Section IX

CONSTANT-SPEED GENERATOR DRIVE SYSTEM

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DESCRIPTION

9-1. GENERAL.

The constant-speed generator drive system is provided to transmit mechanical power from the engine to drive the aircraft generators. The system consists of an engine mounted gearbox or power takeoff assembly, a fuselage mounted transmission and remote gearbox assembly, an interconnecting drive shaft between the gearboxes, and a self contained oil system. The remote gearbox is equipped to mount four generators. A three or a four generator combination may be used. The number of generators to be used on the airplane will depend upon whether the AWCIS (Aircraft and Weapons Control Interceptor System) is installed. This system requires the four-generator installation. For schematic illustrations of the constant-speed drive system, see figures 9-1 and 9-2.

9-2. ENGINE MOUNTED GEARBOX.

The engine mounted gearbox is a power takeoff unit installed on the engine between the forward side of the N_2 accessory section and the engine starter. The gear box is equipped with a gear train that provides an offset to permit the drive shaft to extend forward from the gear box without interference with the engine starter. Lubrication is provided as a part of the constant-speed drive lubrication system. The gearbox is equipped with a low point magnetic drain plug.

9-3. CONSTANT-SPEED REMOTE GEARBOX.

The constant-speed remote gearbox is a fuselage mounted component located on the lower right side of the fuselage at sta. 495.0. This unit incorporates a mechanical-hydraulic variable speed transmission to provide constant output speed with varying input speed. The constant output speeds are as follows:

a. Generator mounting pad "A" 8000 rpm.

b. Generator mounting pads "B," "C," "D" 12,000 rpm.

These output speeds will remain constant at engine power settings between idle and full power. The mounting pads are each designed to receive a specific generator with the exception that the generator normally installed on pad "B" will fit on pad "D;" however, pad "D" generator cannot be installed on pad "B." An indexing pin on each pad mates with a dowel hole on the generator to insure correct generator positioning. The remote gearbox may be removed or installed without removing the engine. The same condition also applies for engine removal or installation. For generator replacement and electrical hookup procedures, refer to T.O. 1F-106A-2-10. The engine mounted and remote gearboxes are equipped with low point chip detector magnetic drain plugs.

9-4. CONSTANT-SPEED SYSTEM DRIVE SHAFT.

The constant-speed system drive shaft transmits power from the engine mounted gearbox to the remote gearbox. The shaft is equipped with flexible couplings to compensate for misalignment of the two interconnected components. Quick detachment provisions are incorporated in the shaft to facilitate constant-speed drive system maintenance and component replacement. A protective cover provided for the shaft is supported by flanged rings on each gearbox. It is permissible to operate the engine with the shaft removed provided the following procedures and conditions are closely observed.

a. Disconnect constant-speed engine mounted gearbox oil "in" and "out" lines at quick disconnect fittings. Connect oil "in" line, attached to engine mounted gearbox, to "out" line attached to engine mounted gearbox.

b. Drain oil from engine mounted gearbox. See figure 9-12 for this procedure.

c. Service engine mounted gearbox with 0.5 pint of oil, Military Specification MIL-L-7808. See figure 9-12 for this procedure.

d. Engine may be run a maximum of 15 minutes.

CAUTION

After a 15 minute run, the engine mounted gearbox must be permitted to cool to ambient temperature. Another run of 15 minutes maximum is then permissible.

9-5. CONSTANT-SPEED DRIVE OIL SYSTEM.

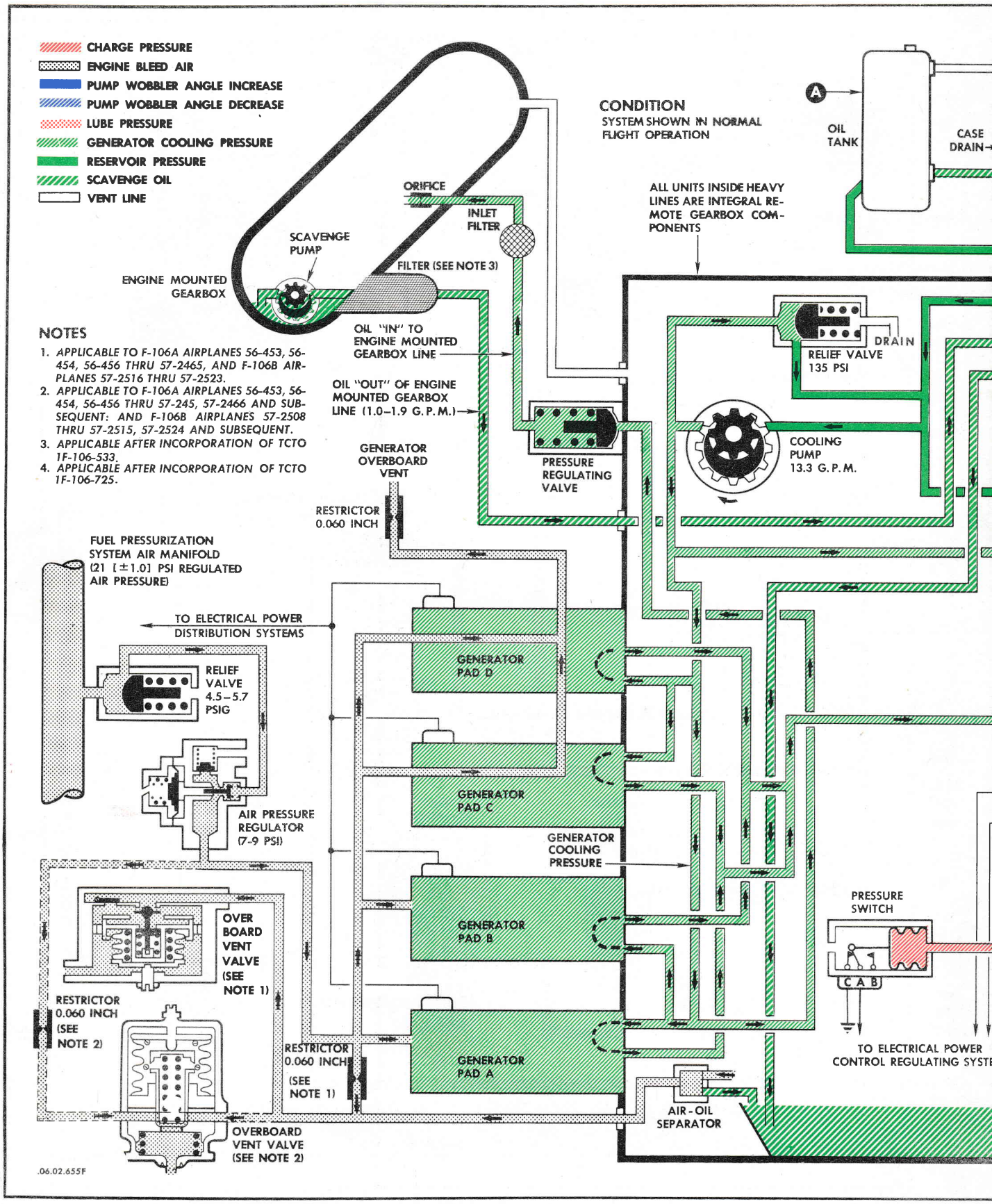
The constant-speed drive oil system is a self contained system provided to supply oil for operation and lubrication of the two gearboxes. The system also provides cooling oil for the generators and lube oil mist for the generator drive end bearings. The system has a capacity of approximately 15.5 quarts of oil, Military Specification MIL-L-7808; 9.5 quarts are contained in the oil reservoir. The 6 remaining quarts are contained within the gear boxes, oil cooler, and attaching lines. For a schematic illustration of the constant-speed oil system, see figures 9-1 and 9-2.

9-6. CONSTANT-SPEED DRIVE OIL SYSTEM PRESSURIZATION.

Oil system pressurization is provided for optimum high altitude operation of the lubrication system. This air pressure maintains a minimum oil pressure of 5 psi at the pump inlets in the remote gearbox at altitudes above 22,000 feet. Pressure is supplied by engine bleed air that is ducted from the main fuel supply system tank pressurization line. Air from this source is constantly available to the gearboxes and generators through an air pressure regulator which regulates the pressure between 7 and 9 psi. At altitudes below 22,000 feet, the overboard vent valve in the air supply system allows this air to be ducted overboard. Above 22,000 feet, the overboard vent valve closes to maintain the required 5 psi. The vent valve incorporates a pressure relief valve and a vacuum relief to prevent excessive positive or negative pressure buildup within the system. Pressurization air is also supplied to the generators to prevent oil leaking past the generator seals and to vent oil vapor overboard.

9-7. CONSTANT-SPEED DRIVE GENERATOR PRESSURIZATION.

Air and oil in remote gearbox forms an oil mist during gearbox operation. This oil mist lubricates the drive gears and drive-end bearings of all generators. Anti-drive end bearings of all generators are sealed. To keep the oil mist from entering and contaminating AWCIS generators, air pressure (purge air) at slightly above the remote gearbox air pressure is applied to the anti-drive end of both AWCIS generators. The purge air and oil vapors exhaust at the drive end of the generators. The fuel pressurization system air manifold is the air source for the generator pressurization (purge air) system. Before the manifold air enters the generator pressurization system, the pressure is regulated to a pressure of 7 to 9 psi by the air pressure regulator. *Applicable to F-106A airplanes 57-246 thru 57-2503, and F-106B airplanes 57-2516 thru 57-2522, 57-2524 thru 57-2530 prior to incorporation of TCTO 1F-106-597.* Purge air is applied to all generators on the remote gearbox, and in turn exhausts through a vent tube just aft of the remote gearbox access door. *Applicable to F-106A airplanes 56-453, -454, -463 thru 56-466, 57-230 thru 57-245, 57-2465, 57-2504 and subsequent; and 57-246 thru 57-2503 after incorporation of TCTO 1F-106-597. Applicable to F-106B airplanes 57-2508 thru -2515, -2523, 57-2531 and subsequent; and all other F-106B airplanes after incorporation of TCTO 1F-106-597.* Purge air is not applied to primary generators. Oil or vapors that may leak past the generator drive end seal are vented and drained through a tube at the bottom of the drive end of the generator. AWCIS generators have purge air applied. Purge air from AWCIS generators and oil from primary generators exhaust from a generator purge air and oil drain manifold on the bottom of the remote gearbox. Tubes from the generators carry purge air and oil to the drain manifold. The drain manifold mates with a generator purge air and oil drain manifold adapter when the remote gearbox access door is closed. Loosening the studs of the pad B generator may cause the oil drain manifold to move slightly. Realignment of the drain manifold and drain manifold adapter is accomplished by manual positioning of the adapter.



NOTES

1. *APPLICABLE TO F-106A AIRPLANES 56-453, 56-454, 56-456 THRU 57-2465, AND F-106B AIRPLANES 57-2516 THRU 57-2523.*
2. *APPLICABLE TO F-106A AIRPLANES 56-453, 56-454, 56-456 THRU 57-245, 57-2466 AND SUBSEQUENT: AND F-106B AIRPLANES 57-2508 THRU 57-2515, 57-2524 AND SUBSEQUENT.*
3. *APPLICABLE AFTER INCORPORATION OF TCTO 1F-106-533.*
4. *APPLICABLE AFTER INCORPORATION OF TCTO 1F-106-725.*

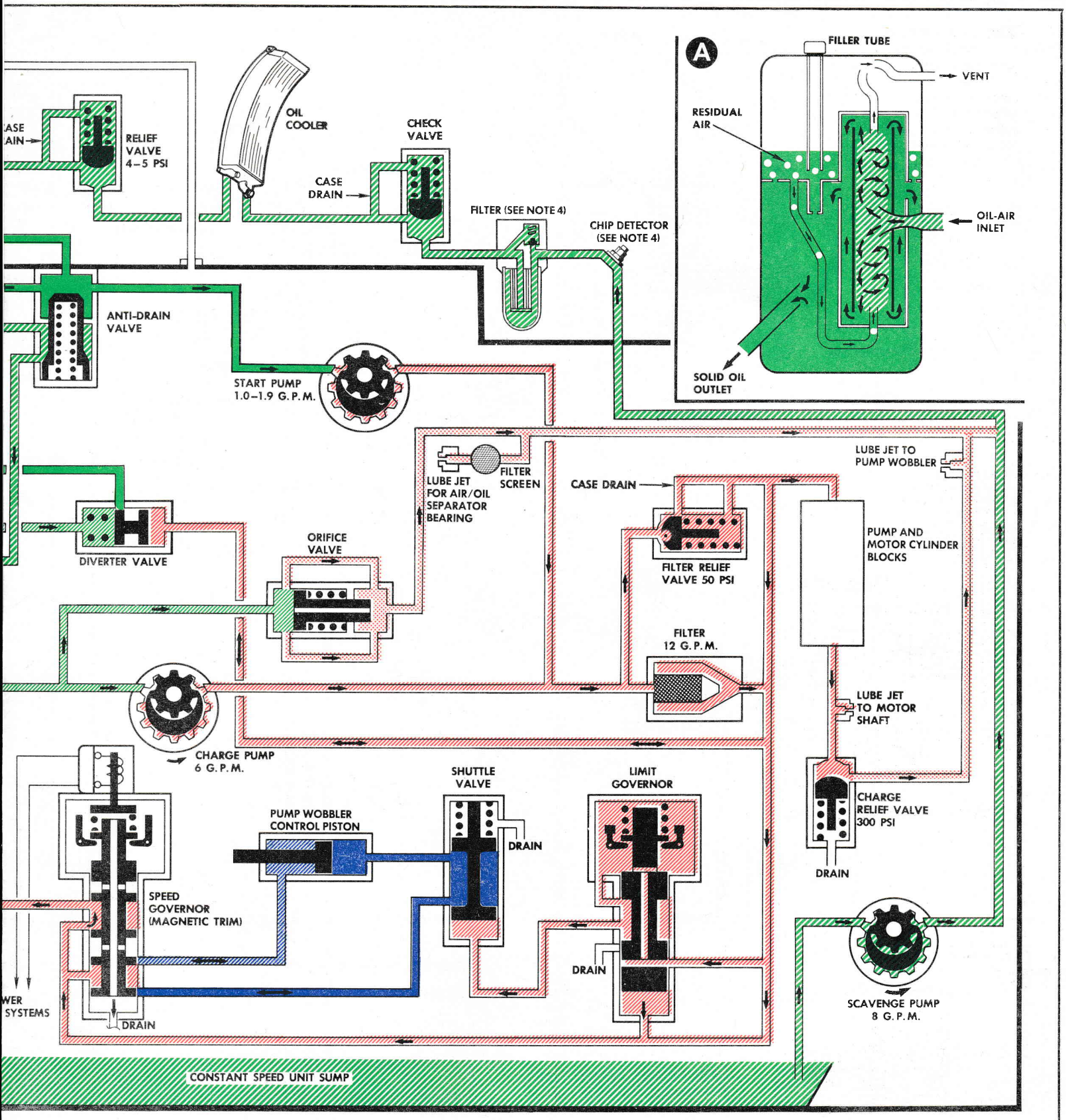
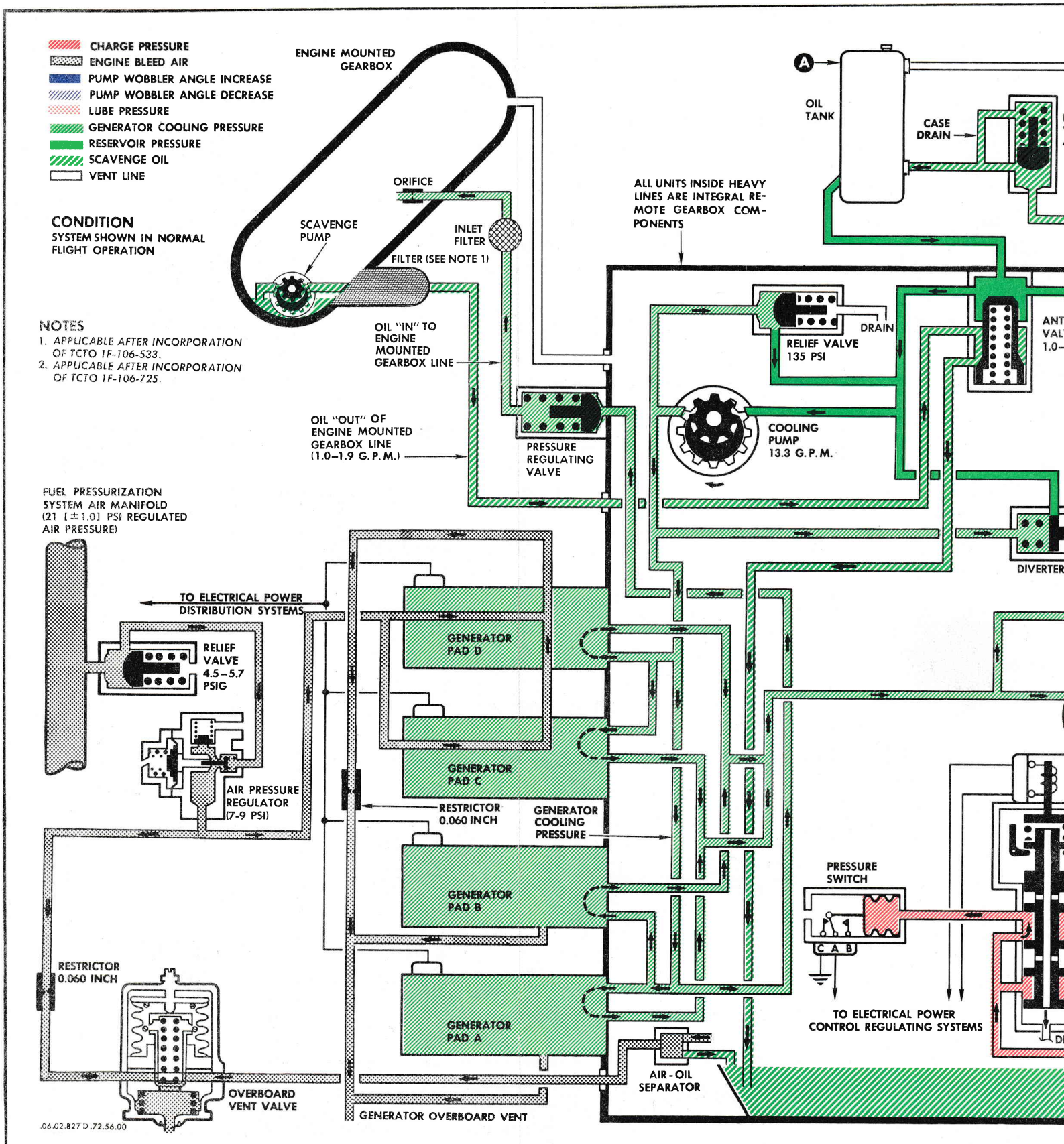


Figure 9-1. Constant-Speed Drive System Schematic
Applicable to F-106A airplanes 57-246 thru 57-2503, and F-106B airplanes 57-2516 thru -2522, -2524 thru 57-2531 prior to incorporation of TCTO 1F-106-597


CHARGE PRESSURE
ENGINE BLEED AIR
PUMP WOBBLER ANGLE INCREASE
PUMP WOBBLER ANGLE DECREASE
LUBE PRESSURE
GENERATOR COOLING PRESSURE
RESERVOIR PRESSURE
SCAVENGE OIL
VENT LINE
CONDITION
SYSTEM SHOWN IN NORMAL FLIGHT OPERATION
NOTES
1. APPLICABLE AFTER INCORPORATION OF TCTO 1F-106-533.
2. APPLICABLE AFTER INCORPORATION OF TCTO 1F-106-725.
ENGINE MOUNTED GEARBOX
SCAVENGE PUMP
ORIFICE
INLET FILTER
FILTER (SEE NOTE 1)
OIL "IN" TO ENGINE MOUNTED GEARBOX LINE
OIL "OUT" OF ENGINE MOUNTED GEARBOX LINE (1.0–1.9 G.P.M.)
PRESSURE REGULATING VALVE
ALL UNITS INSIDE HEAVY LINES ARE INTEGRAL REMOTE GEARBOX COMPONENTS
A
OIL TANK
CASE DRAIN
DRAIN
RELIEF VALVE 135 PSI
COOLING PUMP 13.3 G.P.M.
DIVERTER
FUEL PRESSURIZATION SYSTEM AIR MANIFOLD (21 [±1.0] PSI REGULATED AIR PRESSURE)
TO ELECTRICAL POWER DISTRIBUTION SYSTEMS
RELIEF VALVE 4.5–5.7 PSIG
AIR PRESSURE REGULATOR (7-9 PSI)
GENERATOR PAD D
GENERATOR PAD C
GENERATOR PAD B
GENERATOR PAD A
RESTRICTOR 0.060 INCH
GENERATOR COOLING PRESSURE
PRESSURE SWITCH
C A B
TO ELECTRICAL POWER CONTROL REGULATING SYSTEMS
RESTRICTOR 0.060 INCH
OVERBOARD VENT VALVE
AIR-OIL SEPARATOR
GENERATOR OVERBOARD VENT
.06.02.827 D .72.56.00

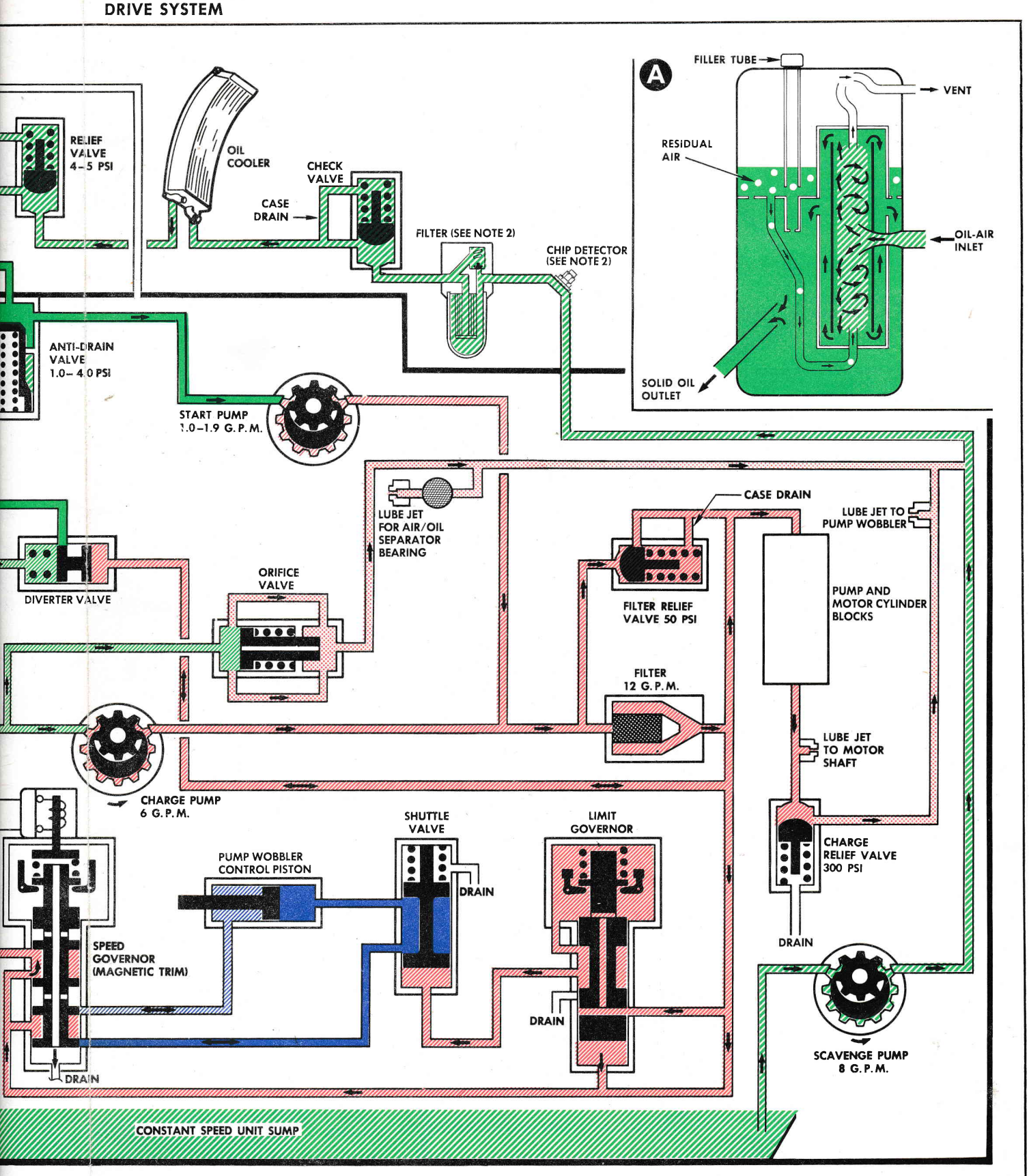


Figure 9-2. Constant-Speed Drive System Schematic

Applicable to F-106A airplanes 56-453, -454, -463 thru 56-466, 57-230 thru 57-245, 57-2465, 57-2504 and subsequent; and 57-246 thru 57-2503 after incorporation of TCTO 1F-106-597. Applicable to F-106B airplanes 57-2508 thru -2515, -2523, 57-2531 and subsequent; and all other F-106B airplanes after incorporation of TCTO 1F-106-597

OPERATIONAL CHECKOUT

9-8. OPERATIONAL CHECKOUT, CONSTANT-SPEED GENERATOR DRIVE SYSTEM.

