



**SERVICE MANUAL**  
**CRAWLER EXCAVATOR**  
**CX225SR**  
**TIER 3**

84184367A EN-US

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# CRAWLER EXCAVATOR CX225SR TIER 3 SERVICE MANUAL

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\* Consult the Engine Service Manual

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**NOTE:** CNH Company reserves the right to make changes in the specification and design of the machine without prior notice and without incurring any obligation to modify units previously sold.

The description of the models shown in this manual has been made in accordance with the technical specifications known as of the date of design of this document.

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# Section 1001

**SAFETY, GENERAL INFORMATION  
AND TORQUE SPECIFICATIONS**

## GENERAL INFORMATION

### Cleanning

Clean all metal parts except bearings, in a suitable cleaning solvent or by steam cleaning. Do not use caustic soda for steam cleaning. After cleaning, dry and put oil on all parts. Clean oil passages with compressed air. Clean bearings in a suitable cleaning solvent, dry the bearings completely and put oil on the bearings.

### Inspection

Check all parts when the parts are disassembled. Replace all parts that have wear or damage. Small scoring or grooves can be removed with a hone or crocus cloth. Complete a visual inspection for indications of wear, pitting and the replacement of parts necessary to prevent early failures.

### Bearings

Check bearings for easy action. If bearings have a loose fit or rough action replace the bearing. Wash bearings with a suitable cleaning solvent and permit to air dry. **DO NOT DRY BEARINGS WITH COMPRESSED AIR.**

### Needle bearings

Before you press needle bearings in a bore always remove any metal protrusions in the bore or edge of the bore. Before you press bearings into position put petroleum jelly on the inside and outside diameter of the bearings.

### Gears

Check all gears for wear and damage. Replace gears that have wear or damage.

### Oil seals, O-rings and gaskets

Always install new oil seals, O-rings and gaskets. Put petroleum jelly on seals and O-rings.

### Shafts

Check all shafts that have wear or damage. Check the bearing and oil seal surfaces of the shafts for damage.

### Service parts

Always install genuine Case service parts. When ordering refer to the Parts Catalog for the correct part number of the genuine Case replacement items. Failures due to the use of other than genuine Case replacement parts are not covered by warranty.

### Lubrication

Only use the oils and lubricants specified in the Operator's or Service Manuals. Failures due to the use of non-specified oils and lubricants are not covered by warranty.

## SAFETY



*This symbol means ATTENTION! BECOME ALERT! YOUR SAFETY IS INVOLVED. The message that follows the symbol contains important information about safety. Carefully read the message. Make sure you fully understand the causes of possible injury or death.*

To prevent injury always follow the Warning, Caution and Danger notes in this section and throughout the manual.

Put the warning tag shown below on the key for the keyswitch when servicing or repairing the machine. One warning tag is supplied with each machine. Additional tags Part Number 331-4614 are available from your service parts supplier



**WARNING:** *Read the operator's manual to familiarize yourself with the correct control functions.*



**WARNING:** *Operate the machine and equipment controls from the seat position only. Any other method could result in serious injury.*



**WARNING:** *This is a one man machine, no riders allowed.*



**WARNING:** *Before starting engine, study Operator's Manual safety messages. Read all safety signs on machine. Clear the area of other persons. Learn and practice safe use of controls before operating.*

*It is your responsibility to understand and follow manufacturers instructions on machine operation, service and to observe pertinent laws and regulations. Operator's and Service Manuals may be obtained from your Case dealer.*



**WARNING:** *If you wear clothing that is too loose or do not use the correct safety equipment for your job, you can be injured. Always wear clothing that will not catch on objects. Extra safety equipment that can be required includes hard hat, safety shoes, ear protection, eye or face protection, heavy gloves and reflector clothing.*



**WARNING:** *When working in the area of the fan belt with the engine running, avoid loose clothing if possible, and use extreme caution.*



**WARNING:** *When doing checks and tests on the equipment hydraulics, follow the procedures as they are written. DO NOT change the procedure.*



**WARNING:** *When putting the hydraulic cylinders on this machine through the necessary cycles to check operation or to remove air from a circuit, make sure all people are out of the way.*



**WARNING:** Use insulated gloves or mittens when working with hot parts.



**WARNING:** Lower all attachments to the ground or use stands to safely support the attachments before you do any maintenance or service.



**WARNING:** Pin sized and smaller streams of hydraulic oil under pressure can penetrate the skin and result in serious infection. If hydraulic oil under pressure does penetrate the skin, seek medical treatment immediately. Maintain all hoses and tubes in good condition. Make sure all connections are tight. Make a replacement of any tube or hose that is damaged or thought to be damaged. **DO NOT** use your hand to check for leaks, use a piece of cardboard or wood.



**WARNING:** When removing hardened pins such as a pivot pin, or a hardened shaft, use a soft head (brass or bronze) hammer or use a driver made from brass or bronze and a steel head hammer.



**WARNING:** When using a hammer to remove and install pivot pins or separate parts using compressed air or using a grinder, wear eye protection that completely encloses the eyes (approved goggles or other approved eye protectors).



**WARNING:** Use suitable floor (service) jacks or chain hoist to raise wheels or tracks off the floor. Always block machine in place with suitable safety stands.



**WARNING:** When servicing or repairing the machine, keep the shop floor and operator's compartment and steps free of oil, water, grease, tools, etc. Use an oil absorbing material and/or shop cloths as required. Use safe practices at all times.



**WARNING:** Some components of this machine are very heavy. Use suitable lifting equipment or additional help as instructed in this Service Manual.



**WARNING:** Engine exhaust fumes can cause death. If it is necessary to start the engine in a closed place, remove the exhaust fumes from the area with an exhaust pipe extension. Open the doors and get outside air into the area.



