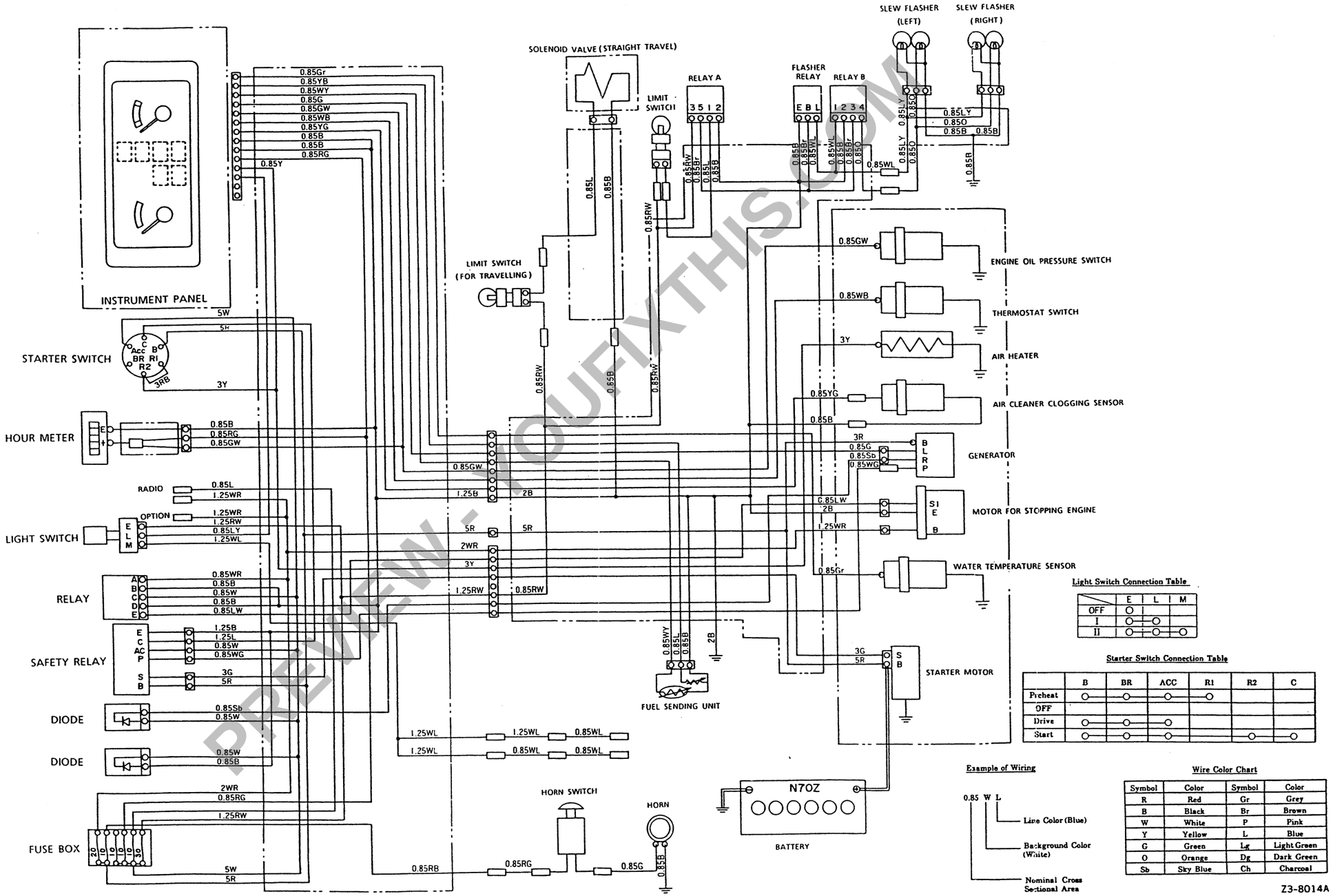
ELECTRICAL SYSTEM

ELECTRICAL WIRING DIAGRAM



Light Switch Connection Table

	E	L	M
OFF	○		
I	○	○	
II	○	○	○

Starter Switch Connection Table

	B	BR	ACC	R1	R2	C
Preheat	○	○	○	○		
OFF						
Drive	○	○	○			
Start	○	○	○		○	○

Example of Wiring

0.85 W L
- Line Color (Blue)
- Background Color (White)
- Nominal Cross Sectional Area

Wire Color Chart

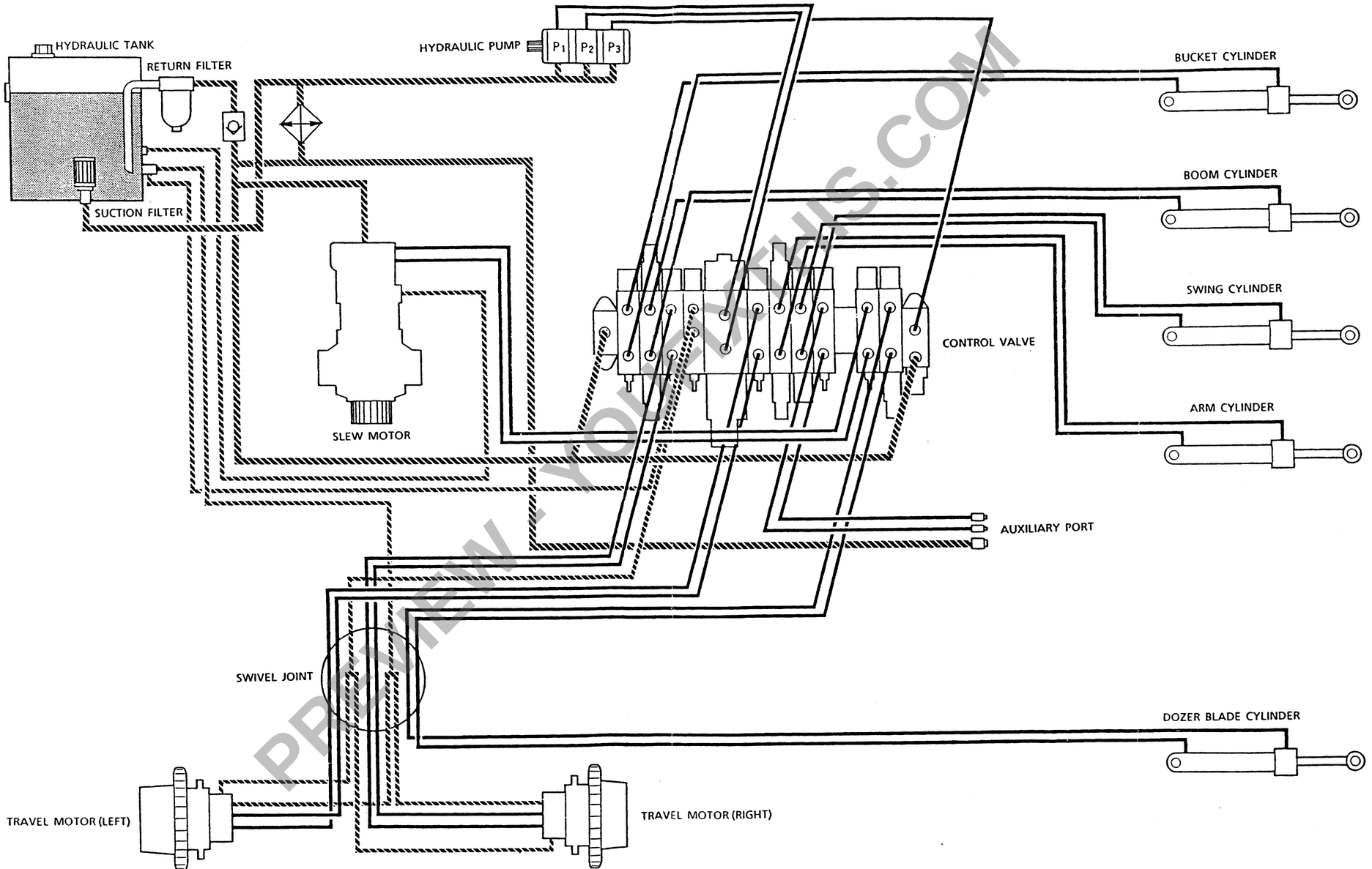
Symbol	Color	Symbol	Color
R	Red	Gr	Grey
B	Black	Br	Brown
W	White	P	Pink
Y	Yellow	L	Blue
G	Green	Lg	Light Green
O	Orange	Dg	Dark Green
Sb	Sky Blue	Ch	Charcoal

Z3-8014A

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HYDRAULIC SYSTEM

HYDRAULIC SYSTEM DIAGRAM



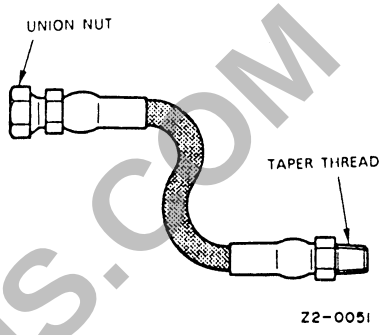
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TIGHTENING TORQUES

Hydraulic Hose Fittings

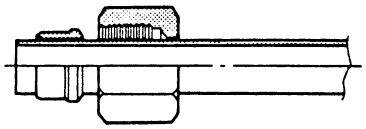
Hose Fitting Size	Torque			
	Union Nut (PF)		Taper Threads (PT)	
	kgf·m	ft-lb	kgf·m	ft-lb
1/8	$1.0^{+0.5}_{0}$	$7.3^{+3.5}_{0}$	$1.2^{\pm 0.12}$	$8.7^{\pm 0.8}$
