



TIGER AIRCRAFT LLC

MAINTENANCE MANUAL

**MODEL
AG-5B**

TIGER AIRCRAFT LLC
226 Pilot Way
Martinsburg, WV 25401

**TIGER AIRCRAFT AG-5B SERIES
MAINTENANCE MANUAL**

SPECIFICATIONS

1. General

This section provides the major specifications for the Tiger AG-5B Aircraft.

2. Specifications

The major specifications for the aircraft are as follows:

<u>FAA Type Certificate</u>	A16EA
<u>Gross Weight (Normal Cat.)</u>	2400 lbs.
<u>Gross Weight (Utility Cat.)</u>	2050 lbs.
<u>Fuel Total Usable</u>	51 gal.
<u>Oil Capacity</u>	8 qts.
<u>Engine</u>	Lycoming O-360-A4K 180 HP@ 2700 RPM
<u>Propeller (Fixed Pitch)</u>	Sensenich 76" Dia.
<u>Spinner</u>	Required Equipment
<u>Length</u>	22'
<u>Height</u>	7' - 8"
<u>Wings: Span</u>	31' - 6"
Dihedral	5°
Incidence	1° 50'
Aileron Travel (UP)	15° + 2°, -0°
(DN)	7 ½° + 2 ½°, -0°
Flap Travel	45° ± 2°
Max Difference Between Flaps	1°
<u>Empennage:</u>	
Horizontal Tail Incidence	0°
Vertical Tail Offset	0°
Elevator Travel (UP)	23° ± 1°
(DN)	17° ± 2°
Rudder Travel (Lt & Rt)	25° ± 2°
Trim Tab Travel (UP)	14° ± 3°
(DN)	30° ± 1°
<u>Main Wheel Tire:</u>	6.00 x 6, 6 ply rating
Pressure	34 psi
<u>Nose Wheel Tire:</u>	5.00 x 5, 4 ply rating
Pressure	25 psi

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INTRODUCTION

GENERAL

The function of this Maintenance Manual is to acquaint maintenance personnel with the systems and their components of the AG-5B aircraft and to direct them in the proper procedures for maintaining the aircraft in an airworthy condition.

This manual contains information on installations made in the aircraft during the manufacture of standard components and optional equipment only. However, information derived from applicable Single Engine Aircraft Service Kits, Service Bulletins, and Service Letters will be included in the manual as soon as possible after the issuance of these documents. Changes or installations made by the owner/operator are not included in this manual.

FORMAT

The chapter identification in this manual has been prepared in accordance with Air Transport Association (ATA) Specification No. 100. A functional breakdown is employed whereby all data pertaining to a given system, or component of a system, may be found in one chapter with a minimum of cross-referencing to other chapters.

The Electrical Power Chapter in this manual covers only the power sources and distribution equipment for the electrical system. There is not a chapter in this manual specifically designated for instruments. Details of individual branch electrical or instrument systems will be found in the applicable chapter.

PAGE AND FIGURE IDENTIFICATION

A "Log of Revision" page stands alone at the start of each chapter and is designated by the chapter number followed by a dash i.

Example: Page 20-i.

The chapter number prefixes page numbers.

Example: Page 12-14 is the 14th instructional page of chapter 12.

Figures (illustrations) are consecutively numbered within each chapter.

Example: Figure 27-3 is the third figure found in chapter 27.

INDEXING

Each chapter is prefaced with a table of contents identifying the subject matter within the chapter in order of presentation. The table of contents is arranged with the following headings: DESCRIPTION; TROUBLESHOOTING; AND MAINTENANCE PRACTICES.

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PART NUMBERS

This manual must not be used for identifying part numbers. Consult the Illustrated Parts Catalog or call Tiger Aircraft LLC for part identification numbers. Part numbers are used in this manual only as a means of identification when nomenclature alone is inadequate.

REVISIONS

Revisions to the original text are indicated by approved date on the page and noted in the chapter index.

Each page revised or added to the manual will be identified by the revision date at the page bottom. Pages issued with the original manual are identified with the manual issue date (09/01/03).

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CHAPTER 5
TIME LIMITS-MAINTENANCE CHECKS

LOG OF REVISIONS

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CHAPTER 5

AIRWORTHINESS LIMITATIONS SECTION

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AIRWORTHINESS LIMITATIONS - DESCRIPTION / OPERATION

1. **General**

This chapter contains the manufacturer's recommended time limits for scheduled and unscheduled maintenance checks and inspections.

NOTE: The Airworthiness Limitations Section is FAA approved and specifies maintenance required under Sections 43.16 and 91.403 of the Federal Aviation Regulations unless an alternative program has been FAA approved.

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TIME LIMITS - DESCRIPTION / OPERATION

1. General

The service guide contains the manufacture's recommended time limits for inspection, maintenance and overhaul of the airplane, its systems and units.

2. Service Life Limited Components

Federal Aviation Regulations require certified aircraft, for which application for a type certificate was made after September 14, 1969, have the critical wing structure components fatigue strength investigated and that, where applicable, these components be service life limited. Since the AG-5B falls into this category, the following service life information is provided. AG-5B wing and associated structure have been shown capable of withstanding the repeated loads of the variable magnitudes expected in service. This was accomplished through a fatigue strength investigation, and as a result of this investigation, discrete service lives have been established for some wing structure components. Those components and their corresponding service lives are listed in Table 5-01.

Service life limited parts must be retired from service in accordance with the specified service life hours listed in Table 5-01.

All wing and fuselage structural components shall be subject to normal inspection, maintenance, repair and replacement procedures. In addition, to ensure maximum life, if minor surface corrosion is detected on wing or inboard spars, remove it as soon as possible and protect the surface from further corrosion in accordance with AC43.13-1B, "Acceptable Methods, Techniques and Practices - Aircraft Inspection and Repair".

Service Life Limited Components
Table 5-01

COMPONENT	AIRCRAFT MODEL	PART NUMBER	SERVICE LIFE (AIRFRAME HRS.)
Wing Inboard Spar (carry through spar) Assembly	AG-5B	5102310-503	12,000
Shoulder Bolt	AG-5B	901044-3	7,250
Inboard Wing Spar Assembly	AG-5B	*5201004-501	12,500
Wing Outboard Spar Assembly	AG-5B	*5201189-501	12,500
Back-Up Battery, G1000 System	AG-5B	G-243	24 Months from activation

* Retiring of wing spars from service will generally require simultaneous removal of corresponding wing panel assemblies from service.

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SCHEDULED MAINTENANCE CHECKS - DESCRIPTION / OPERATION

1. General

Inspection procedures guidelines included in this section may be used by the owner, inspector, or mechanic to ensure a complete and comprehensive coverage of the inspection requirements. The format of the procedures can be reproduced for ready use by the personnel performing the inspection. The checklist includes the minimum requirements for the 100-hour or annual inspection. Reference Table 5-03.

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Table 5-02

INSPECTION MAINTENANCE	Inspection Interval (Operating Hours)			NOTE
	50	100	1000	
AIRFRAME				
1. Clean aircraft.	X	X	X	i & m
2. Aircraft structure (especially the spar around the inboard and outboard wing lock shoulder bolts, gear attachments, and fuselage attach collars).		X	X	
3. Windows, windshield and canopy.	X	X	X	
4. Seats, console, interior seating area and seat belts.	X	X	X	
5. Instrument panel, instruments and placards.		X	X	
6. Baggage compartment and cargo tie downs.		X	X	
7. Antennas.		X	X	
8. Nose gear torque tube assembly.		X	X	
9. Control T-column and bearings.		X	X	
10. Empennage and attachments.	X	X	X	
LANDING GEAR				
1. Strut and upper & lower strut brackets, main gear.		X	X	a b
2. Strut, torque tube assy., fork and boot assy., nose gear.		X	X	
3. Nose and main wheel bearing lubrication.		X		
4. Nose fork swivel lubrication.		X	X	
5. Brake linings and discs.		X	X	
6. Wheel fairings scraper adjustments.		X	X	
7. Main and nose tire pressure.	X	X	X	

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Table 5-02 (continued)

INSPECTION MAINTENANCE	Inspection Interval (Operating Hours)			NOTE
	50	100	1000	
CONTROL SYSTEMS				
1. Cables, turnbuckles, pulleys, guards and terminals.		X	X	
2. Rudder pedals, springs and cables.		X	X	j
3. Flaps, flap actuator, flap push-pull rods, flap torque tubes, torque tube bearings, bearing supports and position indicator.		X	X	
4. All control stops.		X	X	
5. Elevator trim wheel, indicator, indicator shaft and actuator shaft drive screw. Elevator trim tab free play.		X	X	l
6. Ailerons, aileron torque tubes, aileron balance weights, bearings and bearing brackets.		X	X	
POWERPLANT				
1. Oil change.	X	X	X	n
2. Oil cooler.	X	X	X	
3. Replace oil filter.	X	X	X	
4. Check and Clean Suction Screen.		X	X	
5. Spark plugs.		X	X	
6. Ignition harness.	X	X	X	
7. Magneto timing.				c
8. Exhaust system.	X	X	X	
9. Throttle, carburetor heat and mixture controls operation.	X	X	X	p
10. Engine baffles.	X	X	X	
11. Air filter.	X	X	X	k
12. Engine mount.	X	X	X	
13. Oil breather vent.	X	X	X	
14. All lines, flex ducts and connections.	X	X	X	d
15. Propeller and spinner.	X	X	X	
16. Alternator mounting and belt.	X	X	X	

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Table 5-02 (continued)

INSPECTION MAINTENANCE	Inspection Intervals			NOTE
	(Operating Hours)			
	50	100	1000	
POWER PLANT (continued)				
17. Cylinders, crankcase, accessory section, front crankshaft seal.	X	X	X	
18. Engine overhaul.				e
FUEL SYSTEM				
1. Electric fuel pump filter.	X	X	X	
2. Fuel cap seals.	X	X	X	
3. Fuel overboard vents.	X	X	X	
4. Fuel tanks, fuel sumps and drains.	X	X	X	
5. Fuel selector and placard.		X	X	
6. Fuel gauges.		X	X	
7. All hoses and lines.	X	X	X	d
8. Fuel primer system.		X	X	
UTILITY SYSTEMS				
1. Master cylinder fluid level.	X	X	X	
2. Parking brake operation.		X	X	
3. All hoses, lines, and connections.		X	X	
4. Pitot and static systems.		X	X	
5. Pitot line drain.		X	X	
6. Vacuum regulator and filter.		X	X	f
7. Flexible ducts for heating system.		X	X	
8. Cabin heat control operation.		X	X	
9. Compass check.			X	g
10. Vacuum pump.			X	h

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Table 5-02 (continued)

INSPECTION MAINTENANCE	Inspection Interval (Operating Hours)			NOTE
	50	100	1000	
ELECTRICAL SYSTEMS				
1. Battery fluid level.	X	X	X	s
2. Battery hydrometer check.		X	X	
3. All connections.		X	X	
4. All lights for operation.	X	X	X	
5. All wiring harnesses and wires.		X	X	
6. Stall warning.	X	X	X	
7. Electrical flap motor.		X	X	
8. Emergency Buss Diode G1000 Equipped Aircraft		X	X	q
9. Emergency Battery Switch G1000 Equipment Aircraft		X	X	r
10. G1000 System Electrical Bonding Test				t
11. Transorb Fuse		X	X	u

NOTES:

- a. Remove nose gear strut from torque tube yoke and inspect for corrosion of the surfaces every 12 calendar months. Remove minor surface corrosion if present and apply McLube 1708 dry film lubricant or equivalent to the mating end of the strut and the inside of the yoke. Allow lubricant to dry, and reassemble. Seal strut to yoke connection with P/S 870 Class B Sealant by PRC DeSoto or equivalent.
- b. Clean, check for freedom of movement and repack wheel bearings at first 100 hours and at each annual inspection.
- c. Maximum time between magneto timing checks and external condition inspection is 100 hours. A tear down inspection of the magneto must be accomplished every 500 hours. For details on the tear down inspection requirements refer to the Slick Maintenance and Overhaul Manual L-1363. Magneto replacement recommended at engine overhaul.
- d. Recommended replacement of all flexible pressure lines at engine overhaul or every five years, whichever comes first.
- e. Engine overhaul time 2000 hours. (Lycoming TBO)
- f. Replace gyros central air filter each 400 hours. Clean vacuum relief valve filter each 100 hours. For operation in dusty climates, replace filters more frequently.
- g. Check accuracy of compass every 1000 hours or at each time an item of equipment is installed or removed that could affect the accuracy of the unit.

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NOTES: (Continued)

- h. Recommended replacement of vacuum pump is 1000 hours.
- i. Remove the fuel tank access covers and inspect all internal surfaces and structure for corrosion, cracks, and bonding separation every 2000 hours or at any time the access covers are removed.
- j. Replace rudder springs every 1000 hours.
- k. Recommended replacement of engine induction air filter at 100 hours, 12 calendar months, or when 50 percent covered with foreign material, whichever comes first.
- l. Measure the elevator trim tab free play every 500 hours.
- m. Within the first 1000 hours and every 500 hours thereafter perform a Wing Attach Shoulder Bolt (p/n 901044-3) Inspection:
- n. Remove the Shoulder bolts from the wing root and inspect the shoulder of each bolt for fretting and/or scoring to the shoulder of the bolt. If there is any wear resulting in the removal of the cadmium coating on the bolt shoulder, remove the bolt from service and replace the bolt with a new one. Reference chapter 57 of this manual and Service Bulletin SB-185 requirements.
- o. Reference Textron Lycoming Mandatory Service Bulletin No. 480 for engine oil and filter change and maintenance intervals.
- p. Inspect the throttle cable in accordance with Chapter 73 page 73-10. If wear in excess of the published limit is determined, throttle cable replacement is required.
- q. Inspect the Emergency Buss Diode each 100 hours or Annual Inspection for aircraft equipped with the G1000 Integrated Avionics Flight System. (Reference Chapter 24A Section 7, A)
- r. To test the Emergency Battery (E-Battery) Switch installed on G1000 equipped aircraft, place the Master Switch in the "OFF" position. Flip up the switch guard and place the E-Battery Switch in the "ON" position. Verify that the G1000 PFD comes on line. Turn the E-Battery Switch to the "OFF" position and verify that the G1000 PFD is off line.
- s. The G1000 System Back-Up Battery must be replaced 24 months after the date the battery first entered service (date the battery was first serviced with electrolyte). For inspection and servicing of the Gill G-243 (original OEM) Battery, refer to Teledyne Battery Products Document Number: Q01-1120 Dry-Charge Lead-Acid Aircraft Battery Service Manual. The Back-Up Battery replacement date should be recorded and tracked in the airframe logbook.
- t. The G1000 Electrical Bonding test must be accomplished in accordance with Chapter 34 at each 5 year interval after the aircraft certification date and, after maintenance is performed which disturbs any structural ground point such as engine removal/installation or engine ground strap removal/installation, etc.
- u. Inspect the Transorb Fuse at each scheduled inspection or whenever a lighting strike is suspected (Reference Chapter 24A Section 9).

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SCHEDULED MAINTENANCE CHECKS - MAINTENANCE PRACTICES

1. Annual or 100-hour Inspection Procedures

A. Perform Annual or 100-Hour Inspection.

Complete the inspection by performing each of the procedures detailed on the checklist, Table 5-03.

B. In addition to the Servicing Guide and Annual or 100-Hour Inspection Procedure, the following steps should be adhered to when performing an inspection or overhaul:

(1) Check any FAA Airworthiness Directive and Service Bulletins/Letters for compliance at the time specified thereon. Also, appropriate sections of this maintenance manual.

(2) Check that the following aircraft documents are present and in order:

Aircraft Airworthiness Certificate

Aircraft Registration Certificate

Weight and Balance Documentation

Aircraft Equipment List

Repair and Alteration Forms (if applicable)

Aircraft Radio Station License (if applicable)

Airframe, Engine and Propeller Log Books

NOTE: All of the above items except the log books must be carried in the aircraft at all times.

(3) Check that operating limitation placards are displayed.

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**Table 5-03
INSPECTION PROCEDURE GUIDELINE**

<p>TIGER AIRCRAFT MODEL AG-5B ANNUAL OR 100 - HOUR INSPECTION PROCEDURE</p> <p><u>ANNUAL OR 100 - HOUR INSPECTION PROCEDURE GUIDELINE</u></p> <p>FAR 43.15 (c) (1) states: "Each person performing an annual or 100 - hour inspection shall use a check list while performing the inspection. The check list may be of the person's own design, one provided by the manufacturer of the equipment being inspected, or one obtained from another source. This check list must include the scope and detail of the items contained in appendix D to this part and paragraph (b) of this section." The following pages contain a comprehensive annual or 100 - hour inspection procedure check list.</p>			
OWNER'S NAME		STREET ADDRESS	
CITY	STATE	ZIP CODE	
REGISTRATION NO.	SERIAL NO.	AIRFRAME HOURS	DATE INSPECTION COMPLETED
SERVICING AGENCY		CITY	STATE
REPAIR STATION No. (if applicable)			
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <p>Check for conformity with FAA Specifications, Airworthiness Directives and Tiger Aircraft Service Bulletins and Letters.</p> </div>			
<div style="border: 1px solid black; padding: 10px; width: fit-content; margin: 0 auto;"> <p style="text-align: center;">NOTE</p> <p>It is recommended that reference be made to the applicable maintenance handbook, service bulletins, letters, installation instructions, and vendor specifications for torque values, clearances, settings, tolerances and other specification data.</p> </div>			

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Table 5-03 (continued)

MODEL AG-5B ANNUAL OR 100 - HOUR INSPECTION PROCEDURE		
	MECH.	INSP.
<p>PRE - INSPECTION ENGINE RUN UP</p> <p>Prior to beginning the Annual or 100 hour inspection, an engine run up is to be made to facilitate oil drainage and to observe the following, noting any discrepancies.</p>		
<p>1. Fuel Pressure: (0.5 to 8 PSI)</p> <p>Electric Pump only prior to engine start up: _____</p> <p>Engine Pump only after engine start up: _____ Both: _____</p>		
<p>2. Oil Pressure: (60 to 120 PSI @ 1800RPM) (Approx. 25 PSI idling) Oil Temperature in Green Arc.</p> <p>Actual @ 1800 RPM: _____ Actual @ Idle: _____</p>		
<p>3. Magneto RPM Drop @1800 RPM: (175 RPM maximum drop on either Magneto, no more than 50 RPM difference between magnetos.)</p> <p>Actual Drop Left: _____ Right: _____</p>		
<p>4. Check engine static RPM: (Propeller Pitch A, B or C) A. (61" 2100-2275)_____. B. (63" 2050-2225)_____. C. (65" 2000-2175)_____. Prop Pitch: _____ Actual RPM: _____.</p>		
<p>5. Idling Speed: (550 to 650 RPM) Actual RPM: _____.</p>		
<p>6. Check Alternator output:</p> <p>Check volts, 24 -28V. Actual Voltage: _____</p>		
<p>7. Vacuum Gauge: (4.6 to 5.4 In. Hg @ 1800 RPM)</p> <p>Actual: _____</p>		
<p>8. Fuel Selector: (check operation at all positions).</p>		

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Table 5-03 (continued)

MODEL AG-5B ANNUAL OR 100 - HOUR INSPECTION PROCEDURE		
PRE - INSPECTION ENGINE RUN UP (continued)	MECH.	INSP.
9. Carburetor Heat Control: (Free movement and slight RPM drop when 'ON')		
10. Engine response to smooth change in power: (Should not misfire, stumble or hesitate)		
11. Idle cut-off: (Engine should stop immediately)		
A. PROPELLER GROUP	MECH.	INSP.
1. Remove spinner and check for cracks, scratches, scoring, dents, nicks and distortion.		
2. Inspect spinner back plate, bulkheads and doubler for cracks and secure mounting. <i>Reference Propeller Installation "Caution" Chapter 61</i>		
3. Inspect blades for erosion, scratches, nicks and cracks. Dress out nicks as instructed by propeller maintenance manual.		
4. Check front crankshaft seal for oil leaks.		
5. Check torque of propeller mounting bolts: (60-65 ft. lbs. / 720-780 in. lbs.) Re-safety propeller mounting bolts.		
6. Reinstall spinner. Check spinner run out _____ inch. Maximum 0.025 inch at tip.		
B. ENGINE GROUP	MECH.	INSP.
1. Remove engine cowl. Clean and check for cracks, wear, distortion, loose or missing fasteners.		

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Table 5-03 (continued)

MODEL AG-5B ANNUAL OR 100 - HOUR INSPECTION PROCEDURE		
B. ENGINE GROUP (continued)	MECH.	INSP.
2. Drain oil sump. Remove oil filter and replace with a new filter. Check and clean suction screen. Reinstall and resafety. Cut old filter apart and inspect for metal particles. Check oil pressure transducer for security and signs of leakage.		
3. Check oil temperature sending unit, oil lines, cooler, and fittings for leaks, chafing, dents, cracks, and secure mounting.		
4. Service engine with oil per manufacturers specifications.		
5. Clean engine, using mineral spirits or equivalent.		
6. Check engine cylinder compression. Record cylinder compression: #1. _____ #2. _____ #3. _____ #4. _____		
7. Clean and re-gap or replace spark plugs as required (See latest revision of Lycoming Service Instruction No. 1042).		
8. Check ignition harnesses. Clean and inspect insulators.		
9. Check magneto timing and for any oil seal leakage, check distributor block for cracks, burned areas and/or corrosion. <i>NOTE: Reference engine data plate for timing.</i>		
10. Remove and inspect air filter and replace the air filter if found damaged or defective. Reinstall carburetor air filter. <i>NOTE: Do not remove oil coating from air filter.</i>		

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Table 5-03 (continued)

MODEL AG-5B ANNUAL OR 100 - HOUR INSPECTION PROCEDURE		
B. ENGINE GROUP (continued)	MECH.	INSP.
11. Inspect carburetor heat control valve plate, shaft, valve plate to shaft screws and bearings for signs of wear and assure proper security. Inspect gasket between carburetor heat box and carburetor, replace if defective.		
12. Check induction air intake flex ducts for broken or loose strings, loose or displaced supporting wire, signs of wear and/or perforation and general overall condition. Replace if required.		
13. Drain carburetor bowl. Reinstall drain plug and safety wire. Remove and clean carburetor fuel inlet screen with acetone. Reinstall screen.		
14. Remove and clean electric fuel pump filter. Reinstall and safety. Check fuel pressure transducer for secure mounting and signs of leakage.		
15. Check fuel pump for proper operation and secure mounting. Pressurize fuel system with electric pump and inspect fuel system and lines for leaks. Check fuel primer for operation and line leaks.		
16. Check starter for secure mounting.		
17. Check security of throttle arm on carburetor. Check throttle, carburetor heat and carburetor mixture controls for proper travel, security, operating condition and control cushion. Check optional manifold pressure transducer for secure mounting and signs of leakage (if installed).		
18. Remove exhaust shroud and check muffler tailpipe, risers, clamps, gaskets and exhaust system for cracks, leaks and secure mounting. Check EGT probes for damage. Reinstall shroud.		
19. Check breather tube for obstructions and secure mounting. Breather should extend below cowl 1.25 inches. Confirm slit in the aluminum tube is inside cowl and facing forward.		
20. Inspect cylinders for evidence of excessive heat indicated by discoloration of cylinder paint. Check for cracks, loose bolts oil leaks and general condition. Check CHT probes for security and damaged wiring.		

**TIGER AIRCRAFT AG-5B SERIES
MAINTENANCE MANUAL**

Table 5-03 (continued)

MODEL AG-5B ANNUAL OR 100 - HOUR INSPECTION PROCEDURE																	
B. ENGINE GROUP (continued)	MECH.	INSP.															
21. Inspect engine mount for cracks and secure mounting. Check rubber vibration dampeners for signs of deterioration. Replace if required.																	
22. Check all baffles for cracks, loose or missing screws and deteriorated seal material.																	
<p>23. Check alternator for secure mounting and lugs and brackets for cracks. Check condition and tension of alternator drive belt. Replace if required. Adjust the Alternator Belt as follows:</p> <p>Apply a torque wrench to the nut that attaches the pulley to the alternator and apply force in a clockwise direction, note the torque when the pulley slips. Adjust belt to the following tension:</p> <table style="margin-left: 40px; border: none;"> <thead> <tr> <th style="text-align: left;"><u>Belt Size</u></th> <th style="text-align: left;"><u>Condition</u></th> <th style="text-align: left;"><u>Torque Slippage</u></th> </tr> </thead> <tbody> <tr> <td>3/8"</td> <td>New</td> <td>11-13 ft. lbs.</td> </tr> <tr> <td>3/8"</td> <td>Old</td> <td>7-9 ft. lbs.</td> </tr> <tr> <td>1/2"</td> <td>New</td> <td>13-15 ft. lbs.</td> </tr> <tr> <td>1/2"</td> <td>Old</td> <td>9-10 ft. lbs.</td> </tr> </tbody> </table>	<u>Belt Size</u>	<u>Condition</u>	<u>Torque Slippage</u>	3/8"	New	11-13 ft. lbs.	3/8"	Old	7-9 ft. lbs.	1/2"	New	13-15 ft. lbs.	1/2"	Old	9-10 ft. lbs.		
<u>Belt Size</u>	<u>Condition</u>	<u>Torque Slippage</u>															
3/8"	New	11-13 ft. lbs.															
3/8"	Old	7-9 ft. lbs.															
1/2"	New	13-15 ft. lbs.															
1/2"	Old	9-10 ft. lbs.															
<p>24. Check battery electrolyte level and specific gravity. Clean and tighten battery terminals. Check battery drain for condition and assure drainage is clear of the aircraft structure.</p> <p>Note: G1000 equipped aircraft have two batteries (check both). The Back-Up Battery must be replaced every 24 months. See Chapter 24A</p>																	
25. Inspect vacuum system components for secure mounting. Check vacuum pump drive for evidence of seal leakage. Replace seal and pump if required. Check all interconnecting lines and fittings for leaks, deterioration and damage. Replace if required.																	
26. Check ground straps for condition and secure attachment.																	
27. Check electrical wiring for condition and secure connections including shielded cable ground connection.																	
28. Check Alternator Control Unit, Starter Relay and Master Switch Relay for condition, operation and installation.																	

**TIGER AIRCRAFT AG-5B SERIES
MAINTENANCE MANUAL**

Table 5-03 (continued)

MODEL AG-5B ANNUAL OR 100 - HOUR INSPECTION PROCEDURE		
B. ENGINE GROUP (continued)	MECH.	INSP.
29. Check fuses for condition and installation.		
30. Install cowl, checking for proper engagement of air intake duct and cowl latches.		
C. CABIN GROUP	MECH.	INSP.
1. Remove front seats, aft. console, rear seat back cushions and fold rear seat bottom forward, remove cover from rear seat support and remove console side panels. To gain access for following inspections and checks.		
2. Check windshield, windows and canopy for cracks and secure mounting. Clean and lubricate canopy rails. Check canopy operation and locking devices.		
3. Check seat belts and shoulder harnesses for condition and secure mounting.		
4. Check elevator trim control for condition, secure mounting, proper operation and indication.		
5. Check rudder pedal and brake system for proper operation and condition. Check brake fluid level. Replace rudder pedal springs at 1000 hours.		
6. Check control "T" column for secure mounting and adequate clearance from other equipment.		
7. Check pitot static system lines and the alternate air source valve. Drain any accumulated moisture from system drain. ("T" Fitting under the L/H side of rear seat).		
NOTE: Opening the alternate air source valve will drain static lines behind the panel.		

**TIGER AIRCRAFT AG-5B SERIES
MAINTENANCE MANUAL**

Table 5-03 (continued)

MODEL AG-5B ANNUAL OR 100 - HOUR INSPECTION PROCEDURE		
C. CABIN GROUP (continued)	MECH.	INSP.
8. Check chains, cables, pulleys, turnbuckles and cable ends for condition, secure attachment and safeties. Specifically check cables at pulleys for fraying while actuating controls through full travel.		
9. Check all cable tensions.		
10. Check all controls for clearance and proper operation.		
11. Check all interior bond lines for any indication of damage, peeling and/or cracking.		
12. Check nose gear torque tubes , mounting brackets and bond joints for cracks and secure mounting. Check torque of mounting bolts - center bearing bracket bolts 185-195 in. lb. and end plate bolts 300-350 in. lb.		
13. Check flap actuator, push rods, limit switches and indicator for proper operation and secure mounting.		
14. Lubricate per lubrication chart. (Chapter 12).		
15. Check all plumbing in cabin for leaks and condition.		
16. Actuate fuel selector through its full range, check for smooth operation and position detents.		
17. Check gyro system filters, replace if necessary.		
18. Check instruments for condition, secure mounting and legible markings.		
19. Inspect Transorb Fuse. If fuse is blown, replace fuse and Transorb. See Chapter 24A. (G1000 equipped aircraft only)		

**TIGER AIRCRAFT AG-5B SERIES
MAINTENANCE MANUAL**

Table 5-03 (continued)

MODEL AG-5B ANNUAL OR 100 - HOUR INSPECTION PROCEDURE		
C. CABIN GROUP (continued)	MECH.	INSP.
20. Check electrical wiring, switches, lights and electronic equipment for condition and security. Test the Emergency Buss Dual Diode. (Reference Chapter 24A, G1000 equipped aircraft only.)		
21. Inspect baggage compartment, baggage door and cargo tie downs.		
22. Inspect all placards in cabin for condition and legibility.		
23. Inspect the emergency locator transmitter (ELT) for security, operation and battery expiration date.		
24. Reinstall items removed in item 1 of this section.		
25. Check fresh air vents for proper operation.		
D. FUSELAGE AND EMPENNAGE GROUP	MECH.	INSP.
1. Remove tailcone (stinger) and empennage inspection covers.		
2. Inspect exterior surfaces for condition and damage. Assure all drain holes in bottom of fuselage are unobstructed.		
3. Inspect bond lines for any indication of damage, peeling separation and/or cracks.		

**TIGER AIRCRAFT AG-5B SERIES
MAINTENANCE MANUAL**

Table 5-03 (continued)

MODEL AG-5B ANNUAL OR 100 - HOUR INSPECTION PROCEDURE		
D. FUSELAGE AND EMPENNAGE GROUP (continued)	MECH.	INSP.
4. Check, horizontal and vertical stabilizers for damage and secure mounting. Inspect mounting structure carefully for any buckling or cracks (see Chapter 55 for details). Assure the horizontal stabilizer and elevator drain holes are unobstructed.		
5. Check elevator, elevator bearings and stops, rudder, rudder bearings and stops, tab hinges and bellcranks for damage, travel and proper operation. Maximum allowable torque tube wear limit at rudder bearing supports is 0.030 in. reduction in wall thickness. Wear beyond 0.030 in. requires replacement of the control surface. Wear from 0.005 in. up to and including 0.030 in. require the installation of Tiger Aircraft Service Kit 121.		
6. Check elevator trim mechanism for damage, secure mounting (safety wire and cotter pins) and proper operation.		
7. Check rudder and elevator cables and pulleys for damage, proper operation and safeties. Check bellcrank attaching bolts for wear.		
8. Lubricate per lubrication chart. (Chapter 12)		
9. Inspect antenna mountings, wiring and connectors.		
10. Check position and anti-collision light(s) for secure mounting.		
11. Check static system lines in the tailcone for security and chafing.		
12. Reinstall inspection covers.		

**TIGER AIRCRAFT AG-5B SERIES
MAINTENANCE MANUAL**

Table 5-03 (continued)

MODEL AG-5B ANNUAL OR 100 - HOUR INSPECTION PROCEDURE		
E. WING GROUP	MECH.	INSP.
<p>1. Remove wing tips and access panels, except fuel cell area. Inspect all surfaces, skins ribs and tips for damage. Check position/strobe and landing lights for secure mounting. Insure that all drain holes are open.</p> <p>CAUTION: DO NOT USE A MAGNETIC SCREWDRIVER TO REMOVE THE OUTBOARD, FORWARD INSPECTION PANEL ON THE RIGHT WING OF G1000 EQUIPPED AIRCRAFT. (MAGNETOMETER LOCATION)</p>		
<p>2. Visually inspect interior and exterior bond lines for any indication of damage, peeling, separation and/or cracks.</p>		
<p>3. Check ailerons, aileron bearings and stops, flaps, and flap bearings for secure mounting, damage, proper travel and wear. Assure that aileron and flap drain holes are clear. Maximum allowable aileron torque tube wear limit at bearing supports is 0.030 in. reduction in wall thickness. Wear beyond 0.030 in. requires replacement of the torque tube or control surface. Wear from 0.005 in. up to and including 0.030 in. requires the installation of Tiger Aircraft Service Kit 121.</p>		
<p>4. Check fuel vents and connecting lines for damage and/or restrictions.</p>		
<p>5. Check fuel tanks, sump tanks and lines for evidence of leakage. Check sump tanks and lines for secure mounting.</p>		
<p>6. Check fuel cap sealing condition.</p>		
<p>7. Check wing and outboard wing section attaching bolts. Torque to 60-85 in. lb.</p>		
<p>8. Inspect fuel tank placards.</p>		
<p>9. Check pitot tube opening and lines for obstruction and condition and heat element for proper operation.</p>		
<p>10. Check for interior corrosion of skin indicated by a white flaking material.</p>		

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MAINTENANCE MANUAL**

Table 5-03 (continued)

MODEL AG-5B ANNUAL OR 100 - HOUR INSPECTION PROCEDURE		
F. MAIN LANDING GEAR GROUP	MECH.	INSP.
1. Remove wheels and check for cracks. Check condition of brake linings, wheel cylinders, torque plates and mounting pins. Pack wheel bearings, reinstall wheels and key axle nuts at first 100 hours and each 500 hours thereafter. Inspect wheel bearing grease for contamination and solidification at each annual or 100 hour inspection. For operation in dusty areas or areas of high humidity, repack every 100 hours. Perform a complete wheel inspection at each tire replacement.		
2. Check tires for approved type, acceptable condition and proper inflation.		
3. Check brake lines for leaks and secure attachment.		
4. Check struts for secure mounting. Inspect for cracks, delamination and/or nicks.		
5. Inspect the upper main mounting brackets and spar attaching supports (center spar to fuselage) for wear, cracks and/or loose bolts.		
6. Inspect wheel and strut fairings for damage and secure mounting.		
G. NOSE GEAR GROUP	MECH.	INSP.
1. Check nose gear strut for secure mounting, deformation, damage and/or cracks.		
2. Remove nose gear strut from torque yoke and inspect for corrosion of the surfaces every 12 calendar months. Remove corrosion if present and apply McLube 1708 dry film lubricant or equivalent to the mating end of the strut and the inside of the yoke. Allow lubricant to dry and reassemble. Seal strut to yoke connection with P/S 870 by PRC DeSoto, or equivalent.		
3. Remove and check nose gear fork for deformation, wear and/or cracks. Maximum fork to strut bearing clearance is 0.035 in.		

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Table 5-03 (continued)

MODEL AG-5B ANNUAL OR 100 - HOUR INSPECTION PROCEDURE		
G. NOSE GEAR GROUP (continued)	MECH.	INSP.
4. Grease fork and friction dampener, assemble to strut and tighten to 10-22 lb. drag to axle. (Reference Chapter 32)		
5. Remove nose wheel, clean, check for cracks, inspect and repack bearings, reinstall wheel and safety axle at first 100 hours and each 500 hours thereafter. Inspect wheel bearing grease for contamination and solidification at each annual or 100 hour inspection. For operation in dusty areas or areas of high humidity, repack every 100 hours. Perform a complete wheel inspection at tire replacement.		
6. Inspect nose wheel for cracks, corrosion and/or loose or broken bolts.		
7. Check tire for approved type, acceptable condition and proper inflation.		
8. Check wheel fairing for damage and secure mounting.		
H. OPERATIONAL INSPECTION	MECH.	INSP.
1. Check brake and parking brake operation.		
2. Check fuel primer operation and lines for leaks.		
3. Check electric pump operation.		
4. Check fuel pressure.		
5. Check starter for proper operation.		

**TIGER AIRCRAFT AG-5B SERIES
MAINTENANCE MANUAL**

Table 5-03 (continued)

MODEL AG-5B ANNUAL OR 100 - HOUR INSPECTION PROCEDURE		
H. OPERATIONAL INSPECTION (continued)	MECH.	INSP.
6. Check oil pressure and temperature.		
7. Check engine and throttle controls for proper operation.		
8. Check magneto operation @ 1800 RPM: Check with both magnetos ON, then with left mag. OFF, then again with both mag's. ON, then with the right mag. OFF, and once more with both mag's. ON. <i>(Maximum magneto drop 175 RPM on either magneto with 50 RPM maximum difference between magnetos). With engine at idle, turn switch to OFF position momentarily to check magneto grounding. (Reference AD 76-07-12).</i> Actual drop: _____ Left _____ Right		
9. Check engine static RPM: (Propeller Pitch A, B or C) <u>A</u> (61" 2100-2275) <u>B</u> (63" 2050-2225) <u>C</u> (65" 2000-2175). Pitch: _____ RPM: _____		
10. Check carburetor heat for proper operation.		
11. Check alternator output. Record volts: _____		
12. Check vacuum gauge and vacuum system output 4.6 to 5.4 in. Hg @ 1800 RPM.		
13. Check fuel selector valve operation and indexing.		
14. Check heating, defrosting and ventilating system for proper operation.		
15. Check avionics for proper operation. Check the Emergency Battery Switch on G1000 equipped aircraft. (Reference Chapter 24A)		

**TIGER AIRCRAFT AG-5B SERIES
MAINTENANCE MANUAL**

Table 5-03 (continued)

MODEL AG-5B ANNUAL OR 100 - HOUR INSPECTION PROCEDURE		
H. OPERATIONAL INSPECTION (continued)	MECH.	INSP.
16. Check engine mixture setting and idle speed: (550-650 RPM) Actual: _____		
17. Check idle cut off of carburetor for proper operation.		
18. Check ailerons for proper operation.		
19. Check elevators and trim tabs for proper operation.		
20. Check flaps for proper operation and travel.		
21. Check fuel quantity gauges for condition and proper operation.		
22. Pitot static system check.		
23. Record the certification date of the following: Transponder: _____ Altimeter: _____ Encoder: _____ Air Data LRU: _____ (G1000 equipped aircraft)		
24. Complete ELT function test (reference FAR's for time restrictions) and record ELT battery replacement date _____ entered in log book.		
25. Check interior lights for proper operation.		
26. Check navigation and anti-collision lights for proper operation and landing lights for proper operation and adjustment.		
27. Check stall warning device for proper operation.		
28. Inspect engine for leaks after ground run-up. Flight test and inspect for oil leaks and secure mounting of all components.		

**TIGER AIRCRAFT AG-5B SERIES
MAINTENANCE MANUAL**

Table 5-03 (continued)

MODEL AG-5B ANNUAL OR 100 - HOUR INSPECTION PROCEDURE		
I. GENERAL	MECH.	INSP.
1. Aircraft cleaned and serviced.		
2. Aircraft conforms to TC Data Sheet.		
3. All FAA Airworthiness Directives complied with.		
4. All Service Letters and Bulletins complied with.		
5. Checked for proper and complete Pilots Operating Handbook (with AFM).		
6. Aircraft papers in proper order. Make log book entry. Minimum required documents: a. Registration b. Airworthiness Certification c. POH with AFM (including weight and balance records and equipment list.) d. Log Books for Aircraft, Engine and Propeller		

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UNSCHEDULED MAINTENANCE CHECKS - DESCRIPTION / OPERATION

1. General

Following a hard landing and/or a tail strike, certain items and systems of the aircraft should be inspected for subsequent damage. Applicable groups in Table 5-03 should be used as a guideline when performing the unscheduled inspections required as a result of unusual circumstances. For example, if the landing gear required an unscheduled inspection, each procedure listed under the landing gear group should be completed.

UNSCHEDULED MAINTENANCE CHECKS - MAINTENANCE PRACTICES

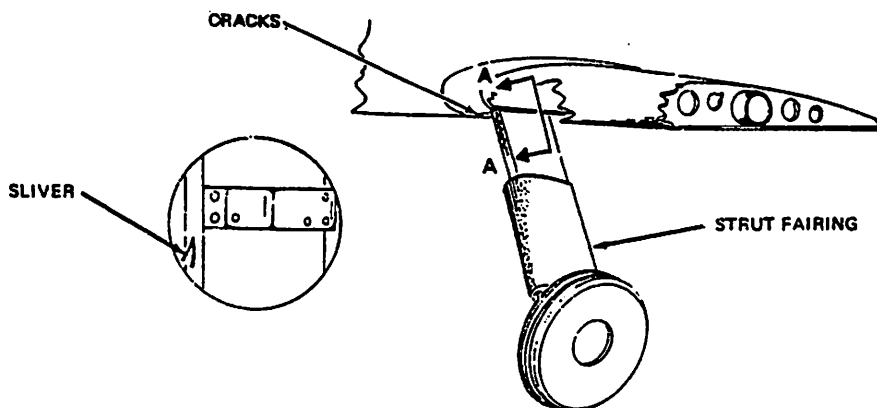
1. Inspection Requirements

A. Inspect Main Landing Gear Assembly

- (1) Remove rubber fairing and thoroughly inspect the fiberglass struts for evidence of nicks, cracks and delamination. (See Figure 5-01)

NOTE: Minor surface de-laminations are acceptable providing they do not extend more than one ply into the surface of the strut. Corner de-laminations (slivers) are acceptable if they are smaller than 1/16 x 1/16 inch in size throughout their length. If airworthiness of a damaged fiberglass strut is in question, close-up photographs of the damaged area may be submitted to the Tiger Aircraft Customer Service Department for analysis and recommendations.

- (2) Minor imperfections may be repaired. Struts with other imperfections must be replaced.



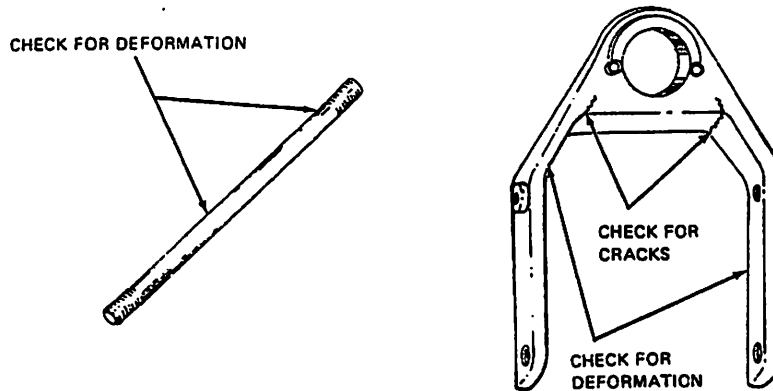
**Main Gear Strut
Figure 5-01**

**TIGER AIRCRAFT AG-5B SERIES
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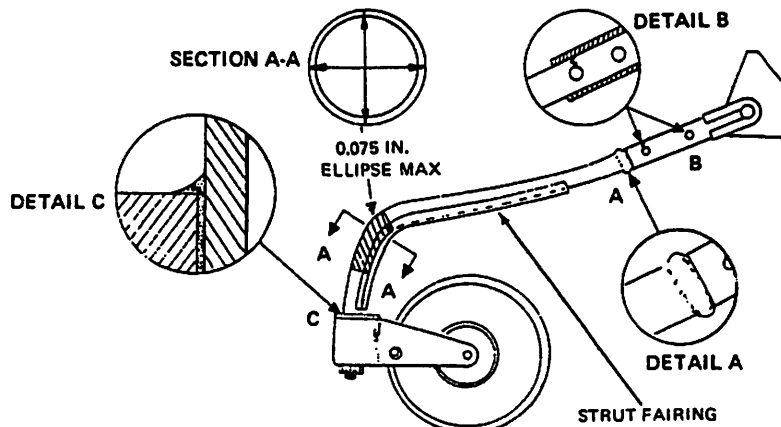
- (3) Inspect main gear attach brackets for deformation, proper bolt torque and evidence of movement on the spar. If spring plate (Item 20, Figure 201, Chapter 32-1-1) between brackets and strut is bent, it must be replaced.
- (4) Check brackets for hole elongation or other damage.
- (5) Check honeycomb for signs of buckling.

B. Inspect Nose Landing Gear Assembly

- (1) Inspect the nose gear axle rod and fork assembly for deformation and/or cracks as shown in Figure 5-02. This damage normally results from a landing at a relatively flat attitude with a high velocity. Any evidence of deformation or cracks is cause for rejection of the fork assembly and/or axle rod.



**Nose Gear Axle Rod & Fork Assy.
Figure 5-02**



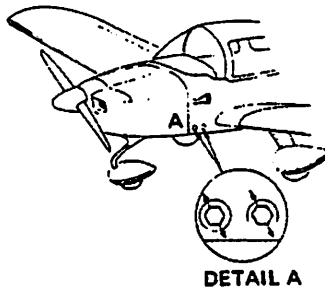
**Nose Gear Strut
Figure 5-03**

**TIGER AIRCRAFT AG-5B SERIES
MAINTENANCE MANUAL**

- (2) Deformation shown in Detail A, Figure 5-03, is the result of landing in a relatively flat attitude with high vertical velocity. Inspect and replace strut if deformed.
- (3) Inspect the curved area of the strut for flattened condition as shown in section A-A, Figure 5-03. An ellipse area exceeding 0.075 in. is cause for rejection of the strut.

**NOTE: Nose gear struts have a streamline fairing attached to the aft side.
 This fairing must be removed to perform the visual inspection.**

- (4) With the weight removed from the nose landing gear, check the fit of the strut assembly into the torque tube yoke assembly by moving the strut up and down. If looseness is noted, determine the cause. If the bolts that attach the strut to the torque tube yoke are worn, they should be replaced with NAS6206P31 bolts. If new bolts do not satisfactorily eliminate the play, ream and install the next larger size NAS bolts (NAS6207P31 maximum).
- (5) With strut removed, inspect bolt hole areas at strut to torque attach point for evidence of elongation and/or cracking.
- (6) Inspect the nose fork, bearing cup to nose strut bond joint for cracks, corrosion, deterioration, and/or damage (See Detail C, Figure 5-03).
- (7) Inspect torque tube assembly attachment to fuselage side panels as shown in Figure 5-04. Remove snap plugs and check location of attach bolts. If bolts have shifted and are not exactly in the center of the counter-bored holes in the fuselage sides, damage may have occurred to the lower engine mount/fuselage area. A very close inspection of this area should be accomplished.

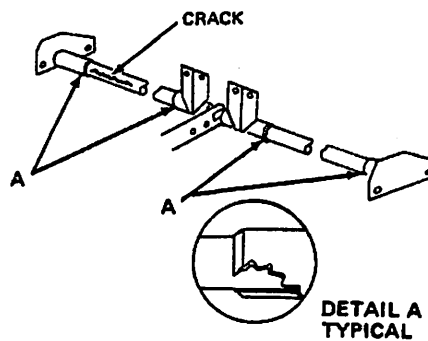


**Torque Tube Assy. Attachment
Figure 5-04**

- (8) Inspect bond fillets in torque tube and yoke assembly as shown in Figure 5-05. If cracks are noted in paint or in the bond fillets, they should be carefully sanded out to determine if they extend into the bond joint. Cracks in the bond fillets are permissible. Cracks in the bonded joints are not permissible and the torque tube assembly must be removed from service.

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- (9) Inspect the torque tubes for longitudinal cracks, as shown in Figure 5-05.
- (10) Inspect cabin floor and firewall where torque tube center bearing support brackets attach for evidence of deformed honeycomb. Inspect torque tube center bearing support brackets for deformation. If torque tube center bearing support brackets are deformed, the entire tube assembly must be replaced.



**Torque Tube & Yoke Assy.
Figure 5-05**

C. Inspect Engine Mount and Propeller

- (1) Inspect engine mount welded assembly for cracks and/or any deformation.
- (2) Inspect attach fittings at fuselage for cracks, deformation, and security of attachment to fuselage.
- (3) Inspect the tips of the propeller for evidence of ground contact. Replace bent or damaged propeller. Refer to Lycoming Service Bulletin 533 for engine inspection.

D. Inspect Fuselage and Empennage Items

- (1) Inspect the tailcone structure for damage. Buckled tailcone flanges can normally be repaired using the procedures from AC 43.13.
- (2) Inspect bond lines for evidence of damage or cracks.
- (3) Inspect the horizontal and vertical stabilizers, elevator, rudder and aileron mounting brackets for damage, cracks, security of mounting, loose bolts and/or buckled supports. Inspect tail mounting structure carefully for any buckling or cracks (see Chapter 55 for details).

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2. Bondline Damage, Inspection Procedures and Repair

A. Isolate Most Commonly Damaged Area.

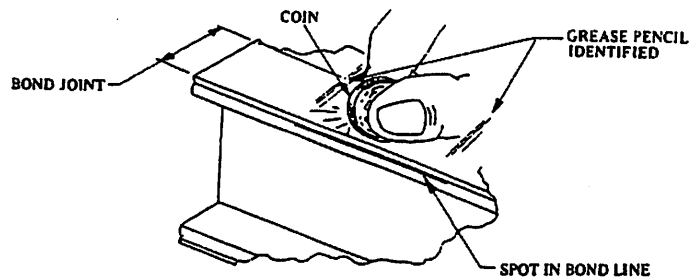
- (1) Areas that should be given particular attention include: Flanges of wing and stabilizer rear spars, trailing edges of control surfaces, the side lap joint between the tailcone and forward cabin section, the joint between the tailcone top and side skin and the aft tail cone bulkhead joints.
- (2) Inside edges and internal joints that have an undisturbed bond-line fillet are generally not affected.

B. Identify Types of Damage

- (1) Physical Damage - The most common type of bond-line damage is physical damage along the trailing edges of the flaps, ailerons, elevators and rudder. This is caused by persons stepping on the inboard trailing edges of the flaps and general "hanger rash" on the other control surfaces. This type of damage is usually readily visible in the form of joint separation.
- (2) Corrosion Damage - A less common type of bond-line damage is damage caused by metal corrosion. This type of damage is usually restricted to edges of un-filleted bond-lines, such as found on the rear spar to skin joints on the trailing edges of wings and stabilizers, particularly if these edges are not well protected by paint. This type of damage is most likely in tropical and subtropical climates, particularly where an aircraft is located close to the coast.

C. Locate and Verify Damage Areas

- (1) Visual Scanning - Carefully scan the edges of all joints in a well-lighted location or outside in bright daylight to determine the existence of hairline cracks between two layers of bonded metal. (Figure 5-06 shows the appearance of this condition) Map the location of any cracks with a grease pencil.



**I/D Suspect Areas Coin Tap
Figure 5-06**

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- (2) Tapping - Gently tap the bond-line with a coin or similar metal object to verify the existence of a bond-line separation. Slowly move along the bond-line, while tapping and listen for a change in tone as the suspect area is traversed. A bond-line separation will produce a flat or hollow sound when tapped directly in the damaged area.
- (3) Separation - If bond-line separation cannot be positively verified by tapping the area with a coin, attempt to insert a 0.004 to 0.006 inch feeler gauge into the bond-line to verify that a separation exists.

D. Repair Bond-line Damage

- (1) If the suspected damage proves not to be an actual separation, the hairline should be wiped with Methyl Ethel Ketone (MEK) and sealed with paint.
- (2) Seal all bare bond-line edges with paint.
- (3) If the suspected damage proves to be actual bond-line separation, order Service Kit No. SK-125A from the Customer Service Department and make the repairs accordingly.

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CHAPTER 6

DIMENSIONS AND AREAS

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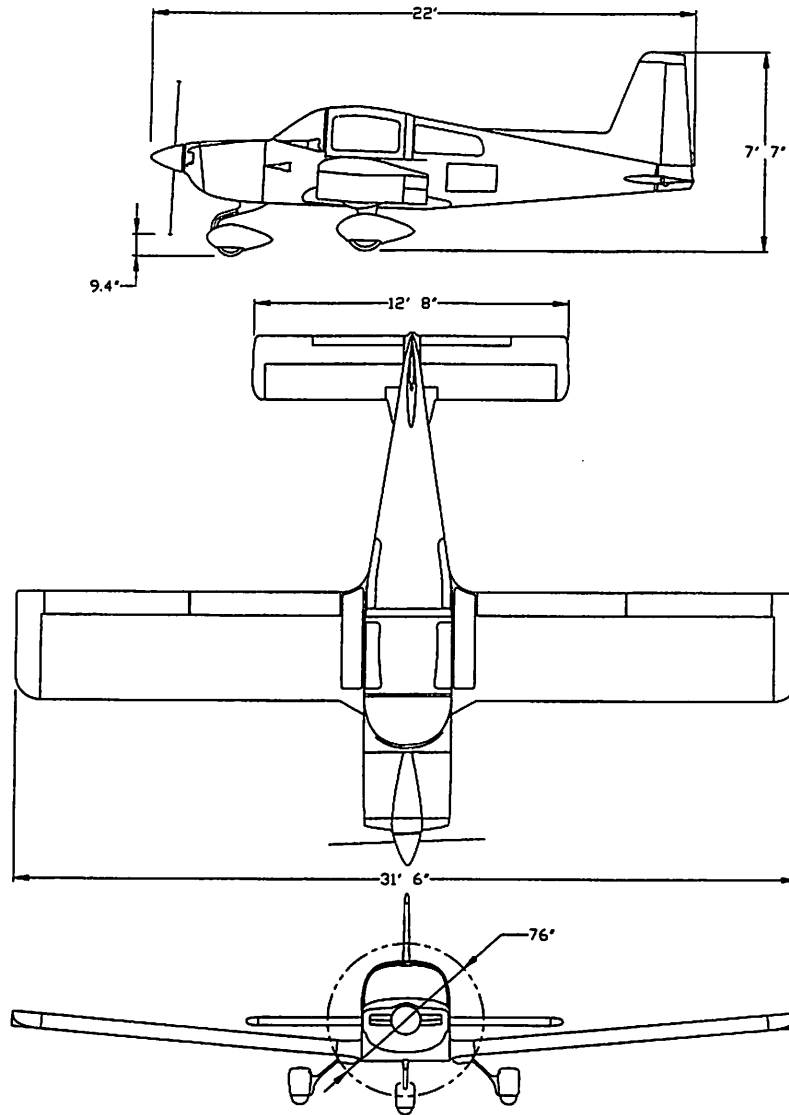
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PRINCIPAL DIMENSIONS

1. General

This section provides, in diagram form, the principal dimensions for the Tiger AG-5B Aircraft.
(See Figure 6-01)



**Principal Dimensions
Figure 6-01**

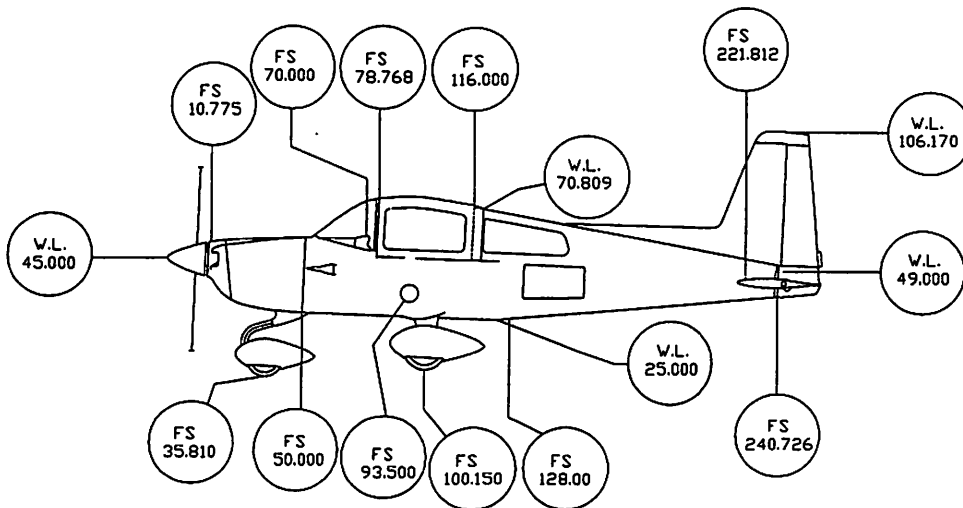
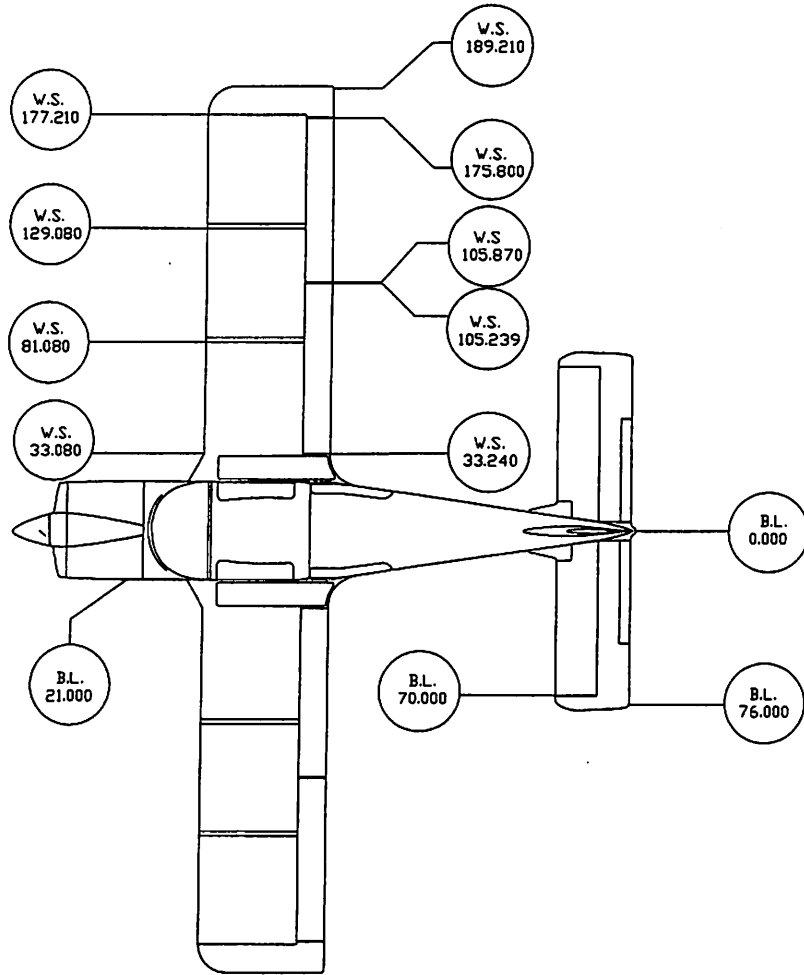
**TIGER AIRCRAFT AG-5B SERIES
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STATION LOCATIONS

1. General

This section provides, in diagram form, the station locations for the Tiger AG-5B Aircraft.
(See Figure 6-02)

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**Top and Side View
Figure 6-02**

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CHAPTER 7

LIFTING AND JACKING

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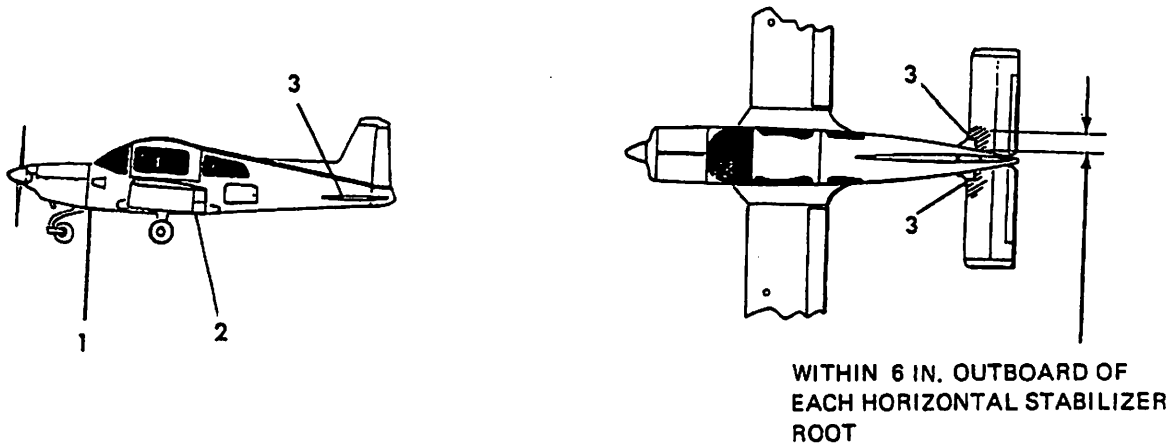
LIFTING AND JACKING POINTS

1. **General**

This section identifies and locates, on illustrations, those points that may be used when lifting or jacking of the aircraft is required. Reference is made to indicate what special lifting; jacking or shoring equipment may be used at each lifting or jacking point.

2. **Lifting and Jacking Points**

The lifting and jacking points for the AG-5B aircraft are shown in Figure 7-01.



**Lifting and Jacking Points
Figure 7-01**

1. Front Lifting Point - Fuselage Station 51.
2. Aft Lifting Point - Fuselage Station 125.
3. Empennage Lifting Point - Within 6 inches of the Horizontal Stabilizer root.

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LIFTING AND JACKING PROCEDURES

1. **General**

This section provides the recommended procedures for lifting and jacking the AG-5B aircraft to accomplish maintenance and inspection procedures. Since lifting and jacking of the aircraft can be accomplished by a wide variety of procedures, depending primarily upon the equipment available, these procedures provide general instructions that can be modified as needed by the user, in light of his equipment availability.

2. **Lifting Procedures**

A. Lifting the nose landing gear is accomplished as follows:

CAUTION: IF A STAND IS USED TO SUPPORT THE FORWARD FUSELAGE WHEN THE NOSE GEAR IS LIFTED, ENSURE THAT THE BEARING SURFACE OF THE STAND EXTENDS THE WIDTH OF THE FUSELAGE AND THAT THE SURFACE IS A MINIMUM OF 4 INCHES WIDE. THE LOAD BEARING SURFACE SHOULD BE PADDED TO PREVENT DAMAGE TO THE FUSELAGE MATING SURFACE. THE STAND MUST BE CAPABLE OF SUPPORTING A MINIMUM OF 1500 POUNDS.

- (1) Engage the parking brake and place chocks at both main landing gear to prevent the aircraft from rolling forward or aft.

CAUTION: WHEN THE NOSE OF THE AIRCRAFT IS RAISED, ENSURE THAT THE TRIM TAB AND FUSELAGE DO NOT STRIKE THE GROUND. DO NOT PRESS DOWN ON THE OUTBOARD END OF THE HORIZONTAL STABILIZER.

- (2) Press down on the horizontal stabilizer in the area of the stabilizer front spar, and within six inches of the fuselage. (See Figure 7-01)

CAUTION: WHEN POSITIONING STANDS CARE MUST BE TAKEN TO ASSURE BOTTOM MOUNTED EQUIPMENT SUCH AS ANTENNAS ARE NOT DAMAGED.

- (3) While holding the aircraft tail down, slide a stand (approximately 30 inches high) beneath the fuselage at Fuselage Station 51, immediately behind the torque tube center bearing mounting bolts.

- (4) Gently lower the aircraft nose to rest the aircraft on the stand.

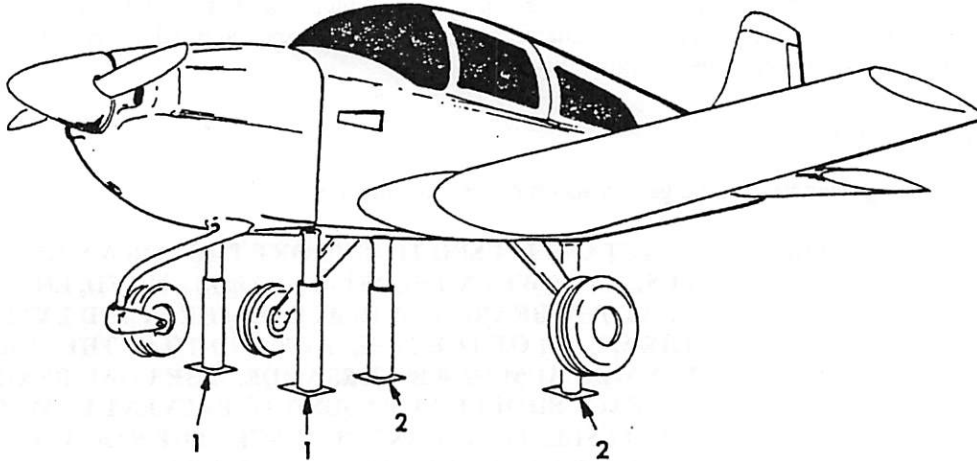
B. Lifting the entire aircraft is accomplished as follows:

- (1) Lift the aircraft nose and place the forward stand as described in paragraph 'A' above.
- (2) Secure a second stand for placement per (3) below of the same height and load-bearing capability as the one under the forward fuselage.

NOTE: The aft Fuselage requires a lifting force of approximately 500 pounds to lift it sufficiently for the stand to be placed under the fuselage.

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- (3) Manually lift the aft fuselage, and slide the stand under the fuselage at Fuselage Station 125.
- (4) Gently lower the aircraft on to the stand.



Jacking Arrangement
Figure 7-02

3. **Jacking Procedure**

- A. Jacking of the aircraft may be accomplished by positioning jacks as shown in Figure 7-02.
 - (1) Place jacks beneath the fuselage at Fuselage Station 51 on each side of the fuselage.
 - (2) Place jacks beneath the aft fuselage at Fuselage Station 125 on each side of the fuselage.
 - (3) Place a suitable pad at the jack / fuselage contact area to distribute the load over a large enough area to prevent damage to the honeycomb fuselage structure.
 - (4) Raise each jack evenly to the required height for the maintenance to be performed.

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CHAPTER 8

LEVELING AND WEIGHING

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AIRCRAFT PREPARATION FOR WEIGHING

1. GENERAL

This section contains the procedure for determining the basic empty weight and moment of the aircraft. Sample forms and the corresponding procedures for their use are provided to enable a rapid calculation of the weight and moment for various operations.

It should be remembered that specific information on weight, arm, moment, and installed equipment for this aircraft can only be found in the appropriate weight and balance records carried in the aircraft.

2. Preparation Procedures

A. Prepare the aircraft for leveling and weighing as follows:

- (1) Inflate all tires to recommended operating pressure. (Refer to Chapter 12)
- (2) Drain all fuel from the tanks and fuel system. (Refer to Chapter 28)
- (3) Run the engine until the engine quits on both fuel tanks.
- (4) Assure the engine is at full oil capacity, 8 quarts.
- (5) Move the front seats to the center of their travel position.
- (6) Raise the flaps to their fully retracted position.
- (7) Place all controls in their neutral positions.
- (8) Ensure that all objects that are not a part of the aircraft or its accessories are removed from the aircraft.
- (9) Slide the canopy to provide a six-inch opening between the canopy and the windshield bow.

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LEVELING

1. GENERAL

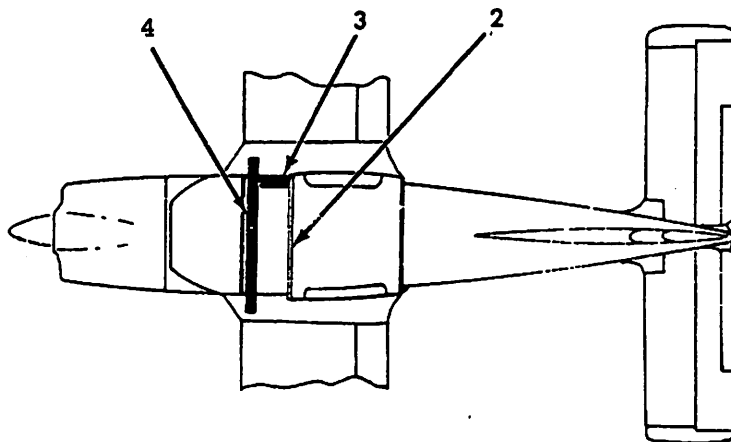
Normally, aircraft leveling is accomplished in conjunction with aircraft weighing. When this is the case, the aircraft should be mounted on the scales prior to leveling.

When leveling is done in conjunction with some maintenance procedure (fuel gage calibration, etc.), the aircraft must be parked on a level surface.

2. Leveling Procedure

A. Level the aircraft as follows:

- (1) Place a load scale under each wheel (minimum capacity 1000 pounds).
- (2) Open the canopy approximately 6 inches.
- (3) Level the aircraft longitudinally by placing a short spirit level on the right canopy rail forward of the pilots seat. Deflate the nose tire, to center the level's bubble.
- (4) Level the aircraft laterally by placing a four-foot carpenter's level across the canopy rails at the windshield and differentially deflating the main gear tires to center the level's bubble.



**Aircraft Leveling
Figure 8-01**

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WEIGHING

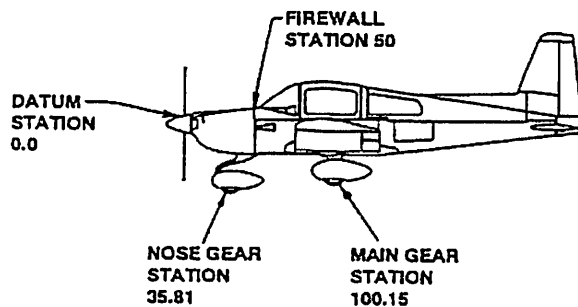
1. GENERAL

Aircraft weighing should be done in an area such as a hangar where wind or other disturbances do not cause inaccurate scale readings. The scales must be properly calibrated and of sufficient capacity to support the aircraft.

2. Weighing Procedure

A. Weigh the aircraft as follows:

- (1) Remove the levels, close and latch the canopy.
- (2) With the aircraft level and brakes released, record the weight shown on each scale.
- (3) Deduct tare (chocks, etc.) if any, from the scale readings and record the results on the weighing form.



**Sample Aircraft Weighing
Figure 8-02**

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3. Computing the Empty Weight and Center of Gravity (C.G.) (Table 8-01)

A. Compute empty weight and C.G. as follows:

- (1) Subtract the tare from each scale reading to obtain the net scale reading for each wheel. Record the net scale reading in the weight column for the appropriate wheel.
- (2) Multiply the net scale reading by the C.G. Arm for each scale to obtain the moment, and record in the moment column for the appropriate wheel.
- (3) Add the net scale reading of each wheel plus the unusable fuel weight (9.6) and record the total in the Basic Empty Weight and C.G. block of Table 8-01.
- (4) Add the calculated moments for each wheel plus the unusable fuel moment (910.1) to obtain the Total Moment and record the total moment sum in the Basic Empty Weight and C.G. block of Table 8-01.
- (5) Divide the Total Moment by the Basic Empty Weight to obtain the C.G. Arm.

TABLE 8-01

ITEM	WEIGHT	C.G. ARM	MOMENT
Left Main Wheel		100.15	
Right Main Wheel		100.15	
Nose Wheel		35.81	
Unusable Fuel (1.6 Gal)	9.6	94.8	910.1
TOTALS: Basic Aircraft Weight & C.G.			

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**CHAPTER 9
TOWING AND TAXIING**

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TOWING AND TAXIING

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**TIGER AIRCRAFT AG-5B SERIES
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TOWING

1. General

This section provides the procedures recommended for manual towing of the Tiger AG-5B Aircraft.

2. Towing Procedures

CAUTION: USING THE PROPELLER FOR GROUND HANDLING COULD RESULT IN SERIOUS PROPELLER DAMAGE, ESPECIALLY IF PRESSURE IS EXERTED ON THE OUTER ENDS. DO NOT ATTEMPT TO PUSH THE AIRCRAFT BACKWARD WITHOUT THE AID OF A TOW BAR. THIS ACTION COULD RESULT IN THE NOSE WHEEL PIVOTING ABRUPTLY AND DAMAGING THE NOSE WHEEL STOPS.

A. Towing of the aircraft should be accomplished by use of the nose gear tow bar, as follows:

- (1) Extend the tow bar by pulling the handle out and inserting the pin.
- (2) Open the jaws of the tow bar by pulling the latch arm forward.

CAUTION: WHEN USING THE TOW BAR, EXERCISE CAUTION TO PREVENT DAMAGING THE FINISH ON THE NOSE WHEEL FAIRING.

- (3) Secure the tow bar sockets over the nose gear tow bolts.
- (4) Tow the aircraft by pulling or pushing the tow bar handle.

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TAXIING

1. General

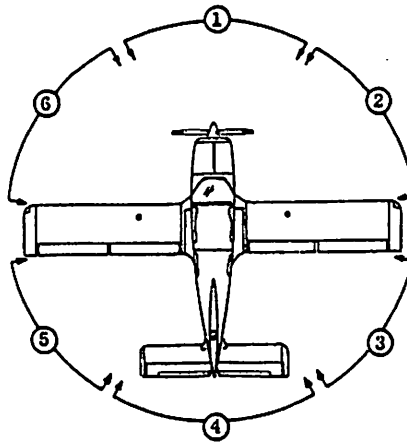
Since the aircraft rudder controls are not directly coupled to the nose wheel, directional control during taxiing is maintained by differential braking.

2. Taxiing Technique

All taxiing should be done at slow speed, and the controls should be positioned such that the affects of wind gusts are minimized. (See Figure 9-01)

Taxiing should not be attempted in strong crosswinds. If taxiing is necessary in strong crosswinds, the use of "wing walkers" is recommended.

Taxiing over loose surfaces such as gravel should be done at low engine speed to minimize stone damage to the propeller tips, horizontal surfaces and landing gears.



**TAXIING DIAGRAM
FIGURE 9-01**

<u>NUMBER</u>	<u>WIND DIRECTION</u>	<u>CONTROL</u>	<u>POSITION</u>
(1)	FWD	WHEEL NEUTRAL	BACK
(2)	FWD RH QUARTER	WHEEL RIGHT	BACK
(3)	AFT RH QUARTER	WHEEL LEFT	FORWARD
(4)	AFT	WHEEL NEUTRAL	FORWARD
(5)	AFT LH QUARTER	WHEEL RIGHT	FORWARD
(6)	FWD LH QUARTER	WHEEL LEFT	BACK

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CHAPTER 10

PARKING AND MOORING

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PARKING

1. General

This section provides the procedures recommended to park the aircraft to minimize the chances of ground damage. Parking is defined as leaving the aircraft unattended for a short period of time.

2. Parking Precautions

A. Use the following precautions when parking the aircraft:

- (1) Do not park the aircraft in an area subject to prop or jet wash.
- (2) Do not park the aircraft if moderate to high winds or if storms are anticipated. Moor the aircraft as described in this chapter.
- (3) If heavy braking was applied during landing, allow the brakes to cool before setting the parking brake.
- (4) Do not set the parking brake when the ambient temperature is near or below freezing. Accumulated moisture may freeze in the brakes and prevent their release.

CAUTION: WHEN CHOCKING WHEELS, ENSURE THAT THE CHOCKS USED ARE NOT LARGE ENOUGH TO COME IN CONTACT WITH THE WHEEL FAIRINGS. USE OF CHOCKS THAT ARE TOO LARGE MAY DAMAGE THE WHEEL FAIRINGS.

3. Parking Procedures

A. Park the aircraft as follows:

- (1) Choose an area free from prop or jet wash.
- (2) Head aircraft into the wind and set the parking brake.
- (3) Install the control lock.

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MOORING

1. General

This section provides the procedures recommended for a normal tie-down of the aircraft, and special precautions that should be taken to minimize the likelihood of damage during severe weather.

2. Normal Tie-Down

A. Use of the proper tie-down procedure is the best precaution against damage to the parked aircraft by gusty or strong winds. To tie-down the aircraft securely, proceed as follows:

- (1) Chock all wheels and install the control wheel lock.

CAUTION: WHEN CHOCKING WHEELS, ENSURE THAT THE CHOCKS USED ARE NOT LARGE ENOUGH TO COME IN CONTACT WITH THE WHEEL FAIRINGS. USE OF CHOCKS THAT ARE TOO LARGE MAY DAMAGE THE WHEEL FAIRINGS.

- (2) Tie a sufficiently strong tether to the wing and tail tie-down fittings and secure each tether to a ramp tie-down fitting.

- (3) Ensure that the canopy is closed and securely latched.

3. Severe Weather Precautions

NOTE: **A closed hanger is the best protection for the aircraft during periods of severe weather.**

A. When it is necessary to moor the aircraft, outside a closed hanger during periods when severe weather is anticipated, the following precautions, in addition to normal tie-down, should be employed.

- (1) Ensure that the aircraft is positioned prop headed directly into the wind.
- (2) Ensure tethers are of high quality, ample strength and show no signs of fraying or deterioration.
- (3) Ensure attach points are secure.

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**CHAPTER 11
PLACARDS AND MARKINGS**

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PLACARDS AND MARKINGS

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PLACARDS AND MARKINGS

1. General

This section contains information relating to placards used on the Tiger AG-5B Aircraft that define the limitations and/or flight safety data required by FAA regulations to be properly affixed to the aircraft. Also shown in this section are placards that provide the pilot, passengers and maintenance personnel with aircraft operational data.

2. Placard Locations

A. Placard appearance, content and location are as follows:

**FOR FLIGHT WITH REAR SEAT OCCUPANTS AND/OR BAGGAGE-CARGO,
— CHECK WEIGHT & BALANCE —**

THIS AIRPLANE MUST BE OPERATED AS A NORMAL OR UTILITY CATEGORY AIRPLANE IN COMPLIANCE WITH THE OPERATING LIMITATIONS STATED IN THE FORM OF PLACARDS, MARKINGS, AND MANUALS.

NORMAL CATEGORY
MAXIMUM DESIGN WEIGHT..... 2400 LBS
DESIGN MANEUVERING SPEED, V_A..... 112 KNOTS IAS
FLIGHT LOAD FACTORS:
FLAPS UP..... +3.8, -1.52
FLAPS DOWN..... +3.5
NO ACROBATIC MANEUVERS, INCLUDING SPINS, APPROVED.

UTILITY CATEGORY
MAXIMUM DESIGN WEIGHT..... 2050 LBS
DESIGN MANEUVERING SPEED, V_A..... 112 KNOTS IAS
FLIGHT LOAD FACTORS:
FLAPS UP..... +4.4, -1.76
FLAPS DOWN..... +3.5

REAR SEATS MUST NOT BE OCCUPIED.
ACROBATIC MANEUVERS ARE LIMITED TO THE FOLLOWING:
MANEUVER ENTRY SPEED
CHANDELLES..... 112 KNOTS IAS
LAZY EIGHTS..... 112 KNOTS IAS
STEEP TURNS..... 112 KNOTS IAS
STALLS(EXCEPT WHIP STALLS)..... SLOW DECELERATION
SPINS PROHIBITED
MAXIMUM ALTITUDE LOSS IN STALLS..... 350 FEET
DEMONSTRATED CROSSWIND VELOCITY 16 KNOTS

**THIS AIRPLANE IS NOT APPROVED
FOR FLIGHT IN ICING CONDITIONS**

THIS AIRPLANE IS CERTIFICATE FOR THE FOLLOWING OPERATION AS OF DATE OF ORIGINAL AIRWORTHINESS CERTIFICATE WHEN EQUIPPED IN ACCORDANCE WITH FAR 91. IFR, VFR, DAY, NIGHT
REFER TO WEIGHT AND BALANCE FOR LOADING INSTRUCTIONS.
READ FUEL GAUGES IN LEVEL FLIGHT ONLY
FOR NORMAL OPERATION, MAINTAIN FUEL BALANCE.

CHECK LIST

TAKE - OFF
1. FUEL - FULLEST TANK
2. MIXTURE - FULL RICH
3. AUX PUMP - ON
4. INSTRUMENTS - SET & CHECK
5. TRIM - SET
6. FLAPS - UP
7. THROTTLE - FULL
8. RAISE - 55 KNOTS IAS

LANDING
1. FUEL - FULLEST TANK
2. MIXTURE - FULL RICH
3. AUX PUMP - ON
4. CARB. HEAT - AS REQUIRED
5. FLAPS - AS REQUIRED
6. APPROACH - 70 KNOTS IAS

TIRE PRESSURE
NOSE 25 LBS.
MAIN 34 LBS.

Interior - On the Left Fwd. Side Panel

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CAUTION: FLASHING BEACON IN CLOUDS
MAY CAUSE VISUAL DISORIENTATION

CLOSE CANOPY WHEN USING ALTERNATE STATIC AIR
SUBTRACT 6 KNOTS FROM IAS ABOVE 87 KNOTS IAS
SUBTRACT 80 FEET FROM ALTITUDE ABOVE 86 KNOTS

Interior - On the Instrument Panel

TURN OFF STROBE IN CLOUD, FOG
OR HAZE, TAXI WITH STROBE OFF

Interior - On the Instrument Panel -

**120 POUNDS MAXIMUM BAGGAGE
FOR ADDITIONAL LOADING
INSTRUCTIONS SEE WEIGHT AND
BALANCE DATA
NO HEAVY OBJECTS ON HAT SHELF**

Interior - In Baggage Compartment

**NO PASSENGERS
340 POUNDS MAXIMUM CARGO
DISTRIBUTE EVENLY**

**FOR ADDITIONAL LOADING
INSTRUCTIONS SEE WEIGHT AND
BALANCE DATA AND PILOTS
OPERATING HANDBOOK**

**Interior - On Rear Seat Base -
(Visible With Rear Seat in Cargo Position)**

TO OPEN DOOR FROM INSIDE

SLIDE HANDLE FORWARD

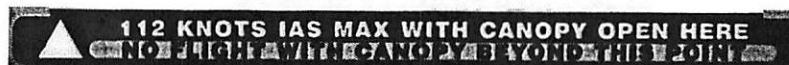
Interior - On Baggage Door Adjacent Latch



Interior – Adjacent to Canopy Lock



Interior – Adjacent to Canopy Lock

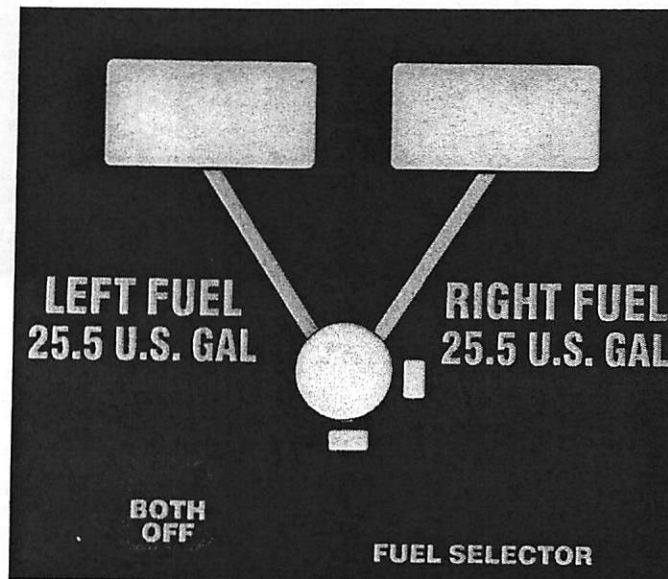


Interior - On the Inside Left Canopy Rail

NO STEP

**- BEFORE FLIGHT -
SEAT BACK MUST BE
TURNED DOWN TO COVER
THIS AREA**

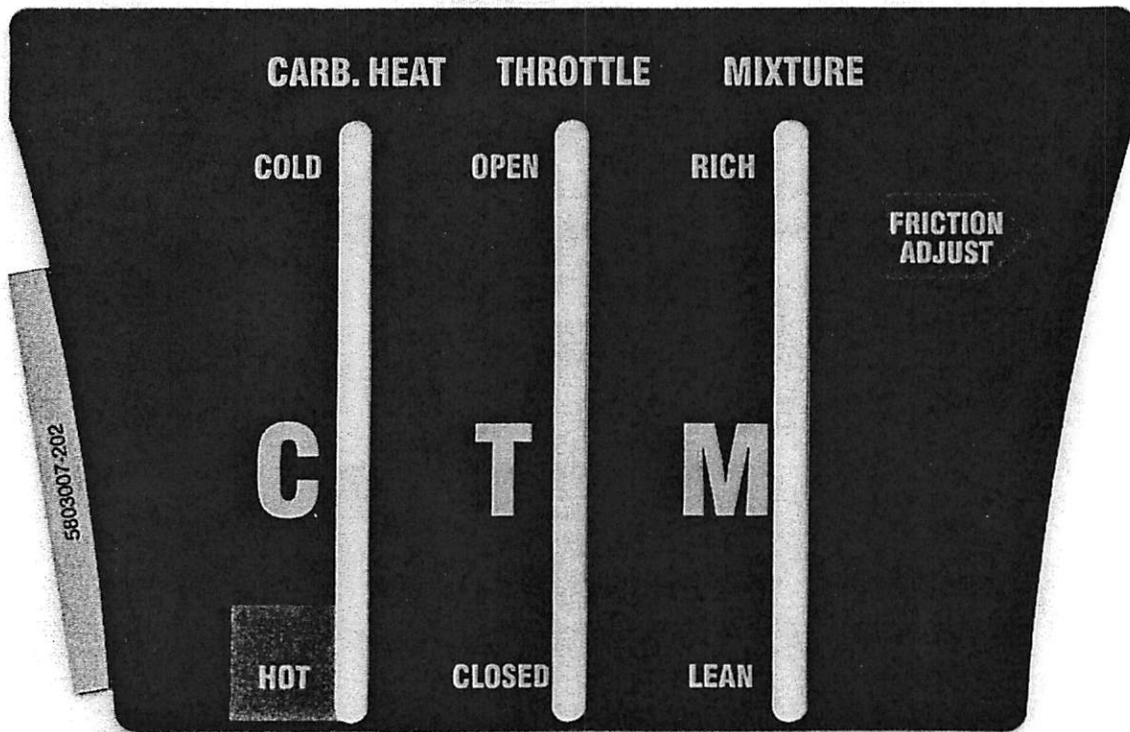
Interior - Under Rear Seat Base -
(Visible With Rear Seat Back Upright)



Interior - Over the Fuel Selector Valve



Interior - On Glare Shield



Interior - On Throttle Quadrant

FUEL
MIN 100/100 LL OCT.
26.3 U.S. GAL. TOTAL CAP.
19.0 U.S. GAL. TO TAB

Exterior - Aft of Fuel Tank Caps



Exterior on Fuselage Fwd of Wing Root

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MAP LIGHT

Interior – On the Left Speaker Cover

PHONE

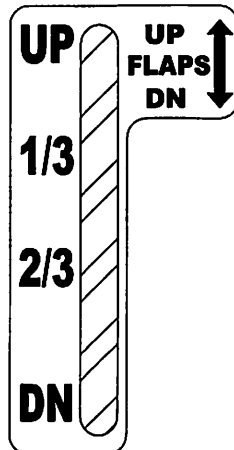
Interior – On the Aft Center Console

MIC

**Interior – On the Pilot and Copilot Control Yokes
On the Aft Center Console**

LEVEL AIRPLANE HERE

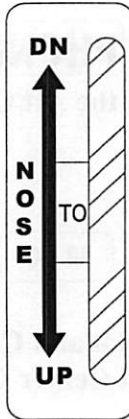
Interior – On the Left Hand Canopy Rail



Interior – On the Center Console, Left Side of the Flap Switch

MOVING MAP DISPLAY NOT FOR NAVIGATION. SEE LIMITATIONS IN POHS

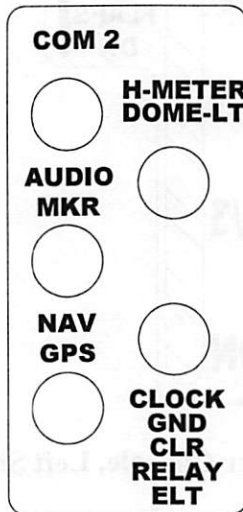
Interior – On the Instrument Panel Above the Moving Map Display



Interior – On the Center Console, Right Side of the Trim Wheel

HAND HOLD

Interior – On the Upper Left and Right Side of the Windshield Bow



Engine compartment – On the Forward Side of the Battery Tray

NO STEP

Exterior – On the Top Inboard Trailing Edge of the Right and Left Flap and On the Forward Top Left and Right Wing Root Fairings



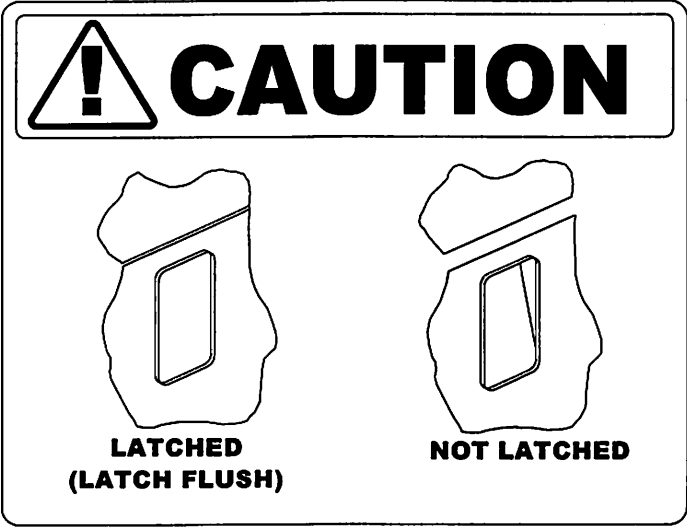
Exterior – On the Canopy Under the Canopy Handle

**DO NOT PAINT
VANE OR SLOT**

Exterior – On The Face of the Lift Detector

NO PUSH
**CLOSE CANOPY WITH
LATCH HANDLE**

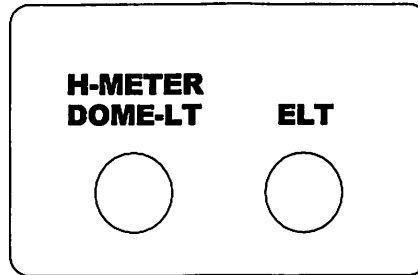
Exterior – On the Lower Trailing Edge of the Canopy, Left and Right Side



Engine Compartment – On the Inside of Each Cowl Door

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**NOTE: ALL PLACARDS ON THIS PAGE ARE FOR GARMIN G1000
EQUIPED AIRCRAFT ONLY**



Engine Compartment - On the Forward Side of the Battery Tray



Exterior – On the Magnetometer Access Cover On the Bottom of the Right Wing

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**CHAPTER 12
SERVICING**

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SERVICING

1. General

This section describes the procedures and precautions necessary for proper servicing of the AG-5B aircraft. Safety precautions are also presented to acquaint the user with potential hazards that may not be readily apparent to persons unfamiliar with the aircraft.

2. Servicing Points

Figure 12-01 illustrates the locations of the major servicing points on the AG-5B aircraft.

3. Access and Inspection Provisions

Various openings in the airframe are provided to enable access for inspection or maintenance. In addition to the normal access provided by opening the engine cowl, other openings, which are covered by removable plates, are located as shown in Figure 12-02.

Access to the interior of the aft fuselage is gained by removal of the panel at the rear of the baggage compartment. Control cables are exposed by removal of the aft console, and removal of the inspection cover beneath the rear passenger seat.

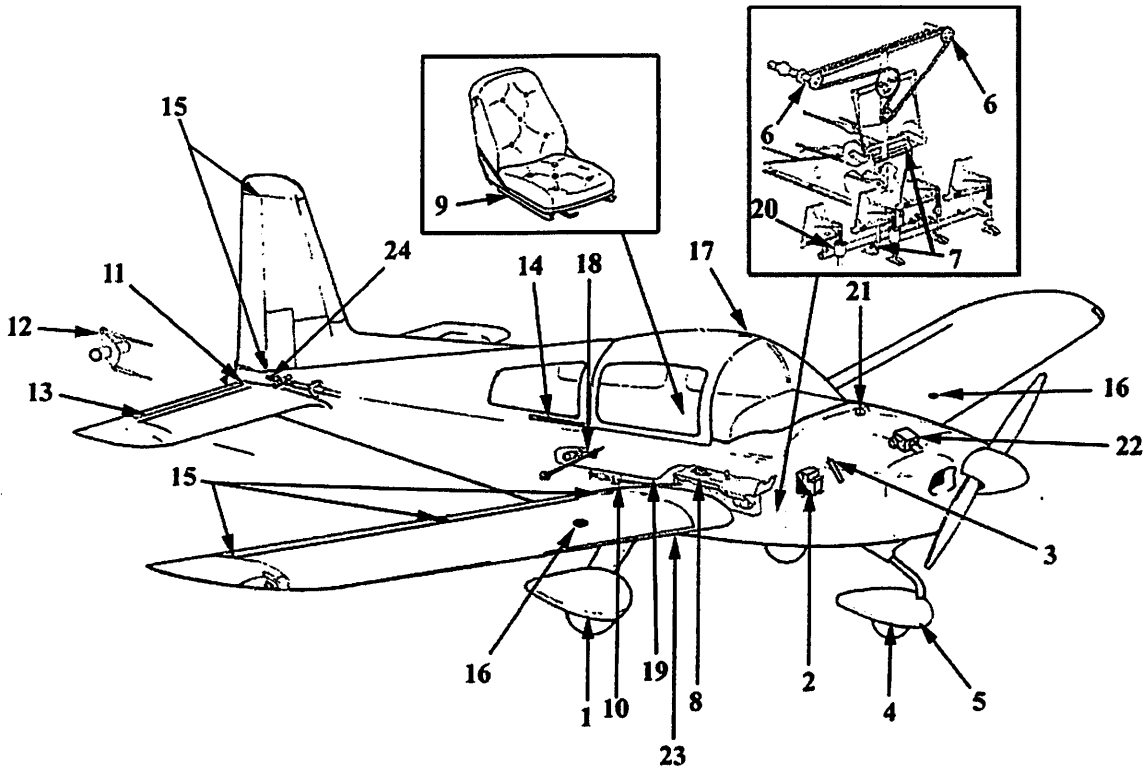
1. MAIN WHEEL BEARINGS (LEFT AND RIGHT) - Grease with MIL-PRF-81332 grease every 100 hours or as required.

TIRES (Main Gear) - Inflate to 34 psi.
2. BATTERY TERMINALS - Coat with commercial grade petroleum jelly to prevent corrosion.

BATTERY - Fill with distilled water as required, to maintain fluid level at top of plates.
3. ENGINE OIL - Change engine oil every 50 hours, *after break in*. Add oil as required to maintain the safe operating level. Reference Textron Lycoming Publication SI 1014.
4. NOSE WHEEL BEARINGS - Grease with MIL-PRF-81332 grease every 100 hours or as required.

TIRE (Nose Gear) - Inflate to 25 psi
5. NOSE FORK SWIVEL AND BELLEVILLE WASHERS - Grease with MIL-PRF-81332 grease every 100 hours or as required.
6. T-COLUMN NEEDLE BEARING - Grease with MIL-PRF-81332 grease as required.
7. T-COLUMN, RUDDER AND FLAP TORQUE TUBE OILITE BEARINGS AND ROLLER CHAIN - Oil with MIL-PRF-7870 as required.
8. TRIM WHEEL GEARS - Grease with MIL-PRF-81332 as required.
9. SEAT TRACKS - Oil with MIL-PRF-7870 oil every 100 hours or as required.

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**Servicing Points
Figure. 12-01**

10. TRIM ACTUATOR SHAFT - Grease with MIL-PRF-81332 grease as required.
11. TRIM TAB BELLCRANKS - Oil with MIL-PRF-7870 oil as required.
12. RUDDER AND ELEVATOR BELLCRANK CLEVIS PINS - Oil with MIL-PRF-7870 oil as required.
13. TRIM TAB HINGE - Oil with MIL-PRF-7870 oil.
14. CANOPY SLIDES - Spray with Lubriplate No. 105 or equivalent as required.
15. ALL CONTROL SURFACE BEARINGS - Grease with MIL-PRF-81332 as required.
(NOTE: A)
16. FUEL TANKS - Fill with 100/100LL minimum grade aviation fuel (Blue). (NOTE: B)
17. CANOPY LATCH - Grease with white grease, Lubriplate No. 105 or equivalent as required.
18. FLAP DRIVE JACKSCREW - Oil with MIL-PRF-7870 oil. Coat with a light film for corrosion prevention only.
19. FLAP POSITION INDICATOR CABLE - Grease with MIL-G-21164 Molybdenum Disulphide grease as required.

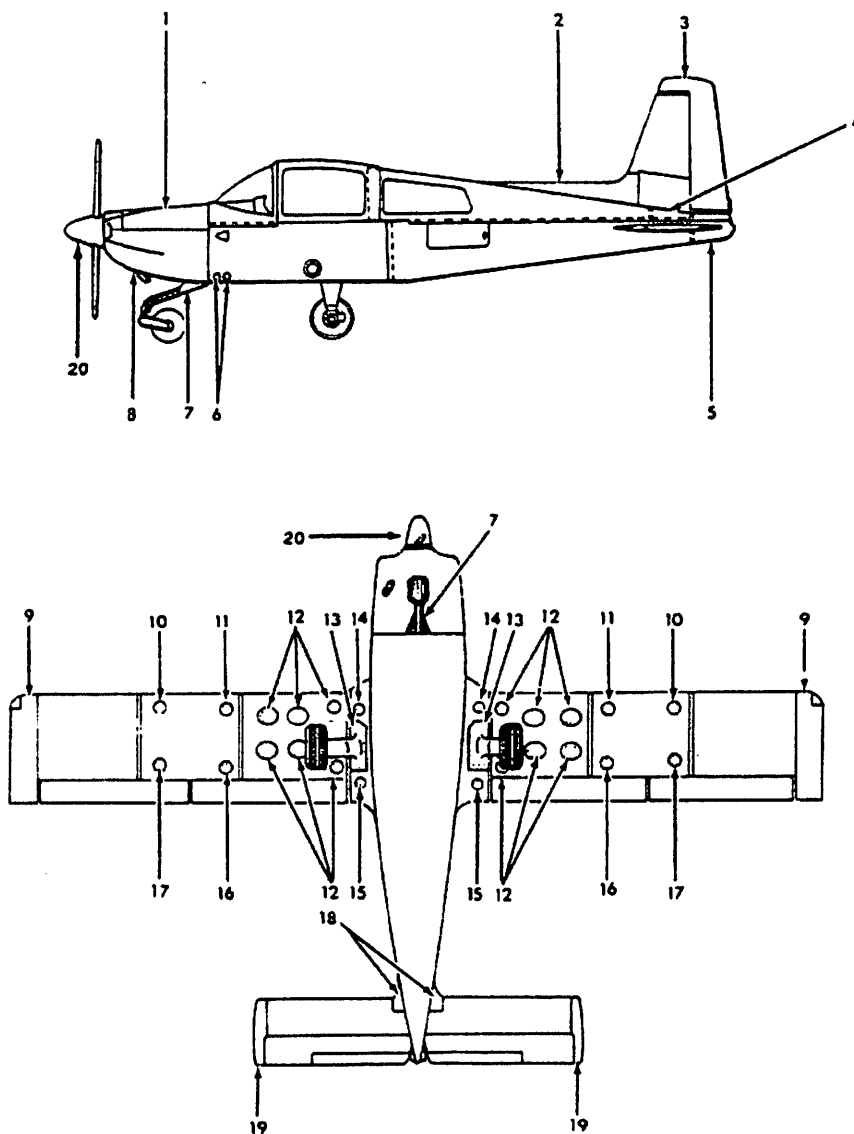
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20. BRAKE RESERVOIRS - Fill to within 1/4 inch of top with MIL-PRF-5606 hydraulic fluid, as required.
21. VACUUM SYSTEM FILTER - Replace filter at 400 hours or as required.
22. VACUUM REGULATOR FILTER – Replace filter annually or as required.
23. ENGINE AIR FILTER - Replace and service as required.
24. FUEL SUMP DRAINS - Clear of water and sediment prior to flight.
25. TRIM JACK SCREW - Grease with white grease, Lubriplate No. 105 or equivalent every 100 hours

NOTES:

- A. Elevator bearings do not require lubrication.
- B. Refer to latest revision of Lycoming Service Instruction No. 1057 for further information concerning fuels.

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- | | |
|--|--|
| 1. Engine Upper Cowl | 12. Fuel Tank Access Plates |
| 2. Dorsal Fin | 13. Landing Gear Root Fairing |
| 3. Rudder Tip | 14. Wing Root Forward Access Plate |
| 4. Tail Cone Access Panels | 15. Wing Root Aft Access Plate |
| 5. Tail Cone | 16. Wing Inboard Aft Access Plate |
| 6. N. G. Torque Tube Bolt Access Hole | 17. Wing Outboard Aft Access Plate |
| 7. N. G. Boot | 18. Horizontal Stabilizer Root Fairing |
| 8. Engine Lower Cowl | 19. Elevator Tips |
| 9. Wing Tip | 20. Propeller Spinner |
| 10. Wing Outboard Forward Access Plate | 21. Fuel Line Access Plates |
| 11. Wing Inboard Forward Access Plate | |

**Access Openings
Figure 12-02**

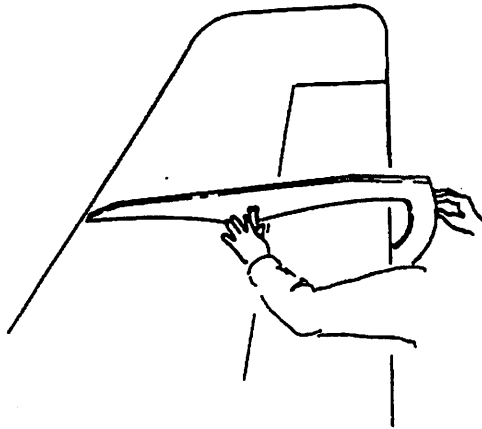
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4. SPECIAL TOOLS AND EQUIPMENT

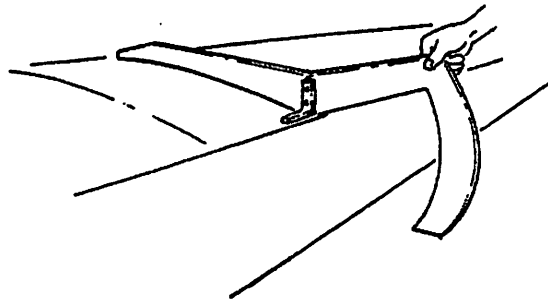
The following is a list of service tools available from the Tiger Aircraft Parts Department. See the applicable parts catalog for ordering information.

TOOL NUMBER	TOOL NAME	MODELS APPLICABLE	FIGURE SHOWN
DE-0002-501	Rudder Rigging Fixture	AG-5B	12-03
DE-5003-501	Aileron & Flap Rigging Fixture		12-04
DE-5004-502	Trim Tab Rigging Fixture		12-05
DE-5005-501	Control Wheel / Elevator Rigging Fixture		Not Shown
DE-5006-1	Aileron & Flap Bearing Sizing Tool: 1-1/8 inch I.D. & 1-1/2 inch I.D.		Not Shown
ST-1064	Canopy Track Sizing Tool		Not Shown
719-40-MRP	Spring Scale- (0-40 lb. Range)		Not Shown

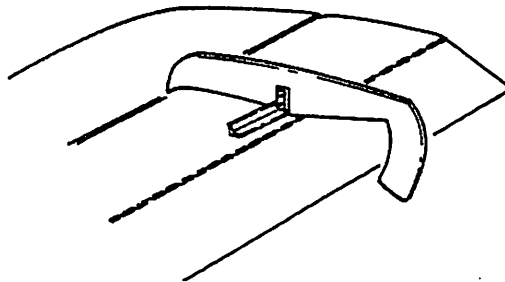
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**Rudder Rigging Fixture
Figure 12-03**



**Aileron & Flap Rigging Fixture,
Figure 12-04**



**Trim Tap Rigging Fixture
Figure 12-05**

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REPLENISHING

1. General

The replenishing procedures contained in this section provide the proper methods for replacing consumed fuel, oil, hydraulic fluid, and battery electrolyte. Also included are methods for tire inflation.

2. Refueling

A. Refueling is accomplished by adding fuel to the wing tanks through their respective filler caps (See Figure 12-06). When fueling the aircraft, the following safety precautions should be followed:

- (1) Never refuel the aircraft with the engine running.
- (2) Always ensure the aircraft is bounded to the refueling unit during refueling.
- (3) Ensure that no one is smoking and there are no open flames within 100 feet of the aircraft during refueling.
- (4) Ensure that all aircraft electrical systems are de-energized during refueling.
- (5) Ensure that no aircraft radar or other powerful transmitters are operating within 100 feet of the aircraft during refueling.
- (6) If fuel is spilled, ensure that the area of spillage is thoroughly flushed with water and that all residual fuel and vapor have dissipated or been neutralized prior to starting the aircraft engine.
- (7) Ensure that all fuel used is from an approved source and free of contamination.
- (8) Ensure that cell phones are off in the area of the aircraft.

The aircraft must be fueled with the following fuel:

CAUTION: UNDER NO CIRCUMSTANCES SHOULD FUEL OF A LOWER OCTANE RATING THAN THAT SPECIFIED BELOW OR AUTOMOTIVE FUEL (REGARDLESS OF OCTANE) BE USED.

Grade 100 Low Lead Aviation Fuel (Blue) is approved. Refer to the latest revision of Lycoming Service Instruction and other Lycoming Publication for further information concerning fuels.

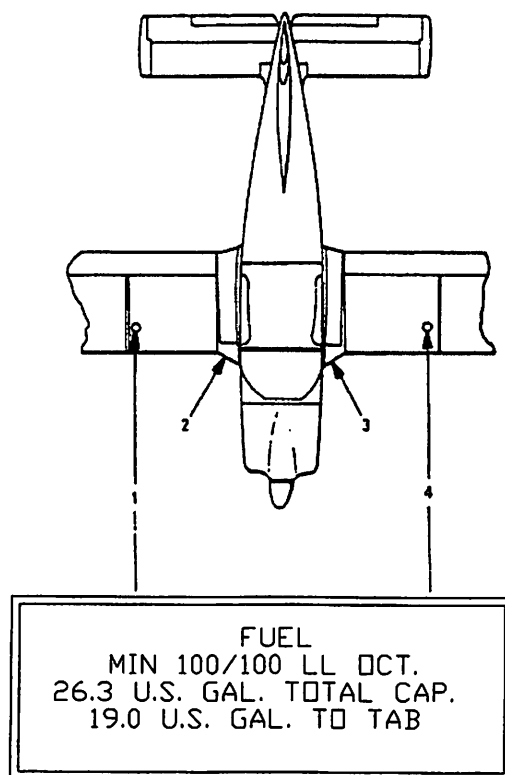
NOTE: The following quantities were measured at an ambient temperature of 70°F. Deviations from this temperature will cause a corresponding change in fuel quantities.

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FUEL SYSTEM CAPACITIES

	U.S. Gallons	Liters	Imp. Gallons
Total Fuel Capacity	52.6	199.1	43.8
Usable Each Tank	25.5	96.5	21.3
Total Usable Fuel	51.0	193.0	42.5

1. Right Fuel Tank Cap
2. Right Sump (Under Wing)
3. Left Sump (Under Wing)
4. Left Fuel Tank Cap



**Fueling Points
Figure 12-06**

3. De-fueling

Assure the following:

- a) The battery is disconnected.
- b) The aircraft is bounded to the refueling unit.
- c) Fire extinguishing equipment is readily accessible.

Remove wing sump drains and drain fuel into a suitable container.

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4. Engine Oil Replenishing

Engine oil replenishment is accomplished by introducing oil into the oil filler spout. Oil quantity can be conveniently checked by use of the dipstick attached to the oil filler spout cap. *When checking oil quantity assure the aircraft is positioned on level ground.*

A. Oil quantity is checked as follows:

- (1) Open the right side of the engine cowl.
- (2) Locate the oil filler spout.
- (3) Unscrew the oil filler spout cap. (Dipstick attached)
- (4) Remove the cap/dipstick from the spout and wipe the oil from the dipstick with a clean cloth or paper towel.
- (5) Replace the cap/dipstick into the filler spout and tighten finger tight.
- (6) Unscrew and remove the cap/dipstick. Reference the oil level on the dipstick using the dipstick reference markings.
- (7) Wipe the oil from the dipstick with a clean cloth or paper towel and re-insert the dipstick into the filler spout. Tighten filler spout cap/dipstick, finger tight.

NOTE: When tightening the cap/dipstick, ensure that it is secure but do not over tighten as over tightening may damage the cap O-ring seal.

Replenish using engine oil of the following specification:

SAE-J1966 Aviation Grade Straight Mineral oil shall be used to replenish the oil supply during the first 35 hours of operation and at the first 10-hour oil change.

NOTE: The aircraft is delivered from the factory with Aviation Grade Straight Mineral Oil. This oil should be drained and replaced along with the oil filter, after the first 10 hours of engine operation.

SAE-J1899 Ashless Dispersant Oil shall be used after the first 35 hours of operation.

Average Ambient Air	Mineral Grade SAE-J1966	Ashless Dispersant SAE-J1899
All Temperatures	—	SAE15W50 or 20W50
Above 80°F (26.67°C)	SAE 60	SAE 60
Above 60°F (15.56°C)	SAE 50	SAE 40 or SAE 50
30°F (-1°C) to 90°F (32°C)	SAE 40	SAE 40
0°F (-18°C) to 70°F (21°C)	SAE 30	SAE 40, 30 or 20W40
Below 10°F (-12°C)	SAE 20	SAE 30 or 20W30

Refer to latest revision of Lycoming Service Instruction SI 1014 and other Lycoming Publications for additional information.

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NOTE: When adding engine oil during cold weather, the change in viscosity due to extreme cold may cause the oil to pour slowly. Warming the oil to room temperature prior to introduction to the engine will expedite oil replenishment.

B. Replace cap/dipstick into oil filler spout and tighten finger tight.

NOTE: When tightening the cap/dipstick, ensure that it is secure but do not over tighten as over tightening may damage the cap O-ring seal.

NOTE: Any oil spillage, particularly on exhaust manifolds, should be wiped clean prior to flight.

C. Close and secure engine cowl.

NOTE: Assure that cowl latches are flush with the cowl.

NOTE: The following quantities were measured at an ambient temperature of 70°F.

THE AG-5B AIRCRAFT OIL SYSTEM CAPACITIES ARE:

	U. S. Quarts	Liters	Imp. Quarts
Total Engine Capacity	8	7.57	6.66
Minimum Safe Quantity	2	1.89	1.66

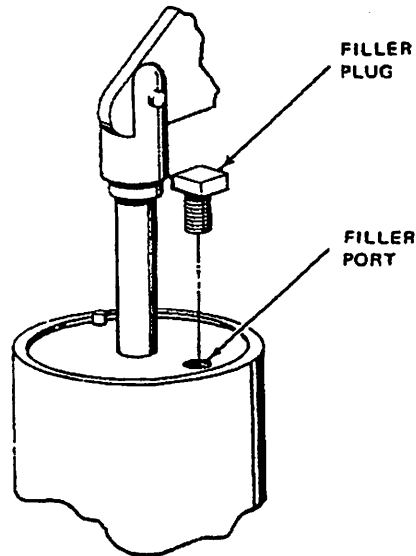
5. Brake Fluid Replenishing

Brake fluid replenishing is accomplished as follows: (See Figure 12-07)

NOTE: When replenishing brake fluid, ensure that the fluid used conforms to specification MIL-PRF-5606, and that the fluid is not contaminated.

- (1) Locate the brake cylinder reservoirs as shown in Figure 12-01 item # 20.
- (2) Using a clean rag or paper towel, wipe any accumulated dirt or other foreign material from the area around the filler plugs.
- (3) Remove filler plugs.
- (4) Using a suitable means, such as a small pump or squeeze bottle, introduce brake fluid (MIL-PRF-5606) to the reservoirs through the filler ports until the level of fluid is ¼ inch from the top of the reservoir.
- (5) Replace the reservoir plugs.
- (6) Check the brake action.
- (7) If more fluid is required, repeat Steps (2) through (6).
- (8) If it is necessary to bleed the brakes, refer to Chapter 32.

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**Brake Cylinder
Figure 12-07**

6. Tire Inflation

WARNING: WHEN INFLATING TIRES, USE REGULATED AIR PRESSURE.

Inflation pressures are as follows:

MAIN LANDING GEAR TIRES-34 psi
NOSE LANDING GEAR TIRES-25 psi

7. Battery Fluid Replenishing

WARNING: THE BATTERY CONTAINS A SULFURIC ACID ELECTROLYTE SOLUTION. DO NOT ALLOW ELECTROLYTE SPILLAGE TO COME INTO CONTACT WITH CLOTHING OR SKIN. SPILLAGE SHOULD BE FLUSHED WITH WATER AND NEUTRALIZED WITH BAKING SODA IMMEDIATELY. EYE PROTECTION SHOULD BE WORN WHEN REPLENISHING THE BATTERY.

A. Replenish battery fluid as follows:

- (1) Open the right side engine cowl door.
- (2) Remove the two wing nuts, washers, and battery cover.
- (3) Using a clean rag or paper towel, remove all dirt and foreign material from the area around the battery filler plugs.

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- (4) Remove filler plugs and visually check the electrolyte level in the battery. If the electrolyte level is below the bottom of the split rings, add distilled water to raise the level to the split ring. Care should be taken not to overfill the battery.
- (5) Install battery filler plugs, clean and neutralize and spillage with baking soda.
- (6) Install battery box cover and secure with washers and wing nuts.
- (7) Close and secure the engine cowl.

NOTE: **Ensure that the cowl latches are flush with the cowl.**

SCHEDULED SERVICING

1. General

This section provides the procedures required to perform servicing required on a scheduled basis.

2. Engine Oil Servicing

The engine oil and filter should be changed after the first 10 hours of operation. It should be refilled with straight mineral oil conforming to Specification No. SAE-J1966. This straight mineral oil should be used until a total of 35 engine operation hours has accumulated, then it should be drained and replaced with ashless dispersant oil. The oil should be changed at least every 50 hours or 4 months, whichever occurs first. At the time of each oil change, the engine oil strainers should be removed, cleaned, and inspected for metal particles. The engine is equipped with a paper throwaway type oil filter; it should be cut apart and inspected for accumulations of metal chips and evidence of internal engine failure.

A. Change engine oil as follows:

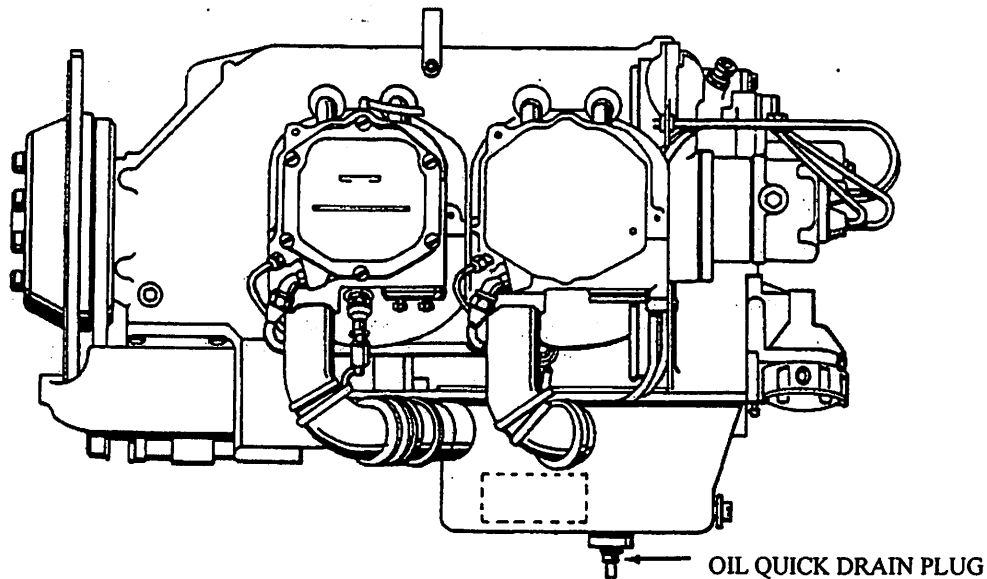
- (1) Open both sides of upper engine cowl, and secure with support tubes.
- (2) Locate engine oil quick drain valve (See Figure 12-08). Attach a suitable hose to the quick drain and route it through the lower cowl exhaust cut out.
- (3) Place the lower end of the hose into a suitable container capable of holding the discarded oil.
- (4) Push the lower portion of the quick drain valve up into its detent to start the oil flow from the engine and drain the oil completely.
- (5) Pull the drain valve down, out of its detent to close the valve.
- (6) Remove, cut open and inspect the oil filter in accordance with the Lycoming Operating Manual.
- (7) Clean the oil filter seating area with a clean towel and install a new oil filter per the Lycoming Operating Manual.
- (8) Remove the engine oil dipstick.

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- (9) Replace the drained oil with 8 quarts of new oil conforming to Specification No. SAE-J1966 or ashless dispersant oil conforming to Specification No. SAE-J1966 (as required).
- (10) Clean the filler dipstick with a clean rag and reinstall it in the spout. Tighten finger tight.
- (11) Unscrew and remove engine oil dipstick. Reference the oil level on the dipstick using the dipstick reference markings.
- (12) Using a clean rag or paper towel wipe oil from dipstick, and reinstall engine oil dipstick. Tighten plug finger tight.
- (13) Close and secure both sides of the upper engine cowl.

NOTE: Ensure that the cowl latches are flush with the cowl.

- (14) Operate engine to normal operating temperature. Shut the engine down and inspect for oil leaks.



**Engine Oil Drain Plug
Figure 12-08**

3. Engine Air Filter Servicing

- A. The AG-5B aircraft uses a Bracket air filter Part No. BA-4305. Replace the foam type filter element every 100 hours, every 12 months, when torn or 50 percent covered with foreign materials. (See Figure 12-09 and 12-10) Replace filter as follows:

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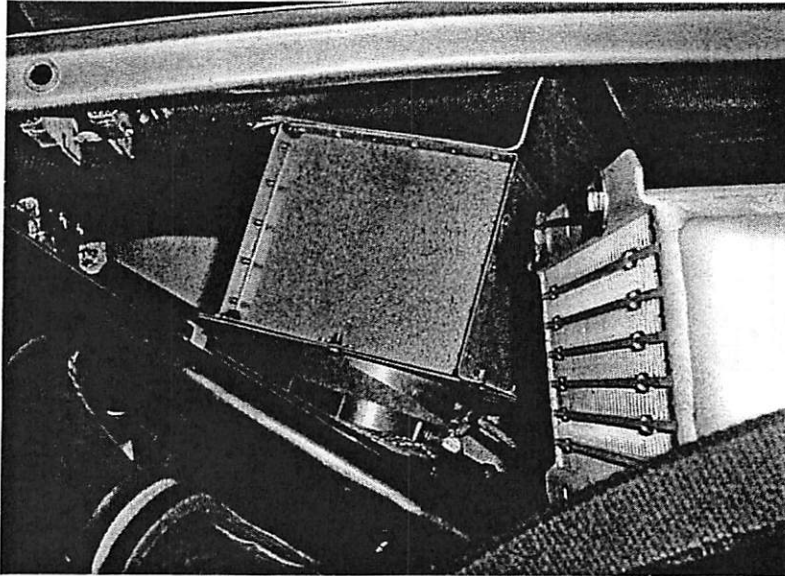
NOTE: Removal of the filter box from the aircraft is not required to access to the filter element for changing.

NOTE: Never attempt to wash the filter element as it is designed as a throw away.

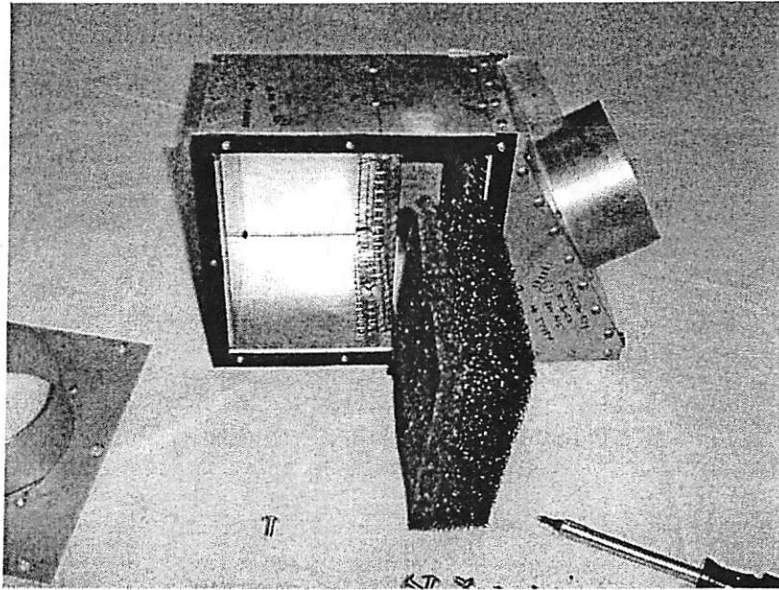
- (1) Open the upper left cowl and secure with support rod.
- (2) Remove the air duct from the filter box cover.
- (3) Remove the screws that attach the filter cover to the filter box and remove the filter.

NOTE: It is important to ensure the filter is firmly seated on all edges prior to installing the filter box cover. The filter must also seat firmly against the filter box cover when the cover is installed.

- (4) Install the filter and filter box cover.
- (5) Install the air duct to the filter box cover.
- (6) Close the engine cowl and ensure the latches are flush with the cowl.



**Engine Air Filter
Figure 12-09**



Engine Air Filter Servicing
Figure 12-10

4. Vacuum System Air Filter Service (Figure 12-11)

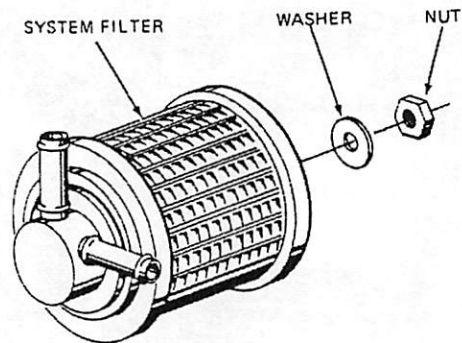
The vacuum system air filter is located beneath the instrument panel, and attached to the inside of the firewall at the upper left corner. The filter element should be checked periodically to ensure that it is not clogged by foreign material. If the filter is clogged it should be replaced.

NOTE: Do not blow the filter off with compressed air, or attempt to wash it.

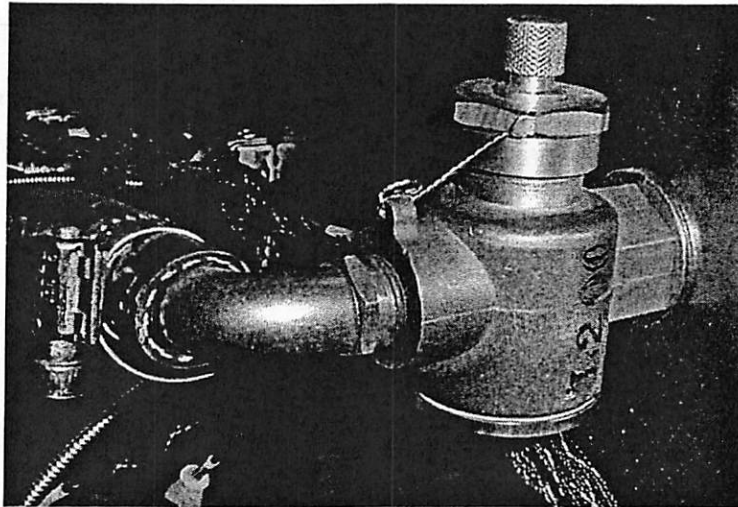
A. Replace the vacuum filter as follows:

- (1) Disconnect the vacuum hoses from the filter.
- (2) Remove the fastener attaching the filter to the firewall.
- (3) Remove and replace the old filter with a new item.
- (4) Reinstall the vacuum hoses.
- (5) Reconnect the filter to the firewall.

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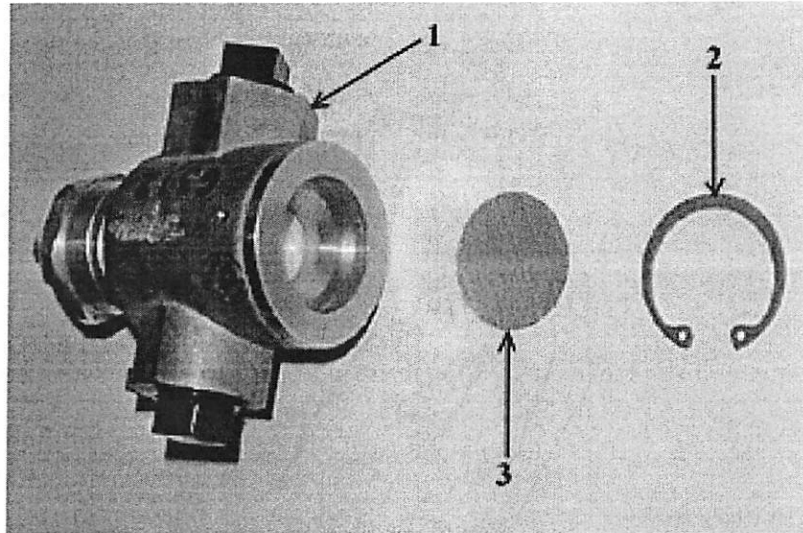
**Vacuum System Air Filter Servicing
Figure 12-11**



**Vacuum Regulator
Figure 12-12 (1 of 2)**

B. Vacuum Regulator adjustment, inspection and cleaning.

- (1) Refer to Chapter 37 for adjustment of the Vacuum Regulator. (Figure 12-12, 1 of 2)
- (2) Vacuum Regulator screen inspection and cleaning. (Figure 12-13, 2 of 2)



Vacuum Regulator Screen
Figure 12-13

The vacuum regulator screen is recessed under the vacuum regulator.

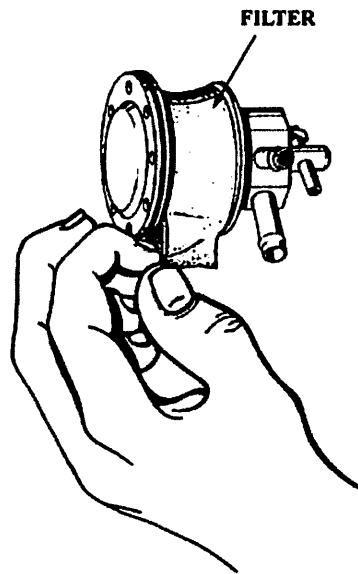
- (3) Using snap-ring pliers, remove snap-ring (2) from the bottom of regulator (1).
- (4) Remove screen (3) from the regulator.

WARNING: USE CLEANING SOLVENTS IN A WELL VENTILATED AREA. AVOID BREATHING FUMES. KEEP AWAY FROM OPEN FLAMES.

- (5) Clean the screen using cleaning solvent and blot dry with a soft dry cloth.
- (6) Reinstall screen (3) and snap ring (2) into regulator (1).

NOTE: Insure that snap ring is firmly seated in its groove.

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**Alternate Vacuum Regulator With Filter
Figure 12-13A**

C. Some aircraft are equipped with an alternate vacuum regulator mounted in the same location with the exception that the regulator is on the aft side of the firewall. This regulator is equipped with a foam type filter element. At each annual inspection or sooner if the filter element appears dirty, it should be replaced as follows:

- (1) Remove the 5 screws that secure the instrument deck to the instrument panel, disconnect the defroster hoses from the defroster vents and remove the instrument deck.
- (2) Locate the vacuum regulator, grasp the filter as shown in Figure 12-13A and remove by stretching the filter over the retainer.
- (3) Install a new filter by stretching the filter over the retainer and seating securely around the regulator.
- (4) Position the instrument deck in place, connect the defroster hoses to the defroster vents and secure the instrument deck to the instrument panel using the 5 previously removed screws

NOTE: As an alternant to removing the instrument deck, the vacuum regulator filter may be removed from under the instrument panel.

5. Airframe Lubrication

A. Lubricate the airframe in accordance with this chapter. During aircraft lubrication, observe the following precautions and procedures:

WARNING: USE CLEANING SOLVENTS IN A WELL VENTILATED AREA. AVOID BREATHING FUMES. KEEP AWAY FROM OPEN FLAMES.

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CAUTION: SYNTHETIC COMPOUNDS SUCH AS THOSE FOUND IN AIRCRAFT OILS AND GREASES CONTAIN ELEMENTS THAT CAN SOFTEN PAINT, NATURAL RUBBER, NEOPRENE, AND SOME ELECTRICAL INSULATORS. IF THIS TYPE LUBRICANT IS SPILLED ON ANY OF THESE MATERIALS, WIPE IT OFF IMMEDIATELY AND THOROUGHLY WITH A CLEAN CLOTH.

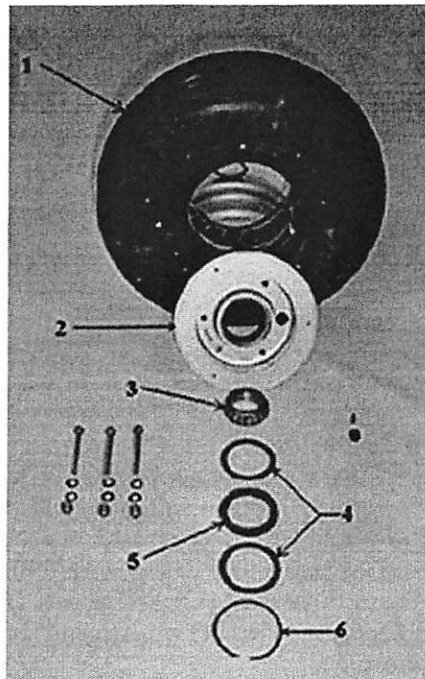
- (1) Remove all foreign matter from joints, fittings, and bearing surfaces immediately before application of lubricant. Use a clean cloth saturated with appropriate cleaning solvent.
- (2) Apply lubricant sparingly to prevent accumulation of contaminants.

B. Main gear and nose gear bearings. (Figure 12-14)

WARNING: USE CLEANING SOLVENTS IN A WELL VENTILATED AREA. AVOID BREATHING FUMES. KEEP AWAY FROM FLAMES.

CAUTION: DO NOT SPIN BEARINGS WITH COMPRESSED AIR. WASH BEARING SEALS IN MINERAL SPIRITS (OR EQUIVALENT) AND DRY WITH A CLEAN, SOFT LINT-FREE CLOTH.

CAUTION: USE A CLEAN, LINT-FREE CLOTH TO CLEAN AND HANDLE BEARINGS.



- | | |
|------------|------------------------|
| 1. Tire | 4. Felt Seal Retainers |
| 2. Wheel | 5. Felt Seal |
| 3. Bearing | 6. Snap Ring |

**Wheel Bearing Lubrication
Figure 12-14**

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(1) Clean and repack wheel bearings after the first 100 hours of operation. Thereafter clean and repack the bearings at each tire change. Remove wheel (2) and bearing (3). Clean bearings and felt seals (5) with mineral spirits or equivalent and dry with soft lint-free cloth.

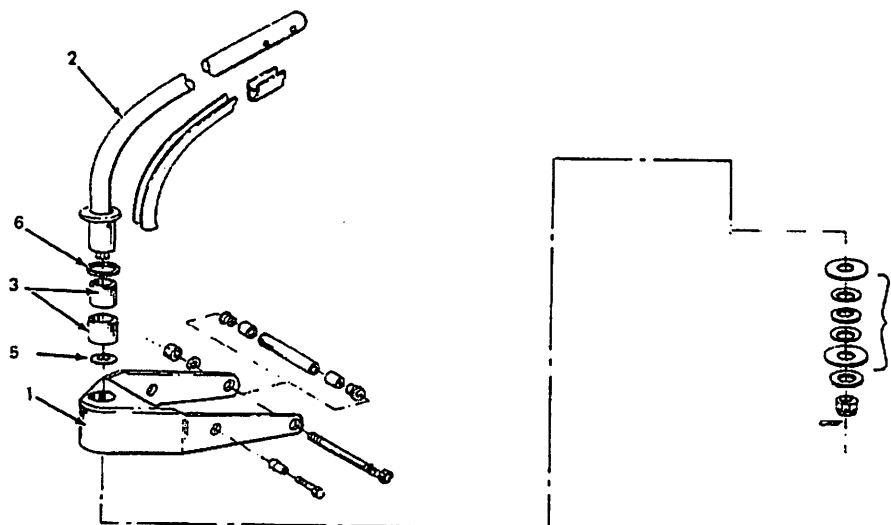
(2) Inspect races and bearings for wear and freedom of movement, replace if necessary.

NOTE: For adjustment of nose and main landing gear wheel bearings, refer to Chapter 32.

(3) Repack bearings only with grease MIL-G-81322 and lubricate felt seal with oil MIL-L-7870 before installation.

C. Nose gear fork assembly (Figure 12-15)

WARNING: USE CLEANING SOLVENT IN A WELL VENTILATED AREA. AVOID BREATHING FUMES. KEEP AWAY FROM FLAMES.



**Nose Gear Fork Assy. Servicing
Figure 12-15**

(1) Clean and grease the nose gear fork assembly, bushings, and Bellville washers every 100 hours. Remove Nose Gear Fork assembly (1) from Strut (2), clean Bushings (3), Bellville Washers (4) and Fork (1) with mineral spirits (P-S-661) or equivalent and dry with soft lint-free cloth.

(2) Inspect Bushings (3), Thrust Bearings (5), and Bellville Washers (4) for wear and damage. Replace if necessary.

NOTE: For adjustment of Nose Gear Fork assembly, refer to Chapter 32.

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- (3) Repack Nose Gear Fork assembly, Bushings, Thrust Bearing and Bellville Washers only with grease MIL-G-81322 before installation.

D. T-Column Bearings

The T-column Needle and Thrust Bearings should be lubricated when evidence of binding occurs, or when the assembly must be disassembled for repair or replacement of parts. Lubricate the bearings as follows:

CAUTION: DO NOT HANDLE BEARINGS WITH BARE HANDS. USE A LINT-FREE CLOTH.

- (1) Remove the Needle and Thrust Bearings.

WARNING: USE CLEANING SOLVENT IN A WELL VENTILATED AREA. AVOID BREATHING FUMES. KEEP AWAY FROM FLAMES.

- (2) Clean the bearings and races with mineral spirits or equivalent and dry with soft lint-free cloth.
- (3) Inspect bearings and races for wear, damage and freedom of movement, replace if necessary.

NOTE: For adjustment of T-column, refer to Chapter 27.

- (4) Repack bearings with MIL-G-81322 grease before installation.

E. Trim Wheel Gears

- (1) Use a clean lint-free cloth to wipe excess grease and foreign material from the shaft.
- (2) Apply a thin coating of MIL-G-81322 grease to the shaft by hand.

F. Trim Actuator Shaft

- (1) Use a clean lint-free cloth to wipe excess grease and foreign material from the shaft.
- (2) Apply a thin coating of MIL-G-81322 grease to the shaft by hand.

G. Canopy and Baggage Door Latches

WARNING: USE CLEANING SOLVENT IN A WELL VENTILATED AREA. AVOID BREATHING FUMES. KEEP AWAY FROM FLAMES.

The Canopy and Baggage Door Latches should be lubricated at each 100-hour inspection or when disassembled for repair. Lubricate the latches as follows:

- (1) Clean internal parts of the latch with mineral spirits and dry with a soft lint-free cloth.
- (2) Inspect parts for wear, damage and freedom of movement. Replace if necessary.

NOTE: For adjustment of Canopy and Baggage Door Latches, refer to Chapter 52.

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- (3) Lubricate latch parts with a light coating of Mil-PRF-81322, grease, before assembly.

H. Flap Position Indicator Cable

The flap position indicator cable should be lubricated when evidence of binding occurs or when it is removed for maintenance. Lubricate the cable as follows:

- (1) Remove the wire from the cable housing.
- (2) Use a clean lint-free cloth to remove excess grease and foreign material from the wire.
- (3) Apply a thin coating of MIL-G-21164 Molybdenum Disulphide grease or equivalent, to the wire by hand.
- (4) Reinstall wire in cable housing.

6. **Auxiliary Fuel Pump Filter Servicing** (Figure 12-16)

A. Clean the auxiliary fuel pump filter as follows:

WARNING: **PRIOR TO REMOVING THE FILTER FROM THE FUEL PUMP, CLOSE AND LOCK THE CANOPY, OR OTHERWISE ENSURE THAT THE PUMP IS NOT ENERGIZED WHILE THE FILTER IS REMOVED. ENERGIZING THE PUMP WITH THE FILTER REMOVED WILL RESULT IN RAW FUEL BEING PUMPED INTO THE ENGINE COMPARTMENT.**

- (1) Locate the auxiliary fuel pump, remove safety wire and bottom cover (2), from pump (1), by turning the cover counterclockwise.

WARNING: **WHEN THE COVER IS REMOVED FROM THE PUMP, A SMALL AMOUNT OF FUEL WILL DRAIN. CAPTURE THIS FUEL IN A CONTAINER FOR PROPER DISPOSAL.**

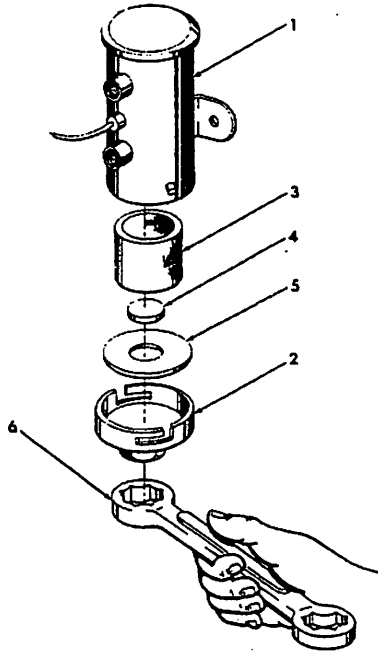
- (2) Remove filter element (3) from fuel pump, and remove magnet (4), and gasket (5) from bottom cover.
- (3) Use compressed air and a clean, lint-free cloth to remove foreign material from filter, magnet, and gasket.

NOTE: **If excessive amounts of foreign material are found in the filter, the Fuel System should be checked for contamination as shown in Chapter 28.**

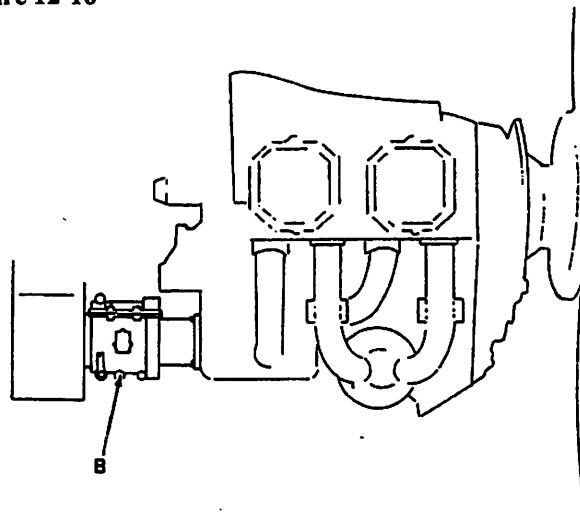
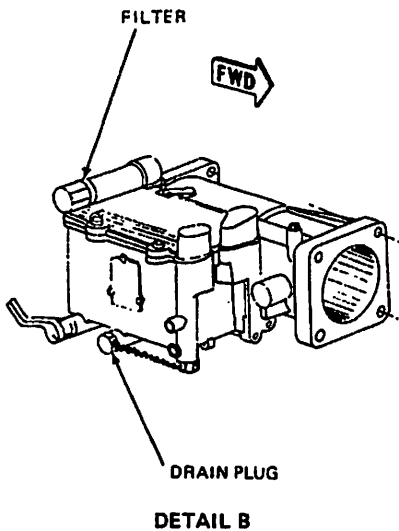
- (4) Reinstall the filter element in the pump and the magnet and gasket in the bottom cover.
- (5) Install the bottom cover on the pump by placing the slots over the lugs and rotating the cover clockwise into detent.
- (6) Safety wire the bottom cover on the pump with 0.032 inch safety wire.
- (7) Energize the auxiliary fuel pump and check for leakage around the bottom cover.

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1. Pump
2. Bottom Cover
3. Filter Element
4. Magnet
5. Gasket
6. 5/8 Inch Wrench



**Aux. Fuel Pump Servicing
Figure 12-16**



**Carburetor Filter Servicing
Figure 12-17**

Carburetor Filter Servicing (Figure 12-17)

- A. Drain the carburetor float bowl and clean the carburetor filter as follows:

WARNING: WHEN THE DRAIN PLUG IS REMOVED FROM THE CARBURETOR BOWL, A SMALL AMOUNT OF FUEL WILL DRAIN FROM THE CARBURETOR. CAPTURE THIS FUEL IN A CONTAINER FOR PROPER DISPOSAL.

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- (1) Remove the safety wire from the filter access plug.
- (2) Remove the safety wire from the float bowl drain plug
- (3) Remove the bowl drain plug, and capture the fuel that drains from the filter / bowl.
- (4) When the carburetor bowl has drained, replace the plug.
- (5) Remove the filter and clean with compressed air.
- (6) Install the filter and access plug.
- (7) Install 0.032 inch safety wire on filter access plug and float bowl drain plug.

UNSCHEDULED SERVICING

1. General

This section provides procedures required in the event of unusual environmental conditions, and servicing procedures that are required on a regularly scheduled basis.

2. Ice and Snow Removal

Accumulation of ice and snow on the aircraft can result in damage during ground handling, and can constitute a flight hazard if not properly removed. Ice and snow removal can result in damage to the aircraft if proper removal methods are not employed. Taxiing or towing through snow or slush can result in ice formation on wheels, brake parts, and fairings. Subsequent attempts to move the aircraft without clearing this ice may damage the wheels and/or fairings.

The recommended method of ice and snow removal is to allow it to melt. Remove as much as possible with a soft bristle broom, make sure the wheels and brakes are clear, and tow the aircraft into a heated area. This method is particularly desirable, since it will melt any undetected ice and snow that could constitute a flight hazard.

If heated facilities are not available, ice must be completely and carefully removed with wooden or plastic scrapers, or by hand.

CAUTION: DO NOT USE SOLVENTS, ALCOHOL, ETHYLENE GLYCOL (ANTI-FREEZE), OR ANY PETROLEUM DERIVATIVE FOR ICE OR SNOW REMOVAL. THESE SUBSTANCES CAN DAMAGE PAINT, PLEXIGLAS, RUBBER, AND PLASTICS, AND MAY DETERIORATE LUBRICANTS.

Ensure ice and snow accumulations are removed from the following areas and flight controls have freedom of full movement:

- (1) Wings, empennage, and control surfaces.
- (2) Between the wing trailing edges and the leading edges of the flaps and ailerons.
- (3) Pitot tube and fuel tank vents.

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- (4) Propeller spinner, inside and out.
- (5) Nose cowling air intakes.
- (6) Landing light.
- (7) Propeller blades.
- (8) Engine oil breather pipe.
- (9) Windshield, canopy, and canopy tracks.
- (10) Wheels, brakes, and wheel fairings.
- (11) Between rudder and vertical stabilizer.
- (12) Between elevators and horizontal stabilizer.
- (13) Between elevator and trim tab.
- (14) Around rudder, elevator, and trim tab linkages.

3. External Cleaning

The painted surfaces of the aircraft have a long lasting, all-weather finish and should require no buffing or rubbing out in normal conditions. However, it is desirable to wash and polish the aircraft to preserve the outstanding exterior finish. The paint can be kept bright simply by washing with water and mild soap. Avoid abrasive or harsh detergents. Rinse with clear water and dry with soft cloth towels or chamois. Oil and grease spots may be removed with kerosene or mineral spirits. Areas affected by kerosene or mineral spirits will require re-waxing.

The use of wax in areas subject to high abrasion, such as leading edges of wings and tail surfaces, propeller, spinner, and blade, is recommended. Use a good automotive-type wax and apply as directed.

4. Internal Cleaning

Clean and vacuum the interior regularly to remove dust and loose dirt from the upholstery and carpeting.

CAUTION: THE APPLICATION OF CERTAIN CLEANING AGENTS, PROTECTIVE COATINGS, STAIN REPELLENTS, AND OTHER CHEMICAL COMPOUNDS MAY REDUCE THE FIRE RETARDANT QUALITIES OF INTERIOR FABRICS. CONSULT THE COMPOUND MANUFACTURER BEFORE USE.

If liquid (coffee, etc.) is spilled on the upholstery or carpet, blot it up promptly with clean tissue or rags. Continue blotting until no more liquid is taken up. Sticky materials may be cleaned with household spot removers, used sparingly. Before using any solvent, read the instructions on the container and test it on an obscure place on the fabric to be cleaned. Never saturate the fabric with a volatile solvent; it may damage the padding and backing materials.

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CAUTION: NEVER USE GASOLINE, BENZINE, ALCOHOL, ACETONE, CARBON TETRACHLORIDE, ANTI-ICE FLUID, LAQUER THINNER, OR GLASS CLEANER TO CLEAN PLASTIC. THESE MATERIALS WILL DAMAGE THE PLASTIC AND MAY CAUSE CRAZING.

The plastic trim, headliner, instrument panel, and control knobs may be cleaned with mild soap and water but do not saturate the material and don't rub it roughly. Use a clean damp cloth or towel to remove any soap residue then wipe with a cloth and let dry.

When cleaning leather use a soft cloth with lukewarm water and a mild soap or saddle soap. Wipe using a clean damp cloth or towel to remove any soap residue. Then wipe dry with a clean dry soft cloth and allow the leather to completely dry naturally. *DO NOT use heat to advance the drying time.* For stubborn stains use leather cleaner but never use oils, varnishes, solvent-based or abrasive cleaners, furniture polish or shoe polish on leather. Soiled or stained leather should be cleaned immediately as the leather may be harmed if dirt is allowed to work into the finish.

Clean safety belts with mild soap and lukewarm water only, never bleach or dye the belts as the fabric may become weakened and unable to provide adequate protection.

5. Windshield and Window Cleaning

In order to maintain good visibility at all times, the Plexiglas in the windshield, windows, and canopy must be kept clean. Techniques and materials used to clean glass should be avoided. Plexiglas is softer than glass and subject to damage by solvents and abrasive glass cleaning agents.

A. Precautions

- (1) Cleaning agents should be limited to soap and water used with a sponge or soft cloth. Most solvents will cloud plastic and may cause cracking and crazing. Many commercial glass cleaners contain abrasives and solvents that may cause windshield/window damage.
- (2) Use only clean soft linen cloths to avoid scratching the windshield/window surface. Do not rub on the Plexiglas. Mud, dirt, and other foreign matter dislodged and trapped beneath the cloth may cause fine surface scratches in the Plexiglas.

CAUTION: NEVER USE GASOLINE, BENZINE, ALCOHOL, ACETONE, CARBON TETRACHLORIDE, FIRE EXTINGUISHER FLUID, ANTI-ICE FLUID, LAQUER THINNER OR GLASS CLEANER TO CLEAN PLASTIC. THESE MATERIALS WILL DAMAGE THE PLASTIC AND MAY CAUSE CRAZING.

B. Recommended Procedures

- (1) Flush the area to be cleaned with a solution of mild soap and water. Wait a few moments to allow the soap to work.
- (2) Flood the area with clear water. Use the soft flooding flow of water and bare hand to dislodge dirt accumulations.

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- (3) After all dirt and grit have been removed, apply soap and water again. Go over the area lightly with a sponge or soft cloth, followed by flooding with clean water. Rinse the cloth or sponge frequently.
- (4) A soft cloth damp with kerosene may be used to remove heavy grease and tar.
- (5) After cleaning, a thin coat of polish or wax may be applied in accordance with the manufacturer's directions. Buff lightly with a soft cloth.
- (6) Plexiglas repair kits may be used to work out or reduce scratches and other mars. Follow the manufacturer's directions.

6. Engine Cleaning

WARNING USE MINERAL SPIRITS IN A WELL VENTILATED AREA. AVOID BREATHING FUMES. KEEP AWAY FROM OPEN FLAMES.

CAUTION PARTICULAR CARE SHOULD BE TAKEN TO PROTECT ELECTRICAL EQUIPMENT BEFORE CLEANING. SOLVENTS SHOULD NOT BE ALLOWED TO ENTER MAGNETOS, STARTER OR ALTERNATOR. COVER ANY FUEL, OIL AND AIR OPENINGS ON THE ENGINE AND ACCESSORIES PRIOR TO WASHING THE ENGINE WITH SOLVENT. CAUSTIC CLEANING SOLUTIONS SHOULD BE USED CAUTIOUSLY AND SHOULD ALWAYS BE PROPERLY NEUTRALIZED AFTER USE.

The engine should be cleaned with mineral spirits and then dried thoroughly with compressed air. If caustic or emulsifying cleaners are used, they should be flushed with water and neutralized as soon as possible after cleaning is complete.

7. Propeller Care

Nicks gouges and other damage to the propeller should receive immediate attention. Reference Chapter 61.

WARNING USE SOLVENT IN A WELL VENTILATED AREA. AVOID BREATHING FUMES. KEEP SOLVENT AWAY FROM OPEN FLAMES.

Cleaning agents such as mineral spirits may be used to clean the propeller. However the introduction of solvent into the spinner cavity must be avoided, as residue will be blown aft over the aircraft upon engine start. The propeller blades should be lightly coated with a film of oil or wax.

Any loose or missing spinner attachment hardware should be replaced or secured as required. The spinner should be replaced if it sustains damage.

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**CHAPTER 20
STANDARD PRACTICES - AIRFRAME**

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CHAPTER 20

STANDARD PRACTICES - AIRFRAME

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AIRFRAME STRUCTURAL REPAIR - DESCRIPTION

1. General

The information in this section should be used in conjunction with AC43.13 "Acceptable Methods, Techniques and Practices - Aircraft Inspection and Repair." Information contained herein is applicable to repair of damage where replacement of the damaged assembly is considered unnecessary. If some doubt exists relative to a repair not specifically covered, consult the Tiger Aircraft Customer Service Department.

Field repairs of bonded structures can be made using rivets. Flush riveted repairs can be made in both sheet metal and honeycomb areas. These repairs should be covered with an epoxy filler to maintain surface contour and smoothness.

2. Tools, Jigs, and Fixtures

Very few special tools are required for normal maintenance on the AG-5B. Standard shop tools (including a torque wrench and micrometer) are usually adequate. Required special tools, jigs, and fixtures can be acquired through your authorized Tiger Aircraft sales or maintenance facility. Special tools are listed in Chapter 12.

3. Materials

Structural repairs should be accomplished using identical material to that being repaired (i.e., 0.032 inch 2024-T3 Clad Aluminum). Figure 20-01 shows the various materials utilized and should be used in determining the type of material for repair work. If material shortages make substitution necessary, 2024 -T3 can be substituted for other aluminum alloys. However, it is important that the 2024 -T3 aluminum be treated for corrosion protection.

4. Service Kits

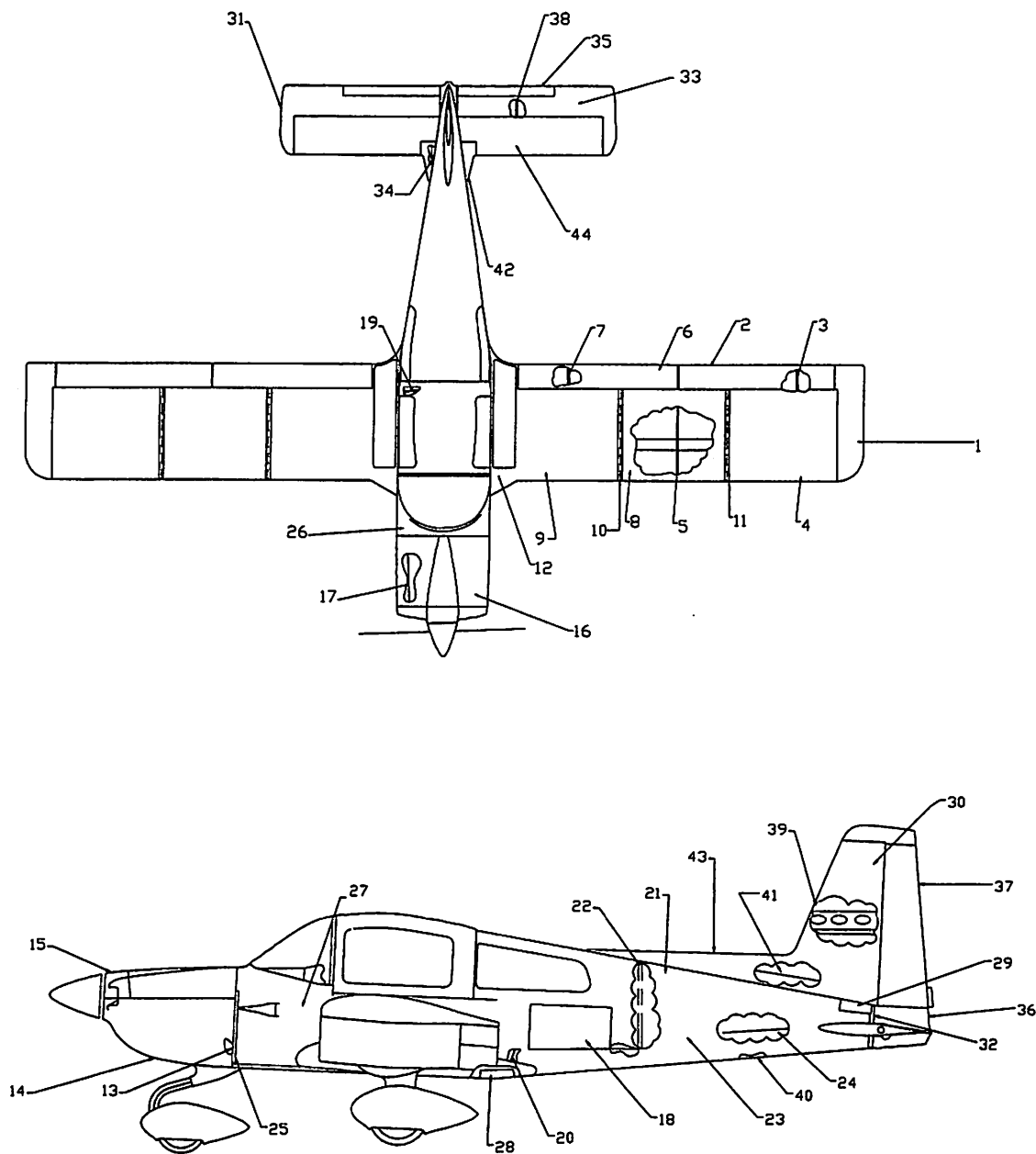
Service Kit No. SK-102A is a potting kit for honeycomb repair and Service Kit No. SK-125A is a bond line repair kit used for the repair of delaminated metal-to-metal bond joints. Both kits contain instructions for proper preparation and application and are available through your authorized Tiger Aircraft sales or maintenance facility.

