KOBELCO

SERVICE MANUAL

Hydraulic Excavator

SK50SR-5

S5PJ0031E01

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APPLICABLE:
SK50SR-5 . . . . . PJ06 - and higher

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1. OUTLINE

TABLE OF CONTENTS

1.1 GENERAL PRECAUTIONS FOR REPAIRS 1-3
1.1.1 PREPARATION BEFORE DISASSEMBLING 1-3
1.1.2 SAFETY IN DISASSEMBLING AND ASSEMBLING 1-3
1.1.3 DISASSEMBLING AND ASSEMBLING HYDRAULIC EQUIPMENT 1-4
1.1.4 ELECTRICAL EQUIPMENT 1-6
1.1.5 HYDRAULIC PARTS 1-7
1.1.6 WELDING REPAIR 1-7
1.1.7 ENVIRONMENTAL MEASURE 1-7
1.2 INTERNATIONAL UNIT CONVERSION SYSTEM (Based on MARKS' STANDARD HANDBOOK FOR MECHANICAL ENGINEERS) 1-8

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2. SPECIFICATIONS

TABLE OF CONTENTS

2.1 COMPONENTS NAME 2-3
2.2 MACHINE DIMENSIONS 2-4
2.3 SPECIFICATIONS AND PERFORMANCE 2-5
2.4 MACHINE & COMPONENTS WEIGHT (DRY) 2-7
2.5 TRANSPORTATION 2-9
2.6 TYPE OF CRAWLER SHOES 2-12
2.7 TYPE OF BUCKET 2-13
2.8 ENGINE SPECIFICATIONS 2-14
2.8.1 SPECIFICATIONS 2-14
2.8.2 ENGINE PERFORMANCE CURVE 2-15

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3. ATTACHMENT DIMENSIONS

TABLE OF CONTENTS

3.1 BOOM 3-3
3.1.1 BOOM DIMENSIONAL DRAWINGS 3-3
3.1.2 BOOM MAINTENANCE STANDARDS 3-4
3.2 ARM 3-8
3.2.1 ARM DIMENSIONAL DRAWINGS 3-8
3.2.2 ARM MAINTENANCE STANDARDS 3-10
3.3 BUCKET 3-14
3.3.1 BUCKET DIMENSIONAL DRAWINGS 3-14
3.3.2 DETAIL DIMENSIONAL DRAWINGS OF LUG SECTION 3-15
3.3.3 DETAIL DIMENSIONAL DRAWINGS OF BOSS SECTION 3-15
3.4 DOZER 3-17
3.4.1 DOZER DIMENSIONAL DRAWINGS 3-17
3.4.2 DOZER MAINTENANCE STANDARDS 3-18
3.5 SWING 3-20
3.5.1 SWING BRACKET DIMENSIONAL DRAWINGS 3-20
3.5.2 SWING PORTION MAINTENANCE STANDARDS 3-21

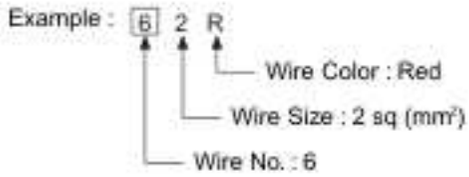
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23.1 HOW TO READ CIRCUIT DIAGRAM AND HARNESS CONNECTION

23.1.1 ELECTRIC CIRCUIT DIAGRAM

(1) In the diagram, the number, size and color of wires are shown on the wiring line.
The size of the wire is to be 0.75 sq (square mm = mm^2) unless otherwise specified.



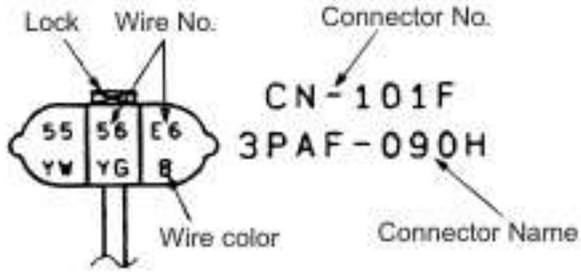
WIRING COLOR TABLE

Symbol	Color	Symbol	Color	Symbol	Color
B	BLACK	Y	YELLOW	Gr	GRAY
G	GREEN	P	PINK	Sb	SKY BLUE
L	BLUE	O	ORANGE	V	VIOLET
R	RED	Br	BROWN		
W	WHITE	Lg	LIGHT GREEN		

23.1.2 HARNESS CONNECTION

(1) Indication for Connector

1. The figure for the connector pin arrangement is shown by putting the lock (nail) to upper portion, and looking from the fitting face.
2. The numbers in the connector show the wire No., and alphabetical letters show the wire color.
3. On the side face of connector, the connector name and serial number of the connector No. are indicated.
4. At the place indicated as "DOUBLE SPLICE", two wires are connected to one place.



