Solar 220LL

Shop Manual

2023-7134E

Serial Number 1001 and Up

Daewoo reserves the right to improve our products in a continuing process to provide the best possible product to the market place. These improvements can be implemented at any time with no obligation to change materials on previously sold products. It is recommended that consumers periodically contact their distributors for recent documentation on purchased equipment.

This documentation may include attachments and optional equipment that is not available in your machine's package. Please call your distributor for additional items that you may require.

Illustrations used throughout this manual are used only as a representation of the actual piece of equipment, and may vary from the actual item.

TO THE OPERATOR OF A DAEWOO EXCAVATOR

DANGER!

Unsafe use of the excavator could lead to serious injury or death. Operating procedures, maintenance and equipment practices or traveling or shipping methods that do not follow the safety guidelines on the following pages could cause serious, potentially fatal injuries or extensive damage to the machine or nearby property.

Please respect the importance of taking responsibility for your own safety, and that of other people who may be affected by your actions.

The safety information on the following pages is organized into the following sections:

SAFETY ALERT SYMBOL

Be Prepared - Get To Know All Operating and Safety Instructions.

This is the Safety Alert Symbol. Wherever it appears in this manual or on safety signs on the machine you should be alert to the potential for personal injury or accidents. Always observe safety precautions and follow recommended procedures.

LEARN THE SIGNAL WORDS USED WITH THE SAFETY ALERT SYMBOL

The words **"CAUTION"**, **"WARNING"**, and **"DANGER"** used throughout this manual and on decals on the machine indicate degree of risk of hazards or unsafe practices. All three degrees of risk indicate that safety is involved. Observe precautions indicated whenever you see the Safety Alert "Triangle," no matter which signal word appears next to the "Exclamation Point" symbol.

CAUTION!

Indicates potential of a hazardous situation that, if not avoided, could result in minor or moderate injury. It may also be used to alert against a generally unsafe practice.

Warming up the engine for a short period may be necessary, to avoid operating with sluggish or reduced working capacity. The jolting shocks and impact loads caused by bumping or bottoming the boom or attachment are more likely to cause severe stress in very cold temperatures. Reducing work cycle rate and work load may be necessary.

PARKING THE MACHINE

Avoid making sudden stops, or parking the machine wherever it happens to be at the end of the work day. Plan ahead so that the excavator will be on a firm, level surface away from traffic and away from high walls, cliff edges and any area of potential water accumulation or runoff. If parking on inclines is unavoidable, block the crawler tracks to prevent movement. Lower the grapple or other working attachment completely to the ground, or to an overnight support saddle. There should be no possibility of unintended or accidental movement.

SHUTDOWN CONTROL FUNCTIONS

After the machine has been lowered to the overnight storage position and all switches and operating controls are in the OFF position, the control stand lock lever must be engaged. Release the left console to disable all pilot circuit control functions.

Insert the swing lock pin and engage all brakes and lock-down security equipment that may have been installed on the machine.

IMPORTANT
When hydraulic system maintenance or service work must be performed, you should be aware that an accumulator in the system stores fluid under pressure after system lock down, even after the control stand is raised. Release this energy by working controls with the engine off, until pressure in the pilot circuit has been completely bled away.

ADDITIONAL OPERATIONAL COMMENTS

DO - Know your machine and its controls before operating the log loader. Learn to feather the controls for smooth operation. Smooth operation will lengthen the service life of all machine parts.

DO - Learn to use two or more functions simultaneously, such as lower stick boom and open grapple for minimum cycle times. Most loaders have multiple pumps which make dual functions possible.

Do - Utilize your equipment to its full capacity. Hydraulic pressure reliefs, and machine stability, tell you when you reach the machines limits. REMEMBER, you may be able to lift the load IN CLOSE at ground level, but as the load radius and elevation changes, the lifting capacity of the loader may decrease. Observe instruments and gauges frequently.

DO - Use EXTREME CARE in actuating a cylinder when oil is cold. A sudden application in a cold system can add 1000 PSI to the normal setting of a relief valve and might cause damage to hoses, fittings, etc.

DO NOT - overload the log loader. Overloading is dangerous to the operator and damaging to the equipment. Do not secure the machine to gain additional capacity.

DO NOT - Use the grapple rotation control to stop the rotation of large logs or loads. This circuit is protected by crossover reliefs which do allow stopping the rotation of the empty grapple, but continuous use of this feature for large loads can cause rotation motor failures.

DO NOT - Swing hoist or brake unnecessarily fast. All can cause accidents.

SPECIFICATIONS

GENERAL SPECIFICATIONS

COMPONENT			SPECIFICATION
Equipment weight (without grapple)			26.73 metric tons (29.46 tons)
Engine	Model		DB58TI
	Style		Water cooled - 6 cylinders
	Rated output		147 ps @ 2,000 rpm (145 hp @ 2,000 rpm)
	Maximum torque		56 kg•m @ 1,600 rpm (405.05 lbf•ft @ 1,600 rpm)
	Fuel tank capacity		310 liters (81.84 U.S. gal.)
Hydraulic pump	Style		Axial piston
	Discharging pressure		350 kg/sq cm (4,978.17 psi)
	Maximum discharge quantity		2 x 212 liters/minutes (2 x 56 U.S. GPM)
	Hydraulic oil tank capacity		160 liters (42.24 U.S. gal.)
Performance	Swing speed		12.9 RPM
	Travel speed	High speed	3.4 mph (5.4 km/h) 5.5 km/h (3.44 mph)
		Low speed	2.2 mph (3.6 km/h) 3.5 km/h (2.19 mph)
	Traction force	High speed	12.7 metric tons (14.00 tons)
		Low speed	20.5 metric tons (22.60 tons)
	Gradeability		35° (70% slope)
	Ground pressure		0.57 kg/sq cm (8.11 psi)
Ground clearance			690 mm (27.17 in.)
Lever operation style			Hydraulic joystick
Upper roller			2 per track
Bottom roller			9 per track

GENERAL MAINTENANCE PROCEDURES

⚠ CAUTION!

Follow all safety recommendations and safe shop practices outlined in the front of this manual or those contained within this section.

Always use tools and equipment that is in good working order.

Use lifting and hoisting equipment capable of safely handling load.

Remember, that ultimately safety is your own personal responsibility.

MODEL	SERIAL NUMBER RANGE
ALL MODELS	ALL RANGES

September 1998

Fatigue Spalling

Flaking of surface metal resulting from fatigue.

Replace bearing - clean all related parts.

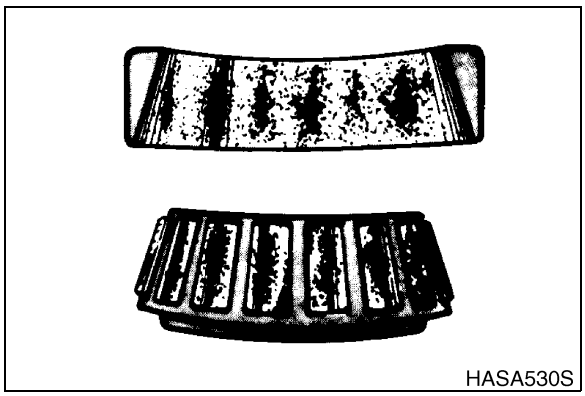


Figure 10

Brinelling

Surface indentations in raceway caused by rollers either under impact loading or vibration while the bearing is not rotating.

Replace bearing if rough or noisy.

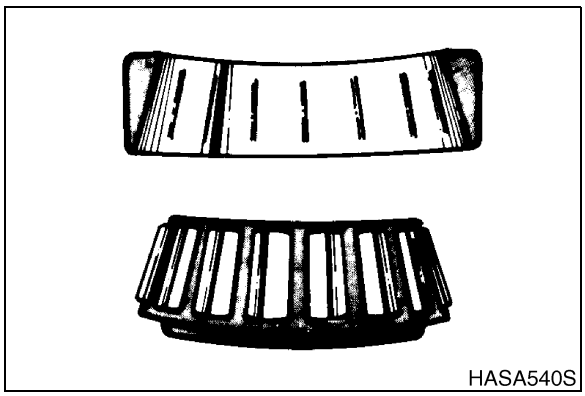


Figure 11

Cage Wear

Wear around outside diameter of cage and roller pockets caused by abrasive material and inefficient lubrication

Replace bearings - check seals.

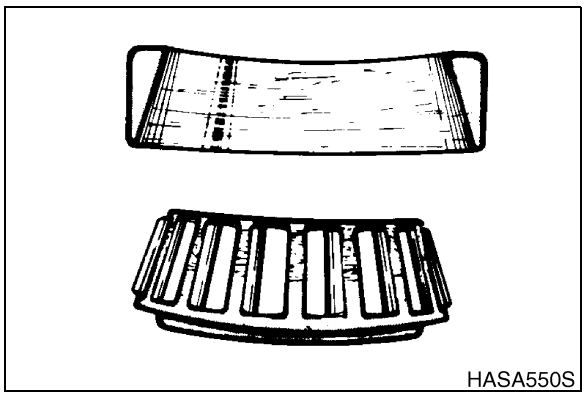


Figure 12

Abrasive Roller Wear

Pattern on races and rollers caused by fine abrasives.

Clean all parts and housings, check seals and bearings and replace if leaking, rough or noisy

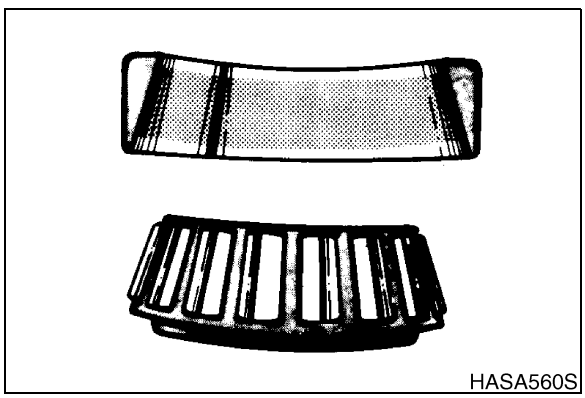


Figure 13

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 lbf in (0.1 kg m)			
	RADIATOR, AIR CLEANER, BOOTS, ETC.		HYDRAULICSYSTEM	
	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 & 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

REMOVAL

CAUTION!

Avoid disassembling cab if there are strong wind gusts, which could catch large surface area of cab shell and push it sideways during lift.

1. Park on firm and level ground.
2. Lower bucket to ground.
3. Shut engine down and remove key from starter switch.

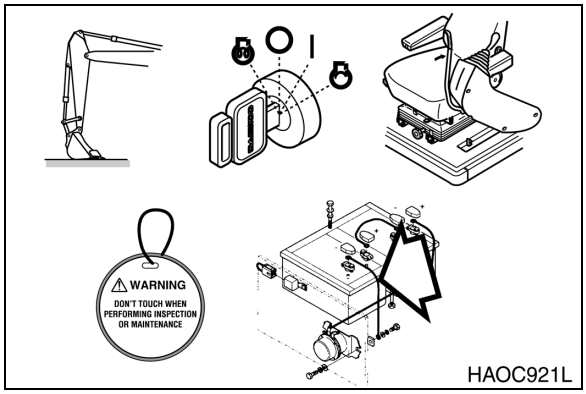


Figure 1

WARNING!

If engine must be run while performing maintenance, use extreme care. Always have one person in the cab at all times. Never leave the cab with the engine running.

4. Set safety lever on "LOCK" position.
5. Hang maintenance warning tag on controls.
6. Disconnect negative (-) battery cable leading to frame from battery.
7. Prepare cab shell for removal by disconnecting wiring connectors for:
   - A. Cab interior lighting.
   - B. External light wiring.
   - C. Radio antenna and connections.
   - D. Wiper/washer connections.

   NOTE: *Control console wiring harnesses and hydraulic piping lines that pass through the floor of the cab do not need to be disassembled.*

   NOTE: *If unit is equipped with a cab protective structure (for forestry, or hazardous working conditions), it must be removed.*

GENERAL

Before any attempt is made to begin removal or installation of the counterweight, the excavator must be parked on a firm and level supporting surface, with no sloping surfaces or soft or muddy ground in the area where the assist lift crane will be working. Position all accessories in the overnight storage position.

⚠ WARNING!

The weight of counterweight is given in the following table. Use only rated and approved slings and hardware when removal or installation lifts are being made. Lifting slings, shackles and all other hardware must be rigged safely. An assist crane that is rated above weight capacity is required.

MODEL	WEIGHT OF COUNTERWEIGHT
Solar 130LC-V	2,100 kg (4,630 lbs.
Solar 220LC-V	4,000 kg (8,818 lbs.)
Solar 220LL	5,300 kg (11,685 lbs.)
Solar 290LC-V	4,500 kg (9,920 lbs.)
Solar 290LL	6,300 kg (13,890 lbs.)
Solar 330LC-V	6,500 kg (14,330 lbs.)
Solar 400LC-V	8,200 kg (18,078 lbs.)

Responsibility should be assigned to one person to be in charge of the lifting crew, and to verify that required safe lifting precautions have been taken before each part of the procedure has been started.

All members of the working crew should know and understand the signals that will be used between the lifting leader, the assist crane operator and the remainder of the work crew.

⚠ WARNING!

If the turntable deck has been unbalanced by removal of weight from one end only, traveling the excavator, swinging the turntable, movement over bumps or sloping and uneven surfaces could cause loss of control and possible accidents or injuries.

Reference Number	Description
1	Fuel Tank
2	Filter
3	O-ring
4	Cover
5	Bolt
6	Spring Washer
7	Cock
8	Bolt
9	Shim
10	Shim
11	Fuel Filter
12	Cap
13	Plug
14	Level Gauge

Reference Number	Description
14a	Plate
14b	O-ring
14c	Bolt
14d	Plug
14e	Tape
18	Cover Flange
19	O-ring
20	Socket Bolt
23	Hard Washer
24	Bolt
25	Vinyl Hose
26	Hose Clamp
28	Hose Clamp

SPECIFICATIONS

Model	Fuel Tank Capacity
290LL	435 liters (115 gal)
220LL	310 liters (81.9 gal)

SWING BEARING MAINTENANCE

OPERATING RECOMMENDATION

The service life of the swing bearing may be extended if a conscious, daily effort is made to equalize usage over both ends of the excavator. If the excavator is used in the same operating configuration day in and day out (for example, with the travel motors always under the counterweight, or with the attachment over one side of the machine more than the other), the bearing's service life could be reduced. Taking a few minutes in the middle of each work shift to reposition the excavator, to work the opposite end of the bearing, will provide a payoff in terms of more even, gradual rate of wear and extended service life.

MEASURING SWING BEARING AXIAL PLAY

Periodic, regular checks of bearing displacement should be made at least twice a year. Use a dial indicator. Push the attachment against the ground to lift the excavator off the ground and take measurements at 4 points, 90° apart, around the circumference of the bearing (Figure 1).

