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ATTACHMENT PRECAUTIONS

Options kits are available through your dealer. Contact Daewoo for information on available one-way (single-acting) and two-way (double-acting) piping/valving/auxiliary control kits. Because Daewoo cannot anticipate, identify or test all of the attachments that owners may wish to install on their machines, please contact Daewoo for authorization and approval of attachments, and their compatibility with options kits.

AVOID HIGH-VOLTAGE CABLES

Serious injury or death can result from contact or proximity to high-voltage electric lines. The bucket does not have to make physical contact with power lines for current to be transmitted.

Use a spotter and hand signals to stay away from power lines not clearly visible to the operator.

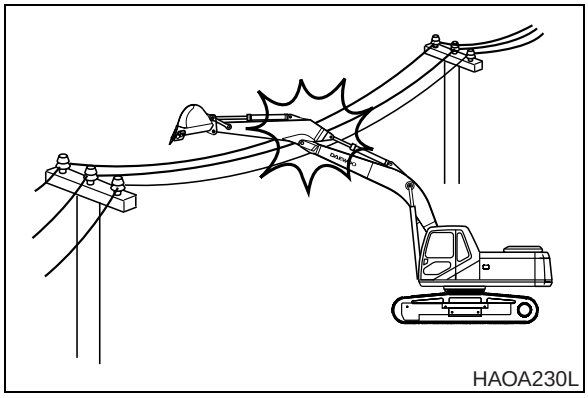


Figure 1

VOLTAGE	MINIMUM SAFE DISTANCE
6.6kV	3.0 m (9' - 10")
33.0kV	4.0 m (13' - 1")
66.0kV	5.0 m (16' - 5")
154.0kV	8.0 m (26' - 3")
275.0kV	10.0 m (32' - 10")

Use these minimum distances as a guideline only. Depending upon the voltage in the line and atmospheric conditions, strong current shocks can occur with the boom or bucket as far away as 4 - 6 m (13 - 20 ft) from the power line. Very high voltage and rainy weather could further decrease that safety margin.

NOTE: *Before starting any type of operation near power lines (either above ground or buried cable-type), you should always contact the power utility directly and work out a safety plan with them.*

BEFORE STARTING TO DIG, CONTACT AUTHORITIES

Below ground hazards also include natural gas lines, water mains, tunnels and buried foundations. Know what's underneath the work-site before starting to dig.

BE AWARE OF HEIGHT OBSTACLES

Any type of object in the vicinity of the boom could represent a potential hazard, or cause the operator to react suddenly and cause an accident. Use a spotter or signal person working near bridges, phone lines, work-site scaffolds, or other obstructions.

FUEL, OIL AND HYDRAULIC FLUID FIRE HAZARDS

Figure 8

Add fuel, oil, antifreeze and hydraulic fluid to the machine only in a well ventilated area. The machine must be parked with controls, lights and switches turned off. The engine must be off and any flames, glowing embers, auxiliary heating units or spark-causing equipment must be doused, turned off and/or kept well clear of the machine.

Static electricity can produce dangerous sparks at the fuel filling nozzle. In very cold, dry weather or other conditions that could produce static discharge, keep the tip of the fuel nozzle in constant contact with the neck of the fuel filling nozzle, to provide a ground.

Keep fuel and other fluid reservoir caps tight and do not start the engine until caps have been secured.

BOOST STARTING OR CHARGING ENGINE BATTERIES

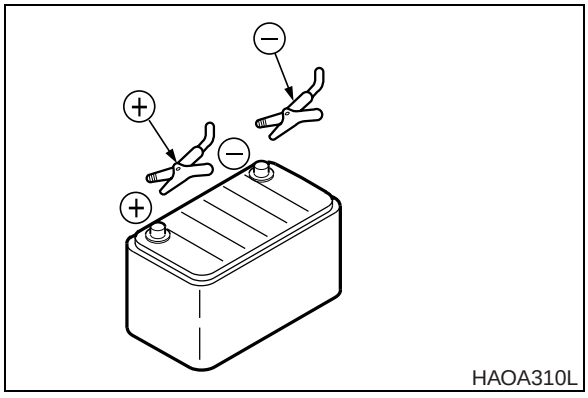


Figure 9

Turn off all electrical equipment before connecting leads to the battery. This includes electrical switches on the battery charger or boost starting equipment.

When boost-starting from another machine or vehicle do not allow the two machines to touch. Wear safety glasses or goggles while required parallel battery connections - positive to positive and negative to negative - are made.

24 volt battery units consisting of two series-connected twelve volt batteries have a cable connecting one positive terminal on one of the 12 volt batteries to a negative terminal on the other battery. Booster or charger cable connections must be made between the non-series-connected positive terminals and between the negative terminal of the booster battery and the metal frame of the machine being boosted or charged. Refer to the procedure and illustration in Operation and Maintenance Manual.