1/4	$2.5^{+0.5}_{0}$	$18.1^{+3.5}_{0}$	$3.0^{\pm 0.30}$	$21.7^{\pm 2.1}$
3/8	$5.0^{+0.5}_{0}$	$36.2^{+3.5}_{0}$	$5.5^{\pm 0.55}$	$39.8^{\pm 3.9}$
1/2	$6.0^{+0.5}_{0}$	$43.4^{+3.5}_{0}$	$9.0^{\pm 0.90}$	$65.1^{\pm 6.4}$
3/4	$12.0^{+0.5}_{0}$	$86.8^{+3.5}_{0}$	$15.0^{\pm 1.50}$	$108.5^{\pm 10.7}$
1	$14.0^{+0.5}_{0}$	$101.3^{+3.5}_{0}$	$20.0^{\pm 2.00}$	$144.7^{\pm 14.3}$



Z2-0051

Bite Type Tube Fittings For Steel Tube

Tube Outer Diameter (mm)	Torque	
	kgf·m	ft-lb
8	$3.5^{\pm 0.5}$	$25.3^{\pm 3.5}$
10	$4.25^{\pm 0.25}$	$30.7^{\pm 1.7}$
12	$6.0^{\pm 0.5}$	$43.4^{\pm 3.5}$
15	$9.0^{\pm 0.5}$	$65.1^{\pm 3.5}$
16	$9.5^{\pm 0.5}$	$68.7^{\pm 3.5}$
18	$13.5^{\pm 0.5}$	$97.6^{\pm 3.5}$
22	$21.0^{\pm 1.0}$	$151.8^{\pm 7.2}$
27.2	$25.0^{\pm 1.0}$	$181.0^{\pm 7.2}$
28	$32.0^{\pm 2.0}$	$231.4^{\pm 14.3}$
32	$32.0^{\pm 2.0}$	$231.4^{\pm 14.3}$
35	$42.0^{\pm 2.0}$	$303.7^{\pm 14.3}$


Z2-0061

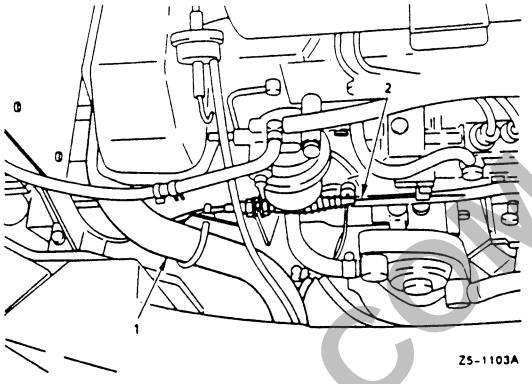
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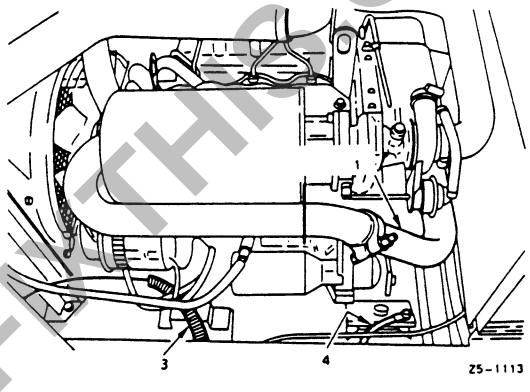
DISASSEMBLY AND ASSEMBLY

