

**PRATT & WHITNEY CANADA**  
**MAINTENANCE MANUAL**  
**MANUAL PART NO. 3013242**

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ACCESSORY GEARBOX ASSEMBLY - DESCRIPTION AND OPERATION

1. Description and Operation (Ref. Fig. 1)

The accessory gearbox, located at the rear of the engine, consists of two magnesium alloy castings, bolted together at their outer flanges and secured to studs on Flange G of the compressor inlet case (Ref. 72-20-00).

The front casting, provided with preformed packings at the front and rear mating faces, forms an oil-tight diaphragm between the oil tank compartment in the compressor inlet case and the accessory gearing. The diaphragm also provides support for the oil pump and pressure relief valve assembly, which is secured on the front face by four bolts, and the accessory drive gear front bearings and seals. The center of the diaphragm is sealed from the oil tank by the inlet case center tube. The diaphragm is mounted on the gearbox rear housing by four countersunk head screws and self-locking nuts located at the 4th, 8th, 14th and 18th positions in clockwise rotation, assuming the 1st to be at the 12 o'clock position.

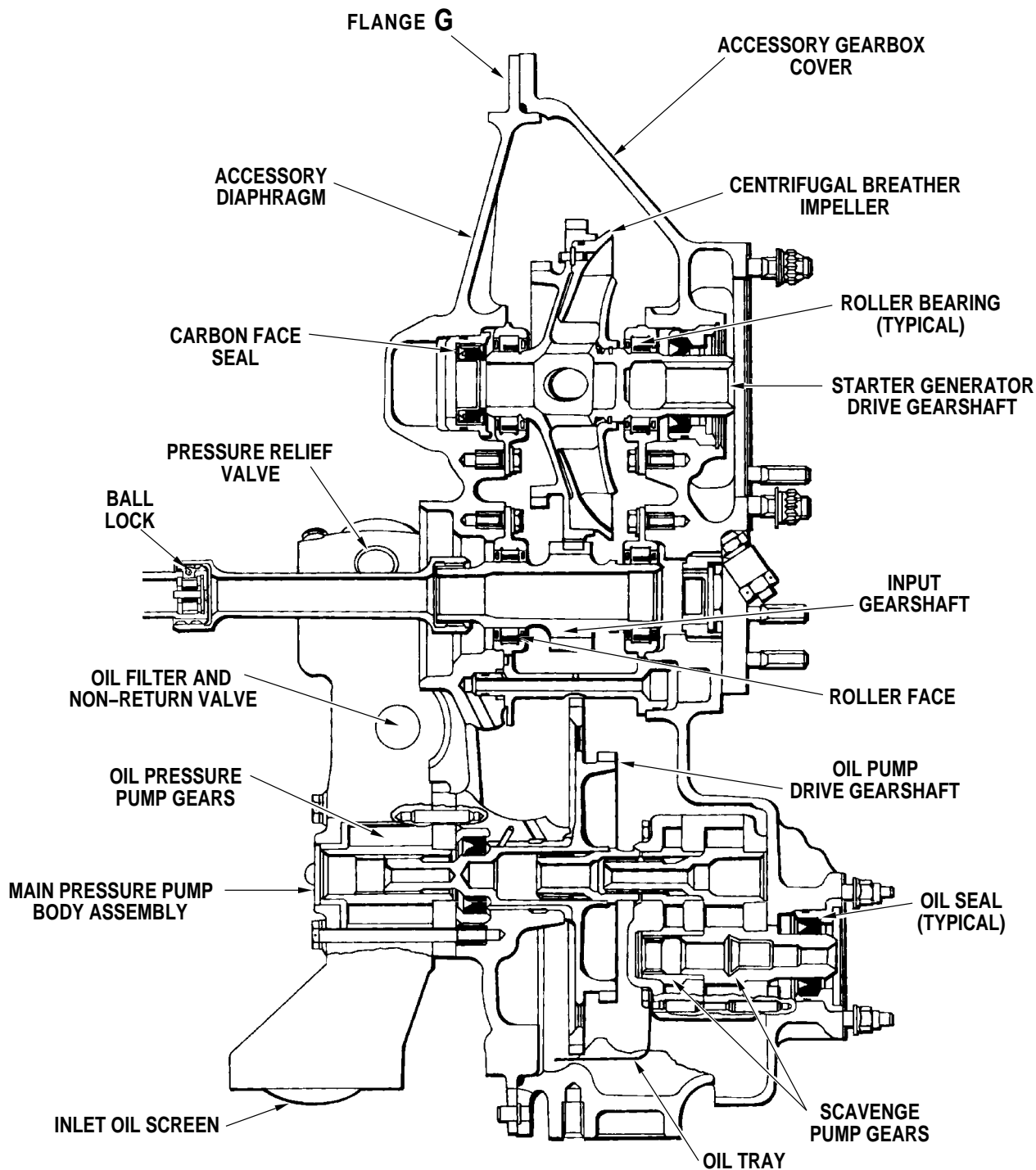
The rear casting forms the gearbox housing and provides support bosses for the accessory drive gear rear bearings and seals. Roller bearings secured to the gearbox rear casting and the diaphragm at the center provide support for the gearbox input gearshaft. The input gearshaft incorporates an external spline at its front end for mating with a corresponding internal spline on the input coupling shaft. The coupling shaft is secured at its front end to the compressor rear hub coupling spline; positive engagement is obtained by a ball-lock in the spline coupling arrangement, which transmits thrust to the compressor No. 1 ball bearing.

The internal scavenge oil pump, consisting of front and rear elements, is mounted at the bottom of the gearbox compartment and driven by the No. 3 drive. Each element consists of twin gears operating in a ported housing; the front element scavenges the No. 2 bearing area and dumps the oil into the gearbox sump. The rear element scavenges the gearbox sump and returns the oil to the airframe-mounted oil cooler and then to the tank.

The external scavenge oil pump, consisting of front and rear elements, is mounted on an external pad on the gearbox housing and driven by the No. 4 drive. The pump is similar to the internal pump; however, the housings of each element incorporate large input elbows which accommodate their respective external scavenge tubes. The front element scavenges the No. 3 and 4 bearing area and dumps the oil into the gearbox sump, while the rear element scavenges the reduction gearbox and directs the oil through an airframe-mounted cooler, and then to tank.

All main accessory drives are supported on identical roller bearings. With the exception of the front bearing of the starter-generator gearshaft, all drives are fitted with garter-type oil seals. An oil tray is incorporated in the lower section of the gearbox adjacent to the scavenge pump drive gears (drives 3 and 4), to minimize oil foaming during engine operation. A centrifugal oil separator, installed on the starter-generator gearshaft, separates oil from engine breather air and discharges relatively oil free air to atmosphere via cored passages in the gearbox diaphragm. Oil drains into the gearbox sump. A carbon-face seal fitted at the front end of the gearshaft and within the cored breather air passage prevents oil leakage through the bearing assembly. The starter-generator gearshaft may be of dry spline Pre-SB1386 or wet spline Post-SB1386 configuration.

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C827B

Accessory Gearbox (Typical Cross-section)  
 Figure 1

**72-60-00**

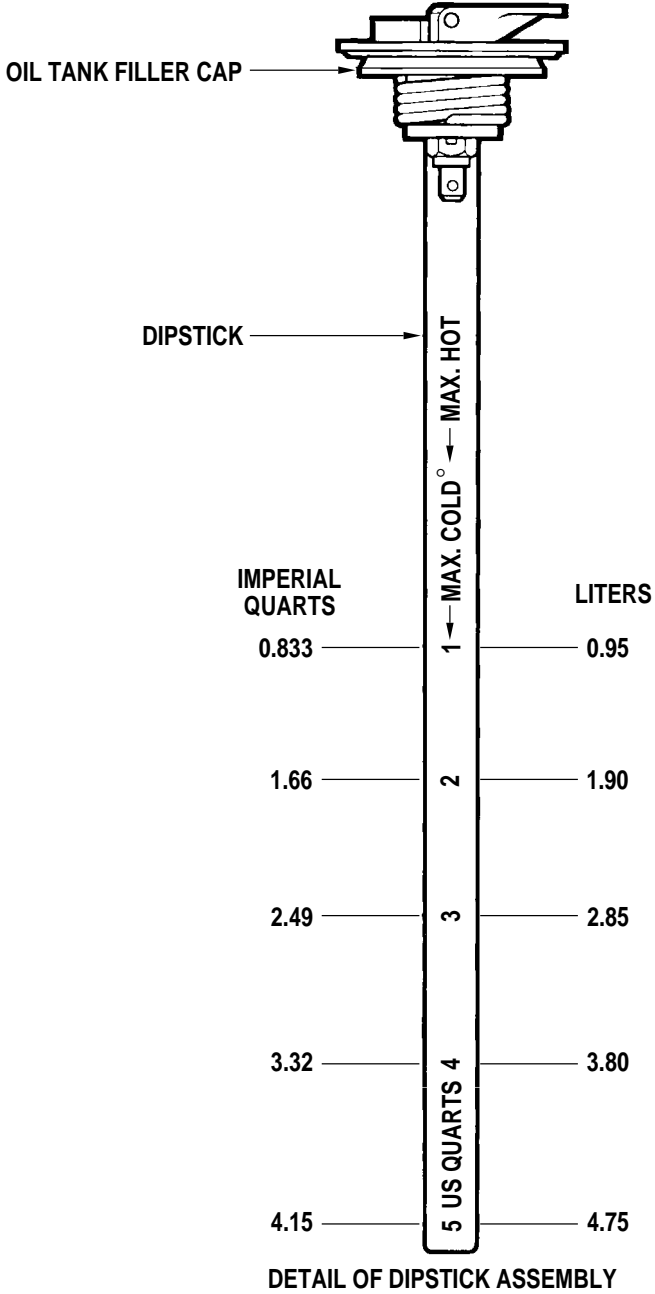
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Mounting pads, complete with studs, are incorporated on the external face of the gearbox housing for the fuel control unit/fuel pump, airframe-supplied starter-generator and Ng tachometer-generator. Two additional pads are incorporated on the left side of the housing and are available for additional bolt-on airframe-supplied equipment. The drive gears at these pads are optional equipment. A mount pad, complete with studs, is also provided at the rear face of the external scavenge pumps for airframe-supplied equipment. The drive gear is a customer-option. An access plug, located below the starter-generator pad, provides access for a puller tool which must be used to disengage the ball-locked input gearshaft and compressor rear hub coupling shaft during disassembly.