Connect positive cable first when installing cables and disconnect the negative cable first when removing them. The final cable connection, at the metal frame of the machine being charged or boost-started, should be as far away from the batteries as possible.

TRAVEL CONTROLS MAY PRODUCE REVERSED OPERATIONS

Before starting the machine you should always check to see which end of the track frame is under the operator's cab. In the normal travel configuration, track frame travel motors are at the rear of the machine, under the engine and counterweight. If the operator swings the cab 180°, travel motors will be underneath the operator's cab, toward the front of the track frame and operating travel will be reversed.

When traveling the excavator always keep lights on; make sure that you are in compliance with all state and local regulations concerning warning flags and signs and keep the operator's cab positioned over the

EXCAVATOR PERFORMANCE STANDARDS

Evaluation of equipment performance and operating condition can be made by running the excavator through a series of different tests, and recording results with a stop watch and tape measure.

Compare results of performance tests against the specifications and standards that follow, which are for equipment in new or renewed condition.

TEST CONDITIONS

1. All tests should be performed on a flat, level, firmly supporting ground surface.
2. All recommended, applicable maintenance and adjustment service should be completed prior to testing.
3. Hydraulic fluid and engine oil should be of appropriate viscosity for ambient weather conditions. Warm up hydraulic oil to standard operating temperature, between 45° to 55°C (112° to 135°F).
4. Run all tests with the engine speed control set to maximum RPM.
5. Repeat tests with Power Mode engine control settings at both Power Mode II (standard work mode) and Power Mode III (high speed mode). Travel speed tests should also be repeated at both high and low speed.

TRAVEL SPEED AND TRAVEL MOTOR BALANCE (STEERING DEVIATION) TESTS

Speed Test

Prepare the excavator for travel speed tests by extending all hydraulic cylinders - boom, arm and bucket - to the fully extended position, shown in Figure 5.

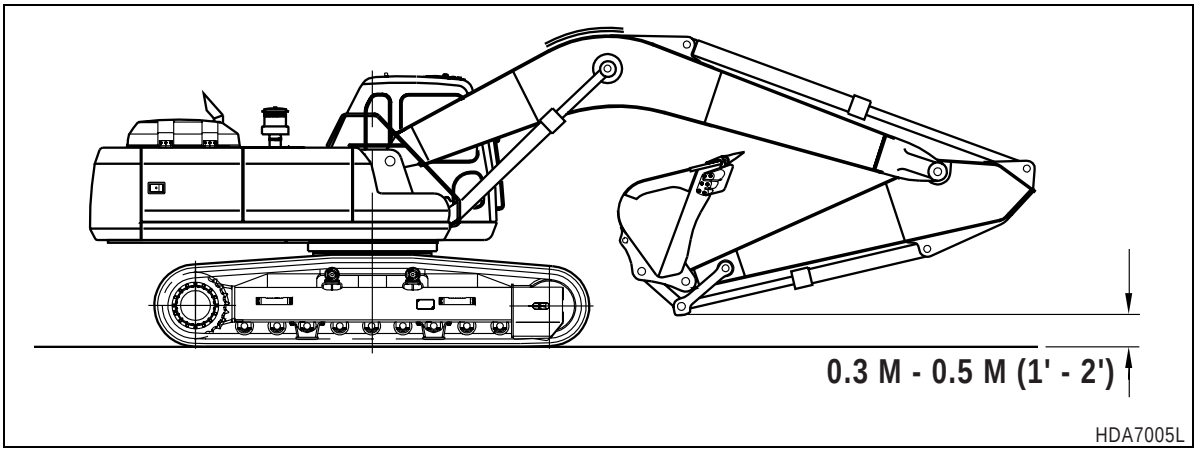


Figure 5

The lowest part of the bucket linkage should be 0.3 m to 0.5 m (1' to 2') off the ground.

Mark off a 20 m (65' 7-1/2") test distance, with a 3 m to 5 m (10' to 15') run-up area, and a 3 m to 5 m (10' to 15', or longer) speed run-off distance.

Travel the excavator back and forth to be sure steering is centered and side frames are perfectly parallel with the test course.

Operate both travel levers at the fully engaged position and measure the time it takes to cross 20 m (65' 7-1/2"). Compare measured results against the standard for new machines:

TORQUE VALUES FOR HOSE CLAMPS

The following chart provides the tightening torques for hose clamps used in all rubber applications (radiator, air cleaner, operating lever boots, hydraulic system, etc.).

