Dimension	Description	Canopy Model			
	Model	**DX15**		**DX18**	
	Serial Number	**40001 and Up**			
	Boom Type (One Piece)	1,690 mm (66.53 in)			
	Arm Type	850 mm (33.46 in)	1,100 mm (43.30 in)	850 mm (33.46 in)	1,100 mm (43.30 in)
	Bucket Type (SAE)	0.04 m^3			

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Table of Contents

General Maintenance Procedures

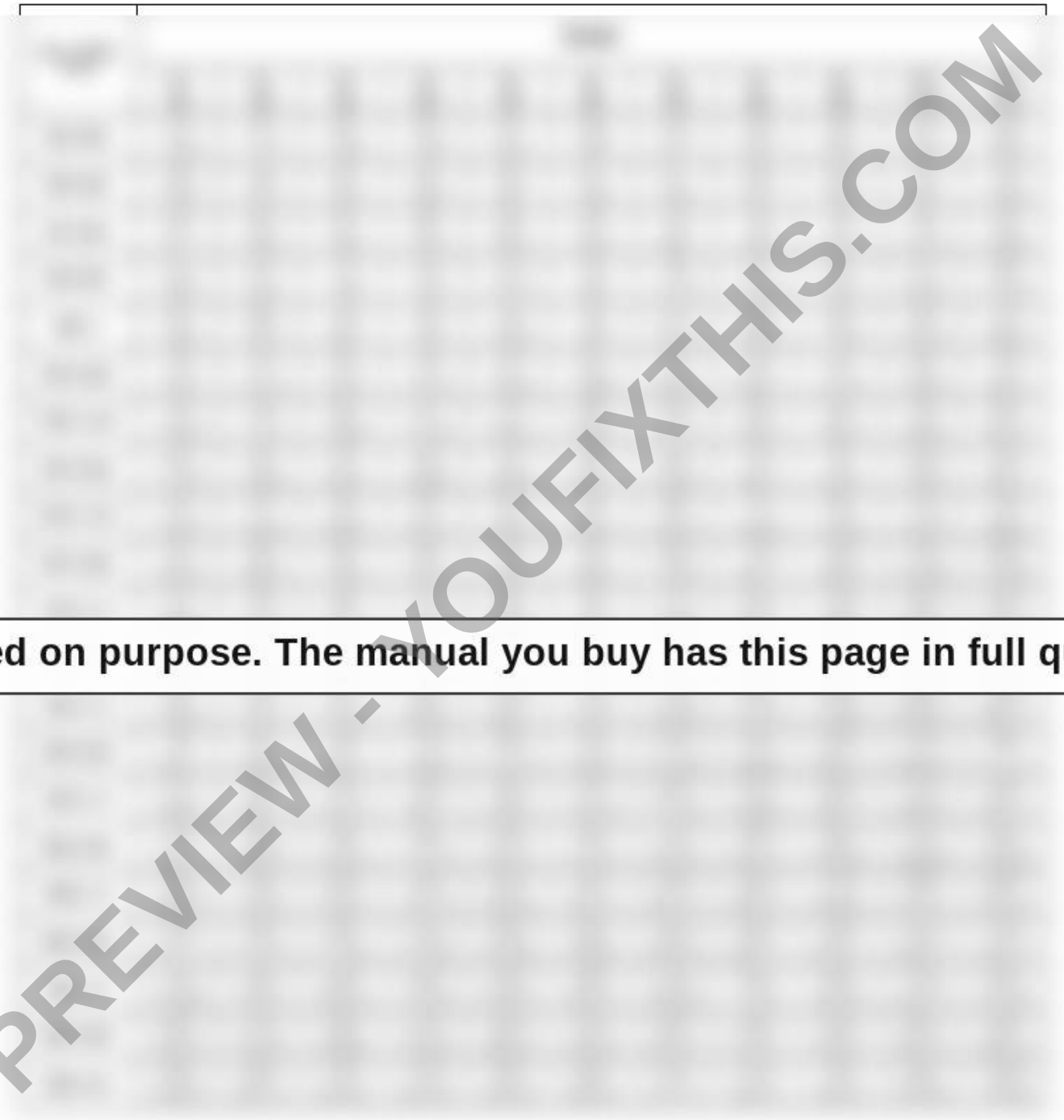
Safety Precautions 5
Applicable Models 5
Welding Precautions and Guidelines 6
Hydraulic System - General Precautions 7
Maintenance Service and Repair Procedure 9
General Precautions 9
Hydraulic System Cleanliness and Oil Leaks 10
Maintenance Precautions for Hydraulic System Service 10
Oil Leakage Precautions 11
Cleaning and Inspection 12
General Guidelines 12
Bearing inspection 13

