CHAPTER 29 — HYDRAULIC SYSTEM

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HYDRAULIC SYSTEM

29-1. HYDRAULIC SYSTEM.

The hydraulic system provides power to operate cyclic and collective flight control servos.

NOTE

Helicopters S/N 4 through 497 have hydraulic powered tail rotor control systems which are also powered by the hydraulic system. Helicopters S/N 498 and subsequent do not have hydraulic powered tail rotor systems, unless a stabilization augmentation system is installed. The hydraulic system consists of the pump/reservoir regulator assembly, filter, solenoid valve, tube, and hose assemblies. Pump, regulator, and reservoir are mounted on forward side of transmission oil pump as an assembly. The pump and regulator assembly includes a mounting pad for rotor tachometer generator. Operation of the hydraulic system is electrically controlled by an ON/OFF switch mounted on console for pilot control of the solenoid valve. When solenoid is energized (ON/OFF switch "OFF"), pressurized hydraulic fluid flows to the reservoir, bypassing servo actuators. Refer to figures 29-1 and 29-2 for system components and to Chapter 98 for hydraulic system wiring diagram. Tail rotor servo is a customer option and may be removed.

SPECIAL TOOLS REQUIRED

NUMBER	NOMENCLATURE
Commercial	Hydraulic Test Stand, 1000 Psi (6895 kPa) Pressure Maximum, 2.50 Gpm (9.46 liters per minute), 10 Micron (394 Micro-inch) Filter
Commercial	Pressure Gage 0 to 1000 Psi (0 to 6895 kPa), Calibrated

29-2. TROUBLESHOOTING.

Figure 29-3 is provided as an aid in hydraulic system troubleshooting. The troubleshooting chart should be used with other sources of information, such as hydraulic schematic (figure 29-2), electrical wiring diagrams, functional test procedures, and other detailed procedures in this and other chapters of the manual.

WARNING

KEEP HEAD, HANDS, AND OTHER BODY PARTS CLEAR OF MOVING FLIGHT CONTROLS. HYDRAULIC FORCES ARE STRONG ENOUGH TO CAUSE SEVERE INJURY. BE CAREFUL WHEN MOVING FLIGHT CONTROLS. ANY MALFUNCTION THAT INTERFERES WITH MOVEMENT OF BOOST-ASSISTED FLIGHT CONTROLS CAN CAUSE SERIOUS DAMAGE.

29-3. LEAKAGE LIMITS.

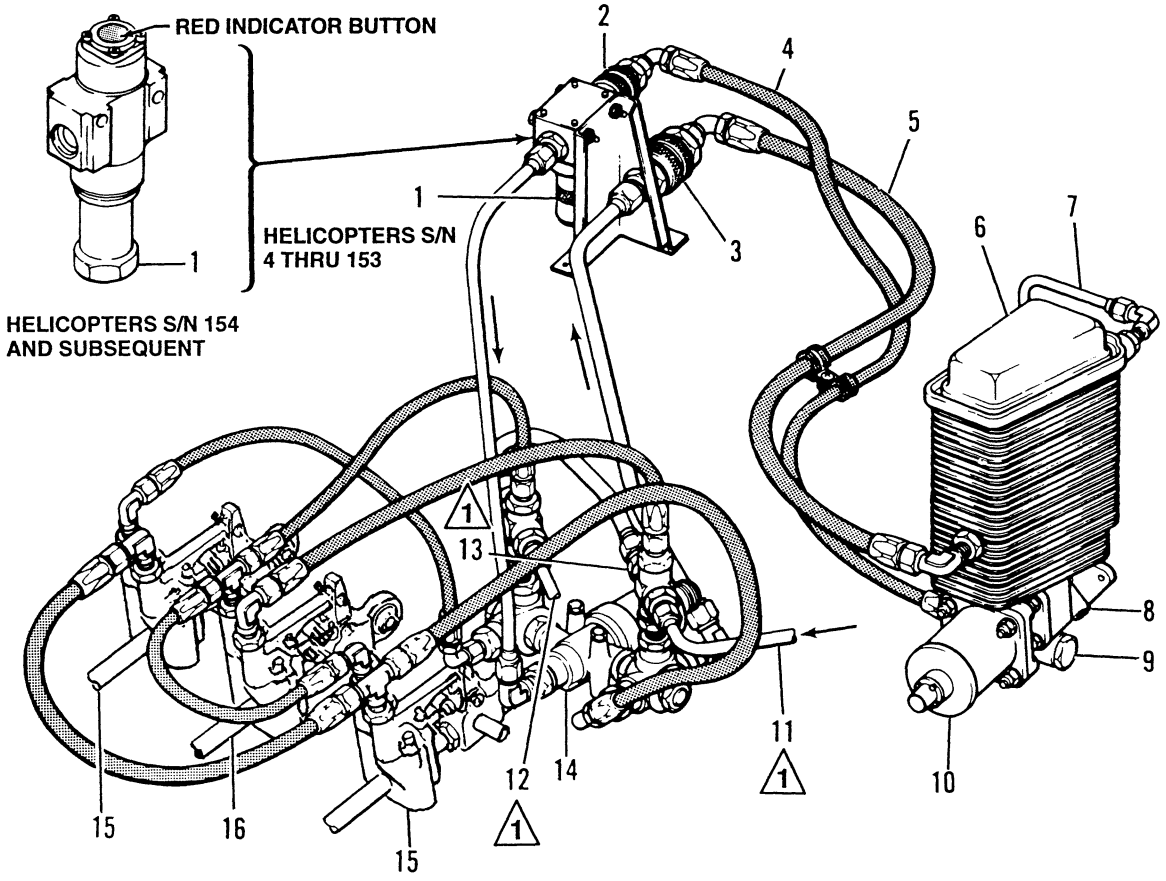
The following are guidelines for allowable external leakage of in-service hydraulic system components, and some methods of measuring such leakage.

1. Scope — Limits described are only for components in service in helicopter hydraulic systems. Intent is to minimize replacement of hydraulic components which are still serviceable.

a. These limits may differ from those contained in various specifications for components, which are intended to control quality, assembly, and proper functioning of components for procurement. Components in service sometimes develop leakage rates in excess of those specification limits, without necessarily becoming detrimental to the system or failing to provide reliable operation.

b. These limits are not to be used as basis for acceptance or rejection of components during any bench functional test, or systems on new helicopters.

c. These limits are not applicable to self-contained, closed-compartment hydraulic units such as viscous dampers, liquid springs, or oleo struts.



1. Filter assembly
2. Quick-disconnect socket (pressure)
3. Quick-disconnect socket (return)
4. Pressure hose
5. Return hose
6. Pump and reservoir
7. Scupper drain line
8. Vent (pump seepage drain)
9. Pressure regulator valve
10. Tachometer generator
11. Antitorque servo actuator tube (return)
12. Antitorque servo actuator tube (pressure)
13. One way check valve
14. Solenoid valve
15. Servo actuator (cyclic)
16. Servo actuator (collective)
17. Body seal
18. Packing

NOTE

1 Helicopters S/N 4 thru 497 and those equipped with stability augmentation system.

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Figure 29-1. Hydraulic system

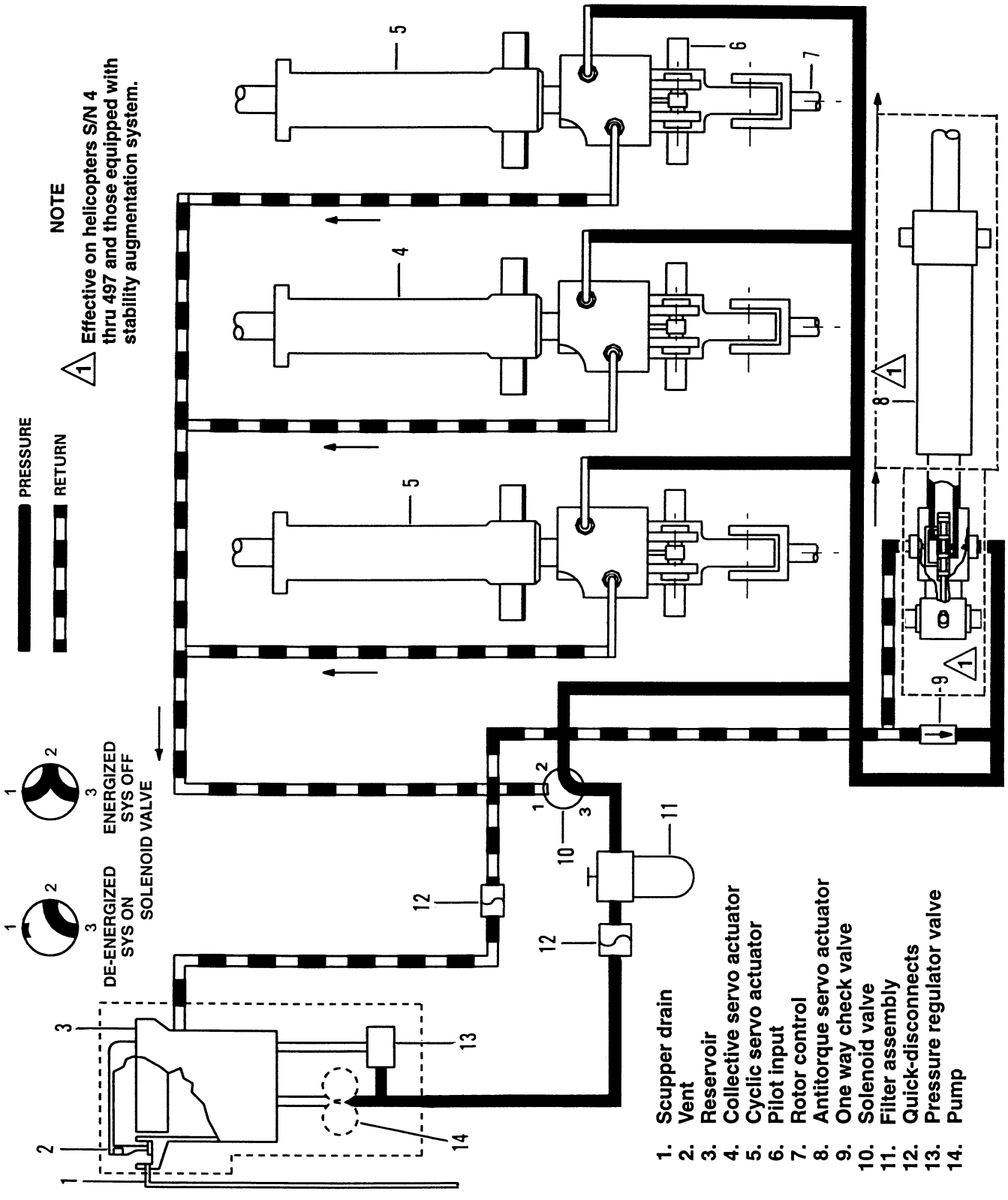

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Figure 29-2. Hydraulic system schematic

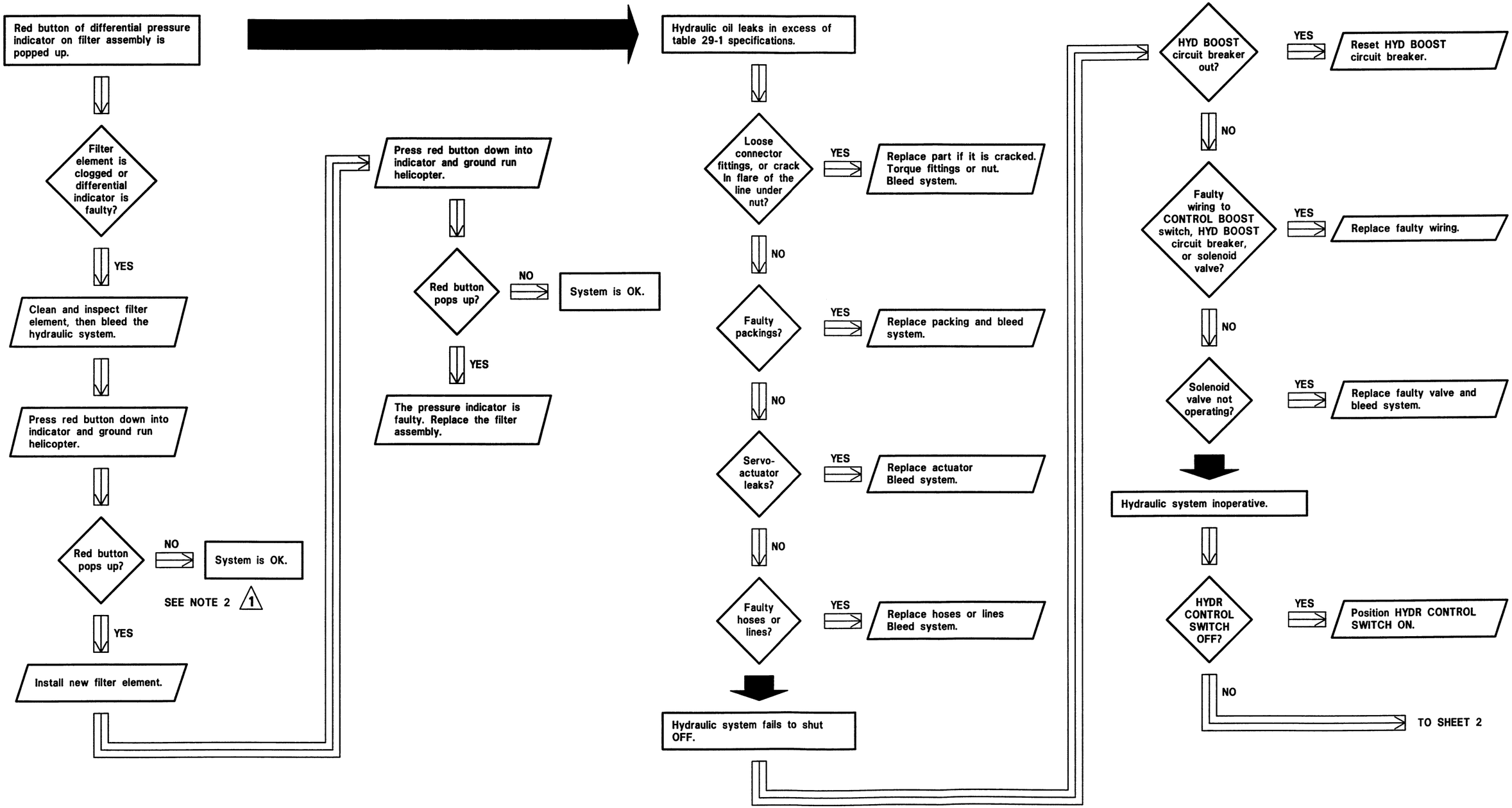

Figure 29-3. Hydraulic system troubleshooting (Sheet 1 of 3)

