DX60R

Shop Manual

K1042957E

Serial Number 50001 and Up

PREVIEW - YOUFIXTHIS.COM

DOOSAN reserves the right to improve its products continuously, delivering the best possible product to the marketplace. These improvements can be implemented at any time with no obligation to change materials previously sold. It is recommended that consumers periodically contact their distributors for most recent documentation on purchased equipment.

This documentation may include attachments and optional equipment 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.

K1042957E Shop Manual
Copyright 2008 DOOSAN

Download full manual at youfixthis.com

Table of Contents

Safety

Track Excavator Safety.....SP001614

Specifications

Specification for DX60R.....SP001615

General Maintenance

General Maintenance Procedures.....SP000016

Standard Torques.....SP000813

Upper Structure

Cabin.....SP001623

Swing Bearing.....SP001624

Lower Structure and Chassis

Track Assembly.....SP001625

Engine and Drive Train

Engine.....SP001693

Drive Coupling (Main Pump).....SP001627

Hydraulics

Accumulator.....SP000028

Center Joint (Swivel).....SP001628

Cylinders.....SP001629

Swing Motor.....SP001630

Travel Motor.....SP001686

Main Control Valve.....SP001639

Main Pump.....SP001488

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

SP001614

Track Excavator Safety

Edition 1

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

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 the load.

Remember that ultimate safety is your own responsibility.

APPLICABLE MODELS

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

MODEL	SERIAL NUMBER RANGE
DX60R	50001 and Up

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

STANDARD SPECIFICATIONS

COMPONENT			SPECIFICATION	
			1.48 m (4' 10") STANDARD ARM	1.9 m (6' 3") ARM
Bucket capacity	SAE (CECE)		0.175 m^3 (0.151 m^3)	
Operating weight			6.0 tons	6.13 tons
Engine	Model		4TNV98-ESDB6	
	Displacement (Total dis. Volume)		3,319 cc	
	Rated power (Gross)		50.4 hp @ 2,200 rpm	
			37.6 kW @ 2,200 rpm	
Front Attachment	Boom length		2,900 mm (9' 6")	
	Arm length		1,480 mm (4' 10")	1,900 mm (6' 3")
Transport Dimension	Length		5,600 mm (18' 4")	5,664 mm (18' 7")
	Height		2,560 mm (8' 5")	2,560 mm (8' 5")
	Height (Boom)		1,940 mm (6' 4")	2,188 mm (7' 2")
	Width		1,980 mm (6' 6")	1,980 mm (6' 6")
Performance	Max.digging force (ISO)	Bucket	39.9 KN	39.9 KN
		Arm	26 KN	22.6 KN
	Traveling speed	1-speed	2.07 km/h	
		2-speed	3.9 km/h	
	Swing speed		9.58 rpm	
	Drawbar pull		5,300 kg	
Hydraulic pump	Type		Variable displacement axial piston pump	
	Max. flow rate		49.3 x 2 *l*/min + 35.6 *l*/min (Gear pump: 9.9 *l*/min)	
	Main relief set pressure		230/210 kg/cm^2 (21 - 23 MPa)	
Track	Shoe width		400 mm (1' 4")	
	Tumbler distance		1,990 mm (6' 7")	
Control	Lever control type		Hydraulic pilot	
	Lever pattern		SAE	
Tank	Fuel tank		78 ℓ	
	Hydraulic tank		65 ℓ	
Ground pressure			0.34 kg/cm^2 (0.034 MPa)	

