SECTION 13

UTILITY AND OPTIONAL SYSTEMS

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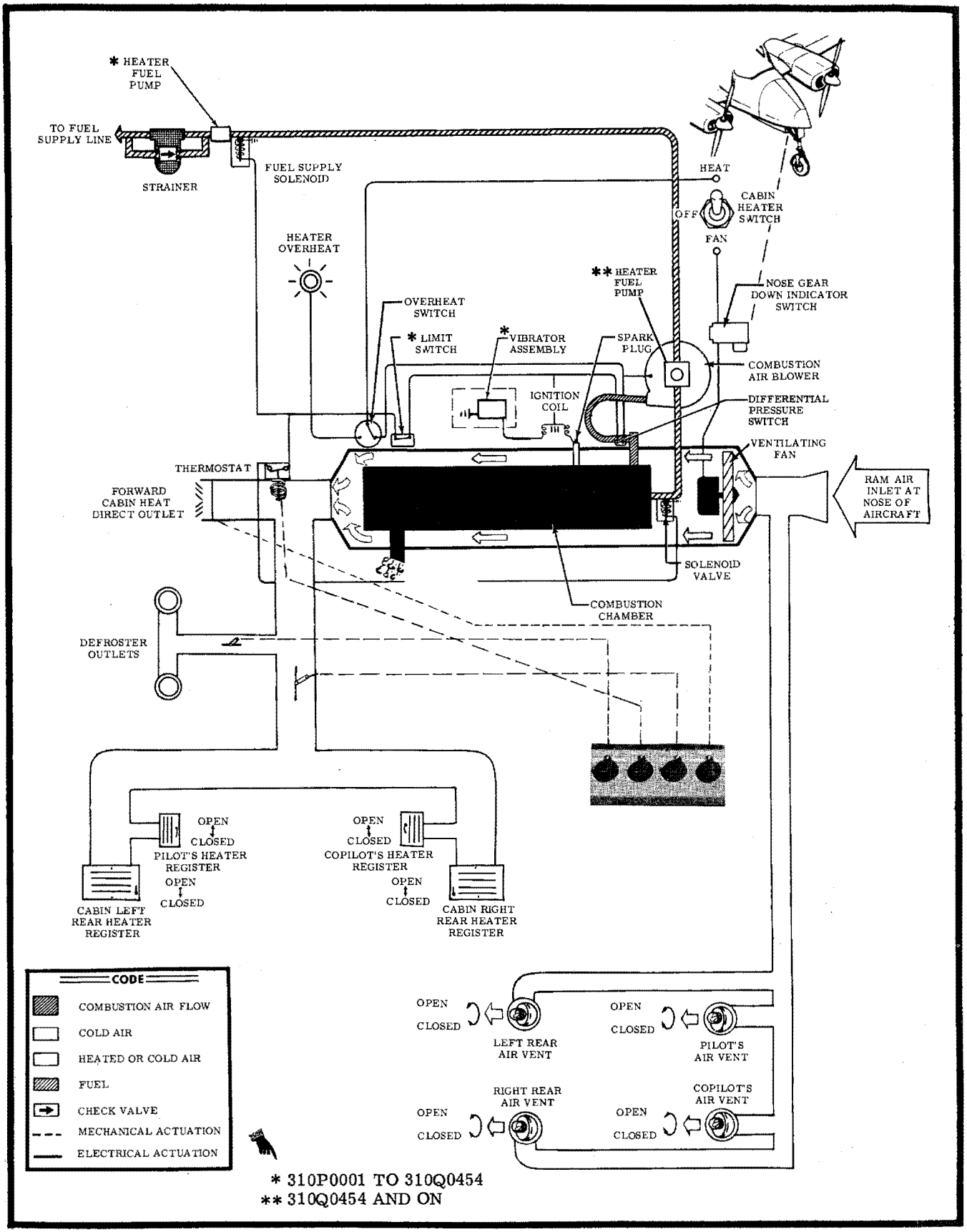


Figure 13-1. Heating, Ventilating and Defrosting Schematic

HEATING, VENTILATING AND DEFROSTING SYSTEM. (See figure 13-1.)

The heating and ventilating system provides controlled air, either heated or cool, to all areas of the cabin. Air is supplied to the heater through a ram air opening in the nose of the aircraft. From the heater, air is ducted to seven controllable heat outlets in the cabin. Two heat outlets are located at the base of the windshield for defrosting purposes, two are located in the forward upholstery side panels (left and right) slightly aft of the rudder pedals, two are on the aft face of the main spar beneath the pilot's and copilot's seat, and a direct air outlet located on the firewall. To insure a sufficient supply of air when ram air cannot be utilized, a ventilating fan is incorporated in the heater which will deliver either cool or heated air, depending on the heater switch. The electrical circuit leading to the ventilating fan is controlled by the nose gear down indicating switch which allows it to operate only when the landing gear is extended. In addition to the ventilation provided by the heating system, a separate ducting system routes ram air to four adjustable wemacs; two are located on the lower corners of the instrument panel and two on the side walls of the aft cabin compartment. Air in the cabin is not recirculated. Fresh air continually enters the system and cabin air is continually exhausted into the slipstream through a spill vent which is located in the baggage compartment.

Description of Heater and Basic Components.

The heater is a gasoline combustion type and is mounted in the right side of the nose section. Fuel is routed from a tee in the fuel crossfeed line through a shutoff valve, a filter and pulsating pump to the solenoid valve-regulator which regulates the fuel pressure to 7 psi. On aircraft 310Q0454 and On, the fuel pump is mounted on the combustion blower motor. Fuel from the solenoid valve-regulator is routed through the fuel line assembly to the heater. The heater fuel line assembly fitting, at the heater, is enclosed in a metal housing. The housing is vented and drained as a precaution against fire in the event of a fitting leakage. Fuel routed through the fuel line assembly enters the heater solenoid valve which allows fuel to pass through the combustion chamber spray nozzle. Electrical current is supplied to the combustion air blower, combustion air pressure switch and ignition coil when the heater switch is placed in the HEAT position. When the nose gear is in the DOWN position, electrical current is also supplied to the ventilating fan. As the combustion air flow increases, the combustion air pressure switch closes and actuates the ignition coil and heater solenoid valve. Fuel then flows through the heater solenoid valve into the combustion chamber spray nozzle which injects a conical shaped spray cone of fuel into the combustion chamber where the spark plug is already sparking, thus combustion occurs. As the heated air flowing from the heater to the cabin exceeds the thermostat setting, the thermostat automatically closes the solenoid valve, stopping fuel flow into the heater. As the heater cools, the thermostat opens the solenoid valve, allowing fuel to flow and combustion takes place since the spark plug is continually sparking. By cycling on and off, the heater maintains an even air temperature in the cabin. The heater combustion chamber is completely separate from the ventilating system to prevent any exhaust gases from contaminating the cabin air. All exhaust gases are vented overboard through an exhaust tube directly beneath the heater.

Troubleshooting the Heater.

TROUBLE	PROBABLE CAUSE	CORRECTION
HEATER FAILS TO LIGHT	Heater switch or circuit breaker open.	Position heater switch to HEAT or close circuit breaker.
	Low voltage.	Connect to auxiliary power supply.
	No fuel to system.	Turn on fuel shutoff valve.
	Insufficient fuel pressure caused by faulty fuel pump or no pump current.	Correct faulty fuel pump wiring or repair or replace fuel pump.
	Fuel pump operating but not building up sufficient pressure.	Remove and repair or replace fuel pump.
	Fuel nozzle clogged in heater.	Remove the nozzle and clean or replace it.
	Heater fuel solenoid not operating.	Remove and check solenoid. Replace it if faulty.

Troubleshooting the Heater (Continued).

TROUBLE	PROBABLE CAUSE	CORRECTION
HEATER FAILS TO LIGHT (CONT.)	Fuel lines clogged or broken.	Inspect all lines and connections. It may be necessary to disconnect lines at various points to determine where the restriction is located.
	Fuel filter clogged.	Clean fuel filter element.
	Defective vibrator (310P0001 to 310Q0454)	Replace vibrator.
	Defective ignition assembly.	Replace ignition assembly.
	Manual reset limit switch open.	Press reset button and recheck to determine reason for switch opening.
	Combustion air pressure switch open. (From defective switch or low combustion-air blower output.)	Check for low blower output and correct it. If switch is defective, replace it.
	Cycle switch open.	Replace if defective.
	Thermostat switch open.	Operate control to see if switch will come on. Replace switch if defective.
	Short-circuited radio-noise capacitor.	Replace capacitor.
	Faulty or burned-out motor.	Remove combustion air blower for overhaul or replacement.
HEATER WILL NOT START AND BLOWERS DO NOT RUN	Open circuit breaker.	Reset circuit breaker.
	Defective heater switch or wiring.	Replace switch or replace wiring.
VENT AIR BLOWER RUNS BUT COMBUSTION AIR BLOWER DOES NOT START	Overheat switch tripped.	Reset switch (find cause of overheating).
	Defective combustion air blower motor.	Replace blower.
VENTILATING AIR BLOWER FAILS TO RUN	Heater switch OFF. Broken or loose wiring to motor.	Turn heater switch to FAN. Check and repair wiring.
	Circuit breaker out.	Close circuit breaker.
	Worn motor brushes.	Replace motor brushes.
	Blower wheel jammed.	Remove and repair the ventilating-air blower.
	Motor burned out.	Remove blower assembly and replace defective motor.
	Defective radio-noise capacitor.	Replace capacitor.
COMBUSTION AIR BLOWER FAILS TO RUN	Faulty wiring to motor.	Inspect and replace faulty wiring.
	Poor ground connection.	Tighten ground screw.
	Worn motor brushes.	Replace motor brushes.

Troubleshooting the Heater (Continued).

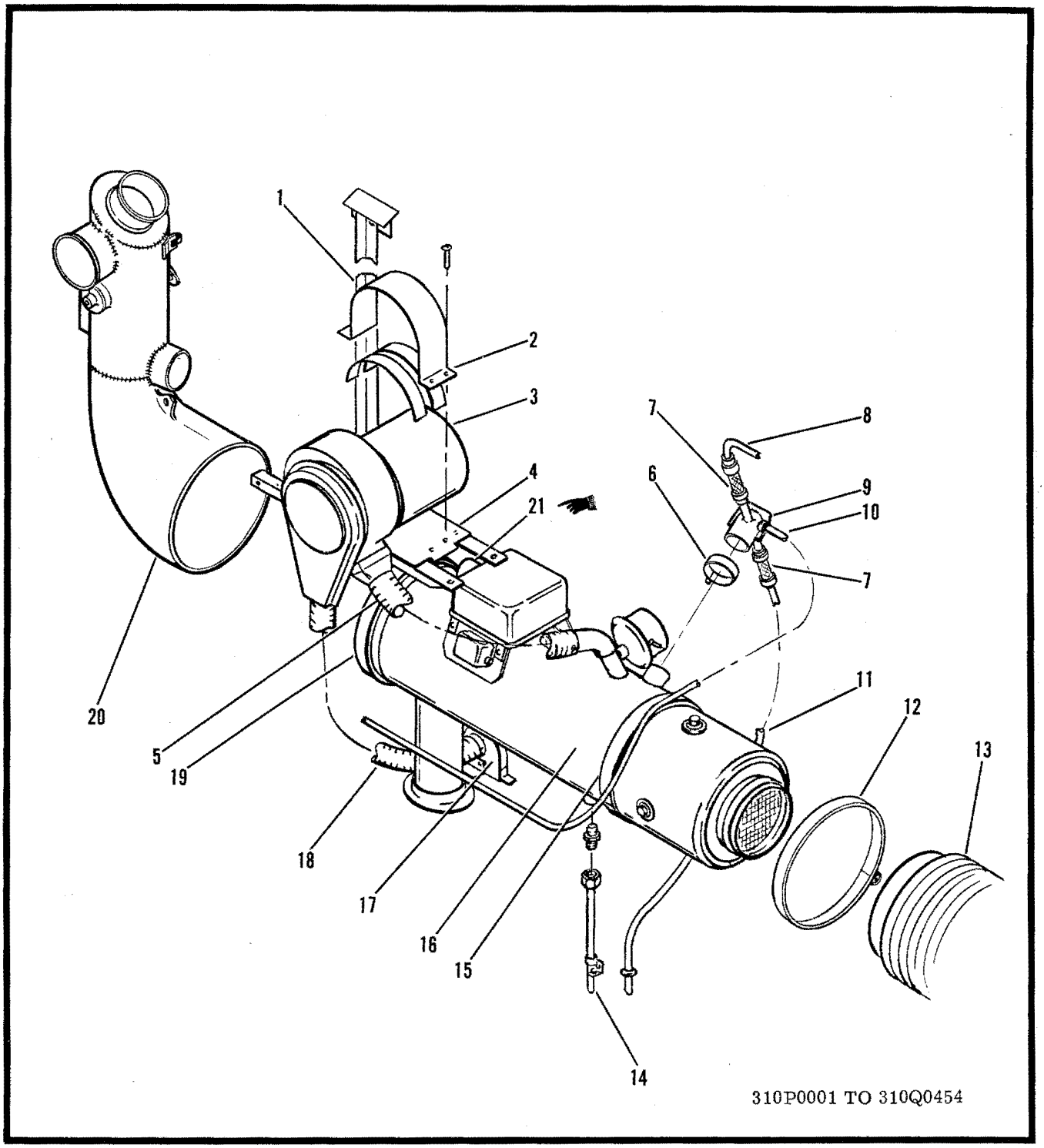
TROUBLE	PROBABLE CAUSE	CORRECTION
COMBUSTION AIR BLOWER FAILS TO RUN (CONT.)	Blower wheel jammed. (Usually indicated by hot motor housing.)	Overhaul the combustion-air blower.
BOTH BLOWERS RUN BUT HEATER FAILS TO START	Defective spark plug.	Replace plug.
	Obstruction in comb. air passage.	Remove obstruction.
	Defective ignition coil.	Replace coil.
	Defective solid state ignition unit.	Replace ignition unit.
	Open circuit in thermostat.	Replace thermostat.
	Defective solenoid coil or clogged nozzle.	Replace nozzle holder and solenoid assembly.
	Open circuit in duct limit switch.	Replace switch.
	Defective fuel pump.	Replace or overhaul pump.
	Remote solenoid closed.	Repair or replace solenoid.
	Open circuit in radio noise filter.	Replace filter.
	Airflow switch open.	Recalibrate switch or correct cause of low comb. air flow.
HEATER STARTS THEN GOES OUT	Lack of fuel at heater.	Check fuel supply through all components from the tank to the heater. Make necessary corrections.
	Defective combustion-air pressure switch.	Replace switch assembly.
	Damaged overheat switch.	Replace the switch.
	Damaged cycling switch.	Adjust or replace the switch.
	Fouled spark plug.	Replace spark plug.
HEATER FIRES BUT BURNS UNSTEADILY	Insufficient fuel supply.	Inspect fuel supply to heater, including shutoff valve, solenoid valve, fuel filter, fuel pump and fuel lines. Make necessary repairs.
	Spark plug partially fouled.	Replace spark plug.
	Loose primary connection at ignition assembly.	Tighten connection.
	Faulty vibrator.	Replace vibrator.
	Combustion-air blower speed fluctuates. (Can be caused by low fluctuating voltage, loose blower wheel, worn brushes or defective motor.)	Remove and overhaul the combustion-air blower assembly as required.
	High-voltage leak in lead between ignition assembly and spark plug.	Replace ignition assembly.

Troubleshooting the Heater (Continued).

TROUBLE	PROBABLE CAUSE	CORRECTION
HEATER FIRES BUT BURNS UNSTEADILY (CONT.)	Defective ignition assembly.	Replace ignition assembly.
	Restriction in fuel nozzle orifice.	Remove nozzle for cleaning or replacement.
	Nozzle loose in retainer or protruding improper spray angle.	Tighten or replace the nozzle as required.
HEATER BURNS BUT THERMOSTAT WILL NOT CONTROL TEMPERATURE	Defective thermostat.	Replace, or adjust thermostat.
	Defective fuel solenoid.	Replace solenoid.
OUTLET AIR TEMPERATURE TOO HIGH	Insufficient vent air.	Increase vent air flow.
	Defective thermostat.	Replace, or adjust thermostat.
OUTLET AIR TEMPERATURE TOO LOW	Excessive vent air flow.	Reduce vent air flow.
	Defective thermostat.	Replace, or adjust thermostat.
	Defective duct limit switch.	Replace, or adjust switch.
	Low fuel pressure.	Repair, or replace pump.
	Dirty fuel nozzle.	Replace nozzle.
HEATER TRIPS OVERHEAT SWITCH	Defective overheat switch.	Replace switch.
	Defective duct limit switch.	Replace, or adjust duct limit switch.
SMOKING HEATER EXHAUST	Defective nozzle.	Replace nozzle.
	Slow combustion blower.	Replace combustion motor.
	Leaking solenoid valve.	Repair valve.
HEATER POPS OR BANGS WHEN STARTING OR CYCLING	Leaking solenoid.	Repair valve.
	Delayed ignition caused by intermittent spark.	Replace sparking plug - check coil, ignition unit
	Defective fuel nozzle.	Replace nozzle.
RUMBLE OR COMBUSTION NOISE IN HEATER	Loose burner assembly mounting screws.	Tighten mounting screws.
	Defective nozzle.	Replace nozzle.
HEATER FAILS TO SHUTOFF	Fuel solenoid valve in heater stuck open.	Remove and replace solenoid assembly.
	Defective heater switch.	Replace the heater switch.
COLD HEATER OUTPUT AT HIGH AIR SPEEDS	Combustion air supply is low.	Perform functional check of air pressure switch with voltmeter.
	Defective thermostat.	Perform functional check of thermostat.
	Defective pressure switch.	Replace pressure switch.

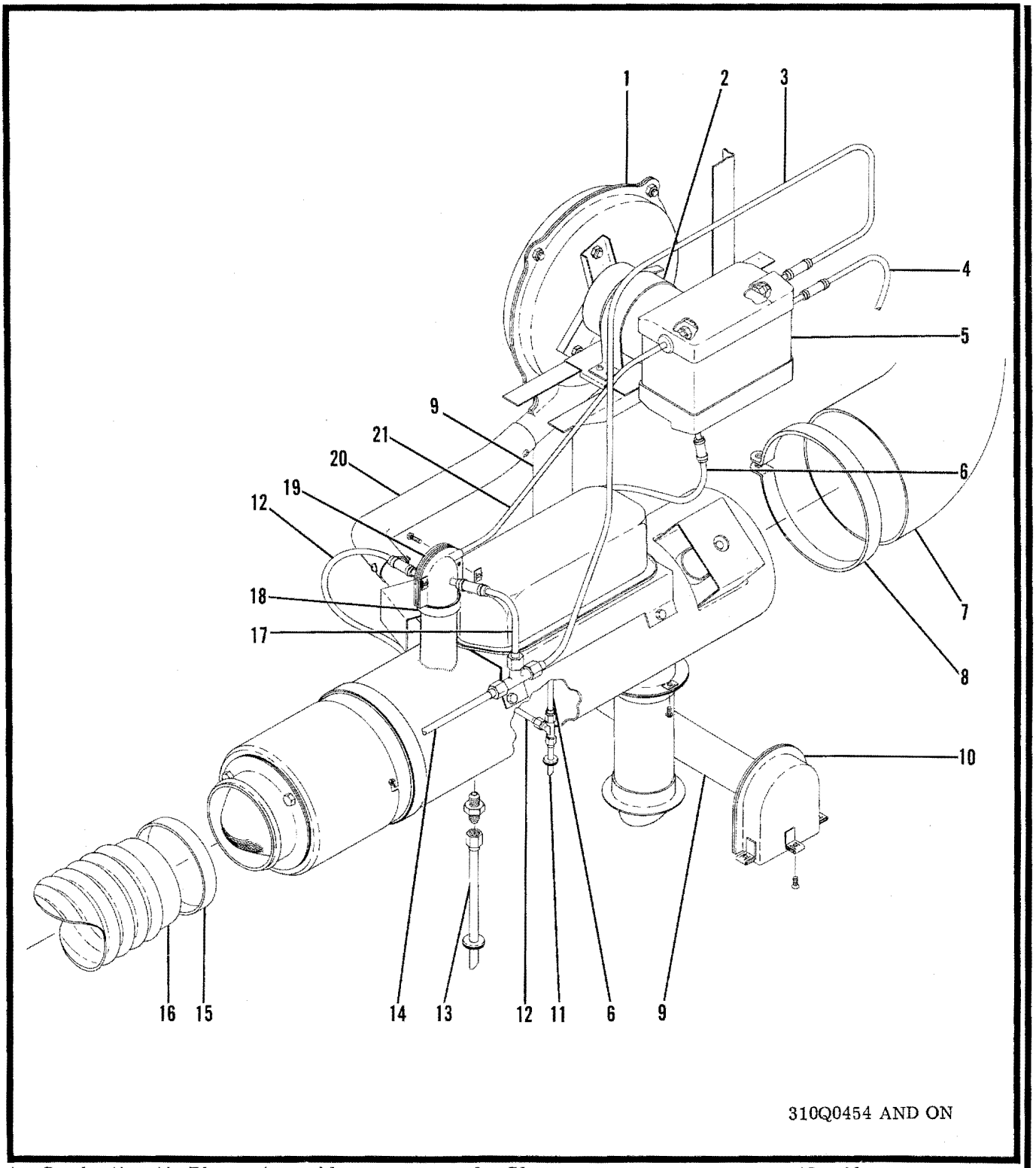
Troubleshooting the Heater (Continued).

TROUBLE	PROBABLE CAUSE	CORRECTION
INSUFFICIENT HEATER OUTPUT AT HIGH AIR SPEEDS	Malfunction in heater fuel supply.	Perform checks in accordance with functional check of heater fuel supply and heater fuel nozzle. Replace components as necessary.
HEATER OPERATES ON GROUND, BUT NOT IN FLIGHT	Insufficient combustion air.	Check ducts for obstruction. Check blower motor for proper speed. Check fan blades for damage and freedom of rotation.
	Weak ignition.	Check spark plug. A good ignition system check may be performed by using a long reach automotive spark plug opened up to a 3/32 inch gap. If the ignition system is operating properly the spark in this gap will ignite a business card or a manila tag. NOTE Heater spark plug will not work for this check, due to the annular spark gap. Check ignition unit.
	Lack of fuel.	Check power to heater solenoid terminal (#8). If no voltage is present, check thermostat calibration, air flow switch, and cycling switch. Check fuel pressure between fuel pump and heater. Refer to Cessna Heater Overhaul/Parts Manual. Check fuel supply to pump (remote solenoid, filter manual valves, etc.). Refer to Cessna Heater and Components Overhaul/Parts Manual and perform Fuel Nozzle and Solenoid test.
HEATER OPERATES IN FLIGHT, OUTPUT IS LOW	Poor thermostat operation	Check thermostat calibration and freedom of movement.
	Poor fuel atomization in burner.	Check fuel pressure to heater. Refer to Cessna Heater and Components Overhaul/Parts Manual and perform Fuel Nozzle and Solenoid test.



1. Support
2. Strap Assembly
3. Combustion Air Blower and Motor Assembly
4. Support Assembly
5. Blower Outlet Tube
6. Clamp
7. Hose
8. Vent Air Inlet Line
9. Fuel Inlet Shroud
10. Fuel Line Assembly
11. Fuel Drain Line
12. Clamp
13. Ram Air Inlet Hose
14. Drain Line
15. Strap
16. Heater Assembly
17. Inlet Assembly
18. Blower Inlet Tube
19. Clamps
20. Heat Control Assembly
21. Vibrator

Figure 13-2. Heater Installation



1. Combustion Air Blower Assembly
2. Strap Assembly
3. Vent Air Inlet Line
4. Fuel Inlet Line
5. Fuel Pump Assembly
6. Fuel Pump Vent Line
7. Heat Control Assembly
8. Clamp
9. Blower Inlet Tube
10. Inlet Assembly
11. Vent Line
12. Shroud Vent Line
13. Drain Line
14. Vent Air Inlet Line
15. Clamp
16. Ram Air Inlet Hose
17. Vent Air Inlet Line
18. Clamp
19. Fuel Inlet Shroud
20. Blower Outlet Tube
21. Fuel Line

Figure 13-2A. Heater Installation

Electrical Continuity Checks.

For electrical continuity check, refer to Section 14 and Heater and Components Overhaul/Parts Manual.

Functional Check of Heater Fuel Supply

a. Heater Fuel Supply. Install a pressure gage in the heater fuel supply line (between the heater fuel pump and heater). Start the heater and observe pressure gage, it should indicate 7 to 8 psi. If this pressure is low, check:
1. Heater Fuel Shutoff Valve (located in right wing leading edge at station 38.16 - check that valve is open.
2. Heater Fuel Pump - with a supply source to the pump (inlet hose in a container of fuel), pump output should be 7 to 8 psi. Replace fuel pump if defective.
3. Heater Solenoid Valve (remote valve in wing right-hand leading edge) - check that solenoid valve is open. Replace valve if defective.
4. Heater Fuel Pump Filter and Lines - clean filter and check lines for obstructions.

Removal of the Heater. (See figure 13-2.)
310P0001 to 310Q0454

a. If (optional equipment) radio shelves and radio equipment are installed, remove as follows:
1. Tag cable assemblies and remove radio equipment.
2. Drill out rivets attaching angles and angle assemblies to nose bulkheads.
3. Work radio shelves out of nose section through the nose wheel well.
b. Tag and disconnect all electrical wires from the combustion air blower motor (3) and from heater terminal strip.
c. Loosen clamps and slide hoses from fuel inlet shroud (9).
d. Loosen clamp (6) attaching fuel inlet shroud to heater assembly (16), separate shroud halves by removing two attaching screws.
e. Disconnect fuel line assembly (10) from heater assembly (16) at the fitting.

CAUTION

A small amount of fuel will drain from fuel line assembly (10). Wipe away fuel with rags.

f. Disconnect combustion air blower outlet tube (5) from heater elbow by removing attaching nut and bolt.
g. Disconnect combustion air blower inlet tube (18) from inlet assembly (17) by removing attaching nut and bolt.
h. On the underside of heater assembly, loosen support clamp and disconnect drain line (14) from heater assembly (16).
i. Remove four screws attaching clamp (2) to support assembly (4) and remove combustion air blower and motor assembly (3) from aircraft through RH nose access door.
j. Remove four screws and clamp attaching heater assembly (16) to heater control assembly (20).

NOTE

To facilitate removal of blower and motor assembly (3), remove blower inlet tube (18) and outlet tube (5) from blower by removing attaching nuts and bolts.

k. Remove clamp retaining ram air inlet hose (13) to forward inlet of heater assembly and disconnect hose.
l. Remove heater assembly (16) from aircraft by working out through nose wheel well.

Removal of the Heater. (See figure 13-2A.)
(310Q0454 and ON)

a. If (optional equipment) radio shelves and radio equipment are installed, remove as follows:
1. Tag assemblies and remove radio equipment.
2. Drill out rivets attaching angles and angle assemblies to nose bulkheads.
3. Work radio shelves out of nose section through the nose wheel well.
b. Tag and disconnect electrical wires from the heater terminal strip. Disconnect heater case ground wire.
c. Loosen clamps and slide hoses from fuel inlet shroud (18).
d. Loosen clamp (18) and separate shroud halves by removing two attaching screws.
e. Disconnect fuel line (21) from heater fitting.

CAUTION

A small amount of fuel will drain from fuel line. Wipe away fuel with rags.

f. Disconnect combustion air blower outlet tube (20) from heater.
g. Disconnect drain line (13).
h. Remove vent lines (3, 6, 11, 12 and 17).
i. Remove ram air inlet duct (16) by removing clamp (15).
j. Remove heater control assembly (7) by removing clamp (8).
k. Remove heater assembly from aircraft by working out through nose wheel well.

Installation of Heater. (See figure 13-2.)

a. Install in reverse order of removal.
b. If optional radio shelves were removed, install in reverse order of removal.

Disassembly and Assembly of Heater Components.

For disassembly and Assembly of heater components, see Cessna Heater and Components Overhaul/Parts Manual.

Heater Fuel System Components.

These components are a shutoff valve, fuel pump, solenoid valve and a filter, mounted on right wing nose rib, inboard of station 38. 16. The fuel pump supplies fuel pressure through the filter to the solenoid valve, which in turn regulates fuel pressure that is supplied to the heater. On aircraft 310Q0454 and On, the fuel pump is mounted on the combustion blower motor. If an overheat condition exists in the heater, the heater fuel pump and solenoid valve will automatically be shut off.

NOTE

Heater fuel pressure is regulated by the solenoid valve which has been preset by the manufacturer. If it becomes necessary to adjust heater fuel pressure, see Cessna Heater and Components Overhaul/Parts Manual.

Removal of Heater Fuel System Components.

a. Remove access hole covers from lower leading edge at right wing station 38. 16.
b. Close heater fuel shutoff valve.
c. Disconnect electrical leads from pump and solenoid valve, disconnect and tag all fuel lines to insure proper reinstallation.

NOTE

On aircraft 310Q0454 and On, the fuel pump is mounted on the combustion blower-motor assembly.

d. Remove bolts attaching pump, filter, and solenoid valve to wing nose rib, route components from wing.

Installation of Heater Fuel System Components.

a. Install in reverse order of removal.
b. Move shutoff valve to ON position.
c. Conduct operational check and check for fuel leaks.
d. Install access covers.

Cabin Warm Air Vents and Ducting. (See figure 13-3.)

The cabin is heated by five warm air vents. The warm air is routed through warm air ducting and expelled through the heat registers and the forward cabin direct outlet. These registers are controlled by knobs on the right switch and control panel. They also have individual air control knobs which regulate the amount of warm air entering the cabin through the register.

Removal of Cabin Warm Air Vents and Ducting. (See figure 13-3.)

a. Remove copilot's seat in accordance with Section 3.
b. Remove right and left warm air registers from heat ducts by removing attaching screws.
c. Remove forward floorboard carpeting in accordance with Section 3.
d. Remove applicable access covers and loosen ducting clamps securing right and left warm air ducting to the heat ducts and the heat control assembly.
e. Remove right and left cover plate rubber shields and work right and left rear seat ducting out through the nose wheel well opening.

Installation of Cabin Warm Air Vents and Ducting. (See figure 13-3.)

a. Work right and left rear seat ducting in through nose wheel well opening and replace right and left cover plate rubber shield.
b. Secure right and left ducting clamps to the heat ducts and heat control assembly, replace access covers.
c. Replace forward floorboard carpeting in accordance with Section 3.
d. Replace right and left warm air registers by positioning over heat ducts and securing with screws.
e. Replace copilot's seat in accordance with Section 3.

Cabin Cool Air Vents and Ducting.

Fresh cool air is routed through the ventilating ducting and expelled through individual wemac valves positioned by each seat. These wemac valves are individually controlled to regulate the amount of fresh air entering each position.

Removal of Cabin Cool Air Vents and Ducting. (See figure 13-3.)

a. Loosen clamps securing forward air vent ducting to air vent tees and forward air vent adapters. Remove ducting from behind the instrument panel.
b. Remove forward air vents and forward air vent adapters from the stationary instrument panel, by removing the four attaching screws and nuts.
c. Loosen clamp securing each end of cool air supply duct and work duct forward and remove.
d. Loosen clamp securing right warm air duct at each end and remove duct.
e. Loosen clamps securing crossover duct to air vent tees and remove duct.
f. Remove front and rear carpets in accordance with Section 3.
g. Remove upholstery side panels in accordance with Section 3.
h. Remove outboard access hole covers and cover plates from floorboards by removing attaching screws.
i. Loosen clamps at the aft end of right and left floorboard ducting and work ducting with supply duct tee and left air vent tee attached, forward and out through routing holes in forward cabin bulkhead.
j. Loosen clamps at each end of aft air vent ducting and remove ducting.
k. Remove aft air vent adapters by removing the attaching screws.

Installation of Cabin Cool Air Vents and Ducting. (See figure 13-3.)

a. Attach forward end of left floorboard duct to air vent tee and work duct into position through routing hole in forward cabin bulkhead. Secure duct to floorboard adapter with clamp.
b. Attach forward end of right floorboard duct to supply duct tee and work duct into position through routing hole in forward cabin bulkhead. Secure duct to floorboard adapter with clamp.
c. Position aft air vent adapters and secure with attaching screws.
d. Install aft air vent ducting and attach to aft air vent adapters and secure with clamps.
e. Install side panels in accordance with Section 3.
f. Install front and rear carpet in accordance with Section 3.
g. Install forward air vents and forward air vent adapters and secure with attaching screws and nuts.
h. Install forward cool air supply duct and attach to nose duct adapter and supply duct tee with clamps.
i. Install crossover duct and attach to the air vent tees with clamps.

Heater Switch.

The heater fan is controlled by a three-position toggle switch located on the instrument panel. The positions of the switch are HEAT, OFF and FAN. The HEAT position starts and maintains heater operation, delivering warm air to all heat and defrosting outlets. The OFF position allows the heater ducting to be used as a ventilating system while the aircraft is in flight. The FAN position provides ventilating air to the cabin while the aircraft is on the ground.

Removal and Installation of Heater Switch.

Remove and replace heater switch in accordance with Section 14.

Temperature Control.

The temperature control is located below and slightly to the left of the right control column. It is a rotary type knob and is labeled TEMP CONTROL, LOW (counterclockwise position), and MAX (clockwise position). Clockwise rotation of the temperature control knob increases cabin temperature and counterclockwise rotation decreases it. This knob mechanically controls the setting of a thermostat located within the outlet adapter just aft of the heater. The thermostat in turn cycles the heater to maintain the cabin temperature setting selected with the control knob.

If this switch is set for ground operating comfort, it may be necessary to reset it after airborne, since ram air will increase the ventilating airflow and heater output.

Removal of Temperature Control.

a. Loosen screw securing control wire to thermostat actuating arm.
b. Remove clamp securing coil wire housing to the thermostat.
c. Remove control knob by removing knob set screw.
d. Remove nut securing temperature control assembly to the stationary instrument panel. Slide temperature control assembly forward until free of stationary instrument panel and then aft beneath stationary panel until coiled wire housing is removed from forward cabin bulkhead.

Installation of Temperature Control.

a. Route temperature control wire housing through forward cabin bulkhead and attach to thermostat with attaching clamp.
b. Insert temperature control assembly through hole in stationary instrument panel and secure with nut.
c. Place control knob on temperature control assembly and secure with set screw.
d. With control knob turned to the LOW position and the thermostat arm forward, secure arm to the control wire by tightening clamp screw.

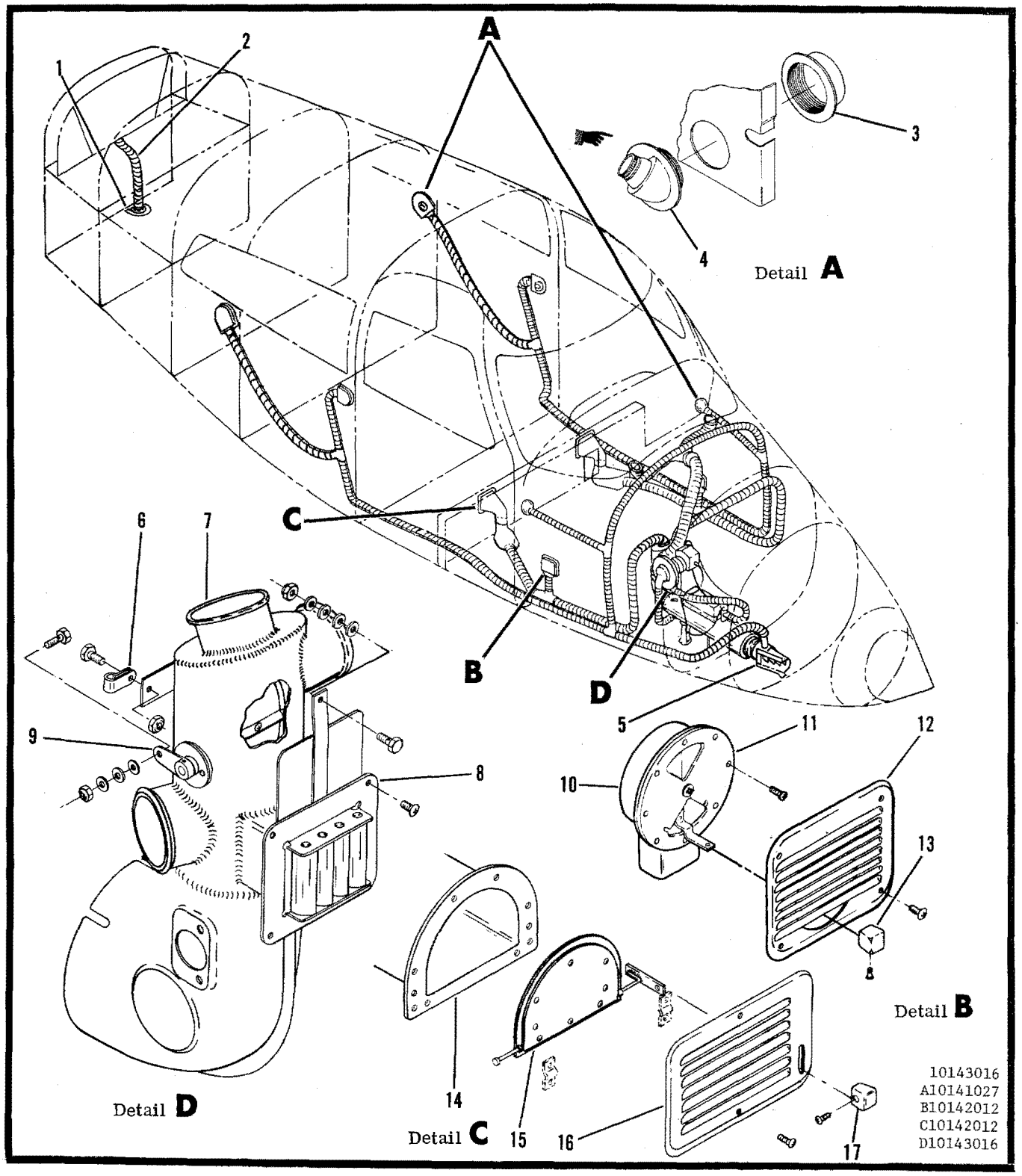
Airflow Controls.