5. Sheet Metal Repairs - Riveted

Damage to skin, ribs, and frame areas can generally be repaired using normal sheet metal repair techniques. These are covered in AC43.13. Several typical repairs are also discussed in Approved Repairs, Paragraphs 1 and 2. Complete fuselage sections can be replaced using standard rivet practices as discussed in Approved Repairs, Paragraphs 10, 11, and 13. Local wing skin damage can be satisfactorily repaired using rivets. However, if extensive wing skin damage exists, it is recommended that the complete wing panel be replaced. The Tiger Aircraft Customer Service Department should be contacted for additional information.

NOTE: Wing repair in the fuel tank area is not authorized.

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**Airframe Materials Chart
Figure 20-01
(Sheet 1 of 2)**

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ITEM NO.	DESCRIPTION	MATERIAL
1	Wing Tip	Fiberglass
2	Aileron Skin	0.016" 2024-T3 Alclad
3	Aileron Rib	0.50" Honeycomb
4	Wing Skin	0.020" 2024-T3 Alclad
5	Wing Rib	0.040" 6061-T6
6	Flap Skin	0.032" 2024-T3 Alclad
7	Flap Rib	0.50" Honeycomb
8	Wing Skin	0.025" 2024-T3 Alclad
9	Wing Skin	0.032" 2024-T3 Alclad
10	Doubler	0.025" 2024-T3 Alclad
11	Doubler	0.025" 2024-T3 Alclad
12	Wing Root Fairing	Fiberglass
13	Firewall	0.018" Aluminized Steel
14	Lower Cowl	Carbon Fiber
15	Nose Cowl	Carbon Fiber
16	Upper Cowl	Carbon Fiber
17	Baffle	0.032" 6061-T4
18	Baggage Door	0.032" 2024-T3 Alclad
19	Bulkhead	0.032" 2024-T3 Alclad
20	Bulkhead	0.032" 2024-T3 Alclad
21	Skin	0.020" 2024-T3 Alclad
22	Bulkhead	0.025" 2024-T42 Alclad
23	Side Skin	0.032" 2024-T3 Alclad
24	Stiffener	0.032" 2024-T3 Alclad
25	Angles	0.025" 2024-T3 Alclad
26	Skin	0.025" 6061-T4
27	Fuselage Panels	0.50" Honeycomb
28	Gusset	0.063" 2024-T42 Alclad
29	Cover	0.020" 2024-T3 Alclad
30	Stabilizer Skin	0.020" 2024-T3 Alclad
31	Stabilizer Tip	Thermo-Plastic
32	Bulkhead	0.090" 2024-T42 Alclad
33	Elevator Skin	0.016" 2024-T3 Alclad
34	Horizontal Fillet Channel	0.032" 2024-T3 Alclad
35	Trim Tab Skin	0.025" 2024-T3 Alclad
36	Tailcone	Thermo-Plastic
37	Rudder Skin	0.016" 2024-T3 Alclad
38	Elevator Rib	0.50" Honeycomb
39	Stabilizer Rib	0.025" 2024-T42 Alclad
40	Bottom Skin	0.025" 2024-T3 Alclad
41	Dorsal Fin Channel	0.025" 2024-T3 Alclad
42	Horizontal Fillet	Thermo-Plastic
43	Dorsal Fin	Fiberglass
44	Stabilizer Skin	0.020" 2024-T3 Alclad

**Airframe Materials Chart
Figure 20-01
(Sheet 2 of 2)**

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6. Honeycomb Panel Repairs - Riveted

Damage to honeycomb panels can be repaired by removal of the damaged section, sealing any exposed honeycomb core with P/S 870B-2 Sealant, and splicing in new repair parts. The splice can be installed with rivets and can be made flush with external surface if desired. Representative repairs for damaged honeycomb panels are discussed in Approved Repairs, Paragraphs 3 through 8.

NOTE: P/S 870B-2 Sealant is approved and is available through PRC Desoto or other maintenance supply companies.

Critical honeycomb areas are those areas within 6 inches of the wing spar and within 4 inches of the engine mount, tail cone and nose gear structures. Minor damage to one face sheet of a honeycomb panel that is confined to an area of 1.0 inch or less in diameter, and located in a non-critical area, can be repaired by smoothing sharp edges in the damaged area, sealing any exposed honeycomb core with P/S 870B-2 sealant and filling with an epoxy filler.

Minor damage to a critical area that is equal to or less than 1.0 inch in diameter can be repaired by removal of the damaged face sheet, sealing any exposed honeycomb core with P/S 870B-2 sealant, application of a resin filler, and installation of a doubler plate. Service Kit No. SK-102A includes acceptable resin filler with resin, hardener, and instructions for preparation and application. It is available through your authorized Tiger Aircraft sales or maintenance facility. A representative repair is discussed in Approved Repairs, paragraph 3.

Damaged areas greater than 1.0 inch in diameter or including punctures through both face sheets will require removal of the damaged area and insertion of a honeycomb repair section. Typical repairs are discussed in Approved Repairs section of this chapter.

Extensive honeycomb panel damage, such as in the nose gear attachment area can be repaired by splicing in new honeycomb repair assemblies which are available through your authorized Tiger Aircraft sales or maintenance facility. Such a repair is discussed in Approved Repairs section of this chapter.

When making honeycomb panel repairs which require splicing of the bonding strap angles located at the lower corners of the fuselage, the splice must be so designed to maintain the continuity of the angles across the splice. This is discussed in the Approved Repairs section of this chapter. The length of the external splice angle can be increased as required for appearance purposes.

All riveted honeycomb repairs must include some means of sealing the repair joint from external moisture. This protection is provided by P/S 870B-2 Sealant. Epoxy filler may be used to smooth the repair prior to painting.

All honeycomb edges and repair faying surfaces should be coated with P/S 870B-2 Sealant. In addition, rivets should be dipped in the sealant prior to installation. After completion of the repair, the repaired area should be coated with zinc chromate primer.

7. Repair of Formed Thermo-Plastic Parts

Repairs of punctures may be accomplished by cutting out the damaged area, removing the surrounding paint and installing an overlapping or flush patch of identical material. A doubler may be added behind the patch if additional strength is required. The bonding agent can be MEK or a suitable substitute.

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WARNING: WHEN USING MEK ENSURE THAT THE WORKING AREA IS WELL VENTILATED AND THAT PERSONAL PROTECTIVE EQUIPMENT (SUCH AS BUT NOT LIMITED TO GLOVES AND EYE PROTECTION) IS WORN. AVOID BREATHING FUMES. KEEP AWAY FROM FLAMES.

Cracks or voids may be repaired by applying filler composed of solvent and material shavings to produce a slurry of melted plastic using MEK as the agent. Upon completion of the repair, sand the area smooth and repaint. Extensively damaged parts should be replaced.

8. Engine Mount Repair

Engine mount repairs should be accomplished in strict accordance with Part 43 of the Federal Aviation Regulations. Details for the repairs of damaged honeycomb in the areas adjacent to the two upper and lower engine mount extrusions are given in the Approved Repairs section of this chapter.

9. Control Surface Repair

After repair or repainting of any control surface, it is necessary to check the balance and adjust the mass balance weights as required bringing it within tolerance per Chapter 27.

10. Bond-line Damage and Repair

A. Types of Bond-line Damage

(1) Physical Damage

The most common type of bond-line damage is physical damage along the trailing edges of the Flaps, Ailerons, Elevators and Rudder. This is usually caused by persons stepping on the inboard trailing edges of the flaps and general "hangar rash" on the other control surfaces. This type of damage is usually readily visible in the form of joint separation. A typical bond-line repair procedure is discussed in the Approved Repairs section of this chapter.

(2) Corrosion Damage

A less common type of bond-line damage is damage caused by metal corrosion. This type of damage is usually restricted to edges of un-filletted bond-lines, such as the trailing edges of Wings, Rudders, Elevators, and Trim Tabs, particularly if these edges are not well protected by paint. This type of damage is more likely in tropical and sub-tropical climates, where the aircraft is subjected to a salt air environment.

B. Areas Requiring Inspection Emphasis

Areas that should be given particular attention include: Flanges of wing and stabilizer, rear spars, trailing edges of control surfaces, the side lap joint between the tailcone and forward cabin section, the joint between the tailcone top and side skin and the aft tailcone bulkhead joints.

Inside edges and internal joints have an undisturbed bond-line fillet and are generally not affected. See the Approved Repairs section of this chapter.

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11. Non-Repairable Parts

A. The following parts are not repairable and must be replaced if damaged:

- (1) Center Spar
- (2) Wing Spar
- (3) Main Gear Leg (If damage exceeds allowable limit specified in Note below.)
- (4) Nose Strut
- (5) Nose Gear Torque Tubes

NOTE: Minor Main Gear Strut surface de-laminations are acceptable providing they do not extend more than one ply into the surface of the strut. Corner de-laminations (slivers) are acceptable if they are smaller than 1/16 x 1/16 inch throughout their length. To correct these minor damages see the Approved Repairs section of this chapter.

12. Rivet/Sealant Substitution

Rivets of higher strength than those called out may be used on any structural repair.

Corrosive inhibiting sealants meeting the requirements of MIL-PRF-81733 Type II Class I may be substituted for P/S 870B-2.

13. Primary Structures

The following portions of the aircraft are primary structures:

A. Fuselage

- (1) Engine Mount
- (2) Engine Mount Extrusions
- (3) Lower Fuselage Honeycomb Corner (4 inches of floor and 4 inches of side panels)
- (4) Upper 4 inches of Fuselage Honeycomb Side Panels
- (5) Center Spar
- (6) Center Spar Attach Collars
- (7) Nose Gear Assembly
- (8) Main Gear Assembly
- (9) Aft Fuselage Waterline 49.00 Stiffener Flanges
- (10) Aft Fuselage Lower Corner Flanges

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- (11) Aft Fuselage Bulkhead (Stabilizer Spar Attach)
 - (12) Horizontal and Vertical Stabilizer Forward Attach Fuselage Bulkheads
 - (13) Forward Turtleback Bulkhead
 - (14) Aft Fuselage/Cabin Honeycomb Side and Bottom Bond Joints
- B. Control Systems
- (1) All Components
- C. Wing
- (1) Wing Main Spar(s)
 - (2) Wing Main Spar Doublers
- D. Empennage
- (1) Stabilizer Rear Spars
 - (2) Stabilizer Front Spars
- E. Control Surfaces
- (1) Support Brackets
 - (2) Balance Weight Supports
 - (3) Torque Tubes

AIRFRAME STRUCTURAL REPAIR - APPROVED REPAIRS

1. Leading Edge Repair

Figure 20-02 illustrates a typical repair to be employed when patching skin on the leading edge. The repair should be made flush with the external surface of the leading edge skin and surface contour must be maintained.

A. Repair skin as follows:

- (1) Trim out the damaged area in a rectangular pattern and de-burr the edges.
- (2) Place repair doubler beneath the wing skin.

NOTE: Dimensions given in Figure 20-02 are typical for most repairs of the leading edge.

- (3) Holding repair doubler in place, drill and dimple holes 1/8 inch (0.125") diameter through wing skin, spacing holes 5/8 inch (0.625") apart on center.

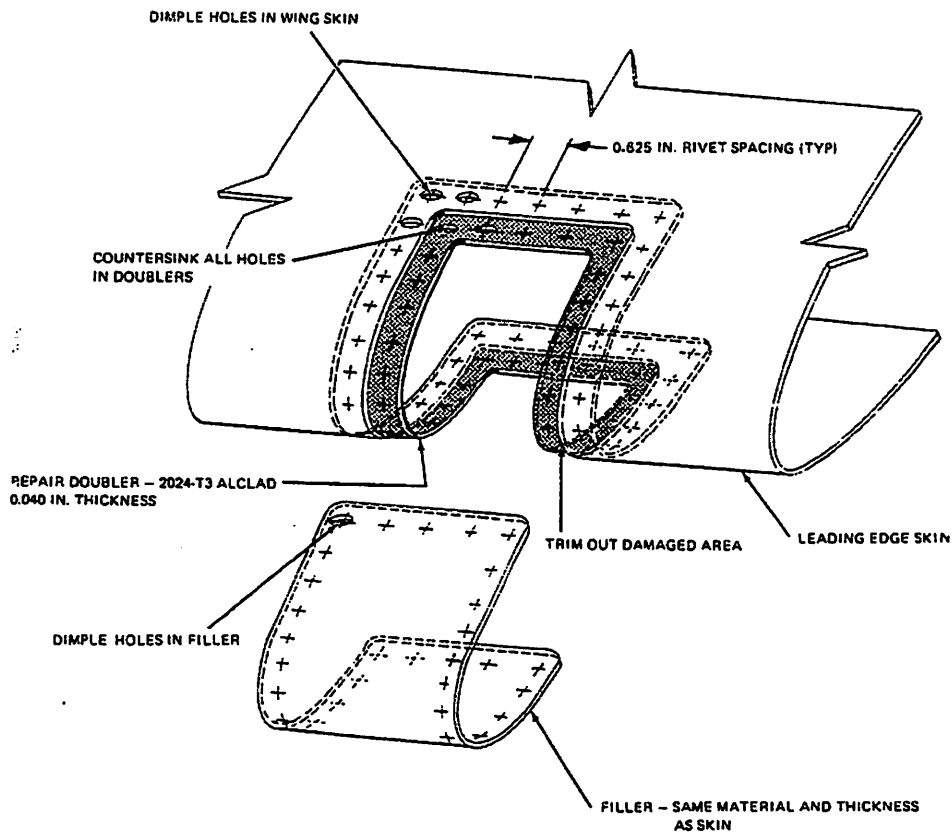
**TIGER AIRCRAFT AG-5B SERIES
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NOTE: This repair can be completed in the area of wing ribs by installing the doubler in two pieces, one on each side of the rib flange.

- (4) Secure doubler to wing leading edge with 1/8 inch (0.125") diameter countersunk cherry rivets CR3242, CR3243 or equivalent. If bucked rivets are used, exercise caution to prevent nearby bond damage.

NOTE: Filler should be of the same material and thickness as the skin.

- (5) Place filler flush with the doubler.
- (6) Holding filler piece in place, drill dimple holes through filler, spacing holes 5/8 inch (0.625") apart on center.
- (7) Secure filler to doubler with rivets as specified in Step D.
- (8) Use epoxy filler as necessary, sand smooth and paint as required.



**Leading Edge Repair
Figure 20-02**

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2. Wing Rib Repair

Figure 20-03 illustrates typical wing rib repairs. If the wing ribs are extensively damaged, they should be replaced. (Refer to Chapter 57)

A. Repair rib as follows:

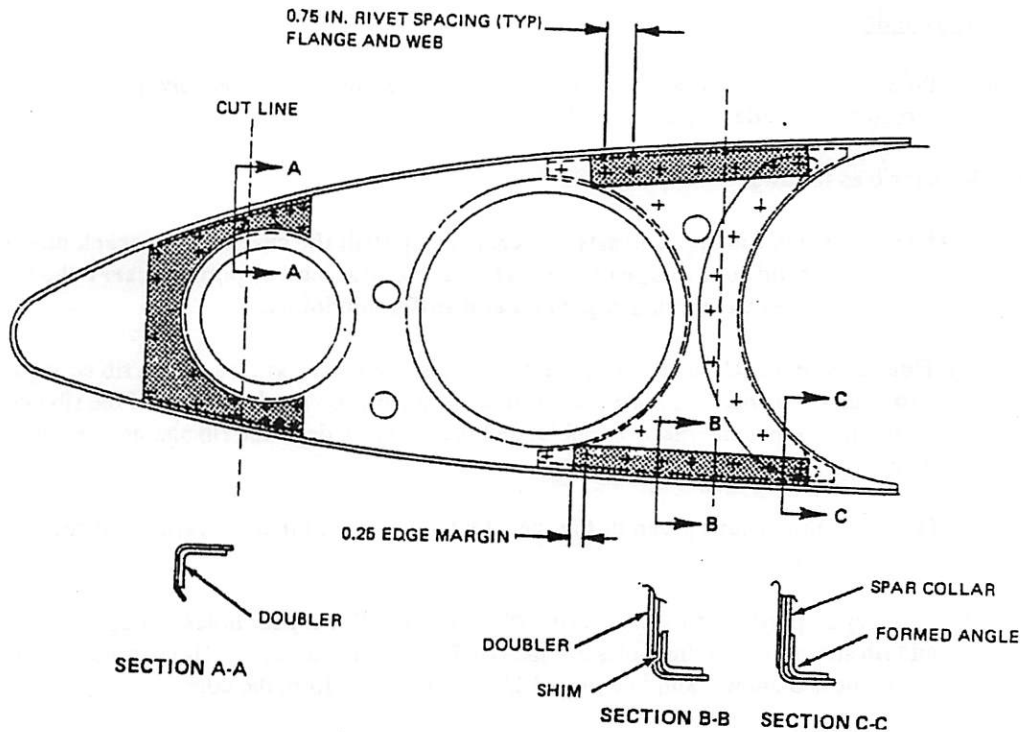
NOTE: If rib damage consists of a crack, stop drill the crack, if the crack does not extend to the edge of the part add a reinforcement plate to carry the stress across the damaged portion and stiffen the joints.

- (1) Hold doubler (0.032 inch thick) in place against the damaged area on the rib structure. If extra support is needed, place a formed angle against the inside portion of the rib nested under the flange; and place a doubler on the opposite side of the rib against the damaged area.

NOTE: Dimensions given in Figure 20-03 are typical for most repairs of the wing rib.

- (2) With repair parts held in place, drill 1/8 inch (0.125") diameter holes through repair parts and rib structure, spacing holes 3/4 inch (0.750") apart on center. Holes drilled at the ends of the formed angle should be placed 1/4 inch (0.250") from the edge.

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**Wing Rib Repair
Figure 20-03**

- (3) Install all rivets, 1/8 inch (0.125") diameter Cherry rivets CR3242, CR3243, or equivalent with wet zinc chromate primer. If bucked rivets are used, exercise caution to prevent nearby bond damage.
- (4) After the repair is completed, the repaired area should be coated with zinc chromate primer.

3. Honeycomb Repair, Partial Core Damage

- A. Minor damage extending partially through the core of honeycomb panel and equal to or less than 1 inch diameter (Figure 20-04) can be repaired with an external doubler as follows:
 - (1) Trim out damaged area of face sheet in a circular pattern. (Trim out may not exceed 1 inch)
 - (2) Thoroughly clean the repair area with fine sandpaper and acetone.
 - (3) Coat all repair parts with zinc chromate primer.
 - (4) Seal the exposed honeycomb core with P/S 870B-2 Sealant.
 - (5) Using Service Kit SK-102A, apply resin filler to area where damaged honeycomb core was removed.

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NOTE: Refer to AC 43.13 for doubler and rivet pattern dimensions. Dimensions given in Figure 20-04 are typical repair for this type.

- (6) Place 2024-T3 alclad aluminum doubler (0.040 inch thick) over repair and drill out 1/8 inch (0.125") diameter holes around circumference of doubler.
- (7) Dip all rivets, 1/8 inch (0.125") diameter Cherry rivets, CR3242, CR3243, or equivalent in P/S 870B-2 Sealant and install to secure doubler to honeycomb panel.
- (8) Fill external doubler periphery with epoxy filler to maintain a smooth surface.
- (9) Coat repaired area with zinc chromate primer.

4. Honeycomb Repair, Extensive Core Damage

Damaged areas greater than 1 inch diameter or areas in which damage extends completely through the core require removal of the damaged area and installation of a honeycomb repair section. (See Figures 20-05, 20-06 and 20-07)

A. Patch repair using external and internal doublers. (See Figure 20-05)

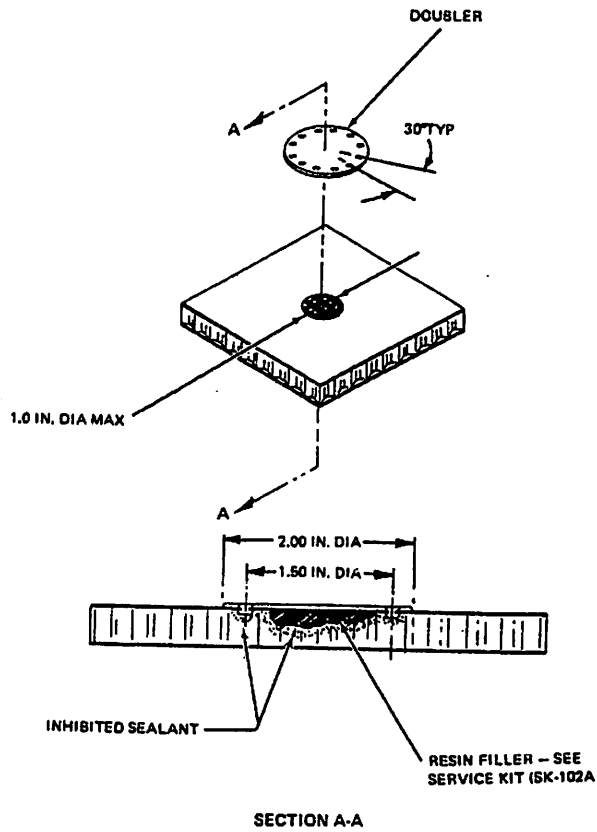
Repair honeycomb as follows:

- (1) Trim out damaged area in a circular pattern as shown in Figure 20-05 and de-burr the edges.
- (2) Coat all repair parts with zinc chromate primer.
- (3) Seal all exposed honeycomb core areas on the repair section and the panel section with P/S 870B-2 Sealant.
- (4) Place internal and external doublers (2024-T3 Alclad aluminum, 0.040 inch thick) over repair area.

NOTE: Refer to AC 43.13 for hole diameter limitations and corresponding rivet patterns.

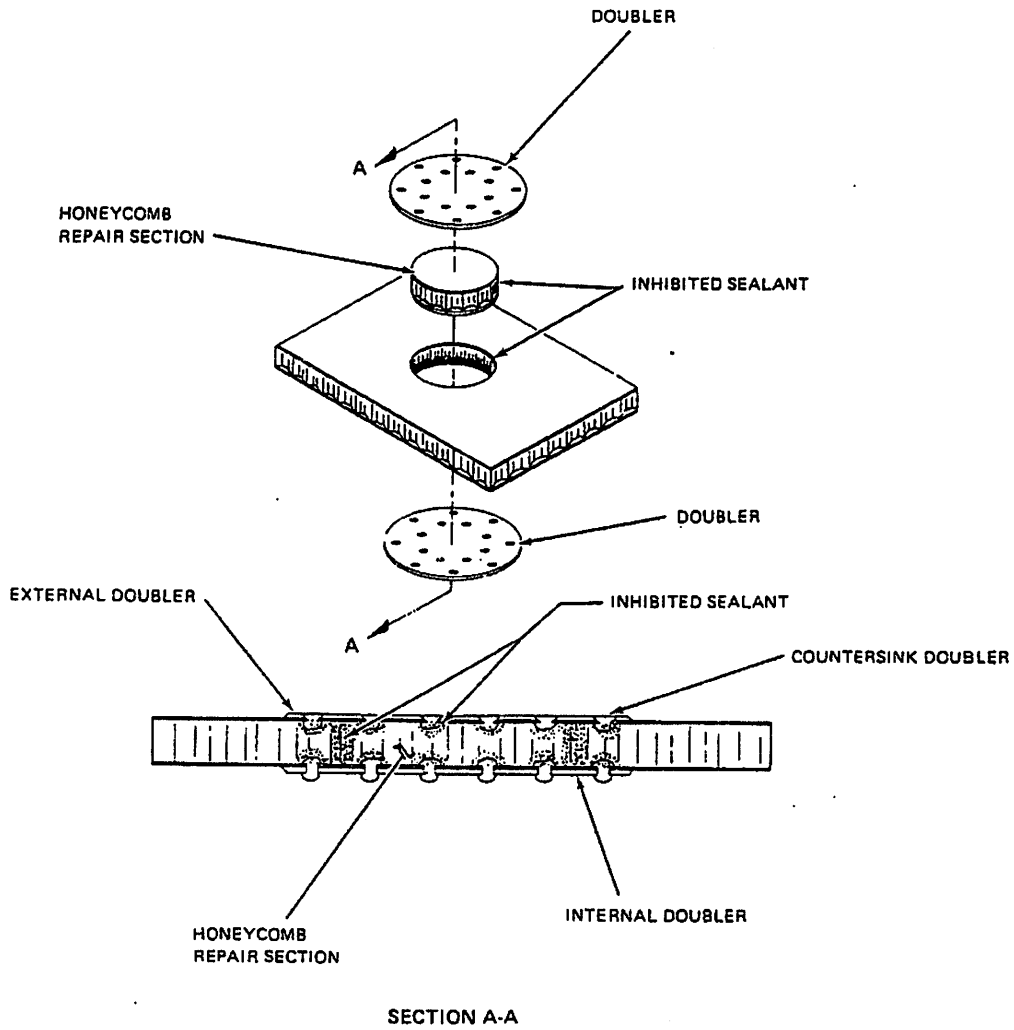
- (5) Dip all rivets 1/8 inch (0.125") diameter Cherry rivets, CR3242, CR3243, or equivalent in P/S 870B-2 Sealant and install through the doubler and repair section (both sides) such that the maximum distance between any two rivets is 1.5 inch.
- (6) Fill external doubler periphery with epoxy filler to maintain a smooth surface.
- (7) Coat repair area with zinc chromate primer.

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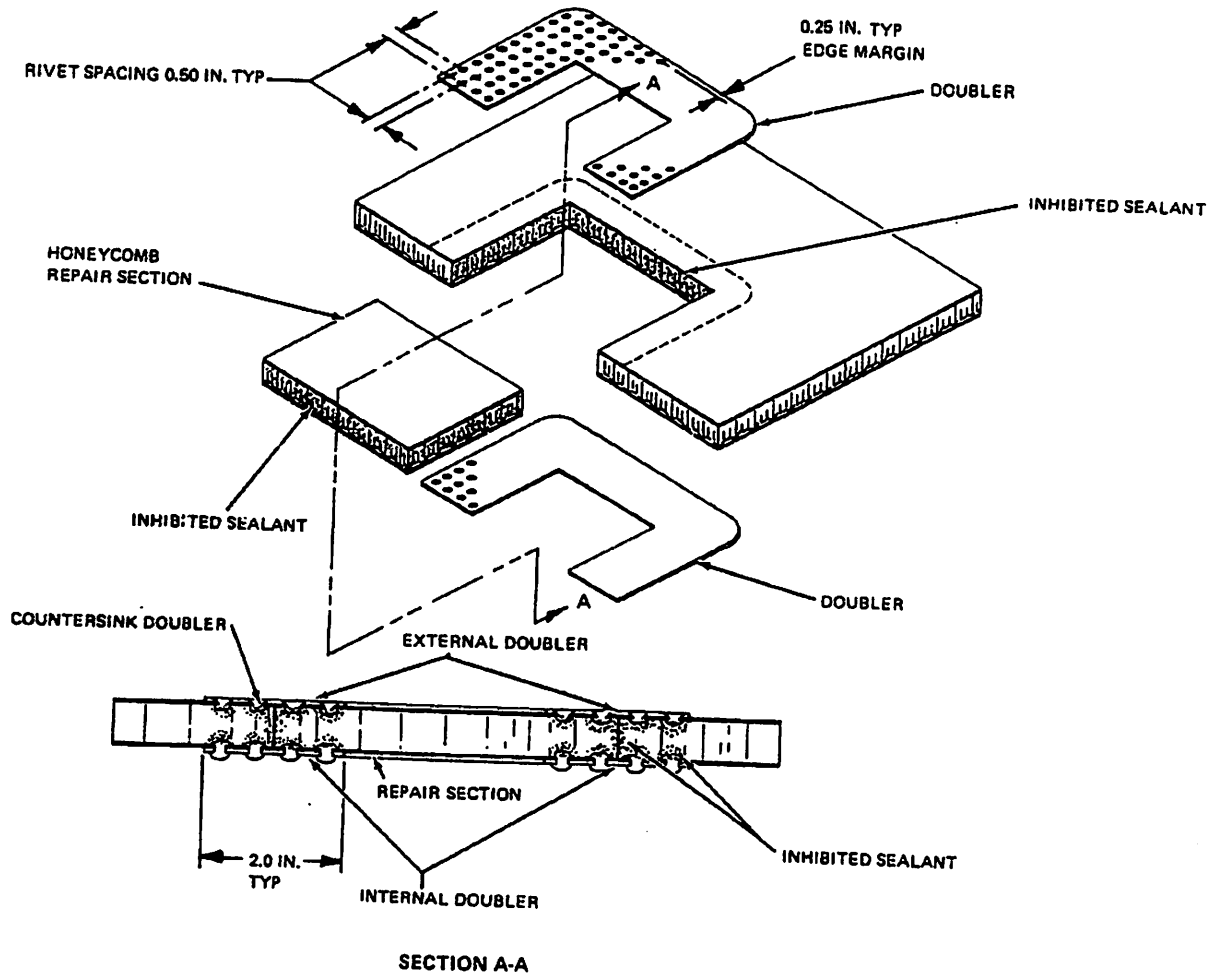
**Honeycomb Repair, Partial Core Damage
Figure 20-04**

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**Honeycomb Patch Repair, External & Internal Doublers
Figure 20-05**

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**Honeycomb Repair Using Spliced-In Panel Section
Figure 20-06**

B. Splicing in New Panel Section (See Figure 20-06)

This repair is satisfactory for most honeycomb repairs that require new panel sections to be spliced into an existing structure. Repair honeycomb as follows:

- (1) Trim out damaged area in a rectangular pattern as shown in Figure 20-06 and de-burr.
- (2) Coat all repair parts with zinc chromate primer.
- (3) Seal all exposed honeycomb core areas with P/S 870B-2 Sealant.
- (4) Place internal and external doublers (2024-T3 Alclad aluminum) over repair area.

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NOTE: Dimensions given in Figure 20-06 are typical for most honeycomb repairs using external doublers.

- (5) Dip all rivets 1/8 inch (0.125") diameter Cherry rivets, CR3242, CR3243, or equivalent in P/S 870B-2 Sealant and install through the doubler and repair section, both sides.
- (6) Fill external doubler periphery with epoxy filler to maintain a smooth surface.
- (7) Coat repaired area with zinc chromate primer.

5. Honeycomb Repair, Forward Fuselage Section

Repair in the area of the forward fuselage section of the aircraft can be accomplished using:

- (A) External doublers as shown in Figure 20-05
Or
- (B) Rectangular sections of honeycomb the length of the repair splice similar to Section AA of Figure 20-06
Or
- (C) Sheet metal pan and doubler method as described below

The external doublers are recommended for repair splices in the firewall and floor honeycomb panels. This allows the honeycomb panels to be butted enhancing ease of repair. The decision on whether to use an external or flush repair on the fuselage side panel is a matter of preference. When using the sheet metal pan or doubler, repair honeycomb as follows:

CAUTION: TO PREVENT DISTORTION, CAREFULLY SUPPORT THE OUTER FACE SHEETS OF HONEYCOMB PANELS WHILE REMOVING CORE MATERIAL.

- (1) Remove damaged core material from the internal surface side of the panel.
- (2) Coat all parts with zinc chromate primer.
- (3) Seal all exposed honeycomb core areas with P/S 870B-2 Sealant.

NOTE: Obtain pre-formed pan sections through your authorized Tiger Aircraft sales or maintenance facility.

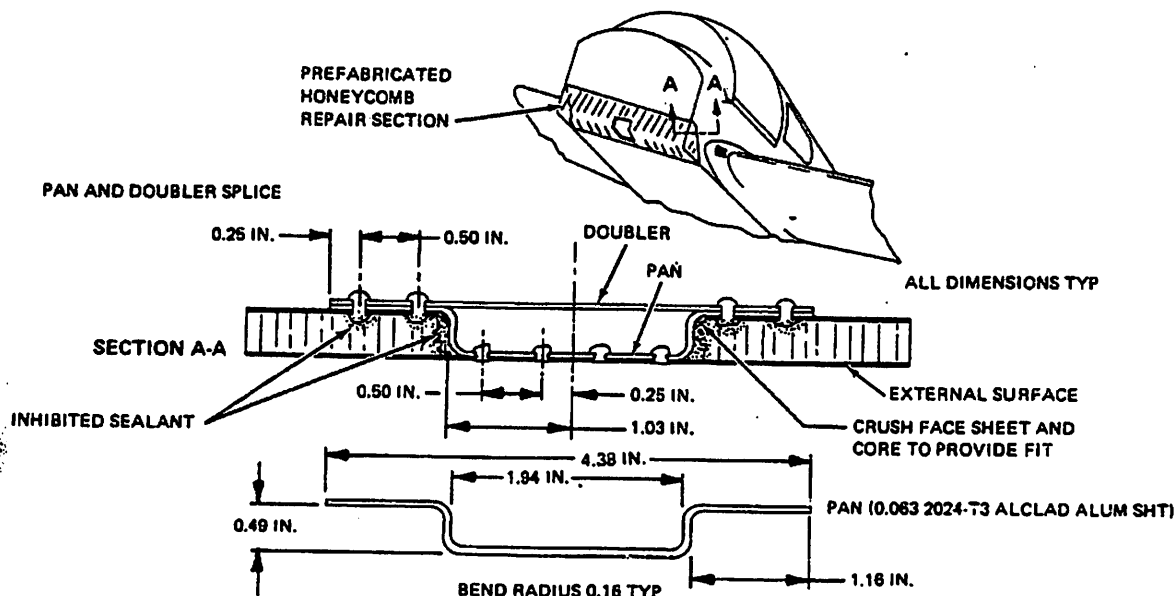
- (4) Countersink pan and dimple honeycomb face sheets.
- (5) Provide fit for pan (0.063 inch 2024-T3 Alclad aluminum or equivalent) by crushing internal face sheet and core edges.
- (6) After fitting pan into panel, install rivets to secure external surface to pan bottom, rivet spacing in Figure 20-07 is typical.

NOTE: Dimensions given in Figure 20-07 are typical for most honeycomb repairs of this type.

- (7) Place doubler (0.063 inch 2024-T3 Alclad aluminum or equivalent) over pan.

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- (8) Dip all rivets 1/8 inch (0.125") diameter Cherry rivets, CR3242, CR3243, or equivalent in P/S 870B-2 Sealant.
- (9) Install rivets along outer edge of pan, penetrating doubler, pan and internal surface of panel rivet spacing in Figure 20-07 is typical.
- (10) Coat the repaired area with zinc chromate primer.



**Honeycomb Repair-Fwd. Fuselage Sec.-Flush Riveted
Figure 20-07**

6. Bonding Strap Angle Splice

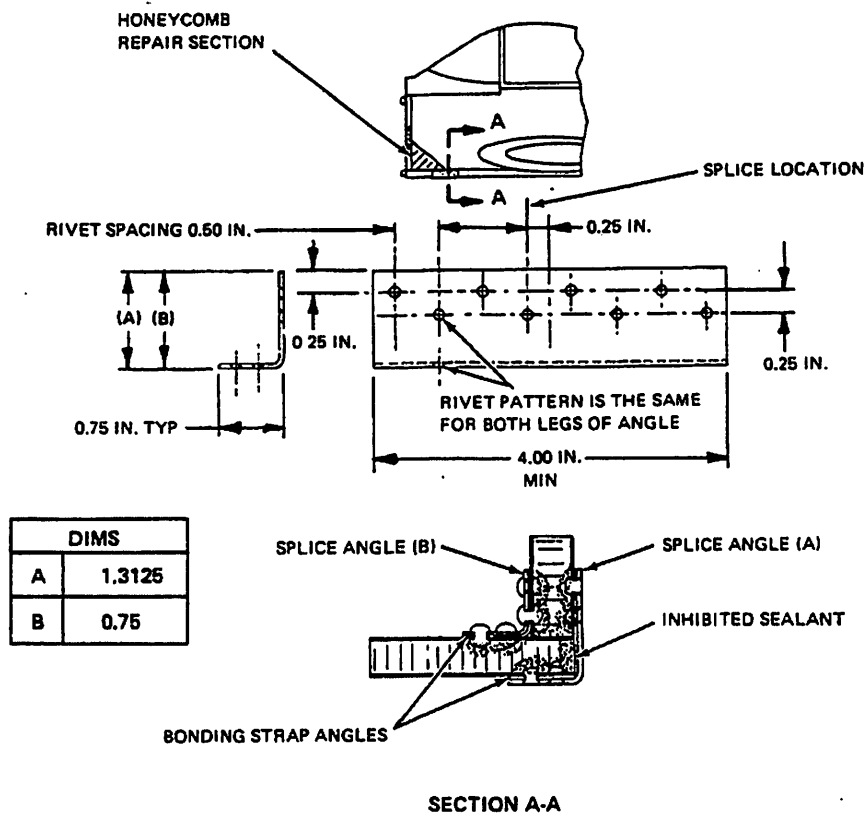
In order to maintain the continuity of angles from an original panel to a repair panel, edges must be riveted over the bonding strap angles across the splice. (See Figure 20-08)

- A. Repair honeycomb panel using the bonding strap angle splice as follows:
- (1) Remove damaged honeycomb panel section.
 - (2) Coat all parts with zinc chromate primer.
 - (3) Seal all exposed honeycomb core areas with P/S 870B-2 Sealant.
 - (4) Install honeycomb repair section at fuselage corner junction with bonding strap angle.
 - (5) Place splice angle (2024-T3 Alclad aluminum) over the bonding strap angle and across the splice. (Where countersunk rivets are to be installed, angle thickness shall be 0.040 inch. Otherwise, 0.032 inch thick material is satisfactory)

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NOTE: The length of the external splice angle can be increased as required for appearance purposes. If splice angle length is increased, rivet spacing may be increased proportionately up to 1.0 inch maximum.

- (6) Dip all rivets 1/8 inch (0.125") diameter Cherry rivets, CR3242, CR3243 or equivalent in P/S 870-B2 Sealant.
- (7) Install a minimum of 8 rivets on each side of splice, rivet spacing as shown in Figure 20-08 typical.
- (8) Coat the repair area with zinc chromate primer.



**Bonding Strap Angle Splices – (Riveted)
Figure 20-08**

7. Honeycomb Repair, Lower Engine Mount Area

A. Repair damaged honeycomb in the area adjacent to the lower engine mount extrusions (Figure 20-09) as follows:

- (1) Remove engine and damaged honeycomb area.

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- (2) Using fine grain sandpaper, clean away all remaining adhesive before riveting in repair sections. Coat any remaining exposed bond-lines with P/S 870B-2 Sealant.
- (3) Coat all parts with zinc chromate primer.
- (4) Seal all exposed honeycomb core areas with P/S 870B-2 Sealant.

NOTE: Numbers in parentheses denote call-outs in Figure 20-09.

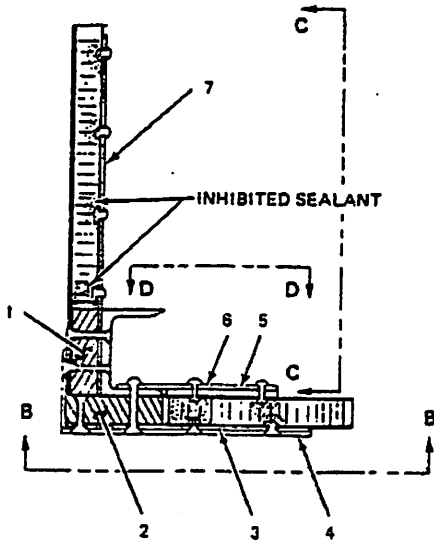
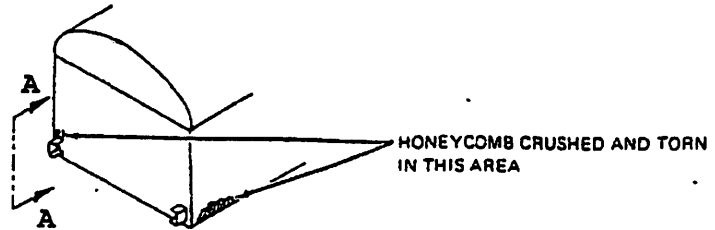
- (5) Using 10, MS20426AD4-14 rivets dipped in P/S 870B-2 Sealant rivet 2024-T3 Alclad spacer (3) and 2024-T3 Alclad splice (4) to bottom block (2). (See Section B-B, Figure 20-09)
- (6) Fit bottom block with engine mount extrusion into position in repair area, and place 2024-T3 Alclad spacer (5) to fit under splice installed in Step E above.
- (7) Using 27 CR3243-4-1 rivets dipped in P/S 870B-2 Sealant, rivet through splice (6), spacer (5) and bottom honeycomb panel. (See Section D-D, Figure 20-09)
- (8) Using 34 CR3242-4-1 rivets, dipped in P/S 870B-2 Sealant, rivet through splice (4), spacer (3) and underneath side of bottom honeycomb panel. (See Section B-B, Figure 20-09)
- (9) Slide side block (1) into place between the side honeycomb panel and the bottom block.
- (10) Slide the reinforcement panel (7) between the side block and the new engine mount extrusion.
- (11) Using 48, CR3243-4-1 rivets dipped in P/S 870B-2 Sealant, rivet the reinforcement panel (7) to the side honeycomb panel. (See Section C-C, Figure 20-09)
- (12) Using 18, MS20426AD4-12 rivets dipped in P/S 870B-2 Sealant rivet through engine mount extrusion, reinforcement panel (7), and side block (1). (See Section C-C, Figure 20-09)
- (13) Fill over rivet heads on exterior areas with epoxy filler and smooth before applying primer.
- (14) Coat repaired area with zinc chromate primer prior to application of exterior finish paint.

8. Honeycomb Repair, Upper Engine Mount Area

- A. Repair damaged honeycomb in the area adjacent to the upper engine mount extrusions as follows: (Figure 20-10)
 - (1) Trim out damaged honeycomb area with engine mount extrusion.
 - (2) Using fine grain sand paper, clean away all remaining adhesive before riveting in repair sections.
 - (3) Coat all parts with zinc chromate primer.
 - (4) Seal all exposed honeycomb core areas with P/S 870B-2 Sealant.

NOTE: Numbers in parentheses denote call-outs in Figure 20-10.

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<u>ITEM</u>	<u>DESCRIPTION</u>	<u>MATERIAL</u>
1.	Block .484 x 1.5 x 9.6	2014-T6 or 2024-T3
2.	Block .484 x 1.7 x 9.6	2014-T6 or 2024-T3
3.	Spacer t = .025, trim to fit under item 4.	2024-T3 Alclad
4.	Splice See Section B-B	2024-T3 Alclad
5.	Spacer t = .090, trim to fit under item 6.	2024-T3 Alclad
6.	Splice See Section D-D	2024-T3 Alclad
7.	Reinforcement t = .080 See Section C-C	2024-T3 Alclad

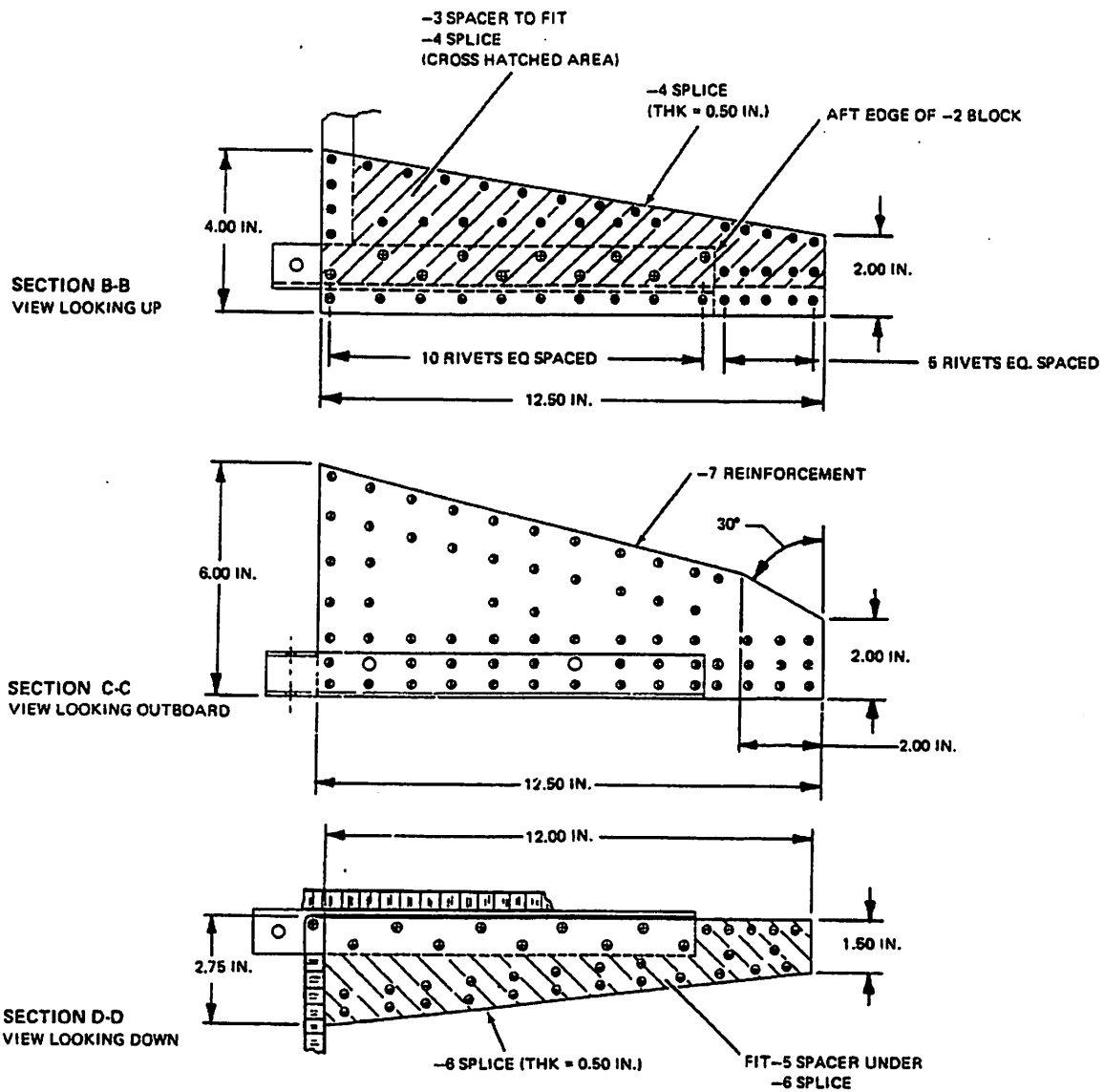
View B-B, C-C, & D-D on following page.

NOTE: Nose gear torque tube not shown.

SECTION A-A Looking Aft (Firewall Removed)

**Honeycomb Repair, Lower Engine Mount Area
Figure 20-09
(Sheets 1 of 2)**

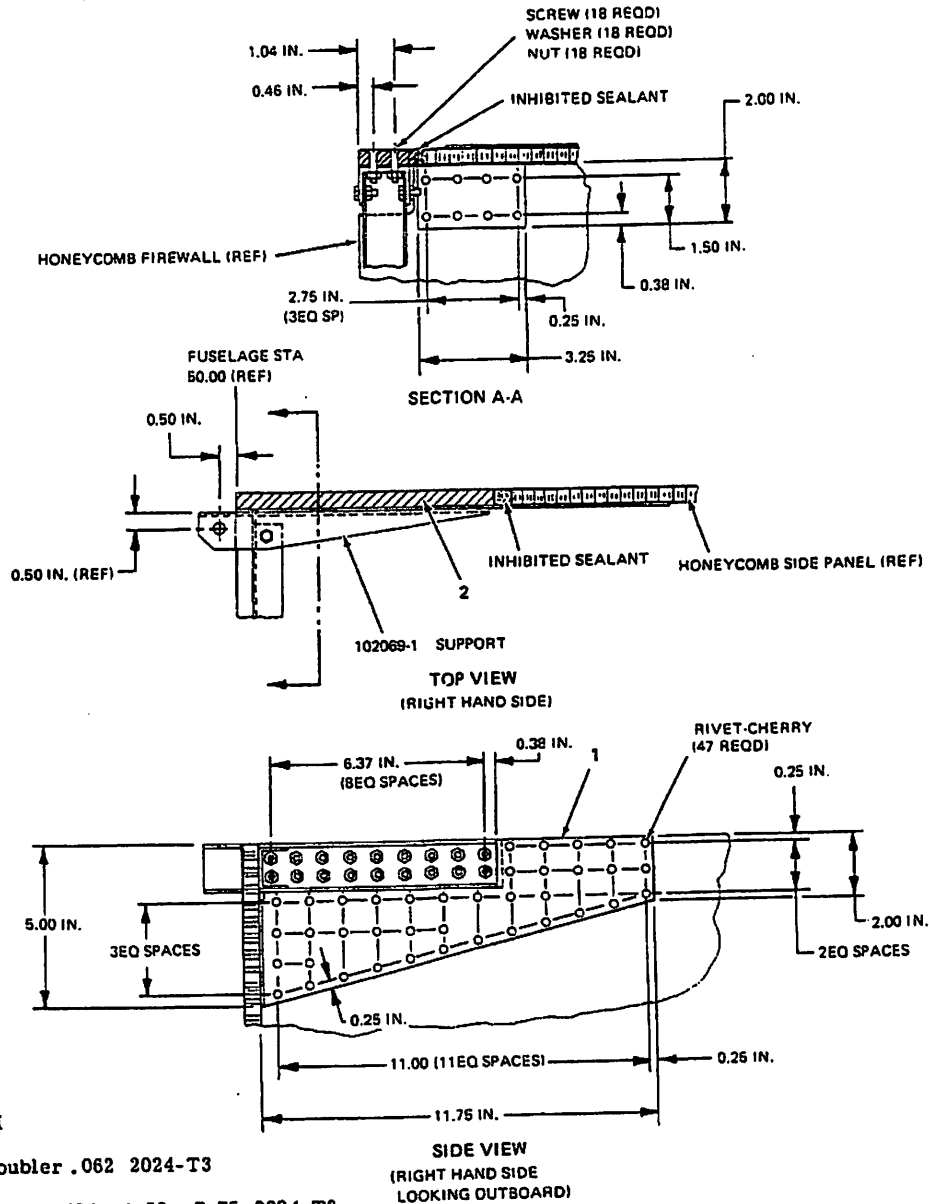
**TIGER AIRCRAFT AG-5B SERIES
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- MS20426AD4-14 Double Countersunk as shown, Section A-A
- CR3242-4-2 Located as shown; 35 required
- ⊕ MS20426AD4-16; 10 required
- ⊖ CR3243-4-3; 27 required
- MS20426AD4-12; 18 required
- ⊕ CR3243-4-2; 48 required

**Honeycomb Repair, Lower Engine Mount Area
Figure 20-09
(Sheet 2 of 2)**

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ITEM

1. Doubler .062 2024-T3
2. Filler .484 x 1.50 x 7.75 2024-T3
(Alternate-Use .125 thick 2024-T3 laminated)

**Honeycomb Repair, Upper Engine Mount Area
Figure 20-10**

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- (5) Place the doubler repair section (1) into place flush against the honeycomb side panel and honeycomb front panel. (Fuselage Station 50.0 See Figure 20-13)
- (6) Using 47, CR3243-4-1 Cherry rivets dipped in P/S 870B-2 Sealant, rivet the doubler to the honeycomb side panel and the honeycomb front panel.
- (7) Place the new filler section (2) into the repair area, flush against the doubler (1).
- (8) Install a new engine mount extrusion to the doubler and filler sections with 18, MS24694-S59 screws, NAS1149F0363P washers, and MS21042L3 nuts.
- (9) Layout and drill new engine mount holes in extrusion.
- (10) Fill over the rivet and bolt heads on exterior areas with epoxy filler and smooth before applying primer.
- (11) Coat the repaired area with zinc chromate primer prior to application of exterior finish paint.

9. Honeycomb Panel Replacement (Station 50)

A. Replace the forward fuselage (Station 50) honeycomb panel as follows: (Figure 20-11)

- (1) Remove the damaged forward fuselage honeycomb panel without removing existing angles.
- (2) Using fine grain sandpaper, clean away all remaining adhesive before riveting in the repair sections. Coat any remaining exposed bond-lines with P/S 870B-2 Sealant.
- (3) Coat all parts with zinc chromate primer.
- (4) Seal all exposed honeycomb core areas with P/S 870B-2 Sealant.
- (5) Place the new honeycomb panel into position flush against existing angles. Rivet the panel to angles using CR3243-4-1 rivets dipped in P/S 870B-2 Sealant.

NOTE: Numbers in parentheses denote call-outs in Figure 20-11.

- (6) Using CR3242-4-1 rivets dipped in P/S 870B-2 Sealant, rivet side angles (1) into place at corner junction of forward fuselage.
- (7) Using CR3242-4-1 rivets dipped in P/S 870B-2 Sealant rivet bottom angle (2) into place at bottom edge of forward fuselage.
- (8) Fill over exterior rivets with epoxy filler and smooth before applying primer.
- (9) Coat repaired area with zinc chromate primer prior to application of exterior finish paint.

10. Upper Forward Fuselage Assembly Replacement

A. Replace the entire upper forward fuselage assembly as follows: (Figure 20-12)

- (1) Remove windshield. (See Chapter 56)

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- (2) Scrape the bond at the aft end of the forward fuselage assembly near the canopy.
- (3) With pliers, peel the assembly from the fuselage structure.
- (4) Remove the damaged upper forward fuselage assembly.
- (5) Using fine grain sandpaper, clean away all remaining adhesive before riveting new assembly into place.
- (6) Coat all joints with P/S 870B-2 Sealant.
- (7) Align the upper forward fuselage assembly with the honeycomb panel on each side of the fuselage according to dimensions given in Figure 20-12.

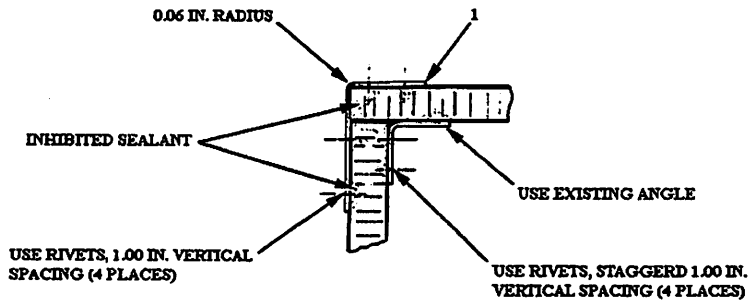
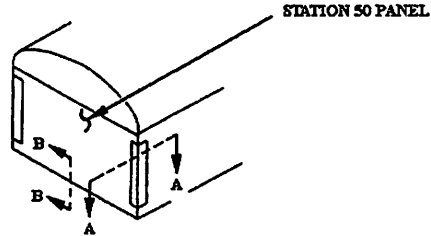
NOTE: Rivet spacing dimensions given below are typical for repairs of the upper forward fuselage assembly.

- (8) Using CR3242-4-1 Cherry rivets dipped in P/S 870B-2 Sealant, rivet the upper forward fuselage assembly to the honeycomb panel on each side of the fuselage, 57 rivets required per side.
- (9) Using 20 1691-0410 Avdel rivets dipped in P/S 870B-2 Sealant, rivet the upper forward fuselage assembly to the firewall arch.
- (10) Fill over exterior rivets with epoxy filler and smooth before applying primer.
- (11) Coat repaired area with zinc chromate primer prior to application of exterior finish paint.

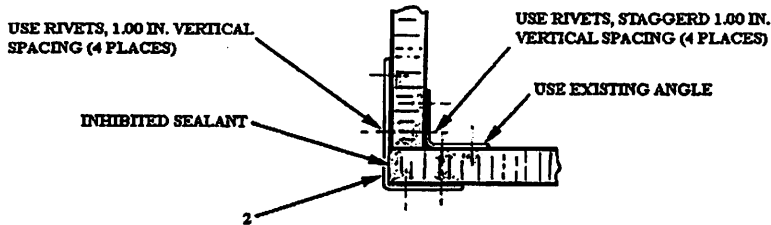
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ITEM

1. ANGLE 1.00 IN x 1.50 IN., Make from 2024-T3 Alclad
THK = 0.040 IN., LHT = 21.77 IN.
2. ANGLE 1.00 IN x 1.50 IN., Make from 2024-T3 Alclad
THK = 0.040 IN., LHT = 17.80 IN.



**SECTION A-A
TOP VIEW**



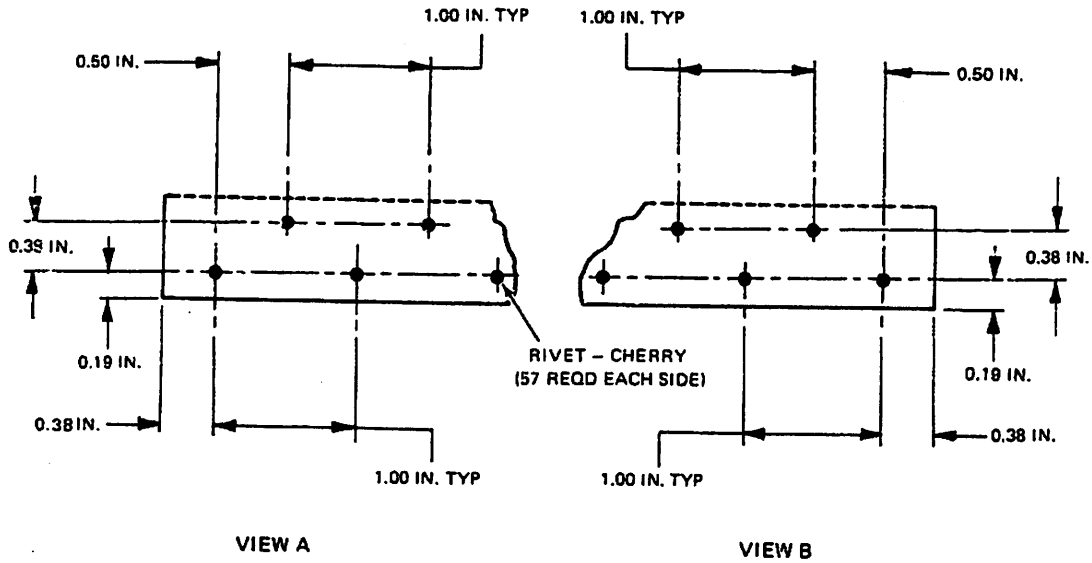
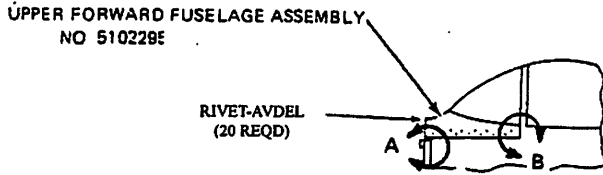
**SECTION B-B
SIDE VIEW**

x x
 x x
 VERTICAL

x
 x
 STAGGERED
 VERTICAL

**Honeycomb Panel Replacement (Station 50)
Figure 20-11**

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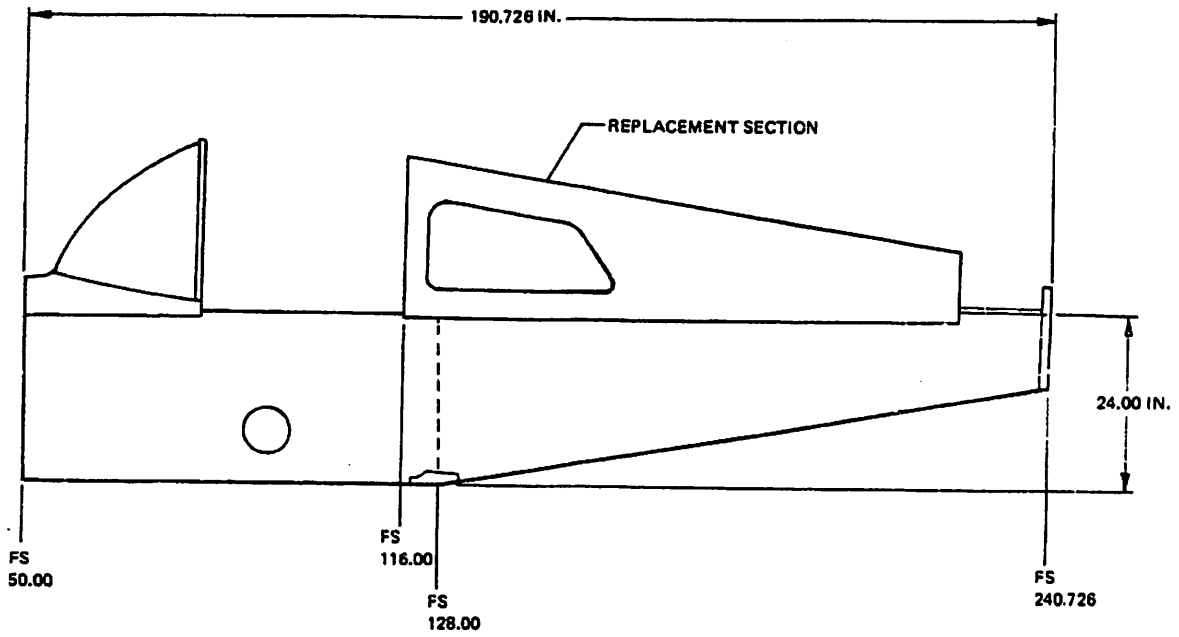
**Upper Forward Fuselage Assembly Replacement
Figure 20-12**

**TIGER AIRCRAFT AG-5B SERIES
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11. Aft Fuselage Assembly Replacement

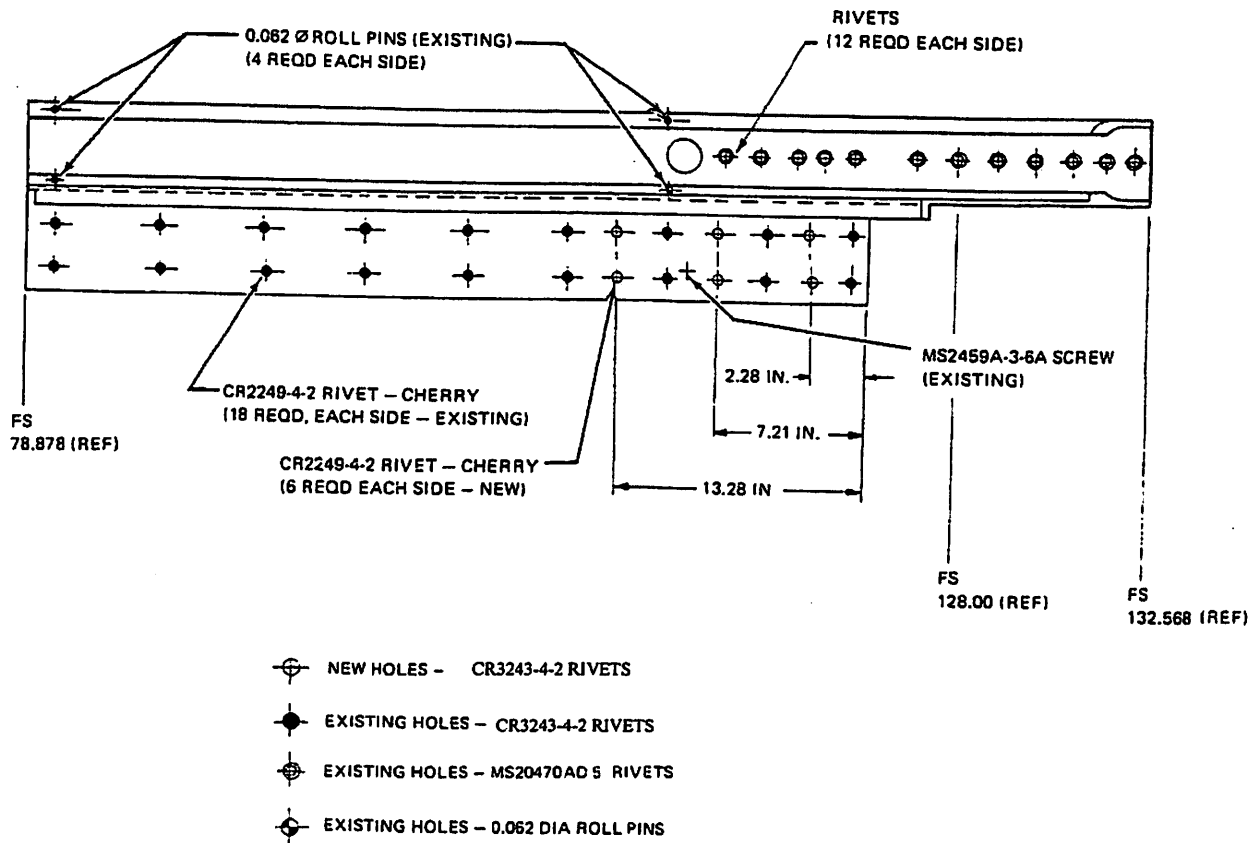
- A. Replace the entire aft fuselage assembly as follows: (Figure 20-13)
- (1) Remove the forward and aft side panel interiors. (See Chapter 25)
 - (2) Remove the canopy. (See Chapter 52)
 - (3) Remove the canopy rail as follows: (Figure 20-14)
 - (a) Remove the bolt attaching the canopy rail to the forward fuselage and the upper aft fuselage bulkhead.
 - (b) Drill out the rivets attaching the canopy rail to the forward fuselage.
 - (c) Drill out the rivets attaching the rail to the upper aft fuselage skin.
 - (4) Remove the rear seat. (See Chapter 25)
 - (5) Disconnect the flap actuator motor from the motor bracket.
 - (6) Disconnect all rigging cables, (See Chapter 27) electrical wiring, and static system tubing at the rear seat section of the fuselage.
 - (7) Remove the vertical and horizontal stabilizers if existing stabilizers are to be used on the new aft fuselage section. (See Chapter 55)
 - (8) Refer to the appropriate chapter for the removal of the control cables, elevator trim torque tube, static tubes and electrical components from the aft fuselage.
 - (9) Drill out rivets from two side braces connecting the two bulkhead assemblies at the rear seat section of the fuselage.
 - (10) Remove the wings and wing root fairings.
 - (11) Remove the damaged aft fuselage station 128 as follows: (See Figure 20-15)
 - (a) On each side of the fuselage, remove two 3/16 in. diameter bolts (just below W.L. 49) attaching the flange of the aft fuselage to the aft end of the forward fuselage side honeycomb panel.
 - (b) Remove remaining screw attaching the upper aft bulkhead to the forward fuselage.
 - (c) Drill out rivets to remove gussets from the bottom edges of the fuselage. (W.L. 25, F.S. 128)
 - (d) On inside of fuselage, forward of F.S. 128. Remove rivets from the reinforcement that secures the aft fuselage to top edge of the forward fuselage.
 - (e) Pry the flange of the aft fuselage section from the forward fuselage section and with a pair of pliers, peel skin off to remove.

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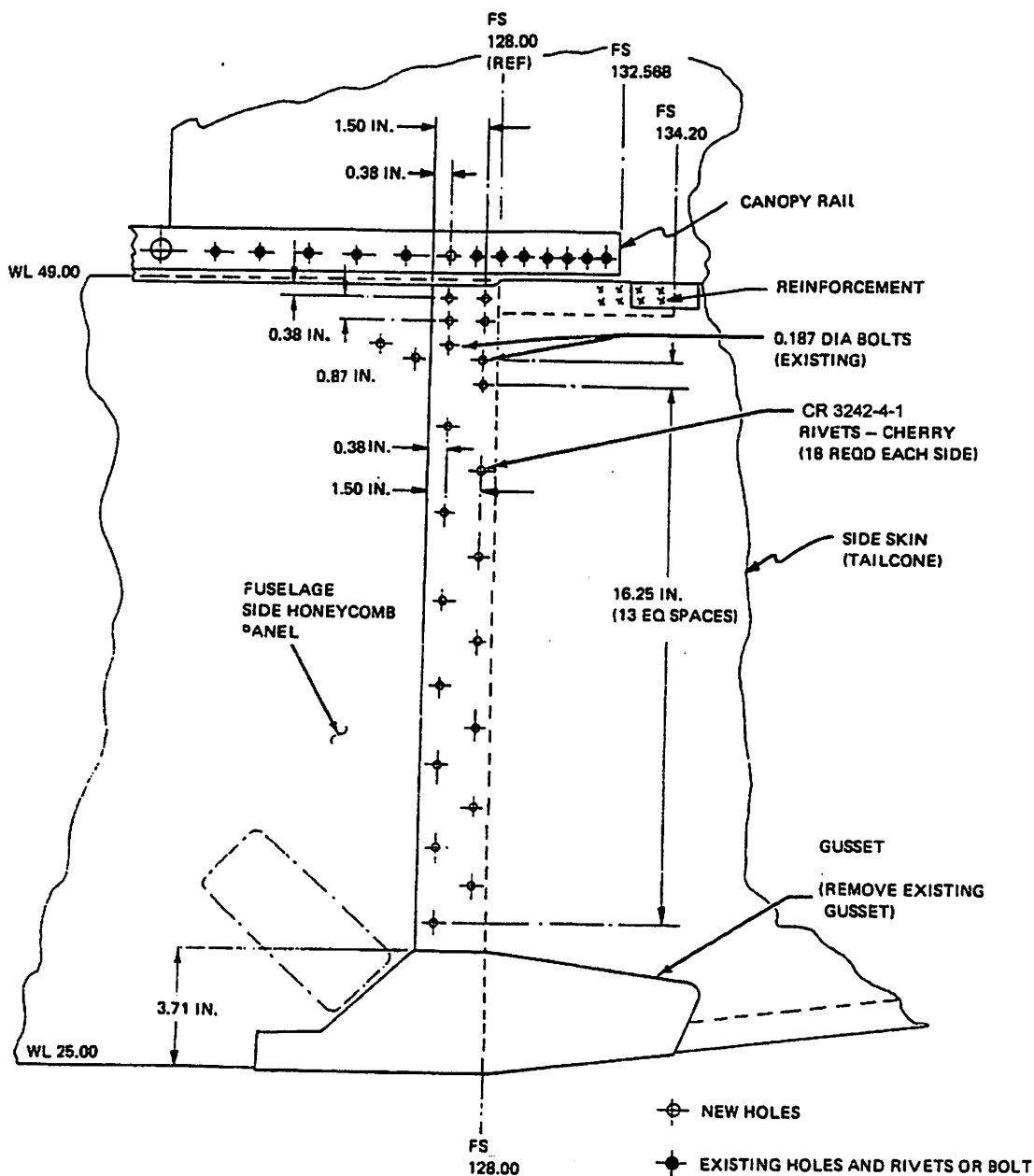
**Overall Fuselage Dimensions
Figure 20-13**

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**Installation of Track Assembly – Canopy Outer
Figure 20-14**

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**Fuselage Side Attachment Details
Figure 20-15**

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(12) Using fine grain sand paper, clean away all remaining adhesive before riveting the new assembly in place.

(13) Seal any exposed honeycombed core with P/S 870B-2 Sealant.

(14) Align the aft fuselage assembly with the forward fuselage assembly according to dimensions given in Figures 20-15 and 20-16.

NOTE: Rivet spacing dimensions given in Figures 20-15 and 20-16 are typical for repairs of the aft fuselage assembly.

(15) Install bolt attaching upper aft fuselage bulkhead to the forward fuselage.

(16) On each side of the fuselage, install two 3/16 in. diameter bolts (just below W.L. 49) attaching the flange of the aft fuselage to the aft end of the forward fuselage side honeycomb panel.

(17) Using CR3242-4-1 Cherry rivets dipped in P/S 870B-2 Sealant, rivet flanges of the aft fuselage section to the forward fuselage side honeycomb panel. (Eighteen (18) rivets required for each side of fuselage). (See Figure 20-15)

(18) Using 31, CR3243-4-1 Cherry rivets dipped in P/S 870B-2 Sealant, rivet the bottom flange of the aft fuselage section to the forward fuselage bottom honeycomb panel. (See Figure 20-16)

(19) Align gusset assemblies in place at the bottom edges of the forward and aft fuselage sections, and secure in place as follows: (See Figure 20-17)

(a) Using CR3242-4-1 Cherry rivets dipped in P/S 870B-2 Sealant, rivet the gusset to the side skin of the fuselage. Thirty-nine (39) CR3242-4-1 Cherry rivets are required for each side of fuselage.

(b) Using CR3242-4-1 Cherry rivets dipped in P/S 870B-2 Sealant, rivet the gusset to the side skin of the aft fuselage section. Eight (8) CR3242-4-1 Cherry rivets are required for each side of fuselage.

(c) Using CR3242-4-1 Cherry rivets dipped in P/S 870B-2 Sealant, rivet the bottom edge of the gusset to the bottom skin of the aft fuselage section. Seven (7) CR3242-4-1 Cherry rivets are required for each side of the fuselage.

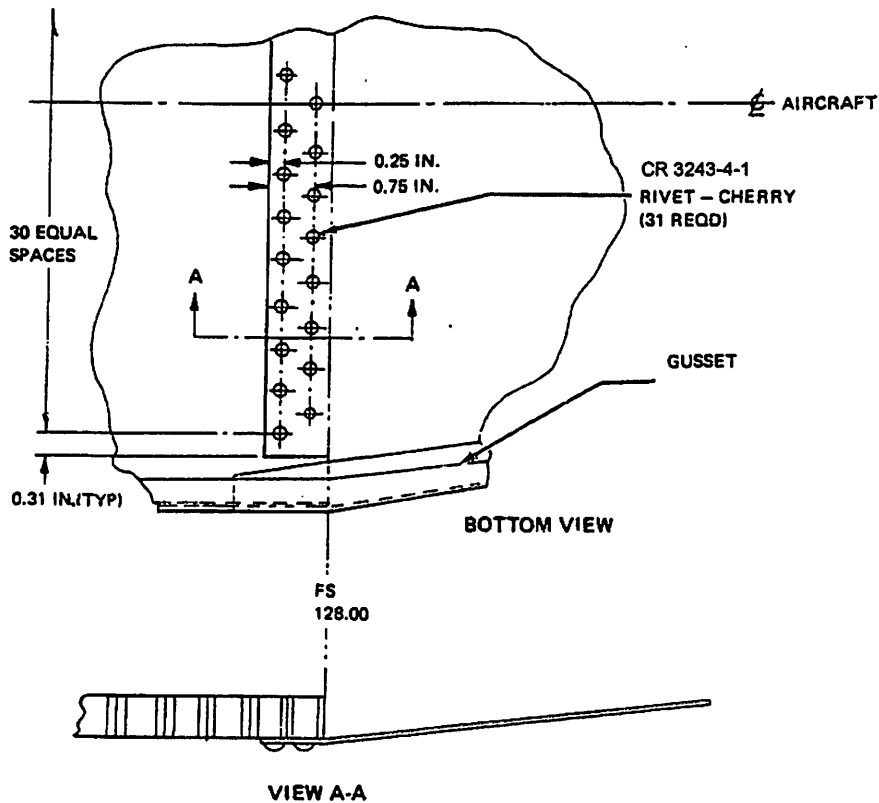
(d) Using CR3242-4-1 Cherry rivets dipped in P/S 870B-2 Sealant, rivet the bottom edge of the gusset to the bottom skin of the forward fuselage section. Seven (7) CR3242-4-1 Cherry rivets are required for each side of the fuselage

(20) Align reinforcements in place at the top edges of the forward and aft fuselage sections and secure in place as follows: (See Figure 20-18)

(a) Using CR3243-4-1 Cherry rivets dipped in P/S 870B-2 Sealant, rivet reinforcement to the side skin of the forward fuselage section. Six (6) CR3243-4-1 Cherry rivets are required for each side of the fuselage.

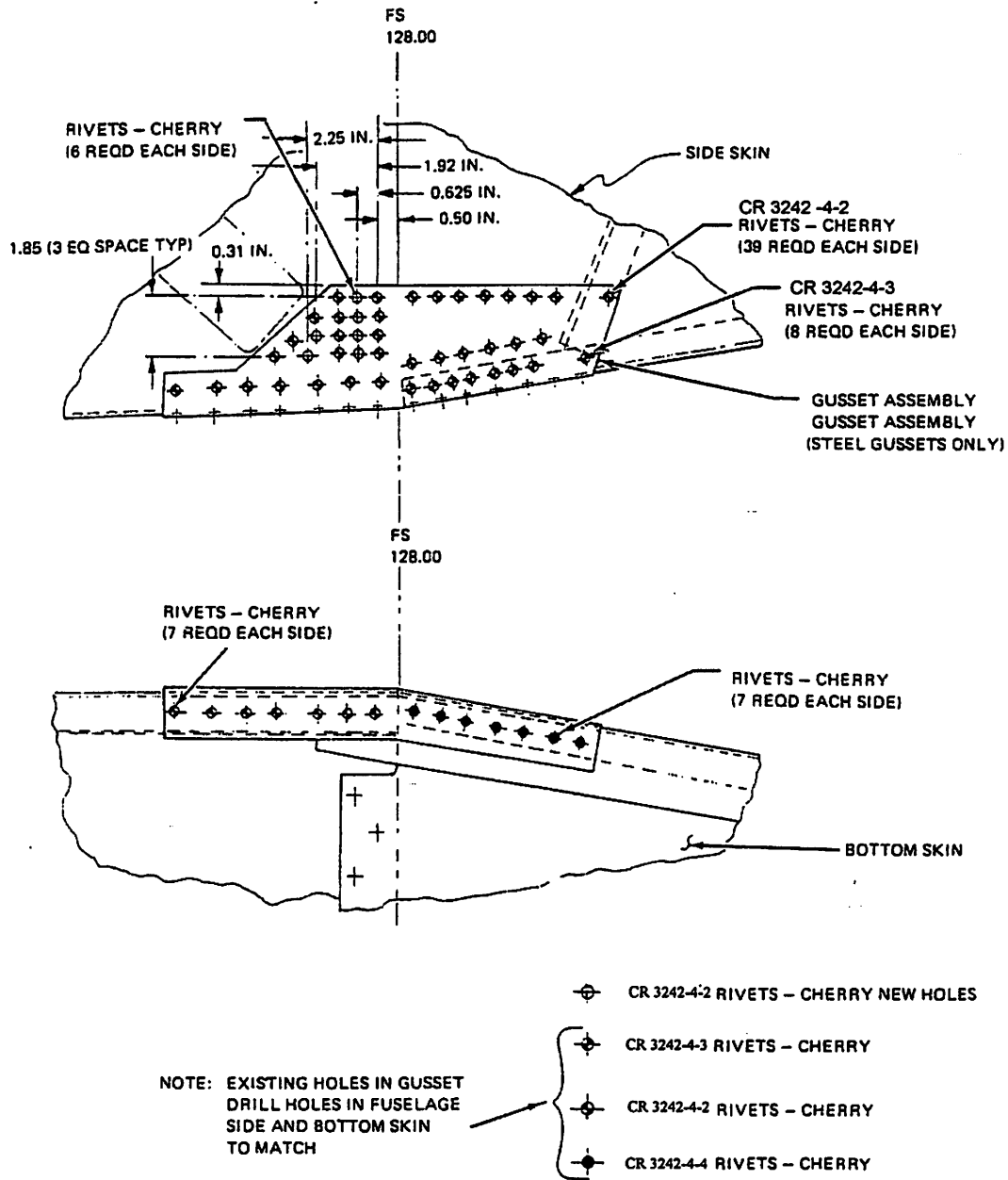
**TIGER AIRCRAFT AG-5B SERIES
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- (b) Using CR3242-4-1 Cherry rivets dipped in P/S 870B-2 Sealant, rivet reinforcement to the side skin of the aft fuselage section. Eight (8) CR3242-4-1 Cherry rivets are required for each side of the fuselage.
 - (c) Using CR3243-4-1 Cherry rivets dipped in P/S 870B-2 Sealant, rivet the upper aft fuselage (turtle deck) skin to the top of the reinforcement. Five (5) CR3243-4-1 Cherry rivets are required for each side of the fuselage.
- (21) Align the canopy track assemblies in place along the top edges of the forward and aft fuselage sections and secure in place as follows: (See Figure 20-14)
- (a) Install bolt attaching the canopy rail to the forward and upper aft fuselage bulkhead.



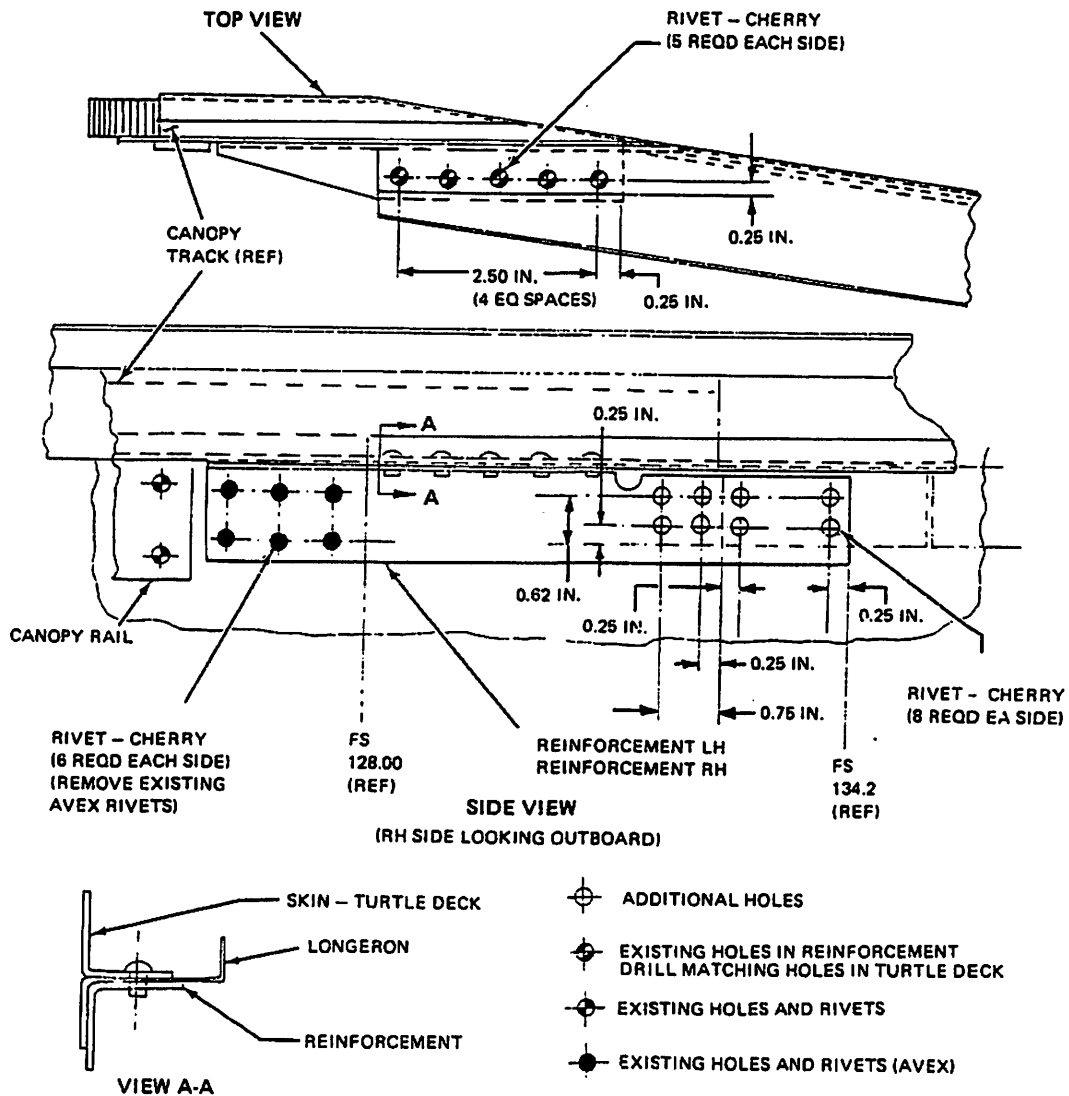
**Bottom Skin Attachment Details
Figure 20-16**

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**Gusset Attachment Details (L.H. Side)
Figure 20-17**

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**Reinforcement Attachment Details
Figure 20-18**

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- (b) Using CR3243-4-1 Cherry rivets dipped in P/S 870B-2 Sealant, rivet the canopy rail to the forward fuselage. Twenty-four (24) CR3243-4-1 Cherry rivets are required for each side of the fuselage.
 - (c) Using MS20470AD5 rivets dipped in P/S 870B-2 Sealant, rivet the canopy rail to the upper aft fuselage skin. Twelve (12) MS20470AD5 rivets are required for each side of the fuselage.
 - (d) Install 0.062 inch roll pins on the canopy rail. Four (4) roll pins are required for each rail.
- (22) Fill over all exterior rivets with epoxy filler and smooth before applying primer.
- (23) Coat all repaired areas with zinc chromate primer prior to application of exterior finish paint.
- (24) Connect the flap actuator motor to the motor bracket.
- (25) Install the vertical and horizontal stabilizers. (See Chapter 55)
- (26) Connect all control cables electrical wiring, and static system tubing at the rear seat section of the fuselage. (See Chapter 27)
- (27) Rivet two side braces in place connecting the two bulkhead assemblies at the rear seat section of the fuselage.
- (28) Install the wing roots and wings. (See Chapter 57)
- (29) Install the canopy. (See Chapter 52)
- (30) Install the forward and aft side panel interiors. (See Chapter 25)
- (31) Install the rear seat. (See Chapter 25)

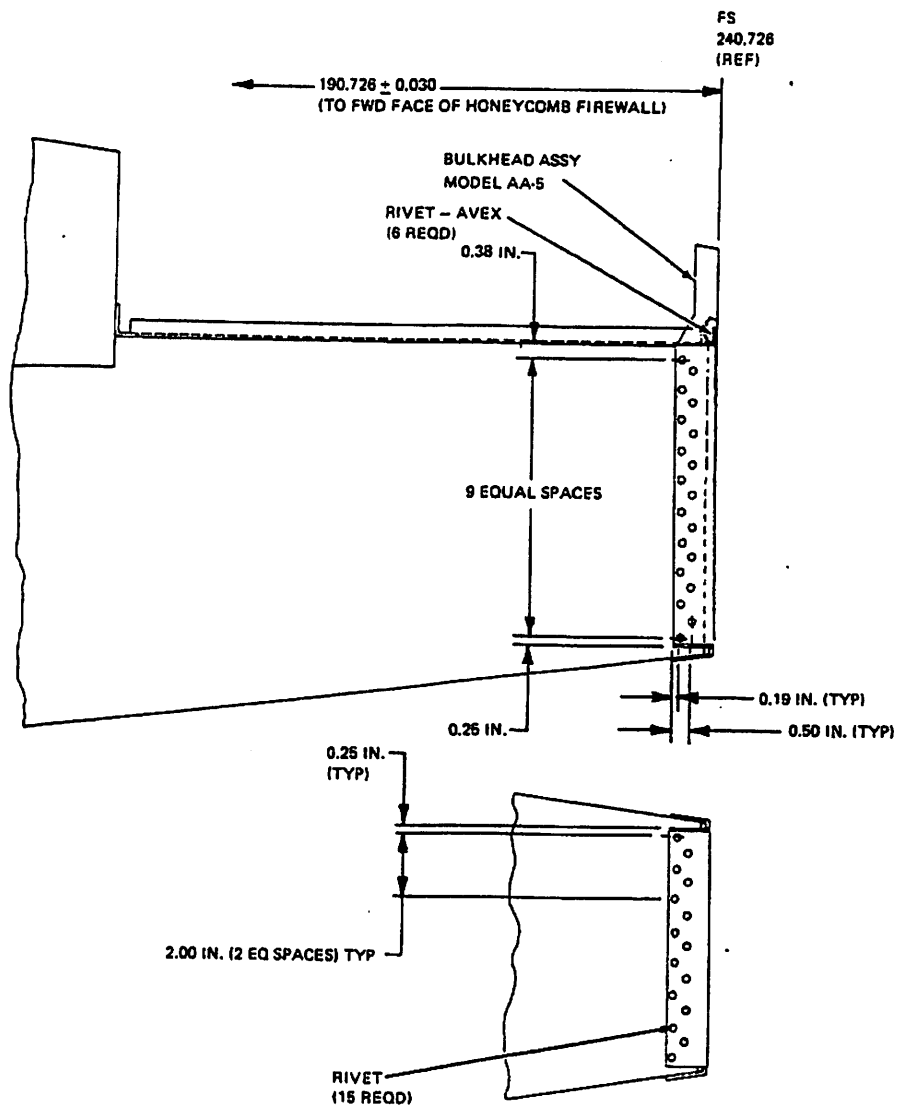
12. Aft Fuselage Bulkhead Replacement

- A. Replace the entire aft fuselage bulkhead as follows: (Figure 20-19)
- (1) Remove the rivets attaching the aft fuselage bulkhead to the horizontal bulkhead and the fuselage structure.
 - (2) Scrape out bonding between the bulkhead and fuselage structure.
 - (3) Remove the damaged aft fuselage bulkhead.
 - (4) Using fine grain sand paper, clean away all remaining adhesive before riveting the new bulkhead in place.
 - (5) Coat all joints with zinc chromate primer.

NOTE: Rivet spacing dimensions given are typical for repairs of the aft fuselage bulkhead.

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- (6) Secure the new bulkhead assembly to the fuselage with MS20426AD4-5 rivets installed wet with zinc chromate primer. Install 19 rivets to right fuselage side, 19 rivets to the left side, and 15 rivets to bottom side.
- (7) Secure the new bulkhead assembly to the panel assembly flanges with 6, 1691-0410 Avex rivets installed wet with zinc chromate primer.
- (8) Fill over exterior rivets with epoxy filler and smooth before applying primer.
- (9) Coat repaired area with zinc chromate primer prior to application of exterior finish paint.



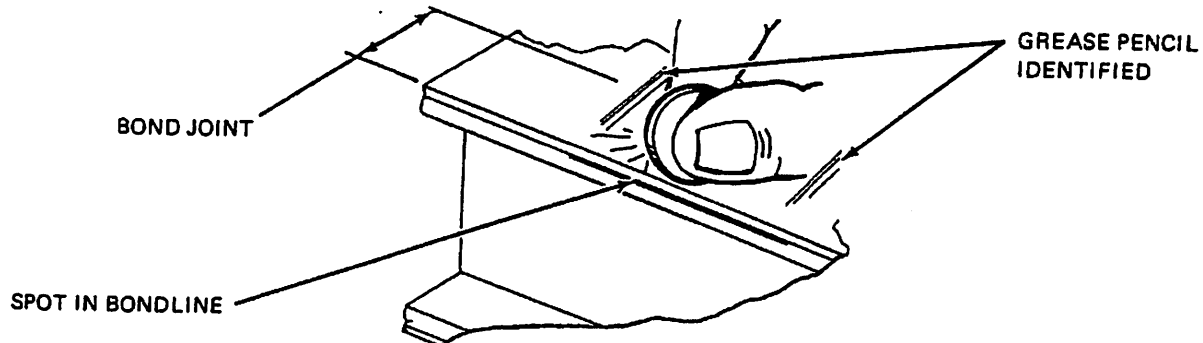
**Aft. Fuselage Bulkhead Replacement
Figure 20-19**

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13. Bond-line Repair

- A. If inspection of joint edges determine the existence of hairline cracks between two layers of bonded metal, perform the following steps:

- (1) Map the location of any cracks with a grease pencil as shown in Figure 20-20.



**Identifying Suspect Areas
Figure 20-20**

- (2) Gently tap the bond-line with a coin or similar metal object to verify the existence of a bond-line. While tapping, listen for a change in tone as the suspect area is traversed. A bond-line separation will produce a flat or hollow sound when "tapped" directly in the separated area.
- (3) If the results of Step B above are questionable, insert a 0.004 inch to 0.006 inch feeler gauge into the bond-line to verify that a separation exists.

WARNING: WHEN USING MEK OR ACETONE ENSURE THAT THE WORKING AREA IS WELL VENTILATED AND THAT PERSONAL PROTECTIVE EQUIPMENT IS WORN. AVOID BREATHING FUMES. KEEP AWAY FROM FLAMES.

- (4) If the results of Steps B and C are negative, the hairline should be wiped clean with MEK or Acetone and sealed with paint. Also, any bare bond-line edges should be sealed with paint. If the results of either Steps B or C are positive, order Service Kit No. SK-125A from your authorized Tiger Aircraft sales or maintenance facility and make the repairs accordingly.

14. Main Gear Strut Repair

- A. The following main gear strut repair procedure covers surface de-laminations which do not extend more than one ply into the surface of the strut, and corner de-lamination which are smaller than 1/16 x 1/16 inch (0.062" X 0.062") throughout their length.

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- (1) Remove delaminated material.
- (2) Smooth out minor paint chips or stone bruises with Scotch Brite pad or fine sand paper.

WARNING: WHEN USING MEK OR ACETONE ENSURE THAT THE WORKING AREA IS WELL VENTILATED AND THAT PERSONAL PROTECTIVE EQUIPMENT IS WORN. AVOID BREATHING FUMES. KEEP AWAY FROM FLAMES.

- (3) Clean unpainted areas thoroughly with MEK or Acetone.
- (4) Seal minor surface or corner de-laminations with a two-part epoxy adhesive to seal moisture from the damaged area.
- (5) Clean the strut with wax and grease remover.
- (6) Prime with two light coats of zinc chromate primer and reinstall the Main Gear Strut rubber wraps.

15. Damaged or Delaminated Spar Collar Repair

The repair is for any forward or aft rib to spar collar and may be used separately, or in conjunction with other approved repairs providing that no spar damage has occurred. If collar is not delaminated from the spar, reference this chapter for repair.

A. If collar is delaminated from spar, repair as follows:

CAUTION: DO NOT USE STEEL WOOL OR SILICON GRIT ABRASIVES. USE EXTREME CARE NOT TO SCRATCH OR GOUGE SPAR.

- (1) Clean the area to be repaired by removing loose bonding material using aluminum wool, 3-M Scotch Brite cloth or aluminum oxide paper. Thoroughly clean the area using a vacuum cleaner or other suitable means.

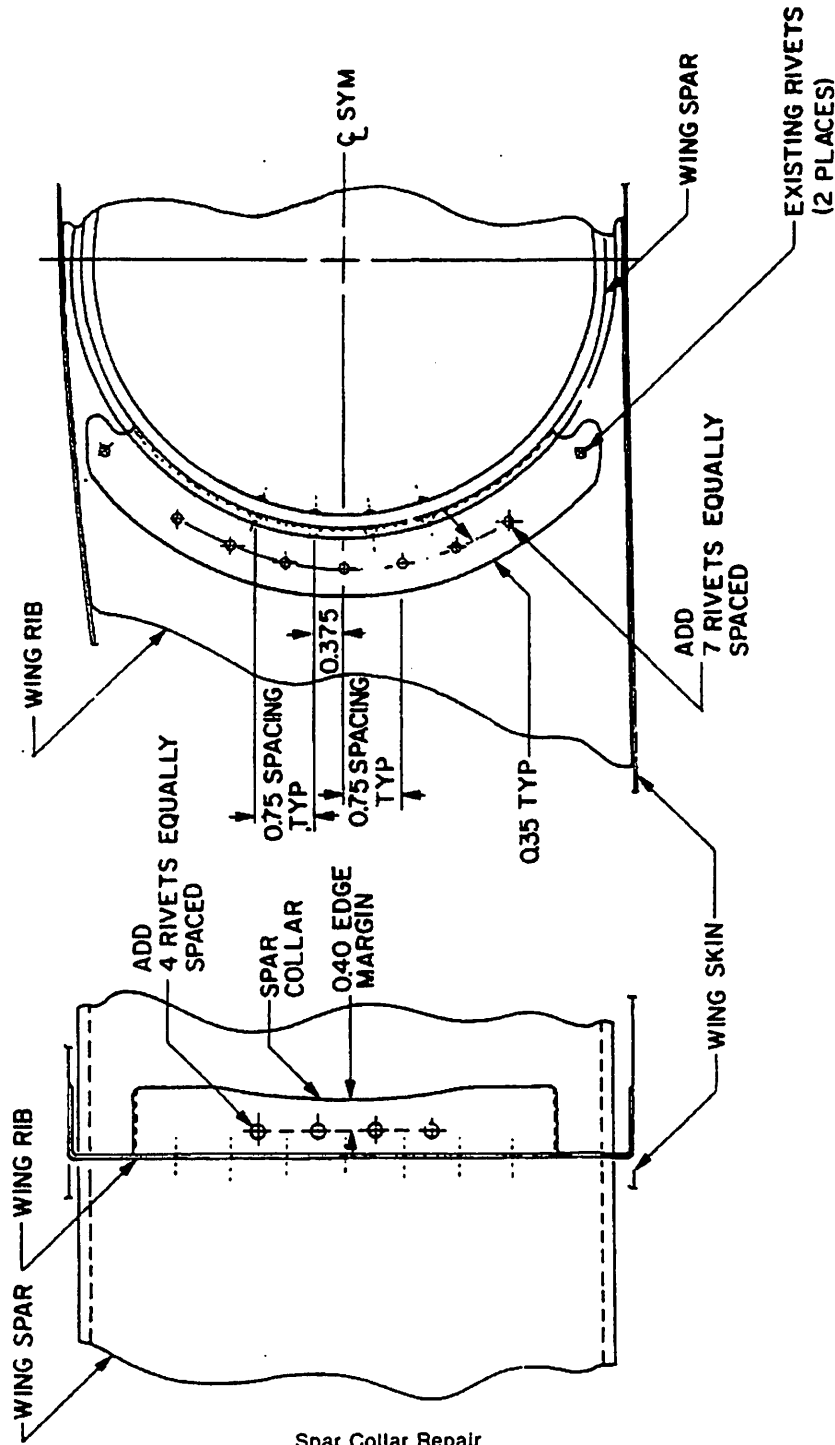
WARNING: USE CLEANING SOLVENTS IN A WELL VENTILATED AREA. AVOID BREATHING FUMES. KEEP AWAY FROM FLAMES.

- (2) Clean the area with a lint-free cheese cloth dampened with MEK, alcohol (99% Isopropyl), or acetone until the cloth shows no sign of smudge or stain.
- (3) Inspect the collar for damage and replace if required. If using the old collar, ensure it is clean.
- (4) Locate the collar in the correct position and drill as shown in Figure 20-21 for MS20470AD4 or NAS1919B04 (or equivalent) rivets.
- (5) Remove the collar and de-burr the holes.

CAUTION: OBSERVE ALL PRECAUTIONS NOTED IN THE KIT INSTRUCTIONS IN THE USE OF SEALANTS AND WORKINGS IN FUEL TANK AREAS.

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- (6) Prepare the sealant per Service Kit No. SK125A, or if in a fuel tank area, per SK140A. Coat mating surfaces with sealant and rivet into place. Coat rivets with proper sealant before insertion.



Spar Collar Repair

**Spar Collar Repair
Figure 20-21**

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PREPARATIONS FOR PAINTING

1. General

The three basic steps involved in the preparation of the aircraft for painting are stripping, cleaning and priming. The directions given in this section are intended as basic guidelines for preparing the aircraft for painting.

The information in this section shall apply to all polyurethane coated aircraft manufactured by TIGER AIRCRAFT LLC. Any deviation from or modification of this information must be approved by the TIGER AIRCRAFT Customer Service Department.

Because paint strippers are formulated to remove a synthetic substance, it must be understood that they are detrimental to all substances of the synthetic family. For this reason, *the following procedure has been prepared and must be carefully followed to ensure against damage to synthetic components on the aircraft.*

2. Stripping and Cleaning Procedure

WARNING: WHEN USING MEK OR ACETONE ENSURE THAT THE WORKING AREA IS WELL VENTILATED AND THAT PERSONAL PROTECTIVE EQUIPMENT IS WORN. AVOID BREATHING FUMES. KEEP AWAY FROM FLAMES.

CAUTION: LONG TERM EXPOSURE OF BOND JOINTS TO PAINT STRIPPERS WILL AFFECT THE INTEGRITY OF THE BOND STRENGTH. ALL AREAS MUST BE COMPLETELY SEALED TO PREVENT THE STRIPPER FROM CONTACTING BOND JOINTS OR GETTING INTO INTERNAL AREAS OF THE AIRCRAFT. IF STRIPPER DOES INADVERTENTLY CONTACT THE BOND JOINT, FLUSH THOROUGHLY WITH TAP WATER.

- (1) Wipe all bond-lines and areas with MEK, Acetone or a suitable substitute so that they will be free of dust, oily material, wax, cleaning agents or other foreign material.

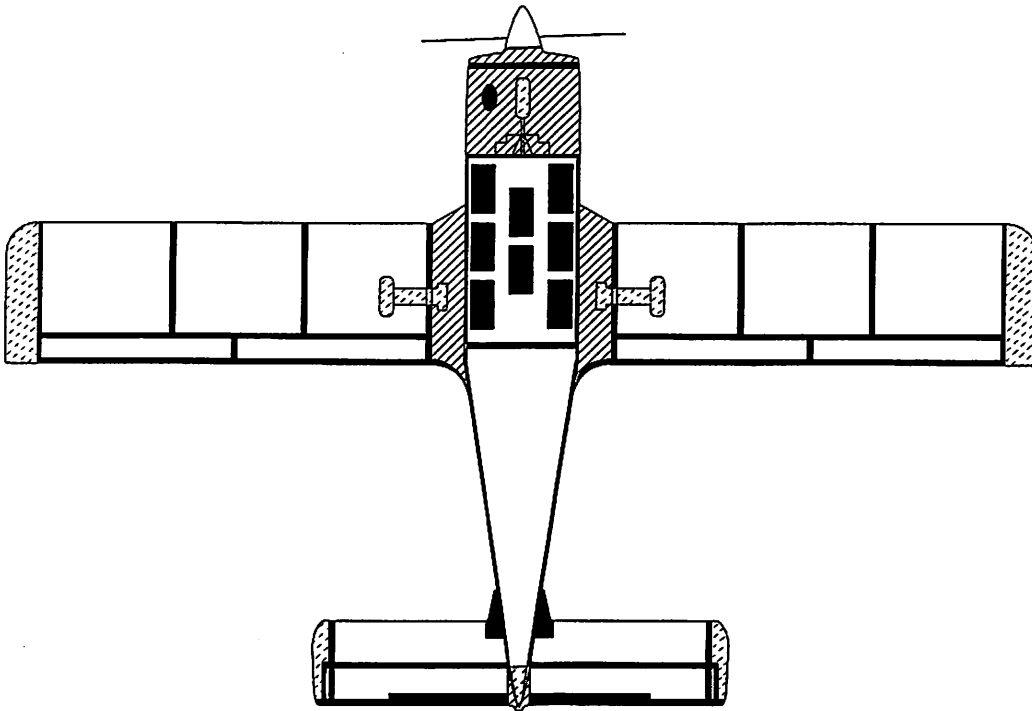
CAUTION: APPLY PROTECTIVE TAPE TIGHTLY TO ENSURE AGAINST SEEPAGE OF THE CHEMICALS INTO THE AREAS MENTIONED IN 'B' AND 'C' BELOW.

- (2) Using aluminum tape, mask windows, windshield, wing tips, stabilizer tips, wing roots, nose cowl, tailcone, propeller, main landing gear, drain holes, fasteners and all bond-lines as shown in the shaded areas of Figure 20-22.
- (3) Encase antennas, lights, beacons, tires, windows, windshield and all fiberglass or plastic parts in a double layer of aluminum foil as indicated by cross hatching in Figure 20-22.
- (4) Apply approved polyurethane stripper per the manufacture's instructions taking care to avoid stripper contact with undesired areas. Allow the stripper to work per manufacturer's instructions.

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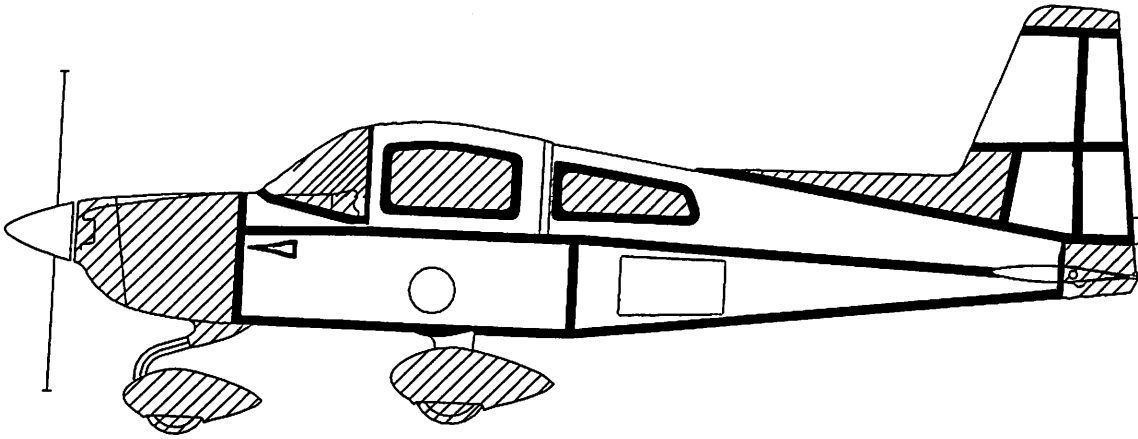
- (5) Flush stripped paint and excess stripper from the aircraft. Assure that all stripper residue is thoroughly removed.
- (6) Remove masking materials from all areas and inspect these areas carefully to ensure all chemicals have been removed.
- (7) After removing masking material, sand and feather the paint edge in all areas that had been protected from chemical contact.

NOTE: It is permissible to sand the paint completely from the bond-lines; however, for best bond-line protection, it is recommended that these areas be lightly sanded.



**Aircraft Stripping Sheet
Figure 20-22
(Sheet 1 of 2)**

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**Aircraft Stripping Sheet
Figure 20-22
(Sheet 2 of 2)**

3. Metal Conditioner Application

WARNING: BECAUSE METAL CONDITIONERS COULD HAVE AN ADVERSE EFFECT ON SOME AIRCRAFT MATERIALS PROPER MASKING IS ESSENTIAL. ASSURE THAT BOND LINES AND SYNTHETIC MATERIALS ARE ADEQUITELY ISOLATED FROM CONDITIONER CONTACT.

- A. Preparation, usage and removal of metal conditioners should be per the manufacturer's instructions.

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CHAPTER 21

AIR CONDITIONING

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CABIN HEAT AND VENTILATION - DESCRIPTION/OPERATION

1. General

Cabin heating and ventilation, is defined as any method used to maintain a desired level of heating, ventilating or controlling the air within the occupied areas of the aircraft. The system consists of the components and associated controls used for heating and ventilating the aircraft cabin. The system is a completely manually controlled, mechanical system. The cabin heat control is a push-pull type control located in the lower left of the instrument panel. Each air vent has an individual control. The air vent for the forward cabin area is a push-pull type control located at the lower corners of the instrument panel adjacent to the louvered outlets. A rear air vent system is located on each aft side panel. Forward floor heat is controlled by a push/pull lever located on the lower left of the instrument panel.

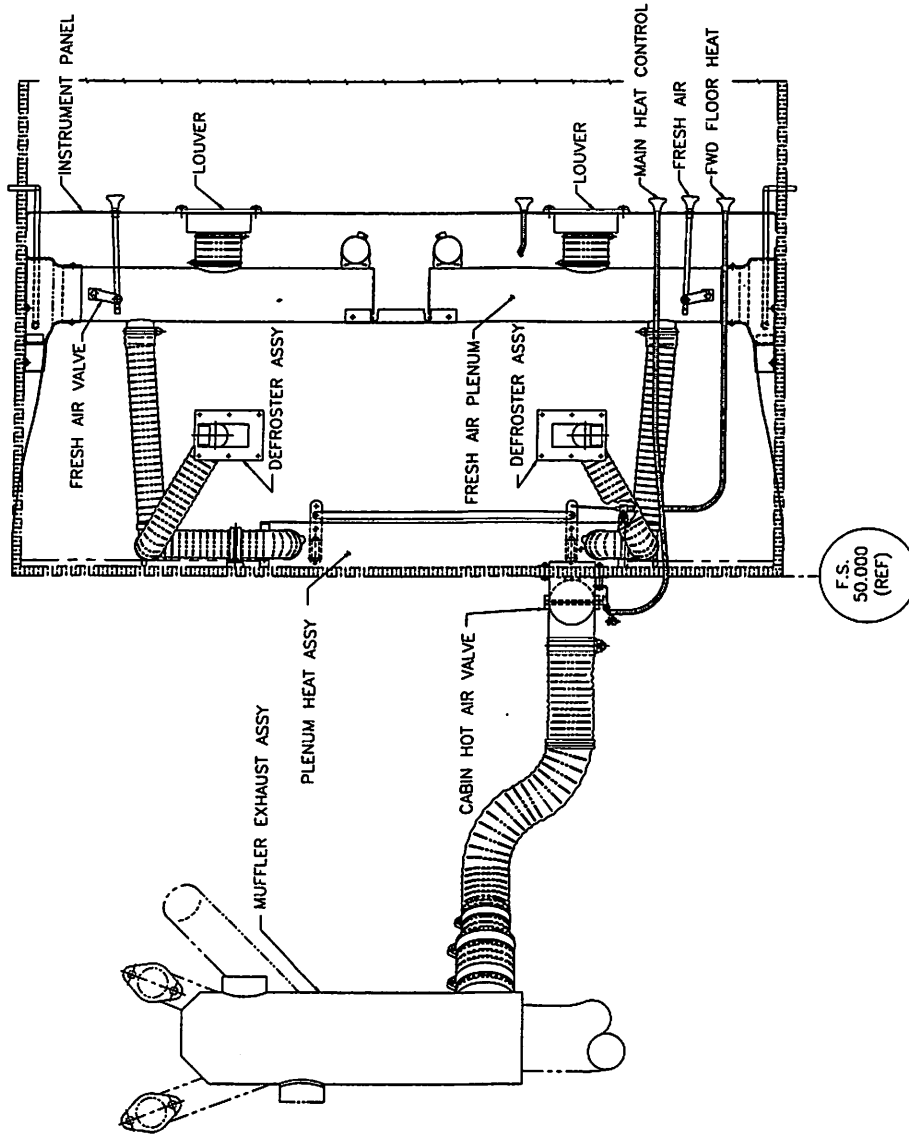
VENTILATION SYSTEM - DESCRIPTION/OPERATION

1. General

Forward cabin area ventilation is provided by two ventilators, one in each side of the fuselage. Manually adjustable valves for air quantity control the ventilators. The flow of fresh air in the cabin can be regulated in the desired direction by movable louvers located in the air vent outlets. (See Figure 21-01)

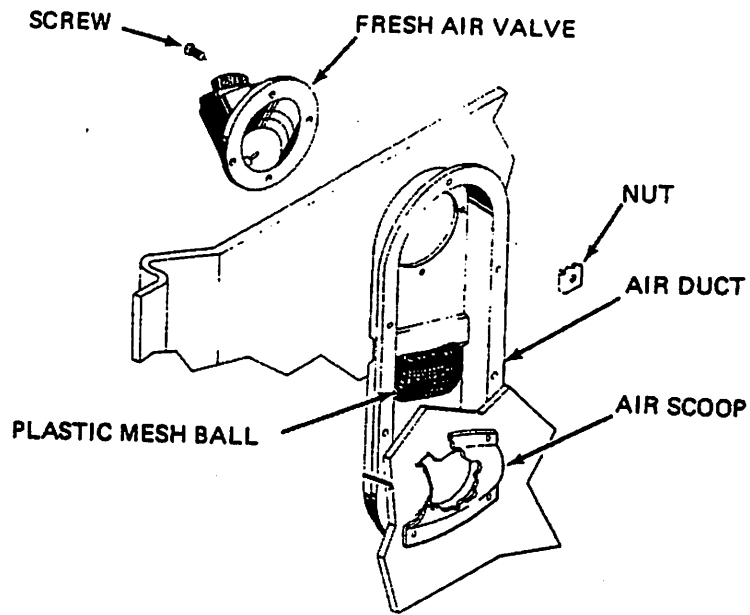
Ventilation for the rear seat area of the cabin is a separate system. The air vents for the rear cabin area are located on each side of the fuselage at the rear seat location. The flow of air inside the cabin can be regulated, or shut off completely, by rotating the knurled ring on the outlet valve. (See Figure 21-02)

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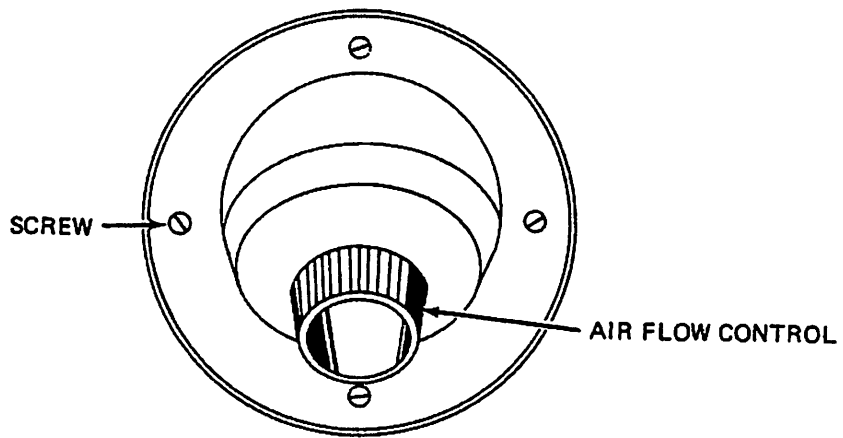


Forward Cabin Area Air Vent System
Figure 21-01

**TIGER AIRCRAFT AG-5B SERIES
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OUTSIDE AIR SCOOP



OUTLET VALVE

**Rear Cabin Area Air Vent System
Figure 21-02**

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HEATING SYSTEM - DESCRIPTION/OPERATION

1. General

The cabin heating system is basically a controlled air flow in which air passes over the muffler core and is ducted into the cockpit. The amount of heated air is regulated by a valve mounted through the firewall. Cool air picked up by the nose cowl inlet serves two purposes, cooling the muffler, and providing heated air for cabin area comfort.

The valve mounted through the firewall is used to regulate the warm air by either ducting it overboard or into the cabin as desired. The amount the push-pull control is moved determines the amount of heat ducted into the cabin.

To provide for windshield defrosting, flexible ducts are connected to a plenum inside the firewall and terminated just below the sliding doors located on the forward panel deck. Pulling the push-pull control out and opening the sliding doors accomplish operation of the defroster.

HEATING SYSTEM - TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Insufficient heat.	Duct damaged or disconnected.	Replace or connect duct.
	Loose control cable connection.	Tighten control cable connection.
	Air valve damaged.	Replace air valve.
Control hard to operate.	Control cable binding.	Check cable for proper routing and free the cable. Lubricate as required.
	Air valve sticking or binding.	Lubricate valve stem bearing and free the valve.
Exhaust fumes in cabin.	Defective muffler.	Inspect muffler and replace if defective.
Heat does not turn off.	Heat valve is not closing.	Adjust heat control.

HEATING AND VENTILATION SYSTEMS - MAINTENANCE PRACTICES

1. General

Maintenance of the heating and ventilation system will probably be confined to replacement of ducting when damaged, or adjustment / replacement of control cables. Ducts can be replaced by removing the clamp and duct and installation of new ducts.

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CHAPTER 22

AUTOPILOT

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1. **General**

The auto pilot system(s) installed by Tiger Aircraft have been installed via Supplemental Type Certificate (STC). Refer to the continued airworthiness instructions provided with the STC.

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CHAPTER 23

COMMUNICATIONS SYSTEMS

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COMMUNICATIONS SYSTEMS – DISCREPTION/OPERATION

1. General

The aircraft is delivered with customer ordered avionics equipment installed. For specific guidance on service of the avionics equipment, refer to the avionics manufacturers' installation/service manuals.

2. Emergency Locator Transmitter (ELT) System

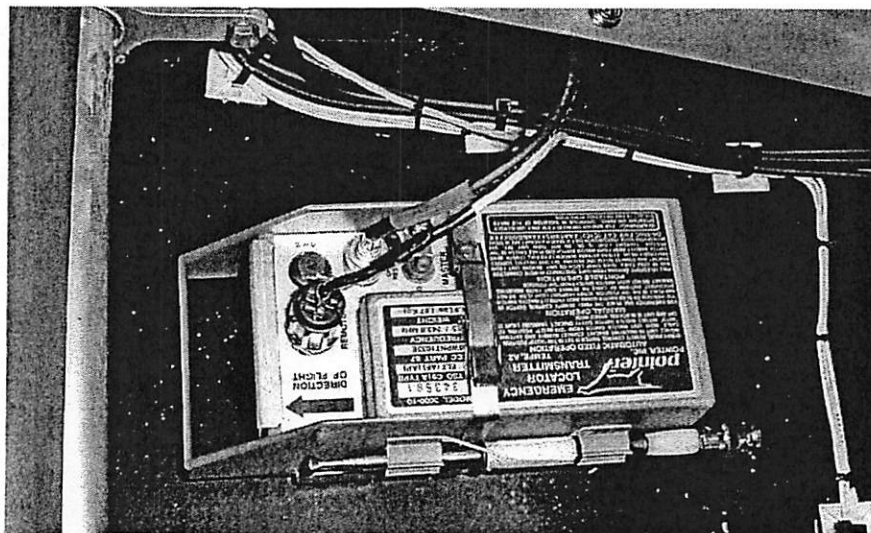
The purpose of the ELT is to serve as a radio beacon, should the aircraft make an emergency or crash landing. The transmitter has automatic activation provisions should the aircraft strike an object with a force of 5 G's or more along the flight axis. A remote activation switch is provided on the right hand side of the instrument panel. The ELT can be used as a portable beacon should it be necessary to leave the vicinity of the aircraft. It has its own antenna, battery pack, and a manual activating switch.

3. Battery Service Life Requirements

The finite service life on the ELT Battery is placarded on the battery shown by month and year. When the placarded date has been reached the battery should be properly discarded and replaced with a new battery. The ELT Battery cannot be recharged or reconditioned.

4. Location (Reference Figure 23-01)

The ELT is located under the right side of the aircraft's rear seat and can be accessed by pulling the bottom of the rear seat up and unsnapping the canvas cover.



**Emergency Locator Transmitter (ELT)
Figure 23-01**

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**CHAPTER 24
ELECTRICAL POWER**

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CHAPTER 24

ELECTRICAL POWER

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ELECTRICAL POWER - DESCRIPTION

1. **General**

This chapter describes the electrical power system and its operation. This covers the battery system, and alternator system.

The battery system consists of the battery, battery relay, (Battery side of the split Master Switch) and associated wiring. The alternator system consists of the alternator, shunt, load indicator (Alternator side of the split Master Switch) alternator indicator, alternator control unit and associated wiring. The optional external power system consists of the external power receptacle and associated wiring.

**WARNING: THE AG-5B AIRCRAFT IS *NOT* CERTIFIED FOR FLIGHT
WITHOUT THE BATTERY INSTALLED.**

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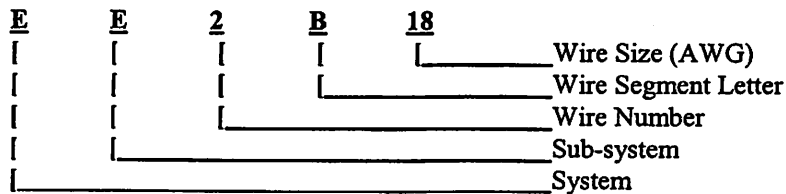
GENERAL ELECTRICAL INFORMATION - DESCRIPTION

1. General

This section covers general aspects of design and construction common to the AG-5B electrical systems. Details of actual systems are discussed in their appropriate section of this manual. The following information is intended to give a basic understanding of the over-all electrical systems design so that maintenance personnel can better troubleshoot those systems.

2. Wire Identification

*A wire identification code consists of a system letter, a sub-system letter, wire number, segment letter and wire size (American Wire Gauge). A suffix indicating ground (N), phase (A, B, etc.) or thermocouple material (Alumel, etc.) maybe added. A list of system and sub-system designations plus an illustration of a typical wire number breakdown is shown as follows:



SYSTEMS:

- A. Avionics
- E. Electrical

SUB-SYSTEMS:

- A. Altimeter
- B. Instruments other than flight or engine instruments: Load meter, voltmeter, outside air temperature, etc.
- C. Control surfaces, autopilot
- D. DME
- E. Engine instruments: Fuel pressure, oil pressure, cylinder temp, etc.
- F. Flight instruments
- G. Not used
- H. ADF
- J. Ignition
- K. Starter
- L. Lighting
- M. Marker beacon
- P. DC Power
- R. Radio/Comm.
- S. Special electronics, stormscope, etc.
- T. Transponder
- U. Miscellaneous electronics
- V. Audio, Intercom, Sidetone, etc.
- Y. Navigation Receivers.

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ELECTRICAL POWER SUPPLY SYSTEM - DESCRIPTION/OPERATION

1. **General**

An alternator and/or battery provide power for the electrical system. The alternator serves as the main component to power the electrical system and charges the battery during normal conditions. The battery is used for starting the engine and powering the electrical system when alternator power is not available. For the Direct Current (DC) Power System reference Figure 24-01.

A rocker type split Master Switch performs two functions. The Battery side of the split Master Switch energizes the Battery Relay and the Alternator side supplies power to the Alternator Control Unit (ACU). The Battery Relay, when energized, connects power to the electrical system and starting system. The ACU, receiving power from Battery via the Master Switch (with both sides of the switch on) energizes the Alternator field. With the Alternator field energized, the Alternator will produce an output to the electrical system. The ACU varies the output voltage of the Alternator to meet the requirements of the electrical system.

Diodes are used in the airplane electrical system across several components to dissipate back EMI and provide extended component life. Some components will function with a defective diode but operational life of the component will be limited.

The negative side of the battery is connected to the rear crankcase bolt of the engine (negative ground). This provides a ground for the airplane electrical systems through the airframe. The positive side of the battery is connected to the coil of the battery relay. This relay is in the relaxed state until the Battery side of the split Master Switch is placed in the "ON" position.

Placing the Battery side of the split Master Switch in the "ON" position provides a ground to energize the battery relay. With the battery relay energized, power is applied to the power bus and one side of the starter relay. The power bus distributes power to operate the starter relay coil and other electrical equipment on the airplane except the clock and the dome/cargo lights.

Placing the Alternator side of the split Master Switch in the "ON" position will provide power from the bus through a 5 amp ALT. control circuit breaker to the alternator control unit. The alternator control unit then provides power to the 'Field 1 terminal' of the alternator. With the Field 1 terminal in the alternator energized and the alternator operating (engine running at 1200 RPM or higher) the alternator will develop a power output to the power bus through a 90 amp Alternator circuit breaker. An "ALTNR" light on the instrument panel is provided to alert the operator whenever an under voltage condition exists.

A power receptacle is offered as optional equipment to provide 12 volts DC current to power certain accessories. The receptacle is located in the center console just aft of the spar and the 24VDC to 12VDC converter is located on the right side fuselage floor under the rear seat.

An external power receptacle is offered as optional equipment to supplement the battery system for starting and ground operation.

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BATTERY SYSTEM - DESCRIPTION/OPERATION

1. **General**

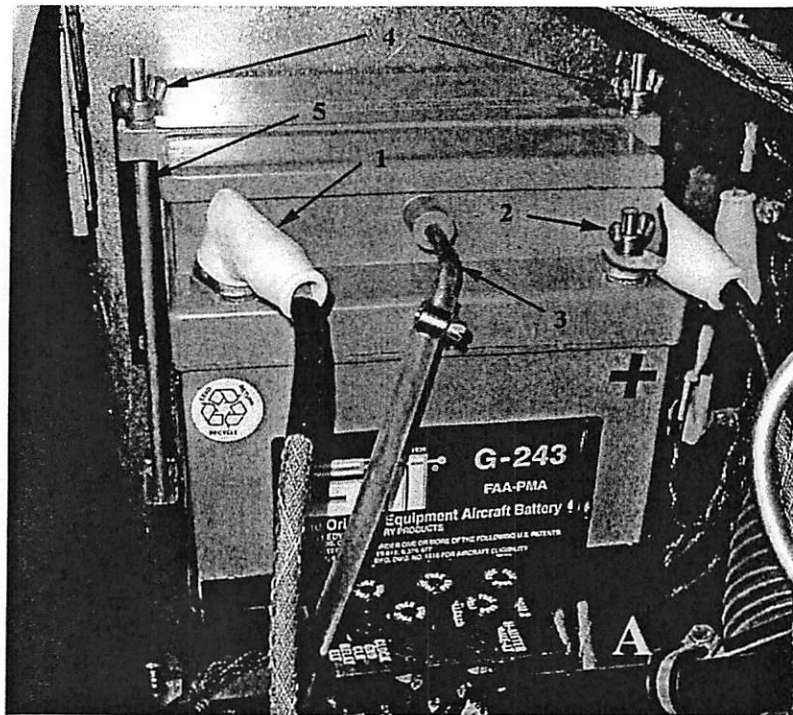
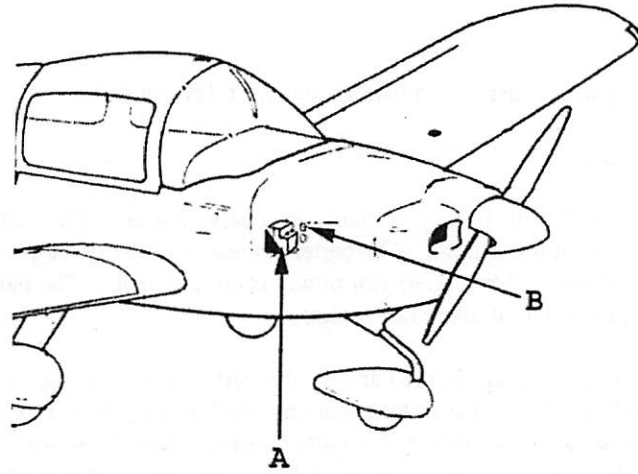
The AG-5B battery system consists of a battery, battery relay, master switch, and associated wiring.

2. **Battery** (See Figure 24-02)

The AG-5B battery is a 24 volt, 10 ampere hour, dry-charge battery. The battery is located on the lower-right forward side of the firewall. The battery is used to provide engine start and supply power to the electrical system when alternator power is not available. The battery is also used as an emergency supply in the event of alternator failure.

Under normal use, a battery being charged and discharged will decompose the water from the electrolyte by electrolysis. When the water is decomposed, hydrogen and oxygen gases are formed which escape into the atmosphere through the battery vent system. Low water levels are caused by this decomposition, distilled water should be added as necessary to maintain the electrolyte level.

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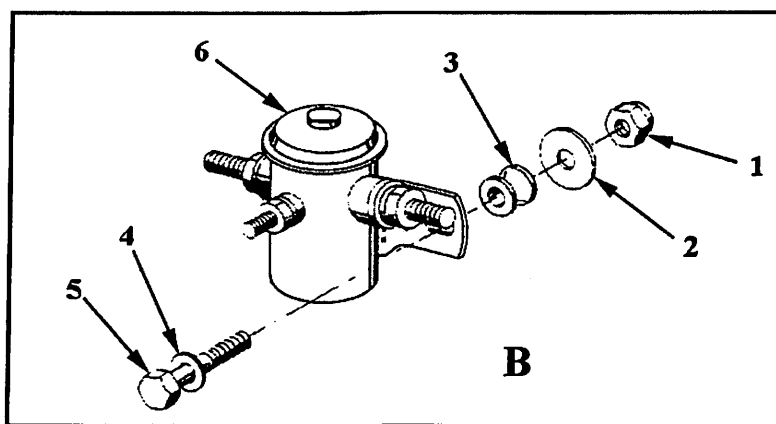
- | | | | |
|----|-----------|----|-----------|
| 1. | Boot | 4. | Wing Nuts |
| 2. | Wing Nut | 5. | J Bolt |
| 3. | Vent Tube | | |

Battery
Figure 24-02

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3. **Battery Relay** (See Figure 24-03)

The battery relay is located on the forward right side of the firewall near the battery tray. The relay is a 24 volt plunger type. It is actuated when the Battery side of the split Master Switch is placed in the "ON" position, completing a circuit between the battery and the power bus. It also provides power to the starter relay. With the Master Switch in the "OFF" position, the relay isolates the battery from the electrical system.

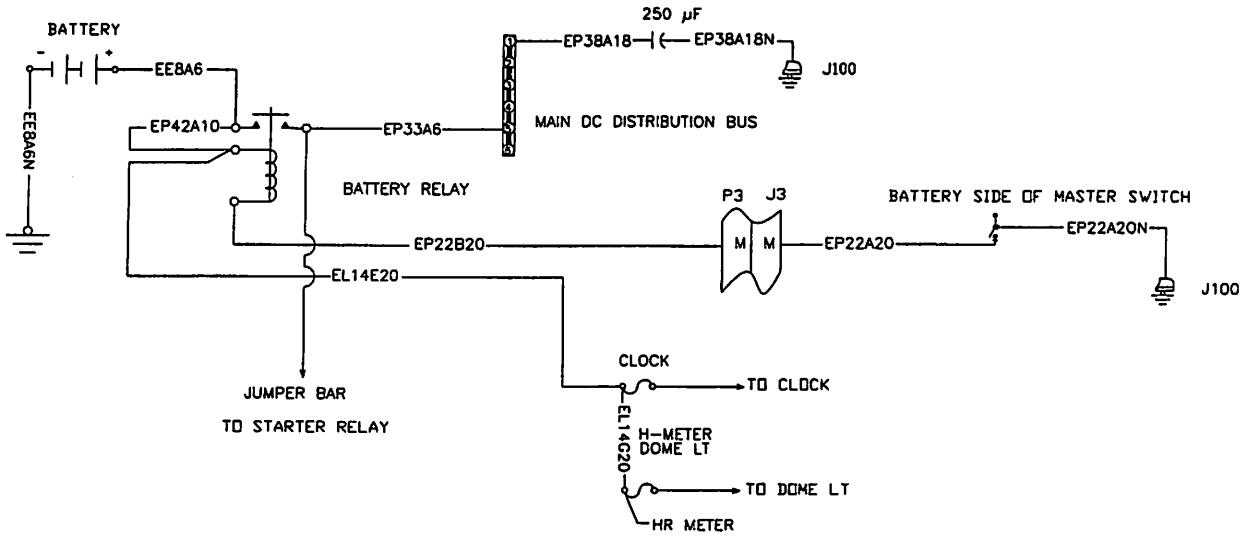


1. Nut
2. Washer
3. Spacer

4. Washer
5. Bolt
6. Relay

'B' Relay
Figure 24-03

**TIGER AIRCRAFT AG-5B SERIES
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**Battery Electrical Diagram
Figure 24-04**

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BATTERY SYSTEM - TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
System not energized when master switch is turned on.	Dead battery.	Recharge or replace.
	Defective wiring.	With master switch OFF, check entire DC power system for an open circuit with a continuity tester.
	Defective battery relay.	Connect, in sequence, a voltmeter to each battery relay terminal and check voltage with master switch on. If no voltage is indicated from either terminal, check the relay and replace if required.
	Defective master switch.	Remove the switch from the aircraft and check with a continuity tester. Replace switch if defective.
Battery discharge.	Charging rate too low.	Replace ACU.
	Battery left standing too long.	Recharge or replace.
	Equipment left on accidentally.	Recharge battery.
	Impurities in electrolyte.	Replace battery.
	Cell separator broken.	Replace battery.
	Short circuit in wiring.	Check wiring & repair as required
	Loose or broken alternator belt.	Adjust tension or replace.
	Corroded and/or loose battery connections.	Clean and tighten.
Short battery life.	Low charging rate.	Replace ACU.
	Impurities in electrolyte.	Replace battery.
	Battery left standing too long.	Recharge or replace.
	Sulfation due to nonuse.	Replace.
	Electrolyte level below top of plates.	Maintain electrolyte at proper level.

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BATTERY SYSTEM - TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Battery uses excessive amount of water.	Charging rate too high.	Check ACU / Alternator output.
	Cracked case. (Leaking)	Replace battery.
	Shorted cell.	Replace battery.
	Shorted diode in alternator.	Test diodes and replace as required.
Battery polarity reversed.	Connected backwards on airplane or charger.	Battery should be slowly discharged completely and then charged correctly and tested.
Battery freezes.	Undercharged or discharged battery.	Replace.
	Water added and battery not charged immediately.	Always recharge battery for 1/2 hour following addition of water in freezing weather.
ALTNR light stays on.	Alternator belt loose or broken.	Adjust tension or replace belt.
	Open circuit between alternator and bus bar.	Check wiring for clean, secure connections and repair as necessary. Check alternator circuit breaker.

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BATTERY SYSTEM - MAINTENANCE PRACTICES

1. **Servicing**

A. Visual Check

- (1) Remove battery cover - (See Battery - Removal/Installation)
- (2) Inspect battery terminals for corrosion. If corrosion exists, terminal should be cleaned as described below in "Cleaning Battery".
- (3) Inspect for low water level condition. Distilled water should be added as required to bring the level up to the split rings. (Do not over fill the battery)
- (4) Inspect for plugged vents and clean if necessary.
- (5) Replace battery cover (See Battery - Removal/Installation)

B. Cleaning Battery

WARNING: ENSURE THAT EXTERNAL POWER IS DISCONNECTED PRIOR TO REMOVING THE BATTERY.

- (1) Remove battery from aircraft (See Battery - Removal/Installation)
- (2) Tighten the filler caps to prevent cleaning solution from entering the battery. (Cleaning agent may neutralize the acid)
- (3) Wipe down the entire battery with a clean cloth dampened with a solution of bicarbonate of soda (baking soda) and water.
- (4) Wipe the battery cable ends with the same solution used in step (3) above.
- (5) Rinse the baking soda affected areas with clean water and assure the battery is dry before installation.
- (6) Use a brass wire brush or emery cloth to clean battery cable and battery terminal contact areas.

C. Determining State of Charge

To determine the state of battery charge, the specific gravity of the battery is checked using a hydrometer. When battery is completely charged, the specific gravity reading should read between 1.285 and 1.295.

D. Battery Charging

WARNING: ALWAYS KEEP SPARKS AND OPEN FLAME AWAY FROM THE BATTERY. CHARGING PRODUCES EXPLOSIVE GASES THAT MAY IGNITE.

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- (1) Remove the battery from the aircraft. (See Battery - Removal/Installation)
- (2) Place the battery in a well ventilated area.
- (3) Remove the vented caps and check the level of electrolyte. Distilled water should be added as needed to bring the electrolyte level to the top of the split rings.
- (4) Charge the battery as required.
- (5) Replace vented caps assure battery exterior is clean and dry then reinstall the battery. (See Battery Removal/Installation)

E. Battery Tray

WARNING: BE CAREFUL WHEN WORKING AROUND BATTERY ACID DEPOSITS. SERIOUS ACID BURNS COULD RESULT IF CONTACT IS MADE WITH ACID DEPOSITS. IF CONTACT IS MADE, WASH THE AFFECTED AREA IMMEDIATELY WITH SOAP AND WATER.

The battery box, cover and drain tube should be inspected and cleaned when the battery is removed. The battery box, cover and drain tube can be cleaned with a solution of baking soda and water. After cleaning box, cover and drain tube, flush them thoroughly with clean water. Inspect box, cover and drain tube for physical damage and replace if required.

2. **Battery Removal/Installation**

A. Battery Removal

- (1) Open the right hand engine cowl door.

CAUTION: REMOVE GROUND (NEGATIVE CABLE) FIRST TO PREVENT POSSIBLE SHORTING.

- (2) Remove the battery cables. (See above caution)
- (3) Remove the two wing nuts and battery cover.
- (4) Remove the drain tube.
- (5) Lift battery from the battery tray.

B. Battery Installation

CAUTION: ASSURE CORRECT POLARITY (NEGATIVE GROUND) TO PREVENT EQUIPMENT DAMAGE.

- (1) Place battery in the battery tray.
- (2) Install the battery cover with wing nuts.

CAUTION: CONNECT GROUND (NEGATIVE CABLE) LAST TO PREVENT ACCIDENTAL SHORT CIRCUIT DURING INSTALLATION.

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- (3) Connect the battery cables and coat the terminals with petroleum jelly. (See above caution)
- (4) Connect the drain tube.
- (5) Close the engine cowl door.
- (6) Perform operational check.

3. **Battery Relay Removal/Installation**

A. Battery Relay Removal

- (1) Open right engine cowl door.

CAUTION: GROUND (NEGATIVE) CABLE MUST BE DISCONNECTED AND CLEAR OF BATTERY.

- (2) Disconnect the ground (negative) cable from the battery terminal and pull clear of battery (See Battery Removal).
- (3) Pull the rubber insulators away from the battery relay terminals.
- (4) Remove hardware and battery cables from the relay.
- (5) Remove attaching hardware/wires from terminals.
- (6) Remove attaching hardware and the jumper bar from the battery and starter relays.
- (7) Remove attaching hardware and battery relay from the firewall.

B. Battery Relay Installation

CAUTION: GROUND (NEGATIVE CABLE) MUST BE CLEAR OF BATTERY TERMINALS BEFORE INSTALLING RELAY.

- (1) Place the battery relay on the firewall and secure with attaching hardware.
- (2) Install the electrical leads on the terminals and secure with attaching hardware.
- (3) Slide the rubber insulator over the terminals.
- (4) Install the jumper bar on the starter and battery relays and secure with attaching hardware.
- (5) Connect the ground (negative) cable to the battery. (See Battery Removal/Installation)
- (6) Close the right engine cowl door.
- (7) Perform operational check

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4. **Master Switch Removal/Installation**

A. Master Switch Removal

- (1) Open the right upper engine cowl.

CAUTION: GROUND (NEGATIVE) CABLE MUST BE DISCONNECTED
AND CLEAR OF BATTERY.

- (2) Disconnect the ground (negative) cable from the battery terminal and pull clear of battery. (See Battery Removal)
- (3) From under and behind the instrument panel, press switch mounting clips to release the Master Switch and pull the switch from the instrument panel.
- (4) Tag and disconnect the wiring.

B. Master Switch Installation

- (1) Connect wiring and remove identification tags.
- (2) Press the switch into the instrument panel mounting position until mounting clips secure the switch.
- (3) Reinstall and secure the instrument deck assembly.
- (4) Connect the negative (ground) battery cable to the negative battery terminal. (See Battery Installation)
- (5) Close right engine cowl door.
- (6) Perform operational check.

5. **Circuit Breaker Removal/Installation (Typical)**

A. Toggle Switch Type Circuit Breaker(s) Removal

- (1) Open right engine cowl door.

CAUTION: GROUND (NEGATIVE) CABLE MUST BE DISCONNECTED
AND CLEAR OF BATTERY.

- (2) Disconnect negative (ground) cable from battery terminal and pull clear of battery. (See Battery Removal)
- (3) Remove screws, and the instrument deck assembly.
- (4) Remove screw and disconnect the power wire from the bus bar.

NOTE: Toggle switch type circuit breakers are ganged together by a common bus.

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- (5) Remove remaining screws and the bus bar.
- (6) Tag and remove wiring from appropriate circuit breaker.
- (7) Remove the locknut and star washer from the instrument panel.

B. Toggle Switch Type Circuit Breaker(s) Installation

- (1) Check for proper orientation and place the circuit breaker in the appropriate instrument panel location.
- (2) Install the star washer and locknut.
- (3) Install wire(s) and remove tag(s).

NOTE: Toggle switch type circuit breakers are ganged together by common bus.

- (4) Install the bus bar and connect power wire to the bus bar.
- (5) Reinstall the instrument deck assembly and secure.
- (6) Connect the battery cable to the battery terminal. (See Battery Installation)
- (7) Close the engine cowl.
- (8) Perform operational check.

C. Push-Pull Type Circuit Breaker(s) Removal

- (1) Open right engine cowl door.

CAUTION: NEGATIVE (GROUND) CABLE MUST BE DISCONNECTED AND CLEAR OF BATTERY.

- (2) Disconnect negative (ground) cable from battery terminal and pull clear of battery. (See Battery Removal)
- (3) Remove screws, remove the instrument deck assembly.
- (4) Remove screw and disconnect power wire from bus bar.

NOTE: Push-pull type circuit breakers are ganged together by common bus except ALTERNATOR, AVION/BRK, and AVION/FAN.

- (5) Remove remaining screws and remove bus bar (as required).
- (6) Tag and remove wire from the appropriate circuit breaker.
- (7) Remove locknut, star washer and remove the circuit breaker from instrument panel.

D. Push-Pull Type Circuit Breaker(s) Installation

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- (1) Check for proper orientation and place circuit breaker in appropriate instrument panel location.
- (2) Install star washer and locknut.
- (3) Install wire(s) and remove tags.
- (4) Install bus bar and connect power wire to the bus bar.
- (5) Reinstall instrument deck assembly and secure.
- (6) Connect battery cables to battery terminals. (See Battery Installation)
- (7) Close right engine cowl door.
- (8) Perform operational check.

6. Operational Check of Battery

NOTE: Ensure that all circuit breakers are closed (pushed-in position) and fuses are operational.

A. Operational Check

- (1) Place Battery side of the split Master Switch in the "ON" position.
- (2) Turn Landing Lights Switch and Strobe (rudder flashing beacon) Switch to the "ON" position and observe that both landing lights and flashing rudder beacon light are operational.
- (3) Place Landing Lights and Strobe switches in the "OFF" position. Observe that both landing lights and rudder flashing beacon (strobe) lights are out.
- (4) Place Battery side of the split Master Switch in the "OFF" position.

ALTERNATOR SYSTEM - DESCRIPTION/OPERATION

1. Alternator

The alternator's continuous output is rated at 24 volts and 70 amperes.

The Alternator silicon diodes make it susceptible to reverse polarity current. If the current flow from the battery power source is inadvertently reversed the diodes will offer no electrical resistance to the current flow resulting in possible diode damage if the diode current rating is exceeded.

The alternator control unit controls excitation applied to the alternator field thus controlling the output of the alternator. A five-amp ALT. CONTROL circuit breaker, located on the instrument panel, is placed in series with the bus and the alternator control unit to protect the alternator field circuit.

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2. Alternator Control

The Alternator Control Unit (ACU) is a solid-state device designed to rectify and regulate alternating current output of the airplane alternator power supply system when the engine is running. The ACU is designed for use with 24VDC aircraft alternators. The alternator control unit also provides for field-to-ground protection, field current limiting, field induction protection, under-voltage caution indication and protection, and over-voltage caution indication and protection.

When the engine is running and with the Alternator side of the split Master Switch in the "ON" position, the ACU keeps the voltage at a predetermined level by comparing the voltage to a precise internal reference-voltage and supplies current to the alternator field independent of load, speed, and/or temperature. The field output is current limited and protected, by the ACU, against being shorted to ground.

When the alternator is charging the battery and an over-voltage condition occurs, the alternator field current is interrupted which causes the ALTNR light (powered by the alternator control) to illuminate.

ACU FIELD SERVICE TIPS

The FAULT / FUNCTION indicator, on the unit is designed to alert the user to the condition of the Alternator / ACU system.

RED light, with the Master Switch 'ON' indicates a ground short in the alternator field circuit.

GREEN steady light, with the engine running, indicates there is power coming out of the ACU but the alternator field or field wire to it is open.

Green light, fast flickering, with the engine running means the power input devices, (circuit breaker, switch, etc) and the field system are functioning correctly.

GREEN light, slow flickering, with the engine running means the power input devices are defective or have a higher than normal resistance.

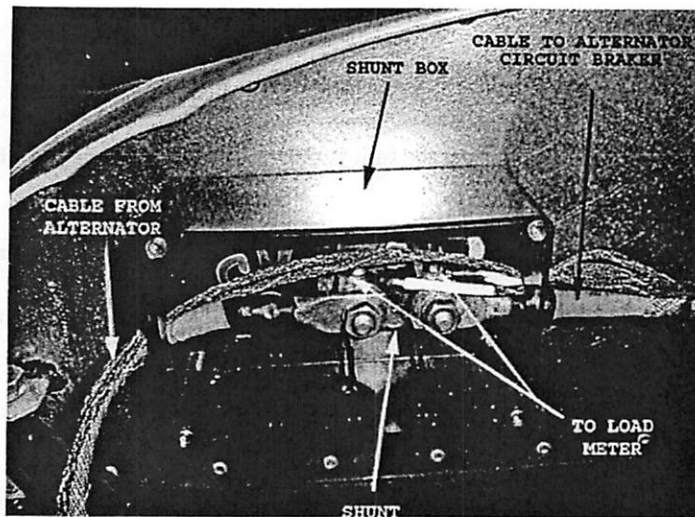
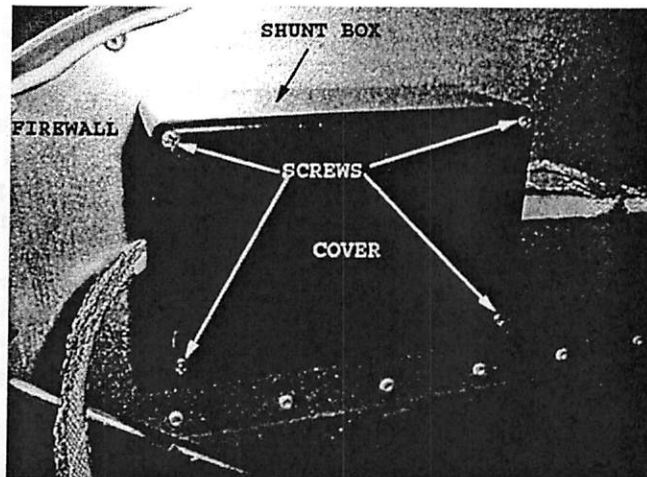
NO LIGHT, with the Master Switch 'ON' indicates that one power input device, (circuit breaker, switch, or wiring) or ACU is defective. A defective ACU can be confirmed by the presence of voltage on its input (pin 1) and no voltage on its output (pin 2).

3. Loadmeter Shunt

The shunt is located on the upper-right forward side of the firewall. It is mounted in an electrically insulated box with a removable cover and held in place by the shunt mounting hardware. The shunt assembly consists of a shunt resistor and connecting terminals to facilitate connecting a loadmeter.

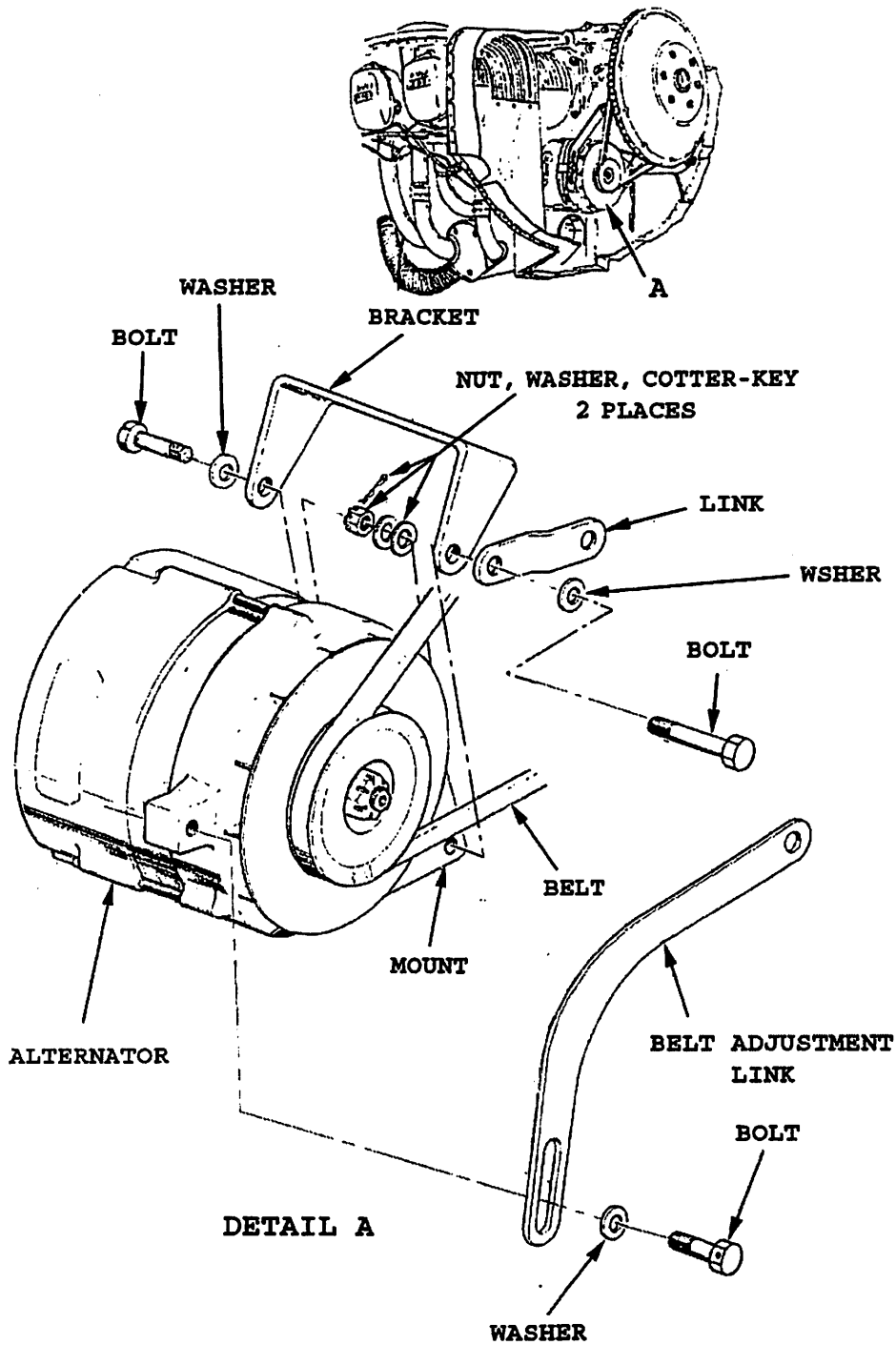
The shunt is connected in series with the alternator output terminal and the power bus. One side is connected to the alternator output and the other side is connected to the power bus through a 90 amp circuit breaker. The loadmeter is connected in parallel with the shunt to provide an indication of alternator load.

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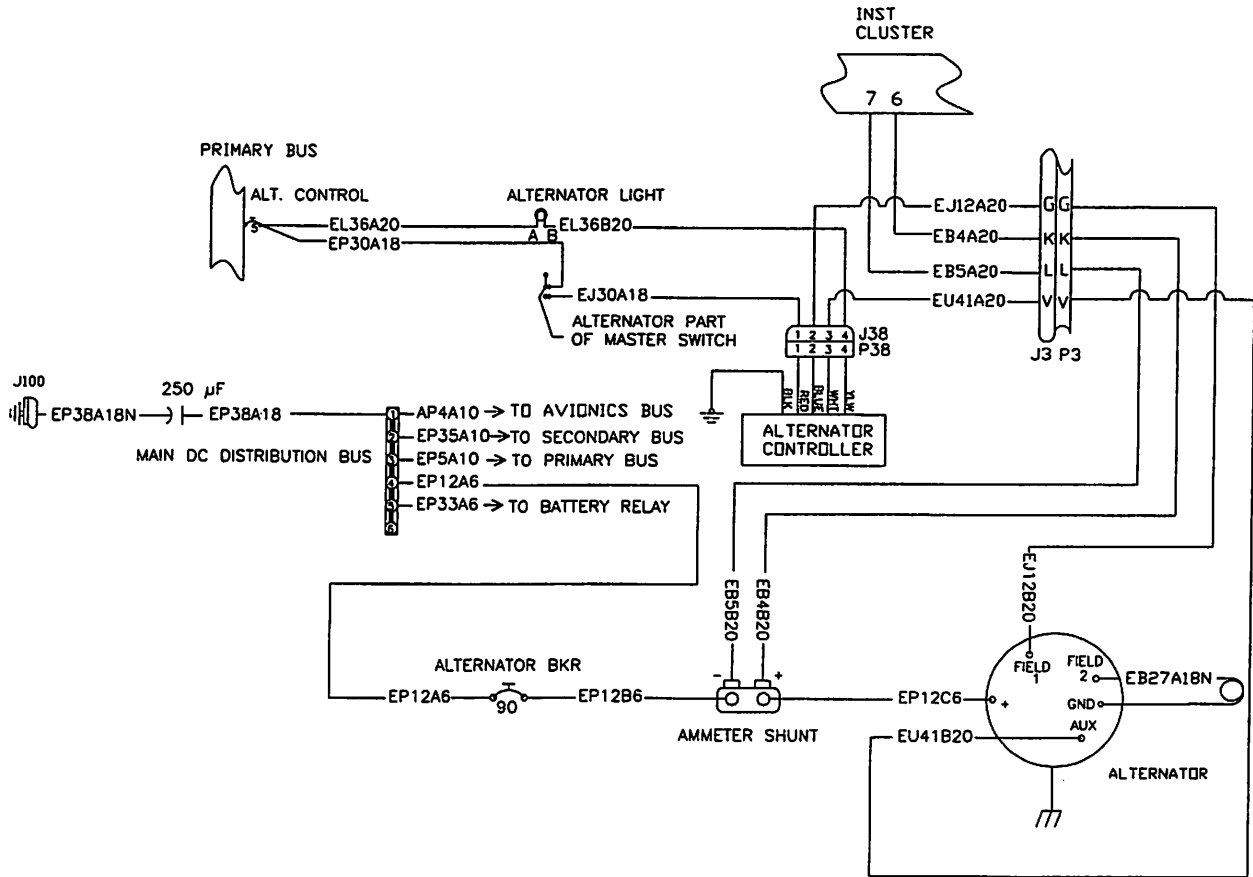
Shunt Installation
Figure 24-05

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Alternator-Exploded View
Figure 24-06

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Alternator Circuit
 Figure 24-07

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1. Alternator Removal/Installation

A. Alternator Removal

NOTE: If the alternator drive belt requires replacement, the propeller must be removed. (See Chapter 61)

- (1) Remove lower engine cowl. (See Chapter 71)

CAUTION: **NEGATIVE (GROUND) CABLE MUST BE DISCONNECTED AND CLEAR OF THE BATTERY.**

- (2) Disconnect the negative (ground) cable from the battery terminal and pull clear of battery. (See Battery Removal)
- (3) Cut the safety wire and remove the alternator attaching bolt from the adjustment link.
- (4) Remove cotter keys, nuts, and spacer-washers from the two alternator bracket bolts. Slide the bolts from the alternator bracket.
- (5) Lower the alternator to gain access to the alternator terminals, tag, disconnect wiring and remove the alternator.