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

COMPONENT LOCATIONS

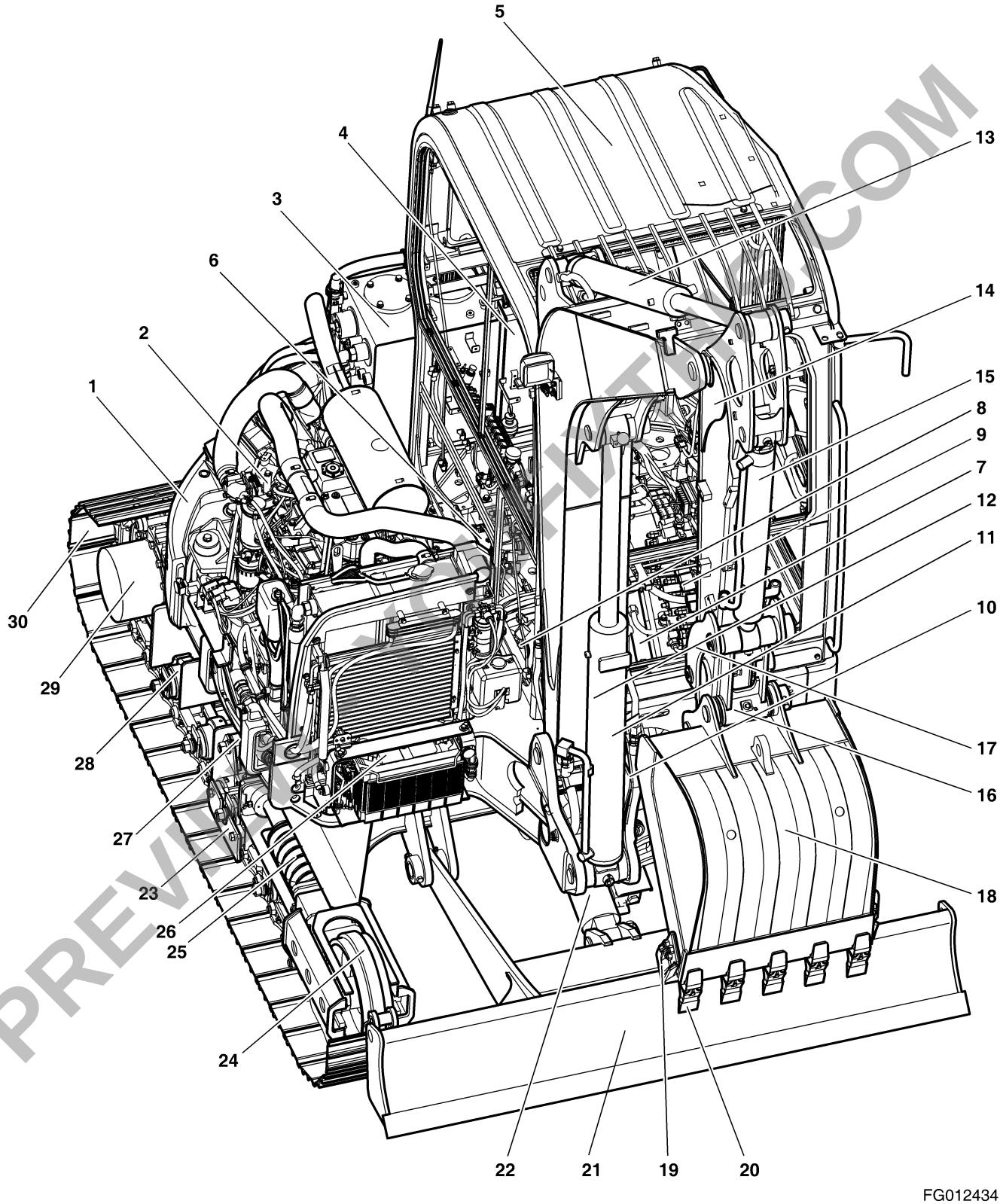


Figure 1

PREVIEW ONLY - WATERMARK.COM

Download full manual at youfixthis.com

TORQUE VALUES FOR STANDARD METRIC FASTENERS

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

Dia. x Pitch (mm)	Grade										
	3.6 (4A)	4.6 (4D)	4.8 (4S)	5.6 (5D)	5.8 (5S)	6.6 (6D)	6.8 (6S)	6.9 (6G)	8.8 (8G)	10.9 (10K)	12.9 (12K)
M5 x Std.	0.15 (1.08)	0.16 (1.15)	0.25 (1.80)	0.22 (1.59)	0.31 (2.24)	0.28 (2.02)	0.43 (3.11)	0.48 (3.47)	0.50 (3.61)	0.75 (5.42)	0.90 (6.50)
M6 x Std.	0.28 (2.02)	0.30 (2.16)	0.45 (3.25)	0.40 (2.89)	0.55 (3.97)	0.47 (3.39)	0.77 (5.56)	0.85 (6.14)	0.90 (6.50)	1.25 (9.04)	1.50 (10.84)
M7 x Std.	0.43 (3.11)	0.46 (3.32)	0.70 (5.06)	0.63 (4.55)	0.83 (6.00)	0.78 (5.64)	1.20 (8.67)	1.30 (9.40)	1.40 (10.12)	1.95 (14.10)	2.35 (16.99)
M8 x Std.	0.70 (5.06)	0.75 (5.42)	1.10 (7.95)	1.00 (7.23)	1.40 (10.12)	1.25 (9.04)	1.90 (13.74)	2.10 (15.18)	2.20 (15.91)	3.10 (22.42)	3.80 (27.48)
M8 x 1	0.73 (5.28)	0.80 (5.78)	1.20 (8.67)	1.00 (7.23)	1.50 (10.84)	1.35 (9.76)	2.10 (15.18)	2.30 (16.63)	2.40 (17.35)	3.35 (24.23)	4.10 (29.65)
M10 x Std.	1.35 (9.76)	1.40 (10.12)	2.20 (15.91)	1.90 (13.74)	2.70 (19.52)	2.35 (19.99)	3.70 (26.76)	4.20 (30.37)	4.40 (31.18)	6.20 (44.84)	7.20 (52.07)
M10 x 1.25	1.50 (10.84)	1.60 (11.57)	2.50 (18.08)	2.10 (15.18)	3.10 (22.42)	2.80 (20.25)	4.30 (31.10)	4.90 (35.44)	5.00 (36.16)	7.00 (50.63)	8.40 (60.75)
M12 x Std.	2.40 (17.35)	2.50 (18.08)	3.70 (26.76)	3.30 (23.86)	4.70 (33.99)	4.20 (30.37)	6.30 (45.56)	7.20 (52.07)	7.50 (54.24)	10.50 (75.94)	12.50 (90.41)
M12 x 1.25	2.55 (18.44)	2.70 (19.52)	4.00 (28.93)	3.50 (25.31)	5.00 (36.16)	4.50 (32.54)	6.80 (49.18)	7.70 (55.69)	8.00 (57.86)	11.20 (81.00)	13.40 (96.92)
M14 x Std.	3.70 (26.76)	3.90 (28.20)	6.00 (13.23)	5.20 (37.61)	7.50 (54.24)	7.00 (50.63)	10.00 (72.33)	11.50 (83.17)	12.00 (86.79)	17.00 (122.96)	20.00 (144.66)
M14 x 1.5	4.10 (29.65)	4.30 (31.10)	6.60 (47.73)	5.70 (41.22)	8.30 (60.03)	7.50 (54.24)	11.10 (80.28)	12.50 (90.41)	13.00 (94.02)	18.50 (133.81)	22.00 (159.12)
M16 x Std.	5.60 (40.50)	6.00 (43.39)	9.00 (65.09)	8.00 (57.86)	11.50 (83.17)	10.50 (75.94)	15.50 (112.11)	17.90 (129.47)	18.50 (133.81)	26.00 (188.05)	31.00 (224.22)
M16 x 1.5	6.20 (44.84)	6.50 (47.01)	9.70 (70.16)	8.60 (62.20)	12.50 (90.41)	11.30 (81.73)	17.00 (122.96)	19.50 (141.04)	20.00 (144.66)	28.00 (202.52)	35.50 (256.77)
M18 x Std.	7.80 (56.41)	8.30 (60.03)	12.50 (90.41)	11.00 (79.56)	16.00 (115.72)	14.50 (104.87)	21.00 (151.89)	27.50 (198.90)	28.50 (206.14)	41.00 (296.55)	43.00 (311.01)
M18 x 1.5	9.10 (65.82)	9.50 (68.71)	14.40 (104.15)	12.50 (90.41)	18.50 (133.81)	16.70 (120.79)	24.50 (177.20)	27.50 (198.90)	28.50 (206.14)	41.00 (296.55)	49.00 (354.41)
M20 x Std.	11.50 (83.17)	12.00 (86.79)	18.00 (130.19)	16.00 (115.72)	22.00 (159.12)	19.00 (137.42)	31.50 (227.83)	35.00 (253.15)	36.00 (260.38)	51.00 (368.88)	60.00 (433.98)
M20 x 1.5	12.80 (92.58)	13.50 (97.64)	20.50 (148.27)	18.00 (130.19)	25.00 (180.82)	22.50 (162.74)	35.00 (253.15)	39.50 (285.70)	41.00 (296.55)	58.00 (419.51)	68.00 (491.84)
M22 x Std.	15.50 (112.11)	16.00 (115.72)	24.50 (177.20)	21.00 (151.89)	30.00 (216.99)	26.00 (188.05)	42.00 (303.78)	46.00 (332.71)	49.00 (354.41)	67.00 (484.61)	75.00 (542.47)
M22 x 1.5	17.00 (122.96)	18.50 (133.81)	28.00 (202.52)	24.00 (173.59)	34.00 (245.92)	29.00 (209.75)	47.00 (339.95)	52.00 (44.76)	56.00 (405.04)	75.00 (542.47)	85.00 (614.80)
M24 x Std.	20.50 (148.27)	21.50 (155.50)	33.00 (238.68)	27.00 (195.29)	40.00 (289.32)	34.00 (245.92)	55.00 (397.81)	58.00 (419.51)	63.00 (455.67)	82.00 (593.10)	92.00 (655.43)
M24 x 2.0	23.00 (166.35)	35.00 (253.15)	37.00 (267.62)	31.00 (224.22)	45.00 (325.48)	38.00 (202.52)	61.00 (441.21)	67.00 (484.61)	74.00 (535.24)	93.00 (672.66)	103.00 (744.99)