(2) The connector is to be connected with engaging the male (M) and female (F) connectors of the same number.
Example : CN-101M and CN-101F
Where : M means for Male, and F for Female.

(3) The mark shown the right figure means the connector with diode. The direction for diode is shown by the arrow.



(4) The AVSS wires are to be used for the size between 0.75 sq and 2 sq. AVS wires between 3 sq and 5 sq and others are AV wires, unless otherwise specified.
(5) The wire size is 0.75 sq, unless otherwise specified.
(6) The treatment for the harness end is to be as follows :

1) ——— : After roughly applying harness taping, wires are installed in a corrugated tube.
2) ═══ : Harness taping by two plies.
3) ——— : No harness treatment for connection.

(7) The length for the above (6)-3) is to be 30±10 mm. (1.2±0.4 in), and the length includes in the total length of wire shown in the diagram.

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32.2.1.8 POSSIBLE CAUSES FOR TROUBLE AND REMEDY

Trouble Conditions	Major Possible Causes	Remedy
Oil leakage from sliding face of piston rod. (A ring shape oil is formed on piston rod and enlarged resulting dripping down of oil)	Foreign matter is caught by U-ring or wiper ring at its inside periphery.	Remove foreign matter.
	Scuffing or fault on U-ring or wiper ring at its inside periphery.	Replace each part with new one.
	Scuffing on sliding face of piston rod.	Grind sliding face with a fine oil stone. (less than 1.6S)
		If leakage is not stopped by grinding, replace seals such as U-ring, etc. with new ones.
		If leakage is not stopped by replacing seals, replace piston rod.
	Peeling off of hard chrome plating.	Re-plating of hard chrome on piston rod.
Oil leakage from outer periphery of cylinder head.	Damages on O-ring.	Replace.
	Damages on back-up ring.	Replace.
Oil leakage from welded portion.	Damages on welded portion on tube.	Replace.
Piston movement due to leakage. (For the case when static load that is equivalent to product of multiplication of max. working pressure and cylinder area, is applied to rod, max. movement of piston is larger than 0.5mm (0.02 in)) per 10 minutes.	Foreign matter is caught by sliding face of slide ring.	Remove foreign matter.
	Scuffing or faulty condition on sliding face of slide ring.	Replace.
	Scuffing on sliding face of seal ring assembly.	Replace.
	Damages on O-ring.	Replace.

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PRINCIPAL ENGINE SPECIFICATIONS

3TNV82A (~ EPA Tier2)

Engine Model	3TNV82A								
Version	CL			VM					
Type	Vertical In-line Diesel Engine								
Combustion System	Direct Injection								
Aspiration	Natural								
No. of Cylinders	3								
Bore × Stroke	82 × 84mm								
Displacement	1.331L								
Continuous Rated Output	min⁻¹	1500	1800						
	kW	9.9	12.0						
	PS	13.5	16.3						
Max. Rated Output (Net)	min⁻¹	1500	1800	2000	2200	2400	2600	2800	3000
	kW	11.0	13.2	14.6	16.0	17.5	19.0	20.4	21.9
	PS	14.9	17.9	19.9	21.8	23.8	25.8	27.8	29.8
High Idling	min⁻¹	1600 ± 25	1895 ± 25	2180 ± 25	2375 ± 25	2570 ± 25	2780 ± 25	2995 ± 25	3180 ± 25
Engine Weight (Dry) *with Flywheel Housing	138kg			128 kg					
PTO Position	Flywheel End								
Direction of Rotation	Counterclockwise Viewed From Flywheel End								
Cooling System	Liquid-Cooled with Radiator								
Lubricating System	Forced Lubrication with Trochoid Pump								
Normal Oil Pressure at Rated Engine Speed	0.34 - 0.49 MPa							0.39 - 0.54 MPa	
Normal Oil Pressure at Low Idle Speed	0.06 MPa								
Starting System	Electric Starting (Starter Motor: DC12V (1.2 kW)) ***								
	Alternator: DC12V, 40A***								
	Recommended Battery Capacity: 12V, 55Ah*** (5h rating)								
Dimensions (L × W × H)*	553 × 489 × 565 mm			528 × 489 × 565 mm					
Engine Oil Pan Capacity**	5.5/3.6L (Dipstick Upper Limit / Lower Limit)								
Engine Coolant Capacity	1.8L Engine Only								
Standard Cooling Fan	335mm O.D., 6 Blade Pusher-Type ***								
Crank V-pulley dia./ Fan V-pulley dia.	ϕ120/ ϕ90mm ***			ϕ110/ ϕ110mm ***					