Removal of Airflow Controls.

a. Loosen clamp and nuts securing control wires to the cabin air defroster valve arms.
b. Work cabin air control coiled wire housing from routing bracket.
c. Work defroster control coiled wire housing from routing bracket supporting it to forward cabin bulkhead.
d. Loosen nuts securing control assemblies to lower instrument panel and slide assemblies aft through mounting holes.

Installation of Airflow Controls.

a. Insert control assemblies through mounting holes in lower instrument panel.
b. Slide lockwashers and nuts over coiled wire housings and secure control assemblies to lower instrument panel by tightening nuts onto threaded fittings on control ends.
c. Route defroster control through bracket on forward cabin bulkhead, and cabin air control through routing bracket.
d. With control knobs locked in the CLOSED position and plenum chamber valves closed, insert the control wires through the valve actuating arm clamps and secure by tightening clamp nuts.



1. Clamp
2. Cabin Air Spill Tube
3. Adapter
4. Wemac Valve
5. Nose Inlet Adapter
6. Clamp
7. Heat Control Assembly
8. Outlet
9. Arm Assembly
10. Adapter
11. Valve
12. Grill
13. Knob
14. Heat Outlet
15. Valve and Rod Assembly
16. Grill
17. Knob

Figure 13-3. Heating, Ventilating and Defrosting System Installation

Air Spill Vent Tube.

Removal and Installation of Air Spill Vent Tube. (See figure 13-3.)

a. Refer to Section 3, remove rear upholstery panels.
b. Loosen clamps (1) and remove cabin air spill vent tube (2) by sliding from upper and lower adapters.
c. Install cabin air spill vent tube (2) by reversing removal procedures.

SURFACE DEICE SYSTEM.

The optional light-weight deicing system consists of inflatable rubber deice boots cemented to the leading edges of the outer wing panels and horizontal stabilizers. Air for inflation of the boots is supplied by the pressure side of the vacuum pump. A left wing light is incorporated on the outboard side of the left engine nacelle to provide an aid in observing ice formations during night operation.

Operation of the deicing system is through six-second delay action control, labeled WING DEICE ACTUATE, located on the left hand instrument panel. When the control is positioned to ACTUATE, the control valve closes its overboard air valve and redirects the air from the pressure side of the vacuum pump through a filter, shuttle valve and into the deice boots for the inflation cycle. After the six-second inflation cycle is complete, the system returns to its off position. Everytime an inflation cycle is desired, the control must be momentarily positioned to ACTUATE. After a six-second inflation is completed the deflation cycle begins. Air pressure returns through the system and overboard through the control valve. When the shuttle valve has less than 1 psi against it, it closes and the vacuum side of the vacuum pump holds the boots in a deflated position. The pressure indicator light (amber) should light when the control is moved to ACTUATE and the system reaches 10 psi.

Troubleshooting Surface Deice System.

TROUBLE	PROBABLE CAUSE	CORRECTION
DEICE BOOTS DO NOT INFLATE OR INFLATE SLOWLY	Pressure regulator valve set too low or valve malfunction.	Reset or replace pressure regulator valve.
	Solenoid valve malfunction.	Replace solenoid valve.
	Shuttle valve malfunction.	Replace shuttle valve.
	Loose or missing gasket.	Tighten fitting or replace gasket.
	Loose or faulty hose.	Replace hose.
	Loose or faulty wiring.	Tighten or replace wiring.
NOTE If the vacuum pump malfunctions, this system will not operate.		
DEICE BOOTS DO NOT DEFLATE OR DEFLATE SLOWLY	Solenoid valve or control valve malfunction.	Replace valve.

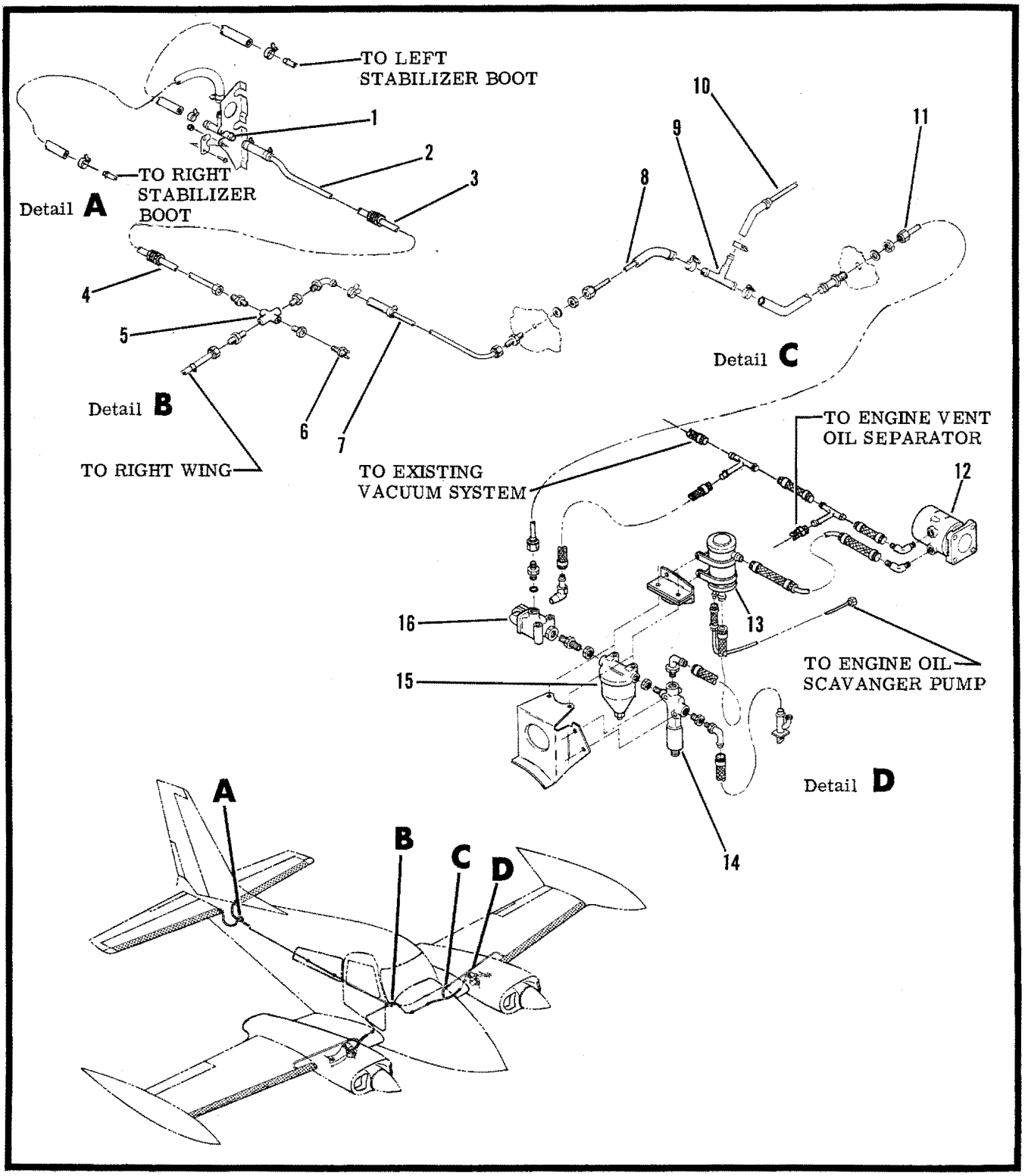
Removal and Installation of Surface Deice System. (See figure 13-4.)

a. For removal and installation of deice system refer to figure 13-4.

Surface Deice System Check.

a. Electrical Test:
1. Position deice control to OFF position.
2. Position aircraft battery switch to ON position.
3. Press indicator light to check light circuit and bulb.
4. Position deice control to ACTUATE and repeat step 3.
5. If indicator light does not function in step 3 and 4, the circuit breaker may have opened. Check for short in the system. Reset circuit breaker and recheck step 3.

b. Air Leakage Test:
1. This test can be performed in either the left or right nacelles. The following steps refer to the left nacelle.
2. Disconnect pressure hose from the control valve inlet fitting.
3. Disconnect tube from overboard port and cap the port with an AN929-10 cap assembly.



1. Tee
2. Aft Tailcone Line
3. Forward Tailcone Line
4. Center Fuselage Line
5. Cross
6. Pressure Switch
7. Fuselage Line (Cross to Wing)
8. Wing Line (To Nacelle Tee)
9. Tee
10. Wing Line (To Wing Boot)
11. Nacelle Line
12. Vacuum Pump
13. Oil Separator
14. Pressure Control Valve
15. Air Filter
16. Shuttle Valve

Figure 13-4. Surface Deice Installation

4. Connect a source of clean air to the control valve inlet port. It is necessary that the inlet pressure be a minimum of 18-20 PSIG to perform this test. Include a pressure gage in the air line to observe the system pressures.
5. Apply 18 PSIG pressure to the system and by means of a hand-operated valve, trap the pressure on the deice system. Observe the system for leakage. The leakage rate should not exceed a pressure drop of 4.0 PSIG per minute.
6. To check the pressure switch, turn on the aircraft battery switch while the deice system is under pressure. The indicator light should glow.
7. Remove test equipment, lubricate all threads, and replace all system components.
8. Disassembly or rework of the operating equipment in this system should not be attempted, replace any unit which does not function correctly.

Cold Patch Repair of Deice Boots.

There are four types or areas of damage that are most common to the deice boots. An outline of the cold patch repair procedure for each follows:

NOTE

When repairing the deicer boots and replacement layers are being installed, exercise care to prevent trapping air beneath the replacement layers. If air blisters appear after material is applied, remove them with a hyperdermic needle. Should air blisters appear after boots have been installed, for a length of time, it is permissible to cut a slit in the deicer boot, apply adhesive and repair in accordance with the following cold patch repair procedures. An alternate method of repair is to peel the deicer boot back using Ketone solvent, and reapply using normal adhesives

a. Scuff or Surface Damage. This type of damage is the most commonly encountered and is usually caused by scuffing the outer surface of the deice boots while using scaffolds, refueling hoses, ladders, etc. Repair is generally not necessary because the thick outer veneer provides protection to the natural rubber underneath. If the scuff is severe and has caused removal of the entire thickness of veneer (exposing the brown natural rubber underneath) the damage should be repaired as outlined below:
1. Select a patch (Part Number 3306-1, 3306-2, or 3306-3) of ample size to cover the damaged area.
2. Clean the area to be repaired with a cloth dampened slightly with solvent.
3. Buff the area around the damage with steel wool so that the area is moderately but completely roughened.
4. Wipe the buffed area clean with a cloth slightly dampened in solvent to remove all loose particles.
5. Apply one even thorough coat of cement (Part Number 3306-16) to the patch and to the corresponding damaged area of the deice boot. Allow cement to set until it becomes tacky.
6. Apply patch to the deice boot with an edge or the center adhering first, then work the remainder of the patch down, being careful to avoid trapping air pockets.
7. Roll the patch thoroughly with a stitcher-roller (Part Number 3306-10) and allow to set for ten to fifteen minutes.
8. Wipe the patch and surrounding area from the center of the patch outward, with a cloth slightly dampened with solvent.
9. Apply one light coat of A-56-B conductive cement (Part Number 3306-13) to the patched area.

NOTE

Satisfactory adhesion should be obtained in four hours; however, if the patch is allowed to cure for a minimum of 20 minutes, the deice boots may be inflated to check the repair.

b. Damage to Tube Area. This type of damage consists of cuts, tears, or ruptures to the inflatable tube area and a fabric reinforced patch must be used for this repair. Damage to the tube area should be repaired as outlined below:
1. Select a patch (Part Number 3306-4, 3306-5, or 3306-6) of ample size to extend at least 5/8 inch beyond the damaged area.

NOTE

If none of these patches are of proper size, one may be cut to the size desired from one of the larger patches. If this is done, the edge should be beveled by cutting with the shears at an angle. These patches are manufactured so they will stretch in one direction only. Be sure to cut the patch selected so that the stretch is in the widthwise direction of the inflatable tubes.

2. Clean the area to be repaired with a cloth dampened slightly with solvent.
3. Buff the area around the damage with steel wool so that area is moderately but completely roughened.
4. Wipe the buffed area clean with a cloth slightly dampened in solvent to remove all loose particles.
5. Apply one even thorough coat of cement (Part Number 3306-16) to the patch and the corresponding damaged area of the deice boot. Allow cement to set until it becomes tacky.
6. Apply the patch to the deice boot with the stretch in the widthwise direction of the inflatable tubes, sticking edge of patch in place first and working remainder down with a very slight pulling action so the rupture is closed. Use care not to trap air between patch and deice surface.
7. Roll the patch thoroughly with a stitcher-roller (Part Number 3306-10) and allow to set for ten to fifteen minutes.
8. Wipe the patch and surrounding area, from the center of the patch outward, with a cloth slightly dampened with solvent.
9. Apply one light coat of A-56-B conductive cement (Part Number 3306-13) to restore conductivity.

NOTE

Satisfactory adhesion of patch to deice boot should be reached in four hours; however,

if the pitch is allowed to cure for a minimum of 20 minutes, the deice boots may be inflated to check the repair.

c. Damage to Fillet Area. This includes any tears or cuts to the tapered area aft of the inflatable tubes. Damage to the fillet area should be repaired as outlined below:

1. Trim damaged area square and remove excess material. Cut must be sharp and clean to permit good butt joint of inlay.
2. Cut inlay from tapered fillet (Part Number 3306-7) to match cutout area.
3. Using solvent, loosen edges of the deice boot around area approximately 1-1/2 inch from all edges.
4. Clean the area to be repaired with a cloth dampened slightly with solvent.
5. Lift back edges of cutout and apply one coat of EC-1300 cement to the underneath side of loosened portion of the boot.
6. Apply one coat of EC-1300 cement to the wing skin underneath the loosened edges of the deice boot and extending 1-1/2 inch beyond edges of deice boot into the cutout area.
7. Apply second coat of cement to underneath side of deice boot as outlined in step 5.
8. Apply one coat of EC-1300 cement to one side of a 2-inch wide neoprene coated fabric tape (Part Number 3306-8) and allow to dry and trim to size.
9. Reactivate cemented surfaces with solvent and apply reinforcing tape to wing skin, using care to center tape under all edges of cutout.
10. Roll down tape on wing skin with stitcher-roller (Part Number 3306-10) to assure good adhesion, being careful to avoid air pockets.
11. Apply one coat of EC-1300 cement to top surface of tape and allow to dry approximately 5 to 10 minutes.
12. Reactivate cemented surfaces with solvent. Working toward cutout, roll down the edges of the loosened deice boot, being careful to avoid trapping air pockets. The edges should overlap on the tape approximately 1 inch.
13. Roughen back surface of inlay repair material (Part Number 3306-7, previously cut to size) with steel wool. Clean with solvent and apply one coat of EC-1300 cement.
14. Apply the second coat of EC-1300 cement to back side of inlay material and allow to dry.
16. Reactivate cemented surfaces with solvent and carefully insert inlay material with feathered edge aft. Working from the leading edge of wing aft, roll down the inlay material carefully to avoid trapping air.
17. Roughen area on outer surface of deice boot and inlay with steel wool 1-1/2 inch on each side of the splice. Clean with solvent and apply one coat of EC-1300 cement to this area.
18. Apply one coat of EC-1300 cement to one side of 2-inch wide neoprene coated fabric tape (Part Number 3306-8) trim to size and center tape over splice on all three sides.
19. Roll down tape on deice boot with stitcher-roller (Part Number 3306-10) to assure good adhesion, being careful to avoid air pockets.
20. Apply one light coat of A-56-B conductive cement (Part Number 3306-13) to restore conductivity.

d. Damaged Veneer - Loose from Deice Boot. If the veneer should become loosened from the deice boot, repairs should be made as outlined below.

1. Peel and trim the loose veneer to the point where the adhesion of veneer to the deice boot is good.
2. Roughen the area in which veneer is removed with steel wool, rubbing parallel to cut edge of veneer ply to prevent loosening it.
3. Taper edges of veneer down to the tan rubber ply by rubbing parallel to the edges with steel wool and solvent.
4. Cut a piece of veneer material (Part Number 3306-9) to cover the damaged area and extend at least 1 inch beyond in all directions.
5. Mask off an area 1/2 inch larger in length and width than the size of veneer patch.
6. Apply one coat of EC-1300 cement to the damaged area and one coat to the veneer ply. Allow cement to set until it becomes tacky.
7. Roll the veneer ply to the deice boot with a 2-inch rubber roller, applying a slight tension on the veneer ply when applying to prevent trapping air.
8. Wipe the patch and surrounding area, from the center of the patch outward, with a cloth slightly dampened with solvent.
9. Apply one light coat of A-56-B conductive cement (Part Number 3306-13) to restore conductivity.

Replacement of Surface Deice Boots.

a. Remove wing tip tank front fairings.
b. (LH wing only) Remove four screws securing the stall warning transmitter.
c. Refer to Removal and Installation of Propeller Deice Boots procedures and remove and install deice boots.
d. Install stall warning transmitter screws on left wing.
e. Replace tip tank front fairings.

NAV-O-MATIC 400 AUTOPILOT.

CAUTION

Primary and secondary flight control cables, push-pull tubes, bellcranks and mountings on late model aircraft use dual locking fasteners. The lock nuts for these fasteners incorporate a fiber lock, and are castellated for safetying with a cotter pin. When any of these areas are disconnected on any aircraft, new dual locking fasteners should be installed. See the Aircraft Parts Catalog for part numbers and location of these fasteners.

Removal of Control Cables. (See figure 13-6.)

a. Refer to Section 3 and remove the following items:

1. Rear upholstery panel for access to tailcone.
2. Rear reclining, middle individual or fifth and sixth seats (optional equipment).
3. Rear carpet.

4. Stabilizer fairings.

b. Remove floorboards above aileron bellcrank and autopilot pulleys.

c. In the aileron bellcrank area, disconnect turnbuckle (21) and clevis connecting cables (12 and 13) to terminal ends and tie guide wire to cables.

d. Remove three sets of autopilot pulleys by removing attaching nuts, bolts and cotter pins.

e. At the roll actuator (15), separate cables (12 and 13) from chain (14) by removing master link on chain.

f. At the elevator bellcrank (1), disconnect turnbuckles connecting cables (3 and 4) to bellcrank.

g. At the pitch actuator (5), separate cables (3 and 4) from chain (14) by removing master link on chain.

h. Tag cables (3, 4, 12 and 13) for identification, route through fuselage and remove through the baggage door.

Installation of Control Cables. (See figure 13-6.)

a. Route cables (3, 4, 12 and 13) through baggage door and tie cables (12 and 13) to guide wires.

b. At the pitch actuator (5), secure cables (3 and 4) to chain (14) with master link.

c. Route cables (3 and 4) to elevator bellcrank (1) and attach cables to terminal ends with turnbuckle and clevis.

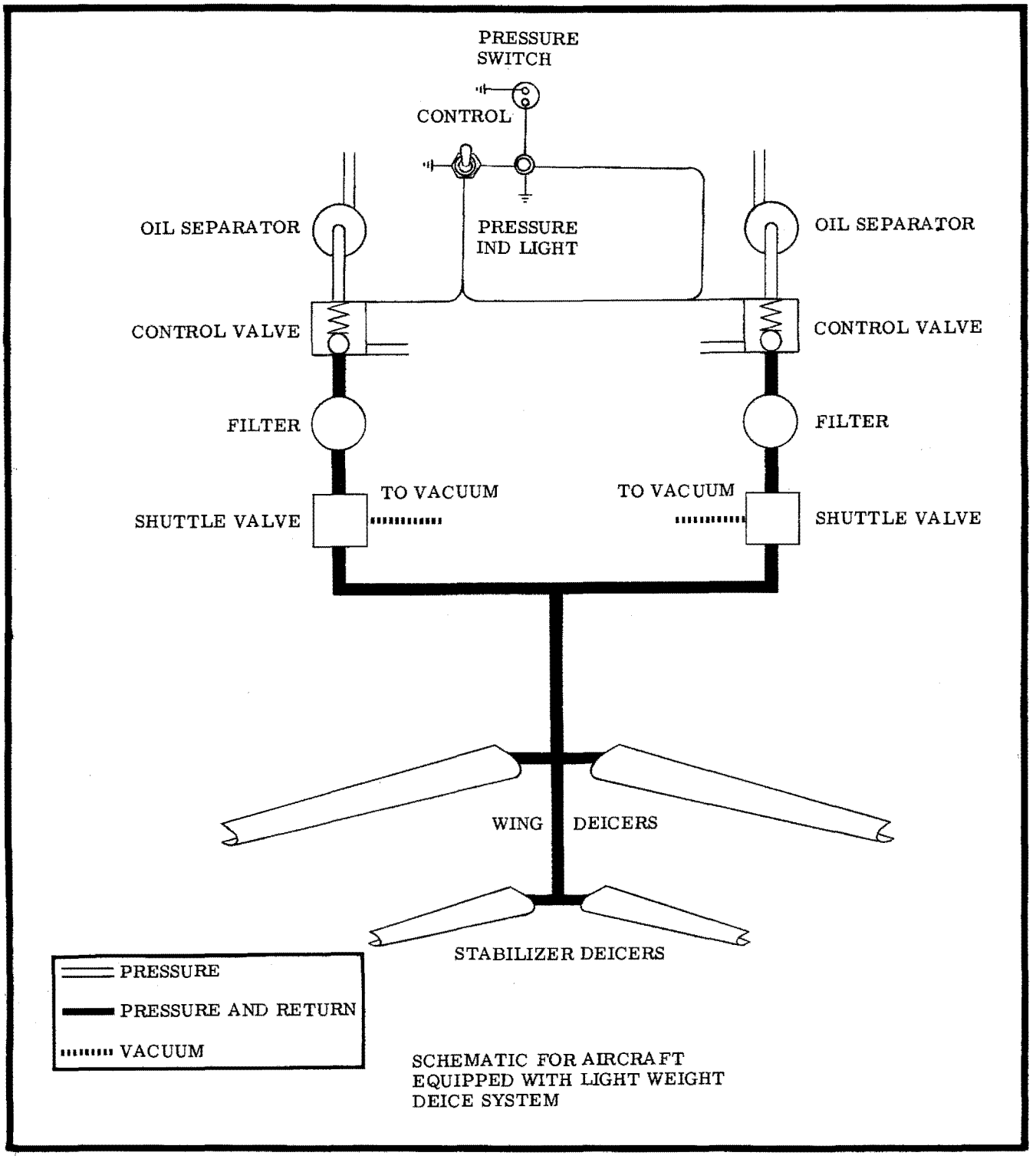


Figure 13-5. Surface Deice Schematic

d. Route cables (12 and 13) forward through fuselage, connect cable ends to terminals which are attached to cable clamp (20) with turnbuckle (21).
e. At the roll actuator (15), secure cables (12 and 13) to chain (14) with master link.
f. Install three sets of pulleys at fuselage stations 132.00, 109.37 and 89.25 with attaching bolts, nuts and cotter pins.

NOTE

Install pulleys so that cable (12) is routed beneath the upper pulley at fuselage station 132.00 and beneath left-hand pulleys at fuselage stations 109.37 and 89.25. Likewise, cable (13) is routed beneath lower and right-hand pulleys.

g. Rig cables in accordance with rigging procedures.

NOTE

After rigging is complete, turn on autopilot and verify that the control surfaces respond in the correct direction. Assist the movement of the elevator by pulling back on control wheel, this will aid in overcoming the counterbalance of the elevator bob-weight.

h. Install floorboards.
i. Refer to Section 3 and install the following items:
1. Rear upholstery panel.
2. Rear carpet and seats.
3. Install stabilizer fairings.

Removal and Installation of Actuators and Computer. (See figure 13-6.)

a. Refer to Section 3 and remove the following items:
1. Remove rear seats and upholstery panel.
2. Stabilizer fairings.
b. Remove pitch actuator (5) as follows:
1. Relieve tension on cables (3 and 4) by loosening turnbuckles at elevator bellcrank (1).
2. Disengage cables (3 and 4) and chain (14) from sprocket on actuator (5).
3. Disconnect electrical cable assembly (10) from pitch actuator (5).
4. Remove four screws, washers and lockwashers attaching pitch actuator (5) to shelf.
5. Remove pitch actuator from tailcone.
c. Remove roll actuator (15) as follows:
1. Relieve tension on cables (12 and 13) by loosening turnbuckle (21) near cable clamp (20).
2. Disengage cables (12 and 13) and chain (14) from sprocket on actuator (15).
3. Disconnect electrical cable assembly (9) from roll actuator (15).
4. Remove four screws, washers and lockwashers attaching roll actuator (15) to shelf.
5. Remove roll actuator from tailcone.
d. Remove computer (7) as follows:
1. Disconnect line assembly (6) from computer (7).
2. Disconnect electrical cable assemblies (8, 9 and 10) from computer (7).
3. Remove four nuts and screws attaching computer (7) to shelf.
4. Remove computer from tailcone.
e. Install computer (7), roll actuator (15) and pitch actuator (5) by reversing removal procedures. Rig cables in accordance with rigging procedures.

Removal and Installation of Gyros.

a. Refer to Section 12 for typical removal and installation.

Removal and Installation of Switches.

a. Refer to Section 14 for typical removal and installation of electrical switches.

Removal and Installation of Controller. (See figure 13-6.)

a. Disconnect electrical cable assembly from controller (27).
b. Remove controller (27) and bezel (26) from retainer (28).
c. Install controller (27) by reversing removal procedures.

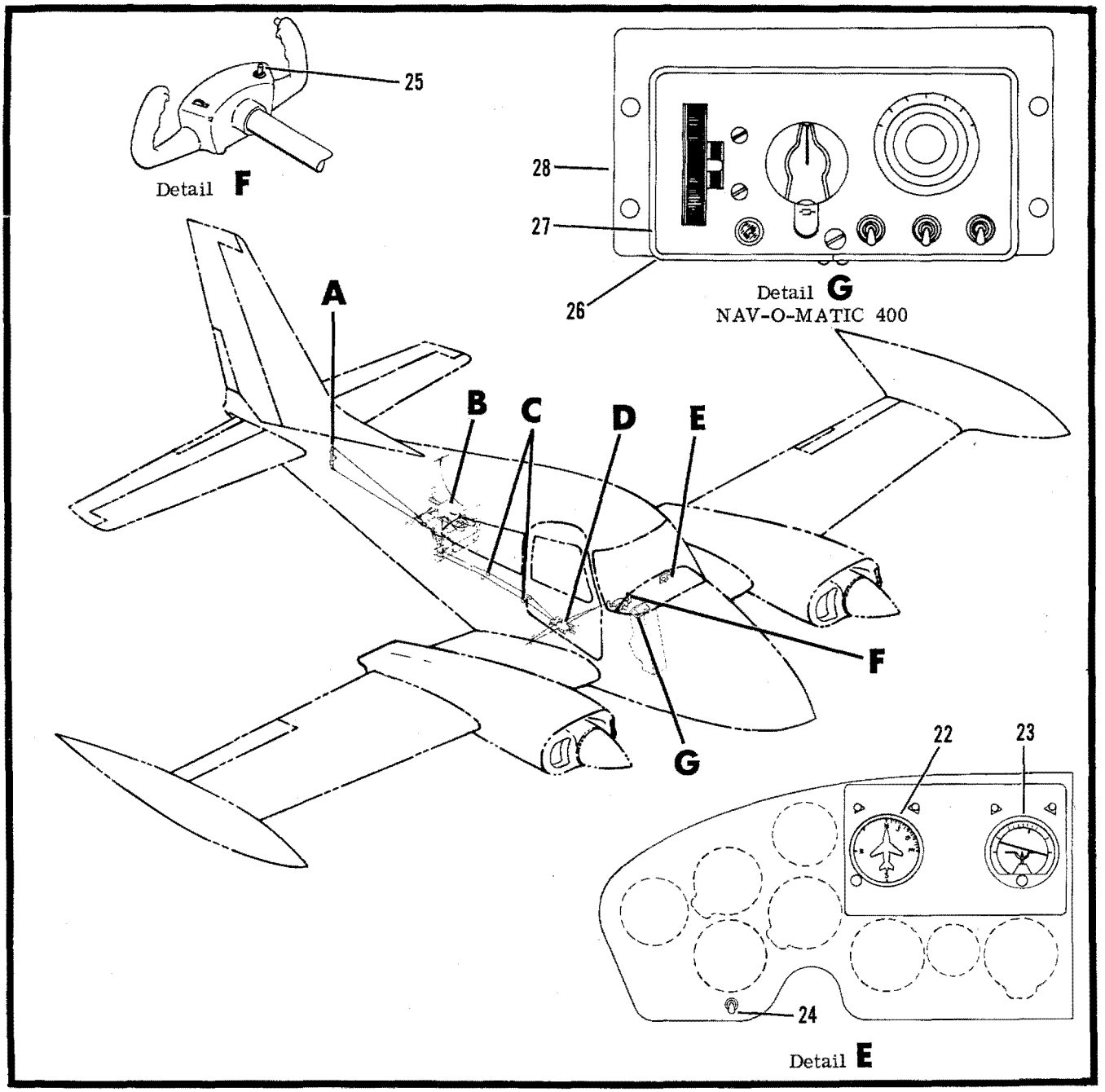
Rigging Nav-O-Matic 400 Autopilot Control Cables. (See figure 13-6.)

a. Rig aileron control cables as follows:
1. Verify that aileron control system is properly rigged.
2. Using a clamp or other locking device, lock ailerons in the neutral position.
3. Place chain (14) evenly over sprocket on actuator (15). Slide cable clamps (20) outboard from bracket (16) until slack is removed from cables (12 and 13). Tighten cable clamps (20) in place.

NOTE

Cable clamps (20) must be equal distance from bracket (16) to properly rig aileron cables.

4. Rig the aileron actuator cables (12 and 13) to 12 ± 3 inch-pounds tension by tightening turnbuckle.
5. Remove locking device from aileron control surfaces and move aileron through entire travel. Observe chain (14) on actuator (15) for sufficient remaining links at the extreme travel limits.
6. Safety turnbuckles.
b. Rig elevator control cables as follows:
1. Verify that aileron control system is properly rigged.
2. Using a clamp or other locking device, lock elevator in the neutral position.
3. With elevator control surface in the neutral position, place chain (14) evenly over sprocket on actuator (5) and attach cables (3 and 4) to links (2) on bellcrank (1).
4. Rig the elevator actuator cables (3 and 4) to 12 ± 3 inch-pounds tension by tightening the turnbuckles.



1. Elevator Bellcrank
2. Link
3. Elevator Cable (Upper, Actuator to Bellcrank)
4. Elevator Cable (Lower, Actuator to Bellcrank)
5. Pitch Actuator
6. Line Assembly (Computer to Static Line)
7. Computer Amplifier
8. Cable Assembly (Computer to Controller)
9. Cable Assembly (Roll Actuator to Computer)
10. Cable Assembly (Pitch Actuator to Computer)
11. Pulley
12. Cable Assembly (Top, Actuator to Aileron Cable)
13. Cable Assembly (Bottom, Actuator to Aileron Cable)
14. Chain Assembly
15. Roll Actuator
16. Bracket
17. Left Aileron Cable
18. Aileron Bellcrank Assembly
19. Right Aileron Cable
20. Cable Clamp
21. Turnbuckle
22. Directional Gyro
23. Horizontal Gyro
24. Selector Switch
25. Disengage Switch
26. Bezel
27. Controller
28. Retainer

Figure 13-6. Nav-O-Matic 400 (Sheet 1 of 2)

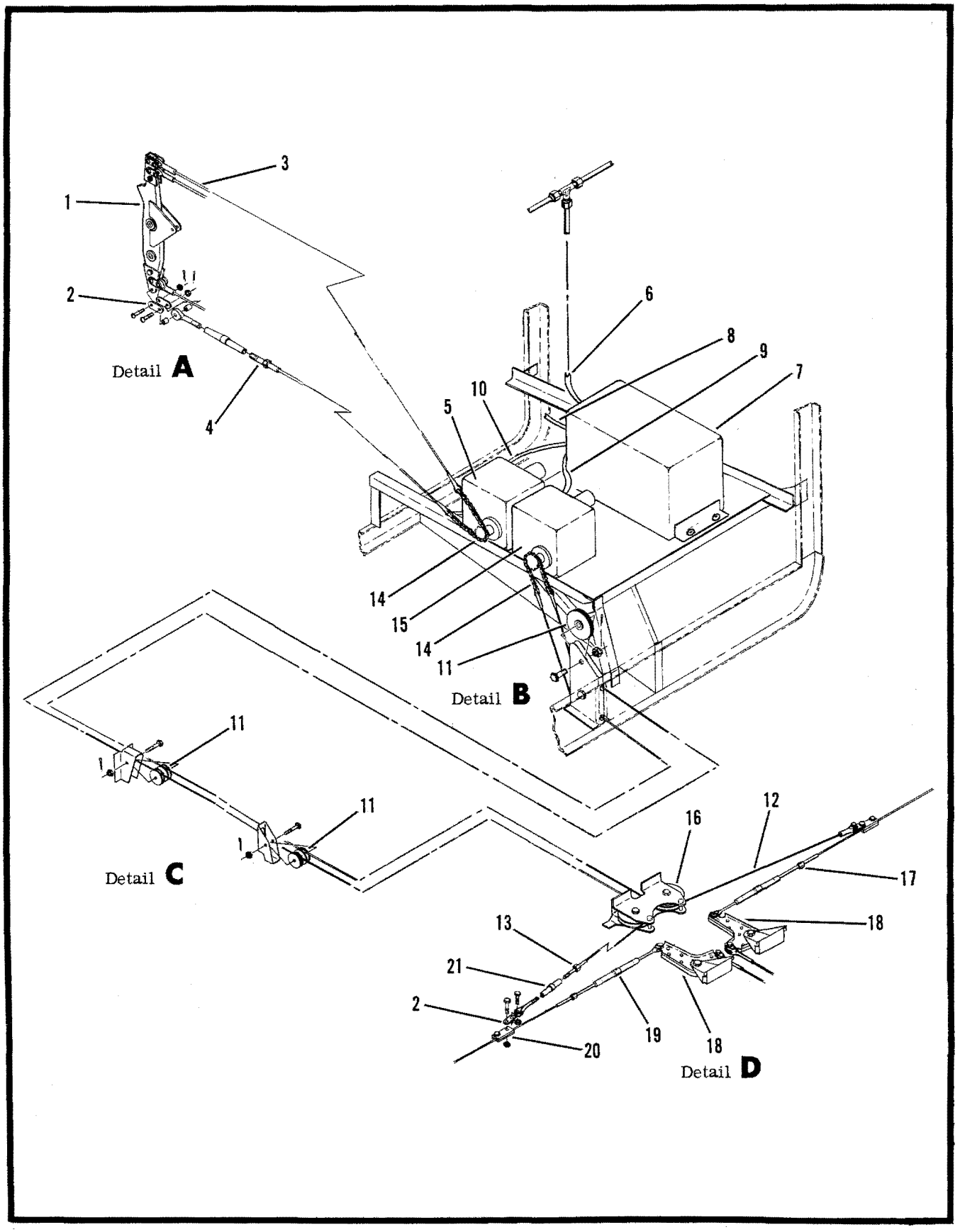
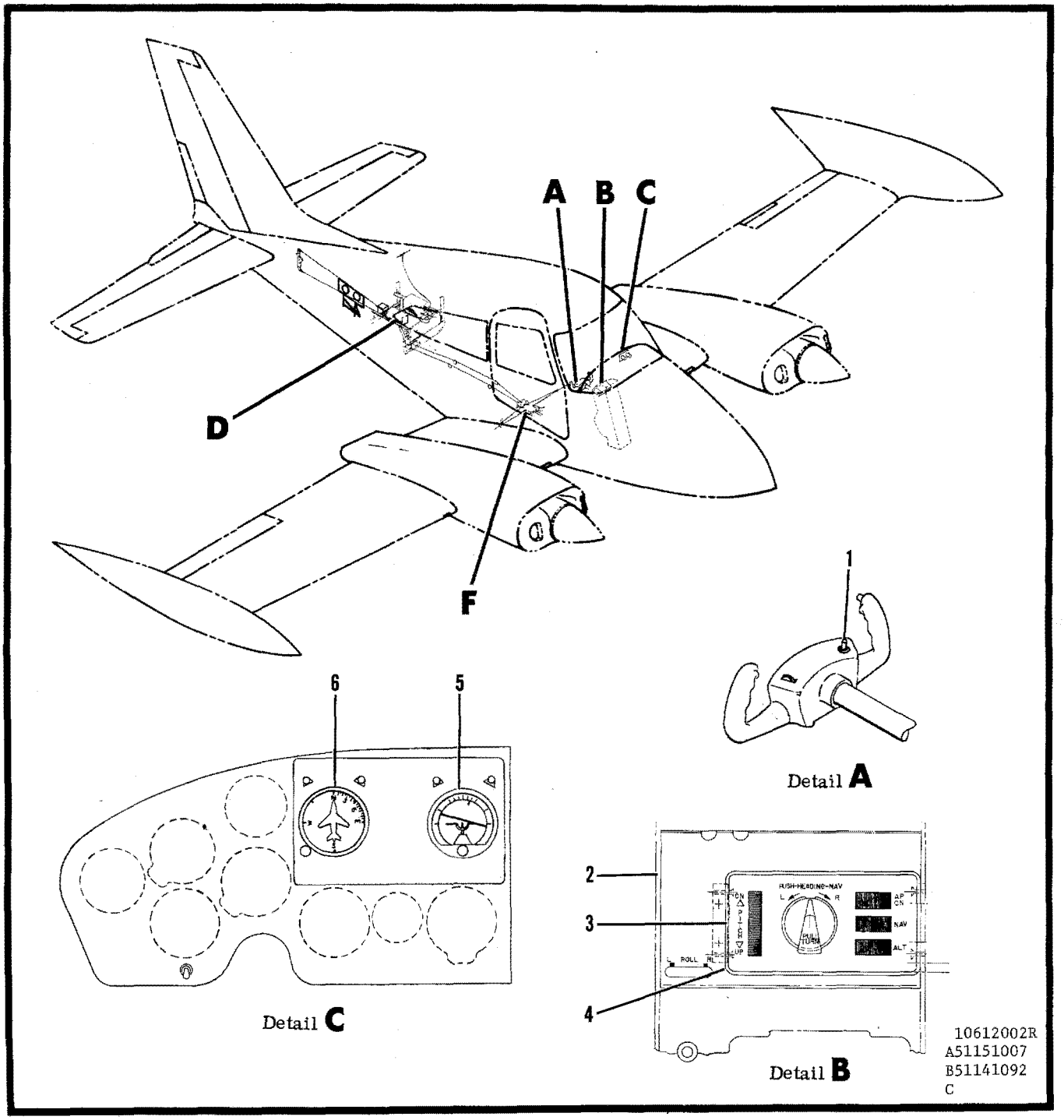


