Solar 015

Shop Manual

2023-7125E

Serial Number 0001 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.

UNAUTHORIZED MODIFICATIONS

Any modification made without authorization or written approval from Daewoo can create a safety hazard, for which the machine owner must be held responsible.

For safety's sake, replace all OEM parts with the correct authorized or genuine Daewoo part. For example, not taking the time to replace fasteners, bolts or nuts with the correct replacement parts could lead to a condition in which the safety of critical assemblies is dangerously compromised.

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.

VOLTAGE	MINIMUM SAFE DISTANCE
6.6kV	3 m (9' 10")
33.0kV	4 m (13' 1")
66.0kV	5 m (16' 5")
154.0kV	8 m (26' 3")
275.0kV	10 m (32' 10")

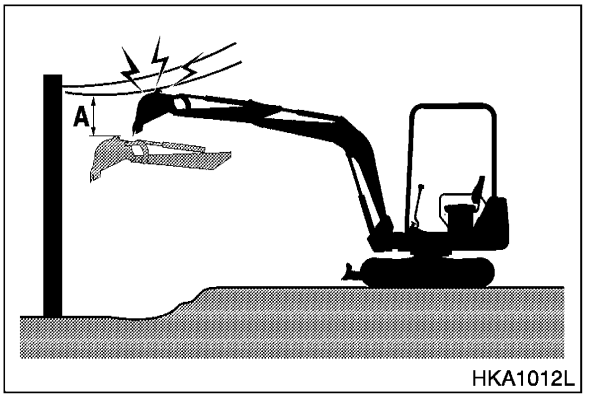

Figure 2

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.*

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.

EQUIPMENT

ROUGH OPERATION MAY REQUIRE USE OF CERTIFIED SAFETY EQUIPMENT

Work in mines, tunnels, deep pits or on loose or wet surfaces could produce danger of falling rock, roll over or hazardous flying objects. Additional protection for the operator's cab could be required in the form of a TOPS/Tip Over Protective Structure reinforcement system.

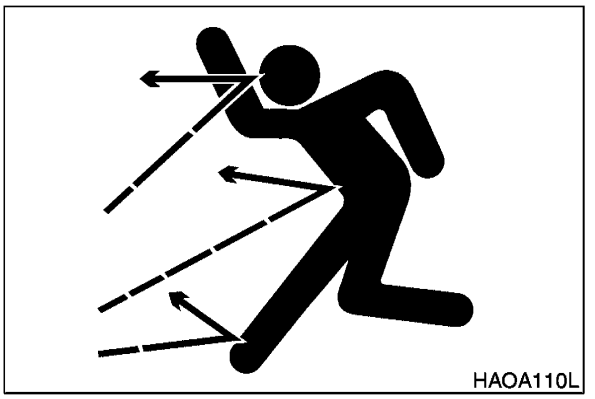

Figure 18

Any reinforcement system that is installed on the machine must pass safety and certification standards and carry appropriate labeling and rating information.

Never attempt to alter or modify any type of protective structure reinforcement system, by drilling holes, welding or remounting or relocating fasteners. Any serious impact or damage to the system requires a complete integrity reevaluation. Reinstallation, recertification and/or replacement of the system may be necessary.

Figure 19

SPECIFICATIONS FOR SOLAR 015

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 015	0001 and UP

February 1999

APPROXIMATE WEIGHT OF WORKLOAD MATERIALS

IMPORTANT

Weights are approximations of estimated average volume and mass. Exposure to rain, snow or ground water; settling or compaction due to overhead weight, chemical or industrial processing or changes due to thermal or chemical transformations could all increase the value of weights listed in the table.

MATERIAL	LOW WEIGHT OR DENSITY, 1,100 KG/M^3 (1,850 LB/YD^3), OR LESS	MEDIUM WEIGHT OR DENSITY, 1,600 KG/M^3 (2,700 LB/YD^3), OR LESS	HIGH WEIGHT OR DENSITY, 2,000 KG/M^3 (3,370 LB/YD^3), OR LESS
Charcoal	401 kg/m^3 (695 lb/yd^3)		
Coke, blast furnace size	433 kg/m^3 (729 lb/yd^3)		
Coke, foundry size	449 kg/m^3 (756 lb/yd^3)		
Coal, bituminous slack, piled	801 kg/m^3 (1,350 lb/yd^3)		
Coal, bituminous r. of m., piled	881 kg/m^3 (1,485 lb/yd^3)		
Coal, anthracite	897 kg/m^3 (1,512 lb/yd^3)		
Clay, DRY, in broken lumps	1,009 kg/m^3 (1,701 lb/yd^3)		
Clay, DAMP, natural bed		1,746 kg/m^3 (2,943 lb/yd^3)	
Cement, Portland, DRY granular		1,506 kg/m^3 (2,583 lb/yd^3)	
Cement, Portland, DRY clinkers		1,362 kg/m^3 (2,295 lb/yd^3)	

GENERAL MAINTENANCE

Normal Bearing

Smooth even surfaces with no discoloration or marks

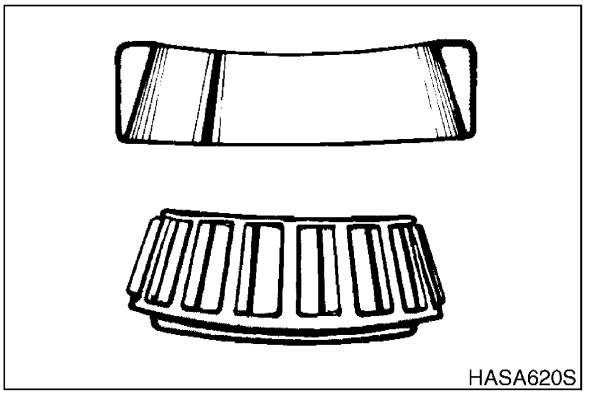

Figure 2

Bent Cage

Cage damage due to improper handling or tool usage.

Replace bearing

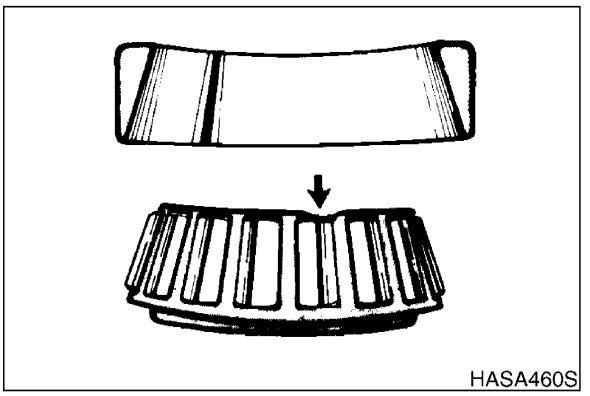

Figure 3

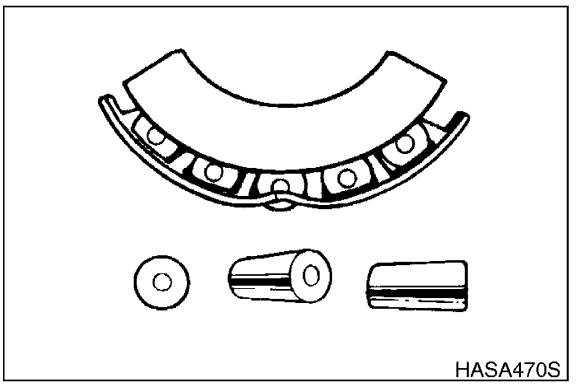

Figure 4

Galling

Metal smears on roller ends due to overheat, lubricant failure or overload.