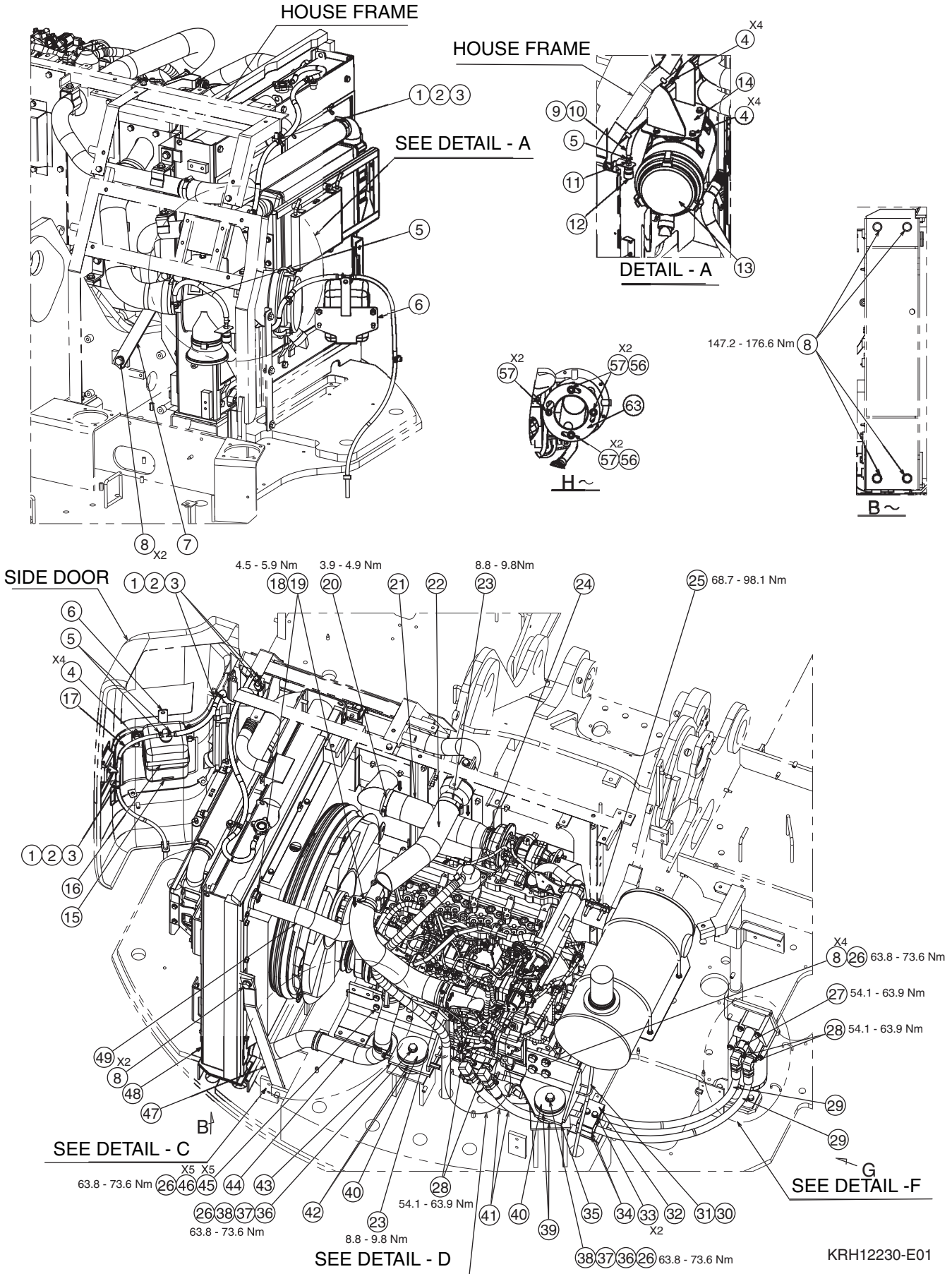
**WARNING:** When the battery electrolyte is frozen, the battery can explode if (1), you try to charge the battery, or (2), you try to jump start and run the engine. To prevent the battery electrolyte from freezing, try to keep the battery at full charge. If you do not follow these instructions, you or others in the area can be injured.

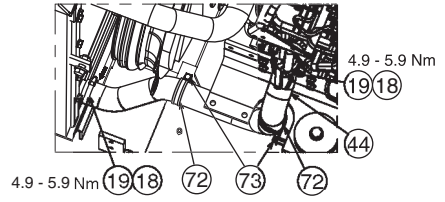
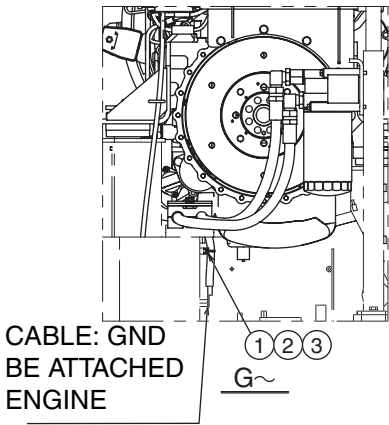
# Section

# 2000

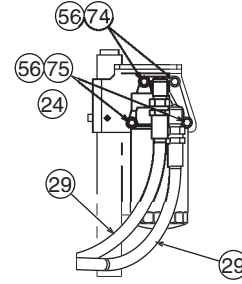
## REMOVAL AND INSTALLATION OF THE ENGINE