Record and keep all measurements. Play in the bearing should increase minimally from one inspection to the next. Eventually, however, as the bearing begins to approach the limit of its service life, clearance increases become much more pronounced and the actual measured play in the bearing could exceed twice the value that was measured when the machine was new.

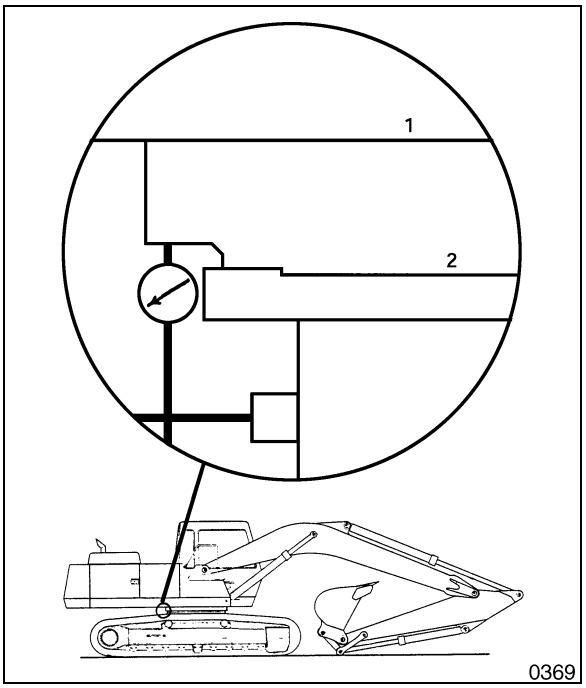


Figure 1

MEASURING BEARING LATERAL PLAY

At the same time that vertical checks are made, the side-to-side play in the bearing can be checked by fully retracting the arm and bucket cylinders and extending the tip of the bucket as far forward as it will go. With the excavator parked on a flat, level surface and the bucket tip just off the ground, push against the bucket sideways to take up all of the lateral clearance in the bearing. (Less than 100 lb of force should be required to move the bucket over all the way.) Check lateral play in both directions and record the values. When the bearing is beginning to approach the end of its service life, measured lateral clearance should start to show larger and larger increases.

TROUBLESHOOTING, TESTING AND ADJUSTMENT

Symptoms	Possible Causes	Remedies
1. No rotation and –		
a. Pressure at swing motor inlet *increases*	Swing brake not releasing	Check brake engagement and disengagement, check release pressure
	Internal damage to gearbox drive train	Replace broken gears, drive train assemblies
	Overload	Reduce load weight
b. Pressure at swing motor inlet shows *no increase,* **and** the swing motor is making irregular noises	Swing motor drive shaft damage	Replace swing motor
	Internal damage to gearbox drive train	Repair/replace broken or faulty assemblies
c. Pressure at swing motor inlet shows *no increase,* but **without** irregular *noises* from the swing motor	Hydraulic pump or valve broken	Troubleshoot hydraulic system
2. Oil leakage		
a. From drive shaft	Oil seal damaged	Replace oil seal
b. From bolted connections or other assembled surfaces	Assembly compound (joint sealer) old and not sealing, bolt not tight or flange warped	Disassemble and check mating surfaces. Reapply Loctite, torque bolts to specifications
3. Excess heat		
Gearbox casing becomes excessively hot, with or without irregular noise(s) during operation	Low oil level	Replace oil, refill to specified level
	Bearings or gear worn but not completely inoperative	Repair or replace gearbox

HAOE960L

10. Install the assembled drive shaft, with the bearings and other components in proper position, to the gearbox housing.

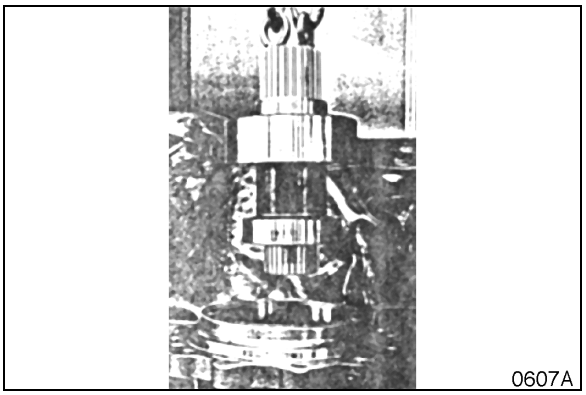


Figure 31

11. Attach the O-ring.

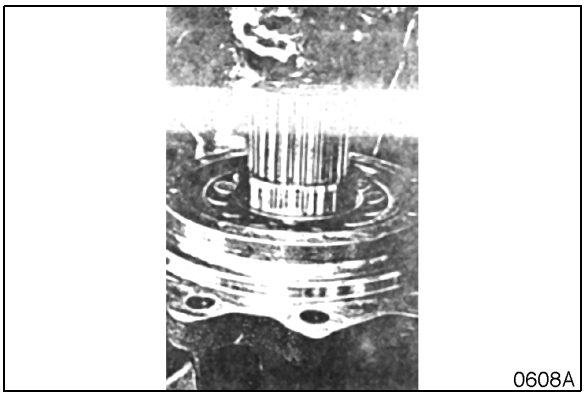


Figure 32

12. Install the oil seal in the front cover.

    NOTE: *The contact surface of the oil seal can be damaged if the oil seal is installed carelessly. Prelube the contact surface and make sure it is pressed in straight.*

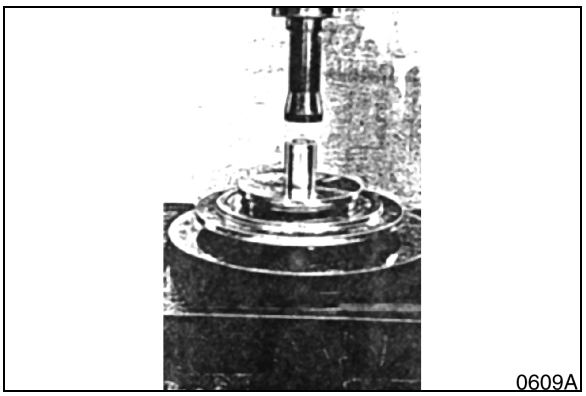


Figure 33

13. Install the front cover retaining bolts and tighten them in even rotation to the specified torque value.

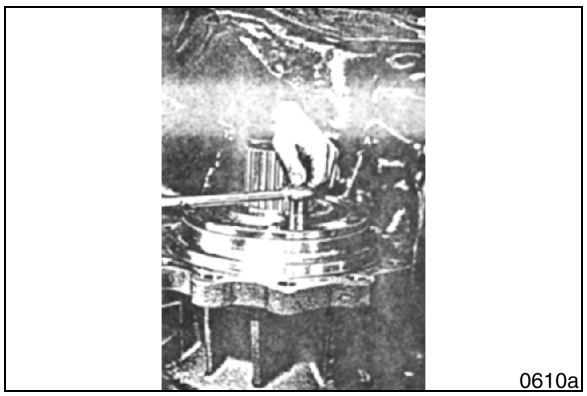


Figure 34

TRACK ASSEMBLY

⚠ CAUTION!

Follow all safety recommendations and safe shop practices outlined in the front of this manual or those contained within this section.

Always use tools and equipment that is in good working order.

Use lifting and hoisting equipment capable of safely handling load.

Remember, that ultimately safety is your own personal responsibility.

MODEL	SERIAL NUMBER RANGE
Solar 220LL	1001 and Up

March 1999

TRACK INSTALLATION

1. Lay rebuilt or new track into position under track frame. End of track should be positioned under front idler roller.
2. With upper structure at 90° to track frame. Use bucket and boom to raise track frame off blocking.
3. With blocking removed, lower track frame onto track. Make sure all rollers are properly positioned on track.
4. Move unit backwards while feeding track up over front idler roller. Continue to pull track back until it engages drive sprocket.
5. Align master links and install master pin.
6. Apply track tension. Refer to "Track Tension" in this section for procedure.

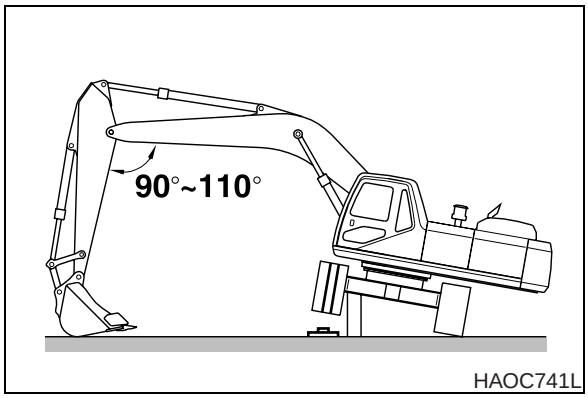


Figure 15

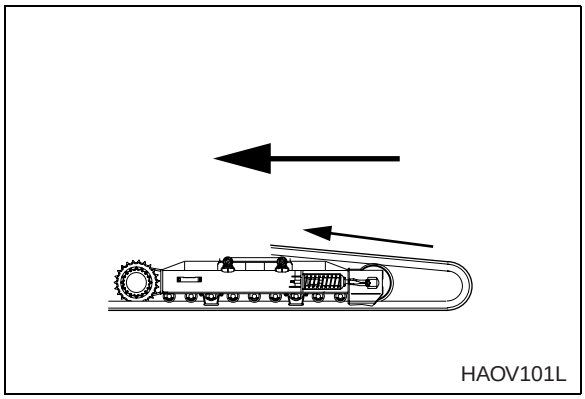


Figure 16

TRACK SPRING AND TRACK ADJUSTING CYLINDER

PARTS LIST

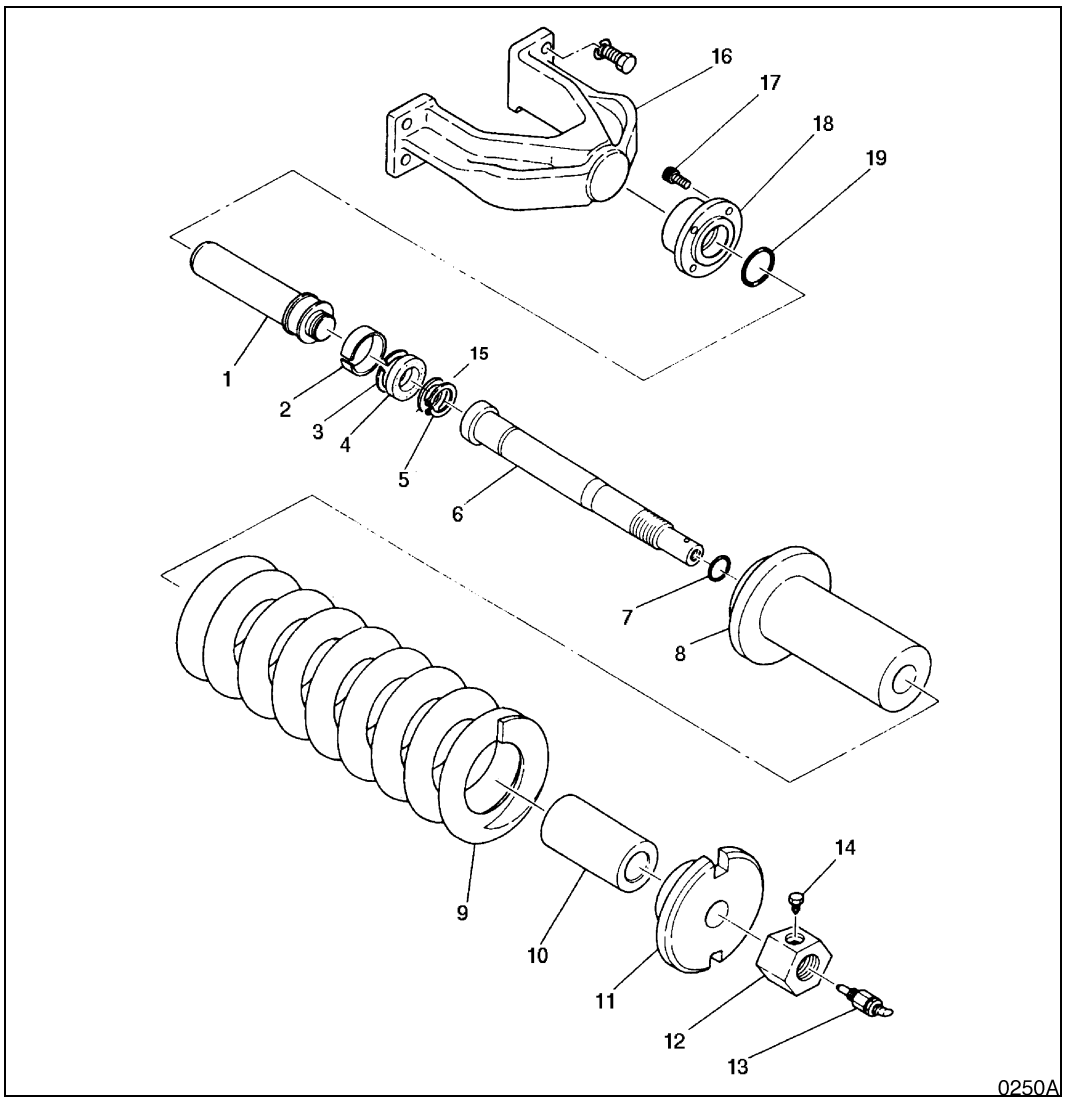
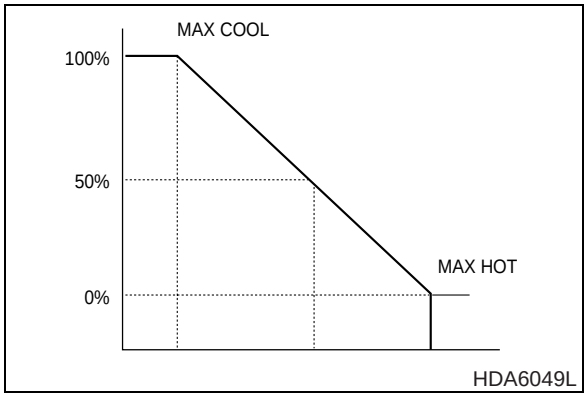
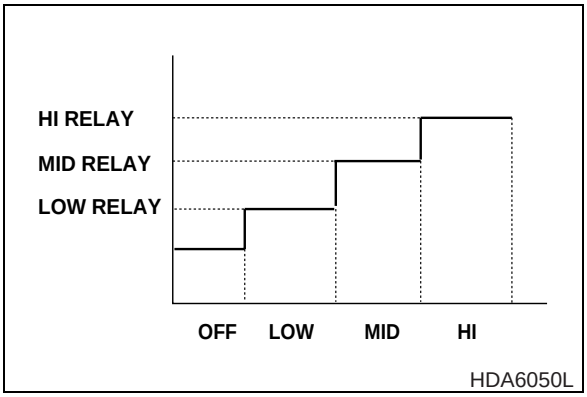
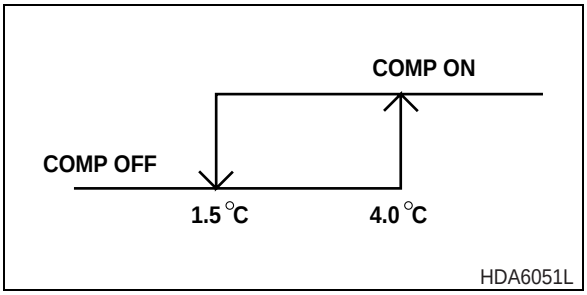


Figure 38

Reference Number	Description
1	Piston Rod
2	Piston Ring
3	Back-up Ring
4	Packing
5	Retaining Ring
6	Rod
7	O-ring
8	Cylinder
9	Spring
10	Spacer

Reference Number	Description
11	Flange
12	Nut
13	Valve
14	Bolt
15	Plate
16	Yoke
17	Socket Bolt
18	Flange
19	O-ring

CONTROL SPECIFICATIONS

Control Item	Control Switch	Control Specifications
Temperature Control	'COOL' Switch 'WARM' Switch	 **Figure 4** Temperature control switch consists of a 24 step variable selector. The display uses 7, Green / Red two-color LEDs to display the selected temperature.
Blower Fan Speed Control	'OFF' Switch 'LOW' Switch 'MID' Switch 'HI' Switch	 **Figure 5**
Compressor Control	Temperature Sensor	 **Figure 6**

REFRIGERANT SYSTEM REPAIRS

⚠ WARNING!