Figure 13-6. Nav-O-Matic 400 (Sheet 2)



1. Disengage Switch
2. Retainer
3. Controller
4. Bezel
5. Horizontal Gyro
6. Directional Gyro
7. Elevator Cable (Upper)
8. Follow-up Sensor
9. Static Line
10. Computer Amplifier
11. Follow-up Actuator
12. Elevator Trim Tab Cable
13. Elevator Trim Follow-up Cable
14. Pulley
15. Chain
16. Roll Actuator
17. Pitch Actuator
18. Trim Sensor Bracket
19. Elevator Cable (Lower)
20. Link
21. Elevator Bellcrank
22. Aileron Bracket
23. Left Aileron Cable
24. Aileron Bellcrank
25. Right Aileron Cable
26. Cable Clamp
27. Turnbuckle
28. Cable Assembly (Bottom)
29. Cable Assembly (Top)

Figure 13-6A. 400A Nav-O-Matic (Sheet 1 of 2)

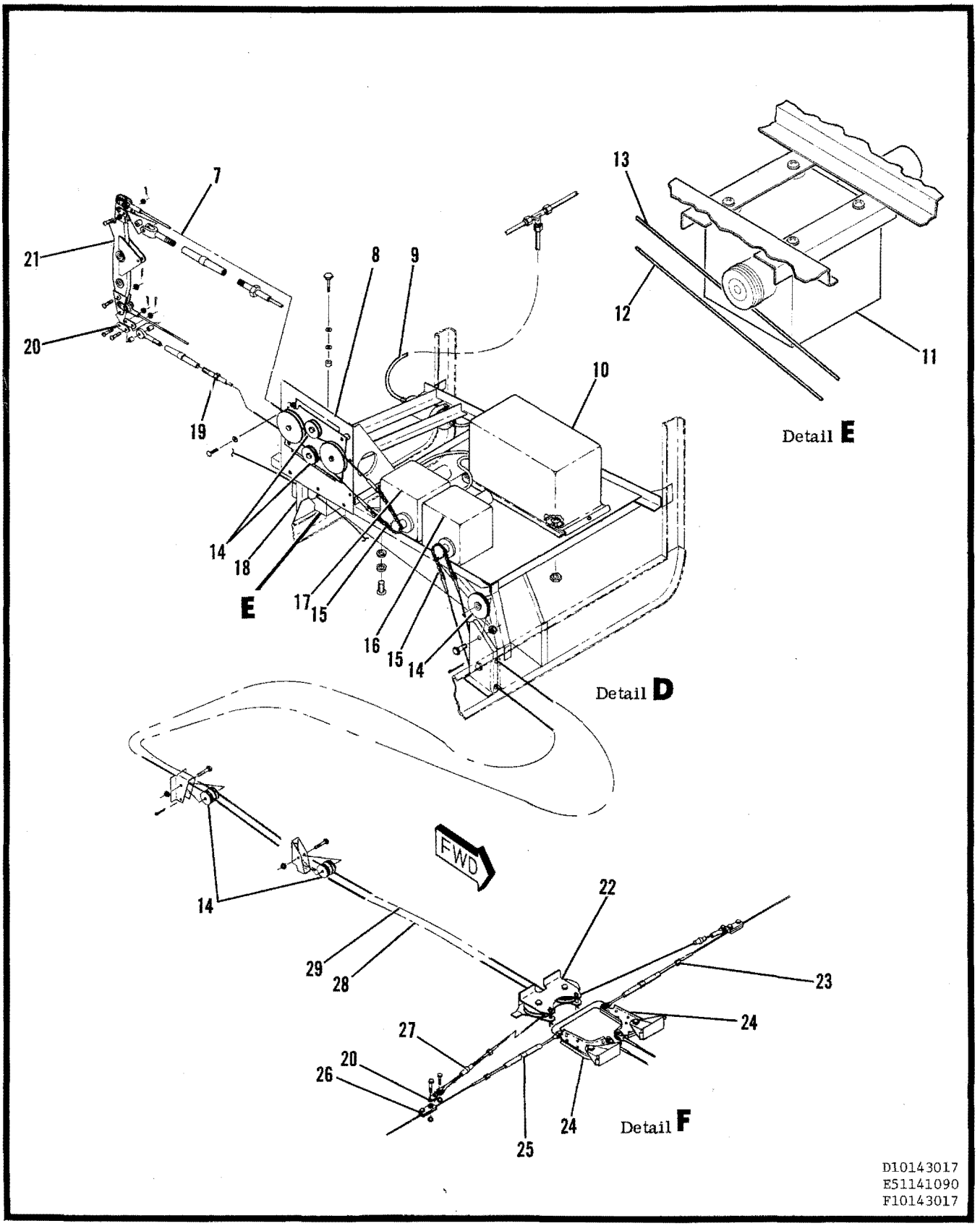


Figure 13-6A. 400A Nav-O-Matic (Sheet 2)

NOTE

Cable tension should be adjusted when ambient temperature is 60°F to 90°F. Allow aircraft temperature to stabilize for a period of 4 hours.

5. Remove locking device from elevator control surfaces and move elevator through entire travel. Observe chain (14) on actuator (5) for sufficient remaining links at the extreme travel limits.
6. Safety turnbuckles.

400A NAV-O-MATIC AUTOPILOT SYSTEM. (See figure 13-6A.)

The Cessna 400A Nav-O-Matic Autopilot is a two-axis flight control system featuring vacuum gyros, altitude hold, synchronous pitch trim, heading preselect, omni intercept and track, and turn command.

The following offerings are options to the basic autopilot: Automatic pitch trim, ILS approach coupler, and slaved directional gyro. The automatic pitch trim operates in conjunction with the aircraft's elevator trim tab. A sensor installed in the elevator servo cables actuates the elevator trim tab to provide a follow-up system. The ILS approach coupler enables the pilot to fly inbound on ILS front course or back course, this option is installed in the computer and connects to the indicator at the nose junction box. The slaved directional gyro replaces the standard directional gyro and provides heading information for the 400A Nav-O-Matic.

For additional description of the 400A Nav-O-Matic Autopilot and components, refer to Cessna 400A Nav-O-Matic Autopilot Service/Parts manual.

Removal of Control Cables. (See figure 13-6A.)

a. Refer to Section 3 and remove the following items:
1. Rear upholstery panel for access to tailcone.
2. Rear reclining, middle individual or fifth and sixth seats (optional equipment).
3. Rear carpet.
4. Stabilizer fairings.
b. Remove floorboards above aileron bellcrank and autopilot pulleys.
c. In the aileron bellcrank area, disconnect turnbuckle (27) and clevis connecting cables (28 and 29) to terminal ends and tie guide wire to cables.
d. Remove three sets of autopilot pulleys by removing attaching nuts, bolts and cotter pins.
e. At the roll actuator (16), separate cables (28 and 29) from chain (15) by removing master link on chain.
f. At the elevator bellcrank (21), disconnect turnbuckles connecting cables (7 and 19) to bellcrank.
g. At the pitch actuator (17), separate cables (7 and 19) from chain (15) by removing master link on chain.
h. Remove pulleys (14) from trim sensor (8) to free cables (7 and 19).
i. Route cable (7) from sprocket and remove cable.
j. Tag cables (7, 19, 28, and 29) for identification; route through fuselage and remove through the baggage floor area.

Installation of Control Cables. (See figure 13-6A.)

a. Route cables (7, 19, 28 and 29) through baggage floor and tie cables (28 and 29) to guide wires.
b. At the pitch actuator (29), secure cables (7 and 19) to chain (15) with master link.
c. Route cables (7 and 19) to elevator bellcrank (21) and attach cables to terminal ends with turnbuckle and clevis.
d. Route cables (28 and 29) forward through fuselage, connect cable ends to terminals which are attached to cable clamp (26) with turnbuckle (27).
e. At the roll actuator (16), secure cables (28 and 29) to chain (15) with master link.
f. Install three sets of pulleys at fuselage stations 132.00, 109.37 and 89.25 with attaching bolts, nuts and cotter pins.

NOTE

Install pulleys so that cable (29) is routed beneath the upper pulley at fuselage station 132.00 and beneath left-hand pulleys at fuselage stations 109.37 and 89.25. Likewise, cable (28) is routed beneath lower and right-hand pulleys.

g. Rig cables in accordance with rigging procedures.

NOTE

After rigging is complete, turn on autopilot and verify that the control surfaces respond in the correct direction. Assist the movement of the elevator by pulling back on control wheel, this will aid in overcoming the counterbalance of the elevator bob-weight.

h. Install floorboards.
i. Refer to Section 3 and install the following items:
1. Rear upholstery panel.
2. Rear carpet and seats.
3. Install stabilizer fairings.

Removal and Installation of Actuators, Computer and Flight Controller. (See figure 13-6A.)

a. Refer to Section 3 and remove the following items:
1. Remove rear seats and upholstery panel.
2. Stabilizer fairings.
b. Remove pitch actuator (17) as follows:
1. Relieve tension on cables (7 and 19) by loosening turnbuckles at elevator bellcrank (1).
2. Disengage cables (7 and 19) and chain (15) from sprocket on actuator (17).
4. Remove four screws, washers and lockwashers attaching pitch actuator (17) to shelf.
5. Remove pitch actuator from tailcone.

c. Remove roll actuator (16) as follows:
1. Relieve tension on cables (28 and 29) by loosening turnbuckle (27) near cable clamp (26).
2. Disengage cables (28 and 29) and chain (15) from sprocket on actuator (14).
3. Disconnect electrical cable assembly from roll actuator (17).
4. Remove four screws, washers and lockwashers attaching roll actuator (17) to shelf.
5. Remove roll actuator from tailcone.
d. Remove computer (10) as follows:
1. Disconnect line assembly (9) from computer (10).
2. Disconnect electrical cable assemblies from computer (10).
3. Remove four nuts and screws attaching computer (10) to shelf.
4. Remove computer from tailcone.
e. Install computer (10), roll actuator (16) and pitch actuator by reversing removal procedures. Rig cables in accordance with rigging procedures.

Removal and Installation of Elevator Trim Follow-Up Actuator. (See figure 13-6A.)

a. Place a suitable support under tailcone.
b. Remove tailcone access panel.
c. Disconnect electrical plug from actuator.
d. Remove four screws securing actuator.
e. Lift actuator up and slide aft far enough to disconnect cable.
f. Unwind cable from actuator drum.

NOTE

If elevator trim follow-up cables are to be removed, refer to Section 6 and remove in accordance with Elevator Trim Tab Cable Removal procedures.

g. The installation of the elevator trim follow-up actuator is the reversal of the removal procedures.

NOTE

The elevator trim follow-up cable must make two complete turns on the actuator drum when installing.

h. Check elevator trim follow-up rigging and tension in accordance with Section 6, Rigging Elevator Trim System.
i. If optional electric trim control system is installed, adjust elevator trim stop blocks as follows:
1. Rotate elevator trim control wheel to maximum down position (refer to Section 6), slide aft stop block against electric elevator trim actuator and secure stop block.
2. Rotate elevator trim control wheel to maximum up position (refer to Section 6), slide forward stop block against electric elevator trim actuator and secure stop block.

Removal and Installation of Elevator Trim Follow-Up Sensor. (See figure 13-6A.)

a. Place a suitable support under tailcone.
b. Remove tailcone access panel and elevator bellcrank access covers.
c. Remove pulleys (14) from sensor unit (8) to free cables (7 and 19).
d. Disconnect electrical plug from sensor units.
e. Remove sensor unit (8) from bracket (18) by removing attaching screws and nuts.
f. Install sensor unit by reversing the removal procedures.

Removal and Installation of Gyros.

a. Refer to Section 12 for typical removal and installation.

Removal and Installation of Switches.

a. Refer to Section 14 for typical removal and installation of electrical switches.

Removal and Installation of Controller. (See figure 13-6A.)

a. Disconnect electrical cable assembly from controller (3).
b. Remove controller (3) and bezel (4) from retainer (2).
c. Install controller (3) by reversing removal procedures.

Rigging Nav-O-Matic 400A Autopilot Control Cables. (See figure 13-6A.)

a. Rig aileron control cables as follows:
1. Verify that aileron control system is properly rigged.
2. Using a clamp or other locking device, lock ailerons in the neutral position.
3. Place chain (15) evenly over sprocket on actuator (16). Slide cable clamps (26) outboard from bracket (22) until slack is removed from cables (28 and 29). Tighten cable clamps (26) in place.

NOTE

Cable clamps (26) must be equal distance from bracket (22) to properly rig aileron cables.

4. Rig the aileron actuator cables (28 and 29) to 12 ±3 inch-pounds tension by tightening turnbuckle.
5. Remove locking device from aileron control surfaces and move aileron through entire travel. Observe chain (15) on actuator (16) for sufficient remaining links at the extreme travel limits.
6. Safety turnbuckles.
b. Rig elevator control cables as follows:
1. Verify that aileron control system is properly rigged.

2. Using a clamp or other locking device, lock elevator in the neutral position.
3. With elevator control surface in the neutral position, place chain (15) evenly over sprocket on actuator (17) and attach cables (7 and 19) to links (20) on bellcrank (21).
4. Rig the elevator actuator cables (7 and 19) to 12 ±3 inch-pounds tension by tightening the turnbuckles.

NOTE

Cable tension should be adjusted when ambient temperature is 60°F to 90°F. Allow aircraft temperature to stabilize for a period of 4 hours.

5. Remove locking device from elevator control surfaces and move elevator through entire travel. Observe chain (14) on actuator (5) for sufficient remaining links at the extreme travel limits.
6. Safety turnbuckles.

YAW DAMPER SYSTEM. (See figure 13-6B.)

The independent yaw damper system consists of a G830A (turn and slip indicator), rudder servo actuator and the disengage switch.

The turn and slip indicator provides standard turn and slip information. It also monitors yaw axis motion and supplies the servo actuator with a signal to minimize that motion. The indicator includes an electrically driven gyro, computer circuit, rate-of-turn indicator, turn-and-slip indicator and warning flags. The manually operated trim knob compensates for attitude or airspeed variations.

The rudder servo applies the signal from the gyro through a mechanical linkage to the rudder. An electric clutch in the drive linkage provides a positive disconnect between actuator and rudder when yaw damper is not in use.

The yaw damper switch is located on the left instrument panel and de-energizes the electric clutch and gyro computer. The autopilot/yaw damper disengage switch, located on the pilot's control wheel, also disengages the yaw damper.

Troubleshooting

For troubleshooting the yaw damper system, refer to the Yaw Damper System Service/Parts manual.

Removal and Installation of Yaw Damper Actuator. (See figure 13-6C.)

a. Place a suitable support under tailcone.
b. Remove tailcone access panel and rudder bellcrank access covers.
c. Remove chain guard (11), loosen turnbuckle (7) and remove chain assembly from sprocket.
d. Remove bolts (9) securing actuator (1) to structure.
e. Disconnect electrical connector and remove actuator from aircraft.
f. Install the rudder yaw actuator by reversing the removal procedures.

NOTE

Secure bolts (9) with safetywire after tightening to proper torque valve.

g. Rig cables in accordance with rigging procedures.

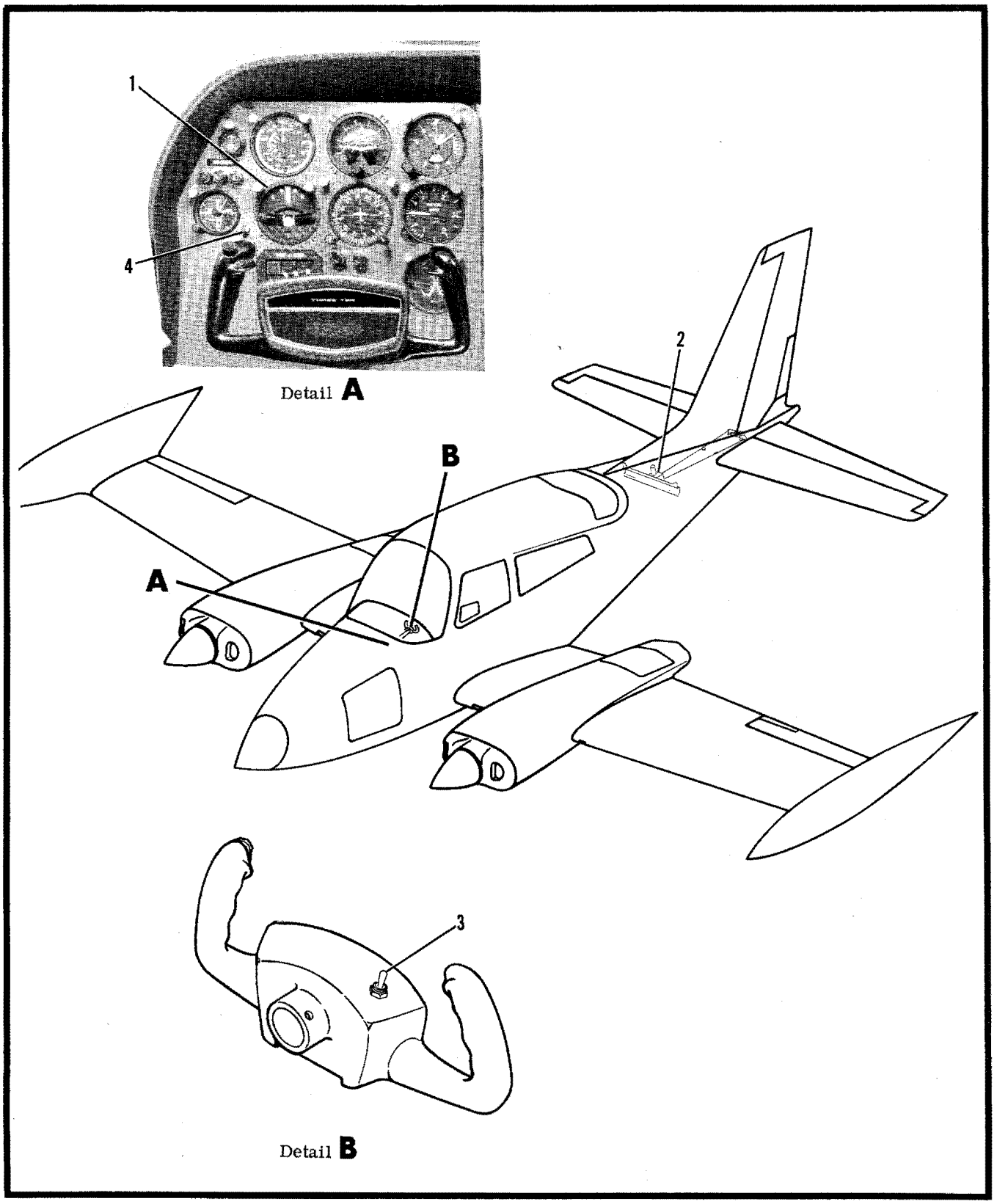
Rigging Yaw Damper System. (Refer to figure 13-6C.)

a. Refer to Section 7 and verify that rudder control system is properly rigged.
b. Rig yaw actuator cables (3) and (8) to 16, +2, -2, pounds tension by tightening turnbuckle (7).
c. Safety turnbuckle.
d. Adjust actuator in accordance with Actuator Centering Adjustment procedures.

Actuator Centering Adjustment

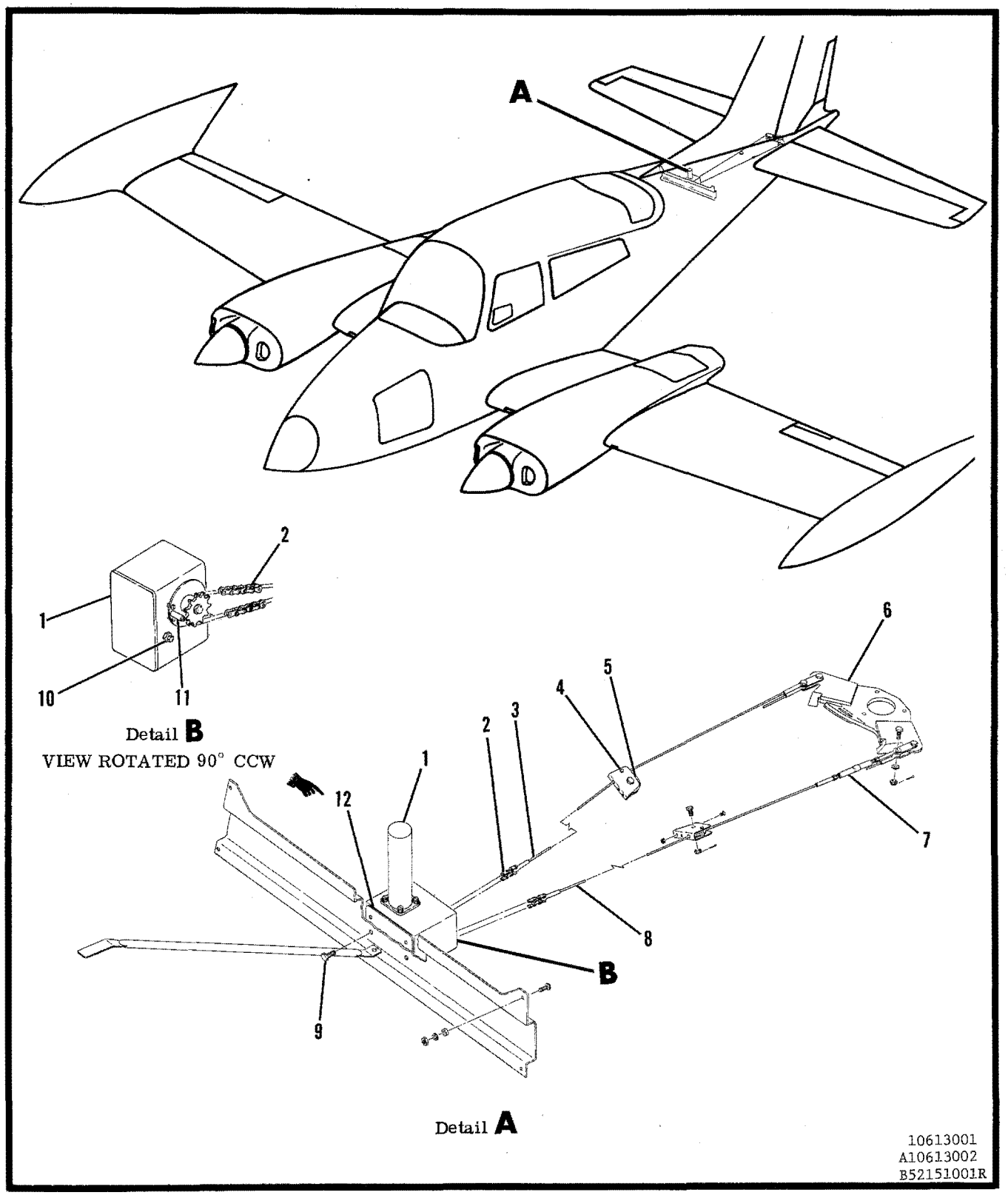
Before making actuator centering adjustments, assure that rudder system and yaw damper system is rigged in accordance with rigging procedures.

a. Turn yaw damper system "ON."
b. Check position of rudder. If rudder deflects from neutral position, manually hold rudder in the assumed position and disengage yaw damper switch. Refer to figure 13-6B, turn and hold centering screw (10) in a full (CW) position while returning rudder to



1. Turn and Bank Indicator
2. Actuator
3. Autopilot Disengage Switch
4. Yaw Actuator Switch

Figure 13-6B. Yaw Damper Control System



1. Actuator
2. Chain
3. Cable (Right)
4. Guard Pin
5. Pulley
6. Bellcrank
7. Turnbuckle
8. Cable (Left)
9. Bolt
10. Centering Screw
11. Chain Guard
12. Support

Figure 13-6C. Yaw Damper Installation

neutral position. Release adjusting screw on actuator.

c. Turn yaw damper system "ON" and recheck for zero rudder deflection.

INTEGRATED FLIGHT CONTROL SYSTEM. (See figure 13-6D.)

The Integrated Flight Control System is a two axis (aileron and elevator) automatic flight control system consisting of the autopilot and flight director. Either the flight director or the autopilot may be used separately or as a combination. As an autopilot, in addition to holding the wings level and compensating for rotation about the pitch axis, the autopilot provides an automatic intercept and track of any magnetic heading or VOR radial. Also included is an automatic pitch trim, turn command, pitch command, altitude hold and an ILS approach feature. As a flight director the Integrated Flight Control System provides steering information, visually presented on the attitude director indicator (ADI), for climb, cruise, descent and altitude hold. Heading, VOR navigation, glide slope and ILS approaches are visually presented on the horizontal situation indicator (HSI).

For additional description, installation adjustments, troubleshooting, schematic and parts listing, refer to Cessna Integrated Flight Control System Service/Parts Manual.

300 And 400 Series Integrated Flight Control Systems.

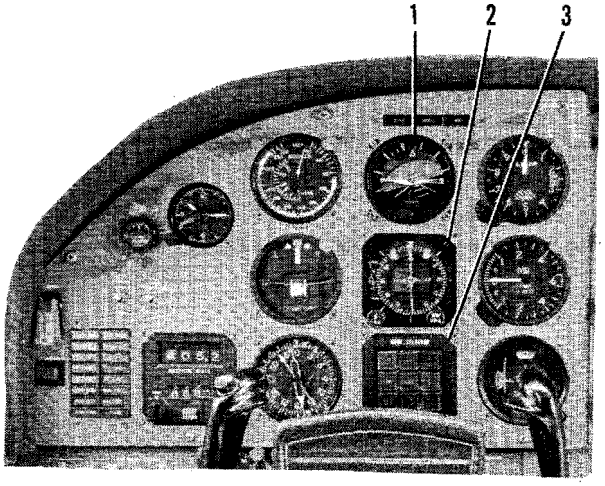
The 300 and 400 Integrated Flight Control Systems consist of the 400A Nav-O-Matic autopilot and flight director, ILS coupler, slaved directional gyro, pitch synchronization and associated avionics. The 300 Integrated Flight Control System uses 300 avionics, while the 400 Integrated Flight Control System uses 400 avionics. Simultaneous or independent operation of the autopilot and flight director are provided. Go-around commands selectable by the pilot are provided in addition to the pitch synchronization.

800 Series Integrated Flight Control System.

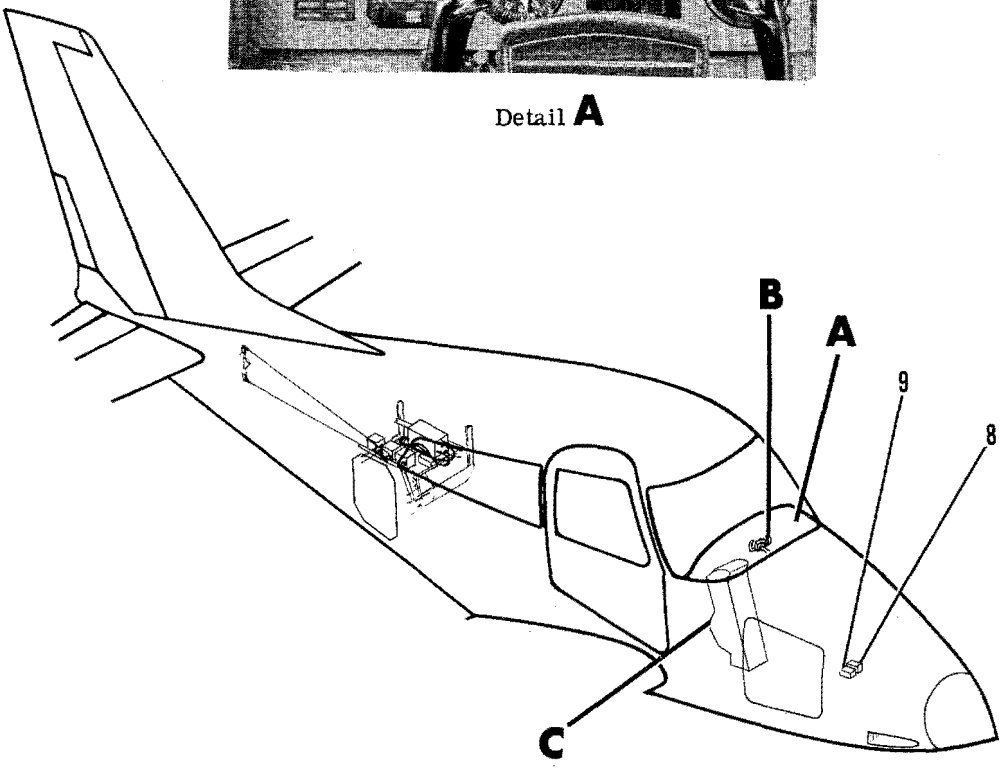
The 800 Integrated Flight Control System consists of the 400A Nav-O-Matic autopilot and flight director, with yaw damper, altitude hold, automatic pitch trim, pitch synchronization, heading preselect, omni/ILS couplers and turn and pitch command. Simultaneous or independent operation of the autopilot and flight director is provided and in addition to the autopilot features, the flight director includes pitch synchronization and go-around commands as selected by the pilot. The 800 Integrated Flight Control System includes a vacuum, slaved directional gyro with ADF presentation and an horizontal situation indicator (HSI). Nav 1 is connected to the HSI and Nav 2 is connected to an individual course indicator. 400 or 800 avionics system may be used with the 800 Integrated Flight Control System.

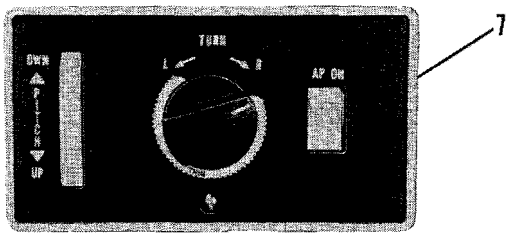
Removal, Installation and Rigging the Integrated Flight Control System Components. (See figure 12-2 and figure 13-6A.)

Refer to Removal, Installation and Rigging Procedures for the Nav-O-Matic 400A Autopilot Section 13 and Typical Instrument Removal and Installation Procedures Section 12 for removal, installation and rigging the Integrated Flight Control System Components.

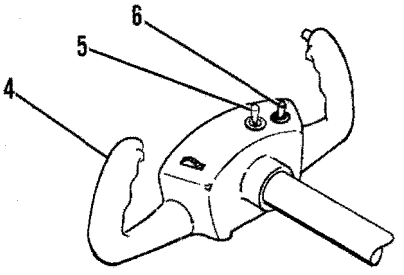


Detail **A**





Detail **C**



Detail **B**

1. ADI Indicator
2. HSI Indicator
3. Mode Selector
4. Pitch Synchronization Switch
5. Autopilot Disengage Switch
6. Go-Around Switch
7. Autopilot Controller
8. Inverter
9. Gyro

Figure 13-6D. Integrated Flight Control System

NAV-O-MATIC 800 AUTOPILOT.
(310P0001 TO 310Q0401.)

Refer to Cessna Nav-O-Matic 800 Service and Parts Manual for general descriptions of components and troubleshooting procedures. Refer to Section 15 for aircraft electrical wiring diagrams.

Removal and Installation of Autopilot Aileron Cables. (See figure 13-7.)

a. Refer to Section 3 and remove the following items:
1. Front seats, rear, middle and aft rear seats (optional equipment).
2. Rear carpet.
3. Rear upholstery panel.
4. Floorboards over aileron bellcrank and pulleys.
b. Disconnect turnbuckle (2) and clevis attaching autopilot aileron cable (11) to links (12).
c. Remove cable guard pins from pulley brackets at fuselage stations 89.25 and 109.37.
d. Route cable ends aft to aileron servo.
e. Disengage cable (11) from aileron servo as shown in Cessna Nav-O-Matic 800 Service and Parts Manual.
f. Install autopilot aileron cable (11) by reversing removal procedures.
g. Rig cable (11) in accordance with rigging procedure.

Removal and Installation of Autopilot Rudder Cable. (See figure 13-7.)

a. Refer to Section 3 and remove the following items:
1. Rear seats and upholstery panel.
2. Stabilizer fairing.
b. Refer to Section 2 and support tailcone.
c. Disconnect turnbuckle (2) connecting LH autopilot rudder cable (4) to link (1) at bellcrank (3).
d. Disconnect clevis end of autopilot cable (4) from link (1) by removing attaching nut, washers and bolts.
e. Remove cable guard pins from pulley bracket.
f. Route autopilot rudder cable (4) forward to rudder servo.
g. Disengage cable (4) from servo as shown in Cessna Nav-O-Matic 800 Service and Parts Manual.
h. Install cable (4) by reversing removal procedures.
i. Rig cable (4) in accordance with rigging procedures.

Removal and Installation of Autopilot Elevator Cables. (See figure 13-7.)

a. Refer to Section 3 and remove the following items:
1. Rear upholstery panel.
2. Stabilizer fairing.
b. Refer to Section 2 and support tailcone.
c. Disconnect turnbuckle (2) connecting lower autopilot elevator cable (9) to links (8) at elevator bellcrank (7).
d. Disconnect clevis end of cable (9) from link (8) by removing attaching nut, spacer and bolt.
e. Route cable (9) forward to elevator servo.
f. Disengage cable (9) from aileron servo as shown in Nav-O-Matic 800 Service and Parts Manual.
g. Remove cable (9) from aircraft.
h. Install autopilot elevator cable (9) by reversing removal procedures.
i. Rig cable (9) in accordance with rigging procedures.

Removal and Installation of Autopilot Elevator Trim Extension Cable. (See figure 13-7.)