Removing Engine

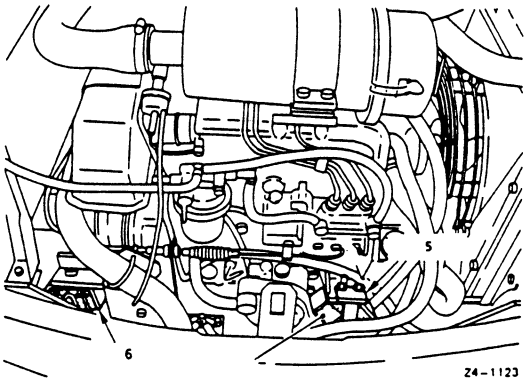
1. Remove the hood, radiator cover and engine cover (F).
   • Refer to the section, Removing Covers.
2. Remove the fuel tank.
   • Refer to section, Removing Fuel Tank.
3. Remove the hydraulic pump.
   • Refer to section, Removing Hydraulic Pump.
4. Remove the radiator.
   • Refer to section, Removing Radiator.
5. Remove exhaust pipe (1).
6. Disconnect the control cable (2) from the engine.
7. Disconnect the electrical wiring (3) from the engine.
   • Reference tag should be attached to the disconnected wiring.
8. Disconnect the engine's ground cable (4) from the engine.
9. Remove the stoppers (5).
10. Remove the nuts securing the damping rubbers (6), then remove the engine assembly.
    • Engine assembly weight :
      approx. 183 kg (SK024), approx. 190 kg (SK027)
      approx. 190 kg (SK032)



Z5-1103A



Z5-1113



Z4-1123

Installing Engine

The procedures for mounting the engine are the reverse of removal.

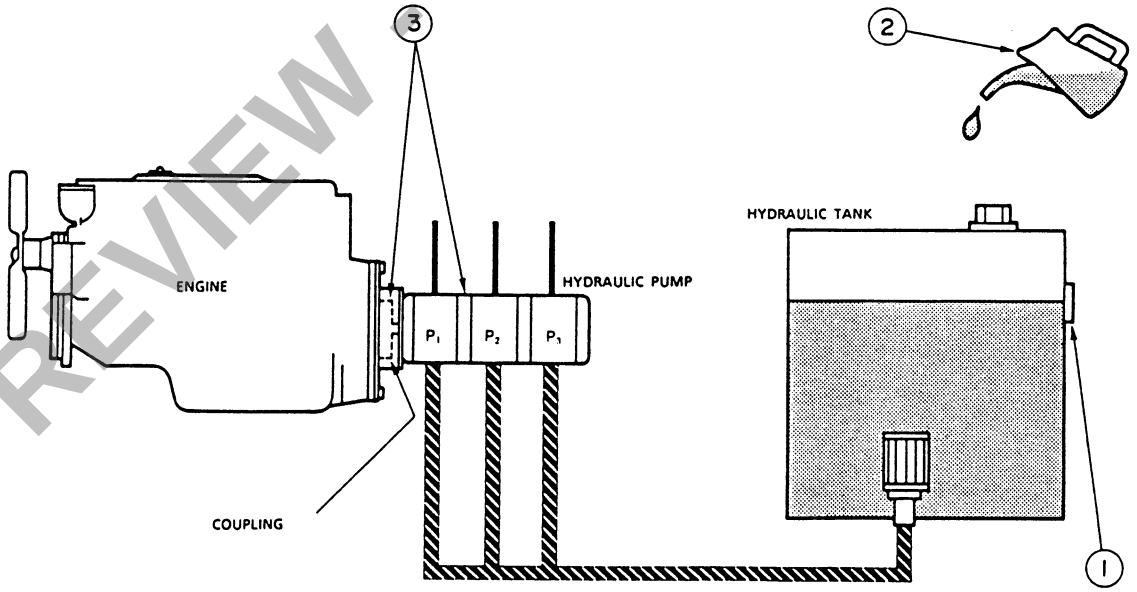
• Torque for damping rubber nuts : 9.9 kgfm

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ALL FUNCTIONS INOPERABLE

1	Inspect hydraulic fluid level.	Low →	2	Replenish hydraulic fluid.
		Sufficient ↓		
3	Faulty pump or coupling	→	• Repair or replace pump. • Replace coupling.	



Z3-1015

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SPECIFICATION TABLES

SPECIFICATIONS

Model	SK024	
Serial Number	PV02600~	
Type	Canopy	Cab
Bucket Capacity (JIS) (m^3)	0.055	←
Weight in Transport Condition (kg)	2,510(2,480)	2,630(2,600)
Dimensions (mm)		
Overall Length (in Transport Position)	4,400	←
Overall Width (in Transport Position)	1,450	←
Overall Height (in Transport Position)	2,335	2,440
Minimum Ground Clearance	295(310)	←
Upper Machinery Minimum Height	565	←
Upper Machinery Overall Width	1,440	←
Overall Crawler Width	1,450	←
Overall Crawler Length	1,870	←
Minimum Slew Radius	1,455	1,890
Maximum Hoe Height at Min. Slew Radius	3,550	3,320
Tail Swing Radius	1,290	←
Dozer Blade Width	1,450	←
Dozer Blade Height	350	←
Operating Range (mm)		
Maximum Digging Height	4,645(4,665)	4,100(4,120)
Maximum Digging Depth	2,610(2,590)	←
Vertical Digging Depth	1,875(1,850)	←
Maximum Digging Reach	4,570	←
Maximum Reach at Ground Level	4,445	←
Maximum Dumping Height	3,335(3,355)	2,865(2,885)
Bucket Offset (Right/Left)	560/495	←
Dozer Blade Lift (Above/ Below ground)	385/310	←
Performance		
Digging Force (Arm/Bucket) (kg)	1,370/1,800	←
Slew Speed (rpm)	10.0	←
Travel Speed (km/hr)	Low:2.3 (2.5)/high:4.1 (4.4)	←
Traction Force (kg)	1,530	←
Gradeability (degree)	30	←
Ground Pressure (JIS) (kgf/cm^2)	0.27(0.26)	0.28(0.27)

*( ) Indicates specifications for rubber crawler.

