

CX490C
CX500C
Tier III
Crawler Excavator

SERVICE MANUAL

Part number 48044249

English

September 2016

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CASE
CONSTRUCTION

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INTRODUCTION

Function	Straight travel circuit	
	Boom-up/arm 2 pumps internal flow	
	Boom and arm load holding circuit	
	Boom-down regenerative circuit	
	Bucket-close regenerative circuit	
	Arm-in forced regenerative circuit	
	Boom-up priority variable orifice (for arm operation)	
	2 pumps flow	
Weight	424 kg (934.760 lb)	

Solenoid valve (5 stack)

Manufacturer		Yuken Kogyo Co., Ltd.	
Valve specifications			
Maximum flow	P→B 25 l/min (6.604 US gpm) Other 5 l/min (1.321 US gpm)		
Rated pressure	4.5 MPa (652 psi)		
Port size	P.T.B port	G3/8	
	C1, C2, C3, C4 C5 ports	G1/4	
Solenoid specifications			
Operating voltage	DC 20 - 32 V		
Power consumption	17 W max.		
Weight	6.7 kg (14.7710 lb)		

Remote control valve for left/right operations

Manufacturer		Kawasaki Heavy Industries, Ltd.	
Operating pressure		3.92 MPa (569 psi)	
Secondary pressure		0.49 - 2.89 MPa (71.0745 - 419 psi) primary short type	
Operating angle	1,3 port	19 °	
	2,4 port	25 °	
Weight	1.9 kg (4.1888 lb)		

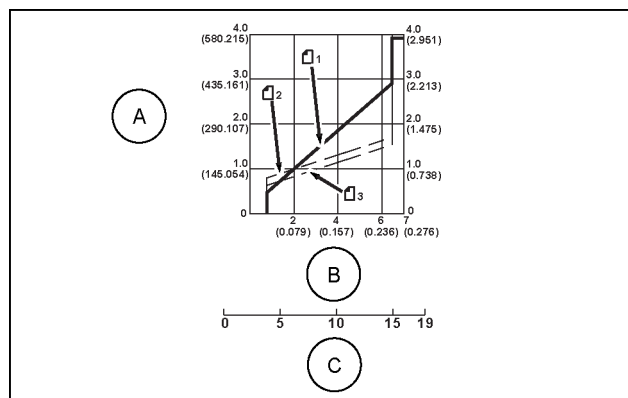
Remote control valve for travel operation

Manufacturer		Kawasaki Heavy Industries, Ltd.	
Operating pressure		3.92 MPa (569 psi)	
Secondary pressure		0.49 - 2.89 MPa (71.0745 - 419 psi) primary short type	
Operating angle		12.4 °	
Weight	4.1 kg (9.0390 lb)		

Remote control valve characteristic diagram

Operation remote control valve control diagram

- A. Secondary pressure [MPa (psi)]
 - B. Push rod stroke [mm (in)]
 - C. Operating angle [deg.]
- 1 Secondary pressure
 - 2 Independent operating torque (port 1)
 - 3 Independent operating torque (port 3)



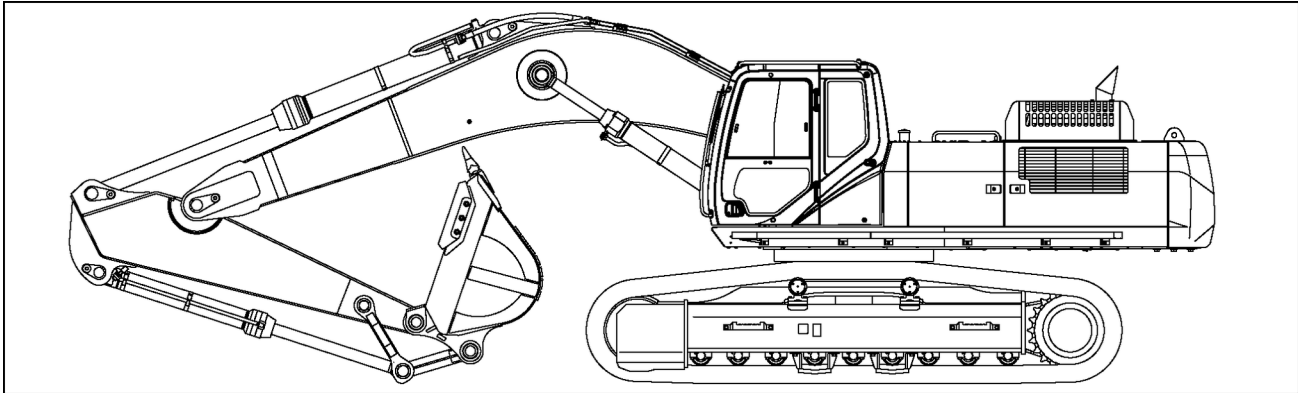
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Product identification

CX500C Crawler excavator LC ME version (TIER 3)

LA

The CX500C LC are totally hydraulic excavators. They consist of an undercarriage fitted with tracks and a turntable bearing which supports the upper structure frame. The upper structure frame supports the attachment, at the front end of the machine, plus the engine, hydraulics and cab. When the operator works the controls, the engine-driven pump delivers hydraulic fluid to the control valves. The control valves distribute the hydraulic fluid to the various cylinders and hydraulic motors employed. A cooling system maintains the hydraulic fluid at normal operating temperature.



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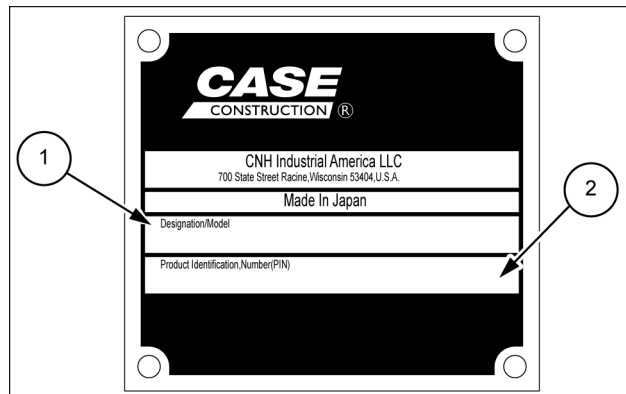
When ordering parts, obtaining information or assistance, always supply your CASE CONSTRUCTION Dealer with the type and serial number of your machine or accessories.

Write the following in the spaces below: the type, serial number and year of manufacture of your machine, accessories and the serial numbers of the various hydraulic and mechanical components.

Machine

(1) Type / Model and Category:
(Hydraulic Excavator) CX500C LC.

(2) Product identification number:



SMIL15CEXY711AB 2

Crankcase - Remove

Battery ground cable disconnect

1. Disengage the battery ground cable from the battery.

NOTICE: Do not disconnect the battery cable for **1 min** after turning OFF the ignition switch.

Coolant drain

⚠ WARNING

Burn hazard!

Hot coolant can spray and scald if you remove the radiator or deaeration tank cap while the system is hot. To remove the cap: allow the system to cool, turn the cap to the first notch, and wait for all pressure to release. Remove the cap only after all pressure has released. Failure to comply could result in death or serious injury.

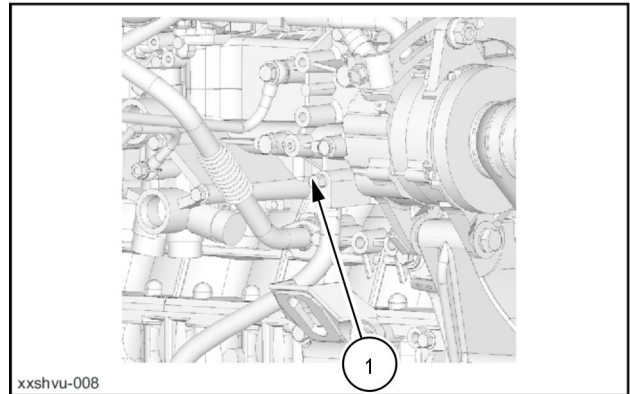
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1. Drain the coolant from the radiator.

NOTICE: After draining the coolant, tighten the drain plug.

2. Drain the coolant from the engine assembly.

NOTE: Loosen the drain plug (1) on the cylinder block side.



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Engine oil drain

1. Remove the drain plug from the oil pan.

NOTE: Drain engine oil into the drain pan.

2. Install the drain plug to the oil pan.

Tightening torque: **70 N·m (51.63 lb ft)**

NOTICE: Be careful not to forget to tighten the drain plug.

Oil level gauge guide tube removal

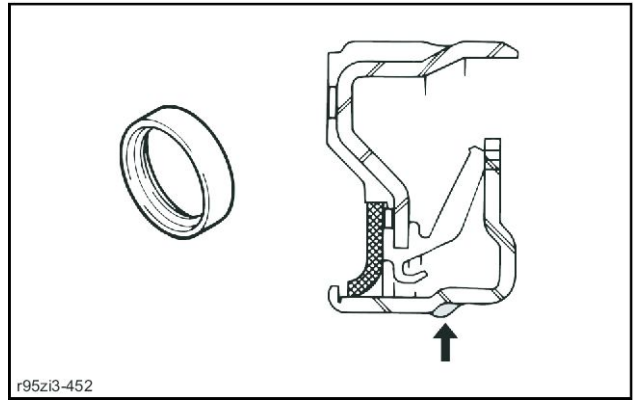
1. Remove the oil level gauge guide tube from the inlet duct.
2. Disconnect the oil level gauge guide tube from the oil pan.

NOTICE: Do not damage the O-ring.

Crankshaft oil seal identification color

Front-side slinger	Silver
Rear-side slinger	Gray

NOTICE: If flaws are found on the crankshaft, apply Three-Bond 1207C to the area shown in the diagram below.



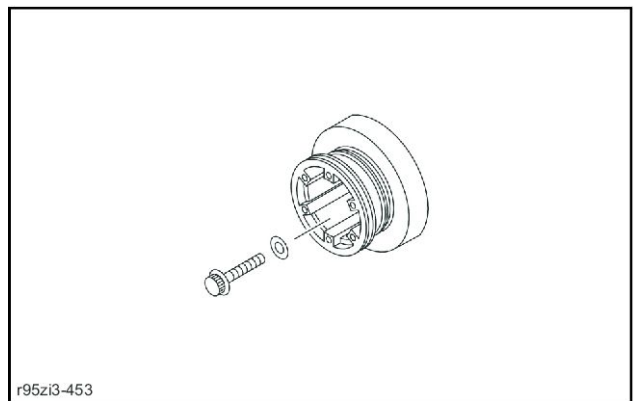
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Crankshaft pulley installation

1. Apply the engine oil to the bolt.
2. Apply engine oil to the washer.
3. Install the crankshaft pulley to the crankshaft.

NOTE: Tighten the bolts in diagonal order.

Tightening torque: **200 N·m (148 lb ft)**



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Piston installation

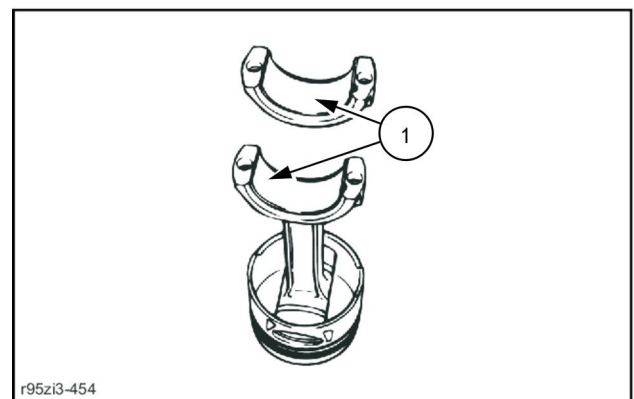
1. Dry the connecting rod bearing using an air splay gun.
2. Install the connecting rod bearing to the connecting rod.

NOTE: Confirm that yellow paint is on the connecting rod bearing lower side.

NOTICE: Install the connecting rod bearing with its installation surface dry.

3. Apply the engine oil to the connecting rod bearing.

NOTE: Apply to the sliding surface (1) of the connecting rod bearing.



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Generator drive belt adjustment

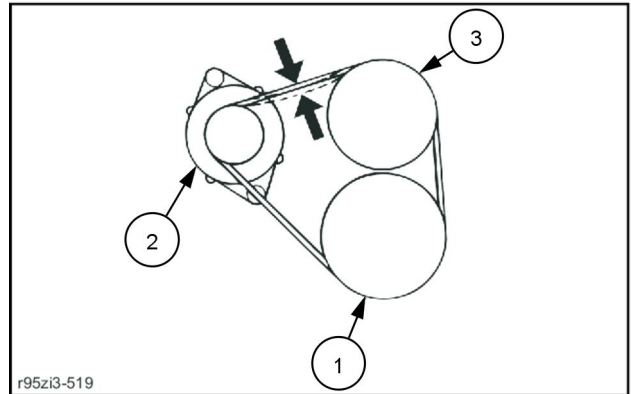
1. Turn the adjust bolt

Standard: **98.0 N·m (72.28 lb ft)**

Specified value: **12.0 - 14.0 mm (0.4724 - 0.5512 in)**

NOTE: Conduct adjustment so that the amount of belt flex that occurs when the belt is pressed at the location indicated by the arrow in the diagram with the specified pressure matches the standard value.

1. Crankshaft pulley
2. Generator
3. Water pump pulley



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NOTICE: Crank the engine for approximately 5 rotations and readjust the belt tension to the standard value.

2. Securely tighten the adjust plate onto the cylinder block.

Tightening torque: **50 N·m (37 lb ft)**

3. Tighten the penetration bolt with a wrench.

Tightening torque: **157 N·m (116 lb ft)**

4. Tighten the lock nut with a wrench.

Tightening torque: **93 N·m (69 lb ft)**

Oil level gauge guide tube installation

1. Apply the engine oil to the O-ring.
2. Connect the oil level gauge guide tube to the oil pan.
3. Install the oil level gauge guide tube to the inlet duct.

Tightening torque: **44 N·m (32.45 lb ft)**

Engine oil filling

1. Replenish the engine with the engine oil.

NOTE: Add engine oil up to the MAX position of the oil level gauge.

NOTICE: Check the tightening of the oil drain plug before adding the engine oil.

Battery ground cable connect

1. Connect the battery ground cable to the battery.

Coolant filling

⚠ WARNING

Burn hazard!

Hot coolant can spray and scald if you remove the radiator or deaeration tank cap while the system is hot. To remove the cap: allow the system to cool, turn the cap to the first notch, and wait for all pressure to release. Remove the cap only after all pressure has released.

Failure to comply could result in death or serious injury.

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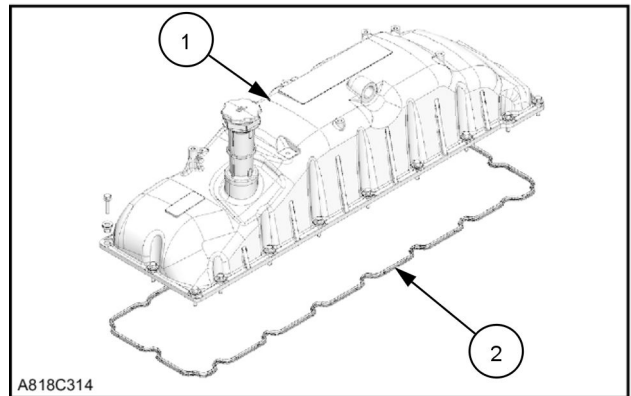
Cylinder head cover (1) installation

1. Install the gasket (2) to the cylinder head cover.

NOTICE: If the gasket has looseness or a slant, repair it before installation.

2. Install the cylinder head cover (1) to the camshaft carrier.

Tightening torque: **15 N·m (11.06 lb ft)**.



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Ventilation hose connect

1. Connect the ventilation hose to the air breather.

Battery ground cable connect

1. Connect the battery ground cable to the battery.

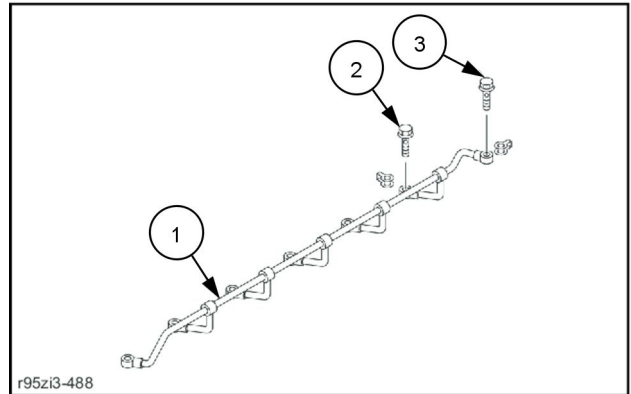
Injector leak-off pipe installation

1. Install the gasket to the injector leak-off pipe.

NOTICE: Use a new gasket.

2. Install the injector leak-off pipe (1) to the cylinder head assembly.

Injector leak-off pipe tightening torque	
Bolt size	Tightening torque
M8 eyebolt (2)	15 N·m (11 lb ft)
M12 eyebolt (3)	34 N·m (25 lb ft)



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Glow plug installation

1. Install the glow plug to the cylinder head assembly.

Tightening torque: **20 N·m (15 lb ft)**.

2. Install the glow plug connector to the glow plug.

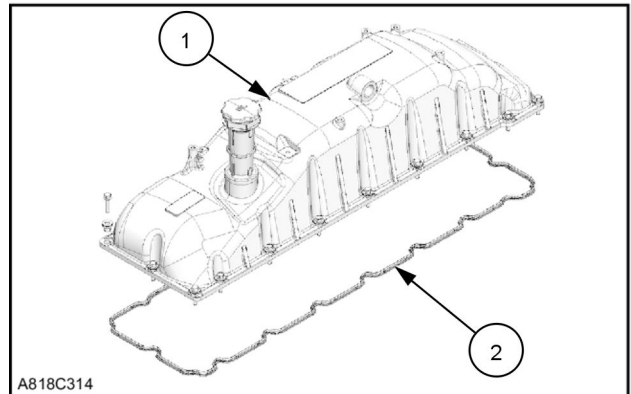
Cylinder head cover installation

1. Install the gasket (2) to the cylinder head cover.

NOTICE: If the gasket has looseness or a slant, repair it before installation.

2. Install the cylinder head cover (1) to the camshaft carrier.

Tightening torque: **15 N·m (11 lb ft)**.



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Turbocharger assembly installation

1. Install the gasket to the exhaust pipe adapter.
2. Install the exhaust pipe adapter to the turbocharger.

Tightening torque: **54 N·m (39.83 lb ft)**

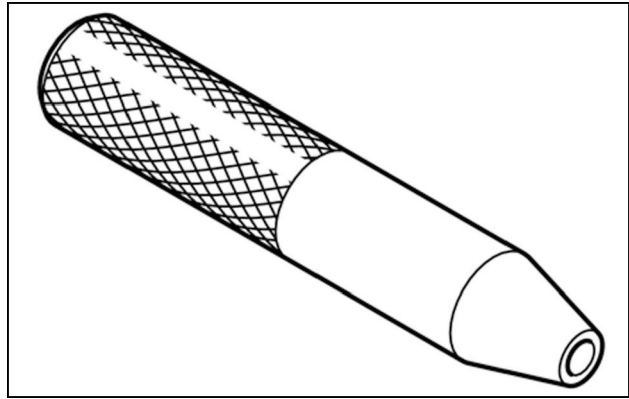
NOTE: Secure it with double nuts.

3. Replenish the turbocharger assembly with the engine oil.

NOTE: Apply about **1 cm³** of engine oil to the oil path to lubricate the turbine bearing portion.

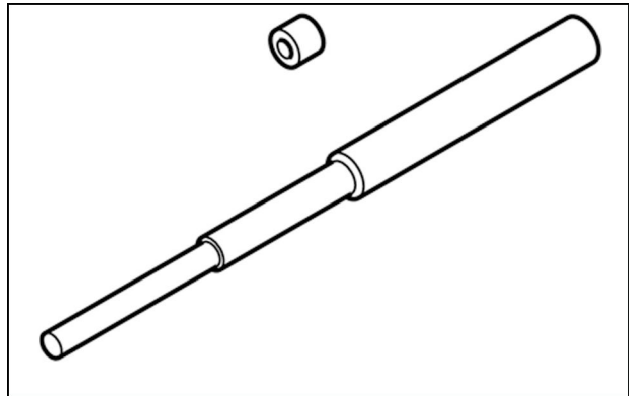
Cylinder head - Special tools

Isuzu reference	5-8840-2626-0
CASE CONSTRUCTION tool number	Common tool
Description	Bridge guide setting tool



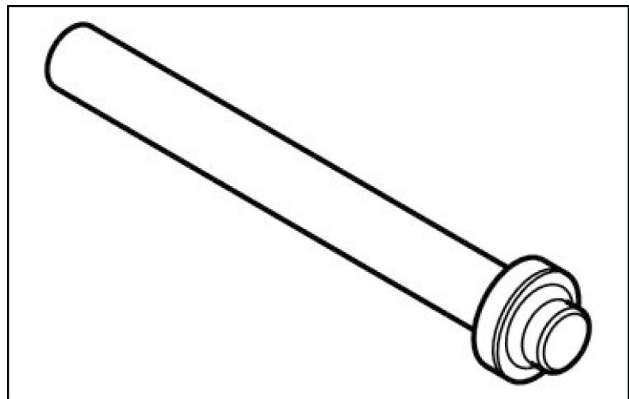
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Isuzu reference	5-8840-2628-0
CASE CONSTRUCTION tool number	380300014
Description	Valve guide replacer



SMIL14CEX2690AA 2

Isuzu reference	5-8840-2627-0
CASE CONSTRUCTION tool number	Common tool
Description	Oil seal installer

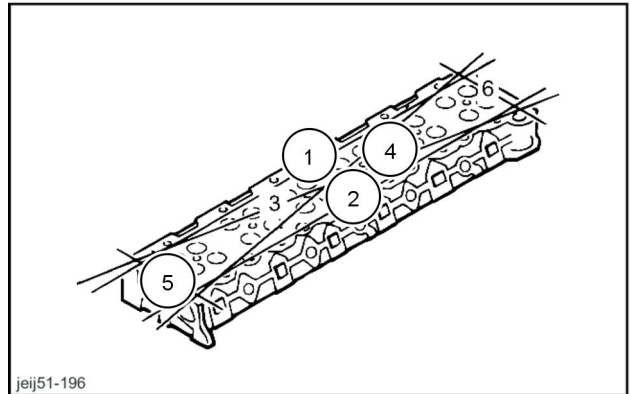


SMIL14CEX3037AA 3

Cylinder head assembly inspection

1. Measure the cylinder head assembly using a feeler gauge.

1. Measurement point
2. Measurement point
3. Measurement point
4. Measurement point
5. Measurement point
6. Measurement point



NOTE: Apply a simple straight ruler extending from section 1 to section 6 in the following diagram and measure the deformation of the cylinder head.

