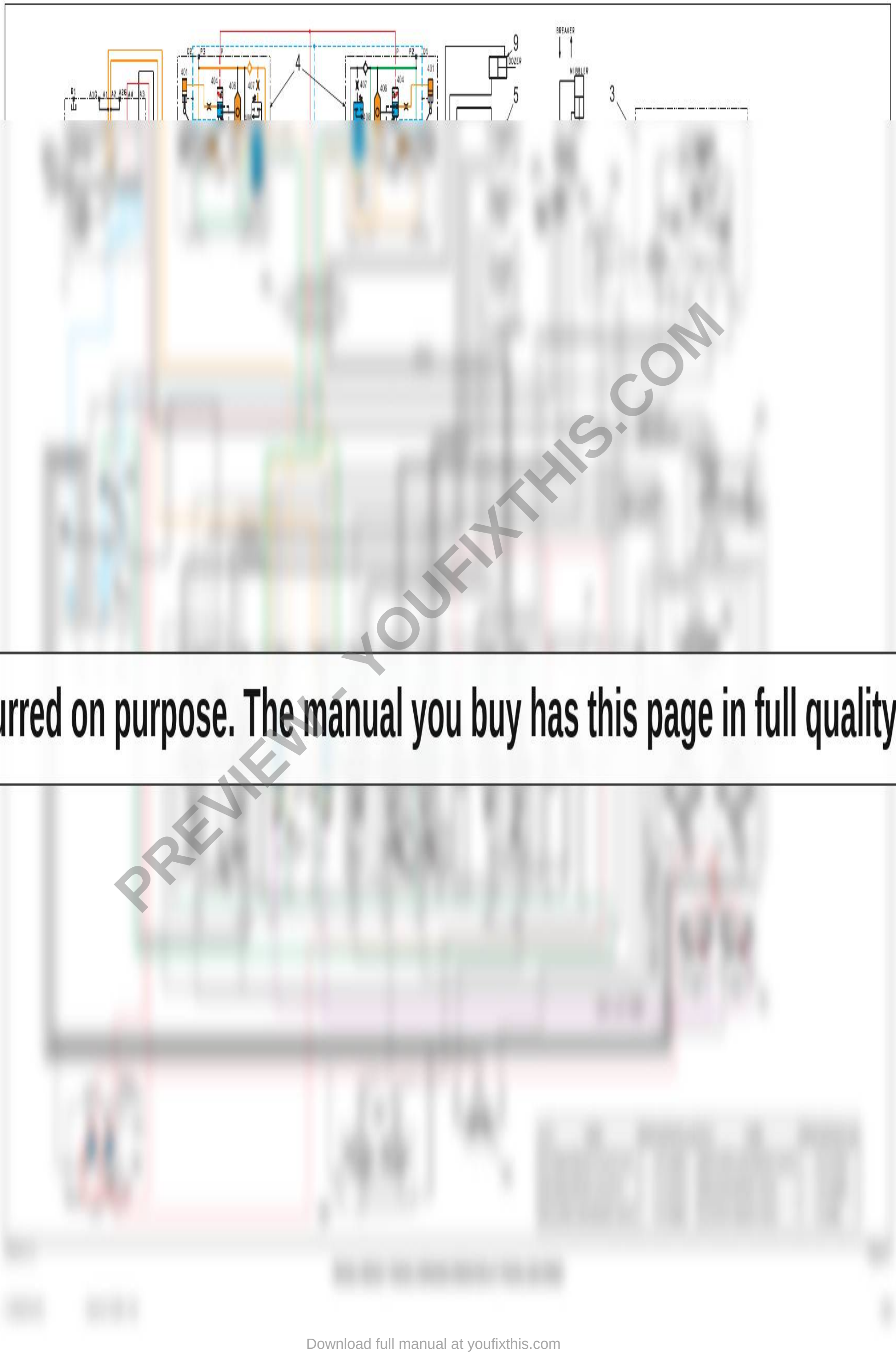
SECTION 3 - SYSTEMS
CHAPTER 1 - HYDRAULIC SYSTEM



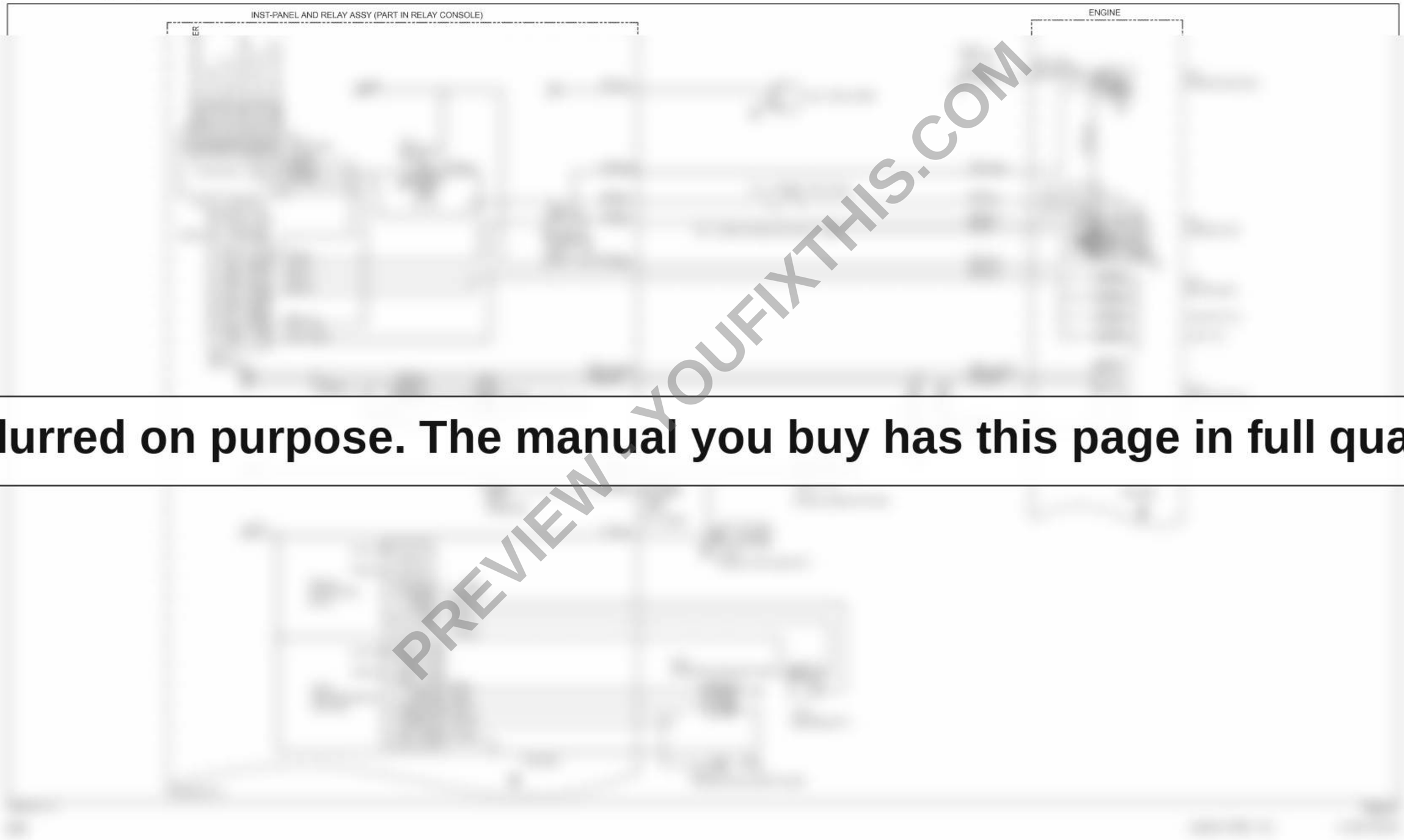
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SECTION 3 - SYSTEMS
CHAPTER 2 - ELECTRICAL SYSTEM

Electric Circuit Diagram

Electric circuit diagram (1/3)



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SPECIFICATIONS AND PERFORMANCE

SPEED AND GRADEABILITY

Model		E50BSR			
Applicable Machines		PJ06-08001~			
Shoe Type		Rubber shoe		Iron shoe (OPT)	
Slewing Speed	min^{-1} {rpm}	8.8 {8.8}			
Travel Speed	km/h (mph)	Low (1st)	High (2nd)	Low (1st)	High (2nd)
		2.8	4.6	2.8	4.6
Gradeability	% (degree)	58(30)			

ENGINE

Model (YANMAR)		4TNV88-BXYB (EDM-4TNV88)
Type		Water-cooled, 4-cycle type Swirl chamber type diesel engine
Number of cylinders-Bore × Stroke		4 - ø88 mm × 90 mm (3.46 in × 3.54 in)
Total Displacement	L	2.189 (134 cu/in)
Output Rating	kW/min^{-1} {PS/rpm}	29.3/2,400 {40/2,400}
Maximum Torque	Nm/min^{-1} (pound-ft/rpm)	131/1,440 (97/1,440)
Starting Motor	V × kW	12 × 2.3
Generator	V × A	12 × 55