# ENGINE

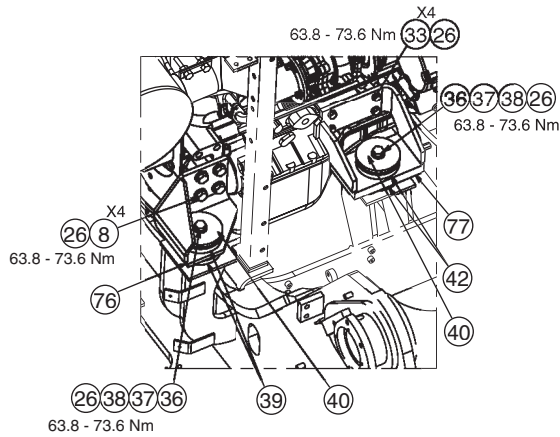




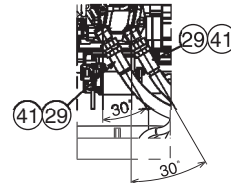
DETAIL - C



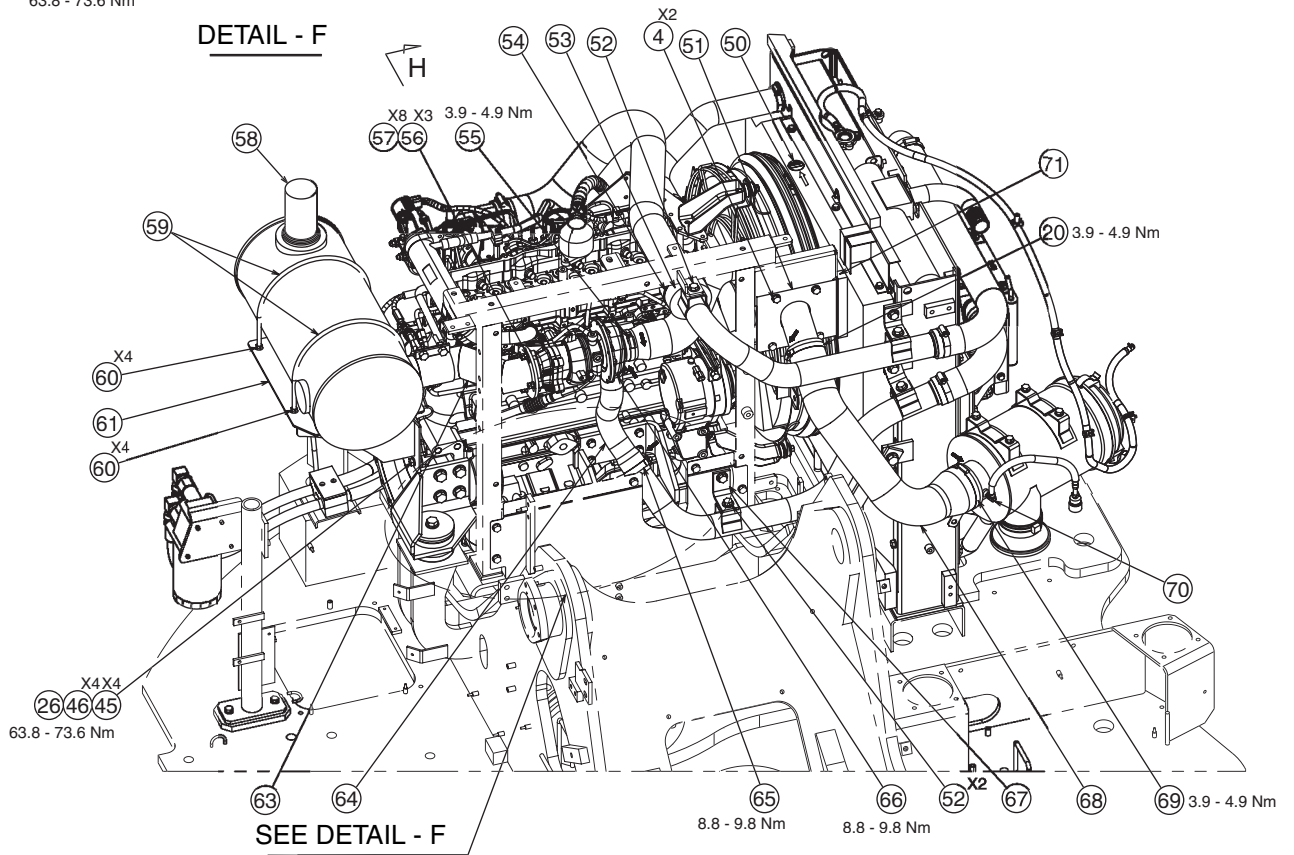
DETAIL - E



DETAIL - F



DETAIL - D



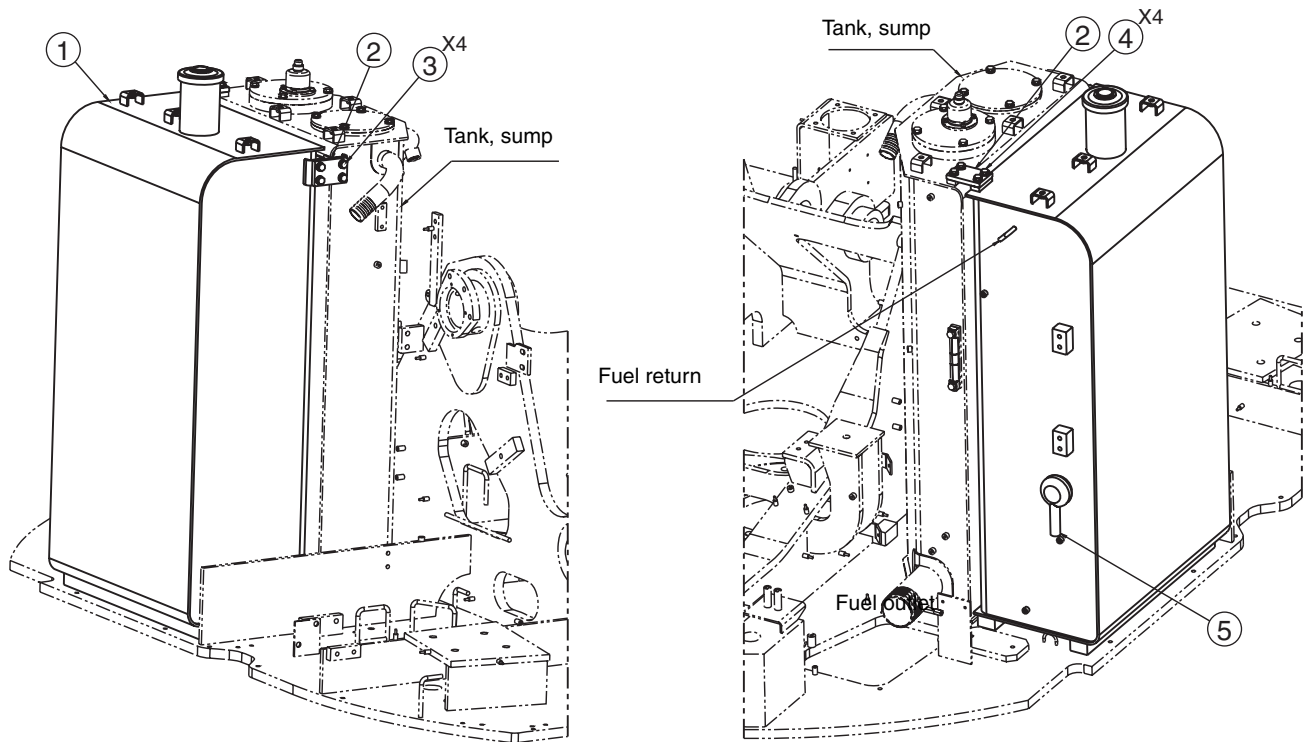
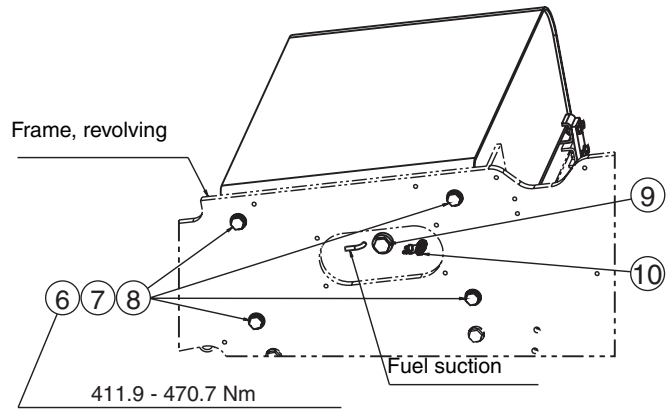
KRH12230-E01