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Cylinder head distortion	
Limit for use	less than 0.2 mm (0.0079 in)

NOTICE: Replace the cylinder head if it exceeds the use limit.

Do not repair the cylinder head because the backlash of the timing gear will change.

NOTE: Inspect the cylinder head while referring to the following table, as necessary.

Cylinder head inspection		
Inspection method	Supplement	
Dye penetrant check	Crack and damage inspection	The magnetic flaw detection method can also be used.
Water pressure tester	Water jacket crack inspection	490 kPa (71 psi)

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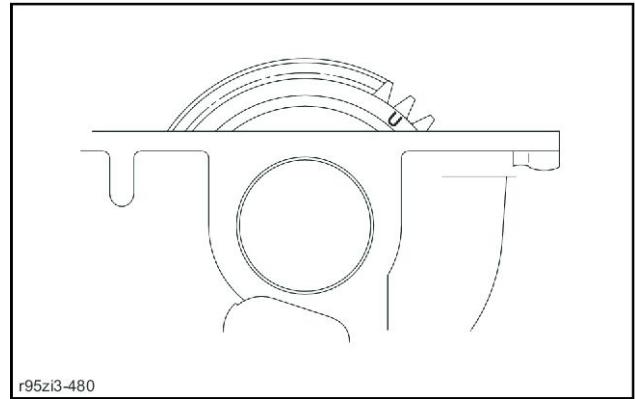
4. Align the alignment mark with the camshaft carrier.
5. Apply engine oil to the cam holder.

NOTE: Apply it on the cam holder journal surface.

NOTICE: In tightening, if attached oil is found, thoroughly remove oil from each seat surface and threaded portion of the bolt, camshaft carrier, and cam holder.

6. Align the cam holder with the camshaft carrier.

NOTICE: Confirm the identification code and front mark of the cam holder.



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7. Temporarily tighten the cam holder onto the camshaft carrier.

NOTE: Temporarily tighten the bolts in the numerical order indicated in the diagram.

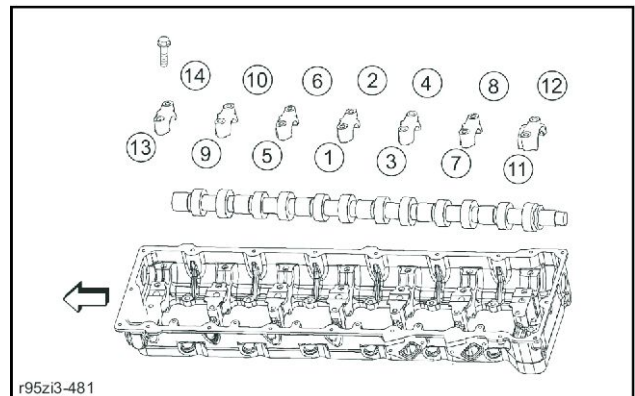
Tightening order.

8. Securely tighten the cam holder onto the camshaft carrier.

NOTE: Securely tighten them in the numerical order indicated in the diagram.

Tightening torque: **53 N·m (39 lb ft)** M8 bolt.

NOTICE: After tightening the cam holder, confirm the alignment mark of the camshaft gear again.



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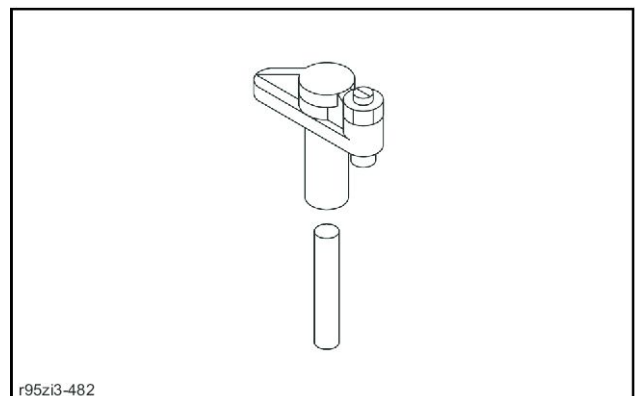
Bridge installation

1. Apply the engine oil to the bridge guide.
2. Loosen the adjust screw using the wrench.

NOTICE: Be sure the adjust screw does not loosen too much because it may fall off of the bridge.

3. Install the bridge to the bridge guide.

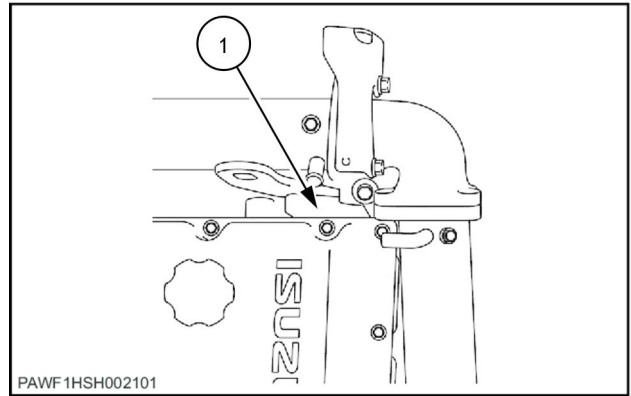
NOTICE: Install it in the same position as it was removed.



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11. Remove the EGR cooler bracket (1) from the cylinder head.

NOTE: Remove the inlet side bracket.

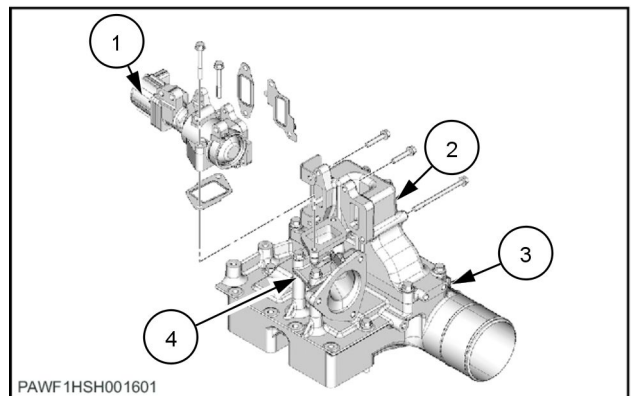


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EGR valve removal

1. Disconnect the connector from the EGR valve (1).
2. Remove the EGR valve (1) from both EGR cooler duct B and EGR cooler duct A (2).
3. Remove EGR cooler duct B (4) from the inlet duct (3).



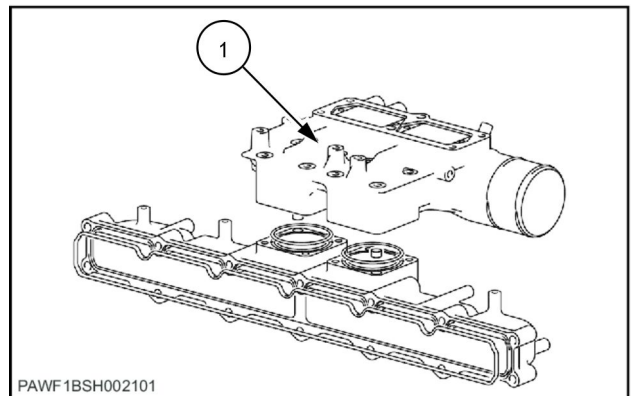
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Inlet duct removal

1. Remove the inlet duct (1) from the inlet cover.
2. Remove the O-ring from the inlet cover.

NOTICE: Seal the inlet cover opening to prevent intrusions of foreign material.



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Ventilation hose removal

1. Disconnect the ventilation hose from the cylinder head cover.
2. Remove the ventilation hose from the bracket.

Fuel suction pipe removal

1. Remove the fuel suction pipe from the fuel supply pump.

EGR valve installation

NOTICE: When assembling the EGR devices, temporarily tighten in the following order before performing securely tightening.

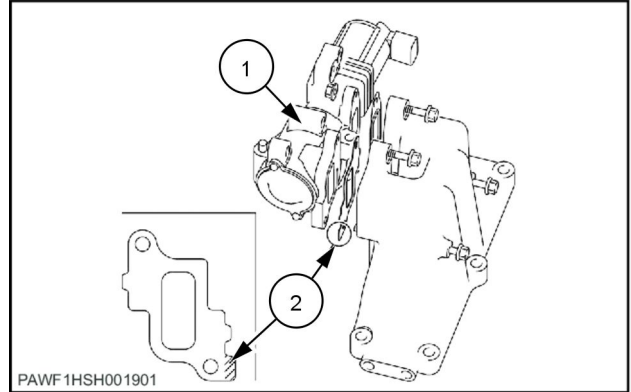
Use a new gasket.

Securely tighten after assembling the EGR cooler.

1. Temporarily tighten the EGR valve (1) to EGR cooler duct A.

Tightening torque: **5 N·m (3.69 lb ft)**

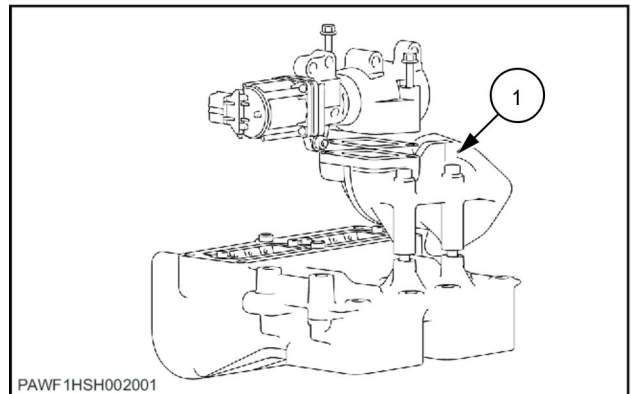
NOTE: Referring to the diagram, align with the gasket identification mark (2).



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2. Temporarily tighten EGR cooler duct B (1) to the EGR valve (1) and inlet duct.

Tightening torque: **5 N·m (3.69 lb ft)**



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EGR cooler installation

1. Install the EGR cooler bracket (1) to the cylinder head.

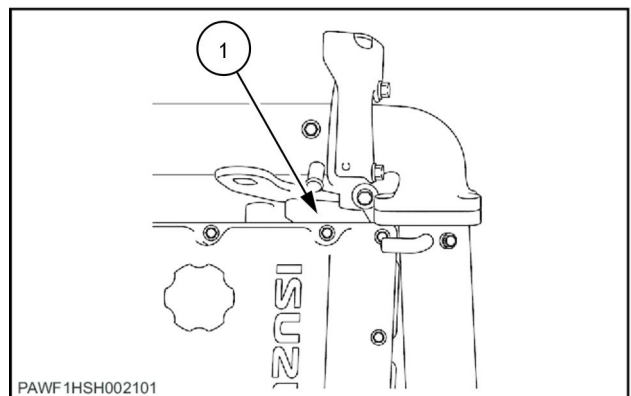
Tightening torque: **97 N·m (71.54 lb ft)**

NOTE: Install the inlet side bracket.

2. Install the EGR cooler bracket (1) to the cylinder head.

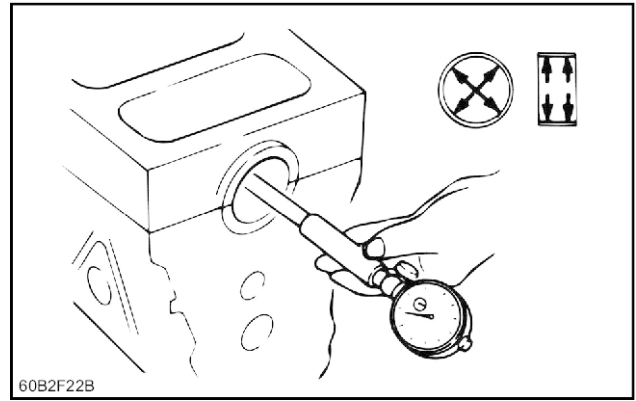
Tightening torque: **97 N·m (71.54 lb ft)**

NOTE: Install the exhaust side bracket.



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9. Measure the cylinder block using a cylinder gauge.



60B2F22B

60B2F22B 6

10. Calculate the clearance from the measured value.

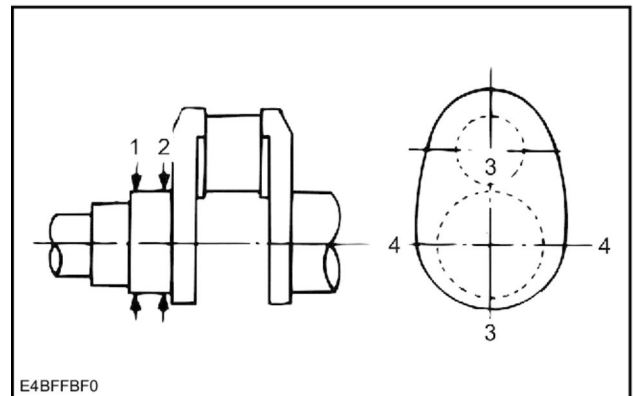
NOTE: Calculate the clearance from the inner diameter of the crankshaft bearing and the outer diameter of the crankshaft journal.

Clearance between the bearing and the journal:

Standard value: **0.045 - 0.080 mm (0.0018 - 0.0031 in)**

Limit: **0.09 mm (0.0035 in)**

1. Measurement point
2. Measurement point
3. Measurement point
4. Measurement point



E4BFFBF0

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Common rail assembly installation

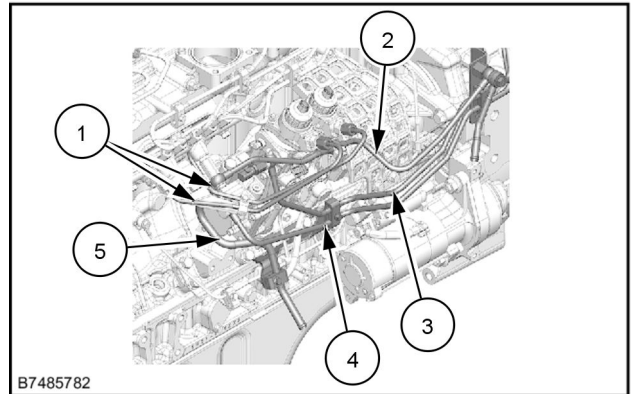
1. Install the common rail bracket to the cylinder block.
Tightening torque: **44 N·m (32 lb ft)**.
2. Install the common rail assembly to the bracket.
Tightening torque: **44 N·m (32 lb ft)**.

Fuel filter installation

1. Install the fuel filter to the cylinder head assembly.
- NOTE:** *It varies depending on the machine.*

Fuel feed pipe installation

1. Temporarily tighten the fuel field pipe (4) to the fuel supply pump and the fuel filter.
2. Securely tighten the fuel feed pipe (4) onto the fuel supply pump.
Tightening torque: **17 N·m (13 lb ft)**.
3. Securely tighten the fuel feed pipe (4) onto the fuel filter.
Tightening torque: **50 N·m (37 lb ft)**.
 1. Fuel pipe
 2. Fuel leak-off pipe
 3. Fuel pipe
 5. Fuel suction pipe



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Fuel pipe installation

1. Temporarily tighten the fuel pipe to the fuel supply pump and the fuel filter.
- NOTICE:** *Use new fuel pipes.*
2. Securely tighten the fuel pipe onto the fuel supply pump.
Tightening torque: **17 N·m (13 lb ft)** Fuel temperature sensor adapter
 3. Securely tighten the fuel pipe onto the fuel filter.
Tightening torque: **50 N·m (37 lb ft)** Fuel temperature sensor adapter
 4. Install the clip to the fuel feed pipe.
Tightening torque: **9 N·m (80 lb in)**.

Fuel pipe installation

1. Temporarily tighten the fuel pipe onto the common rail assembly and the fuel supply pump.
2. Securely tighten the fuel pipe onto the common rail assembly and the fuel supply pump.
Tightening torque: **44 N·m (32 lb ft)** Sleeve nut.
Tightening torque: **9 N·m (80 lb in)** Clip.

Fuel filters - Install

Fuel filter installation

1. Install the fuel filter to the cylinder head assembly.

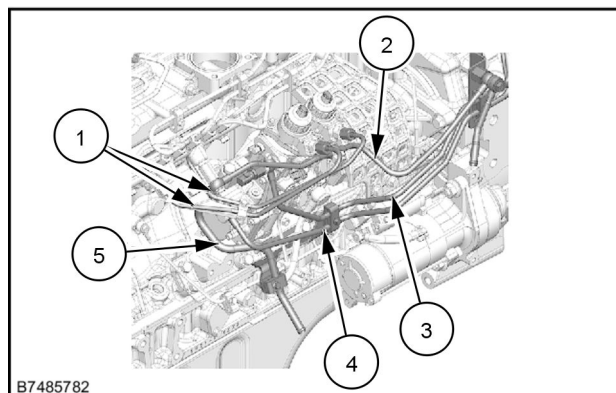
NOTE: It varies depending on the machine.

Fuel feed pipe installation

2. Securely tighten the fuel feed pipe (4) onto the fuel filter.

Tightening torque: **50 N·m (37 lb ft)** .

1. Fuel pipe
2. Fuel leak-off pipe
3. Fuel pipe
5. Fuel suction pipe



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Fuel leak-off pipe installation

1. Completely tighten the fuel leak-off pipe to the fuel filter bracket.

Tightening torque: **41 N·m (30.24 lb ft)**

Battery ground cable connect

1. Connect the battery ground cable to the battery.

Fuel air bleed

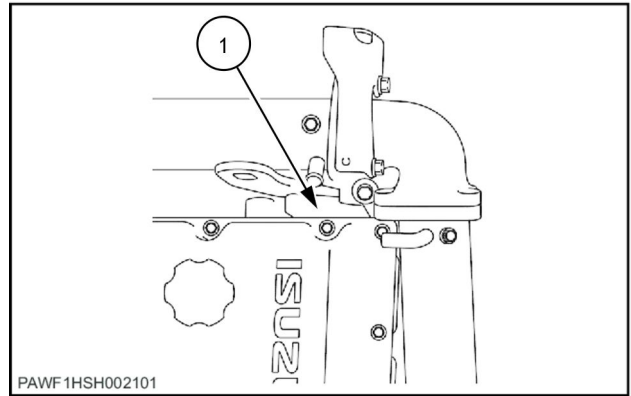
NOTICE: Always perform air bleeding to prevent engine failure after removing or installing fuel system parts.

NOTE: The following applies to types equipped with a priming pump.

1. Prepare a pan.

11. Remove the EGR cooler bracket (1) from the cylinder head.

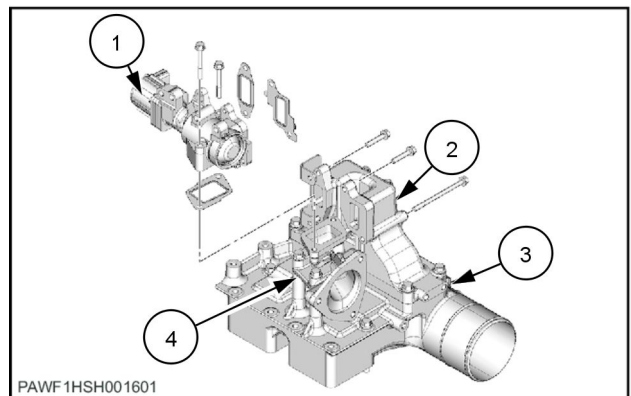
NOTE: Remove the inlet side bracket.



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EGR valve removal

1. Disconnect the connector from the EGR valve (1).
2. Remove the EGR valve from both EGR cooler duct B and EGR cooler duct A (2).
3. Remove EGR cooler duct B (4) from the inlet duct (3).

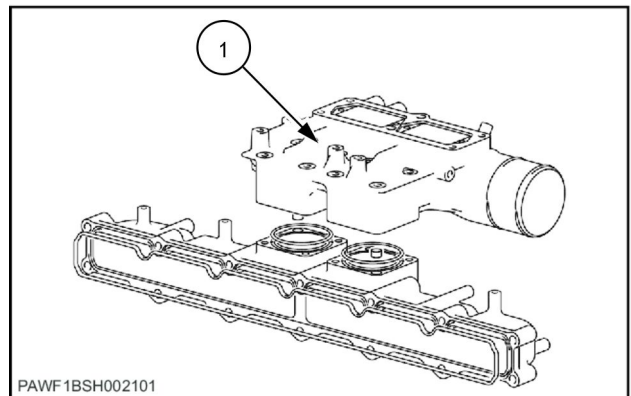


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Inlet duct removal

1. Remove the inlet duct (1) from the inlet cover.
2. Remove the O-ring from the inlet cover.

NOTICE: Seal the inlet cover opening to prevent intrusions of foreign material.



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Fuel pipe removal

1. Disconnect the fuel pipe from the common rail assembly.
2. Remove the fuel pipe from the fuel supply pump.

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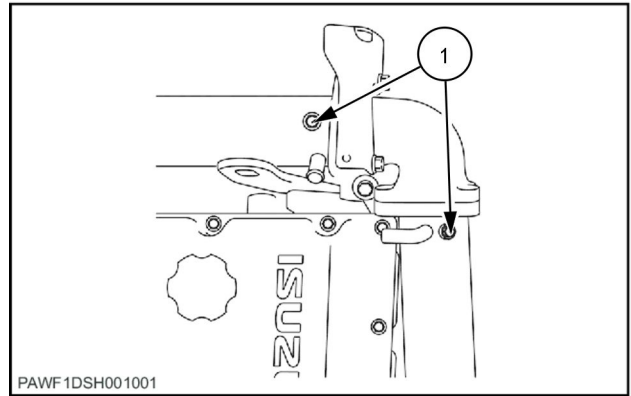
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Common rail - Remove - Pressure limiter	32
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High pressure pump - Install	14
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5. Replenish the radiator with the coolant.