HYDRAULIC COMPONENTS

Hydraulic Pump	Variable displacement axial piston + gear pump
Hydraulic Motor	Axial piston
Hydraulic Motor w/Reducer (Travel)	2-Axial piston, 2-Speed motor
Control Valve	11-spool multiple control valve
Cylinder (Boom, Arm, Swing, Bucket, Dozer)	Double action cylinder
Return Filter	Safety valve containing/Filter Type (30μ)

SIDE DIGGING & DOZER

Type		Boom swing by hydraulic cylinder
Boom Swing Angle	Right	60°
	Left	70°
Stroke of Dozer (above/below)	mm (in)	495 / 375 (19.5/14.8)

WEIGHT

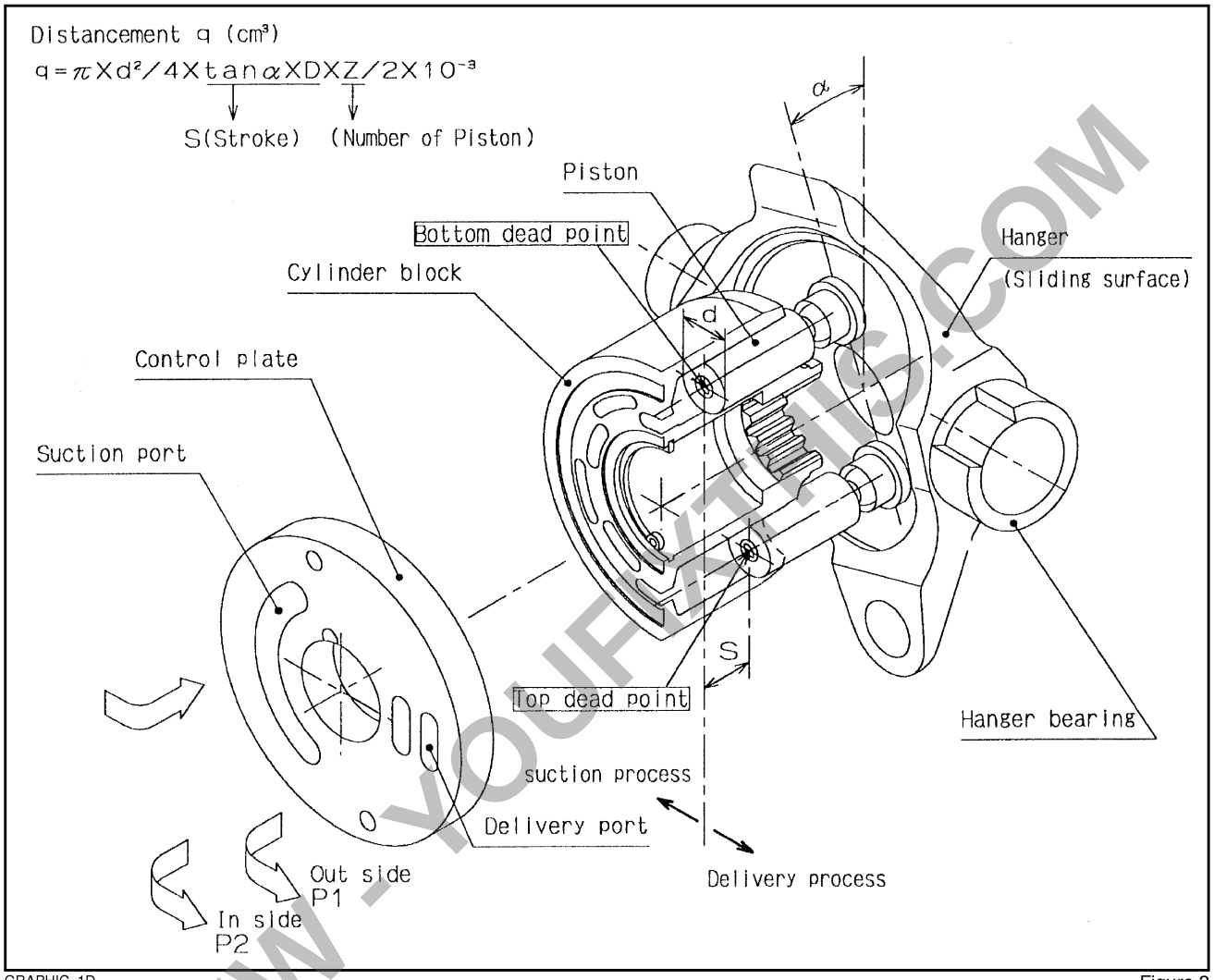
Machine Weight	kg (lb)	Rubber shoe	Iron shoe
		4,630 (10,200)	4,730 (10,400)
Upper slewing body	kg (lb)	2,280 (5,030)	←
Travel system	kg (lb)	1,720 (3,790)	1,820 (4,010)
Attachment (Boom+STD Arm+STD Bucket)	kg (lb)	535 (1,180)	
Oil & Water	kg (lb)	95 (209)	

NOTE: *This figure is calculated with Japanese standard bucket.*

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(2)Operation

1. Pump operation



GRAPHIC_1D

Figure 3

A. The cylinder block is fitted on the spline and rotates with the drive shaft.

B. The piston fitted on the cylinder block follows the sliding surface of the hanger and moves to and from.

C. The piston moves to increase the capacity from the bottom dead point to the top dead point, the pressure oil flows from the inlet port into cylinder block through the control plate. (Suction stroke)

2. But as the piston moves to decrease the capacity from the top dead point to the bottom dead point, the pressure oil is sent out to the delivery port. (Delivery stroke)
3. By changing the tilting angle of the hanger (sliding surface), the displacement varies.
4. The oil sucked from the inside port of the cylinder block is delivered from the delivery port inside of the control valve.
5. The oil sucked from the outside port of the cylinder block is delivered from the delivery port outside of the control plate.

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REMOVING AND INSTALLING

CANOPY / CAB

Canopy Removal

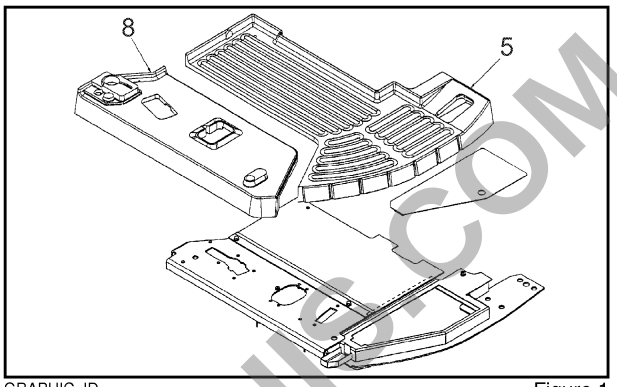
(1)Remove the floor mats (5) and (8).

(2)Removing handrail (A3)
Loosen the sems-bolt M16×65 (A4) and M16×100 (A5) to remove the handrail (A3).

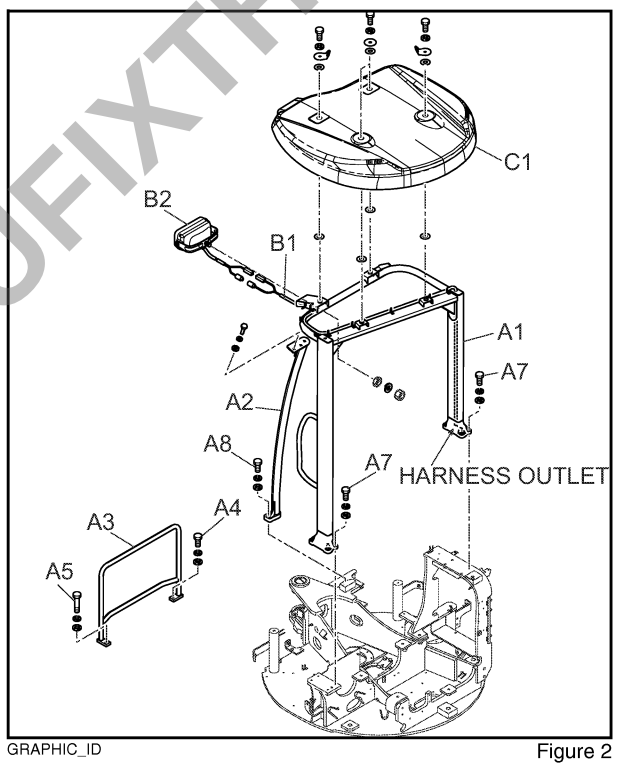
(3)Removing canopy assembly

1. Disconnect the light harness (B1) that runs inside the support (A1) and is connected to the main harness with a connector.
2. Loosen one capscrew M10×40 (A8) and four capscrews M12×55 (A7) to remove the canopy.
   Canopy weight : 85 kg (187 lbs)

(4) Install the canopy in reverse order of the removal.
Tighten the capscrews at the torque specified below :
M10 : Tightening torque: 46 Nm (34 pound-ft)
M12 : Tightening torque: 79 Nm (59 pound-ft)
M16 : Tightening torque: 191 Nm (141 pound-ft)



GRAPHIC_ID Figure 1



GRAPHIC_ID Figure 2

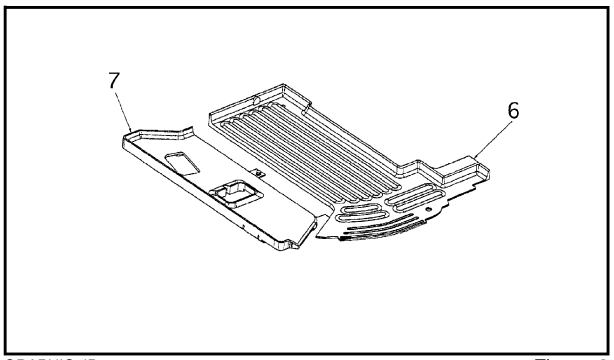
Cab Removal (Option)

Cab removal preparation

(1)Remove the floor mats (6) and (7).

