Solar 330LC-V

Shop Manual

2023-7135AE

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:

idler end of the track frame. That will keep travel controls in their intended configuration and at the same time, maintain the proper orientation of lights on the machine and posted flags and signs.

KEEP "PINCH POINT" AREAS CLEAR - USE CAUTION IN REVERSE AND SWING

Use a signal person in high traffic areas and whenever the operator's view is not clear, such as when traveling in reverse. Make sure that no one comes inside the swing radius of the machine.

Anyone standing near the track frames, or working assemblies of the attachment, is at risk of being caught between moving parts of the machine.

Never allow anyone to ride on any part of the machine or attachment, including any part of the turntable or operator's cab.

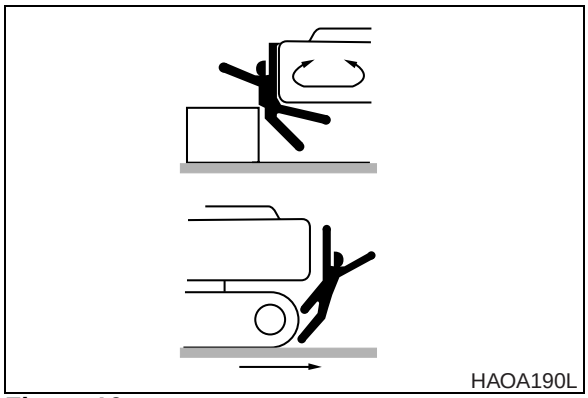


Figure 10

TRAVEL PRECAUTIONS

Attachment control levers should not be operated while traveling.

Do not change selected travel mode (FAST/SLOW) while traveling.

Fold in work equipment so that the outer end of the boom is as close to the machine as possible, and is 200 mm - 300 mm (8" - 12") above ground.

Never travel over obstacles or slopes that will cause the machine to tilt severely. Travel around any slope or obstacle that causes 10 degrees tilt, or more.

OPERATE CAREFULLY ON SNOW AND ICE AND IN VERY COLD TEMPERATURES

In icy cold weather avoid sudden travel movements and stay away from even very slight slopes. The machine could skid off to one side very easily.

Snow accumulation could hide or obscure potential hazards. Use care while operating or while using the machine to clear snow.

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 bucket or other working attachment completely to the ground, or to an overnight support saddle. There should be no possibility of unintended or accidental movement.

SPECIFICATIONS

GENERAL SPECIFICATIONS

Shipping Weight	33.1 metric tons (72,973 lbs), includes 10% fuel, boom, 3,200 mm (10’ 6") arm, 1.3 cu. m backhoe bucket and standard shoes.
Operating Weight	Add weight of full fuel tank and operator.
Shipping Weights With Optional Track Shoes	Add 400 kg (1,320 lbs) for 700 mm (28") shoes.
	Add 800 kg (1,984 lbs) for 800 mm (32") shoes.
	Add 1000 kg (2,315 lbs) for 850 mm (34") shoes.
Major Component Weights	Standard Boom 2,719 kg (5,994 lbs)
	3,200 mm (10’ 6") Arm 1,565 kg (3,450 lbs)
	2,600 mm (8’ 5") Arm 960 kg (3,200 lbs)
	4,000 mm (13’ 1") Arm 1,673 kg (3,688 lbs)
	Boom Cylinders 285 kg (628.32 lbs) each
	Arm Cylinder 419 kg (923.74 lbs)
	Bucket Cylinder 269 kg (593.04 lbs)
	Counterweight 6,500 kg (14,330.05 lbs)
	Upper Turntable 14,500 kg (31,967.03 lbs) (With Counterweight)
	Lower - below Swing Bearing 11,550 kg (25,463.39 lbs)
Digging Forces (at Bucket Boost):	
Bucket Cylinder	21,800 kg (48,061 lbs) - (with either 3,200 mm [10’ 6"] or 2,600 mm [8’ 5"] arm)
Arm Cylinder	17,400 kg (38,360 lbs) with 3,200 mm (10’ 6") standard arm
Fuel Tank Capacity	520 liters (137.4 gal)
Hydraulic Reservoir Capacity	235 liters (62 gal)
Bucket Heaped Capacity Range	CECE 1.10 - 1.6 cu. m
	IMPORTANT: Refer to the Load Weight, Bucket and Arm Length Compatibility Table for information on which bucket sizes may be used safely with which arm length, for load material weights.
Shoe Type	Triple Grouser
Shoe Width and Optional Sizes	600 mm (23.5") - standard
	700 mm (28") - optional
	800 mm (32") - optional
	850 mm (34") - optional
Ground Pressure Ratings:	
Standard 600 mm (23.6") shoe -	0.64 kg/sq cm (9.10 psi)
Optional 700 mm (28.0") shoe -	0.55 kg/sq cm (7.82 psi)
Optional 800 mm (32.0") shoe -	0.49 kg/sq cm (6.97 psi)
Optional 850 mm (34.0") shoe -	0.46 kg/sq cm (6.54 psi)

CYLINDER PERFORMANCE TESTS

NOTE: *All tests are performed with standard boom, arm and bucket configuration. The bucket should be empty.*

Boom Cylinders Test

The starting points for the test are with the boom and arm extended away from the excavator, and the bucket curled inward. The arm cylinder should be fully retracted; boom and bucket cylinders must be extended. Test movement in both directions, several times, and average results for both Power Mode II and Power Mode III.

Arm Cylinder Test

Start with the boom up and the arm cylinder fully retracted. Test movement in both directions several times, between the "crowd" and "dump" positions, and average the results of both tests, in both standard and extra-duty power modes.

Bucket Cylinder Test

Start with the boom up and the teeth of the bucket hanging vertically, 500 mm (1-1/2’ to 2’) above the ground. Dump and crowd the bucket several times, and average results, for both standard and extra-duty power modes.

OPERATION	MODE II	MODE III
Boom Up	3.5 - 4.3 seconds	3.1 - 3.9 seconds
Boom Down	2.6 - 3.4 seconds	2.6 - 3.4 seconds
Arm Dump	3.0 - 3.8 seconds	2.8 - 3.6 seconds
Arm Crowd	3.6 - 4.4 seconds	3.3 - 4.1 seconds
Bucket Dump	2.6 - 3.4 seconds	2.4 - 3.2 seconds
Bucket Crowd	2.9 - 3.7 seconds	2.8 - 3.6 seconds

Hydraulic Cylinder Natural Drop Test

To check boom and arm cylinder tightness against the specified performance standard for new cylinders, put a full load of dirt in the bucket and move the attachment cylinders so that the arm cylinder is extended 20 mm to 50 mm (1" to 2") and boom cylinders are retracted the same amount, 20 mm to 50 mm (1" to 2"). The top of the bucket should be approximately 2 m (6' to 7') off the ground.

Turn off the engine and measure cylinder drop after 5 minutes. Bucket cylinder should not show more than 10 mm (0.39 in.) change, the arm cylinder should not show more than 5 mm (0.20 in.), while the boom cylinders should not fall more than 15 mm (0.59 in.).

Travel Motor Jack-up Test

Test travel motor operation on each side by painting or chalking a mark on one crawler shoe, with a corresponding mark on the travel frame. Use the attachment to jack up one side of the machine and operate the raised travel motor. Record the number of seconds it takes the crawler shoe to make 3 full rotations, during both high speed and low speed operation.

OPERATION	MODE II	MODE III
High Speed	23.6 - 25.6 seconds	21.7 - 23.7 seconds
Low Speed	36.0 - 38.0 seconds	33.2 - 35.2 seconds

NOTE: *Grease lip seals prior to assembly.*

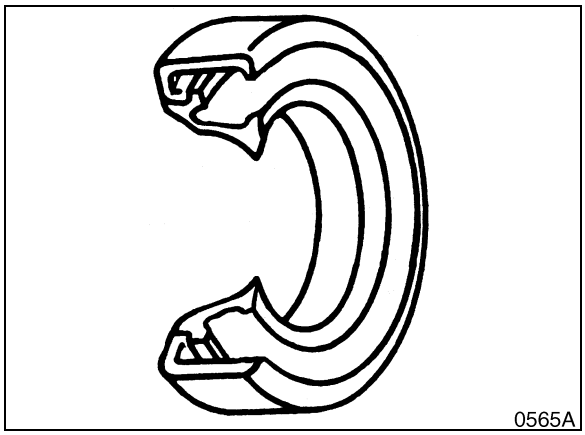


Figure 1

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

TORQUE VALUES FOR STANDARD METRIC FASTENERS

NOTE: *The units for the torque values are kg•m (ft lbs)*

Dia. x Pitch (mm)	Grade										
	3.6 (4A)	**4.6 (4D)**	**4.8 (4S)**	**5.6 (5D)**	**5.8 (5S)**	**6.6 (6D)**	**6.8 (6S)**	**6.9 (6G)**	**8.8 (8G)**	**10.9 (10K)**	**12.9 (12K)**
M5 x Std.	0.15 (1.08)	0.16 (1.15)	0.25 (1.80)	0.22 (1.59)	0.31 (2.24)	0.28 (2.02)	0.43 (3.11)	0.48 (3.47)	0.50 (3.61)	0.75 (5.42)	0.90 (6.50)
M6 x Std.	0.28 (2.02)	0.30 (2.16)	0.45 (3.25)	0.40 (2.89)	0.55 (3.97)	0.47 (3.39)	0.77 (5.56)	0.85 (6.14)	0.90 (6.50)	1.25 (9.04)	1.50 (10.84)
M7 x Std.	0.43 (3.11)	0.46 (3.32)	0.70 (5.06)	0.63 (4.55)	0.83 (6.00)	0.78 (5.64)	1.20 (8.67)	1.30 (9.40)	1.40 (10.12)	1.95 (14.10)	2.35 (16.99)
M8 x Std.	0.70 (5.06)	0.75 (5.42)	1.10 (7.95)	1.00 (7.23)	1.40 (10.12)	1.25 (9.04)	1.90 (13.74)	2.10 (15.18)	2.20 (15.91)	3.10 (22.42)	3.80 (27.48)
M8 x 1	0.73 (5.28)	0.80 (5.78)	1.20 (8.67)	1.00 (7.23)	1.50 (10.84)	1.35 (9.76)	2.10 (15.18)	2.30 (16.63)	2.40 (17.35)	3.35 (24.23)	4.10 (29.65)
M10 x Std.	1.35 (9.76)	1.40 (10.12)	2.20 (15.91)	1.90 (13.74)	2.70 (19.52)	2.35 (19.99)	3.70 (26.76)	4.20 (30.37)	4.40 (31.18)	6.20 (44.84)	7.20 (52.07)
M10 x 1	1.50 (10.84)	1.60 (11.57)	2.50 (18.08)	2.10 (15.18)	3.10 (22.42)	2.80 (20.25)	4.30 (31.10)	4.90 (35.44)	5.00 (36.16)	7.00 (50.63)	8.40 (60.75)
M12 x Std.	2.40 (17.35)	2.50 (18.08)	3.70 (26.76)	3.30 (23.86)	4.70 (33.99)	4.20 (30.37)	6.30 (45.56)	7.20 (52.07)	7.50 (54.24)	10.50 (75.94)	12.50 (90.41)
M12 x 1.5	2.55 (18.44)	2.70 (19.52)	4.00 (28.93)	3.50 (25.31)	5.00 (36.16)	4.50 (32.54)	6.80 (49.18)	7.70 (55.69)	8.00 (57.86)	11.20 (81.00)	13.40 (96.92)
M14 x Std.	3.70 (26.76)	3.90 (28.20)	6.00 (13.23)	5.20 (37.61)	7.50 (54.24)	7.00 (50.63)	10.00 (72.33)	11.50 (83.17)	12.00 (86.79)	17.00 (122.96)	20.00 (144.66)
M14 x 1.5	4.10 (29.65)	4.30 (31.10)	6.60 (47.73)	5.70 (41.22)	8.30 (60.03)	7.50 (54.24)	11.10 (80.28)	12.50 (90.41)	13.00 (94.02)	18.50 (11.26)	22.00 (158.12)
M16 x Std.	5.60 (40.50)	6.00 (43.39)	9.00 (65.09)	8.00 (57.86)	11.50 (83.17)	10.50 (75.94)	15.50 (112.11)	17.90 (129.47)	18.50 (133.81)	26.00 (188.05)	31.00 (224.22)
M16 x 1.5	6.20 (44.84)	6.50 (47.01)	9.70 (70.16)	8.60 (62.20)	12.50 (90.41)	11.30 (81.73)	17.00 (122.96)	19.50 (141.04)	20.00 (144.66)	28.00 (202.52)	35.50 (256.77)
M18 x Std.	7.80 (56.41)	8.30 (60.03)	12.50 (90.41)	11.00 (79.56)	16.00 (115.72)	14.50 (104.87)	21.00 (151.89)	27.50 (198.90)	28.50 (206.14)	41.00 (296.55)	43.00 (311.01)
M18 x 1.5	9.10 (65.82)	9.50 (68.71)	14.40 (104.15)	12.50 (90.41)	18.50 (133.81)	16.70 (120.79)	24.50 (177.20)	27.50 (198.90)	28.50 (206.14)	41.00 (296.55)	49.00 (354.41)
M20 x Std.	11.50 (83.17)	12.00 (86.79)	18.00 (130.19)	16.00 (115.72)	22.00 (159.12)	19.00 (137.42)	31.50 (227.83)	35.00 (253.15)	36.00 (260.38)	51.00 (368.88)	60.00 (433.98)
M20 x 1.5	12.80 (92.58)	13.50 (97.64)	20.50 (148.27)	18.00 (130.19)	25.00 (180.82)	22.50 (162.74)	35.00 (253.15)	39.50 (285.70)	41.00 (296.55)	58.00 (419.51)	68.00 (491.84)
M22 x Std.	15.50 (112.11)	16.00 (115.72)	24.50 (177.20)	21.00 (151.89)	30.00 (216.99)	26.00 (188.05)	42.00 (303.78)	46.00 (332.71)	49.00 (354.41)	67.00 (484.61)	75.00 (542.47)
M22 x 1.5	17.00 (122.96)	18.50 (133.81)	28.00 (202.52)	24.00 (173.59)	34.00 (245.92)	29.00 (209.75)	47.00 (339.95)	52.00 (44.76)	56.00 (405.04)	75.00 (542.47)	85.00 (614.80)
M24 x Std.	20.50 (148.27)	21.50 (155.50)	33.00 (238.68)	27.00 (195.29)	40.00 (289.32)	34.00 (245.92)	55.00 (397.81)	58.00 (419.51)	63.00 (455.67)	82.00 (593.10)	92.00 (655.43)
M24 x 1.5	23.00 (166.35)	35.00 (253.15)	37.00 (267.62)	31.00 (224.22)	45.00 (325.48)	38.00 (202.52)	61.00 (441.21)	67.00 (484.61)	74.00 (535.24)	93.00 (672.66)	103.00 (744.99)

UPPER STRUCTURE

FALLING OBJECT PROTECTIVE STRUCTURES (F.O.P.S.)

DANGER!

If the excavator is to be used in mines, for demolition, or in other areas where falling rocks, building materials (concrete blocks, steel beams) or other heavy objects pose a danger to the safety of the operator, a certified Falling Object Protective Structure (F.O.P.S.) must be installed over the roof and/or front of the cab.

NOTE: ***A Falling Object Guard (F.O.G.) is another type of protective structure. In all cases check with all regulatory agencies for your situation.***

Falling Object Protective Structures are available from independent manufacturers or fabricators. A certified, approved F.O.P.S. system should normally have a permanent, environmentally-protected label securely attached to the structure (per Society of Automotive Engineers [SAE] standard J1164, "Labeling of ROPS and FOPS and OPS"), indicating the following:

- Name and address of the manufacturer or fabricator and their certification control.
- Model number of the protective structure and/or the equipment make, model(s) or series the structure is designed to fit.
- Maximum machine weight for which the structure is certified.
- Numbered, dated list of SAE performance criteria that have been met or exceeded; for example, SAE J1040 (Apr88), SAE J231 (Jan81), SAE J1356 (Feb88) and/or other performance criteria or recognized standards (ISO).

WARNING!