1. Plug



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Battery ground cable connect

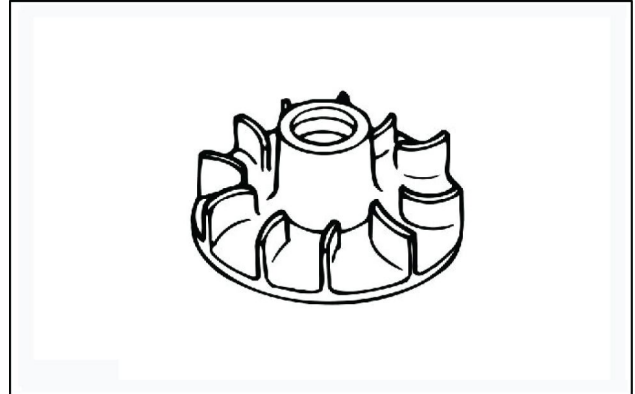
1. Connect the battery ground cable to the battery.

Water pump - Inspect

Impeller inspection

1. Inspect the impeller.

NOTE: Inspect the impeller for corrosion, and the oil seal unit contact surface for wear or damage.



SMIL13CEX7061AA 1

Water pump pulley inspection

1. Inspect the bearing.

NOTE: Check to see from the ball clearance to the lace for scratching or flaking (full circumference).

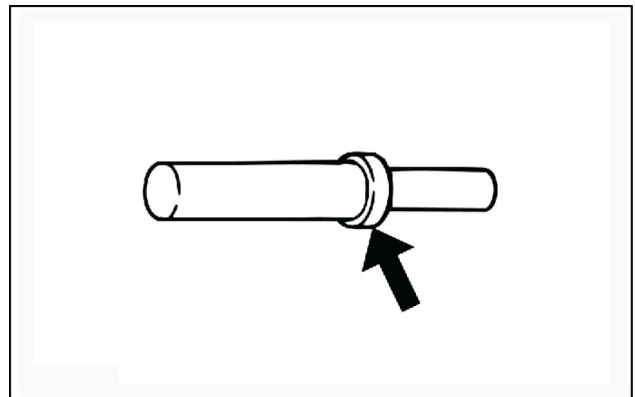
Inspect the ball and race for any abnormal looseness.

Check if you can feel anything unusual in your hand when rotating the bearing.

Shaft inspection

1. Inspect the shaft.

NOTE: Inspect the contact surface of the oil seal of the shaft for worn and damage.



SMIL13CEX7062AA 2

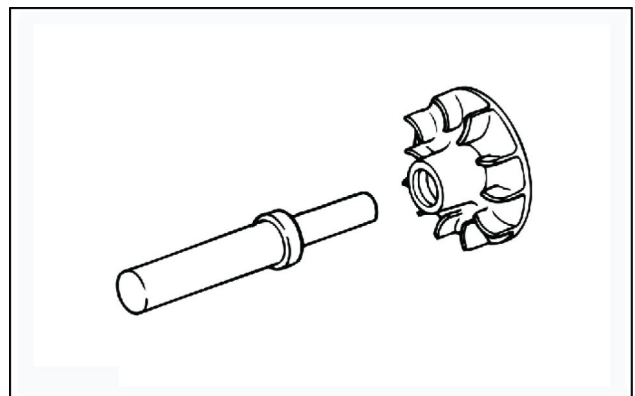
2. Measure the shaft using the micrometer.

Specified value: **0.023 - 0.051 mm (0.000906 - 0.002008 in)**

NOTE: Measure the interference of the impeller and shaft.

Specified value: **0.048 - 0.082 mm (0.001890 - 0.003228 in)**

NOTE: Measure the interference of the impeller and water pump pulley.



SMIL13CEX7063AA 3

Contents

Engine - 10

Aftercooler - 310

SERVICE

Aftercooler

Prepare	3
Remove	4
Inspect	5
Cleaning	6
Install	7

Engine oil cooler - Disassemble

Oil cooler assembly disassembly

1. Remove the water guide from the oil cooler assembly.
2. Remove the oil cooler element from the oil cooler assembly.

NOTE: Loosen the nut on the oil cooler front side to remove it.

NOTICE: Seal the oil gallery to prevent foreign matter from entering the gallery.

NOTE: Pour cleaning solution into the element and soak the inside for approx. **10 h**.

NOTICE: Keep sparks, flames and smoking materials away from cleaning solutions. Wear safety glasses and a mask, and provide sufficient ventilation.

NOTE: Clean the oil cooler element using the cleaning fluid below.

Manufacturer	Product name
Nippon Oil Corporation	Hi-arpmu 2S
Maruzen	Suwazoru 310
Showa	Hi-zoru
Mobil Oil	Mobile Zol A

NOTE: Drain approx. 1/3 of the cleaning solution. Apply compressed air from the oil port to discharge the cleaning fluid.

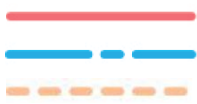
Air pressure: **200 kPa (29.01 psi)**

NOTE: When the oil cooler element is significantly dirty, repeat the work above for a few times.

3. Remove the oil thermo valve from the oil cooler assembly.

NOTICE: The oil thermo valve cannot be disassembled.

4. Remove the oil relief valve from the oil cooler assembly.



Pressure line

Tank line

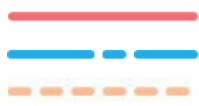
Pilot pressure line



Pilot tank line

Electric line

- | | |
|------------------------------------|---------------------------------|
| 1. Travel motor | 11. Hydraulic pump |
| 2. Travel high-speed select switch | 12. Travel remote control valve |
| 3. Computer A | 13. Oil cooler |
| 4. Control valve | 14. Backward left |
| 5. Travel (left) | 15. Forward left |
| 6. Travel (right) | 16. Backward right |
| 7. Travel high speed | 17. Forward right |
| 8. Lever lock | 18. Computer B |
| 9. 5 stack solenoid valve | 19. Swash plate |
| 10. Console lever lock switch | |



Pressure line

Tank line

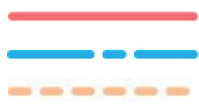
Pilot pressure line



Pilot tank line

Electric line

- | | |
|--------------------------------------|---------------------------------|
| 1. Swing motor | 10. 5 stack solenoid valve |
| 2. Cushion valve | 11. Console lever lock switch |
| 3. Right swing | 12. Computer A |
| 4. Left swing | 13. Control valve |
| 5. Swing pilot pressure sensor | 14. Upper pilot pressure sensor |
| 6. Remote control valve (arm, swing) | 15. Hydraulic pump |
| 7. Swing | 16. Oil cooler |
| 8. Lever lock | 17. Swing parking brake |
| 9. Swing brake | 18. Shuttle valve |



Pressure line

Tank line

Pilot pressure line

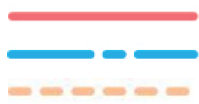


Pilot tank line

Electric line

1. Arm cylinder
2. Arm (in)
3. Arm (out)
4. Cushion valve
5. Remote control valve (arm, swing)
6. Lever lock
7. Boost pressure relief
8. 5 stack solenoid valve
9. Control valve
10. Arm load holding valve check valve
11. Arm **(1)**

12. Arm **(2)**
13. Travel pilot pressure sensor
14. Upper pilot pressure sensor
15. Console lever lock switch
16. Monitor display
17. Computer A
18. P1 pressure sensor
19. P2 pressure sensor
20. Hydraulic pump
21. Oil cooler



Pressure line

Tank line

Pilot pressure line



Pilot tank line

Electric line

1. Cushion valve
2. Boom (up)
3. Boom (down)
4. Boom **(2)**
5. Remote control valve (boom, bucket)
6. Lever lock
7. Pressure boost relief
8. 5 stack solenoid valve
9. Control valve
10. Boom pressure sensor
11. Boom **(1)**
12. Boom cylinder
13. Travel pilot pressure sensor
14. Upper pilot pressure sensor
15. Console lever lock switch
16. Monitor display
17. Computer A
18. Hydraulic pump
19. Oil cooler
20. Horsepower control proportional valve
21. HBCV check valve

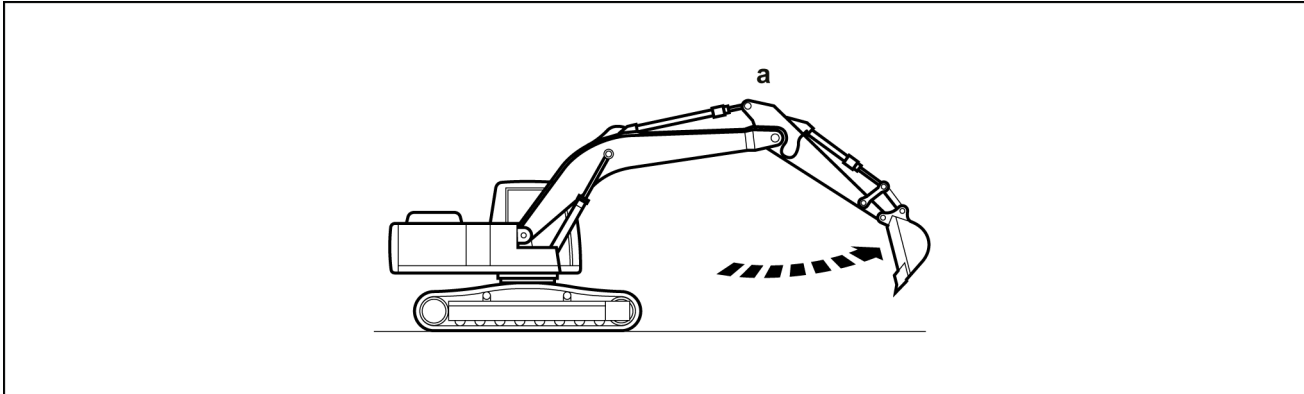
	Pressure line		Pilot tank line
	Tank line		Electric line
	Pilot pressure line		

1. Control valve
2. Relief valve
3. Breaker
4. Option remote control valve
5. Option pilot pressure switch
6. ATT select switch
7. Computer A
8. Monitor display
9. Hydraulic pump
10. Console lever lock switch
11. Lever lock
12. 5 stack solenoid valve
13. P1 flow control proportional valve

A. Attachment pressure measurement

Example: Arm-out pressure measurement

Measure with the following operations.



SMIL15CEX3568EA 20

a. Arm-out relief

When the attachment operates, since the pressure boost operates automatically, the pressure resulting from the pressure boost setting can be checked for about **8 s**.

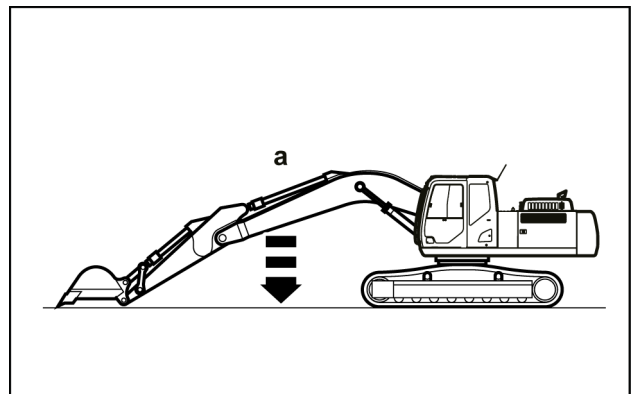
After **8 s**. or more, the standard set pressure can be checked.

Measure relieving each cylinder with the arm out/in, the bucket open/close, and the boom up.

Boom-down pressure measurement

For pressure measurement with the boom down, put the arm cylinder at its out stroke end, open the bucket, put the bucket tip on the ground, carry out the boom-down operation, and measure.

a. Boom-down relief



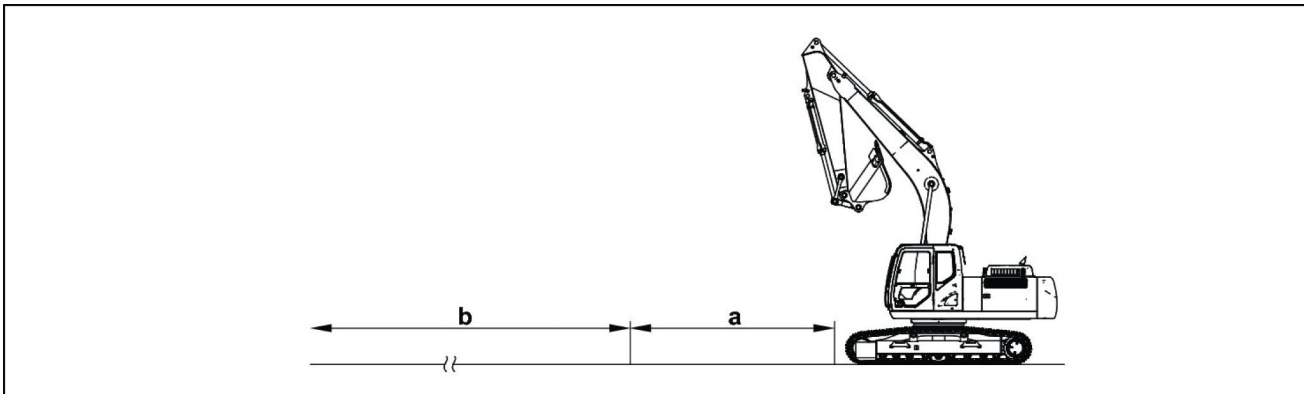
SMIL15CEX3572AA 21

Travel speed

Measurement method

1. Engine high idle and oil temperature is **45 - 55 °C (113 - 131 °F)** with no load.
2. Measure the required time to travel **6 m (19.69 ft)** after a **4 - 5 m (13.12 - 16.40 ft)** running start. If the off travel distance is **1 m (3.28 ft)** or more, however, use the off travel distance as a reference value to correct the off travel, then measure the travel speed again.
3. Travelling should be done on concrete.
4. Conduct both high-speed and low-speed travelling.

Main unit posture



LPIL12CX00050EA 8

- a. **4 - 5 m (13.12 - 16.40 ft)** running start b. **6 m (19.69 ft)** travel

Off travel amount

Measurement method

1. Engine high idle and oil temperature is **45 - 55 °C (113 - 131 °F)** with no load.
2. Measure the required time to travel **20 m (65.62 ft)** after a **4 - 5 m (13.12 - 16.40 ft)** running start.
3. Shoe tension amount should be standard.
4. Measure for both forward and backward traveling.
5. Measure for both high-speed and low-speed traveling.

N- Distance of a running start

a-
N.

3. Measurement distance
4. Off travel amount; a

Operation a

- Low speed forward travel
- Low speed backward travel
- High speed forward travel
- High speed backward travel

Code	Part name	Code	Part name
307	Poppet (Quantity 1)	433	Flange socket (Quantity 2)
308	Seat (Quantity 1)	434	Flange socket (Quantity 2)
309	Ring (Quantity 1)	435	Flange socket (Quantity 4)
310	Spring (Quantity 1)	466	VP plug (Quantity 1)
311	Adjusting screw (Quantity 1)	700	Angle ring (Quantity 1)
312	Lock nut (Quantity 1)	710	O-ring (Quantity 1)
351	Gear case (Quantity 1)	725	O-ring (Quantity 1)
353	Drive gear (Quantity 1)	732	O-ring (Quantity 1)
354	Driven gear (Quantity 1)	850	Locking ring (Quantity 1)
355	Filter (Quantity 1)	887	Pin (Quantity 2)
361	Front case (Quantity 1)		

Structure

The casing comprises the front case (**361**) and gear case (**351**). Inside the casing the drive gear (**353**), driven gear (**354**) pair and the relief valve for setting the discharge pressure are installed.

The relief valve comprises the filter (**355**), poppet (**307**), seat (**308**), spring (**310**), ring (**309**), adjusting screw (**311**), and lock nut (**312**).

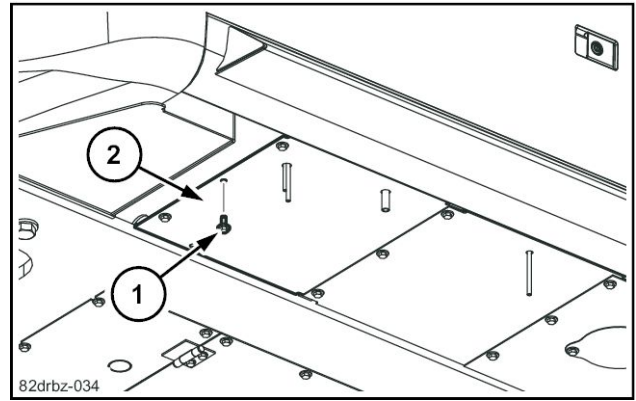
In order to prevent oil leaking to the outside, an angle ring (**700**) and O-ring (**710**) are mounted on the front case (**361**).

Operation

Oil suctioned in from suction port B3 is discharged from discharge port A3 by the drive and driven gears.

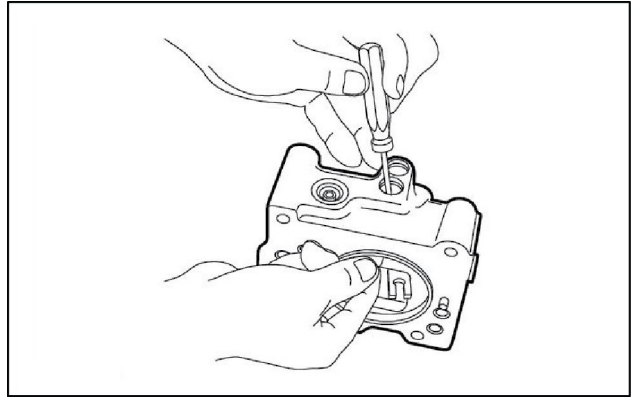
The discharge oil is held at the set pressure of **3.90 MPa (565.70 psi)** by the relief valve. Unnecessary discharge oil is drained from the drain port via the relief valve.

7. Use a wrench [**19 mm**] to install the under cover (**2**) with six bolts (**1**).
 - Bolt (**1**) tightening torque: **63.7 - 73.5 N·m (46.983 - 54.2 lb ft)**



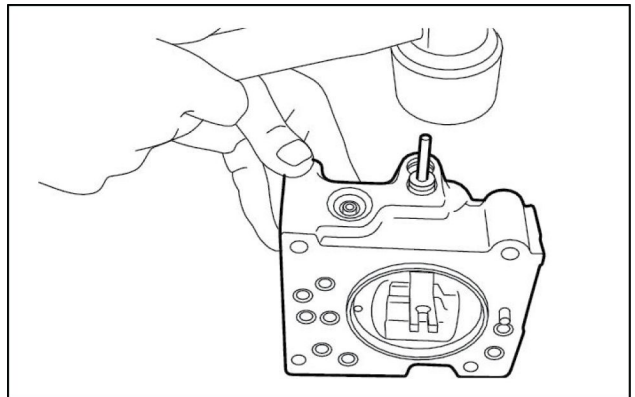
82DRBZ-034 7

5. Install the pilot piston (**643**) into the flow control hole on the casing.
 - Check that the pilot piston slides smoothly without catching.
6. Insert the pin press fit in lever 2 (**613**) into the groove on the pilot piston, and assemble lever 2.



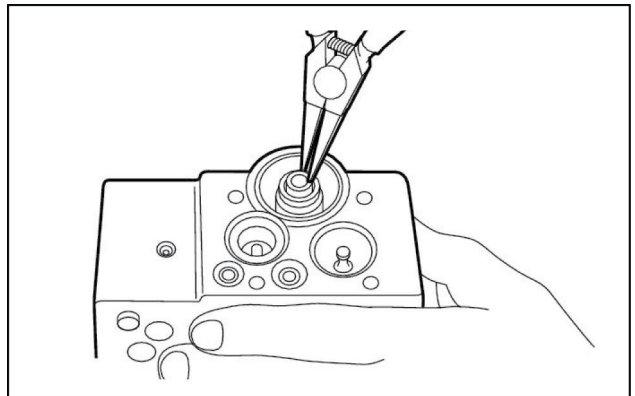
LPIL12CX03485AA 3

7. Assemble the fulcrum plug (**614**) and install the locking ring (**858**) so that the pins press fit in the fulcrum plug are inserted into the pin holes on lever 2.
8. Insert the adjusting plug (**615**), and install the locking ring.
 - Be careful to insert the fulcrum plug and adjusting plug into the correct openings.
 - At this time, check that the backlash from the movement of the feedback lever is not too great and that the feedback lever does not catch on anything.



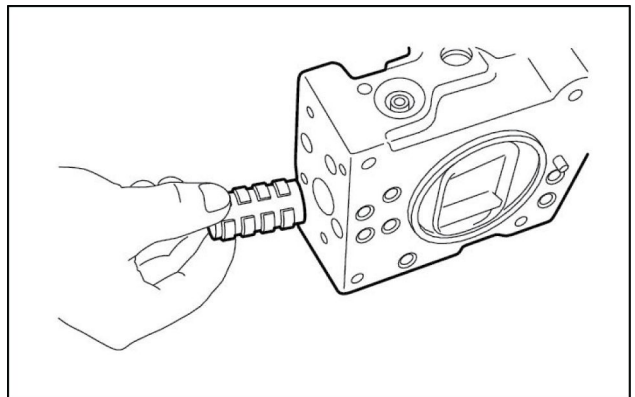
SMIL13CEX0970AA 4

9. Install the return spring (**654**) and spring seating (**653**) into the spool hole, and install the stop ring (**814**).

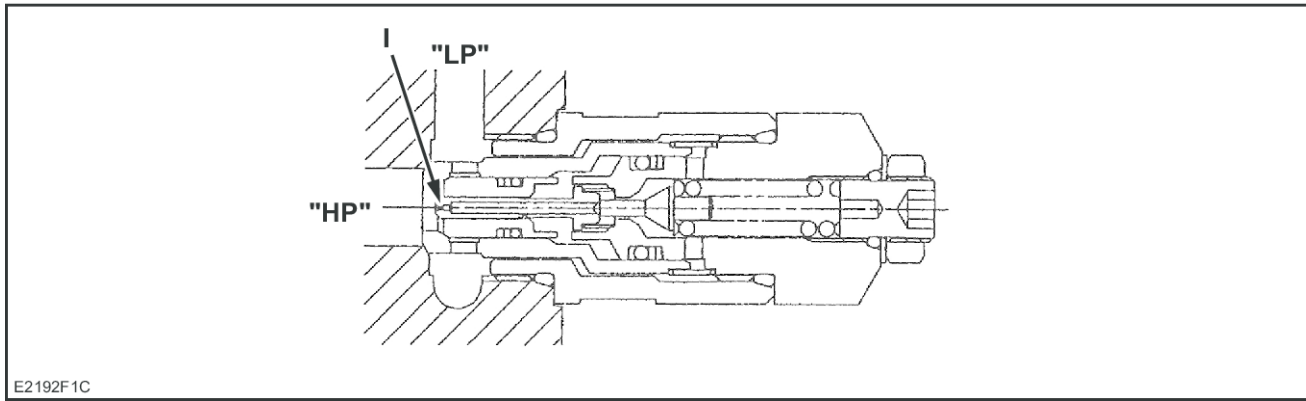


SMIL13CEX0971AA 5

10. Assemble the set spring (**655**) into the spool hole, assemble the compensation piston (**621**) and piston case (**622**) into the compensation hole, install the pilot cover (**641**), and tighten the hexagon socket head bolts (**436**) and (**438**).