Engine oil pressure is regulated by a plunger-type pressure relief valve located and secured to a boss at the top of the oil pump housing. All oil in excess of the regulated pressure is returned directly into the tank. The relief valve consists of a valve sleeve, valve, spacers, spring and spring seat, guide and retaining ring, which are retained within the valve housing by a second retaining ring. The assembly is accessible through the oil filter boss on the compressor inlet case, with the filter and filter housing removed. The pressure relief valve is adjusted during engine assembly, to provide the required oil pressure, by insertion of a suitable number of spacers under the spring. Under normal conditions, this setting will require no further adjustment.

A combined filler cap and dipstick/gage assembly (Ref. Fig. 2) is installed at the 11 o'clock position of the accessory gearbox housing. The assembly is secured to a removable filler tube and housing by a quick-release and locking arrangement. The filler tube projects forward and downward through the accessory gearbox and diaphragm and into the oil tank to form a seal between the tank and gearbox. The dipstick blade is calibrated in U.S. quarts and indicates the quantity required to fill the tank to maximum oil level for both hot and cold oil conditions.

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C7073

Dipstick and Filler Cap  
 Figure 2



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ACCESSORY GEARBOX ASSEMBLY - MAINTENANCE PRACTICES

1. General

- A. Maintenance personnel should make reference to the INTRODUCTION section and Chapter 70-00-00 STANDARD PRACTICES of this manual to familiarize themselves with general procedures.
- B. Install suitable protective caps/covers over all disconnected tubes/lines and component openings.
- C. Lockwire shall comply with specification AMS 5687, heat and corrosion resistant steel wire MS9226-03, which is 0.025 inch diameter, and will not be specified in instructions.

2. Consumable Materials

The consumable materials listed below are used in the following procedures.

<u>Item No.</u>	<u>Name</u>
PWC03-001	Oil, Engine Lubricating
PWC05-037	Enamel, Epoxy
PWC05-061	Cloth, Abrasive Coated Crocus
PWC05-101	Cloth, Abrasive
PWC11-014	Alcohol, Isopropyl
PWC13-001	Primer, Epoxy

3. Special Tools

The special tools listed below are used in the following procedures.

<u>Tool No.</u>	<u>Name</u>	<u>Application</u>
PWC30046-52	Puller	
PWC30046-54	Puller	Post-SB1386
PWC30046-57	Puller	
PWC30051-01	Base	
PWC30051-02	Drift	
PWC30052	Puller	
PWC30075	Drift	
PWC30128-04	Puller	
PWC30274	Base	
PWC30373	Puller/Pusher	
PWC30415	Compressor	
PWC30499-50	Gage, spline wear	
PWC30675	Drift	Post-SB1386
PWC30854	Adapter	
PWC32275	Plate, Impeller	

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<u>Tool No.</u>	<u>Name</u>	<u>Application</u>
PWC32396	Jackscrews	(No. 10-32)
PWC37088-001	Drift, Seal	
PWC37088-002	Drift, Seal	
PWC37088-003	Drift, Seal	
PWC50502	Compressor, AGB Centrifugal Impeller Ring	

4. Fixtures, Equipment and Supplier Tools

Not Applicable

5. Removal/Installation

NOTE: Replacement of externally mounted driveshaft seals, oil pressure relief valve, oil filler cap/dipstick/gage assembly and oil filler tube is accomplished as a Line Maintenance Practice and detailed under Removal/Installation. Replacement of internally mounted driveshaft seals, centrifugal breather carbon seal and starter-generator gearshaft are done as a Heavy Maintenance Practice and detailed under Approved Repairs.

A. Removal of Accessory Drive Seals (Ref. Fig. 201)

- (1) Remove the accessory unit, if applicable, from the mounting pad on the accessory gearbox housing.
- (2) Use the gearshaft oil seal carrier puller (PWC30046-57), and the starter-generator gearshaft oil seal carrier puller (PWC30046-52) on Pre-SB1386 dry-spline starter-generator arrangements, or puller (PWC30046-54) on Post-SB1386 wet-spline starter-generator arrangements, to remove the oil seal and carrier from the gearbox housing.

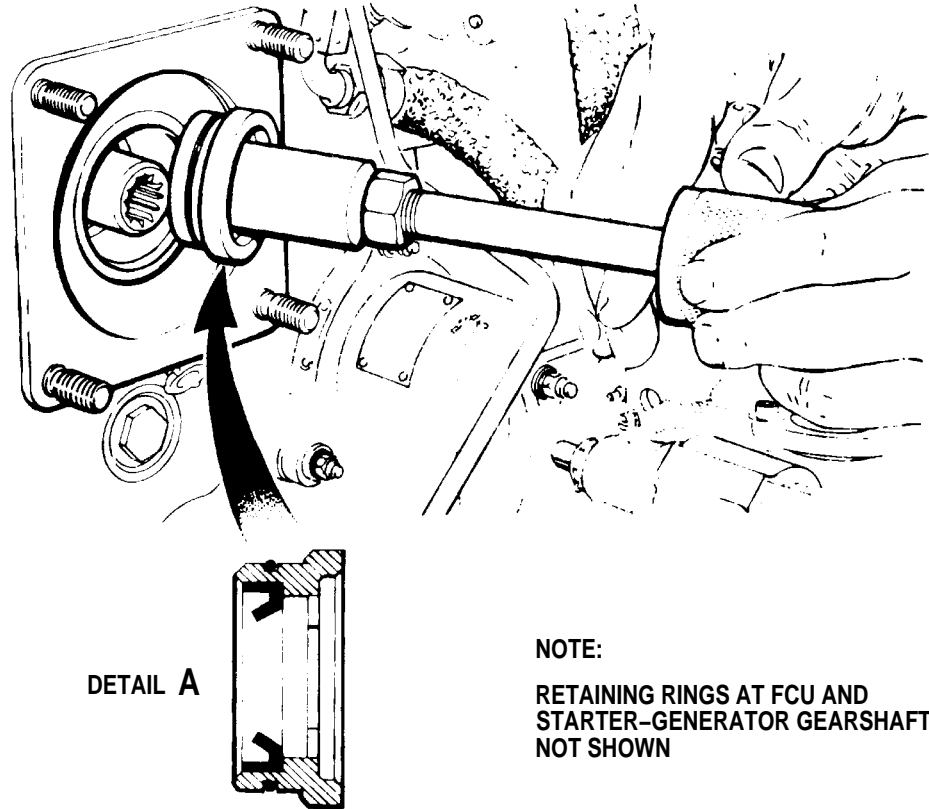
NOTE: When removing seals at the fuel control unit (FCU) and starter-generator mounting pads, be sure the retaining rings are removed before attempting to withdraw the assembled seal and carrier.

- (3) Remove the seal and preformed packing from the oil seal carrier.

B. Removal of Oil Pressure Relief Valve (Ref. Fig. 202)

- (1) Remove the oil filter element and housing (Ref. 79-20-02).
- (2) Insert the oil relief valve compressor (PWC30415) through the oil filter housing port to collapse the retaining ring (1) securing the relief valve in the internal bore of the relief valve housing (9).
- (3) Screw the shaft of the compressor into the spring seat (3) to compress the retaining ring (1). When the compressor shaft bottoms, pull on the shaft to extract the relief valve cartridge from the housing.

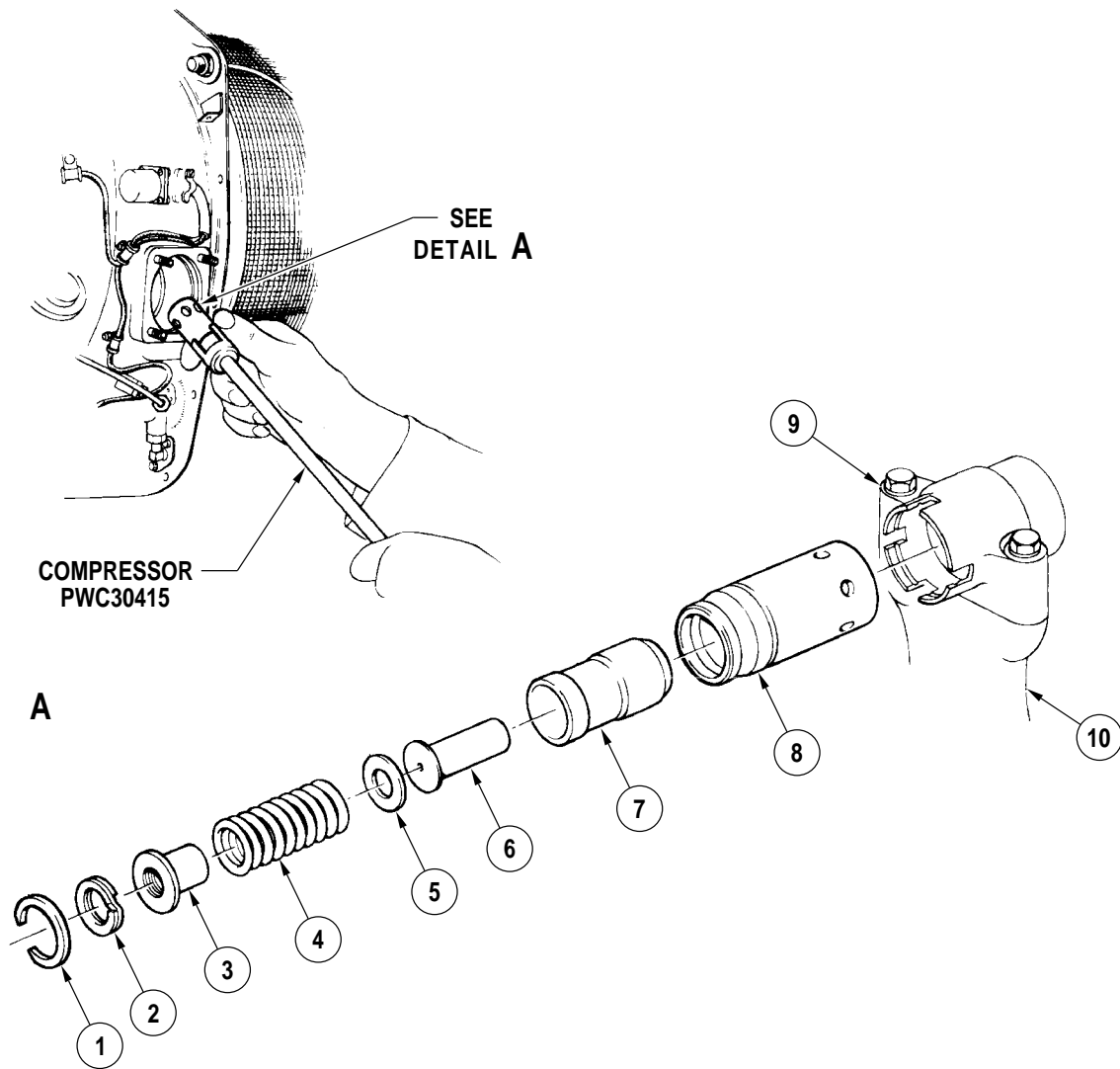
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C502B

Removal of Oil Seal and Oil Seal Carrier (Typical)  
Figure 201

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C1248B

Removal/Installation of Oil Pressure Relief Valve  
Figure 202

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Key to Figure 202

1. Retaining Ring
2. Retaining Ring
3. Spring Seat
4. Spring
5. Spacer(s) (6 max.)
6. Guide
7. Relief Valve Piston
8. Sleeve
9. Relief Valve Housing
10. Oil Pump Body

- (4) Remove the retaining ring (2) from the sleeve (8). Extract the spring seat (3), spring (4), spacer(s) (5), guide (6) and relief valve piston (7) from the sleeve (8).