Operational checkout of the constant-speed generator drive system is performed during engine ground run. Refer to Section I for ground run procedures. Refer to T.O. 1F-106A-2-10 for electrical system checks to be performed during operation.

CAUTION

A positive flow of oil must be maintained through the constant-speed drive system at all times. Refer to paragraph 9-27 for lubrication and servicing information.

SYSTEM ANALYSIS

9-9. SYSTEM ANALYSIS, CONSTANT-SPEED GENERATOR DRIVE SYSTEM.

NOTE

Refer to T.O. 1F-106A-2-10 for electrical component system analysis.
Refer to paragraph 9-10 in this manual for MC2 test stand criteria.

PROBABLE CAUSE	ISOLATION PROCEDURE	REMEDY
ONE ELECTRICAL POWER WARNING LIGHT EXTINGUISHED; ONE ILLUMINATED.		
Electrical malfunction.	Manually reset generating system at cockpit control panel.	If trouble persists, refer to T.O. 1F-106A-2-10 for electrical system troubleshooting.
BOTH ELECTRICAL POWER WARNING LIGHTS ILLUMINATED AFTER SYSTEMS ARE RESET.		
	NOTE If malfunction is accompanied by severe remote gearbox vibration and noise at idle rpm, replace remote gearbox. Do not replace the remote gearbox until any trouble source external to the remote gearbox has been corrected.	
Sheared or frozen remote gearbox charge and scavenge pump drive shaft.	Malfunction will be evidenced by oil flow out of remote gearbox overboard vent port during operation.	Remove TRGB and comply with MC2 test stand criteria.
Low constant-speed system oil level.	Check tank oil level.	Service as required.
Interconnecting drive shaft not connected.	Check for shaft installation.	
Defective or kinked oil lines.	Check line condition and installation.	Adjust or replace as required.
Electrical malfunction.	Refer to T.O. 1F-106A-2-10 for isolation procedures.	
Air entering the 1 inch remote gearbox oil line.	Check line connections.	Tighten or replace as required.

9-9. SYSTEM ANALYSIS, CONSTANT-SPEED GENERATOR DRIVE SYSTEM (CONT).

PROBABLE CAUSE	ISOLATION PROCEDURE	REMEDY
BOTH ELECTRICAL POWER WARNING LIGHTS ILLUMINATED AFTER SYSTEMS ARE RESET (CONT).		
Malfunctioning remote gearbox anti-drain valve.	Remove 1 inch oil inlet line. Depress plunger inlet port. Plunger should offer only slight resistance to movement and should return to closed position when released.	Replace or clean valve if action is defective.
Sheared engine mounted gearbox shaft or engine mounted gearbox scavenge pump malfunctioning.	Remove drive shaft and disconnect 0.25 inch oil "OUT" line at engine mounted gearbox. Drain oil from engine mounted gearbox; reprime with ½ pint of oil, Military Specification MIL-L-7808. Air motor engine. If oil issues from gearbox oil port, scavenge pump is satisfactory. If gearbox splined stub shaft rotates, shear sections are intact.	Replace engine mounted gearbox if oil does not flow from oil "OUT" port. If EMGB output shaft is sheared, replace EMGB. If input shaft is sheared, remove EMGB and comply with MC2 test stand criteria.
Defective remote gearbox cooling pump.	Disconnect engine mounted gearbox oil in line at quick disconnect fitting. Drain EMGB and prime with ½ pint of oil, Military Specification MIL-L-7808. Start airplane engine; advance throttle to idle and shut down immediately, at same time depress fitting on end of oil in hose.	If oil does not flow from fitting, replace remote gearbox and comply with MC2 test stand criteria.
Malfunctioning remote gearbox charge relief valve.	Remove and inspect valve components.	Replace or clean valve if action is defective.
Internal malfunction.	This may be assumed when the above items do not locate trouble.	Replace remote gearbox and comply with MC2 test stand criteria.
OIL LEAKAGE DURING OPERATION.		
Defective seal or sheared preformed packing.	Motor engine and locate leak. **NOTE** Remote gearboxes with No. Aerno 48-0558 may normally leak some oil overboard after engine shutdown.	Replace seals or preformed packing, if accessible. If not, remove gearbox and comply with MC2 test stand criteria.
OIL LEAKAGE AT GENERATOR OVERBOARD VENT DURING OPERATION.		
Oil passing generator drive end (air-oil mist) seal (no oil passing through system aneroid vent).	Leakage past drive end (air-oil mist) seal can be caused by: 1. Overfilling of CSD oil system (refer to paragraph 9-28) plus an obstruction in vent system. If oil system has been properly serviced and vent system is clear of obstructions, disconnect vent lines at generators while engine is running. If generator(s) is still leaking, see items 2 and 3.	

9-9. SYSTEM ANALYSIS, CONSTANT-SPEED GENERATOR DRIVE SYSTEM (CONT).

PROBABLE CAUSE	ISOLATION PROCEDURE	REMEDY
OIL LEAKAGE AT GENERATOR OVERBOARD VENT DURING OPERATION (CONT).		
	2. Defective drive end (air-oil mist) seal.	Replace generator.
	3. Failure of cooling oil seal or internal remote gearbox drive malfunction plus obstruction in vent system. Check for obstruction in vent system.	Replace generator and/or gearbox.
Rupture of generator oil passage (no oil passing through system aneroid vent).	Disconnect vent lines at generators while engine is operating to isolate the leaking generator.	Replace defective generator.
OIL LEAKAGE AT OVERBOARD VENT DURING SHUTDOWN.		
System oil tank overfilled.	Check oil level on constant-speed drive oil tank filler dipstick. Tank should never be overfilled.	Drain remote gearbox sump. Insure system oil tank is not overfilled.
System oil tank filled too rapidly allowing oil to collect in top compartment of tank and flow into remote gearbox through the vent line.	This condition is evidenced when an empty tank requires more than 9½ quarts to fill it.	Fill system oil tank slowly in future (approximately 1 quart every 30 seconds). Drain remote gearbox.
Malfunctioning remote gearbox anti-drain valve.	Disconnect oil in from tank quick disconnect. If dripping stops, anti-drain valve was leaking.	Remove quick disconnect from tank boss. Remove anti-icing valve assembly from gearbox and inspect for foreign particles or defective O-ring seal on plunger. Check to insure that color code on O-ring seal does not face outside but faces into O-ring seal groove. Replace O-ring seal with *correct* O-ring seal as required. Clean and reinstall anti-drain valve. Drain remote gearbox sump.
Malfunctioning check valve.	Disconnect oil out to cooler quick disconnect. If dripping stops drain oil cooler and oil out lines. Remove check valve from airplane. Examine for contamination. Stand valve on male end and fill female cavity with oil. Valve should not leak.	If check valve leaks, replace it. Contaminated valves may be cleaned (but not disassembled) and reused. Drain remote gearbox sump.
UNUSUAL NOISE IN DRIVE SYSTEM.		
Internal malfunction of a gearbox.	Remove drive shaft and motor engine to determine if noise is caused by engine mounted gearbox.	Replace affected gearbox.
IMPROPER AC GENERATOR FREQUENCY.		
Electrical malfunction.	Refer to T.O. 1F-106A-2-10 for isolation procedures.	

9-9. SYSTEM ANALYSIS, CONSTANT-SPEED GENERATOR DRIVE SYSTEM (CONT).

PROBABLE CAUSE	ISOLATION PROCEDURE	REMEDY
IMPROPER AC GENERATOR FREQUENCY (CONT).		
Oil supply low.	Check lubricating system oil supply.	
Oil filters clogged restricting oil flow.	Remove filters.	Clean filters.
Defective or kinked oil lines.	Check line condition and installation.	Adjust or replace as required.
Air entering the 1 inch remote gearbox oil line.	Check line connections.	Tighten or replace, as required.
Malfunctioning remote gearbox anti-drain valve.	Remove 1 inch oil inlet line. Depress plunger inlet port. Plunger should offer only slight resistance to movement and should return to closed position when released.	Replace or clean valve if action is defective.
Defective remote gearbox cooling pump.	Disconnect engine mounted gearbox oil in line at quick disconnect fitting. Drain engine mounted gearbox and reprime with ½ pint of oil, Military Specification MIL-L-7808. Motor engine and at same time depress fitting on end of oil in-hose.	If oil does not flow from fitting, replace remote gearbox and comply with MC2 test stand criteria on removed gearbox.
Malfunctioning remote gearbox charge relief valve.	Remove and inspect valve components.	Replace or clean valve if action defective.
Internal malfunction.	This may be assumed when the above items do not locate trouble.	Replace remote gearbox.
OIL CONSUMPTION RATE EXCEEDS 1 PINT PER HOUR.		
Remote gearbox sump has been drained since last engine run; dipstick reading after subsequent shutdown shows ½ to 1½ quarts low.	Check oil level.	Add oil to "FULL" mark.
Oil tank not filled after last flight or prolonged engine run.	Check oil level.	Fill oil tank to "FULL" mark.
Oil added to system at rate exceeding 1 quart every 30 seconds.	Check oil level.	Refer to paragraph 9-28 for servicing information.
Leak in oil system lines.	Check for leaks at all B-nuts and quick disconnect couplings.	Tighten and/or replace as required.
Check valve in oil OUT line in main wheel well or the anti-drain valve in remote gearbox is leaking.	Check valves as follows: Drain remote gearbox sump. Check magnetic drain plug for chips. Normal sump oil quantity varies between ½ to 1½ quarts. Disconnect remote gearbox 1 inch oil IN and OUT lines at the quick disconnect fittings. After oil stops dripping from sump drain port, connect oil IN line. If sump drain port starts dripping oil within 5 minutes, remove anti-drain valve.	Install replacement item.

9-9. SYSTEM ANALYSIS, CONSTANT-SPEED GENERATOR DRIVE SYSTEM (CONT).

PROBABLE CAUSE	ISOLATION PROCEDURE	REMEDY
OIL CONSUMPTION RATE EXCEEDS 1 PINT PER HOUR (CONT).		
	If no oil appears within 5 minutes disconnect oil IN line and connect oil OUT line. If sump drain port starts dripping oil within 5 minutes, remove check valve.	Install replacement item.
Remote gearbox scavenge sump shaft sheared.	If oil flows from the remote gearbox overboard vent during operation.	Remove TRGB and comply with MC2 test stand requirements.
Generator drive gear face seal is leaking.	If oil drips from remote gearbox overboard vent valve port during engine run or after shutdown, drain remote gearbox. Inspect generator gear seal face for nicks, or the bronze seals in gearbox for scoring or damage. If seals are scored or damaged, remove gearbox. If gear face is nicked or damaged, remove generator.	Install replacement item.
Defective seal at EMGB mating surfaces, input seal or starter mounting pad.	Check for oil in lower fuselage.	Remove EMGB. If leak is at mating surfaces, return to depot. If leak is at EMGB input seal or starter pad, comply with MC2 test stand criteria.
Defective or missing O-ring seals at generator mounting face.	Check for evidence of oil around generator mount pad.	Remove generator and install new seals. Refer to T.O. 1F-106A-2-10 for replacement procedure.
Generator leaking.	Check for evidence of leaking on generator surface, terminal strip, or excessive oil streaks on outside of fuselage behind to generator overboard vent. If leakage is found, drain remote gearbox and proceed as follows: If sump oil quantity is normal (½ to 1½ quarts), remove generator and check mounting face seals. If seals are satisfactory, the leak is inside the generator.	Replace generator.
	If sump oil quantity is more than 1½ quarts, check proceeding probable causes. In addition, disconnect air supply line to overboard vent and plug the vent valves air supply line port. Disconnect the remote gearbox overboard vent line at gearbox. Cup hand around flex line and blow by mouth. If no air comes from overboard vent valve port, remove valve.	Install replacement item.
	Install all disconnected lines. Wipe off generator case. Refill CSD oil tank. Start engine. If generator continues to leak, remove generator.	Install replacement item.

9-9. SYSTEM ANALYSIS, CONSTANT-SPEED GENERATOR DRIVE SYSTEM (CONT).

PROBABLE CAUSE	ISOLATION PROCEDURE	REMEDY
OIL CONSUMPTION RATE EXCEEDS 1 PINT PER HOUR (CONT).		
CSD generator pressurization system malfunction.	See next probable cause.	
CSD GENERATOR PRESSURIZATION SYSTEM MALFUNCTION.		
Faulty connection or leaking line.	Check all connections and lines.	Tighten or replace as necessary.
Air pressure regulator malfunction (outlet pressure below 7 psi).	Check pressure at inlet of regulator. If inlet pressure is above 10 psi, remove regulator.	Install replacement item.
Relief valve malfunction.	Check air pressure at valve outlet. Pressure shall be above 4.5 to 5.7 psi (normal pressure 21 ±1 psi from fuel pressurization manifold). If pressure is below 4.5 psi, remove valve.	Install replacement item.
	If pressure is below 21 ±1 psi, fuel pressurization system is not functioning properly. See next item.	
Fuel pressurization system malfunction.	Check fuel pressurization system. Refer to T.O. 1F-106A-2-5.	Correct as required.
AC AND DC POWER FAILURE WARNING LIGHTS ILLUMINATE AT ALTITUDE AND EXTINGUISH UPON DESCENT.		
Overboard vent valve malfunction.	Bench test valve.	Replace as necessary.
Air pressure regulator malfunction (outlet pressure below 7 psi).	Check pressure at regulator inlet. If above 10 psi, remove regulator.	Install replacement item.
Defective seal on constant-speed oil tank filler cap.	Check seal.	Replace seal if found defective.

9-10. CRITERIA FOR USE OF MC-2 TEST STAND FOR CHECKING TRANSMISSION REMOTE GEAR BOX (TRGB) AND ENGINE MOUNTED GEAR BOX (EMGB).

a. All tests will be made in accordance with T.O. 9H6-3-14-2.

NOTE

The following must be accomplished prior to each test:

1. Inspect and clean TRGB and EMGB filters and chip detector plugs.
2. Inspect TRGB three generator mounting pad holes. Contamination in this area is cause for rejection.
3. Check rotation of gear trains on TRGB and EMGB to assure free and even rotation.
4. Inspect TRGB and EMGB filters and chip detector plugs after completion of test. If unacceptable contamination is present, return units to depot; otherwise, return to service if units have passed all phases of test.

b. Test parameters are listed by paragraph with their respective conditions.

1. When the TRGB and/or EMGB are removed for contamination, test in accordance with paragraphs 4-10 through 4-45, T.O. 9H6-3-14-2.
2. When an ac-dc power loss occurs and failure of TRGB and EMGB is not evident, test TRGB in accordance with paragraphs 4-10 through 4-45 and EMGB in accordance with paragraphs 4-10 through 4-14.
3. When a cooling pump or charge and scavenge pump failure occurs, inspect for contamination as indicated preceding NOTE. Replace defective pump and perform test in accordance with paragraphs 4-10 through 4-20.
4. Test TRGB when low or no output rpm is encountered, provided generators are operating properly and CSD system prime was assured. Test in accordance with paragraphs 4-10 through 4-45.

5. Test TRGB when input seal or external "O" ring packings have been replaced. This applies to those cases where leakage cannot be corrected on aircraft. Test in accordance with paragraphs 4-10 through 4-14.
6. Test TRGB when EMBG output shaft shears, provided TRGB gear train rotates freely and evenly. Test in accordance with paragraphs 4-10 through 4-45.
7. Check and reset limit governor in event of nuisance trips. Test in accordance with paragraph 4-54.
8. Check and reset magnetic trim (basic) governor when TRGB will not govern any output from one or more generators. Test in accordance with paragraphs 4-46 through 4-53.
9. Test pressure switch when frequency and voltage are temporarily lost when loads are applied. Test in accordance with paragraphs 4-28 through 4-40.
10. Test EMBG when input shaft shears and gear train rotates freely. Replace input shaft and test in accordance with paragraphs 4-4, 4-10 through 4-14.
11. When EMGB is removed for contamination and failure of EMGB is not evident, test in accordance with paragraphs 4-10 through 4-14.
12. When leak occurs at EMGB input or starter pad seals, replace seals and test in accordance with paragraphs 4-10 through 4-14.

REPLACEMENT

9-11. REPLACEMENT, CONSTANT-SPEED DRIVE SYSTEM COMPONENTS.

9-12. Equipment Requirements.

FIGURE	NAME	TYPE	ALTERNATE	USE AND APPLICATION
9-3	Retractable Stand.	AF Type ETU-8/E (1740-294-3397)	8220-780800	To support remote gearbox during removal procedure.
	Adapter Kit.	8-96253 (for use with ETU-8/E) (1740-657-1185)	8-96024 (for use with 8220-780800)	To adapt remote gearbox to retractable stand.
	Constant Speed Remote Gearbox Hoist.	8-96044-1 (1730-788-4690)	8-96044 (1730-589-9469)	For lowering gearbox from the installed to the hanging position.
	Constant-Speed Shaft Release Tool.	8-96264 (4920-705-0190)		To aid removal of constant speed drive shaft.
	Sling.	8-96116 (1730-619-6576)		To be used to remove/install remote gearbox from/in retractable transport stand.

9-13. Procedure.

a. See figures 9-3 thru 9-9 for removal and installation of constant-speed drive system components. If the constant-speed remote gearbox is to be removed from the retractable stand following removal from the airplane, use the sling 8-96116.

NOTE

Applicable to F-106A airplanes 56-453, -454, 56-456 thru 57-245, 59-001 and subsequent, and F-106B airplanes 57-2508 thru 57-2515, 57-2542 and subsequent, the remote gearbox generator purge air line, vent to tank line, and overboard vent line are equipped with in-line swivel fittings. This eliminates the need for disconnecting these lines when swinging the remote gearbox to the hanging position.

CAUTION

Check that the generator electrical conduits do not chafe fuselage structure or the right elevon push-pull tube when raising or lowering the remote gearbox.

b. Conduct an operational checkout of the constant-speed system after completion of component replacement.

CAUTION

Remove remote gearbox hoist 8-96044-1 prior to operation of the flight control system.

9-14. REPLACEMENT, CONSTANT-SPEED REMOTE GEARBOX CHARGE RELIEF VALVE.

See figure 9-9 for replacement procedure.

9-15. REPLACEMENT, CONSTANT-SPEED REMOTE GEARBOX ANTI-DRAIN VALVE.

See figure 9-9 for replacement procedure.

9-16. REPLACEMENT, CONSTANT-SPEED REMOTE GEARBOX PRESSURE SWITCH.

See figure 9-9 for replacement procedure.

9-17. REPLACEMENT, CONSTANT-SPEED DRIVE SYSTEM GENERATORS.

Refer to T.O. 1F-106A-2-10 for replacement procedures.

NOTE

Exercise extreme care when installing the dc generator on pad "A" of the remote gearbox. Make sure the generator drive gear is in alignment with the idler gear of the remote gearbox and the generator mounting flange is flush against the remote gearbox mounting pad prior to installing the generator mounting nuts. Do not jam the generator against the remote gearbox mounting pad as damage to the remote gearbox idler gear and idler gear bearing will result.

CAUTION

Prevent contamination of the inside of the remote mounted gearbox while generators are removed by covering the mounting pads with noncorrosive paper. Absolute cleanliness must be maintained, as serious damage to the units can be caused by very small amounts of foreign matter. Generator pad covers should be installed if generators are removed for extended maintenance periods.

9-18. REPLACEMENT, CONSTANT-SPEED DRIVE GENERATOR PRESSURIZATION SYSTEM AIR PRESSURE REGULATOR.

See figure 9-7 for replacement procedure.

9-19. REPLACEMENT, CONSTANT-SPEED DRIVE OVERBOARD VENT VALVE.

See figure 9-8 for replacement procedure.

9-20. REPLACEMENT, CONSTANT-SPEED REMOTE GEARBOX LIMIT GOVERNOR.

See figure 9-10 for replacement procedure.

9-21. REPLACEMENT, CONSTANT-SPEED REMOTE GEARBOX MAGNETIC TRIM (BASIC) GOVERNOR.

See figure 9-10 for replacement procedure.

9-22. REPLACEMENT, ENGINE MOUNTED GEARBOX OIL OUT PORT FILTER.

See figure 9-16 for replacement procedure.

ADJUSTMENT

9-23. ALIGNMENT CHECK, CONSTANT-SPEED REMOTE GEARBOX.

Alignment checking of the constant-speed remote gearbox is required only after suspected structural damage, or after completion of structural modification.

9-24 Equipment Requirements.

FIGURE	NAME	TYPE	ALTERNATE	USE AND APPLICATION
9-11	Alignment Gage, Constant-Speed Drive Shaft.	8-96090 (5220-601-9973)		To check alignment between constant-speed drive unit and engine mounted gear box.

9-25. Preparation.

a. Check alignment gage 8-96090 for damage or distortion, and for recent calibration.

CAUTION

The constant-speed drive unit alignment gage is a precision optical instrument and must be handled with extreme care.

b. Open constant-speed unit access doors. Check constant-speed unit for proper installation and security; hinge and support fittings for wear.

c. Check engine mount fittings for condition and installation; engine centered in tail cone.

d. Check that the airplane is in a normal groundborne attitude.

9-26. Procedure.

See figure 9-11 for the alignment procedure for the constant-speed drive remote gearbox.

SERVICING

9-27. DRAINING AND PRIMING CONSTANT-SPEED OIL SYSTEM.

See figure 9-12 for the oil system draining and priming procedure. As an alternate priming procedure, if priming equipment is not available, perform the following:

a. Insure that constant-speed drive shaft and cover are properly installed and safetied.

b. Fill oil tank to "FULL" mark with oil, Military Specification MIL-L-7808. Refer to paragraph 9-28 for servicing procedure.

c. Check that oil is available at the remote gearbox oil inlet by disconnecting the quick disconnect coupling and lowering the oil line to allow any air trapped in the line to escape to the tank.

d. Connect the oil "IN" line quick disconnect.

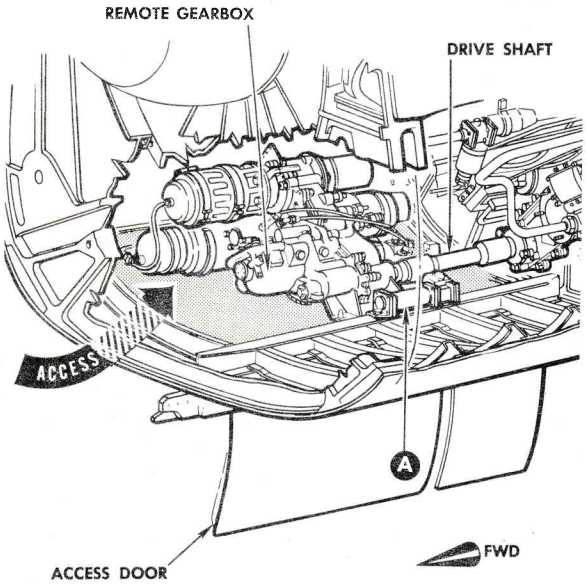
CAUTION

Improperly installed quick disconnect couplings can result in oil starvation and subsequent malfunction of the remote gearbox.

e. Disconnect the line at engine mounted gearbox vent port and pour ½ pint of oil, Military Specification MIL-L-7808, into gearbox. Connect vent line.

f. Attach ac voltmeter across terminals P_1 and P_2 on the ac generator mounted on pad B of the remote gearbox.

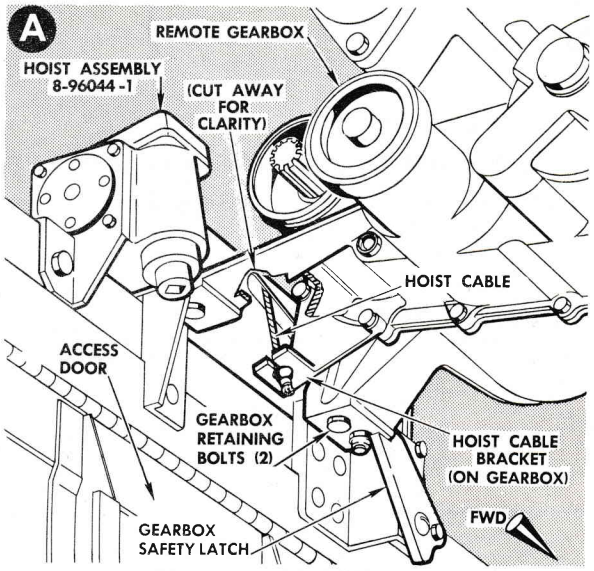
g. Start engine and accelerate to IDLE rpm, then shutdown engine immediately.



REMOVAL PREPARATION

a. Open constant speed access door on lower RH side of fuselage.

b. Remove drive shaft. See replacement, constant speed drive shaft for proper removal procedure.



c. Install hoist assembly 8-96044-1 at attachment point on inboard side of the access door frame.