SMIL13CEX0972AA 6

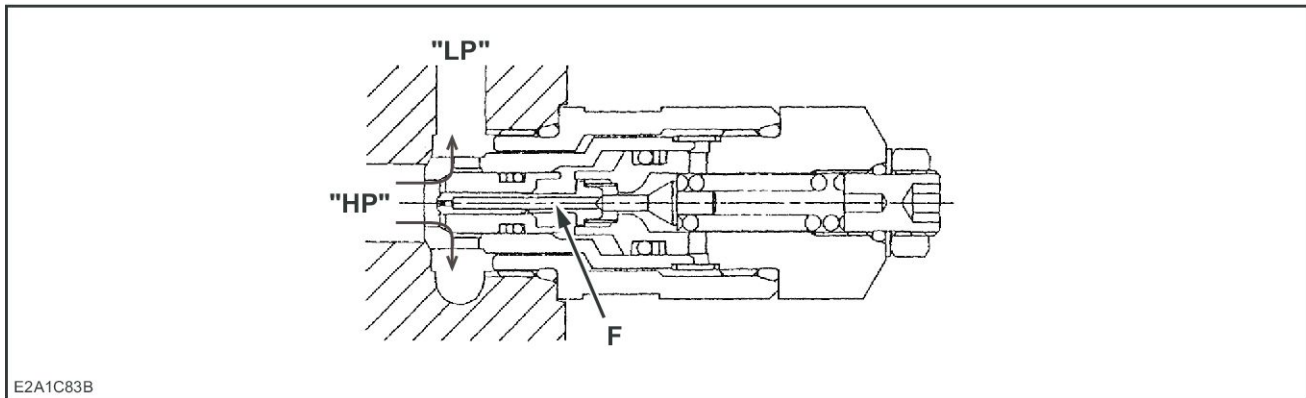


E2192F1C

E2192F1C 24

The flow of oil from the path " HP " to the rear side of the poppet (D) is only through the rings haped gap between the poppet (D) and the piston (C) and through the orifice (F), so the pressure difference increases.

Because of this, the poppet (D) opens and the oil flows directly into the path " LP ".



E2A1C83B

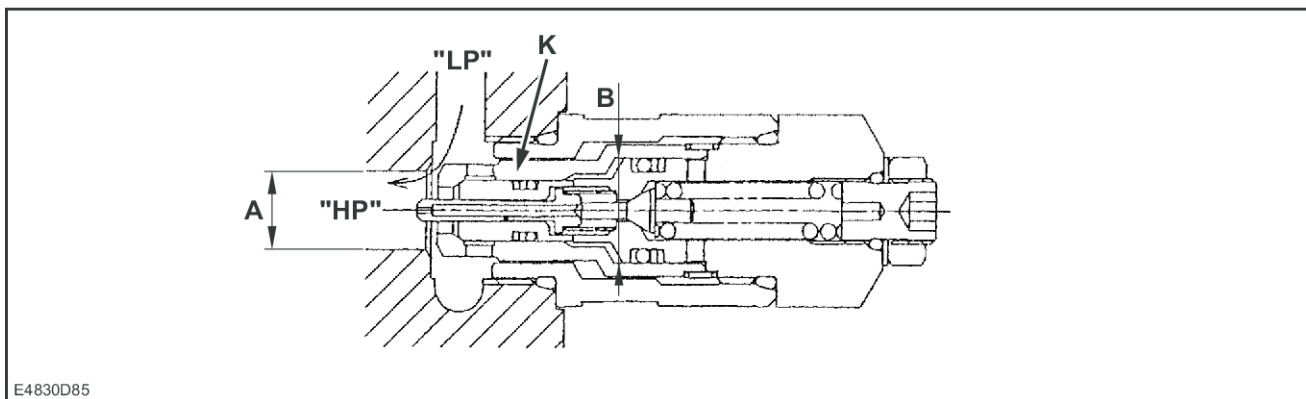
E2A1C83B 25

Overload relief valve intake operation

This relief valve has a built-in anti-void unit that supplies oil if cavitation occurs at the cylinder port " HP ".

When the cylinder port " HP " pressure is lower than the low-pressure side " LP ", the sleeve (K) is opened by the surface area difference between (A) and (B).

Oil enters the cylinder port " HP " from the low-pressure side " LP " to prevent cavitation.



E4830D85

E4830D85 26

Low-pressure relief valve operation

When no oil is passing through

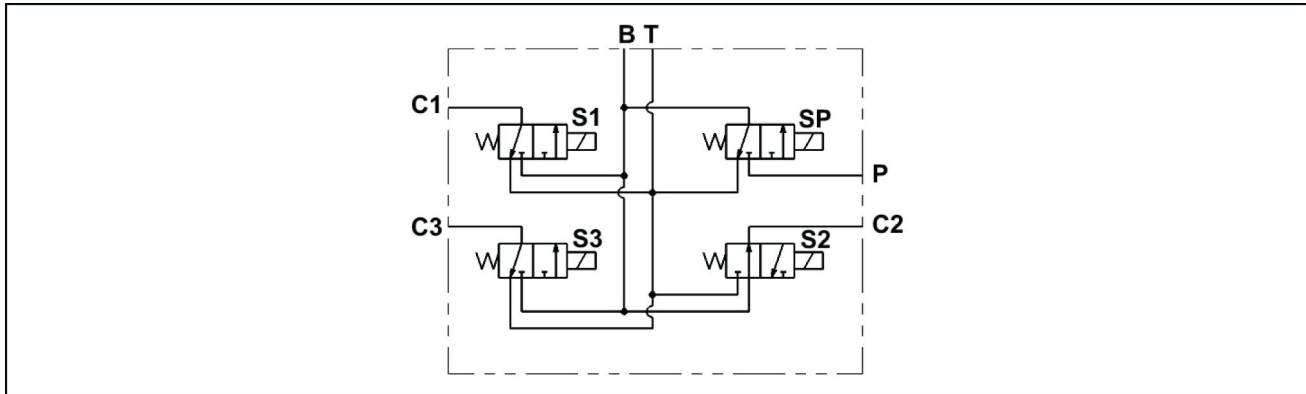
Stacked control valves - Cleaning

Completely clean all the disassembled parts with clean mineral oil.

Dry with compressed air and place each part on clean paper or vinyl for inspection.

Pilot solenoid valve block - Dynamic description

Operation explanation



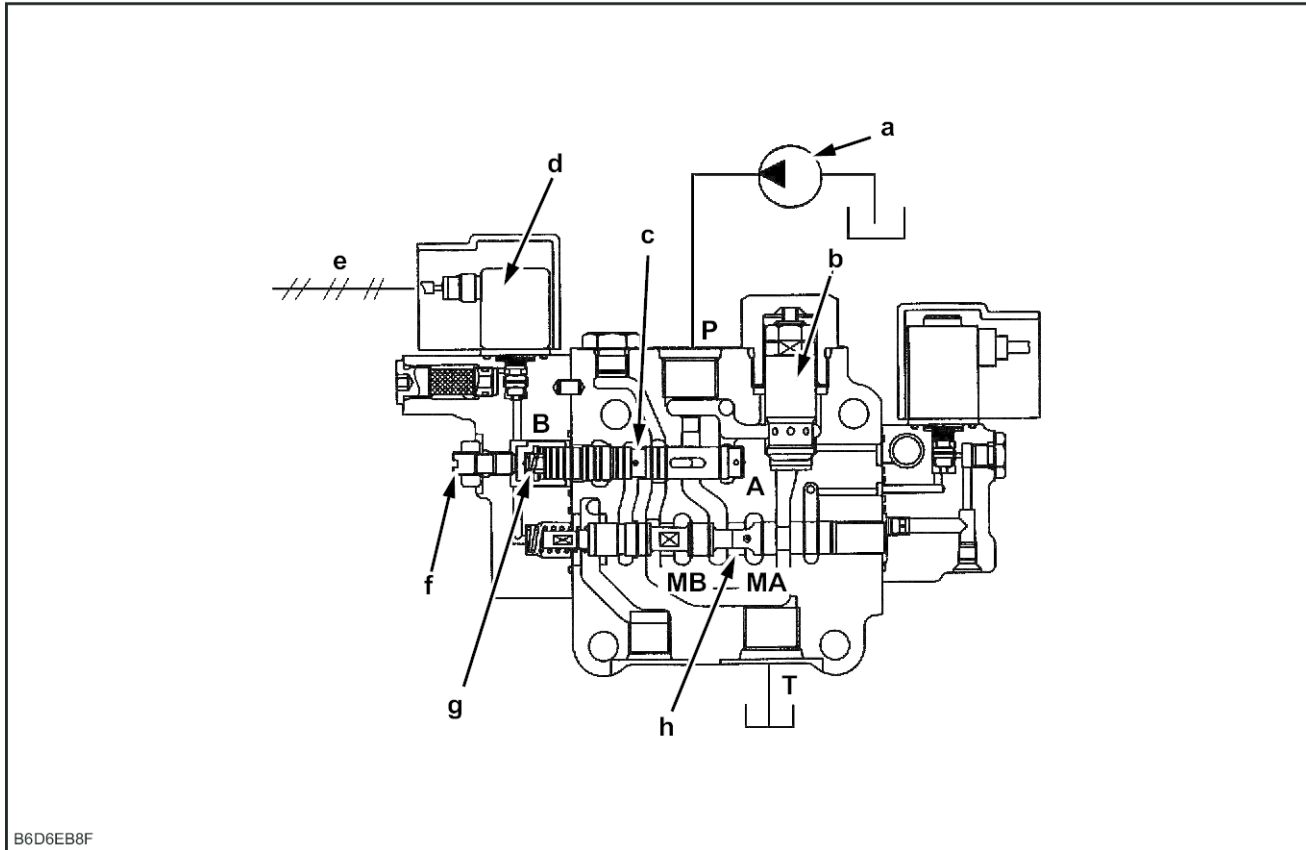
SMIL13CEX3185EA 1

Hydraulic circuit diagram

The pressure oil fed from the P port feeds pressure oil to the C1 - C5 ports according to the excitation or non-excitation of electromagnetic switchover valves S1 - S4 resulting from exciting electromagnetic switchover valve SP.

- | | |
|--|--|
| Electromagnetic switchover valves S1, S3 | → Oil passing through when valve excited |
| Electromagnetic switchover valve S2 | → Oil passing through when valve not excited |
| Electromagnetic switchover valve S4 | → Oil passing to C5 when valve excited
Oil passing to C4 when valve not excited |

This motor is equipped with an electromagnetic proportional variable flow control valve (c). With this type of flow control valve, as shown in Diagram 2, it is possible to continuously vary the constant motor speed over the range of A' → C' by varying the command milli-amp of the motor rotation between A' and C'.



B6D6EB8F 7

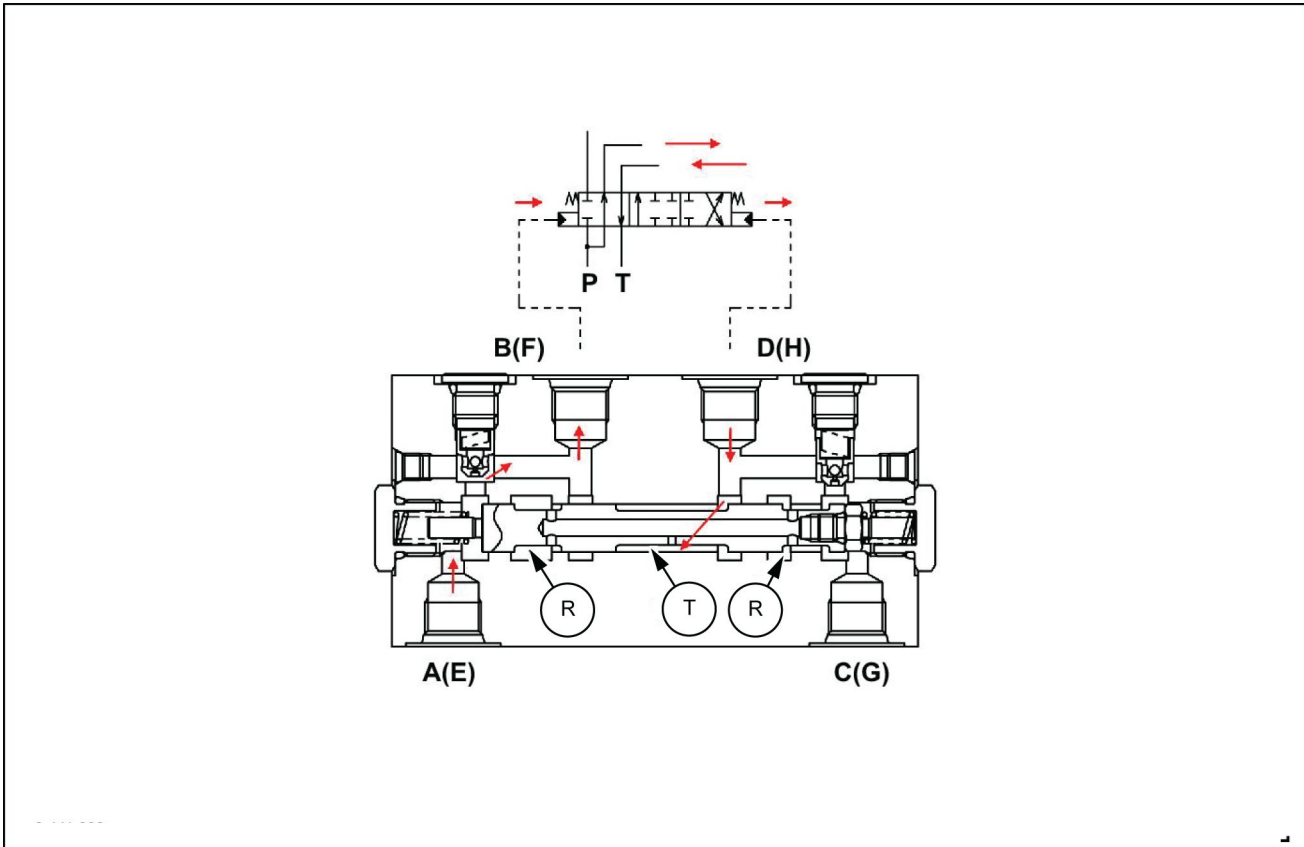
- | | | | | | |
|---|----------------------|---|--|---|------------------|
| a | Gear pump | d | Electromagnetic proportional control valve | f | Adjuster screw |
| b | Safety suction valve | e | Command milli-amp | h | Metering section |

Normal operation

The pressure oil fed from the pilot operation valve to the A port (or C, E, or G port) pushes up the check plunger and is sent to the B port (or D, F, or H port).

The pressure oil that has passed through the B port operates on the control valve spool and operates the actuator.

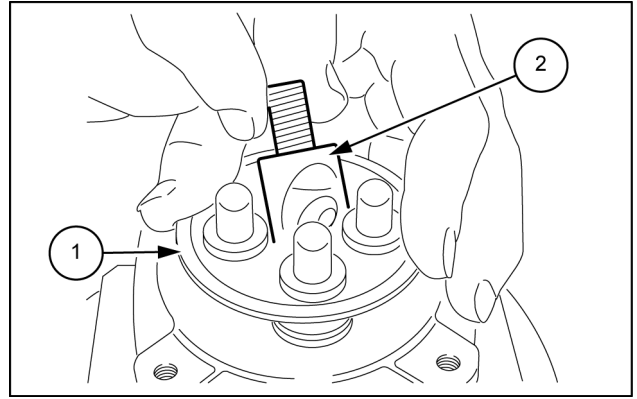
The oil pushed out from the control valve spool passes through the D port (or B, F, or H port) and flows out to the T port.



LPIL12CX02303FB 2

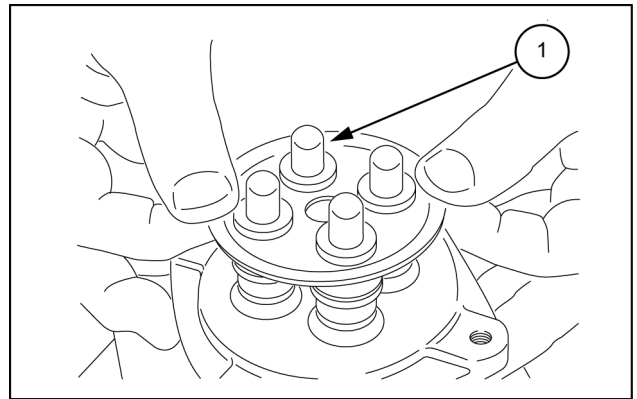
8. If the return spring is strong, use the plate (1) to install all 4 plug assemblies at the same time and temporarily tighten them with the joint (2).

- Be careful of the plug assemblies and plate flying off.



SMIL14CEX1439AB 9

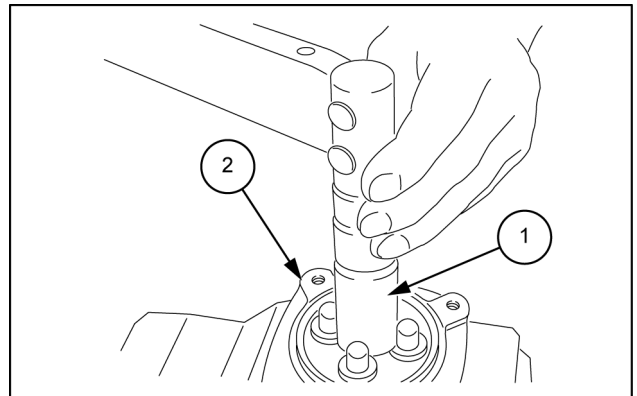
9. Install the plate (1).



SMIL14CEX1440AB 10

10. Use a jig, and tighten the joint (1) to the casing (2) to the specified torque.

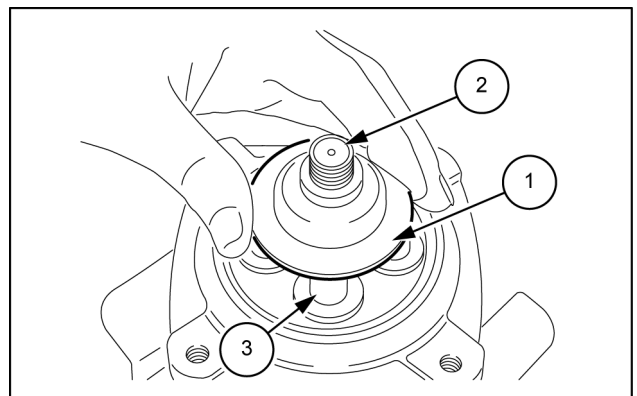
Tightening torque: **44.2 - 50.0 N·m (32.600 - 36.878 lb ft)**



SMIL14CEX1441AB 11

11. Install the disk (1) onto the joint (2).

- Screw the disk in until it is equally touching each of the 4 push rods (3). Secondary pressure will cause faulty operation of the machine if the disk is screwed in too much, so pay attention to adjustment of the tightening position.



SMIL14CEX1442AB 12

Hydraulic systems - Hydraulic foot control

Code	Part name	Quantity	Code	Part name	Quantity
218	Spring seating	4	471	Locking screw	4
220	Hexagon socket head bolt	2	472	Lock nut	4
224	Piston 2D085	4	501	Bellows	2
225	Steel ball	12			

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Hydraulic swing system - 352

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DIAGNOSTIC

Swing reduction gear - Prepare

CAUTION

Avoid injury! Always do the following before lubricating, maintaining, or servicing the machine. Wait for all movement to stop before you service or adjust the machine or equipment. Failure to comply could result in minor or moderate injury.

C0154A

CAUTION

Burn hazard! Wait for all components to cool before performing any operation. Failure to comply could result in minor or moderate injury.

C0053A

NOTICE: Check performance after reassembly. Do not resume use unless performance is fully recovered. Using this product at a sub-par performance level may result in product damage.

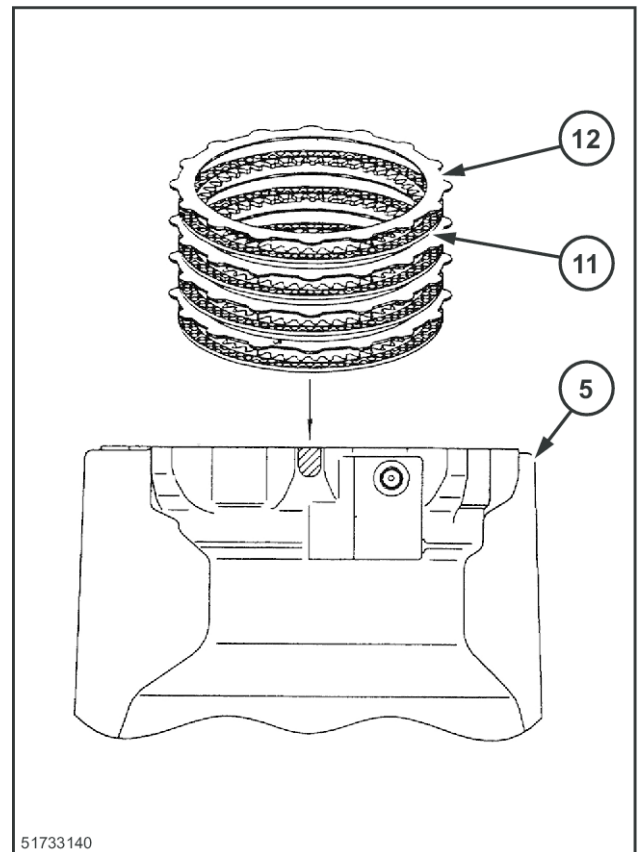
CAUTION:

1. Read and understand the contents of this maintenance manual before performing disassembly, reassembly, inspection, repair, or other such work of this product.
2. Handle this product according to the separate "Usage Precautions".
3. When removing this product from the equipment it is mounted on, stop that equipment system and wait for the surface temperature of this product to fall to about **40 °C (104.0 °F)** or below before removing it. Working on this product while it is still hot can cause burns. Additionally, always bleed out the pressure before removing any line from this product. Removing a pressurized line can result in oil spraying out and causing injury or oil leak.
4. Use the specialty tools and measurement instruments for disassembly, reassembly, inspection, and repair, etc. of this product. Using an inappropriate tool may result in injury or product damage.
5. Be careful of parts falling when performing disassembly, reassembly, inspection or repair, etc. of this product. This may result in injury or parts damage.
6. Do not directly touch with bare hands the machined edges or threaded sections of parts during disassembly, reassembly, inspection, or repair etc. of this product. Doing so may result in injury.
7. Check performance after reassembly. Do not resume use unless performance is fully recovered. Using this product at a sub-par performance level may result in product damage.
8. The cautions (mark !) listed in this maintenance manual do not cover all possible dangers. Always think of safety first during disassembly, inspection, reassembly, repair, or other such work.