C. Removal of Oil Filler Cap Dipstick/Gage Assembly and Oil Filler Tube (Ref. Fig. 203)

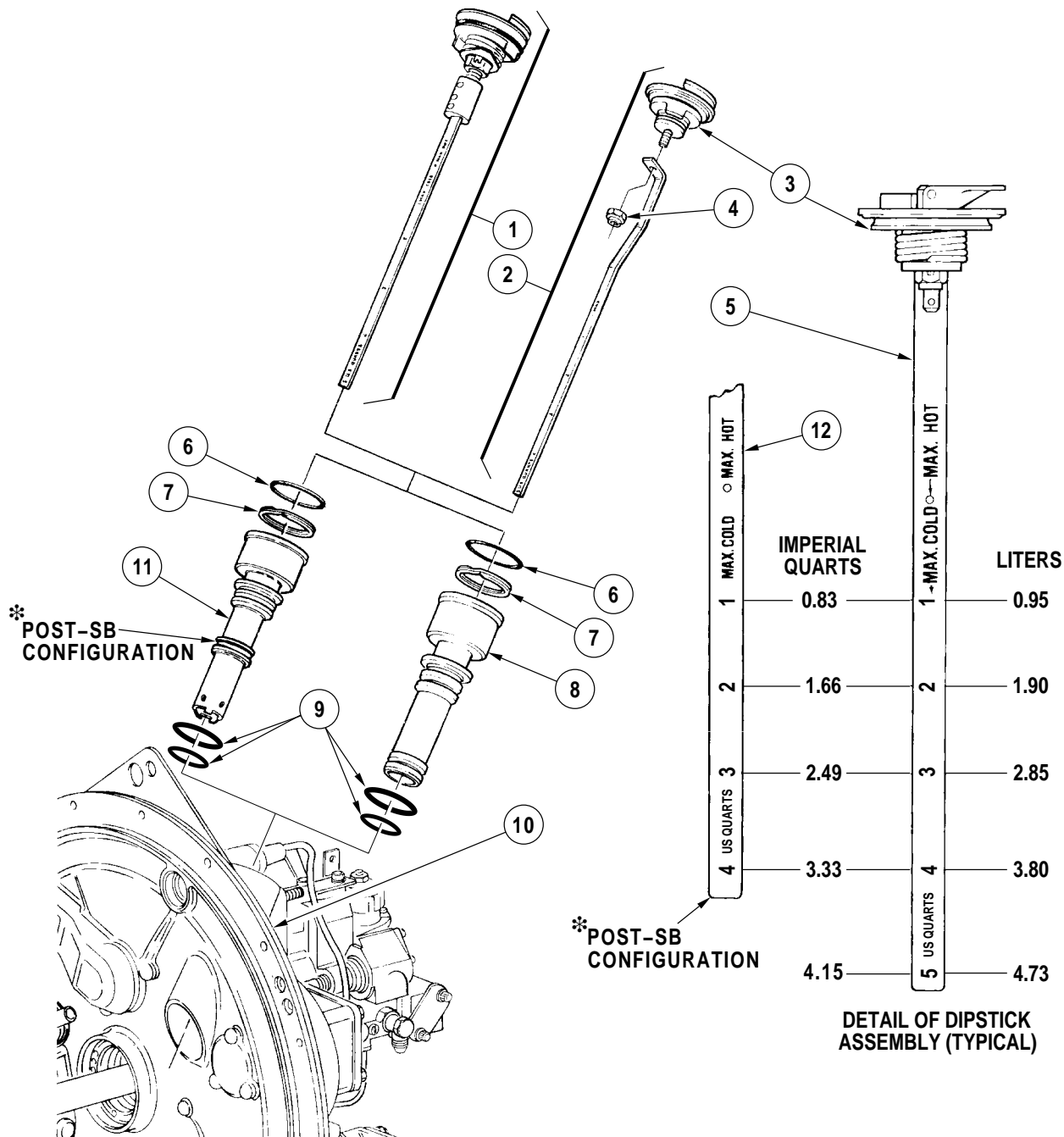
- (1) Unlock and remove the oil filler cap and dipstick assembly (2) or the oil filler cap and gage assembly (1) from the accessory gearbox housing (10). Remove the preformed packing (6).
- (2) When necessary, remove the retaining ring (7) securing the filler tube (8 or 11) to the accessory gearbox housing.
- (3) Withdraw the filler tube from the housing and remove the preformed packings (9) from the tube.
- (4) When the dipstick requires replacement:
  - (a) Remove the locknut (4) securing the dipstick (5) to the underside of the filler cap body and remove the dipstick.
  - (b) Fit a new dipstick (5) on the filler cap spindle (3) and secure with the locknut (4). Tighten the locknut 6 to 11 lb.in.

NOTE: The filler cap and gage assembly (1) are not repairable and should be returned to an approved overhaul facility.

D. Installation of Accessory Drive Seals (Ref. Fig. 201)

- (1) Heat the oil seal carriers to 141°C (285°F) in an oven.
- (2) Make the oil seals moist with engine oil (PWC03-001).
- (3) Remove the oil seal carriers from the oven.
- (4) Install each oil seal in their oil seal carrier using the drift (PWC37088-001), (PWC37088-002) or (PWC37088-003).

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**\* Post-SB1506**

**C41891C**

Removal/Installation of Oil Filler Cap, Dipstick/Gage Assembly and Oil Filler Tube  
Figure 203

**72-60-00**

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Key to Figure 203

1. Oil Filler Cap and Gage Assembly
2. Oil Filler Cap and Dipstick Assembly
3. Dipstick Filler Cap
4. Locknut
5. Dipstick
6. Preformed Packing
7. Retaining Ring
8. Filler Tube Assembly
9. Preformed Packings
10. Accessory Gearbox Housing
11. Filler Tube Assembly Post-SB1506
12. Oil Filler Cap and Gage Assembly Post-SB1506

- (5) Make the preformed packings moist with engine oil (PWC03-001). Install a new preformed packing on the outside diameter of each oil seal carrier.
- (6) Put the assembled oil seal and carrier in their boss on the accessory gearbox housing. Carefully install each oil seal carrier into position with the drift (PWC30075).

NOTE: Early engines may include seal elements of fluorosilicone rubber, where use of the drift is not necessary. The latest seal elements are of fluorocarbon rubber, where use of the drift is necessary.

- (7) At the starter-generator and fuel control unit driveshaft seals only, secure the seal and carrier with the retaining ring.
- (8) Check for oil leakage (Ref. Chapter 71-00-00, ADJUSTMENT/TEST).
- (9) Check for oil leakage after 5 to 10 hours of operation (Ref. Chapter 71-00-00, ADJUSTMENT/TEST, Post-Shutdown Check).

E. Installation of Oil Pressure Relief Valve (Ref. Fig. 202)

- (1) Slide the relief valve piston (7) into the sleeve (8) followed by the guide (6), spacer(s) (5), spring (4) and spring seat (3). Secure the spring seat in the sleeve (8) with the retaining ring (2).

NOTE: A maximum of six spacers (5) may be used to establish the desired oil pressure. Each additional spacer will increase the oil pressure by three to five psi. Lapping of the valve is not recommended.

- (2) Fit the retaining ring (1) into the exterior groove on the sleeve (8).
- (3) Install the oil relief valve compressor into the threaded spring seat (3).

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**CAUTION:** WHEN INSTALLING THE COMPRESSOR ON THE VALVE, MAKE SURE THAT THE GAP IN THE RETAINING RING IS SITUATED MIDWAY BETWEEN ANY TWO COMPRESSOR FINGERS. FAILURE TO DO SO WILL MAKE SUBSEQUENT VALVE REMOVAL DIFFICULT.

- (4) Insert the relief valve, mounted on the valve compressor (Ref. Fig. 202, Detail A), through the filter housing port into the relief valve housing (9); be sure the valve is fully inserted.
- (5) Slide the compressor body outward to release the retaining ring (1). Pull the shaft of the compressor outward until the retaining ring snaps into place. Unscrew the compressor shaft from the spring seat (3) and remove the compressor.
- (6) Install the filter housing and filter element (Ref. 79-20-02).

F. Installation of Oil Filler Cap Dipstick/Gage Assembly, and Oil Filler Tube (Ref. Fig. 203)

- (1) Install preformed packings (9) on the filler tube (8 or 11).
- (2) Insert the filler tube into the accessory gearbox housing (10). Align the notch in the flange of the tube with the dowel pin in the boss of the housing. Secure the tube with the retaining ring (7).

**CAUTION:** WHEN THE FILLER CAP AND DIPSTICK/GAGE ASSEMBLY IS INSTALLED AND LOCKED INTO POSITION, NO MOVEMENT IS ALLOWED.

- (3) Install a new preformed packing (6) on the filler cap and dipstick assembly (2) or the filler cap and gage assembly (1) and insert into the filler tube (8 or 11). Lock the cap and double check to confirm that the cap is correctly positioned and locked.

**NOTE:** Post-SB1506 when installing the oil filler tube assembly (11) featuring the ball type check valve, the applicable filler cap and gauge assembly (12) must also be installed.