PREVIEW: YOUFIXTHIS.COM

Download full manual at youfixthis.com

REMOVAL

CAUTION

Avoid disassembling cabin if there are strong wind gusts, which could catch large surface area of cabin shell and push it sideways during lift.

1. Park on firm and level ground.
2. Lower front attachment (bucket) to ground.
3. Shut down engine.
4. Set safety lever on "RELEASED" position.
5. Turn starter switch to "I" (ON) position.

WARNING

If engine must be run while performing maintenance, use extreme care. Always have one person in the cabin at all times. Never leave the cabin with the engine running.

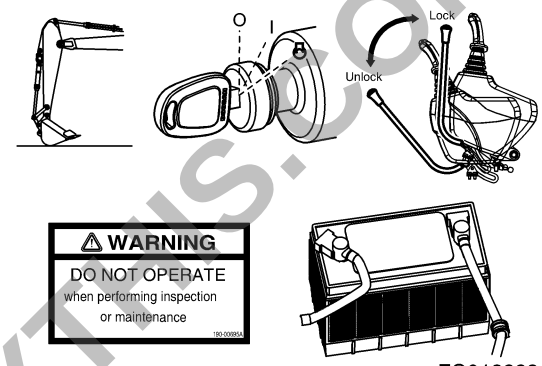


Figure 1

6. Fully stroke work levers (joysticks) in all directions to relieve pressure from accumulators.
7. Set safety lever on "LOCK" position.
8. Turn key to "O" (OFF) position and remove from starter switch.
9. Hang maintenance warning tag on controls.
10. Disconnect the battery cable from the negative (-) battery terminal.
11. Prepare cabin shell for removal by disconnecting wiring connectors for:
    A. Main harness.
    B. Left stand harness.
    C. Right stand harness.
    D. Harness passing next to the air conditioner box.

NOTE: *Control console wiring harnesses and hydraulic piping lines that pass through the floor of the cabin do not need to be disassembled.*

NOTE: *If unit is equipped with a cabin protective structure (for forestry, or hazardous working conditions), it must be removed.*

