WORK-SITE PRECAUTIONS

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.

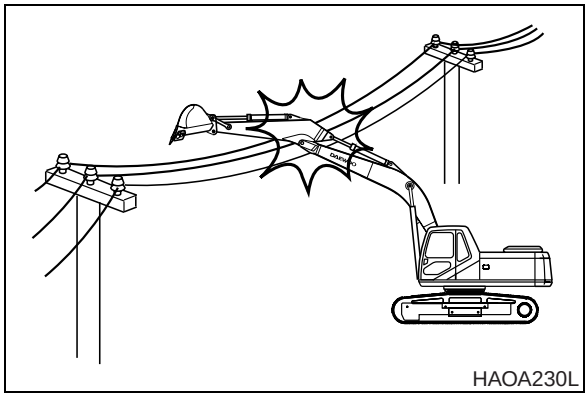

Figure 1

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.

BEFORE STARTING THE ENGINE

Do a "pre-start" safety check:

- Walk around your machine before getting in the operator's cab. Look for evidence of leaking fluid, loose fasteners, misaligned assemblies or any other indications of possible equipment hazard.
- All equipment covers and machinery safety guards must be in place, to protect against injury while the machine is being operated.
- Look around the work-site area for potential hazards, or people or property that could be at risk while operation is in progress.
- NEVER start the engine if there is any indication that maintenance or service work is in progress, or if a warning tag is attached to controls in the cab.
- A machine that has not been used recently, or is being operated in extremely cold temperatures, could require a warm-up or maintenance service prior to start-up.
- Check gauges and monitor displays for normal operation prior to starting the engine. Listen for unusual noises and remain alert for other potentially hazardous conditions at the start of the work cycle.

NEVER USE ETHER STARTING AIDS

An electric-grid type manifold heater is used for cold starting. The glowing heater element can cause ether or other starting fluid to detonate, causing injury.

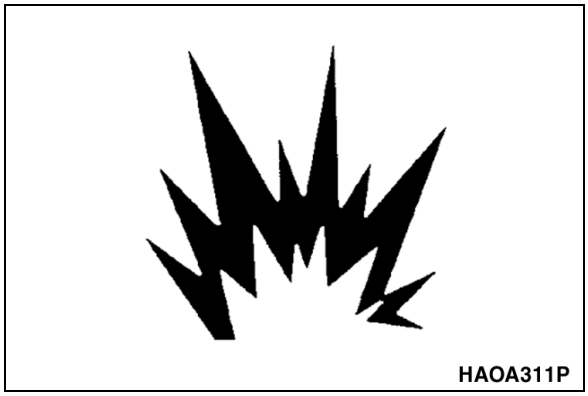

Figure 5

MOUNTING AND DISMOUNTING

NEVER get on or off a moving machine. Do not jump on/off. The entry/egress path should be clear of mud, oil and spills and mounting hardware must be kept tight and secure.

Always use handholds, steps or track shoes and maintain at least 3-point contact of hands and feet. Never use controls as handholds.

NEVER get up from the operator's seat or leave the operator's station and dismount the machine if the engine is running.

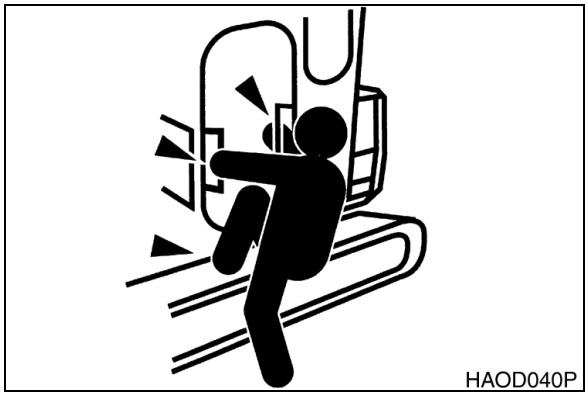

Figure 6

NOTE: *Grease lip seals prior to assembly.*

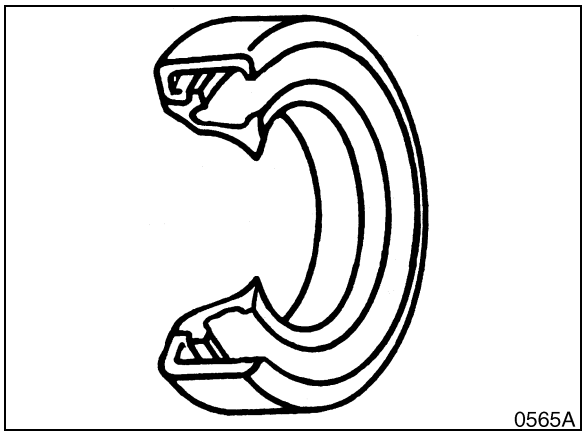

Figure 1

CLEANING AND INSPECTION

GENERAL GUIDELINES

All parts must be clean to permit an effective inspection. During assembly, it is very important that no dirt or foreign material enters unit being assembled. Even minute particles can cause malfunction of close fitting parts such as thrust bearing, matched parts, etc.