- (4) If the installed cap and gage assembly does show movement, remove and tighten the self-locking nut 6 to 11 lb.in. This should bottom out the nut. If the cap still shows movement when inserted and locked in the filler tube, replace with a new filler cap and gage assembly.
- (5) If the required force to depress the lock tab by hand is excessive, remove the filler cap and back off the self-locking nut in increments of 1/4 turn at a time. Do not exceed 1/2 turn adjustment.

6. Inspection/Check

A. Starter-Generator Gearshaft Spline Wear Check (Ref. Fig. 204)

**NOTE:** The starter-generator gearshaft should be checked for spline wear at starter-generator removal/installation (Ref. Aircraft Maintenance Manual).

- (1) Release the clamp screw (3) and adjust the screw assemblies (4) to obtain the dimension of 0.660 inch over the ball ends. Tighten the clamp screws and recheck the dimension.



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- (2) Tilt the gage (1), outer end uppermost, and insert the gage (PWC30499-50) into the shaft centerbore until the ball ends are approximately midway along vertically opposite splines.
- (3) Gradually release the gage, allowing it to support itself in the shaft. If the gage is self-supporting, the gearshaft is considered serviceable. If the gage extension falls below the horizontal, the gearshaft must be replaced (Ref. Subpara. 8.D.).

**B. Oil Filler Cap, Dipstick/Gage Assembly and Oil Filler Tube (Ref. Fig. 203)**

- (1) Examine the filler cap and level indicator assembly, and the oil filler tube for corrosion and signs of damage.
- (2) For Post-SB1506 Engines: Make sure the ball moves freely in the check valve of the filler tube.
- (3) Check the spring-loaded locking feature of the cap for serviceability. If the force required to depress/lift the handle is outside the limit (8 to 11 lbs.), remove the cap and tighten/loosen the self-locking nut to meet the required limit.
- (4) Check the gage blade for security and visible damage.
- (5) When the cap is locked, there should be no movement. If movement is found, replace the cap.

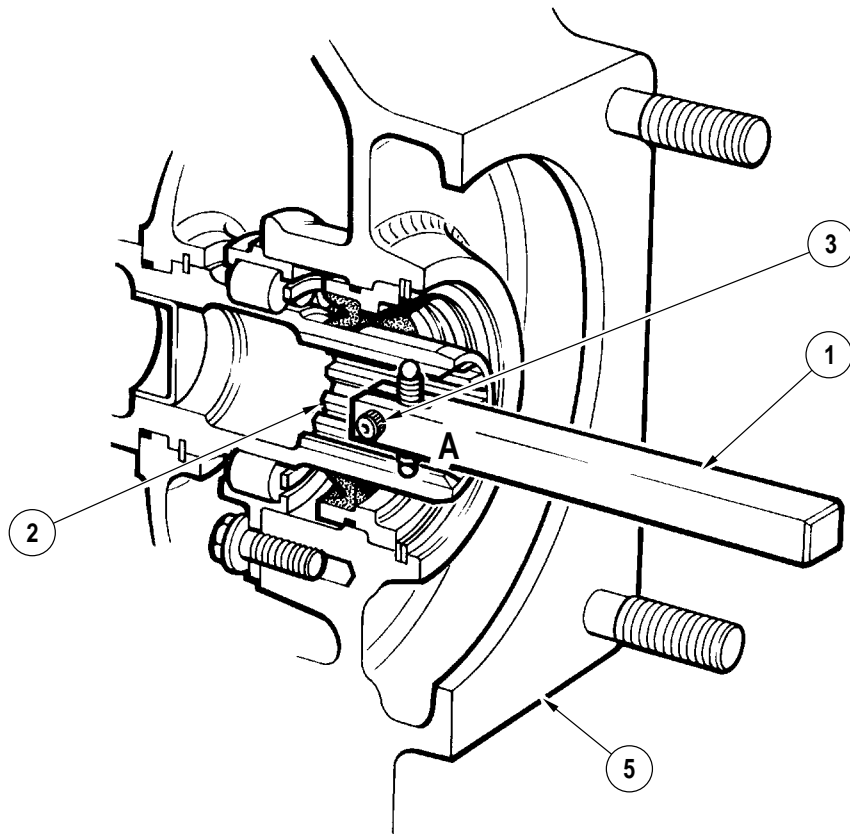
**C. Inspection of Scavenge Pump Inlet Screen**

- (1) Remove oil drain plug located on the AGB housing (Ref. Fig. 205).  
NOTE: For engine equipped with an AGB chip detector, remove the chip detector.
- (2) Collect drained oil in a clean container and check for any debris (Ref. Chap. 79-20-02, MAINTENANCE PRACTICES).
- (3) Use a mirror and suitable light source (or borescope) and inspect the scavenge oil pump inlet screen for carbon or debris (Ref. Chap. 79-20-02, MAINTENANCE PRACTICES).

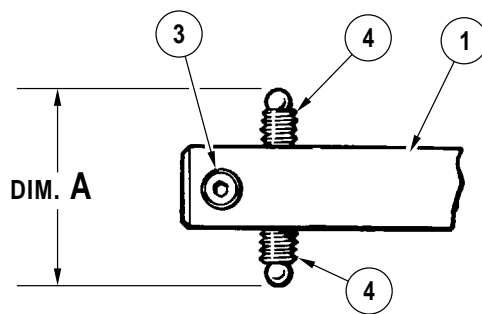
NOTE: Any foreign material found blocking the screen or contained in the oil should be identified. Look especially for paint flakes approximately 1/8 inch to 1/2 inch in diameter (Ref. Chap. 79-20-02, MAINTENANCE PRACTICES).

- (4) If carbon or debris is present, clean the inlet screen (Ref. Cleaning/Painting, Fig. 205).
- (5) Install the drain plug on the AGB housing (Ref. Chapter 72-00-00, SERVICING).  
NOTE: For engine equipped with an AGB chip detector, install the chip detector.
- (6) Replenish the drained oil (if not contaminated by foreign material) in oil tank (Ref. Chapter 72-00-00, SERVICING).

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ALLOW GAGE TO SUPPORT ITSELF



DETAIL A

C1539B

Starter-generator Gearshaft Spline Check  
Figure 204

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Key to Figure 204

1. Gearshaft Spline Wear Gage (PWC30499-50)
2. Gearshaft Splines
3. Gage Clamp Screw
4. Ball and Screw Assemblies
5. Starter-generator Mount Pad

7. Cleaning/Painting

A. Cleaning of Scavenge Oil Pump Inlet Screen (Ref. Fig. 205)

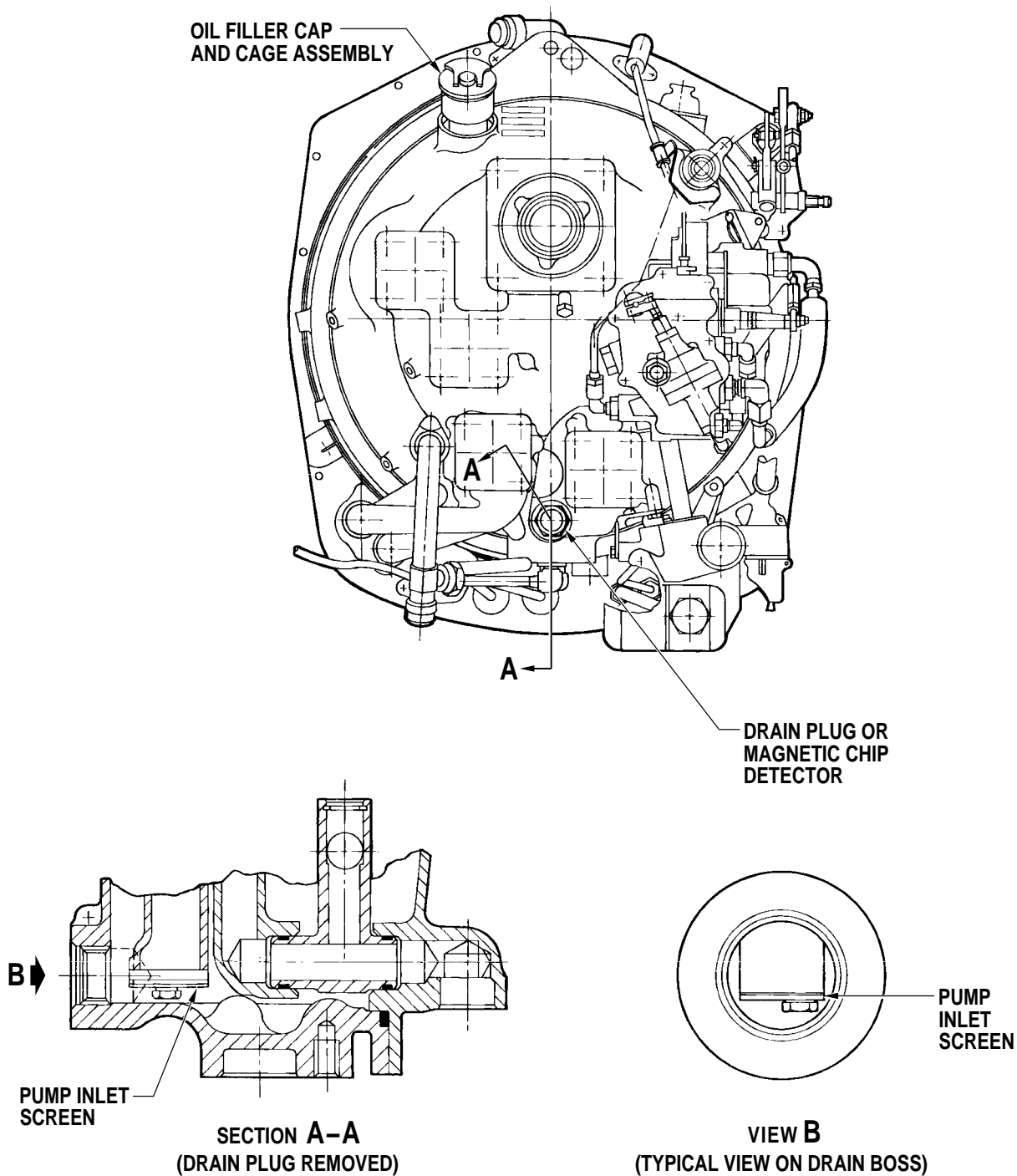
- (1) If carbon is present on the screen mesh, loosen with a suitable small plastic scraper or similar nonmetallic scraper. Do not deform the screen mesh.
- (2) Flush any carbon residue from the AGB as follows:
  - (a) Remove the oil filler cap (Ref. Removal/Installation).
  - (b) Remove the retaining ring and the oil filler tube (Ref. Removal/Installation)
  - (c) Place a suitable container under the AGB drain, and pour approximately 34 fluid ounces (one liter) of new engine oil (PWC03-001) heated to 122°F (50°C), into the AGB filler tube opening. Make sure oil does not enter oil tank.
  - (d) Let oil drain. Examine inlet screen and surrounding area to make sure carbon residue is removed. If not, repeat flushing procedure above.
- (3) Install oil filler tube (Ref. Removal/Installation).
- (4) Refill oil tank (Ref. Chapter 72-00-00, SERVICING)

8. Approved Repairs

A. Removal of Accessory Gearbox from Compressor Inlet Case (Ref. Figs. 206 and 207)

- (1) Drain the oil tank (Ref. 72-00-00, SERVICING).
- (2) Remove the accessory gearbox drain plug and allow the residual oil to drain into a suitable container.
- (3) If the engine is installed in the airframe, disconnect the following and remove as necessary:
  - (a) Connection(s) to the heated pneumatic tube electrical receptacle at Flange G.
  - (b) Connection to the overboard breather line.
  - (c) Connections to the oil pressure and temperature sensors and the Ng tachometer-generator.
  - (d) Connection to the starter-generator seal cavity drain.