CLAMP TYPE AND SIZE	TORQUE PLUS OR MINUS 5 in lbs (0.1 kg•m)			
	RADIATOR, AIR CLEANER, BOOTS, ETC.		HYDRAULIC SYSTEM	
	KILOGRAM METER (kg•m)	INCH POUNDS (In. Lbs.)	KILOGRAM METER (kg•m)	INCH POUNDS (In. Lbs.)
``T'' Bolt (Any Diameter)	0.6 - 0.7	55 - 65	-------	------
Worm Drive - 1-3/4 in. Open Diameter and Under	0.2 - 0.3	20 - 30	0.5 - 0.6	40 - 50
Worm Drive - Over 1-3/4 in. Open Diameter	0.5 - 0.6	40 - 50	-------	------
Worm Drive - All ''Ultra-Tite''	1.1 - 1.2	95 - 105	0.5 - 0.6	40 - 50

INSTALLATION

NOTE: *Be sure to clean or replace fuel strainer/screens prior to installation. These are located in top and bottom of fuel tank and mounted in-line, downstream from fuel filler pump.*

1. Install two 12 mm eye bolts in threaded holes at that bolts (1 and 2, Figure 12) came out of. Using a suitable lifting device, sling eye bolts.
2. Set fuel tank (3, Figure 12) into position. Install four bolts and washers (4) finger tight, to secure tank to frame.

   NOTE: *The clear level gauge on the side of the tank is easily damaged. Be careful of obstacles and wind gusts.*
3. Install shims (5, Figure 12) as needed to prevent tank (3) from rocking or stress from mounting bolts (4).
4. Tighten mounting bolts (4, Figure 12) after shims are installed.
5. Install cover (2, Figure 13) on fuel tank (3) and support (4) with four bolts and washers (1)

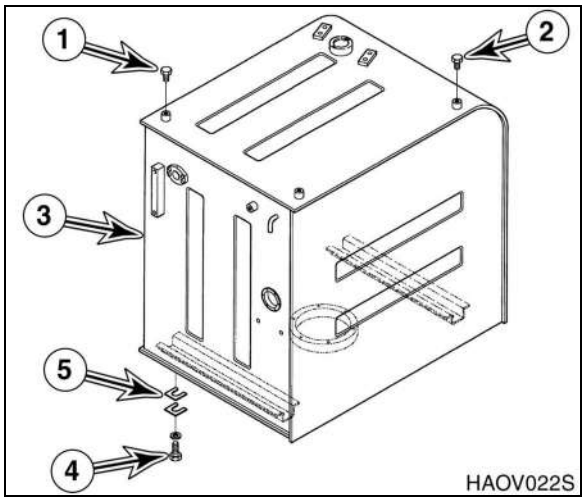


Figure 12

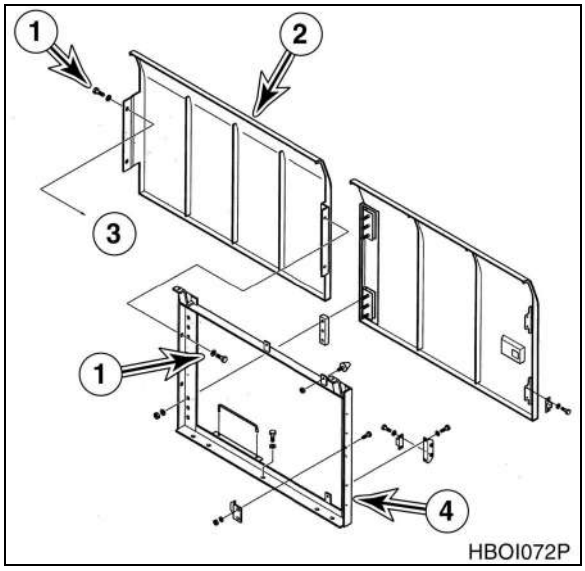
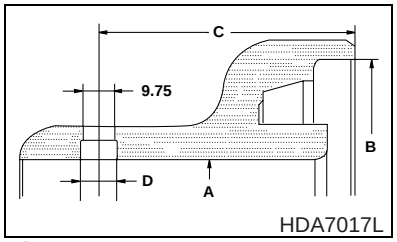
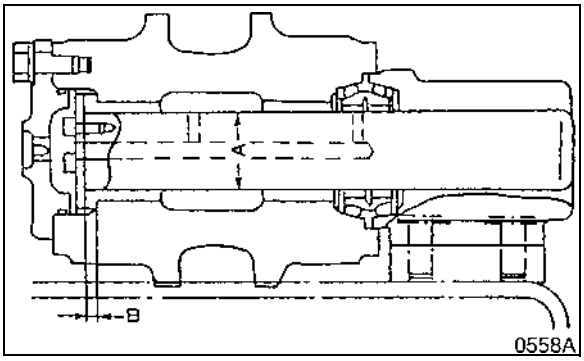
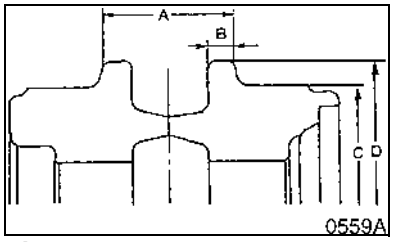