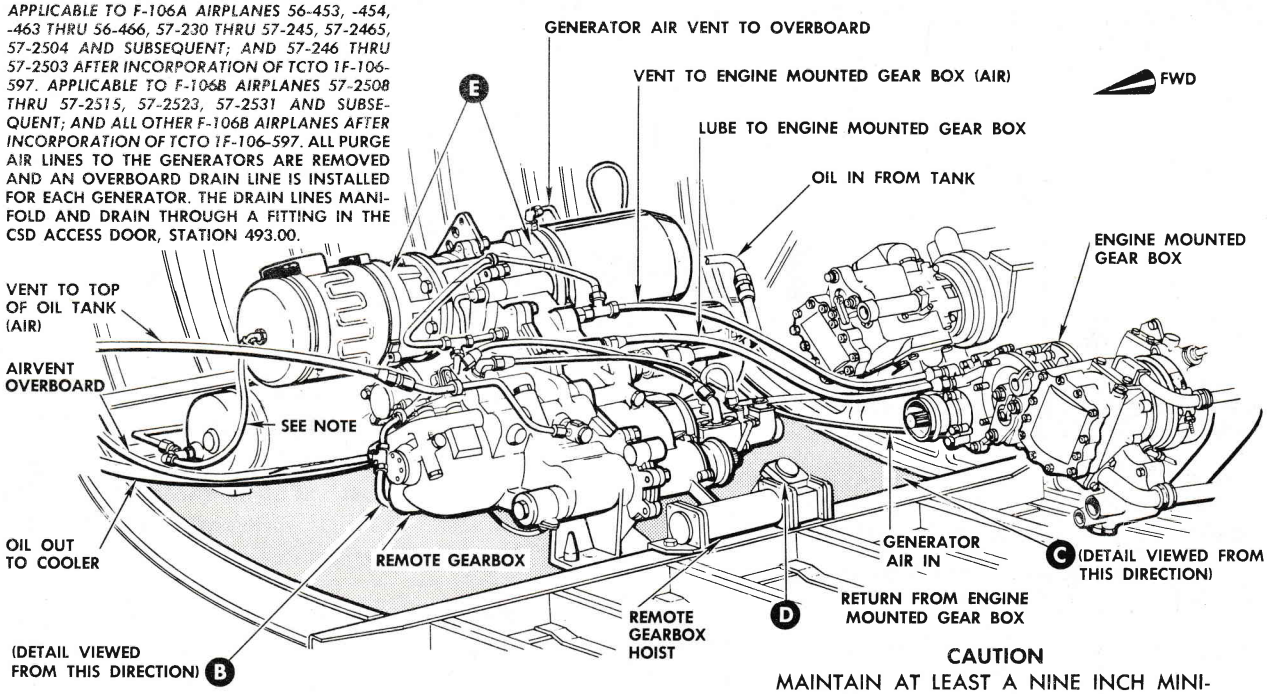
WARNING

USE HOIST ASSEMBLY 8-96044-1 TO MOVE THE REMOTE GEARBOX IN OR OUT OF THE FUSELAGE. REMOTE GEARBOX WITH FOUR GENERATORS INSTALLED WEIGHS 300 POUNDS.

d. Install hoist cable in drive unit cable attachment bracket.

NOTE

APPLICABLE TO F-106A AIRPLANES 56-453, -454, -463 THRU 56-466, 57-230 THRU 57-245, 57-2465, 57-2504 AND SUBSEQUENT; AND 57-246 THRU 57-2503 AFTER INCORPORATION OF TCTO 1F-106-597. APPLICABLE TO F-106B AIRPLANES 57-2508 THRU 57-2515, 57-2523, 57-2531 AND SUBSEQUENT; AND ALL OTHER F-106B AIRPLANES AFTER INCORPORATION OF TCTO 1F-106-597. ALL PURGE AIR LINES TO THE GENERATORS ARE REMOVED AND AN OVERBOARD DRAIN LINE IS INSTALLED FOR EACH GENERATOR. THE DRAIN LINES MANIFOLD AND DRAIN THROUGH A FITTING IN THE CSD ACCESS DOOR, STATION 493.00.



e. Disconnect oil and pressurization lines. See details "B" and "C."

CAUTION

MAINTAIN AT LEAST A NINE INCH MINIMUM BEND RADIUS FOR OIL INLET AND OUTLET FLEX LINES TO PREVENT DAMAGE TO LINES.

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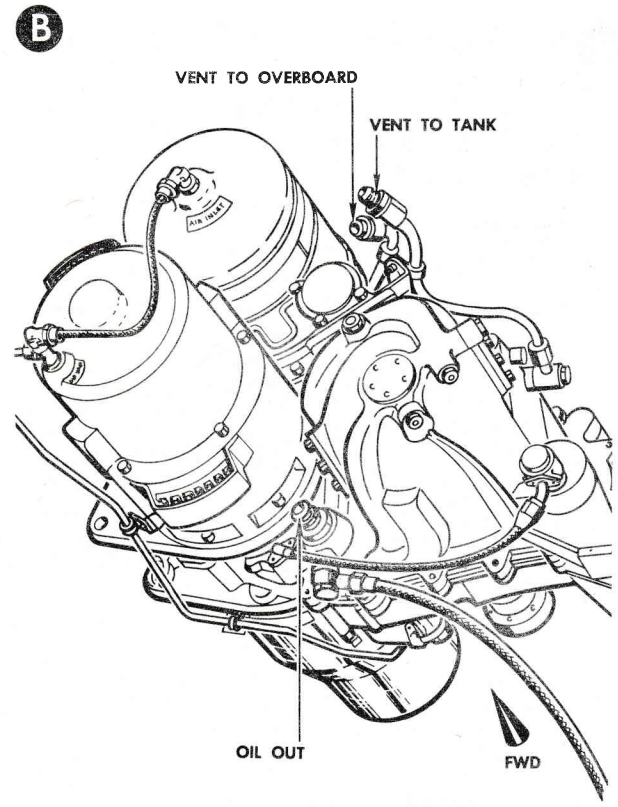
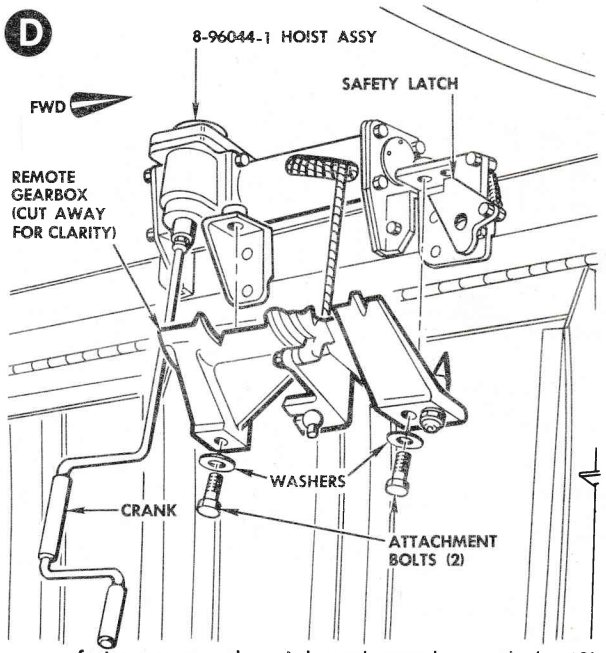
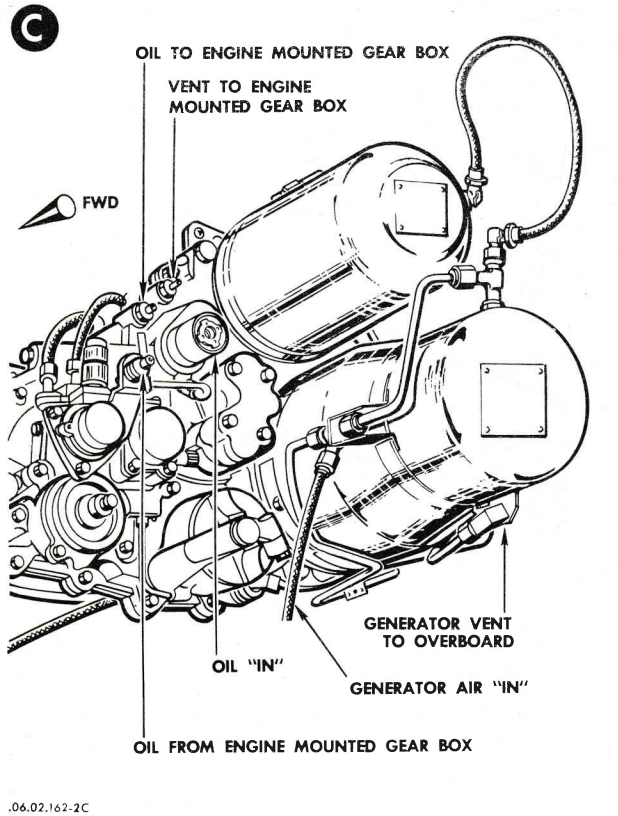
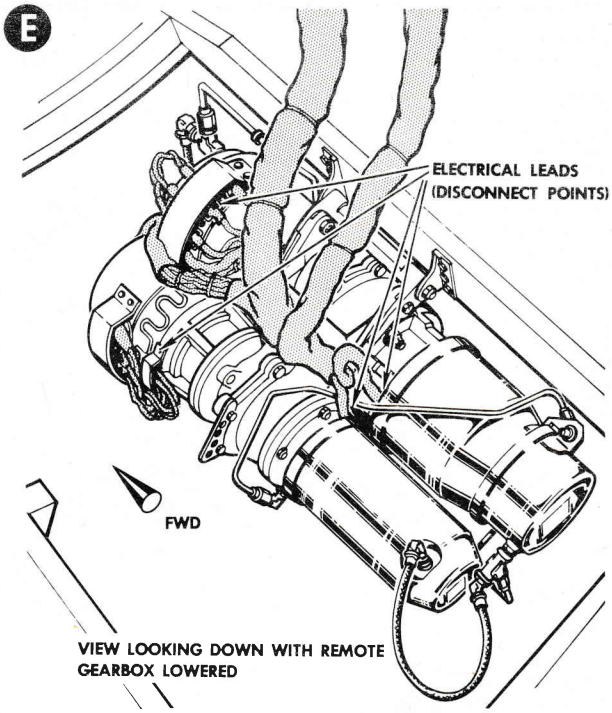
Figure 9-3. Replacement, Constant-Speed Remote Gearbox (Sheet 1 of 4)





f. Loosen gearbox inboard attachment bolts (2); remove bolts and washers.
g. Crank hoist assembly clockwise enough to permit tripping of gearbox safety latch.
h. Crank hoist assembly counterclockwise and allow gearbox to be lowered out of fuselage. Remove hoist cable.





i. Disconnect electrical leads from the generators. Tag each lead as it is removed from the generator terminal to insure proper reinstallation of all leads.

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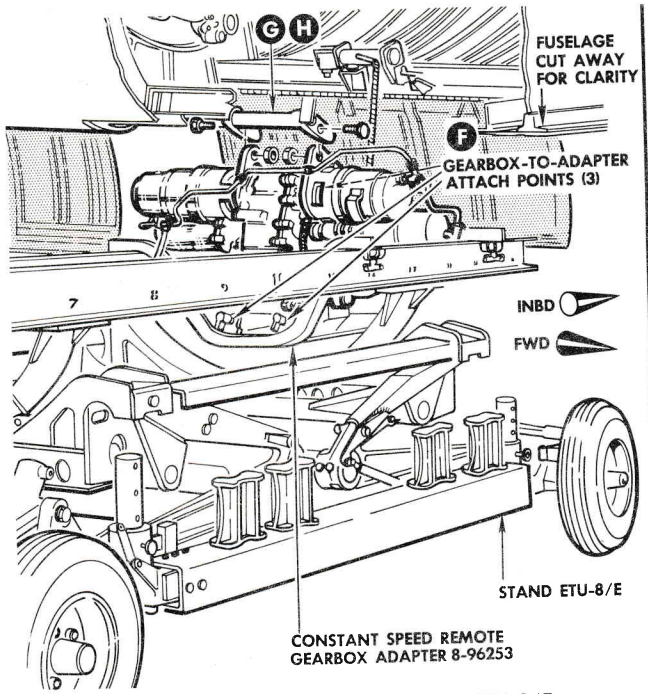
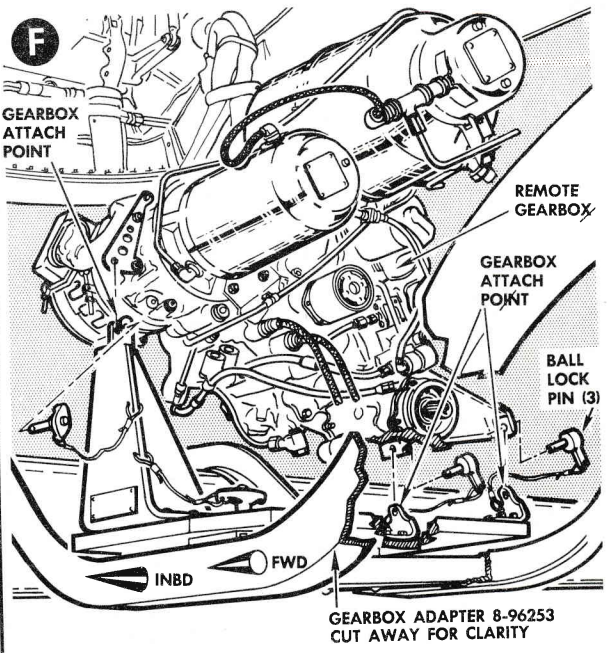
Figure 9-3. Replacement, Constant-Speed Remote Gearbox (Sheet 2 of 4)

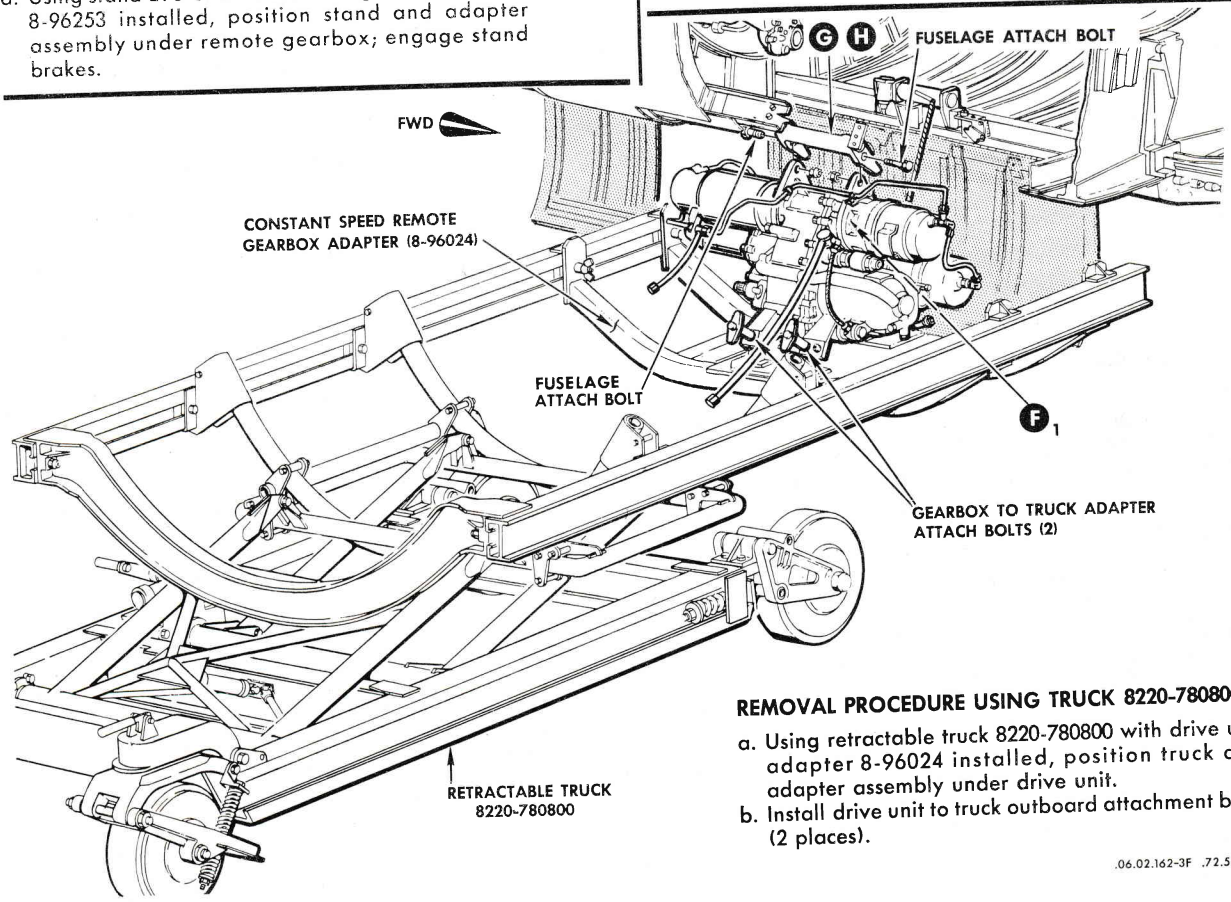


REMOVAL PROCEDURE USING STAND USAF ETU-8/E

a. Using stand ETU-8/E with remote gearbox adapter 8-96253 installed, position stand and adapter assembly under remote gearbox; engage stand brakes.



b. Install gearbox to stand attachment pins (3 places).
c. Remove gearbox to fuselage attachment bolts (2). Lower and move stand away from airplane. Refer to detail G.



REMOVAL PROCEDURE USING TRUCK 8220-780800

a. Using retractable truck 8220-780800 with drive unit adapter 8-96024 installed, position truck and adapter assembly under drive unit.
b. Install drive unit to truck outboard attachment bolts (2 places).

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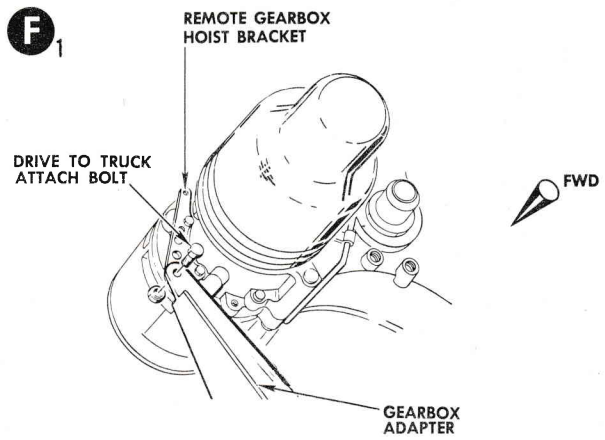
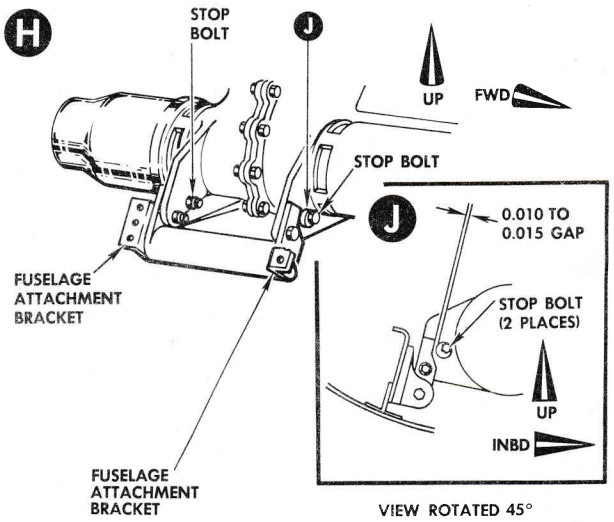
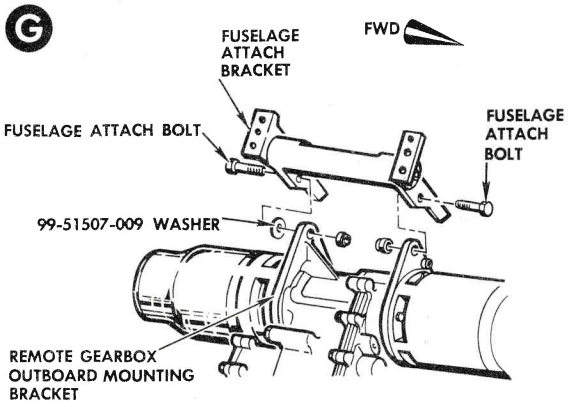
Figure 9-3. Replacement, Constant-Speed Remote Gearbox (Sheet 3 of 4)



c. Install drive unit to truck inboard attachment bolt (1 place).





d. Remove gearbox to fuselage attachment bolts; remove gearbox.

INSTALLATION

a. Install gearbox using essentially the reverse of removal procedure. See the engine mounted gearbox replacement procedure for correct interconnecting line and fitting installations.
b. Install washers No. 99-51507-009 between gearbox aft outboard mounting bracket and fuselage attaching bracket to maintain a maximum end play clearance of 0.015 inch.
c. Install constant speed interconnecting drive shaft. See Replacement, Constant Speed Drive Shaft for proper installation procedure.
d. After completion of gearbox installation, adjust stop bolts as shown in Detail J. Torque bolts 80 to 100 inch-pounds.

CAUTION

CHECK THAT QUICK DISCONNECT COUPLINGS ARE PROPERLY COUPLED. REFER TO SECTION I FOR QUICK DISCONNECT COUPLING INFORMATION.

MAINTAIN AT LEAST A NINE-INCH MINIMUM BEND RADIUS FOR REMOTE GEARBOX OIL IN AND OUT FLEX LINES TO PREVENT DAMAGE TO LINES. DO NOT TWIST OIL IN FLEX LINE WHEN CONNECTING QUICK DISCONNECT COUPLING. EXERCISE EXTREME CARE TO PREVENT GENERATOR HARNESS BUNDLE AND CONDUIT FROM CHAFING OR BINDING AGAINST FLIGHT CONTROL COMPONENTS OR AIRPLANE STRUCTURE.

e. Conduct filling and priming procedure as specified in this section of the manual.
f. Conduct engine ground run; perform drive unit operational checkout and check for possible oil filter leakage. Refer to Section I of this manual for the engine ground run procedure.
g. Start engine and operate at "IDLE" rpm. Within 10 seconds after reaching "IDLE" rpm and with external electrical power removed from airplane, energize the airplane electrical generating system, and check that the ac and dc power failure warning lights are extinguished. If lights are illuminated, terminate engine operation immediately and correct cause of malfunction. Refer to T. O. 1F-106A-2-10 for complete checkout procedure of the electrical generating system.

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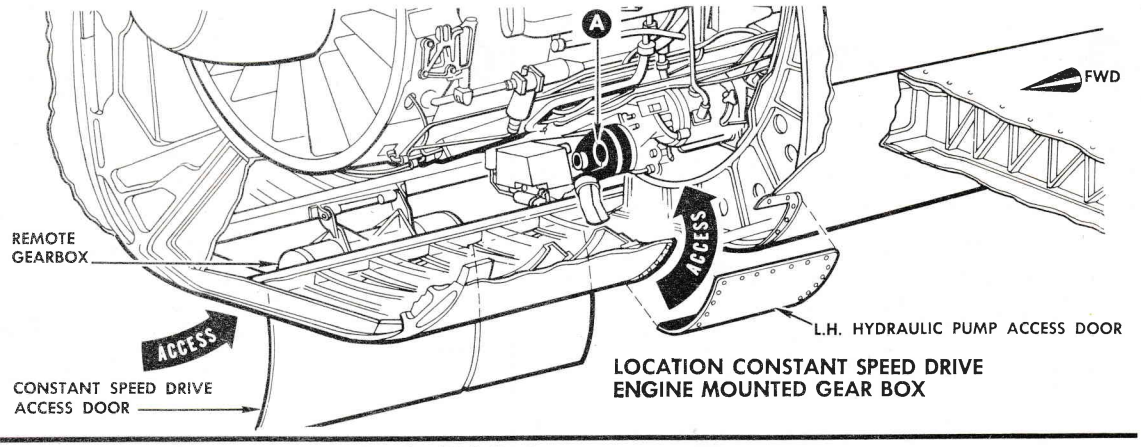
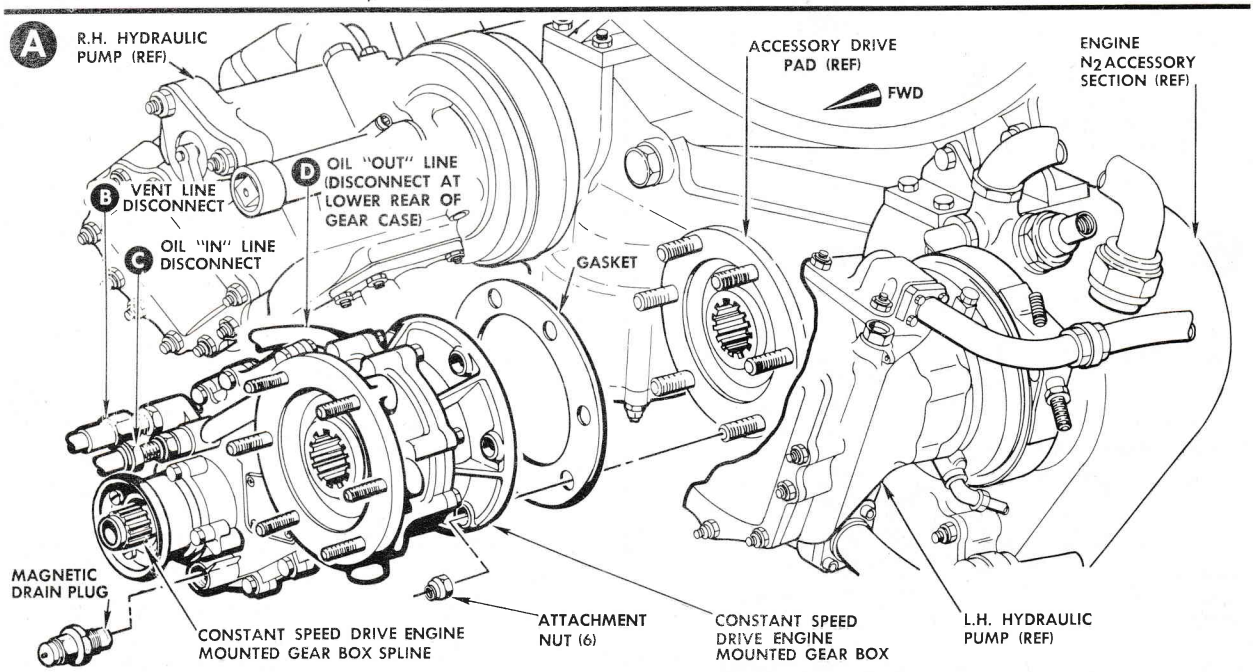
Figure 9-3. Replacement, Constant-Speed Remote Gearbox (Sheet 4 of 4)



LOCATION CONSTANT SPEED DRIVE ENGINE MOUNTED GEAR BOX



REMOVAL

a. Open constant speed drive access door in lower right-hand side of fuselage.
b. Remove interconnecting drive shaft. See replacement, constant speed drive shaft, for proper drive shaft removal procedure.
c. Lower constant speed remote gearbox out of fuselage; do not disconnect gearbox from suspension point.
d. Remove engine starter.
e. Disconnect engine mounted gearbox oil lines at quick-disconnect fittings.
f. Disconnect vent line at gearbox.
g. Remove gearbox attachment nuts (6). Move gearbox forward and remove.