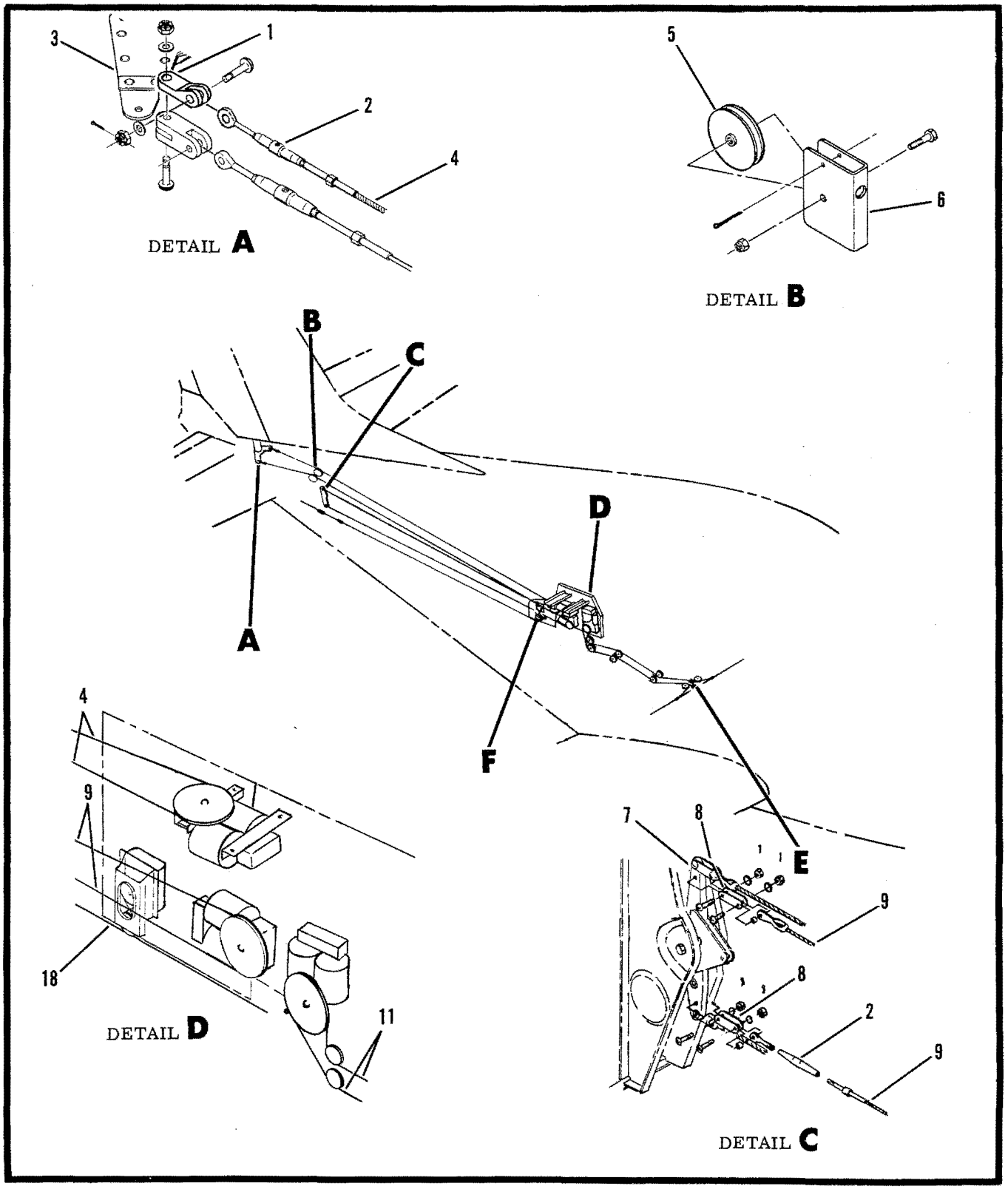
a. Refer to Section 3 and remove the following items:
1. Rear upholstery panel.
2. Stabilizer fairing.
3. Stinger.
b. Release tension on elevator trim control system by referring to Section 6 and loosening turnbuckle.
c. Disconnect autopilot extension cable (19) from elevator trim cable (18) by removing nuts and bolts.
d. Remove autopilot extension cable (19) from aircraft.
e. Install autopilot extension cable (19) by reversing removal procedures.
f. Rig elevator trim cable in accordance with autopilot rigging procedures.

Removal and Installation of Pneumatic System.

a. Remove and install pneumatic system components, line assemblies and hoses as shown in figure 13-9.

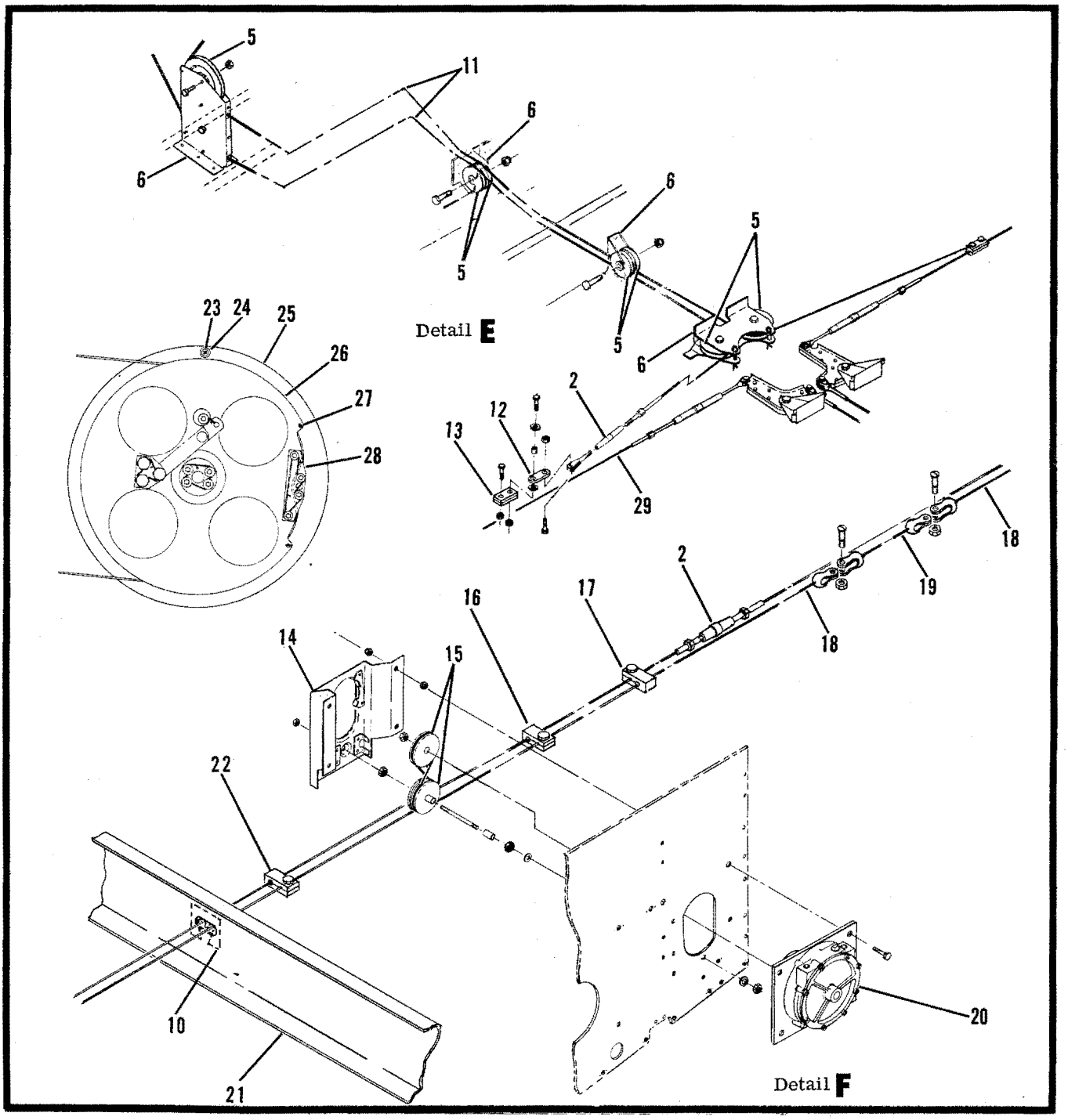
NOTE

Line assembly (23) can be removed from wing without removing wing. Accomplish removal of line assembly (23) by carefully bending line assembly and route through wing gap area. Line assembly (25) is assembled into the wing nacelle and should not be removed.



1. Link(Rudder)
2. Turnbuckle
3. Rudder Bellcrank
4. Rudder Cable Assembly (Servo to Bellcrank)
5. Pulley
6. Pulley Bracket
7. Elevator Bellcrank
8. Link (Elevator)

Figure 13-7. Nav-O-Matic 800 Servos and Cable Installation (Sheet 1 of 2)



9. Elevator Cable Assembly (Servo to Bellcrank)
10. Fairlead
11. Aileron Cable Assembly (Servo to Aileron System)
12. Link (Aileron)
13. Cable Clamps
14. Pulley Bracket Assembly
15. Pulley (Elevator Trim)
16. Trim Stop Block (Center)
17. Trim Stop Block (Aft)
18. Elevator Trim Cable
19. Elevator Trim Extension Cable (Autopilot)
20. Elevator Trim Servo
21. Bulkhead (Station 132.00)
22. Trim Stop Block (Forward)
23. Screw
24. Spacer
25. Cable Guard
26. Cable Drum
27. Cotter Pin
28. Cable Clamp
29. Aileron Control Cable

Figure 13-7. Nav-O-Matic 800 Servos and Cable Installation (Sheet 2)

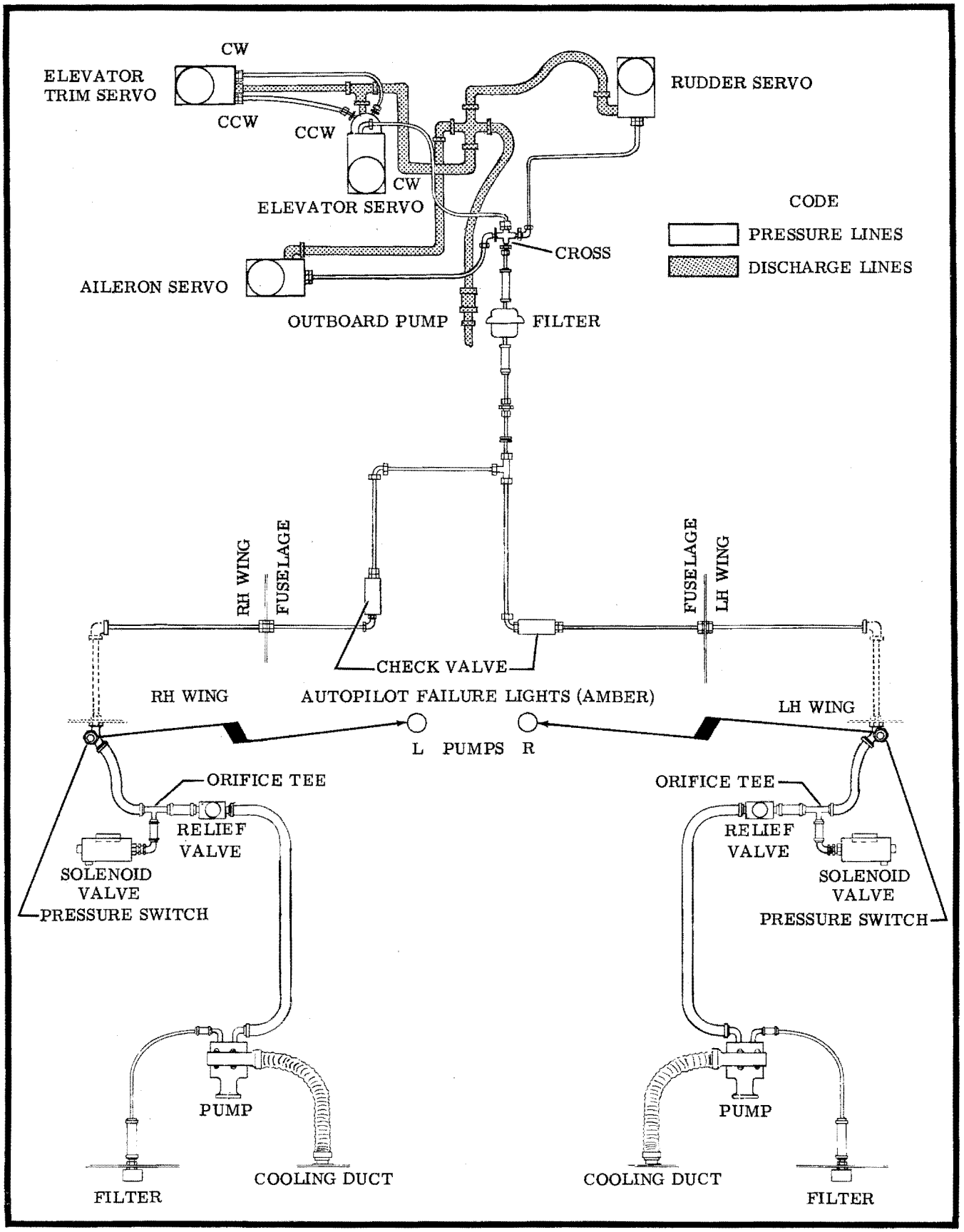
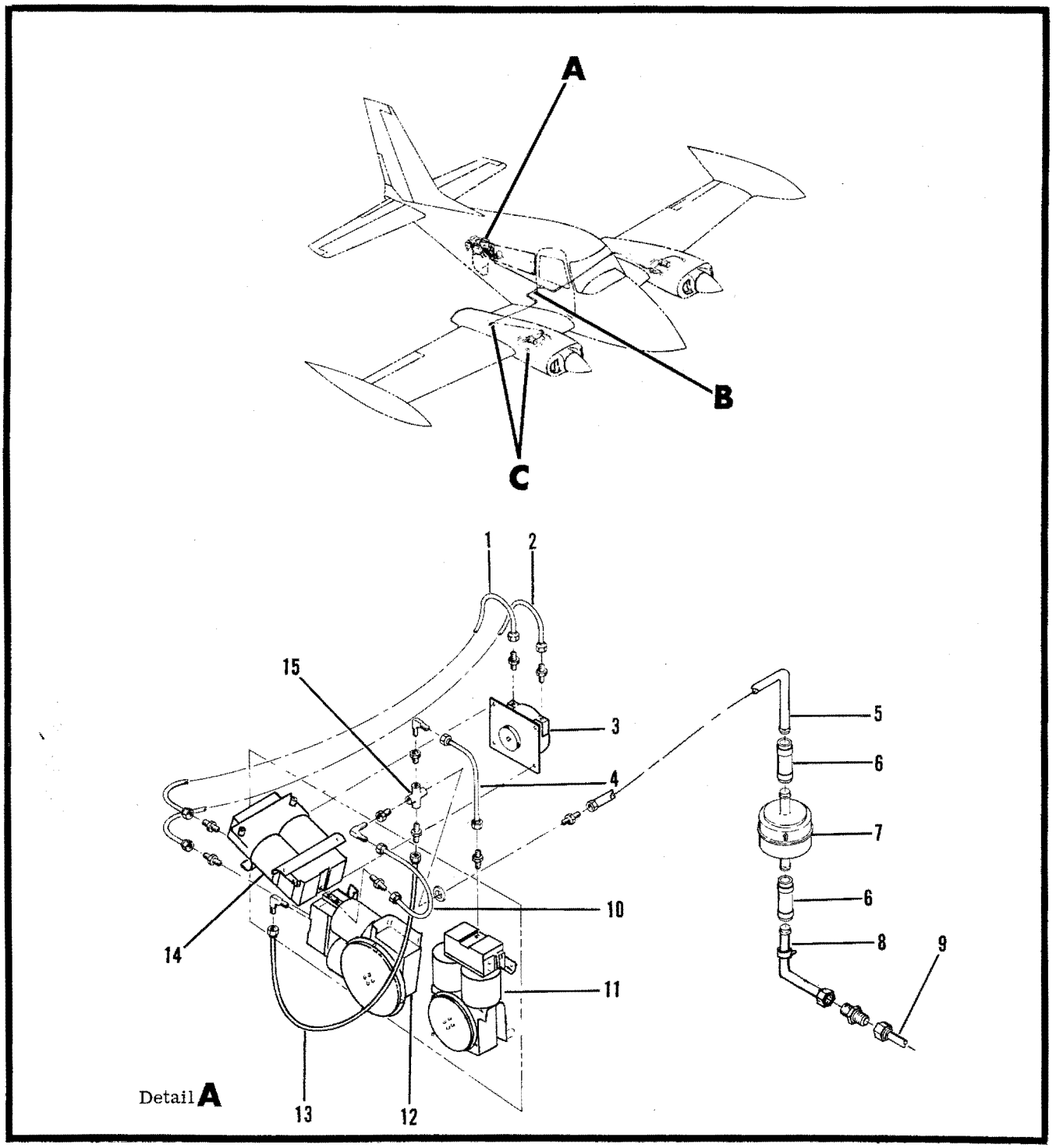
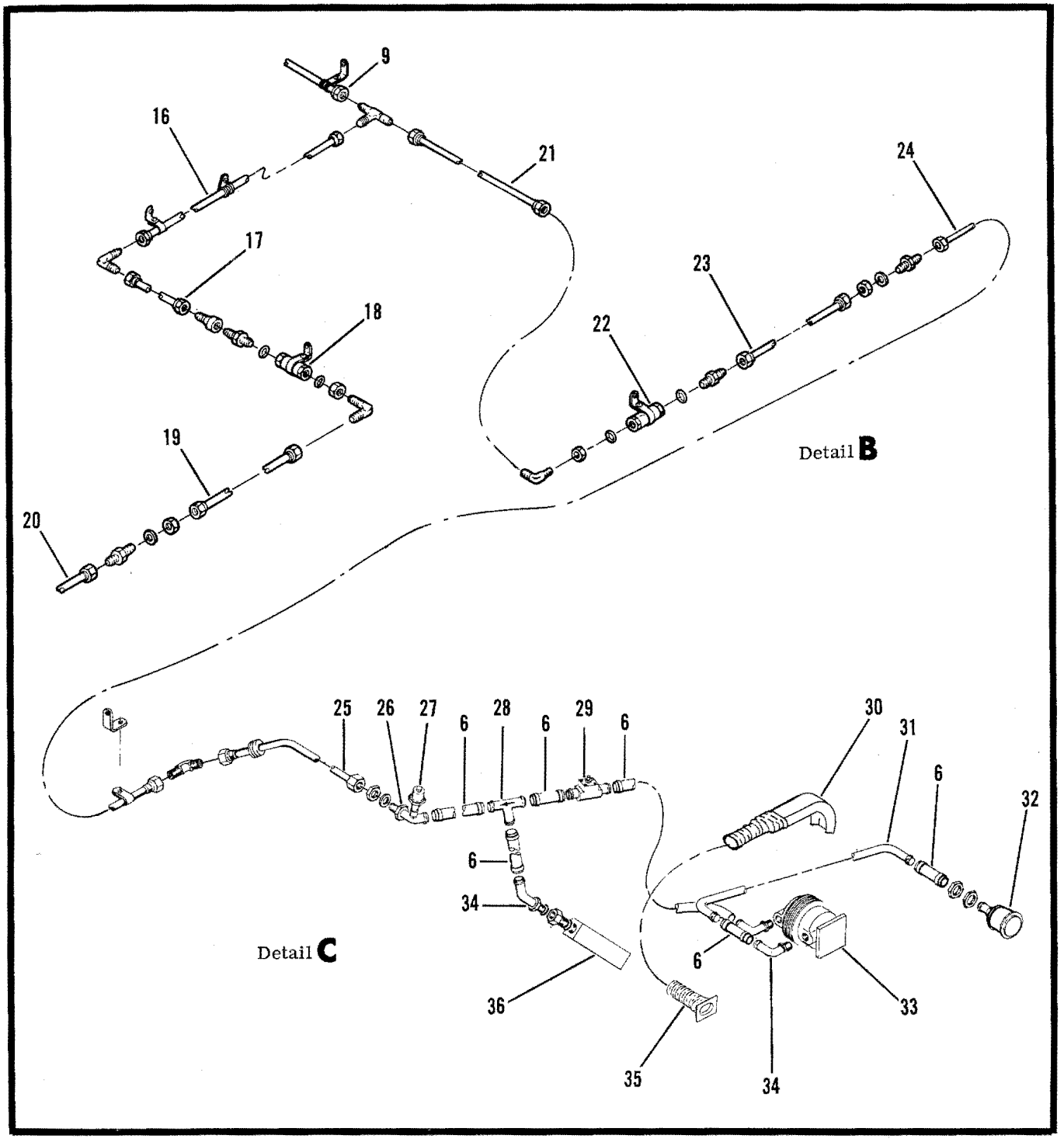


Figure 13-8. Nav-O-Matic 800 Pneumatic System Schematic



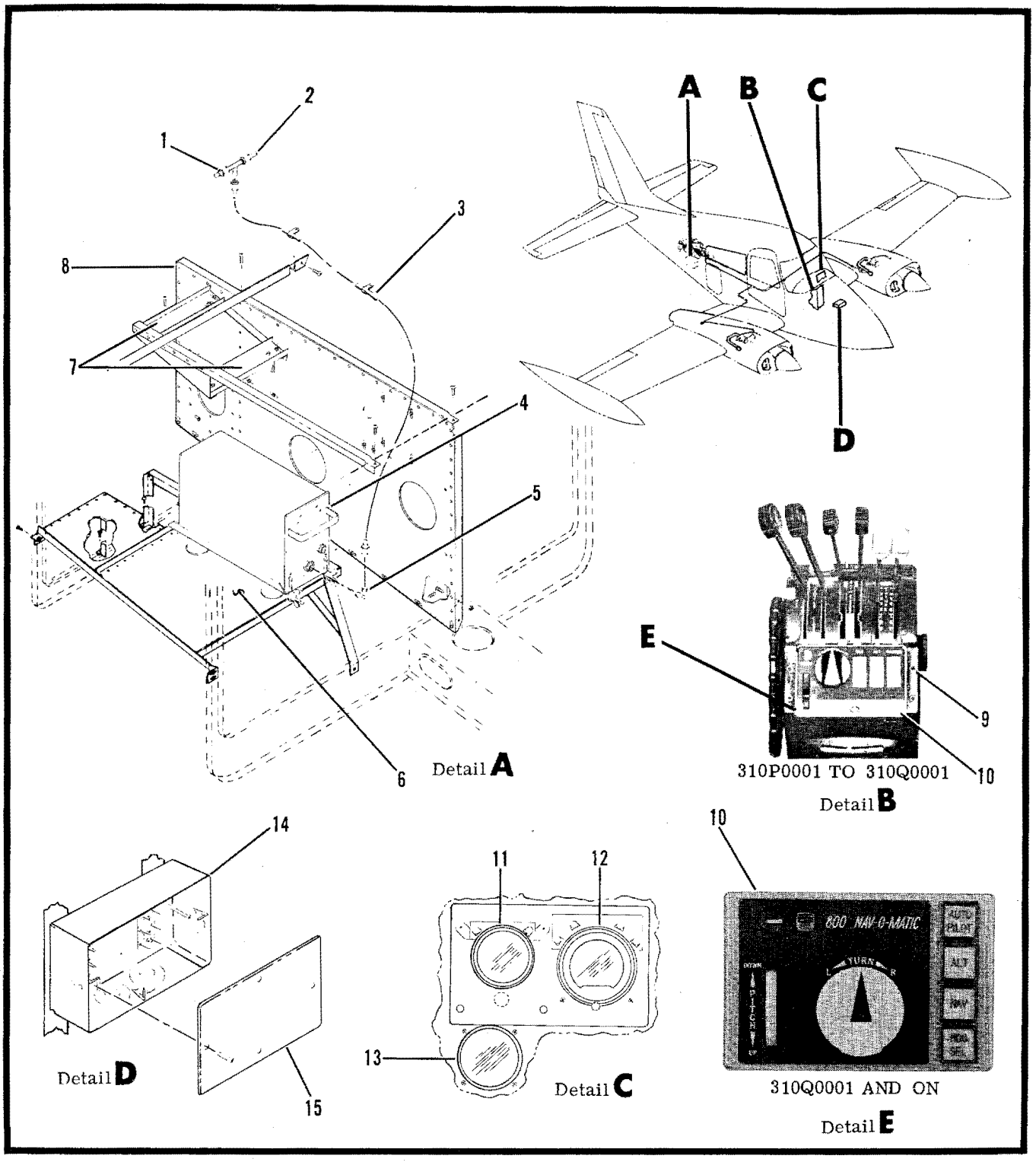
1. Line (CCW to Elevator Servo)
2. Line (CW to Elevator Servo)
3. Elevator Trim Servo
4. Line (Cross to Aileron Servo)
5. Line (Cross to Filter)
6. Hose (Interconnecting)
7. Filter Assembly
8. Line (Filter to Cabin Line)
9. Line (Cabin to Tee)
10. Line (Cross to Rudder Servo)
11. Aileron Servo
12. Elevator Servo
13. Line (Cross to Elevator Servo)
14. Rudder Servo
15. Cross
16. Line (Tee to Elbow, RH Wing)
17. Line (Elbow to check Valve)
18. Check Valve (RH Wing)

Figure 13-9. Nav-O-Matic 800 Pneumatic System Installation (Sheet 1 of 2)



19. Line (Check Valve to Fuselage Skin)
20. Line (RH Wing)
21. Line (Center Cabin to Check Valve)
22. Check Valve (LH Wing)
23. Line (Check Valve to Fuselage Skin)
24. Line (LH Wing)
25. Line (Aft Nacelle to Firewall)
26. Adapter (Pressure Switch)
27. Pressure Switch
28. Tee (Restrictor)
29. Pressure Relief Valve
30. Shroud
31. Line (Air Filter to Pump)
32. Air Filter
33. Pump
34. Elbow Adapter
35. Ram Air Hose
36. Solenoid Valve

Figure 13-9. Nav-O-Matic 800 Pneumatic System Installation (Sheet 2 of 2)



1. Line Assembly (Tee to static source)
2. Line Assembly (Tee to instruments)
3. Hose Assembly (Tee to computer)
4. Computer
5. Elbow
6. Computer Shelf
7. Channel Assembly (Rudder servo)
8. Panel Assembly (Aileron servo, Elevator, Elevator trim servos)
9. Screw
10. Controller
11. Directional Gyro
12. Horizontal Gyro
13. Turn and Bank Indicator
14. Network Loading Box
15. Cover

Figure 13-10. Nav-O-Matic 800 Components and Shelves Installation

Removal and Installation of Servos. (See figure 13-9.)

a. Remove autopilot aileron servo (11) as follows:
1. Remove seats, carpet, rear upholstery panel and floorboards necessary to gain access to turnbuckle on autopilot aileron cables.
2. Relieve tension on autopilot aileron cables by loosening turnbuckle.
3. Disengage autopilot aileron cable from servo drum as shown in the Nav-O-Matic 800 Service and Parts Manual.
4. Disconnect line assembly (4) and electrical cable from aileron servo (11).
5. Remove four nuts and bolts attaching aileron servo (11) to shelf assembly and remove servo from aircraft.
6. Install aileron servo (11) by reversing removal procedures.
7. Rig autopilot aileron cables in accordance with rigging procedures.
b. Remove autopilot elevator servo (12) as follows:
1. Remove rear upholstery panel and stabilizer fairings.
2. Relieve tension on autopilot elevator cables by loosening turnbuckle.
3. Disengage autopilot elevator cable from servo drum as shown in the Nav-O-Matic 800 Service and Parts Manual.
4. Disconnect line assemblies (1, 2 and 13) and electrical cable from elevator servo (12).
5. Remove four nuts and bolts attaching elevator servo (12) to shelf assembly and remove servo from aircraft.
6. Install elevator servo (12) by reversing removal procedures.
7. Rig autopilot elevator cables in accordance with rigging procedures.
c. Remove autopilot rudder servo (14) as follows:
1. Remove rear upholstery panel and stabilizer fairings.
2. Relieve tension on autopilot rudder cable by loosening turnbuckle.
3. Disengage autopilot rudder cable from servo drum as shown in the Nav-O-Matic 800 Service and Parts Manual.
4. Disconnect line assembly (10) and electrical cable from rudder servo (14).
5. Remove four nuts and bolts attaching rudder servo (14) to support assemblies and remove servo from aircraft.
6. Install rudder servo (14) by reversing removal procedures.
7. Rig autopilot rudder cables in accordance with rigging procedures.
d. Remove autopilot elevator trim servo (3) as follows:
1. Remove rear upholstery panel, stabilizer fairing, and stinger.
2. Relieve tension on elevator trim system by loosening turnbuckle.
3. (See figure 13-7.) Disconnect cable (18) from cable (19) by removing attaching nut and bolt. Remove pulley bracket assembly (14) from shelf and elevator trim servo by removing five nuts and four bolts.
4. Remove elevator trim cable from pulleys.
5. (See figure 13-9.) Tag and disconnect line assemblies (1 and 2) from elevator trim servo (3).
6. Remove elevator trim servo from shelf assembly.
7. install elevator trim servo by reversing removal procedures.
8. Rig elevator trim cables in accordance with rigging procedures.

Removal and Installation of Computer. (See figure 13-10.)

a. Remove rear upholstery panel.
b. Disconnect electrical wiring cable from computer.
c. Disconnect hose assembly (3) from elbow on computer (4).
d. Loosen thumb screws retaining computer to shock mount and remove computer.
e. Install computer by reversing removal procedures.

Removal and Installation of Controller. (See figure 13-10.)

a. Remove four screws (9) attaching controller (10) to pedestal.
b. Lift controller (10) from pedestal and disconnect electrical plug from controller.
c. Install controller by reversing removal procedures.

Removal and Installation of Miscellaneous Components. (See figure 13-10.)

a. Refer to Section 12, remove and install gyros in accordance with removal and installation procedures.
b. Remove and install support channels (7) and panel (8) as shown in illustration.
c. Remove and install computer shelf (6) as shown in illustration.

Rigging Autopilot Control Systems. (See figure 13-7.)

a. Rig autopilot aileron control system as follows:
1. Refer to Section 5 and verify that the aileron control system is rigged properly.
2. Place aileron control surfaces to the NEUTRAL position and secure with suitable clamping device.
3. Insure that cable (11) is properly routed on pulleys and check installation of cable guard pins.
4. Install cable clamps (13) on aileron control cables (29), attach cable (11) to cable clamps (13).
5. Thread cable (11) over cable drum (26) and through cable clamp (28). Loosely affix cable clamp (28) to cable drum (26) in such a manner that cable (11) can slip when cable drum is rotated.
6. Install three cable guard screws and spacers, rotate aileron servo cable drum through entire travel limits and return servo to NEUTRAL position.
7. Slide cable clamps (13) along aileron control cables (29) until slack in cable (11) is removed, ob-

serve that cable clamps (13) are equal distances from pulleys (5). Secure cable clamps to aileron control cable (29).

8. Rotate cable drum (26) a few degrees clockwise from the NEUTRAL position and tighten cable clamp (28) to cable drum (26), install cotter pins (27), and safety.

9. Rig control cable (11) to a tension of 12 ± 3 pounds by tightening turnbuckle (2), observe that cable drum (26) has returned to the NEUTRAL position.

10. Remove clamping device from aileron control surface, observe that the surfaces remain aligned with trailing edge of wing.

11. Safety wire turnbuckle (2) on cable (11) and install floorboards, carpets, rear upholstery panel and seats.

b. Rig autopilot rudder control system as follows:

1. Refer to Section 7 and verify that the rudder control system is rigged properly.

2. Place rudder to the NEUTRAL position and secure with suitable clamping device.

3. Insure that cable (4) is properly routed on pulleys in tailcone and check installation of cable guard pins.

4. Thread cable (4) over cable drum (26) and through cable clamp (28). Loosely affix cable clamp (28) to cable drum (26) in such a manner that cable (4) can slip when cable drum is rotated.

5. Install three cable guard screws and spacers, rotate rudder servo cable drum through entire travel limits and return servo to NEUTRAL position.

6. With rudder cable (4) attached to bellcrank (3), rotate cable drum (26) a few degrees clockwise (referenced when looking up at cable drum) from the NEUTRAL position and tighten cable clamp (28) to cable drum (26), install cotter pins (27), and safety.

7. Rig control cable (4) to 15 ± 5 pounds tension by tightening turnbuckle (2), observe that cable drum (26) has returned to the NEUTRAL position.

8. Remove clamping device from rudder control surface, observe that the rudder control surface is aligned with the vertical stabilizer.

9. Safety wire turnbuckle (2) on cable (4) and install rear upholstery panel and seats.

c. Rig autopilot elevator control system as follows:

1. Refer to Section 6 and verify that the elevator control system is rigged properly.

2. Place elevator control surface to the NEUTRAL position and secure with suitable clamping device.

3. Thread cable (9) over cable drum (26) and through cable clamp (28). Loosely affix cable clamp (28) to cable drum (26) in such a manner that cable (9) can slip when cable drum is rotated.

4. With elevator cable (9) attached to bellcrank (7), rotate cable drum (26) a few degrees clockwise (referenced when looking directly at servo drum) from the NEUTRAL position and tighten cable clamp (28) to cable drum (26), install cotter pins (27), and safety.

5. Rig control cable (9) to 15 ± 5 pounds tension by tightening turnbuckle (2), observe that cable drum (26) has returned to the NEUTRAL position.

NOTE

Cable tension should be adjusted when ambient temperature is 60°F to 90°F. Allow aircraft temperature to stabilize for a period of 4 hours.

6. Remove clamping device from elevator surface, safety wire turnbuckle (2), and install fairings, rear upholstery panel and seats.

d. Rig autopilot elevator trim control system as follows:

1. Refer to Section 6 and rig trim control system in accordance with rigging procedures.

NOTE

Refer to figure 13-7 for proper cable routing on servo pulleys, and assure that the cable tension is set to 16 ± 3 pounds.

2. Position stop blocks as follows:

(a) Rotate elevator trim tab to full NOSE DOWN position, slide stop block (22) against aft side of bulkhead (21).

(b) Rotate elevator trim tab to full NOSE UP position, slide stop blocks (16 and 17) together and locate at a point where stop block (16) will not come in contact with servo pulleys when the trim tab is positioned to NOSE DOWN.

Autopilot Pressure Check and Adjustment. (See figure 13-9.)

a. Disconnect line assembly (5) from filter (7).
b. Connect a pressure gage to filter outlet.
c. Start one engine and run at cruise RPM.
d. Pressure at the filter outlet should read 10 + .75, -0 PSI.
e. If pressure obtained is below prescribed tolerance, adjust pressure relief valve (29) in engine compartment to obtain correct pressure.
f. Start other engine and perform same check and adjust as necessary.

OXYGEN SYSTEM.

The standard oxygen system is designed to supply regulated oxygen for the pilot, copilot and three passengers. The standard system is used only with aircraft having a standard seating arrangement. Optional oxygen systems are also provided, these systems supply oxygen for the pilot, copilot and two passengers, or: pilot, copilot and four passengers. The oxygen system consists of an oxygen cylinder-regulator, filler valve, plumbing, pressure gage, outlets and mask assemblies. High pressure oxygen is routed from the cylinder-regulator through a capillary line to the pressure gage. Low pressure oxygen is routed from the cylinder-regulator to each individual outlet.

On Aircraft 310Q0601 and ON the 48.3 and 76.6 cubic foot oxygen installations incorporate an oxygen altitude compensator in the line from the regulator to the cabin outlets. This compensator reduces oxygen expenditures at lower altitudes and increases oxygen duration. A continuous flow of oxygen to the oxygen masks is provided whenever the control knob on the stationary panel is pulled to the ON position and the mask hoses are engaged into the outlets. Each outlet contains a spring-loaded valve which

Trouble Shooting the Oxygen System.

TROUBLE	PROBABLE CAUSE	CORRECTION
NO PRESSURE INDICATION ON PRESSURE GAGE	Leak in system has exhausted pressure.	Visually check pressure gage. Charge system and use detector fluids, Type CG-1, MIL-25567A, or its equivalent, to check lines and fittings. Tighten or replace fittings as necessary.
	Defective pressure gage.	Pull knob out, insert mask hose into outlet and note flow indicator. Replace gage.
PRESSURE INDICATION NORMAL BUT OXYGEN FAILS TO FLOW	Defective oxygen cylinder-regulator assembly.	Replace oxygen cylinder-regulator assembly.
OXYGEN DURATION TOO SHORT	Leak in system.	Draw a line on gage cover glass directly over pointer with a grease pencil. Loss of oxygen should not exceed one percent of total supply for a 24-hour period. Charge system and use detector fluids, Type CG-1, MIL-25567A, or its equivalent, to check lines and fittings. Tighten or replace fittings as necessary.

prevents the flow of oxygen until the mask hose is engaged with the outlet. The mask hose contains a flow indicator for visual proof of oxygen flow. The masks, rubber hoses and flow indicators are stored in the oxygen case on the baggage shelf, when not in use.

WARNING

Oil, grease, or other lubricants in contact with oxygen create a serious fire hazard, and such contact must be avoided. Do not permit smoking or open flame in or near aircraft while work is performed on oxygen system, or when the system is in operation. Guard against inadvertently turning the master switch on.

Oxygen Cylinder Identification.

The following information is reflected on each oxygen cylinder.

a. Cylinder specification followed by service pressure such as "ICC-3AA 1800 or ICC-3HT 1850" will be stamped on the shoulder or neck of each cylinder.

NOTE

Effective January 1, 1970, all newly manufactured cylinders will be stamped "DOT" (Department of Transportation) in lieu of "ICC" (Interstate Commerce Commission). An example for the new designation would be "DOT-3HT-1850."

b. Cylinder serial number will be stamped below or directly following the cylinder specification.

c. Hydrostatic test date will be stamped directly below the original manufacture date and shall include the month and year of the hydrostatic test date.

Maintenance.