Replace bearing - check seals and check for proper lubrication.

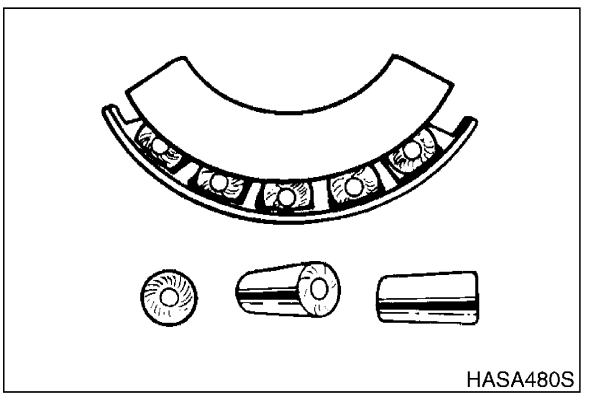

Figure 5

The following General Torque Values must be used in all cases where **SPECIAL TORQUE VALUES** are not given

NOTE: *TORQUE VALUES LISTED THROUGHOUT THIS MANUAL ARE LUBRICATED (WET) THREADS; VALUES SHOULD BE INCREASED 1/3 FOR NON-LUBRICATED (DRY) THREADS.*

THREAD SIZE	HEAT TREATED MATERIAL GRADE 5 & GRADE 8			
	GRADE 5 (3 RADIAL DASHES ON HEAD)		GRADE 8 (6 RADIAL DASHES ON HEAD)	
	FOOT POUNDS (Ft. Lbs.)	NEWTON METER (N.m)	FOOT POUNDS (Ft. Lbs.)	NEWTON METER (N.m)
1/4" - 20	6	8	9	12
1/4" - 28	7	9	11	15
5/16" - 18	13	18	18	24
5/16" - 24	15	20	21	28
3/8" - 16	24	33	34	46
3/8" - 24	27	37	38	52
7/16" - 14	38	52	54	73
7/16" - 20	42	57	60	81
1/2" - 13	58	79	82	111
1/2" - 20	65	88	90	122
9/16" - 12	84	114	120	163
9/16" - 18	93	126	132	179
5/8" - 11	115	156	165	224
5/8" - 18	130	176	185	251
3/4" - 10	205	278	290	393
3/4" - 16	240	312	320	434
7/8" - 9	305	414	455	617
7/8" - 14	334	454	515	698
1" - 8	455	617	695	942
1" - 14	510	691	785	1064
1 1/8" - 7	610	827	990	1342
1 1/8" - 12	685	929	1110	1505
1 1/4" - 7	860	1166	1400	1898
1 1/4" - 12	955	1295	1550	2102
1 3/8" - 6	1130	1532	1830	2481
1 3/8" - 12	1290	1749	2085	2827
1 1/2" - 6	1400	2034	2430	3295
1 1/2" - 12	1690	2291	2730	3701
1 3/4" - 5	2370	3213	3810	5166
2" - 4 1/2	3550	4813	5760	7810

NOTE: *If any bolts and nuts are found loose or at values less than what the chart states, it is recommended that the loose bolt and/or nut be replaced with a new one.*

LOWER STRUCTURE AND CHASSIS

TRACK FRAME SPRING

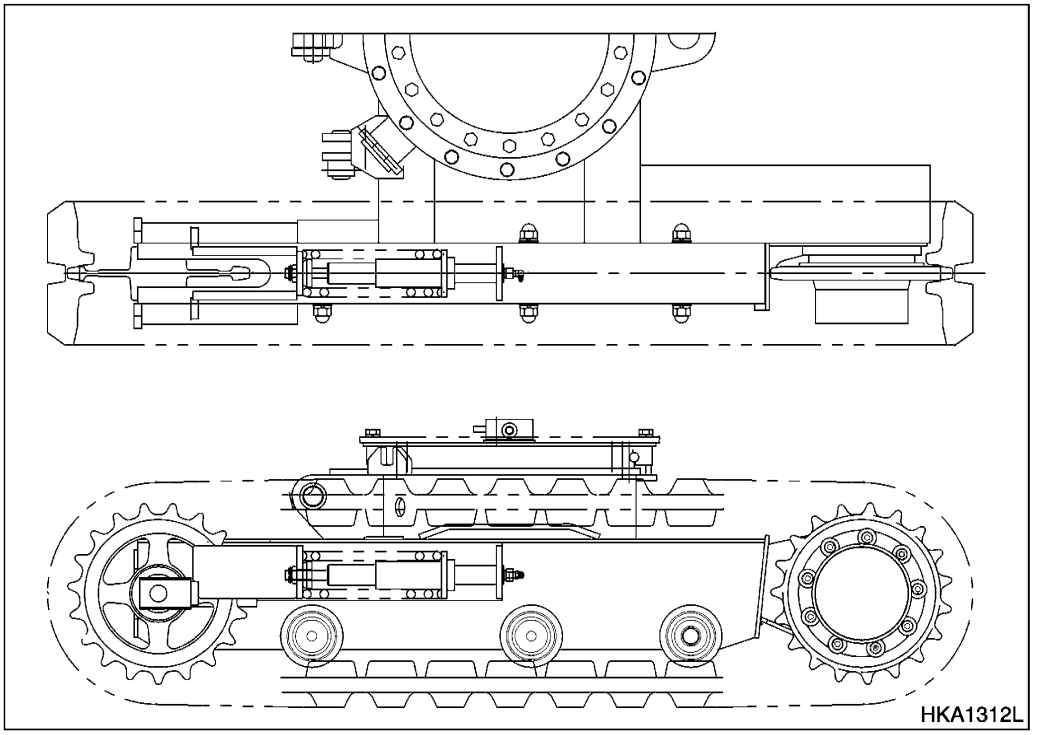

Figure 10

Item		Limit	Remarks
Deformed Frame	Bending	5.0 mm (0.20 in.) (Overall length of track frame	Bent
	Distorted	10.0 mm (0.39 in.) (Distortion between left and right crawler frames)	
	Widened Idler	5.0 mm (0.20 in.)	