INSTALLATION

a. Installation is essentially the reverse of removal. Coat gear box shaft and mating spline with grease, Specification MIL-G-3545 prior to installation.
b. Use new gasket coated with oil, Specification MIL-L-7808, between EMGB and accessory drive pad.

NOTE

Only 5 attaching nuts required on newly configured gearboxes (gearboxes with heavier "beefed up" housings). Nut to be eliminated is in the 9 o'clock position looking aft and at front of gearbox.

c. Install constant speed drive shaft. See replacement, constant speed drive shaft for proper installation procedure.
d. Conduct filling and priming procedure of the constant speed oil system as specified in this section of the manual.
e. Conduct engine ground run; check drive unit operational checkout and check for possible oil leakage. Refer to Section I for the engine ground run procedure.
f. Start engine and operate at "IDLE" rpm. Within 10 seconds after reading "IDLE" rpm and with external electrical power removed from airplane, energize the airplane electrical generating system, and check that the ac and dc power failure warning lights are extinguished. If lights are illuminated, terminate engine operation immediately and correct cause of malfunction. Refer to T.O. 1F-106A-2-10 for complete checkout procedure of the electrical generating system.

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Figure 9-4. Replacement, Constant-Speed Engine Mounted Gearbox (Sheet 1 of 2)

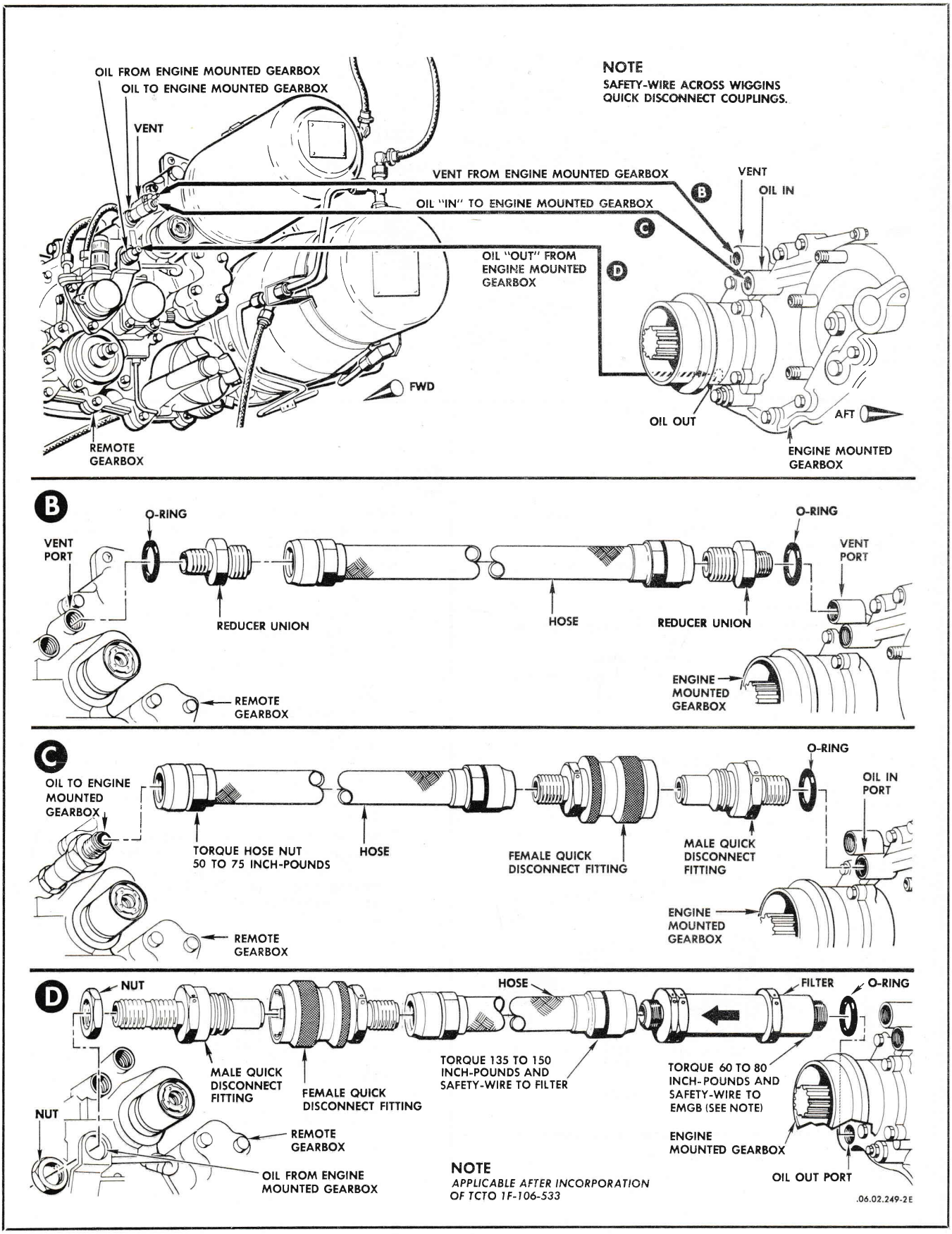
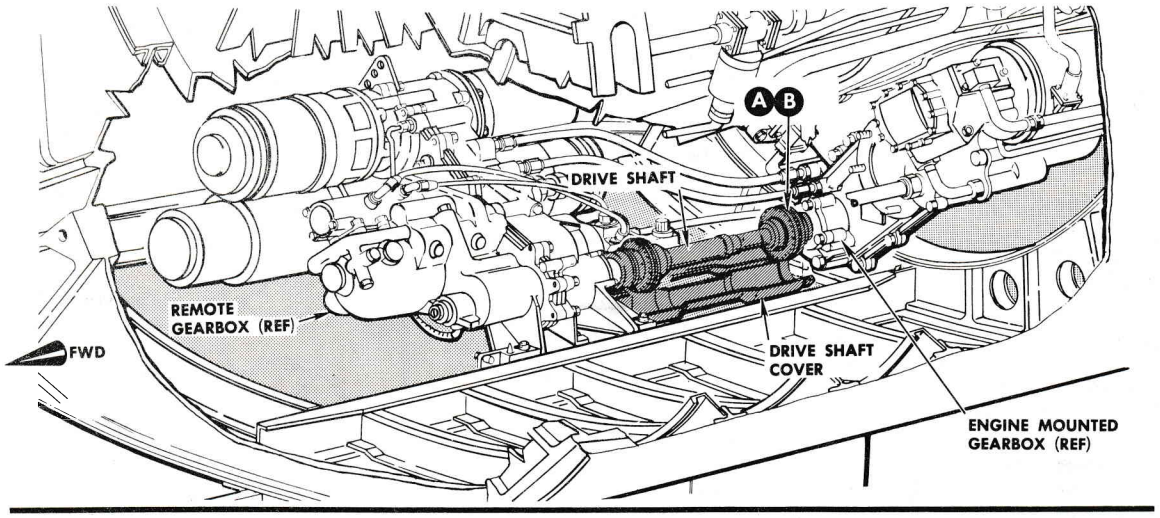


Figure 9-4. Replacement, Constant-Speed Engine Mounted Gearbox (Sheet 2 of 2)



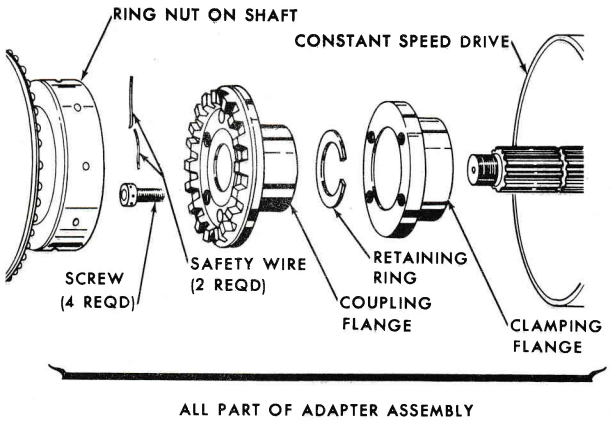
A REMOVAL

a. Open constant speed drive access door on lower right side of fuselage.
b. Remove drive shaft cover.
c. Remove interconnecting shaft and adapter assemblies as follows:

1. Remove safety wire.
2. Using spanner wrench U3501 loosen ring nuts.
3. Compress shaft and remove.
4. Loosen adapter attaching screws.
5. Remove retaining ring and remove adapters as assemblies.

CAUTION

DO NOT PRY, HAMMER, OR USE TOOLS THAT WILL IN ANY WAY CAUSE DAMAGE TO THE SHAFT.



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B INSTALLATION

a. Prior to drive shaft installation, check transmission remote gear box (TRGB) and engine mounted gear box (EMGB) drive splines for wear and play in support bearings (reference Figure 9-11, Details B and C for side play allowances).
b. Inspect and install the drive shaft assembly using the following procedure to ensure that the drive shaft is properly installed and secured at both the TRGB and EMGB.

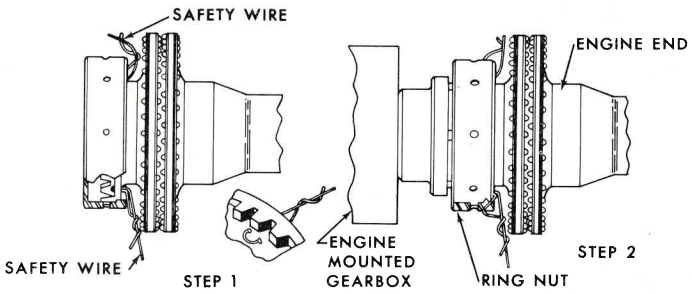
1. Using spanner wrench U3501 to engage the ring nuts on both ends of flexible power transmission shaft; unscrew adapter assemblies.
2. Apply a light coating of molybdenum disulfide grease (Military Specification MIL-G-21164) to the splines and the retaining ring groove.
3. Do not disassemble adapters, but install adapter as an assembly with adapter screws no more than finger tight insuring that retaining ring is positioned in the slot. This can readily be noticeable as retaining ring will snap lightly into place.

NOTE

THE ADAPTER ASSEMBLY IS AXIALLY LOOSE ON THE SPLINES AT THIS POINT. FURTHER TIGHTENING OF THE SCREWS WILL COLLAPSE THE RETAINING RING INTO THE RETAINING RING GROOVE OF THE CONSTANT SPEED DRIVE SPLINES. THUS, IT IS ESSENTIAL THAT THE RETAINING RING IS PROPERLY INSTALLED.

Figure 9-5. Replacement, Constant-Speed Drive Shaft (Sheet 1 of 2)

4. Tighten the screws progressively in clockwise sequence, taking up the slack and tightening no more than 1/4 additional turn each time. If this procedure is not carefully followed, the parts may jam and become damaged. Check the progress of positioning of the retaining ring by sliding the adapter assembly on the spline at frequent intervals.
5. Tighten the screws to a torque of 25 inch-pounds, and safety wire screws in pairs using 0.020 inch diameter stainless steel wire.
6. When the adapter assembly is properly positioned on the spline, a gap of approximately 0.091 inch exists between the clamping flange and coupling flange.
7. Follow steps 1 thru 5 for installing adapter assembly on opposite end.



8. Insert two pieces 0.032 inch diameter stainless steel wire (approximately 10 inches long (180 degrees apart, through the shaft coupling on each end of the shaft in the positions shown above.
9. Apply a light coating of molybdenum disulfide grease (Military Specification MIL-G-21164) to the curvic teeth on both shaft couplings of the flexible power transmission shaft.
10. Compress the flexible power transmission shaft and install between the adapter assemblies with the end marked "engine end" mounted on the engine mounted gear box.
11. Hand-start the ring nuts on the shaft, then, using spanner wrench Part No. U3501, tighten the ring nuts as tight as possible.
12. Complete the safety wiring installation by running one end of the safety wire through the approaching hole in the ring nut. Tie the safety wire together on top of the ring nuts. Repeat operation for second safety wire. Use same procedure for safety wiring opposite end.
13. Install cover assembly Part No. 647861-1A over the flexible power transmission shaft so that the clamp nuts are accessible from the bottom. Close cover, engage T-bolts and secure in place.

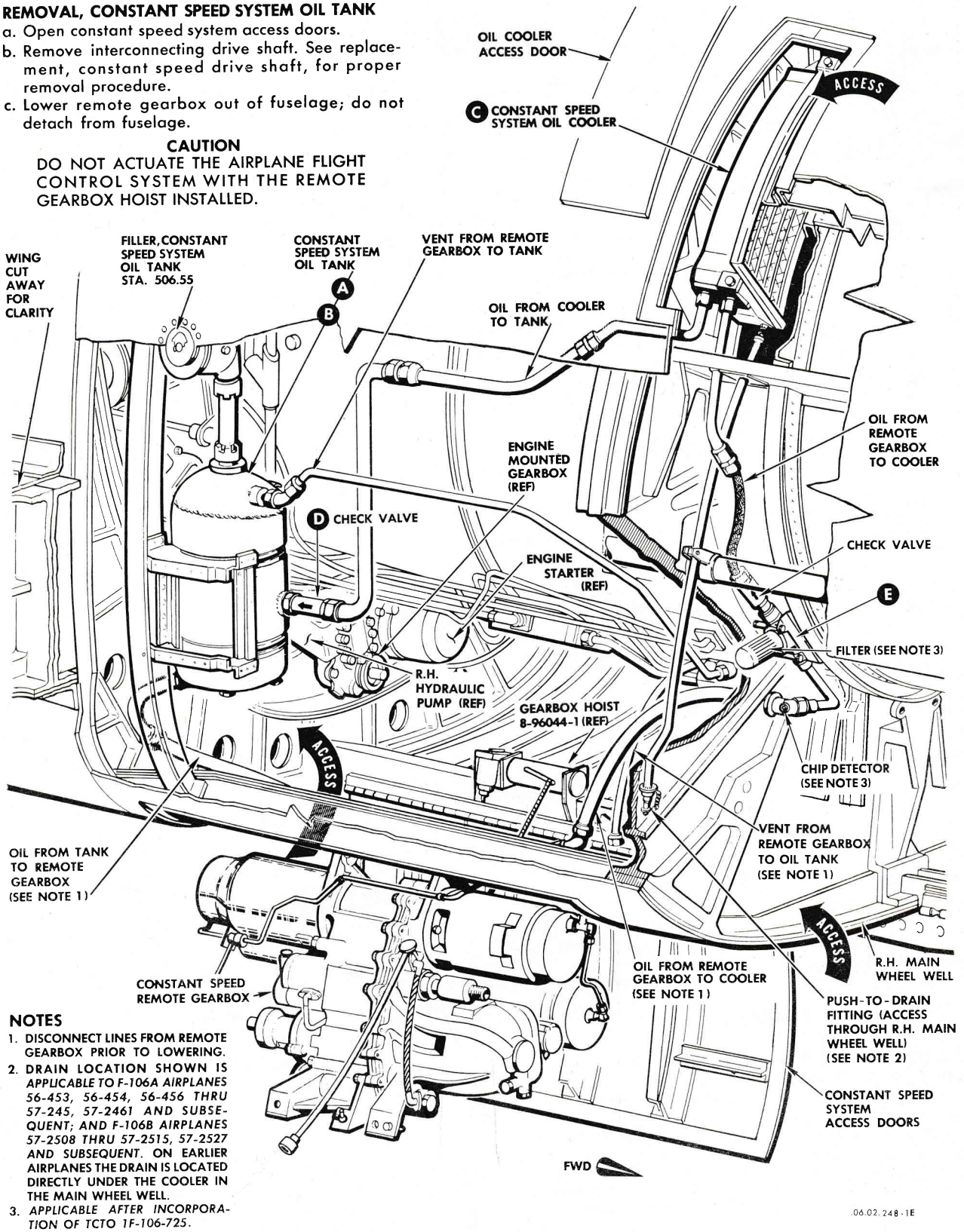
Figure 9-5. Replacement Constant-speed Drive Shaft (Sheet 2 of 2)

REMOVAL, CONSTANT SPEED SYSTEM OIL TANK

a. Open constant speed system access doors.
b. Remove interconnecting drive shaft. See replacement, constant speed drive shaft, for proper removal procedure.
c. Lower remote gearbox out of fuselage; do not detach from fuselage.

CAUTION

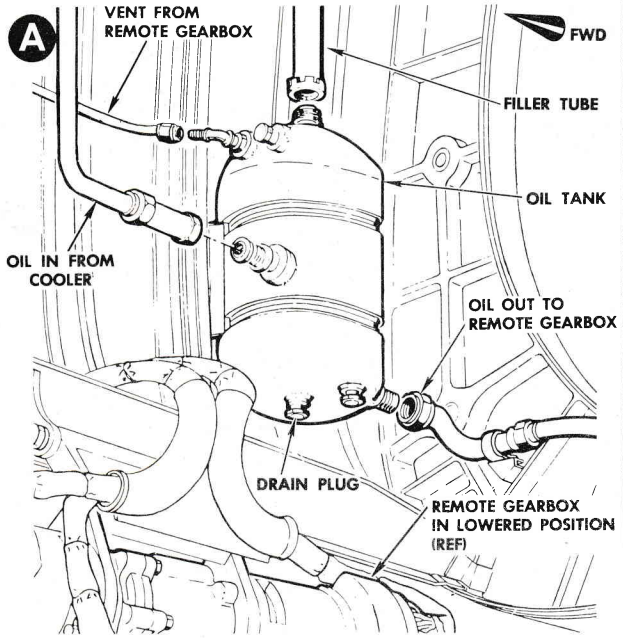
DO NOT ACTUATE THE AIRPLANE FLIGHT CONTROL SYSTEM WITH THE REMOTE GEARBOX HOIST INSTALLED.



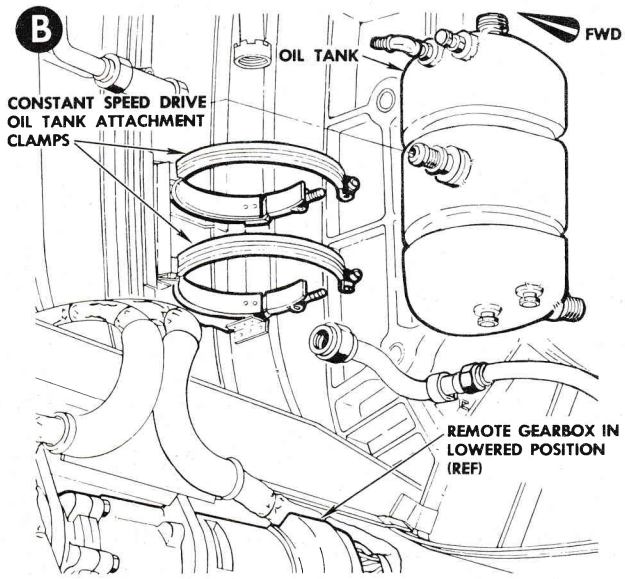
NOTES

1. DISCONNECT LINES FROM REMOTE GEARBOX PRIOR TO LOWERING.
2. DRAIN LOCATION SHOWN IS *APPLICABLE TO F-106A AIRPLANES 56-453, 56-454, 56-456 THRU 57-245, 57-2461 AND SUBSEQUENT; AND F-106B AIRPLANES 57-2508 THRU 57-2515, 57-2527 AND SUBSEQUENT.* ON EARLIER AIRPLANES THE DRAIN IS LOCATED DIRECTLY UNDER THE COOLER IN THE MAIN WHEEL WELL.
3. *APPLICABLE AFTER INCORPORATION OF TCTO 1F-106-725.*

Figure 9-6. Replacement, Constant-Speed Oil System Components (Sheet 1 of 3)



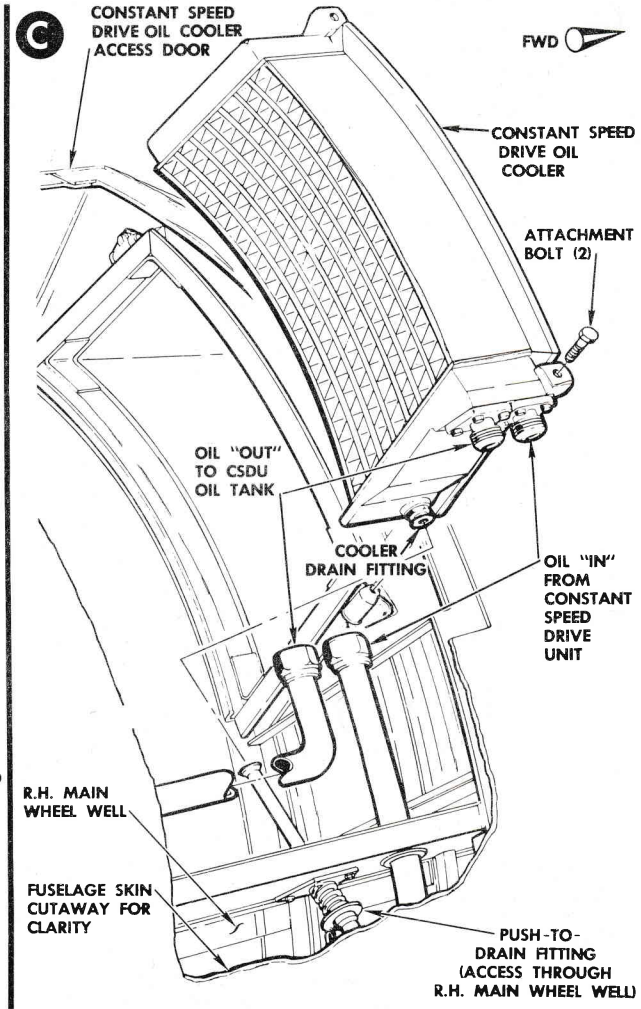
d. Provide receptacle and remove drive system oil tank drain in bottom of tank: drain oil.
e. Disconnect lines attached to tank.



f. Loosen straps (2) holding tank to structure; remove tank. Cap all lines.

INSTALLATION, CONSTANT SPEED DRIVE SYSTEM OIL TANK

a. Installation is essentially the reverse of removal.
b. Install remote gearbox and drive shaft.
c. Conduct filling and priming procedure as specified in this section of the manual.
d. Conduct engine ground run; check drive unit operational checkout and check for possible oil leakage. Refer to Section I for the engine ground run procedure.



REMOVAL, CONSTANT SPEED DRIVE SYSTEM OIL COOLER

a. Drain cooler at push-to-drain fitting in right-hand main wheel well.
b. Open cooler access door on upper right-hand surface of fuselage.
c. Disconnect cooler oil lines (2).
d. Remove cooler attachment bolts (2); slide cooler out of fuselage. Cover line openings.

INSTALLATION, CONSTANT SPEED DRIVE SYSTEM OIL COOLER

a. Installation is essentially the reverse of removal.
b. Conduct filling and priming procedure as specified in this section of the manual.
c. Conduct engine ground run; check drive unit operational checkout and check for possible oil leakage. Refer to Section I for the engine ground run procedure.

NOTE

OIL COOLER-TO-DUCT SEAL STRIPS ARE ATTACHED TO DUCTS USING SEALER A-4000 (8040-200-6414).