Additional protection against projectiles or flying or thrown objects, or supplementary protection for the operator in the event of equipment tip-over could also be required, if operating conditions pose additional hazards.

Roll Over Protective Structures (R.O.P.S.) are designed to work with seat belt protective restraints and shield the operator in the event of an overturn, in situations where equipment is operated over hazardous slopes or other unstable ground conditions. Additional R.O.P.S. performance criteria specify protective measures for fuel tanks, oil reservoirs, batteries and operator's cab edges, corners and projections.

Operator Protective Structures (O.P.S.) are designed to provide additional barrier protection around the operator's cab area. For example, using a shearing attachment on the excavator for demolition work or certain kinds of mining operation could cause violent break-up of materials, posing the threat of hazardous projectiles or flying objects being thrown through the operator's cab wall or window.

IMPORTANT

Observe all recommended equipment installation procedures for O.P.S., F.O.P.S., and/or R.O.P.S. systems. Do not attempt to weld, drill holes in or otherwise modify the structure. The integrity of the system could be compromised. Always use correct fasteners, torqued to specified limits, and follow all manufacturer's instructions for installation, maintenance, and/or transfer or re-installation of the protective system.

FUEL TANK

⚠ 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 330LC-V	1001 and Up
Solar 400LC-V	1001 and Up

March 1999

6. Install six bolts and washers (1, Figure 14), and handrail (2) on fuel tank (3) and cover (4).

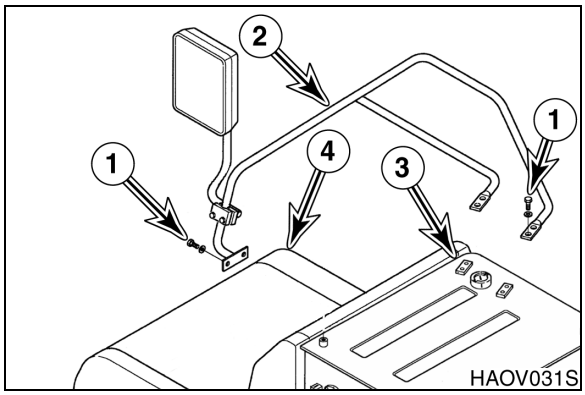


Figure 14

7. Connect wires as tagged to fuel sensor (1, Figure 15) on side of fuel tank (2).
8. If equipped, connect components to the fuel filler pump port on side of fuel tank (2, Figure 15).

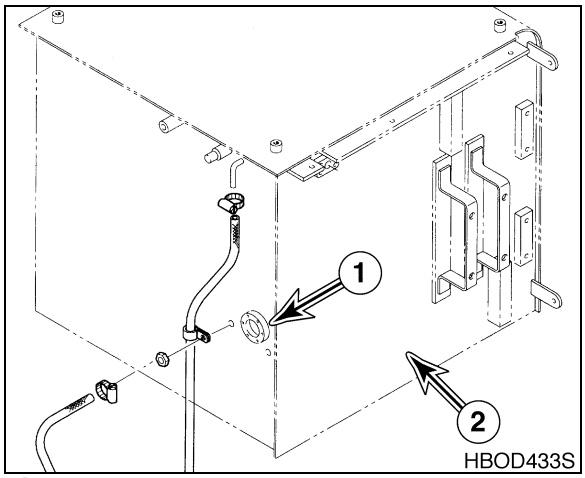


Figure 15

9. Connect as tagged, fuel supply line (1, Figure 16) and fuel return line (2) to fuel tank (3).
10. Install clamp (4, Figure 16) to hold fuel return line (2) to tank (3).

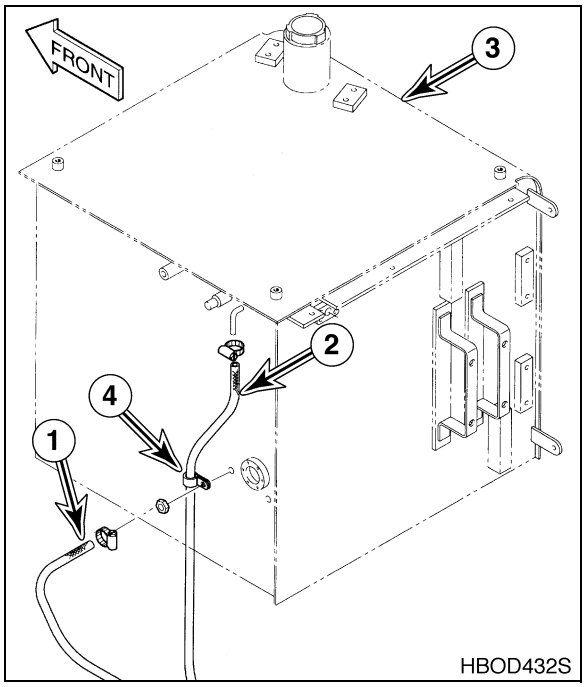


Figure 16

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.

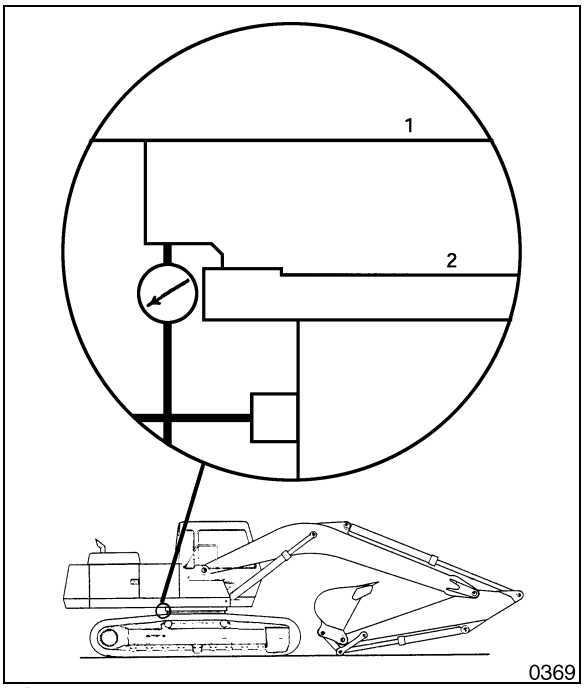


Figure 1

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.

SPECIFICATIONS

Swing Reduction Gearbox	Specification	
	Solar 330LC-V	**Solar 400LC-V**
Drive Type	Two Stage Planetary Gear	Two Stage Planetary Gear
Reduction Ratio	19.560	21.968
Maximum Output Speed	57.3 rpm	61.2 rpm
Maximum Output Torque	2,100 kg•m (15,189 ft lbs)	2,360 kg•m (17,070 ft lbs)
Weight	275 kg (606 lbs)	275 kg (606 lbs)

Pinion Gear	Specification
Type	Spur Gear
Gear P.C.D.	196 mm (7.72 in.)
No. of Teeth	14
Module	14

INSTALLATION

1. Coat pinion gear with grease. Refer to operation manual for specifications.
2. Make sure two alignment pins (6) are installed in flange of swing reduction gearbox (5).
3. Using a suitable lifting device, sling swing motor (1, Figure 4) and position swing motor and reduction gearbox (5) as an assembly on unit.
4. Install twelve bolts and washers (4, Figure 4) to secure swing reduction gearbox (5) to frame.

   NOTE: *Apply Loctite #262 to bolt threads.*

5. Connect tube (2) to drain cock (3) and hose fitting (7) to fill hole.
6. Connect hoses as tagged during removal to swing motor (1, Figure 4).
7. Fill swing reduction gearbox with oil. Refer to operation manual for specifications.

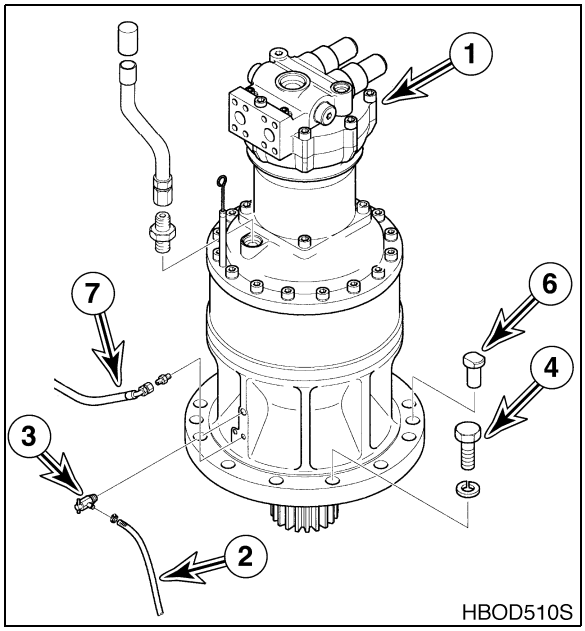
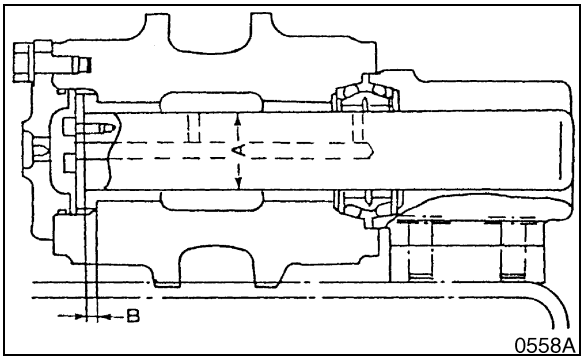
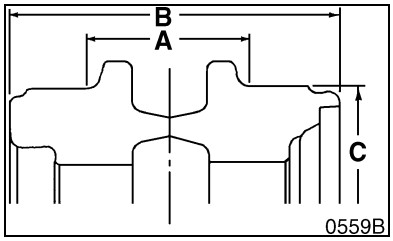


Figure 30

Component / Reference Dimensions	Reference	Normal (New) Dimension	Recommended Limit for Maintenance	Limit for Use (Repair - P or Replace - R)
 **Figure 9**				
Upper roller, axle	A	55 mm (2.165 in.)	54.5 mm (2.146 in.)	54.22 mm [R] (2.134 in.)
Upper roller, bushing	A	55 mm (2.165 in.)	55.5 mm (2.185 in.)	56 mm [R] (2.205 in.)
Axle-bushing, clearance			1 mm (0.039 in.)	1.8 mm (0.071 in.)
Gap between bushing and side collar	B		1 mm (0.039 in.)	1.50 mm (0.06 in.)
Flange thickness	B	6.5 mm (0.256 in.)	5.5 mm (0.217 in.)	5 mm (0.197 in.)
Upper roller  **Figure 10**	A	94 mm (3.70 in.)		
	B	188 mm (7.40 in.)		
	C	142 mm (5.591 in.)	135 mm (5.315 in.)	130 mm [P] (5.118 in.)

4. Detach O-rings (2, Figure 32) from the axle.
5. Separate group seals (6, Figure 32) from the collar and roller (5).
6. Detach collar (3, Figure 32) and O-rings (2) from the axle, using a press.

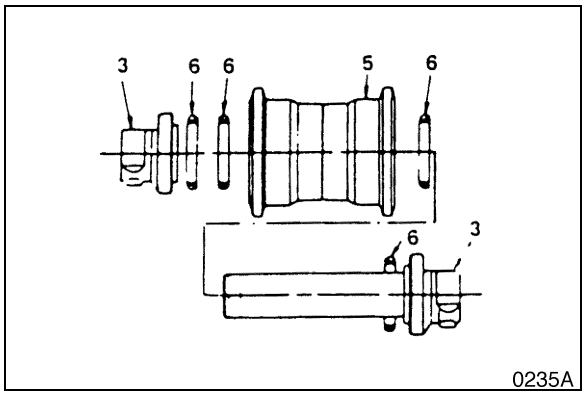


Figure 32

LOWER ROLLER REASSEMBLY

1. Degrease, clean and dry all parts before reassembly. Insert bushing (7, Figure 33) into roller.
2. Apply grease to the O-rings (2, Figure 33) and insert into axle.

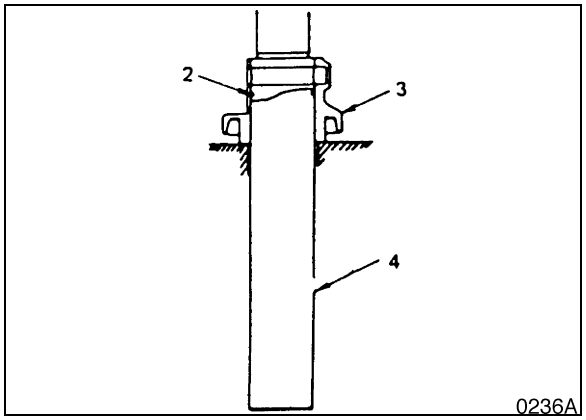


Figure 33

3. Align collar (3, Figure 34) and axle (4) pin holes and pin (1) the collar.

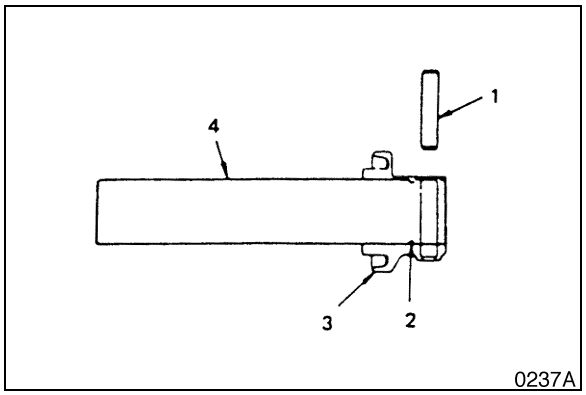


Figure 34

ENGINE AND DRIVE TRAIN

AIR DISCHARGE ACCORDING TO PATH SELECTION

Vent

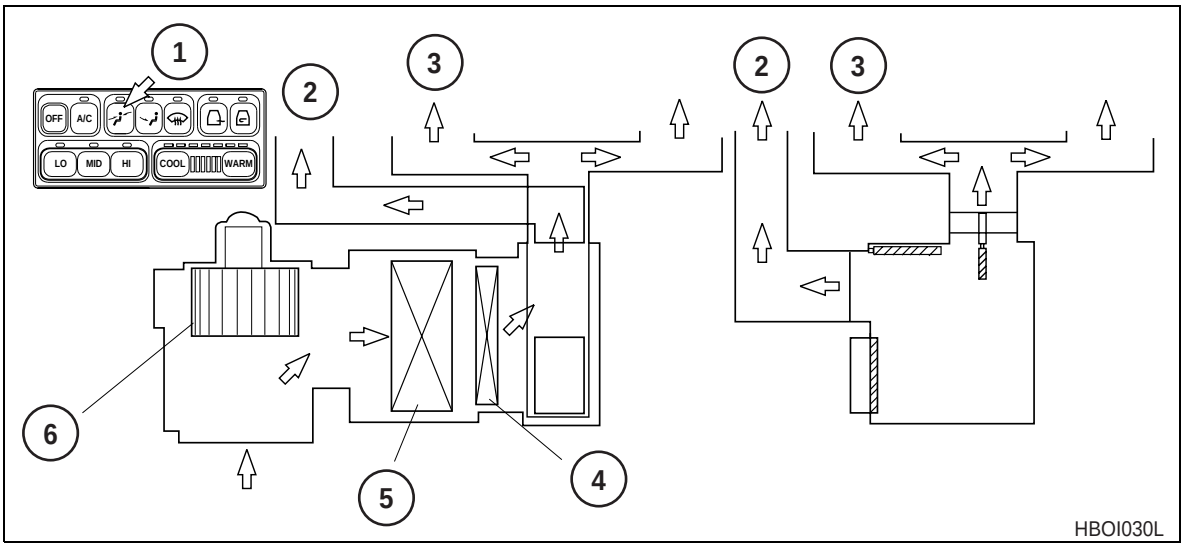


Figure 7

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

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

5. The new refrigerant oil (PAG type) has a high moisture absorption characteristic. When the refrigerant system vacuum seal has been broken, immediately plug up all openings to prevent moisture from entering into the system.
6. When joining unions which use O-ring seals, lightly coat O-rings with refrigerant oil. Be careful not to drip oil on the threads of the nut.
7. Be certain the O-rings are seated properly on the refrigerant line lip. Always use new O-rings when reassembling parts. Do not reuse old O-rings.
8. Use a vacuum pump to evacuate refrigerant system of air.
9. When charging the refrigerant system with the engine running, do not open the high pressure valve on the manifold gauge as the reverse flow of high pressure refrigerant will rupture the hose.
10. When releasing the high pressure hose after completing the charging process, quickly disconnect the hose to minimize refrigerant released to the air.