Always wear protective glasses and gloves when handling refrigerant. If refrigerant comes in contact with the skin or eyes, immediately flush with clean, running water and consult a physician.

Select a clean and well ventilated area to work.

The refrigerant container is under high pressure and should be stored below 40°C (104°F). Be careful not to drop the container from a high location

The contents are under high pressure and should not be used with compressed air or near an open flame.

REFRIGERANT SAFE HANDLING PROCEDURES

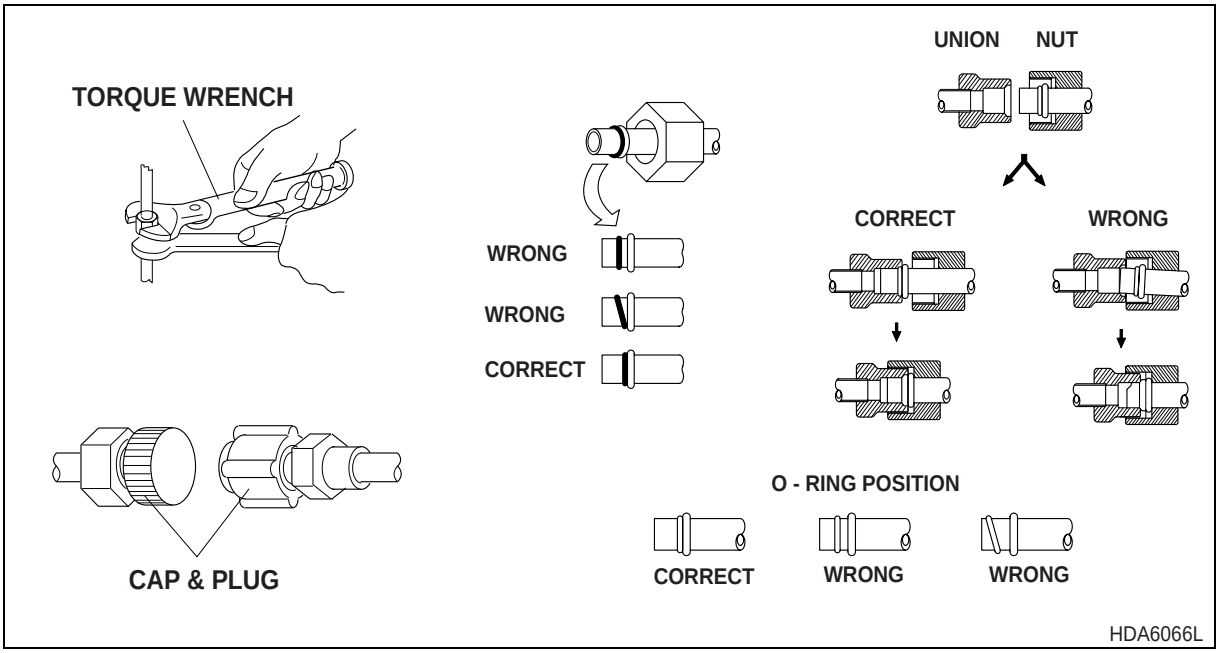


Figure 12

The following procedures should be observed for safe handling of refrigerant during vacuum and charging process.

1. Use an approved recovery / charging device which can safely perform vacuum and charge work simultaneously.
2. The new refrigerant has improved cooling characteristics than the old type and care should be used not to overcharge the system.
3. Do not over tighten connections when working on refrigerant system.
4. The new refrigerant system standards require new tools, equipment and parts. DO NOT attempt to use equipment use in servicing the old refrigerant system.

HYDRAULIC SYSTEM TROUBLESHOOTING, TESTING AND ADJUSTMENT

⚠ CAUTION!

Follow all safety recommendations and safe shop practices outlined in the front of this manual or those contained within this section.

Always use tools and equipment that is in good working order.

Use lifting and hoisting equipment capable of safely handling load.

Remember, that ultimately safety is your own personal responsibility.

MODEL	SERIAL NUMBER RANGE
Solar 220LC-V	0001 and Up
Solar 220LL	1001 and Up

March 1999

PROCEDURAL TROUBLESHOOTING BASELINE RECOMMENDATIONS

INITIAL CHECKS AND TESTS TO ESTABLISH OPERATING CONDITION OF THE EXCAVATOR

Triage Summary

An excavator that fails to deliver designed performance should be checked for the following:

- Hydraulic flow, first, and
- Hydraulic pressure, afterwards, in a specified order of priority through different points of the system.

To verify adequate available hydraulic flow, before any other tests are performed through the circuit:

Check engine operation –

- at 2,150 RPM with no load in power mode III.
- at 2,000 RPM stall load in power mode III.

If engine RPM drops excessively with a load or fails to surpass rated speed (1,900 RPM), performance problems may be due to inadequate hydraulic flow caused by lagging rotational speed.

NOTE: *Verify actual flow on the excavator against rated performance, with a flow meter.*

If engine tests meet specifications and adequate torque and horsepower are available at the pump drive flex coupling, pull out the electrical tray under the operator's seat to inspect the self-diagnostic display.

If the EPOS trouble code display is clear, check hydraulic functions in the following sequence:

- Pilot pressure
- Negacon, negative control pressure
- Main relief pressure (front and rear pump)
- Swing pressure
- Port relief pressure (individual control functions; crowd, bucket, boom, travel)
- Power boost circuit
- Standard performance tests; cylinder speed, hydraulic motor (travel and swing) speed, cylinder oil-tightness "permissible drift" test

NOTE: *System specification performance tests of individual activator function are determined by flow rate through the component or circuit, not the control pressure or system pressure available to the actuator. Poor flow through the individual circuit may indicate that the component is worn beyond tolerance limits, while all other hydraulic functions are adequate.*

IMPORTANT
It is suggested that the troubleshooter maintain the testing sequence of the preceding list. Checks and adjustments nearer the middle or the end of the list may depend on adequate functioning of systems tested nearer the top of the list.

- Drain some tank oil to a clean, clear container. Look for metal shavings/grit, cloudiness/water or foam/air bubbles in the oil.
- Check for wobble through the engine/pump flex coupling. Run engine with the pump input hydraulic power control nut turned to the lowest power to check the engine.
- Investigate unusual operating noises or vibration. Check for loose bolts, connections.

SWING RELIEF VALVE CHECKING AND ADJUSTMENT

Make a check of operating pressures through the swing relief valve if:

- The swing motor fails to turn.
- Swings in one direction only.
- Swings but continues to coast.
- There is drifting on a slope.

1. Check operation by connecting:

   A. Two 600 bar (8,700 psi) pressure gauges to the inlet and outlet measuring ports on top of the swing motor.

      Pressure should be between 280 and 290 bar (4,060 psi and 4,205 psi), with both swing locks engaged. With swing locks released, during full acceleration and deceleration, pressure should approach 250 bar (3,625 psi) in each direction.

   B. Connect a 60 bar (870 psi) pressure gauge at the “SH” port of the hydraulic brake.

      Pressure should always stay at or above 4 bar (58 psi) when operating swing, boom or arm.

   C. Connect a 10 bar (145 psi) gauge at the motor makeup valve.

      Pressure should stay consistently above 2.5 bar (36 psi). If pressure falls below the recommended minimum level, forceful acceleration of the swing motor could lead to cavitation of the circuit and stalling, slowed rotation, noise and possible damage.

2. If main inlet and outlet pressures were off in the preceding tests in Step 1, adjust swing relief valve pressure.

   Following adjustment, repeat the operating pressure tests (with gauges connected to the inlet and outlet test ports on top of the swing motor) and check pressures with the swing locks engaged and released.

   If pressure adjustment fails to restore adequate performance, proceed to the Troubleshooting – Swing table.

3. If pressure tests were at recommended levels through the main inlet and outlet ports, and through the “SH” port of the swing brake, the causes of poor swing performance could include a faulty swing motor, drive train overloading or gearbox defect, or a problem in the brake assembly or swing control valve. Proceed to the troubleshooting information in the next procedure.

   If pressure through the “SH” port was tested below the minimum 4 bar (58 psi) level, check the shuttle valve in the rear compartment behind cabin. When pressure through the port is at the recommended level, the brake release valve should disengage the swing brake, allowing the swing motor to rotate the excavator. If pressure adjustment to the valve has been restored but the brake still fails to release, the brake piston or friction plate may be frozen, requiring disassembly of the motor and parts repair/ replacement.

4. If pressure tested at the motor makeup valve falls below recommended minimum level, and consequent problems with cavitation, stalling and surging are observed, check the restriction valve. If

GENERAL DESCRIPTION

The accumulator is a gas-charged storage device designed to hold a reserve quantity of hydraulic fluid under pressure. Accumulators are used in hydraulic circuits in much the same way that condensers (or capacitors) are used to collect, store and maintain electrical charge in a circuit.

In a hydraulic circuit, minor variations or lags in pump output that might otherwise cause unsteady or irregular operation are made up from the supply of pressurized oil in the accumulator.

Reference Number	Description
1	Screw Plug
2	Sealing Ring
3	Diaphragm
4	Fluid Valve
5	Steel Pressure Vessel

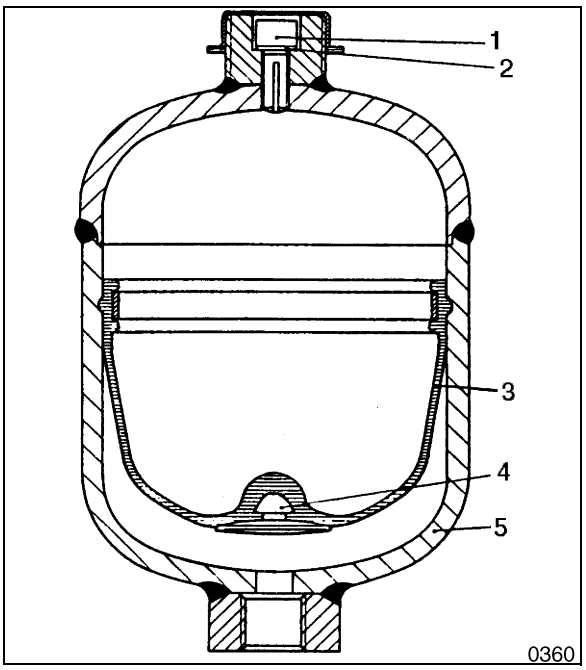


Figure 1

Accumulators are solidly constructed to resist the high operating pressures of the fluids they contain. There are only three main moving parts: a valve assembly at the top allows adding or expelling gas from the compressible, pre-charged upper chamber; a valve assembly at the bottom of the accumulator for passing hydraulic fluid in and out, and an elastic diaphragm to separate the two chambers. The flexible diaphragm changes shape to conform to the changing pressures and volumes of the two fluids in the upper and lower chambers.

There are six possible positions the diaphragm can be in and they are as follows:

1. With no gas charge in the upper chamber 0 bar (0 psi, empty) and no oil in the bottom 0 bar (0 psi, dry) the elastic diaphragm hangs loosely.
2. When the pre-pressure charge of gas (usually nitrogen) is introduced through the valve at the top of the accumulator, the diaphragm expands to maximum size. The valve button in the center of the diaphragm pushes into the fluid opening in the bottom chamber, sealing off the lower valve. If the pressure of the gas charge exceeds system oil pressure, no fluid enters the accumulator. The button also keeps the diaphragm from protruding into the lower valve opening.

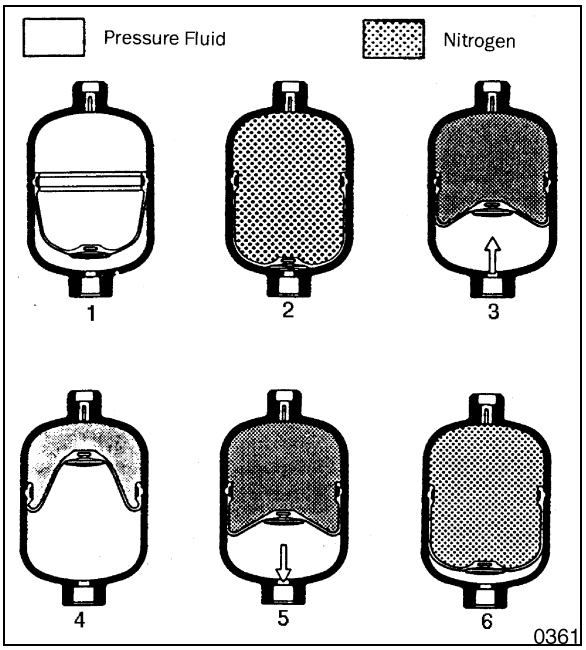


Figure 2

DISASSEMBLY

Refer to the assembly drawing of the swivel joint for component references (Figure 1).

IMPORTANT
Do not unbolt the center joint from the lower car body until an adequate number of piping block-off plates are available, for disconnected piping lines. Be sure that system pressure has been vented – including the hydraulic accumulator and tank reserve pressure – before disassembly is started.