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

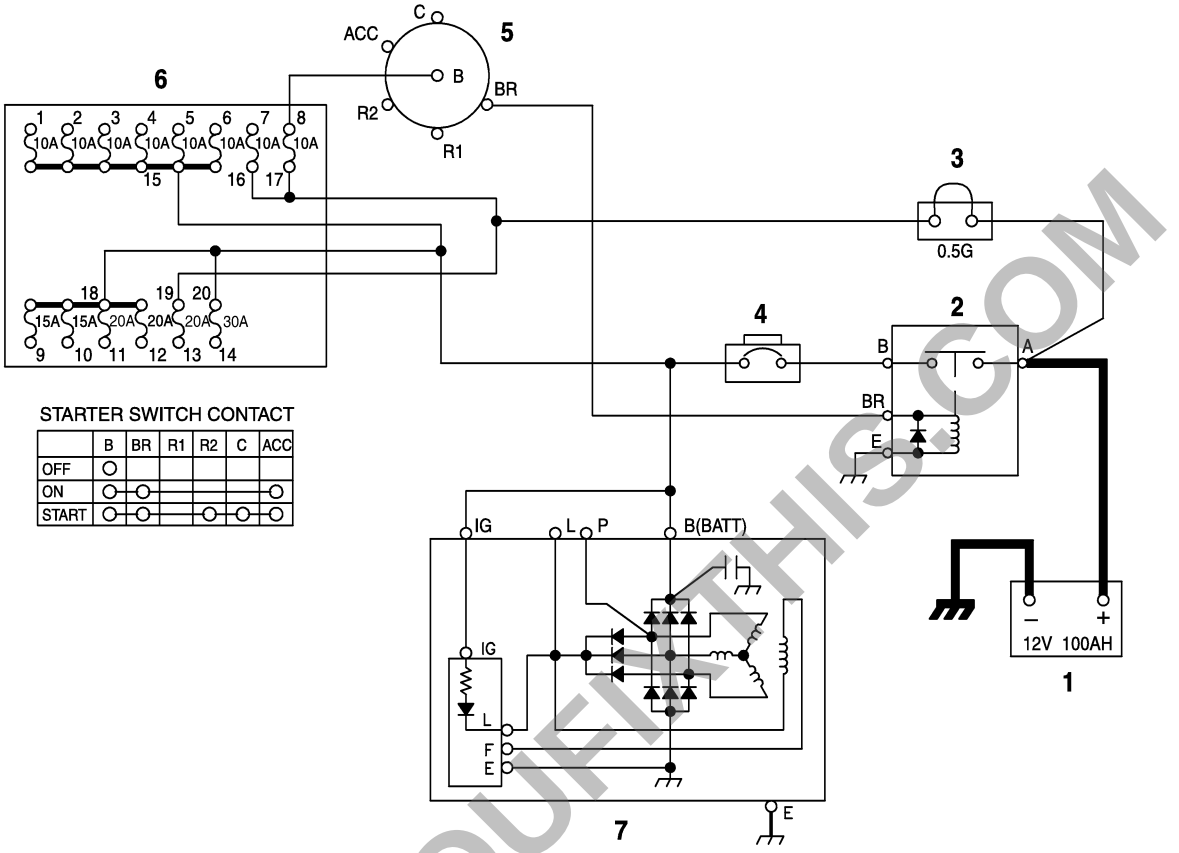


Figure 1 ELECTRIC POWER CIRCUIT DIAGRAM

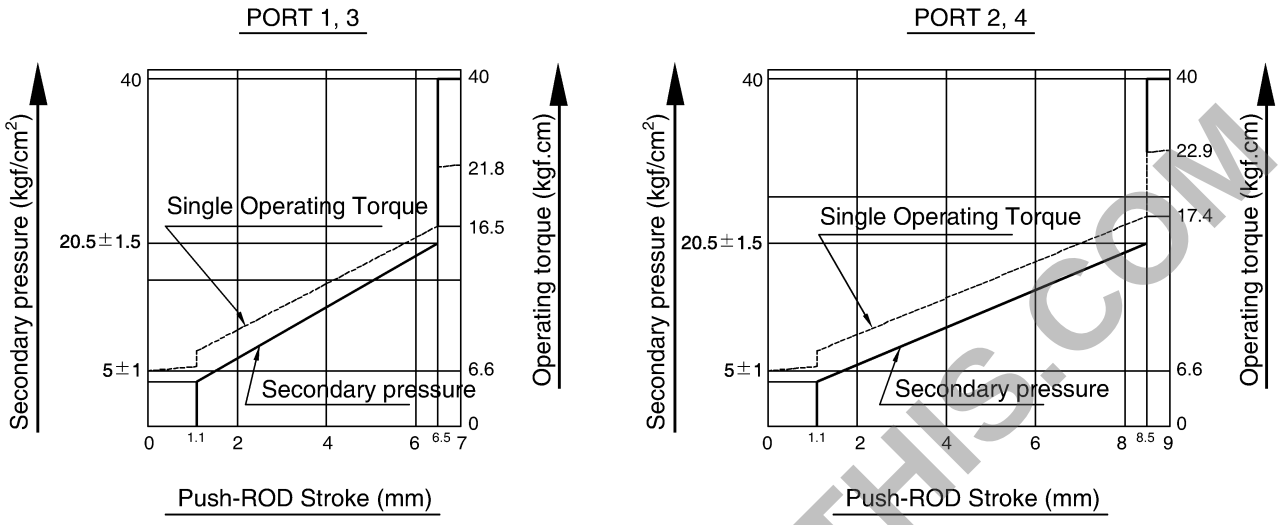
Reference Number	Description
1	Battery
2	Battery Relay
3	Fusible Link
4	Circuit Breaker

Reference Number	Description
5	Starter Switch
6	Fuse Box
7	Alternator

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

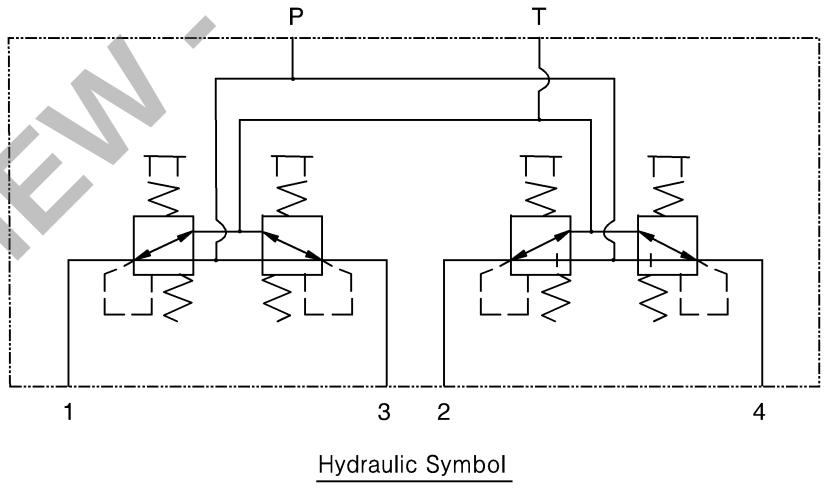
PERFORMANCE SPECIFICATION



FG013465

Figure 2

HYDRAULIC PRESSURE CIRCUIT DIAGRAM



FG011413

Figure 3

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Control Failure Detection

The E-ECU performs various self-diagnostics.

Diagnostic items are divided into "Always enable", "Default to enable" and "Default to disable" in the table.

Diagnostic list

No	Item	Failure detection conditions	Operation when failure occurs	Action/ condition for recovery	Category	Number of flashes
1	Coolant temperature sensor failure	Sensor voltage is 4.8V or more, or 0.2V or less.	Engine runs with a coolant temperature of 30°C	Correct failure.	Always enable	4
2	Accelerator sensor failure	Sensor voltage is 4.6V or more, or 0.2V or less.	[Without optional backup accelerator sensor] Engine runs at 1500min^{-1}. (Option can change) [With optional backup accelerator sensor] Select backup accelerator sensor : No limitation Backup accelerator sensor failure : Engine runs at 1500min^{-1}. (Option can change)	Correct failure.	Default to disable	5
3	Speed sensor failure	Engine start signal (E8) is on, but the engine speed is zero.	[With optional backup speed sensor] Backup speed sensor becomes active ; speed is limited to 1800 min^{-1}.(Option can change) Backup speed sensor failed : Engine stops. [Without optional backup speed sensor] Engine stops.	Turn key off.	Always enable	6
		Engine speed decreases by 480 min^{-1} or more in 40 ms				
4	Rack position sensor failure	Correlation between rack actuator output and rack position exceeds threshold upper limit by 0.32 sec. or more.	Engine runs with limited output and speed. (Rack position control is inactive and speed control is active).	Turn key off.	Always enable	7
		Correlation between rack actuator output and rack position exceeds threshold upper limit by 0.16 sec. or more.				
5	Rack actuator failure	Rack actuator current is too high.	Engine stops.	Turn key off.	Always enable	8
		Rack actuator current is too low.				
		Engine accelerates with minimum rack actuator output				
		Engine stalls while rack position sensor is failed.				
6	Over speed	Ldling engine speed exceeds high idling speed plus 600 min^{-1}.	Engine stops.	Turn key off.	Always enable	9

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

TRAVEL MOTOR TROUBLESHOOTING

Travel Motor

Applicable Parts	Component	Weight
Motor Does Not Turn	Defective of motor, counter balance valve, decelerator, etc.	Check suction pressure
	Major components of motor broken	Replace abnormally abraded parts. Remove surface scratches, burrs and reinstall. Replace damaged parts
Motor Rotates Slow	Insufficient oil pressure or quantity	Check oil level in tank
	Poor pump performance	Check for any abnormal signs of moisture icing damage after disassembling parts. Repair or replace parts.
Motor Rotates With Varying Speed	Leakage of pressurize oil towards the drain port due to ice abrasion.	Check pressure at input port of the motor.
	Abraded bearings	Replace all worn parts
Oil Leakage	Broken oil seal and O-rings	Replace broken oil seal and O-rings. Coat O-rings with small quantity of grease when replacing.