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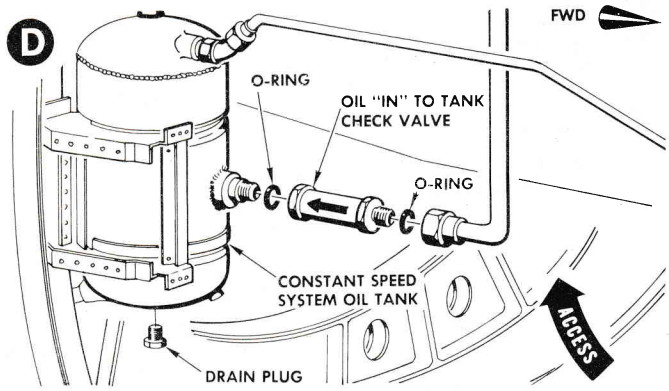
Figure 9-6. Replacement, Constant-Speed Oil System Components (Sheet 2 of 3)



REMOVAL, OIL "IN" TO TANK RELIEF VALVE

a. Open constant speed drive system access doors.
b. Remove interconnecting drive shaft. See replacement, constant speed drive shaft, for proper removal procedure.
c. Lower remote gear box out of fuselage; do not detach.
d. Provide receptacle and remove drain plug from bottom of oil tank; allow all oil to drain from tank.
e. Disconnect oil in from cooler line from relief valve; remove relief valve from fitting on oil tank.

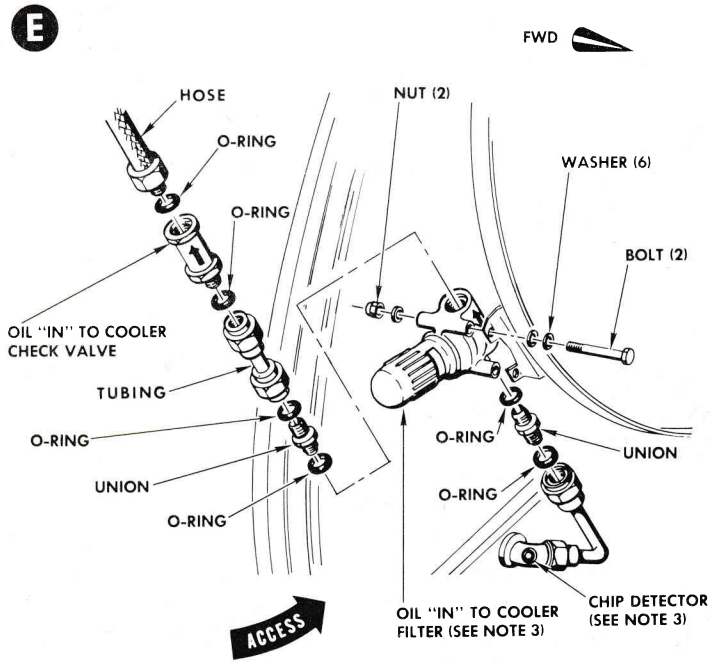
INSTALLATION, OIL "IN" TO TANK RELIEF VALVE

a. Installation is essentially the reverse of the removal procedure except new O-rings must be used and all fittings must be torqued as specified in Section I of manual.

CAUTION

MAKE CERTAIN THAT FREE FLOW (INDICATED BY ARROW STAMPED ON VALVE) IS IN THE DIRECTION OF THE OIL TANK.

b. Install remote gear box and drive shaft.
c. Conduct filling and priming procedure as specified in this section of manual.
d. Conduct engine ground run; perform drive unit operational checkout and check for leakage. Refer to Section I for engine ground run procedure.



REMOVAL, OIL "IN" TO COOLER FILTER

a. Disconnect tubing from inlet and outlet ports on filter head.
b. Remove unions from filter head and retain for reinstallation.
c. Remove nuts, washers, and bolts securing filter to support bracket.

INSTALLATION, OIL "IN" TO COOLER FILTER

a. Installation is essentially the reverse of the removal procedure except new O-rings must be used and fittings, unions, and bolts must be torqued as specified in Section I of manual.

CAUTION

MAKE CERTAIN THAT DIRECTION OF FLOW (INDICATED BY ARROW STAMPED ON FILTER HEAD) IS IN THE DIRECTION OF OIL COOLER.

b. Disconnect and rotate the main landing gear door mechanism arm P/N 8-44565, to determine that a minimum clearance of 0.75 inch is maintained between arm and filter. If necessary, omit washers between filter and mounting bracket to gain correct clearance.
c. Conduct filling and priming procedure as specified in this section of manual.
d. Conduct engine run; perform drive unit operational checkout and check for leakage. Refer to Section I for engine ground run procedure.

REMOVAL, OIL "IN" TO COOLER CHECK VALVE

a. Drain cooler at push-to-drain fitting in right-hand main wheel well.
b. Disconnect tubing from inlet port of check valve; and remove check valve from cooler inlet hose.

INSTALLATION, OIL "IN" TO COOLER CHECK VALVE

a. Installation is essentially the reverse of removal, except new O-rings must be used and all fittings must be torqued as specified in Section I of manual.

CAUTION

MAKE CERTAIN THAT FREE FLOW (INDICATE BY ARROW STAMPED ON VALVE) IS IN THE DIRECTION OF THE OIL COOLER.

b. Conduct filling and priming procedure as specified in this section of manual.
c. Conduct engine run; perform drive unit operational checkout and check for leakage. Refer to Section I for engine ground run procedure.

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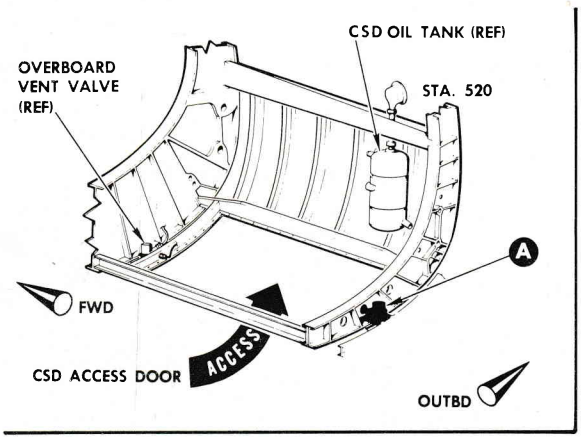
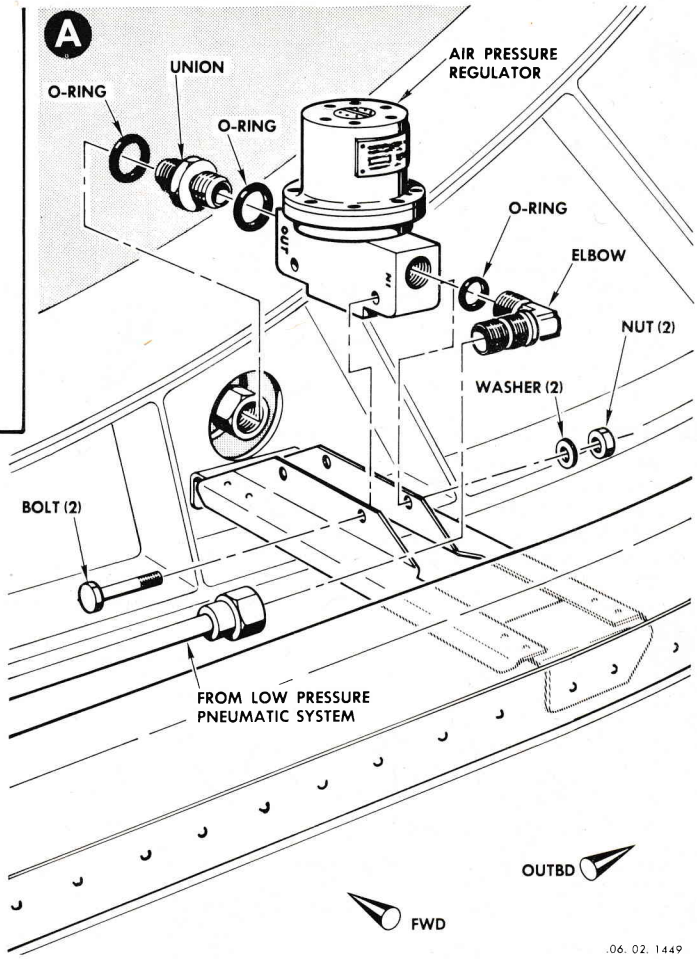
Figure 9-6. Replacement, Constant-Speed Oil System Components (Sheet 3 of 3)





REMOVAL

a. Disconnect tubing from inlet and outlet ports of regulator.
b. Remove two nuts, two washers, and two bolts securing regulator to bracket.
c. Cover open ends of disconnected tubing; cover open ports on regulator.

INSTALLATION

a. Secure regulator to bracket using two bolts, two washers, and two nuts. Refer to Section I for bolt torque values.
b. Remove plugs from inlet and outlet ports of regulator. Remove cover from ends of tubing.
c. Connect tubing to inlet and outlet ports of regulator using new O-rings. Refer to Section I for tubing torque values.

Figure 9-7. Replacement, Constant-Speed Drive Generator Pressurization System Air Pressure Regulator

CAUTION

If monitor voltmeter voltage does not increase steadily on starting to a maximum steady value at IDLE, determine the cause of malfunction before proceeding.

h. Check oil supply system for signs of leakage. Repair as required.

i. Reservice oil tank to the FULL mark.

NOTE

If quantity of oil required to refill tank is greater than 4 quarts, repeat steps "c" through "i."

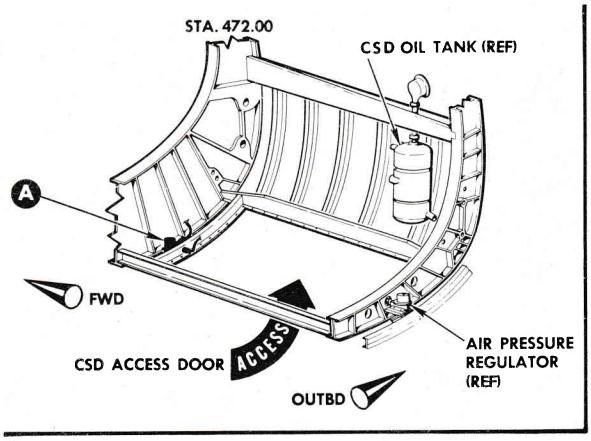
j. Start engine and accelerate to idle rpm.

k. Within 10 seconds after reaching idle rpm and with external electrical power removed from the airplane, energize airplane electrical generating system and check that the ac and dc power failure warning lights are extinguished. If lights are illuminated, terminate engine operation immediately and correct cause of malfunction.

l. Refer to T.O. 1F-106A-2-10 for complete checkout of the electrical generating system.

9-28. SERVICING CONSTANT-SPEED OIL SYSTEM

The constant speed oil system shall be checked and serviced to the "FULL" mark immediately after engine shutdown. See figure 9-13 for constant-speed oil system servicing instructions. Refer to T.O. 1F-106A-2-2 for servicing lubrication of the constant-speed drive shaft. If the airplane has been idle for a period exceeding



REMOVAL

a. Disconnect tubing from valve.
b. Remove unions from valve; retain for reinstallation.
c. Cap open ends of disconnected tubing and install plugs in open ports of valve.
d. Remove nuts, washers and screws (4 each) securing valve to structure.

INSTALLATION

a. Install new O-ring around vent port of valve.
b. Position valve so that when looking forward one port will be to the aft and the other port will be to the right.
c. Install unions; using new O-ring.

NOTE

FOR BOLT AND TUBE TORQUE VALUES REFER TO SECTION I OF THIS MANUAL.

d. Install screws, washers and nuts (4 each) to secure valve to structure. Torque screws to proper value.
e. Connect tubing to valve and torque to proper value.

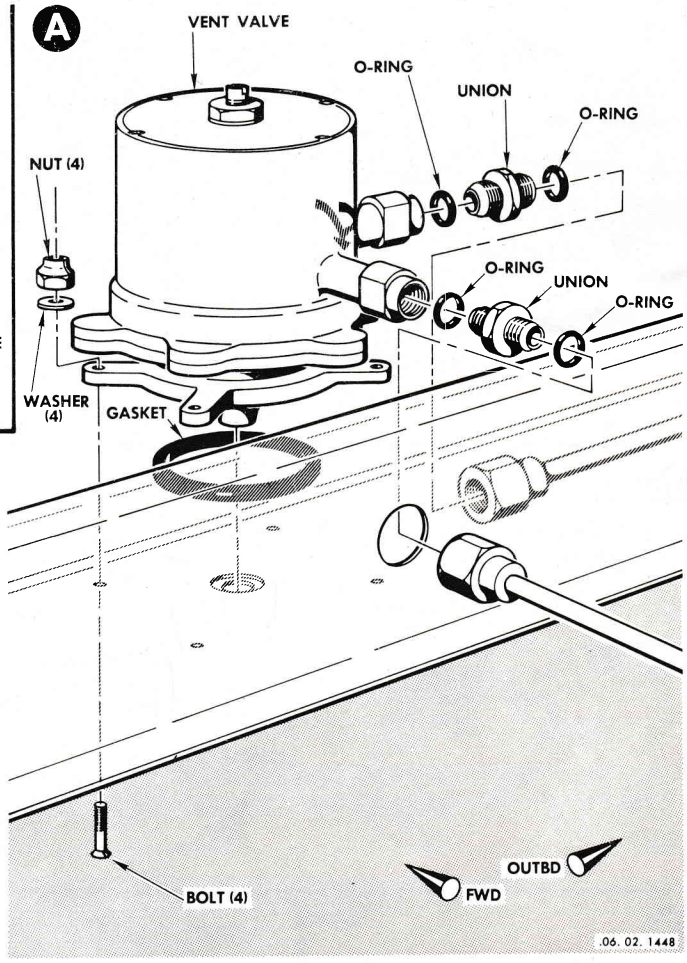


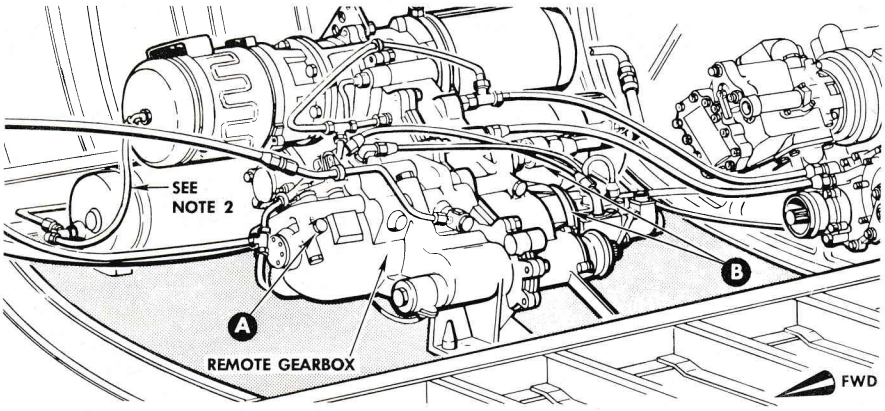
Figure 9-8. Replacement, Constant-Speed Drive Overboard Vent Valve

12 hours, check the constant-speed tank oil level prior to starting the engine. The oil level shall not have changed appreciably from the "FULL" mark regardless of the length of time that the airplane has been idle.

NOTE

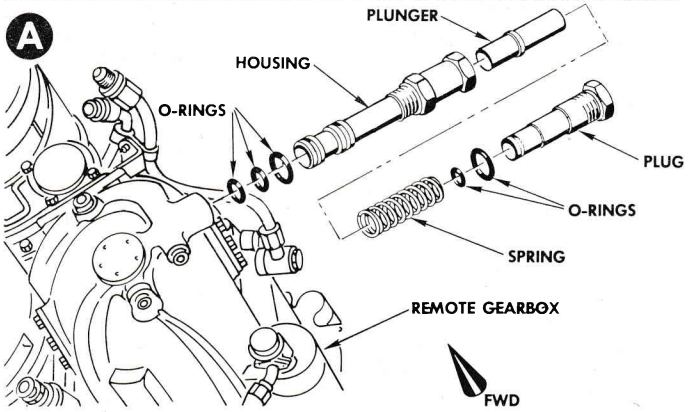
Normal oil consumption for the constant speed drive system is 1 pint for each hour of operation. Oil consumption exceeding 1 pint per hour will require checking system for external leaks and for excessive oil drainage at the overboard vent. Refer to System Analysis, paragraph 9-9.

Applicable to F-106A airplanes 56-453, -454, 56-456 thru 57-245, 59-001 and subsequent, and F-106B airplanes 57-2508 thru 57-2515, 57-2542 and subsequent. A trap is formed in the vent-to-tank line which under normal condition does not affect the performance of the system. However, if the tank is filled at a rate exceeding 1 quart every 30 seconds, or if the tank is overfilled, the trap in the vent-to-tank line fills with oil, causing an airlock. The airlock, in turn, causes a false oil level indication on the tank dipstick when servicing the tank past the 8.5 quarts to the 9.5 quarts "FULL" level because of the premature filling of the dipstick well. Rapid filling of the dipstick well past the 8.5 quarts oil level is the only indication personnel have that the vent-to-tank line contains oil. Subsequent engine operation will blow the oil out of the vent-to-tank line and empty the dipstick well to the 8.5 quarts level. A check of the oil level following such an occurrence would indicate the system was approximately 1 quart below capacity. To insure that the oil tank is filled to the 9.5 quarts "FULL" level, the amount of oil added shall be checked against the change in oil level indicated on the dipstick. If the amount added is less than the amount indicated on the dipstick, the vent-



NOTES

1. FOR THE REMOVAL AND INSTALLATION OF THE CONSTANT SPEED DRIVE COMPONENTS, IT WILL BE NECESSARY TO GAIN ACCESS TO THE REMOTE GEARBOX THROUGH THE ACCESS DOORS ON THE LOWER SIDE OF THE FUSELAGE.
2. *APPLICABLE TO F-106A AIRPLANES 56-453, -454, -463 THRU 56-466, 57-230 THRU 57-245, 57-2465, 57-2504 AND SUBSEQUENT; AND 57-246 THRU 57-2503 AFTER INCORPORATION OF TCTO 1F-106-597. APPLICABLE TO F-106B AIRPLANES 57-2508 THRU 57-2515, 57-2523, 57-2531 AND SUBSEQUENT; AND ALL OTHER F-106B AIRPLANES AFTER INCORPORATION OF TCTO 1F-106-597.* ALL PURGE AIR LINES TO THE GENERATORS ARE REMOVED AND AN OVERBOARD DRAIN LINE IS INSTALLED FOR EACH GENERATOR. THE DRAIN LINES MANIFOLD AND DRAIN THROUGH A FITTING IN THE CSD ACCESS DOOR, STATION 493.00.

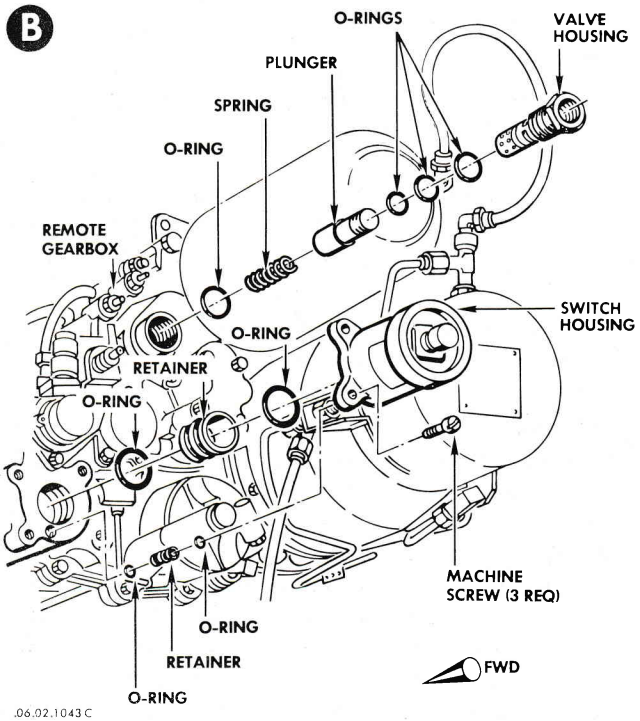


CHARGE RELIEF VALVE, REMOVAL

a. Remove plug.
b. Remove valve spring, plunger, and housing.
c. Remove and discard all seals.

INSTALLATION

a. Installation of the charge relief valve is essentially the reverse of the removal procedure.
b. Use new seals on installation.
c. Torque plug 100 to 150 inch-pounds, and safety-wire.



ANTI-DRAIN VALVE, REMOVAL

a. Remove valve housing from gearbox.
b. Remove plunger from valve housing. If plunger is hard to remove, reach through hole in housing and remove seal from plunger.
c. Remove spring and seal from gearbox.
d. Remove and discard all seals.

INSTALLATION

a. Installation of the anti-drain valve is essentially the reverse of the removal procedure.
b. Use new seals on installation.
c. Torque valve housing 180 to 220 inch-pounds and safety-wire.

PRESSURE SWITCH, REMOVAL

a. Disconnect the electrical lead.
b. Remove the three screws securing the switch assembly to the gearbox.
c. Pull the switch assembly from the gearbox. Remove the seal retainers from the switch body.
d. Remove and discard all seals.

INSTALLATION

a. Installation of the pressure switch is essentially the reverse of the removal procedure.
b. Use new seals on installation.
c. Safety-wire screws and electrical lead.

Figure 9-9. Replacement, Constant-Speed Drive Pressure Switch, Charge Relief Valve, and Anti-Drain Valve

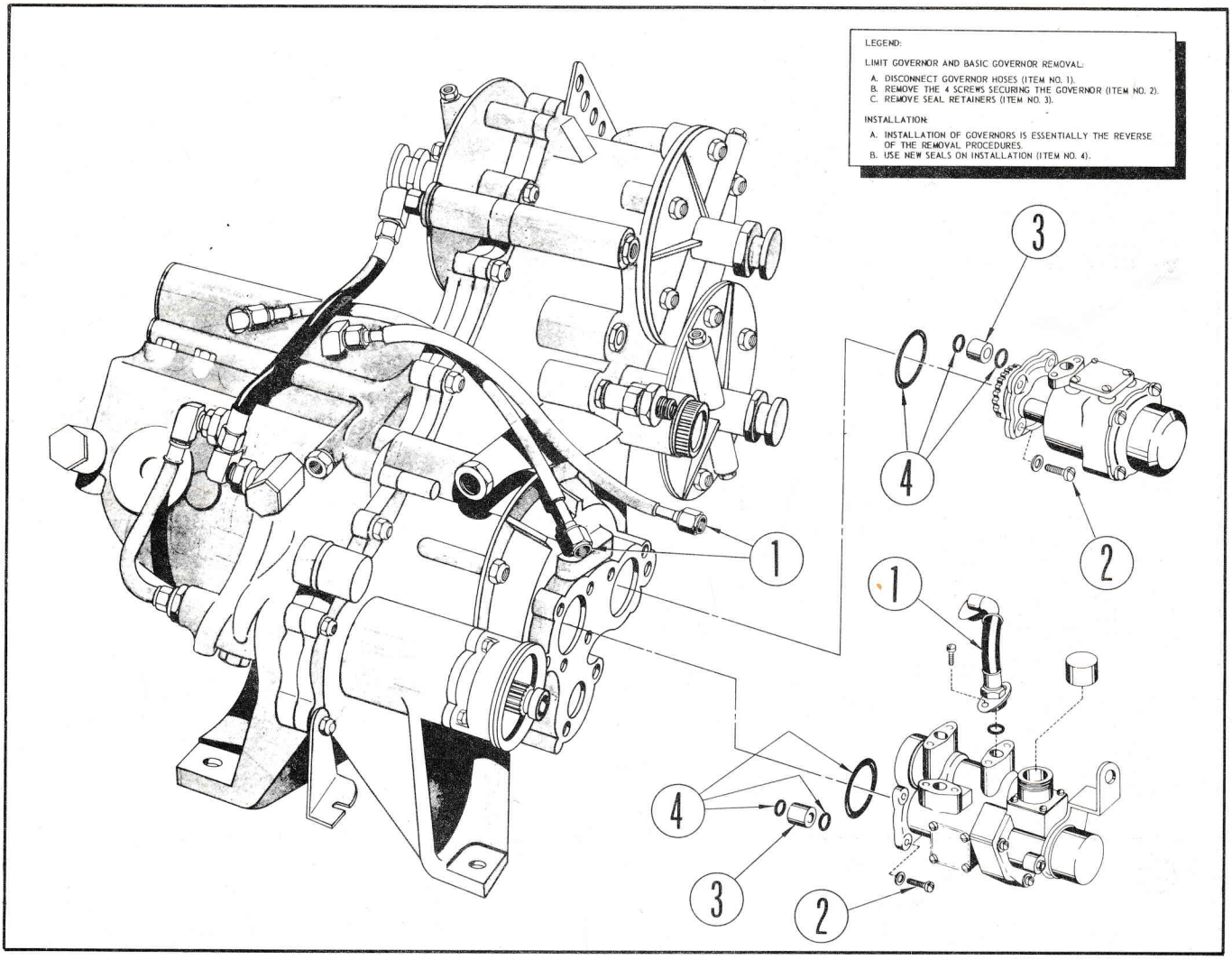


Figure 9-10. Replacement, Constant-Speed Drive Limit and Magnetic Trim Governor.