Figure 13

Component / Reference Dimensions	Reference	Normal (New) Dimension	Recommended Limit for Maintenance	Limit for Use (Repair - P or Replace - R)
Lower roller, side collar  **Figure 9**	A	70 mm (2.756")	70.5 mm (2.776")	70.7 mm [R] (2.783")
	B	145 mm (5.709")	138 mm (5.433")	135 mm [R] (5.315")
	C	64.75 mm (2.550")	63.5 mm (2.50")	62.5 mm [R] (2.461")
 **Figure 10**				
Upper roller, axle	A	55 mm (2.165")	54.5 mm (2.146")	54.22 mm [R] (2.134")
Upper roller, bushing	A		55.5 mm (2.185")	56 mm [R] (2.205")
Axle-bushing, clearance			1.0 mm (0.039")	1.8 mm (0.071")
Upper roller, axle	B	6.5 mm (0.256")		
Upper roller, bushing	B		5.5 mm (0.217")	5.0 mm (0.197")
Upper idler  **Figure 11**	A	78 mm (3.071")	73 mm (2.874")	70 mm [P] (2.756")
	B	14 mm (0.551")	11 mm (0.433")	8 mm [P] (0.315")
	C	142 mm (5.591")	135 mm (5.315")	130 mm [P] (5.118")
	D	169 mm (6.654")	160 mm (6.299")	155 mm [P] (6.102")

2. Check system for vacuum leak.

   Allow system to sit for 10 minutes and check whether the system is holding the pressure. If the pressure has dropped, it must be repaired before proceeding to the next step.

3. Vacuuming Procedure

   If the system is holding the pressure and it has not changed for 10 minutes, vacuum out the system for an additional 20 minutes.

   A. Turn on the vacuum pump and slowly open both valves.

   B. Allow vacuum pump to run for additional 20 minutes until the low pressure gauge dial reads approximately 750 mmHg.

   C. Close both valves and stop the vacuum pump.

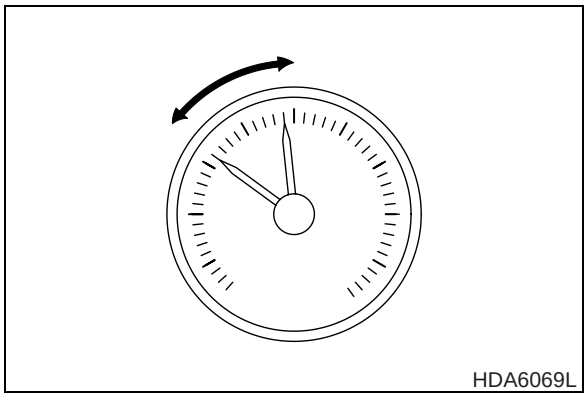


Figure 16

4. Installation Of Refrigerant Container

Reference Number	Description
1	Handle
2	Hose Connection
3	Mounting Disk

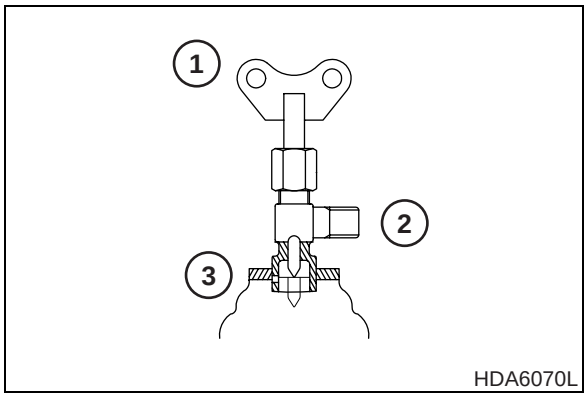


Figure 17

   A. Before mounting valve on the container, make sure the handle is in the counter clockwise most position, with the puncture pin retracted and the mounting disk is in the raised position.

   B. Attach the manifold gauge center hose to the valve assembly.

   C. Turn the disc in the clockwise direction and securely mount valve onto refrigerant container.

   D. Turn the valve handle in the clockwise direction and puncture the container seal with the pin.

   E. Once the can has been punctured, turn the handle in the counter clockwise direction so the refrigerant can flow into the manifold gauge center hose. At this time, do not open the low and high pressure valves of the manifold gauge.