9. Installation of friction plate and partner plate

Install the friction plate (11) and partner plate (12).

- Apply hydraulic oil to both sides of each of these plates.

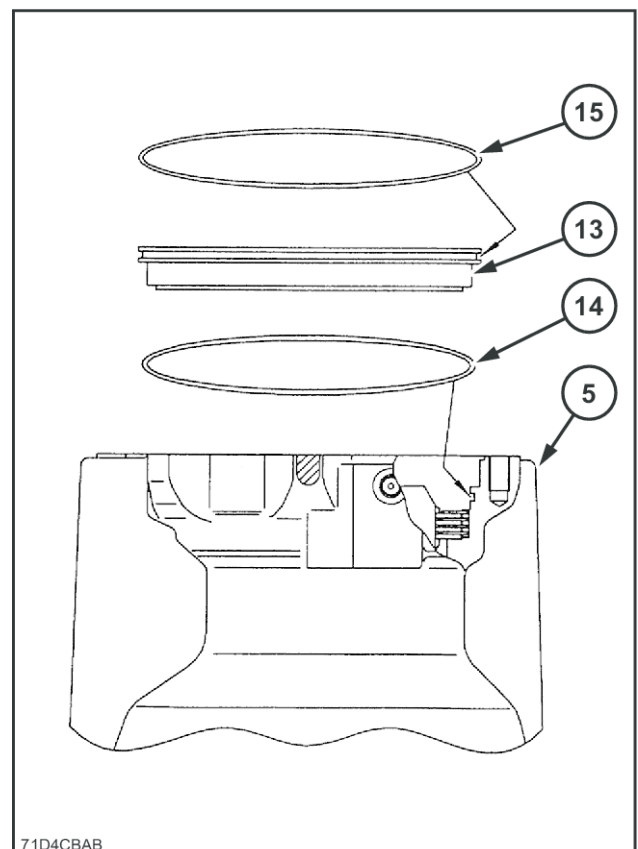


51733140 11

10. Installation of O-ring

Attach the O-ring (14) to the housing (5).
Attach the O-ring (15) to the piston (13).

- Apply grease to the O-ring.



71D4CBAB 12

Travel motor - Prepare

⚠ WARNING

Escaping fluid!

Hydraulic fluid or diesel fuel leaking under pressure can penetrate the skin and cause infection or other injury. To prevent personal injury: Relieve all pressure before disconnecting fluid lines or performing work on the hydraulic system. Before applying pressure, make sure all connections are tight and all components are in good condition. Never use your hand to check for suspected leaks under pressure. Use a piece of cardboard or wood for this purpose. If injured by leaking fluid, see your doctor immediately.

Failure to comply could result in death or serious injury.

W0178A

⚠ WARNING

Pressurized fluid can penetrate the skin and cause severe injuries.

The grease in the cylinder is under high pressure. Never loosen the grease fitting adaptor completely in order to speed up the flow of grease.

Failure to comply could result in death or serious injury.

W0261A

⚠ WARNING

Crushing hazard!

The lifting systems must be operated by qualified personnel who are aware of the correct procedures to follow. Make sure all lifting equipment is in good condition, and all hooks are equipped with safety latches.

Failure to comply could result in death or serious injury.

W0256A

⚠ WARNING

Heavy objects!

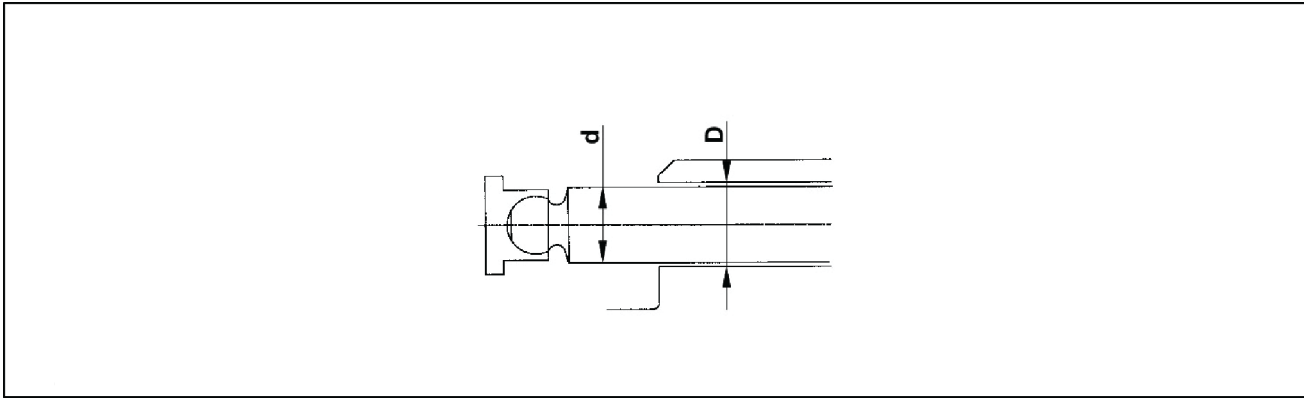
Lift and handle all heavy components using lifting equipment with adequate capacity. Always support units or parts with suitable slings or hooks. Make sure the work area is clear of all bystanders.

Failure to comply could result in death or serious injury.

W0398A

Items to prepare:

- Box wrenches [19 mm, 36 mm]
- Wrenches [19 mm, 27 mm, 41 mm]
- Hammer (to remove the master pin)
- Striking jig (to remove the master pin)
- Lifting equipment (with the required lifting capacity)
- Wire rope (with the required breaking load)
- **LOCTITE® 262™**
- Wood planks, etc.
- Rag
- Cleaning fluid



LPIL12CX03404EB 1

Part name and inspection item	Standard value	Permissible limit value	Solution
Piston outer diameter d maximum - d minimum	0.01 mm (0.0004 in)	0.05 mm (0.0020 in)	Replace the piston or cylinder block
Cylinder bore inner diameter D maximum - D minimum	0.01 mm (0.0004 in)	0.022 mm (0.0009 in)	
Clearance D - d	0.037 - 0.047 mm (0.0015 - 0.0019 in)	0.065 mm (0.0026 in)	

- (Piston replacement should be performed 9 pistons at a time.)

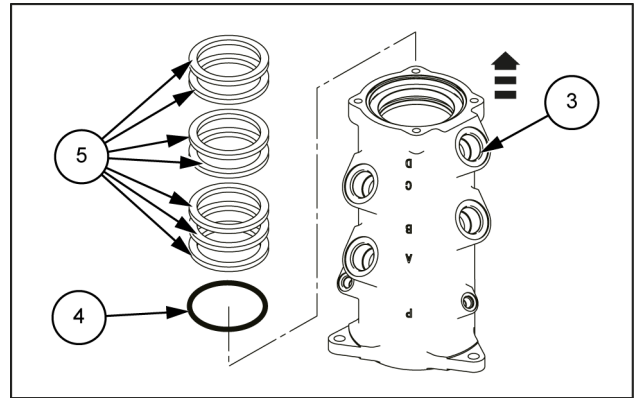
3. Piston and shoe backlash

Judgment criteria and solution

- Use a measurement jig to press the shoe on the surface plate, pull out the pistons in an upward direction, and measure the piston and shoe backlash δ . (See "Caulking section backlash" and "Measuring backlash".)

Part name and inspection item	Standard value	Permissible limit value	Solution
Piston and shoe backlash	0 - 0.1 mm (0.000 - 0.004 in)	0.3 mm (0.01 in)	Replace piston

6. Use the removal jig "b" or the like to remove the O-ring (4) and packing rings (5) from the rotor (3).



SMIL14CEX1357AB 6

- 28. Pipe assembly
- 29. Pipe assembly

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Overview	4
Overview - Relief valve (electromagnetic proportional)	5

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- You can download the complete manual from: www.heydownloads.com by clicking the link below

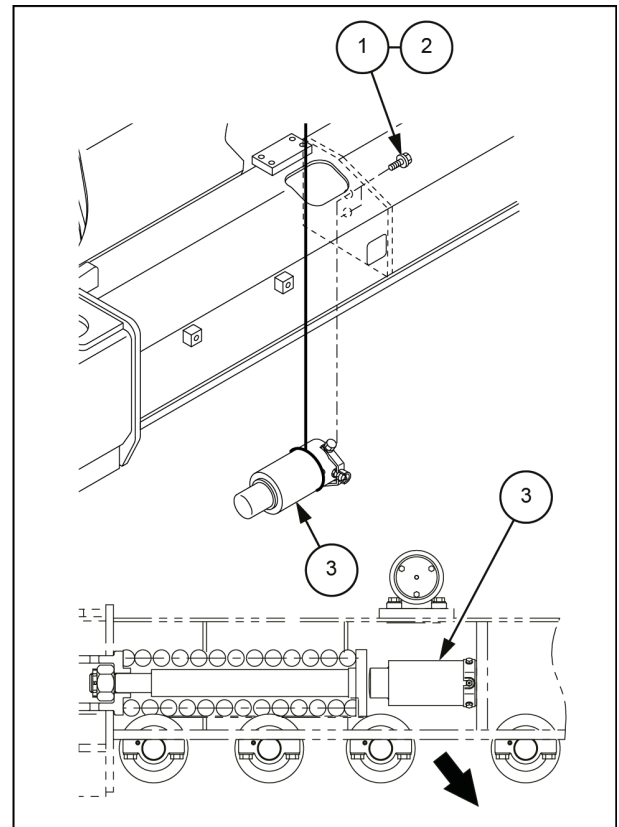


- Please note: If there is no response to CLICKING the link, please download this PDF first and then click on it.

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6. Use a wrench or box wrench [**24 mm**] to remove the bolt (1) and the washer (2), and then remove the grease cylinder (3).

Lower the lifting equipment as is to lower to under the frame, and then take out from between the lower rollers.

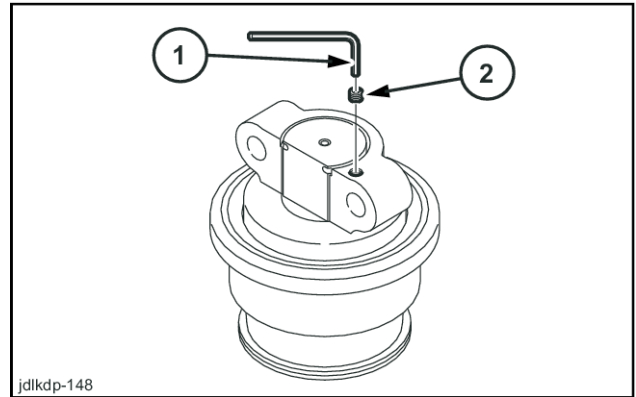


SMIL15CEX3525BB 5

Track frame roller - Disassemble

1. Stand the roller vertically and use a hexagon wrench [**6 mm**] (1) to remove the plug (2).

- The plug is coated with seal nylon, which comes off when the plug is removed. To reuse the plug, using seal tape is necessary.

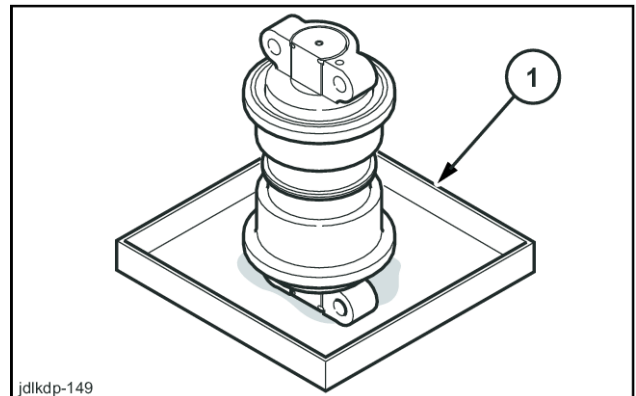


jdlkdp-148

JDLKDP-148 1

2. Face down the part of the roller from which the plug was removed and empty the oil from within the roller.

- It may take a few hours to completely empty the oil.
- Place an oil pan (1) underneath to catch the oil.
- Securely fasten so that the roller does not fall over.

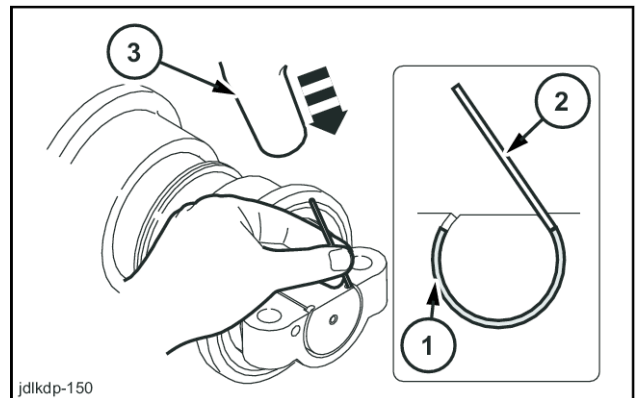


jdlkdp-149

JDLKDP-149 2

3. Remove the wire clip (1). Tap another wire (2) with the hammer (3) from the outside to push out the wire clip that is already in the roller.

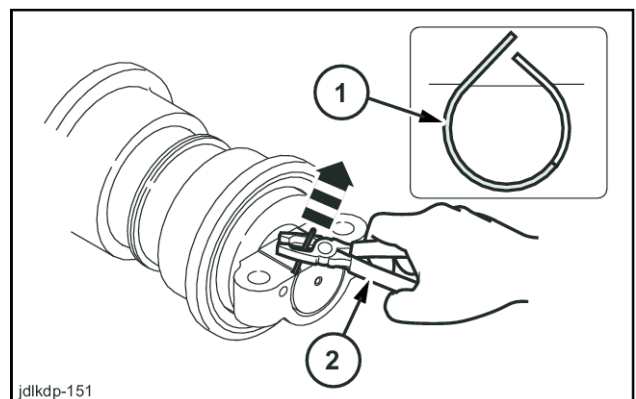
- Place the roller horizontally and secure it so it does not roll before doing this work.
- The wire in the roller is very securely fixed, so prepare several wire clips. Also be sure to coat with lubricant.



jdlkdp-150

JDLKDP-150 3

4. Use pliers (2) to remove the pushed out wire clip (1).



jdlkdp-151

JDLKDP-151 4

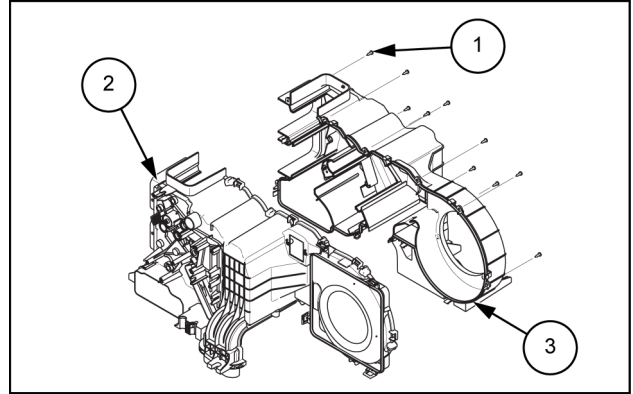
Heating, Ventilation, and Air-Conditioning (HVAC) unit - Remove

NOTICE: At this time, perform work with the heater core removed from the heater case.

NOTICE: The evaporator sensor cord is sandwiched in the groove of the HVAC unit, so carefully check it and remove it while making sure not to damage it.

Removal of right heater case and left heater case

1. Remove the 10 Phillips screws (1) and remove the right heater case (2) and left heater case (3).
 - Phillips screws (1): M4 x 16



SMIL14CEX1813AB 1

Air-conditioning condenser - Prepare

 WARNING:

- Be careful when loosening the lines. The air conditioner circuit is filled with high-pressure gas, so there is the danger of gas splaying out.

 CAUTION:

- Be sure to stop the engine before beginning work.

 CAUTION:

- When removing and installing the condenser, resupply and check the compressor oil quantity.

Items to prepare:

- Wrenches (**13 mm, 17 mm, 19 mm, 24 mm**)
- Cap
- Plug
- Rag
- Cleaning fluid

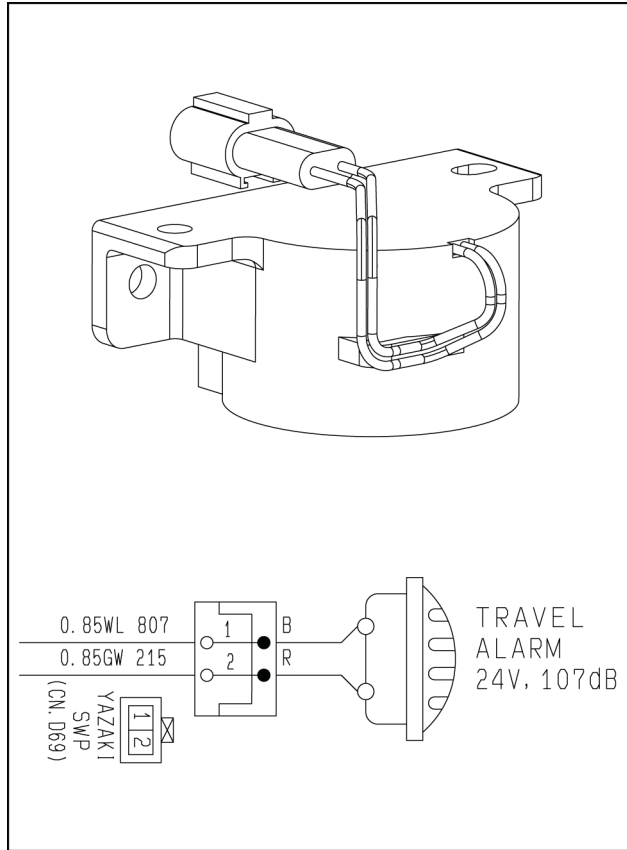
- | | | | |
|----|------------------------|-----|-------------------------------|
| 1. | Cup holder | 7. | Tilt lever left |
| 2. | Starter switch | 8. | Ashtray |
| 3. | Warning select switch | 9. | Air-conditioner control panel |
| 4. | Radio | 10. | Engine emergency stop switch |
| 5. | Engine throttle switch | 11. | Gate lock lever |
| 6. | Tilt lever right | 12. | Fan reverse switch |

Travel alarm

Electrical circuit diagram: H2

Basic frequency; **2560 Hz**

Part No.: KHR3852



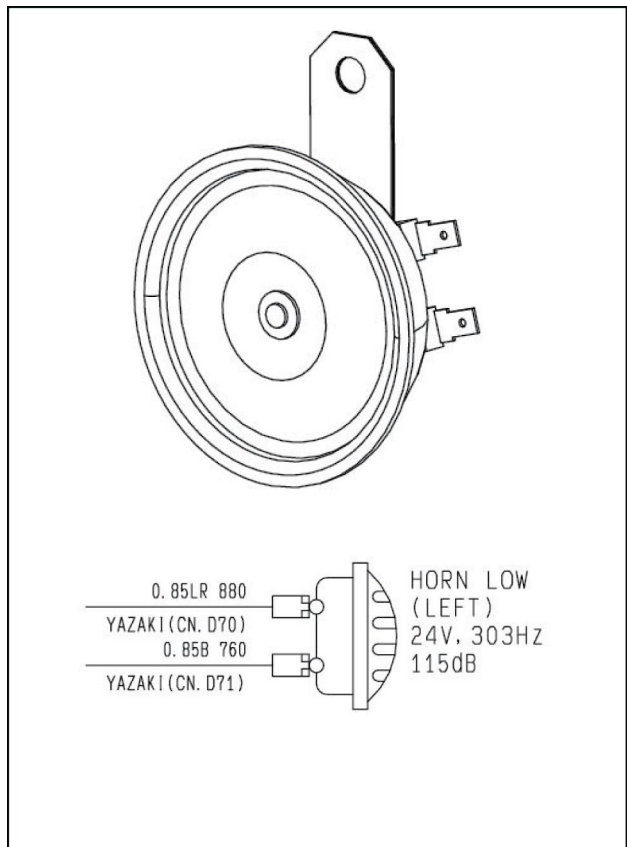
SMIL15CEX4887BA 55

Horn (low)