⚠ WARNING!

Care should be exercised to avoid inhalation of vapors, exposure to skin and creating fire hazards when using solvent type cleaners.

1. Clean all metal parts thoroughly using a suitable cleaning fluid. It is recommended that parts be immersed in cleaning fluid and moved up and down slowly until all oils, lubricants, and/or foreign materials are dissolved and parts are thoroughly clean.
2. For bearings that can be removed, soak them in a suitable cleaning fluid for a minute or two, then remove bearings from cleaning fluid and strike flat against a block of wood to dislodge solidified particles of lubricant. Immerse again in cleaning fluid to flush out particles. Repeat above operation until bearings are thoroughly clean. To dry bearings, use moisture-free compressed air. Be careful to direct air stream across bearing to avoid spinning bearings that are not lubricated. DO NOT SPIN BEARINGS WHEN DRYING; bearings may be rotated slowly by hand to facilitate drying process.
3. Carefully inspect all bearing rollers, cages and cups for wear, chipping or nicks to determine condition. Do not replace a bearing cone or cup individually without replacing mating cup or cone at the same time. After inspection, dip bearings in light weight oil and wrap in clean lintless cloth or paper to protect them until installation.

   For those bearings that are to be inspected in place; inspect bearings for roughness of rotation, scoring, pitting, cracked or chipped races. If any of these defects are found, replace bearings. Also inspect defective bearing housing and/or shaft for grooved, galled or burred conditions that indicate bearing has been turning in its housing or on its shaft.
4. It is more economical to replace oil seals, O-rings, sealing rings, gaskets and snap rings when unit is disassembled than waiting for premature failures; refer to latest Micro Fiche and/or Parts Book for replacement items. Be extremely careful when installing sealing members, to avoid cutting or

Fatigue Spalling

Flaking of surface metal resulting from fatigue.

Replace bearing - clean all related parts.

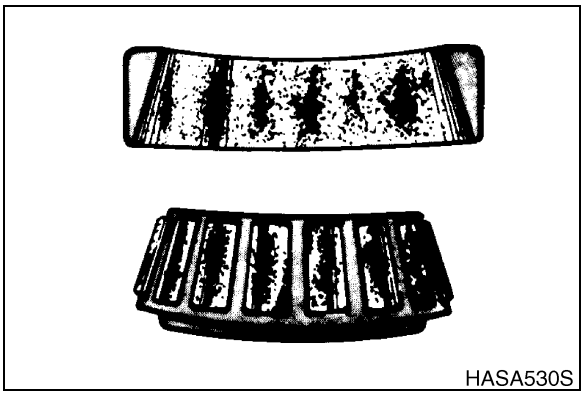

Figure 10

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.

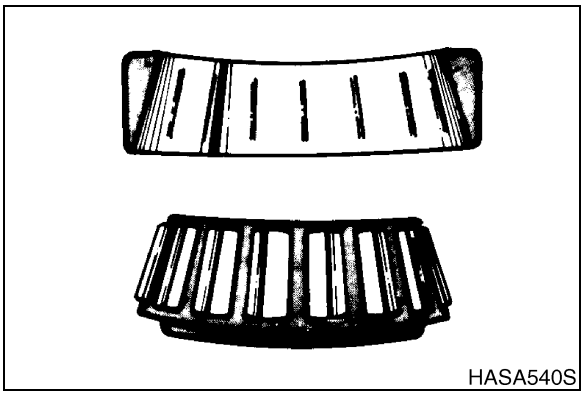

Figure 11

Cage Wear

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

Replace bearings - check seals.

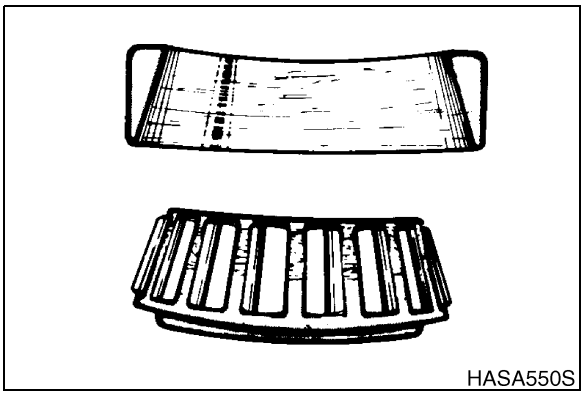

Figure 12

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

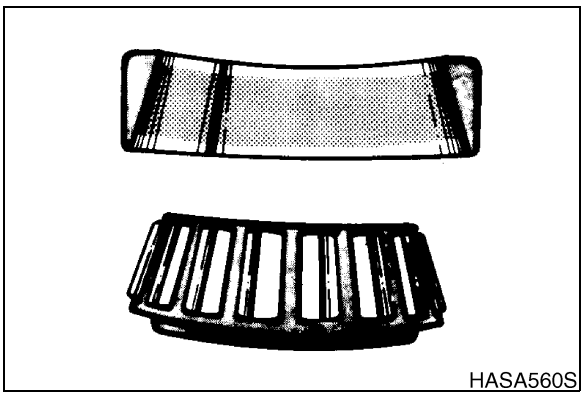

Figure 13

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.