   F. Press the manifold gauge low side valve to eliminate the trapped air in the hose.

BUCKET OPERATING CIRCUIT

The bucket operating circuit includes the right and left main pumps, the right and left halves of the control valve and the bucket cylinder. 360 kg/cm sq. (5,112 psi) overload relief valves located at **BKC** and **BKD 1** ports of the control valve protect the circuit and its components from damage.

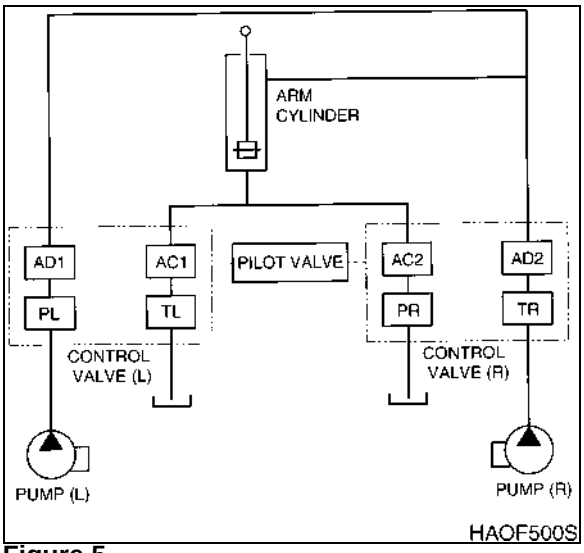


Figure 5

BUCKET CROWD CIRCUIT

When the bucket control lever is placed in the crowd position, the bucket control valve spool on the right side of the control valve opens and oil from both main pumps flows to the bucket cylinder.

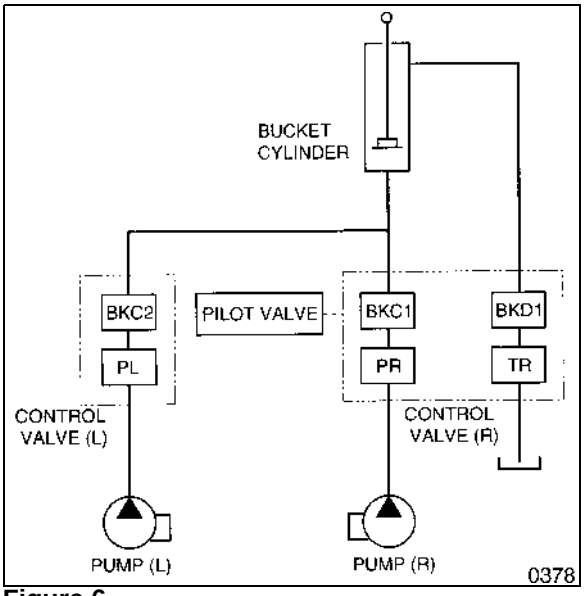


Figure 6

BUCKET DUMP CIRCUIT

When the bucket control lever is put in the dump mode, the bucket control valve spool in the right half of the control valve opens to supply oil from the right main pump to the cylinder.

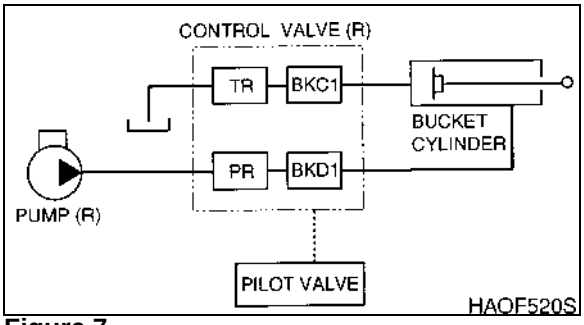


Figure 7

SWING OPERATING CIRCUIT

The swing operating circuit consists of the left main pump in the pump assembly, the left half of the control valve and the swing motor. To keep the upper works from coasting when the swing control is in neutral, an electrical sensor in the control circuit activates a valve to automatically engage a mechanical brake.