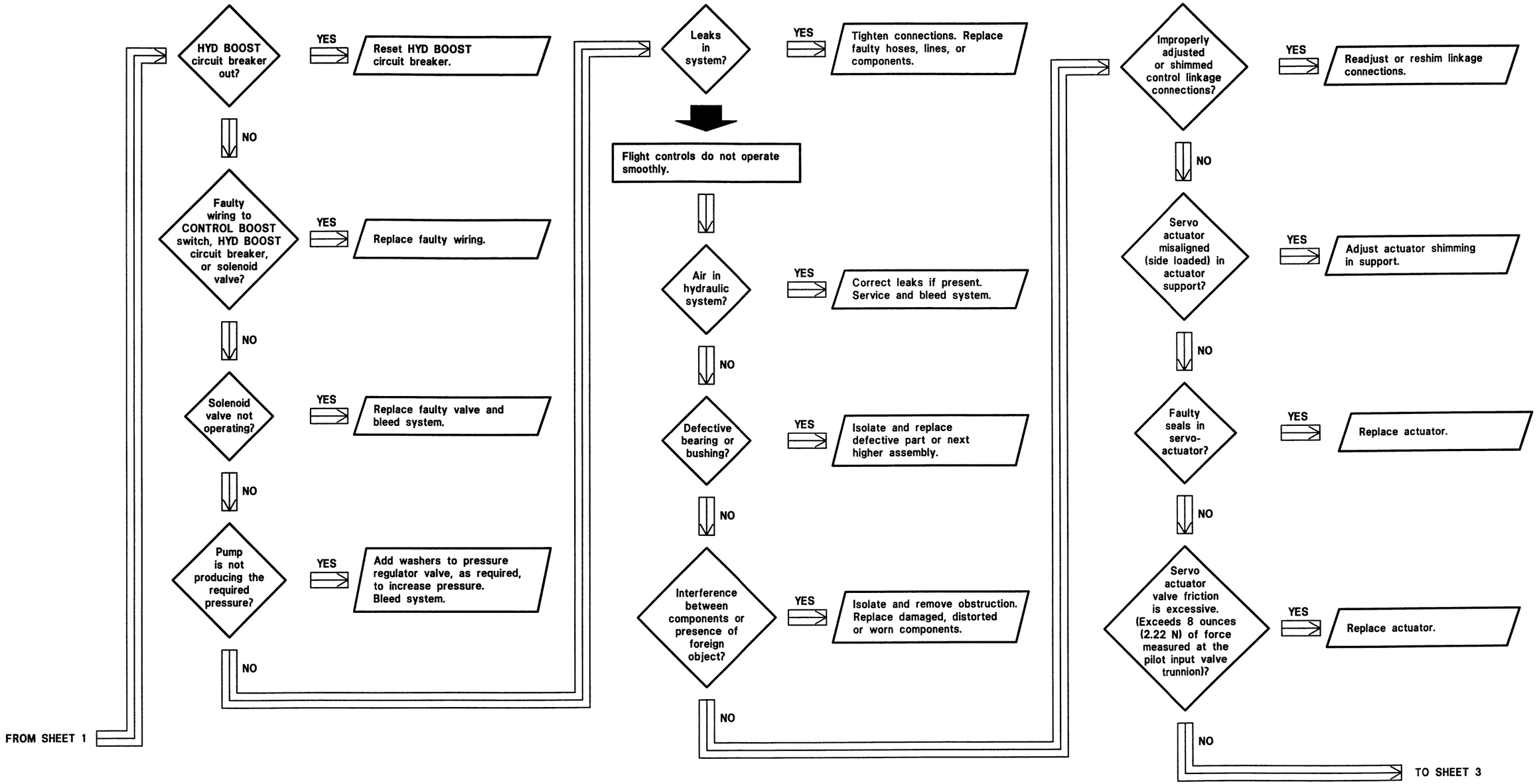

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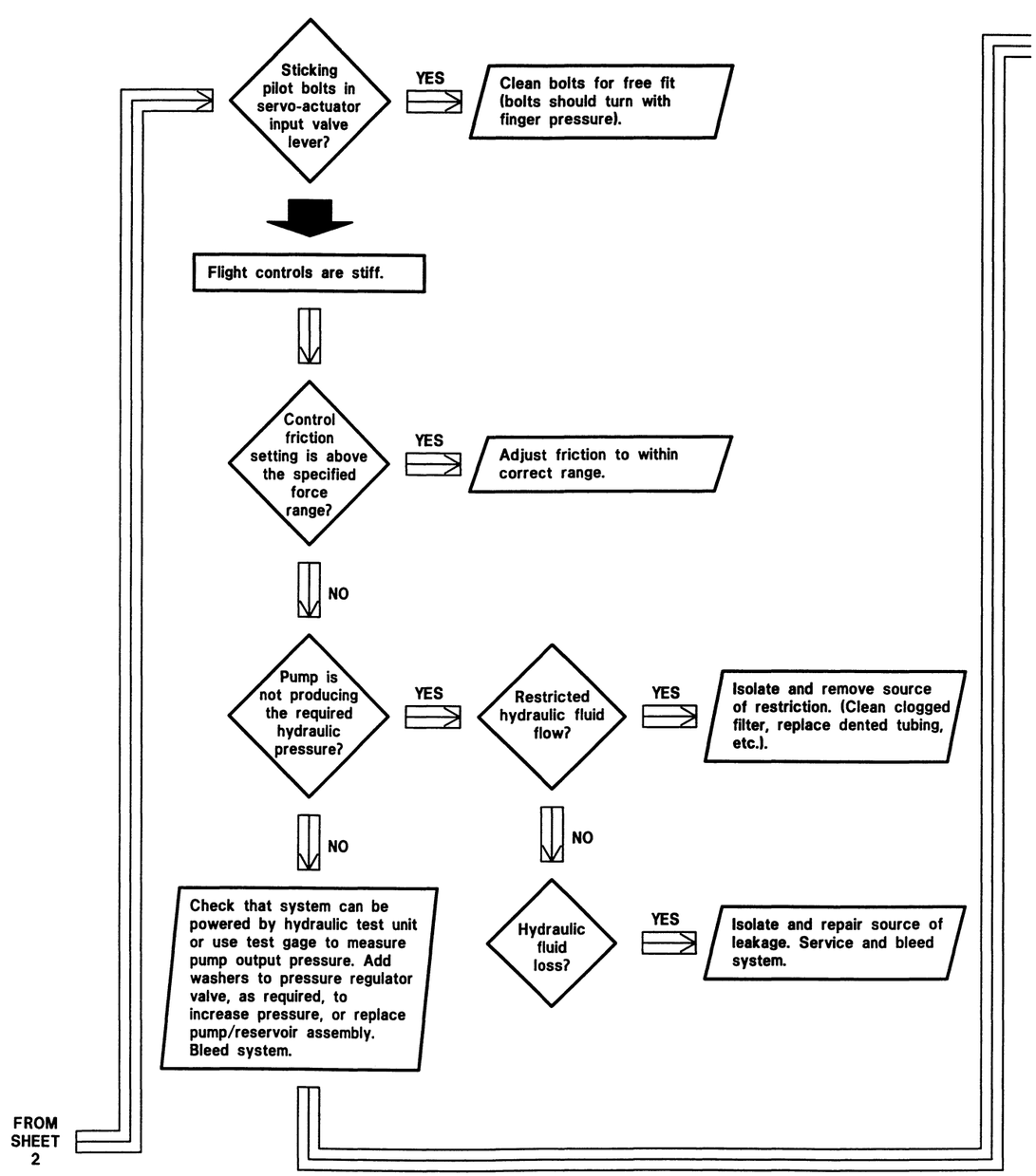
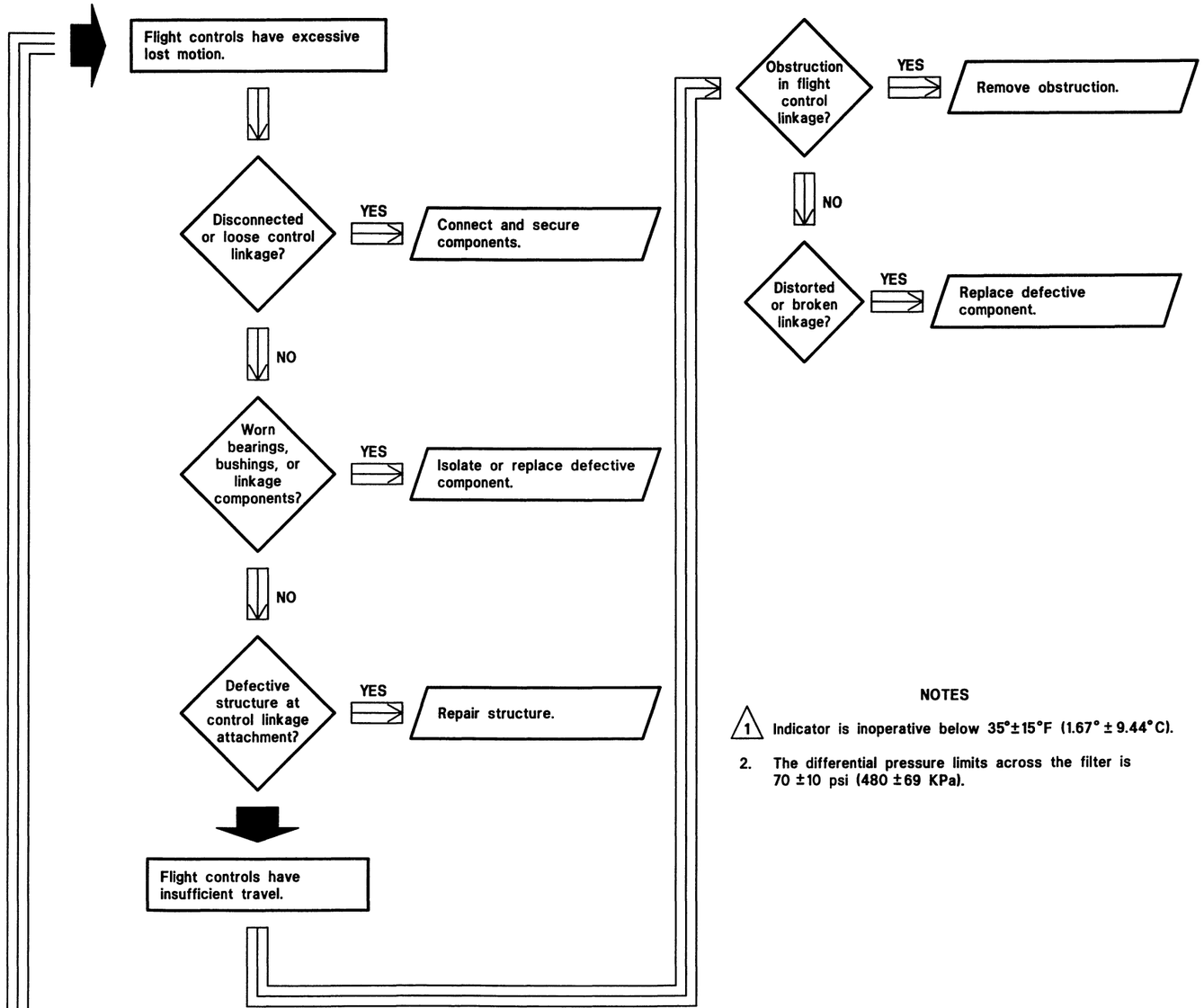
Figure 29-3. Hydraulic system troubleshooting (Sheet 2)





NOTES

1. Indicator is inoperative below 35°±15°F (1.67° ± 9.44°C).
2. The differential pressure limits across the filter is 70 ±10 psi (480 ±69 KPa).

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Figure 29-3. Hydraulic system troubleshooting (Sheet 3)

2. Causes of Leakage — Some seepage is normally present, since static or dynamic seals are not functionally perfect, due to such causes as:

a. A film of hydraulic fluid being retained by metal surfaces such as piston rods, and thus carried past seals. This film is necessary for seal lubrication.

b. Pressure and temperature variations affecting seals.

c. Seals tending to take a permanent set after a period of time.

3. Classification of Leakage — External leakage of hydraulic fluid can be broadly classified as excessive or allowable.

a. Excessive Leakage: Fluid leakage such that hydraulic reservoir level may be dangerously lowered or depleted during normal operation, or a fire hazard may be created, or airworthiness of helicopter may be otherwise compromised.

b. Allowable Leakage: Fluid leakage such that quantity lost is insignificant, that will have no detrimental effect on helicopter operation, and such that correction does not warrant maintenance time involved.

c. General: Leakage usually shows as a seepage, stain, or wet area. It is possible for allowable leakage or seepage to collect in a cavity or depression in adjacent structure over a period of time and falsely indicate excessive leakage. Accumulation on a flat area or a white-painted surface often appears to be excessive, though it is actually allowable. It is also possible to have enough components with allowable leakage that their combined leakage should be classified as excessive.

4. Leakage Checks — Measurement of leakage rates, for classification according to Table 29-1, can be performed as follows:

a. When hydraulic systems have remained in static, unpressurized condition for an appreciable period of time, leakage checks should not be performed immediately after starting operation. Activate systems and operate components several times, then wipe off any leaked hydraulic fluid before making leakage checks.

b. Where location of a component does not permit direct observation, it is possible to measure leakage on a flat surface, either on part of structure below or a panel temporarily positioned for that purpose. Wipe surface clean and place a drop of fluid on area, allow it to stabilize, then outline drop area with grease pencil before wiping off fluid. Pressurize and cycle the component to observe leakage rate, comparing wetted surface to marked one-drop area.

c. Where fluid dropping from a component can be directly observed, pressurize and cycle the component until a drop falls free. Continue operating, observing time until next drop to determine leakage rate.

Table 29-1. Maximum Allowable Leakage for In-service Components

COMPONENT	FUNCTION	TYPE	LEAKAGE RATE
Servo Actuators (Flight Controls)	Rod Seal	D	1 drop/20 full cycles
	Rod Seal	S-D	1 drop/15 minutes
	End Cap	S	2 drops/day
	Valve Input	D	1 drop/5 cycles
	Valve Input	S-D	1 drop/5 minutes
Pump	Output Shaft	D	1 drop/minute
	Ouput Shaft	S-D	1 drop/minute
	Housing (Mating Surfaces)	S	2 drops/day
Fittings	Flared or Flareless Fittings	S	None
	Compression Seals	S	1 drop/30 minutes
Type Symbols: D - Dynamic S - Static S-D - Static leakage through dynamic seal			

29-4. HYDRAULIC SYSTEM — FLUSHING

WARNING

DRYCLEANING SOLVENT (C-304) IS FLAMMABLE AND FUMES ARE TOXIC. PROVIDE ADEQUATE VENTILATION. DO NOT USE NEAR A FLAME.

CAUTION

USE OF ISOPROPYL ALCOHOL (C-385) IS PROHIBITED ON EITHER INTERNAL OR EXTERNAL SURFACES OF HYDRAULIC COMPONENTS.

NOTE

Cap or plug all openings upon completion of cleaning operation.

1. Remove and clean in drycleaning solvent (C-304) the following components of the hydraulic system:

a. Hydraulic pump and reservoir (6, Figure 29-1). Refer to paragraph 29-11.

b. Pressure hose (4) and return hose (5).

c. Filter bowl (7, Figure 29-4) and filter element (8). Reinstall bowl (paragraph 29-19 and paragraph 29-21).