NOTE: Maintenance performed on the alternator should be in accordance with the manufacturer's published procedures.

B. Alternator Installation

NOTE: If new drive belt is installed, the tension should be rechecked after 10 to 20 hours of operation.

- (1) Place the alternator near its mount and re-connect wiring.
- (2) Slide the alternator into its mount and install the drive belt on the alternator pulley.

NOTE: Correct spacer-washer stack-up is important to ensure proper belt alignment.

- (3) Slide the front alternator bracket bolt through link and bracket hole toward the firewall and rear alternator bracket bolt toward the alternator pulley. Install spacer-washers, nuts and cotter key.
- (4) Install alternator attaching bolt to adjustment link and adjust belt tension as follows:

NOTE: Use the following method to check belt tension adjustment.

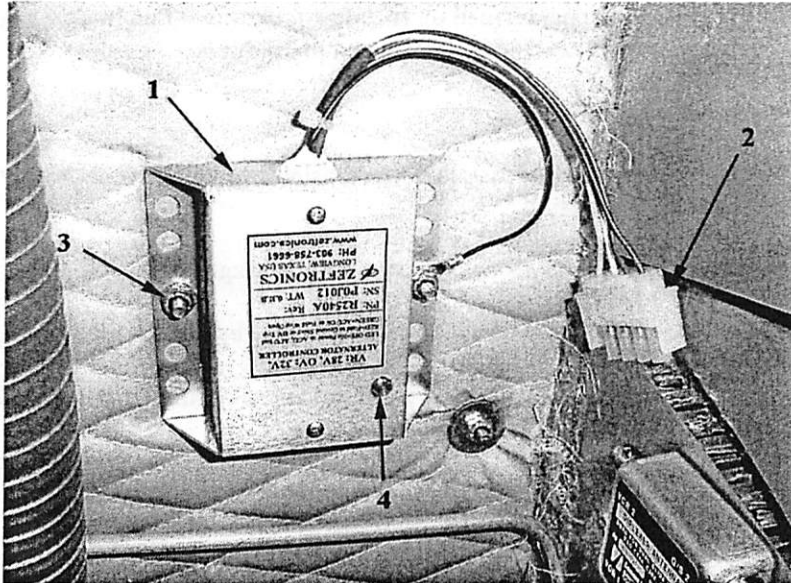
- (a) Apply a torque-indicating wrench to the nut that attaches the pulley to the alternator and turn the wrench in a clockwise direction. Observe the torque shown on the wrench at the instant the pulley slips.
- (b) Check the torque indicated in step (a) above with the torques specified in the following chart and adjust belt tension accordingly.

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<u>Width of Belt</u>	<u>Belt Condition</u>	<u>Torque indicating at alternator pulley</u>
3/8 inch	New	11 to 13 ft. lbs.
3/8 inch	Used	7 to 9 ft. lbs.

- (5) Install, tighten, and safety wire bolt attaching the adjustment link to the alternator.
- (6) Connect negative (ground) cable to battery. (See Battery Installation)
- (7) Install lower cowl. (See Chapter 71)
- (8) Perform Operational Check.

2. Alternator Controller Removal/Installation



- | | | | |
|----|-------------------------|----|---------------------------------|
| 1. | Alternator Control Unit | 3. | Bolt, Nut and Washer |
| 2. | Connector | 4. | Field Fault Function /Indicator |

Alternator Control Unit
Figure 24-08

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A. Alternator Control Unit (ACU) Removal (Reference Figure 24-08)

NOTE: The alternator control unit is a sealed unit, do not attempt to adjust or repair.

- (1) Open right engine cowl door.

CAUTION: **NEGATIVE (GROUND) CABLE MUST BE DISCONNECTED AND CLEAR OF THE BATTERY.**

- (2) Disconnect the negative (ground) cable from the battery terminal and pull clear of battery.
- (3) Reach under the instrument panel and unplug the ACU electrical connector (2).
- (4) Remove the hardware (3) securing the ACU (1) to the firewall and remove the ACU

B. Alternator Control Unit (ACU) installation

- (1) Install the mounting bolts in the firewall above the battery.
- (2) Install the ACU on the mounting bolts and install securing hardware (3).
- (3) Connect the ACU connector (2).
- (4) Connect the negative (ground) cable to the battery terminal.
- (5) Close right engine cowl door.
- (6) Perform operational check

3. **Shunt Removal/Installation**

A. Shunt Removal

NOTE: The shunt assembly is not repairable. Repair is limited to replacement.

- (1) Open right engine cowl door.
- (2) Disconnect the negative (ground) cable from its battery terminal and pull clear of the battery.
- (3) Remove screws from insulating box cover.
- (4) Remove screws and instrument deck assembly.
- (5) Tag and disconnect wiring.
- (6) Remove the shunt, insulating box and mounting bolts as an assembly.

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B. Shunt Installation

CAUTION: ENSURE THE NEGATIVE BATTERY CABLE IS DISCONNECTED.

- (1) Assemble ammeter shunt and mounting bolts in electrically insulating box and install in its mounting position on the firewall.
- (2) Install ammeter shunt assembly attaching hardware.
- (3) Connect wiring to ammeter shunt and tighten.
- (4) Install electrically insulating box cover and secure.
- (5) Reinstall the instrument deck assembly.
- (6) Reconnect battery cable.
- (7) Close right engine cowl.

4. **Operational Check of Alternator System**

WARNING: BEFORE STARTING ENGINE ENSURE PROPELLER AREA IS CLEAR.

A. Operational Check

- (1) Start engine in accordance with the Pilots Operating Handbook. Set power at 1800 RPM.
- (2) Voltmeter should indicate more than battery voltage, but not more than 31.5 volts maximum.
- (3) Shut down engine in accordance with the Pilots Operating Handbook.

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5. 12 Volt Accessory Power (Optional)

A. Operational Check

- (1) Turn on the aircraft master switch
- (2) Verify that 12 Volts DC is present at the receptacle.

B. Power Converter Removal (Refer to Figure 24-09)

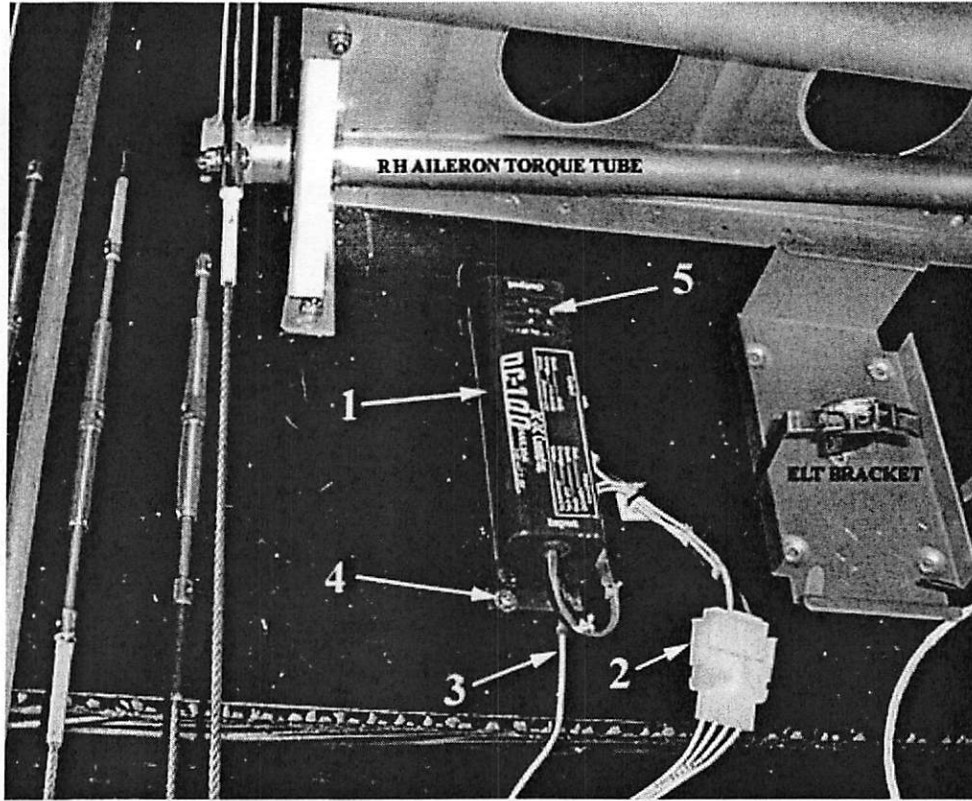
- (1) Disconnect the battery and prepare the aircraft for safe maintenance.
- (2) Remove the two back seat cushions and flip the rear seat bottom forward.
- (3) Remove the canvas cover.
- (4) Disconnect plug (2).
- (5) Remove four attach screws (4) ground wire (3) and remove the converter.

C. Power Converter Installation (Reference Figure 24-09)

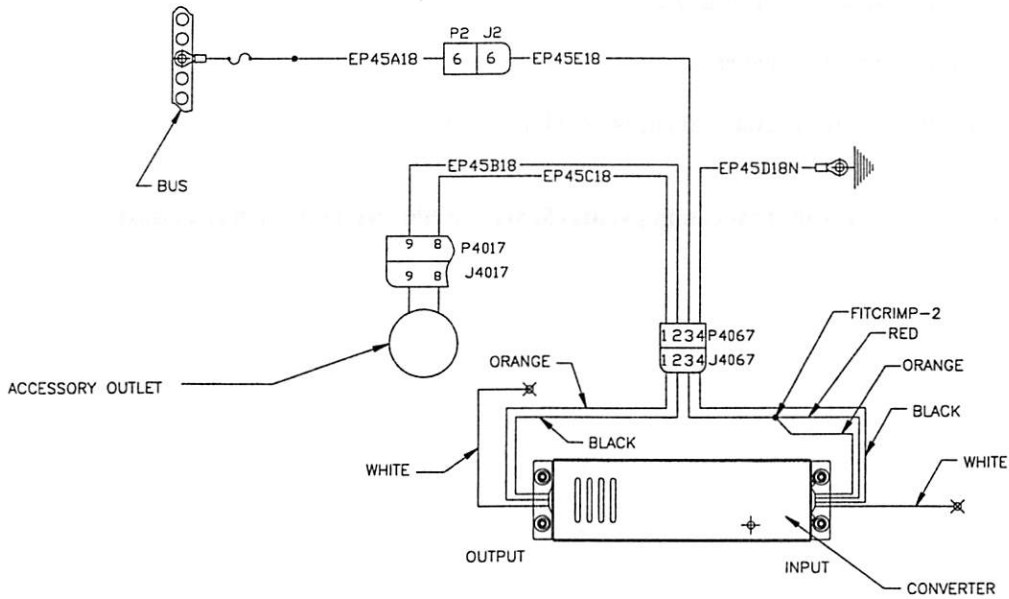
- (1) Place the converter in position over four rivnuts located in the floor.
- (2) Attach the converter using four screws (4). Install ground wire (3) under the head of one of the aft screws.
- (3) Reconnect plug (2).
- (4) Reinstall the canvas cover
- (5) Reconnect the battery
- (6) Perform the operational check noted in (5, A) above.

NOTE: Insure that cooling vents (5) are not blocked and are free of dust.

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24/12 VDC Power Converter Installation
 Figure 24-09

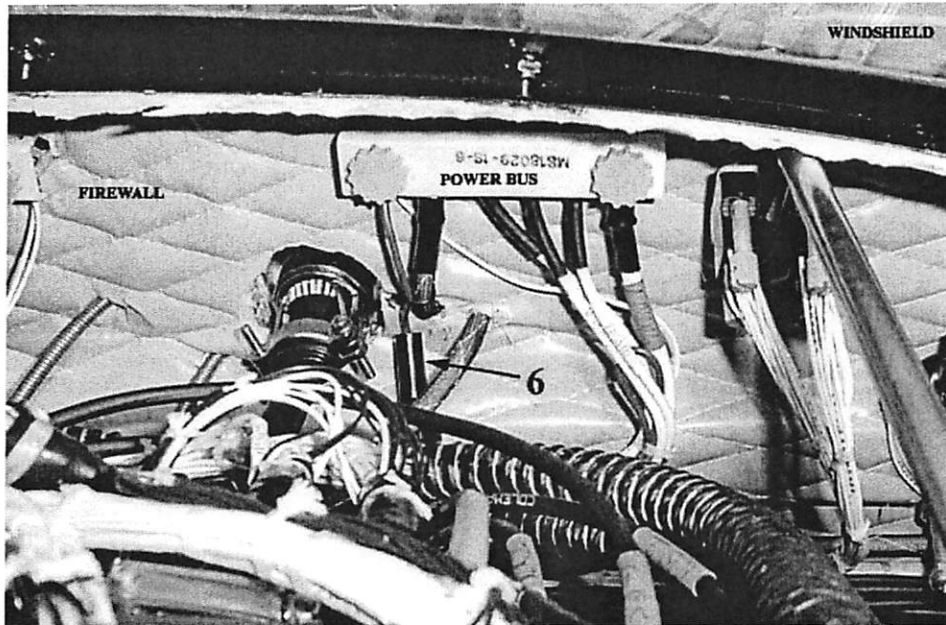


12VDC Power Supply Schematic
 Figure 24-10

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D. 12 Volt Power Supply Fuse Replacement (Reference Figure 24-11)

1. Disconnect the battery and prepare the aircraft for safe maintenance.
2. Remove the glare shield and instrument deck.
3. The power supply fuse holder (6) is located near the firewall and is connected to the power bus on the firewall by a red wire.
4. Open the fuse holder, replace the fuse and close the fuse holder.
5. Reinstall the instrument deck and glare shield.
6. Reconnect the battery.



12-VDC Power Supply Fuse Location
Figure 24-11

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**CHAPTER 24A
ELECTRICAL POWER
Garmin G1000 Integrated Cockpit System**

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CHAPTER 24A

ELECTRICAL POWER
Garmin G1000 Integrated Avionics System

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ELECTRICAL POWER – DESCRIPTION
Garmin G1000 Integrated Avionics System

1. **General**

This chapter describes the electric power system and its operation for AG-5B aircraft equipped with the optional Garmin G1000 Integrated Avionics System.

The battery system consists of a Main Battery for normal operations, a Back-Up Battery for G1000 emergency power, battery relays, battery side of the split Master Switch, Emergency Battery Switch, on screen battery condition indications and associated wiring. The alternator system consists of the alternator, shunt, alternator side of the split Master Switch, on screen volt and amp indication, alternator control unit and associated wiring.

NOTE: The Back-Up Battery and the Emergency Buss (E-Buss) are diode isolated from the main electrical system.

WARNING: G1000 EQUIPPED AG-5B AIRCRAFT ARE *NOT* CERTIFIED FOR FLIGHT WITHOUT BOTH BATTERIES INSTALLED.

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GENERAL ELECTRICAL INFORMATION - DESCRIPTION

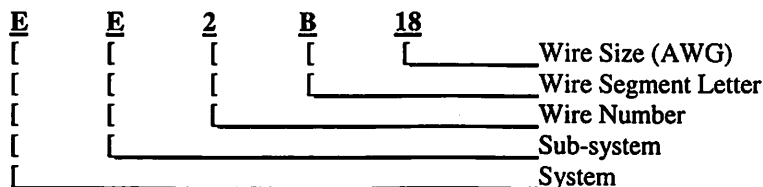
Garmin G1000 Integrated Avionics System

1. General

This section covers general aspects of design and construction common to the AG-5B electrical systems. Details of actual systems are discussed in their appropriate section of this manual. The following information is intended to give a basic understanding of the over-all electrical systems design so that maintenance personnel can better troubleshoot those systems.

2. Wire Identification

A wire identification code consists of a system letter, a sub-system letter, wire number, segment letter and wire size (American Wire Gauge). A suffix indicating ground (N), phase (A, B, etc.) or thermocouple material (Alumel, etc.) maybe added. A list of system and sub-system designations plus an illustration of a typical wire number breakdown is shown as follows:



SYSTEMS:

- A. Avionics
- E. Electrical

SUB-SYSTEMS:

- A. Altimeter
- B. Instruments other than flight or engine instruments: Load meter, voltmeter, outside air temperature, etc.
- C. Control surfaces, autopilot
- E. Engine instruments: Fuel pressure, oil pressure, cylinder temp, etc.
- F. Flight instruments
- J. Ignition
- K. Starter
- L. Lighting
- M. Marker beacon
- P. DC Power
- R. Radio/Comm.
- S. Special electronics, stormscope, etc.
- T. Transponder
- U. Miscellaneous electronics
- V. Audio, Intercom, Sidetone, etc.
- Y. Navigation Receivers.

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ELECTRICAL POWER SUPPLY SYSTEM - DESCRIPTION/OPERATION

Garmin G1000 Integrated Avionics System

1. General

An alternator and/or Main Battery provide power for the electrical system. The alternator serves as the main component to power the electrical system and charges the batteries during normal conditions. The Main Battery is used for starting the engine and powering the electrical system when alternator power is not available. The Back-Up Battery is used to power the Emergency Buss (E-Buss) when the "ON" position of the Emergency Battery Switch is selected. For the Electrical System Diagram reference Figure 24A-02.

A rocker type split Master Switch performs two functions. The battery side of the split Master Switch energizes the Main Battery Relay and the alternator side supplies power to the Alternator Control Unit (ACU). The Main Battery Relay, when energized, connects power to the electrical system and starting system. The ACU, receiving power from the Main Battery via the Master Switch (with both sides of the switch on) energizes the alternator field. With the alternator field energized, the alternator will produce an output to the electrical system. The ACU varies the output voltage of the alternator to meet the requirements of the electrical system and recharge both the Main Battery and the Back-Up Battery.

Diodes are used in the airplane electrical system across several components to dissipate back EMI and provide extended component life. Some components will function with a defective diode but operational life of the component will be limited. A large Dual Diode is used to isolate the E-Buss and Back-Up Battery from the main electrical system.

The negative sides of the batteries are connected to the rear crankcase bolts of the engine (negative ground). This provides a ground for the airplane electrical systems through the airframe. The positive side of the Main Battery is connected to the coil of the battery relay. This relay is in the relaxed state until the battery side of the split Master Switch is placed in the "ON" position. The positive side of the Back-Up Battery is connected to one side of the Emergency Battery Switch and powers the Emergency Buss when the switch is placed in the "ON" position.

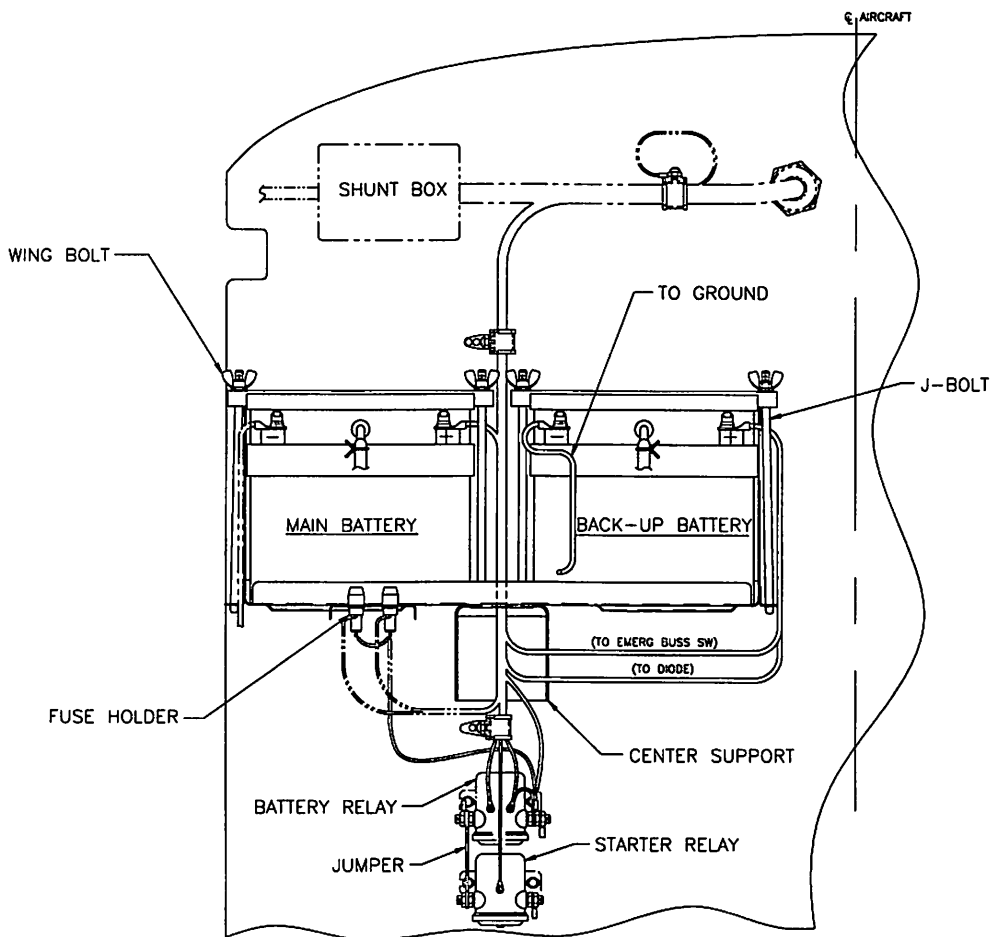
Placing the battery side of the split Master Switch in the "ON" position provides a ground to energize the relay for the Main Battery. With the battery relay energized, power is applied to the Main Power Distribution Buss and one side of the starter relay. The Main Power Distribution Buss distributes power to operate the starter relay coil and other electrical equipment on the airplane except the clock, the dome/cargo lights and the ELT switch.

When Main Battery and alternator power are not available, placing the Emergency Battery Switch in the "ON" position supplies power from the Back-Up Battery to the Emergency Buss for operation of essential aircraft equipment. A Back-Up Battery low voltage warning is annunciated on the G1000 Primary Flight Display (PFD) when battery voltage drops to 25.0 volts and below.

A 40 amp circuit breaker is installed between the Main Power Buss and the Emergency Battery Isolation Diode. This breaker protects the Main Battery and charging system from excessive current draw from the Back-Up Battery or E-Buss should E-Buss circuit become shorted to ground or a cell in the Back-Up Battery become shorted to ground. Pulling the E-Buss breaker will isolate the Back Up Battery from the aircraft charging system, however, Back-Up Battery power will continue to be available to power the E-Buss (if the Emergency Battery Switch is "ON").

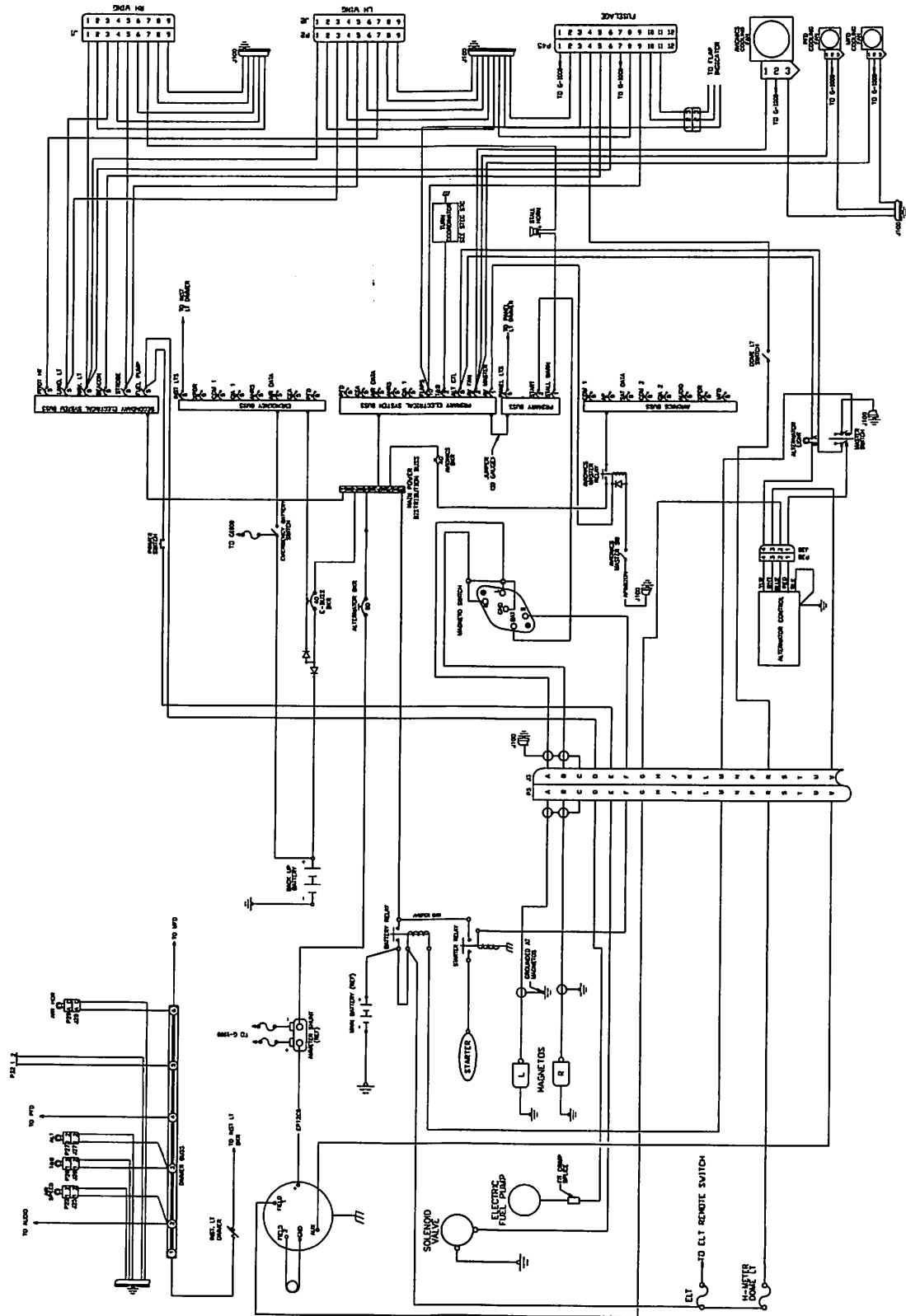
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Placing the alternator side of the split Master Switch in the "ON" position will provide power from the buss through a 5 amp alternator control circuit breaker to the ACU. The ACU then provides power to the 'Field 1 terminal' of the alternator. With the field 1 terminal of the alternator energized and the alternator operating (engine running at 900 RPM or higher) the alternator will develop a power output to the power busses through a 90 amp alternator circuit breaker. An "ALTNR" light on the instrument panel is provided to alert the operator whenever a fault in the system is detected by the ACU. Alternator output amperage and Main Battery voltage are annunciated on the G1000 display.



**Dual Battery Installation
Distribution
Figure 24A-01**

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Electrical System Diagram With G1000
Figure 24A-02

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BATTERY SYSTEM - DESCRIPTION/OPERATION
Garmin G1000 Integrated Avionics System

1. General

The AG-5B battery system consists of a Main Battery, a Back-Up Battery, a Main Battery Relay, Master Switch, Emergency Battery Switch and associated wiring.

2. Batteries (See Figure 24A-01)

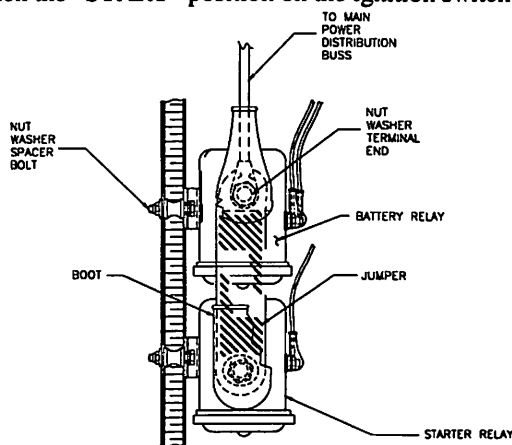
The batteries in the AG-5B are 24 Volt, 10 ampere hour, batteries. The batteries are mounted in a dual battery tray located on the right forward side of the firewall. The Main Battery is used to provide engine start and supply power to the electrical system when alternator power is not available. The Back-Up Battery is used as an emergency power source to power essential equipment in the event of alternator and Main Battery failure. The G1000 System Back-Up Battery is life limited to 24 months time in service, originating from the date the battery first entered service (date the battery was first serviced with electrolyte). For inspection and service of the Gill G-243 (original OEM) Battery, refer to Teledyne Battery Products Dry-Charge Lead-Acid Aircraft Battery Service Manual. Document Number: Q01-1120. The Back-Up Battery serial number and replacement date should be recorded and tracked in the airframe logbook.

NOTE: The Main Battery is replaced on condition.

Under normal use, a battery being charged and discharged will decompose the water from the electrolyte by electrolysis. When the water is decomposed, hydrogen and oxygen gases are formed which escape into the atmosphere through the battery vent system. Low water levels are caused by this decomposition, distilled water should be added as necessary to maintain the electrolyte level.

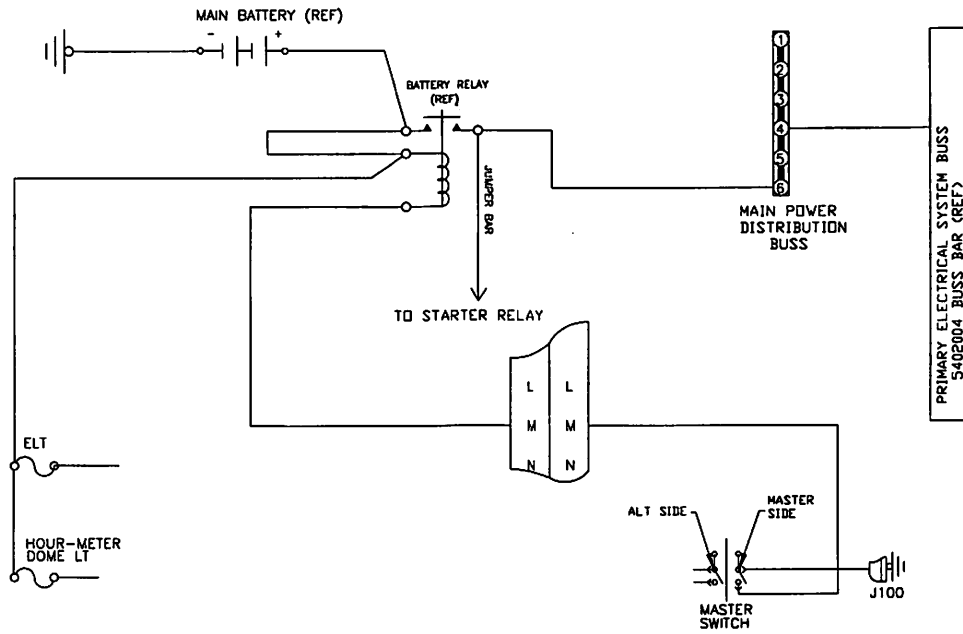
3. Battery and Starter Relay (See Figure 24A-03)

The battery relay is located on the forward right side of the firewall under the battery tray. The relay is a 24 volt plunger type. It is actuated when the battery side of the split Master Switch is placed in the "ON" position, completing a circuit between the Main Battery and the Main Power Distribution Buss. It also provides power to the starter relay. With the battery side of the Master Switch in the "OFF" position, the relay isolates the Main Battery from the electrical system. The starter relay is located on the firewall under the battery relay and is connected to the battery relay by a copper jumper. With the Battery side of the Master Switch in the "ON" position, the starter relay provides power to the starter when the "START" position on the ignition switch is selected.

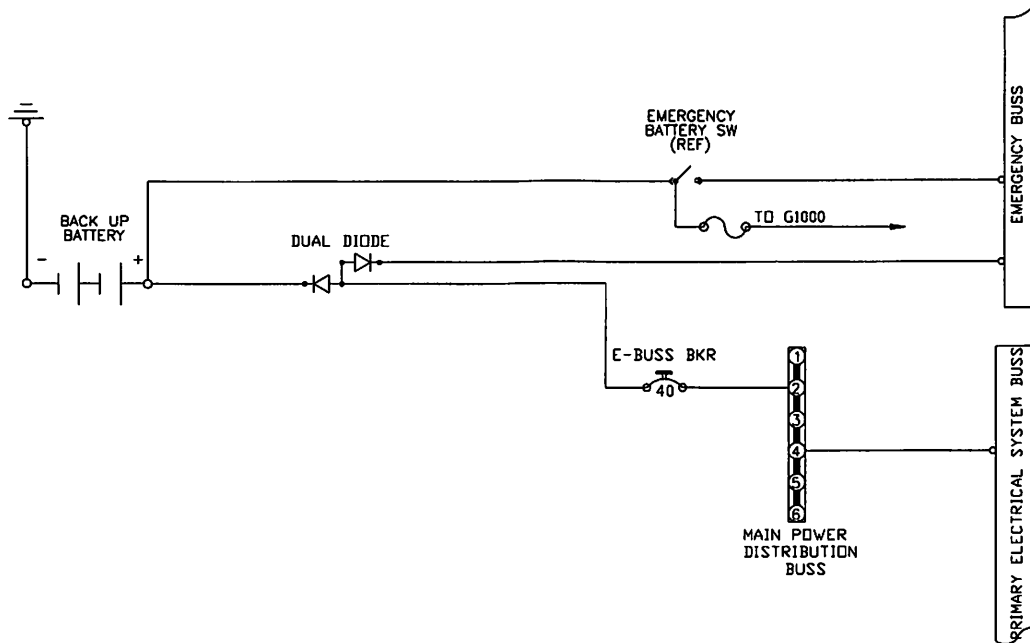


Battery and Starter Relay
Figure 24A-03

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Main Battery, G1000 System
 Figure 24A-04



Back-Up Battery Electrical Diagram
 Figure 24A-04A

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BATTERY SYSTEM – TROUBLESHOOTING

NOTE: The following troubleshooting chart is to be used in conjunction with the Battery System Troubleshooting Chart in Chapter 24 for troubleshooting the battery system in G1000 equipped aircraft.

TROUBLE	PROBABLE CAUSE	REMEDY
Emergency Buss not energized when Emergency Battery Switch is placed in the "ON" position.	Dead Back-Up Battery.	Replace Battery.
	Faulty Switch.	Remove the switch from the aircraft and check with a continuity tester.
	Faulty Wiring.	With Emergency Buss Switch "OFF", check entire Back-Up Battery system for an open circuit with a continuity tester.
Back-Up Battery will not charge.	Electrolyte low.	Service battery and recharge.
	Shorted cell in battery.	Replace Battery.
	Back-Up Battery Diode is "Open."	Replace Diode.
G1000 PFD annunciation: "ALTERNATOR".	Shunt Fuse blown.	Replace Shunt Fuse.
	See: Alternator light stays on Chapter 24.	
G1000 PFD annunciation: "LOW VOLTS – E BATTERY".	E-Buss, Dual Diode is "Open".	Replace Diode.
	Back-Up Battery electrolyte low.	Service Battery.
	Shorted cell in Back-Up Battery.	Replace Battery.

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BATTERY SYSTEM - MAINTENANCE PRACTICES
Garmin G1000 Integrated Avionics System

NOTE: If the Back-UP Battery on screen “Low Volt Warning” is observed after the G1000 Display has been turned on and has stabilized for at least one minute, the Back Up Battery must be inspected, serviced and recharged or replaced prior to flight in Instrument Flight Rules (IFR) conditions.

1. **Servicing**

Refer To Chapter 24 for battery servicing.

2. **Battery Removal/Installation G1000 System with 2 Batteries** (Reference Figure 24A-01)

NOTE: The Main and Back-Up batteries are identical. Before removing the batteries, identify the outside battery as the Main Battery and the inside battery as the Back-Up Battery to insure correct placement when the batteries are reinstalled. The Back-Up Battery has a service life limit of 24 months.

A. Battery Removal

- (1) Open the right hand engine cowl door.

CAUTION: REMOVE GROUND (NEGATIVE) CABLES FIRST TO PREVENT POSSIBLE SHORTING.

CAUTION: WHEN REMOVING AND INSTALLING THE BATTERIES, DO NOT ALLOW THE BATTERY TO DAMAGE THE FUSE HOLDERS MOUNTED TO THE FORWARD RIGHT SIDE OF THE BATTERY TRAY.

- (2) Remove the battery cables. (See above caution)
- (3) Remove the drain tubes.
- (4) Remove the four wing nuts and two battery covers. Pull the two center “J” bolts from the bottom of the battery tray.
- (5) Lift the Main Battery up high enough to clear the forward lip of the battery tray, move the battery forward and to the right until clear.
- (6) Slide the Back-Up Battery to the Main Battery location and remove the same as the Main Battery

B. Battery Installation

CAUTION: ASSURE CORRECT POLARITY (NEGATIVE GROUND) TO PREVENT EQUIPMENT DAMAGE.

CAUTION: VERIFY THAT THE BATTERY PLACED IN THE BACK-UP BATTERY LOCATION IS INTENDED FOR USE AS THE BACK-UP BATTERY AND THE SERIAL NUMBER AND TIME IN SERVICE ARE RECORDED IN THE MAINTENANCE RECORDS.

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- (1) From the right, forward corner of the battery tray, maneuver the Back-Up Battery onto the battery tray and slide the battery to the far left side of the tray.
- (2) From the right, forward corner of the battery tray, maneuver the Main Battery onto the battery tray.
- (3) Insert the two center "J" bolts through the battery tray.
- (4) Secure the batteries by installing the battery covers and four wing nuts.
- (5) Connect the battery drain tubes.

**CAUTION: CONNECT GROUND (NEGATIVE) CABLES LAST TO PREVENT
ACCIDENTAL SHORT CIRCUIT DURING INSTALLATION.**

- (6) Connect the battery cables and coat the terminals with petroleum jelly. (See above caution)
- (7) Close the engine cowl door.
- (8) Perform operational check.

3. Battery (or Starter) Relay Removal/Installation

A. Relay Removal (Reference Figure 24A-03)

- (1) Remove the lower engine cowl. (Refer to Chapter 71)

**CAUTION: GROUND (NEGATIVE) CABLES MUST BE DISCONNECTED
AND CLEAR OF BATTERIES.**

- (2) Disconnect the ground (negative) cables from the battery terminals and pull clear of batteries. (See Battery Removal)
- (3) Pull the rubber insulators away from the relay terminals.
- (4) Remove hardware and cables from the relay.
- (5) Remove attaching hardware/wires from terminals.
- (6) Remove attaching hardware and the jumper bar located between the two relays.
- (7) Remove attaching hardware and relay from the firewall.

B. Relay Installation

**CAUTION: GROUND (NEGATIVE) CABLES MUST BE CLEAR OF
BATTERY TERMINALS BEFORE INSTALLING RELAY.**

- (1) Place the relay on the firewall and secure with attaching hardware.
- (2) Install the electrical leads on the terminals and secure with attaching hardware.
- (3) Slide the rubber insulator over the terminals.
- (4) Install the jumper bar between the relays and secure with attaching hardware.

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- (5) Connect the ground (negative) cables to the batteries. (See Battery Removal/Installation)
- (6) Reinstall the lower engine cowl. (Refer to Chapter 71)
- (7) Perform operational check.

4. **Master Switch Removal/Installation**

A. Master Switch Removal

- (1) Open the right upper engine cowl.

CAUTION: GROUND (NEGATIVE) CABLES MUST BE DISCONNECTED AND CLEAR OF THE BATTERIES.

- (2) Disconnect the ground (negative) cables from the battery terminals and pull clear of batteries. (See Battery Removal)
- (3) From under and behind the instrument panel, press switch mounting clips to release the Master Switch and pull the switch from the instrument panel.
- (4) Install identification tags and disconnect the wiring.

B. Master Switch Installation

- (1) Connect wiring and remove identification tags.
- (2) Press the switch into the instrument panel mounting position until mounting clips secure the switch.
- (3) Connect the ground (negative) battery cables to the negative battery terminals. (See Battery Installation)
- (4) Close right engine cowl door.
- (5) Perform operational check.

5. **Emergency Battery Switch Removal/Installation**

A. Emergency Battery Switch Removal

CAUTION: GROUND (NEGATIVE) CABLES MUST BE DISCONNECTED AND CLEAR OF THE BATTERIES.

- (1) Disconnect ground (negative) cables from the battery negative terminals and pull clear of the batteries. (See Battery Removal)
- (2) From under the left side of the instrument panel, disconnect the three wires from the Emergency Battery Switch and label the wires.
- (3) Flip up the switch guard and remove the hex nut, lock washer and switch guard while holding the back of the switch.
- (4) Remove the switch and locking ring from the back of the instrument panel.

B. Emergency Battery Switch Installation

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CAUTION: GROUND (NEGATIVE) CABLES MUST BE DISCONNECTED AND CLEAR OF THE BATTERIES.

- (1) Check for proper orientation and place the Emergency Battery Switch in appropriate instrument panel location with the locking ring correctly seated in the panel.
- (2) Install the switch guard, lock washer and hex nut.
- (3) Connect the three wires to the switch terminals.
- (4) Connect the ground (negative) battery cables to the negative battery terminals. (See Battery Installation)
- (5) Close right engine cowl door.
- (6) Perform operational check. (Reference 7-B)

6. E-Buss Diode Removal and Installation (Reference Figure 24A-05)

General: The E-Buss Diode is two diodes in a single unit. One side of the Diode permits charging of the Back-Up Battery while not allowing power to back feed from the Back-Up Battery to the Primary Power Buss. The other side of the Diode allows the Alternator and Main Battery to power the Emergency Buss and isolates Back-Up Battery power to the Emergency Buss only when the Emergency Battery Switch is in the "ON" position.

A. Diode Removal

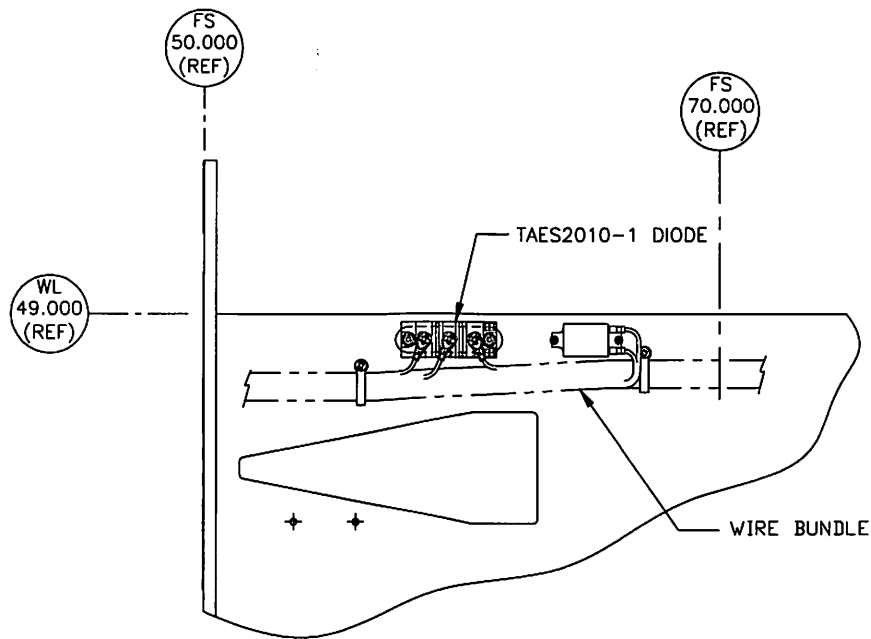
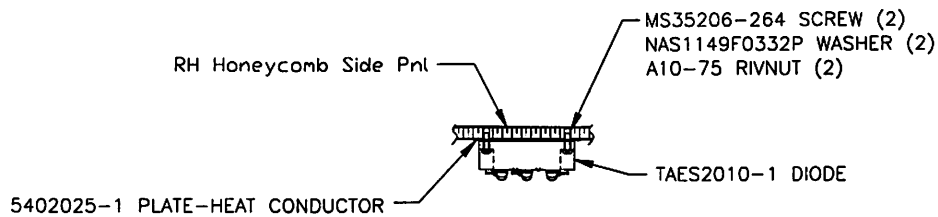
- (1) Open the right cowl door and disconnect the ground (negative) battery leads from both batteries.
- (2) Remove the instrument deck and locate the Diode Assembly on the upper, right hand side panel, ten inches aft of the firewall.
- (3) Pull back the rubber boots, remove and label three wires attached to the Diode.
- (4) Remove two screws and washers and remove the Diode and its Heat Conductor Plate.

B. Diode Installation

CAUTION: DO NOT INSTALL THE DIODE WITHOUT THE HEAT CONDUCTOR PLATE BETWEEN THE DIODE AND THE SIDE PANEL.

- (1) Align the Diode and Heat Conductor Plate with the rivnuts in the side panel and secure with two screws and washers.
- (2) Attach the three wires in the same location as removed and pull the rubber boots over the terminals.
- (3) Reinstall the instrument deck.
- (4) Reconnect the ground (negative) battery leads.

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E-Buss Diode
Figure 24A-05

7. E-Buss Diode Operational Tests

NOTE: If either of the following tests indicate a failed Diode, the Diode must be replaced.

A. Test 1

- (1) Open the right engine cowl and disconnect the ground (negative) lead from the Back-Up Battery.
- (2) Using a volt meter, verify that there is no voltage at the positive lead of the Back-Up Battery, with the tester negative lead grounded to the fuselage.
- (3) Place the battery side of the split Master Switch in the "ON" position and verify 24 volts at the positive terminal of the Back-Up Battery, with the negative tester lead grounded to the fuselage. If no voltage is present, the Diode has failed. (Open Circuit)
- (4) Reconnect the ground (negative) lead to the Back-Up Battery.

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B. Test 2

- (1) Verify that the Emergency Battery Switch is in the "OFF" position.
- (2) Verify that the instrument light circuit breaker is "IN".
- (3) Place the battery side of the split Master Switch in the "ON" position.
- (4) Verify that the G1000 PFD comes on and turn on the instrument light dimmer switch and verify that the lights are on. Attempt to transmit on #1 COM. If the instrument lights do not come on and #1 COM will not transmit, the diode has failed. (Open Circuit)
- (5) Place the battery side of the split Master Switch in the "OFF" position.

8. **Circuit Breaker Removal/Installation (Typical)**

A. Toggle Switch Type Circuit Breaker(s) Removal

- (1) Open right engine cowl door.

CAUTION: GROUND (NEGATIVE) CABLES MUST BE DISCONNECTED AND CLEAR OF THE BATTERIES.

- (2) Disconnect ground (negative) cable from battery terminals and pull clear of the batteries. (See Battery Removal)
- (3) Remove screws and the instrument deck assembly.
- (4) Remove screw and disconnect the power wire from the buss bar.

NOTE: Toggle switch type circuit breakers are ganged together by a common buss.

- (5) Remove remaining screws and the buss bar.
- (6) Tag and remove wiring from appropriate circuit breaker.
- (7) Remove the locknut and star washer and remove the circuit breaker from the instrument panel.

B. Toggle Switch Type Circuit Breaker(s) Installation

- (1) Check for proper orientation and place the circuit breaker in the appropriate instrument panel location.
- (2) Install the star washer and locknut.
- (3) Install wire(s) and remove tag(s).

NOTE: Toggle switch type circuit breakers are ganged together by common buss.

- (4) Install the buss bar and connect power wire to the buss bar.
- (5) Reinstall the instrument deck assembly and secure.

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- (6) Connect the battery cables to the negative battery terminals. (See Battery Installation)
- (7) Close the engine cowl.
- (8) Perform operational check.

C. Push-Pull Type Circuit Breaker(s) Removal

- (1) Open right engine cowl door.

**CAUTION: GROUND (NEGATIVE) CABLES MUST BE DISCONNECTED
AND CLEAR OF THE BATTERIES.**

- (2) Disconnect ground (negative) cables from battery terminals and pull clear of batteries. (See Battery Removal)
- (3) Remove screws, remove the instrument deck assembly.
- (4) Remove screw and disconnect power from buss bar.

**NOTE: Push-pull type circuit breakers are ganged together by common buss except
ALTERNATOR, AVION/BRK, AVION/FAN AND STARTER ENGAGED.**

- (5) Remove remaining screws and remove buss bar as required.
- (6) Tag and remove wire from the appropriate circuit breaker.
- (7) Remove locknut, star washer and remove the circuit breaker from instrument panel.

D. Push-Pull Type Circuit Breaker(s) Installation

- (1) Check for proper orientation and place circuit breaker in appropriate instrument panel location.
- (2) Install star washer and locknut.
- (3) Install wire(s) and remove tags.
- (4) Install buss bar and connect power wire to the buss bar.
- (5) Reinstall instrument deck assembly and secure.
- (6) Connect ground (negative) cables to the negative battery terminals. (See Battery Installation)
- (7) Close right engine cowl door.
- (8) Perform operational check.

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9. **Transorb Removal and installation** (Reference Figure 24A-06)

General

A transorb is connected to the Main Electrical Distribution Buss and is used to protect G1000 components by absorbing and dissipating excess electrical current created by lightning. A 5 amp fuse is located between the Main Electrical Distribution Buss and the transorb. If inspection reveals that this fuse has blown, both the fuse and transorb must be replaced.

A. Transorb Removal

- (1) Open right engine cowl door.

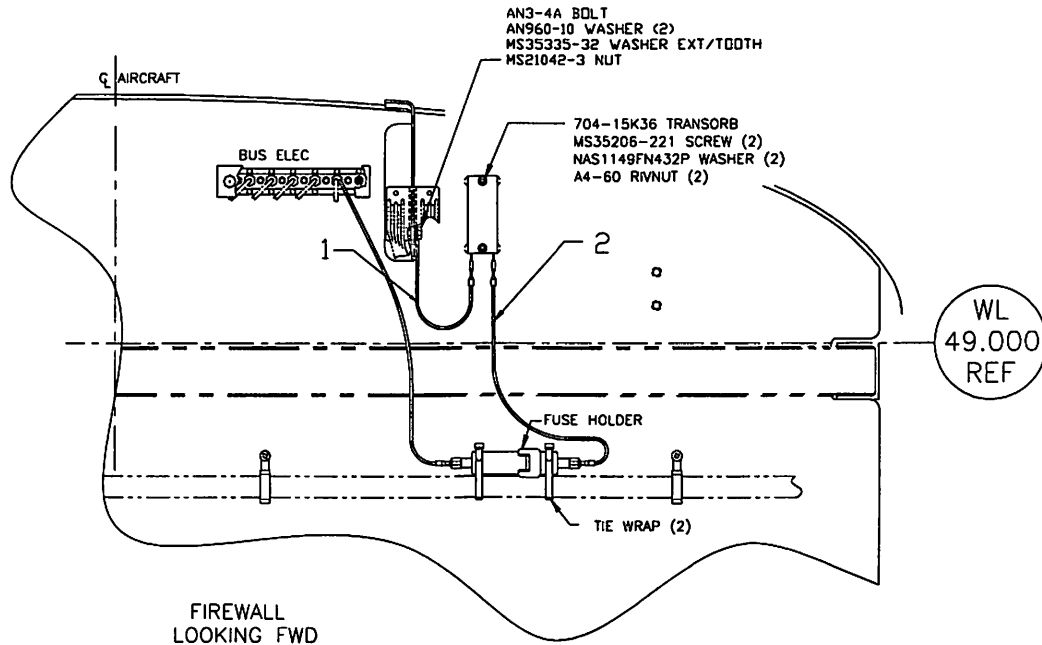
**CAUTION: GROUND (NEGATIVE) CABLES MUST BE DISCONNECTED
AND CLEAR OF THE BATTERIES.**

- (2) Disconnect ground (negative) cable from battery terminals and pull clear of the batteries. (See Battery Removal)
- (4) Remove the instrument deck assembly.
- (5) Locate the transorb and the transorb fuse holder behind the instrument panel on the right side of the firewall.
- (6) Disconnect wire (2) at the fuse holder.
- (7) Remove the bolt, nut and washers that attach the transorb ground wire (1) to the fuselage.
- (8) Remove the two screws that attach the transorb to the airframe and remove the transorb, wires and fuse holder cap.
- (9) Heat the terminals to melt the solder and remove wires (1) and (2) from the transorb.

B. Transorb Installation

- (1) Solder fuse holder wire (2) to one terminal of the transorb and ground wire (1) to the other terminal.
- (2) Locate the transorb on the firewall and secure using two screws.
- (3) Place a serviceable, 5 amp fuse in the fuse holder and connect wire (2) to the fuse holder.
- (4) Clean the contact surfaces and connect the ground wire to the airframe using the previously removed hardware. Position the star-lock washer between the terminal end of the ground wire and the airframe.
- (5) Reinstall the instrument deck assembly.
- (6) Reconnect the ground cables to the batteries.

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MAINTENANCE MANUAL



TRANSORB INSTALLATION

Figure 24A-06

9. Operational Check of Batteries

NOTE: Ensure that all circuit breakers are closed (pushed-in position) and fuses are operational.

A. Main Battery Operational Check

- (1) Place Battery side of the Split Master Switch in the "ON" position.
- (2) Turn the Landing Light and Strobe Beacon Switch to the "ON" position and observe that both Landing Lights and Strobe Beacon are operational.
- (3) Place Landing Lights and Strobe Switches in the "OFF" position. Observe that both Landing Lights and Strobe Beacon are out.
- (4) Place Battery side of the split Master Switch in the "OFF" position.

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B. Back-Up Battery Operational Check

- (1) Place the Split Master Switch in the "OFF" position.
- (2) Raise the guard for the Emergency Battery Switch and place the switch in the "ON" position.
- (3) Observe that the G1000 comes on. Turn the Instrument Light Dimmer switch to the "ON" position and verify that the Instrument Lights are operational.
- (4) Turn the Instrument Lights off and verify that the lights are out.
- (5) Place the Emergency Battery Switch in the "OFF" position and observe that the G1000 PFD is off.

ALTERNATOR SYSTEM - DESCRIPTION/OPERATION
Garmin G1000 Integrated Avionics System

1. Alternator

The alternator's continuous output is rated at 24 volts and 70 amperes.

The alternator silicon diodes make it susceptible to reverse polarity current. If the current flow from the battery power source is inadvertently reversed the diodes will offer no electrical resistance to the current flow resulting in possible diode damage if the diode current rating is exceeded.

The Alternator Control Unit (ACU) controls excitation applied to the alternator field thus controlling the output of the alternator. A five-amp ALT. CONTROL circuit breaker, located on the instrument panel, is placed in series with the buss and the alternator control unit to protect the alternator field circuit.

2. Alternator Control

The ACU is a solid-state device designed to rectify and regulate alternating current output of the airplane alternator power supply system when the engine is running. The ACU is designed for use with 24VDC aircraft alternators. The ACU also provides for field-to-ground protection, field current limiting, field induction protection, under-voltage caution indication and protection, and over-voltage caution indication and protection.

When the engine is running and the alternator side of the Split Master Switch is in the "ON" position, the ACU keeps the voltage at a predetermined level by comparing the voltage to a precise internal reference-voltage and supplies current to the alternator field independent of load, speed, and/or temperature. The field output is current limited and protected, by the ACU, against being shorted to ground.

With the engine running at or above 900 RPM and alternator output current is less than 4 amps, the G1000 PFD will annunciate an "Alternator" warning with a descriptive text "Alternator failed Battery is only elec source." The annunciation will automatically clear when the output current is greater than 4 amps.

When the alternator is charging the batteries and an over-voltage condition occurs, the alternator field current is interrupted which causes the ALTNR light (triggered by the ACU) to illuminate.

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ACU FIELD SERVICE TIPS

The FAULT / FUNCTION indicator, on the unit is designed to alert the user to the condition of the Alternator / ACU system.

RED light, with the Master Switch 'ON', indicates a ground short in the alternator field circuit.

GREEN steady light, with the engine running, indicates there is power coming out of the ACU but the alternator field or field wire to it is open.

GREEN light, fast flickering, with the engine running means the power input devices, (circuit breaker, switch, etc) and the field system are functioning correctly.

GREEN light, slow flickering, with the engine running means the power input devices are defective or have a higher than normal resistance.

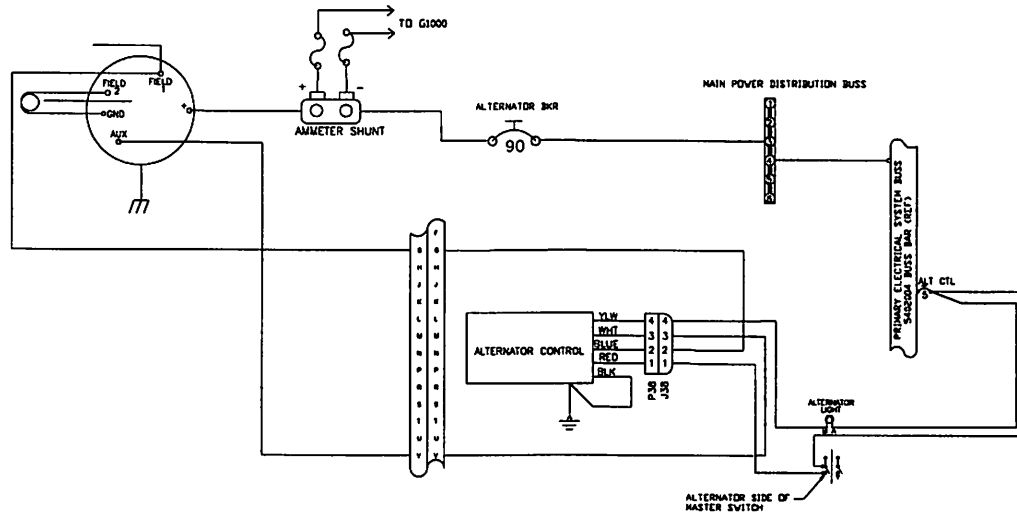
NO LIGHT, with the Master Switch 'ON' indicates that one power input device, (circuit breaker, switch, or wiring) or ACU is defective. A defective ACU can be confirmed by the presence of voltage on its input (pin 1) and no voltage on its output (pin 2).

3. Ammeter Shunt

The shunt is located on the upper-right forward side of the firewall. It is mounted in an electrically insulated box with a removable cover and held in place by the shunt mounting hardware. The shunt assembly consists of a shunt resistor and connecting terminals to facilitate connecting an ammeter.

The shunt is connected in series with the alternator output terminal and the Main Power Distribution Buss. One side is connected to the alternator output and the other side is connected to the power distribution buss through a 90 amp circuit breaker. The ammeter is connected in parallel with the shunt to provide an indication of alternator load on the G1000 MFD or the PFD in reversionary mode. A fuse, connected inline on each of the wires from the shunt to the G1000, protects the engine/airframe (GEA) line replaceable unit (LRU) from excessive electrical loads. The fuses are located on the left side of the shunt box.

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Alternator Circuit - G1000
Figure 24A-07

4. **Alternator Removal/Installation**

See Chapter 24

5. **Alternator Controller Removal/Installation**

See Chapter 24

6. **Shunt Removal/Installation** (Reference Figure 24A-09)

See Chapter 24

12 VOLT ACCESSORY POWER (Optional)

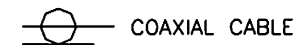
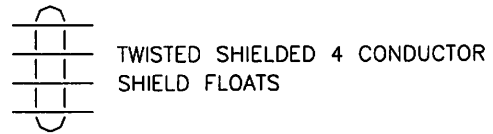
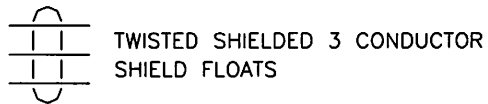
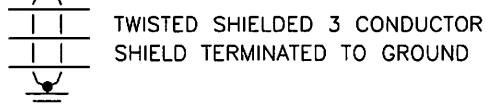
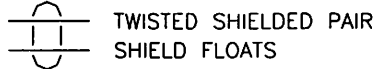
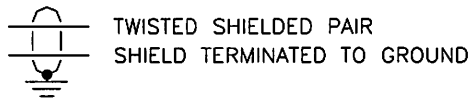
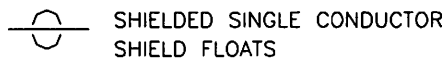
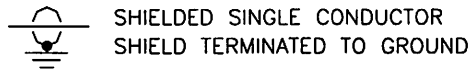
See Chapter 24

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GARMIN G1000 LRU WIRING DIAGRAMS

The following are wiring diagrams for the G1000 Line Replaceable Units (LRUs)

SYMBOL DESIGNATIONS



N/C = NO CONNECTION

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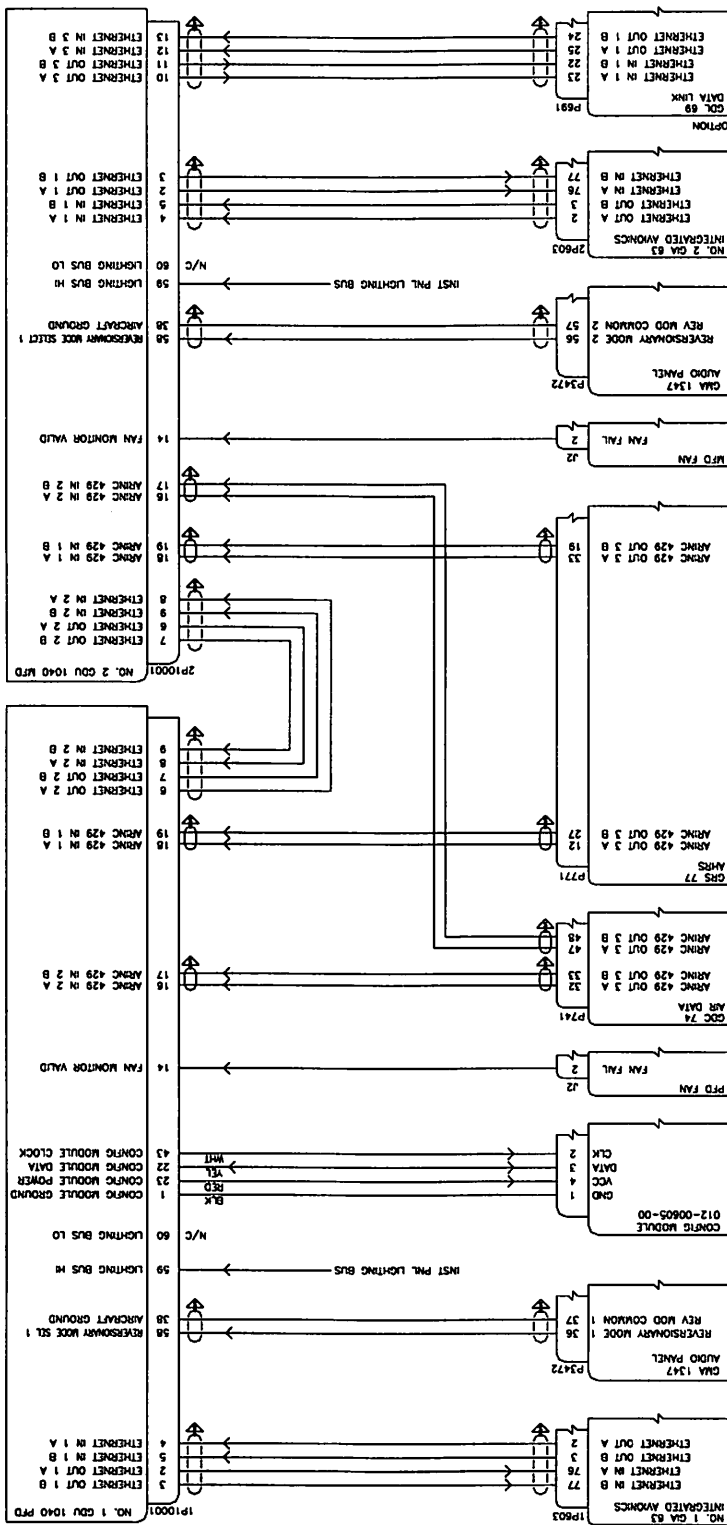
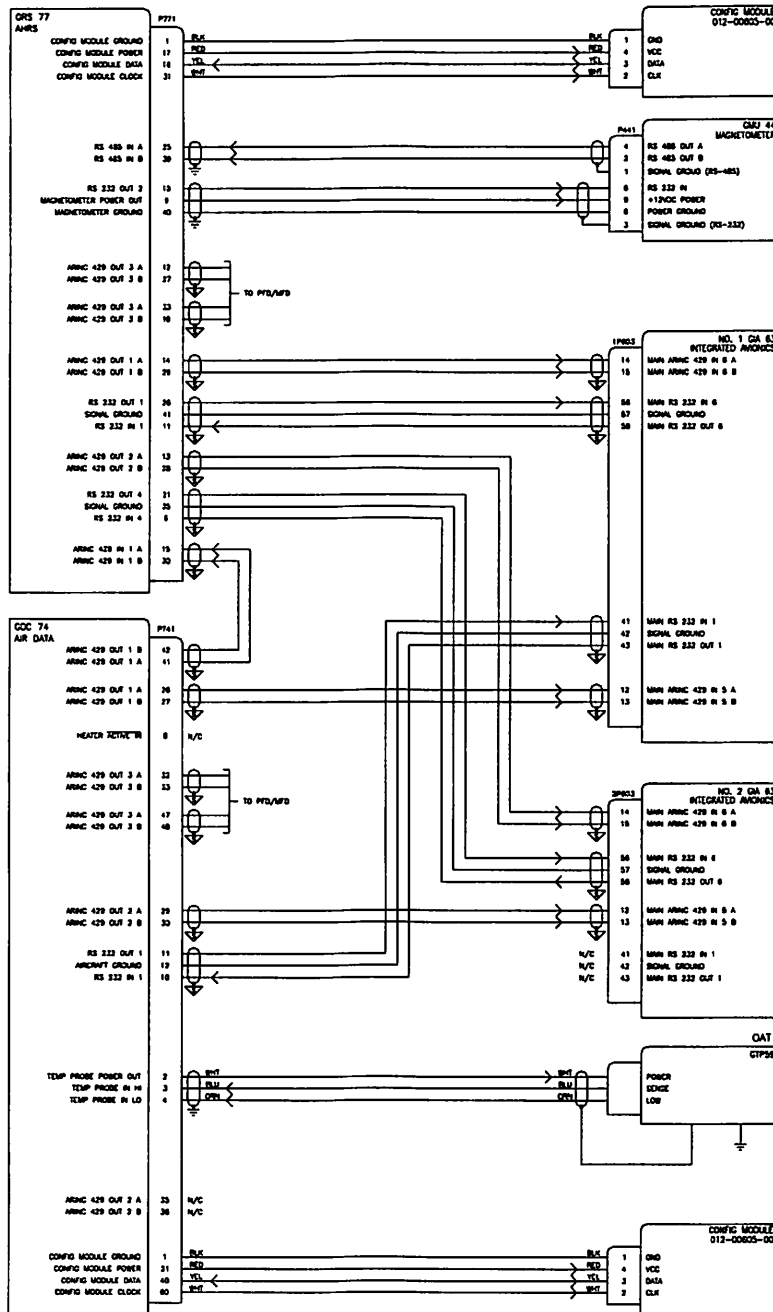


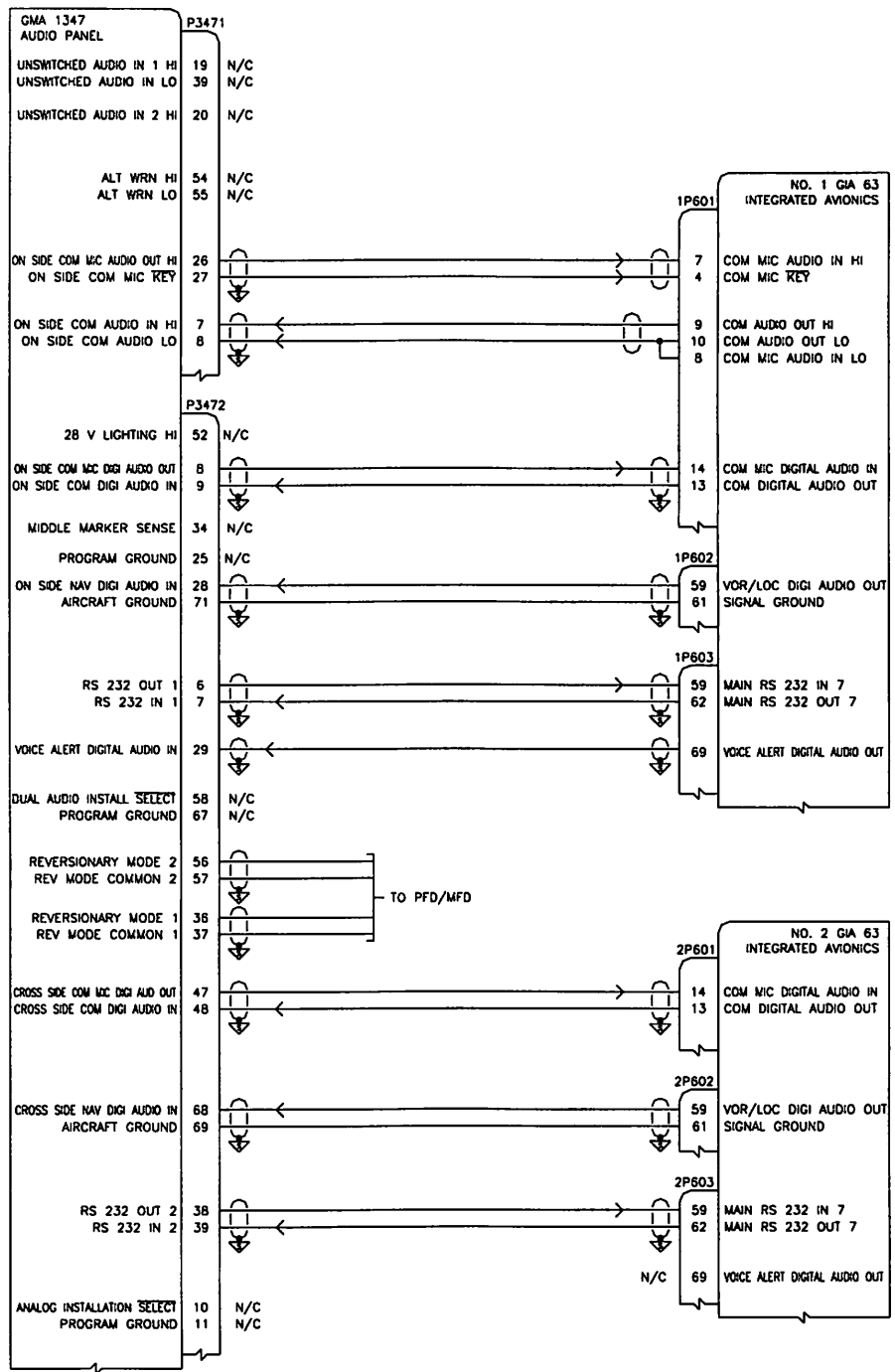
Figure 24A-08
GDU 1040 PFD, GDU 1040 MFD

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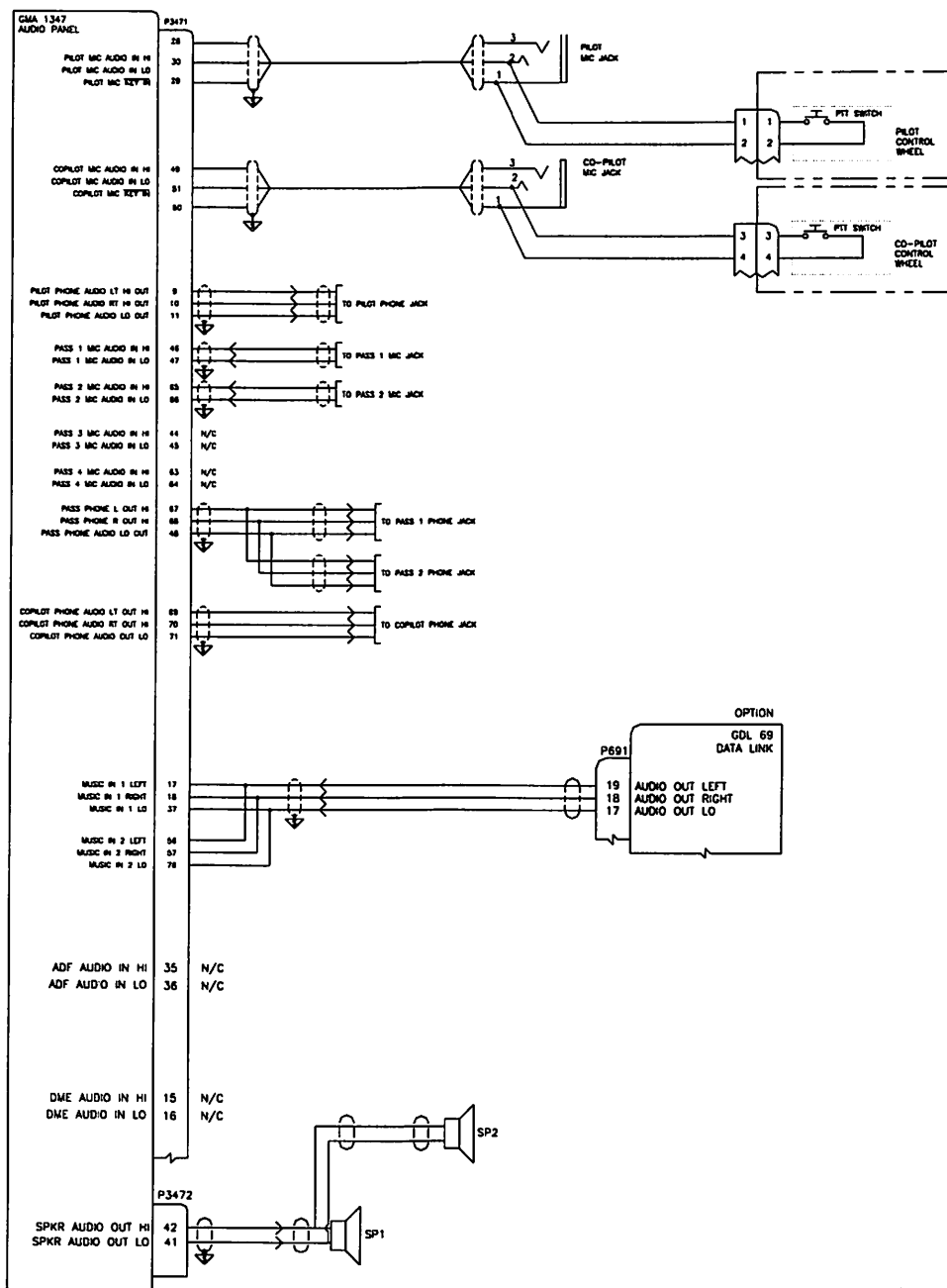
**GRS 77, GMU 44, GDC 74
Figure 24A-09**

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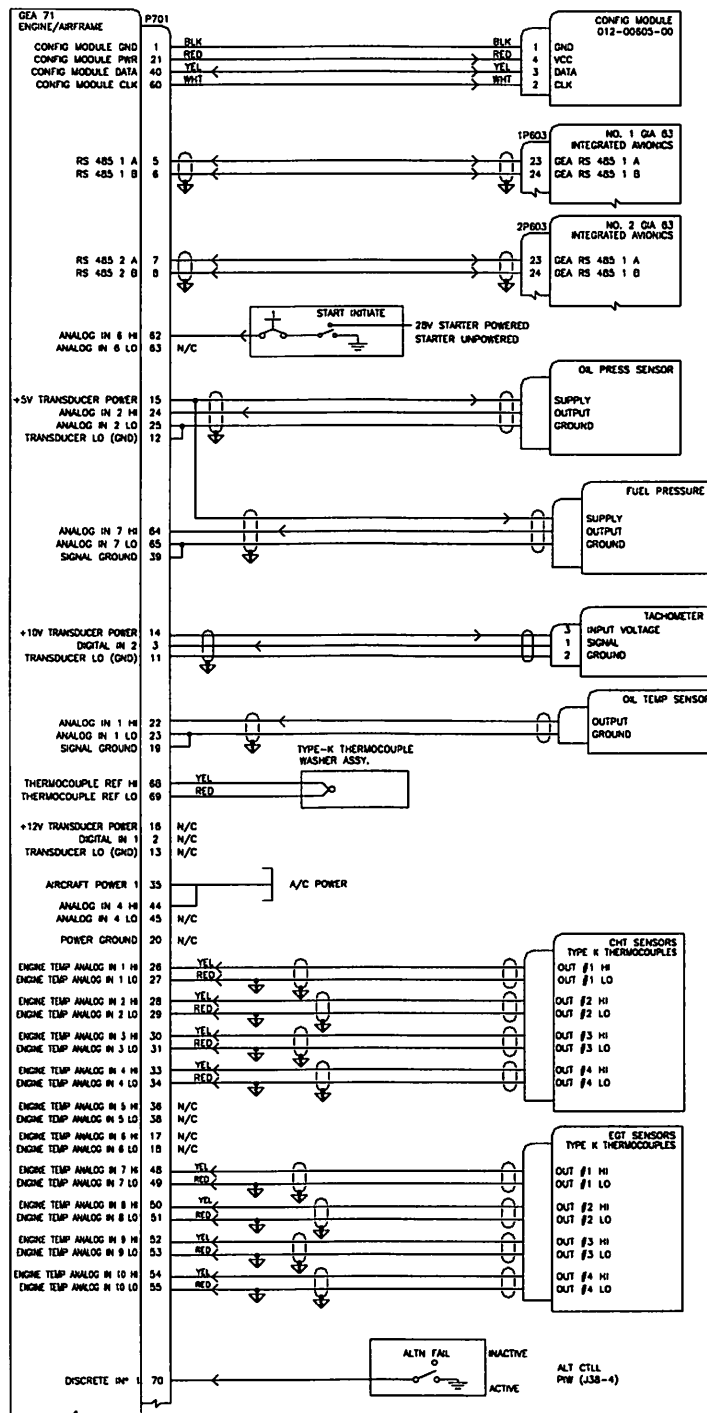
**GMA 1347 Audio Panel (Sheet 1)
Figure 24A-10**

TIGER AIRCRAFT AG-5B SERIES MAINTENANCE MANUAL



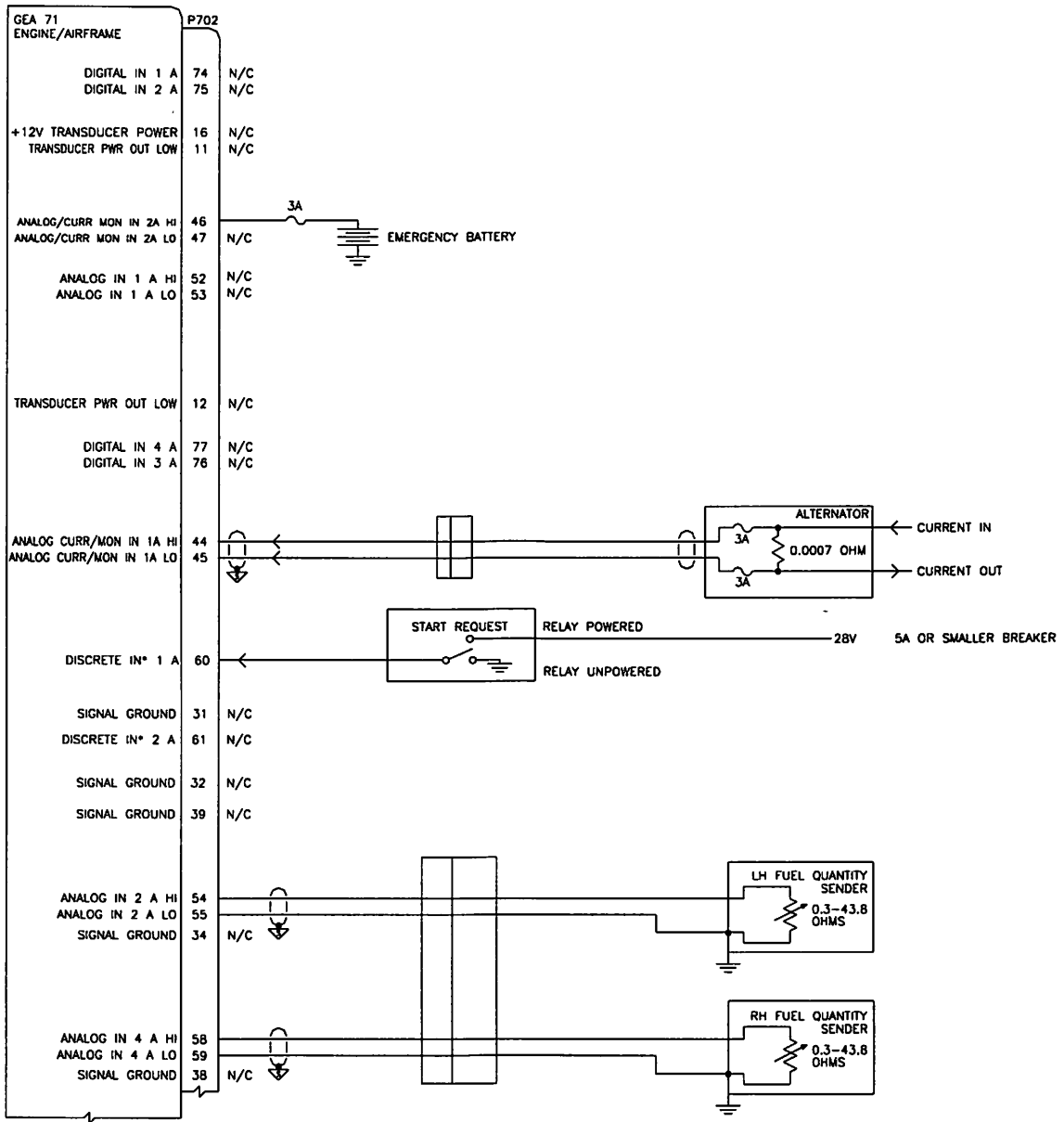
**GMA 1347 Audio Panel (Sheet 2)
Figure 24A-10**

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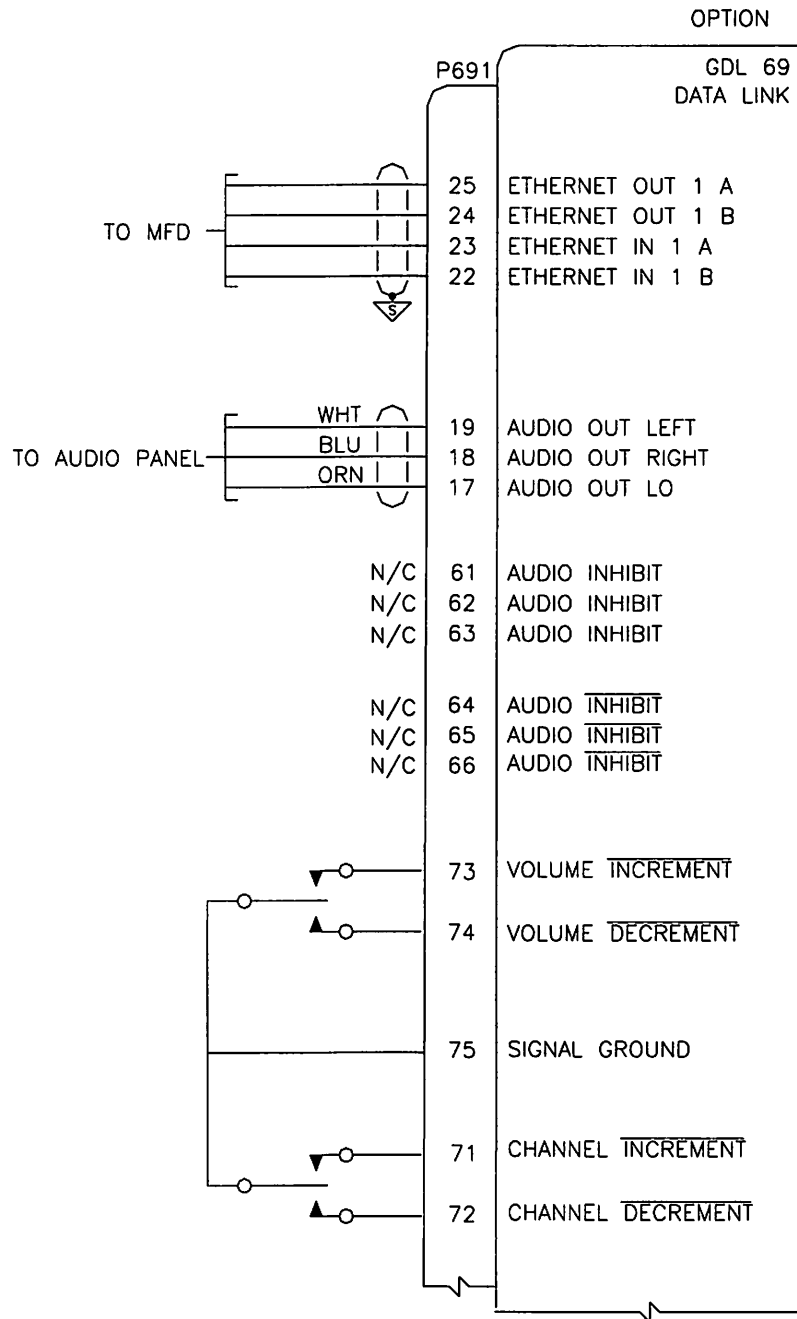
**GEA 71 (Sheet 1)
Figure 24A-11**

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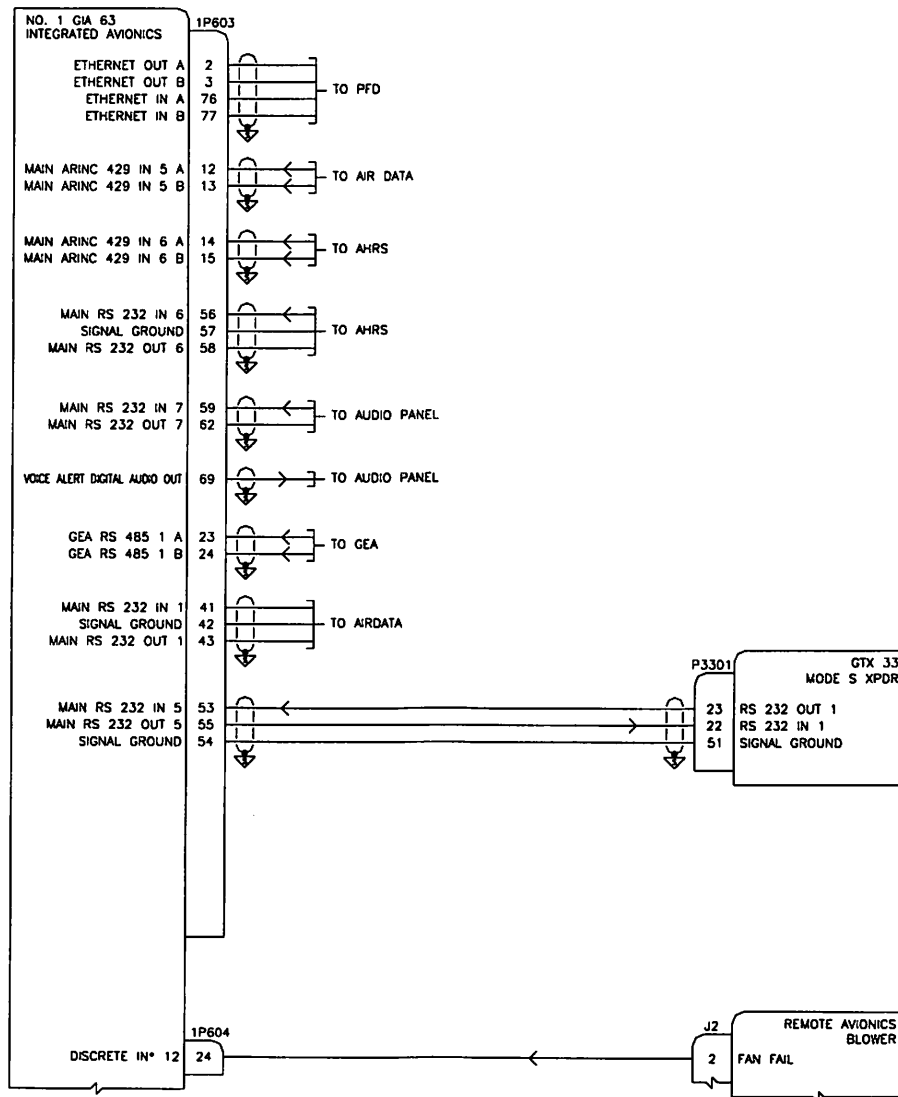
GEA 71 (Sheet 2)
Figure 24A-11

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 MAINTENANCE MANUAL



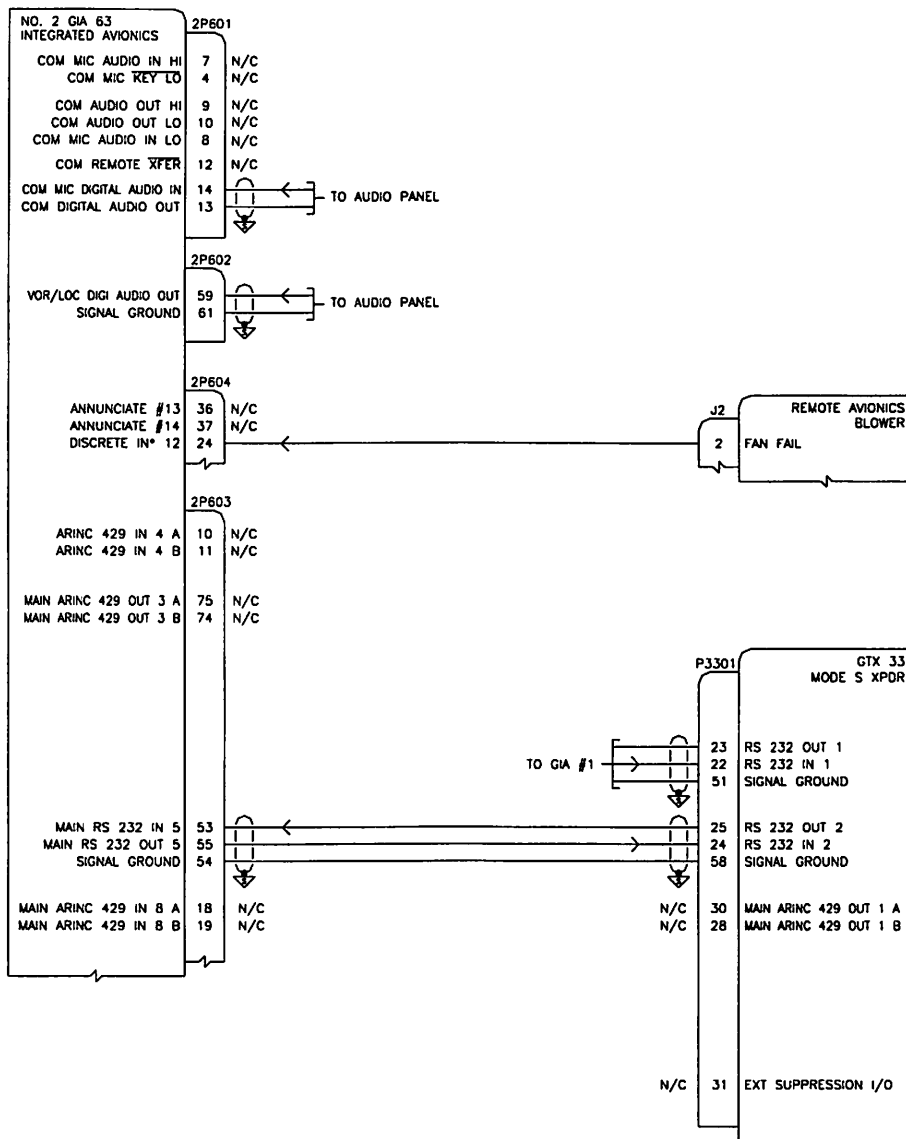
GDL 69 (Optional)
Figure 24A-12

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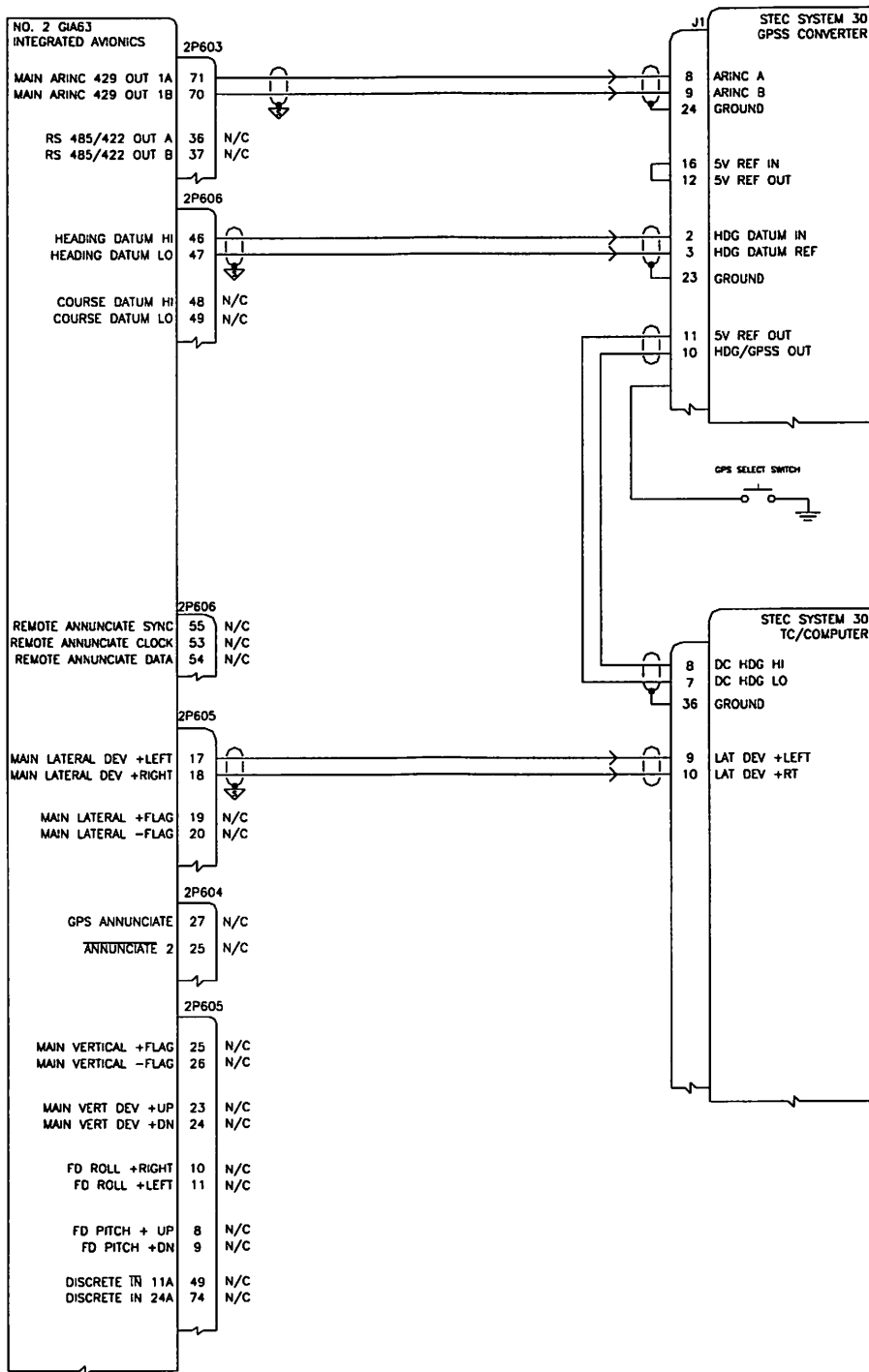
**GIA 63 Number 1
Figure 24A-13**

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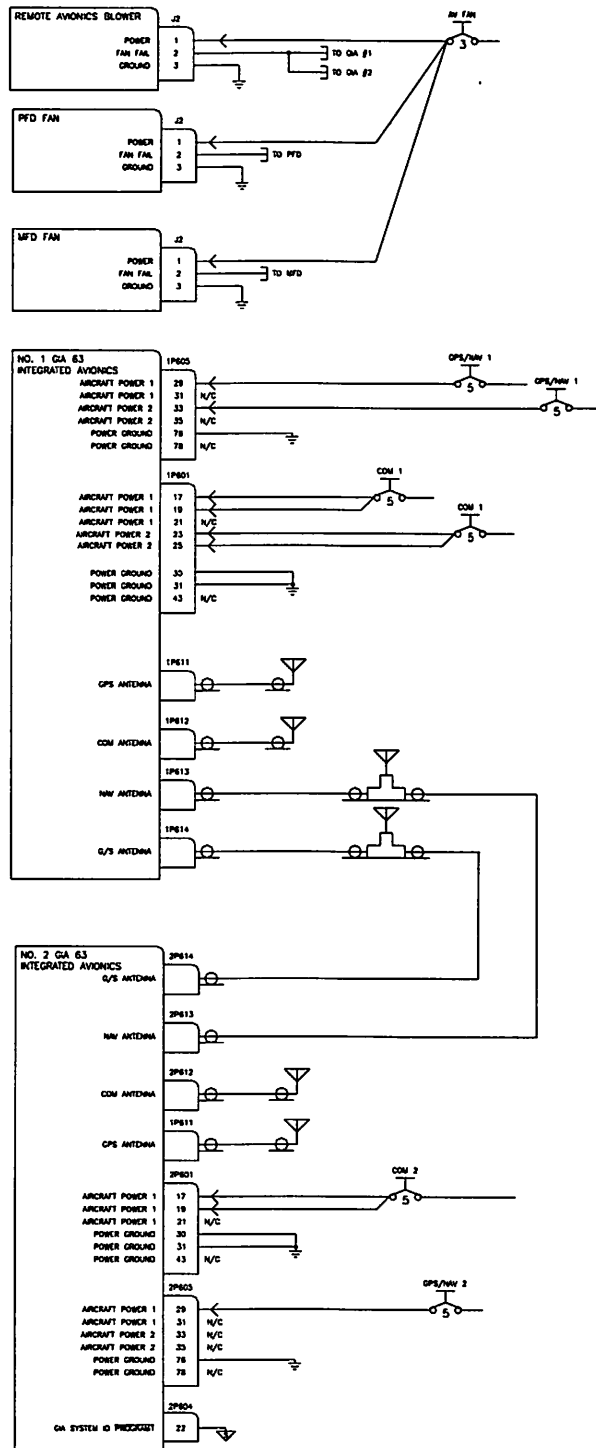
**GIA 63, Number 2
Figure 24A-14**

TIGER AIRCRAFT AG-5B SERIES MAINTENANCE MANUAL



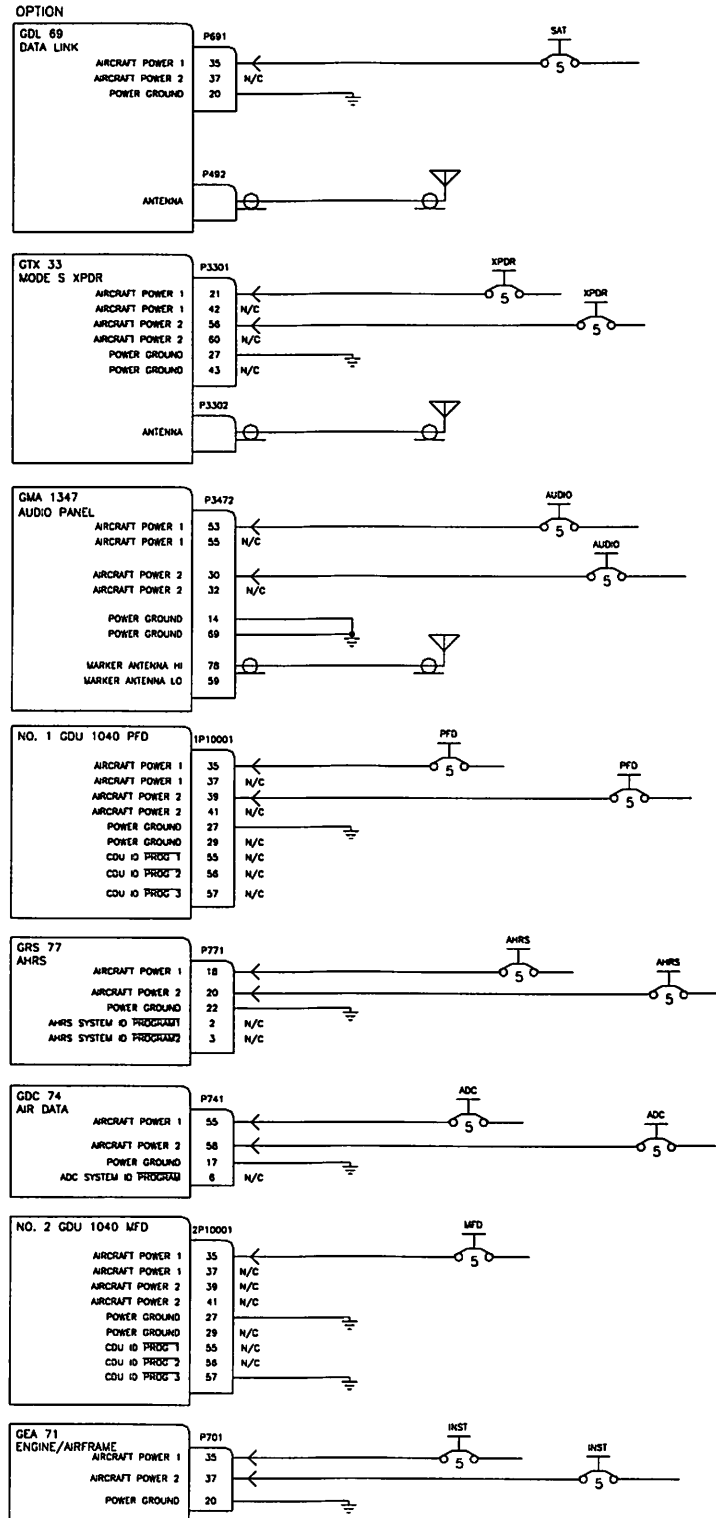
**S-Tec System 30
Auto Pilot Interface
Figure 24A-15**

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**28V POWER/ANTENNA (Sheet1)
Figure 24A-16**

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28V POWER/ANTENNA (Sheet 2)
Figure 24A-16

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CHAPTER 25

EQUIPMENT AND FURNISHINGS

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SEATS - DESCRIPTION/OPERATION

1. General

The seats for the AG-5B model aircraft consist of two bucket type seats in the forward compartment and a bench type double place seat in the rear compartment.

2. Front Seats

The front bucket seats are leather or fabric covered and horizontally adjustable. (See Figure 25-01)

A spring-loaded adjustment lever is located on the outboard side of each seat just below the front portion of the seat cushion. This adjustment lever releases the seat to move forward or aft along the guide track. Detents along the inside and outside track are engaged to lock the seat in place.

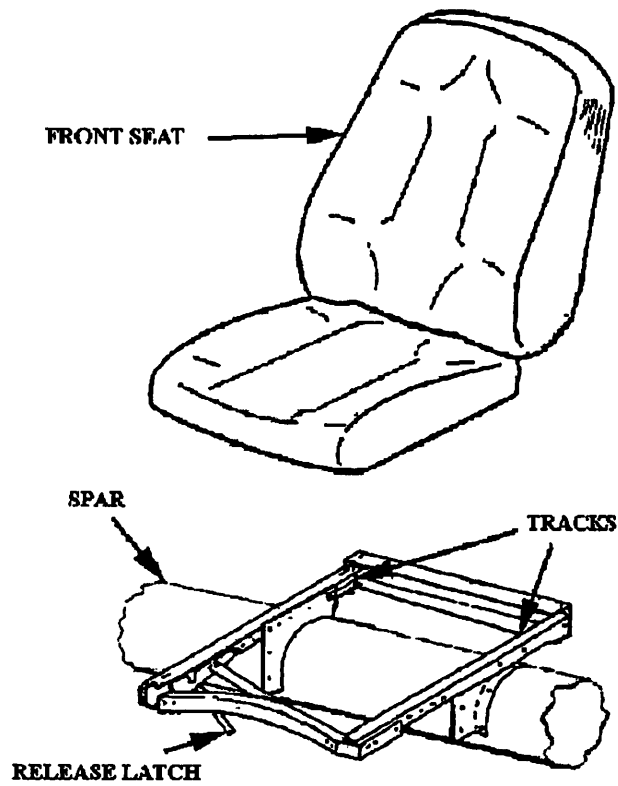
The seat backs fold forward to allow entry to the rear seat area or to allow access to the bottom cushion snaps, which secure the bottom cushion to the seat pan.

3. Rear Seat

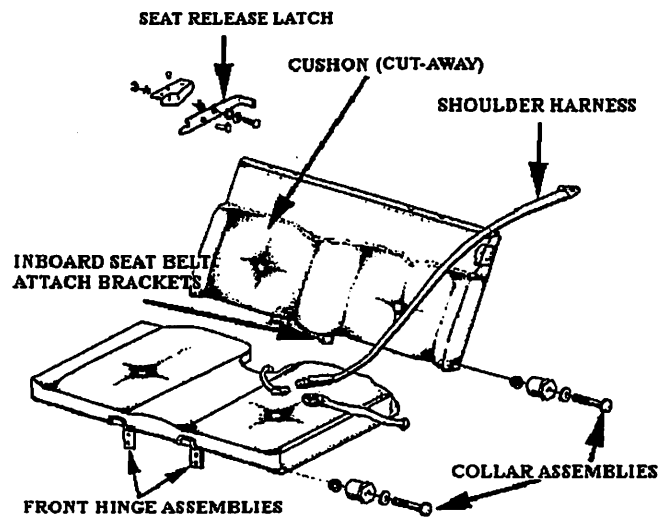
The rear seat is a bench seat with leather or fabric covering. (See Figure 25-02) When the front seats are moved full forward, the rear seat bottom may be folded forward, providing access to the flap actuator and control surface rigging turnbuckles, by removing or folding back the protective canvas cover.

With the rear seat bottom folded forward, the rear seat back may be folded forward by first, removing the seat back cushions and second, pulling up on the spring-loaded latches on each side of the fuselage behind the rear seat. These latches release the seat back to be folded forward and down. The rear seat back in this stowed position provides an expanded cargo area.

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Front Seat
Figure 25-01



Rear Seat (Typical)
Figure 25-02

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SEATS - MAINTENANCE PRACTICES

1. Front Seat Removal/Installation

A. Front Seat Removal

- (1) Locate the mounting brackets beneath the seat assembly.
- (2) Remove the screws attaching the mounting brackets to the inner seat tracks.
- (3) Slide the seat aft. As the spacers on the inner track slide out of the slots at the rear of the mounting brackets, lift the seat out of the aircraft.

NOTE: Front seat removal does not require removal of the front seat mounting brackets. If they are being removed, however, exercise caution in removing the bolts to prevent pulling the rivnuts loose. After the bolts are removed from the mounting, remove the seat with the mounting bracket attached to the seat tracks.

B. Front Seat Installation

- (1) Slide the spacers on the inner tracks into the slots at the rear of the mounting brackets.
- (2) Install the screws attaching the mounting brackets to the inner seat tracks.

2. Rear Seat Removal/Installation

A. Seat Back Removal

- (1) Slide the front seats full forward.
- (2) Fold the rear seat bottom forward.
- (3) Remove the rear seatback cushions by pushing the cushions up to disengage the mounting tubes from the seat back frame.
- (4) Remove the screws from the ring and clip assembly located on the floor behind the rear seat back.
- (5) Locate the support at the bottom center portion of the seat back and remove the bolt from the support.
- (6) Remove the attaching bolts from the collar assemblies located at the hinge points on each side of the seat back and lift the seat back out.

NOTE: It may be necessary to hold the collar assembly with a 7/8 inch open-end wrench while removing the attaching bolts.

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B. Seat Bottom Removal

- (1) Fold the seat bottom back to the sitting position.
- (2) Locate the seat bottom supports on each side of the rear seat console. Remove the bolts from the supports.
- (3) Remove the attaching bolts from the collar assemblies located at the hinge points on each side of the seat bottom and lift the seat bottom out.

NOTE: It may be necessary to hold the collar assembly with a 7/8 inch open-end wrench while removing the attaching bolts.

C. Rear Seat Installation

(1) Seat Bottom Installation

- (a) Slide the front seats full forward.
- (b) Align the collar assemblies on each side of the seat bottom with the hinge holes in the support bracket mounted to the fuselage floor.
- (c) Install the bolts to the collar assemblies securing the seat bottom to the support bracket.

NOTE: It may be necessary to hold the collar assembly with a 7/8 inch open-end wrench while installing the attaching bolts.

- (d) Secure the seat bottom supports on each side of the rear seat console to the fuselage floor structures.
- (e) Swing the seat bottom forward and aft several times to ensure easy movement at the hinge points.

(2) Seat Back Installation

- (a) Fold the rear seat bottom forward.
- (b) Align the collar assemblies on each side of the seat back with the hinge holes in the support bracket mounted to the fuselage floor.
- (c) Install the bolts to the collar assemblies securing the seat bottom to the support bracket.

NOTE: It may be necessary to hold the collar assembly with a 7/8 inch open-end wrench while installing the attaching bolts.

- (d) At the bottom center portion of the seat back, secure the seat back support to the fuselage floor structure.
- (e) Install the screws to the ring and clip assembly securing the support to the floor behind the seat back.

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- (f) Swing the seat back forward and aft several times to ensure easy movement at the hinge points.
- (g) Align cushion support tubes with holes in seat back frame and slide the cushions in place.

SAFETY BELTS - DESCRIPTION/OPERATION

1. General

The seat safety belts consist of four lap straps and four shoulder harnesses. All lap straps and shoulder harnesses may be lengthened or shortened by means of an adjustable slide buckle.

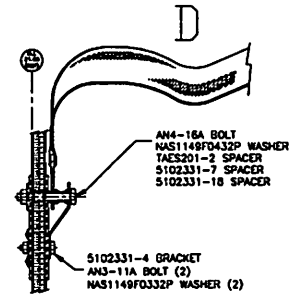
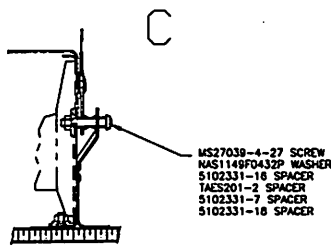
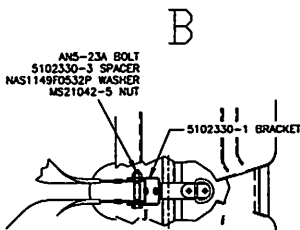
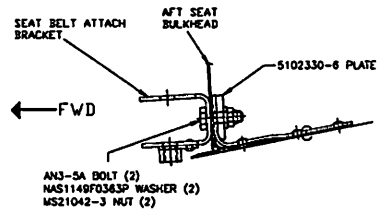
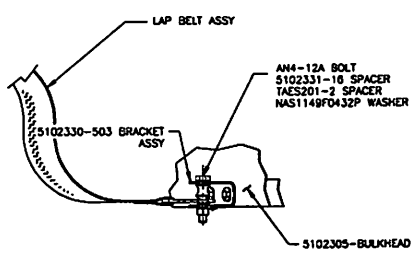
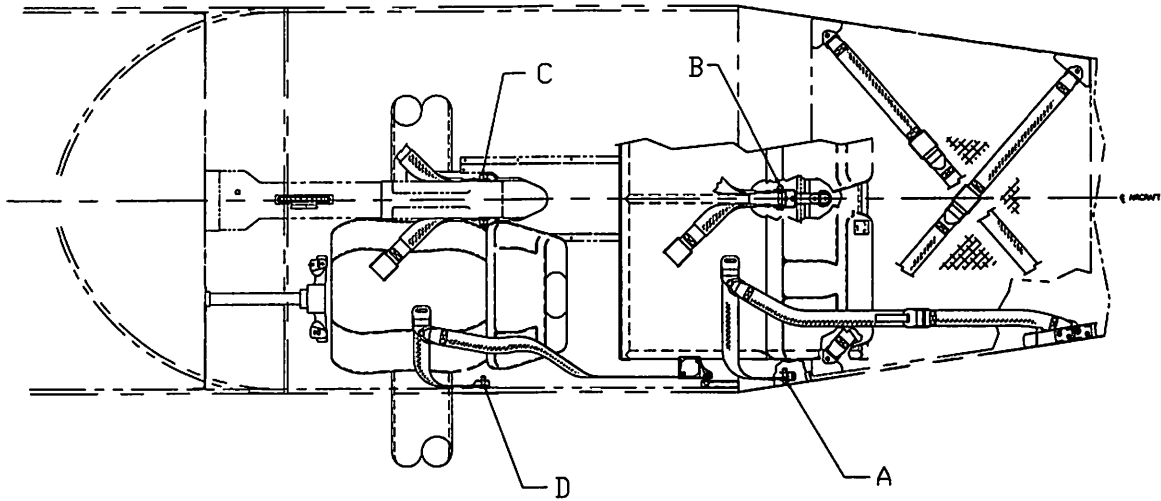
2. Shoulder Harnesses

The rear seat shoulder harnesses are anchored to mounting plates located on the fuselage sidewalls just aft of the baggage compartment. The front seat shoulder harnesses with inertia reels are anchored to mounting plates located on the fuselage sidewalls just aft of the front seats.

3. Lap Belts

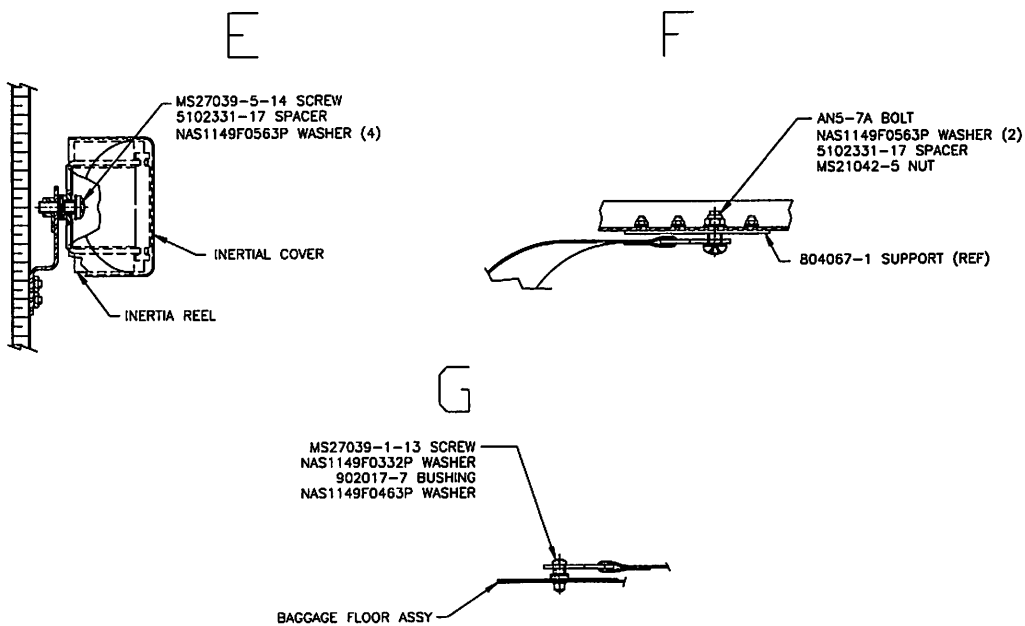
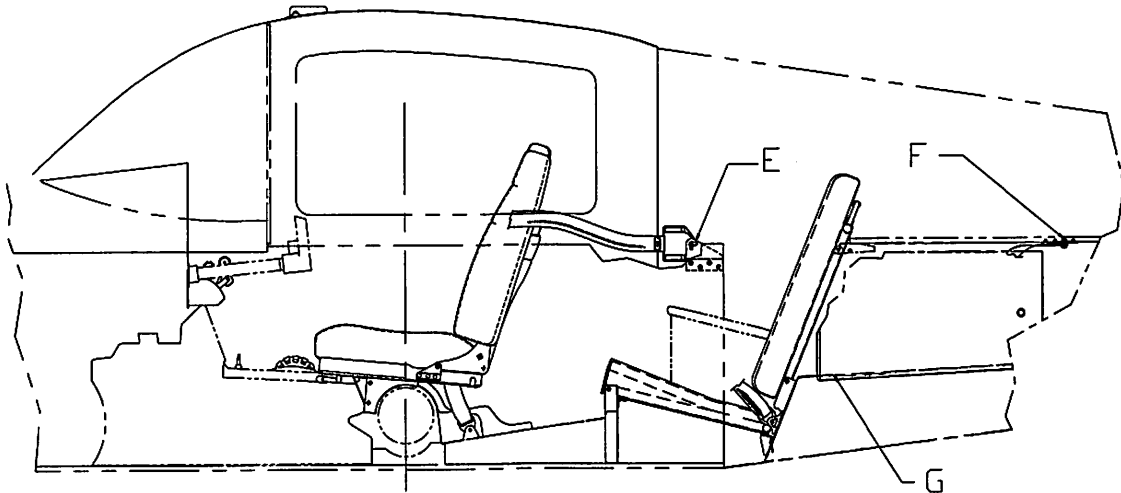
The rear seat inner lap belt assemblies are anchored to a bracket mounted to the fuselage bulkhead beneath the center bottom portion of the seat back. The rear seat outer lap belt assemblies are anchored to brackets mounted to the fuselage bulkhead on the left and right outboard sides of the rear seat. The inner and outer lap belt assemblies for the front seats are anchored to brackets, which are mounted to the fuselage and located to the left and right sides of each front seat assembly.

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Lap Belt and Shoulder Harness Removal/Installation (Sheet 1)
 Figure 25-03

TIGER AIRCRAFT AG-5B SERIES
 MAINTENANCE MANUAL



Lap Belts and Shoulder Harness Removal/Installation (Sheet 2)
 Figure 25-03

TIGER AIRCRAFT AG-5B SERIES
MAINTENANCE MANUAL

SAFETY BELTS - MAINTENANCE PRACTICES

1. Front Seat Belt Assy Removal/Installation (Reference Figure 25-03)

A. Removal of Front Seat Belt Assembly

- (1) Locate the point where the front seat shoulder harness is attached to the inertia reel, just aft of the front seat.
- (2) Remove the inertia reel cover.
- (3) Remove the screw, washers and spacer securing the inertia reel to the mounting plate.
- (4) Remove the three screws that secure the armrest to the inside of the fuselage and remove the armrest.
- (5) Remove the four screws that secure the interior side panel and remove the interior side panel.
- (6) Fold the carpet back to expose the outer lap belt attaching point and remove the screw, spacers and washer to release the outer lap belt end fitting. (Reference Detail "D")
- (7) Remove the screw, spacers and washer that secure the inner lap belt end fitting. (Reference Detail "C")
- (8) Remove the seat belt assembly.

B. Installation of the Front Seat Belt Assembly

- (1) Secure the lap belt end fittings to the outboard brackets and align the hardware in the following order: screw, washer, bracket, spacer, lap belt end fitting and spacers. (Reference Detail "D")
- (2) Secure the lap belt end fittings to the inboard brackets and align the hardware in the following order: screw, washer, spacer, bracket, spacer, lap belt end fitting and spacers. (Reference Detail "C")
- (3) Torque screws to 30-40 inch-pounds.
- (4) Install and secure the interior side panel with four screws.
- (5) Install and secure the arm rest with three screws.
- (6) Secure the inertia reel to the mounting plate and align the hardware in the following order: screw, washer, spacer, inertia reel, washers, over spacer.
- (7) Torque screw to 60-85 inch-pounds.
- (8) Install inertia reel cover.

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2. **Rear Seat Belt Assembly Removal/Installation** (Reference Figure 25-03)

A. Removal of Rear Seat Shoulder Harness

- (1) Remove the front seat inertia reels. (Reference Detail "E")
- (2) Remove the twelve screws that secure the rear window molding and remove the molding.
- (3) Remove the rear side panel attaching screws and the side panel.
- (4) Remove the hatshelf.
- (5) Remove the closure web.
- (6) Remove the bolt, two washers and spacer securing the rear shoulder harness to the mounting plate. (Reference Detail "F")

B. Removal of Rear Seat Lap Belts. (Reference Figure 25-3)

NOTE: Aircraft S/N 10234 and subsequent have a nut plate installed on the outboard seat belt attach brackets which allow removal of the seatbelt end fitting without removing the bracket. (Reference Detail A)

- (1) Remove the ten screws securing the baggage floor carpet retainer below the baggage door and remove the retainer.
- (2) Remove the two screws securing the baggage straps to the left side of the baggage compartment and remove the straps.
- (3) Unsnap and fold the carpet away from the baggage door to gain access to the inspection cover located near the front center of the baggage floor.
- (4) Remove the inspection cover to gain access to the nuts securing the left and right lap belt outer bracket bolts.
- (5) Remove the rear seat backs by lifting straight up.
- (6) Remove the rear seat back frame by removing the end bolts from their collars and the center ring and clip.
- (7) Lift the back of the rear seat base to gain access to the outer lap belt bracket bolts and the inner lap belt bracket.
- (8) Remove the outer lap belt brackets then remove the lap belt end fittings from the bracket by removing the nut, screw, washer, and spacers.
- (9) Remove the inner lap belt end fittings from the inner bracket by removing the nut, washer, bolt, and spacer.

C. Installation of Rear Seat Shoulder Harness

- (1) Secure the rear shoulder harness end fitting to the mounting plate, align the hardware in the following order: bolt, washer, spacer, shoulder harness end fitting, and washer.
- (2) Torque bolt to 65-85 inch pounds.

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- (3) Install the closure web.
- (4) Install the hatshelf.
- (5) Install the rear side panels and secure with screws.
- (6) Install the rear window moldings and secure with twelve screws.
- (7) Install the front seat inertial reels.

D. Installation of Rear Seat Lap Belts. (Reference Figure 25-3)

- (1) Secure the inner lap belt end fitting to the inner bracket, align the hardware in the following order: bolt, washer, bracket, lap belt end fitting, spacer, lap belt end fitting, bracket, washer, and nut.
- (2) Torque nut to 65-85 inch pounds.
- (3) Secure the outer lap belt end fittings to the outer brackets, align the hardware in the following order: screw, washer, spacer, bracket, spacer, spacer, lap belt end fitting, bracket, washer, and nut.
- (4) Torque nut to 30-40 inch pounds.

CAUTION: **The -6 Plate must be installed on the aft side of the bulkhead with the beveled edge nestled in the corner of the outer skin and the bulkhead. (Reference Figure 25-03, Detail A)**

- (5) Secure the outer bracket to the bulkhead with two bolts. Access to the bolt ends through the inspection hole in the baggage compartment floor.
- (6) Install the rear seat back frame and secure it with two collars, bolts and the center ring and clip.
- (7) Install the rear seat backs.
- (8) Reinstall the baggage floor inspection cover.
- (9) Reinstall the baggage floor carpet.
- (10) Reinstall the two baggage straps.
- (11) Reinstall the baggage carpet retainer.

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BAGGAGE STRAP ASSEMBLIES - DESCRIPTION

1. General

The baggage strapping consists of four strap assemblies, anchored to each corner of the baggage compartment floor.

The straps are normally arranged in a crossed position for securing baggage. Each of the two straps directly behind the rear seat are equipped with a buckle that accepts and clamps the strap anchored at the diagonally opposite corner of the baggage floor.

BAGGAGE STRAP ASSEMBLIES - MAINTENANCE PRACTICES

1. Removal/Installation (Reference Figure 25-04)

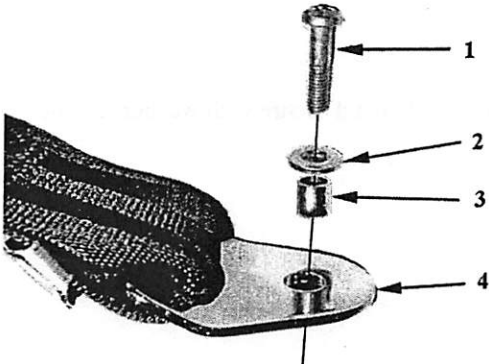
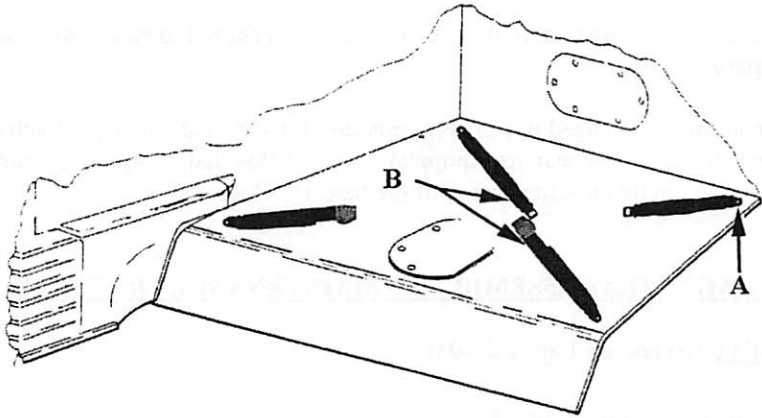
A. Baggage Strap Assembly Removal

- (1) Fold the rear seat bottom forward and fold the rear seat back down.
- (2) Remove the baggage floor carpet.
- (3) Remove screw (1), washer (2), and spacer (3) securing strap end fitting to baggage floor and remove strap.

B. Baggage Strap Assembly Installation

- (1) Locate strap end fitting on baggage floor, insert bushing (3) and secure with washer (2) and screw (1).
- (2) Install baggage floor carpeting.

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Detail A



Detail B

- 1. Screw
- 2. Washer
- 3. Spacer
- 4. Baggage Strap

Baggage Strap Assemblies
Figure 25-04

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CONSOLE ASSEMBLY - DESCRIPTION

1. General

The console assembly is located between the front seats and consists of forward, top, side and aft thermoplastic panel sections surrounding the console frames. The console assembly contains the fuel gauges, fuel selector valve, trim wheel, trim indicator, flap switch and flap indicator. The console assembly also covers the control surface pulley group in the cabin area.

The console sections can be removed individually or as an assembly depending on the nature of the maintenance being performed. Maintenance Practices in the following section gives removal and installation procedures for each console section and the items that can be serviced or inspected with that console section removed.

CONSOLE ASSEMBLY - MAINTENANCE PRACTICES

1. Removal/Installation (Reference Figure 25-05)

A. Forward (Front) Console Removal

- (1) Remove the fuel selector handle screw and remove the handle.
- (2) Remove the upper and lower forward console panel screws and remove the panel.

B. Top Console Removal

NOTE: Removal of the top console section allows access to the trim wheel and flap switch.

- (1) Remove the flap switch handle by rotating it counterclockwise and remove the boot.
- (2) Remove the side screws around the top of the console and remove the console.

C. Aft Console Removal

NOTE: Removal of the aft console cover provides access to the aileron and elevator turnbuckles.

- (1) Lift the carpet from the floor and pull up from the base of the console.
- (2) Remove the aft console attach screws and the aft console.

D. Side Console Removal

NOTE: Removal of the console side panels provides access for inspection and servicing of the pulley groups, trim wheel and indicator, and flap switch and indicator.

NOTE: Removal of front seats will provide easier access to the side console panels.

- (1) Unsnap the floor carpet around the console.

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- (2) Remove the screws securing the console panel to the floor. If the console top has not been removed, then also remove the screws securing the side panel to the console top.
- (3) Loosen the clamps and remove the air ducts from the upper right and left console side panels.
- (4) Remove the side console panel. If the top console has not been removed, remove the side panel by pulling the bottom out and down to disengage the upper edge of the panel from under the flange on the top cover.

E. Side Console Installation

NOTE: If the top console panel is installed, be sure the upper edge of side panel is inserted between the metal console frame and the flange on the top console panel.

- (1) Install the screws securing the side panel to the floor and top console.
- (2) Install the air ducts.
- (3) Snap the floor carpet to the floor.

F. Aft Console Installation

- (1) Install the screws securing the aft console to the floor.
- (2) Snap the floor carpet to the floor.

G. Top Console Installation

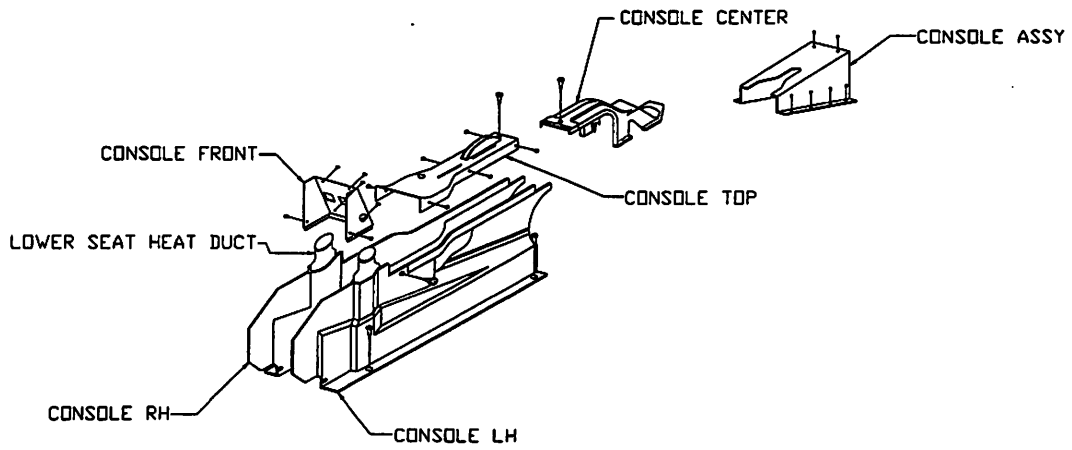
- (1) Align the top console panel with the metal console frame.
- (2) Install the screws around the side flange of the top console.

H. Forward Console Installation

- (1) Install the upper and lower forward console frame.
- (2) Install the screw securing the fuel selector handle to the handle shaft.

NOTE: Assure 'D' flat of selector handle matches 'D' flat of the shaft.

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Console Assembly
Figure 25-05

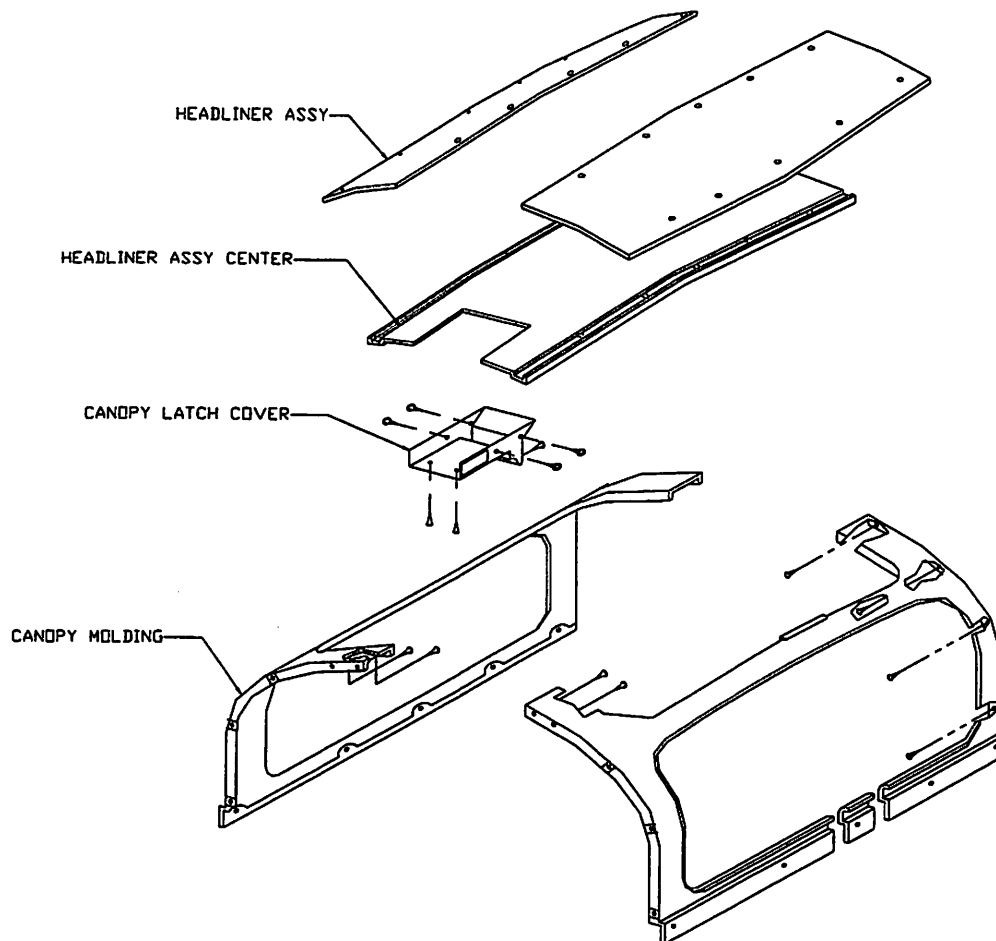
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CANOPY AND AFT FUSELAGE INNER TRIM PANELING AND
AFT FUSELAGE MOULDING - DESCRIPTION

1. General

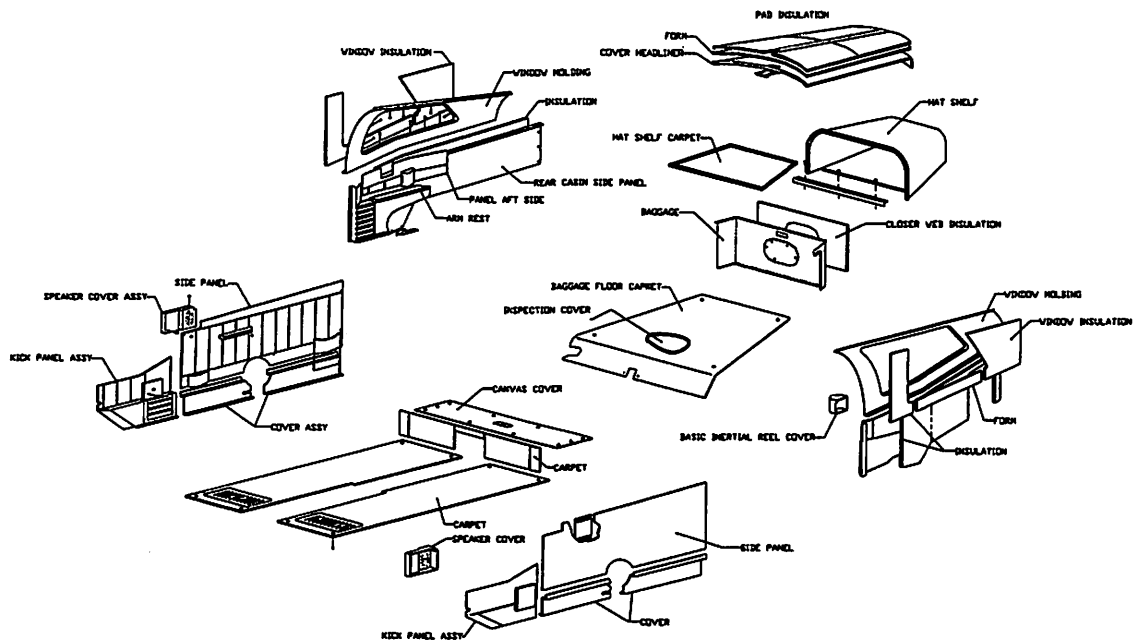
The canopy inner paneling and aft fuselage moldings consist of a thermoplastic material and serve as trim around the canopy and aft fuselage windows.

The aft fuselage inner paneling consists of a thermo-plastic material which extends across the lower section of the aft fuselage, including the baggage door.



Inner Paneling
Figure 25-06
(Sheet 1 of 2)

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Inner Paneling
Figure 25-06
(Sheet 2 of 2)

**CANOPY AND AFT FUSELAGE INNER TRIM PANELING AND
AFT FUSELAGE MOULDING - MAINTENANCE PRACTICES**

1. Canopy Inner Trim Paneling Removal/Installation (Reference Figure 25-06)

A. Canopy Inner Trim Paneling Removal

- (1) Remove canopy. (See Chapter 52)
- (2) Drill out four rivets toward the top of the forward canopy bow. (Fourth rivet is covered by a seal)
- (3) Remove the remaining screws from the forward canopy bow.
- (4) On the outside of the canopy, remove the bottom row of screws.
- (5) Drill out the rivets securing the side panel to the back flange of the canopy and pull the panel out.

B. Canopy Inner Trim Paneling Installation

- (1) If a new panel is to be installed, align the plastic trim panel to the inside of the canopy and drill out holes needed for screws and rivets. If required, trim the panel for proper fit. Insert the panel flange beneath the forward canopy bow.

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- (2) Install screws to secure the panel to the bottom edge of the canopy.
- (3) Install screws to the forward canopy bow to secure the flange of the panel.
- (4) Install rivets securing the flange of the panel to the top portion of the forward canopy bow.
- (5) Install rivets securing the side panel to the back flange of the canopy.
- (6) Install the canopy. (See Chapter 52)

2. Aft Fuselage Molding - Removal/Installation

A. Aft Fuselage Molding Removal

- (1) Remove the bottom 4 screws on the aft fuselage bow.
- (2) Remove the 12 screws from the panel around the window edges and pull the panel out.

B. Aft Fuselage Molding Installation

- (1) If new molding is to be installed, align the molding to the inside of the aft fuselage and drill out the holes needed for the screws. If required, trim the panel for proper fit. Insert the molding flange beneath the aft fuselage bow.
- (2) Install screws to the aft fuselage bow to secure flange to molding.
- (3) Install 12 screws to secure flanges to molding around window edges.

3. Aft Fuselage Inner Trim Paneling - Removal/Installation

A. Aft Fuselage Inner Trim Paneling Removal

- (1) Remove the upholstery side paneling in the front seat cabin area by removing the screws securing the upholstery to the fuselage.
- (2) Fold the back seat bottom section forward to gain access to the screws securing the panel to the mounting flange. Remove screws.
- (3) Remove the bolt securing the front shoulder harness end fitting to the mounting bracket.
- (4) Remove the screws attaching the air outlet vent to the side panel and remove the vent.
- (5) At the rear section of aft fuselage paneling, pull the panel down and out.
- (6) At the forward section of aft fuselage paneling, pull the panel from beneath the aft fuselage molding.
- (7) Pull the paneling out and up to remove the paneling from the shoulder harness mounting bracket.
- (8) If the baggage door inner panel is to be removed, remove the screws attaching the panel to the baggage door.

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B. Aft Fuselage Inner Trim Paneling Installation

NOTE: Pre-fit panels prior to drilling.

- (1) If new paneling is to be used, drill out the holes needed for the screws.
- (2) Fit the paneling over the shoulder harness mounting bracket and under the back seat latch.
- (3) Place the top edge of the paneling beneath the aft fuselage molding.
- (4) Install the screws securing the air outlet vent to the side panel.
- (5) Install the bolt securing the front shoulder harness end fitting to the mounting bracket.
- (6) Install the screws securing the upholstery side paneling to the fuselage.
- (7) Install the screws securing the upholstery side paneling to the fuselage.
- (8) If the baggage door inner panel is to be installed, install the screws attaching the panel to the baggage door.

MISCELLANEOUS FURNISHINGS - DESCRIPTION

1. Carpeting

The flooring in the cabin area and in the baggage compartment is covered with carpeting which is secured to the floor with snap attachments allowing easy removal and replacement. The carpeting just below the side trim panels is secured to the forward and aft cover assemblies with an adhesive. An adhesive application is also used to secure the carpeting to the aft console frame.

2. Panel Upholstery

The side paneling in the front seat cabin area consists of a vinyl or leather/carpet combination. The paneling is installed to the side fuselage with screws. The vinyl/leather portions of the paneling may be cleaned with a damp cloth. Spots and stains on carpet portions of the paneling may be removed with a household spot remover, used sparingly.

3. Hatshelf

The aircraft is furnished with a hatshelf installation located just aft of the baggage compartment.

4. Armrests

The front seat armrests are located on each fwd fuselage side trim panel. The rear seat armrests are attached to the aft panels.

5. Glareshield and Deck Assemblies

The glareshield and deck assemblies are mounted to the top of the instrument panel and supported by the instrument panel brace and left and right angle structures. The deck assembly houses defroster outlet assemblies. The glareshield and deck assemblies may be removed by removing the attaching screws.

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6. Headliners

Headliner panels for the canopy section are located on each side of the center cover section. These headliner panels are permanently affixed to the canopy. The headliner in the aft overhead section may be removed by removing the dome light assembly and the outer frame on the front molding.

7. Fire Extinguisher

A fire extinguisher is available as optional equipment, bracket mounted under the right front seat.

INTERIOR CARE - MAINTENANCE PRACTICES

1. Cleaning

Clean the interior regularly with a vacuum cleaner to remove dust and loose dirt from the upholstery and carpet.

CAUTION: THE APPLICATION OF CERTAIN CLEANING AGENTS, PROTECTIVE COATINGS, STAIN REPELLENTS, AND OTHER CHEMICAL COMPOUNDS MAY REDUCE THE FIRE RETARDANT QUALITIES OF INTERIOR FABRICS. CONSULT THE COMPOUND MANUFACTURER BEFORE USE.

If liquid (coffee, etc.) is spilled on the upholstery or carpet, blot it up promptly with a cleaning tissue or rag. Continue blotting until no more liquid is taken up. Sticky materials may be scraped up with a dull knife, then cleaned with a spot remover.

Oily spots may be cleaned with household spot removers, used sparingly. Before using any solvent, read and follow the instructions on the container. Test it on an obscure place on the fabric to be cleaned. Never saturate the fabric with a volatile solvent, it may damage the padding and backing materials.

CAUTION: NEVER USE GASOLINE, BENZINE, ALCOHOL, ACETONE, CARBON TETRACHLORIDE, ANTI-ICE FLUID, LACQUER THINNER, OR GLASS CLEANER TO CLEAN PLASTIC. THESE MATERIALS WILL DAMAGE THE PLASTIC AND MAY CAUSE SEVERE CRAZING.

The plastic trim headliner, instrument panel, and control knobs need only to be wiped off with a damp cloth. Oil / grease on the control wheel and control knobs can be removed with a cloth moistened with a mild soap and water.

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FLIGHT CONTROLS - DESCRIPTION/OPERATION

1. General

The AG-5B aircraft flight control system consists in a dual control column of the "T" configuration, which operates conventional ailerons and an anti-servo elevator, dual rudder pedals which operate the rudder, and electrically actuated flaps.

2. Lateral Control System

The lateral control system consists of torque tube actuated ailerons, positioned by cables extending from the control column. As either control wheel is turned, the chain and sprocket drive to which it is coupled actuates a bellcrank to which the aileron control cables are attached.

3. Directional Control System

The directional control system consists of a conventional rudder actuated by control cables extending from the rudder pedal linkage to the rudder.

4. Longitudinal Control System

The longitudinal control system consists of an anti-servo elevator actuated by control cables extending from the control column.

Longitudinal trim is provided by a trim tab mounted on the trailing edge of the elevator. This tab is actuated by a linkage that is adjusted by the trim wheel mounted on the console.

5. Flap System

The flap system consists of two wing flaps, one on each wing, mounted inboard of the ailerons, and an electrically operated flap drive mechanism. The flaps are actuated by torque tubes extending into the fuselage. Linkages transmit the linear motion of the actuator to the torque tubes.

6. Gust Lock

The gust lock consists of a metal pin that can be inserted through a hole in the control column to secure the ailerons and elevators against wind damage.

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AILERON AND TAB - DESCRIPTION/OPERATION

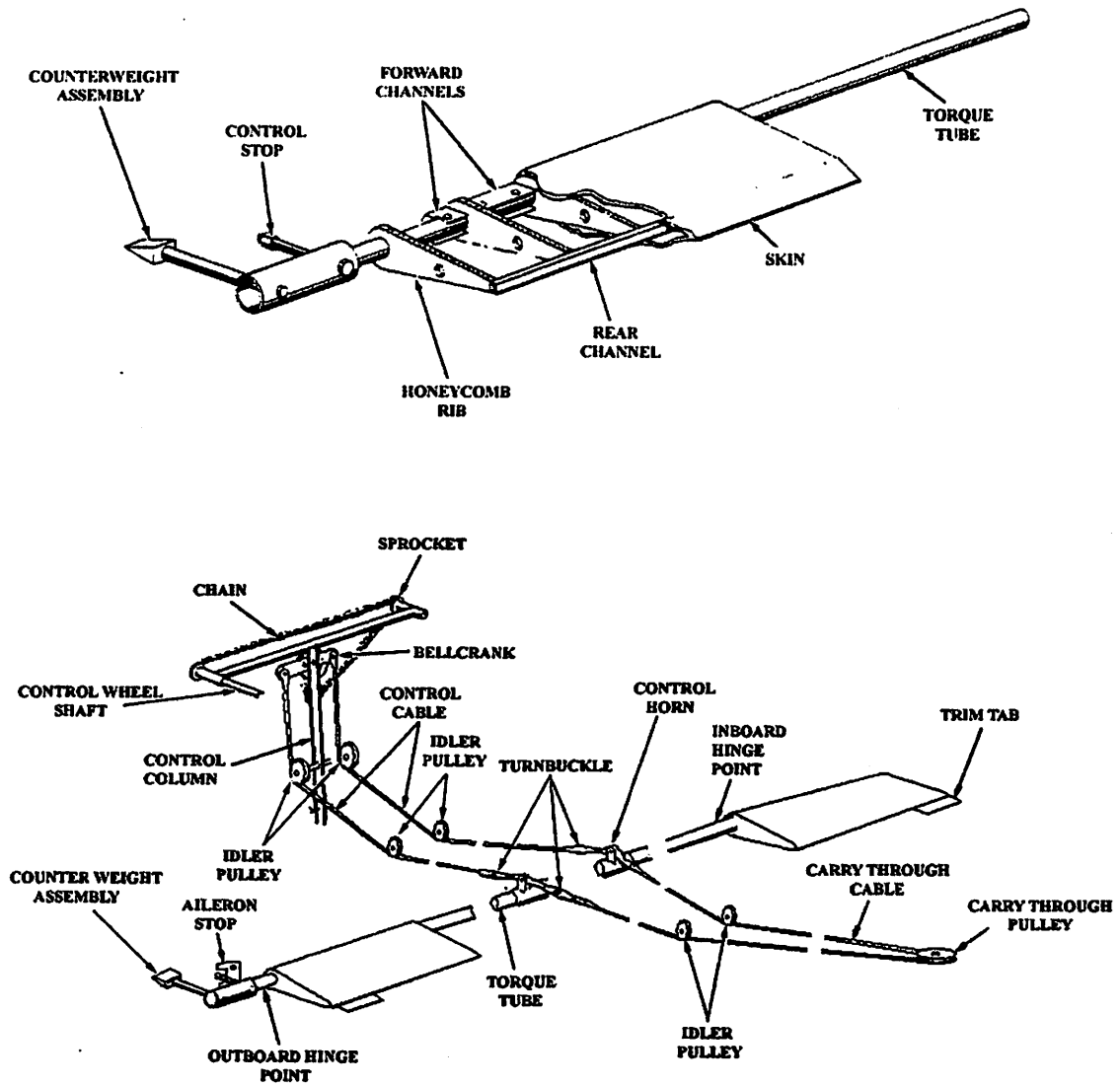
1. General

As the control wheel is rotated its angular displacement is transmitted through a sprocket and chain arrangement on the control column to the bellcrank. Control cables attached to the bellcrank are routed through idler pulleys to the control horns attached to the aileron torque tubes. The control horns rotate the torque tubes, thus positioning the aileron control surfaces in direct proportion to control wheel displacement. A carry-through cable, attached to the control horns, extends aft to the carry-through pulley in the aft fuselage. This cable provides completion of the aileron control loop such that as one aileron moves up the other aileron moves down.

The aileron control surfaces are mounted on bearings that fit over the torque tube at each end of the control surface. Each aileron is composed of a formed metal skin, which is bonded to seven internal ribs. The internal ribs are made of aluminum honeycomb. The torque tube extends the length of the aileron through the flap, and into the fuselage. The torque tube forms the aileron hinges. The aileron counterweight and control stop are mounted on the outboard end of the torque tube. The forward channels are riveted to the torque tube and form the contour of the aileron leading edge. The skin is bonded to the channels along its forward seam. In addition the torque tube is bonded to the ribs. This type of structure enables rotational movement of the torque tube to position the control surface. Ground adjustable trim tabs are attached to the trailing edge of the control surfaces at their outboard ends.

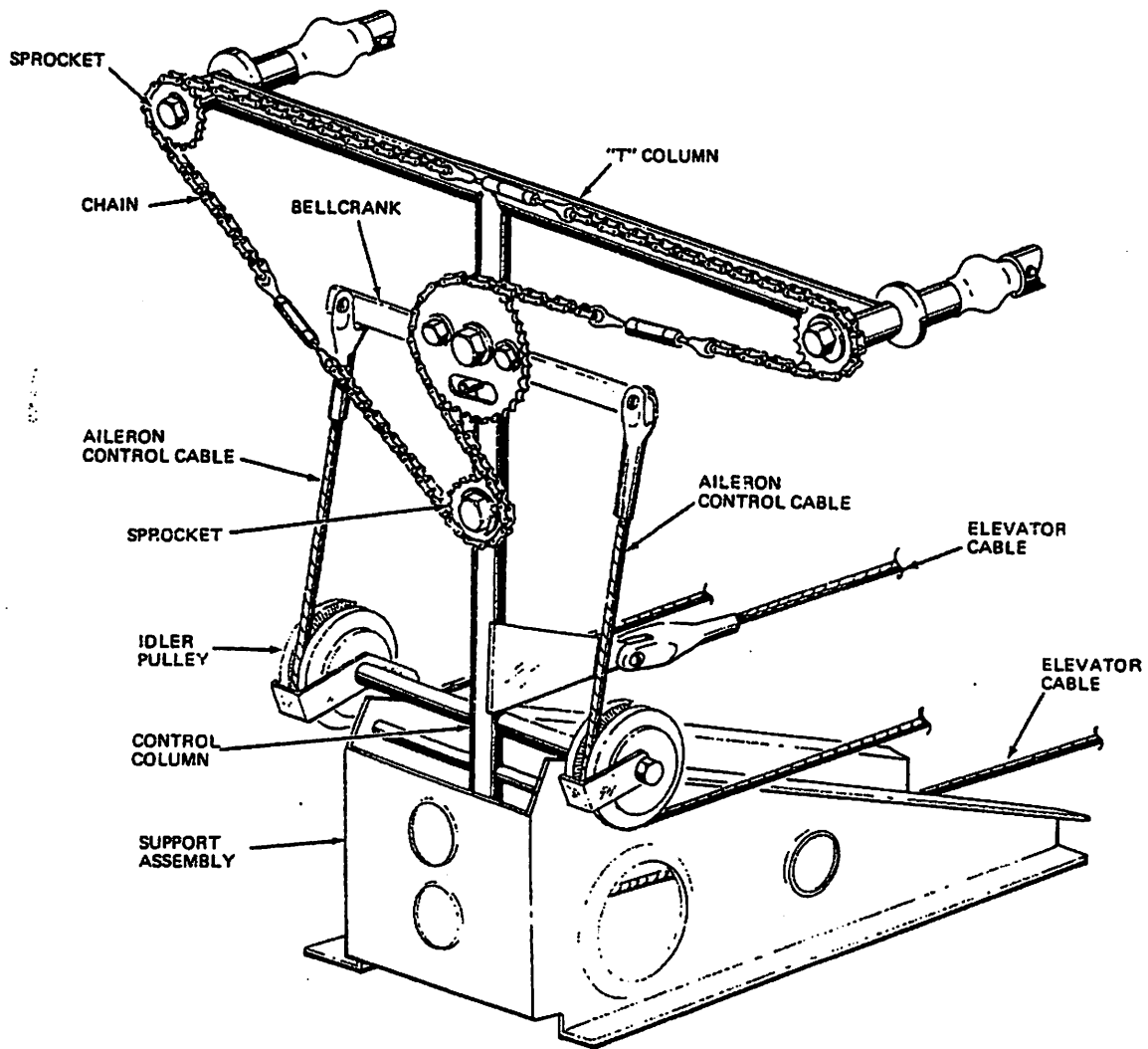
The control column consists of a "T" column, the bottom of which is attached to the aircraft through a needle bearing hinge. A bicycle-type chain extends around sprockets attached to the control wheel shafts, around an idler sprocket, and around a sprocket attached to the bellcrank. The three turnbuckles on the chain enable adjustment of chain tension, adjustment of the relative control wheel positions, and adjustment of the bellcrank in relation to control wheel position. The shaft of each control wheel is attached through a universal joint to the "T" column. This allows forward and aft movement of the control column (for elevator action) while ensuring that the angular movement of the control wheel is transmitted to the sprocket. Needle bearings in the "T" column and in the sprockets minimize control system friction.

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**Aileron Control System
Figure 27-01**

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**Control Column
Figure 27-02**

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MAINTENANCE PRACTICES - SERVICING

1. Lubrication of Aileron Bearings and Control Column

A. Aileron Bearing Lubrication

Lubricate the aileron bearings by injecting a small amount of grease, MIL-PRF-81332 (See Chapter 12) between the bearings and torque tube.

B. Control Column Lubrication

Proper lubrication of the needle bearings in the control column requires disassembly of the control column. Disassemble the control column as described in this chapter, and lubricate the bearings as follows:

WARNING: USE SOLVENTS IN A WELL VENTILATED AREA. AVOID BREATHING FUMES. KEEP AWAY FROM FLAMES.