Electrical circuit diagram: B92

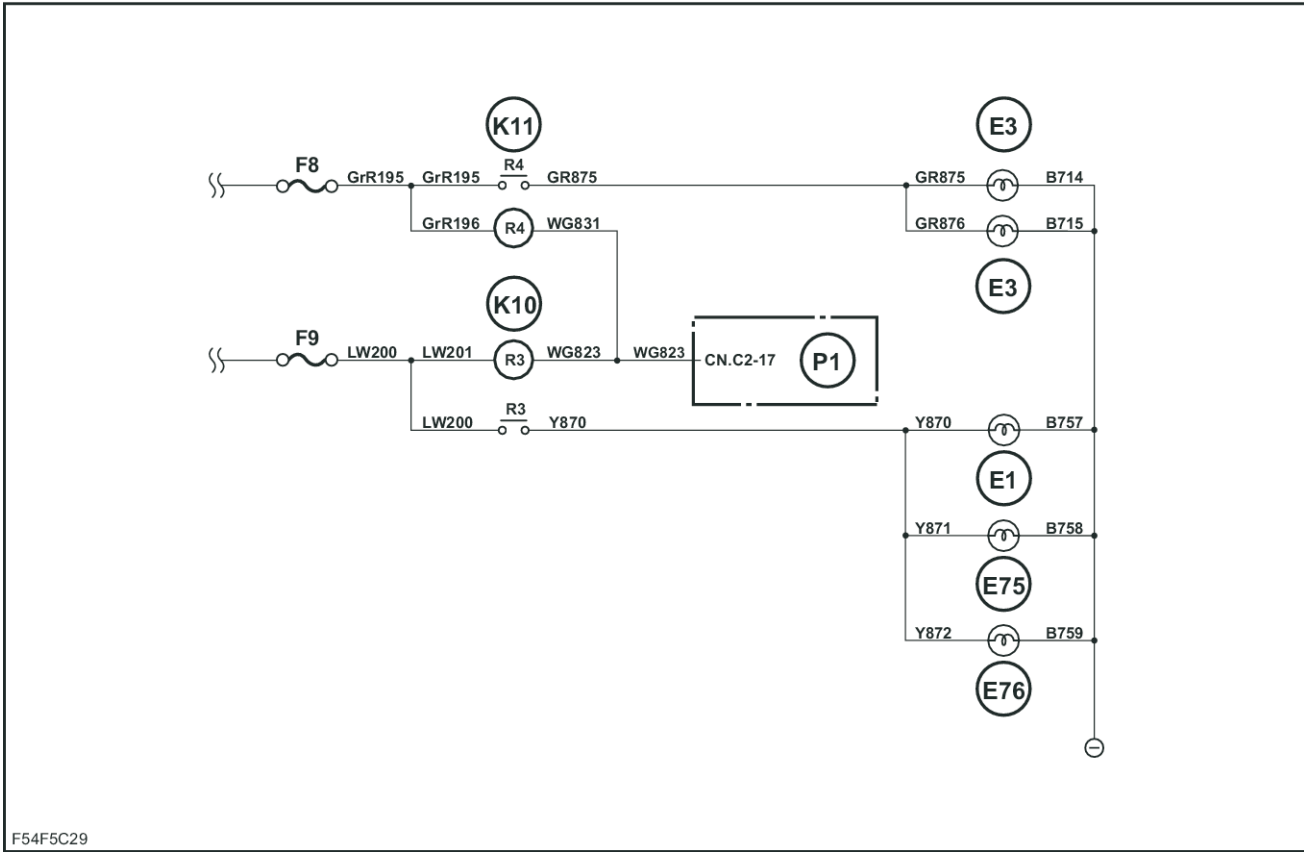
Basic frequency; **370 Hz**

Part No.: KHR11440



SMIL13CEX3345BA 56

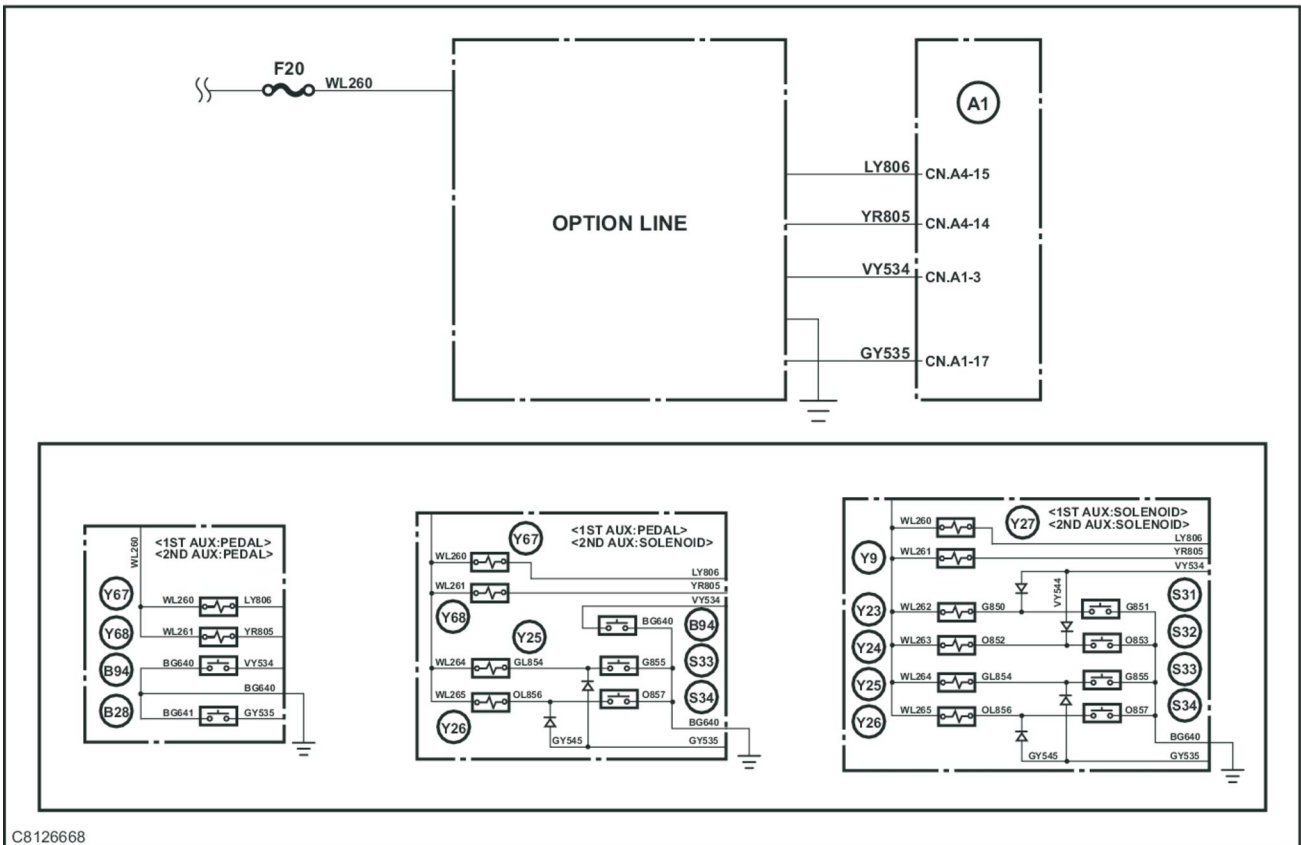
Working light



F54F5C29

F54F5C29 9

Reserve



C8126668

C8126668 10

Electrical systems - Electrical system

CN.175F	Diode
CN.G3M	Frame main harness
CN.G4M	Pump relay
CN.G5M	Stop relay
CN.G6M	Switch
CN.G7M	Feed pump

Electrical systems - Electrical system

Code	Part name	Quantity
1	CCD camera wire harness [11.5 m (37.730 ft)]	2
2	CCD camera wire harness [480 mm (18.898 in)]	2
3	CCD camera wire harness [1200 mm (47.244 in)]	1
4	CCD camera (normal image)	1
5	CCD camera wire harness [2000 mm (78.74 in)]	1

Electrical systems - Electrical system

CN.A57	Cab main harness; (16-pin), Connect with the cab main harness.
CN.A57-1	Option switch over solenoid valve (ID tape: Blue)
CN.A57-2	Solenoid valve for 2 pumps flow (ID tape: Red)
CN.A57-3	First option pressure switch
CN.A57-7	Second option (up) proportional valve
CN.A57-8	Second option (down) proportional valve
CN.A57-9	Second option (up) pressure switch
CN.A57-10	Second option (down) pressure switch

Wiring harnesses - Electrical schematic sheet 07 - Engine controller

Type	Components	Connectors / link	Description
Controller	A2		Engine Controller
Connector	CN.D1-2	CN.D1-2	Engine Controller
Connector	CN.D7	CN.D7	
Connector	CN.D8	CN.D8	
Connector	CN.D10	CN.D10	

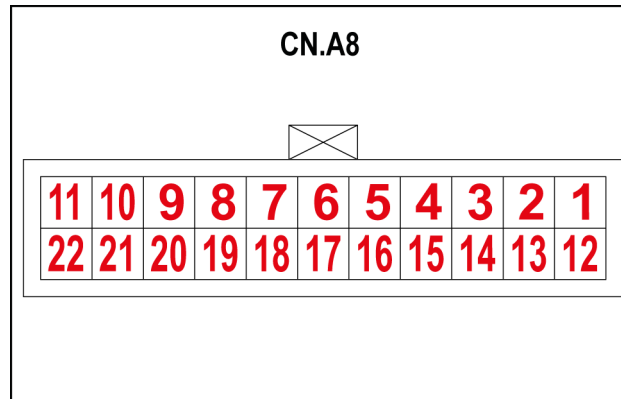
Wiring harnesses - Electrical schematic sheet 21 - Main cab-controller A

Type	Components	Connectors / link	Description
Controller	A1		Controller A
Connector	CN.A3	CN.A3	Controller A
Connector	CN.A4	CN.A4	Controller A
Connector	CN.A23	CN.A23	To controller C
Connector	CN.A25	CN.A25	EST connector B
Connector	CN.A44	CN.A44	Cab harness A
Connector	CN.A54	CN.A54	Frame main harness E
Connector	CN.A55	CN.A55	Frame main harness F
Connector	CN.A56	CN.A56	Frame main harness G

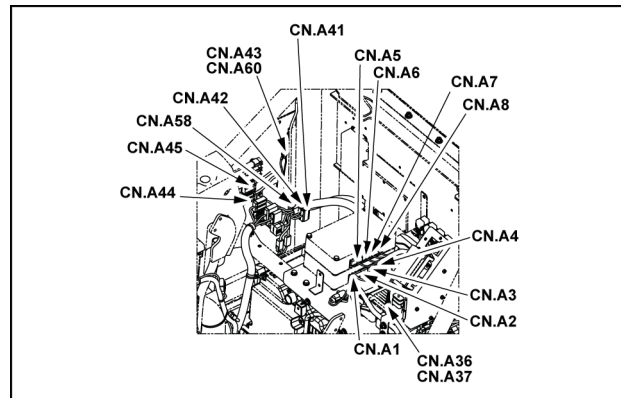
Wiring harnesses - Electrical schematic sheet 35 - Radio and converter

Type	Components	Connectors / link	Description
Radio	P15		Radio A/ FM stereo
Converter	U1		DC/DC converter
Connector	CN.A23	CN.A23	To controller C
Connector	CN.A28	CN.A28	DC/DC converter
Connector	CN.A49	CN.A49	Console harness D
Connector	CN.B13	CN.B13	Radio AM/FM stereo
Connector	CN.B14	CN.B14	Output for radio
Connector	CN.B15	CN.B15	Output for radio
Connector	CN.B16	CN.B16	Output for radio
Connector	CN.B17	CN.B17	Air suspension
Connector	CN.B18	CN.B18	Diode seat
Connector	CN.B22	CN.B22	Ground

CONNECTOR CN.A8 – CONTROLLER B (Female)



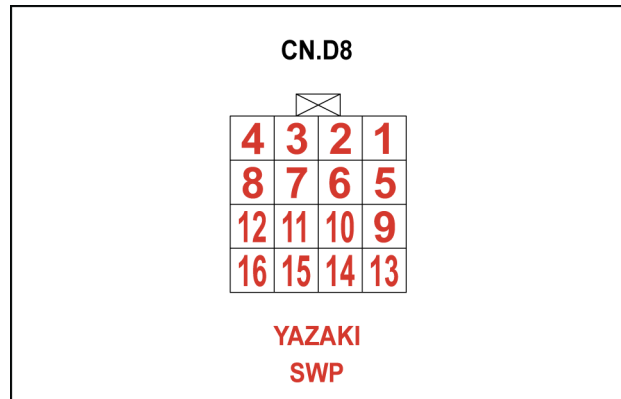
SMIL15CEX3860AA 15



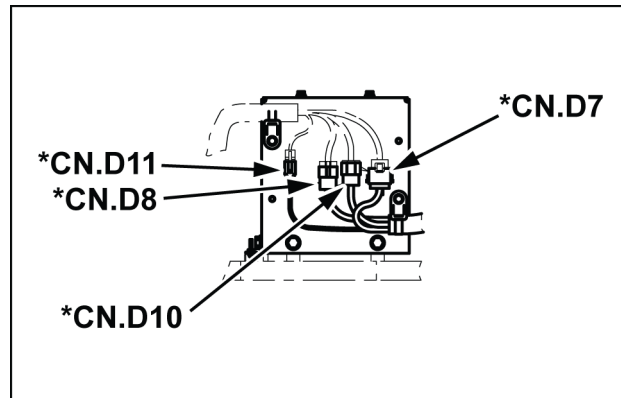
SMIL15CEX3855AA 16

Pin	From	Wire ID	Description	Color-Size	Frame
1	SP-109-P-X	109		W-1.25	SHEET 23
2	SP-602-P-X	602		BG-1.25	
3	CN.A55-F-P-7	813		Lg	
5	SP-702-P-X	702		B-0.85	
7	CN.A55-F-P-6	812		G	
12	SP-109-P-X	109A		W-1.25	
13	SP-602-P-X	602A		BG-1.25	
16	SP-702-P-X	702A		B-0.85	
17	CN.A56-F-P-13	818		YL-0.85	
19	CN.A24-M-P-5	819		WL	

CONNECTOR CN.D8 – CN.D8 (Male)



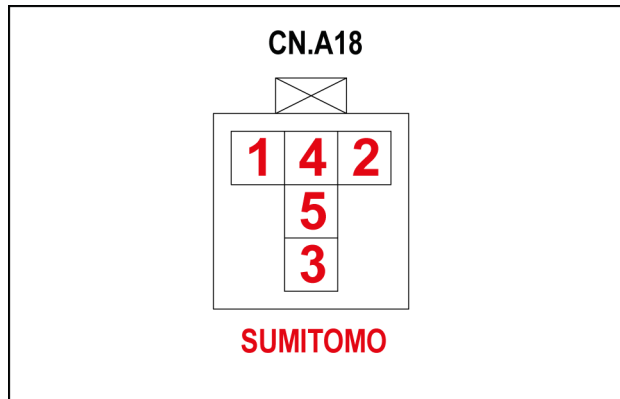
SMIL15CEXZ173AA 56



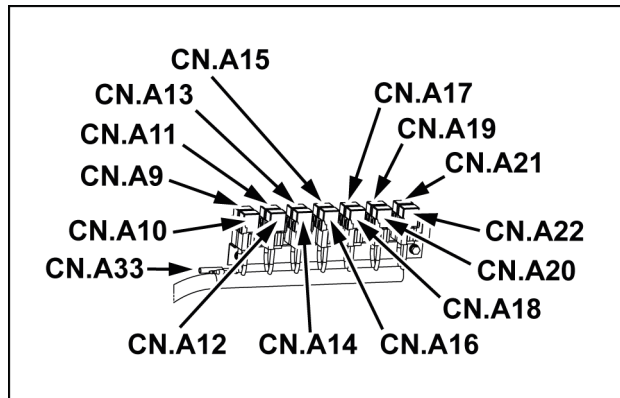
SMIL15CEXZ169AA 57

Pin	From	Wire ID	Description	Color-Size	Frame
1	CN.E3-P-1	353A		GB-0.75	SHEET 10
2	CN.E3-P-2	354A		GW-0.75	
3	CN.E3-P-3	355A		GY-0.75	
4	CN.E3-P-4	352A		L-0.75	
5	CN.E3-P-5	386A		WR-0.75	
6	CN.E3-P-6	387A		WB-0.75	
7	CN.E3-P-7	388A		WL-0.75	
8	SP-356A-P-X	356B		LW-0.75	

CONNECTOR CN.A18 – RELAY LAMP CAB (Female)



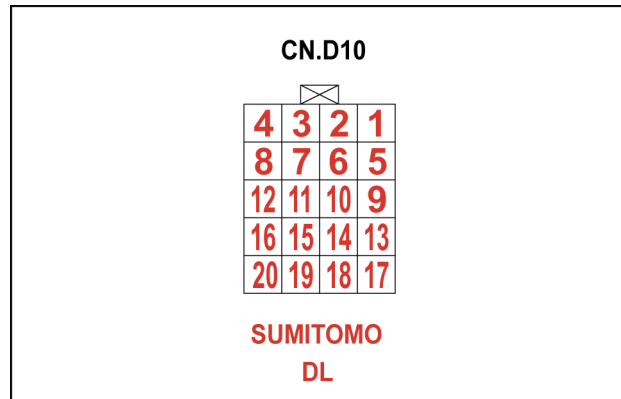
SMIL15CEX3922AA 17



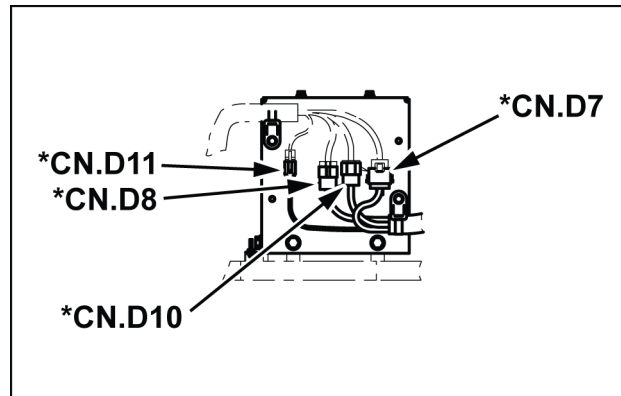
SMIL15CEX3909AA 18

Pin	From	Wire ID	Description	Color-Size	Frame
1	SP-195-P-X	196		GrR-1.25	SHEET 32
2	SP-823B-P-X	831		WG	
3	SP-195-P-X	195A		GrR-1.25	
5	CN.A45-M-P-5	875C		GR-1.25	SHEET 28

CONNECTOR CN.D10 – SUPPLY PUMP PCV 1 (Female)



SMIL15CEXZ175AA 50



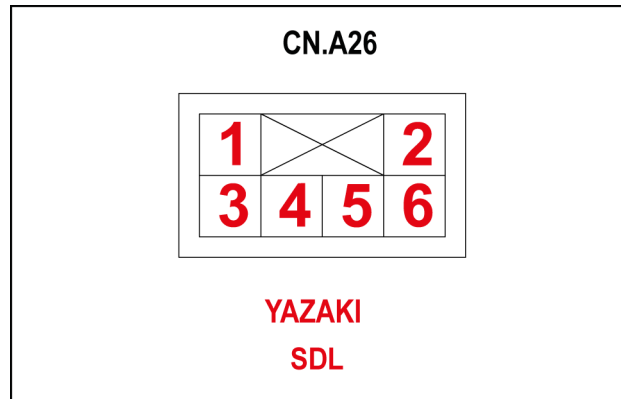
SMIL15CEXZ169AA 51

Pin	From	Wire ID	Description	Color-Size	Frame
1	CN.D1-2-P-31	375		W-1.25	SHEET 08
2	CN.D1-2-P-46	379		RL-1.25	
3	CN.D1-2-P-32	377		L-1.25	
4	CN.D1-2-P-48	383		RL-1.25	
5	CN.D1-2-P-1	374		B-1.25	
6	CN.D1-2-P-2	378		RB-1.25	
7	CN.D1-2-P-3	376		Y-1.25	
8	CN.D1-2-P-16	382		L-1.25	
9	CN.D1-2-P-33	385		RB-1.25	
10	CN.D1-2-P-47	381		BW-1.25	
12	SP-142-P-X	151C		R-1.25	SHEET 06
13	CN.D1-2-P-17	384		W-1.25	SHEET 08
14	CN.D1-2-P-18	380		B-1.25	
15	CN.D1-2-P-43	692b		BW-0.75	SHEET 07
16	SP-394-P-X	394		RG-0.75	SHEET 08
17	CN.D1-2-P-22	316		R-0.75	SHEET 07
18	CN.D1-2-P-56	317		W-0.75	
19	SP-318-P-X	318A		L-0.75	SHEET 08
20	SP-396-P-X	396B		RW-0.75	

CONNECTOR CN.D105 – CTWT SOLENOID VALVE (RED TAPE) (Male)

Pin	From	Wire ID	Description	Color-Size	Frame
1	CN.D101-M-P-1	866		RB	SHEET 43
2	SP-722-P-X	775		B	

CONNECTOR CN.A26F – LAMP (CAB) (Female)



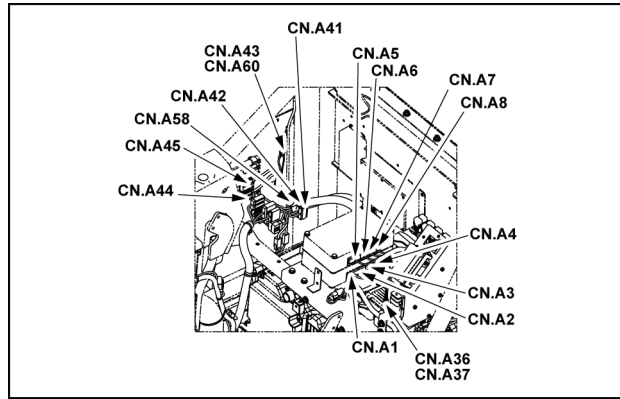
SMIL15CEX4242AA 22

Pin	From	Wire ID	Description	Color-Size	Frame
1	SP-875-P-X	875		GR-1.25	SHEET 28

CONNECTOR CN.C28 – CAMERA 2 (RIGHT SIDE) (Female)

Pin	From	Wire ID	Description	Color-Size	Frame
1	CN.C29-M-P-1	965C		R	SHEET 40
2	CN.C29-M-P-2	966C		B	
3	CN.C29-M-P-3	968G		W	
4	CN.C29-M-P-4	967D		Y	

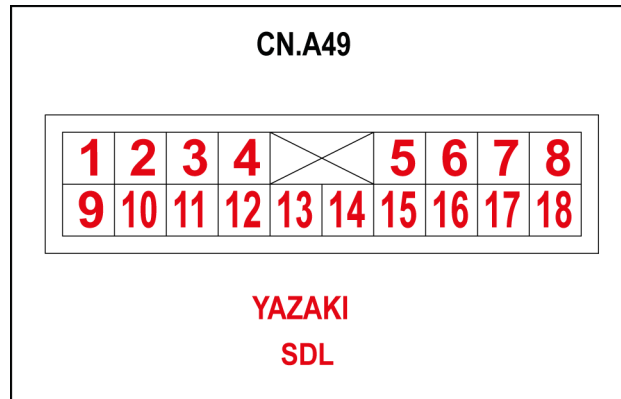
CONNECTOR CN.A36 – DIAG SWITCH (Male)