2. Connect ground hydraulic test stand pressure line to pressure quick-disconnect socket (2) (paragraph 29-6).

3. Connect overboard drain hose to the return quick-disconnect socket (3), of sufficient length to reach a container for contaminated fluid.

4. Start test stand and adjust pressure to 600 PSI (4137 kPa).

5. Cycle collective full up to full down until fluid from overboard drain hose to container is clear.

6. Place collective in full down position and accomplish the following steps:

a. Move cyclic from left aft corner to right forward corner until fluid from overboard drain hose is clear.

b. Move cyclic from right aft corner to left forward corner until fluid from overboard drain hose is clear.

7. Place collective in the full up position and repeat step 6a and step 6b.

8. On helicopters with tail rotor servo actuator installed, actuate tail rotor pedals through complete travel until fluid from overboard drain hose is clear.

9. Disconnect hydraulic test stand and install clean filter element (8, Figure 29-4) in filter bowl (7) (paragraph 29-21).

10. Install pump and reservoir (1, Figure 29-6) (paragraph 29-13).

11. Install pressure hose (4, Figure 29-1) and return hose (5).

12. Fill reservoir (6) with hydraulic fluid (C-002) to proper level.

13. Connect a calibrated gauge (0 to 1000 PSI) (0 to 6895 kPa) to test port of one of the cyclic servo actuators (Chapter 67).

14. Place the hydraulic switch located on helicopter console in the OFF position. Start engine. Operate at idle RPM to bleed air from solenoid valve lines. Refer to applicable JetRanger Flight Manual.

15. Increase the RPM to 100% N_R and place the hydraulic switch in ON position. Observe calibrated gauge. Pressure should be 600 ±50 PSI (4137 ±345 kPa).

16. Shut down engine. If required, adjust pressure (paragraph 29-8).

17. Remove calibrated pressure gauge and replace port plug. Secure with lockwire. Fill reservoir with clean hydraulic fluid (C-002) if required.

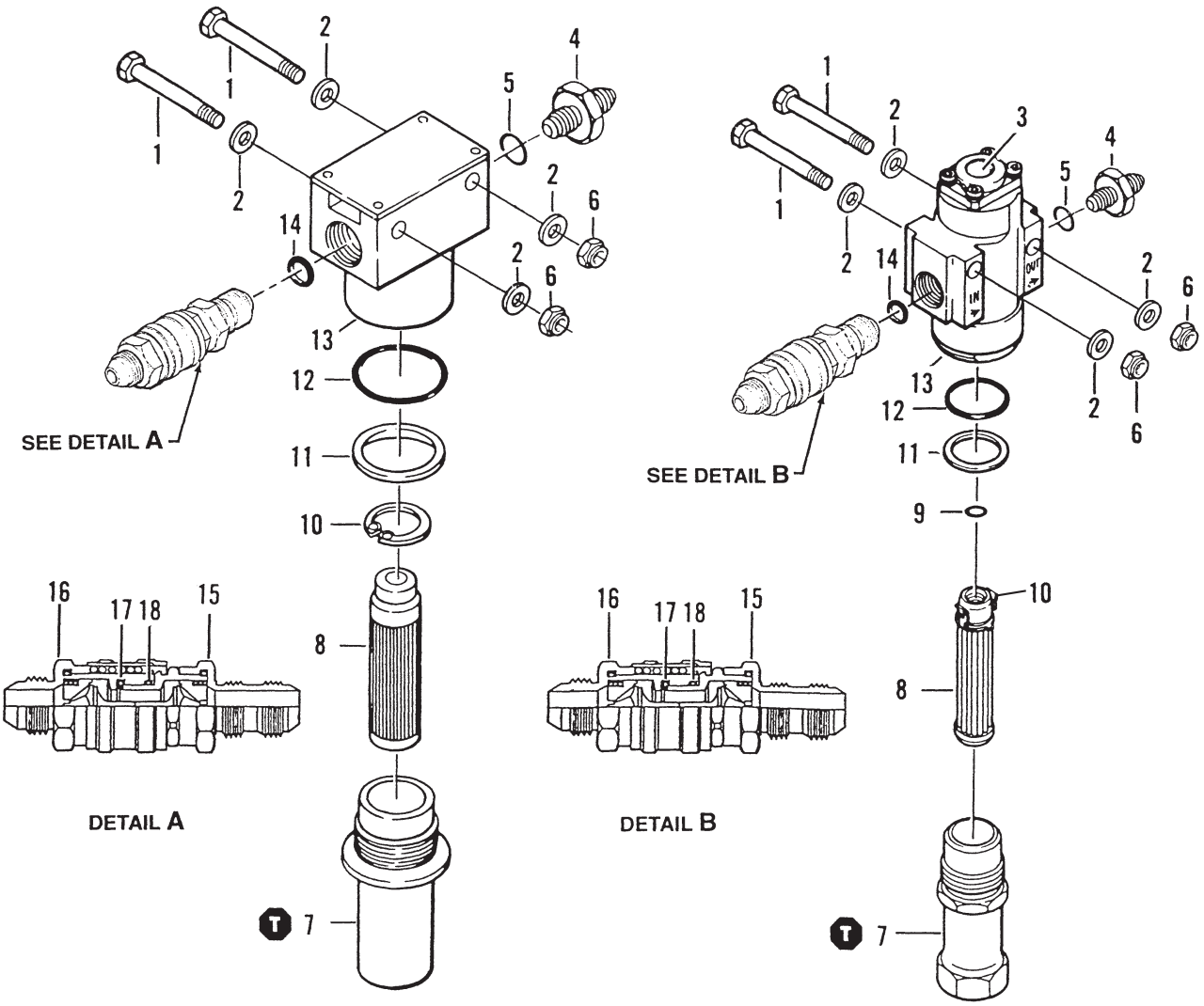
29-5. HYDRAULIC SYSTEM — BLEEDING

Bleeding air from hydraulic system may be accomplished with the use of a hydraulic test stand (step 1) or by operation of helicopter (step 2).

1. Bleed air from hydraulic system with hydraulic test stand as follows:

a. Connect hydraulic test stand to helicopter (paragraph 29-6).

b. Set hydraulic test stand pressure to 600 PSI (4137 kPa) with a flow rate of 2.5 gallons per minute (9.46 L/min).



1. Bolt
2. Washer
3. Red indicator button
4. Union
5. Packing
6. Nut
7. Filter bowl
8. Filter element
9. Packing
10. Retainer
11. Backup ring
12. Packing
13. Filter body
14. Packing
15. Coupling
16. Coupling half
17. Body seal
18. Packing

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Figure 29-4. Hydraulic Filter and Element

c. Slowly move pilot cyclic and collective controls through full travel, a minimum of 10 times, to bleed air from system.

d. Fill reservoir with hydraulic fluid (C-002) as required.

e. Repeat step c and step d as required.

f. Disconnect hydraulic test stand from helicopter.

2. Bleed air from hydraulic system by operation of helicopter as follows:

a. Refer to applicable JetRanger Flight Manual. Start helicopter engine and operate at idle.

b. Slowly move pilot cyclic and collective controls to allowable limits for ground operation. Repeat at least 10 times to bleed air from system.

c. Refer to applicable JetRanger Flight Manual. Shut down engine and fill reservoir with hydraulic fluid (C-002) to proper level if required.

29-6. FUNCTIONAL TEST USING TEST STAND

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-002	Hydraulic Fluid

All hydraulic system components, with the exception of the transmission-driven hydraulic pump, may be functionally tested using the following procedures. Refer to paragraph 29-7 for procedure to test transmission-driven hydraulic pump.

1. Use hydraulic test stand equipped with a 10-micron filter and calibrated pressure gauge with a range up to 1000 PSI (6895 kPa). The test stand must be capable of producing 1000 PSI (6895 kPa) at a minimum flow rate of 2.5 gallons per minute (9.46 L/min). Clean stand and service with hydraulic fluid (C-002) prior to use.

2. Inspect helicopter hydraulic system visually to ensure all components and lines are attached, cotter pins and lockwire installed, and system appears capable of satisfactory operation.

3. Position hydraulic test stand on right side of helicopter near transmission/deck.

4. Remove forward fairing. Disconnect two quick-disconnect couplings (2 and 3, Figure 29-1). Connect test stand hoses to coupling halves of two quick-disconnects.

5. Apply electrical power to helicopter. Push HYDR SYSTEM circuit in and position HYDRAULIC SYSTEM switch ON.

6. Set test stand for minimum flow of 2.5 gallons per minute (9.46 L/min) with pressure compensator adjusted to 600 PSI (4137 kPa). Apply 600 PSI (4137 kPa) to hydraulic system and maintain pressure for at least 15 minutes. Accomplish the following checks:

a. While cyclic and collective controls are being slowly moved, observe movement of hydraulic servo actuators and check for binding, chafing, and hose movements which would tend to loosen fittings.

7. Operate cyclic, collective, and antitorque controls, if tail rotor servo actuator is installed, rapidly through full stroke a minimum of 10 times to bleed air from system.

8. Energize solenoid valve by turning console hydraulic boost switch to OFF. Cycle cyclic and collective controls: controls should require more force to operate. Turn the hydraulic boost switch ON.

9. Decrease test stand pressure to zero. Slowly increase pressure until it can be determined, by operation of flight controls, that the system is functioning with hydraulic power. This should occur at 200 PSI (1379 kPa) minimum pressure.

10. Decrease test stand pressure to zero. Check cyclic and collective servo actuators for operation of the irreversible valves by grasping rod ends of three servo actuators and pushing and pulling with approximately 50 pounds (222.40 N) force. Rod ends should not move.

11. Disconnect the hydraulic test stand and reconnect quick-disconnect couplings.

12. Fill helicopter hydraulic reservoir with hydraulic fluid (C-002) to proper level.

13. Cut lockwire and remove plug at test port of one cyclic servo actuator and attach a calibrated hydraulic gauge to test port. Use gauge designed to indicate pressure up to 1000 PSI (6895 kPa).

14. Turn the console hydraulic boost switch to OFF. Refer to applicable JetRanger Flight Manual; start engine and operate at idle. This will bleed air from the solenoid valve lines. Increase the RPM to 100% N_R, turn hydraulic boost switch ON, and observe calibrated gauge installed in step 13. Pressure should be 600 ±50 PSI (4137 ±345 kPa). Shut off engine. If required, adjust pressure (paragraph 29-8). Remove calibrated pressure gauge and replace port plug. Secure plug with lockwire.

29-7. FUNCTIONAL TEST USING HELICOPTER SYSTEM

1. If a hydraulic test stand is not available, a functional test of the hydraulic system may be performed using transmission-driven hydraulic pump (6, Figure 29-1). This test is less comprehensive than the test described in paragraph 29-6.

2. Inspect helicopter hydraulic system visually to ensure all components and lines are attached, cotter pins and lockwire are installed, and system appears capable of satisfactory operation.

3. Ground run helicopter at idle RPM. Position HYDRAULIC SYSTEM switch ON, and push HYDR SYSTEM circuit breaker in.

4. Move cyclic and collective controls slowly to allowable limits for ground operation with engine at idle RPM. Check servo actuators and hoses for binding, chafing, and hose movements which would tend to loosen fittings.

5. Position HYDRAULIC SYSTEM switch OFF; greater force should be required to move cyclic and collective controls.

6. Increase the RPM to 100% N_R and position HYDRAULIC SYSTEM switch ON. When engine has been operating a total of 15 minutes, check hydraulic system components for leaks (paragraph 29-3).

29-7A. HYDRAULIC SYSTEM OR CONTROL BOOST SWITCH — OFF CHECK

NOTE

The following check is to be accomplished if an anomaly is reported by the pilot after accomplishment of the hydraulic system or control boost switch – Off check (applicable 206 Flight manual/ASB 206-09-124).

1. Ensure the electrical power and hydraulic systems are turned off.

2. Disconnect control tubes (1, Figure 29-4A) from each of the three hydraulic actuators (2). Protect control tubes (1) from damage (Chapter 67).

3. Using a temperature measuring device, ensure hydraulic actuators (2) are at minimum room temperature of 60°F (16°C).

4. Center the cyclic and collective flight controls. Make sure friction is removed from both the collective and the cyclic flight controls.

NOTE

In order to collect consistent data, it is important to measure loads on the cyclic and collective flight controls at the same position during travel for both hot and cold tests. A calibrated spring scale is required. Record results in Table 29-2.

5. Position the spring scale at the center of the cyclic grip. Move the cyclic from the left forward position towards the right aft position while measuring the force required moving the cyclic as it reaches its center position. Record reading in Table 29-2.

6. Position the spring scale at the center of the cyclic grip. Move the cyclic from the right aft position towards the left forward position while measuring the force required moving the cyclic as it reaches its center position. Record reading in Table 29-2.

7. Position the spring scale at the center of the cyclic grip. Move the cyclic from the right forward position towards the left aft position while measuring the force required moving the cyclic as it reaches its center position. Record reading in Table 29-2.

8. Position the spring scale at the center of the cyclic grip. Move the cyclic from the left aft position towards the right forward position while measuring the force required moving the cyclic as it reaches its center position. Record reading in Table 29-2.

9. Position the spring scale at the center of the throttle grip on the collective flight control. Move the collective from the full down position while measuring the force required to raise the collective as it reaches its center position. Do not constrain the cyclic stick from moving during this operation.

10. Position the spring scale at the center of the throttle grip on the collective flight control. Move the collective from the full up position while measuring the force required to lower the collective as it reaches its

center position. Do not constrain the cyclic stick from moving during this operation.

CAUTION

DO NOT EXCEED 200°F (93°C) AT ANY LOCATION ON THE ACTUATOR.

11. Using a heat gun, heat the boost actuator cylinder end gland nuts (3) uniformly and all around the circumference to 160° to 180°F (71° to 82°C). Repeat step 5 through step 10 and record results in Table 29-2.

Table 29-2. Functional Test Readings

	FORCE					
	CYCLIC				COLLECTIVE	
TEST	Step 5 from Left Forward	Step 6 from Right Aft	Step 7 from Right Forward	Step 8 from Left Aft	Step 9 from Full Down	Step 10 from Full Up
Room Temperature Actuators						
Heated Actuators						

12. Compare cyclic forces recorded at room temperature prior to heating the actuators to the forces recorded after heating both cyclic hydraulic actuators (2).

a. If the cyclic stick force recorded with heated hydraulic actuators (2) minus the forces recorded at room temperature is greater than 10 pounds (4.54 kg), then the respective cyclic boost actuator is defective and should be replaced.

b. If the cyclic stick forces recorded with heated hydraulic actuators (2) minus the forces recorded at room temperature is less than 10 pounds (4.54 kg), and the force recorded at room temperature is greater than 15 pounds (6.8 kg), the hydraulic actuator is serviceable. Investigation should be conducted to identify the root cause of the discrepancy. Swashplate friction being too high is a possible cause. Contact Product Support Engineering for further guidance.