- (1) Use mineral spirits, to wash all grease from the needle and thrust bearings.
- (2) Inspect bearings for excessive wear, damage and freedom of movement, replace if defective.
- (3) Use a clean lint free cloth saturated with mineral spirits to remove grease and foreign material from the bearing races.
- (4) Inspect the races for excessive wear or damage and replace if defective.
- (5) Pack the needle and thrust bearings with MIL-PRF-81332 grease.
- (6) Assemble the control column as described in this chapter.
- (7) Use a clean, lint-free cloth saturated with mineral spirits to wipe all foreign material from the chain and sprockets.
- (8) Lubricate the chain with a light coat of MIL-PRF-81332 grease.

MAINTENANCE PRACTICES - REMOVAL/INSTALLATION

1. Aileron and Torque Tube Removal/Installation (See Figure 27-03)

NOTE: The following procedure treats the aileron and torque tube as a unit. Refer to Paragraph 7 of this chapter for Removal/Installation of the aileron only.

A. Aileron and Torque Tube Removal

- (1) Fold rear seat bottom forward and remove canvas access cover to gain access to the aileron control horns.
- (2) Remove nut, washer and bolt securing the control horn to the torque tube.
- (3) Remove the wing tip as described in Chapter 57.

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- (4) Remove nuts, washers, and bolts from aft wing spar and remove the control stop and bearing bracket from the wing, disconnect the ground terminal.
- (5) Pull the aileron outboard until the torque tube clears the outboard flap hinge.

B. Aileron and Torque tube Installation

NOTE: When installing the aileron, the torque tube may catch on the ribs in the flap as the tube is pushed through. A guide such as the one shown in Figure 27-04 may be helpful.

- (1) Slide the aileron torque tube through the flap until it extends into the fuselage.
- (2) Position the torque tube in the control horn and align the holes.
- (3) Secure the control horn with bolt, washers, and nut. Torque to 50 inch pounds.
- (4) Position bearing bracket and control stop to align their mounting holes with the wing aft spar.
- (5) Secure the bearing bracket, stop and ground strap with bolts, washers, and nuts.
- (6) Install wing tip as described in Chapter 57.
- (7) Install interior trim as described in Chapter 25.

2. Aileron Bearing Removal/Installation (See Figure 27-05)

A. Aileron Bearing Removal

- (1) Remove the aileron as described in Removal/Installation.
- (2) Collapse the bearing and remove from the bearing support. (See Figure 27-05)

NOTE: Do not attempt to collapse a new bearing if it is cold (below 70°F) since the bearing material loses its elasticity and may break. Bearing installation can be facilitated by warming the bearing to approximately 98°F.

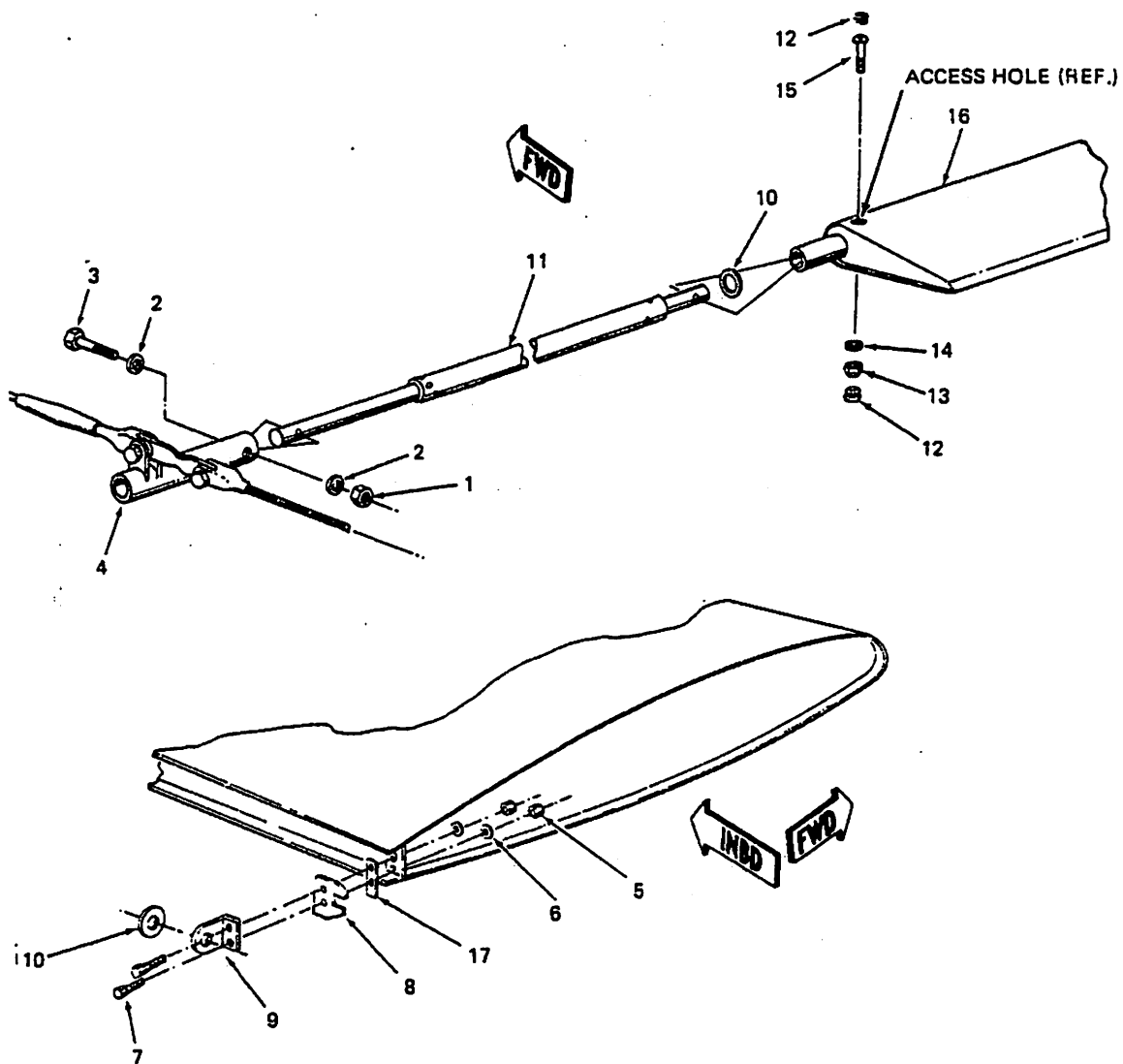
B. Aileron Bearing Installation

- (1) Collapse the new bearing (see note above) and install it in the bearing support.
- (2) Use the aileron and flap bearing sizing tool, 1-1/8 inches I.D., Part No. DE-5006-1, to seat the bearing so that it will fit over the torque tube.

NOTE: Once inserted in the support bracket the bearing I.D. should be rounded out or "sized" by inserting the correct bearing sizing tool and rolling the new insert into its correct size. New bearings should be sized to prevent control system stiffness.

- (3) Lightly grease the bearing with MIL-PRF-81332 grease. (See Chapter 12)
- (4) Install the aileron as described in Removal/Installation.

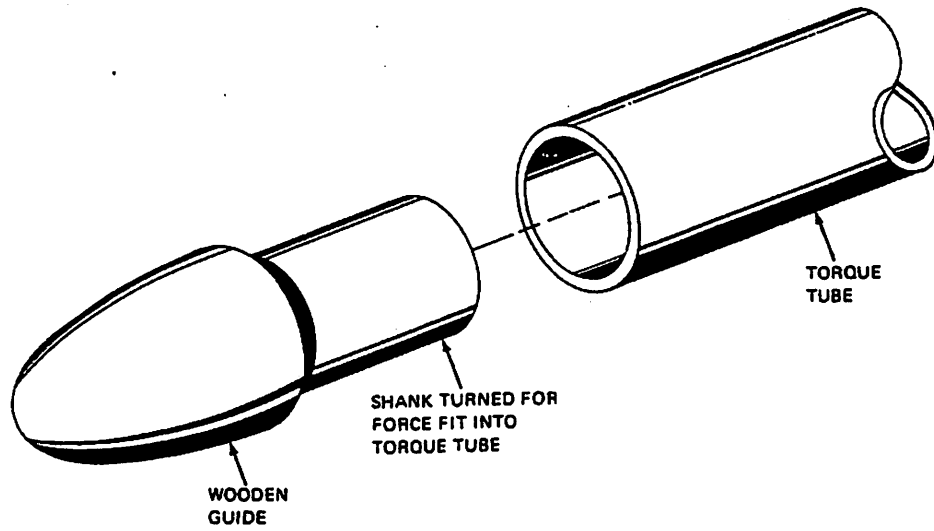
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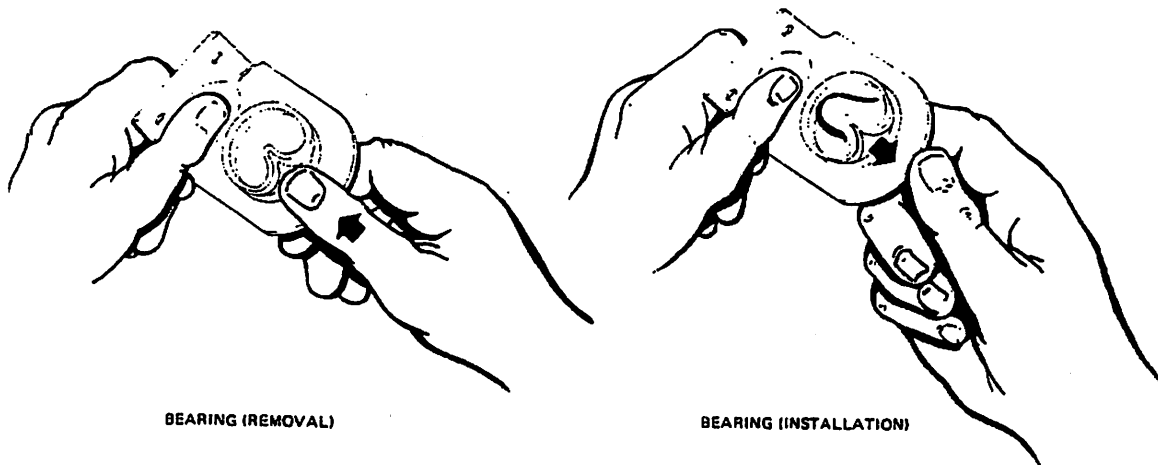
- | | |
|--------------------|-------------------------|
| 1. Nut | 11. Aileron Torque Tube |
| 2. Washer | 12. Plug |
| 3. Bolt | 13. Nut |
| 4. Control Horn | 14. Washer |
| 5. Nut | 15. Bolt |
| 6. Washer | 16. Aileron |
| 7. Bolt | 17. Shims |
| 8. Control Stop | |
| 9. Bearing bracket | |
| 10. Spacers | |

**Aileron & Torque Tube Removal / Installation
Figure 27-03**

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**Torque Tube Guide
Figure 27-04**



**Aileron Bearing Removal / Installation
Figure 27-05**

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3. Aileron Bearing Wear Limits

MAXIMUM 902013 BEARING WEAR LIMITS

Bearing	-1, -2, -3
Minimum wall thickness	0.030"

BEARINGS WORN BEYOND ABOVE LIMITS MUST BE REPLACED

NOTE: Maximum control surface, or control surface torque tube wear is 0.030 inch wall thickness reduction. Wear greater than this requires replacement of the control surface. Service Kit No. SK-121, (control surface torque tube repair kit) is available from the Tiger Aircraft Customer Service Department for worn torque tubes that have not exceeded the maximum wear limits.

4. Aileron Cable Removal/Installation (See Figure 27-06)

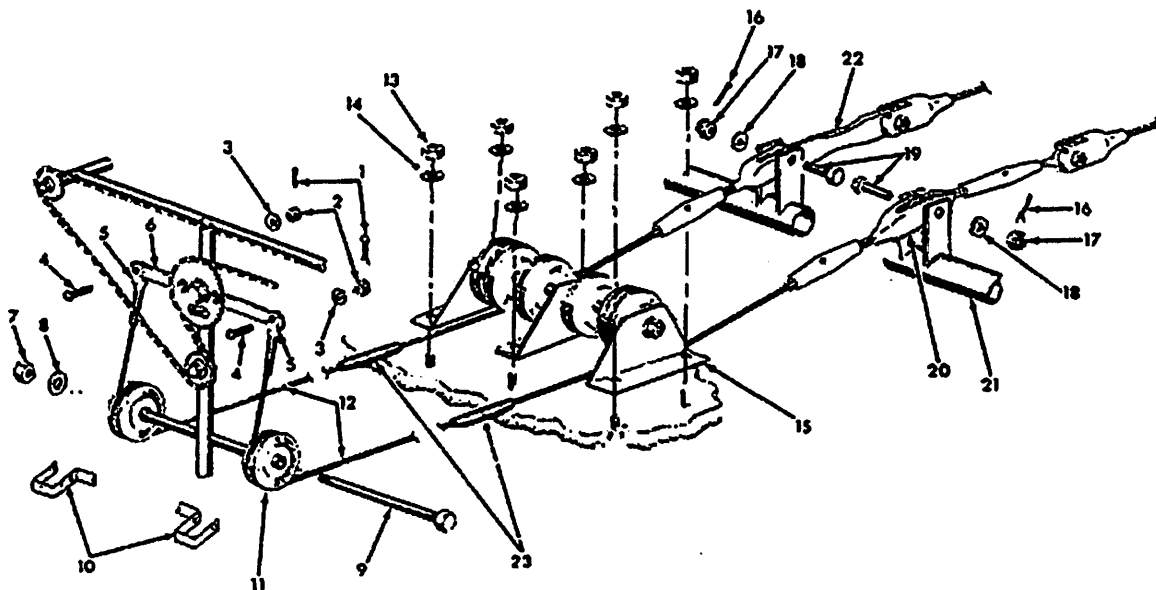
A. Control Cable Removal

- (1) Remove interior trim per Chapter 25 to gain access to the aileron control horns.
- (2) Remove the console trim per Chapter 25 to gain access to the idler pulleys (15) forward of the spar center section.
- (3) Remove cotter pin (1), nut (2), washer (3), and bolt (4) from the cable clevis end (5) and remove the cable clevis from the bellcrank (6).
- (4) Remove nut (7), washer (8), and bolt (9).
- (5) Remove guards (10) from pulleys (11) to clear cables.
- (6) Remove nuts (13), washers (14), and lift control pulley assembly (15) to clear cables.
- (7) Pull the cables from beneath the control pulley assembly and spar center section.
- (8) Remove cotter pin (16), nut (17), washer (18), and bolt (19).
- (9) Remove the cable clevis (20) from the control horn (21).

B. Control Cable Installation

- (1) Install the cable in reverse order as removed in 'A' above
- (2) Rig aileron controls as described in this chapter.
- (3) Reinstall the removed trim as described in Chapter 25.

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- | | |
|---------------|--------------------|
| 1. Cotter Pin | 13. Nut |
| 2. Nut | 14. Washer |
| 3. Washer | 15. Pulley bracket |
| 4. Bolt | 16. Cotter Pin |
| 5. Clevis | 17. Nut |
| 6. Bellcrank | 18. Washer |
| 7. Nut | 19. Bolt |
| 8. Washer | 20. Link |
| 9. Bolt | 21. Control Horn |
| 10. Guard | 22. Link |
| 11. Pulleys | 23. Turnbuckle. |
| 12. Cable | |

**Aileron Cable Removal / Installation
Figure 27-06**

C. Aileron Carry-Through Cable Removal (See Figure 27-07)

- (1) Remove aft. center console trim as described in Chapter 25 to provide access to the aileron control horns.
- (2) Remove the tailcone access panel per Chapter 53.
- (3) Remove nuts (1), washers (2), and bolts (3) then remove the link (4) from the control horn.
- (4) Remove cotter pin (6) from guard (7) and remove guard from brackets (8).
- (5) Remove nuts (9), washers (10), and bolts (11) from brackets (12).

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- (6) Remove guard (13) and carry-through pulley (14) from bracket.
- (7) Slide carry-through cable (15) from pulley and remove from aircraft.

D. Carry-Through Cable Installation (See Figure 27-07)

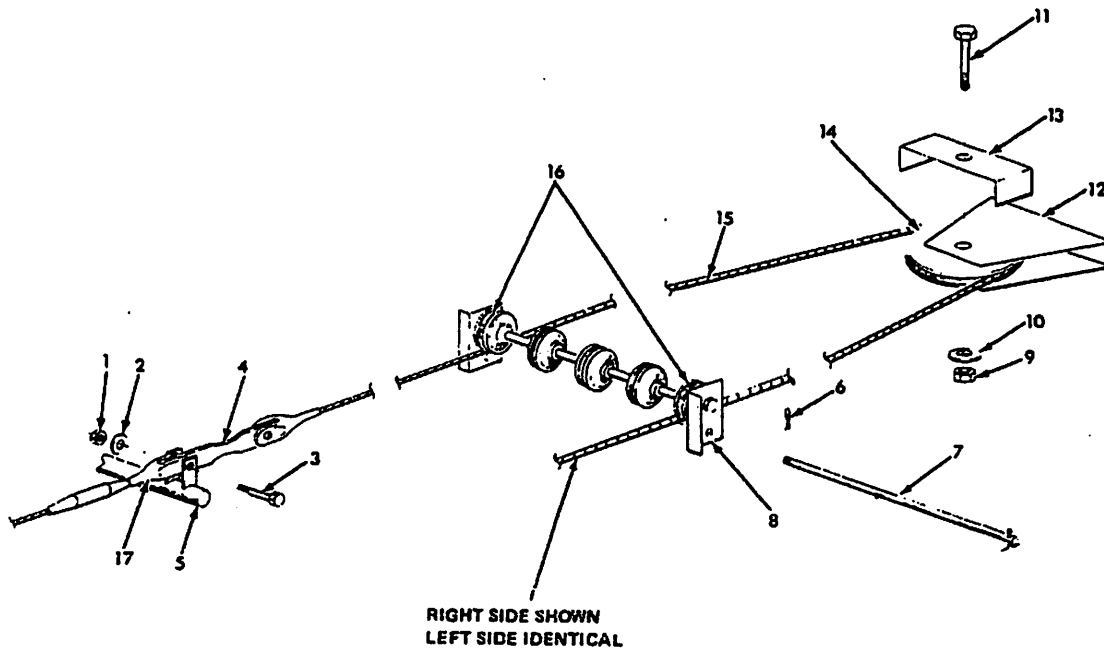
- (1) Place carry-through cable (15) on pulley (14) and insert pulley in bracket (12).
- (2) Install guard (13), bolt (11), washer (10), and nut (9). Torque to standard value per Chapter 91.
- (3) Route cable under outboard pulleys (16) and install guard (7). Secure with cotter pin (6).
- (4) Insert link (4) into clevis and place link and clevis in control horn (5). Secure with bolt (3), washer (2), and nut (10). Torque to standard value per Chapter 91.
- (5) Install the tailcone access panel per Chapter 53.
- (6) Rig the aileron controls per this chapter.
- (7) Install the aft. center console trim per Chapter 25.

5. Control Column Removal/Installation (See Figure 27-08)

A. Control Column Removal

- (1) Remove the forward console trim per Chapter 25.
- (2) Remove cotter pin (1), nut (2), washer (3), and bolt (4) attaching the elevator and aileron control cables to the control column.
- (3) Disconnect the wiring for the autopilot and push to talk switch.
- (4) Remove nut (7), washer (8), and bolt (9). Slide control wheel shaft (10) from universal (11) and remove shaft from aircraft.
- (5) Remove six (3 on each side) nuts (12) and washers (13) securing support assembly (14) to aircraft floor.
- (6) Remove nut (15), washer (16), and bolt (17) from control column (6).
- (7) Remove guards (18) from pulleys (19) and remove cables (5) from the column.
- (8) If an autopilot servo is installed, remove it per Chapter 22.
- (9) Remove the control column from the aircraft.

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- 1. Nut
- 2. Washer
- 3. Bolt
- 4. Link
- 5. Control Horn
- 6. Cotter Pin
- 7. Guard
- 8. Bracket

- 9. Nut
- 10. Washer
- 11. Bolt
- 12. Bracket
- 13. Guard
- 14. Pulley
- 15. Cable
- 16. Pulley

**Carry Through Cable Remove / Installation
Figure 27-07**

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B. Control Column Installation

- (1) Position control column such that support assembly (14) fits over its six mounting studs. Secure support with six washers (13) and nuts (12). Torque to standard value per Chapter 91.
- (2) Attach elevator cables (5) to control column (6) with bolt (4), washer (3), nut (2), and cotter pin (1).
- (3) Place aileron cables (5) over pulleys (19) and place guards (18) over pulleys.
- (4) Align guards (18) and pulleys (19) with the control column and secure with bolt (17), washer (16), and nut (15). Torque to standard value per Chapter 91.
- (5) Attach aileron cables (5) to bellcrank (23) with bolt (4), washer (3), nut (2), and cotter pin (1).
- (6) Slide shaft (10) through guide in the instrument panel, and over the end of the universal (11).
- (7) Align the shaft and spacer holes and attach shaft (10) and spacer to universal (11) with bolt (9), washer (8), and nut (7). Torque to standard value per Chapter 91.
- (8) If an autopilot is used, install per Chapter 22.
- (9) Rig the controls per this chapter.
- (10) Install the console trim per Chapter 25.

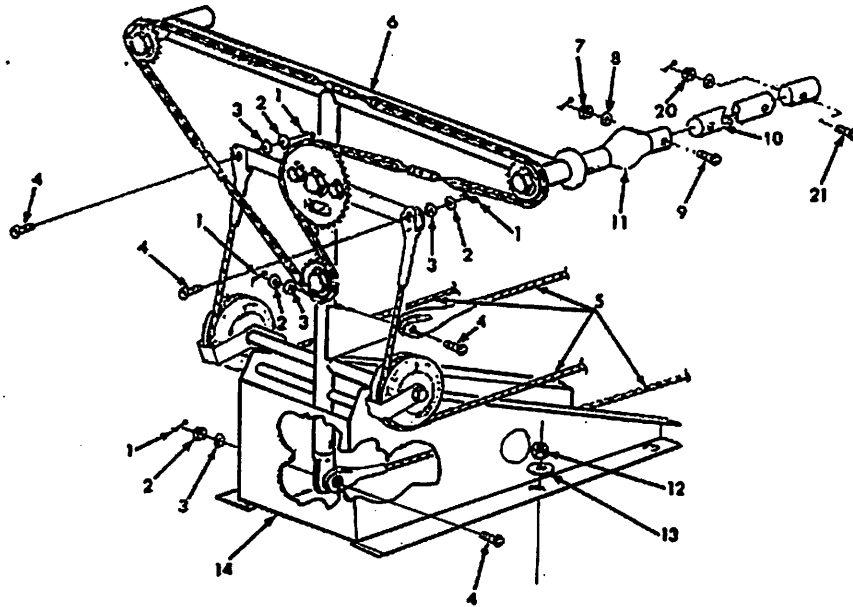
6. Control Column Disassembly/Assembly (See Figure 27-09)

A. Control Column Disassembly

- (1) Loosen turnbuckle (1) and remove chain (2) from sprockets (3), (4), and (5).
- (2) Remove nut (6), washer (7), and bolt (8) from collar (9), and remove spacer (10) and universal (11).
- (3) Grasp sprocket (3) and pull shaft (12) from control column (13). Shims (14) and thrust plate (15) will separate from the shaft.
- (4) Remove thrust plate (15) and spacer (16) from shaft (12).
- (5) Drive pin (17) from shaft (12) and remove sprocket (3).
- (6) Pull Thrust bearings (18) from control column (13).
- (7) Remove nut (19), washer (20), and bolt (21) from control column (13).
- (8) Remove washer (22), sprocket (4), needle bearing (23), sleeve (24), and washers (25) from bolt (21).
- (9) Remove nut (26), washer (27), and bolt (28) from control column (13).

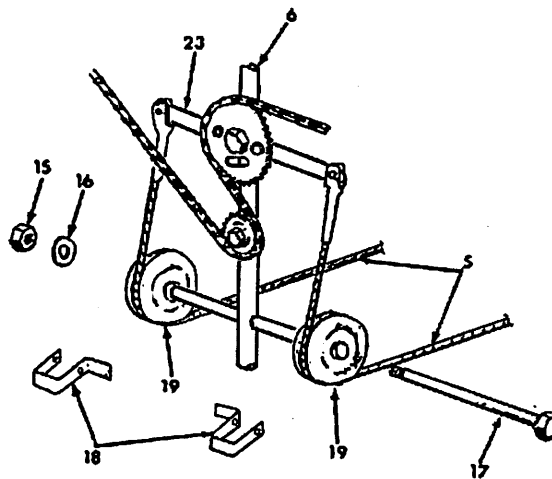
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- (10) Remove washer (29), sprocket (5), needle bearing (30), sleeve (31), and washers (32) from bolt (28).
- (11) Remove nut (33), washer (34), and bolt (35) from sprocket (5) and remove bellcrank (36).
- (12) Remove bushing (37) from control column (13).



- 1. Cotter Pin
- 2. Nut
- 3. Washer
- 4. Bolt
- 5. Cables
- 6. Control Column
- 7. Nut
- 8. Washer
- 9. Bolt
- 10. Control Wheel Shaft
- 11. Universal
- 12. Nut

- 13. Washer
- 14. Support
- 15. Nut
- 16. Washer
- 17. Bolt
- 18. Guard
- 19. Pulley
- 20. Washer
- 21. Rivet
- 22. Control Wheel
- 23. Bellcrank



**Control Column Remove / Installation
Figure 27-08**

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(13) Remove needle bearing (45) from control column (13).

(14) Disassemble chain (2) by unscrewing turnbuckles (1), (46), and (47).

B. Control Column Assembly

(1) Install needle bearings (45) in control column (13).

(2) Position control column (13) in support assembly (40) such that the mounting holes align. Install bolt (39) and nut (38). Adjust torque to allow free movement. Torque to standard value per Chapter 91.

(3) Install bushing (37) in control column (13).

(4) Position bellcrank (36) on sprocket (5) aligning attachment holes. Secure with bolts (35), washers (34), and nuts (33). Torque to standard value per Chapter 91.

(5) Place washers (32), and sleeve (31) on bolt (28).

(6) Place needle bearing (30) over sleeve (31).

(7) Install bolt (28), and needle bearing (30) in sprocket (5), and place washer (29) on bolt (28) behind bellcrank (36).

(8) Install bolt (28) in control column (13) and secure with washer (27) and nut (26). Torque to standard value per Chapter 91.

(9) Place washers (25) on bolt (21).

(10) Place sleeve (24) on bolt (21) and place needle bearing (23) over sleeve (24).

(11) Place sprocket (4) over needle bearing (23) and install washer (20) and nut (19). Torque to standard value per Chapter 91.

(12) Install bolt (21) in control column (13) and secure with washer (20) and nut (19). Torque to standard value per Chapter 91.

(13) Place sprockets (3) on end of shafts (12) and secure with drive pins (17).

(14) Place spacers (16) and thrust plates (15) on shafts (12).

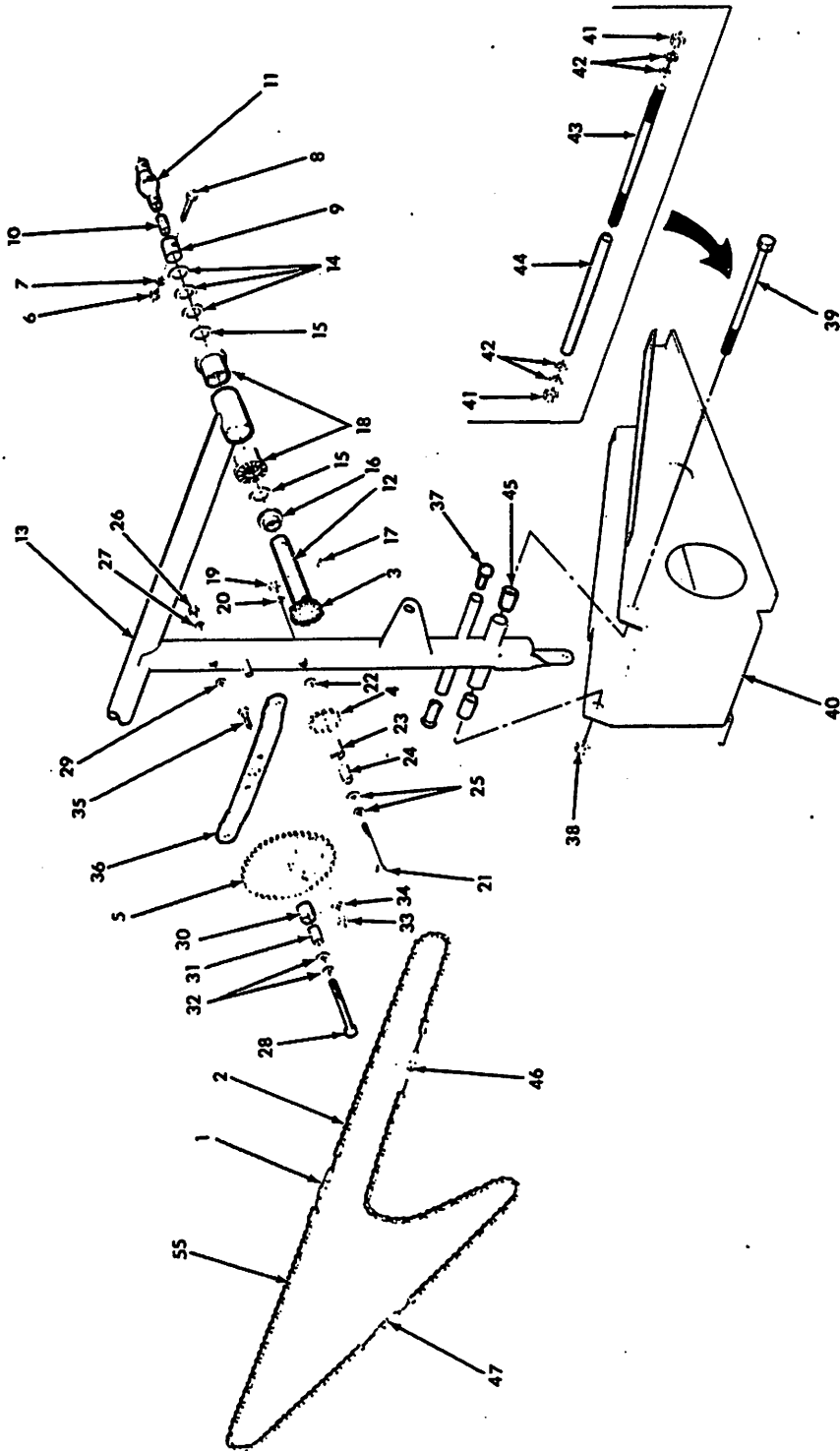
(15) Install thrust bearings (18) in control column.

(16) Slide shafts (12) through thrust bearings (18) and install thrust plates (15), shims (14), and collars (9) on shafts (12). Align holes in collars (9) and shafts (12).

(17) Place spacers (10) in end of universals (11) such that holes align, then insert universals (11) in end of shafts (12).

(18) Align holes in universals (11) and shafts (12) and secure with bolts (8), washers (7), and nuts (6). Torque to standard value per Chapter 91.

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**Control Column Disassembly / Assembly
Figure 27-09
(Sheet 1 of 2)**

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1.	Turnbuckle	28.	Bolt
2.	Chain	29.	Washer
3.	Sprocket	30.	Needle Bearing
4.	Sprocket	31.	Sleeve
5.	Sprocket	32.	Washers
6.	Nut	33.	Nut
7.	Washer	34.	Washer
8.	Bolt	35.	Bolt
9.	Collar	36.	Bellcrank
10.	Spacer	37.	Bushing
11.	Universal	38.	Nut
12.	Shaft	39.	Bolt
13.	Control Column	40.	Support
14.	Shims	41.	Nut
15.	Thrust Plate	42.	Washers
16.	Spacer	43.	Pin
17.	Pin	44.	Sleeve
18.	Thrust Bearing	45.	Needle Bearing
19.	Nut	46.	Turnbuckle
20.	Washer	47.	Turnbuckles
21.	Bolt	48.	Shaft
22.	Washer	49.	Bolt
23.	Needle Bearing	50.	Washer
24.	Sleeve	51.	Nut
25.	Washers	52.	Wood Block
26.	Nut	53.	Clamp
27.	Washer	54.	Control Wheel
		55.	Chain Tension Point

Control Column Disassembly/Assembly

**Figure 27-09
(Sheet 2 of 2)**

(19) Install and align chain (2) as follows:

- (a) Place control wheel shafts (48) and spacer (56) on universals (11) and secure with bolts (49), washers (50), and nuts (51).
- (b) Use a straight piece of wood (52) and two clamps (53) to hold both control wheels (54) at their neutral positions.
- (c) Position bellcrank (36) so that it is horizontal.
- (d) Route chain (2) around the two upper sprockets (3) such that the turnbuckle (1) is over the large sprocket (5) and such that turnbuckle (46) is approximately half-way between sprockets (3) and (5).
- (e) Route chain (2) over sprocket (5), under and around (4) and to sprocket (3).
- (f) Adjust turnbuckle (1) to take up slack in chain between two upper sprockets (3).
- (g) Adjust turnbuckles (46) and (47) to take up remaining slack in chain.

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- (h) Tighten all three turnbuckles until chain tension is such that a 2-pound force applied to the chain at point (55) will cause a 1/4 inch deflection in chain, and the bellcrank (36) is horizontal when both wheels (54) are at their neutral position.
- (i) Safety wire turnbuckles, with 0.032" safety wire or locking clips.

7. Aileron Removal/Installation (See Figure 27-03)

NOTE: Refer to Paragraph 1 for removal of the aileron and torque tube as a unit.

A. Aileron Removal

- (1) Remove the wing tip. (Refer to Chapter 57)
- (2) Remove nut (5), washers (6), and bolt (7) then remove aileron bearing bracket (9), stop (8), and shims (17), remove ground strap.
- (3) Remove plugs (12), from aileron (16).
- (4) Remove nut (13), washers (14), and bolt (15). Slide aileron (16) off end of torque tube (11).

B. Aileron Installation

- (1) Slide aileron (16) onto the end of torque tube (11). Align bolt holes in torque tube and aileron. Install bolt (15), washers (14), and nut (13). Tighten nut (13) to standard torque value per Chapter 91.
- (2) Align aileron bearing bracket with rear spar and install bolts (7), stop (8), ground strap, [spacers (17) as required], washers (6), and nuts (5). Torque to standard torque value per Chapter 91.
- (3) Install the control wheel lock in the control wheel shaft. Place the aileron rigging fixture (Part No. DE-5003-501) on the wing at Wing Station 140. The aileron should be positioned at 0° on the rigging fixture.
- (4) Remove the control wheel lock and move the control wheel through its full travel, noting the position at which the aileron contacts the stops. The aileron should contact at 15° + 2° / -0° up, and 7 1/2° + 2 1/2° / -0° down.
- (5) If the requirements of steps (3) and (4) above are not met, rig the ailerons. Refer to this chapter, for rigging procedures.
- (6) Install and plug shaft (12).
- (7) Install the wing tip. (Refer to Chapter 57)

8. Aileron Control Horn and Torque Tube Repair

Excessive play between the ailerons and the control wheel can be caused by slippage at the aileron control horn and torque tube. In certain high-time, in-service aircraft, this condition has been traced to the enlargement or elongation of the attach holes in the aileron torque tube (11, Figure 27-03) at the aileron control horn (4).

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The following is an acceptable repair from a structural standpoint:

- A. Install the control wheel lock in the control wheel shaft.
- B. Gain access to the aileron control horns (4, Figure 27-03) by removing required console covers and trim (Chapter 25). Hold one aileron control horn and attempt to rotate the attached aileron torque tube in both directions. Repeat this procedure on the opposite side.
- C. If play is noted, determine the largest diameter aileron torque tube and aileron control horn boltholes.
- D. If the largest diameter exceeds 0.2505 inch, open the existing boltholes in the aileron torque tube and aileron control horn to 0.312 to 0.315 inch diameter.

NOTE: Do not increase the hole size beyond that specified in "D" above. If the holes will not clean up, the aileron control horn and aileron torque tube must be replaced. If removal for repair/replacement is necessary, refer to Maintenance Practices Removal/Installation.

- E. If existing bolt holes are opened in accordance with paragraph 'D' above, install over-size attach hardware listed below.

NAS464P5A19 -- Bolt , NAS1149F0563P -- Washers , MS20364-524 -- Nut

- F. Perform aileron rigging check if repair or replacement is made. Refer to this chapter for rigging procedures.
- G. Record the repair/replacement in the aircraft log.

MAINTENANCE PRACTICES - ADJUSTMENT/TEST

1. Aileron Rigging

NOTE: The aircraft can be rigged to suit individual requirements by adjusting the fixed trim tabs on the ailerons. Do not exceed 45° as it will not contribute any more toward trim.

A. Aileron Rigging

- (1) Secure the control wheels in the neutral position by installing the control wheel lock in the control wheel shaft.
- (2) Place the aileron-rigging fixture (Part No. DE-5003-501) on the right wing as shown in Figure 27-10.
- (3) Remove trim, per Chapter 25, to gain access to the aileron control horns.
- (4) Remove the locking clip from the turnbuckle immediately forward of the right control horn.
- (5) Adjust the turnbuckle until the right aileron is positioned at 0° on the rigging fixture.
- (6) Place the rigging fixture on the left wing.

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- (7) Remove the locking clip from the turnbuckle immediately forward of the right control horn.
- (8) Adjust the turnbuckle until the left aileron is positioned at 0° on the rigging fixture.
- (9) Check control column cable tension. Tension shall be 30 ± 2 pounds.
- (10) Readjust turnbuckles until cable tension is 30 ± 2 pounds and both ailerons are positioned at 0° on the rigging fixture.
- (11) Ensure that the control column chain tension is as described in this chapter.
- (12) Install locking clips on turnbuckles and remove control wheel lock.
- (13) Use rigging fixture to check aileron travel as control wheel is moved through its full range of travel. Full travel range for each aileron should be $15^\circ + 2^\circ / -0^\circ$ up, and $7\ 1/2^\circ + 2\ 1/2^\circ - 0^\circ$ down. The free aileron position should be $\pm 2^\circ$ of neutral.
- (14) If aileron travel does not fall within tolerance, remove wing tips per Chapter 57, and check the aileron control stops (Figure 27-03) for damage. Replace if damaged or distorted.

NOTE: **The down aileron contacts the stop before the up aileron. If aileron stops are not distorted or damaged, file the stop contact surface until specified aileron travel is attained.**

- (15) Reinstall wing tips (if removed) per Chapter 57.

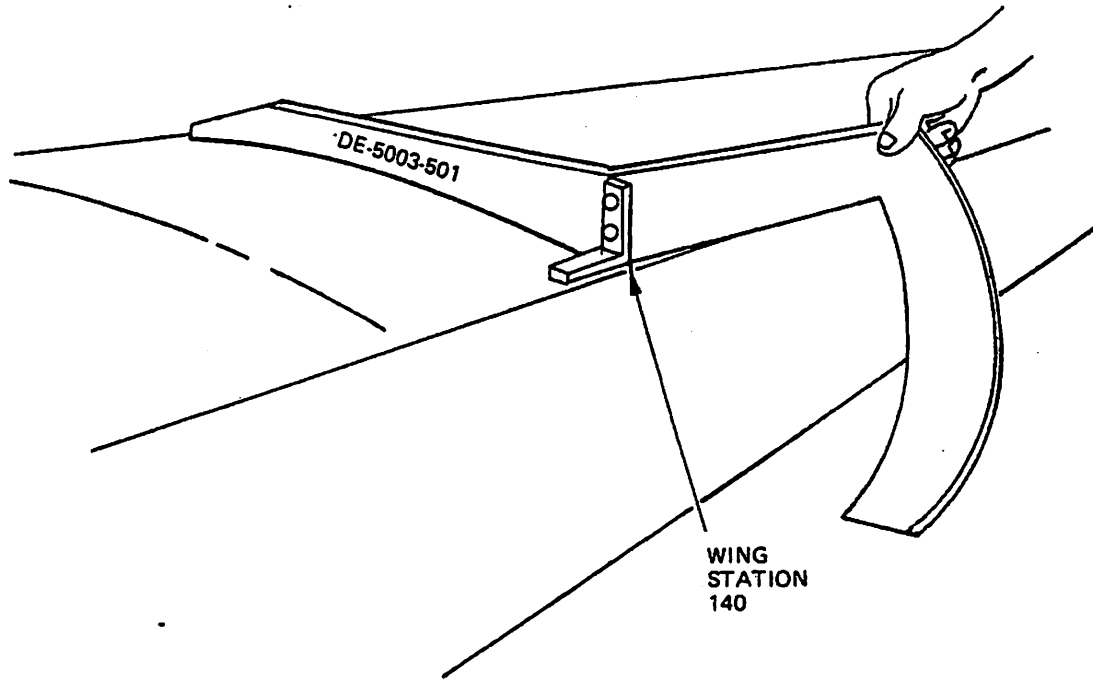
2. Control Surfaces Balancing Procedures

A. Definitions (See Figure 27-11)

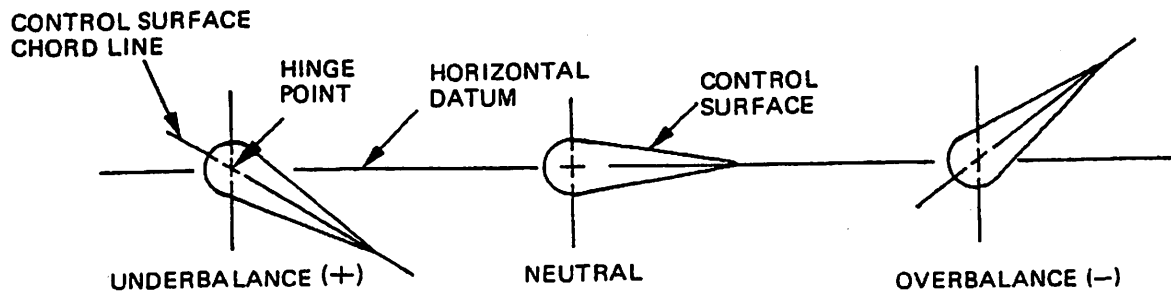
- (1) Under-balance is defined as the condition that exists when the control surface is trailing edge heavy and shall be symbolized by the plus (+) sign.
- (2) Neutral Static balance is defined as the condition that exists when the chord line of the control surface is horizontal when the surface is balanced.
- (3) Over-balance is defined as the condition that exists when the control surface is leading edge heavy and shall be symbolized by the minus (-) sign.

NOTE: **This information is applicable to the AG-5B Tiger Aircraft for the purpose of clarifying and facilitating the balancing of movable control surfaces.**

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**Aileron Rigging Fixture
Figure 27-10**



**Control Surface Static Balance
Figure 27-11**

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B. General Balancing Procedures

NOTE: The balancing device may be constructed in any manner as long as the requirements given below are met.

- (1) A line drawn through the hinge line support points must be level and perpendicular to the supporting knife-edges.
- (2) The supporting knife edges must be horizontal and parallel to each other within the requirements of paragraph (1) above. The knife-edges must be designed to allow the control surface to pivot freely about the hinge points.
- (3) The control surface must always be balanced with the hinge line in a horizontal attitude.
- (4) The area in which balancing operations are performed must be free of air movements including drafts, which might disturb the balancing operation.
- (5) Control surfaces equipped with trim tabs must have the tab and the tab actuating rod in place during the balancing operation.
- (6) The balancing device must include a means for accurately measuring the distance of the gage weight from the hinge line. The size of the gage weight is not critical as long as it's weight in ounces is accurately known; however, if the values given in Table 1 below are used, computation of moment will not be necessary.
- (7) The balancing device must include a means of determining when the chord line of the control surface is horizontally level, indicating a balanced condition exists.
- (8) Control surface balance must be rechecked after any painting, striping, repairs, or alterations to any control surface. An out-of-balanced control surface can seriously affect control and performance of the airplane.

NOTE: A typical device meeting these requirements is shown in Figure 27-12.

CONTROL SURFACE BALANCE DATA (Painted surface)

TABLE 1

MODEL	CONTROL SURFACE	GAUGE WT. (OZ.)	LIMIT	(INCHES)	MOMENT (IN. OZ.)
			AFT	FWD	
AG-5B	Aileron	8	2	4	-16 to +32
	Rudder	8	4	2	-32 to +16
	Elevator	8	14 to 2	6 to 12	-112 to -16

C. Aileron Balancing (See Figures 27-12 and 27-13)

- (1) Level the balancing device.
- (2) Support the Aileron on the knife-edges of the balancing device at both ends of the hinge line.

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NOTE: The torque tube is the hinge line of the aileron.

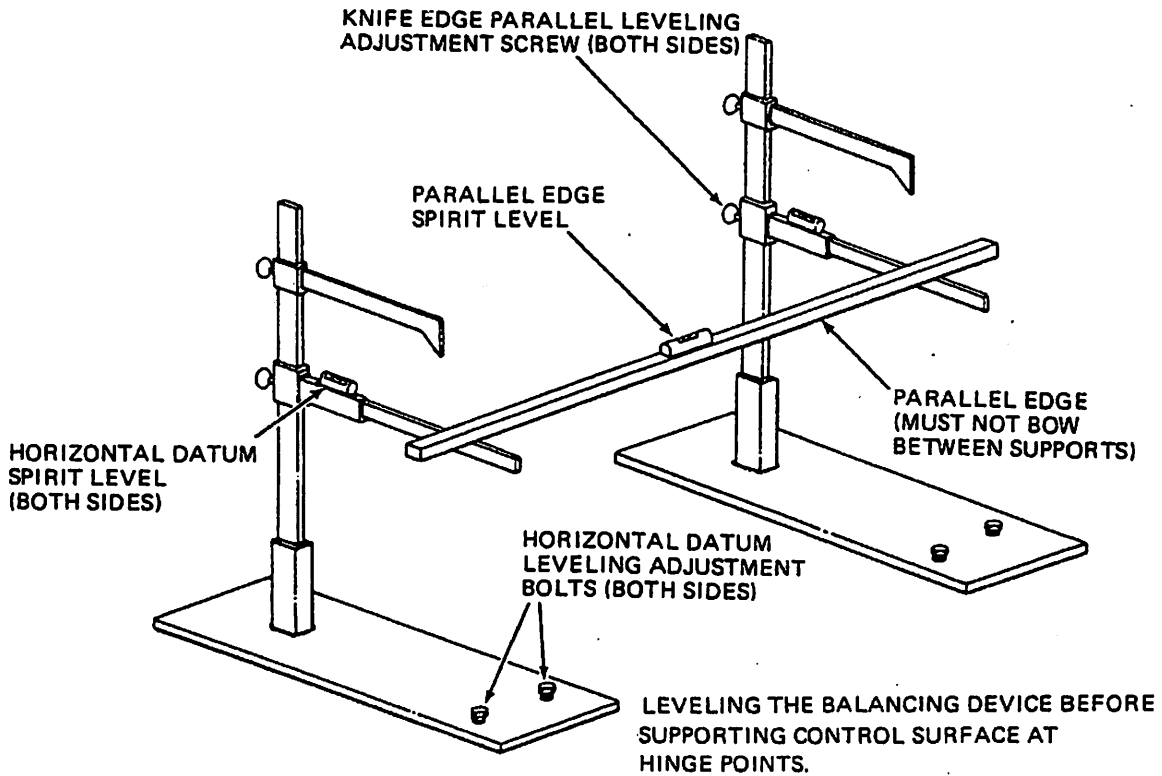
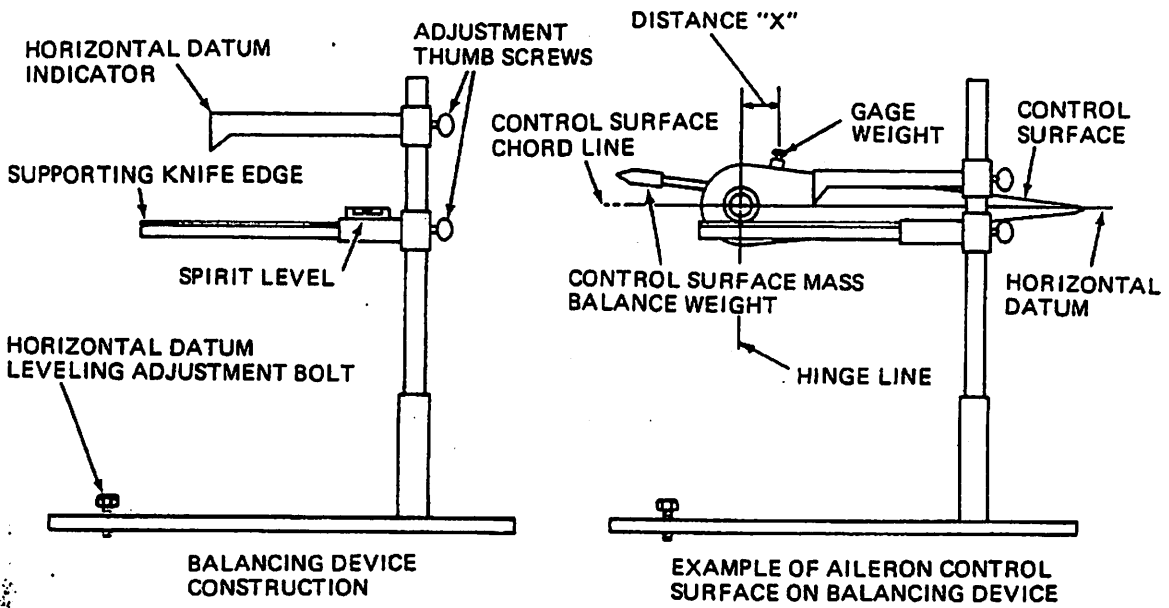
(3) Provide aileron chord line/horizontal datum reference as follows:

- (a) Place a light mark through the center of the torque tube and the center of the aileron trailing mark.

CAUTION: DO NOT USE A SCRIBE TO DRAW LINE. MARRING THE METAL CAN CAUSE CORROSION.

NOTE: For ease of accessibility, Sub-Paragraph (3) (a) may be accomplished before supporting aileron on balancing device.

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**Typical Control Surface Balance Device
Figure 27-12**

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- (b) Measure the distance from the top edge of the support knife to the center of the torque tube. Then set the horizontal datum indicator by measuring the same distance from the top edge of the support knife to the tip of the indicator pointer.
- (4) Check Aileron to see if it is nose heavy or tail heavy.
 - (a) If Aileron is nose heavy, start balance test by placing gauge weight on aileron surface aft of the hinge line.
 - (b) If Aileron is tail heavy, start balance test by placing gauge weight on aileron surface forward of hinge line.
- (5) Move gauge weight until chord line is horizontally level as pointed out by horizontal datum indicator.
- (6) Measure and record the distance (X) from the hinge centerline to the center of the gauge weight. The gauge weight must be within the distance limits given in Table 1 above.
- (7) If gauge weight is forward of the distance limits given in Table 1 (under-balance condition), the mass balance weight assembly must be replaced. This assembly is designed to provide a slight over-balance to allow balancing by removal of weight.

NOTE: If it is necessary to move the gauge weight forward of the hinge line, attach a string or fine wire to the gauge weight and loop it over the mass balance weight support tube.

- (8) If gauge weight is aft of the distance limits given in Table 1 (over-balance condition), remove weight from aileron mass balance weight until aileron balances by:
 - (a) Shaving away lead material from top and bottom of weight, (Maximum 0.125 inch).
 - or
 - (b) Drilling holes in either side of weight (Maximum depth 0.38 inch).

D. Elevator Balancing (See Figure 27-12 and 27-14)

NOTE: Elevator tip cap and attaching hardware must be installed on elevator before balancing is accomplished.

- (1) Level the balancing device.
- (2) Support the elevator on the knife-edges of the balancing device at both ends of the hinge line.

NOTE: Balance each elevator separately.

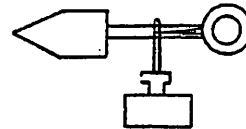
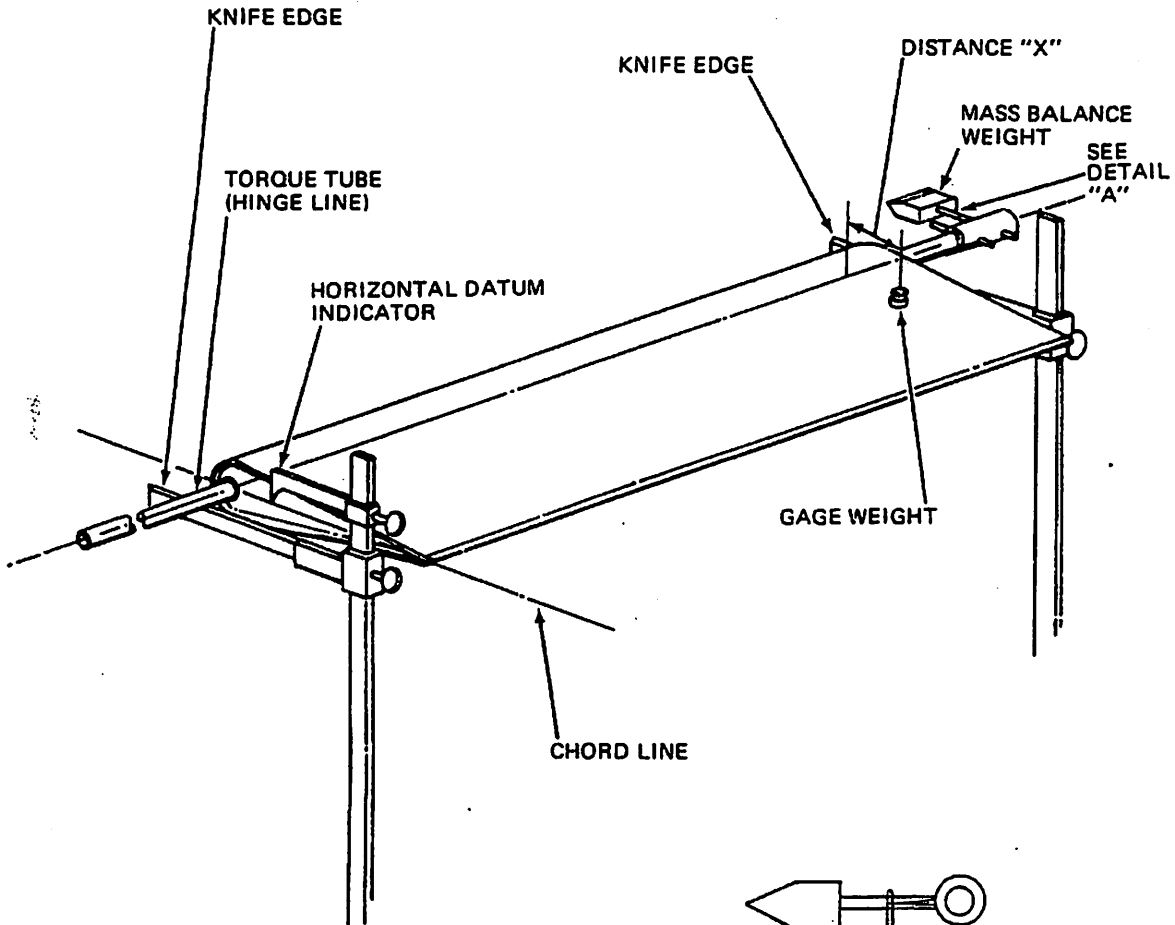
- (a) Install hinge bolts at the inboard and outboard hinge points.
- (3) Provide elevator chord line/horizontal datum reference as follows:
 - (a) Place a light mark through the center of the hinge point bolthole and through the center of the elevator trailing edge.

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CAUTION: DO NOT USE A SCRIBE TO DRAW LINE. MARRING THE METAL CAN CAUSE CORROSION.

NOTE: For ease of accessibility, Sub-Paragraph (3) (a) above may be accomplished before supporting elevator on balancing device.

- (b) Measure the distance from the top edge of the support knife to the center of the hinge point bolthole. Then set the horizontal datum indicator by measuring the same distance from the top of the support knife to the tip of the indicator pointer.

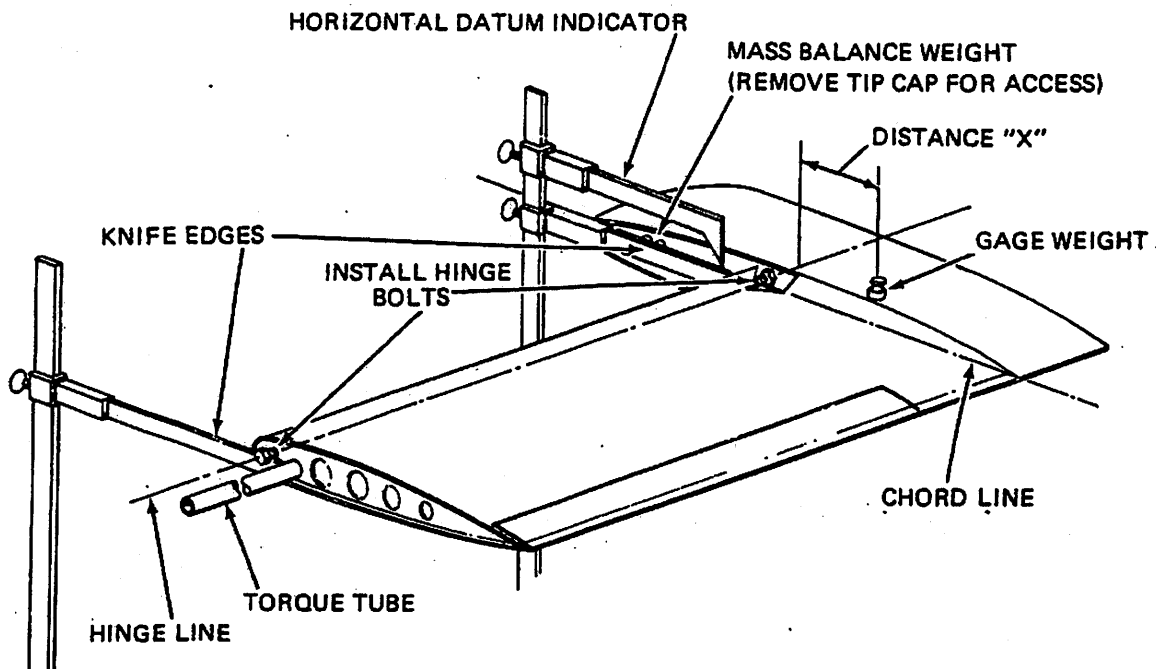


DETAIL A

EXAMPLE OF GAGE WEIGHT LOOPED OVER MASS BALANCE WEIGHT. SUPPORT TUBE WHEN NECESSARY TO MOVE GAGE WEIGHT FORWARD OF HINGE LINE.

**Typical Aileron Balancing
Figure 27-13**

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**Typical Elevator Balancing
Figure 27-14**

- (4) Check elevator to see if it is nose heavy or tail heavy.
 - (a) If elevator is nose heavy, start balance test by placing a gauge weight on the elevator surface aft of the hinge line.
 - (b) If elevator is tail heavy, start balance test by placing a gauge weight on elevator surface forward of the hinge line.
- (5) Move gauge weight until chord line is horizontally level as pointed out by horizontal datum indicator.
- (6) Measure and record the distance (X) from the hinge centerline to the gauge weight. The gauge weight must be within the distance limits given in Table 1.
- (7) If gauge weight is forward of the distance limits given in Table 1 (under-balance condition), the mass balance weight must be replaced with a heavier weight.
- (8) If gauge weight is aft of the distance limits given in Table 1 (over-balance condition), remove weight from elevator mass balance weight by drilling or shaving away lead weight material to bring elevator within balance limits.

NOTE: Tip cap must be reinstalled before determining new balance. It is necessary to remove the tip cap during mass balance weight rework.

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E. Rudder Balancing (See Figure 27-12 and 27-15)

NOTE: Rudder tip cap, flashing beacon and all attaching hardware must be installed on rudder before balancing is accomplished. Route flashing beacon, wire through torque tube to assure that it does not interfere with, or influence balancing procedure.

- (1) Level the balancing device.
- (2) Support the rudder on the knife-edges of the balancing device at both ends of the hinge line.

NOTE: The torque tube is the hinge line of the rudder.

- (3) Provide rudder chord line/horizontal datum reference as follows:

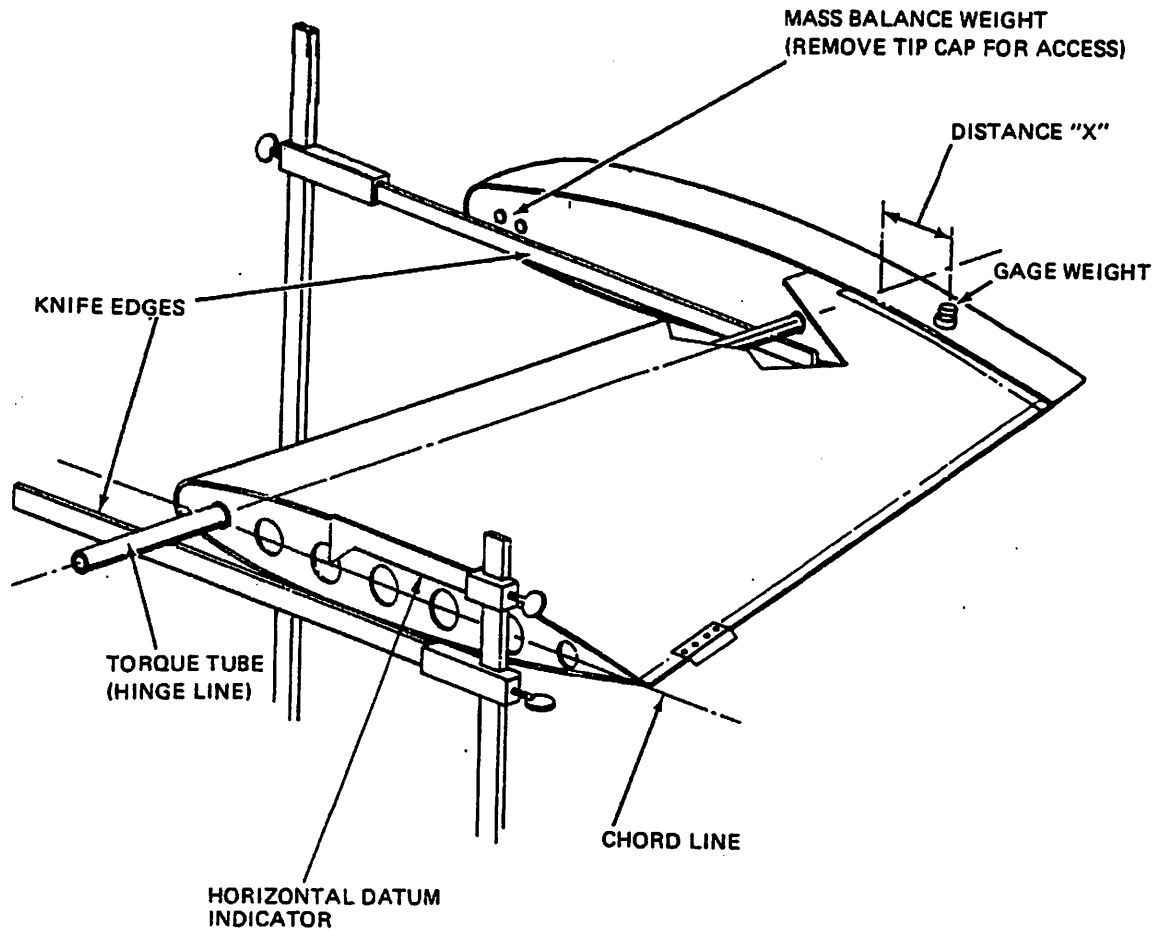
- (a) Place a light mark through the center of the torque tube and the center of the rudder trailing edge.

CAUTION: DO NOT USE A SCRIBE TO DRAW LINE. MARRING THE METAL CAN CAUSE CORROSION.

NOTE: For ease of accessibility, Sub-Paragraph (3) (a) above may be accomplished before supporting rudder on balancing device.

- (b) Measure the distance from the top edge of the support knife to the center of the torque tube. Then set the horizontal datum indicator by measuring the same distance from the top of the support knife to the tip of the indicator pointer.
- (4) Check the rudder to see if it is nose heavy or tail heavy.
 - (a) If the rudder is nose heavy, start balance test by placing a gauge weight on the rudder surface aft of the hinge line.
 - (b) If the rudder is tail heavy, start balance test by placing a gauge weight on the rudder surface forward of the hinge line.
- (5) Move the gauge weight until the chord line is horizontally level as pointed out by horizontal datum indicator.
- (6) Measure and record the distance (X) from the hinge centerline to the center of the gauge weight. The gauge weight must be within the distance limits given in Table 1.

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**Typical Rudder Balancing
Figure 27-15**

- (7) If the gauge weight is forward of the distance limits given in Table 1 (under-balance condition), the mass balance weight must be replaced with a heavier weight.
 - (a) Remove the rudder tip cap to gain access to mass balance weight. The tip cap must be reinstalled before determining new balance.
- (8) If the gauge weight is aft of the distance limits given in Table 1 (over-balance condition), remove weight from rudder mass balance weight by drilling or shaving away lead weight material to bring the rudder within balance limits.

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MAINTENANCE PRACTICES - CLEANING/PAINTING

1. General

CAUTION: WHEN CONTROL SURFACES ARE PAINTED THEIR BALANCE IS CHANGED. ALWAYS CHECK BALANCE AFTER PAINTING.

Clean and paint ailerons in accordance with Chapter 20.

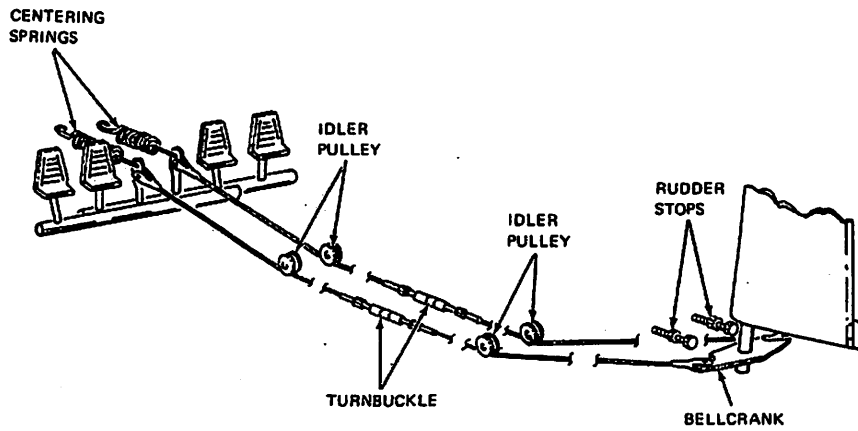
RUDDER AND TAB - DESCRIPTION/OPERATION

1. General (See Figure 27-16)

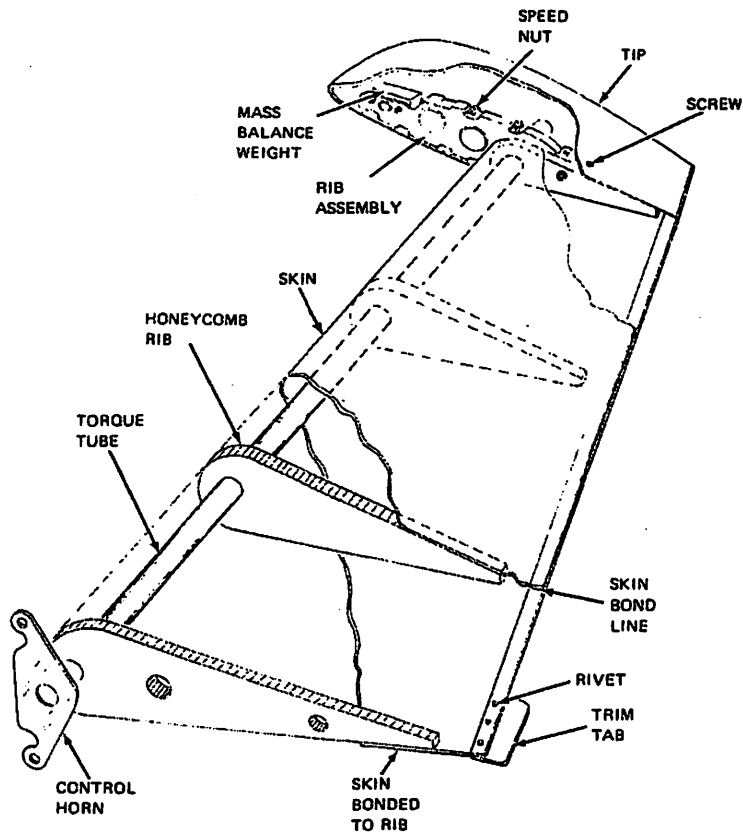
The rudder system is composed of dual rudder pedals, which are center loaded by centering springs, cables which extend from the rudder pedals to the rudder, and a rudder actuated by a bellcrank attached to the cables. Adjustable rudder stops are provided to limit rudder travel to that required for proper control.

The rudder assembly (Figure 27-17) is a bonded structure composed of a torque tube, honeycomb ribs, skin and a tip. The ribs are bonded to both the torque tube and the skin to form a rigid structure that can be positioned by the torque tube. A fixed, ground adjustable trim tab is riveted to the lower trailing edge of the rudder. The rudder is supported by two bearings, one at the base of the rudder, and the other between the top honeycomb rib and the tip. The rudder tip is supported by a rib assembly that is attached to the torque tube and the top honeycomb rib. This rib assembly also provides a mounting point for the rudder mass balance. The red transparent plastic rudder tip is attached to the rib by speed nuts and screws. The control horn is attached to the rudder torque tube beneath the bottom hinge. The flashing beacon is mounted under the rudder tip on the tip rib. (For more detail see Chapter 33, Lighting)

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**Rudder System
Figure 27-16**



**Rudder Assembly
Figure 27-17**

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MAINTENANCE PRACTICES - SERVICING

1. Lubrication

A. Rudder Bearing Lubrication

Apply MIL-PRF-7870 (See Chapter 12) oil to the torque tube, rudder bearings and the rudder control horn clevis bolts.

B. Rudder Pedal Lubrication

Apply MIL-PRF-7870 (See Chapter 12) oil to the rudder pedal bearings.

MAINTENANCE PRACTICES - REMOVAL/INSTALLATION

1. Rudder Removal/Installation

A. Rudder Removal (See Figure 27-18)

- (1) Remove tailcone per Chapter 53.
- (2) Remove tailcone access covers per Chapter 53.
- (3) Remove nut (1), washers (2), and bolt (3) from bellcrank (4).
- (4) Hold rudder deflected and remove screw (5) from top hinge (6).
- (5) Hold rudder deflected in the opposite direction and remove the other screw (5) from top hinge (6).
- (6) Disconnect connector (7) for beacon by pushing release pins and pulling apart.
- (7) Lift rudder (9) until its torque tube (10) clears the bottom spacer (11), bellcrank (4), and hinge (12).
- (8) Remove top spacer (13) from the torque tube (10).
- (9) Slowly remove the rudder while feeding the wire bundle (14) through the vertical fin until it clears.

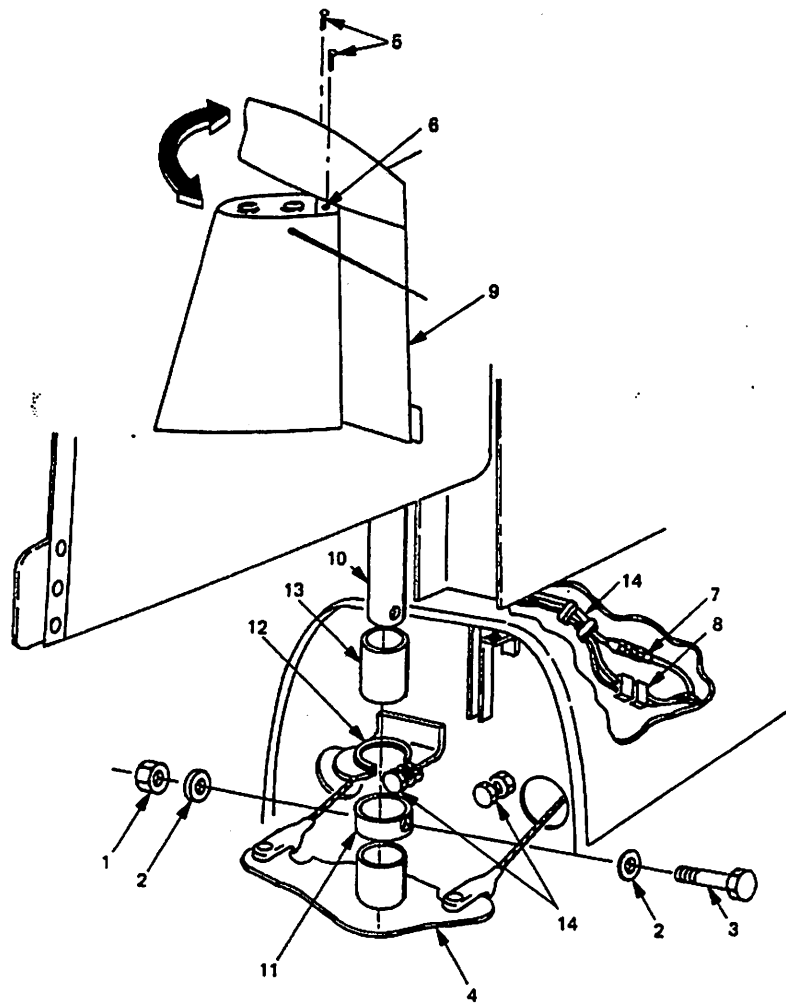
B. Rudder Installation. (See Figure 27-18)

- (1) Position the rudder so the wire bundle (14) can be fed through the access hole in the vertical fin. Feed the wire bundle through the bottom of the vertical fin and connect the ground strap.
- (2) Place upper spacer (13) on torque tube (10).
- (3) Slide torque tube (10) through hinge (12).
- (4) Place bottom spacer (11) on torque tube and align holes.

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- (5) Insert bellcrank tube (4) in torque tube and align holes.
- (6) Secure with bolt (3), washers (2), and nut (1).
- (7) Hold rudder deflected and install screw (5) through top hinge (6). Hold deflected in the other direction and install screw (5) in hinge (6).
- (8) Connect electrical connector (8) by pressing halves together, assure tabs lock.
- (9) Install tailcone per Chapter 53.
- (10) Check controls for freedom of movement.
- (11) Check operation of flashing beacon.
- (12) Check rudder tip fin clearance per Rudder Tip-Fin Clearance Adjustment paragraph under Rudder Rigging below.

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- | | |
|--------------|------------------|
| 1. Nut | 8. Connector |
| 2. Washer | 9. Rudder |
| 3. Bolt | 10. Torque Tube |
| 4. Bellcrank | 11. Spacer |
| 5. Screw | 12. Hinge |
| 6. Hinge | 13. Spacer |
| 7. Connector | 14. Control Stop |

**Rudder Removal / Installation
Figure 27-18**

2. Rudder Pedal Removal/Installation (See Figure 27-19)

A. Rudder Pedal Removal

- (1) Remove cotter pin (1), washer (2), and clevis pin (3) from brake (4) and remove rudder pedal linkage (5).
- (2) Depress left rudder pedal and disconnect left return spring (6) from control horn (7).
- (3) Disconnect right return spring (8) from control horn (7).

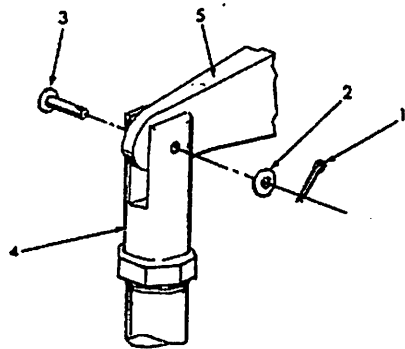
**TIGER AIRCRAFT AG-5B SERIES
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- (4) Remove return springs (6) and (8) from eye bolts (9).
- (5) Remove cotter pins (10), nuts (11), and washers (12) from clevis bolts (13), and remove rudder cables (14) from control horns (7).
- (6) Remove nuts (15) and washers (16) from mounting bolts (17), and remove bearing assembly.
- (7) Disconnect hydraulic lines (19) from elbow (20) on rudder bar assembly (21) and remove brake lines (22). Cap all open lines for storage.
- (8) Pull the rudder bar assemblies (21) laterally until they clear the bearings (18) on the right side, and remove the rudder bar assemblies (21).

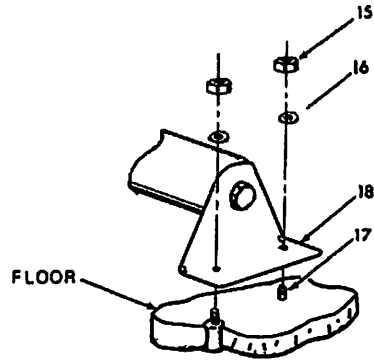
B. Rudder Pedal Installation

- (1) Install a bearing assembly (18) in the left end of each rudder bar assembly (21).
- (2) Position the rudder bar assemblies (21) such that their open ends slide over the bearings on the right side of the aircraft.
- (3) Place the bearing assemblies (18) on the left ends of the rudder bar assemblies (21) so that they fit over the mounting bolts (17) in the floor of the aircraft. Secure with washers (16) and nuts (15), and torque to standard value. (See Chapter 91)
- (4) Connect hydraulic lines (19) to elbow fittings (20) and torque to standard value. (See Chapter 91)
- (5) Position rudder cable clevises (14) over control horns (7) and secure with clevis bolts (13), washers (12), nuts (11), and cotter pins (10).
- (6) Hook return springs (6) and (8) into eye bolts (9).
- (7) Depress left rudder pedal and hook return spring (6) into control horn (7).
- (8) Depress right rudder and connect return spring (8) to control horn (7).
- (9) Place rudder pedal brake arms (5) in slot in top of brakes (4). Secure with clevis pin (3), washer (2), and cotter pin (1).
- (10) Bleed brakes per Chapter 32.
- (11) Rig rudder controls per Rudder Pedal Rigging.

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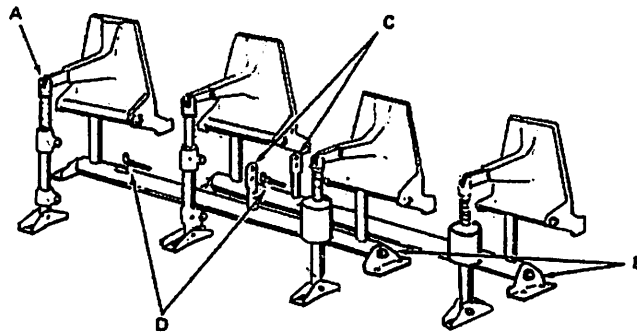


DETAIL A

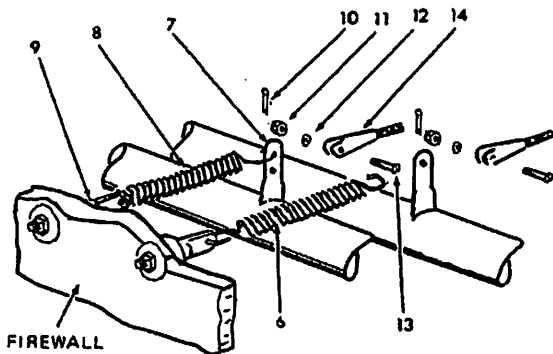


DETAIL B

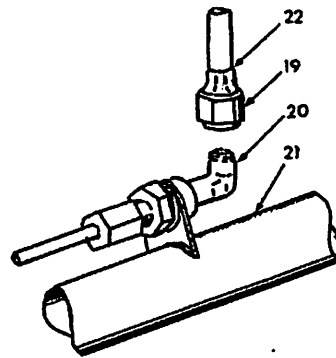
- 1. Cotter Pin
- 2. Washer
- 3. Clevis Pin
- 4. Brake
- 5. Rudder Pedal Linkage
- 6. Spring
- 7. Control Horn
- 8. Spring
- 9. Eye Bolt
- 10. Cotter Pin
- 11. Nut



- 12. Washer
- 13. Clevis Bolt
- 14. Rudder Cable
- 15. Nut
- 16. Washer
- 17. Bolt
- 18. Bearing
- 19. Hydraulic Line
- 20. Elbow
- 21. Rudder Bar
- 22. Brake Line



DETAIL C



**DETAIL D
ROTATED 90°**

**Rudder Pedal Removal and Installation
Figure 27-19**

**TIGER AIRCRAFT AG-5B SERIES
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3. Rudder Cable Removal/Installation (See Figure 27-20)

A. Rudder Cable Removal

- (1) Remove tailcone per Chapter 53.
- (2) Remove cotter pins (1), nuts (2), washers (3), and clevis bolts (4) from cable clevis (5).
- (3) Remove cable clevises (5) from rudder bellcrank (6) and allow cables (7) to move forward into fuselage.
- (4) Remove cotter pin (8) from guard (9) and remove guard (9) from pulley assembly (10).
- (5) Pull cables (7) from under pulley assembly (10).
- (6) Remove nuts (11) and washers (12) from studs (13) in aircraft floor (14) and lift pulley assembly (15) to clear cables (7).
- (7) Pull cables (7) from under pulley assembly (15).
- (8) Remove cotter pins (16), nuts (17), washers (18), and clevis bolts (19) from cable clevis ends (20).
- (9) Remove clevis ends (20) from control horns (21) and remove cables (7) from aircraft.

B. Rudder Cable Installation

NOTE: Lubricate new cables with commercial grade paraffin before installation.

- (1) Each rudder cable is composed of a short cable (forward cable) and a long cable (aft cable) joined by a turnbuckle. Select the clevis end (5) of the long cable and attach it to the rudder bellcrank (6) with clevis bolt (4), washer (3), nut (2), and cotter pin (1). Attach both rudder cables to the bellcrank (6).
- (2) Feed both cables (7) into the fuselage and route them so they engage the pulleys (22) on the pulley assembly (10).
- (3) While holding the cables (7) in the pulleys (22), install guard (9) and secure it with a cotter pin (8).
- (4) Route the cables beneath the spar center section, and through the pulleys on the pulley assembly (15).
- (5) While holding the cables in the pulleys, install pulley assembly (15) over studs (13). Secure with washers (12) and nuts (11). Torque to standard values per Chapter 91.
- (6) Place cable clevises (20) over control horns (21), align holes, and secure with clevis bolts (19), washers (18), nuts (17), and cotter pins (16).
- (7) Rig rudders per this chapter.
- (8) Install tailcone per Chapter 53.

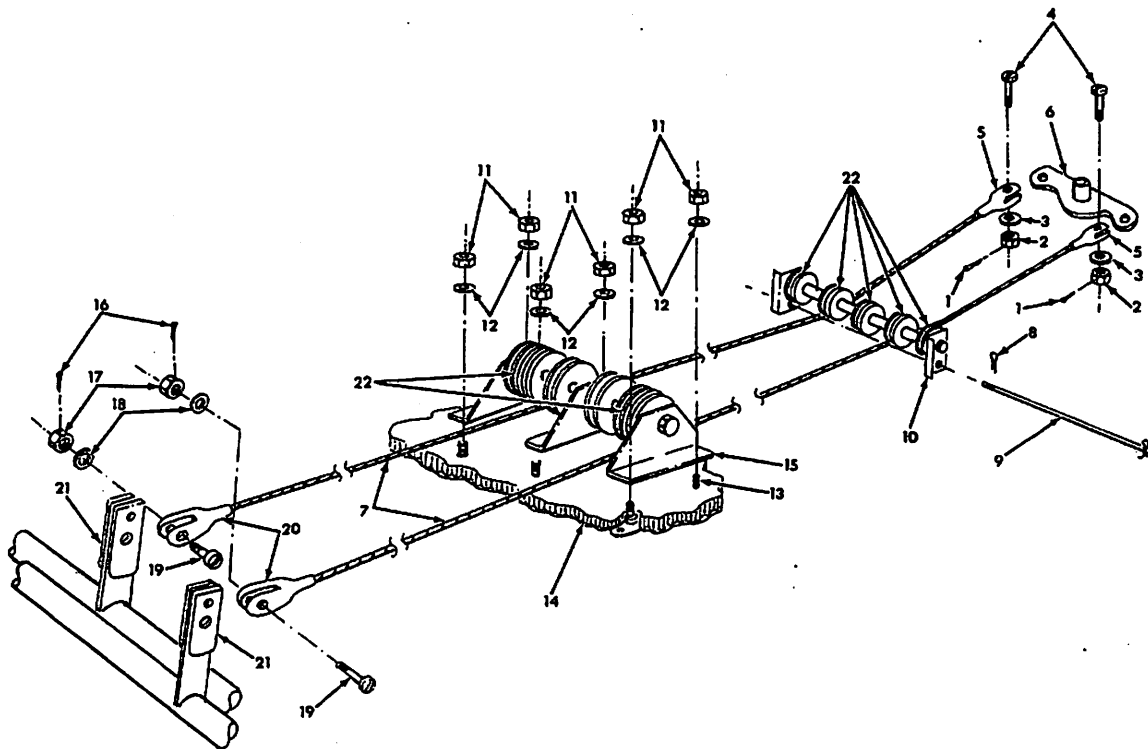
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4. Rudder Bearing Removal/Installation

- A. Remove the rudder as described above.
- B. The rudder bearings are located in the hinges (6 and 12, Figure 27-18) and are removed and installed in the same manner as the aileron bearings.

5. Rudder Bearing Wear Limits

Reference "Aileron Bearing Wear Limits" this chapter.



- | | |
|---------------------|---------------------|
| 1. Cotter Pin | 12. Washer |
| 2. Nut | 13. Studs |
| 3. Washer | 14. Aircraft Floor |
| 4. Clevis Bolt | 15. Pulley Assembly |
| 5. Cable Clevis | 16. Cotter Pin |
| 6. Bellcrank | 17. Nuts |
| 7. Cables | 18. Washers |
| 8. Cotter Pin | 19. Clevis Bolts |
| 9. Guard | 20. Cable Clevis |
| 10. Pulley Assembly | 21. Control Horn |
| 11. Nuts | 22. Pulleys |

**Rudder Cable Removal / Installation
Figure 27-20**

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6. Rudder Bellcrank and Torque Tube Repair

Excessive play in the rudder control system can be caused by slippage at the rudder bellcrank and rudder torque tube. In certain high-time, in-service aircraft, this condition has been traced to enlargement or elongation of the attach holes in the rudder torque tube (10, Figure 27-18) at the rudder bellcrank (4).

A. The following is an acceptable repair from a structural standpoint:

- (1) Remove tailcone assembly. (Refer to Chapter 53)
- (2) Hold the rudder bellcrank (4, Figure 27-18) firmly against one of the rudder control stops (14). Grasp the rudder (9) at the trailing edge and attempt to rotate the rudder torque tube (10) in both directions. (The torque tube is an integral part of the rudder)
- (3) If play is noted, determine the largest diameter of the rudder torque tube and rudder bellcrank bolt holes.
- (4) If the largest diameter exceeds 0.2505 inch, open the existing boltholes in the rudder torque tube, spacer and rudder bellcrank to 0.312 to 0.315 inch diameter.

NOTE: Do not increase the hole size beyond that specified. If the hole will not clean up, the rudder bellcrank and rudder must be replaced. If removal for repair/replacement is necessary, Refer to Maintenance Practices - Removal/Installation, in this chapter.

- (5) If existing bolt holes are opened in accordance with paragraph 'D' above, install oversize attach hardware listed below.

NAS464P5A23 -- Bolt, NAS1149F0563P -- Washers, MS20364-524 - Nut

- (6) If repair or replacement is made, perform a rudder rigging check. Refer to Adjustment/ Test, this chapter, for rigging procedures.
- (7) Record the Repair/Replacement in the aircraft log.

1. Rudder Rigging

A. Rudder Return Tension Adjustment (See Figure 27-21)

- (1) Remove tailcone per Chapter 53.
- (2) Remove trim per Chapter 25, as required to gain access to rudder turnbuckles.
- (3) Hold the rudder centered so that it aligns with the top of the vertical fin, and clamp blocks to the rudder bellcrank so that rudder is held in alignment.
- (4) Loosen rudder cable turnbuckles.
- (5) Place a 7 inch wooden block between each pilot rudder pedal and the firewall.
- (6) Slowly tighten rudder turnbuckles (each by the same amount) until one or both wooden blocks fall from behind rudder pedals.

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- (7) Safety the rudder turnbuckles.
- (8) Remove the clamps and blocks from bellcrank.
- (9) Install tailcone per Chapter 53.
- (10) Reinstall trim per Chapter 25.

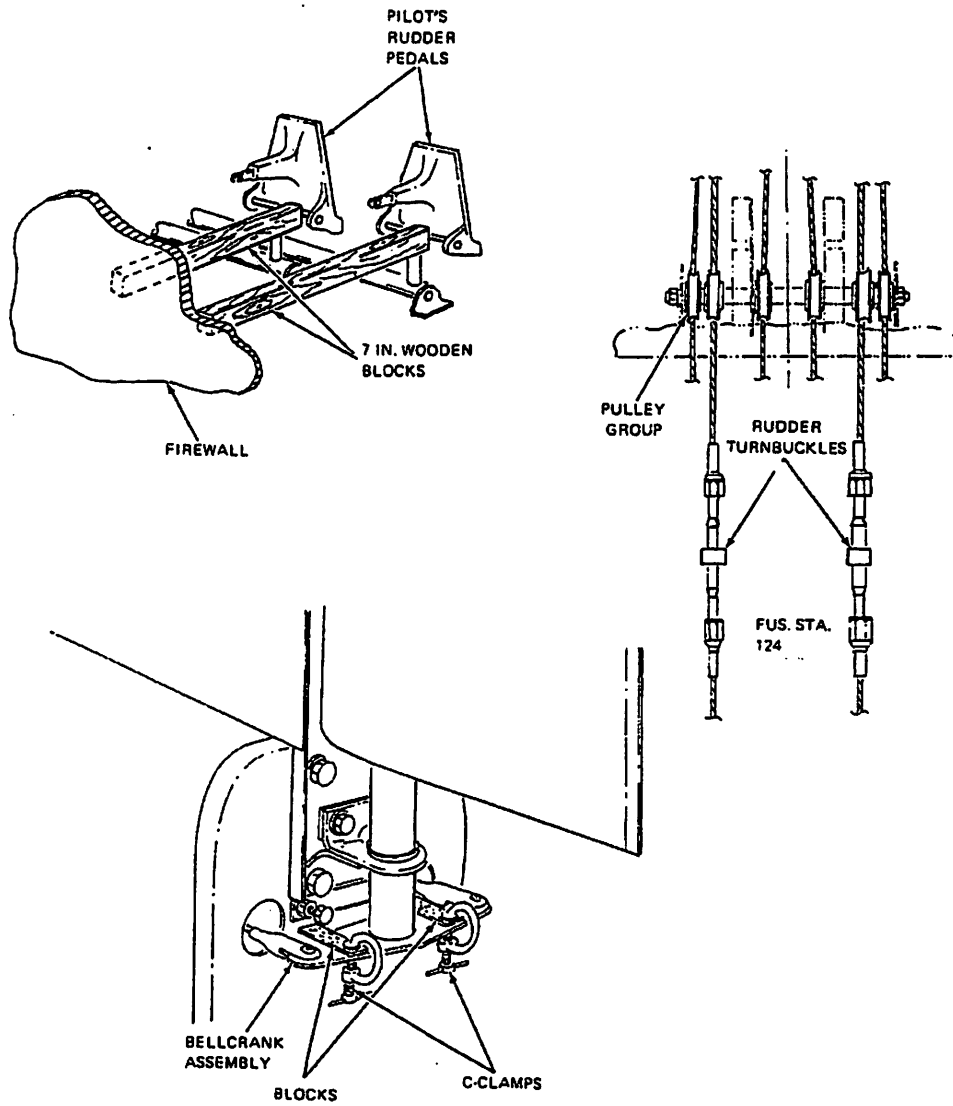
B. Rudder Travel Adjustment (See Figure 27-22)

- (1) Remove tailcone per Chapter 53.
- (2) Position rudder rigging fixture (DE-0002-501) on vertical fin.
- (3) Loosen the control stop lock nut on each control stop.
- (4) Depress the left rudder pedal to its stop, and adjust the left control stop until the rudder rigging fixture indicates $25^{\circ} \pm 2^{\circ}$ rudder deflection to the left.
- (5) Hold the control stop and tighten lock nut.
- (6) Repeat Steps (4) and (5) for the right hand side.
- (7) Install tailcone per Chapter 53.

C. Rudder Tip-Fin Clearance Adjustment (See Figure 27-23)

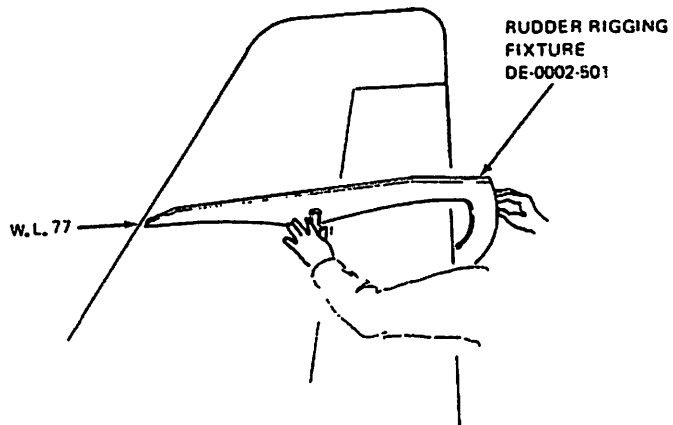
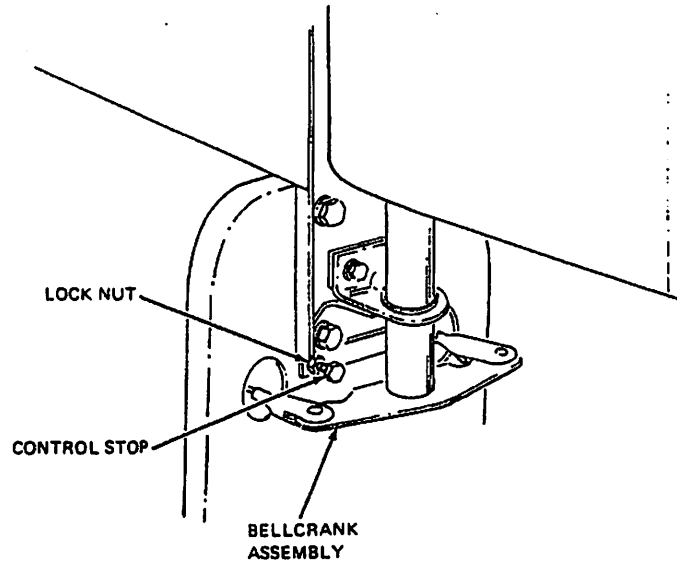
- (1) Inspect rudder for proper clearance (0.10 inch minimum) between rudder tip and vertical fin.
- (2) If insufficient clearance exists, remove rudder per this chapter.
- (3) Remove screws (1) and rudder tip (2).
- (4) Remove nut (3) and washer (4).
- (5) Remove nut (5), washer (6), and bolt (7) from torque tube, and lift rib (8) from rudder (9).

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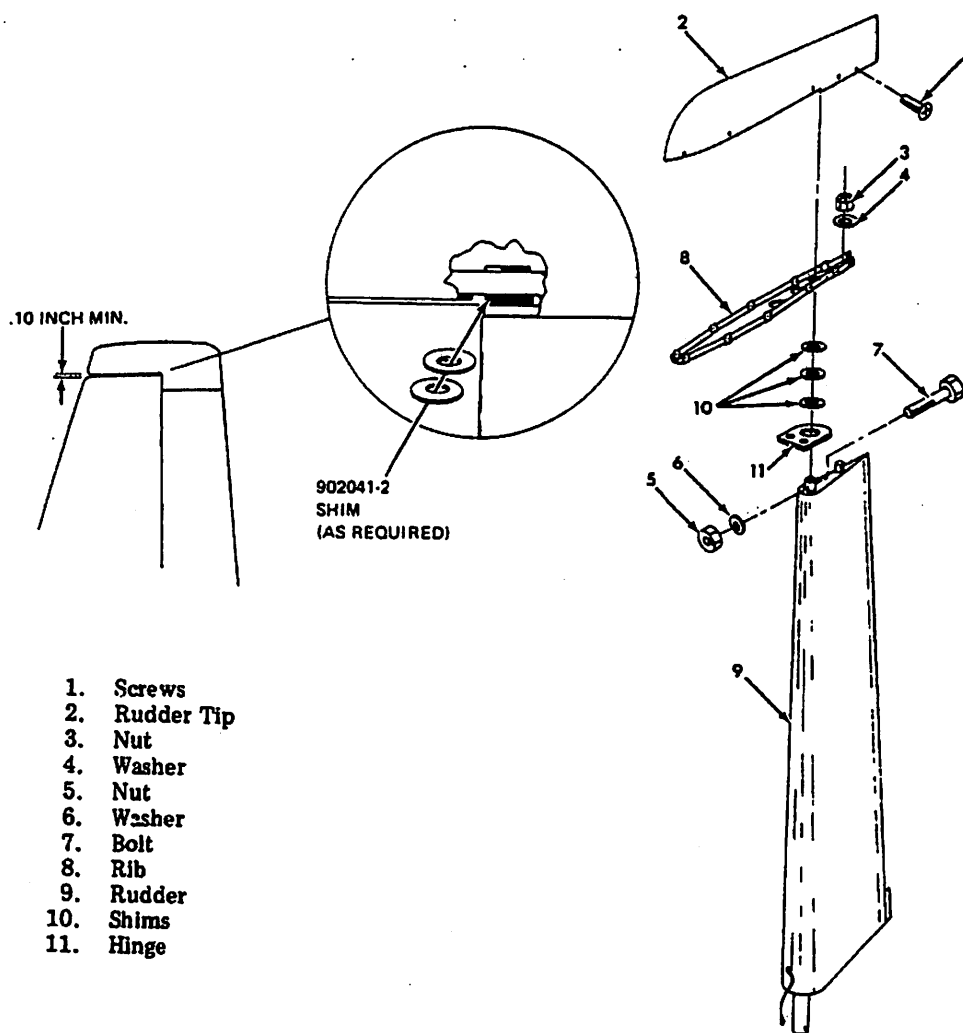
**Rudder Return Tension Adjustment
Figure 27-21**

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**Rudder Travel Adjustment
Figure 27-22**

**TIGER AIRCRAFT AG-5B SERIES
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**Rudder Tip Fin Adjustment
Figure 27-23**

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- (6) Place shims (10) on torque tube between hinge (11) and rib (8), to achieve the required clearance.
- (7) Place rib (8) on rudder (9), secure with washer (4), nut (3), bolt (7), washer (6), and nut (5).
- (8) Place tip (2) on rudder (9) and secure with screws (1).
- (9) Install rudder per Removal/Installation, and Figure 27-18.

D. Rudder Trim Tab Adjustment

The rudder trim tab consists of a ground adjustable tab located on the lower end of the rudder trailing edge.

NOTE: The aircraft can be rigged to suit individual requirements by adjusting the fixed trim tab on the rudder. Do not exceed 45° as it will not contribute any more toward trim.

2. Rudder Balancing

Refer to control surface balancing procedures.

MAINTENANCE PRACTICES - CLEANING/PAINTING

1. Cleaning/Painting

CAUTION: WHEN CONTROL SURFACES ARE PAINTED THEIR BALANCE IS CHANGED. ALWAYS CHECK BALANCE AFTER PAINTING.

Refer to Chapter 20 for proper cleaning and painting procedures.

ELEVATOR & TAB - DESCRIPTION/OPERATION

1. General (See Figure 27-24)

A. Elevator Control System

As the control wheel is moved fore and aft, its displacement is transmitted by cables to the bellcrank on the elevator. Turnbuckles in the elevator control cables enable adjustment of cable tension, and control stops permit adjustment of elevator travel.

B. Elevator Assembly (See Figure 27-25)

The elevator assembly consists of the elevator, and the anti-servo tab. The elevator is composed of a torque tube to which is bonded honeycomb ribs, which in turn are bonded to an aluminum skin. The one-piece skin is formed around the elevator leading edge, and bonded to the ribs and rear spar. The outboard end of the control surface is capped by a formed plastic tip attached with screws. Contained within the tip is the mass balance weight that provides proper control surface balance.

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Attached to the inboard trailing edge of the elevator, is the anti-servo tab. This tab is attached to the elevator by a piano hinge. The tab is composed of a formed aluminum skin bonded to internal ribs, and actuated by an arm on its inboard end.

C. Elevator and Trim Linkage (See Figure 27-26)

The elevator control cables are attached to the elevator bellcrank. This bellcrank moves the elevator in response to control column movement. The anti-servo bellcrank is mounted on bearings surrounding the elevator torque tubes. The trim arm, which is positioned by the trim system, establishes the position of the anti-servo bellcrank.

As the elevator is moved upward, a roller, attached to the anti-servo bellcrank, moves the front end of the trim tab arm downward. Since the trim tab is hinged at its center (in line with the trim tab hinge) the trim tab is forced upward by an amount proportional to elevator movement. When the elevator moves downward, movement of the trim tab is also in the downward direction.

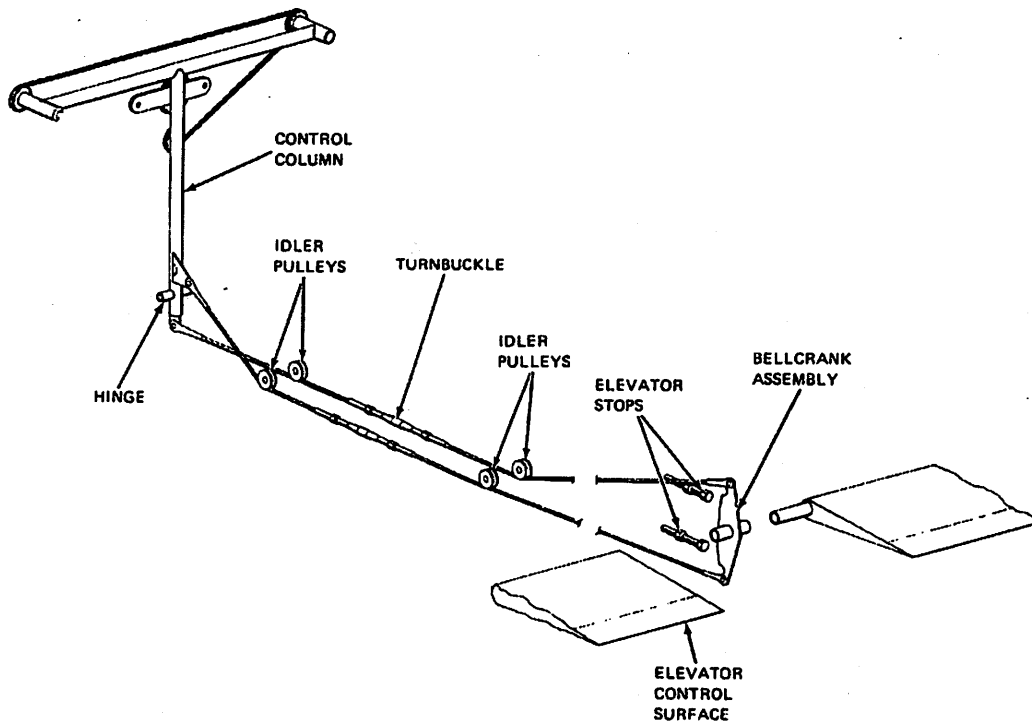
Thus, the trim tab provides control pressure, proper control "feel" and increases the effectiveness of the elevator.

Elevator trim is accomplished by positioning the anti-servo bellcrank, through the trim system such that the deflection of the trim tab is caused to increase in one direction while decreasing in the other direction.

D. Elevator Trim Control (See Figure 27-26)

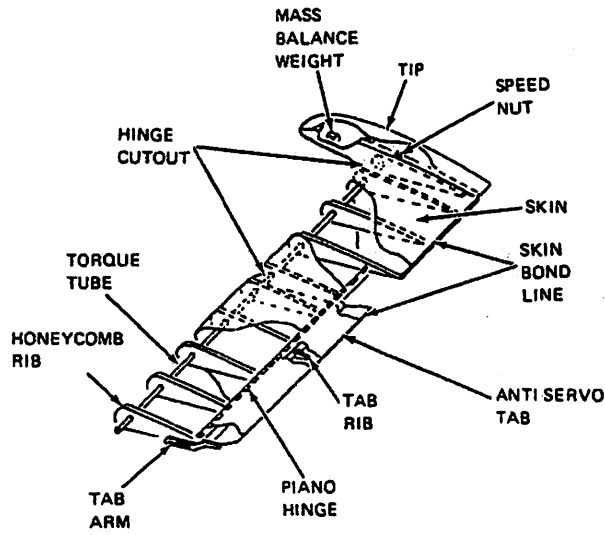
As the trim wheel is rotated, a set of spur gears turn the flexible shaft. This shaft is, in turn, connected to an aluminum shaft that extends to the empennage. The aluminum shaft drives a jackscrew that positions the anti-servo bellcrank.

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**Elevator Control System
Figure 27-24**

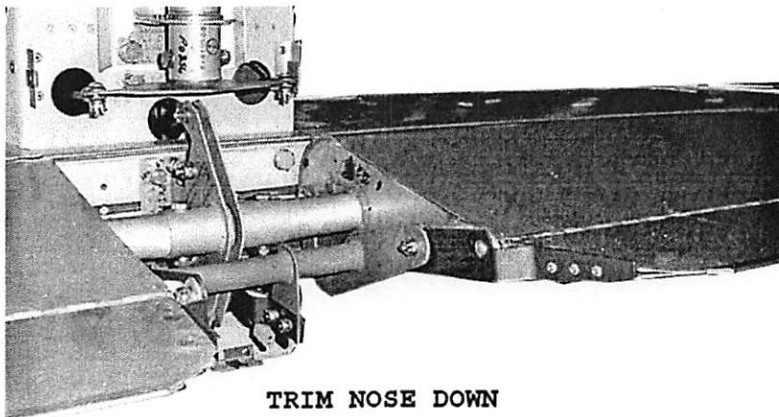
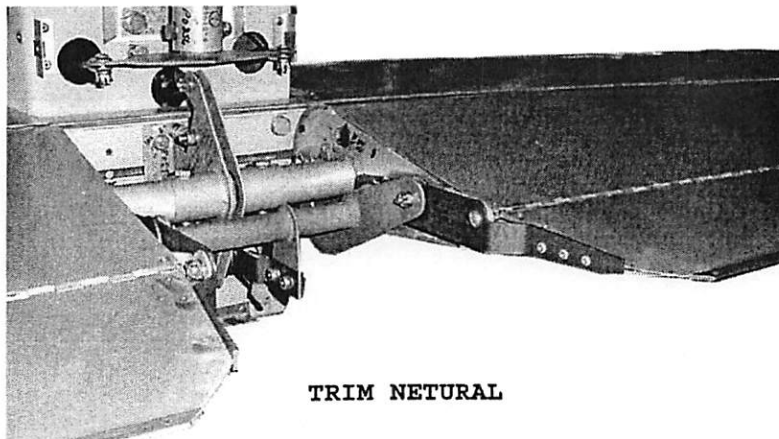
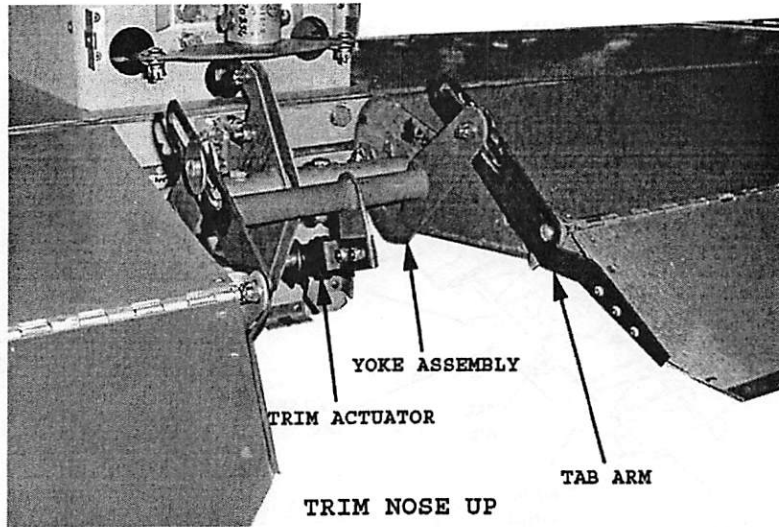
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**NOTE: RIGHT SIDE SHOWN
LEFT SIDE MIRROR
IMAGE.**

**Elevator Control Surface
Figure 27-25**

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**Elevator and Trim Linkage
Figure 27-26**

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MAINTENANCE PRACTICES - SERVICING

1. Lubrication

A. Trim Wheel Gear Lubrication

- (1) Remove console trim per Chapter 25.
- (2) Use a clean, lint-free cloth to wipe excess grease and foreign material from the gears.
- (3) Apply a coating of MIL-PRF-81332 grease to the gears. (See Chapter 12)
- (4) Install console trim per Chapter 25.

B. Trim Actuator Shaft Lubrication

- (1) Remove tailcone per Chapter 53.
- (2) Use a clean, lint-free cloth to wipe excess grease and foreign material from the actuator shaft screw threads.
- (3) Apply a coating of MIL-PRF-81332 grease to the shaft screw threads. (See Chapter 12)
- (4) Install tailcone per Chapter 53.

C. Trim Tab Bellcrank and Clevis Pin Lubrication

- (1) Remove tailcone per Chapter 53.
- (2) Apply a light coating of oil, MIL-PRF-7870 to bellcranks at pivot points and to rollers. (See Chapter 12)
- (3) Install tailcone per Chapter 53.

MAINTENANCE PRACTICES - REMOVAL/INSTALLATION

1. Elevator Removal/Installation (See Figure 27-27)

A. Elevator Removal

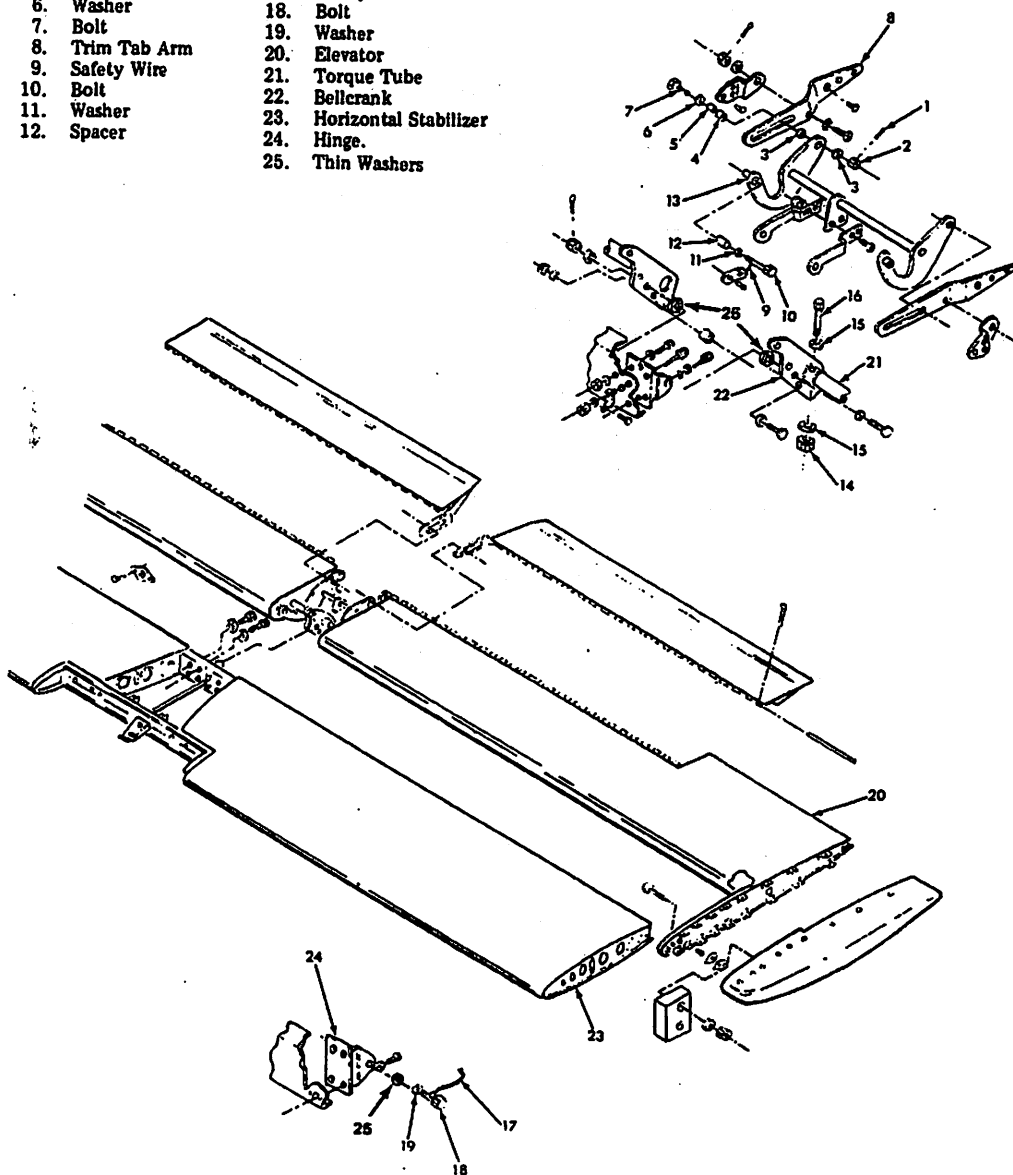
- (1) Remove tailcone per Chapter 53.
- (2) Remove cotter pin (1), nut (2), washers (3), roller (4), bushing (5), washer (6), and bolt (7) from trim tab arm (8).
- (3) Cut safety wire (9) and remove bolt (10), washer (11), and spacer (12) from yoke assembly (13).
- (4) Remove nut (14), washers (15), and bolt (16).

NOTE: Support elevator so that it does not fall when the hinge bolts are removed.

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- (5) At the two hinges, hold the elevator in the full up position, and remove safety wire (17). Remove bolts (18), and washers (19 and 25).
- (6) Pull elevator (20) outboard until torque tube (21) clears bellcrank (22) and remove elevator from aircraft.

- | | |
|-----------------|---------------------------|
| 1. Cotter Pin | 13. Yoke Assembly |
| 2. Nut | 14. Nut |
| 3. Washers | 15. Washer |
| 4. Roller | 16. Bolt |
| 5. Bushing | 17. Safety Wire |
| 6. Washer | 18. Bolt |
| 7. Bolt | 19. Washer |
| 8. Trim Tab Arm | 20. Elevator |
| 9. Safety Wire | 21. Torque Tube |
| 10. Bolt | 22. Bellcrank |
| 11. Washer | 23. Horizontal Stabilizer |
| 12. Spacer | 24. Hinge |
| | 25. Thin Washers |



**Elevator Removal/Installation
Figure 27-27**

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B. Elevator Installation

- (1) Position elevator (20) on horizontal stabilizer (23) so that hinges (24) align with boltholes in stabilizer. Also ensure that torque tube (21) is inserted in bellcrank (22) with holes aligned.
- (2) Install bolts (18) and washers (19 and 25), through hinge (24) into nut plate in elevator.
- (3) Use bolt (16), washers (15), and nut (14) to secure bellcrank (22) to torque tube (21).
- (4) At the forward end of each elevator tip cap, check for a gap of 0.100 to 0.350 inches between the tip cap and the horizontal stabilizer. If the gap is excessive, adjust the quantity and position of washers (25) between the bellcranks (22) and at the hinges (24) as required to obtain the proper clearance. If gap is less than 0.100 inch, loosen screws (1), reposition tip (2), obtain required clearance and retighten screws. Torque bolts (18) and (16) to standard value, Chapter 91, and secure bolts (18) with safety wire.
- (5) On bolt (7), place washer (6) and bushing (5).
- (6) Place roller (4) over bushing (5) and install bolt (7) through the slot in the trim tab arm (8).
- (7) Place washer (3) on bolt (7) and insert bolt (7) in rear arm of yoke assembly (13). Secure bolt (7) with washer (3), nut (2), and cotter pin (1).
- (8) Align forward arm of yoke (13) with hole in elevator (20).
- (9) Place bushing (12) in arm yoke (13) and secure to elevator (20) with washer (11) and bolt (10). Torque to standard value (Chapter 91) and safety wire with 0.040" wire.
- (10) Rig elevator per Adjustment/Test.
- (11) Install tailcone per Chapter 53.

2. Elevator Disassembly/Assembly (See Figure 27-28)

A. For Elevator Bearing Removal reference Chapter 55.

B. Elevator Disassembly

(1) Trim Tab Removal

- (a) Remove screws (1) and pull elevator tip (2) from elevator (3).
- (b) Remove cotter pin (4), nut (5), washers (6), roller (7), bushing (8), washer (9), and bolt (10) from trim tab arm (11).
- (c) Remove cotter pin (12), nut (13), washers (14), and bolt (15) from trim tab arm (11) and bracket (16).
- (d) Remove cotter pin (17) from hinge pin (18) and hinge (19).
- (e) Pull hinge pin (18) from inboard end of hinge (19) and remove trim tab (20) from elevator (3).

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(2) Linkage Disassembly

- (a) Remove nut (21), washers (22), and bolt (23) from bellcrank (24).
- (b) Remove safety wire (25), bolt (26), washer (27), and bushing (28) from yoke assembly (29).
- (c) Pull torque tube (30) from bellcrank (24).
- (d) Remove cotter pin (31), nut (32), washers (33), and bolt (34) from bellcrank (24) and hinge (35).
- (e) Remove nuts (36), washers (37), bolts (38), and spacers (39) from bellcrank (24) and separate the bellcrank.
- (f) Remove nuts (40), washers (41) and bolts (42), and remove tab arms (43) from yoke assembly (29).

C. Elevator Assembly

(1) Trim Tab Installation

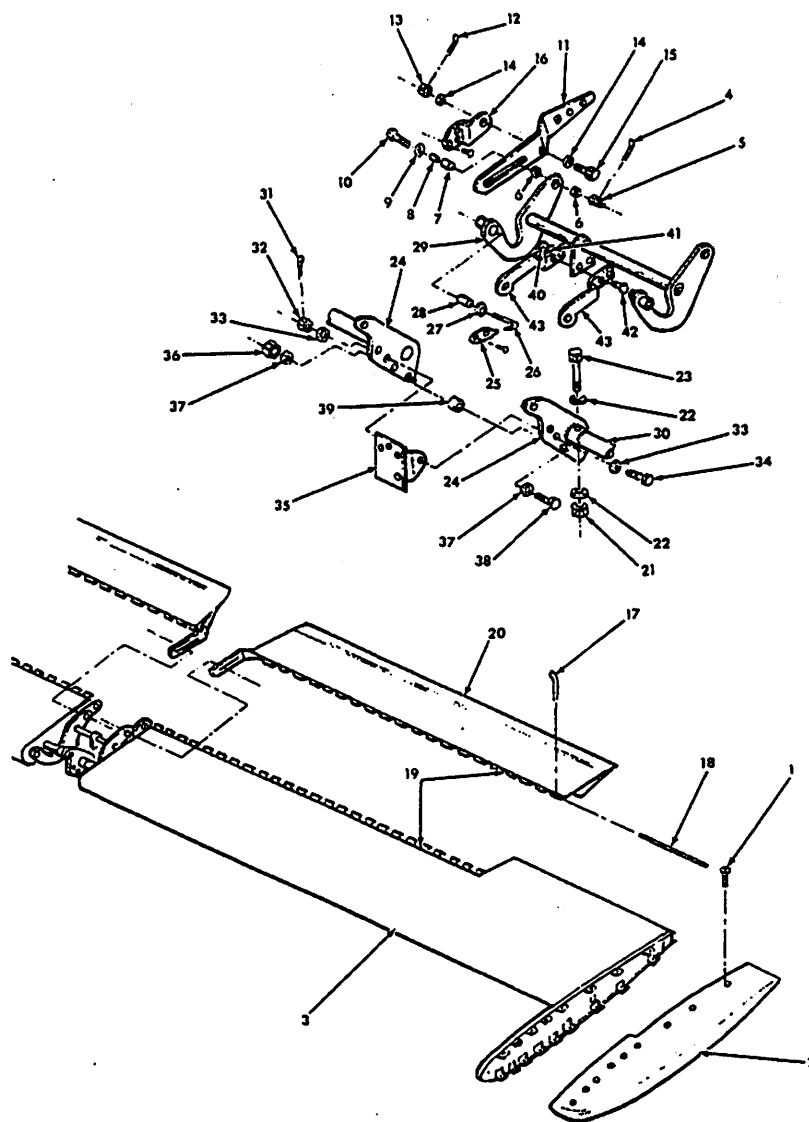
- (a) Position tip (2) on end of elevator (3) so that holes align. Secure with screws (1).
- (b) Position trim tab so that its hinge (19) aligns with that of the elevator.
- (c) Drive hinge pin (18) through hinge from inboard end.
- (d) Align hole in end of hinge pin with that in hinge and secure pins (18) with cotter pin (17).

(2) Linkage Assembly

- (a) Position spacers (39) between halves of bellcrank (24). Align holes and secure with bolts (38), washers (37), and nuts (36).
- (b) Insert hinge (35) between halves of bellcrank (24) and align holes. Secure with bolt (34), washers (33), nut (32), and cotter pin (31).
- (c) Insert torque tube (30) in bellcrank (24), align holes, and secure with bolt (23), washers (22), and nut (21). Torque to standard value. (See Chapter 91)
- (d) Position tab arms (43) on yoke assembly (29) and secure with bolts (42), washers (41), and nuts (40). Torque to standard value. (See Chapter 91)
- (e) Place washer (27) and spacer (28) on bolt (26).
- (f) Align hole in front arm of yoke assembly (29) with mounting hole in elevator (3) forward of torque tube (30).
- (g) Insert bolt (26) with bushing (28) and washer (27) through yoke assembly (29) arm into elevator, and torque to standard value. (See Chapter 91) Safety wire bolt (26), with 0.040 inch wire.

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1. Screws
2. Elevator Tip
3. Elevator
4. Cotter Pin
5. Nut
6. Washers
7. Roller
8. Bushing
9. Washer
10. Bolt
11. Trim Tab Arm
12. Cotter Pin
13. Nut
14. Washers
15. Bolt
16. Bracket
17. Cotter Pin
18. Hinge Pin
19. Hinge
20. Trim Tab
21. Nut
22. Washers
23. Bolt
24. Bellcrank
25. Safety Wire
26. Bolt
27. Washer
28. Bushing
29. Yoke Assembly
30. Torque Tube
31. Cotter Pin
32. Nut
33. Washers
34. Bolt
35. Hinge
36. Nuts
37. Washers
38. Bolts
39. Spacers
40. Nuts
41. Washers
42. Bolts
43. Trim Tab Arm



**Elevator Disassembly/Assembly
Figure 27-28**

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- (h) Place washer (9) and bushing (8) on bolt (10).
- (i) Place roller (7) over bushing (8) and install bolt with bushing and roller in slot of trim tab arm (11).
- (j) Place washer (6) on bolt (10) and insert bolt (10) through hole in the rear arm of yoke assembly (29).
- (k) Secure bolt (10) with washer (6), nut (5), and cotter pin (4).
- (l) Place washer (14) on bolt (15) and insert bolt (15) through hole in trim tab arm (11) and hole in bracket (16).
- (m) Secure with washer (14), nut (13), and cotter pin (12).

3. Trim Tab Control Removal/Installation (See Figure 27-29)

A. Trim Tab Control Removal

(1) Actuator Removal

- (a) Remove tailcone per Chapter 53.
- (b) Remove nuts (1), washers (2), and bolts (3) from trim arms (5).
- (c) Remove tailcone access panel per Chapter 53.
- (d) Remove nut (6), washer (7), and bolt (8) from torque tube (9).
- (e) Pull actuator (10) aft until it clears guide (11).
- (f) Remove bearings (12) and washer (13).
- (g) Remove nuts (14), washers (15), and bolts (16), then remove guide (11).

(2) Torque Tube Removal

- (a) Remove console trim per Chapter 25.
- (b) Remove roll pins (17) from universal (18) and pull rear torque tube (9) from universal (18).
- (c) Pull rear torque tube (9) forward through bushing (19) until it clears the rear support (20).
- (d) Pull universal (18) from front torque tube (21).
- (e) Remove nut (22), washer (23), and bolt (24) from flexible cable (25), and pull cable (25) from torque tube (21).
- (f) Pull torque tube (21) aft until it clears bushing (26) in front support (27) and bushing (28) in aft support (29).

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(3) Trim Wheel Assembly Removal

- (a) Remove console trim per Chapter 25.
- (b) Drive roll pin (30) from drive gear (31), and pull flexible cable (25) from bracket assembly (33).
- (c) Drive roll pin (34) from flexible cable (25) and pull shaft (32) from flexible cable (25).
- (d) Remove cotter pin (35), nut (36), washers (37 and 38), and bolt (39) from trim wheel (40).
- (e) Drive roll pin (41) from trim wheel (40) and remove pinion gear (42).
- (f) Remove cotter pin (43), nut (44), washers (45 and 46), bolt (47), and indicator bracket (48) from bracket assembly (33).

(4) Actuator Disassembly

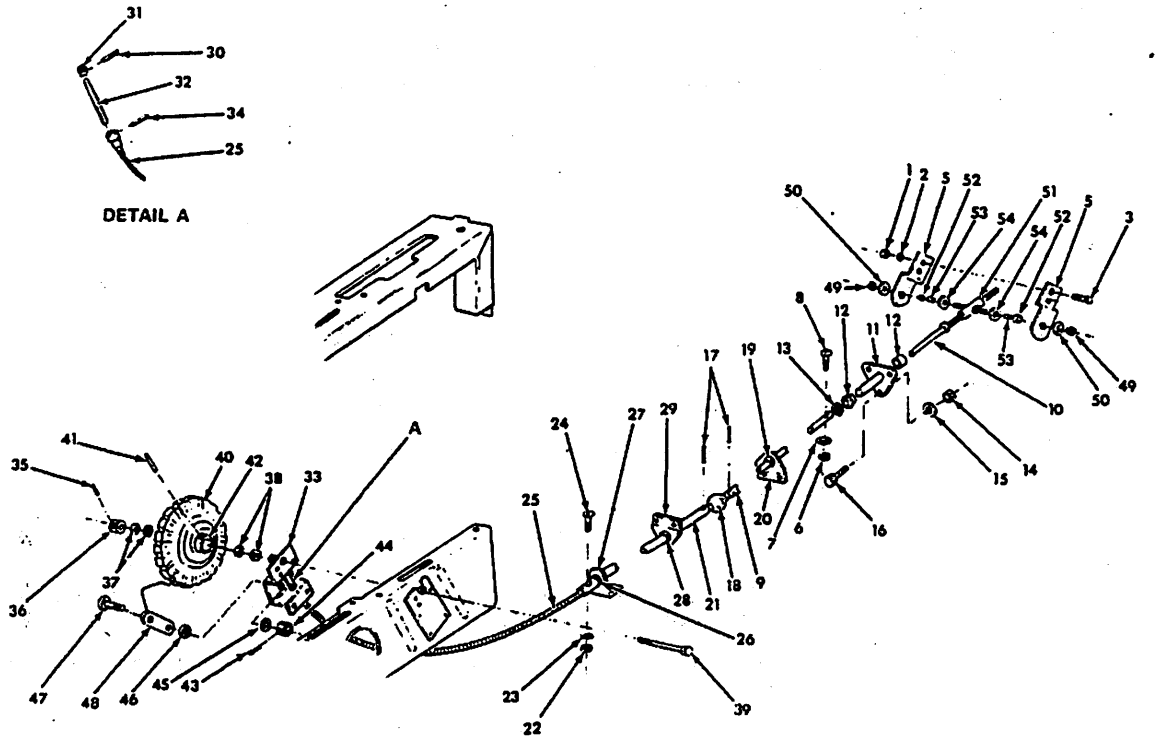
- (a) Remove nuts (49) and washers (50). Pull trim arms (5) from actuator assembly (51).
- (b) Remove roller (52), bushing (53), and washer (54) from actuator assembly (51).
- (c) Unscrew actuator assembly (51) from jackscrew (10).

B. Trim Tab Control Installation

(1) Actuator Assembly/Installation

- (a) Screw actuator (51) onto jackscrew (10).
- (b) Place washers (54) and bushings (53) on actuator (51).
- (c) Place rollers (52) over bushings (53) and place trim arms (5) over rollers (52). Secure with washers (50) and nuts (49). Torque to standard value. (See Chapter 91)
- (d) Place arms (5) on yoke assembly and secure with bolts (3), washers (2), and nuts (1). Torque to standard value. (See Chapter 91)

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- | | | |
|----------------|----------------------|-----------------------|
| 1. Nut | 19. Bushing | 37. Washer |
| 2. Washer | 20. Rear Support | 38. Washer |
| 3. Bolt | 21. Torque Tube | 39. Bolt |
| 4. Reserved | 22. Nut | 40. Trim Wheel |
| 5. Trim Arms | 23. Washer | 41. Roll Pin |
| 6. Nut | 24. Bolt | 42. Pinion |
| 7. Washer | 25. Flexible Cable | 43. Cotter Pin |
| 8. Bolt | 26. Bushing | 44. Nut |
| 9. Torque Tube | 27. Support | 45. Washer |
| 10. Jackscrew | 28. Bushing | 46. Washer |
| 11. Guide | 29. Support | 47. Bolt |
| 12. Bearing | 30. Roll Pin | 48. Indicator Bracket |
| 13. Washer | 31. Drive Pinion | 49. Nut |
| 14. Nut | 32. Shaft | 50. Washer |
| 15. Washer | 33. Bracket Assembly | 51. Actuator Assembly |
| 16. Bolt | 34. Roll Pin | 52. Roller |
| 17. Roll Pin | 35. Cotter Pin | 53. Bushing |
| 18. Universal | 36. Nut | 54. Washers |

Trim Tab Control Removal / Installation

Figure 27-29

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(2) Trim Wheel Assembly (See Figure 27-29)

- (a) Insert shaft (32) into flexible cable (25) and secure with roll pin (34).
- (b) Insert shaft (32) through Nyliner bushings in bracket assembly (33).
- (c) Place pinion (31) on shaft (32) and secure with roll pin (30).
- (d) Place pinion (42) in trim wheel (40), align holes, and secure with roll pin (41).
- (e) Place bolt (47) through trim indicator (48), washer (46), and bracket assembly (33).
- (f) Secure with washer (45), nut (44), and cotter pin (43).
- (g) Place bolt (39) through bracket assembly (33), and place washers (38) on bolt (39).
- (h) Slide trim wheel (40) on bolt (39) until pinion teeth (31 and 42) engage, and follower pin on trim indicator (48) engages in spiral groove on trim wheel (40).
- (i) Secure trim wheel (40) with washers (37), nut (36), and cotter pin (35).
- (j) Tighten nut (36) to provide 50% compression of spring washers (38) and install cotter pin (35).

(3) Torque Tube Installation

- (a) Slide forward torque tube (21) through rear support (29) and then through forward support (27).
- (b) Place end of flexible cable (25) in front end of forward torque tube (21) and align holes. Secure with bolt (24), washer (23), and nut (22).
- (c) Place one end of universal (18) in rear end of torque tube (21). Secure with roll pin (17) and safety wire pin with 0.032 inch wire.
- (d) Slide aft torque tube (9) through lower elevator cable access hole and through support (20).
- (e) Place forward end of aft torque tube (9) over the universal end (18). Align holes, and secure with roll pin (17). Safety wire roll pin (17) with 0.032 inch wire.
- (f) Place bushing (12) in guide assembly (11) and secure guide assembly (11) to fuselage with bolts (16), washers (15), and nuts (14). Torque to standard value. (See Chapter 91)
- (g) Slide screw (10) through guide assembly (11) and place washer (13) on end of screw (10).
- (h) Insert front end of screw (10) in aft end of torque tube (9). Align holes and secure with bolt (8), washer (7), and nut (6).

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4. Elevator Trim Tab Free Play Reduction

A. Free Play

Free play is defined as the accumulated free motion at the elevator trim tab trailing edge, the sum of normal manufacturing tolerances, wear, and any other contributing factors. When progressed sufficiently to allow an excessive amount of free play, replacement of defective components is in order. While any component in the elevator trim tab system linkage may be involved, data obtained inspecting and repairing high-time aircraft indicate that the components listed below frequently contribute to excessive free play.

- (1) Trim tab arms (11, Figure 27-28) rollers (7), and bushings (8). Refer to Sub-Paragraph B below.
- (2) Excessive end play at actuator assembly (51, Figure 27-29). Refer to Sub-Paragraph C below.
- (3) Trim arms (5, Figure 27-29), rollers (52), and bushings (53). Refer to Sub-Paragraph D below.

B. Trim Tab Arm and Roller Replacement

- (1) Remove the elevator and disassemble as required to move the trim tab. Refer to paragraphs 1 and 2 above.

CAUTION: TO AVOID MISALIGNMENT OR DAMAGE TO THE TRIM TAB, FOLLOW THE INSTRUCTIONS GIVEN BELOW CLOSELY. DO NOT ATTEMPT TO DRILL THE RIVETS OUT.

- (2) At the inboard end of the elevator trim tab, locate the rivets securing the trim tab arm (11, Figure 27-28) to the trim tab. Block all openings into the trim tab interior with masking tape to prevent the entry of foreign matter.
- (3) Grind off the heads of the three rivets securing the trim tab arm to the trim tab. Use a soft brush to remove all grinding debris and other foreign matter from the end of the trim tab.
- (4) Remove the tape from the openings. Using a drift or punch, carefully drive the rivets into the interior of the trim tab.

NOTE: It is essential that all rivet debris be removed from the trim tab interior. Foreign material left within the trim tab could cause surface balance change, corrosion, or block the drain holes.

- (5) Rotate the trim tab so that it is standing on the hinge. Using a pipe cleaner, wire, or other means, locate and remove the rivet debris through the gap between the inboard rib and the skin at the leading edge.
- (6) Temporarily install the trim tab and the hinge pin. Open the pilot holes in the new trim tab arm to 0.143 to 0.146 inches. Using alignment clamps (Cleco or equivalent), install the new trim tab arm in its proper position.
- (7) Use the existing hole in the bracket (16, Figure 27-28) and/or the elevator trim tab hinge pin to locate and drill a 0.187 to 0.190 inch hole in the trim tab arm concentric with the hinge pin center line.

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- (8) Remove the alignment clamps and install the trim tab arm to the trim tab using blind rivets. Part No. CR3243-4-3 or CR2249-4-3 rivets may be used.

NOTE: Lubricate all moving parts during assembly in accordance with servicing instructions (Chapter 12)

- (9) Using a new roller and bushing (7 and 8, Figure 27-28), assemble and install the elevator in accordance with instructions contained in paragraphs 1 and 2 above.
- (10) Perform an elevator and elevator trim tab rigging check. Refer to Adjustment/Test, for rigging procedures.

C. Actuator Assembly End Play Reduction

With the cone removed, the actuator assembly endplay can be measured at the aft bearing (12, Figure 27-29) as follows:

- (1) With approximately 10 pounds of hand pressure, rock the actuator assembly (51, Figure 27-29) fore and aft along its longitudinal axis several times.
- (2) While maintaining the actuator assembly in the aft position, measure the gap between the aft bearing (12) and the actuator (10). Maximum permissible gap is 0.010 inch.
- (3) Add Part No. 607016-1 shims at the washer (13) as required to provide a maximum end play of 0.010 inch.

D. Trim Arm and Roller Replacement

Wear at the trim arm slot and roller can result in free play at the elevator trim tab trailing edge. Replace both of the trim arms (5, Figure 27-29), rollers (52), and bushings (53). Inspect the arms of the actuator assembly (51) for scoring and replace if required.

5. Elevator Bellcrank and Torque Tube Repair (Reference Figure 27-30)

Excessive play in the elevator control system can be caused by slippage at the elevator bellcrank and elevator torque tube. In certain high time, aircraft, this condition has been traced to the enlargement or elongation of the attach holes in the elevator torque tube (5) at the elevator bellcrank (4).

A. From a structural standpoint the following is an acceptable repair:

- (1) Remove the tailcone assembly in accordance with Chapter 53.
- (2) Hold the elevator bellcrank (4) firmly against one of the elevator control stops (7). Grasp one elevator (6) at the trailing edge and attempt to rotate the elevator torque tube (5) in both directions. Repeat this procedure on the opposite elevator. (The torque tube is an integral part of the elevator.)
- (3) If play is noted, determine the largest diameter of the elevator torque tube and elevator bellcrank boltholes.
- (4) If the largest diameter exceeds 0.2505 inch, open the existing boltholes in the elevator torque tube and elevator bellcrank to 0.312 to 0.315 inch diameter.

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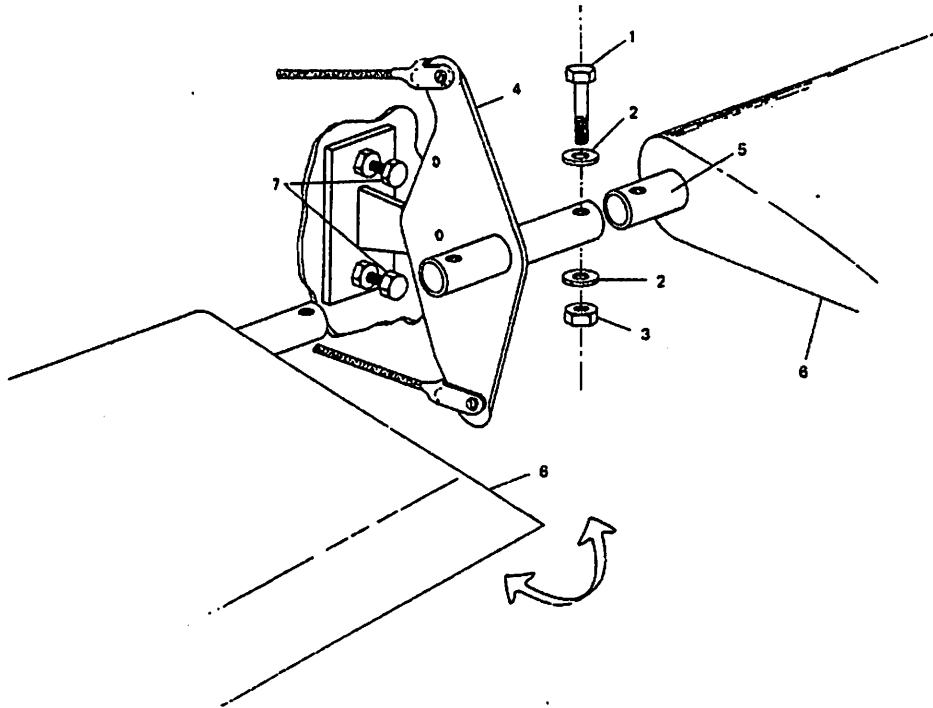
NOTE: Do not increase the hole size beyond that specified. If the holes will not clean up, the elevator and elevator bellcrank must be replaced. If removal for repair/replacement is necessary, refer to Maintenance Practices - Removal/Installation this chapter.

- (5) If existing boltholes are opened in accordance with paragraph 'D.' above, install over-size attach hardware listed below.

NAS464P5A19 -- Bolt, NAS1149F0563P -- Washers, MS20364-524 -- Nut

- (6) If repair or replacement is made, perform an elevator rigging check. Refer to Adjustment/Test, this chapter for rigging procedures.

- (7) Record the repair/replacement in the aircraft log.



**Elevator Bellcrank and Torque Tube Repair
Figure 27-30**

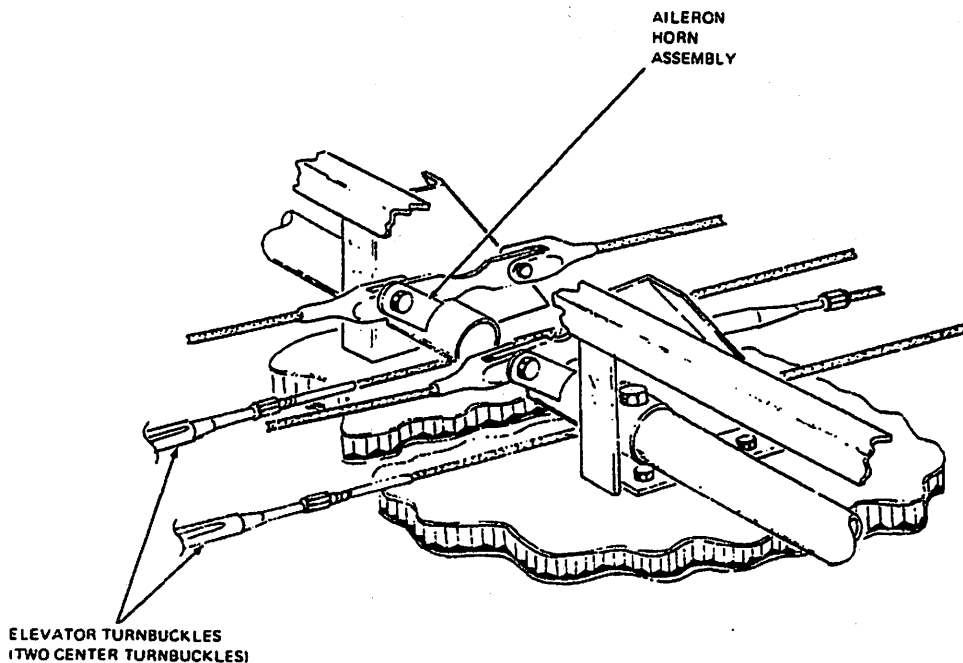
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MAINTENANCE PRACTICES - ADJUSTMENT/TEST

1. Rigging

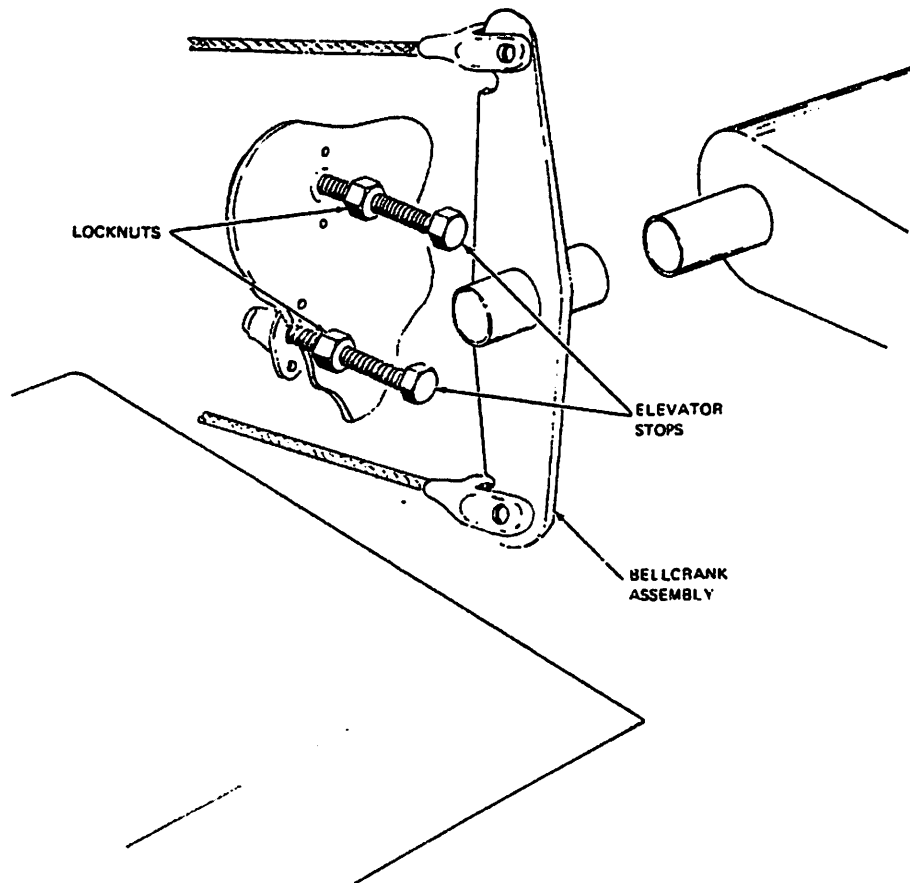
A. Elevator Rigging

- (1) Secure the control wheel in the neutral position by installing fixture. (Part No. DE 5005-501)
- (2) Remove trim per Chapter 25 to provide access to the elevator turnbuckles located under the aft end of the console.
- (3) Adjust the elevator turnbuckles until the elevator is located at neutral. Neutral position of the elevator is the position where elevators are streamlined with the stabilizer. (Figure 27-31)
- (4) Check the elevator cable tension and adjust the turnbuckles to obtain $35 \pm 0 - 5$ pounds tension. Recheck the 0° position of the elevator surface.
- (5) Remove the rigging fixture.
- (6) Remove tailcone per Chapter 53.
- (7) Loosen lock nuts on elevator control stops. (Figure 27-32)



**Elevator Turnbuckles
Figure 27-31**

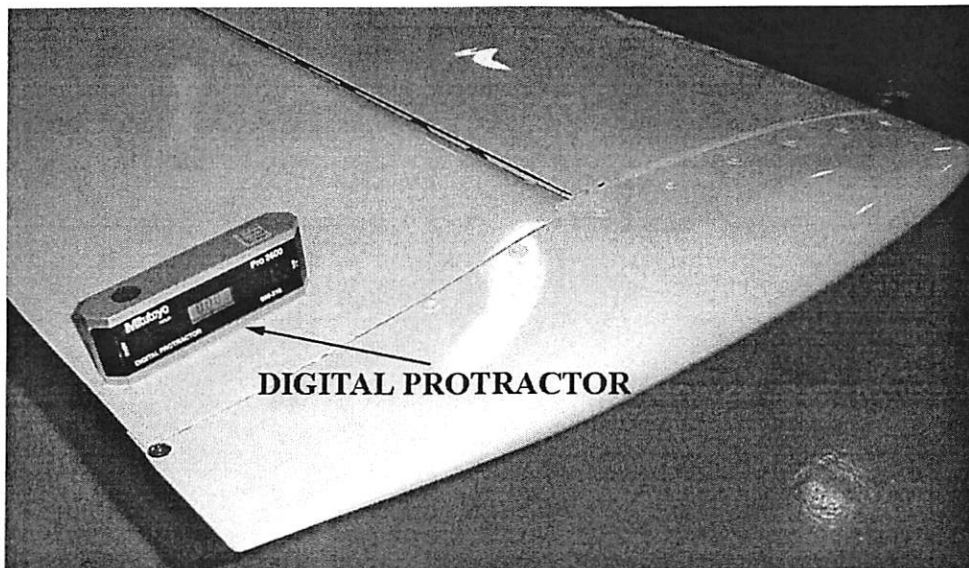
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**Elevator Control Stops
Figure 27-32**

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- (8) With the elevator in the streamline position with the horizontal stabilizer, place a suitable protractor on the elevator, outboard of the trim tab, and zero the protractor.
(Figure 27-33)
- (9) Move the elevator to its full up position (against the control stop) and note the throw on the protractor.
- (10) Adjust the elevator up stop to obtain $23^{\circ} \pm 1^{\circ}$ indication on the protractor.
- (11) Move the elevator to its full down position (against the control stop) and note the throw on the protractor.
- (12) Adjust the elevator stop to obtain $17^{\circ} \pm 2^{\circ}$ indication on the protractor. Tighten the control stop lock nut.
- (13) Recheck the cable tension, and safety turnbuckles with clips.
- (14) Replace trim per Chapter 25.
- (15) Install tailcone per Chapter 53.



**Elevator Rigging Fixture
Figure 27-33**

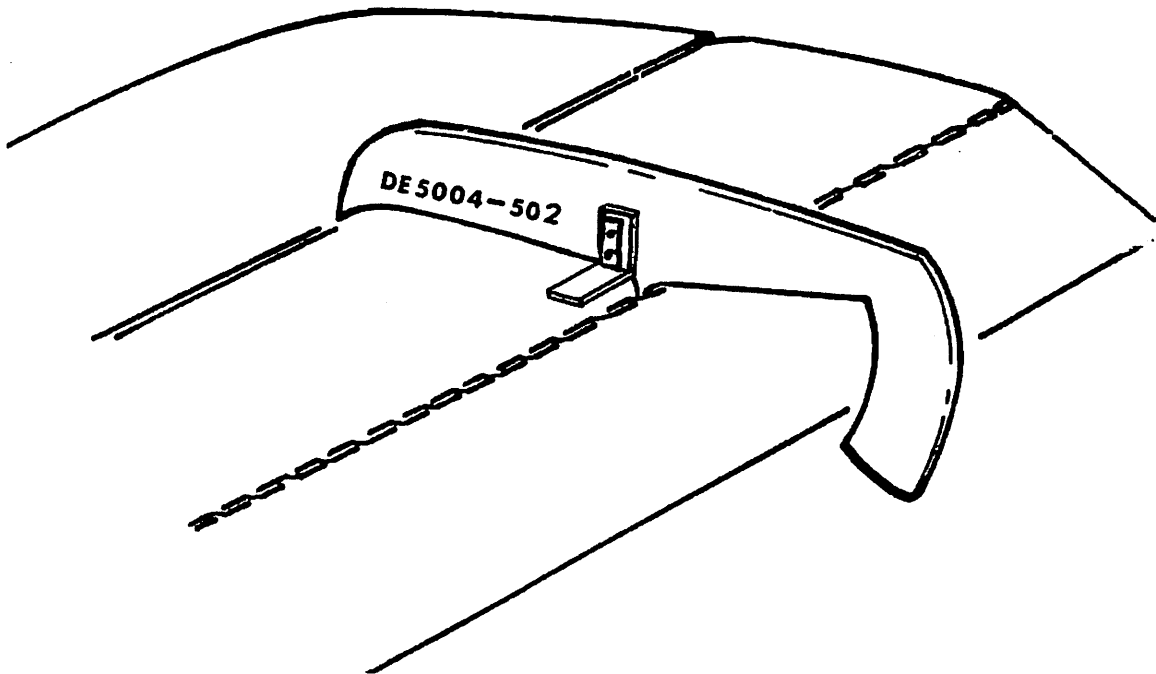
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B. Trim Tab Rigging

NOTE: Elevator rigging should always be checked prior to checking or changing trim tab rigging.

- (1) Run trim wheel to its full nose up position. (Full aft rotation)
- (2) Place trim tab rigging fixture (Part No. DE 5004-502, Figure 27-34) on the elevator, at the trim tab hinge cutout area.
- (3) Position elevator to its neutral position (streamlined with horizontal stabilizer) and note reading on fixture.
- (4) Fixture shall indicate $30^{\circ} \pm 1^{\circ}$ up throw of trim tab. If tab throw is not within tolerance, adjust rigging as follows: (See Figure 27-29)
 - (a) Position the elevators to their neutral position (streamline with the horizontal stabilizer) and lock in place using wood blocks and a long $1/8^{\text{th}}$ inch diameter bolt. (Figure 27-35)
 - (b) Rotate control wheel to its full nose up position (full aft rotation).
 - (c) Remove console trim per Chapter 25 to provide access to trim control mechanism.
 - (d) Remove cotter pin (35), nut (36), and washers (37).
 - (e) Pull trim wheel (40) out until pinion (42) clears drive pinion (31).

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**Trim Tab Rigging Fixture
Figure 27-34**

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- (f) Rotate the flexible cable (25) until the trim tab throw is $30^{\circ} \pm 1^{\circ}$.
- (g) Push the trim wheel (40) in to engage the pinion gears (42 and 31). Secure with washers (37), nut (36), and cotter pin (35).
- (h) Rotate trim wheel (40) until the trim tab is in the neutral "0" position.
- (i) Bend the indicator wire on the trim indicator bracket (48) to agree with "N" on the trim placard.
- (j) Remove control lock.

2. Elevator Balancing

Refer to Control Surface Balancing Procedures in this chapter.

3. Elevator Trim Tab Free Play Measurement

It has been determined that the amount of free play at the elevator trim tab is an indicator of the effectiveness of the trim tab in fulfilling the requirements for irreversibility. The procedures outlined below provide a means to determine the general condition and amount of wear sustained by certain trim system components.

A. Preparation (Figure 27-35)

- (1) Move the aircraft into an area protected from wind or other air disturbances that may interfere with the control surfaces.
- (2) Set the parking brake and/or install wheel chocks. Provide support for the fuselage at or near the aft bulkhead to steady the aircraft.
- (3) Fair the elevator with the horizontal stabilizer and use plywood or blocks and long 1/8-inch bolts to hold the elevators in this position during the remainder of the proceedings.
- (4) Using the trim tab control wheel, fair the trim tab and elevator trailing edges.

NOTE: The trim tab control wheel should not be moved again until the measurements are completed. Procedures given below are for one trim tab only, and must be repeated on the other trim tab.

- (5) Using tape or other means, fasten a flat, thin piece of suitable material to the trim tab trailing edge to act as a reference pointer.
- (6) Fasten a 6-inch scale to the elevator trailing edge.
- (7) Using safety wire or cord, suspend a 2.00 ± 0.05 -pound weight from the slot in the trim tab arm.

B. Measurement of Free Play

- (1) Using 8 to 10 pounds of hand pressure, press down on the elevator trim tab at the in-board end to remove all of the slack from the system.