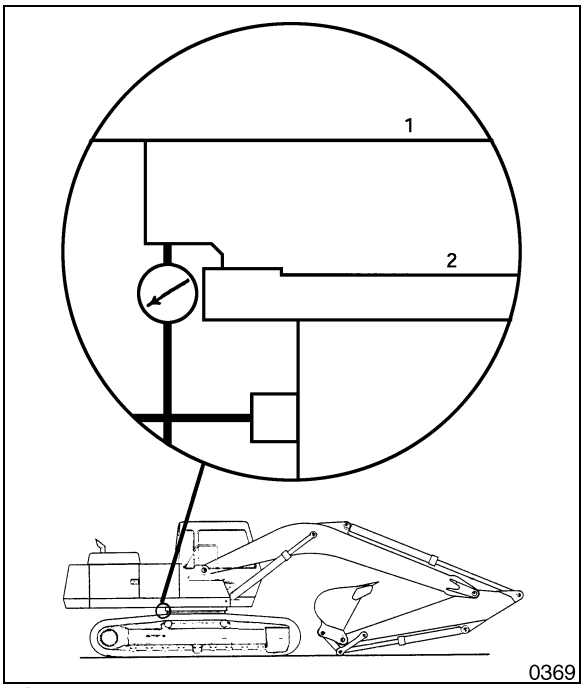

Figure 1

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.

2. Measuring the distance (A, Figure 2) between the bottom of the side frame and the top of the lowest crawler shoe. Recommended tension for operation over most types of terrain is 320 - 340 mm (12.60 - 13.38 in.)

   NOTE: *This measurement can be thrown off if there is too much mud or dirt or other material in the track assembly. Clean off the tracks before checking clearance.*

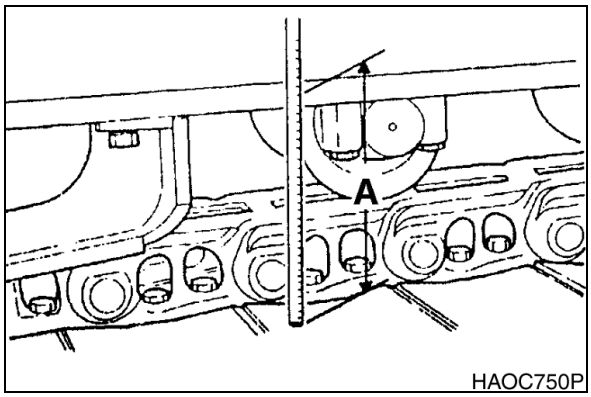

Figure 2

3. Too little sag in the crawler track (less than 320 mm (12.60 in.) clearance) can cause excessive component wear. The recommended adjustment can also be too tight causing accelerated stress and wear if ground conditions are wet, marshy or muddy, or if the ground is hard and full of rocks or gravel.

4. The increased clearance recommended for muddy ground conditions is between 340 - 380 mm (13.38 - 14.96 in.). The clearance should be approximately 380 mm (14.96 in.) for operation over gravel, rocky terrain, or over sand or snow.

Terrain Type	Distance "A"
Normal	320 - 340 mm (12.60 - 13.38 in.)
Muddy	340 - 380 mm (13.38 - 14.96 in.)
Gravel, Rocky, Sand or Snow	380 mm (14.96 in.)

WARNING!

The track adjusting mechanism is under very high pressure. NEVER release pressure too suddenly. The grease cylinder valve should never be backed off more than 1 complete turn from the fully snugged down position. Bleed off pressure slowly and keep your body away from the valve at all times.

5. Track tension adjustments are made through the grease fitting (1, Figure 3) in the middle of each side-frame. Adding grease increases the length of an adjustment cylinder (2). The longer the adjustment cylinder, the greater the pressure on the tension spring pushing the track idler wheel outward.

6. If there is not enough slack or clearance in the tracks and the adjustment is too tight, the idler wheel and adjusting cylinder can be retracted by bleeding off grease thru hole in adjustment cylinder (2, Figure 3).