REPAIR AND REPLACEMENT PROCEDURE

1. Work Procedure
   A. Before repairing or replacing any refrigerant components first, return all refrigerant oil to the compressor and perform recovery procedures.
2. Operating Condition
   A. Run engine at maximum engine speed.
   B. Select ‘HI’ blower fan speed and select A/C switch to ‘ON’.
   C. Set the temperature control switch for maximum cooling and leave running for approximately 20 minutes.

   NOTE: *The manifold gauge dial pointer can vary depending on the outdoor temperatures.*

DRIVE COUPLING

When installing the main pump on the engine, it is very important to properly adjust clearance between the face of the coupling hub and end of pump drive shaft ("Measurement H" shown in the following procedure) to a specific value.

Figure 1 thru Figure 3, show typical drive coupling installations.

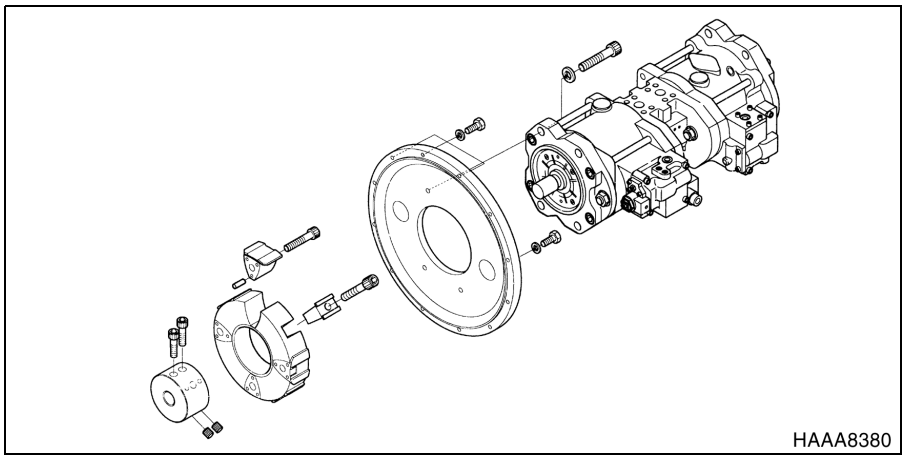


Figure 1 KAWASAKI

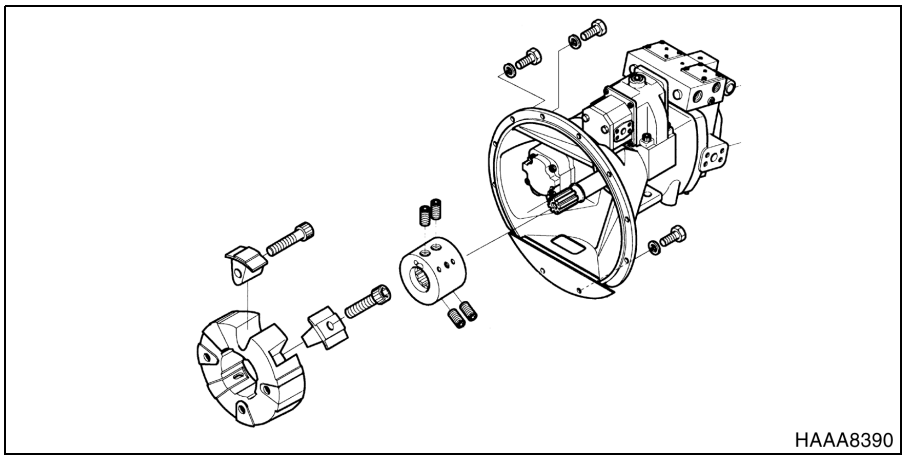


Figure 2 UCHIDA

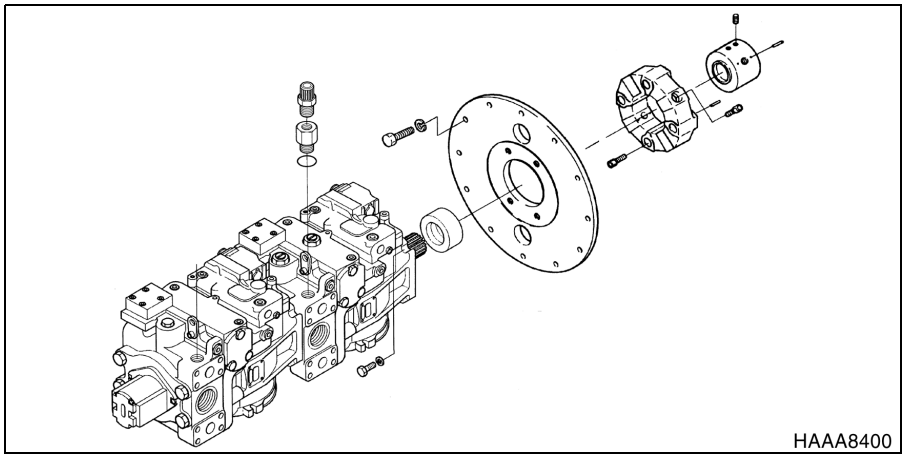


Figure 3 SAUER SUNDSTRAND

HYDRAULICS

FORWARD TRAVEL CIRCUIT

When the right and left travel control levers are pushed forward, output from both of the main pumps is directed through the **PR**, **PL**, **TRF** and **TLF** ports on the control valve, through the upper works center joint, to the travel motors on each side of the machine.

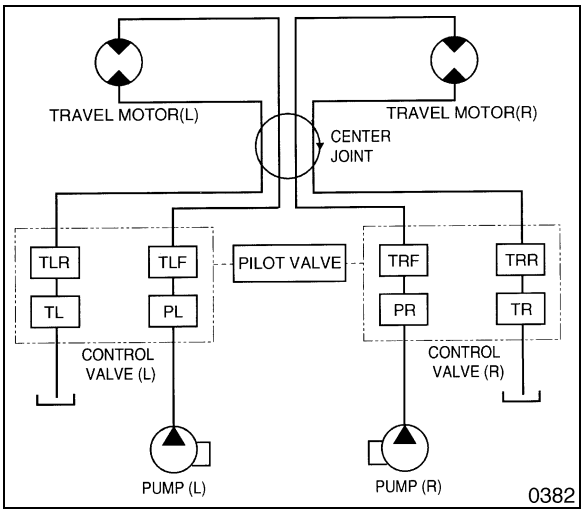


Figure 10

REVERSE TRAVEL CIRCUIT

When the right and left travel control levers are pushed backward, output from both main pumps is directed through the PR, PL, TRR and TLR ports on the control valve, through the upper works center joint, to the travel motors.

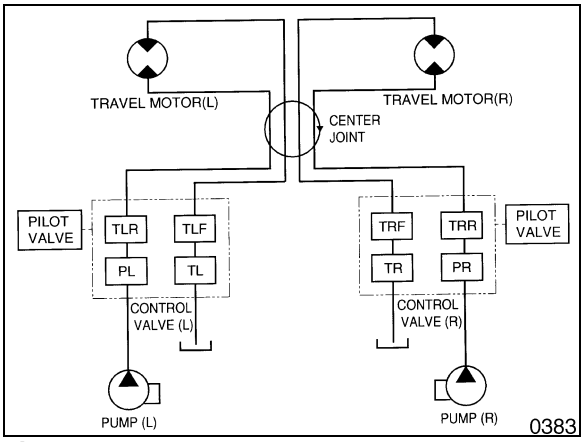


Figure 11

Start the engine and turn the engine speed dial to maximum. When normal operating temperature is reached, loosen the largest diameter lock nut around the adjustment screw (2) for the outer regulator spring. Tightening the screw shifts the P/Q (Pressure/Flow) control curve to the right, and increases compensating control pressure.

On the other hand, if the persistent cause of performance problems is engine overloading, decreasing the adjustment by turning the larger diameter adjusting screw (2) out will decrease pump input horsepower. 1/4 turn on the adjusting screw is equal to approximately 17 horsepower.

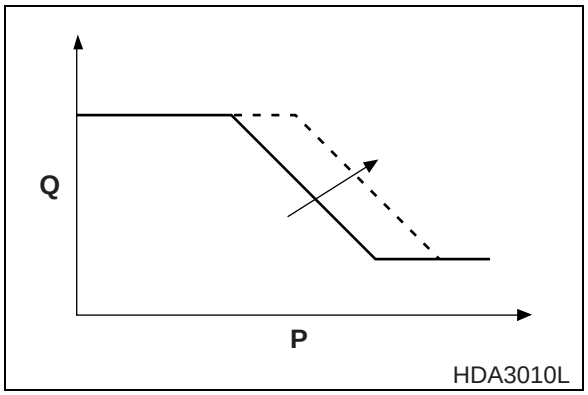


Figure 15

IMPORTANT

Because changing the position of adjusting screw (2) also affects the setting of the adjustment for the inner spring, the smaller diameter adjusting screw (1), turn in the inner screw 198° (slightly more than 1/2 turn, 180°) before screw (2) is backed out 1/4 turn (90°).

NOTE: *For each full turn of adjustment on the larger diameter screw (2), the square-tipped adjusting screw should be turned in the opposite direction 2.2 turns to avoid changing inner spring adjustment.*

Pump input power adjustments are normally made in small increments, 1/4 turn (90°) or less, each time.

Turning the square-tipped, smaller diameter screw (1) clockwise moves the flow curve up, increasing flow and then input horsepower.

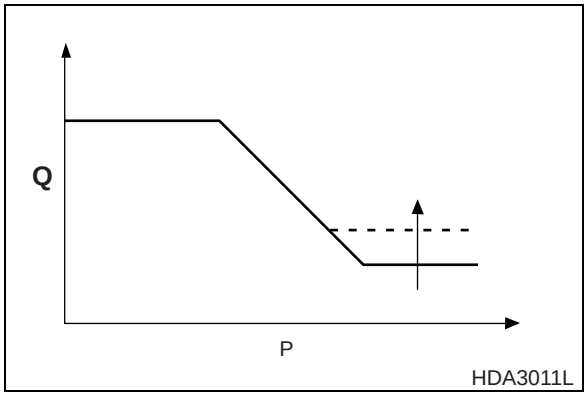


Figure 16

The adjusting screw on the opposite side of the regulator (3) affects the delivery rate (Q) of the pump. Tightening the adjusting screw decreases the maximum cut flow (as shown in Figure 17) while backing out the screw increases cut flow delivery rate.

Balance both pumps for equal output.

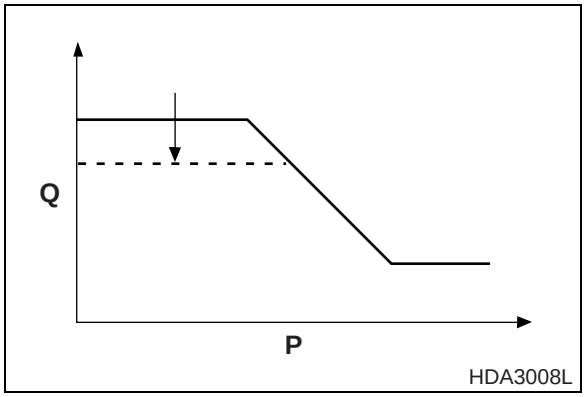


Figure 17

TROUBLESHOOTING - JOYSTICK CONTROL VALVE

Problem	Possible Causes	Remedies
Secondary pressure does not increase	Low primary pressure	Check primary pressure
	Broken spring	Replace spring
	Spool sticking	Clean, repair or replace
	Excess spool to casing clearance	Replace spool casing
	Worn or loose handle subassembly	Repair or replace handle subassembly
Secondary pressure too high	Dirt, other interference between valve parts	Clean, repair or replace
	Return line pressure too high	Redirect return line
Secondary pressure does not hold steady	Dirt, other interference between valve parts, or worn spool sticking intermittently	Clean, repair or replace
	Interference or binding on spool return spring	Clean, repair or replace
	Unsteady pressure in tank return line	Redirect return line
	Air bubbles in piping (temporary) or air leak	Vent air, or repair leak
NOTE: *Look for evidence of leaking oil to help locate damaged seals or gaskets that could be the cause of air leaks.*		

GENERAL DESCRIPTION

The center joint (swivel) is designed to allow hydraulic oil from the upper structure to flow to components in the lower structure.

It is capable of allowing continuous 360° rotation of the upper structure in relationship to the lower structure.

Reference Number	Description
1	Bushing
2	Dust Wiper
3	Retaining Ring
4	U-Packing
5	Buffer Seal
6	Rod Bushing
7	Bolt
8	Retaining Ring
9	Rod Cover
10	O-ring
11	O-ring
12	Backup Ring
13	Piston Rod
14	Cylinder Tube
15	Cushion Ring

Reference Number	Description
16	Piston
17	Slide Ring
18	Wear Ring
19	Slipper Seal
20	O-ring
21	Backup Ring
22	Piston Nut
23	Set Screw
24	Cushion Plunger
25	Bushing
26	Check Valve
27	Spring Support
28	Spring
29	Plug
30	Stop Ring

16. Disassemble retaining ring (3) and dust wiper (2). Separate retaining ring (8) and rod bushing (6).

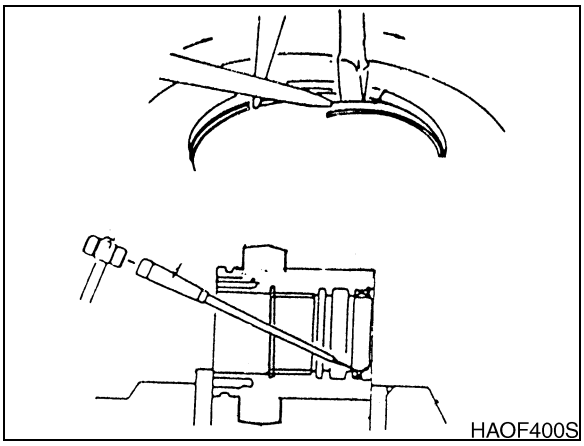


Figure 23

17. Force out pin bushing (1) from body of cylinder.

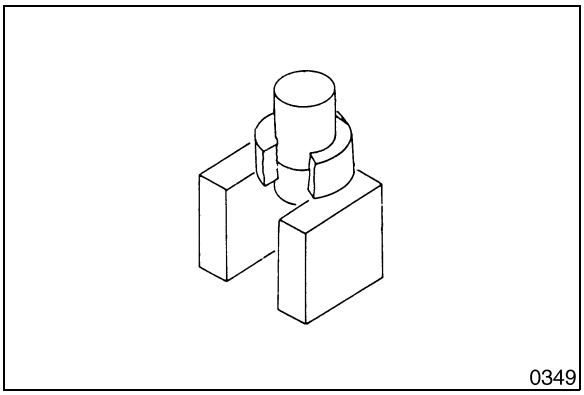


Figure 24

RELIEF VALVE

The relief valve is one of a set of two, and is Item "51" of the swing motor assembly in Figure 5.

Return line pressure (the normal pressurization of the hydraulic reservoir, also referred to as "tank pressure") pushes the valve piston to open ports "R" and "P" at the end of the valve whenever the hydraulic system is operating.

This valve initially reacts to the engagement of hydraulic function (and pressurization of the tank) by opening momentarily, so that there is no pressure developed through the valve at all.

Tank pressure at "pressurized area A2" is set against spring pressure inside the valve, opening the relief valve until pressure at the spring chamber ("g") momentarily reduces "g" chamber pressure "Pg." "Pg" subsequently increases until the piston reaches the end of travel inside the valve bore at "h."

After the piston reaches "h" and its normally closed, pressurized operating position, pressure through the valve can be continually increased up to the relief valve maximum pressure ("Ps").