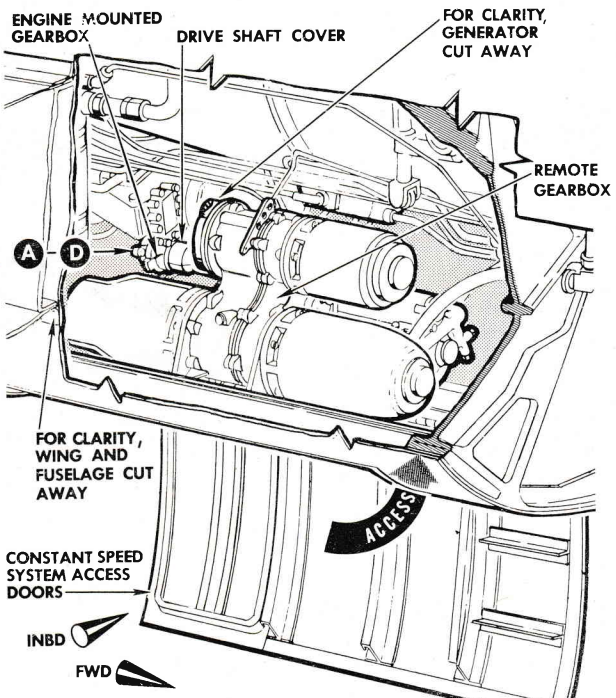
to-tank line contains oil. To eliminate the airlock, disconnect the vent-to-tank line at the swivel fitting and drain the line. Gain access to the swivel fitting through the small aft constant-speed drive access door on the lower right side of the fuselage.

9-29. CONTAMINATION CHECK, CONSTANT-SPEED OIL SYSTEM.

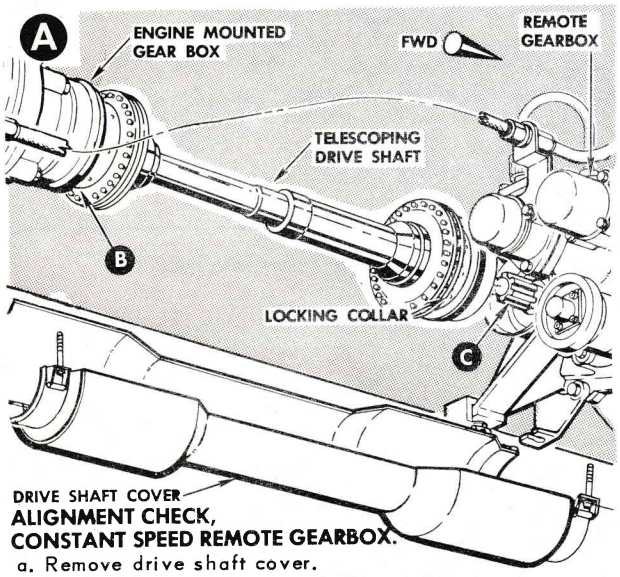
a. See figure 9-14 for the contamination check procedure of the constant-speed drive oil system. This procedure shall be accomplished at the frequency outlined in T.O. 1F-106A-6 and each time engine mounted gearbox, remote mounted gearbox, or generator internal mechanical failure occurs. Refer to paragraph 9-30 for contamination check of generators.

NOTE

In most instances when failure of the airplane ac generator drive end bearing occurs, copper shunt bars are thrown from the permanent magnet generators (PMG) rotor into the remote gearbox sump and gear train. These bars are usually ground into smaller particles by the gear train, picked up by the scavenge pump and forced upstream to the oil cooler and oil tank. This type of metal particle (nonferrous) contamination will not be revealed by the chip detector plugs (reference figure 9-14) and will not in all instances be revealed by the remote gearbox charge filter.



LOCATION—CONSTANT SPEED REMOTE GEARBOX, ENGINE MOUNTED GEARBOX, AND CONNECTING DRIVE SHAFT.



ALIGNMENT CHECK, CONSTANT SPEED REMOTE GEARBOX.

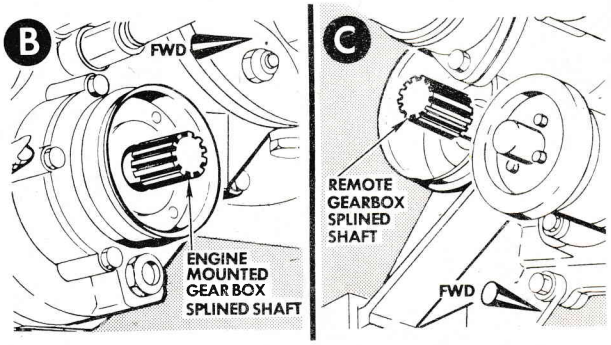
a. Remove drive shaft cover.

b. Remove interconnecting shaft and adapter assemblies as follows:

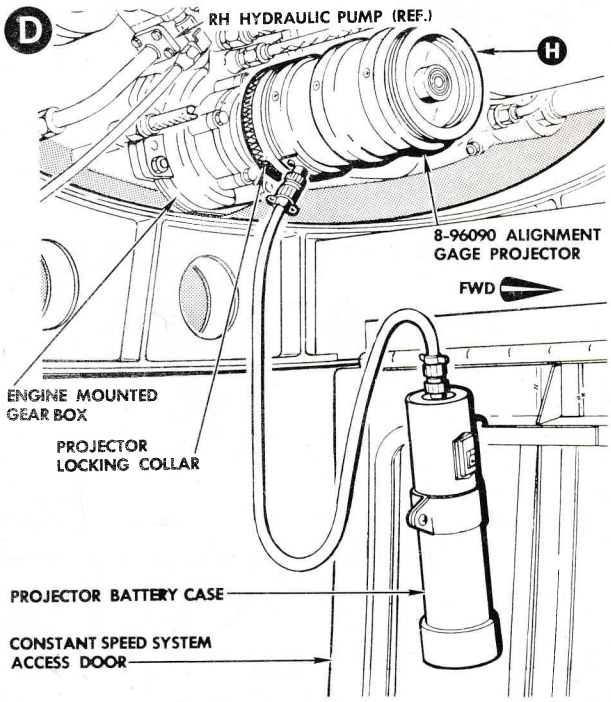
1. Remove safety wire.
2. Using spanner wrench U3501, loosen ring nuts.
3. Compress shaft and remove.
4. Loosen adapter attaching screws.
5. Remove retaining ring and remove adapters as assemblies.

CAUTION

DO NOT PRY, HAMMER, OR USE TOOLS THAT WILL IN ANY WAY CAUSE DAMAGE TO THE SHAFT.



c. Check remote gearbox and engine mounted gearbox splined drive shafts for indication of wear and play in support bearing. Remote gearbox shaft maximum sideplay, 0.007 inch. Engine mounted gearbox shaft maximum sideplay, 0.028 inch.



d. Using a recently calibrated alignment gage 8-96090, install projector portion of gage on engine mounted gear box splined shaft as follows:

CAUTION

THE CONSTANT SPEED GEARBOX ALIGNMENT GAGE IS A PRECISION OPTICAL INSTRUMENT AND MUST BE HANDLED WITH EXTREME CARE.

1. Remove projector portion of gage from carrying case and hang battery case from drive unit access door frame.
2. Loosen projector locking collar (turn counterclockwise) and install projector on gearbox splined shaft.
3. Tighten locking collar by hand until it is snug. Do not overtighten collar.

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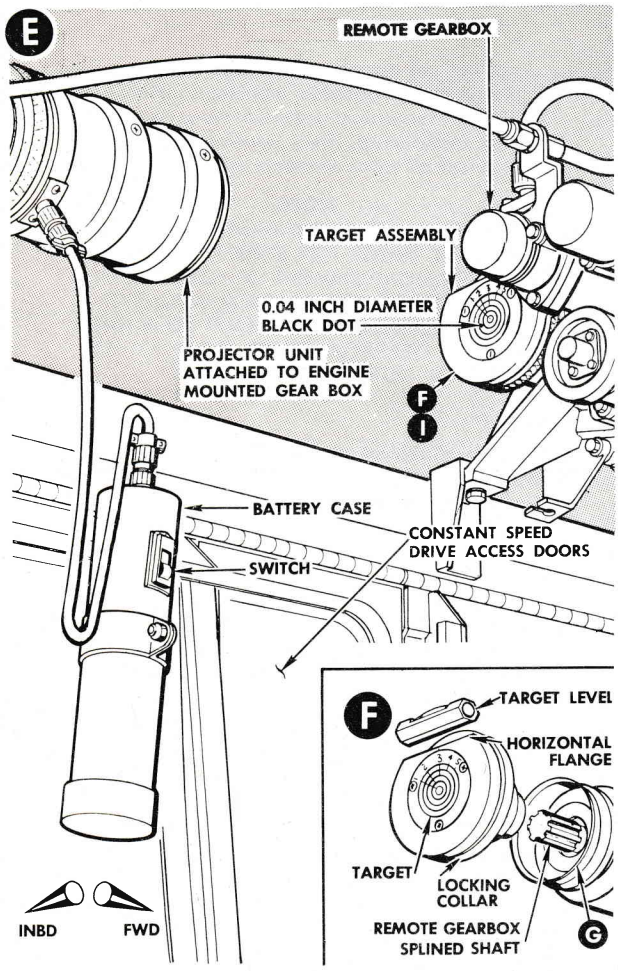
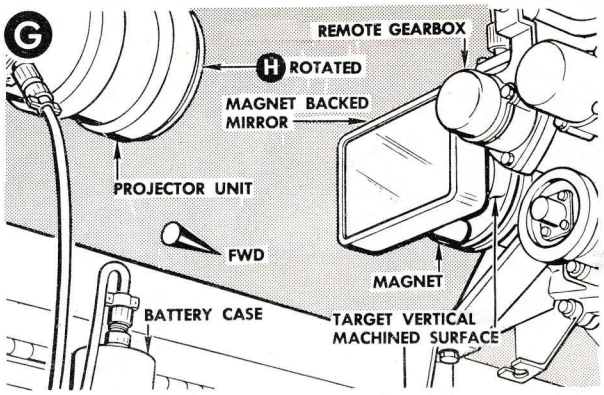
Figure 9-11. Alignment Check, Constant-Speed Remote Gearbox (Sheet 1 of 3)



e. Install target portion of the alignment gage as follows:
   1. Remove target from carrying case and loosen locking collar.
   2. Install target on remote gearbox splined shaft. Tighten target locking collar by hand until target is just free to rotate.
   3. Remove target level from carrying case and place on flat horizontal flange of target. Rotate target slowly until flange is level; tighten locking collar by hand until snug. Do not overtighten collars, remove level.

f. Actuate switch on projector battery case to the "ON" position.

g. Check for 0.04 inch diameter black dot image projected on face of target. Note number of smallest circle that the black dot falls completely within. Dot may fall any place inside No. 5 circle.

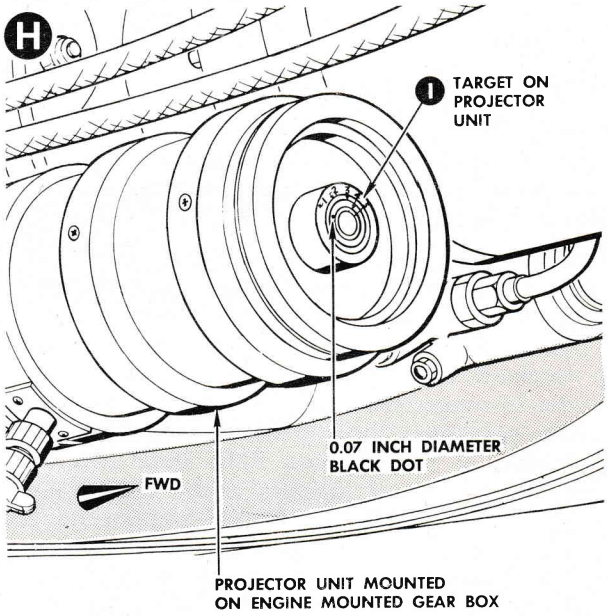


h. Remove mirror assembly from carrying case. Check that contact surfaces of magnets on back of mirror are clean and free of particles. Check that the vertical machined surface of the target assembly is clean. Remove cover from face of mirror.

CAUTION

EXERCISE CARE NOT TO MAR, SCRATCH, OR TOUCH SURFACE OF MIRROR. DISTORTION OF MIRROR CAN CAUSE ERROR IN THE ALIGNMENT CHECK PROCEDURE. CLEANING OF MIRROR TO BE ACCOMPLISHED AT TIME OF INSTRUMENT CALIBRATION ONLY.

i. Place mirror on target vertical machined surface.



j. Check for 0.07 inch diameter black dot image on target portion of projector lens. Note number of smallest circle that black dot falls completely within. Dot shall fall inside same numbered circle as found in step "g."

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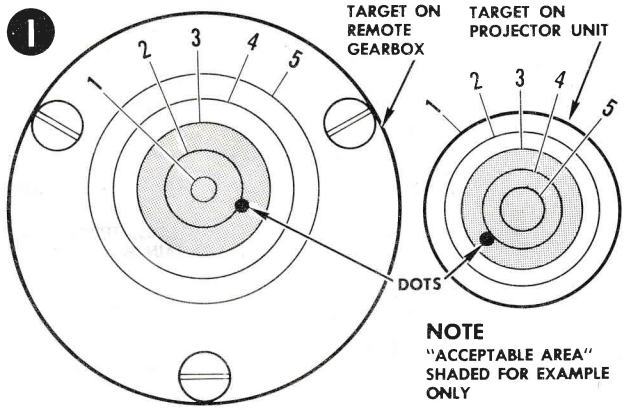
Figure 9-11. Alignment Check, Constant-Speed Remote Gearbox (Sheet 2 of 3)



NOTE
"ACCEPTABLE AREA" SHADED FOR EXAMPLE ONLY

EXAMPLE:

IF DOT FALLS WITHIN AREA BETWEEN CENTER AND CIRCLE NO. 3 OF REMOTE GEARBOX TARGET, THEN DOT SHOULD APPEAR WITHIN AREA BETWEEN CENTER AND CIRCLE NO. 3 ON PROJECTOR TARGET.

k. If black dots fall inside same numbered circle on both targets, the remote gearbox is in alignment.

l. If the dots do not fall within the same circles, perform the following:
   1. Check alignment gage target and projector for security of attachment; mirror magnets, target vertical and horizontal machined surfaces clean.
   2. Check that contact surface of target level is clean and undistorted; check leveling of target.
   3. Recheck all steps of preparation procedure.

NOTE

IF MISALIGNMENT IS INDICATED AFTER A RECHECK, CHECK FOR STRUCTURAL DAMAGE OR MISALIGNMENT OF FUSELAGE IN ENGINE OR REMOTE GEARBOX MOUNT FITTING AREAS. DO NOT ATTEMPT TO ALIGN REMOTE GEARBOX USING STOPS (2) AT GEARBOX OUTBOARD HINGE.

CLEANUP :

a. Remove alignment gage.
b. Install constant speed drive shaft and shaft cover. See replacement, constant speed drive shaft for proper installation procedure.

CAUTION

PULL ON EACH END OF DRIVE SHAFT TO CHECK FOR SECURE SHAFT INSTALLATION. CHECK THAT THE SHAFT LOCKING COLLAR AT EACH END OF SHAFT IS IN THE LOCKED POSITION.

c. Close access doors.

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Figure 9-11. Alignment Check, Constant-Speed Remote Gearbox (Sheet 3 of 3)

b. In the event of an airplane ac generator failure, the following procedure will be accomplished in addition to the procedures outlined in figure 9-14:

1. Remove the ac generator from pad "B." Refer to T.O. 1F-106A-2-10 for generator removal instructions. Check the generator drive end area for evidence of mechanical failure. Particular emphasis should be placed on the condition of the 16 copper shunt bars on the PMG rotor of the generator. Visually examine the exposed portion of the generator PMG rotor area for evidence of metal particles. If the PMG shunt bars are all intact, no further examination is required. Replace the generator in accordance with instructions in T.O. 1F-106A-2-10.

2. If copper shunt bars are found missing, examine the interior of the remote gearbox pad "B" area for evidence of copper particles. Remove the constant-speed drive oil cooler. Visually examine the oil-in and oil-out ports of the cooler for evidence of copper particles. If copper particles are found, replace components and perform maintenance as outlined in paragraph 9-31.

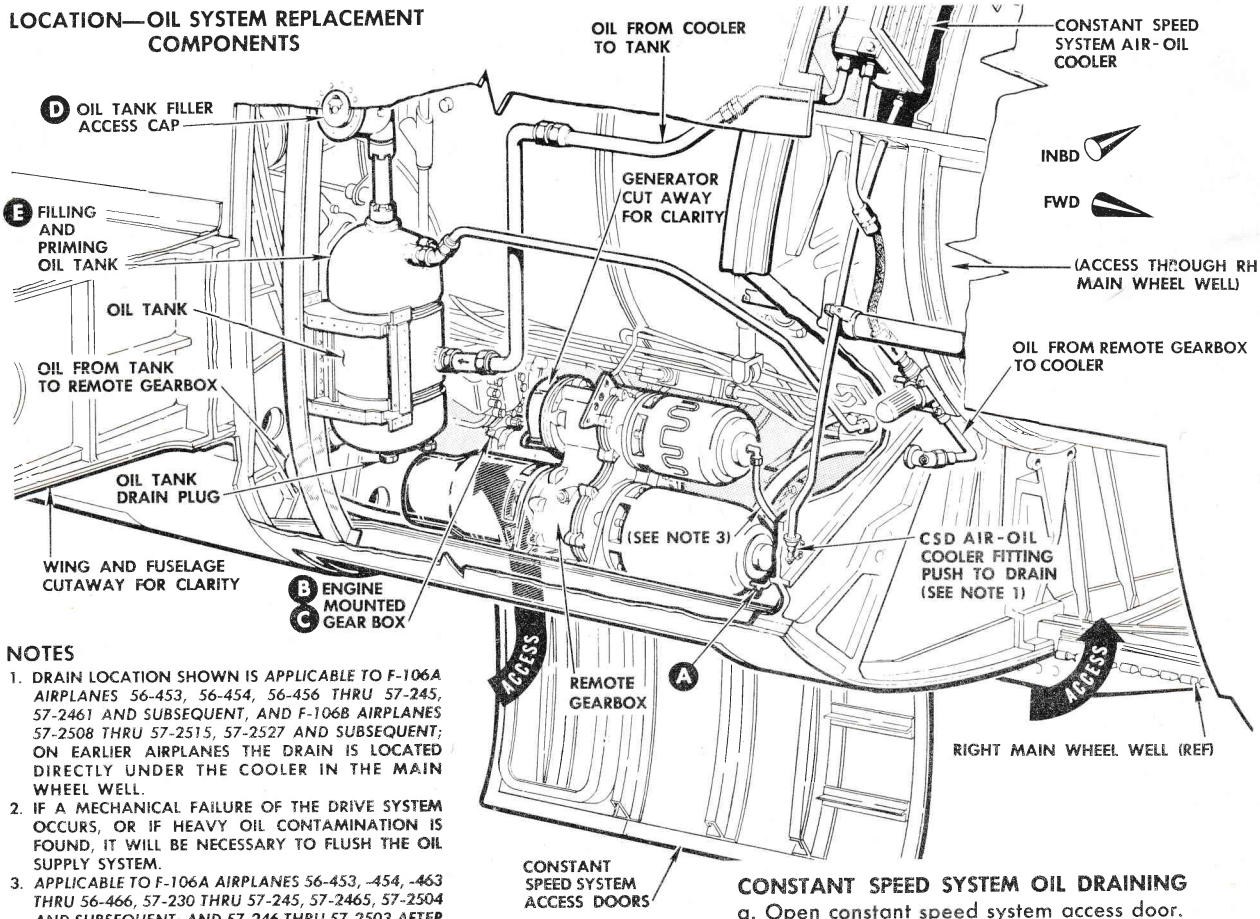
9-30. CONTAMINATION CHECK, CONSTANT-SPEED SYSTEM GENERATORS.

See figure 9-15 for the contamination check procedure for the constant-speed system generators. This procedure is to be followed in the event of a remote gearbox or generator malfunction of a nature which would contaminate the constant-speed oil system with metal chips.

NOTE

If remote gearbox malfunction occurs, resulting in contamination, replace the gearbox and check all generators and filters for contamination. If a generator mechanical failure of a nature to contaminate the remote gearbox occurs, replace the generator and the remote gearbox. Clean the constant-speed oil system filters, since the remote gearbox cannot be cleaned; check the remaining generators for contamination. See figure 9-25 for procedures on cleaning the constant-speed oil system filters. Refer to paragraph 1-25 for contamination check procedure of the constant-speed drive oil system.

LOCATION—OIL SYSTEM REPLACEMENT COMPONENTS

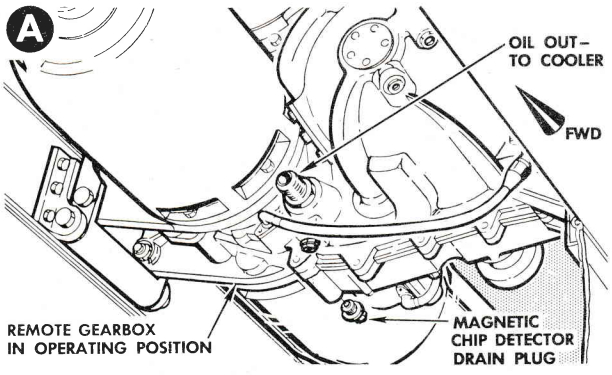


NOTES

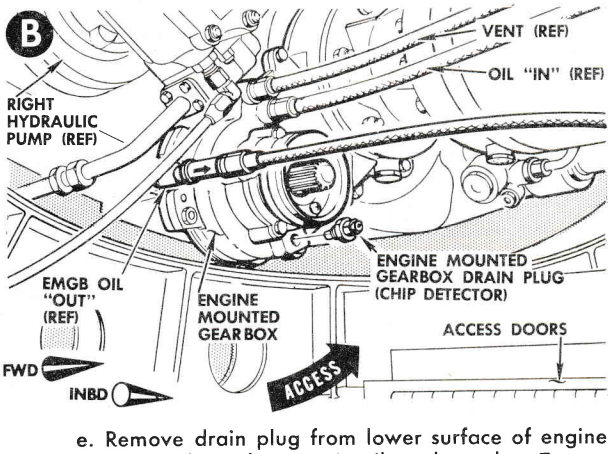
1. DRAIN LOCATION SHOWN IS *APPLICABLE TO F-106A AIRPLANES 56-453, 56-454, 56-456 THRU 57-245, 57-2461 AND SUBSEQUENT, AND F-106B AIRPLANES 57-2508 THRU 57-2515, 57-2527 AND SUBSEQUENT;* ON EARLIER AIRPLANES THE DRAIN IS LOCATED DIRECTLY UNDER THE COOLER IN THE MAIN WHEEL WELL.
2. IF A MECHANICAL FAILURE OF THE DRIVE SYSTEM OCCURS, OR IF HEAVY OIL CONTAMINATION IS FOUND, IT WILL BE NECESSARY TO FLUSH THE OIL SUPPLY SYSTEM.
3. *APPLICABLE TO F-106A AIRPLANES 56-453, -454, -463 THRU 56-466, 57-230 THRU 57-245, 57-2465, 57-2504 AND SUBSEQUENT; AND 57-246 THRU 57-2503 AFTER INCORPORATION OF TCTO 1F-106-597. APPLICABLE TO F-106B AIRPLANES 57-2508 THRU 57-2515, 57-2523, 57-2531 AND SUBSEQUENT; AND ALL OTHER F-106B AIRPLANES AFTER INCORPORATION OF TCTO 1F-106-597.* ALL PURGE AIR LINES TO THE GENERATORS ARE REMOVED AND AN OVERBOARD DRAIN LINE IS INSTALLED FOR EACH GENERATOR. THE DRAIN LINES MANIFOLD AND DRAIN THROUGH A FITTING IN THE CSD ACCESS DOOR, STATION 493.00.

CONSTANT SPEED SYSTEM OIL DRAINING

a. Open constant speed system access door.
b. Provide drain receptacle; remove plug from bottom of oil tank and drain oil from tank. Replace plug using new gasket; safety wire.
c. Gain access to oil cooler drain through right aft side of main wheel well. Provide drain receptacle. Remove cap and push cooler drain; drain oil from cooler. Release drain.



d. Gain access to remote gearbox at door on lower right side of fuselage. Remove magnetic drain plug from lower surface of drive unit. Drain oil; replace plug. Torque plug to 20 inch-pounds maximum; safety-wire.



e. Remove drain plug from lower surface of engine mounted gearbox. Drain oil; replace plug. Torque plug to 20 inch-pounds maximum; safety-wire.