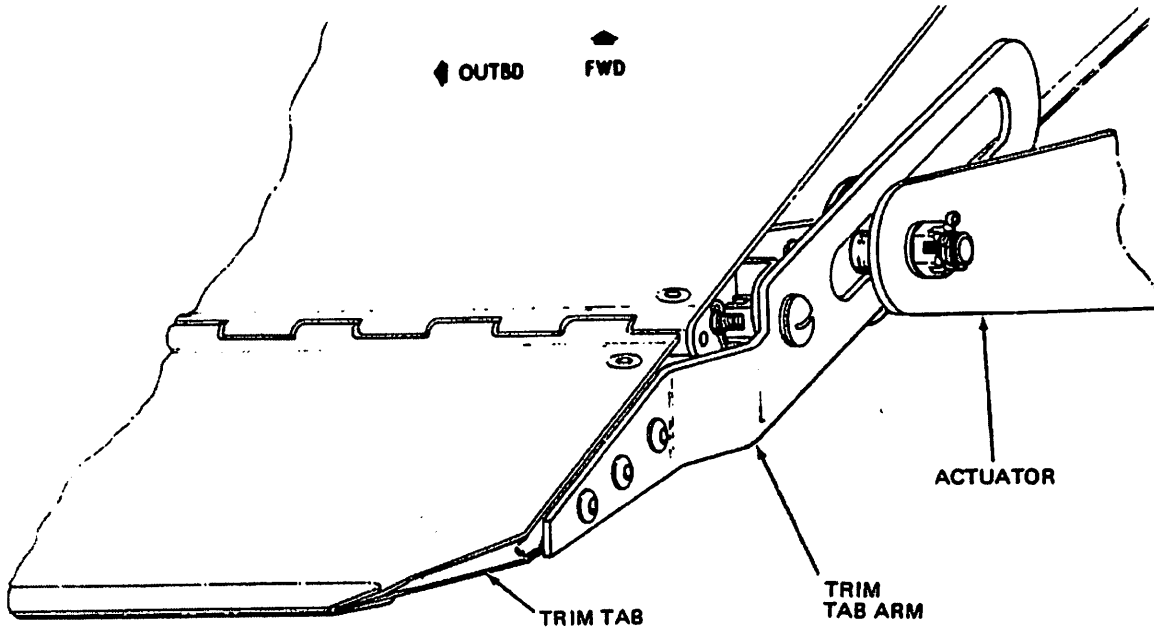
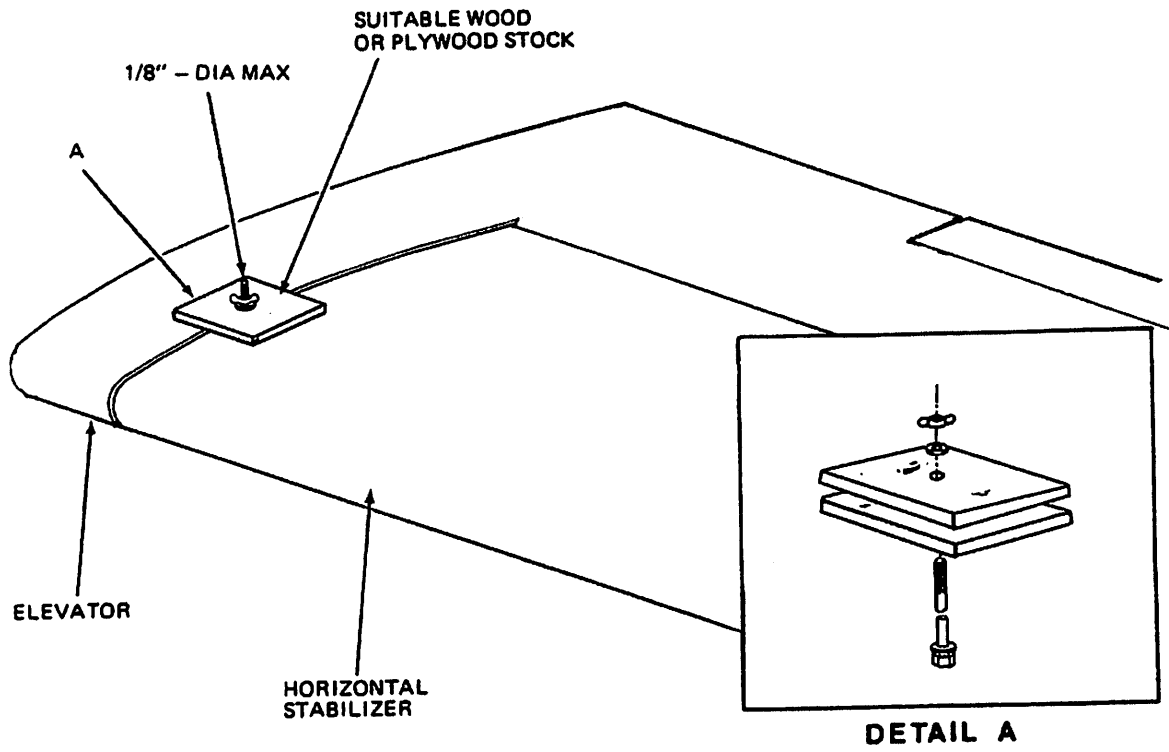
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- (2) Slowly release the hand pressure to zero and remove the hand from the trim tab. Note the position of the reference pointer relative to the scale.

NOTE: After the initial measurement is taken, the positions of the elevator, index, and scale must not be disturbed.

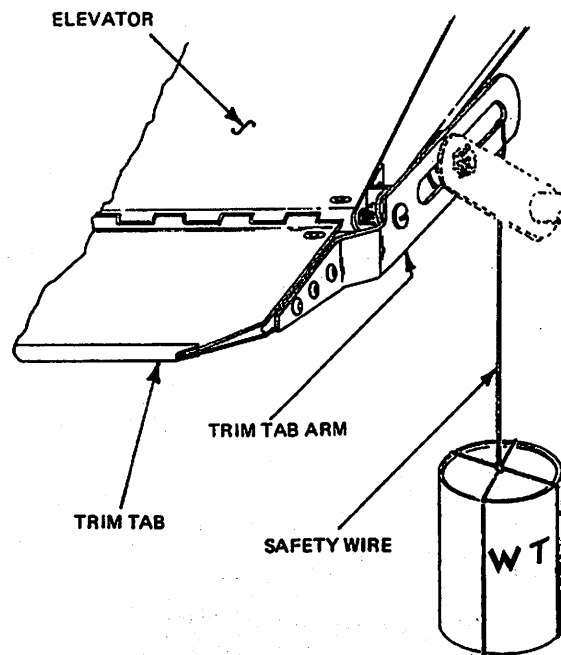
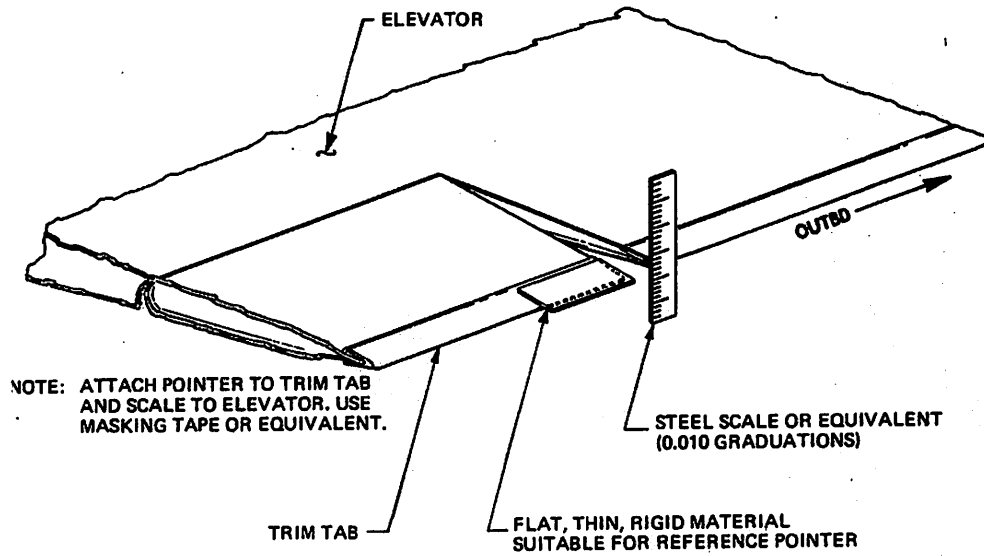
- (3) Suspend the balance weight (2 ± 0.05 pounds) at the forward end of the slot in the trim tab arm. Do not allow the balance weight to slip from the forward end of the slot.
- (4) Using 8 to 10 pounds of hand pressure, press up on the elevator trim tab at the inboard end to remove all of the slack from the system.
- (5) Slowly release the hand pressure to zero and remove the hand from the trim tab. Note the position of the reference pointer relative to the scale.
- (6) Using the scale readings obtained in Steps (2) and (5) above, subtract the smaller from the larger to obtain the net free play. Note the net free play measurement.
- (7) Remove the balance weight from the trim tab arm. Repeat Steps (1) through (6) above to obtain a second net free play measurement.
- (8) If the difference between the two net free play measurements is 0.020 inch or less, calculate the average of the two values (add the values together, then divide by 2). The maximum allowable free play is 0.270 inch.
- (9) If the difference between the two net free play measurements is more than 0.020 inch, repeat Steps (1) through (7) above to obtain two more net free play measurements. Discard the highest and lowest of the four values obtained. Calculate the average of the two values (add the values together, then divide by 2). The maximum allowable free play is 0.270 inch.
- (10) If the free play exceeds 0.270 inch, excessive wear to the trim tab arm system components may be indicated. Refer to Maintenance Practices - Removal/Installation, paragraph entitled "Elevator Trim Tab Free Play Reduction."

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**Elevator Trim Tab Free Play Measurement
Figure 27-35
(Sheet 1 of 2)**

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**Elevator Trim Tab Free Play Measurement
Figure 27-35
(Sheet 2 of 2)**

FLAPS - DESCRIPTION/OPERATION

1. General (See Figure 27-36)

The flap system consists of two flaps, one on each wing, mounted inboard of the ailerons, an electrically driven actuator, and mechanical linkage to actuate the flaps. The electrical motor is controlled by a toggle-type switch mounted on the console, and flap position is indicated by a mechanically positioned tab on the console.

2. Flap Structure (See Figure 27-37)

The flap structure consists of honeycomb ribs bonded to two stiffener tubes extending the length of the flap, and an aluminum skin bonded to the ribs. Each of the ribs contains a hole along its hinge line. These holes contain bearings to accommodate the aileron torque tube, over which the flaps fit. The flap torque tube fits over the aileron torque tube, and actuates the flap by means of a horn bolted to the flap root rib.

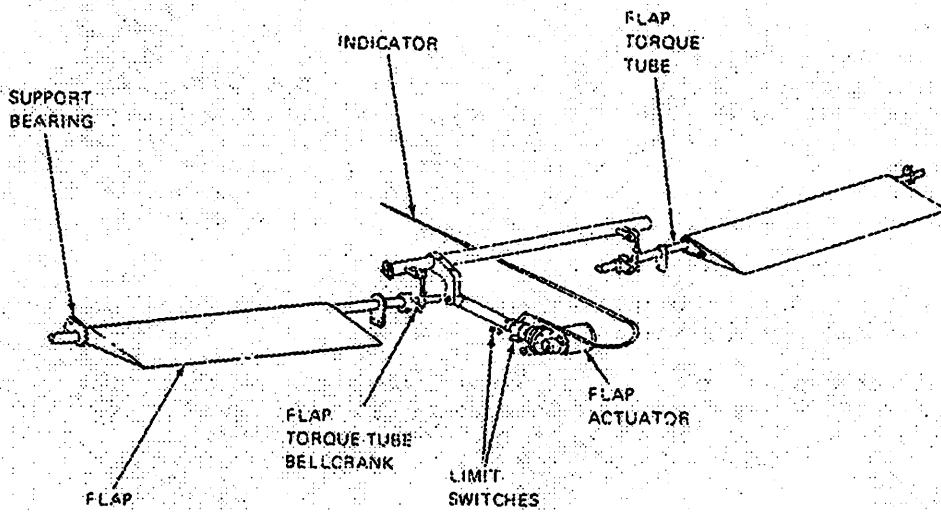
3. Flap Drive and Linkage (See Figure 27-38)

The flaps are positioned by a reversible DC motor. When this motor is actuated, it turns a worm drive gear in the gearbox. The driven gear actuates a screw mechanism to move the push-pull linkage. This linkage is attached to a horn on the center torque tube, thus as the push-pull linkage moves the center torque tube rotates. The center torque tube is attached, through adjustable linkages and horn assemblies, to the flap torque tubes. Thus, as the center torque tube rotates, the flap torque tubes rotate the same amount. This arrangement provides a large mechanical advantage for the DC motor so that it can move the flaps against the aerodynamic load imposed in flight. In addition, it is a "one-way" mechanism that effectively locks the flaps in position when the motor is stopped. Flap position is indicated by means of an indicator on the console. This indicator is positioned by a flexible cable actuated by an arm attached to the push-pull linkage. Flap travel is limited by micro-switches located adjacent to the push-pull linkage or mounted on the actuator. As this linkage moves to each limit of travel, a cam on the linkage actuates a micro-switch to remove power from the motor.

4. Flap Electrical System (See Figure 27-39)

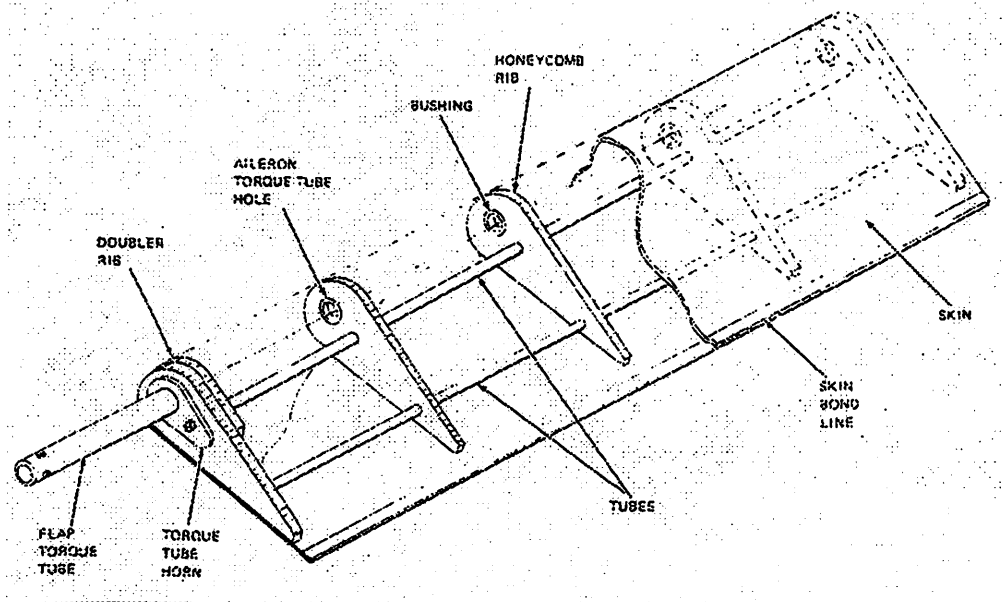
The flap electrical system receives DC voltage from the bus through a 10 amp circuit breaker. This voltage is applied to one arm of the double pole, double throw flap switch. When this switch is held in the DOWN position (aft position), voltage is routed through the normally closed contacts of the down limit switch, through the black (BLK) lead, to the flap motor. The ground return for the flap motor is through its yellow (YEL) lead, and through the other arm of the flap switch to ground. The flap motor drives the flaps down until the limit of downward movement is reached. At this point the down limit switch is opened, breaking the DC voltage supply for the flap motor, thus causing the motor to stop. The flap switch is spring-loaded so that when it is released it moves from the down position to the neutral position. When the flap switch is set to UP (forward position), voltage is routed through the flap switch; the normally closed contacts of the up limit switch, and through the yellow (YEL) lead of the motor. The ground return for the motor is through its black (BLK) lead, and the other arm of the flap switch to ground.

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Flap System

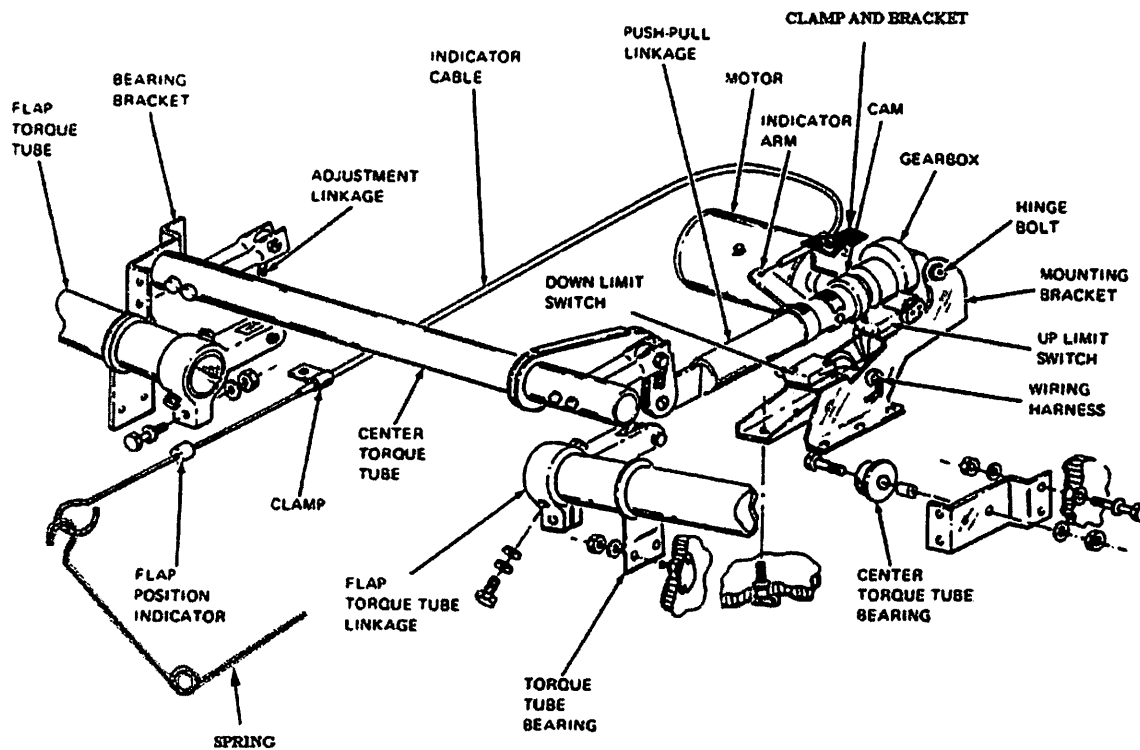
Figure 27-36



Flap Surface Structure

Figure 27-37

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**Flap Drive Mechanism
Figure 27-38**

The flap motor drives the flaps up until the upward limit of travel is reached. At this point the up limit switch is opened, breaking the DC supply to the motor, causing the motor to stop.

The flap actuator switch has a detent in its UP position and the switch will remain in the UP position until moved out of the detent.

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Troubleshooting Flaps

TROUBLE	PROBABLE CAUSE/ACTION	REMEDY
Flaps do not move when switch is actuated.	Set MASTER switch to on. Check circuit breaker.	Reset circuit breaker.
	Hold flap switch in DOWN position and check for 24 volts DC at normally-closed contact of down-limit switch.	If voltage is not present, replace flap switch.
		If voltage is present, check that pin 1 of J15 is grounded. If not, replace flap switch.
	Hold flap switch in UP position and check for 24 volts DC at normally-closed contact of up limit switch.	If voltage is not present, replace flap switch.
		If voltage is present check that pin 2 of J15 is grounded. If not, replace flap switch.
	Disconnect plug P15 from connector J15. Hold flap switch in DOWN position and jumper across down limit switch.	On plug P15 pin 2 should be positive (24v DC) with respect to pin 1. If not, check wiring. If so, replace down limit switch.
	Hold flap switch in UP position and jumper across up limit switch.	On plug P15, pin 1 should be positive (24v DC) with respect to pin 2. If not, check wiring. If so, replace up limit switch.
	Reconnect plug P15 to connector J15 and actuate flap switch.	If flaps do not move, check motor, jackscrew, and linkage. Replace as required.
Loose connection or open circuit.	Tighten connections; repair or replace wire.	
Flaps move past up or down limit.	Check limit switches.	Adjust flap rigging per Adjustment/Test, this chapter, or replace limit switch.

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MAINTENANCE PRACTICES - SERVICING

1. Lubrication

A. Flap Drive Jackscrew Lubrication

- (1) Set MASTER switch to ON.
- (2) Hold flap switch in DOWN (aft) position until flaps are fully deployed.
- (3) Set MASTER switch to OFF.
- (4) Remove trim per Chapter 25 to provide access to the flap drive mechanism.
- (5) Use a clean, lint-free cloth to wipe excess oil and foreign material from threads of jackscrew.
- (6) Apply a light coat of MIL-PRF-7870 oil to expose threads. (See Chapter 12)
- (7) Install trim per Chapter 25.
- (8) Set master switch to ON.
- (9) Set flap switch to UP.
- (10) When flaps have moved to the up position, set master switch to OFF.

B. Torque Tube Oilite Bearing Lubrication

- (1) Remove trim per Chapter 25 to expose flap torque tube bearings.
- (2) Inject a small amount of MIL-PRF-7870 oil between bearings (23) and bushing (24). (Figure 27-40A)
- (3) Install trim per Chapter 25.

C. Flap Position Indicating Cable Lubrication

- (1) Remove interior trim per to provide access to flap position indicator cable.
- (2) Remove indicator cable assembly from console per Removal/Installation, this chapter.
- (3) Pull wire from center of cable assembly.
- (4) Use a clean, lint-free cloth to wipe all grease and foreign material from wire.
- (5) Apply a light coating of MIL-G-21164 Molybdenum Disulfide grease to wire. (See Chapter 12)
- (6) Install wire in cable assembly.
- (7) Install cable assembly in console per Removal/Installation, this chapter.
- (8) Install trim per Chapter 25.

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MAINTENANCE PRACTICES - REMOVAL/INSTALLATION

1. Flap Assembly Removal/Installation (See Figures 27-40 and 27-40A)

A. Flap Assembly Removal

- (1) Remove aileron per this chapter.
- (2) Remove interior trim per Chapter 25 to expose flap drive mechanism and flap torque tubes. (See Figure 27-38)
- (3) Remove nut (1), washer (2), and bolt (3) from arm (4).
- (4) Remove bolts (5) and washers (6).
- (5) Use a screwdriver or similar tool to open the slot in the arm (4) slightly, (take care to avoid damaging the inside faces of the arm) then pull the torque tube (7) outboard until it clears the aircraft.

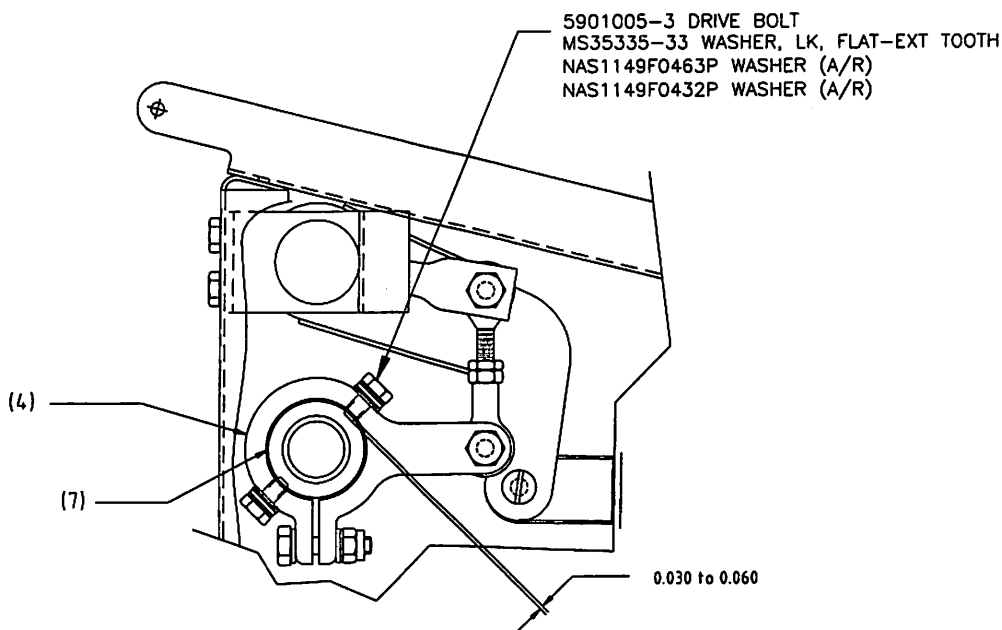
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B. Flap Assembly Installation

- (1) Position flap on wing and slide torque tube (7) through bearing (8) and arm (4).

NOTE: Be sure that the drive bolts are indexed properly in torque tube holes. Use the same number of washers under the head each bolt. Drive bolts should extend 0.030 to 0.060 inch through torque tube.

For aircraft S/N 10235 and subsequent, use bolts and washers as shown below.



**Drive Bolt Installation
Figure 27-40**

Apply Loctite 242 to the threads of the 5901005-3 Drive bolts and install new lock washers at each installation. Torque Per Chapter 91.

- (2) Align holes in arm (4) and torque tube (7) and secure with bolts (5) and washers (6). Torque to standard value per Chapter 91.
- (3) Install bolt (3), washer (2), and nut (1). Torque per Chapter 91.
- (4) Install aileron per this chapter.
- (5) Install trim per Chapter 25.

2. Flap Drive Removal/Installation (See Figure 27-40A)

A. Flap Drive Removal

- (1) Remove trim per Chapter 25 to provide access to flap drive.

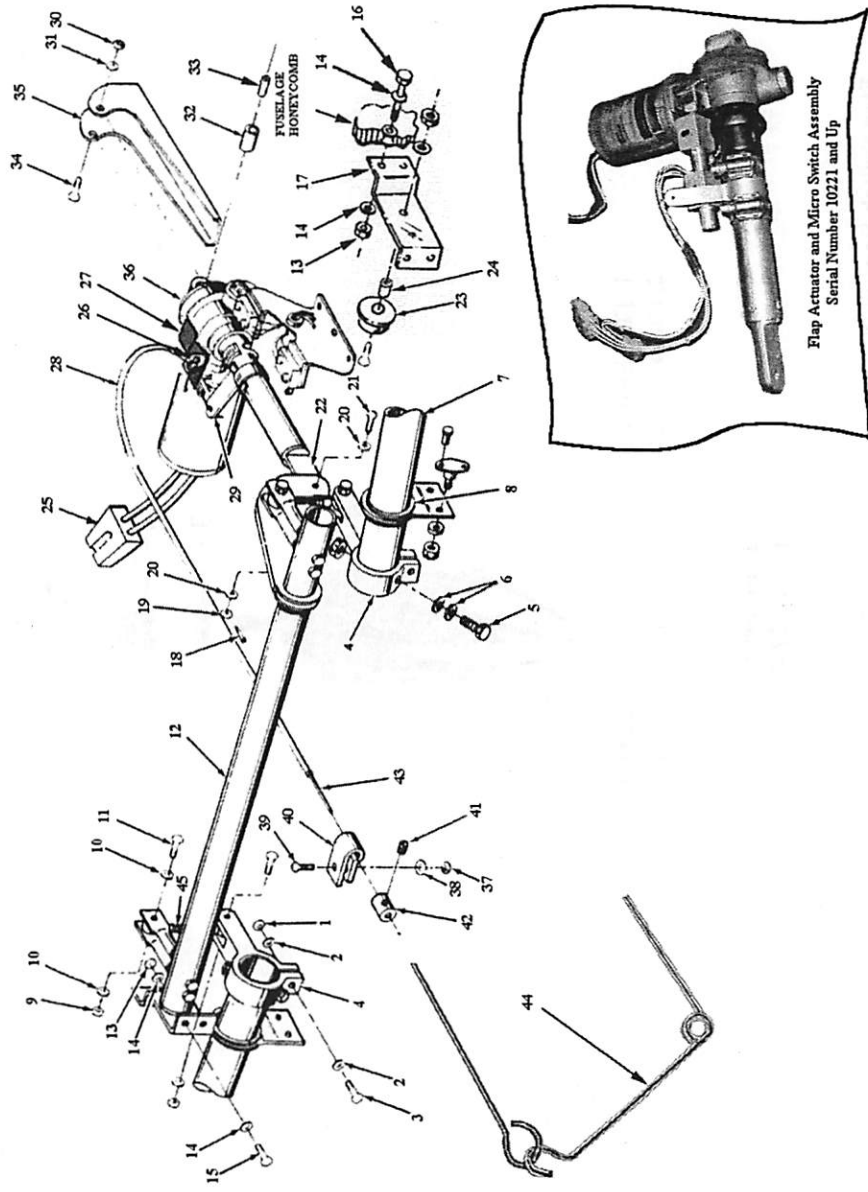
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- (2) Remove nuts (9), washers (10), and bolts (11) from torque tube (12).
- (3) Remove nuts (13), washers (14), and bolts (16) from torque tube mounting bracket (17).
- (4) Remove cotter pin (18), nut (19), washer (20), and bolt (21) from torque tube (12) and disconnect actuator fitting (22) from horn on torque tube (12).
- (5) Remove bracket (17) from aircraft and pull bearing (23) from torque tube (12).
- (6) Remove torque tube (12) from aircraft.
- (7) Disconnect drive motor connector (25).
- (8) Remove clamp (26) securing indicator cable (28) to actuator assembly and disconnect joggled end of cable from horn (29).
- (9) Remove nut (30), washer (31), bushing (32), spacer (33), and bolt (34) from mounting bracket (35) and lift drive mechanism (36) from aircraft.
- (10) Remove setscrew (41) and pull indicator (42) from wire (43).
- (11) Remove nut (37), washer (38), and screw (39) from clamp (40).
- (12) Disconnect wire (43) from spring (44). Remove cable (26) from console.

B. Flap Drive Installation

- (1) Insert cable (28) in clamp (40) and secure to console with screw (39), washer (38), and nut (37).
- (2) Insert wire (43) into indicator (42) and secure with setscrew (41).
- (3) Form a loop in the end of wire (43) and hook in spring (44).
- (4) Insert bearing (23) in each end of torque tube (12).
- (5) Position brackets (17) to align mounting holes. Secure to aircraft with bolts (16), washers (14), and nuts (13). Torque to standard value. (See Chapter 91.)
- (6) Insert bushing (32) and spacer (33) in mounting hole on aft end of actuator (36). Secure actuator (36) to bracket (35) with bolt (34), washer (31), and nut (30). Torque to standard value. (See Chapter 91.)
- (7) Insert joggled end of cable (28) in arm (29) and attach cable to brace (27) with clamp (26).
- (8) Align holes in fitting (22) and the arm on the torque tube (12). Secure with bolt (21), washer (20), nut (19), and cotter pin (18).
- (9) Connect electrical connector (25) to its mating connection in the aircraft-wiring bundle.
- (10) Place linkages (45) in horns on torque tube (12). Secure with bolts (11), washers (10), and nuts (9). Torque to standard value. (See Chapter 91)

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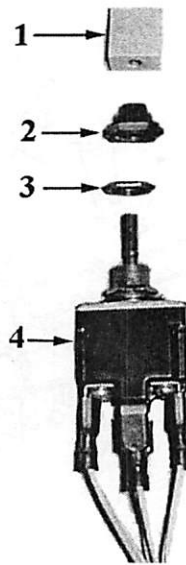


- | | |
|------------------------|---------------------|
| 1. Nut | 23. Bearing |
| 2. Washer | 24. Bushing |
| 3. Bolt | 25. Connector |
| 4. Arm | 26. Screw/Clamp |
| 5. Bolt | 27. Bracket |
| 6. Washer | 28. Cable |
| 7. Torque Tube | 29. Horn |
| 8. Oilite Bearing | 30. Nut |
| 9. Nut | 31. Washer |
| 10. Washer | 32. Bushing |
| 11. Bolt | 33. Bushing |
| 12. Torque Tube | 34. Bolt |
| 13. Nut | 35. Mount Bracket |
| 14. Washer | 36. Drive Mechanism |
| 15. Bolt | 37. Nut |
| 16. Bolt | 38. Washer |
| 17. Tube Mount Bracket | 39. Bolt |
| 18. Cotter Pin | 40. "P" Clamp |
| 19. Nut | 41. Set Screw |
| 20. Washer | 42. Indicator |
| 21. Bolt | 43. Inner Cable |
| 22. Actuator Fitting | 44. Spring |

Flap Removal / Installation

Figure 27-40A

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**1. Flap Switch Knob
2. Rubber Boot**

**3. Mounting Nut
4. Flap Switch**

**Flap Switch
Figure 27-41**

3. Flap Switch Removal/Installation (See Figure 27-41)

A. Flap Switch Removal

- (1) Unscrew flap switch knob (1) from flap switch (4).
- (2) Remove console trim per Chapter 25.
- (3) Remove rubber boot (2) and mounting nut (3) from flap switch (4) and pull flap switch from console.
- (4) Tag and disconnect wires.

B. Flap Switch Installation

- (1) Connect wires.
- (2) Insert flap switch (4) from underside of console, positioning locator slot in switch to correspond to tab on console.
- (3) Secure mounting nut (3) on switch (2) and install rubber boot (2).
- (4) Install trim per Chapter 25.
- (5) Screw flap knob (1) on flap switch (4).

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4A. Micro-switch Removal/Installation (Aircraft Ser. No. 10220 and lower) (See Figure 27-42)

A. Micro-switch Removal

- (1) Remove trim per Chapter 25 to provide access to micro-switch.
- (2) Identify and disconnect wires.
- (3) Remove screws (4) from micro-switch (5). Lift micro-switch (5) and pad (6) from bracket (7).

B. Micro-switch Installation

- (1) Position pad (6) on bracket (7) so that holes align.
- (2) Place micro-switch (5) on pad (6) and secure with screws (4).
- (3) Reconnect wires.
- (4) Install trim per Chapter 25.

4B. Micro-switch Removal /Installation (Aircraft Ser. No. 10221 and higher) (See Figure 27-42)

A. Micro-switch Removal

- (1) Remove trim per Chapter 25 to gain access to the micro-switch.
- (2) Identify wires and disconnect from terminals.
- (3) Mark the location of mount blocks (9) on grooved shaft.
- (4) Loosen allen screws (2) until mounting blocks (9) will rotate on shaft (5).
- (5) Rotate mount blocks (9) clockwise, remove screws (6) and switch (3).

B. Micro-switch Installation

- (1) Position switch (3) on mount block (9) and secure with screws (6).
- (2) Reconnect wires as identified to terminals (4).
- (3) Rotate mounting blocks (9) until allen screw (2) aligns with shaft groove and the mounting blocks align with the marks on shaft (5).
- (4) Secure allen screws (2).
- (5) Check flap rigging and rig in accordance with this chapter if required.
- (6) Install trim per Chapter 25.

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5. Wiring Removal/Installation

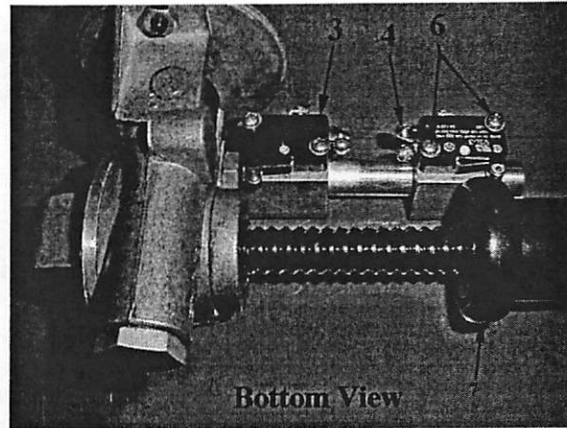
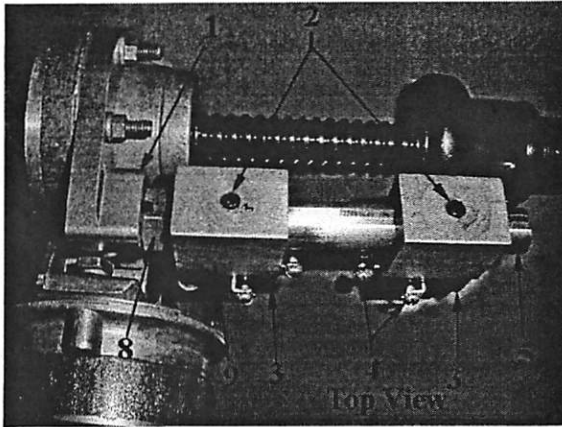
A. Wiring Removal

- (1) Ensure that electrical power is off prior to removing or installing wires.
- (2) Disconnect wiring.

B. Wiring Installation

- (1) Route wires per Figure 27-42.
- (2) Refer to Figure 27-39, Flap Electrical System Schematic, for wiring diagram.

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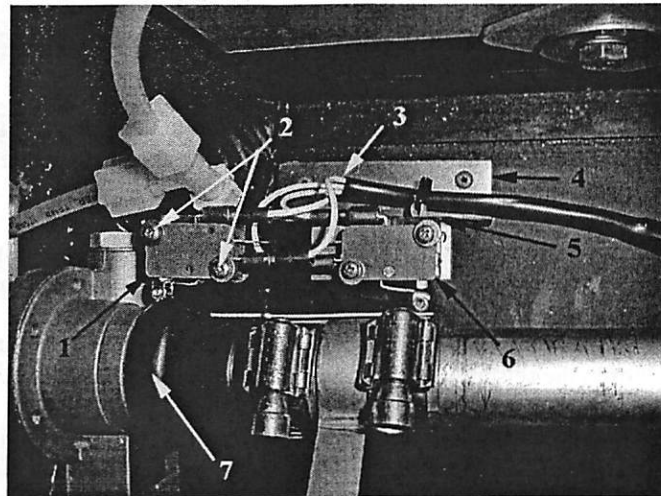
AG-5B S/N 10221 and above

- | | |
|---------------------|-------------------|
| 1. Mount Bracket | 6. Screws |
| 2. Allen Screw | 7. Cam |
| 3. Micro-switch | 8. Jam Nut |
| 4. Switch Terminals | 9. Mounting Block |
| 5. Grooved Shaft | |

Above applies to Aircraft Serial Numbers 10221 and higher.

**Micro-Switch Switch Removal / Installation
Figure 27-42**

Below applies to Aircraft Serial Numbers 10220 and lower.



AG-5B S/N 10000 to 10220

- | | |
|---------------------------|-----------------------------|
| 1. Micro-switch, Up Limit | 5. Insulator |
| 2. Screw | 6. Micro-switch, Down Limit |
| 3. Wiring | 7. Cam |
| 4. Bracket, Micro-switch | |

MAINTENANCE PRACTICES - ADJUSTMENT/TEST

1. **Rigging** (See Figure 27-43)

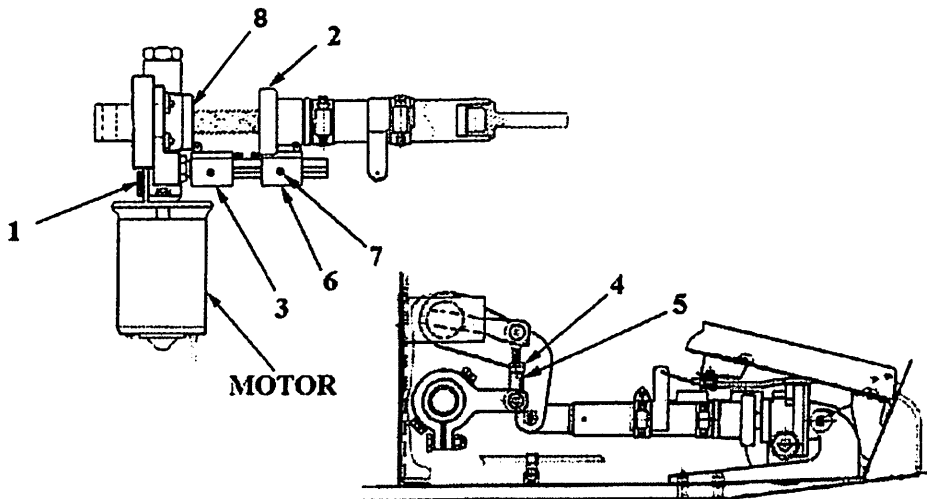
A. Flap Rigging

- (1) Remove trim per Chapter 25 to provide access to the flap drive.
- (2) Ensure that flap switch is set to OFF.
- (3) (a) *For S/N 10220 and prior*, manually rotate rubber coupling (1) until cam (2) depresses roller on aft limit switch (3) and a click is heard from the switch. This is the fully retracted flap position.
- (b) *For S/N 10221 and subsequent*, manually rotate rubber coupling (1) until cam (2) contacts the drive housing (8). Rotate the rubber coupling the opposite direction until the distance between the cam and the housing is $0.100" \pm 0.050"$ inch. Loosen set screw (7) and slide aft limit switch (3) forward until cam (2) depresses roller on the aft limit switch and a click is heard from the switch. Tighten the setscrew. This is the fully retracted flap position.
- (4) Place rigging fixture (P/N DE 5003-501) on wing at mid-span of flap.

NOTE: Aerodynamic lift and normal tolerance buildup in the linkage from flap motor to flap trailing edge result in a smaller flap angle in flight than on the ground. Before taking flap angle readings, grasp the flap at the center of the trailing edge and lift upward with 5 to 10 pounds of force as required to take up any slack in the linkage. Failure to comply will result in shortened flap travel when airborne.

- (5) While holding both flaps up, note the reading on the flap rigging fixture. Flaps should be $0 \text{ degree} \pm 1 \text{ degree}$ with no more than 1 degree difference between left and right flap readings.
- (6) If flap readings are not as given in Step 5, loosen locknuts (4) and adjust rod ends (5) to provide proper flap position. Tighten locknuts (4) when proper flap position is obtained.
- (7) Check flap position indicator in forward console for correct alignment. If adjustment is required, loosen the setscrew in the indicator and position as required.
- (8) With power on, cycle the flaps to the full down position, then back up until stopped by the aft limit switch (3). Check the flap position as in Steps 5 and 6 above. Hold the flap switch in the DOWN position until the flaps are stopped by the forward limit switch (6). With the flaps held up to remove slack (See NOTE above.), the flap rigging fixture should indicate $45 \text{ degrees} \pm 2 \text{ degrees}$. Adjust forward limit switch (6) as required to obtain this condition.
- (9) Move cam (2) past front limit switch (6) by turning rubber coupling (1) until end stop in jackscrew is reached. Check for positive clearance between flap actuation parts and aileron torque tubes.
- (10) Install trim per Chapter 25.

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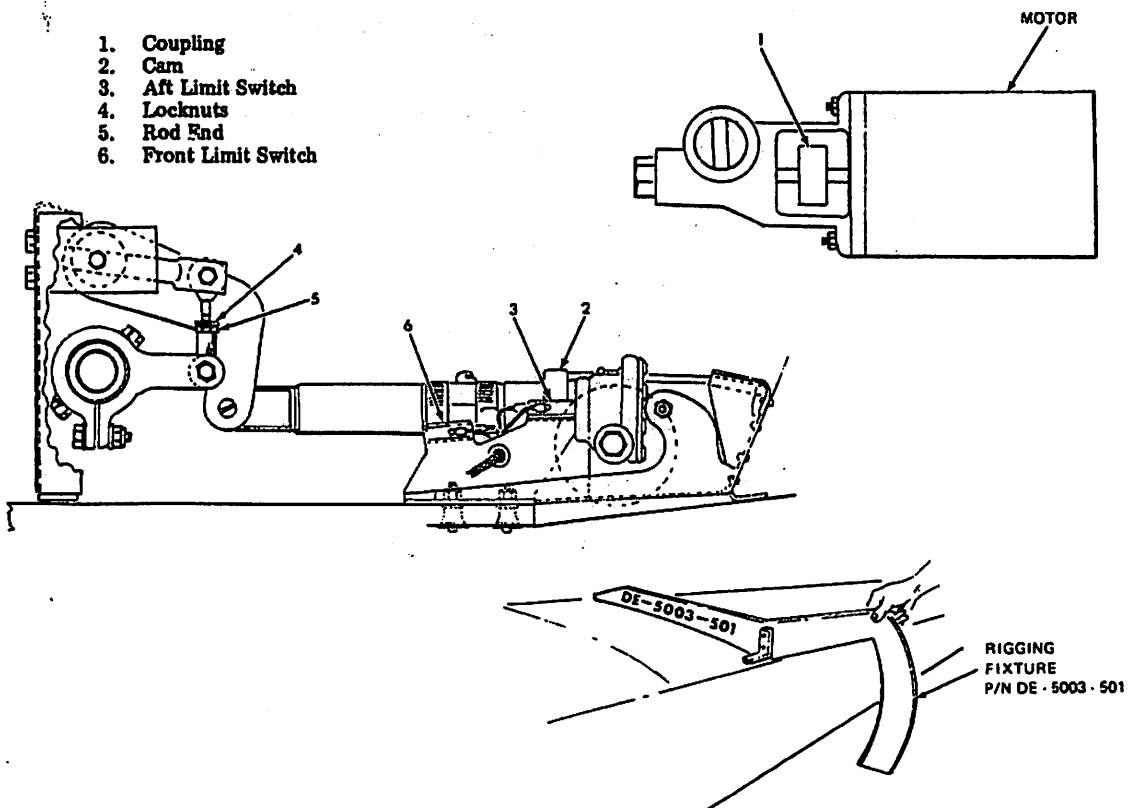


- | | |
|---------------------|-------------------------|
| 1. Coupling | 5. Rod End |
| 2. Cam | 6. Forward Limit Switch |
| 3. Aft Limit Switch | 7. Set Screw |
| 4. Lock Nut | 8. Housing |

Above applies to Aircraft Serial Numbers 10221 and higher.

**Flap Rigging
Figure 27-43**

Below applies to Aircraft Serial Numbers 10220 and lower.

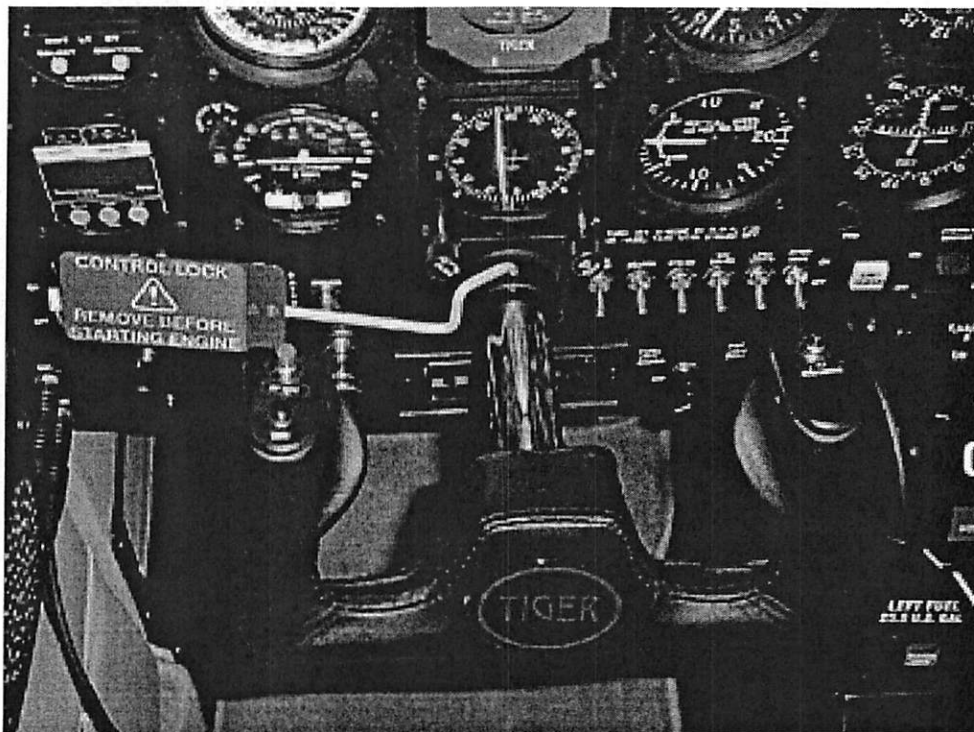


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GUST LOCK - DESCRIPTION/OPERATION

1. General

The gust lock is composed of a formed metal rod attached to a placard tab. The lock is installed by positioning the control wheel until the hole in its shaft is aligned with the hole in its guide. After hole alignment insert the gust lock pin. (See Figure 27-44)



Gust Lock
Figure 27-44

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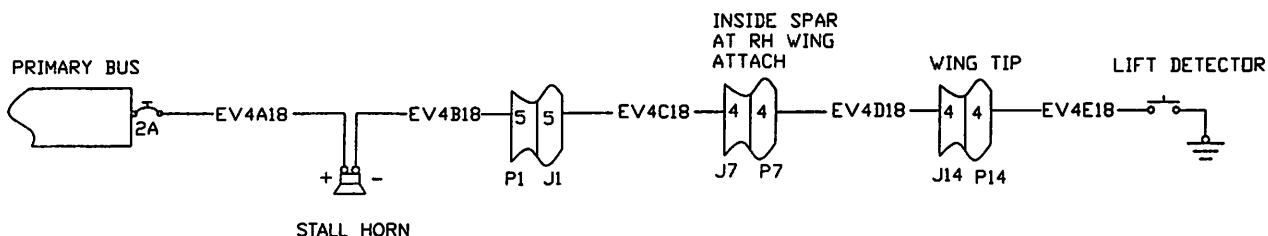
STALL WARNING - DESCRIPTION/OPERATION

1. General

The stall warning system is an electrically operated aural warning that informs the pilot of an impending stall at approximately 4 to 9 knots (5 to 10 mph) prior to stall. This system is composed of a stall sensor switch, wiring, and a stall warning horn.

DC power from the aircraft bus is applied through a 2amp circuit breaker to the stall warning system. DC power is applied directly to one side of the stall warning horn. The other side of this horn is connected to the normally open stall sensor switch. When the aircraft approaches to within 4 to 9 knots (5 to 10 mph) of its stalling speed, the stall sensor switch closes, completing the ground to the stall warning horn. The horn then sounds as long as the switch remains closed. (See Figure 27-45)

The stall sensor switch is mounted on the leading edge of the right wing. The stall warning horn is mounted on a bracket beneath the left side of the instrument panel.



**Stall Warning System
Figure 27-45**

Troubleshooting Stall Warning System

TROUBLE	PROBABLE CAUSE	REMEDY
Horn fails to sound when sensor switch is closed.	Set MASTER switch to ON. Check circuit breaker.	Replace if defective.
	Check that pin 5 of JP-1 is grounded when stall sensor switch is closed.	If not, repair wiring or replace switch. If grounded, replace stall-warning horn.

MAINTENANCE PRACTICES – REMOVAL/INSTALLATION

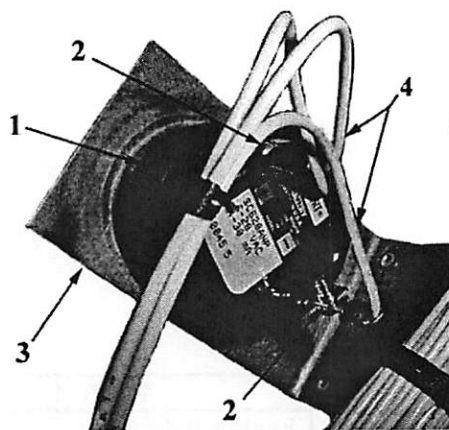
2. Stall Warning Horn Removal/Installation (See Figure 27-46)

A. Stall Warning Horn Removal

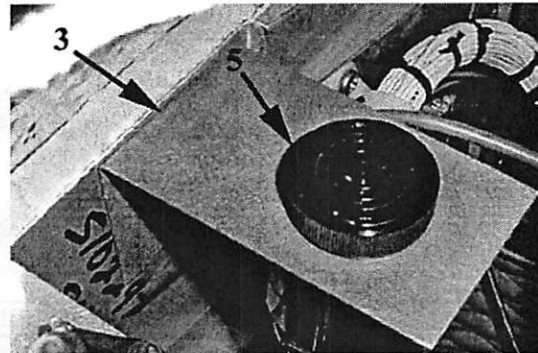
- (1) Remove glare-shield and deck. (See Chapter 25)
- (2) Identify wires (4) to assist on re-assembly.
- (3) Remove screws (2) and wires (4) from stall warning horn connection terminals.
- (4) Remove knurled nut (5).
- (5) Remove the stall warning horn (1) from mounting bracket (3).

B. Stall Warning Horn Installation

- (1) Install warning horn (1) on bracket (3) and secure with knurled nut (5).
- (2) Attach wires (4) as identified with screws (2).
- (3) Remove identification tags from wires.
- (4) Install glare-shield and deck. (See Chapter 25)



Bottom View



Top View

1. Horn
2. Screws
3. Bracket

4. Wires
5. Knurled Nut

**Stall Warning System Removal / Installation
Figure 27-46**

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1. Stall Sensor Switch Removal/Installation (See Figures 27-47)

A. Stall Sensor Switch Removal

- (1) Remove access cover (1) from bottom of wing.
- (2) Remove screws (2) securing sensor switch (3) to wing (4).
- (3) Tag and disconnect wires (5) and remove sensor switch (3) from inside of wing (4).
- (4) Ensure that insulating strip (6) is not damaged.

B. Stall Sensor Switch Installation

- (1) Ensure insulation strip (6) is in correct position beneath switch mounting location.
- (2) Connect wires (5) to switch (3).
- (3) Position switch (3) inside wing (4) and secure with screws (2).
- (4) Adjust switch per this chapter.
- (5) Install access cover (1).

NOTE: The stall-warning vane should never be painted.

MAINTENANCE PRACTICES – ADJUSTMENT/TEST

1. Stall Sensor Switch Adjustment/Operational Check (See Figure 27-47)

A. Stall Sensor Switch Adjustment

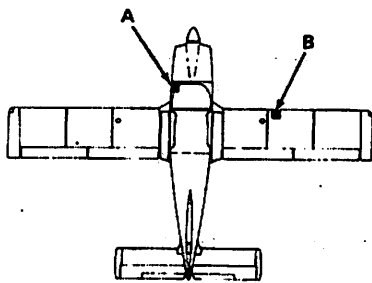
NOTE: Adjustment of the stall sensor switch requires aircraft flight test.

- (1) Install stall sensor switch per Removal/Installation, this chapter.
- (2) Flight test aircraft, noting speed at which stall warning system sounds, and speed at which stall occurs. Stall warning horn shall sound 4 to 9 knots (5 to 10 mph) prior to stall.
- (3) If stall warning occurs at incorrect speed, adjust switch as follows:
 - (a) Remove the stall sensor switch access panel (1).
 - (b) Loosen screws (2) securing sensor switch.
 - (c) Reposition switch slightly, downward to decrease speed at which horn sounds, or upward to increase speed.
 - (d) Tighten screws (2) and replace access panel (1).
 - (e) Repeat step (c) as necessary to obtain proper stall warning.

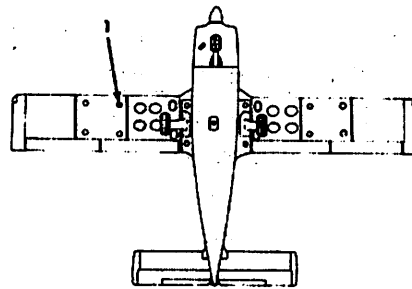
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B. Stall Warning System Operational Check

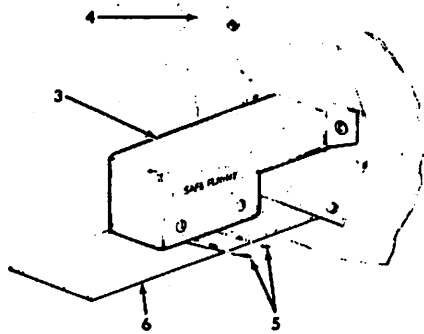
- (1) Set MASTER switch to ON.
- (2) Lift vane on stall sensor switch. Stall warning horn shall sound.
- (3) Release vane and set MASTER switch to OFF.



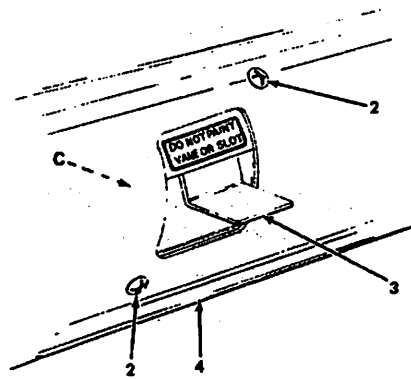
AIRCRAFT TOP VIEW



AIRCRAFT BOTTOM VIEW



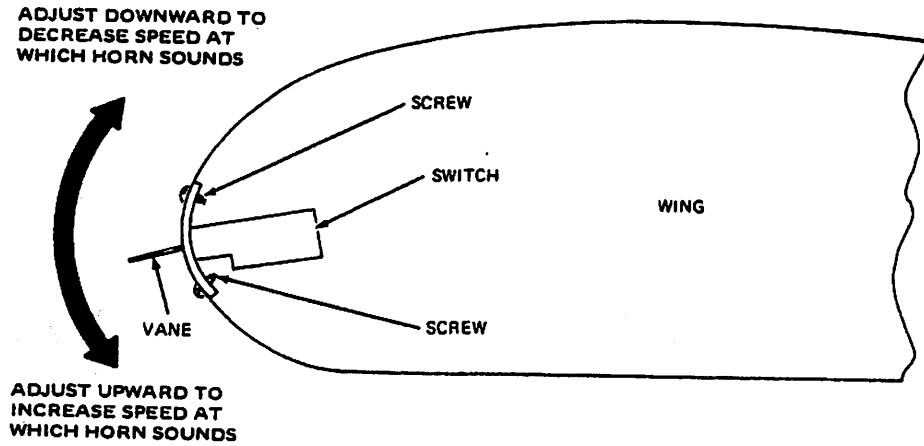
DETAIL C



DETAIL B

**Stall Warning System Removal/Installation/Adjustment
Figure 27-47
(Sheet 1 of 2)**

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- | | |
|------------------|---------------------|
| 1. Access Cover | 4. Wing |
| 2. Screw | 5. Wires |
| 3. Sensor Switch | 6. Insulation Strip |

**Stall Warning System Removal/Installation/Adjustment
Figure 27-47
(Sheet 2 of 2)**

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CHAPTER 28

FUEL SYSTEM

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FUEL SYSTEM - DESCRIPTION/OPERATION

1. **General** (See Figure 28-01)

A. The fuel system consists of two fuel tanks, two sumps, two flush mounted fuel tank vents, a fuel selector valve, an engine-driven fuel pump, an auxiliary electrical fuel pump, an electrically operated primer valve and fuel gauges. The fuel tanks are integral parts of the wing and located outboard of the wing root. Fuel is piped to the sumps mounted in the wing roots just below the main spar. From the sumps, fuel is directed to the selector valve mounted on the upper forward console panel and then to the fuel pumps. No gascolator or fuel drain is located in the engine compartment as the fuel system piping slopes downward to the sump drains located under the wing roots. The fuel tank vents are flush mounted and maintain a slight positive pressure in flight.

B. The fuel tank capacities are as follows:

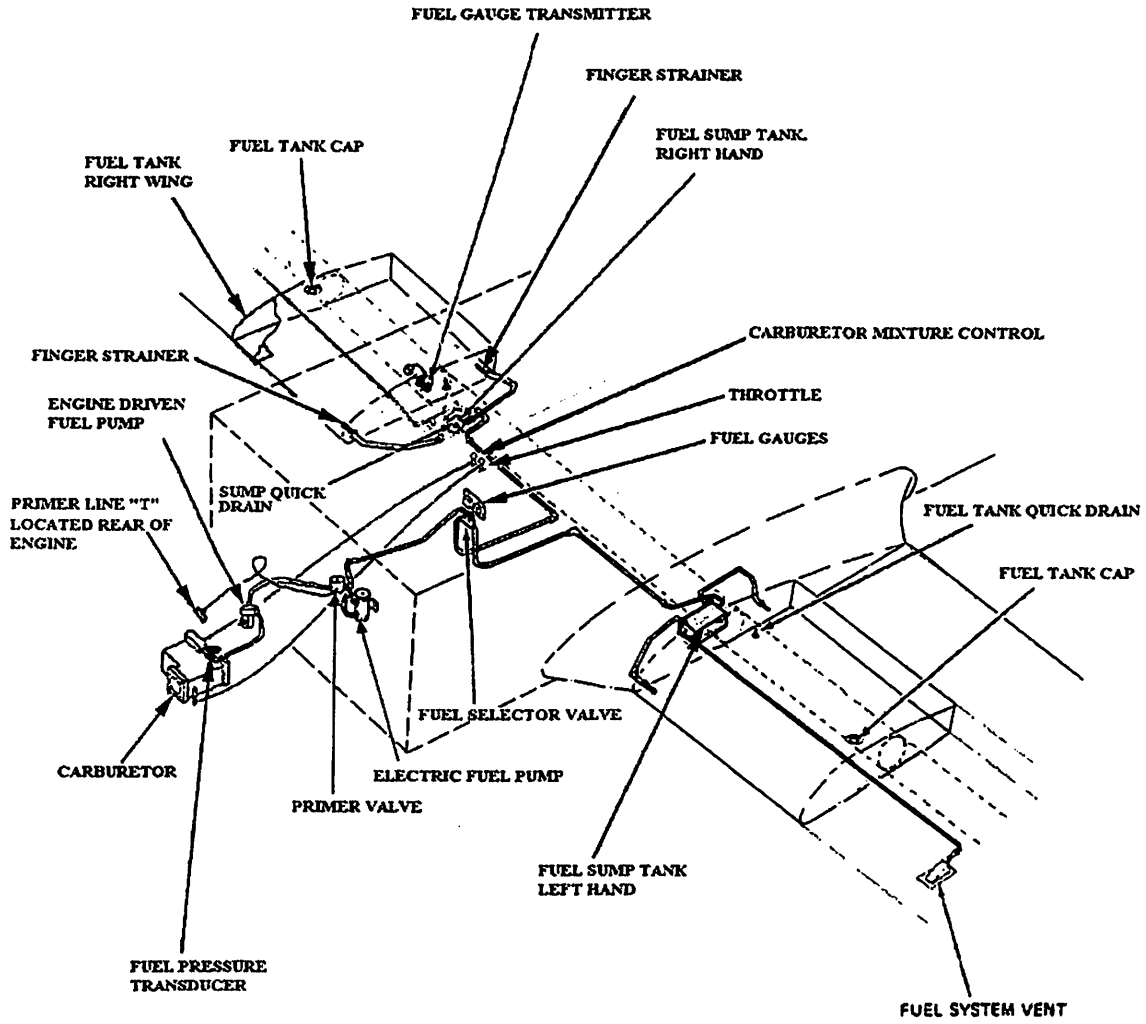
<u>FUEL STORAGE AREA</u>	<u>TOTAL CAPACITY</u> <u>U.S. GAL.</u>
Left Tank	26.3
<u>Right Tank</u>	<u>26.3</u>
Total	52.6

<u>Unusable Fuel:</u>	
Left Tank	0.8
<u>Right Tank</u>	<u>0.8</u>
Total	1.6

<u>Usable Fuel:</u>	
Left Tank	25.5
<u>Right Tank</u>	<u>25.5</u>
Total	51.0

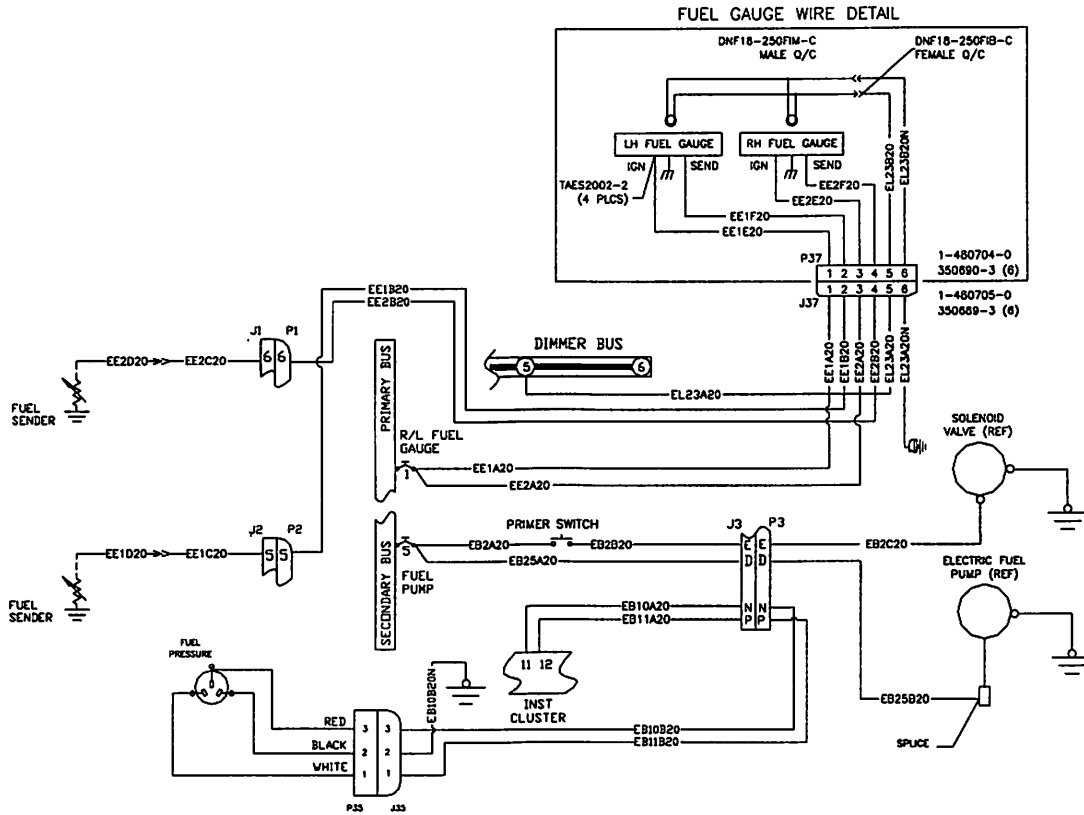
C. The electrical wiring and circuit protective devices that supply electrical power to the auxiliary fuel pump and the fuel quantity indicators are shown in Figure 28-02.

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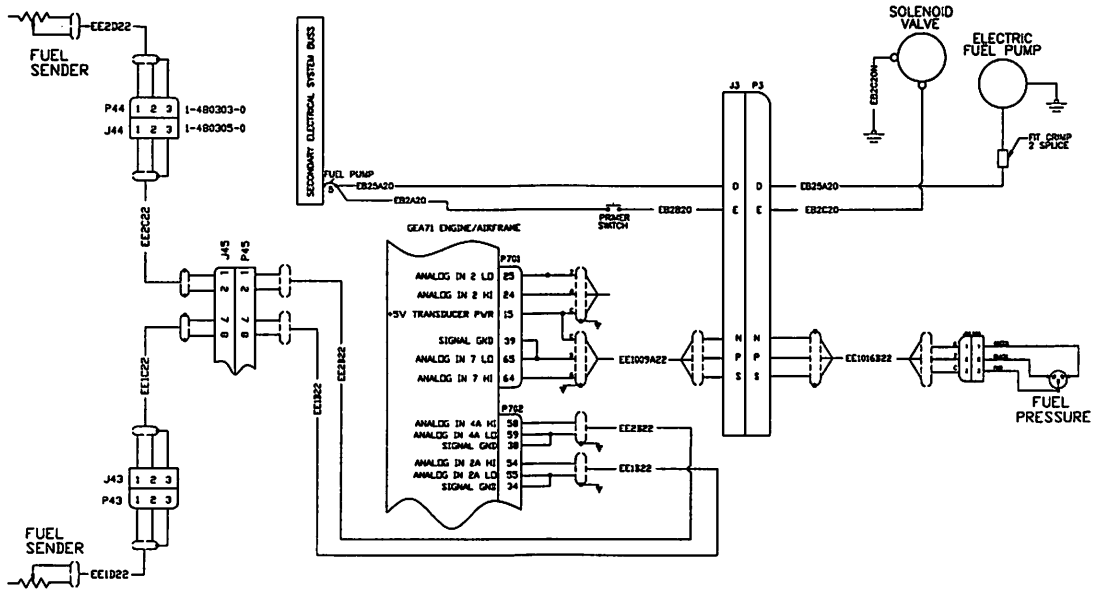


Fuel System Diagram
Figure 28-01

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**Fuel System Electrical Circuits
Figure 28-02**



**Fuel System Electrical Circuits, G1000
Figure 28-02A**

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FUEL SYSTEM - TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
No fuel pressure (electrical fuel pump turned on).	Fuel tanks empty.	Service tanks with proper grade fuel.
	Defective gauge.	Replace gauge.
	Fuel selector valve in 'OFF' position.	Switch to select the serviced tank.
	Clogged electrical fuel pump filter.	Check filter for blockage. Clean or replace filter as required.
	Obstruction in fuel supply line.	Starting at carburetor, remove, inspect and clean each line.
	Faulty switch.	Replace switch.
	Defective pump.	Remove outlet line from pump if no fuel flow, replace pump.
	Faulty fuel pressure transducer.	Install new fuel pressure transducer.
Low pressure.	Fuel valve improperly positioned.	Check position.
	Clogged electric fuel pump filter.	Check filter for blockage. Clean or replace filter as required.
	Obstruction in fuel supply line.	Starting at carburetor, remove, inspect, and clean each line.
	Fuel line or connection leaking.	Inspect all lines and tighten connections as required. Use thread sealant as required.
	Dirty tank strainer.	Remove and clean strainer. Flush tank prior to reassembly.
	Fuel primer valve open.	Replace defective valve. Replace primer switch.
	Faulty fuel pressure transducer.	Install new fuel pressure transducer.
No fuel quantity indication. (See continuation next sheet)	Fuel tanks empty.	Service tanks with proper grade fuel.
	Master switch off.	Turn master switch on.
	Loose connections or open circuit.	Tighten connections; repair or replace wire as required.

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FUEL SYSTEM - TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
No fuel quantity indication. (Con't.)	Defective gauge or transmitter.	Check fuel indicating system, repair as required.
Fuel quantity indicating too high or to low.	Aircraft not level.	Level aircraft and recheck.
	Defective gauge or transmitter.	Check fuel indicating System.

FUEL SYSTEM – MAINTENANCE PRACTICES

1. Fuel Tank and Sump Quick Drains (See Figure 28-03)

Two fuel drains are provided beneath each wing, one in each wing tank and one in the fuel sump. The drains are spring-loaded to the closed position to provide a convenient method of draining small samples of fuel for preflight inspection. If fuel system drainage is required, the quick drains may be unscrewed and removed.

Aircraft fuel tank quick drains are as shown in Figure 28-03. The sampler cup pin is used to press the drain fitting upward allowing a sample of fuel to be taken.

Aircraft sump quick drains are similar to those shown in Figure 28-03, and include a plunger attached to the fitting. The plunger is pushed upward to obtain a sample of fuel.

A. Refueling – Defueling

- (1) For detailed Refueling and Defueling procedures, refer to Chapter 12.

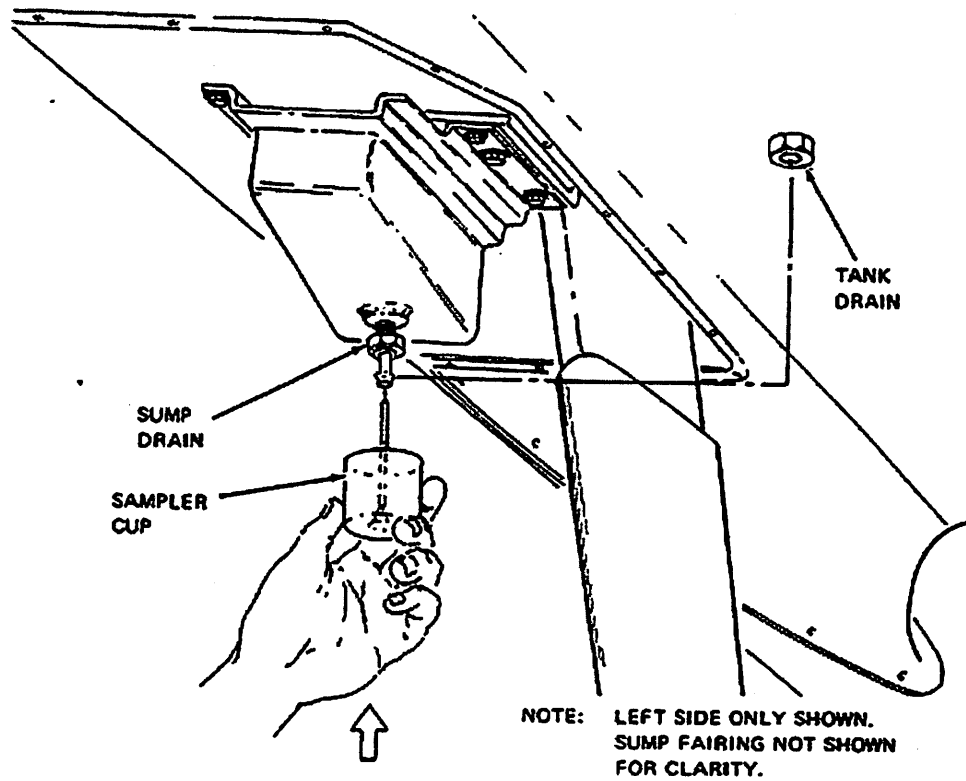
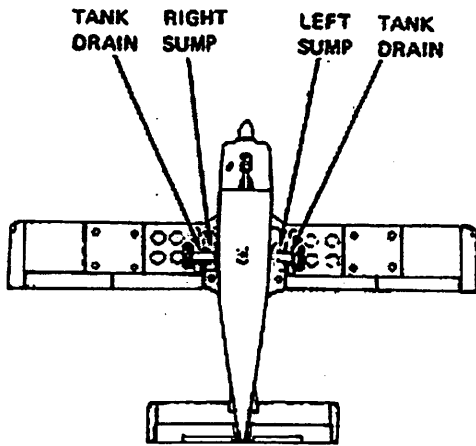
B. Reduction of Fuel Tank Vapor Hazards

C. General Precautions

During all defueling, ventilation, inerting or maintenance procedures involving the fuel system the following general precautions should be observed:

- (1) Defueling should be done outdoors with the aircraft at least 100 feet from hangars or other aircraft.
- (2) Smoking should not be permitted within 100 feet of aircraft.
- (3) Suitable fire fighting equipment should be readily available. Foam or soda type extinguishing agents are recommended.
- (4) The Aircraft should be grounded to prevent static electricity from causing sparks.
- (5) Flame and spark producing equipment should not be operated within 100 feet of the aircraft.

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Fuel Sump and Fuel Tank Drain Operation
Figure 28-03

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- (6) The aircraft should have the battery removed or disconnected.
- (7) Only personnel working on the aircraft should be allowed in the immediate area, and no other maintenance should be performed while the tanks are being serviced.
- (8) When a fuel tank is opened for repair, air ventilation or inerting procedures should be started immediately to reduce vapor concentrations.
- (9) When draining fuel, ensure that suitable containers are available and that drained fuel is stored safely. Do not allow fuel to drip to the ground and form pools.
- (10) If it is necessary to ventilate or inert a tank when the aircraft is in a hangar, ensure that vapors do not accumulate to explosive or toxic levels in the hangar.

WARNING: WHEN FUEL IS BEING DRAINED, THERE IS LITTLE CONTROL OVER THE RELEASE OF FUEL VAPOR. THIS VAPOR SHOULD BE DISSIPATED AS QUICKLY AS POSSIBLE. COMPRESSED AIR OR EXPLOSION-PROOF BLOWERS MAY BE USED FOR THIS PURPOSE.

Before working on fuel tanks, defuel them per Chapter 12. Fuel that cannot be drained by normal defueling must be removed from the tanks by opening all sump drains and access panels.

Two general methods of reducing fuel vapor hazards can be used, ventilating or inerting. The simplest method ventilation is forcing clean air through the tank until all vapors have been dissipated. This method is best when the tank access covers must be removed for work in the tank.

Inerting is another method of reducing vapor hazards. In this method an inert gas, such as nitrogen or carbon dioxide, is forced into the tank to replace the air in the tank. This reduces the oxygen in the tank to a level that will not support combustion. Although inerting may be used to prevent explosion hazards from fuel vapor, it does not prevent toxic levels of vapor in the tank.

B. Air Ventilation

- (1) Completely drain the tank (or tanks).
- (2) Remove the access covers and tank cap.
- (3) Use compressed air or an explosion-proof blower to blow air into the tank until tank interior is dry and free of vapor.
- (4) Continue ventilation while the tank is open and being serviced.

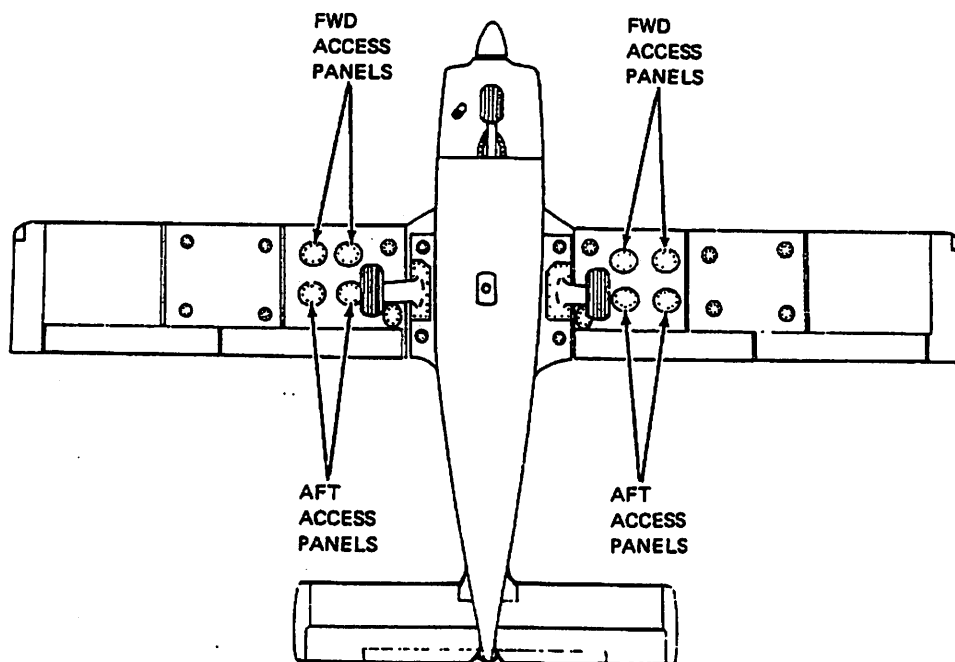
FUEL STORAGE SYSTEM – DESCRIPTION/OPERATION

1. **General**

Since the fuel tanks are formed by the inner wing panels, they are non-removable. Each tank has four access panels, two forward of the wing spar and two aft. The spar and ribs serve as baffles within the tank.

The tank area extends from the leading edge to the trailing edge of two wing bays and the inboard and outboard sides are located from 16 inches to 48 inches from the wing root.

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Fuel Tank Access Panels
Figure 28-04

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FUEL SYSTEM – ADJUSTMENT/TEST

1. **Testing Fuel Tanks**

A. Test each fuel tank as follows:

- (1) Plug the vent line at the outboard end.
- (2) Attach a differential pressure gauge or water manometer capable of measuring 0.750 psi or 20 inches of water to the fuel line leading from the sump to the fuel selector.
- (3) Connect a regulated supply of air or nitrogen (0.5 psi Maximum or 13.8 inches of water) to the fuel tank sump quick drain port.
- (4) Make sure filler cap is installed.

CAUTION: DO NOT ATTEMPT TO APPLY PRESSURE TO THE TANK WITHOUT A GOOD REGULATOR AND A POSITIVE SHUTOFF IN THE SUPPLY LINE. DO NOT PRESSURIZE THE FUEL TANK TO MORE THAN 0.5 PSI OR DAMAGE MAY OCCUR.

- (5) Apply pressure slowly until 0.5 psi is obtained.
- (6) Prepare a solution of 50% liquid dishwashing detergent and 50% water.
- (7) Apply detergent solution to the outside of the tank in suspect areas.
- (8) Allow 5 minutes for the pressure to stabilize.
- (9) Check for the presence of detergent solution bubbles on the outside of the tank to indicate the location of leakage.
- (10) Turn off the air supply.
- (11) If the tank holds pressure for 15 minutes, with a pressure loss not exceeding 0.05 psi, the tank is acceptable.
- (12) Reseal and retest per this chapter if any leaks are found.

FUEL STORAGE SYSTEM – INSPECTION/CHECK

1. **Checking Fuel Tank Leaks**

Fuel leaks that are not considered a flight hazard are stains, seeps and heavy seeps NOT in an enclosed area. However, all fuel leaks should be repaired as soon as possible. Fuel leaks that are a flight hazard are running leaks in any area, and seeps, heavy seeps or stains in an enclosed area, such as sections of the wing inboard of the fuel tank. These leaks must be repaired before that tank is used for another flight. A wet or stained spot on a wing in the area of the tank is an indication of the intensity of a leak. Fuel leak classifications are shown in Figure 28-05.

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NOTE: Stains from previously repaired leaks are not considered a flight hazard but must be inspected before each flight to insure that seepage has not begun, causing a flight hazard.

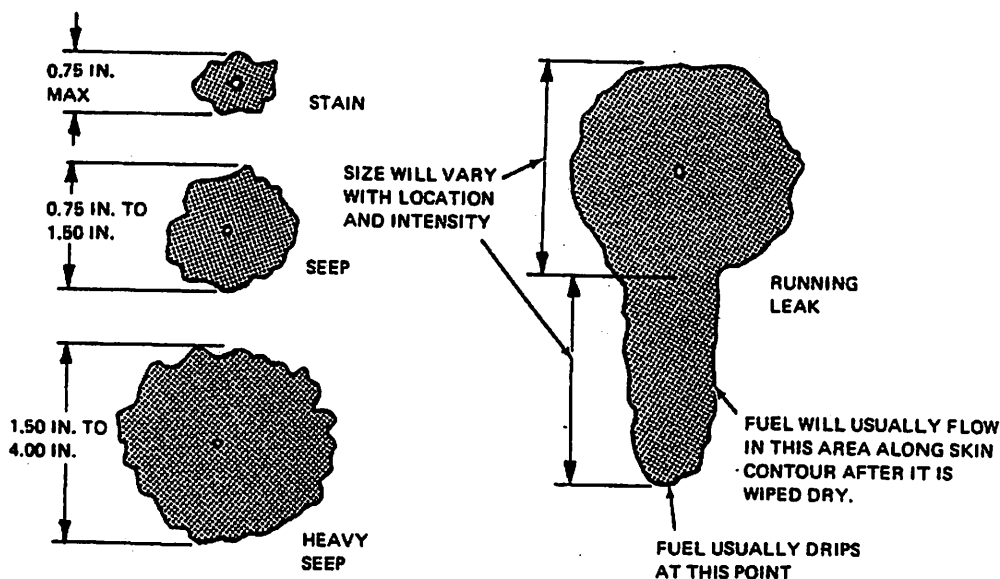
If a leak causing a flight hazard should occur at a place with no facilities available to make an acceptable repair, it is recommended that the leaking tank be drained and cleared of explosive vapor. By switching the fuel selector valve to the other tank, the aircraft can be flown to a facility where the fuel leak can be repaired.

2. Checking Fuel Tank Caps

The fuel caps are not vented and should be inspected at every scheduled inspection to assure the gasket inside the cap has not deformed or deteriorated. Lubricate the gasket and release tabs with grease (MIL-G-6032A). Refer to Chapter 12.

3. Checking Fuel Tank Drains

The fuel tank drains should be checked at every scheduled inspection to ensure that leakage or seepage through the drain valve is not occurring. In addition, the drains should be checked for proper operation.



Classification of Fuel Leaks

Classification of Fuel Leaks
Figure 28-05

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FUEL STORAGE SYSTEM – APPROVED REPAIRS

1. Integral Fuel Tank Sealants

Sealants have been proven to be safe materials when used with reasonable care, however the following precautions must be observed:

WARNING: SOME SEALANTS CONTAIN FLAMMABLE AND VOLATILE SOLVENTS. KEEP SEALANTS AWAY FROM HEAT, SPARKS AND FLAME. PROPER PRECAUTIONS USED WITH FLAMMABLE MATERIAL MUST BE TAKEN WHEN APPLYING SEALANTS. COMPLY WITH ALL LOCAL SAFETY REGULATIONS.

USE AND HANDLE ONLY IN A WELL VENTILATED AREA. AIR SUPPLIED RESPIRATORS SHOULD BE USED DURING APPLICATION. AVOID REPEATED OR PROLONGED EXPOSURE.

REMOVE AFFECTED PERSONNEL TO FRESH AIR IMMEDIATELY AND OBTAIN MEDICAL ATTENTION.

POLYETHYLENE GLOVES AND CHEMICAL TYPE GOGGLES MUST BE USED WHEN HANDLING OR MIXING MATERIALS.

2. Sealing Fuel Leaks (See Figure 28-06)

A. Prepare the aircraft for safe maintenance as follows:

- (1) Insure the Master Switch is OFF.**
- (2) Ground the aircraft.**
- (3) Observe all safety precautions addressed in this chapter.**

B. Determine source of leak. Fuel can flow along the structure of the wing, making a leak source difficult to find. A stained area is an indication of a leak source.

C. Drain tank to be repaired.

D. Gain access to tank by removing access covers. Retain hardware for reuse.

NOTE: See Figure 28-12 for access panel installation.

E. With tank opened, purged and properly ventilated prepare the leak area as follows:

- (1) Remove all loose, chipped or cracked sealant from the area to be repaired. Use of a chisel-like tool made of hard fiber or Plexiglas, is excellent to remove old sealant.**
- (2) Remaining sealant may then be removed with aluminum wool, 3M Elektro-Cut cloth or aluminum oxide paper. *Do not use steel wool or silicon grit abrasive.***
- (3) Thoroughly clean the area using a vacuum cleaner or other suitable cleaning device.**

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NOTE: Checking and correcting for loose rivets and/or other mechanical fasteners is recommended prior to applying sealant. Check area of leak for defects in bond joints. Areas of cracked bond fillets or separated bond joints must be repaired. Reference chapter 20 for additional information.

- (4) If inspections reveal no rework required, proceed with cleaning of area to be sealed.
- (5) Using lint-free cheesecloth that has been dampened with MEK, alcohol, or acetone, clean the area until the cheesecloth shows no sign of dark smudge or stain.

NOTE: If the fuel tank float is in the area to be sealed, apply wax to the float to prevent the sealant from sticking to it.

F. For Tank Sealant – storage, mixing and care instructions.

- (1) Check the date of manufacture of the sealant to assure it is still within its specified shelf life.
- (2) Mix sealant according to instructions on container. If weight measuring devices are not available for use, entire contents of kit can be mixed as each kit contains base compound and accelerator in proper proportions.
- (3) Application life will vary, depending on temperature. For every 10 degrees F. rise above standard (75 degrees F. and 50% relative humidity) life is reduced by half and for every 10 degrees F. below standard life is doubled. High humidity at the time of mixing shortens application life.
- (4) Cure times depend on the ambient temperatures and relative humidity.

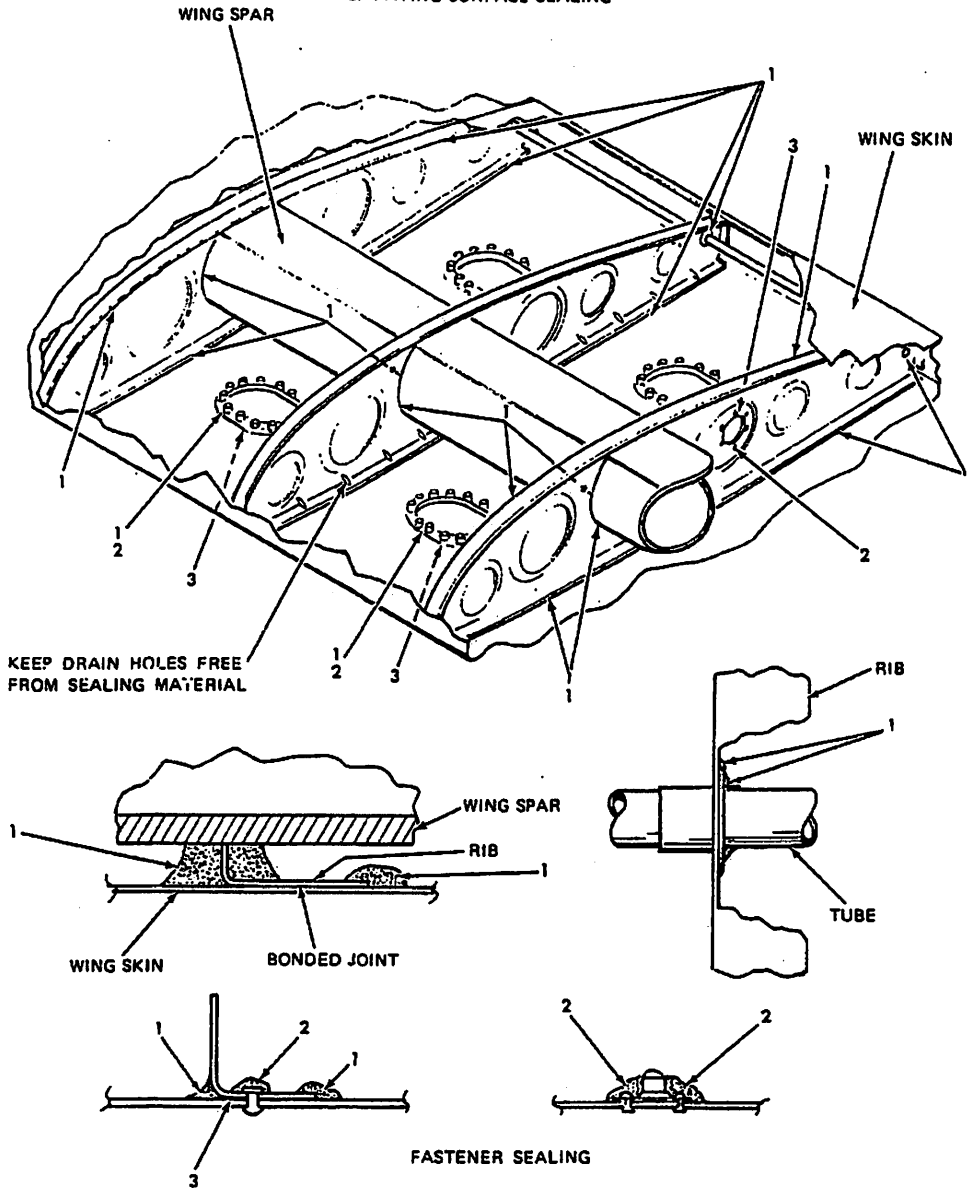
G. Apply sealant to area to be sealed. Special care must be taken at joints that have a direct fuel path out of the tank area. Sealant must be pressed between these surfaces thoroughly and then fillet sealed on the fuel side. Fillet sealing is applying sealant to the edge of all joints, joggles, bend relief's, voids and all rivets and/or fasteners through the boundary of the tank and any other place that a fuel leak has occurred.

H. Follow sealant cure time instructions before fueling.

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LEGEND

- 1. FILLET SEALING
- 2. RIVET AND FASTENER SEALING
- 3. FAYING SURFACE SEALING



NOTE: TYPES OF SEALING SHOWN IN THIS FIGURE ARE USED WHEN MAKING A STRUCTURAL REPAIR TO THE FUEL TANK AREA AND WHEN REINSTALLING THE ACCESS COVERS.

**Fuel Tank Sealing
Figure 28-06**

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FUEL DISTRIBUTION SYSTEM – DESCRIPTION/OPERATION

1. **General**

The fuel distribution system is composed of the fuel sump tanks, the fuel selector valve, the electric fuel pump, the engine-driven fuel pump, and the plumbing associated with these components. In addition, the electrical circuitry necessary to operate the electric fuel pump and electric primer valve is included in this system.

FUEL DISTRIBUTION SYSTEM – MAINTENANCE PRACTICES

1. **Servicing**

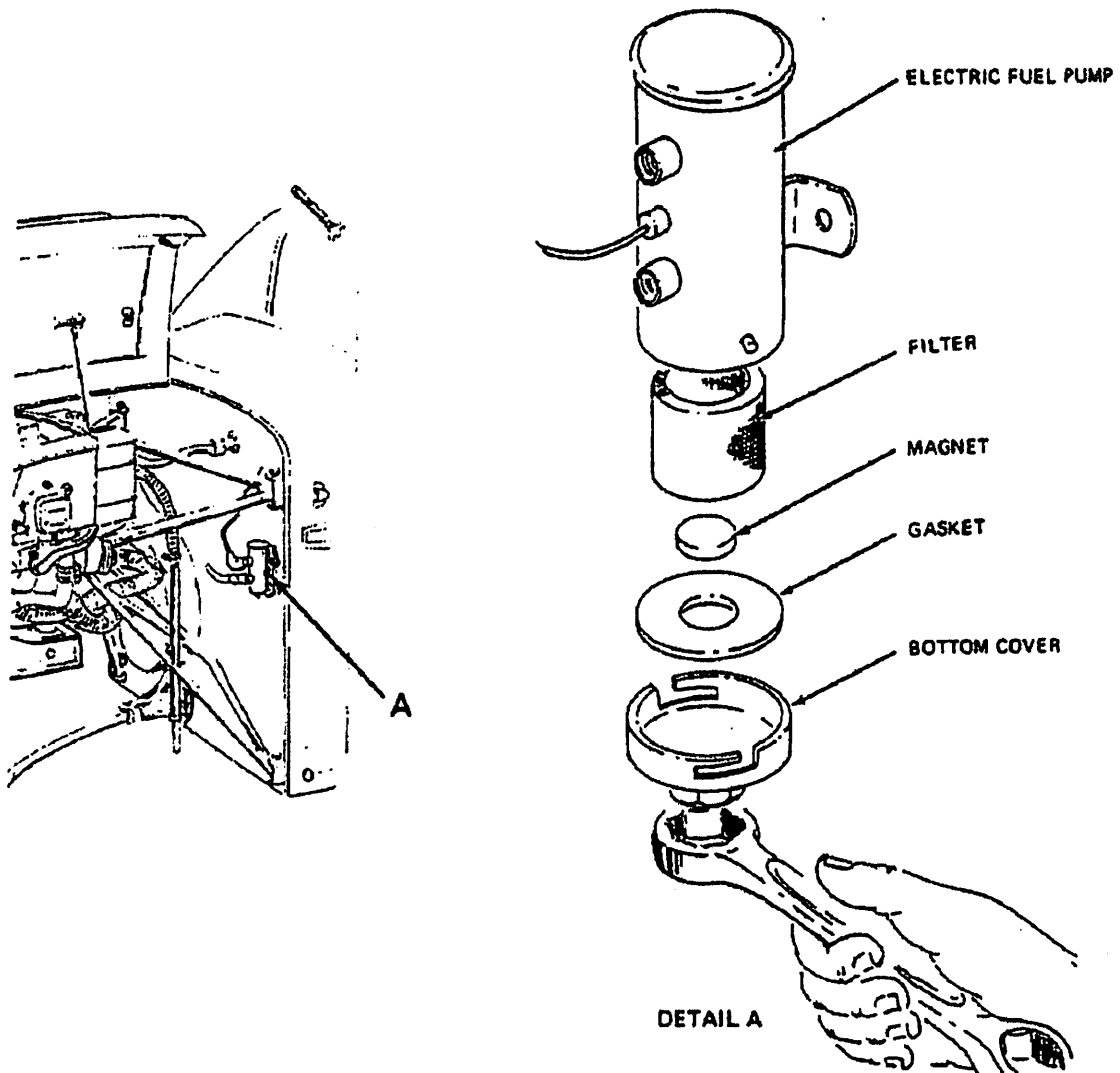
A. Electric Fuel Pump Filter

- (1) Open top left engine cowl.
- (2) Remove the bottom cover from the fuel pump by cutting the safety wire and turning the cover counter-clockwise with a 5/8 inch wrench. (See Figure 28-07)
- (3) Remove the cover, gasket, magnet, and filter.

WARNING: USE SOLVENT IN A WELL VENTILATED AREA. AVOID BREATHING FUMES. KEEP AWAY FROM FLAMES.

- (4) Clean the filter by rinsing in mineral spirits or equivalent and blowing out cleaning agent with compressed air. If filter is distorted or damaged, it should be replaced.
- (5) Reinstall filter, magnet, gasket and bottom cover.
- (6) Turn bottom cover clockwise until lugs engage, and safety with 0.032 inch wire.

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Fuel Pump Servicing
Figure 28-07

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2. Fuel Selector Valve Removal/Installation (See Figure 28-08)

A. Fuel Selector Valve Removal

- (1) Remove forward upper console panel. (Refer to Chapter 25)

CAUTION: WHEN LINES ARE DISCONNECTED SOME FUEL SPILLAGE MAY OCCUR. TAKE PROPER PRECAUTIONS TO PREVENT FIRE HAZARD DUE TO SPILLAGE.

- (2) Disconnect fuel lines from three elbows (1) attached to fuel selector valve (2). To prevent contamination, cap open lines.
- (3) Remove screw (9) attaching handle (8) to the valve stem and pull the handle from the valve stem.
- (4) Remove panel (10). Reference Figure 28-11.
- (5) Remove screws (5) and washers (4) securing fuel selector valve (2) to bracket (6).
- (6) Remove clamp (7) and selector stop (3).
- (7) Remove fuel selector valve (2) from bracket (6).

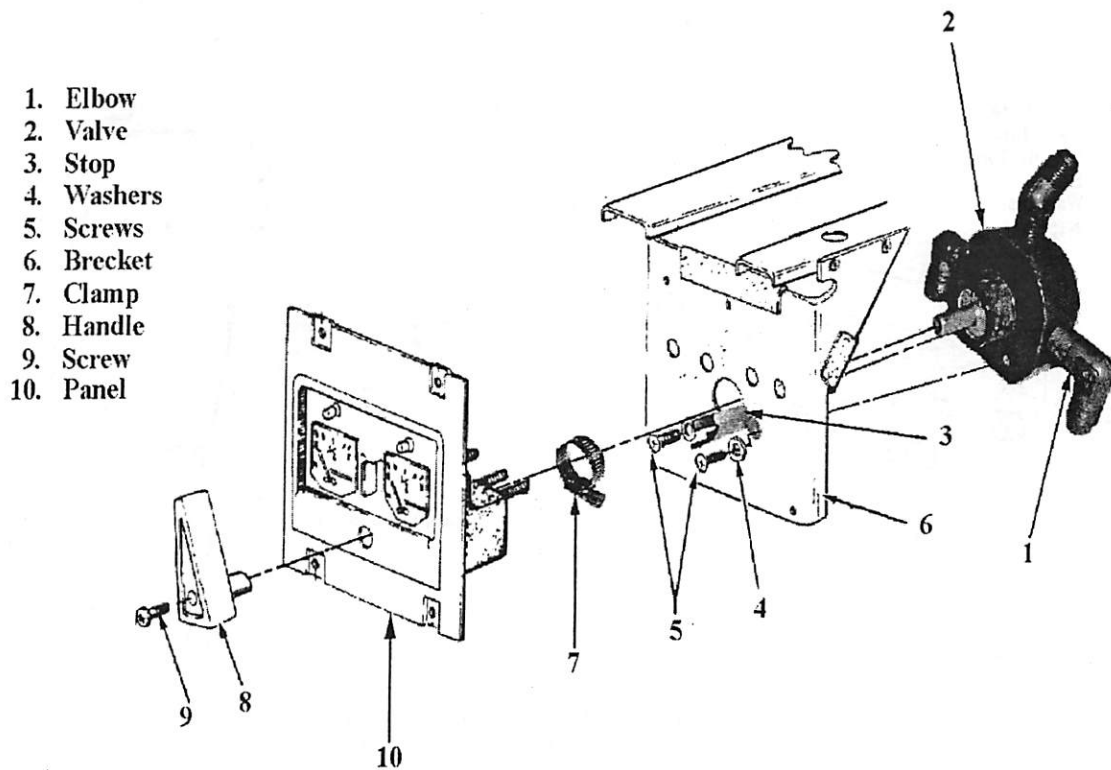
B. Fuel Selector Valve Installation.

- (1) Position fuel selector valve (2) in bracket (6).
- (2) Install clamp (7) around stop (3) and shoulder of valve (2).
- (3) Install screws (5) with washers (4) through bracket (6) [right screw also through stop (3)] and attach screws (5) to fuel selector valve (2).

NOTE: On installation of the control handle to the valve stem, assure correct alignment. The "D" handle I/D flat surface must mate with the stem O/D flat surface.

- (4) Install handle (8) on valve stem and secure it with the screw (9).
- (5) Clean the exposed threads of elbows (1).
- (6) Reconnect the three fuel lines and torque to 100 - 125 inch pounds.
- (7) Fill both fuel tanks, then with fuel pump on set fuel selector to left tank, then to right tank while observing that no leakage occurs at connectors or valve.
- (8) Reinstall forward upper console panel.

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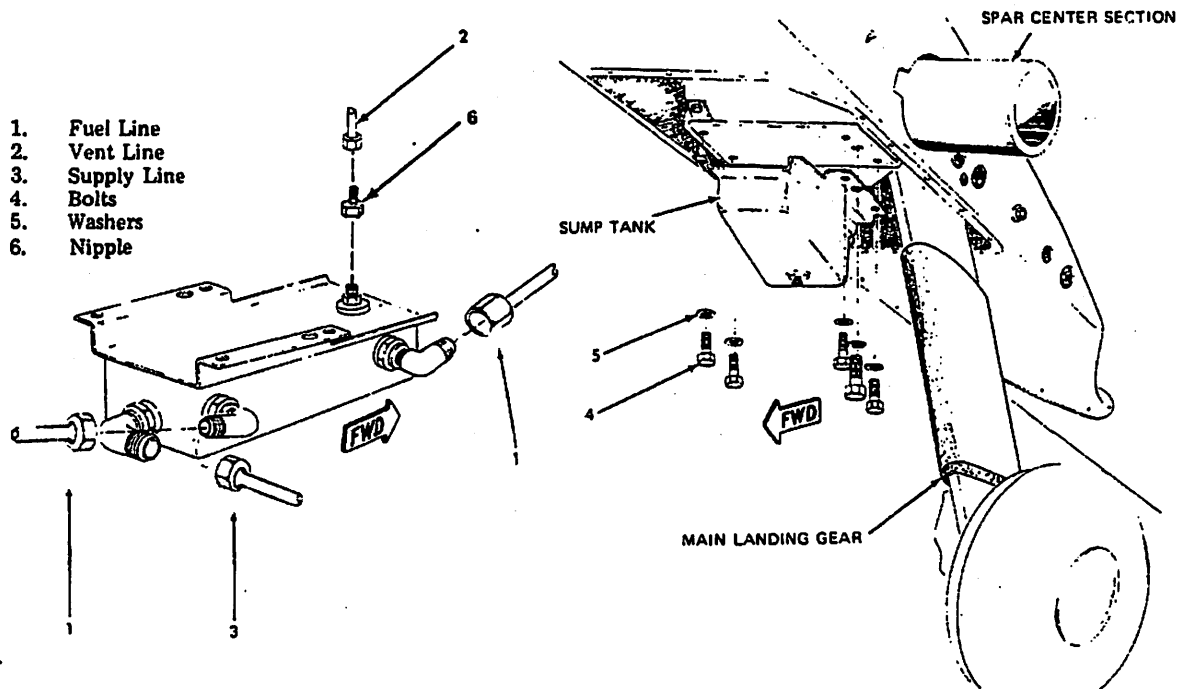
Fuel Selector Valve Removal/Installation
Figure 28-08

3. Fuel Sump Tank Removal/Installation (See Figure 28-09)

A. Fuel Sump Tank Removal

- (1) Remove the access panel at the wing root.
- (2) Drain the fuel tank as described in Fuel Storage System – Maintenance Practices.
- (3) Disconnect forward and aft fuel lines (1).
- (4) Disconnect vent line (2) at nipple (6) and disconnect supply line (3).
- (5) Remove bolts (4) and washers (5) attaching sump tank to the landing gear bracket and lower sump tank through the access opening.
- (6) Cap all open lines and fittings.

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Fuel Sump Tank Removal/Installation
Figure 28-09

B. Fuel Sump Tank Installation

NOTE: Teflon impregnated pipe thread sealant is recommended for use on fuel system external pipe threads. To prevent fuel contamination, ensure the first two leading threads are not covered by sealant.

- (1) Position the sump tank on the landing gear bracket as shown.

CAUTION: WHEN MOUNTING THE SUMP TANK, BE SURE THAT THE PROPER MOUNTING BOLTS (AN3-3A) ARE USED. BOLTS THAT ARE TOO LONG MAY EXTEND THROUGH THE LANDING GEAR MOUNT AND SCRATCH OR GOUGE THE CENTER SPAR.

- (2) Using retained hardware, secure the sump tank to the landing gear mount. Torque bolts to standard value. (Refer to Chapter 91)
- (3) Remove caps from lines and fittings.
- (4) Use a brush to clean threads of disconnected fuel lines.
- (5) Reconnect the disconnected lines.
- (6) Torque the forward and aft fuel lines to 200 - 250 inch pounds.
- (7) Torque the vent line to 40-65 inch pounds.

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- (8) Put fuel in tank and check fittings for leakage. (Refer to Chapter 12).
- (9) Reinstall wing root access panel. (Refer to Chapter 57).

4. Fuel System Plumbing Removal/Installation

A. Fuel System Plumbing Removal

WARNING: WHEN DISCONNECTING FUEL LINES FROM THE MAIN FUEL TANK, HOLD THE BULKHEAD FITTING WITH A WRENCH TO PREVENT IT FROM TURNING AND BREAKING THE SEAL.

CAP ALL OPEN LINES AND FITTINGS TO PREVENT CONTAMINATION FROM ENTERING THE SYSTEM.

WHEN DISCONNECTING LINES, FIRST ENSURE THAT ALL RESIDUAL FUEL IS DRAINED FROM THE LINE.

EXERCISE THE PRECAUTIONS PREVIOUSLY MENTIONED TO MINIMIZE FIRE HAZARDS.

Since the fuel system plumbing is composed of standard tubing and fittings, its removal only requires the use of standard maintenance practices.

B. Fuel System Plumbing Installation

CAUTION: PRIOR TO INSTALLATION, ALL FUEL LINES AND FITTINGS SHOULD BE CLEANED INTERNALLY BY PASSING MINERAL SPIRITS THROUGH THEM THEN AIR DRYING TO PREVENT CONTAMINATION FROM BEING INTRODUCED INTO THE SYSTEM. ALL THREADED FITTINGS SHOULD BE CLEANED WITH A STIFF BRISTLE BRUSH BEFORE THE FITTING IS INSTALLED. THREADED FITTINGS SHOULD BE TORQUED IN ACCORDANCE WITH BELOW LISTED VALUES.

Like removal, the installation of fuel system plumbing follows standard Maintenance practices.

<u>FUEL SYSTEM FITTING TORQUE VALUES</u>		
<u>PART NO.</u>	<u>NAME</u>	<u>TORQUE VALUE</u>
F391-53S	Drain Valve	25-30 in. lbs.
AN818-8D	Nut	200-250 in. lbs.
AN924-8D	Nut	200-250 in. lbs.
AN924-6D	Nut	100-125 in. lbs.
AN818-4D	Nut	52.5-65 in. lbs.
AN818-6D	Nut	100-125 in. lbs.
AN818-2D	Nut	25-30 in. lbs.
AN924-2D	Nut	25-30 in. lbs.
AN818-2	Nut	25-30 in. lbs.
AN805-2	Nut	25-30 in. lbs.
AN818-6	Nut	120-150 in. lbs.
AN924-6	Nut	120-150 in. lbs.

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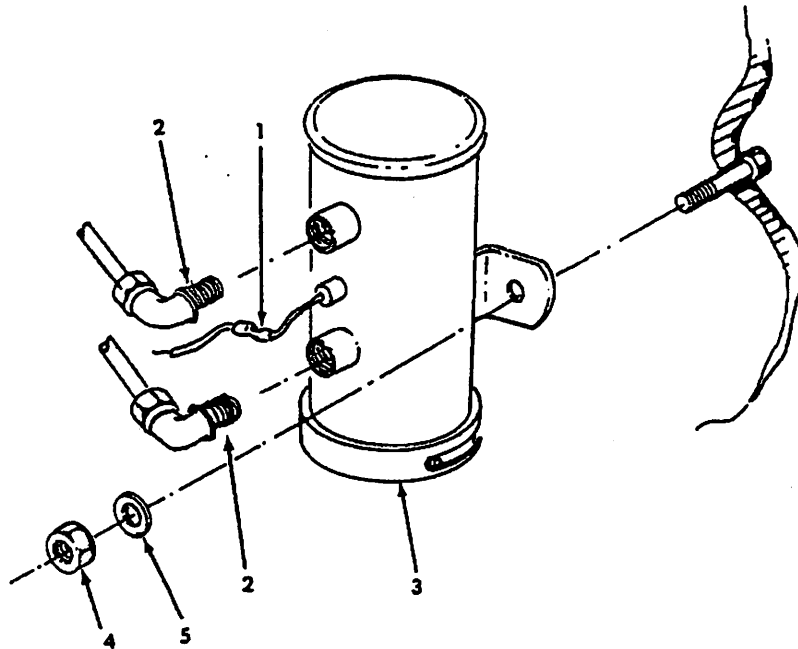
5. Electric Fuel Pump Removal/Installation (See Figure 28-10)

A. Electric Fuel Pump Removal

- (1) Disconnect electrical wire connector at splice clip (1).
- (2) Disconnect the two fuel lines (2) from the pump (3) and cap fittings to prevent contamination.
- (3) Remove nuts (4) and washers (5) securing the pump to the firewall and remove the pump.

B. Electric Fuel Pump Installation

- (1) Position fuel pump on firewall.
- (2) Install washers (5) and nuts (4).
- (3) Torque to 35-40 in. lbs.
- (4) Clean exposed threads on elbow fittings with a stiff bristle brush.
- (5) Torque fittings per fuel system torque values.
- (6) Reconnect electrical wire to pump wire and crimp connector.



Electric Fuel Pump Removal/Installation
Figure 28-10

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6. Fuel System Adjustments/Tests

A. Fuel Sump Tank Pressure Test

- (1) Remove fuel sump tank.
- (2) Plug all fuel line fittings on the sump tank.
- (3) Attach a regulated supply of air or nitrogen, capable of supplying 0.5 psi pressure.

CAUTION: DO NOT ATTEMPT TO APPLY PRESSURE TO THE TANK WITHOUT A GOOD REGULATOR AND A POSITIVE SHUTOFF IN THE SUPPLY LINE. DO NOT PRESSURIZE THE SUMP TANK TO MORE THAN 0.5 PSI OR DAMAGE MAY OCCUR.

- (4) Apply pressure slowly until 0.5 psi is obtained.
- (5) Prepare a solution of 50% liquid dishwashing detergent and 50% water.
- (6) Apply solution to outer surface of tank.
- (7) Check for presence of bubbles to indicate location of leakage.
- (8) If sump tank holds pressure for 15 minutes with pressure loss not exceeding 0.05 psi, tank is acceptable.
- (9) If leaks are found, reseal and retest. (See fuel distribution System – Approved Repairs, this chapter)

B. Fuel System Plumbing Pressure Test

- (1) Pressurize the fuel system plumbing by performing the Procedures in Fuel Storage System – Inspection/Check.
- (2) Prepare a solution of 50% liquid dishwashing detergent and 50% water.
- (3) Apply solution to plumbing at all locations of suspected leakage.
- (4) Check for presence of bubbles to indicate location of leakage.
- (5) If plumbing holds pressure for 15 minutes with pressure loss not exceeding 0.05 psi, plumbing is acceptable.
- (6) If leaks are found, check torque at fittings and assure flairs and fittings are free of anomalies. If leakage continues replace lines as required.

C. Electric Fuel Pump Operational Check

- (1) Ensure that one fuel tank contains at least 3 gallons of fuel.
- (2) Set FUEL SELECTOR valve to the tank containing fuel.
- (3) Set MASTER SWITCH to ON.

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- (4) Set AUX. FUEL PUMP switch to ON.
- (5) Observe FUEL PRESSURE gauge. Gauge must indicate 0.5 to 8.0 psi.
- (6) Set AUX. FUEL PUMP and MASTER switches to OFF.

D. Engine Driven Fuel Pump Operational Check

NOTE: It is necessary to operate the aircraft engine in order to check the engine driven fuel pump.

- (1) Ensure that one fuel tank contains at least 3 gallons of fuel.

WARNING: ENSURE THAT THE PROPELLER IS CLEAR PRIOR TO STARTING THE ENGINE.

- (2) Start engine. (Refer to Pilot's Operating Handbook)
- (3) Set the AUX. Fuel Pump Switch to the OFF position and observe that the fuel pressure is between 0.5 and 8.0 psi.
- (4) Run the engine at several different power settings and assure that the fuel pressure remains between 0.5 and 8.0 psi.
- (5) Shut the engine down. (Refer to the Pilot's Operating Handbook)

7. **Fuel Distribution System Repairs**

A. Fuel Sump Tank Sealing

- (1) Remove the fuel sump tank.
- (2) Pressure and test the fuel sump tank.

NOTE: Prior to removing sump tank fittings, note their position (the angles at which the elbows are installed) so that they can be similarly positioned on reinstallation.

- (3) Remove fuel line and vent line fittings from sump tank.

WARNING: USE SOLVENT IN A WELL VENTILATED AREA. AVOID BREATHING FUMES. KEEP AWAY FROM FLAMES.

- (4) Wash inside of sump tank thoroughly with mineral spirits (or equivalent) until no residue washes from tank.
- (5) Leave fitting open and allow tank to thoroughly air-dry.
- (6) Plug or tape fitting openings except the sump tank drain plug opening.
- (7) Pour approximately 4 ounces of sloss coating (or equivalent) into the drain plug opening of the sump tank.

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- (8) Plug or tape the drain plug opening.
- (9) Rotate and shake the sump tank such that the coating entirely coats its interior.
- (10) Remove the plug or tape from the drain plug and allow excess coating to pour from sump tank.
- (11) Remove plugs or tape from all sump tank fitting holes and position sump tank so that excess coating will drain from sump tank.
- (12) Leave sump tank in this position and allow to air-dry for 24 hours.
- (13) When tank coating is thoroughly dry, scrape excess coating from threaded fitting holes. Hold tank with threaded holes down while scraping coating to ensure that flakes of coating removed do not fall into the tank.
- (14) Apply thread lube to fuel and vent line fittings and install fittings.
- (15) Pressure test the sump tank.
- (16) Install the sump tank.

FUEL INDICATING SYSTEM – DESCRIPTION/OPERATION

1. General

The fuel quantity indicating system is composed of two fuel quantity transmitters (one in the inboard end of each fuel tank), two electrically operated fuel gauges (one for each tank) and the wiring necessary to connect the system components. The fuel pressure system is composed of a transducer, fuel pressure indicator and associated wiring. Reference Figure 28-02.

NOTE: Fuel quantity gauge indication will be accurate only when the aircraft is in a level attitude.

FUEL INDICATING SYSTEM – TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Fuel gauge fails to indicate or does not indicate properly.	Defective transmitter.	Replace transmitter.
	Transmitter not grounded.	Check transmitter ground connection.
	Loose or damaged wiring.	Check wiring for damage and secure connections.
	Defective fuel gauge.	Replace gauge.

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MAINTENANCE PRACTICES - REMOVAL/INSTALLATION

1. **Fuel Quantity Indicators Removal/Installation** (See Figure 28-11)

NOTE: For G1000 equipped aircraft, this information is not applicable since the fuel quantity information is provided on the GDU 1040 display and is controlled by the GEA71 LRU (Garmin Engine and Airframe Line Replaceable Unit). Refer to Garmin Line Service Manual P/N 190-00303-04 for service information.

A. Fuel Quantity Indicator Removal

- (1) Ensure MASTER switch is in the OFF position.
- (2) Remove the FUEL SELECTOR handle attaching screw (2) and pull the handle (3) from the valve stem (4).
- (3) Remove four screws (13) and lift the forward console front cover, with indicator faceplate, from the indicator mounting bracket (17).
- (4) Pull insulator boots (5) along the wires to expose terminals stud (10).
- (5) Tag the wires and remove nuts (6), washers (7 and 8), and wire lugs (9) from indicator terminal studs (10).
- (6) Remove nuts (11) and insulators (12) from indicator terminal studs (10).
- (7) Disconnect connector (20) and remove panel (14) with gauges (15).
- (8) Remove fuel quantity gauges (15) from panel (14).

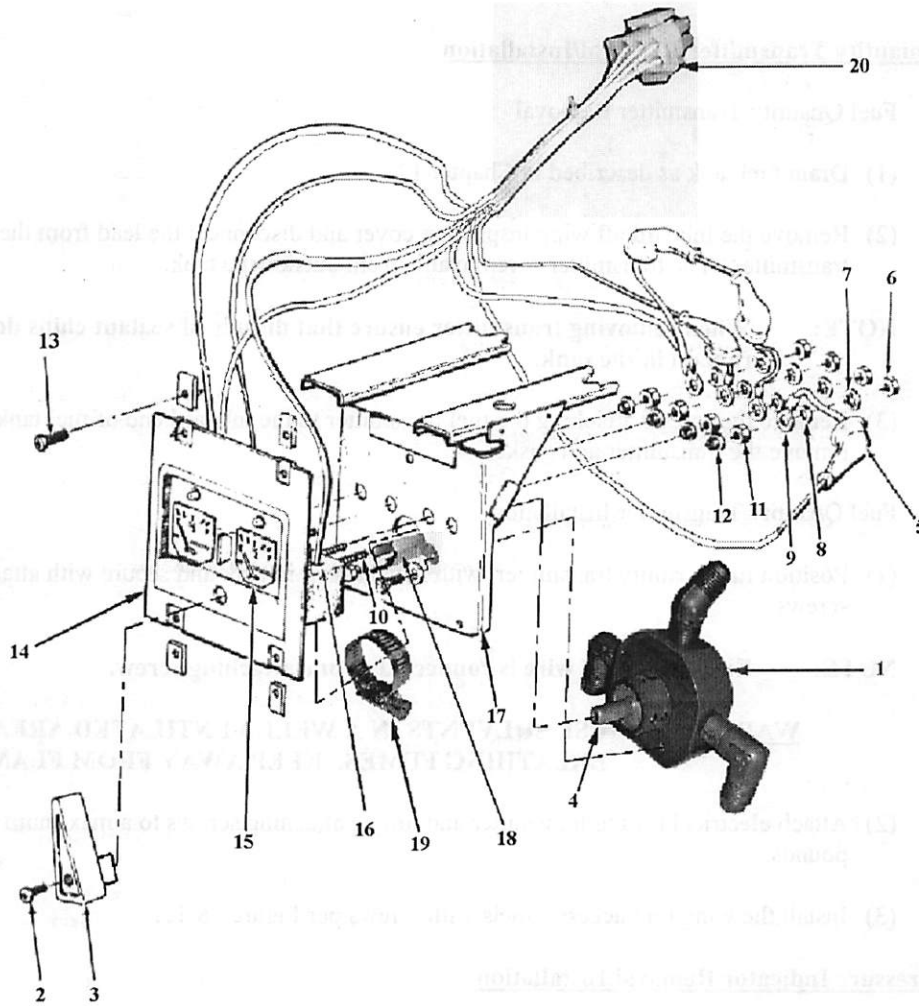
B. Fuel Quantity Indicators Installation

- (1) Ensure MASTER switch is in the OFF position.
- (2) Place fuel quantity gauges (15) in panel (14).
- (3) Place panel (14) over valve stem (4) and on bracket (17).
- (4) Install insulator (12) and nuts (11) on terminal studs (10).
- (5) Install wiring lugs (9), washers (7 and 8), and nuts (6) on indicators terminal studs (10).
- (6) Remove tags and slide boots (5) along wires to cover indicator terminal studs (10) and lugs (9).
- (7) Connect connector (20) to receptacle.
- (8) Install forward console panel (14), and secure with screws (13). (Refer to Chapter 25).
- (9) Install FUEL SELECTOR control handle (3) on valve stem (4) and secure with screw (2).

NOTE: On installation of the control handle to the valve stem, assure correct alignment. The "D" handle I/D flat surface must mate with the stem O/D flat surface.

NOTE: For removal of Valve (1) reference Figure 28-08.

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- | | |
|--------------------------------|--------------------|
| 1. Fuel Selector Valve | 11. Nuts |
| 2. Screw, Fuel Selector Handle | 12. Insulator |
| 3. Handle | 13. Screws |
| 4. Valve Stem | 14. Panel |
| 5. Insulator Boot | 15. Gauge |
| 6. Nuts | 16. Access Opening |
| 7. Washers | 17. Bracket |
| 8. Washers | 18. Selector Stop |
| 9. Wire Lug | 19. Clamp |
| 10. Terminal Stud | 20. Connector |

Fuel Quantity Indicator Removal/Installation
 Figure 28-11

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2. **Fuel Quantity Transmitter Removal/Installation**

A. Fuel Quantity Transmitter Removal

- (1) Drain fuel tank as described in Chapter 12.
- (2) Remove the inboard aft wing inspection cover and disconnect the lead from the fuel transmitter. The transmitter is removable from outside the tank.

NOTE: When removing transmitter ensure that dislodged sealant chips do not remain in the tank.

- (3) Remove the screws attaching the fuel transmitter to the inboard end of fuel tank and remove the transmitter and gasket.

B. Fuel Quantity Transmitter Installation

- (1) Position fuel quantity transmitter, with new gasket, in tank and secure with attaching screws.

NOTE: Ensure ground wire is connected to one attaching screw.

WARNING: USE SOLVENTS IN A WELL VENTILATED AREA. AVOID BREATHING FUMES. KEEP AWAY FROM FLAMES.

- (2) Attach electrical lead to transmitter and torque attaching screws to a maximum of 15 inch pounds.
- (3) Install the wing root access panels with screws per Figure 28-12.

3. **Fuel Pressure Indicator Removal/Installation**

NOTE: For G1000 equipped aircraft, this information is not applicable since the fuel pressure information is provided on the GDU 1040 display and is controlled by the GEA71 LRU (Garmin Engine and Airframe Line Replaceable Unit). Refer to Garmin Line Service Manual P/N 190-00303-04 for service information.

A. Remove Fuel Pressure Indicator

- (1) Ensure MASTER switch is in the OFF position.
- (2) Loosen the screw in the lower left corner of the fuel pressure indicator.
- (3) Slide fuel pressure indicator from the instrument cluster by pulling on the head of the screw.

C. Install Fuel Pressure Indicator

- (1) Ensure MASTER switch is in the OFF position.
- (2) Insert fuel pressure indicator into the instrument cluster.
- (3) Secure fuel pressure indicator with screw in lower left corner of the indicator.

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4. Fuel Pressure Transducer Removal/Installation

A. Fuel Pressure Transducer Removal

- (1) Open upper left engine cowl.
- (2) Disconnect at electrical connector.

WARNING: OPEN FUEL LINES AND FITTINGS CAN BE A FIRE HAZARD AND WILL EXPOSE FUEL SYSTEM TO POSSIBLE FUEL CONTAMINATION. CAP OR PLUG OPEN FITTINGS.

- (3) Remove fuel pressure transducer from fuel plumbing tee-fitting by turning transducer counter-clockwise.

B. Fuel Pressure Transducer Installation

- (1) Remove cap or plug from tee-fitting and install transducer.
- (2) Connect electrical connector.
- (3) Operate electrical fuel pump and check for leaks.
- (4) Close engine cowl.

5. Fuel Pressure Transducer Removal/Installation G1000 Equipped Aircraft

A. Fuel Pressure Transducer Removal

- (1) Remove lower engine cowl.
- (2) Locate the transducer bracket (3) on the lower right engine mount.
- (3) Disconnect the transducer lead at connector (2).

WARNING: OPEN FUEL LINES AND FITTINGS CAN BE A FIRE HAZARD AND WILL EXPOSE FUEL SYSTEM TO POSSIBLE FUEL CONTAMINATION. CAP OR PLUG OPEN FITTINGS.

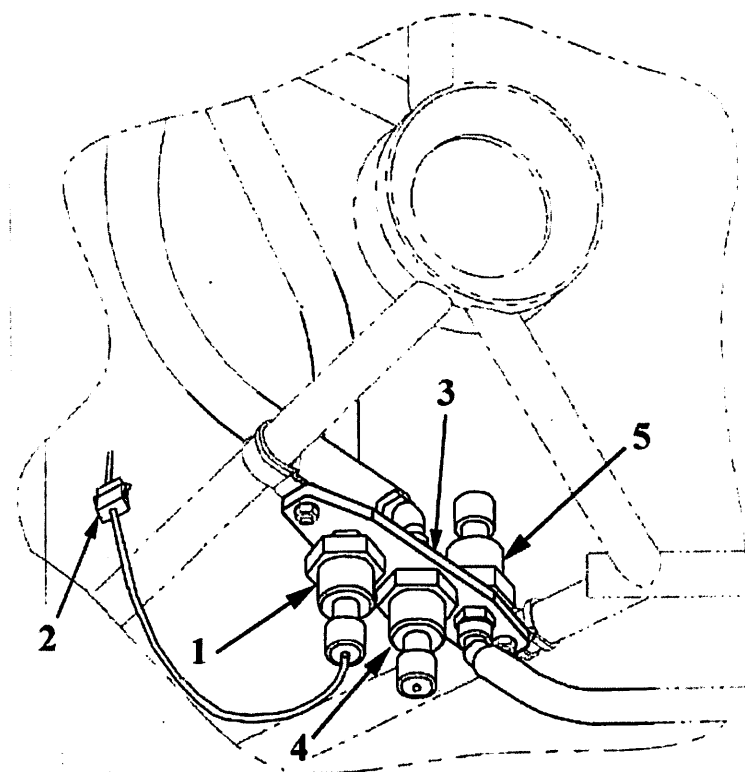
- (4) Remove fuel transducer (1) from the transducer mount bracket.

B. Fuel Pressure Transducer Installation.

- (1) Apply thread lube to the fuel transducer threads and install the transducer on transducer bracket (3).
- (2) Reconnect the transducer lead at connector (2).
- (3) Turn on the aircraft master switch.
- (4) Place the electric fuel pump switch in the "ON" position and check the fuel pressure indication on the G1000 PFD or MFD.
- (5) Place the electric fuel pump switch in the "OFF" position.

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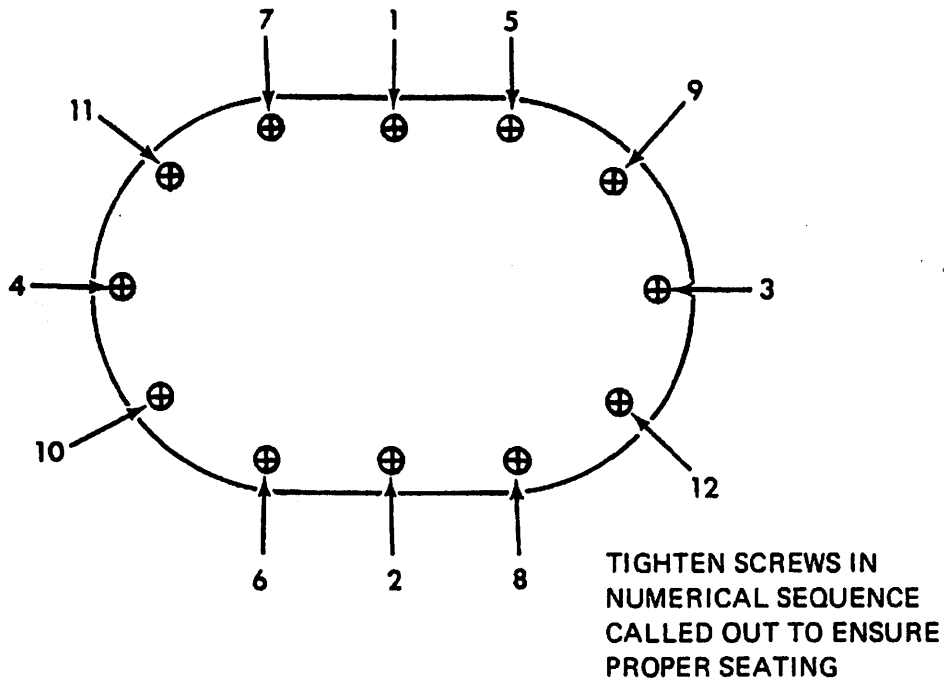
- (6) Turn the master switch off.
- (7) Check for signs of fuel leakage.
- (8) Reinstall lower engine cowl.



**G1000 Transducer Installation
Figure 28-12**

- 1. Fuel Pressure Transducer**
- 2. Connector**
- 3. Transducer Mount Bracket**
- 4. Oil Pressure Transducer**
- 5. Manifold Pressure Transducer (Optional)**

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Access Panel Installation
Figure 28-13

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CHAPTER 30

ICE AND RAIN PROTECTION

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ICE AND RAIN PROTECTION - DESCRIPTION/OPERATION

1. General

This Chapter includes those units and components installed on the aircraft, as a means of prevention and disposing of ice formations in the carburetor and pitot system, and the elimination of frost and fog on the windows and windshield.

A. This Chapter contains the following systems and their related components.

- (1) Carburetor Heat System
- (2) Pitot Heat System
- (3) Windshield Defrosting System

CARBURETOR HEAT SYSTEM - DESCRIPTION/OPERATION

1. General

The aircraft engine is equipped with a carburetor heat system for use when carburetor icing conditions exist. The system provides a source of heated air to the carburetor from an alternate hot air source in the induction system. The system is controlled from the instrument panel by the carburetor heat control, connected to a shutoff valve on the carburetor air box by a control cable. When the carburetor heat control is in the OFF (fwd) position, filtered air is drawn through ducting into the carburetor. When the carburetor heat control is in the ON (aft) position, the shutoff valve shuts off the filtered air source, and warm unfiltered air from a shroud around the exhaust system is directed to the carburetor.

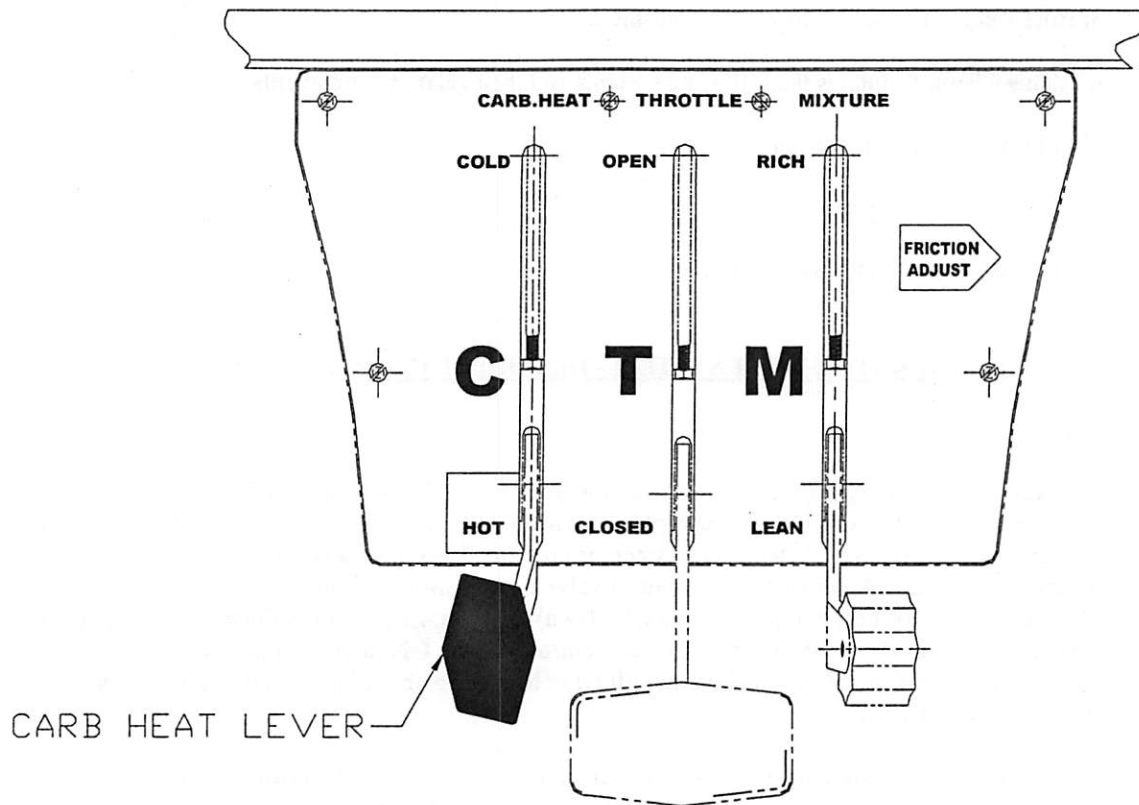
NOTE: Limited operation of the carburetor heat system is recommended since no filter is incorporated in the hot air source.

2. Major Components and Their Location

Carburetor Heat System

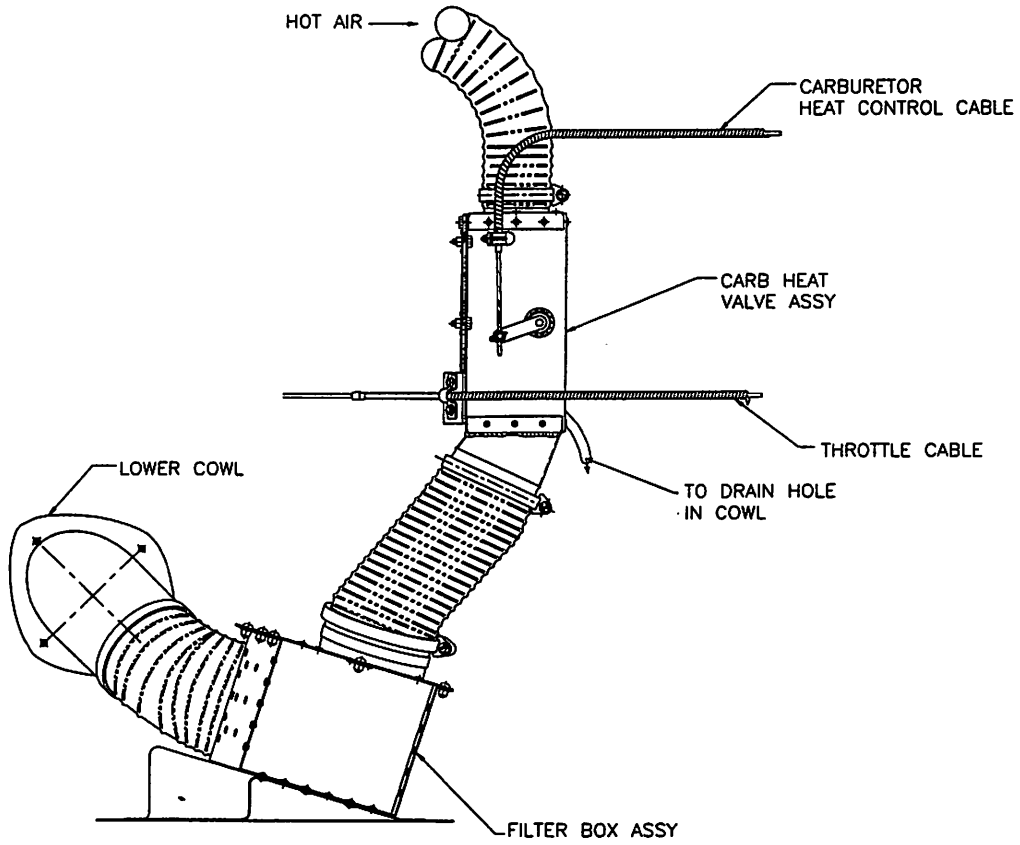
<u>Unit</u>	<u>No. Per Aircraft</u>	<u>Location</u>
Carburetor Heat Control lever	1	In throttle quadrant of throttle.
Carburetor Heat Shutoff Valve	1	In carburetor air box housing.
Carburetor Heat Control Cable	1	Runs from control lever in throttle quadrant to shutoff valve on carburetor air box.

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Carburetor Heat Control
Figure 30-01

**TIGER AIRCRAFT AG-5B SERIES
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**Carburetor Air Box Installation
Figure 30-02**

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CARBURETOR HEAT SYSTEM - MAINTENANCE PRACTICES

1. Operational Test

- A. Disconnect the hot air duct at the air box assembly.
- B. Pull the carburetor heat control knob aft (HOT position) and make sure the shutoff valve on the carburetor air box is in the full open position. Push the heat control knob fwd (COLD position) and visually check that the shutoff valve is full closed. Ensure no binding exists throughout the travel of the heat control.

NOTE: It is necessary to operate the aircraft engine to operationally test the carburetor heat system.

WARNING: ENSURE THAT THE PROPELLER AREA IS CLEAR PRIOR TO STARTING THE ENGINE.

- C. Start and run the engine: (Refer to the Pilot's Operating Handbook)
 - (1) Run the engine at 1800 RPM.
 - (2) Pull the carburetor heat control aft (HOT position) and check for an RPM decrease. This indicates heat to the carburetor.
 - (3) Push the carburetor heat control fwd (COLD position) and note an increase in RPM.

NOTE: Limited operation of the carburetor heat system is recommended since no filter is incorporated in the hot air source.

- D. Shut the engine down: (Refer to the Pilot's Operating Handbook)

CARBURETOR HEAT CONTROL - TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Control will not operate through full travel range.	Linkage binding, broken or crimped.	Adjust or replace linkage.
	Control binding in throttle quadrant.	Clean, adjust, and lubricate as required.
	Air shutoff valve binding or stuck in carburetor air box	Clean, adjust, lubricate or replace valve as required.
Control moves through full range of travel but does not fully shut off or restrict the flow of heated air to the carburetor.	Control and linkage improperly adjusted or broken.	Repair/adjust control and linkage as required.

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CARBURETOR HEAT CONTROL - MAINTENANCE PRACTICES

1. Cable Removal/Installation

A. Removal

- (1) Disconnect the carburetor heat cable from the valve lever on the carburetor air box by loosening the clamp bolt assembly.
- (2) Loosen the clamp on the air box assembly and slide the cable from the clamp.
- (3) Remove the knobs from the throttle, mixture, and carburetor heat control levers.
- (4) Remove the throttle quadrant cover plate that is secured with 8 screws.
- (5) Remove the nut, washers, and screw that secure the control cable end fitting to the control lever.
- (6) Remove two AN3 Bolts and remove the cable guide from the front of the throttle quadrant.
- (7) Pull the control cable through the firewall from inside the aircraft.

B. Installation

- (1) Pass the control cable end through the firewall and the clamp on the air box assembly.
- (2) Connect the cable loosely to the air box control arm.
- (3) Attach the control cable end fitting to the control lever with screw, washers, and nut. Secure with cotter pin.
- (4) Install the cable guide to secure the cable to the throttle quadrant.
- (5) Adjust the control cable to provide a minimum of 4.5 inch bend radius and tighten the clamp on the air box.
- (6) Seal opening in firewall around control cable with firewall sealant (MIL-S-38249 or SAE-AMS3374).
- (7) Install throttle quadrant cover plate and control lever knobs.

2. Adjustment/Operational Test

A. Adjustment

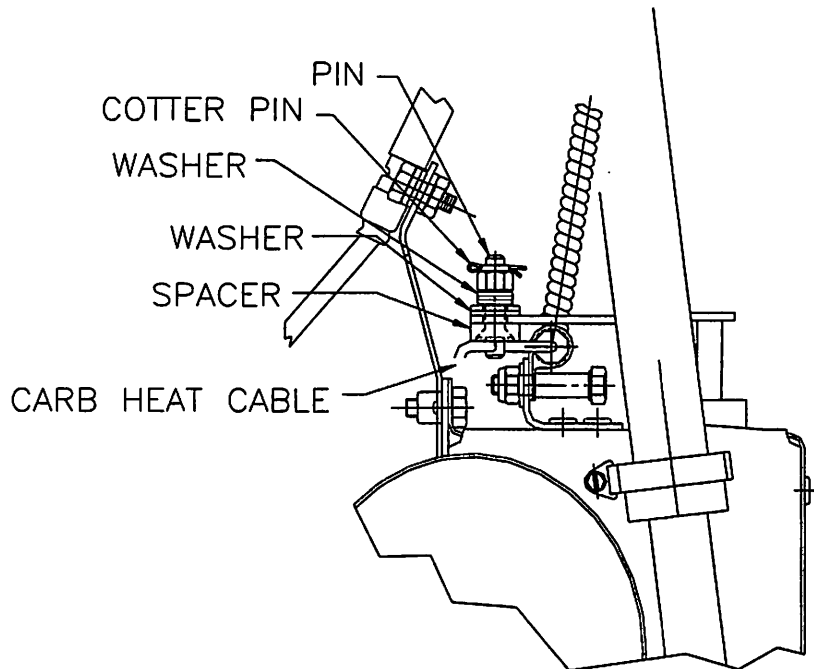
- (1) Position the carburetor heat control arm in the full closed (cold) position. Push the carburetor heat control lever forward until it reaches the mechanical stop then pull it aft 1/8 to 1/4 inch.

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- (2) With the carburetor heat control arm in the fully closed position and the control lever 1/8 to 1/4 inch aft of the mechanical stop, tighten the cable clamp on the side of the carburetor air box and the control arm attaching bolt.
- (3) Check the carburetor heat control operation.
- (4) Install the cotter pin.

B. Operational Test

- (1) Check for smooth operation through the full range of control lever travel.
- (2) The carburetor air box valve should fully close before the carburetor heat control lever contacts its mechanical stop.



**Carburetor Heat Control Wire Installation
Figure 30-03**

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CARBURETOR HEAT VALVE - DESCRIPTION/OPERATION

1. General

The carburetor heat valve is an integral part of the carburetor air box. The valve control arm is located on the exterior section of the carburetor air box and is connected to the carburetor heat control lever by a control wire assembly. When the valve is open, heated air is diverted to the carburetor air intake. Carburetor heat is shut off when the valve is closed.

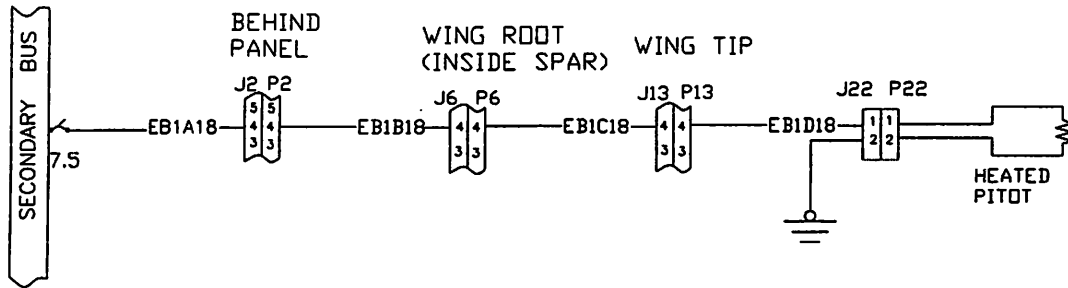
Since the carburetor heat valve is an integral part of the carburetor air box, removal or replacement of the valve requires removal of carburetor air box. (Refer to Chapter 73)

PITOT HEATER - DESCRIPTION/OPERATION

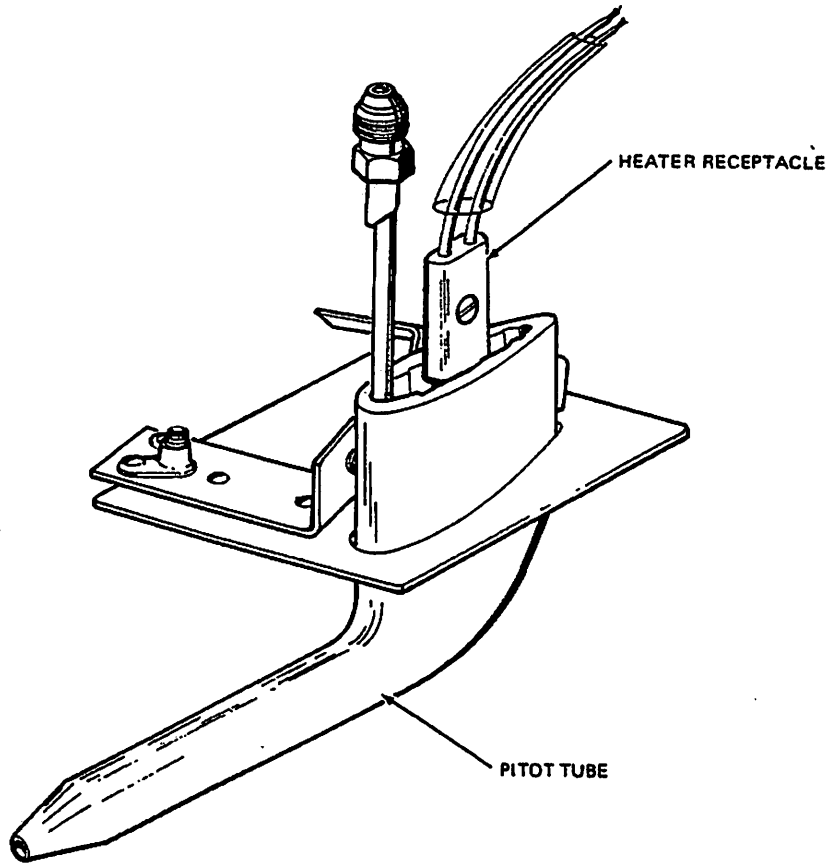
1. General

The pitot heating system (Figure 30-05) consists of an electrical heating element that is an integral part of the pitot tube, a receptacle for connection to the element, a breaker switch and associated wiring. The breaker switch is mounted on the instrument panel to the left of the throttle quadrant. The purpose of the pitot heater is to prevent or eliminate the formation of ice inside the pitot tube during flight.

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**Pitot Heater Circuit
Figure 30-04**



**Pitot Heater System
Figure 30-05**

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PITOT HEATER - TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Pitot tube fails to heat.	Tripped breaker switch.	Reset breaker switch.
	Defective wiring.	Check with ohmmeter and repair as necessary
	Heater element burned out.	Replace pitot tube.

PITOT HEATER - MAINTENANCE PRACTICES

1. Pitot Heater Removal/Installation

When the pitot heater becomes inoperative, the pitot tube assembly must be replaced. For removal/installation procedures refer to Chapter 34.

2. Pitot Heater Breaker Switch Removal/Installation

A. Remove Pitot Heater Breaker Switch

- (1) Disconnect the battery.
- (2) Remove nut from the front of the breaker switch.
- (3) Disconnect electrical connections from the breaker switch.
- (4) Remove the switch from rear of the instrument panel.

B. Install Pitot Heater Breaker Switch

- (1) Ensure the battery is disconnected.
- (2) Position the switch in the instrument panel and secure with nut.
- (3) Connect wiring and bus bar to the breaker switch.
- (4) Reconnect the battery.

3. Operational Test of Pitot Heater

A. Test Pitot Heater

WARNING: WHEN THE PITOT HEATER IS OPERATING THE PITOT TUBE BECOMES EXTREMELY HOT. PHYSICAL CONTACT COULD RESULT IN A SEVERE BURN.

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NOTE: Ground operation of the pitot heater should be held to a minimum during operational checks.

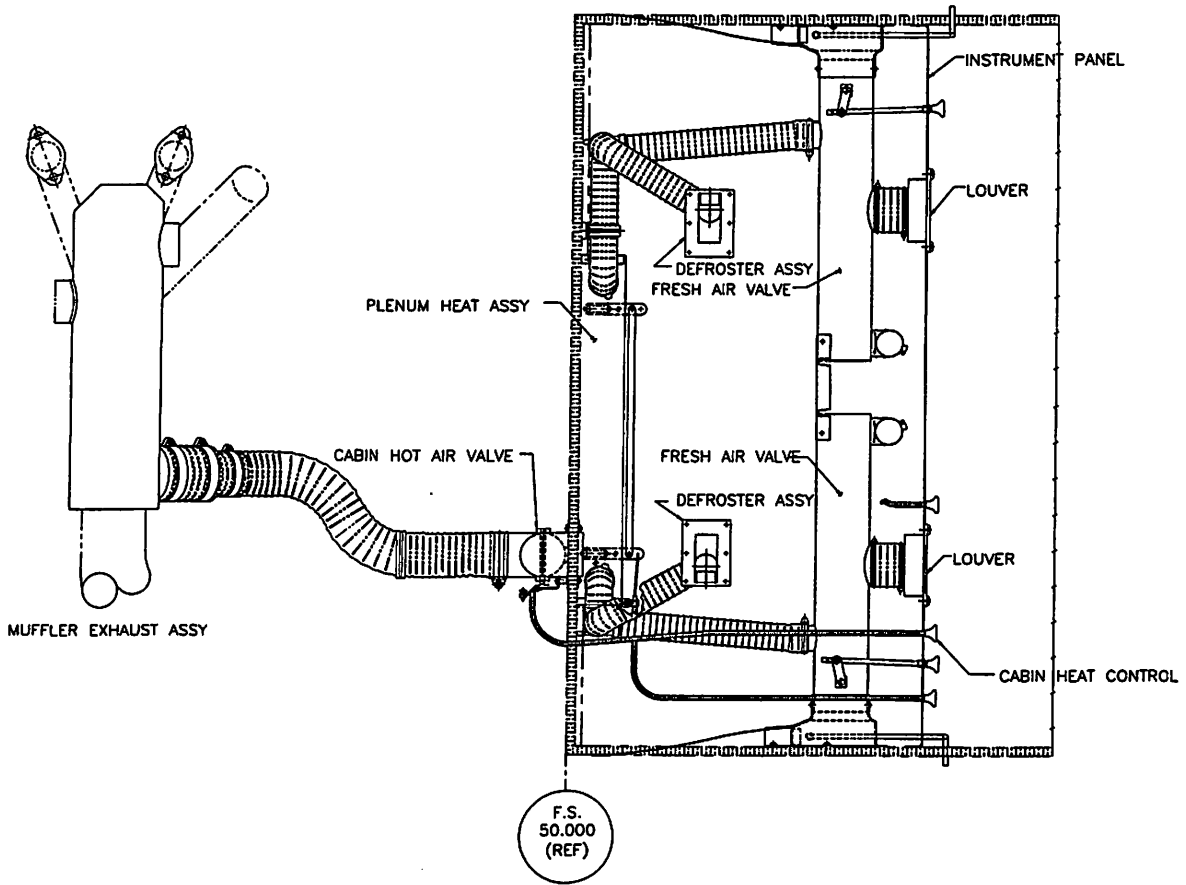
- (1) Place master switch to the ON position.
- (2) Place pitot heater switch to the ON position. Within 2 or 3 seconds the pitot tube will begin to heat.
- (3) *Lightly* feel the pitot tube immediately after the pitot heater switch has been placed in the ON position.
- (4) Place pitot heater switch and master switch to the OFF position.

WINDSHIELD DEFROSTER - DESCRIPTION/OPERATION

1. General

To provide windshield defrosting, flexible ducts are connected to the plenum assembly of the heating system and terminated just below the sliding doors located on the instrument panel deck. Operation of the defroster is accomplished by pulling the push-pull cabin heat control out and opening the sliding doors on the defroster outlets.

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Defrosting System
Figure 30-06

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CHAPTER 32
LANDING GEAR

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CHAPTER 32

LANDING GEAR

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LANDING GEAR - DESCRIPTION/OPERATION

1. General

The AG-5B aircraft utilize a non-retractable, tricycle type landing gear. The main gear consists of fiberglass struts attached to forged brackets that mount to the carry through spar. Forgings attached to the lower end of each main landing gear strut serve as the wheel axles and as an attaching base for the brake torque plate assembly. The nose gear is the castering type and consists of a tubular strut attached to the torque tube and yoke assembly mounted in the fuselage.

The aircraft is fitted with wheel fairings for all three wheels. The fairings are equipped with an adjustable scraper that inhibits the ingress of mud and slush into the fairing cavity. Aircraft operation on rough field conditions, with tires out of balance, or in snow, ice, or mud can be detrimental to the life of the wheel fairings and should be avoided.

MAIN LANDING GEAR - DESCRIPTION/OPERATION

1. General

The main landing gear consists of the right and left hand gear assemblies. Each assembly consists of a laminated fiberglass strut, forged wheel axle, attaching brackets, strut fairings, and attaching hardware.

MAIN LANDING GEAR - MAINTENANCE PRACTICES

1. Removal/Installation of Main Landing Gear (Reference Figure 32-01)

A. Removal of Main Landing Gear

- (1) Support the aircraft on jacks. (Refer to Chapter 7)
- (2) Remove the wing and wing root fairing. (Refer to Chapter 57)
- (3) Drain the brake system and disconnect the brake line at the fuselage as described in this chapter.
- (4) Remove the fuel tank sump. (Refer to Chapter 28)
- (5) Remove the main landing gear wheel as described in this chapter.
- (6) Support the main gear strut assembly and remove nuts (3), bolts (4), and washers (5) securing the strut brackets to the spar mounting bracket (9) and remove the landing gear assembly and shims (6). *(Shim order and position should be noted for reassembly)*
- (7) Remove bolts (7), washers (8), and spar mounting bracket (9).
- (8) Disassemble the landing gear strut assembly as follows:
 - (a) Remove nuts (10), bolts (11), washers (12), and separate brackets (13, 14, and 15) shims (16, 17, and 18), spacer (19) and spring plate (20) from strut (21).