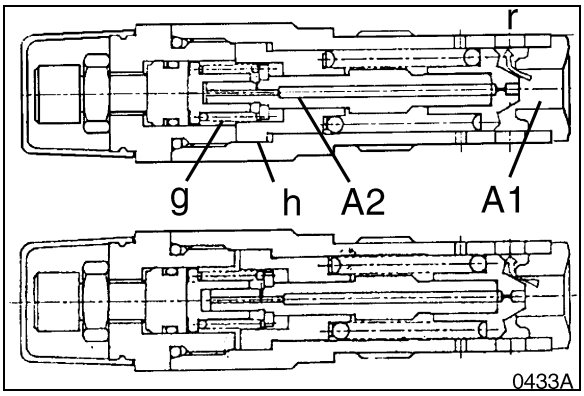


Figure 2

$$Ps = \frac{Fsp}{A_1 - A_2}$$

Where Fsp: Spring Force

SWING BRAKE OPERATION

The swing brake is normally held in the applied position - preventing the upper deck revolving superstructure from rotating - whenever the hydraulic system is not operated (pressurized). The brake system is automatically released whenever the swing controls are engaged to swing in one direction or the other.

18. Drive the oil seal (3) out of the housing (5). A new oil seal must be used for assembly.

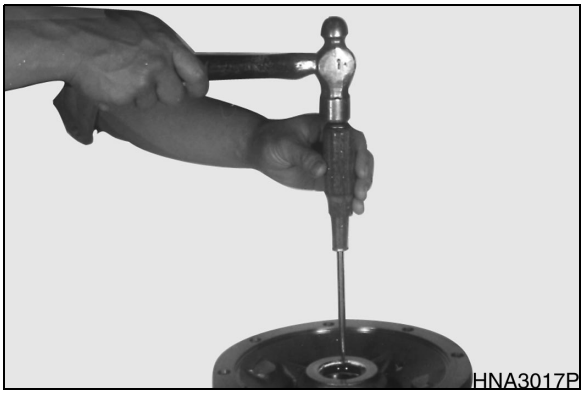


Figure 19

IMPORTANT

Number the pistons and the bores in the cylinder assembly (9) so that when reassembled, the pistons can be put back into their original bores.

19. Use a snap ring pliers to remove the snap ring (1) from the end of the cylinder assembly (9) output shaft.

    Then use a bearing puller to remove the tapered roller bearing (4) from the output shaft. Be certain that the puller jaws bear on the inner bearing race, to prevent damage to the bearing cage. The seal wear ring (2) that sits on top of the bearing will also be pulled off the shaft.

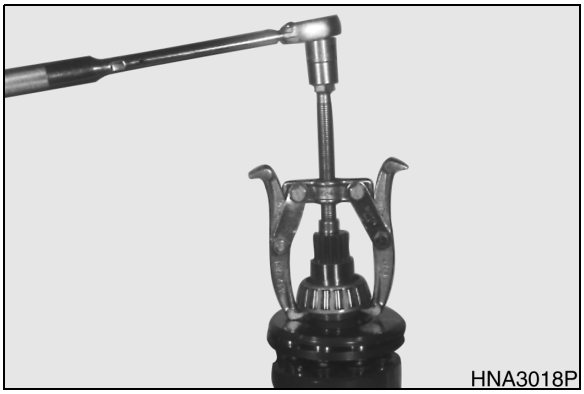


Figure 20

20. Slide the cam plate (6), the return plate (7), and the piston assembly (10), out of the cylinder assembly (9).

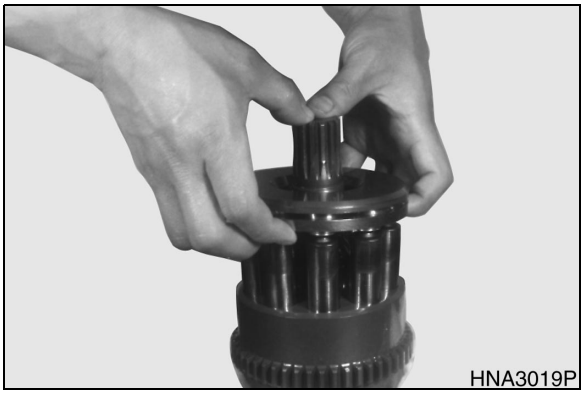


Figure 21

21. Caulk a bead of Threebond sealant around the outer edge of the sealing face on the motor housing (5). This will prevent oil in the housing bolt holes from leaking out and being mistaken for a pressure leak of motor hydraulic fluid.

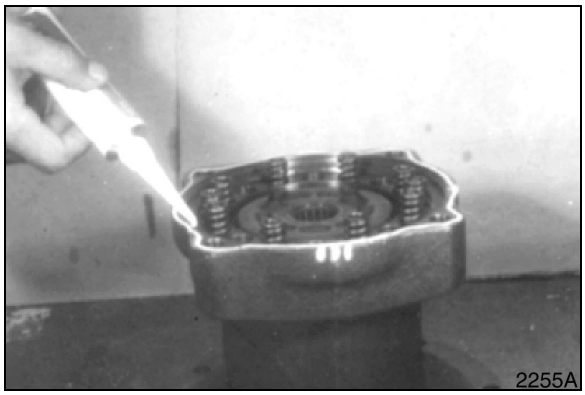


Figure 45

22. Use both hands to lift the motor cover (23). Hold the balance plate (26) in position while setting the cover (23) on the motor housing (5). Align the match marks on the cover and housing that were made when the motor was disassembled. Pin (25) on the cover should fit into the hole in the housing (5). Try to make sure that the balance plate (26) and the bushings (19) do not fall out of their positions in the cover (23).

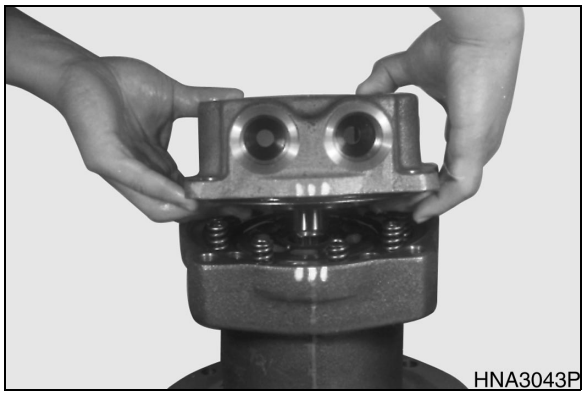


Figure 46

23. Install the bolts (21) through the cover (23) and into the housing (5). Tighten the bolts to 14 kg•m (100 ft lbs).

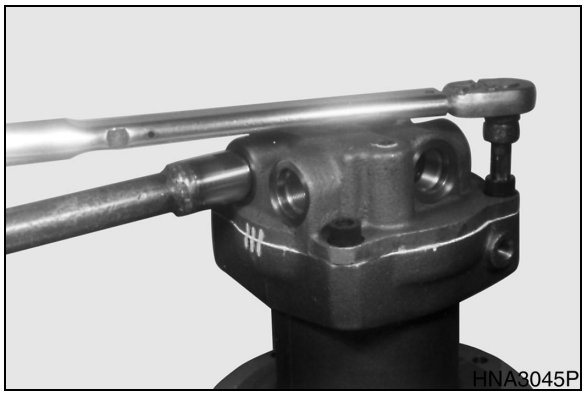


Figure 47

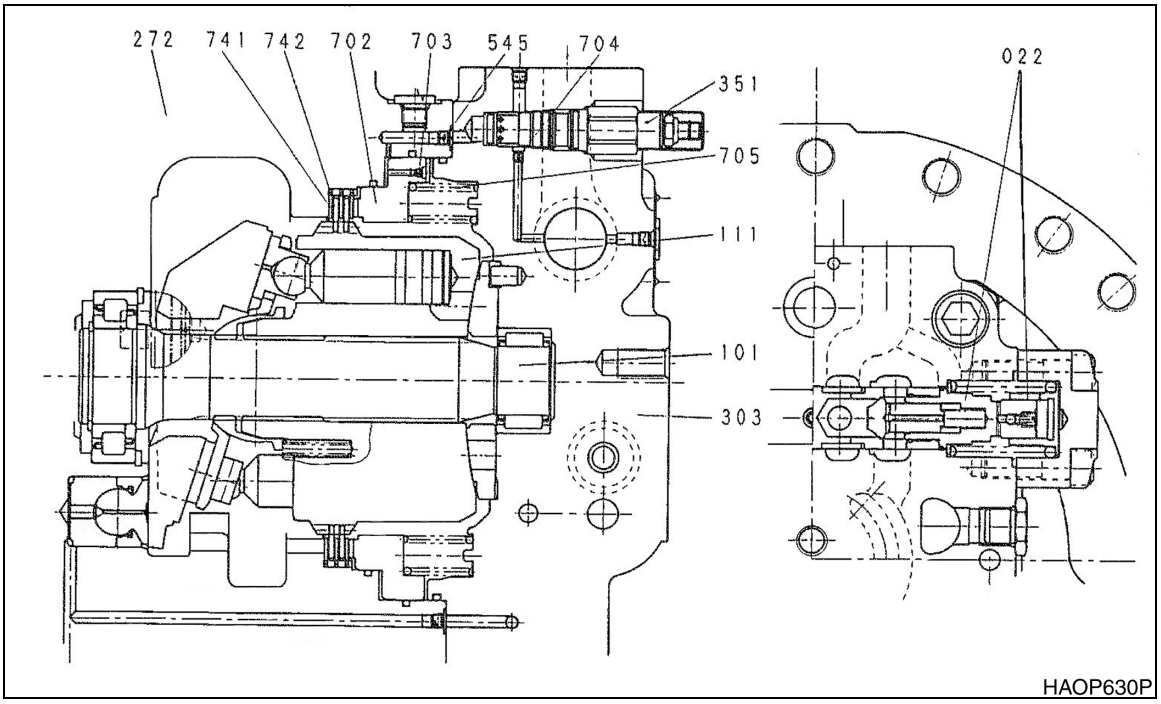


Figure 7

High pressure oil works on the motor by a high pressure selection valve installed in the valve casing (303). The valve casing works on the port P of the tilting valve. This pressure becomes SERVO- pressure.

Because the spool (531) installed in the tilting valve is pushed to the plug (571) by the spring (533), the high pressure of port P becomes blocked.

B. When the external pilot pressure is applied to the valve, at 20 kg/sq cm or higher (Pi> 20 kg/sq cm), the tilting angle becomes low.

Tools	B Dimension	Applicable Parts Remarks
Minus Driver		For removing a floating seal
Press (1 ton)		Angular Bearing (33)
Depth Gauge (depth 100mm)		For adjusting shim (35)
Punch		Not to be taken off spring pin
Torque Wrench		It should be possible to be tightened with tightening torque.
Tap M16		For releasing locking of tapped hole
Grindstone		
Seal Tape		Plug (32)
Screw Lock Adhesive (Three bond 1303B)		Hex Screw (29)