Counterbalance Valve

Applicable Parts	Component	Weight
Slow or No Rotation	Plungers will not change over. Hydraulic oil will not circulate. Foreign objects between the plunger and the base plate. Clogged orifice.	Check if hydraulic line is damaged. Replace or repair damaged parts and install after cleaning. Assemble after cleaning.
Slow Stopping or Will Not Stop	Plunger will not return. Foreign objects between the plunger and the base plate. Spring defect or damage Clogged orifice.	Install after cleaning. Replace or repair damaged parts. Install new spring and replace damaged parts.
Large Shock When Stopping	Plunger changeover speed is too fast Defective spring seat.	Install spring seat on a correct position.
Abnormal noise	Plunger does not return. Foreign objects lodged between plunger and base plate. Damaged spring. Clogged orifice.	Install after cleaning. Repair or replace damaged parts Replace spring.

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Precautions for Operation

Be careful not to mistakenly travel too close to the edge of a cliff.

Use the machine only for its main purpose. Using it for other purposes will cause failures.

To ensure a good view, always do the following:

- When working in dark areas, attach working lights and front lights to the machine. If necessary, set up lighting at the work site.
- Stop operations when the visibility is poor, such as in fog, mist, snow, and rain. Wait for the visibility to improve to a level which causes no problems for the operation.

To avoid hitting the work equipment, always do the following:

- When working in tunnels, on bridges, under electrical wires, or when parking the machine or carrying out other operations in places with limited height, be careful not to hit the bucket or other parts.
- To prevent collisions, operate the machine at a safe speed when working in confined spaces, indoors, or in crowded areas.
- Do not pass the bucket over the heads of workers or over the operator's cabin of dump truck.

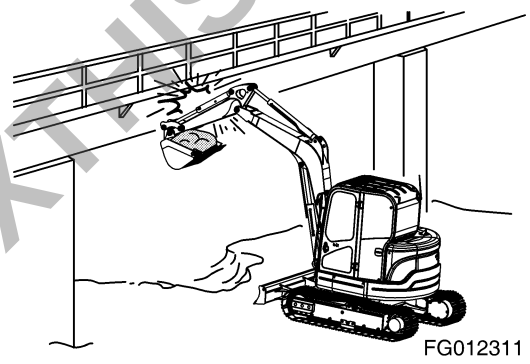


Figure 22

Avoid High-voltage Cables

Serious injury or death can result from contact or proximity to high-voltage electrical 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
6.6 kV	3 m (9' 10")
33.0 kV	4 m (13' 1")
66.0 kV	5 m (16' 5")
154.0 kV	8 m (26' 3")
275.0 kV	10 m (32' 10")

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 faraway 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 operation near power lines (either above ground or buried cable type), you should*

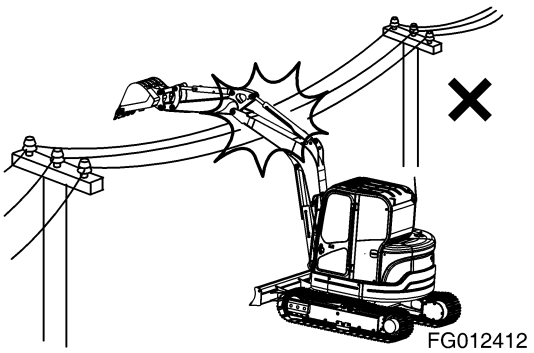


Figure 23

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Introduction

This section of the Service Manual describes the procedures necessary to service the standard engine coolant pump. This engine coolant pump is representative of the coolant pumps used on other TNV model engines. For specific part detail, see the parts catalog for the engine you are working on.

