINTENANCE (Cont.)	
	Balancing Control Surfaces	3-8
	Balancing the Elevator	3-8
	Balancing the Rudder	3-10
	Balancing the Aileron	3-12
	Rigging Wing Flap Control System	3-14
	Flap System	3-15
	Landing Gear Manual Clutch Adjustment	3-16
	Landing Gear Overload Clutch Testing and Adjustment	3-16
	Rigging the Landing Gear	3-16
	Nose Steering Link Inspection	3-18
	Nose Wheel Steering Mechanism Adjustment	3-18
	Throttle Warning Horn Adjustment	3-18
	Landing Gear System	3-19
	Bleeding the Brake System	3-20
	Adjustment of the Brake Master Cylinder Linkage	3-20
	Adjustment of Parking Brake Control	3-20
	Brake Wear Limits	3-20
	Brake System	3-21
	Heating and Ventilating System	3-22
	Heater Control Box Adjustment	3-22A
	Disassembly, Cleaning and Reassembly of the Heater Fuel Nozzle	3-24
	Cleaning Heater Spark Plug	3-24
	Aft Mounted Cylinder Oxygen System	3-25
	Oxygen System Purging	3-26
	Forward Mounted Cylinder Oxygen System	3-27
	Adjusting Propeller Anti-icer Fluid Flow	3-28
	Idle Speed Adjustment	3-28
	Cabin Entrance Door Latch Adjustment	3-28
	Propeller and Windshield Anti-icer System	3-29
	Adjustment of Suction Relief Valve	3-30
	Vacuum and Pitot-Static Systems	3-31
	Engine Driven De-icer System Check and Adjustment	3-32
	Engine Driven De-icer System Frequency Sequence Check	3-32

TABLE OF CONTENTS (Continued)

SECTION		PAGE
III	SYSTEMS MAINTENANCE (Cont.)	
	Test and Adjustment of Components of Light Weight De-icer System	3-32
	Engine Driven De-icer System	3-33
	Light Weight De-Icer System	3-35
	De-icer Boot Maintenance	3-36
	Rigging of Fuel Selector Valves	3-36
	Fuel System Schematic	3-37
	Testing the Fuel Level Transmitter	3-38
	Adjusting the Fuel Level Transmitter	3-38
	Adjusting Fuel Quantity Gages	3-38
	Adjusting the Fuel Pressure (Engine Driven Fuel Pump)	3-38
	Oil Pressure Adjustment	3-38
	Adjusting the Ram Air Filter Door	3-38A
	Adjustment of Alternate Air Door	3-38A
	Propeller Checks	3-38A
	Oil System Schematic	3-39
	Propeller and Governor Adjustment	3-40
	Low RPM Settings	3-40
	High RPM Settings	3-40
	Feathering Adjustment	3-40
	Static RPM	3-40
	Exhaust Augmenter Inspection	3-40
	Magneto Adjustment and Timing	3-41
	Adjustment of Stall Warning Sensing Switch	3-42
	Generator Minor Repair and Parts Replacement	3-42
	Electrical System.	3-43
	Electrical Utilization Load Chart	3-44
	Generator Field Flashing	3-45
	Checking Reverse Current Relay	3-46
	Voltage Regulator Adjustment and Generator Paralleling	3-46
	Alternator - Rectifier	3-46A
	Lamp Replacement Guide	3-46C
	Jato Unit Removal	3-46C

TABLE OF CONTENTS (Continued)

SECTION		PAGE
III	SYSTEMS MAINTENANCE (Cont.)	
	Jato Unit Installation.	3-46C
	Jato System.	3-47
	Trouble Shooting	3-48
IV	MAJOR DISASSEMBLY	4-1
	Cabin Door Removal	4-2
	Installation of Cabin Door	4-2
	Windshield Removal	4-2
	Installation of Windshield	4-2
	Pilot and Copilot Seat Removal	4-2
	Installation of Pilot and Copilot Seat	4-2
	Forward Passenger Seat Removal	4-2
	Installation of Forward Passenger Seat	4-2
	Aft Passenger Seat Removal	4-2
	Installation of Aft Passenger Seat	4-2
	Optional Cabin Couch Removal	4-4
	Installation of Optional Cabin Couch.	4-4
	Wing Removal	4-4
	Wing Disassembly	4-4
	Reassembly of Wing	4-4
	Installation of Wing	4-4A
	Wing Installation	4-5
	Wing Adjustments	4-6
	Wing Tip Removal	4-6
	Installation of Wing Tip	4-6
	Elevator Removal	4-6
	Empennage Section	4-7
	Installation of Elevator	4-8
	Rudder Removal	4-8
	Installation of Rudder	4-8

TABLE OF CONTENTS (Continued)

SECTION		PAGE
IV	MAJOR DISASSEMBLY (Cont.)	
	Horizontal Stabilizer Removal	4-8
	Installation of Horizontal Stabilizer	4-8
	Vertical Stabilizer Removal	4-8
	Installation of Vertical Stabilizer	4-8
	Aileron Removal	4-8
	Installation of Aileron	4-9
	Flap Removal	4-9
	Installation of Flap	4-9
	Aileron Control Cable Removal (Control Column to Quadrant)	4-9
	Installation of Aileron Control Cable (Control Column to Quadrant)	4-9
	Aileron Control Cable Removal (Quadrant to Bell Crank)	4-9
	Installation Aileron Control Cable (Quadrant to Bell Crank)	4-10
	Aileron Control Cables (Control Column to Quadrant)	4-10
	Aileron Tab Control Cable Removal (Wheel Well to Tab Control)	4-10
	Installation Aileron Tab Control Cables (Wheel Well to Tab Control)	4-11
	Aileron Tab Control Cables (Wheel Well to Tab Control)	4-11
	Aileron Tab Control Cables (Wheel Well to Actuator)	4-12
	Aileron Tab Actuator and Cable Removal (Wheel Well to Actuator)	4-12
	Installation of Aileron Tab Actuator and Cable (Wheel Well to Actuator)	4-13
	Elevator Control Cables Removal	4-13

TABLE OF CONTENTS (Continued)

SECTION		PAGE
IV	MAJOR DISASSEMBLY (Cont.)	
	Installation of Elevator Control Cables	4-13
	Elevator Control Cables	4-13
	Elevator Tab Control Cables Removal (Control Wheel to Turnbuckles)	4-14
	Elevator Tab Control Cables (Control Wheel to Turnbuckles)	4-14
	Installation of Elevator Tab Control Cables (Control Wheel to Turnbuckles)	4-15
	Elevator Tab Control Cable Removal (Turnbuckles to Tab Actuator)	4-15
	Installation of Elevator Tab Control Cables (Turnbuckles to Tab Actuator)	4-15
	Rudder Control Cable Removal	4-15
	Rudder Control Cables	4-15
	Installation of Rudder Control Cables	4-16
	Rudder Pedal and Bell Crank Removal	4-16
	Installation of Rudder Pedals and Bell Crank	4-16
	Rudder Tab Control Cable Removal (Control Wheel to Turnbuckles)	4-16
	Installation of Rudder Tab Control Cables (Control Wheel to Turnbuckles)	4-16
	Rudder Tab Control Cables (Control Wheel to Turnbuckles)	4-17
	Rudder Tab Control Cable Removal (Turnbuckles to Actuator) - Model 65	4-17
	Installation of Rudder Tab Control Cables (Turnbuckles to Actuator) - Model 65	4-17
	Rudder Tab Control Cable Removal (Turnbuckles to Actuator) - Model 80	4-17
	Installation of Rudder Tab Control Cables (Turnbuckles to Actuator) - Model 80	4-18
	Flap Actuator System Removal	4-18

TABLE OF CONTENTS (Continued)

SECTION		PAGE
IV	MAJOR DISASSEMBLY (Cont.)	
	Installation of Flap Actuator System	4-18
	Wheel, Tire and Tube Removal	4-18
	Installation of Wheel, Tire, and Tube	4-18
	Tubeless Tires	4-18
	Tubeless Tire Removal	4-18A
	Installation of Tubeless Tires	4-18A
	Wheel Brake Assembly Removal	4-18A
	Installation of Wheel Brake Assembly	4-18A
	Brake Master Cylinder Removal	4-18A
	Installation of Brake Master Cylinder	4-18A
	Main Shock Strut Removal	4-19
	Installation of Main Shock Strut	4-19
	Nose Shock Strut Removal	4-19
	Installation of Nose Shock Strut	4-19
	Landing Gear Motor Removal	4-19
	Installation of Landing Gear Motor	4-19
	Landing Gear Retract Box and Motor Removal	4-19
	Landing Gear Retract Box and Motor	4-20
	Installation of Landing Gear Retract Box and Motor	4-21
	Main Gear Jackscrew Actuator Removal	4-21
	Installation of Main Gear Jackscrew Actuator	4-21
	Nose Gear Jackscrew Actuator Removal	4-21
	Installation of Nose Gear Jackscrew Actuator	4-21
	Nose Gear Retract Chain Removal-Landing Gear Motor to Forward Compartment	4-21
	Short Chain Removal	4-22
	Installation of Nose Gear Retract Chain (Both Chains)	4-22
	Nose Steering Mechanism Removal	4-22

TABLE OF CONTENTS (Continued)

SECTION		PAGE
IV	MAJOR DISASSEMBLY (Cont.)	
	Installation and Adjustment of Nose Steering Mechanism	4-22
	Cabin Air Blower Removal	4-22
	Installation of Cabin Air Blower	4-22
	Cabin Heater Removal	4-23
	Installation of Cabin Heater	4-23
	Cabin Heater Removal and Installation	4-23
	Heater Vibrator Removal	4-24
	Installation of Heater Vibrator	4-24
	Oxygen Cylinder Removal	4-24
	Installation of Oxygen Cylinder	4-24
	Propeller Unfeathering Accumulator Removal - Model 65	4-24
	Installation of Propeller Unfeathering Accumulator - Model 65	4-24
	Propeller Unfeathering Accumulator Removal - Model 80	4-24

TABLE OF CONTENTS (Continued)

SECTION		PAGE
IV	MAJOR DISASSEMBLY (Cont.)	
	Power Plant Installation	4-25
	Installation of Propeller Unfeathering Accumulator - Model 80	4-26
	Cowling Removal	4-26
	Installation of Cowling	4-26
	Engine Removal	4-26
	Installation of Engine	4-26A
	Vacuum Pump Removal	4-26A
	Installation of Vacuum Pump	4-26A
	Battery Removal	4-26A
	Installation of Battery	4-27
	Starter Removal	4-27
	Installation of Starter	4-27
	Generator Removal	4-27
	Installation of Generator	4-27
	Injection Pump Removal	4-27
	Installation of Injection Pump	4-27
	Exhaust Stack Removal	4-27
	Installation of Exhaust Stacks	4-28
	Exhaust Augmenter Removal	4-28
	Installation of Exhaust Augmenter	4-28
	Submerged Fuel Booster Pump Removal	4-28
	Installation of Submerged Fuel Booster Pump	4-28
	Engine Driven Fuel Pump Removal	4-28
	Installation of Engine Driven Fuel Pump	4-28
	Fuel Level Transmitter Removal	4-28
	Installation of Fuel Level Transmitter	4-28
	Fuel Selector Valve Removal	4-28

TABLE OF CONTENTS (Continued)

SECTION		PAGE
IV	MAJOR DISASSEMBLY (Cont.)	
	Installation of Fuel Selector Valve	4-29
	Main Fuel Cell Removal	4-29
	Installation of Main Fuel Cell	4-29
	Leading Edge Auxiliary Fuel Cell Removal	4-29
	Installation of Leading Edge Auxiliary Fuel Cell	4-30
	Inboard Auxiliary Fuel Cell Removal	4-30
	Installation of Inboard Auxiliary Fuel Cell	4-30
	Outboard Auxiliary Fuel Cell Removal	4-30
	Installation of Outboard Auxiliary Fuel Cell	4-31
	Instrument Removal	4-31
	Installation of Instrument	4-31
	Propeller Removal	4-32
	Installation of Propeller	4-32
	Propeller Removal and Installation (Sheet 1 of 2)	4-32
	Propeller Removal and Installation (Sheet 2 of 2)	4-33
V	MAJOR MAINTENANCE AND OVERHAUL	5-1
	Main Landing Gear Drag Brace Assembly Overhaul	5-3
	Disassembly	5-3
	Cleaning and Replacement	5-3
	Wear Tolerances	5-3
	Reassembly	5-3
	Main Landing Gear Assembly Overhaul	5-3
	Disassembly	5-3
	Cleaning and Replacement	5-4
	Wear Tolerances	5-5
	Reassembly	5-5

TABLE OF CONTENTS (Continued)

SECTION		PAGE
V	MAJOR MAINTENANCE AND OVERHAUL (Cont.)	
	Nose Landing Gear Drag Brace Assembly Overhaul	5-6
	Disassembly	5-6
	Cleaning and Replacement	5-6
	Reassembly	5-6
	Nose Landing Gear Assembly Overhaul	5-6
	Disassembly	5-6
	Cleaning and Replacement	5-8
	Wear Tolerances	5-8
	Reassembly	5-9
	Nose and Main Landing Gear Actuator Overhaul	5-11
	Disassembly	5-11
	Cleaning and Repairs	5-11
	Reassembly	5-11
	Landing Gear Retract Box Assembly Overhaul	5-11
	Disassembly	5-11
	Cleaning, Repair, and Reassembly	5-13
	Shimmy Dampener Overhaul	5-14
	Disassembly	5-14
	Cleaning, Repair, and Parts Replacement	5-14
	Reassembly	5-14
	Brake Master Cylinder Overhaul	5-14
	Disassembly	5-14
	Cleaning, Repair, and Reassembly	5-15
	Elevator Tab Actuator Assembly Overhaul	5-15
	Disassembly	5-15
	Cleaning, Repair, and Reassembly	5-15
	Wear Tolerances	5-16

TABLE OF CONTENTS (Continued)

SECTION		PAGE
V	MAJOR MAINTENANCE AND OVERHAUL (Cont.)	
	Flap Actuator Overhaul	5-17
	Disassembly	5-17
	Cleaning and Repair	5-17
	Reassembly	5-17
	Flap Motor Gear Box Overhaul	5-18
	Disassembly	5-18
	Cleaning, Repair, and Reassembly	5-18
	Wear Tolerances	5-18
	Aileron Trim Tab Actuator Overhaul	5-20
	Disassembly	5-20
	Cleaning, Repair, and Reassembly	5-21
	Wear Tolerances	5-21
	Minor Repair of Fuel Cells	5-21
	De-icer Boot Repair (Temporary)	5-21
VI	ELECTRICAL WIRING DIAGRAMS	6-1
VII	PERIODIC INSPECTION SCHEDULE	7-1
	100-hour Inspection	7-2
	1000-hour Inspection	7-4
VIII	REPLACEMENT SCHEDULE	8-1

TOPICAL INDEX

PAGE

A

Access Openings
Fuselage . . . . . Illus. 2-4
Wing . . . . . Illus. 2-5
Actuator & Cable Installation
Aileron Trim Tab. 4-13
Elevator Trim Tab 4-15
Rudder Trim Tab - Model 65 4-17
Rudder Trim Tab - Model 80 4-18
Actuator & Cable Removal
Aileron Trim Tab. 4-12
Elevator Trim Tab 4-15
Rudder Trim Tab - Model 65 4-17
Rudder Trim Tab - Model 80 4-17
Actuator
Aileron Overhaul 5-20
Elevator Overhaul . . . . 5-15, Illus. 5-16
Flap Installation 4-17
Flap Overhaul . . . . . 5-17, Illus. 5-18
Flap Removal 4-17
Main Gear Jackscrew Installation . . . 4-21
Main Gear Jackscrew Removal 4-21
Nose Gear Jackscrew Installation . . . 4-21
Nose Gear Jackscrew Removal 4-21
Rudder Overhaul . . . . Illus. 4-16A, 4-16B
Aft Mounted Cylinder Oxygen System . Illus. 3-25
Aft Passenger Seat
Installation 4-2
Removal 4-2
Aileron
Balancing . . . . . 3-12, Illus. 3-12
Control Cables . . . . . Illus. 4-10
Installation (Control Column to Quadrant 4-9
Installation (Quadrant to Bell Crank) . 4-10
Removal (Control Column to Quadrant 4-9
Removal (Quadrant to Bell Crank) . . 4-9
Control System . . . . . Illus. 3-3
Rigging 3-1
Installation of 4-9
Removal 4-8
Tab Control Cables . . . . . Illus. 4-10, 4-12
Installation (Wheel Well to Actuator) . 4-13
Installation (Wheel Well to Tab Control) 4-11
Removal (Wheel Well to Actuator) . . 4-12
Removal (Wheel Well to Control). . . 4-10
Tab Indicator Adjustment 3-2
Tab, Rigging 3-2
Trim Tab Actuator Overhaul 5-20

PAGE

A

Air Blower, Cabin
Installation 4-22
Removal 4-22
Aircraft, Dimensions of . . . . . Illus. 2-2
Alternate Air Door, Adjustment 3-38A
Alternator - Rectifier
Description 3-46A
Removal 4-27
Servicing 3-46A
Specifications 3-46A
Anchoring and Mooring Provisions 2-14
Anti-icer System . . . . . Illus. 3-29
Fluid Flow Adjusting 3-28
Servicing 2-16A
Augmenter, Exhaust
Inspection 3-40
Installation 4-28
Removal 4-28
Auxiliary Fuel Cell
Installation of Inboard 4-30
Installation of Leading Edge 4-30
Installation of Outboard 4-31
Removal, Inboard 4-30
Removal, Leading Edge 4-29
Removal, Outboard 4-30

B

Balancing Control Surfaces 3-8
Aileron . . . . . 3-12, Illus. 3-13
Elevator . . . . . 3-8, Illus. 3-9
Rudder . . . . . 3-10, Illus. 3-11
Battery
Installation 4-27
Removal 4-26A
Servicing 2-18
Bell Crank and Rudder Pedals
Installation 4-16
Removal 4-16
Bleeding the Brake System 3-20
Blower, Cabin Air
Installation 4-22
Removal 4-22
Brake System . . . . . Illus. 3-21
Bleeding 3-20
Brake Wear Limits 3-20
Master Cylinder
Installation 4-18

TOPICAL INDEX (Continued)

PAGE

B

Brake System (Cont)
Master Cylinder (Cont)
Linkage Adjustment 3-20
Overhaul 5-14
Removal 4-18
Parking 2-14
Servicing 2-16A
Wheel Brake Assembly
Installation 4-18A
Removal 4-18A
Booster Pump, Submerged Fuel
Installation 4-28
Removal 4-28

C

Cabin Door
Installation 4-2
Latch Adjustment 3-28
Removal 4-2
Cabin Air Blower
Installation 4-22
Removal 4-22
Cabin Heater
Installation . . . . . Illus. 4-23
Removal . . . . . Illus. 4-23
Cell, Fuel
Inboard Auxiliary Installation 4-30
Inboard Auxiliary Removal 4-30
Leading Edge Auxiliary Installation . . . 4-30
Leading Edge Auxiliary Removal 4-29
Main Installation 4-29
Main Removal 4-29
Outboard Auxiliary Installation 4-31
Outboard Auxiliary Removal 4-30
Chain, Nose Gear Retract
Installation 4-22
Removal, Gear Motor to Forward Compartment 4-21
Removal, Short Chain 4-22
Cleaning
De-icer Boots 2-20
Engine Air Filter 2-20
Heater Spark Plug 3-24
Plastic Windows 2-21
Clutch Adjustment, Landing Gear Manual . . 3-16
Clutch Testing and Adjustment, Landing Gear Overload 3-16
Consumable Materials Chart 2-10
Control Lock 2-14

PAGE

C

Control Surfaces, Balancing 3-8
Control System
Aileron . . . . . 3-2, Illus. 3-3
Elevator . . . . . 3-6, Illus. 3-7
Rudder . . . . . 3-4, Illus. 3-5
Couch, Optional Cabin
Installation 4-4
Removal 4-4
Cowling
Installation 4-24
Removal 4-24

D

De-icer System
Boots, Cleaning 2-20
Boot Maintenance 3-36
Boot Repair (Temporary) 5-21
Check and Adjustment, Engine Driven . . 3-32
Engine Driven . . . . . Illus. 3-33
Frequency Sequence Check, Engine Driven 3-32
Light Weight . . . . . Illus. 3-35
Servicing Light Weight 2-19
Door, Cabin
Installation 4-2
Latch Adjustment 3-28
Removal 4-2
Diagram
Lubrication . . . . . Illus. 2-11
Stations . . . . . Illus. 2-3
Dimensions of Aircraft . . . . . Illus. 2-2
Disassembly, Cleaning and Reassembly of the Heater Fuel Nozzle 3-24
Draining Pitot and Static Lines 2-19

E

Electrical System . . . . . Illus. 3-43
Electrical Utilization Load Chart 3-44
Elevator
Balancing . . . . . 3-8, Illus. 3-9
Control Cables
Installation . . . . . Illus. 4-13
Removal . . . . . Illus. 4-13
Control System . . . . . Illus. 3-7
Rigging 3-6
Installation 4-8
Removal 4-6

TOPICAL INDEX (Continued)

PAGE

F

Flap System (Cont)
Control System, Rigging 3-14
Installation 4-9
Motor Gear Box Overhaul 5-18
Removal 4-9
Fuel Booster Pump, Installation of Submerged 4-28
Fuel Booster Pump Removal, Submerged . . 4-28
Fuel Cell
Installation of Inboard Auxiliary 4-30
Installation of Leading Edge Auxiliary . . . 4-30
Installation of Main 4-29
Installation of Outboard Auxiliary 4-31
Removal, Inboard Auxiliary 4-30
Removal, Leading Edge Auxiliary 4-29
Removal, Main 4-29
Removal, Outboard Auxiliary 4-30
Repair 5-21
Fuel Level Transmitter
Adjusting 3-38
Installation 4-28
Removal 4-28
Testing 3-38
Fuel Pressure, Adjusting (Engine Driven Fuel Pump 3-38
Fuel Pump, Installation of Engine Driven . . 4-28
Fuel Pump Removal, Engine Driven 4-28
Fuel Quantity Gages, Adjusting 3-38
Fuel Selector Valve
Installation 4-29
Removal 4-28
Rigging 3-36
Fuel System Schematic . . . . . Illus. 36A, 3-37
Fuel System, Servicing 2-14
Forward Mounted Cylinder Oxygen System . . . . . Illus. 3-27
Forward Passenger Seat
Installation 4-2
Removal 4-2
Fuselage Access Openings . . . . . Illus. 2-4
Fuselage and Empennage Skin Plating . . Illus. 2-7

G

Gages, Adjusting Fuel Quantity 3-38
Generator
Field Flashing 3-45
Installation 4-27
Minor Repair and Parts Replacement . . . 3-42
Paralleling and Voltage Regulator Adjustment 3-46
Removal 4-27
Governor and Propeller Adjustment 3-40
Ground Handling 2-13

H

Heater, Cabin
Control Box Adjustment 3-22A
Fuel Nozzle, Disassembly, Cleaning and Reassembly 3-24
Installation . . . . . Illus. 4-23
Removal . . . . . Illus. 4-23
Spark Plug, Cleaning 3-24
Vibrator, Installation 4-24
Vibrator Removal 4-24
Heating and Ventilating System . . 3-22, Illus. 3-23
High RPM Sitting 3-40
Hoisting the Airplane 2-13
Horizontal Stabilizer Removal 4-8

I

Idle Speed Adjustment 3-28
Inboard Auxiliary Fuel Cell
Installation 4-30
Removal 4-30
Indicator Adjustment
Aileron Tab 3-2
Elevator Tab 3-6
Rudder Tab 3-4
Injection Pump, Model 65
Installation 4-27
Removal 4-27
Inspection
100-Hour 7-2
1000-Hour 7-4
Instrument
Installation 4-31
Removal 4-31

J

Jacking 2-13
Jackscrew Actuator
Installation of Main Gear 4-21
Installation of Nose Gear 4-21
Removal, Main Gear 4-21
Removal, Nose Gear 4-21
Jato Unit . . . . . Illus. 3-47
Installation 3-46C
Removal 3-46C

L

Lamp Replacement Guide 3-46C
Landing Gear System . . . . . Illus. 3-19
Manual Clutch Adjustment 3-16
Motor, Installation 4-19
Motor Removal 4-19
Overload Clutch Testing and Adjustment . . 3-16
Retract Box Assembly Overhaul 5-11

TOPICAL INDEX (Continued)

PAGE

L

Landing Gear System (Cont)
Retract Box and Motor Installation . . . . . 4-21, Illus. 4-20
Retract Box and Motor Removal . . . . . 4-19, Illus. 4-20
Rigging 3-16
Shimmy Dampener Servicing 2-17
Shock Absorber Servicing 2-17
Leading Edge Auxiliary Fuel Cell
Installation 4-30
Removal 4-29
Leveling Provisions 2-13
Light Weight De-icer System . . . . . Illus. 3-35
Test and Adjustment of Components. . . 3-32
Link Inspection, Nose Steering 3-18
Lock, Control 2-14
Low RPM Settings 3-40
Lubricants, Table of Thread 2-10
Lubrication Diagram. . . . . Illus. 2-11

M

Magneto Adjustment and Timing 3-41
Main Fuel Cell
Installation 4-29
Removal 4-29
Main Gear Jackscrew Actuator
Installation 4-21
Removal 4-21
Main Landing Gear
Assembly Overhaul 5-3
Drag Brace Assembly Overhaul 5-3
Main Shock Strut
Installation 4-19
Removal 4-19
Master Cylinder, Brake
Installation 4-18
Removal 4-18
Materials Chart, Consumable. 2-10
Mechanism Adjustment, Nose Wheel Steering 3-18
Mooring and Anchoring Provisions 2-14
Motor Removal
Landing Gear 4-19
Landing Gear Retract Box and 4-19
Motor, Installation
Landing Gear 4-19
Landing Gear Retract Box and 4-21

N

Nose Gear Jackscrew Actuator
Installation 4-21

PAGE

N

Nose Gear Jackscrew Actuator (Cont)
Removal 4-21
Nose Gear Retract Chain
Installation 4-22
Removal
(Gear Motor to Forward Compartment) 4-21
(Short Chain) 4-22
Nose Landing Gear
Assembly Overhaul 5-6
Drag Brace Assembly Overhaul 5-6
Actuator Overhaul 5-11
Nose Shock Strut
Installation 4-19
Removal 4-19
Nose Steering Link Inspection 3-18
Nose Steering Mechanism
Adjustment 3-18
Installation and Adjustment 4-22
Removal 4-22

O

Oil System
Pressure Adjustment 3-38
Schematic . . . . . Illus. 3-39
Servicing 2-16
Outboard Auxiliary Fuel Cell
Installation 4-31
Removal 4-30
Overhaul
Aileron Trim Tab Actuator. 5-20
Brake Master Cylinder 5-14
Elevator Tab Actuator 5-15
Flap Actuator 5-17
Flap Motor Gear Box 5-18
Landing Gear Retract Box Assembly . . 5-11
Main Landing Gear Assembly 5-3
Main Landing Gear Drag Brace Assembly. 5-3
Nose Landing Gear Assembly 5-6
Nose Landing Gear Drag Brace Assembly. 5-6
Nose and Main Landing Gear Actuator . . 5-11
Rudder Tab Actuator Assembly 5-16A
Shimmy Dampener 5-13
Oxygen Cylinder
Installation 4-24
Removal 4-24
Oxygen System
Aft Mounted Cylinder. . . . . Illus. 3-25
Forward Mounted Cylinder. . . . Illus. 3-27
Purging 3-26
Servicing 2-20

TOPICAL INDEX (Continued)

PAGE

P

Parking Brake 2-14
Control, Adjustment 3-20
Pilot and Copilot Seat
Installation of 4-2
Removal 4-2
Pitot-Static
And Vacuum Systems . . . . . Illus. 3-31
Lines, Draining 2-19
Power
Plant Installation . . . . . Illus. 4-24A, 4-25
Receptacle, External 2-18
Propeller
Checks 3-38A
Anti-icer System . . . . . Illus. 3-29
Governor Adjustment 3-40
Installation 4-32
Removal 4-32
Removal and Installation . . . Illus. 4-32, 4-33
Unfeathering Accumulator
Installation, Model 65 4-24
Installation, Model 80 4-26
Removal, Model 65 4-24
Removal, Model 80 4-24
Servicing 2-21
Pressures, Leveling 2-13
Pump
Installation of Engine Driven Fuel . . . 4-28
Installation of Injection, Model 65 . . . 4-27
Installation of Submerged Fuel Booster . 4-28
Installation of Vacuum 4-26
Removal, Engine Driven Fuel 4-28
Removal, Injection 4-27
Removal, Submerged Fuel Booster . . . 4-28
Removal, Vacuum 4-26

R

Ram Air Filter Door Adjusting 3-38A
Relay, Checking Reverse Current 3-46
Repair
Doubler Bolt (Temporary) 5-21
Fuel Cells 5-21
Replacement Guide, Lamp 3-46C
Retract Box and Motor
Installation . . . . . 4-21, Illus. 4-20
Removal . . . . . 4-19, Illus. 4-20
Retract Chain
Installation of Nose Gear 4-22
Removal, Nose Gear
Gear Motor to Forward Compartment). 4-21
Short Chain 4-22
Reverse Current Relay, Checking 3-46

PAGE

R

Rigging
Aileron Control System . . . . 3-2, Illus. 3-3
Aileron Tab 3-2
Elevator Control System . . . 3-6, Illus. 3-7
Elevator Tab 3-6
Fuel Selector Valves. 3-36
Landing Gear 3-16
Rudder Control System . . . . 3-4, Illus. 3-5
Rudder Tab 3-4
Wing Flap Control System 3-14
RPM
Setting, High 3-40
Setting, Low 3-40
Static 3-40
Rudder
Balancing . . . . . 3-10, Illus. 3-11
Control Cables
Installation . . . . . 4-16, Illus. 4-15
Removal . . . . . Illus. 4-15
Control System . . . . . Illus. 3-5
Control System, Rigging 3-4
Installation 4-8
Pedals and Bell Crank Installation . . . 4-16
Pedal and Bell Crank Removal 4-16
Removal 4-8
Tab Actuator Overhaul 5-16A
Tab Control Cables
Installation (Control Wheel to Turnbuckles) . . . . 4-16, Illus. 4-17
Installation (Turnbuckles to Actuator) 4-17
Removal (Control Wheel to Turnbuckles) . . . . 4-16, Illus. 4-17
Removal (Turnbuckles to Actuator) 4-17
Tab Indicator Adjustment 3-4
Tab, Rigging 3-4

S

Seat
Installation of Aft Passenger 4-2
Installation of Forward Passenger . . . 4-2
Installation of Pilot and Copilot 4-2
Removal, Aft Passenger 4-2
Removal, Forward Passenger. 4-2
Removal, Pilot and Copilot. 4-2
Selector Valve
Installation of Fuel 4-29
Removal, Fuel 4-28
Servicing
Anti-icer System 2-16A

TOPICAL INDEX (Continued)

PAGE

S

Servicing
Battery 2-18
Brakes 2-16A
Fuel System 2-14
Landing Gear Shimmy Dampener. . . . 2-17
Landing Gear Shock Absorber. 2-17
Light Weight De-icer System 2-19
Points . . . . . Illus. 2-15
Propeller Unfeathering Accumulator . . 2-21
Oil System 2-16
Oxygen System 2-19
Tires 2-17
Tubeless Tires 2-17
Vacuum System 2-19
Shimmy Dampener
Servicing Landing Gear 2-17
Overhaul 5-13
Shock Absorber, Servicing Landing Gear . . 2-17
Shock Strut
Installation of Main 4-19
Installation of Nose 4-19
Removal Main 4-19
Removal Nose 4-19
Skin Plating
Fuselage and Empennage . . . . . Illus. 2-7
Wing . . . . . Illus. 2-9
Special Tools . . . . . Illus. 2-12
Stall Warning
Installation 4-28
Removal 4-27
Stall Warning Sensing Switch, Adjustment . 3-42
Starter
Installation 4-27
Removal 4-27
Static RPM 3-40
Stations Diagram . . . . . Illus. 2-3
Steering Mechanism
Installation and Adjustment of Nose. . . 4-22
Removal Nose 4-22
Strut
Installation of Main Shock 4-19
Installation of Nose Shock 4-19
Removal Main Shock. 4-19
Removal Nose Shock. 4-19
Submerged Fuel Booster Pump
Installation 4-28
Removal 4-28
Suction Relief Valve, Adjustment 3-30
Surfaces, Balancing Control 3-8
Switch, Adjustment of Stall Warning Sensing. 3-42

PAGE

S

System
Aft Mounted Cylinder Oxygen . . . Illus. 3-25
Aileron Control . . . . . Illus. 3-3
Brake. . . . . Illus. 3-21
Check and Adjustment Engine
Driven De-icer 3-32
Electrical . . . . . Illus. 3-43
Elevator Control . . . . . Illus. 3-7
Engine Driven De-icer . . . . . Illus. 3-33
Flap . . . . . Illus. 3-15
Forward Mounted Cylinder Oxygen . Illus. 3-27
Frequency Sequence Check, Engine
Driven De-icer 3-32
Heating and Ventilating . . . 3-22, Illus. 3-23
Landing Gear . . . . . Illus. 3-19
Light Weight De-icer . . . . . Illus. 3-35
Propeller Anti-icer . . . . . Illus. 3-29
Purging Oxygen 3-26
Rigging the Aileron Control 3-1
Rigging the Elevator Control 3-6
Rigging the Rudder Control 3-4
Rudder Control . . . . . Illus. 3-5
Schematic Fuel . . . . . Illus. 3-36A, 3-37
Schematic Oil . . . . . Illus. 3-39
Servicing Anti-icer 2-16A
Servicing Fuel. 2-14
Servicing Light Weight De-icer 2-19
Servicing Oil 2-16
Servicing Oxygen 2-19
Servicing Vacuum. 2-19
Test and Adjustment of Components of
Light Weight De-icer 3-32
Vacuum and Pitot-Static . . . . Illus. 3-31

T

Thread Lubricants, Table of 2-10
Tip
Installation of Wing 4-6
Removal, Wing 4-6
Tire
Installation of Wheel 4-18
Installation of Tubeless 4-18
Removal of Tubeless 4-18
and Tube Removal, Wheel 4-18
Tires
Servicing 2-17
Servicing Tubeless 2-17
Tools, Special . . . . . Illus. 2-12

TOPICAL INDEX (Continued)

PAGE

T

Towing 2-13
Transmitter
  Adjusting the Fuel Level 3-38
  Installation of Fuel Level 4-28
  Removal, Fuel Level 4-28
  Testing the Fuel Level 3-38
Trouble Shooting 3-48
Tube
  Installation of Wheel, Tire, and 4-18
  Removal of Wheel, Tire, and 4-18
Tubeless Tires 4-18
  Installation of 4-18
  Removal of 4-18

U

Unfeathering Accumulator
  Installation, Model 65 4-24
  Installation, Model 60 4-26
  Removal, Model 65 4-24
  Removal, Model 60 4-24
  Servicing 2-21

V

Vacuum
  Pitot-Static Systems . . . . . Illus. 3-31
  Pump Installation 4-26
  Pump Removal 4-26
  System Servicing 2-19
Valve
  Adjustment of Suction Relief 3-30
  Removal, Fuel Selector 4-28

PAGE

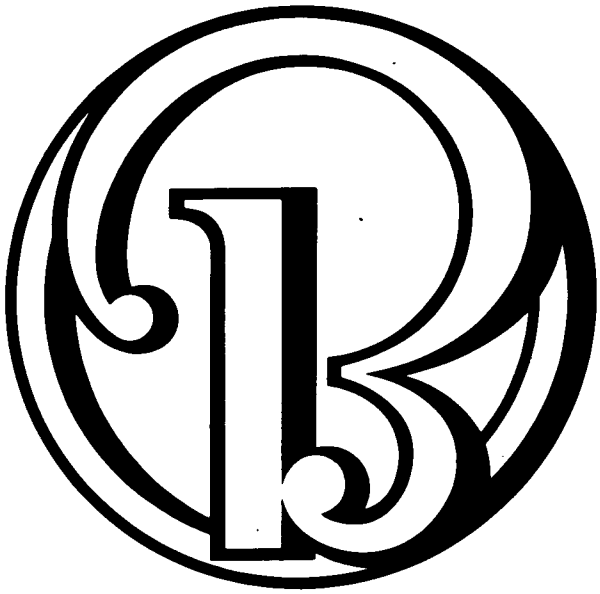
V

Valve (Cont.)
  Installation of Fuel Selector 4-29
Ventilating and Heating System . 3-22, Illus. 3-23
Vertical Stabilizer
  Installation 4-8
  Removal 4-8
Vibrator, Heater
  Installation 4-24
  Removal 4-24
Voltage Regulator Adjustment
(Alternator - Rectifier) 3-46A
Voltage Regulator Adjustment and
Generator Paralleling 3-46

W

Wheel
  Brake Assembly Installation 4-18A
  Brake Assembly Removal 4-18A
  Tire, and Tube
  Installation 4-18
  Tire, and Tube Removal 4-18
Windows, Cleaning Plastic. 2-21
Windshield
  Installation of 4-2
  Removal 4-2
Wing
  Access Openings . . . . . Illus. 2-5
  Adjustments 4-6
  Disassembly . . . . . Illus. 4-3, 4-4
  Installation of . . . . . Illus. 4-5, 4-4A
  Reassembly of 4-4
  Removal 4-4
  Skin Plating . . . . . Illus. 2-9
  Tip, Installation of 4-6
  Tip, Removal 4-6

2



SECTION II

General Information

SECTION II

GENERAL INFORMATION

Some of the most important information about the Queen Air... lubrication, cleaning, shop handling... will be found in this section. Particular attention should be paid to these items, since they are among the items which the customer sees and consequently can influence directly his decision to come back again, or to go elsewhere.

The section includes a three-view drawing giving the major dimensions of the Queen Air, and an access opening illustration. A skin plating diagram gives the material, gage and temper of each wing, empennage and fuselage skin, as a guide for making minor skin repairs.

A full-page illustration shows the special tools, with their part numbers, which will make maintenance of the Queen Air more easily accomplished.

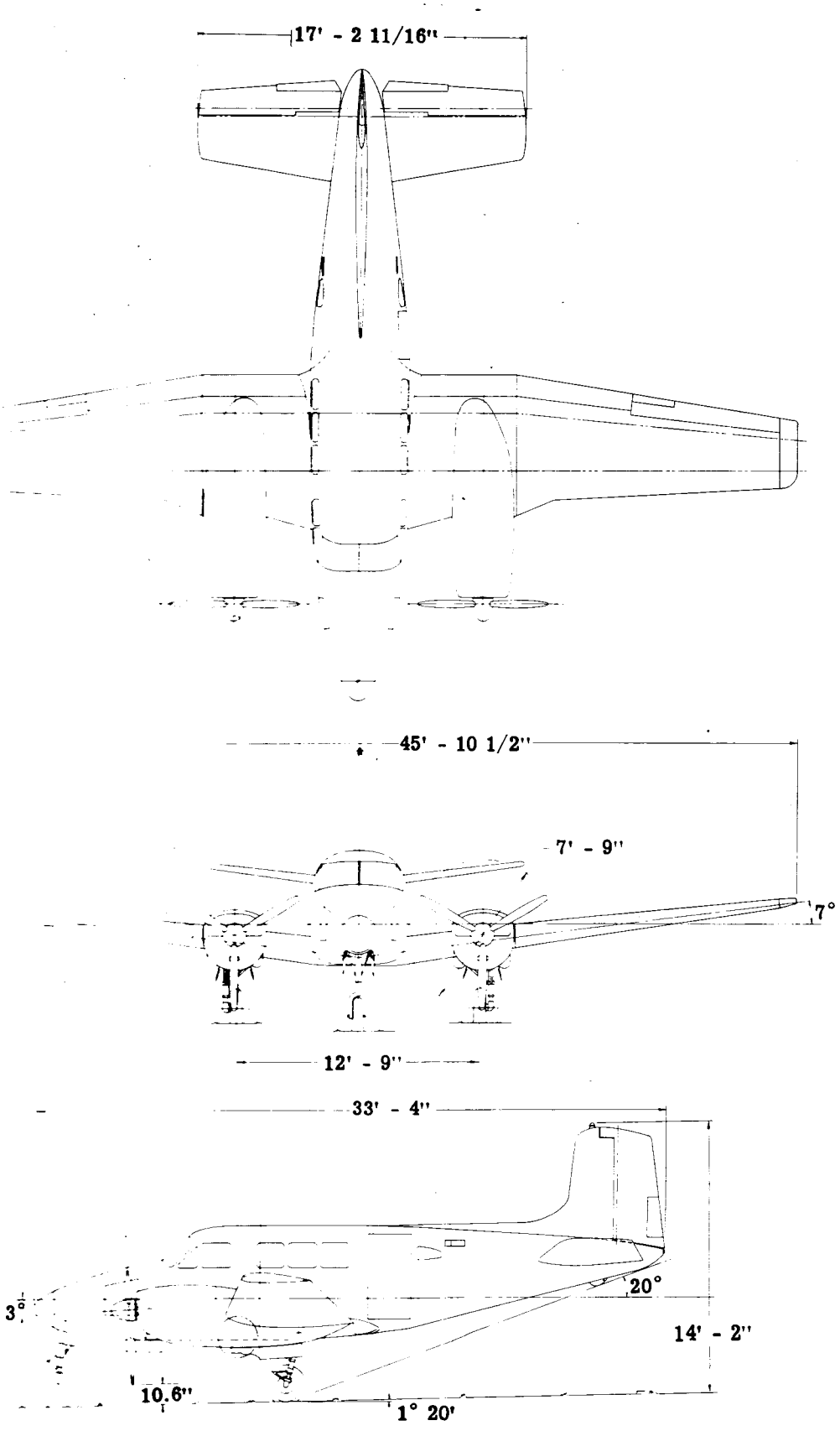


Figure 2-1. Dimensions of Aircraft - Model 65

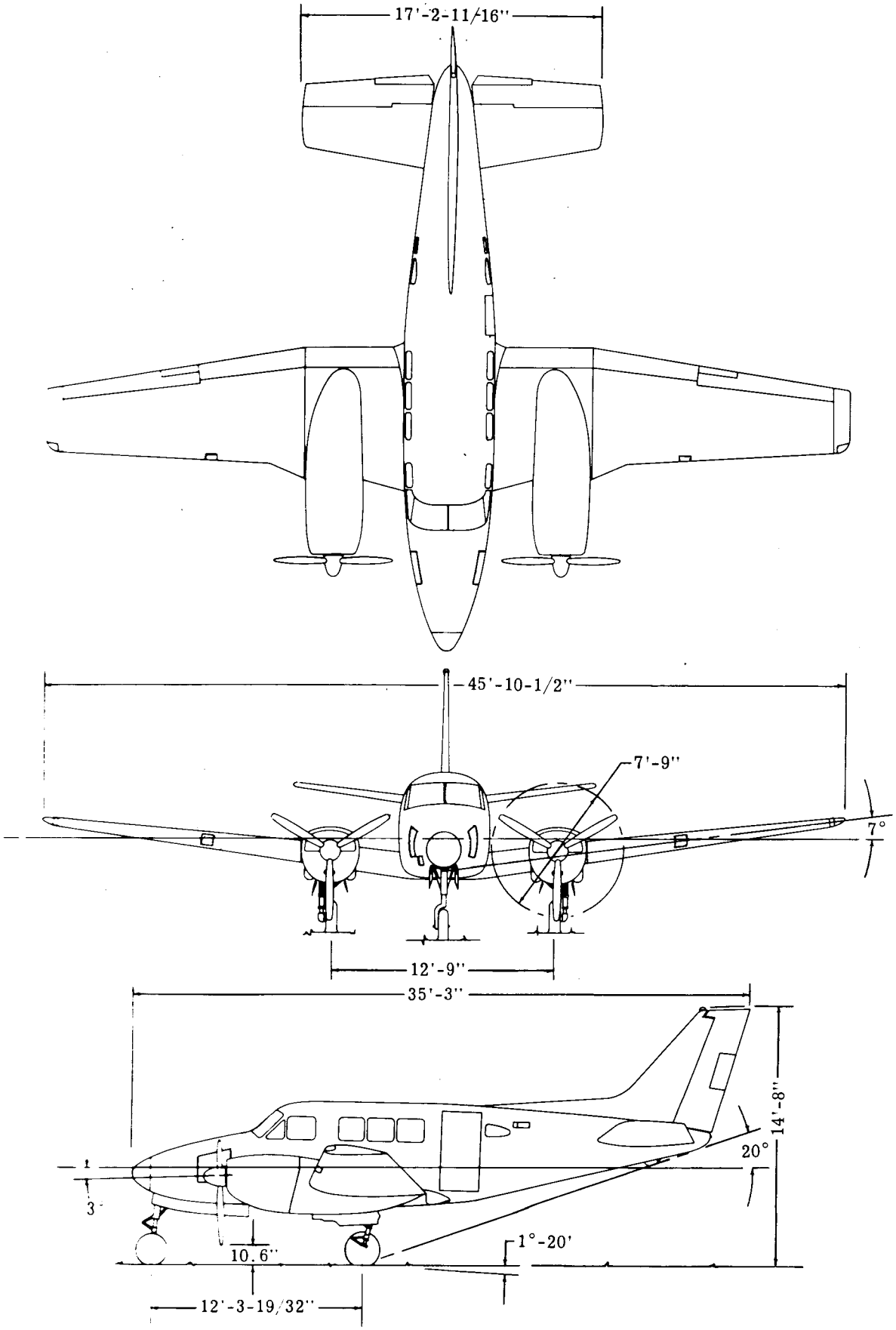


Figure 2-1A. Dimensions of Aircraft - Model 80

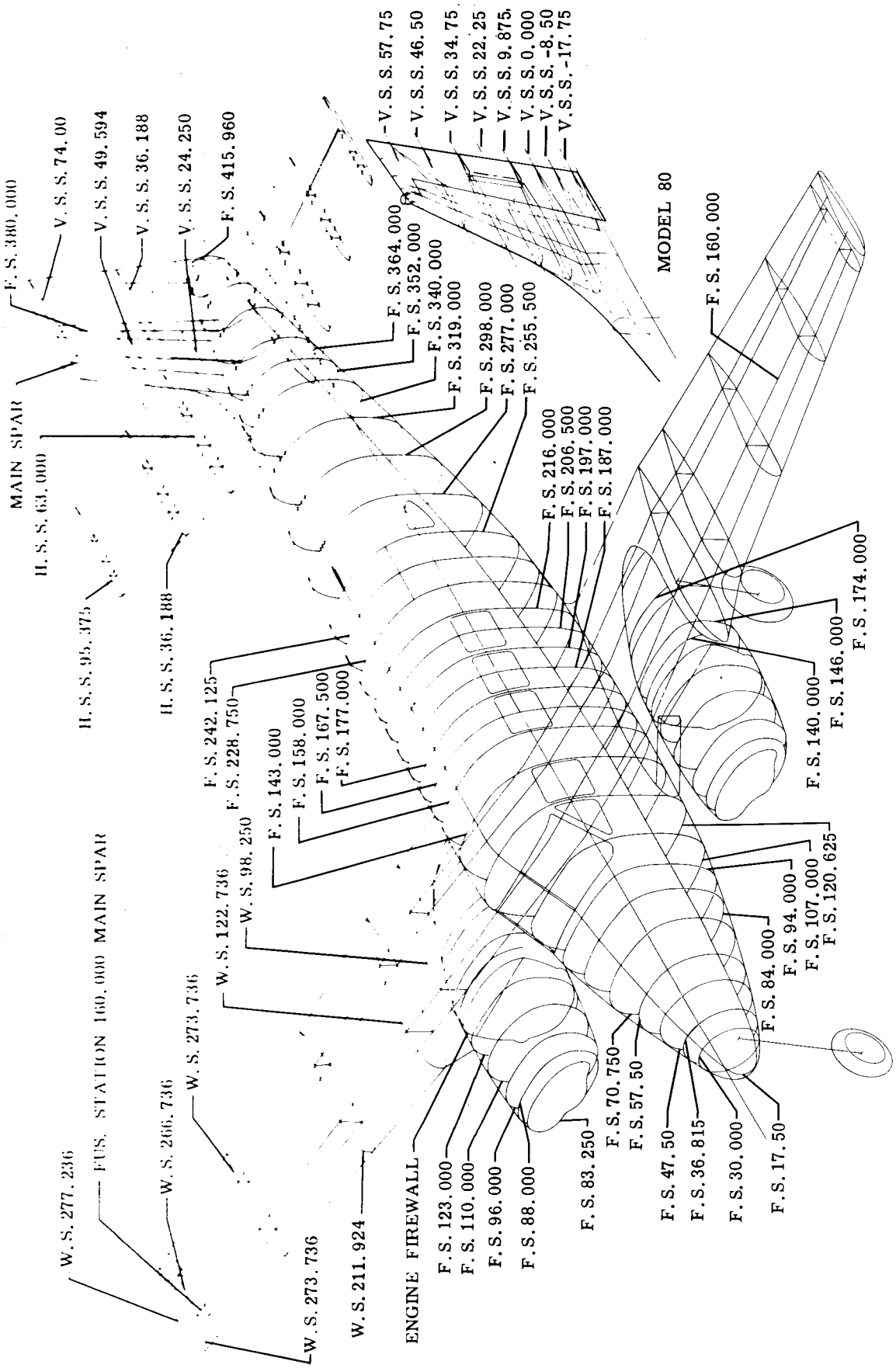
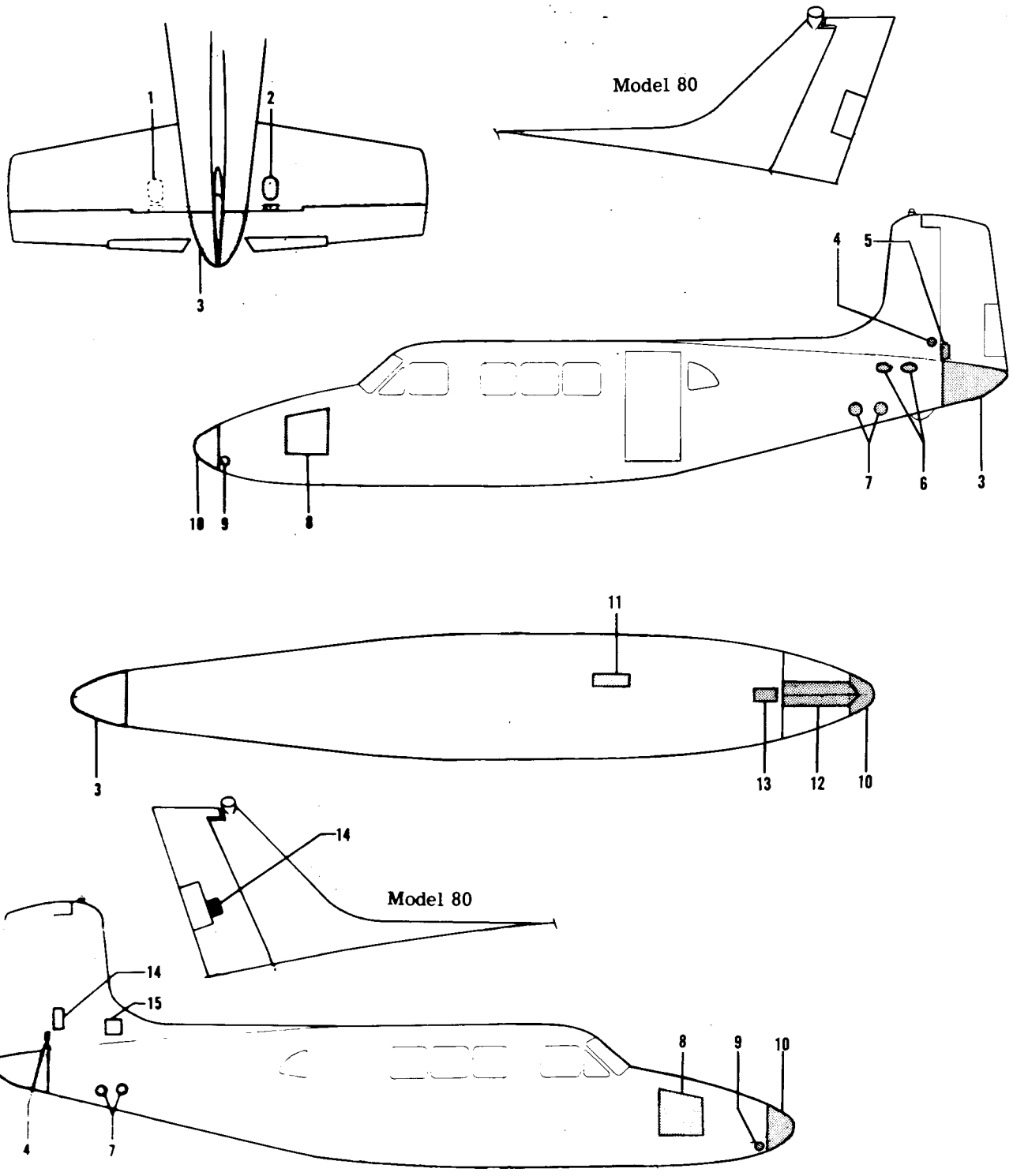
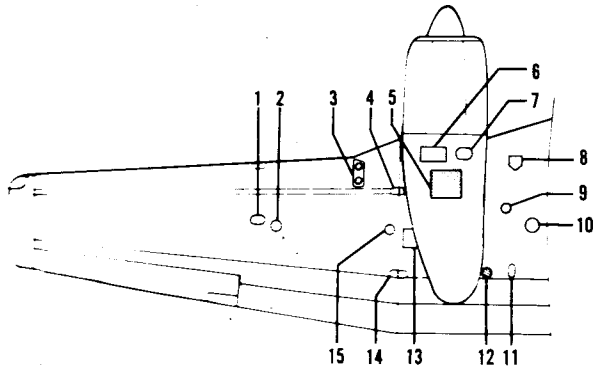


Figure 2-2. Stations Diagram

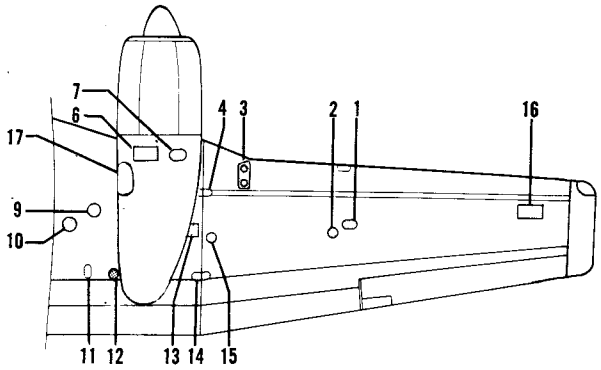


1. Elevator Trim Tab Actuator LH
2. Elevator Trim Tab Actuator RH
3. Empennage Control Linkage and Rudder Stops
4. Rudder Torque Tube Attachment - Model 65
5. Rudder Trim Tab Actuator - Model 65
6. Vertical and Horizontal Stabilizer Attaching Bolts
7. Elevator Bell Crank and Stops and De-icer Valve
8. Nose Equipment Compartment
9. Nose Gear Mounting Bolt
10. Nose Steering Linkage and Taxi Light
11. Landing Gear Clutch and Chain Sprocket
12. Nose Landing Gear
13. Control System Pulleys and Control Pedestal
14. Rudder Trim Tab Actuator - Model 65
15. Dorsal Fin Attaching Bolts - Model 65
16. Rudder Trim Tab Actuator - Model 80

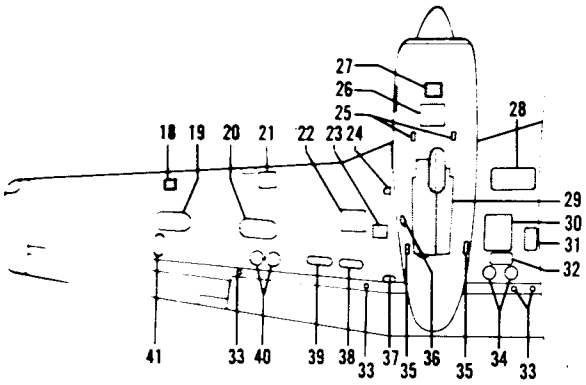
Figure 2-3. Fuselage Access Openings



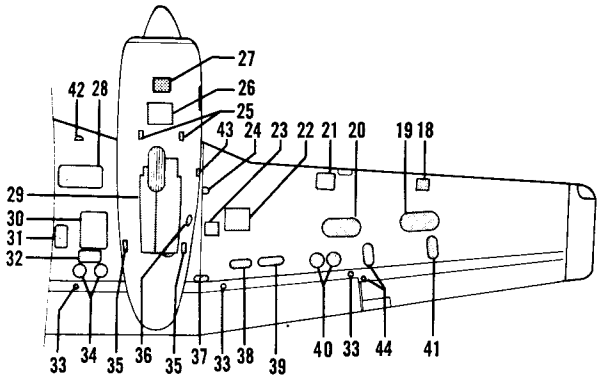
LEFT WING - UPPER SURFACE



RIGHT WING - UPPER SURFACE



RIGHT WING - LOWER SURFACE



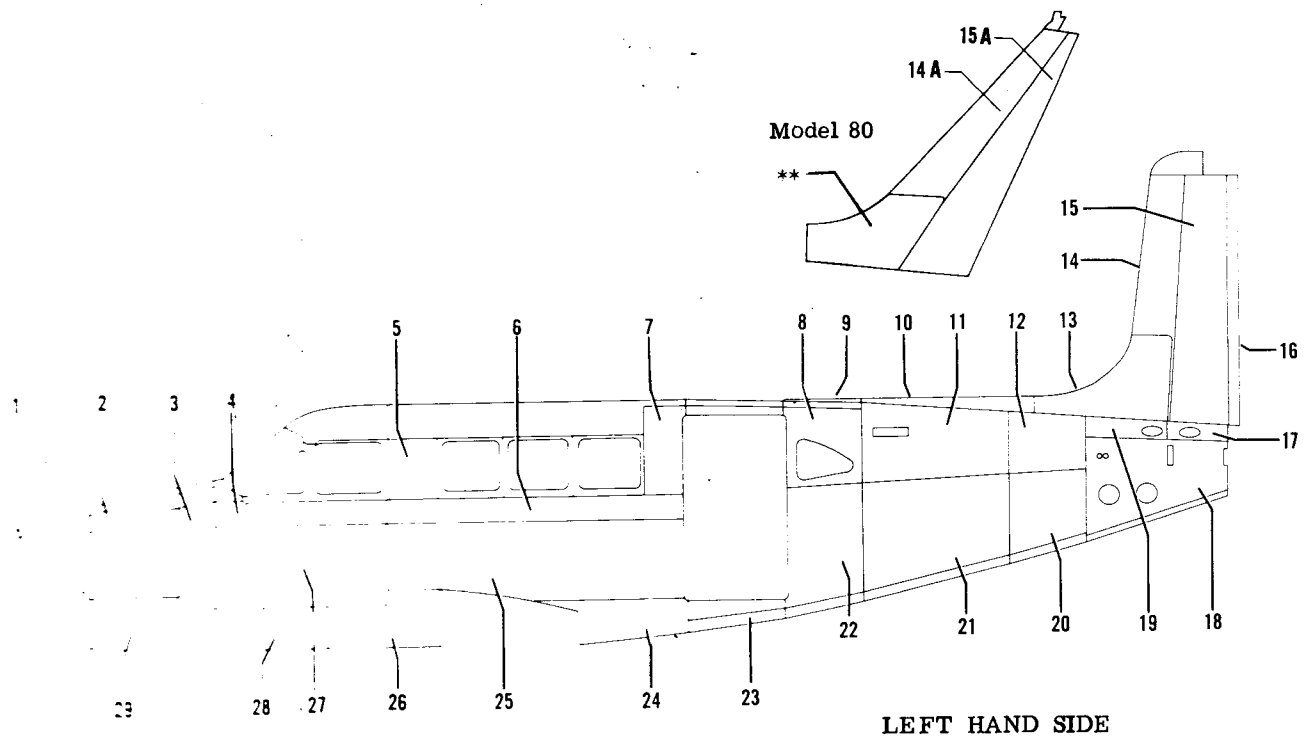
LEFT WING - LOWER SURFACE

1. Outboard Auxiliary Fuel Cell Quantity Transmitter
2. Outboard Auxiliary Fuel Cell Filler Neck
3. Leading Edge Auxiliary Fuel Cell Quantity Transmitter
4. Upper Forward Wing Bolt
5. Battery
6. Oil Lines
7. Oil Filler and Dipstick
8. Anti-icer Filler Neck
9. Main Fuel Cell Filler Neck
10. Main Fuel Cell Quantity Transmitter
11. Inboard Flap Actuator
12. Aileron and Aileron Tab Cables
13. Wing Plumbing
14. Upper Aft Wing Bolt
15. Inboard Auxiliary Fuel Cell Quantity Transmitter
16. Remote Compass Transmitter
17. Radar Inverter
18. Fuel Vent Lines and De-icer Plumbing
19. De-icer Lines
20. Outboard Auxiliary Fuel Cell Installation
21. Landing Light
22. Inboard Auxiliary Fuel Cell Installation
23. Auxiliary Fuel Boost Pump
24. Lower Forward Wing Bolt
25. Engine Mount Bolts
26. Fuel Filter and Air Induction Installation
27. Induction Air Filter
28. Landing Gear Retract Universal and Bearing and (LH Only) Anti-icer Tank Drain
29. Main Landing Gear
30. Main Fuel Tank Installation
31. Main Fuel Boost Pump
32. Fuel Line Connections
33. Flap Rollers
34. Inboard Flap Actuator
35. Main Landing Gear Suspension Points
36. Wing Electrical Connections
37. Lower Aft Wing
38. Outboard Flap Actuator
39. Aileron Pulley
40. Aileron Pulley and Fairlead
41. Aileron Bell Crank and Stops
42. Pitot Drain
43. External Power Receptacle
44. Aileron Trim Tab Actuator

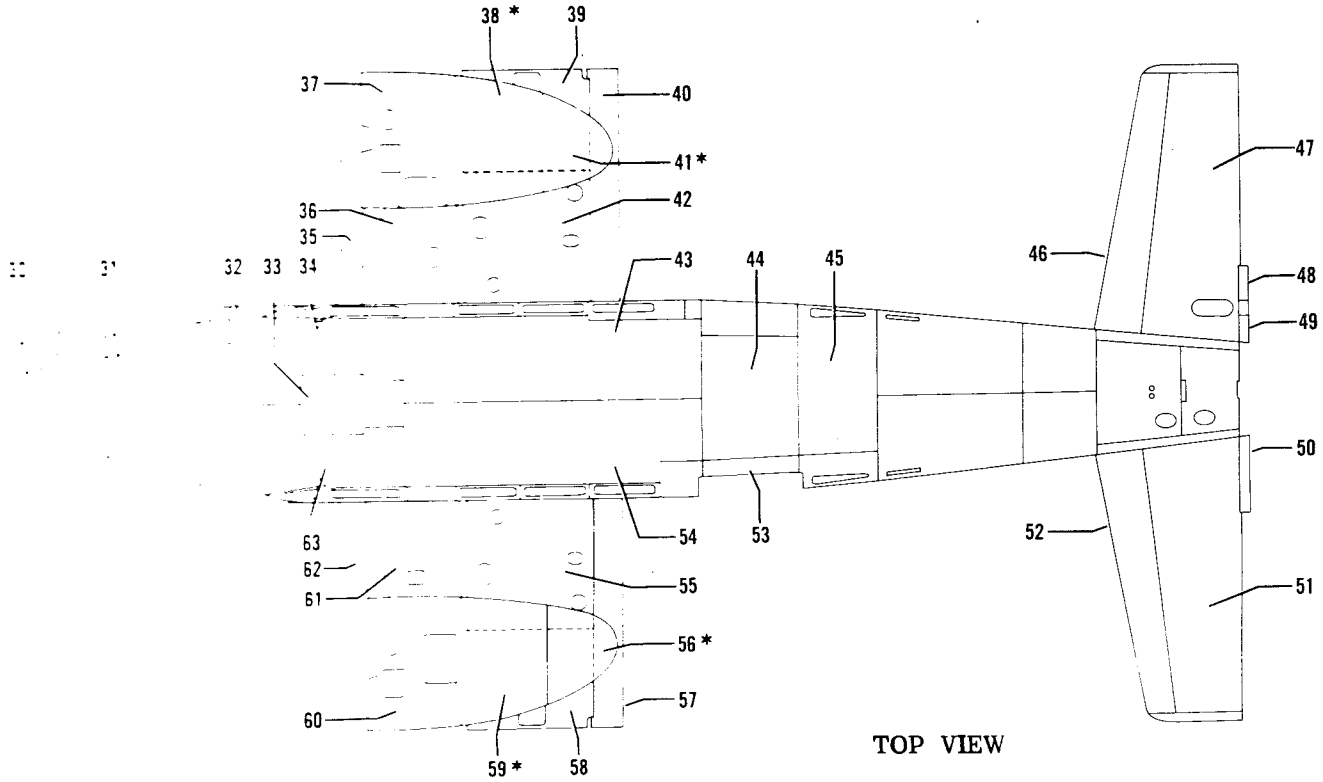
Figure 2-4. Wing Access Openings

LEGEND FOR FIGURE 2-5.

INDEX NO.	GAGE	DESCRIPTION
1.	.032	2024-T4
2.	.025	2024-T4
3.	.025	2024-T4
4.	.025	2024-T4
5.	.040	2024-T3
6.	.040	2024-T3
7.	.040	2024-T3
8.	.032	2024-T3
9.	.020	2024-T4
10.	.020	2024-T3
11.	.020	2024-T3
12.	.025	2024-T3
13.	.025	6061-T6
14.	.025	24ST3
14A.	.025	2024T
14B.	.025	2024T3
15.	.020	24S0
16.	.020	24ST3
17.	.032	2024-T3
18.	.032	2024-T3
19.	.032	2024-T3
20.	.025	2024-T3
21.	.025	2024-T3
22.	.025	2024-T3
23.	.063	2024-T3
24.	.032	2024-T3
25.	.040	2024-T3
26.	.025	2024-T4
27.	.025	2024-T4
28.	.025	2024-T4
29.	.025	2024-T4
30.	.025	2024-T4
31.	.025	2024-T4
32.	.040	2024-T4
33.	.032	2024-T4
34.	.032	2024-T4
35.	.040	2024-T3
36.	.063	2024-T3
37.	.025	2024-T4
38.	.025	2024-T3
39.	.032	2024-T3
40.	.032	6061-T6
41.	.025	2024-T3
42.	.050	2024-T3
43.	.020	2024-T3
44.	.020	2024-T3
45.	.020	2024-T3
46.	.025	24ST3
47.	.020	24S0
48.	.020	24S0
49.	.020	24S0
50.	.020	24S0
51.	.020	24S0
52.	.025	24ST3
53.	.040	2024-T3
54.	.020	2024-T3
55.	.050	2024-T3
56.	.025	2024-T4
57.	.032	6061-T6
58.	.032	2024-T3
59.	.025	2024-T3
60.	.025	2024-T4
61.	.063	2024-T3
62.	.040	2024-T3
63.	.032	2024-T4
64.	.020	24ST3
65.	.020	24S0
65A.	.025	2024-T3
66.	.025	2024-T3
67.	.025	2024-T3
68.	.025	2024-T3
69.	.025	2024-T3
70.	.040	2024-T3
71.	.040	2024-T3
72.	.025	2024-T4
73.	.025	2024-T4
74.	.025	2024-T4
75.	.025	2024-T4
76.	.025	2024-T4
77.	.025	2024-T4
78.	.025	2024-T4
79.	.025	2024-T4
80.	.040	2024-T3
81.	.032	2024-T3
82.	.025	2024-T3
83.	.025	2024-T3
84.	.025	2024-T3
85.	.025	2024-T3
86.	.032	2024-T3
87.	.032	2024-T4
88.	.025	2024-T3
89.	.025	Corrosion Resistant Steel (18-8)
90.	.020	2024-T3
91.	.025	2024-T3
92.	.025	2024-T3
93.	.025	2024-T3
94.	.025	2024-T3
95.	.025	Corrosion Resistant Steel (18-8)
96.	.025	2024-T3
97.	.025	Corrosion Resistant Steel (18-8)
98.	.025	Corrosion Resistant Steel (18-8)
99.	.032	2024-0
100.	.020	2024-T3
101.	.025	2024-T3
102.	.025	Corrosion Resistant Steel (18-8)
103.	.025	Corrosion Resistant Steel (18-8)
104.	.063	2024-T3
105.	.032	2024-T4
106.	.025	2024-T3
107.	.025	2024-T3
108.	.020	2024-T3
109.	.025	2024-T3
110.	.020	24S0
111.	.020	24ST3
112.	.020	24ST3
113.	.032	2024-T3
114.	.020	24ST3
115.	.020	24S0
116.	.025	2024-T3
117.	.025	2024-T3
118.	.032	2024-T3
119.	.025	2024-T3
120.	.063	2024-T3
121.	.025	Corrosion Resistant Steel (18-8)
122.	.025	Corrosion Resistant Steel (18-8)
123.	.020	2024-T3
124.	.032	2024-0
125.	.025	Corrosion Resistant Steel (18-8)
126.	.025	Corrosion Resistant Steel (18-8)
127.	.025	Corrosion Resistant Steel (18-8)
128.	.025	2024-T3
129.	.025	2024-T3
130.	.025	2024-T3
131.	.025	2024-T3
132.	.025	2024-T3
133.	.020	2024-T3
134.	.025	Corrosion Resistant Steel (18-8)
135.	.032	2024-T3
136.	.020	2024-T4
137.	.032	2024-T4



LEFT HAND SIDE



TOP VIEW

* Effective Model 65 serials LC-50 and after and Model 80 serials LD-1 and after, skins, indexes 38 and 41, and indexes 56 and 59, become one piece skins, gage .040, description 6061-0.
** This is a moulded plastic part on Model 80 aircraft.

Figure 2-5. Fuselage and Empennage Skin Plating (Sheet 1 of 2)

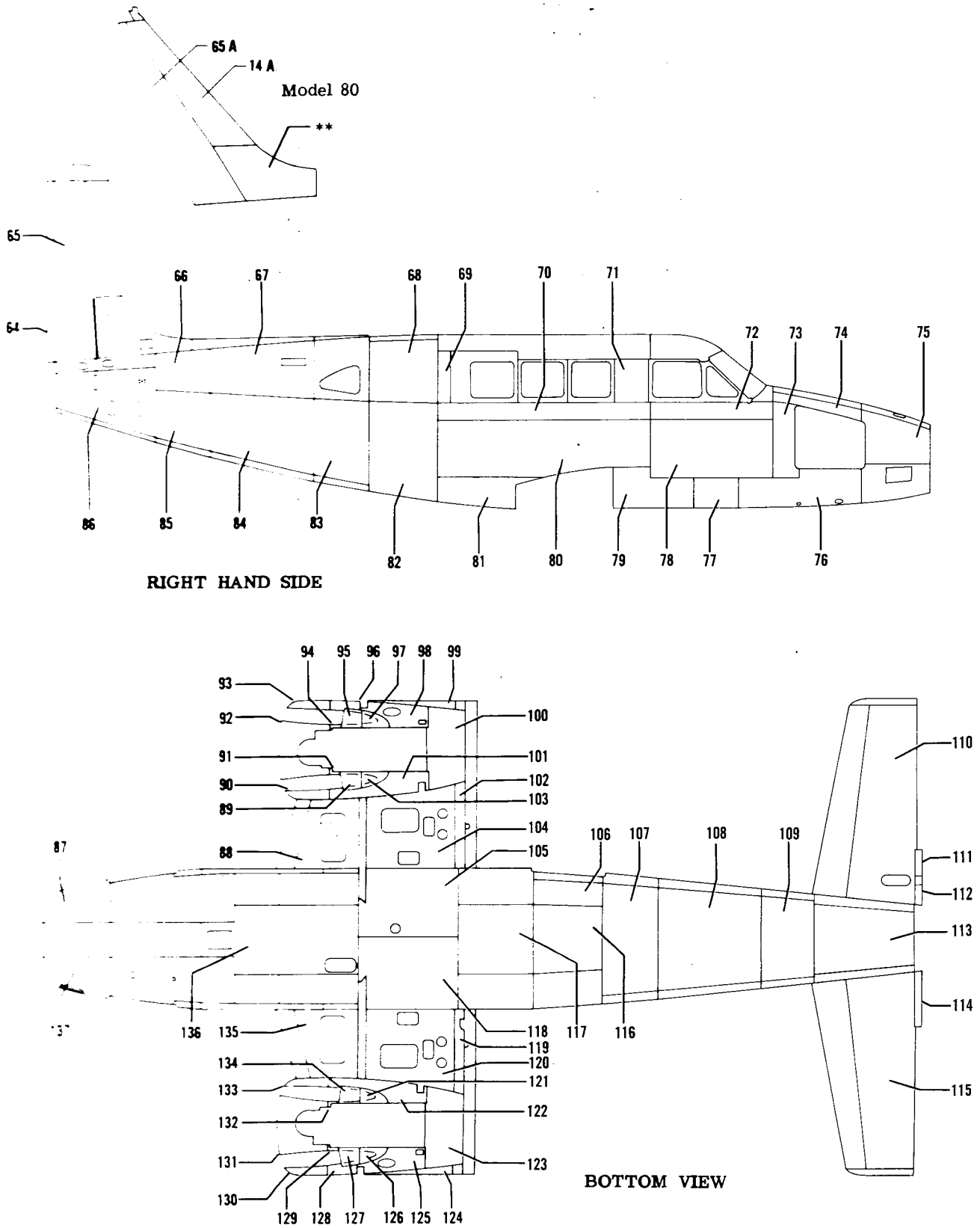
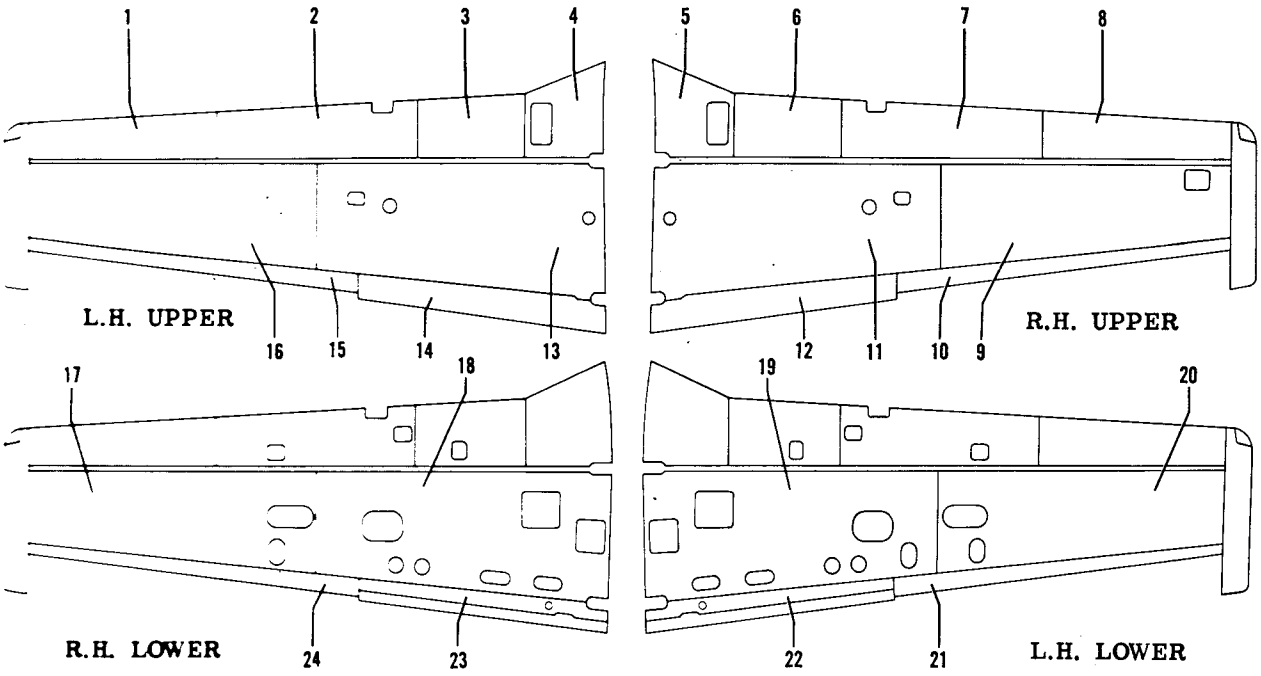


Figure 2-5. Fuselage and Empennage Skin Plating (Sheet 2 of 2)



INDEX NO.	GAGE	DESCRIPTION
1.	.032	24ST3
2.	.032	2024-T3
3.	.040	2024-T3
4.	.032	2024-T3
5.	.032	2024-T3
6.	.040	2024-T3
7.	.032	2024-T3
8.	.032	24ST3
9.	.020	2024-T3
10.	.020	2024-T3
11.	.020	2024-T3
12.	.020	2024-T3
13.	.020	2024-T3
14.	.020	2024-T3
15.	.020	2024-T3
16.	.020	2024-T3
17.	.020	2024-T3
18.	.020	2024-T3
19.	.020	2024-T3
20.	.020	2024-T3
21.	.020	2024-T3
22.	.025	2024-T3
23.	.025	2024-T3
24.	.025	2024-T3

Figure 2-6. Wing Skin Plating

CONSUMABLE MATERIALS CHART

ITEM	MATERIAL	SPECIFICATIONS
1.	Fuel, Engine	100/130
2.	Engine Oil	SAE 30 (Above 10°F) SAE 20 (Below 10°F)
3.	Lubricating Oil (Special Preservative)	MIL-L-644
4.	Lubricating Oil (General Purpose, Low Temperature)	MIL-L-7870
5.	Lubricating Oil (Aircraft Reciprocating (Piston) Engine)	MIL-L-6082
6.	Lubricating Grease (General Purpose)	MIL-G-7711
7.	Lubricating Grease (Aircraft and Instruments, Low and High Temperature)	MIL-G-3278
8.	Lubricating Grease (High Temperature)	MIL-L-3545
9.	Lubricating Grease, Graphite	MIL-G-7187
10.	Lubricant, Powdered Graphite	MIL-G-6711
11.	Hydraulic Fluid	MIL-H-5606
12.	Anti-icer Fluid	MIL-F-5566
13.	Solvent	Federal Specification, P-S-661
14.	Lubricating Grease, Special	Mix 45 grams Molykote Type "Z" (Product of the Alpha Molykote Corporation, Stanford Conn.) per pound of MIL-G-10924A
15.	Soap Solution, Oxygen - System Leak - Testing	MIL-S-4282
16.	Lubricating Grease, (Automotive and Artillery)	MIL-G-10924A

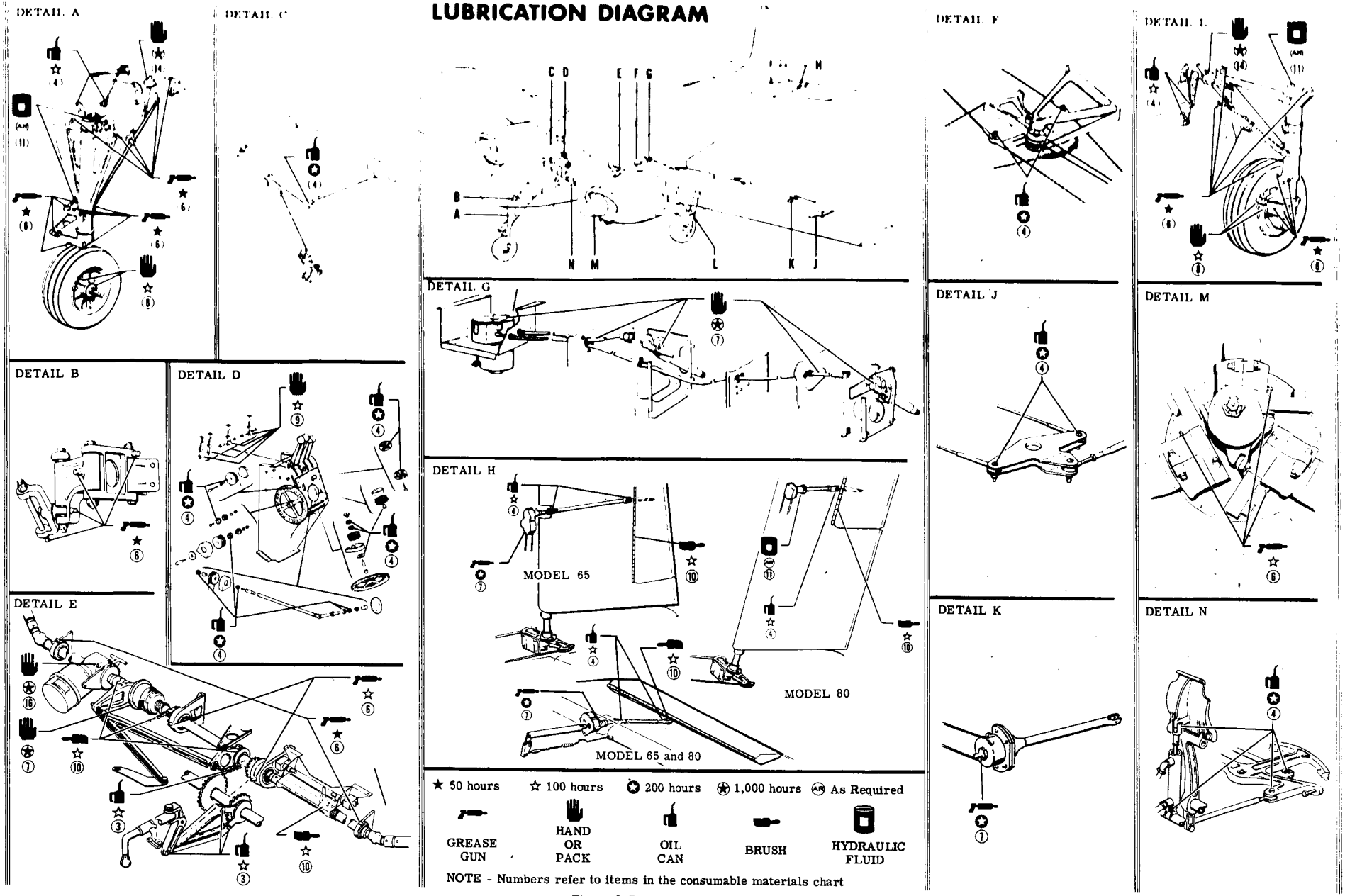
NOTES

1. If 100 130 octane fuel is not available, 115/145 octane fuel may be used as an alternate. Never use 91/96 octane fuel.
2. Mix Item 10. with quick evaporating liquid (naptha) and apply with a brush.
3. Precautions should be taken when using MIL-G-3278 and MIL-G-7711, since these greases contain chemicals harmful to painted surfaces.

TABLE OF THREAD LUBRICANTS

SYSTEM	MATERIAL	SPECIFICATIONS
Fuel	Anti-Seize: Graphite Petrolatum	MIL-T-5544
Oil Manifold Pressure Anti-icer Vacuum	Lubricating Grease (Gasoline and Oil Resistant)	MIL-G-6032
Brake De-icer Static and Pitot	Anti-Seize Compound, White Lead Base	JAN-A-669
Oxygen	Thread Compound, Anti-Seize and Sealing, Oxygen Systems	MIL-T-5542

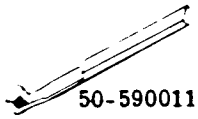
LUBRICATION DIAGRAM



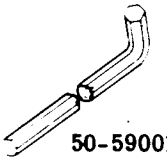
NOTE - Numbers refer to items in the consumable materials chart

Figure 2-7. Lubrication Diagram

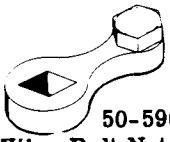
SPECIAL TOOLS



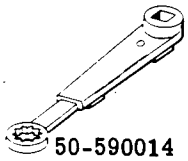
50-590011
Wing Bolt Wrench



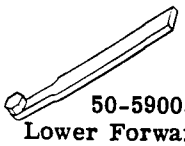
50-590012
Wing Bolt Wrench



50-590013
Wing Bolt Nut Torque Wrench Adapter

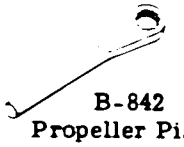


50-590014
Forward Wing Bolt Nut Torque Wrench Adapter

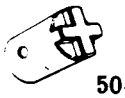


50-590036
Lower Forward Wing Bolt Wrench

WING

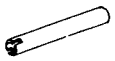


B-842
Propeller Piston Nut Wrench



50-590084
Splined Propeller Retainer Nut Wrench

50-590018
Engine Sling Assembly

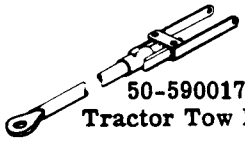


50-590106
Sump Drain Wrench

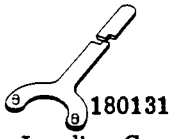
POWER PLANT

18092
Airplane Hoisting Eye Bolt

AN78A15
Bolt

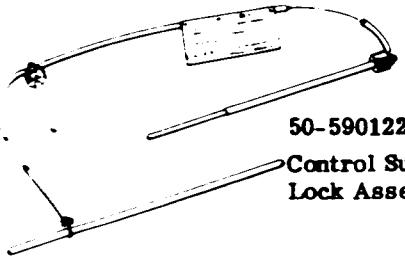


50-590017
Tractor Tow Bar

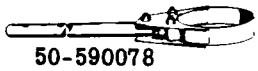


180131
Landing Gear Overload Clutch Wrench

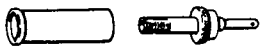
50-590019
Brake Cylinder Spanner Wrench



50-590122
Control Surface Lock Assembly

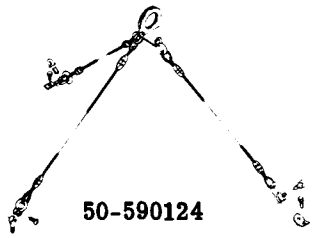


50-590078
Landing Gear Clutch Wrench

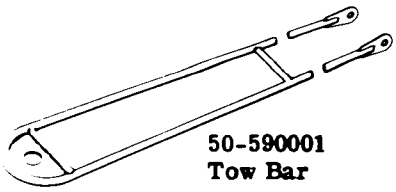


206-108172
Inflation Valve Kit

50-590032
Main Spar Hoisting Lug



50-590124
Airplane Sling Assembly



50-590001
Tow Bar

AIR FRAME

Figure 2-8. Special Tools

GROUND HANDLING

Care must be used in ground handling of the airplane to avoid unnecessary damage. The following procedures are provided to reduce the possibility of ground damage.

JACKING

Provision is made for a three-point jack-pad system. The two aft pads are located on the center section rear spar inboard of each nacelle. The forward jack pad is located near the aft edge of the nose wheel well and to the left of the fuselage center line.

Jacks points on each main and nose landing gear enable the individual raising of each wheel for changing tires or minor brake repair.

CAUTION

When jacking the nose wheel, use an automobile type jack with a capacity of at least 3000 pounds.

LEVELING PROVISIONS

The airplane, while resting on its wheels may be trimmed in both directions merely by inflating or deflating the main gear or nose gear struts, as required. Lateral leveling is accomplished by using a bubble level on the aft baggage compartment floorboard and deflating the tire or strut on the high side of the airplane to center the bubble.

To level the airplane longitudinally, attach a cord and plumb bob to the upper Phillips-head screw just forward of the cabin door. Inflate or deflate the nose gear shock strut as required, to pass the cord through the center line of a second Phillips-head screw directly below. Suspending the plumb bob in a can of light engine oil will assist in stabilizing it.

HOISTING THE AIRPLANE

The airplane may be hoisted for maintenance or parts replacement with a three-cable sling attached to the hoisting lugs and eyebolt. A minimum overhead clearance of 17 feet and a hoist of at least 10,000 pounds capacity is required for hoisting.

NOTE

If it is necessary to hoist the airplane with one or both engines removed, use a sling under the tail. The tail mooring hole can be used to hold the sling in position.

a. Remove the plug in the nose section top skin, just aft of the nose cone and install an eyebolt in the fitting.
b. Remove the wing center section plug at the inboard edge of each nacelle, just forward of the front spar. Insert AN78-A15 bolts through the wing hoisting lugs and screw bolt into the wing fitting.
c. Attach the sling to the three hoist points.
d. Remove all loose equipment from the aircraft and hoist the aircraft smoothly.

TOWING

Towing lugs are provided on the upper torque knee fitting of the nose strut. Using the hand tow bar, one man can pull the aircraft on level areas.

NOTE

Although steering is automatic when the aircraft is being towed by the nose strut, someone should ride in the pilot's seat to operate the brakes in the event of an emergency.