TROUBLESHOOTING - SWING GEARBOX

Problem	Possible Causes	Remedies
Swing motor fails to operate and:		
Three pressure tests at motor, brake or makeup valve show low reading(s).	Swing relief valve defective Brake release valve defective Motor makeup valve defective.	Adjust pressure to recommended range in affected valve. OR Disassemble and clean valve assembly. Replace all valve components that show damage.
All three pressure checks are OK but left travel also fails to run.	Exchange front and rear pump inlet and outlet hoses to test pump function.	If swing and left travel are restored but right travel stops working, replace or repair P1 pump.
All three pressure tests are OK, but machine fails to swing at all.	Brake assembly or motor friction plate failing to release.	Check for binding. Disassemble and repair.
	Pilot (control) pressure low or swing control valve stuck.	Disassemble / Repair pilot pressure swing spool (305) and / or swing control valve.
	Swing motor defective.	Test motor drain rate. Replace / Repair motor.
	Gear train defective.	Refer to "Swing Gear Troubleshooting" procedure.
Swing functions but only at reduced RPM.	Causes listed above could also produce dragging swing, OR hot or wrong oil OR worn-out parts.	Check above list; then replace oil, test motor drain rate and check for "02" reading (EPOS-V self-test).
Left travel speed is also reduced.	Low output at P1 pump or external pilot piping leaks/is clogged.	Clean and repair piping or repair or replace pump P1.
Swing control movement is reversed.	Inlet / outlet piping reversed.	Reset controls or reverse piping.
Machine swings but continues coasting on past stopping point.	Swing control valve spool not centered.	Replace return spring; clean/ repair valve piston and spool.
	Pilot pressure may be outside range.	Disassemble, clean or replace pilot relief valve or pilot valve.
	Swing relief valve may be faulty.	Repair/Replace swing relief valve.
Swing movement is in one direction only.	Check to see that pilot pressure is the same right and left.	If pilot pressure is unequal, clean or repair piping or repair/ replace valve.
	Swing control valve spool may be stuck.	Repair/Replace the swing control valve.
	Swing relief valve may be faulty.	Repair/Replace the swing relief valve.
No rotation and:		

REASSEMBLY

IMPORTANT

Replace any part that shows evidence of damage or excessive wear. Replacement of all O-rings and flexible seals is strongly recommended. Before starting the cylinder reassembly procedure, all parts should be thoroughly cleaned and dried, and/or prelubricated with clean hydraulic fluid. Prepare the work area beforehand to maintain cleanliness during the reassembly procedure.

NOTE: *Reassemble the subassemblies of the cylinder in the following order:*

1.Body of the cylinder

2.Piston rod

3.Piston assembly

4.Cylinder head assembly

1. Reassemble pin bushing (1) to piston rod (13) and body of cylinder (14).

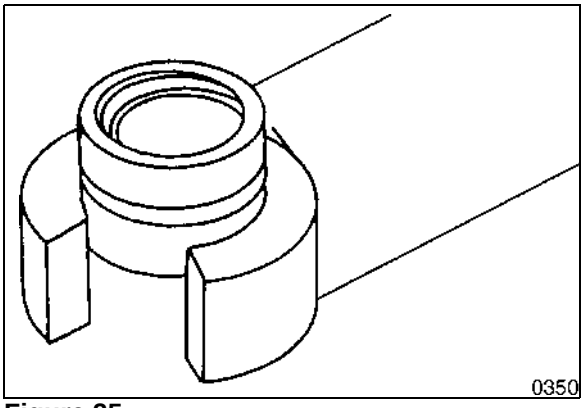


Figure 25

2. Following reassembly of rod cover components, install the dust wiper (2) and rod bushing (6) to the rod cover (9). Insert retaining rings (3 and 8).