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- (b) Remove nuts (22), bolts (23), washers (24), and separate axle (25), bracket (26), re-enforcement plate (27), and shims (28) from strut (21).
- (c) Remove nuts (29), bolts (30), and washers (31) to remove torque plate assembly (7) (Figure 32-04)

B. Install Main Landing Gear

- (1) When installing the main landing gear observe the following torque values:

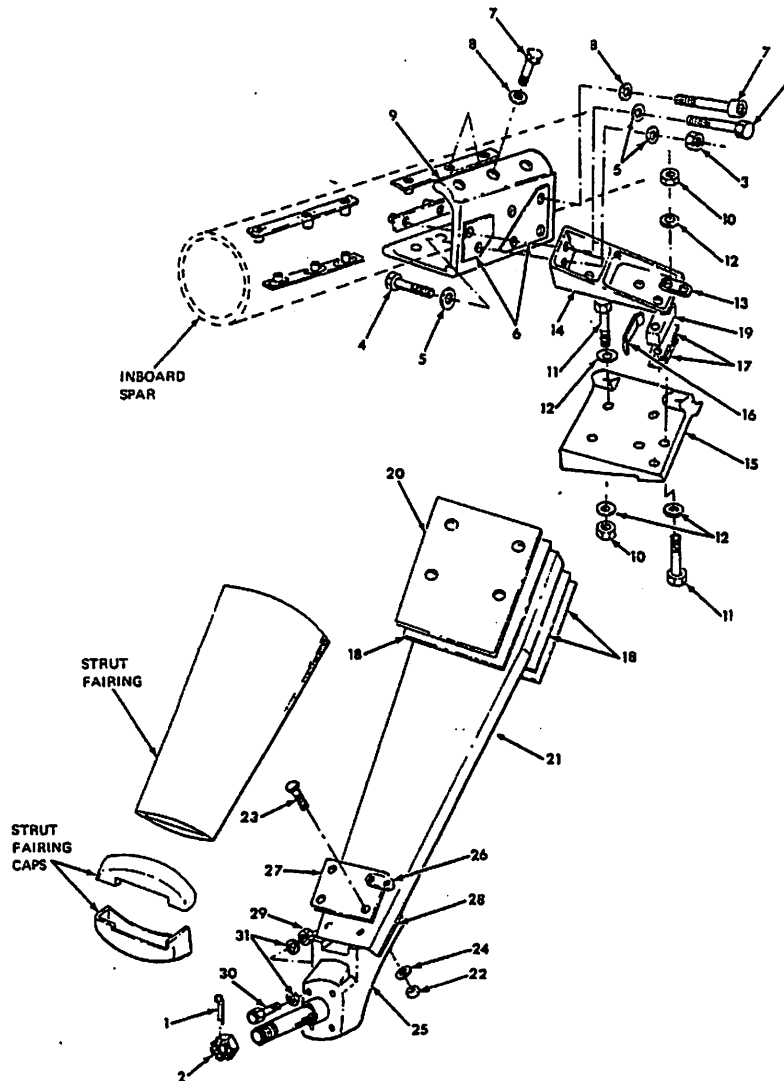
<u>BOLT DIA. (in.)</u>	<u>TORQUE (in. lb.)</u>
1/2	650-750
3/8	250-300
5/16	200-225

- (2) Check shims for excessive wear or hole elongation and replace if necessary. Shims must assure a tight fit.

NOTE: Install shims in same order and position as removed.

- (3) Assemble the landing gear strut assembly as follows:
 - (a) Position torque plate assembly (7), Figure 32-04, in place on axle (25) and install bolts (30), washers (31), and nuts (29).
 - (b) Assemble shims (28), axle (25), reinforcement plate (27), and bracket (26) in place on strut (21) and install bolts (23), washers (24), and nuts (22).
 - (c) Assemble shims (18, 17, and 16), spring plate (20), spacer (19), brackets (15, 14, and 13) in place on spar and install bolts (11), washers (12), and nuts (10).

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- | | | |
|---------------|------------------|-------------|
| 1. Cotter Pin | 12. Washer | 23. Bolt |
| 2. Nut | 13. Bracket | 24. Washer |
| 3. Nut | 14. Bracket | 25. Axle |
| 4. Bolt | 15. Bracket | 26. Bracket |
| 5. Washer | 16. Shim | 27. Plate |
| 6. Shims | 17. Shims | 28. Shim |
| 7. Bolt | 18. Shims | 29. Nut |
| 8. Washer | 19. Spacer | 30. Bolt |
| 9. Bracket | 20. Spring Plate | 31. Washer |
| 10. Nut | 21. Strut | |
| 11. Bolt | 22. Nut | |

NOTE: Strut Fairing Caps are only required when Wheel Fairings are not installed.

**Main Landing Gear
Figure 32-01**

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- (4) Apply a solid film lubricant to the mating surfaces of the inboard spar and spar mounting bracket (9).
- (5) Position the spar, mounting bracket (9) in place on the inboard spar and install washers (8) and bolts (7).
- (6) Position shims (6) and main gear strut assembly in place and install bolts (4), washers (5), and nuts (3) that secure the strut assembly to the spar mounting bracket (9) and to the inboard spar.
- (7) Install the fuel tank sump. (Refer to Chapter 28)
- (8) Connect the brake system fluid line at the fuselage.
- (9) Install the main gear wheel axle (25), nut (2), and cotter pin (1).
- (10) Service the brake system as outlined in this chapter.
- (11) Install the wing root and wing. (Refer to Chapter 57)
- (12) Remove the aircraft from the jacks.

2. Visual Inspection of Main Landing Gear

A visual inspection of the main landing gear strut and attach brackets should be made at each 100 hour inspection and after any hard landing. Inspect the laminated fiberglass main gear struts for evidence of nicks, cracks, and/or de-laminations. Inspect the struts above and below the streamline fairing. Refer to Chapter 5 for scope of inspections and detailed procedures.

3. Repair of Main Landing Gear Strut

Inspect for minor surface de-laminations, which are acceptable providing they do not extend more than one ply into the surface of the strut. Corner de-laminations (slivers) are acceptable if they are smaller than 1/16 X 1/16 in. in size throughout their length. If airworthiness of a damaged fiberglass strut is in question, close-up photographs of the damaged area may be submitted to Tiger Aircraft for analysis and service recommendations.

Remove the delaminated material. Smooth out minor paint chips or stone bruises with fine sand paper or emery cloth. Clean any unpainted areas thoroughly with Methyl Ethyl Ketone (MEK). Seal minor surface or corner de-laminations with a two-part epoxy adhesive to seal out moisture from the damaged area.

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NOSE LANDING GEAR - DESCRIPTION OPERATION

1. General

The nose landing gear consists of a fuselage mounted torque tube and yoke assembly connected to a non-steerable strut with a castoring nose wheel mounted on the forward end. Normal servicing of the nose wheel strut includes the application of grease to the nose fork swivel and adjustment of the Belleville washers. A pair of shock absorbers is connected to the nose landing gear strut. The shock absorbers minimize porpoising when the aircraft is rolling over rough terrain.

NOSE LANDING GEAR - MAINTENANCE PRACTICES

1. Removal/Installation of Nose Landing Gear and Shock Absorber Assembly (Figure 32-02)

A. Remove Nose Landing Gear and Shock Absorber Assembly

- (1) Remove the weight from the nose gear by either tying down the tail or placing a suitable support under the front of the fuselage. (Reference Chapter 7)
- (2) Remove the lower cowling. (Refer to Chapter 71)
- (3) Remove bolt (1) and spacer (2).
- (4) Remove nut (3), washers (4), and withdraw axle bolt (5) from nose wheel.
- (5) Remove plugs (6), spacers (7), and axle (8).

NOTE: Some aircraft have nose wheel fairings installed. See this chapter for fairing removal.

- (6) Remove cotter pin (9), nut (10), washers (11, 12, and 13), fork assembly (14) with fairing assembly attached, thrust bearing (15), and O-ring (16) from strut assembly (20).
- (7) Remove two attaching bolts and remove nose wheel fairing from fork assembly (14).
- (8) Remove rubber fairing (21) from strut assembly (20).
- (9) Remove screws (17), retainer (18), and slide boot (19) down the strut assembly (20).
- (10) Remove nuts (22), washers (23 and 24)), bolts (25), and remove shocks (26) and bushings (27).
- (11) Remove nuts (28), washers (29), and bolts (30). Slide strut (20) from the torque yoke assembly (32). Slide boot (19) off strut assembly (20).
- (12) Remove lower shock mount bracket (31) from yoke assembly (32).

NOTE: Removal of the upper shock mount is not required for the removal of the nose gear assembly.

- (13) To remove the upper shock mount, remove nuts (37), washers (38, 40, and 42), and bolts (39). Remove upper shock mount bracket (41) from firewall.

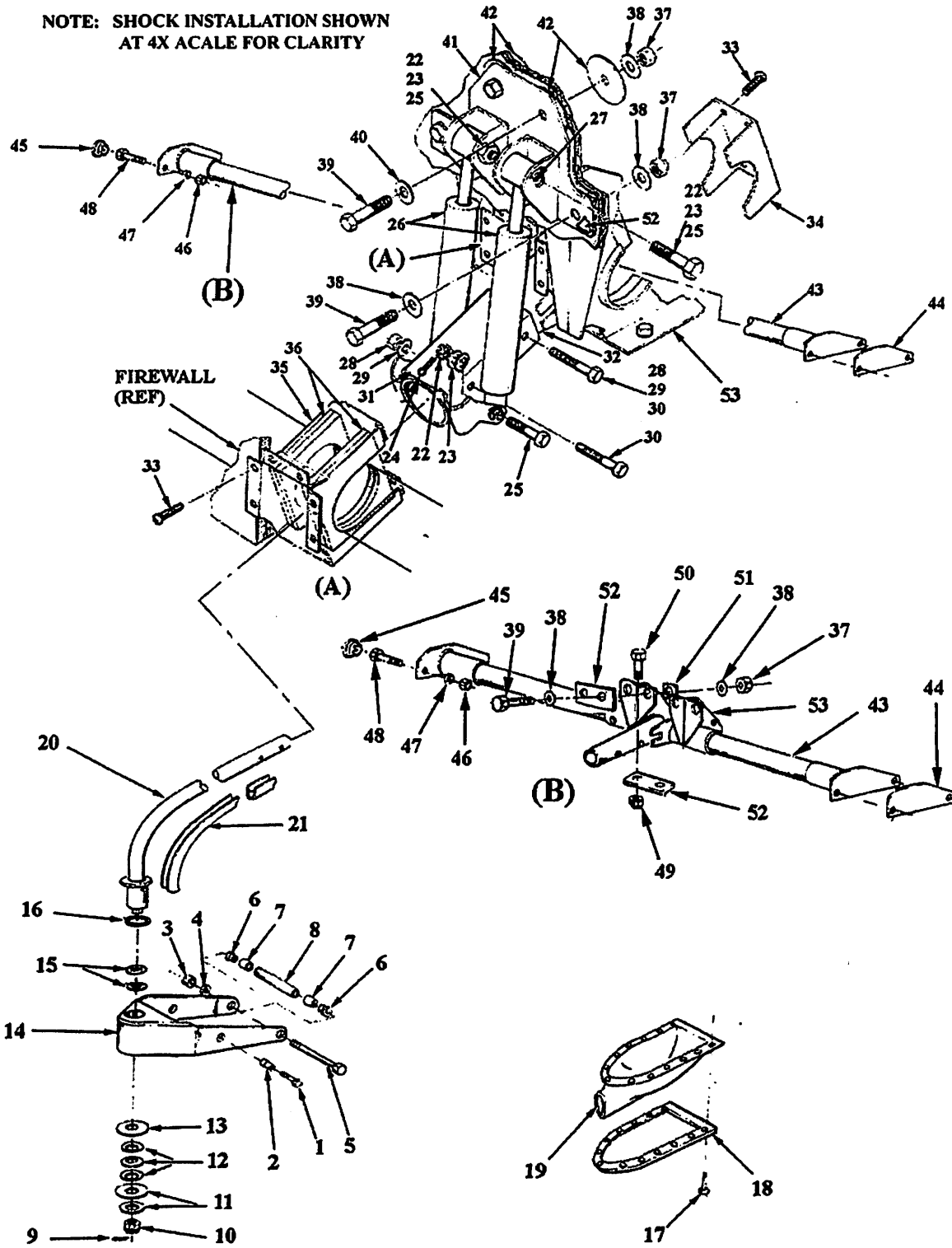
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NOTE: The torque tube and yoke assembly is located in the front end of the fuselage. To gain access to the torque tube and yoke assembly, some items / equipment must be removed from the cockpit area.

- (14) Remove the front seats. (Refer to Chapter 25)
 - (15) Remove the left-hand and right-hand forward console panels. (Refer to Chapter 25)
 - (16) Remove the upholstery side panels from the left and right-hand forward inside panels.
 - (17) Disconnect the rudder return springs by unbolting the eyebolts from the forward face of the firewall. *Note that additional washers are used under the left hand, eyebolt for proper rudder pedal centering and rudder trim.*
 - (18) Remove the nuts that secure the right forward rudder bar attach bracket to the floor. Lift the rudder bar up and aft to provide clearance for removing the left brake cylinder attach brackets on the co-pilot's side.
 - (19) Remove the nuts that attach the brake cylinder brackets to the floor. Lift brake cylinders free from the floor and allow pedals to rotate aft.
 - (20) Remove clevis pins from left and right brake cylinder attachment to rudder pedals on pilot's side.
 - (21) Move the left and right master cylinders on the pilot's side up as high as possible and against the firewall and secure them temporarily in this position.
 - (22) Remove the nuts that attach the T-column support to the floor. Lift the T-column and support assembly from the studs that protrude through the floor and allow the assembly to come as far aft as possible.
 - (23) Remove screws (33) and box cover (34), box (35), and seals (36).
 - (24) Remove nuts (49), bolts (50), doublers (52), and clips (51) that secure the center torque tube and yoke bearing supports (53) to the floor.
 - (25) Remove nuts (37), washers (38), bolts (39), and clips (51) that secure the center torque tube and yoke bearing supports to the firewall.
 - (26) Remove four plug buttons (45) on the lower forward fuselage and the four nuts (46), washers (47), and bolts (48) that secure the ends of the torque tube and yoke assembly (43) to the fuselage side panels.
- CAUTION: TO PREVENT DAMAGING THE HONEYCOMB SKIN, CARE SHOULD BE TAKEN NOT TO WEDGE THE TORQUE TUBE ASSEMBLY INTO THE FUSELAGE PANELS.**
- (27) Remove the torque tube and yoke assembly (43) from the fuselage by working the assembly up and aft, left end first, so that the assembly is withdrawn from under the pilot's side of the instrument panel.
 - (28) Remove shims (44).

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**NOTE: SHOCK INSTALLATION SHOWN
AT 4X A SCALE FOR CLARITY**



**Nose Landing Gear and Shock Assembly
Figure 32-02
(Sheet 1 of 2)**

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- | | |
|------------------------|-----------------------------------|
| 1. Bolt | 27. Bushing |
| 2. Spacer | 28. Nut |
| 3. Nut | 29. Washer |
| 4. Washer | 30. Bolt |
| 5. Axle Bolt | 31. Lower Shock Mount Bracket |
| 6. Plug | 32. Yoke Assembly |
| 7. Spacer | 33. Screw |
| 8. Axle | 34. Box Cover |
| 9. Cotter Pin | 35. Box |
| 10. Nut | 36. Seals |
| 11. Washers | 37. Nut |
| 12. Belleville Washers | 38. Washer |
| 13. Washer | 39. Bolt |
| 14. Fork Assembly | 40. Washer |
| 15. Thrust Bearings | 41. Upper Shock Mount Bracket |
| 16. O-Ring | 42. Washers |
| 17. Screw | 43. Torque Tube and yoke Assembly |
| 18. Retainer | 44. Shim |
| 19. Boot | 45. Plug |
| 20. Strut Assembly | 46. Nut |
| 21. Rubber Fairing | 47. Washer |
| 22. Nut | 48. Bolt |
| 23. Washer | 49. Nut |
| 24. Cotter Key | 50. Bolt |
| 25. Bolt | 51. Clip |
| 26. Shocks | 52. Doubler |
| | 53. Bearing Support |

**Nose Landing Gear and Shock Assembly
Figure 32-02
(Sheet 2 of 2)**

B. Install Nose Landing Gear and Shock Absorber Assembly

- (1) Carefully position the torque tube and yoke assembly (43) in place and install clips (51), doublers (52), bolts (50), and nuts (49) that secure the center torque tube and yoke assembly, bearing supports (53) to the floor. Do not tighten nuts (49).

NOTE: Upper Shock bracket (41) must be in place before bolts (50) are installed through firewall.

- (2) Position upper shock bracket (41) on firewall with washers (42) between the shock bracket and the firewall. Install bolts (39), washers (42 and 38), and nuts (37). The lower bolts also secure the center torque tube and yoke assembly bearing supports (53) to the firewall. Do not tighten nuts (49).
- (3) Check the clearance between the ends of the torque tube and yoke assembly (43) and the inside of the lower engine mount extrusions, and install the proper thickness shims (44) to obtain a minimum clearance between the ends of the torque tube assembly and the inside of the lower engine mount extrusions.

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- (4) Install bolts (48), washers (47), and nuts (46).
 - (5) Torque the center torque tube bearing support bolts (39 and 50) at the firewall and the cabin floor to 185-195 inch pounds and torque bolts (48) that attach the ends of the torque tube assembly to the fuselage sides to 300-350 inch pounds.
 - (6) Install plug buttons (45).
 - (7) Position the T-column and support assembly in place and install nuts. (Refer to Chapter 27)
 - (8) Position brake master cylinders on co-pilot's side in place and install washers and nuts to secure attach brackets to the floor.
 - (9) Position right-hand rudder bar in place and install washer and nuts on attach brackets.
 - (10) Attach the left and right brake master cylinders to the floor on the pilot's side.
 - (11) Install rudder return spring eyebolts in firewall using same number of washers as were removed.
 - (12) Where upholstery side panels and foam insulation have been removed from the forward cabin area, the foam insulation may be cemented to the fuselage side skin with Uniroyal 6306 adhesive or equivalent.
 - (13) Install right and left hand forward console panels.
 - (14) Install the front seats. (Refer to Chapter 25)
- WARNING: USE CLEANING SOLVENT IN A WELL VENTILATED AREA.
AVOID BREATHING FUMES. KEEP AWAY FROM FLAMES.**
- (15) Use, mineral spirits to clean firewall area around nose gear torque tube and flanges of firewall seal box assembly.
 - (16) Install seals (36) on torque tube and yoke assembly (43) with split edge of seal facing up and thin seal outboard.
 - (17) Coat aft side (firewall side) of box (35) flanges with firewall sealant, Pro-Seal 700 and position box in place against firewall, making sure seals (36) are inside the box. Secure box to firewall with screws (33).
 - (18) Be sure that seals (36) remain in place and install box cover (34). Secure cover with four screws (33).
 - (19) Use firewall sealant and seal any opening between box and box cover so that the box forms an airtight seal around the torque tube.
 - (20) Slide lower shock mount bracket (31) over yoke (32).

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- (21) Clean the end of strut assembly (20) and apply zinc chromate primer at the torque tube yoke assembly attachment area. After primer is dry, coat with grease MIL-PRF-81332.
- (22) Slide boot (19) over end of strut assembly (20). Position strut into torque tube yoke assembly and align holes in strut, yoke and lower shock mount bracket. Install attaching bolts (30), washers (29), and nuts (28). Torque nuts to 95-110 in. lb.
- (23) Insert bushing (27) into upper shock mount lug and position shock in upper shock mount bracket (41) and lower shock mount bracket (31). Secure with bolts (25), washers (23), nuts (22), and cotter key (24).

NOTE: Cotter pin is not used with upper shock attachment hardware.

- (24) Apply Dow Corning RTV 732 sealant, or equivalent to strut-to-torque tube connection and to the heads of bolts (30) and nuts (28).

- (25) Install the lower engine cowl.

- (26) Slide boot (19) up nose gear strut assembly (20) and secure with screws (17).

- (27) Reinstall rubber fairing (21) to strut assembly (20) using contact cement.

- (28) If nose wheel fairing was removed, position strut assembly (20) through cutout in fairing.

NOTE: Prior to assembling per (29) below assure mating surfaces are sufficiently coated with grease conforming to the requirements of MIL-PRF-81332.

- (29) Assemble O-ring (16), thrust bearings (15), and fork assembly (14) in place on strut assembly (20).

NOTE: Proper installation of the nose gear strut and fork assembly is essential to prevent nose wheel shimmy.

- (30) Install washers (13, 12, and 11) and nut (10).

- (31) Install the two attaching bolts that secure the nose wheel fairing to the fork assembly (14).

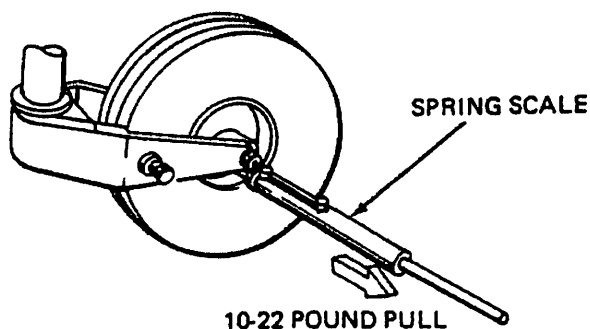
- (32) Assemble axle (8), spacers (7), and plugs (6) in nose wheel. Position nose wheel in fork assembly (14) and insert axle bolt (5) through fork, wheel, and fairing mount brackets.

- (33) Install washers (4), nuts (3), and tighten until a very slight drag is evident when the wheel is rotated.

- (34) Install spacer (2) and bolt (1).

- (35) Proper nose fork friction is attained by adjustment of torque at nut (10). Tighten nut (10) until a 10-22 lb drag is attained at the axle centerline when the fork is rotated. The cotter pin (9) must be in place for this measurement.

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**Nose Fork Friction Measurement
Figure 32-03**

2. Inspection and Minor Repair of Nose Landing Gear

A. Visually Inspect Nose Landing Gear

- (1) Inspect the steel tube nose gear for nicks, rust or damage to protective paint coating.
- (2) Perform a thorough inspection of the nose landing gear at each 100-hour inspection and after any hard landing. Refer to Chapter 5 for scope of inspections and detailed procedures.

B. Repair Nose Landing Gear Minor Damage

- (1) Smooth out minor nicks on strut with fine sandpaper.
- (2) Use 150 sandpaper to remove all rust and smooth out damaged paint.
- (3) Clean strut with wax and grease remover and prime with two light coats of zinc chromate primer per MIL-P-8585. (Refer to Chapter 12)
- (4) Apply final coat of paint to match aircraft color.
- (5) Inspect the nose fork, bearing cup to strut fillet for cracks, corrosion, deterioration and damage. If any discrepancies are found, place a 150 foot-pound torque load on cup (suitably protecting the bearing surface), preferably around the stop plate. Any detectable rotation is reason for strut replacement. After testing, replace fillet as follows:
 - (a) Remove cup-to-strut fillet with hand abrasive. Remove rust and paint from strut, 1.5 inch minimum, upward from cup stop plate.
 - (b) Apply Loctite 290 Adhesive/Sealant (wicking) Loctite Corporation, to any cracks remaining in cup to strut bondline.

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- (c) Apply a uniform 0.12 inch radius fillet of sealant to replace fillet removed. Also apply sealant on strut up 1.5 inch minimum from cup stop plate.
- (d) After sealant has cured, prime area with two light coats of zinc chromate primer and paint strut to match aircraft color.

EC-16758, Class 8-1/2, 8-2 or 8-4 with EC-1675A accelerator 3M Company.
890 Class 8-2 or 8-4 with 890 curing agent, PRC Desoto. PR-1422, Class B-
1/2 or 8-2 with accelerator, PRC Desoto.

WHEELS AND TIRES - DESCRIPTION/OPERATION

1. General

The AG-5B aircraft are equipped with a 4-ply, 5.00 x 5 tube type tire on the nose landing gear and tube type, size 6.00 x 6; 6 ply tires on the main gear. Main gear tires should be rotated (removed and remounted on the same wheel, with the tread closes to the outer wheel face remounted closes to the inner wheel face) periodically to obtain maximum tire life. All wheels are of the split-wheel design for easy servicing and each main wheel has an independent disc-type hydraulic brake system. For information and instructions covering the brake system, refer to this chapter.

All wheels and tires are balanced at the factory. It is recommended that replacement tires be balanced to prevent excessive landing gear assembly vibration. Assure balancing is accomplished using suitable balancing equipment.

WHEELS AND TIRES - MAINTENANCE PRACTICES

1. Removal/Installation of Main Gear Wheel Assemblies (Refer to Figures 32-01 and 32-04)

A. Remove Main Gear Wheel Assemblies

- (1) Support the aircraft on jacks. (Refer to Chapter 7)
- (2) Remove the main wheel fairing if installed.
- (3) Remove two bolts (1) and washers (2) which attach the brake pressure plate (4) and backplate (3) to the brake cylinder assembly (5). (Figure 32-04)
- (4) Remove cotter pin (1), nut (2), and wheel assembly from axle (25). (Figure 32-01)

B. Install Main Gear Wheel Assembly

- (1) Position wheel on axle (25). (Figure 32-01)
- (2) Check brake anchor bolts (6) for freedom of movement in torque plate assembly (7) and for adequate lubrication. (Figure 32-04)
- (3) Install and tighten the axle nut (2) until a slight drag is evident when rotating the wheel. Back off the nut to the next castellation/hole line-up and install the cotter pin (1). (Figure 32-01)

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- (4) Position brake backplate assembly (3) in place and install washers (2) and bolts (1). Torque mounting bolts (1) to 90 in. lb. (Figure 32-04)
- (5) Install wheel fairing where applicable.
- (6) Remove jacks.

2. Disassembly/Reassembly of Main Gear Wheel Assemblies (Figure 32-04)

A. Disassembly of Main Landing Gear Wheel Assembly

- (1) Remove main landing gear wheel assembly.
- (2) Match-mark the wheel halves and brake discs prior to disassembly to assure reassembly is in the same relative position.

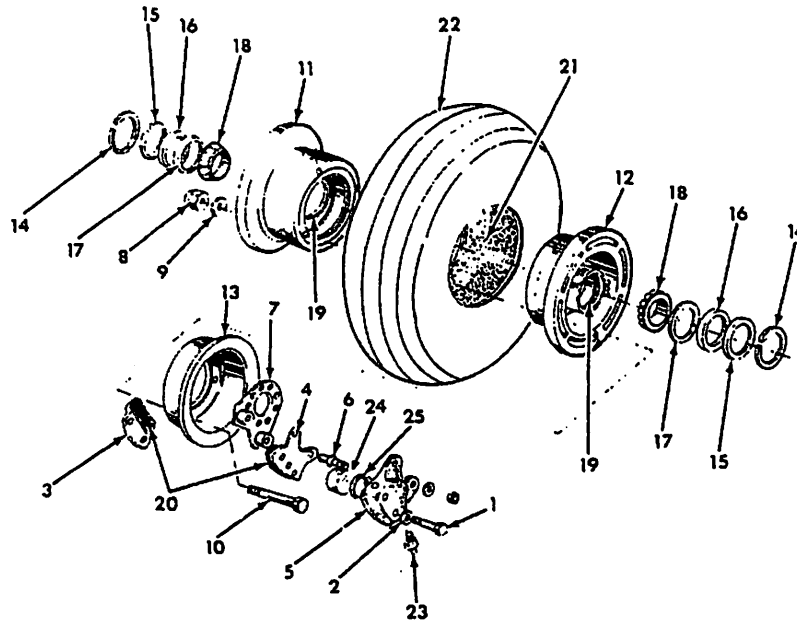
**WARNING: DO NOT ATTEMPT TO SEPARATE THE WHEEL HALVES
WHILE THE TIRE IS PRESSUREIZED. SERIOUS INJURY
COULD RESULT.**

- (3) Deflate the tire by removing the valve core.
- (4) Break the tire bead loose from the wheel half assemblies.

NOTE: Care should be taken to prevent damage to the wheel halves when breaking the beads loose.

- (5) Remove nuts (8), washers (9), bolts (10), and separate the wheel halves (11 and 12) and brake disc assembly (13).

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- | | |
|----------------------------|----------------------|
| 1. Bolt | 13. Brake Disc Assy. |
| 2. Washer | 14. Snap Ring |
| 3. Backplate Assy. | 15. Grease Seal Ring |
| 4. Pressure Plate Assy. | 16. Felt Grease Seal |
| 5. Cylinder Assy. | 17. Grease Seal ring |
| 6. Anchor Bolt | 18. Cone Bearing |
| 7. Torque Plate Assy. | 19. Bearing Cap |
| 8. Nut | 20. Brake Lining |
| 9. Washer | 21. Tube |
| 10. Bolt | 22. Tire |
| 11. Outer Wheel Half Assy. | 23. Bleeder |
| 12. Inner Wheel Half Assy. | 24. Piston |
| | 25. O-ring |

**Main Wheel and Brake Assembly
Figure 32-04**

(6) Remove the snap rings (14), grease seal rings (15), felt grease seals (16), grease seal rings (17), and cone bearings (18) from both wheel halves (11 and 12).

(7) Inspect the bearing cups (19) for nicks and /or discoloration, and replace if necessary.

NOTE: To remove the bearing cups, heat the wheel halves for 15 minutes in boiling water. With an arbor press, press out the damaged bearing cups and press in the new ones while the wheel is still hot. Care should be taken to prevent trapping moisture between the bearing cup and wheel half.

(8) Clean bearings (18), rings (15 and 17), and seals (16) with solvent and dry thoroughly using clean compressed air. Examine bearings (18) for damage freedom of movement and/or discoloration. Repack the bearings with bearing grease per Lubrication Chart. (Refer to Chapter 12) Replace defective bearings.

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- (9) Inspect wheel halves (11 and 12) for nicks, cracks, gouges, scoring, scratches, and / or corrosion. Replace cracked wheels.
- (10) Repair minor damage by sanding area with fine sandpaper, clean thoroughly, apply zinc chromate primer, and paint.
- (11) Inspect brake disc (13) and linings (20) for excessive wear or scoring and replace if necessary. *Small scratches may be sanded smooth.*

B. Reassemble Main Landing Gear Wheel Assembly

- (1) Position tube (21) inside tire (22) and align the red dot on the tire with the index mark on the tube. If tube is not marked, align red dot with tube seam.
- (2) Place outboard wheel half (11) in tire (22) and position the valve stem through the stem hole.
- (3) Position inner wheel half (12) and brake disc (13) in tire (22) and install bolts (10), washers (9), and nuts (8).

NOTE: Care must be taken not to pinch the tube between the wheel halves.

**WARNING: IMPROPER TORQUE OF BOLTS (10) MAY RESULT IN
WHEEL FAILURE.**

- (4) Torque bolts (10) to 150 in. lb. Torque value may be indicated on the wheel.
- (5) Install bearings (18), grease seal rings (17), felt grease seals (16), grease seal rings (15), and snap rings (14).
- (6) Inflate the tire to prescribed pressure. (Reference Chapter 6)

3. Removal/Installation of Nose Wheel Assembly (Reference Figure 32-02)

A. Remove Nose Wheel Assembly

- (1) Support aircraft on jacks. (Refer to Chapter 7)
- (2) Remove nut (3), washer (4), and bolt (5).
- (3) Remove nose wheel assembly from nose fork (14).
- (4) Remove plugs (6), spacers (7), and axle (8) from nose wheel assembly.

B. Install Nose Wheel Assembly

- (1) Assemble axle (8), spacers (7), and plugs (6) in nose wheel is rotated.
- (2) Position the nose wheel in nose fork (14) and insert the axle bolt (5).
- (3) Install washers (4) and nuts (3) and tighten until a very slight drag is evident when the wheel is rotated.

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- (4) Install nose wheel fairing where applicable.
- (5) Remove jacks.

4. Disassembly/Reassembly of Nose Wheel Assembly (Reference Figure 32-05)

A. Disassemble Nose Wheel Assembly

- (1) Remove nose wheel per this chapter.

WARNING: DO NOT ATTEMPT TO SEPARATE THE WHEEL HALVES WITH THE TIRE PRESSUREIZED. SERIOUS INJURY COULD RESULT. COMPLETELY DEFLATE THE TIRE PRIOR TO WHEEL SEPERATION.

- (2) Deflate the tire by removing the valve core.
- (3) Separate the tire beads from the wheel halves.

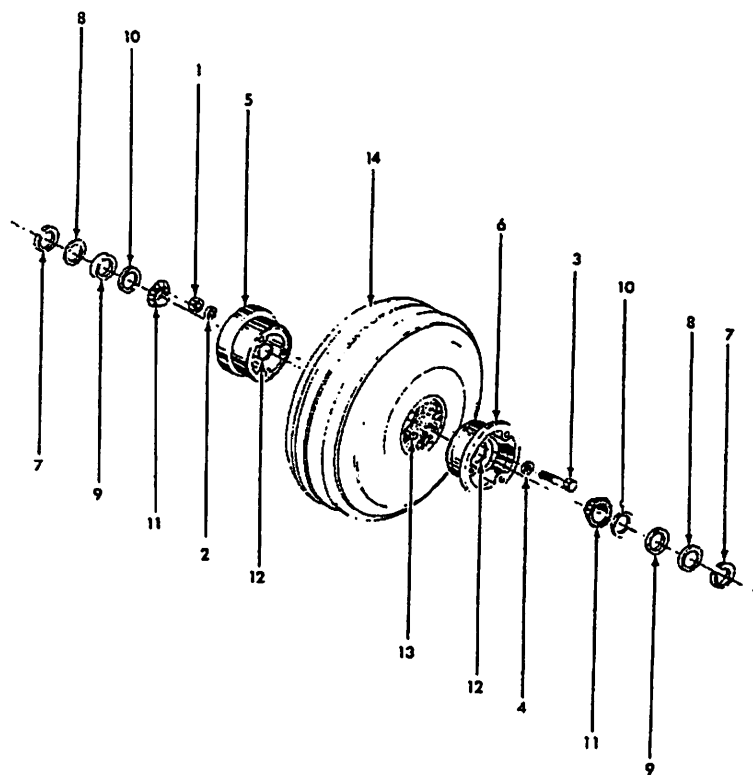
NOTE: Care should be taken to prevent damage to the wheel halves when breaking the beads loose.

- (4) Separate wheel halves (5 and 6) by removing nut (1), washers (2 and 4), and bolts (3).
- (5) Remove snap ring (7), grease seal rings (8), felt grease seals (9), grease seal rings (10), and cone bearings (11).
- (6) Inspect bearing cups (12) for nicks and/or discoloration and replace if necessary.

NOTE: To remove the bearing cups, heat the wheel halves for 15 minutes in boiling water. With an arbor press, press out the damaged bearing cups and press in the new ones while the wheel is still hot. Care should be taken to prevent trapping moisture between the bearing cup and wheel half.

- (7) Clean bearings (11), rings (8 and 10), and seals (9) with solvent, and dry thoroughly using clean compressed air.
- (8) Inspect wheel halves (5 and 6) for discoloration, nicks, cracks, gouges, scoring, scratches, or corrosion. Replace cracked wheels.
- (9) Repair minor damage by sanding the area with fine sandpaper, cleaning thoroughly, applying zinc chromate primer, and paint.
- (10) Examine bearings (11) for damage, freedom of movement and/or discoloration. Replace damaged bearings. Repack bearings with grease specified in Chapter 12.

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- | | |
|---------------------------|----------------------|
| 1. Nut | 8. Grease Seal Ring |
| 2. Washer | 9. Felt Grease Seal |
| 3. Bolt | 10. Grease Seal Ring |
| 4. Washer | 11. Cone Bearing |
| 5. Inner Wheel Half Assy. | 12. Bearing Cup |
| 6. Outer Wheel Half Assy. | 13. Tube |
| 7. Snap Ring | 14. Tire |

**Nose Wheel Assembly
Figure 32-05**

B. Reassemble Nose Wheel Assembly

- (1) Position tube (13) inside tire (14), aligning the red dot on the tire with the index mark on the tube. If the tube is not marked, align the red dot with the tube seam.
- (2) Position the tire and tube on wheel half (6) and insert the valve stem through the hole.
- (3) Position other wheel half (5) in tire (14) and install washers (4), bolts (3), washers (2), and nuts (1).

NOTE: Care must be taken to avoid pinching the tube between the wheel halves.

- (4) If a new tire is installed, balance in accordance with this chapter.

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CAUTION: IMPROPER TORQUE OF BOLTS (3) COULD RESULT IN WHEEL FAILURE.

- (5) Torque bolts (3) to 90 in. lb.
- (6) Install bearings (11), grease seal rings (10), felt grease seal (9), grease seal rings (8), and snap ring (7).
- (7) Inflate the tire to the pressure prescribed in Chapter 6.
- (8) Install nose wheel assembly per this chapter.
- (9) Remove jacks.

5. Main Wheel Fairing Assembly Removal/Installation (Reference Figure 32-06)

A. Remove Wheel Fairing Assembly.

- (1) Remove screws (1), washers (2), and slide streamlining fairing (3) up the strut.
- (2) Remove plug button (4), bolts (5), washers (6), and bearing (7).
- (3) Remove nut (13) and washer (14) from flex bolt (11), tilt fairing to clear flex bolt (11), and remove fairing shell assembly (12).

B. Install Main Wheel Fairing Assembly.

- (1) Position fairing shell assembly (12) in place on wheel with flex bolt (11) end through flat plate on fairing and install washer (14) and nut (13).
- (2) Install bearing (7), washers (6), bolts (5), and plug button (4).
- (3) Position streamlining fairing (3) in place and install washers (2) and screws (1).
- (4) Check position of scraper (15) in relation to tire, and if necessary adjust scraper for 1/2-inch clearance.

6. Nose Wheel Fairing Assembly Removal/Installation (Refer to Figures 32-02, 32-03 and 32-07)

A. Remove Nose Wheel Fairing Assembly.

- (1) Remove weight from the aircraft. (Reference Chapter 7)
- (2) Remove Fairing Plug Button (1). (Figure 32-07)
- (3) Remove bolt (1) and spacer (2) from nose fork (14). (Figure 32-02)
- (4) Remove nuts (3), washers (4), and withdraw axle bolt (5) from the nose wheel. (Figure 32-02)
- (5) Remove plug (6), spacers (7), and axle (8). (Figure 32-02)

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- (6) Remove nose wheel from the aircraft.
- (7) Remove cotter pin (9), nut (10), washers (11, 12, and 13), fork assembly (14), with fairing assembly attached, thrust bearing (15), and O-ring (16). (Figure 32-02)
- (8) Remove two attaching bolts and fairing from fork.

B. Install Nose Wheel Fairing Assembly.

- (1) Reverse order of A. above. (Replace O-Ring (16) on re-assembly)
- (2) Proper nose fork friction is attained by adjustment of nut (10) (Figure 32-02) torque. Tighten nut (10) until a 10 – 22 lb drag is obtained at the axle centerline when the fork is rotated. (Reference Figure 32-03 for proper nose fork friction measurement.) Correct measurement requires the installation of cotter pin (9). (Figure 32-02)

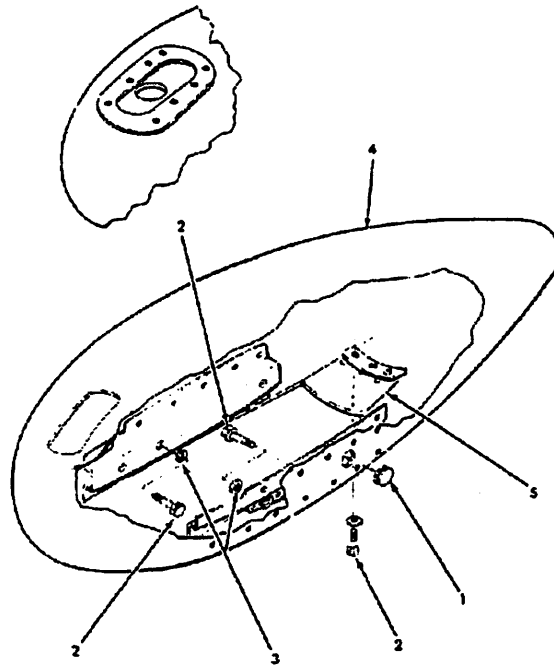
7. Main Landing Gear Wheel Alignment

Toe-in adjustments are made at the factory within the tolerances specified in Figure 32-08 and the toe-in adjustment should be checked periodically to ensure the wheels are properly aligned. Setting toe-in within the specified tolerances while the cabin and fuel tanks are empty will give approximate zero toe-in at gross weight. Ideal setting is zero toe-in at normal operating weight. Therefore, if normally operated at less than gross weight and abnormal tire wear occurs, the wheel alignment should be adjusted to obtain the ideal setting for the load conditions that the aircraft normally operates. At wheel alignment, the desired procedure is to use the least number of shims possible to obtain the specified tolerances. Shims are available from the factory under the following part numbers.

<u>PART NUMBER</u>	<u>SHIM ANGLE</u>	<u>AMOUNT OF TOE-IN/OUT CHANGE</u>
701068-1	0° -30 min. Ref.	15 minutes
701068-2	0° -45 min. Ref.	23 minutes
701068-3	1° -0 min. Ref.	30 minutes

NOTE: The use of toe-in adjustment shims requires the replacement of two AN6-22A bolts with longer AN6-23A bolts on the thick side of the shim.

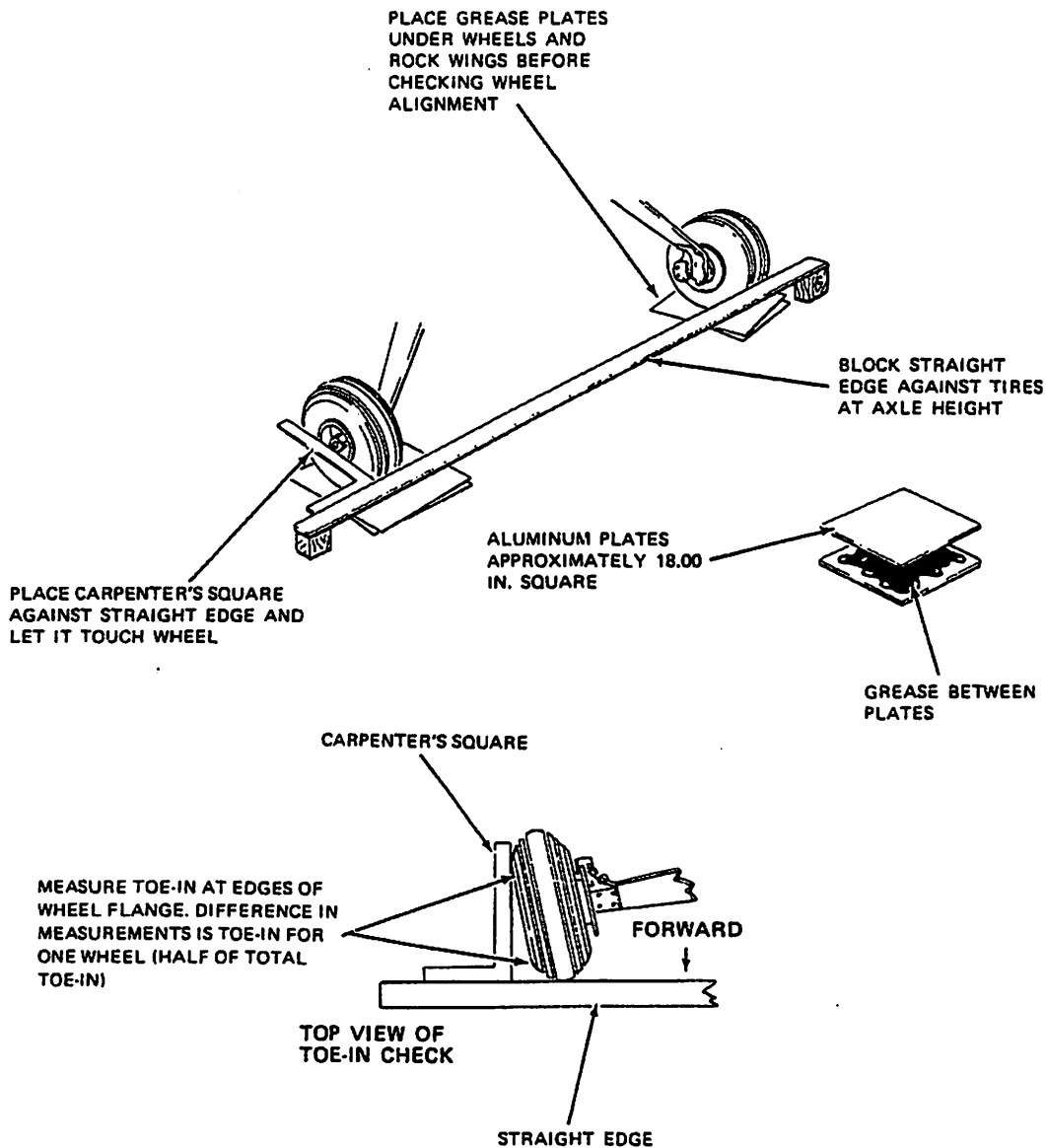
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- | | |
|-----------------------|-------------------|
| 1. Plug Button | 4. Fairing |
| 2. Bolt | 5. Scraper |
| 3. Washer | |

**Nose Wheel Fairing Assembly
Figure 32-07**

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TOE-IN/OUT LIMIT (EACH WHEEL) \pm 30 MINUTES
MAXIMUM DIFFERENCE BETWEEN WHEELS = 30 MINUTES

**Wheel Alignment Procedure
Figure 32-08**

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BRAKES - DESCRIPTION/OPERATION

1. General

The aircraft utilizes hydraulic brakes on each main landing gear. The toe brake cylinders attached to the rudder pedals control the brakes.

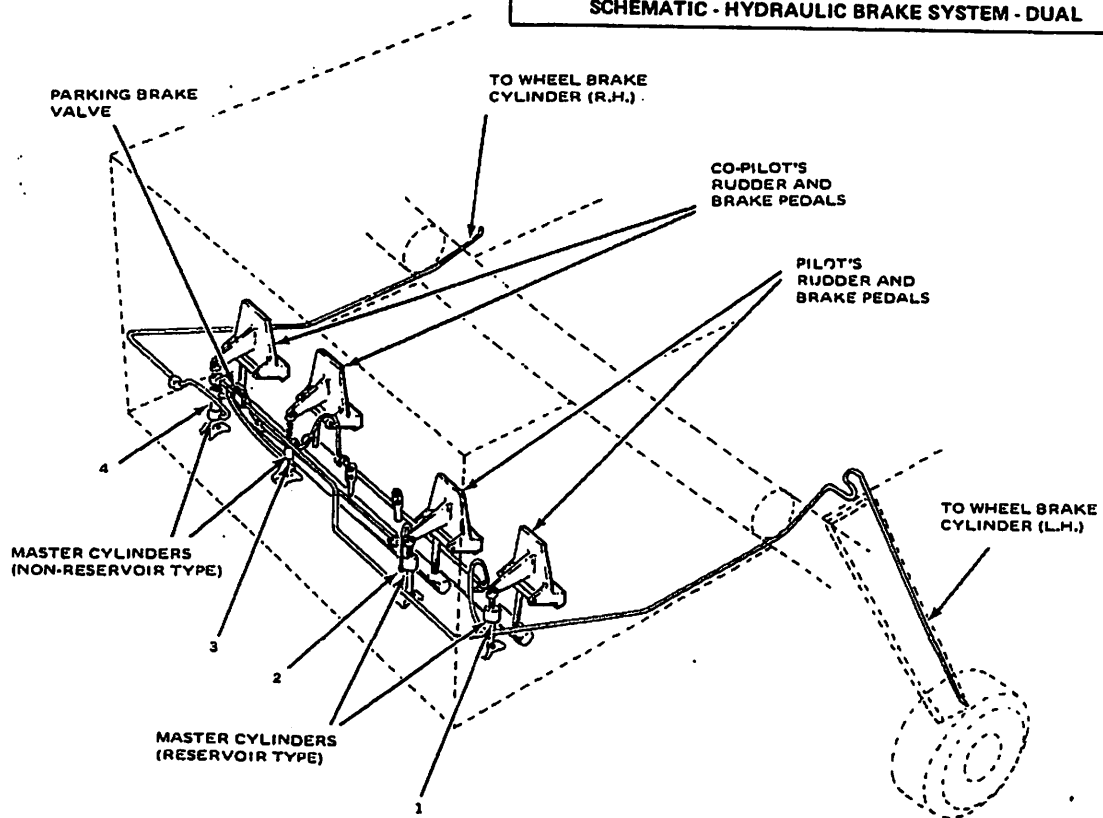
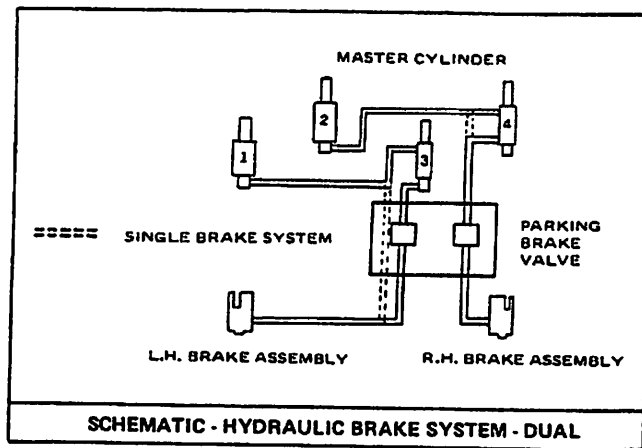
The hydraulic brake system consists of the wheel brake assemblies, four master cylinders for the dual brake system, and a parking brake assembly. The wheel brake assemblies use a disc that is attached to the main wheel thru-bolts. The floating brake assembly is attached to the inside of the axle assembly.

The dual hydraulic brake system used on the AG-5B is unique in the fact it requires no additional reservoir. The system is designed for dual operation and incorporates two types of master cylinders. Pressure applied to the left master cylinder (1, Figure 32-09) passes through an integral piston by-pass port in the right master cylinder (3) closes the port and applies pressure to the left wheel assembly. If pressure is applied to both cylinders simultaneously, the force from the left cylinder is applied to the top of the piston in the right cylinder, nearly doubling the pressure at the wheel brake assembly. Master cylinders (2) and (4) operate in the same manner.

When the brake pedals for master cylinders (3) and (4) are in neutral position, the ports are open for direct flow to the brake assemblies from cylinders (1) and (2).

The parking brake system consists of a parking brake control that operates a dual in-line valve between the brake cylinders and the respective wheel brakes. The parking brakes are applied by depressing both toe brakes, at either station, and pulling the parking brake control out to the stops. Brake release is accomplished by pushing the control all the way in.

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Hydraulic Brake System
 Figure 32-09

**TIGER AIRCRAFT AG-5B SERIES
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BRAKES - MAINTENANCE PRACTICES

1. Removal/Installation of Master Cylinder

A. Remove Master Cylinder

- (1) Drain the fluid from the brake system by removing the bleeder valve in the bottom of the brake assembly.
- (2) Disconnect the flexible hose assembly at the master cylinder connection.
- (3) Remove the cotter pin and withdraw the clevis pin that connects the clevis on the master cylinder to the rudder pedal.
- (4) Remove the cotter pin and withdraw the clevis pin that attaches the mounting lug of the master cylinder to the mounting bracket.

B. Install Master Cylinder

- (1) Position the master cylinder to the mounting bracket and install the clevis pin and cotter pin.
- (2) Position the master cylinder clevis to the rudder pedal connection and install the clevis pin and cotter pin.
- (3) Connect the flexible hose assembly to the master cylinder connection.
- (4) Service the hydraulic brake system with MIL-PRF-5606 fluid. (Refer to Chapter 12)

2. Disassembly/Reassembly of Master Cylinder – Reservoir and Non-Reservoir Type

- A. Reference Parker Hannifin technical data for Master Cylinder overhaul / repair.**

3. Removal/Installation of Wheel Brake Assembly

A. Remove Wheel Brake Assembly (Reference Figure 32-10)

**NOTE: The brake disc (11) is removed after wheel removal and disassembly.
Torque plate assembly (12) may be removed after the wheel has been removed.**

- (1) Disconnect the hydraulic line at the wheel brake assembly fitting.
- (2) Remove bolts (1) and washers (2) then remove backplate (3).
- (3) Pull anchor bolts (10) out of torque plate assembly (12) and remove brake cylinder assembly (4).
- (4) Slide pressure plate (5) off anchor bolts.
- (5) Introduce low pressure compressed air, into the hydraulic line fitting to force piston (6) from cylinder (4). Slide O-ring (7) off piston (6).
- (6) Remove nuts (8), washers (9), and anchor bolts (10).

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B. Install Wheel Brake Assembly

NOTE: Keep brake lining (13) dry and completely free of hydraulic fluid. Install new O-ring (7) at reassembly.

- (1) Lubricate piston (6), bore of cylinder (4), and new O-ring (7) with clean hydraulic fluid.
- (2) Assemble anchor bolts (10) into cylinder (4), and install washers (9), and nuts (8).
- (3) Assemble O-ring (7) on piston (6) and install in cylinder (4). Hold piston in cylinder until pressure plate (5) is installed.
- (4) Slide pressure plate (5) onto anchor bolts (10).
- (5) Insert anchor bolts (10) into torque plate assembly (12), and install washers (2), bolts (1), and backplate (3). Torque bolts (1) to Parker Hannifin technical data requirements.

4. Bleeding Hydraulic Brake System

A. Bleed Hydraulic Brake System

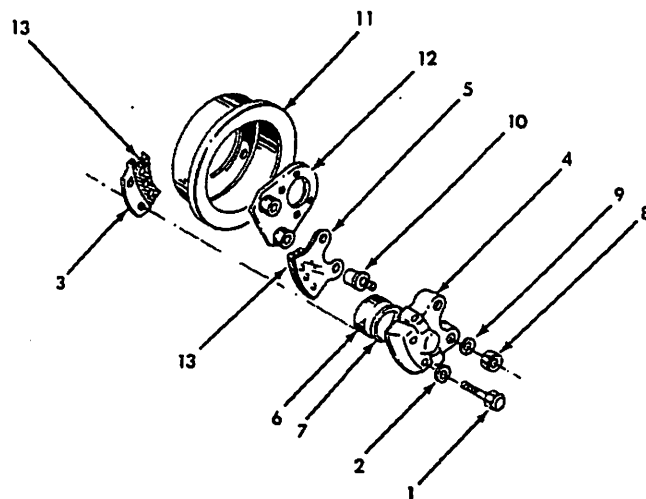
NOTE: When servicing the hydraulic brake system, use MIL-PRF-5606 hydraulic fluid. (See Chapter 12)

- (1) Remove vent plugs from master cylinders (1 and 2 Figure 32-09) and replace with overflow lines. Immerse the free ends of the overflow lines into a can of clean hydraulic fluid. This will prevent air from entering the lines / system.
- (2) Connect a clean hydraulic pressure source to the brake assembly bleeder valve.
- (3) Fill the system until the overflow line in the master cylinder produces no more air bubbles. Remove overflow line.
- (4) Remove the pressure and fluid source. Allow the fluid to drain back through the system until the fluid level is approximately 1/4 inch from the top of the master cylinder reservoir.

NOTE: To avoid spillage do not fill the reservoir beyond 1/4 inch from the top.

- (5) Secure the bleeder valve and replace the vent plugs.

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1. Bolt
2. Washer
3. Backplate
4. Cylinder
5. Pressure Plate
6. Piston
7. O-Ring

8. Nut
9. Washer
10. Anchor Bolt
11. Brake Disk
12. Torque Plate
13. Lining

Wheel Brake Assembly
Figure 32-10

5. Cleaning Brake System Parts

WARNING: USE SOLVENTS IN A WELL VENTILATED AREA. AVOID BREATHING FUMES. KEEP AWAY FROM FLAMES.

- A. Clean all parts *except* brake linings with mineral spirits. Thorough cleaning is important to prevent system malfunction.

6. Brake System Inspection/Testing

A. Inspection and Testing

- (1) Inspect brake linings for damage, deterioration, and/or excessive wear.
- (2) Inspect anchor bolts on wheel brake assembly for nicks and/or damage and sand smooth with fine sandpaper if required.
- (3) Inspect wheel brake disc for wear.
- (4) Upon completion of servicing the brakes a system leak check is required. Assure all fittings are clean and free of hydraulic brake fluid. Inspect hoses for deterioration.

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- (5) Apply pressure to both brake pedals simultaneously. Hold firm pressure on the brakes for 30 seconds and watch/feel for pedal/pressure drop in one or both pedals. If pedal/pressure drop is detected in either or both pedals, inspect all connections for fluid leakage and repair as required.

7. Rigging the Parking Brake

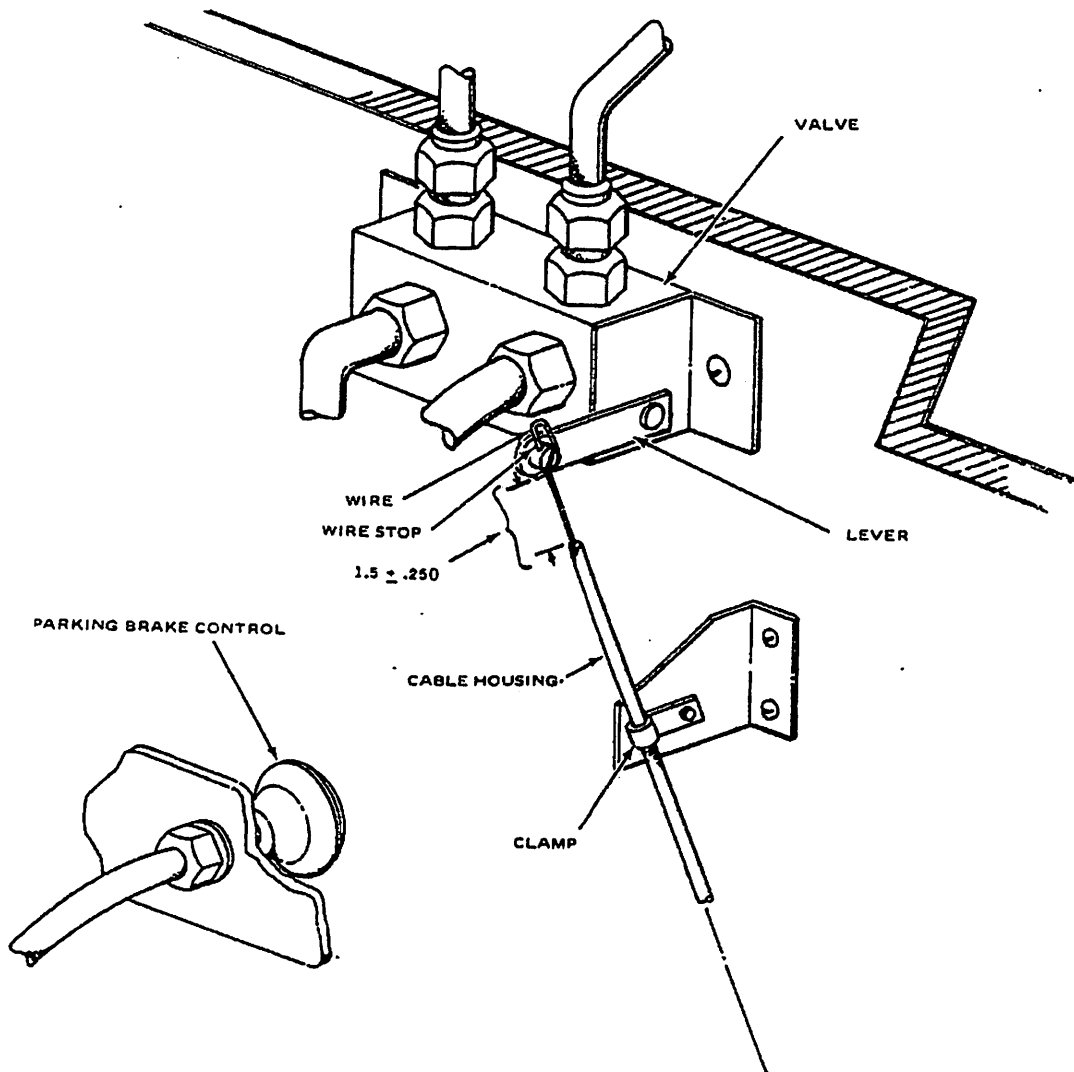
- (1) If not previously accomplished, bleed and service the brake system per this chapter.
- (2) Install the wire through the cable stop on the lever but do not tighten. Push the parking brake control in as far as it will go.
- (3) Push the lever on the valve to the up stop and tighten the wire stop securely.
- (4) Position the outer cable housing and tighten clamp hardware. Pull the parking brake control until the lever contacts the cable housing. The control travel should be 1.5 ± 0.250 inches. Readjust the cable housing position as required.
- (5) With the control in the full out position, press both toe brakes in as far as they will go and release them. Both main landing gear wheels should lock.
- (6) Push the parking brake control in as far as it will go. Both main landing gear wheels should turn freely.
- (7) Bend the end of the wire beyond the wire stop as shown in Figure 32-11.

8. Relining Brakes

A. Relining Brakes (See Figure 32-10)

- (1) Remove wheel brake assembly per this chapter.
- (2) Place backplate (3) on a stable flat surface with the lining side down. Center a 9/64 inch (or slightly smaller) punch in the rolled rivet and strike the punch sharply with a hammer. Punch out all rivets securing the linings to the backplate and pressure plate (5) in the same manner.
- (3) Clamp the lining with flat side of the angle in a vise.
- (4) Align the new lining on the back plate and place brake rivet in hole with rivet head in the lining. Place the rivet head against the anvil.
- (5) Center the rivet setting punch on the lips of the rivet. While holding the back plate down firmly against the lining, strike the punch with a hammer to set the rivet. Repeat blows on the punch until the lining is firmly against the back plate.
- (6) Realign the lining on the backplate and install rivets in the remaining holes.
- (7) Install a new lining on pressure plate in the same manner.

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Parking Brake Rigging
Figure 32-11

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CHAPTER 33

LIGHTING

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LIGHTING - DESCRIPTION

1. General

To simplify this chapter, it has been divided into two sections. The first section will cover the interior lights, and the second section will cover the exterior lights.

The interior lights consist of instrument lights, dome lights and avionics and compass lights. The exterior lights consist of landing lights, navigation lights, rudder beacon strobe and wing strobe lights.

BULB CHART

<u>QUANTITY</u>	<u>INTERIOR LIGHTS</u>	<u>BULB P/N/MFG.</u>
2	Dome	1820 /GE
2	Fuel Gauge	2990D4-28 / Lenrose
2	Instrument (Speaker)	1820 /GE
3	Instrument (Glareshield)	1495 /GE
1	Map (Placard)	2990D4-28 / Lenrose

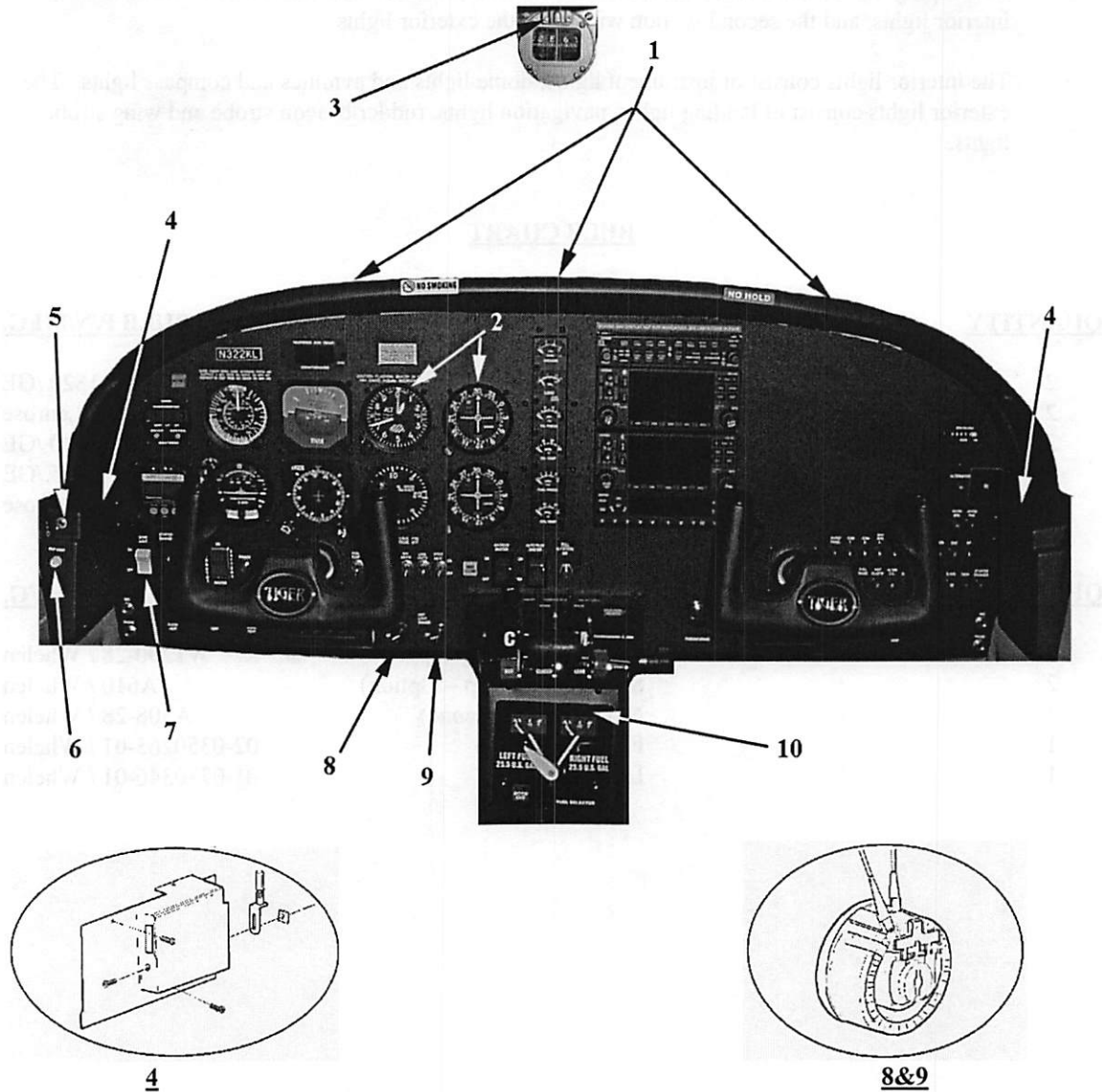
<u>QUANTITY</u>	<u>EXTERIOR LIGHTS</u>	<u>BULB P/N/MFG.</u>
2	Navigation (Wing Tip)	W1290-28 / Whelen
2	Strobe (Wing Tip – Option)	A610 / Whelen
1	Navigation (Tailcone)	A508-28 / Whelen
1	Flashing Beacon	02-0350263-01 / Whelen
1	Landing / Taxi	01-0770346-01 / Whelen

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INTERIOR LIGHT - DESCRIPTION/OPERATION

1. Instrument Lights

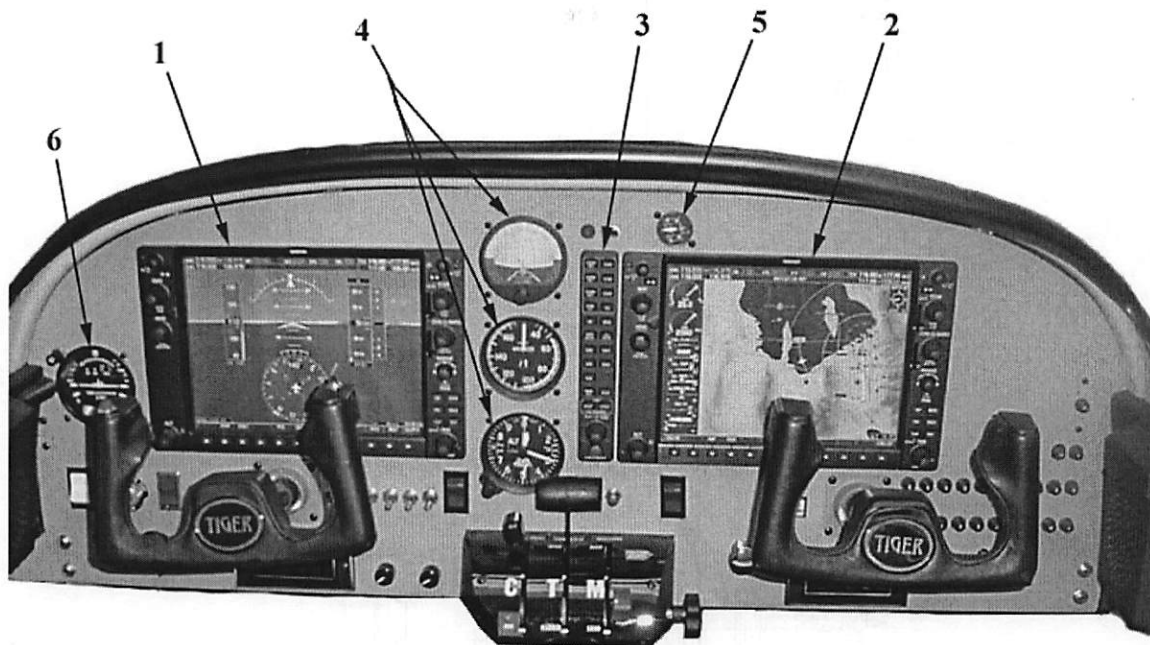
Lights built into the instrument provide instrument back lighting. The instrument lights receive power through a rheostat to control light intensity, and a five (5) amp instrument light circuit breaker.



- | | |
|---------------------------------|------------------------------------|
| 1. Glareshield Panel Lights | 6. Map Light (Illuminates Placard) |
| 2. Instrument Lights (Internal) | 7. Dome Light Switch |
| 3. Compass Light | 8. Panel Lights Dimmer |
| 4. Speaker Mounted Panel Lights | 9. Instrument Lights Dimmer |
| 5. Map Light Switch | 10. Fuel Gauge Lights |

Instrument Lights
Figure 33-01

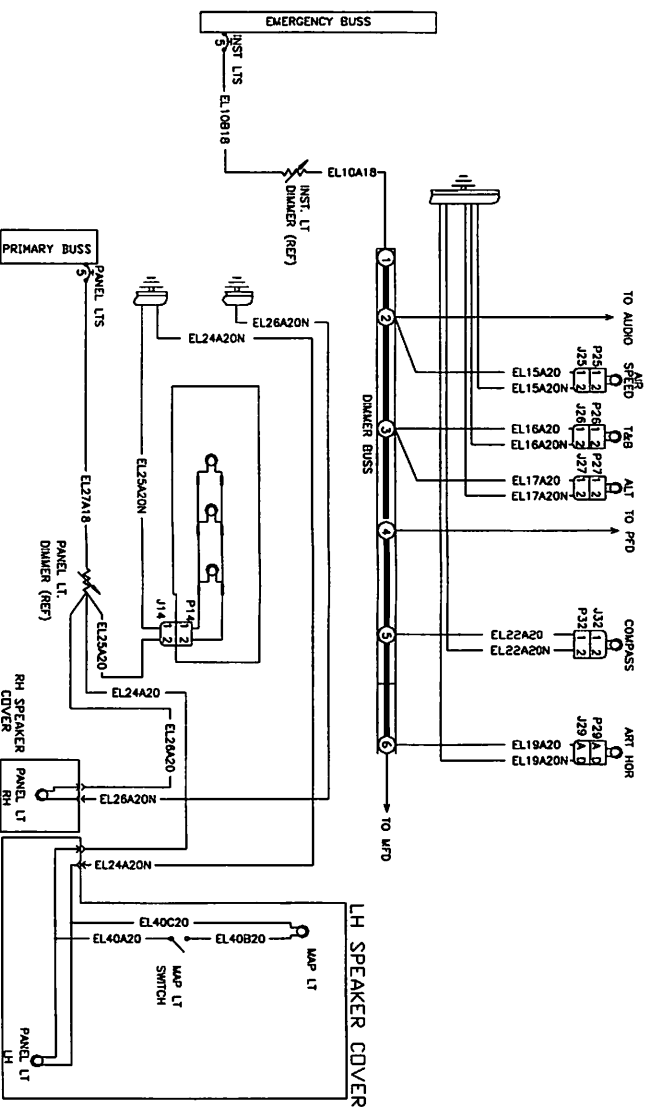
TIGER AIRCRAFT AG-5B SERIES
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G1000 Instrument Panel
Figure 33-01A

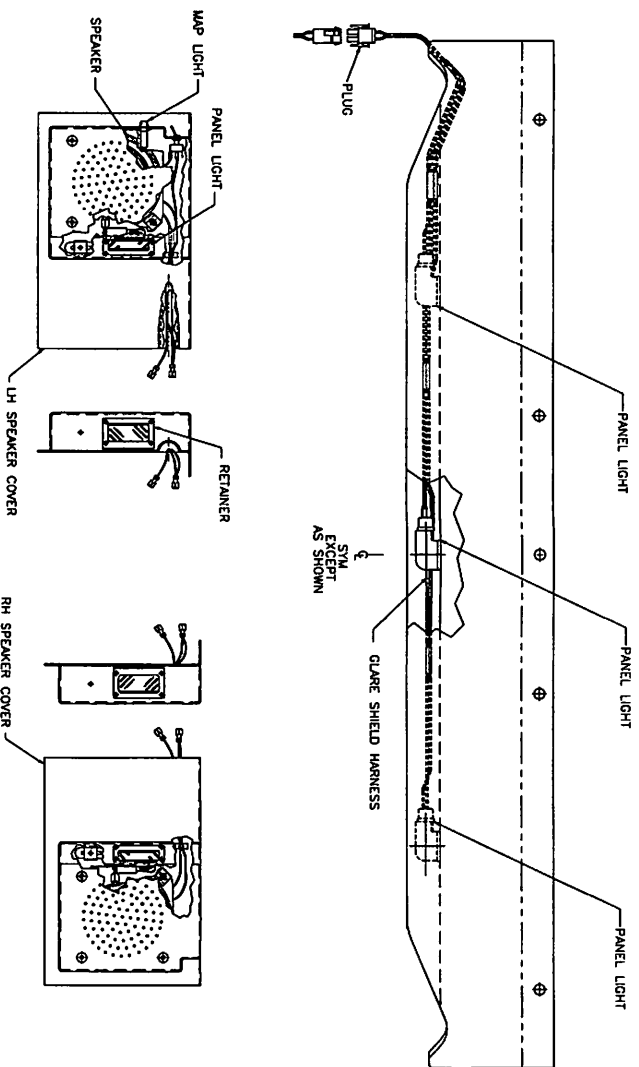
1. PFD – Lighted Display
2. MFD – Lighted Display
3. Audio Panel - Internal Lighting
4. Back-Up Instruments - Internal Lighting
5. Vacuum Gauge – No Internal Lighting
6. Auto Pilot – Internal Lighting

NOTE: Items that were not changed for the G1000 system are shown on Figure 33-01.



Instrument and Panel Light - Wiring Diagram
 G1000

Figure 33-02A



Instrument Lights Detail
 Figure 33-03

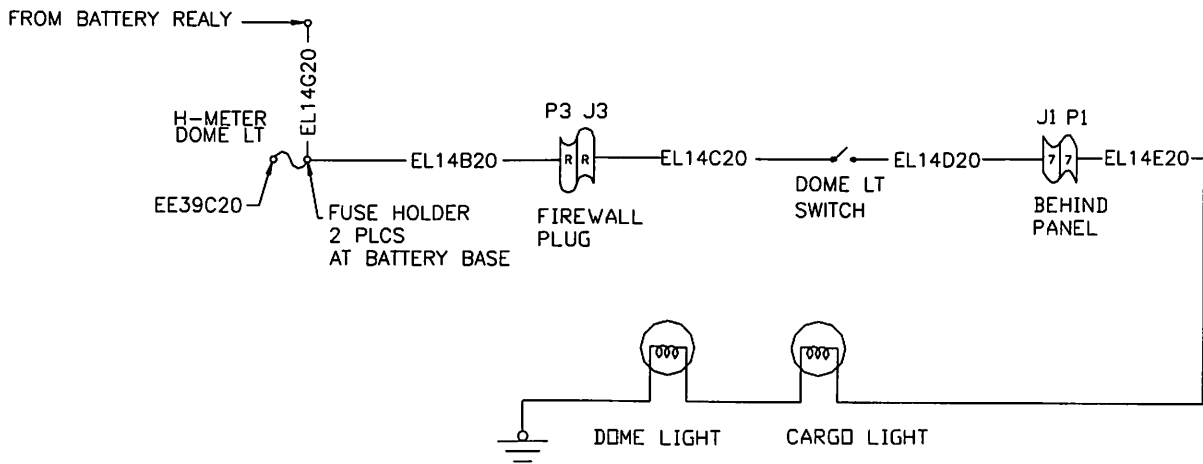
**TIGER AIRCRAFT AG-5B SERIES
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2. Panel Lights

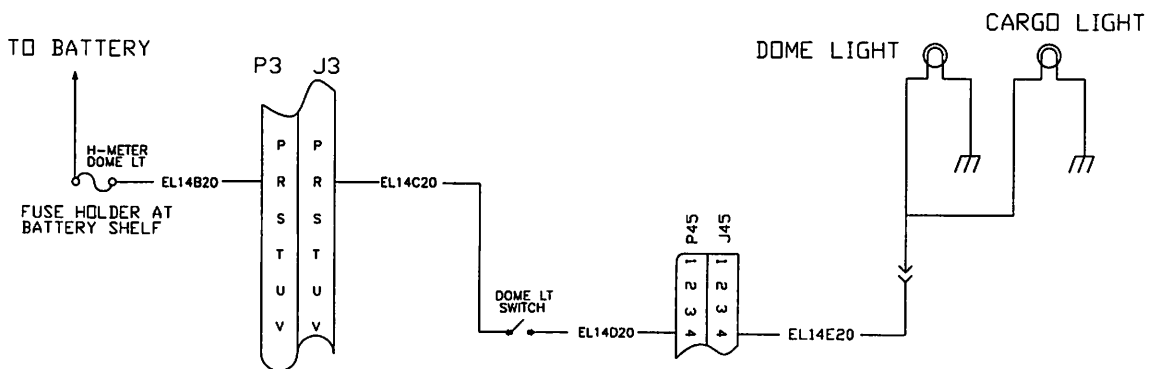
The panel lights consist of three (3) lights mounted under the glareshield, (2) lights mounted in the forward part of the speaker housings, and a map (placard) light mounted in the left hand speaker housing. The panel lights receive power through a rheostat, to control light intensity, and a ten (10) amp panel light circuit breaker.

3. Dome/Cargo LightS

The dome/cargo lights are located behind the canopy in the top center of the passenger compartment and are controlled by a rocker switch located near the bottom of the instrument panel. These lights are energized directly from the battery regardless of the master switch position, and the electrical circuit is protected by a three (3) amp fuse mounted on the battery support tray.



**Dome and Cargo Lights – Wiring Diagram S/N 10247 and Prior
Figure 33-04**



**Dome and Cargo Lights – Wiring Diagram S/N 10248 and Subsequent
Figure 33-04A**

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INTERIOR LIGHTS - MAINTENANCE PRACTICES

1. Replacement of Instrument Light Bulbs

A qualified instrument technician should change bulbs, used with integral instrument lighting.

2. Replacement of Panel Light Bulbs

A. Glareshield Light Replacement

- (1) The three light assemblies are located under the glareshield and secured with double sided adhesive tape.
- (2) Pull the lights free and remove the bezel and hood to replace the bulb.

B. Speaker Light Replacement

- (1) Remove the speakers that are located on each side of the aircraft just aft of the instrument panel.
- (2) Lights are located inside the speaker housing.
- (3) Map light (LH speaker housing only).

3. Replacement of Dome/Cargo Light Bulbs

- A. Remove the screw that attaches the light cover to the light assembly.
- B. Remove and replace bulb(s).

INTERIOR LIGHT - OPERATIONAL CHECK

1. Instrument Lights

NOTE: **Ensure circuit breaker is set.**

- A. Place MASTER switch to the "ON" position.
- B. Turn control knob on the instrument light rheostat from dim to bright. (The bulbs in the instruments should become brighter)
- C. Turn the control knob on the rheostat to the "OFF" position. (Lights should go out)
- D. Place MASTER switch to the "OFF" position.

NOTE: **On G1000 equipped aircraft, the instrument lights receive their power from the Emergency Buss and are used to verify power on that buss during preflight inspections. The panel lights receive their power from the Primary Buss.**

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2. Panel Lights

NOTE: Ensure circuit breaker is set.

- A. Place MASTER switch and Map Light switch to the "ON" position.
- B. Turn the control knob on the Panel Light rheostat from dim to bright. The three lights mounted under the glareshield, the two speaker lights and the map light should become brighter.
- C. Cycle the Map Light Switch to ensure it is working properly.
- D. Turn the control knob on the rheostat to the "OFF" position, lights should go out.
- E. Place MASTER switch and Map Light switch to the "OFF" position.

3. Dome/Cargo Lights

NOTE: Ensure fuse is serviceable before performing check.

- A. Actuate the Dome Light switch. Light should go on and off as switch is actuated regardless of MASTER switch position.

EXTERIOR LIGHTS - DESCRIPTION/OPERATION

1. Landing Lights

The landing lights serve as landing and taxi lights. The landing lights are located in each wing tip and are covered with clear plastic to provide protection and serve as a light lens.

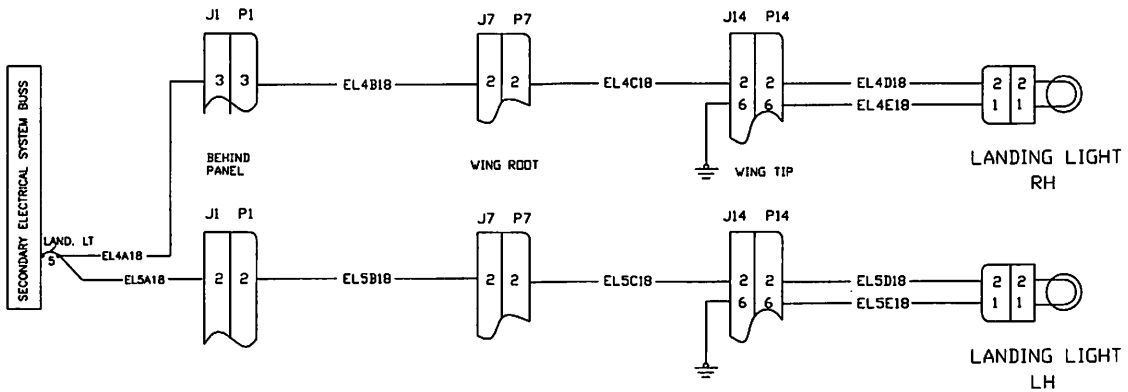
The landing lights are controlled by a five (5) amp circuit breaker switch located left of the throttle quadrant on the instrument panel.

Adjustments to the landing lights are made by removing the clear plastic cover and adjusting the four spring-loaded mounting screws.

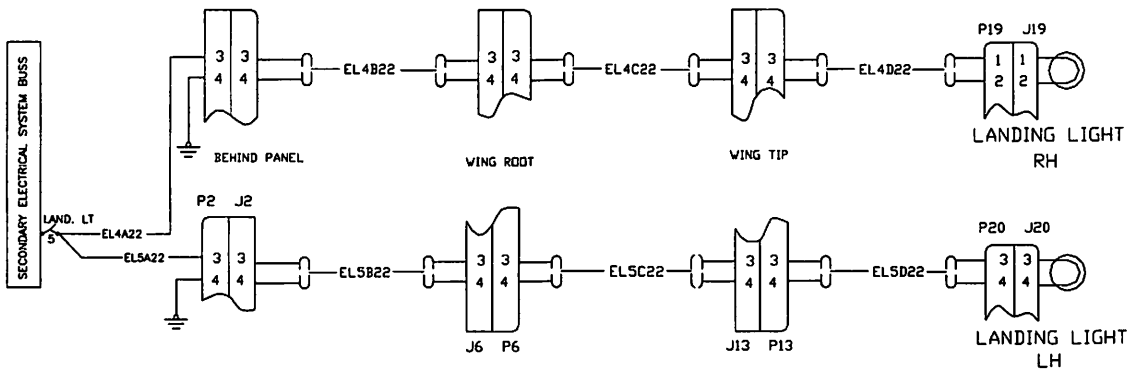
2. Navigation Lights

The navigation lights consist of two (2) wing-tip lights and the taillight mounted in the tailcone. A NAV LTS five (5) amp circuit breaker switch located left of the throttle quadrant on the instrument panel controls the lights.

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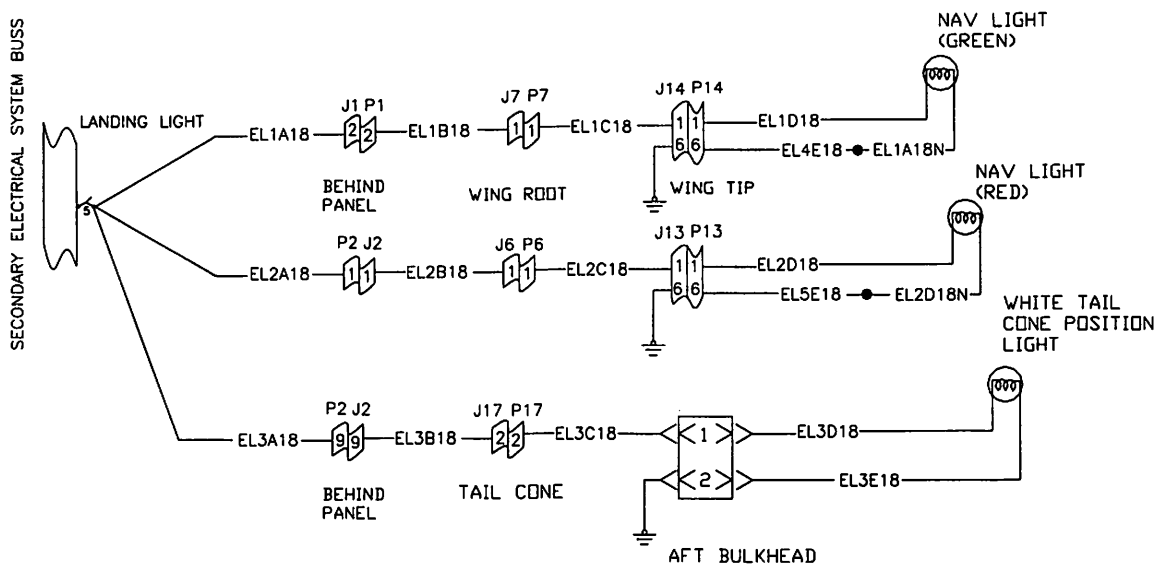


**Landing Light – Wiring Diagram S/N 10247 and Prior
Figure 33-05**

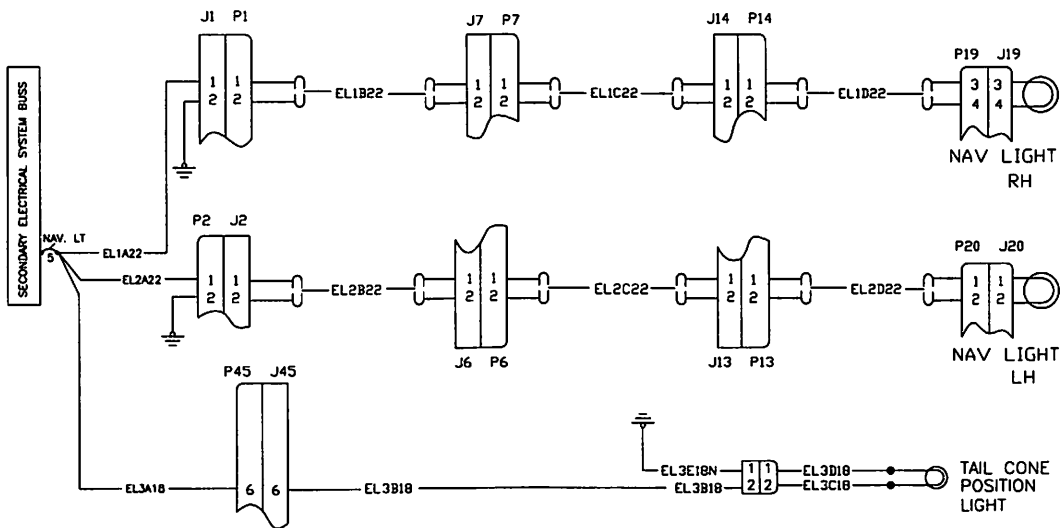


**Landing Light – Wiring Diagram S/N 10248 and Subsequent
Figure 33-05A**

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**Navigation Light – Wiring Diagram S/N 10247 and Prior
Figure 33-06**



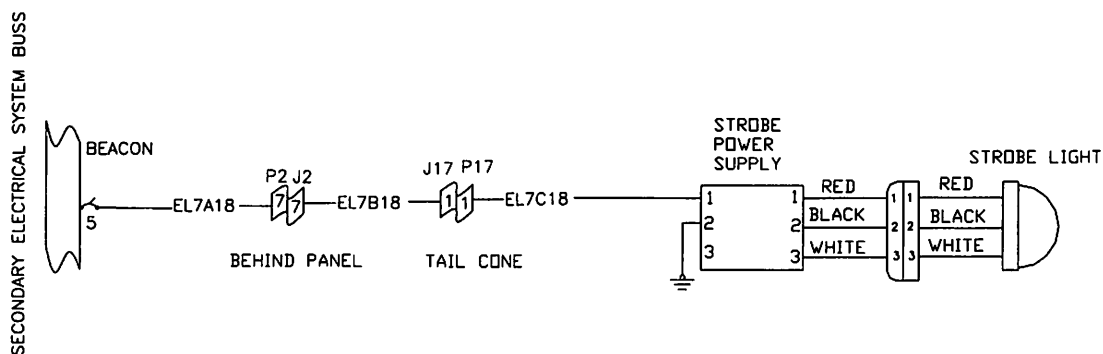
**Navigation Light – Wiring Diagram S/N 10248 and Subsequent
Figure 33-06A**

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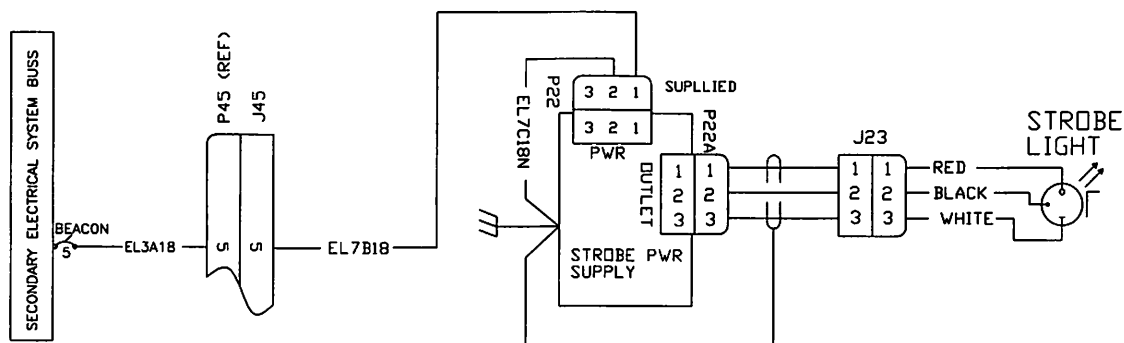
3. Rudder Beacon Strobe Light

The rudder beacon strobe light consists of a light assembly mounted at the top of the vertical stabilizer under a red plastic cover and a power supply mounted in the tail assembly under the vertical stabilizer. The flashing strobe is an iodine vapor lamp electrically switched by the transistorized power supply unit.

The strobe light is controlled by a five (5) amp beacon circuit breaker switch, located to the left of the throttle quadrant on the instrument panel.

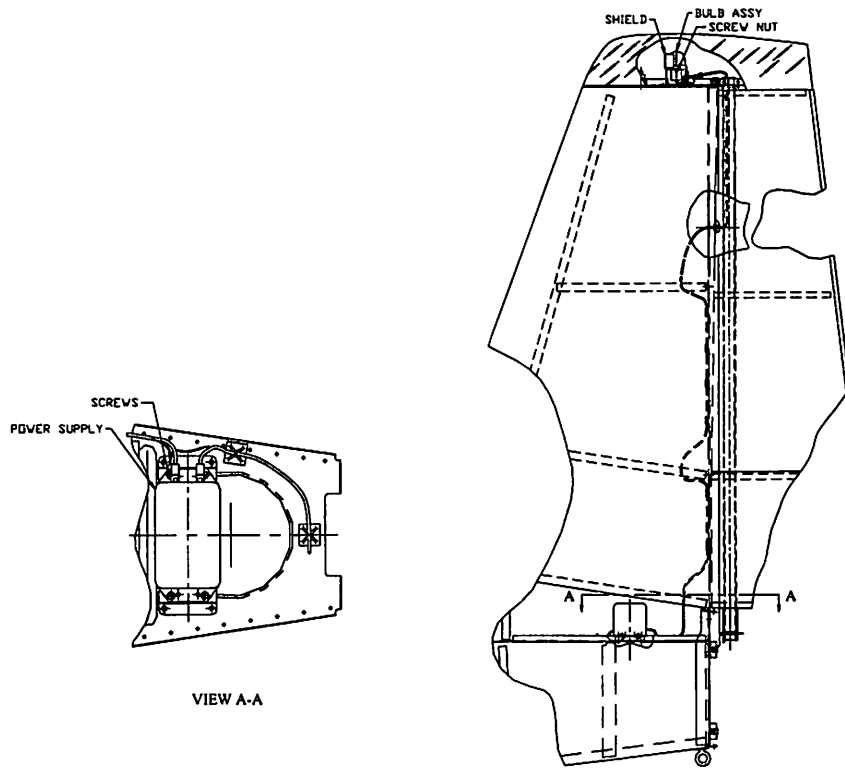


**Rudder Beacon Strobe Light – Wiring Diagram S/N 10247 and Prior
Figure 33-07**



**Rudder Beacon Strobe Light – Wiring Diagram S/N 10248 and Subsequent
Figure 33-07A**

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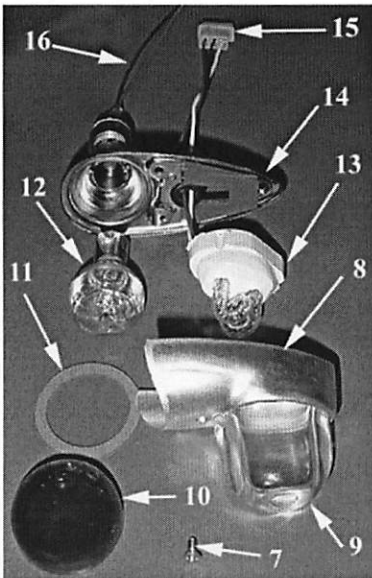
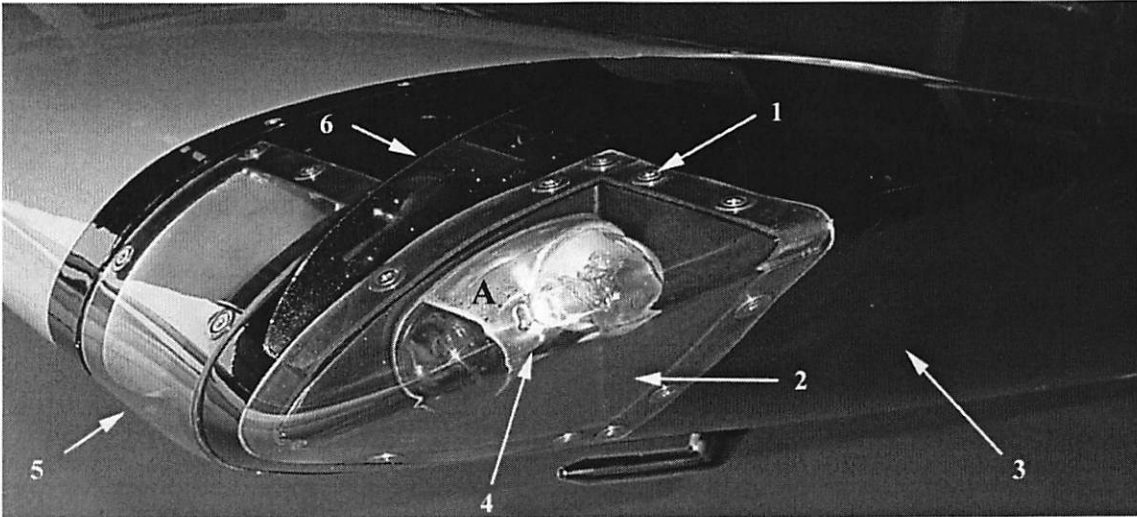


**Rudder Strobe (Flashing Beacon)
Figure 33-08**

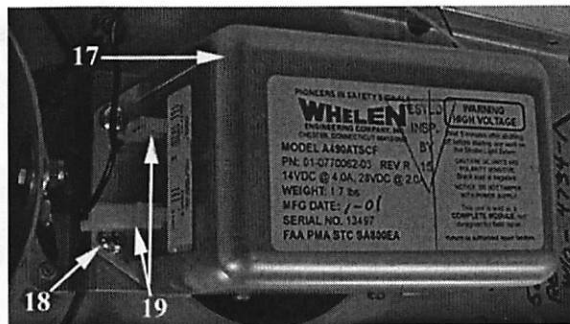
4. Wing Tip Strobe Lights

The wing tip strobe lights consist of assemblies that contain both the navigation and the strobe lights located in each wing tip. A power supply is mounted to each wing outer rib and the lights are controlled by a five (5) amp strobe circuit breaker switch located to the left of the throttle quadrant.

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DETAIL A



WING STROBE POWER SUPPLY
(MOUNTED ON EACH OUTBOARD WING RIB)

- | | | | |
|-----|------------------------------|-----|------------------|
| 1. | Screw and countersunk washer | 11. | Gasket |
| 2. | Nav Light Assembly Lens | 12. | Lamp, Nav Light |
| 3. | Wing Tip | 13. | Strobe Tube |
| 4. | Nav/Strobe Light Assembly | 14. | Base |
| 5. | Landing Light Lens | 15. | Strobe Connector |
| 6. | Strobe Shield | 16. | Nav Light Wires |
| 7. | Screw, retainer | 17. | Power Supply |
| 8. | Retainer | 18. | Screw (4 Places) |
| 9. | Strobe Lens | 19. | Electrical Plugs |
| 10. | Nav Light Lens | | |

Nav/Strobe Light
Figure 33-09

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5. Wing Navigation/Strobe Light Assembly (Reference Figure 33-09)

A. Removal of Navigation/Strobe Lights (Wing Tip)

- (1) Remove screws and washers (1), lens (2) and strobe shield (6) from the wing tip.
- (2) Remove screw (7) securing the lamp retainer (8) and remove the retainer, strobe lens (9), nav light lens (10) and gasket (11).
- (3) Remove and replace nav lamp if required.

NOTE: Removal of the strobe tube (13) or base (14) requires the removal of the wing tip assembly.

- (4) Remove wing tip (3). (Refer to Chapter 57)
- (5) Disconnect wire connectors (15 and 16).
- (6) Remove the three screws that secure base (14) to wing tip (3) and remove the base.
- (7) Remove the strobe tube by removing wires from connector (15) and pulling the wires through base (14).

B. Installation of Navigation/Strobe Lights

- (1) Insert flash tube wires through grommet in base (14) and install connector (15).
- (2) Attach base (14) to wing tip (3) using three screws.
- (3) Reinstall wing tip. (Refer to Chapter 57)
- (4) Connect wire connectors (15 and 16) in the order removed.
- (5) Install lamp (12) in base (14).
- (6) Position gasket (11), lens (10), strobe tube (13) and strobe lens (9) on base (14) and install retainer (8) and screw (7).
- (7) Perform operational check. (See Exterior Lights - operational check)
- (8) Install Nav light assembly lens (2) and strobe shield (6) using screws and washers (1).

C. Wing Strobe Light Power Supply Removal (Reference Figure 33-09)

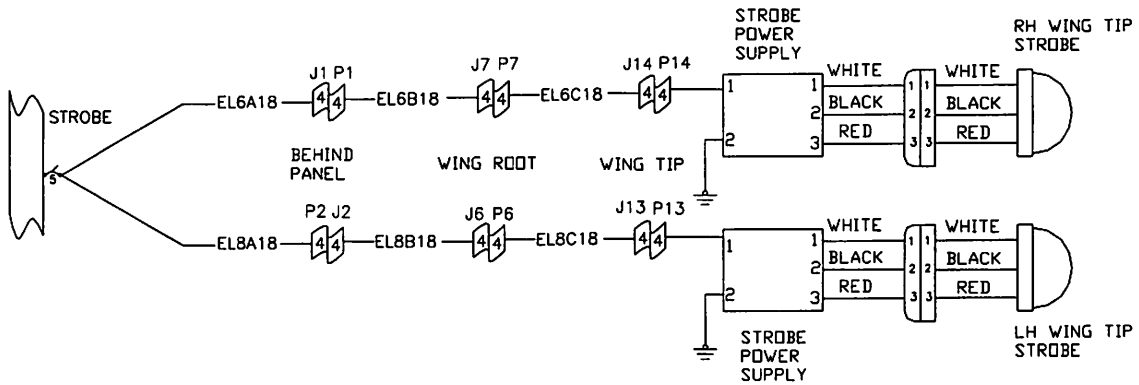
WARNING: REMOVE POWER FROM STROBE SYSTEM FOR FIVE MINUTES PRIOR TO SERVICING THE STROBE POWER SUPPLY.

- (1) Remove wing tip. (Refer to Chapter 57)
- (2) Disconnect wires at plugs (19).
- (3) Remove four screws (18) and remove power supply (17).

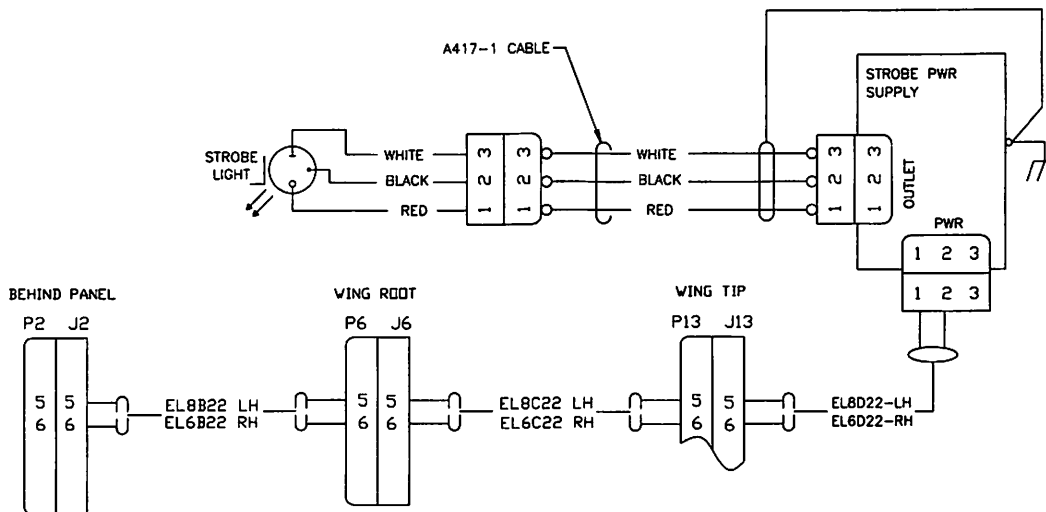
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D. Wing Strobe Light Power Supply installation (Reference Figure 33-09)

- (1) Locate power supply (17) on the outboard wing rib and attach using four screws (18).
- (2) Connect wires at plug (19).
- (3) Reinstall wing tip (3).
- (4) Perform operational check of strobe light.



**Wing Strobe Lights - Wiring Diagram S/N 10247 and Prior
Figure 33-10**



**Wing Strobe Lights - Wiring Diagram S/N 10248 and Subsequent
Figure 33-10A**

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EXTERIOR LIGHTS - MAINTENANCE PRACTICES

1. Exterior Light Replacement

A. Replacement of Landing Lights

- (1) Gain access to the landing lights by removing the screws, washers and plastic lens cover.
- (2) Remove the four spring loaded mounting screws.
- (3) Remove light and disconnect wiring connector.
- (4) Replace light by connecting wiring connector and installing the four spring loaded mounting screws.
- (5) Perform operational check and adjust light if necessary with the spring loaded mounting screws. (See Exterior Lights - operational check)

B. Tail Light Replacement

- (1) Remove the two screws that hold the lamp retainer to the tailcone.
- (2) Withdraw the retainer and lens.
- (3) Remove the lamp and replace as required.
- (4) Replace lens and retainer to the tailcone.
- (5) Perform operational check per this chapter.

C. Rudder Beacon Strobe Light Replacement

- (1) Remove attaching hardware and lift red lens cover from top of vertical stabilizer.
- (2) Remove two screws from rudder beacon flashing strobe light base.
- (3) Disconnect rudder beacon flashing strobe light wiring connector and feed wire and connector through hole in light mounting bracket with shield.
- (4) Install replacement rudder beacon flashing strobe light by feeding connector and wiring through hole in light mounting bracket with shield.
- (5) Connect rudder beacon flashing strobe light wiring connector and place light in its mounting position.
- (6) Align rudder beacon flashing strobe light base with mounting holes and secure with screws.
- (7) Place red plastic lens cover over rudder beacon flashing strobe light and secure with attaching hardware.

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- (8) Perform rudder beacon flashing strobe light operational check per this chapter.
- (9) Actuate the rudder from stop to stop and assure sufficient clearance (min. 0.100 inches) between rudder tip and vertical stabilizer.

2. Rudder Beacon Strobe Light Power Supply Removal/Installation

A. Rudder Beacon Strobe Light Power Supply Removal

WARNING: REMOVE POWER FOR 5 MINUTES BEFORE SERVICING SYSTEM.

- (1) Remove left and right tail inspection covers.
- (2) Disconnect two wiring connectors from power supply.
- (3) Remove four screws and washers attaching power supply to mounting bracket. Remove power supply.

B. Rudder Beacon Strobe Light Power Supply Installation

- (1) Place power supply on its bracket, place ground wire on one screw and install four screws and washers.
- (2) Connect two wiring connectors to power supply.
- (3) Install left and right tail inspection covers.
- (4) Perform Exterior Light Operational Check per this chapter.

LANDING LIGHT - MAINTENANCE PRACTICES

1. Landing Light Adjustment (See Figure 33-11)

NOTE: Before adjusting landing lights, ensure tires are properly inflated.

A. Light Adjustment

- (1) Completely fill both fuel tanks.
- (2) Ensure there is no baggage in the baggage compartment or rear seat area.
- (3) Choose a suitable location in a hanger or on a ramp, which will allow aircraft positioning in a level attitude, with the center of the nose wheel at 40 feet from a flat wall. Align the wing leading edges parallel to the wall so that the wing tips are an equal distance from the wall.
- (4) Project a line from the tail tie down through the center of the nose gear to the wall.
- (5) From the spot where the projected line meets the wall, measure 15 feet left along the bottom of the wall. From this spot measure up 42" and place a reference point mark at this point on the wall.

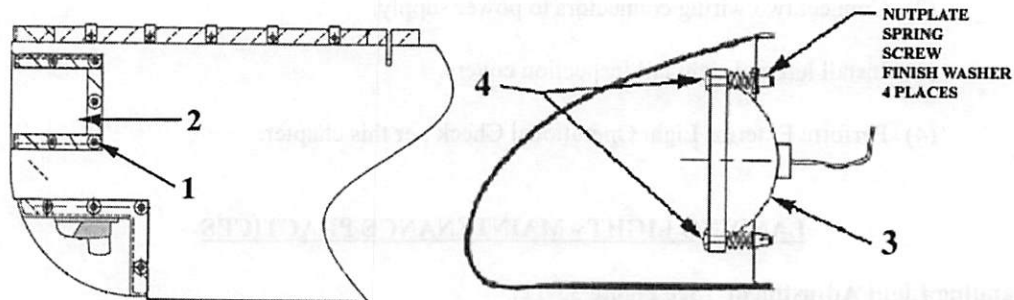
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- (6) Using the reference point mark as the upper outboard corner, draw a 2 ft. square on the wall.
- (7) Remove screws and washers (1) and remove the left landing light lens (2).
- (8) Turn on the Master switch and landing lights.
- (9) Aim the landing light (3), using the four adjustment/attach screws (4), so that the center of the beam falls within the square, as close to center as possible.
- (10) Turn off landing lights and master switch.

CAUTION: DO NOT OVER TIGHTEN LENS SCREWS.

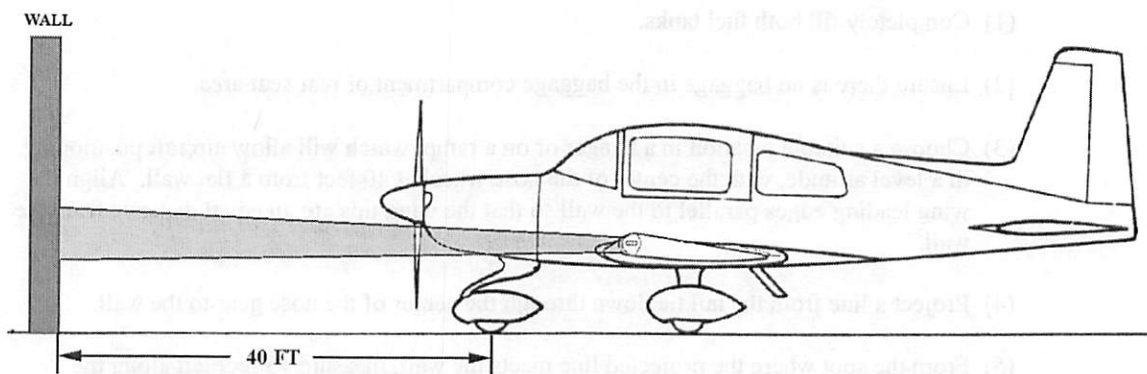
- (11) Reinstall landing light lens using screws and washers.

Repeat above procedure for the right landing light.

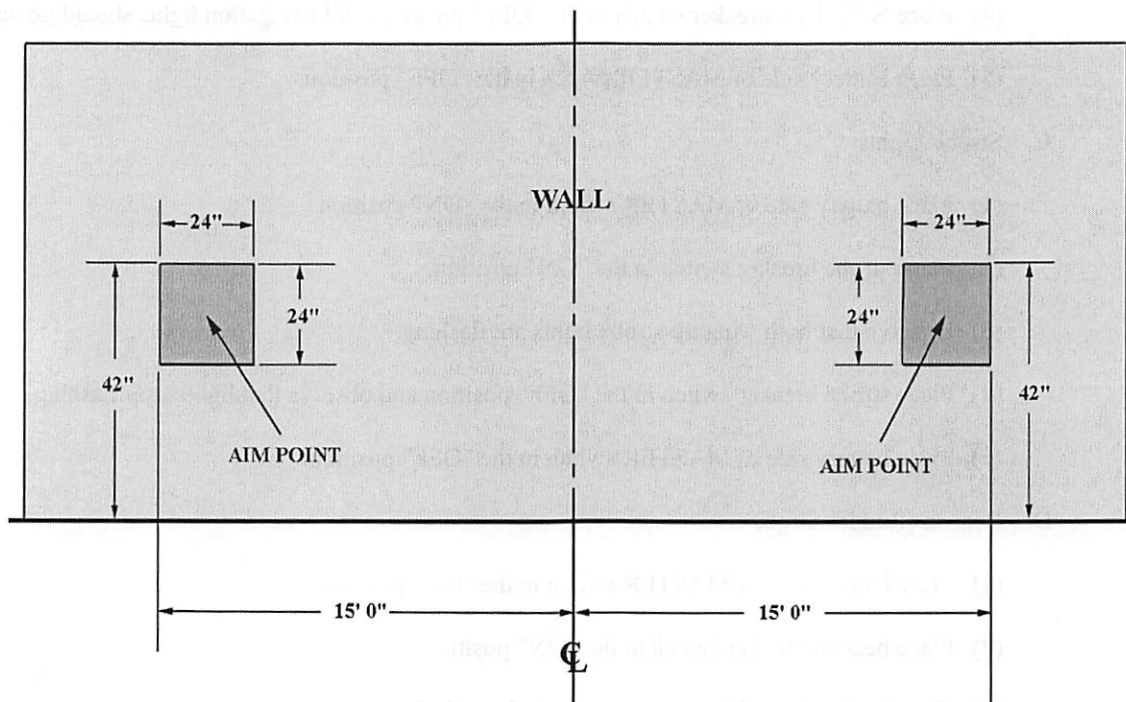


1. Screws and Washers
2. Landing Light Lens

3. Landing Light Assembly
4. Adjustment Screws



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Landing Light Adjustment
Figure 33-11

EXTERIOR LIGHT - OPERATIONAL CHECK

1. Operational Check of Landing, Navigation and Strobe Lights

A. Landing Lights

CAUTION: LANDING LIGHTS POSE A HEAVY DRAIN ON THE BATTERY IF LEFT ON FOR A PROLONGED PERIOD.

- (1) Place battery side of MASTER switch in the "ON" position.
- (2) Place landing light breaker switch in the "ON" position.
- (3) Both landing lights should illuminate.
- (4) Place landing light breaker switch in the "OFF" position. Lights should go out.
- (5) Place battery side of MASTER switch in the "OFF" position.

B. Navigation Lights

- (1) Place battery side of MASTER switch in the "ON" position.
- (2) Place NAV LTS breaker switch in the "ON" position.
- (3) The tailcone light and both wing tip lights should illuminate.

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- (4) Place NAV LTS breaker switch in the "OFF" position. All navigation lights should go out.
- (5) Place Battery side of MASTER switch in the "OFF" position.

C. Strobe Lights

- (1) Place battery side of MASTER switch in the "ON" position.
- (2) Place strobe breaker switch in the "ON" position.
- (3) Observe that both wing tip strobe lights are flashing.
- (4) Place strobe breaker switch in the "OFF" position and observe that lights stop flashing.
- (5) Place battery side of MASTER switch in the "OFF" position.

D. Beacon (Rudder Strobe)

- (1) Place battery side of MASTER switch in the "ON" position.
- (2) Place beacon breaker switch in the "ON" position.
- (3) Observe that the rudder beacon strobe light is flashing.
- (4) Place the beacon breaker switch in the off position and observe that the light stops flashing.
- (5) Place the battery side of MASTER switch in the "OFF" position.

Exterior Lights – Troubleshooting

Strobe Light System

TROUBLE	PROBABLE CAUSE	REMEDY
Both flash tubes fail to flash.	Defective switch.	Replace switch.
	Defective wiring.	Check wiring from buss to power Supply. (flasher power unit)
One flash tube fails to flash.	Defective flash tube.	Replace flash tube with a known serviceable flash tube (opposite wing). Replace defective flash tube.
	Shorted or open circuit to flash tube.	Check wiring from power supply (flasher power unit) to the flash tube.
	Defective power supply unit.	Replace power supply.

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CHAPTER 34

NAVIGATION

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NAVIGATION SYSTEMS - DESCRIPTION/OPERATION

1. General

Not all AG-5B aircraft will have identical navigational equipment installed. As new more effective systems become available, presently installed equipment may be replaced. The basic items that provide minimum requirements to comply with FAA regulations are available on all aircraft. More diverse navigational items may be installed as a customer requested option. It is the intent of this manual to present procedures and instructions adequate for minor inspection and flight line maintenance of navigation equipment that may be installed on the aircraft excluding optional items. Overhaul or shop maintenance of the navigation equipment must be performed in accordance with the individual equipment manufacturers' data.

Portions of the optional Garmin G1000 Integrated Cockpit System will be addressed in this chapter, due to required changes to various systems to accommodate its installation.

PITOT AND STATIC PRESSURE SYSTEMS - DESCRIPTION/OPERATION

1. General

The pitot and static pressure systems supply impact (pitot) and atmospheric (static) pressure to various instruments. Some of these instruments require static pressure only; others require both static and pitot pressure for operation. (See Figure 34-01) Both systems operate independently of each other.

The pitot and static systems consist of metal and plastic tubing that convey ram air pressure and atmospheric pressure to the airspeed indicator, vertical speed indicator, altimeter and on G1000 equipped aircraft, the GDC 74A Air Data Computer (ADC) located behind the PFD display.

Ram air pressure is picked up by the pitot tube located under the left wing tip. From the pitot tube a line runs through the wing and main spar into the cockpit and then to the airspeed indicator.

On G1000 equipped aircraft, the line from the pitot tube is split and is also connected to the GDC 74A Air Data Computer. (See Figure 34-01A)

CAUTION: TO PREVENT DAMAGE TO THE AIRSPEED INDICATOR, DO NOT INTRODUCE HIGH PRESSURE AIR INTO THE PITOT TUBE WITH THE LINE CONNECTED TO THE AIRSPEED INDICATOR OR THE G1000 ADC, IF INSTALLED.

At each scheduled inspection or if the airspeed indicator fails to operate properly the pitot line should be disconnected at the pitot tube, the airspeed indicator and the ADC (if installed) and blown out with compressed air in order to remove any accumulation of moisture.

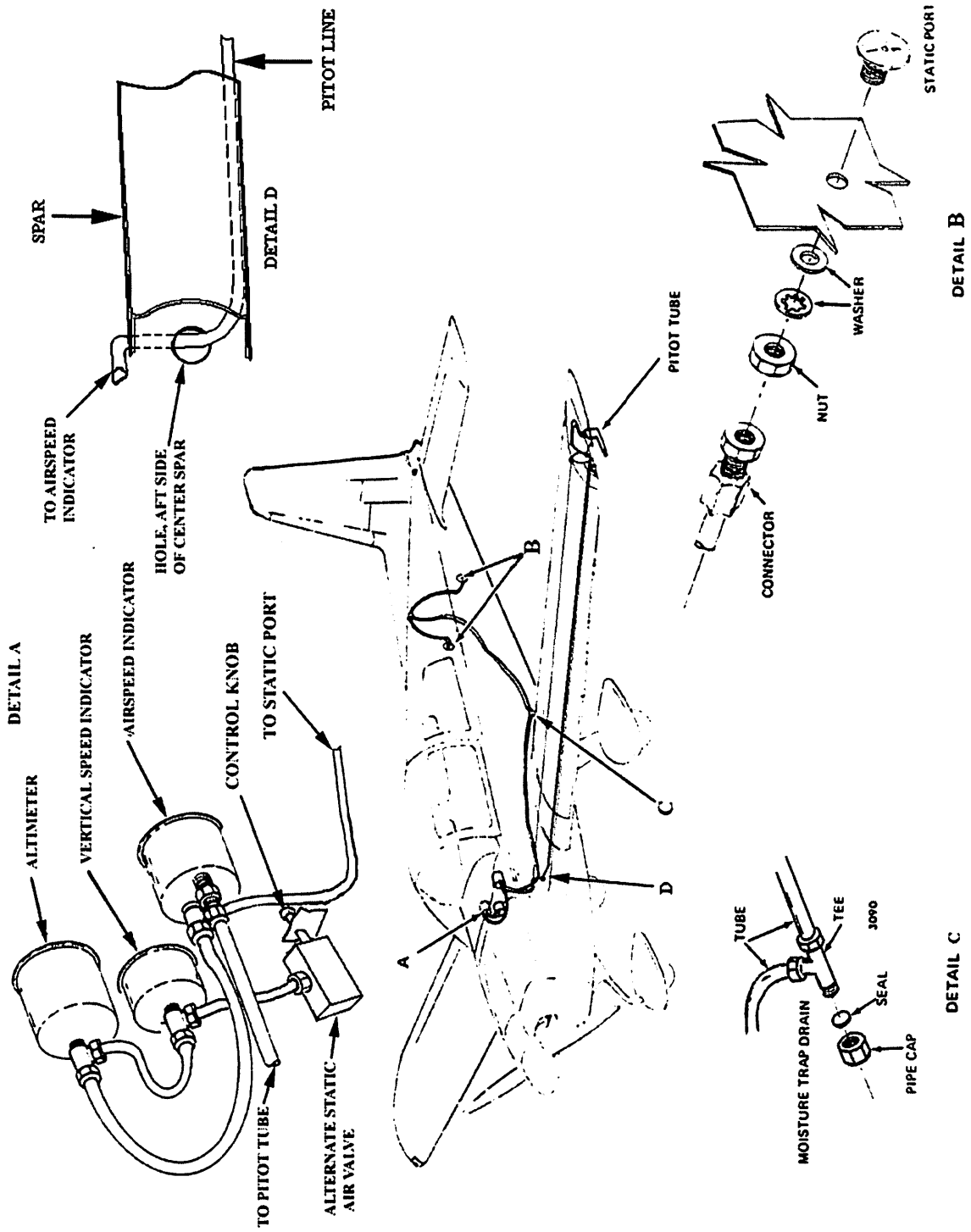
The static system, consisting of a static port on each side of the aft fuselage, conducts atmospheric pressure to the instruments. The line that runs from the ports to the instruments incorporates a moisture trap located behind the left rear seat upholstery side panel. It is recommended that the moisture trap drain be serviced at each static system test, or more often if fluctuations are observed in the instruments connected to the static system, or if moisture is noted inside the cover glass of the airspeed indicator.

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An alternate static air valve is located on the instrument panel. Each time the valve is placed in the alternate (open) position the valve functions as a drain for the static lines behind the panel. At a minimum this valve should be opened and closed at every 100 hour / annual inspection.

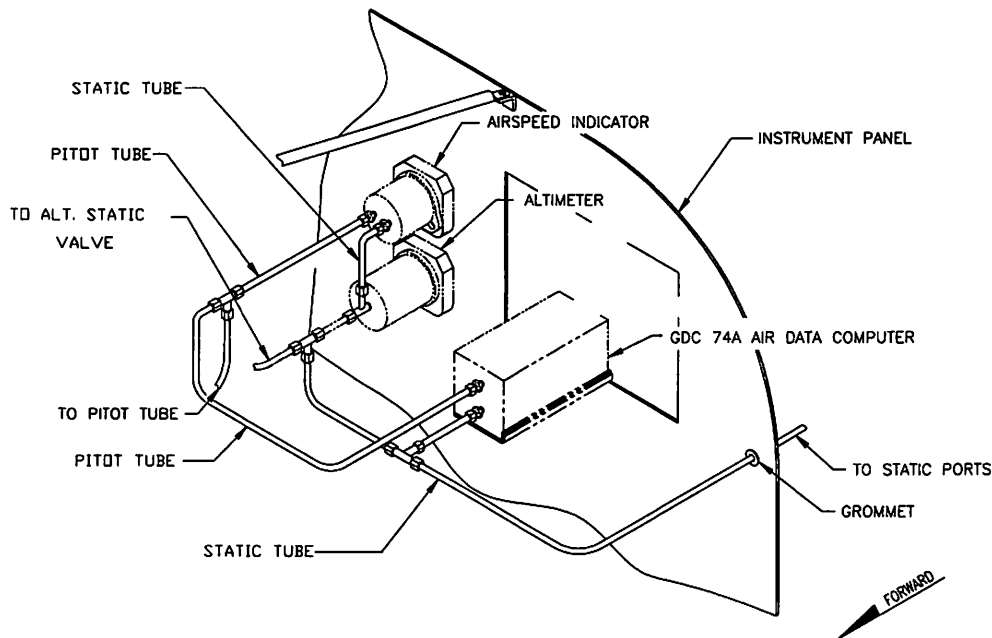
The pitot tube is equipped with an electrical heating element for icing protection. The breaker switch that controls the heating element is located to the left of the throttle quadrant. For complete details on the pitot heat system reference Chapter 30.

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Pitot and Static System
 Figure 34-01

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**Pitot and Static System, G1000
Figure 34-01A**

PITOT AND STATIC PRESSURE SYSTEMS - TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Airspeed indicator fails to indicate.	Static buttons blocked. Obstruction in pitot or static lines.	Check all lines and fittings for obstruction and clean as necessary.
	Water in static system.	Drain static system.
	Pitot line kinked or disconnected	Check all pitot lines and repair as required.
Airspeed indicator fluctuates or indicates incorrectly.	Leak in pitot or static systems.	Tighten all system connections until no leakage is evident.
	Defective instrument.	Replace instrument.
	Instrument leakage.	Test instrument individually and replace if necessary.
Altimeter fails to operate.	Clogged static lines.	Check all lines and fittings and clear lines as required.
	Defective instrument.	Replace instrument.
Altimeter fluctuates.	Instrument leakage.	Test instruments individually and replace if necessary.

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PITOT AND STATIC PRESSURE SYSTEMS – TROUBLESHOOTING (CONTINUED)

TROUBLE	PROBABLE CAUSE	REMEDY
Altimeter fluctuates (continued).	Defective instrument.	Replace instrument.
	Leak in static system.	Tighten all connections and test system until no leakage is evident.
Vertical speed indicator fails to operate, fluctuates or reads incorrectly.	Obstruction in static lines.	Remove, inspect and clean all static lines.
	Defective instrument.	Replace instrument.
	Instrument leakage.	Test instrument individually and replace if necessary.

PITOT AND STATIC PRESSURE SYSTEMS - MAINTENANCE PRACTICES

1. Removal/Installation of Pitot Tube (Reference Figure 34-02)

A. Remove Pitot Tube Assembly

- (1) Remove left wing tip to gain access to pitot tube attaching hardware.
- (2) Disconnect pitot tube air inlet line and wiring.
- (3) Remove hardware supporting pitot tube mount to wing spar and wing rib.
- (4) Remove pitot tube assembly.

B. Install Pitot Tube Assembly

- (1) Place pitot tube assembly in position and install attaching hardware.
- (2) Connect pitot tube air inlet line and wiring.
- (3) Perform pitot / static system checks and confirm proper operation of the pitot heat element. (Reference Chapter 30)
- (4) Replace wing tip.

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2. Pitot and Static Pressure System Leakage Test

A. Test the Pitot System

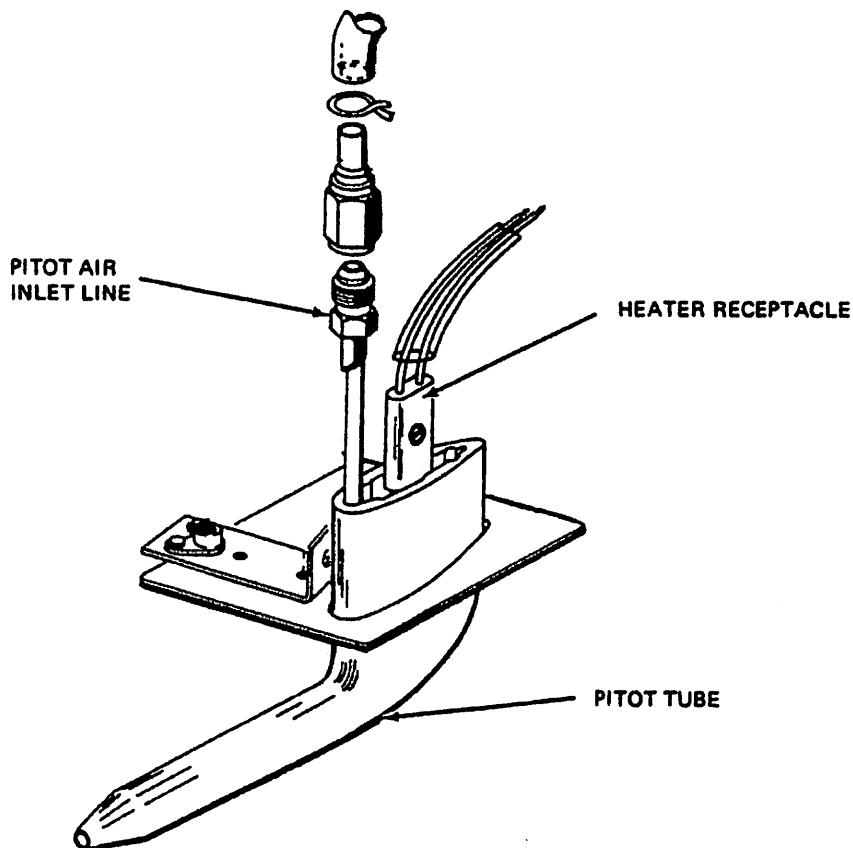
**CAUTION: TO PREVENT DAMAGE TO THE AIRSPEED INDICATOR
DO NOT APPLY SUCTION TO THE PITOT TUBE WITH THE
LINE CONNECTED TO THE AIRSPEED INDICATOR OR
THE G1000 AIR DATA COMPUTER, IF INSTALLED.**

Perform system check in accordance with 14 CFR Part 43

B. Test the Static System

**CAUTION: NEVER APPLY POSITIVE PRESSURE TO THE STATIC
SYSTEM UNLESS ALL INSTRUMENTS ARE
DISCONNECTED.**

Federal Aviation Regulations require that static systems and altimeters be checked every 24 months for IFR certification. The most common method of testing static systems is covered in FAR 43, Appendix E, "Altimeter System Test and Inspection". Additional information may be found in FAA Advisory Circular No. AC 43-203

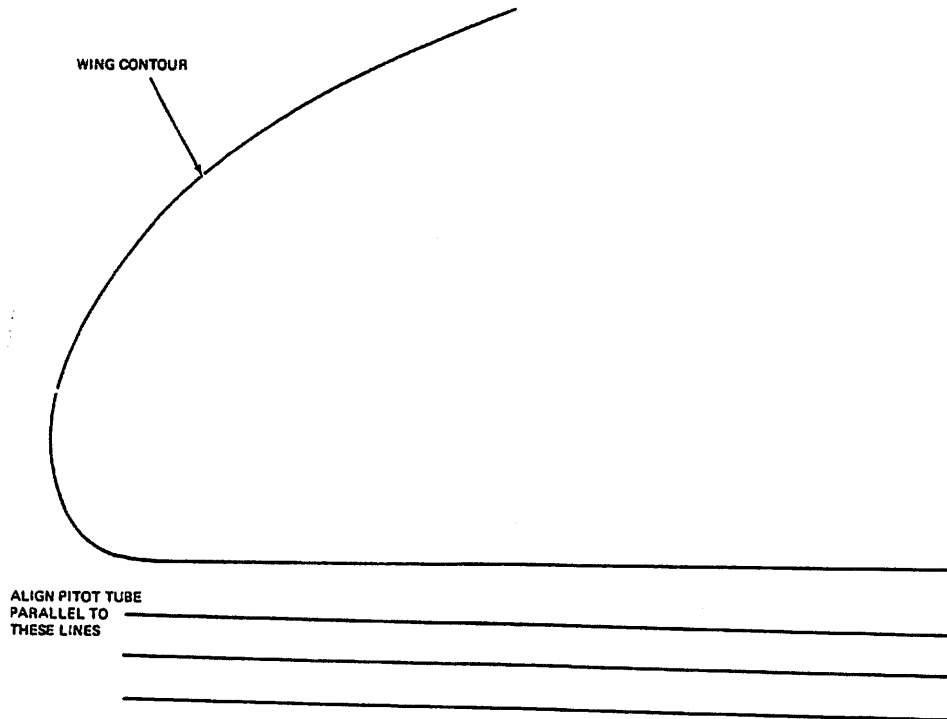


**Pitot Tube Installation
Figure 34-02**

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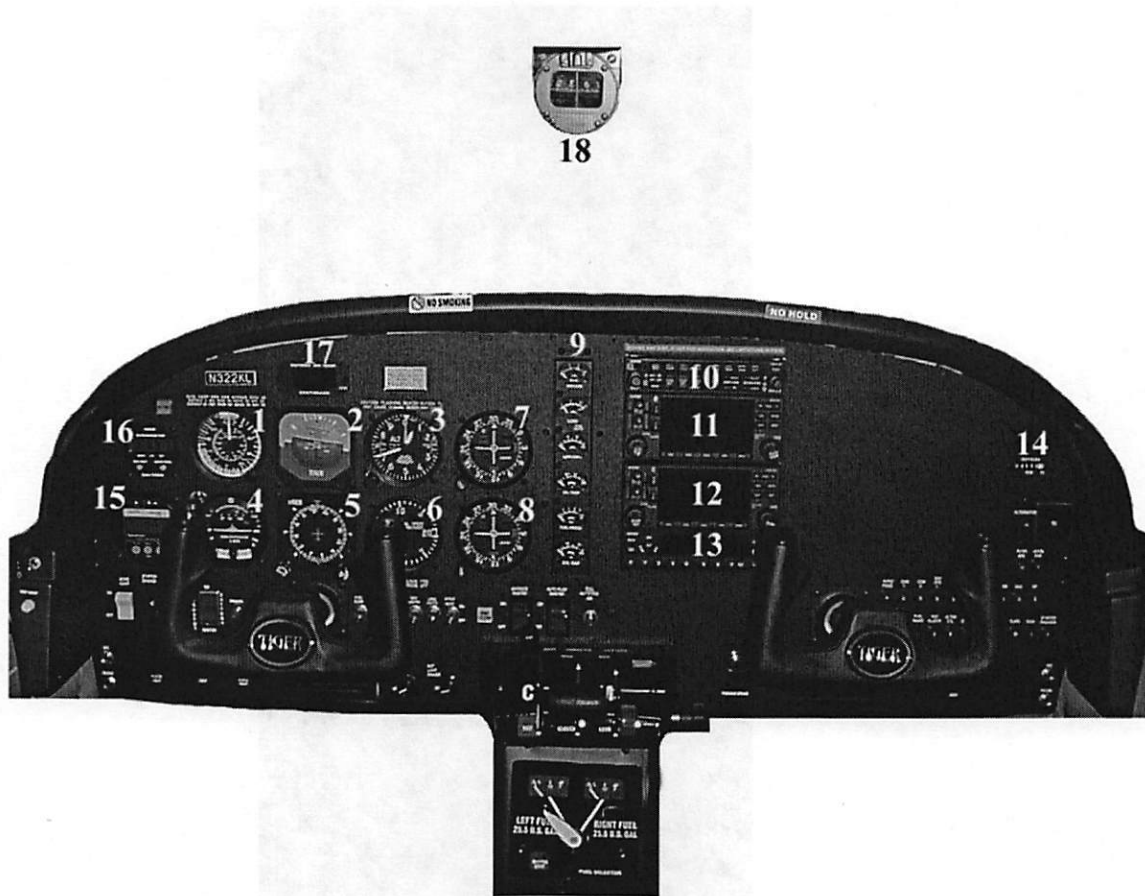
3. Pitot Tube Alignment

Figure 34-03 shows an outline of the wing contour and a series of parallel lines. To check the proper alignment of the pitot tube, make a template conforming to the lines shown in Figure 34-03. When the pitot tube is properly aligned, it will parallel one of the lines.



**Pitot Tube Alignment Template
Figure 34-03**

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- | | | | |
|----|--|-----|-------------------------|
| 1. | Airspeed | 10. | Audio Panel |
| 2. | Attitude Gyro | 11. | Nav/Com/GPS #1 |
| 3. | Altimeter | 12. | Nav/Com/GPS #2 |
| 4. | Turn Coordinator / Autopilot Control | 13. | Transponder |
| 5. | Directional Gyro | 14. | Hour Meter |
| 6. | Vertical Speed indicator | 15. | Tachometer |
| 7. | Course Deviation Indicator #1 | 16. | Clock |
| 8. | Course Deviation Indicator #2
(OAT) | 17. | Outside Air Temperature |
| 9. | Engine Instruments (Gauge Cluster) | 18. | Magnetic Compass |

Instrument Panel
Figure 34-04
(Sheet 1 of 2)

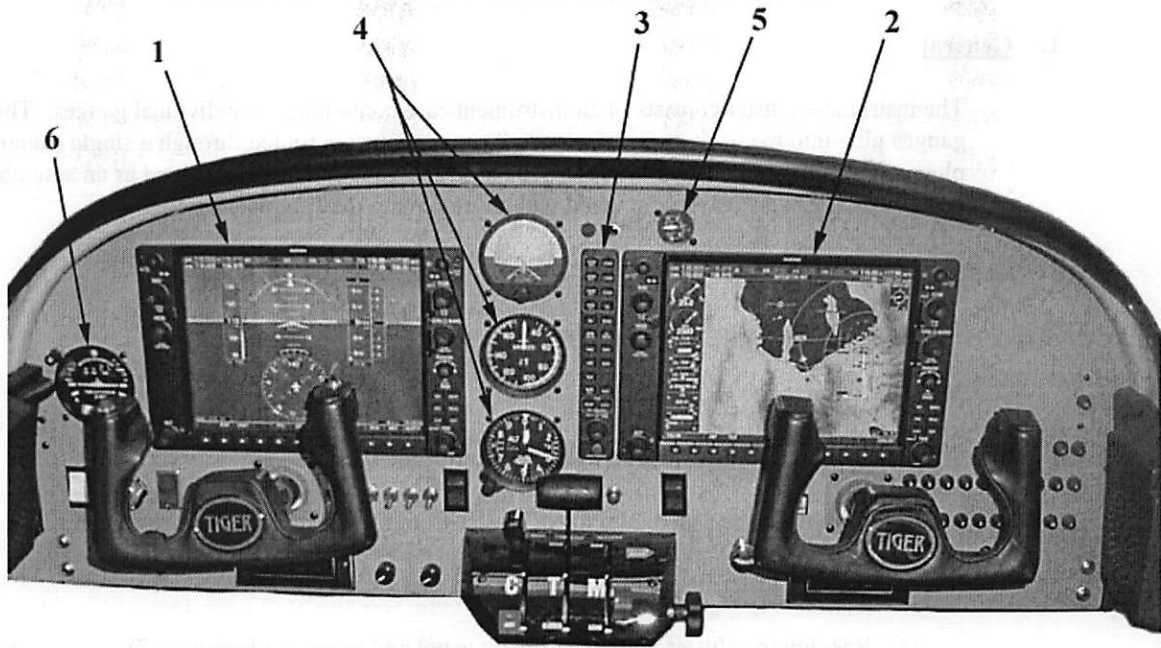
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- | | |
|--------------------|-----------------------------------|
| 1. Vacuum Gauge | 5. Fuel Pressure |
| 2. Load meter | 6. Cylinder Head Temperature |
| 3. Oil Pressure | 7. Cluster mounting screws (8 ea) |
| 4. Oil Temperature | 8. Gauge Securing Screw |

Instrument Panel
Engine Instrument Cluster
Figure 34-04
(Sheet 2 of 2)

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**Optional G1000 Instrument Panel
Figure 34-04A**

1. PFD
2. MFD
3. Audio Panel
4. Back-Up Instruments
5. Vacuum Gauge
6. Auto Pilot

NOTE: Items that were not changed for the G1000 are shown on Figure 34-01.

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INSTRUMENT CLUSTER – DESCRIPTION/OPERATION

1. General

The instrument cluster consists of an instrument case containing six individual gauges. The gauges plug into the back of the case and all connections are routed through a single cannon plug connector on the rear of the case. The case and gauges may be removed as an assembly or individual gauges may be removed without removing the complete assembly.

1. Removal/Installation (Reference Figure 34-04)

A. Instrument Cluster Removal

- (1) Remove the glare shield.
- (2) Disconnect the cannon plug on the rear of the cluster case.
- (3) Remove screws (7) and remove cluster from the backside of the instrument panel.

B. Instrument Cluster Installation

- (1) Position the cluster in the instrument panel and secure with screws (7).
- (2) Connect the cannon plug to the back of the instrument cluster.
- (3) Re-install the glare shield.

2. Gauge Removal/Installation (Reference Figure 34-04)

A. Gauge Removal

- (1) Loosen screw (8) until it turns freely (the screw will not come out of the gauge).

**CAUTION: TO AVOID DAMAGING THE GAUGE *DO NOT* ATTEMPT
TO PRY THE GAUGE FROM THE CLUSTER**

- (2) Grasp the head of the screw and gently pull the gauge from the cluster.

B. Gauge Installation

- (1) Align the gauge in the proper instrument cluster slot and press the gauge in using finger pressure.
- (2) Tighten screw (8) to secure the gauge.

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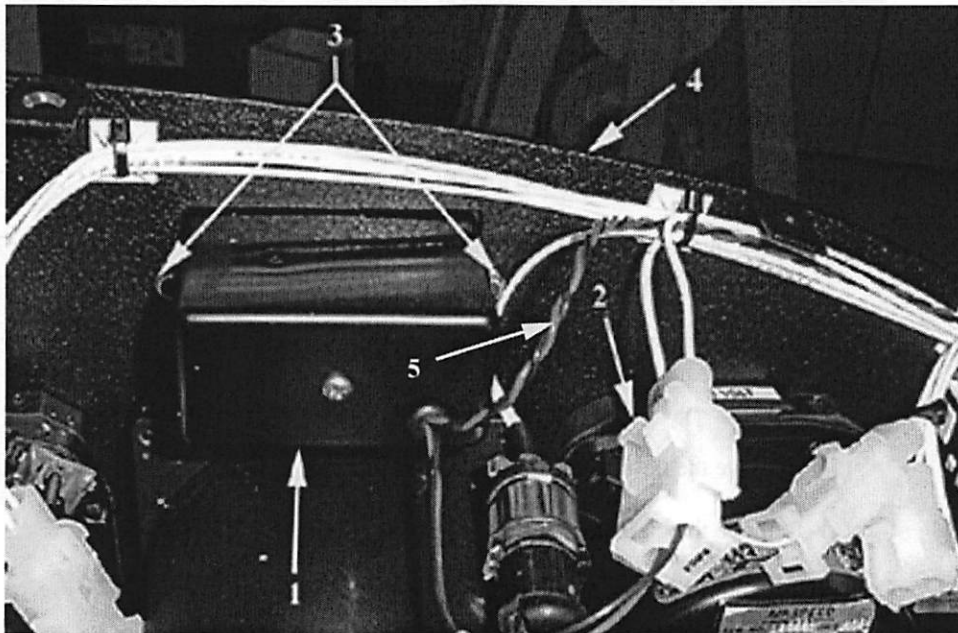
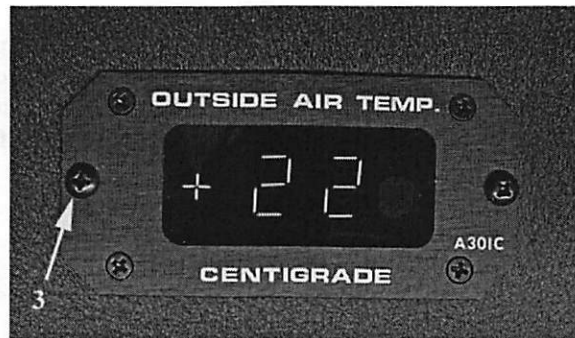
OUTSIDE AIR TEMPERATURE GAUGE - DESCRIPTION/OPERATION

1. **General**

The Outside Air Temperature (OAT) gauge is mounted above the Attitude Gyro in the instrument panel. The OAT Probe is mounted in the bottom side of the left wing root. The electrical resistance of the probe will change with outside temperature changes. The change in resistance alters the current flow to the OAT Indicator and provides a range of temperature readings from - 40°C to +100°C.

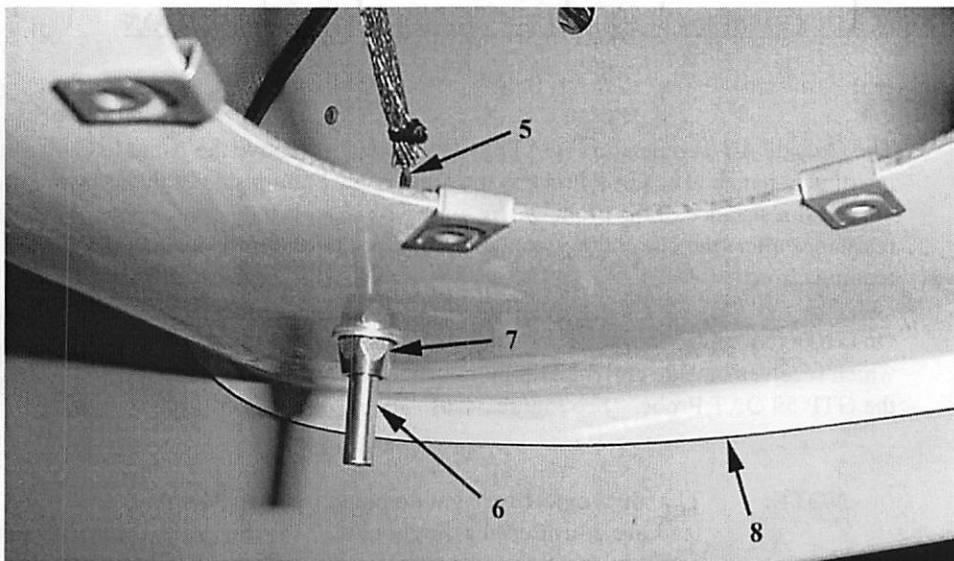
On G1000 equipped aircraft, OAT information is displayed on the PDF and/or the MFD, which receives outside air temperature information from the GDC 74 Air Data Computer and the GTP 59 OAT Probe. (See Figure 34-6)

NOTE: The air temperature gauge panel mounted display, probe and probe lead are considered a single unit. Severing or splicing of leads (5) will result in erroneous temperature readings.



Outside Air Temperature Gauge
Figure 34-05
(Sheet 1 of 2)

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- | | | | |
|----|-------------------------------|----|------------------------|
| 1. | Outside Air Temperature Gauge | 5. | Lead Wire, Probe |
| 2. | Power Connector | 6. | Probe |
| 3. | Screw, Washer and Nut | 7. | Nut |
| 4. | Instrument Panel | 8. | Left Wing Root Fairing |

Outside Air Temperature Gauge
Figure 34-05
(Sheet 2 of 2)

OUTSIDE AIR TEMPERATURE GAUGE – MAINTENANCE PRACTICES

1. **Removal/Installation** (Reference Figure 34-05)
 - A. Removal of the OAT gauge and probe
 - (1) Remove access cover from lower left wing root.
 - (2) Reach through the access opening and hold probe (6) while removing nut (7) from the outside, and push the probe through to the inside of fairing (8).
 - (3) Remove the forward two pilot side interior panels.
 - (4) Locate lead (5) and pull the probe through the fuselage side panel.
 - (5) Remove the tie-raps that secure lead (5) to the left brake line and instrument panel.
 - (6) Remove the glair shield.
 - (7) Disconnect power connector (2).
 - (8) Remove two nuts, washers, and screws (3) and withdraw gauge (1), lead (5), and probe (6) through the front of the instrument panel.

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B. Installation of the OAT gauge and probe

- (1) Insert probe (6) and lead (5) through the instrument panel.
- (2) Position OAT gauge (1) in the instrument panel and secure using screws, nuts and washers (3).
- (3) Connect power connector (2).
- (4) Secure lead (5) along instrument panel and down the left brake line using tie-wraps.

**CAUTION: PROTECT THE LEAD FROM CHAFING ON THE SIDE
PANEL SKINS WITH A PROTECTIVE WRAP.**

- (5) Insert probe (6) through the left fuselage side panel and into the left wing root fairing (8).

NOTE: On G1000 equipped aircraft, the OAT probe has a ground terminal positioned between the Probe and the inside wing root fairing. This ground terminal must be installed.

- (6) Insert probe (6) through the hole in the lower forward wing root fairing and secure with nut (7).
- (7) Install forward wing root fairing access cover.
- (8) Install the glare shield.
- (9) Turn on the battery switch and check the operation of the OAT gauge.

VERTICAL SPEED INDICATOR - DESCRIPTION/OPERATION

1. General

The vertical speed indicator (Figure 34-04), located on the instrument panel, measures the rate of change in static pressure when the aircraft is climbing or descending. By means of a pointer and dial this instrument will indicate the rate of ascent or descent of the aircraft in feet per minute. Due to the slight lag of the instrument, the aircraft will be climbing or descending before the instrument starts to read and the instrument will continue to read after the aircraft has assumed level flight. The lag of the instrument is normal and should not be considered a malfunction.

On G1000 equipped aircraft, vertical speed information is displayed on the PDF and/or the MFD, which receives vertical speed information from the GDC 74 Air Data Computer. (See Figure 34-06)

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VERTICAL SPEED INDICATOR - TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Pointer fails to respond.	Obstruction in static line.	Disconnect all instruments connected to the static line. Clear line. Remove cap at low place in static line (under rear seat) and drain. Open and close the alternate static valve.
Pointer oscillates.	Leaks in static lines.	Disconnect all instruments connected to the static line. Check individual instruments for leaks. Reconnect instruments to static line and test installation for leaks.
	Defective mechanism.	Replace instrument.
Rate of climb changes when aircraft is banked.	Water in static line.	Remove cap at low place in static line and drain line.
Pointer has to be set before every flight.	Temperature compensator inoperative.	Replace instrument.
Pointer cannot be reset to zero.	Diaphragm distorted.	Replace instrument.
Instrument reads very low during climb or descent.	Instrument case broken or leaking.	Replace instrument.

VERTICAL SPEED INDICATOR - MAINTENANCE PRACTICES

1. Removal/Installation

A. Remove Vertical Speed Indicator

- (1) Remove screws securing glareshield to instrument panel.
- (2) Raise deck assembly and tape to windshield or remove from aircraft by disconnecting defroster vent and hoses.
- (3) Locate vertical speed indicator on instrument panel and loosen clamp to disconnect tubing. Disconnect electrical wiring (lighted gauge).
- (4) Remove three screws and nuts mounting vertical speed indicator to instrument panel and remove indicator.

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B. Install Vertical Speed Indicator

- (1) Position vertical speed indicator in place on instrument panel and install three screws and nuts securing vertical speed indicator to instrument panel.
- (2) Connect tubing to back of indicator. Secure by tightening fittings. Connect electrical wiring.
- (3) Position glareshield in place and install screws securing deck assembly to instrument panel.

AIRSPEED INDICATOR - DESCRIPTION/OPERATION

1. General

The airspeed indicator (Figure 34-04) located on the instrument panel provides a means of indicating the speed of the aircraft. The airspeed indication is derived from the differential pressure between pitot air pressure and static air pressure. This instrument has a diaphragm vented to the pitot air source and its case vented to the static air system. As the aircraft increases speed, the pitot air pressure increases, causing the diaphragm to expand. A mechanical linkage picks up this motion and moves the instrument pointer to the indicated speed. The instrument dial is calibrated in knots and also has the necessary operating range markings for safe operation of the aircraft. The instrument is a true airspeed indicator that is adjusted by means of a knob whereby the OAT is set as the conditions change and this in turn indicates the true airspeed of the aircraft in a separate window of the airspeed indicator.

On G1000 equipped aircraft, the airspeed indicator is used for back-up airspeed information. Primary airspeed information is displayed on the PDF and/or the MFD, which receives airspeed information from the GDC 74 Air Data Computer. (See Figure 34-06)

AIRSPEED INDICATOR - TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Airspeed indicator pointer does not indicate properly.	Leak in instrument case or pitot lines.	Locate and seal leak.
Pointer oscillates.	Defective mechanism.	Replace instrument.
Indicator reads high.	Pointer not on zero.	Replace instrument.
	Leaking static system.	Locate and seal leak.
Indicator reads low.	Pointer not on zero.	Replace instrument.
	Leaking static system.	Locate and seal leak.
	Pitot tube not aligned correctly.	Realign pitot tube per this chapter.

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AIRPEED INDICATOR – TROUBLESHOOTING (CONTINUED)

TROUBLE	PROBABLE CAUSE	REMEDY
Airspeed changes as aircraft is banked.	Water in pitot line.	Remove pitot line from altimeter and clear pitot line from cockpit to pitot tube.
True airspeed can not be adjusted.	Internal failure of instrument.	Replace instrument.

AIRPEED INDICATOR - MAINTENANCE PRACTICES (CONTINUED)

1. Removal/Installation

A. Remove Airspeed Indicator

- (1) Remove screws securing deck assembly to instrument panel.
- (2) Raise deck assembly and tape to windshield.
- (3) Locate the indicator on the instrument panel, loosen the fittings and disconnect the tubing and electrical connections from back of the indicator.
- (4) Remove four mounting screws securing the airspeed indicator to the instrument panel and remove the indicator.

B. Install Airspeed Indicator

- (1) Position the indicator in place on the instrument panel and install four screws securing the indicator to the instrument panel.
- (2) Connect tubing and electrical connections on back of indicator.
- (3) Connect wiring for internal lighting.
- (4) Place deck assembly in position and install screws securing deck assembly to instrument panel.
- (5) Perform leak check.

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ALTIMETER - DESCRIPTION/OPERATION

1. General

The altimeter (Figure 34-04), located on the instrument panel indicates pressure altitude in feet above sea level. The indicator has three pointers and a dial scale; the long pointer is read in hundreds of feet, the middle pointer in thousands of feet and the shorter pointer in ten thousands of feet. Barometric pressure windows are located on the right (indicate in. Hg) and left (indicated in millibars) sides of the indicator dial. The barometric pressure indication is set with the knob located on the lower left corner of the instrument. The altimeter consists of a sealed diaphragm that is connected to the pointers through a mechanical linkage. The instrument case is vented to the static air system, and as static air pressure changes the diaphragm changes causing the pointers to move through the mechanical linkage.

On G1000 equipped aircraft, the altimeter is used for back-up altitude information. Primary altitude information is displayed on the PDF and/or the MFD, which receives altitude information from the GDC 74 Air Data Computer. (See Figure 34-06)

ALTIMETER - TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Excessive scale error.	Improper calibration adjustment.	Replace / repair instrument.
Excessive pointer oscillation.	Defective mechanism.	Replace instrument.
High or low reading.	Improper venting.	Eliminate leak in static pressure system.
Setting knob is hard to turn.	Incorrect or lack of lubrication.	Replace / repair instrument.
Inner reference marker fails to move when setting knob is rotated.	Out of engagement.	Replace instrument.
Setting knob set screw loose or missing.	Not tight when altimeter was reset.	Tighten instrument screw, if loose. Replace if missing.
Cracked or loose cover glass.	Case gasket hardened.	Replace instrument.
Dull or discolored markings.	Age deterioration.	Replace markings.
Barometric scale and reference markers out of synchronism.	Slippage of mating parts.	Replace instrument.
Barometric scale and reference markers out of synchronism with pointers. (millibars and/or Hg)	Drive in mechanism.	Reset pointers, per AC43.13-1
Altimeter sticks at altitude or does not change with change of altitude.	Water or restriction in static line.	Remove static lines from all instruments, and clear line from cockpit to static ports.

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ALTIMETER – TROUBLESHOOTING (CONTINUED)

TROUBLE	PROBABLE CAUSE	REMEDY
Altimeter changes reading as aircraft is banked.	Water in static line.	Remove drain cap from static line and drain water.
Altimeter requires resetting frequently.	Temperature compensator inoperative.	Replace instrument.