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TORQUE VALUES FOR STANDARD METRIC FASTENERS

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



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DX15/DX18 - FIXED TRACK

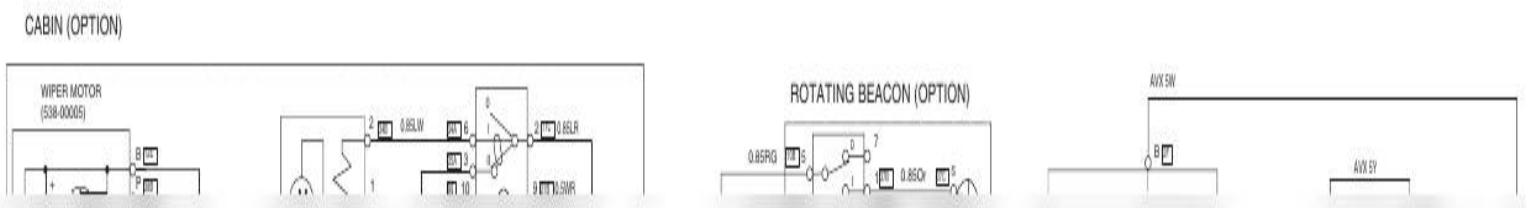


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DX15/DX18



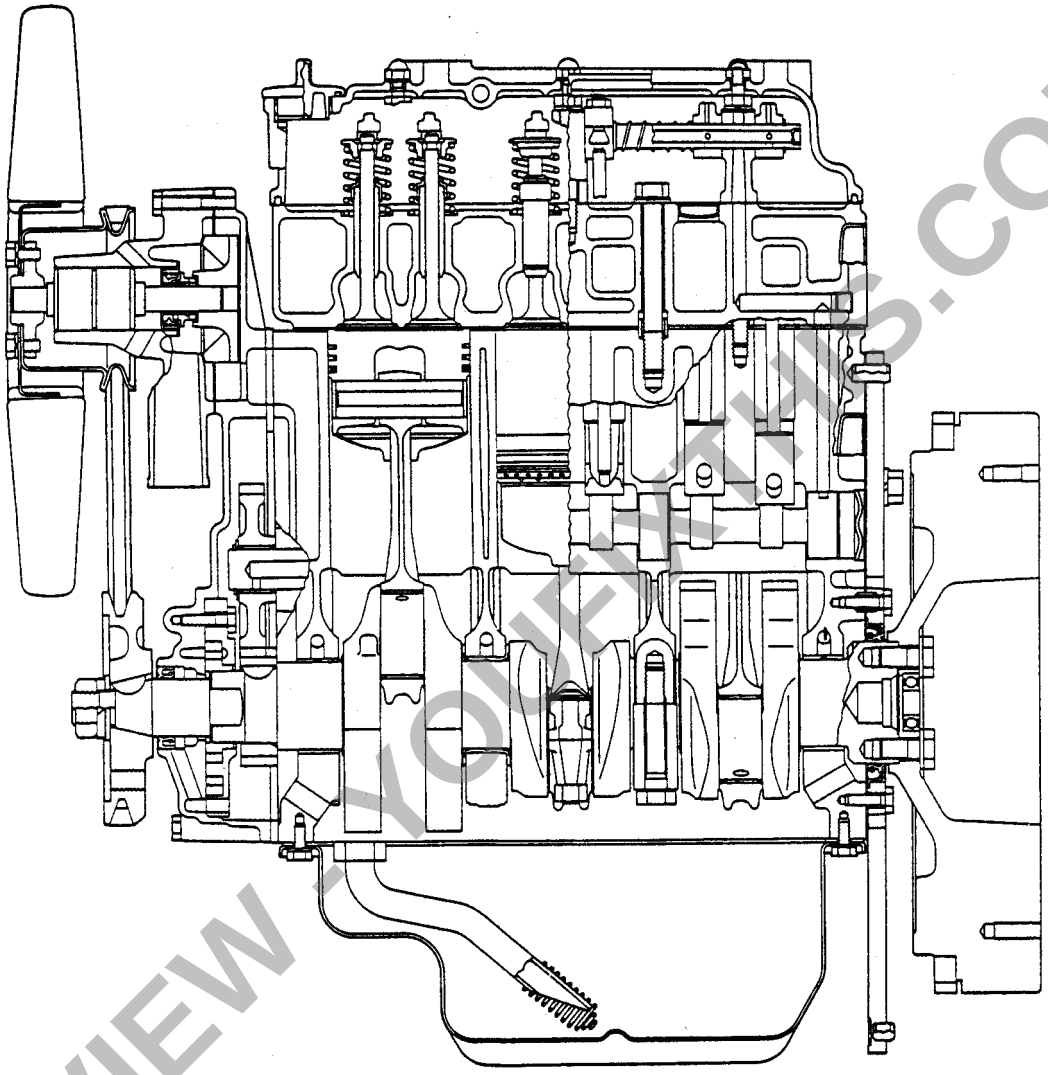
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Sectional Views

Longitudinal Section (L3C)



AKS2260S

Figure 3

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Table of Contents

Center Joint (Swivel)

Safety Precautions 5
Applicable Models 5
General Description 6
Parts List 10
Troubleshooting, Testing and Adjustment 12
Inspection 12
Disassembly 13
Reassembly 13