(2)Removing cab harness connector

1. Respectively disconnect 6P connectors of cab harness and cab connecting harness, 2P connector of washer motor, 3P connector of radio (optional) and so on. (See ELECTRICAL SYSTEM)



GRAPHIC_ID Figure 3

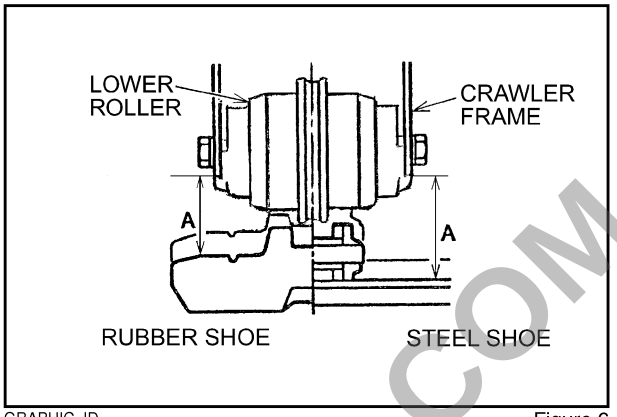
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(6)Tension

Rubber shoe
Appropriate tension A : 85~95mm(3.35~3.74 in)

Steel shoe
Appropriate tension A : 130~150mm(5.12~5.91 in)



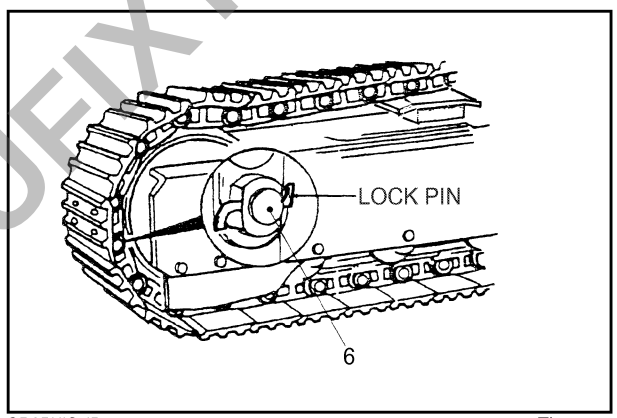
GRAPHIC_ID Figure 6

CRAWLER TENSION

Removal and Installation Procedures (Steel : OPT)

(1)Removal

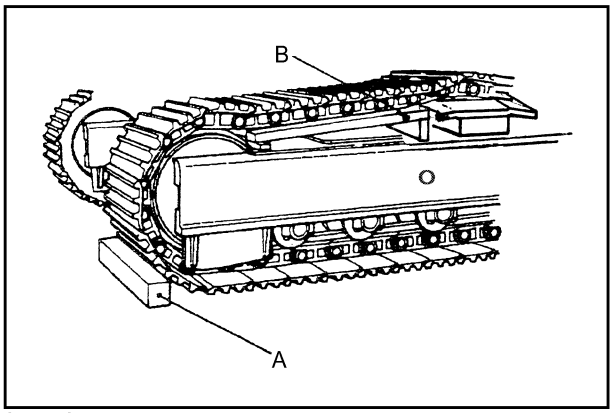
1. The crawler track link includes a set of master pin(6), which should be placed at the position front of the front idler.



GRAPHIC_ID Figure 7

POSITION OF MASTER PIN

2. Put square timbers A and B under the shoe at the top end of the crawler and between the crawler and the link over the track frame to reduce the load to the master pin.



GRAPHIC_ID Figure 8

REMOVING OF MASTER PIN

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Valve Spring

Inspection Item	Model	Standard	Limit	Reference Page
Free Length	3TNV82A (2-Valve Head)	1.7480 in. (44.4 mm)	1.7283 in. (43.9 mm)	*See Inspection of Valve Springs on page 6-44 and 6-60.*
	4TNV84, 3TNV84, 3TNV84T, 4TNV88 (2-Valve Head)	1.6535 in. (42.0 mm)	1.6339 in. (41.5 mm)	
	4TNV84T (4-Valve Head)	1.4724 in. (37.4 mm)	1.4528 in. (36.9 mm)	
	4TNV94L, 4TNV98, 4TNV98T (4-Valve Head)	1.5630 in. (39.7 mm)	1.5433 in. (39.2 mm)	
	4TNV106, 4TNV106T (4-Valve Head)	1.9921 in. (50.6 mm)	1.9724 in. (50.1 mm)	
Squareness	3TNV82A (2-Valve Head)	-	0.0551 in. (1.4 mm)	
	4TNV84, 3TNV84, 3TNV84T, 4TNV88 (2-Valve Head)	-	0.0551 in. (1.4 mm)	
	4TNV84T (4-Valve Head)	-	0.0551 in. (1.3 mm)	
	4TNV94L, 4TNV98, 4TNV98T (4-Valve Head)	-	0.0551 in. (1.4 mm)	
	4TNV106, 4TNV106T (4-Valve Head)	-	0.0551 in. (1.5 mm)	

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Revision History			
Issue	Issue Date	Applicable Machine	Remarks
First Edition	Issued 01-2008	E50BSR	COMPACT CRAWLER EXCAVATOR

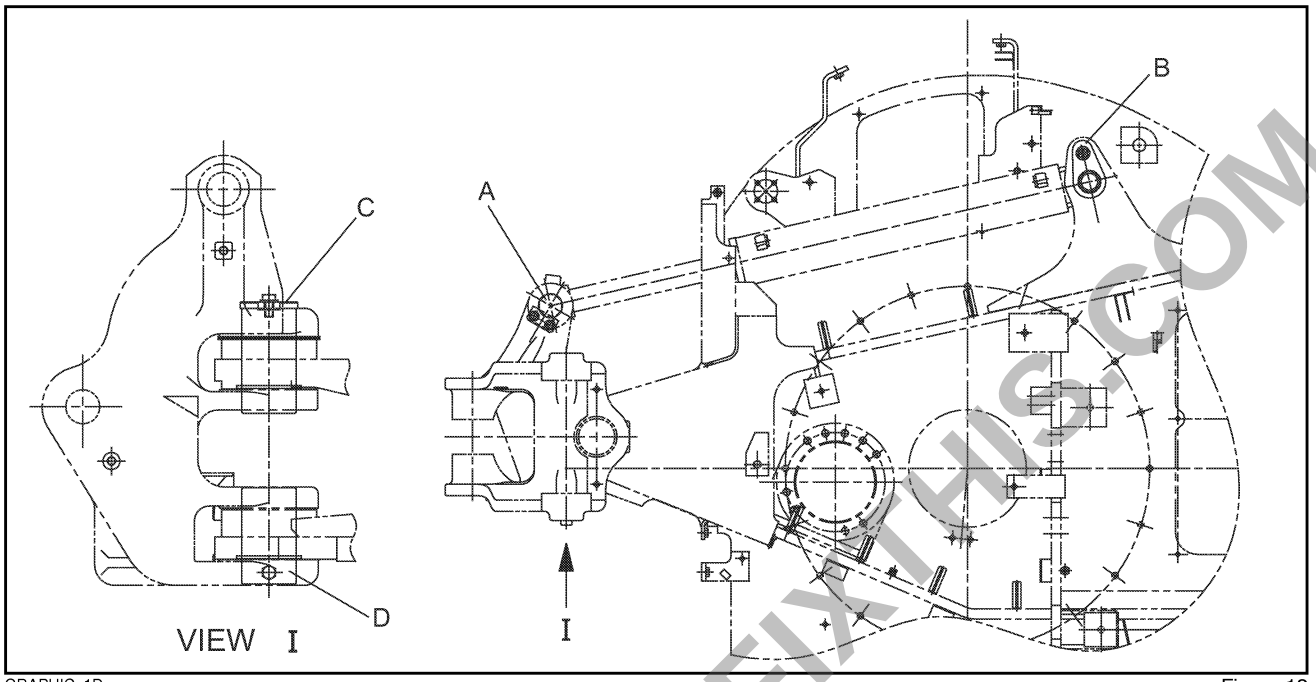
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Swing Portion Maintenance Standards