SYM.	PART NAME	QTY.	SYM.	PART NAME	QTY.
1	SPL CLAMP	6	39	ELASTIC RUBBER	4
2	BAND HARNESS L=250	6	40	PLATE	4
3	PAN HEAD SCREW M6 x 8	6	41	CORRUGATED TUBE 250 x 400	2
4	SEMS BOLT M10 x 25	14	42	ELASTIC RUBBER	4
5	HOSE BAND	4	43	ENGINE SUPPORT	1
6	BRACKET	1	44	RADIATOR HOSE	1
7	RADIATOR STAY	1	45	HIGH STRENGTH BOLT M10 x 35	9
8	SEMS BOLT M16 x 40	16	46	HIGH STRENGTH WASHER 10	9
9	RUBBER HOSE (L=350)	1	47	RADIATOR STAY	1
10	CORRUGATED TUBE 13 x 300	1	48	RADIATOR (STANDARD) ASSY	1
11	SPL JOINT	1	49	RADIATOR HOSE	1
12	SPL INDICATOR	1	50	SPL LABEL	1
13	AIR CLEANER	1	51	BRACKET	1
14	BRACKET	1	52	SPL BOLT	3
15	TANK RESERVE	1	53	INSULATION ACOUSTIC	1
16	HOLDER RESERVE TANK	1	54	BAND HARNESS	1
17	RUBBER HOSE (L=1000)	1	55	JUBILEE CLIP 68 - 85	1
18	LIQUID PACKING	NEED	56	HIGH STRENGTH WASHER M8	7
19	HOSE CLAMP 50 - 65	4	57	HIGH STRENGTH NUT M8	8
20	JUBILEE CLIP 77 - 95	2	58	MUFFLER D280 x L600	1
21	AIR HOSE	1	59	U BOLT M10	2
22	AIR HOSE	1	60	FLANGED NUT M10	8
23	HOSE CLAMP	1	61	MUFFLER BRACKET	1
24	DIESEL ENGINE	1	63	EXHAUST PIPE	1
25	SPL CLAMP	1	64	AIR HOSE	1
26	LOCTITE NO.262	NEED	65	HOSE CLAMP	1
27	SOCKET G3/4	1	66	HOSE CLAMP	1
28	ELBOW HL204-060 G3/4	4	67	BRACKET	1
29	ASSY HOSE	1	68	AIR HOSE	1
30	HOSE BAND	1	69	JUBILEE CLIP 6	1
31	TEFLON TUBE L=850	1	70	ELBOW	1
32	PLATE	1	71	CUSHION SEAL	1
33	SEMS BOLT M10 x 30	6	72	HOSE CLAMP	2
34	HOSE CLAMP	2	73	SPL BOLT M8 x 25	2
35	ENGINE SUPPORT	1	74	HIGH STRENGTH BOLT M8 x 110	2
36	HIGH STRENGTH BOLT M16 x 130	4	75	HIGH STRENGTH BOLT M8 x 140	2
37	SPL NUT	4	76	ENGINE SUPPORT	1
38	HIGE STRENGTH WASHER 16	4	77	ENGINE SUPPORT	1

**NOTE:**

1. COAT THE THREAD OF SYM 8, 33, 36, 45 WITH LOCTITE #262 OR EQUIVALENT AFTER REMOVING ANY OIL FILM AND FASTEN BY TIGHTENING TORQUE.
2. THE ELASTIC RUBBERS OF SYM 39, 42 SHOULD BE ASSEMBLED AFTER CONFIRMING THE DISCRIMINATION COLOR.
3. APPLY LIQUID PACKING 18 TO THE CONNECTION OF RADIATOR HOSE AFTER REMOVING ANY OIL FILM AND FASTEN BY TIGHTENING TORQUE.
4. TIGHTEN UP THE HOSE BAND FROM THE DIRECTION SHOWN ON THE DRAWING.
5. ARROW MARK (↑) IN THE LABELS 50 REPRESENT THE TOP.