Before and during maintenance on oxygen systems, the following general rules must be followed.

a. Clean hands, tools and working area.

b. Keep oil, grease, water and all foreign matter from system.

c. Keep all lines dry and capped until installed.

d. All compounds used on fittings must conform to MIL-T-5542. No compound shall be used on aluminum alloy flared fittings. Compounds are used only on the first three threads of male fittings. No compound is used on coupling sleeves, or outside of tube flares.

CAUTION

Whenever a component of the oxygen system, (lines, gages, cylinder or regulators, etc.), has been removed, reinstalled, replaced or system has been disassembled in any way, the oxygen system must be leak checked and purged as per procedures outlined in this section.

e. Inspection of the cylinder is required before charging. Do not attempt to charge the cylinder if any of the following conditions exist:

1. Contaminated or corroded fitting on cascade cylinder or filler valve.
2. Cylinder out of hydrostatic test date.
3. Cylinder bears no I. C. C. designation.
4. Cylinder completely empty after shutoff valve has been turned off for a length of time. Must be completely disassembled and inspected in an FAA approved facility before charging.

f. Fabrication of pressure lines is not recommended. Lines should be replaced from factory by part number.

g. Lines and fittings shall be clean and dry. One of the following methods may be used to clean lines.

1. A vapor degreasing solution of stabilized trichlorethylene conforming to Specification MIL-T-7003 followed by blowing tubing clean and dry with a stream of clean, dry, filtered air.

CAUTION

Most air compressors are oil lubricated, and a minute amount of oil may be carried by the air stream. A water lubricated compressor should be used to blow tubing clean.

2. Flush with naphtha conforming with Specification TT-N-95, then blow clean and dry with clean, dry, filtered air. Flush with anti-icing fluid conforming to MIL-F-5566 or anhydrous ethyl alcohol. Rinse thoroughly with fresh water and dry with clean, dry filtered air.

3. Flush with hot inhibited alkaline cleaner until free from oil and grease. Rinse with fresh water and dry with clean, dry, filtered air.

NOTE

Cap lines at both ends immediately after drying to prevent moisture from entering.

Bleeding the Oxygen System. (See figure 13-12.)

a. Pull oxygen control knob (14) to ON position.

b. Remove tubing from the mask end of one of the passengers oxygen masks and insert into oxygen outlet port. Route the hose outside the cabin area through the pilot's foul weather window.

WARNING

The bleeding procedure should be accomplished outdoors. If the bleeding is done indoors extreme care must be exercised to prevent oxygen flow from oils, grease, contaminants and electrical sparks. The area should be roped off and no smoking or open flame allowed in or near the area.

c. Bleeding the oxygen system into the cabin area is not recommended.

Removal of Oxygen Cylinder-Regulator Assembly. (See figure 13-12.)

a. Position control knob to OFF position.

WARNING

The oxygen cylinder-regulator may be removed with the cylinder charged; however, extreme care must be taken when installing or working near the cylinder-regulator to prevent damaging the cylinder. The slightest scratch, nick or dent is cause for immediate condemnation of the cylinder.

b. Disconnect three line assemblies (4, 5 and 11) from oxygen cylinder-regulator assembly (10) and cap lines.

CAUTION

Do not move control to the ON position with outlet ports (low pressure) open to atmosphere. Damage to regulator metering poppet may occur.

c. Disconnect control cable (8) from oxygen cylinder-regulator assembly (10). Safety in the OFF position.

d. Remove control mounting clamp (9) from oxygen cylinder-regulator assembly (10).

e. Remove safety wire and loosen wing nuts securing mounting straps (15) around oxygen cylinder-regulator assembly (10).

f. Lower oxygen cylinder-regulator assembly and remove through nose wheel well opening.

Installation of Oxygen Cylinder-Regulator Assembly. (See figure 13-12.)

a. Install oxygen cylinder-regulator assembly (10) through nose wheel well into position in mounting straps (15).

b. Align oxygen cylinder-regulator assembly (10) with control cable (8) and three line assemblies (4, 5 and 11), tighten wing nuts on mounting straps (15) and secure with safety wire.

c. Install three line assemblies (4, 5 and 11) on the oxygen cylinder-regulator assembly (10).

d. Install control mounting clamp (9) on the oxygen cylinder-regulator assembly (10) and connect the control cable (8) to the control actuator with a cotter pin (7).

CAUTION

Make sure cutout is in clamp (9) and is in line with vent hole in regulator (10). Also make sure that no foreign material such as nylon or gasket material is used between clamp and regulator.

Removal of Altitude Compensating Oxygen Regulator. (See figure 13-12.) (310Q0601 and On)

a. Move oxygen control knob to the OFF position.

NOTE

Repair or maintenance of this unit is not recommended. If malfunction should occur, remove and replace.

b. Disconnect inlet and outlet lines from compensating regulator (18).
c. Loosen mounting clamp and remove compensating regulator from aircraft.
d. Install clean dry caps in inlet and outlet ports of compensating regulator and install clean dry plugs in disconnected oxygen lines.

Installation of Altitude Compensating Oxygen Regulator. (See figure 13-12.) (310Q0601 and On)

a. Remove protective caps and plugs from compensating regulator and supply lines.
b. Install compensating regulator in clamp mount.
c. Connect supply lines to compensating regulator.
d. Tighten clamp mount screws.

Removal of Pressure Gage. (See figure 13-12.)

The oxygen pressure gage may be removed without bleeding the oxygen pressure system. A check valve is incorporated in the high and low pressure side of the regulator to shutoff the flow of oxygen from the cylinder when either the high or low pressure lines are disconnected from the cylinder.

WARNING

Use non-sparking tools and make sure tools and hands are free from oils, grease and other contaminants when working with oxygen.

a. Disconnect pressure gage line (4) at the regulator. The check valve should close as the gage line is loosened.

CAUTION

If oxygen continues to flow when line is loosened, reconnect the line and bleed off pressure in accordance with bleeding procedure.

b. Disconnect gage line (4) from nipple in back of pressure gage (16) and cap line.
c. Remove light assembly in accordance with Section 14.
d. Remove pressure gage (16) by removing three screws.

Installation of Pressure Gage. (See figure 13-12.)

a. Position pressure gage (16) in mounting hole and secure with three attaching screws.
b. Install light assembly in the upper right position.
c. Remove caps from line and connect pressure gage line (4) to nipple in back of pressure gage.
d. Connect pressure gage line (4) to oxygen regulator.

Removal of Filler Valve. (See figure 13-12.)

The oxygen filler valve may be removed without bleeding the oxygen pressure system. A check valve is incorporated in the high pressure side of the oxygen regulator to shutoff the flow of oxygen from the cylinder when the high pressure lines are disconnected from the oxygen cylinder.

WARNING

Use non-sparking tools and make sure tools and hands are free from oils, grease and other contaminants when working with oxygen.

CAUTION

If oxygen continues to flow when line is loosened, reconnect the line and bleed off oxygen pressure in accordance with bleeding procedures.

a. Disconnect the filler valve line (11) from the filler valve (12) and cap line.
b. Remove filler valve protective cap (13).
c. Remove filler valve (12) by removing three nuts and bolts.

Installation of Filler Valve. (See figure 13-12.)

a. Position filler valve (12) in mounting bracket and secure with three attaching bolts and nuts.
b. Replace filler valve protective cap (13).
c. Connect filler valve line (11) to filler valve (12).

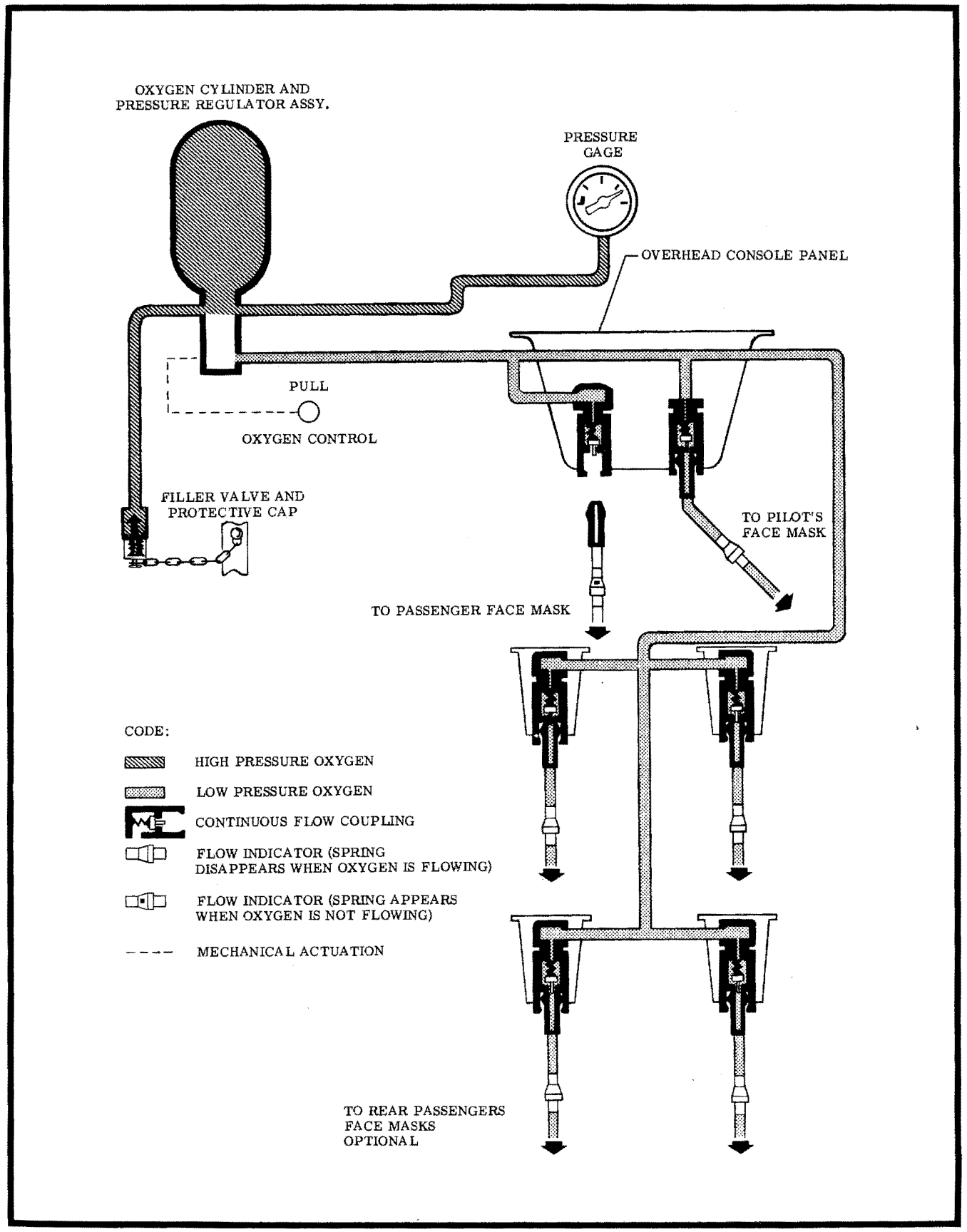
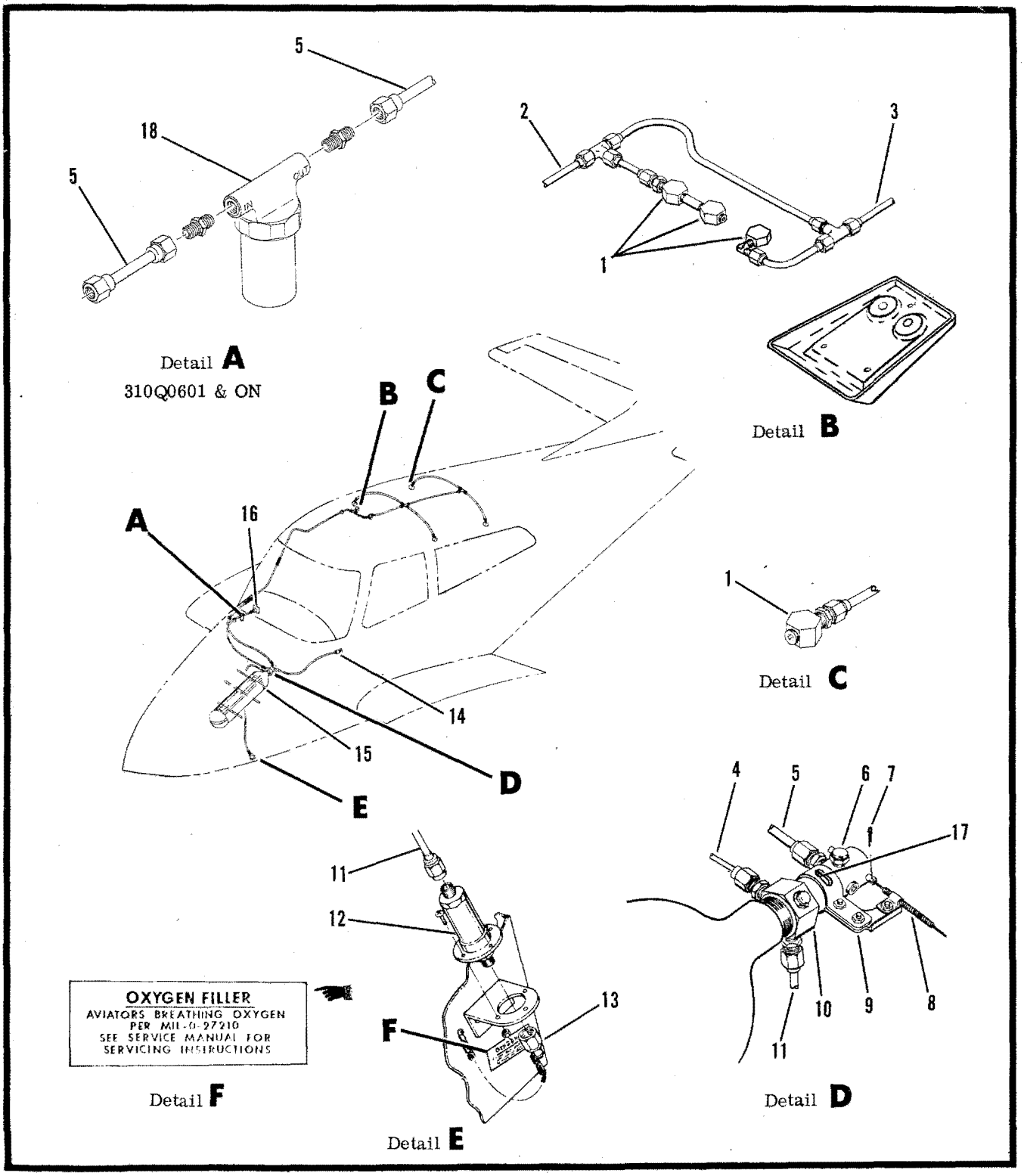


Figure 13-11. Oxygen Supply Systems Schematic



1. Oxygen Outlet
2. Line Assembly (Tee to union)
3. Line Assembly (Port to cross)
4. Line Assembly (To pressure gage)
5. Line Assembly (Regulator to union)
6. Pressure Relief Valve
7. Cotter Pin
8. Control Cable
9. Control Cable Mounting Clamp
10. Cylinder-Regulator Assembly
11. Line Assembly (Regulator to filler valve)
12. Filler Valve
13. Cap
14. Control Knob
15. Mounting Strap (Cylinder)
16. Pressure Gage
17. Atmospheric Vent Hole
18. Altitude Compensating Oxygen Regulator

Figure 13-12. Oxygen System Installation

TABLE OF FILLING PRESSURES

Initial temperature refers to ambient temperature in filling room. A rise of approximately 25°F may be expected as a result of compression. The cylinder should be filled as quickly as possible and allowed to cool by ambient air only.

Initial Temp. °F	Filling Pressure Psig	Initial Temp. °F	Filling Pressure Psig
0	1,600	70	1,925
10	1,650	80	1,950
20	1,675	90	2,000
30	1,725	100	2,050
40	1,775	110	2,100
50	1,825	120	2,150
60	1,875	130	2,200

Charging the Oxygen System.

The following procedure may be used in conjunction with the table of pressure/temperature values for charging the cylinder.

a. Connect the cascade connection to filler valve.
b. Slowly open valve on cascade cylinder having lowest pressure and allow pressure to equalize.
c. Close cylinder valve on cascade cylinders, and slowly open valve on cylinder with next highest pressure until cylinder has been charged in accordance with chart.

Leak Testing the Oxygen System.

Test the oxygen system for leakage by applying detector fluids, Type CG-1 solution per Specification MIL-L-25567A, or its equivalent, to each fitting and observe for formation of bubbles. No visible leakage should occur. Remove all traces of solution and repair or replace leaky fittings and repeat preceding procedure. Further test the oxygen system for leakage by pressurizing it to service pressure. The leak rate should not exceed one per cent of total supply per 24-hour period.

Each interconnected series of oxygen cylinders is equipped with a single gage. The trailer type cascade may also be equipped with a nitrogen cylinder (shown reversed) for filling landing gear struts, accumulators, etc. Cylinders are not available for direct purchase, but are usually leased and refilled by a local compressed gas supplier.

Service Kit SK310-32 (available from the Cessna Service Parts Center) contains an adapter, a pressure gage, hose, lines, and fittings for equipping two oxygen cylinders to service oxygen systems. As noted in the Service Kit, a tee (Part No. 11844) and a pigtail (Part No. 1243-2) should be ordered for each additional cylinder to be used in the cascade of cylinders. Be sure to ground the aircraft and ground servicing equipment before use.

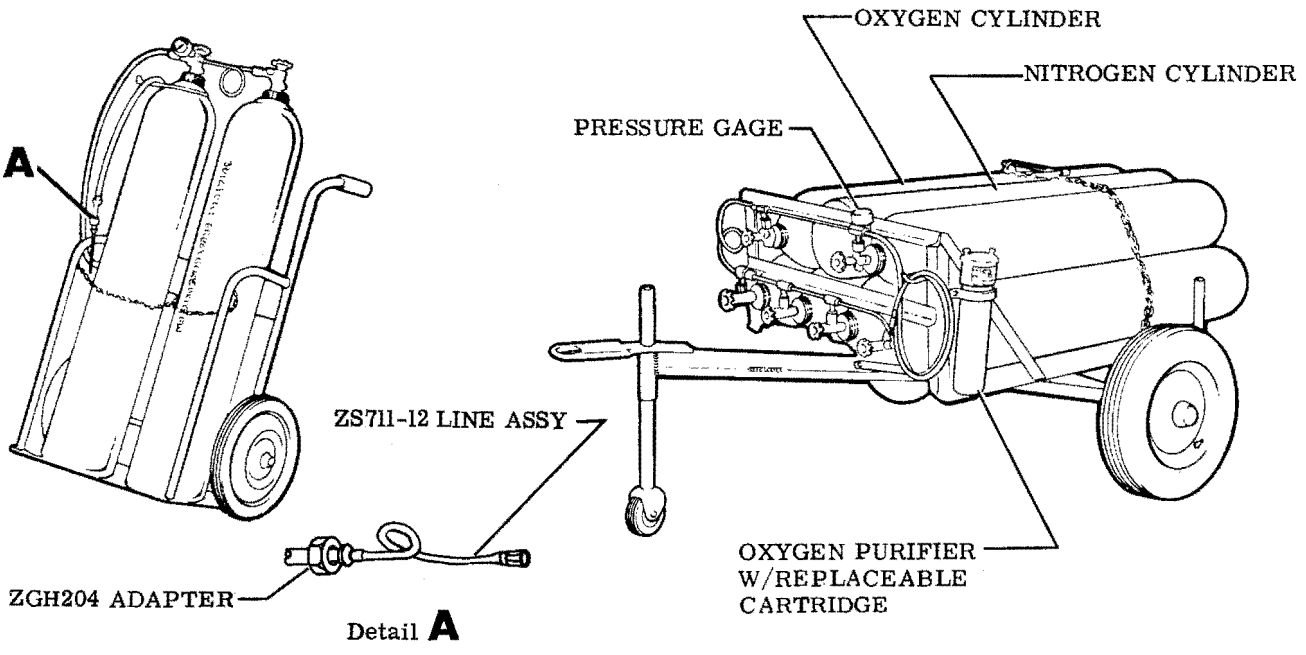


Figure 13-13. Typical Portable Oxygen Cascades

INSPECTION CRITERIA FOR ACCEPTANCE OF OXYGEN CYLINDERS

The following data may be used to determine that oxygen cylinders are acceptable for service. This criteria should be used prior to charging cylinders.

Discrepancies	Cylinder Classification	
	ICC-3HT	1800
Isolated pitting or corrosion (Depth)	.010	2 3
Local pitting or corrosion or line corrosion (Depth)	.005	3 4
General corrosion	Not allowed	5
Cuts, Digs, Gouges (Depth)	.005	6
Dents (Depth)	.031	7
Fire damage	Not allowed	8
Bulges	Not allowed	9

2. Isolated pits of small cross section involving loss of wall thickness by corrosive media. Small isolated pits with a maximum depth as shown are acceptable.
3. If depth exceeds figure shown, cylinder must be returned to the manufacturer for disposition.
4. Local pitting or corrosion or line corrosion involving loss of wall thickness by corrosive media with a pattern of pits which are connected to others in a band or line. A small area with a minimum depth as shown is acceptable. Areas extending beyond 3 inches in diameter or 4 inches long shall be considered general corrosion.
5. General corrosion (sometimes accompanied by pitting) involving loss of wall thickness by corrosive media covering a considerable area. Cylinder must be returned to the manufacturer for hydrostatic testing.
6. Deformations caused by contact with a sharp object cutting or upsetting the material of the cylinder, decreasing the wall thickness. Maximum defect permissible without corrective action. If this depth is exceeded, the cylinder must be returned to the manufacturer for removal of defects and verification of cylinder strength by hydrostatic testing.
7. Deformations caused by contact with blunt objects in such manner that the thickness of the metal is not materially impaired. The major diameter of the dent must be equal to or greater than 32 times the depth of the dent. Sharper dents (or deeper dents) than this are considered too abrupt and must be returned to the cylinder manufacturer for disposition.
8. Fire damage is indicated by charring or burning or sintering of the metal, charring or burning of the paint, distortion of the cylinder, functioned safety relief devices, melting of valve parts, etc. Cylinders must be returned to the cylinder manufacturer for disposition.
9. Bulged cylinders are not acceptable. Cylinders must be returned to the cylinder manufacturer for disposition.

TABLE I

NOTE

Oxygen installations untilize a standard filler valve. To attach to this valve, the oxygen service cart must be equipped with an AN805-3 nut.

Servicing and Inspection of Oxygen System

Servicing and inspection of oxygen shall be accomplished as follows:

a. Hydrostatic test requirement:

1. Standard weight (ICC or DOT-3AA 1800) cylincer must be hydrostatically tested to 5/3 their working pressure every five years starting with the date of the last hydrostatic test.

2. Light weight (ICC or DOT-3HT 1850) cylinder must be hydrostatically tested to 5/3 their working pressure every three years starting with the date of the last hydrostatic test.

NOTE

These test requirements are established by the Interstate Commerce Commission Code of Federal Regulations, Title 49, Chapter 1, Paragraph 73.34.

b. Service life requirements:

1. Standard weight (ICC or DOT-3AA 1800) cylinders have no life limitations, and may continue to be used until they fail hydrostatic testing.

2. Lightweight (ICC or DOT-3HT 1850) cylinders must be retired from service after 12 years or 4,380 filling cycles after date of manufacture, whichever occurs first.

c. Oxygen inspection requirements:
A careful visual inspection of the cylinders should be performed during routine maintenance and periodic inspections. If any bad dents, scratches or areas of corrosion are found, the cylinder must be carefully checked per the criteria Table I.

NOTE

If the acceptability of the cylinder is questionable after using Criteria Table I, do not hesitate to return cylinder to manufacturer.

d. Regulator shall be removed and overhauled by manufacturer or an FAA approved facility during hydrostatic testing.

e. Pressure Gage. The pressure gage shall be checked for accuracy and cleaned by the manufacturer every 3 years or 3000 flight hours, whichever occurs first.

f. Individual outlets shall be disassembled and inspected, and the sealing core, and/or all rubber parts replaced, regardless of condition every 3 years or 3000 flight hours, whichever occurs first.

g. The filler valve should be disassembled, inspected and the O-rings replaced, regardless of condition every 3 years or 3000 flight hours, whichever occurs first.

h. High pressure lines should be inspected for scratches, dents, cracks, deep gouges if a leak is indicated. Lines should be tested to not less than 3000 PSIG if trouble is indicated.

WARNING

Whenever components have been removed and replaced or oxygen system has been allowed to deplete to below 50 psi, the system must be purged in accordance with purging procedures before charging the system.

i. Mask and Hose.

1. Cleaning - Clean mask and hose with a mild solution of soap and water. Rinse thoroughly with clean water and allow to dry. Make sure all soap is removed after rinsing. Masks may be disinfected with a hospital type antiseptic spray or Zep Aero SBT-12.

2. Inspection - Inspect mask and hoses for leaks, cracks, deterioration, check mask storage compartment for cleanliness and general condition, check flow indicators for free movement, and inspect couplings for proper insertion.

NOTE

Remove mike from pilot's mask when cleaning.

Purging the Oxygen System

a. Charge the oxygen system in accordance with charging procedures.

b. Move aircraft outdoors if possible. If unable to move aircraft outdoors, make sure area is roped off, no smoking or open flame permitted in the area, no grease or lubricant near cabin area, cabin door and pilot's window open. Allow only qualified personnel to perform the purging operation.

c. Plug all masks into outlets and purge system by allowing the oxygen to flow for at least 10 minutes. Smell the oxygen flowing from the outlets and continue to purge until the oxygen is odorless. Refill cylinder as required during and after purging.

Functional Testing the Oxygen System.

Whenever the oxygen system regulator (or regulator-cylinder assembly) has been replaced or overhauled, perform the following flow and internal leakage tests to check that the system functions properly.

a. Fully charge the oxygen system per charging instructions.

b. Install an oxygen outlet adapter (Cessna Part Number C166005-0506) into a pressure gage (gage should be calibrated in one-pound increments from 0 to 100 PSIG), and insert adapter into pilots' oxygen outlet. Place control lever in the "ON" position. The gage pressure should be 70 ±10 PSIG.

c. Insert adapters (or mask and line assemblies if they are operating properly) into all remaining outlets. With oxygen flowing from all outlets, the pressure should still be 70 ±10 PSIG. Flow check shall be accomplished with a ground check flow meter model 40400, or equivalent.

d. Place oxygen control lever in the "OFF" position and allow pressure to fall to 0 PSI. Remove all adapter assemblies except the one with the pressure gage. The pressure must not rise above 0 PSI when observed for one minute. Remove pressure gage and adapter from oxygen outlet.

NOTE

If pressure specified in the foregoing procedures are not obtained, the oxygen regulator is not operating properly. Remove and replace cylinder-regulator assembly with another unit and repeat test procedure.

e. Connect oxygen masks to each outlet and check each mask for proper operation.

f. After checking, return all masks to mask case.

g. Recharge oxygen system as required.

OIL DILUTION SYSTEM (OPTIONAL EQUIPMENT). (See figure 13-14.) Aircraft 310P0001 To 310Q0601

The oil dilution system consists of two solenoid valves, one mounted on the firewall of each engine compartment. Each valve is connected to the main fuel supply line, and to each engine crankcase at an oil passage on the suction side of the engine oil pump. The valves are operated electrically by placing the oil dilution switch in either the left or right position. When the switch is depressed, oil in the selected engine will be diluted. When the switch is released, it automatically returns to the OFF position.

OIL DILUTION SYSTEM. (Optional Equipment.)

Oil Dilution System Operation. (Aircraft 310P0001 to 310Q0601.)

If oil dilution is required, dilute the oil with the engines operating at 1000 RPM and the auxiliary fuel pump switch in ON or LOW position. Refer to the applicable Owner's Manual for oil dilution time. On 310 aircraft, the fuel will flow into the oil pump of the engine being diluted at the rate of four quarts every one minute and 20 seconds. On Turbo 310 aircraft the fuel will flow into the oil pump of the engine being diluted at the rate of four quarts every two minutes. Diluting oil in each engine for two minutes (4 quarts of fuel) is the maximum dilution that should be used. Oil dilution longer than two minutes per engine will exceed the sump capacity of the engines. When diluting, watch the oil pressure closely. A slight, gradual pressure drop is to be expected as the oil is thinned. Stop the engine if any sharp fluctuation in pressure is observed, it may be caused by an oil screen being clogged with sludge washed down by the fuel. On starting and warm-up after diluting the oil, watch the oil pressure closely for an indication of sludge blocking the oil screens. If the full dilution time was used, starting with full sumps, run the engines long enough to evaporate some of the fuel and lower the sump level to 12 quarts before takeoff. To avoid progressive dilution of the oil, flights of at least one hour duration should be conducted between oil dilution operations.

Removal of Oil Dilution System. (See figure 13-14A.)

NOTE

Plug all open ports and lines to prevent entry of foreign materials.

a. Disconnect connector (6) from oil dilution valve (7).
b. Disconnect line assembly (3) from tee (4) and oil dilution valve (7), remove line assembly from nacelle.
c. Disconnect hose assembly (9) from oil dilution valve (7) and tee, remove hose assembly from nacelle.
d. Remove oil dilution valve (7) by removing two screws retaining clamp (1), bracket (8) and oil dilution valve (7) to nacelle canted bulkhead.

Installation of Oil Dilution System.(See figure 13-14A.)

a. Install oil dilution system by reversing removal procedures.
b. Connect electrical connector (6) to solenoid valve and secure with safety wire.

NOTE

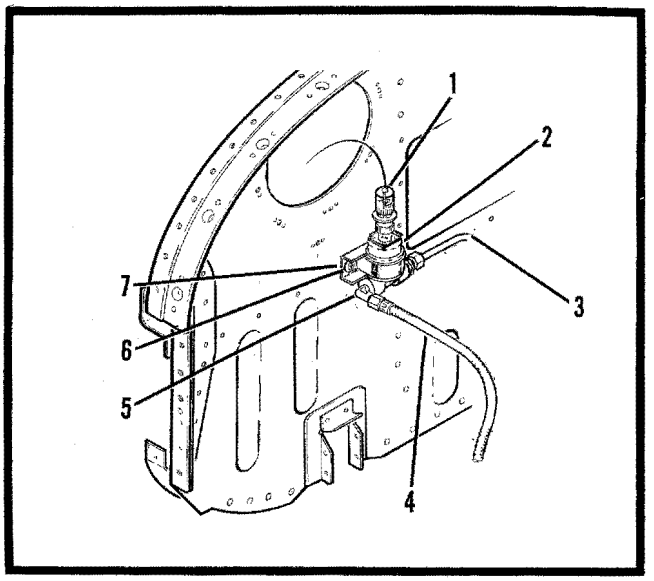
When the dilution system is used for the first time each season, it is recommended that the oil be changed and the oil screens cleaned to remove sludge accumulations washed down by the fuel. Use the full oil dilution period, drain the oil, clean the screens, refill with new oil and redilute as required for anticipated temperature.

Removal of Oil Dilution Solenoid Valve. (See figure 13-14.)

a. Disconnect oil dilution hose (4) and fuel line (3).
b. Disconnect oil dilution electrical connector (1).
c. Remove two screws (6), clamp and bracket (7) attaching the solenoid valve (2) to engine firewall, and remove solenoid valve (2) from firewall.

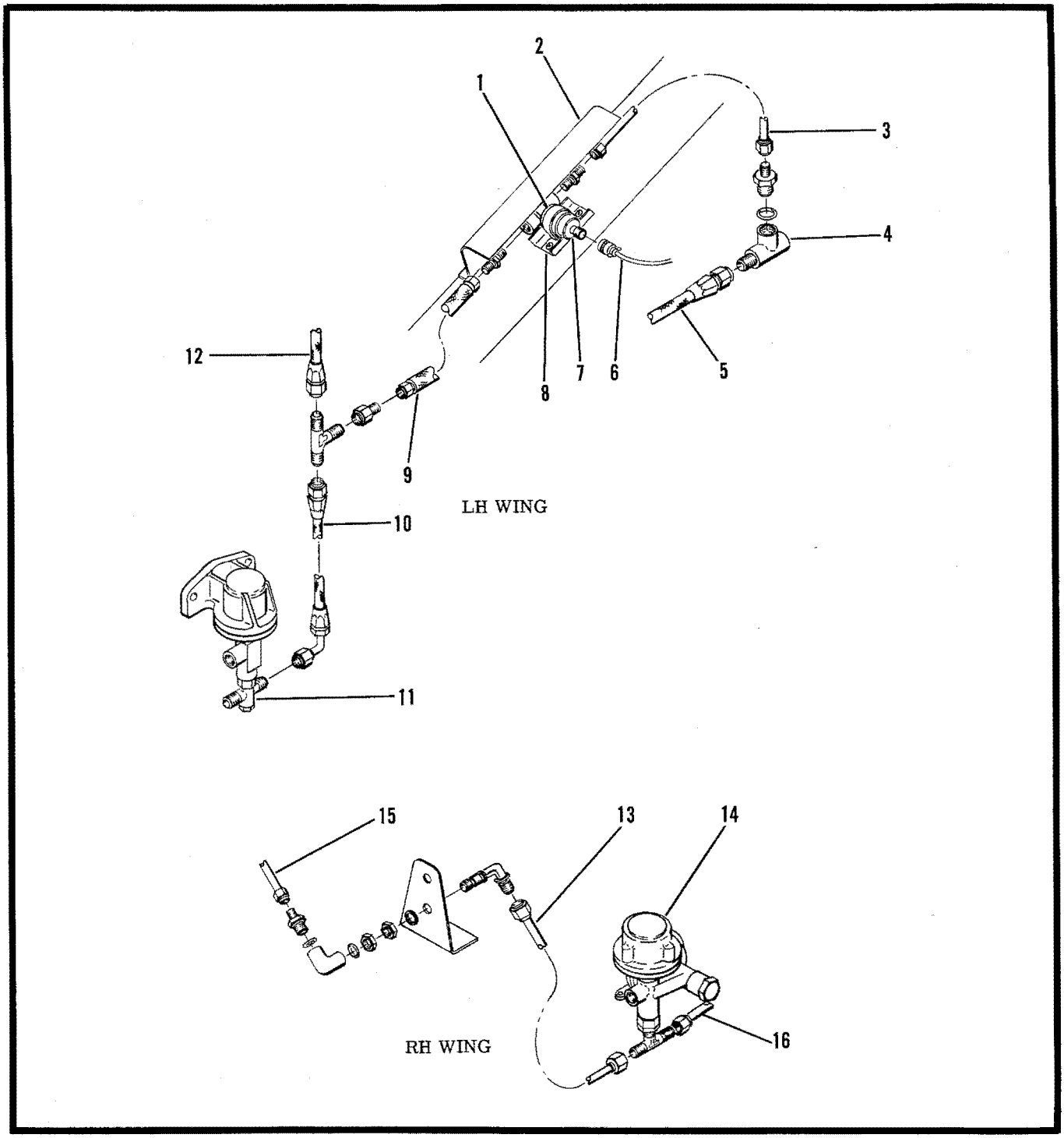
Installation of Oil Dilution Solenoid Valve. (See figure 13-14.)

a. Attach solenoid valve to engine firewall as shown in figure 13-14.
b. Connect electrical connector (1) to the solenoid valve and secure with safety wire.
c. Connect fuel line (3) from main fuel supply line. Connect oil dilution hose (4) to solenoid valve.



1. Electrical Connector
2. Oil Dilution Solenoid Valve
3. Fuel Line
4. Oil Dilution Hose
5. Elbow
6. Screw
7. Bracket

Figure 13-14. Oil Dilution Solenoid Valve



1. Clamp
2. Shield
3. Line Assembly (Tee to Valve)
4. Tee (Outboard nacelle rib)
5. Fuel line Assembly (To fuel Pump)
6. Electrical Connector
7. Oil Dilution Valve
8. Bracket
9. Hose Assembly (Valve to tee)
10. Hose Assembly (Tee to controller)
11. Pressure Ratio Controller
12. Hose Assembly (Tee to Scavenger pump)
13. Line Assembly (Controller to elbow)
14. Absolute Pressure-Rate Controller
15. Line Assembly (Valve to elbow)
16. Line Assembly (Controller to controller)

Figure 13-14A. Oil Dilution System

PROPELLER DEICE SYSTEM. (OPTIONAL)

The propeller deice system is the electrothermal type. It consists of the following components added to the propeller installation: propeller blade deice boots bonded to the propeller blades, slip ring assembly mounted to engine crankshaft, brush holder assembly mounted to the engine crankcase, a repeat cycle timer, ammeter mounted in the instrument panel, a switch and circuit breaker. The propeller blade deice boots are designed to remove ice under all probable icing conditions. Deicing is accomplished by raising the temperature of the ice and deice boot interface to a point at which centrifugal force removes the ice. The cycle timer used on the deicing system heats the propeller deice boots from 28 to 40 seconds. For example: if the timer should start on cycle number 1, the deicing system heats the outer element on the right propeller from 28 to 40 seconds (the timer pauses one second between cycles), then proceeds into cycle number 2, which heats the inner element on the right propeller from 28 to 40 seconds. It then cycles to the outer element on the left propeller from 28 to 40 seconds and to the inner element for 28 to 40 seconds to complete cycles numbers 3 and 4. The cycling is done in order to maintain a balance between the left and right propellers and reduce power drain on the electrical system.