ALTIMETER - MAINTENANCE PRACTICES

1. Removal/Installation

A. Remove Altimeter

- (1) Remove screws securing deck assembly to instrument panel.
- (2) Raise deck assembly and tape to windshield.
- (3) Locate altimeter on instrument panel and loosen fittings to disconnect tubing from tee connection on back of instrument.
- (4) Disconnect wiring for internal lighting.
- (5) Remove three screws securing altimeter to instrument panel and remove altimeter.

B. Install Altimeter

- (1) Position altimeter in place on instrument panel and install three mounting screws securing altimeter to instrument panel.
- (2) Connect tubing to tee connection on back of altimeter.
- (3) Connect wiring for internal lighting.
- (4) Place deck assembly in position and install screws securing deck assembly to instrument panel.
- (5) Perform leak check.

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DIRECTIONAL GYRO - DESCRIPTION/OPERATION

1. General

The directional gyro (Figure 34-04) located on the instrument panel is a flight instrument incorporating an air driven gyro stabilized in the vertical plane. This instrument operates off the vacuum system (See Chapter 37). The gyro is rotated at high speed by lowering the pressure in the airtight case and simultaneously allowing atmospheric air pressure to enter the instrument against the gyro buckets. Due to gyroscopic inertia, the spin axis continues to point in the same direction even though the aircraft yaws to the right or left. This relative motion between the gyro and the instrument case is shown on the instrument dial that is similar to a compass card. The dial, when set to agree with the aircraft magnetic compass, provides a positive indication free from swing and turning error. The gyro should only be checked to the heading on which it was first set. Due to internal friction, spin axis error, air turbulence and airflow, the gyro should be set at least every 15 minutes for accurate operation.

On G1000 equipped aircraft, directional information is displayed on the PDF and/or the MFD and is controlled by the GRS 77 Attitude Heading and Reference System (AHRS). The AHRS obtains directional information from the GMU 44 Magnetometer located in the right wing. (See Figure 34-06) The Magnetic Compass is used for directional information in the event of AHRS malfunction.

DIRECTIONAL GYRO – TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Excess drift in either direction.	Setting error.	Reset gyro.
	Defective instrument.	Replace instrument.
	High or low vacuum. If vacuum is not correct check for the following:	
	a. Relief valve improperly adjusted.	a. Adjust.
	b. Incorrect gauge reading.	b. Replace gauge.
	c. Pump failure.	c. Repair or replace.
	d. Vacuum line kinked or leaking.	d. Check and repair. (Check for collapsed inner wall of hose.)
	e. Dirty filters.	e. Replace filters.
Dial spins during turn.	Limits (55° bank) of gimbals has been exceeded.	Gyro will self correct in level flight. (non-caging gyro)
Dial spins continuously.	Defective mechanism.	Replace instrument.

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DIRECTIONAL GYRO - MAINTENANCE PRACTICES

1. Removal/Installation

A. Remove Directional Gyro

- (1) Remove screws securing deck assembly to instrument panel.
- (2) Raise deck assembly and tape to windshield.
- (3) Disconnect lines from fittings on back of gyro.
- (4) Disconnect electrical connector from back of gyro on aircraft equipped with autopilot.
- (5) Remove reset knob(s). (two knobs if aircraft is equipped with autopilot)
- (6) Remove three mounting screws and slide gyro backward out of instrument panel.

B. Install Directional Gyro

- (1) Position gyro in place on instrument panel and install three mounting screws.
- (2) Install reset knob(s) (two knobs if aircraft is equipped with autopilot)
- (3) Connect electrical connector to back of gyro.
- (4) Connect lines to fittings on back of gyro.
- (5) Position deck assembly in place and install screws securing deck assembly to instrument panel.

ATTITUDE GYRO - DESCRIPTION/OPERATION

1. General

The attitude gyro (Figure 34-04) located on the instrument panel is essentially an air driven gyroscope rotating in a horizontal plane and is operated by the same principle as the directional gyro. Due to the gyroscope inertia, the spin axis continues to point in the vertical direction, providing a constant visual reference to the attitude of the aircraft relative to pitch and roll axis. A bar across the face of the indicator represents the horizon and aligning the miniature aircraft to the horizon bar simulates the alignment of the aircraft to the actual horizon. Any deviation simulates the deviation of the aircraft from the true horizon. The attitude gyro is marked for different degrees of bank.

On G1000 equipped aircraft, a vacuum driven attitude indicator is used for back-up attitude information. Primary attitude information is displayed on the PDF and/or the MFD and is controlled by the GRS 77 Attitude Heading and Reference System (AHRS). The AHRS obtains attitude information from the GMU 44 Magnetometer located in the right wing. (See Figure 34-06)

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ATTITUDE GYRO - TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Bar fails to respond.	Insufficient vacuum.	Check pump and tubing.
	Filters dirty.	Replace filter.
Bar does not settle.	Insufficient vacuum.	Check pump and tubing. Adjust valve.
	Incorrect instrument.	Check part number.
	Defective instrument.	Replace.
Bar oscillates or shimmies continuously.	Instrument loose in panel.	Tighten mounting screws.
	Vacuum too high.	Adjust valve.
	Defective mechanism.	Replace instrument.
Instrument does not indicate level flight.	Aircraft out of trim.	Trim aircraft.
	Instrument not adjusted.	Adjust instrument.
	Instrument not level in panel.	Loosen screws and level instrument.
Instrument tumbles in flight.	Low vacuum.	Reset regulator.
	Dirty filters.	Replace filters.
	Line to filter restricted.	Replace line.
	Plug missing or loose in instrument.	Replace or tighten plug.

ATTITUDE GYRO - MAINTENANCE PRACTICES

1. Removal/Installation

A. Remove Attitude Gyro

- (1) Remove screws securing deck assembly to instrument panel.
- (2) Raise deck assembly and tape to windshield.
- (3) Loosen clamps and disconnect lines from gyro.
- (4) Disconnect electrical plug from gyro.
- (5) Remove the four mounting screws that secure gyro to instrument panel and remove gyro.

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B. Install Attitude Gyro

- (1) Position attitude gyro in place on instrument panel and install four mounting screws.
- (2) Connect electrical plug to gyro.
- (3) Connect lines and install clamps in place at back of gyro.
- (4) Position deck assembly in place and install screws securing deck assembly to instrument panel.

TURN COORDINATOR - DESCRIPTION/OPERATION

1. General

The turn coordinator, is actually two instruments. The electric powered gyro portion shows the aircraft's rate of turn, how fast it's changing direction. A ball in a tube called an "inclinometer" or a "slip/skid indicator" shows the quality of the turn, whether the turn is coordinated or not.

The gyro in the coordinator is usually mounted at a 30-degree angle. When the aircraft turns, forces cause the gyro to precess. The rate of precession makes a miniature airplane on the face of the instrument bank left or right. The faster the turn, the greater the precession, and the steeper the bank of the miniature airplane.

When the wings of the miniature airplane align with the small lines next to the 'L' and 'R' the aircraft is making a standard rate turn, which is three degrees per second and the aircraft will complete a 360 degree turn in two minutes.

The black ball in the slip/skid indicator stays between the two vertical reference lines when the forces in a turn are balanced and the aircraft is in coordinated flight. If the ball drops toward the inside of the turn, the aircraft is slipping and if the ball drops toward the outside of the turn the aircraft is skidding.

On G1000 equipped aircraft, slip/skid information is displayed on the PDF and/or the MFD and is controlled by the GRS 77 Attitude Heading and Reference System (AHRS). (See Figure 34-06)

TURN COORDINATOR - TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Pointer fails to respond.	Foreign matter lodged in instrument.	Replace instrument.
	Master switch is "OFF".	Place master switch "ON".
	Tripped circuit breaker.	Reset breaker.
Incorrect sensitivity.	Out of calibration.	Replace / repair instrument.
	Aircraft not in coordinated turn.	Center ball in turn.
Ball sticky.	Flat spot on ball.	Replace instrument.
Ball not in center when aircraft is correctly trimmed.	Instrument not level in panel.	Level instrument.

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TURN COORDINATOR - MAINTENANCE PRACTICES

1. Removal/Installation

A. Remove Turn Coordinator

- (1) Remove screws securing deck assembly to instrument panel.
- (2) Raise deck assembly and tape to windshield.
- (3) Disconnect electrical plug from indicator.
- (4) Remove the four mounting screws and nuts that secure the indicator to the instrument panel and remove the indicator.

B. Install Turn Coordinator

- (1) Position the coordinator in place on the instrument panel and install the four mounting screws and nuts.
- (2) Connect electrical lead to the rear of the indicator.
- (3) Position the deck assembly in place and install the screws securing the deck assembly to the instrument panel.

MAGNETIC COMPASS - DESCRIPTION/OPERATION

1. General

The magnetic compass (Figure 34-04), located at the top center of the windshield frame is the liquid-filled, compensating type, incorporating two adjustable magnets. No maintenance is required for the magnetic compass except to calibrate it on a compass rose. Adjustments may be made to the instrument by the two screws located on the front face using a screwdriver made of non-ferrous material i.e. brass, aluminum, or non-magnetic stainless steel. The compass correction card is located in the cardholder mounted on the instrument.

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MAGNETIC COMPASS - TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Excessive card error.	Compass not properly compensated.	Compensate the compass.
	External magnetic interference.	Locate and eliminate interference, if possible.
Excessive card oscillation.	Insufficient liquid.	Replace instrument.
Card sluggish.	Weak card magnet.	Replace instrument.
	Excessive pivot friction or broken jewel.	Replace instrument.
Liquid leakage.	Loose bezel screws.	Replace instrument.
	Broken cover glass.	Replace instrument.
	Sealing gasket leaking.	Replace instrument.
Markings discolored.	Age deterioration.	Replace instrument.
Defective light.	Lamp burned out or circuit broken.	Replace lamp confirm circuit continuity.
Card sticks.	Altitude compensating diaphragm collapsed.	Replace instrument.
Card fails to move when compensating screws are turned.	Turning gears for compensating magnets are stripped.	Replace instrument.

MAGNETIC COMPASS - MAINTENANCE PRACTICES

1. Removal/Installation

A. Remove Magnetic Compass

- (1) Remove two mounting screws and nuts.
- (2) Disconnect electrical lead and remove compass.

B. Install Magnetic Compass

- (1) Connect electrical lead to magnetic compass.
- (2) Position magnetic compass in place and install mounting screws and nuts.
- (3) Calibrate compass and complete compass correction card.

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AVIONICS - DESCRIPTION/OPERATION

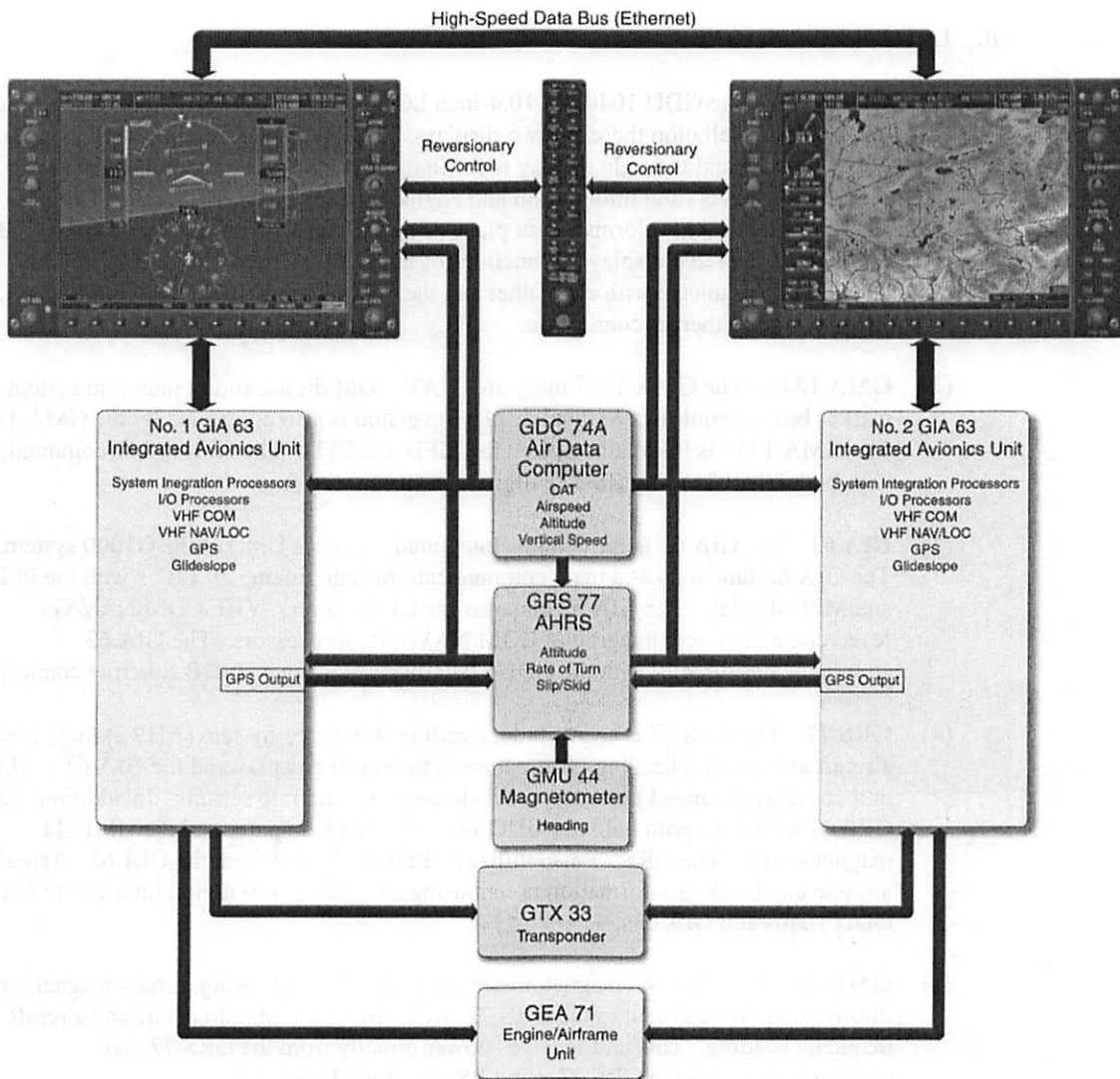
1. General

Avionics will vary depending on factory updates or customer requested optional equipment. For operation and maintenance of installed avionics reference the avionics manufacture's technical data.

OPTIONAL G1000 INTEGRATED COCKPIT SYSTEM

1. General

The G1000 Integrated Cockpit System, for the Tiger AG-5B, consists of the Line Replaceable Units (LRUs) described below. All LRUs have a modular design which greatly eases troubleshooting and maintenance of the G1000 system. A G1000 block diagram is given in Figure 34-06 to support the description of the system. For maintenance of this system refer to the Garmin G1000 Maintenance and Configuration Manual, Garmin P/N 190-00303-04.



Garmin G1000 System Overview
Figure 34-06

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A. G1000 LRUs

- GDU 1040 Primary Flight Display (PFD)
- GDU 1040 Multi Function Display (MFD)
- GMA 1347 Audio System with integrated Marker Beacon Receiver
- GIA 63 Integrated Avionics Units (2)
- GRS 77 Attitude & Heading Reference System (AHRS)
- GMU 44 Magnetometer
- GDC 74A Digital Air Data Computer (ADC)
- GTP 59 Outside Air Temperature (OAT) Probe
- GEA 71 Engine and Airframe Adapter
- GTX 33 Mode S Transponder
- Secure Digital Cards for the PFD and MED

B. LRU DESCRIPTIONS

- (1) **GDU 1040** - The GDU 1040 is a 10.4-inch LCD display with 1024 x 768 resolution. In the AG-5B installation there are two displays. The left display is configured as a Primary Flight Display and the right display is configured as a Multi Function Display. The MFD shows navigation information and engine/airframe instrumentation. The PFD shows primary flight information in place of traditional air data and gyro systems. Both GDU 1040s link and display all functions of the G1000 system during flight. The displays communicate with each other and the GIA 63 units through a High-Speed Data Buss (HSDB) Ethernet connection.
- (2) **GMA 1347** - The GMA 1347 integrates NAV/COM digital audio, intercom system and marker beacon controls. Manual display reversion is also controlled by the GMA 1347. The GMA 1347 is installed between the MFD and PFD. The GMA 1347 communicates with both GIA 63s using RS-232 digital interface.
- (3) **GIA 63** - The GIA 63 is the central 'Integrated Avionics Unit' of the G1000 system. The GIA 63 functions as a main communications hub, linking all LRUs with the PFD and MFD display. The GIA 63 contains the GPS receiver, VHF COM/NAV/GS receivers, and system integration COM/NAV microprocessors. The GIA 63 communicates directly with the GDU 1040 displays using a HSDB Ethernet connection.
- (4) **GRS 77** - The GRS 77 is an Attitude, Heading Reference System (AHRS) that provides aircraft attitude and heading information to the G1000 display and the GIA 63s. The unit contains advanced tilt sensors, accelerometers, and rate sensors. In addition, the GRS 77 interfaces with both the GDC 74A Air Data Computer and the GMU 44 magnetometer. The GRS 77 also utilizes GPS signals sent from the GIA 63. Actual attitude and heading information is sent using an ARINC 429 digital interface to both GDU 1040s and GIA 63s.
- (5) **GMU 44** - The GMU 44 magnetometer, located in the right wing, senses magnetic field information. Data is sent to the GRS 77 ARHS for processing to determine aircraft magnetic heading. This unit receives power directly from the GRS 77 and communicates with the GRS 77 using RS-485 digital interface.

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- (6) **GDC 74A** - The GDC 74A Air Data Computer processes information from the pitot/static system and the outside air temperature (OAT) sensor providing pressure altitude, airspeed, vertical speed and OAT information to the G1000 system. The GDC 74A communicates with the GIA 63s, GDU 1040s and GRS 77 using ARINC 429 digital interface.
- (7) **GEA 71** - The GEA 71 receives and processes signals from engine and airframe sensors. Sensor types include engine temperature and pressure sensors as well as fuel measurement and pressure sensors.
- (8) **GTX 33** - The GTX 33 is a solid-state Mode-S transponder providing Modes A, C and S operation. Control and operation takes place via the PFD. The transponder communicates with both GIA 63s through RS-232 digital interface.

2. G1000 System Electrical Bonding Test

- A. An electrical bonding test must be conducted on all units specified below at intervals not to exceed five years from the time the aircraft entered service to insure adequate HIRF and lightening protection. The measurement between each unit and the engine ground attach point at the top of the engine mount must be no more than 2.50 milli-ohms (0.0025 ohms). All units must be installed and secured prior to making any measurements. Measurements must be made using a calibrated milli-ohm meter, using Kelvin probes. Measure from the engine ground attach point at the top of the engine mount to the point designated below.
 - (1) **PFD & MFD**: Any point on the top of the unit chassis forward of the instrument panel.
 - (2) **AHRS & AIR DATA**: Any point on the unit mounting tray.
 - (3) **GIA 63, # 1 & 2**: Any point on top of the unit.
 - (4) **OAT PROBE**: From the top of the probe base, inside the left wing root fairing.

NOTE: It is recommended that aircraft operated/stored in coastal or humid areas have the Electrical Bonding Test performed at more frequent intervals.

NOTE: The Electrical Bonding Test must be conducted after maintenance is performed which disturbs any structural ground point such as engine removal/installation, engine ground strap removal/installation, etc.

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CHAPTER 37

VACUUM SYSTEM

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VACUUM SYSTEM - DESCRIPTION/OPERATION

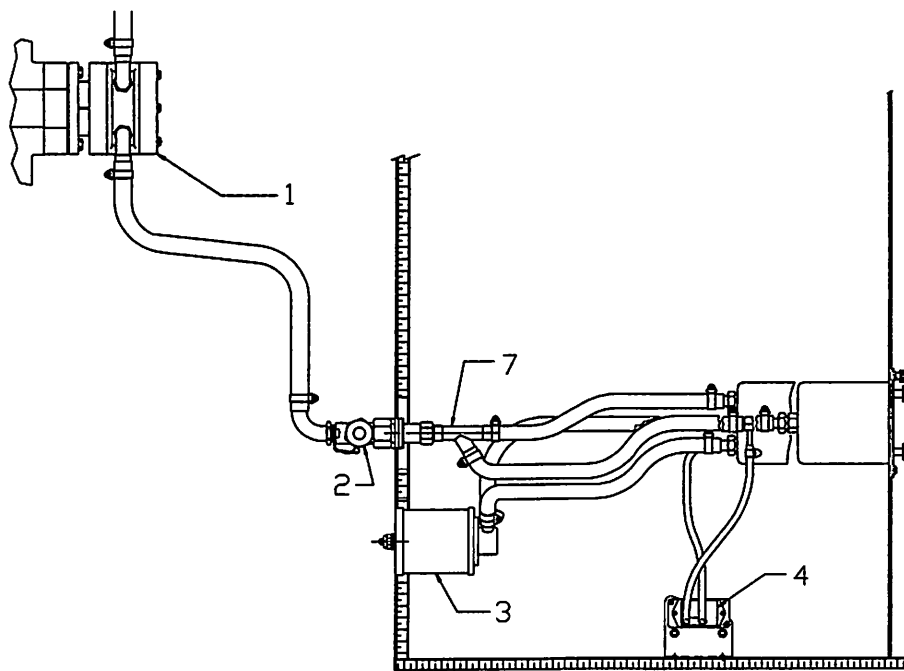
1. General (See Figure 37-01)

The vacuum system consists of an engine driven vacuum pump, vacuum regulator, filter, directional gyro, horizon gyro, vacuum sensor, vacuum gauge, low vacuum warning light (S/N 10238 and subsequent) and necessary tubing and fittings. Since the vacuum pump is of the dry type, an oil separator is not required.

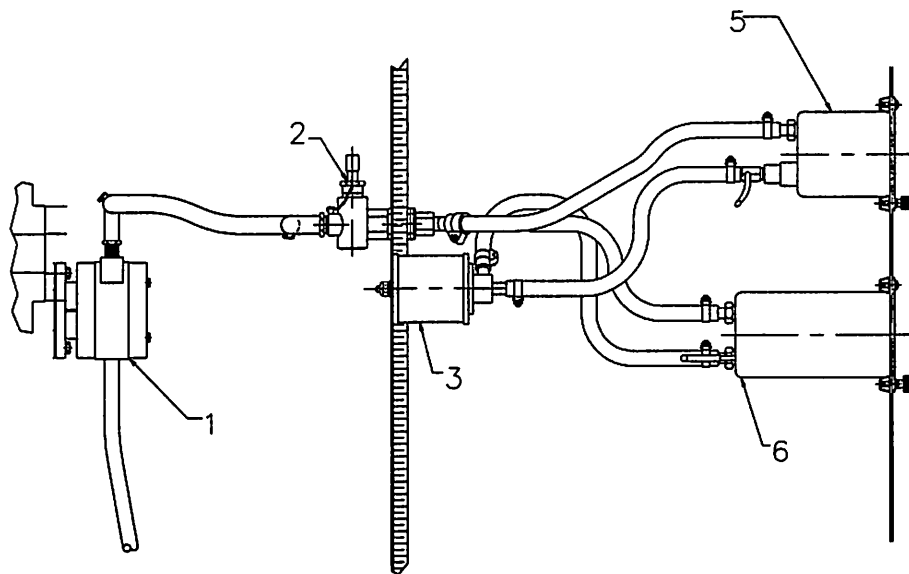
NOTE

AG-5B serial numbers 10219, 10222 and 10232 through 10236 were equipped with an optional Aero Advantage ADV211CC Dual chamber Vacuum Pump System, which is no longer in production. For replacement of the vacuum pump on these aircraft, refer to Service Kit No. 155, which is available from Tiger Aircraft LLC.

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Top View



Side View

**Vacuum System
Figure 37-01**

- 1. Engine Driven Vacuum Pump**
- 2. Vacuum Regulator**
- 3. Vacuum Filter**
- 4. Vacuum Transducer**

- 5. Horizon Gyro**
- 6. Directional Gyro/H.S.I.**
- 7. Vacuum Splitter**

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VACUUM SYSTEM - TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
No vacuum	Pump inoperative. Gauge inoperative. Plugged central filter. Collapsed vacuum hose. Vacuum sensor or gauge inoperative.	Replace Replace Replace Replace Test sensor/gauge
Low vacuum	Partially plugged central filter. Partially collapsed suction hose. Improperly set regulator. Vacuum sensor or gauge error.	Replace Replace Adjust Test sensor/gauge
Erratic vacuum	Oil in pump.	Replace
High vacuum	Improperly set regulator.	Adjust
Vacuum gauge follows engine RPM	Foreign material on regulator seat. Regulator inoperative.	Release tension on regulator, adjust screw, remove material, reset. Replace
Gyro(s) won't erect	Gyro(s) inoperative.	Replace gyro(s)
Gyro(s) tumble/precess	Gyro(s) defective.	Replace gyro(s)
Vacuum gauge indicates frequent need for regulator adjustment	Filter restricted.	Replace filter Readjust regulator
Frequent pump replacement	Partially restricted pump discharge or restricted (kinked) suction hose. Incorrect pump for engine or system.	Replace hose Not Bi-directional pump, check rotation direction. Applications list (Catalog)
Pump oily	Defective engine drive seal.	Replace seal
No vacuum at low RPM	Oil in pump.	Replace pump
Vacuum low at high RPM	Suction hose cut (crimped).	Replace hose
Vacuum warning light does not illuminate when aircraft power is turned on	Light is burned out. Vacuum switch inoperative. Instrument Light circuit breaker tripped.	Replace light. Replace switch. Re-set Instrument Light circuit breaker
Vacuum warning light comes on in flight, vacuum gauge reads low	Vacuum pump inoperative. Vacuum hose loose or broken.	Replace vacuum pump Secure or replace hose
Vacuum warning light comes on in flight, vacuum gauge reads normal	Vacuum switch inoperative.	Replace Vacuum switch

Note: For trouble shooting Dual Vacuum Pump System see "Instructions for Continued Airworthiness" supplied by the pump manufacturer.

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VACUUM SYSTEM - MAINTENANCE PRACTICES

1. Adjustment/Test

A. Operational Test

NOTE: It is necessary to operate the aircraft engine in order to operationally test the vacuum system.

WARNING: ENSURE THAT PROPELLER AREA IS CLEAR PRIOR TO STARTING ENGINE.

- (1) Start engine in accordance with Pilot's Operating Handbook and set engine speed to 2100 RPM. If vacuum is outside the range of 4.6 - 5.4 inches Hg proceed to item (2) below.
- (2) Adjust vacuum gauge reading to 4.6 - 5.4 inches Hg by cutting safety wire and moving adjustment screw in increments with the engine stopped, retest at 2100 RPM. Repeat as necessary to attain proper adjustment. Re-safety using 0.025 inch safety wire.
- (3) During flight vary engine speed from 2100 RPM to 2700 RPM; ensure vacuum gauge indication remains between 4.6 and 5.4 inch Hg as set in (2) above. If necessary, readjust the regulator to ensure the proper vacuum range is obtained.

DISTRIBUTION SYSTEM - DESCRIPTION/OPERATION

1. General

The distribution system consists of the engine driven vacuum pump, the vacuum regulator, the vacuum filter and the lines necessary to route the vacuum to the instruments being driven.

A. When installing a dry air pump, fitting installation or removal should be accomplished with good mechanical practices.

- (1) Always assure lines and hoses are clean and free of debris, oils or solvents.
- (2) Replace any hard or brittle hose, particularly on the pump inlet, as sections of the inner layers may separate and cause a pump failure.
- (3) If thread compounds are used, omit the first two lead threads. One recommended compound is spray silicone on the fitting threads.
- (4) Never over-torque the fittings. Install fittings hand tight, then with a box wrench tighten to desired position a maximum of 1-1/2 turns beyond hand tight.
- (5) Never place pump directly into a vise. Clamp across the mounting flange with the drive coupling down to remove fittings. Use suitable protection between the flange and vise jaws. Never clamp rotor housing in a vise.

B. When installing a dry air pump, always use a new mounting gasket. Torque the four pump mounting nuts to 65 - 75 inch pounds (removing an adjacent appliance may be required). Never use a pump that has been dropped.

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- C. Always verify that the pump is of the correct configuration (P/N) for the engine and/or system. Consult the vendors applications list and the PMA label on the pump box. If improper application is suspected or questions arise, check with the pump manufacturer's service department.
- D. Never attempt modifications to system components. Unauthorized alterations may cause additional problems and void any warranty.
- E. Do not add items in a pneumatic system unless it is an approved change.
- F. Consult service instructions for specific settings or adjustments.

DISTRIBUTION SYSTEM - MAINTENANCE PRACTICES

1. Servicing

A. Regulator Filter.

Refer to Chapter 12 for regulator filter servicing.

B. System Filter.

Refer to Chapter 12 page 12-17 for system filter servicing.

2. Vacuum Pump Removal/Installation (Reference Figure 37-02)

CAUTION: Cap or plug all openings to the vacuum system to prevent contamination, which could cause premature failure of the pump and/or vacuum driven gauges.

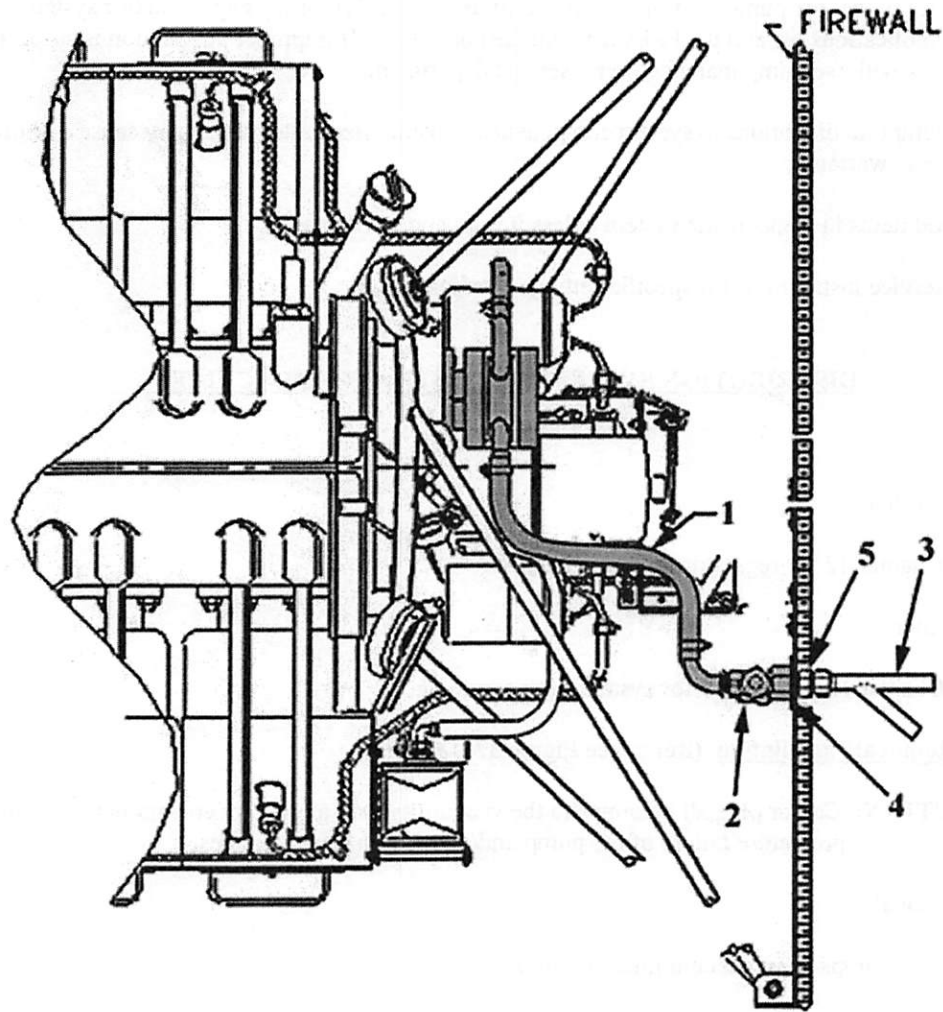
A. Pump Removal

- (1) Remove clamps from vacuum lines at pump.
- (2) Remove vacuum (1) and exhaust hose (6) from the pump.
- (3) Remove four nuts and washers securing pump to engine accessory pad.
- (4) Pull pump from engine.
- (5) Cover opening in accessory pad to prevent foreign material from entering the engine.

B. Pump Installation

- (1) Install new pump gasket.
- (2) Position pump and gasket on engine accessory pad. Rotate pump slightly so that its splined shaft mates with female spline in engine.
- (3) Slide pump on to its mounting studs on the engine accessory pad. Secure the pump with four nuts and washers. Torque to 65-75 inch pounds.
- (4) If fittings were removed, install on pump and torque to 20 to 30 inch lbs.
- (5) Install vacuum hose (1) and exhaust hose (6) on the vacuum pump and secure with hose clamps.

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Regulator Installation (Sigma-Tek P/N 32-436)
Figure 37-02

3. Regulator Removal/Installation, Sigma-Tek P/N 32-436 (Reference Figure 37-02)

CAUTION: Cap or plug all openings to the vacuum system to prevent contamination, which could cause premature failure of the pump and/or vacuum driven instruments.

A. Regulator Removal

- (1) Remove 5 screws and washers, disconnect the glare shield lights and remove the glare shield and instrument deck from the aircraft.
- (3) Remove hose (1) from regulator (2).
- (4) Remove vacuum splitter (3) from the regulator from behind the firewall.
- (5) While holding the regulator to prevent it from turning, remove fitting (5) and spacer (4) securing the regulator to the firewall.

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(6) Remove regulator from the aircraft.

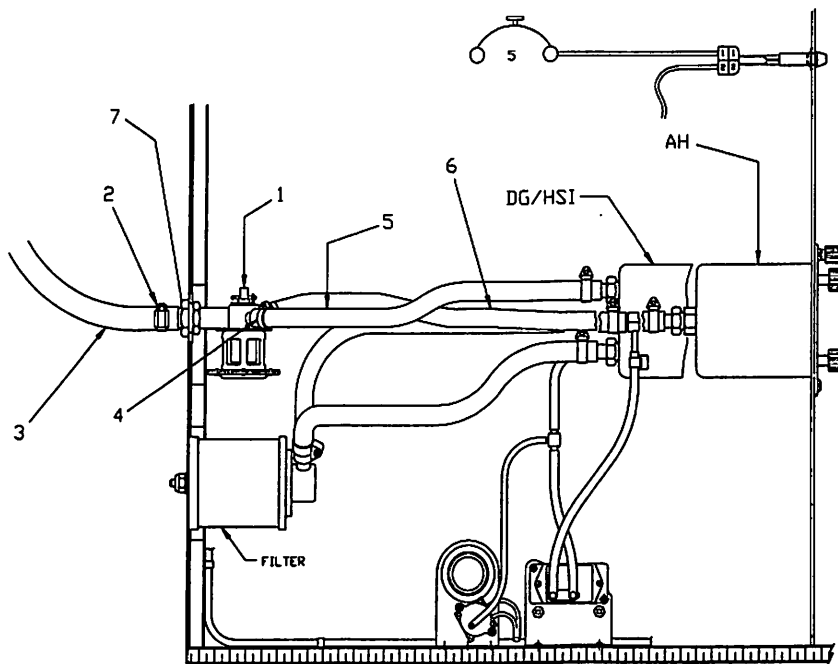
B. Regulator Installation

(1) Position regulator (2) and spacer (4) on firewall.

(2) Install fitting (5) through the firewall and spacer into the vacuum regulator. Tighten securely.

(3) Install hose (1) and secure with clamp.

(4) Reinstall vacuum splitter (3).



Vacuum Regulator Installation (Tempest P/N AA2H3-12)

Figure 37-03

4. Regulator Removal/Installation, Tempest P/N AA2H3-12 (Reference. Figure 37-03)

CAUTION: Cap or plug all openings to the vacuum system to prevent contamination, which could cause premature failure of the pump and/or vacuum driven instruments.

A. Vacuum Regulator Removal

(1) Remove 5 screws and washers, disconnect the glare shield lights and remove the glare shield and instrument deck from the aircraft.

(2) Remove clamps (4) and remove hoses (5) and (6) from regulator (1).

(3) Remove clamp (2) and remove hose (3) from the regulator.

(4) Remove nut (7) and remove regulator (1).

B. Vacuum Regulator Installation

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- (1) Position regulator (1) through the firewall from the aft side and secure with nut (7).
- (2) Install hose (3) over the regulator fitting and secure with clamp (2).
- (3) Install hoses (5) and (6), over fittings on the regulator and secure with hose clamps (4).
- (4) Position glare shield and instrument deck over the instrument panel, connect the glare shield lights and secure the instrument deck and glare shield with 5 previously removed screws.

5. Filter Assembly Removal/Installation (Reference Figure 37-01)

CAUTION: Cap or plug all openings to the vacuum system to prevent contamination, which could cause premature failure of the pump and/or vacuum driven instruments.

A. Filter Assembly Removal

- (1) Remove the clamps from the two hoses on the filter assembly.
- (2) Remove hoses from the filter assembly.
- (3) While holding filter to prevent its turning, remove the nut securing the filter to the firewall.

NOTE: The filter mount may be a grounding point for the engine compartment electrical systems.

- (4) Remove filter assembly from inside aircraft.

B. Filter Assembly Installation

- (1) Position assembly.
- (2) While holding filter to prevent it from turning, install ground terminal(s) nut and washers on stud securing it to firewall. Torque nut to 20 to 25 inch pounds.
- (3) Install hoses on filter assembly and secure clamps.

6. Adjustment/Test

A. Regulator Adjustment

See "VACUUM SYSTEM – MAINTENANCE PRACTICE" "Adjustment/Test" Page 37-6.

INDICATING SYSTEM - DESCRIPTION/OPERATION

1. General

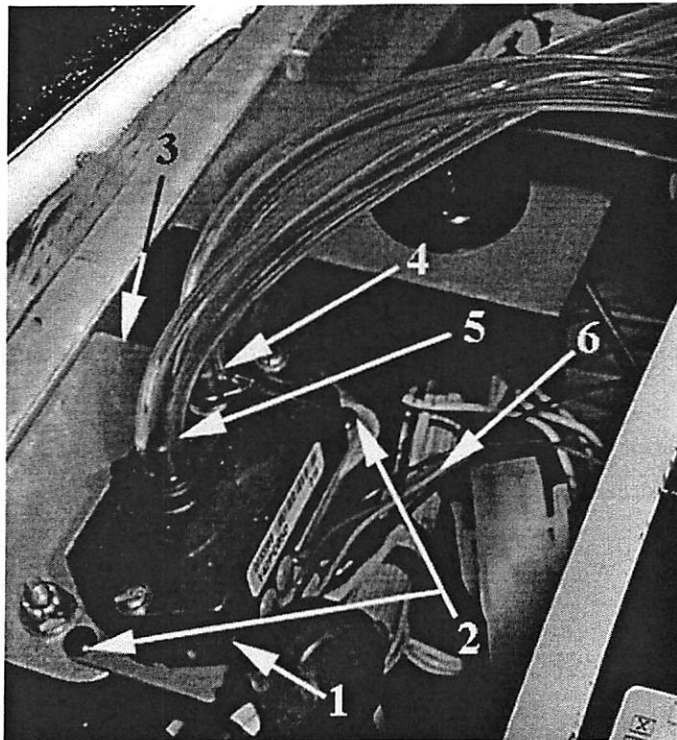
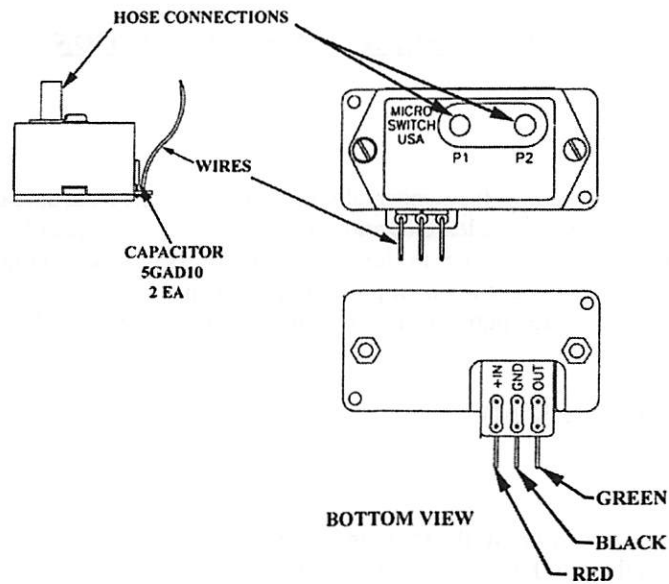
The indicating system consists of the vacuum gauge and the lines attaching it to the vacuum transducer that is connected to the other vacuum system components. The indicating system is further enhanced by the addition of a Low Vacuum Warning Light in some aircraft.

INDICATING SYSTEM - MAINTENANCE PRACTICES

1. Vacuum Gauge Removal/Installation

- A.** Refer to Chapter 34 for gauge installation and removal.

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- | | | | |
|----|------------------------|----|-----------------------------------|
| 1. | Vacuum Transducer | 4. | Static Line (to Vacuum Filter) |
| 2. | Screws, Washer and Nut | 5. | Vacuum Line (Connected to DG/HSI) |
| 3. | Bracket | 6. | Wires |

Vacuum Transducer Installation
Figure 37-04

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VACUUM TRANSDUCER - DESCRIPTION AND OPERATION

1. General

The vacuum transducer is located at the base of the windshield on the forward left hand side of the instrument panel. The vacuum transducer contains sensing elements and resistors buried in the face of a thin, silicon diaphragm. A pressure change causes the diaphragm to flex, inducing a stress or strain in the diaphragm and the buried resistors. The output voltage changes in direct proportion to changes in pressure. The vacuum gage in the instrument cluster measures the voltage output of the transducer and displays the information in inches Hg on the face of the gauge.

2. Removal/Installation (Reference Figure 37-04)

A. Transducer Removal

CAUTION: Cap or plug all openings to the vacuum system to prevent contamination, which could cause premature failure of the pump and/or vacuum driven gauges.

1. Insure that the master switch is in the off position.
2. Remove the instrument deck.
3. Remove lines (4) and (5) from the transducer.
4. Disconnect wires (6).
5. Remove screw, washer, and nut (2) and remove the transducer from bracket (3).

B. Transducer Installation

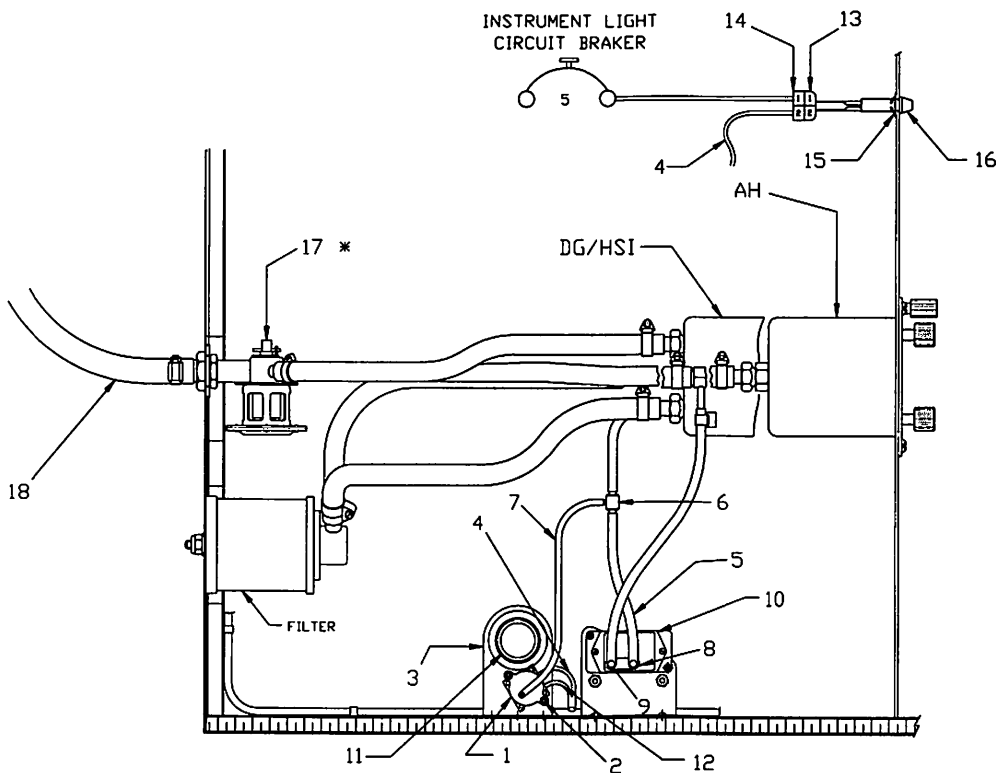
1. Position transducer (1) on bracket (3) and secure using screws, washers, and nuts (2).
2. Connect wires (6).
3. Install lines (4) and (5).
4. Reinstall instrument deck.

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LOW VACUUM WARNING SYSTEM-DESCRIPTION AND OPERATION

1. General

The low vacuum warning light system consists of a single light annunciator installed on the instrument panel in the pilot's primary field of view. This annunciator is powered through the aircraft electrical bus and operated by an electro pneumatic pressure switch. When operating at normal engine speeds the switch is held open by vacuum from the system. If the vacuum pressure drops below 3.5 inches Hg the switch closes causing the annunciator to illuminate.



**Vacuum System with Low Vacuum Warning
Figure 37-05**

- | | |
|--|---|
| (1) Vacuum Switch | 10. Vacuum Transducer |
| 2. Attach Screws | 11. Stall Warning Horn |
| 3. Stall Warning Horn Bracket | 12. Ground Wire |
| 4. Positive Electrical Lead | 13. Connector Side A |
| 5. Vacuum Hose (from DG/HSI to Vacuum Transducer) | 14. Connector Side B |
| 6. "T" Fitting | 15. Push Nut |
| 7. Vacuum Hose (to switch) | 16. Light |
| 8. P-1 Port | 17. Vacuum Regulator (Alternate Version Shown) |
| 9. P-2 Port | 18. Hose to Vacuum Pump |

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2. Vacuum Warning Switch Removal/Installation (Reference Figure 37-05)

A. Vacuum Warning Switch Removal

- (1) Remove 5 screws and washers, disconnect the glare shield lights and remove the glare shield and instrument deck from the aircraft.
- (2) Disconnect vacuum hose (7) from vacuum switch (1).
- (3) Disconnect wires (4) and (12) from switch (1).
- (4) Remove nut, washers and screws (2) connecting switch (1) to Stall Warning Horn Bracket (3) and remove the switch.

B. Vacuum Warning Switch Installation

- (1) Position Switch (1) on bracket (3) and attach using screws, washers and nuts (2).
- (2) Connect wires (4) and (12) to switch (1).
- (3) Connect vacuum hose (7) to switch (1).
- (4) Actuate the master switch to the on position and confirm that light (16) illuminates.
- (5) Position the aircraft in a suitable run up area, insure that the area around the propeller is clear then start the engine. The vacuum warning light should extinguish when the vacuum gauge reads in the normal operating range.
- (6) Position glare shield and instrument deck over the instrument panel, connect the glare shield lights and secure the instrument deck and glare shield with 5 previously removed screws.

3. Low Vacuum Warning Light Removal/Installation (Reference Figure 37-05)

A. Light Removal

- (1) Remove 5 screws and washers, disconnect the glare shield light wires and remove the glare shield and instrument deck from the aircraft.
- (2) Disconnect connector (13 - 14) and remove pins 1 and 2 from connector half (13).
- (3) Remove push nut (15) and pull light (16) from the instrument panel.

B. Light Installation

- (1) Insert wires and light (16) through the hole in the instrument panel.
- (2) Slide push nut (15) over the wires and base of the light. While holding the light firmly in place, seat the push nut snugly against the back of the instrument panel.
- (3) Insert the light wire pins into connector half (13) and connect to connector half (14).
- (4) Actuate the master switch to the on position and confirm that light (16) illuminates.
- (5) Connect the glare shield lights and reinstall the glare shield and instrument deck.

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VACUUM SYSTEM, G1000 EQUIPPED AIRCRAFT - MAINTENANCE PRACTICES

1. General

The Vacuum System used in G1000 equipped aircraft differ from the standard system in that the only vacuum driven instrument is the Artificial Horizon (AH) and, the system uses a mechanical vacuum gauge mounted near the upper center of the instrument panel. Since the maintenance and troubleshooting of this vacuum system is the same as the standard vacuum system, only vacuum indicating will be addressed in this section.

INDICATING SYSTEM - DESCRIPTION/OPERATION (G1000 SYSTEM)

1. General

The indicating system consists of a vacuum gauge and the lines attaching it to vacuum plumbing that is connected to the other vacuum system components. The indicating system is further enhanced by the addition of a Low Vacuum Warning Light.

INDICATING SYSTEM - MAINTENANCE PRACTICES

1. Vacuum Gauge Removal/Installation (Reference Figure 37-06)

A. Vacuum Gauge Removal

- (1) Remove the glare shield and instrument deck.
- (2) Disconnect tubes (5) and (7) from the rear of vacuum gauge (3).
- (3) Hold the back side of the gauge and remove the knurled nut from the face of the gauge.
- (4) Remove the gauge from behind the panel.

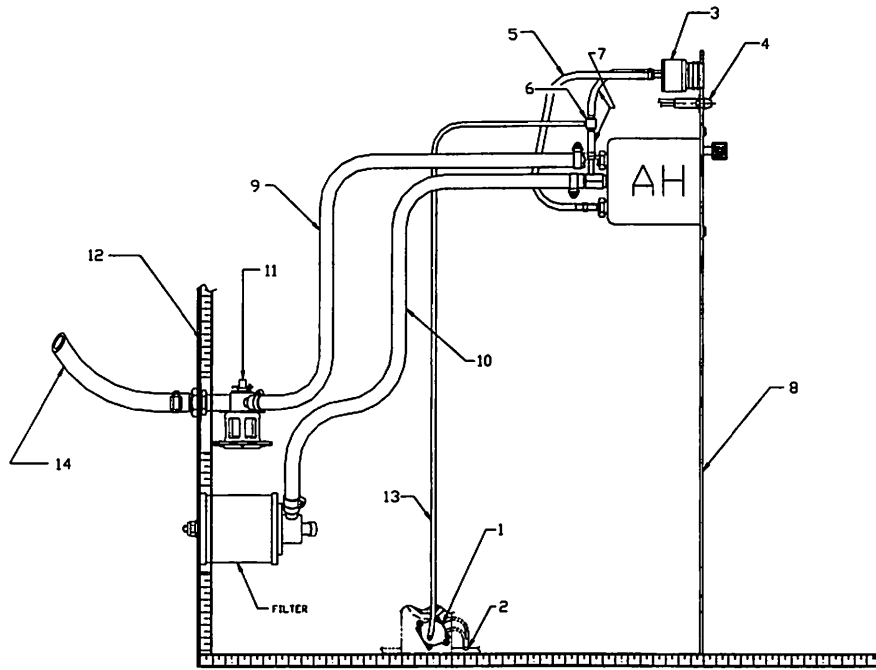
B. Vacuum Gauge Installation

- (1) Adjust the aft side knurled nut on gauge (1) to provide the proper thread protrusion through the instrument panel and insert the gauge into the panel cut out.
- (2) Hold the gauge on the back side of the instrument panel and install the forward knurled nut.
- (3) Connect vacuum tubes (5) and (7) to the rear of vacuum gauge (3).
- (4) Reinstall the instrument deck and glare shield.

2. Low Vacuum Warning System (G1000 System)

See "Low Vacuum Warning System Description and Operation" page 37-13.

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**Vacuum System with Low Vacuum Warning (G1000 Equipped Aircraft)
Figure 37-06**

- 1. Vacuum Switch**
- 2. Wiring, to Low Vacuum Warning Light**
- 3. Vacuum Gauge**
- 4. Low Vacuum Warning Light**
- 5. Vacuum Tube, to Vacuum Gauge**
- 6. "T" Fitting**
- 7. Tube, Filtered Air to Vacuum Gauge**
- 8. Instrument panel**
- 9. Hose, Vacuum Regulator to DG**
- 10. Hose, Vacuum Filter to DG**
- 11. Vacuum Regulator**
- 12. Firewall**
- 13. Vacuum Tube, To Vacuum Switch**
- 14. Hose, To Vacuum Pump**

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CHAPTER 52

DOORS

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DOORS - DESCRIPTION/OPERATION

1. General

The doors covered in this chapter consist of a sliding canopy that provides access to the aircraft for the pilot and passengers, and a baggage door that provides access to the baggage compartment.

2. Canopy

The canopy is a formed aluminum structure containing side windows of Plexiglas, and a latching mechanism to lock the canopy in the closed position.

3. Baggage Door

The baggage door is located on the left side of the fuselage behind the rear seats and provides access to the baggage compartment.

4. Assist Handle

An assist handle, for entry and exit of the aircraft is provided on each side of the outer fuselage immediately beneath the canopy rail.

CANOPY - DESCRIPTION/OPERATION

1. General

The canopy consists of a formed aluminum structure, mounted on tracks extending along the sides of the fuselage. When positioned in its aft limit of travel the canopy opening provides an entry opening of approximately 40 inches in length. This allows entry into both front and rear seats of the airplane. Fixed windows on each side of the canopy provide lateral visibility. The canopy is held in the closed (forward) position by a latch mechanism that can be actuated by handles from either inside or outside the airplane. A spring-loaded button and protruding rivets on each canopy track provide a means to hold the canopy in the desired open position while in flight. A key actuated lock is provided to lock the canopy in the closed position from outside the airplane.

CANOPY - MAINTENANCE PRACTICES

1. Servicing

A. Rail Lubrication

WARNING: USE SOLVENTS IN A WELL VENTILATED AREA. AVOID BREATHING FUMES. KEEP AWAY FROM FLAMES.

- (1) Use isopropyl alcohol and a small brush to clean the Teflon runners inside the canopy outer tracks. Ensure that the tracks are clean and free of residue.
- (2) Apply a small amount of silicon based spray lubricant onto the sliding surfaces.
- (3) Open and close the canopy several times to distribute the lubricant.

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B. Latch Lubrication

- (1) Lubricate the canopy latch in accordance with Chapter 12.

2. Canopy Removal/Installation (Reference Figure 52-01)

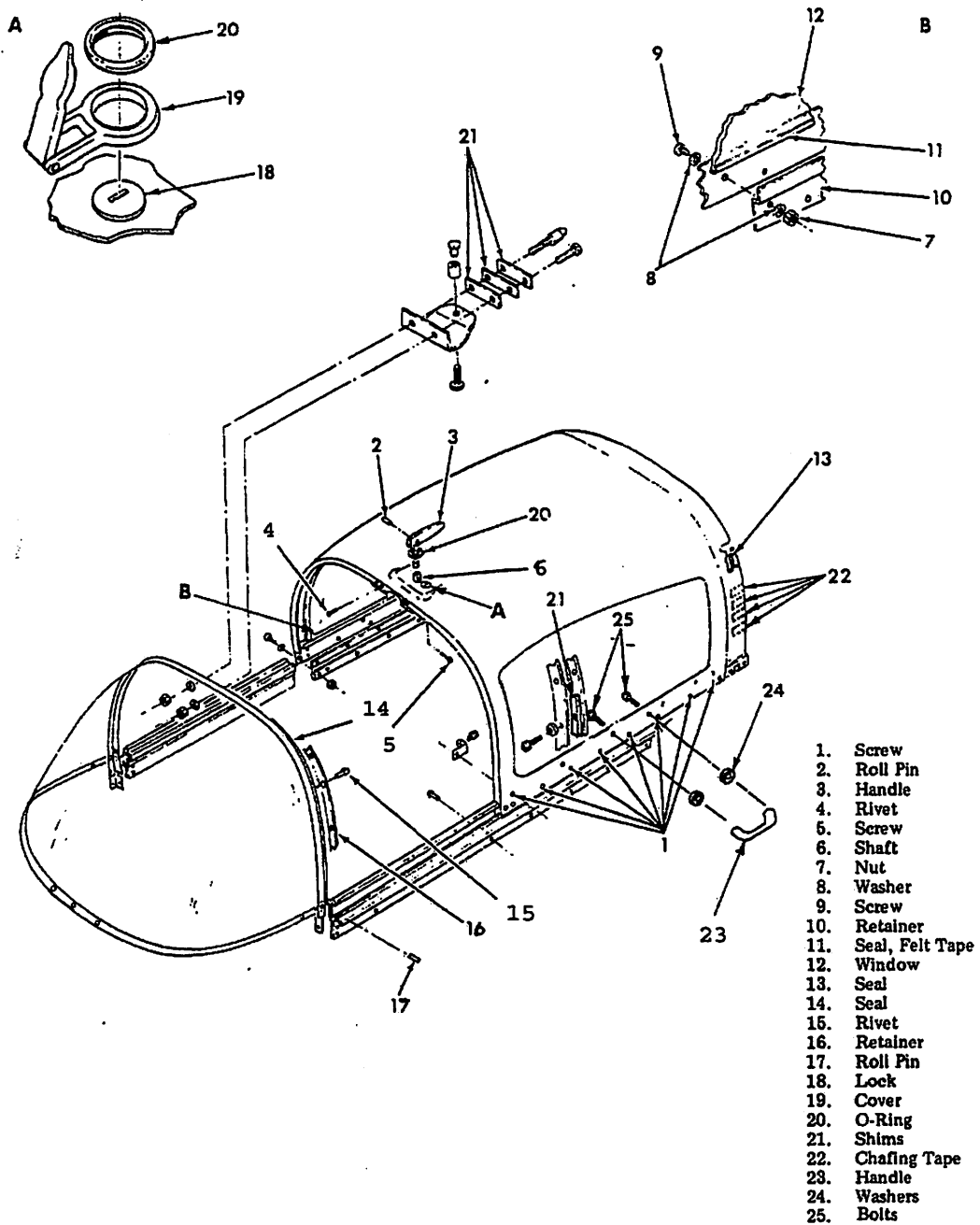
A. Canopy Removal

- (1) Remove bottom row of screws (1) on each side of the canopy.
- (2) Lift canopy straight up to remove shims and canopy from aircraft.

B. Canopy Installation

- (1) Lower canopy straight down and align the canopy holes with the rail holes.
- (2) Install shims between the canopy and rail.
- (3) Install bottom row of screws (1) through the canopy, shim, and into the track.

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**Canopy Removal / Installation
Figure 52-01**

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3. Canopy Latch Removal /Installation (Reference Figure 52-01)

A. Canopy Latch Removal

- (1) Remove roll pin (2) from exterior canopy handle (3).
- (2) Remove latch cover and center canopy trim panel. (Refer to Chapter 25)
- (3) Use a small drift punch to drive out the mandrel in the center of rivets (4).
- (4) Use a number 30 drill (0.128 inch diameter) to drill out rivets (4).
- (5) Remove screws (5) securing latch to canopy.
- (6) Remove latch from canopy.

B. Latch Disassembly (Reference Figure 52-02)

- (1) Disconnect spring (1) from cotter pin (2).
- (2) Remove nuts (3), washers (4 and 5), and screws (6).
- (3) Remove link (7).
- (4) Remove spacers (8) and washers (9).
- (5) Remove guide (10) from housing (11).
- (6) Disconnect spring (12) from cotter pin (2). (Detail C.)
- (7) Remove screw (13), washer (14), and nyliner (15).
- (8) Lift lever assembly (16) from housing and remove washers (17) from shaft lever assy. (16).
- (9) Remove nut (18) from screw (19).
- (10) Remove washer (20), spacer (21), and lever assembly (16).
- (11) Remove nut (23) and screw (24).
- (12) Remove washer (25), then spacer (26), spring (12), and washer (27).
- (13) Remove screw (24) from hook (22).
- (14) Press plastic rivet (28) from lever assembly (16).
- (15) Remove screws (29), then handle (30) from lever assembly (16).

C. Latch Assembly (Reference Figure 52-02)

- (1) Position handle (30) on lever assembly (16) and secure with screws (29).
- (2) Press plastic rivet (28) into lever assembly (16).

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- (3) Insert screw (24) into hook (22) and install washer (27) and spacer (26).
- (4) Place end of spring (12) over spacer (26). Install washer (25) and secure with nut (23). Tighten nut to standard torque value, per Chapter 91.
- (5) Install screw (19) in hook (22).
- (6) Install washer (20) and spacer (21) on screw (19).
- (7) Place lever assembly (16) over spacer (21) and install washer (20) and nut (18). Tighten nut.
- (8) Place washers (17) over hole in housing (11) and slide bottom shaft of lever assembly (16) through washers (17) and housing (11).
- (9) Install nyliner (15), washer (14), and screw (13). Tighten screw.
- (10) Connect spring (12) to cotter pin (2).
- (11) Position guide (10) on housing (11) and install screws (6).
- (12) Place washers (9) and spacers (8) on screw (6).
- (13) Install link (7) on spacers (8).
- (14) Install washers (4 and 5) and nuts (3) on screws (6). Tighten nuts.
- (15) Connect spring (1) to cotter pin (2). (Detail A)
- (16) Lubricate moving parts of latch with a light film of Lubriplate 501, or equivalent.

D. Latch Installation (Reference Figure 52-01)

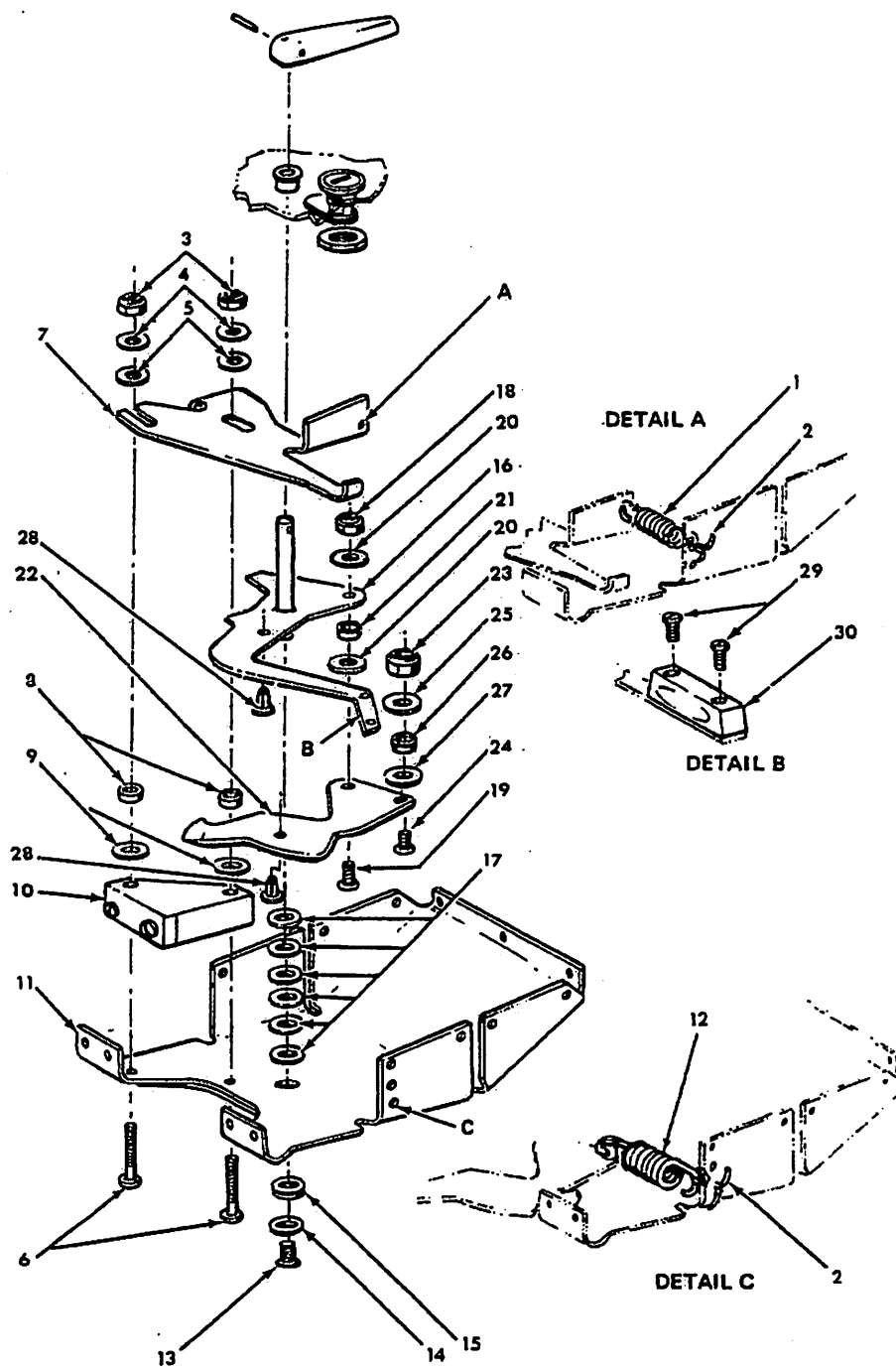
- (1) Position latch assembly in canopy with shaft lever assembly (6) extending through the door handle opening, and guide end of the latch assembly facing forward.
- (2) Secure the aft end of the latch assembly to the canopy by installing screws (5).
- (3) Secure the forward end of the latch assembly to the canopy with Avdel rivets (4)
- (4) Install handle (3) and O-ring (20) on shaft of lever (6) and secure with roll pin (2).

NOTE: The canopy latch assembly can be adjusted for a tighter seal between the canopy and windshield by installing additional shims (Figure 52-01), as required.

NOTE: It is necessary to remove the canopy latch from the canopy in order to remove the key lock assembly.

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1. Spring
2. Cotter Pin
3. Nut
4. Washer
5. Washer
6. Screws
7. Link
8. Spacers
9. Washers
10. Guide
11. Housing
12. Spring
13. Screw
14. Washer
15. Nyliner
16. Lever
17. Washers
18. Nut
19. Screw
20. Washers
21. Spacer
22. Hook
23. Nut
24. Screw
25. Washers
26. Spacer
27. Washer
28. Rivet
29. Screw
30. Handle



Canopy Latch Disassembly / Assembly
 Figure 52-02

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4. Window Removal/Installation (Reference Figure 52-01)

A. Window Removal

- (1) Remove canopy inner trim, as required. (Refer to Chapter 25)
- (2) Remove nuts (7), washers (8), screws (9), and retainers (10) securing Plexiglas to canopy.
- (3) Remove Plexiglas.

B. Window Installation

CAUTION: NEVER USE GASOLINE, BENZINE, ALCOHOL, ACETONE, MEK, ANTI-ICE FLUID, LACQUER THINNER OR GLASS CLEANER TO CLEAN PLASTIC. THESE MATERIALS WILL DAMAGE THE PLASTIC AND MAY CAUSE SEVERE CRAZING.

WARNING: USE SOLVENTS IN A WELL VENTILATED AREA. AVOID BREATHING FUMES. KEEP AWAY FROM FLAMES.

- (1) Use mineral spirits to remove stubborn grease and grime from the window in an area approximately one inch wide around the edge of the window.
- (2) Install felt tape seal (11) approximately 1/8th inch thick around edge of window.
- (3) Position window (12) in canopy.
- (4) Seal lower edge of window (11) and up the sides 4.0 inches to the canopy with P/S 1425 sealer, or equivalent.
- (5) Secure with retainers (10), screws (9), washers (8), and nuts (7).
- (6) Reinstall canopy inner trim.

5. Rear Canopy Seal Removal/Installation (Reference Figure 52-01)

WARNING: USE SOLVENTS IN A WELL VENTILATED AREA. AVOID BREATHING FUMES. KEEP AWAY FROM FLAMES.

A. Rear Canopy Seal Removal

- (1) Use a cloth moistened with MEK to soften the cement holding seal (13) to the canopy.
- (2) Use a fiber (plastic) scraper to lift the seal as the cement softens and slowly peel from canopy.
- (3) Use a cloth moistened with MEK to remove any remaining cement from the canopy.

NOTE: Methyl Ethyl Ketone (MEK) may attack the paint on the surfaces to which the seal is cemented. After removal of the seal, it may be necessary to repaint this area prior to installation of a new seal.

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B. Rear Canopy Seal Installation

- (1) If required clean and repaint canopy seal area. (Refer to Chapter 20) Allow paint to completely dry prior to installing a new seal.
- (2) Cement new seal to the canopy with 3M 1300L or equivalent cement.

6. Canopy Front Seal Removal/Installation (Reference Figure 52-01)

NOTE: Sealing at the front of the canopy is accomplished with the use of a double bulb seal mounted to the windshield frame and a flat rubber seal attached to the leading edge of the canopy.

NOTE: Observe caution and warning as stated in 4. B. above. *Avoid all contact of MEK with Plexiglas window material.*

A. Canopy (leading edge) Front Seal Removal

- (1) Remove the eight rivets using a number 30 drill and separate the seal from the canopy. MEK may be used to soften the cement holding the seal to the canopy.
- (2) Use a fiber scraper to carefully separate the seal from its seating surface as the cement softens.
- (3) Use a cloth moistened with MEK to remove any remaining seal / adhesive material from the canopy.

B. Canopy (leading edge) Front Seal Installation

- (1) If required, clean and repaint the seal attach area of the canopy (Refer to Chapter 20). If painting is required allow the paint to completely dry prior to installation of the new seal.
- (2) Cement the new seal to the canopy using 3M 1300L adhesive or equivalent.
- (3) Complete installation using new rivets and washers.
- (4) Adjust canopy latch as required for proper sealing fit.

C. Windshield Double Bulb Seal Removal

- (1) Remove 12 screws and washers attaching the seal retainers to the windshield frame.
- (2) Separate the retainers from the front face of the seal.
- (3) MEK may be used to soften the cement holding the seal to the windshield frame.
- (4) Use a fiber scraper to carefully separate the seal from its seating surface as the cement softens.
- (5) Use a cloth *moistened* with MEK to remove any remaining seal material from the windshield frame.

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D. Windshield Double Bulb Seal Installation

- (1) If required clean and repaint the seal attach area at the windshield frame (Refer to Chapter 20). If painting is required allow the paint to completely dry prior to installation of the new seal.
- (2) Cement the new seal in place using 3M 1300L adhesive or equivalent.
- (3) Replace seal retainer, washers, and screws.
- (4) Adjust canopy latch as required for proper sealing.

7. Adjustment / Test

A. Track Adjustment

Field experience has shown that after extended operation, the canopy may become difficult to open and close. The following suggestions are provided to aid in maintaining satisfactory operation of the canopy.

- (1) *DO NOT* use the canopy as a handhold during entry to or exit from the aircraft as bending of the inner tracks may occur.
- (2) The inner canopy tracks must be perfectly straight. If the tracks are bent, they should be straightened or replaced.
- (3) The sliding surfaces of the canopy inner tracks and the Teflon runners in the canopy outer tracks must be kept clean and lightly lubricated (recommend silicon based lubricant). Smoother operation may be achieved by cleaning the sliding surfaces with isopropyl alcohol and a small brush, then applying a small amount of spray lubricant into the sliding surfaces.
- (4) If external cleaning and lubricating does not satisfactorily eliminate canopy sticking or binding, the canopy should be removed from the tracks and the tracks slid completely out of the aircraft. (*SEE NOTE BELOW*) All sliding surfaces should then be carefully cleaned with isopropyl alcohol and re-lubricated with a very thin film of lubricant. If the Teflon runners are galled or severely worn, they should be replaced. The Teflon runners are secured in the outer tracks with roll pins (Item 17, Figure 52-01), inserted at the forward end of each channel.

NOTE: When the canopy tracks are removed from the aircraft, the canopy detent button and spring washers will fall out. Assure the detent button and spring washers are reinstalled on reinstallation of the canopy.

- (5) A canopy track sizing tool P/N ST-1064 is available which may be used to resize the Teflon runners when the tracks are removed for cleaning or when the Teflon runners are replaced in the field. This tool is simply inserted into the outer track in place of the sliding inner track and forced through the entire length of the outer track to force the Teflon runners tightly into their retaining channels. Properly installed Teflon runners allow a 1/32 inch vertical clearance between the inner canopy track and the runners. This clearance can be checked with the canopy installed by moving it up and down and measuring the inner track movement. Clean lubricated Teflon runners installed with the correct clearance is essential for smooth, bind free canopy operation.

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8. Cleaning/Painting

A. Plexiglas Cleaning

NOTE: There are various brands of Plexiglas cleaners and polishes available. Use the manufacturers recommendations to care for Plexiglas.

CAUTION: NEVER USE GASOLINE, BENZINE, ALCOHOL, ACETONE, MEK, ANTI-ICE FLUID, LACQUER THINNER OR GLASS CLEANER TO CLEAN PLASTIC. THESE MATERIALS WILL DAMAGE THE PLASTIC AND MAY CAUSE SEVERE CRAZING.

- (1) If large deposits of mud and/or dirt have accumulated on the Plexiglas, flush with clean water. Rubbing with your hand is recommended to dislodge excess dirt and mud without scratching the Plexiglas.
- (2) Wash with soap and water. Use a sponge or heavy wadding of a soft cloth. *DO NOT* rub, as the abrasive action in the dirt and mud residue will cause fine scratches in the surface.
- (3) Grease and oil spots may be removed with a soft cloth soaked in mineral spirits.
- (4) After cleaning, wax the Plexiglas surface with a thin coat of hard polish-wax. Buff with a soft cloth.
- (5) If a severe scratch or marring occurs, jeweler's rouge or a Plexiglas repair kit is recommended. Follow directions, rub out scratch, smooth, apply wax, and buff.

B. Painting Metal Surfaces (Reference Chapter 20)

BAGGAGE DOOR - DESCRIPTION/OPERATION

1. General

The baggage door installed on the aircraft is located on the left side of the fuselage at approximately fuselage Station 150. This hinge-mounted door provides an opening measuring approximately 12 by 24 inches for access to the baggage compartment. The door is hinged on its forward end and provided with a chain type restraint to prevent damage to hinges due to possible over-travel when opening. Door opening from outside the aircraft is accomplished by turning the key-actuated lock mounted on the door. The door can be opened from inside the aircraft by actuating a slide-type latch.

BAGGAGE DOOR - MAINTENANCE PRACTICES

1. Servicing

A. Hinge and Latch Lubrication (Reference Chapter 12)

2. Baggage Door Removal/Installation (Reference Figure 52-03)

A. Baggage Door Removal

- (1) Remove interior trim surrounding the baggage door. (Refer to Chapter 25)

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- (2) Use a number 30 drill to remove eight rivets (1) securing the baggage door to the hinge.
- (3) Remove cotter pin (2) from clevis (4), remove washer (3) and disconnect chain from aircraft.
- (4) Open baggage door latch (5) and remove baggage door from the aircraft.
- (5) Drill out rivets securing the baggage door hinge to the fuselage and remove the hinge.

B. Latch Disassembly (See Figure 52-04)

- (1) Remove trim panel from inside door. (Refer to Chapter 25)
- (2) Disconnect spring (1) from cotter pin (2) and clip (3).
- (3) Remove cotter pin (4), washer (5), and clevis pin (6).
- (4) Remove cotter pin (2), washer (7), and clevis pin (8), then remove link (9).
- (5) Remove bolt (10) and washer (11), then pull slide (12) from under clip (3). Remove washer (13).
- (6) Remove screw (14), lock washer (15), and link (16) from cam lock (17).
- (7) Unscrew cam lock retainer nut (18) and remove cam lock (17).

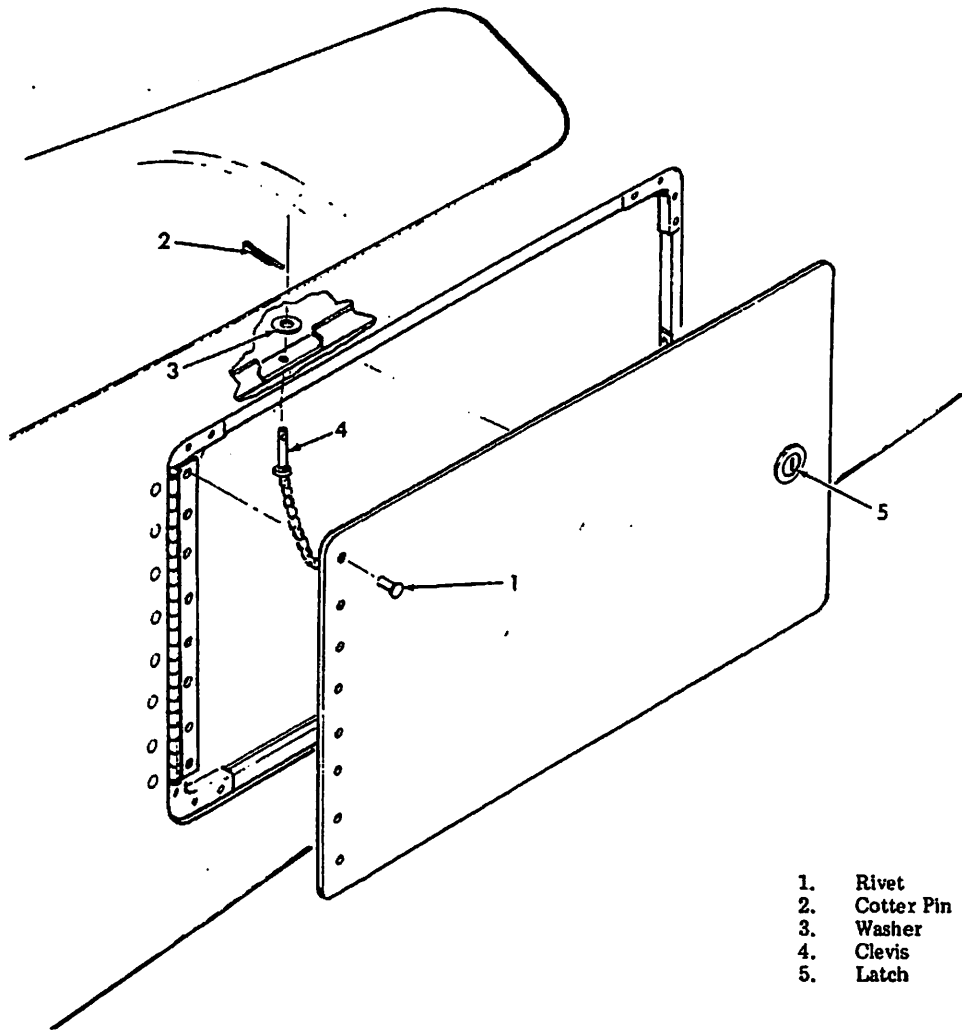
NOTE: If clip (3) is to be removed, it will be necessary to drill out retaining rivets (19). Replacement will require use of blind fasteners.

- (8) Remove clip (3) by drilling rivets (19) out with a number 30 drill.

C. Latch Assembly (See Figure 52-04)

- (1) Place cam lock (17) in door to set key slot in the vertical position when the door is installed. Secure with retainer nut (18).
- (2) If clip (3) has been removed, position clip (3) over the mounting holes. Secure with two blind rivet fasteners.
- (3) Place clevis pin (8) through matching holes in slide (12) and link (9). Secure with washer (7) and cotter pin (2).
- (4) Place clevis pin (6) through matching holes in links (16 and 9). Secure with washer (5) and cotter pin (4).

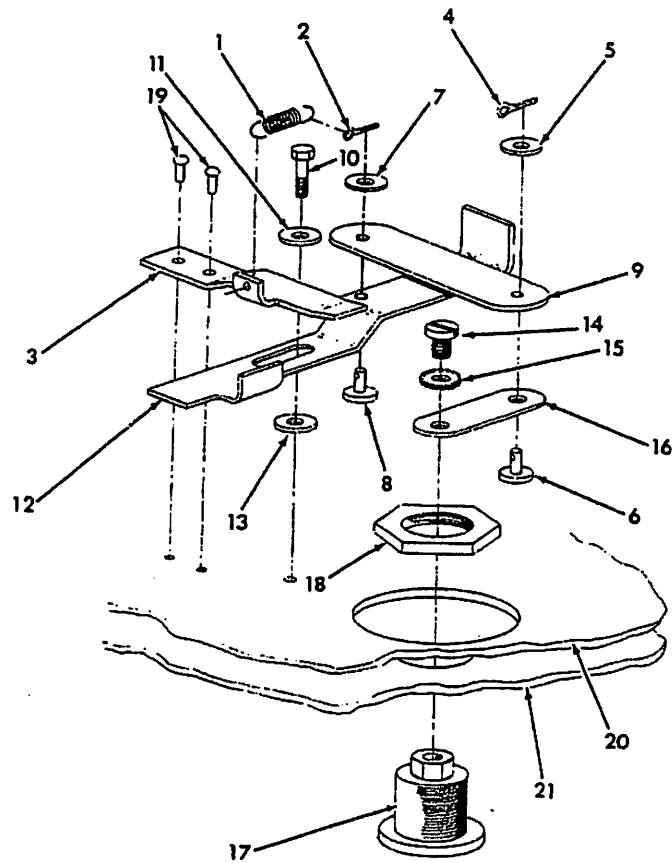
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- 1. Rivet
- 2. Cotter Pin
- 3. Washer
- 4. Clevis
- 5. Latch

**Baggage Door – Removal / Installation
Figure 52-03**

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- | | |
|---------------|------------------|
| 1. Spring | 12. Slide |
| 2. Cotter Pin | 13. Washer |
| 3. Clip | 14. Screw |
| 4. Cotter Pin | 15. Lock Washer |
| 5. Washer | 16. Link |
| 6. Clevis Pin | 17. Cam Lock |
| 7. Washer | 18. Retainer Nut |
| 8. Clevis Pin | 19. Rivets |
| 9. Link | 20. Pan |
| 10. Bolt | 21. Door Skin |
| 11. Washer | |

**Baggage Door Latch Disassembly / Assembly
Figure 52-04**

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- (5) Place washer (13) over pan bolt hole.
- (6) Place slide (12) over washer (13) to align holes with bolt hole and slide (12) under clip (3).
- (7) Install washer (11) and bolt (10). Torque bolt to allow 0.032 inch endplay for slide.
- (8) Install spring (1) on cotter pin head (2) and clip (3).
- (9) Position link (16) so that it is parallel with slide (12), and hold in position while securing with washer (15) and screw (14).

D. Door Installation (Reference Figure 52-05)

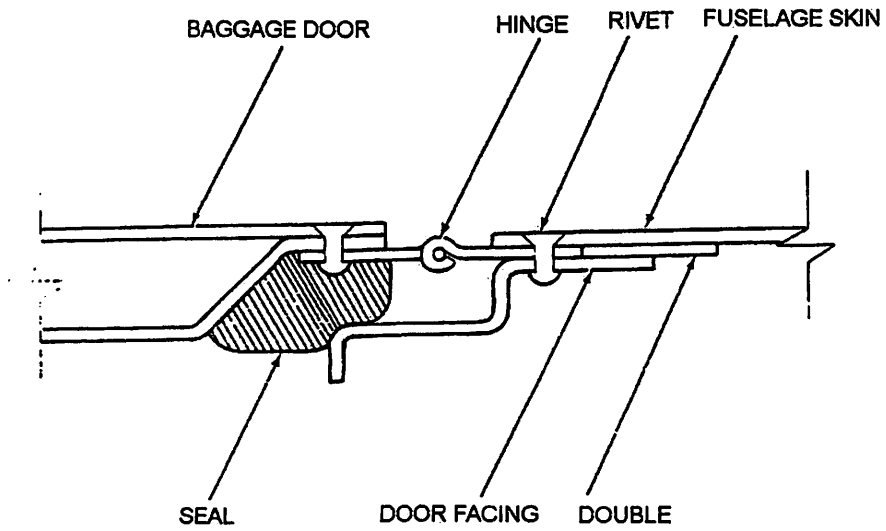
NOTE: If the door is being reinstalled, omit Step (3).

- (1) Position door hinge on fuselage and secure with rivets.
- (2) Position door so that its hinge fits between the fuselage skin and the baggage door facing.
- (3) Adjust door so that it fits within door facing with a clearance of 0.060 inch between the door and the aircraft skin.
- (4) While holding the door in this position, drill 0.098 inch holes in hinge to match holes in skin and facing.
- (5) Secure door to aircraft with eight MS20426AD3-3 rivets.
- (6) Install attaching chain to fuselage and cotter pin (2). (Reference Figure 52-03)
- (7) Install interior trim. (Refer to Chapter 25)

3. Cleaning/Painting

Refer to Chapter 20 for metal cleaning and painting procedures.

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**Baggage Door Installation
Figure 52-05**

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CHAPTER 53

FUSELAGE

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FUSELAGE - DESCRIPTION/OPERATION

1. General

The main fuselage structure (Figure 53-01) is a single piece bonded aluminum assembly using one-half inch thick lightweight aluminum honeycomb panels to form the cabin area. The aft section of the fuselage from the cabin area rearward is composed of sheet aluminum panels bonded together with high strength adhesive and formed aluminum stiffeners and bulkheads. Bulkheads inside the cabin compartment provide support for the floor panels and attaching provisions for other equipment. The engine support mounts and support mount doublers are bonded to the front end of the main fuselage structure.

Most fuselage maintenance requirements will consists of removal and replacement of detachable components or structural repair as described in Chapter 20.

2. Fuselage Assembly Components

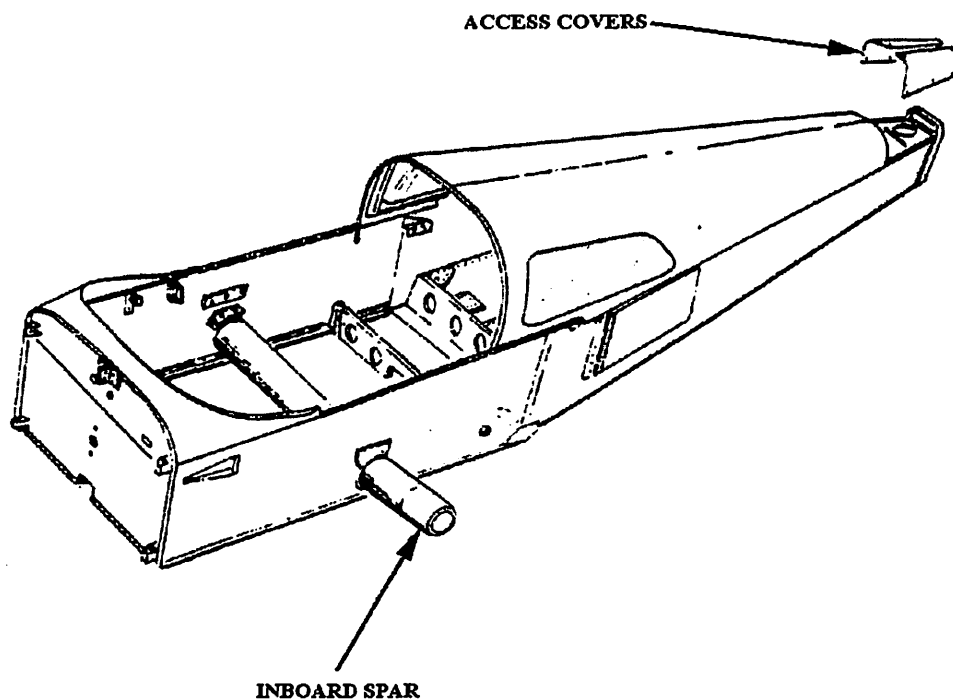
The fuselage assembly consists of the main fuselage structure, the inboard carry through spar, dorsal fin, horizontal stabilizer fairings, tailcone, aft fuselage access covers, and attach fittings and brackets for other equipment. These items are detachable and may be removed and replaced when necessary. The tubular inboard carry through spar extends through the main fuselage structure beneath the pilot and co-pilot's seats, and provides attach points for the wings and the main landing gear. The spar is attached to the fuselage with two support brackets located beneath the spar on the outside of the fuselage structure and two brackets above the spar on the inside of the fuselage. The removable attach fittings, fairings, fins, tailcone, and access covers are secured to the fuselage with screws and clips.

The tailcone is made of thermo-plastic and consists of an upper and a lower half. Either half can be removed separately. The taillight is mounted in the rearmost part of the tailcone. The tailcone houses the rudder and elevator bellcrank assemblies.

The horizontal stabilizer fairings are made of thermo-plastic and the dorsal fin is made of fiberglass. They are attached to the main fuselage structure with screws and clips.

The access covers on the aft section of the fuselage are made of aluminum and attached with screws.

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**Fuselage Assembly
Figure 53-01**

FUSELAGE - MAINTENANCE PRACTICES

1. Removal/Installation of Inboard Spar (Reference Figure 53-02)

A. Remove Inboard Spar

- (1) Remove wings and wing roots. (Refer to Chapter 57)
- (2) Remove main landing gear. (Refer to Chapter 32)
- (3) Remove seats and upholstery as necessary to gain access to seat support brackets. (Refer to Chapter 25)
- (4) Remove seat support brackets, trim console attach screw, and rear seat support brackets from inboard spar.
- (5) Remove pitot tubing from the spar.
- (6) Remove electrical wiring from the spar.
- (7) Remove sealant from around spar at fuselage structure.
- (8) Remove bolts that attach support brackets to spar on outside of fuselage structure. Note the quantity and location of shims.

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(9) Remove bolts that attach the support brackets to the spar and the fuselage, on inside of the fuselage structure and remove the support brackets. Note shim location and quantity for reassembly.

(10) Slide inboard spar out of main fuselage structure.

B. Install Inboard Spar

(1) Slide inboard spar through main fuselage structure and line up bolt holes in lower support brackets.

(2) Install bolts, washers, and nuts that attach lower support brackets to inboard spar but do not tighten nuts.

NOTE: With the bolts installed through the spar and brackets and not torqued, check the clearance between the spar and the bracket at the bolt shanks. Maximum clearance is 0.012 inches. After the bolts are torqued, the maximum clearance is 0.004 inch measured at the bolt shank. A maximum of three 0.012 inch shims may be used between each spar bracket and the spar to obtain the proper clearance.

(3) Position upper support brackets in place and secure to fuselage structure with bolts, screws, washers, and nuts. Torque nuts to 60-70 inch pounds.

(4) Align holes in spar with holes in support brackets and install shims (see NOTE above) as required, bolts, washers and nuts. Torque all spar attaching bolts to 340-360 inch pounds.

(5) Apply corrosion inhibiting sealant around spar on outside of fuselage structure.

(6) Install seat support brackets, rear seat support brackets and connect trim console to inboard spar.

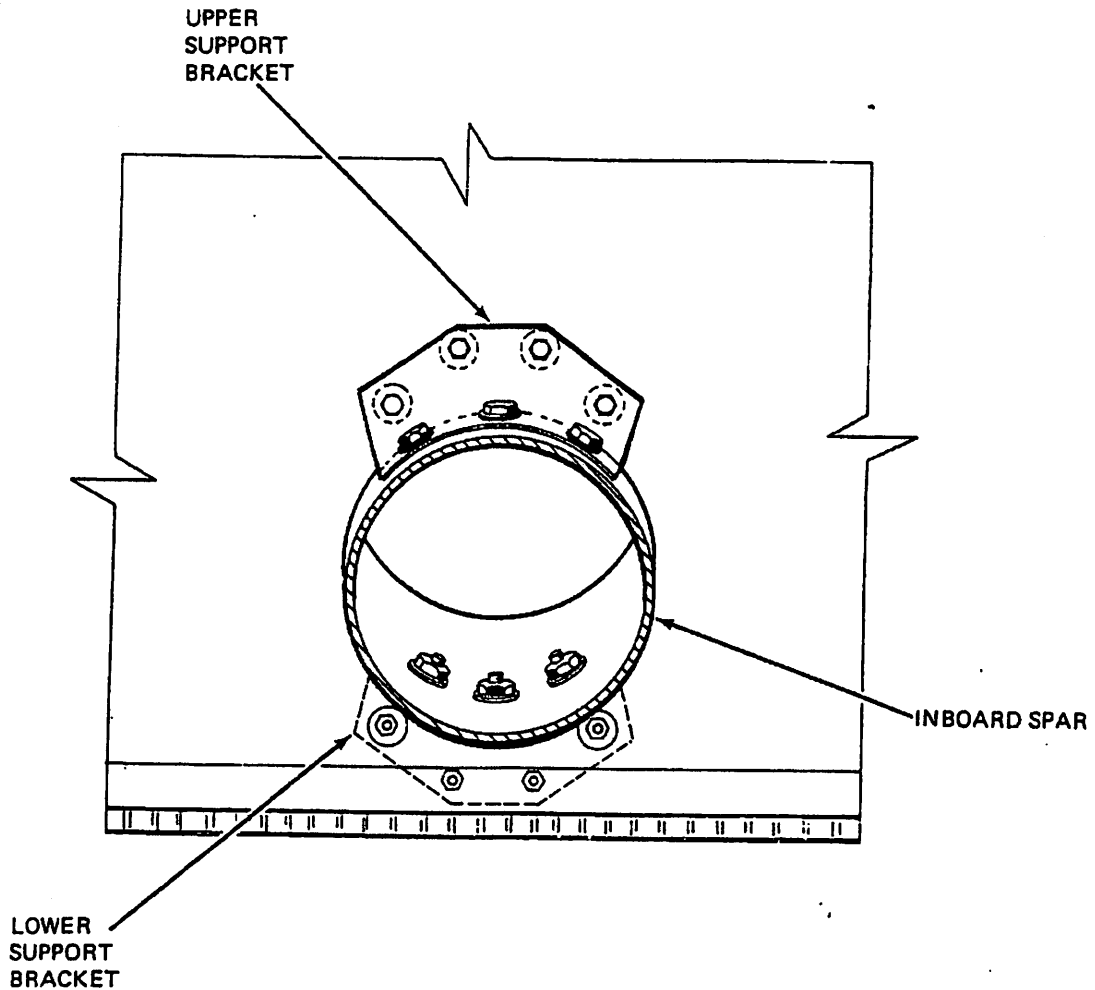
(7) Route pitot line and electrical wiring through hole in the aft center of the spar to the outside of the left side of the spar.

(8) Install seats and upholstery removed at spar removal. (Refer to Chapter 25)

(9) Install main landing gear. (Refer to Chapter 32)

(10) Install wing roots and wings. (Refer to Chapter 57)

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Inboard Spar Installation-Inside View
Figure 53-02

2. Removal/Installation of Dorsal/Horizontal Stabilizer Fairing (Reference Figure 53-03)

NOTE: The Dorsal Fairings and Horizontal Fairings are installed using the same method.

NOTE: The ELT Antenna is located in the aft fuselage and protrudes into the Dorsal Fairing. Take care not to damage the antenna.

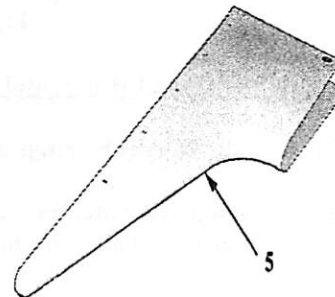
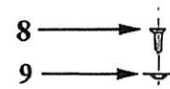
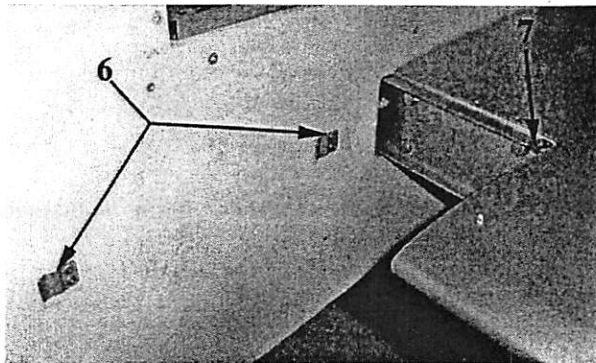
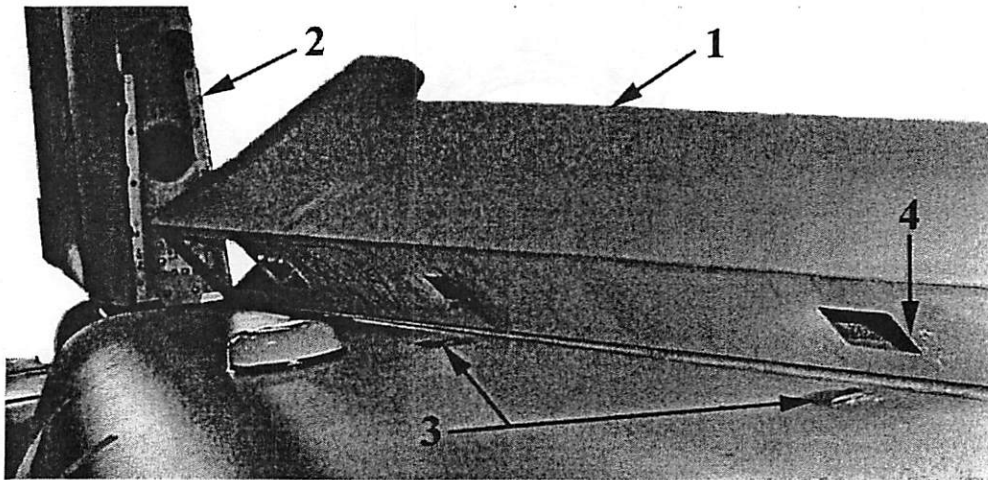
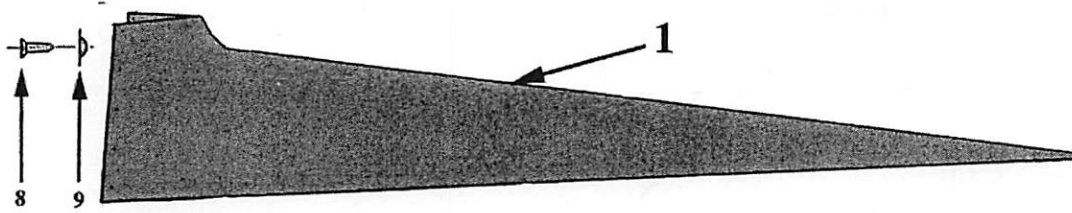
A. Remove Dorsal/Horizontal Stabilizer Fairing

- (1) Remove screws (8) and washers (9) that secure Dorsal (1) or horizontal stabilizer fairing (5) to the stabilizer.
- (2) Slide fairing forward to release channel base (4) from clips (3 or 6) and remove fairing.

B. Install Dorsal/Horizontal Stabilizer Fairing

- (1) Position fairing in place on fuselage and slide back to engage channel base (4) with clips (3 or 6).
- (2) Install screws (8) and washers (9) that secure fairing (1 or 5) to stabilizer.

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- | | | | |
|----|-------------------------------|----|----------------------|
| 1. | Dorsal Fairing | 6. | Fairing Attach Clips |
| 2. | Clip Nuts | 7. | Clip Nut |
| 3. | Dorsal Fairing Attach Clips | 8. | Screw |
| 4. | Clip Nut Attach Point | 9. | Washer (countersunk) |
| 5. | Horizontal Stabilizer Fairing | | |

Dorsal and Horizontal Fairings
 Figure 53-03

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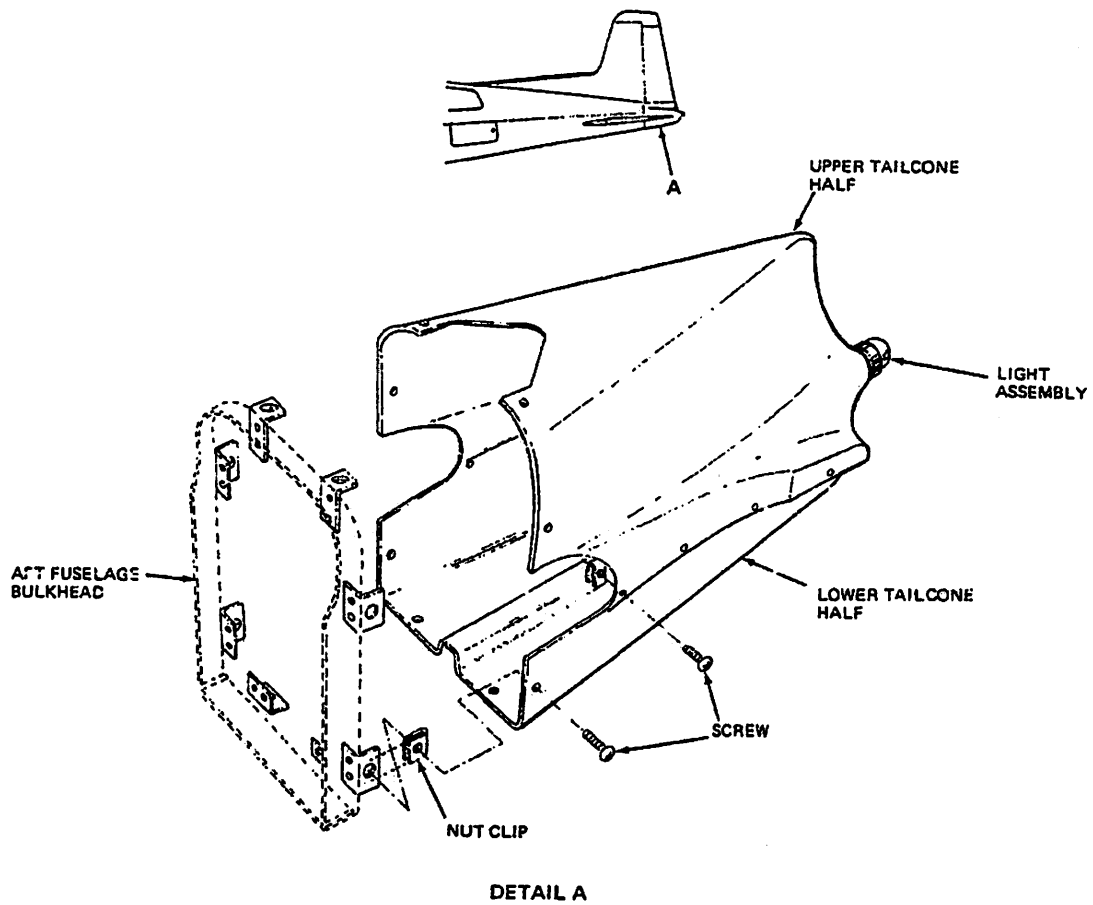
3. Removal/Installation of Tailcone (Reference Figure 53-04)

A. Remove Tailcone

- (1) Remove screws that secure tailcone to aft fuselage.
- (2) Slide tailcone back, disconnect tail light wires, and remove tailcone.

B. Install Tailcone

- (1) Connect tail light wires at aft fuselage bulkhead.
- (2) Perform tail light functional check.
- (3) Position tailcone to fuselage and install attaching screws.



**Tailcone Removal/Installation
Figure 53-04**

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4. Removal/Installation of Access Covers on Aft Fuselage (Reference Figure 53-01)

A. Remove Access Covers

- (1) Remove attaching screws that secure covers to fuselage and remove covers.

B. Install Access Covers on Aft Fuselage

- (1) Position the covers in place on fuselage assuring the upper edges of the covers are positioned under the vertical stabilizer.
- (2) Install attaching screws.

6. Removal/Installation of Brackets, Supports and Attach Fittings

Various brackets, supports, and attach fittings are considered components of the fuselage assembly. The cowling attach brackets mounted on the upper firewall, the battery support bracket mounted on the lower firewall, and the shoulder harness and baggage tie-down attach fittings are secured to the fuselage structure with either screws or bolts. Removal and replacement of these items require only a simple procedure of removing screws or bolts to detach the bracket or attach fitting. Install by positioning bracket or fitting in place and installing attaching screws or bolts.

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CHAPTER 55

STABILIZERS

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STABILIZERS - DESCRIPTION/OPERATION

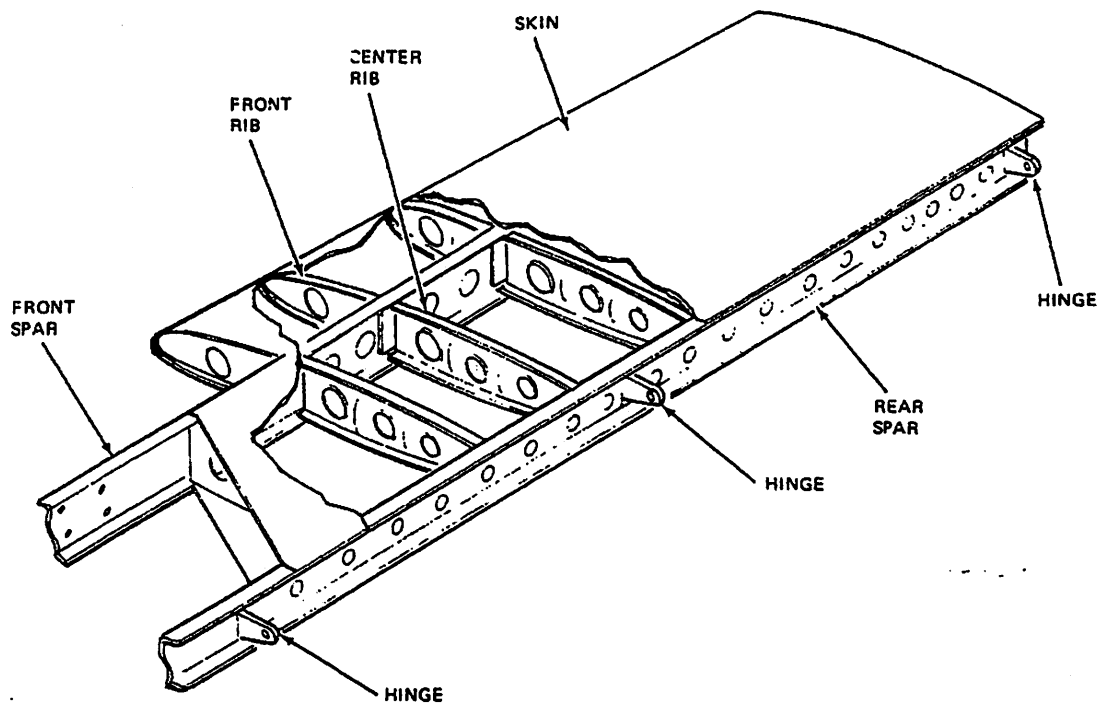
1. General

The horizontal and vertical stabilizers are the fixed empennage structures to which the elevator and rudder are connected. In addition to providing attachment points for the control surfaces, the stabilizers assist in ensuring directional and longitudinal stability of the aircraft.

HORIZONTAL STABILIZERS - DESCRIPTION/OPERATION

1. General

The horizontal stabilizer is of conventional dual spar and rib structure, with the skin bonded to the ribs and spars. The horizontal stabilizer is of constant chord configuration.



**Horizontal Stabilizer
Figure 55-01**

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HORIZONTAL STABILIZERS - MAINTENANCE PRACTICES

NOTE: It is important to inspect the horizontal stabilizer forward spar attach points on the fuselage after a hard landing, wing tip strike, strike to the tail tie-down ring, or after any damage to the empennage. The area should also be inspected prior to installation of the horizontal stabilizer.

1. Horizontal Stabilizer Forward Spar Attach Point Inspection

- (1) Remove the aft fuselage inspection covers below the vertical fin. (Refer to Chapter 53)
- (2) Remove the flashing beacon power supply. (Refer to Chapter 33)
- (3) Through the large lighting hole in horizontal bulkhead (5) use a suitable light and mirror to perform the following inspections: (Refer to Figure 55-02)
 - (a) Inspect spar support angles (1 and 2) for delamination, cracks and buckling above and below stabilizer spar (3). Also inspect the upper flanges of the angles for cracks in or near the bend radii.
 - (b) Inspect the angles for cracks or buckling around stabilizer attach bolts (8).
 - (c) Inspect the lower stiffener in areas (6 and 7) for cracks and/or delamination.
 - (d) Inspect the exterior skins on either side of angles (1 and 2) for cracks.
- (4) If any damage is found, remove stabilizer spar (3) and repair or replace damaged angles (1 and 2) and stiffener (6/7) and any other damage in accordance with Chapter 20 of this manual, Service Kit 125A and/or AC43-13.
- (5) Reinstall the flashing beacon power supply. (Refer to Chapter 33)
- (6) Reinstall the aft fuselage inspection covers below the vertical fin. (Refer to Chapter 53)

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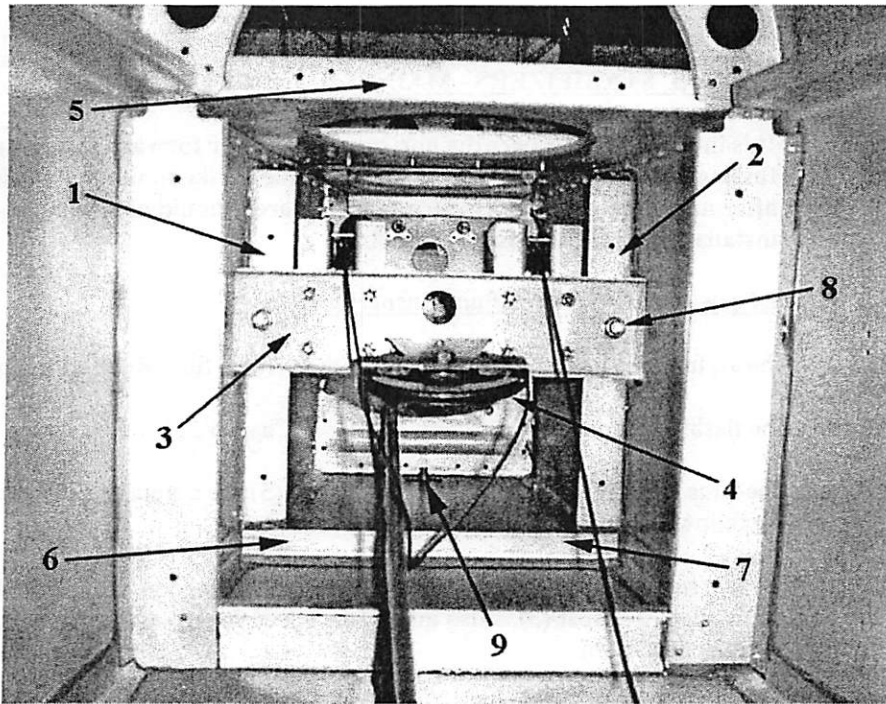


Figure 55-02
Forward Horizontal Support Angles

- | | |
|---|-------------------------------|
| 1. RH Spar Support Angle | 6. Lower Stiffener, RH side |
| 2. LH Spar Support Angle | 7. Lower Stiffener, LH side |
| 3. Horizontal Stabilizer Forward Spar | 8. Spar Attach Bolt |
| 4. Aileron Balance Cable Pulley (reference) | 9. Tail Tie-Down Attach Point |
| 5. Horizontal Bulkhead | |

2. Removal/Installation (Reference Figure 55-03)

A. Horizontal Stabilizer Removal

NOTE: The horizontal stabilizer can be removed as an assembly, with trim tabs and elevator intact, or by sub-assembly removal procedures, whichever is required. If the trim tabs or elevators are being replaced, this can be accomplished without removing the stabilizer. For complete stabilizer assembly removal, the following procedure may be used.

- (1) Remove the tailcone and the aft fuselage inspection covers below the vertical fin. (Refer to Chapter 53)
- (2) Disconnect the elevator control cables and trim linkage. (Refer to Chapter 27)
- (3) Remove the horizontal stabilizer fairings. (Refer to Chapter 53)
- (4) Remove forward mounting bolts and washers (4) on each side of the fuselage.

NOTE: Shim stack-up, if any, between the stub spar and the stabilizer (each side) should be noted to assist in reassembly.

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- (5) Remove the 2 L/H center hinge mounting bolts (8) and washers (9).
- (6) Remove elevator stop bolts (12) and spacers (13).
- (7) Remove spar attach bolts (10) and washers (11).
- (8) Pull the horizontal stabilizer aft and remove it from the aircraft.

B. Horizontal Stabilizer Installation

- (1) Position the horizontal stabilizer to its installed location and check the clearance between the aft spar and the aft fuselage bulkhead. If a gap exists, shim the forward carry through spar forward by installing 5302050-1 shims (maximum of three per side) until the aft spar is flush against the aft bulkhead. (Reference Figure 55-03)

NOTE: The AN6 bolt length may be revised as required.

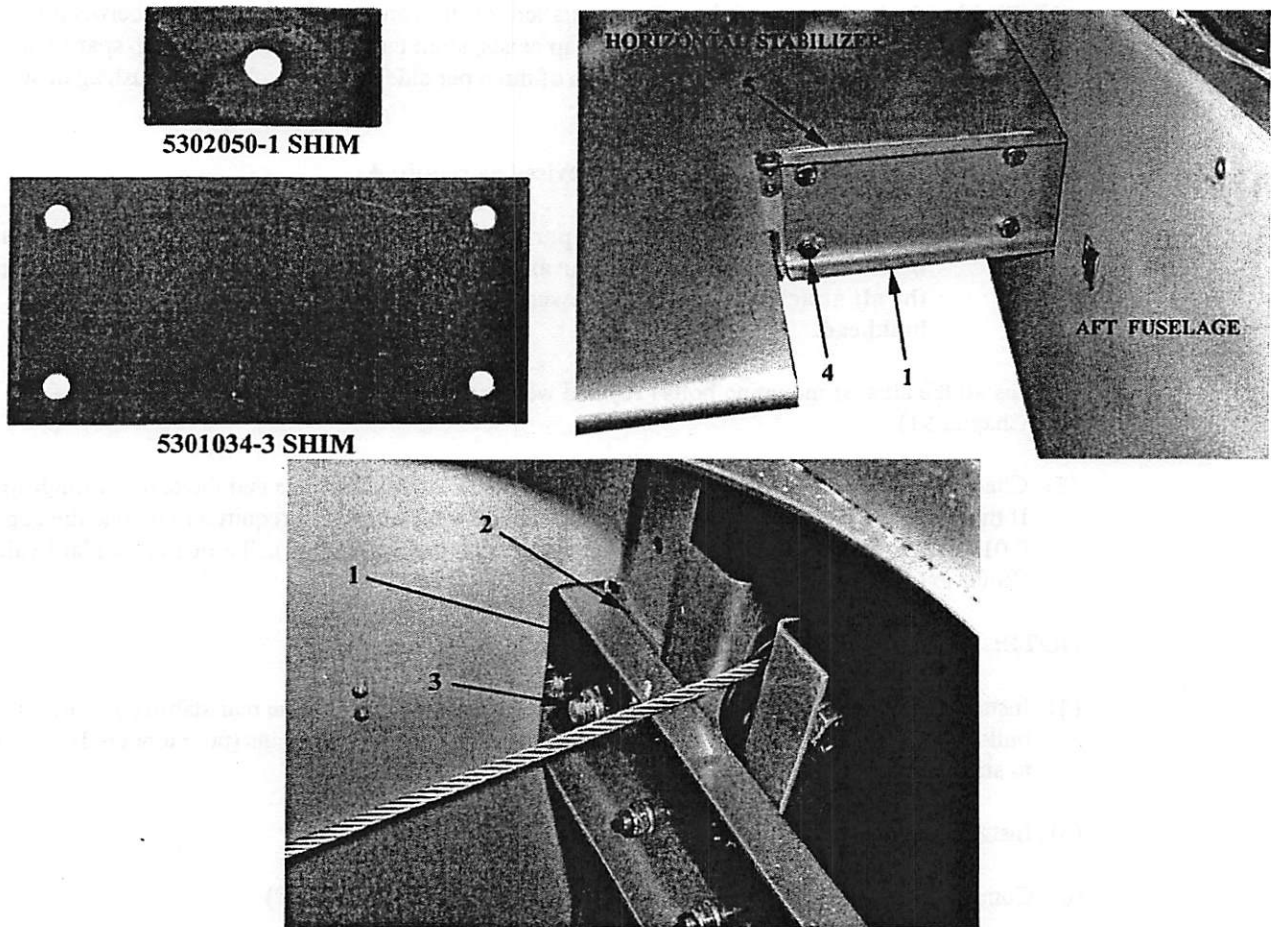
NOTE: If the forward carry through spar is shimmed, install 5302055-5 shims as necessary between the carry through spar and the pulley bracket support assembly to align the aft attach lugs of support assembly (7) flush with the external surface of the aft bulkhead.

- (2) Install the aft spar mounting bolts (10) and washers (11). Torque to standard value. (Refer to Chapter 91)
- (3) Check the clearance between the forward stabilizer spar attach points and the carry through spar. If the gap is greater than 0.010 inch, install 5301034-3 shims (5) as required to reduce the gap to 0.010 inch or less and install forward mounting bolts and washers (4). Torque to standard value. (Refer to Chapter 91)

NOTE: AN4 Bolt (4) length may be revised as required.

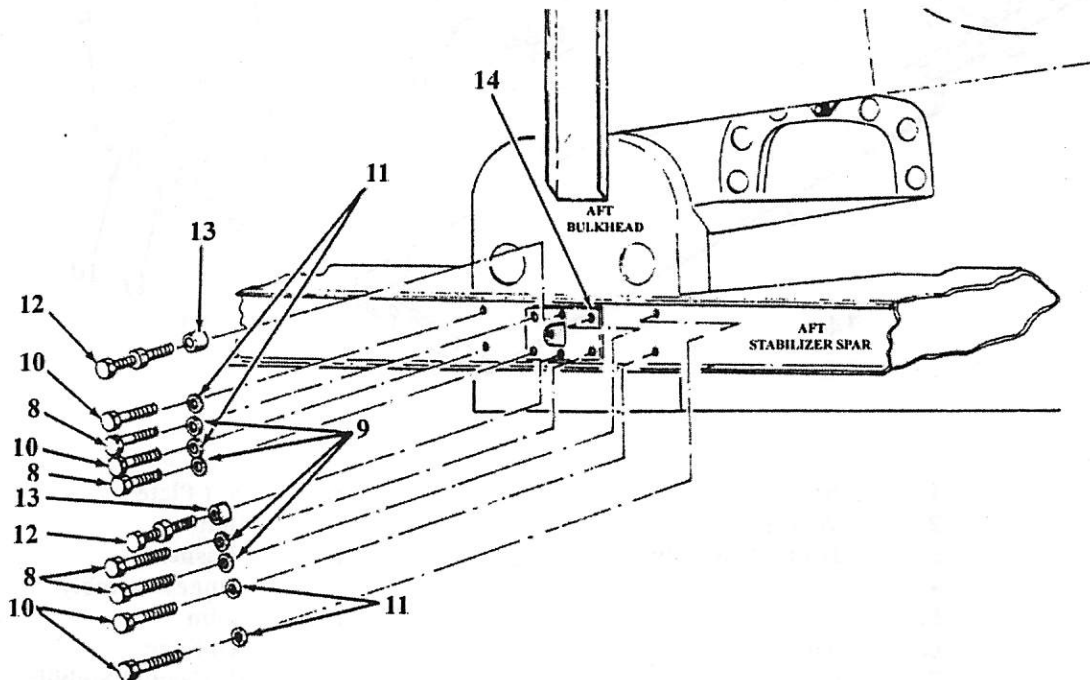
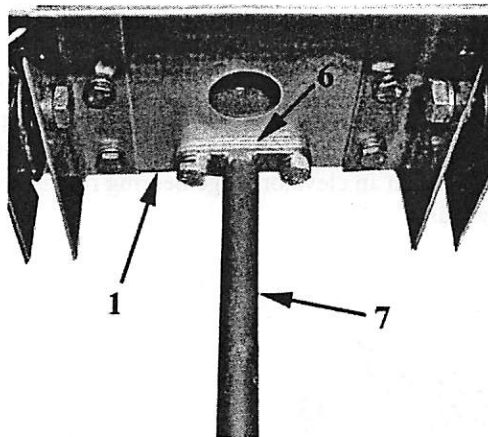
- (4) Install 2 ea. AN4-13A bolts (8) through the left side of hinge (14), the rear stabilizer spar, aft bulkhead and pulley support brace (7) and secure with washers and nuts (not numbered). Torque to standard value. (Refer to Chapter 91)
- (5) Install elevator stops (12) and spacers (13).
- (6) Connect the elevator and trim linkages, and rig. (Refer to Chapter 27)
- (7) Install tailcone, aft fuselage inspection covers and fairings. (Refer to Chapter 53)

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Horizontal Stabilizer Removal / Installation
Figure 55-03
(Sheet 1 of 2)

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- | | |
|------------------------------------|--------------------|
| 1. Carry Through Spar | 8. AN4 Bolts |
| 2. 5302050-1 Shim | 9. Washers |
| 3. AN6 Bolt, Nut and Washer | 10. Bolt |
| 4. AN4 Bolt and Washer | 11. Washers |
| 5. 5301034-3 Shim | 12. Stop, Elevator |
| 6. 5302055-5 Shim | 13. Spacer |
| 7. Pulley Bracket Support Assembly | 14. Inboard Hinge |

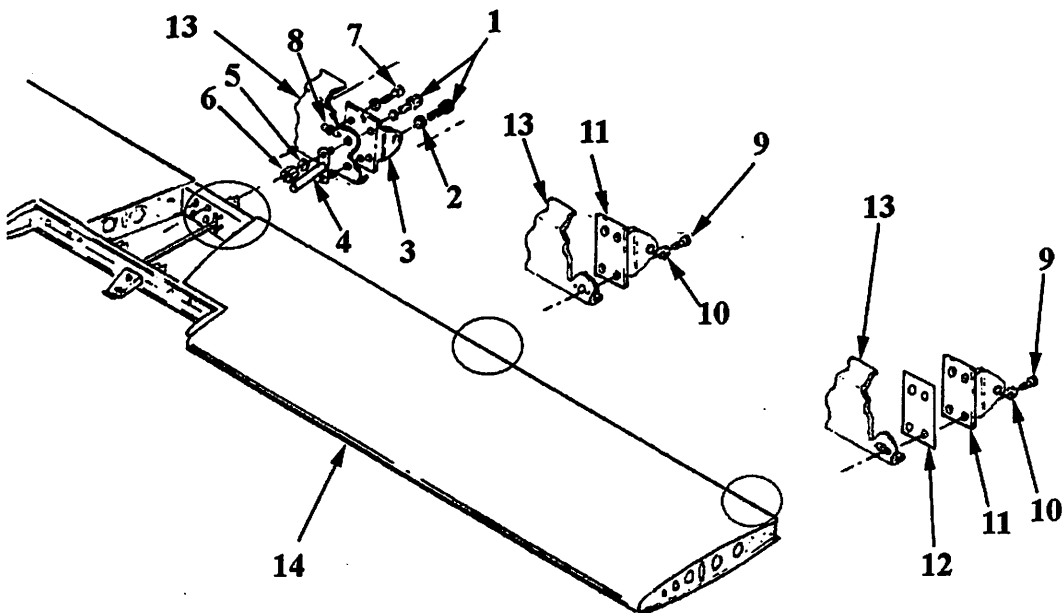
Horizontal Stabilizer Removal / Installation

Figure 55-03
 (Sheet 2 of 2)

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3. Elevator Bearing Removal/Installation (Reference Figure 55-04)

The elevators are attached to the horizontal stabilizer through five hinge bearing assemblies, one outboard on each side, one center on each side and an inboard hinge bearing assembly common to both elevators. The elevator bearings are sealed roller bearings staked into a bearing bracket and considered a single unit. When an elevator hinge bearing requires replacement, the complete assembly must be replaced.



- | | | | |
|----|-----------------------|-----|------------------------------|
| 1. | Bolt | 8. | Nut Plate |
| 2. | Washer | 9. | Bolt |
| 3. | Hinge Assembly | 10. | Washer |
| 4. | Brace | 11. | Hinge Assembly |
| 5. | Washer | 12. | Shim |
| 6. | Nut | 13. | Aft Spar |
| 7. | Bolt | 14. | Horizontal Stabilizer |

**Elevator Bearing Removal/Installation
Figure 55-04**

- A. Remove the elevator as described in Chapter 27, Figure 27-27.
- B. Hinge Bearing Removal

NOTE: The outboard and center hinge bearing assemblies are attached in the same manner.

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- (1) Remove Nuts (6) washers (5) and pull the left two bolts (1) from hinge assembly (3), spar (13) and brace (4).
- (2) Remove the two right side bolts (7), secured by nut plate (8), and remove hinge assembly (3).
- (3) Remove bolts (9) and washers (10) and remove hinge assembly (11) and shim (12) if installed.

C. Hinge Bearing Installation

- (1) If the hinge installation is being accomplished as part of the installation of a new horizontal stabilizer or if the factory shimming setup can not be determined then, align the hinges by installing shims (12) as necessary between hinge assembly (11) and spar (13).
- (2) Locate hinge assembly (11) and shim (12), (if previously installed) on aft spar (13) and install bolt (9) and washer (10). Torque bolts to standard values. (Refer to Chapter 91)
- (3) Locate hinge assembly (3) on aft spar (13) and install right side bolts (7) and washers (2).
- (4) Install left side bolts (1) washers (2 and 5) and nut (6). Torque nut to standard values. (Refer to Chapter 91)

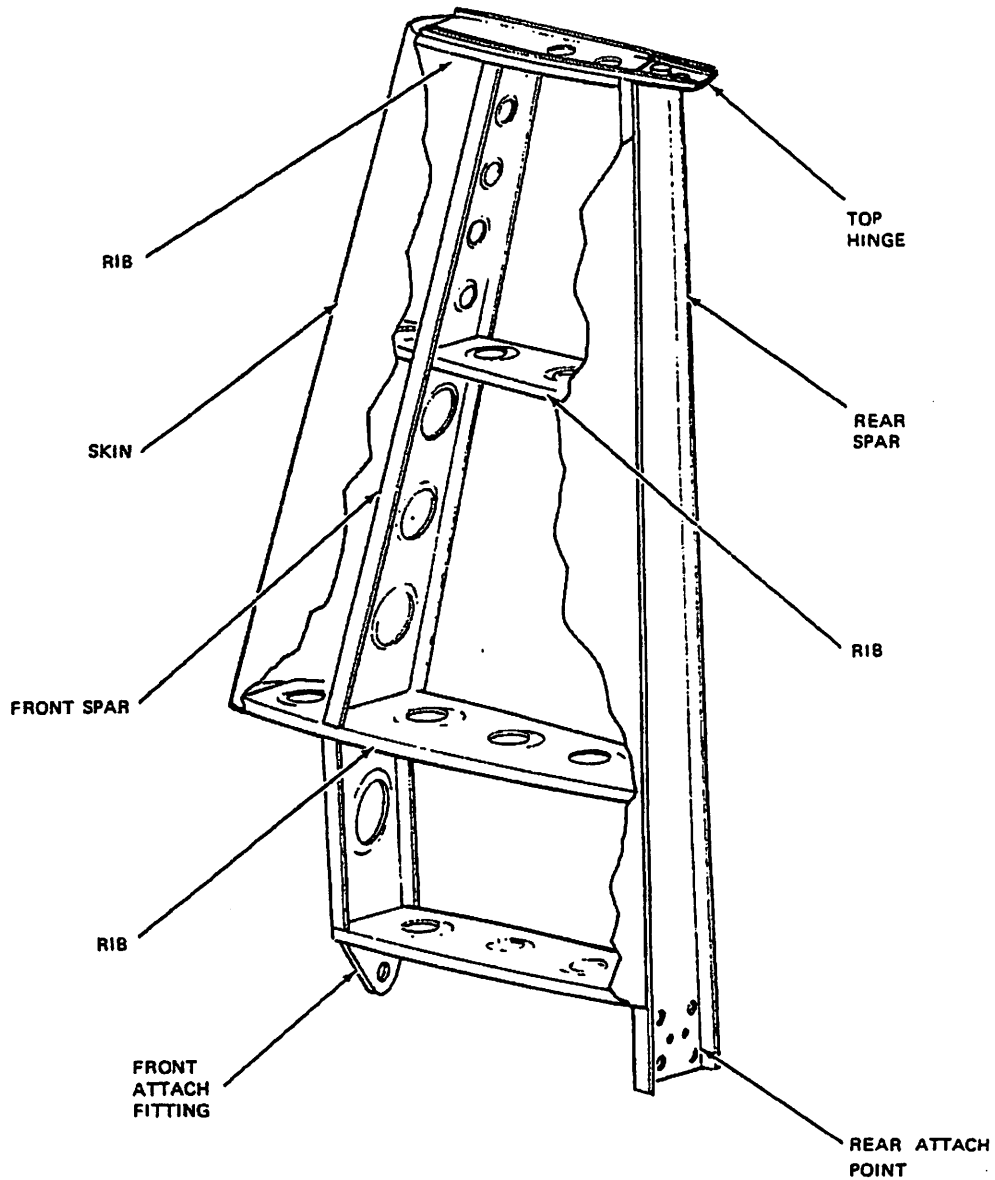
D. Reinstall elevators as described in Chapter 27.

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VERTICAL STABILIZER - DESCRIPTION/OPERATION

1. General

The vertical stabilizer is of conventional dual spar and rib construction, with its skin bonded to the ribs and spars. It has a tapered chord, with its maximum chord at the root, and its minimum chord at the tip.



Vertical Stabilizer
Figure 55-05

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VERTICAL STABILIZER – MAINTENANCE PRACTICES

1. Removal/Installation (Reference Figure 55-06)

A. Vertical Stabilizer Removal

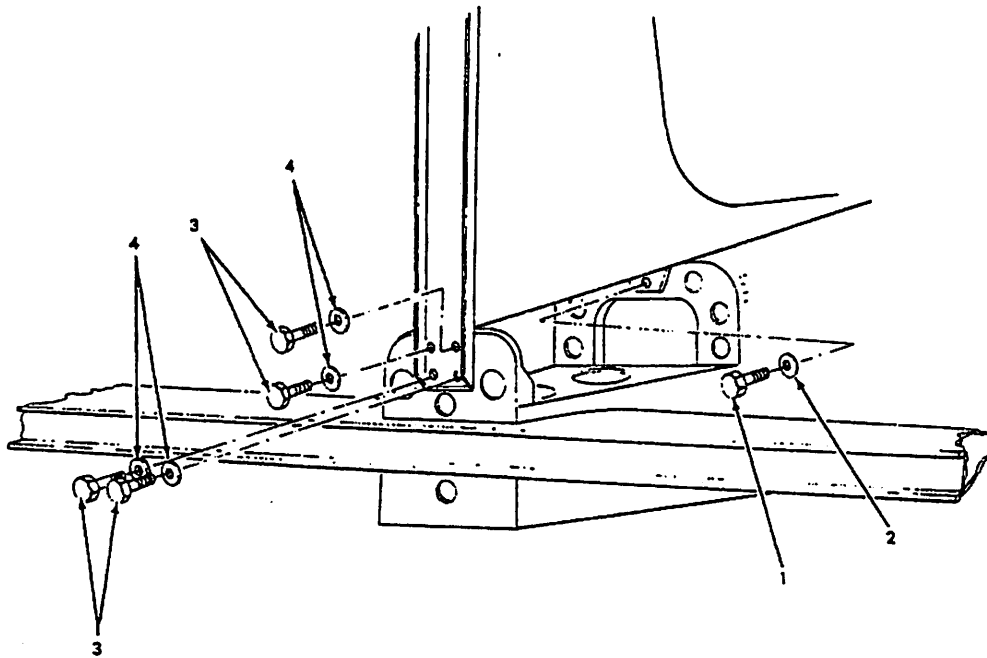
NOTE: The vertical stabilizer can be removed as an assembly with rudder intact, or by a disassembly procedure, whichever is required. If the rudder is being replaced this can be accomplished without removing the vertical stabilizer. Refer to Chapter 27 for rudder removal. For stabilizer and rudder removal as an assembly, proceed as follows:

- (1) Remove the tailcone and the aft fuselage inspection covers. (Refer to Chapter 53)
- (2) Disconnect the rudder cables. (Refer to Chapter 27)
- (3) Remove front attachment bolt (1) and washer (2).
- (4) Remove aft attachment bolts (3) and washers (4).
- (5) Disconnect the antenna and strobe beacon wiring.
- (6) Remove the vertical stabilizer and rudder from the aircraft.

B. Vertical Stabilizer Installation

- (1) Position the vertical stabilizer and rudder on the aircraft so that its rear mounting holes are aligned with those in the fuselage. Secure with rear mounting bolts (3) and washers (4). Torque to standard value. (Refer to Chapter 91)
- (2) Align the hole in the forward mount with the hole in the fuselage. Secure with bolt (1) and washer (2). Torque to standard value. (Refer to Chapter 91)
- (3) Connect the antenna and strobe beacon wiring.
- (4) Connect the rudder cables and rig rudder. (Refer to Chapter 27)
- (5) Install the tailcone, and the aft inspection covers. (Refer to Chapter 53)

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**1. Front Attach Bolt
2. Washer**

**3. Aft Attachment Bolts
4. Washers**

**Vertical Stabilizer Removal/Installation
Figure 55-06**

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CHAPTER 56

WINDOWS

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WINDOWS-DESCRIPTION

1. General

The windshield, canopy windows, and aft fuselage cabin windows are constructed of Plexiglas.

2. Windshield

The Plexiglas windshield and frame assembly are bonded together and serviced as a single unit. The windshield assembly is attached to the forward fuselage with screws and sealant.

3. Canopy and Aft Fuselage Cabin Windows

The canopy and aft fuselage cabin windows are held in position by retaining strips. Sealing of the windows consists of a sealing compound used along with a felt seal around the windows edges.

WINDOWS-MAINTENANCE PRACTICES

1. Windshield Removal/Installation (Reference Figure 56-01)

A. Windshield Removal

- (1) Remove glareshield and instrument deck assembly.
- (2) Remove speaker cover assemblies.
- (3) Remove screws (5), washer (3) and nut (4) securing the windshield to the forward fuselage.
- (4) Remove screws (5), washers (3) and nut (4) where windshield bow is secured to the fuselage assembly.
- (5) Remove screws (4), washer (3) and bolt (2) that attach the windshield bow support (8) to the fuselage and remove the windshield from the aircraft. A thin blade putty knife may be used to separate the windshield from the airframe.
- (6) Remove adhesive residue from upper forward fuselage assembly.

B. Windshield Installation

- (1) Make sure faying surface of windshield and upper forward fuselage assembly are clean and dry.
 - (a) The Plexiglas faying surface may be cleaned with a cloth moistened with aliphatic naphtha or alcohol.
 - (b) For preparation of the forward fuselage faying surface, see (6) in Paragraph 1 above.
- (2) With the faying surface of the windshield clean and dry, apply PR 1425B sealant to the faying surface of the windshield and the upper forward fuselage assembly. Excess sealant may be wiped off after the joint is mated.

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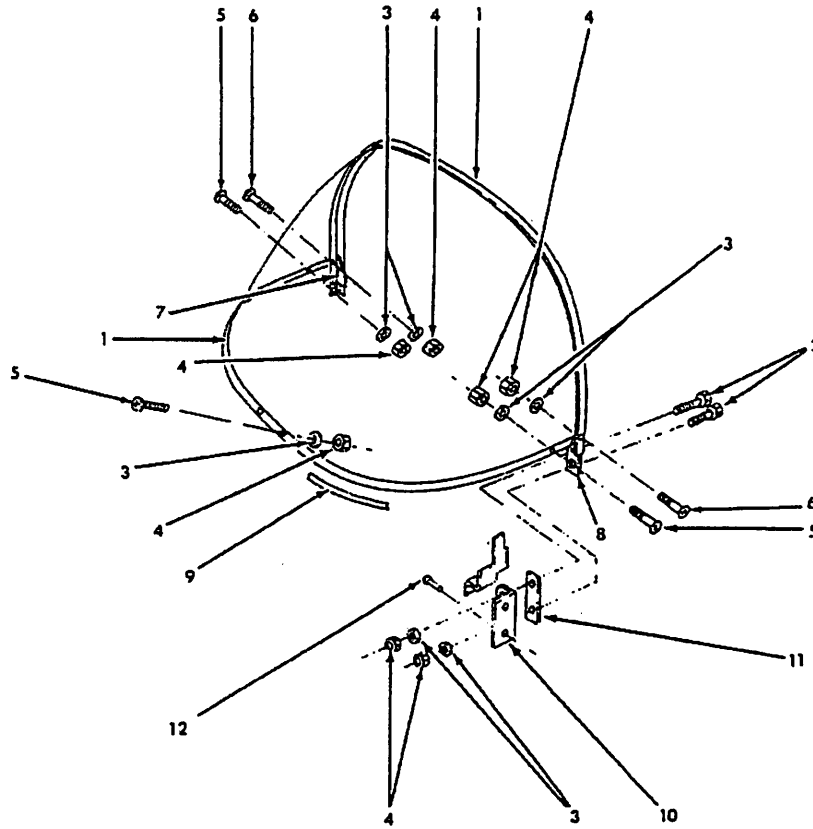
- (3) Align the hole at the bottom of the windshield bow support with the hole in the bracket. Install bolts (2), washers (3), and nuts (4) that attach the windshield bow support (8) to the bracket (10).

NOTE: For new windshields, position the bow vertically parallel with the forward canopy bow in alignment with the canopy contour and carefully match drill the mounting holes (0.193 inches in diameter) through the Plexiglas. Remove the windshield from the aircraft and open the holes in the plexiglas to 0.312 inch then countersink the holes to 0.040"x 100°. Realign the windshield in the aircraft as in (3) above.

CAUTION: WHEN DRILLING THE HOLES THROUGH THE PLEXIGLAS, EXERCISE CARE TO PREVENT CRACKING THE WINDSHIELD OR ELONGATING THE MOUNTING HOLES.

- (4) Install screws (6) washers (3) and nuts (4) when the windshield bow is secured to the fuselage assembly.
- (6) Install screws (5), washers (3) and nuts (4) securing the windshield to the forward fuselage and torque 8 to 12 inch-pounds.

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- | | |
|------------------------|------------|
| 1. Windshield Assembly | 7. Rivet |
| 2. Bolt | 8. Support |
| 3. Washer | 9. Bracket |
| 4. Nut | 10. Shim |
| 5. Screw | 11. Rivet |
| 6. Screw | |

**Windshield Removal/Installation
Figure 56-01**

1. Removal/Installation of Aft Fuselage Window

A. Aft Fuselage Windows Removal

- (1) Remove aft fuselage interior molding. (Refer to Chapter 25)
- (2) Remove screws from the five retaining strips mounted around the edge of the window and remove the window.
- (3) Remove the old felt seal from the windows edge.

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- (4) Remove sealant from the fuselage area where the window was mated.

B. Aft Fuselage Window Installation

- (1) Clean the area around the edges of the window where the adhesive tape seal is to be applied. Use a cloth moistened with aliphatic naphtha.
- (2) Apply felt seal around the window edges.
- (3) Apply PR 1425 or equivalent sealant by hand to the fuselage area where the window is to be mated.
- (4) Place the window on the fuselage-mating surface and install five retaining strips around the edges of the window. If sealant flows out after joint is mated, the excess should be wiped off.
- (5) Install aft fuselage molding. (Refer to Chapter 25)

2. Remove/ Installation Canopy Window

For canopy window removal and installation procedures, refer to Chapter 52.

3. Cleaning

A. Windshield and Window Cleaning

**CAUTION: DO NOT USE GASOLINE, ALCOHOL, BENZINE, ACETONE,
MEK, OR GLASS WINDOW CLEANER ON PLEXIGLAS.
THESE FLUIDS WILL DAMAGE THE PLEXIGLAS MATERIAL.**

- (1) If large deposits of mud and/or dirt have accumulated on the Plexiglas, flush the area with clean water and hand rub to dislodge dirt and/or mud to avoid scratching the Plexiglas.
- (2) Wash the Plexiglas with soap and water. Use a sponge or heavy wadding of a soft cloth. Do not rub, as the abrasive action with the dirt and mud residue will cause surface scratches.
- (3) Grease and oil spots may be removed with a soft cloth soaked in mineral spirits.
- (4) After cleaning, wax the Plexiglas surface with a thin coat of hard polish or wax, then buff with a soft cloth.
- (5) Jeweler's rouge or a commercially available scratch repair kit is recommended for the removal of scratches or marring. Follow the rouge manufacturer's directions, apply wax, and buff.

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CHAPTER 57

WINGS

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WINGS - DESCRIPTION

1. General

The wings consist of all-metal structures bonded to ribs and incorporate the ailerons, flaps, fuel tanks, fuel sump tanks and wing tip assemblies. The total aircraft wingspan is 31 feet and 6 inches.

Each wing half consists of two assemblies, the inner and outer wing panels. These panels are bolted together and each can be removed and replaced separately. The wing halves are bonded around tubular spars that attach to the main spar located in the fuselage.

2. Wing Root Fairing

The wing root fairing is located between the wing and fuselage and provides a smooth transition of the wing assembly to the fuselage. The wing root fairing also encloses the upper main landing gear attaching brackets, fuel sumps and lines to the fuel tanks.

3. Wing Tips

The wing tips are the outermost part of the wing assembly. They blend the wing leading edge and trailing edge into a single unit. The wing tips house the aileron balance weight assemblies and contain the navigation and landing lights.

WINGS - MAINTENANCE PRACTICES

1. Wing Removal/Installation (Reference Chapter 57)

A. Wing Removal

NOTE: The wing halves can be removed as assemblies with the wing tips, ailerons, and flaps intact, or they can be removed by a disassembly procedure, whichever is required. If the wing is being removed for transportation or storage, use the following procedure. If it is being removed for sectional repair, it may be advantageous to remove the wing tip (See Chapter 57 for Wing Tip Removal and Wing Tip Installation), aileron (Refer to Chapter 27, Aileron Removal), and flap (Refer to Chapter 27, Flap Removal), prior to the following procedure.

- (1) Remove the screws (1) attaching the access panel (2) to the wing root (3). (Figure 57-01)
- (2) From within the wing root, remove the two shoulder bolts (1) and washers (2). (Figure 57-02)
- (3) Disconnect the airspeed pitot line located in the wing tip (left side only).
- (4) Drain the fuel from the main tank and sump and disconnect the fuel lines to the wing root. (Refer to Chapter 28)
- (5) Disconnect the fuel gauge wire at each wing root.
- (6) Tilt the rear seat forward and remove the access cover.

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CAUTION: DO NOT DISTURB THE CABLE TURNBUCKLES OR CONTROL SURFACE RIGGING.

- (7) Remove the nut and bolt attaching the aileron horn to the torque tube and remove the horn from the torque tube by rotating and sliding from the end of the tube. (Figure 57-03)
- (8) Disconnect the flap drive linkage from the flap torque tube horn (1) assembly located under the rear seat. (Figure 57-04)
- (9) Remove the two special drive bolts (2) from the flap torque tube bellcrank (3). Loosen the bellcrank clamp bolt and slide the bellcrank from the torque tube. (Figure 57-04)

CAUTION: EXERCISE CARE TO PREVENT FLAP "OVERTRAVEL" WHICH MAY RESULT IN SCRATCHING THE PAINT OR SKIN.

- (10) Place two men at the wing tip to support wing weight and to be ready to pull wing out.
- (11) Place one man inside the aircraft to make sure the torque tubes do not bind.
- (12) Place one man at the inboard leading edge and another man at inboard trailing edge and rotate the wing slightly clockwise and counterclockwise until the wing is free of the spar. Pull wing outboard from the fuselage far enough to disconnect the wiring at the plug inside the spar / spar carry-thru. The pitot line will slide out when the wing is removed.

B. Wing Disassembly (Figure 57-02)

NOTE: Before disassembly of the wing, remove the wing tip (See Chapter 57 for Wing Tip Removal and Wing Tip Installation.), the aileron (Refer to Aileron Removal, Chapter 27.), and the flaps. (Refer to Flap Removal, Chapter 27.)

- (1) Locate the trailing edge end of the wing seam strap (3) joining the inner and outer wing panels. At the outboard side of the wing seam strap, drill out the rivets (one at the top of the wing, one on the under side of the wing).
- (2) Remove four bolts (4) from the splice plate assembly (5) at the junction of the inner and outer panels.
- (3) Remove two outboard access covers from bottom side of the inner wing panel.
- (4) Through the access holes, disconnect the fuel vent lines.
- (5) Through the access holes, remove the shoulder bolts (6) and washers (7).
- (6) Work the wing panels partially apart by rotating the panels slightly clockwise until the navigation light wires and stall warning switch wires (right wing) are exposed. Cut these wires near the center for easier splicing on reassembly.
- (7) After disconnecting the wiring continue rotating the wing panels slightly to separate.

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C. Wing Reassembly (Figure 57-02)

- (1) Spray the wing panel spar-mating surface with a solid film lubricant and rub general purpose lubricating oil over the inner wing panel spar-mating surface. Approved solid film lubricants are:
 - (a) McLube 1708 by McGee Chemical Co., Inc.
 - (b) Lube-Lok 5396 by Allen Aircraft Products, Inc.
- (2) Work the inner and outer wing panel spars together approximately 3 inches.
- (3) Slide a short length of shrink tubing over each wire and splice wires with quick-connects.
- (4) Slide shrink tube over connections and shrink to a tight sealing fit.
- (5) Continue sliding the wing panels together, using caution to assure the ABS plastic spacer under the splice strap (3), slides over the wing skin.
- (6) When the spar attach bolts are aligned, install the shoulder bolts (6) and washers (7). Torque the spar attach bolts 60 to 85 inch pounds.
- (7) Install splice plate assembly (5) at the junction of the inner and outer panels with four bolts (4) and washers (9). Torque bolts 20 to 25 inch pounds.
- (8) Through the access hole, connect the fuel vent lines.
- (9) Install access covers (10) with screws (11).
- (10) Install the rivets in the trailing edges of the wing seam splice strap on the top and bottom of the rear spar.

D. Wing Installation

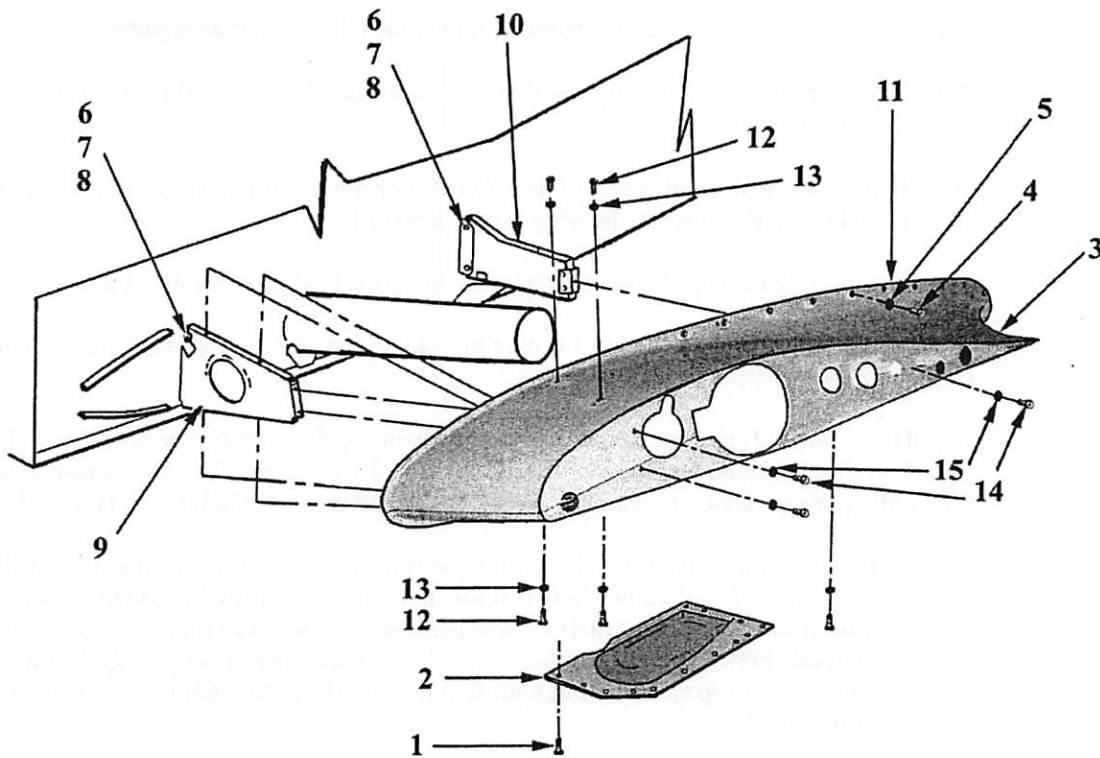
- (1) Spray the spar mating surfaces with a solid film lubricant and rub general purpose lubricating oil over the fuselage carry-through spar.
- (2) Tilt the rear seat forward and remove the access cover to gain access to the flap and aileron control assemblies. Place one man inside the aircraft to adjust the aileron and flap tube assemblies when inserted through the wing root and fuselage. A cord should be routed through the spar and attached to the pitot tube to assist in guiding the pitot tube through the spar as the wing is installed.
- (3) Place one man at the wing tip, one man at the inboard leading edge, and another man at the inboard trailing edge.
- (4) With all three men lifting, lift the wing and align the center spar with the wing spar and align the torque tube assembly with aft hole in the wing root.
- (5) Carefully install wing spar to the center spar, reconnect wiring in spar. A man is required inside the aircraft to align flap tube to flap bearing and aileron tube to aileron horn assembly.

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- (6) Prior to installation of shoulder bolts, shake wing vertically and horizontally to check for looseness. If looseness is noted at the wing tip, proceed with the following steps:
 - (a) Apply a 25 pound down load at the wing tip and measure gap at top of spar, between center spar and wing spar, using a wire type feeler gauge. If gap exceeds 0.016 inch, shim with aluminum or copper shim stock to reduce the gap to no more than 0.008 inch (un-shimmed gap less shim thickness) as described in steps (b) through (f) below. (See Figure 57-05)
 - (b) Sand edges of the shim(s) down to remove sharp corners.
 - (c) Place the shim(s) on the top and/or bottom of the inboard spar as required.
 - (d) Bend approximately 1.25 inches of the outboard end of the shim(s) over the ends and inside the inboard spar.
 - (e) Bend over the inboard end(s) of the shim(s) so that this portion will wrap over the end of the outboard wing spar when the wing is fully installed.
 - (f) Before wing installation, coat surfaces of shim(s) with solid film lubricant.
 - (7) Slide the flap torque tube bellcrank (3) over the flap torque tube. Tighten bellcrank clamp bolt. (Figure 57-04)
 - (8) Install drive bolts (2) making sure they are properly indexed in torque tube hole, and tighten. The drive bolt should extend into the torque tube 0.030 to 0.060 inches. This adjustment is made by the addition or subtraction of washers, NAS1149F0432P under the bolt head. (Figure 57-04)
- NOTE:** Check alignment of the aileron torque tube inside the flap torque tube at the flap bellcrank. The distance between the inner surface of the flap torque tube and the aileron torque tube at their closest point should be 0.120 inch or greater. The distance between the tip of the flap drive bolt and the aileron torque tube must be 0.060 inch or greater throughout flap travel. Refer to Chapter 27 for torque tube adjustment.
- (9) Connect flap drive linkage to flap torque tube horn assembly.
 - (10) Install the nut and bolt securing the aileron horn to the torque tube. (Figure 57-03)
Torque bolt 50 inch pounds maximum.
 - (11) Connect all fuel gauge wiring and fuel lines in the wing root.
 - (12) Connect the airspeed pitot line located in the wing tip (left side of aircraft).
 - (13) Through access panel (2, Figure 57-01) on wing root fairing, install shoulder bolts and washers (1 and 2, Figure 57-02). Torque shoulder bolts to 60 to 85 inch pounds.
 - (14) Install the screws (1) attaching the access panel (2) to the wing root (3). (Figure 57-01)

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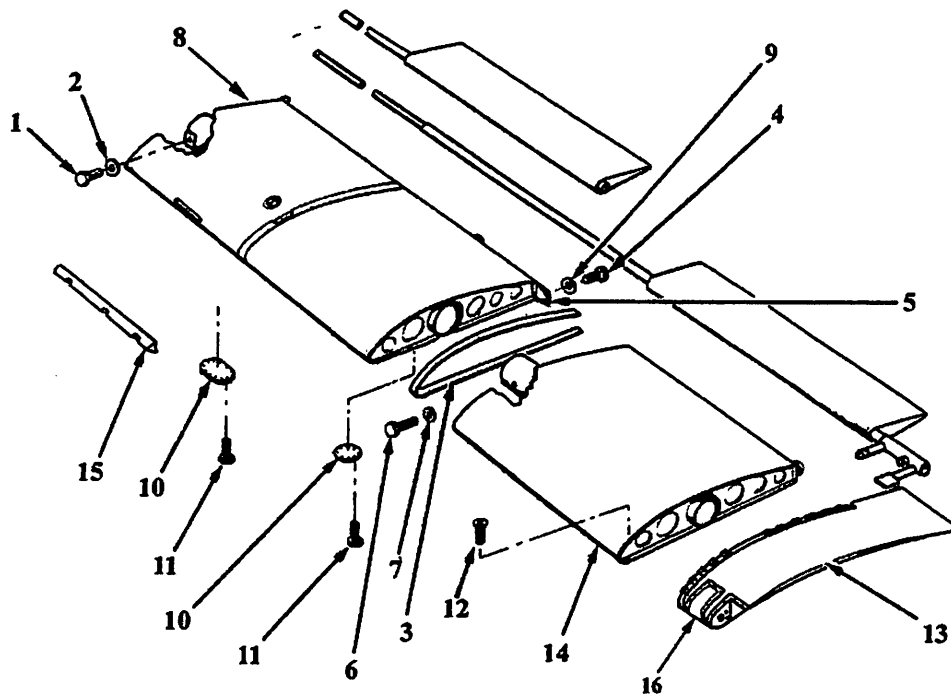
NOTE: If the original wing is replaced by a new wing, the outboard stall strip (Item 15), Figure 57-02) should be installed 64.25 ± 0.25 inches from the inboard edge of the wing, centered on a line drawn 0.31 inches up from the flat surface on the bottom side of the wing and taped in place. The aircraft should be test flown to "fine tune" the wing. Perform a series of stalls at idle and move the stall strip slightly up or down (maximum 1/8 inch), as required, to obtain a straight ahead stall. Then rivet the strip in place.