Item		Normal (New) Dimension	Recommended Limit for Maintenance	Remarks
Gap between upper and lower sides of idler guide	Track Frame	51.0 mm (2.01 in.)	56.0 mm (2.20 in.)	Rebuild or Replace
	Idler Frame	50.0 mm (1.97 in.)	45.0 mm (1.77 in.)	Rebuild or Replace
Gap between left and right of idler guide	Track Frame	153.0 mm (6.02 in.)	158.0 mm (6.22 in.)	Rebuild or Replace
	Idler Support	150±1.0 mm (5.91±0.04 in)	145.0 mm (5.71 in.)	Rebuild or Replace

Item	Free Length	Mounted Length	Remarks
Track Spring	261.0 mm (10.28 in.)	223.0 mm (8.78 in.)	Replace

FRONT IDLER ROLLER REMOVAL & DISASSEMBLY

1. Refer to "Track Removal" section to remove the track assembly before proceeding to the following steps.
2. Remove spring pin(7, Figure 26) from guide(8).
3. Remove guide(8, Figure 26) from shaft(3).
4. Remove oil seal(6, Figure 26) using a screw driver.

   NOTE: *Once removed, the oil seal should not be reused.*

5. Remove snap ring(5, Figure 26), bearing(4), and shaft(3).
6. Repeat steps 2-7 for other side.

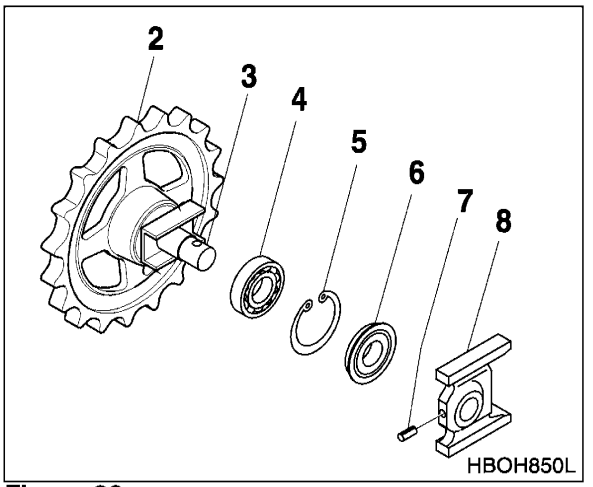

Figure 26

FRONT IDLER ROLLER REASSEMBLY & INSTALLATION

1. Degrease, clean and dry all parts before reassembly.
2. Insert shaft (3, Figure 26) into idler gear (2).
3. Assemble bearing (4, Figure 26) onto shaft (3) and install snap ring (5)
4. Install new grease seal (6, Figure 26).
5. Install Shaft guide (8, Figure 26) and spring pin (7).
6. Repeat steps 2-7 for other side.
7. Refer to "Track Installation" section for track assembly installation procedures.

HYDRAULICS

REASSEMBLY

1. Pre-lubricate O-rings with hydraulic oil, white grease or petroleum jelly.

> **⚠ CAUTION!**
>
> **Apply a very light film of white grease or petroleum jelly to the lower rim of the stem and inner surface of the center swivel body. Apply slow, even-handed pressure, using both hands, to slowly push the stem into the body. Seals may be damaged if the stem is pushed in too quickly.**

2. Thoroughly clean all other component surfaces of dirt or grease prior to reassembly.
3. Inspect o-rings and seals for damage and replace as necessary.
4. Reverse disassembly steps for reassembly.
5. Clean threads of fasteners before pre-applying Loctite 243 to the threads, and before torquing the thrust plate and cover bolts.
6. Pre-fill the center swivel with clean hydraulic fluid prior to reassembly of high-pressure and drain line piping. Clean and pre-fill piping line ends to reduce the amount of air in the system. Bleed air from the hydraulic system and verify hydraulic tank fluid level before returning the excavator to service.

5. Slowly turn the cylinder rod assembly to disconnect it from the tube.

   NOTE: *After disassembling the piston rod, take care not to damage it.*

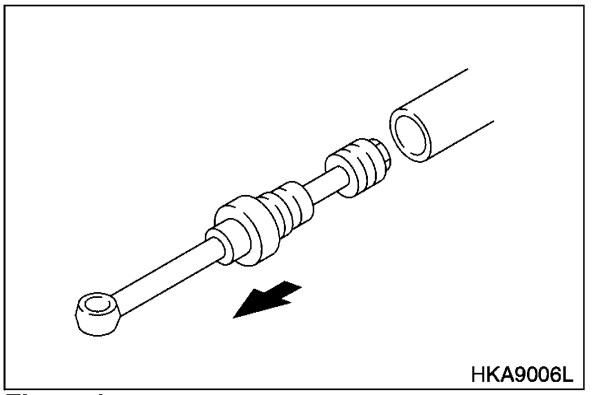

Figure 9

6. Install wood blocks (1, Figure 10) on the inside of the vise as shown so that the piston rod may not be damaged and clamp the rod for disassembly.

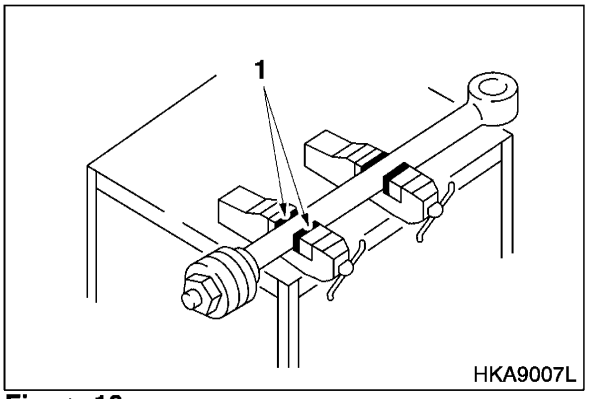

Figure 10

7. Remove the nut from the piston rod assembly by turning the nut slowly counterclockwise.

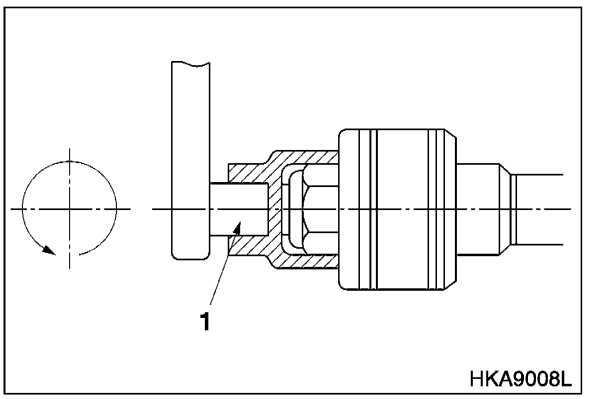

Figure 11

8. Lay the piston rod assembly on the work bench on top of wooden blocks (2, Figure 12).
9. Remove the rod cover by moving it back and forth.
10. Remove the backup ring and O-ring.