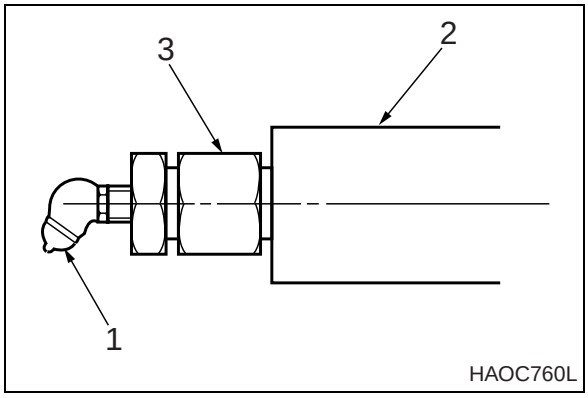

Figure 3

AIR DISCHARGE ACCORDING TO PATH SELECTION

Vent

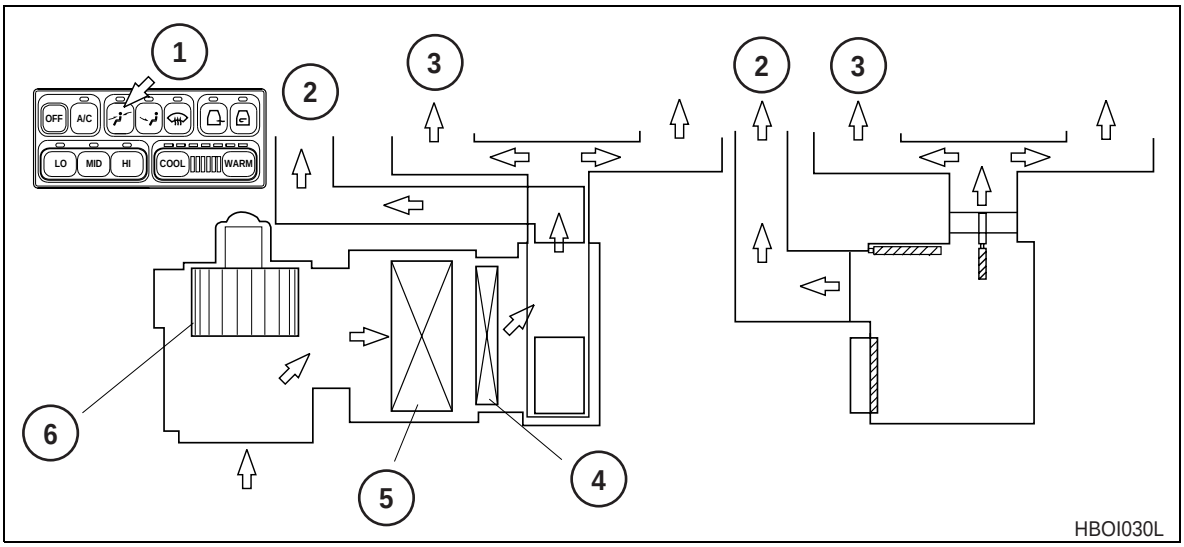

Figure 7

Reference Number	Description
1	Select Switch
2	Side Vent
3	Rear Vent

Reference Number	Description
4	Heater Core
5	Evaporator Core
6	Blower Motor

UCHIDA PUMP TOOL

This tool is used to control the distance between the shoulder on the pump drive shaft and the rear face of the drive coupling hub (Figure 7 and Figure 10). This distance will be referred to as "Measurement H" in the installation instructions that follow.

NOTE: *In manufacturing drawing (Figure 8), dimension "A" equals "Measurement H."*