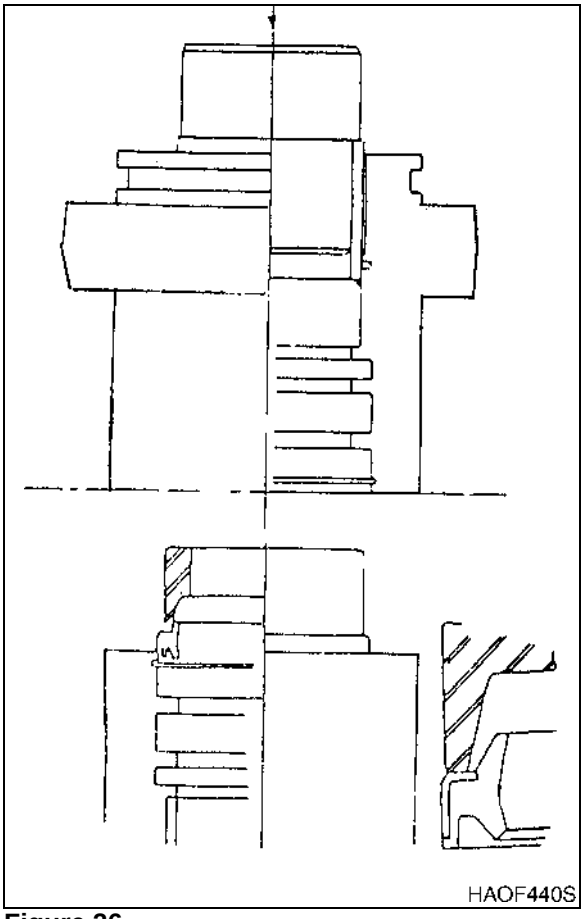


Figure 26

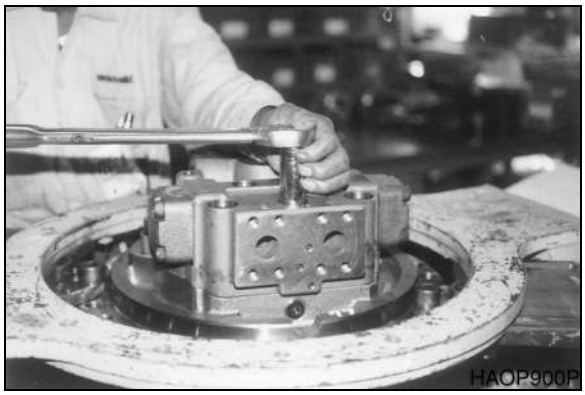


Figure 31

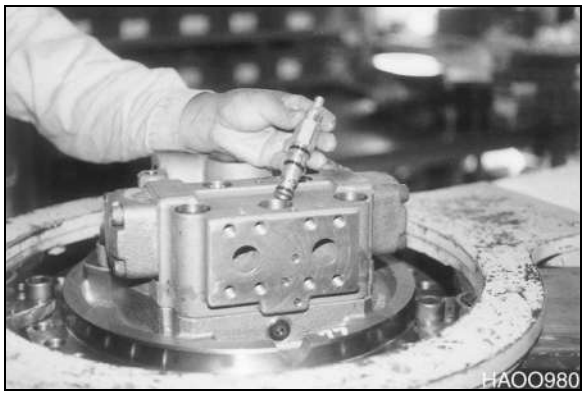


Figure 32

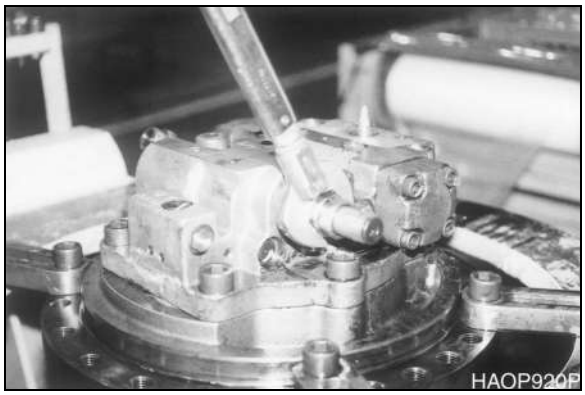


Figure 33

3. Remove M10X135 bolt from valve casing (303) for manual brake release and subassembly valve casing and brake piston.

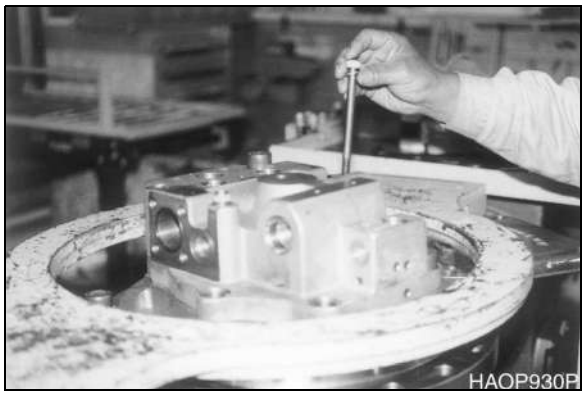


Figure 34

CLEANING AND INSPECTION (WEAR LIMITS AND TOLERANCES)

NOTE: *Inspect all components and precision surfaces to confirm that they haven't been worn beyond service limits. Check the table below for dimensional specifications.*

All parts should be cleaned, air-dried and re-lubricated with clean, approved-type hydraulic fluid, prior to final reassembly or as the final step after the unit has been put back together again.

Replacement of all O-rings and oil seals with new parts is generally recommended, unless pump has had very few operating hours of use.