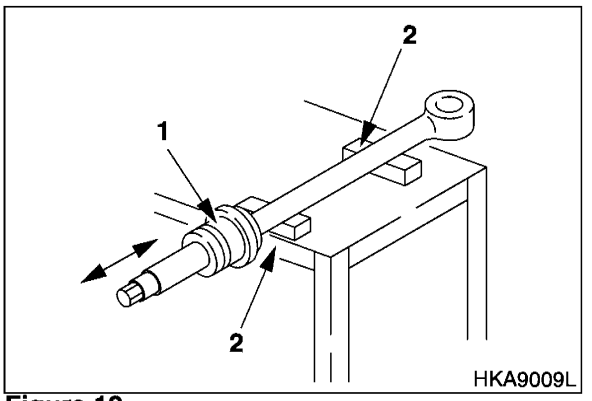

Figure 12

SHOCKLESS RELIEF VALVE FUNCTIONS

The hydraulic motor, even at stationary, would continue to rotate by inertia force although the port A shuts off hydraulic pressure. Then, pressure generated within the port B pushes the relief valve poppet open at the primary pressure P1.

Also, pressurized oil is induced at the piston section by means of the poppet check, and as a result, the piston moves to the right side. This motion increases the spring load to generate the secondary pressure P and to control the pressure within the port B in the manner as shown, and accordingly the hydraulic motor come to a stop smoothly.

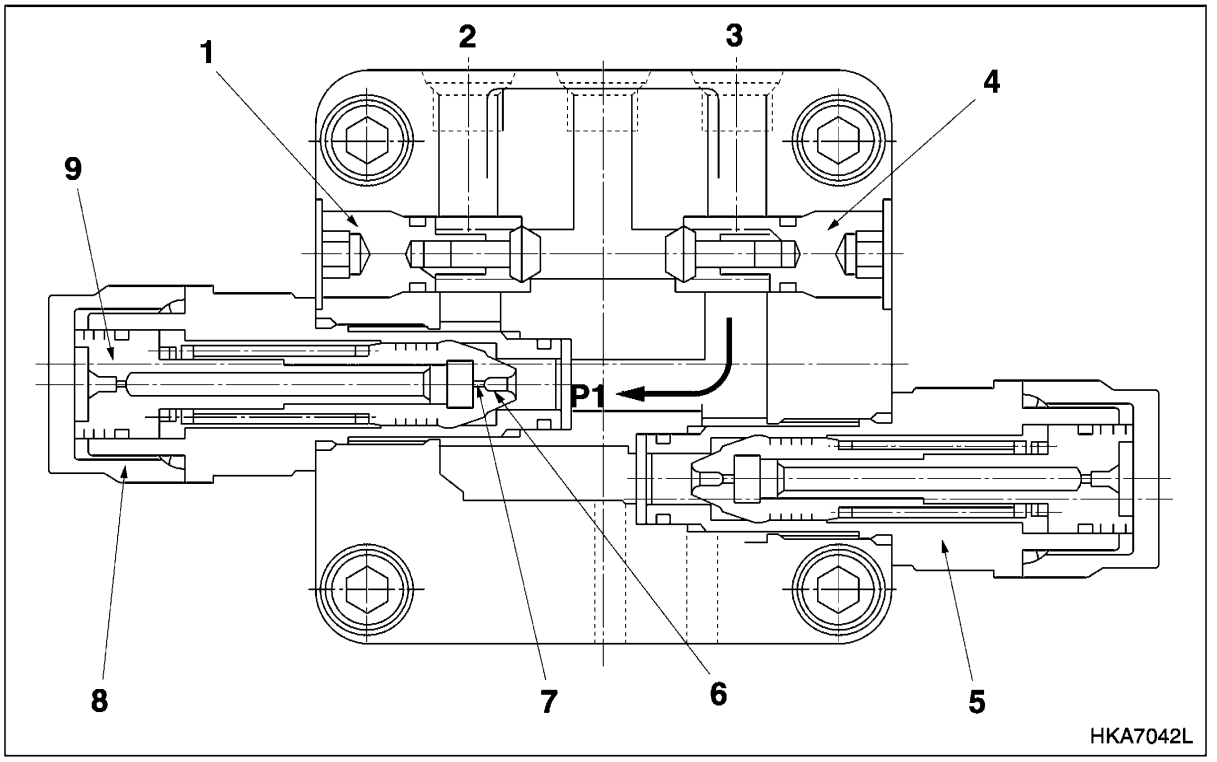

Figure 3

Reference Number	Description
1	Suction Check Valve
2	Port A
3	Port B
4	Suction Check Valve
5	Shockless Relief Valve

Reference Number	Description
6	Poppet
7	Check
8	Shockless Relief Valve
9	Piston

REASSEMBLY

1. Assemble ball bearing to bearing housing using a plastic hammer.

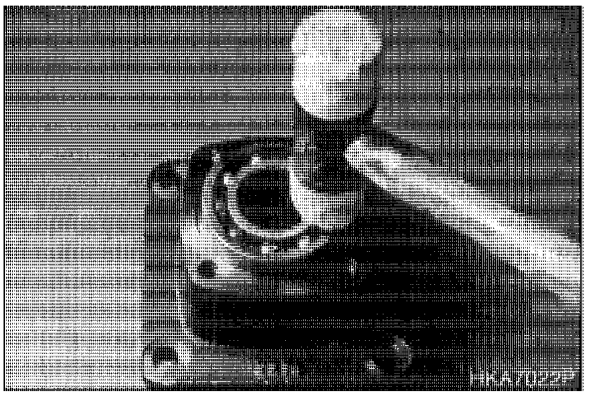

Figure 21

2. Assemble X-ring to bearing housing.

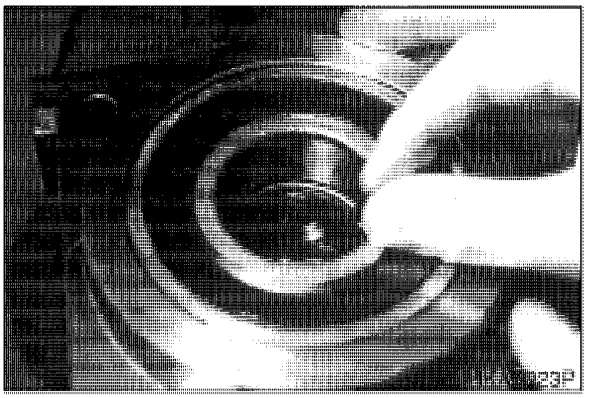

Figure 22

3. Insert pinion gear into bearing housing with a press.

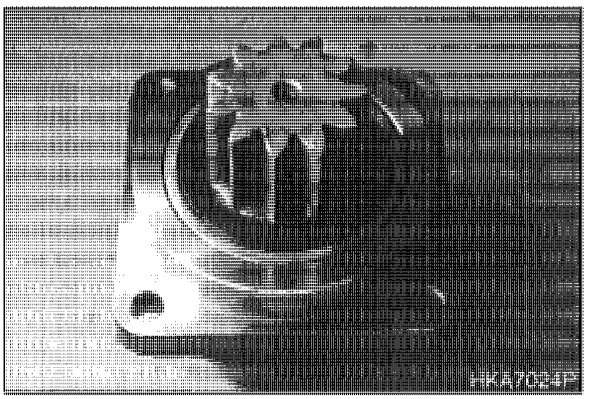

Figure 23

Reference Number	Description
M1	Spacer Plate
M2	Seat Roller
M3	Drive
M4	Valve Plate Assembly
M5	Valve
M6	Spacer
M7	O-ring
M8	O-ring
M9	O-ring
M10	O-ring
M11	Spring
M12	Bolt
M13	Body Assembly
M14	Valve Housing Assembly
M15	Plug
M16	O-ring
1	Spindle
2	Seal Plate
3	Wheel
4	Ball Bearing
5	Snap Ring
6	Ball Bearing
7	Bolt
8	X-ring
9	Back-up Ring
10	O-ring
11	Retainer
12	Snap Ring
13	End Cover
14	Plug
15	O-ring
16	Snap Ring