1. Clearance of pin and bushing



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Figure 13

Table 14

Unit : mm (in)

Pos.	Item	Pin part No.	Standard dimension			Clearance			Remedy
			Pin dia.	Tolerance on pin dia.	Tolerance on bushing bore dia.	Standard value	Standard value for repair	Serviceability limit	
A	Swing cylinder (Rod side)	PY02B01163P1	ø50 (1.97)	-0.02 -0.05 (-0.0008) (-0.0020)	+0.150 0 (+0.0059) (0)	0.02~ 0.20 (0.0008~0. 0079)	1.5 (0.059)	2.0 (0.079)	Replace bushing or pin
B	Swing cylinder (Head side)	PY02B01241P1							
C	Swing center (Upper side)	PY02B01158P1	ø80 (3.15)		+0.061 +0.009 (+0.0024) (+0.0004)	0.029~ 0.111 (0.0001~0. 0044)			
D	Swing center (Lower side)	PY02B01048P1							

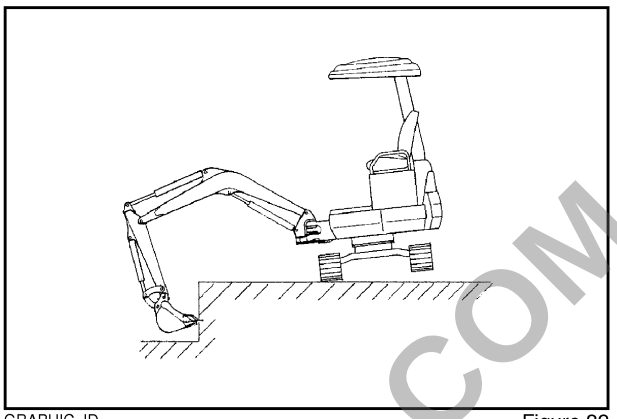
NOTE: *The tolerance for bushing inside diameter means the dimension after fitting of it into place.*

NOTE: *The part number for pins may be changed owing to improvement, use them only for reference.*

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(3)Then raise the opposite crawler and read the dial gauge.



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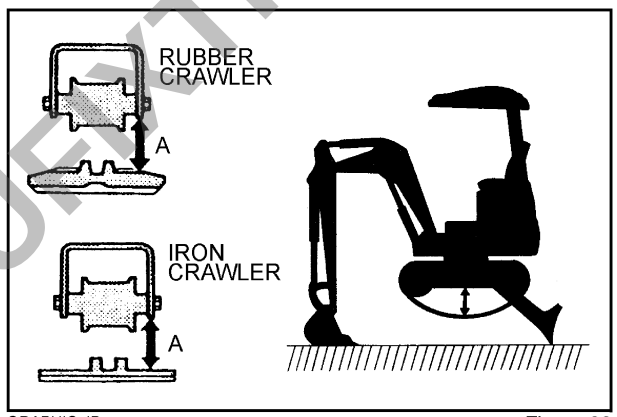
Figure 32

MEASURING CRAWLER TENSION

Crawler Tension

- Raise the machine completely off the ground using the hoe attachment and dozer blade. Then measure the distance (of sag) between the center point on the crawler frame and top of the crawler shoe.

NOTE: *In the case of rubber crawlers, measurements should be taken with setting the joint ("M" or " ∞ " mark) in the top center position.*