1. Clean off the exterior of the swivel joint after it has been removed.
2. Scribe or otherwise mark a line across the cover and the body of the center joint, to allow reassembly in the same configuration.
3. Unbolt the four 12 mm fasteners holding the cover. Use a vise or v-block to hold the assembly in place.
4. Remove the cover, withdraw the O-ring and unbolt the fasteners holding the thrust plate, taking care to support the stem (inner) assembly, so that it will not separate and fall out when bolts are disconnected.
5. If the stem assembly doesn't separate easily when the thrust plate and fastener bolts are removed, use a wooden block and hammer to drive it out of the housing.
6. O-rings and seals should be replaced whenever the assembly is being overhauled or rebuilt. For repair procedures or emergency tear down, use a thin but rounded-tip, smooth-edge scraper or spatula to remove O-rings or seals, to avoid causing damage to those that must be reused.

   NOTE: *The "backup ring" shown in the assembly drawing (above the swivel joint stem lower seals) should not be overlooked. It is tucked behind the top slip ring, doubled up inside the same groove in the body of the stem.*
7. Before reassembling the center swivel, visually inspect ball bearing surfaces for visible signs of wear, damage or discoloration and replace any worn component.

   Check clearance between the cover and thrust plate, and between the stem and thrust plate. Replace any component that shows more than 0.5 mm (0.020") of visible wear.

   Clearance between the stem and body of the center swivel must be tight. Replace or repair either component if there is more than 0.1 mm (0.0039") of measurable wear.

SPECIFICATIONS

Swing Motor	Specification
Type	Axial Piston
Displacement	121.60 cc/rev (18.85 cu. in./rev)
Crossover Relief Valve Setting	280 kg/cm^2
Maximum Supply Flow Rate @ 2000 rpm	227 l/min
Max. Motor Shaft Speed	1,867 rpm
Rated Motor Shaft Torque	54.20 kg/m (392.03 ft lbs)
Weight	56.5 kg (124.56 lbs.)

Service Standards for Replacing Worn Parts

NOTE: *When parts exceed the standard, replace them. When there is conspicuous surface damage, it is always safer to replace parts, whether standards are exceeded or not.*

Item	Standard Value mm (In)	Replacement Limit mm (In)	Remedy
Clearance between cylinder bore and piston (D-d)	0.028 mm (0.0011 in.)	0.058 mm (0.0023 in.)	Replace piston or cylinder
Clearance between piston and shoe socket	0 mm (0 in.)	0.30 mm (0.0118 in.)	Replace piston, shoe assembly parts
Thickness of shoe (t)	5.5 mm (0.2166 in.)	5.30 mm (.2087 in.)	Replace piston, shoe assembly parts
Height of push plate, round bushing assembly (H-h)	6.5 mm (0.256 in.)	6.0 mm (.236 in.)	Replace set; spherical bushing and retainer
Thickness of friction plate	4.0 mm (0.157 in.)	3.6 mm (0.142 in.)	Replace

Inspect O-rings and oil seals very carefully for cuts, nicks, brittleness, softness or any other type of damage or distortion, prior to final reassembly if any must be reused.

GENERAL DESCRIPTION

THEORY OF OPERATION

Refer to the assembly cross-section at the end. Travel motor consists of the hydraulic motor and reduction gearbox.

Hydraulic motor consists of the rotary part, cross relief valve, negative brake, counter balance valve and tilting parts. The reduction gearbox consists of a 3-speed planetary gearbox. The next figure shows the motor as a symbol.

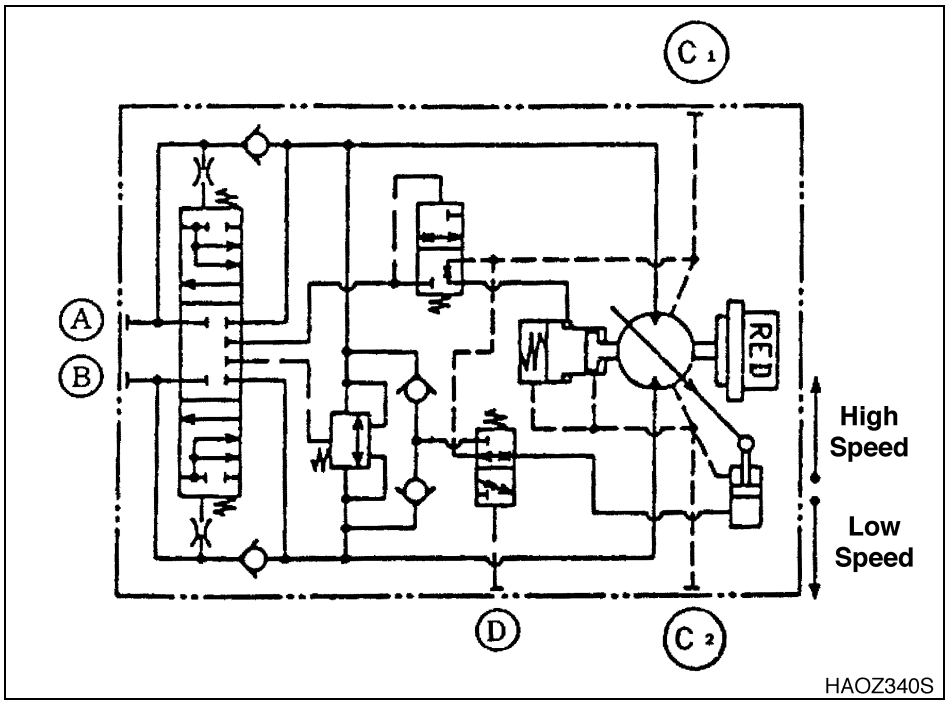


Figure 1

Reference Number	Description
	Travel Reduction Gear
	Hub
2	Spindle
3	Flange; Holder
	RV Gear Kit
4	RV Gear A
5	RV Gear B
6	Gear; Input
7	Gear; Spur
8	Cover
9	Crank; Shaft
12	Spacer
13	Distance Piece
15	Coupling
17	Pin
19	Bolt; Socket M24x70

Reference Number	Description
20	Ring; Snap
21	Bearing; A/Ball
22	Bearing; T/R
23	Bearing; Needle
25	Ring; Snap
27	O-ring 1BP8
29	O-ring 1AG230
30	O-ring 1AP335
31	Seal; Floating
33	Plug
34	Pin; Parallel
35	Bolt; Socket M12x32
36	Ball; Steel
37	Washer; Plain
42	Pin; Parallel
43	O-ring 1 Bp18

2. Remove springs (330) and valves (327) from two flanges (301).
3. Remove O-ring (337) from plug (326).

Figure 4

Two Speed Switching Valve Disassembly

1. Remove plug (357) from rear flange (301).

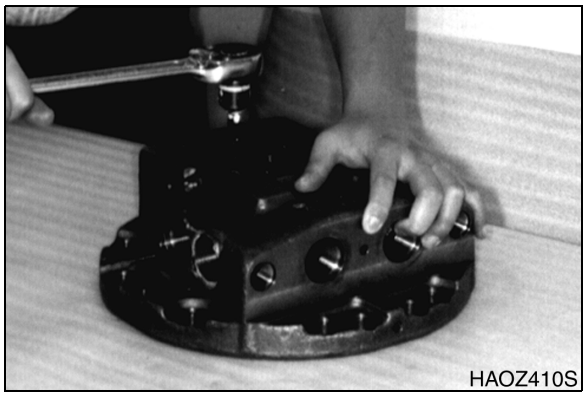


Figure 5

2. Remove spool (363) and spring (366) from rear flange (301)
3. Remove O-ring (355) from plug (357).

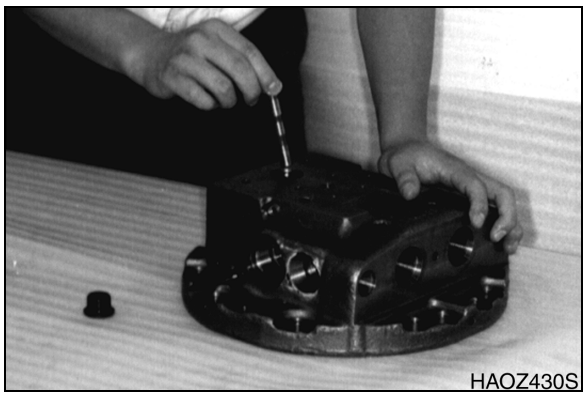


Figure 6

Disassembly of Internal Parts (SRV)

1. Remove two plugs (380).
2. Remove O-ring (359) from plug (380).

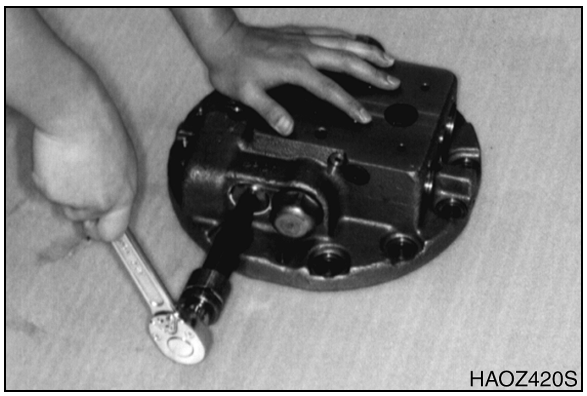


Figure 7

4. Putting screw driver on the outer edge of oil seal (A) in spindle (2), by tapping with hammer, remove oil seal. (132).

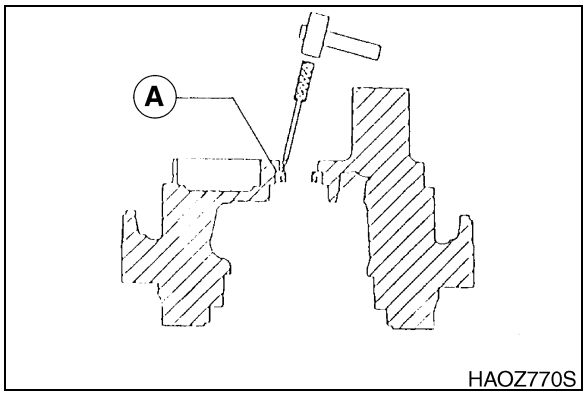


Figure 37

Bearing (149) Disassembly

1. Putting clamping metal fitting {II} (D)on the press work bench, and put shaft into it.
2. Remove deep ditch ball bearing (C, Figure 38) (149) with holding down the shaft tip (B) parts by a press (A).

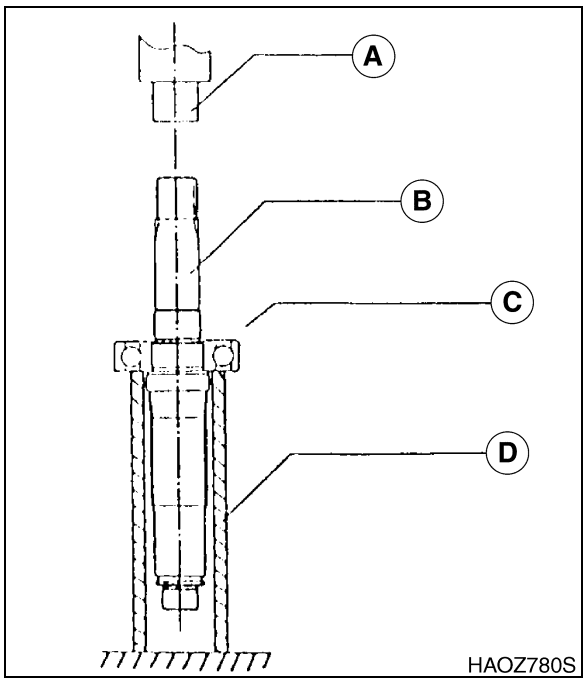


Figure 38

TRAVEL REDUCTION GEAR REASSEMBLY

Hub Reassembly

1. Place hub (1) on work bench.
2. Press in the outer race of ball bearing (A) (21) into hub (D) (1) by using jig (C) and hammer (B).

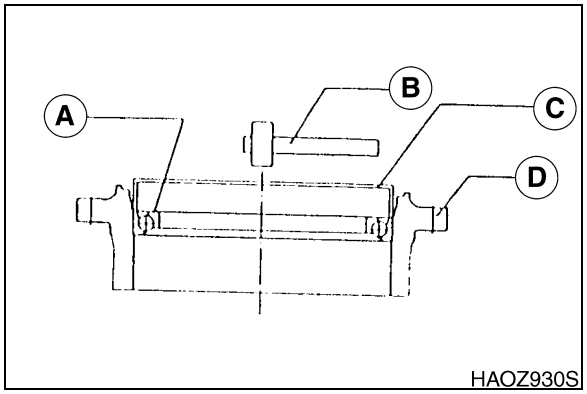


Figure 53

3. Assemble floating seal (B) (31) into hub (D) (1).

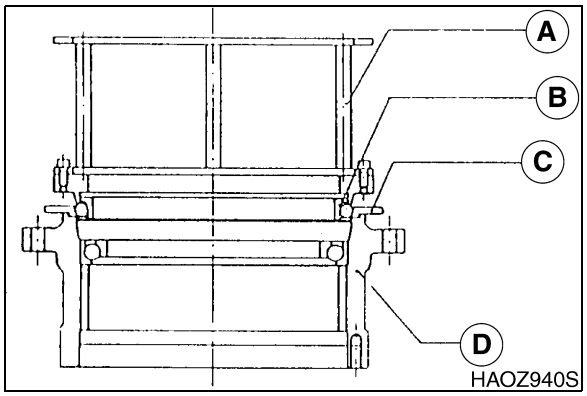


Figure 54

Spindle Reassembly

1. Assemble floating seal (B) (31) into spindle (D) (2)

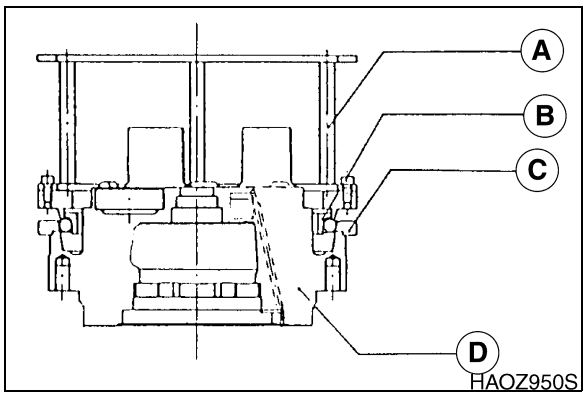


Figure 55

6. Fill reduction gear housing with hydraulic oil.
7. Install two O-rings (29 and 27), two parallel pins (42) into spindle (2).
8. Install rear flange (301) to spindle by aligning rear flange with aligning pins.