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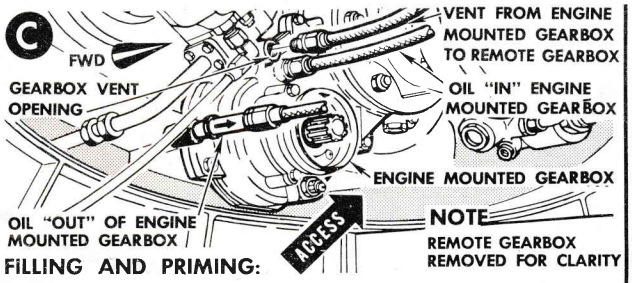
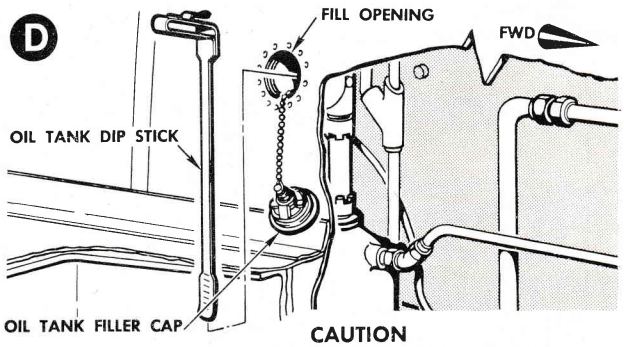
Figure 9-12. Draining and Priming, Constant-Speed Oil Supply System (Sheet 1 of 2)



FILLING AND PRIMING:

a. Disconnect vent line from engine mounted gearbox. Service gearbox with ½ pint of oil, Specification MIL-L-7808, through gearbox vent fitting. Reinstall vent line.

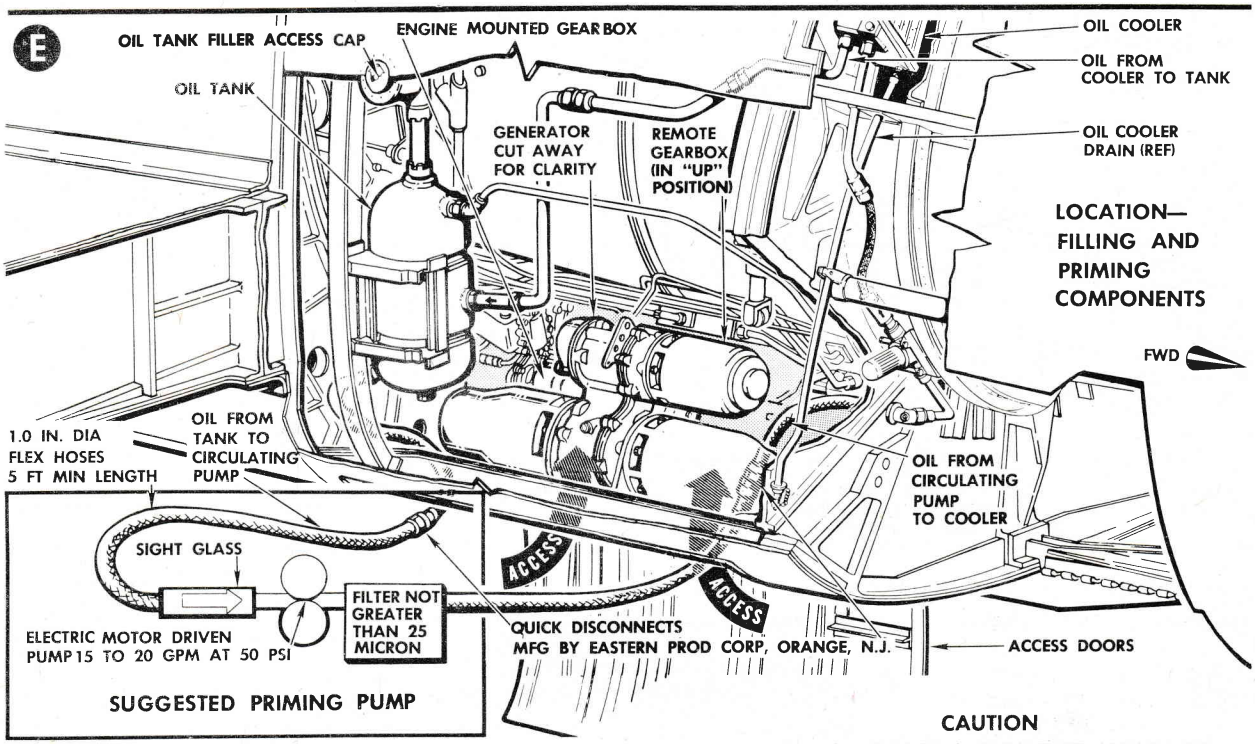
b. Attach AC voltmeter across terminals P_1 and P_2 on the AC generator mounted on pad B of the remote gearbox.



CAUTION

MAKE CERTAIN THAT OIL AND CONTAINER ARE CLEAN AND FREE OF CONTAMINATION.

c. Fill oil tank to "FULL" mark with oil, Specification MIL-L-7808.



d. Remove oil inlet and oil outlet lines from remote gearbox at quick disconnect fittings. Connect oil circulating pump to system. See detail for suggested method. All components of priming system must be resistant to oil, Specification MIL-L-7808.

NOTE

THIS PROCEDURE IS REQUIRED TO PRIME AND INSURE A POSITIVE FLOW OF OIL TO THE DRIVE SYSTEM PRIOR TO OPERATION.

e. Start prime pump and run until oil runs clear and no air bubbles are visible in sight glass. Disconnect priming assembly. Reconnect oil lines.

f. Fill oil tank to "FULL" mark.

g. Start engine and operate at "IDLE."

CAUTION

IF MONITORED VOLTMETER VOLTAGE DOES NOT INCREASE STEADILY ON STARTING TO A MAXIMUM STEADY VALUE AT "IDLE", DETERMINE THE CAUSE BEFORE PROCEEDING.

h. Within 10 seconds after reaching "IDLE" rpm and with external electrical power removed from airplane, energize airplane electrical generating system and check that the ac and dc power failure warning lights are extinguished. If lights are illuminated, terminate engine operation immediately and correct cause of malfunction. Refer to T. O. 1F-106A-2-10 for complete checkout of the electrical generating system.

i. Shut down engine. Check drive system components for oil leaks. Recheck tank oil level.

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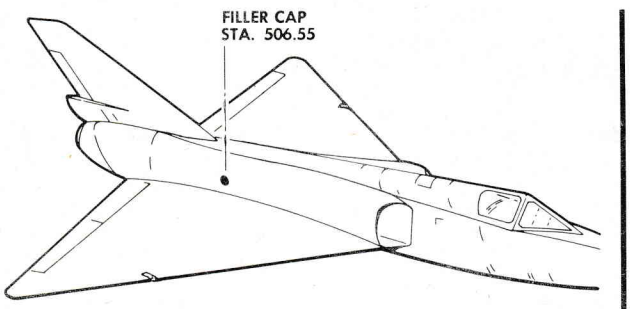
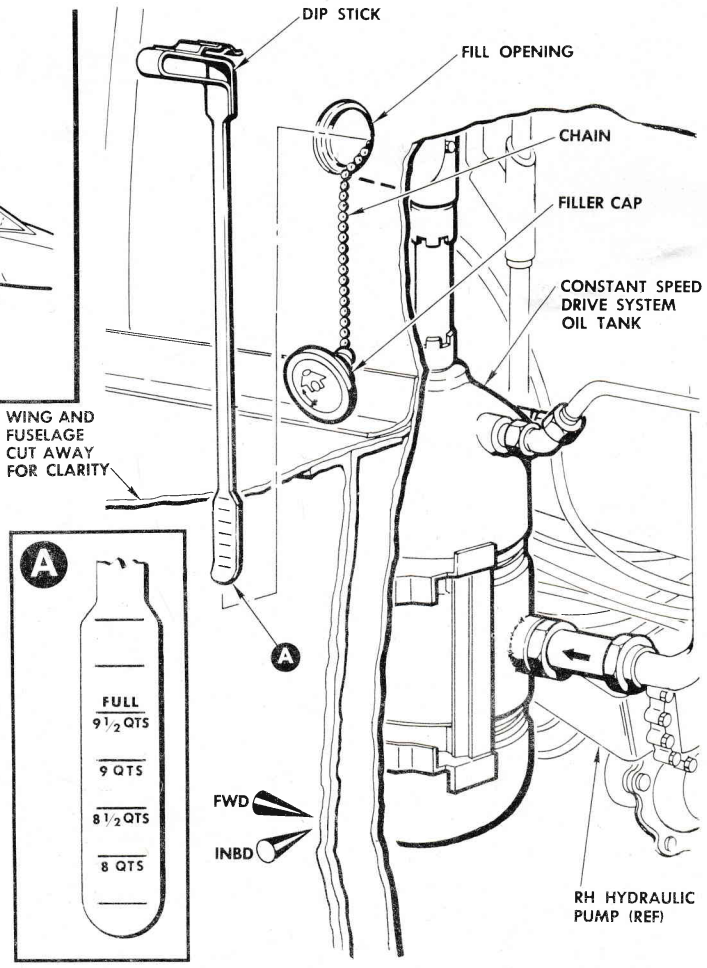
Figure 9-12. Draining and Priming, Constant-Speed Oil Supply System (Sheet 2 of 2)



LOCATION—CONSTANT SPEED DRIVE UNIT OIL TANK FILLER CAP



SERVICING

a. Remove filler cap.
b. Remove dip stick by pulling outboard and up.

CAUTION

MAKE CERTAIN THAT OIL AND CONTAINER ARE CLEAN AND FREE OF CONTAMINATION.

c. Check oil level as indicated on dip stick. Fill tank slowly (approximately 1 qt. every 30 seconds) with oil, Specification MIL-L-7808 as required. Check oil level. Wait for a period of at least 5 minutes, then recheck oil level. Add oil if required. Wipe up oil spilled on the airplane.
d. Install dip stick.
e. Install filler cap.

.06.02.332 D

Figure 9-13. Servicing Constant-Speed Oil System

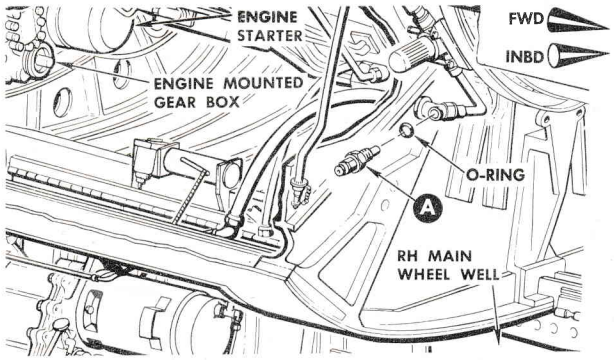
9-31. CONSTANT-SPEED OIL SYSTEM FLUSHING AND COMPONENT REPLACEMENT.

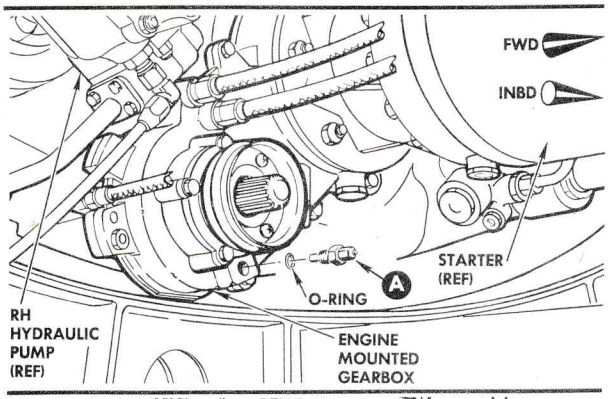
In the event of remote mounted gearbox, engine mounted gearbox, or generator mechanical failure resulting in contamination, or if contamination check (figure 9-14) reveals an unacceptable condition in either gearbox, perform the maintenance outlined in the following table:

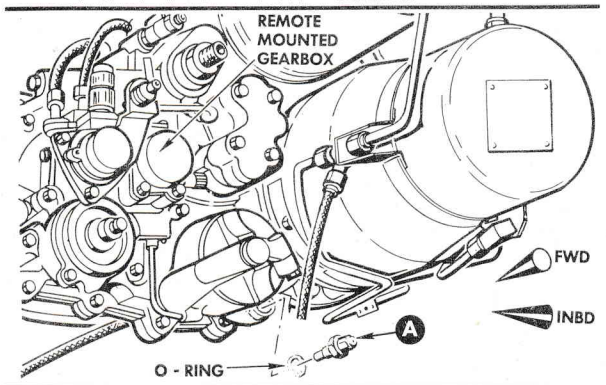
CAUTION

Exercise care during maintenance to assure that cleanliness of all components is maintained. Serious damage to the units can be caused by very small amounts of foreign material.

COMPONENT	MAINTENANCE REQUIRED
Transmission and Remote Gearbox (TRGB)	If TRBG failure or chip detector reveals unacceptable contamination, proceed as follows:
	a. Inspect scavenge return line (wheel well) filter and chip detector plugs. If contamination is found, remove filter and check Delta "P." If check shows filter has bypassed, make contamination check of generators, replace EMGB, cooler, and oil tank and flush lines.
	b. If filter has not bypassed, remove TRGB only and make contamination check of generators.
	c. If TRGB failed, remove and return to depot for overhaul. If TRGB has not failed but shows unacceptable contamination, remove and bench check. See figure 9-3 for replacement procedure.







PROCEDURE

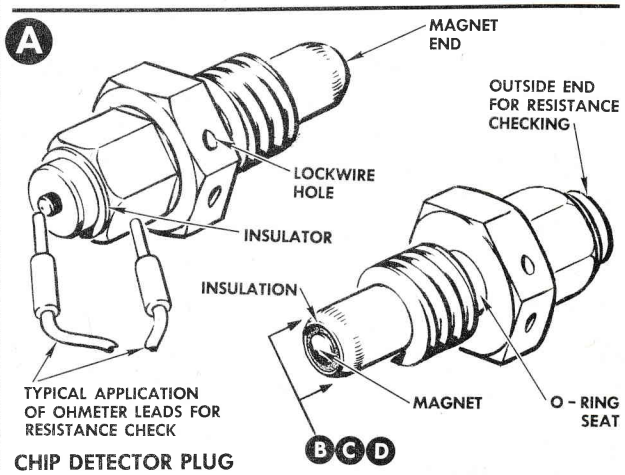
a. Gain access to the constant speed drive remote and engine mounted gearboxes through the constant speed drive aft access door on the lower side of the fuselage.

b. Using a standard ohmmeter, check resistance between center pin and shoulder of chip detector magnetic drain plugs. If resistance readings are more than 5000 ohms, no further check need be made.

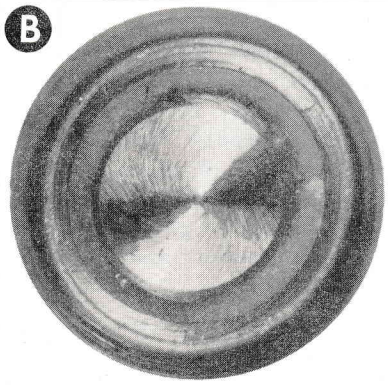
c. If reading at either plug is less than 5000 ohms, remove affected plug. If examination of plug reveals metal chip contamination not exceeding that shown in detail C, clean plug and filter of affected gearbox. Reinstall using new O - rings. Torque magnetic plug 35 to 50 inch-pounds and lockwire; recheck resistance. If engine mounted gearbox plug has been removed, reprime gearbox per draining and priming instructions.

d. If examination reveals metal chip contamination similar or worse than that shown in detail "D," replace plug without cleaning. Replace affected gearbox and drain oil supply system. Refer to constant speed oil system flushing and component replacement procedures.

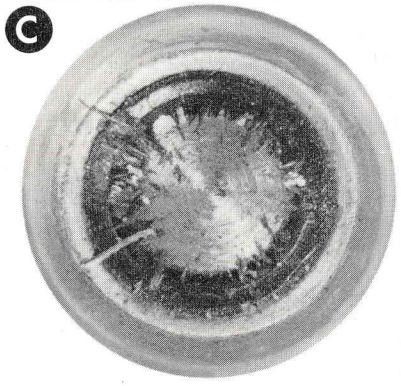
e. Prime constant speed oil system.



CHIP DETECTOR PLUG

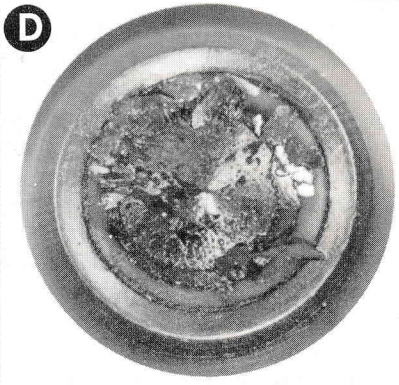


CLEAN PLUG



ACCEPTABLE CONDITION

PARTICLES LESS THAN 3/32 INCH IN LENGTH, OR LESS THAN 1/32 INCH IN DIAMETER.



UNACCEPTABLE CONDITION

PARTICLES 3/32 INCH IN LENGTH OR LONGER, OR 1/32 INCH IN DIAMETER OR LARGER.

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Figure 9-14. Contamination Check, Constant-Speed Oil System

PROCEDURE

a. Gain access to the constant speed remote gearbox through the constant speed access doors on the lower right side of the fuselage. Lower the constant speed remote gearbox out of fuselage; do not detach from fuselage.

b. Refer to T. O. 1F-106A-2-10 for the removal and installation procedure for the constant speed system generators.

c. Check each generator by placing it on end, with drive gear up. Pour clean oil, Specification MIL-L-7808, into a stator oil port until the oil level reaches the port; then apply low pressure shop air into the port. Direct the air and oil issuing from the opposite stator oil port into a clean, lint free cloth. Cut off shop air when the air flowing from the opposite port is free of oil mist. Inspect the cloth. If metal chips are found, replace the generator; if not, repeat this procedure for both the remaining stator oil port and the center rotor oil tube. If either of these procedures discloses metal chips, replace the generator.

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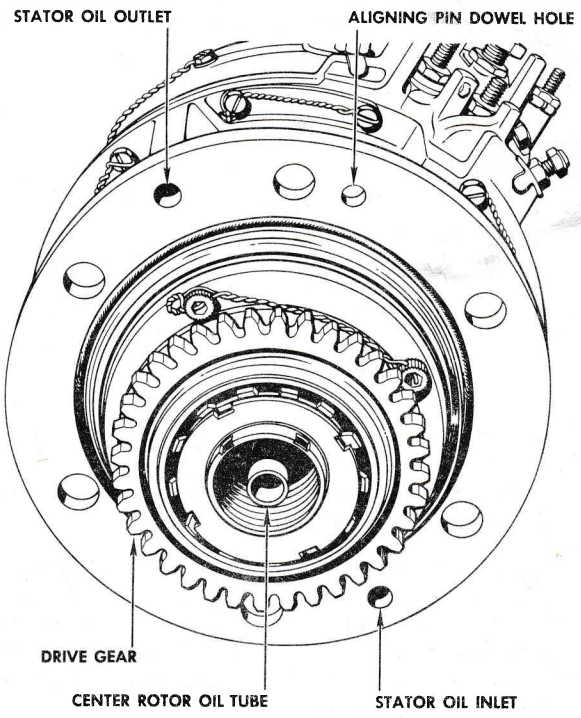


Figure 9-15. Contamination Check, Constant-Speed System Generators

COMPONENT	MAINTENANCE REQUIRED
Engine Mounted Gearbox (EMGB)	If EMGB fails or chip detector plug reveals unacceptable contamination, proceed as follows: a. Check EMGB oil out port filter. If contamination is found remove filter and check Delta "P." If check shows filter has bypassed then check TRGB filter and chip detector plug. If contamination is found at these two points remove TRGB for bench check and perform contamination check of generators. b. Inspect scavenge return line chip detector plug and filter (wheel well) and if contamination is found remove filter and check Delta "P." If filter has bypassed remove cooler and tank and flush lines. c. If EMGB has failed remove and return to depot for overhaul. If EMGB has not failed but shows unacceptable contamination, remove and bench check. See figure 9-4 for replacement procedures.

COMPONENT	MAINTENANCE REQUIRED
CSD Oil Tank	Replace tank if scavenge return line (wheel well) filter Delta "P" check shows filter has bypassed. See figure 9-6 for replacement procedures. Flush in accordance with T.O. 7J10-6-3.
CSD Oil Cooler	Replace cooler if scavenge return line (wheel well) filter Delta "P" check shows filter has bypassed. See figure 9-6 for replacement procedures. Return replaced item to depot for flushing.
CSD Generators	Perform contamination check of generators if contamination is found in TRGB and/or if contamination is found in EMGB and EMGB oil out port filter Delta "P" check reveals filter has bypassed. See figure 9-15.
CSD Oil System Lines	Remove all lines and flush with solvent, Federal Specification P-S-661 if scavenge return line (wheel well) filter Delta "P" check shows filter has bypassed.

COMPONENT	MAINTENANCE REQUIRED
	If cleaning not accomplished by flushing, replace lines.
Oil "IN" to Cooler Check Valve and Oil "IN" to Tank Relief Valve	Remove valves from lines if scavenge return line (wheel well) filter Delta "P" check shows filter has bypassed. Flush valves, in direction of free flow, with solvent, Federal Specification P-S-661. Pump solvent at 15 to 20 GPM. Valves cannot be disassembled. See figure 9-6 for procedure on replacement of oil system check valves.
Generator Pressure and Vent Lines	Remove lines and flush with solvent, Federal Specification P-S-661 when unacceptable contamination is found in TRGB. If cleaning not accomplished by flushing, replace lines.
Oil "OUT" of of EMGB and Oil "IN" to Cooler Filter	Check filters for contamination and clean if necessary. See figure 9-16 for procedure on cleaning oil system filters.

NOTE

a. Scavenge return line (wheel well) filter: Filter has bypassed if Delta "P" exceeds 12 psi when applying 50 psi pressure at 12 gpm flow.

b. EMGB oil out port filter: Filter has bypassed if Delta "P" exceeds 15 psi when applying pressure required to flow 400-500 cc/minute.

9-32. PRESERVATION CONSTANT-SPEED DRIVE SYSTEM.

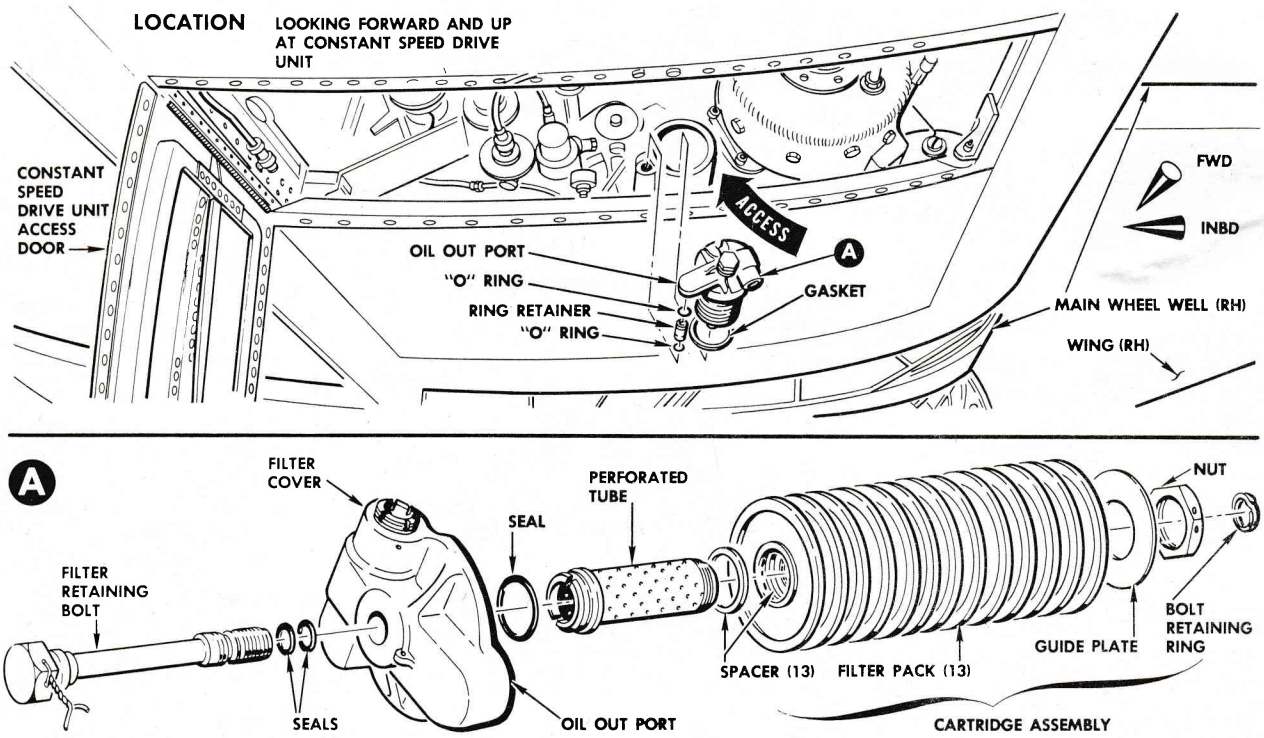
Refer to paragraph 1-81 for preservation information for the constant-speed drive system.

9-33. DEPRESERVATION, CONSTANT-SPEED DRIVE SYSTEM.

Refer to paragraph 1-82 for depreservation information for the constant-speed drive system.