CAUTION

Do not tow airplane with rudder locks installed. Severe damage to nose steering linkage can result. When towing with a tug, observe turn limits to prevent damage to nose gear.

PARKING BRAKE

The brakes are set for parking by pulling out the parking brake control and depressing the pilot's brake pedals to pressurize the system. Do not attempt to lock the parking brake by applying force to the parking brake handle; it controls a valve only, and cannot apply pressure to the brake master cylinder.

CAUTION

Do not set the parking brakes during low temperatures when an accumulation of moisture may cause the brakes to freeze, or when they are hot from severe use.

CONTROL LOCK

The control lock for the Model 65 airplane holds the throttle in the closed position, and the elevator, aileron and rudder in the neutral position. The control lock assembly consists of three pins connected together by a chain. Install the pins in the following order: throttle lock pin, elevator and aileron lock pin, and the rudder lock pin.

CAUTION

The above sequence is important, due to the possibility of an attempt to taxi or fly the airplane with the throttle lock pin removed and the control surface lock pins installed.

The throttle lock pin is installed through the control pedestal, preventing operation of the throttle. The elevator-aileron control lock pin is installed vertically, from above, through the pilots control column assembly. The rudders are held in neutral by the largest of the three pins installed through the pilots rudder pedals.

A placard attached to the chain assembly displays the proper installation procedure.

ANCHORING AND MOORING PROVISIONS

Three mooring eyes are provided, one in each wing and one in the tail bumper. To moor the airplane, chock the wheels fore and aft, install the control lock and tie the airplane down at all three points. Avoid overtightening the rear rope and pulling the nose of the airplane up so far that wind will create lift on the wings. If extreme weather is anticipated, it is advisable to nose the airplane into the wind.

SERVICING INSTRUCTIONS

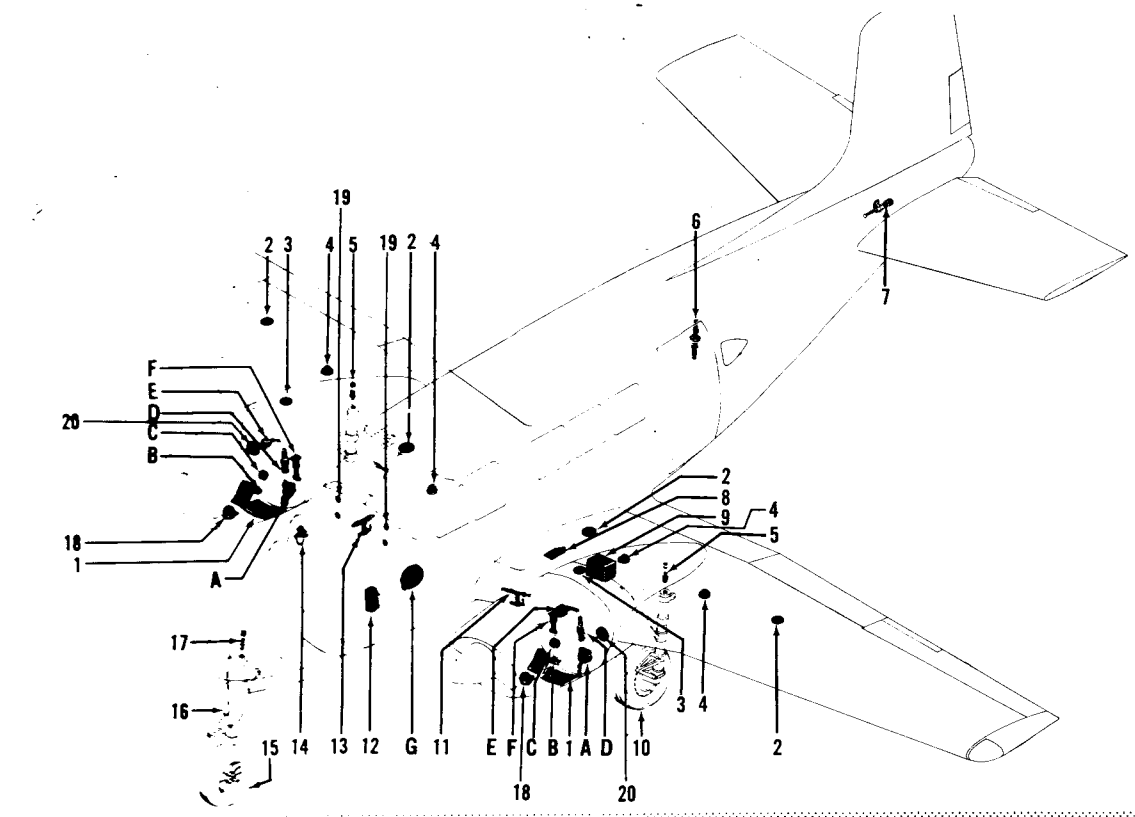
Proper and periodic servicing of the airplane will prevent considerable wear and greatly lengthen the service life of parts and systems involved. For points of lubrication and the correct interval and materials, refer to the Lubrication Chart in this section. The following information gives instruction on the servicing of major systems.

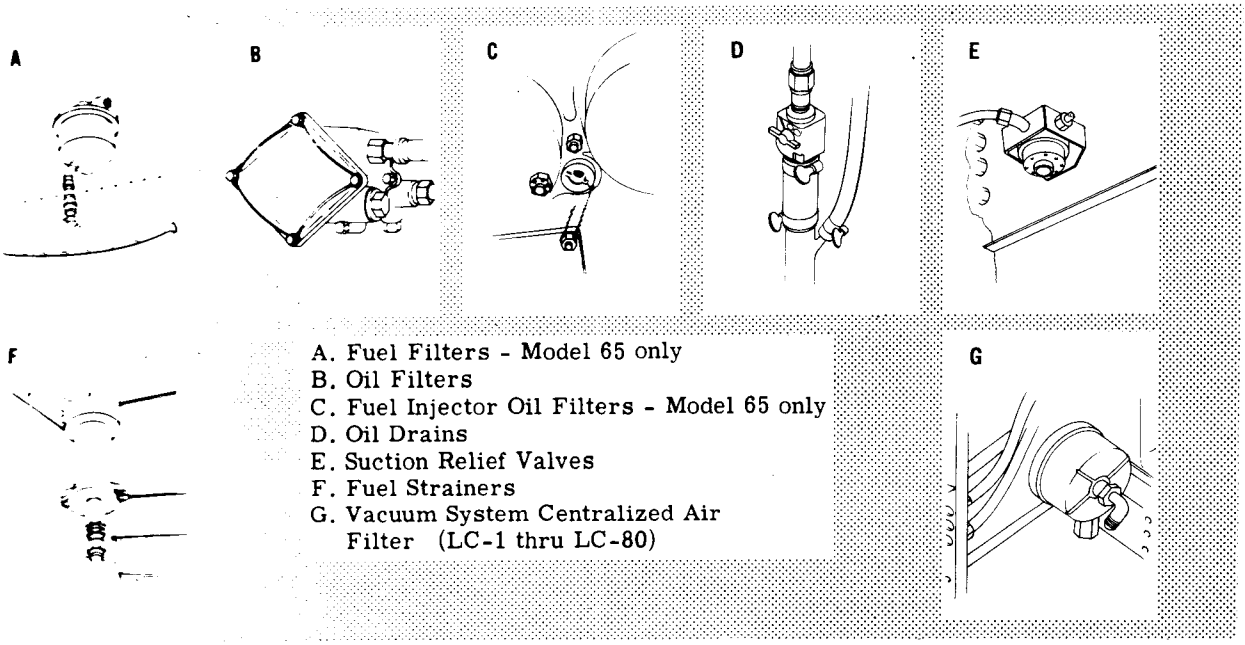
SERVICING FUEL SYSTEM

Refer to the Consumable Materials Chart for the correct grade of fuel. A 44-gallon main fuel cell is installed in each wing center section and is serviced through flush type filler caps located in the upper wing skins midway between the fuselage and engine nacelle. Two 23-gallon auxiliary tanks are located in each outboard wing section, and are serviced through a single filler cap in the upper outboard wing skin. An optional 25-gallon auxiliary tank can be installed along with the outer auxiliary tanks and is serviced through the same filler cap. Prior to transferring fuel, ground the refueling hose to one of the airplane grounding jacks. Do not fill fuel cells near open flame or within 100 feet of any open energized electrical equipment capable of producing sparks. Secure filler caps immediately after service.

NOTE

If the cells are to remain unfilled for 10 days or more, apply a thin coating of light engine oil to the inside surface of the cell to prevent deterioration and cracking.





A. Fuel Filters - Model 65 only
B. Oil Filters
C. Fuel Injector Oil Filters - Model 65 only
D. Oil Drains
E. Suction Relief Valves
F. Fuel Strainers
G. Vacuum System Centralized Air Filter (LC-1 thru LC-80)

1. Engine Air Filter
2. Fuel Tank Fillers
3. Oil Fillers
4. Fuel Booster Pump Screens
5. Main Gear Shock Struts
6. Rear Mounted Oxygen Cylinder Filler Valve
7. Light Weight De-Icer Filler Valve
8. Anti-Icer Tank Filler
9. Battery
10. Main Gear Tire
11. Pitot Line Drain
12. Brake Fluid Reservoir
13. Static Line Drain
14. Front Mounted Oxygen Cylinder Filler Valve
15. Nose Gear Tire
16. Nose Shimmy Dampener Reservoir
17. Nose Gear Shock Strut
18. Propeller Unfeathering Accumulator - Model 65
19. Gyro Instrument Air Filter
20. Propeller Unfeathering Accumulator - Model 80

Figure 2-9. Servicing Points

A fuel sump drain is located in each of the main tanks and each of the inboard auxiliary tanks. They should be drained before the first flight of the day and after refueling.

Most fuel injection system malfunctions can be attributed to contaminated fuel. Inspecting and cleaning the fuel strainers should be considered to be of the utmost importance as a regular part of preventive maintenance. The frequency of inspecting and cleaning the fuel strainers will depend upon service conditions and fuel handling equipment cleanliness. However, when operating in localities where there is an excessive amount of sand or dust, the strainers should be inspected and cleaned at more frequent intervals.

Clean the screens in the main fuel strainers at least every 100 hours. The main fuel strainers are integral parts of the fuel selector valves and are removed by removing the locks and seal plates in the bottoms of the valves.

Clean the booster pump screens at least every 500 hours. For access to the booster pump screen remove the pump from the fuel cell.

Clean the all-metal fuel filter on the lower section of each firewall every 50 hours. Remove the filter pack cartridge assembly by removing the retaining nut on the bottom of the filter bowl. It is not necessary to remove the packs from the center tube. Wash the filter pack in cleaning solvent (Item 13, Consumable Materials Chart). Plug the open ends of the center tube while washing to keep out dirt. Replace the filter pack cartridge, bowl and retaining nut. Safety wire the retaining nut.

Clean the fuel injector oil filter located between the left magneto and the injector pump in the accessory housing cover every 50 hours. Service the filter as follows:

a. Cut safety wire, remove the oil filter from the accessory housing cover and place a cork or plug in the discharge port.

NOTE

This plug must remain in the filter throughout the cleaning process to prevent particles from entering the interior of the filter where they will be more difficult to remove.

b. Soak the filter in solvent (Item 13, Consumable Materials Chart). To accelerate cleaning and remove any metal particles from the filter, a light brushing action may be used on the oil filter screen.
c. After removing the filter assembly from the solvent, apply a combination of solvent and air against the screen surfaces. The filter can be considered clean when solvent dripping from the screen is not discolored. Care must be exercised so that the screen is not damaged during this process.
d. When the cleaning process has been accomplished, remove the cork or plug and dry the assembly with compressed air.
e. Replace the oil seal rings if they are damaged or distorted, replace the filter in the accessory housing cover, and safety.

SERVICING OIL SYSTEM

The oil grades listed in the Consumable Materials Chart are general recommendations only, and will vary with individual circumstances. The determining factor for choosing the correct grade of oil is the oil inlet temperature observed during flight; however, inlet temperatures consistently near the maximum allowable indicate a heavier oil is needed. Lycoming recommends use of the lightest weight oil that will give adequate cooling.

Each engine is supplied with oil by a 4-gallon tank located in the top of the nacelle. To service the engine with oil, open the quick release oil access door on top of the nacelle and remove the filler cap. A dip stick attached to the filler cap indicates the oil level. The oil should be changed every 100 hours under normal operating conditions, using only the oils recommended in the above referenced chart. Access to the oil drain is through the main landing gear wheel wells.

The oil filters should be cleaned and inspected at 50-hour intervals, and at every oil change regardless of the time interval. Service the filter as follows:

a. Unscrew the filter cover and remove the filter assembly from the oil pump.
b. Remove the disc retainer nut and disassemble the filter discs.
c. Clean the filter discs in solvent (Item 13, Consumable Materials Chart).
d. Check the discs for damaged screens and note the amount and kind of solid material trapped by the filter. Investigate if unusual or excessive amounts of solid material are found.
e. Assemble the filter discs on the body. The filter discs are completely interchangeable and may be assembled at random.
f. Install the disc retainer nut on the body, with its lip toward the discs. Run the nut down by hand until the lip bears on the end filter disc and the cotter key hole lines up, then install the cotter key. Do not overtighten the retainer nut; it should be run down only enough to firmly seat the discs against each other.
g. Coat the filter body threads with thread lubricant (refer to Table of Thread Lubricants) and place the anti-seize washer over the retaining nut.
h. Screw the filter by hand into the filter chamber in the oil pump body, turning it finger-tight, then torque it to 40 to 50 inch-pounds. Do not overtorque the body; doing so may deform the body, changing the flow characteristics of the filter.
i. Install the filter cover with a new gasket, tightening it to 100 to 200 inch-pounds torque.

SERVICING THE ANTI-ICER SYSTEM

The anti-icer tank is located in the left wing between the nacelle and the fuselage, just forward of the main spar. The tank has a capacity of 3 U.S. gallons of anti-icer fluid (Item 12, Consumable Materials Chart). Access to the tank filler cap is through an access opening in the upper wing skin. Check the fluid level and refill if necessary before each cold weather flight. The tank should be drained and flushed twice a year.

SERVICING BRAKES

The hydraulic brake system may contain either Goodyear of Cagle brakes. Both systems consist of two single-disc, three cylinder, self adjusting brakes operated by toe pressure on the rudder pedals. The two different brakes may not be installed on the same airplane, nor may the individual parts be interchanged.

The brake fluid reservoir is located in the nose compartment and should be filled to within one inch of the top with hydraulic fluid (Item 11, Consumable Materials Chart). Brakes are provided for pilot and copilot.

SERVICING TIRES

The main wheel tires are 8:50 x 10, 8-ply. The nose wheel tire is a 6:50 x 10, 4-ply standard, 6-ply optional. Inflate the nose tire to 35 psi and the main wheel tires to 47 psi +3 -0. Maintaining proper tire inflation will help to avoid damage from landing shock and contact with sharp stones and ruts, and will minimize tread wear. When inflating tires, inspect them visually for cracks, breaks, or evidence of internal damage.

SERVICING TUBELESS TIRES

Inflation of the tubeless tires may be accomplished as follows:

a. Lubricate the end of the inflating needle by pressing it against the lubrication pads in the carrying case.

b. With the end of the inflating needle, work glycerine around the guide hole of the tire valve located in the side of the tire.

CAUTION

The needle and the valve opening should be well lubricated before the needle is inserted. Never insert the needle into a dry valve.

c. Insert the inflating needle into the tire valve opening with a rotating motion.

CAUTION

Do not force the needle; if the needle does not enter easily, relubricate needle and valve.

d. After the needle is seated in the tire valve, inflate the tire to the normal operating pressure. Inflate the nose tire to 35 psi and the main wheel tires to 47 psi +3 -0.

e. After the tire has been inflated to the correct pressure, remove the inflating needle and place it in the carrying case.

SERVICING LANDING GEAR SHOCK ABSORBER

The landing gear shock absorbers are of the air-oil type. They should be serviced with hydraulic fluid (Item 11, Consumable Materials Chart).

To check the fluid level, deflate the strut by releasing air through valve; after the air pressure is released, remove the filler valve adapter.

WARNING

Release the air pressure entirely before removing the valve adapter.

Fill the strut to the bottom of the valve standpipe with the strut in a vertical position, or the normal position on the airplane. Work the strut slightly to eliminate any trapped air, then refill to correct level.

The main gear struts should be inflated to a height of three inches, and the nose strut should be inflated to a height of five inches. This measurement is of the exposed portion of the piston. The airplane should never be operated with a flat strut.

SERVICING THE LANDING GEAR SHIMMY DAMPENER

To check the fluid level in the shimmy dampener, insert a wire, approximately 1/16 inch in diameter, through the hole in the disc at the end of the piston rod until the wire touches the bottom of the hole in the floating piston. Mark the wire, remove it and measure the depth of insertion. Inserting the wire in the hole of the floating piston, rather than letting it rest against the face of the piston, will give a more accurate check. The wire can be inserted approximately 5 1/4 inches when the reservoir is empty. ■

NOTE

To determine if the wire is inserted in the hole of the floating piston, insert the wire several times, noting each insertion depth. When the wire is in the hole the length will be approximately 1/2 inch greater.

When the shimmy dampener is full, the distance from the end of the piston rod to the bottom of the hole in the aft floating piston is 2-1/8 +1/4 -0 inches. To add hydraulic fluid (Consumable Material Chart, Item 11), remove the shimmy dampener and proceed as follows:

a. Remove the piston rod end fitting and secure the shimmy dampener in a fixed position with the fitting end of the piston rod down.
b. Remove the snap ring, disc and spring from the aft end of the piston rod.

CAUTION

The spring in the piston rod is under compression, and care should be exercised to prevent injury when the snap ring is removed.

c. Remove the aft floating piston from the piston rod by screwing a 10/32 threaded rod into the piston and pulling it out.
d. Fill the piston rod with fluid.
e. Insert the 10 32 threaded rod through the fitting end of the piston rod and engage the forward floating piston. Pull the floating piston toward the fitting end of the piston rod, at the same time inserting the aft floating piston and spring, and installing the disc and snap ring.
f. Remove the rod from the forward floating piston and install the piston rod end fitting.

SERVICING BATTERY

The 24-volt nickel-cadmium battery, which provides the dc current for the aircraft, is designed to give many years of trouble-free service. The only servicing required is a check of the electrolyte level at each periodic inspection to observe if the level is above the top of the plates. If the electrolyte is low, add distilled water only.

CAUTION

The electrolyte in this battery is an alkali. Never attempt to add an acid to the electrolyte. Avoid contamination of the electrolyte from acid-laden hydrometers, etc.

Because of the nature of the battery and electrolyte, the specific gravity of the electrolyte has little meaning, and will not indicate the state of charge of the battery. To determine the charged state of the battery, operate both engines at 1600 rpm or above, and note the amperage flow on both generator ammeters. If the combined amperage flow is 25 amps or more, the battery is low and should be charged. This can be accomplished by attaching a constant voltage charger to the battery, either directly or through the external power receptacle. Apply a maximum of 1.55 volts per cell to the battery from the power source. With the constant voltage type charge, you may expect the battery to accept current at a high rate initially, but as the battery comes up to strength, the charge rate falls rapidly. With external power, the battery should be completely charged within half an hour. If a slower charge is desired, it can be accomplished by using a constant current charger. Apply approximately 5.5 amperes to the battery for a period of 3.5 hours or until battery voltage reaches 28.5 volts.

EXTERNAL POWER RECEPTACLE

An external power supply may be connected to the aircraft electrical system through a receptacle located on the outboard side of the left engine nacelle. The auxiliary power unit must have a negative ground system and should have a standard AN type plug. If the auxiliary power unit does not have the standard plug, check the polarity of the unit with a voltmeter, and connect the positive lead to the center post and the

negative lead to the aft post of the receptacle. It is essential that you make certain the power unit is a negative ground and is connected properly, otherwise, a battery fire may result. Set the power unit at 29 volts before beginning operations.

NOTE

Never attach the auxiliary power cable while the unit is in operation; to do so will produce arcing between the receptacle and cable contacts. Always connect the unit first, then start it operating.

DRAINING PITOT AND STATIC LINES

The drain cock for the pitot line is located in the wing center section leading edge between the fuselage and the nacelle. It is accessible by opening a door in the lower leading edge of the center section.

The drain point for the static system is located on the right side of the pilot's compartment forward of the copilot's seat. The drain cock is accessible by opening a door in the right side panel of the pilot's compartment.

SERVICING THE VACUUM SYSTEM

Servicing consists of cleaning the different components of the system. The centralized air filter located behind the instrument panel on Model 65 serials LC-1 thru LC-80 only, removes dust, grit and other foreign particles from the air before it enters the vacuum system. This filter should be cleaned frequently, especially when operating in dusty conditions or heavy smoke. To remove the filter, disconnect the air line from the filter and remove the retaining bolts. To clean, remove the filter bowl, clean the inlet screen in solvent (Item 13, Consumable Materials Chart) and dry with compressed air. Clean element by blowing air through it in the direction opposite to normal air passage. The cleaning air should be directed at an angle of approximately 45 degrees to the walls of the element to prevent clogging it with dust. After cleaning, reassemble the air filter and install it on the aircraft. The individual instruments on all Models 65 and 80 aircraft have air filters to protect the instruments from foreign particles. These filters should be removed and cleaned every 100 hours (or less during operation in dusty conditions or heavy smoke).

The oil separator, located on the forward side of the engine firewall near the top, is installed in the vacuum system to collect the oil required for lubrication of the pump and send it back to the engine. The separator should be removed and cleaned occasionally. To remove the separator, disconnect the inlet, exhaust and oil return lines and remove the attaching bolts securing the separator to its mounting bracket, then lift the separator from the bracket. Clean with solvent (Item 13, Consumable Materials Chart). Plug outlets and fill separator with solvent. Allow to soak, sloshing occasionally, then drain. Dry with low pressure air blast. Replace separator after it has been cleaned.

The suction relief valve, located on the lower aft side of the engine firewall, is incorporated in the vacuum system as a regulator. The relief valve is connected in the inlet line of each vacuum pump and allows air to enter the pump so that the vacuum of the system does not exceed operating limits.

Since the suction relief valves bleed outside air into the vacuum pump to control the system vacuum, it is essential to proper operation of the vacuum-driven instruments that the relief valve screens be kept clean. Frequency of cleaning the valves will vary with the conditions under which the airplane is operated; however, should it appear that the valves need adjustment, especially to lower the vacuum, the screens should be cleaned and the setting rechecked before readjusting the valves. Refer to Section III for adjustment of suction relief valve.

The valve can be removed for cleaning by disconnecting the lines from the valve and removing the retaining nuts. The valve should be cleaned in solvent (Item 13, Consumable Materials Chart) and dried with compressed air.

After cleaning, replace the valve in the aircraft and connect the lines.

SERVICING LIGHT WEIGHT DE-ICER SYSTEM

The light weight de-icer system receives its working pressure from a reservoir mounted in the tail section just forward of the horizontal stabilizer. The reservoir

should be charged to a pressure of 2,800 ± 200 psi with dry compressed air or nitrogen.

To service the system, pull the air supply valve control out so that valve is full open, remove the left forward tail section inspection door and the yellow safety cap on the tank filler valve. Attach the filler hose to the valve and release tension of the aft hex nut on the valve assembly 1/4 turn.

WARNING

Connect filler hose to filler valve before releasing filler valve locking device.

Fill the tank to a pressure 2800 ± 200 psi. Tighten the hex nut, close the air supply valve, remove the filler hose and replace the safety cap and inspection door.

SERVICING THE OXYGEN SYSTEM

The filler valve for the forward mounted oxygen cylinder is located on the aft bulkhead of the nose compartment, accessible by opening the right hand nose compartment door. The filler valve for the aft mounted oxygen cylinder is located on the aft side of the aft cabin bulkhead, accessible by opening the filler valve access door in the bulkhead. To recharge the oxygen system, remove the protective cap from the filler valve and attach the hose from an oxygen recharging cart to the filler valve.

CAUTION

Keep fire, including sparks and cigarettes away when any of the outlets are in use. Open and close all oxygen valves slowly. Keep system and all components and tools clean, as fire and explosion may occur when oxygen comes in contact with organic material such as grease and oil.

To prevent overheating, fill the system slowly by adjusting the recharging rate with the pressure regulating valve on the cart. When the pressure gage on the cylinder or cart reads 1800 psi, close the pressure regulating valve on the cart. Disconnect the filler hose from the filler valve and replace the protective cap on the filler valve.

CLEANING THE ENGINE AIR FILTER

The Model 65 has three sources of induction air. One of the cold air sources is filtered air.

The engine air filter is located in the bottom of the lower cowling section. The filter should be removed and cleaned frequently, espcially when operating under dusty conditions.

To remove the air filter for cleaning, remove the air intake access cover on the lower cowling and slide the filter out through the access hole.

To clean, use solvent (Item 13, Consumable Material Chart) and spray-type cleaning equipment. Flush filter screen thoroughly and dry filter completely with compressed air. After filter is completely dry, saturate in clean engine oil, then allow the excess oil to drain off before reinstalling.

After the filter has drained, slide it into position, observing arrow indicating direction of airflow stamped on filter frame. Install access cover and retaining screws.

CLEANING DE-ICER BOOTS

The boots should be checked for engine oil after servicing and at the end of each flight, and any oil found should be removed. This can be accomplished by the use of a neutral soap and water solution. Care should be exercised to avoid scrubbing the surface of the boot as this will tend to remove the special graphite surfacing.

NOTE

Since de-icer boots are made of soft, flexible stock, care must be exercised against dragging gasoline hoses over them or resting ladders or platforms against the boots surface.

CLEANING PLASTIC WINDOWS

Cleaning of the acrylic plastic windows should never be attempted when dry. The window should first be flushed with water or a mild soap solution, then rubbed slightly with a grit-free soft cloth, chamois or sponge. Stubborn grease or oil deposits are readily removed with aliphatic naphtha or hexane. Rinse with clear water.

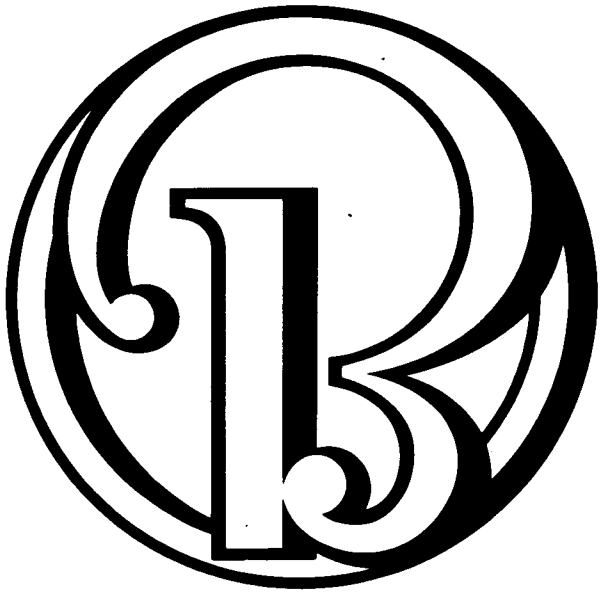
CAUTION

Do not use thinner or aromatic abrasive cleaners to clean the windows; they will damage the surface of the plastic. Aliphatic naphtha and similar solvents are highly inflammable, and extreme care must be taken when using them.

PROPELLER UNFEATHERING ACCUMULATOR SERVICING

To insure proper operation, the accumulator should be checked periodically for correct pressure. To check the air pressure, position the propeller controls for low pitch to exhaust the oil from the accumulators. The pressure should be maintained at 100 ± 5 psi. The accumulators are located in the left side of the lower cowling at Fuselage station 88.000 on the Model 65 and in the outboard side of the firewall on the Model 80.

3



SECTION III

Systems Maintenance

SECTION III

SYSTEM MAINTENANCE

Since it is intended for use as a day-to-day reference, this section has been arranged to provide as far as possible "at-a-glance" information on the location, adjustments and rigging of the components in the various systems.

Each system is pictured in an illustration showing the location of the various components in the airplane and their interconnecting cables, wiring or tubing. Detail illustrations on the basic drawing, either photographs or line drawings, show the exact locations of the components and their adjustment or other maintenance procedures; whereever practical, cable tensions, pressures, measurements, clearances and the like are tabulated directly on the illustration or shown on the details.

Each illustration has been placed on a right hand page and information impractical to place on the illustration is given on the left hand page facing it, so that in most instances when the book is opened to a system illustration all the information concerning that system is available without turning a page.

Detailed explanations of procedures have been limited to those instances, such as rigging the landing gear, where the proper sequence of actions is important and its illustration is impractical. Procedures for major disassembly and overhaul of various units are contained in other sections of the Shop Manual; this section has been confined deliberately to day-to-day maintenance information.

RIGGING THE AILERON CONTROL SYSTEM

a. Place the aileron quadrant in the neutral position and install the rig pin.

b. Rig the top control column cable to tension shown on rigging diagram. After cable has been adjusted, control wheels should align within ± 1/2 degree.

c. Rig control column to quadrant cables to tension shown on the rigging diagram. Adjust cables so that when the proper tension is reached, control wheels will be in the neutral position.

d. Rig quadrant to bellcrank cables to tension shown on the rigging diagram. Aileron bellcrank should be parallel with the wing rib when proper cable tension has been reached.

e. Set the aileron in neutral by adjusting the length of the push-pull tube. Loosen the locknuts on both ends and turn the tube to shorten or lengthen. The aileron is in neutral when its trailing edge aligns with the trailing edge of the wing tip and its inboard end is parallel with the outboard end of the flap. A horizontal misalignment of plus or minus 3/16 inches is allowed between trailing edges of the aileron and wing tip. Aileron surfaces must align with upper and lower surfaces of the wing within 1 16 inch. Aileron and connecting linkage may have a maximum of 1/16 inch lost motion. Check for lost motion at the midpoint of the aileron trailing edge.

f. Remove the quadrant rig pin.

g. Adjust the aileron travel as shown on the rigging diagram with the adjustable stops provided on the bellcrank in the wings.

NOTE

Perform a visual check to make sure that the aileron movement corresponds to the movement of the control wheel.

RIGGING THE AILERON TAB

a. Disconnect the tab from the tab actuator.

b. Set the control wheel on the pedestal so the cable turnbuckles are opposite each other.

c. Rig cables to tension shown on rigging diagram.

d. Position the actuator screw in the mid-point of its travel.

e. Connect the tab to the actuator and adjust the actuator linkage until the tab is in neutral.

f. Adjust the aileron tab travel as shown in the rigging diagram by adjusting the cable stop bolts in the left hand wheel well.

g. With the tab in neutral position, check the tab indicator, if it does not read "O", the indicator must be set. Refer to Aileron tab Indicator Adjustment.

NOTE

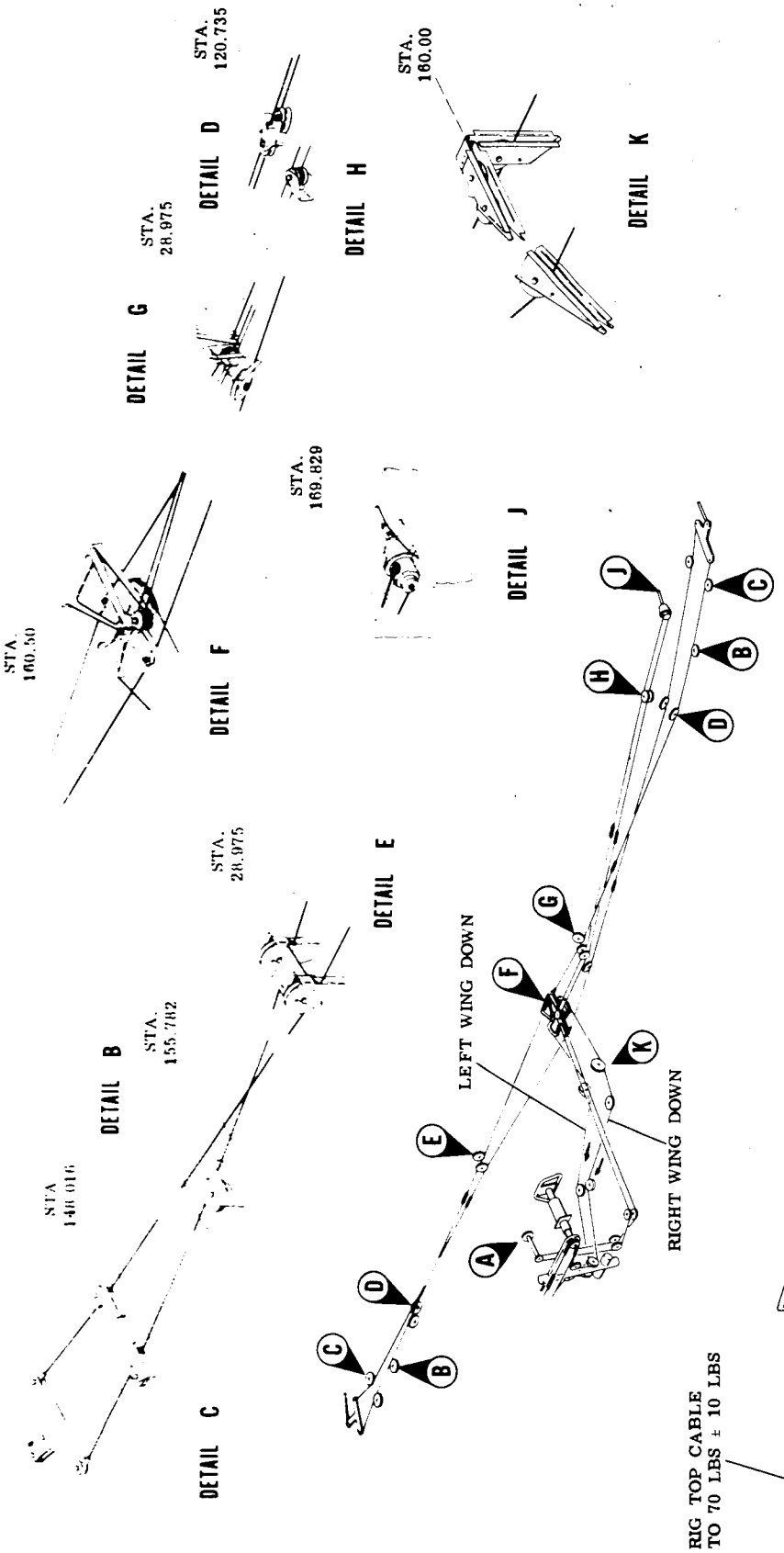
Perform a visual check to make sure the aileron tab movement corresponds to the movement indicated on the tab indicator: right wing up, tab down; left wing up, tab up.

AILERON TAB INDICATOR ADJUSTMENT

a. Place the tab in the neutral position.

b. Remove the aileron tab control wheel by removing the retainer ring and pin.

c. Remove the trim tab indicator panel on the pedestal by removing the four bolt lights.



SYSTEM	CABLE TENSION	SURFACE TRAVEL
Aileron	1/8 inch 40 lbs. +5 -0 lbs. 3/16 inch 50 lbs. +5 -0 lbs.	20° ±1-1/2° Up and Down
Aileron Tab	10 lbs. +3 -2 lbs.	7-1/2° ±1-1/2° Up and Down
Aileron Tab Anti-Servo		14° +2 -1 Up 8° +2 -0 Down

Figure 3-1. Aileron Control System

d. Remove the access panel on the right side of the pedestal.

e. Remove the cotter pin which holds the indicator dial drum in mesh with the drum shaft.

f. Push the indicator dial drum out of gear and turn the dial face to "O".

g. Remesh the indicator dial drum and install the cotter pin.

h. Reinstall panels and aileron tab control wheel.

RIGGING THE RUDDER CONTROL SYSTEM

a. Release rudder pedal adjusting levers and place all pedals in the aft position.

b. Install rig pin in the holes provided in the pilot's rudder pedals.

c. Adjust copilot's pedals to the neutral position by lengthening ot shortening the push-pull tube between the bellcranks.

d. Rig the cables to the tension shown in the rigging diagram. The adjustment should be made on both cables so that rudder will be positioned in neutral when the correct cable tension is reached.

e. Remove rig pin from pilot's rudder pedals.

f. Adjust the forward lefthand bellcrank stops to produce 27° ±1/2° rudder surface travel left and right.

g. Adjust the rudder travel as shown on the rigging diagram with the adjustable stops provided on the rudder lower hinge assembly.

NOTE

Perform a visual check to make sure that rudder movement corresponds to the movement of the rudder pedals.

RIGGING THE RUDDER TAB

a. Disconnect the tab from the tab actuator.

b. Set the control wheel on the pedestal so the cable turnbuckles are opposite each other.

c. Rig cables to tension shown on rigging diagram.

d. Position the actuator screw in the mid-point of its travel.

e. Connect the tab to the actuator and adjust the actuator linkage until the tab is in neutral.

f. Adjust rudder tab travel as shown in the rigging diagram by adjusting the cable stop bolts in the fuselage tail section.

g. With the tab in neutral position check the tab indicator, if it does not read "O", the indicator must be set. Refer to Rudder Tab Indicator Adjustment.

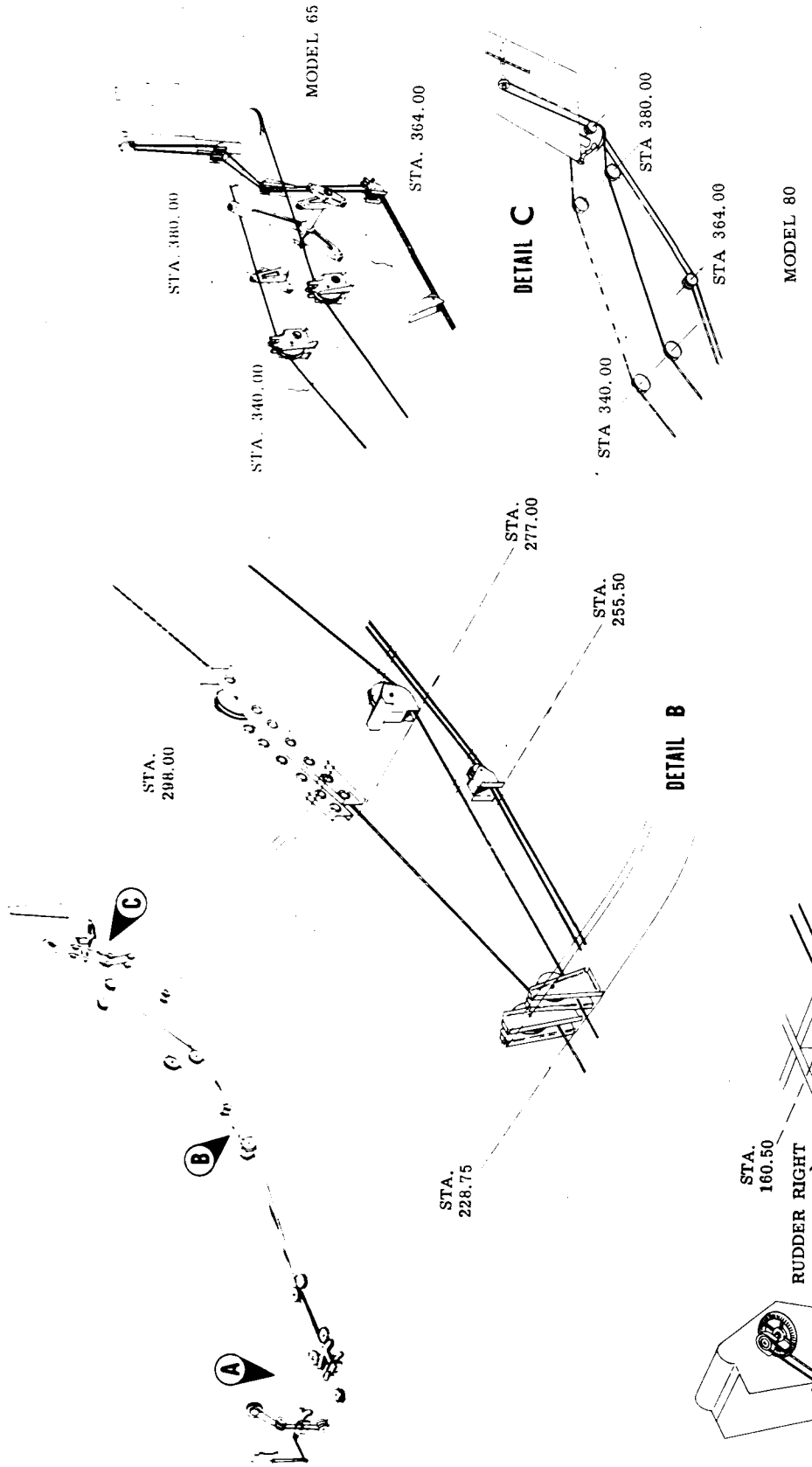
NOTE

Perform a visual check to make sure that rudder tab movement corresponds to the movement indicated on the tab indicator; "Nose Left", tab moves right; "Nose Right", tab moves left.

RUDDER TAB INDICATOR ADJUSTMENT

a. Place the tab in neutral position.

b. Remove the aileron tab control wheel by removing the retainer ring and pin.



SYSTEM	CABLE TENSION	SURFACE TRAVEL
RUDDER	75 LBS. + 5 - 0 LBS.	25° ± 1° LEFT and RIGHT
RUDDER TAB	10 LBS. + 3 - 2 LBS.	30° ± 1-1/2° LEFT and RIGHT

Figure 3-2. Rudder Control System

c. Remove the trim tab indicator panel on the pedestal by removing the four bolt lights.

d. Remove the round access panel on the lower front side of the pedestal.

e. Remove the access panel on the right side of the pedestal.

f. Remove the cotter pin which holds the indicator dial drum in mesh with the drum shaft.

g. Push the indicator dial drum out of gear and turn the dial face to "O".

h. Remesh the indicator dial drum and install the cotter pin.

i. Reinstall panels and aileron tab control wheel.

RIGGING THE ELEVATOR CONTROL SYSTEM

a. Install rig pins in the elevator quadrant and bellcrank.

b. Adjust the aft push-pull rods to bring the elevators to the neutral position.

c. Adjust the quadrant push-pull tube so that control lock pin can be installed through the control column assembly.

d. Rig the cables to the tension shown on rigging diagram.

e. Remove the rig pins.

f. Adjust the elevator surface travel as shown on the rigging diagram with the adjustable stops provided on the elevator horns. After elevator travel has been set, adjust forward quadrant stops so that 1/16 inch + 1/16 -0 inch clearance is maintained.

NOTE

Perform a visual check to make sure the elevator movement corresponds to the movement of the control column.

RIGGING ELEVATOR TAB

a. Disconnect the tab from the tab actuator.

b. Set the control wheel on the pedestal so the forward turnbuckles are opposite each other.

c. Rig cables to tension shown on rigging diagram.

d. Connect the tabs to the actuator and adjust the actuator linkage until the tab is in neutral.

e. Adjust elevator tab travel as shown in the rigging diagram by adjusting the cable stop bolts in the fuselage tail section.

f. With the tab in neutral position check the tab indicator, if it does not read "O" the indicator must be set. Refer to Elevator Tab Indicator Adjustment.

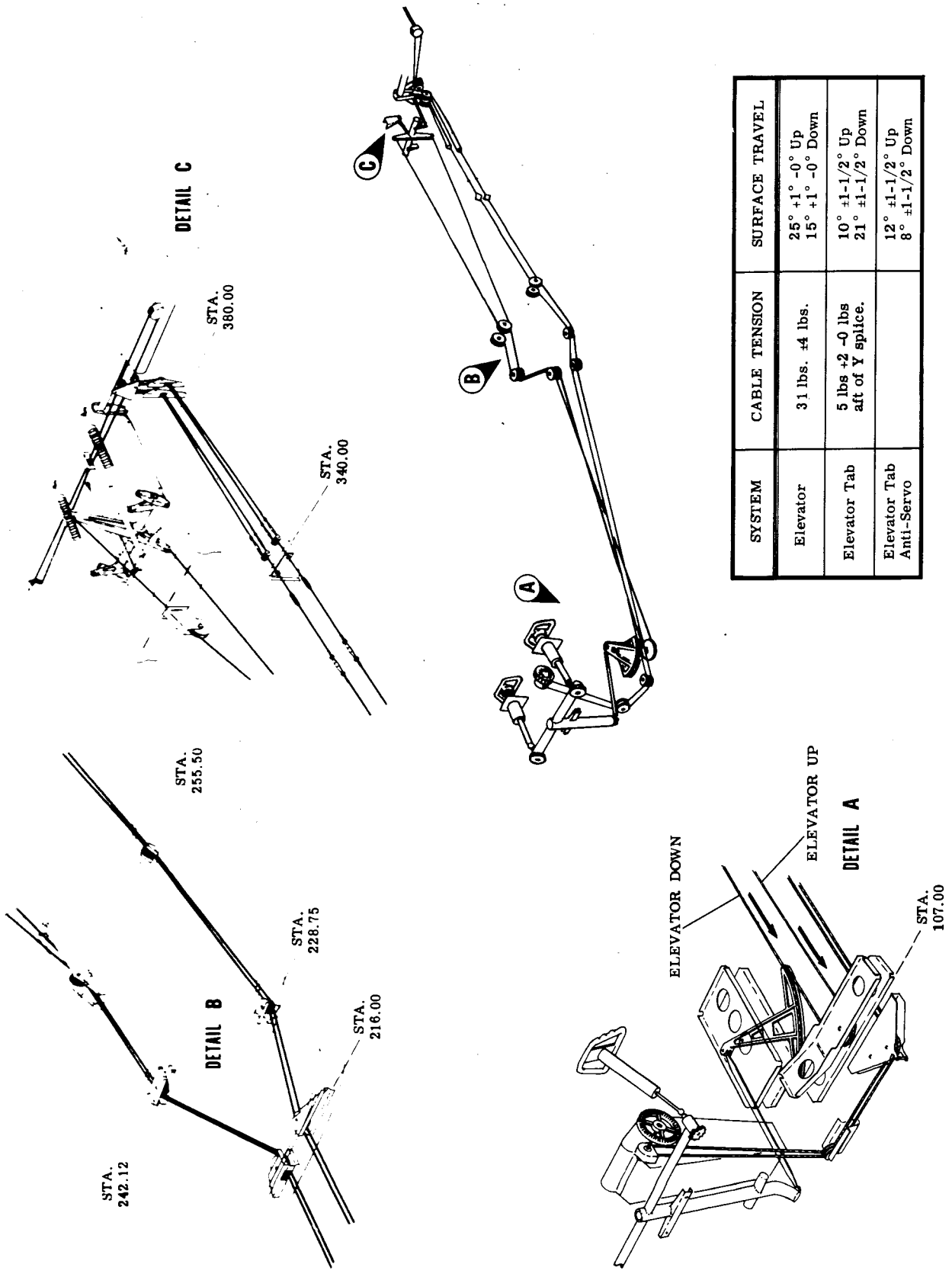
NOTE

Perform a visual check to make sure that the tab movement corresponds to the movement indicated on the tab indicator: "Nose UP", tab down; "Nose Down", tab up.

ELEVATOR TAB INDICATOR ADJUSTMENT

a. Place the tab in the neutral position.

b. Remove the aileron tab control wheel by removing the retainer ring and pin.



SYSTEM	CABLE TENSION	SURFACE TRAVEL
Elevator	31 lbs. ±4 lbs.	25° +1° -0° Up 15° +1° -0° Down
Elevator Tab	5 lbs +2 -0 lbs aft of Y splice.	10° ±1-1/2° Up 21° ±1-1/2° Down
Elevator Tab Anti-Servo		12° ±1-1/2° Up 8° ±1-1/2° Down

Figure 3-3. Elevator Control System

c. Remove the trim tab indicator panel on the pedestal by removing the four bolt lights.

d. Remove the access panel on the left side of the pedestal.

e. Remove the cotter pin which holds the indicator dial drum in mesh with the drum shaft.

f. Push the indicator dial drum out of gear and turn the dial face to "O".

g. Remesh the indicator dial drum and install the cotter pin.

h. Reinstall panels and aileron tab control wheel.

BALANCING CONTROL SURFACES

The movable control surfaces are carefully balanced to obtain adequate static and dynamic balance. A specified limitation of tail heavy balance is of great importance to flight safety. Ordinarily, a control surface should not have to be rebalanced unless it is repainted, repaired, or component parts are replaced.

NOTE

When any of the surfaces are being repainted; suspend them by trailing edge, so the excess paint will drain towards the leading edge.

While determining a scale reading, the chord line of the surface must be in a horizontal position.

NOTE

To determine when the control surface chord line is in a horizontal position, locate the chord line at the inboard end of the surface. Place a straight edge at the inboard end of the surface so that one end is on the hinge center line and the other end is centered on the trailing edge. Mark the chord line in grease pencil or other suitable method on the rib at the inboard end. When determining the horizontal chord line during balancing procedure, hold a bubble protractor or level on the marked chord line and adjust the spindle until the bubble is centered.

BALANCING THE ELEVATOR

Static tail heaviness of beaded elevators must not exceed 14.0 inch-pounds and smooth-skinned elevators must not exceed 18.7 inch-pounds in static tail heaviness. To measure the balance, place the elevator on a jig as shown in the illustration with platform scales under the trailing edge. Support the trailing edge with a spindle positioned on the scales. To determine the amount of tail heaviness present, use the following equation:

Static Tail Heaviness D(W-S)

D = Distance in inches from hinge center line to point where spindle supports the elevator.

W = Scale reading of platform scale in pounds.

S = Weight of Spindle (in pounds) used to support trailing edge of elevator.

A nut plate is installed in the outboard hinge cutout for the addition of lead washers to compensate for excessive tail heaviness (See illustration). If the static tail heaviness exceeds the maximum, add the amount of 183809 washers, not to exceed five, required to balance the elevator within its required limits.

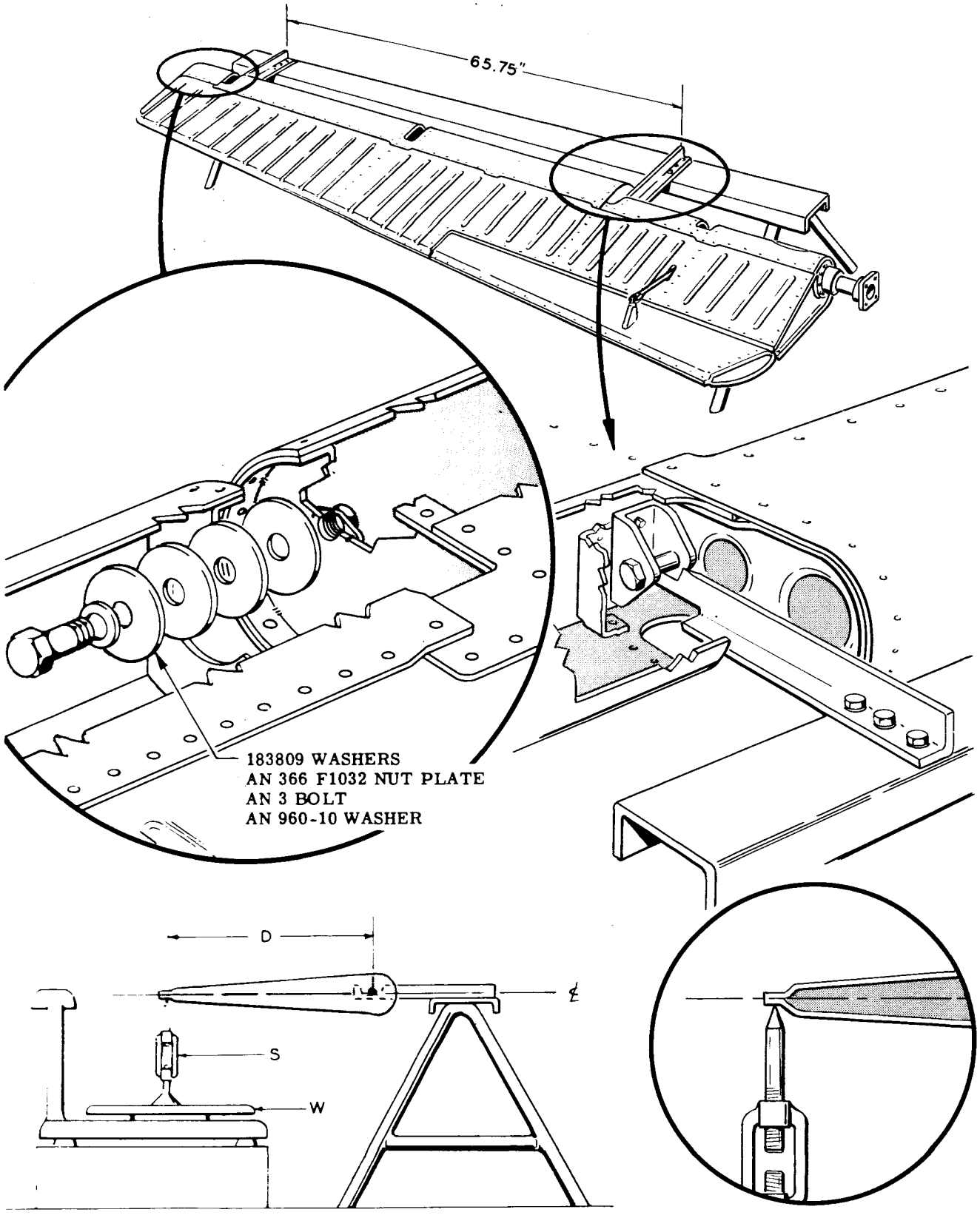


Figure 3-4. Balancing Elevator

BALANCING THE RUDDER

Model 65 rudder tail heaviness should be between 28.9 and 38.9 inch-pounds measured with tab and its attaching parts installed. Maximum static underbalance of the Model 80 rudder with its tab, tab actuator and attaching parts installed is 49.0 inch-pounds. To balance the rudder, place the rudder on a jig with a platform scale under the trailing edge as shown in Figure 3-5. Support the trailing edge with a spindle positioned on the scale platform. To determine the rudder balance use the equation below:

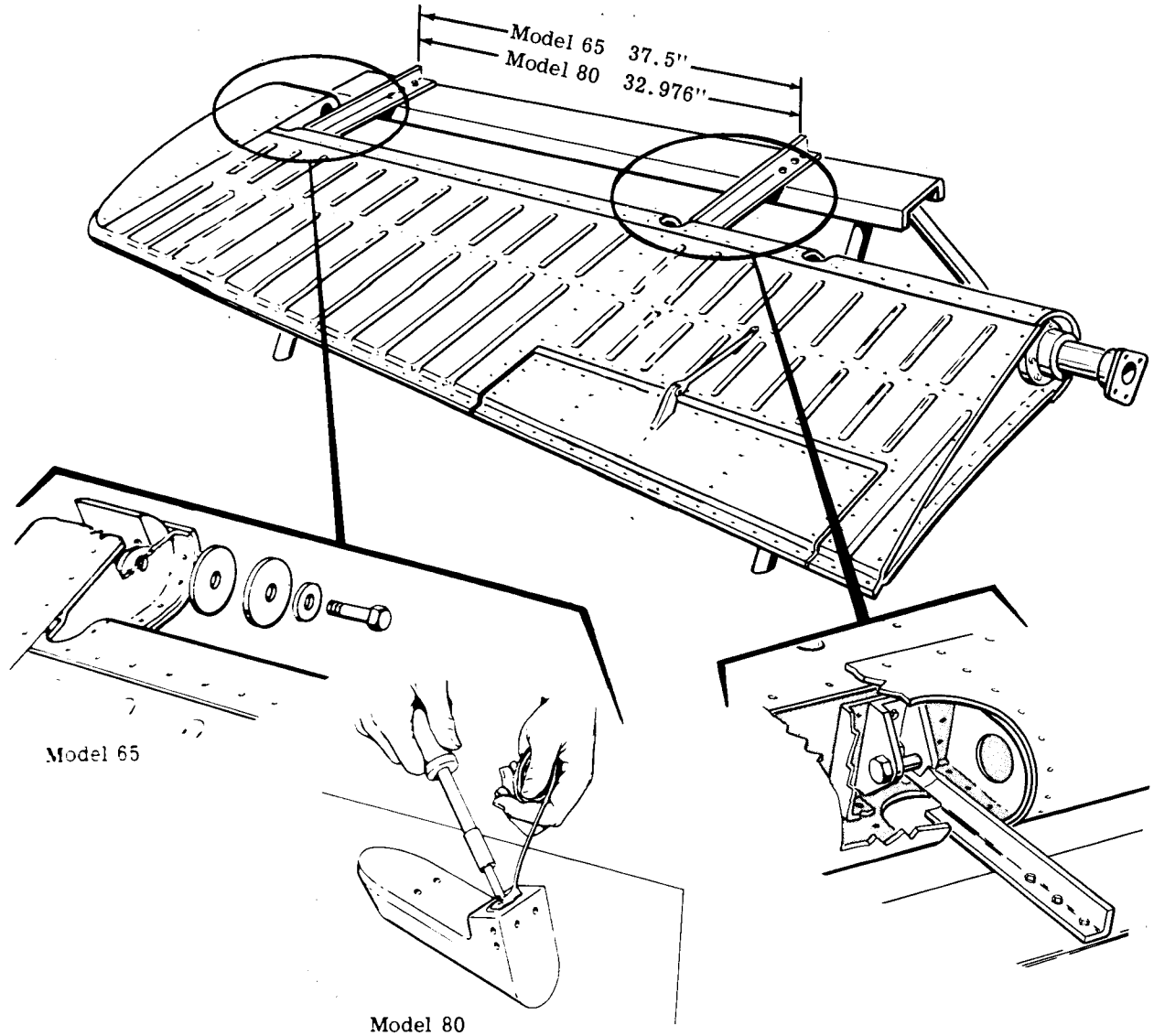
Static Tail Heaviness = D(W-S)

D = Distance in inches from hinge center line to point where spindle supports the rudder.

W = Scale reading of platform scale in pounds.

S = Weight of spindle (in pounds) used to support trailing edge of rudder.

A nut plate is installed in the counterbalance portion (tip) of the Model 65 rudder for addition of lead washers to compensate for excessive tail heaviness. If the static tail heaviness exceeds 38.9 inch-pounds, add the amount of 183890 washers, not to exceed six, required to balance the rudder within its required limits. Remove the Model 80 rudder horn weight and add or remove solder to bring the balance to 49.0 inch-pounds or less. Coat the weight with a correction preventive material such as zinc chromate primer. Replace the rudder horn weight and recheck the rudder balance.



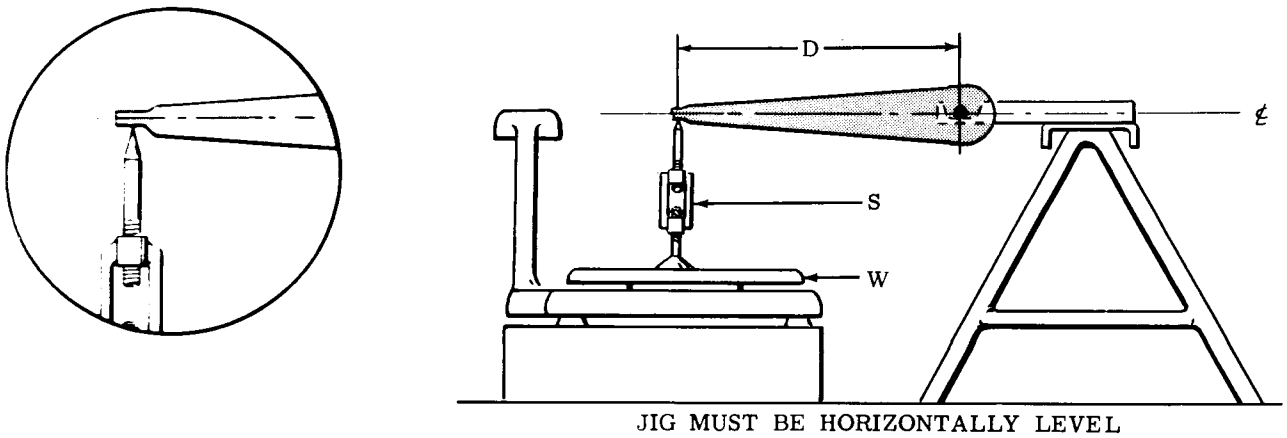


Figure 3-5. Balancing Rudder

BALANCING THE AILERON

The aileron should be nose heavy by 0.2 to 1.5 inch-pound. Check its balance by placing the aileron on a jig as shown in the illustration. Support the leading edge with a spindle resting on a platform as shown in the illustration. To determine the amount of nose heaviness present, use the following equation:

Static Nose Heaviness = D(W-S)

D = Distance in inches from hinge center line to point where spindle supports the aileron.

W = Scale reading of platform scale in pounds.

S = Weight of spindle (in pounds) used to support leading edge of aileron.

Assume the surface has a .72 inch-pound tail heavy balance. Add 0.2 (minimum nose heavy balance) and we have .92 inch-pound total tail heavy balance of the control surface. To determine the amount of weight to be added, use the following formula:

Y(X = B

Y = Distance in inches from hinge center line to center line of the balance weights to be installed. (using 3 inches as an example).

X = The unknown weight to be added or removed.

3X = 0.92

X = 0.306 lbs. of weight to be added.

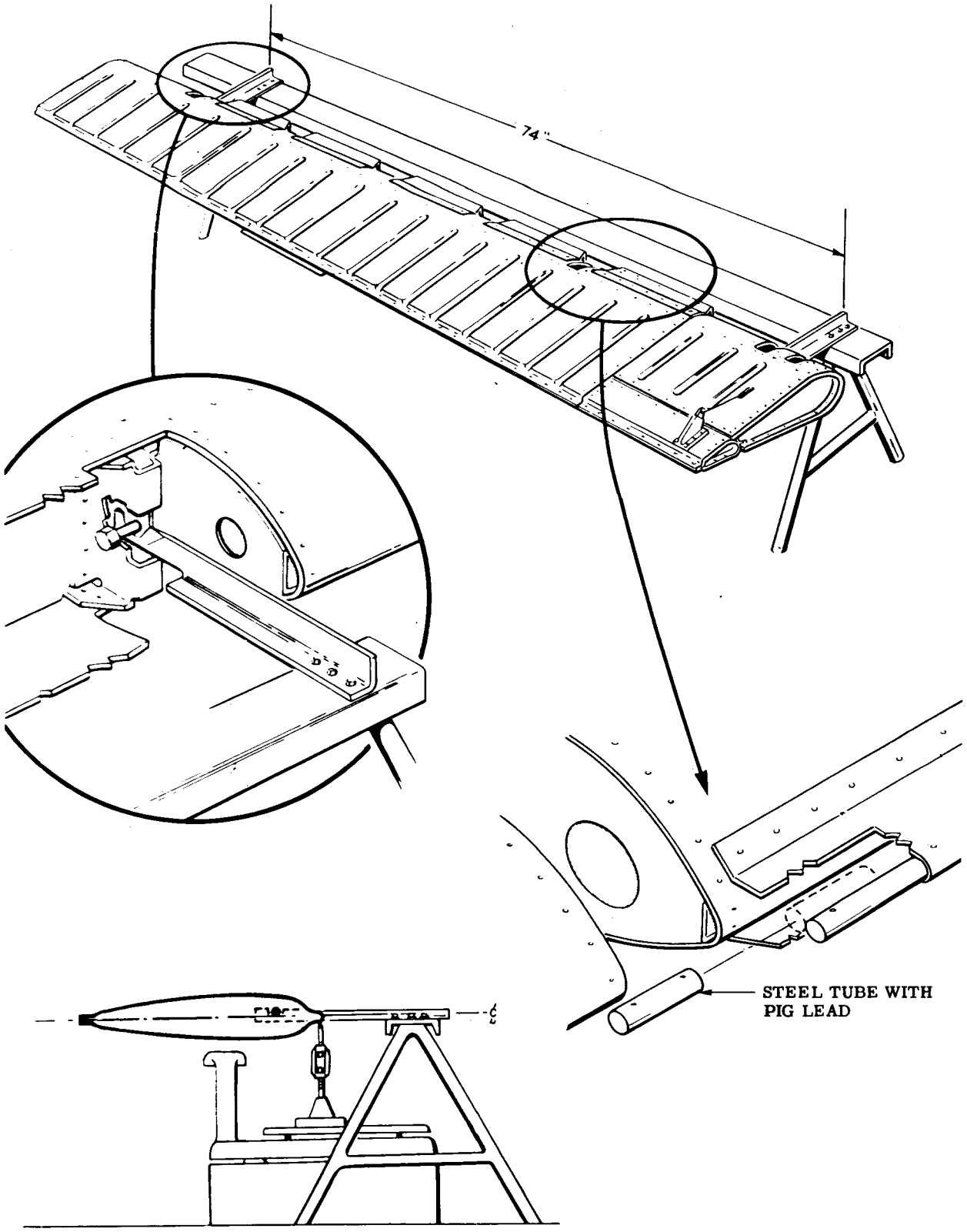


Figure 3-6. Balancing Aileron

RIGGING WING FLAP CONTROL SYSTEM

Flap surfaces must align with upper and lower surfaces of the wing within 1/16 inch.

A horizontal misalignment of 1/4 ± 1/4 inches is allowed between the outboard flap and aileron with the aileron above.

The outboard flap may vary from 1/2 inch above to 1/4 inch below the inboard flap at the trailing edge.

The flap travel is adjusted by moving the limit switches. The right inboard flap is rigged first, then the others are synchronized with it. Rig as follows:

a. Adjust the up limit switch so the trailing edge of the flap fairs flush with the bottom of the fuselage.

b. Adjust the down limit switch for 30° ± 1° travel of flap.

c. Synchronize the other three flaps by removing the bolts from the actuator arms at the flaps and screwing the arms in or out of the actuators.

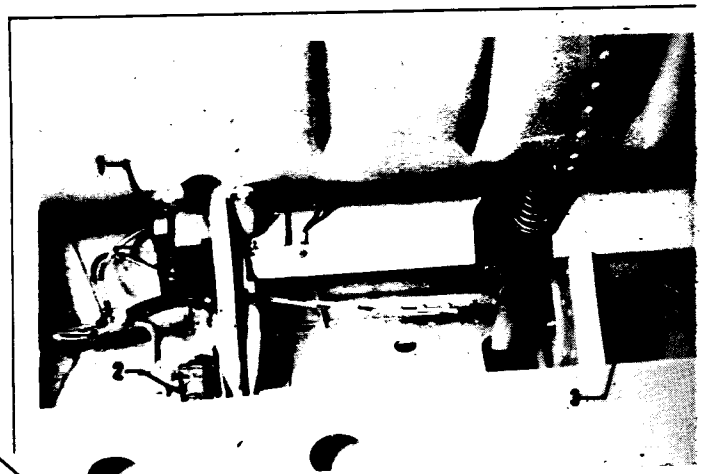
d. After rigging has been completed, run flaps down and check cockpit position indicator. If the indicator does not show 100% flaps, loosen the transmitter arm bolt and rotate transmitter shaft until reading is correct, then tighten transmitter arm bolt.

e. Run flaps up and check cockpit position indicator for 0% flaps. If indication is not correct, lower flaps and lengthen (if greater than 0%) or shorten (if less than 0%) the position transmitter fork to correct approximately one-half the indication discrepancy.

f. After indicator travel has been corrected, readjust the transmitter arm as in step "d" above.

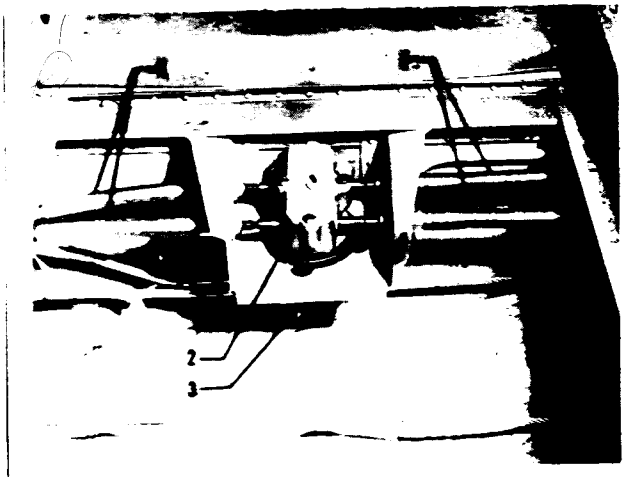
CAUTION

If flaps are removed for any reason the flap actuator switch should be in the "OFF" position or the main power switch "OFF".

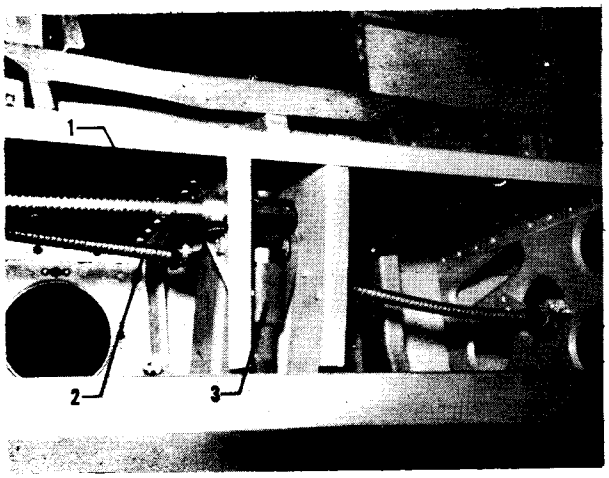


1. FLAP DOWN LIMIT SWITCH
2. FLAP UP LIMIT SWITCH
3. FLAP POSITION TRANSMITTER

NOTE:
FLAP MOTOR MINIMUM
BRUSH LENGTH 1/4 INCH



1. FLAP ACTUATOR DRIVE SHAFTS
2. FLAP GEAR BOX
3. FLAP MOTOR



1. INBOARD FLAP DRIVE SHAFT
2. OUTBOARD FLAP DRIVE SHAFT
3. ACTUATOR

Figure 3-7. Flap System

LANDING GEAR MANUAL CLUTCH ADJUSTMENT -

The manual clutch should be adjusted to allow 1/16-inch clearance between clutch teeth when fully disengaged. This clearance can be obtained by adding or removing space washers on the bolt connecting the throw out arm to the linkage.

LANDING GEAR OVERLOAD CLUTCH TESTING AND ADJUSTMENT

The landing gear overload clutch can be checked and adjusted by the following procedure:

a. With airplane on jacks, place a short length of steel pipe or similar support between the main gear axle and the landing gear support leg on the side of the wheel well.

b. Place strap wrench around overload clutch housing and manually raise gear until positive stops bottom on pipe.

NOTE

Do not turn the gear against the down stops.

c. Attach spring scale to handle of wrench, measuring from point of attachment to center line of clutch to determine length of arm.

d. Clutch should slip at a torque of 290 inch-pounds plus or minus 20 inch-pounds. (A scale reading of 49 pounds on the scale, if attached 6 inches from the clutch center line, indicates a torque of 290 inch-pounds).

e. If not within tolerances, loosen lock screw on tension nut and spread slightly, if seized. Using Spanner Wrench 180131, tighten nut to increase tension or loosen to decrease it. Tighten lock screw on nut and resafety.

f. Following inspection and clutch adjustment, check the synchronization of the landing gear in both the extended and retracted position. Refer to Landing Gear Rigging.

RIGGING THE LANDING GEAR

Following the repair or replacement of any part of the landing gear retract system, place the airplane on jacks and check the rigging of the landing gear in both extended and retracted position. There are several adjustments which will alter the travel of the retract mechanism; a combination of these adjustments may be required to synchronize all three gears to identical ranges of travel.

CAUTION

Following any rigging adjustment, the retract mechanism should be operated cautiously as it nears extreme of travel, in order to prevent damage from possible overtravel. With master switch off, position the landing gear switch for the desired direction of travel. The gear then may be moved to any intermediate position and stopped for synchronization checks by operating the master switch until the desired position is reached.

The nose gear should be rigged first, then the main gears. Before starting nose gear rigging, disconnect both main gear actuators by removing the bolts from the universal joints nearest the actuator.

a. A major adjustment of the nose gear can be made by removing the bolt securing the jackscrew actuator to the drag leg and turning the screw (a half turn at a time) in or out as required.

When fully extended, the actuator spring should have a minimum compression of .125 inch with a minimum of .020 inch clearance between the active coils of the spring.

CAUTION

The actuator clevis must align freely with the drag brace fitting. If any misalignment is evident, loosen the actuator support bolts, realign the clevis and retighten the bolts. Failure to maintain proper alignment may result in galling of the actuator nut.

b. Adjust the long chain by applying a 9 to 11 pound load on the lower strand of chain at a point approximately half way between the first and second sprockets forward of the main spar. The forward sprocket is located on the bulkhead approximately even with the control pedestal and the aft sprocket is located on the bulkhead just forward of the main spar carry-through structure. A 9 to 11 pound load should deflect the chain 1 inch ± 1/16 inch. Access to the check point is through the opening near the center of the belly aft of the nose gear doors.

c. Adjust the short chain through the access plate on the right side of the nose wheel well. A load of 7 to 9 pounds on the lower strand between the two exposed lower sprockets should deflect the chain 1/4 inch ± 1/6 inch.

d. With gear down and locked, adjust down-limit switch, located near the center of the front spar, with the hexagonal mounting nuts so that plunger is depressed 1/16 inch beyond point where switch clicks. Completely retract gear and again extend it without stopping in an intermediate position. Make fine adjustments with above mounting nuts, if necessary, to compensate for slight "coast" and backlash of system. Switch should cause actuator to stop when actuator shock spring is compressed a minimum of .125 inch with a minimum of .020 inch clearance between the active coils of the spring.

e. Retract gear until positive up stops are approximately 1/16 inch apart. Adjust up-limit switch with hexagonal mounting nuts so that plunger is depressed 1/16 inch beyond point where switch clicks. Completely extend gear and again retract it without stopping in an intermediate position. Make fine adjustments with above mounting nuts, if necessary, until switch stops retraction when positive up stops are 1/16 inch ± 1 16 inch apart.

f. Completely extend the landing gear.

g. A major adjustment of the main gears may be made at the point where they were disconnected for nose gear rigging by turning the actuator drive shaft (with a pin inserted through the shaft hole) to actuate the jackscrew to the desired position, or by removing the bolt securing the jackscrew actuator to the drag leg and turning the screw (a half turn at a time) in or out as required. Fine adjustments of the main gear may be obtained by changing the position of the universals (at the wing root) on their splined drives. When fully extended, the actuator spring should have a maximum length of .78 inch with a minimum of .020 inch clearance between the active coils of the spring.

When fully retracted, there should be a 1/16 inch +1/4 -1/16 inch clearance between each wheel axle and its up-stop bumper.

NOTE

When the main landing gear doors are properly rigged to the "UP" position, considerable "play" in the doors and linkage can be noted when the gear is in the "DOWN" position.

h. After the system has been rigged and inspected, the down-lock position switch should be checked. Manually disengage down lock and slowly engage it again, observing where click occurs. Lower edge of switch housing should move approximately 7/32 inch after click, before reaching end of its travel. To adjust down-lock switch, remove safety wire from the two hexagonal mounting bolts and loosen slightly. Move switch in elongated holes until desired action is attained, tighten bolts and safety. Test retraction system for proper operation of horn and light through at least one complete cycle.

i. With gears down, check the adjustment of the safety switch. Place a small jack under shock strut and raise until shock absorber is compressed .50 inch ±.12 inch from fully extended position. At this point the actuator should just barely click the safety switch, if not, loosen the switch mounting clamp and readjust the switch. After switch is adjusted lower strut and remove jack.

j. Remove aircraft from jacks.

NOSE STEERING LINK INSPECTION

The nose gear steering linkage should be inspected every 100 hours for excess end play in the rod assembly. Remove the nose steering link, located on the left side of the nose wheel well, from the idler arm. Check the end play of the rod assembly and if play exceeds .030 inch it can be taken up as follows:

a. Remove the wire snap ring from the end of the barrel assembly and slide the spring cartridge out of the barrel. Check the spring retainer nut for tightness.

b. End play is removed by adding 100951-DD-032-101-117 washers between the spring cartridge and the retainer as needed. If more than three washers are required to take out the end play, check for a broken spring.

c. Insert the spring cartridge into the barrel and secure with the wire snap ring.

d. Recheck the rod assembly for the correct tolerance of end play.

e. Reinstall the nose steering link.

NOSE WHEEL STEERING MECHANISM ADJUSTMENT

The nose wheel should be parallel to the fore and aft centerline of the airplane with the rudder pedals in the neutral position. If an adjustment is needed, adjust the steering link in the nose wheel well by screwing the end fitting either in or out until the misalignment is corrected.

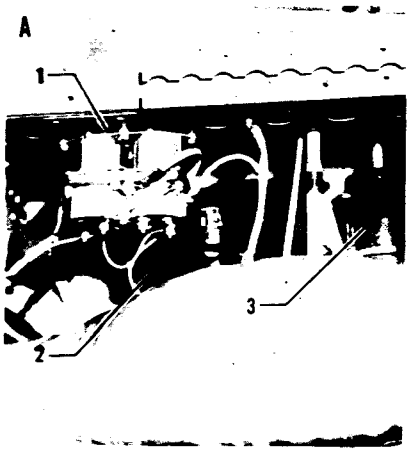
THROTTLE WARNING HORN ADJUSTMENT

A cam-operated switch is connected to each throttle linkage in the pedestal. The switches are wired so that closing either or both throttles beyond a safe flight setting with the gear retracted will sound the warning horn intermittantly. Adjustment of the throttle warning horn switch is as follows:

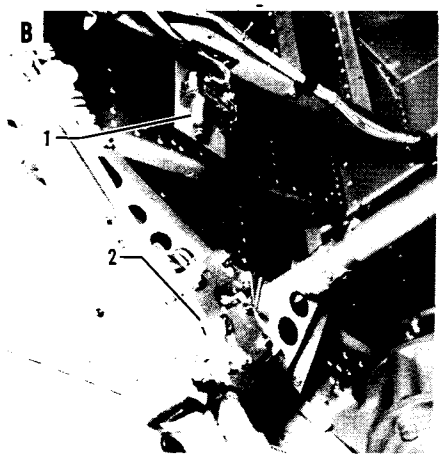
a. Set the parking brake, chock the wheels, and start the engines.

b. Advance the throttles to obtain approximately 14 inches Hg. manifold pressure with propellers in low pitch.

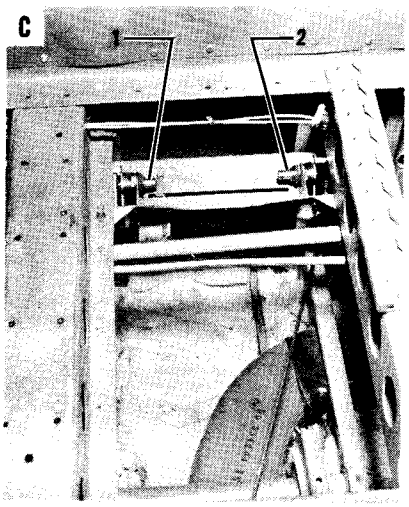
c. Shut the engines down with the Idle Cut-Off, leaving the throttle setting the same.



1. LANDING GEAR CONTROL RELAY
2. LANDING GEAR MOTOR
3. LANDING GEAR GEARBOX

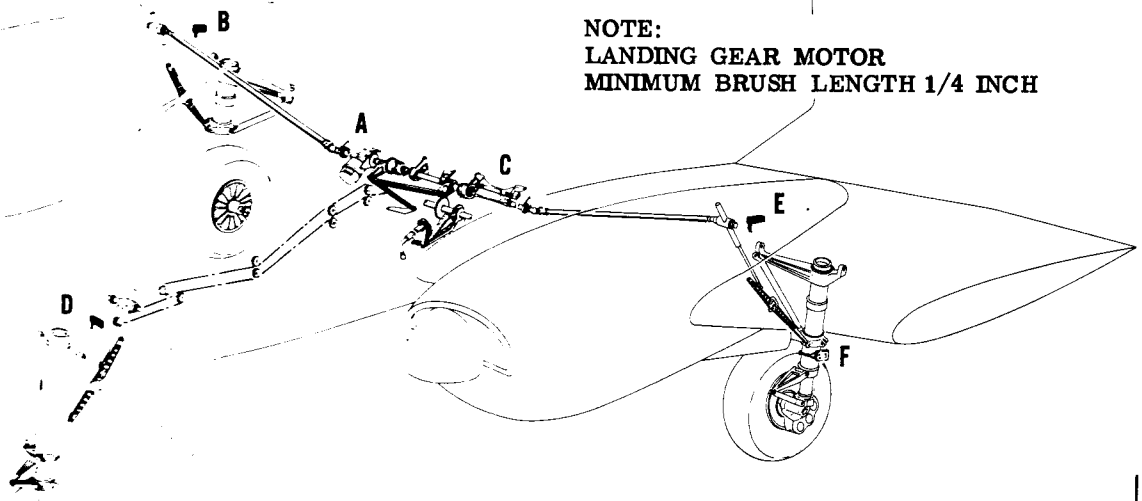


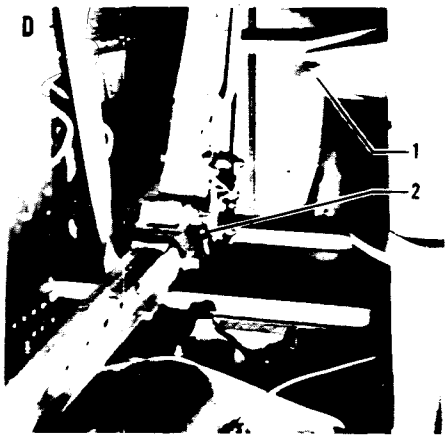
1. R.H. GEAR UP INDICATOR SWITCH
2. R.H. GEAR DOWN INDICATOR SWITCH



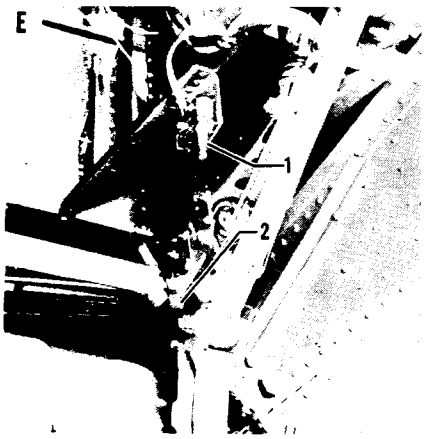
1. DOWN LIMIT SWITCH
2. UP LIMIT SWITCH

NOTE:
LANDING GEAR MOTOR
MINIMUM BRUSH LENGTH 1/4 INCH

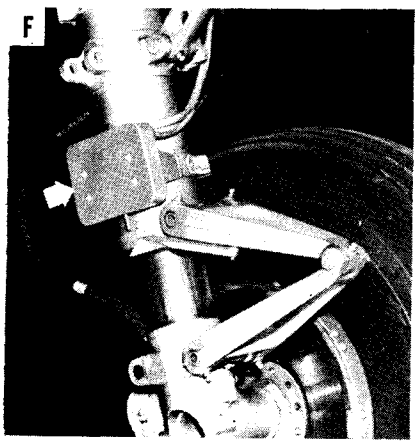




1. NOSE GEAR UP INDICATOR SWITCH
2. NOSE GEAR DOWN INDICATOR SWITCH



1. L.H. UP INDICATOR SWITCH
2. L.H. DOWN INDICATOR SWITCH



LANDING GEAR SAFETY SWITCH

Figure 3-8. Landing Gear System

d. Adjust the cam linkage until the switch just clicks.

e. Flight test the airplane to assure correct adjustment.

BLEEDING THE BRAKE SYSTEM

Brake system bleeding will be required any time the system is opened any place from the master cylinder inlet to the wheel brake assembly or in the event the brakes become spongy in service. The latter case is ordinarily an indication of a leak in the system and the system should be checked.

The brakes may be bled using any of the several proven methods for brake bleeding. However, the most efficient system is back-bleeding using a pressure pot and bleeding the system from the wheel cylinder up, in the following manner:

a. Drain the hydraulic reservoir.

b. Disconnect the system supply line from the reservoir.

c. Connect an extension line approximately three feet long to the brake supply line and place the open end in a clean container.

d. Connect the pressure pot to one of the wheel cylinder bleeder valves.

e. Maintain a pressure of approximately 15 pounds on the pressure pot and open the bleeder valve. Bleed the pilot's brake until all evidence of sponginess is gone. When the pilot's brake is satisfactory, close the valve on the pressure pot and pump the copilot's brake pedal to change the shuttle valve position so the fluid will be routed through the copilot's brake system. Bleed the copilot's brakes in the manner described above for the pilot's brakes. After the pilot's and copilot's brakes for one wheel are bled, close the bleeder valve and repeat the process for the other wheel.

f. Remove the supply line extension hose and connect the supply line to the reservoir.

g. Fill the hydraulic reservoir to within one inch of the top.

h. Check the brake operation; pedal pressure should be equal on both pedals.

ADJUSTMENT OF THE BRAKE MASTER CYLINDER LINKAGE

a. Loosen lock nut on piston shaft.

b. Remove pin from clevis on back of rudder pedal and slide clevis free of lug.

c. Adjust length of shaft by turning clevis on or off shaft. A maximum of 7 threads on the shaft can be exposed.

d. Reinstall clevis and pin, safety the pin and tighten lock nut.

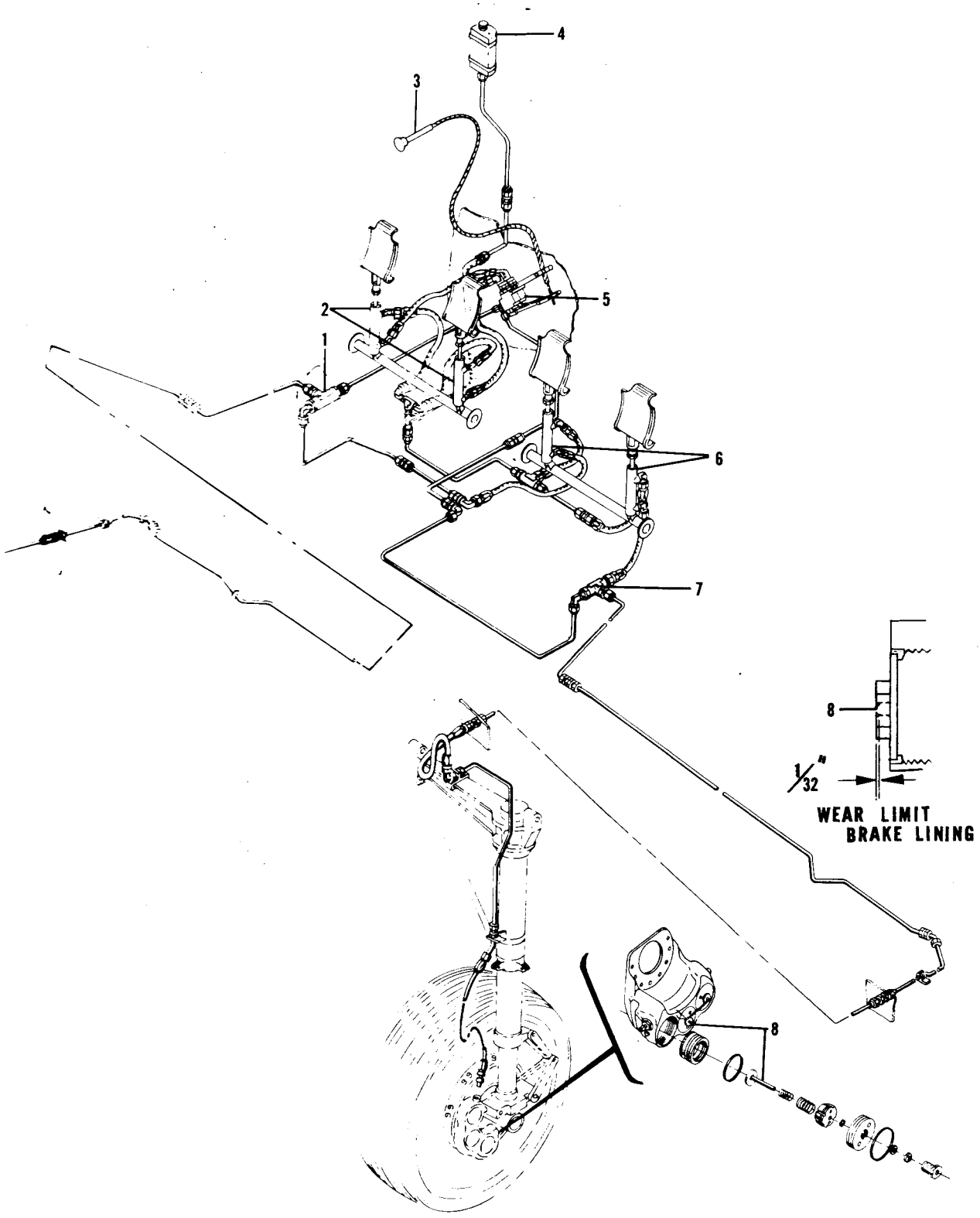
ADJUSTMENT OF PARKING BRAKE CONTROL

When a parking brake valve has been replaced, it is important that full travel of the parking brake valve be maintained. Adjust as follows:

Loosen the phenolic block bolts and reposition the outer housing of the brake control in the blocks so that the pushing in of the brake control will fully open the parking brake valve.