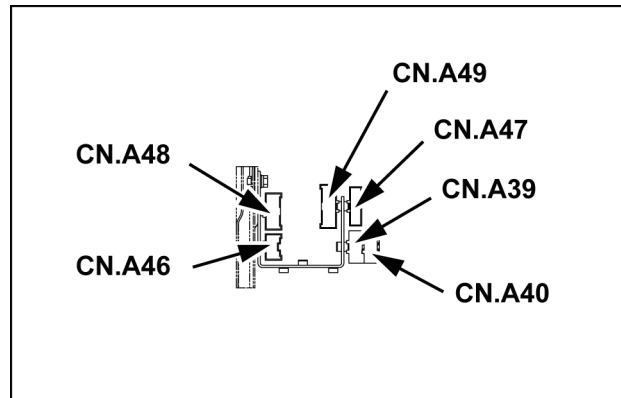
SMIL15CEX3855AA 8

Pin	From	Wire ID	Description	Color-Size	Frame
1	SP-635-P-X	634		BG	SHEET 29

CONNECTOR CN.A49 – CONSOLE HARNESS D (Male)



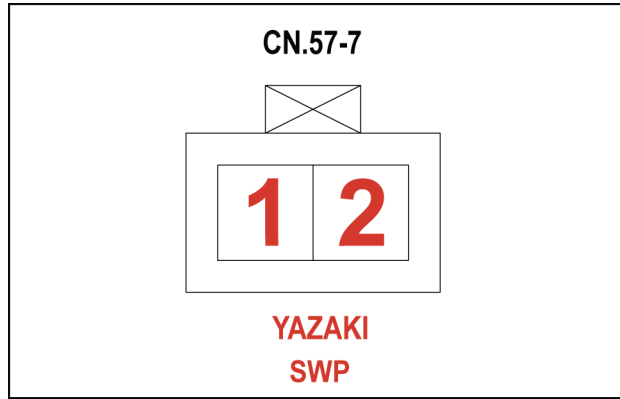
SMIL15CEX3902AA 26



SMIL15CEX3899AA 27

Pin	From	Wire ID	Description	Color-Size	Frame
1	CN.B13-M-P-6	162A		RL	SHEET 35
2	SP-221B-P-X	221B		YR-0.85	
3	CN.B9-P-3	536A		GW-0.85	SHEET 41
4	CN.B11-P-3	537A		WG-0.85	
5	CN.B8-P-3	558A		YL-0.85	
6	CN.B12-P-1	570A		YB-0.85	
7	CN.B12-P-3	571A		V-0.85	
8	CN.B9-P-7	834A		Br-0.85	
9	CN.B10-P-3	842B		LG-0.85	
10	CN.B13-M-P-3	980A		Y-0.85	SHEET 35
11	CN.B13-M-P-4	981A		L-0.85	
12	CN.B13-M-P-8	982C		BY-0.85	
13	CN.B13-M-P-9	983C		BL-0.85	
14	CN.B14-P-1	280B		RY-0.85	
15	CN.B15-P-1	281A		WR-0.85	
16	CN.B16-P-1	709A		BW-0.85	

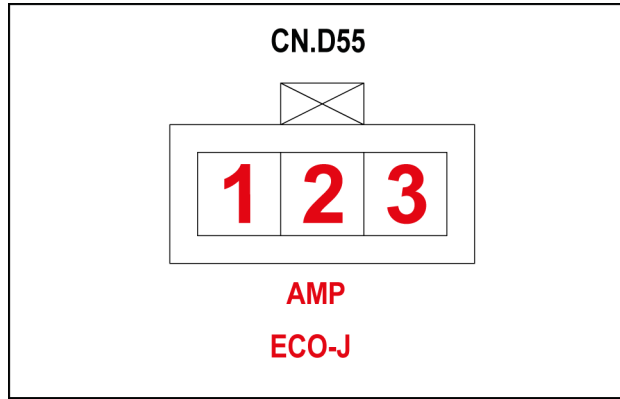
CONNECTOR CN.57-7 – OPTION 2 KNOB (L)-R SOLENOID VALVE (BLUE TAPE) (Male)



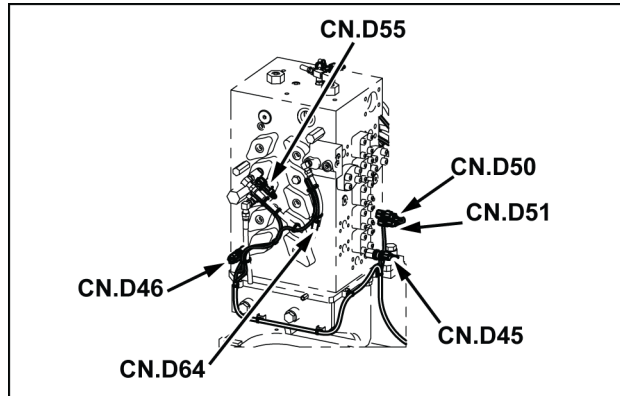
SMIL15CEX7615AA 19

Pin	From	Wire ID	Description	Color-Size	Frame
1	SP-263A-P-X	264		WL-0.75	SHEET 20
2	SP-854A-P-X	854B		GL-0.75	

CONNECTOR CN.D55 – PRESSURE SENSOR (PILOT BUCKET CLOSE) (Female)



SMIL15CEX3987AA 66



SMIL15CEX2222AA 67

Pin	From	Wire ID	Description	Color-Size	Frame
1	SP-431-P-X	431		WL-0.85	SHEET 17
2	CN.A54-M-P-15	446A		LR-0.85	SHEET 24
3	SP-452-P-X	451A		BL-0.85	SHEET 17

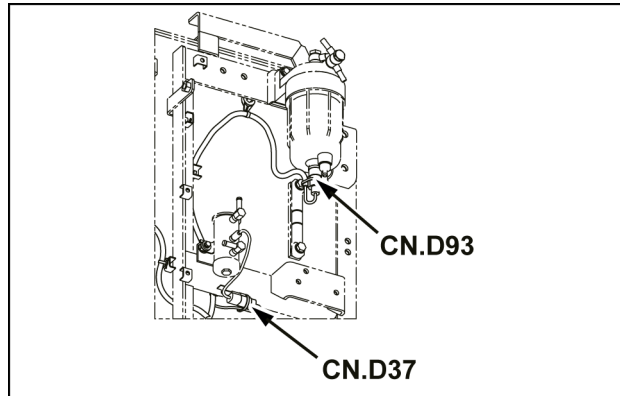
CONNECTOR CN.D72 – HORN HIGH (RIGHT) (Female)

Pin	From	Wire ID	Description	Color-Size	Frame
1	CN.A55-M-P-11	882D		YR-0.85	SHEET 11

CONNECTOR CN.D93 – LEVEL SWITCH (FUEL FILTER) (Female)

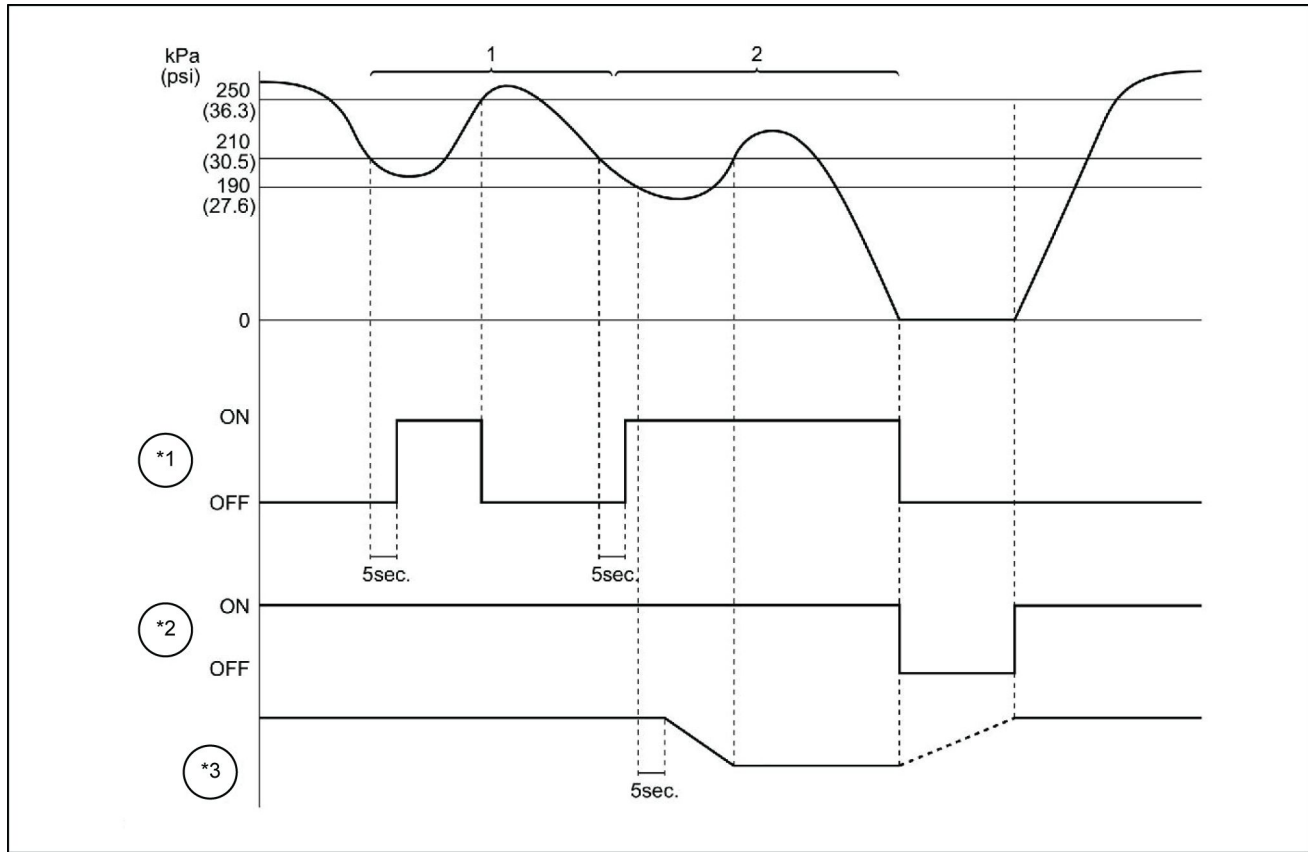


SMIL15CEXZ221AA 3



SMIL15CEX7425AA 4

Pin	From	Wire ID	Description	Color-Size	Frame
1	SP-600D-P-X	654		BG-0.75	SHEET 11
2	CN.A54-M-P-21	546A		WG-0.75	SHEET 22



SMIL13CEX7113FB 7

- *1. Lamp
- *2. Starter SW
- *3. Engine speed (RPM)
- 1. The first stage
- 2. The second stage

EGR

The EGR system recirculates a part of the exhaust gas to the intake manifold, and by mixing in inert gas with the intake air, the combustion temperature is lowered and the generation of NOx is suppressed.

The EGR amount is controlled by opening and closing the EGR valve provided between the exhaust manifold and intake manifold.

The EGR amount is determined from the engine rpm and engine load ratio and the EGR valve is operated to control the EGR amount.

By providing the EGR cooler on the path of the EGR gas, high-temperature EGR gas is cooled by the EGR cooler and then mixed with air to further lower the burning temperature in order to reduce the NOx amount.

EGR control

The ECM controls the EGR valve lift amount by operating the motor according to the engine status such as the engine rpm and engine load.

The valve lift amount is detected by the EGR position sensor.

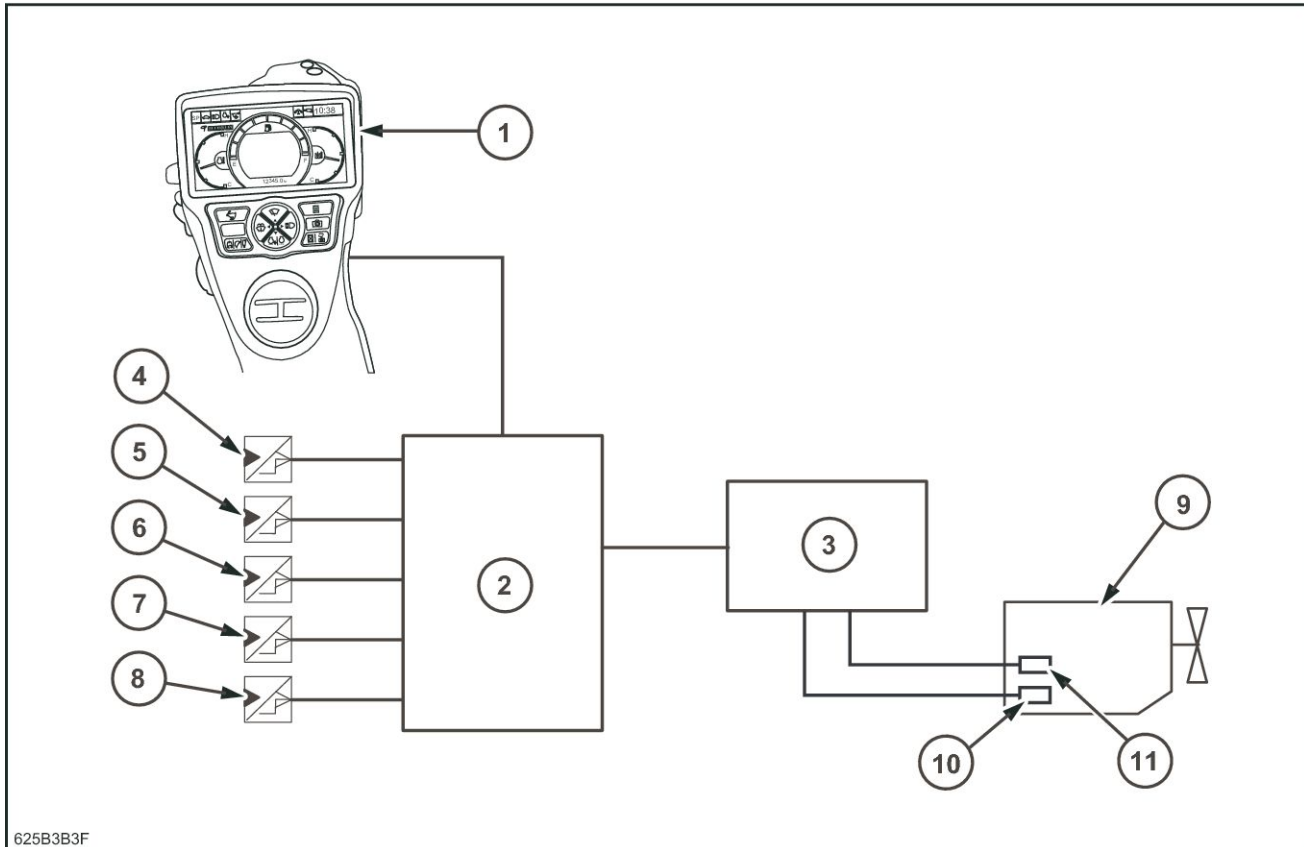
Electrical systems - Engine control system

Diagnostic trouble code	
P1113	Boost temperature sensor circuit high
P1261	ECM Charge Circuit 1 Low Voltage
P1262	ECM Charge Circuit 2 Low Voltage
P1293	Fuel filter pressure sensor circuit low
P1294	Fuel filter pressure sensor circuit high
P1404	Exhaust gas recirculation BLDC zero position
P1621	Control module EEPROM error
P1655	5 Volt reference 4 circuit
U2106	Lost communication
P2122	Pedal position sensor 1 circuit low input
P2123	Pedal position sensor 1 circuit high input
P2127	Pedal position sensor 2 circuit low input
P2128	Pedal position sensor 2 circuit high input
P2138	Pedal position sensor 1-2 circuit correlation
P2146	Fuel injector group 1 supply voltage circuit
P2149	Fuel injector group 2 supply voltage circuit
P2228	Barometric pressure circuit low input
P2229	Barometric pressure circuit high input
P2295	PCV-2 monitoring constant low
P2296	PCV-2 monitoring constant high

Engine starting system - Dynamic description - Hot shutdown warning

Purpose

To warn the operator to perform cooling operation before stopping the engine to protect the turbocharger.



625B3B3F

625B3B3F 1

- | | |
|-----------------------------|---------------------------------|
| 1. Monitor | 7. Pressure sensor (1st option) |
| 2. Computer A | 8. Pressure sensor (2nd option) |
| 3. ECM | 9. Engine |
| 4. Pressure sensor (upper) | 10. Coolant temperature sensor |
| 5. Pressure sensor (swing) | 11. Crank position sensor |
| 6. Pressure sensor (travel) | |

Control

1. Operation:

- A. Turn the key ON to start the engine.
- B. Finish the work and stop the engine.
- C. The system displays the "IMPROPER SHUT DOWN" message on the monitor and sounds an alarm for **5 s** when it determines that the engine is hot and cool down operation has not been performed. At this time, the cooling time distribution is recorded into the engine log.

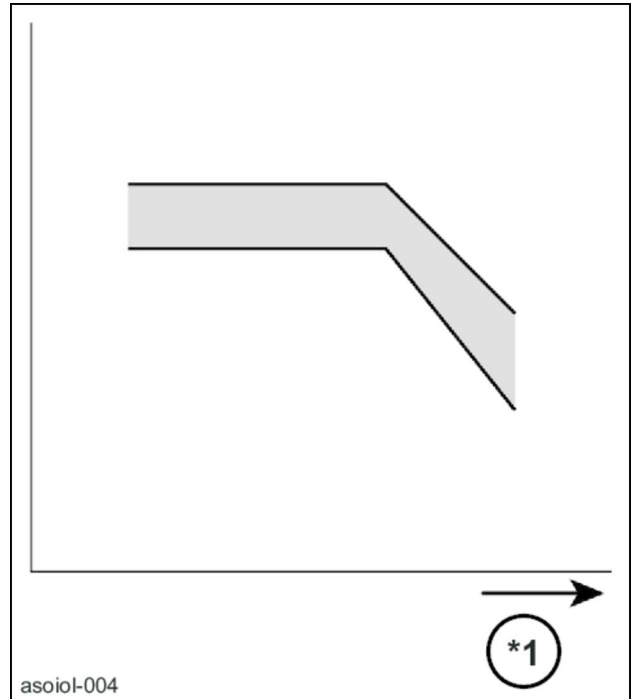
2. Operation conditions:

When the following conditions are all met, the engine is considered to be hot.

1. The engine coolant temperature is **80.0 °C (176.0 °F)** or higher.
2. At least **3 min** have passed since the engine has started.
3. Upper, swing, travel, 1st option, or 2nd option operation was performed at least once while the engine is being started.

The SCV opening and closing interval and the injector electrified time are controlled according to the high altitude (*1) conditions at this time, and correction is made to achieve the optimum fuel flow.

Barometric pressure (kPa)



Contents

Electrical systems - 55

Cold start aid - 202

FUNCTIONAL DATA

Cold start aid	
Static description	3

SERVICE

Cold start aid	
Inspect	4
Glow plug system	
Remove	6
Test	9
Install	10

Common rail pressure sensor - Inspect

Fuel pressure sensor inspection

1. Inspect the fuel pressure sensor.
 - Inspect for causes of a bad electrical connection such as fallen and bent terminals.

Contents

Electrical systems - 55

Engine cooling system - 012

SERVICE

Engine coolant temperature sensor

Remove 3

Inspect 4

Install 5

Coolant high temperature sensor

Remove 6

Install 7

Electronic module - Install - Computer A

1. To install, perform the reverse of the removal procedure.

11. H mode load ratio distribution

RATIO < R1	hour	R < 30
R1 ≤ RATIO < R2	hour	30 ≤ R < 40
R2 ≤ RATIO < R3	hour	40 ≤ R < 50
R3 ≤ RATIO < R4	hour	50 ≤ R < 60
R4 ≤ RATIO < R5	hour	60 ≤ R < 70
R5 ≤ RATIO < R6	hour	70 ≤ R < 80
R6 ≤ RATIO	hour	80 ≤ R

ENGINE HISTORY					11/18
RATIO < R1	0	0	1	0	hour
R1 ≤ RATIO < R2	0	0	2	0	hour
R2 ≤ RATIO < R3	0	0	3	0	hour
R3 ≤ RATIO < R4	0	0	2	0	hour
R4 ≤ RATIO < R5	0	0	1	0	hour
R5 ≤ RATIO < R6	0	0	0	5	hour
R6 ≤ RATIO	0	0	0	5	hour

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12. Fuel density distribution

DENSITY < D1	hour	D < D1
D1 ≤ DENSITY < D2	hour	D1 ≤ D < D2
D2 ≤ DENSITY < D3	hour	D2 ≤ D < D3
D3 ≤ DENSITY < D4	hour	D3 ≤ D < D4
D4 ≤ DENSITY < D5	hour	D4 ≤ D < D5
D5 ≤ DENSITY < D6	hour	D5 ≤ D < D6
D6 ≤ DENSITY	hour	D6 ≤ D

ENGINE HISTORY					12/18
DENSITY < D1	0	0	1	0	hour
D1 ≤ DENSITY < D2	0	0	2	0	hour
D2 ≤ DENSITY < D3	0	0	3	0	hour
D3 ≤ DENSITY < D4	0	0	2	0	hour
D4 ≤ DENSITY < D5	0	0	1	0	hour
D5 ≤ DENSITY < D6	0	0	0	5	hour
D6 ≤ DENSITY	0	0	0	5	hour

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15. Supply pump inlet pressure distribution

PRESS. < P1	hour	P < -40
P1 ≤ PRESS. < P2	hour	-40 ≤ P < -30
P2 ≤ PRESS. < P3	hour	-30 ≤ P < -20
P3 ≤ PRESS. < P4	hour	-20 ≤ P < -10
P4 ≤ PRESS. < P5	hour	-10 ≤ P < 0
P5 ≤ PRESS. < P6	hour	0 ≤ P < 10
P6 ≤ PRESS.	hour	10 ≤ P
PRESS. MAX	kPa	Maximum pressure
PRESS. MIN	kPa	Minimum pressure

ENGINE HISTORY					15/18
PRESS < P1	0	0	1	0	hour
P1 ≤ PRESS < P2	0	0	2	0	hour
P2 ≤ PRESS < P3	0	0	3	0	hour
P3 ≤ PRESS < P4	0	0	2	0	hour
P4 ≤ PRESS < P5	0	0	1	0	hour
P5 ≤ PRESS < P6	0	0	0	5	hour
P6 ≤ PRESS	0	0	0	5	hour
PRESS. MAX					kPa
PRESS. MIN					kPa

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Instrument cluster - Static description - Screen brightness setting

Summary

Decides the brightness of the backlight through operation that is linked to the working light and solar radiation sensor.