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Table of Contents

Track Assembly

Safety Precautions 5
Applicable Models 5
General Description 6
Track Tension 6
Cleaning and Inspection (Wear Limits and Tolerances) 8
Track Shoes and Links 15
Interchanging Shoe Types 17
Front Idler Roller 18
Lower Roller 20
Track Spring and Track Adjusting Cylinder 22
Sprocket 25

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Table of Contents

Boom and Arm

Safety Precautions 5
Applicable Models 5
Front Attachment Pin Specifications 6
Front Attachment - Removal and Installation 7
Arm Removal Procedure 7
Boom Removal Procedure 9
Cleaning and Inspection (Wear Limits and Tolerances) 10
Installation 14
Arm Installation Procedure 14
Boom Installation Procedure 14
Start-up Procedures 14

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Table of Contents

Safety

Track Excavator Safety SP001521

Specifications

Specification for DX15/DX18 ..... SP001522

General Maintenance

General Maintenance Procedures SP000016

Standard Torques SP000813

Upper Structure

Lower Structure and Chassis

Track Assembly SP001523

Engine and Drive Train

Engine SP001524

Hydraulics

Center Joint (Swivel) SP001525

Cylinders SP001526

Swing Motor SP001527

Travel Motor (With Gear Box) SP001528

Pilot Control Valve (Work Lever / Joystick) SP001529

Main Pump SP001530

Main Control Valve SP001531

Solenoid Valve SP001532

Hydraulic Schematic (DX15/DX18) SP001681

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Table of Contents

Track Excavator Safety

Safety Precautions 5
Applicable Models 5
To the Operator of a *DOOSAN* Excavator 6
General Safety Essentials 8
Location of Safety Labels 8
Unauthorized Modifications 8
Work Site Precautions 9
Operation 13
Equipment 19
Maintenance 24
Shipping and Transportation 28

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SAFETY PRECAUTIONS

⚠ 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 are in good working order.

Use lifting and hoisting equipment capable of safely handling load.

Remember, that ultimately safety is your own personal responsibility.

APPLICABLE MODELS

The contents of this section apply to the following models and serial number ranges.

MODEL	SERIAL NUMBER RANGE
DX15	40001 and Up
DX18	40001 and Up

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SAFETY PRECAUTIONS

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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 retaining 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 scratching.

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CLEANING AND INSPECTION (WEAR LIMITS AND TOLERANCES)

CAUTION

Refer to the "Welding Precautions and Guidelines" information in "General Maintenance Procedures" section for general recommendations and specific safety precautions, before starting any lower travel frame component rebuilding procedure.

The tables that follow provide factory specified dimensional limits (as new condition, recommended service and replacement limit) for lower travel frame components.

Recommended maintenance to renew most listed components requires welding on additional material and grinding off excess. Some components must be replaced before the service limit is exceeded. No maintenance or renewal is possible.

Compare the values in the tables with dimensions and profiles shown in the following figures.

Rubber Tracks

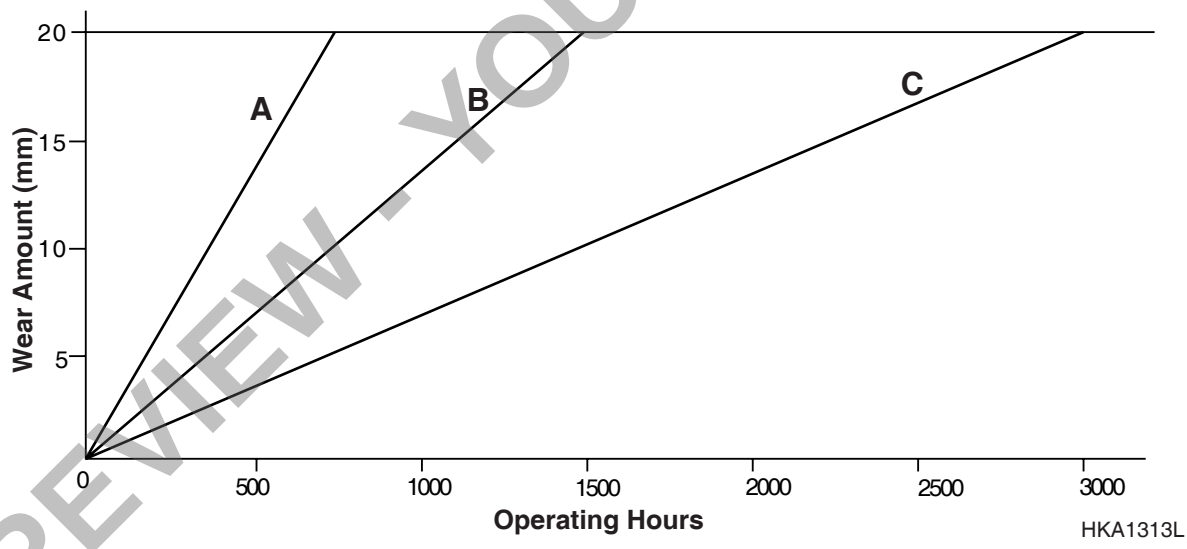


Figure 5

Reference Number	Description
A	Concrete Surface
B	Normal Use
C	Dirt

The amount of friction on the rubber track shoes determines the limit of use. However, it is subject to change depending upon the work condition and environment.