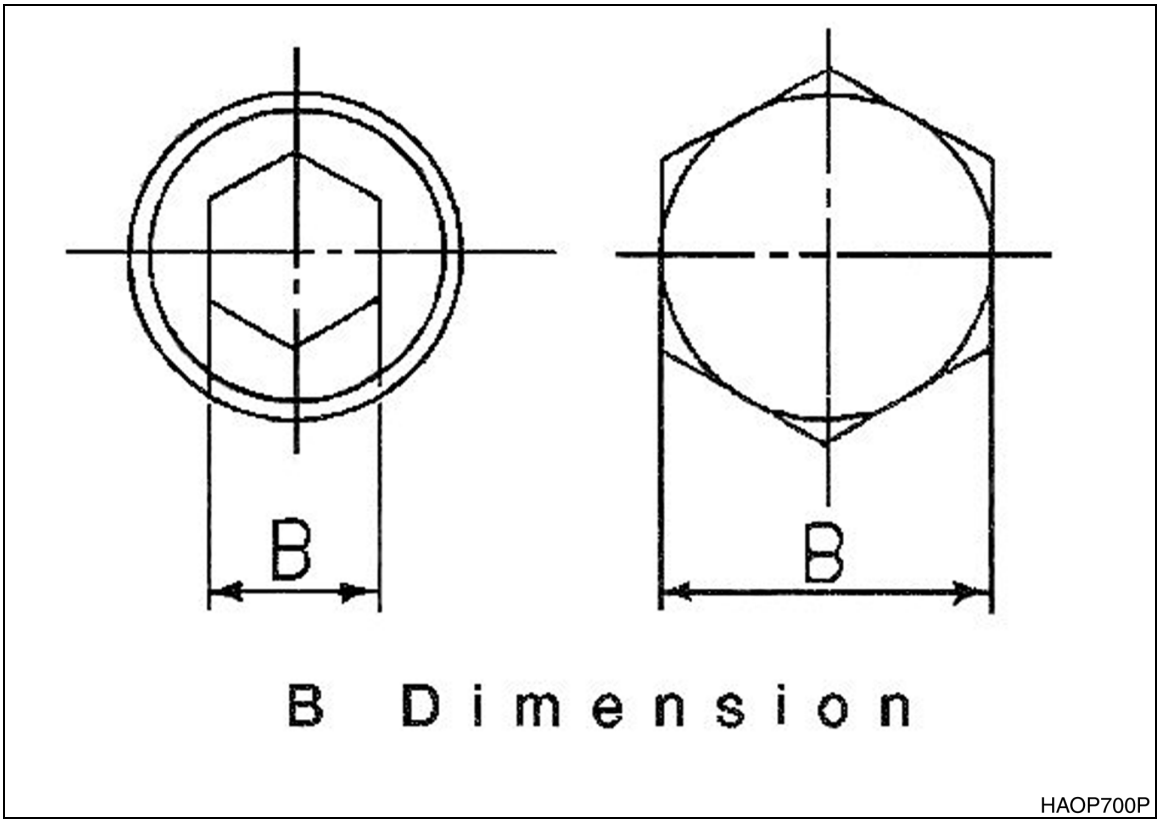


Figure 13

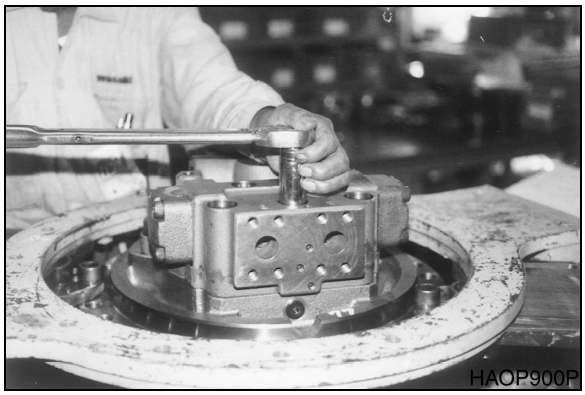


Figure 31

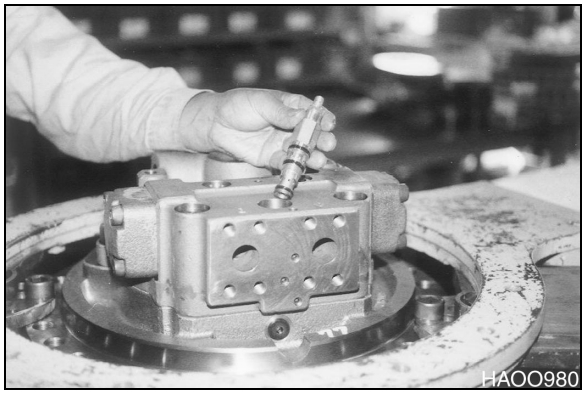


Figure 32

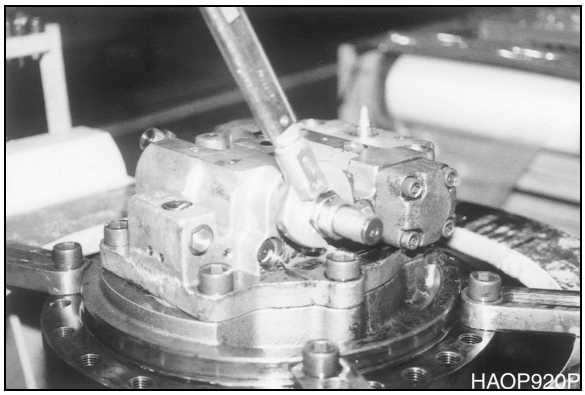


Figure 33

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

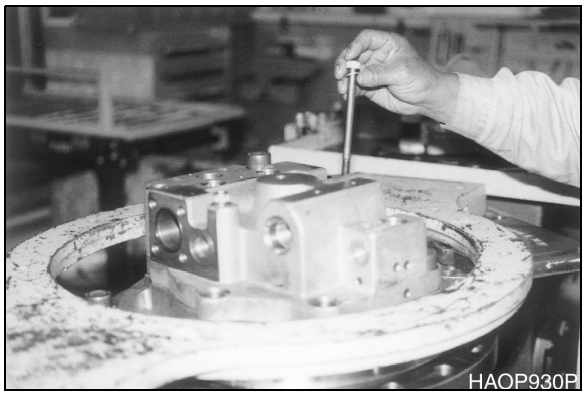


Figure 34

Parts name and Inspection item	Standard Value	Standard value of replacement	Remedies
No.3 planetary gear	Tooth thickness 54.930 mm (2.1626 in.) (4 teeth)	54.630 mm (2.1508 in.)	Replacement (z=22)
Ring gear (for the third step)	Over pin 348.740 mm (13.7299 in.) (ϕ 8.50 mm (0.3346 in.))	349.340 mm (13.7535 in.)	Replacement (z=71)
Crack and flaking of bearing inner or outer race			If there are any signs of crack and flaking, replace it
Crack and flaking of 1,2,3 speed planetary gear and pin			If there is any signs of crack and flaking, replace it.
Radial clearance of needle cage	0.010 - 0.040 mm (0.0004 - 0.0016 in.)	0.070 mm (0.0028 in.)	Replace the whole set
Crack of spline			If there is any signs of damage, replace it.
Back lash of spline	0.10 - 0.30 mm (0.0039 - 0.0118 in.)	0.50 mm (0.0197 in.)	After checking dimension, replace parts according to the next standard.
Thrust ring (26)	Thickness 7.0 mm (0.2756 in.)	6.60 mm (0.2598 in.)	Replace each part, if part is worn and stuck.
Thrust ring (27)	Thickness 8.0 mm (0.3150 in.)	7.60 mm (0.2992 in.)	
Floating seal			Replace it, if the sliding surface is scratched, or rusted, and if the O-ring is deformed or damaged
Gear oil	90EP or SAE#90		The 1st replacement: 500 operation hours After the 2nd replacement: about every 2000 hours

17. Reassemble No. 2 carrier subassembly.

A. After assembling No. 2 carrier (6) to No. 3 sun gear (1), insert clip (46).

B. Place No. 2 carrier so that front side of No. 3 sun gear is facing down.

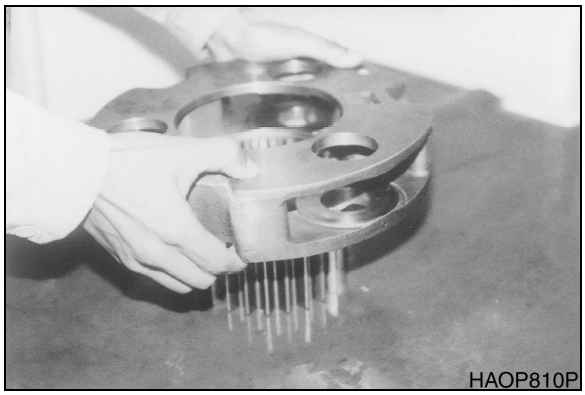


Figure 82

C. After inserting needle cage (22) inside No. 2 planetary gear (13), assemble to No. 2 carrier so that it is between side plate (19).

D. Insert No. 2 pin (16) into No. 2 carrier.

E. Insert spring pin (37) into holes of No. 2 carrier and No. 2 pin. Tighten using a punch at both locations as shown in Figure 84.

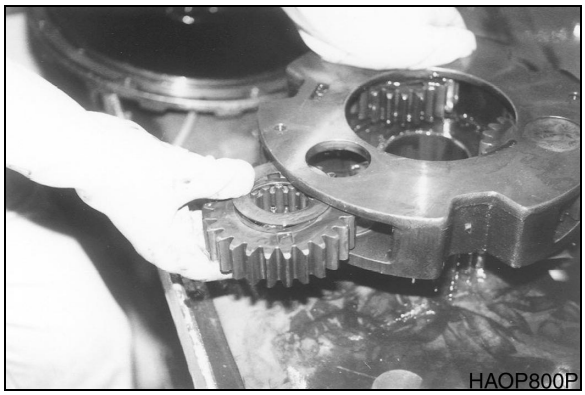


Figure 83

NOTE: *Configure center of planetary gear and pin hole of carrier.*

Match up bolt holes of spring.

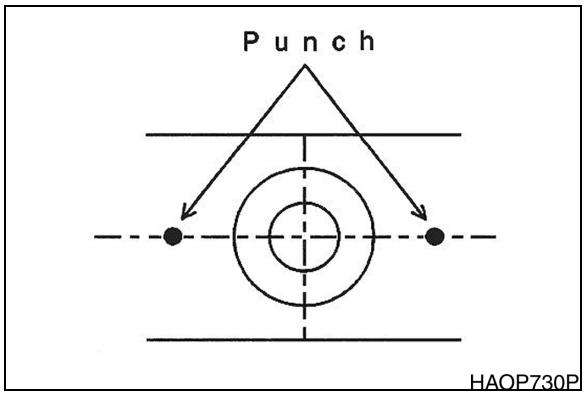


Figure 84

18. Screw two M10 lifting eye bolts in No. 2 carrier subassembly, and assemble with a crane making sure that No. 2 planetary gear and ring meshed correctly.

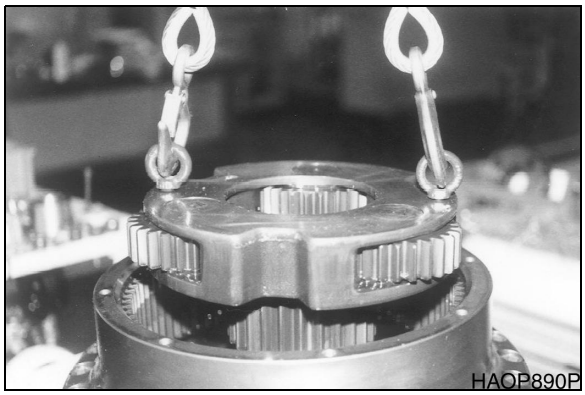


Figure 85

PUMP REGULATOR OPERATION

The relationship between Pump Displacement Flow (Q on the vertical axis) and Pilot Pressure (Pi on the horizontal axis). Pump output discharge is controlled by increasing or decreasing pilot pump pressure (Figure 7).

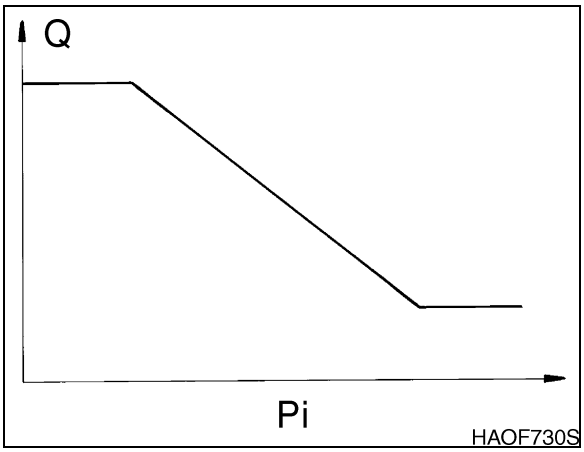


Figure 7

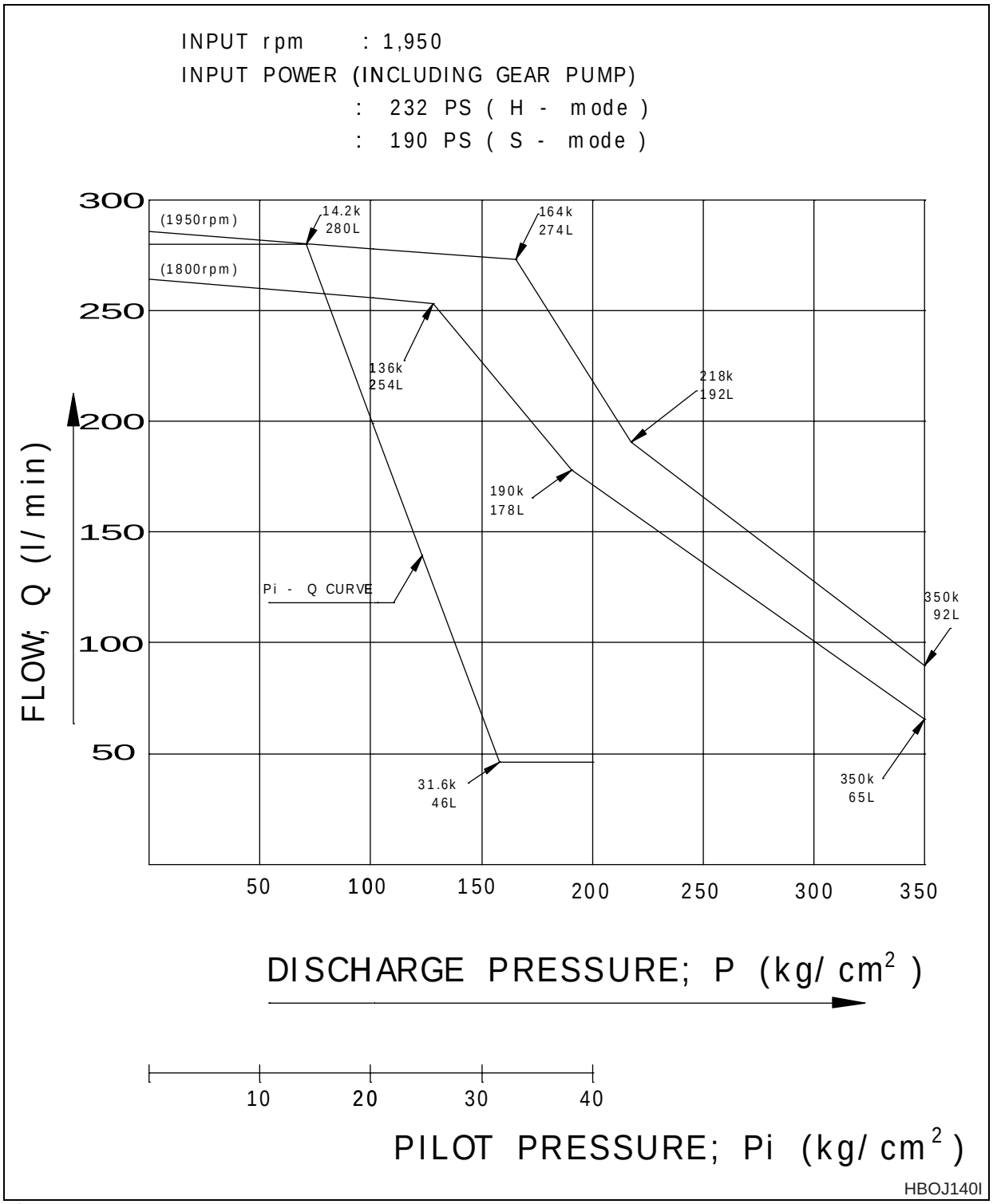

INPUT rpm : 1,950
INPUT POWER (INCLUDING GEAR PUMP)
: 232 PS (H - mode)
: 190 PS (S - mode)
(1950rpm)
(1800rpm)
14.2k
280L
164k
274L
136k
254L
218k
192L
190k
178L
Pi - Q CURVE
350k
92L
31.6k
46L
350k
65L
300
250
200
150
100
50
FLOW; Q (l/min)
50
100
150
200
250
300
350
DISCHARGE PRESSURE; P (kg/cm2)
10
20
30
40
PILOT PRESSURE; Pi (kg/cm2)
HBOJ140I

Figure 15

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.*

Reference Number	Item	Standard Value mm (In)	Replacement Limit mm (In)	Remedy
1	Clearance between cylinder bore and piston (D-d)	0.043 mm (0.00169 in.)	0.070 mm (0.00276 in.)	Replace piston or cylinder
2	Free-length of cylinder spring (L)	47.9 mm (1.88 in.)	47.1 mm (1.85 in.)	Replace spring
3	Thickness of shoe (t)	5.4 mm (0.2126 in.)	5.0 mm (.1968 in.)	Replace piston, shoe assembly parts
4	Piston ball - shoe socket clearance (a)	0 - 0.1 mm (0.00394 in.)	0.30 mm (.01 in.)	Replace piston or shoe assembly
5	Height of push plate, round bushing assembly (H-h)	13.5 mm (.531 in.)	12.5 mm (.492 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.

ARM LOAD HOLDING VALVE

1. When plunger is in neutral position (Pal pilot signal: "OFF")

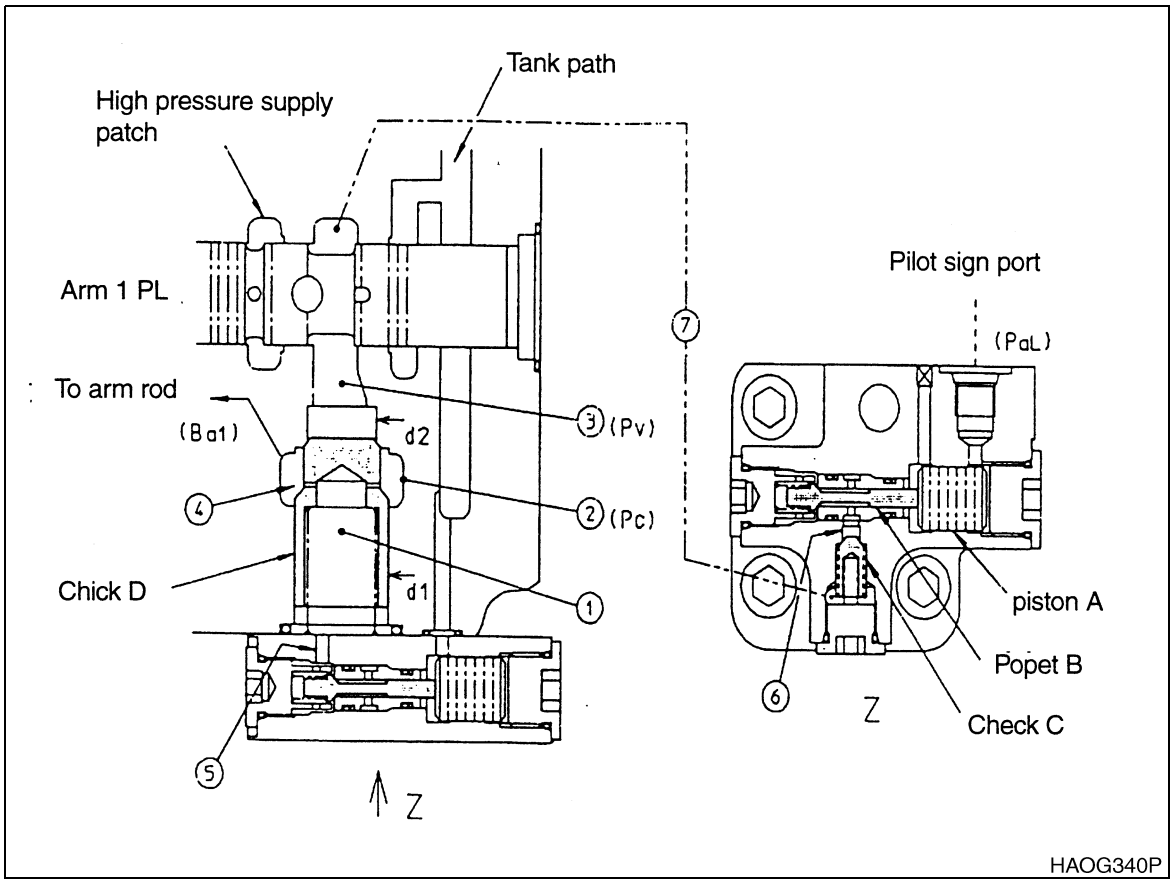


Figure 16

A. Piston A and poppet B are in position blocking path 5 and 6. As oil flows from chamber (1) to chamber (2), the pressure at orifice (4) is Pe. Since d1 > d2, check valve D is seated completely blocking out chambers (2 and 3).