Reference Number	Description
17	O-ring
18	Floating Seal
19	Parallel Pin
20	Seal
21	Seal
22	Seal
23	Seal
V1	Valve Hosing
V2	2 Speed Spool
V3	2 Speed Spring
V5	2 Speed Plug
V6	O-ring
V7	O-ring
V8	Orifice (0.50
V9	Spool
V10	Poppet
V11	Main Spring
V12	Spring
V13	Plug
V14	Check Plug
V15	Washer
V16	O-ring
V17	O-ring
V18	Plug
V19	O-ring
V20	Ball
V21	Pilot Plug
V22	Pilot Poppet
V23	Pilot Poppet Spring
V24	Plug
V25	Orifice (0.5)

MAIN PUMP

Problem	Possible Causes	Remedies
Engine overloading	Engine RPM control off	Readjust RPM control
	Pump regulator set too high	Readjust
	Pump inner parts worn or damaged	Look for impurities or particles inside the filter and rebuild, replace pump components, as required
	Pump regulator piping clogged or leaking	Repair or replace piping
Overloading on one pump only	Regulator	Regulator compensator piston or pin (898) sticking. Disassemble, clean.
Pump discharge output reduced, pressure does not increase	Pump regulator faulty or piping clogged, leaking or kinked	Repair or replace regulator or piping
	Pump inner parts worn or damaged	Look for particles inside the filter and rebuild or replace pump components
	Gear pump (pilot pump) worn or faulty	Check pilot pressure and make sure pilot piston, spool and/or QMC are not sticking before repairing or replacing pilot pump
	Accessory control valve faulty	Inspect valve (poppet, seat, spring)
Excessive vibration or noise	Cavitation	Look for leaks or evidence of air intrusion. Disconnect return lines, add clean oil and reassemble to bleed air
	Regulator or relief valve hunting	Check pressures and inspect for clogged or damaged inlet piping
	Broken or damaged piston, shoe, cylinder	Repair or replace damaged component.

HAOE950L

17. Cover group disassembly. Remove the control plate.

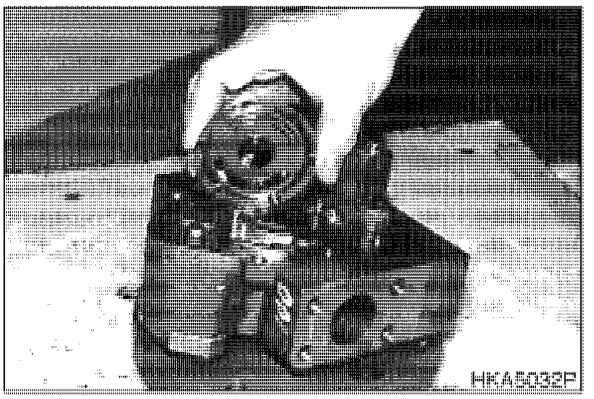

Figure 34

18. Remove control piston group. Remove two hex socket bolt.

    NOTE: *If further disassembly is not necessary, do not remove control piston group.*