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Engine Specifications

Model		Item					
		L2A	L2C	L2E	L3A	L3C	L3E
General	Engine Type	4-cycle, Water Cooled, Vertical, Diesel					
	Firing Order	1-2			1-3-2		
	Compression Ratio	23:1					
	Combustion Chamber	Swirl Chamber					
	Dry Weight	61 kg (134 lb)			75 kg (165 lb)		
Cylinders	Number of Cylinders	2			3		
	Bore x Stroke	65 x 70 mm (2.56 x 2.76 in)	70 x 70 mm (2.76 - 2.76 in)	76 x 70 mm (2.99 - 2.76 in)	65 x 70 mm (2.56 x 2.76 in)	70 x 70 mm (2.76 - 2.76 in)	76 x 70 mm (2.99 - 2.76 in)
	Total Displacement	464 cc (28.32 in^3)	538 cc (32.83 in^3)	635 cc (38.75 in^3)	696 cc (42.47 in^3)	808 cc (49.31 in^3)	952 cc (58.09 in^3)
Performance	Maximum Power Maximum Torque Specific Fuel Consumption	See the engine performance curves.					
List Ability	In every direction (to lower limit of oil level)	25° continuous			30° in a short time (within 30 min.)		
Fuel System	Injection Pump	Bosch NC type					
	Nozzle	Throttle type					
	Fuel	JIS No. 2 or No. 3 Diesel Fuel					
Lubrication System	Lubricating Method	Forced Lubrication					
	Oil Filtration	Paper Element Filter (Full-flow Type)					
	Oil Capacity Upper Limit/Lower Limit (Excluding 0.5 liters (0.13 U.S. gal.) for oil filter)	2.4/1.4 liters (0.63/0.37 U.S. gal.)			3.0/1.5 liters (0.79 - 0.40 U.S. gal.) 3.6/1.8 liters (0.95 - 0.48 U.S. gal.) or 4.8/3.0 liters (1.3 - 0.79 U.S. gal.)		
Cooling System	Cooling Method	Forced water circulation with pressurized radiator.					
	Coolant Capacity (Except Radiator and Hose)	1.20 liters (0.32 U.S. gal.)			1.80 liters (0.48 U.S. gal.)		
Accessories	Alternator	12 V @ 15 A or 12 V @ 40 A					
	Starting Motor	12 V @ 1.2 kW or 12 V @ 0.6 kW					
	Battery	45 Ah or more			60 Ah or more		

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Removal

1. Pry retaining ring out and remove idle gear.

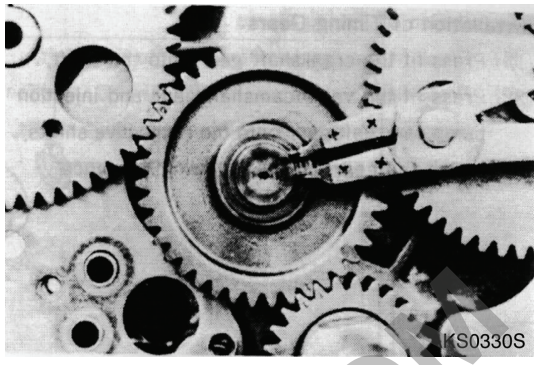


Figure 71 Removing Delivery Valve

2. Remove valve camshaft and injection pump camshaft on which the respective gears are press fitted. Remove gears from shafts.
3. Remove crankshaft. Remove gear from crankshaft.

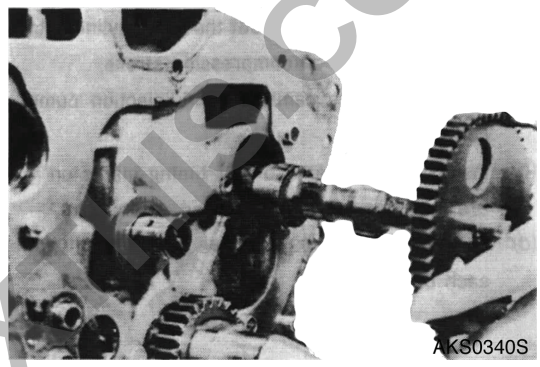


Figure 72 Removing Camshaft Gear

Inspection

Check removed gears. If any gear is found defective, replace it.