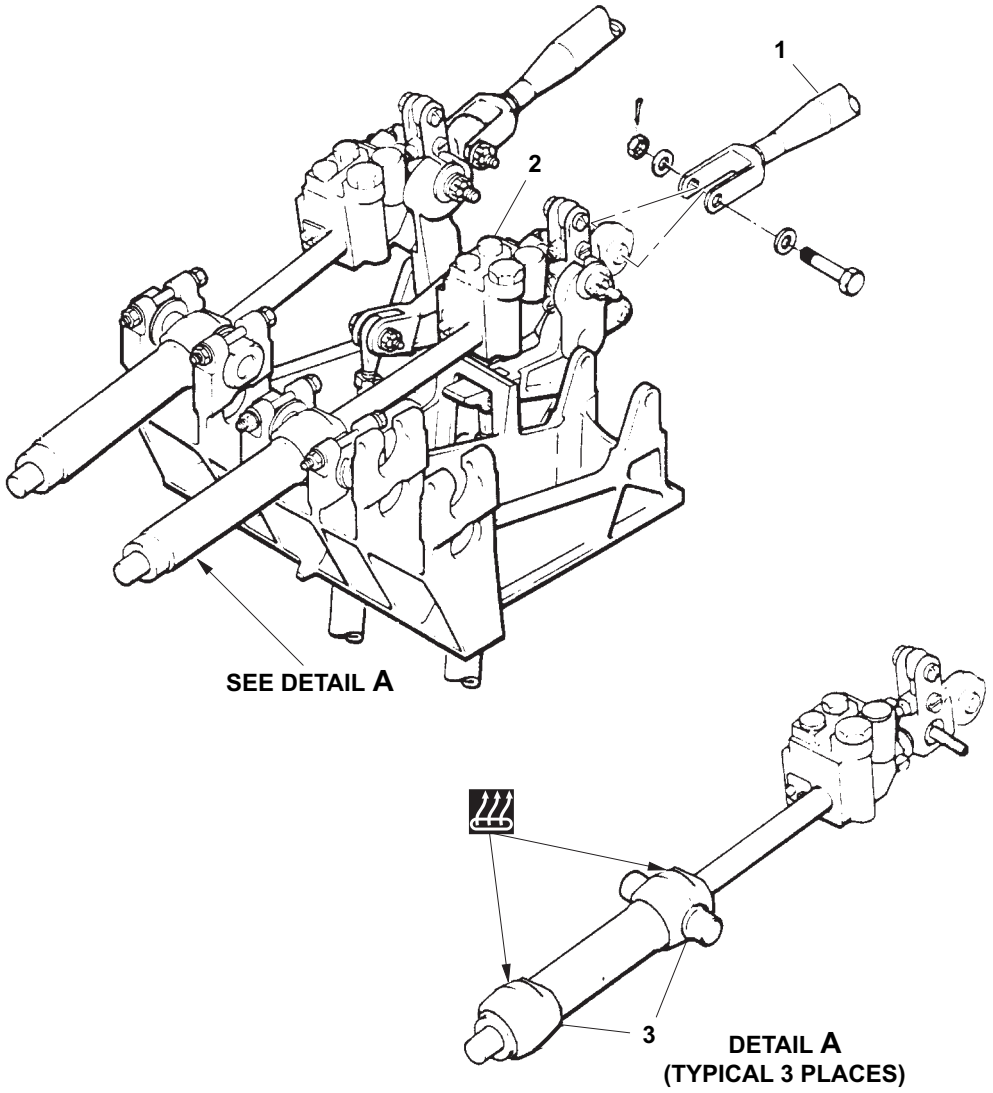
c. If the cyclic stick forces recorded with heated hydraulic actuators (2) minus the forces recorded at room temperature is less than 10 pounds (4.54 kg), and the force recorded at room temperature is less than 15 pounds (6.8 kg), then there is no defect in the hydraulic actuator or control system and no further maintenance action is required.

13. Compare collective forces recorded at room temperature to the forces recorded after heating the collective hydraulic actuator (2).

a. If the collective stick forces recorded with heated hydraulic actuator (2) minus the forces recorded at room temperature are greater than 25 pounds (11.34 kg), then the collective boost hydraulic actuator (2) is defective and should be replaced.

b. If the collective stick forces recorded with heated hydraulic actuator (2) minus the forces recorded at room temperature is less than 25 pounds (11.34 kg), and the force recorded at room temperature is greater than 20 pounds (9.07 kg), the hydraulic actuator is serviceable. Investigation should be conducted to identify the root cause of the discrepancy. Swashplate sleeve bearing contamination is a possible cause. Contact Product Support Engineering for further guidance.

c. If the collective stick forces recorded with heated hydraulic actuator (2) minus the forces recorded at room temperature is less than 25 pounds (11.34 kg), and the force recorded at room temperature is less than 20 pounds (9.07 kg), then there is no defect in the hydraulic actuator or control system, therefore no further maintenance action is required.



1. Control tube
2. Hydraulic actuator
3. Cylinder end gland nut

HEAT APPLICATION (160 TO 180°F/71 TO 82°C).
DO NOT EXCEED 200°F (93°C) MAXIMUM.

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Figure 29-4A. Cyclic and Collective Servo Actuator

14. Install control tube (1) on each hydraulic actuator (2) (Chapter 67).

29-8. HYDRAULIC SYSTEM — PRESSURE ADJUSTMENT

NOTE

Check hydraulic system pressure and adjust as required after replacement of hydraulic pump and regulator, and/or when it is suspected that operating pressure of 600 ±50 PSI (4137 ±345 kPa) is not being maintained.

1. Cut lockwire and remove plug at test port of one cyclic servo actuator and attach a calibrated hydraulic pressure gauge to the test port. Use gauge designed to indicate pressure up to 1000 PSI (6895 kPa).

2. Start engine and operate helicopter at 100% rotor RPM and observe hydraulic pressure. Refer to applicable JetRanger Flight Manual. If pressure is not within 600 ±50 PSI (4137 ±345 kPa), adjust as follows:

3. Cut and remove lockwire on pressure regulating valve housing (9, Figure 29-5). Remove valve housing from pump and reservoir (1).

4. Remove and discard packings (2 and 3) from valve housing (9) and sleeve (4).

CAUTION

DO NOT SEPARATE PISTON (6) AND SPRING (7) FROM SLEEVE (4). DO NOT REMOVE WASHERS (8) FROM VALVE HOUSING (9), EXCEPT FOR ADJUSTMENT.

5. To increase pressure, addition of one washer (8) will increase pressure approximately 30 PSI (206.85 kPa). Removal of one washer will decrease pressure approximately 30 PSI (206.85 kPa).

6. Install pressure baffle (5) over threaded end of sleeve (4). Align cutaway area of the pressure baffle with the flats on the sleeve.

NOTE

Pressure baffle (5) is required on all pressure regulator valves.

7. Ensure required number of washers (8) are installed inside valve housing (9) and that piston (6) and spring (7) are correctly positioned in sleeve (4). Thread sleeve to valve housing (T). Tighten sleeve to valve housing.

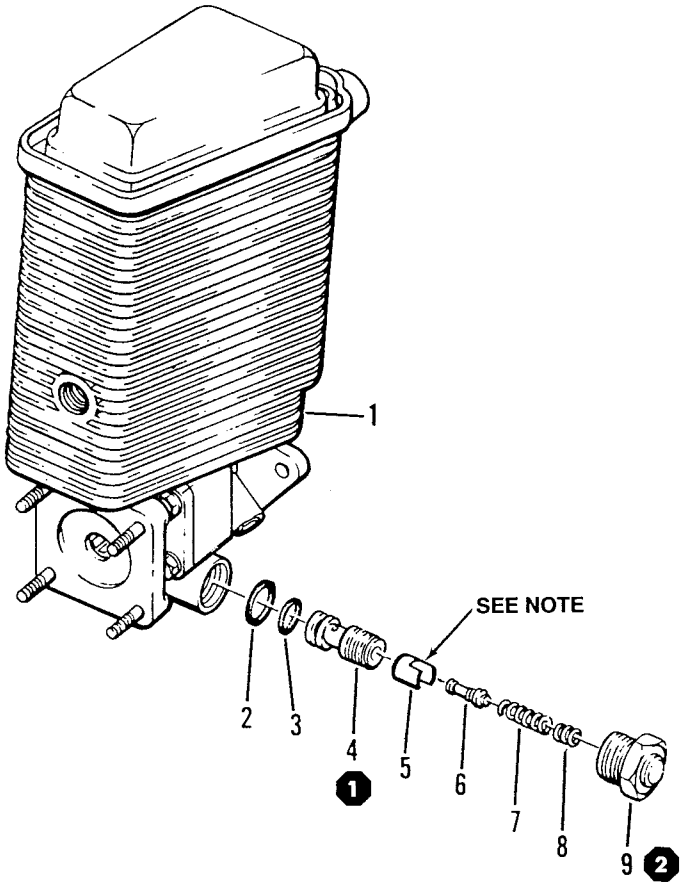
8. Lubricate new packings (2 and 3) with hydraulic fluid (C-002) and install on sleeve (4) and valve housing (9).

9. Install pressure regulator valve in pump and reservoir (1). Tighten valve housing (9) (T).

10. Operate helicopter at 100% rotor RPM and check hydraulic pressure. If required, adjust quantity of washers (8) and check hydraulic pressure.

11. Remove hydraulic test gauge and replace plug in cyclic servo test port. Secure with lockwire.

12. Secure the pressure regulating valve housing (9) to pump and reservoir (1) with lockwire.



1. Pump and reservoir
2. Packing
3. Packing
4. Sleeve
5. Pressure baffle
6. Piston
7. Spring
8. Washers (AN960-4L)
9. Valve housing

NOTE

Pressure baffle (5) is required on all pressure regulating valves.

1. 80 TO 100 IN-LBS (9.03 TO 11.29 Nm)
2. 150 TO 250 IN-LBS (16.94 TO 28.24 Nm)

206A/BS-M-29-5

Figure 29-5. Hydraulic System Pressure Regulator Valve

29-9. HYDRAULIC SYSTEM COMPONENTS

Hydraulic system components consist of pump and reservoir (1, Figure 29-6), pressure regulator valve (2) (located within pump and reservoir assembly), solenoid valve (3), hydraulic system filter (4) with replaceable filter element, and quick-disconnect sockets (5 and 6).

NOTE

The servo actuator assemblies are discussed in Chapter 67.

29-10. HYDRAULIC PUMP AND RESERVOIR

The hydraulic pump and reservoir (1, Figure 29-6) is located on the forward end of the transmission.

29-11. Hydraulic Pump and Reservoir — Removal

1. Disconnect cooling air hose (2, Figure 29-7) at hydraulic reservoir.

2. Disconnect wiring at connector plug on tachometer generator (10, Figure 29-6).

3. Remove hydraulic fluid from reservoir with a suction pump. Dispose of fluid.

4. Disconnect scupper drain line (7). Disconnect pressure hose (8) and return hose (9) at quick-disconnect sockets (5 and 6).

5. Remove three nuts (8, Figure 29-7) and three washers (7). Remove hydraulic pump and reservoir assembly (14) from transmission.

29-12. Hydraulic Pump and Reservoir — Inspection and Repair

1. Inspect pump and reservoir assembly (14, Figure 29-7) for evidence of cracks, corrosion, or leakage, and security of mounting. Inspect splines of pump driveshaft and coupling for wear. Inspect cooling air jacket (5) for cracks and security, and cooling air hose (2) for deterioration and security.

2. For repair and overhaul of hydraulic pump and reservoir, refer to BHT-206A/B-SERIES-CR&O.

29-13. Hydraulic Pump and Reservoir — Installation

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-002	Hydraulic Fluid
C-525	Grease
C-561	Grease

1. If removed, position cooling air jacket (5, Figure 29-7) on hydraulic pump and reservoir assembly (14). Attach with screws (12), washers (7) and nuts (6). Apply a thin film of grease (C-525) or grease (C-561) to the pump splines and mating splines of transmission oil pump and rotor tachometer generator.

2. Position pump and reservoir assembly (14) on transmission gasket (15). Secure with three washers (7) and three nuts (8). Ensure that vent (9) is open. No line is required for this vent.

3. Attach scupper drain line (7, Figure 29-6). Install pressure and return hoses (8 and 9) to reservoir and quick-disconnect sockets (5 and 6). Install supporting hose clamps.

4. Connect rotor tachometer generator (10) wiring.

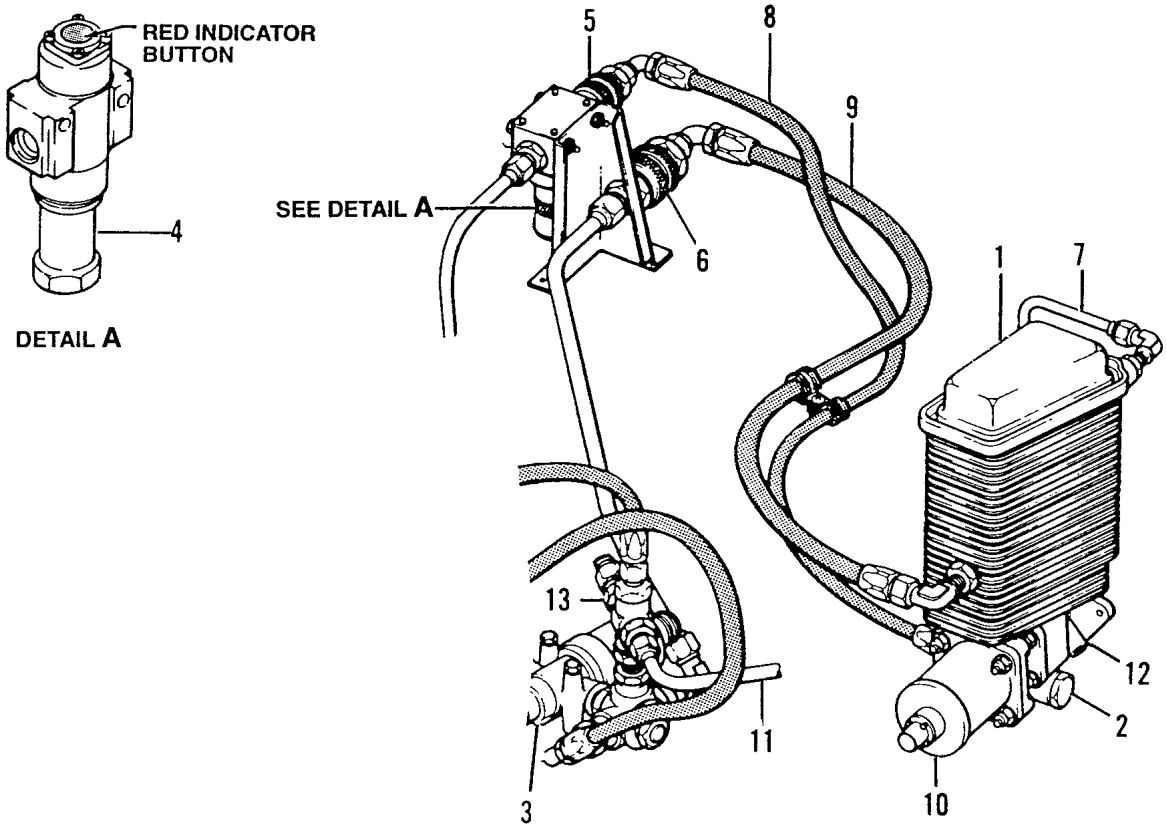
5. Attach cooling air hose (2, Figure 29-7) to hydraulic reservoir cooling air jacket (5).