Figure 84

1. Install rear flange (301) to spindle (2). Tighten twelve bolts (343) to specified torque.
2. Install O-ring (355) to plug (357) and install in drain port.

   Tightening Torque 10 ±2 kg•m (72 ±14 ft lbs)

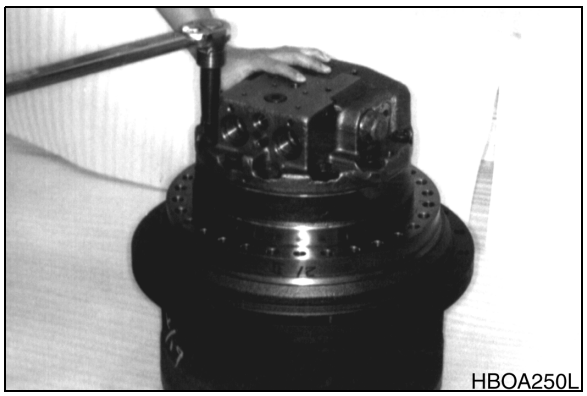


Figure 85

3. Install relief valve to rear flange (301).
4. Tighten to specified torque.

   Tightening Torque 25 ±5 kgf•m 25.0 kg•m (181 ±36 ft lbs)

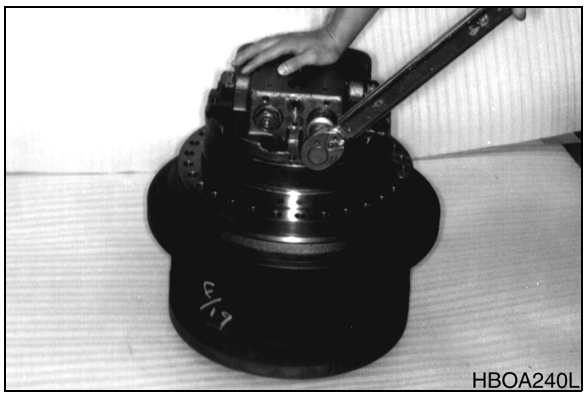


Figure 86

Reference Number	Description
1	Special Bolts
1A	Special Bolts
1B	Special Bolts
1C	Special Bolts
2	End Cover
3	Seal Ring-Commutator
4	Seal Ring (5)
5	Commutator
6	Commutator Ring
7	Manifold
8	Rotor Set
8A	Rotor
8B	Stator or Stator Half
8C	Vane (7)
8D	Stator Half
8E	Vane (7)
9	Wear Plate
10	Drive Link
11	Thrust Bearing
12	Coupling Shaft

Reference Number	Description
12A	Key
12B	Nut
12C	Washer
12D	Bolt
12E	Lock Washer
12F	Retaining Ring
13	Bearing/Bushing, Inner
14	Thrust Washer
15	Thrust Bearing
16	Seal
17	Backup Washer
18	Housing
18A	O-Ring (2)
19	Bearing/Bushing, Outer
20	Dirt & Water Seal
21	Plug 12)
22	0-Ring (2)
23	Spring
24	Valve (Shuttle or Relief)
25	Backup Washer

SPECIAL TOOLS AND MATERIALS

SPECIAL TOOLS

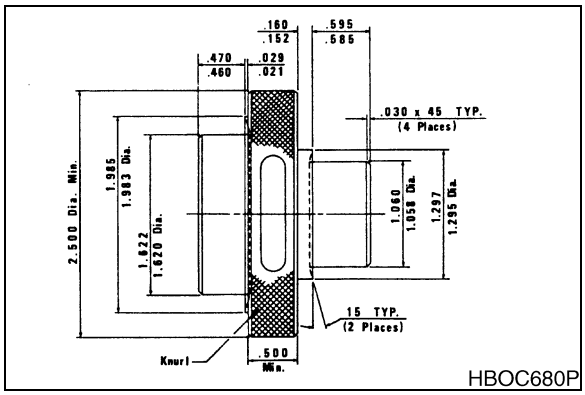


Figure 3 Fabricate if considered necessary
MG & MF

NOTE: *Series ME Torqmotors™ may have a rotor set with two stator halfs (8B & 8D) with a seal ring (4) between them and two sets of seven vanes (8C & 8E). Discard seal ring only if stator halfs become disassembled during the service procedures.*

NOTE: *A polished pattern on the wear plate from rotor rotation is normal.*

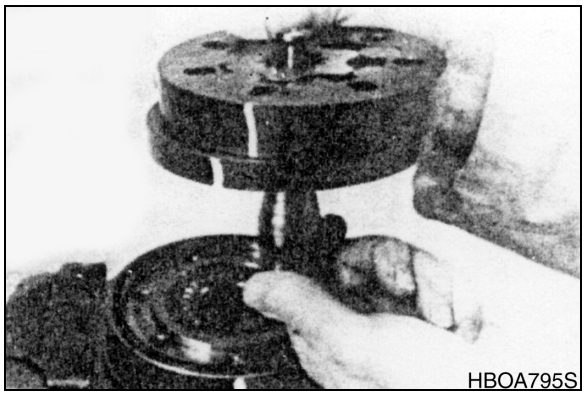


Figure 17

11. Place rotor set (8) and wear plate (9) on a flat surface and center rotor (8A) in stator (8B) such that two rotor lobes (180 degrees apart) and a roller vane (8C) center line are on the same stator center line. Check the rotor lobe to roller vane clearance with a feeler gage at this common center line. If there is more than.005 inches (0.13 mm) of clearance, replace rotor set. See Figure 18.

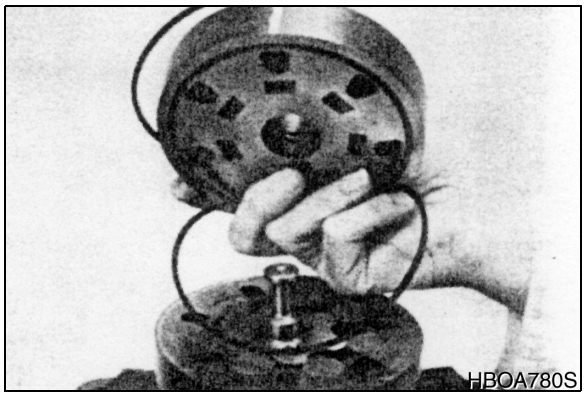


Figure 18

NOTE: *If rotor set (8) has two stator halfs (8B & 8D) and two sets of seven vanes (8C & 8E) as shown in the alternate construction ME rotor set assembly view, check the rotor lobe to roller vane clearance at both ends of rotor.*

12. Remove drive link (10) from coupling shaft (12) if it was not removed with rotor set and wear plate. Inspect drive link for cracks and worn or damaged splines. No perceptible lash (play) should be noted between mating spline parts. See Figure 19. Remove and discard seal ring (4) from housing (18).

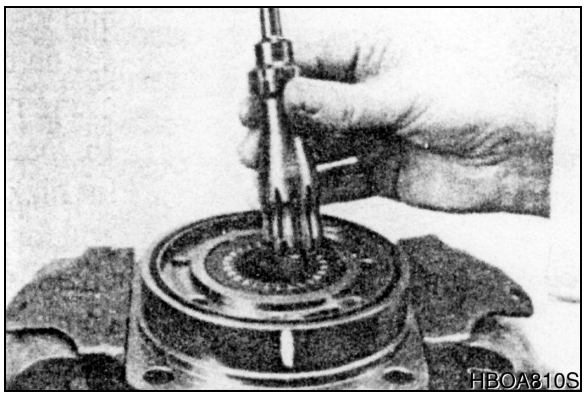


Figure 19

8. Be sure that a generous amount of clean corrosion resistant grease has been applied to the lower (outer) housing bearing/bushing (19). Install the coupling shaft (12) into housing (18), seating it against the thrust bearing (15) in MG and MF Series housings and against the second thrust washer (14) in MB and ME Series housings. See Figure 48.

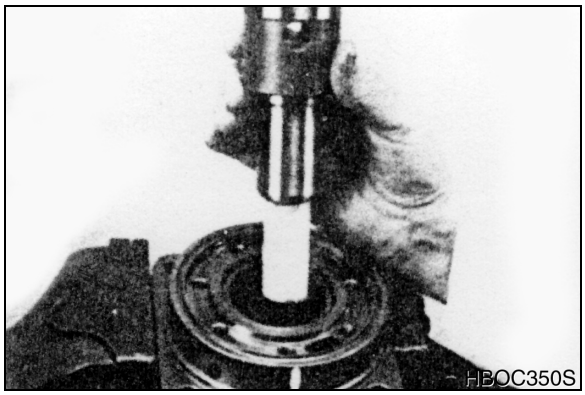


Figure 49

⚠ CAUTION!

The outer bearing (19) is not lubricated by the system's hydraulic fluid. Be sure it is thoroughly packed with the recommended grease, Ross Gear grease specification #045236, E/M Lubricant #K-70M.

NOTE: *Mobil Mobilith SHC (9 460 NOTE: A 102 Tube (P/N 406010) is included in each seal kit.*

NOTE: *The coupling shaft (12) will be flush or just below the housing wear plate surface on Small Frame, Series MG and MF Torqmotors™ when properly seated while the coupling shaft (12) on Large Frame, Series MB and ME Torqmotors™ will be approximately .10 inch (2.54 mm) below the housing wear plate surface to allow the assembly of thrust bearing (11). The coupling shaft must rotate smoothly on the thrust bearing package. See Figure 50.*

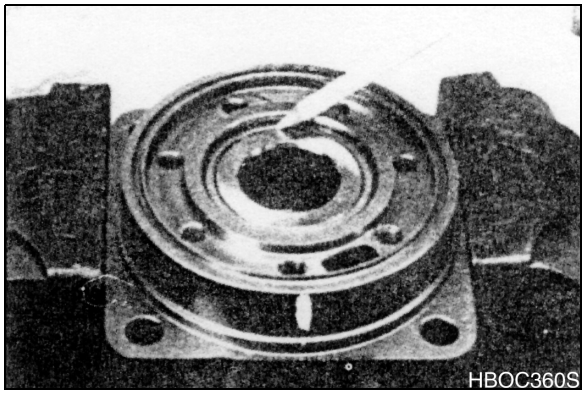


Figure 50

9. Install thrust bearing (11) onto the end of coupling shaft (12) only if you are servicing an MB or ME Series Torqmotor™. See Figure 51.

Figure 51

START-UP PROCEDURES

- Pressurize the Torqmotor™ with 100 p.s.i. dry air or nitrogen and submerge in solvent to check for external leaks.
- Check Torqmotor™ for rotation. Torque required to rotate coupling shaft should not be more than 50 ft. lbs. (68 N m)
- On MG & MF Series Torqmotors, pressure port with “A” cast under it on housing (18) is for clockwise coupling shaft rotation as viewed from the output end of coupling shaft. Pressure port with “B” cast under it is for counter clockwise coupling shaft rotation.
- On MB, ME, & MJ Series Torqmotors, pressure port with “B” cast under it on housing (18 is for clockwise coupling shaft rotation as viewed from the output end of coupling shaft. Pressure port with “A” case under it is for counter clockwise coupling shaft rotation.
- Use test stand if available, to check operation of the Torqmotor™.

HYDRAULIC FLUID

Keep the hydraulic system filled with one of the following:

- Hydraulic fluid as recommended by equipment manufacturer, but the viscosity should not drop below 50 SSU or contain less than.125% zinc anti-wear additives.

⚠ CAUTION!

Do not mix oil types. Any mixture, or an unapproved oil, could deteriorate the seals. Maintain the proper fluid level in the reservoir. When changing fluid, completely drain old oil from the system. It is suggested also that you flush the system with clean oil.

- Adjust fluid level in reservoir as necessary.
- Encourage all operators to report any malfunction or accident that may have damaged the hydraulic system or component.
- Do not attempt to weld any broken Torqmotor™ component. Replace the component with original equipment only.
- Do not cold straighten, hot straighten, or bend any Torqmotor™ part.
- Prevent dirt or other foreign matter from entering the hydraulic system. Clean the area around and the filler caps before checking oil level.
- Investigate and correct any external leak in the hydraulic system, no matter how minor the leak.
- Comply with manufacturer's specifications for cleaning or replacing the filter.

⚠ CAUTION!

Do not weld, braze, solder or any way alter any Torqmotor™ component.

PUMP OUTPUT DECREASE

When pilot pressure (Pi) increases, the pilot piston (643) shifts toward the right, stopping at that point at which pilot pressure and the force of the return spring (646) cancel each other out. Movement of the pilot piston pushes the pin (875) attached to the feedback lever assembly (613, 611, 897) around the “B-point plug” (614) and the pin (875) on the opposite side of the feedback lever assembly. The pin at the lower end of the feedback lever is attached to the tilting pin of the swash plate (531/538 in Figure 1).

NOTE: *In Figure 6, the circled capital letter “D” at the lower end of the feedback lever shows the approximate location where the assemblies shown in Figure 1, Figure 6 and Figure 8 react as the pin (897) at the top of the feedback lever moves and the piston shifts, maintaining dynamic balance through the valve between pilot pressure (Pi) and discharge output flow (Q) as shown in Figure 7.*

PUMP DISCHARGE DECREASE

The regulator feedback lever assembly is also pin-connected to the outermost spool (652) in the discharge port (Cl) of the regulator (Figure 8). As that spool moves toward the right, in response to differences in servo pressure, the servo piston moves to the right, resulting in a decreased swash plate tilt angle and reduced pump output flow. The system is balanced and control movement of the spool (and servo piston) stops when the outermost spool (652) and spool sleeve (651) close into each other, shutting off oil movement.

PUMP DISCHARGE INCREASE

When pilot pressure (Pi) decreases, the pilot piston shifts toward the left and the feedback lever assembly pivots around point “D” (Figure 6), pushing the spool and servo piston left. Swash plate tilt angle is heightened and pump output flow begins to increase as a result. Control movement of the spool and servo piston stops when the feedback lever assembly rotates around point “C” (Figure 6), moving the spool to the right until it slides into the sleeve (651) and oil movement is blocked.

HORSEPOWER CONTROL

Horsepower control function occurs as each regulator responds to changes in the output of the opposite pump. As increases or decreases in pump output occur (as outlined in the preceding paragraphs) at one pump, it is necessary for the output of the remaining pump to compensate to allow equalizing of the total discharge rate.

The relationship between changes in pressure and changes in output flow when the operation of both pumps (P1 and P2) is measured (Figure 9).