Main Relief Valve

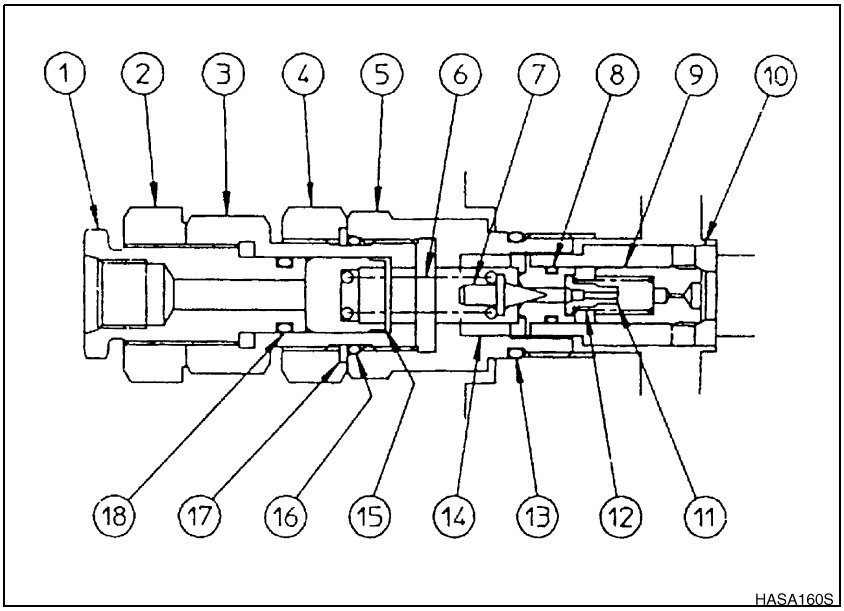


Figure 29

Reference Number	Description
1	Adjusting Screw
2	Hexagonal Nut
3	Sleeve
4	Hexagonal Nut
5	Cap
6	Spring
7	Pilot Poppet
8	O-ring
9	Main Poppet

Reference Number	Description
10	Sleeve
11	Orifice
12	Spring
13	O-ring
14	Pilot Sheet
15	Piston
16	O-ring
17	Backup Spring
18	O-ring

CONTROL VALVE DRAWING AND HYDRAULIC CIRCUIT

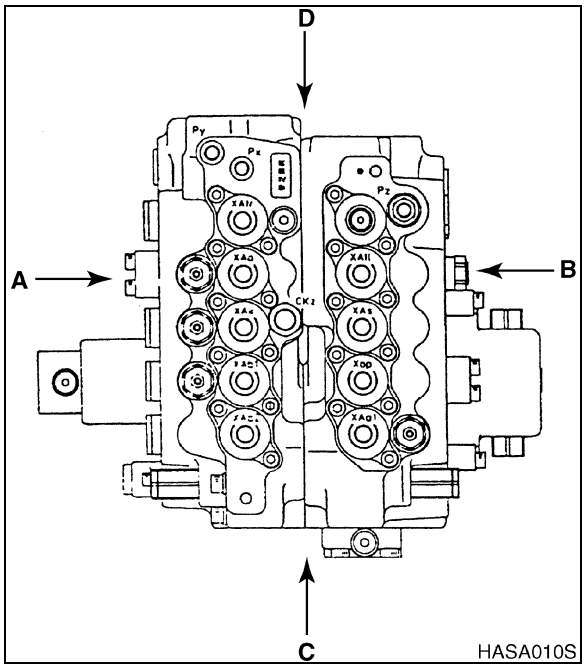


Figure 50 CONTROL VALVE TOP VIEW

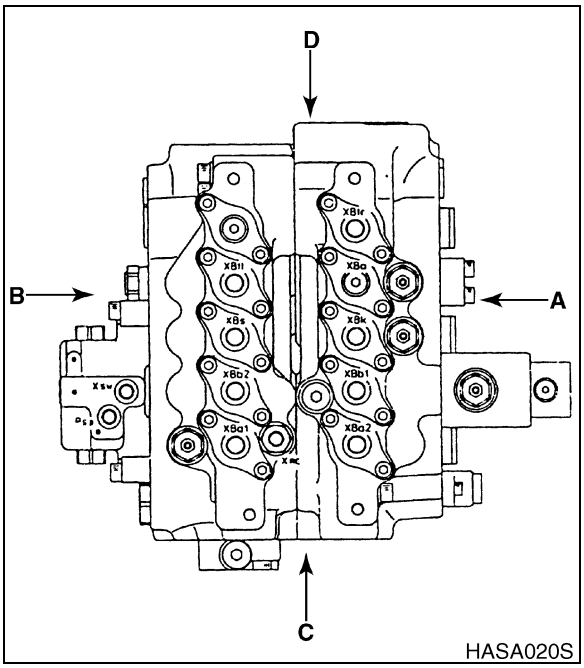


Figure 51 CONTROL VALVE BOTTOM VIEW

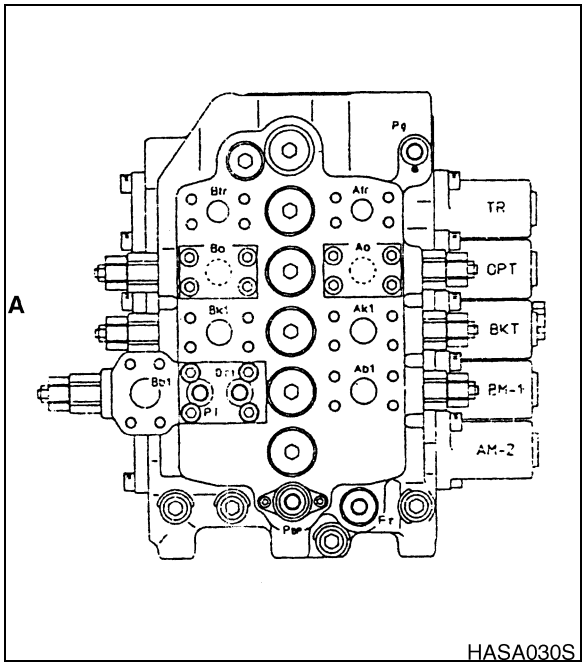


Figure 52 CONTROL VALVE LEFT VIEW

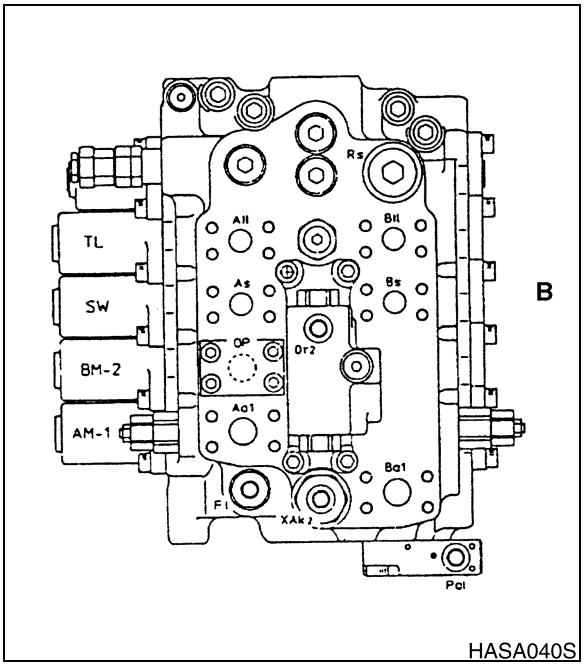


Figure 53 CONTROL VALVE RIGHT VIEW

IMPORTANT

Improper relief valve pressure settings may cause severe damage to the hydraulic system. Extreme caution should be taken when making pressure adjustments.

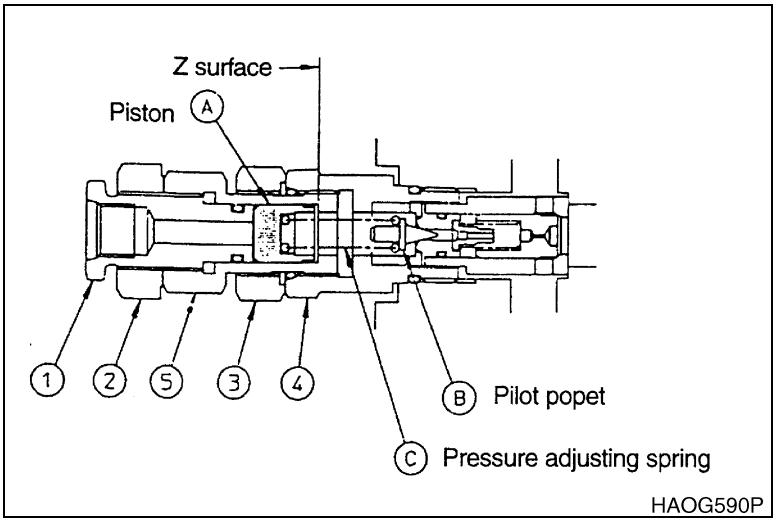


Figure 75

IMPORTANT

Inspect all O-ring gaskets for damage and replace as necessary. Never reuse damaged or questionable O-rings.

Main Relief Valve - Reassembly

1. Insert piston (A) into sleeve (7). Assemble hex nut (2) onto adjust screw (1). Assemble adjust screw (1) to sleeve (7), until piston (A) is seated.
2. Insert pilot poppet (B) into pressure adjust spring (C) and insert into sleeve (7). Assemble cap (4) onto sleeve (7), making sure pilot poppet (B) is properly seated.
3. Insert orifice (10), spring (9) and piston (8) into lower sleeve (6).
4. Assemble lower sleeve (6) onto cap (4).
5. Insert assembled relief valve into control valve body and tighten cap (4).

Tightening torque	10 kg•m (72 ft lbs)

IMPORTANT

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

Reference Number	Description
1	Cap
2	Check
3	Spring

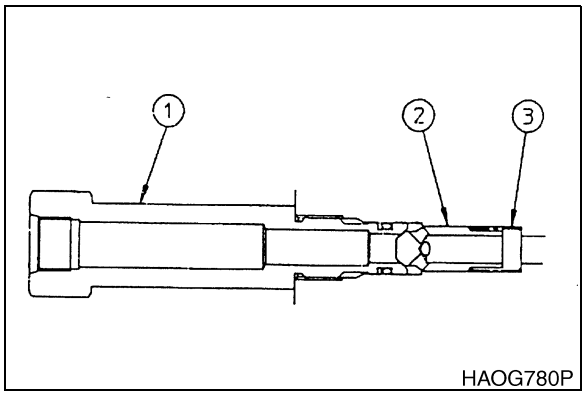


Figure 92

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

Cap wrench size	32 mm
Tightening torque	10 kg•m (72 ft lbs)

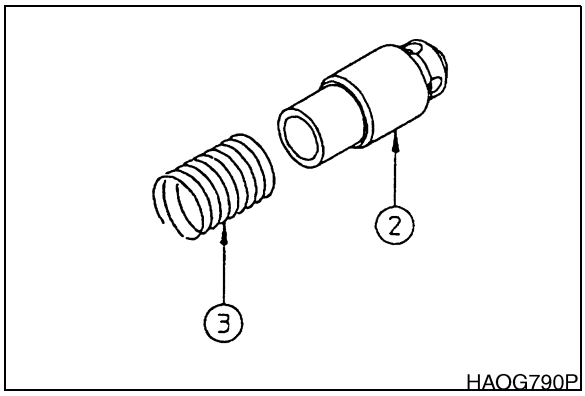


Figure 93

IMPORTANT

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

A: Check Valve (Main Relief Valve, TS)

Reference Number	Description
1	Cap
2	Spring
3	Check

Cap hole size	12 mm
Tightening torque	10 kg•m (72 ft lbs)

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

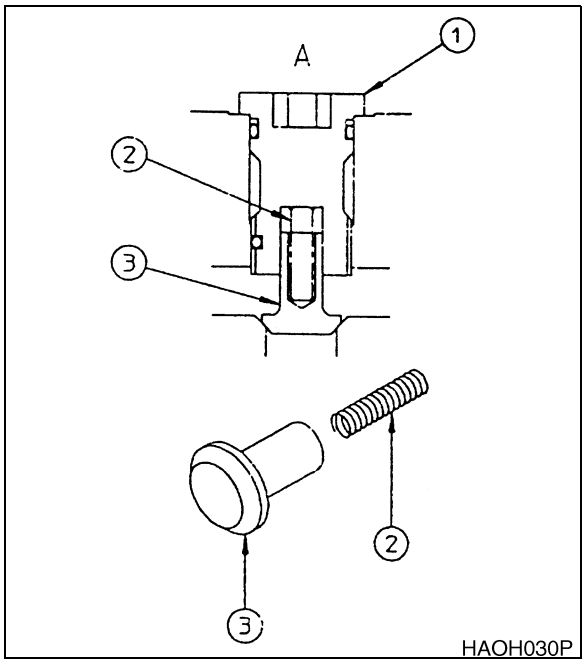


Figure 113

B: Check Valve (P2)

Reference Number	Description
1	Cap
2	Spring
3	Check

Cap hole size	12 mm
Tightening torque	20 kg•m (145 ft lbs)

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

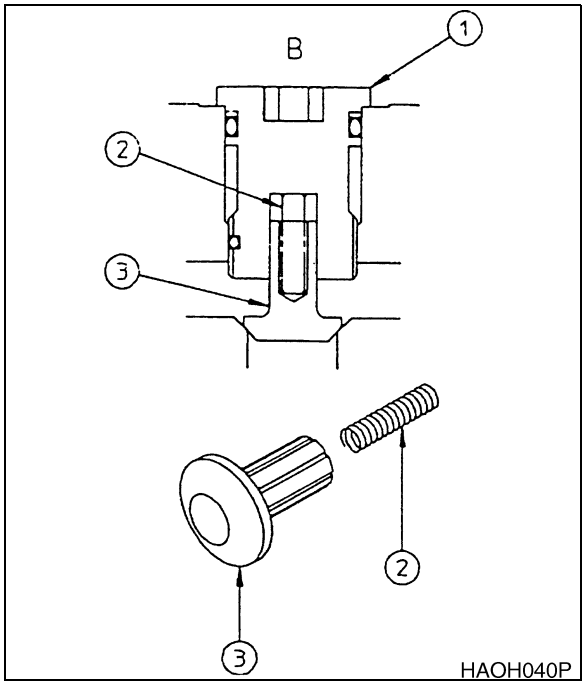


Figure 114

Reference Number	Description
1	Switch Assembly
2	Nut
3	Boot
4	Nut
5	Nut
6	Push Rod
7	Plate
8	Plug
9	Stopper
10	Shim
11	Spring
12	Spool
13	Plug
14	O-ring

Reference Number	Description
15	Plug
16	Case
17	O-ring
18	Spring
19	Spring Seat
20	O-ring
21	Bushing
22	Rod Seal
23	Swash Plate
24	Joint Assembly
25	Connector, Handle
26	Insert
27	Screw
28*	Handle Assembly

NOTE: ** On some models the handle assembly (28) may contain other switches for operation of specialized components (grapples, scrap handlers, etc.). Basic construction of valve is the same.*

SPECIFICATIONS

Torques

Reference Number	Description	Size	Torque
15	Plug	PT 1/8	
5	Nut	M14	
4	Nut	M14	
23	Swash Plate	M14	
24	Joint	M14	