6. Fill reservoir with hydraulic fluid (C-002) to proper level.

NOTE

All inspection windows and sight glasses are to be inspected for cracking, crazing, and discoloration. If any one of these conditions is present, the part must be removed and replaced prior to returning helicopter to service.

7. Check hydraulic pressure (paragraph 29-8). During operation of helicopter for hydraulic pressure check, observe system for leaks and ensure that rotor tachometer generator is operating properly. After removal of hydraulic pressure, check indicator. Check level of hydraulic fluid and add fluid if required.



1. Pump and reservoir
2. Pressure regulator valve
3. Solenoid valve
4. Filter assembly
5. Quick-disconnect socket (pressure)
6. Quick-disconnect socket (return)
7. Scupper drain line
8. Pressure hose
9. Return hose
10. Tachometer generator
11. Antitorque servo actuator tube (return)
12. Vent (pump seepage drain)
13. One way check valve

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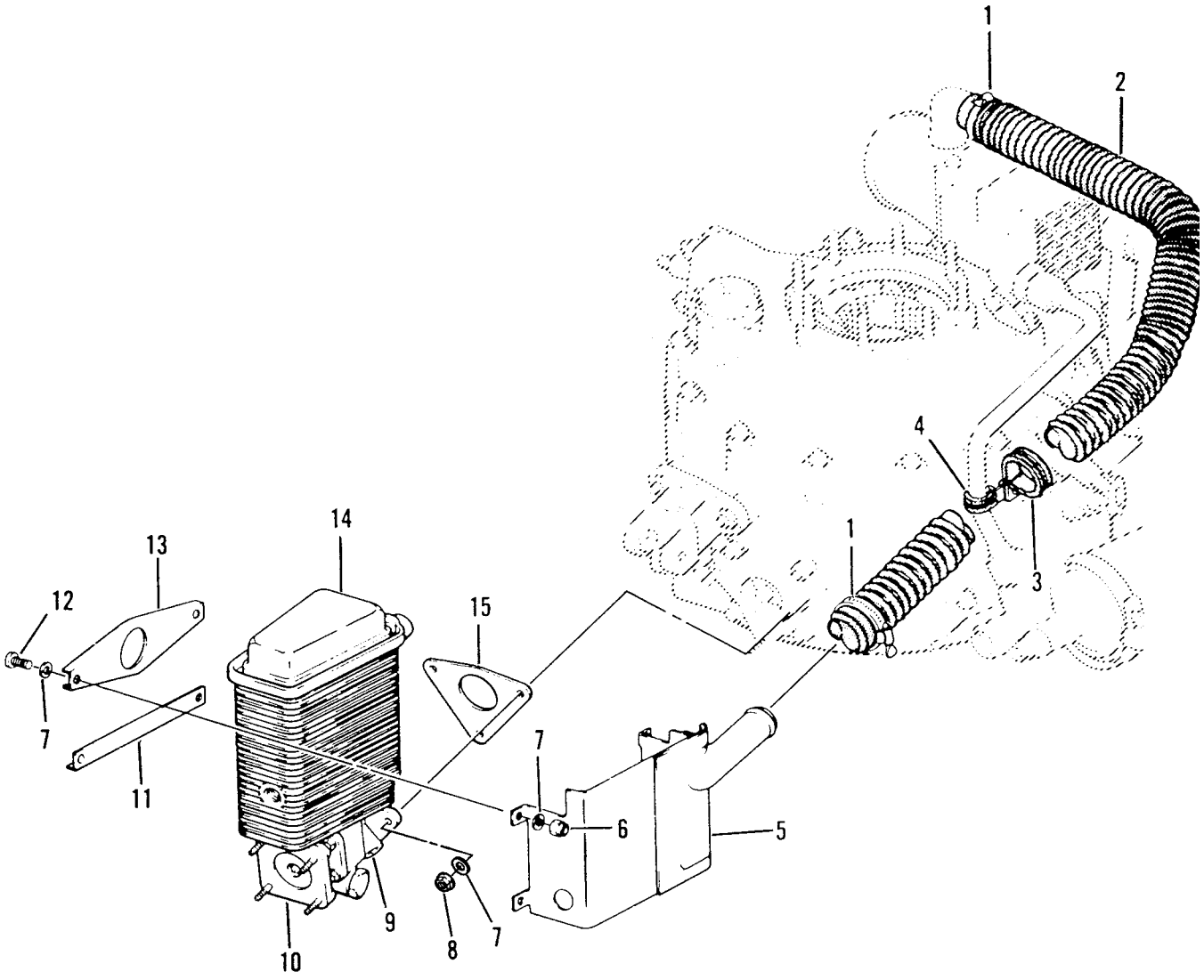
Figure 29-6. Hydraulic System Components



1. Clamp
2. Cooling air hose
3. Clamp
4. Clamp
5. Cooling air jacket
6. Nut
7. Washer
8. Nut
9. Vent (pump seepage drain)
10. Rotor tachometer generator mounting pad
11. Angle
12. Screw
13. Channel
14. Pump and reservoir assembly
15. Gasket

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Figure 29-7. Hydraulic Pump and Reservoir

29-14. HYDRAULIC FILTER ASSEMBLIES

Two configurations of filter assemblies are utilized on the helicopters. Both utilize elements with a filtration rating of 15 microns absolute. The unit utilized on helicopters S/N 154 and subsequent provides a positive indication of restricted flow through the filter element by means of a red indicator button (3, Figure 29-4) located on top of the filter body. The button pops up at 70 ±10 PSI (480 ±69 kPa) differential, and is inoperative below 35° ±15°F (1.67° ±9.44°C).

29-15. HYDRAULIC FILTER ASSEMBLIES — REMOVAL

1. Disconnect coupling half (16, Figure 29-4) from coupling (15).

2. Disconnect tube from union (4).

3. Remove two bolts (1) with attaching nuts (6) and washers (2) securing filter assembly to brackets mounted on cabin roof. Remove filter assembly.

4. Remove coupling (15) and discard packing (14).

5. Remove union (4) and packing (5).

6. For removal of element (8), refer to paragraph 29-19.

29-16. HYDRAULIC FILTER ASSEMBLIES — INSPECTION

WARNING

USE OF ISOPROPYL ALCOHOL (C-385) IS PROHIBITED ON EITHER INTERNAL OR EXTERNAL SURFACES OF HYDRAULIC COMPONENTS.

1. Clean filter body (13, Figure 29-4) with drycleaning solvent (C-304). For inspection and cleaning of element, refer to paragraph 29-20.

2. Inspect filter body for scratches, nicks, and dents.

3. Inspect threaded ports, coupling, coupling half, and union for damaged threads and fluid leakage. Replace damaged parts.

4. Inspect red indicator button (3) for proper operation.

29-17. HYDRAULIC FILTER ASSEMBLIES — INSTALLATION

1. Lubricate new packings (5, 9, 12, and 14, Figure 29-4) with hydraulic fluid (C-002).

2. Install new packing (14) on coupling (15) and install in inlet port of filter body (13).

3. Install new packing (5) on union (4) and install in outlet port of filter body (13).

4. Position filter assembly, on bracket on cabin roof. Secure with bolts (1), washers (2), and nuts (6).

5. Attach coupling (15) to mating coupling half (16) and secure.

6. For installation of filter element (8), refer to paragraph 29-21.

7. Fill hydraulic reservoir (1, Figure 29-6) with hydraulic fluid (C-002) to proper level.

8. Bleed hydraulic system (paragraph 29-5).

29-18. HYDRAULIC FILTER ELEMENT

The hydraulic filter element (8, Figure 29-4) functions at high pressure over a wide temperature range. Filtration rating is 15 microns absolute. When red indicator button (3) on return line filter pops up, inspect, clean, or replace hydraulic filter element.

29-19. HYDRAULIC FILTER ELEMENT — REMOVAL

1. Cut and remove lockwire from filter bowl (7, Figure 29-4) and filter body (13). Remove filter bowl and filter element (8).

2. Remove and discard backup ring (11) and packings (9 and 12).

3. Helicopters S/N 4 through 153: Remove retainer ring and withdraw filter element (8), from filter bowl (7).

4. Helicopters S/N 154 and subsequent: Press end of springs on filter element (8) to disengage from retention groove in filter bowl (7) and withdraw filter element from filter bowl.

29-20. HYDRAULIC FILTER ELEMENT — INSPECTION AND CLEANING

CAUTION

DO NOT USE ALCOHOL ON THE HYDRAULIC COMPONENTS. ALCOHOL CAN CAUSE DAMAGE TO THE COMPONENTS.

1. Examine the filter element (8, Figure 29-4) for damage to the filtering surfaces, and bonding of the end caps to the filtering core and general condition. Replace the filter element if any abnormality is found.

2. Inspect the filtering core for metal, brass, and aluminum contamination. Replace the filter element if contamination is found and flush the hydraulic system (paragraph 29-4).

3. The filter element (8) can be cleaned a maximum of three times with any one of the following solutions:

- Hudraulic fluid (C-002)
- Safety solvent (C-319)
- Turbine fuel (C-003)
- Solvent (C-389)
- 0.5% cleaning compound (C-318) in filtered water. Backflush with water.

NOTE

Cap or plug both ends of filter element to prevent contaminant migration into the element.

Do not use ultrasonic equipment.

4. Submerge and agitate vigorously by hand the filter element (8) in one of the previous solvents.

5. Backflush the filter element (8) with the same type of solvent used in step 4. Solvent/air mixture can be utilized. Backflush pressure to be 10 to 15 PSIG.

6. Repeat step 1. If the filter element (8) is undamaged, continue to step 7.

7. Dry the filter element (8) with dry filtered air at 50 to 60 PSIG.

NOTE

Lubricate preformed packing and retainer with hydraulic fluid (C-002) before installation.

8. Replace packing (9).

9. Verify retainer (10) on filter element (8) for serviceability.

10. Scribe an X on the filter element (8) bottom end to indicate the cleaning event.

29-21. HYDRAULIC FILTER ELEMENT — INSTALLATION

NOTE

All packings must be lubricated with hydraulic fluid (C-002) prior to installation.

1. For helicopters S/N 4 through 153:

a. Insert filter element (8, Figure 29-4) into filter bowl (7) and secure with retainer (10).

b. Install filter bowl (7) into filter body (13) under backup ring (11) and packing (12).

c. Tighten filter bowl (7) and secure with lockwire (T).

d. Fill pump and reservoir assembly (14, Figure 29-7) with hydraulic fluid (C-002) to proper level.

e. Bleed hydraulic system (paragraph 29-5).

2. For helicopters S/N 154 and subsequent:

a. Ensure a serviceable packing (9, Figure 29-4) is installed in filter element (8) and is seated in groove.

b. Press ends of springs on filter element (8) and insert element in filter bowl (7) until springs engage in retention groove.

c. Install packing (12) and backup ring (11) in filter body (13).

d. Thread filter bowl (7) into filter body (13) T. Secure filter bowl to filter body with lockwire.

e. Fill pump and reservoir assembly (14, Figure 29-7) with hydraulic fluid (C-002) to proper level.

f. Bleed hydraulic system (paragraph 29-5).

29-22. HYDRAULIC SOLENOID VALVE

The solenoid valve (21, Figure 29-8) is incorporated in the hydraulic system for turning the system ON and OFF. The solenoid valve is located forward of transmission work deck area. The solenoid valve is normally de-energized; when HYDR SYSTEM circuit breaker is in and HYDRAULIC SYSTEM switch is OFF, electrical power is applied to energize solenoid, which closes the valve and removes hydraulic pressure from the servo actuators (Figure 29-2).

29-23. HYDRAULIC SOLENOID VALVE — REMOVAL

1. Position battery switch OFF and disconnect external power if connected.

2. Disconnect electrical connector (51) from solenoid valve (21, Figure 29-8).

3. Drain hydraulic fluid from reservoir. Place cloths around solenoid valve (21) to absorb hydraulic fluid during removal.

4. Disconnect hose assemblies (1, 13, 30, and 33) from reducers (2, 12, 29, and 32).

5. On helicopters S/N 498 and subsequent:

a. Remove tube assemblies (34) from check valve (36) and union (52), and hose assemblies (35) from reducers (37).

b. Loosen nuts (45) and remove unions (43) and attached parts as a unit from body (48). Discard retainers (46) and packings (47).

6. Disconnect lines from elbows (6 and 19).

7. Remove lockwire from bolts (23). Remove bolts and washers (22) from solenoid valve (21) and remove solenoid valve assembly from helicopter.

8. Cap or plug all openings to prevent hydraulic system contamination.

9. Remove lockwire from nut (8) and remove nut and packing (9) from bolt (15). Discard packing.

10. Remove body (10) and packing (14) from bolt (15). Discard packing.

11. Remove bolt (15) and packing (16) from solenoid valve (21). Discard packing.

12. Remove elbow (19), nut (18), retainer (17), and packing (20) from forward end of solenoid valve (21). Discard packing.