BRAKE WEAR LIMITS

New brake linings should be installed on Goodyear brakes when the adjusting pin is recessed 1/32-inch inside the self adjusting nut. (See figure 3-9). Brake discs which have dished in excess of 1/16-inch or have worn to 0.337-inch minimum thickness should be removed and new discs installed. Also remove brake discs which have the keyways worn in excess of 1.188-inch in width and install new discs. On Cagle Brakes, install new linings when the adjusting pin is flush with the cylinder head.



1. L.H. Shuttle Valve
2. Pilot's Master Cylinders
3. Parking Brake Control
4. Hydraulic Fluid Reservoir
5. Parking Brake Valve
6. Copilot's Master Cylinders
7. R.H. Shuttle Valve
8. Adjusting Pin

Figure 3-9. Brake System

HEATING AND VENTILATING SYSTEM

Ram air pressure supplies the heating and ventilating system with fresh air while the airplane is in flight. For ground operations, a blower supplies air through the hot air duct outlets. Power for the blower is provided by the HEATER AND BLOWER switch and is controlled by a switch on the landing gear which permits the blower to operate only when the landing gear strut is compressed. For cooling on the ground, turn the HEATER CONTROL switch "OFF" and turn the HEATER BLOWER switch to the "ON" position. The heater then, is cut out of the system and the blower impels cool air from the screened intake on the top of the nose through the air ducts.

Fuel under pressure is supplied to the heater combustion chamber from the left engine fuel pump. The proper fuel air ratio being delivered is maintained by a regulator; sensitive to dynamic air control; mounted on the left side of the nose wheel well and two solenoid valves, one located in the left engine compartment and one mounted on the right side of nose wheel well, prevent any seepage of fuel when the heater is not operating. When the HEATER AND BLOWER CONTROL switches are in the "ON" position, ignition is continuously supplied to the combustion chamber spark plug. Fuel flow, however, and consequently, cabin temperature, is governed by a sensing element in the cabin exit air vent which acts in conjunction with the other elements in the electronic control system.

The heater can be operated by two methods, Manual or Automatic. A MANUAL-AUTO heater control selector switch permits the pilot to select the desired method of operation of the heater.

For normal operation, the HEATER AND BLOWER switch and the HEATER CONTROL switch are flipped up and the MANUAL-AUTO switch is toggled to "AUTO". This combination sets up circuits that provide thermostatic temperature regulation. With switches in this position, the heater is controlled by heat sensing elements wired into an automatic heat control system set up in a Wheatstone Bridge arrangement. Comprising this system are the outside air sensing element, located on the rear face of the forward plunum assembly; the heater discharge sensing element, mounted in the hot air exit duct of the rear plunum chamber; and the cabin air sensing element positioned in a panel overhead, just aft of the cockpit entry. Two rheostats, one in the cockpit and the other in the cabin, selects cabin temperature. The CABIN-COCKPIT switch on the left subpanel, determines which of these rheostats will be used to control the temperature throughout the aircraft. The operation of the entire bridge circuit controls the opening and closing of the heater fuel control solenoid valve. A 200°F, N.C. temperature limit thermoswitch is wired into the circuit before the other heat sensing elements. This thermoswitch is installed in the rear plunum hot air exit duct to prevent the air entering the cabin from becoming too warm. If the automatic heater control system allows temperatures to rise to 200°F in the exit duct, this switch automatically cycles the heater off, breaking the circuit to the heater fuel solenoids and the primary and secondary (stand-by) ignitor points.

As was stated previously, ignition is continuously supplied to the spark plug by the heater ignition unit when the HEATER AND BLOWER CONTROL switches are "ON" The heater ignition vibrator unit is equipped with two sets of ignitor points that are controlled by the AUTO-MANUAL switch. While the heater is operating on "AUTO" the ignition is supplied by the primary set of points, when the switch is changed to "MANUAL" the ignition is supplied by the secondary set of points. Should the heater fail to operate when in the "AUTO" position, go to "MANUAL". If heater operation is restored by this changeover, malfunction within the vibrator is indicated and should be replaced. If manual heat control is desired or required by malfunction of the "AUTO" system, change the MANUAL-AUTO switch to "MANUAL". This removes the sensing elements from the control system, allowing continuous combustion in the heater. Temperature within the aircraft is then maintained by manipulation of the HEATER CONTROL switch or by the 200°F, temperature limit thermoswitch if the air entering the cabin becomes too warm.

A 300°F, N.O. heater overtemperature switch is installed in the rear plunum hot air exit duct as a safety switch. If this switch actuates, it will blow a fuse in the heater circuit, cutting off all current to the heater system. The fuse is located behind the instrument subpanel next to the heater control switch. If this fuse is blown, the heater system should be checked out completely before the heater is operated again as this indicates a fault in the system.

Following is an overhaul and replacement schedule for the heater and its components based on heater operation time.

HEATER (OVERHAUL & PRESSURE TEST)	500 hrs.
IGNITION UNIT (OVERHAUL)	2000 hrs.
REGULATOR (OVERHAUL)	1500 hrs.
VIBRATOR (REPLACE)	1000 hrs.
HEATER CONTROL BOX (OVERHAUL)	2000 hrs.

HEATER CONTROL BOX ADJUSTMENT

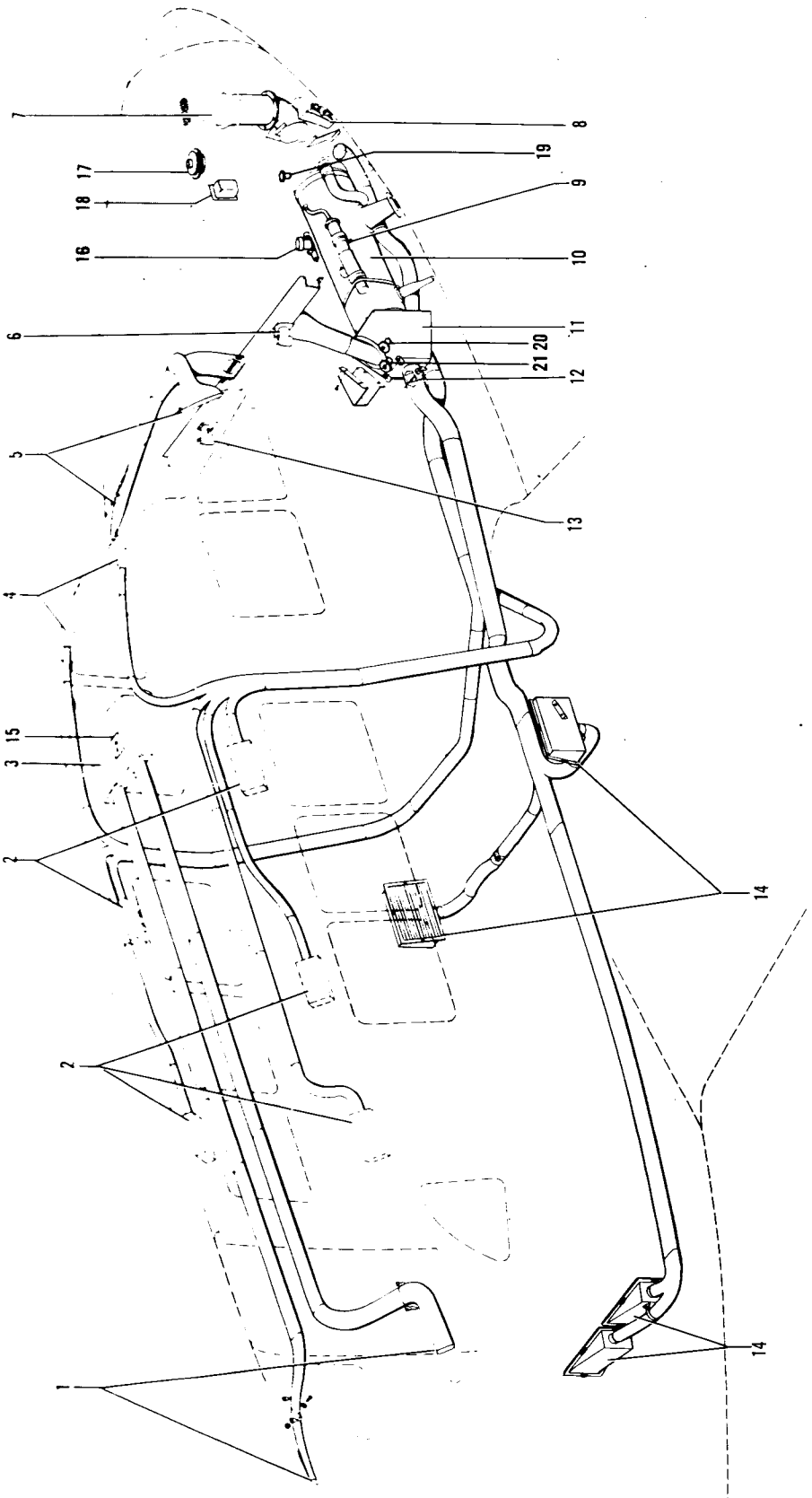
If the desired temperature cannot be obtained by operating the cockpit and cabin heater rheostats, the heater control box should be checked for proper adjustment. The control box is located on the forward right hand side of the nose radio compartment.

a. Rotate the "TEMP. INCR." knob clockwise as far as possible.

b. Rotate the "FREQ. INCR." knob clockwise as far as possible, then back the knob off 1 4 turn.

NOTE

The above adjustments have been established to provide optimum heater operation. If the heater control system does not operate properly with these settings, no further adjustments should be attemped; the automatic heat control system should be inspected at an approved heater repair facility.



1. Cabin Air Exits
2. Cabin Cold Air Outlets
3. Cabin Air Exit Plenum
4. Cockpit Cold Air Outlets
5. Windshield Defroster Outlets
6. Copilots Air Shut-off Valve
7. Heater Blower
8. Heating and Ventilating System Air Inlet Plenum
9. Heater Igniter
10. Combustion Heater
11. Hot Air Distribution Plenum
12. Cabin Air Control Valve
13. Pilots Air Shut-off Valve
14. Cabin Heater Air Outlets
15. Cabin Air Element
16. Fuel Shut-Off Valve
17. Fuel Pressure Control Valve
18. Heater Control Box
19. Outside Air Temperature Sensing Unit
20. Heater Discharge Element
21. High Limit Switch

Figure 3-10. Heating and Ventilating System

DISASSEMBLY, CLEANING AND REASSEMBLY OF THE HEATER FUEL NOZZLE

a. Remove heater from aircraft. Refer to Section IV for procedure.

b. Disconnect the air tube from the jacket fitting inside the heater jacket.

c. Remove the nut and washer that attaches the fuel fitting to the jacket.

d. Remove the safety wire and screws attaching the fuel and air assembly to the heater combustion head and lift the assembly out.

e. Remove the spray nozzle from the fuel and air assembly by unscrewing the nozzle body from the assembly.

f. Unscrew the fuel strainer from the spray nozzle body. The strainer should only be finger tight.

g. Unscrew the core from the body using a screwdriver.

h. Clean the fuel strainer, core, and body by immersing them in solvent, (Consumable Material Chart, Item 13).

i. Remove the parts and check them for cleanliness. Use a small, soft, non-metallic brush to aid in removing the more stubborn foreign material or particles.

j. If brushing fails to remove the foreign matter from the grooves in the body, core, and orifice, they may be cleaned using a small stick made by shaping a piece of soft wood (a toothpick is satisfactory).

NOTE

Do not use a metal tool to scrape these parts as this upsets the flow characteristics of the nozzle.

k. Rinse the parts carefully in clean solvent, (Consumable Material Chart, Item 13) and dry with filtered compressed air.

l. When assembling the spray nozzle, screw the core into the body using a screwdriver.

m. Screw the filter into the spray nozzle finger tight.

n. Screw the nozzle into the fuel and air assembly.

o. Replace the fuel and air assembly on the combustion head and connect lines and safety wire as before.

CLEANING HEATER SPARK PLUG

a. Remove the spark plug from the well using a deep socket.

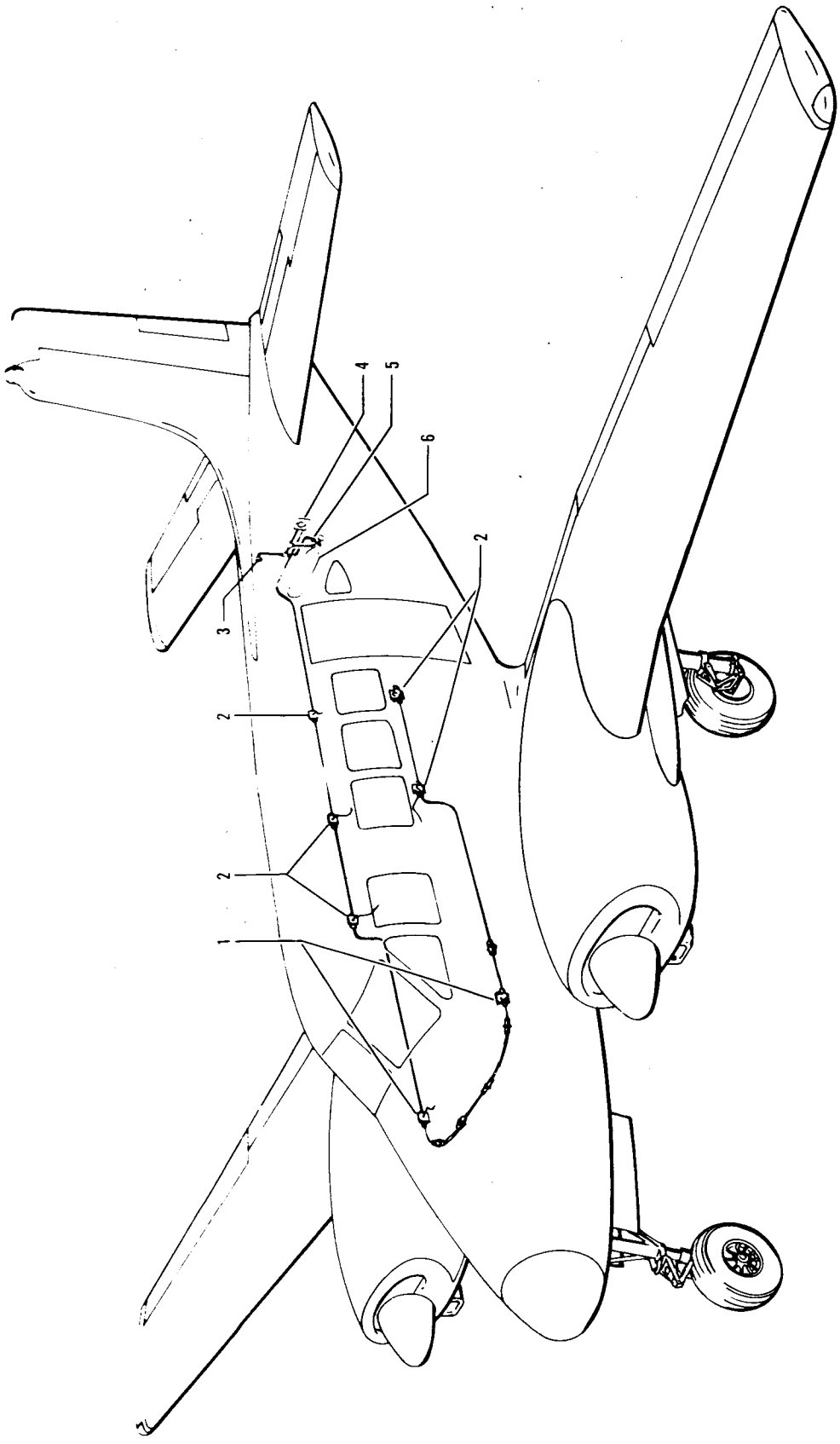
b. Before cleaning, examine the spark plug for evidence of cracked or broken porcelain, arcing or carbon tracks inside the spark plug well. If cracks are found in the porcelain, the plug should be discarded without further examination. Arcing or carbon tracks may be caused by shorting of the plug or by dirt on the spring connector that seats in the well. In either case the fault should be corrected before installing the plug in service or using a new plug.

c. Wipe out the inside of the well of the plug with a clean cloth dampened with solvent, (Consumable Material Chart, Item 13) to remove any grease or carbon deposits.

d. Clean the spark plug by sand blasting.

NOTE

Close the well of the spark plug with a stopper or cap to prevent dirt or sand from lodging there during the cleaning.



1. Cockpit Oxygen Outlets
2. Cabin Oxygen Outlets
3. Oxygen Pressure Gage
4. Oxygen Regulator
5. Oxygen Filler Valve
6. Oxygen Cylinder

Figure 3-11. Aft Mounted Cylinder Oxygen System

OXYGEN SYSTEM PURGING

The oxygen system may be rid of obnoxious and offensive odors by purging. Also, the system should be purged any time the system pressure falls below 50 psi or the lines are left open for a period of time. The purging operation consists of nothing more than connecting a recharging cart filler hose to the applicable oxygen filler valve and allowing oxygen to flow through the system and escape at the outlets carrying away the bad odors. The following steps outline the procedure for purging the oxygen system.

CAUTION

Keep fire, including sparks and cigarettes, away when any of the outlets are in use. Open and close all oxygen valves slowly. Keep system and all components and tools clean as fire and explosion may occur when oxygen comes in contact with organic material such as grease and oil.

a. Connect a line from a recharging cart to the applicable oxygen filler valve.

b. Slowly open the oxygen supply cylinder valve.

c. On aircraft LC-53 and after, which incorporate the nose mounted oxygen bottle, slowly open the high pressure line valve.

d. Plug in an oxygen mask at each outlet in the cabin and cockpit.

e. Open all the doors and windows.

f. Set the cart pressure regulator to deliver 50 psi to the system.

g. Allow system to purge for one hour and check for the presence of odor. If the odor is still present continue purging for one additional hour. If the odor is still present after the second hour of purging replace the supply cylinder. After purging system, refer to Section II for servicing instructions.

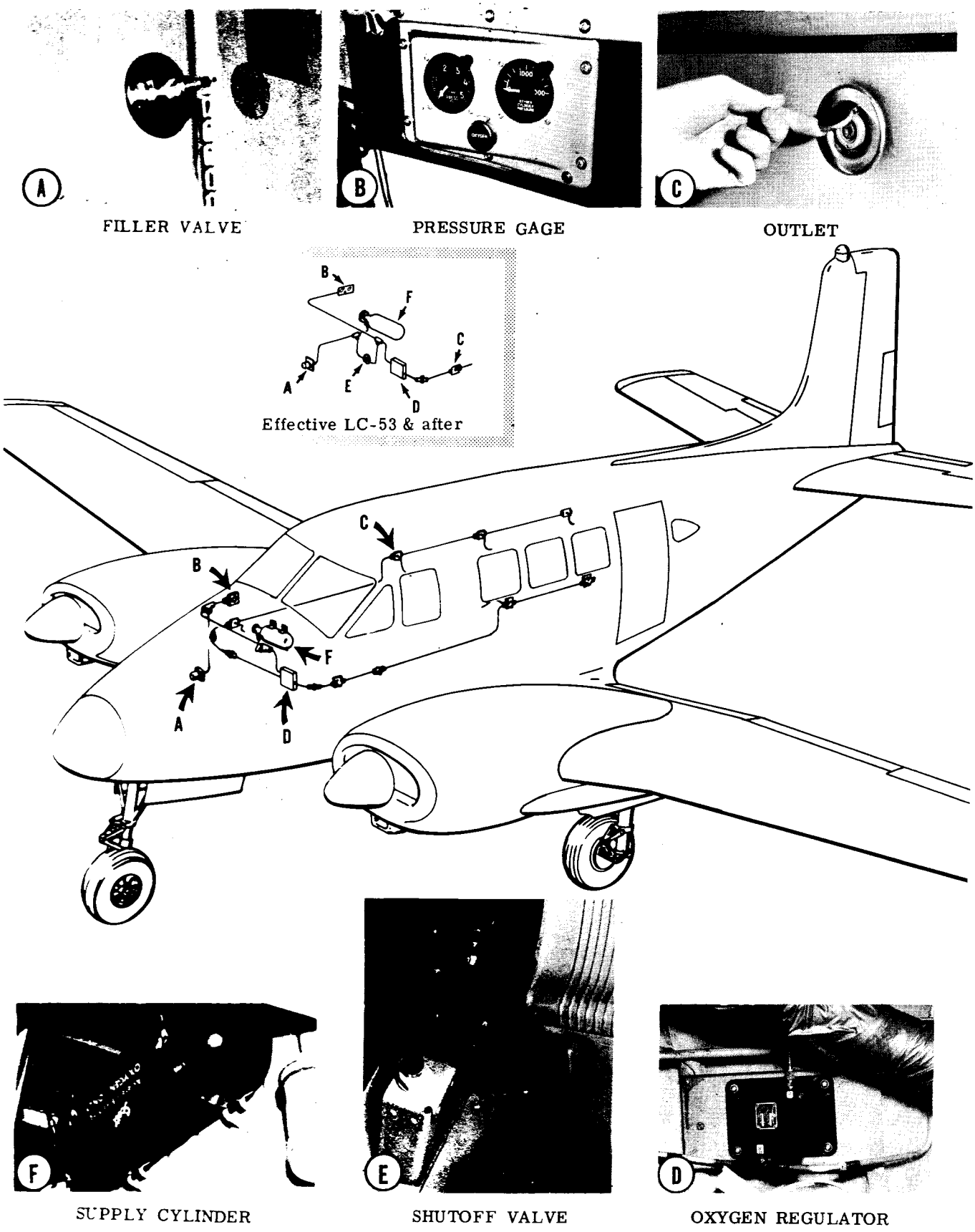


Figure 3-12. Forward Mounted Cylinder Oxygen System

ADJUSTING PROPELLER ANTI-ICER FLUID FLOW

To establish the normal flow of anti-icer fluid, disconnect the discharge tube from the check valve and install a rubber tube over the end of the check valve. Connect the tube to a flowmeter or to a vessel of known volume. Adjust the check valve spring so that a flow of 3-1/2 to 3-3/4 quarts per propeller per hour is obtained with 28.5 volts dc applied to the aircraft electrical system with the rheostat set in the normal range.

IDLE SPEED ADJUSTMENT

a. Start the engine and warm-up until oil and cylinder head temperatures are normal.

b. Check magnetos. If the "drop-off" exceeds 150 rpm, check for fouled spark plugs. If the "drop-off" is normal, proceed with idle speed adjustment.

c. Retard the throttle to the idle stops and then turn idle stop adjusting screw on the supercharger intake throat to set the idle rpm at 700. Turn the adjusting screw clockwise to increase rpm and counterclockwise to decrease rpm.

CABIN ENTRANCE DOOR LATCH ADJUSTMENT

a. Remove screws from door handle.

b. Remove screws from placard and step panel.

c. Place the outside handle in the fully locked position.

NOTE

The latching mechanism must be in the "LOCK" position in order to align clevis pin for removal.

d. Remove the clevis pin from yoke and rod.

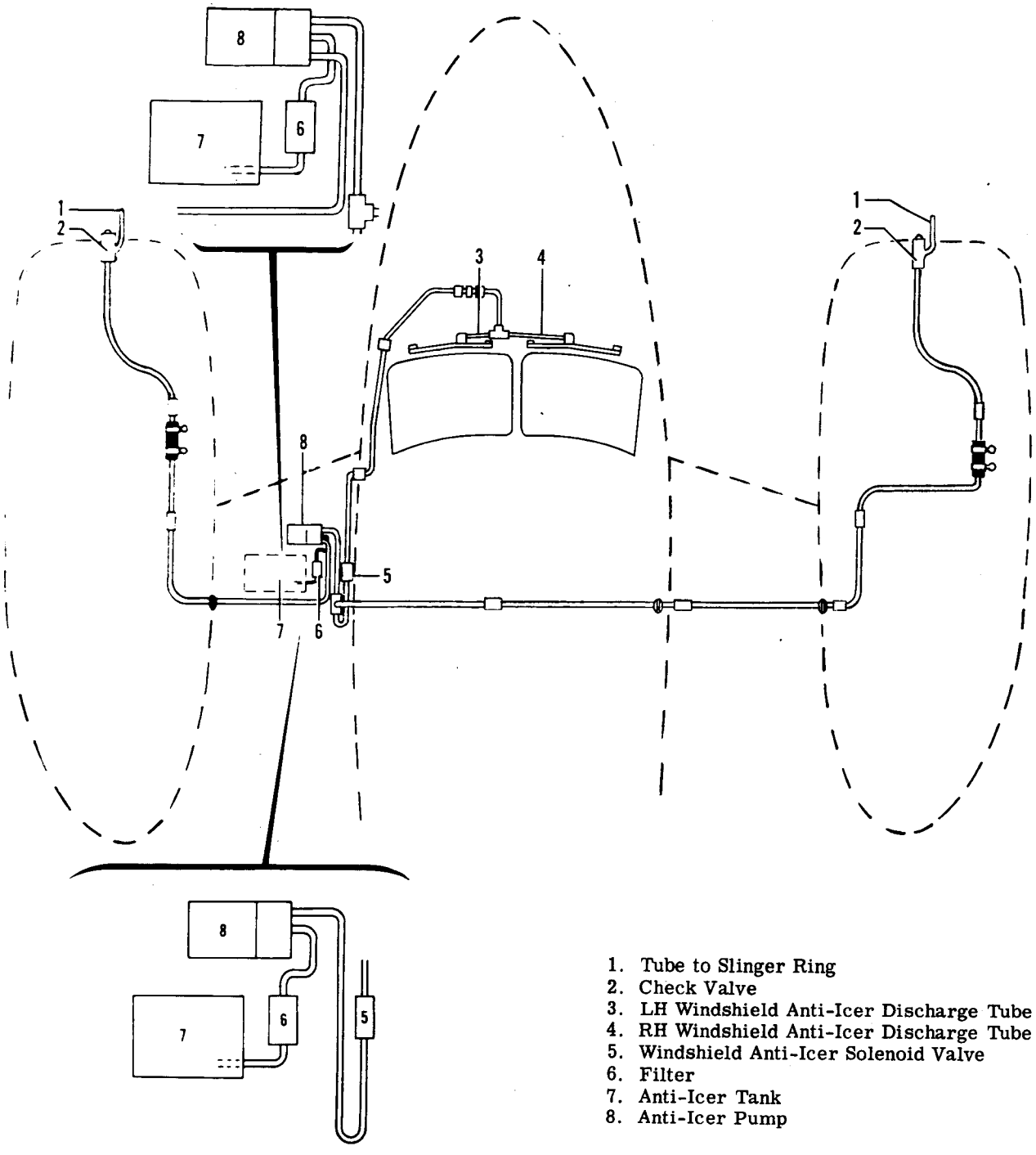
e. Place outside handle in unlocked position, disengage rod from yoke.

f. Adjust the latches by turning the aft or forward rod to the right (looking from the cam mechanism toward the latch assembly) to decrease the latch protrusion or to the left to increase it. The latch should measure 29/32 ± 1/32 inch from the door frame facing to the tip of the latch. Place the door latch in the "LOCK" position when taking measurements.

NOTE

Both the forward and aft rods are fitted to the latch assembly with right hand threads.

(Propeller and Windshield Anti- Icer System)



(Independent Windshield Anti-Icer System)

1. Tube to Slinger Ring
2. Check Valve
3. LH Windshield Anti-Icer Discharge Tube
4. RH Windshield Anti-Icer Discharge Tube
5. Windshield Anti-Icer Solenoid Valve
6. Filter
7. Anti-Icer Tank
8. Anti-Icer Pump

Figure 3-13. Propeller and Windshield Anti-Icer System

ADJUSTMENT OF SUCTION RELIEF VALVE

a. Start one engine and allow it to warm up to normal operating temperatures.

b. Run engine at 2600 rpm. Check the suction gage for an approximate indication per table below. If indication is incorrect, adjust the suction relief valve located on lower aft side of the engine firewall.

c. Unsafety the lock retaining washer and loosen the adjusting screw locknut.

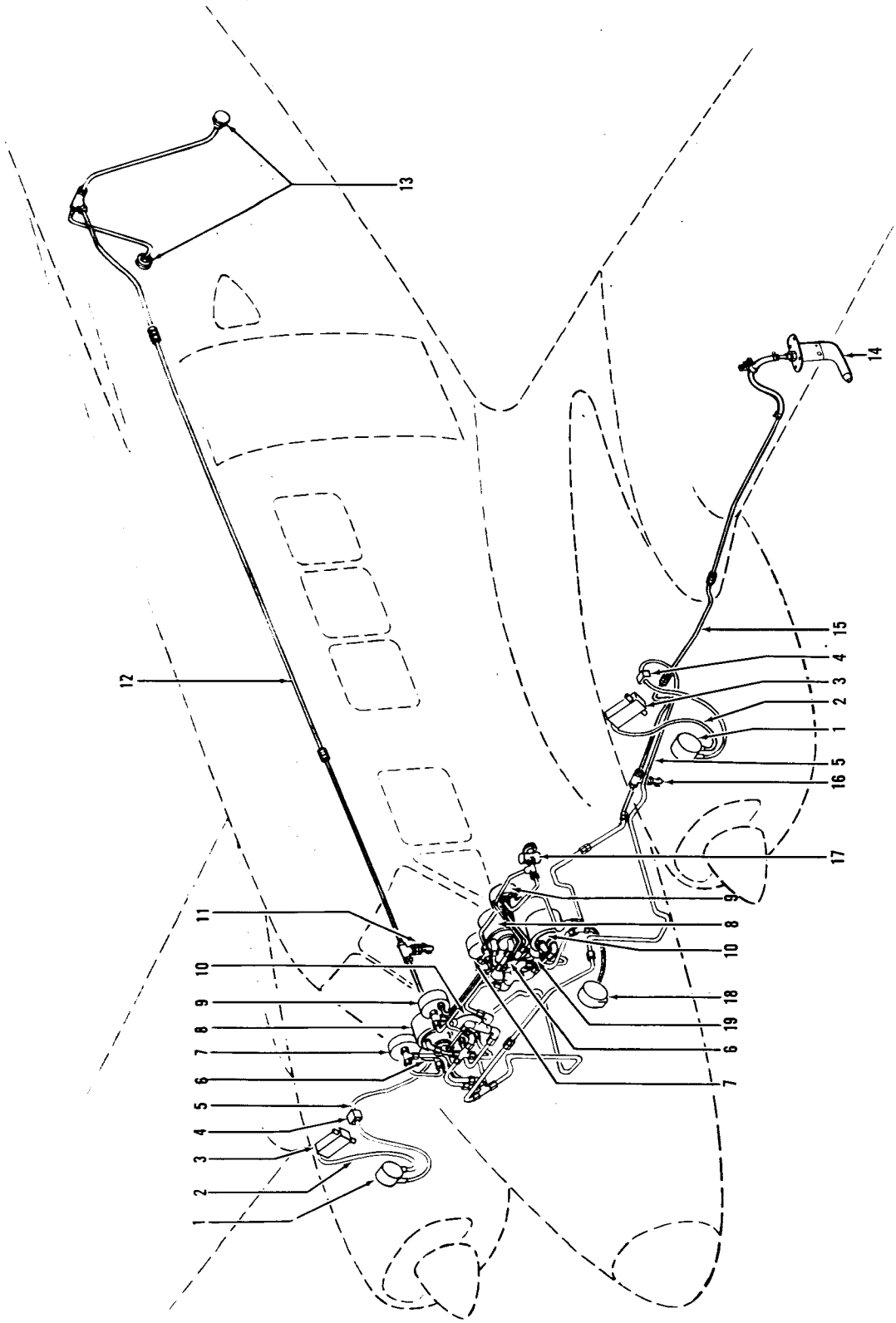
d. Turn adjusting screw "IN" (counterclockwise) to increase or "OUT" (clockwise) to decrease suction setting. Set per table below.

e. Tighten locknut and resafety. Shut down engine.

f. Repeat the same procedure for the other engine. After both pumps have been checked and adjusted restart the other engine; the reading on gage should be approximately 5.0 inches Hg. with engines operating at 2600 rpm.

The approximate single pump indications are as follows:

No. of Instruments Installed	Approximate Gage Indication With One Pump
4	4.0 in. Hg.
3	4.25 in. Hg.
2	4.5 in. Hg.



1. Vacuum Pump
2. Oil Separator Line
3. Oil Separator
4. Suction Relief Valve
5. Vacuum Line
6. Rate of Climb Indicator
7. Altimeter
8. Gyro Horizon
9. Airspeed Indicator
10. Directional Gyro
11. Static Drain Cock
12. Static Line
13. Static Air Buttons
14. Pitot Mast Head
15. Pitot Line
16. Pitot Drain Cock
17. Alternate Static Air Source
18. Centralized Air Filter (LC-1 thru LC-80)
19. Suction Gage

Figure 3-14. Vacuum and Pitot-Static System

ENGINE DRIVEN DE-ICER SYSTEM CHECK AND ADJUSTMENT

CAUTION

The suction relief valve located on the upper aft side of the firewall is a safety valve, its setting can be checked by referring to adjustment of Suction Relief valve. Do not change its setting to adjust de-icer system pressure. If any pressure adjustment is required for the de-icer system, adjust the combination unit located in the right wing center section.

a. Remove the access door and attaching screws located in the top wing skin between the right nacelle and fuselage.

b. Remove safety wire and two cover plate attaching screws.

c. With one engine operating at 2000 rpm, turn the adjusting screw to adjust the combination unit to 15 psi on the de-icer pressure gage located on instrument panel. Limit operation to one cycle, with adequate cooling period before repetition.

d. After adjustment install cover plate, attaching screws and safety.

e. Reinstall access door.

ENGINE DRIVEN DE-ICER SYSTEM FREQUENCY SEQUENCE CHECK

CAUTION

Do not operate the system on the ground over one cycle of operation, to prevent overheating of the vacuum pumps.

a. After the de-icer control switch in the cockpit has been turned "ON" allow 5 seconds delay for the tube warm up and a cycle will start.

b. The "A" ports on the inboard ends of the left and right wing boots will operate first. The "A" port tubes are located along the extreme leading edges and each alternate air tube adjacent to the trailing edge of the boots.

c. The "B" ports on the inboard wing boots operate second. The "B" port tubes are all the remaining air tubes in the boots.

d. The "A" ports on the outboard wing boots operate third.

e. The "B" ports on the outboard wing boots operate fourth.

f. The "A" ports on the horizontal and vertical stabilizers operate fifth.

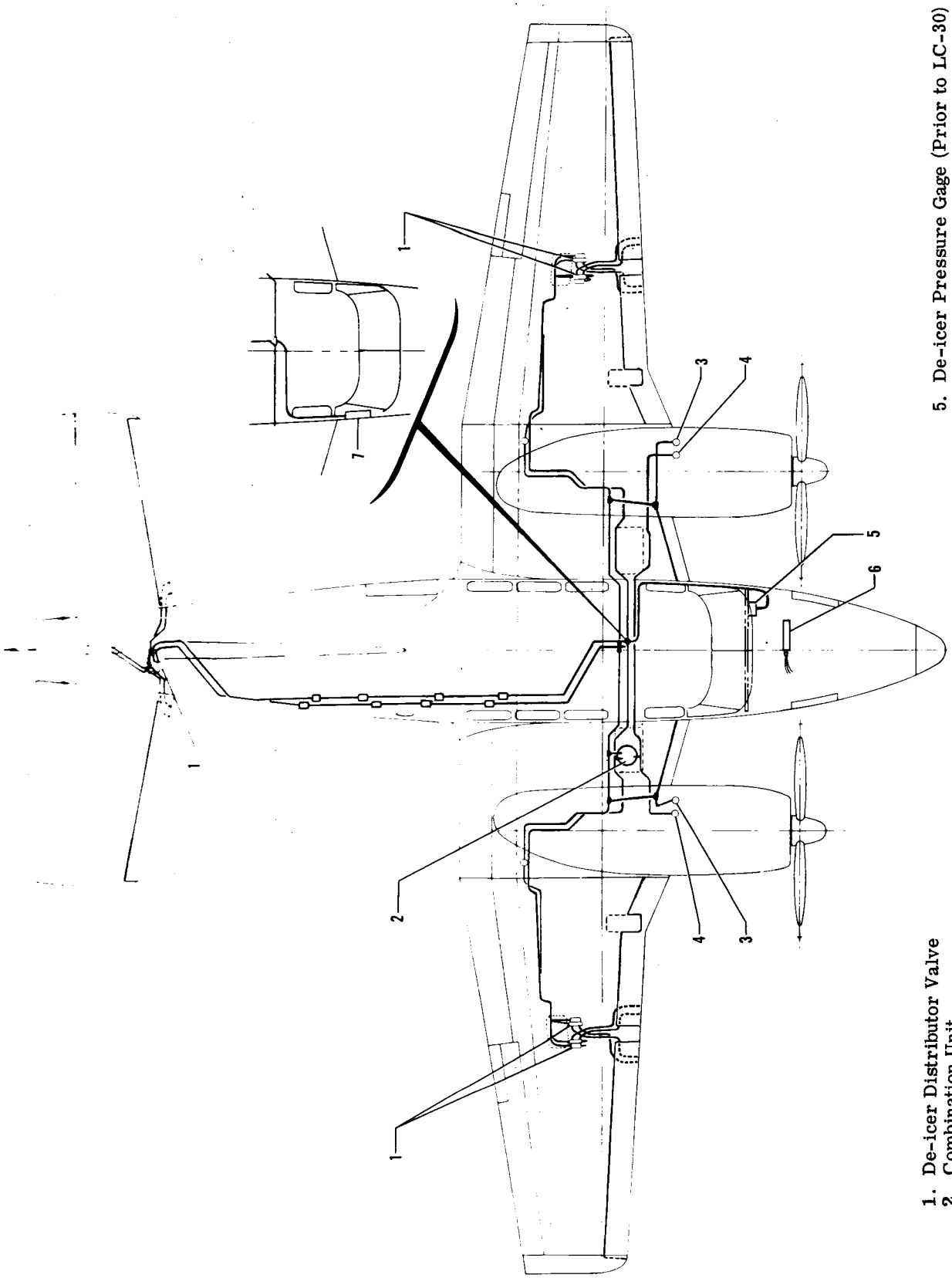
g. The "B" ports on the horizontal and vertical stabilizer operate sixth.

h. The final operation will be a 23 second pause which will allow the pressure to be dumped overboard. During the pause the distributor valve allows suction to be applied to the boots for hold down in flight. The cycle is a 60 second cycle and will continue automatically until the switch is turned off. In each cycle each boot is fully inflated once. When the switch is turned off the timer trips through the remaining contacts and returns to the number 1 position. All ports remain inflated for a period of 5 seconds with the exception of the "A" ports on the outboard wings and the horizontal and vertical stabilizers; these ports will remain inflated for a period of 6 seconds.

TEST AND ADJUSTMENT FOR COMPONENTS OF LIGHT WEIGHT DE-ICER SYSTEM

Control Cables.

a. The air supply valve control cable should be attached to the reservoir air supply valve so that the valve operating lever closes completely without the cable stopping short against the cable housing.



1. De-icer Distributor Valve
2. Combination Unit
3. Pressure Relief Valve
4. Suction Relief Valve
5. De-icer Pressure Gage (Prior to LC-30)
6. Timer Unit
7. De-icer Pressure Gage (LC-30 & After)

Figure 3-15. Engine Driven De-icer System

b. The cycling control cable should be attached to the cycling valve so that the control arm can operate to the extreme limits of the cycling valve. The cable handle in the "IN" position should have a 1/4 inch cushion from the cable housing in the instrument panel to insure the cycling valve is in the fully closed position.

Air Pressure Regulator.

Regulator gages will not register unless the air supply valve is open. With the air supply valve in the open position observe the gages. If necessary, reset the regulator to agree to the following table. A tolerance of ±1 psi may be used.

INLET PRESSURE (PSI)	REGULATED PRESSURE (PSI)
3000	22
2500	23
2000	24
1500	25
1000	27
750	28
500	29

The pressure regulator may be adjusted by loosening the locknut on the pressure regulator and turning the screw clockwise to decrease pressure and counter-clockwise to increase pressure.

Cycling Valve.

a. Cycling Valve Control Arm Adjustment.

1. Adjustment for all possible variations in the control arm assembly is accomplished by the addition or removal of laminated shims between the upright supporting the control arm and the angle attaching the upright to the valve mechanism base.

2. With the valve shaft actuated and locked in the detent, the control arm is properly adjusted only when the "dog" which operates the valve shaft will:

(a). Engage 1 64 to 1 32 of an inch on the shaft, and then:

(b). Slide past the shaft without driving the shaft beyond and out of the detent.

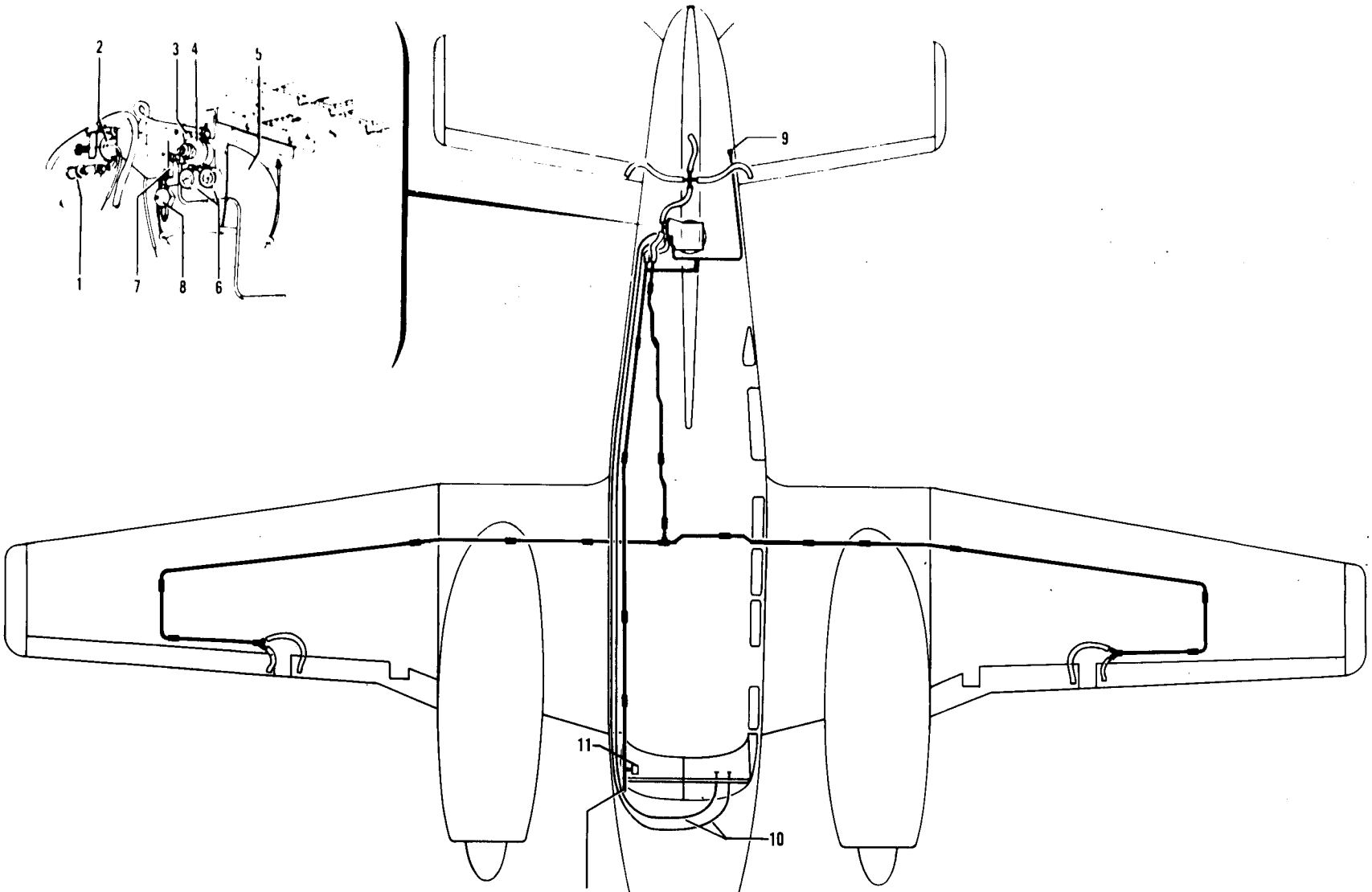
3. The adjustment of the mechanism is accomplished by loosening the fasteners between the previously described upright and angle, then adding or removing laminated shim stock.

If the "dog" engages too far on the shaft or drives the shaft past the detent, add shims until the mechanism is properly adjusted. If the "dog" does not cause the valve shaft to engage in the detent, remove shims until the valve shaft engages in the detent satisfactorily.

4. The valve operating mechanism and valve should be functionally tested with pressure from the reservoir package.

b. Cycling Valve Adjustment.

1. The valve is properly adjusted when the low pressure gage on the regulator reads 18 psi to ±1 psi at the time the valve shaft automatically returns to its normal position completing the de-icing cycle. This is known as the "pop-off" pressure. The low pressure gage on the regulator will show a higher value after the valve completes the de-icing cycle. This higher value is the set pressure of the regulator.



1. Check Valve
2. Cycling Valve Assembly
3. Relief Valve
4. Regulator
5. Reservoir
6. Regulator Pressure Gages
7. Air Supply Valve
8. Reservoir Fitting
9. De-icer Filler Valve
10. De-icer Controls
11. De-icer System Pressure Gages

Figure 3-16. Light Weight De-icer System

2. The valve is adjusted by rotating a ring on the valve located directly below the top plate on the working end of the valve. The cam action of the interior of this ring increases or decreases the "pop-off" pressure as the ring rotates.

3. To adjust the "pop-off" pressure of the valve:

(a). Remove the cotter pin locking the adjusting ring to the valve body.

(b). Cycle the valve and observe the "pop-off" pressure on the low pressure gage of the regulator.

(c). Rotate the adjusting ring, recycle the valve and again observe the "pop-off" pressure.

(d). Determine from the "pop-off" pressure, the direction of the adjusting ring to increase or decrease the "pop-off" pressure.

(e). Set the adjusting ring on the valve so that the "pop-off" pressure is from 17-19 psi.

(f). Relock the adjusting ring to the valve body with the cotter pin.

DE-ICER BOOT MAINTENANCE

De-icer boots should be resurfaced with Goodrich Prenite-Graphite cement (Goodrich Specification #029476) as often as found necessary. The principal factors to be considered are:

a. If surfacing material has abraded off.

b. If surfacing has developed cracks.

c. If conductivity is low.

The following procedure should be followed:

a. Scrub the surface to be recoated with a clean cloth wet with butyl acetate, isopropyl acetate, or benzol. Under normal shop conditions the relative effectiveness of these solvents is in the order named. However, isopropyl acetate is preferable in cold weather. Use a vigorous scrubbing action to remove all loose particles and to smooth out any wrinkles in the old coating.

b. Mask off behind the boots to shield the wing during the spraying operation.

c. Spray two light coats of the Prenite-Graphite cement allowing ample drying time between coats.

d. Avoid contacting the surface after coating until the material is completely dry.

e. If possible the airplane should remain in a warm place, such as in the blast of a heater for as long as possible after application.

NOTE

The de-icer boots are installed as a permanent installation and should not be removed except when repairs are required.

RIGGING OF FUEL SELECTOR VALVES

Rig the fuel selector system as follows: Set the fuel selector valve in the nacelle to the "OFF" position, then set the selector valve handle in the cabin in the "OFF" position. Remove the access panel under the fuel selector panel and rig the cables to a tension of 10 pounds ± 2 pounds. Care must be used to see that both the selector handle and the selector valve remain in the "OFF" position during the rigging operation. After completion of the rigging operation, check to be sure that selector handle and selector valve positions correspond when turned to each tank.

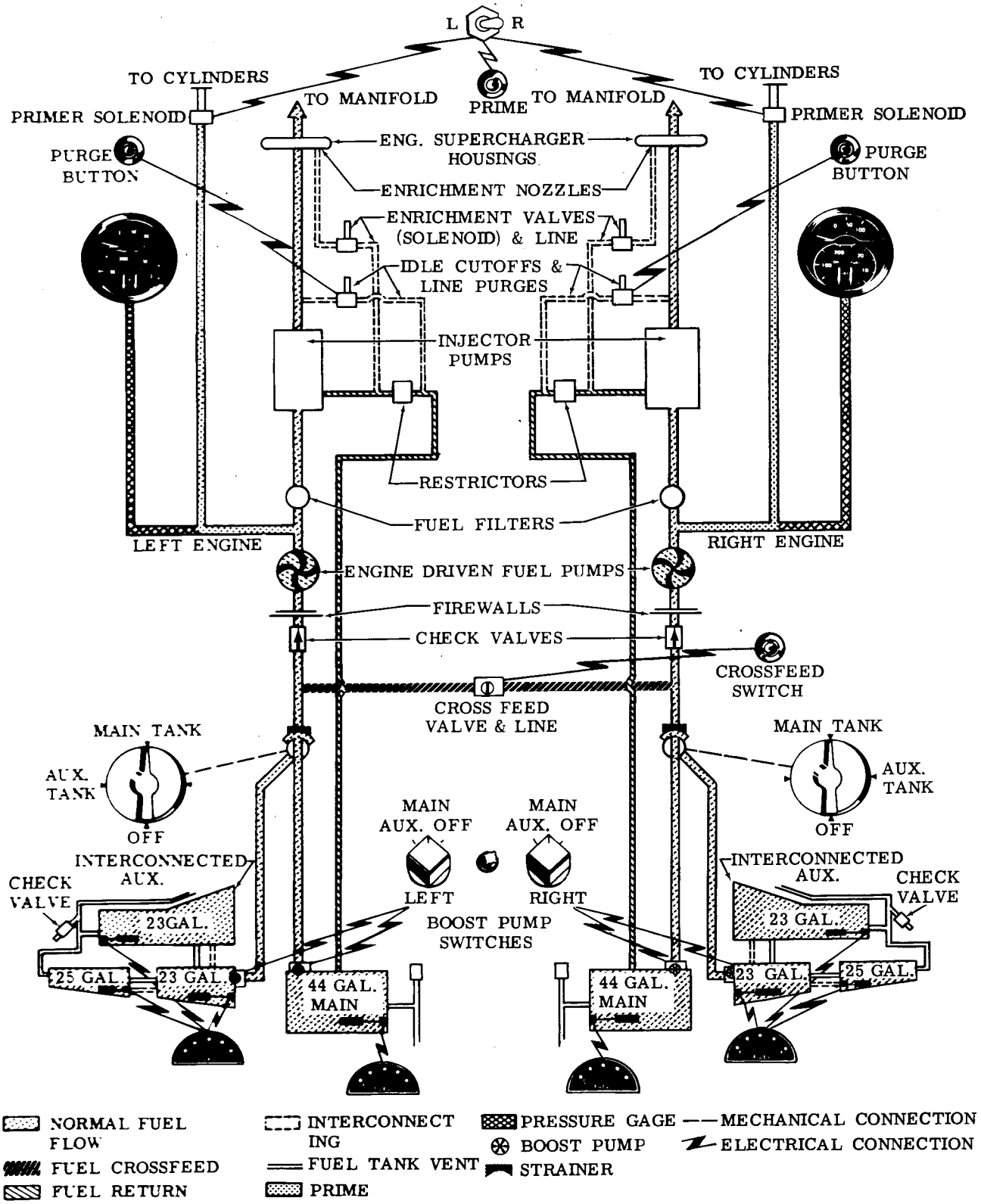


Figure 3-17. Fuel System Schematic - Model 65

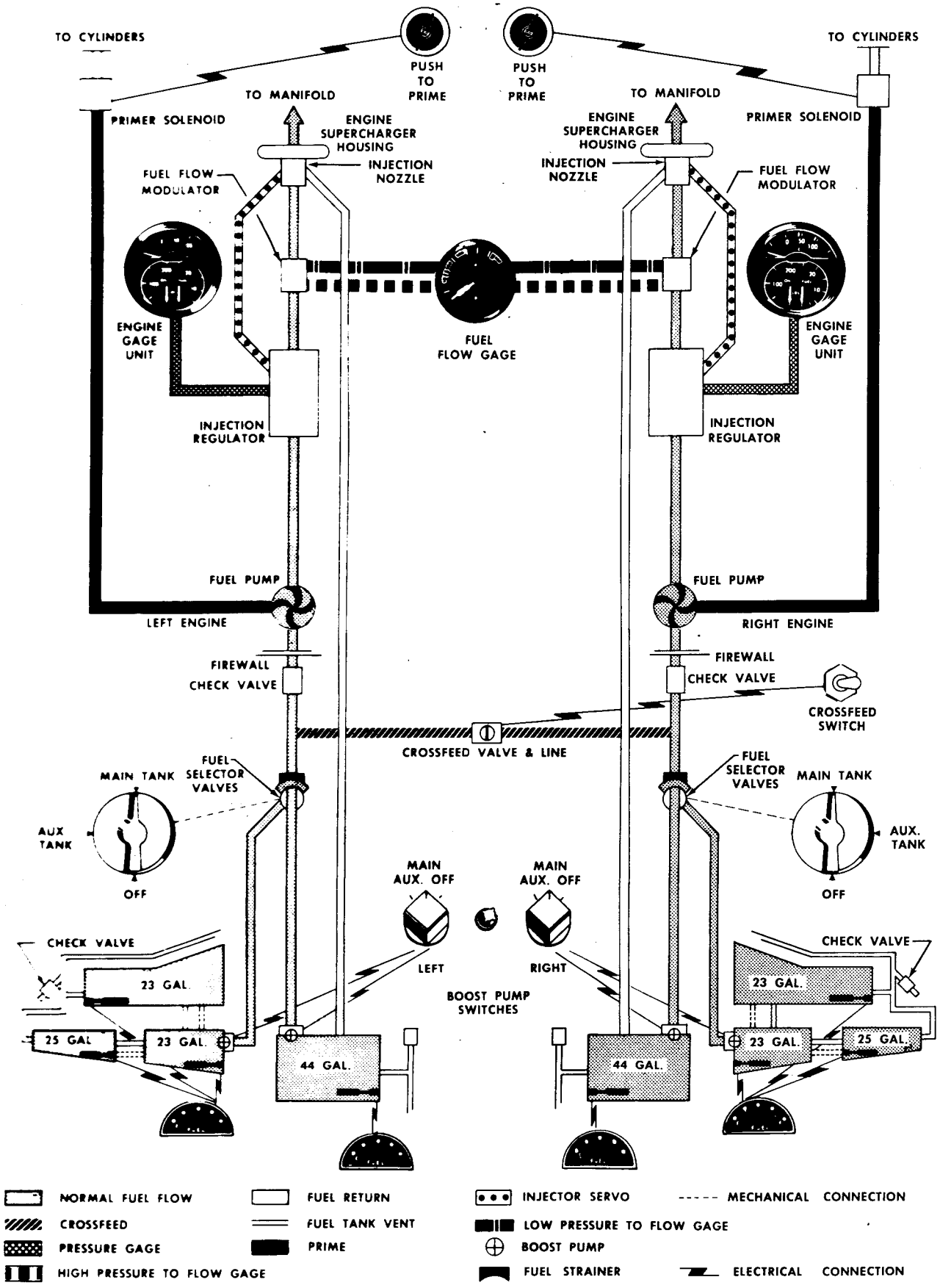


Figure 3-17. Fuel System Schematic - Model 80

TESTING THE FUEL LEVEL TRANSMITTER

a. Apply 28.25 volts to the aircraft electrical system.

b. With float resting on the bottom of the cell, check the gage for "EMPTY" reading.

NOTE

Check the bottom of the cell to be sure it is not raised, lifting the float to give an inaccurate gage indication.

c. Manually raise the float to the top of the cell and check the indicator for "FULL" reading.

ADJUSTING THE FUEL LEVEL TRANSMITTER

a. If tank reading is low for the amount of fuel in the cell, bend the wire down slightly.

b. If the tank reading is high for the amount of fuel in the cell, bend the wire up slightly.

c. After completing the above operation, check the transmitter at both ends of the scale to be sure that correct readings are obtained in both the full and empty tank conditions.

ADJUSTING FUEL QUANTITY GAGES

Each gage incorporates a potentiometer for adjusting the gage needle to the proper reading. Each gage should be adjusted with a full fuel tank; adjusting the gage to the full position will correct erroneous readings in the other needle positions. The following procedure is recommended:

a. Remove the fuel control panel.

b. Apply 28.25 volts to the fuel gage circuit either with an external power supply or the airplane's generators.

c. Loosen the lock nut on the potentiometer adjusting screw.

d. Turn the adjusting screw to move the gage needle to the "FULL" position.

e. Tighten lock nut and replace fuel control panel.

ADJUSTING THE FUEL PRESSURE (ENGINE DRIVEN FUEL PUMP)

a. Locate the fuel pressure adjustment screw on the engine driven fuel pump (lower right hand side of engine).

b. Break the safety wire and loosen the lock nut on the adjusting screw.

c. Adjust the pressure relief valve on the fuel pump to obtain 15 pounds pressure with the engine running at 2600 rpm. Turn the adjustment screw clockwise to increase and counterclockwise to decrease pressure.

d. Tighten lock nut and safety.

OIL PRESSURE ADJUSTMENT

a. Locate the oil pressure adjustment screw on the left hand side of the accessory housing.

b. Break the safety wire, remove cap, and loosen the lock nut on the adjustment screw.

c. Operate the engine at 2600 rpm with the oil temperature at 150°F.

d. Set the adjustment screw until 80 pounds pressure is registered at the oil pressure gage. To make this adjustment, turn the adjustment screw clockwise to increase and counterclockwise to decrease pressure.

e. Tighten the lock nut, replace cap, and safety.

ADJUSTING THE RAM AIR FILTER DOOR

a. Locate the ram air filter and actuator on the lower left hand side of the engine.

b. Disconnect the control rod, located between the ram air filter door control arm and the actuator, at the ram air filter door control arm.

c. Place the control arm for the actuator in its most forward position.

d. Set the control arm for the ram air filter to the closed position (as far forward as possible).

e. Maintain the settings in Steps c and d and align, adjust and connect the control rod to the ram air filter door control arm.

NOTE

Air pressure on the ram air door may cause it to open slightly during flight. This may be prevented when adjusting the ram air door control rod. After aligning the control rod, turn the rod end 1/2 revolution (clockwise) before connecting it to the ram air door control arm.

ADJUSTMENT OF ALTERNATE AIR DOOR

a. Loosen the clamp securing the alternate air door control linkage.

b. Position the door in the closed position.

c. Retighten the clamp.

NOTE

When installing a new control linkage, there should be 1/8-inch minimum clearance between the telescoping rod and the nut on the rod end.

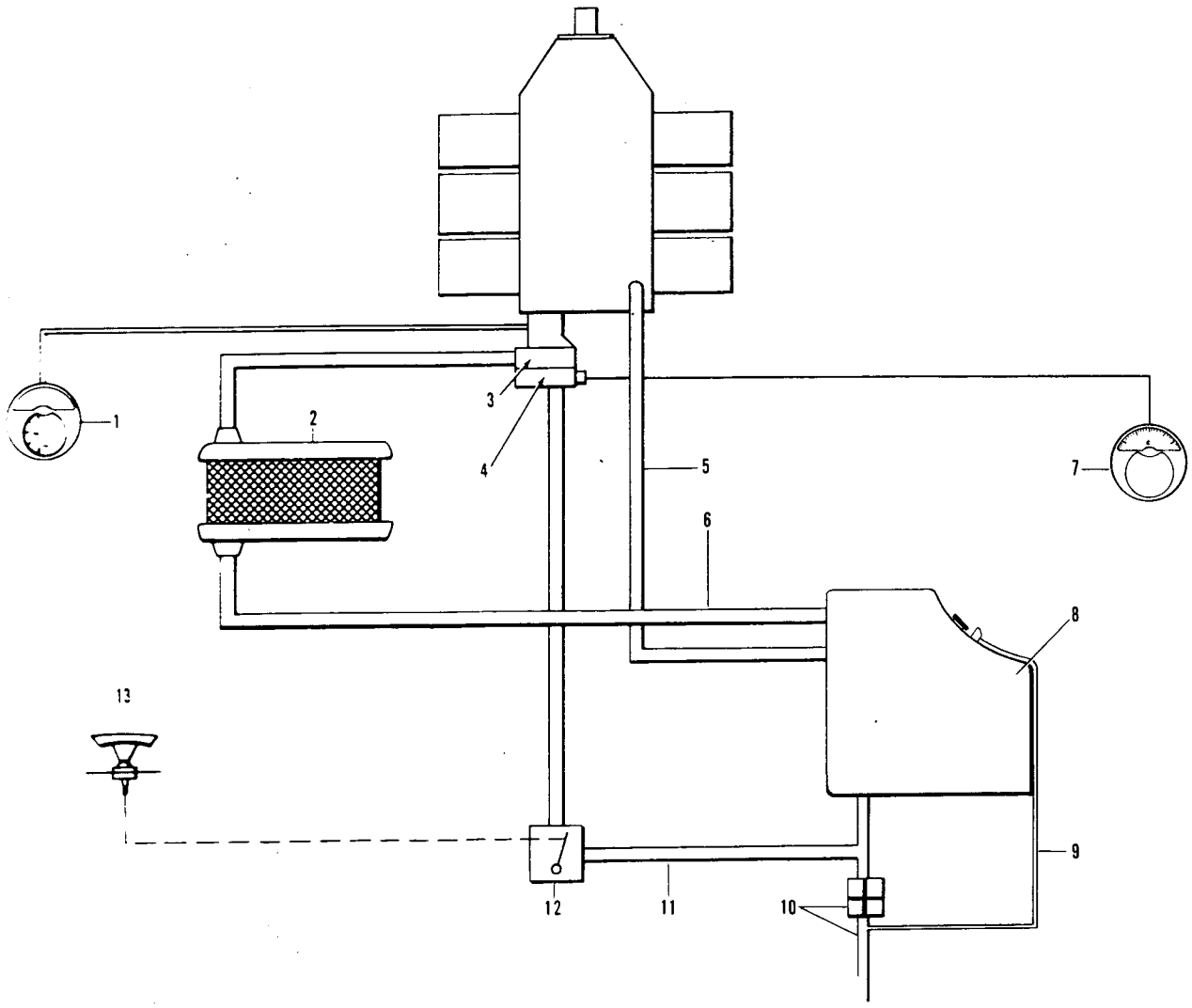
PROPELLER CHECKS

The ground check of each propeller governor should be started with the engine operating at approximately 2600 rpm with the propeller control full forward and the blades in the low pitch (high rpm) position (16 +1/2 -0 degrees for Model 65, 18-1/2 -0 -1 2 degrees for Model 80). Pull the propeller control back to the detent; the engine rpm should be at low governing rpm as the blades go into high pitch. The propeller control should be moved full forward and back to the detent several times slowly to check the propeller governor.

For a partial feathering check at 2600 rpm pull propeller control back through the detent and QUICKLY push it back out of the feathered position. A rapid decrease of approximately 500 engine rpm should occur before the engine speed returns to its original rpm. A full feathering check should not be started with an engine rpm in excess of 1700.

CAUTION

Do not exceed the rpm given in the preceding steps. Exceeding these limits can produce cylinder pressures which may result in detonation.



1. Engine Oil Pressure Gage Unit
2. Oil Cooler
3. Scavenge Pump
4. Pressure Pump
5. Oil Tank Vent Line
6. Oil Return Line
7. Engine Oil Temperature Gage Unit
8. Oil Tank
9. Scupper Drain Line
10. Tank Drain Valve
11. Oil Supply Line
12. Manual Shut-off Valve
13. Oil Shut Off Control Handle

Figure 3-18. Oil System Schematic

PROPELLER AND GOVERNOR ADJUSTMENTS

STATIC RPM	Model 65 - 3250 ±75 at 40 inches Hg. M.P.
	Model 80 - 3350 ±50 at 45 inches Hg. M.P.
LOW PITCH . . .	Model 65 - 16 +1/2 -0 degrees at 30 inch station
	Model 80 - 18-1/2 +0 -1/2 degrees at 30 inch station
FULL FEATHER	87 ±1/2 degrees at 30 inch station
LOW RPM (HIGH). .	Model 65 (LC-1 thru LC-63) and Model 80-2400
PITCH)	Model 65 (LC-64 and after) - 2500
FEATHERING RPM	Model 65 (LC-1 thru LC-63) - 2300 ±25
	Model 65 (LC-64 and after) - 2425 ±25
	Model 80 - 2325 ±25

NOTE

To make the low rpm and feathering adjustments, first position the propeller control in full high rpm and then set the throttle for about 2600 rpm, to make sure you are in the governing range.

LOW RPM SETTINGS

To adjust the low rpm setting, pull the propeller lever back against the detent, then lengthen or shorten the governor control linkage as required to obtain the specified setting. If the adjustment available at the control is insufficient, the control arm on the governor may be moved a serration in either direction to make a gross change and the final adjustment made by adjusting the control linkage. However, if the control arm is relocated the high rpm stop also will require readjustment, to obtain the proper static rpm.

HIGH RPM SETTINGS

A high rpm setting may be due to many factors and the engine, ignition and fuel system should be checked before the governor settings are changed. If a governor adjustment is required, adjust the high rpm stop screw on the governor head, if the linkage to the control lever will allow sufficient travel for the control arm to contact the stop. If the linkage will not allow sufficient travel, adjust the control linkage at either rod end fitting, which in turn will require resetting the low rpm and the feathering adjustments.

FEATHERING ADJUSTMENT

Adjustment of the point at which propeller feathering starts is made by turning the square-head screw on the end of the governor control shaft. Turning the screw in makes it feather later and turning it out makes it feather sooner. In adjusting the feathering action, pull the control slowly back through the detent and observe the point at which the rpm setting begins to fall off sharply, then bring the propeller back to high rpm, shut down the engine and make the necessary adjustments. Since during the time the propeller is feathering the engine is subjected to heavy loads, this check should be made as quickly as possible.

STATIC RPM

The purpose of a static rpm check is to assure the pilot that full power is available. The adjustment itself is simple, but other factors governing the actual static rpm must be considered: propeller low pitch adjustment, effect of the weather on the engine performance and the wind load effect on the propellers.

Generally speaking, a high static rpm will be due to improper low pitch stop adjustment or perhaps to an extremely high headwind (whenever possible, check the rpm with the aircraft headed at a right angle to the wind to minimize this factor, but watch the engine temperature closely).

EXHAUST AUGMENTER INSPECTION

After every 100 hours of operation, remove the exhaust augmenters and inspect them thoroughly. Check the liner for burn-through and the glass fiber insulation between the liner and the tube for signs of deterioration. Remove the augmenter tube and check them for cracks. Replace all defective parts as the space directly above the augmenter tubes carries electrical wiring and fuel lines.

MAGNETO ADJUSTMENT AND TIMING

CAUTION

The Model 80 magneto is internally grounded so it is inactive when the primary lead is disconnected. It is necessary to insert a strip of heavy paper insulation between the grounding spring and the magneto housing to prevent timing light interference. With the spring insulated from the housing the magneto is active. Never fail to remove the insulation when completing the service procedures or it will be electrically impossible to switch off the ignition. The Model 65 magnetos are not internally gronded, so when the primary lead is disconnected the magneto becomes active. To ground the Model 65 magneto, disconnect the magneto switch wire at the capacitor and ground the capacitor pole. If this is impractical, remove the outlet plate on the rear of the magneto or disconnect all the spark plug leads.

Magneto timing and breaker point timing procedures for the Model 65 and Model 80 are the same. Two types of high tension magnetos are installed on the Model 65: the S6 series prior to LC-65 and the S6LN-200 series on LC-65 and after. The Model 80 uses low tension S6RN-600 series magnetos with individual high tension coils for each spark plug.

Every 100 hours check the breaker points for condition, clearance and timing. If the points are burned or worn excessively, do not try to redress the contact surfaces. Install a complete new breaker assembly if they are found to be in an unsatisfactory condition. The point timing can be checked by the following method:

a. Remove the timing inspection plug and breaker cover from the magneto.

b. Rotate the engine until the white tooth of the distributor gear lines up with the timing mark or pointer as seen through the inspection hole of the magneto.

c. At the instant the marks line up, the points should be just starting to open. This can be determined more accurately by using a timing light.

d. If the points do not open at this position, loosen the screw in the slotted hole of the breaker assembly and shift the breaker slightly so that the points just break contact when the marks are aligned.

After the magnetos have been checked for point timing, they should be checked for correct timing to the engine.

Magnetos can be timed by the following procedure:

a. Remove the engine timing inspection plug located on the right side of the accessory housing above and to the right of the generator mounting pad.

b. Set the engine crankshaft at 25 degrees BTC on the compression stroke of No. 1 cylinder. This can be accomplished by turning the engine until the mark on the camshaft gear and the timing pointer seen through the inspection hole are aligned.

c. Connect the ground wire of a timing light to the engine, and one of the positive wires of the timing light to the ground terminal connection of the right magneto.

d. Turn the engine crankshaft several degrees from 25 degrees BTC in direction opposite normal rotation, then slowly turn in direction of normal rotation until the ignition timing pointer aligns with the mark of the camshaft gear, at which point the light should dim (or go out, on battery-operated models).

e. If the timing light does not indicate that the points are opening, turn the magneto in its mounting flange slots and repeat the procedure until the light dims at 25 degrees before top dead center.

f. Tighten the magneto mounting nuts and replace magneto inspection plug.

g. Connect the other positive wire of the timing light to the ground terminal of the left magneto and time in the same manner as described for the right magneto.

NOTE

When timing the left magneto, on Model 65's prior to LC-65, the crankshaft should not be rotated more than 35° in direction opposite normal rotation, as the pawl on the impulse coupling will engage with the stop pin and late timing will be indicated through the impulse coupling mechanism. If this should happen, rotate engine in normal direction until sharp click is heard, which will indicate that the impulse coupling has passed through firing position; then turn crankshaft in direction opposite normal rotation to approximately 35° before top center and proceed with timing check.

h. After both magnetos have been timed, leave the timing light wires connected and re-check magneto timing as previously described to make sure that both magnetos are set to fire together. If timing is correct, both timing lights will dim simultaneously when the timing pointer aligns with the mark on the camshaft gear. If the breaker points open too early, loosen the mounting nuts and rotate the magneto clockwise. If the breaker points open too late, rotate the magneto counterclockwise.

i. After magnetos have been checked for synchronization, remove timing light and replace inspection plug in accessory housing.

j. Replace the breaker point cover and reinstall the magneto wiring.

ADJUSTMENT OF STALL WARNING SENSING SWITCH

Whenever the sensing switch is replaced, or repairs or adjustments are made to the wings, the airplane must be test flown to check the stall warning system for proper adjustment. With the gear and flaps up and power OFF, the airplane is to be stalled gently, straight ahead, reducing speed not more than one mile per hour per second. The stall warning horn should function at 7 to 9 mph above complete stall. If readjustment is required, loosen the two screws beside the detector vane opening in the mounting plate. Move the switch up and forward to raise the indication speed, or down and back to lower the indication speed. A movement of 1/4 inch will shift the indication speed about 5 mph. After each adjustment, the airplane must be test flown to check the operation and setting of the sensing switch.

CAUTION

The detector vane is heat treated. Never attempt to adjust the switch by bending the vane. Never coat the vane with dope, paint or other material; such coating will interfere with correct operation.

GENERATOR MINOR REPAIR AND PARTS REPLACEMENT

a. Clean brushes, brush boxes, and commutator by wiping them with a cloth moistened in solvent. (Consumable Materials Chart, Item 13).

NOTE

Do not use carbon tetrachloride to clean parts.

b. Check the length of each brush, and replace if 1/2 inch or shorter.

c. Check the tension of the brush pressure springs. The tension of spring stretched to a position of 1 8 inch above the top of the brush box should be 56 to 64 ounces. If tension is less replace springs.

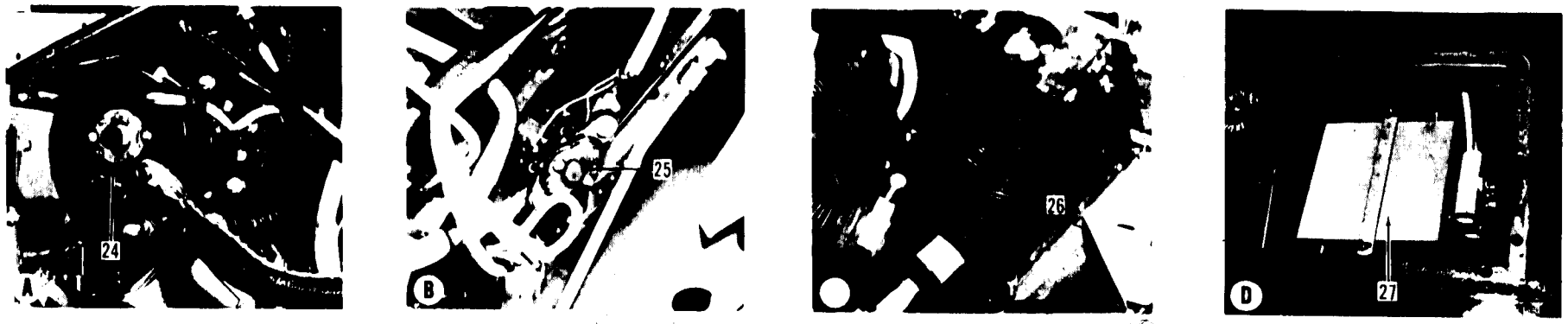
d. Closely inspect the contact surface of the commutator. It should have a clean, oil-free surface. If the surface is rough, pitted or badly scored it must be resurfaced

in a shop with adequate equipment and personnel trained in such work.

e. Rotate the armature assembly by hand and check for rubbing, binding, or noise.

f. Check for indication of engine oil leaks. If excess oil is visible in generator interior, the seal on the engine drive shaft must be replaced.

g. Make a visual check of the housing and mounting flange for cracks. If any are present the parts must be replaced.



1. RH Engine Magnetos
2. RH Landing Gear Up Indicator Switch
3. RH Landing Gear Down Lock Switches
4. Safety Switch
5. Flap Position Transmitter
6. Flap Limit Switches
7. Flap Control Relay
8. Flap Motor
9. LH Landing Gear Up Indicator Switches
10. LH Landing Gear Down Lock Switches
11. Stall Warning Switch
12. External Power Receptacle
13. LH Engine Magnetos
14. Landing Gear Limit Switches
15. Heater Over Temperature Switch
16. Heater Blower Relay
17. Nose Landing Gear Down Lock Switches
18. Nose Landing Gear Up Indicator Switch
19. Heater Control Box
20. Heater Fuel Solenoid
21. Landing Gear Motor
22. Landing Gear Control Relay
23. Circuit Breaker Panel
24. Starter
25. RH Starter Relay
26. DC Generator or Alternator-Rectifier
27. Battery
28. LH Starter Relay
29. Cabin Entrance Light Circuit Breaker
30. Battery Relay
31. Voltage Regulators
32. DC Generator Reverse Current Relays
33. Landing Gear Motor Circuit Breaker
34. Generator Circuit Breakers

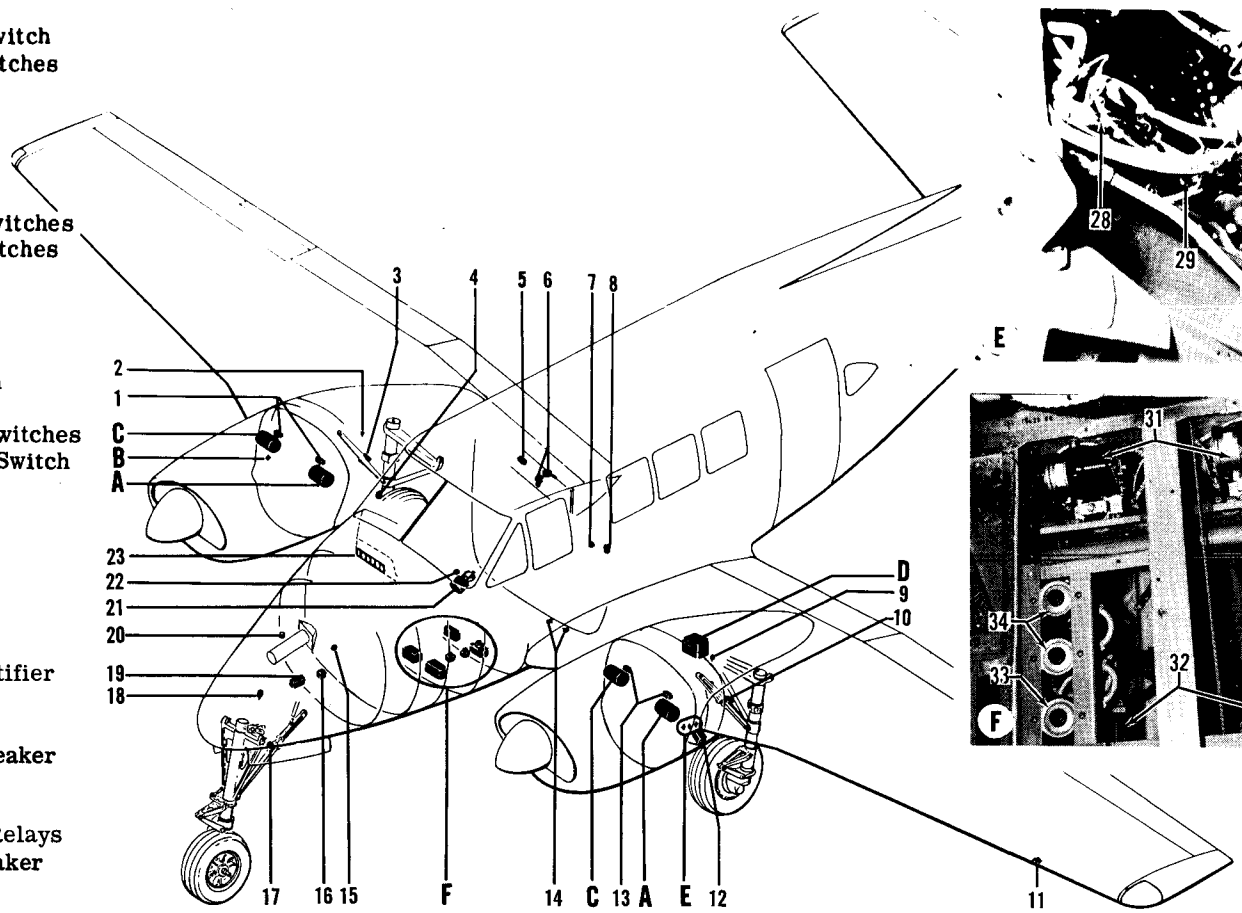


Figure 3-19. Electrical System

ELECTRICAL UTILIZATION LOAD CHART

EQUIPMENT	NO. OF UNITS	AMPERES PER UNIT
Flap Motor	1	3.50
*Oil Temperature Indicator	2	.10
*Cylinder Head Temperature Indicator	2	.10
*Turn and Bank Indicator	1	.15
Landing Gear Motor	1	47.50
*Landing Gear Control Relay	1	.95
*Landing Gear Indicators	3	.03
Heater Blower	1	15.00
*Heater Igniter	1	1.50
*Heater Fuel Valve	2	.25
*Heater Control	1	1.50
Air Filter Motor	2	.45
*Heated Pitot	1	3.33
Stall Warning Switch Heater	1	1.60
*Tail Light	1	.80
*Wing Tip Light	2	1.60
*Rotating Beacon	2	3.60
*Indicator Lamps	8	.04
*Instrument Lights	47	.04
*Panel Edge Lights	38	.04
*Cockpit Red Light	2	.80
*Cockpit Dome Light	1	.34
*Cabin Dome Light	5	.17
*Cabin Reading Light	5	.80
Threshold Light	1	.17
Landing Light	2	9.56
Cigarette Lighter	1	15.00
*Battery Relay	1	.72
*Reverse Current Relay	2	.95
*Compass Inverter	1	.40
*Fuel Boost Pumps	4	3.10
*Fuel Quantity Indicator	4	.25

ELECTRICAL UTILIZATION LOAD CHART

EQUIPMENT	NO. OF UNITS	AMPERES PER UNIT
OPTIONAL EQUIPMENT		
Radio and Navigation		
15F---Omni	2	2.80
R33A or MKA-7A---Marker Beacon	1	1.25
R31A or GSA-8A---Glide Slope	1	1.25
CD-1---Course Director	1	1.70
R-30A---ADF	1	2.20
RT-11A---Receiver	1	4.28
Transmitter	1	6.43
T-25A---Standby Transmitter	1	2.50
RA-21A---Receiver	3	.70
TA-21A---Standby Transmitter	2	.70
Speaker	2	.20
Propeller Anti-icing	1	1.20
De-icer Timer	1	.76
*Turn and Bank Indicator	1	.15
Taxi Light	1	3.60
Cabin Sign	4	.04
*Instrument Light	2	.04
Cigarette Lighter	2	15.00
Windshield Wiper	1	6.00

*Items included in electrical utilization load report to FAA.

GENERATOR FIELD FLASHING

If generator voltage is not indicated on the voltmeter during engine runup, check the following probable causes:

a. High resistance film of gummed oil on generator commutator.

NOTE

The commutator need not have a bright surface since a slight bronze discoloration is normal for high generator load and high altitude operation.

b. Loose connections or open circuit.

c. High brush-to-commutator resistance caused by weak brush springs or excessive friction between brushes and brush guides.

d. Defective voltage regulator.

If the above causes have been eliminated and the trouble appears to be reversed polarity or loss of residual magnetism, the generator field may be flashed as follows:

a. Turn the generator switch and battery switch to the "ON" position.

b. Remove the voltage regulator from the generator circuit to be flashed.

c. Disconnect wire from terminal marked "SW" on the reverse current relay, in order to prevent possible damage to electrical instruments connected to the system.

d. Connect one end of a suitable length of cable, 18-gage or larger, to the generator "A" terminal on the voltage regulator base.

e. With engine operating at idling rpm, touch the other end of cable to terminal marked "BAT" on the reverse current relay and hold for one second.

f. Reinstall voltage regulator and "SW" wire on reverse current relay.

g. Run engine up to cruising rpm and note whether voltmeter shows a reading.

h. If a voltage is not obtained, the generator is faulty and must be replaced. If a voltage is obtained temporarily but is not maintained, replace voltage regulator.

CHECKING REVERSE CURRENT RELAY

While the relay is not adjustable in the airplane, proper relay operation may be checked as follows:

a. Using a precision voltmeter, ground the negative lead and attach the positive lead to the "BAT" terminal of the relay.

b. Start engine and run at idling speed, noting indication on the test voltmeter.

c. Advance throttle SLOWLY until meter shows a sudden increase in voltage, indicating point at which relay closes. If relay does not close between 20 and 24 volts, it must be replaced.

NOTE

The reverse current relay is entirely self-contained and automatic, therefore requiring no adjustment. Since this is a delicate devise, the cover should not be removed for any reason except overhaul by qualified personnel with suitable bench test equipment.

VOLTAGE REGULATOR ADJUSTMENT AND GENERATOR PARALLELING

Paralleling of the generators consist of adjusting both voltage regulator rheostats to give equal minimum-load voltages and then adjusting the equalizer resistors so that both generators supply equal amperage when the system is under full load.

To adjust procede as follows:

a. Bring voltage regulators up to normal operating temperature by flying airplane for a minimum of 15 minutes with battery and generator switches and a small load turned on.

b. Upon landing, connect the positive lead of a 0-30 volt precision voltmeter to the common bus terminal post (or common connector between circuit breakers) in the generator control box. Ground the negative lead.

NOTE

The voltmeters on the instrument panel are not suitable for test purposes.

c. Turn off left generator and all possible electrical load, throttling back left engine. Run up right engine to 2200 rpm with right generator "ON" and check voltage.

d. If the meter does not read 28 volts, turn rheostat knob on voltage regulator one notch at a time (clockwise to increase voltage, counterclockwise to decrease it) until a reading of exactly 28 volts is obtained.

CAUTION

Never adjust the core or pile adjusting screws (slotted heads), since the voltage setting as well as the regulating characteristics of the regulator will be altered.

e. Repeat steps c and d for the left generator with right generator "OFF".

f. With both engines at 2600 rpm, switch from one generator to the other several times and make any fine adjustments necessary to maintain minimum load voltage at 28 volts.

g. Check ammeters on instrument panel for accuracy by switching on the normal operating (cruising) electrical load. If equal readings are obtained as each generator supplies the current individually, ammeters are satisfactory.

h. With both generators "ON" turn on all possible electrical load. Each generator should take its share of the load within 10% of single generator rated output.

i. As necessary, adjust the equalizer resistors in the generator control box until the load is equally shared. (To make a generator take more load, move the equalizer tap toward the ground end of the equalizer resistor and to make it take less, move tap away from the ground end.)

ALTERNATOR-RECTIFIER

Description:

The alternator-rectifier is composed of two different units contained within a single case. The alternator, basically a generator, produces alternating current by rotating a magnetic field inside a stationary armature. The alternating current produced by this action then passes through the silicon rectifier which converts it to direct current.

Specifications:

Voltage (Nominal)	28 Volts DC
Voltage Range	26 - 29 Volts
Current	125 Amperes
Full Rating Continuous Speed Range	4000 - 8000 RPM
Cut-In Speed	2100 RPM (800 Engine RPM)
Overspeed	10,000 RPM
Cooling	4-6 Inches Water Pressure Drop Across Generator
Duty Cycle	Continuous Rated Load at 25,000 FT. at 25°C.

Servicing:

It is not necessary for alternators to be paralleled as with dc generators. The problem of paralleling generators to obtain an equalized sharing of the electrical load in dual systems is automatically solved with alternator-rectifiers.

a. Voltage Regulator Adjustment.

1. Bring voltage regulators up to normal operating temperature by operating engines for a minimum of 30 minutes with battery and alternator, and a small load turned on.

2. At the end of warm-up period, connect the positive lead of a 0-30 volt precision voltmeter to the common bus terminal post (or common connector between circuit breakers) in the alternator control box. Ground the negative lead.

NOTE

The voltmeters on the instrument panel are not suitable for test purposes.

3. Turn off left alternator and all possible electrical load, throttling back left engine. Run up right engine to 2200 rpm with right alternator "ON" and check voltage.

4. If meter does not read 28.5 volts, turn rheostat knob on voltage regulator one notch at a time (clockwise to increase voltage, counterclockwise to decrease voltage) until a reading of 28.5 ± .25 volts is obtained.

CAUTION

Never adjust the core or pile adjusting screws (slotted heads), since the voltage setting as well as the regulating characteristics of the regulator will be altered.

5. Repeat steps 3 and 4 for the left alternator with the right alternator "OFF". Both left and right alternator-rectifiers should be adjusted as nearly to the same voltage as possible.

NOTE

An "A" has been added to the General Electric part number of the carbon pile voltage regulator to designate it for use with alternators.

b. Inspecting and Cleaning Brushes.

1. Clean brushes, brush boxes, and slip rings by wiping them with a cloth moistened in solvent (Consumable Materials Chart, Item 13).

NOTE

Do not use carbon tetrachloride to clean parts.

2. Check the condition of each brush. If brushes are chipped, broken, or worn to the wear groove inside the brush, they should be removed and new brushes installed.

3. Rotate the magnetic field assembly and check for rubbing, binding, or audible noise.

4. Check for indication of engine oil leaks. If excessive oil is visible in alternator interior, the seal on the drive shaft must be replaced.

5. Make a visual check of the housing and mounting flange for cracks. If any are present the parts must be replaced.

c. Removal and Installation of Brushes.

1. Remove the air inlet cover by removing the four screws.

2. Remove the four brush caps and brushes, noting the location of the straight and angle brushes.

3. Reverse steps 1 and 2 to install brushes.

NOTE

New brushes should be run-in when installed. To run-in brushes, operate the unit at no load or lightly loaded until the face of each brush contacts its slip ring for at least 50 percent of brush area.

d. Other Pertinent Servicing Information.

1. The alternator-rectifiers are not self-excited. Battery or external power supplied voltage must be provided to excite the field.

2. The temperature limitation of the silicon rectifier is 300°F. It is not likely this temperature will ever be reached in flight; however, this temperature may be approached while idling on the ground in a high ambient temperature.

3. Three radio filter condensers are used on each alternator-rectifier to reduce radio interference. These are a 1.0 Micro-Farad (field) filter, a 10 Micro-Farad (output) filter, and a 1000 Micro-Farad (ripple) filter.

4. When performing electrical checks on the alternator-rectifier, it should be remembered that current will flow through the unit in one direction only.