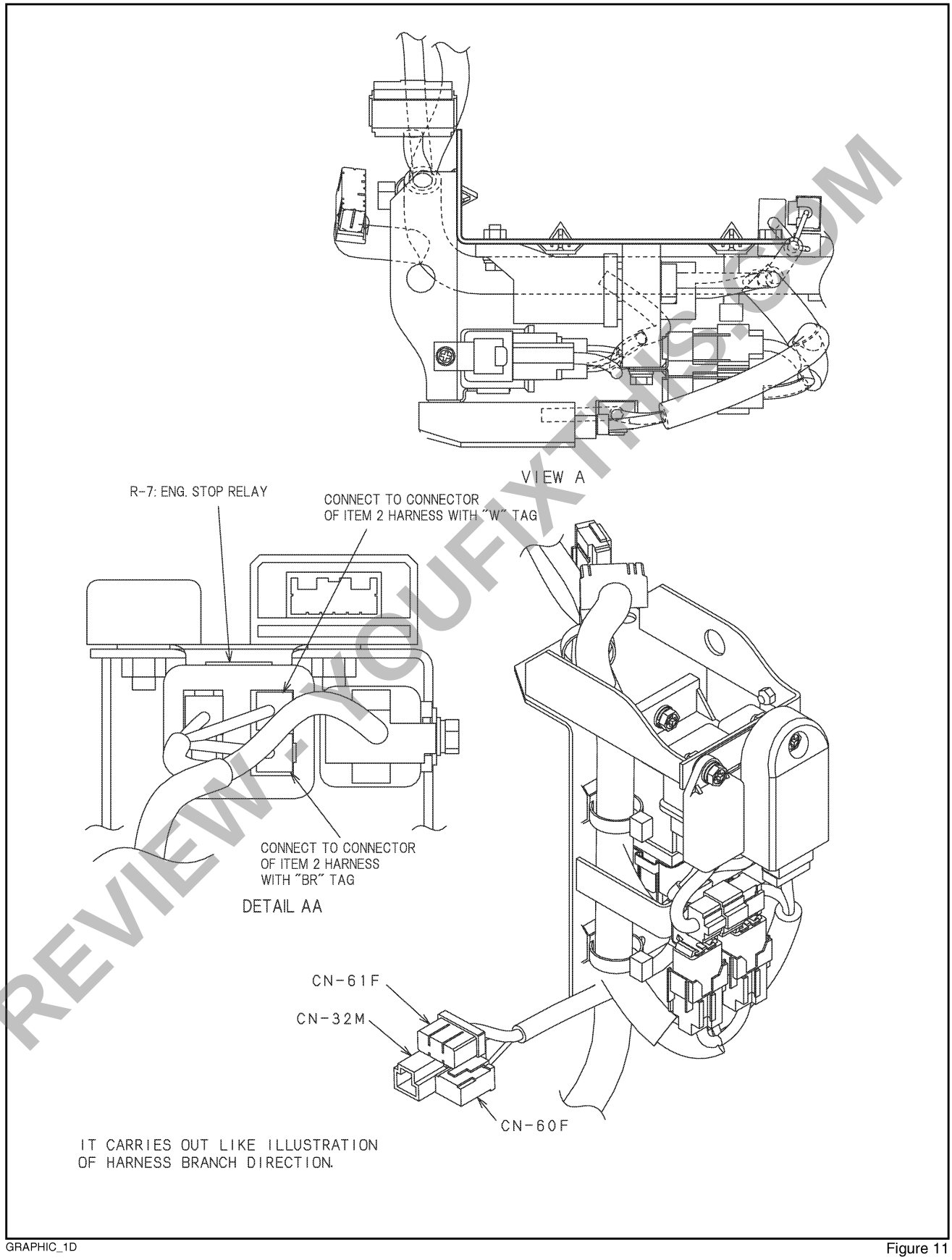


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Figure 33

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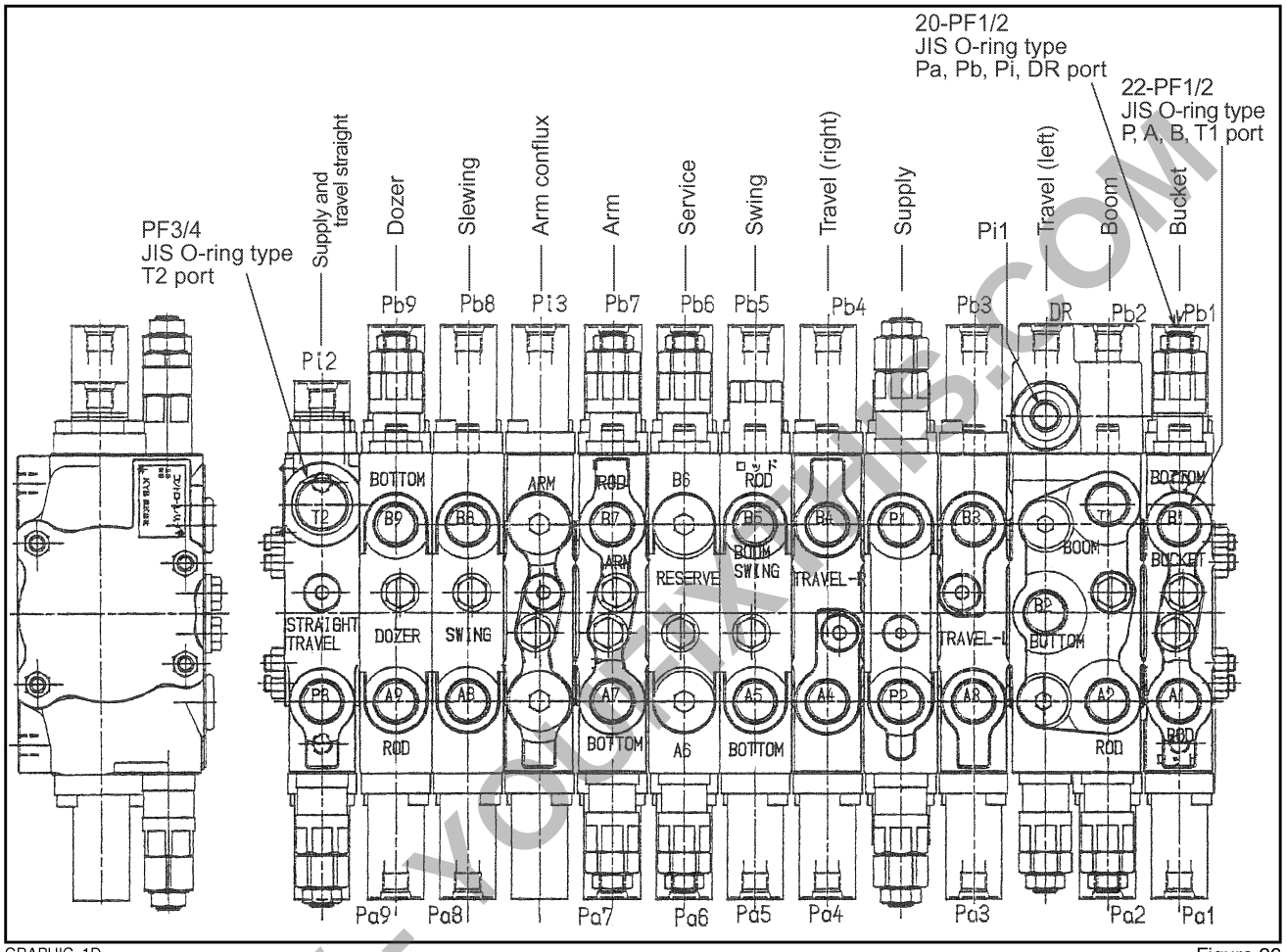
Figure 11

RELAY UNIT (2/2)

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CONTROL VALVE

General View and Hydraulic Ports No.(s)



GRAPHIC_1D

Figure 26

Specifications

Model (Type)		KVSE-72-11
Valve operation	Manual	None
	Pilot	Travel left, Travel right, Boom, Arm, Bucket, Slewing, Swing, Dozer, Service, Travel straight and conflux
Flow rate		P1, P2 - 57 L/min(15.1gal/min), P3 - 34 L/min(9.0gal/min)
Setting pressure at main relief valve P1, P2, P3		P1, P2: 22.5 $^{+0.5}_{0}$ MPa (3263 $^{+72}_{0}$ psi) at 57 L/min (15.1 gal/min) (MRV1) P3:21.2 $^{+0.5}_{0}$ MPa (3074 $^{+72}_{0}$ psi) at 34L/min (9.0 gal/min) at 34 L/min (9.0 gal/min) (MRV2)
Setting pressure at over load relief valve		B1, A7, B7, B9 port (OR1, OR7, OR8, OR9) 25.5 $^{+0.5}_{0}$ MPa (3700 $^{+72}_{0}$ psi) at 5 L/min (1.3 gal/min) A2, B2 port (OR3, OR4) 27.5 $^{+0.5}_{0}$ MPa (4000 $^{+72}_{0}$ psi) at 5 L/min (1.3 gal/min)

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CONTROL VALVE

Removal Preparation

(1)Unlock and open the right upper cover (1).

(2)Remove the right lower cover (2).

Spread a vinyl sheet under the control valve to prevent contamination due to oil leakage.

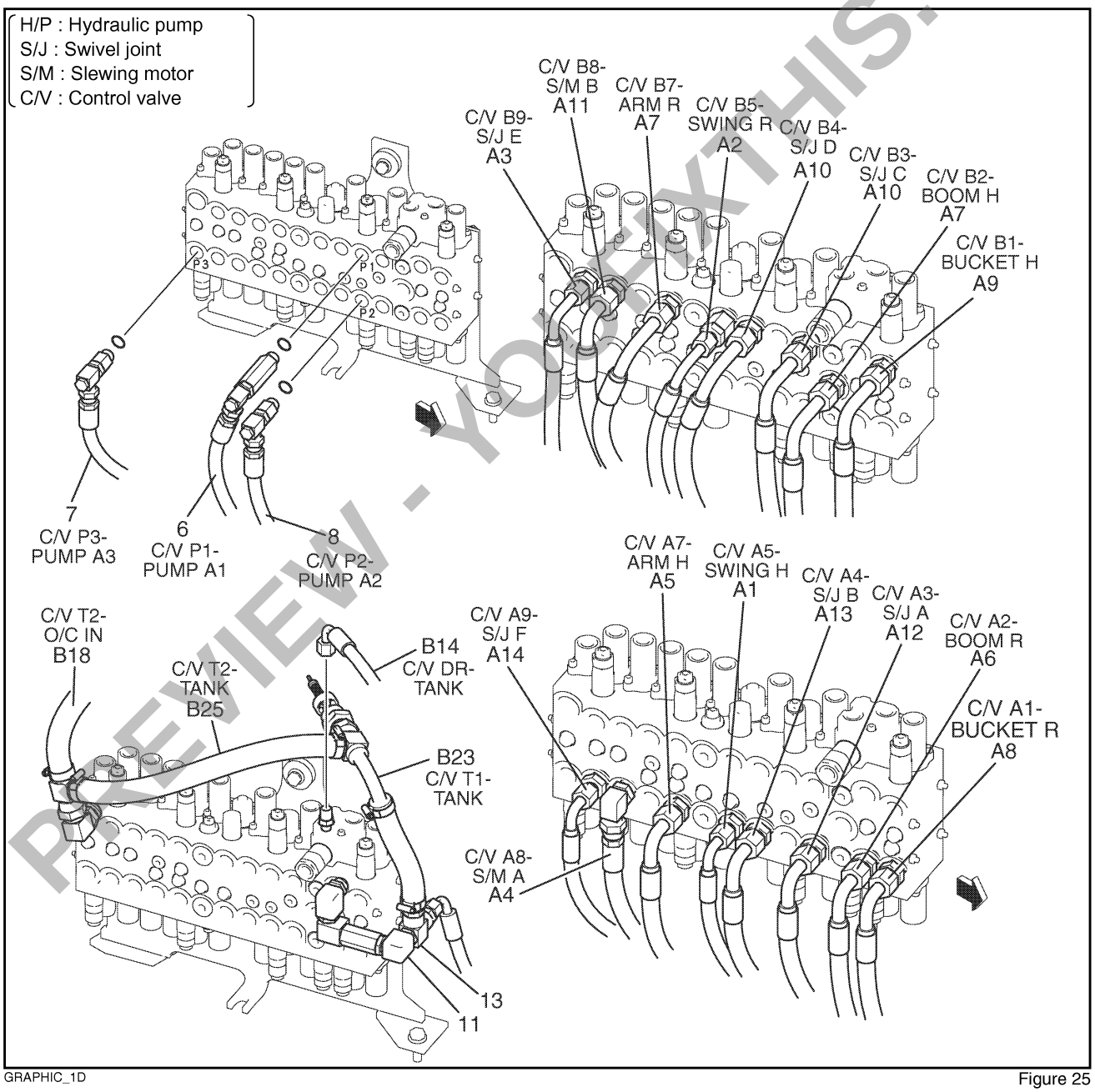
(3)Release the residual pressure in the circuit and the pressure in the hydraulic oil tank.

Removal

(1) Disconnecting hoses

Disconnect all the hoses connecting to the control valve, and attach blind plugs and tags recording the installation place.

Remove the return hose to the hydraulic oil tank to improve workability.



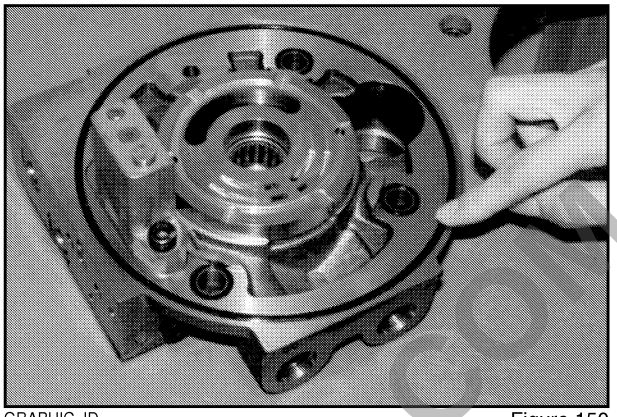
GRAPHIC_1D

Figure 25

MAIN HYDRAULIC HOSE DISCONNECTION

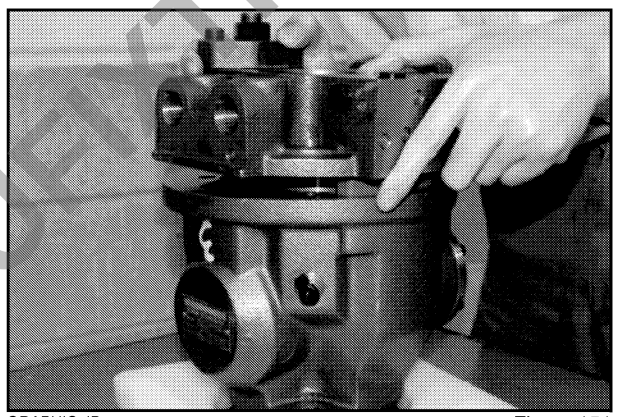
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26. Fit five O-rings (2 kinds), on mating face of cover.