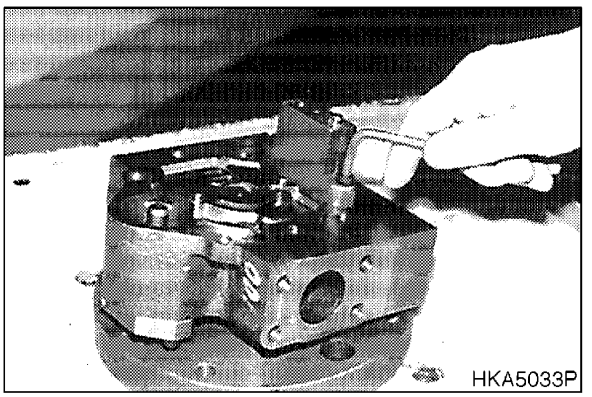

Figure 35

19. Remove cylinder and parallel pin. Be careful not to lose O-ring.

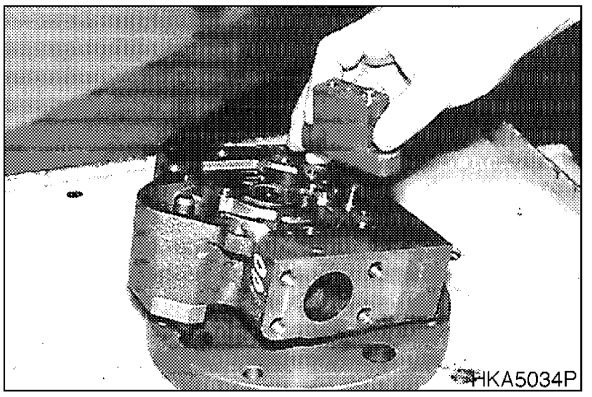

Figure 36

20. Remove piston.

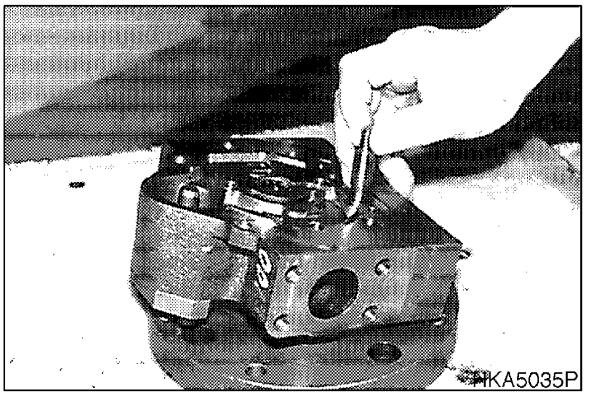

Figure 37

15. Apply grease to the rounded face of guide.

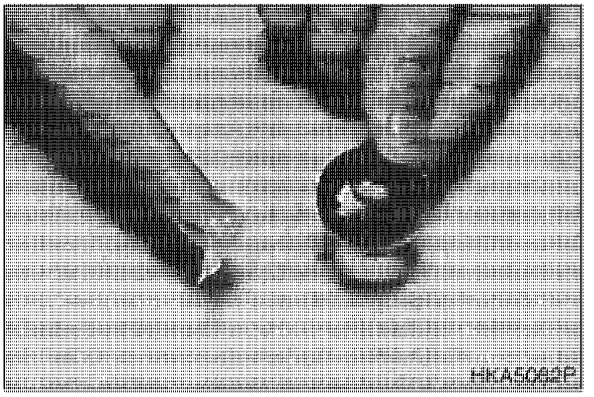

Figure 65

16. Place the guide between retainer and cylinder block and assemble pistons into the cylinder block holes.

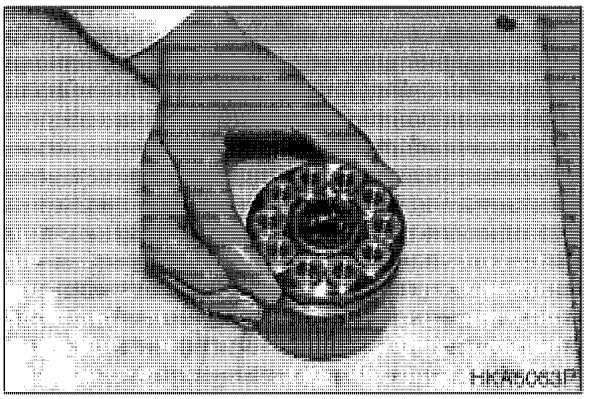

Figure 66

17. Applying grease to the inside face of plate and assemble onto swash plate.

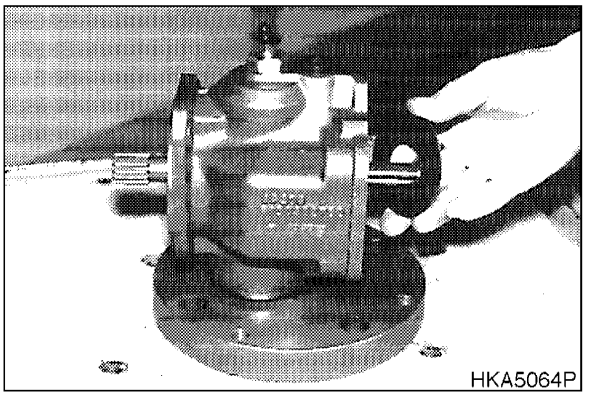

Figure 67

18. Assemble the rotary group onto shaft spline.

    Apply grease to the sliding surface of piston shoe and sliding surface of control plate of cylinder block.

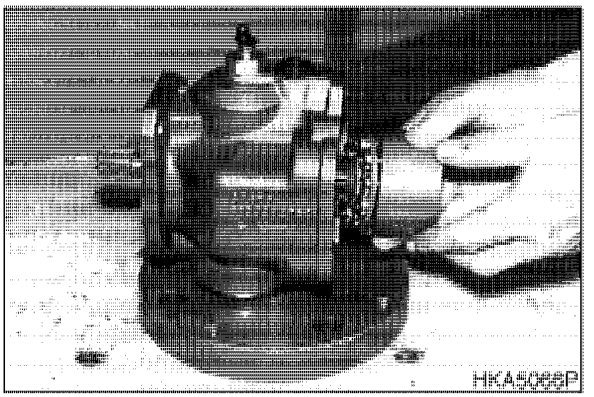

Figure 68

6. Assemble the seal ring.

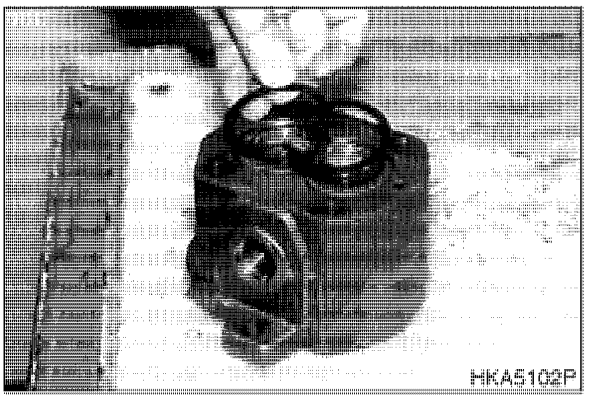

Figure 105

7. Assemble cover onto housing.

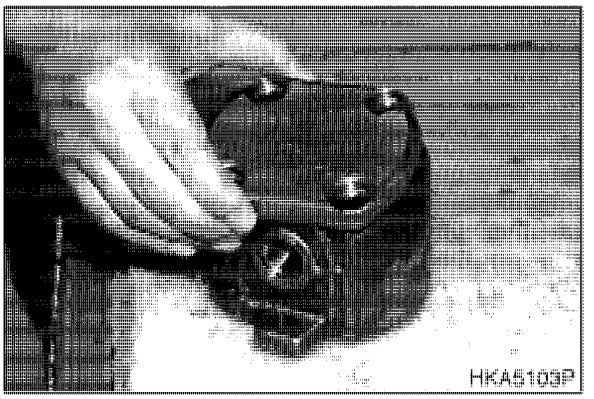

Figure 106

8. Mount cover onto housing using four hex socket bolts (M10 x 25).

   NOTE: *Tightening Torque: 6.02 kg•m (43.52 ft lbs).*

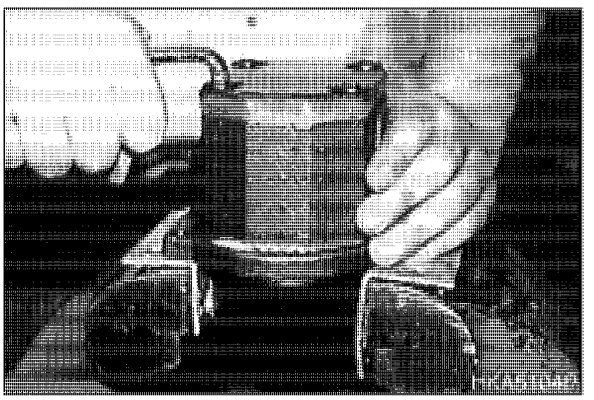

Figure 107

MAIN CONTROL VALVE

⚠ CAUTION!

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

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MODEL	SERIAL NUMBER RANGE
Solar 015	0001 and Up

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Reference Number	Description
1	P1 Block
2	Travel (LH)
3	Arm
4	Port Relief Valve
5	Travel (RH)
6	Bucket
7	Boom
8	Combination Valve
9	Block

Reference Number	Description
10	Boom Swing
11	Dozer
12	Swivel
13	Block
14	Main Relief Valve (175k)
16	Port Relief Valve
17	Port Relief Valve
18	Main Relief Valve (200k)

Port	Size
P1,P2, P3, T1, T2	PF1/2
A1~A9, B1~B9	PF3/8
PA1, PA4, PA5, PA8	PF1/4
PB1, PB4, PB5, PB8	PF1/4

Port Locations	Relief Pressure
P1 Main	210 kg/sq cm (2,987 psi)

Port Locations	Relief Pressure
P2 Main	210 kg/sq cm (2,987 psi)
P3 Main	165 kg/sq cm (2,347 psi)
A4 Port	250 kg/sq cm (3,556 psi)
B4, B5, A8, B8 Port	250 kg/sq cm (3,556 psi)

TROUBLESHOOTING, TESTING AND ADJUSTMENT

MAIN RELIEF VALVE PRESSURE

1. Install a pressure gauge between the pump at section to be measured and the control valve.

   NOTE: *Use a pressure gauge fitting if available.*

2. Raise the oil temperature up to 50°C~60°C to obtain the rated engine rpm.
3. Operate the control lever and check the pressure when the cylinder reaches the end stroke.
4. To raise the pressure, use a allen wrench (3, Figure 18) to turn the suction port relief valve adjusting nut clockwise (2). To lower the pressure turn the nut in the counterclockwise direction (1).