13. Remove lockwire from nut (31) and remove nut, packing (26), and body (27) from bolt (25). Discard packing.

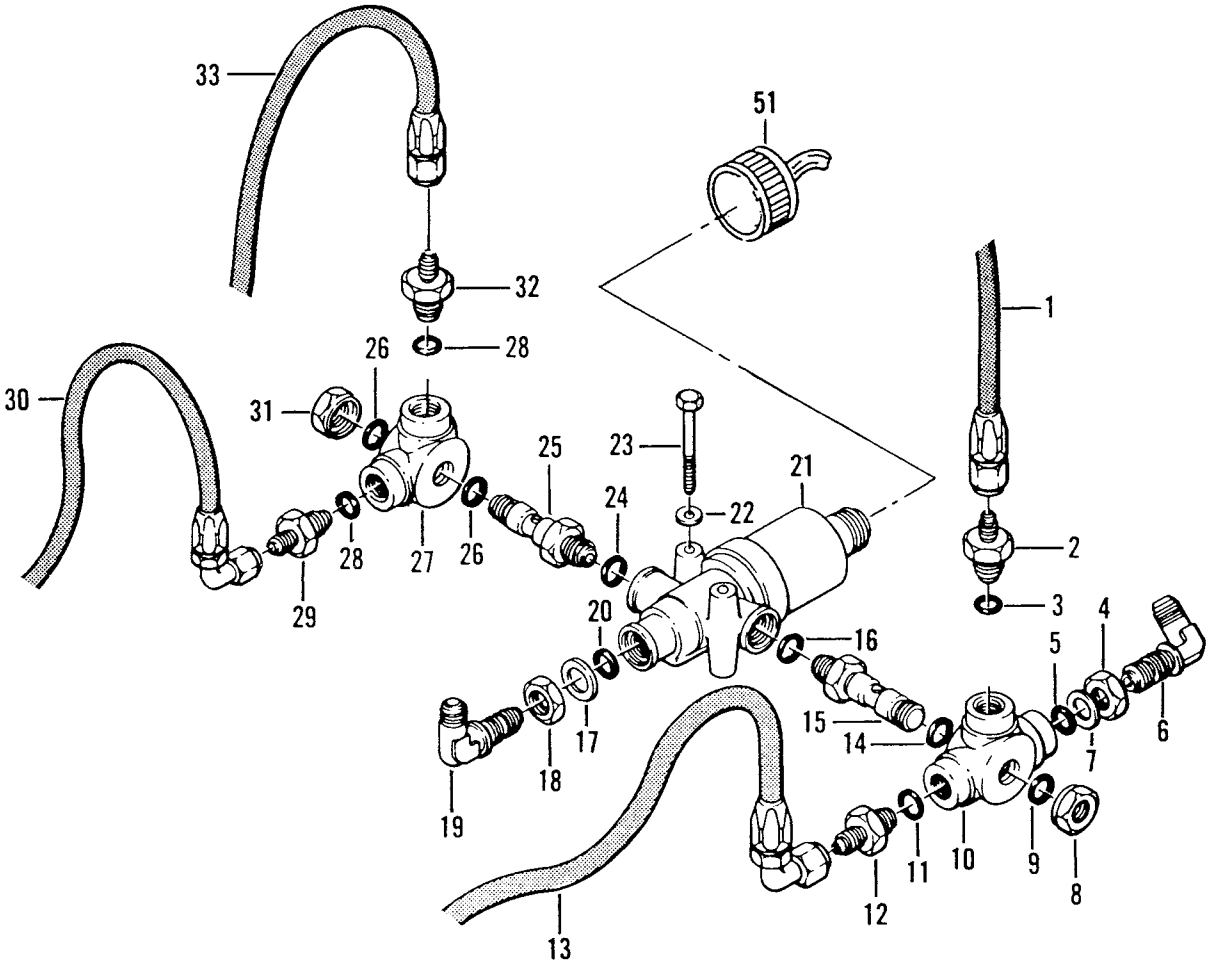
14. Remove packing (26) from bolt (25) and remove bolt and packing (24) from solenoid valve (21). Discard packing.

29-24. HYDRAULIC SOLENOID VALVE — INSPECTION

1. Inspect solenoid valve (21, Figure 29-7) for damage and leakage.

2. Inspect electrical connector for damage and inspect electrical wiring for chafing and condition.

3. Inspect solenoid valve (21) for damaged thread parts and corrosion.



HELICOPTERS S/N 4 THRU 497

1. Hose assembly
2. Reducer
3. Packing
4. Nut
5. Packing
6. Elbow
7. Retainer
8. Nut
9. Packing
10. Body
11. Packing
12. Reducer
13. Hose assembly
14. Packing
15. Bolt
16. Packing
17. Retainer
18. Nut
19. Elbow
20. Packing
21. Solenoid valve
22. Washer
23. Bolt
24. Packing
25. Bolt
26. Packing
27. Body
28. Packing
29. Reducer
30. Hose assembly
31. Nut
32. Reducer
33. Hose assembly

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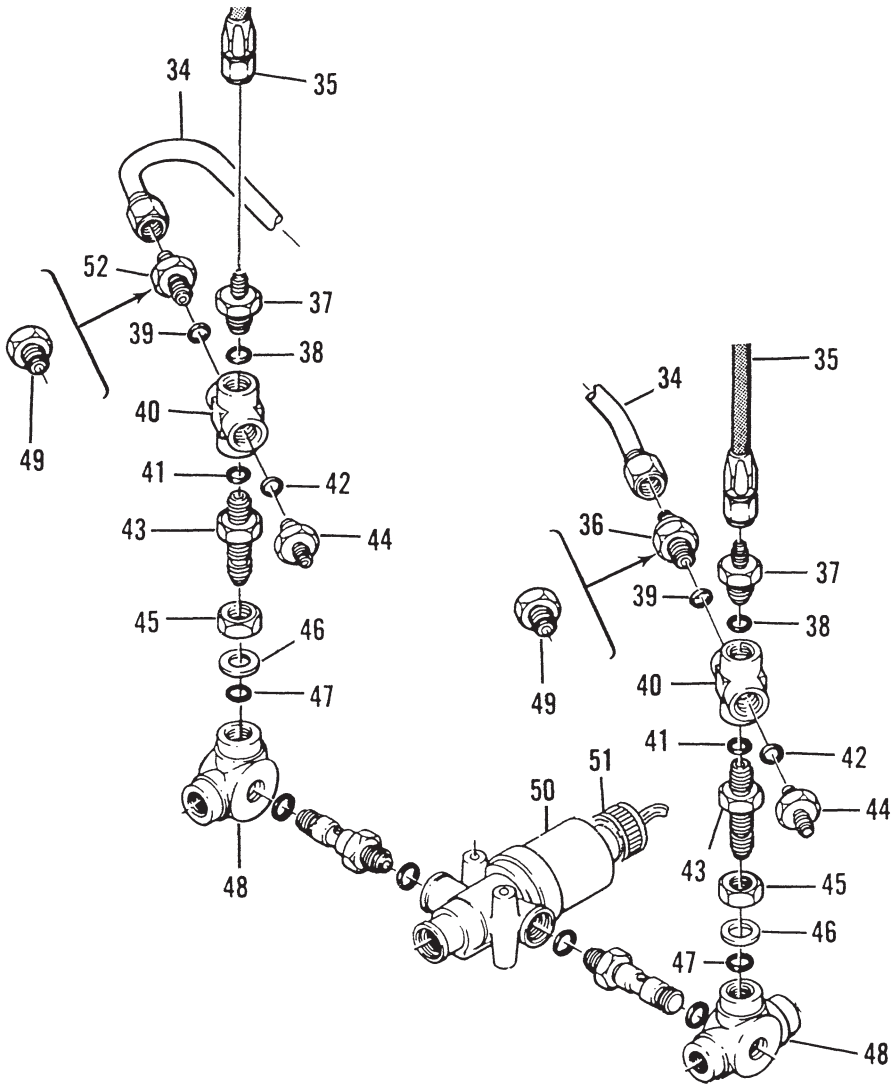
Figure 29-8. Hydraulic Solenoid Valve (Sheet 1 of 2)



HELICOPTERS S/N 498 AND SUBSEQUENT

34. Tube assembly
35. Hose assembly
36. Check valve
37. Reducer
38. Packing
39. Packing
40. Cross
41. Packing
42. Packing
43. Union
44. Reducer
45. Nut
46. Retainer
47. Packing
48. Body
49. Plug
50. Solenoid valve
51. Electrical connector
52. Union

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Figure 29-0. Hydraulic Solenoid Valve (Sheet 2 of 2)

29-25. HYDRAULIC SOLENOID VALVE — INSTALATION

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-002	Hydraulic Fluid

NOTE

All packings must be lubricated with hydraulic fluid (C-002) prior to installation.

1. Install packing (24, Figure 29-8) and bolt (25) in solenoid valve (21).

2. Install packing (26) on bolt (25) and install body (27) on bolt.

3. Install packing (26) and nut (31) on bolt (25) and tighten. Secure nut (31) with lockwire.

4. Install packing (20), retainer (17), nut (18), and elbow (19) in solenoid valve (21).

5. Install packing (16) and bolt (15) in solenoid valve (21).

6. Install packing (14) on bolt (15) and install body (10) on bolt (15).

7. Install packing (9) and nut (8) on bolt (15) and tighten. Secure nut (8) with lockwire.

8. Position solenoid valve (21) on mounting point forward of hydraulic pump and secure with bolts (23) and washers (22). Secure bolts with lockwire.

NOTE

When torquing hose nuts, use a backup wrench on hose end fitting to prevent twisting of hose.

9. Connect hose assemblies (33, 30, 13, and 1) to reducers (32, 29, 12, and 2). Tighten all fittings.

10. On helicopter S/N 498 and subsequent (Figure 29-8, sheet 2), disassemble numbered parts previously removed as one unit. Reassemble numbered parts, using new packings and retainers.

a. Install unions (43) into bodies (48) with new packings (47) and retainers (46). Tighten nuts (45).

b. Connect tube assemblies (34) to check valve (36) and union (52), and hose assemblies (35) to reducers (37). If plugs (49) are installed, tighten and secure with lockwire.

11. Connect electrical connector to solenoid valve (21).

12. Make sure that all fittings and hydraulic lines are properly positioned.

13. Fill reservoir to proper level with hydraulic fluid (C-002).

14. Bleed hydraulic system (paragraph 29-5).

15. Move cyclic and collective controls through full range of travel, and ensure hoses do not bind or chafe.

16. Refer to applicable JetRanger Flight Manual. Ground run helicopter at idle and slowly move cyclic, collective, and anti-torque pedals (if boost kit is installed) to allowable limits for ground operation, several times to ensure all air has been bled from the system. Observe installation for evidence of leaks.

17. Turn boost to OFF to functionally check solenoid valve (21). If solenoid valve functions properly, controls will require more force to move.

18. Shut helicopter down and check hydraulic fluid (C-002) in reservoir for proper fill level.

29-26. QUICK-DISCONNECTS

Two quick-disconnect fittings provide a convenient means of connecting a hydraulic test stand to helicopter. Each quick-disconnect is made up of a coupling and a coupling half (15 and 16, Figure 29-4). When disconnected, each coupling automatically closes to prevent loss of fluid and/or entry of foreign matter.

29-27. Quick-disconnects — Removal

1. Grasp coupling (15, Figure 29-4) of quick-disconnect, push toward filter assembly, and turn counterclockwise to disconnect the quick-disconnects.

2. Remove couplings (15) and coupling halves (16) from hoses and from the filter assembly. Be prepared to catch hydraulic fluid when couplings are removed from hoses and filter assembly.

3. Cap or plug openings to prevent system contamination.

29-28. Quick-disconnects — Inspection and Repair

1. Inspect coupling and coupling halves for cracks, distortion, and proper locking when the two couplings are joined.

2. Repair coupling by removing and replacing coupling halves.

3. Repair coupling halves by removing and replacing packings.

29-29. Quick-disconnects — Installation

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-002	Hydraulic Fluid

1. Lubricate with hydraulic fluid (C-002) and install packing (14, Figure 29-4) on coupling (15) and install on filter body (13).

2. Install coupling half (16) on hose assembly.

3. Connect quick-disconnects and bleed hydraulic system (paragraph 29-5).

29-30. HYDRAULIC HOSES AND TUBE ASSEMBLIES

The hydraulic hoses and tube assemblies illustrated (Figure 29-1) are used to connect components of the hydraulic system. Tube assemblies have sleeve end fittings, which are retained by flared ends of tubes.

29-31. Hydraulic Hoses and Tube Assemblies — Removal

1. Disconnect hose or tube assembly at connecting fittings.

2. Remove attaching clamps securing hose or tube assembly to helicopter and remove.

3. Cap or plug openings to prevent system contamination.

29-32. Hydraulic Hoses and Tube Assemblies — Inspection and Cleaning

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-304	Drycleaning Solvent

1. Inspect hose and tube assemblies for evidence of chafing, crimping, or damaged threads.

2. Inspect hose and tube assemblies for leakage. Refer to Table 29-1 for maximum allowable leakage for in-service components.

3. Clean hose and tube assemblies with drycleaning solvent (C-304) prior to installation.

29-33. Hydraulic Hoses and Tube Assemblies — Installation

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-002	Hydraulic Fluid

NOTE

When torquing hose nuts, use a backup wrench on hose end fittings to prevent twisting of hoses.

1. Install hose or tube assemblies and secure with clamps and supports, as required. Make sure there will be no chafing between hose or tube assemblies and helicopter components.

2. Fill hydraulic reservoir (15, Figure 29-7) with hydraulic fluid (C-002) to proper level. Bleed hydraulic system (paragraph 29-5).

3. Inspect for hydraulic fluid leaks while system is pressurized.

29-34. ROTOR BRAKE SYSTEM

The rotor brake system provides a positive means of stopping main and tail rotors. The rotor brake is a completely self-contained hydraulic system. It is operated by a handle located on the right side of the overhead console. Rotor brake system is shown in Figure 29-9.

29-35. ROTOR BRAKE SYSTEM — TROUBLESHOOTING

Figure 29-10 provides troubleshooting procedures for the rotor brake system.

29-36. ROTOR BRAKE SYSTEM — SERVICING

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-002	Hydraulic Fluid

1. Remove forward fairing (Chapter 71).

2. Remove filler cap (1, Figure 29-11) from master cylinder.

NOTE

Operating handle (12) must be in stowed (up) position while filling reservoir.

3. Fill master cylinder with hydraulic fluid (C-002) to bottom of filler neck (16).

4. Replace filler cap.

5. Install forward fairing (Chapter 71).

29-37. ROTOR BRAKE SYSTEM — BLEEDING

1. Remove forward fairing (Chapter 71) and open left and right engine cowl side panels.

2. Check master cylinder for proper fluid level (paragraph 29-36).

3. On helicopters S/N 4 through 2211 (rotor brake assemblies incorporating single bleed valve), open bleed valve (2, Figure 29-12) of left rotor brake assembly (3) and attach a clean rubber bleed hose (1) on valve extension. Place other end of hose in container to receive discharged fluid.

4. Slowly pull handle (4) down and hold in position. Do not allow handle to move back into stowed position.

5. Close bleed valve (2) and return handle (4) to stowed position (up). Replenish fluid in master cylinder.

6. Repeat step 4 and step 5 until discharged fluid is free of air bubbles.

7. Remove right rotor brake assembly (3) from cap assembly (8, Figure 29-13) (do not disconnect hose assembly).

8. Rotate removed rotor brake assembly (3, Figure 29-12) so bleed valve (2) is in up position.

9. Insert suitable block between brake linings and repeat step 4 through step 6.

10. Install rotor brake assembly on freewheel cap assembly (paragraph 29-46).

11. On helicopters S/N 2212 and subsequent (rotor brake assemblies incorporating two bleed valves), bleed from top bleed valves (step 3 through step 6).