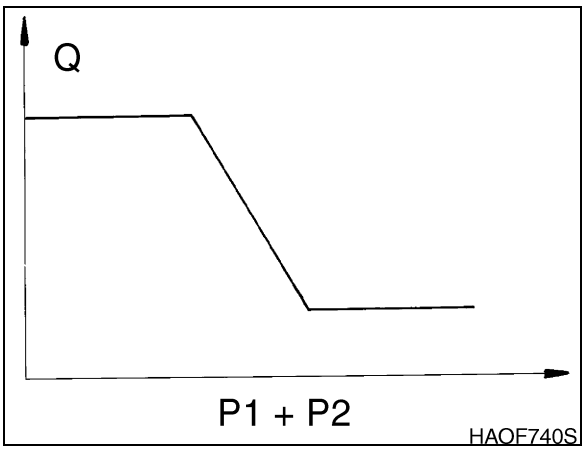


Figure 9

DISASSEMBLY

GENERAL DISASSEMBLY

This procedure assumes that the main pump assembly will be removed from the upper deck plate. Use the eye bolts in the center valve block assembly to move the valve block and the assembled pumps (still bolted together) to the prepared work area.

The area where the pumps are to be rebuilt should be well-lit, clean and protected from dust and/or wind gusts that could carry in dust or grit. Use a rubber mat or other protective overlay on the workbench area to prevent damaging or scratching any precision machined components.

IMPORTANT

Clean all of the exterior surfaces of the pump prior to disassembly. There should not be any visible dirt, grease or other type of accumulation on the outside of the pump case. Clean off or blow dry all traces of cleaner and solvent before starting work.

Open the drain plugs to drain oil from the pump cases prior to disassembly.

IMPORTANT

If at all possible, use a clean, dry container to catch gear oil. A clean container allows an evaluation to be made of the used oil. The presence or relative lack of metal wear shavings in the used oil or obvious deterioration or contamination of the oil can provide a useful indicator of the pumps' general condition.

NOTE: *Used oil is an environmental contaminant and should be disposed of promptly at approved recycling facilities. Prolonged physical contact with used oil has been thought by some to pose a health risk. Clean oil residue from hands and clothing promptly, and do not allow used oil containers to accumulate.*

NOTE: *Main Pump component parts (numbered in parentheses) are keyed to Figure 14.*

1. Loosen socket bolts (412, 413) to begin separation of regulator valves from two pumps.

   NOTE: *See "Pump Regulator Disassembly" on page -22 of this section for disassembly procedures*

2. Unbolt gear pump (rear pilot pump) at rear of main pump assembly.

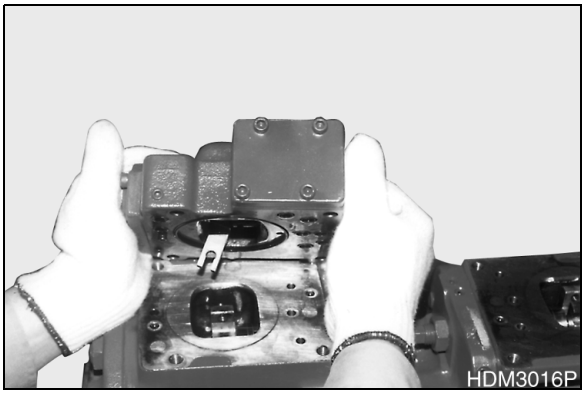


Figure 16

5. Attach feedback lever (611) to spool (652) using pin (874).

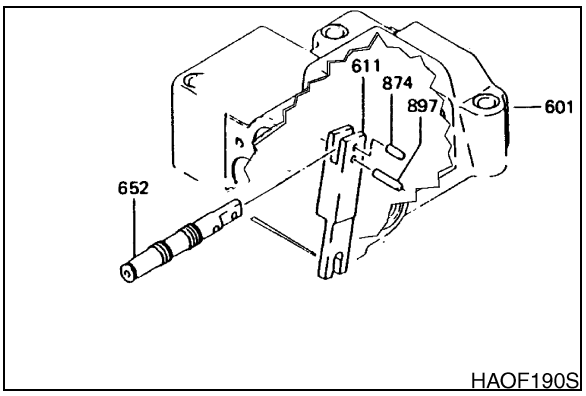


Figure 38

NOTE: *The notched portion of spool should face down when mated into feedback lever for correct pin alignment.(Figure 16)*

1, 2 - Feedback lever (611)

3 - Spool (652)

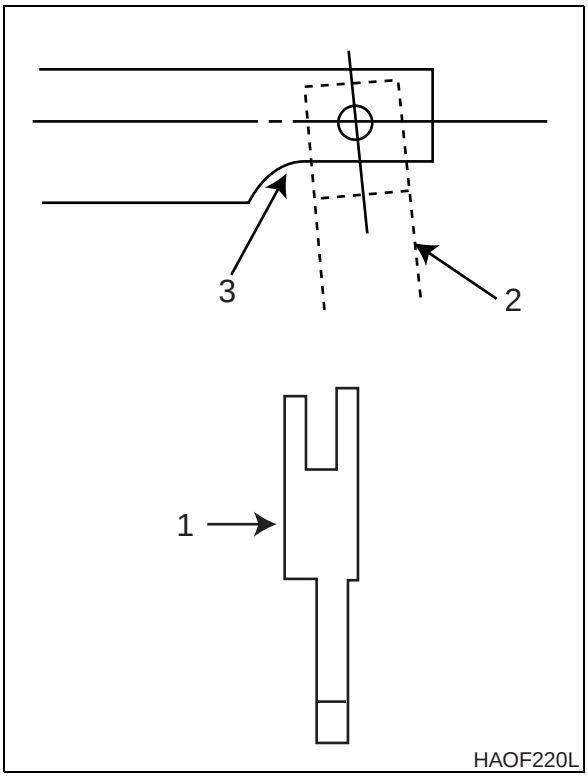


Figure 39

6. Insert pilot piston (643) into bore.

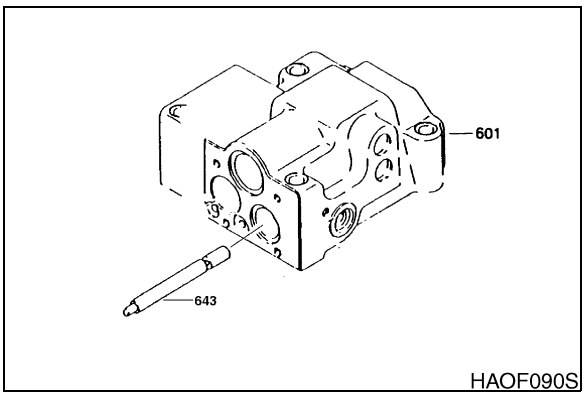


Figure 40

ARM PRIORITY CIRCUIT

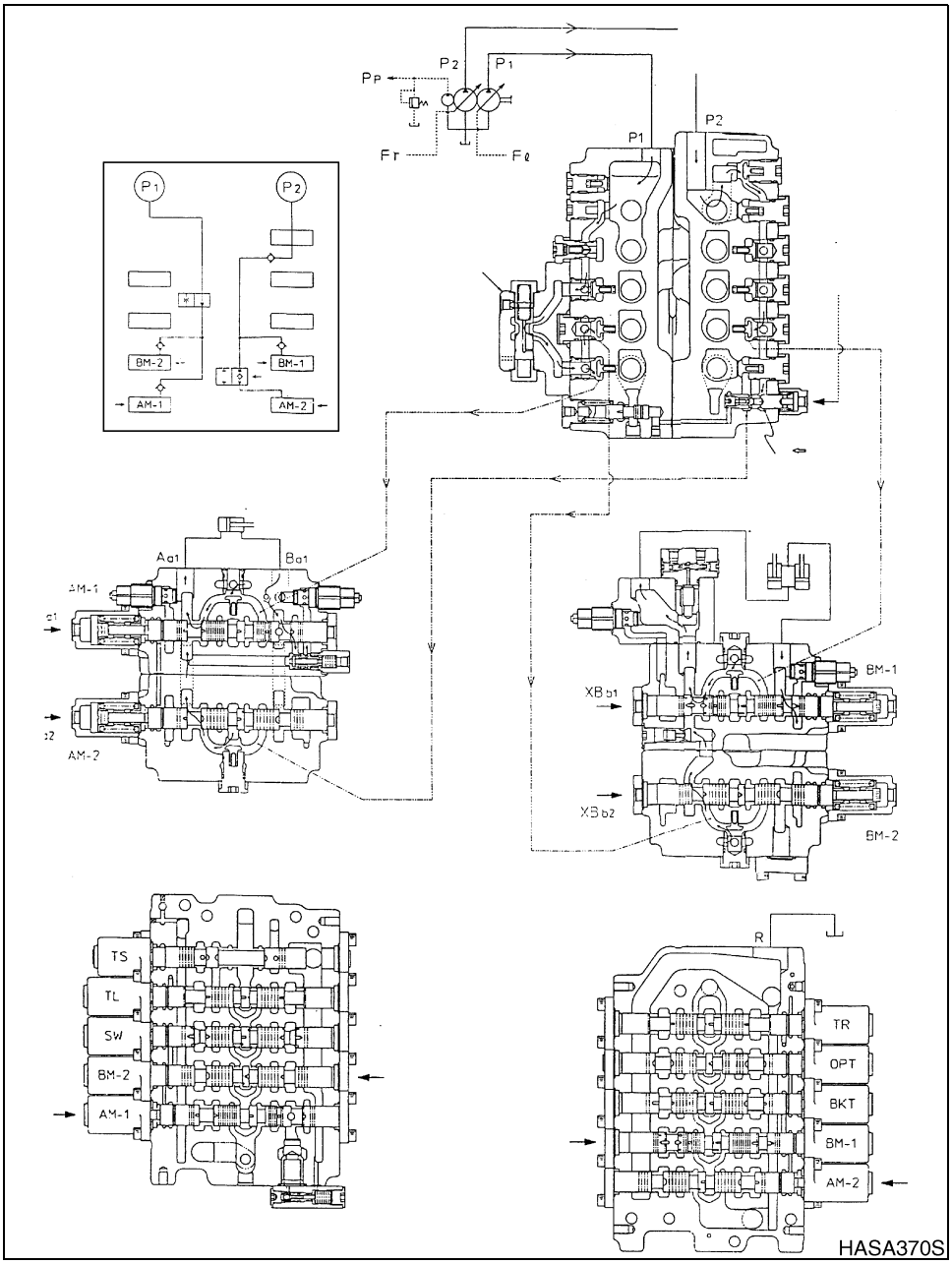


Figure 2

1. When PAP pilot pressure is ON, hydraulic oil from the P2 pump passes through the AP valve to the low (load) arm.
2. Hydraulic oil from the P2 pump does not trigger the AP valve. Oil, therefore, passes through a parallel passage supplying oil to the high (load) arm and to the boom.
3. When PAP pressure is OFF, hydraulic oil from pump P2 triggers the AP valve's spool AP and stops the flow of oil, so that oil is supplied only to the boom.

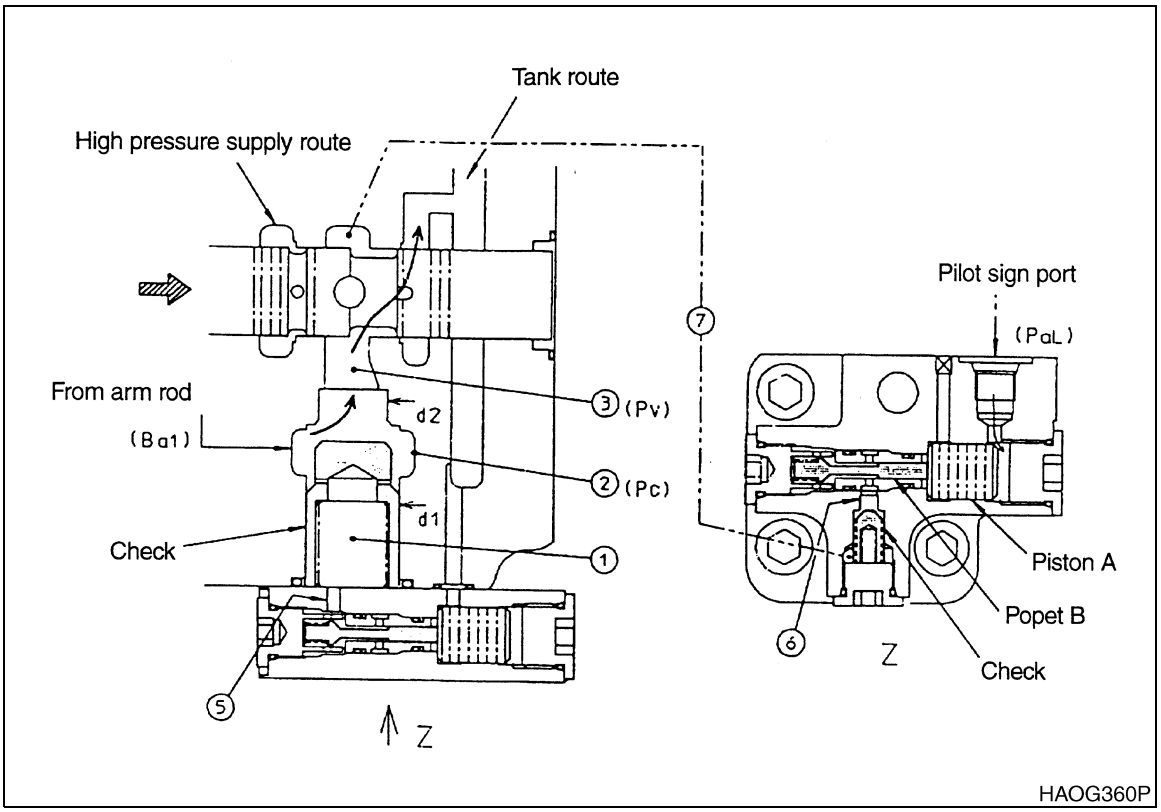


Figure 18

B. Arm Crowd (Pc > Pv) (PaL pilot signal: ON)

Pilot signal pressure enters signal port, piston A moves to the left and poppet B is opened and paths (5) & (6) are connected. The oil from chamber (1) flows back to the tank through path (7). The oil pressure in chamber (1) is released allowing the poppet to open, and oil from the rod side flows to the tank.