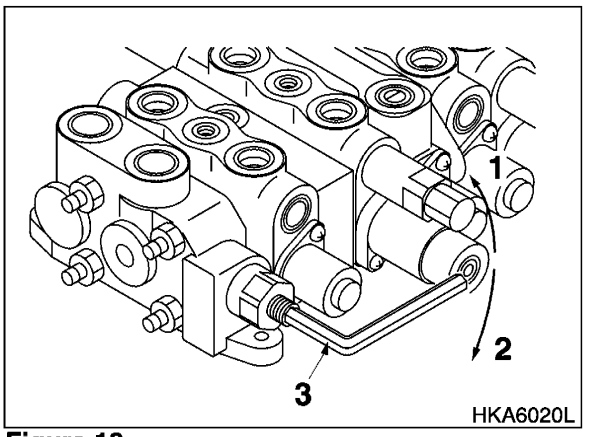


Figure 18

   NOTE: *Main relief valve: 100 kg/sq cm (1,422 psi) per turn*

   NOTE: *Port relief valve: 100 kg/sq cm (1,422 psi) per turn*

5. After adjusting to the specified pressure, tighten it securely.

LEVER LOCK SOLENOID

If the lever lock solenoid(A) is OFF, the spool does not allow the oil in the port P to flow to the port A.

If the lever lock solenoid(A) is ON, the spool moves downward to permit the passage for the port P and A to be opened; if the solenoid(C) is ON, pilot pressure is produced at the port P and transferred from the port P to the port A.

Reference Number	Description
1	Sleeve C
2	Spool C
3	Spool A

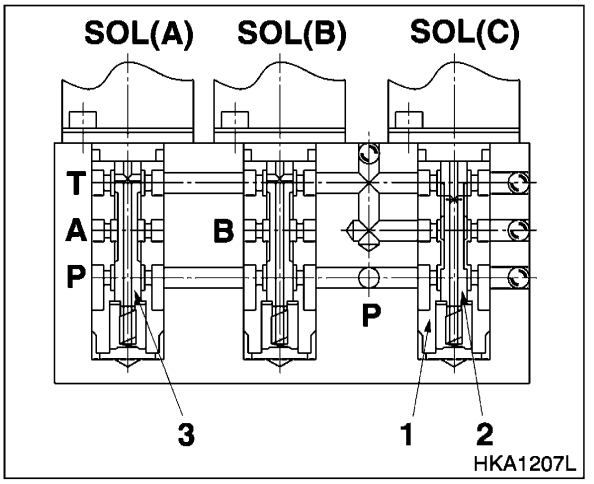


Figure 4

TRAVEL MOTOR HIGH/LOW SPEED SHIFTING SOLENOID

If the travel motor speed shifting solenoid(B) is OFF, the oil discharged from the port P is shut off from the port B by the spool(B), with the result that the pilot pressure does not flow in the port B.

If the travel motor speed shifting solenoid(B) is ON, the spool(B) moves to allow the ports P and A to be opened; if the solenoid(C) is ON, pilot pressure is produced at the port P and transferred from the port P to the port A.

Reference Number	Description
1	Sleeve C
2	Spool C
3	Spool B

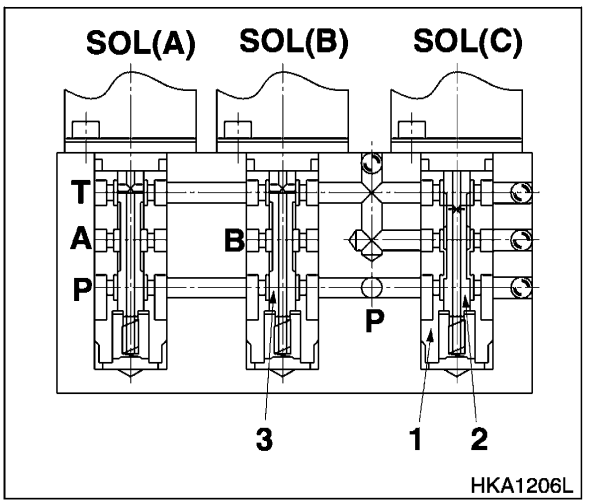
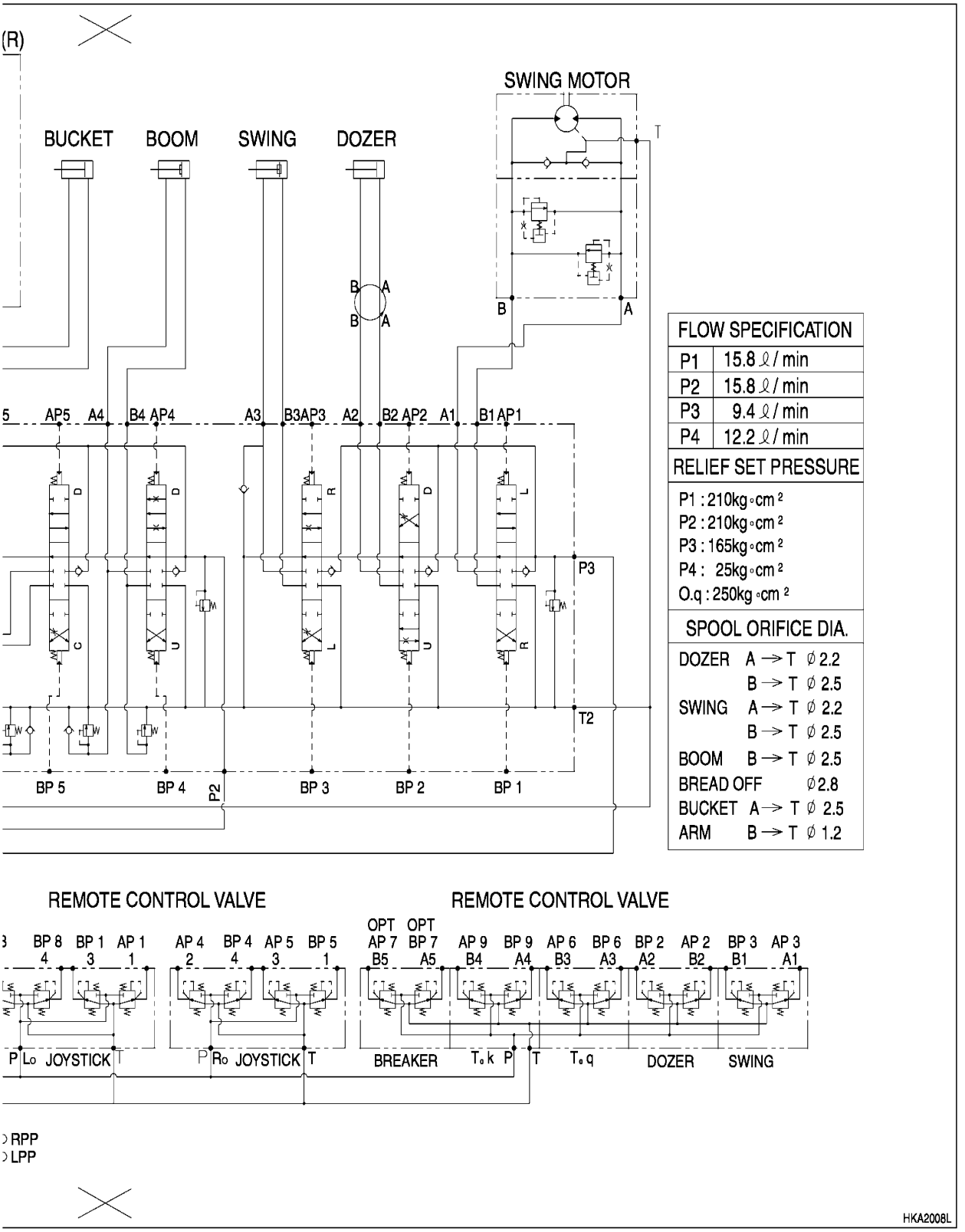