- | | | | |
|----|-------------------|-----|---------|
| 1. | Screw | 9. | Support |
| 2. | Access panel | 10. | Support |
| 3. | Wing Root Fairing | 11. | Seal |
| 4. | Screw | 12. | Screw |
| 5. | Washer | 13. | Washer |
| 6. | Bolt | 14. | Bolt |
| 7. | Washer | 15. | Washer |
| 8. | Spacer | | |

**Wing Root Installation (L.H.)
Figure 57-01**

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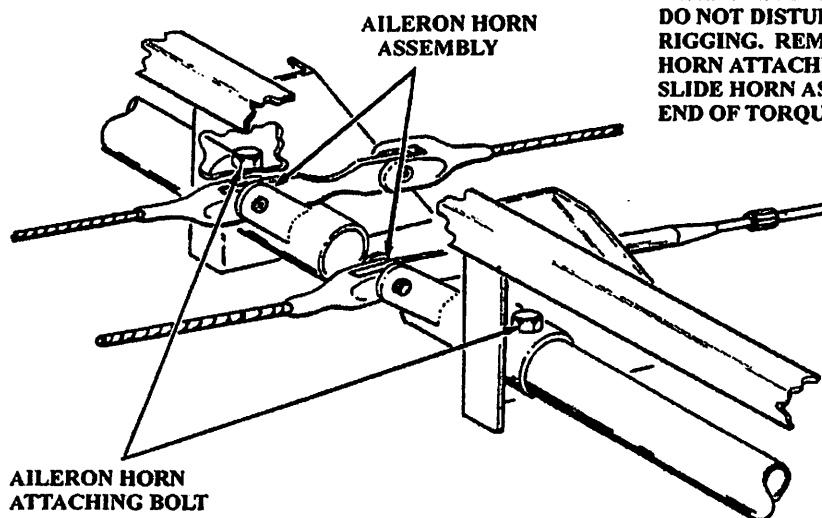
- | | | | |
|----|-----------------------|-----|----------------------|
| 1. | Shoulder Bolt | 9. | Washer |
| 2. | Washer | 10. | Cover |
| 3. | Strap and Spacer | 11. | Screw |
| 4. | Bolt | 12. | Screw |
| 5. | Splice Plate Assembly | 13. | Wing Tip Assembly |
| 6. | Shoulder Bolt | 14. | Outer Panel Assembly |
| 7. | Washer | 15. | Stall Strip |
| 8. | Inboard Wing Panel | 16. | Landing Light |

Wing Half (L.H.)
Figure 57-02

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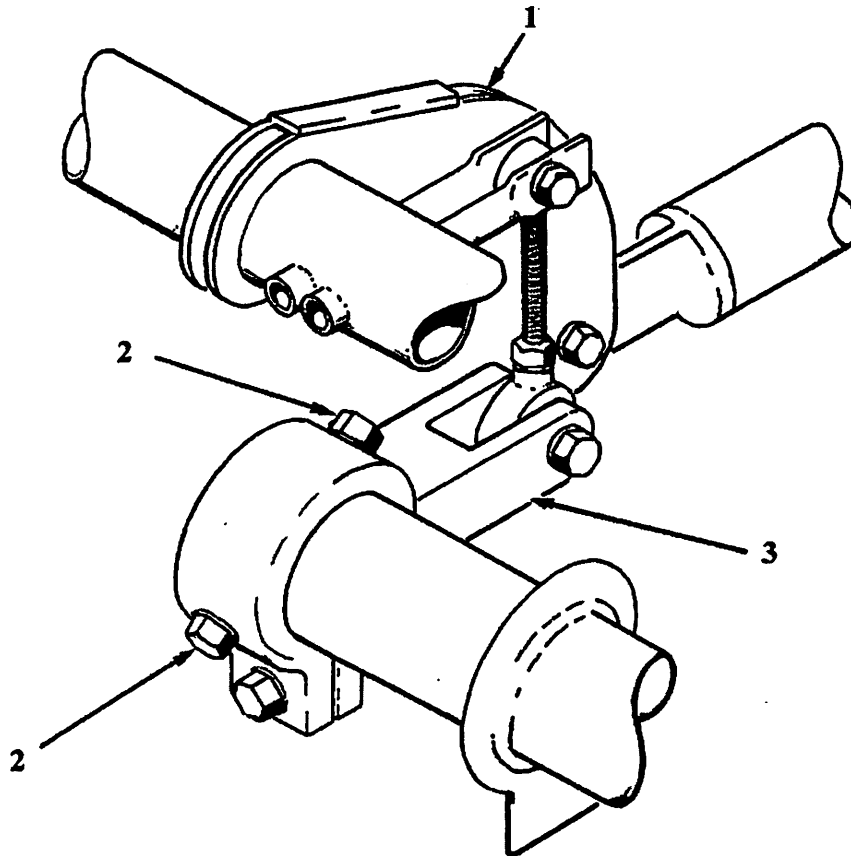
NOTE

**WHEN REMOVING AILERONS,
DO NOT DISTURB AILERON
RIGGING. REMOVE THE AILERON
HORN ATTACHING BOLT AND
SLIDE HORN ASSEMBLY FROM
END OF TORQUE TUBE.**



**Aileron Torque Tube Horn Assemblies
Figure 57-03**

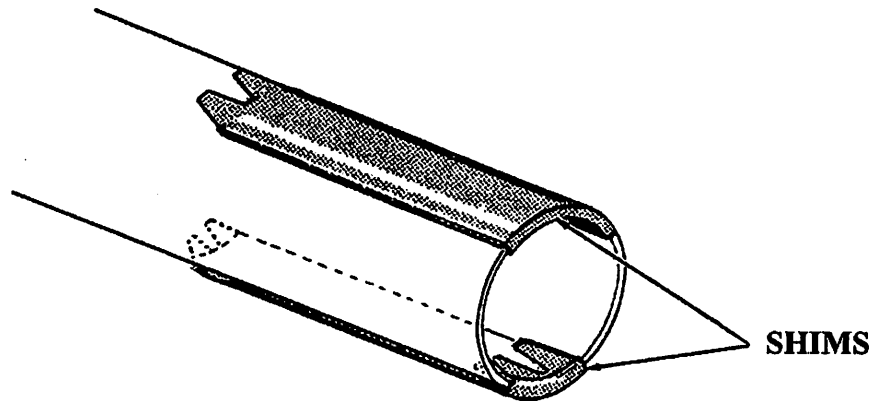
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- 1. Flap Torque Tube Horn
- 2. Special Drive Bolts
- 3. Flap Torque Tube Bellcrank

**Flap Drive Assembly
Figure 57-04**

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**Shim Installation
Figure 57-05**

2. Wing Root Removal/Installation (Reference Figure 57-01)

A. Wing Root Removal

- (1) Remove wing, per this chapter.
- (2) Remove screws (12) and washers (13) on the top and bottom surfaces of wing root (3).
- (3) Remove bolts (14) and washers (15) from the side face of the wing root.
- (4) Remove screws attaching interior upholstery side panels to fuselage.
- (5) Remove aft fuselage inner trim paneling. (Refer to Chapter 25)
- (6) Remove screws (4) and washers (5) from the inboard edge of the wing root and pull the wing root from the fuselage.

B. Wing Root Installation

- (1) Place seal in position between wing root (3) and fuselage.
- (2) Align holes in wing root with holes in support brackets (9 and 10) and align holes in the inboard edge of the wing root with holes in the fuselage side.
- (3) Apply Loctite to screw threads and install screws (12) and washers (13) on the top and bottom surface of the wing root.

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- (4) Install bolts (14) and washers (15) to the side face of the wing root.
- (5) Apply Loctite to screw threads and install screws (4) and washers (5) to wing root inboard edge.
- (6) Install wing, per this chapter.
- (7) Install screws attaching interior upholstery side panels to fuselage.
- (8) Install aft fuselage inner trim paneling. (Refer to Chapter 25)

3. Wing Tip Removal/Installation (Reference Figure 57-02)

A. Wing Tip Removal

- (1) Remove screws (12) from the outboard edge of the outer wing panel.
- (2) With aileron in the neutral or down position to clear the balance weight, carefully slide wing tip (13) from outer wing panel (14) until the landing, navigation and strobe light wires come into view.
- (3) From inside the wing tip, disconnect the navigation landing and strobe light wires and pull the wing tip from the outer wing panel.

B. Wing Tip Installation

NOTE: Check condition and location of all clip nuts prior to wing tip installation.

- (1) Align wing tip (13) with the outboard edge of outer wing panel (14) and connect landing, navigation and strobe light wires.

NOTE: Assure positive clearance of the aileron balance weight.

- (2) Secure wing tip to outer panel with screws (12).

4. Wing and Center Spar Repair

Enlarged or elongated mounting holes in the wing spar and center spar and the resulting deformation or wear in the shoulder bolts (1, Figure 57-02) may result in excessive play or rocking at the junction. The maximum allowable diameter on mounting holes in the wing and center spar at this junction is 0.380 inch.

If either mounting hole exceeds the above dimension, the following repair is acceptable from a structural standpoint.

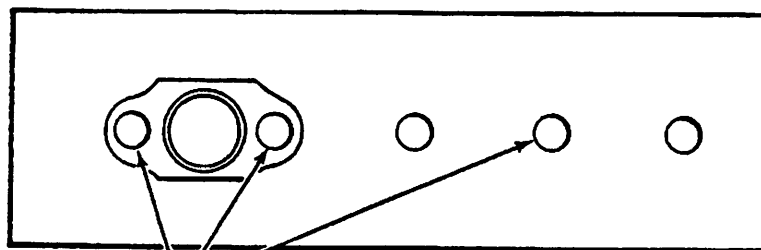
NOTE: If both sets of mounting holes in one wing are to be repaired, complete the repair on one set of mounting holes before beginning the other to maintain proper alignment.

- (1) Remove the wing and wing root per this chapter.
- (2) Remove the rivets and the spacer assembly containing the nut plate from the inboard spar.
- (3) Install the wing on the airplane and install the bolt in the remaining nut plate to ensure proper alignment.

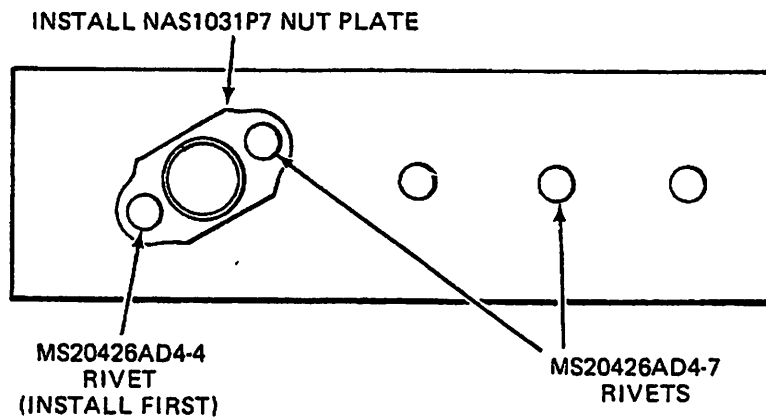
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- (4) Drill and ream the mounting holes in the wing and center spar to 0.4375 / 0.4395 inch.
Remove the wing from the airplane.
- (5) Modify the spacer assembly as shown in Figure 57-06.
- (6) Install the modified spacer assembly in the wing spar and secure with MS20426AD4-12 rivets.
- (7) Install the wing using AN7 or AN177 bolt of suitable length in the modified spacer assembly.

5102342-501
SPACER ASSEMBLY



REMOVE RIVETS AND
NAS1031P5 NUT PLATE



INSTALL NAS1031P7 NUT PLATE

MS20426AD4-4
RIVET
(INSTALL FIRST)

MS20426AD4-7
RIVETS

NOTE: Rotate P7 nut plate approximately as shown to allow sufficient rivet edge clearance. Drill 0.128 / 0.133 holes. Countersink 100° X 0.242 diameter on the opposite side. Secure nut plate with rivet types indicated above.

Spacer Assembly Modification
Figure 57-06

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CHAPTER 61

PROPELLER

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PROPELLER ASSEMBLY - DESCRIPTION/OPERATION

1. General

The AG-5B aircraft is equipped with a two blade, fixed-pitch, aluminum alloy propeller manufactured by Sensenich Propeller Co. Lancaster, Pa. Part numbers for the three approved propeller are 76EM8S10-0-61, 76EM8S10-0-63 and 76EM8S10-0-65. The last two digits of the propeller part number designate the propeller blade pitch.

The propeller assembly consists of the propeller, spacer, the spinner, and attaching hardware. The spinner assembly consists of a formed aluminum spinner, and two aluminum support bulkhead assemblies to which the spinner is secured by screws and washers.

CAUTION: DO NOT MOVE THE AIRCRAFT ON THE GROUND BY PUSHING ON THE SPINNER. STORE THE AIRCRAFT WITH THE PROPELLER IN THE VERTICAL POSITION TO PREVENT WATER ACCUMULATION IN THE SPINNER AND SUBSEQUENT FREEZING IN COLD WEATHER.

DO NOT OPERATE THE ENGINE WITH ICE ON OR INSIDE THE SPINNER.

PROPELLER ASSEMBLY - MAINTENANCE PRACTICES

1. Servicing

Keep the propeller clean and free from stains or foreign matter. Continued propeller care will aid in preventing corrosion, especially in coastal regions. Refer to this chapter for cleaning procedure and materials.

2. Propeller Removal/Installation

A. Propeller Removal (Reference Figure 61-01)

- (1) Prepare a suitable padded support for the propeller. The propeller should be supported as close to the hub as possible.

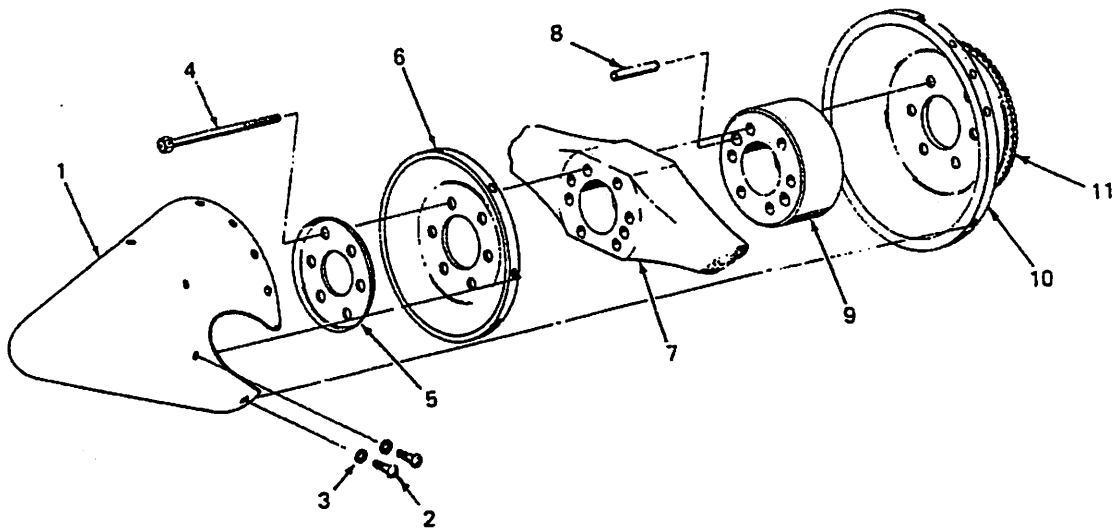
CAUTION: SUPPORTING THE PROPELLER NEAR THE TIPS MAY RESULT IN DAMAGE.

- (2) Prepare the aircraft for safe maintenance. Place the MASTER and MAGNETO switches in the OFF position. Make sure the airplane is grounded. Set the mixture control to the idle cutoff position.

CAUTION: WHEN WORKING WITH THE PROPELLER, ALWAYS TREAT IT AS THOUGH THE MAGNETOS ARE ON. STAND CLEAR IF NECESSARY TO ROTATE THE PROPELLER FOR ANY REASON. ROTATION OF THE PROPELLER SHOULD BE BACKWARDS (COUNTER CLOCKWISE AS VIEWED FROM THE PILOTS SEAT) TO PREVENT THE ENGINE FROM STARTING. A FAULTY GROUND ON EITHER MAGNETO COULD CAUSE THE ENGINE TO START IF ROTATED IN ITS NORMAL DIRECTION OF OPERATION.

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- (3) Remove screws (2) and washers (3) securing spinner (1) to forward bulkhead assembly (6) and aft bulkhead assembly (10). Remove the spinner (1) by sliding it forward.
- (4) Remove safety wire from bolts (4). Provide support for propeller (7) and remove bolts (4) doubler (5), and forward bulkhead (6). Remove propeller (7) and aft bulkhead assembly (10). Place propeller on a padded surface with the spacer (9) facing down.
- (5) Using a brass, or other soft metal 3/8 inch drift, drive the dowel pins (8) from the propeller (7). Remove spacer (9) and aft bulkhead assembly (10).



- | | |
|------------------------------|---------------------------|
| 1. Spinner | 7. Propeller |
| 2. Screw | 8. Dowel Pin |
| 3. Washer | 9. Spacer |
| 4. Bolt | 10. Aft Bulkhead Assembly |
| 5. Doubler | 11. Starter Ring Gear |
| 6. Forward Bulkhead Assembly | |

**Propeller Removal / Installation
Figure 61-01**

B. Propeller Installation (Reference Figure 61-01 and 61-02)

NOTE: Propeller (7) and spacers (9) are provided by the manufacturer as a matched set identified with the same serial number. The set pieces should not be intermixed with those from another set.

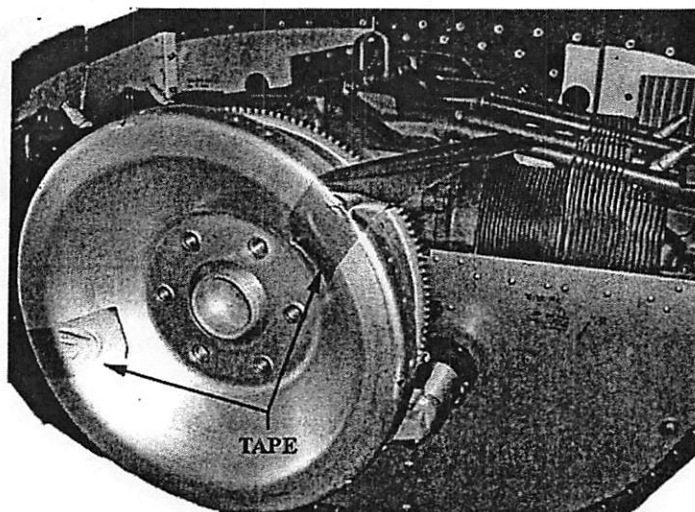
- (1) Install the dowel pins (8) in the dowel holes of the spacer (9).

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- (2) With the propeller (7) secure on the padded support, place a padded wooden block on the propeller hub. Lightly tap the block with a hammer to seat the dowel pins (8) in the propeller.

CAUTION: THE AFT BULKHEAD CAN BE DAMAGED (PINCHED BETWEEN RING GEAR AND SPACER) IF NOT HELD SECURELY IN PLACE DURING PROPELLER INSTALLATION.

- (3) Install aft bulkhead assembly (10) on starter ring gear (11) and secure the bulkhead with tape as shown in Figure 61-02 below. If the cowling has not been removed, the tape may be attached to the cowling to hold the aft bulkhead in place. (Reference Figure 61-01 for parts numbering)



**Aft Bulkhead Assembly
Figure 61-02**

WARNING: ENSURE THAT THE MAGNETO SWITCH IS SET TO OFF AND THE MIXTURE IS SET TO IDLE CUTOFF PRIOR TO ROTATING THE CRANKSHAFT.

- (4) Position the propeller by rotating the crankshaft until the top center (TC) mark on the starter gear and the index on the starter housing are aligned, then install the propeller at the one and seven o'clock position. (Viewed from rear)
- (5) Position forward bulkhead assembly (6) and doubler (5) on propeller (7) and insert propeller mount bolts (4) through the doubler, bulkhead, propeller, and spacer. Install this assembly on the starter ring gear (11).
- (6) Install mounting bolts (4) into starter ring gear (11) and torque the bolts to 60 - 65 ft. lbs. (720 to 780 in. lbs.). Remove tape applied in (3) above.

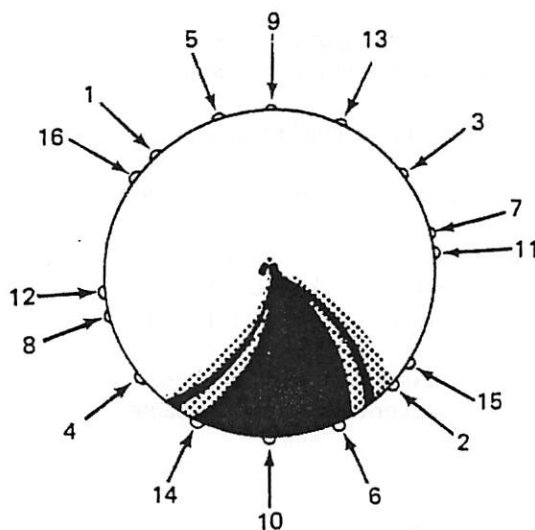
NOTE: Safety wire propeller mount bolts in pairs.

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- (7) Install the spinner (1) over the propeller (7) and align with holes in forward bulkhead assembly (6) and aft bulkhead assembly (10). Install washers (3) and screws (2).

NOTE: Use only washers conforming to Federal Specification NAS1515. Do not use metal washers of any kind. Install all screws and washers before beginning the tightening sequence.

- (8) Tighten the screws to standard torque values (Chapter 91) using the sequence shown in Figure 61-03. Repeat the sequence to correct any torque loss due to compression of the nonmetallic washers.



**Spinner Screw Tightening Sequence
Figure 61-03**

3. Inspection/Check

A. Propeller Inspection

- (1) Include the propeller in every preflight inspection. The propeller should receive special attention for condition during the 50 and 100 hour inspections. Visually inspect the entire propeller for damage or defects. All necessary repairs should be made before further flight, and should strictly adhere to FAA requirements and service publications of the propeller manufacturer.
- (2) Remove the spinner at each 100 hour inspection. After inspection, necessary repairs and spinner reinstallation check the spinner run-out. Maximum allowable run-out measured at the tip of the spinner is 0.025 inch.
- (3) Some types of damage and defects that may be observed are defined as follows:

Burrs, Corrosion, Cracks, Dents, Erosion, Fretting, Gouges, Nicks, Pitting, Scratches, Scores and Stains.

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- (4) Visually inspect all parts for damage and/or defects. Check attaching bolt threads for rough edges and irregularities. Check that the surface finish (anodizing or plating) is not broken, chipped, peeled or scored. Inspect for corrosion and its effects, if coatings are absent revealing material substrate. Staining and slight surface markings (not detectable to finger-nail) are normal and alone are not cause for rejection or replacement.
- (5) If scratches or suspected cracks are found, refer to the propeller manufactures data for corrective action.

B. Spinner Inspection

- (1) Include the spinner in every preflight inspection.
- (2) Inspect for loose, damaged, or missing screws and washers. Visually inspect for evidence of corrosion. Tighten or replace mounting hardware as required.
- (3) Inspect for dents, scoring, nicks, cracks and scratches.
- (4) Inspect the flanged area around the propeller cutout for nicks and cracks.
- (5) Remove the spinner at each 100 hour inspection. Visually inspect the bulkheads and doubler for mounting security, cracks and missing or damaged plate nuts. Inspect the spinner items listed in sub-paragraphs (2), (3) and (4) above.
- (6) Upon Completion of the 100 hour inspection, necessary repairs and spinner reinstallation, check spinner run-out in accordance with this chapter.

4. Cleaning/Painting

A. Propeller Cleaning/Painting

WARNING: USE SOLVENT IN A WELL VENTILATED AREA. DO NOT BREATHE FUMES. KEEP AWAY FROM FLAMES.

CAUTION: DO NOT USE METAL TOOLS OR HARD BRISTLE BRUSHES ON THE PROPELLER. DO NOT USE GRAPHITE PENCIL TO MARK ON ANY ALUMINUM PART. INCLUDING THE PROPELLER.

- (1) Prepare a solution consisting of one part Lubricating Oil, and two parts mineral spirits. Use this solution and a soft cloth to remove grease, dirt, and stains from the propeller. A soft bristle brush may be used on stubborn deposits, but do not use hard bristles, metal brushes, or metal tools on the propeller.
- (2) After cleaning, rinse the excess cleaning solution from the propeller and allow to air dry, or use low-pressure shop air to accelerate drying.
- (3) Refer to manufacturer's data for propeller painting instructions.

B. Spinner Cleaning/Painting

- (1) Refer to Chapter 20 for cleaning and painting procedures.

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5. Approved Repairs

A. Propeller Repair

- (1) Repair the propeller in accordance with FAA requirements and the service publications of the propeller manufacturer.

NOTE: Propeller diameter reduction is *not* permitted.

B. Spinner Assembly Repair

- (1) Spinner and component repairs consists of replacement of missing or loose attachment hardware such as screws and nut plates. If the spinner is warped or dented it should be replaced.
- (2) Polish out nicks, scratches, and scoring.
- (3) Cracks may be repaired by welding per FAR 43 practices. Do not attempt repair if crack extends into a mounting hole.

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CHAPTER 71

POWER PLANT

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POWER PLANT - DESCRIPTION/OPERATION

1. General

A three-segment cowl assembly encloses the power plant. The cowl consists of an upper, lower and upper forward cowl assembly.

The engine is attached to the engine mount assembly at four places using vibration isolator shock mounts. After complete engine build-up the power plant is attached to the fuselage at the four, engine mount support locations.

The engine is cooled by ram air pressure that is forced over and around the cylinders via baffles. The air is then exhausted to the atmosphere through exit ducts located in the bottom of the lower cowl.

2. Engine Data

AG-5B

Engine Model	0-360-A4K
Rated Horsepower	180
Rated Speed, RPM	2700
Bore, Inches	5.125
Stroke, Inches	4.375
Displacement, Cubic Inches	361.0
Compression Ratio	8.50:1
Firing Order	1-3-2-4
Spark Occurs Degrees BTC	25°
Spark Plug Gap	0.017" to 0.021"*
Valve Rocker Clearance (hydraulic tappets collapsed)	0.028" to 0.080"
Propeller Drive Ratio	1:1
Propeller Drive Rotation (viewed from rear)	Clockwise

*See latest revision of Lycoming Service Instruction for specific plug gap requirements.

3. Engine Operation

Refer to Textron Lycoming Operator's Manual, Textron Lycoming Service Instructions, and the Pilot's Operating Handbook for proper engine operation.

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POWER PLANT - TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY	
Engine fails to start.	Lack of fuel.	Open fuel selector valve. Service fuel tanks. Push mixture control to full rich position. Prime engine.	
	Flooded, or over primed.	Open the throttle, set mixture to lean and engine by cranking.	
	Under primed.	Prime for 5 to 10 seconds.	
	Incorrect throttle setting.	Open throttle approximately 1/4 inch.	
	Defective spark plugs.	Clean and re-gap, or replace.	
	Dead or weak battery.	Recharge or replace.	
	Defective ignition wire.	Check with electric tester, and replace defective wires.	
	Water in carburetor.	Drain carburetor and lines.	
Engine not idling properly.	Internal failure.	Check oil sump for metal particles. If found, complete engine repair or overhaul is indicated.	
	Incorrect carburetor idle adjustment.*	Adjust throttle stop to obtain correct idle.	
	Idle too fast. *	Idle mixture incorrect Lean * Rich **	Adjust mixture.
		Rough Idle. **	Open primer line *
	Leak in the induction system*		Tighten all connections and replace defective parts. Check intake hoses and gaskets.
	Uneven cylinder compression**		Check condition of rings and valve seats and then check cylinder compression.
	Insufficient fuel pressure**		Check fuel pumps and filters.
Faulty ignition system**	Check ignition leads, plugs and magnetos.		

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POWER PLANT - TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Low power and uneven running.	Mixture too rich.	Readjustment of carburetor by authorized personnel.
	Leaks in induction system.	Tighten all connections and replace defective parts.
	Defective spark plugs.	Clean and gap or replace spark plugs.
	Defective ignition wires.	Replace wires.
	Magnetos not properly timed.	Check for proper timing and synchronization.
	Defective spark plug terminal connectors.	Replace connectors on spark plug wire.
	Improper grade of fuel.	Empty tank and fill with proper grade fuel.
Failure of engine to develop full power.	Throttle not properly adjusted.	Adjust throttle lever.
	Leak in the induction system.	Tighten all connections and replace any defective parts.
	Carburetor heat on.	Turn carburetor heat off. Check carburetor heat valve for correct rigging and operation.
	Dirty air filter.	Replace air filter.
	Restriction in air scoop.	Remove restriction.
	Improper grade of fuel.	Empty tank and fill with proper grade fuel.
	Faulty ignition system.	Check ignition leads, plugs, and magnetos.
Rough running engine.	Lead deposit on spark plugs.	Clean and re-gap or replace spark plugs.
	Unbalanced propeller.	Remove propeller and check for balance.
	Worn mounting bushings.	Install new mounting bushings.
	Uneven compression.	Check condition of rings and valve seats. Overhaul may be required.
	Magneto not properly timed.	Check magneto timing. (Refer to Chapter 74)

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POWER PLANT - TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Low oil pressure.	Insufficient oil quantity.	Check oil supply and fill as required.
	Defective pressure gauge.	Replace gauge.
	Dirty oil filter.	Replace filter.
	Air or dirt in relief valve.	Remove and clean oil pressure relief valve.
	Leak in pressure lines.	Check gasket between accessory housing and crankcase.
	Stoppage in oil pump intake passage.	Check line for obstruction and clean strainer.
	High oil temperature.	See "High Oil Temperature" in "Trouble" column.
High oil temperature.	Insufficient oil supply.	Check oil supply and fill as required.
	Insufficient cooling air.	Check oil cover fins for obstructions.
	Low grade of oil.	Replace with oil conforming to specifications. (Refer to Chapter 12)
	Clogged oil cooler, lines or strainers.	Remove and clean oil cooler, lines, and strainer.
	Defective gauge.	Replace gauge.
	Defective probe.	Replace probe.
	Excessive blow-by.	Usually caused by worn or stuck rings. Overhaul may be required.
	Bearing failure.	Examine sump for metal particles. If found, complete engine overhaul required.
	Oil temperature control valve stuck.	Replace valve.
Excessive oil consumption.	Worn piston rings.	Install new rings.
	Incorrect installation of piston rings.	Install new rings.
	Incorrect grade oil.	Replace with proper grade.

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POWER PLANT - TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Excessive oil consumption. (con't)	External leakage.	Check engine carefully for leaking gaskets and O-rings.
	Failure of rings to seat. (new nitride cylinders)	Use mineral base oil, climb to cruise altitude at full power and operate above 75% cruise power setting until oil consumption stabilizes.
Engine does not stop.	Mixture control not correctly adjusted.	Adjust mixture control.
	Faulty ignition system.	Check ground wires.
	Faulty ignition switch.	Replace switch. (Ref. AD 76-07-12 R1 Bendix Switches)
Cold weather difficulties.	Cold oil.	Pre-Heat engine.
	Weak battery.	Recharge or replace battery.
	High oil pressure.	In extreme cold weather, readings up to approximately 100 psi do not necessarily indicate malfunction. Assure proper oil viscosity.
	Over priming.	Open throttle, place mixture control in idle cut-off position. Crank engine until it starts. Immediately return mixture control to full rich position and close throttle as required.

POWER PLANT - MAINTENANCE PRACTICES

1. General

Prior to performing maintenance on the power plant, ensure that all safety precautions such as switches are in the OFF position, fire extinguishers are available, and NO SMOKING rules are enforced. The complete power plant should be inspected for cleanliness and general condition. More detailed and up-to-date maintenance information can be obtained from the Textron Lycoming Operator's Manual, Service Letters, Service Bulletins, and Service Instructions.

2. Cleaning Power Plant

WARNING: USE SOLVENTS IN A WELL VENTILATED AREA. AVOID BREATHING FUMES. KEEP AWAY FROM FLAMES.

Cleaning of the power plant can be accomplished with a suitable solvent (mineral spirits or equivalent) and drying thoroughly.

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NOTE: Use extreme care to prevent solvent entering the magnetos, alternator, starter, vacuum pump, and engine openings. Keep solvent contact with wiring to a minimum.

3. Removal/Installation

A. Remove Power Plant

CAUTION: PRIOR TO REMOVAL OF THE ENGINE, PLACE A SUPPORT UNDER THE TAIL OF THE AIRCRAFT TO PREVENT DAMAGE TO THE EMPENNAGE. TAG OR LABEL ALL WIRING AND CABLES PRIOR TO REMOVAL FOR REFERENCE ON INSTALLATION.

- (1) Remove the propeller and spinner. (Reference Chapter 61)
- (2) Remove the cowling per this chapter.
- (3) Disconnect the throttle, mixture, and carburetor heat controls.
- (4) Disconnect the oil pressure line from transducer to engine.
- (5) Disconnect the main fuel line at the inlet to the engine-driven fuel pump.
- (6) Disconnect the vacuum pump hose at the pump.
- (7) Disconnect the fuel primer line.
- (8) Disconnect electrical wiring and bonding straps from the engine.
- (9) Disconnect all wiring from the engine to the airframe.
- (10) Disconnect spark plug leads and lead clamps from engine.
- (11) Disconnect the heater duct at the muffler.

NOTE: To assure correct engine alignment on reassembly, record location and orientation of engine mount isolators, spacers, and washers at each mounting point.

- (12) Attach a suitable lifting device to the engine and remove the engine mounting bolts.

B. Install Power Plant

NOTE: Inspect the engine rubber mounting bushings for wear and/or deterioration prior to installing the engine. Replace bushings as required.

- (1) Position the engine to the engine mount and install the engine mount mounting bolts, isolators, spacers, washers, and bolts in the same orientation as removed. Torque the mounting bolts to 450-500 inch pounds.
- (2) Connect the heater duct to the muffler.
- (3) Connect all wiring to the engine.

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- (4) Connect the fuel primer line.
- (5) Connect the vacuum pump hose at the pump.
- (6) Connect the main fuel line at the inlet to the engine-driven fuel pump.
- (7) Connect the oil pressure line.
- (8) Connect the throttle, mixture, and carburetor heat control.
- (9) Connect wiring and electrical bonding straps at the top of the engine.
- (10) Connect all spark plug leads and lead clamps.

NOTE: Refer to Chapter 73 for proper installation of the carburetor throttle control.

NOTE: Maintain a minimum 4-1/2 inch bend radius on all carburetor controls.

- (11) Install the cowling per this chapter.
- (12) Install the propeller. (Reference Chapter 61)

POWER PLANT COWLING - DESCRIPTION/OPERATION

1. General

A three-piece cowl assembly encloses the engine. The upper cowl assembly is located above the engine between the fuselage and forward cowl and is hinged in the center creating left and right cowl doors. Each cowl door is latched to the lower cowl on its corresponding side. The upper cowl doors can be raised to gain access to the engine for inspection, service, or minor repair. The lower cowl assembly encloses the lower engine components and must be removed to gain access to the carburetor, exhaust system, air induction system and other lower engine components. The forward cowl covers the upper front of the engine and encloses the top half of the flywheel.

POWER PLANT COWLING - MAINTENANCE PRACTICES

1. Removal/Installation (See Figure 71-01)

A. Remove Cowling

- (1) Unfasten latches (19) on each side of the lower cowl.
- (2) Remove nuts, bolts, and washers (30) and nuts, screws, and washers, (31) and lift off the upper cowl door assembly (1).
- (3) Remove Screws (6) from forward cowl and lift off forward cowl.
- (4) Remove strut fairing attach screws and slide the fairing down the nose gear strut. (See Chapter 32)

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- (5) Loosen the clamp securing the air duct between the filter box and the carburetor heat valve and pull the duct clear of the filter box.

CAUTION: APPLY PROTECTIVE TAPE TO THE LOWER CORNERS OF THE FIREWALL AND AROUND THE BASE OF THE SPINNER TO PREVENT SCRATCHING OF THE PAINT DURING COWL REMOVAL/INSTALLATION.

- (6) Remove screws (6) that attach the lower cowl (16) to the firewall and remove the cowl.

B. Install Cowling

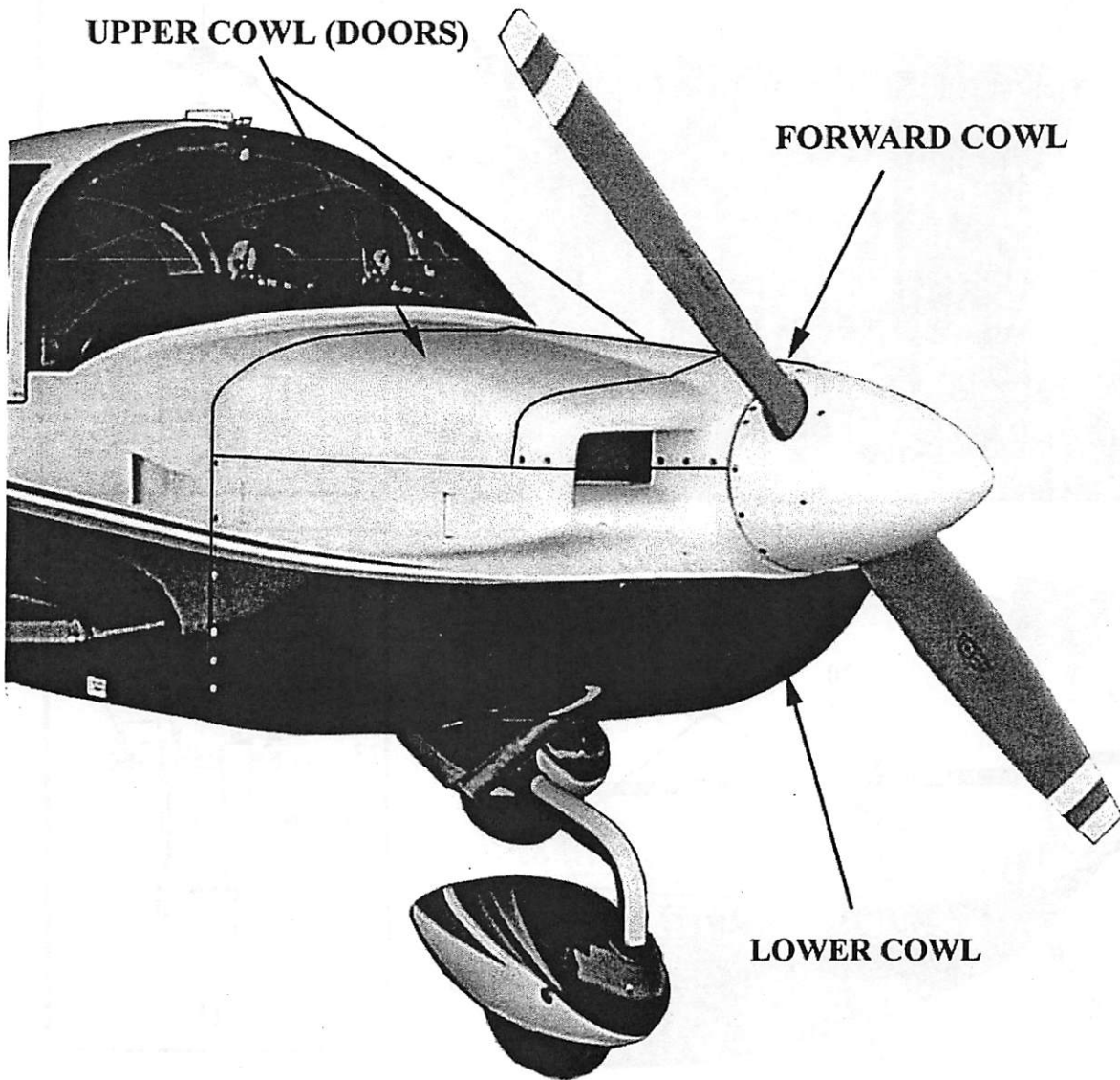
- (1) Position lower cowl assembly (16) in place and secure the cowl to the firewall using screws (6).
- (2) Slide the nose gear strut fairing up the strut and attach to lower cowl (16). (Reference Chapter 32)
- (3) Attach forward cowl (18) to lower cowl (16) using screws (6).
- (4) Attach the carburetor air duct to the filter box and tighten clamp.
- (5) Position upper cowl door assembly (1) on forward cowl (18) at forward hinge attach point (3) and attach the forward end hinge (4) using screws, washers, and nuts (31).
- (6) Sandwich the aft end of hinge (4) in bracket (29) and secure with bolts, nuts, and washers (30).
- (7) Inspect springs (11) for secure attachment to grommet (12).
- (8) Inspect latch springs (22) for security and tension.

NOTE: Coat lower 2.00 inches of latch pin (10) and inside diameter of guide bushing (20) with a dry film lubricant.

- (9) Close cowl doors (1)

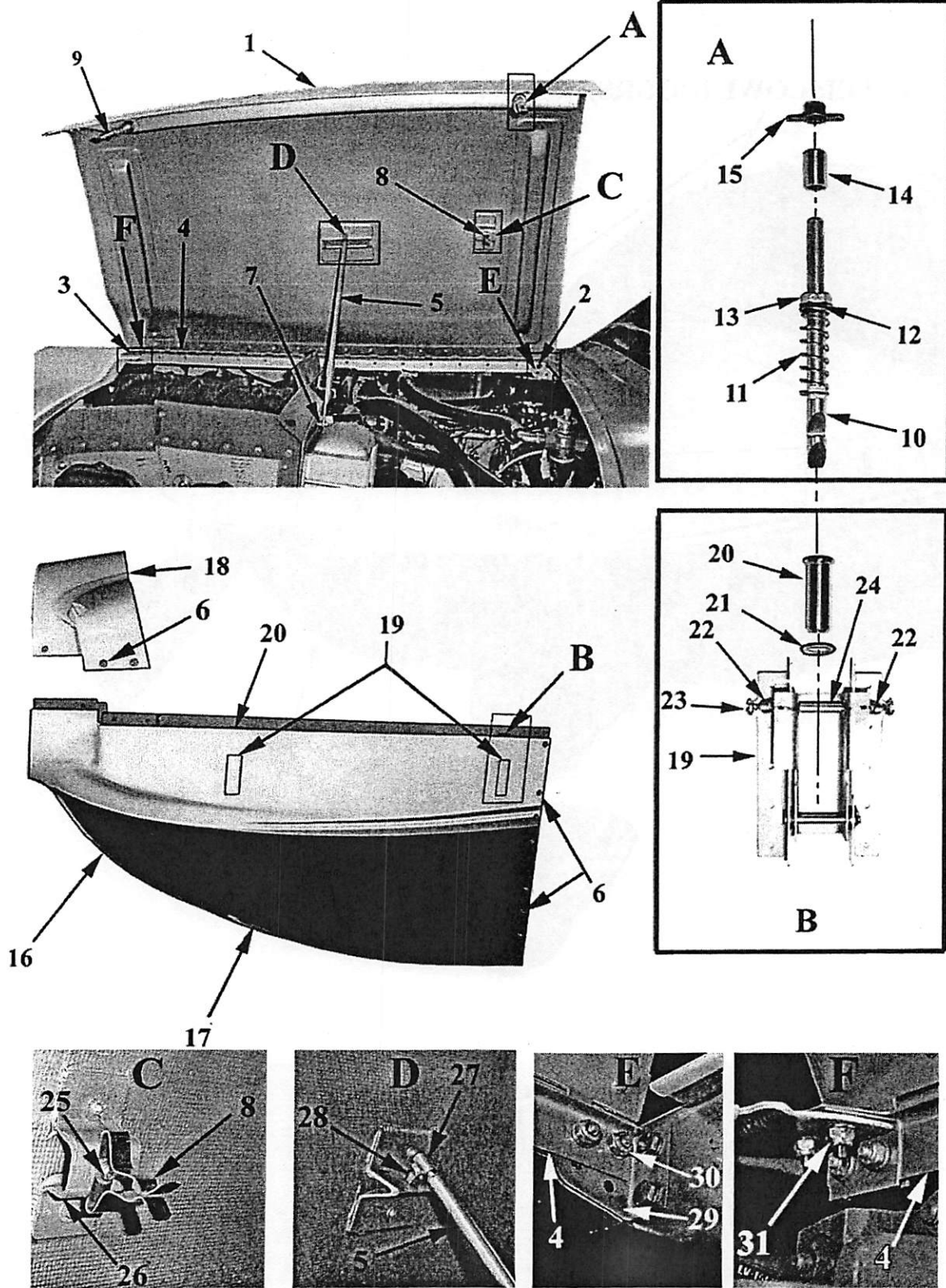
NOTE: Adjust latch pin (10) lengths for secure fit of upper cowl at front and rear edges by loosening jam nut (13) and rotating pin (full turns) clockwise to tighten or counterclockwise to loosen fit. Back off, if required, so that each latch requires no more than a 50 pound push for positive engagement. Latch pin must be rotated so that notch is aligned with clevis pin/roller (24) for positive engagement. Measure latch position (19) outside/inside cowl contour with cowl closed and open. Latch position when open must be 0.030 inch minimum outside of latch position when closed to ensure complete pin engagement.

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Cowl Assembly
Figure 71-01
(Sheet 1 of 3)

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Cowl Assembly
 Figure 71-01
 (Sheet 2 of 3)

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- | | |
|-------------------------------|---------------------------------|
| 1. Upper Cowling (Doors) | 17. Induction Air Intake |
| 2. Aft Hinge Attach Point | 18. Forward Cowl |
| 3. Forward Hinge Attach Point | 19. Cowl Latch Assembly |
| 4. Hinge | 20. Guide Bushing |
| 5. Cowl Door Support Rod. | 21. Press Nut |
| 6. Screws | 22. Spring |
| 7. Snap | 23. Cotter key |
| 8. Clip | 24. Pin and Roller |
| 9. Latch Pin Assembly | 25. Screw, Washer and Plate-Nut |
| 10. Pin | 26. Bracket, Composite |
| 11. Spring | 27. Clip |
| 12. Grommet | 28. Ball |
| 13. Jam Nut | 29. Bracket |
| 14. Bushing | 30. Nut, Washer and Bolt |
| 15. Nut plate | 31. Nut Washer and Screw |
| 16. Lower Cowling | |

**Cowl Assembly
Figure 71-01
(Sheet 3 of 3)**

ENGINE MOUNT - DESCRIPTION

1. General

The engine mount is composed of steel tubing sections formed and welded together. The purpose of the engine mount is to support and attach the engine to the airframe. The engine is attached to the mount at four places using vibration isolator shock mount assemblies, bolts, and self-locking nuts secured with cotter pins.

ENGINE MOUNT - MAINTENANCE PRACTICES

1. Removal/Installation (Reference Figure 71-02)

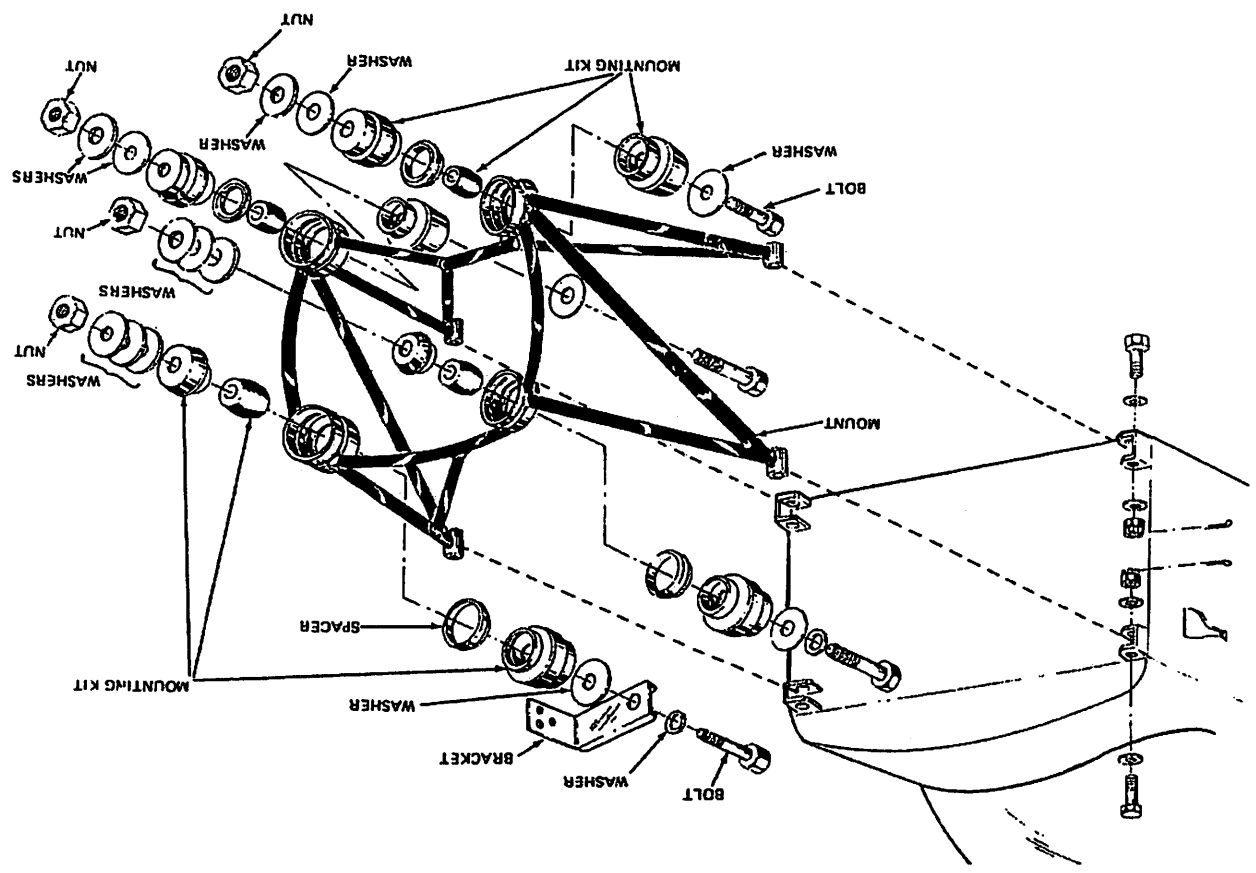
A. Remove Engine Mount

- (1) Remove power plant per this chapter.
- (2) Disconnect all wiring, ties, and clamps attached to the engine mount.
- (3) Remove nuts, washers, and bolts securing mount to engine mount supports and remove mount.

B. Install Engine Mount

- (1) Position engine mount to engine mount supports and install mounting bolts, washers, and nuts.
- (2) Torque mounting bolts to 160 - 190 inch lbs.
- (3) Connect clamps and ties to mount.
- (4) Install power plant per this chapter.

Engine Mount Removal/Installation
Figure 71-02



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AIR INTAKES - DESCRIPTION/OPERATION

1. General

Openings in the cowl provide the entry for ram air to the engine. An opening in the lower front of cowl provides ram air directly to the carburetor air filter and then to the carburetor.

ENGINE BAFFLES - DESCRIPTION/OPERATION

1. General

The engine baffles are made from sheet aluminum with rubberized composition seals at points of contact with the engine cowling. The baffles are attached to the engine and direct the cooling air around the engine to provide optimum engine cooling. The complete baffles are composed of several segments that provide for easy removal and replacement of any single segment. The engine baffles should be inspected thoroughly at each periodic inspection for condition and secure mounting. Any loose or damaged baffles should be repaired or replaced.

ENGINE BAFFLES - MAINTENANCE PRACTICES

1. Removal/Installation (Reference Figures 71-03)

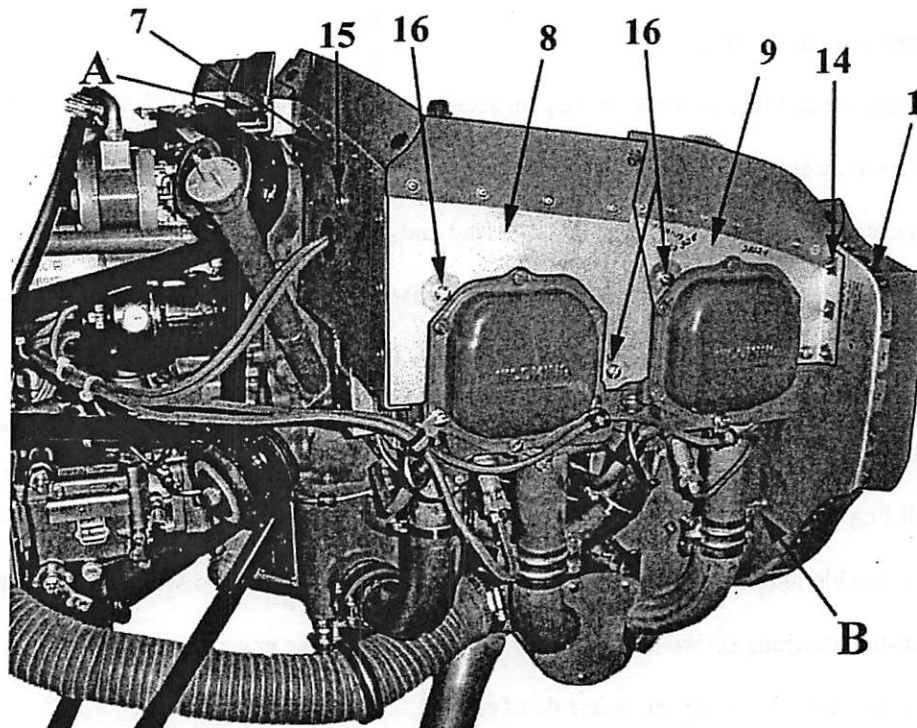
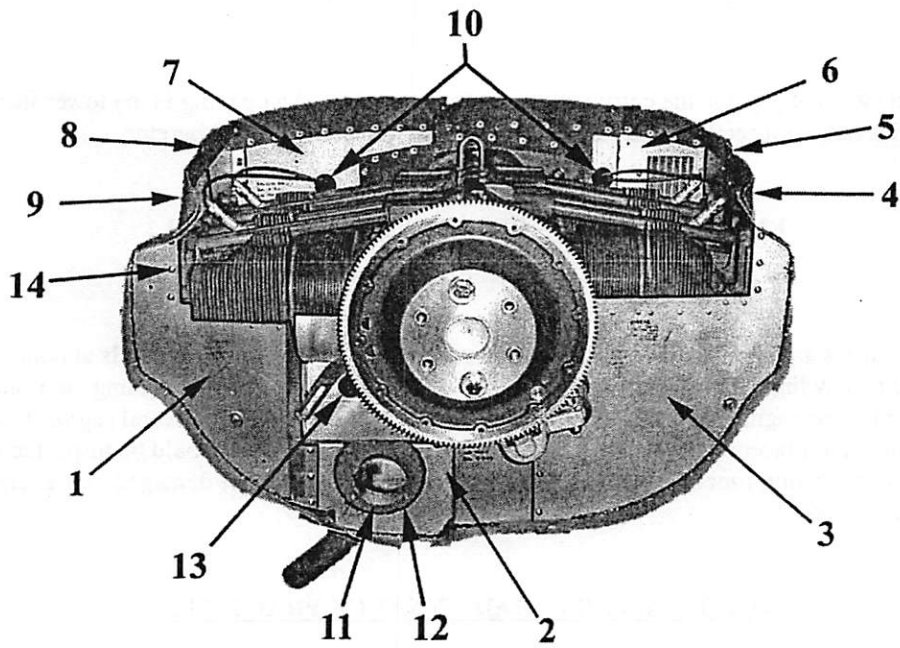
A. Remove Engine Baffles.

- (1) Remove cowling as necessary to gain access.
- (2) Disconnect baffle springs at underside of engine.
- (3) Disconnect spark plug leads and route lead ends through hole in rear baffles.
- (4) Disconnect braces to exhaust clamp on front baffles.
- (5) Remove attaching screws and bolts that secure baffles to the engine.
- (6) Remove the screws that secure the baffle segments together where necessary to remove individual segments and remove the baffles.

B. Install Engine Baffles.

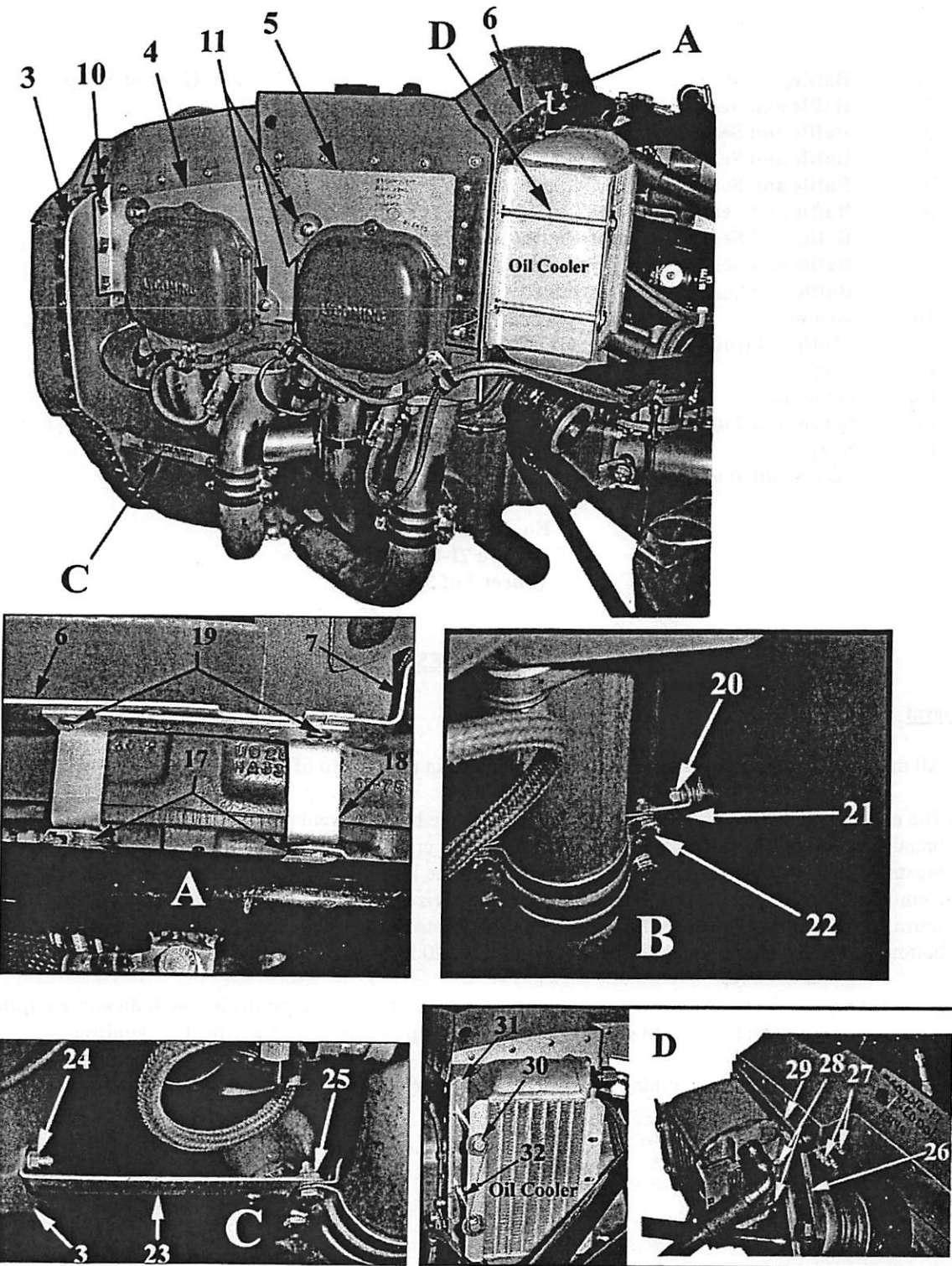
- (1) Assemble individual baffle segments in position on the engine and secure together with screws.
- (2) Install attaching screws and bolts that secure baffles to the engine.
- (3) Connect baffle springs at underside of engine.
- (4) Connect baffle to exhaust clamp braces on front baffle.
- (5) Route spark plug leads through holes in rear baffle, install grommets in holes, and reconnect spark plug leads.
- (6) Install cowling per this chapter.

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Engine Baffles
Figure 71-03
(Sheet 1 of 3)

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Engine Baffles
 Figure 71-03
 (Sheet 2 of 3)

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- | | | | |
|-----|-------------------------------------|-----|-------------------------------|
| 1. | Baffle, Right Front | 17. | Bolt, Washer and Ground Strap |
| 2. | Baffle and Seal Assy., Center Front | 18. | Bracket |
| 3. | Baffle and Seal Assy., Left Front | 19. | Screw and Tinnerman Nut |
| 4. | Baffle and Seal Assy., # 2 Cylinder | 20. | Nut, Bolt and Washer |
| 5. | Baffle and Seal Assy., # 4 Cylinder | 21. | Brace |
| 6. | Baffle and Seal Assy., Rear Left | 22. | Nut, Bolt and Washer |
| 7. | Baffle and Seal Assy., Rear Right | 23. | Brace |
| 8. | Baffle and Seal Assy., #3 Cylinder | 24. | Nut, Bolt and Washer |
| 9. | Baffle and Seal Assy., #1 Cylinder | 25. | Nut, Bolt and Washer |
| 10. | Grommet | 26. | Brace, Oil Cooler |
| 11. | Muffler Shroud Air Intake | 27. | Nut, Bolt and Washer |
| 12. | Seal | 28. | Screw, Nut and Washer |
| 13. | Grommet | 29. | Seal, Oil Cooler |
| 14. | Screw and Tinnerman Nut | 30. | Bolt, Washer and Nut |
| 15. | Snap | 31. | Doubler |
| 16. | Screw and Washer | 32. | Spacer |

**Engine Baffles
Figure 71-03
(Sheet 3 of 3)**

ENGINE DRAINS - DESCRIPTION

1. General

All drain lines are routed overboard through openings in the bottom of the lower cowl.

The engine breather line is a flexible line attached at the breather vent port in the top of the engine. The breather prevents excessive pressure buildup inside the crankcase. Aluminum tubing attached to the flexible breather line with a clamp and routed overboard thru the lower cowl extends the breather line. The aluminum tubing is vented by a horizontal slit. The horizontal slit must remain inside the cowling to allow warm air to enter the breather and prevent possible obstruction of the breather line caused by freezing. The bottom end of the aluminum tube should extend 1.25 ± 0.25 inches below the bottom of the fuselage.

NOTE: Evidence of fuel seepage or flow from the fuel pump drain line indicates a rupture of the fuel pump diaphragm. Fuel pump repair or replacement is required.

Clamp attached clear plastic drain lines vent the fuel pump, battery box and carburetor air filter box.

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CHAPTER 73

ENGINE FUEL AND AIR CONTROL

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ENGINE FUEL AND AIR CONTROL - DESCRIPTION/OPERATION

1. General

The engine fuel and air control system consists of the units and components that deliver metered fuel and air to the engine. The fuel portion includes the carburetor and associated controls, fuel primer and fuel pressure indicator. The air portion includes the air induction system and associated controls. The induction system consists of the air box assembly, flexible ducts and air filter. The fuel controls consist of the throttle and mixture control.

Fuel induction system components that are an integral part of the engine are described in the Textron Lycoming Operator's Manual.

AIR INDUCTION SYSTEM - DESCRIPTION/OPERATION

1. General

The air induction system consists of an air inlet, a filter box, a carburetor air box and flexible ducts that permit filtered outside air to enter the carburetor. The induction system also includes an alternate source of unfiltered hot air. When carburetor-icing conditions exist, the carburetor heat control may be pulled out (moved from cold to hot) to provide hot air to the carburetor air box.

NOTE: Limited operation of carburetor heat is recommended since no filter is incorporated in the hot air source.

AIR INDUCTION SYSTEM - MAINTENANCE PRACTICES

1. Removal/Installation of Carburetor Air Box (Reference Figure 73-01)

A. Removal of Carburetor Air Box

- (1) Remove clamps and flexible ducts from each side of the carburetor air box.
- (2) Remove the carburetor heat cable from the carburetor air box.
- (3) Remove the 8 bolts from the front of the carburetor air box.
- (4) Separate the carburetor air box and remove the rear section.
- (5) Remove the safety wire and the 4 bolts that secure the forward part of the carburetor air box to the carburetor. Also remove the gasket between the carburetor air box and the carburetor.

B. Install Carburetor Air Box

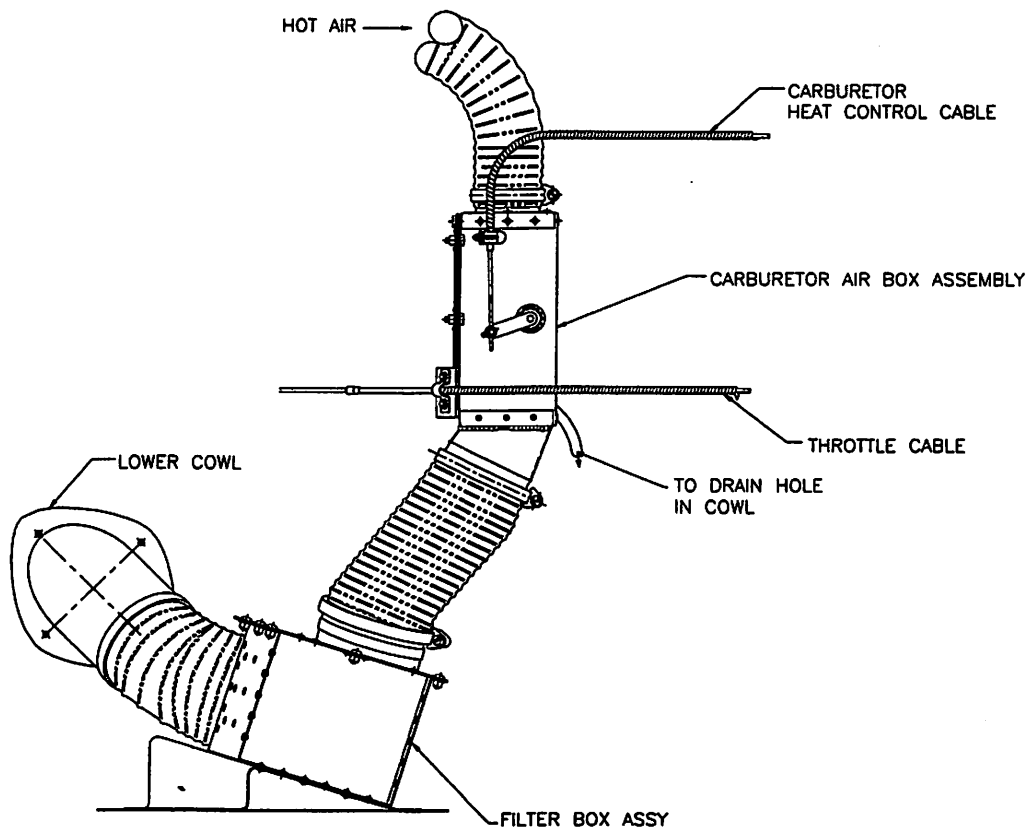
- (1) Check the condition of the screen and replace the gasket.
- (2) Install the gasket and the front of the carburetor air box to the carburetor using the 4 bolts removed. Tighten and safety wire the bolts.

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- (3) Install the 8 bolts that connect the two parts of the carburetor air box and the throttle cable bracket.
- (4) Install the carburetor heat control cable and safety.
- (5) Install the flexible ducts to each side of the carburetor air box and secure with clamps.

2. Removal/Installation of Air Filter

- A. Reference Chapter 12 for servicing the air filter.



**Air Induction System
Figure 73-01**

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CARBURETOR - DESCRIPTION/OPERATION

1. General

The engine is equipped with a single barrel, float-type carburetor, incorporating an idle cut-off mechanism and a manual mixture control. The carburetor is mounted horizontally on the rear of the engine.

**CAUTION: SOME FUEL SPILLAGE MAY OCCUR WHEN FUEL LINES ARE
DISCONNECTED. PROPER PRECAUTIONS SHOULD BE TAKEN
TO PREVENT A FIRE HAZARD.**

CARBURETOR - MAINTENANCE PRACTICES

1. Removal/Installation (Reference Figure 73-02)

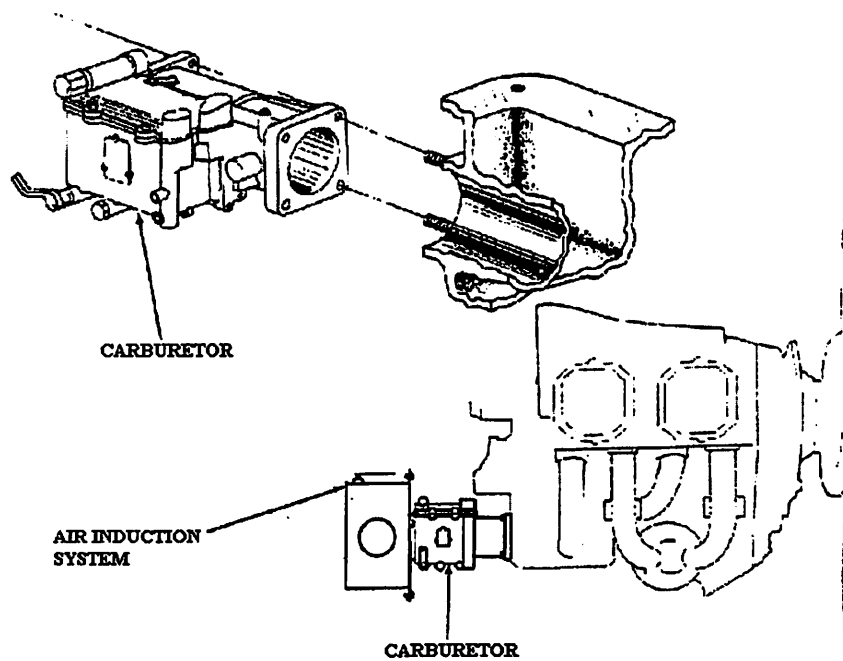
A. Remove Carburetor

- (1) Disconnect the battery.
- (2) Ground the aircraft.
- (3) Place the fuel shut-off valve in the OFF position.
- (4) Remove the induction system per this chapter.
- (5) Disconnect the fuel inlet and fuel pressure lines at the carburetor.
- (6) Remove the four securing nuts and washers and remove the carburetor.

B. Install Carburetor

- (1) Using a new gasket, position the carburetor to the engine and install washers and nuts.
- (2) Connect the fuel inlet and fuel pressure lines at the carburetor.
- (3) Place the fuel shut-off valve in the ON position.
- (4) Reconnect the battery.
- (5) Place the auxiliary fuel boost pump switch in the ON position to pressurize the system and check all connections for leaks.
- (6) Install the induction system per this chapter.

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**Carburetor Removal/Installation
Figure 73-02**

ENGINE PRIMER SYSTEM - DESCRIPTION/OPERATION

1. General

The engine is equipped with a four cylinder priming system. Fuel is injected directly into the cylinder intake system by the electric auxiliary fuel pump when the pump is operating and the primer switch is engaged.

The auxiliary fuel pump and the electric primer valve both receive electric power through the 5-amp fuel pump breaker switch on the instrument panel. Therefore, the engine primer will not operate when the auxiliary fuel pump is turned off.

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ENGINE PRIMER SYSTEM - MAINTENANCE PRACTICES

1. Removal/installation (Reference Figure 73-03)

A. Removal of Primer Valve

- (1) Open cowl doors.
- (2) Disconnect the battery.

**CAUTION: WHEN DISCONNECTING FUEL LINES, FUEL SPILLAGE
MAY OCCUR. ASSURE SUITABLE FIRE FIGHTING
EQUIPMENT IS AVAILABLE.**

- (3) Disconnect leads (5 and 6).
- (4) Disconnect fuel lines (2 and 4).
- (5) Remove screws (11) and valve (1) from bracket (3).

B. Installation of Primer Valve.

- (1) Position primer valve (1) on bracket (3) and secure with screws (11).
- (2) Connect fuel lines (2 and 4).
- (3) Connect leads (5 and 6).
- (4) Reconnect battery.
- (5) Turn on the master switch and electric fuel pump and check for fuel leaks.
- (6) Press the primer switch and check the fuel pressure gauge for a slight drop in fuel pressure, indicating that the primer valve opened.
- (7) Check all primer fittings for leaks.
- (8) Close cowl doors.

2. Primer Line Removal/Installation (Reference Figures 73-03 Sheet 2 of 2)

A. Primer Line Removal

- (1) Remove engine cowl.
- (2) Disconnect the battery.

**CAUTION: WHEN DISCONNECTING FUEL LINES, FUEL SPILLAGE
MAY OCCUR. ASSURE SUITABLE FIRE FIGHTING
EQUIPMENT IS AVAILABLE.**

- (3) Remove primer line (4) at tee fitting (7) (rear of engine) and at primer valve (1).

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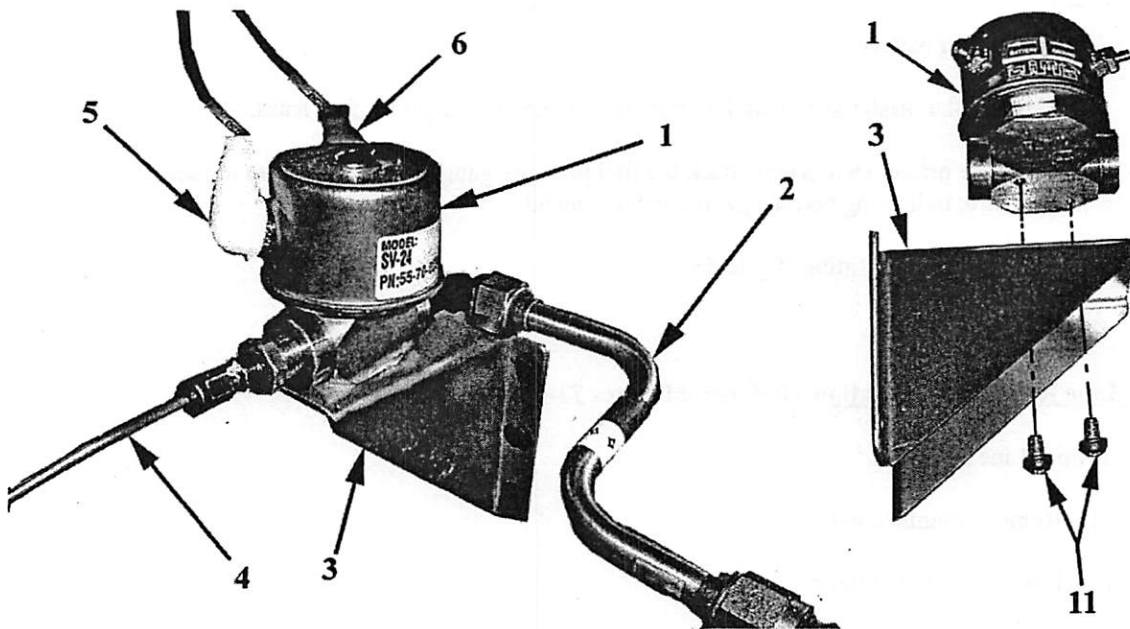
- (4) Remove clamp (8) securing primer line (9) to the cylinder intake tube.
- (5) Disconnect primer line (9) from primer nozzle (10) and Tee fitting (7) (side of engine) and remove primer line (9).

B. Primer Line Installation

- (1) Install primer line (9) to individual cylinder and connect the line at Tee fitting (7) (side of engine) and primer nozzle (10).
- (2) Secure primer line (9) on intake tube with clamp (8).
- (3) Connect primer line (4) to primer valve (1) and Tee fitting (7) (rear of engine).
- (4) Operate the primer system and check for leaks.

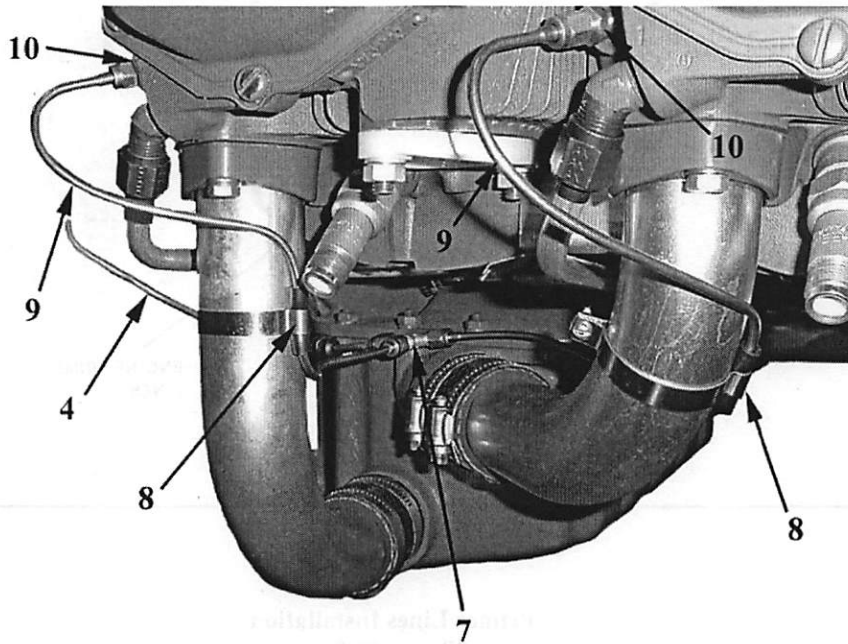
NOTE: After operating the primer and leak checking the system, allow sufficient time for excess fuel to drain from the engine manifold before attempting to start the engine.

- (5) Reconnect Battery.
- (6) Install lower cowl.



Engine Primer
Figure 73-03
(Sheet 1 of 2)

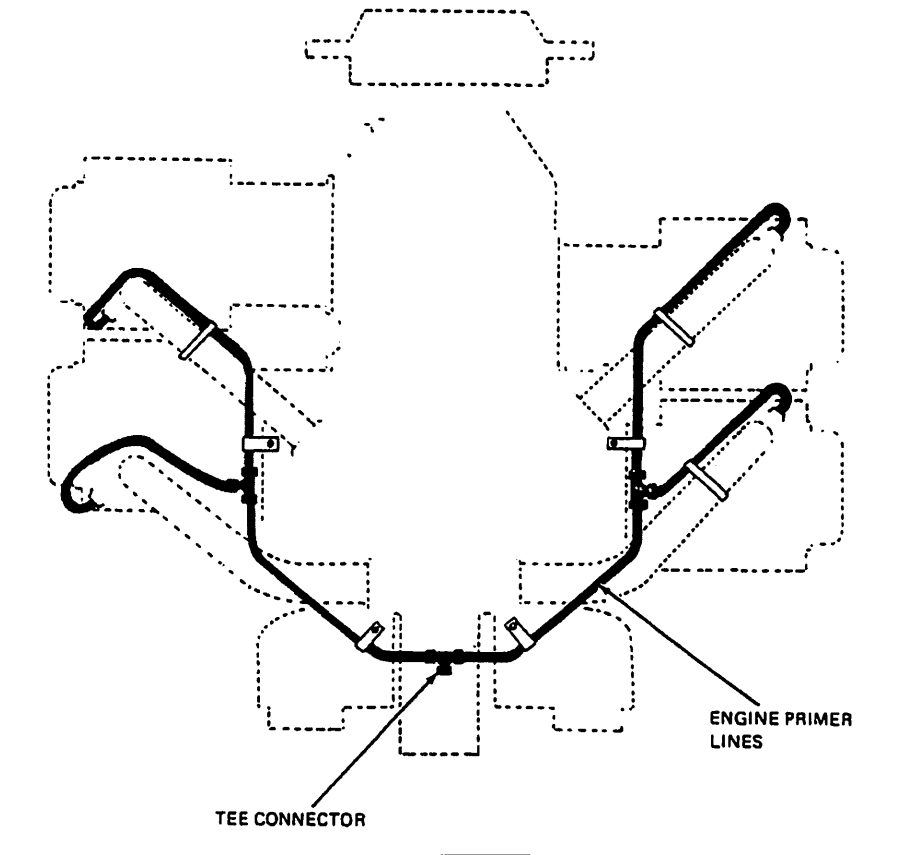
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- | | | | |
|----|------------------------------|-----|-------------------------|
| 1. | Primer Valve | 7. | Tee Fitting |
| 2. | Fuel Line From Electric Pump | 8. | Primer Line Clamp |
| 3. | Mount Bracket | 9. | Primer Line to Cylinder |
| 4. | Primer Line to Engine | 10. | Primer Nozzle |
| 5. | Negative Terminal Lead | 11. | Screw |
| 6. | Positive Terminal Lead | | |

Engine Primer (Sheet 2 of 2)
Figure 73-03

**TIGER AIRCRAFT AG-5B SERIES
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**Primer Lines Installation
Figure 73-04**

THROTTLE CONTROL - DESCRIPTION/OPERATION

1. General

The throttle position regulates the power output of the engine by controlling the amount of the fuel/air mixture that moves into the engine cylinders. The throttle control is located in the throttle quadrant and is connected to the carburetor throttle valve by a flexible cable. The engine manifold pressure is controlled by the throttle valve position.

THROTTLE CONTROL - MAINTENANCE PRACTICES

1. Throttle Cable Actuator Sleeve Inspection (Reference Figure 73-05, 73-05A and 73-05B)

A. Disconnect Throttle Cable from the Carburetor.

- (1) Open the left side engine cowl door and secure with the cowl prop rod.
- (2) Locate throttle control cable (8).

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- (3) Remove nut, bolt and washers (13) securing the throttle rod end bearing (1) to throttle arm (2).
- (4) Remove safety wire (16), two bolts and two washers (9) and retainer (6) and pull the cable free of attach bracket (7).
- (5) Route the cable over the top of the engine mount and engine to gain access to the cable end.

B. Throttle Cable Inspection. (Reference Figures 73-05A and 73-05B)

- (1) Slide rubber boot (10) from sleeve (4) and boot (5) from swivel collar (12).
- (2) Install a "C" clamp on sleeve (4) approximately 0.50 inch from swivel collar (12).

CAUTION: DO NOT OVER TIGHTEN THE CLAMP AS DAMAGE TO THE SLEEVE MAY OCCUR.

- (3) Push the sleeve as far as possible into swivel collar (12) then, using calipers, measure and record the distance from the "C" clamp to the edge of the swivel collar.
- (4) Pull cable guide (4) outward from swivel collar (12) as far as possible using hand force then measure and record the distance from the "C" clamp to the edge of the swivel collar.
- (5) If the difference between the IN and OUT distance from the clamp to the swivel collar is less than 0.045 inch, reattach the throttle cable.
- (6) If the difference between the IN and OUT distance from the clamp to the swivel collar is 0.045 inch or greater, the throttle cable must be replaced with a serviceable cable prior to further flight.

C Reattach the throttle cable

- (1) See Throttle Control Cable Installation below.

2. Throttle Cable Removal/Installation (Reference Figures 73-05 and 73-06)

A. Remove Throttle Control Cable.

- (1) Open the upper cowl to gain access.
- (2) Disconnect rod end bearing (1) from carburetor throttle arm (2). (Figure 73-05)
- (3) Remove bolts (9) and retainer (6) that secure throttle cable swivel collar (12) to support bracket (7).
- (4) Loosen jam nut (3) and remove rod end bearing (1) and jam nut (3) from the control cable actuator shaft (11).
- (5) Remove boots (10) and (5) from control cable actuator sleeve (4).
- (6) Remove knobs (1), (2) and (3) from control levers (7), (8) and (9). (Figure 73-06)

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- (7) Remove eight screws (4), loosen control levers by rotating friction knob (6) counter clockwise and lift off cover (5).
- (8) Remove nut, washer and clevis bolt (10) that secure control cable clevis end (11) to the throttle control lever (7).
- (9) Remove bolts (15) and cable retainer plate (16) from the rear of the throttle quadrant and detach the cable housing from the retainer.
- (10) Pull the throttle cable through the firewall from inside the aircraft.

B. Install Throttle Control Cable. (Reference Figures 73-05 and 73-06)

- (1) Pass end of the throttle control cable through the firewall and route it to the carburetor. (Figure 73-05)
- (2) Install clevis end (11) to the quadrant end of the throttle cable and attach the clevis end to throttle control lever (7) with clevis bolt, washer and nut (10). Secure with a cotter key. (Figure 73-06)
- (3) Position cable end (18) in the center slot of the throttle quadrant and secure using retainer (16) and bolts (15).
- (4) Position retainer (6) and throttle cable swivel collar (12) on support bracket (7) and secure with bolts and washers (9). (Figure 73-05)

NOTE: The retainer tang must engage the slot in the throttle plunger sleeve to secure the throttle cable at the support bracket.

- (5) Install safety wire to secure throttle cable to support bracket.
- (6) Install boot (5) and (10) on the actuator sleeve (4).

NOTE: If rubber boots are cracked or show signs of deterioration, install new rubber boots.

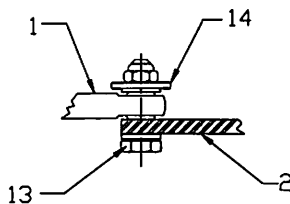
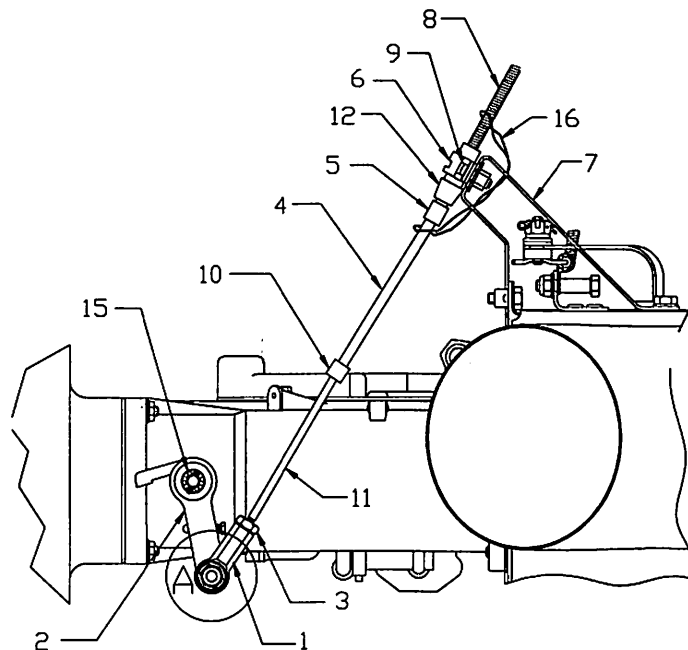
- (7) Install the jam nut (3) and rod end bearing (1) loosely on control cable actuator shaft (11).
- (8) Check carburetor throttle arm (2) with the arm against the full open stop. The arm should be approximately 5° aft of vertical. If the throttle arm requires adjustment, re-torque attaching nut (15) to 30 - 48 inch-pounds and install a new cotter pin after the adjustment.
- (9) Place a 1/8 inch (0.125") spacer between throttle control lever (7) and its mechanical forward stop (13). (Figure 73-06)
- (10) Adjust the threaded rod end bearing (1) to position carburetor throttle arm (2) against the full open stop with the rod end attached to the inner hole of the throttle arm. (Outer hole on S/N 10247 and subsequent) Ensure there is a minimum of 3/16 inch rod end engagement. Secure with bolt, washers and nut (13). Figure 73-05

NOTE: It is essential that the large washer is located as shown in Figure 73-05, Detail A.

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- (11) If thread engagement in step (10) above is less than 3/16 inch, clevis end (11) may be threaded out to 3/16 inch minimum thread engagement then repeat (10) above. (Figure 73-06)
- (12) The space between throttle control lever (7) and forward stop (13) must be 1/8 to 1/4 inch when the carburetor full throttle stop is reached.
- (13) The space between throttle control lever (7) and aft stop (14) must be 1/8 to 1/4 inch when the carburetor idle stop is reached.
- (14) Install throttle quadrant cover (5) and secure with screws (4).
- (15) Install knobs (1), (2) and (3) on control levers (7), (8) and (9) and tighten friction knob (6).
- (16) Check all attachments including jam nuts and safety devices to ensure proper installation.
- (17) Check throttle for smooth operation.
- (18) Seal the opening in the firewall around the control cable with firewall sealant.
- (19) Close and latch cowl doors.

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DETAIL A

**Engine Throttle Control Installation
Figure 73-05**

- 1. Rod End Bearing**
- 2. Throttle Arm**
- 3. Jam Nut**
- 4. Control Cable Actuator Sleeve**
- 5. Boot (Not Shown)**
- 6. Retainer**
- 7. Throttle Cable Support Bracket**
- 8. Throttle Cable**
- 9. Bolt and Washer**
- 10. Boot**
- 11. Control Cable Actuator Shaft**
- 12. Swivel Collar**
- 13. Bolt, Washers and Nut**
- 14. AN970-3 Washer**
- 15. Throttle Arm Attach Nut and Cotter Key**
- 16. Safety Wire**

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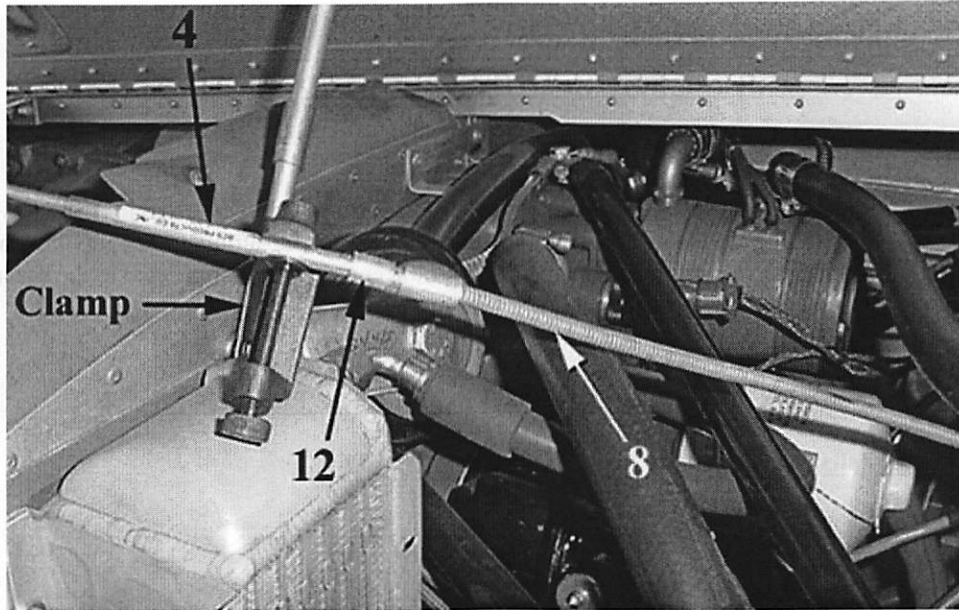


Figure 73-05A

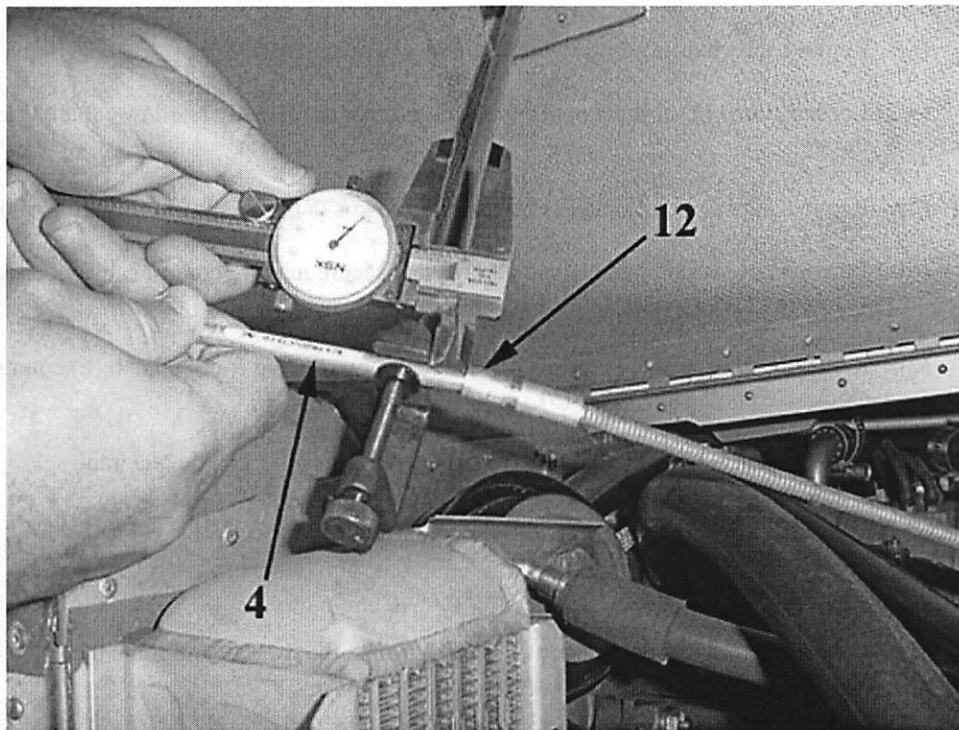


Figure 73-05B

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MIXTURE CONTROL - DESCRIPTION/OPERATION

1. General

The mixture control meters the amount of fuel that passes through the carburetor main jet, and is used to regulate fuel economy at a given power setting and cruise altitude. The mixture control is located in the throttle quadrant adjacent to the throttle control and is connected to the carburetor mixture control arm by a flexible cable.

MIXTURE CONTROL - MAINTENANCE PRACTICES

1. Removal/Installation (Reference Figure 73-06, 73-07 and 73-08)

A. Remove Mixture Control.

- (1) Open the upper cowl.
- (2) Disconnect mixture cable (3) at the carburetor by removing the swivel assembly from the mixture control arm (6). (Figure 73-08)
- (3) Remove the mixture control wire from the swivel assembly.
- (4) Loosen clamp (2) at bracket (4) on the carburetor sufficiently to allow cable (3) to slide through.
- (5) Remove knobs (1), (2) and (3) from control levers (7), (8) and (9). (Figure 73-06)
- (6) Remove nut, washer and clevis bolt (10) that secure mixture control cable clevis end (11) to mixture control lever (8).
- (7) Remove eight screws (4) loosen control levers by rotating friction knob (6) counter clockwise and lift off cover (5).
- (8) Remove bolts (15) and retainer (16) from the front of the throttle quadrant.
- (9) Pull the mixture control cable through the firewall from inside the aircraft.

B. Install Mixture Control.

- (1) Pass the end of the mixture control cable through the firewall and route the cable through clamp (2) on carburetor bracket (4). (Figure 73-08)
- (2) Attach control cable clevis end (11) to mixture control lever (8) with screw, washer and nut (10). Secure with a cotter pin. (Figure 73-06)
- (3) Install the cable retainer (16) with bolts (15) to secure the mixture cable to the throttle quadrant.
- (4) Check mixture control arm (6), (Figure 73-08), with the arm against full rich stop. The arm should be 50° forward of vertical. If arm (6) requires adjustment, re-torque attaching nut (7) to 25-60 inch pounds and install cotter pin after adjustment.

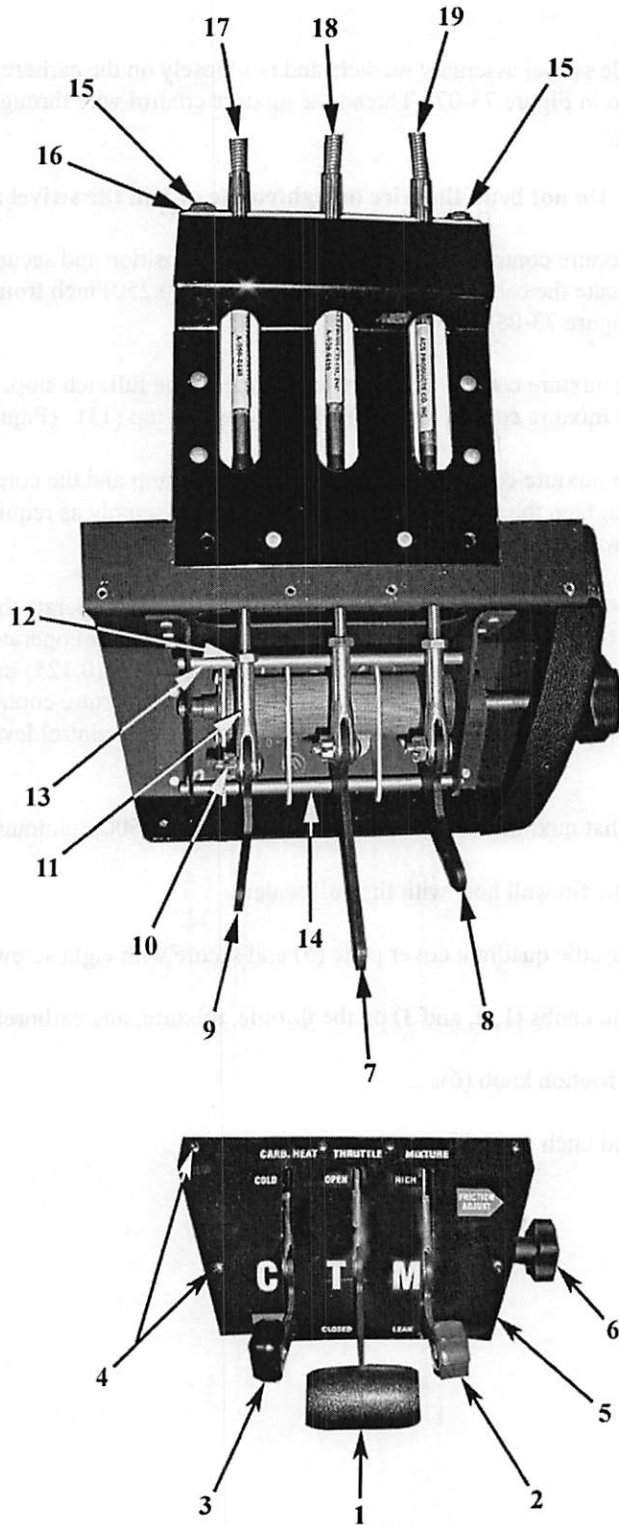
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- (5) Assemble swivel assembly washers and nut loosely on the carburetor mixture control arm as shown in Figure 73-07. Thread the mixture control wire through the hole in the swivel assembly.

NOTE: Do not bend the wire or tighten the nut on the swivel at this time.

- (6) Place mixture control arm (6) in the idle cut-off position and secure clamp (2) to bracket (4) to locate the cable housing 1/8 (0.125) to 1/4 (0.250) inch from the mixture control arm. (Figure 73-08)
- (7) Position mixture control arm completely against the full rich stop. Place a 1/8 inch spacer between mixture control lever (8) and its forward stop (13). (Figure 73-06)
- (8) With the mixture control arm against the full rich stop and the control lever against the spacer, tighten the nut on the control arm swivel assembly as required to clamp the control wire securely. Install cotter pin.
- (9) Remove the spacer behind mixture control lever (8) and operate the mixture control through its full range of travel, making sure that the control operates freely. With the mixture control arm against the full rich stop, assure 1/8 (0.125) inch clearance between control lever (8) and its forward stop (13). With the mixture control arm against the idle cut-off stop, assure 1/8 (0.125) inch clearance between control lever (8) and its aft stop (14).
- (10) Ensure that mixture control cable has a 4 1/2 inch (4.500) minimum bend radius.
- (11) Reseal the firewall hole with firewall sealant.
- (12) Install throttle quadrant cover plate (5) and secure with eight screws (4).
- (13) Install the knobs (1, 2, and 3) on the throttle, mixture, and carburetor heat control levers.
- (14) Tighten friction knob (6).
- (15) Close and latch cowl doors.

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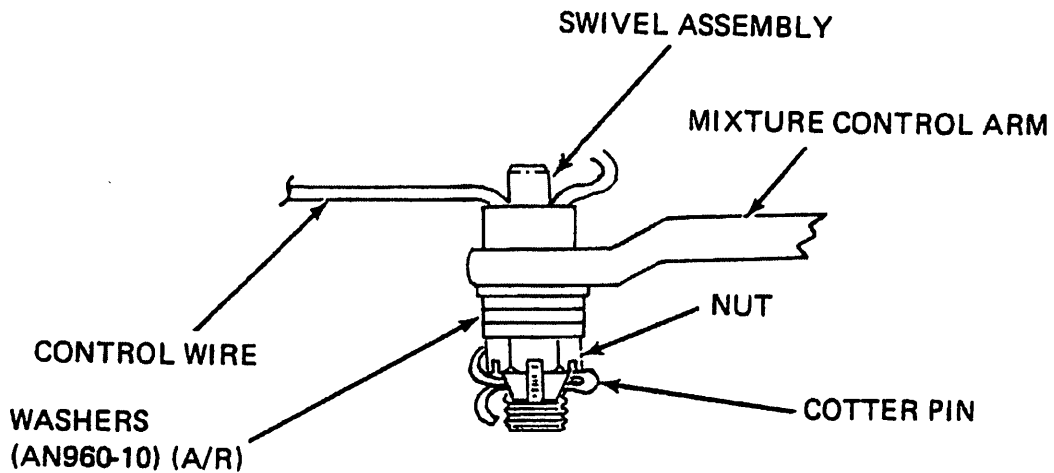


Engine Control Rigging (Sheet 1 of 2)
 Figure 73-06

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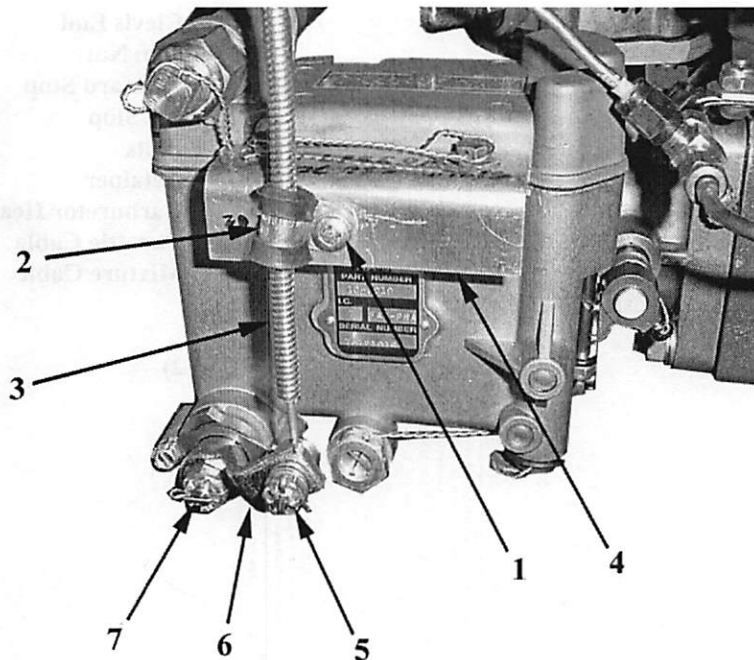
- | | |
|---|---------------------------|
| 1. Throttle Knob | 11. Clevis End |
| 2. Mixture Knob | 12. Jam Nut |
| 3. Carburetor Heat Knob | 13. Forward Stop |
| 4. Screw | 14. Aft Stop |
| 5. Cover | 15. Bolts |
| 6. Friction Knob | 16. Retainer |
| 7. Throttle Lever | 17. Carburetor Heat Cable |
| 8. Mixture Lever | 18. Throttle Cable |
| 9. Carburetor Heat Lever | 19. Mixture Cable |
| 10. Clevis bolt, Washer, Nut & Cotter Pin | |

**Engine Control Rigging (Sheet 2 of 2)
Figure 73-06**



**Mixture Control Wire Installation
Figure 73-07**

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Mixture Rigging
Figure 73-08

- | | | | |
|----|---------------------|----|------------------|
| 1. | Screw, Washer & Nut | 5. | Swivel Assembly |
| 2. | Clamp | 6. | Arm, Mixture |
| 3. | Mixture Cable | 7. | Nut & Cotter Pin |
| 4. | Bracket | | |

2. Idle Speed and Mixture Adjustment

A. Adjust Idle Speed and Mixture Setting

- (1) Perform a normal engine warm-up until the oil temperature has stabilized.
- (2) With the engine operating at 1800 RPM, check for normal magneto RPM drop (175 RPM maximum drop with no more than 50 RPM difference between magnetos).
- (3) Set the throttle stop idle speed adjustment screw on the carburetor so that the engine idles at 600 to 650 RPM.
- (4) With a smooth and steady motion, pull the cockpit mixture control towards the idle cut-off position and observe the tachometer for changes. Return the control to the full rich position prior to the engine cutting off. An increase of more than 50 RPM while "leaning out" indicates an excessively rich idle mixture. An immediate decrease in RPM indicates the idle mixture is too lean.
- (5) If the procedure in Step (4) above indicates the fuel mixture is too rich or too lean, adjust the carburetor idle mixture screw to obtain a 25 to 50 RPM increase.

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- (6) Each time the idle or mixture adjustment is changed, run the engine up to 2000 RPM before proceeding with the next RPM check.
- (7) Check the engine idle speed and if necessary, make adjustments to obtain the correct idle speed.

FUEL PRESSURE GAUGE - DESCRIPTION/OPERATION

1. General

The fuel pressure gauge is located in the instrument cluster assembly and receives its electrical power through a 2 amp instrument cluster circuit breaker.

The gauge is connected to the fuel system electrically through a transducer mounted at the fuel inlet of the carburetor.

On G1000 equipped aircraft, the fuel quantity is annunciated on the G1000 display and the fuel pressure transducer is located on a bracket mounted to the lower right side of the engine mount.

FUEL PRESSURE GAUGE - MAINTENANCE PRACTICES

1. Removal/Installation

- A. Reference Chapter 34 for standard aircraft.
- B. For G1000 equipped aircraft, the fuel pressure information is annunciated on the GDU 1040 display and is controlled by the GEA71 LRU (Garmin Engine and Airframe Line Replaceable Unite) and the fuel pressure transducer.

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CHAPTER 74

IGNITION

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IGNITION SYSTEM - DESCRIPTION/OPERATION

1. General

The ignition system components generate, control, and distribute an electrical current to ignite the fuel-air mixture in the cylinders. The engine dual ignition system consists of the magnetos, shielded harness, spark plugs and ignition switch. The magnetos are sealed, and require no internal adjustments. However, timing the magnetos to the engine at installation is required. Each lead of the ignition harness can be removed separately. The ignition switch is located on the lower left-hand side of the instrument panel.

IGNITION SYSTEM - MAINTENANCE PRACTICES

1. Inspection of Ignition System Components

- A. Check magneto harness for security of mounting clamps, tight connections, and /or frayed shielding.
- B. Examine spark plug lead shielding, compression springs and ceramics for corrosion and deposits. If this condition exists, clean the leads and ceramics with a clean cloth moistened with naphtha (see warning below).

WARNING: USE SOLVENT IN A WELL VENTILATED AREA. AVOID BREATHING FUMES. KEEP AWAY FROM FLAMES.

NOTE: If lead has been disassembled, see Figure 74-01 for correct arrangement at reassembly.

- C. Remove and check the spark plugs for proper gap and evidence of fouling. Clean and re-gap plugs if necessary. (See latest revision of Lycoming Service Instruction No. 1042). Plugs should be rotated upper-to-lower every 100 hours of plug service life, or sooner if fouling occurs.
- D. Check magnetos to engine timing. If necessary, time the magnetos to the engine. The magneto to engine timing check should be made every 100 hours.

2. Removal/Installation of Ignition System Components

A. Remove Ignition Harness

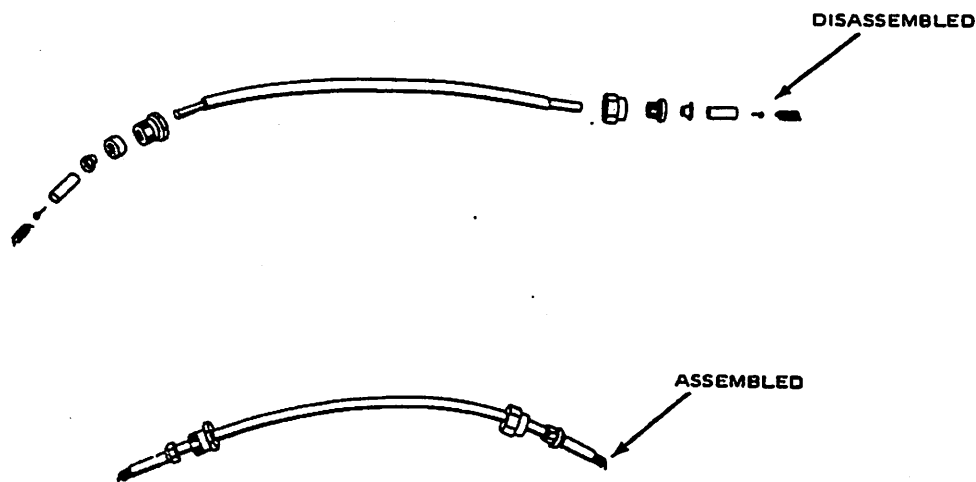
- (1) Remove cowl as necessary to gain access.
- (2) Tag and identify each lead for reference at reinstallation.
- (3) Disconnect harness leads at spark plugs.
- (4) Remove clamps securing the harness to the cylinder head.
- (5) Remove harness ties to engine mount.
- (6) Remove plastic ties as necessary to separate harness leads.

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- (7) Remove attaching screws from magneto caps.
- (8) Remove the magneto caps and harness as an assembly.

B. Install Ignition Harness

- (1) Route ignition harness leads as shown in Figure 74-02. (For alternate ignition lead routing, see Lycoming Service Instruction No. 1294).
- (2) Install ignition harness leads and magneto caps on magnetos.
- (3) Connect ignition harness leads to the spark plugs. Tighten nut finger tight plus one-quarter turn (90 degrees).
- (4) Install plastic ties on harness as necessary.
- (5) Install clamps securing ignition leads to cylinder heads as necessary.
- (6) Secure ignition harness to engine mount or accessories as necessary.
- (7) Remove identification tags installed prior to removal.
- (8) Install cowl.



**Magneto Lead Arrangement
Figure 74-01**

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C. Remove Spark Plugs

- (1) Remove cowl as necessary to gain access.
- (2) Disconnect ignition harness leads from spark plugs.
- (3) Remove spark plugs.

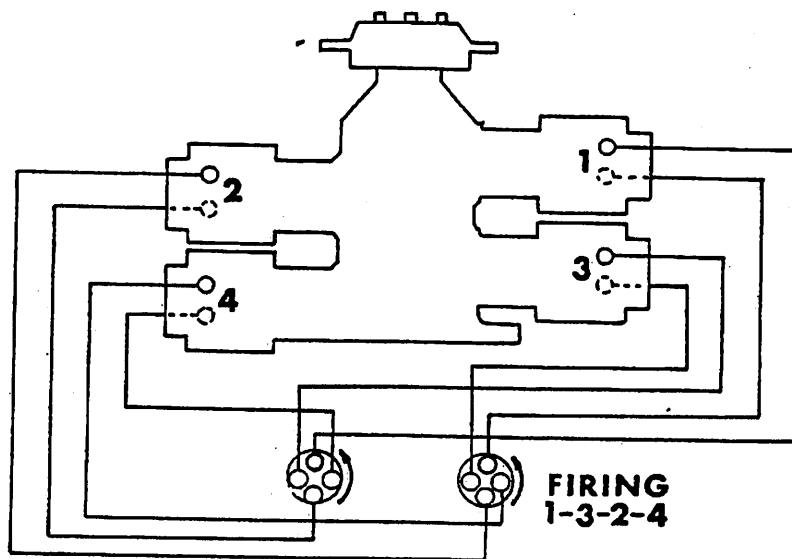
D. Install Spark Plugs

- (1) Apply anti-seize compound on all but the first two threads of the spark plug.
- (2) Install spark plugs and torque to 360-420 inch pounds.
- (3) Install ignition harness leads to spark plugs. Tighten nut finger tight plus one-quarter turn (90 degrees).
- (4) Install cowl.

E. Remove Magneto

WARNING: DURING ALL MAGNETO MAINTENANCE, TAKE PROPER PRECAUTIONS TO MAKE SURE THE ENGINE CANNOT FIRE OR START WHEN THE PROPELLER IS MOVED.

- (1) Remove cowl as necessary to gain access.
- (2) Disconnect the magneto ground wire and shielding terminal.



**Ignition System Schematic
Figure 74-02**

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- (3) Remove the distributor cap assembly.

NOTE: Make a note of the approximate angle the magneto makes with the engine centerline as an aid at reinstallation.

- (4) Remove the mounting lugs and magneto.

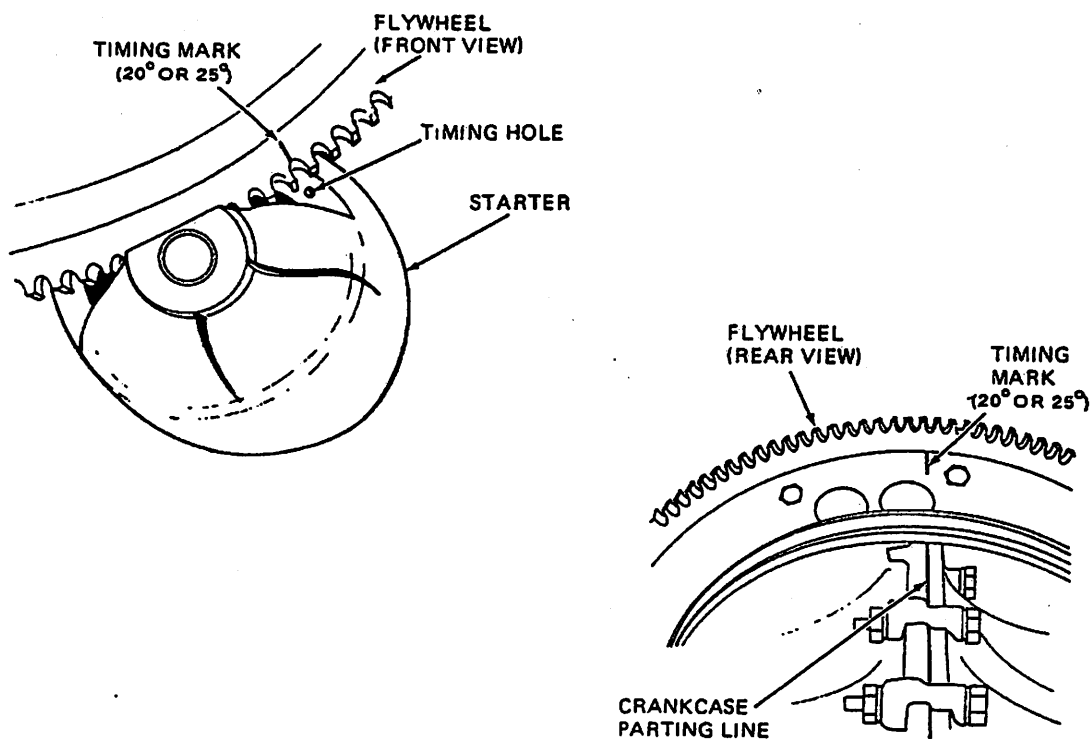
F. Install Magneto

- (1) Rotate the propeller in the normal direction of rotation until No. 1 cylinder enters its compression cycle.

NOTE: To determine if the No. 1 cylinder is in the compression cycle, remove the top plug from the No. 1 cylinder and place thumb over the port. As the piston approaches the end of the compression stroke, a positive pressure will be felt as it try's to force the thumb off the port.

- (2) The ring gear (flywheel) will be marked at 20° / 25°. Consult Engine Specifications for correct timing mark for your installation.

- (3) Continue turning the propeller in the normal direction of rotation until the advanced timing mark on the forward face of the flywheel becomes aligned with the small hole drilled in the head of the starter casing. An alternate method is to align the advance mark on the back of the flywheel with the crankcase parting line. At this point, the engine is ready to receive the magnetos. (See Figure 74-03)



**Advance Timing Alignment
Figure 74-03**

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- (4) Remove the plug from the bottom of the magneto.

NOTE: In order to rotate the magneto incorporating an impulse coupling, depress the pawl on the impulse coupling with a finger.

- (5) Rotate the magneto shaft until a spark occurs from number one lead (hold a screwdriver close to No. 1 lead while turning the shaft). As soon as the spark occurs, slowly reverse direction until the timing hole in the rotor is centered in the plug opening. (Figure 74-04)

NOTE: Failure to spark check the number one positive lead leaves the possibility of the magneto being 180° out of phase. The timing hole appears in the plug opening twice for every complete firing cycle.

- (6) Insert the special Slick Timing Pin into the timing hole in order to keep the rotor in the timed position.

- (7) Assure security of the left Magneto Impulse Coupling Gear and Drive Cushions.

- (8) Position the magneto into the crankcase at the approximate angle noted on removal. Be sure the gasket is installed behind the magneto-mounting flange.

- (9) Install the attach clip over the magneto mounting flange and tighten the nut finger tight.

NOTE: Install the magneto with the impulse coupling on the left side.

- (10) Install the second magneto in the same manner as described in steps (4) through (9) above.

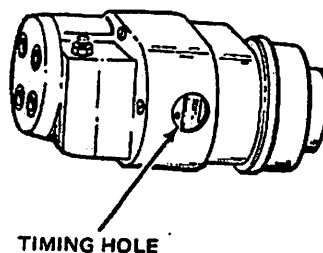
CAUTION: DO NOT ROTATE THE PROPELLER WITH THE PIN INSTALLED IN THE MAGNETO TIMING HOLE.

- (11) Final timing should be accomplished with a timing light. Using a battery powered timing light, attach the positive leads to the magneto ground terminal, and the negative lead to any unpainted portion of the engine.

- (12) Remove the pins from the magnetos.

- (13) Rotate the magneto in its mounting flange until the light comes on. Slowly turn the magneto in the opposite direction until the light goes off. Move the magneto back slowly and stop the instant the light comes on.

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**Magneto Timing Hole
Figure 74-04**

(14) Repeat this process for the other magneto.

(15) At completion of timing both magnetos, check to assure that both magnetos fire simultaneously.

NOTE: To check the simultaneous firing of both magnetos, back off on the propeller a few degrees (timing light should go out). Bring the propeller back slowly in the direction of normal rotation until the 25° advanced timing mark aligns with the hole in the starter casing. At this point, both lights should go on simultaneously. When timing the magneto to the engine, a maximum tolerance of $\pm 2^\circ$ is allowable.

(16) Torque the magneto mounting nuts to 204 inch pounds (17 ft. lbs.) and install magneto ground wire and shielding terminal.

NOTE: When Magneto mounting nuts are removed, new internal tooth Lock Washers P/N STD-475 must be installed.

(17) Magneto replacement is required at each engine TBO. No attempt should be made to field repair the magneto. Disassembly of the magneto will void its warranty.

NOTE: If the drive shaft nut has been removed from the magneto incorporating the impulse coupling, care must be exercised not to over tighten on reassembly. The recommended torque is 120 to 300 inch pounds (10 to 25 ft. lbs.). Torque may be increased to align safety hole with slot in nut.

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CHAPTER 77

ENGINE INDICATING

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ENGINE INDICATING SYSTEM - DESCRIPTION/OPERATION

1. General

Because of the simplicity of the engine installed in the AG-5B aircraft a limited number of engine indicating instruments are required. Most of the engine indicating instruments are discussed in their specifically related system chapter. This chapter covers only the tachometer and for the optional G1000 equipped aircraft, the exhaust temperature and cylinder head temperature.

TACHOMETER - DESCRIPTION/OPERATION

1. General

The tachometer is an electrically driven indicator mounted on the lower left side of the instrument panel. It measures the rate at which the crankshaft revolves in revolutions per minute (RPM), and is calibrated in hundreds of RPM. The instrument also incorporates a recording mechanism to keep an accurate record of engine operation hours.

The tachometer provides the pilot with throttle control information necessary in making required power settings and adjustments for takeoff, climb, cruise, and decent. The tachometer is also used when making magneto and engine maintenance checks. The formation of carburetor ice would be indicated by a drop in engine RPM.

Detailed information on the operation on the tachometer is contained in the pilots operating handbook.

On G1000 equipped aircraft, engine RPM is displayed on the MFD and/or the PFD, which receives RPM information from the GEA 71 Engine and Airframe Computer. The GEA 71 receives engine RPM information from a sensor installed in the right magneto.

TACHOMETER - MAINTENANCE PRACTICES

1. Removal/Installation

A. Remove Tachometer

- (1) Disconnect the tachometer electrical connector at the rear of the tachometer.
- (2) Remove four mounting screws then remove the tachometer.

B. Install Tachometer

- (1) Connect the electrical connector to the back of the tachometer.
- (2) Position the tachometer on the rear of instrument panel and install the four mounting screws.

2. Wiring and Trouble Shooting

- A. Refer to service instructions provided by the tachometer manufacturer.

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TACH SENSOR - MAINTENANCE PRACTICES (G1000 Equipped Aircraft)

1. General

The tachometer sensor used on G1000 equipped aircraft is installed in the right magneto. The sensor picks up the magnetic field of the armature, counts the armature revolutions and sends that information to the GEA 71.

2. Removal/Installation (Reference Figure 77-1)

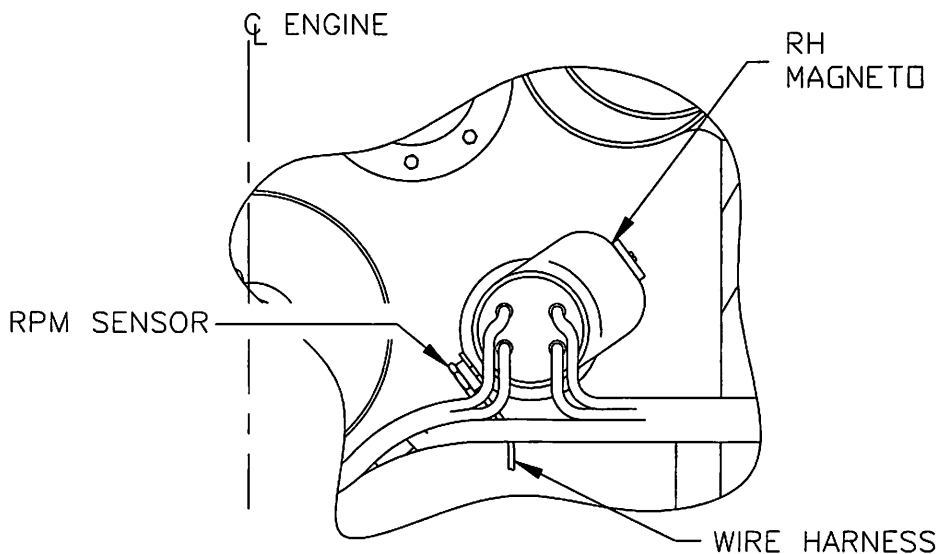
NOTE: Magneto rotation or removal may be required to remove and install the RPM sensor. Refer to Chapter 74 of this manual for magneto installation and timing.

A. Removal RPM Sensor

- (1) Open the right engine cowl door.
- (2) Disconnect the RPM sensor harness.
- (3) Unscrew the sensor from magneto housing.

B. Install RPM Sensor

- (1) Locate the RPM Sensor over the threaded vent hole in the housing closest to the magneto armature.
- (2) Screw the sensor into the housing and torque to 30-40 inch pounds.
- (3) Connect the RPM sensor wiring harness.
- (4) Close and secure the cowl door and perform an operational check of the Engine RPM indicating system.



**RPM Sensor Installation
Figure 77-01**

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EGT PROBE - MAINTENANCE PRACTICES (G1000 Equipped Aircraft)

1. General

On G1000 equipped aircraft, Exhaust Gas Temperature (EGT) is displayed on the MFD and/or the PFD, which receives EGT information from the GEA 71 Engine and Airframe Computer. The GEA 71 receives EGT information from a probe installed in each of the four exhaust risers.

2. Removal/Installation (Reference Figure 77-2)

A. Removal of EGT Probes

- (1) Remove the lower engine cowl
- (2) Disconnect EGT Probe harness (7) from the probe.
- (3) Disconnect worm gear clamp (3) and pull the clamp and probe assembly from exhaust riser (2).

B. Installation of EGT Probes

- (1) Insert EGT probe (1) into the hole in exhaust riser (2) and wrap worm-gear clamp (3) around the stack. Confirm that the EGT probe is correctly seated in the exhaust riser and tighten the clamp.
- (2) Reconnect EGT probe electrical harness (7).
- (3) Reinstall the lower engine cowl and perform an operational check of the EGT System.

CHT PROBE - MAINTENANCE PRACTICES (G1000 Equipped Aircraft)

1. General

On G1000 equipped aircraft, Cylinder Head Temperature (CHT) is displayed on the MFD and/or the PFD, which receives CHT information from the GEA 71 Engine and Airframe Computer. The GEA 71 receives CHT information from a probe installed in each of the four cylinder heads.

2. Removal/Installation (Reference Figure 77-2)

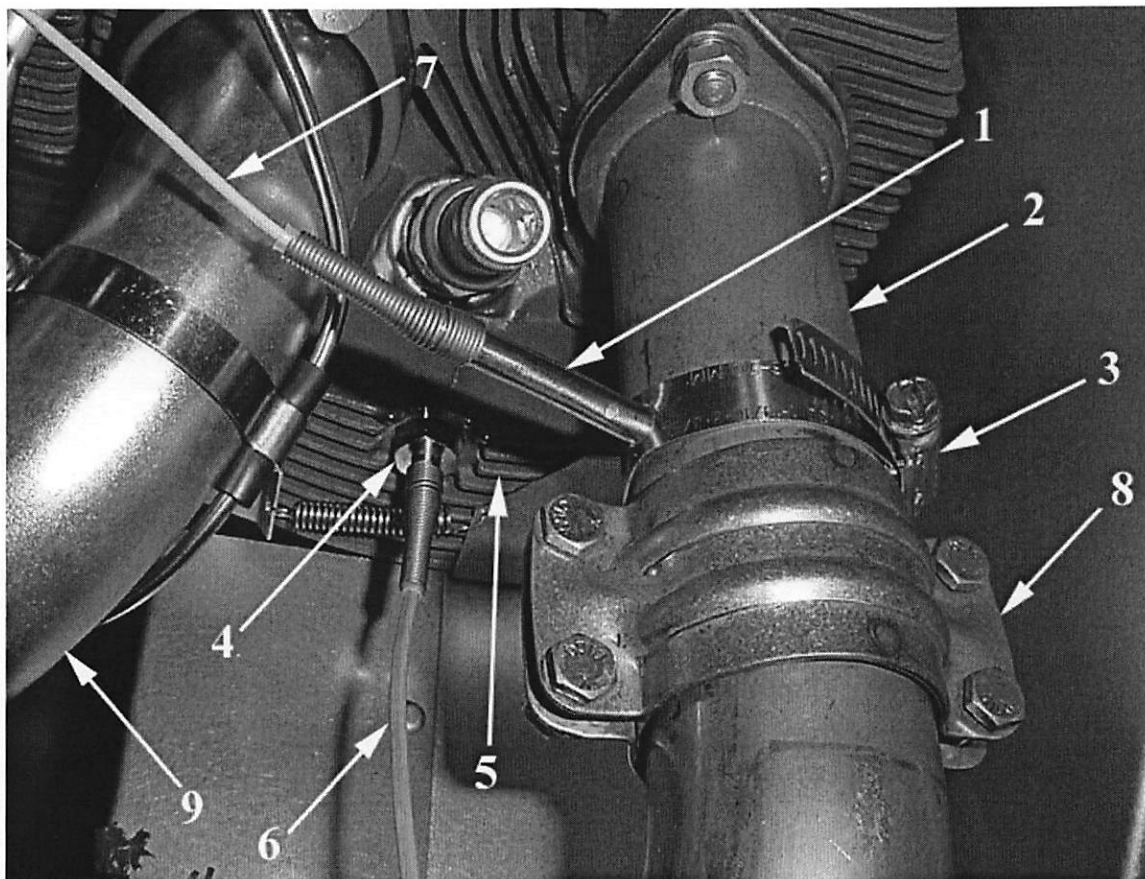
A. Removal of CHT Probes

- (1) Remove the lower engine cowl.
- (2) Disconnect CHT Probe electrical harness (6).
- (3) Remove CHT probe (4) from cylinder head (5).

B. Installation of CHT Probes

- (1) Insert CHT probe (4) into the hole in cylinder head (5) and tighten.
- (2) Reconnect CHT probe electrical harness (6).
- (3) Reinstall the lower engine cowl and perform an operational check of the CHT System.

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EGT and CHT Probe Installation
Figure 77-02

1. **EGT Probe**
2. **Exhaust Riser**
3. **Worm Gear Clamp**
4. **CHT Probe**
5. **Cylinder Head**
6. **CHT Electrical Harness**
7. **EGT Electrical Harness**
8. **Exhaust Clamp (Reference)**
9. **Intake Tube (Reference)**

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CHAPTER 78

EXHAUST

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ENGINE EXHAUST SYSTEM - DESCRIPTION/OPERATION

1. General

The exhaust system consists of an integral muffler, exhaust pipe, clamp assemblies, risers, and gaskets. A metal shroud encloses the muffler. Flexible ducting is attached to this shroud and provides warm air to the cabin for heating. Inlet air is picked up through an opening in the front of the shroud that extends slightly through an opening in the front baffle.

The carburetor heat is supplied to the carburetor from the shroud around the muffler, through flexible tubing to the carburetor heat valve and to the carburetor when the carburetor heat control is opened.

ENGINE EXHAUST SYSTEM - MAINTENANCE PRACTICES

1. Removal/Installation of Engine Exhaust System (See Figure 78-01)

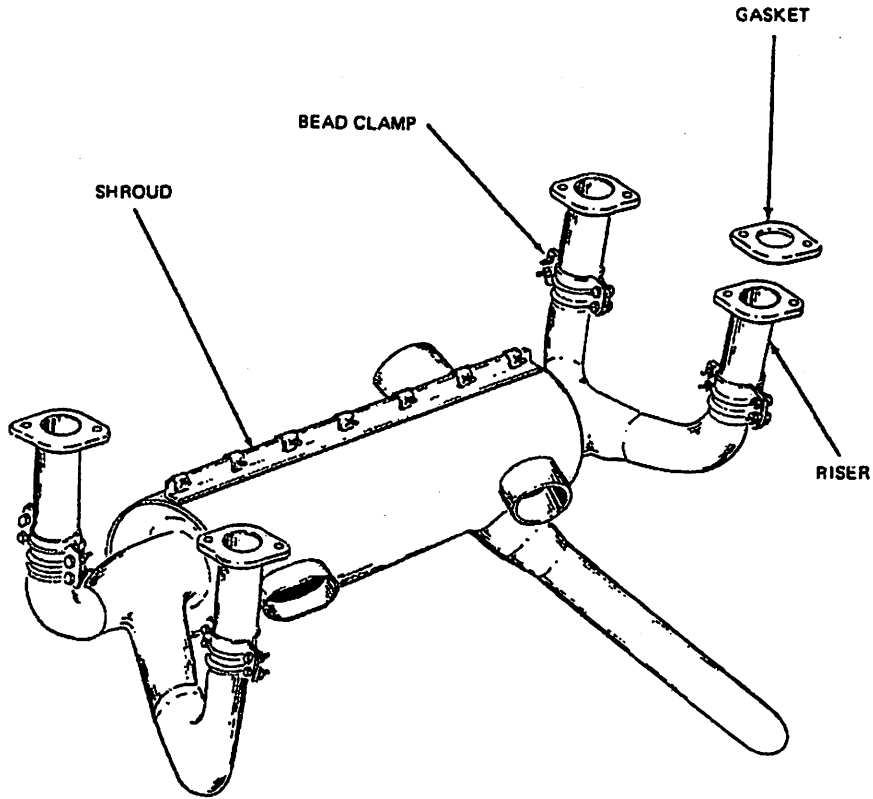
A. Remove Exhaust System

- (1) Remove the lower cowl. (Refer to Chapter 71)
- (2) Loosen clamps and disconnect the carburetor heat and cabin heat inlet flexible ducts from the muffler shroud assembly.
- (3) Remove the nuts securing the exhaust risers to the cylinders, and remove the risers and gaskets.

B. Install Exhaust System

- (1) Using new gaskets, position the risers on the cylinders and loosely install new lock washers and the exhaust flange nuts.
- (2) Tighten the exhaust flange nuts to 110-130 inch pounds and torque. Tighten bead clamp bolts.
- (3) Install carburetor and cabin heat flexible ducts to the muffler shroud assembly and tighten clamps.
- (4) Install the lower cowl. (Refer to Chapter 71)

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**Exhaust System Assembly
Figure 78-01**

2. Inspection of Exhaust System

Exhaust systems are subject to burning, cracking, and general deterioration from alternate thermal stresses and vibration. Consequently, it is extremely important that the system be inspected every 100 hours or at any time power loss is suspected or exhaust fumes or carbon monoxide are detected in the cabin. To properly inspect the exhaust system, the components must be clean and free from oil, grease, or dirt. Mineral spirits may be used to clean exhaust system components.

WARNING: USE SOLVENTS IN A WELL VENTILATED AREA. AVOID BREATHING FUMES. KEEP AWAY FROM FLAMES.

WARNING: DO NOT USE HIGHLY FLAMMABLE SOLVENTS ON THE ENGINE EXHAUST SYSTEM. NEVER USE A WIRE BRUSH OR ABRASIVES TO CLEAN EXHAUST SYSTEMS OR MARK THE SYSTEM WITH LEAD PENCILS.

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A. Inspect Exhaust System

- (1) Perform engine run up and check for required static RPM.
- (2) Clean the exhaust system components using a suitable solvent.
- (3) Allow components to drain and then wipe dry with a clean cloth.
- (4) Inspect core through tail pipe opening for distorted or deteriorated baffles and shake the muffler to determine if baffles are secure or loose.
- (5) Tap the muffler lightly with a rubber mallet and check for scale and rust from the muffler interior. Severely distorted, deteriorated or loose baffles, or large flakes of scale and rust from the interior of the muffler are an indication that muffler replacement is required.

NOTE: Especially check the area adjacent to welds. Look for exhaust gas deposits in surrounding areas, indicating that exhaust gasses are escaping through an opening. If thorough inspection is not possible, pressure test for leaks and repair as required in accordance with FAA Recommended Maintenance Practices.

- (6) Inspect the engine exhaust flanges for smooth seating surfaces. Check the header flanges for distortion.
- (7) Check fit of risers to muffler pipes. If loose, swage out the risers for tight fit.
- (8) Perform exhaust system air leak test as follows:
 - (a) Plug all openings in the muffler and attach the pressure side of an industrial vacuum cleaner (capable of producing a pressure rise of at least 2 inches Hg, above atmospheric pressure) to the tail pipe opening, using a rubber plug or other suitable means of affecting a suitable seal.

NOTE: The inside of the vacuum cleaner hose should be free of any contamination that might be blown into the system.

- (b) With the vacuum cleaner operating, the complete muffler assembly can be checked for leaks by applying a soapy water solution to all areas and watching for air bubbles.
- (9) All leakage must be eliminated using FAA approved repairs.

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CHAPTER 79

OIL

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ENGINE OIL SYSTEM - DESCRIPTION/OPERATION

1. General

This chapter describes only those units and components of the oil system that are external to the engine. The components include the oil cooler, oil pressure gauge, oil temperature gauge, and associated wiring and tubing.

The oil cooler is mounted on the left rear engine baffle. The cooler is connected to the engine accessory housing by flexible lines. Air to the cooler is picked up directly from the top left rear engine baffle.

The oil pressure gauge and the oil temperature gauge are housed in the instrument cluster assembly, which is mounted vertically in the center of the instrument panel.

ENGINE OIL SYSTEM - TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
High Oil Temperature indication.	Obstructions in oil cooler air passages.	Inspect oil cooler core for dirt or obstructions and clean as necessary.

Oil Pressure Gauge Troubleshooting

TROUBLE	PROBABLE CAUSE	REMEDY
No Indication.	Insufficient oil.	Check oil supply and fill as recommended.
	Failed oil pressure transducer.	Replace transducer.
	Obstruction in pressure line.	Remove all fittings and lines, starting at engine, inspect and clean as required.
	Defective gauge.	Replace gauge.
High or low indication.	Defective gauge.	Replace gauge.
	Oil pressure relief valve out of adjustment.	Check engine pressure with a calibrated gauge and correct pressure setting as required.

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Oil Temperature Gauge Troubleshooting

TROUBLE	PROBABLE CAUSE	REMEDY
No indication, high or low indication	Gauge not grounded.	Check gauge ground connections and repair as necessary.
	Defective wiring.	Check system with ohmmeter and repair as necessary.
	Defective gauge.	Replace gauge.
	Defective probe.	Replace probe.
	Defective gauge.	Temporarily substitute a 28.5 ohm resistance for the probe. If gauge does not read 245°F (Red Line), replace gauge.
Low indication.	Low voltage.	Check voltage and adjust accordingly.

ENGINE OIL SYSTEM - MAINTENANCE PRACTICES

1. Oil Cooler Removal/Installation (Reference Figure 79-01)

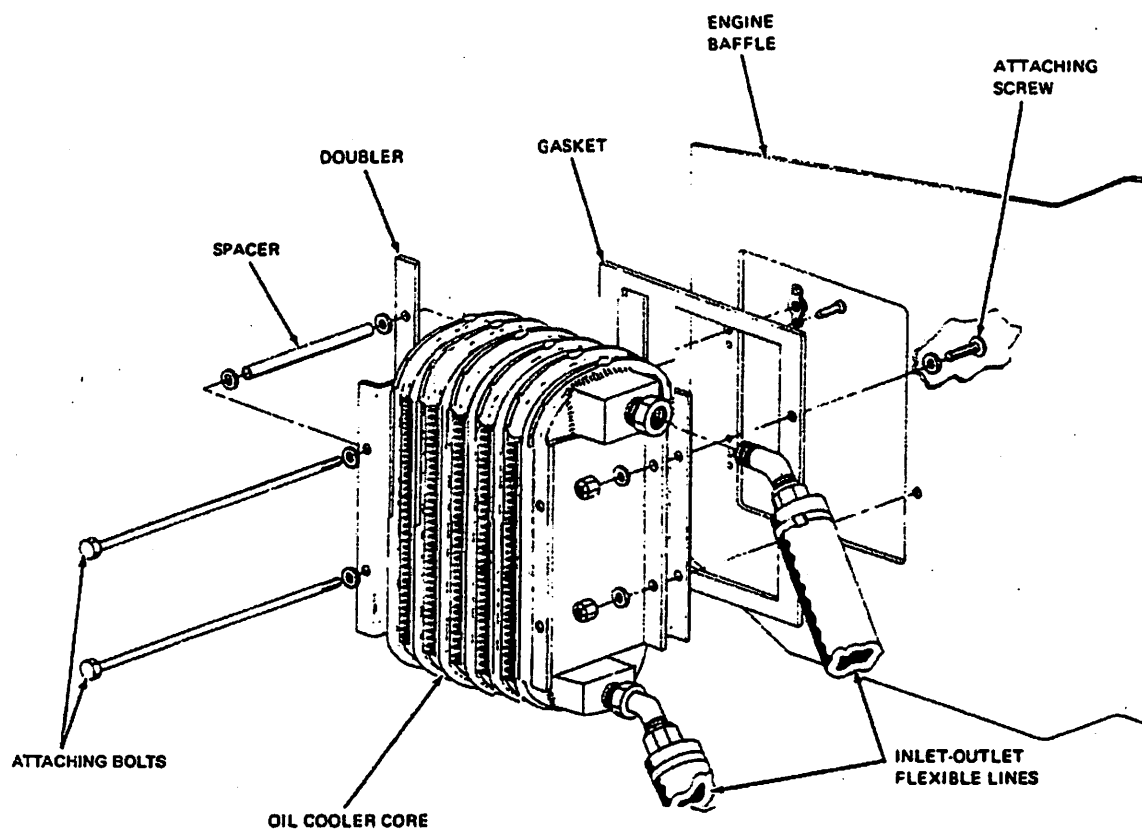
A. Remove Oil Cooler

- (1) Raise upper cowl door to gain access.
- (2) Place a suitable container under the oil cooler and disconnect the lines at the oil cooler inlet and outlet fittings.
- (3) Remove safety wire on the attaching bolts and remove bolts, spacers, washers and doubler.
- (4) Remove two nuts, screws and washers securing the cooler to the engine baffle and remove the oil cooler and gasket.

B. Install Oil Cooler

- (1) Position the reinforcing doublers and oil cooler in place on the engine baffle and install gasket, washers, spacers, bolts, screws, and nuts. Inspect gasket and replace if required.
- (2) Install safety wire in attaching bolt heads.
- (3) Connect the lines at the oil cooler inlet and outlet fittings.
- (4) Close cowl and operate the engine for 3 minutes. Check lines, and connections for leakage.

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Oil Cooler Removal/Installation
Figure 79-01

2. Oil Cooler Inspection

A. Inspect Oil Cooler

- (1) Inspect oil cooler air passages for obstructions.
- (2) Inspect cooler core for cracks, damage, deterioration and evidence of leakage.
- (3) Check lines for worn and/or damaged areas and signs of leakage.
- (4) If necessary to determine leakage, perform a submerged leak test on the oil cooler. (See caution below)

CAUTION: WHEN PERFORMING A SUBMERGED LEAK TEST ON THE OIL COOLER, DO NOT APPLY PRESSURES IN EXCESS OF 100 PSI.

3. Indicating Gauges Removal/Installation

- A. Reference Chapter 34

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4. Inspection and Maintenance of Flexible Hoses

A. Inspect Flexible Hoses

- (1) Inspect the flexible oil hoses at each 50-hour inspection.
- (2) Examine each flexible hose exterior for evidence of leakage.

CAUTION: **AVOID EXCESSIVE FLEXING AND SHARP BENDS WHEN EXAMINING HOSES FOR STIFFNESS.**

- (3) Check all flexible oil hoses for evidence of stiffness.
- (4) Examine the flexible oil hoses for evidence of rubbing or chafing.

B. Recommended Maintenance Procedures for Flexible Oil Hoses

- (1) Replace all flexible oil hoses in the engine compartment at engine overhaul or every 5 years, whichever comes first.
- (2) Replace all flexible oil hoses that show evidence of leaking or stiffness.
- (3) Avoid twisting the hose at installation.
- (4) Provide as large a bend radius as possible at installation.
- (5) At removal, do not attempt to straighten a flexible hose that has taken a permanent set during use.
- (6) At reinstallation of a flexible hose be sure that the hose is returned to its original position.
- (7) Route hoses away from areas of intense heat.
- (8) Refer to AC 43.13-1 for flexible hose installation procedures.
- (9) Assure security of all fire sleeves.

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CHAPTER 80

STARTING

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STARTING SYSTEM - DESCRIPTION/OPERATION

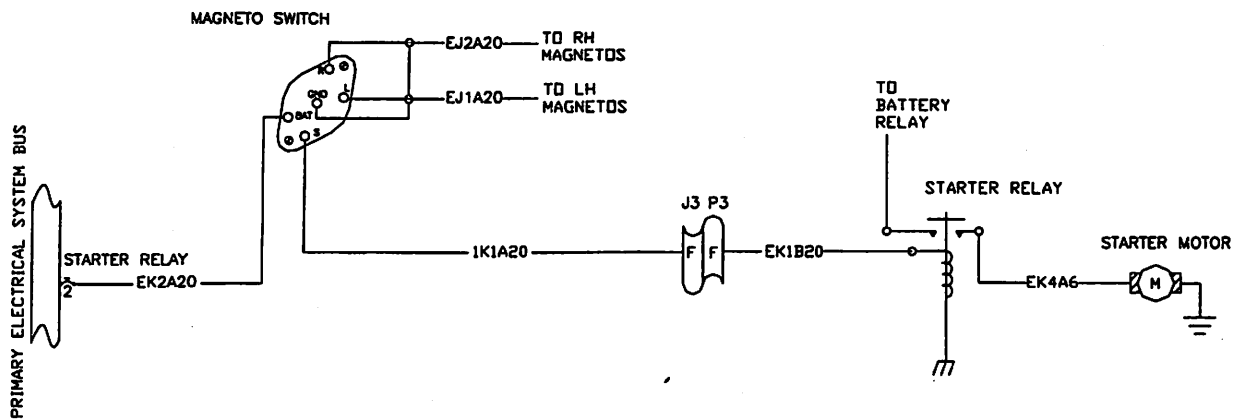
1. General

The engine starting system consists of a starter switch, (incorporated in the magneto switch) a starter relay, a starter, a 2 amp circuit breaker, a starter warning light, and associated wiring.

The 2 amp circuit breaker which protects the starter control circuit is located on the lower right side of the instrument panel. With the MASTER switch, on to energize the battery relay, and the starter switch actuated, electrical current flows through the circuit breaker and starter switch to energize (close) the starter relay. This allows current flow from the battery through the battery relay, to the starter relay and to the starter when the starter switch is actuated.

The battery and starter relays are located on the front of the firewall. The starter is mounted to the front of the engine.

The starter warning light provides a visual indication of a starter fault. If the light remains illuminated after the starter switch is released, a fault in the starting system has occurred.



**Starter Circuit
Figure 80-01**

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STARTING SYSTEM - TROUBLESHOOTING

TROUBLE	PROBABLE CAUSE	REMEDY
Starter will not operate.	Low battery.	Recharge or replace battery.
	Open circuit breaker.	Close circuit breaker.
	Defective wiring.	Check wiring with ohmmeter and repair as required.
	Defective starter relay.	Replace relay.
	Defective starter switch.	Replace switch.
	Defective starter motor.	Repair or replace starter motor.
Starter motor sluggish.	Low battery.	Recharge or replace battery.
	Dirty contacts on starter relay.	Replace starter.
	Defective starter.	Repair or replace starter motor.
	Dirty commutator.	Clean inspect and turn down as required.
Starter noisy.	Worn starter drive gear	Inspect starter drive gear and replace if necessary.
	Worn or broken teeth on flywheel.	Inspect flywheel and replace if necessary.

STARTER SYSTEM - MAINTENANCE PRACTICES

1. Removal/Installation of Starting System Components (Reference Figure 80-02)

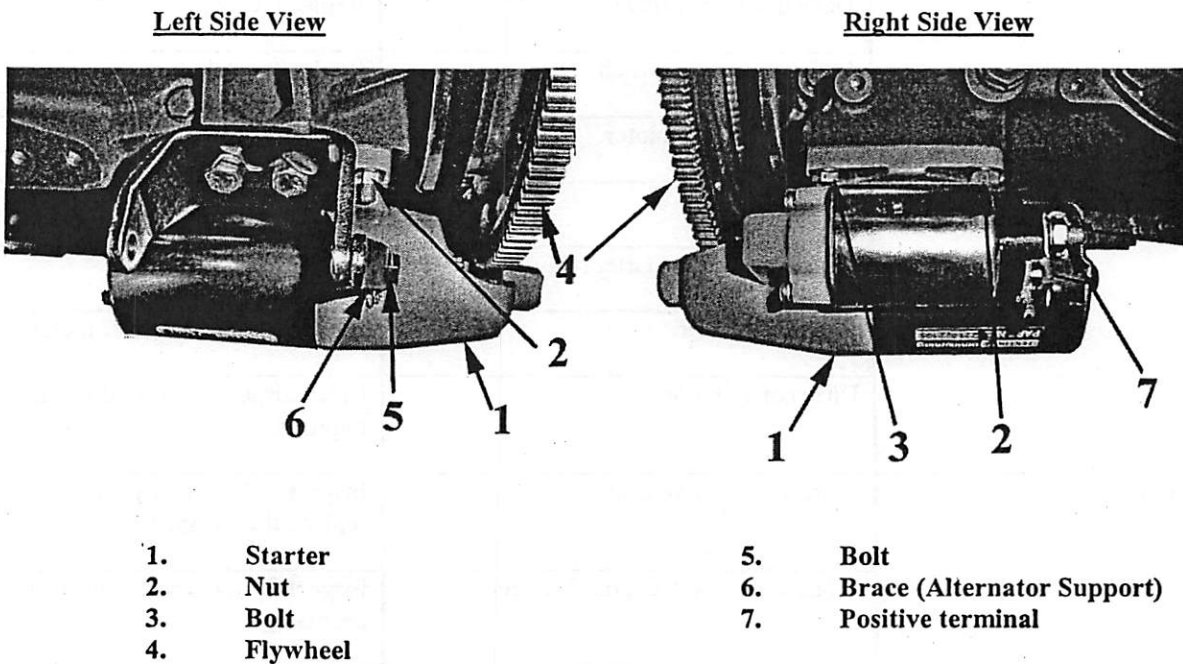
A. Remove starter

- (1) Remove cowl as necessary to gain access to starter.
- (2) Disconnect starter cable at positive terminal.
- (3) Remove bolt (5) securing brace (6) to starter.
- (4) Remove mounting bolt (3) and nuts (2) on starter mounting studs and remove starter.

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B. Install Starter

- (1) Position starter on mounting studs and install nuts (2) and mounting bolt (3).
- (2) Position brace (6) from alternator mount in place, and install mounting bolt (5).
- (3) Connect starter cable to terminal.
- (4) Install cowl.
- (5) Connect battery.



Starter Removal / Installation
Figure 80-02

C. Remove Starter Relay (See Figure 80-03.)

- (1) Raise right-hand side of upper cowl to gain access.

NOTE: Disconnect the negative battery cable and isolate it from the battery.

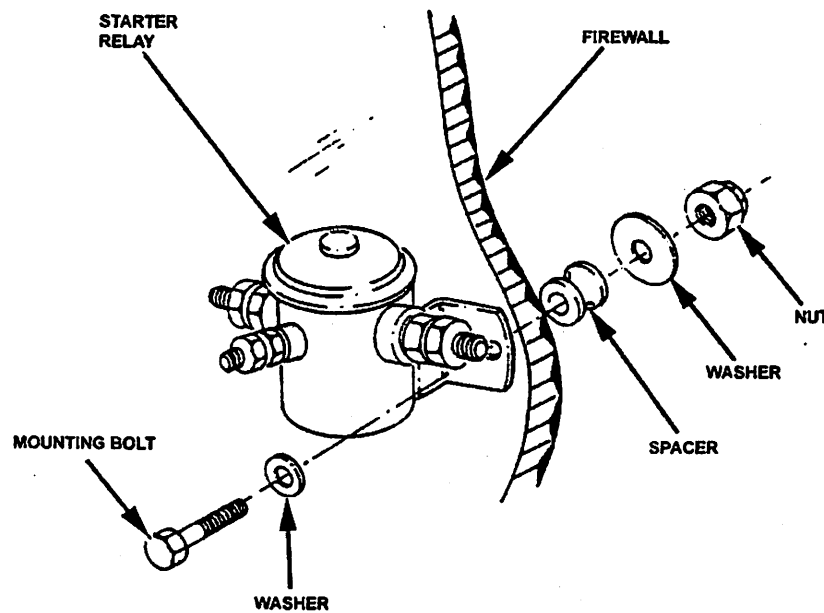
- (2) Disconnect wiring and jumper bar from starter relay.
- (3) Remove bolts, nuts, and washers securing starter relay to firewall and remove relay.

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D. Install Starter Relay

NOTE: Ensure negative battery cable is disconnected.

- (1) Position starter relay to firewall and install bolts, washers, and nuts.
- (2) Connect wiring and jumper bar to starter relay.
- (3) Reconnect negative battery cable.
- (4) Close and secure cowl fasteners.



**Starter Relay Removal/Installation
Figure 80-03**

E. Remove Magneto/Starter Switch

NOTE: Ensure that master switch is in the OFF position.

- (1) Remove knurled nut from shell of magneto/starter switch on front of instrument panel.
- (2) Push switch through panel and make accessible to tag and disconnect wiring.

F. Install Magneto/Starter Switch

- (1) Connect wires to magneto/starter switch.
- (2) Position switch in instrument panel and install knurled nut on switch shell.

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RECOMMENDED NUT TORQUE VALUES

NOTE: The Torque Values stated are inch-pounds, related only to oil-free cadmium plated threads. All torque values given through out this service manual are for oil-free threads unless otherwise noted.

FINE THREAD SERIES TYPE OF NUT				
TAP SIZE	TENSION		SHEAR	
	TORQUE		TORQUE	
	STD (NOTE 1)	ALT (NOTE 2)	STD (NOTE 3)	ALT (NOTE 2)
8-36	12-15		7-9	
10-32	20-25	20-28	12-15	12-19
1/4-28	50-70	50-75	30-40	30-48
5/16-24	100-140	100-150	60-85	60-106
3/8-24	160-190	160-260	95-110	95-170
7/16-20	450-500	450-560	270-300	270-390
1/2-20	480-690	480-730	290-410	290-500
9/16-18	800-1000	800-1070	480-600	480-750
5/8-18	1100-1300	1100-1600	660-780	660-1060
3/4-16	2300-2500	2300-3350	1300-1500	1300-2200
7/8-14	2500-3000	2500-4650	1500-1800	1500-2900
1-14	3700-5500	3700-6650	2200-3300	2200-4400
1-1/8-12	5000-7000	5000-10000	3000-4200	3000-6300
1-1/4-12	9000-11000	9000-16700	5400-6600	5400-10000

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TAP SIZE	COURSE THREAD TYPE OF NUT		SERIES	
	TENSION		SHEAR	
	TORQUE		TORQUE	
	STD (NOTE 4)	ALT	STD (NOTE 5)	ALT
8-32	12-15		7-9	
10-24	20-25		12-15	
1/4-20	40-50		25-30	
5/16-18	80-90		48-55	
3/8-16	160-185		95-1000	
7/16-14	235-255		140-155	
1/2-13	400-480		240-290	
9/16-12	500-700		300-420	
5/8-11	700-900		420-540	
3/4-10	1150-1600		700-950	
7/8-9	2200-3000		1300-1800	

NOTES:

1. Covers AN310, AN316, AN345, AN363, AN366, MS20365, MS21044, MS21045, "1452", "EB", "UWN", "Z1200", and other self-locking nuts.
2. When using AN310 or AN320 castellated nuts, where alignment between bolt and cotter pin is not reached using normal torque values, use alternate torque values or replace nut.
3. Covers AN316, AN320, AN7502, MS20364, MS21042 and MS21083.
4. Covers AN310, AN340, AN366, and other self-locking anchor nuts.
5. Covers AN316 and AN320.

The above values are recommended for all installation procedures contained in this manual except where other values are stipulated. They are not to be used for checking tightness of installed parts during service.