LAMP REPLACEMENT GUIDE

NOMENCLATURE	BULB PART NUMBER
Alternate Air Lights	327
Baggage Compartment Light	303
Cabin Dome Lamp	313
Cabin Door Warning Lamp	327
Cabin Reading Lights	313
Cabin Sign Light	327
Cockpit Dome Lamp	Grimes 1524
Cockpit Red Light	307
Fuel Control Panel Cross Feed Lights	327
Fuel Control Panel Lights	327
Fuel Enrichment Lights	327
Indicator Lamps	327
Instrument Lights	327
Landing Lights	4523
Lighting Panel Edge Lights	327
Navigation Lights	Grimes A7512-24
Navigation Light, Tail	307
Overhead Instrument Lights	327
Panel Edge Lights	327
Beacon, Belly	Grimes A-7079A-24
Rotating Beacon, Tail	Grimes A-7079-24
Taxi Light	4587
Threshold Light	313

JATO UNIT REMOVAL

a. Remove the screws from the jato unit cover and remove the cover.

b. Disconnect the electrical connector from the forward end of the unit.

c. From inside the wheel well, remove the nut and bolt from the block so that the stop will drop down.

d. Remove the jato unit by lifting up and aft.

JATO UNIT INSTALLATION

A new jato unit may be assembled and installed by the following procedure.

a. Open shipping box and remove the jato bottle and the sealed metal container which contains the primer. Open the container and remove the primer.

b. Remove the plastic plug from the forward end of the jato bottle, remove the "O" Ring from this plug and install it on the primer.

c. Insert the primer into the jato bottle and tighten securely.

d. Insert new unit into nacelle opening and slide it forward until the lugs on the bottle set completely into the slots in the mounting channel.

e. Install stop lug and tighten bolt.

WARNING

Before connecting the electrical connector check the wires with a voltmeter to make sure there is absolutely no voltage in the wires.

f. Connect the electrical connector to the unit.

g. Replace jato unit access cover and tighten screws.

h. Check aircraft rocket engine firing circuitry as follows:

1. Place the rotary test switch in "set" position (battery master switch "OFF" and circuit breaker open).

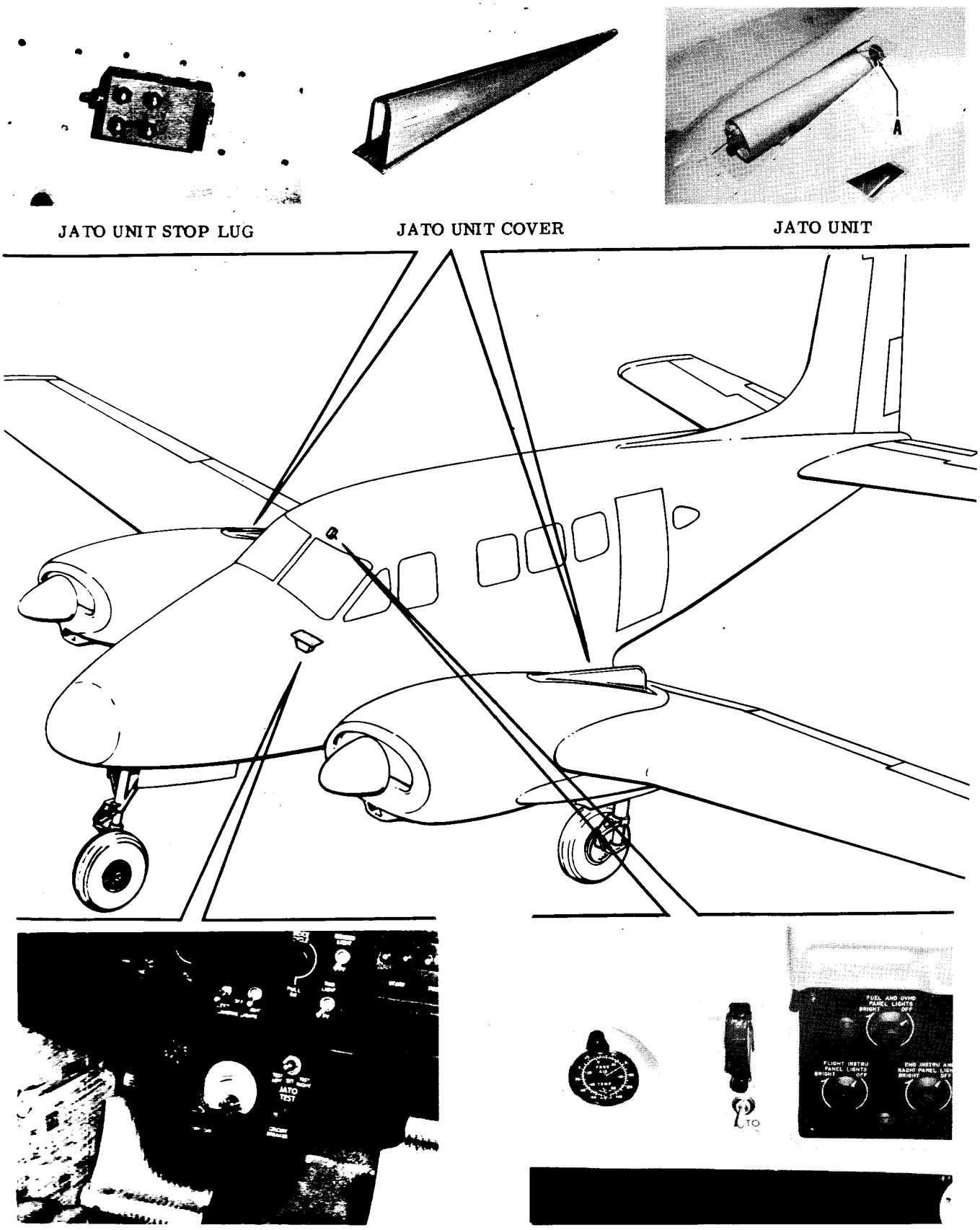
2. Turn on test meter and adjust to "set" position.

3. If meter will not "set", check test meter battery.

4. Place test switch to Left Hand JATO position. Meter should indicate resistance within the white limit marking (approximately .20 to .75 ohms). More or less resistance as well as a change in reading from one check to another is indication of unsatisfactory circuitry.

5. Repeat above procedure for Right Hand JATO.

6. Turn off test meter after completing check.



JATO UNIT STOP LUG | JATO UNIT COVER | JATO UNIT

TEST METER AND SWITCH | JATO ARM AND FIRE SWITCHES

Figure 3-20. Jato System

TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	CORRECTION
	BRAKE SYSTEM	
1. Solid pedal and no brakes.	a. Brake lining worn beyond allowable limit.	a. Replace lining.
2. Spongy brake.	a. Air in system.	a. Bleed brake system.
3. Unable to hold pressure.	a. Leak in brake system.	a. Visually check entire system for evidence of leaks.
		b. Check master cylinder seals; replace if scored.
4. Parking brake will not hold.	a. Air in system.	a. Bleed brake system.
	b. Defective parking brake valve.	b. Replace the valve.
5. Brakes grab.	a. Stones or foreign matter locking brake disc.	a. Clean brake disc and lining.
	b. Warped or bent disc.	b. Replace disc.
	LANDING GEAR CONTROL SYSTEM	
1. Landing gear will not retract or lower.	a. Circuit breaker tripped in control or motor circuit.	a. Reset.
	b. Loose motor ground connection.	b. Clean and tighten.
	c. Open circuit.	c. Test continuity: (1) Control circuit breakers landing gear switch. (2) Main belly terminal post to motor circuit breaker and control relay.
2. Landing gear will lower but not retract.	a. Open circuit between landing gear switch and control relay.	a. Test continuity from up terminal of landing gear switch and energizing wire terminal of the up limit switch.
	b. Up solenoid of control relay inoperative.	b. Check switch for operation.
	c. Open circuit between control relay and up winding in motor.	c. Test continuity from up solenoid power terminal to up winding of motor.
3. Landing gear will retract but not lower.	a. Open circuit.	a. Test continuity from down terminal of landing gear switch to down limit switch and energizing wire terminal of the down solenoid.
	b. Down limit switch inoperative.	b. Check switch for operation.
	c. Open circuit between control relay and down winding of motor.	c. Test continuity from down solenoid power terminal to down winding of motor.

TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	CORRECTION
LANDING GEAR CONTROL SYSTEM (CON'T)		
4. Circuit breaker tripping in circuit.	a. Grounded circuit.	a. Test for ground: (1) Between circuit breaker and landing gear switch. (2) Between landing gear switch and control relay on side (up or down) of control circuit that is tripping circuit breaker.
5. Circuit breaker tripping in motor circuit.	a. Grounded circuit.	a. Test for ground: (1) Between main belly post and control relay (2) In motor leads (with leads disconnected from motor).
	b. Mechanical defect in gear causing overload.	b. Check system for binding, interference, etc.
LANDING GEAR LIMIT AND SAFETY SWITCH		
1. Landing gear motor fails to shut off when gear is retracted and "UP" light stays off.	a. Up limit switch out of adjustment.	a. Readjust.
	b. Defective up limit switch.	b. Check switch for operation.
2. Landing gear fails to retract.	a. Safety switch not closing.	a. Readjust.
	b. Up limit switch stuck.	b. Replace.
3. Landing gear fails to retract completely but "UP" light comes on.	a. Up limit switch operates early.	a. Readjust.
4. Positive down locks do not fully engage.	a. Down limit switch opens early.	a. Readjust.
5. Landing gear motor fails to shut off when gear is extended.	a. Down limit switch does not open.	a. Readjust.
	b. Defective down limit switch.	b. Check switch for operation.
LANDING GEAR POSITION INDICATORS AND SWITCHES		
1. All indicators inoperative.	a. Landing gear indicator circuit breaker tripped.	a. Reset.
	b. Open circuit between circuit breaker and indicators.	b. Check continuity.
2. One indicator completely inoperative.	a. Defective indicator.	a. Test and replace if necessary.
	b. Open circuit.	b. Check continuity of circuit affected.
3. One indicator partically inoperative.	a. Defective indicator.	a. Test and replace if necessary.
	b. Defective indicator switch.	b. Test switch of inoperative circuit. Replace if necessary.

TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	CORRECTION
	LANDING GEAR POSITION INDICATORS AND SWITCHES (CON'T)	
	c. Open circuit.	c. Check continuity of circuit affected.
	LANDING GEAR WARNING HORN AND SWITCHES	
1. Warning horn inoperative of malfunctioning.	a. Horn circuit breaker tripped.	a. Reset.
	b. Open or grounded circuit.	b. Check continuity: (1) Circuit breaker to horn throttle switches, LH gear down lock warning switch, and ground. (2) From throttle switches to nose gear down lock warning switch and ground. (3) From throttle switches to RH gear down lock warning switch and ground.
	c. Throttle switches defective or out of adjustment.	c. Check and adjust if necessary.
	d. Main or nose gear down lock warning switches defective or out of adjustment.	d. Check and adjust if necessary.
	e. Flasher stuck open.	e. Check flasher continuity.
2. Circuit breaker tripping.	a. Grounded circuit.	a. Check for ground between circuit breaker and warning horn.
	LIGHT WEIGHT DE-ICER SYSTEM	
1. De-icers do not inflate, or inflate slowly.	a. Control cables not connected or not fastened to the valves tightly.	a. Inspect cable connections to the valves for tightness and proper adjustment.
	b. Mechanical interference of cables or mechanism.	b. Correct interference problem.
	c. Reservoir empty.	c. Charge reservoir.
	d. Shut-off valve not open.	d. Check shut-off valve control cable for proper adjustment.
	e. Regulator set for too low a pressure.	e. Reset regulator.
	f. Cycling valve not operating or not completely engaged.	f. Check cycling control cable for proper adjustment.
	g. Piping, lines blocked or not connected.	g. Blow out lines and inspect connections.
2. De-icers do not deflate, or deflate slowly.	a. Cycling valve not operating properly.	a. Check cycling control cable for proper adjustment and possible mechanical interference.

TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	CORRECTION
	LIGHT WEIGHT DE-ICER SYSTEM (CON'T)	
	b. Piping, lines blocked or not connected.	b. Blow out lines and inspect connections.
	c. Check valve malfunctions at cycling valve assembly.	c. Observe check valve. Unplug outlet, repair or replace check valve if defective.
	d. Right engine not running, vacuum supply to aid deflation and hold down is not available.	d. Start right engine or correct vacuum system malfunction.
3. De-icers remain inflated, reservoir drains on first cycle, or automatic return of cycling valve does not function.	a. Improper tubing connection.	a. Check tubing connections to cycling valve.
4. Regulator safety valve popping under 30 psi.	a. Regulator safety valve improperly set.	a. Reset valve.
5. Shut-off valve does not effect complete shut-off.	a. Shut-off valve actuating pin does not drop free so as to let the shaft inside the valve seat completely.	a. Check actuating pin, replace if defective.
6. Cycling valve automatic return functions before de-icers are fully inflated or inflation cycle is longer than 5 to 9 seconds.	a. Cycling valve out of adjustment.	a. Adjust the cycling valve "pop-off" pressure.
	ENGINE DRIVEN DE-ICER SYSTEM	
1. System inoperative.	a. Circuit breaker tripped.	a. Reset circuit breaker.
	b. Vacuum pumps inoperative.	b. Check de-icer pressure and replace pumps if necessary.
	c. Defective control switch.	c. Check and replace if necessary.
	d. Open circuit between control switch and electronic timer.	d. Check continuity of circuit.
	e. Electronic timer inoperative.	e. Replace timer.
	f. Combination unit inoperative.	f. Replace combination unit.
2. Partial or slight operation.	a. Connecting tubing may be clogged.	a. Check tubing for stoppage, kinks, or bends.
	b. System pressure may be low.	b. Observe gage and adjust the combination unit to 12 - 17 psi.
	c. Loose or leaky connections.	c. Check connections. Tighten if necessary.
	STALL WARNING SYSTEM	
1. Warning system inoperative.	a. Warning circuit breaker tripped.	a. Reset circuit breaker.
	b. Open circuit.	b. Check continuity. (1) Circuit breaker to indicator. (2) Indicator to sensing

TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	CORRECTION
	STALL WARNING SYSTEM (CON'T)	
		switch. (3) Switch to ground.
	c. Defective switch.	c. Check switch operation.
	d. Defective indicator.	d. Check indicator operation.
2. Horn continues to blow.	a. Circuit grounded between horn and switch.	a. Test for ground.
	b. Defective switch.	b. Check switch operation.
	PROPELLERS	
1. Failure of pitch to change.	a. Propeller governor improperly adjusted.	a. Readjust governor.
	b. Governor control linkage improperly set.	b. Check for freedom of movement.
2. Propeller fails to feather.	a. Incorrect control travel.	a. Re-rig control.
	b. Broken or weak feathering spring.	b. Replace feathering spring.
	c. High pitch stop pins have burrs which prevent movement.	c. Replace high pitch stop pins.
3. Propeller surging.	a. Governor pressure too low.	a. Readjust governor.
	b. Air trapped in propeller actuating piston or engine shaft.	b. Exercise propeller by changing pitch several times.
	c. Propeller lacks sufficient dampening.	c. Change governor speeder spring to stiffer one.
	HEATER SYSTEM	
1. Blower runs but heater will not start.	a. Fuse blown due to overheat condition causing overtemperature switch to close.	a. Replace fuse, check entire circuit for cause of overheat condition.
	b. Defective temperature limit switch.	b. Check switch and lead; replace if necessary.
	c. Faulty ignition unit, vibrator.	c. Switch to reserve vibrator contacts. If this corrects trouble, replace vibrator at first opportunity.
	d. One or both solenoid fuel valves inoperative.	d. Disconnect fuel line and check for fuel flow; check valve in nacelle first. Replace defective valve.
	e. Faulty ignition unit coil.	e. Remove shielded lead from spark plug and check for spark. If no spark, replace ignition unit.
	f. Fouled or defective spark plug.	f. If test "d" above produces spark, remove and clean or replace igniter plug.
	g. One or both heater control rheostats defective.	g. Connect voltmeter across rheostat leads and turn rheostat through its range.

TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	CORRECTION
	HEATER (CON'T)	
		Voltage should decrease as knob is turned toward high temperature. If not replace rheostat.
	h. Shorted lead between cabin thermostat and heater control box.	h. Check continuity from cabin thermostat to heater control box.
	i. Defective heater control box.	i. Disconnect lead from heater control box to cabin thermostat. Heater should start, if not replace heater control box.
	j. Faulty shielded ignition lead.	j. Replace shielded lead.
	k. Worn ground electrodes.	k. Replace ground electrodes.
	l. Fuel pressure regulator faulty.	l. Replace the regulator.
	m. Leaks or obstructions in combustion air supply line.	m. Repair leaks or remove obstructions.
2. Heater will not shut off automatically.	a. One or both heater controls defective.	a. Check as in 1., item "f".
	b. Open circuit from rheostat to cabin thermostat.	b. Check circuit from rheostat to cabin thermostat.
	c. Defective ground at cabin thermostat.	c. Check and repair as needed.
	d. Defective cabin thermostat.	d. Ground lead from thermostat to heater control box; if heater turns off, replace the thermostat.
3. Heater backfires intermittently.	a. Loose connection in control circuit, loose high-tension lead to spark plug.	a. Check connections, check wiring breaks.
	b. Mixture too rich.	b. Make checks listed in item 4.
4. Fuel mixture too rich, pulsating combustion or smoky exhaust.	a. Restriction in combustion air duct.	a. Check air ducts for obstructions.
	b. Restriction in exhaust duct.	b. Check exhaust outlet for obstructions.
	c. Loose core in fuel nozzle.	c. Clean nozzle. Make sure core is seated securely in shell.
	d. Fuel pressure regulator may be faulty.	d. See 1., item "l".
	PITOT AND STATIC SYSTEM	
1. Heating element inoperative.	a. Defective switch.	a. Replace.

TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	CORRECTION
	PITOT AND STATIC SYSTEM (CON'T)	
	b. Grounded or open circuit.	b. Check continuity. Repair or replace as necessary.
	c. Defective heater.	c. Replace pitot head.
2. Circuit breaker keeps tripping.	a. Grounded wire.	a. Repair or replace wire.
3. Instruments inoperative or erratic in operation.	a. Lines clogged.	a. Drain lines at drain cocks, disconnect at instruments and blow out with low pressure air.
	b. Loose connections.	b. Check all connections.
	VACUUM SYSTEM	
1. Low suction gage reading.	a. Suction relief valve not properly adjusted.	a. Adjust.
	b. Pump failure.	b. Replace.
	c. Insufficient lubrication of pump.	c. Remove pump and check lubrication port for restriction.
	d. Leak or break in suction line.	d. Locate and repair.
	e. Defective gage.	e. Replace.
	f. Defective suction relief valve.	f. Replace.
	g. Oil separator clogged or defective.	g. Clean or replace.
2. High suction gage reading.	a. Suction relief valve not properly adjusted.	a. Adjust.
	b. Defective suction relief valve.	b. Replace.
	c. Defective gage.	c. Replace.
	d. Suction relief valve screen clogged.	d. Clean screen.
3. Suction gage inoperative.	a. Clogged lines.	a. Clean lines.
	b. Shaft on vacuum pump broken.	b. Replace pump.
4. Vacuum operated instruments sluggish or inoperative but gage showing normal suction.	a. Clogged filter element.	a. Clean filter element.
	BATTERY SYSTEM	
1. No power indicated with battery master switch key "ON".	a. Battery discharged or defective.	a. Test.
	b. Toggle switch on subpanel "OFF".	b. Turn on.
	c. Open circuit between battery and master switch.	c. Check continuity.

TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	CORRECTION
	BATTERY SYSTEM (CON'T)	
	d. Master switch defective.	d. Check both switches for operation. Replace if necessary.
	e. Defective relay.	e. Check relay for operation. Replace if necessary.
2. Power on with master in "OFF" position.	a. Master switch defective.	a. Check both switches for operation. Replace if necessary.
	b. Relay contacts stuck.	b. Replace relay.
	STARTER SYSTEM	
1. Both starters inoperative.	a. Circuit breaker tripped in starter-switch circuit.	a. Check for short circuit; reset.
	b. Battery relay inoperative.	b. Check continuity of battery system.
	c. Low battery.	c. Test battery. If low, replace or start with external power.
	d. Loose connection or open circuit between battery positive relay and left starter relay.	d. Check connections and continuity.
2. One starter inoperative.	a. Starter relay inoperative.	a. Check relay terminal connections and continuity of solenoid energizing circuit. If energizing circuit is closed and relay does not operate, replace relay.
	b. Poor ground at starter.	b. Test continuity from armature lead to ground. Repair if necessary.
	c. Open circuit.	c. Check continuity to starter.
	d. Defective starting motor.	d. Check brushes, springs, condition of commutator; replace if necessary.
	GENERATOR SYSTEM	
1. Zero or low voltage indicated.	a. Engine speed too low.	a. Increase speed.
	b. Loose connection.	b. Check connections throughout system.
	c. Open or shorted field circuit in generator; defective armature.	c. Test resistance of field. Check field circuit connections. Replace generator if defective.
	d. Brushes not contacting commutator.	d. Clean brushes and holders with a clean, lint-free, dry cloth. Replace weak springs.

TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	CORRECTION
	GENERATOR SYSTEM (CON'T)	
	e. Brushes worn out.	e. Replace brushes if worn to a length of 1/2 inch or less.
	f. Dirty commutator.	f. With generator running, clean commutator with No. 0000 sandpaper. Use air jet to remove grit.
	g. Defective voltage regulator.	g. Replace regulator.
	h. Defective voltmeter.	h. Replace voltmeter.
2. No generator output.	a. Circuit breaker tripped.	a. Check for short circuit; reset.
	b. Open circuit.	b. Check continuity of circuit.
	c. Loss of residual magnetism.	c. Flash generator field.
	d. Defective generator control switch or reverse current relay.	d. Test switches. Replace if defective.
	e. Generator not turning.	e. Check generator shaft. Replace generator if necessary.
3. Low generator output.	a. Generators not paralleled.	a. Readjust minimum-load voltage. Then readjust equalizer resistors.
4. Ammeter or voltmeter reads off scale in wrong direction.	a. Generator field magnetized in wrong direction.	a. Flash field.
5. Ammeter or voltmeter does not read.	a. Loose connection on "SW" terminal of reverse current relay.	a. Tighten.
	b. Loose connection or ground in aircraft wiring.	b. Check entire system.
	ALTERNATOR - RECTIFIER SYSTEM	
1. No voltage output.	a. Field circuit open.	a. Check field circuit for continuity with an ohmmeter. (Resistance 2.3 ohms ± 10%).
	b. Open or shorted stationary winding.	b. Check each phase for resistance (0-483 ohms ± 10%).
	c. System wiring faulty or improperly connected.	c. Disconnect Alternator-Rectifier and check for continuity.
2. Radio Interference.	a. Condenser Open.	a. Test each condenser with a condenser tester or check for a kick on ohmmeter.

ALTERNATOR - RECTIFIER SYSTEM (CON'T)

Do not exceed condenser voltage rating when using condenser tester. (The 1000 mfd condenser is rated at 35 volts - the 10 mfd condenser is rated at 150 volts - the 1.0 mfd condenser is rated at 200 volts dc).

CAUTION

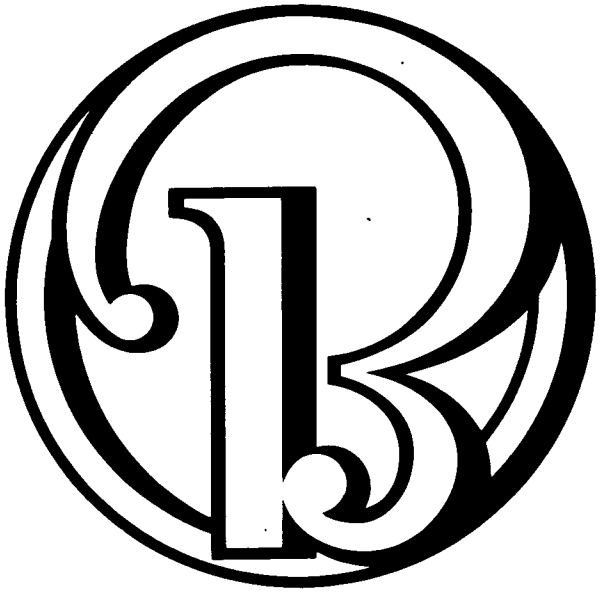
Do not reverse polarity or rectifiers will be damaged.

CABIN LIGHTS

1. Lights inoperative.	a. Circuit breaker tripped.	a. Check for short circuit. Reset circuit breaker.
	b. Loose connection.	b. Check and tighten electrical connections.
	c. Battery defective.	c. Replace battery or use external power.
2. One bulb does not light.	a. Bulb burned out.	a. Replace bulb.
	b. Fixture not grounded.	b. Check for good bonding between fixture and structure. Tighten mounting screws.
	c. Loose connection.	c. Check all connections in circuit.
	d. Defective fixture or switch.	d. Replace fixture or switch.

TROUBLE SHOOTING

TROUBLE	PROBABLE CAUSE	CORRECTION
	LANDING LIGHTS	
1. Lamp fails to light.	a. Circuit breaker tripped.	a. Check for short circuit. Reset circuit breaker.
	b. Lamp burned out.	b. Replace lamp.
	c. Loose connection or defective wire.	c. Tighten connections and check circuit continuity. Replace or repair wire if necessary.
	d. Landing-light switch defective.	d. Check continuity through switch. Replace if necessary.
	STALL WARNING CIRCUIT	
1. Warning horn inoperative.	a. Horn circuit breaker tripped.	a. Check for short circuit; reset.
	b. Open circuit.	b. Check continuity: (1) Circuit breaker to indicator. (2) Indicator to switch. (3) Switch to ground.
	c. Defective switch.	c. Check switch operation.
	d. Defective indicator.	d. Check horn operation.
2. Horn stays on.	a. Grounded circuit between horn and switch.	a. Test for ground.
	b. Defective switch.	b. Check switch operation.



4

SECTION IV

Major Disassembly Procedures

SECTION IV

MAJOR DISASSEMBLY

This section stresses special points on removing and installing major assemblies of the Queen Air.

Step-by-step procedures are given only where it is considered necessary because the process is complex - such as the removing and installing of the wing and the installing of the wing panel leading edge.

SECTION IV
MAJOR DISASSEMBLY

CABIN DOOR REMOVAL

a. Remove the fuselage and door seal tabs and the rubber seal.

b. Remove the hinge wire from the hinge.

c. Disconnect the cable from the fuselage door frame and remove door.

INSTALLATION OF CABIN DOOR

a. Position door and mate hinge halves.

b. Connect the cable to the fuselage door frame.

c. Install hinge wire.

d. Install the rubber seal and the seal tabs.

WINDSHIELD REMOVAL

a. Remove the screws that hold the retainer strips on the front of the windshield.

b. From the inside of the pilot's compartment gently push the windshield panels outward one at a time.

c. Remove the excess sealing compound from the window frames.

INSTALLATION OF WINDSHIELD

a. Install a strip of rubber extrusion around each window.

NOTE

Seal the extrusion with a mixture of 100 parts EC755 sealer to 8 parts of EC1216 catalyst (products of Minnesota Mining and Manufacturing Corp., Detroit, Michigan).

b. Install a 3 16 x 1 2 inch strip of doortite on the inside edge of the windshield channel and place the windshield panels in the channel.

c. Apply pro-seal, EP711 (product of Coast Paint Chemical Co., Los Angeles, California) at the bottom and outside edges of the windshield panel.

d. Install a 1 16 x 1 inch strip of seal, EC1202 (product of Minnesota Mining and Manufacturing Corp., Detroit, Michigan) between the fuselage skin and the windshield retainer strips, replace the retaining strips and attaching screws.

PILOT AND COPILOT SEAT REMOVAL

CAUTION

Lower the pilot's seat to its lowest position and place the left armrest down before removing the seat. If the pilot's seat is not lowered or if the left armrest is up before moving the seat forward it will strike, and may damage, the components of the fuel selector panel.

a. Remove the seat stops at the end of each track.

b. Release the fore and aft adjustment lock.

c. Move the seat forward until it clears the mounting tracks.

NOTE

The seats will not clear the pilot's compartment door in the upright position. To remove a seat from the compartment, place the armrests up, turn the seat on its side, and work it through the door.

INSTALLATION OF PILOT AND COPILOT SEAT

a. Place the seat in position and align the seat guides with the mounting tracks.

CAUTION

Lower the seat to its lowest position and place the left arm rest down before sliding the seat into place. Take care not to force the seat against the fuel selector panel during installation.

b. Release the fore and aft adjustment lock and slide the seat into the desired position. Engage the fore and aft lock making certain it holds the seat securely in place.

c. Replace the seat stops on the end of each track.

FORWARD PASSENGER SEAT REMOVAL

a. Lift sliding lock on each rear leg of the seat until it clears the mounting track and rotate the lock 90 degree in either direction to prevent it from dropping back into the gutter of the mounting track.

b. Lift the seat from the mounting track.

INSTALLATION OF FORWARD PASSENGER SEAT

a. Place the seat in the mounting track in the position desired.

b. Install sliding lock on each rear leg of the seat into the mounting track gutter fittings.

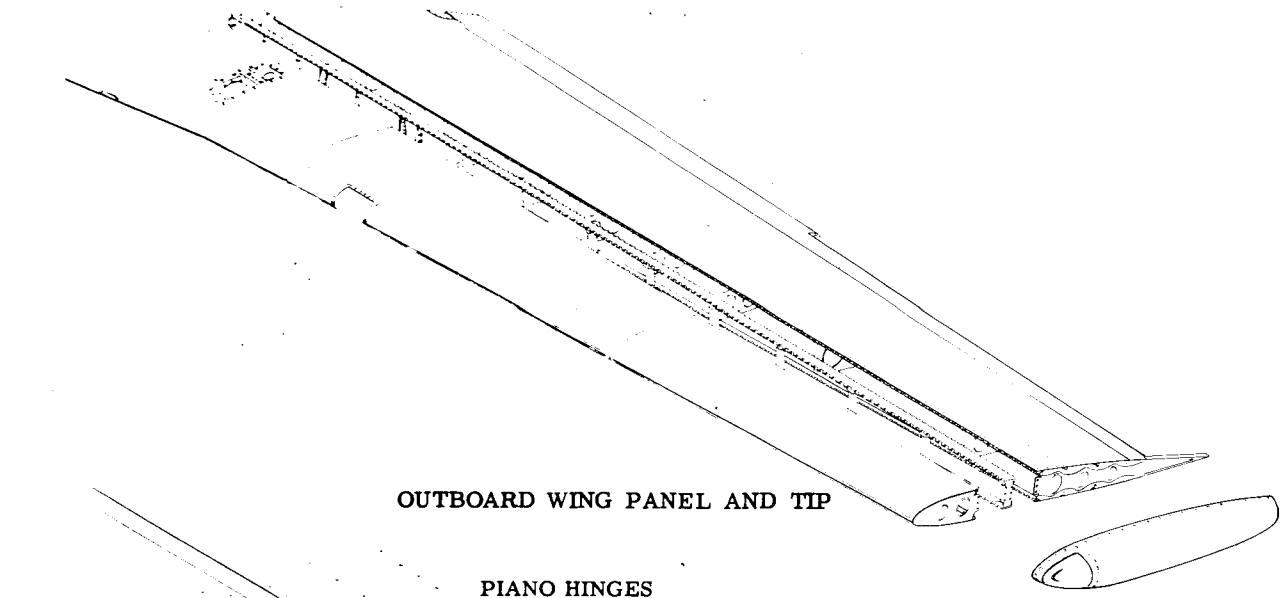
AFT PASSENGER SEAT REMOVAL

a. Remove the set screws at the end of the track and slide the left rear seat off the track.

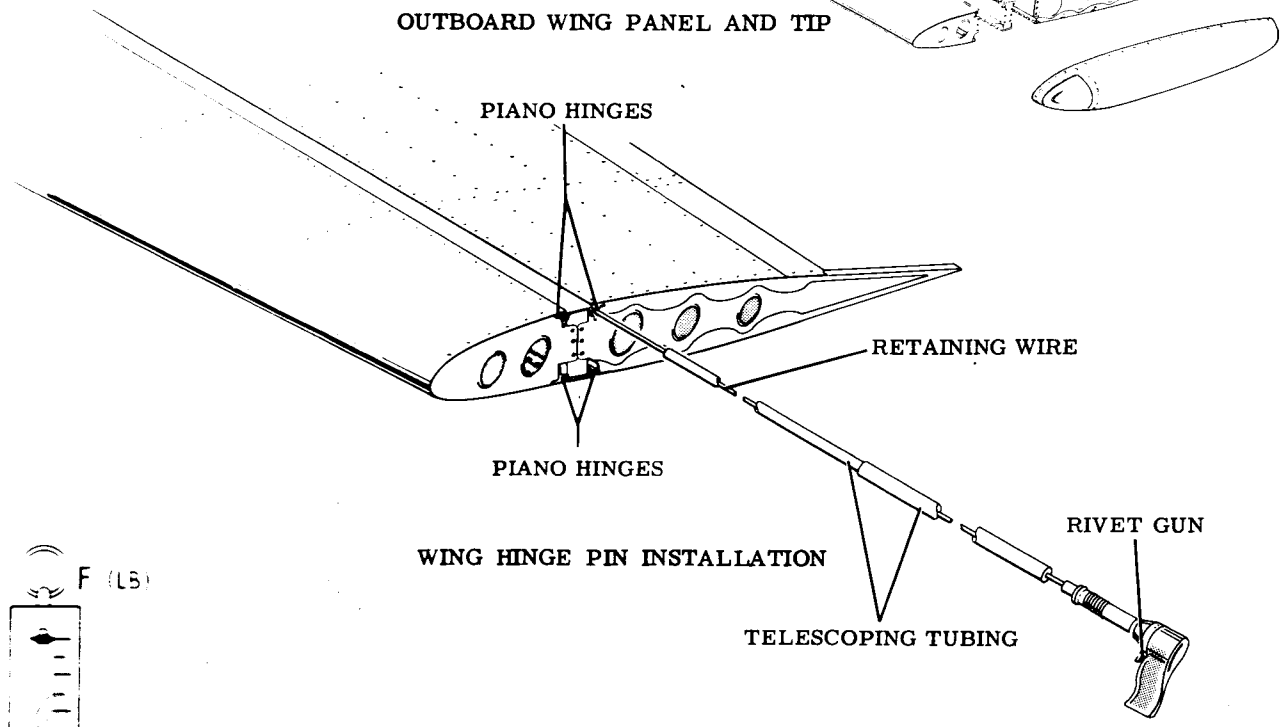
b. To remove the right rear seat slide it forward and remove it from the track at the centrally located slots in the track.

INSTALLATION OF AFT PASSENGER SEAT

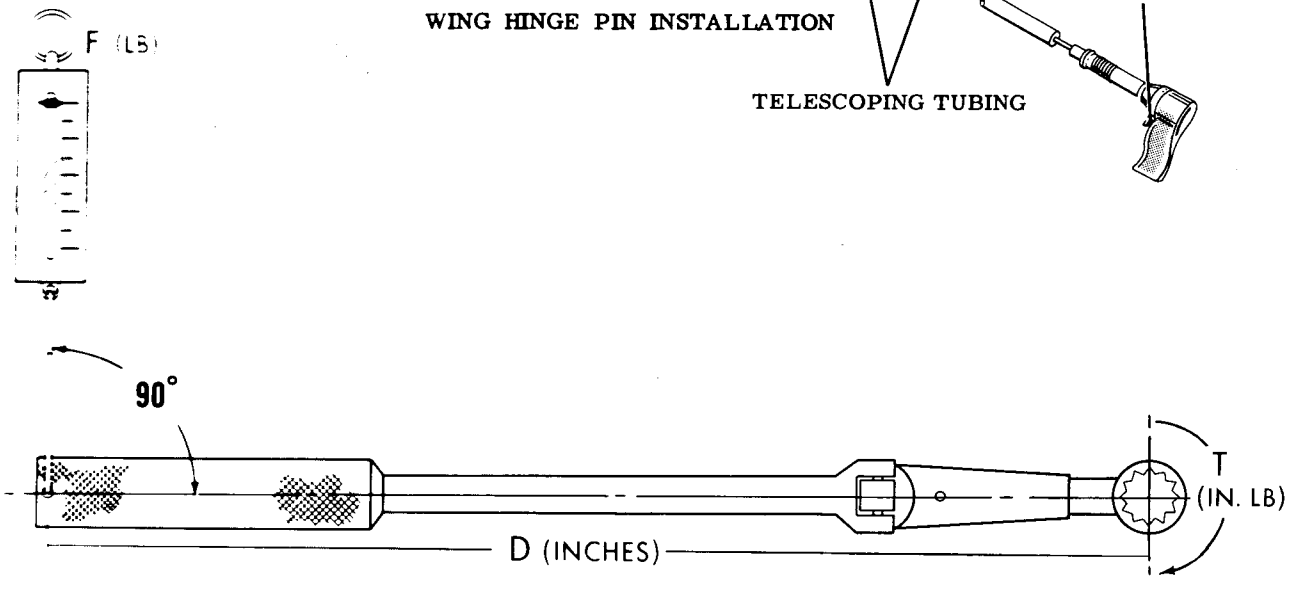
Install the aft passenger seats in the reverse of the removal procedure.



OUTBOARD WING PANEL AND TIP



WING HINGE PIN INSTALLATION



WING BOLT TORQUE COMPUTATION

Figure 4-1. Wing Disassembly

SECTION IV
MAJOR DISASSEMBLY

OPTIONAL CABIN COUCH REMOVAL

a. On each leg equipped with Brownlite fittings, lift the sliding lock until it clears the mounting track and rotate the lock 90 degrees in either direction to prevent it from dropping back into the gutter of the mounting track.

b. Lift the couch from the mounting track.

INSTALLATION OF OPTIONAL CABIN COUCH

a. Place the couch in the mounting track in the position desired.

b. Rotate the sliding locks on the rear legs of the couch until they drop into the mounting track gutter fittings.

WING REMOVAL

a. Drain and purge the fuel cells.

b. Disconnect the aileron and aileron tab cables (left wing only) at the turnbuckles inside the wheel well. Maintain tension on the tab cables to keep them from unwinding from the drum on the pedestal.

c. Remove the outboard augmenter tube cover plate and clamps to gain access to fuel and fuel vent lines.

d. Disconnect fuel lines, fuel vent lines, the airspeed pitot line and de-icer lines if installed.

e. Disconnect the navigation light, landing light, and pitot heater wires at the electrical junction inside the access hole on the lower side of the engine outboard nacelle.

f. Remove the access cover on the lower wing skin just forward of the rear spar at the wing attachment fitting and disconnect the flexible drive shaft.

g. Remove the grommet, located approximately six inches inboard of the outboard flap actuator.

NOTE

Before removing the wing attaching bolts, mark the position of the wing attachment fittings in relation to each other to aid in rigging on installation. Place supports under the wing root and tip before removing wing bolts.

g. Remove the wing attaching bolt cover plates and attaching bolts. Move wing straight away from the airplane until all fuel lines are clear of the center section.

NOTE

Special wrenches are required for the NAS high strength bolts used on the wing attachment fittings.

WING DISASSEMBLY

a. Support the wing on a suitable cradle.

b. Remove wing tip.

c. Disconnect aileron tab cables (left aileron only). Remove screws attaching aileron to brackets, and remove aileron.

d. Remove the bolt attaching the flap jackscrew to the flap. Remove the access plates on top of the flap and remove the bolts attaching the flap to flap track.

e. Remove access cover and scupper plate over fuel cell. Remove filler neck and fuel level transmitter. Unsnap the fuel cell from the upper skin. Disconnect the fuel outlet and vent lines. Remove the fuel cell through the access hole.

f. Remove the screws around the spar cap and rib at the wing attaching point and the screws at the tip rib.

g. The steel retaining wire may be removed by grasping with pliers and pulling. (Vise grip pliers are recommended.) Remove the wires retaining the leading edge first, then remove the wires holding the spar to the rear wing section. Do not attempt to spin the wires out with a drill motor; the heating and expansion of the wire will cause it to seize in the hinge and break.

REASSEMBLY OF WING

a. Before assembling the spar to the wing sections, it is advisable to drive a retaining wire through the hinge sections to remove any burrs or foreign matter.

b. Use a new retaining wire, coated liberally with lubricant (item 10, Consumable Materials Chart).

c. Assemble the spar to the rear wing section and align the hinge sections.

d. Using an E-2 rivet gun (or gun of equivalent size) drive the wire in. The wire must be supported during the driving operation and the use of the following sizes of telescoping tubes are recommended: 3/16 x .049 steel tubing -60, 32, 17, 9, 5, 2-1/2 in. in length; 1/4 x .049 steel tubing -60, 32, 17, 9, 5, 2-1/2 in. in length. The retaining wire is inserted in the assembled steel tubing guides and as the wire is driven in, sections of the tubing are removed.

CAUTION

Do not use a drill motor to spin the wire in as the heat and expansion may cause the wire to seize and break.

e. Install the leading edge in the same manner as the rear wing section.

f. Replace machine screws around the spar fittings and tip and butt rib.

g. Reinstall the component parts of the wing in the reverse of the disassembly procedure. Refer to installation of fuel level transmitter in this section, for the reinstallation of the transmitter.

INSTALLATION OF WING

a. Place wing in position for installation and install the wing attaching bolts.

WARNING

The single soft aluminum washers between each of the upper wing and fuselage fittings must be replaced with a new part each time the joint is disengaged.

One or two washers may be used, at the upper front spar fittings, under the nut to provide a proper bolt grip adjustment, however, one washer only is to be installed at the upper rear spar fittings.

b. Tighten the wing attaching bolts to the specified torque. An acceptable method of checking the torque

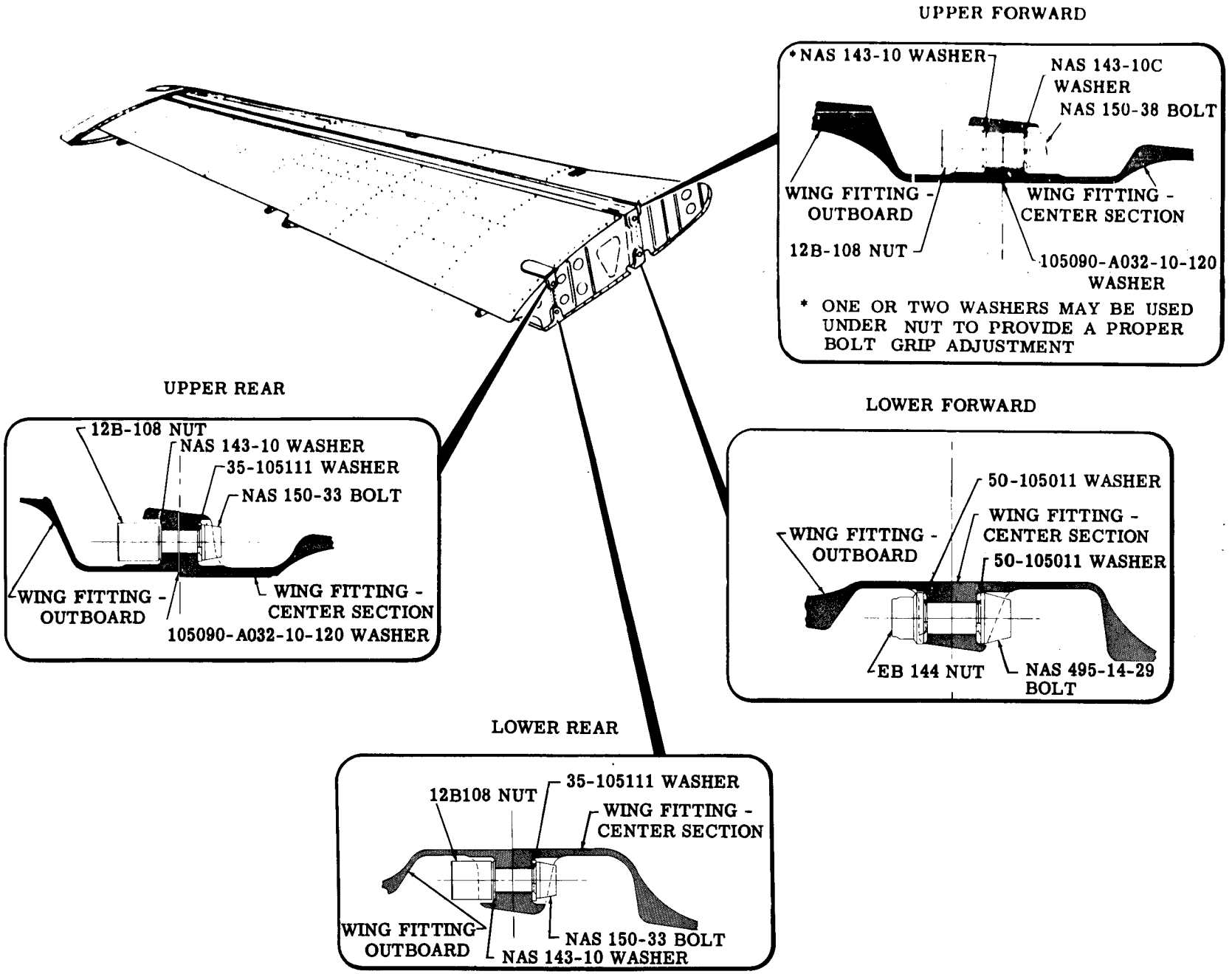


Figure 4-2. Wing Installation

if a torque wrench is not available, is to attach a spring scale to a conventional flex or "T" handle inserted in an adapter. Force should be applied in a direction perpendicular to an imaginary line extending from the center of the bolt through the spring scale attaching point. To calculate the force in pounds (scale reading) required to obtain the specified torque, divide the torque in inch-pounds by the distance in inches between the center of the bolt and the scale attaching point. For example, if the specified torque is 5,000 inch-pounds and the distance is 25 inches a pull of 200 pounds must be applied. Bolts to be torqued must be clean and free of all lubricant; otherwise loss of normal friction allowed for in establishing the specified torque values may result in over-torquing of the bolt. When a torque wrench adapter is used, the length of the adapter must be added to the length of the torque wrench and a value calculated for that particular combination. The following is a typical example in deriving the desired value:

Effective length of torque wrench: 12 inches

Length of adapter . . . . . 3 inches
Total length . . . . . 15 inches
Desired Torque on bolt . . . 2000 inch-pounds

$$\frac{\text{2000 inch-pounds}}{\text{15 inches}} = 133.3 \text{ pounds}$$

Force required at end of torque wrench:	133.3 pounds
133.3 pounds x 12 inches:	1599.6 inch-pounds
Desired reading on torque wrench indicator:	1600 inch-pounds

Use the following torque values for the wing attaching bolts:

1. Lower forward spar bolt, 5,000 to 5,500 inch-pounds.

2. Upper forward, upper and lower rear spar bolt, 2,000 to 2,300 inch-pounds.

c. Connect electrical wiring at junction block in lower side of engine nacelle.

d. Connect fuel outlet and fuel vent line, and pitot line.

e. Connect aileron and aileron tab cables (left wing only) at turnbuckles in landing gear wheel well. Refer to Section III for rigging.

f. Connect the flap flexible drive.

g. Check flap travel and stops. Check operation of navigation lights, landing lights, and pitot heat. Fill the fuel cells and check for leaks. Check the airspeed system for proper operation, preferably against a master instrument. When using a master instrument for checking the airspeed, the temperature must remain constant and differential must not exceed five mph in 15 minutes.

h. Install augmenter tubes and all access hole covers.

NOTE

Retorque the wing bolts after first 100 hours of flight time following a new installation.

WING ADJUSTMENTS

Rigging adjustment of the wing is not ordinarily necessary; however, when flight tests indicate a wing-heavy condition, the wing may be washed in or out for correction. Proceed as follows:

a. Mark the present position of the wing on the wing attachment fittings.

b. Loosen the wing attaching bolts.

c. Remove the upper bolts, one by one, and replace the soft aluminum washers between the wing attachment fittings.

d. Determine the new position of the wing and tighten the wing bolts.

NOTE

If wing is heavy, the trailing edge must be lowered below its original position, as indicated by the marks made before loosening the bolts. If wing is light the trailing edge should be raised.

e. Test fly aircraft. Readjust if necessary.

NOTE

New soft aluminum washers must be installed when the wings are rotated and a log book entry made so the wings may be retorqued after the first 100 hours of flight time after the washers are installed. The stall warning indicator also must be checked and the detector vane reset if necessary.

WING TIP REMOVAL

a. Remove the machine screws attaching the wing tip to the wing.

b. Unscrew the electrical lead to the navigation light from the navigation light base and remove tip.

INSTALLATION OF WING TIP

a. Attach the electrical lead to the navigation light base and tighten.

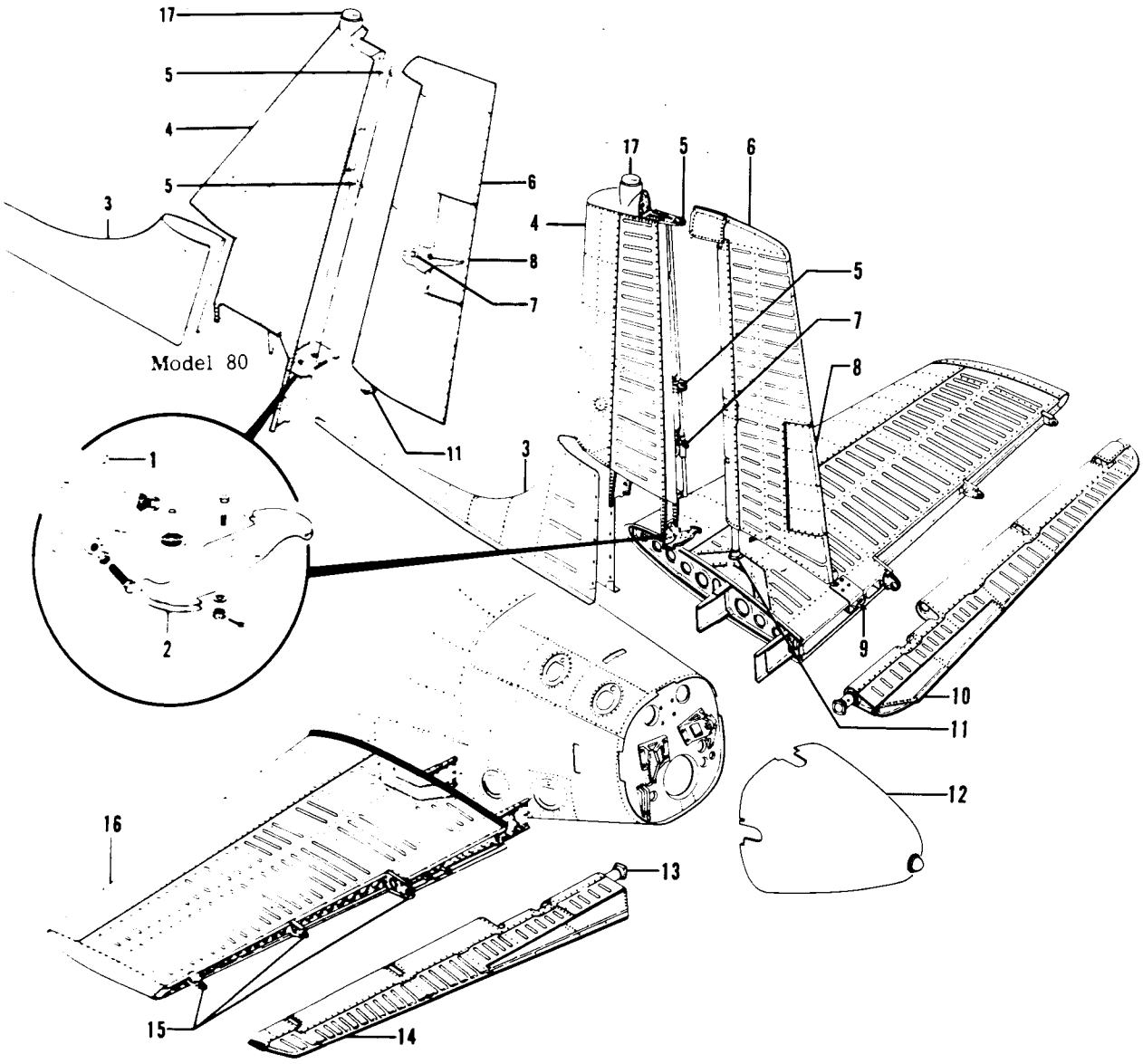
b. Install machine screws which attach the wing tip to the wing.

ELEVATOR REMOVAL

a. Remove tail cone attaching screws, disconnect tail navigation light wire and remove tail cone.

b. Disconnect the tab actuator rod.

c. Remove the four bolts attaching the elevator extension tube adapter to the elevator horn.



1. Rudder Bell Crank Bracket
2. Rudder Bell Crank
3. Dorsal Fin
4. Vertical Stabilizer
5. Rudder Hinges
6. Rudder
7. Rudder Trim Tab Actuator
8. Rudder Trim Tab
9. Elevator Trim Tab Actuator
10. Elevator Trim Tab
11. Rudder Torque Tube
12. Tail Cone
13. Elevator Torque Tube
14. Elevator
15. Elevator Hinges
16. Horizontal Stabilizer
17. Rotating Beacon Assembly

Figure 4-3. Empennage Section

d. Remove the hinge bolts, disconnect the bonding cable and pull the elevator away from the stabilizer.

INSTALLATION OF ELEVATOR

a. Align holes in elevator and stabilizer hinge, install attaching bolts and connect the bonding cable.

b. Install bolts which attach the extension tube adapter to the elevator horn.

c. Attach elevator tab actuator.

d. Install tail cone and connect navigation light wire.

RUDDER REMOVAL - Model 65

a. Remove tail cone attaching screws and disconnect rear navigation light wire. Remove the tail cone.

b. Disconnect rudder tab cables at turnbuckles. Remove cable retainer pins from pulley brackets.

c. Remove the attaching bolts at rudder horn.

d. Remove rudder attaching bolts from the rudder hinge and remove rudder.

INSTALLATION OF RUDDER - Model 65

a. Align holes in rudder and stabilizer hinge and install attaching bolts.
b. Install lower attaching bolts through rudder horn.

c. Route and connect the rudder tab cables.

d. Check travel of tab and rudder tab indicator to see that tab and indicator agree. Refer to Section III for rigging.

e. Install the tail cone and connect the rear navigation light wires.

RUDDER REMOVAL - Model 80

a. Remove the tail cone and disconnect the rear navigation light wire.

b. Disconnect the rudder tab cable at the turnbuckles. Remove the cable retainer pins and the fairlead.

c. Remove the bolts attaching the rudder torque tube to the bell crank.

d. Remove the rudder hinge bolts and remove the rudder.

INSTALLATION OF RUDDER - Model 80

a. Align the holes in the rudder and stabilizer hinges and install the attaching bolts.

b. Install the attaching bolts through the rudder torque tube and bell crank.

c. Connect the rudder tab cables at the turnbuckles. Install the cable retainer pins and fairlead.

d. Check the travel of the tab and rudder tab indicator to see that the tab and indicator agree. Refer to Section III for rigging.
e. Install the tail cone and connect the rear navigation light wires.

HORIZONTAL STABILIZER REMOVAL

a. Remove the elevator tab actuating arm at the tab actuator.

b. Remove the tail cone.

c. Remove the elevator.

d. Remove all rear fuselage access covers and disconnect the elevator tab cables at the turnbuckles. Remove the tab cable pulleys on the aft fuselage bulkhead.

e. Remove the elevator hinge attaching bolts and the elevator hinge.

f. Remove the remaining bolts attaching the front and rear stabilizer spars.
g. Pull stabilizer directly away from the airplane until completely clear.

INSTALLATION OF HORIZONTAL STABILIZER

a. Position stabilizer for installation and align bolt holes.

b. Install mounting bolts, replace pulleys, elevator hinge, and tighten bolts.

c. Route tab cables back through the fuselage and connect the cables at the turnbuckles.

d. Install the elevator.

e. Connect the elevator tab actuating arm.

f. Check the rig and operation of the trim tabs. Refer to Section III for rigging procedures.

g. Replace all access covers.

VERTICAL STABILIZER REMOVAL - Model 65

a. Remove the rudder.

b. Loosen one rudder cable at the turnbuckle then disconnect both cables from the bell crank.

c. Remove the rudder bell crank and bracket.

d. Remove the screws attaching the dorsal fin to the vertical stabilizer.

e. Remove the bolts attaching the vertical fin to the forward and rear attachment points.

INSTALLATION OF VERTICAL STABILIZER - Model 65

a. Position the vertical stabilizer and install bolts at front and rear attachment points.

b. Install the rudder bell crank and bracket.

c. Install the rudder.

d. Connect the rudder cables to the bell crank and rig rudder control system. Refer to Section III for rigging procedures.

e. Connect the rear navigation light and install the tail cone.

f. Replace the screws attaching the dorsal fin to the vertical stabilizer.

VERTICAL STABILIZER REMOVAL - Model 80

a. Remove the rudder.

b. Remove both access plates on the left side of the fuselage above the horizontal stabilizer.

c. Loosen the rudder cables at the turnbuckles then remove them from the bell crank.

d. Remove the rudder bell crank and bracket.

e. Remove the vertical stabilizer fairings.

f. Remove the bolts attaching the vertical stabilizer to the forward and rear attachment points.

INSTALLATION OF VERTICAL STABILIZER - Model 80

a. Position the vertical stabilizer and install bolts at the front and rear attachment points.

b. Install the rudder bell crank and bracket.

c. Install the rudder and connect the rudder cables to the bell crank. Connect the rudder trim tab cables at the turnbuckles.

d. Rig the rudder and rudder tab cables. Refer to Section III for procedures.

e. Connect the rear navigation light wires and install the tail cone and both access plates above the left horizontal stabilizer.

f. Install the vertical stabilizer fairings.

AILERON REMOVAL

a. Disconnect the tab push rod.

b. Disconnect the aileron push rod at the actuator.

c. Support the aileron and remove the two attaching screws from the top and bottom of each aileron hinge bracket.

d. Remove screws attaching bonding cables to aileron.

e. Pull the aileron straight away from the wing to avoid damage to the attaching areas.

INSTALLATION OF AILERON

a. Attach the bonding cables to the aileron.

b. Place aileron in position on the hinge brackets. Be sure the hinge bracket is in the proper place between the aileron skin and the inner reinforcing structure.

c. Install the upper and lower hinge bracket screws.

d. Connect the aileron actuator push rod and the tab push rod. Refer to Section III for rigging.

FLAP REMOVAL

The following procedure applies to both inboard and outboard flaps:

a. Remove bolt from flap actuating arm.

b. Remove bonding from flap tracks.

c. Remove bolts from flap track brackets and remove flaps.

INSTALLATION OF FLAPS

a. Hold flap in position and install rollers and bolts in flap track bracket.

NOTE

When installing the flap track rollers be sure they are installed with the flanges facing each other; four rollers per flap and two rollers per track. All flanges must face the center of the flap being installed.

b. Connect bonding cable and install bolt in actuating arm.

AILERON CONTROL CABLE REMOVAL
CONTROL COLUMN TO QUADRANT)

a. Remove the pilot's seat and the left forward passenger seat.

b. Remove the left pilot's compartment floor panels.

c. Remove the plate between the main spar and the pilot's compartment door.

d. Remove the two oval shaped access plates immediately aft of the main spar in the left passenger seat deck.

e. Disconnect the forward ends of the cables at the turnbuckles at the vertical member of the control column.

f. Disconnect the aileron cable locking plates on the quadrant. Remove the cable retaining pins from the pulley brackets.

-g. Attach lead lines to the forward end of the cables and remove the cables through the aft access opening.

h. Paint one tooth of each of the control column actuating sprockets and it's corresponding link of chain, to insure proper alignment of the control wheels at installation.

i. Loosen the cable turnbuckle in the center of the control column horizontal cross member, remove the cable retaining pins and remove the control column cable and chain assembly.

INSTALLATION AILERON CONTROL CABLES
(CONTROL COLUMN TO QUADRANT)

a. Attach the cables to the lead lines and route into position.

b. Install the cable retaining pins in the pulley brackets.

c. Connect the cables to the quadrant by installing the cable locking plate and attaching screws. Safety screws with .032 safety wire.

d. Replace the control column cable and chain assembly on the cross member of the control column with the painted links of the chains engaging the corresponding painted sprocket teeth. Install the cable retaining pins.

e. Connect the cable sections at the turnbuckles on the vertical member of the control column.

f. Refer to Section III for rigging of the cables.

g. Replace all access plates, floor panels, and seats.

AILERON CONTROL CABLE REMOVAL
(QUADRANT TO BELL CRANK)

a. Remove all inspection plates on the underside of the outboard wing panel and center section immediately forward of the rear spar.

b. Remove both forward passenger seats, remove the floor covering and remove the access plates immediately forward of the rear spar on each side of the passenger compartment.

c. Disconnect the aileron cables at the turnbuckles in the wheel well and attach lead lines to the outboard cable ends and remove the cables through the inboard access opening.

NOTE

Aileron cables from quadrant to the wheel well turnbuckles and from the wheel turnbuckles to the outboard bell crank are not interchangeable. To avoid incorrect reinstallation label each cable in relation to it's location, prior to removal.

d. Disconnect the outboard aileron cable at the bell crank. Remove the cable retaining pins from the pulley brackets.

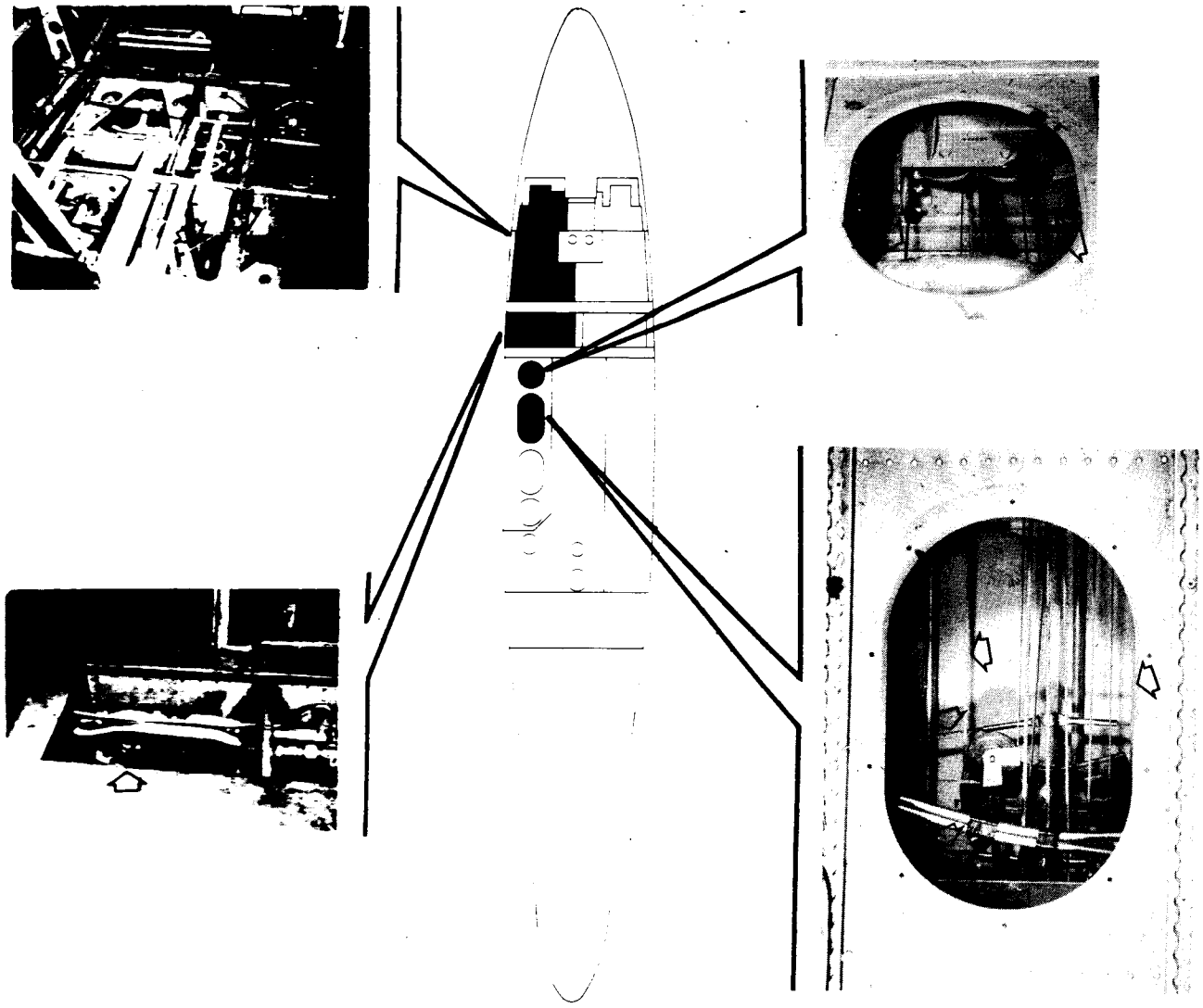


Figure 4-4. Aileron Control Cables (Control Column to Quadrant)

e. Attach lead lines to the inboard ends of the cables and pull the cables through the outboard access opening.

INSTALLATION AILERON CONTROL CABLES (QUADRANT TO BELL CRANK)

a. Attach the cables to the lead lines and route into position.

b. Attach the cables to the bell crank in the outer wing panel and to the quadrant.

c. Install the cable retaining pins in the pulley brackets.

d. Connect the aileron control cables at the turnbuckles in the wheel well.

e. Refer to Section III for rigging of cables.

f. Replace all access covers, floor covering, and seats.

AILERON TAB CONTROL CABLE REMOVAL (WHEEL WELL TO TAB CONTROL)

a. Remove the pilot's seat and the left forward passenger seat.

b. Remove two plates on the left side of the pilot's compartment.

c. Remove the plate between the main spar carry-through structure and the pilot's compartment bulkhead.

d. Remove the second oval shaped access plate aft of the main spar carry-through structure in the left passenger seat deck.

e. Remove the belly access plate below the control pedestal.

f. Disconnect the tab cable at the turnbuckles in the wheel well and connect lead lines to the cable ends.

g. Remove the cable retaining pins from the pulley brackets and the grommets from the inboard wheel well rib.

h. Label the cable routed off the drum on the right side and the cable routed off the drum on the left side. Label the cable ends in the wheel well so right or left hand threads will mate properly with the outboard cable ends at reinstallation.

NOTE

The aileron tab cables can be installed in only one way to obtain the proper tab movement. The cable which is routed off the right side of the pedestal drum has left hand threads at the wheel well turnbuckle and the cable routed off the left side of the pedestal drum has right hand threads at the wheel well turnbuckle. Therefore, when removing the cables from the drum, pay close attention to the number of turns and the direction that each cable is wound, to insure proper reinstallation.

i. Remove the control wheel assembly by removing the snap ring and pin from the shaft assembly.

j. Remove the screws attaching the tab drum support bracket. Remove the nut attaching the drum and remove the drum and bracket.

k. Remove the cable through the fuselage access opening.

INSTALLATION AILERON TAB CONTROL CABLES (WHEEL WELL TO TAB CONTROL)

a. Attach the exact center of the cable to the control drum and wrap the ends in opposite directions, 2-1/2 turns each. Install the taper pin connecting the shaft and drum assembly. Wrap adhesive tape around both lengths of cable as they come off the drum, to secure them in place temporarily.

NOTE

The aileron tab cables can be installed in only

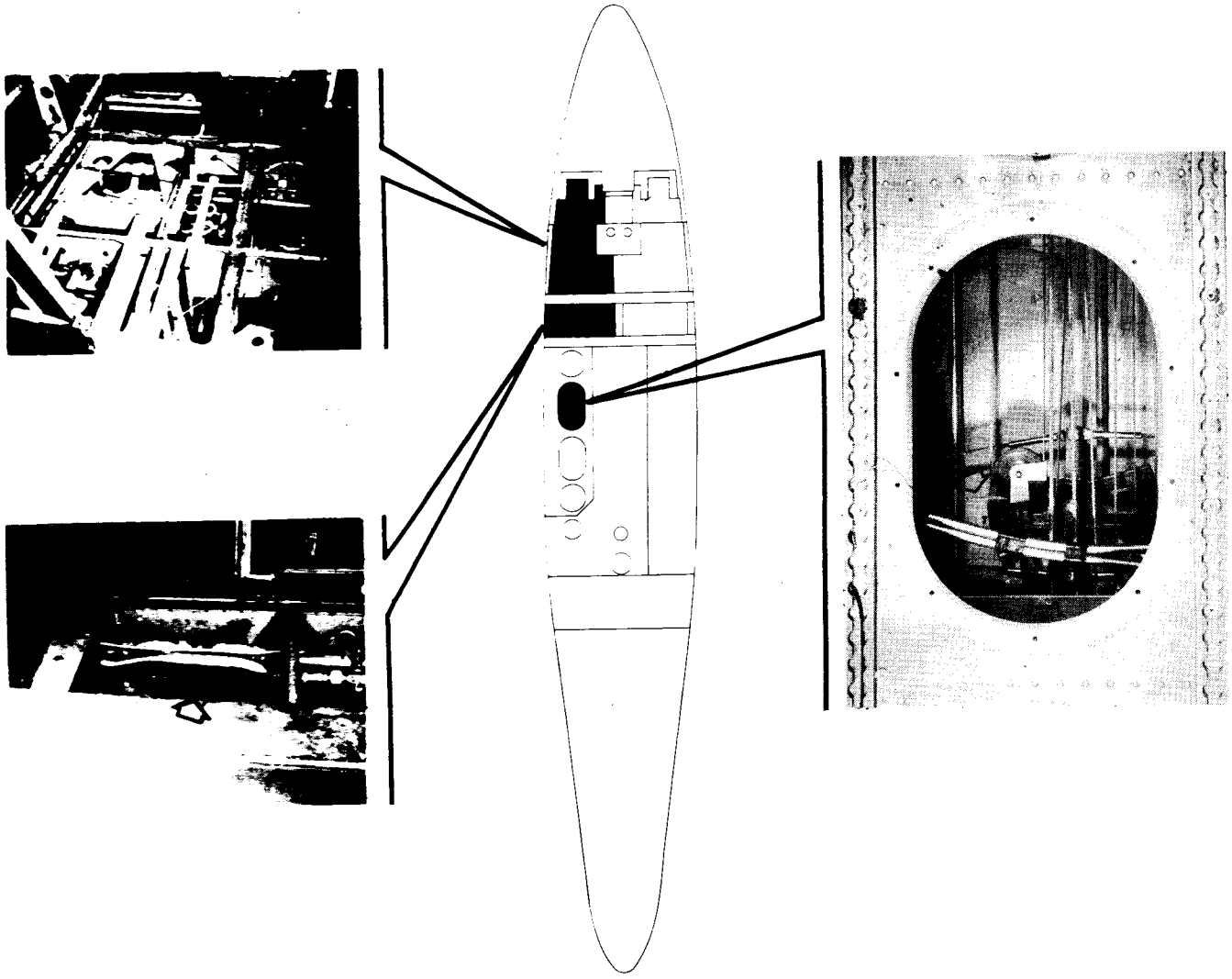


Figure 4-5. Aileron Tab Control Cables (Wheel Well to Tab Control)

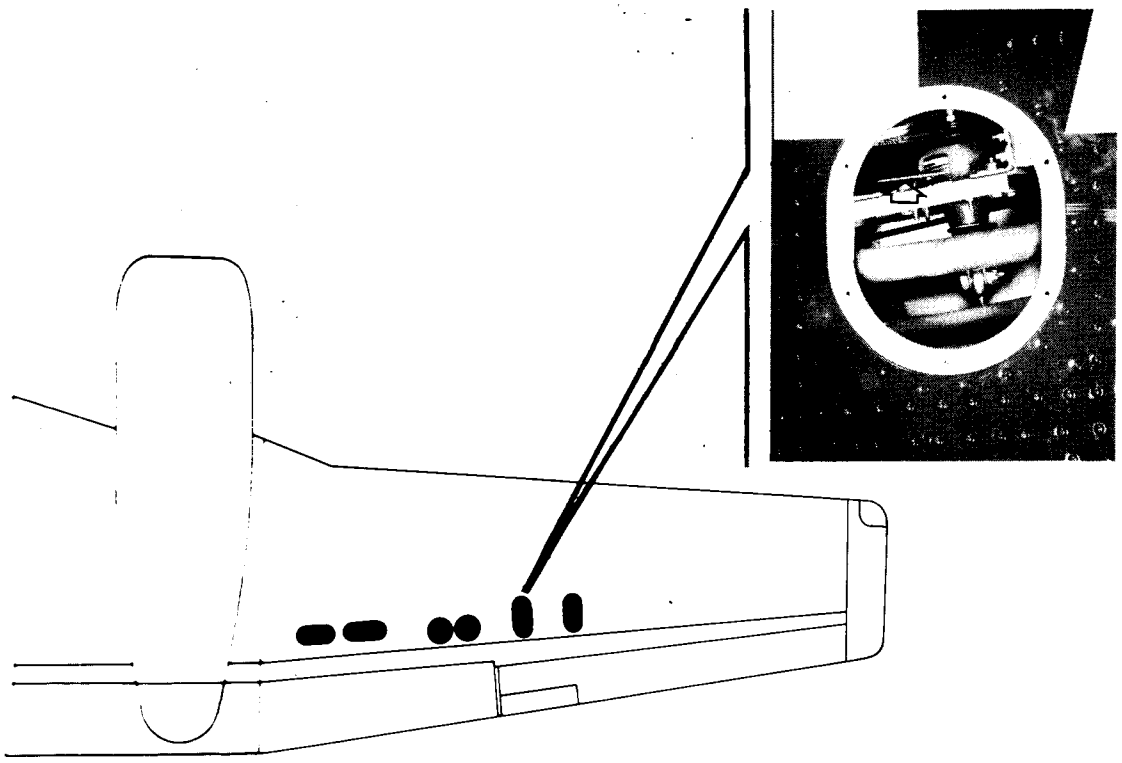


Figure 4-6. Aileron Tab Control Cables (Wheel Well to Actuator)

one way to obtain the proper tab movement. The cable which is routed off the right side of the pedestal drum has left hand threads at the wheel well turnbuckle and the cable routed off the left side of the pedestal drum has right hand threads at the wheel well turnbuckle.

b. Install the drum and support bracket. Secure the drum with attaching nut and the bracket with attaching screws.

c. Install the control knob, pin, and snap ring.

d. Attach the cable to lead lines and route the cables into position by pulling the lead lines out through the wheel well access opening, maintaining tension on the cables.

e. Connect the cables at the turnbuckles in the wheel well and remove adhesive tape at the drum.

f. Install the cable retaining pins in the pulley brackets and the grommets in the inboard wheel well rib.

g. Refer to Section III for rigging procedures.

h. Replace all access covers, floor coverings, and seats.

AILERON TAB ACTUATOR & CABLE REMOVAL (WHEEL WELL TO ACTUATOR)

a. Remove the inspection plates on the underside of the wing immediately forward of the rear spar.

b. Disconnect the tab control cables at the turnbuckles in the wheel well and attach lead lines to the cables.

c. Remove the cable retaining pins from the pulley brackets.

d. Disconnect the rod that connects the actuator to the tab.

e. Remove the bolts attaching the actuator to the rear spar.

f. Remove the actuator and tab control cables from the wing, pulling the cables out through the actuator access hole.

g. Remove the actuator housing attaching screws and remove the housing from the actuator.

NOTE

The aileron tab cables can be installed in only one way to obtain the proper tab movement. The cable which is routed off the top of the actuator drum has right hand threads at the wheel well turnbuckle and the cable routed off the bottom of the drum has left hand threads at the wheel well turnbuckle. Therefore, when removing the cable from the drum, pay close attention to the number of turns and the direction that each cable is wound, to insure proper reinstallation.

h. Remove the cable from the actuator drum.

INSTALLATION OF AILERON TAB ACTUATOR & CABLE (WHEEL WELL TO ACTUATOR)

a. Attach the exact center of the cable to the actuator drum and wrap the cable ends, in opposite directions, 2-1 2 turns each.

NOTE

The aileron tab cables can be installed in only one way to obtain the proper tab movement. The cable which is routed off the top of the actuator drum has right hand threads at the wheel well turnbuckle and the cable routed off the bottom of the drum has left hand threads at the wheel well turnbuckle.

b. Attach the cable ends to the lead lines.

c. Replace the actuator housing and attaching screws.

d. Secure the actuator to the rear spar and route the cable in place.

e. Connect the rod between the actuator and the tab.

f. Install the cable retaining pins in the pulley brackets.

g. Connect the cables at the turnbuckles in the wheel well.

h. Rig the cables as shown in section III.

ELEVATOR CONTROL CABLES REMOVAL

a. Remove the pilot's seat, floor covering and floor panels on the left side of the pilot's compartment.

b. Remove the aft passenger seat on the left side, raise the floor covering on the aft section of the left passenger seat deck and remove the aft access plate on the deck.

c. Remove the floor covering and the round access plate in the center of the entrance way.

d. Remove the aft baggage compartment floor panel and the baggage compartment divider panel to gain entrance to the fuselage tail section.

e. Label both forward elevator cable ends in relation to their attaching point on the forward quadrant.

f. Reduce cable tension at the turnbuckles in the fuselage tail section.

g. Remove cable retaining pins from pulley brackets.

h. Disconnect the elevator cables at the forward and aft attaching points on the forward quadrant and at the turnbuckles in the fuselage tail section.

i. Connect lead lines to the cables and remove the cables through the fuselage tail section.

j. Disconnect the two aft elevator cables from the upper and lower attaching points of the aft elevator

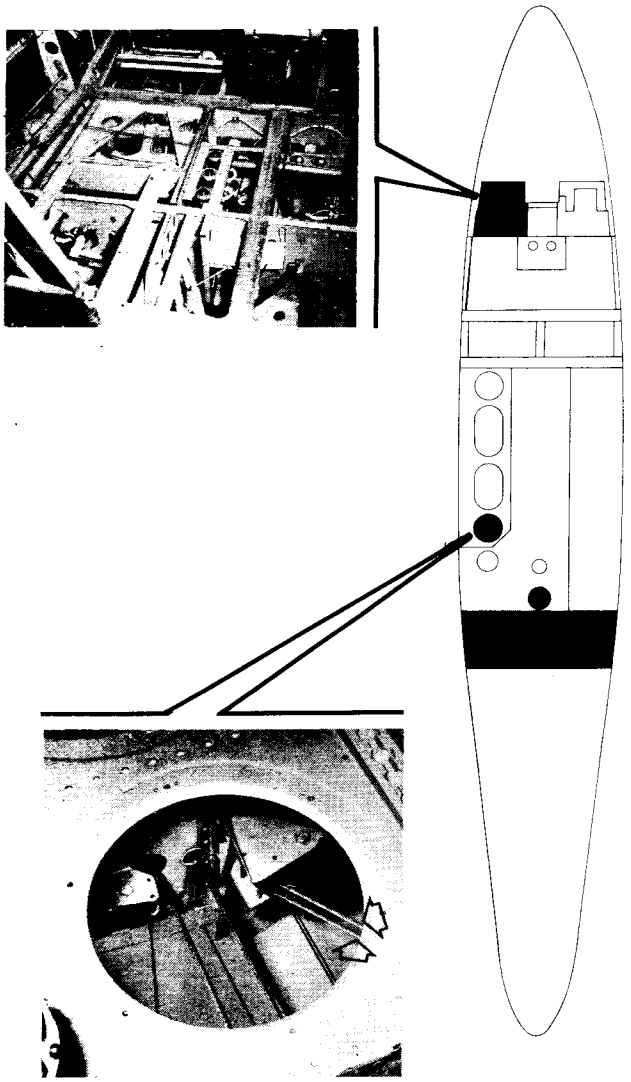


Figure 4-7. Elevator Control Cables

bell crank and label the cable ends in relation to their respective attaching point.

NOTE

Label the lead lines to insure proper reinstallation of elevator cables.

INSTALLATION OF ELEVATOR CONTROL CABLES

a. Attach the aft end of the aft cables to the upper and lower attaching points of the aft bell crank.

b. Attach the properly labeled cable end to the aft fitting of the forward quadrant and route the cable through the pulleys and fairleads to the turnbuckle leading to the upper attaching point of the aft bell crank.

c. Attach the properly labeled cable end to the forward fitting of the forward quadrant and route the cable through the pulleys and fairleads to the turnbuckles leading to the lower attaching point of the aft bell crank.

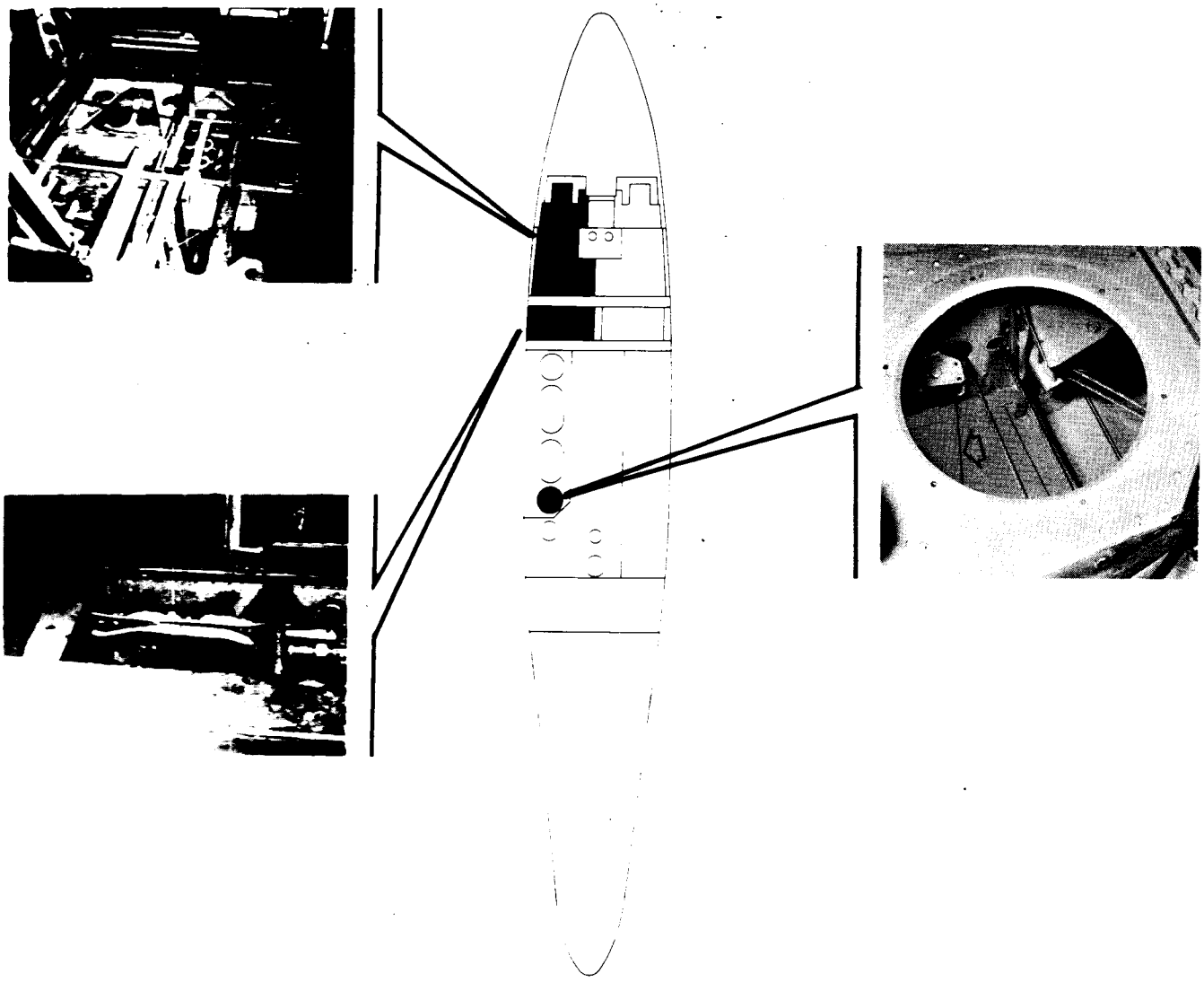


Figure 4-8. Elevator Tab Control Cables (Control Wheel to Turnbuckles)

d. Replace cable retaining pins in pulley brackets.

e. Refer to Section III for rigging the cables.

f. Replace all access covers, floor coverings, baggage compartment panels, and seats.

ELEVATOR TAB CONTROL CABLE REMOVAL (CONTROL WHEEL TO TURNBUCKLES)

a. Remove the pilot's seat, left forward passengers seat, floor covering, and floor panels on the left side of the pilot's compartment.

b. Remove the floor covering and floor panel just aft of the pilot's compartment door.

c. Remove the left rear passenger seat, raise the covering on the aft section of the left passenger seat deck and remove the aft access plate on the deck.

d. Remove the aft baggage compartment floor panel and the baggage compartment divider panel to gain entrance to the fuselage tail section.

e. Disconnect the cable ends at the turnbuckles in the fuselage tail section and attach lead lines.

f. Remove the cable retaining pins from the elevator pulley brackets.

g. Remove the attaching bolt and remove the elevator tab control wheel.

h. Remove the forward console access panel by removing the bolt-lites and the aileron control wheel. Remove the access panels on each side of the console by removing the screws.

i. Tape the cable to prevent it from unwinding from the drum.

j. Remove the drum by removing nut and sliding gear off of shaft, shaft will then slide out and drum can be removed through access hole.

k. Unwind and disconnect the cables from the drum.

NOTE

When removing the cables from the drum, pay particular attention to the number of turns and direction that each is wound.

INSTALLATION OF ELEVATOR TAB CONTROL CABLES (CONTROL WHEEL TO TURNBUCKLES)

a. Attach the cable to lead lines and route the cables into position.

b. Install the cable retaining pins in the pulley brackets.

c. Attach the exact center of the cable to the drum and wind the cable ends in opposite directions, two and one half turns each. Tape both lengths of cable together where they come off the drum, to hold them in place temporarily.

d. Install the control wheel drum assembly, and attach the cable ends to the turnbuckles.

e. Refer to Section III for rigging the cables.

f. Replace all access covers, floor coverings, baggage compartment panels, and seats.

ELEVATOR TAB CONTROL CABLE REMOVAL (TURNBUCKLES TO TAB ACTUATOR)

a. Remove the tail cone and inspection doors on rear fuselage under the stabilizer.

b. Disconnect the cables at the turnbuckles and attach lead lines to each of the cable ends.

c. Remove the cable retaining pins from elevator tab pulleys.

d. Remove the access doors from the lower surface of the left stabilizer skin and upper surface of the right stabilizer skin and disconnect the tab linkage rod from actuator.

e. Remove the actuators from the stabilizer and pull the cables out the access hole.

f. Unwind the cables from the actuator drum, paying particular attention to the cable winding.

INSTALLATION OF ELEVATOR TAB CONTROL CABLES (TURNBUCKLES TO TAB ACTUATOR)

a. Attach exact center of cable to actuator drum, wind cable ends in opposite directions, 2-1/2 turns each and tape both lengths of the cable together, where they come off the drum, to secure them temporarily.

b. Attach the cables to lead lines and route into position.

c. Attach the actuator to the stabilizer and connect the linkage rod to actuator.

d. Attach cables at the turnbuckles.

e. Replace the cable retaining pins in the pulley brackets.

f. Refer to Section III for rigging procedure.

g. Replace all access covers and the tail cone.

RUDDER CONTROL CABLE REMOVAL

a. Remove the pilot's seat, floor covering and floor panels on the left side of the pilot's compartment.

b. Remove the left forward passenger seat, floor covering, and access plate just aft of the main spar carry-through structure on the left side of the fuselage.

c. Remove the covering and small round access plate immediately aft of the left passenger seat deck.

d. Remove the rear baggage compartment divider panel to gain access to the fuselage tail section.

e. Remove the cable retaining pins from the rudder pulley brackets.