Cooling System Diagram

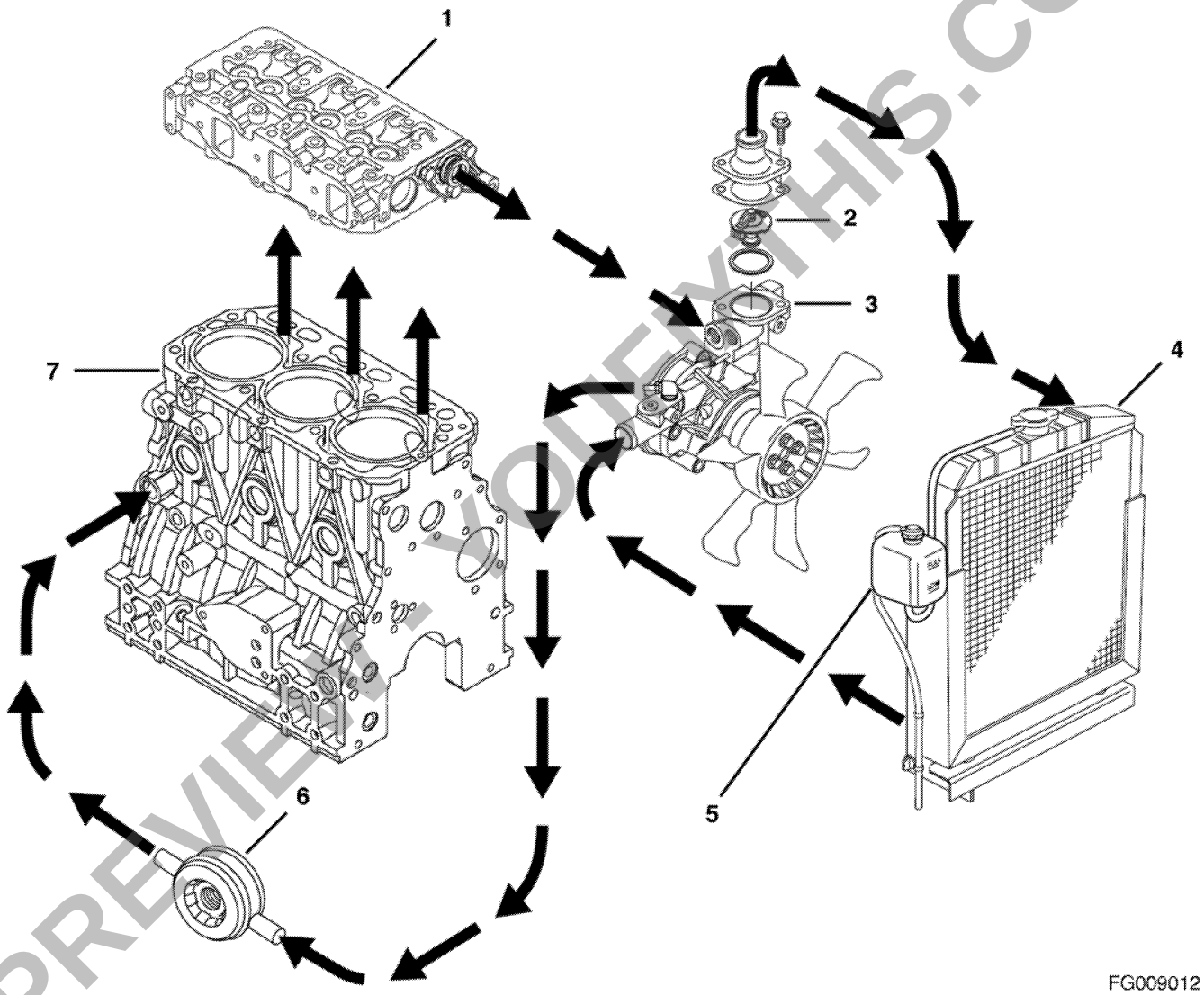


Figure 304

Reference Number	Description
1	Cylinder Head
2	Thermostat
3	Engine Coolant Pump
4	Radiator

Reference Number	Description
5	Coolant Recovery Tank
6	Engine Oil Cooler*
7	Cylinder Block

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

MODEL NAME		4TNV98-ESDB6		REMARKS
Type		4 cycle, Inline, Water-cooled Diesel		
No.of cylinders - Bore × Stroke		mm	4 - ø98 × 110	
Combustion System			Direct Injection	
Compression Ratio			18.5	
Displacement		liter	3.319	
Net Rated Output		kW (PS)	37.3 (50.7)	With Yanmar US fan.
		min^{-1}	2,200	
Gross Rated Output		kW (PS)	38.9 (52.9)	Without fan.
		min^{-1}	2,200	
Max. Torque		kW (PS)	189 ~ 205.9	With Yanmar US fan.
		min^{-1}	1,400 (+100/-100)	
Specific Fuel Consumption		g/kW-h (g/PS-h)	240 (177)	At net rated output
Ambient Condition			25°C, 750 mmHg, 30%	
Engine Speed at No Load	Max.	min^{-1}	2,350	+10/-10
	Min.	min^{-1}	1,050	+10/-10
Governorbility	Governor Type		Electric governor ("ECO")	
	Temporary	%	Max. 12	Load 100% ↓ 0%
	Permanent	%	Max. 7	
	Recovery Time	sec	Max. 6	
	Stability	min^{-1}	Max. 22	
Gradients	Longitudinal	deg	35 (30)	Intermitted ( ): continuous
	Lateral	deg	35 (30)	
Firing Order			1–3–4–2–1	Order from F.W.
Direction of Rotation			Counterclockwise	Viewed from F.W.
Engine Dry Weight		kg	Approx. 270	
Fuel Injection Timing		deg	FIR 3 +0.5/-0.5	FIT 14.0 B.T.D.C.
Fuel System	Fuel Type		Diesel oil	Sulfur : below 1,000 ppm
	Fuel Injection Pump		Distributor type (YPD-MP4), Yanmar made	
	Fuel Injection Nozzle		Hole type	
	Fuel Filter		Paper element	
Lubrication System	System		Forced feed	
	Oil Grade		API class CF, SAE grade 10W30	
	Oil Pump		Trochoid pump	
	Oil Filter		Paper element	
	Oil Capacity	liter	11.6	Max.
		liter	5.2	Effective.
	Oil Pressure	kgf/cm^2	3.5	At rated output
		kgf/cm^2	0.6	At low idle

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

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	C						
	Check and Clean Radiator Fins		C					
	Check and Adjust Cooling Fan V-Belt		C 1st time	C 2nd and after				
	Drain, Flush and Refill Cooling System with New Coolant					R or every year whichever comes first		
Cylinder Head	Adjust Intake / Exhaust Valve Clearance					D		
	Lap Intake / Exhaust Valve Seats. If necessay							D
Electrical Equipment	Check Indicators	C						
	Check Battery		C					
Engine Oil	Check Engine Oil Level	C						
	Drain and Fill Engine Oil			R 1st time	R 2nd and after			
	Replace Engine Oil Filter							
Engine Speed Control	Check and Adjust Governor Lever and Engine Speed Control	C		C				
Emission Control Warranty	Inspect, Clean and Test Fuel Injectors						D	
	Inspect Turbocharger (Blower Wash as Necessary)						D	
	Inspect Crankcase Breather System						D	
Fuel	Check and Refill Fuel Tank Level	C						
	Drain Fuel Tank			C				
	Drain Fuel Filter / Water Separator		C					
	Check Fuel Filter / Water Separator	C						
	Clean Fuel Filter / Water Separator				C			
	Replace Fuel Filter				R			
Hoses	Replace Fuel System and Cooling System Hoses							D or every 2 years
Intake and Exhaust	Clean or Replace Air Cleaner Element			C	R			
Complete Engine	Overall Visual Check Daily	C						

C : Check R : Replace D : Contact your authorized DOOSAN dealer or distributor

Note: These procedures are considered normal maintenance and are performed at the owner's expense.

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Remote Control Valve (Work Lever / Joystick) SP001640
Dozer Valve SP001490
Travel Contorl Valve.....SP001641
Pedal Valve.....SP001073
Hydraulic Schematic SP001692

Electrical System

Electrical System SP001687
Electrical Schematic (DX60R/DX80R) SP001688

Attachments

Boom and Arm.....SP001642
Bucket.....SP001643

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Standard Torques

Edition 1

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

CAUTION

Never attempt to modify the engine's design or safety features such as defeating the engine speed limit control or the diesel fuel injection quantity control.

Modifications may impair the engine's safety and performance characteristics and shorten the engine's life. Any alterations to this engine may void its warranty. Be sure to use genuine replacement parts.

CAUTION

Identify all parts and their location using an appropriate method. It is important that all parts are returned to the same position during the reassembly process.

CAUTION

Each pressure adjusting shim remived or added changes the pressure threshold by approximately 275 psi (1.9 MPa, 19 kgf/cm^2). Addingadjusting shims increases the threshold pressure.