Bucket Unity Check

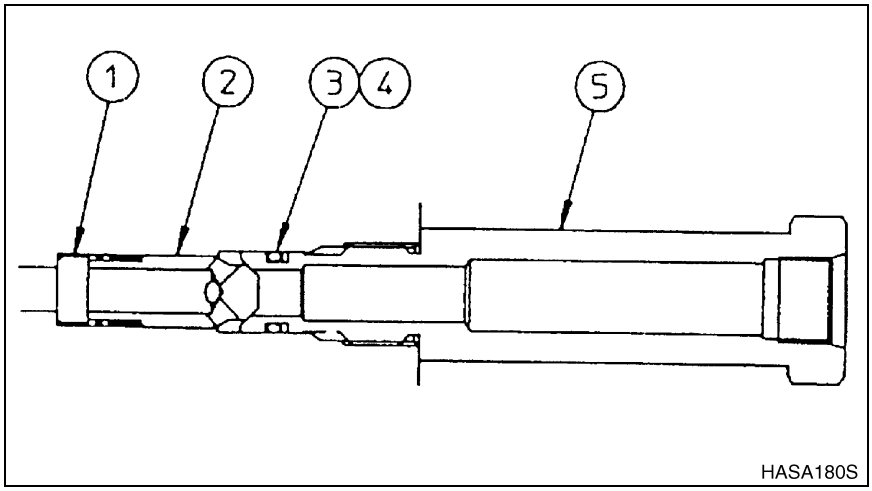


Figure 31

Reference Number	Description
1	Cut
2	Back-up Spring
3	O-ring

Reference Number	Description
4	Tape
5	Spring

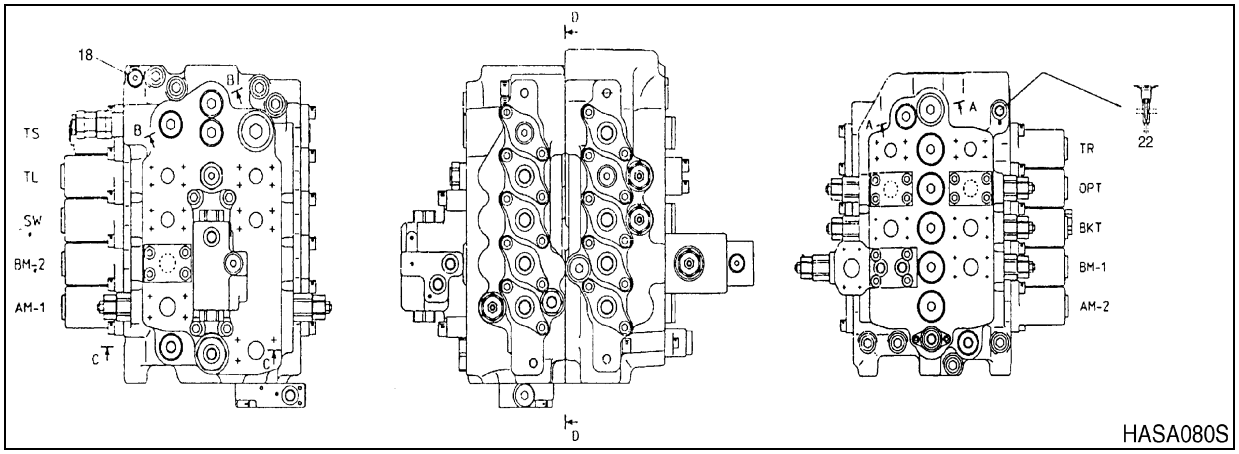


Figure 57

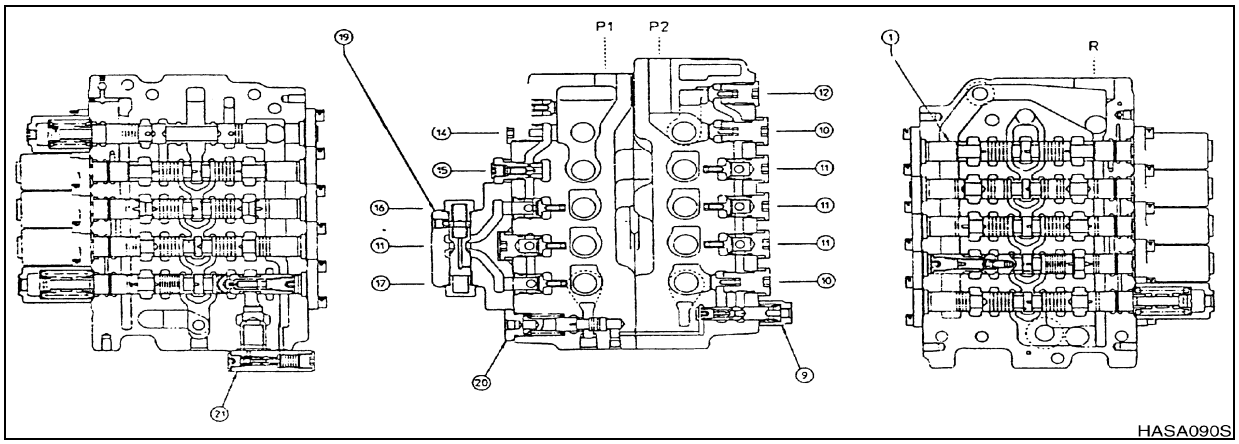


Figure 58

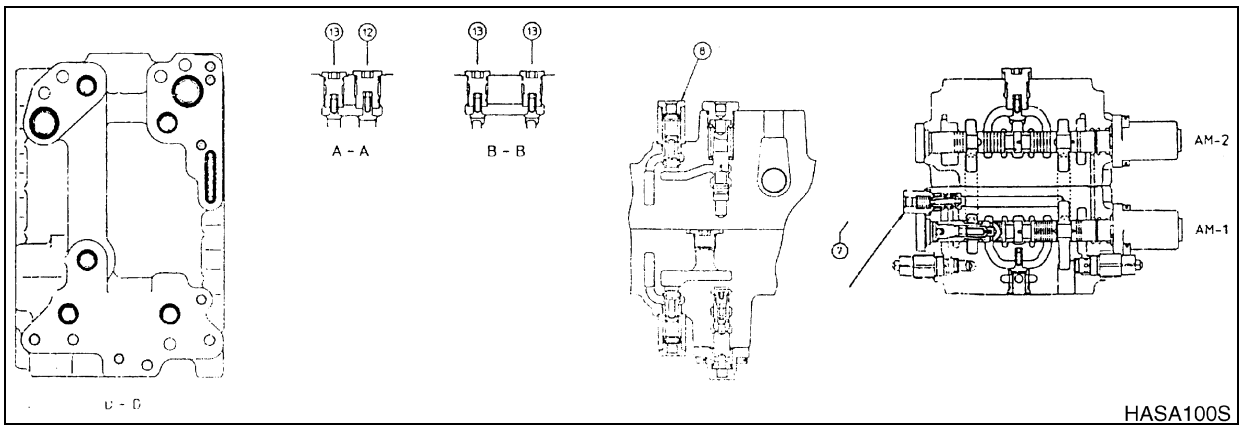


Figure 59

IMPORTANT

When disassembling Overload Relief Valve, tag and label each component so that all parts can be reassembled in the proper order.

IMPORTANT

Do not disassemble the pressure adjustment element. The pressure is factory set and can not be correctly adjusted on the vehicle.

IMPORTANT

Each Overload Relief Valve must be reinstalled into its original position.

1. Loosen sleeve (1) and remove valve assembly.

Reference Number	Description
1	Sleeve
2	Cap

Sleeve hexagonal base	32 mm
Tightening torque	6.0 kg•m (43.40 ft lbs)

2. Loosen cap (1) subassembly from sleeve assembly and remove O-ring, spring (2) and pilot poppet (3).

Reference Number	Description
2	Cap
3	Spring
4	Poppet

Cap hexagonal base	27 mm
Tightening torque	6.0 kg•m (43.40 ft lbs)

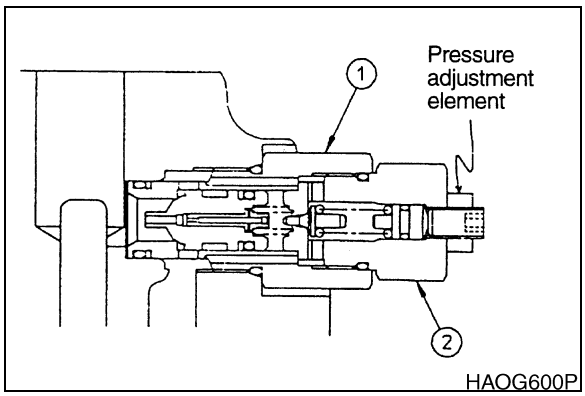


Figure 76

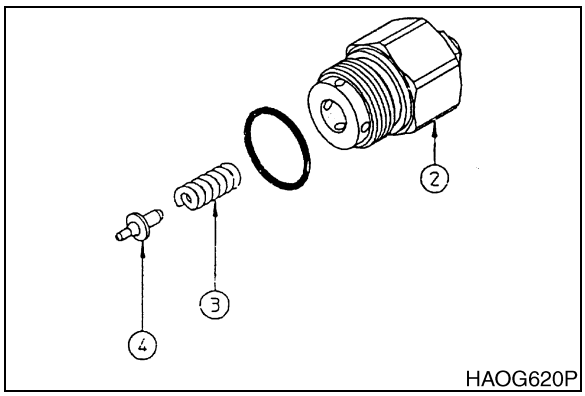


Figure 77

IMPORTANT

When disassembling Center Bypass Valve, tag and label each component so that all parts can be reassembled in the proper order.

Reference Number	Description
1	Cap
2	Spring
3	Spool

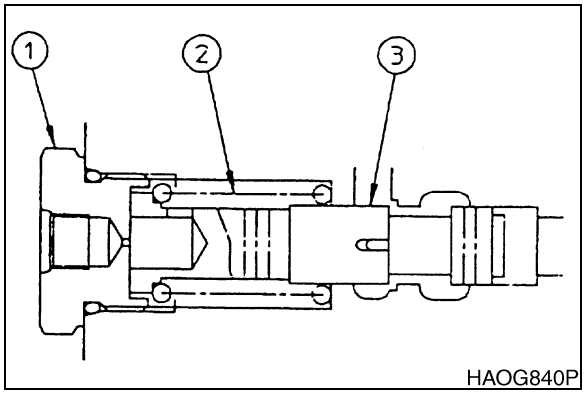


Figure 97

1. Loosen cap (1) and remove spring (2) and spool (3).

Cap wrench size	41 mm
Tightening torque	10.0 kg•m (72.33 ft lbs)

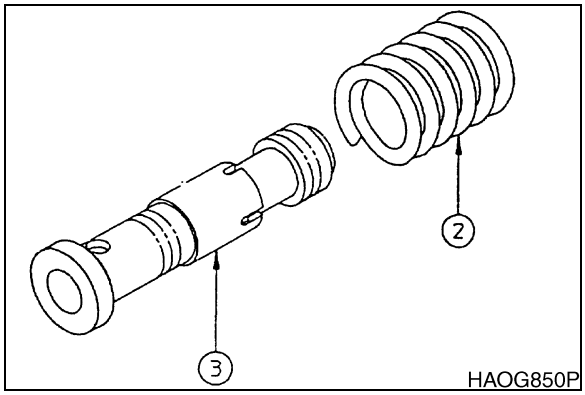


Figure 98

E: Check Valve [TL]

Reference Number	Description
1	Cap
2	Cap
3	Spring
4	Check

Cap 1 hole size	32 mm
Tightening torque	10.0 kg•m (72.33 ft lbs)

1. Loosen cap (1), remove spring (2) and check (3).

Cap 2 hole size	8.0 mm
Tightening torque	10.0 kg•m (72.33 ft lbs)

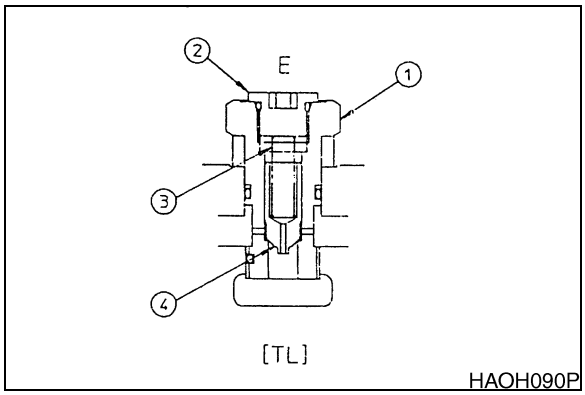


Figure 117

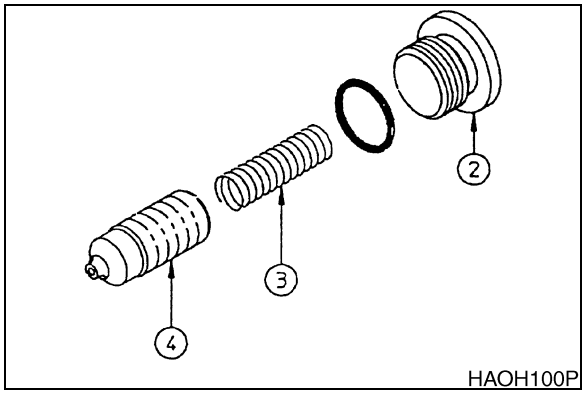


Figure 118

SPECIAL TOOLS

Tool	Size
Spanner	22.0 mm (0.87 in.)
Spanner	27.0 mm (1.06 in.)
Socket Wrench	6.0 mm (0.24 in.)
Phillips Screwdriver	
Slotted Screwdriver	
Special Tool	

16. Lubricate joint (24), plate (23) and push rod (6).

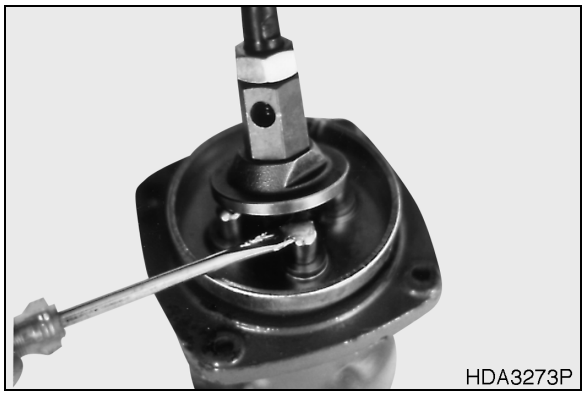


Figure 34

17. Install boot.
18. Apply evaporative, anti-seize compound to ports.

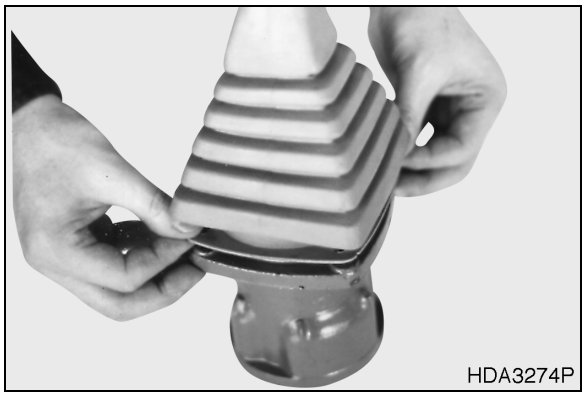


Figure 35

Special Jlg 2 [For Assembly Of Retainer Ring (221)]