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CONTENTS

General Precautions 03
Precautions for Disassembly and Assembly 05
Precautions for Removing and Installing Hydraulic Units 06
Precautions for Removing and Installing Piping 07
When Handling Seals 08
Tightening Torques 09

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⚠ WARNING

SAFETY

⚠ WARNING

The proper and safe lubrication and maintenance for this machine, recommended by KOBELCO are outlined in the OPERATION & MAINTENANCE GUIDE for this machine.

Improper performance of lubrication or maintenance procedures is dangerous and could result in injury or death. Read and understand the OPERATION & MAINTENANCE GUIDE before performing any lubrication or maintenance.

The serviceman or mechanic may be unfamiliar with many of the systems on this machine. This makes it important to use caution when performing service work. A knowledge of the system and or components is important before the removal or disassembly of any component.

Because of the size of some of the machine components, the serviceman or mechanic should check the weights noted in this Manual. Use proper lifting procedures when removing any components.

Following is a list of basic precautions that should always be observed.

1. Read and understand all Warning plates and decals on the machine before operating, lubricating or repairing this product.

2. Always wear protective glasses and protective shoes when working around machines. In particular, wear protective glasses when pounding on any part of the machine or its attachments with a hammer or sledge. Use welders gloves, hood/goggles, apron and other protective clothing appropriate to the welding job being performed. Do not wear loose-fitting or torn clothing. Remove all rings from fingers when working on machinery.

3. Disconnect battery and discharge any capacitors before starting to work on machine. Hang "Do Not Operate" tag in the Operator's Compartment.

4. If possible, make all repairs with the machine parked on a level, hard surface. Block machine so it does not roll while working on or under machine.

5. Do not work on any machine that is supported only by lift jacks or a hoist. Always use blocks or jack stands to support the machine before performing any disassembly.

⚠ WARNING

Do not operate this machine unless you have read and understand the instructions in the OPERATOR'S MANUAL. Improper machine operation is dangerous and could result in injury or death.

---

6. Relieve all pressure in air, oil or water systems before any lines, fittings or related items are disconnected or removed. Always make sure all raised components are blocked correctly and be alert for possible pressure when disconnecting any device from a system that utilizes pressure.

7. Lower the bucket, blade, ripper or other implements to the ground before performing any work on the machine. If this cannot be done, make sure the bucket, blade, ripper or other implement is blocked correctly to prevent it from dropping unexpectedly.

8. Use steps and grab handles when mounting or dismounting a machine. Clean any mud or debris from steps, walkways or work platforms before using. Always face machine when using steps, ladders and walkways. When it is not possible to use the designed access system, provide ladders, scaffolds, or work platforms to perform safe repair operations.

9. To avoid back injury, use a hoist when lifting components which weigh 23 kg (50 lbs) or more. Make sure all chains, hooks, slings, etc., are in good condition and are in the correct capacity. Be sure hooks are positioned correctly. Lifting eyes are not to be side loaded during a lifting operation.

10. To avoid burns, be alert for hot parts on machines which have just been stopped and hot fluids in lines, tubes and compartments.

11. Be careful when removing cover plates. Gradually back off the last two bolts or nuts located at opposite ends of the cover or device and pry cover loose to relieve any spring or other pressure, before removing the last two bolts or nuts completely.

12. Be careful when removing filler caps, breathers and plugs on the machine. Hold a rag over the cap or plug to prevent being sprayed or splashed by liquids under pressure. The danger is even greater if the machine has just been stopped because fluids can be hot.

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HYDRAULIC EXCAVATOR

SK024
SK027
SK032

SHOP MANUAL

model

This is the shop manual for KOBELCO hydraulic excavator. Contained is the necessary technical data concerning the maintenance and repair of this model.

When checking or repairing the machine we suggest that you refer to this manual carefully. We hope that reference to this manual will help to maintain a high level of working efficiency and reliability. For further details on maintenance and checks refer to the "OPERATORS MANUAL" which has been supplied with the machine.

Although all data was correct at the time of printing, due to continual design changes and improvements, some contents may not conform to the actual machine. Take special care to order parts only after confirming the validity of the parts number in the "PARTS MANUAL".

If you notice any explanatory discrepancies, after consulting one of our representatives, please update your manual according to the latest data. However, in the enent of any specification changes, we will issue revised edition.

FOREWORD

KOBELCO

Book Code No. S5RO0002E②

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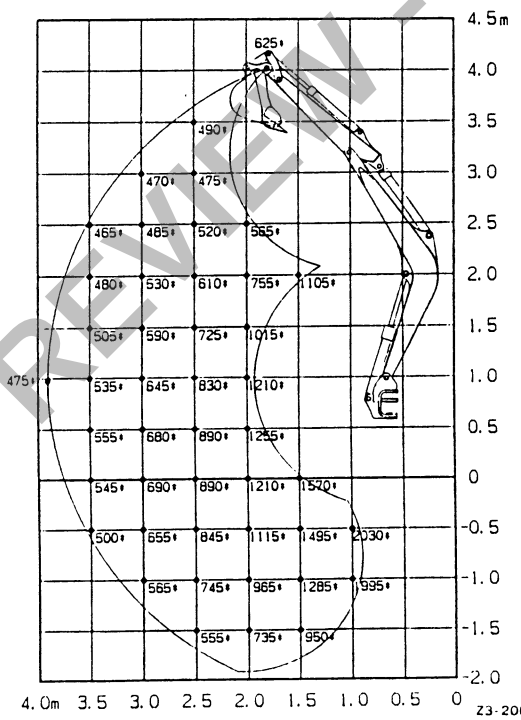
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LIFTING CAPACITIES

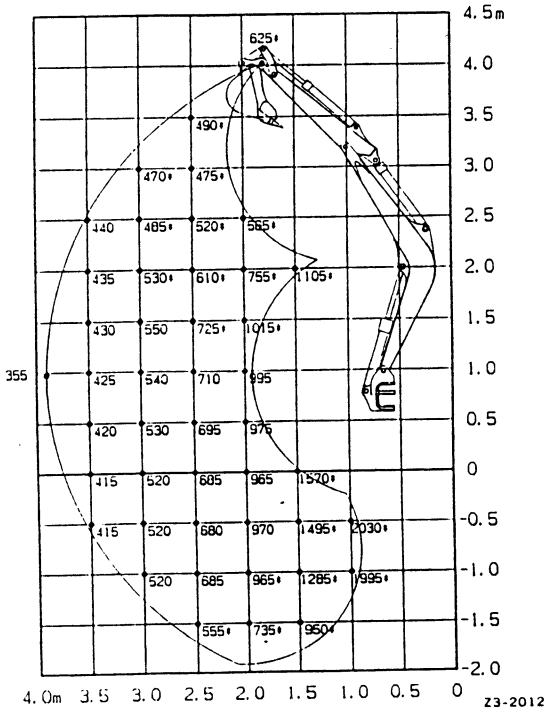
1. The numerical values in the figures indicate either 87% of the hydraulic lift capacity or 75% of the tipping load, whichever value is smaller. (* Marks indicate values limited by the hydraulic lift capacity.)
2. The load point is the bucket hinge pin, and the bucket posture is with the standard bucket completely retracted under the arm.
3. Units : kg