Idle Gear Bushing		
Description	**Standard Value**	**Service Limit**
Clearance between bushing and shaft.	0.03 - 0.07 mm (0.0012 - 0.0028 in)	0.20 mm (0.0079 in)

Backlash Between Gears in Mesh		
Description	**Standard Value**	**Service Limit**
Crankshaft - Idle	0.01 - 0.14 mm (0.0004 - 0.0055 in)	0.30 mm (0.0118 in)
Idle - Camshaft		
Idle - Fuel Pump Gear		

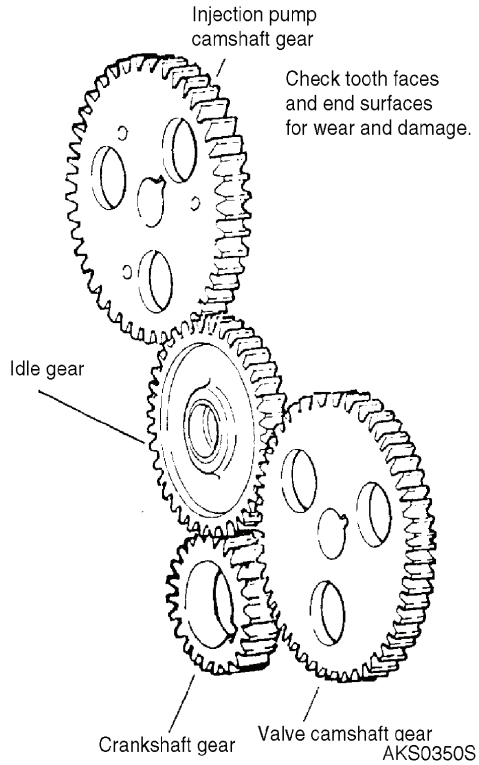


Figure 73 Inspecting Timing Gears

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Removal and Installation

NOTE: *Refer to "Gear Case and Oil Pump" on page 1-46.*

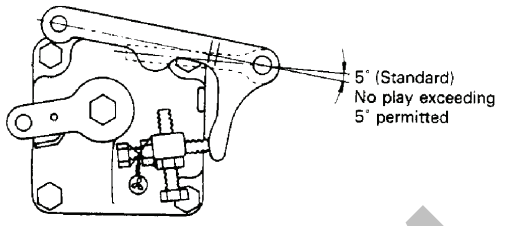
1. Removing levers.

   A. To remove levers, pull out grooved pins which have been driven into governor lever, stop lever, and speed control lever.

   B. Loosen bolts fastening levers and shafts.

2. Installation.

   Install levers and shafts, one after another, checking for proper function of them.



AKS0820S

Figure 122 Installing Speed Control Lever

⚠ CAUTION

After press fitting each grooved pin, check shaft for smooth rotation.

Coat O-ring with oil before installing them.

No deflection exceeding 20.0 mm (0.7874 in) is permitted for governor spring installed.

Install governor spring lever and speed control lever so that play of angle between levers (standard: 5°) is minimized.

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Unit: mm

Description	Specification or Standard	Repair Limit	Service Limit
Camshaft			
Driving Method	Gear drive	----------	----------
Front Journal	Ball bearing	----------	----------
Journal To Cylinder Block Hole Clearance	----------	----------	0.150 mm (0.0059 in)
Major Diameter of Cam (IN and EX)	27.370 mm (1.0776 in)	----------	-1.0 mm (-0.0394 in)
Oil Clearance	----------	----------	0.150 mm (0.0059 in)
Injection Pump Camshaft			
Driving Method	Gear drive	----------	----------
Bearing	Ball bearing (front and rear)	----------	----------
Major Diameter of Cam	30.0 mm (1.1811 in)	----------	-0.70 mm (-0.0276 in)
Tappet			
O.D.	19.0 mm (0.7480 in)	----------	----------
Tappet To Cylinder Block Clearance	----------	----------	0.150 mm (0.0059 in)
Push Rod			
Bend	Within 0.30 mm (0.0118 in)	----------	----------

Lubricating System

Unit: mm

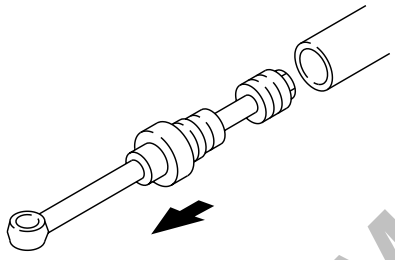
Description	Specification or Standard	Repair Limit	Service Limit
Oil Specification			
API Service Classification	Class CC or higher	----------	----------
Viscosity			
Above: 20°C (68°F)	SAE 30 or low - 30	----------	----------
5 - 20°C (41 - 68°F)	SAE 20 or low - 30	----------	----------
Below: 5°C (41°F)	SAE 10W30	----------	----------

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6. Slowly turn the cylinder rod assembly to remove it from the tube.

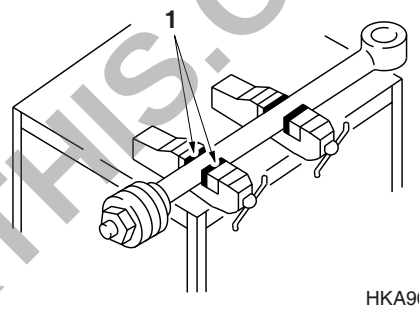
   NOTE: *After disassembling the piston rod, take care not to damage it.*



HKA9006L

Figure 9

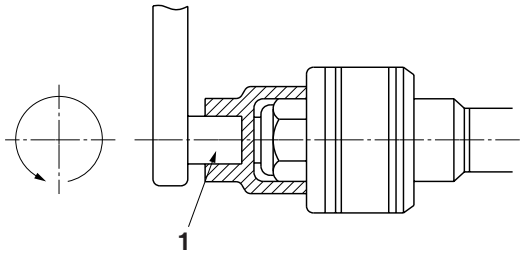
7. Install wood blocks (1, Figure 10) on the inside of the vise as shown so that the piston rod will not be damaged and clamp the rod for disassembly.