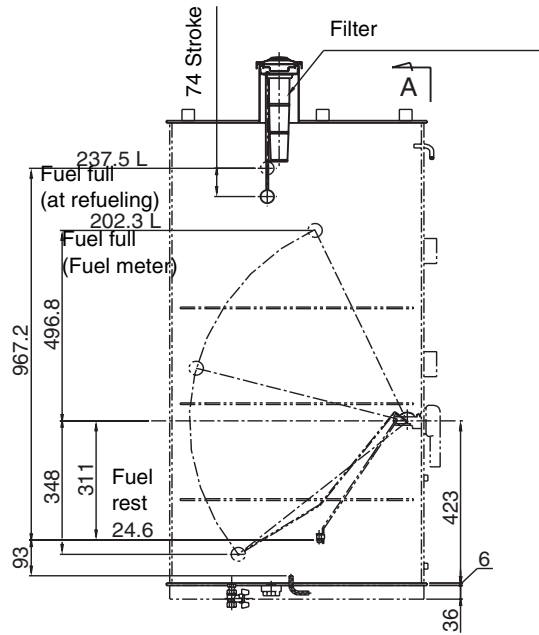
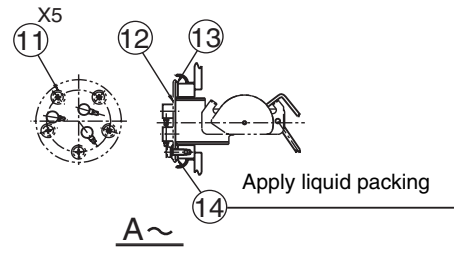
# FUEL TANK



KRH11640-D00

3001-4

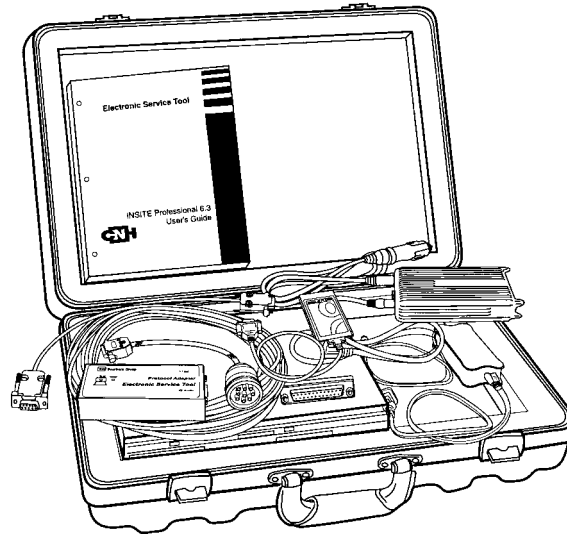
1. Fuel tank
2. Plate
3. Sems bolt M10 x 30
4. Sems bolt M10 x 25
5. Cover sensor
6. Bolt high strength 20 x 60
7. High strength washer M20
8. Bond 262
9. Plug G3/4
10. Cock drain
11. Pan screw HD M5x12
12. Fuel sensor
13. Non asbestos packing
14. Liquid packing



KRH11640-D00

Diagnostic Trouble Code (Monitor Display) .....	115
EPF (engine protection feature) .....	123

## CNH-EST DIAGNOSTIC TOOL



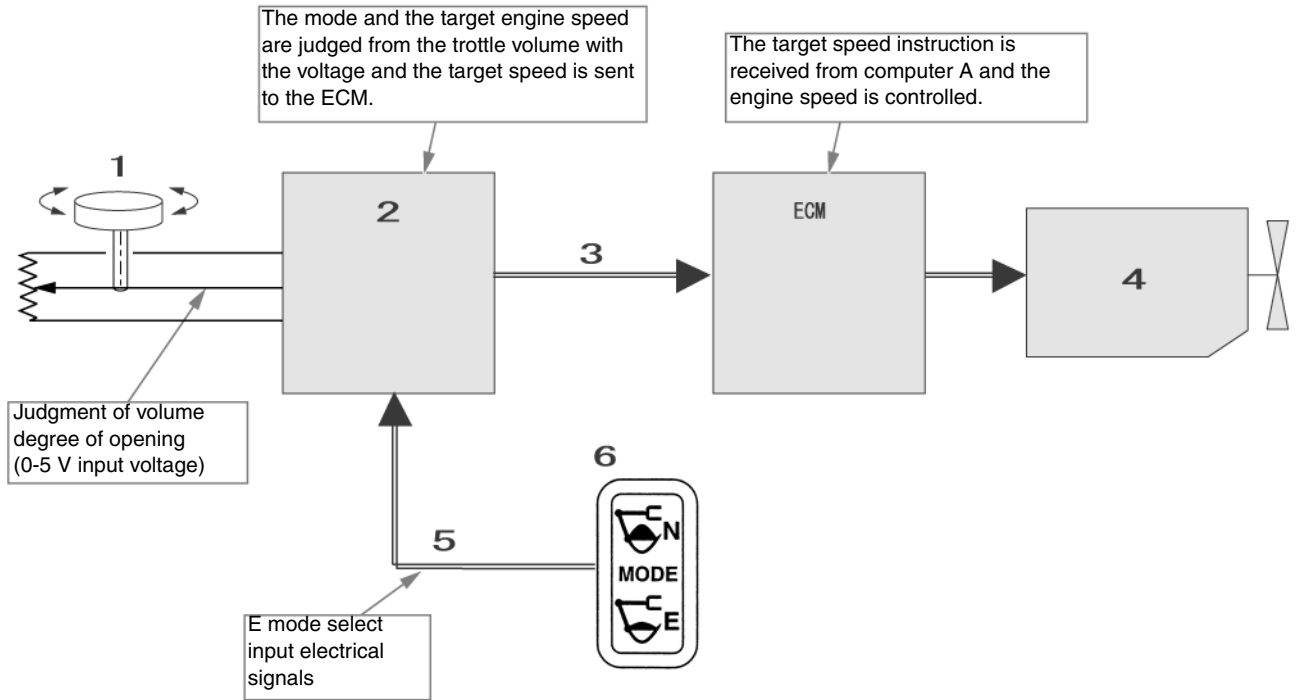
The EST (Electronic Service Tool) system allows diagnoses on machines and engines by detecting the operating parameters of electronic control components (control units, sensors etc.). It is also capable of reading fault codes.

To use this tool, please refer to the book provided during the training sessions.