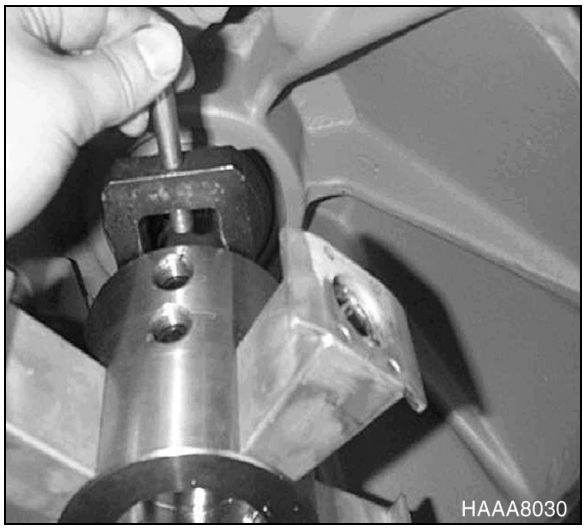

Figure 7

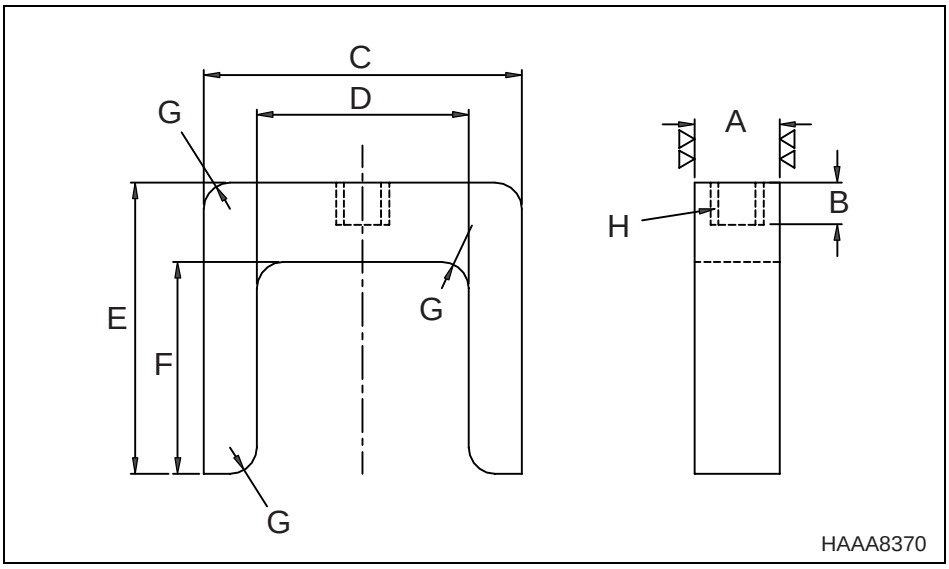

Figure 8

Dimensional Details for Figure 7		
Dimension	**Measurement**	**Models**
A	16 ±0.1 mm (0.6299 ±0.0039 in.)	S130W-III, S130W-V
B	8 mm (0.315 in.)	
C	60 mm (2.362 in.)	
D	40 mm (1.575 in.)	
E	55 mm (2.165 in.)	
F	40 mm (1.575 in.)	
G	5.0 mm (0.196 in.) Radius	
H	TAP M10X1.5	

TROUBLESHOOTING, TESTING AND ADJUSTMENT

INSPECTION

The center joint should be checked for evidence of external oil leakage every 2,000 operating hours. Leaking or defective O-rings are an indication that dirt and other contaminants could be getting inside the assembly, which will promote accelerated, abnormal wear and may cause early failure of the assembly.

If internal seals or other sliding surface components are worn and there is internal fluid leakage, complete overhaul and repair or replacement of the center joint may be required.

TESTING

To check pressure through the center joint, make up a test kit from the following equipment list:

- 700 bar (10,000 psi) pressure gauge
- Adapters, connectors, piping and flange block-off plates conforming to those used in high pressure piping connections of the excavator.
- A high pressure relief valve with a setting pressure 1.5 times maximum system pressure.
- A stop valve
- A manually operated, in-line change-over valve.

Install the change over valve upstream from one of the stem high-pressure ports. Connect the pressure gauge downstream from one of the body ports. Install the stop valve between the change-over valve and the stem of the center joint. Other components should be installed according to the layout in the block diagram. The test kit is used to pressurize the center swivel above normal working pressure and lock in the higher pressure (as the stop valve is closed manually) for a leak down test.

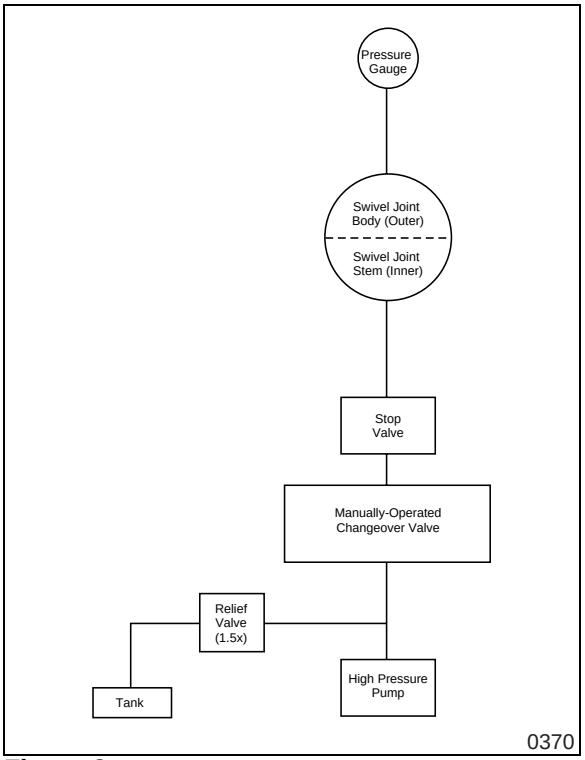

Figure 2

NOTE: *The same type of kit can also be made up for the drain port (return line) side of the center joint. Use appropriate piping, connectors, test gauges, etc., and follow the same block diagram general layout (Figure 2).*