Removal of Propeller Deice Boot.

CAUTION

Do not use sharp tools or objects to remove boot as damage to the propeller may result.

a. Remove deice boot from the propeller by softening the bond line of boot with Toluol until loosened.
b. Pull deice boot slowly from propeller blade as bond line is loosened.

Installation of Propeller Deice Boot.

a. Place deice boot on hub end of propeller blade, centered on blade leading edge and lead strap (terminal end) of boot aligned and against attach holes of installed terminal bracket.
b. Mark off an area on propeller blade (using masking tape) 1/2 inch from each side and outer end of deice boot.
c. Remove boot and clean the masked area of propeller blade using Methyl-Ethyl-Ketone (MEK) cleaning solvent. For final cleaning, wipe the solvent film off quickly with a clean dry cloth before it has time to dry.

CAUTION

Methyl-Ethyl-Ketone (MEK) must be used in a well ventilated area; avoid prolonged breathing of fumes. During all surface cleaning operations take precaution to guard against spark or open flame in work area.

d. Mix thoroughly the EC1300LP cement and apply one brush coat evenly to the cleaned metal surface. Allow to air dry for a minimum of one hour and then apply a second coat of EC1300LP cement.
e. Moisten a clean cloth with MEK and clean the unglazed back surface of the deice boot, changing cloth frequently to avoid contamination of the area.
f. Apply an even brush coat of EC1300LP cement to the unglazed back surface of the deice boot.
g. Allow cement to dry; then using a silver (non-graphite, greaseless) pencil, mark a centerline along the leading edge of the propeller blade and a corresponding centerline on the cemented side of the deice boot.
h. Reactivate the surfaces of the cement using a clean, lint-free cloth, heavily moistened with Toluol solvent. Avoid excessive rubbing of cement which would remove it from surfaces.
i. Position the deice boot centerline on the propeller leading edge, with all marks and terminal leads aligned. Tack the deice boot centerline to the leading edge of the propeller blade.

NOTE

If the deice boot is allowed to get off centerlines, pull up with a quick motion and reposition properly. Roll firmly along centerline with a rubber roller.

j. Roll outwardly from the centerline to the edge. If excessive material at the edges tend to form puckers, work them out smoothly and carefully with fingers.
k. Roll the tapered edges of the deice boot with a metal hand-stitch roller and ensure there are no bubbles entrapped under the boot and that all edges firmly adhere to the propeller.

NOTE

In the event it becomes necessary to remove or loosen installed deice boots, Toluol shall be used to soften the "cement" line. A minimum amount of this solvent should be applied to the cement line as tension is applied to peel back the deice boot. The removal should be slow enough to allow the solvent to undercut the cement so that parts will not be damaged.

l. Apply one brush coat of EC539P coating, mixed per manufacturer's instructions, evenly around the edges of the installed deice boot.
m. Remove masking tape from the propeller blade and clean the surface of the blade with a clean cloth dampened with Toluol.

Removal and Installation of Slip Rings. (See figure 13-15.)

a. Remove propeller spinner from aircraft in accordance with Propeller Removal Procedures.
b. Tag and disconnect electrical leads at terminal strip (7).
c. Remove bolts attaching wire supports to spinner bulkheads, push grommets and wires through spinner bulkhead.
d. Remove propeller from aircraft in accordance with Propeller Removal Procedures.
e. Remove four bolts attaching slip ring, supports, and wires to aft propeller flange.
f. Install slip ring (3), propeller and propeller spinner by reversing removal procedures.

CAUTION

Make sure cable dimensions shown in figure are correct and attaching clamp is behind antislip ring (19) to prevent damage from centrifugal force or propeller feathering.

Brush Holder Assembly.

Contact pressure of the brushes in the slip rings is provided by means of a spring in back of each brush. The spring is designed to provide a maximum of brush life consistent with obtaining sufficient contact pressure of the brushes against the slip rings to provide good operating characteristics. The average life of the brushes is approximately 500 hours.

Removal and Installation of Brush Holder Assembly and Mount Bracket. (See figure 13-15.)

a. Disconnect electrical connector from brush holder assembly (14).
b. Remove brush holder assembly (14) from bracket (10) by removing nuts, spacers, washers and screws.
c. If required, remove mounting bracket (10) from engine assembly by removing attaching nuts, washers, spacers and bolts.
d. Install mounting bracket (10) and brush holder assembly (14) by reversing removal procedures.

NOTE

When installing brush holder, hold the brushes back in the holder until the mounting bolts have been inserted through the crankcase. Be careful not to apply any side loading on the brushes during installation.

Inspection and Testing of Propeller Deice System.

a. Visually check the completed installation.
1. Check propeller deicers for wrinkling or loose spots.
2. Check wiring connections for correctness and tightness.
3. Check continuity of wiring. Remove plug from timer. Using ohmmeter, check continuity from:
(a) Pin C of the plug to Terminal A of one prop shoe on the right engine.
(b) Pin D of the plug to Terminal B of one prop shoe on the right engine.
(c) Pin E of the plug to Terminal A of one prop shoe on the left engine.
(d) Pin F on the plug to Terminal B of one prop shoe on the left engine.
(e) Pin G of the plug to ground.
(f) Terminal C of one prop shoe on the right engine to ground.
(g) Terminal C of one prop shoe on the left engine to ground.
b. System Tests.
1. Propeller Deicer Resistance Check:
(a) Using an ohmmeter, check the resistance between terminals A-C, B-C of prop shoes in both engines. Resistance should be 2.23 to 2.58.
2. Timer Tests:
(a) Connect a jumper wire from Pin B of the timer receptacle to Terminal B of the connector plug and from Pin G of the timer receptacle to ground.
(b) Place the prop deicing system switch in the "ON" position.
(c) Using a voltmeter check the DC volts to ground from Pin B of the timer. This should be approximately 24 volts DC.
(d) Check DC volts to ground from Pins, C, D, E, F; these are the points at which the system voltage is applied in sequence to cycle power to the propeller deicers. The following cycling action of the timer should be:
(1) Timing sequence Pin C, 30 seconds, right engine propeller outboard halves.
(2) Timing sequence Pin D, 30 seconds, right engine propeller inboard halves.
(3) Timing sequence Pin E, 30 seconds, left engine propeller outboard halves.
(4) Timing sequence Pin F, 30 seconds, left engine propeller inboard halves.

NOTE

On time is approximately 30 seconds when operating on alternator voltage. When operating on battery voltage as in this checkout procedure, on time may be longer.

NOTE

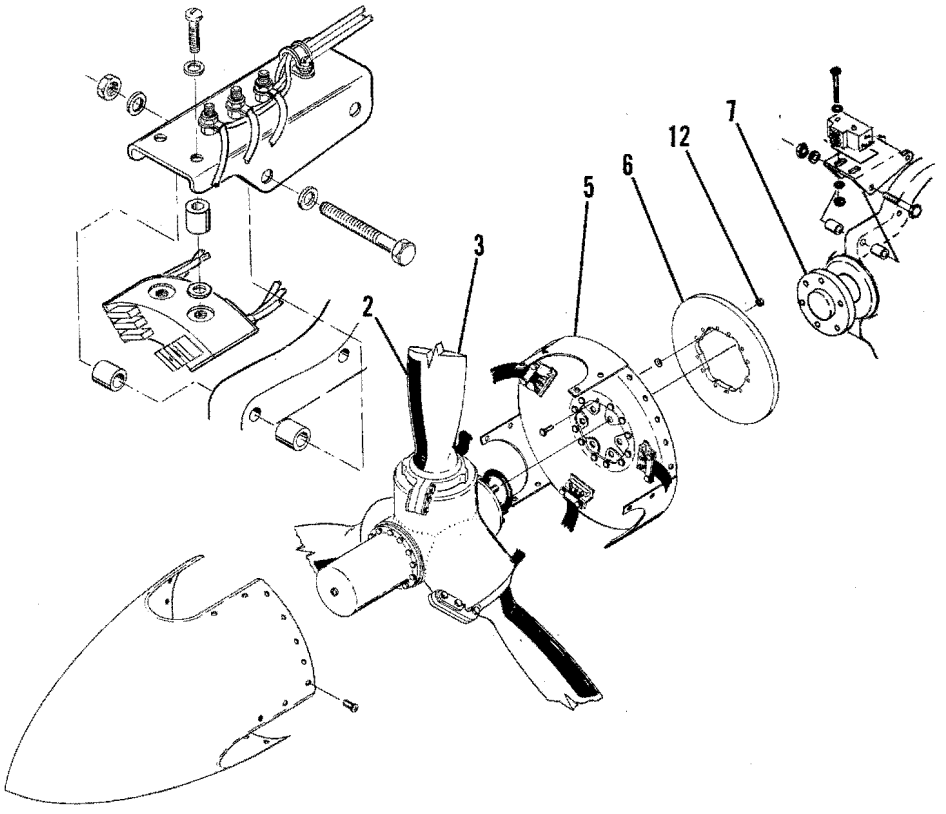
The timer does not reposition itself to start at Pin C when the system is turned off, but will begin its cycling at the same position in which it was last turned off. Cycling will then proceed in the order of C, D, E, F, as shown.

NOTE

Check Pins C, D, E, F, until a voltage reading of approximately 24 volts DC is obtained. Hold the voltmeter probe on the pin until the voltage drops to 0. Move the probe to the next pin in the sequence C, D, E, F. Check volts DC at each pin in sequence, 24 volts DC should be measured at each pin in the sequence C, D, E, F. When correctness of the cycling sequence is established, turn

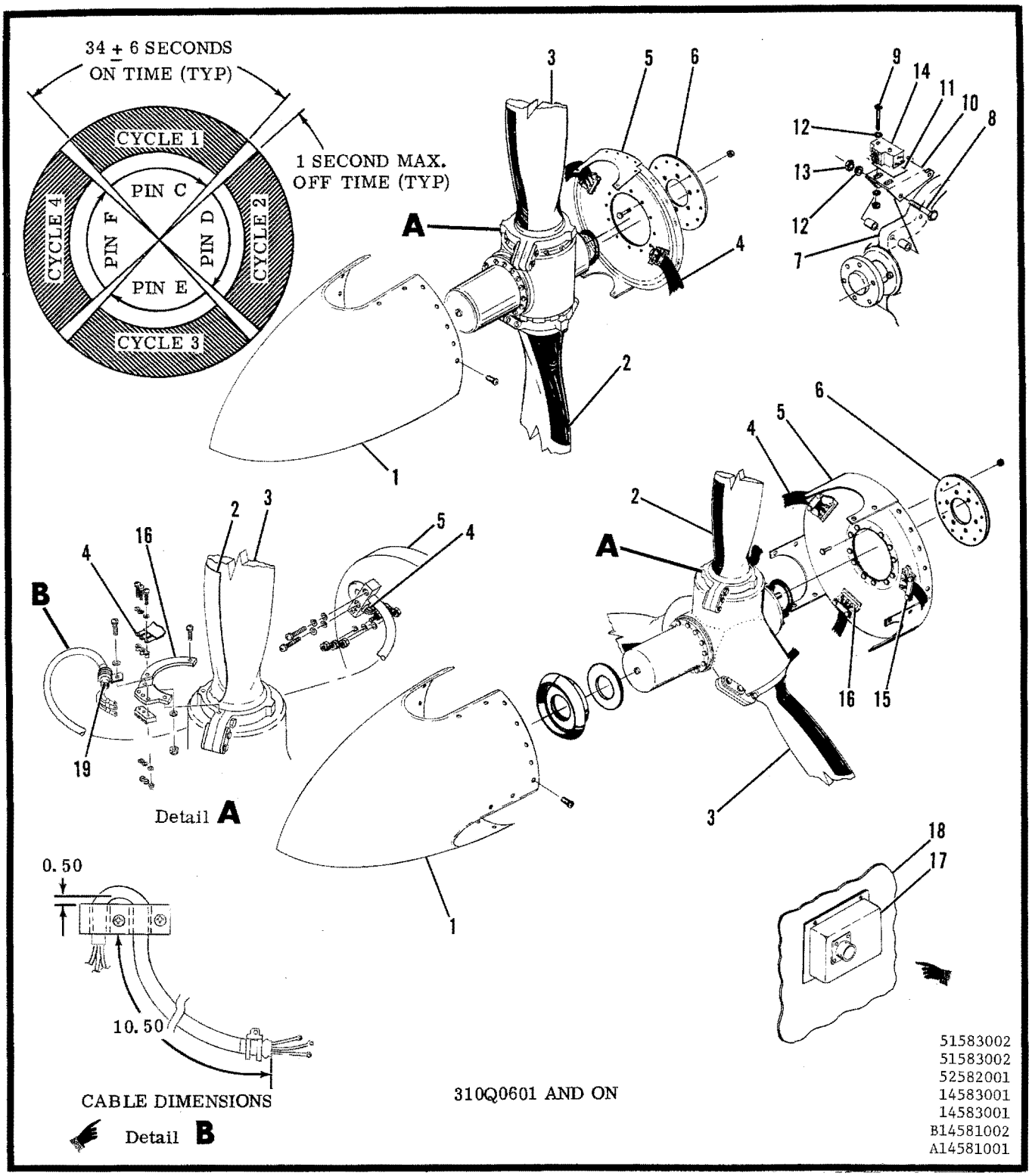
prop deicing system switch off at the beginning of one of the on time periods and record the letter of the pin at which the voltage supply is present.

3. Propeller Deicer Heat Test:
   (a) Remove the jumper wire installed in paragraph b. 2. (a), and replace the connector plug in the timer receptacle.
   (b) Referring to the position in which the timer was left in paragraph b. 2. (d), have an assistant place the prop deice system switch in the "ON" position. As the switch is turned on, place a hand on each of the two deicer areas which should be heated per paragraph b. 2. (d).
   (c) The assistant in the cabin should note and record the prop deicer system ammeter reading. This should be from 8 to 12 amps (for two bladed propellers) or 11 to 18 amps (for three bladed propellers). Keep a close watch on the ammeter needle. The ammeter needle will deflect every 30 seconds because of the switching action of the timer. Each deflection will indicate a change in the heating areas of the prop deicers.



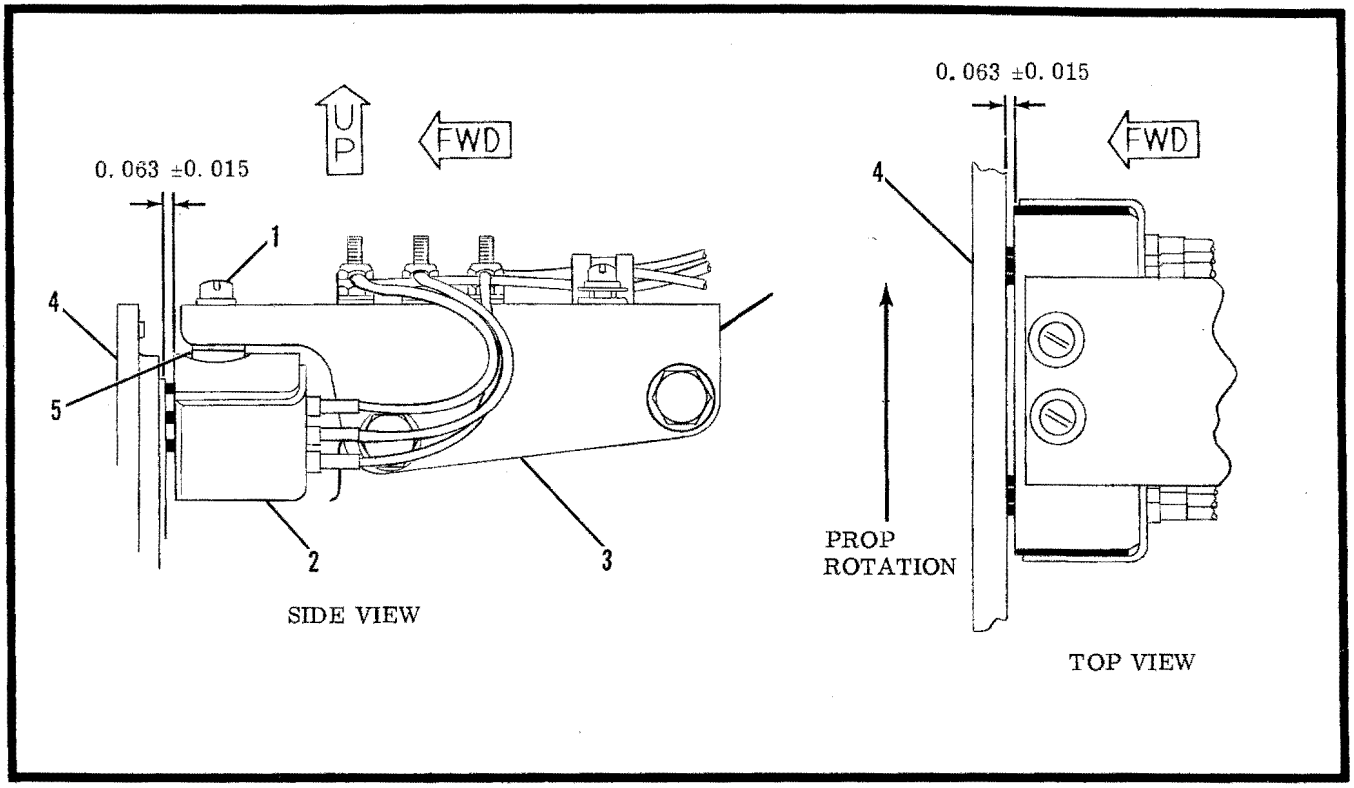
310P0001 TO 310Q0601

Figure 13-15. Propeller Deice Installation (Sheet 1 of 2)



1. Spinner
2. Deice Boot
3. Propeller Blade
4. Electrical Lead
5. Bulkhead
6. Slip Ring Assembly
7. Engine
8. Bolt
9. Screw
10. Brush Bracket
11. Shim
12. Washer
13. Nut
14. Brush Assembly
15. Head Clip
16. Terminal Bracket
17. Timer
18. LH Nose Shelf
19. Antislip Ring

Figure 13-15. Propeller Deice Installation (Sheet 2)



1. Screw 2. Brush Holder 3. Bracket Assembly 4. Slip Ring 5. Washer

Figure 13-16. Deice Brush Holder Installation

NOTE

The observer in the cabin should call out these 30 second interval deflections and the inspector at the propellers should change the position of his hands on the prop deicers accordingly, to check proper heating sequence of the prop deicer areas.

NOTE

If any irregularities are noted, recheck the wiring from the timer to the brush holder assembly and the prop deicer terminal connections. Make corrections as necessary and retest.

c. Slip Ring and Holder Assembly Check.

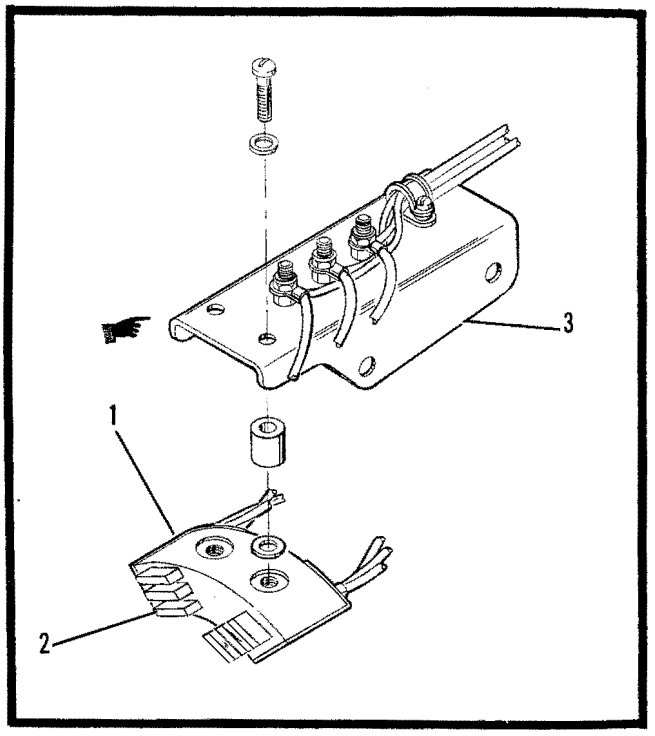
1. Check for out of flatness:

(a) Allowable tolerance is .008. If .008 is exceeded, shim under mounting bolts to bring within tolerance.

NOTE

Ground checkout of the system is allowed, with the engines not running.

Allow a minimum of 5 hours of engine running time to allow the brushes to become seated before turning on the propeller deice system.



1. Brush Block 2. Brush 3. Brush Bracket

Figure 13-16A. Brush Holder Assembly

Adjustment of Brush Holder Assembly. (See figure 13-16.)

a. When a chattering or screeching noise is emitted from the brush slip ring area, the probable cause is the improper alignment of the brushes and slip ring.

NOTE

If this chattering or screeching is noticed over idling engine noises, the trouble is severe and should be remedied immediately. A less severe chattering or screeching may be detected by pulling each propeller through slowly in the direction of rotation.

b. The brush holder assembly should be positioned as follows:

1. Loosen screws through bracket assembly and brush holder.
2. Adjust brush holder assembly by twisting brush holder assembly in brackets so that the brushes are perpendicular to the slip ring surfaces.
3. Check each brush for correct alignment with the slip ring surfaces through 360° rotation. Add or remove washers (5) for correct alignment.
4. Check for a 0.063 ± 0.015 inch (nominal) clearance between the main body of the brush holder assembly and the slip ring through 360° rotation.
5. Check flatness of slip ring as follows:
   (a) Mount a dial indicator on engine.
   (b) Rotate slip ring through 360° of rotation.
   (c) Observe dial indicator for a T.I.R. (Total Indicator Reading) of .012 to .015.
   (d) If reading is not in tolerance, replace slip ring.

Removal and Installation of Timer Unit.

a. Locate timer unit on shelf in upper left-hand nose section, just forward of cabin bulkhead.
b. Disconnect electrical connector from timer unit.
c. Remove timer unit from shelf by removing four attaching screws and nuts.
d. Install timer unit by reversing removal procedures.

Removal and Installation of Deice Ammeter.

a. To remove and install ammeter, refer to Section 12.

Removal and Replacement of Switch and Circuit Breaker.

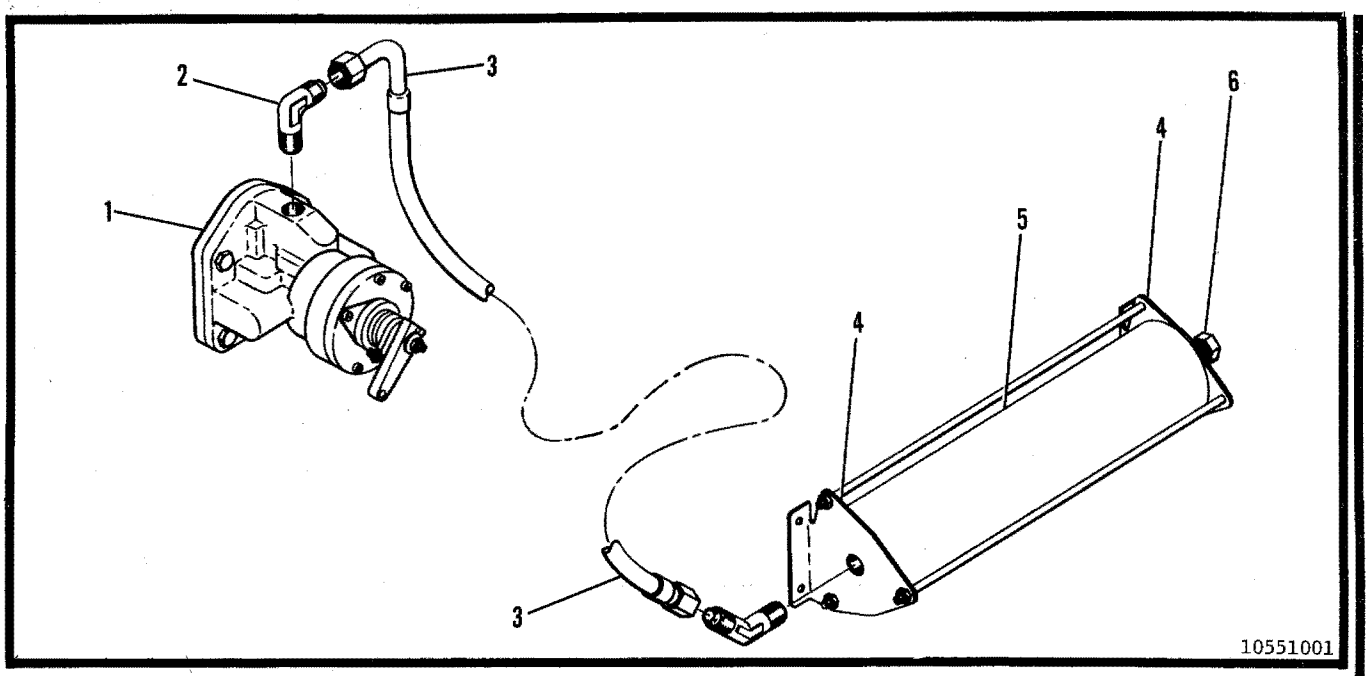
a. Turn battery switch off.
b. Remove hood retaining switches.
c. Loosen decorative nut securing switch, and remove switch from panel.
d. To replace switch, reverse this procedure.

Troubleshooting the Propeller Deice System.

TROUBLE	PROBABLE CAUSE	CORRECTION
ELEMENTS DO NOT HEAT	Open circuit.	Reset circuit breaker.
	Defective switch.	Replace switch.
	Brushes not adjusted properly.	Readjust brushes.
	Broken ground.	Reground.
	Defective brushes.	Replace brushes.
	Defective timer.	Replace timer.
ELEMENTS HEAT IN ERRATIC MANNER	Defective timer.	Replace timer.
	Defective slip ring.	Replace slip ring.
	Defective brushes.	Replace or readjust brushes.
FOUR ELEMENTS HEAT	Defective timer.	Replace timer.
CHATTERING OR SCREECHING	Alignment of brush block assembly.	Replace brushes and adjust in accordance with adjusting procedures.

PROPELLER UNFEATHERING SYSTEM. (OPTIONAL)

Each optional unfeathering system consists of a dry air or nitrogen-charged accumulator, a special governor, and a hose running between the governor and the accumulator. The governor contains a spring-loaded check valve which is unseated while the propeller control is in any position except FEATHER, thus permitting governor-pressurized oil to flow to



1. Governor
2. Elbow
3. Hose
4. Bracket
5. Accumulator
6. Filler Valve

Figure 13-17. Propeller Unfeathering System

and from the accumulator. When the propeller control is moved to the FEATHER position, the check valve is seated and oil under governor-pressure is trapped in the accumulator and hose. As the propeller control is moved out of the FEATHER position, the trapped oil flows back through the governor to the propeller to unfeather it.

CAUTION

Always leave propeller control in the unfeathered position when the aircraft is on the ground. This procedure prevents the possibility of heat causing trapped oil to expand to pressures which could damage the accumulator.

Removal of Propeller Unfeathering System. (See figure 13-17.)

CAUTION

Release system pressure by placing propeller control in UNFEATHER position and release accumulator pressure through the filler valve.

a. Disconnect hose (2) from governor (1) and accumulator (3).
b. Remove accumulator by removing four bolts attaching brackets (4) to the engine beam assembly.
c. Remove governor (1) by removing attaching nuts.

Installation of Propeller Unfeathering System. (See figure 13-17.)

a. Install propeller unfeathering system by reversing removal procedures.
b. Refer to Section 2 and service accumulator.

Operational Check of Propeller Unfeathering System.

a. With engines operating at 2000 RPM, move propeller controls to the FEATHER position, then position mixture to IDLE CUT-OFF. The propellers should move to the feathered position.
b. Move propeller controls to an unfeathered position. Propellers should unfeather.
c. If propellers do not unfeather, check system for leaks and proper pressure.

NOTE

When propellers do not unfeather sufficiently to engage high pitch stop pins, bleed off accumulator pressure to 100-110 psi, then recheck operation.

THREE BLADED PROPELLER. (OPTIONAL)

Removal of Propellers. (See figure 13-18.)

a. Place propeller in the feathered position.
b. Refer to Section 9 and remove engine cowling in accordance with removal procedures.
c. Remove six attaching nuts (9) securing the propeller hub to engine crankshaft.

CAUTION

Support the propeller before removing the last nut to prevent the possibility of dropping propeller.

d. Carefully remove propeller assembly from engine crankshaft.

Installation of Propellers. (See figure 13-18.)

a. Clean the propeller hub (5) and engine crankshaft flange with crocus cloth.
b. Wipe dust and foreign particles from the propeller hub. crankshaft flange. and oil passages with a clean rag.

NOTE

Inspect O-ring seal (6) in propeller hub flange for damage and replace as necessary.

c. Secure propeller assembly to engine crankshaft by six self-locking nuts (9).

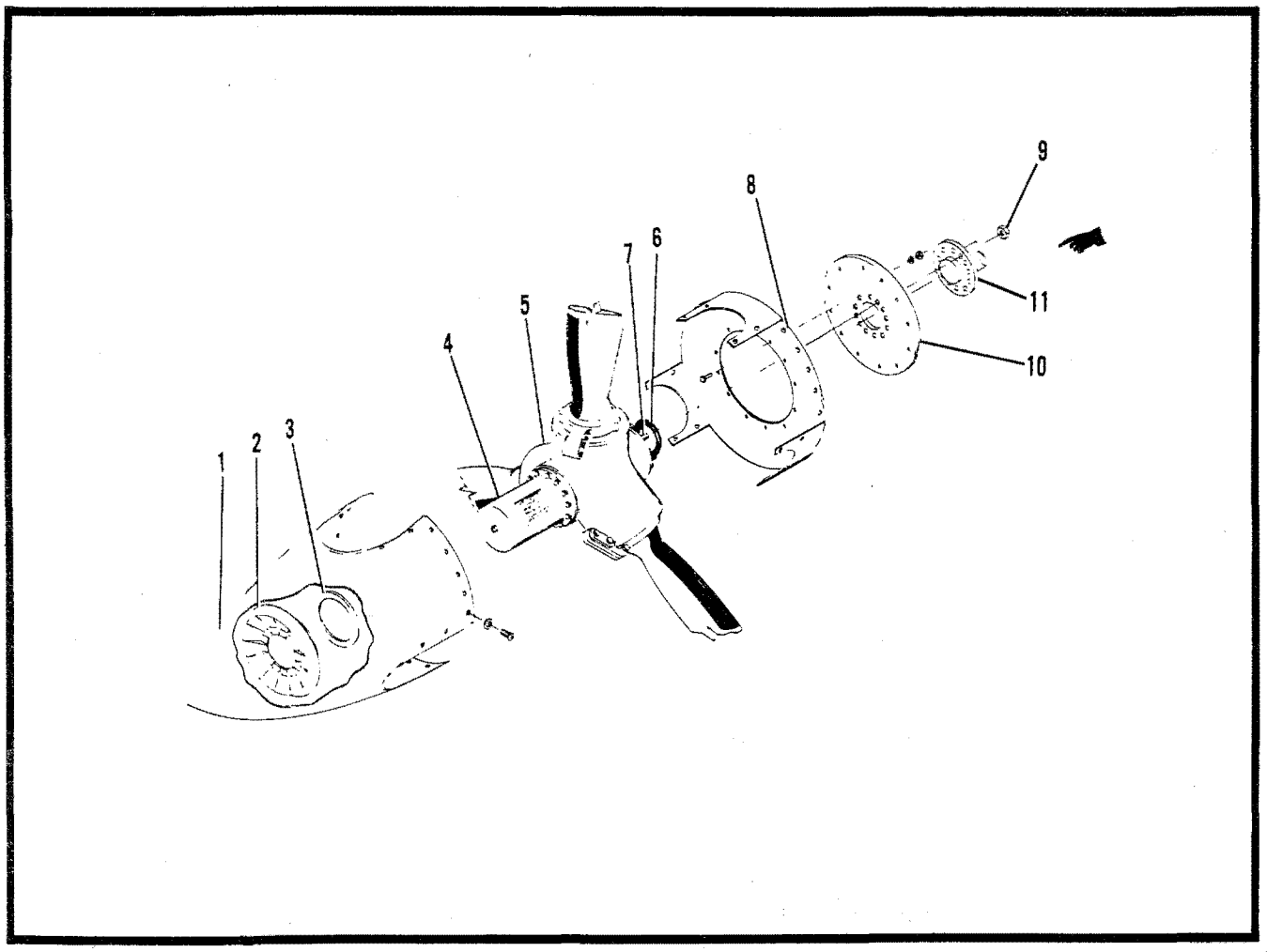
WARNING

Do not use all steel locknuts. Use only new elastic element locknuts when installing propeller.

NOTE

Torque nuts (12) from 80 to 85 ft/lbs.

d. Replace engine cowling in accordance with Section 9.
e. Perform an operational check in accordance with the Operational Check for Propellers.



1. Spinner
2. Support
3. Spacer
4. Propeller Cylinder
5. Propeller Hub
6. O-Ring Seal
7. Stud
8. Spinner Bulkhead
9. Nut
10. Adapter
11. Crankshaft

Figure 13-18. Three Bladed Propeller Installation

CESSNA ECONOMY MIXTURE INDICATOR.

The exhaust gas temperature (commonly referred to as EGT) sensing device is used to aid the pilot in selecting the most economical fuel-air mixture for cruising flight at a power setting of 75% or less. Exhaust gas temperature (EGT) varies with the ratio of fuel-to-air mixture entering the engine cylinders. Refer to the appropriate aircraft Owner's Manual for correct operation procedures of system.

Removal and Installation of EGT System. (See figure 13-19.)

a. Tag and disconnect electrical leads on indicators.
b. Refer to Section 14 and remove two light assemblies attached to indicator and stationary panel.
c. Remove indicator by removing two remaining screws and nuts.
d. Route electrical wires from cabin, through wing, to probe in engine nacelle.
e. Remove probe from exhaust manifold.
f. Install components by reversing the removal procedures.

NOTE

Do not alter length of electrical wires.

Calibration of EGT System. (See figure 13-19.)

a. To check calibration, obtain an average cruise condition of 65% power at 7500 feet and lean mixture to peak exhaust temperature on indicator.

NOTE

To obtain peak exhaust temperature, lean out mixture control slowly enough for pointer to follow. When the pointer stops going up and starts a downward movement, enrich mixture enough to regain peak reading.

b. Record reading achieved after system has stabilized.
c. Repeat step a. several times to insure a positive reading has been achieved.
d. Lean mixture to a setting of not less than 25° below peak exhaust gas temperature.
e. Use adjust screw on face of indicator and position pointer to 4/5 scale.

NOTE

Adjustment should not exceed ± 75°F or three divisions.

f. If adjustment for more than ± 75°F is required, perform the following steps:
1. Gain access to rear of indicator.
2. Viewing meter from rear, turn calibration screws one turn clockwise for increase in indicator reading of 25°F (one division) or one turn counterclockwise for decrease.

Troubleshooting the EGT System.

TROUBLE	PROBABLE CAUSE	CORRECTION
GAGE INOPERATIVE	Defective gage, probe or wiring.	Isolate defective circuit, replace defective probe or gage.
INCORRECT READING	Indicator needs calibrating.	Calibrate in accordance with calibrating procedure.
FLUCTUATING READING	Loose, frayed or broken electrical lead.	Tighten connections, and repair or replace defective leads.

POWER FRONT SEAT. (310P0001 to 310Q0201)

Removal of Power Front Seat. (See figure 13-20.)

a. Raise seat to the full UP position.
b. Pull plunger on circuit breaker (9) out to OPEN electrical circuit, disconnect aircraft power cord (11) from terminal block located on forward seat base.
c. Locate seat stop block on inboard seat track, remove two screws and stop block from seat track.
d. Pull up on the adjustment handle (6) and slide the seat aft to clear seat support (10).
e. Remove seat from the aircraft.

Installation of Power Front Seat. (See figure 13-20.)

a. Check seat for the full UP position.
b. Pull up on the adjustment handle (6) and slide seat onto seat support (10).
c. Install seat stop block on inboard seat track by installing two screws through seat track and seat block.
d. Connect power cord (11) to seat terminal block located on forward seat base.
e. Push IN on circuit breaker plunger to CLOSE electrical circuit and functionally test for proper operation.

WARNING

After seat has been installed, insure that stop block has been installed properly and that the seat adjustment mechanism functions properly.