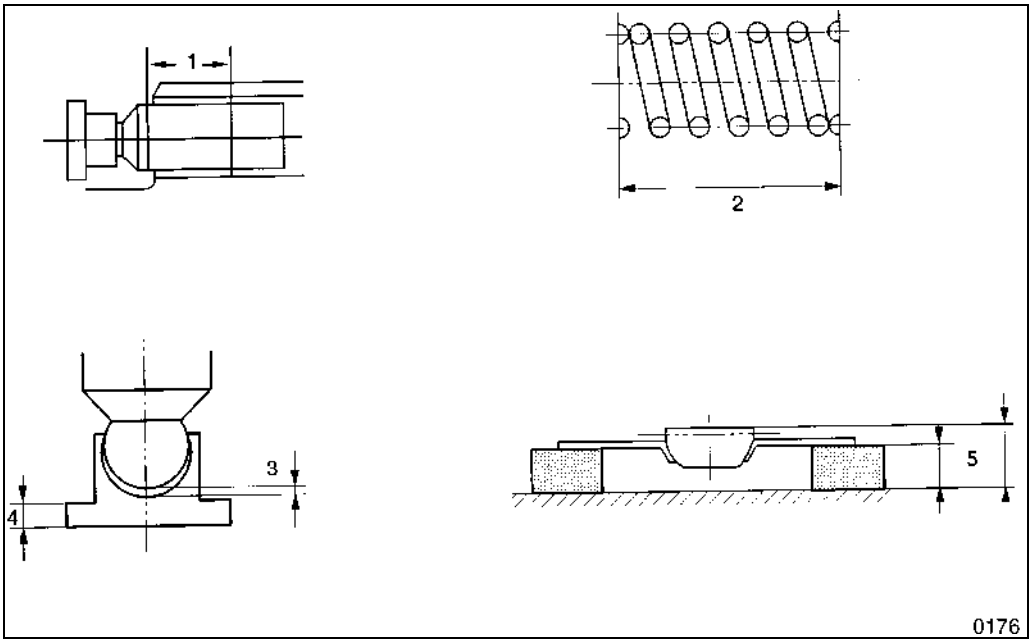


Figure 35

Reference Number	Description
1	Clearance Between Piston and Cylinder Bore
2	Spring Free Length
3	Piston Ball - Shoe Socket Clearance

Reference Number	Description
4	Thickness of Shoe
5	Height Between Round Bushing and Push Plate

NOTE: *Rounded bushings and push plates must always be replaced in sets. If either one requires replacement, also replace the other.*

5. Plunger (Lower side)

AM-1: Remove cap (7), O-rings, backup spring, spring (8) and check valve (9).

Lower cap hex hole	8.0 mm
Tightening torque	6 kg•m (43 ft lbs)

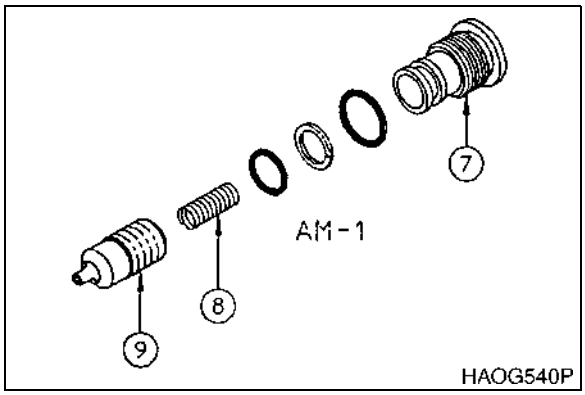


Figure 70

BM-1: Remove cap (7), O-ring, backup spring, sleeve (10), check valve (11) and spring (12).

Lower cap hex hole	8.0 mm
Tightening torque	6 kg•m (43 ft lbs)

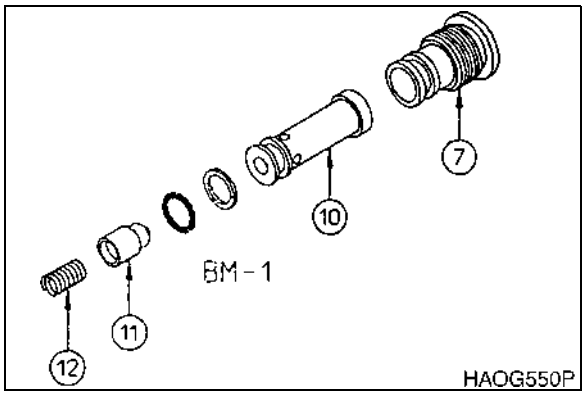


Figure 71

TS: Remove cap (7), O-ring and backup spring.

Lower cap hex hole	8.0 mm
Tightening torque	6 kg•m (43 ft lbs)

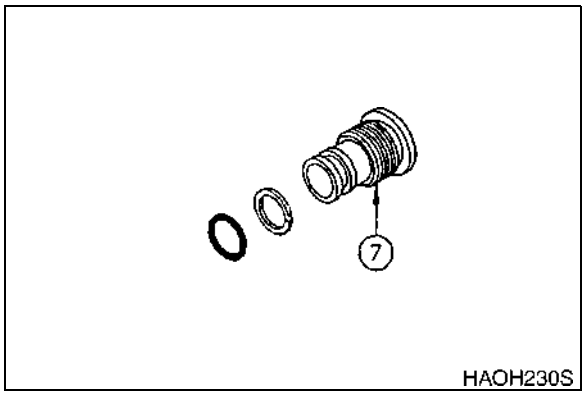


Figure 72