# Work Mode Select Switch

## [1] Flow of throttle control

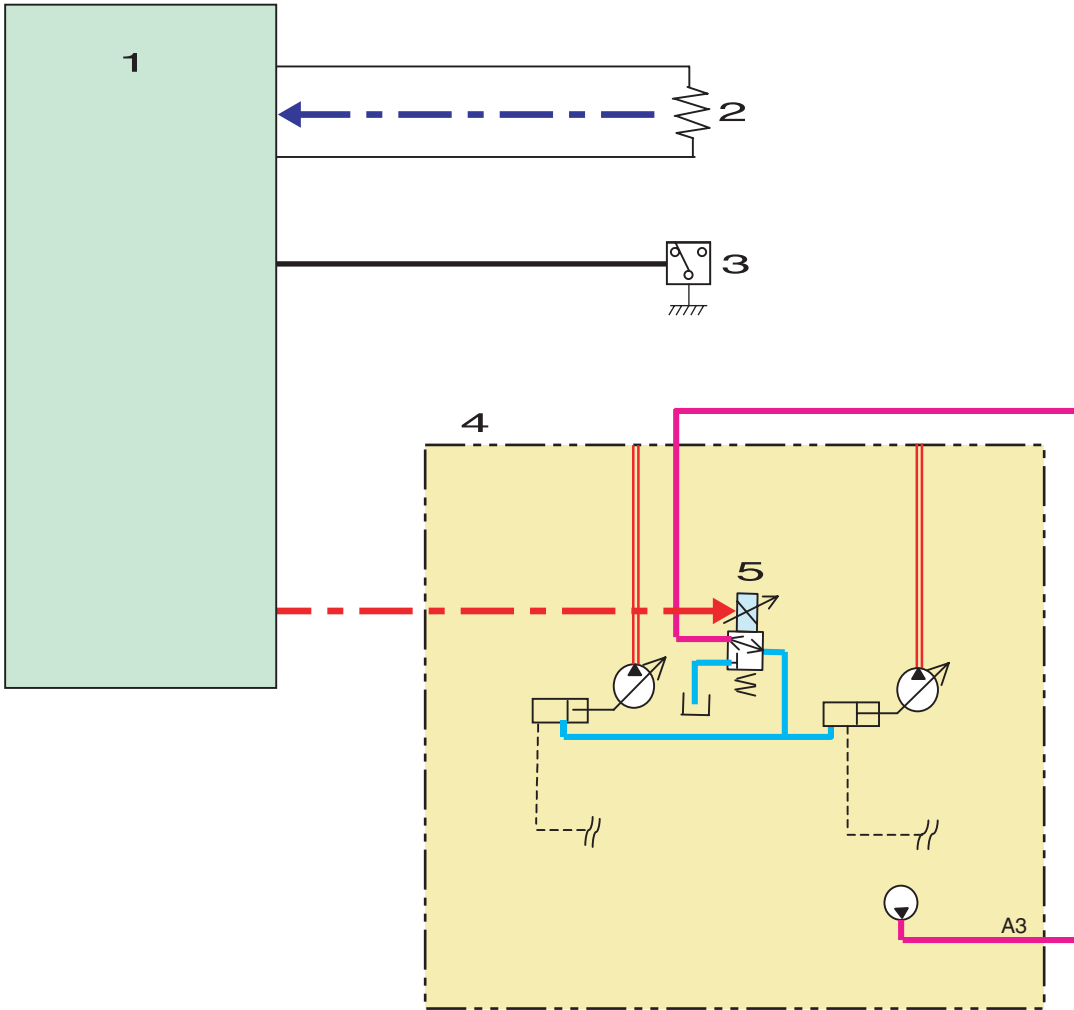
With Model 3, the throttle volume signal is connected directly to the ECU and only the work mode signal instruction is sent from the main unit computer. With Model 5, the throttle volume signal and E mode signal first goes to computer A, then the target engine speed instruction is sent from computer A to the ECM.



R032001-001

1	Throttle volume
2	Computer A
3	CAN communication
4	Engine
5	E mode select switch
6	Monitor

Control milli-amp		* = When the target engine speed is E mode or less, milli-amp for pump horsepower control proportional valve is 50 mA.		
Work mode		N	E	
Engine speed (min <sup>-1</sup> ) {rpm}		1700	1600	1599 - 1300
Milli-amp for pump horsepower control proportional valve (mA)	I Max	570	460	50
	I Min	50	50	50
Boosted pressure		One touch	Normal	Normal

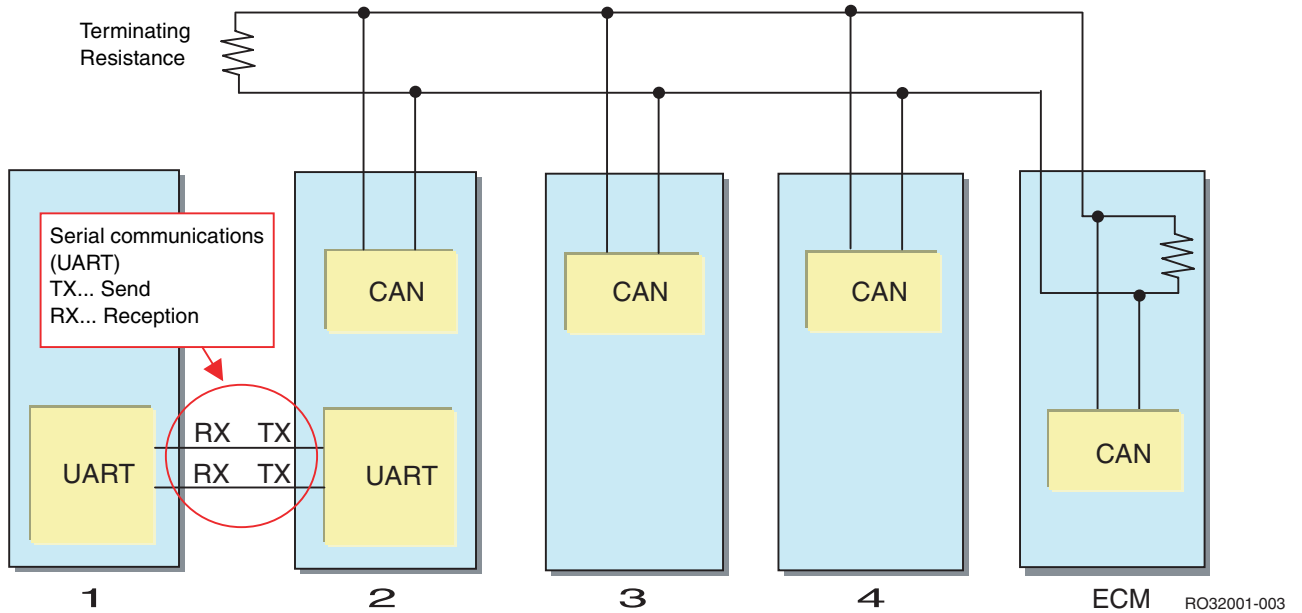


RO32001-002

1	Computer A
2	Throttle volume
3	E mode select switch
4	Hydraulic pump
5	Pump horsepower control proportional valve

## Computer Connection Method

- [1] Computers and the ECM are connected with CAN communication.
- [2] The monitor and computers are connected with serial communication (UART).