HKA9007L

Figure 10

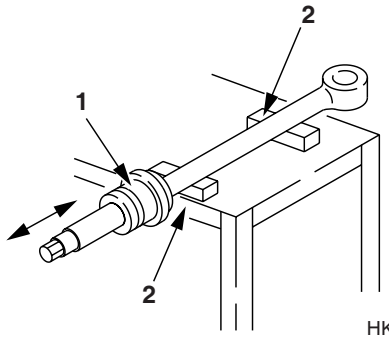
8. Remove the nut from the piston rod assembly by turning the nut slowly counterclockwise.



HKA9008L

Figure 11

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



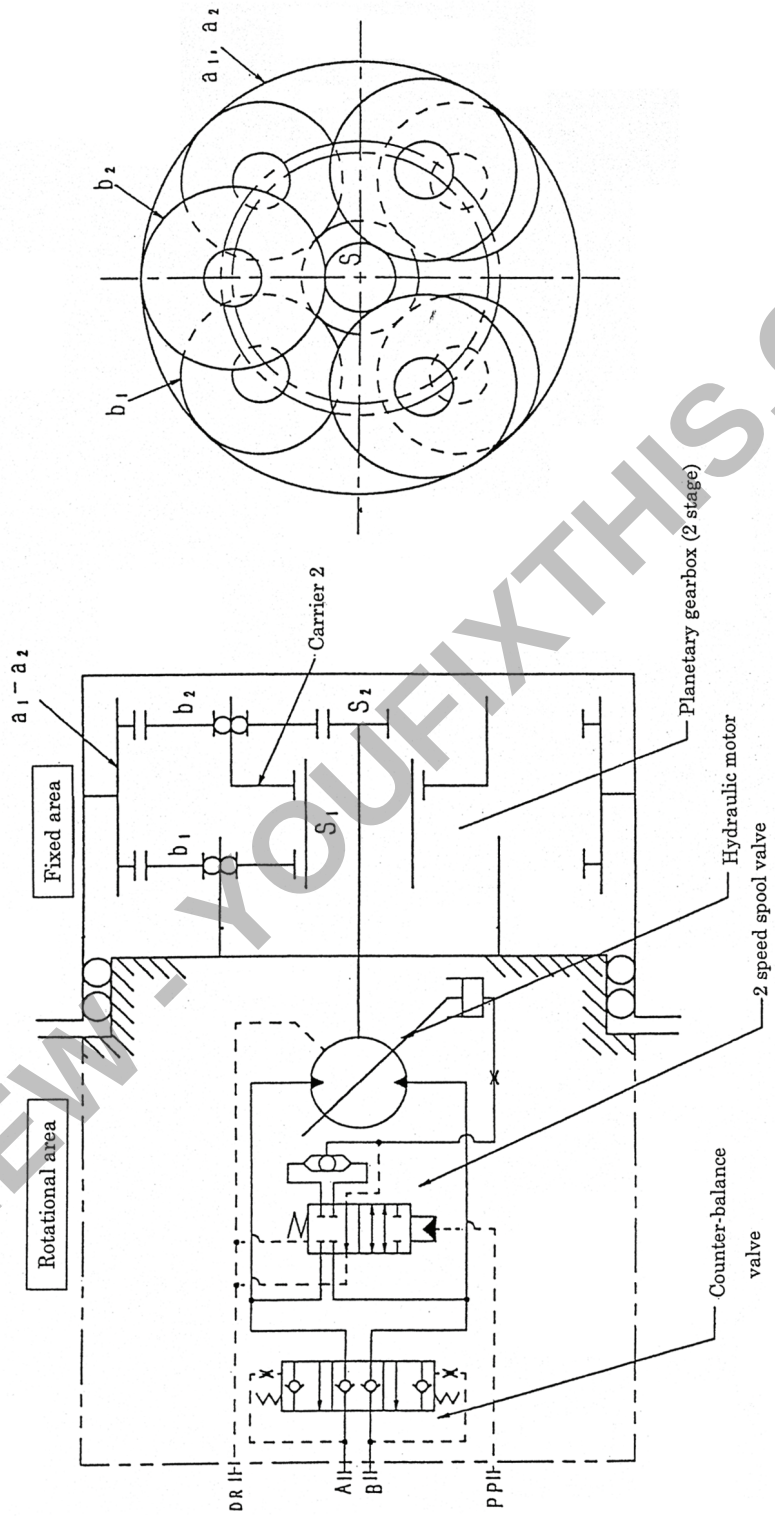
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Figure 12