* *Engine specifications without radiator.*

** *Engine oil capacity for a "Deep Standard" oil pan. Refer to the operation manual provided by the driven machine manufacturer for the actual engine oil capacity of your machine.*

*** *May vary depending on application.*

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CAUTION

Do not operate the engine if the alternator is producing unusual sounds. Damage to the alternator will result.

0000039en

CAUTION

If the engine coolant pump must be replaced, replace the engine coolant pump as an assembly only. Do not attempt to repair the engine coolant pump or replace individual components.

0000041en

CAUTION

Use a new special O-ring between the engine coolant pump and the joint. Be sure to use the special O-ring for each engine model. Although the O-ring dimensions are the same as a commercially available O-ring, the material is different.

0000042en

CAUTION

Remove or install the high-pressure fuel injection lines as an assembly whenever possible. Disassembling the high-pressure fuel injection lines from the retainers or bending any of the fuel lines will make it difficult to reinstall the fuel lines.

0000047en

CAUTION

After marking the position of the pump drive gear, do not rotate the engine crankshaft. Rotating the crankshaft will cause the fuel injection pump to become misaligned.

0000048en

CAUTION

Do not use a high-pressure wash directly on the alternator. Water will damage the alternator and result in inadequate charging.

0000049en

CAUTION

Do not reverse the positive (+) and negative (-) ends of the battery cable. The alternator diode and stator coil will be damaged.

0000050en

CAUTION

When the battery indicator goes out, it should not come on again. The battery indicator only comes on during operation if the alternator fails. However, if an LED is used in the battery indicator, the LED will shine faintly during normal operation.

0000051en

CAUTION

Using a non-specified V-belt will cause inadequate charging and shorten the belt life. Use the specified belt.

0000052en

CAUTION

Agricultural or other chemicals, especially those with a high sulfur content, can adhere to the IC regulator. This will corrode the conductor and result in battery over-charging (boiling) and charging malfunctions. Consult Yanmar before using the equipment in such an environment or the warranty is voided.

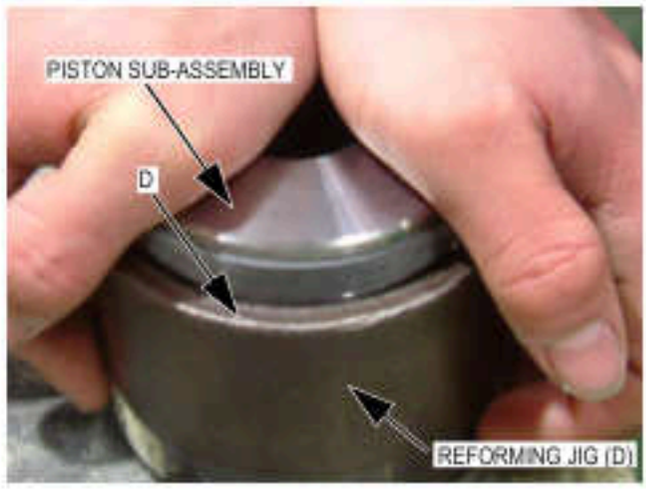
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2. Install wear ring (10) for piston from rod side. (2 places)
   -Expand the split of wear ring as minimum as required.



3. The O-ring of seal ring was extremely stretched at the installation, insert the piston subassembly from the taper side of reforming jig (D) to reform the ring.



(4) Assembly of piston rod

1. Keep clevis of piston rod (2) horizontal, and install the head sub-assembly.
   -Apply hydraulic oil to seal slightly.
   -Take care not to hit the seal against the thread of piston rod.