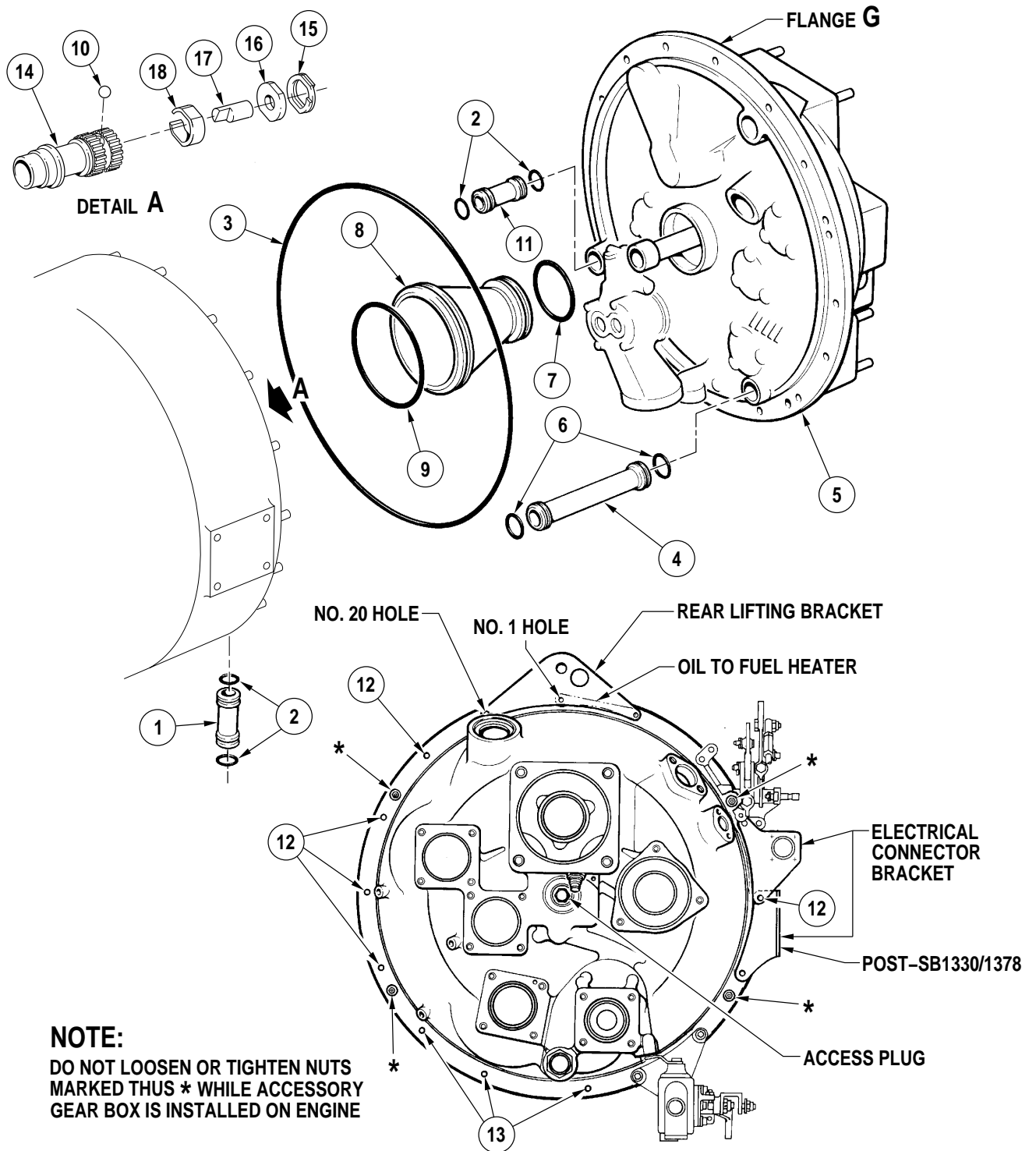
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Scavenge Pump Inlet Screen Inspection  
Figure 205

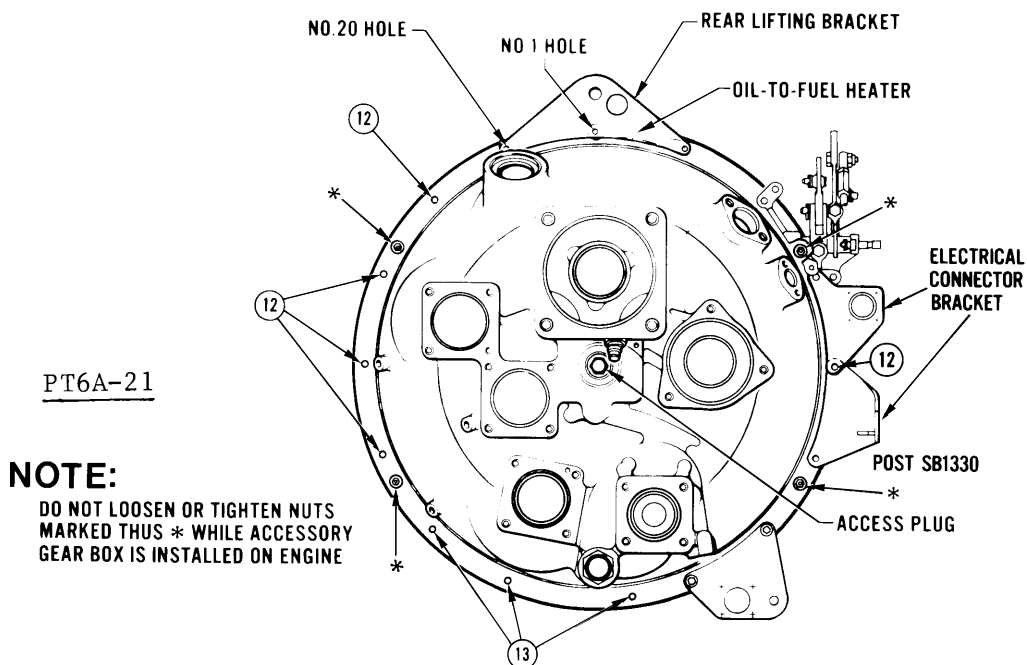
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C38690

Removal/Installation of Accessory Gearbox  
 Figure 206 (Sheet 1 of 2)

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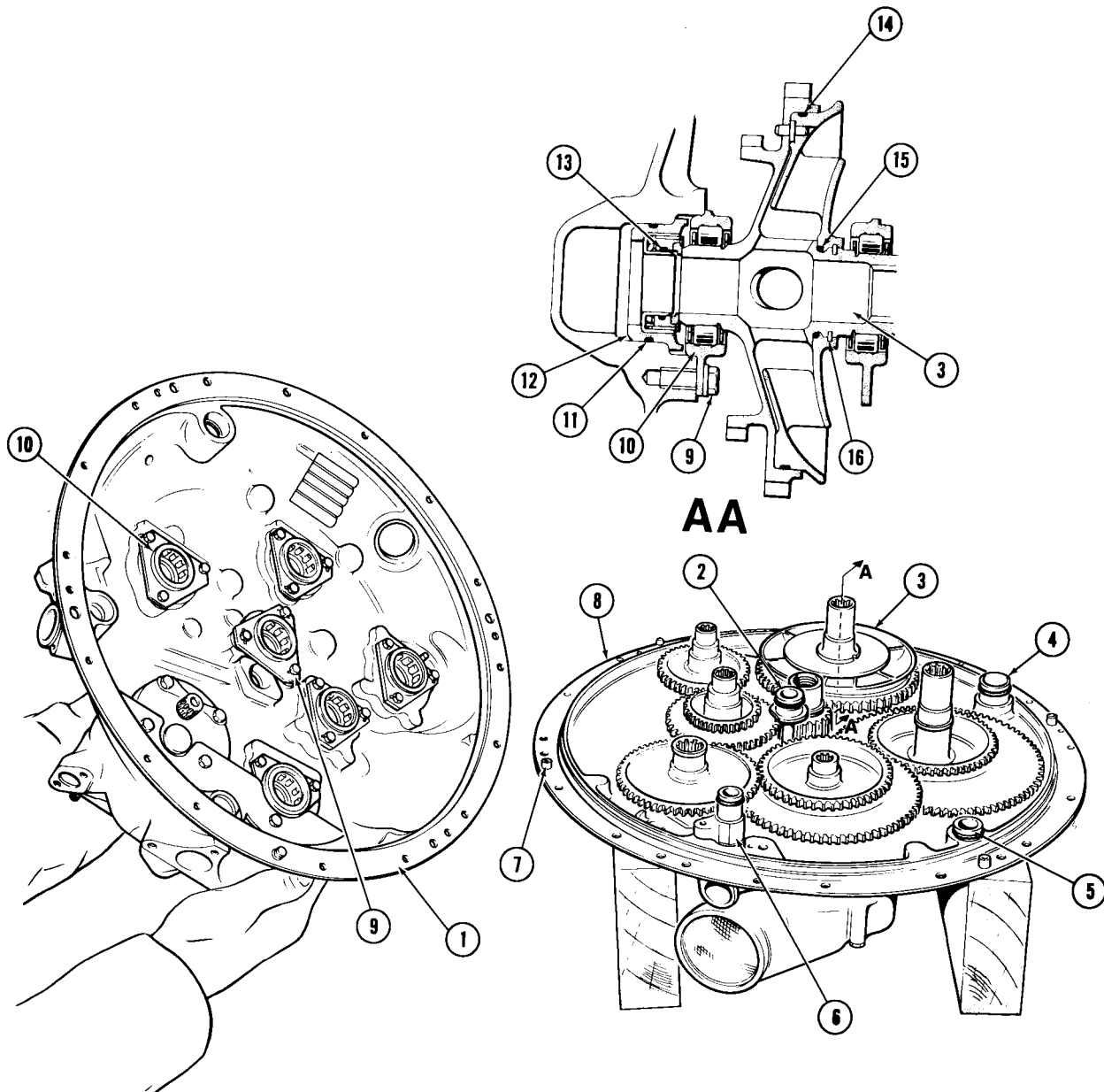
Removal/Installation of Accessory Gearbox  
Figure 206 (Sheet 2)