■ SK024

STANDARD ARM
Over Front ; Dozer Blade Down
Rubber Crawler, Canopy, Standard Bucket



Over Front ; Dozer Blade Up
Rubber Crawler, Canopy, Standard Bucket



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SK024

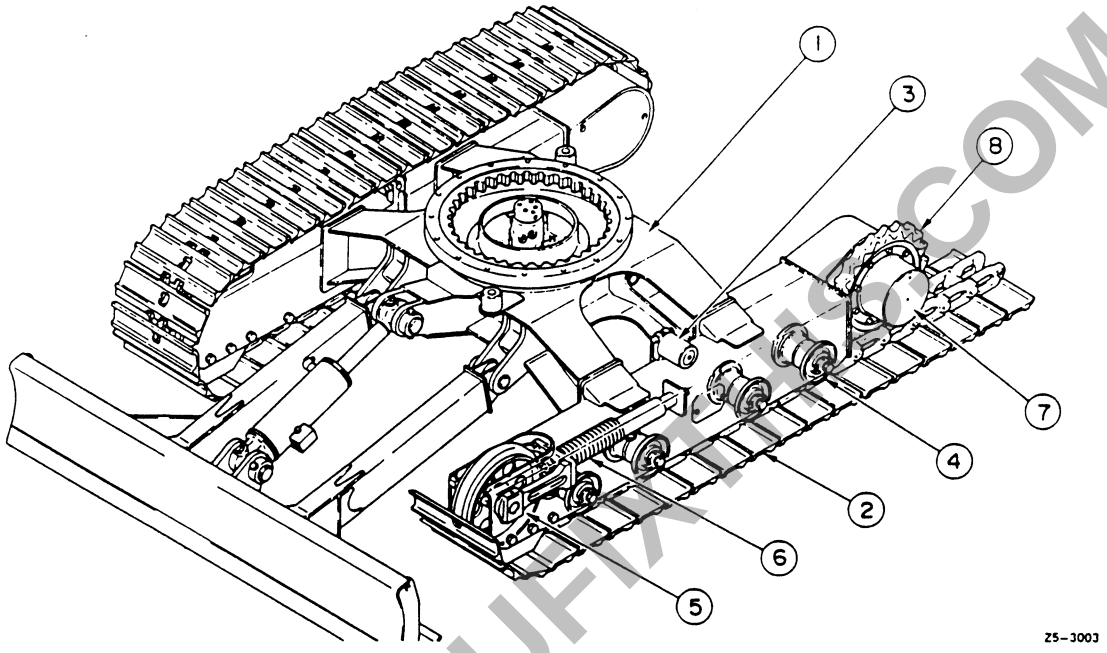
Units : mm

Code	Item	Designated Standard					Servicing Procedure
		Basic Dimensions	Allowable Tolerance		Standard Clearance	Allowable Clearance	
			Shaft	Hole			
A	Clearance Between Boom Foot Pin and Boss Hole	40	−0.06 −0.09	+0.039 0	0.06~0.129	1.0	
B	Clearance Between Boom Foot Pin and Bushing	40	−0.06 −0.09	+0.20 +0.15	0.21~0.29	1.0	
C	Clearance Between Boom Cylinder Head Pin and Boss Hole	40	−0.06 −0.09	+0.039 0	0.06~0.129	1.0	
D	Clearance Between Boom and Boom Cylinder Connecting Pin and Boss Hole	40	−0.06 −0.09	+0.039 0	0.06~0.129	1.0	
E	Clearance Between Boom and Arm Cylinder Connecting Pin and Boss Hole	40	−0.06 −0.09	+0.039 0	0.06~0.129	1.0	
F	Clearance Between Boom and Arm Connecting Pin and Boss Hole	40	−0.06 −0.09	+0.039 0	0.06~0.129	1.0	
G	Clearance Between Boom and Arm Connecting Pin and Bushing	40	−0.06 −0.09	+0.20 +0.15	0.21~0.29	1.0	
H	Clearance Between Arm and Arm Cylinder Connecting Pin and Boss Hole	40	−0.06 −0.09	+0.039 0	0.06~0.129	1.0	
I	Clearance Between Arm and Bucket Cylinder Connecting Pin and Boss Hole	35	−0.06 −0.09	+0.039 0	0.06~0.129	1.0	Replace
J	Clearance Between Arm and Link Connecting Pin and Bushing	35	−0.06 −0.09	+0.20 +0.15	0.21~0.29	1.0	
K	Clearance Between Arm and Bucket Connecting Pin and Bushing	35	−0.06 −0.09	+0.20 +0.15	0.21~0.29	1.0	
L	Clearance Between Bucket and Link Connecting Pin and Bushing	35	−0.06 −0.09	+0.20 +0.15	0.21~0.29	1.0	
M	Clearance Between Bucket Cylinder and Link Connecting Pin and Bushing	35	−0.06 −0.09	+0.20 +0.15	0.21~0.29	1.0	
N	Clearance Between Pivot and Bushing	55	−0.02 −0.05	+0.23 +0.18	0.20~0.28	1.0	
O	Clearance Between Swing Cylinder Rod Pin and Boss Hole	40	−0.02 −0.05	+0.039 0	0.02~0.089	1.0	
P	Clearance Between Swing Cylinder Head Pin and Boss Hole	40	−0.02 −0.05	+0.039 0	0.02~0.089	1.0	
Q	Clearance Between Dozer Blade Cylinder Head Pin and Boss Hole	45	−0.06 −0.09	+0.025 0	0.06~0.115	1.0	
R	Clearance Between Dozer Blade Cylinder Rod Pin and Boss Hole	45	−0.06 −0.09	+0.025 0	0.06~0.115	1.0	
S	Clearance Between Dozer Blade Hinge Pin and Bushing	40	−0.06 −0.09	+0.20 +0.15	0.21~0.29	1.0	