GRAPHIC_ID Figure 150

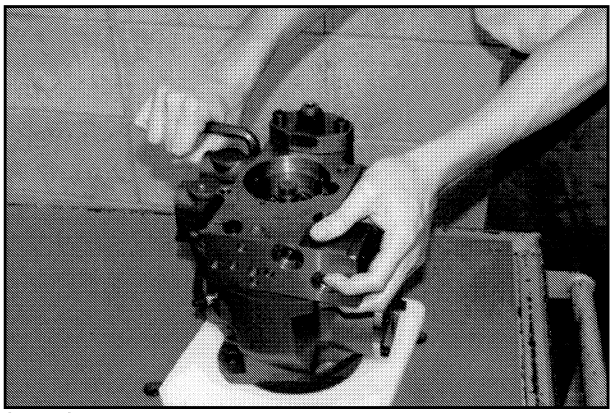
27. Install cover parallel to the attaching surface of housing.



GRAPHIC_ID Figure 151

28. Install cover with three socket bolts (M12×30) and one socket bolt (M12×55).

    Tightening torque : 110 Nm (81 pound-ft)

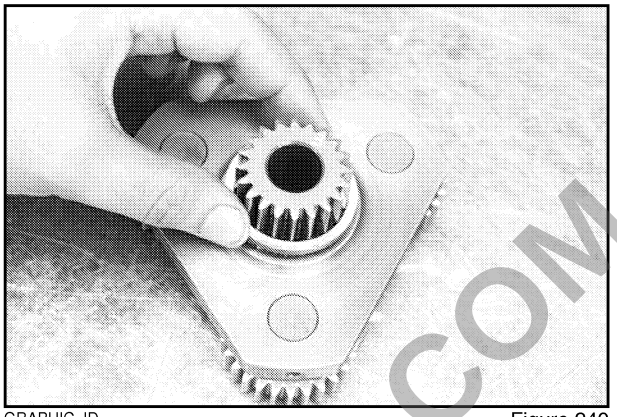


GRAPHIC_ID Figure 152

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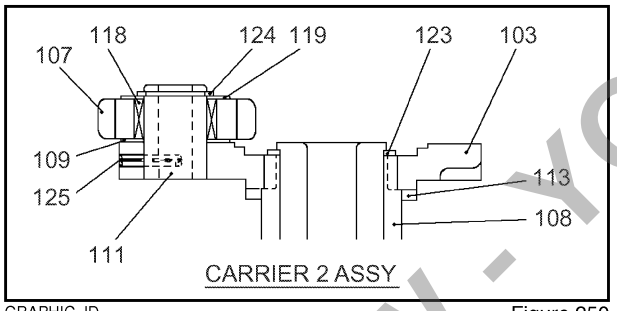
3. Remove the thrust collar (113) installed back side of the carrier 2 assy (103).



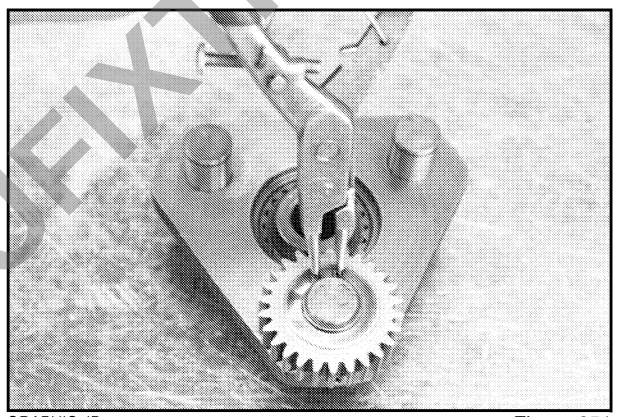
GRAPHIC_ID Figure 249

4. Remove the snap ring (123) of the carrier 2 (103), then remove the thrust washer (119), spur gear 2 (107) and roller (118).

   Number of rollers (118)
   : Twenty three rollers by one spur gear 2.



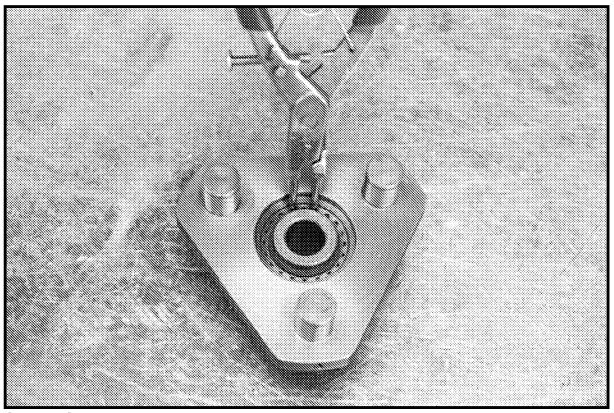
GRAPHIC_ID Figure 250



GRAPHIC_ID Figure 251

5. Remove the snap ring (123), then remove sun gear 1 (108).

   Pin 2 (111) is fixed by spring pin (125) after press-fitting. Do not remove it except where necessary.



GRAPHIC_ID Figure 252

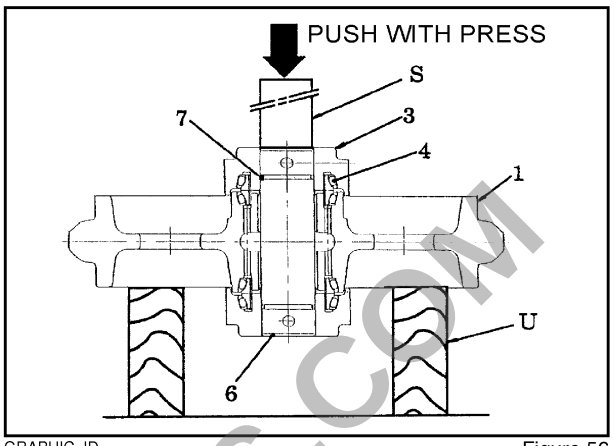
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(4)With idler (1) placed on the stand, tap bushing (2) lightly by hammer, while placing the bushing extruding rod (T) against the end face of bushing (2) evenly all round, till it comes out.

(5)Take out floating seals (4) from idler (1), collar (3). If you intend to re-use floating seals (4), confirm that there is no scoring and rusting on the contact surface and store the floating seals in pairs by placing thick paper between the sealing faces.

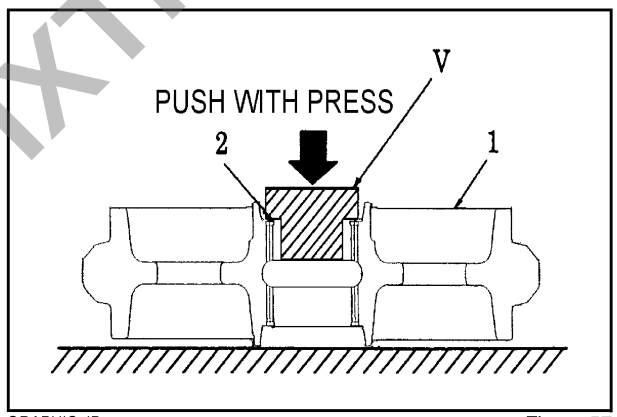
(6)Remove O-ring (7) from shaft (6).



GRAPHIC_ID Figure 56

Assembly

(1)Align inner hole of idler (1) and bushing (2) and press fit it vertically with press.



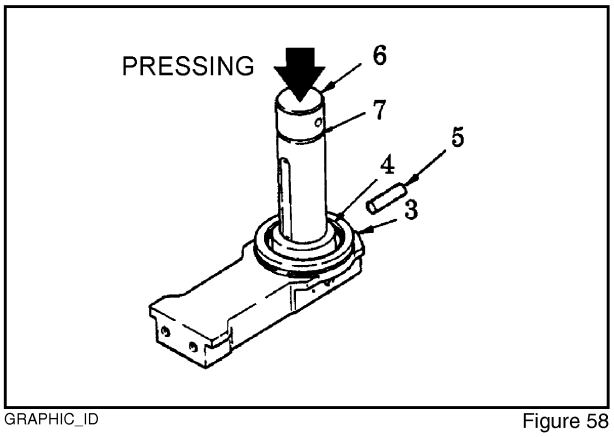
GRAPHIC_ID Figure 57

(2)Fit O-ring (7) to O-ring groove on shaft (2).

A. Apply grease to O-ring

(3)Installing collar (3)
Press fit the O-ring installed side of shaft into collar (3), and drive pin (5).