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Key to Figure 206

- 1. No. 3 Bearing Internal Oil Transfer Tube
- 2. Preformed Packing
- 3. Preformed Packing
- 4. No. 1 Bearing Oil Transfer Tube
- 5. Accessory Gearbox Assembly
- 6. Preformed Packing
- 7. Center Tube Preformed Packing
- 8. Oil Tank Center Tube
- 9. Center Tube Preformed Packing
- 10. Ball
- 11. No. 1 Bearing Oil Pressure Transfer Tube
- 12. Spacers Required
- 13. Washers Required
- 14. Compressor Rear Hub Coupling
- 15. Retaining Ring
- 16. Washer
- 17. Key
- 18. Expander Spring

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Removal/Installation of Accessory Gearbox Diaphragm  
Figure 207



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Key to Figure 207

1. Accessory Gearbox Housing
2. Center Flanged Transfer Tube and Oil Jet
3. Starter-generator Gearshaft and Centrifugal Impeller
4. Transfer Tube and Preformed Packing
5. Transfer Tube and Preformed Packing
6. No. 2 Scavenge Tube and Relief Valve Housing
7. Locating Dowels
8. Accessory Gearbox Diaphragm
9. Bolts and Tabwashers (Typical)
10. Flanged Roller Bearing (Typical)
11. Preformed Packing
12. Seal Carrier
13. Carbon Seal and Carrier
14. Preformed Packing
15. Preformed Packing
16. Retaining Ring

- (e) Connections to the fuel input at the oil-to-fuel heater, the FCU and the fuel pump.
- (f) Connections and linkage to starting flow control (PT6A-27/-28 engines).
- (g) Mechanical linkage connections to the FCU and reversing linkage.
- (h) Starter-generator and such accessories as may be installed on the optional power takeoff mount pads.
- (i) Connections to the airframe oil cooler.

- (4) Remove the oil-to-fuel heater (Ref. 73-10-01).
- (5) Remove the FCU and fuel pump as a complete assembly (Ref. 73-20-00 and 73-10-02).

NOTE: It is not necessary to separate the FCU from the fuel pump mating face.

- (6) Remove starting flow control (PT6A-27/-28 engines) (Ref. 73-10-04).
- (7) Disconnect the propeller reversing rear linkage mechanism at Flange G (Ref. 76-10-00), rear lifting bracket and electrical connector bracket.
- (8) Disconnect and remove the propeller governor Py pneumatic line at the rear of the center fireseal bulkhead coupling (Ref. 73-10-08).
- (9) Disconnect and remove the fuel pressure line(s) (Ref. 73-10-03).

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- (10) Remove the No. 2 bearing scavenge oil tube (Ref. 79-20-01) and remove the short oil transfer tube from the accessory gearbox diaphragm using the puller (PWC30128-04).
- (11) Remove the oil dipstick and filler assembly and remove the oil filler tube from the accessory gearbox housing (Ref. Para. 5.C.).
- (12) Remove the oil filter and filter housing from the compressor inlet case (Ref. 79-20-02).
- (13) Remove the self-locking nuts securing the accessory gearbox housing and diaphragm assemblies to the compressor inlet case at Flange G.

NOTE: The accessory gearbox diaphragm is secured to the accessory gearbox housing by four countersunk screws and self-locking nuts. Assuming the nut at the 12 o'clock position to be No. 1, these nuts are 4th, 8th, 14th and 18th in a clockwise rotation and must not be removed at this stage.

- (14) Remove the starter-generator seal cavity drain plug from the accessory gearbox housing.
- (15) Remove the access plug from the center boss adapter on the accessory gearbox housing, then remove the preformed packing from the plug.
- (16) Determine the location of the lock ball at the compressor rear hub coupling by viewing through the hole in the center boss. Rotate the compressor until the notch on the washer at the rear hub is at the 3 o'clock position. This will make sure that the ball in the locking arrangement is at the 12 o'clock position on the splined end of the rear hub.
- (17) Insert the accessory gearbox coupling shaft puller/pusher tool (PWC30373) through the center boss in the face of the accessory gearbox and screw into the center bore of the coupling shaft (1). Turn the knurled body into the center boss. Do not rotate the puller/pusher T-handle once the tool is secured. Pull on the T-handle until the lock ball is fully disengaged. Handtighten the hexagon nut on the puller/pusher tool to remove any slackness along the coupling shaft.
- (18) Install the accessory gearbox jackscrews (PWC32396) in the relevant locations on Flange G and carefully separate the accessory gearbox and diaphragm assembly from the studs on the compressor inlet case. Remove the preformed packing (3) from the diaphragm/inlet case flange. Remove the oil tank center tube (8) and preformed packings (7 and 9).
- (19) Remove the lock ball (10, Fig. 206) from the locking arrangement on the top of the compressor rotor hub coupling (14), and the retaining ring (15), washer (16), key (17) and expander spring (18) from the inside of the hub. Discard the lock ball and expander spring.

NOTE: If the lock ball has dropped out of the locking arrangement during the removal of the accessory gearbox, retrieve the ball from the No. 1 bearing housing area or the oil scavenge passage in the compressor inlet case.

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- (20) Support the accessory gearbox housing (1, Fig. 207) and diaphragm assembly (8) on suitable wooden blocks with diaphragm face down on the work bench.
- (21) Remove the puller/pusher tool. Remove the self-locking nuts, washers and screws fastening the gearbox housing to the diaphragm. Lift the housing from the diaphragm; use a soft-faced hammer to separate, if necessary. Remove the preformed packing.
- (22) Remove the transfer tubes (2, 4 and 5) and remove the preformed packings from the tubes. Remove the preformed packing(s), as applicable, from the No. 2 bearing scavenge tube and relief valve housing assembly (6).

**B. Replacement of Oil Pump Seal (Ref. Fig. 208)**

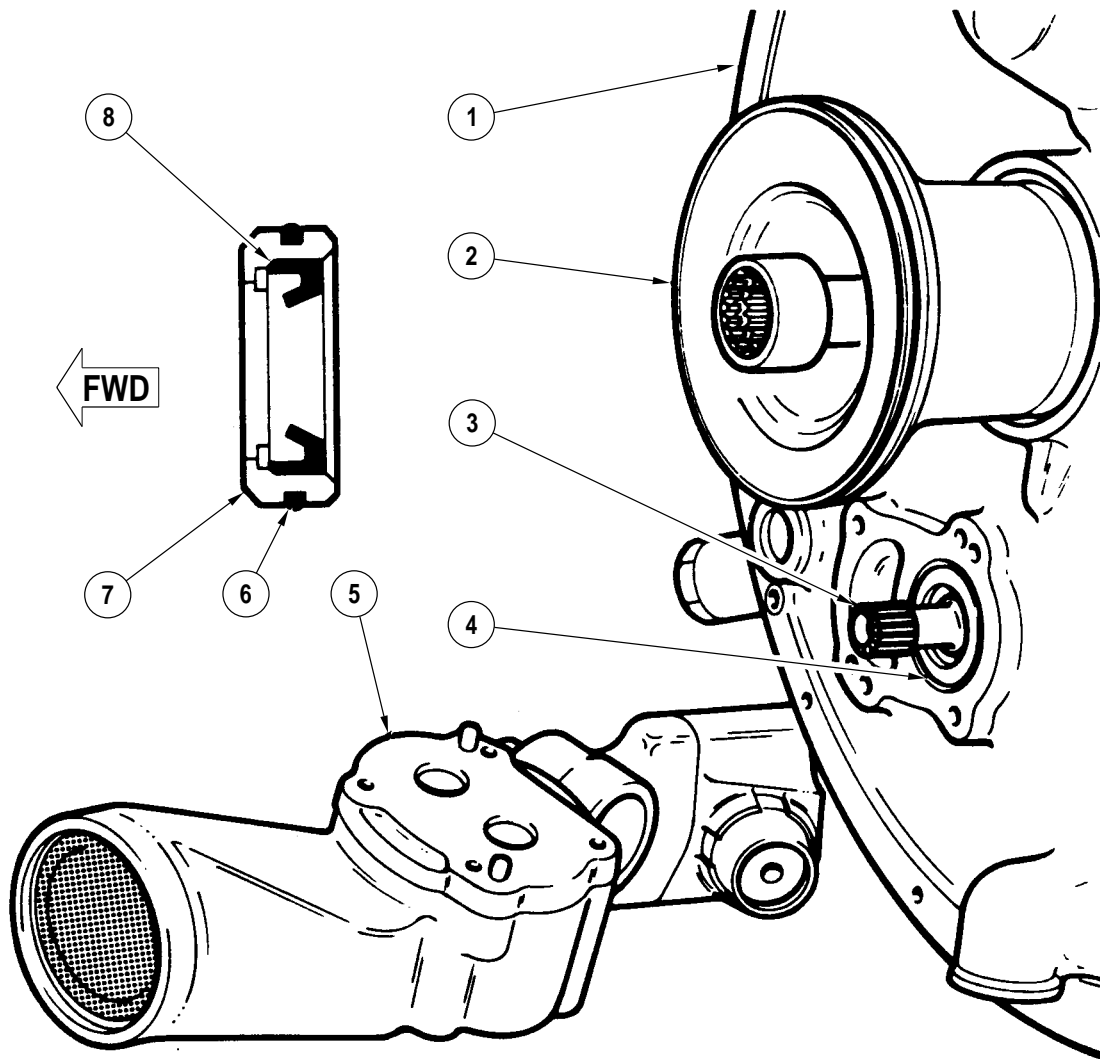
- (1) Remove the accessory gearbox housing and diaphragm assembly from the engine (Ref. Removal/Installation).
- (2) Remove oil pump (5).
- (3) Remove and install the replacement oil pump oil seal (Ref. Paras. 5.A. and 5.D.).