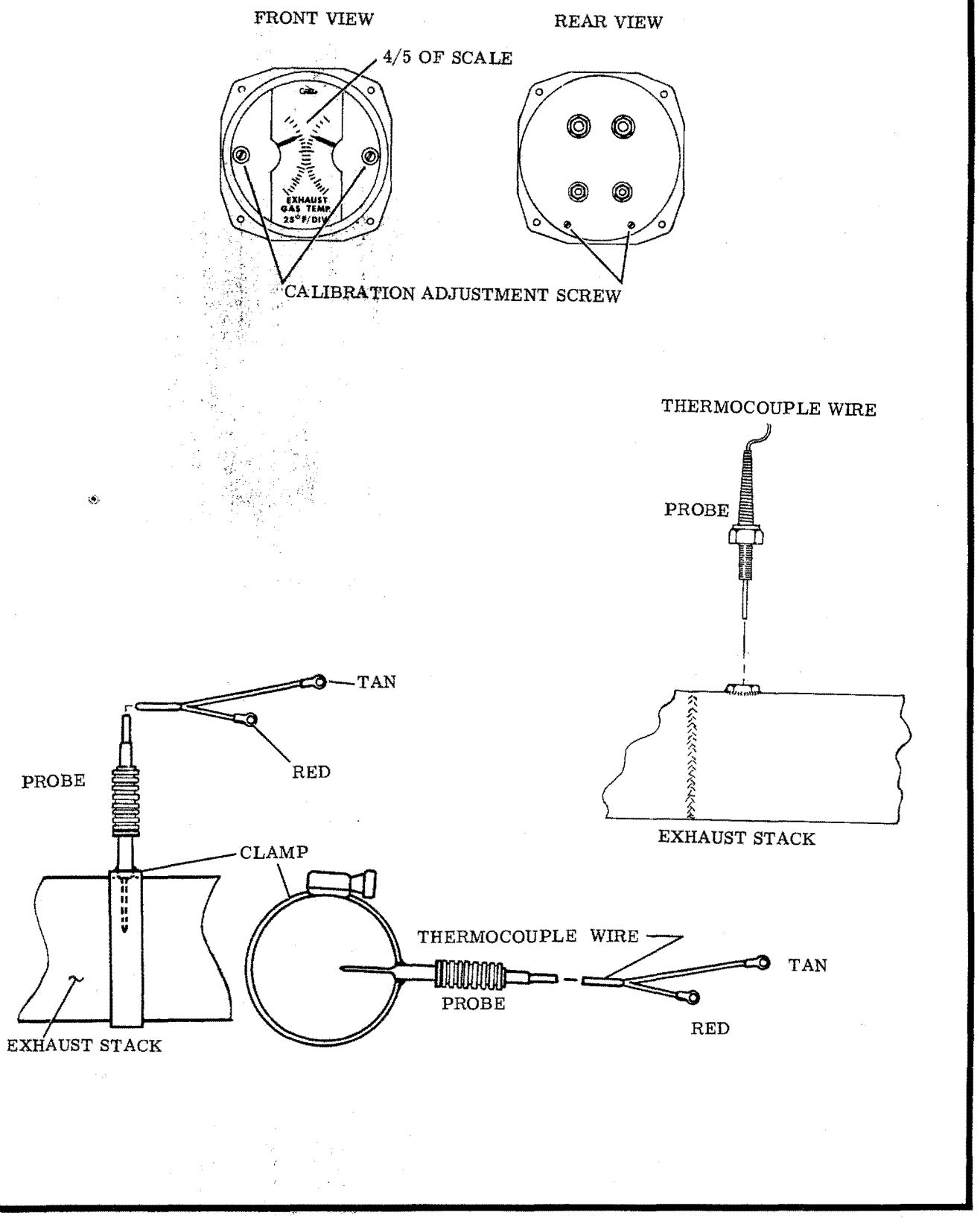
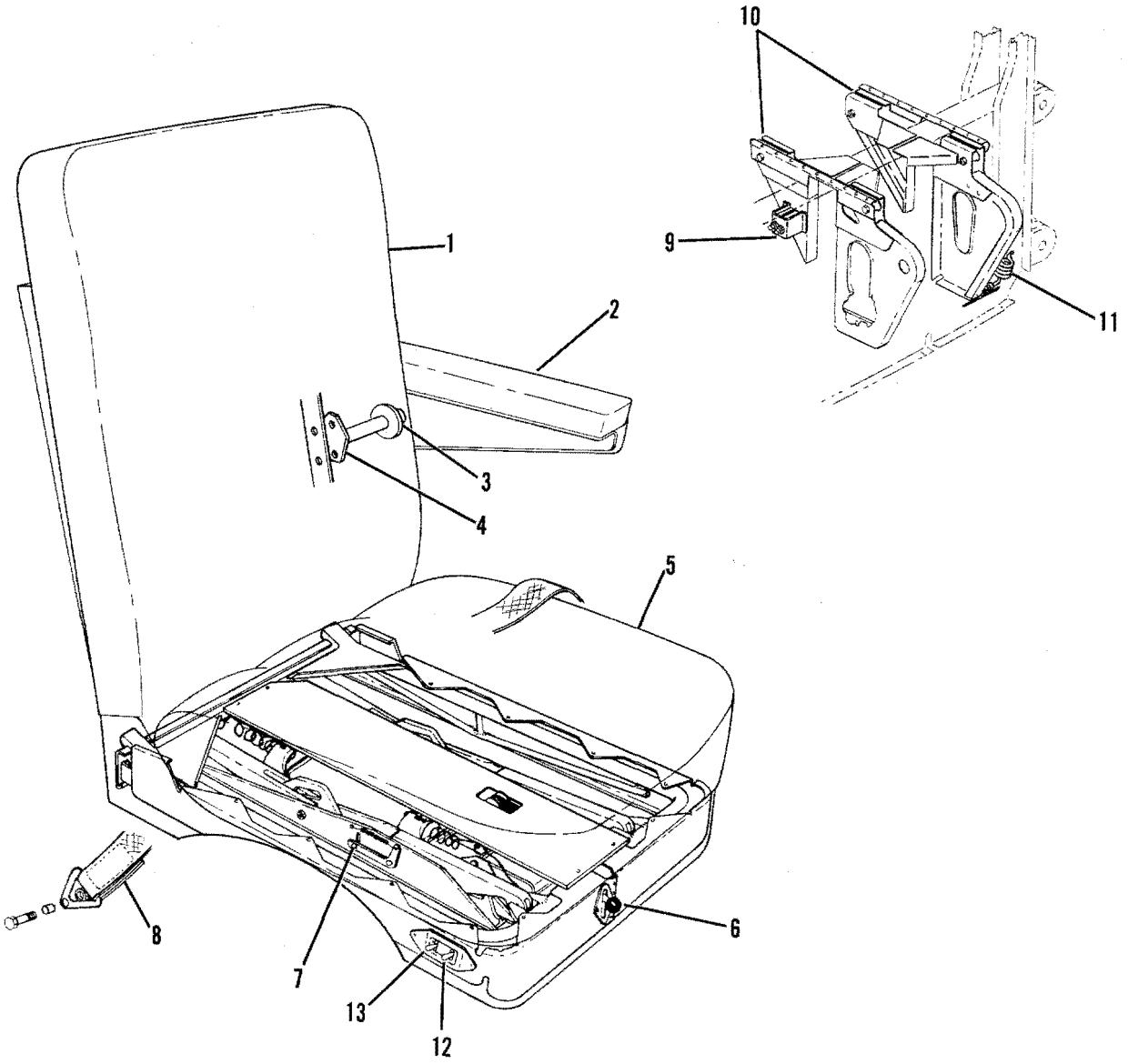


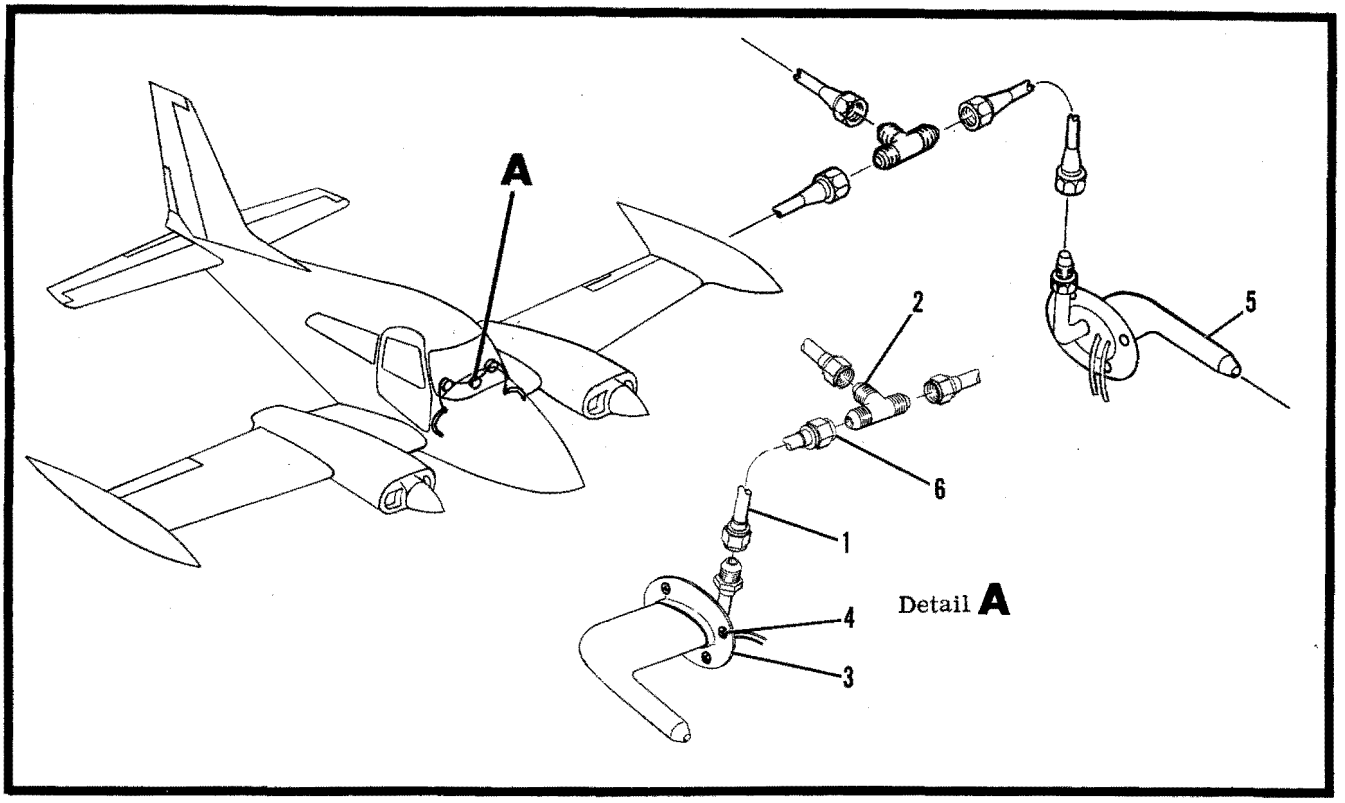
Figure 13-19. Cessna Economy Mixture Indicator



310P0001 TO 310Q0201

1. Seat Back Assembly
2. Armrest
3. Nut and Washer
4. Armrest Assembly
5. Seat Bottom Assembly
6. Adjustment Handle
7. Power Assembly
8. Seat Belt
9. Circuit Breaker
10. Seat Support
11. Power Cord
12. Switch (Forward Bridge)
13. Switch (Aft Bridge)

Figure 13-20. Power Front Seat Installation



1. Pitot Line
2. Tee
3. Pitot Tube Bracket
4. Screw
5. Pitot Tube
6. Connector

Figure 13-21. Dual Pitot Installation

Dual Pitot System. (See figure 13-21.)

Removal of Dual Pitot Tubes. (See figure 13-21.)

Remove four screws (4) attaching pitot tube (5) to pitot tube bracket.
Disconnect pitot line (1)from connector(6).
Tag and disconnect pitot tube heater element wires.
Remove pitot tube (5) by pulling straight out from bracket.

Installation of Dual Pitot Tubes. (See figure 13-21.)

Slide pitot line (1) into pitot tube (5).
Connect pitot line (1)to connector(6).
Attach heater element wires as tagged on removal.
Install four screws (4) attaching pitot tube to pitot tube bracket.

NOTE

Use petrolatum to lubricate all male fittings, omitting the first two threads.

Testing the Dual Pitot Tubes.

Refer to Section 12 for testing the pitot pressure lines. The testing procedure is the same except that one pitot tube should be capped while testing is being performed on the opposite line.

Blowing out Pitot Lines.

Refer to Section 12 for blowing out pitot lines. The blowing out procedure is the same except that both instruments must be disconnected when blowing out lines.

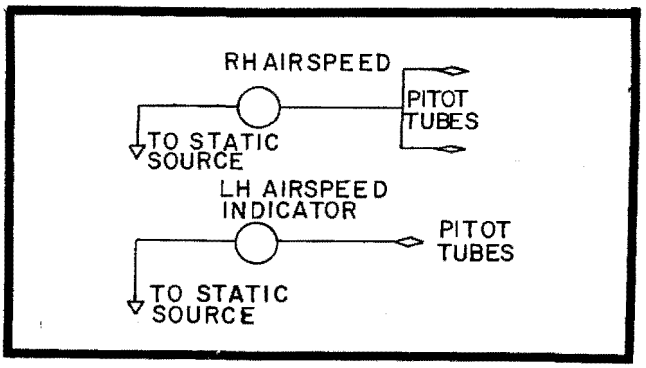


Figure 13-22. Dual Pitot System Schematic

MINI-8 STEREO

Removal of Mini-8 Stereo. (See figure 13-23.)

a. Turn electrical power OFF.
b. Remove screw (4) and washer (3).
c. Remove stereo unit out far enough to gain access to wiring.
d. Tag and disconnect electrical wiring.
e. Remove stereo.

Installation of Mini-8 Stereo. (See figure 13-23.)

a. Position stereo in glove box and connect electrical wiring.
b. Remove tags.
c. Secure stereo in place with washers (3) and screws (4).
d. Turn on electrical power and check operation of stereo.

FIRE EXTINGUISHER. (See figure 13-23A.)

The fire extinguisher mounted on the copilot's seat contains a pressurized Dry Chemical Charge. The fire extinguisher may be used on combustible, liquid, or electrical fires. The dry charge is non-toxic and non-corrosive. Residue left after use may be wiped off with a damp cloth or picked up with a vacuum source. The fire extinguisher may be recharged by most Fire Equipment Dealers.

ENGINE COMPARTMENT FIRE EXTINGUISHER.

The engine compartment fire extinguisher consists of three major components, control panel, thermal detectors, and the extinguisher unit. The annunciator panel may be mounted in any unused standard three-inch instrument hole, the three thermal detectors are mounted in the high heat areas of the engine nacelle and the fire extinguisher is mounted in the nacelle area. An exit line is routed from the fire extinguisher into the forward section of the engine where the freon gas is expelled. A smaller discharge hose which routes off of the large discharge hose expells freon gas from the center of the nacelle area towards the inboard side of the nacelle.

A test function is provided to test the system circuitry. When the test switch is pushed (shown in figure 13-24), all lights should illuminate.

NOTE

The test switch does not check detector system (refer to Servicing paragraph).

If an overheat condition is detected, the appropriate "Fire" light will annunciate the engine to be extinguished. To activate the extinguisher, open the guard for the appropriate engine and press the "Fire" light. Freon, under pressure, will be discharged to the engine and engine accessory compartments. The amber light E (figure 13-24) will illuminate after the extinguisher has been discharged and will continue to show empty until a new bottle is installed. The "Fire" light will remain illuminated until compartment temperatures cool.

NOTE

Only one discharge is available per engine.

Troubleshooting Engine Fire Extinguisher.

TROUBLE	PROBABLE CAUSE	CORRECTION
POWER ON TO INDICATOR PANEL TEST SWITCH DEPRESSED ALL LIGHTS FAIL TO ILLUMINATE	Open circuit breaker.	Close circuit breaker.
	Open circuit between pin A and B of connector at panel. (Pin A is ground.)	Repair wiring.
	Voltage present between Pin A and B at panel connector. Faulty panel.	Replace panel.
GREEN LIGHT(S) ILLUMINATED LIGHT(S) FAIL TO LIGHT	Defective light bulb(s).	Replace bulb(s).
	(Bulb(s) good.) Disconnect wire from bottom stud of cartridge. Ground wire, light(s) illuminate. Defective cartridge.	Replace cartridge.

Troubleshooting Engine Fire Extinguisher (Cont.)

TROUBLE	PROBABLE CAUSE	CORRECTION
GREEN LIGHT(S) ILLUMINATED LIGHT(S) FAIL TO LIGHT (CONT.)	(Light(s) fail to illuminate.) Open circuit between bottom stud wire of cartridge and panel connector.	Repair wiring.
	(Circuit exists between bottom wire of cartridge and connector.) Faulty panel.	Replace panel.
RED (FIRE) LIGHT(S) FAIL TO ILLUMINATE	Defective light bulb(s).	Replace bulb(s).
	(Bulb(s) good.) Defective panel.	Replace panel.
AMBER LIGHT (E) LIGHT(S) FAIL TO LIGHT	Defective light bulb(s).	Replace bulb(s).
	(Bulb(s) good.) Defective panel.	Replace panel.
POWER ON TO INDICATOR PANEL TEST SWITCH NOT DEPRESSED. RED (FIRE) LIGHT(S) LIGHTED	Shorted detectors or shorts in detector wiring. (Check for shorts in detector wiring between pin C or D of harness connector and ground.)	Replace shorted detector or correct shorted wiring.
	(No short in wiring or detector.) Indicator panel defective.	Replace detector.
GREEN LIGHTS OUT LIGHT(S) LIGHTED	(Depress test switch.) If light(s) stay on, indicator panel defective. Also, check affected cartridge for bridge-wire resistance.	Replace indicator panel.
AMBER (E) LIGHT(S) FLICKERING	Empty container.	Replace container.
AMBER (E) LIGHT(S) FLICKERING (CONT.)	If container is full, unscrew cartridge, scratch some anodize off cartridge thread and reinstall. Torque 90 to 100 inch-pounds. If light is still intermittent, ground sensor wire to aircraft. Light goes out.	Replace container.
	If light does not go out. Probable open circuit between sensor wire and connector pin H or G.	Repair wiring.
	If circuit exists between sensor wire and connector pin H or G. Faulty panel.	Replace indicator panel.

Troubleshooting Engine Fire Extinguisher. (Cont.)

TROUBLE	PROBABLE CAUSE	CORRECTION
AMBER (E) LIGHT(S) ON	Empty container.	Replace container.
	If container is full, unscrew cartridge, scratch some anodize of cartridge thread and reinstall. Torque 90 to 100 inch-pounds. If light is still on ground sensor wire to aircraft. Light goes out.	Replace container.
	If light does not go out. Probable open circuit between sensor wire and connector pin H or G.	Repair wiring.
	If circuit exists between sensor wire and connector pin H or G. Faulty panel.	Replace indicator panel.

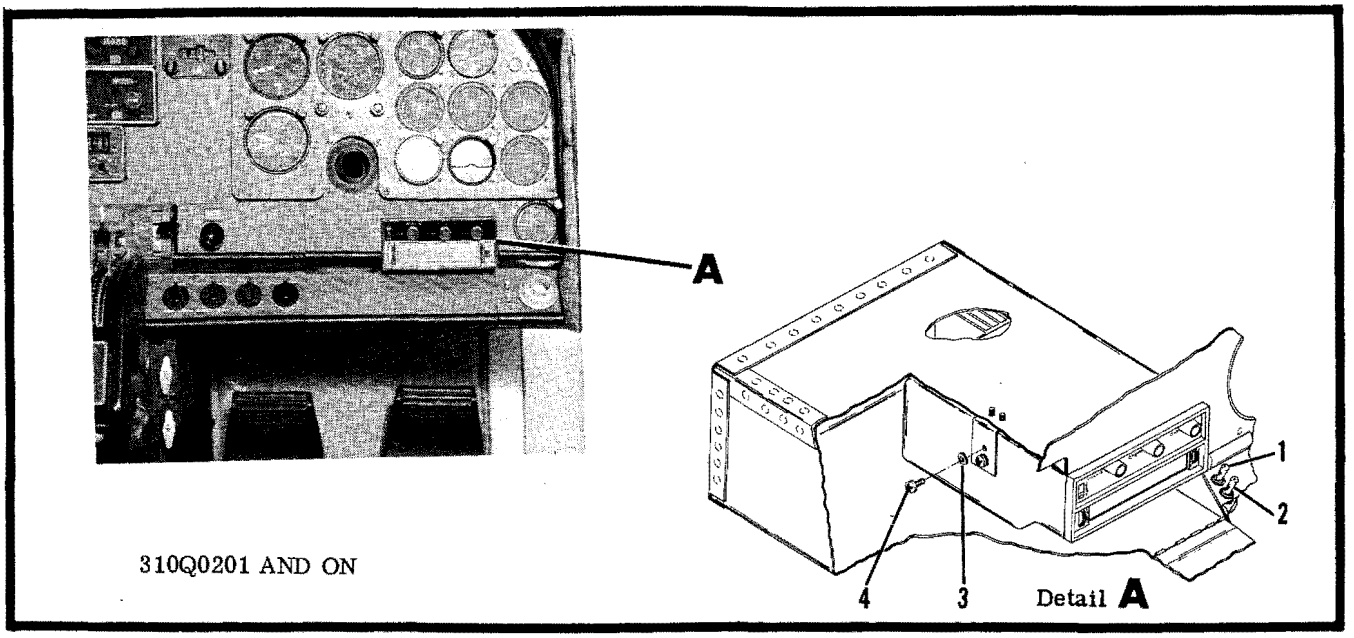
Removal of Fire Extinguisher. (See figure 13-24.)

a. Remove engine cowling.
b. Make sure battery switch is OFF.
c. Disconnect electrical wires from extinguisher.

WARNING

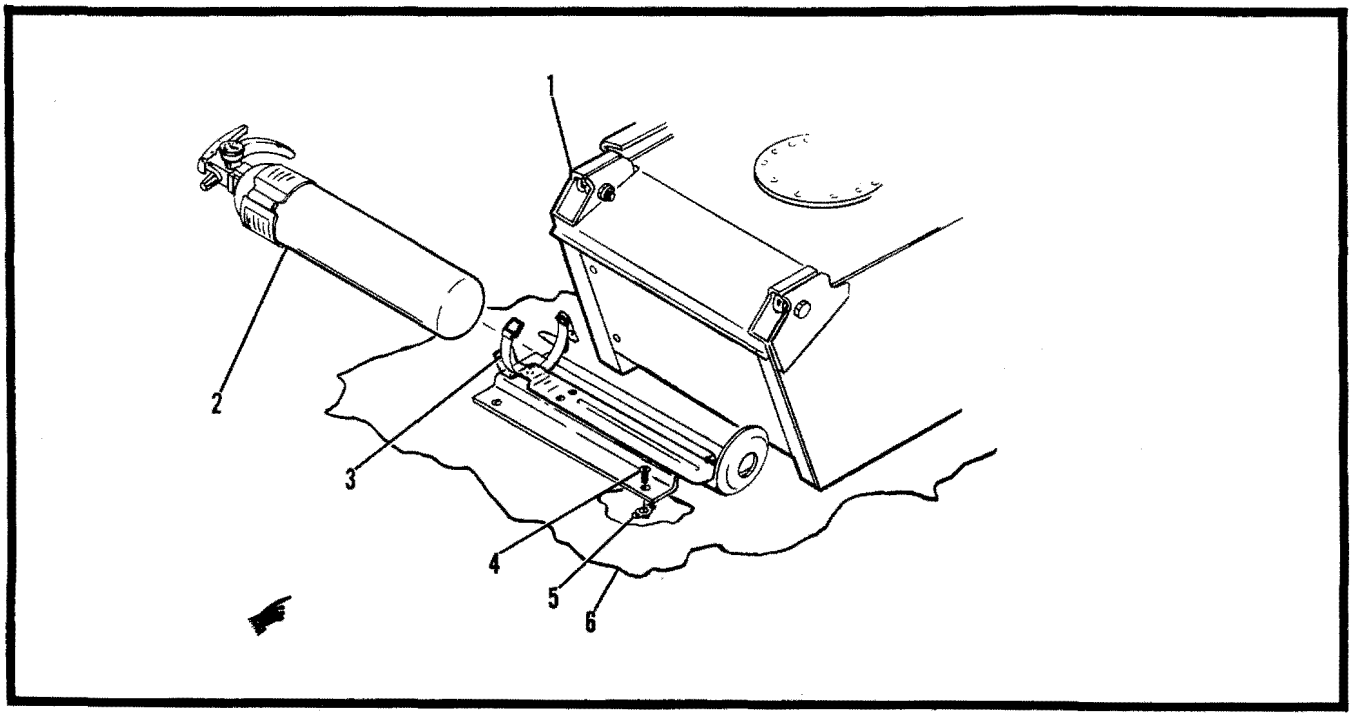
Install a grounding wire between ground terminal and squib terminal before attempting to remove a charged extinguisher unit or cartridge.

d. Disconnect discharge hose (1).
e. Remove clamps (2) securing extinguisher unit to mounting clips.
f. Remove extinguisher from nacelle.



1. Headset Speaker Selector Switch
2. "On" "Off" Switch
3. Washer
4. Screw

Figure 13-23. Mini-8 Stereo



1. Seat Support
2. Fire Extinguisher
3. Bracket
4. Screw
5. Nut
6. Floorboard

Figure 13-23A. Fire Extinguisher Installation

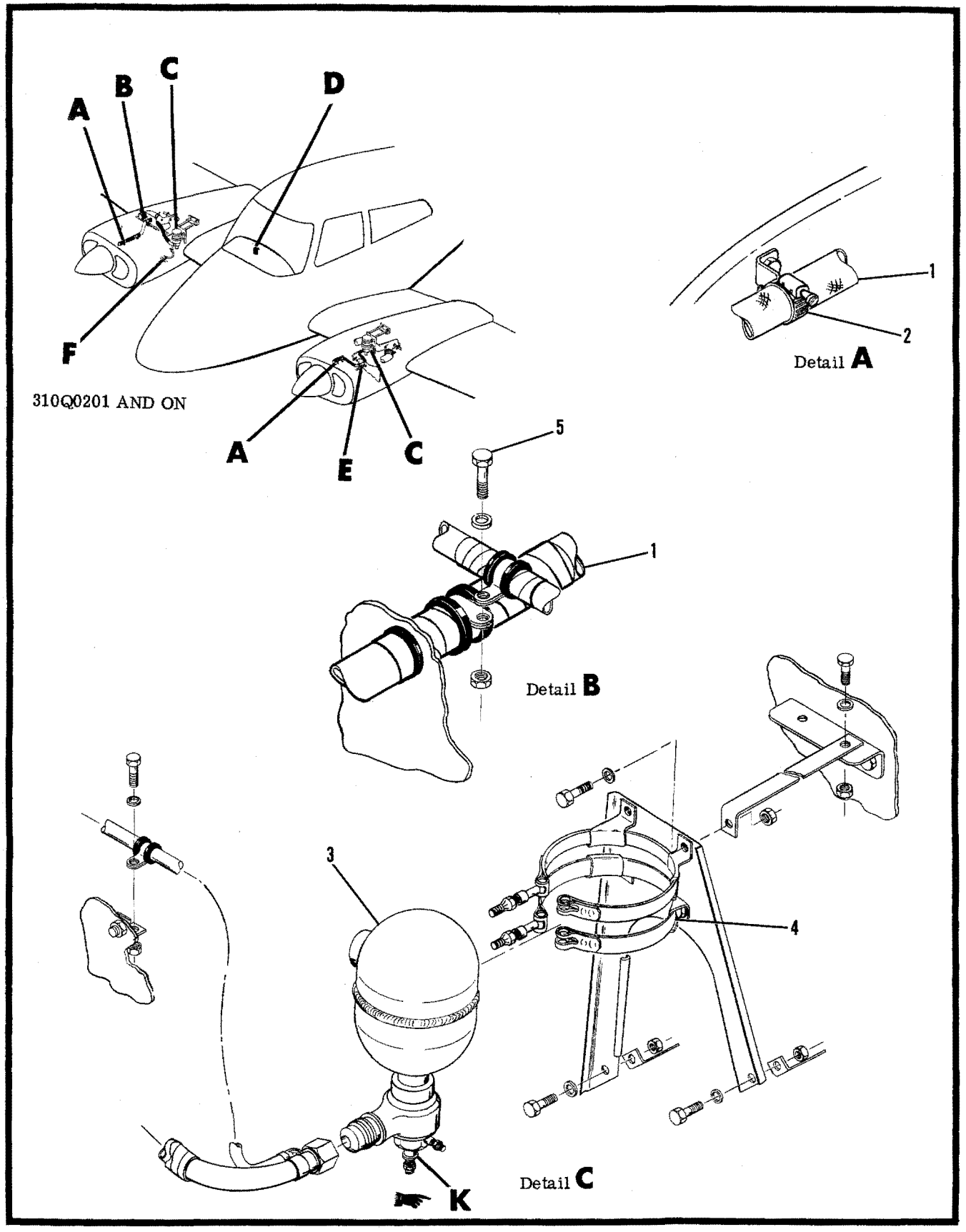
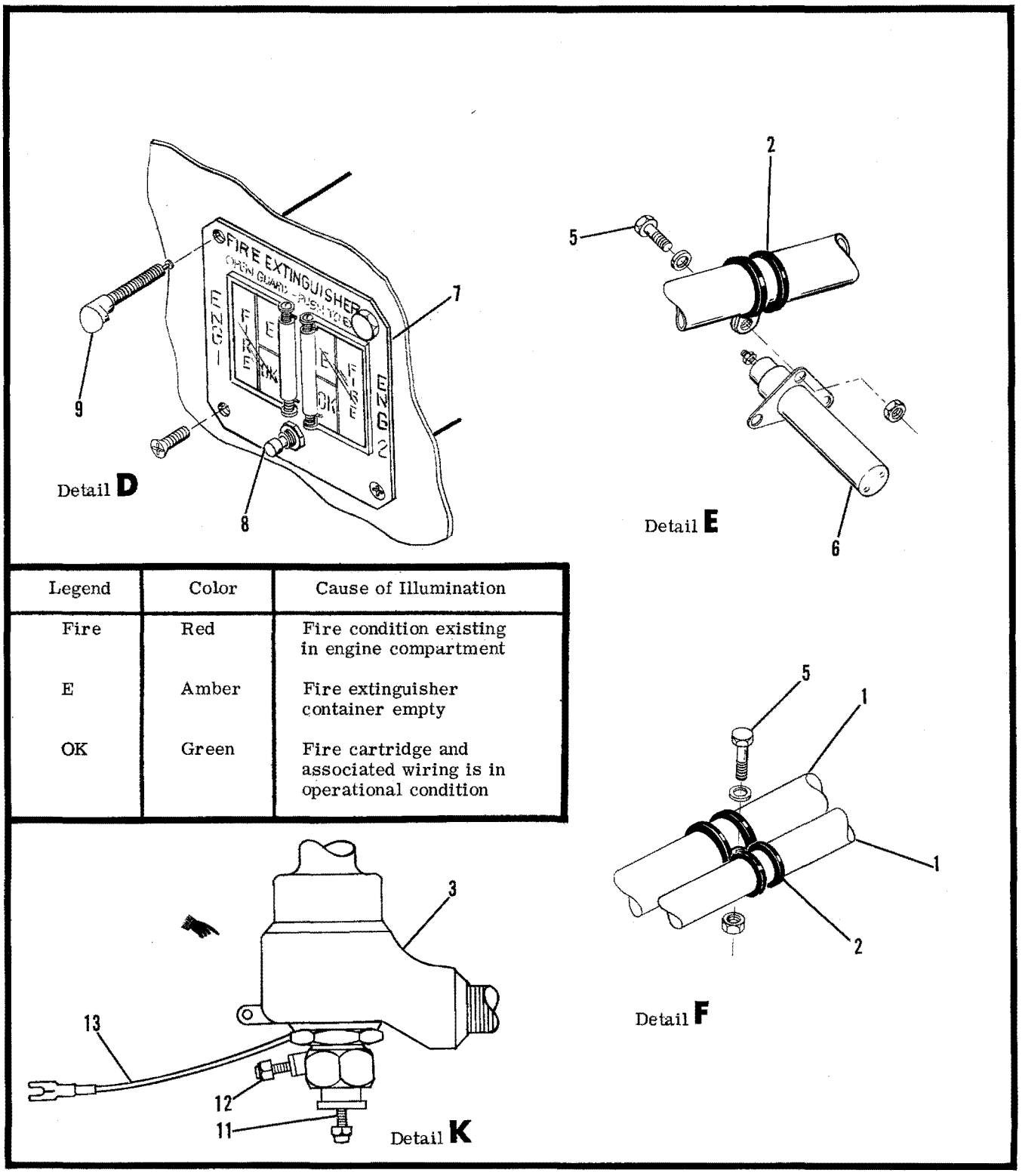


Figure 13-24. Engine Compartment Fire Extinguisher (Sheet 1 of 3)



Legend	Color	Cause of Illumination
Fire	Red	Fire condition existing in engine compartment
E	Amber	Fire extinguisher container empty
OK	Green	Fire cartridge and associated wiring is in operational condition

1. Hose (Discharge)
2. Clamp
3. Fire Extinguisher
4. Mounting Clamp
5. Bolt
6. Thermal Detector
7. Annunciator Panel
8. Test Switch
9. Light
10. Firewall
11. Squib Terminal
12. Ground Terminal
13. Discharge Sensor Lead

Figure 13-24. Engine Compartment Fire Extinguisher (Sheet 2 of 3)

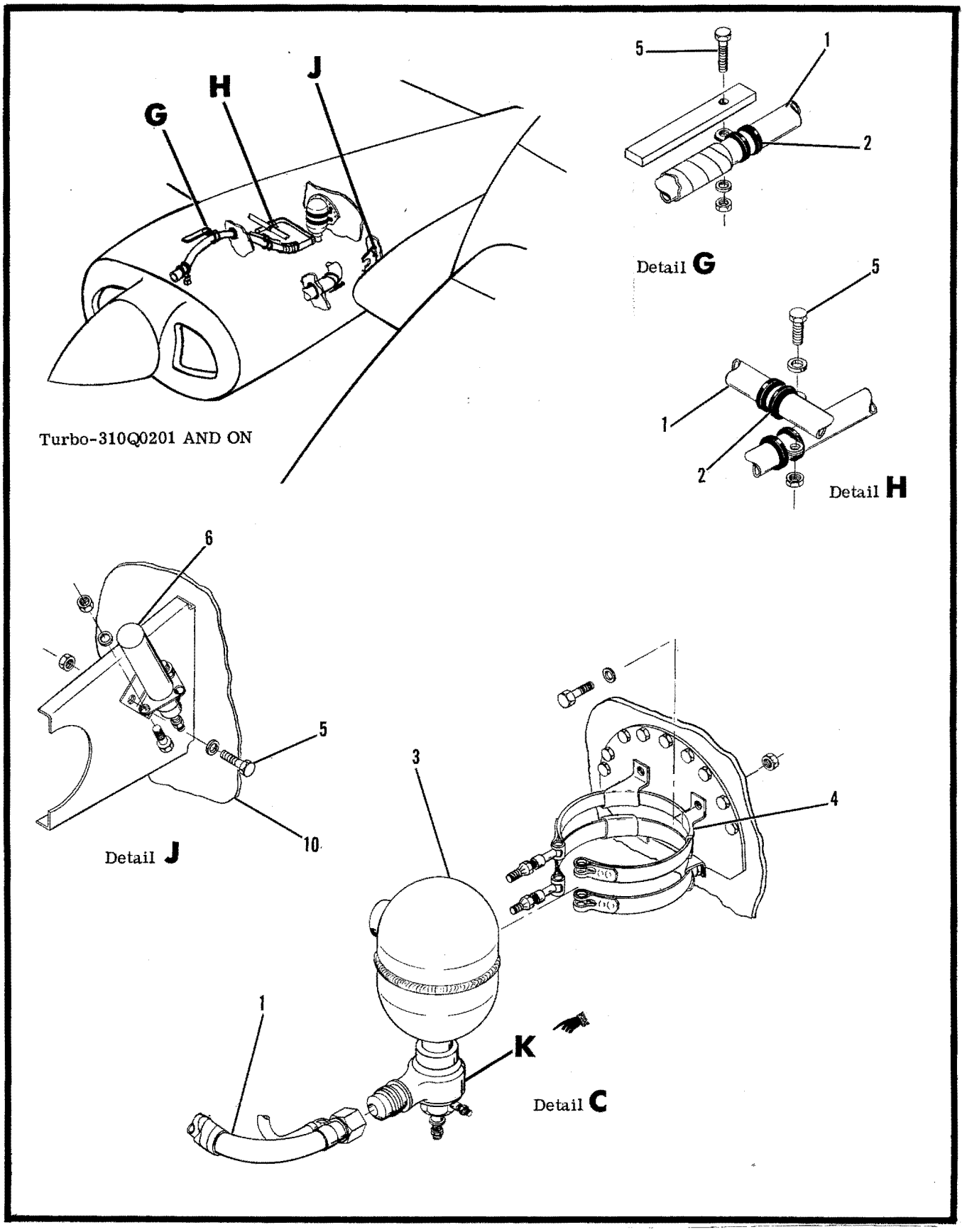


Figure 13-24. Engine Compartment Fire Extinguisher (Sheet 3 of 3)

Installation of Fire Extinguisher. (See figure 13-24.)

a. Position fire extinguisher in place and connect hose (1).

WARNING

Do not remove grounding wire from extinguisher unit or cartridge until installed in aircraft.

b. Clamp fire extinguisher in place with clamps (2).
c. Connect electrical wires.