1. Hydraulic Motor operation.

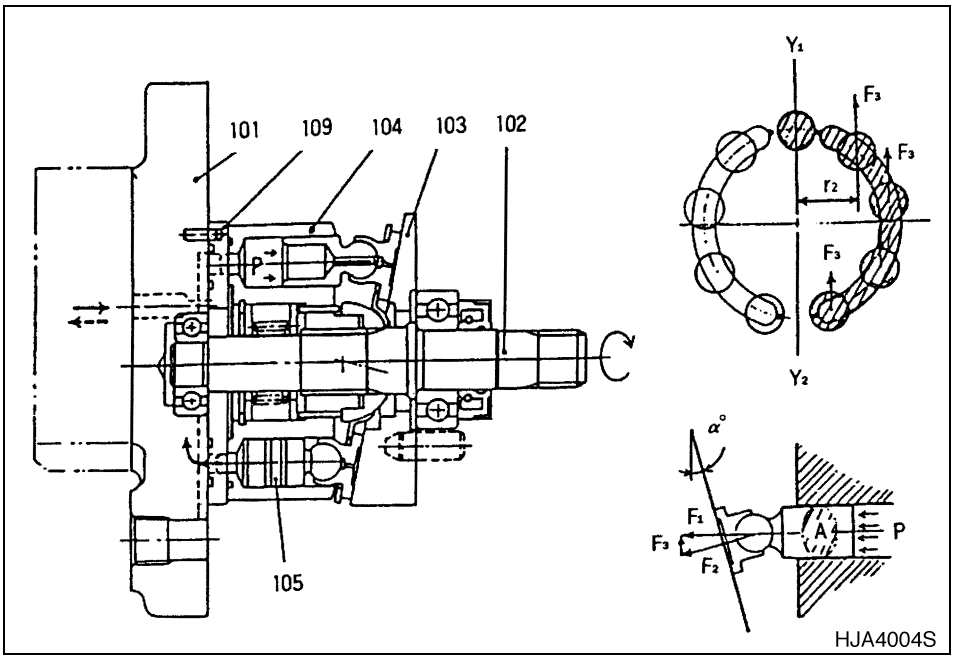

Figure 2

The high pressure oil from the hydraulic pump goes to the cylinder block (104) through the rear flange (101) of the motor and the brake valve device and the timing plate (109). This high pressure oil acts only on the single side of the line Y1-Y2 which connects the bottom dead center and the top dead center of the piston (105) stroke. The oil, after flowing into the side of the cylinder block (104), exerts force on each piston (4 or S pieces) and generates force F (p kg/cm x A cm^2). The force F is exerted on the swash plate (103): as the swash plate (103) is tilted with respect to the driving shaft (102) by a degrees, the force F is divided into two resultant forces F2 and F3. Among these forces, radial force F3 develops torque T (F3 x ri) with respect to each Yl-Y2 line. The combined torque T (Z (F3 x ri)), which is a rotation force, rotates the cylinder block through pistons (105). The cylinder block is coupled with the driving shaft by a spline, and the driving torque is transferred to the shaft.

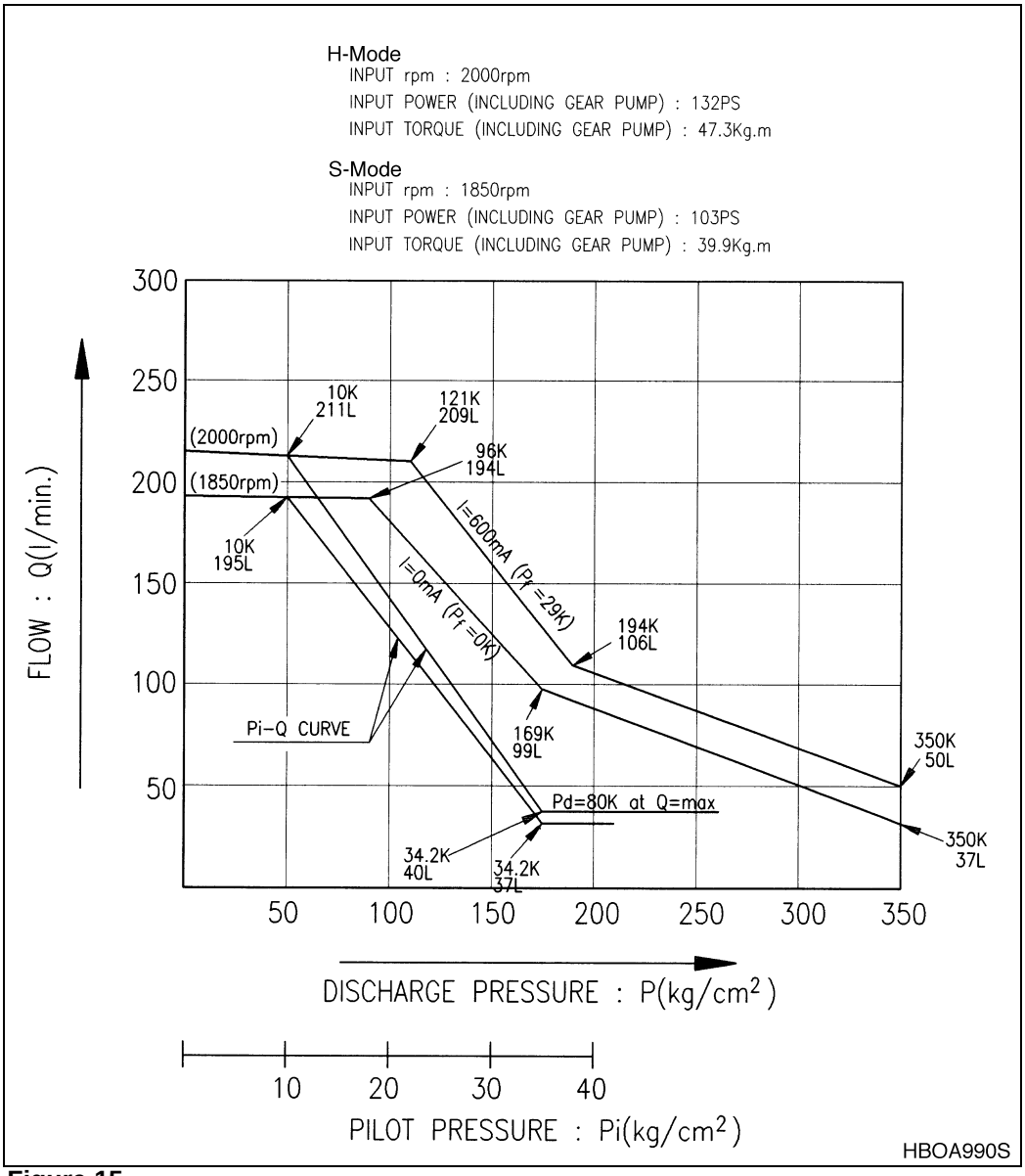
H-Mode
INPUT rpm : 2000rpm
INPUT POWER (INCLUDING GEAR PUMP) : 132PS
INPUT TORQUE (INCLUDING GEAR PUMP) : 47.3Kg.m
S-Mode
INPUT rpm : 1850rpm
INPUT POWER (INCLUDING GEAR PUMP) : 103PS
INPUT TORQUE (INCLUDING GEAR PUMP) : 39.9Kg.m
FLOW : Q(l/min.)
300
250
200
150
100
50
(2000rpm)
(1850rpm)
10K
211L
121K
209L
96K
194L
10K
195L
I=600mA (Pf=29K)
I=0mA (Pf=0K)
194K
106L
Pi-Q CURVE
169K
99L
350K
50L
Pd=80K at Q=max
350K
37L
34.2K
40L
34.2K
37L
50
100
150
200
250
300
350
DISCHARGE PRESSURE : P(kg/cm2)
10
20
30
40
PILOT PRESSURE : Pi(kg/cm2)
HBOA990S