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Operating Principle Diagram



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Figure 2

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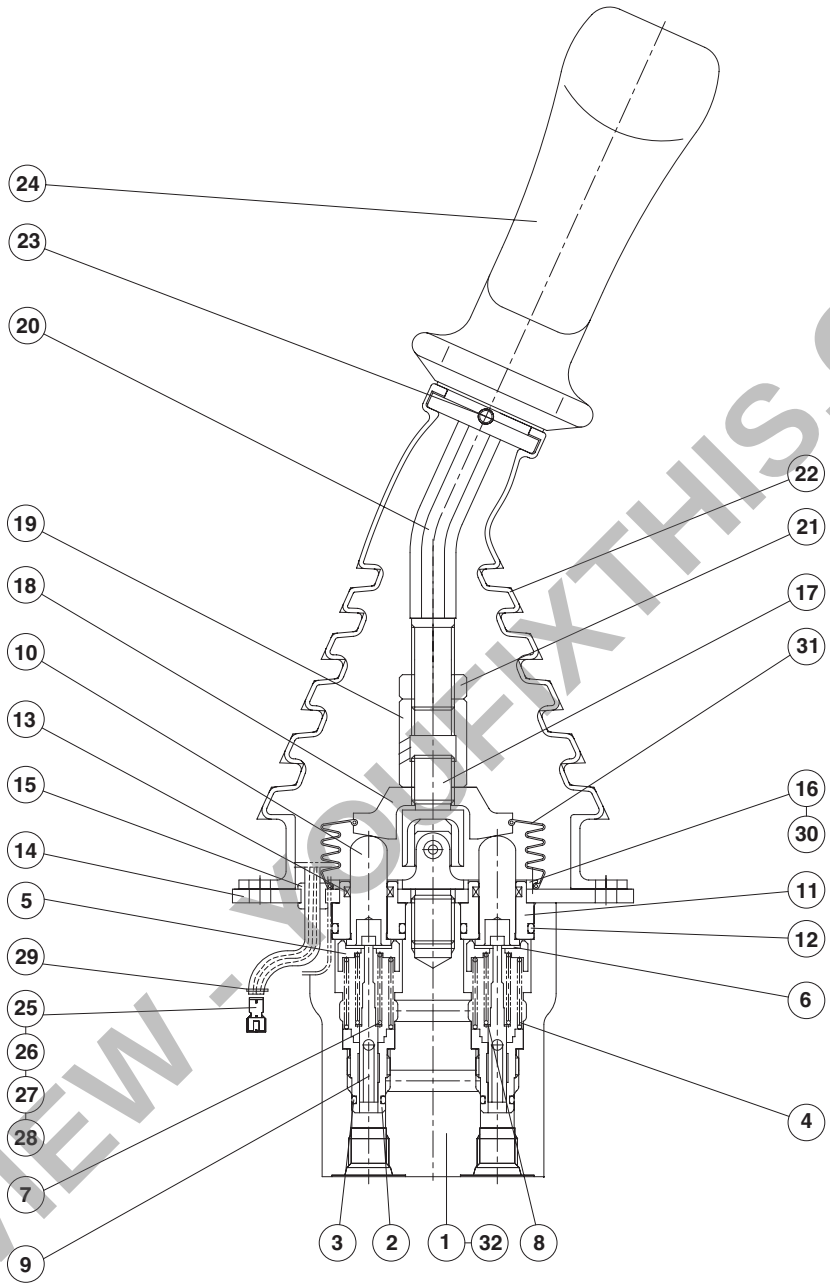


Figure 3

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Assembling Swash Plate

1. Assemble guide into housing.

   NOTE: *Assemble it by noting position of match marks made when disassembling.*

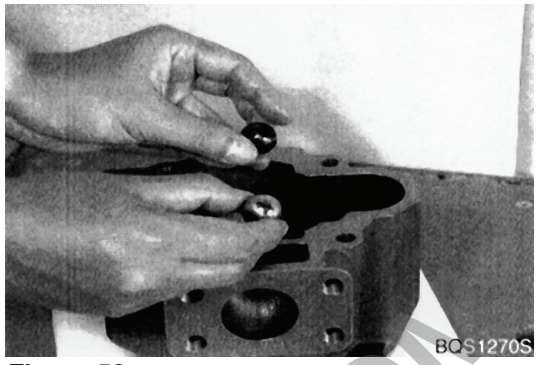
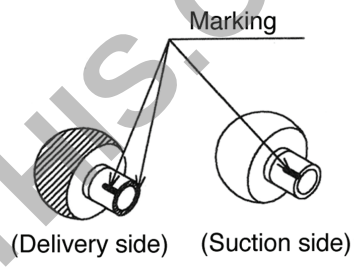


Figure 58



BQS1300S

Figure 59

2. Assemble swash plate.

   NOTE: *If bushing is damaged when disassembling, assemble delivery side and suction side with new parts.*