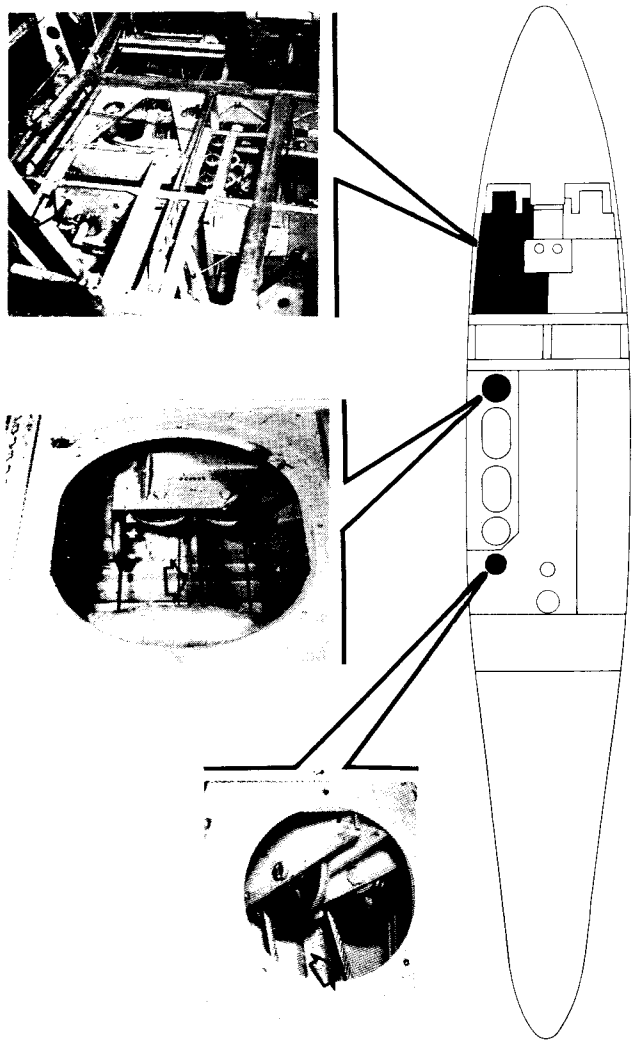


Figure 4-9. Rudder Control Cables

f. Disconnect the rudder cables at the turnbuckles in the tail section and attach lead lines to both ends.

g. Disconnect the rudder cables at the forward rudder quadrant and remove the rudder cables through the pilot's compartment.

INSTALLATION OF RUDDER CONTROL CABLES

a. Attach the cables to the lead lines and route the cables into position, being certain they are routed around the correct pulleys and fairleads.

b. Attach the cables to the forward rudder quadrant and to the turnbuckles in the fuselage tail section.

c. Install the cable retaining pins in the pulley brackets.

d. Refer to Section III for rigging procedure.

e. Replace all access covers, floor coverings, baggage compartment panels, and seats.

RUDDER PEDAL AND BELL CRANK REMOVAL

a. Remove the floor boards forward of the pilot's and copilot's seats.

b. Remove the non-adjustable push-pull tubes connecting idler arms and bell cranks.

c. Disconnect the nose steering push-pull rod at the arm to the right of the pilot's right rudder pedal.

d. Remove the bolts securing the inboard collars on both rudder pedal cross shafts.

e. Disconnect master brake cylinders from rudder pedals.

f. Remove the bolts securing the cross shaft supports inboard of each shaft.

g. Pull cross shaft inboard until shaft is free of the inboard supports.

h. Lift rudder pedals up and out.

NOTE

Note the proper position of the idler arms, pedals and collars on the shaft before removing the rudder pedals. These positions must be maintained in installation to insure proper operation.

i. Release tension on rudder cables and disconnect the cables from the pilot's bell crank.

j. Remove the adjustable push-pull tube connecting the bell cranks.

k. Remove the bolts attaching the bell cranks to brackets.

INSTALLATION OF RUDDER PEDALS AND BELL CRANK

a. Place the rudder pedal bell cranks in their respective positions and install attaching bolts.

b. Install the adjustable push-pull tube connecting the bell cranks.

c. Place the pilot's and copilot's rudder pedals in position with the collars and idler arms and slide the shafts into their outboard supports.

d. Secure the inboard supports with their attaching screws.

e. Replace the bolts securing the inboard collars on each of the cross shafts.

f. Connect the brake master cylinders.

g. Install the non-adjustable push-pull tubes from the pedals to the bell cranks.

h. Connect the nose steering push-pull rod.

i. Connect the cables to the bell crank.

j. Refer to Section III for rigging procedures.

RUDDER TAB CONTROL CABLE REMOVAL (CONTROL WHEEL TO TURNBUCKLES)

a. Remove the floor covering and floor panels in front of the pilot's seat.

b. Remove the belly access plate directly below the control pedestal.

c. Remove the covering and small round access plate immediately aft of the left passenger seat deck.

d. Remove the baggage compartment divider panel and the baggage compartment floor panel.

e. Remove the tab indicator panel on the pedestal by removing the four bolt-lites and the aileron tab control wheel. The round access panel on the lower front side of the pedestal and the access panel on the right side of the pedestal should also be removed.

f. Remove the bolt from the rudder tab control wheel and the nut which holds the rudder tab drum to the shaft.

g. Slide the shaft back and remove the control wheel.

h. Remove the cable retaining pins from the rudder tab pulley brackets.

i. Disconnect the rudder tab cables at the aft turnbuckles in the fuselage tail section and attach lead lines to both ends.

j. Remove the shaft, drum, and cables through the access opening in the front of the pedestal.

k. Unwind the cable from the drum noting the number of turns and the direction in which the cable is wound.

INSTALLATION OF RUDDER TAB CONTROL CABLES (CONTROL WHEEL TO TURNBUCKLES)

a. Attach the forward cables to the lead lines and route the cables.

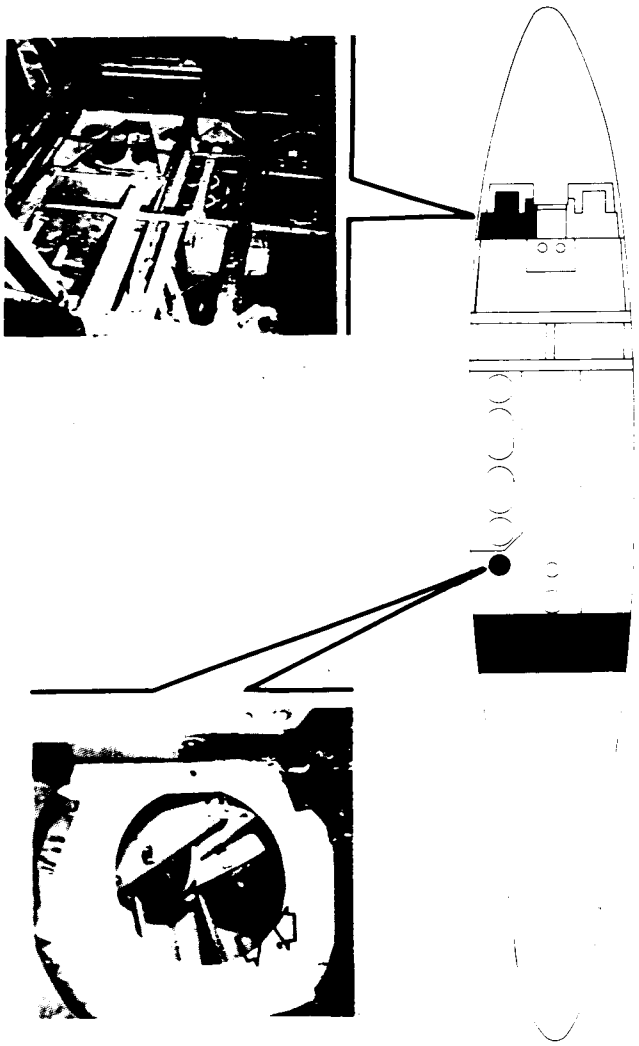


Figure 4-10. Rudder Tab Control Cables (Control Wheel to Turnbuckles)

b. Install the cable retaining pins in the pulley brackets.

c. Attach the exact center of the cable to the control wheel drum and wind the cable ends in opposite directions two and one half turns each. Tape the two lengths of cable as they come off the drum temporarily.

d. Install the control wheel drum assembly, and attach the cable ends to the turnbuckles.

e. Refer to Section III for rigging of the cables.

f. Replace all access covers, baggage compartment panels, and floor coverings.

RUDDER TAB CONTROL CABLE REMOVAL (TURNBUCKLES TO ACTUATOR) - Model 65

a. Remove the tail cone, the four fuselage access doors under the horizontal stabilizer, and the rudder access plate at the actuator.

b. Disconnect the rudder tab cables at the turnbuckles in the tail section and attach lead lines to the actuator cable ends.

c. Remove the cable retaining pins and the fairlead on the rudder bell crank bracket.

d. Disconnect the tab actuating shaft at the tab.

e. Remove the bolt attaching the actuator and remove the actuator and cables through the access hole.

f. Remove the attaching screws and actuator housing from the actuator and remove the cable chain from the sprocket.

NOTE

Check the direction and location of the chain in relation to the sprocket in order to assure correct reinstallation.

INSTALLATION OF RUDDER TAB CONTROL CABLES (TURNBUCKLES TO ACTUATOR) - Model 65

a. Route the chain over the sprocket and reassemble the actuator.

b. Attach the lead lines to the cable ends and reinstall the actuator and cables through the rudder access hole.

c. Connect the cables at the turnbuckles and reinstall the cable retaining pins and fairlead.

d. Install the tab actuator and connect the tab actuator shaft at the tab.

e. Refer to Section III for rigging procedures.

f. Replace the tail cone and access covers.

RUDDER TAB CONTROL CABLE REMOVAL (TURNBUCKLES TO ACTUATOR) - Model 80

a. Remove the tail cone, fuselage access doors under the horizontal stabilizer, and rudder access plate at the actuator.

b. Disconnect the rudder tab cables at the turnbuckles in the tail section and attach lead lines to the actuator cable ends.

c. Remove the cable retaining pins and the fairlead on the rudder bell crank bracket.

d. Disconnect the tab actuator shaft at the tab.

e. Remove the bolt attaching the actuator and remove the actuator and cables through the access hole.

f. Remove the attaching screws and actuator housing from the actuator and remove the cable chain from the sprocket.

NOTE

Check the direction and location of the chain in relation to the sprocket in order to assure correct reinstallation.

INSTALLATION OF RUDDER TAB CONTROL CABLES TURNBUCKLES TO ACTUATOR) - Model 80

a. Route the chain over the sprocket and reassemble the actuator.

b. Attach the lead lines to the cable ends and reinstall the actuator and cables through the rudder access hole.

c. Install the tab actuator and connect the actuator shaft to the tab.

d. Connect the cables at the turnbuckles and reinstall the cable retaining pins and the fairlead.

e. Rig the cables as outlined in Section III.

f. Replace the tail cone and access covers.

FLAP ACTUATOR SYSTEM REMOVAL

a. Lower the flaps and mark the extension of the flap actuator so that it may be replaced without changing the rigging of the flaps.

b. Remove the inspection plate on the lower surface of the wing and uncouple the flexible drive shaft.

c. Disconnect the actuating arm from the flap.

d. Remove the bolts and actuator from bracket.

e. Disconnect the four drive shafts from the motor gearbox through the access opening in the cabin center aisle aft of the rear spar.

f. Disconnect electrical leads.

g. Remove the two screws from the lugs on the base of the housing and remove the motor and gearbox.

INSTALLATION OF FLAP ACTUATOR SYSTEM

a. Place the actuator in position, with the vent holes in the actuator housing at the top, and install the actuator mounting bolts.

b. Connect the flexible drive shaft to the actuator, making sure the drive key is aligned with the right angle drive slot.

c. Connect the actuator arm to the flap.

d. Place the motor and gearbox in position and install the mounting screws.

e. Connect electrical leads to proper terminals.

f. Connect the flexible drive shafts to the gearbox.

WHEEL, TIRE, AND TUBE REMOVAL

a. Jack the wheel up until it is clear of the ground. Jack points for one wheel jacking are provided on each strut.

b. Remove the dust cover retaining ring, dust cover, and wheel retaining nut.

c. Remove the wheel assembly. The brake disc should be supported to prevent it's dropping out of position when the wheel is removed.

d. Remove the valve core to deflate the tire.

e. Break the bead of the tire loose from the wheel flange. Careful use of a rubber mallet is recommended for this operation.

f. Remove the wheel assembly bolts, nuts, and washers from the wheel halves.

g. Split the wheel halves and remove the tire and tube.

INSTALLATION OF WHEEL, TIRE, AND TUBE

a. Install the completely deflated tube in the tire.

b. Install the tire on the inner wheel half and insert the valve stem through the valve stem hole in the wheel half.

c. Install the brake flange half of the wheel.

d. Install the wheel assembly bolts, washers, and nuts and tighten to equal torque. Care must be used to prevent pinching the tube between the wheel halves. The tire may be pushed down from the brake flange side to check the tube and wheel half separation before tightening the assembly bolts.

e. Inflate and deflate the tire several times to seat the tire bead and remove any wrinkles in the tube.

f. Install the valve core and inflate the tire. Refer to Section II for tire pressures.

g. Install wheel bearings and grease retainers.

h. Install the wheel on the axle; guide the brake disc over the wheel brake keys. Upon installation of the wheel, check to be sure that the wheel bearing is not cocked on the axle. A cocked wheel bearing will make wheel removal extremely difficult.

i. Install wheel retaining nut and washer. Tighten the wheel retaining nut until the bearings drag when the wheel is turned, then back the nut off until the wheel will turn freely. Safety the nut. (Bend the cotter pin ends until they will clear the bearing dust cover).

j. Install the wheel dust cover and snap ring.

TUBELESS TIRES

Model 65 aircraft LC-65 and after and all Model 80

aircraft incorporate a redesigned wheel assembly using side inflation tubeless tires on both the nose and main gears. The new wheel has been especially designed for the sidewall inflating tubeless tire and cannot be used with the tube type tire.

TUBELESS TIRE REMOVAL

a. The wheel assembly is removed from the airplane in the usual manner.

b. Insert the inflating needle into the tire sidewall valve as instructed in Section II and fully deflate the tire.

WARNING

Make certain the tire is fully deflated before disassembling the wheel.

c. Break the beads loose from both flanges applying even pressure around the entire circumference of each sidewall with suitable tire tools.

CAUTION

Do not pry between the flange and bead with tools; the wheel or tire bead may be damaged, destroying its sealing qualities.

d. Remove all wheel bolts and nuts and remove both wheel halves from the tire.

INSTALLATION OF TUBELESS TIRES

a. Inspect and clean the wheel, wheel seal and tire.

b. Lubricate the wheel seal with grease (Item 6 of the Consumable Materials Chart) and place it on the wheel half which has the seal groove.

c. Place the wheel half with the seal, in the side of the tire, opposite the sidewall valve, and insert the other wheel half in the side with the side wall valve.

d. Install the bolts, with the heads in the wheel half opposite the sidewall valve; draw up the bolts evenly until the wheel halves seat.

e. Tighten the nuts, making two or more rounds and applying equal torque on each round. Torque the main wheel nuts to 18 foot-pounds, and the nose wheel nuts to 83 inch-pounds.

f. Inflate the tire as described in Section II, enough to seat the beads, and reduce to operating pressure.

g. Install the wheel assembly on the airplane in the usual manner.

NOTE

Install the nose wheel so the bolt heads are on the left side of the airplane.

WHEEL BRAKE ASSEMBLY REMOVAL

a. Jack the airplane up until the wheel or wheels are well clear of the ground.

b. Remove the dust cover retaining ring, bearing dust cover, wheel retaining nut, and washer.

c. Remove the wheel and bearings. The brake disc should be supported to prevent it from dropping and striking the axle.

d. Disconnect the brake hydraulic line.

e. Remove the brake housing attaching bolts.

f. Remove the brake housing from the axle.

g. Remove the brake disc and brake lining.

INSTALLATION OF WHEEL BRAKE ASSEMBLY

a. Install the stationary and movable brake lining in the housing.

b. Press the movable lining back into the housing and install the brake disc.

c. Place the brake housing in position and install the retaining bolts.

d. Connect the hydraulic brake hose to the housing.

e. Support the disc and install the wheel and bearing.

f. Install the wheel retaining nut and washer.

g. Install the dust cover and dust cover retaining ring.

h. Bleed the brakes as outlined in Section III.

BRAKE MASTER CYLINDER REMOVAL

a. Remove front floor board.

b. Disconnect and plug the brake lines at the cylinder.

c. Remove master cylinder attaching bolts at the upper and lower end of the master cylinder. Remove unit.

INSTALLATION OF BRAKE MASTER CYLINDER

a. Place the brake master cylinder in position on the rudder pedal and install the attaching bolts.

b. Connect the brake lines to the master cylinder.

c. Replace the floor board.

d. Bleed the brake system as outlined in Section III.

MAIN SHOCK STRUT REMOVAL

a. Jack up the airplane so the wheels are well clear of the ground.

b. Disconnect hydraulic brake lines and attaching fittings.

c. Retract the gear slightly to take the load off the drag leg.

d. On right hand struts disconnect the safety switch box wires at the wheel well.

e. Disconnect the drag leg at the strut fitting.

f. Remove the landing gear bolt access hole covers.

g. Place blocks under the wheel to remove part of the load on the attaching bolts and to support the strut when the bolts are removed.

h. Remove the attaching bolts and lower the strut away from the airplane.

INSTALLATION OF MAIN SHOCK STRUT

a. Raise the strut to position in the wheel well and install the upper hinge bolts.

b. Attach the drag leg.

c. Connect the landing gear safety switch wires (right strut only).

d. Connect the hydraulic brake hose.

e. Install landing gear bolt access hole covers.

f. Refer to Section III, for brake bleeding procedures.

NOSE SHOCK STRUT REMOVAL

a. Jack up the airplane so the wheels are well clear of the ground.

b. Retract the gear slightly to take the load off the drag leg.

c. Disconnect the nose gear steering linkage from the shock strut.

d. Disconnect the electrical leads for the nose landing gear light if the light is located on the strut.

e. Disconnect the drag leg at the strut fitting.

f. Remove the landing gear hinge bolt access hole covers.

g. Place blocks under the wheel to remove part of the load on the attaching bolts and to support the strut when the bolts are removed.

h. Remove the attaching bolts and lower the strut away from the airplane.

INSTALLATION OF NOSE SHOCK STRUT

a. Raise the strut to position in the wheel well and install the upper hinge bolts.

b. Attach the drag leg at the strut fitting.

c. Install the landing gear bolt access hole covers.

d. Connect the nose gear steering linkage.

e. Connect the electrical leads for the nose gear landing light if it is located on the shock strut.

LANDING GEAR MOTOR REMOVAL

a. Remove the access panels immediately aft of the pilot's compartment door.

b. Disconnect electrical leads to motor.

c. Remove clamp attaching forward end of motor.

d. Remove nuts attaching motor to gearbox.

e. Remove motor.

INSTALLATION OF LANDING GEAR MOTOR

a. Insert motor in bracket.

b. Place clutch throwout arm bracket in position and install attaching nuts.

c. Install clamp.

d. Connect electrical leads.

LANDING GEAR RETRACT BOX AND MOTOR REMOVAL

a. Jack the airplane.

b. Remove the forward passenger seat on the right hand side.

c. Remove the floor board section just behind the pilot's compartment door.

d. Unwrap the insulation from the heat duct, immediately over the gearbox, and remove the section of duct by pulling forward, then back and out.

e. Disconnect the de-icer lines (item A) and the cross-feed fuel lines. The right hand lines will be disconnected in the right hand wing center section and removed through the lower access opening.

f. Mark the electrical leads and remove the landing gear control relays.

g. Remove the right wing center section lower access cover.

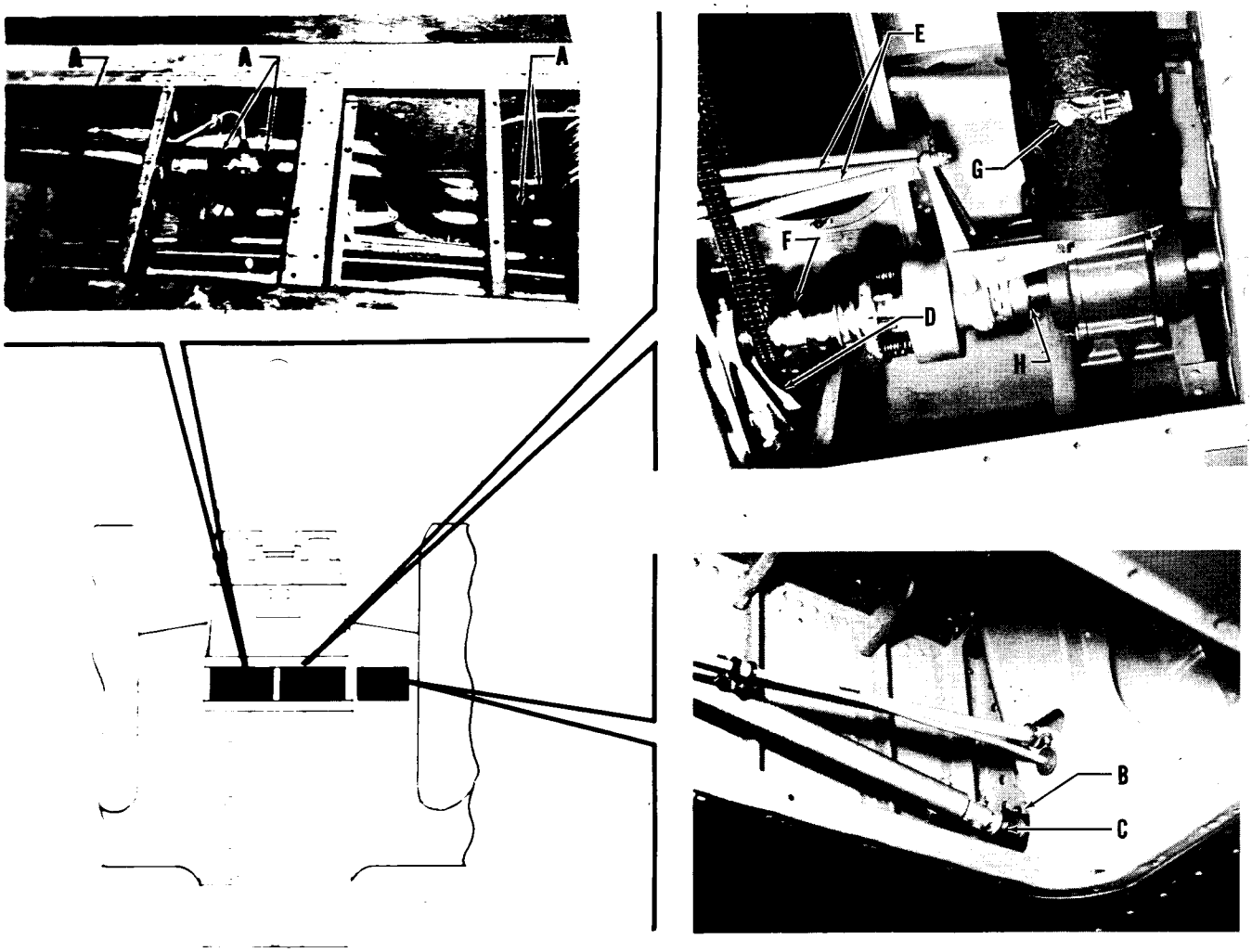


Figure 4-11. Landing Gear Retract Box and Motor

h. Before starting the removal procedure mark the universal joints and drive shafts with Blue Dykem (product of Blue Dykem Co., St. Louis Missouri) at all connections to be sure they are aligned properly at reassembly. Mark the nose landing gear sprocket and drive chain link and sprockets in the same manner.

i. In the right wing root rib at the fuselage, remove the cotter pin (item B) and universal joint (item C) from the landing gear actuator drive shaft.

j. Remove the five bolts from each of the two landing gear drive shaft support bearing brackets (item D) and break the brackets away from the main spar.

k. Remove the bolt holding the gearbox to the main spar.

l. Disconnect the emergency landing gear release arms (item E) from the landing gear clutch throwout lever.

m. Remove the bolt (item F) from the landing gear shaft housing next to the nose landing gear drive chain sprocket.

n. Disconnect electrical leads and loosen the clamp (item G) on the landing gear motor and free the motor from it's mount.

o. To facilitate removal of the gearbox it may be necessary to remove the snap ring (item H).

p. Pull the gearbox slightly forward and to the right to free the left hand shaft and then to the left to free the right hand shaft; move the unit forward and to the left below the fuselage floor structure and lift it free of the aircraft.

NOTE

The landing gear motor and gearbox can be separated to facilitate removal by removing the four bolts in the base of the gearbox connecting it to the motor.

INSTALLATION OF LANDING GEAR RETRACT BOX AND MOTOR

Install the assembly by reversing the removal procedure. However, alignment of the shaft connections and location of the nose gear retract chain in relation to the areas marked with Blue Dykem, is critical. Refer to Section III for rigging procedure.

MAIN GEAR JACKSCREW ACTUATOR REMOVAL

a. Jack the airplane.

b. Remove screws attaching stiffener plate to actuator bracket.

c. Remove bolt attaching universal to actuator.

d. Operate actuator manually until tension is relieved in actuator shock spring.

e. Remove bolt attaching actuator to drag brace.

f. Remove outboard and inboard bearing supports.

g. Remove forward access panel at wing root.

h. Remove the two bolts through the universal at the wing root and telescope the outboard torque shaft, spline, universal, and cross shaft together in order to allow clearance for disconnecting actuator.

i. Rotate actuator assembly 90 degrees from mounting position and remove.

INSTALLATION OF MAIN GEAR JACKSCREW ACTUATOR

a. Insert actuator in mounting position.

b. Install bolt attaching universal to actuator.

c. Install outboard and inboard bearing supports.

d. Install two bolts through universal at wing root and replace access panel.

e. Install screws attaching stiffener plate to actuator bracket.

f. Refer to Section III for rigging procedures.

NOSE GEAR JACKSCREW ACTUATOR REMOVAL

a. Jack the airplane.

b. Retract the gears slightly to relieve the tension on the actuator spring.

c. Remove the necessary radio equipment, in the forward compartment, to gain access to the nose gear vertical retract chain cover.

d. Remove the nose gear vertical retract chain cover in the forward compartment.

e. Release the tension on the chain, at the idler sprocket, in the nose wheel well.

f. Remove the screws attaching the outside bearing supports to the bulkhead in the forward compartment and remove the bearing supports and drive shaft.

g. Remove the inside bearing support.

h. Remove bolt attaching actuator to drag brace.

i. Rotate actuator assembly 90 degrees from mounting position and remove.

INSTALLATION OF NOSE GEAR JACKSCREW ACTUATOR

a. Insert actuator in mounting position.

b. Install inside bearing supports securing actuator.

c. Place drive shaft in position on actuator and install the retaining bearing support.

d. Take up the slack in the chain by adjusting the idler sprocket in the nose wheel well.

e. Install the nose landing gear retract chain access cover.

f. Replace the radio equipment which was removed.

g. Refer to Section III for rigging procedures.

NOSE GEAR RETRACT CHAIN REMOVAL - LANDING GEAR MOTOR TO FORWARD COMPARTMENT

a. Jack the airplane.

b. Remove the floor boards on the right side of the pilot's compartment and the floor panel directly behind the pilot's compartment door.

c. Operate retraction system until divider link which is marked with yellow paint, is positioned at the gearbox.

d. Release the tension on the chain by loosening the idler sprocket under the floor boards on the right side of the pilot's compartment.

e. Disconnect the chain at the divider link and free the chain from the sprocket wheel.

f. Attach a lead line to one end of the chain, pull the other end of the chain to free it from the track and draw the lead line through the chain track. Detach the lead line and leave it in the chain track as a means of replacing the chain.

SECTION IV
MAJOR DISASSEMBLY

SHORT CHAIN REMOVAL

With the landing gear in the down position access to the short drive chain may be gained through the nose wheel well.

a. Jack the airplane.

b. Remove the eleven screws holding the cover to the chain track on the forward wall of the nose equipment compartment.

c. Release the tension on the chain by loosening the idler sprocket in the nose wheel well.

d. Disconnect the chain at the divider link which is marked with yellow paint.

e. Attach a lead line to one end of the chain, pull the other end of the chain to free it from the track and draw the lead line through the chain tracks. Detach the lead line leaving it in the track as a means of replacing the chain.

INSTALLATION OF NOSE GEAR RETRACT CHAIN (BOTH CHAINS)

a. Attach the end of the chain to the lead line in the chain track and with the lead line pull the chain into position.

b. Connect the chain at the divider link.

c. Take up the slack in the chain by tightening the idler sprocket.

d. Replace the chain track cover in the forward equipment compartment and the floor board in the pilot's compartment.

NOTE

The retract chain should be kept free of dirt, rust and corrosion at all times. Cleaning should be done only with a petroleum solvent; under no circumstances should rust or corrosion be removed with an acid. Acid cleaners may embrittle and crack the highly heat-treated links. If a chain is excessively rusted or corroded, it should be replaced. For the recommended lubricant, see item 10 Consumable Materials Chart.

e. Refer to Section III for rigging procedures.

NOSE STEERING MECHANISM REMOVAL

a. Turn nose wheel to full left turn position.

b. Remove nose steering link.

c. Remove scissors links and yoke.

d. Remove pilot's floor boards.

e. Remove aft link and idler arm.

NOTE

On 100-hour inspection, check the nose wheel steering. Remove the stop on the nose gear casting and check the lug on the casting for cracks.

INSTALLATION AND ADJUSTMENT OF NOSE STEERING MECHANISM

a. Install scissors links, yoke and idler arm.

b. Install fore and aft links, adjusting to the proper length with nose wheel and rudder pedals centered.

c. Install nose gear travel stops.

d. Test system for binding through entire travel.

e. Install floor boards.

CABIN AIR BLOWER REMOVAL

a. Jack the nose of the aircraft until the nose wheel clears the ground.

b. Disconnect the nose gear door linkage from the drag leg and remove the bolt attaching the actuator to the drag leg. Remove the drag leg from the airplane.

c. Working from inside the nose wheel well disconnect the electrical lead for the blower from the terminal strip on the right side of the nose wheel well.

d. Remove the screws from the base flange on the blower case.

e. Remove the clamp from the duct at the upper portion of the blower and remove the blower.

INSTALLATION OF CABIN AIR BLOWER

a. Install the clamp at the top of the blower.

b. Align the base flange holes with the holes in the base, and insert screws.

c. Connect the elctrical lead between the blower and the terminal strip.

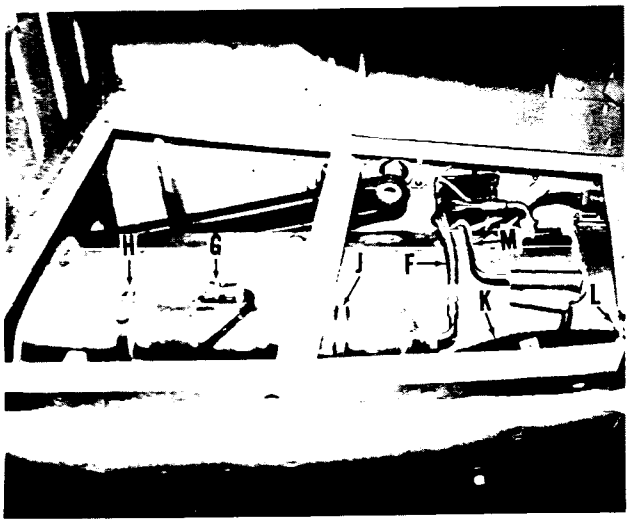
d. Install drag leg to the nose gear strut brace assembly and the retract link to the actuator. Connect the nose gear door linkage to the drag leg.

NOTE

Check the gear for proper clearances, alignment and perform retraction test.

CABIN HEATER REMOVAL

a. Remove the radio equipment (items A, B & C) and the floor panels (items D & E).



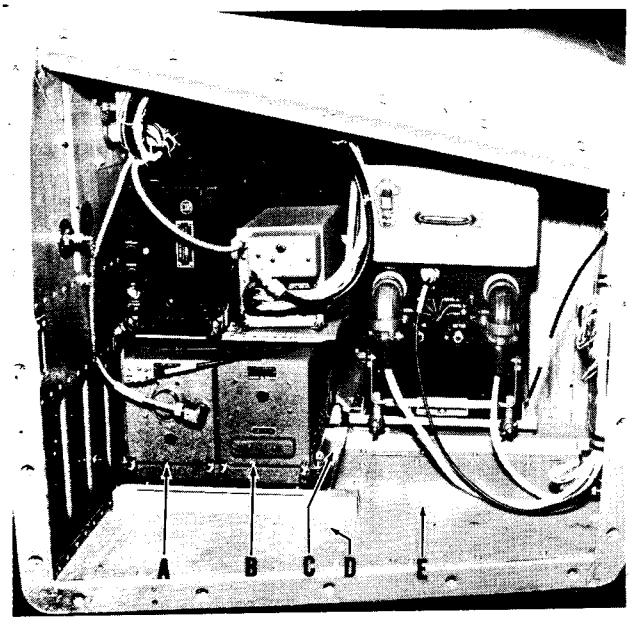
b. Disconnect and remove high tension lead (item F) from igniter plug and ignition unit. Disconnect, and remove the electrical lead (item G).

c. Disconnect clamps (items H & J) and remove the ignition unit.

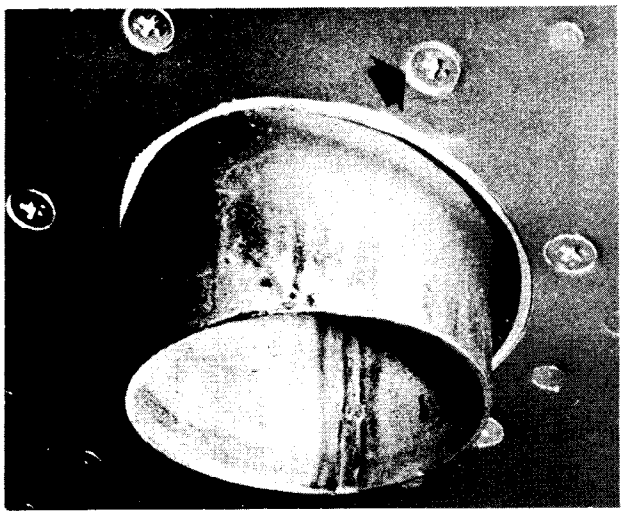
d. Disconnect the flexible combustion air hose (item K) from the cold air duct (item L).

e. Disconnect the heater fuel line (item M) from the solenoid valve, in the nose wheel well. The fuel line (item M) may be disconnected at the heater after removing the four screws and the cover from the fuel inlet shroud assembly.

f. Loosen the heater clamps (items N & O). Remove the forward clamp.



g. Remove the six screws to loosen the exhaust shroud.



h. Lift the heater out of the compartment.

INSTALLATION OF CABIN HEATER

Install the heater in the reverse order of the removal procedure.

Figure 4-12. Cabin Heater Removal and Installation

HEATER VIBRATOR REMOVAL

a. Disconnect the electrical lead at the ignition unit receptacle.

b. Disconnect the high tension lead from the ignitor plug.

c. Remove the clamp at the aft end of the ignition unit.

d. Remove the safety wire from the knurled nut, and unscrew the nut.

e. Remove the vibrator and the radio noise shield.

INSTALLATION OF HEATER VIBRATOR

a. Replace the radio noise shield and insert the vibrator unit.

NOTE

When inserting the vibrator, do not let the "O" ring in the ignition body drop out of place.

b. Install the knurled nut and replace the safety wire.

c. Replace the clamp, high tension lead, and the electrical lead on the ignition unit.

OXYGEN CYLINDER REMOVAL

When removing the oxygen cylinder, certain precautions must be exercised to avoid contamination of the system.

WARNING

Check your hands, tools, and clothing for cleanliness and freedom from grease to prevent possibility of fire.

a. Close the oxygen supply cylinder valve.

b. Disconnect the line from the supply cylinder.

c. Cap the open line immediately with a clean metal fitting.

d. Remove the safety wire and loosen the two bracket clamp wing nuts.

e. Raise the cylinder clamps and remove the cylinder from the brackets.

INSTALLATION OF OXYGEN CYLINDER

Before replacing the cylinder, carefully inspect the fittings on both the cylinder and the line for cleanliness and foreign matter. Any foreign matter entering the oxygen system may cause the oxygen to become obnoxious or unbreathable.

WARNING

Check you hands, tools, and clothing for cleanliness and freedom from grease to prevent the possibility of fire.

a. Place the cylinder in the brackets and close the cylinder clamps.

b. Tighten and safety wire the two bracket clamp wing nuts.

c. Connect the line fitting to the cylinder fitting.

NOTE

Inspect the line fitting and the cylinder fitting for cleanliness and freedom from foreign matter.

d. Open the supply cylinder valve.

e. Test the connections for leaks using a special soap solution (see item 15, Consumable Materials Chart).

PROPELLER UNFEATHERING ACCUMULATOR REMOVAL - Model 65

a. Place the propeller control lever in low pitch to exhaust all oil from the accumulator.

b. Remove the four bolts attaching the accumulator shield to the engine lower cowling structure. Pull the accumulator and shield straight aft.

c. Disconnect the oil hose from the accumulator.

INSTALLATION OF UNFEATHERING ACCUMULATOR - Model 65

a. Connect the oil hose to the accumulator.

b. Place the accumulator shield over the aft portion of the accumulator.

c. Position the accumulator and shield on the lower cowling and attach with four AN3-15A bolts.

d. Inflate the accumulator to 100 ±5 psi, using dry compressed air or bottled nitrogen.

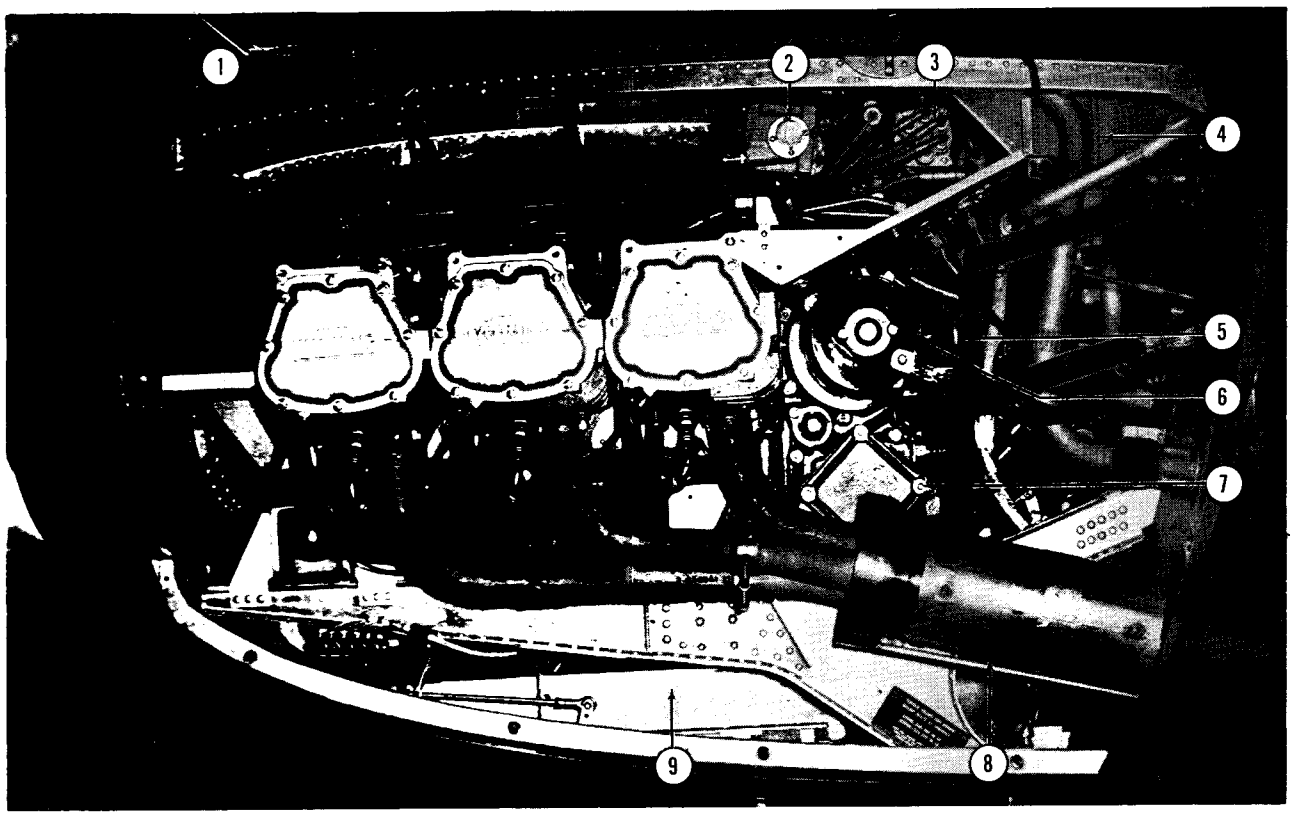
PROPELLER UNFEATHERING ACCUMULATOR REMOVAL - Model 80

a. Place the propeller control lever in low pitch to exhaust all oil from the accumulator.

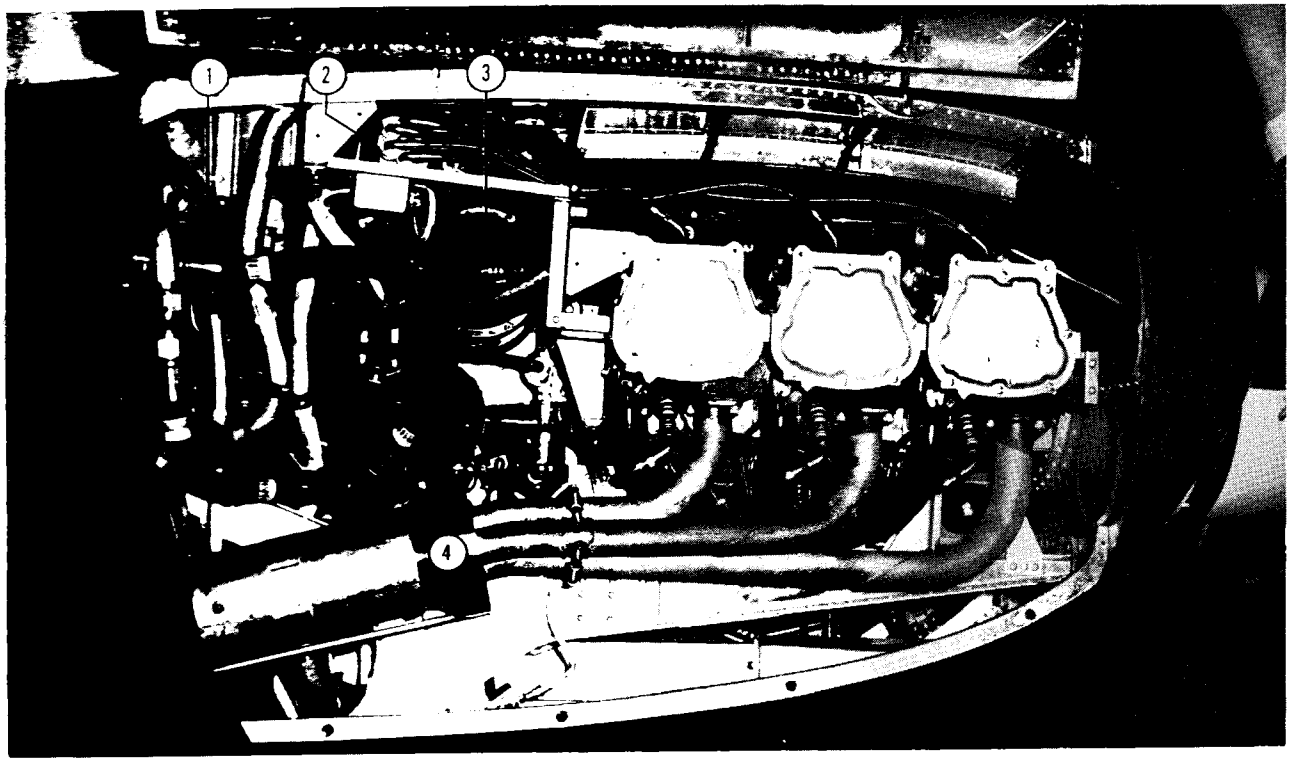
b. Remove the outboard second stage exhaust augmenter.

c. Disconnect the oil line from the accumulator.

d. Remove the four bolts attaching the accumulator shield to the firewall and remove the accumulator.

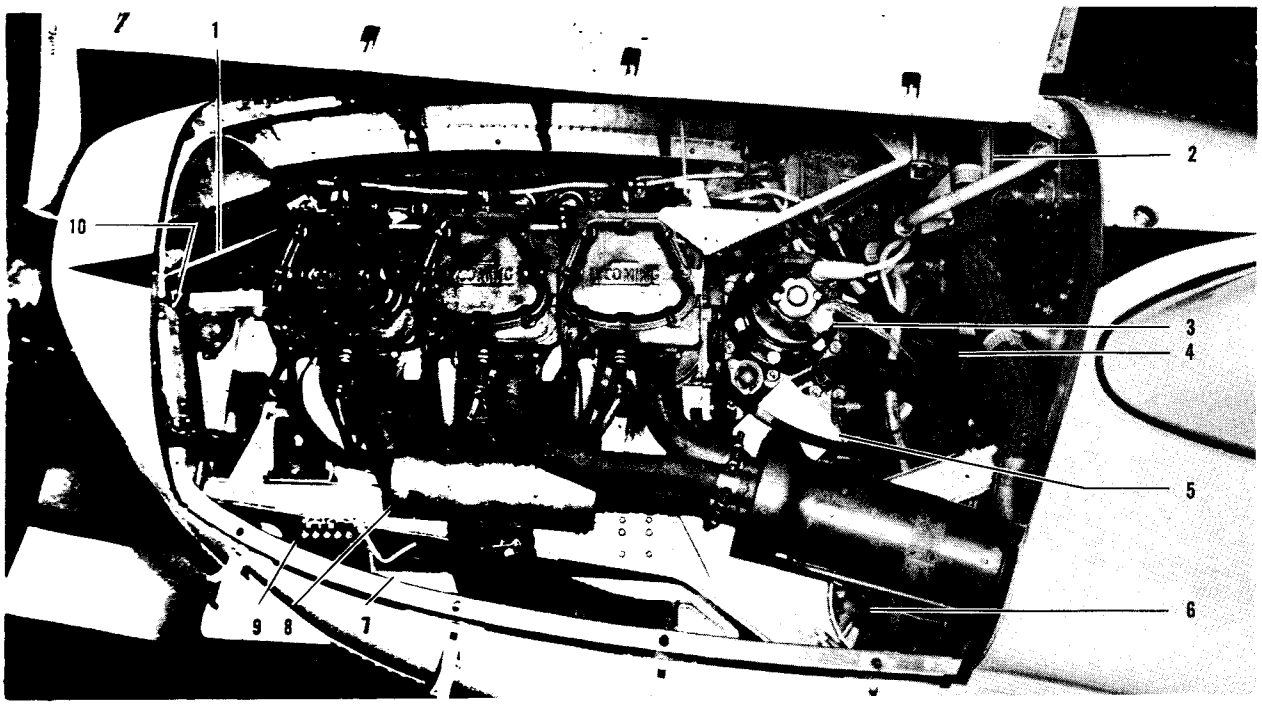


1. Propeller Governor Control
2. Injection Pump
3. Left Magneto
4. Oil Cooler
5. Supercharger Housing
6. Starter
7. Oil Pump and Filter
8. 1st Stage Augmenter
9. Induction Air System

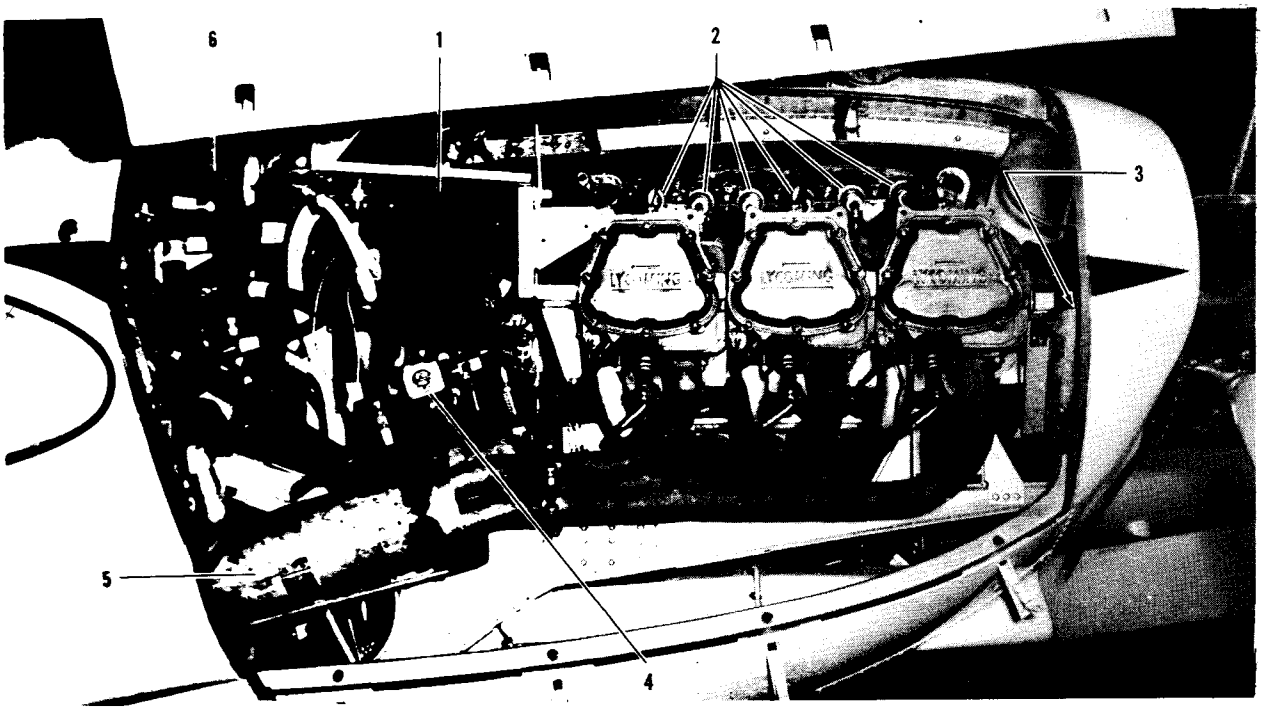


1. De-icer Oil Separator
2. Right Magneto
3. Generator
4. De-icer Vacuum Pump

Figure 4-13. Power Plant Installation - Model 65



1. Propeller Governor Control
2. Oil Cooler
3. Starter
4. Supercharger Housing
5. Oil Pump and Filter
6. Injection Regulator
7. Induction Air System
8. Hot Air Muff
9. Induction Air Valve Actuator
10. Left Magneto (Not Visible)



1. Generator or Alternator
2. Ignition Coils
3. Right Magneto (Not Visible)
4. Fuel Pump
5. First Stage Augmenter
6. Oil Separator

Figure 4-13A. Power Plant Installation - Model 80

INSTALLATION OF PROPELLER UNFEATHERING ACCUMULATOR - Model 80

a. Install the accumulator on the aft side of the firewall with four AN3-23A bolts.

b. Connect the oil line to the accumulator.

c. Install the outboard second stage exhaust augmenter.

d. Inflate the accumulator to 100 ±5 psi using dry compressed air or battled nitrogen.

COWLING REMOVAL

a. Check magneto switches for "OFF" position.

b. If propeller unfeathering accumulators are installed on the Model 65, place the propeller control in full low pitch then disconnect the accumulator oil hose from the control valve on the governor control head. Pull the hose through the front engine baffle.

c. Remove bolts attaching the oil radiator to the cowling former.

d. Remove screws along top of cowling at the nacelle firewall.

e. Remove screws on forward outer surface and inner surface of each side and the two bolts on each side of the forward former that attach the upper and lower cowling sections.

f. Remove four screws attaching upper cowling to firewall and remove upper cowling.

g. Disconnect all drain lines from bottom of lower cowling.

h. Disconnect flexible ducts between induction air box and engine and between the hot air muff (if installed) and induction air box.

i. Disconnect actuator rod from filtered engine air door lever.

j. Disconnect flexible control from alternate warm air door lever.

k. Remove screws along bottom of cowling at nacelle firewall.

l. Remove the two bolts attaching lower cowling to engine mount.

INSTALLATION OF COWLING

a. Position the lower cowling and install the two bolts attaching lower cowling to engine mounts.

b. Install screws along bottom of cowling at nacelle firewall.

c. Connect flexible control to alternate warm air door lever.

d. Connect actuator rod to filtered engine air door lever.

e. Connect flexible ducts between induction air box and engine and between the box and hot air muff (if installed).

f. Connect all drain lines to bottom of cowling.

g. Position upper cowling and install bolts on each side of the forward former and install screws on outer and inner surface of the forward former.

h. Install four screws attaching upper cowling to firewall.

i. Install screws along top of cowling at the nacelle firewall.

j. Install bolts attaching oil radiator to cowling former.

k. If installed on the Model 65, connect the propeller unfeathering accumulator oil hose to the control valve on the governor control head. Service the accumulator as outlined in Propeller Unfeathering Accumulator Servicing.

ENGINE REMOVAL

a. Remove the propeller and cowling as outlined in appropriate paragraphs.

b. Disconnect the wiring harness cannon plug at the firewall.

c. Remove the magneto filter plugs.

d. Disconnect the primer solenoid plug. Disconnect the ground wire from the firewall beside the solenoid.

e. Disconnect the wiring to the induction air valve control actuator.

f. Disconnect the engine and starter bonding cables.

g. Disconnect the vacuum lines at the vacuum pump.

h. Disconnect the oil return line from the oil separator at the engine.

i. Disconnect the fuel inlet, return, pressure gage, and heater supply lines at the firewall. Disconnect the fuel lines from the filter on the Model 65 firewall.

j. Disconnect the oil supply, return, and pressure gage lines from the oil pump.

k. Remove the engine breather tube from the engine.

l. Disconnect the manifold pressure line from the manifold.

m. If installed, disconnect, the de-icing line at the hose connection aft of the rear engine baffle.

n. Disconnect the throttle control from the engine.

On the Model 80 disconnect the mixture control.

o. Remove the governor control cover and remove the control cable.

p. On the Model 80 disconnect the unfeathering accumulator line at the rear engine baffle.

q. Attach hoist (minimum hoist capacity 1,000 pounds) to engine lifting eyes. Lift engine only enough to relieve pressure on mount bolts.

r. Remove the four engine mount bolts and lift engine.

INSTALLATION OF ENGINE

a. Check torque of upper firewall engine mount bolts 340-390 inch-pounds) and lower firewall engine mount bolts (225-275 inch-pounds).

b. Install pins in the four lower sandwich mounts. Install the bushings in place on the lower side of the mounting brackets with the pins inserted in the mount-bracket. Tape the mounts to the mounting brackets temporarily, to hold them in place.

c. Install the four top sandwich mounts in place on the upper side of the mount brackets and tape temporarily.

d. Attach hoist (minimum hoist capacity 1,000 pounds) to engine lifting eyes. Position engine on upper mount bushings.

e. Place the two barrel nuts in the forward upper mount brackets and required MS nuts in the upper rear mounts; install mount bolts and torque to 250-300 inch-pounds.

f. Reinstall the component parts of the engine in the reverse of the removal procedure.

VACUUM PUMP REMOVAL

a. Disconnect inlet and outlet lines from the pump.

b. Remove air blast cooling duct if installed.

c. Remove retaining nuts and lift pump off studs

INSTALLATION OF VACUUM PUMP

a. Slide pump over studs, making certain inlet and outlet ports line up with the proper lines.

b. Install retaining nuts.

c. Connect inlet and outlet lines.

d. Reinstall air blast cooling tube if required.

NOTE

Before installing the pump make sure lubrication holes in the mounting pad, the pump base gasket and the pump base are aligned properly. Misalignment of these holes can cause seizing and failure of the pump.

BATTERY REMOVAL

a. Make certain battery switches are in "OFF" position.

b. Loosen fasteners and remove battery access door on top of the left engine nacelle.

c. Remove quick disconnect from battery.

d. Remove wing retaining nuts and lift battery from airplane.

INSTALLATION OF BATTERY

a. Make certain battery switches are in the "OFF" position.

b. Place battery in well with terminal toward the fuselage.

c. Install wing retaining nuts and safety.

d. Connect battery quick disconnect.

e. Fasten nacelle door.

STARTER REMOVAL

a. Open engine cowling.

b. Disconnect and tape leads to starter.

c. Remove starter mounting nuts.

d. Lift starter aft and up to remove.

INSTALLATION OF STARTER

NOTE

The cotter pin holding the starter jaw nut must be an AN381-2-8, or AN380C2-2 steel pin. Before installing the pin, torque the nut to 53 ±5 inch-pounds; if, after torquing the nut correctly, the slots do not align with the cotter pin hole in the shaft, a new nut must be installed. Do not back off or overtighten the nut to align the slots. Install the pin with the flat side to the bottom of the slot, then bend one end of the pin over the end of the starter shaft and the other end over the outside of the nut.

Prior to installing the starter, extend the starter jaw to the end of its travel and coat the lateral surface of the jaw with Dow Corning Compound #7, then extend and retract the jaw several times to distribute the compound evenly over the surface. The baffle plate seal on a new starter is a tight fit to prevent any lubrication from entering the starter and has a tendency to bind when the starter is disengaged from the engine if the silicone grease is not applied before the starter is installed. To check clearance between the mating surfaces of the jaws, measure with a depth micrometer from the mounting pad gasket on the engine to the top of the tooth on the starter jaw and on the starter from the starter mounting flange to the end of the starter tooth and subtract the difference between the two. The minimum clearance when the starter is disengaged is .031 and the maximum clearance is .187. If the removed starter shows signs of excessive jaw wear, the operator should check to see that he has observed the proper starting procedures as outlined in the flight handbook to avoid abusing the engine starter.

a. Place starter in position and install mounting nuts.

b. Connect starter cables.

c. Fasten engine cowling.

GENERATOR AND ALTERNATOR REMOVAL

WARNING

To lessen the possibility of a short circuit, make certain that the battery master switch is off before attempting to inspect or service the generator or alternator-receifier.

a. Open cowling.

b. Disconnect wiring to generator or alternator.

c. Remove screws attaching the front head cover, and remove the cover and blast tube as a unit.

d. Remove generator or alternator retaining nuts.

e. Slide the assembly aft and outward to remove.

INSTALLATION OF GENERATOR AND ALTERNATOR

a. Install new gasket on engine mounting pad.

b. Turn armature and check for free rotation.

c. Coat the drive-spline of the armature with Lubriplate #130AA compound (manufactured by Fiske Bros. Refining Co., Newark, N. J.).

d. Bolt generator or alternator securely in place.

e. Attach the front head cover and blast tube with screws and safety wire.

f. Attach wiring to generator or alternator.

INJECTION PUMP REMOVAL

a. Remove the temperature bulb in the supercharger housing and remove the clamps along the temperature bulb tubing.

b. Disconnect fuel lines from injection pump.

c. Remove mounting nuts and remove injection pump and temperature bulb. Use caution when removing the temperature bulb tubing as it may be damaged by sudden pulls or sharp bends.

INSTALLATION OF INJECTION PUMP

a. Hold the injection pump in place and install the mounting nuts.

b. Route the temperature bulb tubing and install the screws and clamps securing the bulb and tubing.

c. Connect the fuel lines to the injection pump.

EXHAUST STACK REMOVAL

a. Loosen clamps connecting the stacks.

b. Remove the nuts attaching the exhaust stack to the cylinder.

INSTALLATION OF EXHAUST STACKS

a. Check the stack flanges for flatness and lap or regrind if warped. The maximum permissible gap between the exhaust flange and the engine exhaust port is 0.006 of an inch.

b. Install stacks and nuts, but do not tighten.

c. Install the clamp connecting the three stacks.

d. Torque the nuts attaching stacks to cylinders to 140-150 inch-pounds.

EXHAUST AUGMENTER REMOVAL

a. Remove the first stage augmenter tube in the engine compartment.

b. Remove the attaching clamps and remove the lower half of the crankcase vent line.

c. Remove screws attaching the augmenter cover plate to the engine nacelle and remove cover plate.

d. Remove two clamps attaching the augmenter tube to the nacelle and remove the augmenter.

INSTALLATION OF EXHAUST AUGMENTER

a. Slide the augmenter into position and install the clamps.

b. Install the augmenter cover plate on the engine nacelle.

c. Replace the crankcase vent line and attaching clamps

d. Install the first stage augmenter tube.

SUBMERGED FUEL BOOSTER PUMP REMOVAL

a. Drain fuel cell.

b. Remove access cover on lower wing skin.

c. Disconnect electrical leads at the booster pump.

d. Disconnect fuel lines.

e. Remove the booster pump attaching bolts and remove pump.

INSTALLATION OF SUBMERGED FUEL BOOSTER PUMP

a. Place pump and gasket in position in fuel tank sump and install bolts.

b. Torque bolts to 35 ±5 inch-pounds on the main fuel cell and 50 ±5 inch-pounds on the inboard auxiliary fuel cell. Safety using steel safety wire.

c. Connect electrical leads and fuel lines.

d. Fill fuel tank and check operation of pump.

e. Check attaching area and fuel lines for evidence of leakage.

f. Replace access cover on lower wing.

ENGINE DRIVEN FUEL PUMP REMOVAL

a. Turn fuel selector valves off.

b. Disconnect the fuel inlet and outlet lines.

c. Disconnect the fuel pump drain lines.

d. Remove the four nuts holding the fuel pump to the engine.

INSTALLATION OF ENGINE DRIVEN FUEL PUMP

a. Install pump and gasket.

b. Install nuts that hold the pump to the engine.

c. Connect the fuel pump drain lines.

d. Connect the fuel inlet and outlet lines.

FUEL LEVEL TRANSMITTER REMOVAL

a. Remove access cover over top of fuel cell.

b. Disconnect the electrical connections at the transmitter.

c. Remove the five screws which attach the transmitter to the fuel cell.

d. Remove the transmitter. Care must be used to avoid bending the float wire.

INSTALLATION OF FUEL LEVEL TRANSMITTER

a. Install the transmitter in the cell.

b. Install the five retaining screws and torque to 25 inch-pounds.

c. Install electrical leads to transmitter.

d. Safety retaining screws.

e. Install access cover.

f. For calibration instructions, refer to Section III.

FUEL SELECTOR VALVE REMOVAL

Removal of the fuel selector valve and strainer is accomplished by removing the canvas protective boot and disconnecting the fuel lines from the selector. (The fuel tanks must be drained to prevent fuel loss.) After disconnecting the fuel lines, remove the four bolts which attach the lower mounting bracket to the firewall mounting bracket.

INSTALLATION OF FUEL SELECTOR VALVE

To install the fuel selector and strainer, align the fuel selector valve so it is in the position indicated by the fuel selector handle; then install and bolt to the firewall mounting bracket. Check operation of the selector to see that the valve is fully engaged and is in the same position as the fuel selector handle in the cabin. Connect the fuel lines and install the canvas boot.

MAIN FUEL CELL REMOVAL

a. Turn fuel selector valves and battery master switch "OFF".

b. Drain and purge the cell to be removed.

c. Remove the fuel indicator transmitter access cover on top of the center section

d. Disconnect the electrical lead to the fuel indicator transmitter.

e. Remove the screws which attach the fuel indicator transmitter to the fuel cell and remove the transmitter.

f. Remove the bolts which attach the fuel tank filler neck to the airplane structure and remove the filler neck.

g. Remove fuel cell access plate on lower surface of the center section.

h. Disconnect electrical leads and fuel outlet line from submerged fuel booster pump.

i. Remove the bolts attaching the fuel pump to the tank and structure and remove the pump.

j. Disconnect the fuel tank vent and fuel return lines.

k. Unsnap the seven fasteners which attach the fuel cell to lower surface of the upper wing skin.

l. Collapse the fuel cell and remove through the lower access door.

NOTE

If the fuel cell is to be stored for a period of 10 days or longer, coat the inner surface with light engine oil to prevent cracking or deterioration.

INSTALLATION OF MAIN FUEL CELL

a. Collapse the fuel cell and install through the fuel cell access door in the lower center section skin.

b. Snap the seven fasteners which hold the top of the fuel cell to the lower surface of the upper skin.

c. Install the submerged fuel booster pump and gasket. Install the attaching bolts and torque to 35 ±5 inch-pounds. Safety the bolts together using steel safety wire.

d. Attach electrical connection and fuel outlet line to fuel pump.

e. Install the filler neck and gasket in the fuel tank. Install the attaching bolts and safety bolt heads together.

f. Install the fuel indicator transmitter. Tighten screws and safety.

g. Connect electrical lead to the fuel transmitter.

h. Connect fuel outlet, fuel tank vent, and fuel return lines. Torque clamps to 10 ±1/2 inch-pounds.

i. Check the fuel transmitter as outlined in "Testing the Fuel Level Transmitter", in Section III.

j. Fill tank and operate fuel pump. Check for evidence of leaks at the fittings.

k. Check the fuel pressure on pilot's fuel pressure gage. The fuel booster pump should furnish a pressure within the green range.

l. Install all access panels.

LEADING EDGE AUXILIARY FUEL CELL REMOVAL

a. Turn the fuel selector valves and battery master switch "OFF".

b. Drain and purge the auxiliary fuel cells.

c. Remove the leading edge auxiliary fuel cell indicator transmitter access plate on the top side of the wing leading edge just outboard of the nacelle. Remove the fuel cell cover plate located under the access plate.

d. Disconnect the electrical lead to the fuel indicator transmitter.

e. Remove the screws which attach the fuel indicator transmitter to the fuel cell and remove the transmitter.

f. Disconnect the plumbing from the outboard end of the fuel cell through the landing light access door on the bottom of the leading edge.

g. Remove the clamp which attaches the fuel cell rubber tube fitting to the metal tube at the root rib of the outer wing panel. Remove the outboard augmenter tube to gain access to the above clamp.

h. Remove the drain valve from the inboard end of the tank.

i. Unsnap the fasteners which attach the fuel cell to the lower surface of the upper skin of the wing.

j. Collapse the fuel cell and remove through the leading edge fuel cell transmitter access door.

NOTE

If the cell is to be stored for a period of 10 days or longer, coat the inner surface with light engine oil to prevent cracking or deterioration.

INSTALLATION OF LEADING EDGE AUXILIARY FUEL CELL

a. Collapse the fuel cell and install it in the wing leading edge through the leading edge auxiliary fuel cell access door on the top of the leading edge, just outboard of the nacelle.

b. Snap the fasteners in place that hold the fuel cell against the lower surface of the upper wing skin.

c. Install the drain valve in the outboard end of the cell.

d. Install the fuel cell rubber tube fitting on the metal tube at the root rib of the outer wing panel and clamp in place. Install the outboard augmenter tube.

e. Connect the plumbing at the outboard end of the fuel cell through the landing light access door on the bottom of the leading edge.

f. Install the fuel indicator transmitter. Safety using steel safety wire.

g. Connect electrical lead to the fuel indicator transmitter

h. Install the fuel cell cover plate.

i. Check the fuel indicator transmitter as outlined in "Testing the Fuel Level Transmitter", in Section III.

j. Fill the tank and check all lines and fittings for evidence of leaks at the fittings.

k. Replace all access plates.

INBOARD AUXILIARY FUEL CELL REMOVAL

a. Turn the fuel selector valves and battery master switch "OFF".

b. Drain and purge the auxiliary fuel cells.

c. Remove the auxiliary fuel booster pump access plate and the inboard auxiliary fuel cell access plate.

d. Remove the fuel cell cover plate located under the large access plate.

e. Remove the inboard auxiliary fuel cell indicator transmitter access plate in the top of the wing near the root rib.

f. Disconnect the electrical lead to the fuel indicator transmitter.

g. Remove the screws which attach the fuel indicator transmitter to the fuel cell and remove the transmitter.

h. Disconnect the electrical leads and fuel outlet line from the submerged fuel booster pump.

i. Remove the bolts attaching the fuel booster pump to the cell and structure and remove the pump.

j. Remove the clamp which attaches the fuel cell rubber tube fitting to the metal tube at the root rib of the outer wing panel. Remove the outboard augmenter tube to gain access to the above clamp.

k. Remove all clamps inside the fuel cell and slip the rubber tube fittings from the metal tubes.

l. Unsnap the fasterners which attach the fuel cell to the lower surface of the upper skin of the wing.

m. Collapse the fuel cell and remove through the access door.

NOTE

If the fuel cell is to be stored for a period of 10 days or longer, coat the inner surface with light engine oil to prevent cracking or deterioration.

INSTALLATION OF INBOARD AUXILIARY FUEL CELL

a. Collapse the cell and install it in the wing through the inboard auxiliary fuel cell access door.

b. Snap the fasteners in place that hold the fuel cell against the lower surface of the upper wing skin.

c. Position all internal rubber tube fittings on the metal tubes and install the clamps.

d. Install the fuel cell rubber tube fitting on the metal tube at the root rib of the outer wing panel. Install the outboard augmenter tube.

e. Install the submerged fuel booster pump and gaskets. Install the attaching bolts and torque to 50 ±5 inch-pounds. Safety the bolts together using steel safety wire.

f. Attach the electrical connection to the pump.

g. Install the fuel transmitter through the inboard auxiliary fuel cell transmitter access door in the top of the wing near the nacelle. Tighten the screws and safety using steel safety wire.

h. Attach the electrical lead to the fuel transmitter.

i. Check all lines and fittings for proper installation.

j. Install the fuel cell cover plate.

k. Check the fuel indicator transmitter as outlined in "Testing the Fuel Level Transmitter", in Section III.

l. Fill the tank and operate the fuel pump. Check for evidence of leaks at fittings.

m. Check the fuel pressure on the pilot's pressure gage. The fuel booster pump should furnish a pressure within the green range.

OUTBOARD AUXILIARY FUEL CELL REMOVAL

a. Turn the fuel selector valves and battery master switch "OFF".

b. Drain the auxiliary fuel cells by locking open the quick drain fitting on the auxiliary fuel booster pump.

c. Remove the fuel quantity transmitter access cover in the top of the wing near the auxiliary fuel cell filler neck.

d. Disconnect the electrical lead to the fuel indicator transmitter.

e. Remove the screws which attach the fuel indicator transmitter to the fuel cell and remove the transmitter.

f. Remove the bolts which attach the fuel cell filler neck to the airplane structure and remove the filler neck.

g. Remove the outboard auxiliary fuel cell access plate which is the large oval shaped access plate in the center of the lower wing skin just behind the landing light. Remove the fuel cell cover plate located under the access plate.

h. Remove all clamps inside the fuel cell and slip the rubber tube fittings from the metal tubes.

i. Disconnect the fuel cell vent line from the outboard end of the fuel cell.

j. Unsnap the fasteners which attach the fuel cell to the lower surface of the upper skin of the wing.

k. Collapse the fuel cell and remove it through the lower access opening.

NOTE

If the fuel cell is to be stored for a period of 10 days or longer, coat the inside of the tank with light engine oil to prevent cracking or deterioration.

INSTALLATION OF OUTBOARD AUXILIARY FUEL CELL

a. Collapse the fuel cell and install it in the wing through the outboard auxiliary fuel cell access plate located behind the landing light.

b. Snap the fasteners in place which hold the fuel cell against the lower surface of the upper wing skin.

c. Install the scupper drain pan and connect the fuel cell overflow line.

d. Install the filler neck and gasket using drilled head bolts. Safety the bolts using steel safety wire.

e. Install the fuel cell transmitter through the access opening in the top of the wing near the auxiliary fuel cell filler neck and safety the screws.

f. Attach electrical leads to the fuel transmitter.

g. Connect the fuel cell vent line to the outboard end of the cell.

h. Slip the rubber tube fittings over the metal tubes and install all clamps inside the fuel cell.

i. Check all lines and fittings for proper installation.

j. Install the fuel cell cover plate.

k. Check the fuel indicator transmitter as outlined in "Testing the Fuel Level Transmitter", in Section III.

l. Fill the tank and check all lines for evidence of leaks at the fittings.

m. Replace the fuel quantity transmitter access opening and the fuel cell access plates.

INSTRUMENT REMOVAL

To remove an instrument from the floating panel, proceed as follows:

a. Remove screws attaching padded glare shield to deck.

b. Remove glare shield and the four screws attaching panel to vibration absorbers structure.

c. Pull panel structure out and tilt panel aft.

d. Disconnect the electrical and plumbing connections from back of instrument. Remove screws from panel and remove instrument.

NOTE

To remove fuel quantity indicators remove screws attaching fuel panel to structure and remove indicator from the aft side of panel.

INSTALLATION OF INSTRUMENT

a. Position instrument in proper cutout and install screws connecting instrument to panel.

b. Connect plumbing and electrical connections to back of instrument.

c. Reinstall floating panel and install the four screws attaching panel to upper and lower vibration absorbers.

d. Install padded glare shield and attaching screws.

NOTE

Position fuel quantity indicator over proper cutout and install screws connecting indicator to panel. Install panel to structure with mouning screws.

SECTION IV
MAJOR DISASSEMBLY

PROPELLER REMOVAL (ITEM NUMBERS REFER TO INDEXS ON INSTALLATION INSTRUCTIONS.)

a. If propeller anti-icers are installed, remove the anti-icer tubes, spinner dome, and attaching screws.

b. Using blade bars or feathering boards rotate blades toward low pitch, depress the three high pitch stop pins and slowly release the propeller blades to full feathered position.

WARNING

Feather the propeller to release the tension on the feathering spring before removing the piston retaining nut.

c. Remove piston retaining nut and the three jam nuts (item K) from guide rods.

d. Remove safety wire from safety plate screws and arm pins, and remove screws and piston.

e. Remove ring retainer plate (item H) and four attaching screws from the feathering spring subassembly.

f. Remove split ring and feathering spring subassembly.

g. Remove hub nut safety pin (item E) and hub nut.

h. Remove propeller assembly from engine shaft.

i. Remove "O" ring (item C) and hub mounting cone (item B).

j. Remove spinner bulkhead from engine shaft.

INSTALLATION OF PROPELLER

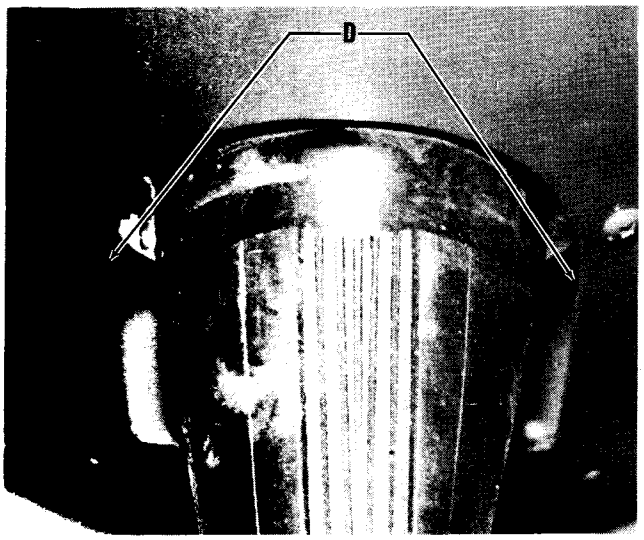
a. Clean the engine shaft and lubricate with engine oil.

b. Compress the three high pitch plungers and pass wires through holes provided in the high pitch brackets (item A) to hold plungers. Wire should extend over the edge of the bulkhead to facilitate removal after the spinner is installed.

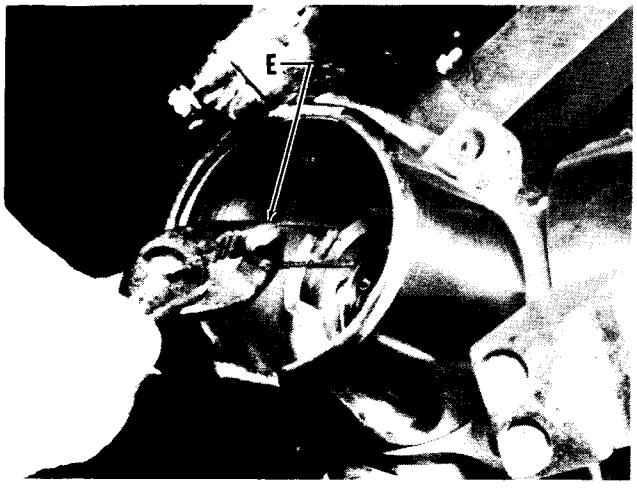
c. Slide the rear spinner bulkhead onto the engine shaft. Slide the rear cone (item B), with the taper forward, onto the engine shaft. Match the holes in the cone with the two pins protruding from the spinner bulkhead.

d. Install "O" ring (item C) against the cone.

e. Place propeller hub on engine shaft, lining up hub and shaft splines, and tighten the hub nut until rear bulkhead becomes snug but not tight.



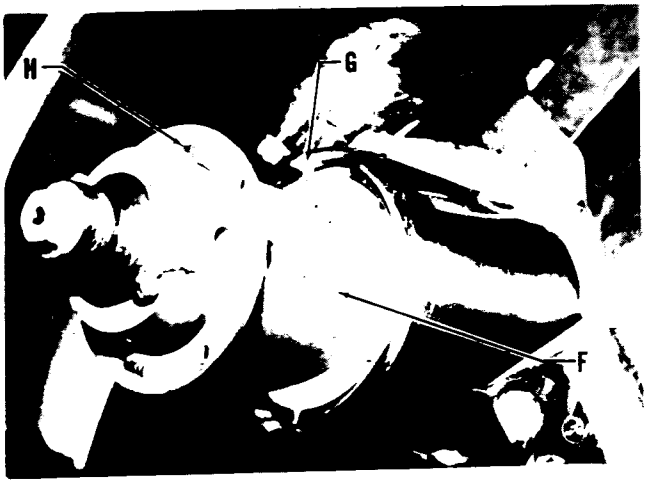
f. Locate the rear bulkhead, by installing spinner dome with at least four screws. Be sure high pitch stop brackets are paralleled with blade axis, but offset to one side. Make final adjustment of bulkhead position by equilizing the clearance between the blades and spinner cutouts (item D).



g. Remove spinner dome and torque hub nut, between 400-440 foot-pounds, with special retainer nut wrench

Figure 4-14. Propeller Removal and Installation (Sheet 1 of 2)

(P/N 50-590084). Install safety pin (item E) on the hub nut.



h. Place feather spring subassembly (item F) into engine shaft and install split rings (item G) in cylinder groove. Install plate (item H) with attaching screws and safety wire.

i. Install dust seat (item J) in the end groove of the piston next to the "O" ring and the phenolic "O" ring.

j. Oil surface of cylinder with engine oil, and install piston.

k. Slide the three guide rods through the collar bushing, install washer and jam nut (item K) on each guide rod. Torque each jam nut to 10 foot-pounds.

l. Install the link arms in piston slots and pin with arm pins (item L). Install screws and safety wire.

m. Install piston retaining nut and torque to 120 foot-pounds. Use special piston nut wrench (P/N B-842).

n. Coat the lock nuts and the piston with a thin stripe of white paint, which may be used in detecting slippage.

o. Install the spinner and attaching screws.

NOTE

When installing the spinner, the arrow on the inside of the spinner should align with the arrow on the rear bulkhead.

p. Remove wires from high pitch stop brackets, allowing pins to rest on high pitch stop plates.

q. Using blade bars or feathering boards rotate the blades into low pitch until high pitch stop pins snap into place.

r. Install the anti-icer tubes and screws to the spinner dome. Make sure the tubes engage the tubes of the slinger ring.

s. Position the anti-icer tube, which runs between the anti-icer valve and the slinger ring, in the slinger ring, providing sufficient clearance to prevent contact of the tube and the ring during normal operation of the propeller.

CAUTION

Failure to accomplish this may result in damage to the slinger ring or anti-icer tube.

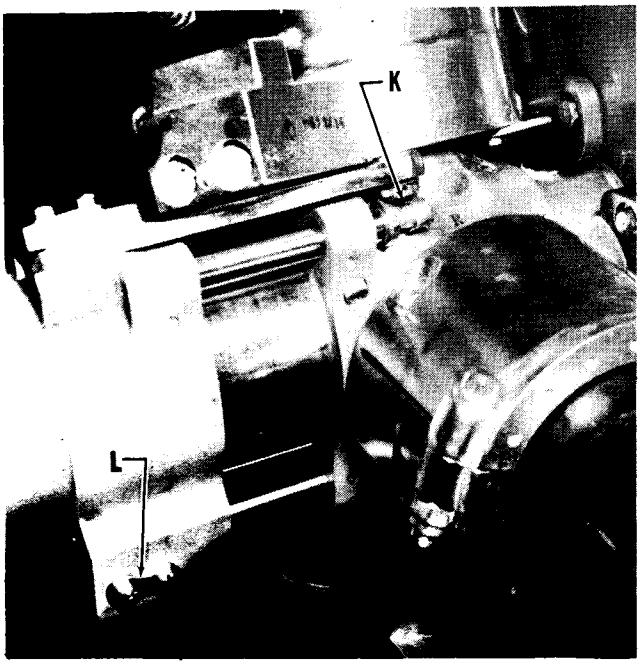


Figure 4-14. Propeller Removal and Installation (Sheet 2 of 2)

5

SECTION V

Major Maintenance and Overhaul

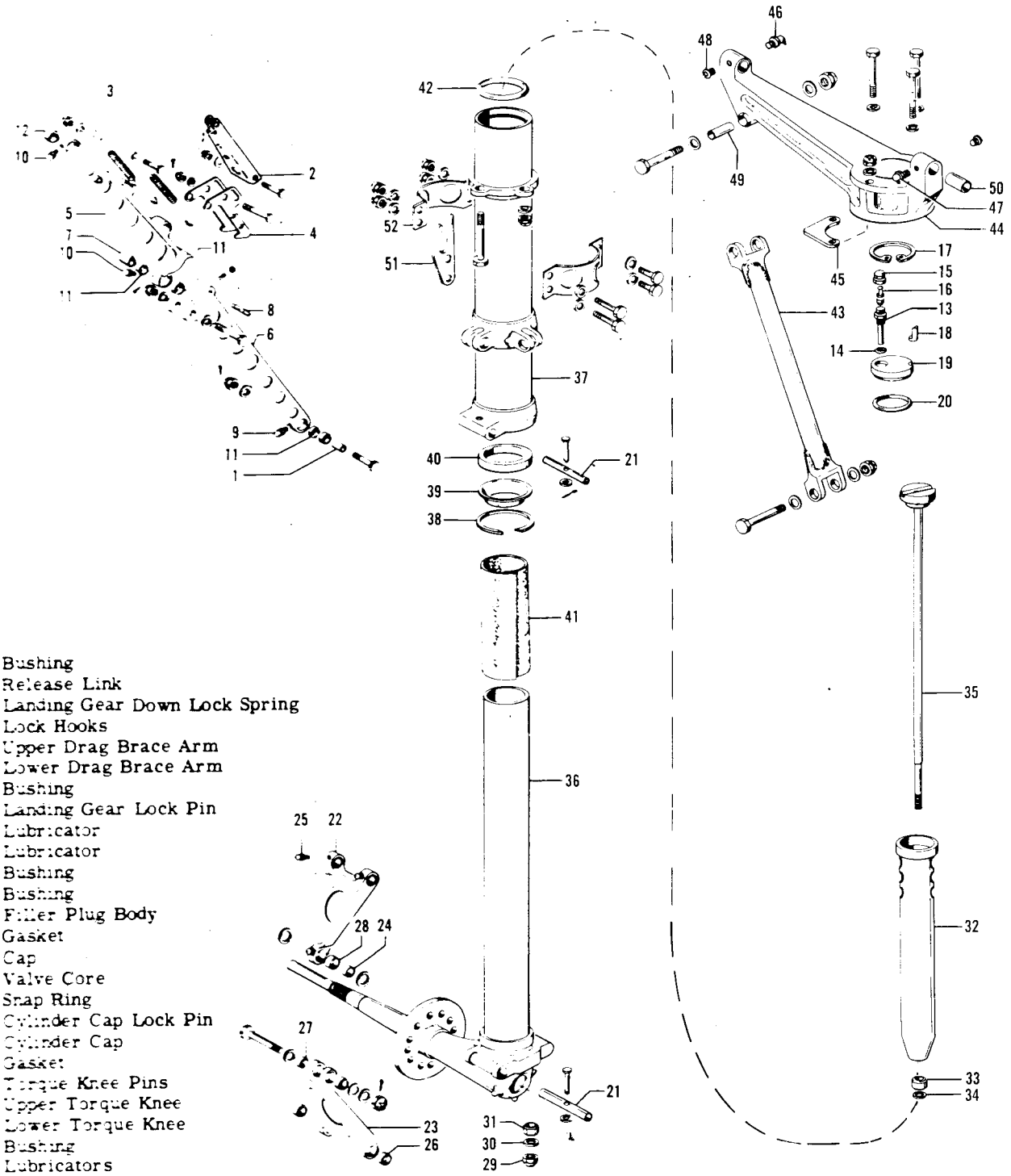
SECTION V

MAJOR MAINTENANCE AND OVERHAUL

This section contains maintenance and overhaul information on major components of the aircraft. Assembly and disassembly procedures, wear tolerances and other criteria for replacing parts are given.

The procedures are given on a parts-replacement basis only. Repair procedures such as welding, brazing, building up with weld material and machining to size, etc., cannot be given a blanket endorsement, since each such case must be evaluated individually. This section is intended, rather, as a guide to normal overhaul, its goal being the restoration of the parts to full serviceability.

As a requirement for them appears, or the information becomes available, overhaul instructions for additional major assemblies will be added to this section.



1. Bushing
2. Release Link
3. Landing Gear Down Lock Spring
4. Lock Hooks
5. Upper Drag Brace Arm
6. Lower Drag Brace Arm
7. Bushing
8. Landing Gear Lock Pin
9. Lubricator
10. Lubricator
11. Bushing
12. Bushing
13. Filler Plug Body
14. Gasket
15. Cap
16. Valve Core
17. Snap Ring
18. Cylinder Cap Lock Pin
19. Cylinder Cap
20. Gasket
21. Torque Knee Pins
22. Upper Torque Knee
23. Lower Torque Knee
24. Bushing
25. Lubricators
26. Bushing
27. Bushing
28. Bushing
29. Nut
30. Washer
31. Extension Pin Washer
32. Rebound Control Assembly
33. Spacer
34. Gasket
35. Extension Pin
36. Lower Shock Absorber Assembly
37. Upper Shock Absorber Assembly
38. Snap Ring
39. Scraper Ring
40. Wiper Ring
41. Felt Lubricating Pad
42. Packing
43. Side Brace Assembly
44. Top Brace Casting
45. Brake Tube Support Bracket
46. Lubricator
47. Lubricator
48. Set Screw
49. Bushing
50. Bushing
51. Main Landing Gear Door Cam
52. Clamp

Figure 5-1. Main Landing Gear Assembly

MAIN LANDING GEAR DRAG BRACE ASSEMBLY OVERHAUL (Figure 5-1)

DISASSEMBLY

a. Remove attaching hardware and disconnect the lower drag brace arm (6) from the main gear shock. Remove the bushing (1) from the lower drag brace arm.

b. Remove attaching hardware and remove the release link (2).

c. Remove attaching hardware and disconnect the landing gear down lock springs (3) and the lock hooks (4), only if necessary, from the upper drag brace arm (5).

CAUTION

Each lock hook is especially fitted for its position. If they are removed care should be taken to reinstall them in the same position and location.

d. Separate the upper (5) and lower (6) drag brace arms, after removing the attaching hardware. Remove the bushing (7) from the upper drag brace arm.

e. The landing gear lock pin (8) should be removed only if it is to be replaced. It can be removed after the retaining set screw and nut have been removed.

f. If necessary, the lubricators (9) and (10) and bushings (11) and (12) can be replaced, if they fail to function or to pass the tolerance specifications.

CLEANING AND REPLACEMENT

Clean all parts with cleaning solvent (item 13, Consumable Materials Chart). Inspect each drag brace arm for cracks, distortion, and wear. Check parts, refering to table below, for wear tolerances. If bushings are replaced, drill lubricating holes in the bushings if they are required.

WEAR TOLERANCES

Drag Brace Assembly		
Bushing (12)	Maximum I.D.	.630 inch
Bushing (11)	Maximum I.D.	.505 inch
Bushing (1)	Minimum O.D.	.490 inch
Bushing (7)	Minimum O.D.	.493 inch
Gear actuator attaching slot	Maximum Width	.327 inch
Gear Lock Hook (4)		
Pivot hole	Maximum I.D.	.320 inch

REASSEMBLY

Reassemble the drag brace arm in the reverse of the above disassembly procedure. Make sure that the set screw attaching the landing gear lock pin (8) is properly seated, in order to assure proper alignment of the pin faces with the hooks (4).

NOTE

When the upper and lower arms of the drag brace assembly are engaged by the lock hook, there should be a minimum clearance of .010 inch between the retaining face of each lock hook and the corresponding landing gear lock pin, and not more than .020 inch average clearance between two hooks and pins on the same drag leg.

After reassembly, lubricate the bushings using lubrication grease (item 6, Consumable Materials Chart).

MAIN LANDING GEAR ASSEMBLY OVERHAUL (Figure 5-1)

DISASSEMBLY

a. With the strut in a vertical position, to keep the hydraulic fluid from spilling from the strut when the filler plug is removed, break the safety wire and release the air pressure from the strut by loosening the top nut on the filler plug body (13) one turn, removing the cap (15), and depressing the valve core.