12. Install forward fairing (Chapter 71) and close left and right engine cowl panels.

29-38. ROTOR BRAKE SYSTEM COMPONENTS

29-39. MASTER CYLINDER

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-304	Drycleaning Solvent

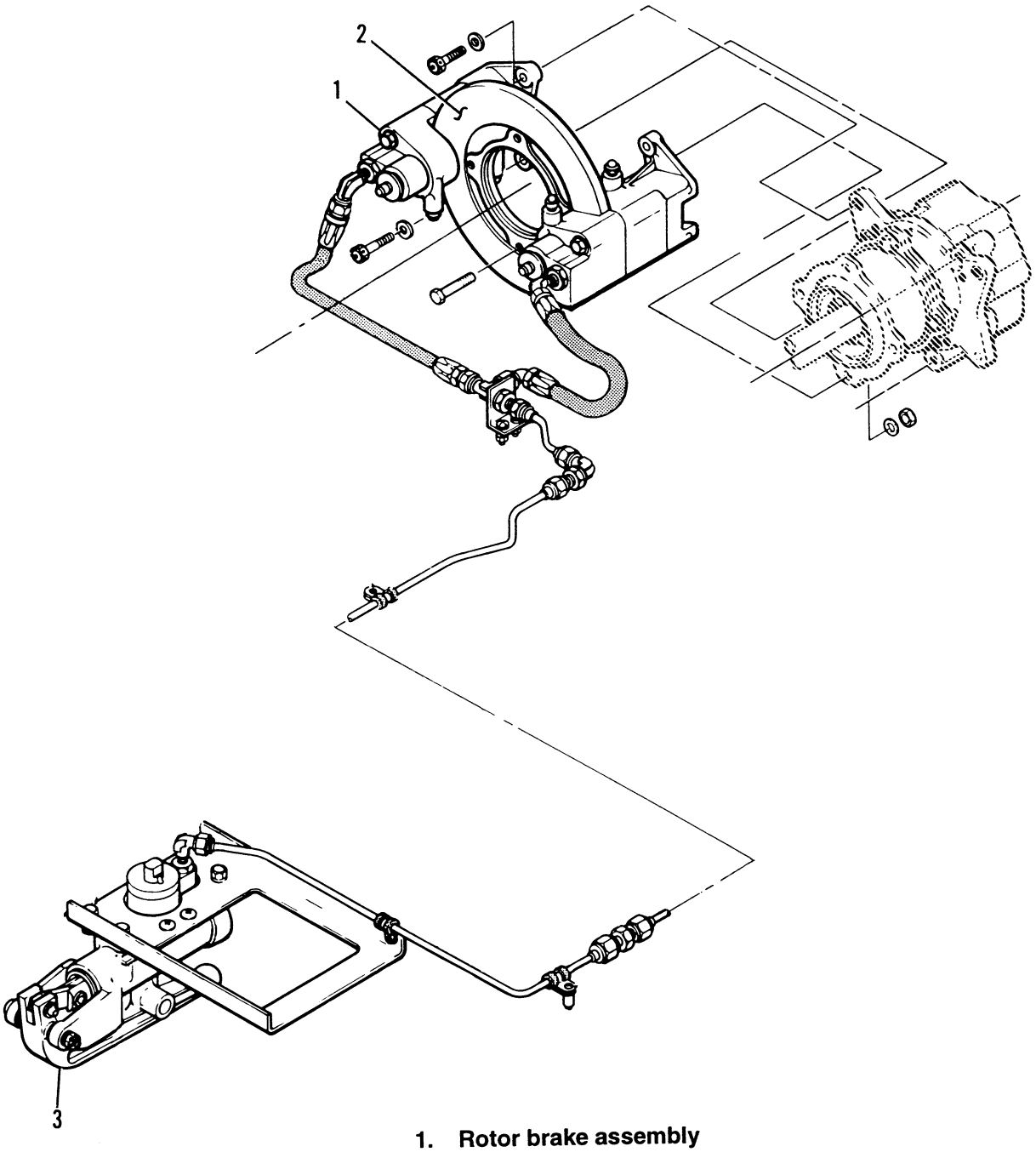
WARNING

CLEANING HYDRAULIC COMPONENTS SHALL BE ACCOMPLISHED WITH DRYCLEANING SOLVENT (C-304) ONLY. DO NOT USE ALCOHOL.

29-40. Master Cylinder — Removal

1. Remove forward fairing (Chapter 71).

2. Remove screws (14, Figure 29-11) and washers (13) and remove trim panel (15), if installed.



1. Rotor brake assembly
2. Rotor brake disc
3. Master cylinder

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Figure 29-9. Rotor brake system

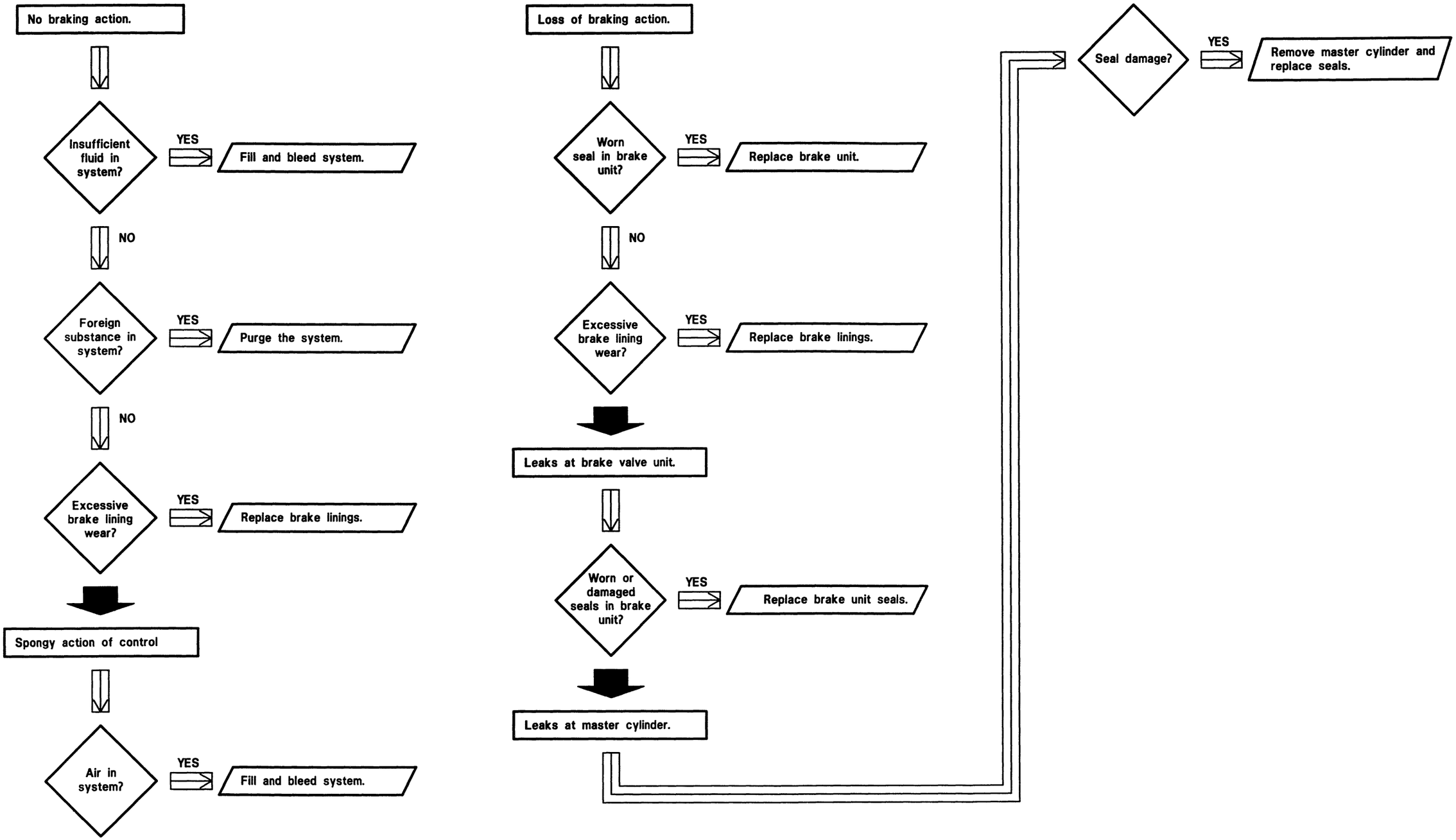

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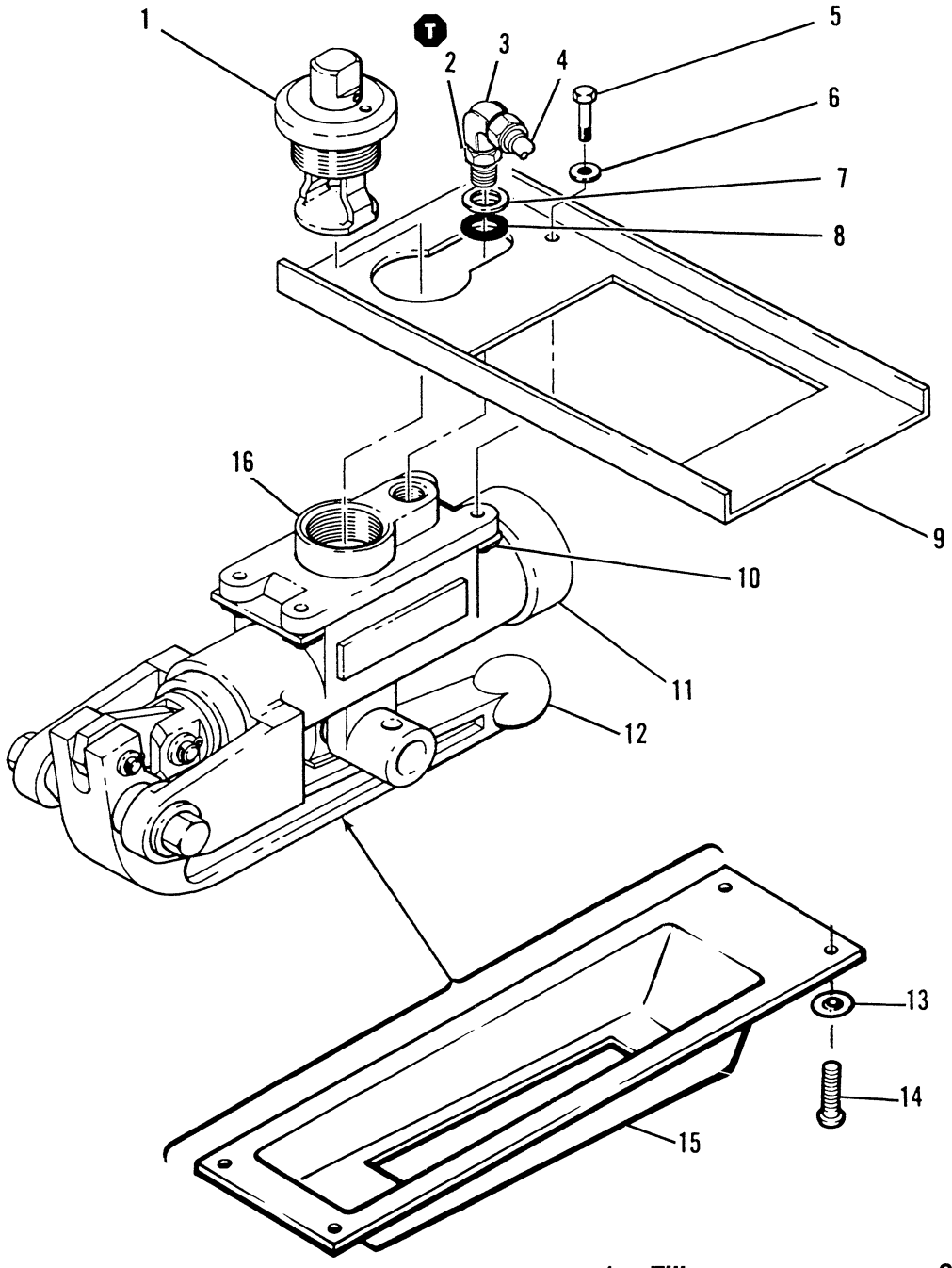
Figure 29-10. Rotor brake system troubleshooting



T 70 TO 120 IN-LBS
(7.91 TO 13.56 Nm)

1. Filler cap
2. Nut
3. Elbow
4. Tube assembly
5. Bolt
6. Washer seal
7. Retainer
8. Packing
9. Bracket
10. Nutplate assembly
11. Master cylinder
12. Operating handle
13. Washer
14. Screw
15. Trim panel
16. Filler neck

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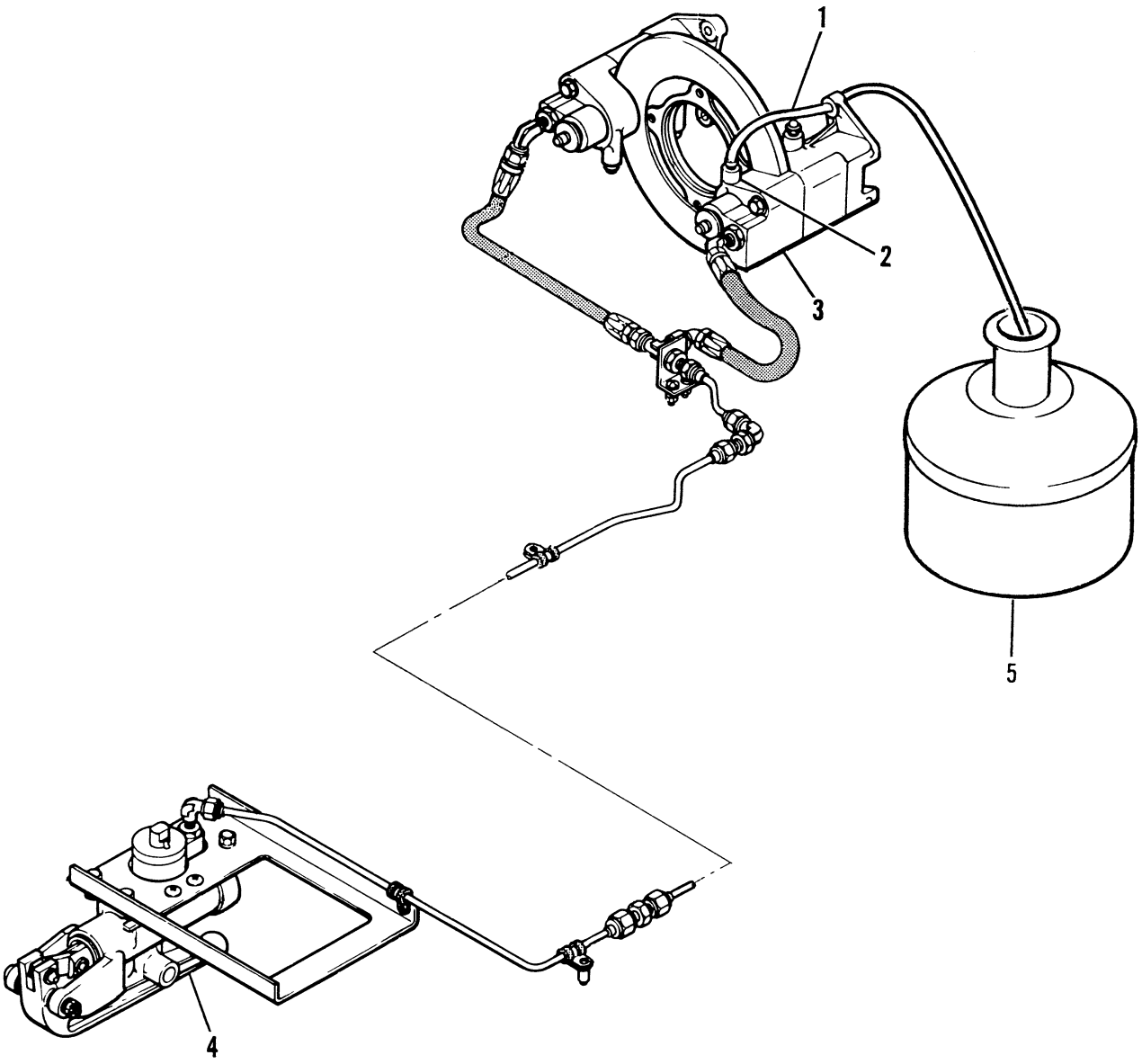
Figure 29-11. Rotor brake master cylinder



1. Bleed hose
2. Bleed valve
3. Rotor brake assembly
4. Handle
5. Bleed container

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Figure 29-12. Rotor brake system bleeding

3. Disconnect tube assembly (4).

4. Loosen nut (2) and rotate elbow (3) to clear opening in cabin roof.

5. Remove four bolts (5) and washer seals (6).

6. Remove forward and aft nutplate assemblies (10).

7. Remove master cylinder (11) from ceiling inside cabin.

8. Remove elbow (3) and discard packing (8) and retainer (7).

9. Cap or plug openings to prevent contamination of hydraulic system.

10. Clean adhesive from faying surfaces of roof skin and master cylinder mounting plate.

29-41. INSPECTION.