Figure 15

Check Valve [Tr, Am-2]

Reference Number	Description
1	Cap
2	Spacer
3	Backup Ring
4	O-ring
5	Spring
6	Nylon Chip
7	Check

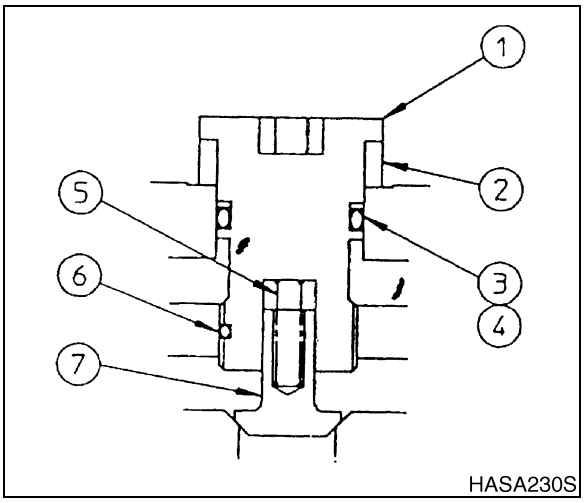

Figure 37

Check Valve [Opt, Bkt, Bm-1, Bm-2]

Reference Number	Description
1	Cap
2	Spacer
3	Backup Ring
4	O-ring
5	Spring
6	Nylon Chip
7	Check

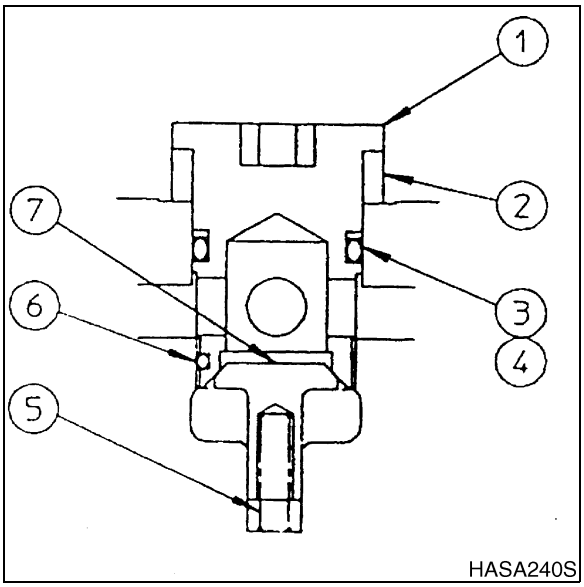

Figure 38

Check Valve

Reference Number	Description
1	Cap
2	Backup Ring
3	O-ring
4	Spring
5	Nylon Chip
6	Check

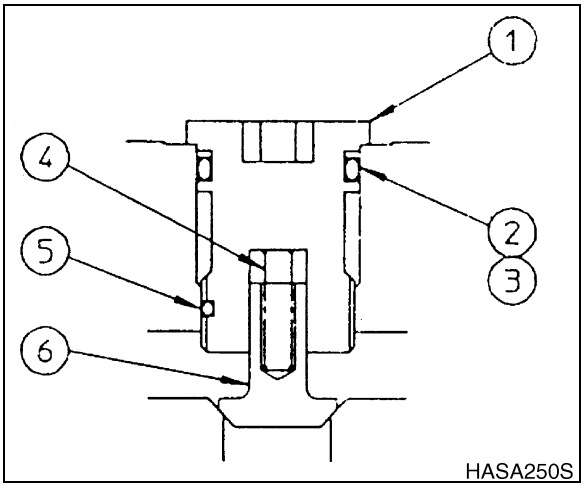

Figure 39

12. Remove the spring seat (218) from the housing.

IMPORTANT
Label and tag each spring seat so that they are returned to the same location in the housing during reassembly.