CAUTION

Do not attempt to remove the filler plug body (13) or the valve core (16) before all air pressure is released from the strut.

b. Remove the filler plug body (13) and gasket (14) from the strut. If necessary, the filler plug can be further disassembled by removing the valve core (16) from the body.

SECTION V
MAJOR MAINTENANCE AND OVERHAUL

NOTE

Do not remove the valve core except for replacement purposes.

c. Remove the snap ring (17) and the cylinder cap lock pin (18) from the top of the strut.

d. A 1 2 inch bolt, with a national fine thread, may be screwed into the filler plug opening and used as an aid in removal of the cylinder cap (19). Remove the gasket (20) from the cap.

e. Drain the hydraulic oil from the strut by inverting it. Invert the strut slowly to prevent internal damage. Work the lower portion of the shock absorber assembly up and down to pump any remaining oil from the strut.

f. Remove the attaching hardware and drive the torque knee pins (21) from the upper (22) and lower (23) torque knees and remove the knees.

g. Separate the two knees by removing the attaching hardware and bushing (24). The lubricators (25) and bushings 26, 27, and (28) should be removed only if they fail to function or are worn beyond tolerance specifications.

h. With the strut in a horizontal position, insert a long screwdriver into the top of the strut barrel and engage the slotted head of the extension pin (35). With the tool engaged, keep the pin from rotating and remove the nut 29, washer (30), and extension pin washer (31).

i. Lift the rebound control assembly (32) from the strut and remove the spacer (33) and the gasket (34) from the extension pin (35). Remove the extension pin 35 from the rebound control assembly (32).

j. Slide the lower shock absorber assembly (36) from the upper shock absorber assembly (37).

k. Remove the snap ring (38), scraper ring (39), and wiper ring (40) from the upper shock absorber assembly 37.

CAUTION

The scraper ring may become sharp during normal operation of the gear; care should be taken when removing the ring to prevent possible injury.

l. Pull the felt lubricating pad (41) from the upper shock absorber assembly and using a suitable length of music wire, see figure 5-2, remove the packing 42 from the brazed bearing inside the upper shock absorber cylinder.

m. Remove the attaching hardware and detach the side brace assembly (43) from the upper shock absorber.

n. Remove the attaching hardware and pull the top brace casting (44) and the brake tube support bracket (45) from the strut.

o. If the lubricators (46) and (47), set screw (48), or bushings (49) and (50) do not function or are worn beyond tolerance specifications, they can be removed and replaced.

p. Remove the attaching hardware and remove the door cam (51) and clamp (52) from the strut.

CLEANING AND REPLACEMENT

Clean all parts with cleaning solvent (*Item 13). Check castings for cracks and pitting and finished surfaces for scoring, pitting, nicks, cracks, distortion, or worn surfaces. Check worn surfaces for allowable wear in the Wear Tolerance Chart.

Replace all strut packings, gaskets, or air valves whenever the strut is disassembled. At overhaul periods, replace the felt lubricating pads.

Prior to reassembly, soak all packing and all parts which come into contact with hydraulic fluid in fluid (*Item 11). Use a special lubrication oil (*Item 3) to saturate the felt pads. After reassembly, use lubrication grease (*Item 6) to lubricate the torque knee bushings and the drag brace bushings.

*Refer to Consumable Materials Chart in Section II for specification.

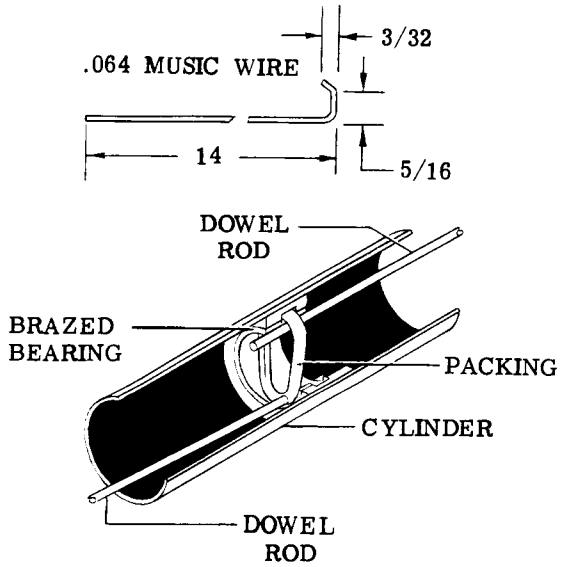


Figure 5-2. "O" Ring Removal and Installation

WEAR TOLERANCES

Gear Attaching Point		
Bushing (50)	Maximum I.D.	.630 inch
Upper Shock Absorber Assembly (37)		
Internal and lower end brazed bearings	Maximum I.D.	2.755 inch
Lower Shock Absorber Assembly (36)		
Piston portion of assembly	Minimum O.D.	2.744 inch
Brazed orifice ring in upper portion of piston assembly	Maximum I.D.	2.245 inch
Rebound Control Assembly (32)		
Outside diameter	Minimum O.D.	2.233 inch
Bore	Maximum I.D.	2.113 inch
Extension stop pin hole	Maximum I.D.	.493 inch
Extension Pin (35)		
Shaft diameter	Minimum O.D.	.437 inch
Piston diameter	Minimum O.D.	2.073 inch
Torque Knee Assembly		
Bushing (28)	Maximum I.D.	.505 inch
Bushing (24)	Minimum O.D.	.491 inch
Bushing (26)	Maximum I.D.	.628 inch
Attaching pin (21)	Minimum O.D.	.620 inch

REASSEMBLY

a. Replace any defective lubricators or bushings.

b. Install the top brace casting (44) on the upper shock absorber assembly (37) and secure it with attaching hardware. Install the bolt, located on the forward side of the strut, with its head down.

c. With the strut in a vertical position attach the side brace assembly (43).

d. Insert the packing (42) into the brazed bearing in the shock absorber cylinder (37) from the bottom, using two dowel rods to work it into the position shown in figure 5-2.

e. Trim to secure proper fit and install the felt lubricating pad (41) in the strut.

f. Assemble the snap ring (38), scraper ring (39), and the wiper ring (40) on the lower shock absorber assembly. The grooved edge of the wiper ring (40) should face the axle and the flanged edge of the scraper ring (39) should face the axle.

g. Insert the extension pin (35) through the rebound control assembly (32) and install spacer (33) and gasket (34) on the end of the pin. Insert the rebound control assembly into the upper shock absorber and into the lower shock absorber.

h. With a long screwdriver, engage the slotted head of the extension pin (35) and install washer (31), washer (30), and nut (29).

i. Install the upper (22) and lower (23) torque knees and the torque knee pins (21) and secure with attaching hardware.

j. Install bushing (24) and join the upper and lower torque knees.

k. When the strut is completely assembled, it can

be fully compressed and filled within 1-11/16 inches of the top of the strut with hydraulic fluid. However, filling can be facilitated at this point in the reassembly procedure as follows:

1. Fully extend the lower shock absorber assembly.

2. Squirt hydraulic fluid, (item 11, Consumable Materials Chart) through the upper holes of the rebound control cylinder. The fluid will, therefore, run down the walls of the strut and will not trap excessive amounts of air within the strut. Stop filling when the oil runs in through the lower holes in the cylinder.

3. Slowly pump the lower shock absorber assembly several times to purge the strut of any trapped air. Maintain the fluid level so that when the strut is in the fully compressed position, the fluid level will be within 1-11 16 inches of the top of the strut.

l. Install gasket (20), cylinder cap (19), lock pin (18), and snap ring (17).

m. Install a new valve core (16) in the filler plug body (13) and install the gasket (14) and the filler plug.

n. Secure the door cam (51) and clamp (52). The top edge of the clamp should be 3-11/16 inches from the upper shoulder of the strut.

o. Inflate the strut to 80 psi air pressure.

p. Apply a soap and water solution in the area of the cylinder cap and upper strut around the brazed joint. Check the area for leaks.

q. Clean the area and install the valve cap (15) and the safety wire.

NOSE LANDING GEAR DRAG BRACE ASSEMBLY OVERHAUL (Figure 5-3)

DISASSEMBLY

a. Remove the attaching hardware and disconnect the lower drag brace arm from the nose gear strut casting (49). Remove the bushing (1) from the lower drag brace arm.

b. Disconnect the release link (2) from the drag brace assembly after removing the attaching hardware.

c. Remove the attaching hardware and remove the landing gear down lock spring (3) and the lock hook (4), if necessary, from the drag leg brace assembly.

CAUTION

Each lock hook is especially fitted for its position. If they are removed, care should be taken to reinstall them in the same position and location.

d. Remove the attaching parts and separate the upper (5) and lower (6) drag brace arms. Remove the bushing (7) from the upper drag brace arm.

e. After removing the nut (8) and set screw (9), the lock pin (10) may be removed only if it is to be replaced. The drag brace lubricators (11) and bushings (12) and (13) can be removed for replacement, if they fail to function or are worn beyond wear tolerance specifications.

CLEANING AND REPLACEMENT

Clean all parts with cleaning solvent (item 13, Consumable Materials Chart). Check all parts for cracks, scoring, distortion, or wear beyond recommended tolerance limits. Replace all broken lubricators. Drill lubrication holes, if required, through all bushings that are replaced.

REASSEMBLY

Reassemble in the reverse of the above disassembly procedure.

NOTE

When the upper and lower arms of the drag brace assembly are engaged by the lock hook, there should be a minimum clearance of .010 inch between the retaining face of each lock hook and the corresponding landing gear lock pin, and not more than .020 inch average clearance between two hooks and pins on the same drag leg.

Lubricate the drag brace bushings with lubrication grease (item 6, Consumable Materials Chart) after the reassembly.

NOSE LANDING GEAR ASSEMBLY OVERHAUL (Figure 5-3)

DISASSEMBLY

a. Begin the disassembly of the landing gear assembly with the strut in a vertical position.

b. Break the safety wire from the filler valve body (14) and release the air pressure from the strut by loosening the filler valve body approximately one turn. Allow the strut to deflate completely.

CAUTION

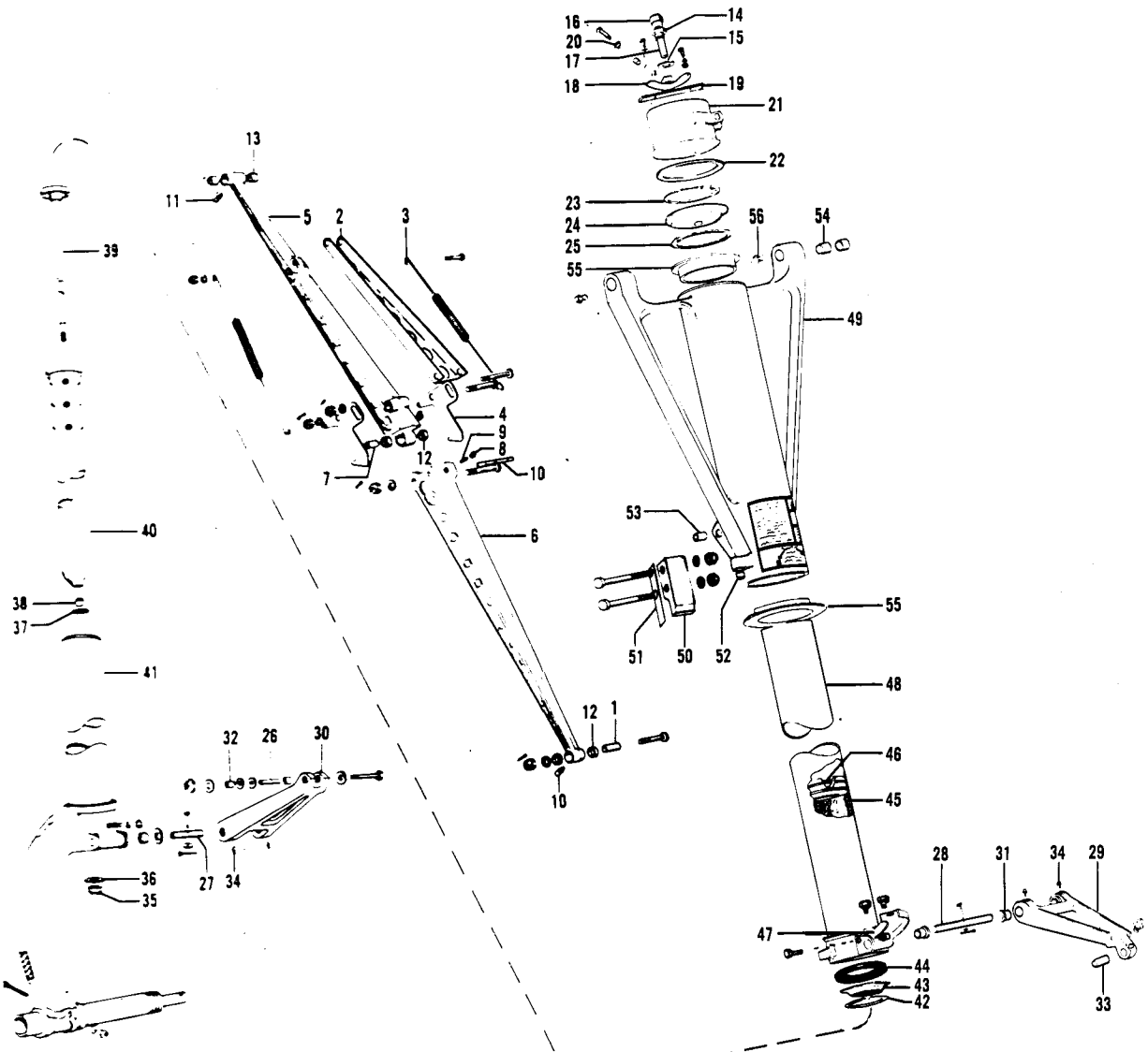
Do not remove the filler valve completely until the strut is entirely deflated.

c. Remove the filler valve (14) and gasket (15). To further disassemble the valve, remove the cap (16) and the valve core (17) from the body.

NOTE

Do not remove or loosen the valve core except when replacing it with a new core.

d. At this point in the disassembly procedure, to prevent the strut from slipping through the casting



1. Bushing
2. Release Link
3. Landing Gear Down Lock Spring
4. Lock Hook
5. Upper Drag Brace Arm
6. Lower Drag Brace Arm
7. Bushing
8. Nut
9. Set Screw
10. Lock Pin
11. Lubricator
12. Bushing
13. Bushing
14. Filler Valve Body
15. Gasket
16. Cap
17. Valve Core
18. Nose Gear Straightener Bracket
19. Nose Gear Sleeve Retainer Bar
20. Nose Gear Roller
21. Nose Gear Sleeve
22. Spacer Shim
23. Snap Ring
24. Cylinder Plug
25. Barrel End Gasket
26. Bushing
27. Torque Knee Pin
28. Torque Knee Pin
29. Upper Torque Knee
30. Lower Torque Knee
31. Bushing
32. Bushing
33. Bushing
34. Lubricators
35. Nut
36. Washer
37. Gasket
38. Spacer
39. Extension Pin
40. Rebound Control Assembly
41. Lower Shock Absorber
42. Snap Ring
43. Scraper Ring
44. Wiper Ring
45. Felt Lubricating Pad
46. Packing
47. Shimmy Dampener Arm
48. Upper Shock Absorber
49. Casting
50. Nose Gear Travel Stop Fitting
51. Shim
52. Bushing
53. Bushing
54. Bushing
55. Bearing
56. Lubricators

Figure 5-3. Nose Landing Gear Assembly

when the nose gear sleeve (21) is removed, tie the upper shock absorber assembly (48) to the nose gear shock brace casting (49) with safety wire. Loop the wire through the shimmy dampener attaching lug on the casting and around the torque knee attaching lugs on the upper shock absorber assembly.

e. Remove the nose gear straightener bracket (18) and the nose gear sleeve retainer bar (19) from the strut, after removing the attaching hardware. Separate the roller (20) from the straightener bracket by removing attaching hardware.

f. Lift the nose gear sleeve (21) and the spacer shim (22) from the strut. Remove snap ring (23) and lift the cylinder plug (24) from the strut. To aid in the removal of the cylinder plug, screw a 1/2 inch bolt with national fine thread into the filler plug opening. Remove the barrel end gasket (25) from the plug.

g. Drain the hydraulic fluid from the strut by inverting the strut and holding the lower portion of the shock absorber by the axle. Pump the shock slowly to drain any remaining fluid from the strut.

h. Remove the attaching hardware and separate the upper (29) and lower (30) knees and remove bushing (26).

i. Remove the attaching hardware and drive the torque knee pins (27) and (28) from the upper (29) and lower (30) torque knees and remove the knees. The torque knee bushings (31), (32), and (33), and lubricators (34) should be checked for operation and excessive wear and removed only for replacement.

j. Rotate the strut to a horizontal position and insert a long screwdriver into the barrel engaging the slotted head of the extension pin (39). Keep the extension pin from rotating and remove nut (35) and washer (36) from the threaded end of the pin.

k. Lift the rebound control assembly (40) from the strut and remove gasket (37) and spacer (38) from the extension pin. Remove the extension pin (39) from the rebound control assembly (40).

l. Slide the lower shock absorber (41) from the upper shock absorber (48). Remove the snap ring (42), scraper ring (43), and the wiper ring (44) from the upper shock absorber assembly (48).

CAUTION

Use care when removing the scraper ring, since, during normal operation of the gear, the lip on the ring may become very sharp.

m. Remove the felt lubricating pad (45) from the upper shock absorber assembly. With a hook shaped end on a suitable length of music wire, see figure 5-2, remove the packing (46) from the brazed bearing in the upper shock absorber assembly.

n. Break the safety wire, remove attaching hardware, and the shimmy dampener arm (47) from the upper shock absorber assembly.

o. Remove the safety wire, previously tied to secure the upper shock absorber to the shock brace casting, and slide the upper shock absorber (48) from the casting (49).

p. Remove the attaching hardware and remove the nose gear travel stop fitting (50) from the attaching lugs on the casting. Remove the shim (51).

q. Bushings (52), (53), and (54); bearings (55); and lubricators (56) in the casting may be replaced if broken, scored, or worn beyond tolerance specifications.

CLEANING AND REPLACEMENT

Clean all parts with cleaning solvent (*Item 13). Check castings for cracks and pitting and finished surfaces for scoring, pitting, nicks, cracks, distortion, or worn surfaces. Check all wear surfaces for allowable wear in the Wear Tolerance Chart.

Replace all strut packings, gaskets, or air valves whenever the strut is disassembled. At overhaul periods, replace the felt lubricating pads.

Prior to reassembly, soak all packings and all parts which come into contact with hydraulic fluid, with fluid (*Item 11). Use special lubrication oil (*Item 3) to saturate the felt pads. After reassembly, use lubricating grease (*Item 6) to lubricate the torque knee bushings and the nose gear shock brace casting bearings.

*Refer to Consumable Materials Chart in Section II for specification.

WEAR TOLERANCES

Gear Attaching Point		
Bushing (54)	Maximum I.D.	.630 inch
Upper Shock Absorber Assembly (48)		
Internal and lower end brazed bearings	Maximum I.D.	2.755 inch

WEAR TOLERANCES (Cont.)

Lower Shock Absorber Assembly (41)		
Piston portion of assembly	Minimum O.D.	2.744 inch
Brazed orifice ring in upper portion of piston assembly	Maximum I.D.	2.245 inch
Rebound Control Assembly (40)		
Outside diameter	Minimum O.D.	2.232 inch
Bore	Maximum I.D.	2.113 inch
Extension Pin (39)		
Shaft diameter	Minimum O.D.	.437 inch
Piston diameter	Minimum O.D.	2.071 inch
Torque Knee Assembly		
Bushing (33)	Maximum I.D.	.505 inch
Bushing (26)	Minimum O.D.	.491 inch
Bushing (31)	Maximum I.D.	.628 inch
Attaching pin (27)	Minimum O.D.	.620 inch
Attaching pin (28)	Minimum O.D.	.620 inch

REASSEMBLY

a. Install any replacement lubricators or bushings which were removed. Make sure that lubricating holes have been drilled through the replacement bushings, if such holes are required.

b. Replace the nose gear travel stop fitting (50) and shim (51) as required to eliminate looseness in stop.

c. With the outer surface of the upper shock absorber assembly (48) lubricated, slide it into the shock brace casting (49). The torque knee lugs should be on the forward side of the casting.

d. Install the shimmy dampener arm (47). Make sure to add the safety wire.

e. Tie the upper shock absorber to the shock brace casting with wire similar to the procedure used in disassembly.

f. Install packing (46) and use two dowel rods to work it into position as shown in figure 5-2.

g. Install the felt pad (45). Trim, if necessary, to insure a proper fit.

h. Assemble the snap ring (42), scraper ring (43), and the wiper ring (44) on the lower shock absorber (40). The wiper ring (44) should be installed with the grooved edge facing the axle and the beveled edge up. The flanged edge of the scraper ring should face the axle.

i. Insert the lower shock absorber assembly (41) into the upper shock absorber assembly (48) and secure the wiper, scraper, and snap rings.

j. Insert the extension pin (39) into the rebound control assembly and slide spacer (38) to the shoulder of the pin. Insert gasket (37) into the recess in the spacer and insert the rebound control assembly in the upper shock absorber assembly.

k. Secure the extension pin at the threaded end, as it comes through the hole at the bottom of the lower shock, with washer (36) and nut (35). To keep the pin from turning, engage the slotted head with a long screwdriver.

l. Install the upper (29) and lower (30) torque knees and the torque knee pins (27) and (28) and secure with attaching hardware.

m. Replace bushing (26) and fasten the two torque knees together.

n. Rotate the strut to a vertical position. At this point, filling the strut can be facilitated by using the following procedure.

1. Fully extend the lower shock absorber assembly.

2. Squirt hydraulic fluid (item 11, Consumable Materials Chart) through the upper holes of the rebound control assembly. Stop filling the strut when the fluid runs back into the lower holes of the rebound control cylinder.

3. Slowly pump the lower portion of the shock absorber to purge the strut of any trapped air. Maintain the fluid level so that when the strut is fully compressed, the level of the fluid is 1-11 16 inches from the top of the strut.

Install the filler plug gasket (15), the filler plug body (14), and the cylinder plug gasket (25) on the cylinder plug (24).

Install the cylinder plug (24) and components on the upper shock absorber with the filler plug (14) on the torque knee side of the strut. Align the holes in plug 24 with the holes in the sleeve retaining bar (19).

Secure the cylinder plug (24) with snap ring (23).

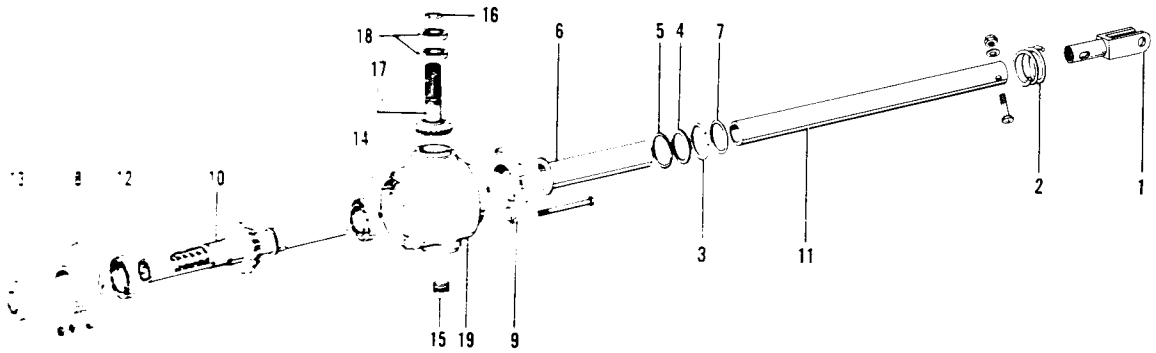
If the air valve core (17) has been removed, install a new core (17) and inflate the strut to 65 psi air pressure.

r. Apply a soap and water solution around the upper portion of the strut, especially around the brazed joint. Check the area for leaks and install valve cap (16) and clean the area of soap and water.

s. Install the spacer shim (22) over the top of the upper shock absorber, place the nose gear sleeve (21) on top of the shim, and install the sleeve retainer bar (19) on the sleeve. Install the roller (20) with attaching hardware in the straightener bracket (18) and secure the straightener bracket (18) over the sleeve retainer bar with attaching hardware.

t. Remove the safety wire tied between the upper shock absorber assembly and the casting.

u. Measure the distance between the nose gear sleeve (21) and the shock brace casting upper bearing (34) or the shock brace casting lower bearing (54) and the lower part of the upper shock absorber assembly (48). A maximum gap of .015 inch is permissible. Part of spacer shim (22) may be added or removed to obtain the desired clearance.



1. Clevis
2. Spring
3. Retaining Ring
4. Washer
5. "O" Ring
6. Shield
7. "O" Ring
8. Top Cover
9. Lower Cover
10. Screw Housing Assembly
11. Nut Assembly
12. Upper Bearing
13. Grease Seal
14. Lower Bearing
15. Plug
16. Snap Ring
17. Pinion Gear
18. Bearings
19. Housing

Figure 5-4. Nose and Main Landing Gear Actuator.

NOSE AND MAIN LANDING GEAR ACTUATOR OVERHAUL (Figure 5-4)

Except for a slight outward appearance the disassembly and overhaul of the nose and main landing gear actuators are the same.

DISASSEMBLY

a. Remove the bolt attaching clevis (1) to the nut assembly (11), and remove clevis and spring (2).

b. Remove shield retaining ring (3), washer (4), "O" ring (5), and shield (6).

c. Remove "O" ring (7) from shield.

d. Remove the four bolts attaching top cover (8) and lower cover (9) to housing (19).

e. Remove screw housing assembly (10), nut assembly (11), upper cover (8), and upper bearing (12) from the housing (19).

f. Unscrew screw assembly (10) from nut assembly (11).

g. Press off upper cover (8) and upper bearing (12).

h. Press grease seal (13) out of upper cover.

i. Remove lower bearing (14).

j. Remove plug (15).

k. Remove snap ring (16) and remove pinion (17) from housing by driving on the shaft end. Remove bearings (18).

CLEANING AND REPAIRS

The main and nose gear actuators should be removed, cleaned with cleaning solvent (item 13, Consumable Materials Chart) inspected, and lubricated every 1000 hours or two years. Replace lower bearing (14) at overhaul.

REASSEMBLY

a. Fill nut assembly (11) half full of lubricating grease (item 14, Consumable Materials Chart).

b. Screw nut assembly (11) into screw housing assembly (10). Run threads completely in and out to make sure they do not bind.

c. Slide bearing (12) over screw housing assembly (10) and insert entire assembly into housing (19).

d. Slide bearing (14) over nut assembly (11) and place shim next to it.

e. Place lower cover (9) next to the shim.

f. Place upper cover (8) over upper end of housing assembly and install the four bolts attaching covers to housing.

g. After the four bolts have been tightened, check axial end play of housing assembly (10). Add shims between housing (19) and lower cover until bearings are free. Shim for maximum axial end play of .004 inch and minimum of .0005 inch.

CAUTION

This adjustment is critical for proper operation of the actuator. It must be made with pinion gear removed.

h. Remove screw housing (10) and nut assembly (11) from housing (19).

i. Install one bearing (18) on the pinion shaft (17) and place shaft in housing (19).

j. Install the other bearing (18) and snap ring (16)

NOTE

When replacing bearings, use only S-5-SFF or S-5-KDD bearings.

k. Repeat steps c. through f. Check alignment of housing assembly gear with pinion gear to make sure they rotate freely.

l. Slide "O" ring (7) and shield (6) over nut assembly.

m. Place "O" ring (5), washer (4), and shield retaining ring (3) over shield (6), locking it in place.

n. Prior to assembly, the spring (2) must be checked for minimum gap of .020 inch between each active coil while spring is compressed to a length of 25/32 inch.

o. Place spring (2) over clevis (1), insert into nut assembly, and install bolt.

p. Fill housing with lubrication grease (item 7, Consumable Materials Chart) and install plug (15).

q. Slide grease seal (13) over screw assembly (10) and press into place.

LANDING GEAR RETRACT BOX ASSEMBLY OVERHAUL (Figure 5-5)

DISASSEMBLY

a. Remove the attaching hardware and remove the landing gear retract motor (2) from the landing gear retract housing (1).

b. Remove attaching hardware and detach the clutch support lever (3).

c. Remove snap ring (4) and spur gear (5).

d. Remove the woodruff key (6) and snap rings (7) and (8).

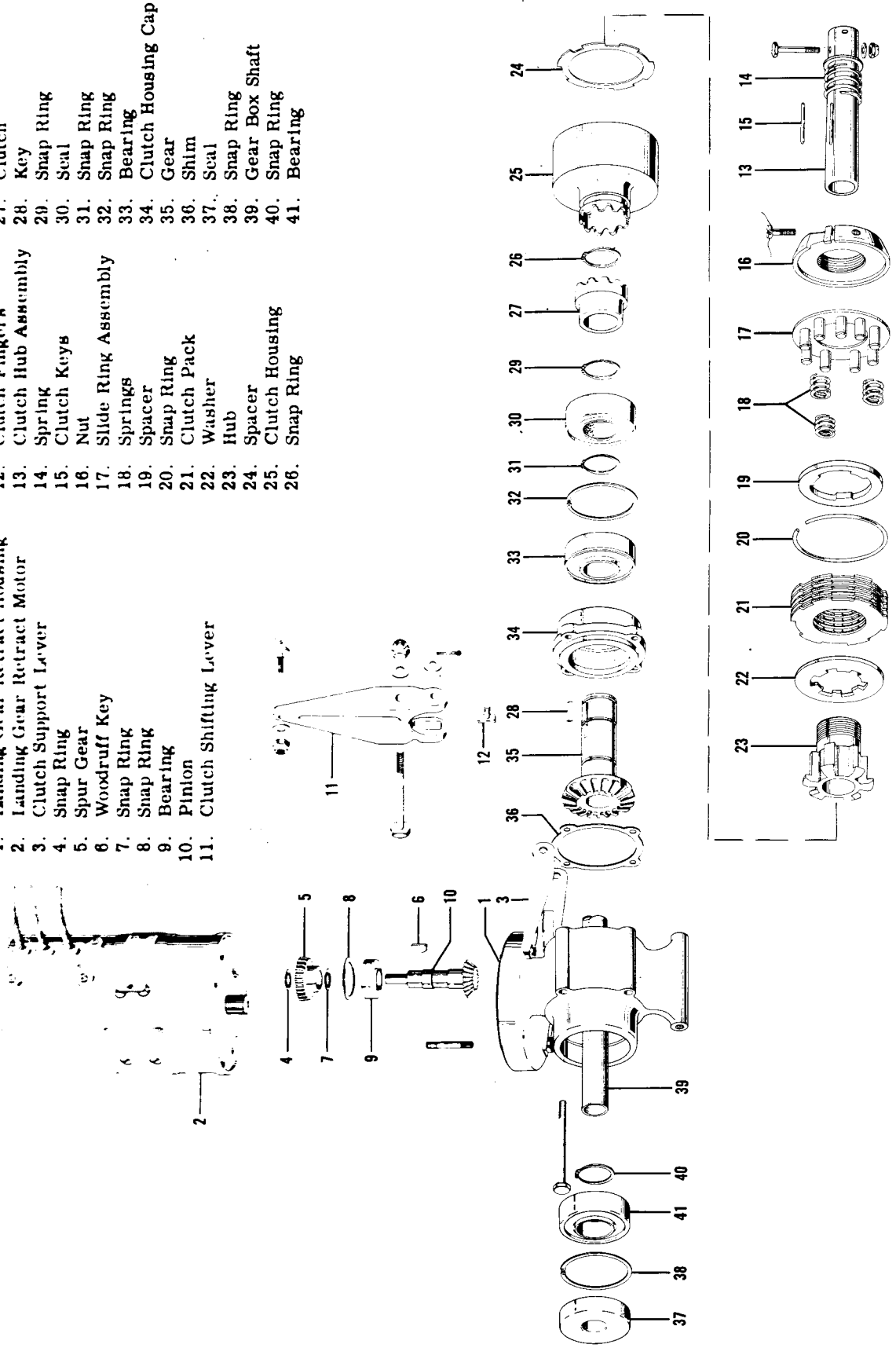


Figure 5-4. Landing Gear Retract Box Assembly

e. Slip bearing (9) off of pinion (10) and remove the pinion from retract housing (1).

f. Remove the clutch shifting lever (11) by removing attaching hardware and clutch fingers (12).

g. Remove the bolt holding the hub assembly (13) and remove the hub, spring (14), and clutch retaining keys (15).

h. Slip landing gear clutch assembly from shaft (39) and disassemble it in the following manner: remove locking wire, loosen set screw, and remove nut (16). Slide ring assembly (17), springs (18), and spacer (19) from hub (23). Remove snap ring (20), clutch pack disks (21), washer (22), hub (23), and spacer (24) from housing (25).

NOTE

When disassembling the clutch pack disks, tie them together with wire or similar material so as not to rearrange their order.

i. Remove attaching hardware and pull cap assembly from shaft (39) and disassemble as follows: remove snap ring (26) and slip clutch (27) from gear (35). Remove key (28), snap ring (29), seal (30), and snap rings (31) and (32). Slip bearing (33) and cap (34) from gear (35). Remove shim (36). Seal (30) will be damaged when removed.

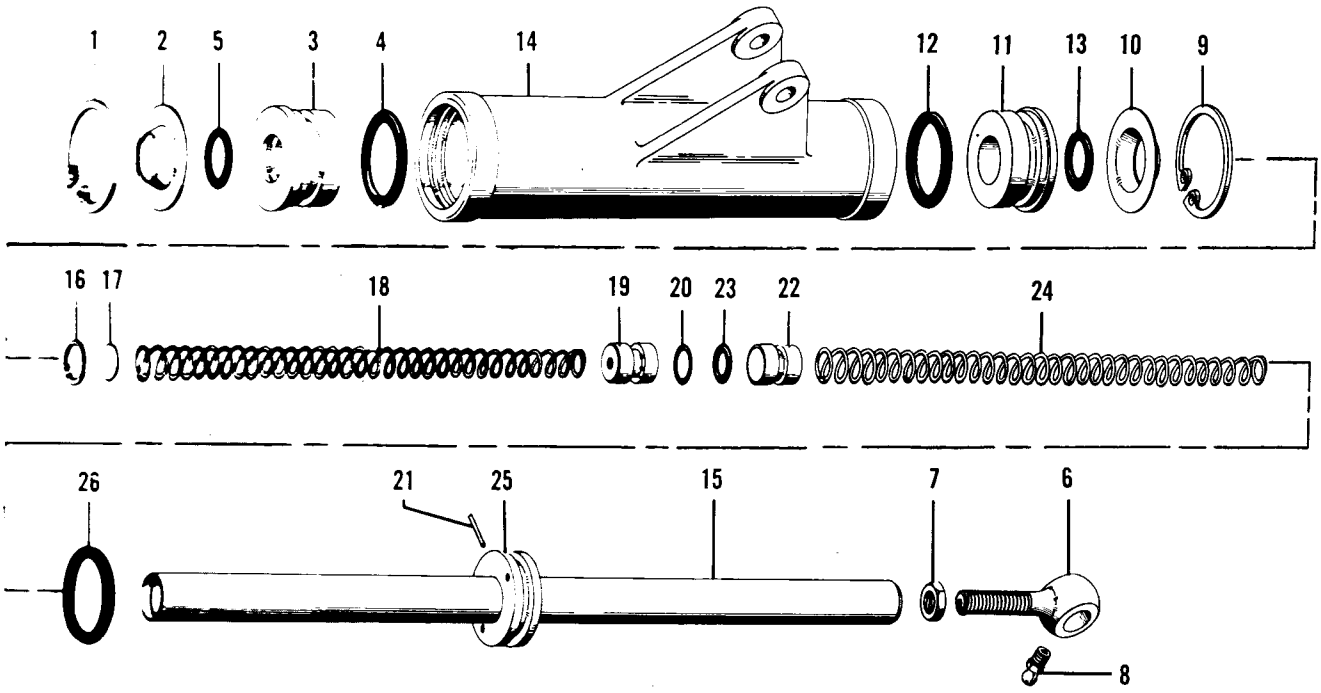
j. Pull gear box shaft (39) free of the gear box (1) after removing seal (37) and snap ring (38).

k. Remove snap ring (40) and slip bearing (41) from shaft (39).

CLEANING, REPAIR, AND REASSEMBLY

Clean all parts with cleaning solvent (*Item 13). Inspect all parts for cracks, scoring, excessive wear, or other defects. Pack all bearings with lubrication grease (*Item 7) and the gear box with approximately 3 oz. of lubrication grease (*Item 16). Pack clutch fingers of (27) and (25) with powdered lubricating graphite (*Item 10). Replace seal (30) upon reassembly. Reassemble the landing gear retract box in the reverse order of the above disassembly procedure.

*Refer to Consumable Materials Chart In Section II for specification.



1. Barrel Snap Ring
2. Scraper Ring
3. Shimmy Dampener Bearing
4. Packing
5. Packing
6. Fitting
7. Nut
8. Lubricator
9. Barrel Snap Ring
10. Scraper Ring
11. Shimmy Dampener Bearing
12. Packing
13. Packing
14. Shimmy Dampener Barrel
15. Shimmy Dampener Rod Assembly
16. Snap Ring
17. Washer
18. Spring
19. Floating Piston
20. Packing
21. Retainer Pin
22. Floating Piston
23. Packing
24. Spring
25. Shimmy Dampener Piston
26. Packing

Figure 5-6. Shimmy Dampener.

SECTION V
MAJOR MAINTENANCE AND OVERHAUL

SHIMMY DAMPENER OVERHAUL (Figure 5-6)

DISASSEMBLY

a. Remove the barrel snap ring (1), scraper ring (2), and the end bearing (3) from the aft end of the barrel.

b. Remove the packings (4) and (5) from the end bearing (3).

c. Remove the fitting (6), nut (7), and the lubricator (8) from the piston rod aft end.

d. Remove the barrel snap ring (9), scraper ring (10), and the dampener bearing (11) from the forward end of the barrel.

e. Remove the packing (12) and (13) from the dampener bearing (11).

f. Remove the rod assembly (15) and parts from the barrel (14).

g. Remove the snap ring (16), washer (17), and spring (18) from the piston rod.

h. Remove the forward floating piston (19) from the rod assembly (15) by screwing a rod, with a 10/32 inch thread, into the piston and pulling it out. Remove the packing (20) from the floating piston.

i. Insert a long rod, with a 10 32 inch thread, into the hole at the forward end of the rod assembly (15). Maintain pressure on the aft floating piston (22), compress the spring (24), and drive out the retaining pin (21) holding the piston.

j. Slowly release the floating piston (22) and push out the open end of the rod assembly and remove the packing (23).

k. Remove the spring (24) and slide the piston (25) off the rod. Remove the packing (26) from the piston.

CLEANING, REPAIR, AND PARTS REPLACEMENT

Repairs on the shimmy dampener should be confined to replacing worn or leaking "O" rings or replacing the complete assembly. When disassembled, clean with cleaning solvent (item 13, Consumable Materials Chart) and lubricate the parts with hydraulic fluid (item 11, Consumable Materials Chart).

REASSEMBLY

a. Replace packing (23) on floating piston (22) and insert spring (24) and floating piston (22) into rod assembly (15). The floating piston should be engaged with a threaded rod and pulled forward to compress the spring until the piston retaining pin can be inserted.

b. Replace piston (25) on rod assembly (15) and insert pin (21) to hold it in place. Replace packing (26) on piston (25).

c. Insert the rod assembly (15) into the barrel (14). Refer to figure 5-6. Make sure the threaded end of the rod is at the forward end of the barrel. The attachment holes in the barrel are 3 inches aft of the forward end nearer to the front than to the rear.

d. Replace the forward end bearing packings (12) and (13) and insert the bearing (11), scraper (10), and secure with the snap ring (9).

e. With the dampener inserted in a vise, and the open end up, fill the barrel and piston rod with hydraulic fluid. (Refer to Consumable Materials Chart, item 11, in Section II). Work the piston rod up and down, to expel all the air, until bubbles stop appearing in the fluid. Refill the barrel and the piston rod with hydraulic fluid.

f. Place the packings (4) and (5) on the dampener bearing (3) and insert it in the barrel securing it with the scraper ring (2) and the snap ring (1).

g. Engage the forward floating piston (22) with the threaded rod and pull forward. At the same time insert the aft floating piston (19) and spring (18) and pushing down, so that they will follow the fluid down and prevent the entry of air into the rod assembly.

h. Secure the spring and piston with washer (17) and snap ring (16).

i. To check the level of the fluid in the piston rod, note the distance of the floating piston faces from the end of the piston rod at both ends. The distance may be checked with a wire, the depth at the fitting end of the shaft to be not less than 2.63 +.25 -.00 inches and the opposite end not less than 2.13 +.25 -.00 inches. If the figure is more, remove the aft floating piston and install more fluid.

j. Install the nut (7), fitting (6), and lubricator (8).

BRAKE MASTER CYLINDER OVERHAUL (Figure 5-7)

DISASSEMBLY

a. Remove the snap ring (1) and pull the assembled piston out of the brake cylinder (2).

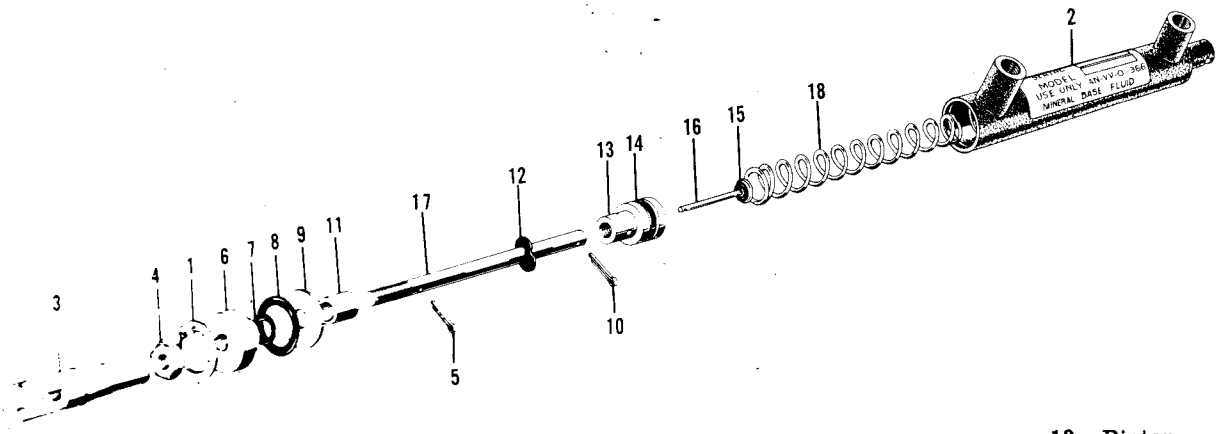
b. Remove the clevis (3) and the thin check nut (4) from the piston rod (17).

c. Remove the cotter pin (5) from the piston rod (17). This will free the piston guide bushing (6), both "O" rings (7) and (8), and the retainer washer (9).

d. Remove the cotter pin (10), thus releasing the collar (11) and freeing the valve spring (12) and piston (13).

e. Remove "O" rings (14) and (15) and free the valve (16) from the piston rod (17).

f. The return spring (18) will fall free of the cylinder



1. Snap Ring
2. Brake Cylinder
3. Clevis
4. Check Nut
5. Cotter Pin
6. Piston Guide Bushing
7. "O" Ring
8. "O" Ring
9. Retainer Washer
10. Cotter Pin
11. Collar
12. Valve Spring
13. Piston
14. "O" Ring
15. "O" Ring
16. Valve
17. Piston Rod
18. Return Spring

Figure 5-7. Brake Master Cylinder.

when the assembled piston has been removed.

CLEANING, REPAIR, AND REASSEMBLY

Clean all parts with cleaning solvent (item 13, Consumable Materials Chart). Check all parts for cracks, scratches, distortion, and wear. Replace all washers and O" rings at reassembly. Reassemble in the reverse of the above stated procedure. Lubricate all parts with hydraulic fluid (item 11, Consumable Materials Chart).

ELEVATOR TAB ACTUATOR OVERHAUL (Figure 5-8)

DISASSEMBLY

a. Remove lubricator fitting (1), retainer pin spring (2), and the retainer pin (3). Screw out the actuator screw (4).

b. Remove the bolts holding the actuator housing (5) to the actuator bracket assembly (6) and remove the shim (7).

c. Take out the retainer ring (8), and remove the seals (9) and bearing (10) from the bushing (11). Bushing (11) is pressed into bracket (6). Do not remove it except for replacement.

d. Remove the drum assembly and the actuator gear (12) from the actuator housing (5). Drum (13) and gear (14) are pressed onto bushing (15). Do not remove them except for replacement.

e. Bearings (16) and (17) are press fit oilite bearings and should be removed only when replaced.

f. To remove the cable (19) from the drum (13), unwind the cable entirely and remove the cable lock pin (18).

NOTE

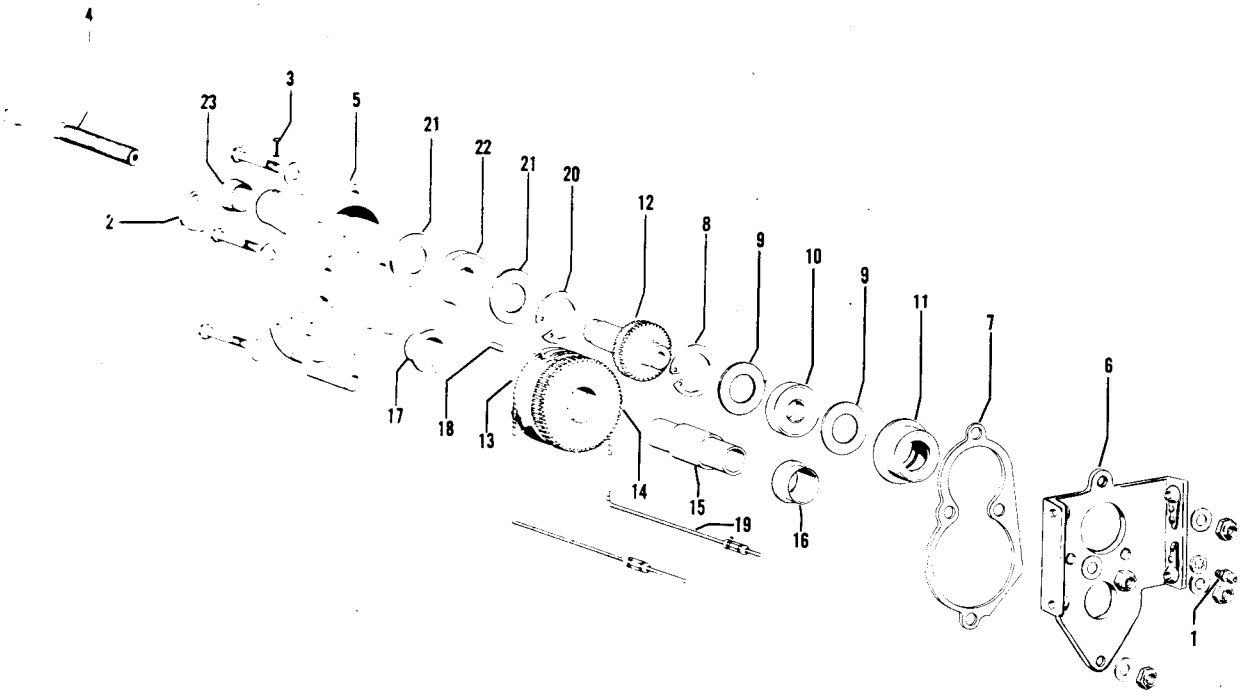
When removing the cable from the drum, note the number of turns and the direction each end is wound to assure correct reinstallation. The cable is secured to the drum at the exact center of the cable.

g. Remove the retainer ring (20), seals (21), and bearing (22) from the actuator housing (5). Remove bearing (23).

CLEANING, REPAIR, AND REASSEMBLY

Clean all parts with cleaning solvent (*Item 13). Check all parts for cracks, scratches, scoring, or distortion. Check parts for conformance with allowable tolerances. Pack bearings (10) and (22) with lubrication grease (*Item 7) before installing. Bearings (16) and (17) are oilite bearings which are pressed in. However, if they are cleaned, they should be lubricated with a light oil (*Item 4). Reassemble the actuator in the reverse order of the above disassembly procedure, shimming to provide a maximum end clearance of .002 inch for the spur gear. Fill the screw assembly with lubrication grease (*Item 7) through the lubricator fitting (1).

*Refer to Consumable Materials Chart in Section II for specification.



1. Lubricator Fittings
2. Retainer Pin Spring
3. Actuator Screw Retainer Pin
4. Actuator Screw
5. Actuator Housing
6. Actuator Bracket Assembly
7. Actuator Shim
8. Retainer Ring
9. Actuator Bearing Seals
10. Bearing
11. Bushing
12. Actuator Spur Gear
13. Tab Actuator Drum
14. Actuator Gear
15. Actuator Drum Shaft
16. Bearing
17. Bearing
18. Cable Lock Pin
19. Rudder Tab Cable
20. Retainer Ring
21. Actuator Bearing Seals
22. Bearing
23. Bearing

Figure 5-8. Elevator Tab Actuator

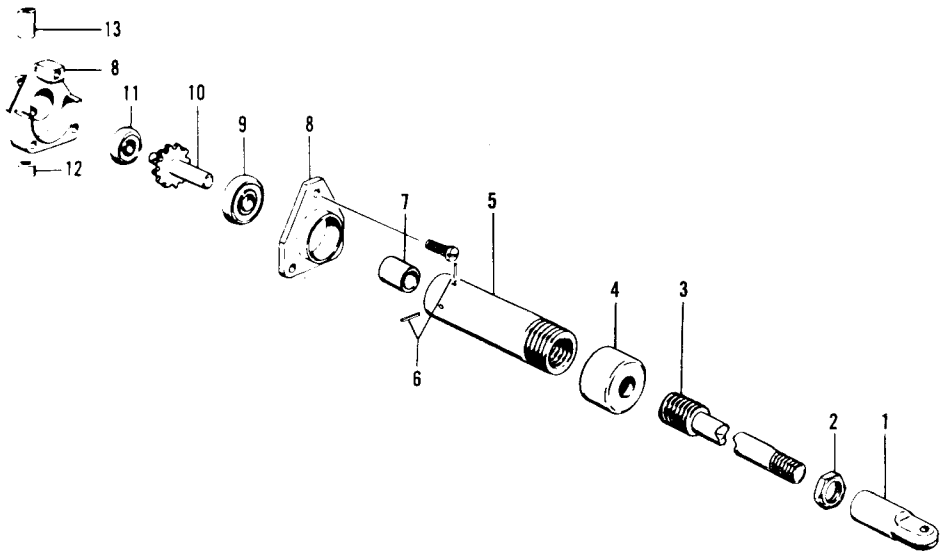
WEAR TOLERANCES

Dimensions listed below will aid in determining the extent of wear.

Bracket (6)		
Mounting surface for bearing (16) flat within T.I.R. of		**.003 inch**
Mounting bore for bushing (11)	**Maximum I.D.**	**1.311 inch**
Bushing (11)	**Minimum O.D.**	**1.311 inch**
	Maximum I.D.	**1.062 inch**

WEAR TOLERANCES (Cont.)

Housing (5)		
Mounting bore for bearing (17)	Maximum I.D.	.8145 inch
Mounting bore for bearing (22)	Maximum I.D.	1.063 inch
Mounting bore for bearing (23) .. rudder only	Maximum I.D.	.6895 inch
Bearing (23) ..... rudder only	Maximum I.D.	.502 inch
Bearings (22) and (23) Concentricity of Bores Within T.I.R. of		.002 inch
Bearing Seals (9) and (21)	Minimum O.D.	1.056 inch
	Maximum I.D.	.785 inch
Eccentricity T.I.R. less than		.002 inch
Surface flatness within T.I.R. of		.002 inch
Spur Gear (12)		
Shaft mounting surface diameter	Minimum O.D.	.6230 inch
Total runout within T.I.R. of		.003 inch
Gear (14)		
Bore	Maximum I.D.	.688 inch
Total runout within T.I.R. of		.003 inch
Shaft (15)		
Bearing surface diameter	Minimum O.D.	.617 inch
Gear mounting surface diameter	Minimum O.D.	.688 inch



1. Check Nut
2. Actuator Rod End
3. Actuator Screw
4. Retaining Nut
5. Actuator Screw Tube
6. Roll Pins
7. Bushing
8. Sprocket Housing
9. Bearing
10. Sprocket Assembly
11. Bearing
12. Bushing
13. Bushing

Figure 5-8A. Rudder Trim Tab Actuator - Model 80

RUDDER TRIM TAB ACTUATOR OVERHAUL

Except for a slight difference in outward appearance, the rudder tab actuator on the Model 65 is the same as the elevator tab actuator and the elevator tab actuator overhaul procedures apply. The following procedure and Figure 5-8A are applicable to the Model 80 rudder tab actuator.

DISASSEMBLY - Model 80 (Figure 5-8A)

a. Loosen the check nut (1) and unscrew the actuator rod end 2 from the actuator screw (3).

b. Unscrew the retaining nut (4) and remove the actuator screw (3) from the actuator screw tube (5).

c. Remove the retaining screws from the sprocket housings (8), separate the housings and remove the sprocket (10).

d. Remove the roll pins (6) and remove the sprocket from the actuator screw tube (5).

e. Remove the bearings (9 and 11) and bushings (7, 12 and 13).

CLEANING, REPAIR, AND REASSEMBLY - Model 80

Clean all parts with solvent (Item 13, Consumable Materials Chart) and inspect for cracks, corrosion, distortion, and excessive wear. Replace bushings and any other parts showing evidence of wear. Lubricate all parts with hydraulic fluid (Item 11, Consumable Materials Chart) prior to reassembly. Reassemble in reverse of the above procedure.

WEAR TOLERANCES

Model 80 rudder trim tab actuator dimensions are listed below to aid in determining the extent of wear.

Retainer Nut 4

Bearing bore for actuator screw (3).	Maximum I. D.	.3755

WEAR TOLERANCES (Continued)

Actuator Screw (3)		
Shank surface	Minimum O. D.	.3735
Actuator Screw Tube (5)		
Mounting bore for bushing (6)	Maximum I. D.	.563
Bushing (7)	Maximum I. D.	.380
	Minimum O. D.	.5025
Sprocket Housing (8)		
Mounting bore for bearing (9)	Maximum I. D.	.8743
Mounting bore for bearing (11)	Maximum I. D.	.6243
Mounting bore for bushing (12)	Maximum I. D.	.1905
Mounting bore for bushing (13)	Maximum I. D.	.3125
Bushing (12)	Maximum I. D.	.189
	Minimum O. D.	.2490
Concentricity of bore within T. I. R. of		.004
Bushing (13)	Maximum I. D.	.2505
Sprocket Assembly (10)	Minimum O. D.	.3715 and .1865

FLAP ACTUATOR OVERHAUL (Figure 5-9)

DISASSEMBLY

a. Remove the 90 degree drive assembly (1) by loosening the nut.

b. Remove the retainer ring (2) and pull the adapter (3) from the housing (8).

c. Remove the two nuts (4) and (5) from the plugs (14) and slip the spring (6) clear. With the actuator housing in a vise, tap the plug (14) lightly on the end with a leather mallet to free the piston (7) from the housing (8).

d. Spacer (9), or spacers, grease seal (10), and bearing (11) can then be removed.

e. Remove screw (12) from piston. Slip bearing (13) from the screw (12).

f. Do not remove the plug (14) from the piston (7).

g. Remove "O" ring (15) from housing (8).

CLEANING AND REPAIR

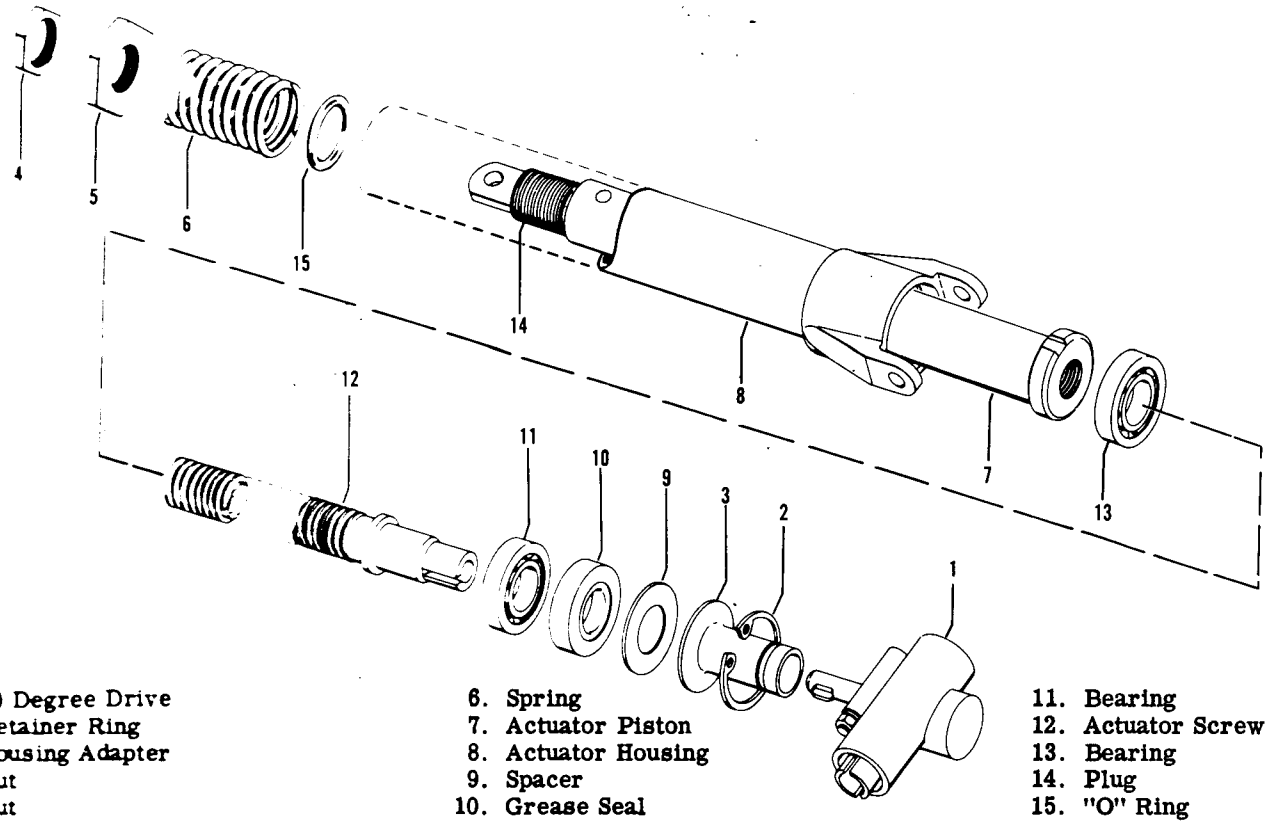
Clean all parts with cleaning solvent (Item 13, Consumable Materials Chart). Inspect all parts for cracks, corrosion, scoring, or excessive wear. Pack all bearings and the 90 degree flap drive assembly with lubricating grease (Item 7, Consumable Materials Chart).

REASSEMBLY

Reassemble the actuator in the reverse of the above disassembly procedure except as noted. Install the piston (7), screw (12), bearings (13) and (11), and the grease seal (10) and apply approximately 1000 lbs. pressure against the grease seal and bearings. Install the spacers (9), adapter (3), and retainer ring (2). Then apply 1000 lbs. reverse pressure to seat the parts against the retainer ring.

CAUTION

When installing the 90 degree flap drive (1) into the adapter make sure it fits flush against the adapter. Damage to the casting will result if the contour of the pin does not fit the contour of the adapter.



1. 90 Degree Drive
2. Retainer Ring
3. Housing Adapter
4. Nut
5. Nut
6. Spring
7. Actuator Piston
8. Actuator Housing
9. Spacer
10. Grease Seal
11. Bearing
12. Actuator Screw
13. Bearing
14. Plug
15. "O" Ring

Figure 5-9. Flap Actuator

FLAP MOTOR GEAR BOX OVERHAUL (Figure 5-10)

DISASSEMBLY

a. Remove the attaching hardware and detach the gear box cover (2) from the gear box (1).

b. Remove bushing (3) from cover (2).

c. Remove roll pins (4) and (5) and pull out the inboard drive shaft (6) and the outboard drive shaft (7).

d. The inboard flap gear (8) and the outboard flap gear (9) and washers (10), (11), and (12) can then be removed.

e. Remove the gear box bearings (13).

f. Remove bearing (14), washer (15), and spacer (16), worm gear (17), spacers (18), worm gear shaft (19), washer (20), washer (21), and bearing (22).

CLEANING, REPAIR, AND REASSEMBLY

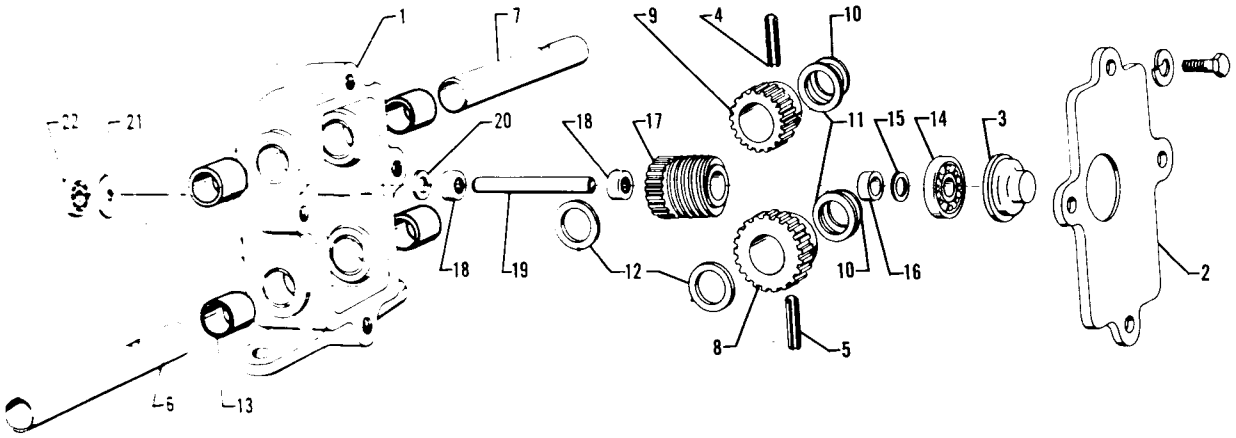
Clean all parts with cleaning solvent (item 13, Consumable Materials Chart). Check all parts for cracks, scoring, burrs, or other defects. Check parts for conformance with allowable tolerances listed in the Wear Tolerance Chart. Pack bearings and gear box with lubricating grease (item 7, Consumable Materials Chart). Reassemble the gear box in the reverse order of the above disassembly procedure. To replace the flap drive motor brushes refer to Section III for replacement procedure.

WEAR TOLERANCES

Gear Box Assembly (1)		
Bore for bearing (13)	Maximum I.D.	.502 inch
Bore for bearing (22)	Maximum I.D.	.6254 inch
Bearing (13)	Minimum O.D.	.501 inch
	Maximum I.D.	.3755 inch

WEAR TOLERANCES (Cont.)

Drive Shaft (6) and (7)	Minimum O.D.	.3735 inch
Inboard Gear (8)		
Bore	Maximum I.D.	.3735 inch
Diameter	Minimum O.D.	1.375 inch
Concentricity within T.I.R. of		.002 inch
Outboard Gear (9)		
Bore	Maximum I.D.	.3755 inch
Diameter	Minimum O.D.	1.123 inch
Concentricity within T.I.R. of		.002 inch
Gear Box Cover Assembly (2)		
Bore for bushing (3)	Maximum I.D.	.875 inch and 1.020 inch
Bushing (3)	Minimum O.D.	.875 inch and 1.000 inch
	Maximum I.D.	.190 inch and .7504 inch
Bushing (5) Concentricity of Diameters Within T.I.R. of		.001 inch



1. Flap Drive Gear Box
2. Gear Box Cover
3. Bushing
4. Roll Pin
5. Roll Pin
6. Inboard Drive Shaft
7. Outboard Drive Shaft
8. Inboard Flap Gear
9. Outboard Flap Gear
10. Washer
11. Washer
12. Washer
13. Gear Box Bearings
14. Bearing
15. Washer
16. Spacer
17. Worm Gear
18. Spacer
19. Worm Gear Shaft
20. Washer
21. Washer
22. Bearing

Figure 5-10. Flap Motor Gear Box.

AILERON TRIM TAB ACTUATOR OVERHAUL (Figure 5-11)

DISASSEMBLY

a. Remove lubricator fitting (1) from actuator screw (4).

b. Remove key retainer spring (2) and roll pin (3). Remove the actuator screw (4) in a clockwise direction.

c. Remove actuator bearing (5) from actuator cap (7) only if it is to be replaced.

d. Separate the actuator housing (6) from the actuator cap (7) by removing the attaching screws.

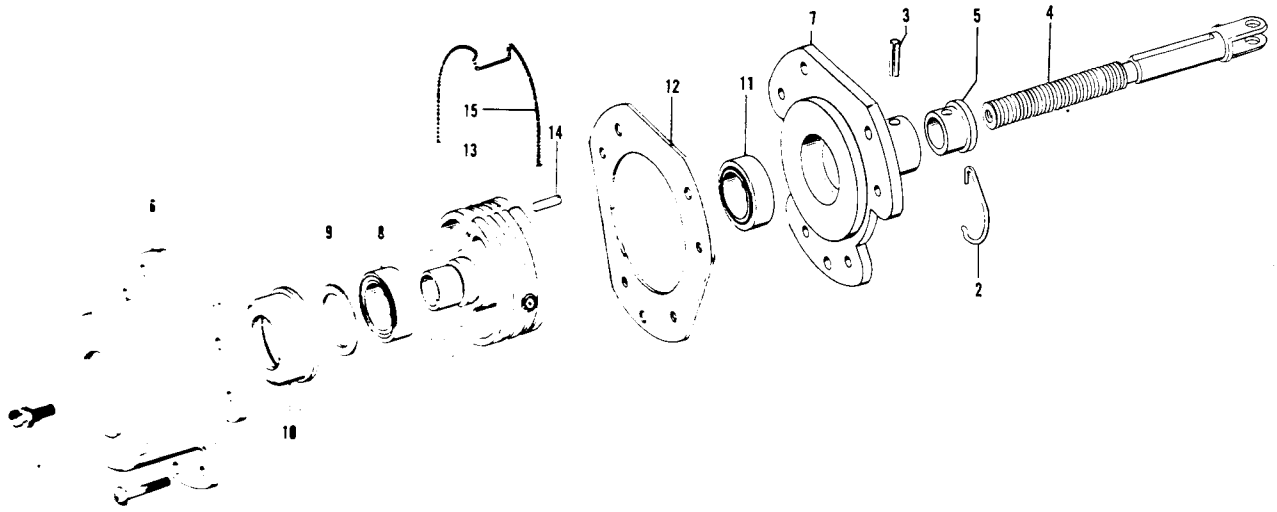
e. Remove the actuator housing bearing (8) and washer (9) from the actuator housing. The bushing (10) may be pressed out only if it is to be replaced.

f. Remove the bearing (11) and the actuator shim (12) from the actuator cap.

g. To remove the cable (15) from the aileron tab drum assembly (13), unwind each end of the cable entirely and remove the cable lock pin (14). This will allow the cable to be removed without being damaged.

NOTE

When removing the cable from the drum, it is important to remember that the end which is routed off the top of the drum has right hand threads, and the end which is routed off the bottom has left hand threads. Therefore, the way the cable is wound on the drum and the number of turns will affect the proper tab movement. The cable is secured to the drum at the exact center of the cable.



1. Lubricator Fitting
2. Key Retainer Spring
3. Roll Pin
4. Actuator Screw
5. Actuator Bearing
6. Actuator Housing
7. Actuator Cap
8. Actuator Housing Bearing
9. Washer
10. Actuator Housing Bushing
11. Actuator Cap Bearing
12. Actuator Shim
13. Aileron Tab Drum Assembly
14. Cable Lock Pin
15. Cable

Figure 5-11. Aileron Trim Tab Actuator.

CLEANING, REPAIR, AND REASSEMBLY

Clean all parts with cleaning solvent (*Item 13) and inspect for cracks and wear. Check tolerances of all parts listed below. Before reassembling, replace all "O" rings and pack all bearings with lubricating grease (*Item 7) except the oilite bearing (5). Lubricate it with a fine oil (*Item 4). Reassemble the actuator in the reverse of the above disassembly procedure. Lubricate the actuator screw (4), with lubricating grease (*Item 7) through the lubrication fitting (1).

*Refer to Consumable Materials Chart in Section II for specification.

WEAR TOLERANCES

Tolerances listed below will aid in determining the extent of wear.

Actuator Cap (7)		
Mounting bore for bearing (5)	Maximum I.D.	1.311 inch
Bushing (10)	Minimum O.D.	1.311 inch
	Maximum I.D.	1.062 inch

MINOR REPAIR OF FUEL CELLS

No damaged area larger than two inches may be repaired. Cells with damage on the radius or in the fitting area must be returned to the manufacturer for repairs. Lesser damage may be repaired with U.S. Rubber Company repair set US538N, applying a patch to each side of the cell wall as follows:

a. Cut a piece of synthetic rubber coated fabric (U.S. Rubber 3136 outside repair material) large enough to exceed damaged area by at least two inches in all directions. Buff lightly and thoroughly with No. "O" sandpaper and wash with methyl ethyl ketone (U.S. Rubber Company 3339 solution) to remove buffing dust.

b. Cement buffed side of patch with two coats of cement (Minnesota Mining and Manufacturing Co., EC-678S); allow each to dry 10 to 15 minutes.

c. Buff and clean outside of cell area to be patched as in step (a).

d. Apply two coats of cement to buffed area, allowing each coat to dry 10 to 15 minutes.

e. Freshen cemented areas of patch and cell with methyl ethyl ketone.

f. While still "tacky," apply one edge of patch to cell. Holding remainder of patch away from cell, roll or press down from a half inch to an inch of patch at a time with roller or blunt instrument, being careful not to trap air between patch and cell.

g. Apply one seal coat of cement approximately one inch wide over entire edge of patch.

h. After outside patch has cured for a minimum of six hours, pull damaged area through the large fitting opening, if possible, to make application of the inside patch easier.

i. Cut a piece of Buna N Nylon sandwich material (U.S. Rubber Company 5063) the same size as the outside patch. The side opposite the red fabric side will be cemented.

j. Buff and clean the mating areas of patch and cell as in step (a). and apply two coats of cement to each, allowing each coat to dry 10 to 15 minutes.

k. Freshen cemented areas with methyl ethyl ketone and apply patch as in step (f).

l. Remove red fabric from patch by moistening with methyl ethyl ketone.

m. Apply two seal coats of cement approximately 1 inch wide over edge of patch, allowing the first to dry 15 minutes and the second coat two hours or more so that the patch will not stick to other areas of the cell.

n. After the cell has been reinstalled in the airplane, test for leakage by completely filling with fuel. If no leakage is indicated after 30 minutes, the cell is ready for service.

DE-ICER REPAIR (TEMPORARY)

If it is necessary to make any repairs to the boot, they should be made with the material supplied by Goodrich for de-icer repair. Cold patch repairs are satisfactory for repairing all small cuts or breaks in the rubber less than 3/4 inch. If damage is across the direction of stretch, the repair should be made with the rubberized fabric provided for this purpose.

NOTE

At no time should an airplane be flown with unrepaired damage to the de-icer rubber parts.

If damage to the de-icer is extensive, the part should

be replaced and the damaged boot returned to B. F. Goodrich Company, Akron, Ohio, for vulcanized repair. In such cases, a temporary repair may be made, using great care to assure a good cement bond and using rubberized fabric for the repair. Proceed as follows:

a. Clean surface in the vicinity of damage with soap and water, and allow to dry.

b. Determine size of patch required and select a template or buffing shield of corresponding size.

c. Place shield over hole so that cutout portion exposes area to be patched, and retain shield in place throughout the following operation:

1. Rub with cloth soaked in benzol to soften and remove Prenite-Graphite surface. Use care so that the cut or tear does not spread.

2. Roughen surface with wire buffer.

3. Smooth out with emery buffer so that surface has been removed to a depth of approximately .003 inch.

4. Wash with benzol and allow to dry.

5. Brush on one coat of EC1403 cement (product of Minnesota Mining & Manufacturing Company, St. Paul, Minnesota) and allow to dry.

d. Keep tacky surface of patch clean after removing fabric and cementing.

1. Allow to dry.

e. Apply patch to de-icer.

1. Stick center or one edge of patch lightly and work remainder down so as not to trap air between surfaces.

2. Roll patch down securely with metal roller or wire buffer.

3. Make certain edges are down firmly, recementing and allowing to dry before before resticking.

f. Allow to stand 10 to 15 minutes, then wipe patch and surrounding area lightly with benzol.

g. Apply coat of Prenite-Graphite cement to restore conductive surface.

SECTION VI

6

Wiring Diagrams

SECTION VI

ELECTRICAL WIRING DIAGRAMS

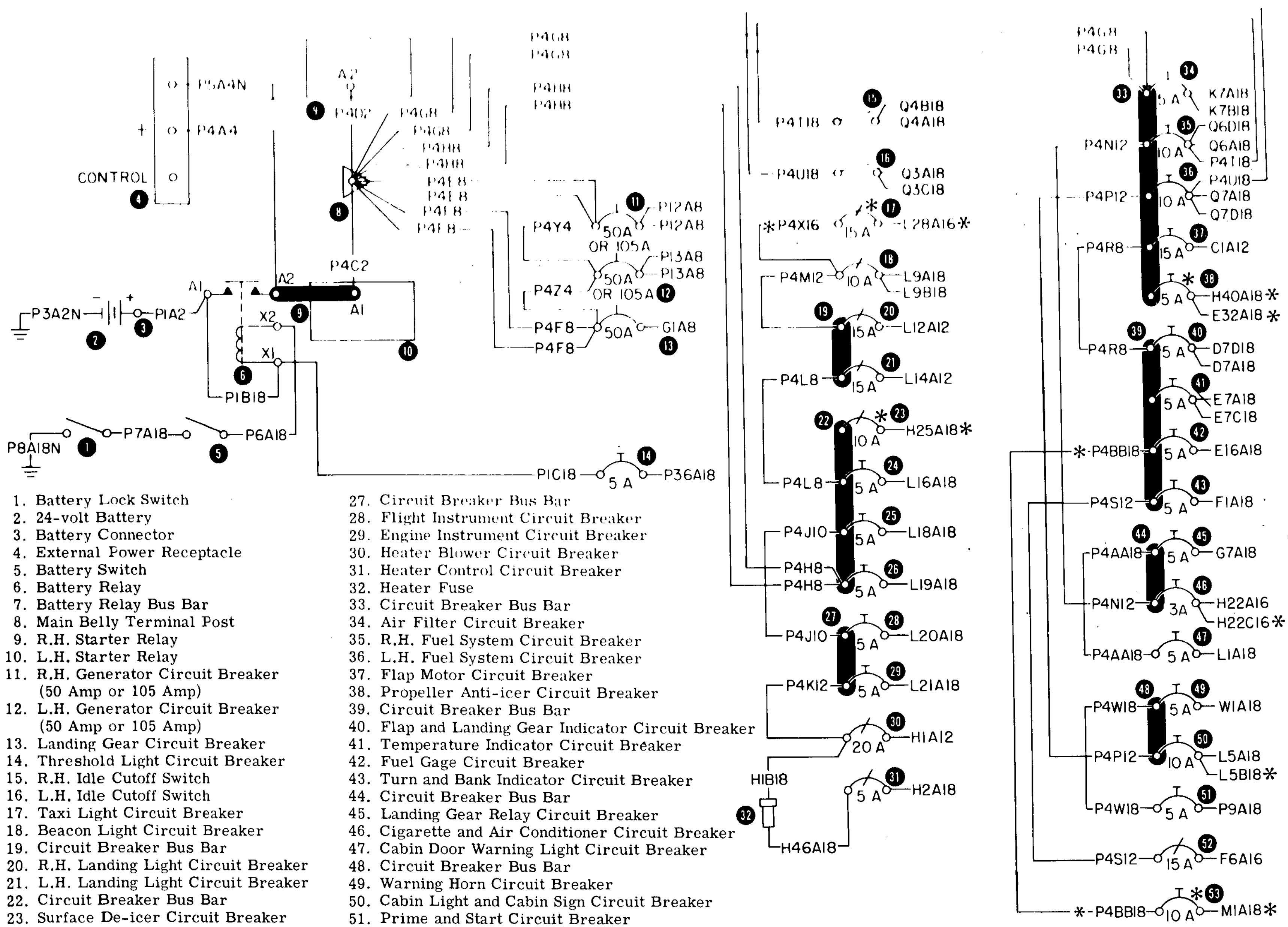
In the individual circuit diagrams on the following pages, each wire is identified by the number which it actually bears in the airplane, so it may be located and traced down. The individual items on each diagram are indexed and the nomenclature for each index is given in the list beneath each diagram. The purpose of the diagrams is to show the terminals, wire numbers and items in a manner which will make the operation of each component easily understandable; wire bundles and harnesses are not indicated and the arrangement of the components in the diagram was chosen for clarity without attempting to indicate their actual location in the airplane. Also, for the sake of simplification, the inter-relationship of the several circuits in most instances is ignored.

Serial effectivity is maintained throughout the diagrams. Model 65 applicability is denoted by the serial prefix LC while LD prefix denotes Model 80 applicability.

Occasional changes in electrical components or circuitry made in production will be incorporated here from time to time as revisions.