(4)Fit one piece of two (2) pieces type floating seal (4) on each side of collar (3) and idler (1).

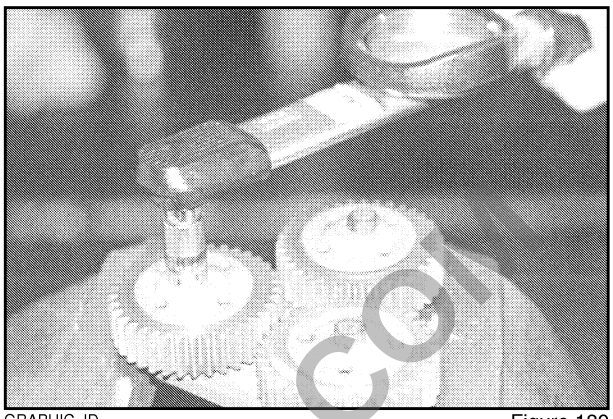


GRAPHIC_ID Figure 58

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2. Tighten three hexagon head screws (40) with three thrust washers 3 (12) to fasten the carrier assembly to the column section of the carrier to the specified torque.

   Tightening torque : 33.3 ± 4.9 Nm (25 ± 4 pound-ft)
   [Carrier assembly finished]



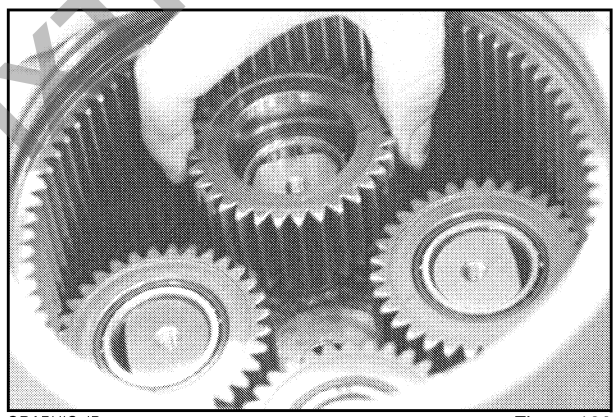
GRAPHIC_ID Figure 189

(12)Tightening planetary gear 2

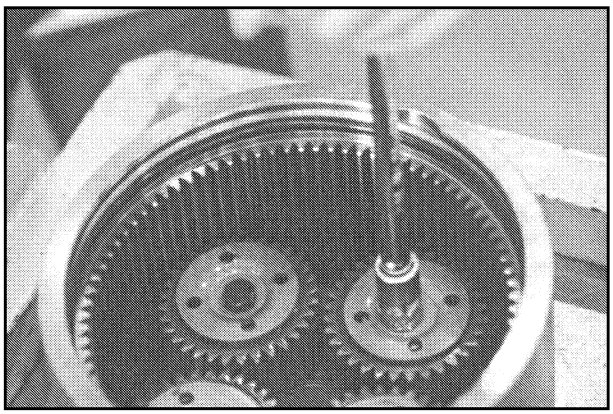
1. Turn over the travel motor. (Direct the reduction unit side upward.)
2. Install the thrust washer 1 (9) to the spindle (2)
3. Insert four thrust collars 4 (11) and four inner races (30) into the column section of the spindle (2).
4. Insert four needle roller bearings with retainer (28) into the column section of the spindle (2).
5. Make four planetary gears 2 (7) intermesh with the internal teeth of the hub (1) to insert them into the column section of the spindle (2).

   If the tapped hole of spindle (2) is smeared oil or grease, degrease it by using the tap (M8 P1.25). After that clean it with slovent, and degrease the solvent of the holes by spraying with compressed air.
   Otherwise axial-force does not occur enough, and it may cause bolt to loosen.
6. Tighten four thrust washers 3 (12) into the column sections of the spindle (2) with four hexagon screws (40) at the specified torque.

   Tightening torque: 33.3 ± 4.9 Nm (25±4 pound-ft)



GRAPHIC_ID Figure 190



GRAPHIC_ID Figure 191

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CHAPTER 1

E50BSR
COMPACT CRAWLER EXCAVATOR
TIER 4

ENGINE

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DIESEL FUEL

Diesel Fuel Specifications

Diesel fuel should comply with the following specifications. The table lists several worldwide specifications for diesel fuels.

Diesel Fuel Specification	Location
No. 2-D, No. 1-D, ASTM D975-94	USA
EN590:96	European Union
ISO 8217 DMX	International
BS 2869-A1 or A2	United Kingdom
JIS K2204 Grade No. 2	Japan
KSM-2610	Korea
GB252	China

Additional Technical Fuel Requirements

- The fuel cetane number should be equal to 45 or higher.
- The sulfur content must not exceed 0.5% by volume. Less than 0.05% is preferred.
  For electronically controlled engines 4TNV84T-Z, 4TNV98-Z, 4TNV98-E, and 4TNV98T-Z, it is mandatory to use fuel that does not contain 0.05% or more sulfur content.
  In general, using a high sulfur fuel may possible result in corrosion inside the cylinder.
- Bio-Diesel fuels. *See Bio-Diesel Fuels on page 4-12*.
- NEVER mix kerosene, used engine oil, or residual fuels with the diesel fuel.
- The water and sediment in the fuel should not exceed 0.05% by volume.
- Keep the fuel tank and fuel-handling equipment clean at all times.
- Poor quality fuel can reduce engine performance and / or cause engine damage.
- Fuel additives are not recommended. Some fuel additives may cause poor engine performance. Consult your Yanmar representative for more information.
- The ash content must not exceed 0.01% by volume.
- The carbon residue content must not exceed 0.35% by volume. Less than 0.1% is preferred.
- The total aromatics content should not exceed 35% by volume. Less than 30% is preferred.
- The PAH (polycyclic aromatic hydrocarbons) content should be below 10% by volume.
- The metal content of Na, Mg, Si, and Al should be equal to or lower than 1 mass ppm. (Test analysis method JPI-5S-44-95)
- Lubricity: The wear mark of WS1.4 should be Max. 0.018 in (460 µm) at HFRR test.

Bio-Diesel Fuels

In Europe and in the United States, as well as some other countries, non-mineral oil based fuel resources such as RME (Rapeseed Methyl Ester) and SOME (Soybean Methyl Ester), collectively known as FAME (Fatty Acid Methyl Esters), are being used as extenders for mineral oil derived diesel fuels.

Yanmar approves the use of bio-diesel fuels that do not exceed a blend of 5% (by volume) of FAME with 95% (by volume) of approved mineral oil derived diesel fuel. Such bio-diesel fuels are known in the marketplace as B5 diesel fuels.

These B5 diesel fuels must meet certain requirements.

1. The bio-fuels must meet the minimum specifications for the country in which they are used.
   - In Europe, bio-diesel fuels must comply with the European Standard EN14214.
   - In the United States, bio-diesel fuels must comply with the American Standard ASTM D-6751.
2. Bio-fuels should be purchased only from recognized and authorized diesel fuel suppliers.

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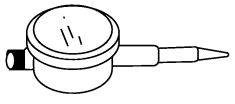
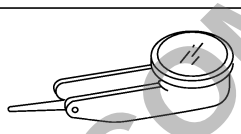
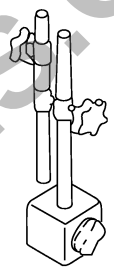
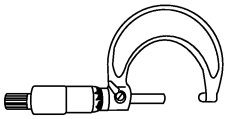
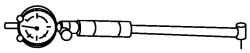
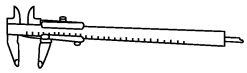
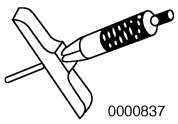
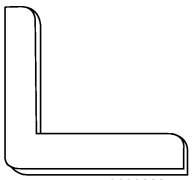
○: Check ◇: Replace ●: Contact your authorized Yanmar industrial engine dealer or distributor

System	Check Item	Daily	Periodic Maintenance Interval					
			Every 50 hours	Every 250 hours	Every 500 hours	Every 1000 hours	Every 1500 hours	Every 2000 hours
Cooling System	Check and Refill Engine Coolant	○						
	Check and Clean Radiator Fins		○					
	Check and Adjust Cooling Fan V-belt		○ 1st time	○ 2nd and after				
	Drain, Flush and Refill Cooling System With New Coolant					◇ or every 1 year which-ever comes first		
Cylinder Head	Adjust Intake / Exhaust Valve Clearance					●		
	Lap Intake / Exhaust Valve Seats. If necessary							●
Electrical Equipment	Check Indicators	○						
	Check Battery		○					
Engine Oil	Check Engine Oil Level	○						
	Drain and Fill Engine Oil		◇ 1st time	◇ 2nd and after				
	Replace Engine Oil Filter							
Engine Speed Control	Check and Adjust Governor Lever and Engine Speed Control	○		○				
Emission Control Warranty	Inspect, Clean And Test Fuel Injectors						●	
	DI ENGINE Inspect Turbocharger (Blower Wash as Necessary) 3TNV84T, 4TNV84T, 4TNV98T, 4TNV106T, 3TNV84T-B, 4TNV84T-Z, 4TNV98T-Z						●	
	DI ENGINE Inspect, Clean and Test EGR Valve 4TNV84T, 4TNV98T						●	
	DI ENGINE Clean EGR Lead Valve 4TNV84T, 4TNV98T						●	
	DI ENGINE Clean EGR Cooler (Clean to Blow Water/Air Passages) 4TNV84T, 4TNV98T						●	
	Inspect Crankcase Breather System						●	
Fuel	Check and Refill Fuel Tank Level	○						
	Drain Fuel Tank			○				
	Drain Fuel Filter / Water Separator		○					
	Check Fuel Filter / Water Separator	○						
	Clean Fuel Filter / Water Separator				○			
	Replace Fuel Filter				◇			
Hoses	Replace Fuel System and Cooling System Hoses							◇ or every 2 yrs.