9-34. CLEANING, CONSTANT-SPEED OIL SYSTEM FILTERS.

See figure 9-16 for cleaning procedures for the constant-speed remote and engine mounted gearbox oil filters.



CLEANING, CONSTANT SPEED DRIVE UNIT FILTER

a. Open constant speed unit access door on lower right side of fuselage. Place drain receptacle under drive unit filter assembly.
b. Cut lockwire and loosen filter retaining hex head bolt; remove filter from drive unit.
c. Cap oil out port of filter cover with a teflon plug or equivalent. Wash assembly in Stoddard solvent, Federal Specification P-S-661. Allow filter to drain.
d. Remove bolt retaining ring; remove bolt from filter assembly. Discard bolt seals.
e. Pull cartridge assembly from filter cover; discard seals.
f. Remove cartridge retaining nut and carefully disassemble cartridge. Place filter pack sections on lint free cloth or paper. Plug center hole of each filter pack section with a teflon plug or equivalent to prevent contamination from entering the inner surfaces of the pack sections.
g. Place plugged packs in cleaning solvent, Specification MIL-C-25107 at room temperature for a soaking period of 4 hours.

WARNING

SOLVENT MIL-C-25107 IS A TOXIC AND CAUSTIC COMPOUND. WEAR PROTECTIVE CLOTHING AND RUBBER GLOVES TO PREVENT SKIN CONTACT. USE SOLVENT ONLY IN A WELL VENTILATED AREA TO PREVENT INHALATION OF FUMES. SHOULD SKIN CONTACT OCCUR, WASH AFFECTED AREA THOROUGHLY WITH FRESH WATER. IF EYE CONTACT OCCURS OR IF SOLVENT IS ACCIDENTALLY INGESTED, SEEK MEDICAL AID IMMEDIATELY.

h. Remove packs from solution and allow to drain.
i. Place packs in Stoddard Solvent for 10 minutes. Remove packs and allow to drain. Wash packs in fresh water until all solvent is removed.
j. Remove plugs and dry packs with compressed air (50 psi max.).

NOTE

BLOW AIR PARALLEL, NOT PERPENDICULAR TO PACK SURFACES TO PREVENT DAMAGE.

k. Reinstall plugs in packs. Inspect packs by holding over a strong light. An example of pack cleanliness should be a new pack of same mesh size.
l. Remove plugs and reassemble filter assembly using new packings and seals. Assembly procedure is essentially the reverse of disassembly procedure.
m. Using new seal, install filter assembly in drive unit and lock-wire attachment bolt.
n. Conduct engine run; perform drive unit operational check. During operational check observe filter installation for leakage. Refer to Section I of this manual for engine run procedure. Refer to T.O. 1F-106A-2-10 for operational check of drive unit.

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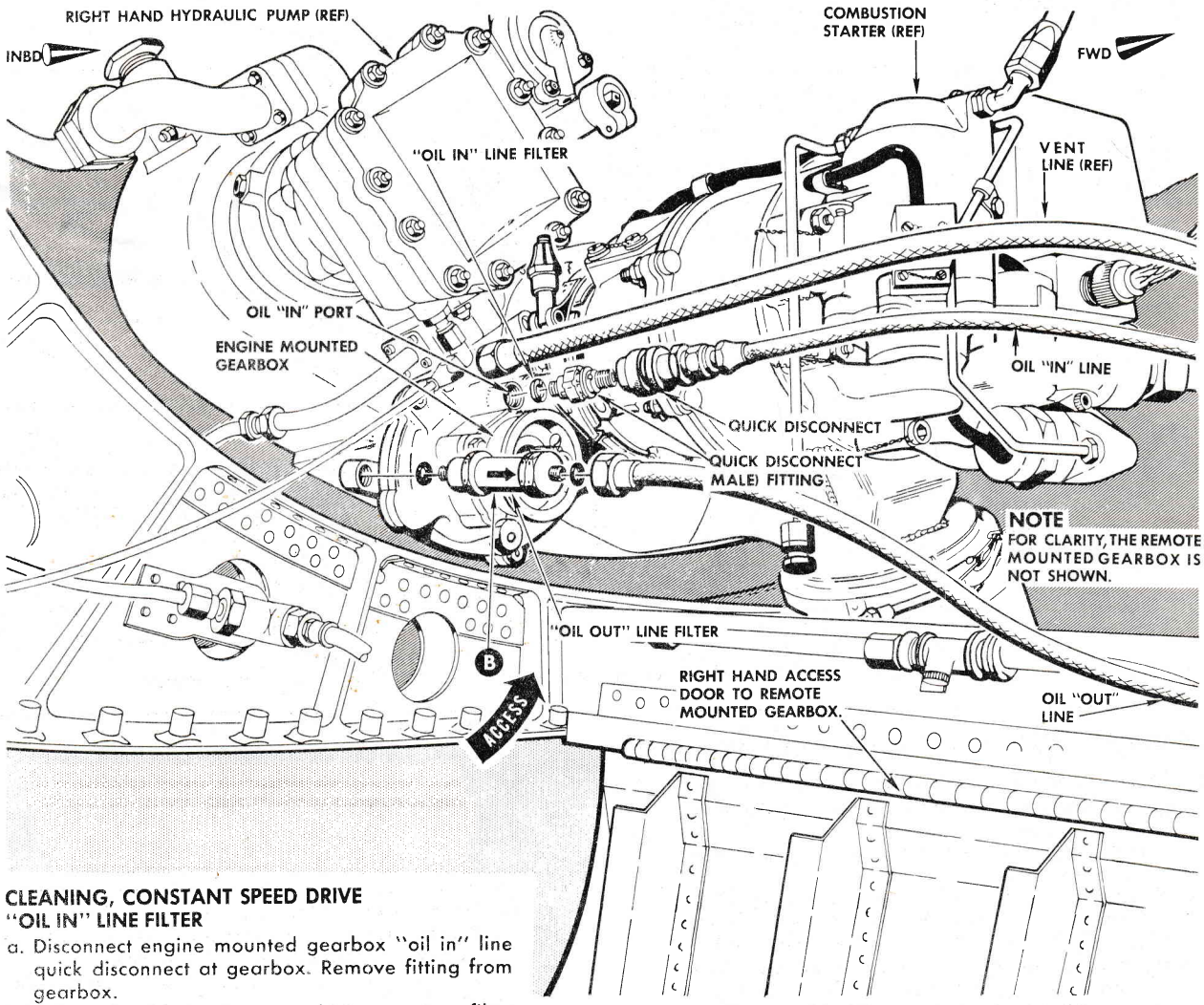
Figure 9-16. Cleaning, Constant-Speed Oil System Filters (Sheet 1 of 3)



CLEANING, CONSTANT SPEED DRIVE "OIL IN" LINE FILTER

a. Disconnect engine mounted gearbox "oil in" line quick disconnect at gearbox. Remove fitting from gearbox.
b. Using wide blade slot screwdriver, unscrew filter from gearbox "oil in" port.
c. Clean filter in solvent MIL-C-25107 using stiff bristled non-metallic brush. Rinse in Stoddard Solvent.
d. Inspect filter for damage. Replace if required.
e. Install filter using slot screwdriver.
f. Install line coupling fitting in gearbox using new O - ring. Torque fitting 35 to 50 inch-pounds.
g. Install oil line to gearbox coupling.
h. If constant speed oil system has been drained, conduct filling and priming procedure as specified in this handbook section.
i. Conduct engine run; perform drive unit operational check. During operational check observe filter installation for leakage. Refer to Section I of this manual for engine run procedure. Refer to T.O. 1F-106A-2-10 for operational check of drive unit.

CLEANING, ENGINE MOUNTED GEARBOX "OIL OUT" LINE FILTER

a. Cut safety-wire and disconnect "oil out" line from filter.
b. Cut safety-wire and remove filter from gearbox.
c. Disassemble filter as shown in detail B.
d. Clean all filter components in solvent MIL-C-25107 using stiff bristled non-metallic brush. Rinse in Stoddard Solvent.

WARNING

SOLVENT MIL-C-25107 IS A TOXIC AND CAUSTIC COMPOUND. WEAR PROTECTIVE CLOTHING AND RUBBER GLOVES TO PREVENT SKIN CONTACT. USE SOLVENT IN A WELL VENTILATED AREA TO PREVENT INHALATION OF FUMES. SHOULD SKIN CONTACT OCCUR, WASH AFFECTED AREA THOROUGHLY WITH FRESH WATER. IF EYE CONTACT OCCURS OR IF SOLVENT IS ACCIDENTALLY INGESTED, OBTAIN MEDICAL AID IMMEDIATELY.

e. Reassemble filter as shown in detail B. Use new O-rings.
f. Hold body of filter with wrench and torque filter cap to 100 to 150 inch-pounds and safety-wire.

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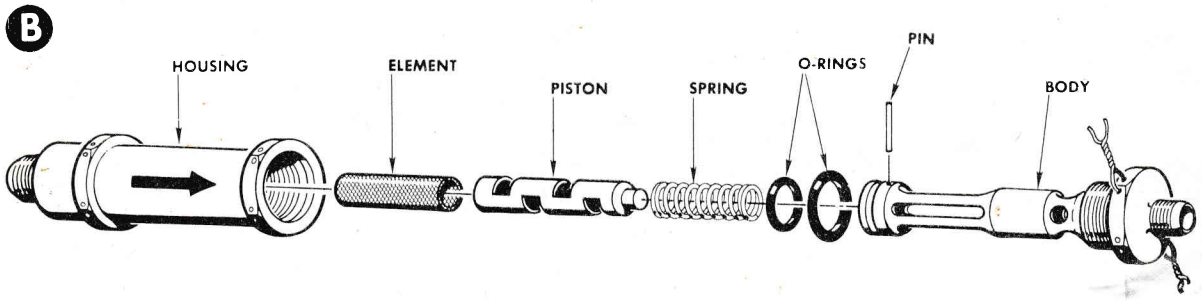
Figure 9-16. Cleaning, Constant-Speed Oil System Filters (Sheet 2 of 3)



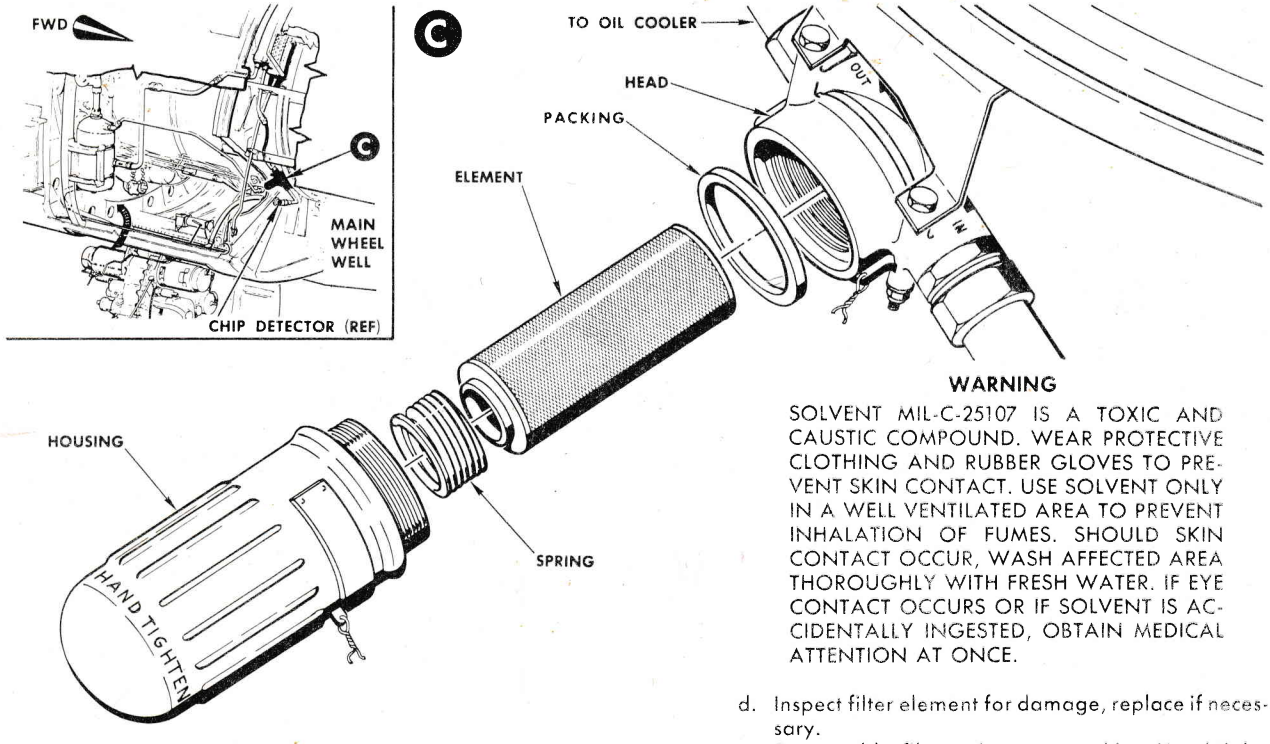
g. Install O-ring in inlet port of filter. Install filter in engine mounted gearbox "oil out" port and torque to 60-80 inch-pounds. Safety-wire filter to gearbox.

CAUTION

MAKE CERTAIN THAT ARROW STAMPED ON FILTER IS POINTING AWAY FROM ENGINE MOUNTED GEARBOX.

h. Connect "oil out" hose to filter; hold filter with wrench and torque hose fitting to 135 to 180 inch-pounds. Safety-wire hose fitting to filter.

i. Conduct engine run; perform drive unit operational check. During operational check observe filter installation for leakage. Refer to Section I of this manual for engine run procedure. Refer to T.O. 1F-106A-2-10 for operational check of drive unit.



CLEANING, "OIL IN" TO COOLER FILTER

a. Cut safety wire and unscrew filter element housing from filter head. Do not use wrench; loosen by hand.

b. Remove filter element and spring.

c. Clean element, spring and housing in solvent MIL-C-25107 using stiff bristled non-metallic brush. Rinse in Stoddard Solvent.

WARNING

SOLVENT MIL-C-25107 IS A TOXIC AND CAUSTIC COMPOUND. WEAR PROTECTIVE CLOTHING AND RUBBER GLOVES TO PREVENT SKIN CONTACT. USE SOLVENT ONLY IN A WELL VENTILATED AREA TO PREVENT INHALATION OF FUMES. SHOULD SKIN CONTACT OCCUR, WASH AFFECTED AREA THOROUGHLY WITH FRESH WATER. IF EYE CONTACT OCCURS OR IF SOLVENT IS ACCIDENTALLY INGESTED, OBTAIN MEDICAL ATTENTION AT ONCE.

d. Inspect filter element for damage, replace if necessary.

e. Reassemble filter using new packing. Hand tighten filter element housing on filter head; do not use wrench.

f. Safety-wire filter element housing to filter head.

g. Conduct engine run; perform drive system operational check. During operational check, observe filter installation for leakage. Refer to Section I of this manual for engine run procedure. Refer to T.O. 1F-106A-2-10 for operational check of drive system.

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Figure 9-16. Cleaning, Constant-Speed Oil System Filters (Sheet 3 of 3)

Section X

DRAINAGE PROVISIONS

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Description 10-1
Operational Checkout 10-3
System Analysis 10-4
Extreme Weather Conditions 10-4

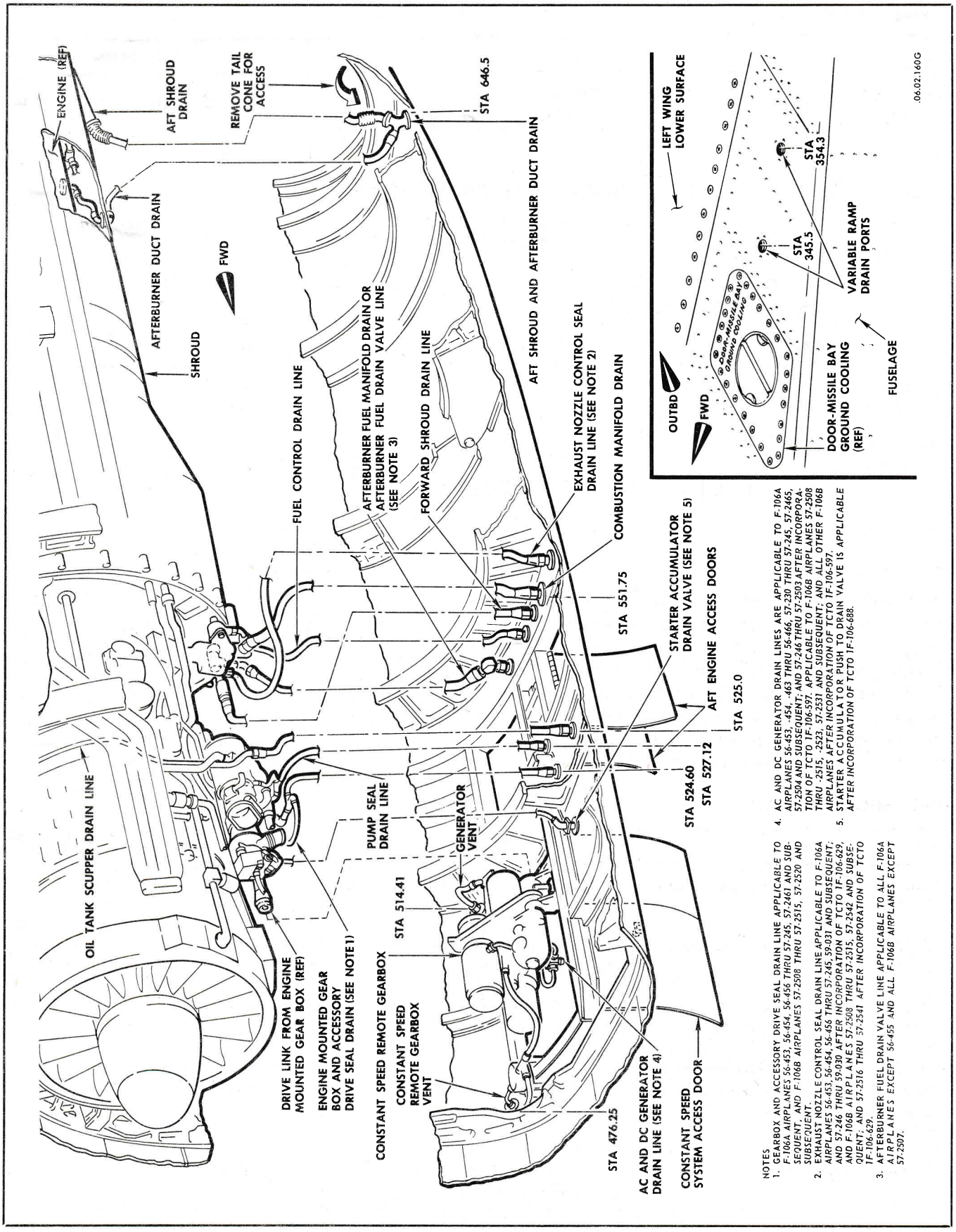
DESCRIPTION

10-1. DESCRIPTION.

Liquid leakage from engine-mounted components, and associated systems is manifolded and drained overboard through drain ports along the lower side of the fuselage, adjacent to the engine. Each of the drain lines is equipped with disconnect points to facilitate removal of the engine. The function and operation of drainage from the various components is governed by the type of system involved. Some areas drain only when the engine is not operating. These eliminate the accumulation of liquids that are normally used during engine operation. The drains may be classified as two types: the first as weep drains which permit elimination of liquids at any time, independent of engine operation; the second as those permitting drainage only during certain engine operating configurations. An abnormal amount of drainage at any of the drain points indicates engine component malfunction or possible impending failure. For an illustration of the engine drainage provisions, see figure 10-1.

10-2. ENGINE DRAINS.

DRAIN	LOCATION	TYPE OF DRAIN
Constant-speed remote gearbox vent.	Fuselage sta. 476.25, right side of fuselage centerline.	Weep drain.
Constant-speed remote governor drain.	Fuselage sta. 514.41, right side of fuselage centerline.	Weep drain.
Engine mounted gearbox and accessory seal drain. *Applicable to F-106A airplanes 56-453, -454, 56-456 thru 57-245, 57-2461 and subsequent, and F-106B airplanes 57-2508 thru 57-2515, 57-2520 and subsequent.*	Fuselage sta. 524.60, left side of fuselage centerline.	Weep drain.
Oil tank scupper drain.	Fuselage sta. 525.0, left side of fuselage centerline.	Weep drain.
Afterburner manifold drain.	Fuselage sta. 551.75, right side of fuselage centerline.	Drains when afterburner is not in use.



NOTES
1. GEARBOX AND ACCESSORY DRIVE SEAL DRAIN LINE APPLICABLE TO F-106A AIRPLANES 56-453, 56-454, 56-456 THRU 57-245, 57-2461 AND SUBSEQUENT, AND F-106B AIRPLANES 57-2508 THRU 57-2515, 57-2520 AND SUBSEQUENT.
2. EXHAUST NOZZLE CONTROL SEAL DRAIN LINE APPLICABLE TO F-106A AIRPLANES 56-453, 56-454, 56-456 THRU 57-245, 59-031 AND SUBSEQUENT; AND 57-246 THRU 59-030 AFTER INCORPORATION OF TCTO 1F-106-629, AND F-106B AIRPLANES 57-2508 THRU 57-2515, 57-2542 AND SUBSEQUENT; AND 57-2516 THRU 57-2541 AFTER INCORPORATION OF TCTO 1F-106-629.
3. AFTERBURNER FUEL DRAIN VALVE LINE APPLICABLE TO ALL F-106A AIRPLANES EXCEPT 56-455 AND ALL F-106B AIRPLANES EXCEPT 57-2507.
4. AC AND DC GENERATOR DRAIN LINES ARE APPLICABLE TO F-106A AIRPLANES 56-453, 454, 463 THRU 56-466, 57-230 THRU 57-245, 57-2465, 57-2504 AND SUBSEQUENT; AND 57-246 THRU 57-2503 AFTER INCORPORATION OF TCTO 1F-106-597. APPLICABLE TO F-106B AIRPLANES 57-2508 THRU 2515, 2523, 57-2531 AND SUBSEQUENT; AND ALL OTHER F-106B AIRPLANES AFTER INCORPORATION OF TCTO 1F-106-597.
5. STARTER ACCUMULATOR PUSH TO DRAIN VALVE IS APPLICABLE AFTER INCORPORATION OF TCTO 1F-106-688.

Figure 10-1. Draining Provisions

10-2. ENGINE DRAINS (CONT).

DRAIN	LOCATION	TYPE OF DRAIN
Afterburner fuel drain. *Applicable to all F-106A airplanes except 56-455 and all F-106B airplanes except 57-2507 after incorporation of TCTO 1F-106-667.*	Fuselage sta. 551.75, right side of fuselage centerline.	Drains when afterburner is not in use.
Fuel control drain.	Fuselage sta. 551.75, left side of fuselage centerline.	Drains at engine shutdown.
Combustion manifold drain.	Fuselage sta. 551.75, left side of fuselage centerline.	Drains at engine shutdown.
Forward shroud drain.	Fuselage sta. 551.75, left side of fuselage centerline.	Weep drain.
Aft shroud drain.	Fuselage sta. 646.50, left side of fuselage centerline.	Weep drain.
Afterburner duct drain.	Fuselage sta. 646.50, left side of fuselage centerline.	Drains at engine shutdown.
Variable ramp hydraulic motor seal drain.	Sta. 345.5, under side of left wing adjacent to fuselage.	Weep drain.
Variable ramp emergency operation vent.	Sta. 354.3, under side of left wing adjacent to fuselage.	Vents during ramp emergency operation.
Exhaust nozzle control seal drain. *Applicable to F-106A airplanes 56-453, -454, 56-456 thru 57-245, 59-031 and subsequent; and 57-246 thru 59-030 after incorporation of TCTO 1F-106-629. Applicable to F-106B airplanes 57-2508 thru 57-2515, 57-2542 and subsequent; and 57-2516 thru 57-2541 after incorporation of TCTO 1F-106-629.*	Fuselage sta. 551.75, left side of fuselage centerline.	Weep drain.

OPERATIONAL CHECKOUT

10-3. OPERATIONAL CHECKOUT, DRAINAGE SYSTEM.

Operation of the drainage systems is a function of the engine operation. Refer to Section I for the engine ground run check procedure.

SYSTEM ANALYSIS

10-4. SYSTEM ANALYSIS, ENGINE DRAINAGE PROVISIONS.

Continuous draining from weep type drains, as identified in paragraph 10-2, is an indication of component malfunction. Failure of drains normally functioning at time of engine shutdown, as identified in paragraph 10-2, is an indication of component malfunction. These malfunctions must be corrected prior to continued engine operation.

EXTREME WEATHER CONDITIONS

10-5. COLD WEATHER OPERATION.

During ground run operation of the engine under normal conditions, drainage will occur during and after engine shutdown as specified. Care must be exercised to see that the drains function properly as indicated by the specified operating procedures. During cold weather conditions, some drains can become blocked by moisture condensation frozen in the lines. At this time it will be necessary to make heat application to the affected areas until positive drainage occurs prior to continued operation. Heat may be applied using Ground Heating Unit 8-96106 (gas) (4520-555-1293), or 8-96107 (electric).

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