9. Install plug (8) to housing. Apply hydraulic oil (13).

Figure 26

Reference Number	Description
1	Seal
2	Plug
3	Hydraulic Oil

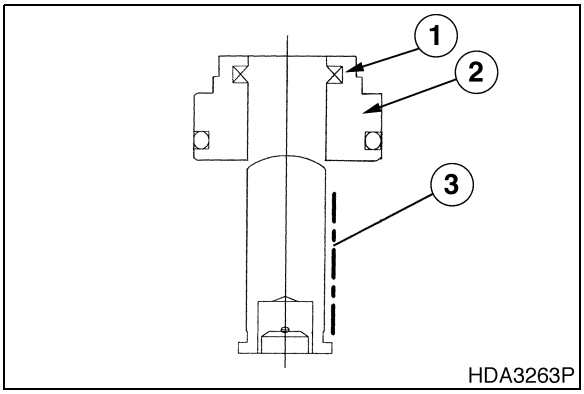


Figure 27

10. Assemble plate. Tighten joint (24) to housing using special tool.

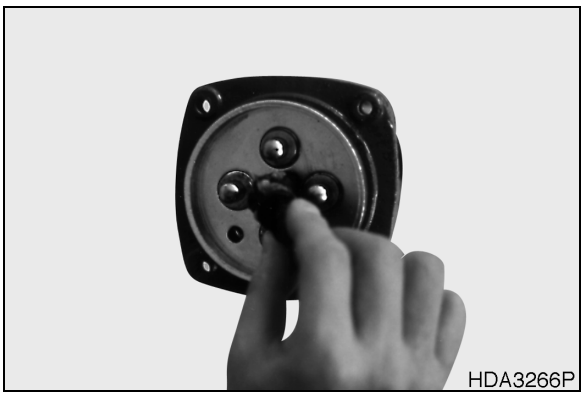


Figure 28

11. Attach swatch plate (23) to joint.

Figure 29

Reference Number	Description
101	Casing
151	Plug
201	Cover
202	Plug
203	Grease Cup
210	NHU Packing
212	O-ring
214	Push Rod
215	Washer 1
217	Washer 2
218	Spring Seat
221	Retaining Ring
223	Bushing
224	Piston
225	Steel Ball

Reference Number	Description
271	Hex Bolt
301	Spool
311	Spring Seat
313	Washer 3
324	Spring
335	Spring
336	Spring
337	Spring
412	Bushing
413	Cam Shaft
420	Cam
423	Set Screw
471	Set Screw
472	Lock Nut
501	Bellows

SPECIFICATIONS

Travel Control Valve	Type:	Pilot Control
	Pressure/Stroke:	27 kg/sq cm (383 psi) @ 4.8 mm (0.19") stroke
	Weight:	7.8 kg (26.5 lb)

TORQUE TABLE

Part Reference Number	Bolt Size	Tightening Torque
151	NPTF 1/16	6.9 ±1 N•m (70 ±10 kgf cm)
271	M12	78.5 ±9.8 N•m (800 ±100 kgf cm)
423	M6	6.9 ±1.0 N•m (70 ±10 kgf cm) Apply Loctite #241
472	M10	33.3 ±3.4 N•m (340 ±35 kgf cm)

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

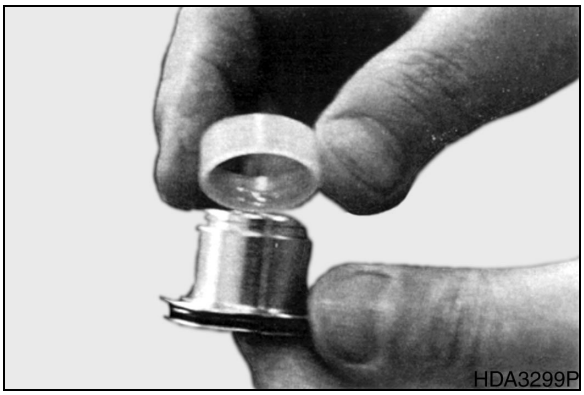


Figure 30

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

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

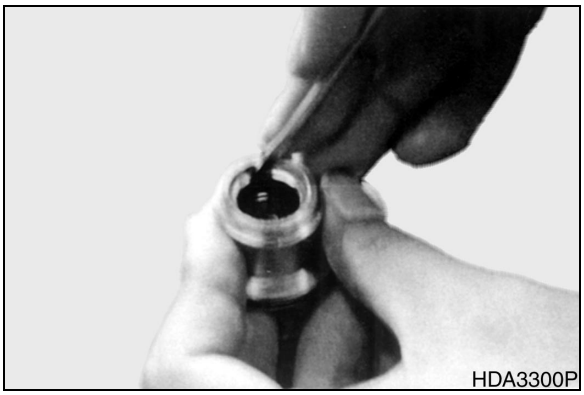


Figure 31

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

Figure 32

24. Apply Loctite #241 on the threads of the set screw (423).

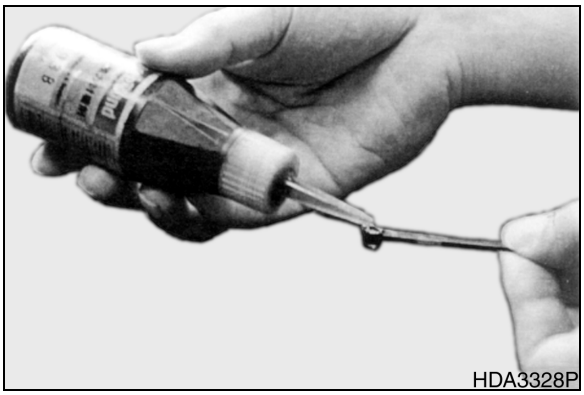


Figure 59

25. Assemble allen head set screw (423) and tighten to torque specified in torque table.

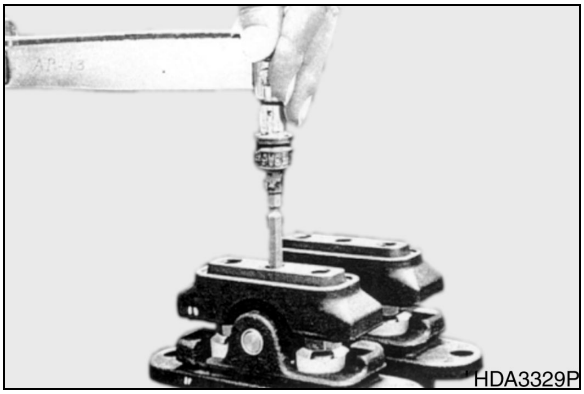


Figure 60

26. Move the cam to the left and right and adjust the height of the set screw (471) so that the cam base is parallel to the cover and tighten lock nut (472).

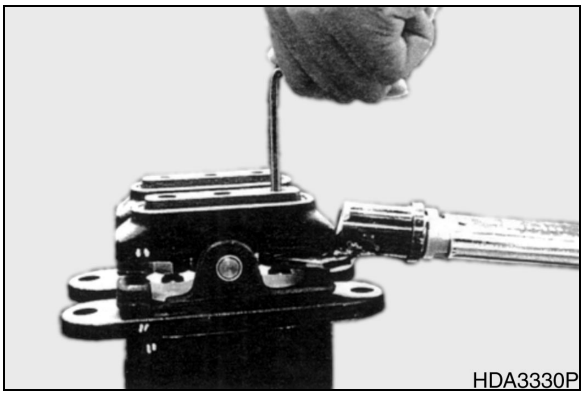


Figure 61

IMPORTANT

Do not overtighten set screw (471) to the point where the push rod is being pressed down in the neutral position. This may cause the excavator to make sudden unwanted movement without the operating the control levers.

9. Remove seal (16,17) from plug (19).
   (16) DUST SEAL
   (17) ROD SEAL

Figure 11

10. Remove plug (19) from O-ring.

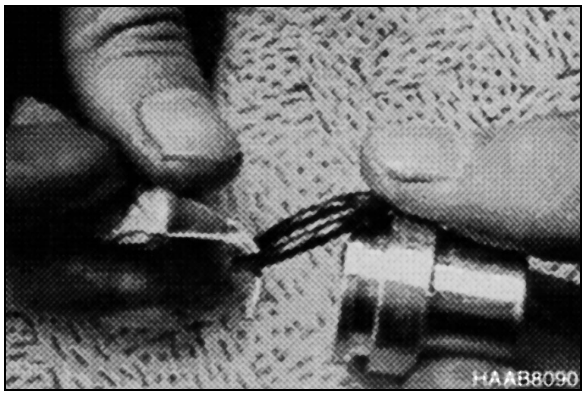


Figure 12

11. Remove spool assembly from casing (1).

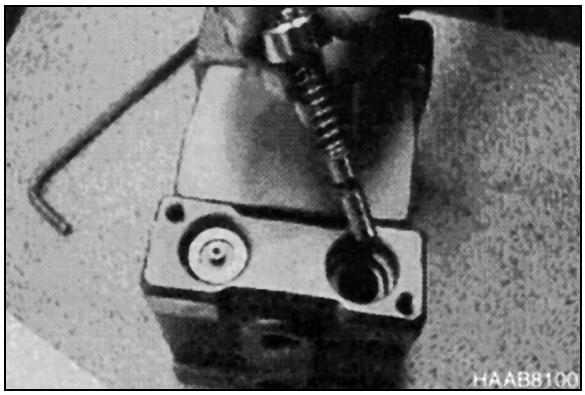


Figure 13

12. Remove stopper (13) from spool assembly.

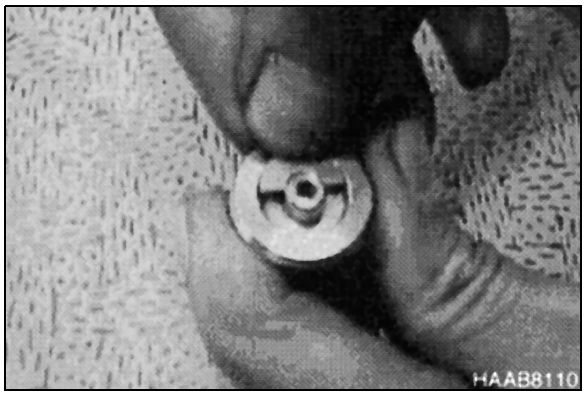


Figure 14

GENERAL DESCRIPTION

Schematic(s) presented in this section are laid out on facing pages.

An overlapping edge has been taken into consideration so that a photocopy can be made and pasted together to make a complete schematic.

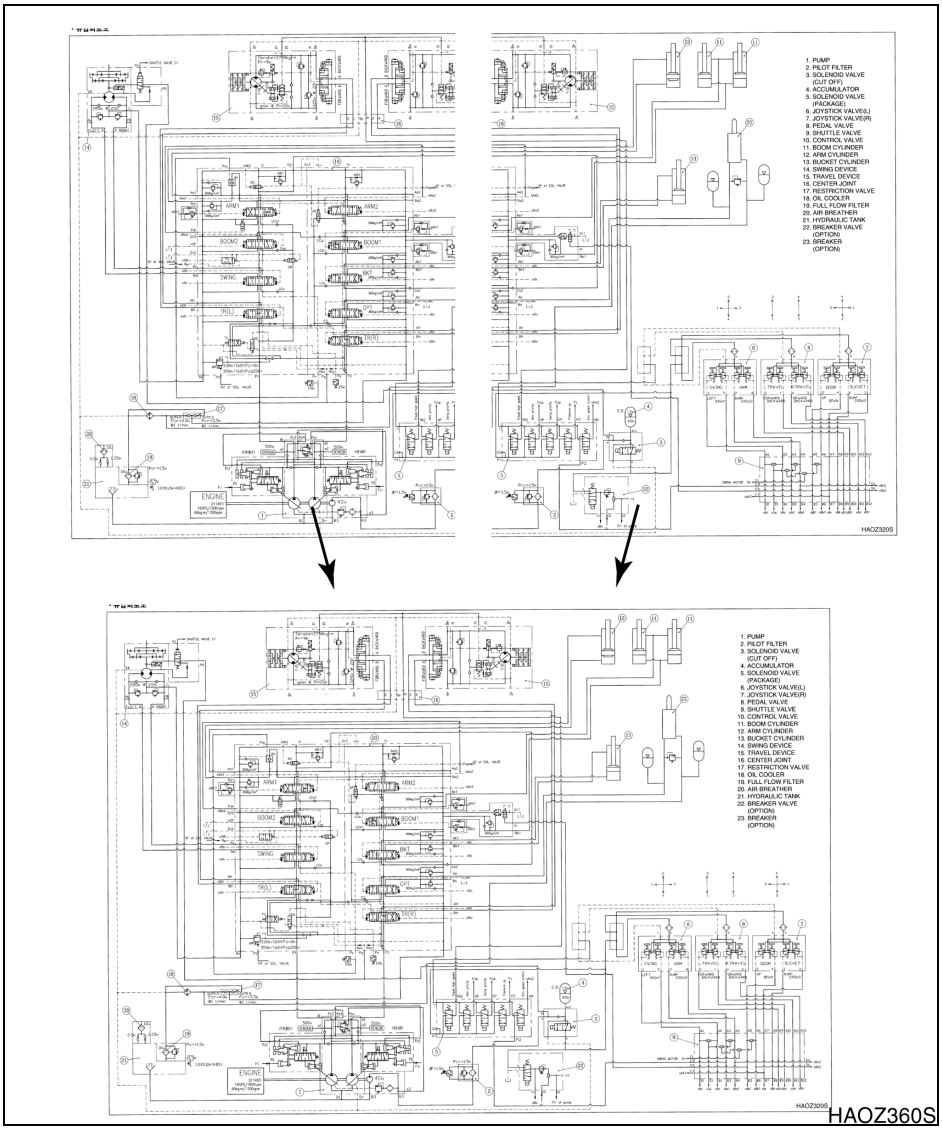


Figure 1

WIRING HARNESS ILLUSTRATIONS

The electrical system diagram(s) is available in the "Hydraulic and Electrical Schematic Shop Manual." This manual is a collection of diagrams and schematics for a number of models.

OVERVIEW

The electrical system for this equipment is DC 24 volts. The rated voltage for all electric components is 24 volts with the exception of the car stereo and the air-conditioning control actuator. The system contains two 12 volt batteries connected in series and a three phase AC generator with a rectifier. The electric wiring used in the system is easily identifiable by the insulator color. The color symbols used in the electric system is listed in the following chart.

Electric Wire Color

Symbol	Color
W	White
G	Green
Or	Orange
B	Black
L	Blue
Lg	Light Green

Symbol	Color
R	Red
Gr	Gray
P	Pink
Y	Yellow
Br	Brown
V	Violet

NOTE: *RW: Red wire with White stripe*

R - Base Color, W - Stripe Color

NOTE: *0.85G: Nominal sectional area of wire core less insulator = 0.85 mm^2*

MONITORING SYSTEM

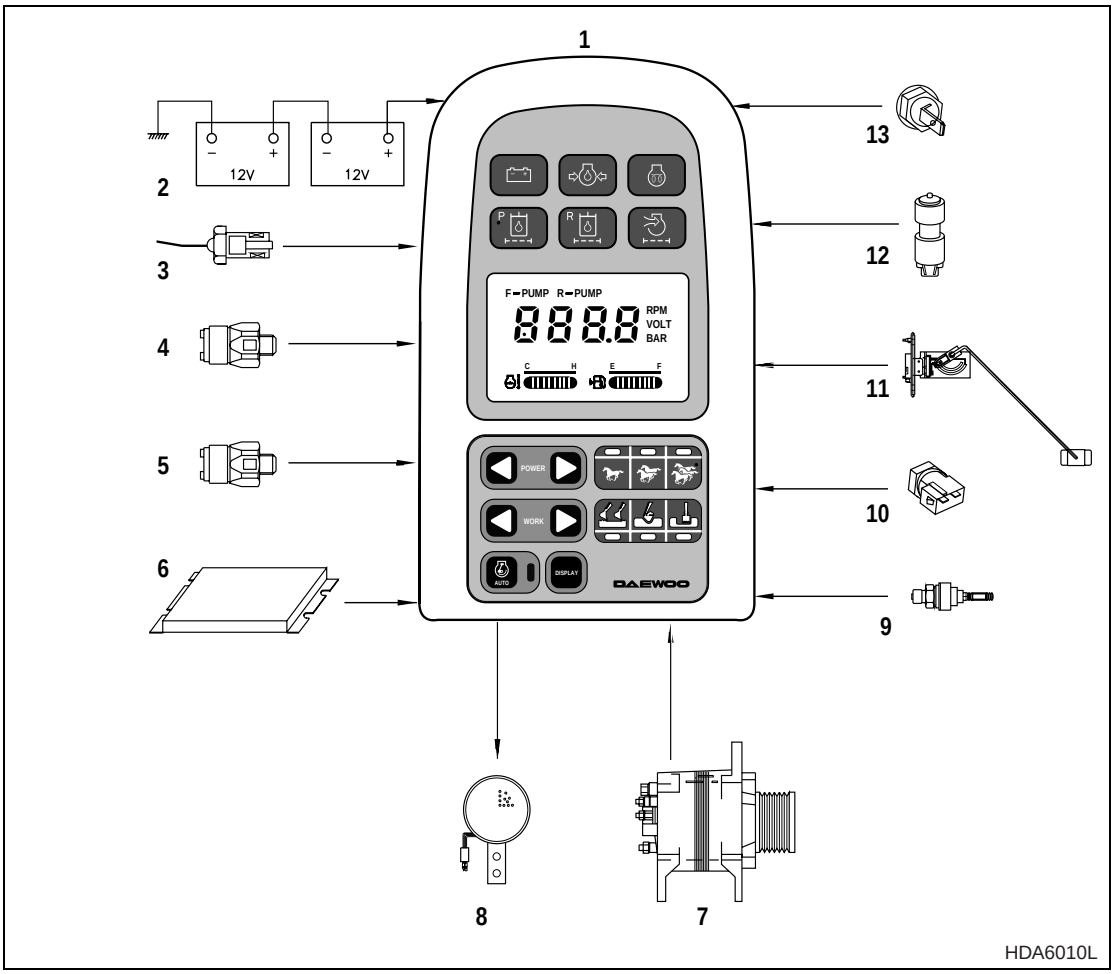


Figure 10

Reference Number	Description
1	Instrument Panel
2	Battery
3	Engine Speed Sensor
4	Return Filter Switch
5	Pilot Filter Switch
6	EPOS-V Controller
7	Alternator

Reference Number	Description
8	Warning Buzzer
9	Pump Discharge Pressure Sensor
10	Engine Coolant Temperature Sensor
11	Fuel Sensor
12	Air Cleaner Indicator
13	Engine Oil Pressure Switch

The monitoring system displays the various data and warning signals onto the instrument panel by processing the information gathered from the various sensors throughout the equipment.