WARNING

Before connecting electrical connectors to cartridges, check connectors with multimeter to ensure no voltage is present at connector.

d. Continuity check detector circuitry in accordance with Servicing Fire Extinguisher.
e. Turn on electrical power and check system for proper operation at the control panel. Press the test switch.
f. Install engine cowling.

Removal and Installation of Fire Extinguisher Thermal Detectors. (See figure 13-24.)

a. Make sure battery switch is OFF.
b. Remove engine cowling.
c. Loosen and remove bolts, washers and nuts attaching thermal detector to bracket or clamp.
d. Disconnect electrical wire from detector.
e. Remove detector from nacelle.
f. The installation procedure for the fire extinguisher thermal detector is the reversal of the removal procedure.
g. Continuity check detector circuit in accordance with Servicing Fire Extinguisher.

Removal and Installation of Annunciator Panel. (See figure 13-24.)

a. The removal and installation procedures for the annunciator panel is the same as any Typical Instrument Removal and Installation Procedures found in Section 12.

NOTE

When removing annunciator panel always make sure the battery switch is in the OFF position.

PRESSURE-TEMPERATURE CORRECTION TABLE

F° Temp	-60	-40	-20	0	+20
Ind	110	127	148	174	207
Pressure	134	155	180	212	251
F° Temp	+40	+60	+80	+100	+120
Ind	249	304	367	442	532
Pressure	299	354	417	492	582

Servicing Fire Extinguisher.

The following item should be checked at every 100 hour inspection. Check the pressure gage on each bottle to ensure the pressures indicated in the Pressure-Temperature Correction Table. If these pressures are not indicated, the bottle must be serviced.

Every six months, remove containers and weigh. (The scale used must be a 5 to 10 pound scale with an accuracy of ±.1% full scale.) Weight of .25 pound below marked weight indicates a leaky container. After bottle has been replaced check the following:
a. Check the test function; if any light fails, replace bulb. If green light (OK) does not light after replacing bulb, replace firing cartridge *(P/N 13083-5) in fire extinguisher. Any other light failure, after replacing bulbs and firing cartridge, indicates malfunction in the unit or associated wiring circuit.

NOTE

The test switch does not check the detector circuit.

b. Conduct a continuity check of detector circuitry as follows:
1. Apply power to the aircraft.
2. Disconnect sensor wire from fire extinguisher bottle. The EMPTY light should come on.
3. With sensor wire disconnected, press the Press-To-Test switch on the control panel. The OK light should come on indicating the squib is in operational condition.
4. Reconnect sensor wire to bottle.

WARNING

Do not attempt to check the continuity of the sensor and/or the squib with a V.O.M. tester. Most V.O.M. testers have enough AMP capability to fire the cartridge. Continuity of the circuit shall be checked only when using a 100 MA current regulated source.

c. Conduct fire detect thermo detector check as follows:
1. Apply power to the aircraft.
2. Using an Alpha Heat gun, apply heat to each thermo detector body for approximately ten seconds and observe that fire light on panel comes on.

NOTE

Heat gun must have a capacity of 500°F or higher.

3. If light does not come on, remove thermo detector and check further in a temperature oven. Switch should actuate at 450°F.

*P/N of HTL Industries, 1900 Walker Avenue, Monrovia, California, 91016.

EMERGENCY LOCATOR TRANSMITTER.

Description.

The emergency locator transmitter (ELT) is a self-contained, solid state unit, having its own power supply with an external mounted antenna. The transmitter is designed to transmit on dual emergency frequencies of 121.5 and 243.0 megahertz simultaneously. Emergency locator transmitter P/N CIR10 is located in the leading edge of the dorsal fin at approximately fuselage station 309.56 and water line 125.00. The antenna is also enclosed in the dorsal. Emergency locator transmitter SHARC-7 is mounted in the tailcone on the side of the fuselage.

On P/N CIR10 transmitter power is supplied from the aircraft system through a switch on the panel or the battery pack located inside the transmitter. The SHARC-7 transmitter is entirely portable operating on the power supplied by a battery pack. The battery pack service life is placarded on the batteries and also on the outside of the cover on the end of the transmitter.

The transmitter broadcast tone is audio modulated in a swept manner over the range of 1600 to 300 Hz and is a distinct, easily recognizable distress signal for reception by search and rescue personnel, and others monitoring the emergency frequencies.

The transmitter meets or exceeds the requirements of the following specifications:

(1) R.S.S. 147 Issue 2, D.O.C.
(2) TSO C612, F.A.A.
(3) F.C.C. Part 87, F.C.C.
(4) TSO C91, F.A.A.

Under favorable conditions, a distress signal from the ELT can be intercepted at a distance of 100 miles. It exhibits line of sight transmission characteristics which correspond approximately to 100 miles at a search altitude of 10,000 feet.

When battery inspection and replacement schedules are adhered to, the transmitter will broadcast an emergency signal at rated power, for a continuous period of at least 48 hours at temperatures from +55°C to -20°C after an emergency landing.

The military monitors 243.0 MHz. The 121.5 MHz frequency is monitored by the general aviation aircraft as well as C.A.P., D.O.T., F.A.A. and some commercial aircraft.

Operation.

A three position switch on the forward end of the unit controls operation. Placing the switch in the ON position will energize the unit to start transmitting emergency signals. In the OFF position, the unit is inoperative. Placing the switch in the ARM position will set the unit to start transmitting emergency signals only after the unit has received a 5G (tolerances are +2G and -0G) impact force. On emergency locator transmitter P/N CIR10, a remote on-off switch on the instrument panel is provided in addition to the switch located on the front end of the transmitter.

CAUTION

Do not leave the emergency locator transmitter in the ON position longer than 10 seconds or you may activate downed aircraft procedures by C.A.P., D.O.T., or F.A.A. personnel.

Removal of Emergency Locator Transmitter. (See figure 13-25.)

The following steps "a" through "d" pertain to emergency locator transmitter P/N CIR10:

a. Refer to figure 1-3 and remove fin access cover.
b. Assure aircraft electrical power is off and the on-off switch on the front of the transmitter is in the OFF position.
c. Disconnect electrical leads from transmitter.
d. Remove screws securing transmitter to mount and remove transmitter from dorsal fin.

Steps "e" through "g" pertain to the SHARC-7 emergency locator transmitter.

e. Remove tailcone access door.
f. Disconnect coaxial cable from end of transmitter.
g. Cut sta-straps securing transmitter and remove transmitter from mounting bracket.

Installation of Emergency Locator Transmitter. (See figure 13-25.)

The following steps "a" through "c" pertain to emergency locator transmitter P/N CIR10:

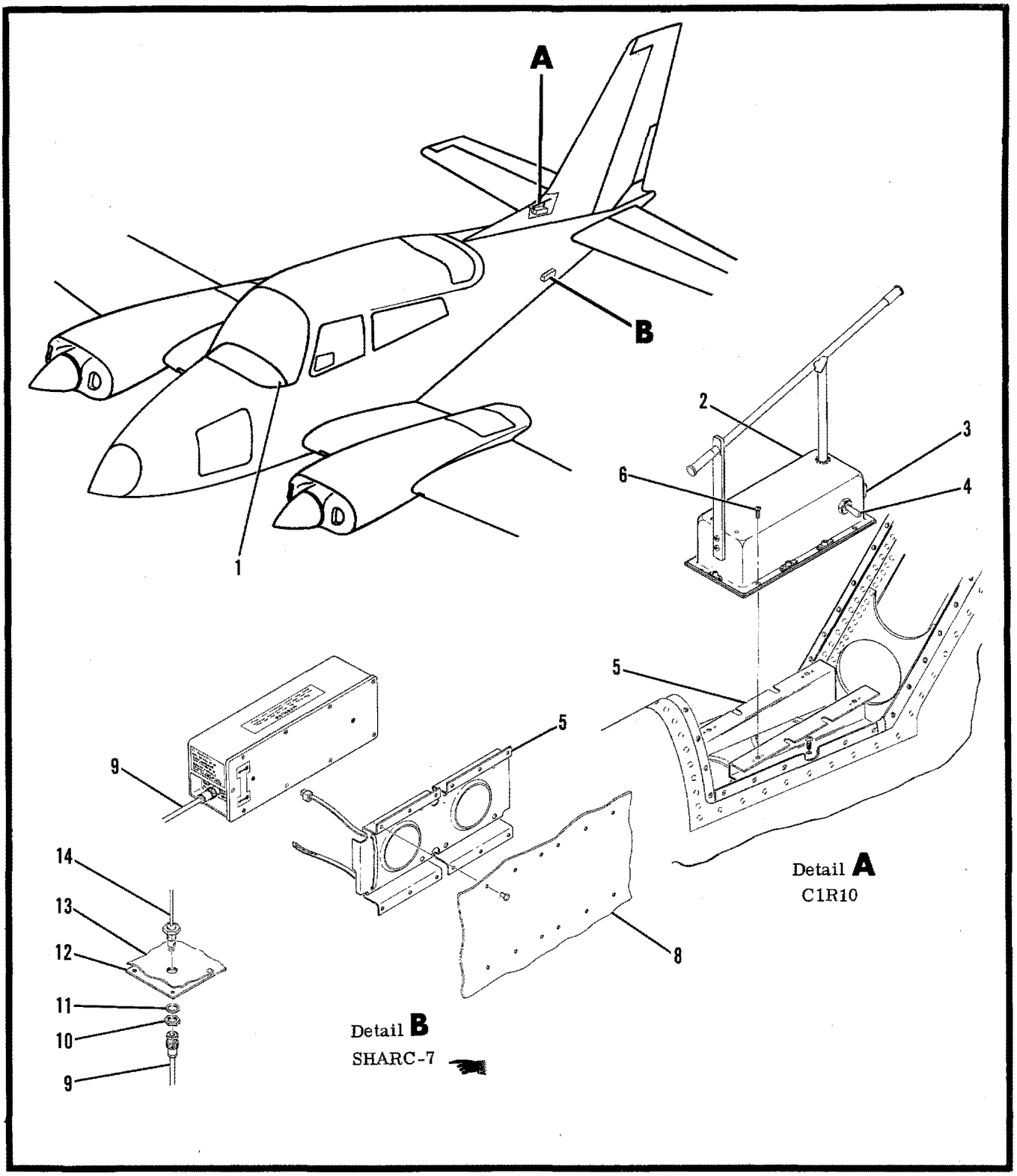
a. Position transmitter in mount and install four mounting screws.

NOTE

Before installing the emergency locator transmitter to the mount, check condition of battery pack and make sure function switch is in the ARM position and the power switch is in the OFF position.

b. Connect electrical leads to terminals.
c. Install dorsal fin access cover.

Steps "d" through "h" pertain to the SHARC-7 emergency locator transmitter.



1. Panel Switch
2. Power Switch
3. Terminal Block
4. Function Switch
5. Mount
6. Screw
7. Battery Access
8. Fuselage Side Skin
9. Antenna Coaxial
10. Nut
11. Lockwasher
12. Doubler
13. Upper Tailcone Skin
14. Antenna

Figure 13-25. Emergency Locator Transmitter

d. Assure that the direction of flight arrows (placarded on the transmitter) are pointing towards the nose of the aircraft.
e. Install transmitter in bracket and secure with new sta-straps.
f. Connect coaxial cable to antenna.
g. Position on-off switch to ARM position.
h. Check operation of emergency locator transmitter in accordance with Section 2.

Removal and Installation of Emergency Locator Transmitter Antenna SHARC-7.

a. Disconnect coaxial cable from base of antenna.
b. Remove nut and lockwasher attaching the antenna base to the fuselage and the antenna will be free to remove.
c. Install the antenna by reversing the removal procedures.

Removal and Replacement of Battery Pack.

a. Remove emergency locator transmitter in accordance with removal procedures.
b. Remove screws attaching the cover to the case and remove cover. Remove rubber gasket to gain access to battery pack.
c. When the battery pack is supplied with a plastic connector attached to the battery leads, merely disconnect the old battery pack and replace with a new battery pack, making sure the plastic connectors are completely mated.

CAUTION

Some early transmitters were delivered with transmitter leads soldered directly to the battery pack. Failure to observe proper polarity in connecting a new battery pack in the transmitter may result in immediate failure of transistorized components attached to the printed circuit board in the transmitter.

NOTE

- Before installing the new battery pack, check to ensure that its voltage is 10.8 volts or greater.
- After relatively short periods of inactivation, the magnesium cell develops a coating over its anode which drastically reduces self-discharge and thereby gives the cell an extremely long storage life. This coating will exhibit a high resistance to the flow of electric current when the battery is first switched on. After a short while (less than 15 seconds), the battery current will completely dissolve this coating and enable the battery to operate normally. If this coating is present when your ELT is activated, there may be a few seconds delay before the transmitter reaches full power.

d. Replace the transmitter cover by positioning the rubber gasket on the cover and pressing the cover and case together and attach with nine screws. Care should be taken to avoid trapping the gasket and overtightening screws.
e. Remove the old battery placard from the end of transmitter and replace with new battery placard supplied with the new battery pack.

CAUTION

Be sure to enter the new battery pack expiration date in the aircraft records.

f. Check operation in accordance with Section 2.
g. Refer to Section 2 and Inspection Chart, figure 2-7 for inspection intervals.

CAUTION

Do not leave the emergency locator transmitter in the ON position longer than 10 seconds. This could initiate downed aircraft search procedures by C. A. P., D. O. T. or F. A. A. personnel.

Troubleshooting the Emergency Locator Transmitter

Should your Emergency Locator Transmitter fail the Periodic or 100 Hours performance checks, it is possible to a limited degree, to isolate the fault to a particular area of the equipment.

CAUTION

In order to protect your warranty, troubleshooting should be conducted without removing the unit cover.

In performing the following troubleshooting procedure to test, peak effective radiated power, you will be able to determine if battery replacement is necessary or if your unit should be returned to your dealer for repair.

CAUTION

Do not leave the emergency locator transmitter in the ON position longer than 10 seconds. This could initiate downed aircraft search procedures by C. A. P., D. O. T. or F. A. A. personnel.

Troubleshooting the Emergency Locator Transmitter.

TROUBLE	PROBABLE CAUSE	CORRECTION
*POWER LOW SHARC-7	Low battery voltage.	1. Set toggle switch to OFF. 2. Remove plastic plug from the remote jack and by means of a Switchcraft #750 jackplug, connect a Simpson 260 model voltmeter and measure voltage. If the voltage is 10-volts or less, the battery is below specification.
	Faulty transmitter.	3. If the battery voltage is 10.8 volts or more, it is O.K. If the battery is O.K., check the transmitter as follows: a. Remove the voltmeter. b. By means of a Switchcraft #750 jackplug and 3 inch long maximum leads, connect a Simpson Model 1223 ammeter to the jack. c. Set the toggle switch to ON and observe the ammeter current drain. If it is in the range 0-50 MA, the transmitter or the coaxial cable is faulty.
	Faulty coaxial antenna cable.	4. Check coaxial antenna cable for high resistance joints. If this is found to be the case, the cable should be replaced.

*This test should be carried out with the coaxial cable provided with your unit.

Troubleshooting the Emergency Locator Transmitter (Continued)

TROUBLE	PROBABLE CAUSE	CORRECTION
POWER LOW CIR10	Low battery voltage.	1. Pull cabin lights circuit breaker. 2. Remove access cover to transmitter. 3. Remove transmitter from mount. 4. Remove battery access cover. 5. Measure voltage at battery contacts. NOTE Transmitter should be turned on when measuring battery voltage. 6. If the battery voltage is 10 volts or less, the battery pack should be replaced.
	Faulty transmitter.	If the battery voltage is greater than 10 volts, insert a 0-150 MA meter in series with power leads and check as follows: 1. Set power switch on transmitter to ON and observe current drain. 2. If current drain is 0-50 MS, the transmitter or the antenna is faulty and should be bench tested.

PILOT AND COPILOT MANUAL AND ELECTRICAL ADJUSTABLE SEAT.

Removal of Pilot and Copilot Manual and Electrical Adjustable Seat. (See figure 13-26.)

The procedures given pertain to either the pilot's or copilot's manual or electrical adjustable seat. The difference between the manual and electrical is the electrical seat utilizes an electric motor in lieu of the manual crank for the up and down and tilting movements.

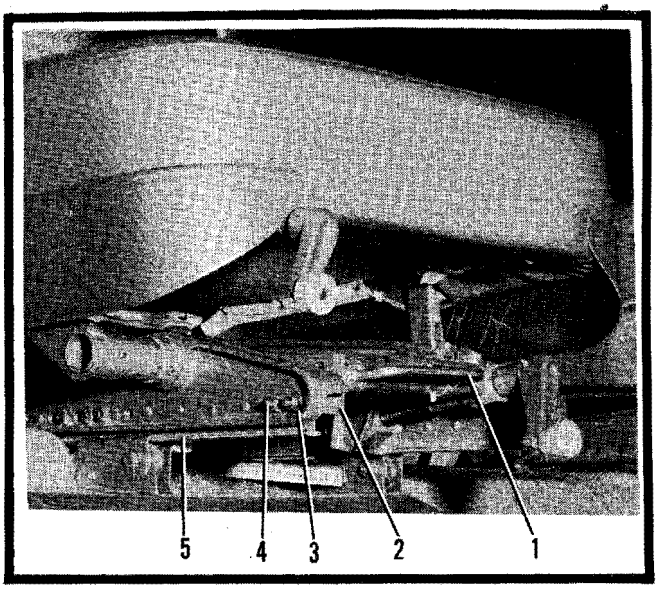
a. Raise seat to the highest position.
b. Remove seat stops on each side of the rail by removing nuts and screws.
c. Tag and disconnect wiring.
d. Pull up on seat stop handle and slide seat aft and remove seat from its mounting.

Disassembly of Pilot and Copilot Manual and Electrical Adjustable Seat. (See figure 13-27.)

a. Disassemble pilot's and copilot's manual and electrical adjustable seat in accordance with Figure 13-27.

Installation of Pilot's and Copilot's Manual and Electrical Adjustable Seat. (See figure 13-26.)

a. Insert seat on seat rails and slide forward.
b. Pull up on seat stop handle and allow seat to move forward far enough to install seat stops.
c. Connect wiring and remove tags.
d. Install seat stops with screws and nuts.
e. Turn on electrical power and check operation.
f. If seat is not electrical, check operation using crank provided on the front of the seats.



1. Adjust Handle
2. Seat Stop
3. Nut
4. Screw
5. Seat Rail

Figure 13-26. Pilot and Copilot Manual and Electrical Seat Installation

Figure 13-27. Pilot and Copilot Manual and Electrical Adjustable Seat Callouts

1. Seat Back
2. Screw
3. Bolt
4. Washer
5. Spacer
6. Seat Belt
7. Nut
8. Side Skirt
9. Seat Bellcrank
10. Seat Stop
11. Nut
12. Shaft
13. Crank
14. Seat Stop Handle
15. Seat Base
16. Shaft
17. Housing
18. Bearing Block
19. Seat Bottom
20. Arm Rest
21. Arm Rest Stop
22. Escutcheon
23. Wire Bundle
24. Vertical Adjust Motor
25. Recline Motor

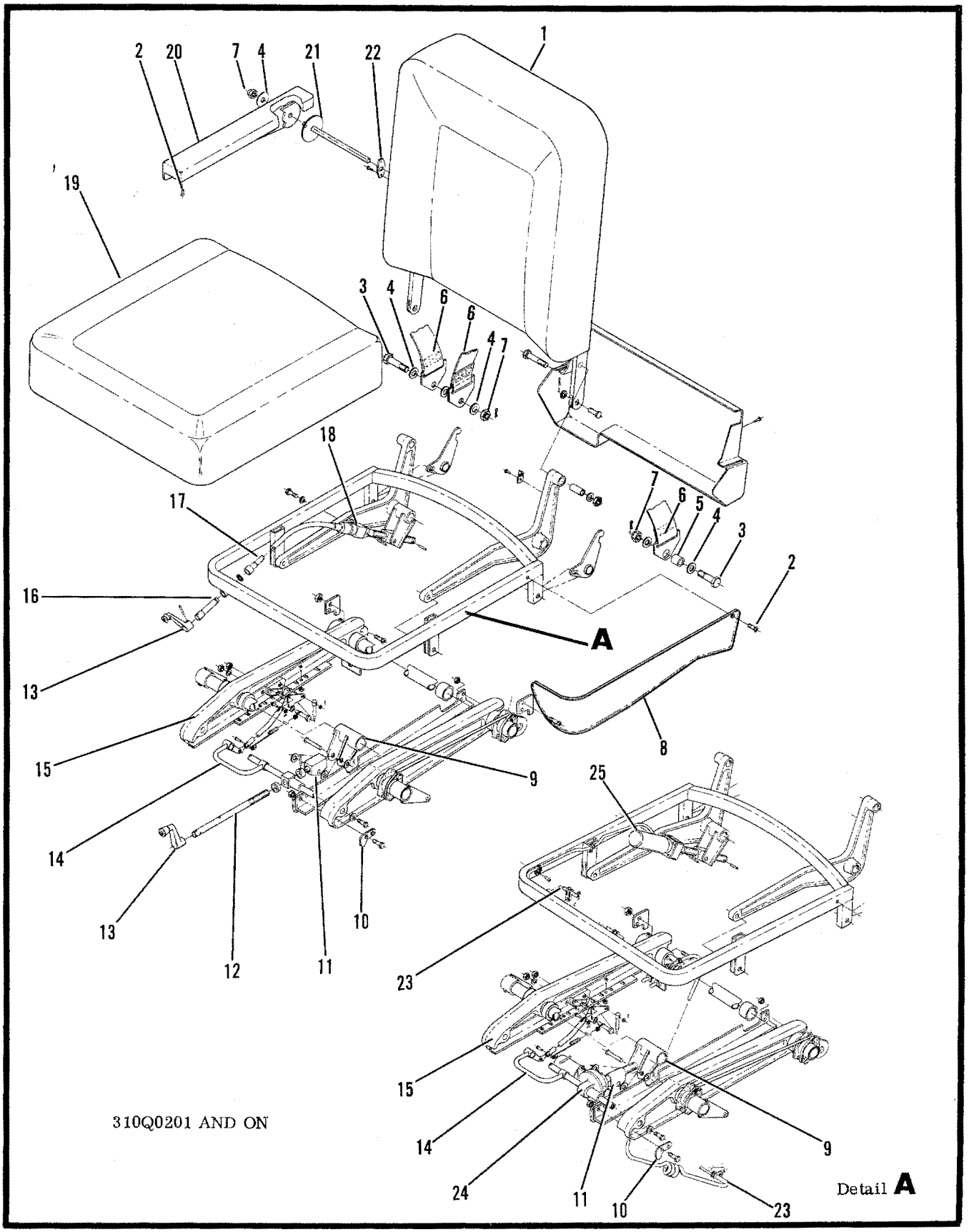


Figure 13-27. Pilot and Copilot Manual and Electrical Adjustable Seat

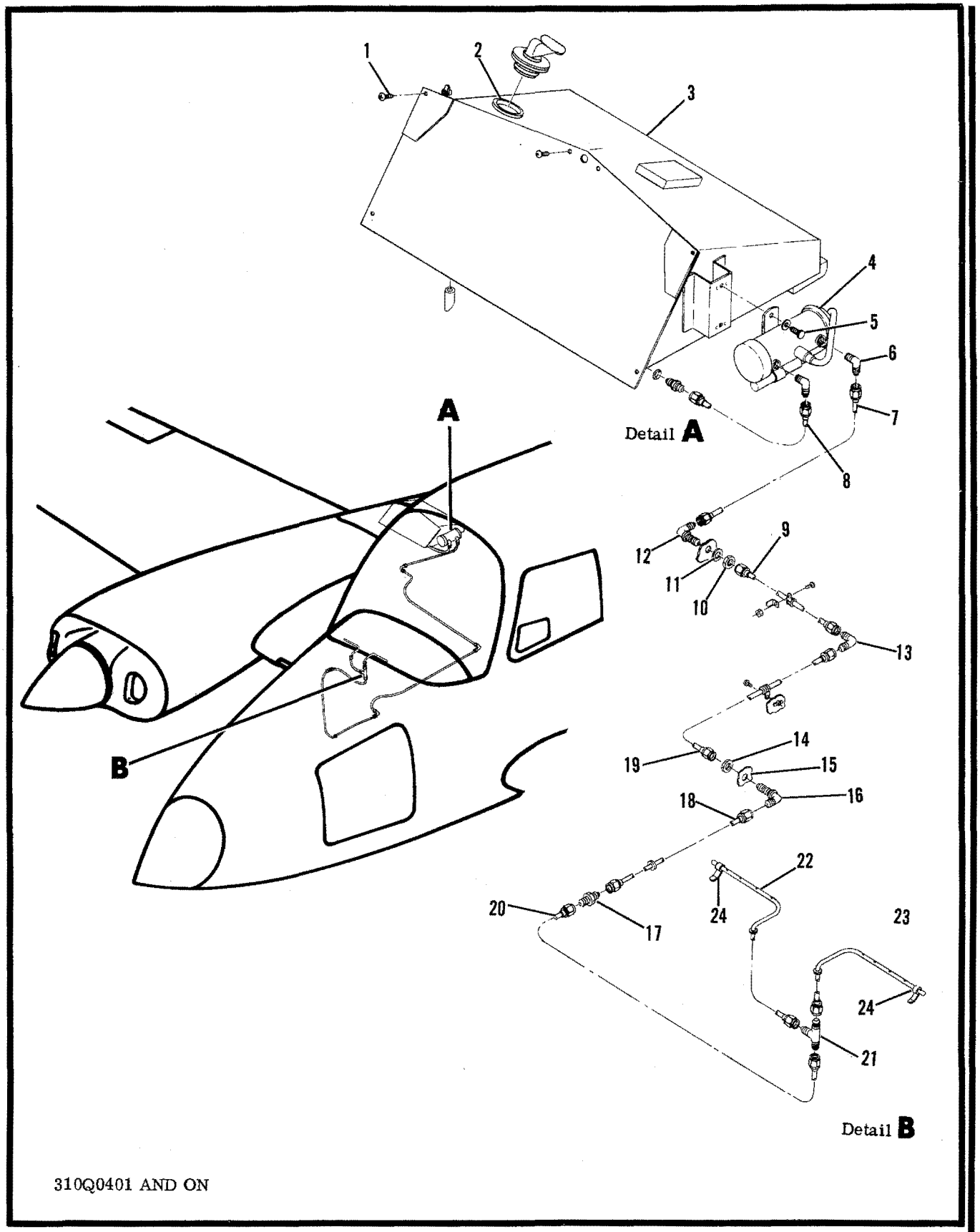


Figure 13-28. Alcohol Windshield Anti-Ice System

Figure 13-28. Alcohol Windshield Anti-Ice System Callouts

1. Screw
2. Filler
3. Tank
4. Pump
5. Bolt
6. Elbow
7. Line (Pump to Elbow)
8. Line (Tank to Pump)
9. Line (Elbow to Elbow)
10. Nut
11. Washer
12. Elbow
13. Elbow
14. Nut
15. Cabin Skin
16. Elbow
17. Union
18. Line (Union to Union)
19. Line (Union to Elbow)
20. Line (Union to Tee)
21. Restrictor Tee
22. Tube RH
23. Tube LH
24. Clamp

ALCOHOL WINDSHIELD ANTI-ICE SYSTEM. (310Q0401 and ON).

The alcohol windshield anti-ice system consists of a three gallon capacity tank which provides approximately one hour anti-icing capability, an electrically operated pump actuated by a switch breaker located on the LH console, and orificed tubes to disperse the anti-ice fluid over the windshield. A restrictor orifice is provided in the dispersal system to meter the alcohol for maximum efficiency. The system is serviced with isopropyl alcohol.

Removal of Alcohol Windshield Anti-Ice System. (See figure 13-28.)

a. Remove aft nacelle baggage compartment upholstery panel.
b. Disconnect line (7) at elbow (12) and using a suitable tube attached to the line, pump remaining fluid from tank (3).
c. Disconnect line (7) from tank and remove line (8).
d. Disconnect electrical wire from pump (4) at splice.
e. Remove pump (4) from tank by removing bolts (5).
f. Remove screws (1) securing tank (3) to structure.
g. Lift forward end of tank until vent tube clears bottom skin and carefully slide tank forward until clear of structure, then lift tank from aircraft.
h. Extend flaps and remove RH wing gap fairings to gain access to lines.
i. Remove clamps and remove lines (9) and (19).
j. Remove RH forward side upholstery panel to gain access to line (18). Remove clamp and remove line.
k. Working through RH nose baggage door, remove line (20), restrictor tee (21) and tubes (22) and (23).

Installation of Alcohol Windshield Anti-Ice System. (See figure 13-28.)

a. Position tank in place and secure with screws (1).

NOTE

Make certain vent extends below lower skin 0.40" and scarfed side is forward.

b. Install pump (4) with two bolts (5) and washers.
c. Install lines (7) and (8).
d. Install lines (9) and (19) and clamp in place.
e. Install line (18) and clamp in place.
f. Install line (20) and restrictor tee (21).

NOTE

Restrictor tee must be installed with restrictor end upstream and arrow pointing downstream of flow.

g. Install tubes (22) and (23), and clamp in place.

NOTE

Make certain tubes (22) and (23) maintain a minimum gap of 0.10" between tubes and windshield retainer.

h. Install forward right cabin upholstery panel, wing gap fairings and access covers.
i. Install aft nacelle baggage compartment upholstery panel.

Operational Check of Windshield Anti-Ice System.

a. Fill reservoir with isopropyl alcohol (MIL-F-5566).
b. Turn master switch ON.
c. Switch windshield anti-ice switch ON.
d. Assure alcohol flows evenly from all five holes on each side. Nominal flow rate is approximately 20 minutes per gallon.

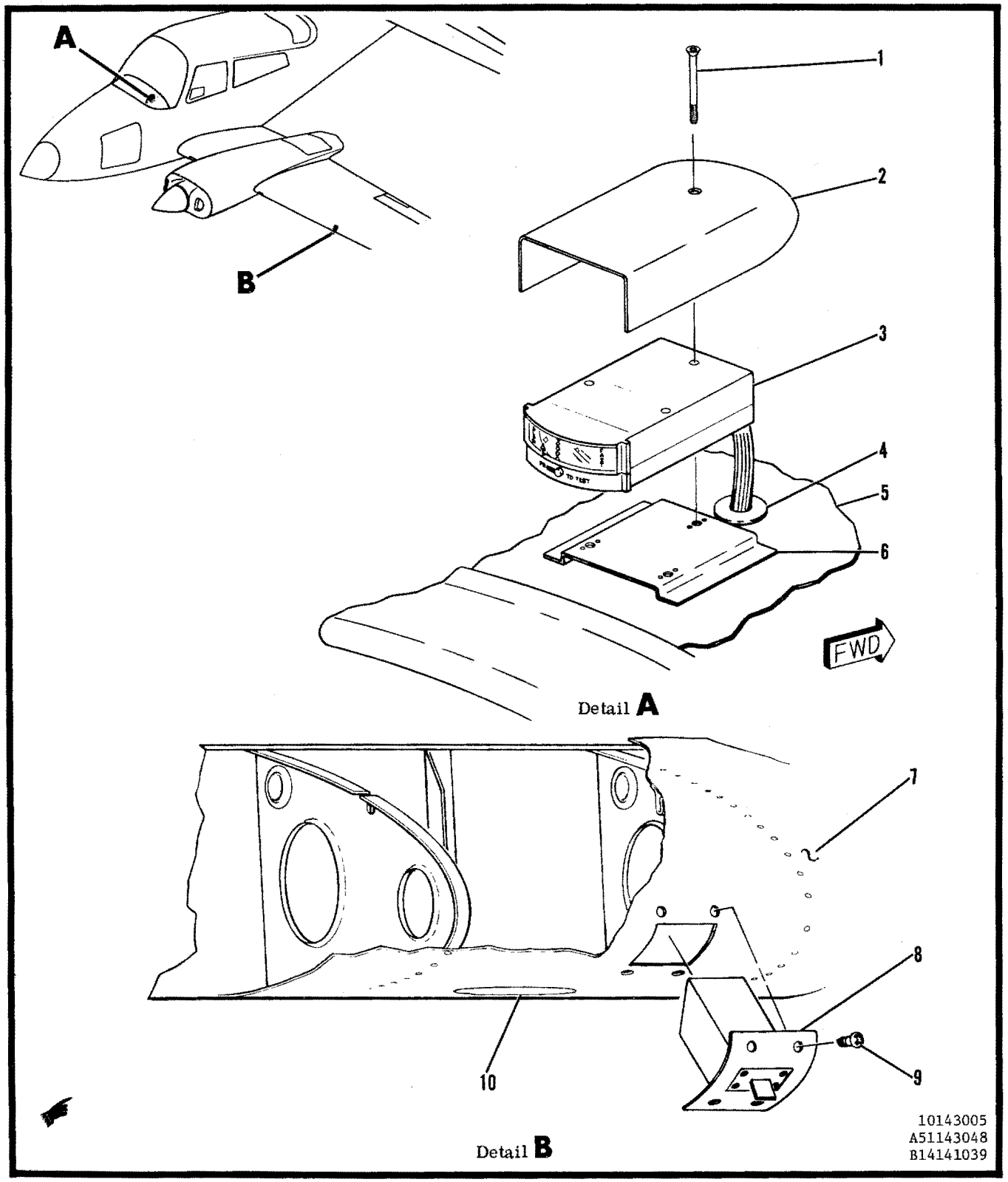
NOTE

The left-hand spray pattern may be slightly greater than the right spray pattern. Spray should extend approximately 4 to 6 inches above nozzles during ground operation.

e. Turn windshield anti-ice switch OFF. Alcohol flow should cease.
f. If alcohol flow is irregular or fails to shut off properly, check pressure at pump. Pressure should be 4.0 to 4.75 PSIG.

ANGLE OF ATTACK SYSTEM. (310Q0901 and On.)

The angle of attack system consists of an indicator incorporating a press-to-test circuit (for ground test or in flight test of the system) and a transducer. The indicator is mounted forward of the glareshield and visually displays the angle of attack of the aircraft.



1. Screw
2. Cover
3. Indicator
4. Grommet
5. Deck Cover
6. Mounting Bracket
7. Wing Leading Edge
8. Transducer
9. Screw
10. Access Cover

Figure 13-29. Angle of Attack System

The transducer is located on the leading edge of the left wing and transmits electrical signals to the indicator for angle of attack display. The transducer incorporates a heater element operated by the pitot heater switch, to prevent ice from hampering the operation of transducer. The system also incorporates a stall warning circuit which, when energized, causes the stall warning horn to sound.

Removal of Angle of Attack Indicator. (See figure 13-29.)

a. Assure aircraft electrical power is off.
b. Disconnect electrical connector to indicator.
c. Remove screws securing indicator to mounting bracket.
d. Remove grommet from deck cover; remove indicator.

Installation of Angle of Attack Indicator. (See figure 13-29.)

a. Insert wire cable of indicator through hole in deck cover.
b. Install grommet in deck cover.
c. Position indicator on mounting bracket and secure with screws.
d. Reconnect electrical plug.

Removal of Angle of Attack Transducer. (See figure 13-29.)

NOTE

Before removal of transducer, it is important that the exact fore-aft location of the vane be marked on the wing so that the replacement unit may be adjusted identically.

a. Assure aircraft electrical power is off.
b. Remove access cover.
c. Disconnect electrical plug to transducer.
d. Remove screws securing transducer to leading edge and remove transducer.

Installation of Angle of Attack Transducer. (See figure 13-29.)

a. Insert wire cable of transducer through transducer mounting hole.
b. Secure transducer to leading edge with screws.
c. Reconnect transducer electrical plug.
d. Replace access cover.

Operational Check of Angle of Attack System.

a. Ground Check.
1. Move battery switch to ON position.
2. Push the "PRESS TO TEST" button on the indicator and check that the indicator needle moves to the left (SLOW) end of scale and the stall warning horn sounds with the needle in the red zone. The needle should return to the SLOW diamond when the button is released.
3. Turn the pitot heat switch ON and check to see that the transducer mounting plate on the left wing leading edge heats up.
4. Turn pitot heat OFF.

NOTE

The pitot heat switch should not be left on any longer than necessary to determine that mounting plate is heating.

5. Push the transducer vane gently aft (down). Check that the needle moves to the right (FAST) end of scale. When released, the vane should return to the approximate center of its travel and the needle should return to the SLOW diamond.
6. Push the transducer vane gently forward (up). The indicator needle should move to the left (SLOW) end of scale and the stall warning horn should sound. When released, the vane should return to the approximate center of travel, the needle to the slow diamond, and the stall warning horn should stop.
7. Turn battery switch OFF.

b. Flight Check and Adjustment.
1. Using the data recorded in the Flight Check portion of the Operational Check of Stall Warning System, adjust the angle of attack system to provide an "on speed" indication when the indicated airspeed is within ±2 knots of the approach speed determined from the chart in Figure 12-3A (corrected for weight at time of the test) for the following configurations:
(a) Landing Gear down.
(b) Flaps full down.
(c) Power as required to maintain a stable rate of descent at 500 FPM.
2. Record the centered approach speed and the aircraft weight.
3. When the system is properly adjusted as above, the prestall warning adjustment screw in the indicator unit should be adjusted as required to provide a stall warning horn at 4 to 9 knots IAS prior to idle power landing configuration stall.