1. Inspect master cylinder for evidence of leakage, corrosion and damage.

2. Inspect mechanical linkage for distortion and wear that would affect function.

3. Refer to BHT-206A/B-SERIES-CR&O for repair of master cylinder.

29-42. INSTALLATION.

1. Thread nut (2, figure 29-11) onto elbow (3).

2. Place new retainer (7) in groove of nut (2).

3. Lubricate new packing (8) with hydraulic fluid (C-002).

4. Position packing (8) against retainer.

5. Install elbow (3) in port on top of master cylinder. Rotate elbow to clear opening in cabin roof.

NOTE

Do not tighten nut (2).

6. Align four bolt holes of master cylinder over four matching holes in roof bracket (9) and overhead panel inside cabin roof.

7. Position aft nutplate (10) with two holes over aft mounting holes of master cylinder.

8. Install bolts (5) and washer seals (6) through roof bracket (9), master cylinder mounting holes and nutplate (10).

9. Repeat steps 7. and 8. for forward nutplate.

NOTE

Do not tighten bolts until after adhesive is applied.

10. Apply a bead of adhesive (C-308) around edge of slotted hole cutout on top of cabin roof. Work adhesive in between contact surfaces of roof skin and master cylinder mounting plate.

11. Tighten mounting bolts (5).

12. Wipe off excess adhesive squeezed from between mounting plate and roof.

13. Rotate elbow (3) to align with tube assembly (4).

14. Tighten nut (2) (T).

15. Connect tube assembly (4) to elbow (3).

16. Apply adhesive to fill hole in cabin roof around master cylinder to prevent standing water.

17. Install trim panel (15) with washer (13) and screw (14), if removed.

18. Fill and bleed rotor brake hydraulic system (paragraphs 29-36 and 29-37).

19. Install forward fairing (Chapter 71).

29-43. ROTOR BRAKE ASSEMBLY.

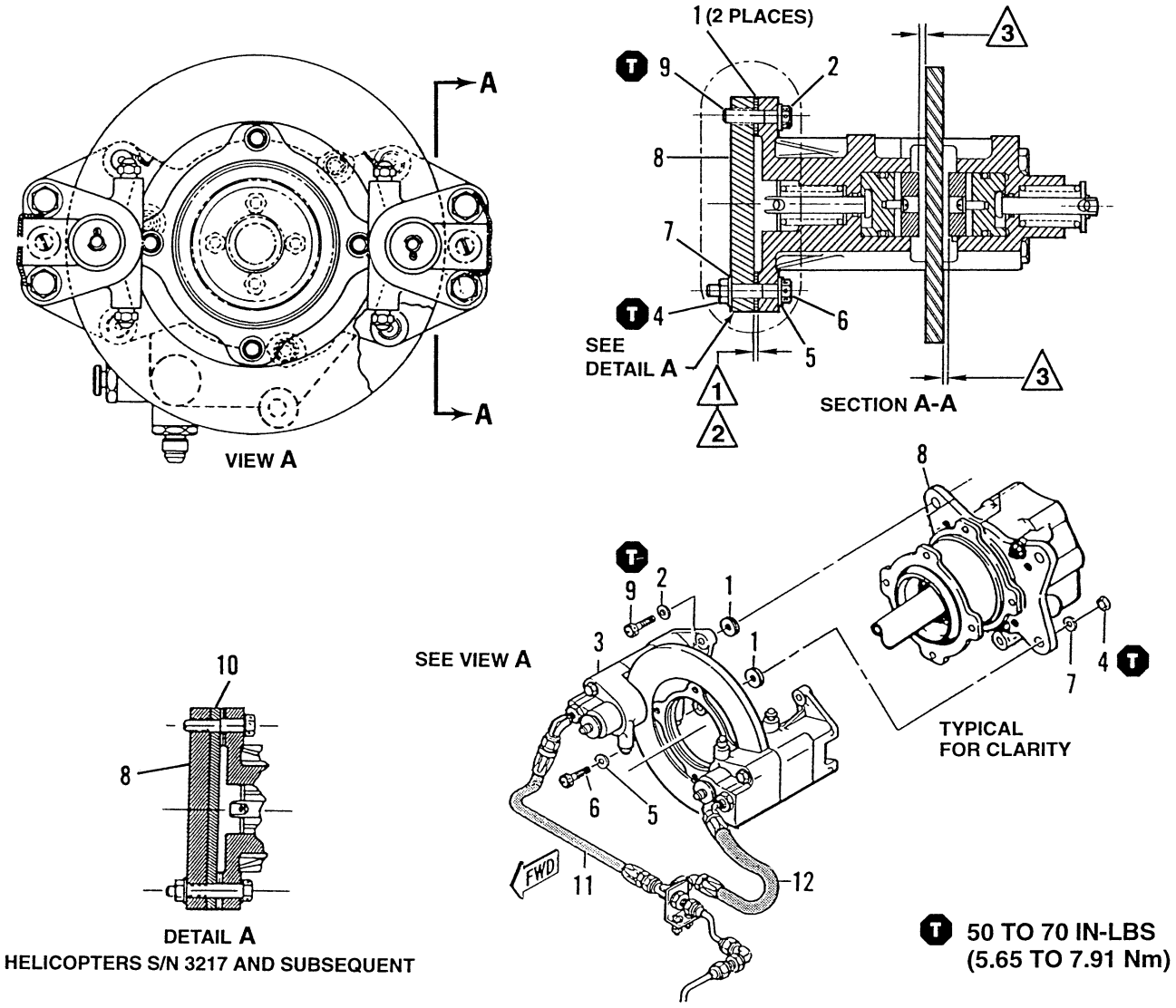
29-44. REMOVAL.

1. Open left and right engine cowl side panels.

2. Remove hose assembly (11 and 12, figure 29-13) from rotor brake assembly.

3. Cut lockwire and remove bolt (9), washer (2), and shim washer (1).

4. Remove nut (4), washer (7), shim washer (1 and 5) and bolt (6).



1. Shim washer
2. Washer
3. Rotor brake assembly
4. Nut
5. Washer
6. Bolt
7. Washer
8. Cap assembly
9. Bolt
10. Spacer
11. Hose assembly
12. Hose assembly

NOTE

1. Maximum shim thickness = 0.130. In. (3.30 mm)
   Mean shim thickness = 0.053 In. (1.35 mm)
2. Shim washer thickness each bolt (6 and 9) must be equal within 0.004 In. (0.10 mm)
3. Shim washer (1) required to make gaps equal within 0.020.

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Figure 29-13. Rotor brake assembly removal and installation

5. Remove rotor brake assembly (3) from cap assembly (8).

29-45. ROTOR BRAKE ASSEMBLY — INSPECTION

1. Inspect rotor brake assembly for corrosion and damage.

2. Inspect rotor brake assembly for evidence of leakage.

3. Refer to BHT-206A/B-SERIES-CR&O for repair of rotor brake assembly.

29-46. ROTOR BRAKE ASSEMBLY — INSTALLATION

1. Loosely install rotor brake assembly (3, Figure 29-13) on cap assembly (8) with bolt (9), washer (2), and shim washer (1).

2. Loosely install bolt (6), washers (5), shim washer (1), washer (7), and nut (4).

NOTE

On helicopters S/N 3217 and subsequent, use spacer (10) instead of shim washer (1).

3. Tighten (but do not torque) nut (4) and bolt (9).

4. Measure gaps A and B, Figure 29-12, Section A-A. Gaps must be equal within 0.004 inch (0.010 mm). Add or remove shim washers (1) as required to obtain proper gaps.

5. Torque bolt (9) and nut (4) T. Secure bolt with lockwire.

6. Install hose assemblies (11 and 12) on brake assemblies.

7. Bleed rotor brake system (paragraph 29-37).

8. Close left and right engine cowl side panels.

29-47. ROTOR BRAKE DISC

29-48. ROTOR BRAKE DISC — REMOVAL

1. Remove air induction fairing (Chapter 71).

2. Remove rotor brake assemblies (paragraph 29-44).

3. Remove main driveshaft (Chapter 63).

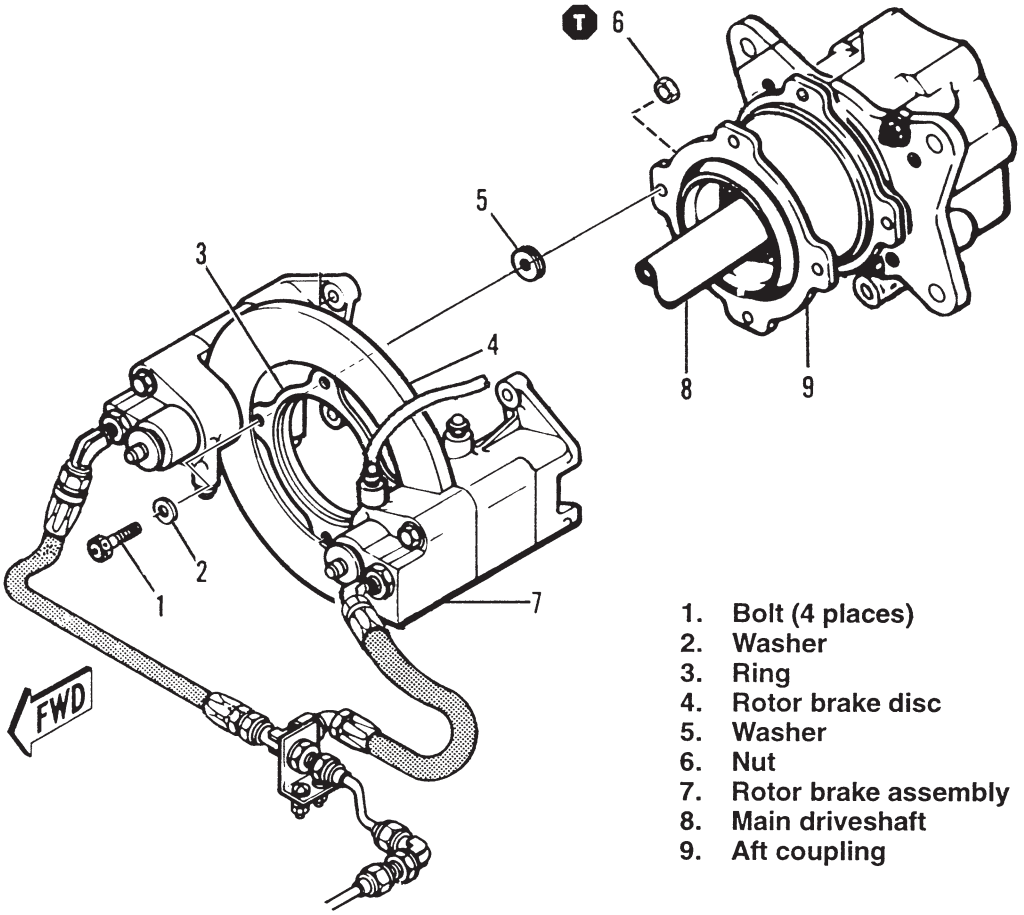
4. Remove four nuts (6, Figure 29-14), washers (2 and 5), and bolts (1) attaching rotor brake disc (4) and ring (3) to aft coupling (9).

5. Remove aft coupling (9) from main driveshaft (8) (Chapter 63) and remove rotor brake disc (4) and ring (3).

29-49. ROTOR BRAKE DISC — INSPECTION

1. Inspect rotor disc for any discoloration indicating evidence of overheating. Replace overheated rotor disc.

2. Inspect rotor disc for any distortion or warping. Replace distorted or warped rotor disc.



1. Bolt (4 places)
2. Washer
3. Ring
4. Rotor brake disc
5. Washer
6. Nut
7. Rotor brake assembly
8. Main driveshaft
9. Aft coupling

T 50 TO 70 IN-LBS
(5.65 TO 7.91 Nm)

206AB_MM_29_0014

Figure 29-14. Rotor Disc Removal and Installation

29-50. ROTOR BREAK DISC — INSTALLATION

MATERIALS REQUIRED

Refer to BHT-ALL-SPM for specifications.

NUMBER	NOMENCLATURE
C-246	Epoxy Primer Coating

CAUTION

AS APPLICABLE TO HELICOPTERS S/N 4523 AND SUBSEQUENT AND HELICOPTERS POST TB 206-06-186, ANYTIME ONE OR ALL OF THE RIVETED TAIL ROTOR SEGMENTED DRIVESHAFTS 206-040-385-105/109 OR THE RIVETED AFT SHORT SHAFT 206-040-383-101 (OR SUBSEQUENT P/N'S) ARE INSTALLED, ROTOR BRAKE DISC 9440904 (OR SUBSEQUENT P/N) SHALL BE INSTALLED TO REDUCE THE EFFECT OF TORTIONAL LOADS DUE TO THE STIFFNESS OF THE RIVETED SHAFTS. IN THIS CONFIGURATION, THE ROTOR BRAKE DISC MAY BE INSTALLED STANDALONE WITHOUT ROTOR BRAKE CALIPER ASSEMBLIES AND MUST BE USED IN CONJUNCTION WITH MAIN DRIVESHAFTS 206-040-015-ALL. INSTALLATION OF ROTOR BRAKE KITS BHT-206-SI-63 (SINGLE CALIPER) OR BHT-206-SI-105 (DUAL CALIPER), AS APPLICABLE, MEET THE ROTOR BRAKE DISC REQUIREMENT.

NOTE

When riveted tail rotor segmented driveshafts or a riveted aft short shaft is installed and the rotor brake kit is not installed per BHT-206-SI-63 or BHT-206-SI-105, apply a uniform epoxy primer coating (C-246) to the machined braking surfaces of the rotor brake disc (4, Figure 29-14). Allow primer to dry prior to installation of rotor brake disc.

1. Slide ring (3) then rotor brake disc (4) on main driveshaft (8).

2. Position ring (3) on rotor brake disc (4).

3. Mate rotor brake disc and ring with aft coupling (9) with washers (5) between disc and coupling.

4. Install four bolts (1) and washers (2) through rotor brake disc and aft coupling and install nuts (6) (T).

5. Reinstall main driveshaft (Chapter 63).

6. Reinstall rotor brake assemblies (paragraph 29-46).

7. Install air induction fairing (Chapter 71).