Removing adjusting shims reduces the pressure threshold.

CAUTION

Do not rotate the crankshaft with the injection pump removed.

CAUTION

Keep the piston pin parts, piston assemblies, and connecting rod assemblies together to be returned to the same position during the reassembly process. Label the parts using an appropriate method.

CAUTION

Do not allow the honing tool to operate in one position for any length of time. Damage to the cylinder wall will occur. Keep the tool in constant up-and-down motion.

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

5. To assure the valve bridge contacts the rear valve, apply light, downward (4, Figure 162) finger pressure on the valve bridge (3, Figure 162), and loosen the valve bridge adjusting screw (1, Figure 162), until there is visible clearance (2, Figure 164) between the adjusting screw and the front valve.

6. To assure the valve bridge has equal contact with the front and rear valves, apply light downward (4, Figure 162) pressure on the valve bridge (3, Figure 162), adjust the valve bridge adjusting screw ((1, Figure 162), (1, Figure 164)) so there is zero "0" clearance (2, Figure 164) between the adjusting screw and the front valve.

7. Tighten the lock nut (1, Figure 163), while holding the valve bridge (3, Figure 163) with a wrench (2, Figure 163). Verify that the valve clearance (2, Figure 164) is zero "0".

NOTE: *Note: There is a tendency for the clearance to decrease slightly when the lock nut is tightened. It is suggested that you make the initial clearance adjustment is made slightly on the "loose" side before tightening the lock nut.*

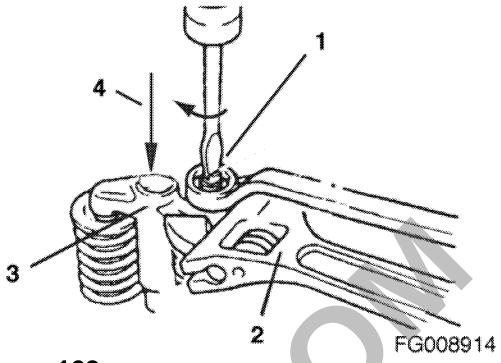


Figure 162

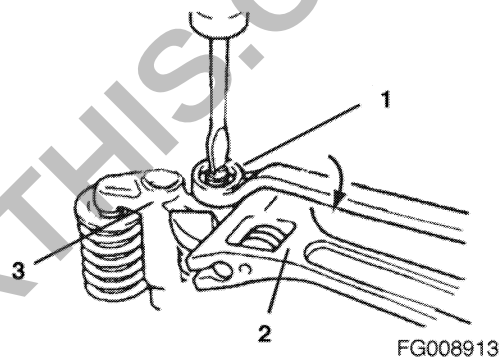


Figure 163

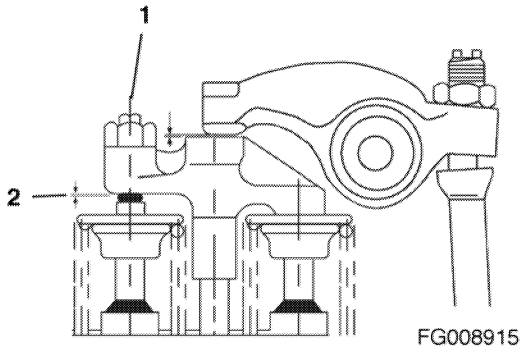


Figure 164

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Introduction

This section of the Service Manual covers the servicing of the starter motor. Standard equipment on TNV model engine is used in this section to show the service procedures for a representative start motor and it may be different from acfural equipment.

Starter Motor Specifications

Nominal Output			3.0 hp (2.3 kW)
Weight			12.1 lb (5.5 kg)
Revolution Direction (As Viewed From Pinion)			Clockwise
Engagement System			Magnetic Shift
No-load	Terminal Voltage / Current		11 V / 140 A max
	Revolution		4100 rpm (min^{-1})
	Terminal Voltage / Current		2.5 V / 1050 A max
	Torque		18 ft-lb (24.5 N•m; 2.5 kgf/m) minimum
Clutch System			Overrunning
Pinion Projection Voltage at 212°F (100 °C)			8.6 V max
Pinion DP or Module / Number of Teeth			M3/9
Difference (O-ring, Oil Seal)			Dry (none)
Application			Standard
Brush	Spring Force		7.868 lbf (35 N; 3.6 kgf)
	Height	Standard	0.591 in. (15 mm)
		Limit	0.354 in. (9 mm)
Magnetic Switch	Series Coil Resistance		0.27 W at 68°F (20°C)
	Shunt Coil Resistance		0.60 W at 68°F (20°C)
Commutator	Outside Diameter	Standard	1.437 in. (36.5 mm)
		Limit	1.398 in. (35 mm)
	Run-Out	Standard	0.001 in. (0.03 mm)
		Limit	0.008 in. (0.2 mm)
	Insulation Depth	Standard	0.020 - 0.031 in. (0.5 - 0.8 mm)
		Limit	0.008 in. (0.2 mm)
Armature	Run-Out	Standard	0.001 in. (0.03 mm)
		Limit	0.008 in. (0.02 mm)
Bearing Type	Armature Front	Nominal Number	6903DDU
	Armature Rear		608DDU
	Pinion Front		60004DDU
	Pinion Rear		6904DDU
Pinion Projection Length (Length L)			0.012 - 0.059 in. (0.3 - 1.5 mm)