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Symptoms and conditions of failure / Possible causes		Starting failure: Starter does not rotates: ECU failure lamp does not go on immediately after turning on the key	Starting failure: Starter does not rotates: ECU failure lamp goes on immediately (within 2 seconds) after turning on the key	Starting failure: Starter rotates: Engine does not start up (without initial ignition)	Starting failure: Starter rotates: Engine does not start up (it stops immediately after initial ignition)	Starting failure: Starter rotates: It takes longer than before to start up engine	Engine stall after start up: Smoke: None	Engine stall after start up: Smoke: Slight	Engine stall after start up: Smoke: Remarkable	Speed control error: Revolution speed cannot be changed with accelerator (stays at a constant speed)	Speed control error: No load: Cannot be set to particular speed	Speed control error: No load: Poor acceleration	Speed control error: No load: Does not smoothly return to low speed	Speed control error: No load: Hunting occurs	Speed control error: Workload: Hunting occurs	Engine output low: Smoke color: Normal	Engine output low: Smoke color: White	Engine output low: Smoke color: Black	Noise and vibration: High knocking sound at combustion time	Noise and vibration: Uneven combustion sound	Noise and vibration: Abnormal sound (other than combustion sound) from engine	Noise and vibration: Engine vibrates heavily	Lubricating oil: Too much lubricating oil consumed	Lubricating oil: Lubricating oil diluted with fuel	Lubricating oil: Lubricating oil mixed with water	Lubricating oil: Oil pressure low (oil pressure warning lamp lit)	Cooling water: Overheat (water temperature warning lamp lit)	Cooling water: Water temperature low	Intake air: Pressure low (air cleaner warning lamp lit)	Intake air: Pressure high	Exhaust gas: Workload: White exhaust gas	Exhaust gas: Workload: Black exhaust gas	Exhaust gas: Too much blow-bye	Exhaust gas: Exhaust gas temperature high	Fuel: Too much fuel consumed	Fuel: Fuel mixed with water (oil-water separator warning lamp lit)	Fuel: Fuel filter fouled shortly	Electrical parts: Battery charge error (charge lamp lit)	Electrical parts: ECU failure lamp flashes	Electrical parts: ECU failure lamp stops flashing immediately (within 2 seconds) after turning off the key	Electrical parts: Specific ECU control functions fail	Electrical parts: Fuses get blown or broken (repeatedly)	Corrective Action	Referenced page number
Electrical system	Fuse blown or broken	○	○				○																																	●	Replace the fuse.	
	Starter faulty		○	○																																				●	Repair or replace the starter.	See "Starter" (on page 11-9).
	Alternator faulty			○																																	○					Repair or replace the alternator.	See "Removing the Alternator" (on page 12-12).
	Wires disconnected	○	○	○			○																														○	○	○	○		Repair or replace the disconnected wire(s) of the harness.	
	Wires short-circuited (sheathing broken); overloaded by the power consumption by additional devices	●																																						●	Inspect, repair, or replace the harnesses and wires as needed. Reexamine the additional devices.	
	Battery voltage low		○	○																																	–					Inspect and charge the battery.	See "Inspecting the Electrolyte Level and Charging the Battery" (on page 5-23).
	Key switch faulty or disconnected	○					○																																○			Repair or replace the harness. Replace the key switch.	
	Key switch instantly cut off				○		○																																			Replace the key switch.	
	Starter relay faulty, disconnected, or short-circuited		○																																							Repair or replace the harness. Replace the starter relay.	
	Main relay faulty (except for sticking of the contact, which is undetectable by ECU)	○																																					○			Repair or replace the harness. Replace the main relay.	
	Actuator relay faulty (contact failure undetectable by ECU)		?	?			○																																			Replace the actuator relay.	
	Start assist relay faulty (contact failure undetectable by ECU)			○		○													●											△												Replace the start assist relay.	
	Accelerator sensor signal error (an error undetectable by ECU)									○			○	○						○																							Repair or replace the accelerator sensor.	
	Water temperature sensor signal error (an error undetectable by ECU)			○		○							●	●					●																							Replace the water temperature sensor.	
	Speed sensor signal error (an error undetectable by ECU, such as caused by noise)				○	●	○						○	○						○																							Repair or replace the fuel injection pump.	Monitor the engine speed using the diagnosis tool.
	Rack position sensor signal error (an error undetectable by ECU)					●	○					●	□	○						○																							Repair or replace the fuel injection pump.	Monitor the rack position sensor signal using the diagnosis tool.
	Rack actuator malfunctioning (an error undetectable by ECU)					●	○					●	○	○						○																							Repair or replace the fuel injection pump.	Monitor the rack actuator using the diagnosis tool.
	ECU failure lamp disconnected																																							○			Replace the lamp. Repair or replace the harness.	
	ECU faulty (ECU self diagnosis failure)	○	○							○																														○	○		Replace the ECU.	

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