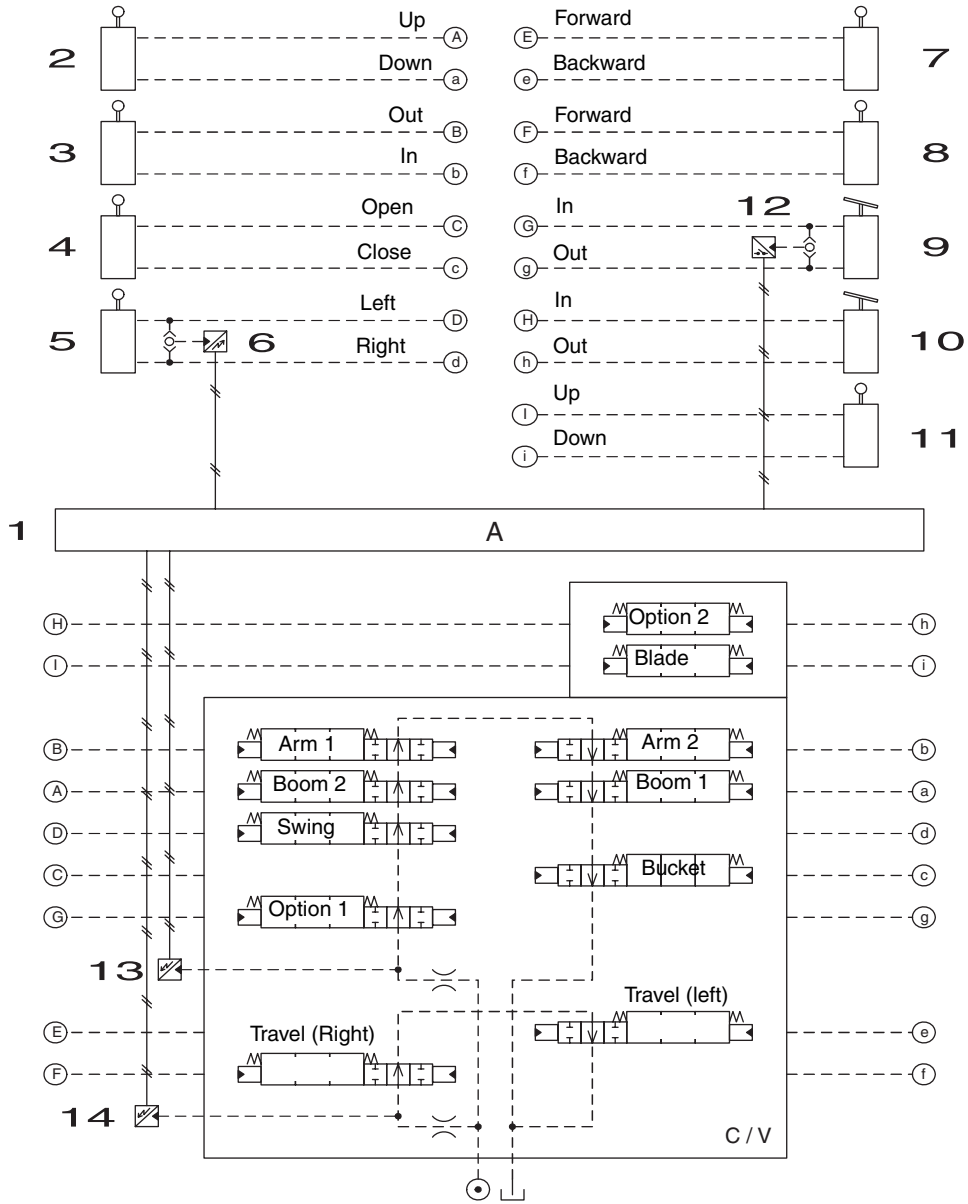
- 1) Computer A ..... Main unit side computer (standard)
- 2) Computer B ..... Up to the wiring for connecting the liftcrane computer (option) is attached as standard.
- 3) Computer S ..... Up to the wiring for connecting the remote support computer (option) is attached as standard.
- 4) ECM..... Engine computer

## Pilot Pressure Switch Changed to Pressure Sensor

No.	Model 3	Model 3B	Change details
1	Upper pressure switch	Upper pressure sensor	Switch to sensor
2	Travel pressure switch	Travel pressure sensor	Switch to sensor
3	Swing pressure switch	Swing pressure sensor	Switch to sensor
4	Option pressure switch	Option pressure switch	No change

[1] Configuration

Pilot pressure sensor and switch sensing point

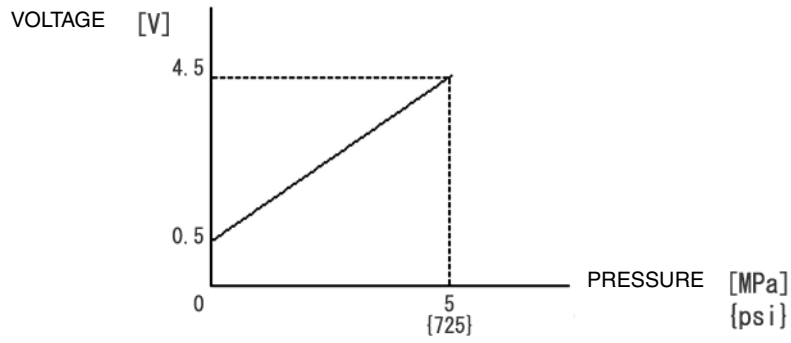


RO32001-004

1	Computer A	6	Swing pressure sensor	11	Blade lever
2	Boom lever	7	Travel (left) lever	12	1st option pressure switch
3	Arm lever	8	Travel (right) lever	13	Upper pressure sensor
4	Bucket lever	9	1st option pedal	14	Travel pressure sensor
5	Swing lever	10	2nd option pedal		