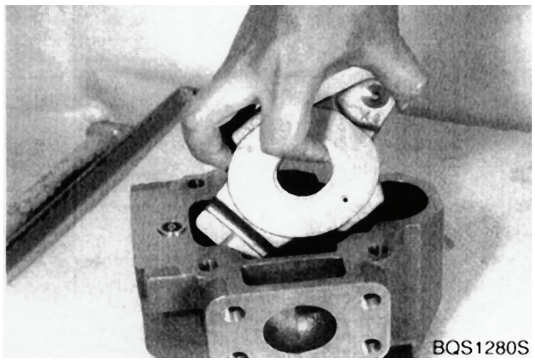
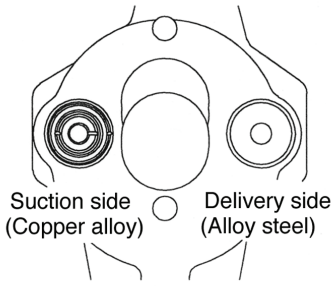


Figure 60



BQS1310S

Figure 61

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INSTALLATION

Handling

1. When handling or transporting the valve, take care not to drop it so that it may not give impact to the spool tip and cap area.
2. When storing the valve for an extended time, tighten plugs to each portion to prevent the entry of dust or water.

Installation

1. When assembling valve fittings, use the specified tightening torque. (Take care so that the pipe may not give unnecessary stress over the valve.)
2. Install the control linkage so that the spool moves correctly in the axial direction.
3. When welding near the valve, take care so that excessive heat and welding sputter may not damage the O-ring and dust seal.
4. In painting, prevent paint from being contacted with the spool.
5. Do not leave plug unscrewed until doing piping works so that dust or water may not enter each port.

START-UP PROCEDURES

Operation

1. Before operation, check to see that the hydraulic pipes and hydraulic oil are clean.
2. Hydraulic oil for use should be at -20°C - 80°C (-4 - 176°F). If the oil temperature is below 0°C (32°F), warm up the engine.
3. Do not raise the set pressure for the main relief valve and port relief valve above the specified one.

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Operation in Charging Mode

When the starter switch (5) is turned to the "ON" position, an initial excited current flows to the field coil of the alternator (3) through the fusible link (2), starter switch (5), and fuse box (4). When the engine is started from this condition the alternator (3) starts charging. The current flows from the terminal "B" of alternator (3) → fusible link (2) → battery (1).

The alternator (3) also supplies electric current to other electrical components.

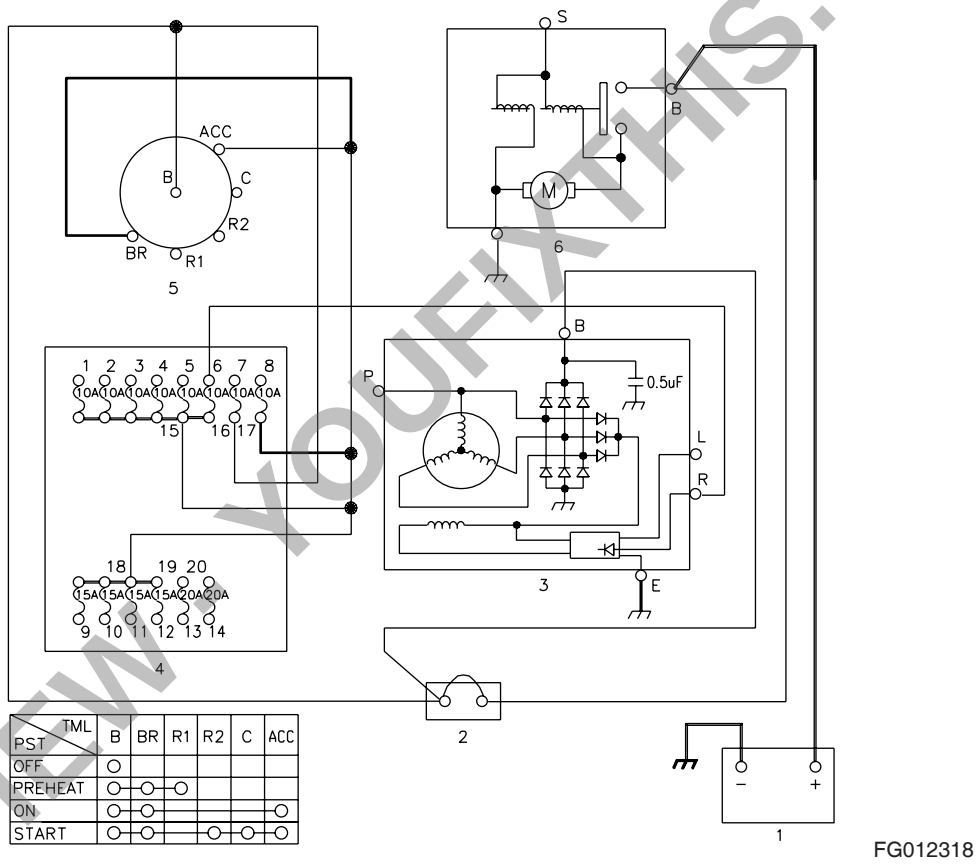


Figure 7 CHARGING CIRCUIT

Reference Number	Description
1	Battery
2	Fusible Link
3	Alternator

Reference Number	Description
4	Fuse Box
5	Starter Switch
6	Starter

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