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TRAVEL SYSTEM

CONSTRUCTION



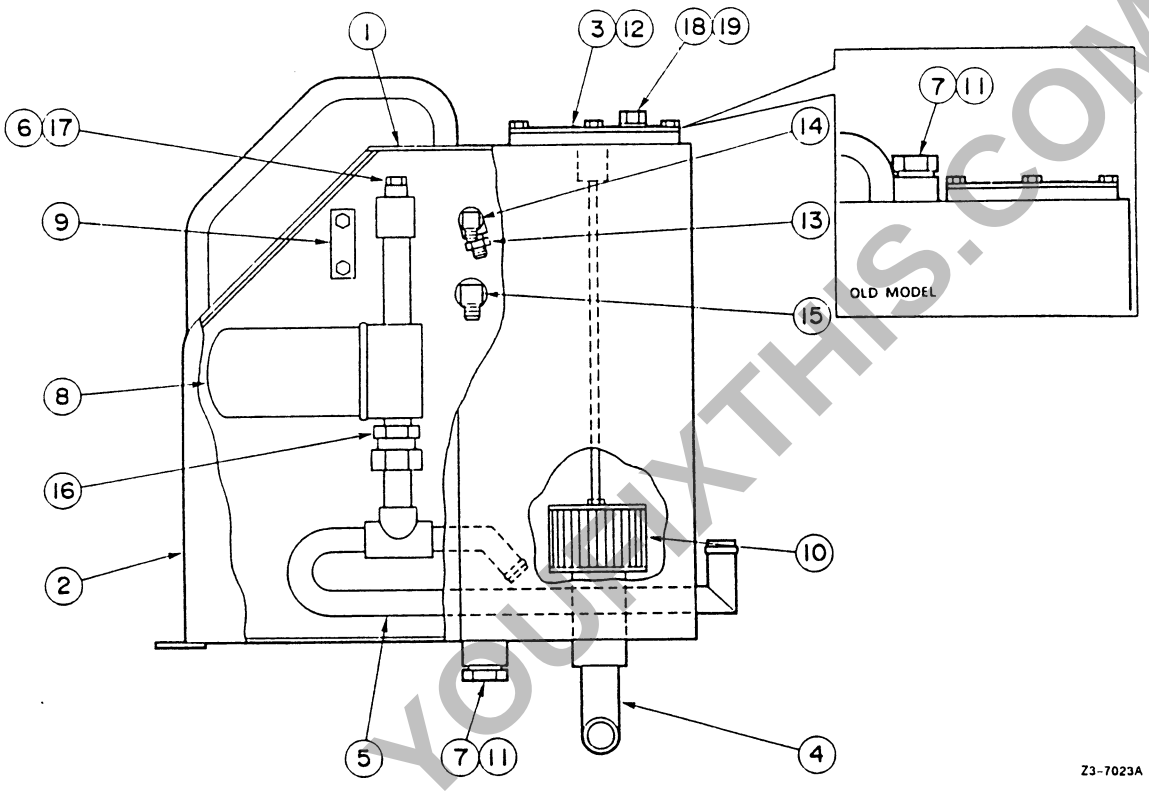
1. Lower Frame
2. Crawler Shoe
3. Upper Roller
4. Lower Roller
5. Idler
6. Track Tension
7. Travel Motor
8. Sprocket

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CONSTRUCTION

Hydraulic Tank
SK024
SK027

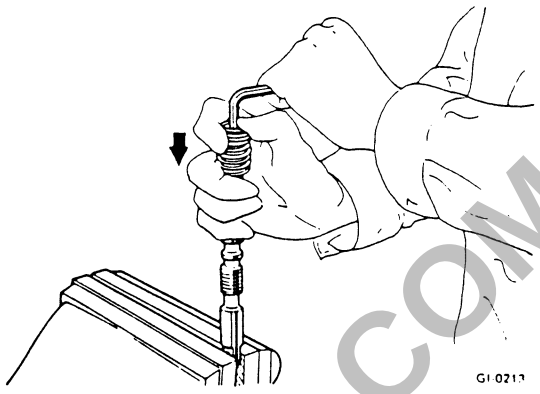


1. Tank
2. Cover
3. Lid
4. Nipple
5. Pipe
6. Plug
7. Plug (old)
8. Spin Filter
9. Level Gauge
10. Suction Filter
11. O-ring (old)
12. O-ring
13. Hose Adapter
14. Hose Adapter
15. Hose Adapter
16. Hose Adapter
17. O-ring
18. Plug (new)
19. Packing (new)

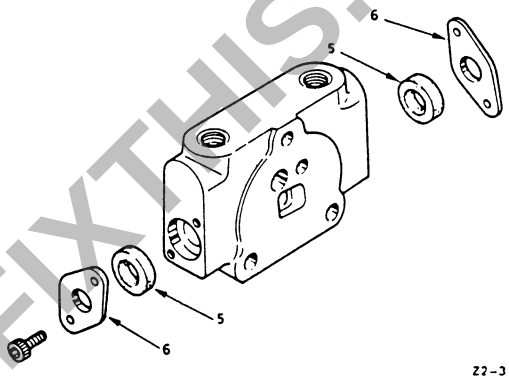
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5. Assemble the spool assembly.
   a. Secure the end of the spool in a vice.
   b. Assemble in the order of spring holder, spacer, spring and spring holder.
   c. Install the socket bolts.
      • Torque for socket bolts : 2~2.5kgfm.
      • Apply Lock tight #242 to the threads inside the socket receiving side.