NOTE: The oil seal is fitted from the non-pressure side.

- (4) After the installation of the oil pump (5) on the gearbox diaphragm, tighten the four attachment bolts 32 to 36 lb.in. and fasten with lockwire.

**C. Replacement of Starter-generator Centrifugal Breather Gearshaft Carbon Seal (Ref. Figs. 207 and 209)**

- (1) Remove the accessory gearbox housing and diaphragm assembly from the engine and remove the housing from the diaphragm (Ref. Para. 8.A.).
- (2) Remove the starter-generator/centrifugal breather gearshaft (3, Fig. 207) from the gearbox housing (1).
- (3) Remove the bolts and keywashers (9) fastening the flanged bearing (10) to the diaphragm. Remove the bearing.
- (4) Withdraw the seal and seal carrier (2, Fig. 209) using the carbon seal carrier puller (1, PWC30052). Remove and discard the preformed packing (4).
- (5) Remove the carbon seal and casing (3) from the carrier (2) using the carbon seal base (PWC30051-01) and drift (PWC30051-02).
- (6) Immerse the new carbon seal in engine oil (PWC03-001) and move the seal in and out within the seal casing to be sure there is freedom of movement.
- (7) Immerse the seal carrier in oil (PWC03-001) heated to 80° to 90°C (176° to 194°F) for a few minutes.
- (8) Remove the carrier from the engine oil, position the replacement carbon seal in the carrier (Ref. Fig. 209) and press into place using the carbon seal carrier drift (PWC30675).



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Removal/Installation of Oil Pump Drive Seal  
Figure 208

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Key to Figure 208

1. Accessory Gearbox Diaphragm
2. Oil Tank Center Tube
3. Oil Pump Driveshaft
4. Oil Seal and Carrier
5. Oil Pump
6. Preformed Packing
7. Oil Seal Carrier
8. Oil Seal

- (9) Install a new lubricated preformed packing (4) on the seal carrier and press the carrier into the boss on the diaphragm.
- (10) Install the flanged bearing (10, Fig. 207) on the boss and secure with three bolts and keywashers (9). Tighten the bolts 36 to 40 lb.in., and lock the keywashers.
- (11) Install the starter-generator/centrifugal breather gearshaft (3) in the gearbox housing.

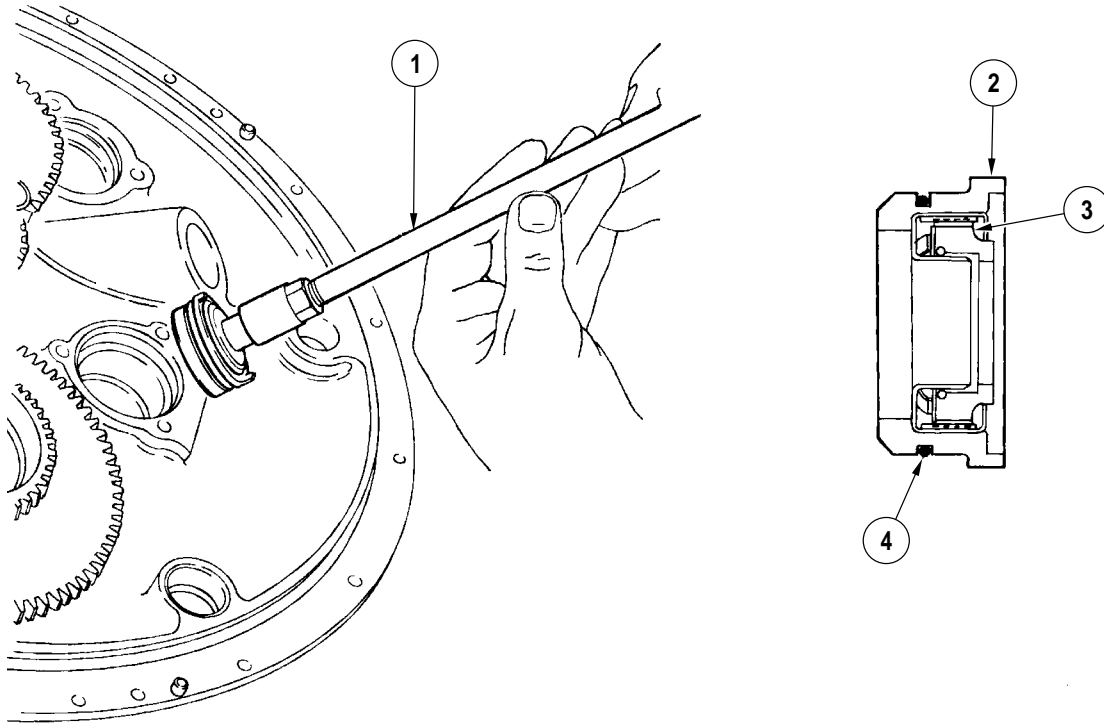
**CAUTION:** IF, FOR ANY REASON, OTHER ACCESSORY DRIVES WERE REMOVED DURING THE PROCEDURE, EXERCISE CARE NOT TO INTERCHANGE THE EXTERNAL SCAVENGE PUMP GEARSHAFT (NO. 4) WITH THE HYDRAULIC PUMP GEARSHAFT (NO. 6). THESE GEARSHAFTS ARE SIMILAR IN APPEARANCE AND MUST BE IDENTIFIED BY PART NUMBER.

- (12) Install the accessory gearbox housing on the diaphragm.
- (13) Install the accessory gearbox assembly on the engine (Ref. Para. 5.E.).

D. Replacement of Starter-generator Gearshaft

- (1) Disassembly (Ref. Figs. 207 and 210):
  - (a) Remove the accessory gearbox housing and diaphragm assembly from the engine, and remove the housing from the diaphragm (Ref. Para. 5.A.).
  - (b) Remove the starter-generator/centrifugal breather gearshaft (3, Fig. 207) from the gearbox diaphragm (8).
  - (c) Locate the split plate (3, Fig. 210) as shown, between the centrifugal impeller (5) and the starter-generator gearshaft (6).
  - (d) Position the assembly on the base (4).
  - (e) Install the compressor (1) on the impeller (5) and mate the lugs of the compressor with the slots in the impeller.

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Replacement of Starter-generator Centrifugal Breather Gearshaft Carbon Seal  
Figure 209

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Key to Figure 209

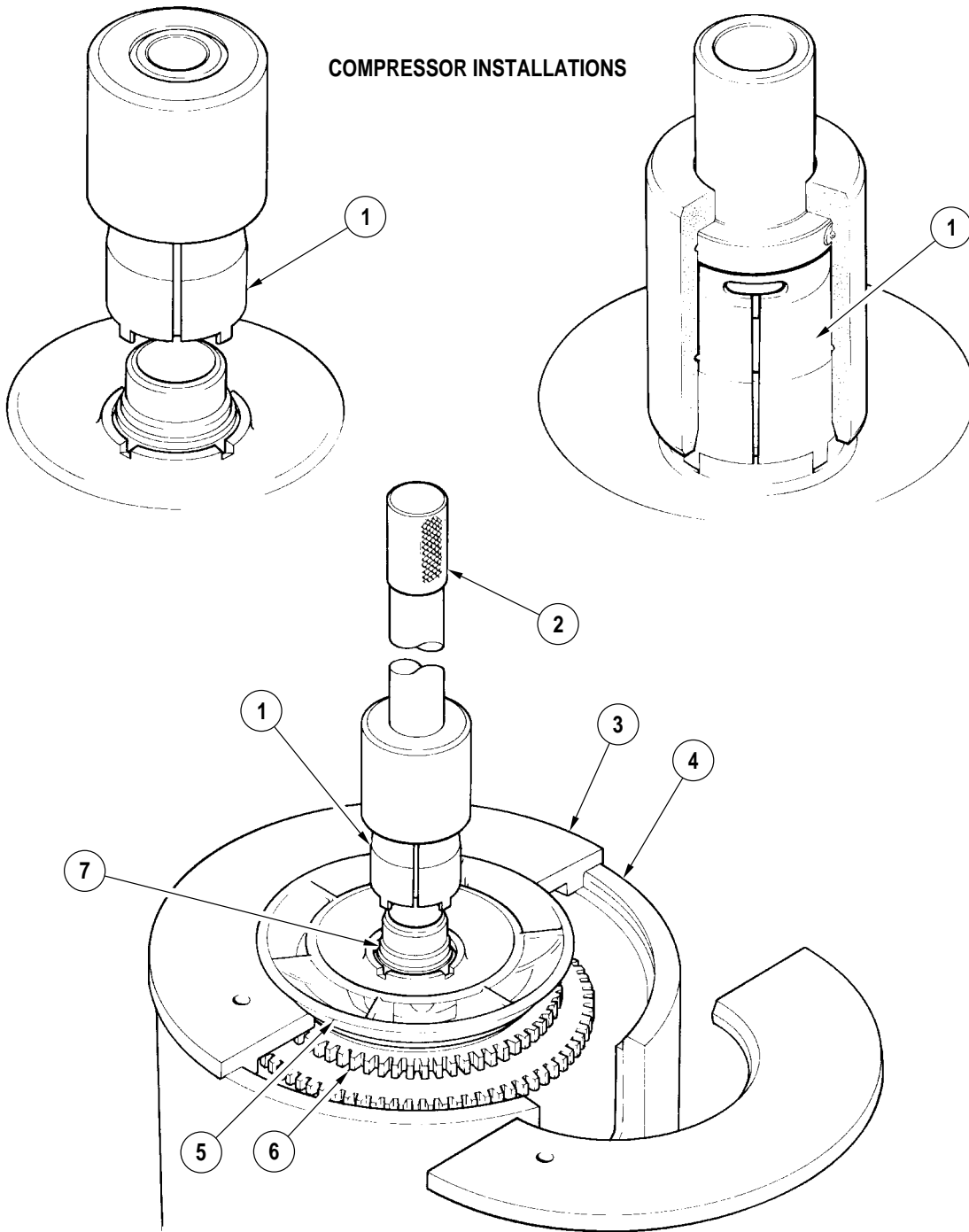
1. Carbon Seal Carrier Puller (PWC30046-57)
2. Carbon Seal Carrier
3. Carbon Seal and Casing
4. Preformed Packing

**CAUTION:** SEPARATION OF THE GEARSHAFT AND IMPELLER SHOULD NOT REQUIRE EXCESSIVE FORCE. IF DIFFICULTY IS EXPERIENCED, CHECK THAT THE RETAINING RING IS COMPLETELY CLEAR OF THE GROOVE IN THE IMPELLER.