LIST OF WIRING DIAGRAMS

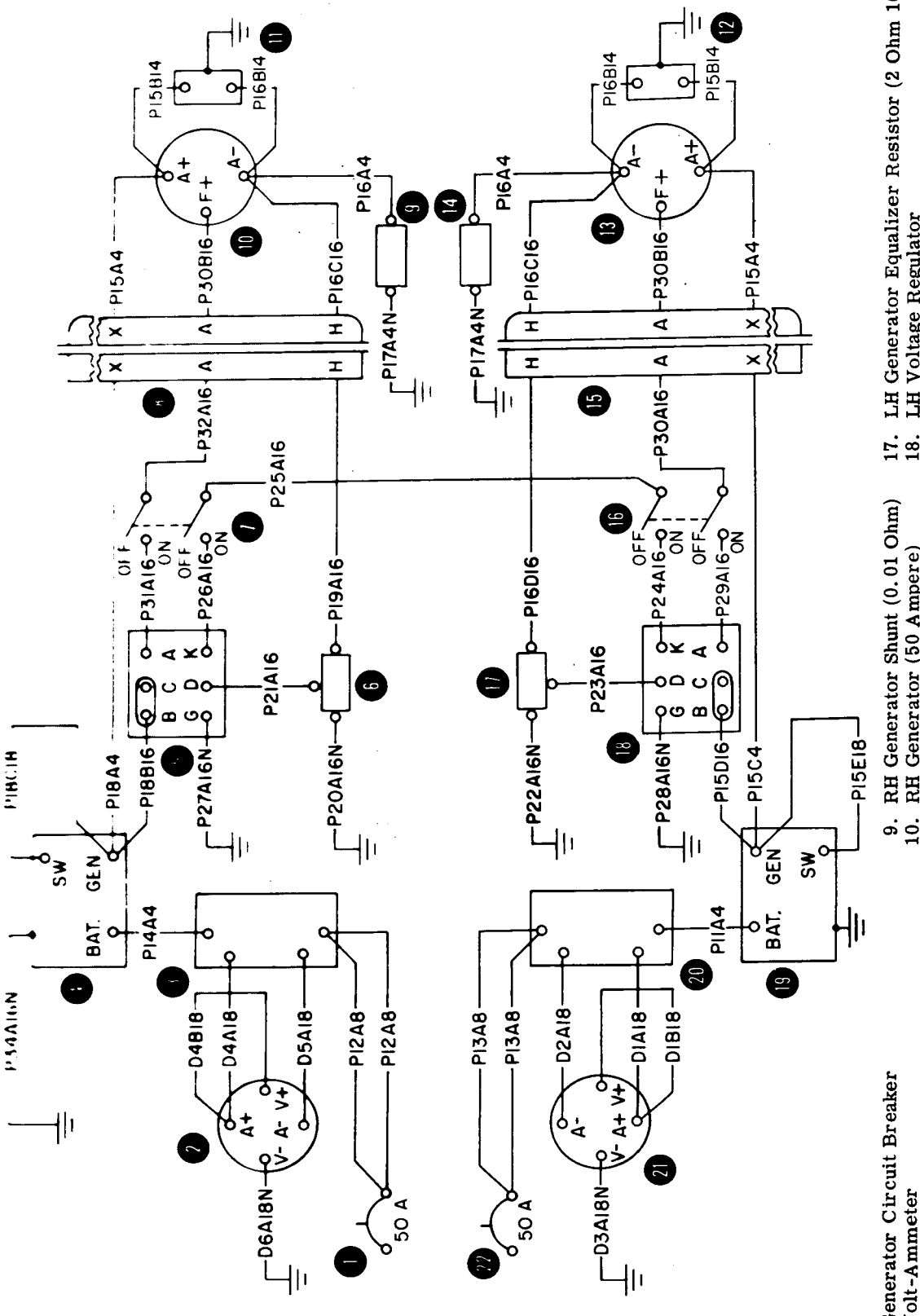
CIRCUIT	Page
Power Distribution	6- 3
Generator (Standard)	6- 4
Alternator-Rectifier (Optional)	6- 4A
Generator (Optional)	6- 5
Starter and Primer (LC-1 through LC-64)	6- 6
Ignition (LC-1 through LC-64)	6- 6
Starter, Primer and Ignition (LC-65 through LC-80)	6- 6A
Starter, Primer and Ignition (LC-81 and after, LD-1 and after)	6- 6B
Air Filter	6- 7
Oil Temperature Indicator	6- 8
Cylinder Head Temperature Indicator	6- 8
Tachometer	6- 9
Fuel Crossfeed Valve	6- 9
Fuel System, LH (LC-1 and after)	6-10
Fuel System, RH (LC-1 and after)	6-10A
Fuel System, LH (LD-1 and after)	6-10B
Fuel System, RH (LD-1 and after)	6-11
Fuel Quantity Indicator	6-12
Stall Warning Indicator	6-12A
Turn and Bank Indicator	6-13
Pitot Heat, RH (Optional)	6-13
Pitot Heat, LH	6-13
Wing Flap Motor	6-14
Wing Flap Indicator	6-14
Landing Gear Position Indicator (LC-1 through LC-80)	6-15
Landing Gear Position Indicator (LC-81 and after, LD-1 and after)	6-16
Landing Gear Warning	6-16A
Landing Gear Motor	6-17
Heater Fuel Control and Igniter	6-17
Heater Temperature Control	6-18
Heater Blower	6-18
Engine Driven Surface De-Icer (Optional)	6-19
Propeller and Windshield Anti-Icer Pump (Optional)	6-20
Propeller and Windshield Anti-Icer Indicator (Optional)	6-20
Windshield Anti-Icer, Independent System (Optional)	6-20A
Wing Ice Light (Optional)	6-20A
Navigation and Taxi Light	6-21
Anti-Collision Light	6-21
Landing Light	6-22
Engine Instrument Light	6-22
Flight Instrument Light	6-23
Fuel and Overhead Light	6-24
Center Panel Light	6-25
Cigarette Lighter	6-26
Cabin Light	6-26
Cabin Warning Sign (Optional)	6-27
Cabin Door Warning Light	6-27
Threshold Light	6-27
Air Conditioner (Optional)	6-28
Windshield Wiper (Optional)	6-28
Jato	6-29
Remote Compass (Optional)	6-30
Induction Air Temperature Gage	6-30



1. Battery Lock Switch
2. 24-volt Battery
3. Battery Connector
4. External Power Receptacle
5. Battery Switch
6. Battery Relay
7. Battery Relay Bus Bar
8. Main Belly Terminal Post
9. R.H. Starter Relay
10. L.H. Starter Relay
11. R.H. Generator Circuit Breaker (50 Amp or 105 Amp)
12. L.H. Generator Circuit Breaker (50 Amp or 105 Amp)
13. Landing Gear Circuit Breaker
14. Threshold Light Circuit Breaker
15. R.H. Idle Cutoff Switch
16. L.H. Idle Cutoff Switch
17. Taxi Light Circuit Breaker
18. Beacon Light Circuit Breaker
19. Circuit Breaker Bus Bar
20. R.H. Landing Light Circuit Breaker
21. L.H. Landing Light Circuit Breaker
22. Circuit Breaker Bus Bar
23. Surface De-icer Circuit Breaker
24. Navigation Light Circuit Breaker
25. Control Panel Light Circuit Breaker
26. Overhead Light Circuit Breaker
27. Circuit Breaker Bus Bar
28. Flight Instrument Circuit Breaker
29. Engine Instrument Circuit Breaker
30. Heater Blower Circuit Breaker
31. Heater Control Circuit Breaker
32. Heater Fuse
33. Circuit Breaker Bus Bar
34. Air Filter Circuit Breaker
35. R.H. Fuel System Circuit Breaker
36. L.H. Fuel System Circuit Breaker
37. Flap Motor Circuit Breaker
38. Propeller Anti-icer Circuit Breaker
39. Circuit Breaker Bus Bar
40. Flap and Landing Gear Indicator Circuit Breaker
41. Temperature Indicator Circuit Breaker
42. Fuel Gage Circuit Breaker
43. Turn and Bank Indicator Circuit Breaker
44. Circuit Breaker Bus Bar
45. Landing Gear Relay Circuit Breaker
46. Cigarette and Air Conditioner Circuit Breaker
47. Cabin Door Warning Light Circuit Breaker
48. Circuit Breaker Bus Bar
49. Warning Horn Circuit Breaker
50. Cabin Light and Cabin Sign Circuit Breaker
51. Prime and Start Circuit Breaker
52. Pitot Heat Circuit Breaker
53. Windshield Wiper Circuit Breaker

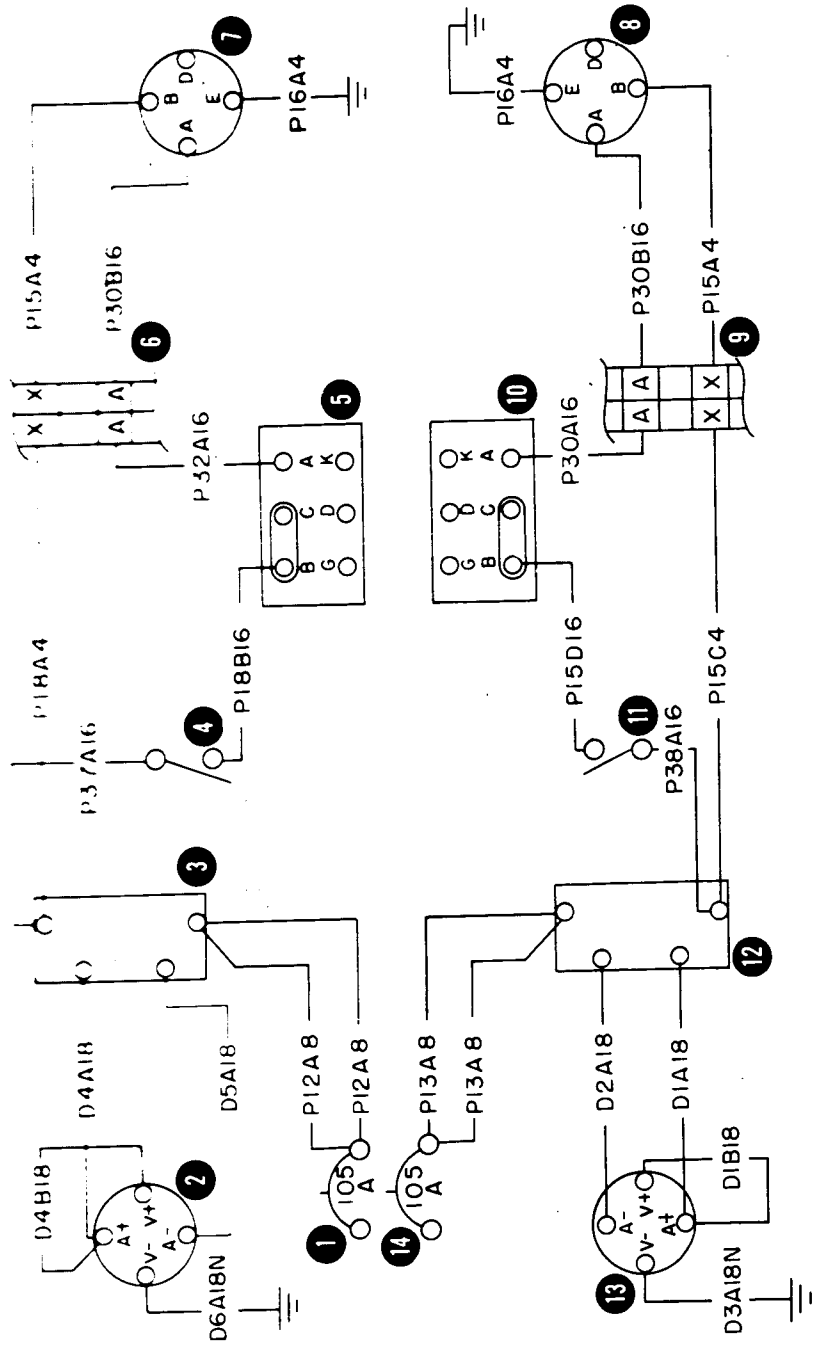
* INSTALLED WITH OPTIONAL EQUIPMENT

Figure 6-1. Power Distribution Circuit



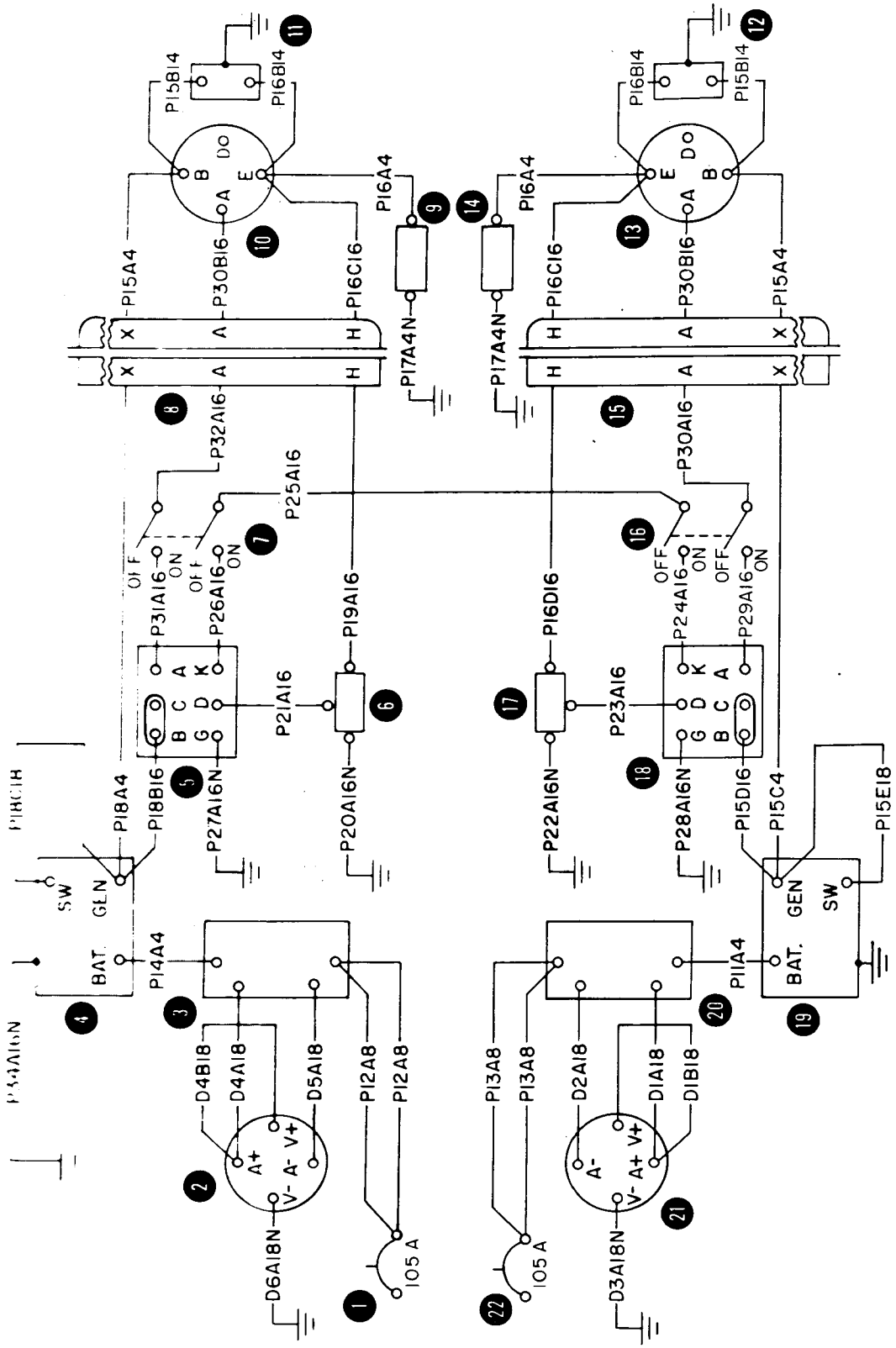
1. RH Generator Circuit Breaker
2. RH Volt-Ammeter
3. RH Ammeter Shunt
4. RH Reverse Current Relay
5. RH Voltage Regulator
6. RH Generator Equalizer Resistor (2 Ohm 10 Watt)
7. RH Generator Switch
8. RH Firewall Connector
9. RH Generator Shunt (0.01 Ohm)
10. RH Generator (50 Ampere)
11. RH Generator Filter
12. LH Generator Filter
13. LH Generator (50 Ampere)
14. LH Generator Shunt (0.01 Ohm)
15. LH Firewall Connector
16. LH Generator Switch
17. LH Generator Equalizer Resistor (2 Ohm 10 Watt)
18. LH Voltage Regulator
19. LH Reverse Current Relay
20. LH Ammeter Shunt
21. LH Volt-Ammeter
22. LH Generator Circuit Breaker

Figure 6-2. Generator Circuit (Standard)



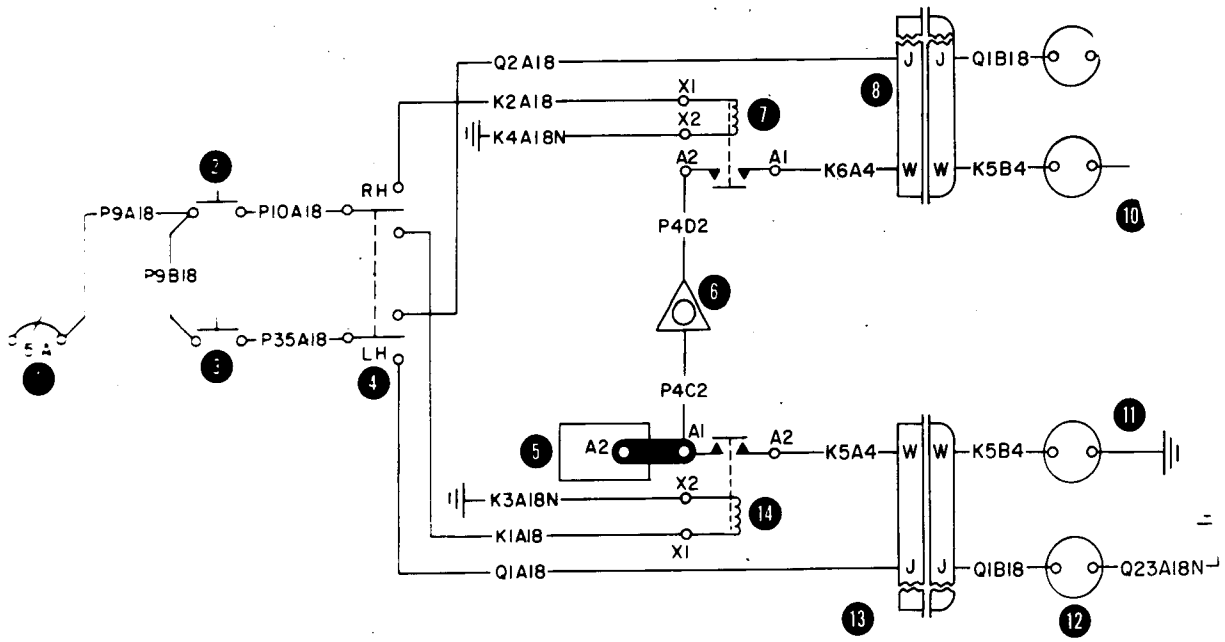
1. RH Alternator-Rectifier Circuit Breaker
2. RH Volt-Ammeter
3. RH Ammeter Shunt
4. RH Alternator-Rectifier Switch
5. RH Voltage Regulator
6. RH Firewall Connector
7. RH Alternator-Rectifier
8. LH Alternator-Rectifier
9. LH Firewall Connector
10. LH Voltage Regulator
11. LH Alternator-Rectifier Switch
12. LH Ammeter Shunt
13. LH Volt Ammeter
14. LH Alternator-Rectifier Circuit Breaker

Figure 6-2A Alternator-Rectifier Circuit (Optional)



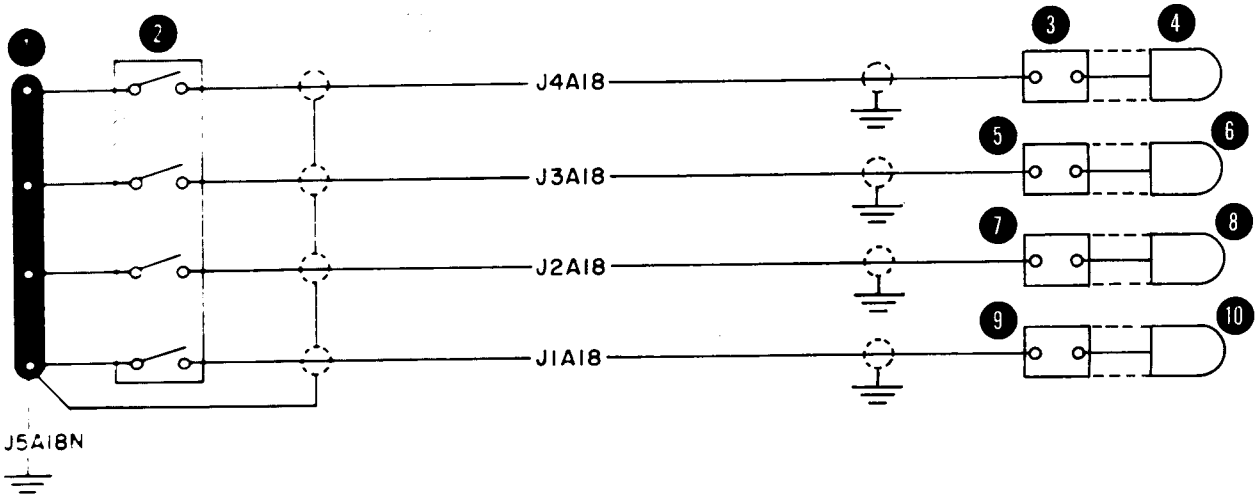
1. RH Generator Circuit Breaker
2. RH Volt-Ammeter
3. RH Ammeter Shunt
4. RH Reverse Current Relay
5. RH Voltage Regulator
6. RH Generator Equalizer Resistor (2 Ohm 10 Watt)
7. RH Generator Switch
8. RH Firewall Connector
9. RH Generator Shunt (0.01 Ohm)
10. RH Generator (100 Ampere)
11. RH Generator Filter
12. LH Generator Filter
13. LH Generator (100 Ampere)
14. LH Generator Shunt (0.01 Ohm)
15. LH Firewall Connector
16. LH Generator Switch
17. LH Generator Equalizer Resistor (2 Ohm 10 Watt)
18. LH Voltage Regulator
19. LH Reverse Current Relay
20. LH Ammeter Shunt
21. LH Volt-Ammeter
22. LH Generator Circuit Breaker

Figure 6-3. Generator Circuit (Optional)



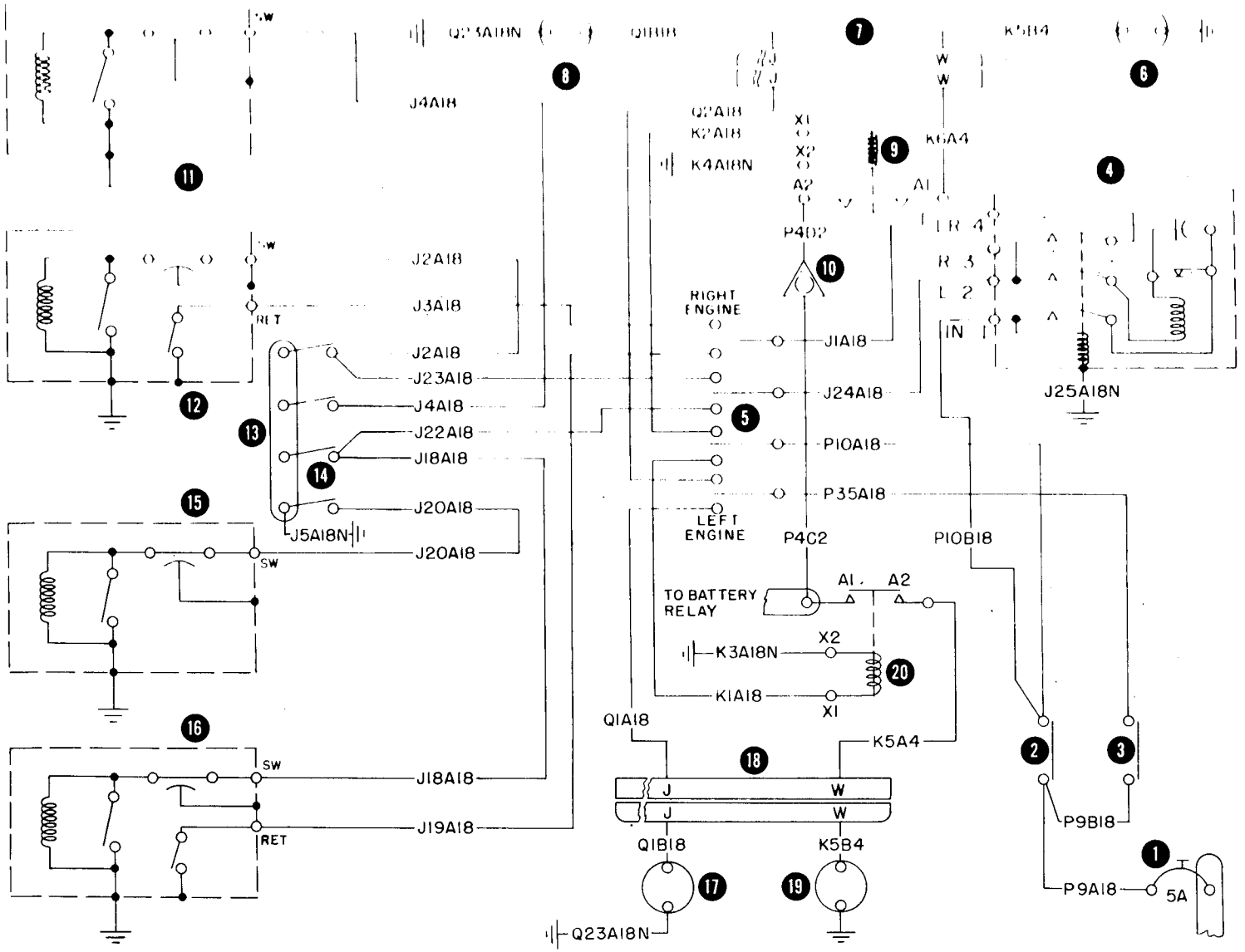
1. Starter and Primer Circuit Breaker
2. Engine Starting Switch
3. Engine Priming Switch
4. Engine Selector Switch
5. Battery Relay
6. Main Belly Terminal Post
7. RH Engine Starting Relay
8. RH Engine Firewall Connector
9. RH Engine Primer
10. RH Engine Starting Motor
11. LH Engine Starting Motor
12. LH Engine Primer
13. LH Engine Firewall Connector
14. LH Engine Starting Relay

Figure 6-4. Starter and Primer Circuit (LC-1 through LC-64)



1. Magneto Switch Bus Bar
2. Magneto Switches
3. RH Engine Right Magneto Filter
4. RH Engine Right Magneto
5. RH Engine Left Magneto Filter
6. RH Engine Left Magneto
7. LH Engine Right Magneto Filter
8. LH Engine Right Magneto
9. LH Engine Left Magneto Filter
10. LH Engine Left Magneto

Figure 6-5. Ignition Circuit (LC-1 through LC-64)



1. Starter and Primer Circuit Breaker
2. Engine Starting Switch
3. Engine Priming Switch
4. Ignition Vibrator
5. Engine Selector Switch
6. RH Engine Starting Motor
7. RH Engine Firewall Connector
8. RH Engine Primer
9. RH Engine Starting Relay
10. Main Belly Terminal Post
11. RH Engine Right Magneto
12. RH Engine Left Magneto
13. Magneto Switch Bus Bar
14. Magneto Switches
15. LH Engine Right Magneto
16. LH Engine Left Magneto
17. LH Engine Primer
18. LH Engine Firewall Connector
19. LH Engine Starting Motor
20. LH Engine Starting Relay

Figure 6-5A Starter, Primer and Ignition Circuit (LC-65 through LC-80)

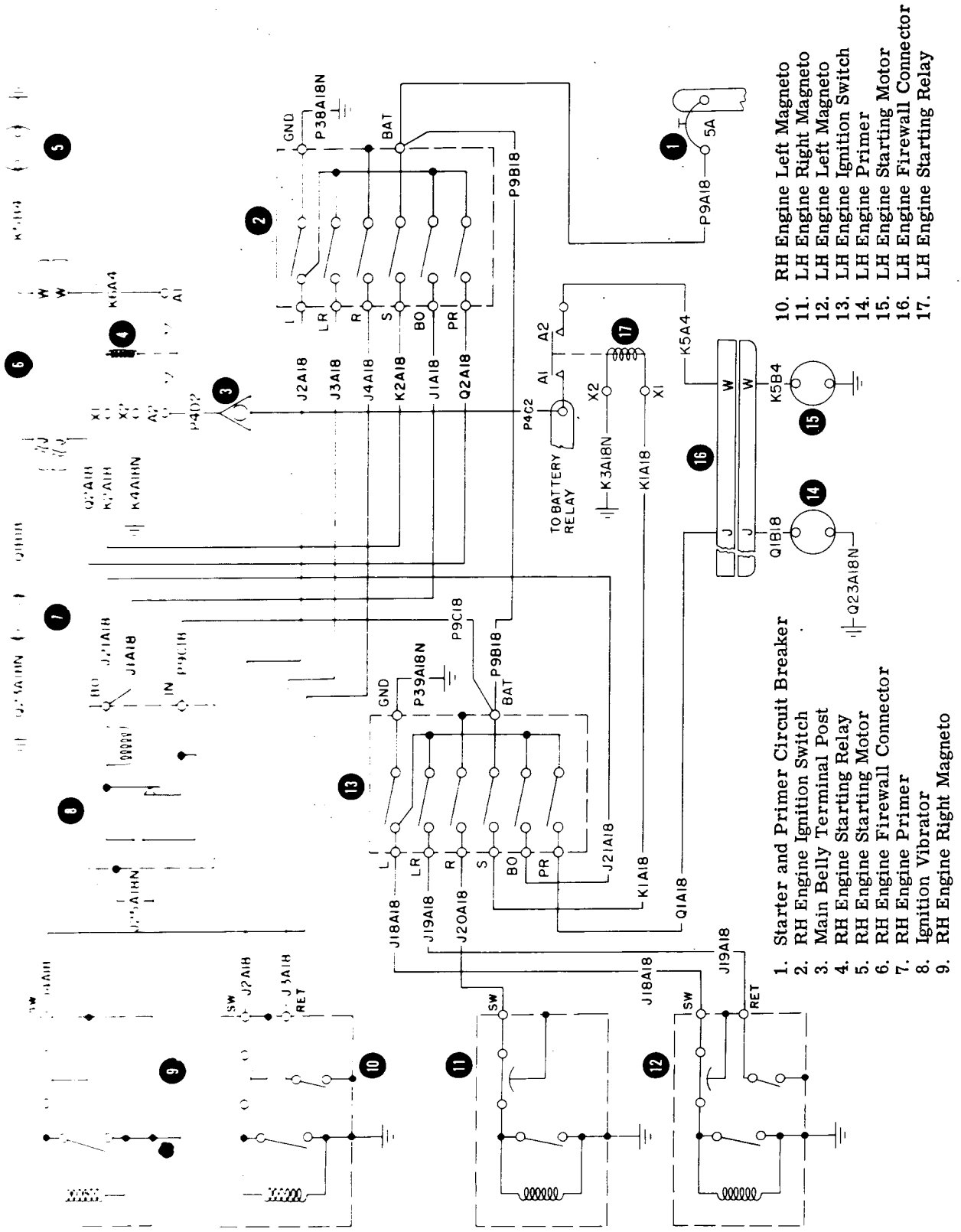
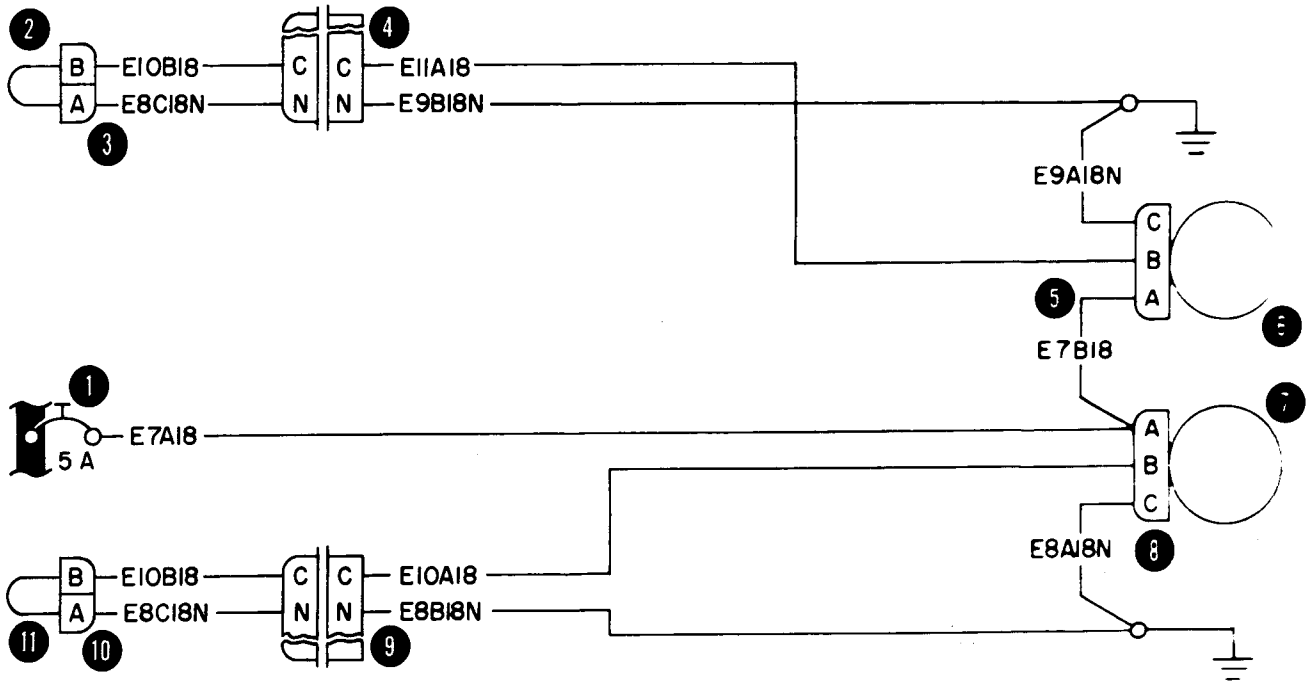
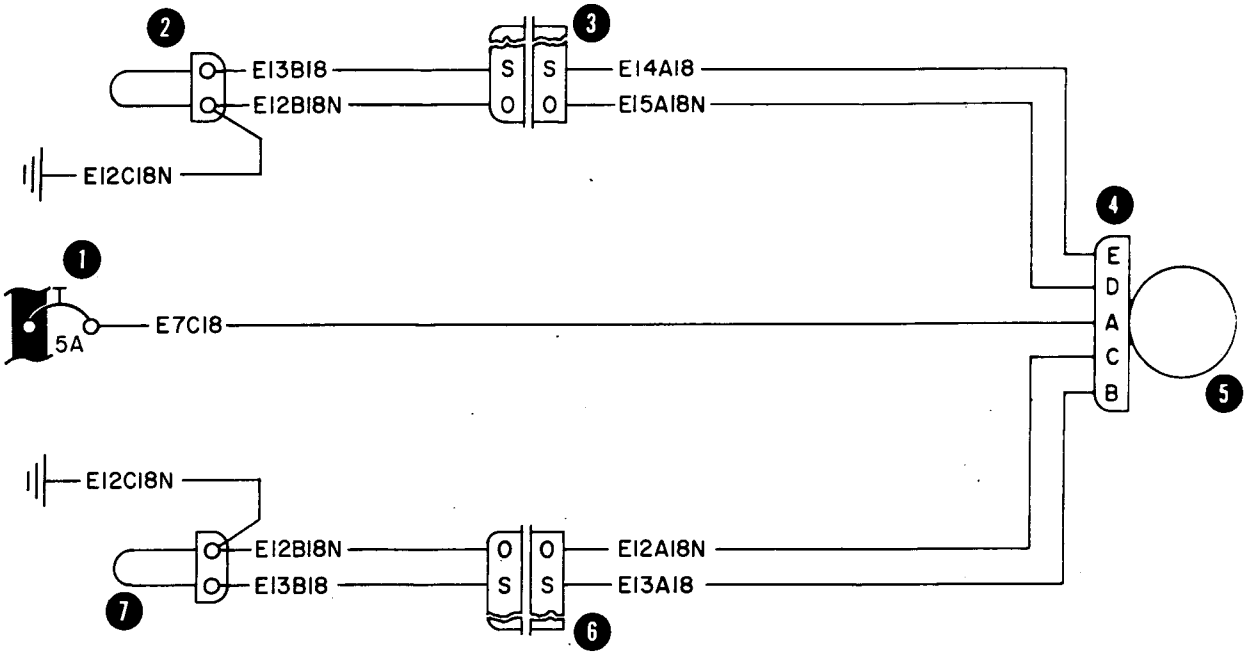


Figure 6-5B. Starter, Primer and Ignition Circuit (LC-81 and After, LD-1 and After)



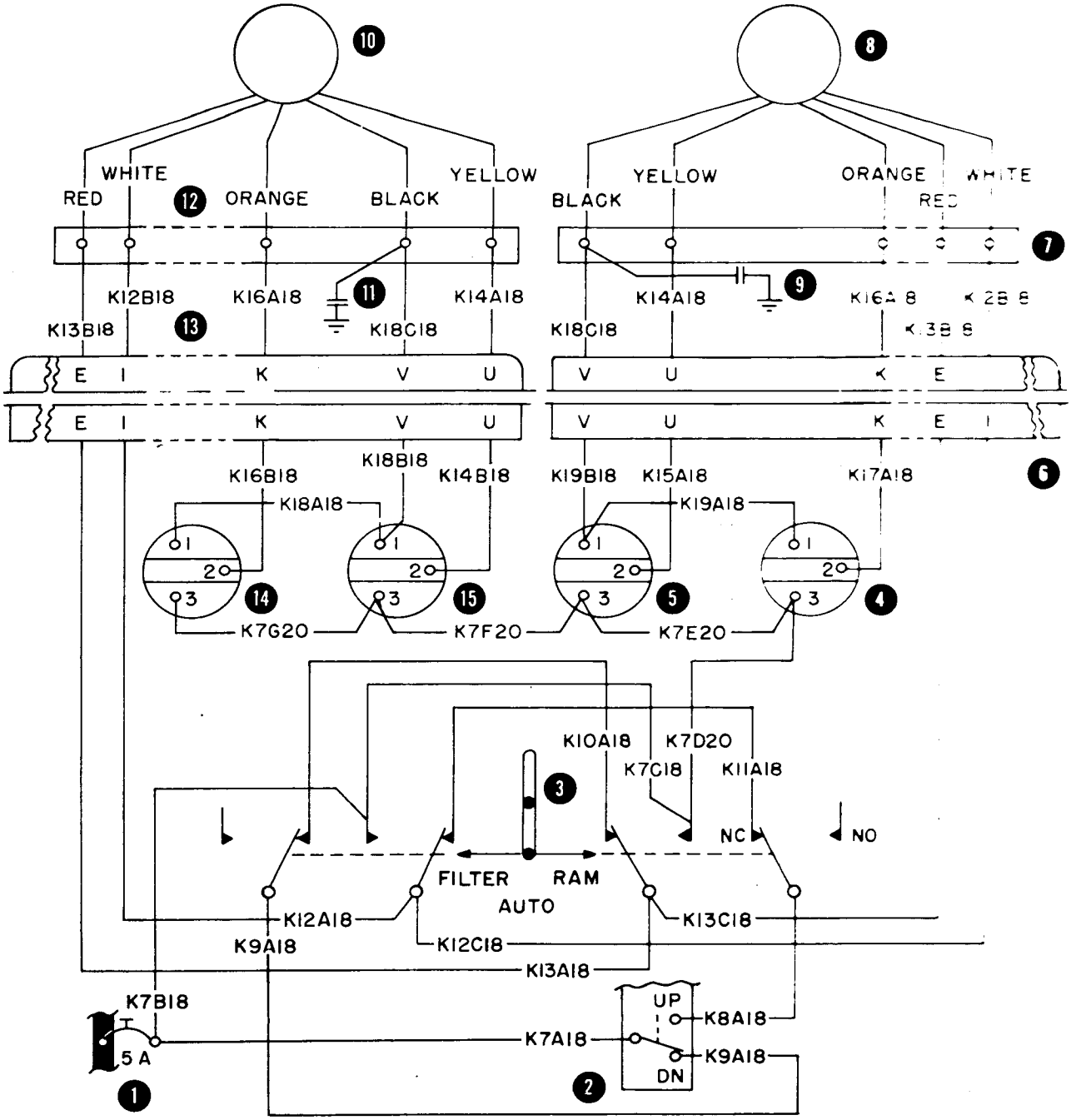
1. Temperature Indicator Circuit Breaker
2. RH Oil Temperature Bulb
3. RH Oil Temperature Bulb Plug
4. RH Engine Firewall Connector
5. RH Oil Temperature Indicator Plug
6. RH Engine Oil Temperature Indicator
7. LH Engine Oil Temperature Indicator
8. LH Oil Temperature Indicator Plug
9. LH Engine Firewall Connector
10. LH Oil Temperature Bulb Plug
11. LH Oil Temperature Bulb

Figure 6-7. Oil Temperature Indicator Circuit



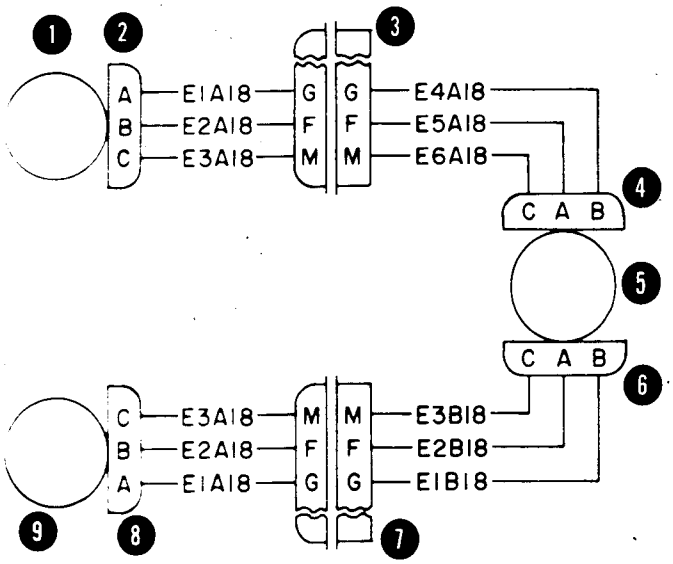
1. Temperature Indicator Circuit Breaker
2. RH Engine Cylinder Head Temperature Transmitter
3. RH Engine Firewall Connector
4. Cylinder Head Temperature Indicator Plug
5. Dual Engine Cylinder Head Temperature Indicator
6. LH Engine Firewall Connector
7. LH Engine Cylinder Head Temperature Transmitter

Figure 6-8. Cylinder Head Temperature Indicator Circuit



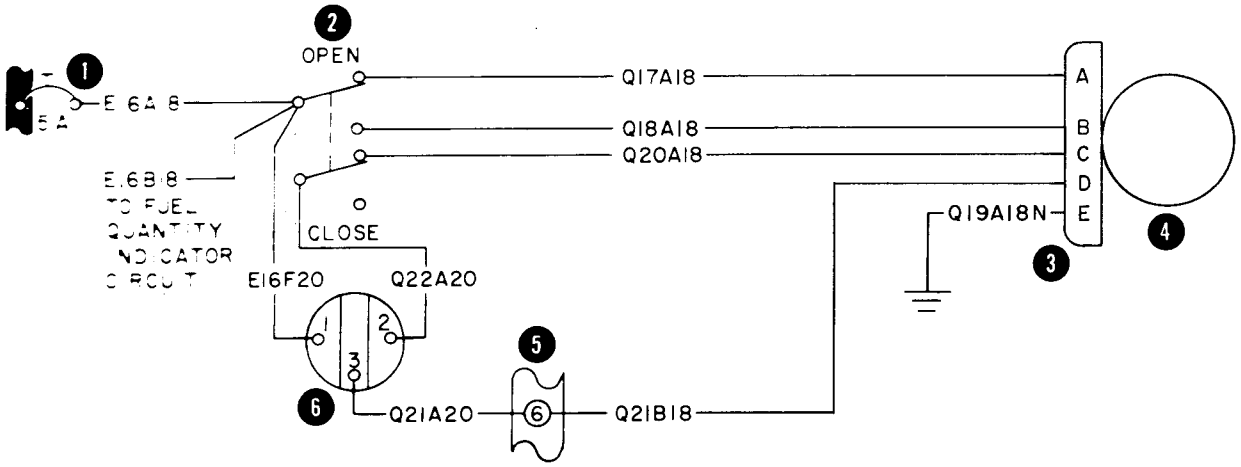
1. Air Filter Circuit Breaker
2. Landing Gear Control Switch
3. Air Filter Control Switch
4. RH Filter Indicator
5. RH Ram Indicator
6. RH Engine Firewall Connector
7. RH Air Blower Motor Terminal Strip
8. RH Air Filter Motor
9. RH Filter Motor Capacitor, .1MFD, 100 VDC
10. LH Air Filter Motor
11. LH Filter Motor Capacitor, .1MFD, 100 VDC
12. LH Air Filter Motor Terminal Strip
13. LH Engine Firewall Connector
14. LH Filter Indicator
15. LH Ram Indicator

Figure 6-6. Air Filter Circuit



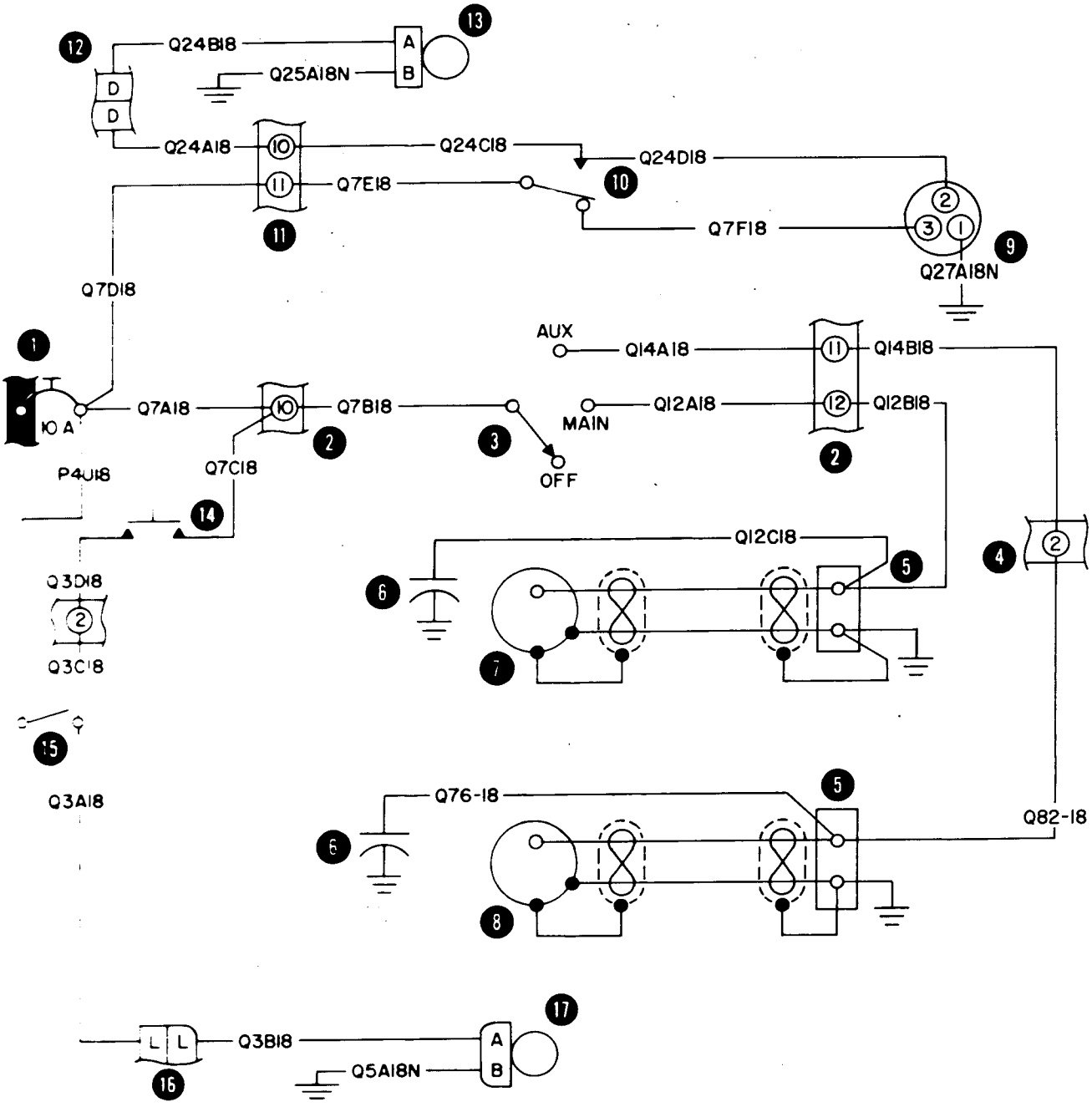
1. RH Engine Tachometer Generator
2. RH Tachometer Generator Plug
3. RH Engine Firewall Connector
4. RH Tachometer Indicator Plug
5. Dual Tachometer Indicator
6. LH Tachometer Indicator Plug
7. LH Engine Firewall Connector
8. LH Tachometer Generator Plug
9. LH Engine Tachometer Generator

Figure 6-9. Tachometer Circuit



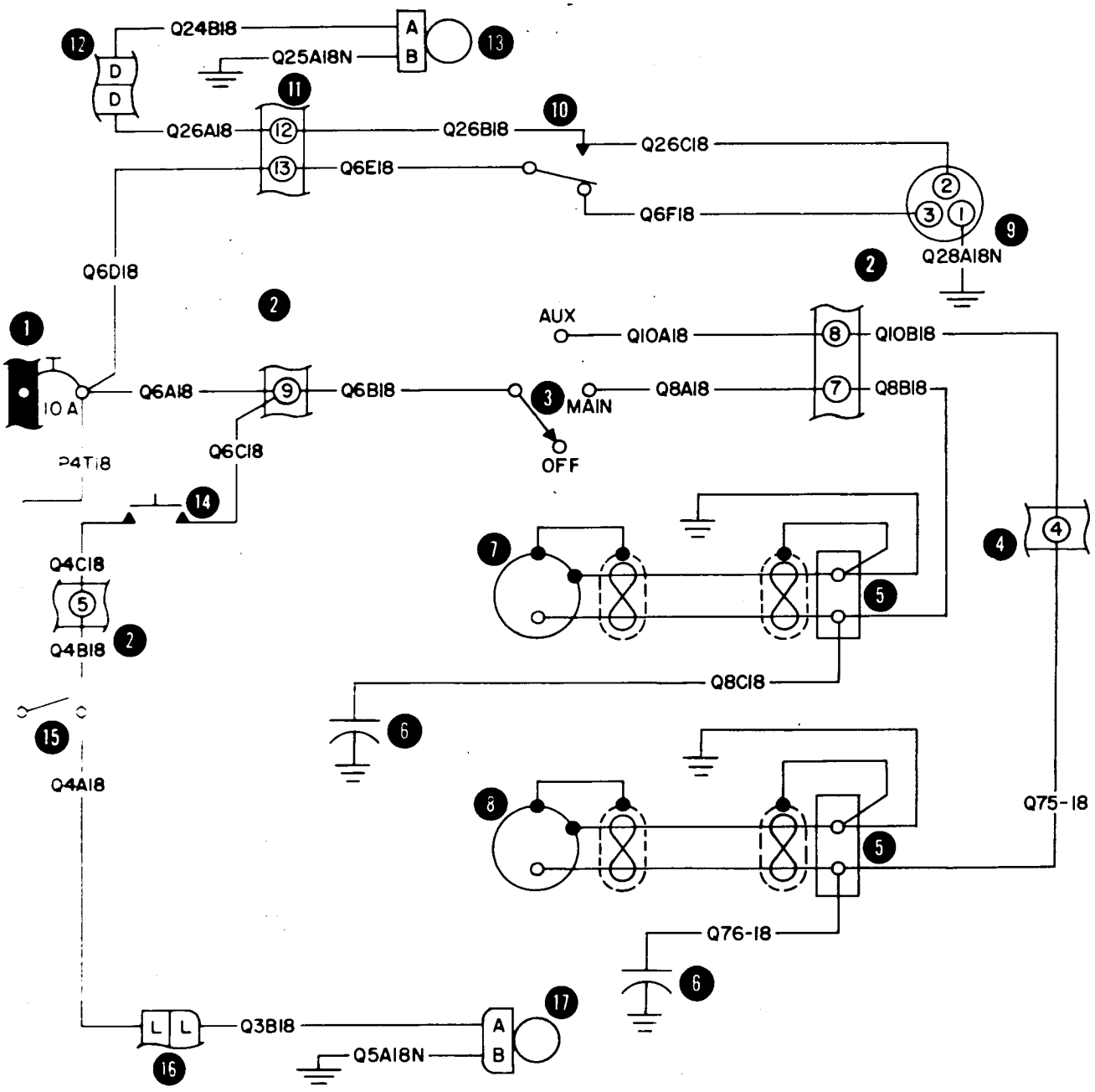
1. Fuel Gage Circuit Breaker
2. Fuel Crossfeed Switch
3. Fuel Crossfeed Valve Plug
4. Fuel Crossfeed Valve
5. Fuel Panel Terminal Strip
6. Fuel Crossfeed Indicator

Figure 6-10. Fuel Crossfeed Valve Circuit



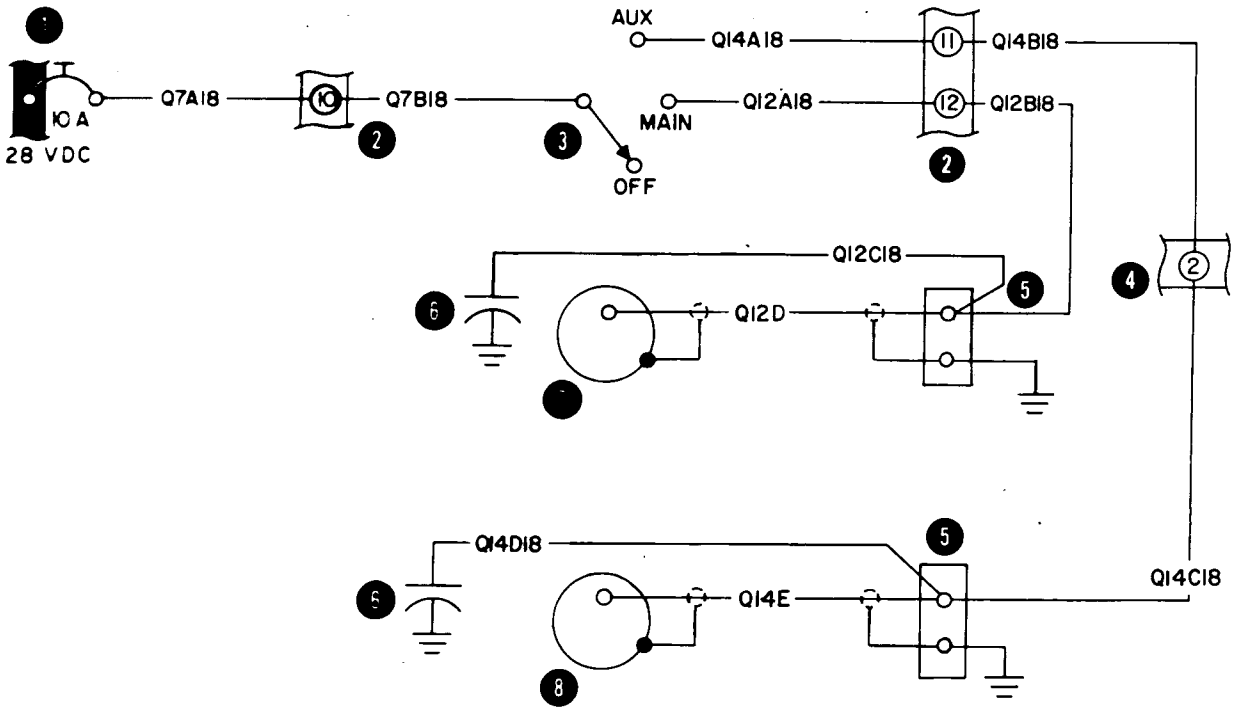
1. Fuel System Circuit Breaker
2. Fuel Panel Terminal Strip
3. Fuel Boost Pump Switch
4. LH Wing Terminal Strip
5. Boost Pump Terminal Block
6. Filter Capacitor
7. LH Main Boost Pump
8. LH Auxiliary Boost Pump
9. Fuel Enrichment Indicator Light
10. Fuel Enrichment Switch
11. Pedestal Terminal Strip
12. Engine Firewall Plug
13. Fuel Enrichment Solenoid
14. Purge Switch
15. Idle Cutoff Switch
16. Engine Firewall Plug
17. Fuel Solenoid

Figure 6-11. Fuel System Circuit, LH (Sheet 1 of 2) (LC-1 and After)



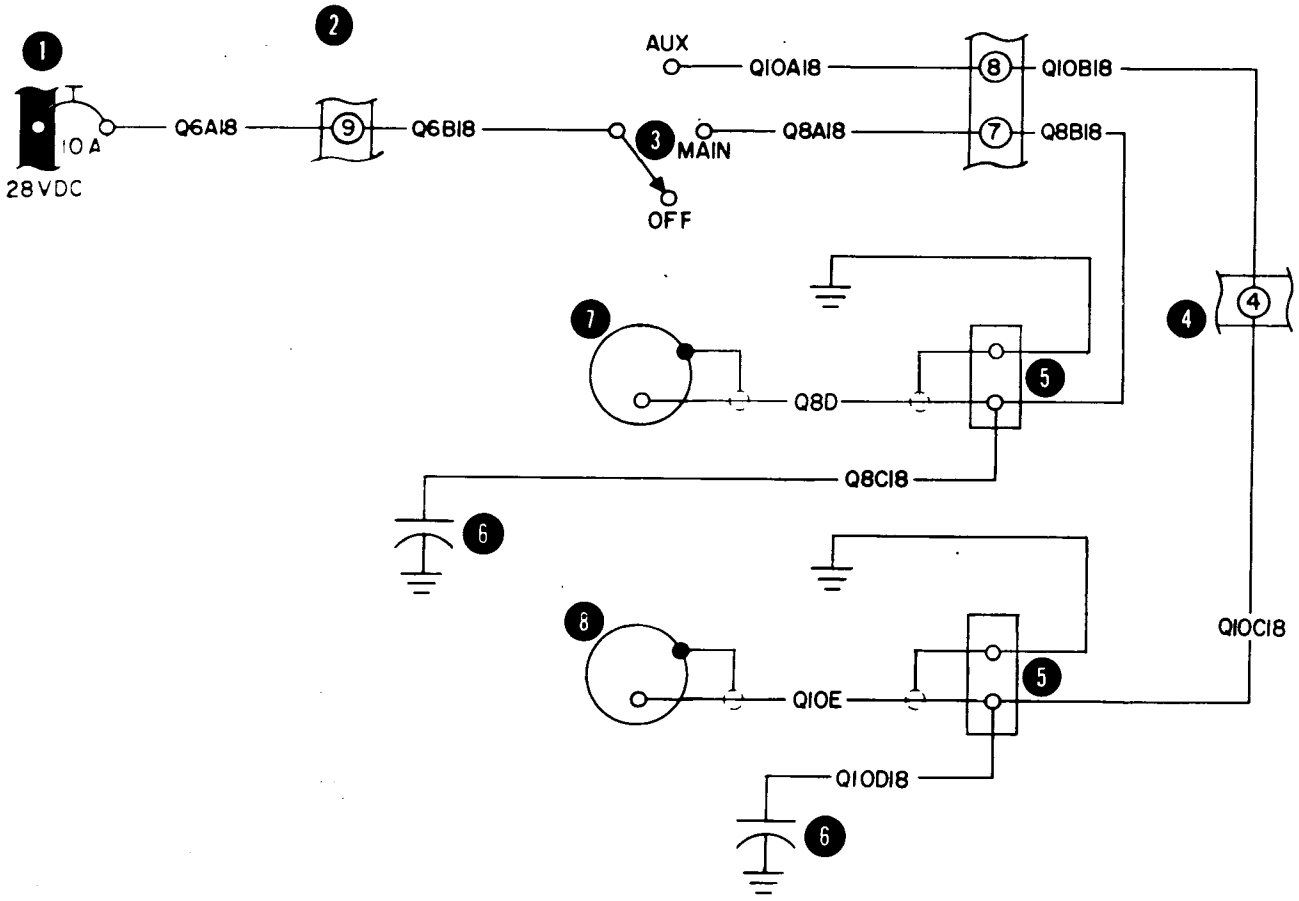
1. Fuel System Circuit Breaker
2. Fuel Panel Terminal Strip
3. Fuel Boost Pump Switch
4. RH Wing Terminal Strip
5. Boost Pump Terminal Block
6. Filter Capacitor
7. RH Main Boost Pump
8. RH Auxiliary Boost Pump
9. Fuel Enrichment Indicator Light
10. Fuel Enrichment Switch
11. Pedestal Terminal Strip
12. Engine Firewall Plug
13. Fuel Enrichment Solenoid
14. Purge Switch
15. Idle Cutoff Switch
16. Engine Firewall Plug
17. Fuel Solenoid

Figure 6-11. Fuel System Circuit, RH (Sheet 2 of 2) (LC-1 and After)



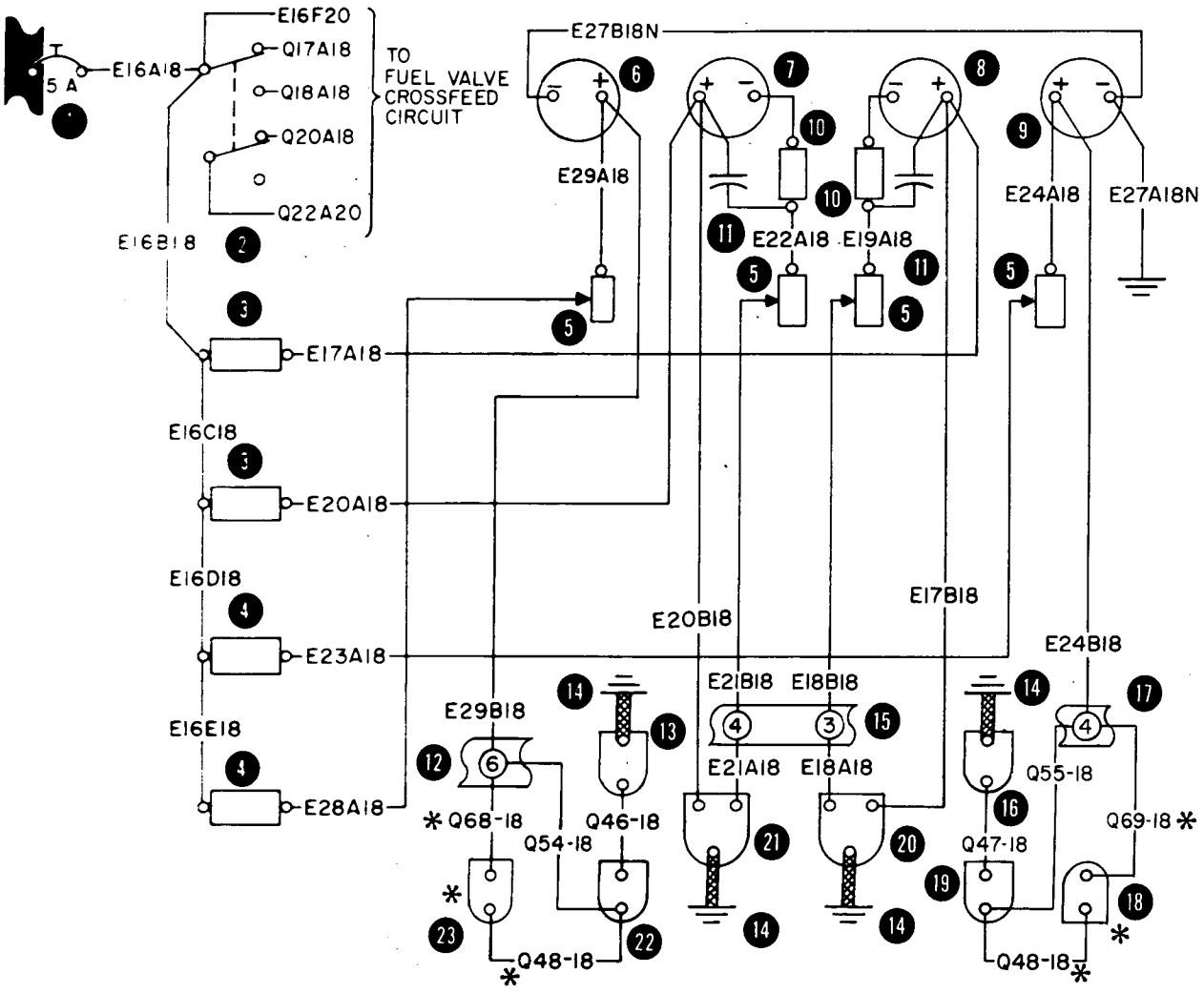
1. Fuel system circuit breaker
2. Fuel panel terminal strip
3. Fuel boost pump switch
4. LH wing terminal strip
5. Boost pump terminal block
6. Filter capacitor
7. LH main boost pump
8. LH auxiliary boost pump

Figure 6-11A. Fuel System Circuit, LH (Sheet 1 of 2) (LD-1 and After)



1. Fuel system circuit breaker
2. Fuel panel terminal strip
3. Fuel boost pump switch
4. RH wing terminal strip
5. Boost pump terminal block
6. Filter capacitor
7. RH main boost pump
8. RH auxiliary boost pump

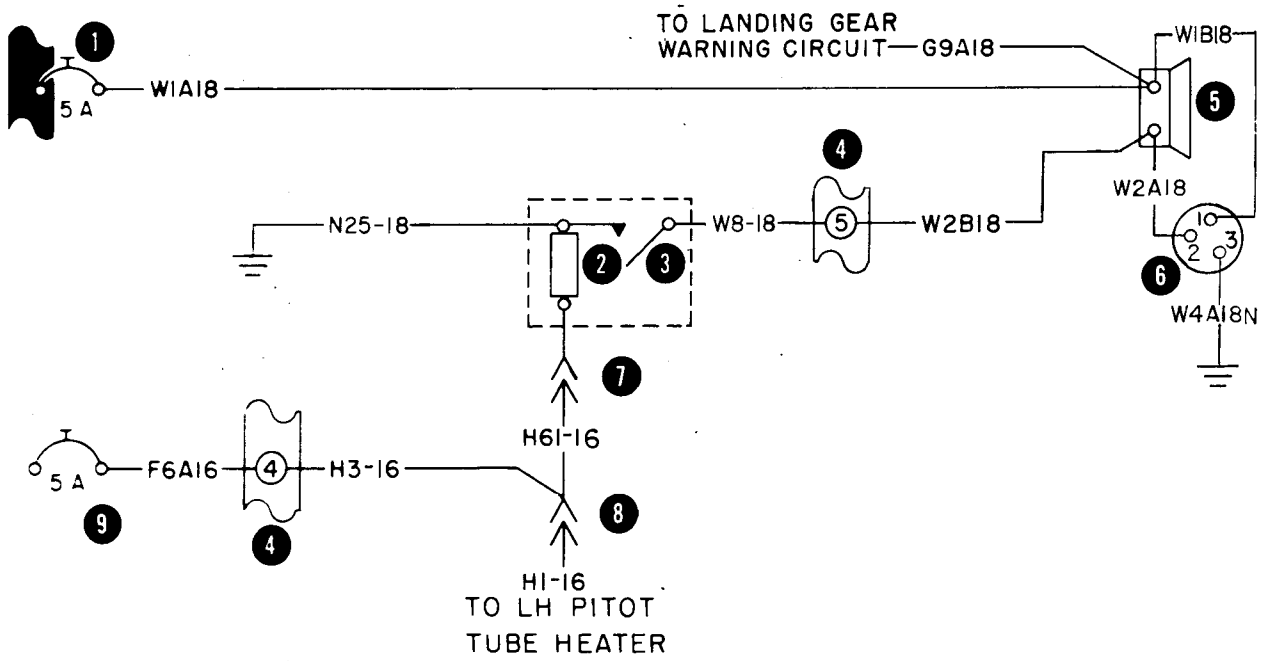
Figure 6-11A. Fuel System Circuit, RH (Sheet 2 of 2) (LD-1 and After)



* INSTALLED WITH OPTIONAL EQUIPMENT

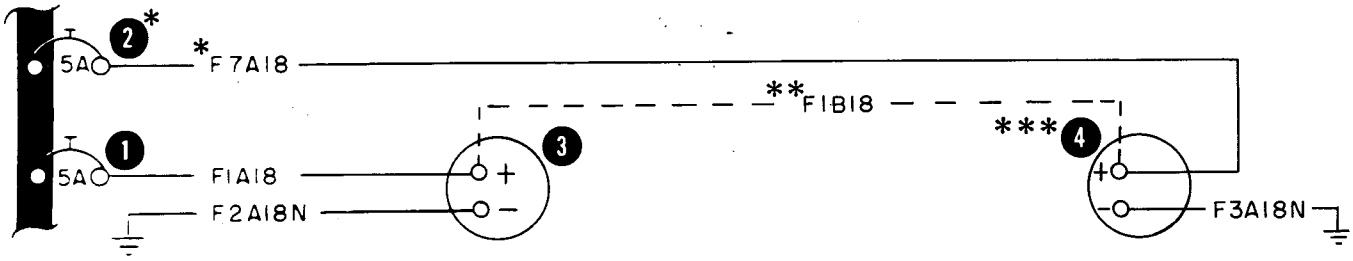
1. Fuel Gage Circuit Breaker
2. Fuel Crossfeed Switch
3. Resistor (75 Ohm 10 Watt)
4. Resistor (7.5 Kilohm 10 Watt)
5. Fuel Quantity Potentiometer
6. LH Auxiliary Fuel Tanks Indicator
7. LH Main (inboard) Fuel Tank Indicator
8. RH Main (inboard) Fuel Tank Indicator
9. RH Auxiliary Fuel Tanks Indicator
10. Resistor (3.3 Kilohm)
11. Capacitor (500 Microfarad)
12. LH Subpanel Terminal Strip
13. LH Forward Auxiliary Fuel Cell Level Transmitter
14. Bond Jumper
15. Fuel Panel Terminal Strip
16. RH Forward Auxiliary Fuel Cell Level Transmitter
17. RH Subpanel Terminal Strip
18. RH Aft Outboard Auxiliary Fuel Cell Level Transmitter
19. RH Aft Inboard Auxiliary Fuel Cell Level Transmitter
20. RH Main Fuel Tank Level Transmitter
21. LH Main Fuel Tank Level Transmitter
22. LH Aft Inboard Auxiliary Fuel Cell Level Transmitter
23. LH Aft Outboard Auxiliary Fuel Cell Level Transmitter

Figure 6-12. Fuel Quantity Indicator Circuit



1. Warning Indicator Circuit Breaker
2. Stall Warning Switch Heating Element
3. Stall Warning Switch
4. Terminal Strip
5. Stall Warning Horn
6. Stall Warning Light
7. Stall Warning Switch Disconnect
8. LH Pitot Tube Disconnect
9. LH Pitot Heat Circuit Breaker

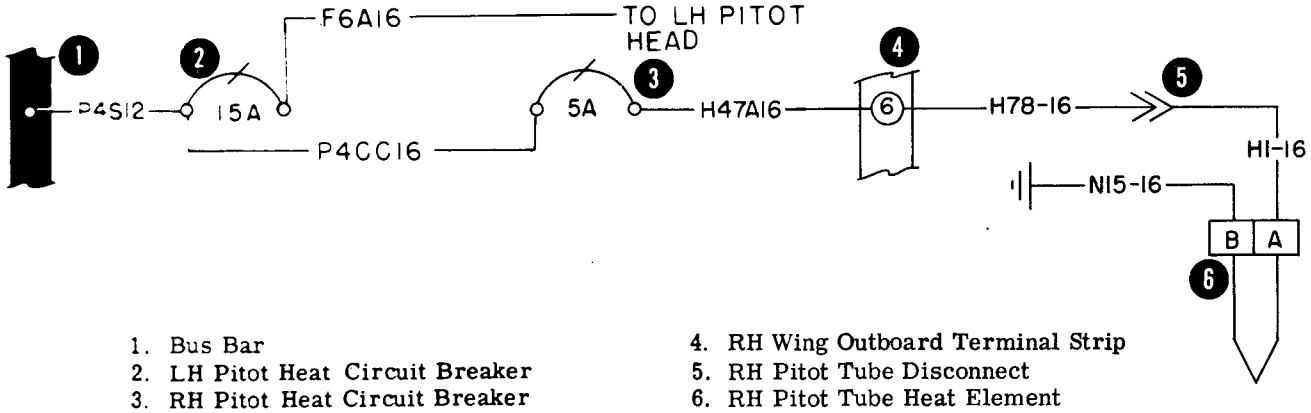
Figure 6-12A Stall Warning Indicator Circuit



*INSTALLED WITH ITEM 4 ON LC-81 AND AFTER
**INSTALLED WITH ITEM 4 PRIOR TO LC-81
***INSTALLED WITH OPTIONAL EQUIPMENT

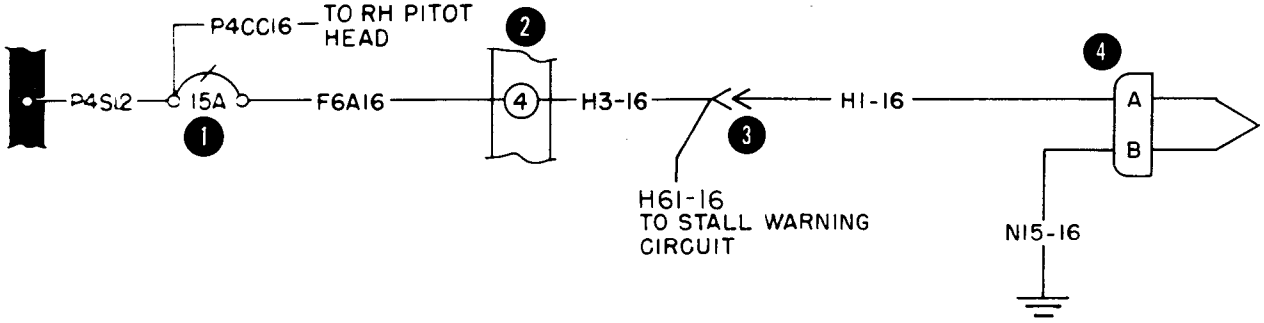
1. Pilot's Turn and Bank Indicator Circuit Breaker
2. Copilot's Turn and Bank Indicator Circuit Breaker
3. Pilot's Turn and Bank Indicator
4. Copilot's Turn and Bank Indicator

Figure 6-13 Turn and Bank Indicator Circuit



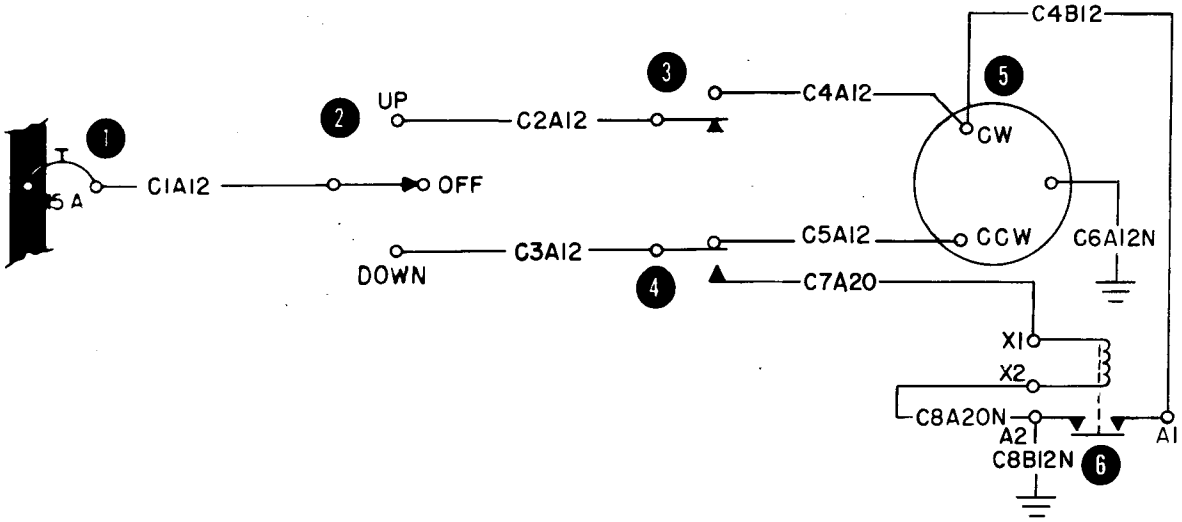
1. Bus Bar
2. LH Pitot Heat Circuit Breaker
3. RH Pitot Heat Circuit Breaker
4. RH Wing Outboard Terminal Strip
5. RH Pitot Tube Disconnect
6. RH Pitot Tube Heat Element

Figure 6-14 RH Pitot Heat Circuit (Optional Equipment LC-46 and After)



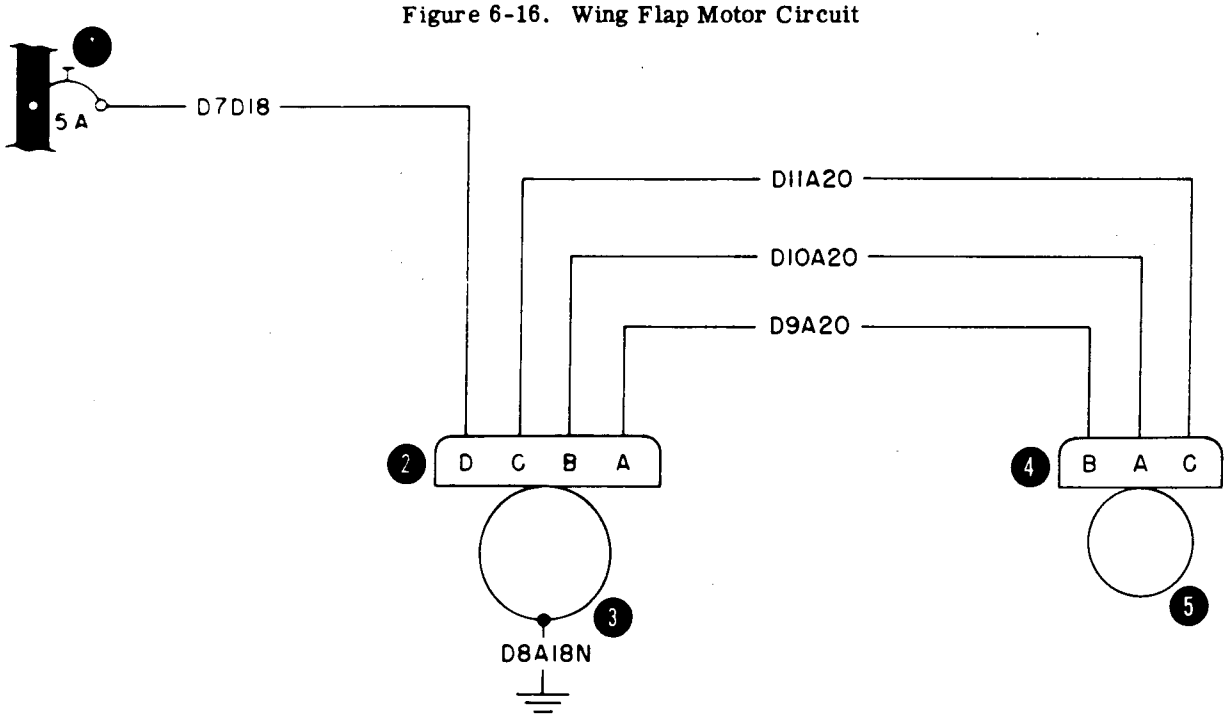
1. LH Pitot Heat Circuit Breaker
2. LH Wing Outboard Terminal Strip
3. LH Pitot Tube Disconnect
4. LH Pitot Tube Heat Element

Figure 6-14A LH Pitot Heat Circuit



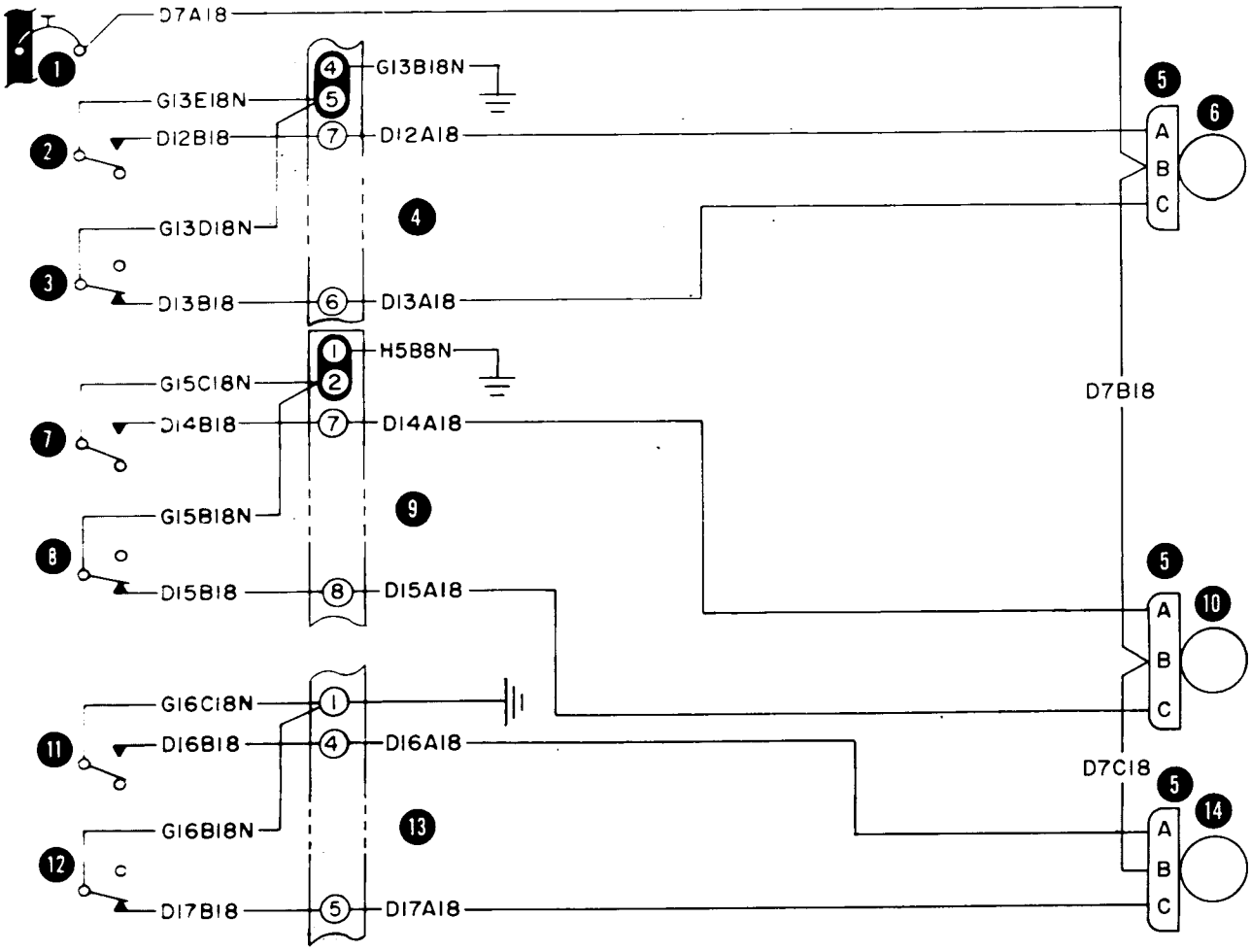
1. Flap Motor Circuit Breaker
2. Flap Control Switch
3. Flap Upper Limit Switch
4. Flap Lower Limit Switch
5. Flap Drive Motor
6. Flap Power Control Relay

Figure 6-16. Wing Flap Motor Circuit



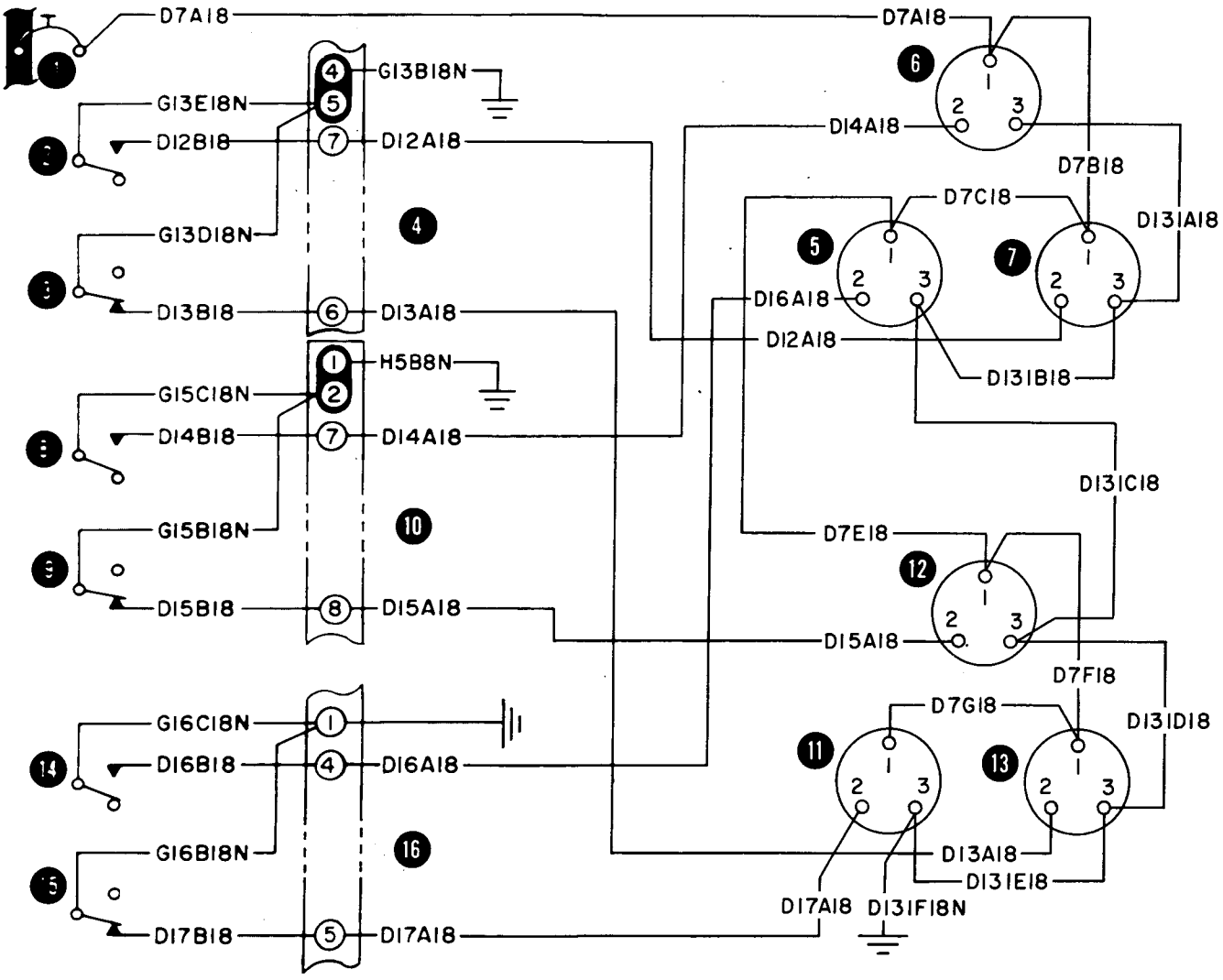
1. Flap and Landing Gear Indicator Circuit Breaker
2. Flap Position Transmitter Plug
3. Flap Position Transmitter
4. Flap Position Indicator Plug
5. Flap Position Indicator

Figure 6-17. Wing Flap Indicator Circuit



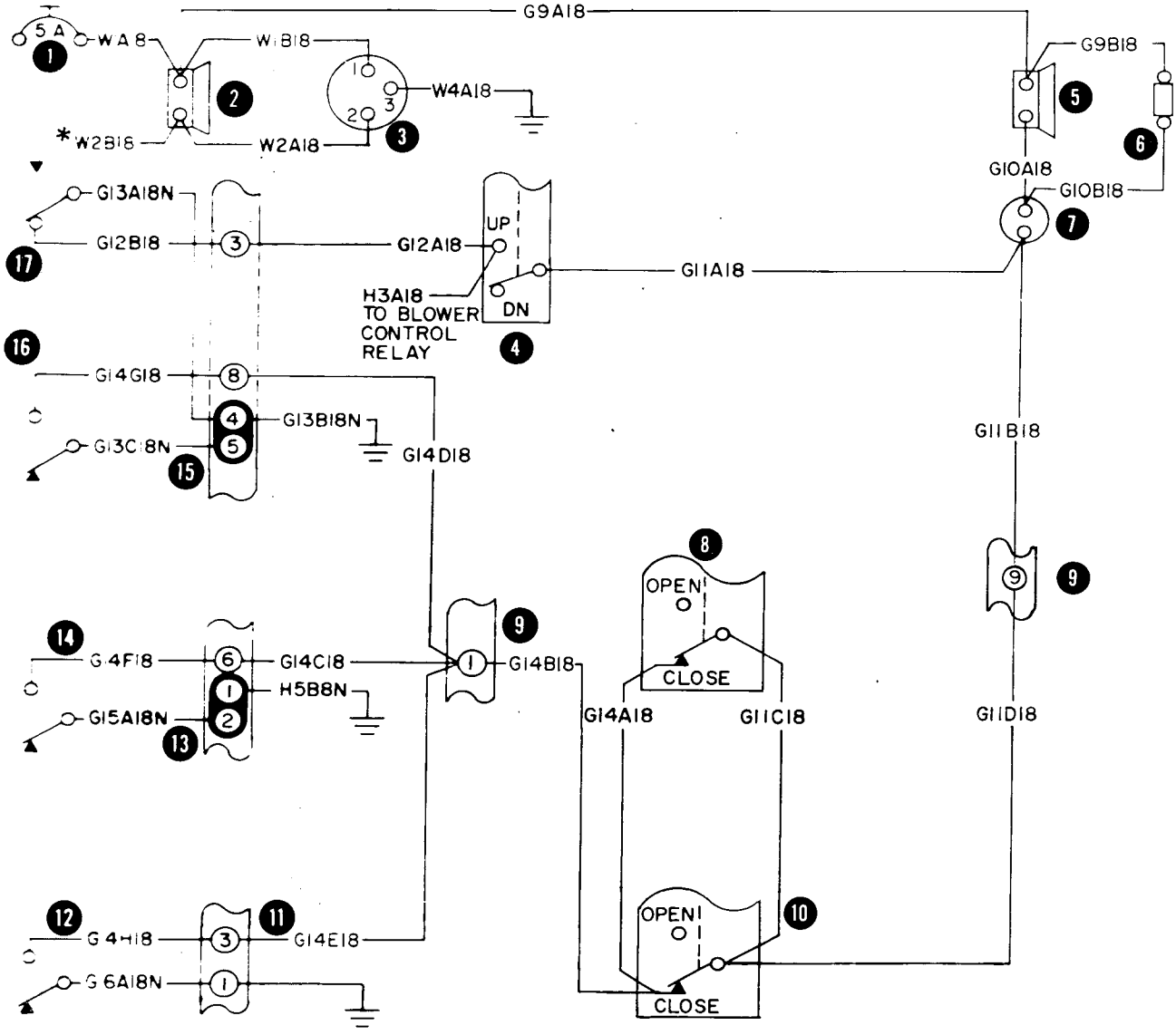
1. Flap and Landing Gear Circuit Breaker
2. RH Landing Gear Up Indicator Switch
3. RH Landing Gear Down Lock Switch
4. RH Wheel Well Terminal Strip
5. Landing Gear Position Indicator Plug
6. RH Landing Gear Position Indicator
7. Nose Landing Gear Up Indicator Switch
8. Nose Landing Gear Down Lock Switch
9. Nose Wheel Well Terminal Strip
10. Nose Landing Gear Position Indicator
11. LH Landing Gear Up Indicator Switch
12. LH Landing Gear Down Lock Switch
13. LH Wheel Well Terminal Strip
14. LH Landing Gear Position Indicator

Figure 6-18. Landing Gear Position Indicator Circuit (LC-1 through LC-80)



1. Flap and Landing Gear Circuit Breaker
2. RH Landing Gear Up Indicator Switch
3. RH Landing Gear Down Lock Switch
4. RH Wheel Well Terminal Strip
5. LH Landing Gear Up Position Light
6. Nose Landing Gear Up Position Light
7. RH Landing Gear Up Position Light
8. Nose Landing Gear Up Indicator Switch
9. Nose Landing Gear Down Lock Switch
10. Nose Wheel Well Terminal Strip
11. LH Landing Gear Down Position Light
12. Nose Landing Gear Down Position Light
13. RH Landing Gear Down Position Light
14. LH Landing Gear Up Indicator Switch
15. LH Landing Gear Down Lock Switch
16. LH Wheel Well Terminal Strip

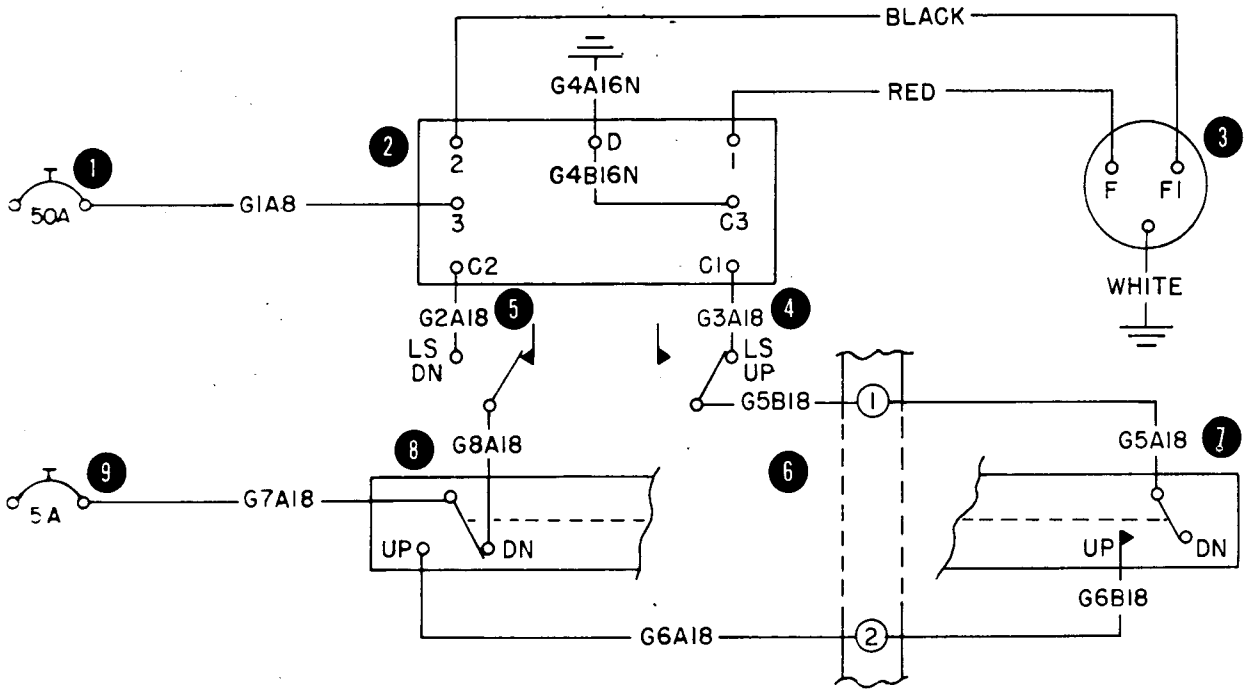
Figure 6-18A. Landing Gear Position Indicator Circuit (LC-81 and After, LD-1 and After)



* To Stall Warning Indicator Circuit

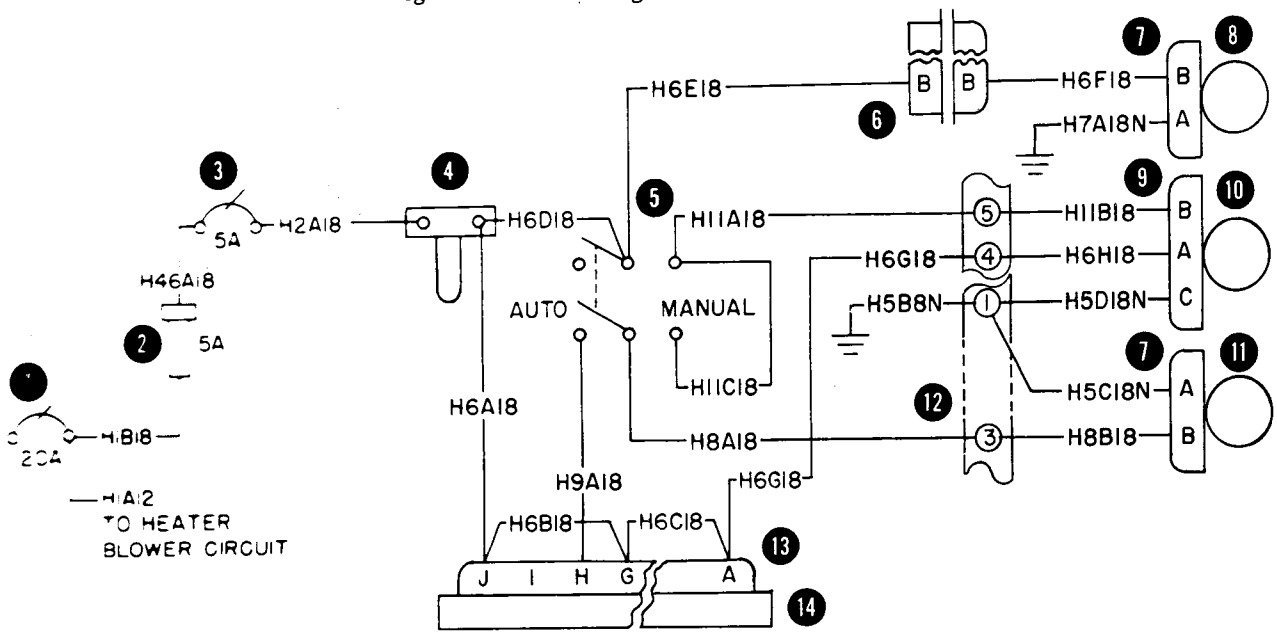
1. Warning System Circuit Breaker
2. Stall Warning Horn
3. Stall Warning Light
4. Landing Gear Control Switch
5. Landing Gear Warning Horn
6. Flasher Resistor
7. Flasher
8. RH Engine Throttle Switch
9. Pedestal Terminal Strip
10. LH Engine Throttle Switch
11. LH Wheel Well Terminal Strip
12. LH Landing Gear Down Lock Switch
13. Nose Gear Terminal Strip
14. Nose Gear Down Lock Switch
15. RH Wheel Well Terminal Strip
16. RH Landing Gear Down Lock
17. Landing Gear Safety Switch