The operator can select the information to be displayed on the instrument panel.

Reference Number	Description
1	Instrument Panel
2	Engine Control Motor
3	Engine
4	Main Hydraulic Pump
5	Control Pump
6	Control Valve
7	Pressure Switch
8	Pump Pressure Sensor
9	Engine Speed Sensor
10	Electro-magnetic Proportional Pressure Reducing Valve (E.P.P.R. Valve)
11	Solenoid Valve (For 2 Stage Relief Valve)

Reference Number	Description
12	Solenoid Valve (Control Valve Control)
13	
14	
15	Solenoid Valve (Travel II - Speed)
16	Travel Motor
17	Engine Throttle Control
18	Engine Control Dial
19	EPOS-V Controller
20	Auto Travel Select Switch
21	Power Max Switch (Right Work Lever)

WORK MODE CONTROL - CIRCUIT DIAGRAM

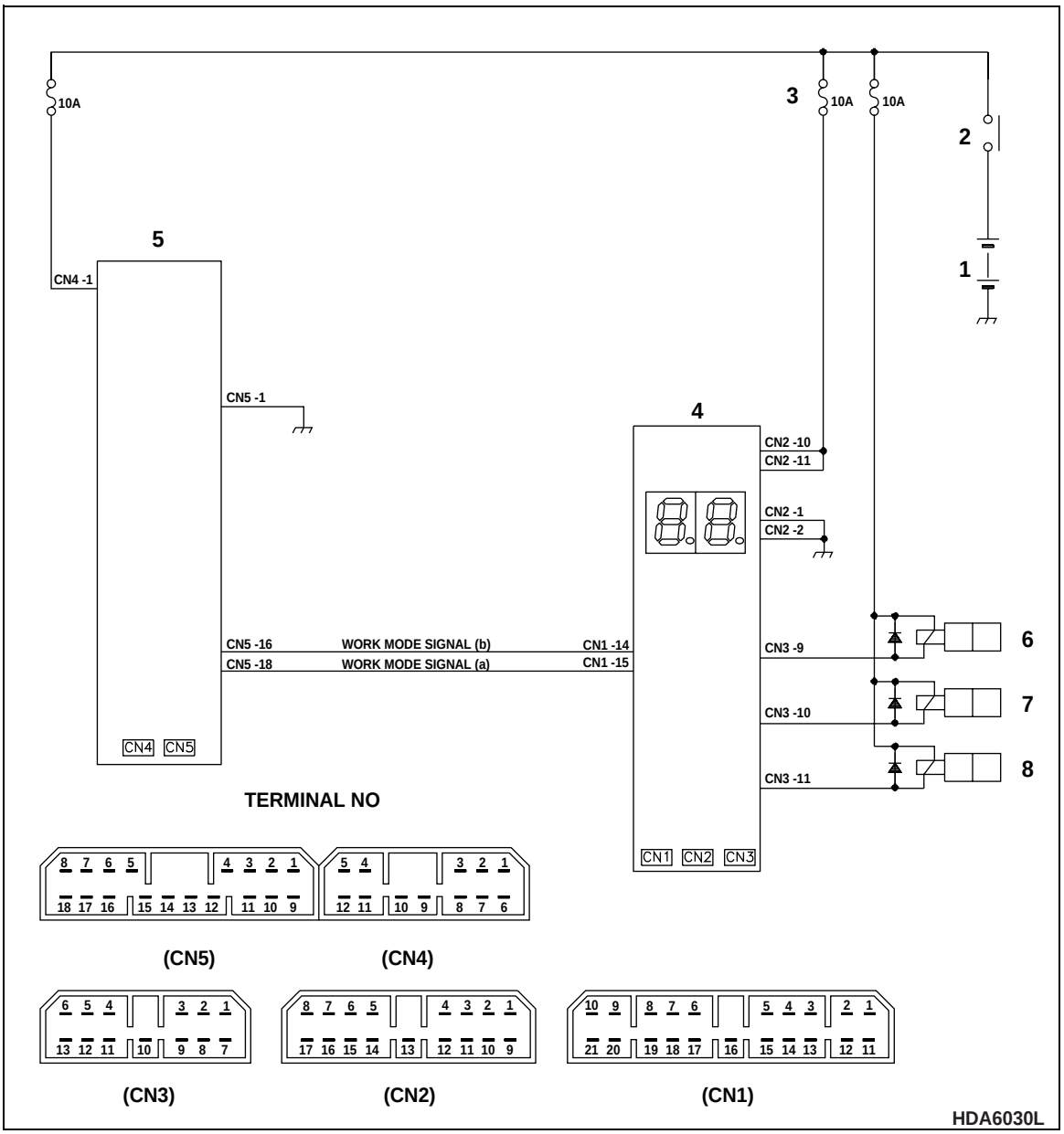


Figure 27

Reference Number	Description
1	Battery
2	Battery Relay
3	Fuse
4	EPOS-V Controller
5	Instrument Panel

Reference Number	Description
6	Solenoid Valve (Swing Priority Control)
7	Solenoid Valve (Arm Regeneration Control)
8	Solenoid Valve (Arm Priority Control)

AUTOMATIC TRAVEL SPEED CONTROL

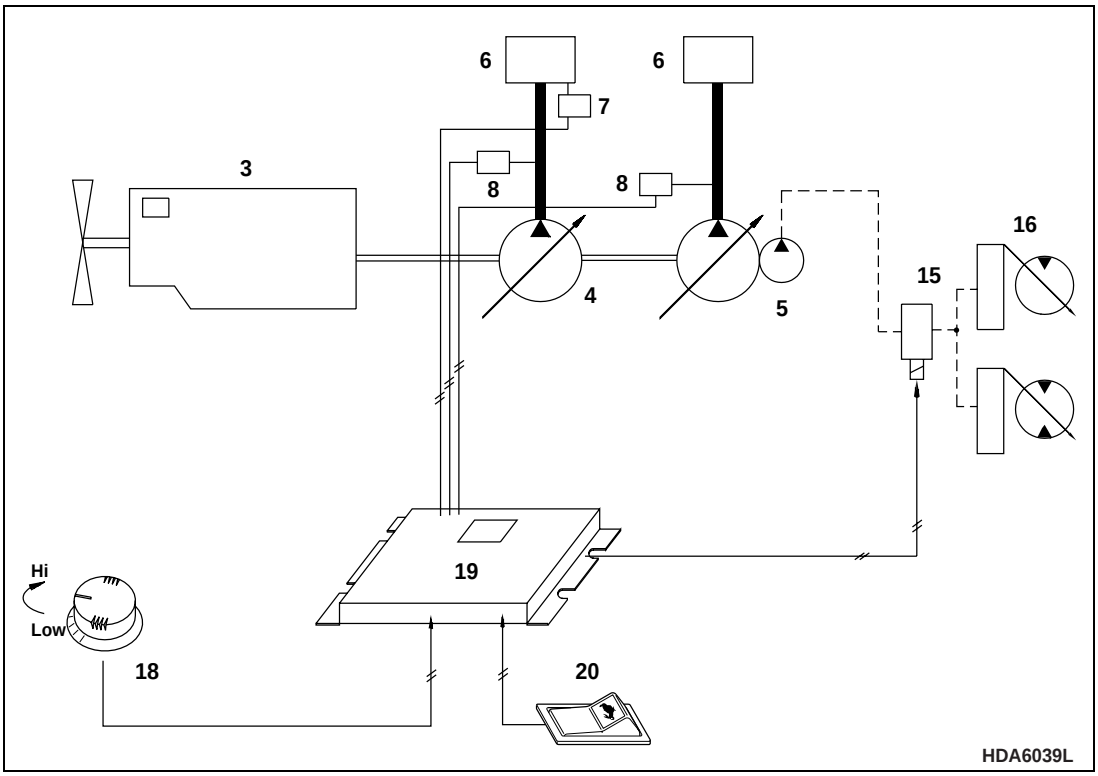


Figure 36

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/sq cm) 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/sq cm), 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 (S330LC-V)

⚠ 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 330LC-V	1001 and Up

March 1999

FRONT ATTACHMENT PIN SPECIFICATIONS

The table below has a complete listing of dimensional specifications for all mounting pins used on the front attachment.

NOTE: *Some mounting pins must be drilled and tapped for lubrication fittings and piping, or may have other required specifications. Consult Daewoo After Sales Service for information on wear tolerances and replacement limits for mounting pins.*

Mounting Pin	Diameter, mm (Inches)	Length, mm (Inches)
A	110.0 mm (4.33 in.)	1,047.0 mm (41.22 in.)
B	100.0 mm (3.94 in.)	918.0 mm (36.14 in.)
C	100.0 mm (3.94 in.)	289.0 mm (11.38 in.)
D	110.0 mm (4.33 in.)	597.0 mm (23.50 in.)
E	100.0 mm (3.94 in.)	289.0 mm (11.38 in.)
F	100.0 mm (3.94 in.)	265.0 mm (10.43 in.)
G	90.0 mm (3.54 in.)	540.0 mm (21.26 in.)
H	100.0 mm (3.94 in.)	540.0 mm (21.26 in.)
I	100.0 mm (3.94 in.)	597.0 mm (23.50 in.)
J	100.0 mm (3.94 in.)	597.0 mm (23.50 in.)
K	100.0 mm (3.94 in.)	265.0 mm (10.43 in.)

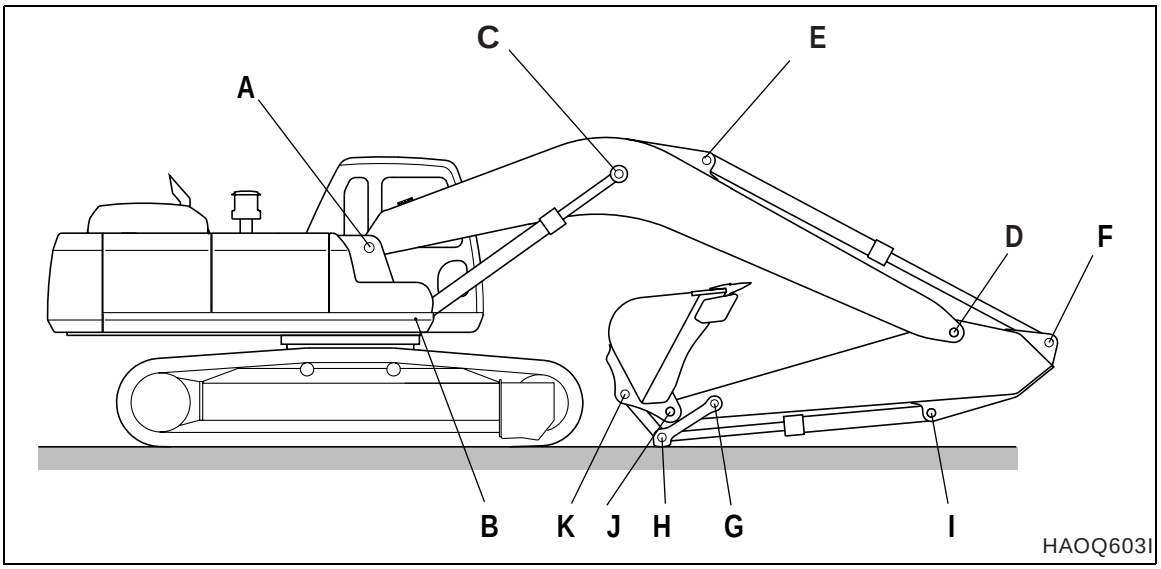


Figure 1

4. Slide the new tooth into position and insert shims. Shim tooth until gap is less than "X" [0.5 mm (0.020 in.)]. See Figure 5.
5. Secure tooth and shim into position with seat, plain washers, lock washers and bolts.

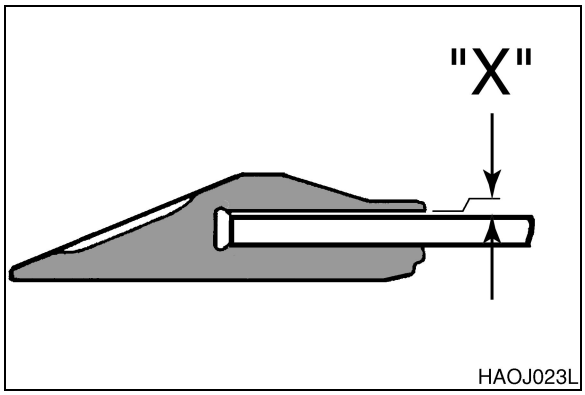


Figure 5

TYPE 3

⚠ WARNING!

Due to the possibility of flying metal objects, always wear safety helmet, protective gloves and eye protection when changing bucket teeth.

Curl the bucket upwards and place the round rear surface of the bucket firmly on the ground. Place wooden blocks under front of bucket. Shut the engine off and lock out the hydraulic controls before working on the bucket.

Inspect locking pin assembly and replace it if the following conditions exist;

1. The locking pin is too short when both surfaces are aligned.
2. The rubber has been torn and bosses of the steel balls are liable to slip off.
3. Pressing steel ball causes the boss to go inside.

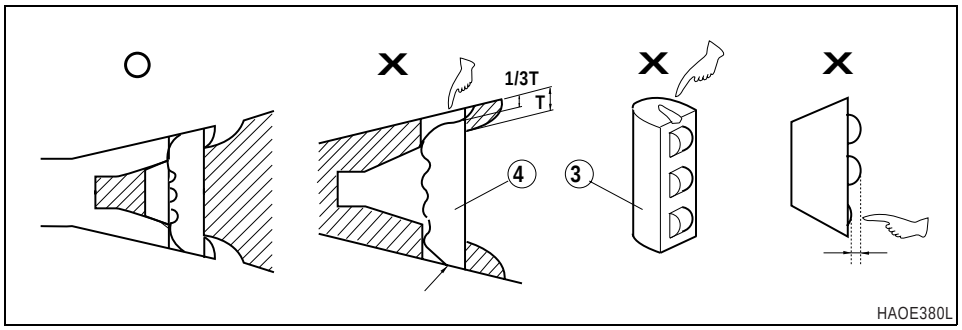


Figure 6