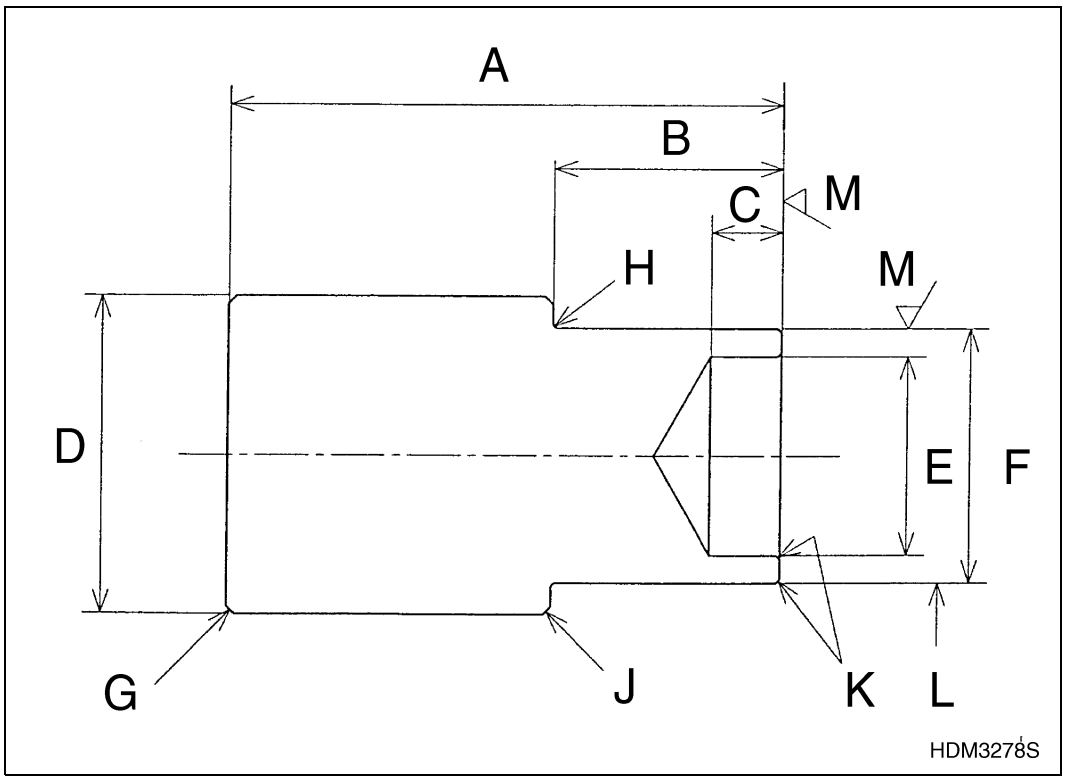


Figure 9

Dimension	Distance
A	70.0 mm (2.76 in.)
B	29 ±0.2 mm (1.14 ±0.01 in.)
C	9.0 mm (0.35 in.)
D	40.0 mm (1.57 in.) Diameter
E	25.0 mm (0.98 in.) Diameter
F	31.92 - 31.97 mm (1.2567 - 1.2587 in.) Diameter

Dimension	Distance
G	1.0 mm (0.04 in.) Chamfer
H	0.5 mm Radius
J	1.0 mm (0.04 in.) Chamfer
K	0.50 mm (0.02 in.) Chamfer
L	0.050 mm (0.0020 in.) Total Diametrical Run Out
M	3.2 Micro Finish

REASSEMBLY

IMPORTANT

1. **Prepare a clean, well lit, stable work bench where assembly can be performed.**
2. **Prepare the tools and materials necessary for reassembly process.**
3. **Inspect all parts, making sure that all parts are free from dirt and damage. If minor surface scratches are visible, use a very fine sandpaper to clean it off.**
4. **Replace all O-rings and NHU packings with new ones. Use care when assembling O-rings and NHU packings.**
5. **Apply a light coat of approved lubricant to aid in smooth assembly.**
6. **Tighten all bolts to the specified torque rating as outlined in the torque table.**
7. **Seal all opens ports to prevent foreign material from entering the valve assembly.**
8. **All precision parts must be handled with great care and all parts must be reassembled to their original position.**
9. **All parts must be carefully reassembled and not be forced. Damaged parts will cause oil leaks and poor performance of the equipment.**
10. **Do not leave parts exposed to air during or after disassembly. Exposed parts will come in contact with contaminants and will cause rust and damage.**
11. **Grease must be applied to the top portion of each push rod (214).**
12. **Grease must be filled into each grease cup (202).**
13. **Spray Anti-rust lubricant into each bellows (501).**

1. Assemble reducing valve by sliding washer 3 (313), washer 2 (217), secondary pressure spring (324) and spring seat (311) onto spool (301).

IMPORTANT

Washer 2 is used as a shim to make secondary pressure spring adjustments. The thickness may vary from spool to spool and at times may even be completely left out.

Figure 33

HYDRAULIC SCHEMATIC (S220LL)

⚠ CAUTION!

Follow all safety recommendations and safe shop practices outlined in the front of this manual or those contained within this section.

Always use tools and equipment that is in good working order.

Use lifting and hoisting equipment capable of safely handling load.

Remember, that ultimately safety is your own personal responsibility.

MODEL	SERIAL NUMBER RANGE
Solar 220LL	1001 and Up

March 1999

When the start switch is in the ‘OFF’ position, the internal components of the engine stop motor‘s cam switch is in the position shown.

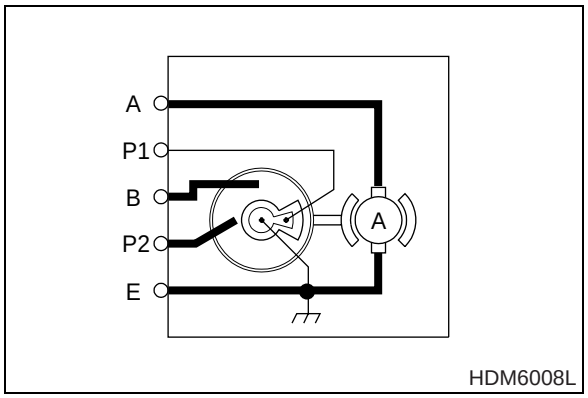
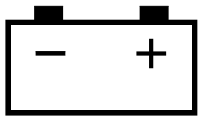


Figure 8

Symbol	Description	Input Terminal	Operation	Remarks
 HAOH290L	Charge	CN4 - 3	Lights up when not charging and I (D+) terminal output drops below 24 V.	Under normal conditions, will light up before engine start up and shut off once engine is running.

INITIAL OPERATION

Item	Input (Terminal)	Output (Operation and initial setting mode)
Initial Operation	When battery voltage is input to CN4 - 1 (start switch is turned from 'OFF' to 'ON' position).	• All LCD, LED and warning lamps are turned on and turned off after 2 ± 0.2 seconds. • Warning buzzer is activated and turned off after 2 ± 0.2 seconds. • Power mode: Power Mode II • Work Mode: Digging Mode I (Domestic models), Digging Mode II (Export models) * (Can be selected by adjusting DIP Switches behind panel) • Auto Idle: High Output • Multi-function numerical display: Engine RPM

1. Leveling Mode

This mode is used for precise ground leveling work. Among the three control valve solenoids, the current is switched to the arm regeneration valve. As a result the oil pressure which operates the arm regeneration valve and the arm two speed spool of the control valve is shut off, reducing the arm speed and giving increased arm control.

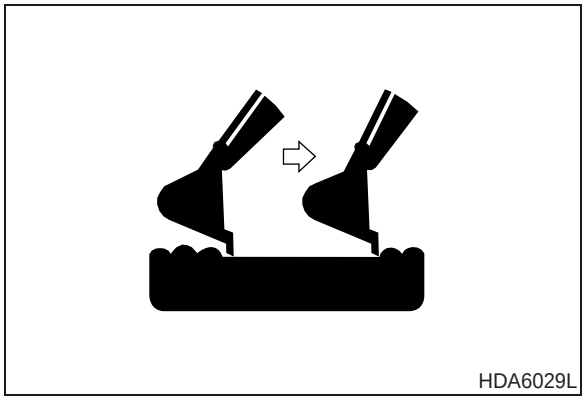


Figure 24

2. Digging Mode

This mode is used for general digging work, loading work and ground leveling work requiring quick stops. Among the three control valve solenoids, the voltage is assigned to the arm priority control valve and becomes operational. When the arm priority control valve is selected the oil pressure activates the arm priority valve and a path is made to the two speed spool.

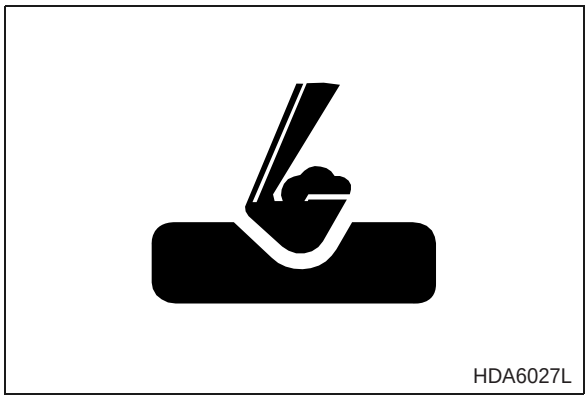


Figure 25

3. Trenching Mode

This mode is used for heavy duty ditch digging work or for loading work requiring big swing angles. Among the three control valve solenoids, the voltage is assigned to the swing priority control valve activating the swing control valve restricting the flow of oil to the boom and the arm.

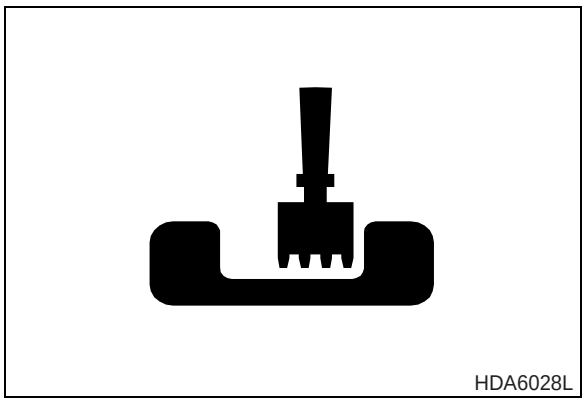


Figure 26

AUTOMATIC TRAVEL SPEED CONTROL

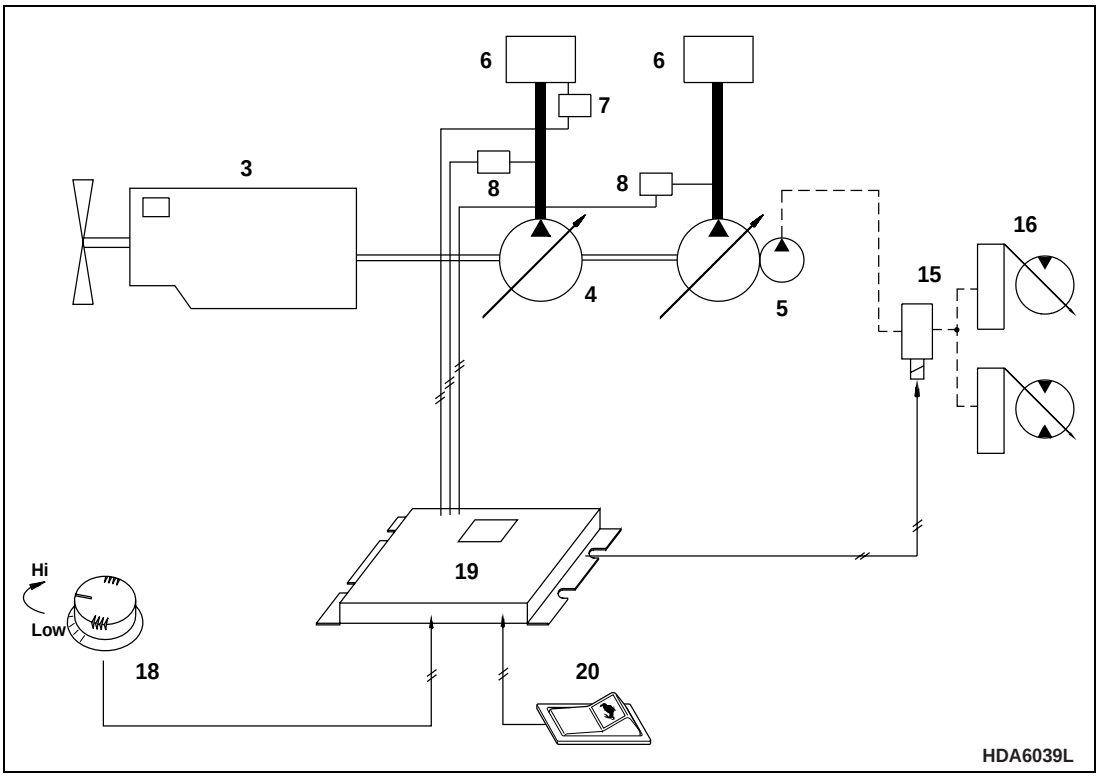


Figure 36

Reference Number	Description
3	Engine
4	Main Pump
6	Control Valve
7	Pressure Switch
8	Pump Pressure Sensor
15	Solenoid Valve (Travel II - Speed)

Reference Number	Description
16	Travel Motor
18	Engine Control Dial
19	Epos-v Controller
20	Selection Switch For Automatic Travel

If the automatic travel speed control switch is set to the ‘OFF’ position, the travel motor will run in the I-speed (low speed) range. If the selection switch is set to the ‘ON’ position, the EPOS-V controller will monitor the main pump discharge pressure and automatically select the ‘ON - OFF’ state of the II - speed travel solenoid valve based on the travel load. The travel speed is changed between the I-speed and the II-speed mode.

The travel load is monitored by the two pressure sensors located in the discharge lines of the front and rear pumps. When the travel load is high (pressure over 270 kg/cm^2 (3,840 psi)) the solenoid valve is turned ‘OFF’ and I-speed (low) is selected. In the case when the travel load is low (pressure under 130 kg/cm^2 (1,849 psi)), the solenoid valve will is turned ‘ON’ and the II-speed will be selected. But, if the engine speed control switch dial is set below approximately 1400 rpm, the travel speed will be set to I-speed mode.

ELECTRICAL SCHEMATIC (S220LL)

⚠ CAUTION!

Follow all safety recommendations and safe shop practices outlined in the front of this manual or those contained within this section.

Always use tools and equipment that is in good working order.

Use lifting and hoisting equipment capable of safely handling load.

Remember, that ultimately safety is your own personal responsibility.

MODEL	SERIAL NUMBER RANGE
Solar 220LL	1001 and Up

March 1999