Figure 20

13. Remove the steel ball (225) using a magnet.

IMPORTANT
The steel ball is very small in size and care should be taken not to lose the steel balls.

Figure 21

14. Remove the retainer ring (221) using a snap ring pliers.

IMPORTANT
Label and tag each retainer ring so that they are returned to the same location in the housing during reassembly. **The bushing is under pressure from the return spring and may pop out.**

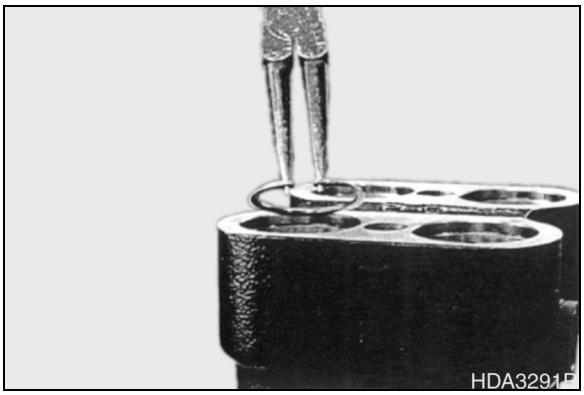

Figure 22

21. Remove grease cup (203) from plug (202).

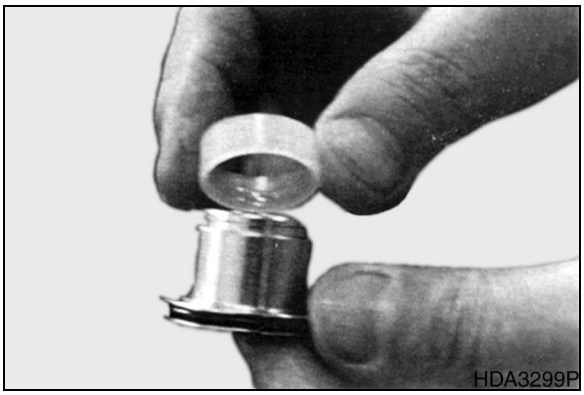

Figure 30

22. Remove NHU packing (210) from plug (202) using a small screwdriver.

IMPORTANT
Be careful not to scratch the inside surface of the plug.

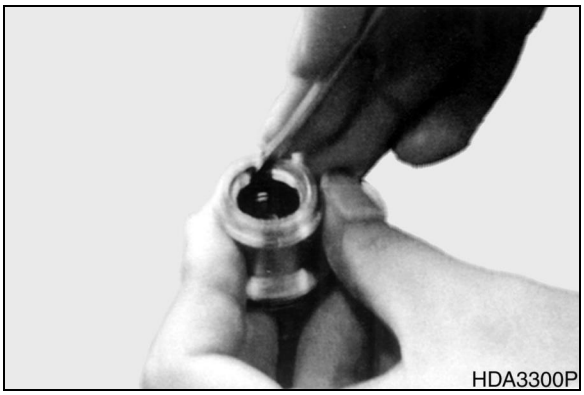

Figure 31

23. Remove O-ring (212) from plug.

Figure 32

TROUBLESHOOTING - ELECTRICAL SYSTEM

Problem	Possible Causes	Remedies
Battery will not stay charged	Internal battery short	Replace battery
	Short in other part of circuit	Repair wiring or replace component
Battery does not charge	Battery worn out or defective	Replace battery
	Defective alternator or belt	Repair or replace
	Cable connection loose or severely corroded. Circuit ground corroded or weak	Repair or replace
Engine RPM not controllable	Engine speed potentiometer or dial defective	Repair or replace
	Engine control cable broken or loose	Repair or replace
	Engine control motor defective or not connected	Repair connection or replace component
	Engine throttle controller defective or not connected	Repair connection or replace component
	Blown fuse	Replace fuse. Check connections and circuit components for shorts or other damage
	Wiring harness or connector defective or damaged	Repair or replace
Power mode selection not switchable	Blown fuse	Replace fuse. Check connections and circuit components for shorts or other damage
	Instrument Panel switch broken	Repair or replace
	Wiring harness or connector defective or damaged	Repair or replace
	EPOS-V controller defective	Replace
	Engine RPM not controllable	See preceding list
Work mode selection not switchable	Blown fuse	Replace fuse. Check connections and circuit components for shorts or other damage
	Instrument Panel switch broken	Repair or replace
	Wiring harness or connector defective or damaged	Repair or replace
	EPOS-V controller defective	Replace
	Engine RPM not controllable	Replace
	Solenoid valve defective	Replace