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MEASURING INSTRUMENTS

No.	Instrument Name		Application	Illustration
1	Dial Indicator	Locally Available	Measure shaft bend and end play	 0000831
2	Test Indicator	Locally Available	Measurements of narrow or deep portions that cannot be measured by dial gauge	 0000832
3	Magnetic Stand	Locally Available	For holding the dial gauge when measuring	 0000833
4	Micrometer	Locally Available	For measuring the outside diameters of crankshaft, pistons, piston pins, etc.	 0000834
5	Cylinder Bore Gauge	Locally Available	For measuring the inside diameters of cylinder liners, bearing bores, etc.	 0000835
6	Calipers	Locally Available	For measuring outside diameters, depth, thickness and width	 0000836
7	Depth Micrometer	Locally Available	For measuring of valve recession	 0000837
8	Square	Locally Available	For measuring valve spring inclination and straightness of parts	 0000838

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- When honing is completed, wash the cylinder block with hot water and soap. The cylinder wall is adequately cleaned when a white rag wiped in cylinder comes out clean. Use brushes to clean all passages and crevices. Rinse with hot water and dry with compressed air. Apply clean engine oil to all steel surfaces to prevent rusting.

Reassembly of Crankshaft and Piston Components

Notes:

- Proceed slowly. Make no forced assemblies unless a pressing operation is called for. All parts must be perfectly clean and lightly lubricated when assembled.
- Use new gaskets, seals and O-rings during assembly.
- Liberally apply clean engine oil to all internal parts during assembly.
- All fasteners should be tightened to a given torque. If a special torque is not provided in the *Special Torque Chart on page 6-25*, tighten to standard torque specifications. *See Tightening Torques for Standard Bolts and Nuts on page 4-46.*

Reassembly of Pistons

1. Select the parts needed to reassemble the piston and connecting rod for one cylinder.
2. If removed, install a new wrist pin bushing **(Figure 6-130, (7))** using a press and the appropriate service tool. Be sure to align the oil holes.

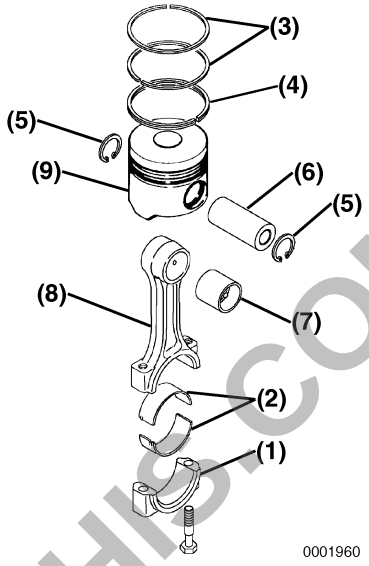


Figure 6-130

3. Reinstall one circlip **(Figure 6-130, (5))** into the piston. Ensure the circlip is securely seated in the groove.

IMPORTANT

*The piston and connecting rod must be assembled together in the correct orientation. The orientation of the piston and connecting rod are **different** depending on engine model.*

Piston to Connecting Rod Orientation - By Model	
All TNV models - 82, 84(T), 88, 94, and 98(T)	Only TNV models - 106(T)
Orient the piston identification mark stamped on top of the piston on the same side as the rod and cap match marks stamped on the connecting rod.	Orient the piston identification mark stamped on top of the piston on the opposite side as the rod and cap match marks stamped on the connecting rod.

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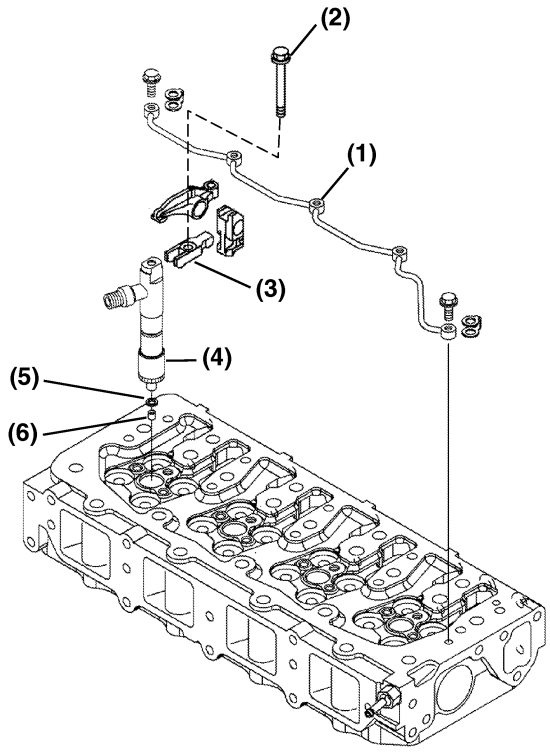


Figure 7-51

Note: The fuel injectors can be removed by manually pulling them out of the fuel injector wells.

6. Remove the injector nozzle protector **(Figure 7-51, (5))** and seat **(Figure 7-51, (6))** from the cylinder head. Discard both items.
7. Repeat steps to remove the remaining fuel injectors.

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1. Connect a hand-operated air pump to the waste gate actuator pipe **(Figure 10-6, (1))**. The pump should be equipped with a 30 psi (0.21 MPa; 2.21 kgf/cm^2) pressure gauge **(Figure 10-6, (2))**, and a pressure release valve to release any pressure pumped into the system. (Similar pumps are used to check for leaks in marine gear cases.)

⚠ WARNING

Never apply over 40 psi (2.8 kgf/cm) to the waste gate actuator.

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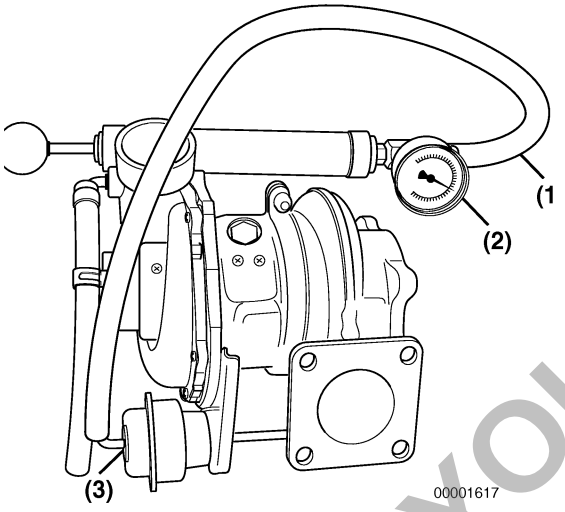


Figure 10-6

2. Apply 17 psi (0.12 MPa; 1.2 kgf/cm^2) to the waste gate actuator **(Figure 10-6, (3))** circuit. Observe if the waste gate valve is open fully. If the waste valve does not open fully, replace the turbocharger or have it repaired by a qualified repair facility.

Waste Gate Actuator Leak Test

Allow the pressure, 17 psi (0.12 MPa; 1.2 kgf/cm^2) to remain in the circuit for one minute. After one minute, observe the pressure reading.

- If the pressure reading is equal to or greater than 15.9 psi (0.11 MPa; 1.1 kgf/cm^2), the waste gate actuator is not leaking and is operating properly.
- If the pressure reading is less than 15.9 psi (0.11 MPa; 1.1 kgf/cm^2), the waste gate actuator is leaking. Replace the turbocharger or have it repaired by a qualified repair facility.

Installation of Turbocharger

1. Pour 2 oz (60 cc) of clean engine oil in the oil inlet port at the top of the turbocharger. Rotate the compressor wheel to ensure the shaft bearings are lubricated.
2. Flush the oil lines to ensure that they are free of containments.
3. Put a new turbocharger exhaust manifold gasket in place and reinstall turbocharger on the exhaust manifold.
4. Apply anti-seize compound to the turbocharger mounting studs.
5. Reinstall the mounting nuts. Torque the nuts to the specified torque.
6. Install new sealing washers and O-rings and reinstall the inlet and outlet oil lines to the turbocharger.

CAUTION

Do not allow any material to fall into the oil lines or the oil inlet and outlet ports of the turbocharger.

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7. Reinstall the air inlet connection to the turbocharger turbine housing.
8. Reinstall the exhaust connection to the turbocharger compressor housing.

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