Figure 5


(R)
SWING MOTOR
BUCKET
BOOM
SWING
DOZER
T
B
A
B
A
B
A
5 AP5 A4 B4 AP4 A3 B3 AP3 A2 B2 AP2 A1 B1 AP1
P3
T2
BP 5
BP 4
P2
BP 3
BP 2
BP 1
FLOW SPECIFICATION
P1 15.8 ℓ / min
P2 15.8 ℓ / min
P3 9.4 ℓ / min
P4 12.2 ℓ / min
RELIEF SET PRESSURE
P1 : 210kg◦cm 2
P2 : 210kg◦cm 2
P3 : 165kg◦cm 2
P4 : 25kg◦cm 2
O.q : 250kg◦cm 2
SPOOL ORIFICE DIA.
DOZER A → T ∅ 2.2
B → T ∅ 2.5
SWING A → T ∅ 2.2
B → T ∅ 2.5
BOOM B → T ∅ 2.5
BREAD OFF ∅ 2.8
BUCKET A → T ∅ 2.5
ARM B → T ∅ 1.2
REMOTE CONTROL VALVE
REMOTE CONTROL VALVE
BP 8 BP 1 AP 1
4 3 1
AP 4 BP 4 AP 5 BP 5
2 4 3 1
OPT AP 7 OPT BP 7 AP 9 BP 9 AP 6 BP 6 BP 2 AP 2 BP 3 AP 3
B5 A5 B4 A4 B3 A3 A2 B2 B1 A1
P Lo JOYSTICK T
P Ro JOYSTICK T
BREAKER
T◦k P T
T◦q
DOZER
SWING
RPP
LPP
HKA2008L

ELECTRICAL SCHEMATIC (SOLAR 015)

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MODEL	SERIAL NUMBER RANGE
Solar 015	0001 and Up

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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	30.0 mm (1.18 in.)	172.0 mm (6.77 in.)
B	30.0 mm (1.18 in.)	172.0 mm (6.77 in.)
C	30.0 mm (1.18 in.)	165.0 mm (6.50 in.)
D	30.0 mm (1.18 in.)	172.0 mm (6.77 in.)
E	30.0 mm (1.18 in.)	104.0 mm (4.09 in.)
F	30.0 mm (1.18 in.)	104.0 mm (4.09 in.)
G	30.0 mm (1.18 in.)	167.0 mm (6.57 in.)
H	35.0 mm (1.38 in.)	225.0 mm (8.86 in.)
I	40.0 mm (1.57 in.)	94.0 mm (3.70 in.)
J	40.0 mm (1.57 in.)	94.0 mm (3.70 in.)
K	30.0 mm (1.18 in.)	220.0 mm (8.66 in.)
L	30.0 mm (1.18 in.)	104.0 mm (4.09 in.)
M	30.0 mm (1.18 in.)	195.0 mm (7.68 in.)

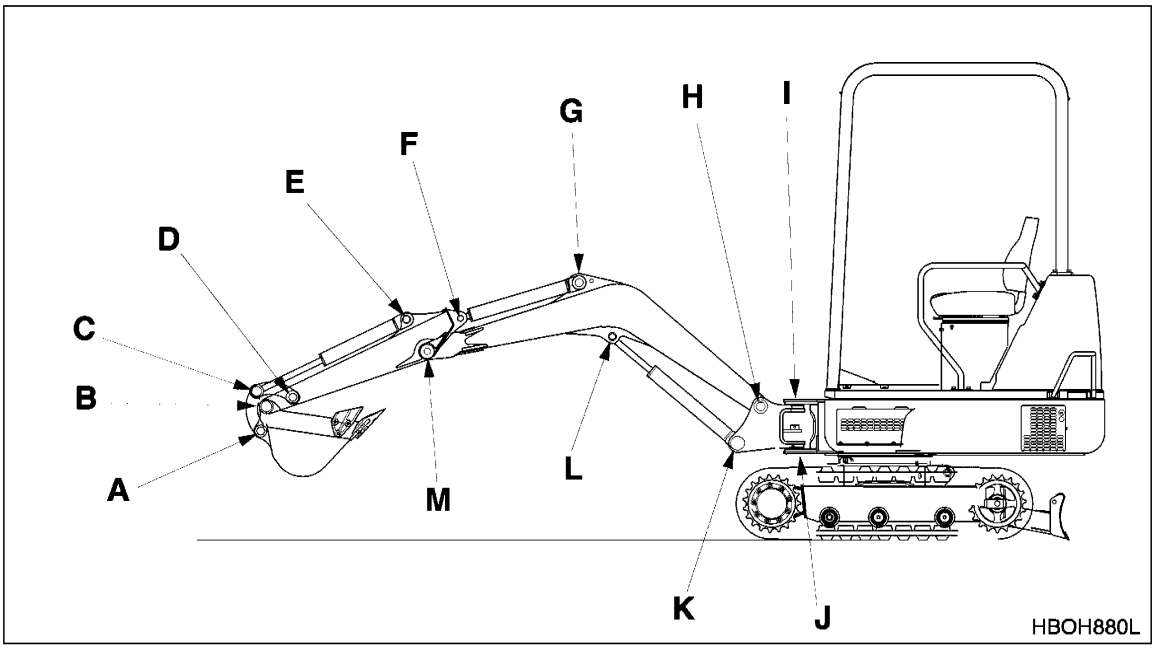

Figure 1