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Slipper Seal Jig

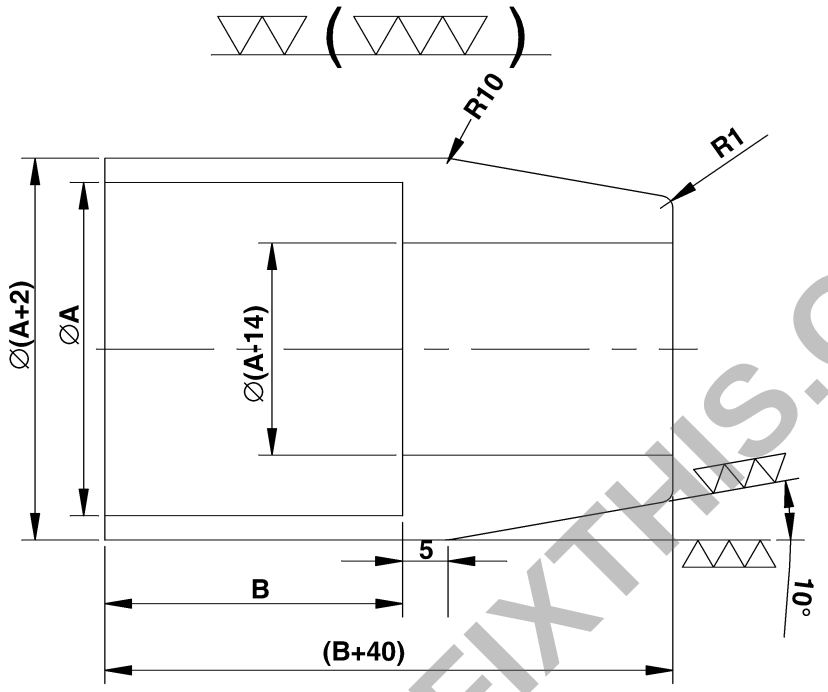


Figure 12

Model	Cylinder	øA (mm)	øB (mm)
DX60R	ARM	79.5	11.5
	BOOM	104.5	21.5
	BUCKET	79.5	15
	SWING	109.5	20.5
	DOZER	109.5	10
DX80R	ARM	99.6	28
	BOOM	114.6	26
	BUCKET	84.5	28.5
	SWING	109.5	21
	DOZER	99.6	19.5

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Removal of Spring Inside Cylinder Block

1. Place cylinder block (104) on the press bench.

   NOTE: *The spring is removed only when replacing. The spring is removed by lining up the shaft centers of holder (I) and washer in order to prevent damage to the cylinder block through contact. Cover cylinder block with a vinyl sheet to prevent sliding surfaces of the cylinder block from being damaged.*

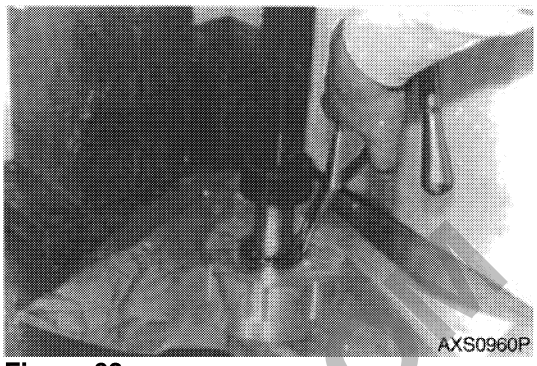


Figure 68

2. Place holder (I) on washer (110), and while clamping holder with the press, remove retaining ring (145) with a retaining ring pliers.

CAUTION

If press is loosened suddenly, the spring could jump out resulting in injury. Loosen the press slowly.

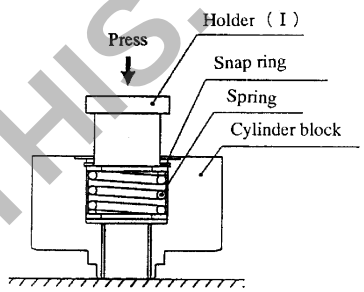


Figure 69

3. Remove spring (114) and washer (110) from cylinder block (104).

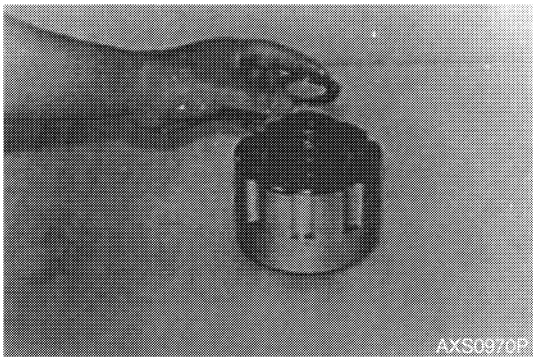


Figure 70

Removal of Swash Plate

1. Take out swash plate (103) from the shaft.
2. Remove shaft (102) and ball bearing (149) on it as well, from spindle (2).
3. Remove pivots (167) and pins (177) from spindle (2).

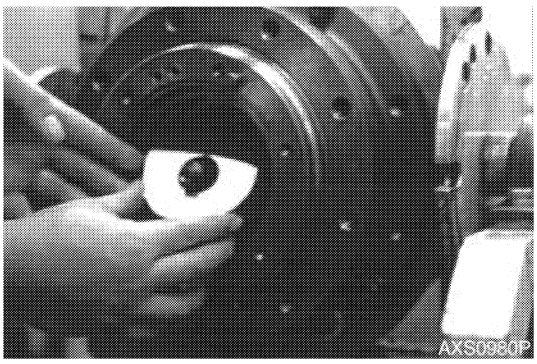


Figure 71

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

ADJUSTMENT

Fine adjustment of the hydraulic pump is made possible by the input power and control. Readjustment of any and all adjusting parts may result in depriving them of control function and placing the pump off the certified specifications. Do not adjust adjusting nuts at your disposal.

INSTALLATION

1. Install pump and place input axle horizontally.
2. Install pump lower than lowest level of actuator oil to ensure that actuator oil will continue to flow into tank.
3. Use a flexible hose after installation of pump on diesel engine. Install an intake pipe, be careful not to allow air to flow into pump.
4. Use a high-pressure flexible hose for discharge ports P1 and P2.
5. Fully charge pump with hydraulic oil following its installation.

DRIVING

1. Use a flexible coupling when you connect it to the motor.
2. Insert couplings near input axle. **Do not** give strong impact to couplings while inserting.
3. While viewing axle from end, rotate input axle clockwise.

HYDRAULIC OIL

1. Make sure that hydraulic oil is either general kerosene based hydraulic oil or anticorrosive actuator oil (ISO 3448, VG32 - 56 or equivalent)
2. The range of an optimum viscosity shall be:
   - Maximum allowable viscosity: 1000 ß ±/s.
   - Minimum allowable viscosity: 10 ß ±/s.
   - The range of recommended viscosity: 15 - 150 ß ±/s.

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

Table of Contents

Pedal Valve

Safety Precautions 5
Applicable Models 5
General Description 6
Parts List 6
Specifications 7
Tools and Materials 7
Disassembly 8
Assembly 10

PREVIEW - YOUFIXTHIS.COM

Download full manual at youfixthis.com

PREVIEW ONLY

You're viewing 25 of 868 pages

The full manual includes:

- All 868 pages, complete
- Searchable PDF (find any keyword)
- No watermarks
- Instant download
- Print-ready quality

GET FULL MANUAL NOW

Doosan DX60R Shop Manual

Scan or click anywhere
youfixthis.com

Click anywhere on this page to get the full manual