Figure 6-19. Landing Gear Warning Circuit



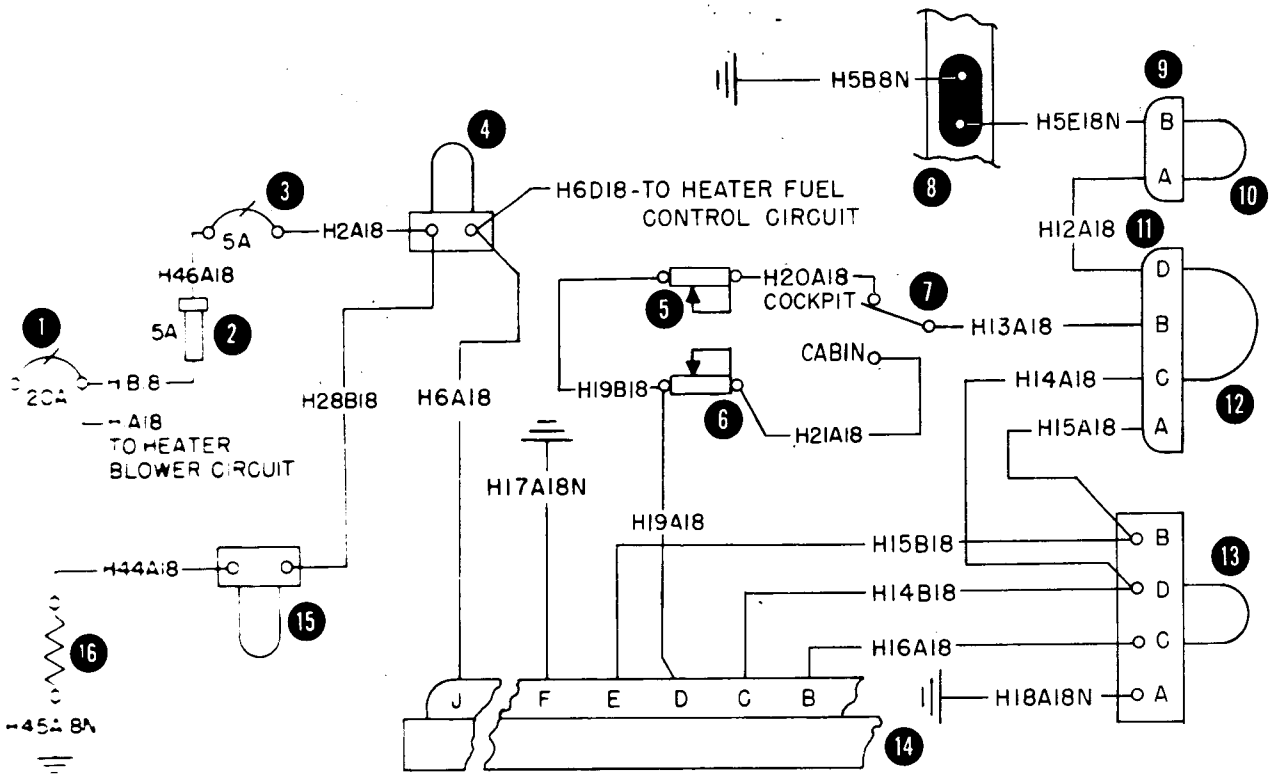
1. Landing Gear Circuit Breaker
2. Landing Gear Control Relay
3. Landing Gear Drive Motor
4. Landing Gear Up Limit Switch
5. Landing Gear Down Limit Switch
6. RH Wheel Well Terminal Strip
7. Landing Gear Safety Switch
8. Landing Gear Control Switch
9. Landing Gear Relay Circuit Breaker

Figure 6-20. Landing Gear Motor Circuit



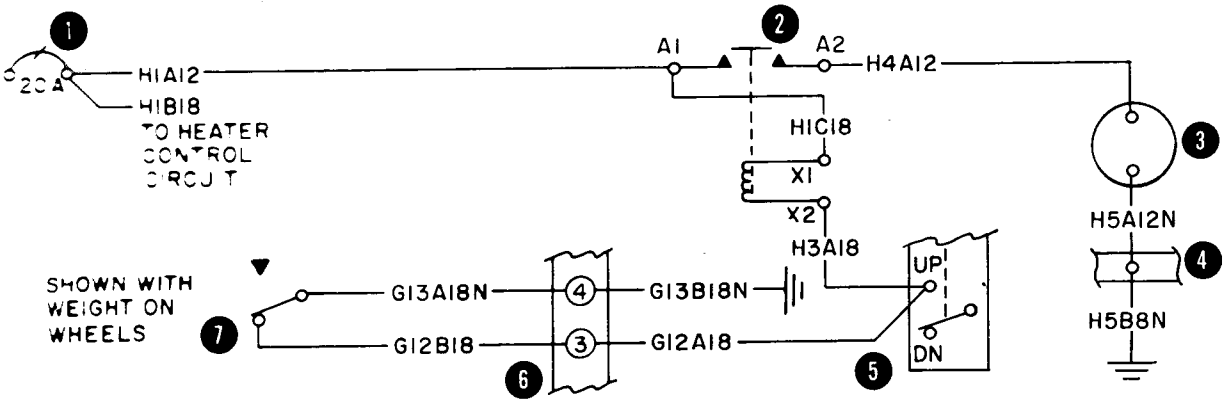
1. Heater Blower Circuit Breaker
2. Heater Control Fuse
3. Heater Control Circuit Breaker
4. Heater Limit Thermoswitch (200° N. C.)
5. Heater Fuel Control Switch
6. LH Engine Firewall Connector
7. Solenoid Plug
8. Heater Fuel Source Solenoid LH
9. Igniter Plug
10. Igniter
11. Heater Fuel Control Solenoid
12. Nose Gear Terminal Strip
13. Heater Control Box Plug
14. Heater Control Box

Figure 6-21. Heater Fuel Control and Igniter Circuit



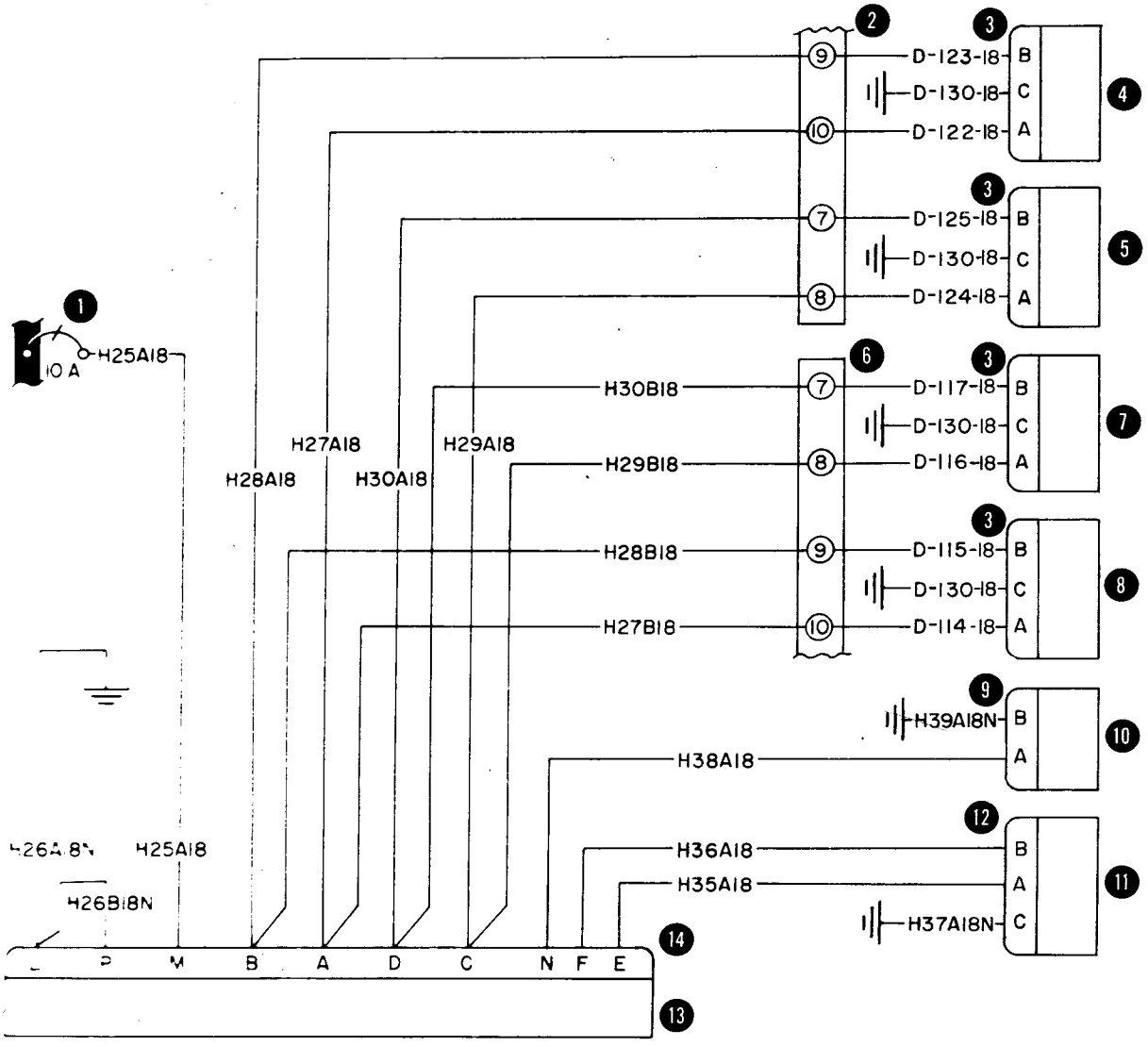
1. Heater Blower Circuit Breaker
2. Heater Control Fuse
3. Heater Control Circuit Breaker
4. Heater Limit Thermoswitch (200° N.C.)
5. Cockpit Heat Control Rheostat (250 Ohm 25 Watt)
6. Cabin Heat Control Rheostat (250 Ohm 25 Watt)
7. Heat Control Selector Switch
8. Nose Gear Terminal Strip
9. Sensing Element Plug
10. Outside Air Thermostat
11. Sensing Element Plug
12. Heater Discharge Air Thermostat
13. Cabin Thermostat
14. Heater Control Box
15. Heater Overtemperature Switch (300° N.O.)
16. Heater Resistor (30 Ohm 10 Watt)

Figure 6-22. Heater Temperature Control Circuit



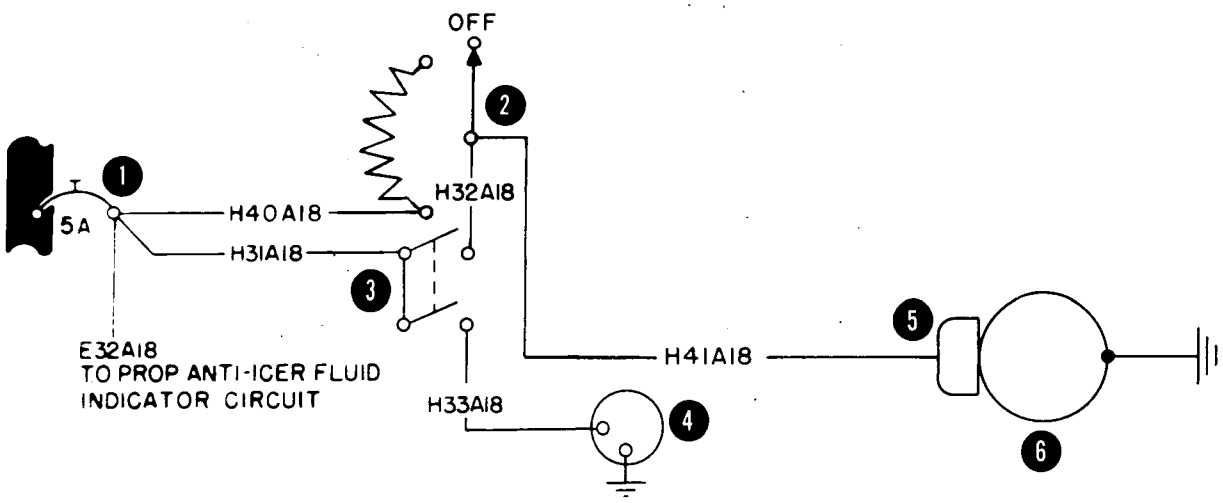
1. Heater Blower Circuit Breaker
2. Blower Control Relay
3. Heater Blower Motor
4. Nose Gear Terminal Strip
5. Landing Gear Control Switch
6. RH Wheel Well Terminal Strip
7. Landing Gear Safety Switch

Figure 6-23. Heater Blower Circuit



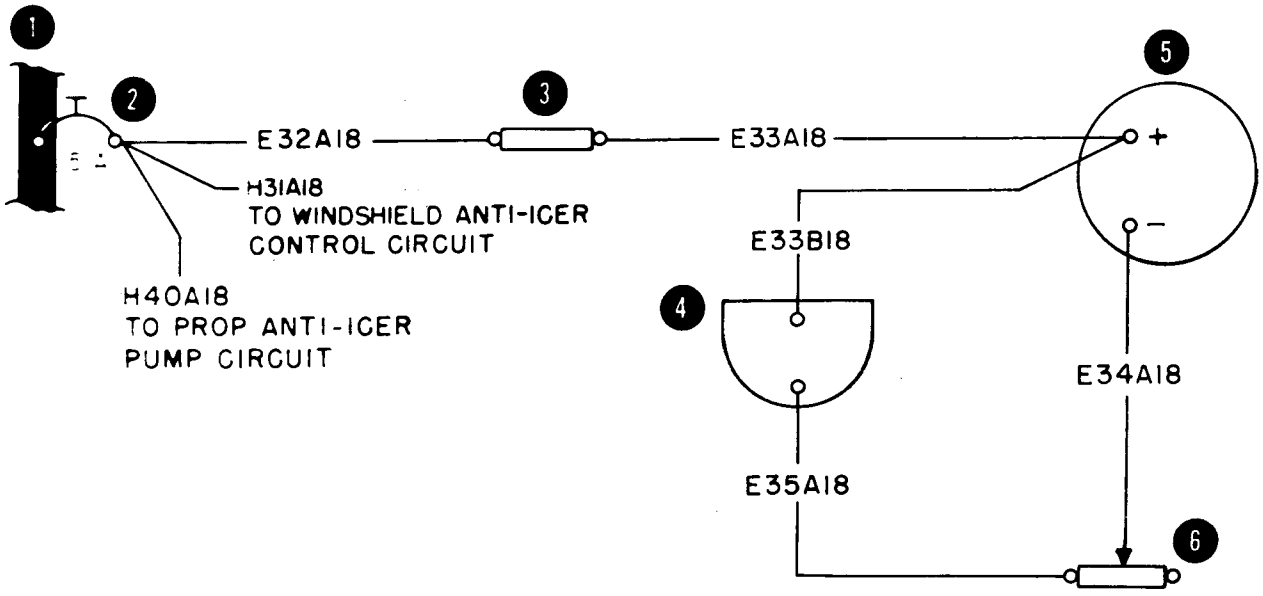
1. Surface De-Ice Circuit Breaker
2. RH Wing Terminal Strip
3. Distribution Valve Plug
4. RH Inboard Boot Distribution Valve
5. RH Outboard Boot Distribution Valve
6. LH Wing Terminal Strip
7. LH Outboard Distribution Valve
8. LH Inboard Distribution Valve
9. Separator Unit Plug
10. Separator Unit
11. Tail Boot Distribution Valve
12. Tail Distribution Valve Plug
13. Surface De-Ice Equipment Timer
14. Timer Plug

Figure 6-24. Engine Driven Surface De-Icer Circuit (Optional)



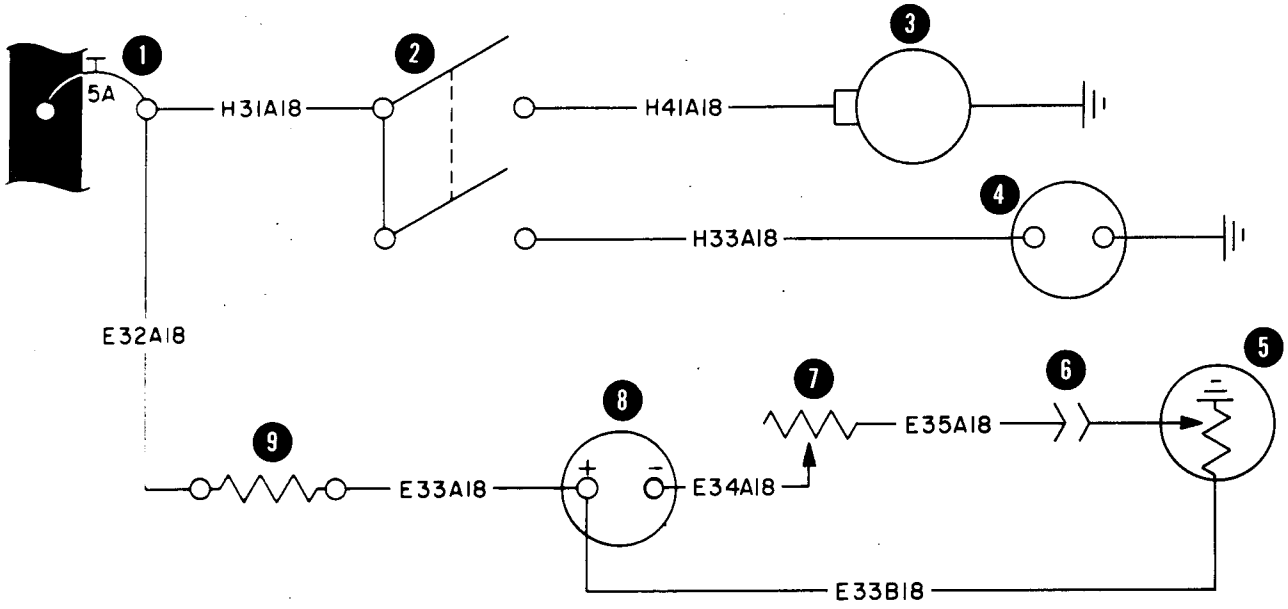
1. Propeller Anti-Icer Circuit Breaker
2. Propeller Anti-Icer Control
3. Windshield Anti-Icer Switch
4. Windshield Anti-Icer Solenoid Valve
5. Pump Plug
6. Propeller and Windshield Anti-Icer Pump

Figure 6-25. Propeller and Windshield Anti-Icer Pump Circuit (Optional)



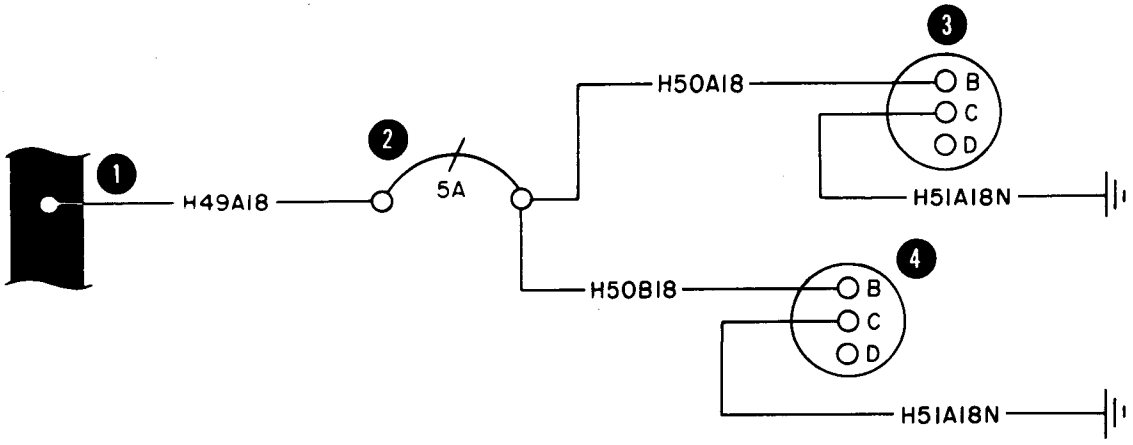
1. Circuit Breaker Bus Bar
2. Prop Anti-Icer Circuit Breaker
3. Resistor (75 Ohm 10 Watt)
4. Anti-Icer Fluid Level Transmitter
5. Anti-Icer Fluid Level Indicator
6. Anti-Icer Indicator Adjusting Potentiometer

Figure 6-26. Propeller and Windshield Anti-Icer Indicator Circuit (Optional)



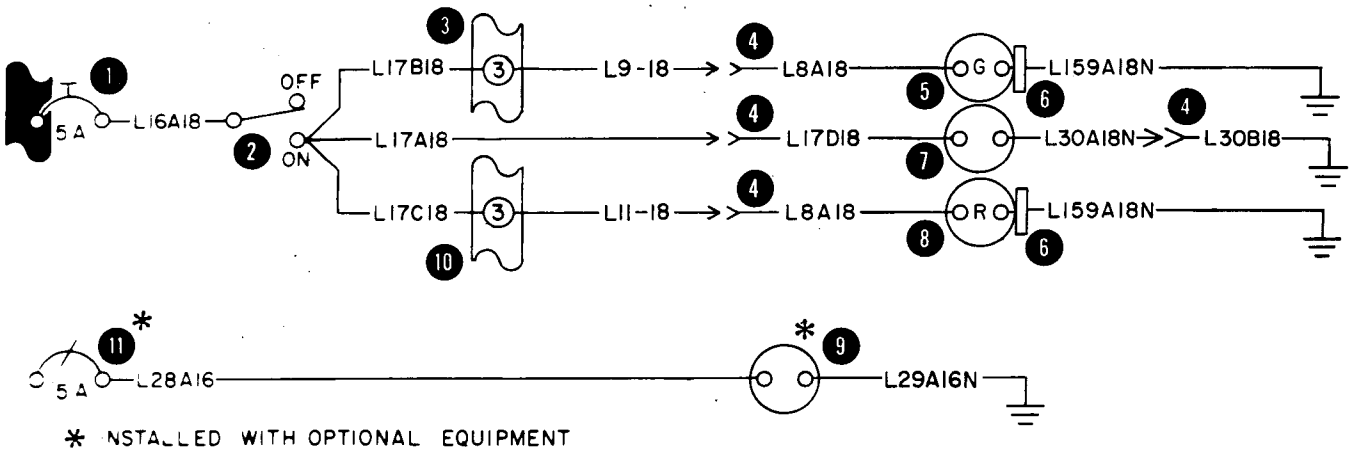
1. Windshield Anti-Icer Circuit Breaker
2. Windshield Anti-Icer Switch
3. Pump
4. Solenoid Valve
5. Fluid Level Transmitter
6. Transmitter Disconnect
7. Potentiometer
8. Fluid Level Indicator
9. Resistor

Figure 6-26A. Windshield Anti-Icer Circuit, Independent System (Optional)



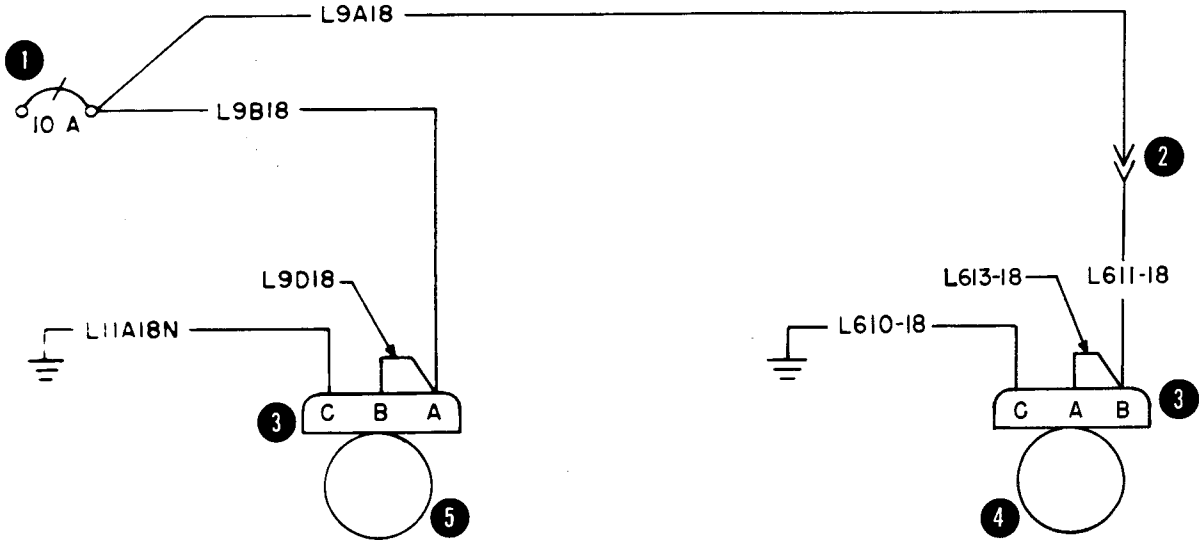
1. Circuit Breaker Bus Bar
2. Ice Light Circuit Breaker
3. RH Ice Light
4. LH Ice Light

Figure 6-26B. Wing Ice Light Circuit (Optional)



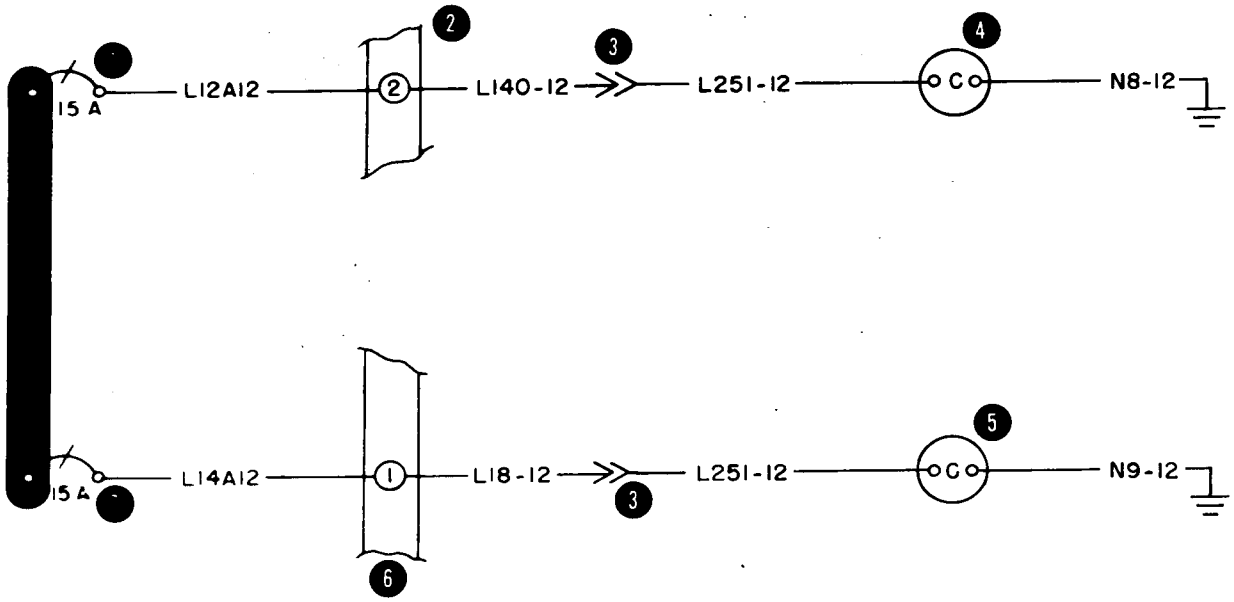
1. Navigation Light Circuit Breaker
2. Navigation Light Switch
3. RH Wing Terminal Strip
4. Disconnect Splice
5. RH Wing Navigation Light
6. Bonding Ring
7. Tail Navigation Light
8. LH Wing Navigation Light
9. Taxi Light
10. LH Wing Terminal Strip
11. Taxi Light Circuit Breaker

Figure 6-27. Navigation and Taxi Light Circuit



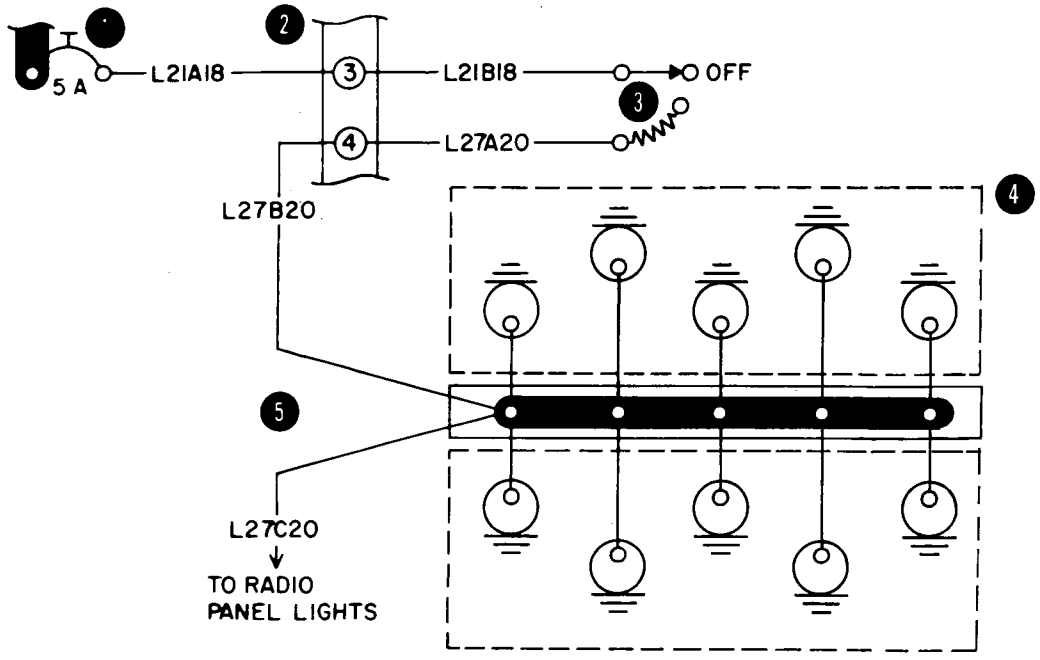
1. Anti-Collision Light Circuit Breaker
2. Disconnect Splice
3. Anti-Collision Light Plug
4. Vertical Stabilizer Anti-Collision Light
5. Belly Anti-Collision Light

Figure 6-28. Anti-Collision Light Circuit



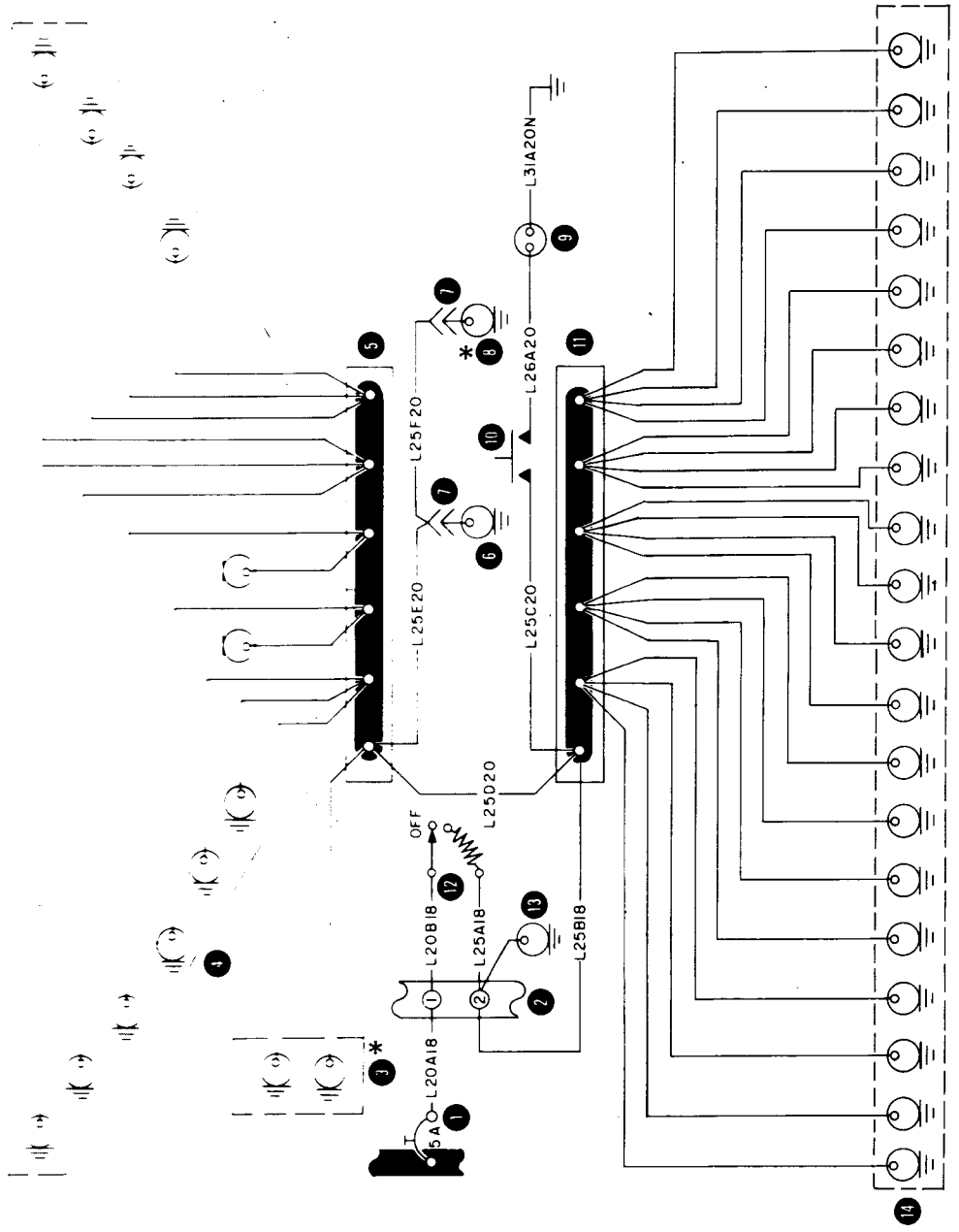
1. RH Landing Light Circuit Breaker
2. RH Wing Terminal Strip
3. Disconnect Splice
4. RH Landing Light
5. LH Landing Light
6. LH Wing Terminal Strip
7. LH Landing Light Circuit Breaker

Figure 6-29. Landing Light Circuit



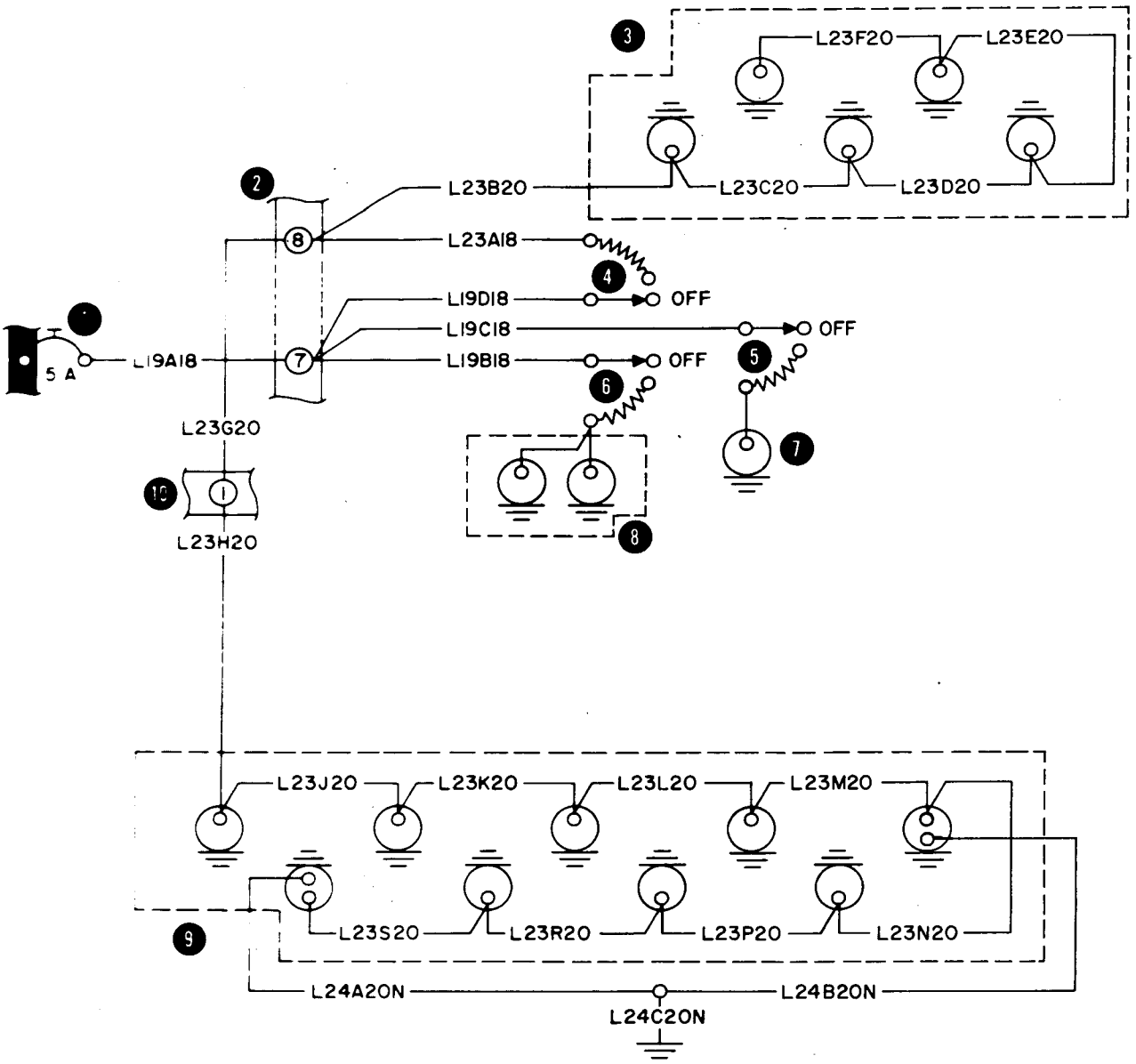
1. Engine Instrument Light Circuit Breaker
2. Overhead Panel Terminal Strip
3. Engine and Radio Light Dimming Control
4. Engine Instrument Lights
5. Engine Instrument and Radio Light Terminal Strip

Figure 6-30. Engine Instrument Light Circuit



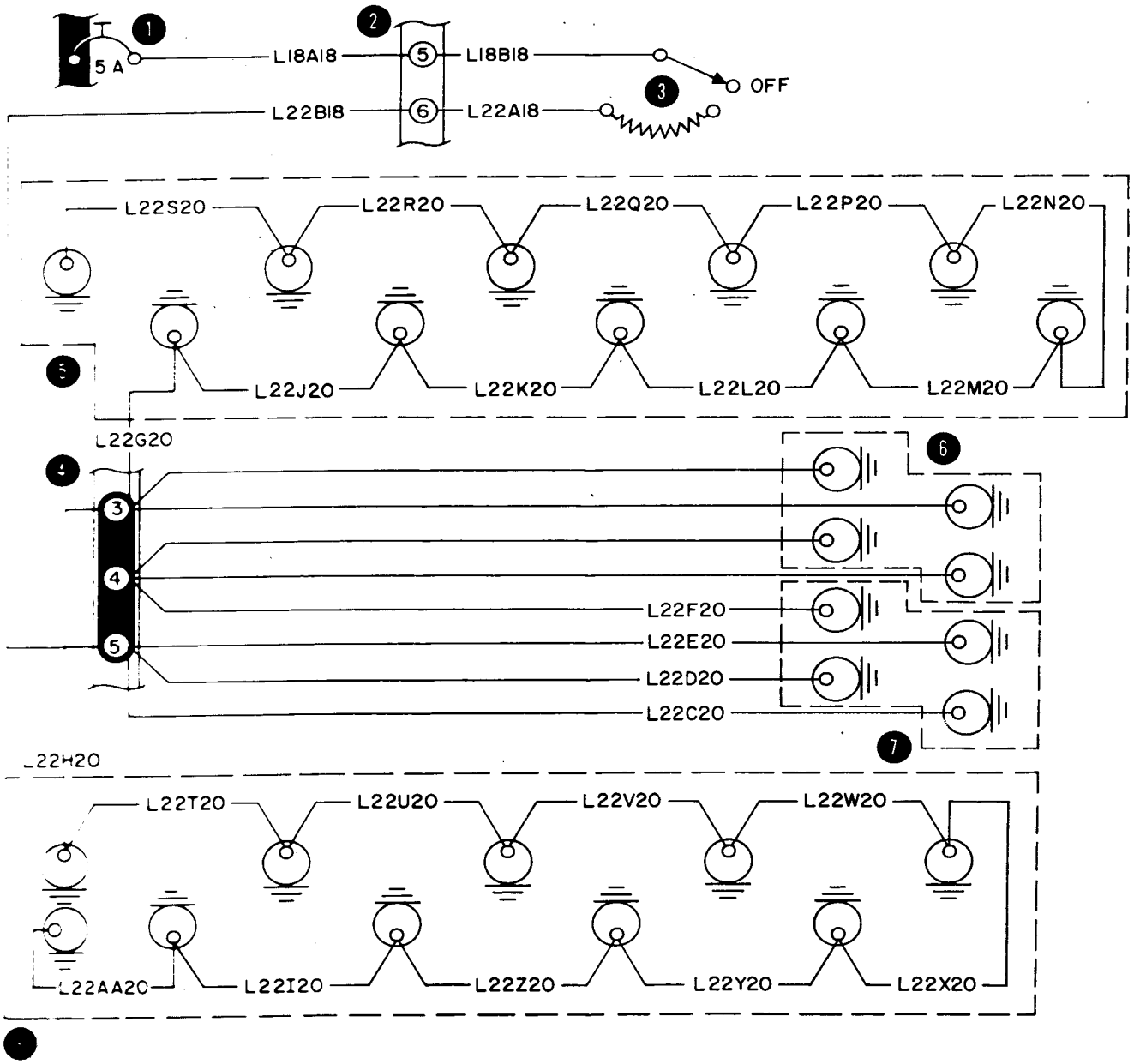
1. Flight Instrument Light Circuit Breaker
2. Overhead Panel Terminal Strip
3. Copilot's Turn and Slip Lights
4. RH Flight Instrument Lights
5. RH Flight InstrumentLight Terminal Strip
6. Oxygen Quantity Indicator Light
7. Disconnect Splice
8. Light Weight De-Icer Pressure Gage Light
9. Free Air Temperature Light
10. Free Air Temperature Light Switch
11. LH Light Instrument Light Terminal Strip
12. Flight Instrument Light Dimming Control
13. Magnetic Compass Light
14. LH Flight Instrument Lights

Figure 6-31. Flight Instrument Light Circuit



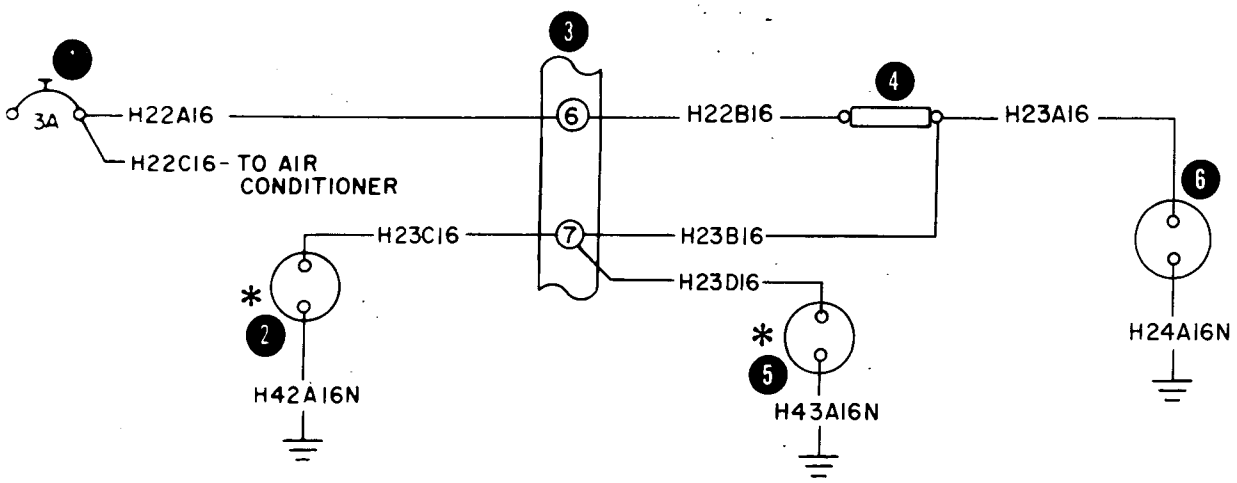
1. Overhead Light Circuit Breaker
2. Overhead Panel Terminal Strip
3. Overhead Panel Edge Lights
4. Fuel and Overhead Dimming Control
5. Map Light Dimming Control
6. Cockpit Red Light Dimming Control
7. Map Light
8. Cockpit Red Lights
9. Fuel Panel Edge Lights
10. Fuel Panel Terminal Strip

Figure 6-32. Fuel and Overhead Light Circuit



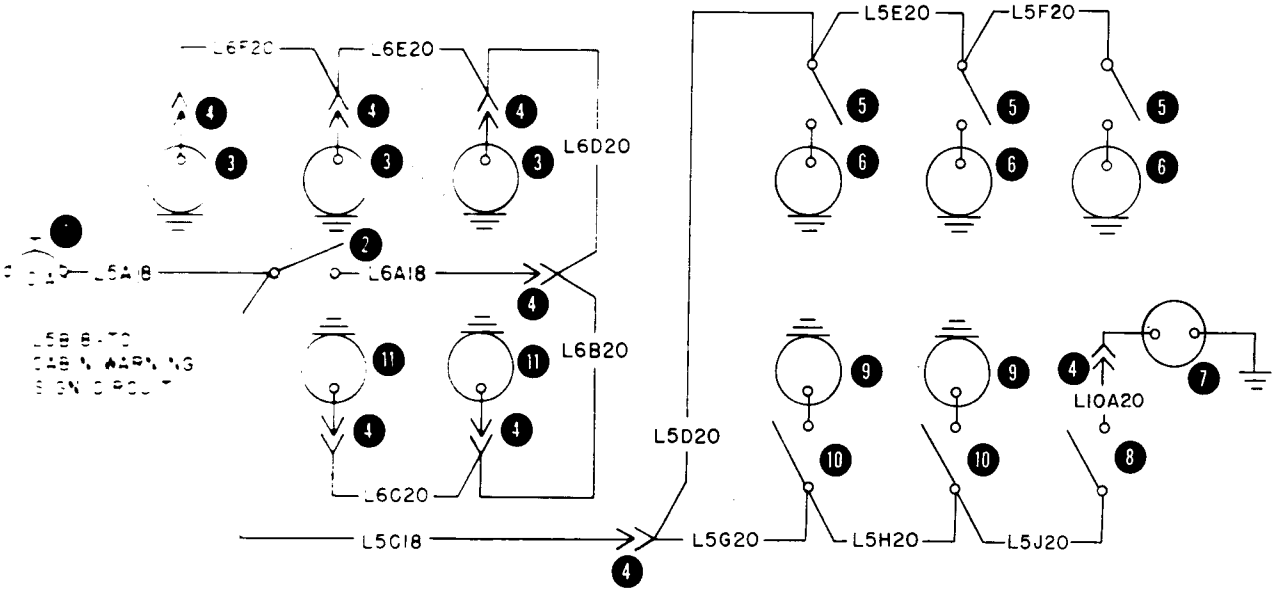
1. Control Panel Light Circuit Breaker
2. Overhead Panel Terminal Strip
3. Subpanel and Tab Dimming Control
4. Pedestal Terminal Strip
5. RH Subpanel Edge Lights
6. Instrument Lights
7. Pedestal Edge Lights
8. LH Subpanel Edge Lights

Figure 6-33. Control Panel Light Circuit



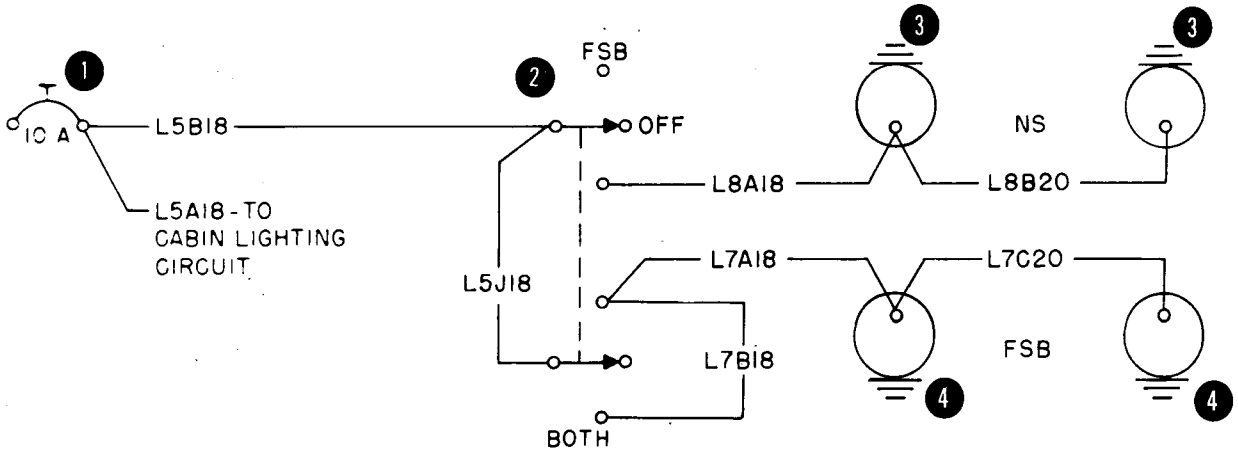
1. Cigarette Lighter and Air Conditioner Circuit Breaker
2. LH Table Cigarette Lighter
3. Pedestal Terminal Strip
4. Cigaretter Lighter Resistor
5. RH Table Cigarette Lighter
6. Cockpit Cigarette Lighter

Figure 6-34. Cigarette Lighter Circuit



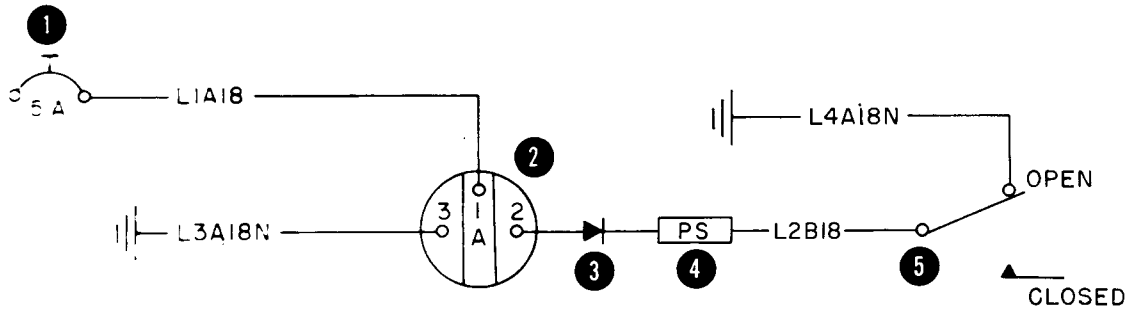
1. Cabin Light Circuit Breaker
2. Cabin Main Light Switch
3. RH Dome Light
4. Permanent Splice
5. RH Reading Light Switch
6. RH Reading Light
7. Aft Dome Light
8. Aft Dome Light Switch
9. LH Reading Light
10. LH Reading Light Switch
11. LH Dome Light

Figure 6-35. Cabin Light Circuit



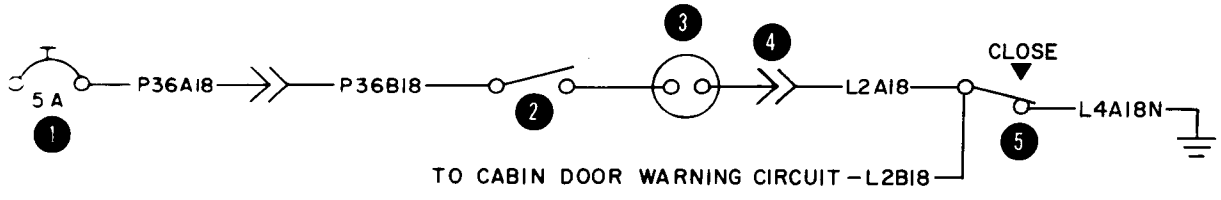
1. Cabin Light Circuit Breaker
2. Cabin Sign Indicator Switch
3. No Smoking Sign Indicator
4. Fasten Seat Belt Sign Indicator

Figure 6-36. Cabin Warning Sign Circuit (Optional)



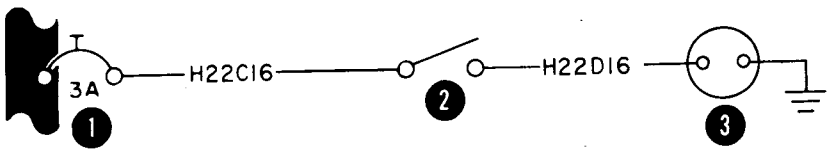
1. Cabin Door Warning Light Circuit Breaker
2. Cabin Door Warning Light
3. Diode
4. Permanent Splice
5. Cabin Door Switch

Figure 6-37. Cabin Door Warning Light Circuit



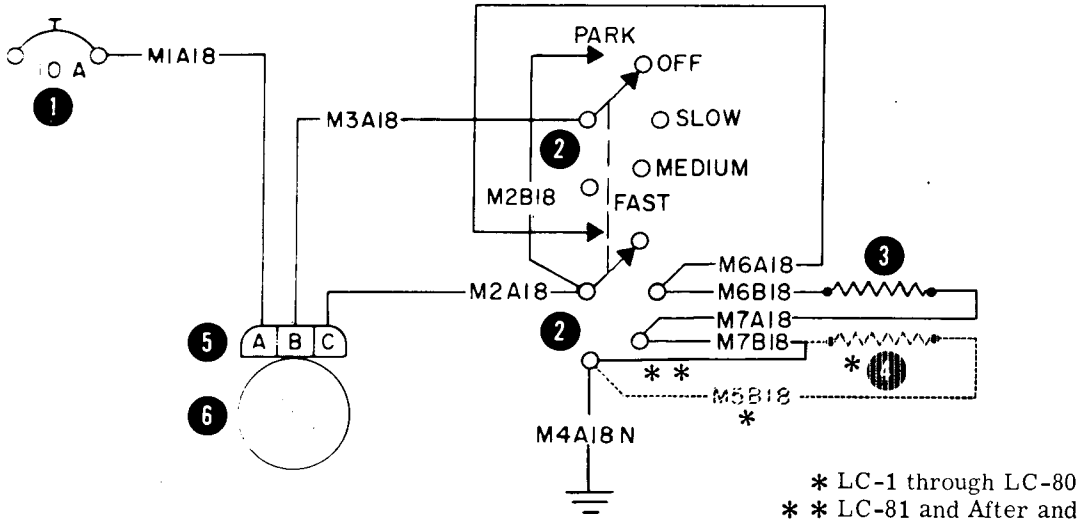
1. Threshold Light Circuit Breaker
2. Threshold Light Switch
3. Threshold Light
4. Permanent Splice
5. Cabin Door Switch

Figure 6-38. Threshold Light Circuit



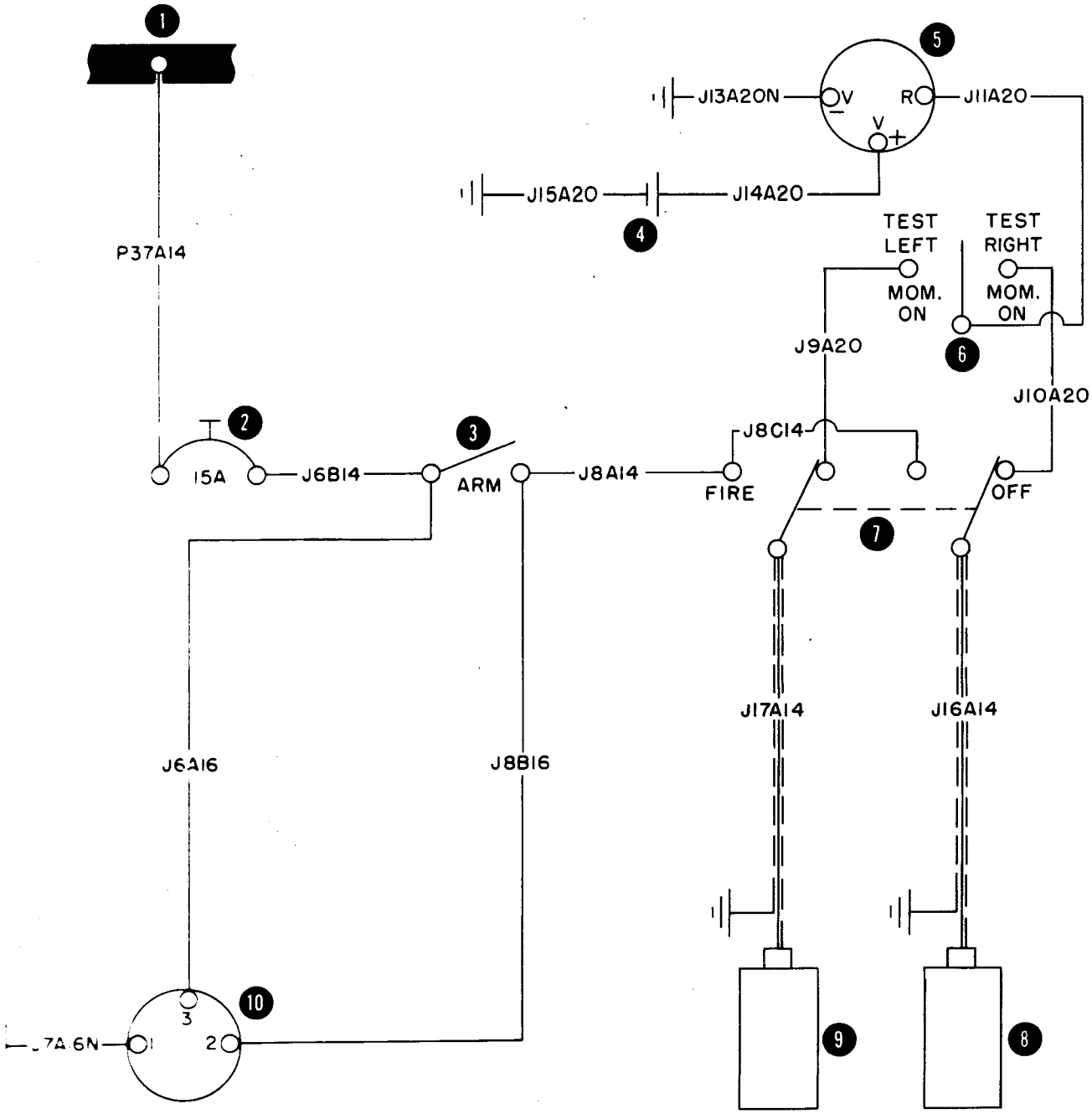
1. Air Conditioner and Cigarette Lighter Circuit Breaker
2. Air Conditioner Motor Switch
3. Air Conditioner Motor

Figure 6-39. Air Conditioner Circuit (Optional)



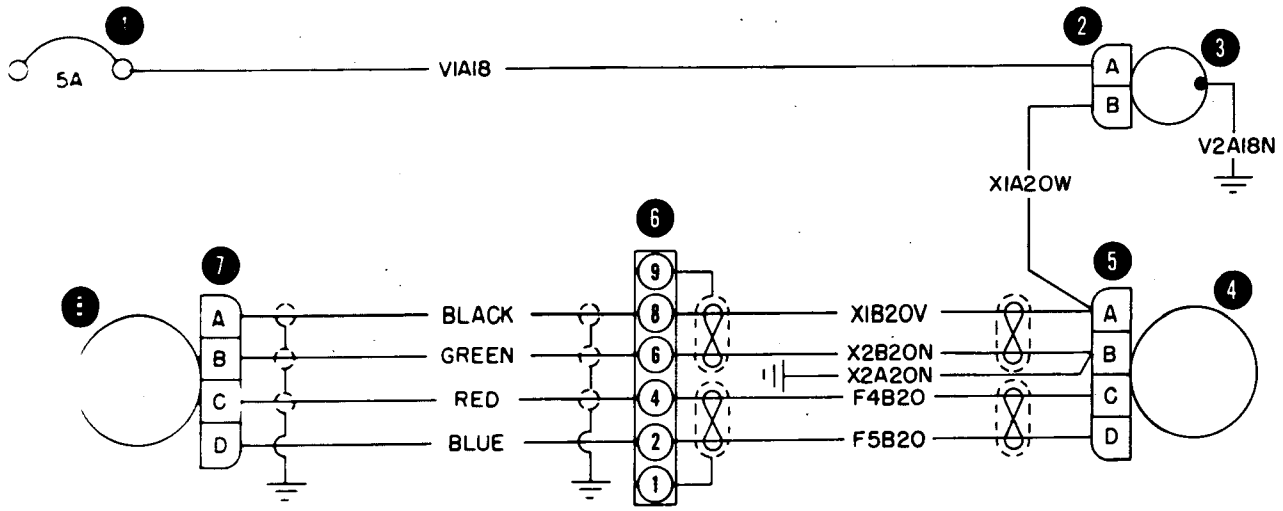
1. Windshield Wiper Circuit Breaker
2. Windshield Wiper Switch
3. Resistor
4. Resistor
5. Windshield Wiper Motor Plug
6. Windshield Wiper Motor

Figure 6-40. Windshield Wiper Circuit (Optional)



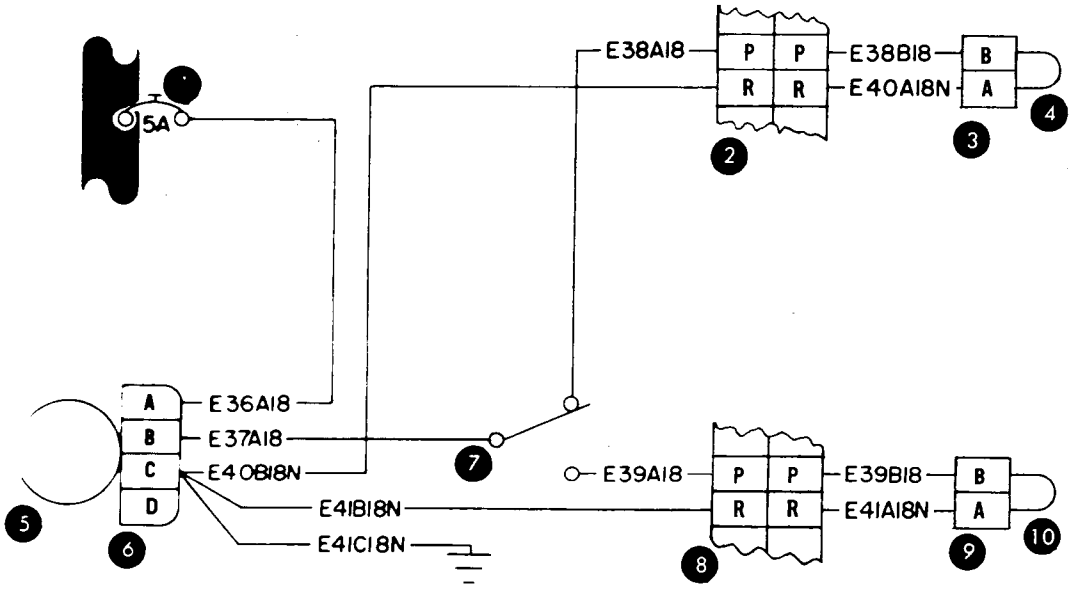
1. Panel Bus Bar
2. Jato Circuit Breaker
3. Arming Switch
4. Test Battery
5. Test Meter
6. Test Switch
7. Firing Switch
8. RH Jato
9. LH Jato
10. Arming Light

Figure 6-41. Jato Circuit

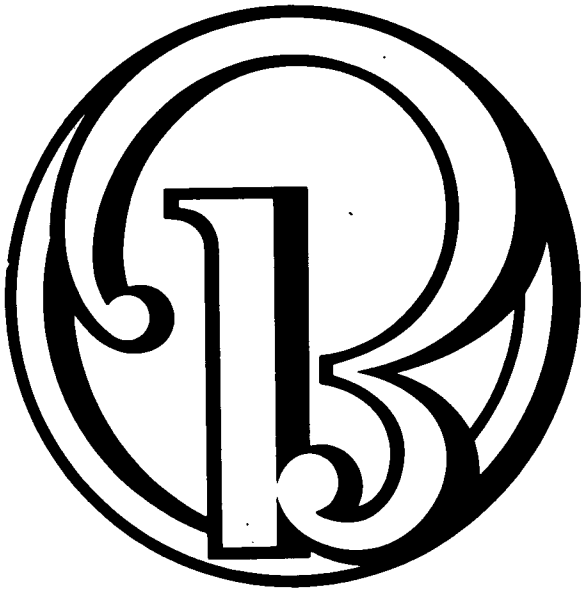


1. Remote Compass Circuit Breaker
2. Inverter Compass Plug
3. Inverter Compass
4. Remote Compass Indicator
5. Remote Compass Indicator Plug
6. Wing Terminal Strip
7. Remote Compass Transmitter Plug
8. Remote Compass Transmitter

Figure 6-42. Remote Compass Circuit (Optional).



1. Induction Air Temperature Gage Circuit Breaker
2. RH Firewall Plug
3. RH Induction Air Temperature Bulb Plug
4. RH Induction Air Temperature Bulb
5. Induction Air Temperature Gage
6. Induction Air Temperature Gage Plug
7. Selector Switch
8. LH Firewall Plug
9. LH Induction Air Temperature Bulb Plug
10. LH Induction Air Temperature Bulb



SECTION VII

Periodic Inspection Schedule

7

SECTION VII

PERIODIC INSPECTION SCHEDULES

The 100 and 1000 hour inspection schedules which make up this section of the Shop Manual are based on field experience with identical or similar components in other BEECHCRAFT products. They will be added to and modified as experience in the field dictates. These inspection schedules should be used as a guide to tell what to inspect for: detailed information on the various systems and components will be found in Section III of this manual and in Vendor Publications.

SECTION VII
PERIODIC INSPECTION SCHEDULES

100-HOUR INSPECTION

OPERATIONAL INSPECTION

1. Engine controls.
2. Boost pump fuel pressure.
3. Oil pressure & temperature.
4. Fuel pressure.
5. Fuel quantity gages.
6. Fuel selectors.
7. Vacuum system.
8. Generator output.
9. Propeller governor.
10. Magnetos.
11. Idle rpm & mixture.
12. Cylinder head temperature.
13. Feather propellers.
14. Idle cutoff.
15. Brakes.
16. Starters.
17. Flaps.
18. Power check.
19. De-icer.
20. Anti-icer.
21. All lights.
22. Heat & vent system.
23. Pitot heat.
24. Stall warning.
25. Gyros.

ENGINE INSPECTION

1. Service oil screens.
2. Clean fuel strainers.
3. Magnetos.
4. Spark plugs & blast tubes.
5. Engine cylinders & baffles.
6. Exhaust & induction system.
7. Electrical wiring & equipment.
8. Plumbing.
9. Engine controls.
10. Engine accessories.
11. Engine mounts.
12. Propellers & accumulators.
13. Starter.
14. Cowling.
15. Generators.
16. Ignition harness.
17. Drain plugs.

CABIN & PILOT'S COMPARTMENT

1. Skin.
2. Structure.
3. Cables & pulleys.
4. Landing gear gear box.
5. Flap motor and drives.
6. Fuel selector system.
7. Brake system.
8. Rudder pedals.
9. Control column.
10. Instrument plumbing & wiring.
11. Instrument air filter.
12. Engine controls.
13. Windows & cabin door.
14. Seats & safety belts.
15. Electrical wiring & equipment.
16. Nose gear chain.
17. Aileron quadrant.

NOSE SECTION

1. Skin.
2. Structure.
3. Heat & ventilating system.
4. Heater fuel system.
5. Radio equipment.
6. Brake reservoir.

WINGS

1. Skin.
2. Structure.
3. Access doors.
4. Cables.
5. Ailerons.
6. Flaps & actuators.
7. Navigation lights.
8. Landing lights.
9. Fuel tanks, vents & pumps.
10. Liquidometers.
11. Plumbing.
12. Electrical wiring & equipment.
13. Wing bolts.
14. Aileron & trim tab controls.

MAIN GEAR AND BRAKES

1. Brakes.
2. Wheels & tires.
3. Landing gear strut.
4. Gear doors & linkage.
5. Retract mechanism.

MAIN GEAR RETRACTION

1. Doors.
2. Position indicators.
3. Warning horn.
4. Locks.
5. Safety switch.
6. Actuators.
7. Limit switches.
8. Emergency extension.
9. Strut fluid level.
10. Clutch tension.
11. General operation.

NOSE GEAR

1. Wheel & tire.
2. Landing gear strut.
3. Doors & linkage.
4. Shimmy dampener.
5. Retract mechanism.
6. Steering linkage.

NOSE GEAR RETRACTION

1. Doors.
2. Position indicator.
3. Locks.
4. Strut fluid level.

WING CENTER SECTION

1. Skin.
2. Structure.
3. Fuel tanks, vents, & pumps.
4. Oil filler doors & caps.
5. Liquidometers.
6. Flaps & actuators.
7. Leading edge wiring & plumbing.
8. Nacelle wiring & plumbing.
9. Cables.

10. Battery.

11. Vacuum regulators.

12. Landing gear torque shafts.

13. Heater fuel system.

REAR FUSELAGE & EMPENNAGE

1. Skin.

2. Structure.

3. Cables & pulleys.

4. Drain static line.

5. Empennage surfaces.

6. Empennage structure.

7. Rudder operation.

8. Elevator operation.

9. Trim tab operation.

10. Static ports.

11. Access doors.

GENERAL

1. Aircraft cleaned & serviced.

2. Aircraft lubricated.

1000-HOUR INSPECTION

OPERATIONAL INSPECTION

1. A complete ground run-up check of the airplane should be accomplished and a check list of malfunctions and discrepancies should be prepared to assure their correction when the airplane is moved into the shop.

CABIN & PILOT'S COMPARTMENT

1. Inspect skin & structure for condition & loose or missing rivets.

2. Remove, disassemble & inspect landing gear motor & gearbox.

3. Inspect landing gear control relay & limit switches, condition & attachment; replace control relay if contact points are pitted.

4. Clean & inspect nose gear retract chain; inspect sprocket condition & attachment.

5. Inspect landing gear torque shaft condition & attachment.

6. Remove, disassemble & inspect flap motor & gearbox; inspect flap drive condition & attachment.

7. Check control cables, pulleys & associated equipment & accessories for condition, attachment, alignment, clearance, rig & proper operation.

8. Check aileron quadrant condition, attachment, alignment & operation.

9. Check rudder pedal condition, clearance, attachment & rig; control column condition, attachment & operation; check flight control lock for condition, positive locking & alignment.

10. Check operation of ailerons, elevator, rudder & tabs; check tab indication; engine control condition, attachment & adjustment.

11. Inspect brake master cylinders for proper operation. Check brake line plumbing & accessories for condition & attachment; brake pedals & linkage for condition, attachment, operation & adjustment.

12. Check brake system components for leakage.

13. Inspect instrument panel, subpanels, placards, shock mounts, instruments & instrument plumbing & wiring for condition & attachment.

14. Check instrument cover glass condition & security; check instrument limit & operating range markings for correctness & legibility; magnetic compass for proper operation, condition of liquid & currentness of correction cards.

15. Check stall warning unit for condition & attachment; outside air temperature indicator for condition, attachments & correct indications.

16. Remove, disassemble & clean vacuum system centralized air filter (LC-1 thru LC-80 only).

17. Inspect electrical wiring & wiring accessories for condition, attachment & clearance; cabin & compartment lights for condition & attachment.

18. Inspect voltage regulator & reverse current relay condition & attachment. (Recommended overhaul period for voltage regulator is 1000 hours).

19. Check cabin heat & cold air outlet valves for condition, obstructions & proper operation; heating, defrosting & cooling ducts for condition & attachment.

20. Check oxygen equipment & outlets for condition,

attachment and cleanliness; check oxygen system for leakage.

21. Check windshield, windows & seals for condition, security, leakage and cleanliness.

22. Check cabin door hinge pins & locking mechanism for positive engagement; emergency exits for condition, operation & secure engagement of locking mechanism.

23. Check cabin seat & safety belt condition, attachment & operation; floor board condition & attachment.

24. Inspect hand fire extinguisher condition & attachment; check first-aid kit for condition, security & completeness of contents.

25. Inspect electrical, radio & electronic equipment attachment & clearance.

FUSELAGE

1. Inspect skin & structure for condition & loose or missing rivets. If damage is found adjacent to structural members in the pilot & passenger compartment area, it is advisable to remove upholstery for a thorough inspection.

2. Check control cables, pulleys & associated equipment & accessories for condition, attachment, alignment, clearance, rig & proper operation.

3. Inspect plumbing & associated equipment & accessories for condition, attachment & clearance.

4. Inspect electrical wiring & associated equipment & accessories for condition, attachment & clearance.

5. Check inspection & access doors for fit, fair & attachment.

6. Check courtesy lights for condition & attachment.

7. Check static ports & drain holes for obstructions.

8. Check antenna condition, attachment & tension.

9. Check navigation light condition & attachment.

10. Check light weight de-icer unit and plumbing for condition & attachment (when applicable).

WING CENTER SECTION

1. Inspect skin & structure for condition & loose or missing rivets.

2. Check access door, inspection plate & fairing fit, fair & attachment.

3. Remove flaps; clean & inspect rollers; inspect brackets & limit switches for condition & attachment; flap structure & skin for condition & loose or missing rivets.

4. Remove, disassemble & inspect flap actuator; inspect flap drive shaft condition & attachment. Reinstall flaps.

5. Inspect landing gear torque shaft & universal joint for condition & attachment.

6. Check control cable condition, alignment, clearance & rig.

7. Check fuel cell (bottom access plate removed), transmitter, fuel tank filler cap & chain for condition; fuel vent & drain lines for condition, security & obstructions.

8. Check fuel boost pump condition & attachment.

9. Drain & flush oil tank; inspect oil tank, oil filler door & oil filler cap condition & attachment.

10. Inspect leading edge & nacelle plumbing & associated equipment & accessories for condition & attachment.

11. Inspect leading edge & nacelle electrical wiring & associated equipment & accessories for condition & attachment.

12. Check battery electrolyte level; check battery & attachments & battery area for corrosion; drains & vents for condition, attachment & obstructions.

13. Inspect de-icer combination unit (when applicable) & plumbing for condition & attachment.

14. Inspect anti-icer tank, transmitter, filler cap, access door, pump, filter, check valve & plumbing condition & attachment.

OUTBOARD WING

1. Inspect skin & structure for condition & loose or missing rivets; check for concealed damage under de-icer boots by applying manual pressure.

2. Check access door & inspection plate fit, fair & attachment.

3. Check control cables, pulleys & associated equipment & accessories for condition, attachment, alignment, clearance, rig & proper operation.

4. Remove flaps; clean & inspect rollers; inspect brackets for condition & attachment; flap structure & skin for condition & loose or missing rivets.

5. Remove, disassemble & inspect flap actuator; inspect flap drive shaft condition & attachment. Reinstall flaps; check operation & travel settings (inboard & outboard flaps).

6. Inspect aileron & tab skin & structure for condition & loose or missing rivets, brackets & hinges for condition & security. Check aileron & tab operation & travel settings.

7. Check wing attach bolts for condition & specified torque: wing attach fittings for condition & security.

8. Check fuel cells (bottom access plates removed), transmitters, fuel tank filler caps & chains for condition: fuel vent & drain lines for condition, security & obstructions.

9. Check fuel boost pump for condition & attachment.

10. Inspect plumbing & associated equipment & accessories for condition & attachment.

11. Inspect electrical wiring & associated equipment & accessories for condition & attachment.

12. Inspect de-icer boot, de-icer distributor valve when applicable) & plumbing condition & attachment.

13. Inspect pitot head & mast condition & attachment; check pitot line for obstructions.

14. Inspect stall warning sensing unit condition & attachment.

15. Check landing & navigation light condition & attachment.

MAIN WHEEL WELL

1. Inspect skin & structure for condition & loose or missing rivets.

2. Check control cable condition, alignment, clearance & rig: turnbuckle & turnbuckle terminal condition & safetying.

3. Inspect plumbing & associated equipment & accessories for condition & attachment.

4. Inspect electrical wiring & associated equipment & accessories for condition & attachment.

5. Check fuel selector valves for leakage, proper rigging (selector handles synchronized with valves) & correct cable tension.

6. Check vacuum regulators for condition & attachment, remove & clean vacuum regulator air screens.

7. Inspect landing gear shock strut & components for condition & attachment.

8. Remove, disassemble & inspect landing gear actuator; check landing gear torque shaft & universal joint for condition & attachment.

9. Check landing gear retract mechanism for condition, attachment & evidence of improper synchronization or adjustment.

10. Check landing gear doors for condition, attachment & adjustment.

11. Check landing gear drag leg, hooks & down-lock & warning switches for condition & attachment.

12. Check landing gear safety switch condition & attachment.

13. Remove, clean & inspect wheel assembly; repack bearings; check tire condition.

14. Check braking surfaces & lining for wear; brake housing & piston assembly & brake lines for condition & attachment; check brake system components for leakage.

ENGINE

1. Inspect engine cowling, scoop, doors & chafing strips for condition & attachment.

2. Check magnetos for condition & attachment; magneto breaker compartments for cleanliness; breaker points for pitting; cam followers for proper lubrication, specified grounding, wear & security. (Recommended overhaul period for magnetos is at engine overhaul).

3. Check starter for condition & attachment; starter brushes for specified lengths; commutator for condition, proper film, evidence of excessive arcing & security. (Recommended overhaul period for starter is at engine overhaul).

4. Check generator for condition & attachment; generator brushes for wear & free movement; brush lead insulation for condition; commutator for evidence of arcing, oil or metal particles & security. (Recommended overhaul period for generator is 800 hours or at engine overhaul).

5. Check engine accessories for condition & attachment.

6. Remove, clean & inspect spark plugs; check spark plug blast tubes for condition & attachment.

7. Inspect ignition harness assemblies & accessories for condition & attachment.

8. Check cylinders, push rod housings, baffles, baffle seals & air deflectors for condition & security.

9. Check drain plugs for security, condition & metal particles.

10. Inspect plumbing & associated equipment & accessories for condition & attachment; check crankcase breather for obstructions.

11. Inspect electrical wiring & associated equipment & accessories for condition & attachment.

12. Check oil radiator & tubes for condition, attachment & obstructions.

13. Remove, clean & inspect oil screens, fuel strainers, & air intake filter; check air intake filter mounting condition & attachment.

14. Check augmentor tubes for condition & alignment.

15. Check induction system for condition & security; air intake duct for condition & obstructions; alternate air system for proper operation.

16. Inspect engine mounts, heat deflectors & heat shields for condition & attachment; rotate engine mount pads if necessary.

17. Check propeller & propeller components for condition, attachment & operation. (Propeller overhaul should coincide with engine overhaul at 500 to 1000 hours.

18. Check engine & propeller governor controls & associated equipment for condition, alignment, attachment & rig. (Recommended overhaul period for propeller governor is 1000 hours or every engine change as a result of engine internal failure).

NOSE SECTION

1. Inspect skin & structure for condition & loose or missing rivets.

2. Check access doors & nose compartment door for fit, fair & attachment.

3. Check nose light condition & attachment.

4. Inspect heater, heater components & associated wiring & ducting for condition & attachment. (Replacement of normal & reserve ignition unit vibrator contacts after 1000 hours of heater operation is recommended; overhaul of ignition unit is recommended after 2000 hours of operation; recommended overhaul period for the heater is every 500 hours of heater operation. Heater should be overhauled and pressure tested as outlined in the manufacturers specifications).

5. Check heater fuel plumbing & exhaust system for condition; heater drain lines for obstructions.

6. Remove & clean evaporative cooler water pump filter; drain, flush & refill water tank.

7. Check brake system reservoir & plumbing for condition & security; reservoir for specified fluid level.

8. Inspect de-icer electrical timer for condition & attachment.

9. Inspect electrical, radio & electronic equipment, wiring & wiring accessories for attachment & clearance; check inverter condition & attachment.

NOSE WHEEL WELL

1. Inspect skin & structure for condition & loose or missing rivets.

2. Inspect electrical wiring & associated equipment & accessories for condition & attachment.

3. Inspect nose gear shock strut & components for condition & attachment.

4. Check retract mechanism for condition, attachment & evidence of improper synchronization or adjustment. Remove disassemble & inspect landing gear actuator.

5. Check landing gear doors for condition, attachment & adjustment.

6. Check nose gear drag leg, hooks & down-lock & warning switches for condition & attachment.

7. Check nose wheel steering mechanism for condition, attachment & correct adjustment.

8. Remove, disassemble & inspect shimmy dampener.

9. Remove, clean & inspect wheel assembly; repack bearings; check tire condition.

10. Check static ground wire for condition, security & positive contact with ground.

EMPENNAGE SECTION

1. Inspect skin & structure for condition & loose or missing rivets; check for concealed damage under de-icer boots by applying manual pressure.

2. Check access & inspection plate fit, fair & attachment.

3. Check control cables, pulleys & associated equipment & accessories for condition, attachment, alignment clearance, rig & proper operation.

4. Check elevator, rudder & trim tabs for condition, attachment, free operation, specified travel & correct direction of movement with respect to cockpit controls; check elevator & rudder balance weights for security.

5. Check horizontal stabilizer & vertical stabilizer attaching bolts for condition & cleanliness; attach fittings for condition & security.

6. Inspect de-icer boot, de-icer distributor valve & plumbing condition & attachment.

7. Check rotating beacon condition & attachment.

LANDING GEAR OPERATION

1. Check for proper operation of actuators, position indicator & warning horn.

2. Check safety switch for proper operation; safety switch plunger for freedom of operation.

3. Check limit & warning switches for proper adjustment.

4. Check main & nose gear door operation, fit, fair & rig.

5. Check locking mechanism for positive engagement in extended position: downlock position switch for proper adjustment.

6. Check emergency extension system for freedom of operation & positive engagement of downlocks.

7. Check overload clutch for specified torque.

8. Check retraction system for proper operation of all components through at least two complete cycles; check for unusual noises or evidence of binding.

GENERAL

1. Aircraft checked for conformity with FAA Specifications, airworthiness directives, service bulletins and letters.

2. Aircraft reassembled, cleaned, serviced and lubricated in accordance with the shop manual.

3. Perform a complete electrical systems check, ground run-up check and flight test.

SECTION VIII

Accessory and Component Replacement Schedule

8

SECTION VIII

ACCESSORY AND COMPONENT REPLACEMENT SCHEDULE

The overhaul and replacement times for vendor furnished equipment on the Queen Air appearing in this section were suggested by our vendors upon request, and to them we are greatly indebted. We are aware of the difficulty of establishing an overhaul or replacement figure for many of the items in this list. However, our vendors have compiled this information from actual service experience, life tests and engineering data and have made their recommendations as liberal as possible with reasonable safety margins.

For convenience the items are listed under the following systems of the airplane: landing gear, power plant, fuel system, instruments, electrical system and utility systems. When an item is to be replaced with a new item the work "replace" is used; in all other cases overhaul is implied.

The overhaul and replacement times in the schedule are subject to change as experience dictates and may be revised occasionally by the various vendors or by BEECH AIRCRAFT CORPORATION. Also, additional purchased parts on which a set overhaul or replacement time seems logical will be included as further information is obtained. As changes are indicated or supplementary data received, revisions will be accomplished to keep the list current.

SECTION VIII
REPLACEMENT SCHEDULE

ITEM	OVERHAUL OR REPLACE	PART NO.
	LANDING GEAR	
Brake assembly	Inspect at lining replacement.	9531893
Master cylinder	Every 1000 to 1200 hours.	V-15-875-2
Parking brake valve	Every 24 months.	4500S- A1
Shuttle valve assembly	Every 1000 hours.	A-22
All hose	Replace every 1000 hours or 5 years from date of manufacture, whichever occurs first.	
	POWER PLANT	
Engine - Model 65	*Every 600 hours.	IGSO-480-A1A6 IGSO-480-A1B6
Engine - Model 80	*Every 600 hours.	IGSO-540-A1A
Starter	At engine overhaul.	G-760
Starter	At engine overhaul.	756-10C
Fuel pump	Every 1600 hours.	2P-R400-BRD 2P-R400-BRD-5
Fuel pump	Every 1200 hours.	RG9570
Fuel pump	Every 1600 hours.	50-921560-5
Vacuum pump	At engine overhaul.	3P-194F
Vacuum pump	At engine overhaul.	G450 G455
Oil cooler	At engine overhaul.	8525330
Propeller	To coincide with engine overhaul at 500 to 1000 hours.	HC-B3Z20-2A/ 10151-8 HC-93Z20-2C1/ 10151-8
Propeller governor	At engine change.	210190F 210365
Generator	At engine change or one year whichever occurs first.	30B24-1-A
Generator	Every 800 hours.	901-9B
All hose	Replace every 1000 hours or 5 years from date of manufacture, whichever occurs first.	
	FUEL SYSTEM	
Main fuel cell transmitter	Replace when necessary.	1517127

*Two extensions of 25% or 150 hours each are permissible if the engine checks satisfactorily

ITEM	OVERHAUL OR REPLACE	PART NO.
	FUEL SYSTEM (Cont.)	
Auxiliary fuel cell transmitter	Replace when necessary.	1518847 1518540 1518414
Main fuel cell drain valve	Replace when necessary.	CCA-4850
Auxiliary fuel cell drain valve	Replace when necessary.	CCA-4850
Fuel line check valve	Every 2000 hours or 18 months whichever occurs first.	1112-581041
Fuel cell vent line check valve	Every 2000 hours or 18 months whichever occurs first.	1111-595272
Fuel cell vent line check valve	Overhaul when necessary	366-00
Fuel shutoff crossfeed valve	Every 5000 to 7000 cycles or two years whichever occurs first.	WE452-1D
Fuel booster pump	Every 1000 hours.	56881-1
Fuel booster pump	Overhaul when necessary	122723-113-01
	INSTRUMENTS	
Turn and bank indicator	Replace 1000 hours or 24 months whichever occurs first.	28W2-E1S
Rate of climb indicator	Every 1000 hours or 24 months.	22-200-01
Airspeed indicator	Every 1000 hours or 24 months.	22-695-019
Altimeter	Every 1000 hours or 24 months.	G371-01-1A
Fuel quantity gage	Replace every 2000 hours.	59-1127 59-1127-A 59-1130 59-1130-A 59-3131 59-3131-A
Cylinder head temperature	Every 1000 hours or 24 months.	22-296-03
Engine gage unit	Every 1000 hours or 24 months.	22-802-013
Ammeter	Every 3000 hours.	8DW53-BAC-228
Ammeter	Every 1000 hours or 24 months.	22-340-03

ITEM	OVERHAUL OR REPLACE	PART NO.
	INSTRUMENTS (Cont.)	
Engine tachometer	Every 1000 hours or 24 months.	22-281-010
Clock	Overhaul when necessary	W-33-7510-LET-10
Clock	Every 1000 hours or 24 months.	A-11-90-WET
Gyro Horizon	Every 1000 hours or 24 months.	656768-1C
Directional gyro	Every 1000 hours or 24 months.	649742-4
Suction Gage	Every 1000 hours or 24 months.	22-880-04
All hose	Replace every 1000 hours or 5 years from date of manufacture, whichever occurs first.	
	ELECTRICAL SYSTEM	
Voltage regulator	Overhaul when necessary	1589-1
Voltage regulator	Inspect every 500 hours, overhaul every 1000 hours.	CR2795B105A1
Battery master relay	Replace when necessary.	6041-H189
Starter relay	Replace when necessary.	6041-H189
Landing gear control relay	Replace when necessary.	6046-H39A
	UTILITY SYSTEMS	
Cabin heater	Overhaul and pressure test every 500 hours of operation.	80C65
Heater ignition unit	Every 2000 hours.	11C30
Heater fuel regulator	Every 1500 hours.	B54A20
Heater fuel shutoff valve	Replace when necessary	AV1B1474
Heater blower	Every 500 hours of on time.	M4861-H-1A
Oxygen regulator	Every 800 hours or 24 months whichever occurs first.	A-2000
Oxygen cylinder	Hydrostatically test every 5 years.	C250-63
Oxygen cylinder	Every 24 months.	6350A2-0

ITEM	OVERHAUL OR REPLACE	PART NO.
	UTILITY SYSTEMS (Cont.)	
Cabin fire extinguisher	Every six months, weigh cartridge, if less than minimum weight, replace cartridge. Overhaul cylinders containing anti-freeze charge every six months, cylinders without anti-freeze charge every 12 months. Hydrostatically test cylinder to 350 psi every 5 years.	890017