- (f) Using the drift (2) inserted in the compressor, separate the assembly.
  - (g) Remove the split plate from the impeller and the gearshaft from the bottom of the base.
  - (h) Remove the retaining ring (16, Fig. 207) and preformed packing (15) from the gearshaft.
  - (i) Remove the preformed packing (14) from the impeller.
- (2) Assembly (Ref. Fig. 207):
- (a) Install the preformed packing (14) on the impeller.
  - (b) Install the preformed packing (15) on the gearshaft.
  - (c) Install the retaining ring (16) in the groove in the gearshaft.

**NOTE:** Check for the security of the shoulder pins before mating the parts.

- (d) Position the impeller on the gearshaft; align the shoulder pins in the impeller with the holes in the gearshaft and press the parts firmly together by hand to engage the retaining ring. Check that the parts are locked together.
  - (e) Install the starter-generator/centrifugal breather gearshaft on the diaphragm (8) by mating with the related gearshafts.
  - (f) Assemble the accessory gearbox housing on the diaphragm and install the assembly on the engine (Ref. Para. 8.E.).
- E. Installation of Accessory Gearbox on Compressor Inlet Case (Ref. Figs. 206 and 207)
- (1) Install new preformed packings on the three transfer tubes (2, 4 and 5, Fig. 207) and insert the tubes into the respective bosses on the accessory gearbox diaphragm (8).
  - (2) Install new preformed packing(s), as applicable, on the No. 2 bearing scavenge tube and relief valve housing assembly (6).



**IMPELLER AND GEARSHAFT SEPARATION**

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Replacement of Starter-generator Gearshaft  
Figure 210



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Key to Figure 210

1. Compressor (PWC50502)
2. Drift (PWC30854)
3. Split Plate (PWC32275)
4. Base (PWC30274)
5. Centrifugal Impeller
6. Starter-generator Gearshaft
7. Retaining Ring

- (3) Install a new preformed packing on the rear flange of the accessory gearbox diaphragm (8) and position the housing (1) over the diaphragm. The lead-in chamfer on the gearshafts permits easy entry of the shafts into the respective bearings and oil seals.

NOTE: Make sure that the flanged transfer tube (2) is fully installed in the center boss of the diaphragm (8), with the flat aligned with the center bearing flange before positioning the housing (1).

- (4) Seat the housing (1) on the diaphragm (8), making sure of the proper engagement of the locating dowels (7), without using force.
- (5) Locate the four countersunk screws, washers and self-locking nuts in the relevant locations on Flange G. Screws are located at the 4th, 8th, 14th and 18th positions from the top center in a clockwise direction. Tighten the nuts 32 to 36 lb.in.
- (6) Install new expander spring (18), key (17), and washer (16) into compressor rear hub coupling (14), and secure with retaining ring (15).
- (7) Before raising the gearbox to the normal position, install the accessory gearbox driveshaft puller/pusher (PWC30373) through the center boss of the housing to engage the thread of the driveshaft. Screw the body of the pusher into the housing.
- (8) Install a new preformed packing (3) on the front flange of the diaphragm and install the oil tank center tube (8) with new preformed packings (7 and 9) into the boss at the center bore of the diaphragm.
- (9) Slowly rotate compressor until hole in splined end of compressor rear hub coupling is at 12 o'clock position. For Pre-SB1104/Post-SB1134 PT6A-27/-28 engines and all PT6A-21 Engines: Coat ball (10) with engine oil (PWC03-001). Install ball in hole.
- (10) Position the accessory gearbox housing and diaphragm assembly on the studs of the compressor inlet case aligning the driveshaft with the compressor rear hub coupling.

NOTE: Make sure all tubes mate with the corresponding bosses in the inlet case, and that the external oil tubes mate with the scavenge pump elbows.

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- (11) Check that the lock ball is seated in the hole in the compressor rear hub, then apply hand pressure on the puller/pusher to engage the ball.

NOTE: The correct engagement of the lock ball will be indicated by the end-float along the driveshaft being reduced to a slight fore and aft movement.

- (12) Remove the driveshaft puller/pusher from the engine. Install a new preformed packing on the access plug and screw the plug into the adapter on the gearbox housing. Tighten the plug 150 to 160 lb.in. and fasten with lockwire.

**CAUTION:** DO NOT OVER-TIGHTEN THE ADAPTER. THE TAPERED PIPE THREADED END ENTERS THE HOUSING CASTING AND OVERTIGHTENING MAY STRIP THE THREADS.

- (13) Install the starter-generator seal cavity drain adapter and plug on the drain adapter boss at the bottom of the starter-generator mounting pad. Tighten the adapter and plug 30 to 40 lb.in. Fasten the adapter, plug and center plug to the locking eye on the gearbox housing with lockwire.

- (14) Install the washers (13) over the short studs, and spacers (12) over the long studs, at Flange G and install self-locking nuts. Tighten the nuts 32 to 36 lb.in.

NOTE: Washers are not required at the rear lifting bracket.

- (15) Install the oil filter housing and filter (Ref. 79-20-04).

- (16) Install the oil dipstick/gage assembly and oil filler tube in the accessory gearbox housing (Ref. Para. 5.F.).

- (17) Fit new preformed packings (2) on the short oil transfer tube (1). Install the tube in the compressor inlet case and connect the No. 2 bearing scavenge oil tube to the boss on the case (Ref. 79-20-02).

- (18) Secure loop clamps, installed on ignition leads to similar loop clamp on No. 2 bearing scavenge oil tube with bolt and self-locking nut. Tighten nuts and torque 32 to 36 lb.in.

- (19) Connect the power turbine governor Py pneumatic line to the rear of the bulkhead coupling at the center fireseal (Ref. 73-10-08).

- (20) Install the rear section(s) of the compressor discharge pressure pneumatic line (Ref. 73-10-07), and connect the electrical leads as necessary to the electrical receptacle on the bracket on Flange G.

- (21) Reconnect the rear section of the propeller reversing linkage mechanism at Flange G (Ref. 76-10-00).

- (22) Install the FCU and fuel pump as a complete assembly on the FCU mount pad (Ref. 73-20-00 and 73-10-02).

- (23) Install starting flow control unit (PT6A-27/-28) (Ref. 73-10-04).

- (24) Install the oil-to-fuel heater (Ref. 73-10-01).

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- (25) Connect the fuel pressure line(s) (Ref. 73-10-03).
- (26) Install the accessory gearbox drain plug at the 6 o'clock position on the gearbox housing. Tighten the plug 215 to 240 lb.in. and fasten with lockwire.
- (27) Fill the oil tank (Ref. 72-00-00, SERVICING).
- (28) Pressure test the pneumatic system (Ref. 73-10-07).
- (29) Install and connect the following, as necessary (Ref. Aircraft Maintenance Manual):
  - (a) Connections to the airframe oil cooler.
  - (b) Starter-generator and accessories on the optional power takeoff mount pads.
  - (c) Mechanical linkage connections to the FCU and reversing linkage.
  - (d) Connections to the starting control, if applicable.
  - (e) Connections to the fuel input at the oil-to-fuel heater, the FCU and the fuel pump.
  - (f) Connections to the starter-generator seal cavity drain.
  - (g) Connections to the oil pressure and temperature sensors and the Ng tachometer.
  - (h) Connection to the overboard breather line.
  - (i) Connection to the heated pneumatic tube electrical receptacle at Flange G.
- (30) Test the engine (Ref. 71-00-00).

F. Repair of Corrosion - Accessory Gearbox Housing

NOTE: Corrosion must not be deeper than 0.010 in. and must not cover an area greater than 10 percent of the total surface of the AGB housing.

- (1) Apply a suitable covering material over the accessories, linkages, compressor section and around the area to be repaired.
- (2) Clean the surface of the area to be repaired with a swab soaked in isopropyl alcohol (PWC11-014) and crocus cloth (PWC05-061).
- (3) Remove all traces of corrosion (magnesium oxide) using a suitable steel brush, crocus cloth (PWC05-061), abrasive cloth (PWC05-101), file or grit paper. Remove all traces of debris using a vacuum cleaner.
- (4) Flush the area with clean water at room temperature.
- (5) Dry the area with clean compressed air at 29 psig.

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**WARNING:** REFER TO THE MATERIAL SAFETY DATA SHEETS BEFORE YOU USE THESE MATERIALS FOR INFORMATION SUCH AS HAZARDOUS INGREDIENTS, PHYSICAL/CHEMICAL CHARACTERISTICS, FIRE, EXPLOSION, REACTIVITY, HEALTH HAZARD DATA, PRECAUTIONS FOR SAFE HANDLING, USE AND CONTROL MEASURES. SOME OF THESE MATERIALS CAN BE DANGEROUS. YOU CAN GET THE DATA SHEETS FROM THE MANUFACTURERS OR THE SUPPLIERS OF THESE MATERIALS.

- (6) Prepare a chrome pickle solution (Ref. Chap. 70-00-00, MAINTENANCE PRACTICES, Touch-Up Solution).
- (7) Using a swab or brush, apply the chrome pickle solution, at a temperature of 17° to 29°C (55° to 85°F), to the prepared surface for 30 to 45 seconds.

**NOTE:** Repeat the application frequently to make sure that the affected surface is continually wet with the solution.

- (8) Swab the area with clean water until successive swabs are no longer stained yellow.
- (9) Dry the area with local heating (air dry or a heat gun at a low setting).
- (10) Clean the affected area with a rag soaked in clean water.
- (11) Dry the area with clean, compressed air at 29 psig.
- (12) Apply two coats of primer (PWC13-001).

**NOTE:** The primer can be diluted with 10% solvent.

- (13) Allow the primer to air dry for eight hours before applying enamel paint. Use compressed air at 29 psig to accelerate the drying time.
- (14) Apply three to four coats of enamel (PWC05-037) to the primed surface. Allow the surface of the enamel to become tacky (approximately 15 minutes) between each coat. The final coat of enamel must dry for 24 hours before returning the engine to service.

**NOTE:** Drying time for the primer and paint can be reduced with the use of a heat gun at a low setting. Refer to the manufacturers instructions.