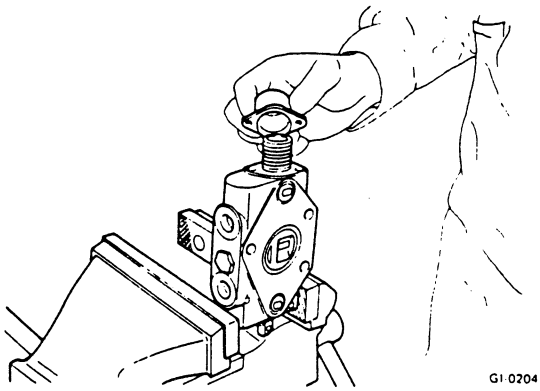


6. Attach the oil seals (5) and seal holders (6) to the block body.

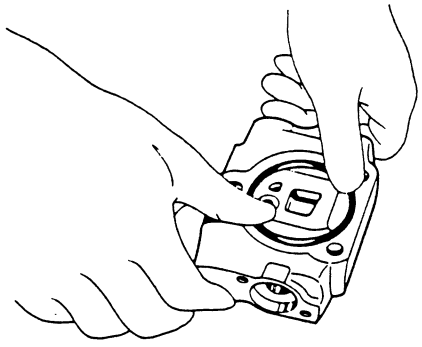


Z2-3124

7. Install the spool assembly in the block body, attach the cover and secure using socket bolts.



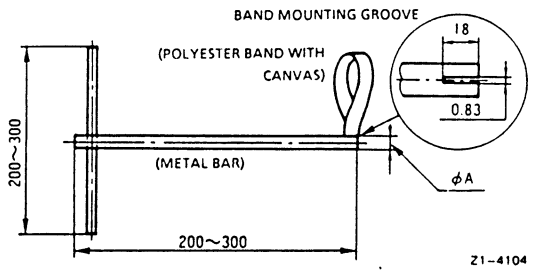
8. Attach the O-ring to the block mating faces.
   • Do not apply grease to the O-ring.



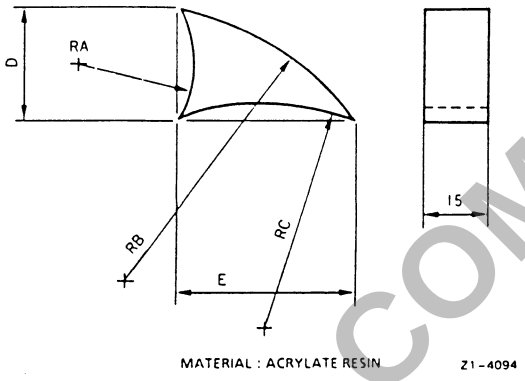
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Correcting jig (E) (SK027, SK032)



Correcting jig (E) (SK027, SK032)



Units : mm.

Boom Cylinder	A	20
Arm Cylinder	A	15
Bucket cylinder	A	15
Dozer Blade Cylinder	A	20
Swing Cylinder	A	15

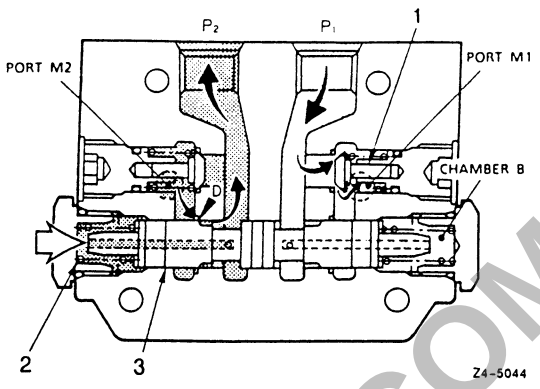
Units : mm.

Model		SK024	SK027
Boom Cylinder	A	20	20
	B	45	47.5
	C	40	42.5
	D	15	15
	E	30	30
Arm Cylinder	A	20	20
	B	42.5	45
	C	37.5	40
	D	15	15
	E	30	30
Bucket Cylinder	A	20	20
	B	37.5	40
	C	32.5	35
	D	15	15
	E	30	30
Dozer Blade Cylinder	A	25	25
	B	54.5	57
	C	47.5	50
	D	20	20
	E	40	40
Swing Cylinder	A	20	20
	B	45	45
	C	40	40
	D	15	15
	E	30	30

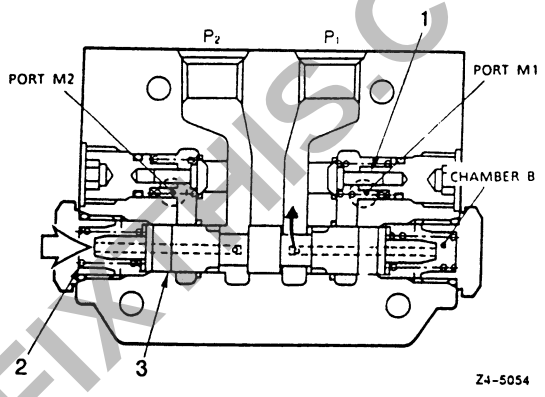
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The return fluid converges at point D, generating back pressure at port M2, which in turn reduces engine rotation speed. The reduced engine speed causes pressure to rise again in port P1 and pilot chamber B. This moves the plunger (3) left and the back pressure at port M2 dissipates. In this way the counter balance valve keeps the engine operating at a speed consistent with the level of fluid flow.



Cutting the flow of high pressure fluid to port P1 equalizes the pressure at ports P1 and P2 and the force of the spring returns the plunger (3) to the neutral position, pushing the fluid in pilot chamber B out through port P1. As this occurs, the fluid converges at orifice and returns to port P1, causing the plunger in turn to return slowly to the neutral position. These flow sequences serve to both stop the engine and cushion the shock generated when it stops.



2-Speed Mechanism

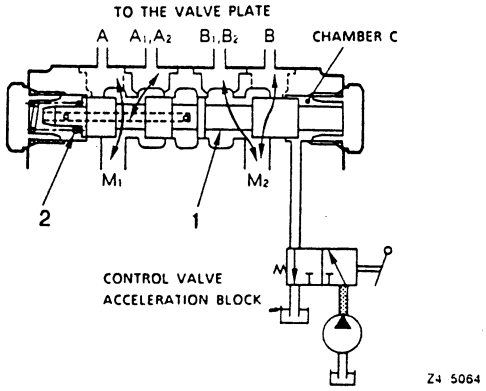
The valve plate's port groove is divided and by switching the 2-speed control valve, the effective port is changed and the hydraulic motor's piston stroke capacity is changed. In this way, shifting between low speed (high torque rotation) and high speed (low torque rotation is accomplished.

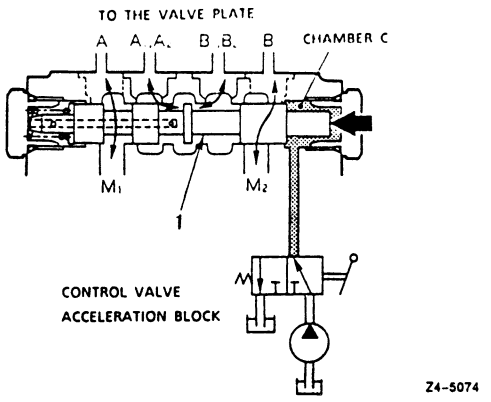
1. 2-Speed Control Valve

When the acceleration block of the control valve is in the 1st gear position, the acceleration block is connected to chamber (C), so the pressure in chamber (C) becomes low. As a result, the plunger (1) is pushed to the right by the force of the spring (2). Therefore, port M1 is connected to ports A, A1 and A2 while port M2 is connected to ports B1, B2 and B.