**[2] Pilot pressure sensor characteristics**

Relationship between pilot pressure and voltage (rated 5 MPa {725 psi})



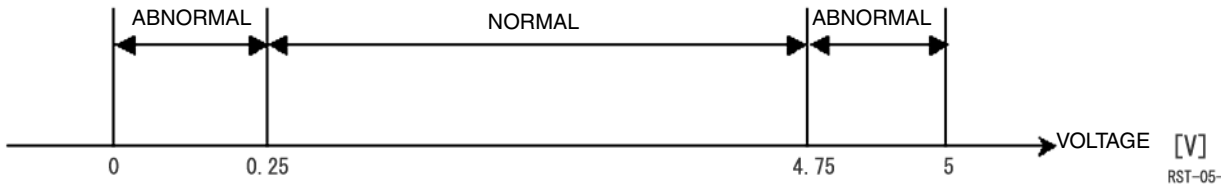
R032001-007

**[3] Sensor ON/OFF criterion**

	Upper sensor	Swing sensor	Travel sensor	Option pressure switch
ON	1.2 MPa {174 psi}	0.5 MPa {73 psi}	2.0 MPa {290 psi}	1.2 MPa {174 psi}
OFF	0.8 MPa {116 psi}	0.3 MPa {44 psi}	1.5 MPa {217 psi}	0.8 MPa {116 psi}

**[4] Sensor trouble criterion**

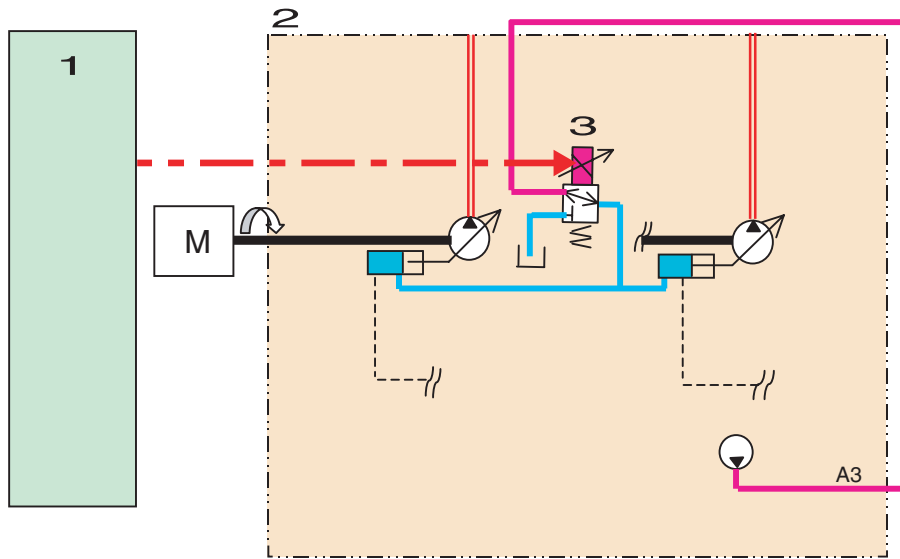
When  $0.25\text{ V} < \text{Voltage} < 4.75\text{ V}$ , normal; otherwise abnormal



RST-05-00-0011

## Pump Electromagnetization Proportional Valve

Horsepower control electromagnetic proportional valves are mounted on the main pump.



RO32001-005

1	Computer A
2	Hydraulic pump
3	Horsepower control proportional valve

### Horsepower Control Proportional Valve

Controls overall flow for the P1 and P2 pumps

<Applications>

Pump horsepower boost control

<Control>

Control milli-amp: 50 mA min. 570 mA max.

Milli-amp increase => Pump flow increase

Milli-amp decrease => Pump flow decrease



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## Explanation of Electrical Functions

No.	Item		Control	Contents
1	Engine speed control	1	One-touch idle	The engine speed drops into low idle if the one-touch idle switch is pressed.
		2	Throttle control	The throttle volume voltage signal is sent to the ECM by CAN communication once the signal has been input to computer A and converted to the target speed.
		3	Auto warm-up	When the coolant temperature is low, the engine speed is gradually raised from low idle until a constant temperature is achieved.
2	Engine start / stop control	1	Engine start	Operation from the key being switched ON to the starter motor stopping.
		2	Neutral start control	To prevent accidental operation of the machine due to the engine being started with the lever accidentally pressed down, cranking is not possible with the gate lever down (gate lever position in which operation is possible).
		3	Glow	During cranking, the insides of the engine cylinders are automatically heated to improve starting.
		4	Idling start	When the engine starts, the engine speed starts in low idle regardless of the throttle volume position.
		5	Engine stop	When the key is switched OFF, the engine stops.
		6	Power-cut delay	If the key is switched OFF, the power goes out after a delay of several seconds.
		7	Engine emergency stop	If the engine emergency stop switch is pressed, the engine stops.
		8	Engine start / stop judgment	Computer A judges engine start / stop based on the engine speed.
3	Pump control	1	Work mode selection	Switching between the engine speed, pump horsepower milli-amp and pressure boost state is done with the E mode select switch.
		2	Constant horsepower control	The pump intake torque is controlled so that the actual engine speed matches the target engine speed.
		3	Travel horsepower boost	During traveling, the pump intake torque is maximized and steady traveling is achieved.
		4	Engine stall prevention	If the target engine speed is at or below the torque-cut engine speed, the milli-amp is reduced.
		5	High altitude correction	The pump torque is lowered to allow for drops in output power at high altitudes.
4	Swing	1	Swing brake	Before swing operation has occurred, the swing brake can be operated mechanically as an aide to the hydraulic brake.
5	Travel	1	Travel speed switchover	Switching between the 1st and 2nd speed is done by pressing the travel 2nd speed switch (on the monitor panel).
		2	Travel alarm	During traveling, the alarm on the machine is sounded to alert workers around the machine of its presence.

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