When the acceleration block is shifted to the 2nd gear position, hydraulic oil from the acceleration block enters the chamber (C) and the pressure in chamber (C) becomes high. This causes the plunger (1) to be moved to the left by the hydraulic oil. As a result, port M1 is connected to port A and port B2 is connected to port B, while ports A1 and A2 are connected to ports B1 and B2.

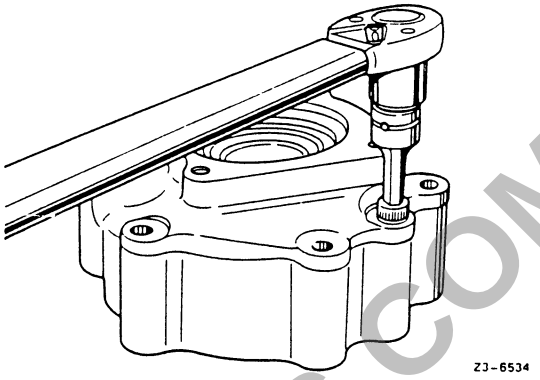
When the engine is stopped, since there is no hydraulic pressure being generated, the force of the spring causes the plunger (1) to move back toward the left to the 1st gear position.



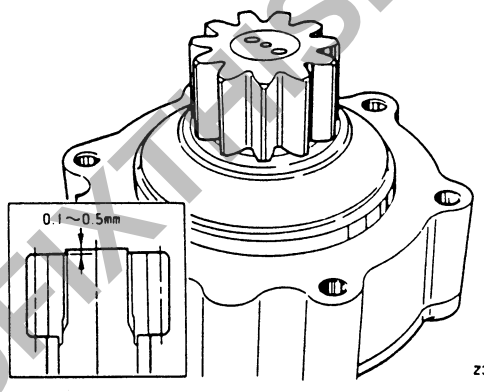


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9. Attach the lower case, turn it around, then install the socket bolts.
   • Torque for socket bolts : 11 $^{\pm 1}$kgfm.

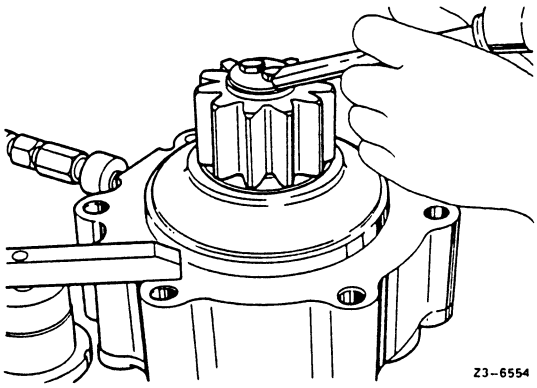

ZJ-6534

10. Install the pinion on the shaft.
    • After installing, confirm that shaft end protrudes 0.1 - 0.5mm past the pinion.

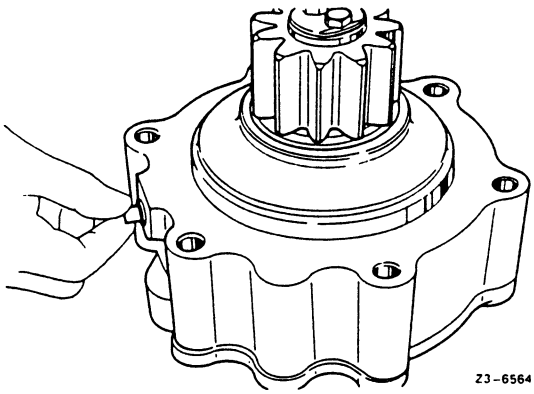


ZJ-6544

11. Mount plate and lock washer, then install the bolt. Bend the lock washer after tightening the bolt.
    • Torque for bolt : 2/.95 $^{\pm 0.25}$kgfm.


ZJ-6554

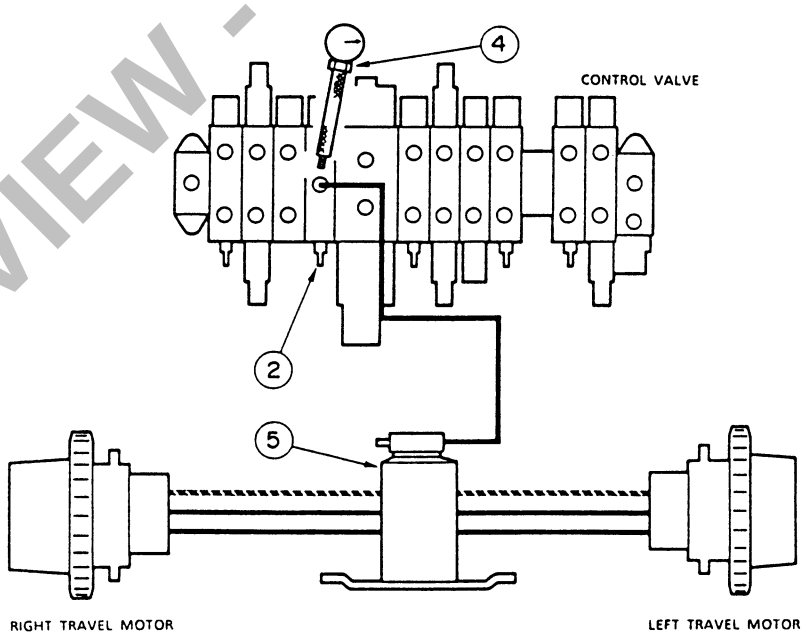
12. Install the plug on the lower case.
    • Torque for plug : 1.25 $^{\pm 0.25}$kgfm.


ZJ-6564

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DOES NOT ACCELERATE

1	Operate actuators other than travel motor.		
	Normal ↓		
2	Inspect operation of spool.	Faulty →	Repair or replace housing block.
	Normal ↓		
3	Inspect linkage.	Faulty →	Adjust, repair or replace components if necessary.
	Normal ↓		
4	Inspect pressure supplied by accelerator block.	Faulty →	Repair or replace accelerator block.
	Normal ↓		
5	Inspect swivel joint.	Faulty →	Repair or replace swivel joint valve.
	Normal ↓		
6	Faulty accelerator valve.	→	Repair or replace accelerator valve.



Z3-2085

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