Operation explanation

The screen brightness can be selected on the menu screen.

Dimming setting can be changed on the service screen.

1. Working light "OFF": Normal (with key "ON"), "Brightness (day)" setting.
2. Working light "ON": The monitor brightness is reduced and the display changes automatically to the "Brightness (night)" setting.
3. Brightness settings: "Brightness (day)" and "Brightness (night)" can be set on the menu screen.
4. Dimming by solar radiation sensor: When the working light-linked dimming is set "OFF" on the menu screen, the dimming level is adjusted automatically to the ambient brightness by the solar radiation sensor.

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Step	Action	Standard value	Yes	No
5	Inspect the blower motor relay. When the blower motor relay white/red and blue/red are directly connected, the blower motor rotates. (Note: 2)		Go to Step 6	Inspect, repair, or replace the wire harness
6	The battery voltage is applied between the blower motor relay white/red and the body		Go to Step 7	Inspect, repair, or replace the wire harness
7	When the blower motor relay purple/white is dropped to ground, the blower motor rotates		Inspect or repair the wire harness or replace the computer	Replace the relay

⚠ CAUTION:

- Measure with the connector connected.
- For the sake of safety, have the air conditioner, vehicle key switch and light switch all OFF when working with direct connections in place.

The blower motor speed does not change

Part 1

Step	Action	Yes	No
1	HL. * is displayed on the panel set temperature display section. * is No. 0 to 9.	<ul style="list-style-type: none"> • Inside air sensor or harness disconnection or short • The inside air sensor connector is disconnected or has a contact defect See the Monitor Mode section too. Inspect and repair or replace part	Replace the blower amp or computer

Part 2

Step	Action	Yes	No
1	Does the blower motor fail to change speed when the mode is other than FACE?	Go to Step 2	See Part 1
2	Is the door or front window open?	While operating under restrictive control by door switch or front window switch	See Part 1

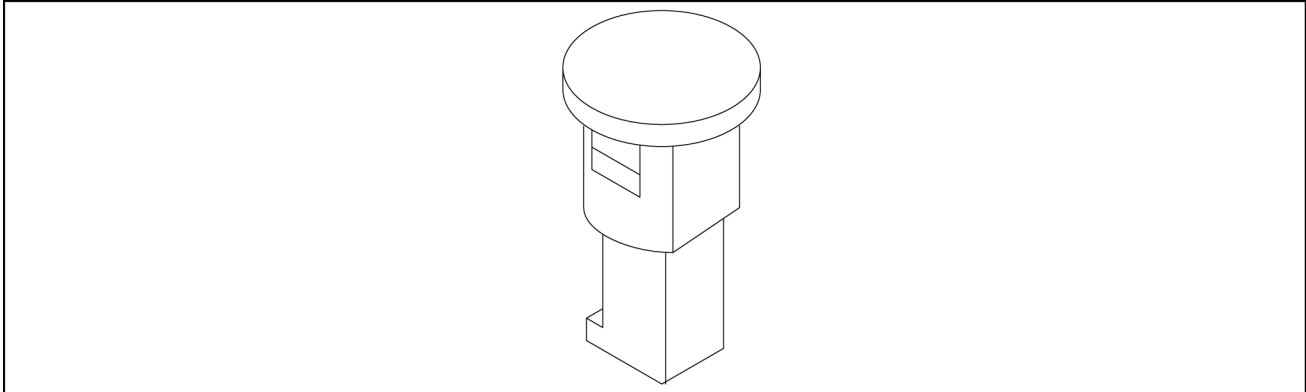
The magnetic clutch does not engage

Step	Action	Yes	No
1	When the AUTO switch or AC switch is pressed, the snow mark lights up	Go to Step 2	The snow mark flashes and E is displayed on the panel display section
2	Voltage is applied to the clutch	Clutch defect. Replace the compressor	Go to Step 3
3	Voltage is applied between the harness and pressure switch	Pressure switch defect or coolant pressure abnormally high or low See the cooling cycle troubleshooting	Go to Step 4
4	Voltage is applied between the vehicle side harness connector blue/red and ground (black)	Go to Step 5	Inspect the clutch fuse
5	Is there trouble in the air conditioner harness?	Replace computer	Replace the harness

Sun load sensor - Static description

Solar radiation sensor

This is the air conditioner solar radiation correct sensor. It detects the strength of sunlight with a photodiode, converts it into milli-amp and sends that to the controller.



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Solar radiation sensor inspection method

- Disconnect the solar radiation sensor connector from the harness and measure the voltage between the sensor side connector terminals using the tester's voltage measurement mode. The voltage must be different when light is striking the photoreceiver section and when it is not. (The voltage is about **0 V** when absolutely no light is striking the photoreceiver.)

NOTICE: Always measure with the tester in voltage measurement mode (V mode). Measuring in resistance mode (Ω mode) would destroy the sensor

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Inspection

Inspection if the monitor continues showing an abnormality display and does not flash when the diagnostic switch is switched ON.

This inspection is performed only when the following functions are provided: a function to check the lamp when the starter switch is turned ON, a function to indicate diagnostic trouble codes by flashing the warning lamp on the monitor.

8. Check the OBD system.
9. Turn OFF the starter switch.
10. Connect the digital multi-meter between the DLC diagnostic switch terminal and ground.
11. Turn ON the starter switch.
12. Check if the indicated digital multi-meter voltage is at least the standard value.

Standard value: **18 V**

13. If it is below the standard value, use a digital multi-meter to inspect the diagnostic switch circuit between the ECM and DLC.

- There must be no disconnection or high resistance.

Standard value: **100 Ω**

- There must be no short circuit to ground.

Standard value: **10 M Ω**

14. Repair if a problem is discovered.
15. Turn OFF the starter switch.
16. Confirm that there is continuity between the DLC body ground and GND.
17. Turn ON the starter switch.
18. Short the DLC.

NOTICE: Short the No.4 terminal and No.12 terminal.

19. Check if the monitor is blinking.

NOTICE: If it does not blink, inspect the monitor blinking circuit system.

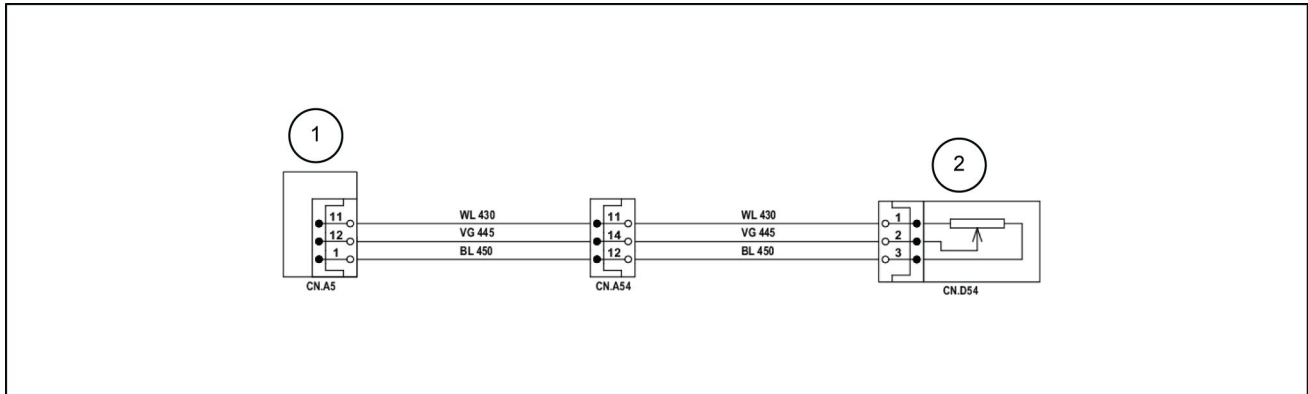
20. Replace the ECM.
21. Set the injector ID code and engine serial number in the ECM.
22. Turn ON the starter switch.
23. Short the DLC body ground terminal and diagnostic switch terminal.
24. Check if the monitor is blinking.
25. Perform the OBD system check.

7023-Arm-in pressure sensor signal abnormality

Control Module : MCM

Solution:

1. Use the below image for the fault code resolution process:



LPIL12CX02640EB 1

1. Computer B
2. Arm in pressure sensor
Turn ON the key switch.
Inspect the connection status of each connector. Make sure that all the connectors are secured.
 - A. If Diagnostic Trouble Code 7023 is displayed, proceed to Step 2.
2. Check the arm-in pressure sensor **(2)** voltage on the service support screen.
 - A. If the voltage is more than or equal to **4.75 V**, proceed to Step 3.
 - B. If the voltage is equal or lesser than **0.25 V**, proceed to Step 6.
3. Turn OFF the key switch and disconnect the arm-in pressure sensor connector **CN.D54**.
Turn ON the key switch.
Measure the voltage between the ground and terminal 1 of the arm-in pressure sensor connector **CN.D54** harness side.
 - A. If the voltage is not about **5 V**, replace the wire ID WL430.
 - B. If the voltage is about **5 V**, proceed to Step 4.
4. Measure the voltage between the ground and terminal 2 of the arm-in pressure sensor connector **CN.D54** harness side.
 - A. If the voltage is more than **4.75 V**, replace the the wire ID VG445.
 - B. If the voltage is equal or lesser than **4.75 V**, proceed to Step 5.
5. Measure the voltage between the ground and terminal 3 of the arm-in pressure sensor connector **CN.D54** harness side.
 - A. If the voltage is more than **0.25 V**, replace the wire ID BL450.
 - B. If the voltage is equal or lesser than **0.25 V**, replace computer B **(1)**.
6. Turn OFF the key switch.
Disconnect the arm-in pressure sensor connector **CN.D54**.

B. If there is continuity, replace the wire ID L904.

4. Turn OFF the key switch and disconnect the P1 flow control proportional valve connector **CN.D40**.

Inspect for continuity between the terminals 1 and 2 of the P1 flow control proportional valve connector **CN.D40** flow control proportional valve side.

A. If there is no continuity, replace P1 flow control proportional valve **(6)**.

B. If there is continuity, proceed to Step 5.

5. Disconnect the cab main harness connector **CN.A56**.

Inspect for continuity between the terminal 1 of the P1 flow control proportional valve connector **CN.D40** male side and terminal 3 of the cab main harness connector **CN.A56** female side.

A. If there is no continuity, find and repair or replace the open circuit on the wire ID L904 between P1 flow control proportional valve connector **CN.D40** and cab main harness connector **CN.A56**.

B. If there is continuity, proceed to Step 6.

6. Inspect for continuity between the terminal 2 of the P1 flow control proportional valve connector **CN.D40** male side and terminal 11 of the cab main harness connector **CN.A56** female side.

A. If there is no continuity, repair or replace the open circuit on the wire ID BL905 between the P1 flow control proportional valve connector **CN.D40** and cab main harness connector **CN.A56**.

B. If there is continuity, proceed to Step 7.

7. Disconnect Computer A connector **CN.A3**.

Inspect for continuity between the terminal 3 of the cab main harness connector **CN.A56** male side and Computer A connector **CN.A3** female side.

A. If there is no continuity, find and repair or replace the open circuit on the wire ID L904 between the cab main harness connector **CN.A56** and Computer A connector **CN.A3**.

B. If there is continuity, proceed to Step 8.

8. Inspect for continuity between the terminal 11 of the cab main harness connector **CN.A56** male side and Computer A connector **CN.A3** female side.

A. If there is no continuity, find and repair or replace the open circuit on the wire ID BL905 between the cab main harness connector **CN.A56** and Computer A connector **CN.A3**.

B. If there is continuity, replace computer A **(1)**.

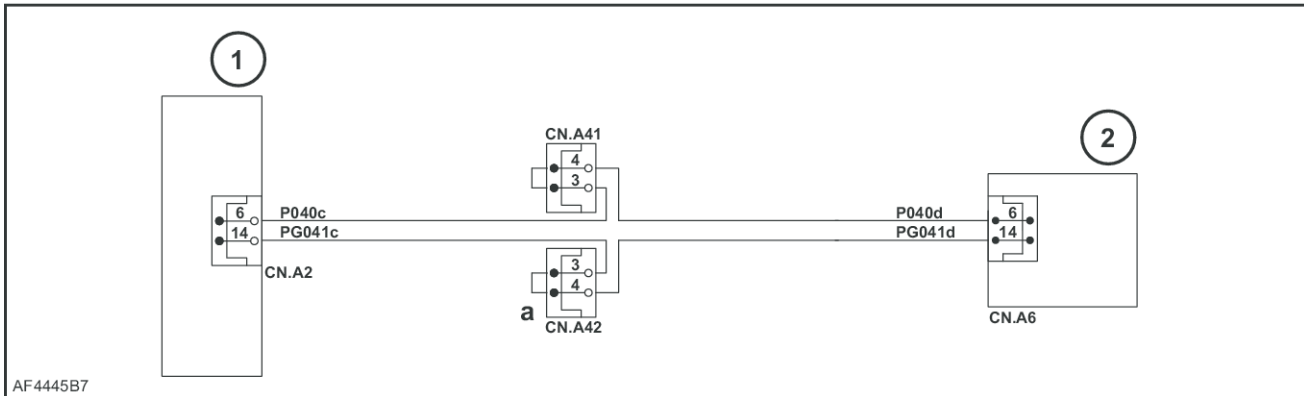
Wiring harnesses - Electrical schematic sheet 13 (55.100) Wiring harnesses - Electrical schematic sheet 20 (55.100) Wiring harnesses - Electrical schematic sheet 21 (55.100) Wiring harnesses - Electrical schematic sheet 22 (55.100)

7611-Computer A communication abnormality

Control Module : MCM

Solution:

1. Use the below image for the fault code resolution process:



AF4445B7 1

- | | |
|---------------|----------------------|
| 1. Computer A | a. CAN communication |
| 2. Computer B | |

Turn ON the key switch.

A. If Diagnostic Trouble Code 7611 is displayed, proceed to Step 2.

2. Inspect for connector A, connector B connection condition on Controller A.

Check whether diagnostic trouble codes 7602 is displayed at the same time.

A. If Diagnostic Trouble Code 7602 is displayed at the same time, inspect for connector **CN.A5 - CN.A8** condition state on Controller B.

B. If Diagnostic Trouble Code 7602 is not displayed at the same time, proceed to Step 3.

3. Turn OFF the key switch and disconnect the connector **CN.A2** and **CN.A6**.

Inspect for continuity between terminal 6 of the connector **CN.A2** harness side and terminal 6 of the connector **CN.A6** harness side.

A. If there is no continuity, repair or replace the open circuit.

B. If there is continuity, proceed to Step 4.

4. Inspect for continuity between terminal 14 of the connector **CN.A2** harness side and terminal 14 of the connector **CN.A6** harness side.

A. If there is no continuity, find and repair the open circuit.

B. If there is continuity, replace the computer A (1).

Wiring harnesses - Electrical schematic sheet 20 (55.100) Wiring harnesses - Electrical schematic sheet 19 (55.100) Wiring harnesses - Electrical schematic sheet 18 (55.100)

P0193-Fuel rail pressure sensor, high input

Control Module : ECM

Solution:

1. Check and diagnose the below fault codes before you proceed with the diagnostics of P0193:

Diagnostic Trouble Code P0641

2. Turn OFF the key switch.

Disconnect the harness connector **CN.E6** from the fuel rail pressure sensor.

Turn ON the key switch.

Measure the voltage between the fuel rail pressure sensor signal circuit and a normal ground.

If the voltage is more than or equal to **5.5 V**, inspect to see if there is a short circuit to the battery or ignition power supply with the signal circuit between the ECM and the fuel rail pressure sensor.

A. If a problem is found, repair the signal circuit.

B. If there are no problems, proceed to Step 3.

3. Measure the voltage between the fuel rail pressure sensor signal circuit and normal ground.

If the voltage is more than or equal to **4.5 V**, inspect to see if there is a short circuit to the **5 V** power supply circuit with the signal circuit between the ECM and the fuel rail pressure sensor.

A. If a problem is found, repair the signal circuit.

B. If there are no problems, proceed to Step 4.

4. Connect the test cable with fuse between the fuel rail pressure sensor signal circuit and ground circuit.

Check the fuel rail pressure sensor display with the trouble diagnosis scan tool.

If the voltage is equal or lesser than **0.1 V**, inspect to see if there is poor connection with the fuel rail pressure sensor harness connector **CN.E6**.

A. If a problem is found, repair the harness connector **CN.E6**.

B. If the harness connector **CN.E6** is normal, replace the fuel pressure sensor. (Refer to “**Common rail pressure sensor - Remove (55.010)**” and “**Common rail pressure sensor - Install (55.010)**”)

C. If there are no problems, proceed to Step 5.

5. Inspect to see if there is an open circuit or high resistance in the ground circuit between the ECM and the fuel rail pressure sensor.

NOTE:

- *The fuel pressure sensor shares the ground circuit with other sensors.*
- *The Diagnostic Trouble Code set on a sensor which shares this circuit may be detected.*

A. If a problem is found, repair the ground circuit.

B. If there are no problems, proceed to Step 6.

6. Inspect to see if there is an open circuit or high resistance in the signal circuit between the ECM and the fuel rail pressure sensor.

A. If a problem is found, repair the signal circuit.

B. If there are no problems, proceed to Step 7.

P0404-Exhaust gas recirculation valve control circuit

Control Module : ECM

Solution:

1. Inspect the motor drive circuit between the ECM and the EGR motor.
 - Make sure that there is no open circuit or high resistance between the ECM and the EGR motor.
 - Make sure that there is no short to ground between the ECM and EGR motor.
 - Make sure that there is no short to the power supply between the ECM and the EGR motor.
 - A. If a problem is found, repair the circuit.
 - B. If there are no problems, proceed to Step 2.
 2. Inspect the ECM power supply circuit.
 - A. If a problem is found, repair the repair the power supply circuit.
 - B. If there are no problems, proceed to Step 3.
 3. Inspect the ground circuit of the ECM.
 - A. If a problem is found, repair the repair the ground circuit.
 - B. If there are no problems, proceed to Step 4.
 4. Replace the EGR valve. (Refer to “ **Exhaust Gas Recirculation (EGR) valve - Remove (10.501)**” and “ **Exhaust Gas Recirculation (EGR) valve - Install (10.501)**”).
 5. Replace the ECM. (Refer to “ **Engine Control Unit (ECU) - Remove (55.015)**” and “ **Engine Control Unit (ECU) - Install (55.015)**”).
Set the injector identification code and the engine number on the ECM.
 6. Confirm resolution:
 1. Clear the Diagnostic Trouble Code using the trouble diagnosis scan tool.
 2. Turn OFF the key switch for **1 min** or longer.
 3. Start the engine.
 4. Perform a test-run while the target EGR valve position is stable.
 5. Use the trouble diagnosis scan tool to confirm that a Diagnostic Trouble Code has not been detected.
- Wiring harnesses - Electrical schematic sheet 10 (55.100) Wiring harnesses - Electrical schematic sheet 07 (55.100)**

P1112-Boost temperature sensor circuit low

Control Module : ECM

Solution:

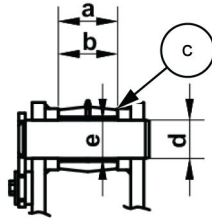
1. Check and diagnose the below fault codes before you proceed with the diagnostics code P1112.
Diagnostic Trouble Code P0651
2. Turn OFF the key switch.
Remove the harness connector **CN.E10** from the boost temperature sensor.
Check the boost temperature sensor display with the trouble diagnosis scan tool.
 - A. If the voltage is more than or equal to **4.5 V**, replace the boost temperature sensor. (Refer to “**Boost pressure sensor - Remove (55.014)**” and “**Boost pressure sensor - Install (55.014)**”)
 - B. If there are no problems, proceed to Step 3.
3. Inspect to see if there is a short circuit to the ground with the signal circuit between the ECM and boost temperature sensor.
 - A. If a problem is found, repair the signal circuit.
 - B. If there are no problems, proceed to Step 4.
4. Inspect the ECM harness connector **CN.D1-2** for a poor connection.
 - A. If a problem is found, repair the harness connector **CN.D1-2**.
 - B. If the harness connector **CN.D1-2** is normal, replace the ECM. (Refer to “**Engine Control Unit (ECU) - Remove (55.015)**” and “**Engine Control Unit (ECU) - Install (55.015)**”).
Set the injector identification code and the engine number on the ECM.
5. Confirm resolution:
 1. Clear the Diagnostic Trouble Code using the trouble diagnosis scan tool.
 2. Turn OFF the key switch for **1 min** or longer.
 3. Start the engine.
 4. Perform a test-run under the conditions for running the Diagnostic Trouble Code.
 5. Use the trouble diagnosis scan tool to confirm that a Diagnostic Trouble Code has not been detected.
Conditions for setting the Diagnostic Trouble Codes such as engine run time or coolant temperature, etc., vary depending on the Diagnostic Trouble Codes.

Wiring harnesses - Electrical schematic sheet 10 (55.100)

1. Clear the Diagnostic Trouble Code using the trouble diagnosis scan tool.
2. Turn OFF the key switch for **1 min** or longer.
3. Start the engine.
4. Perform a test-run under the conditions for running the Diagnostic Trouble Code.
5. Use the trouble diagnosis scan tool to confirm that a Diagnostic Trouble Code has not been detected.
Conditions for setting the Diagnostic Trouble Codes such as engine run time or coolant temperature, etc., vary depending on the Diagnostic Trouble Codes.

Wiring harnesses - Electrical schematic sheet 05 (55.100) Wiring harnesses - Electrical schematic sheet 06 (55.100)

7. Arm and bucket cylinder installation section



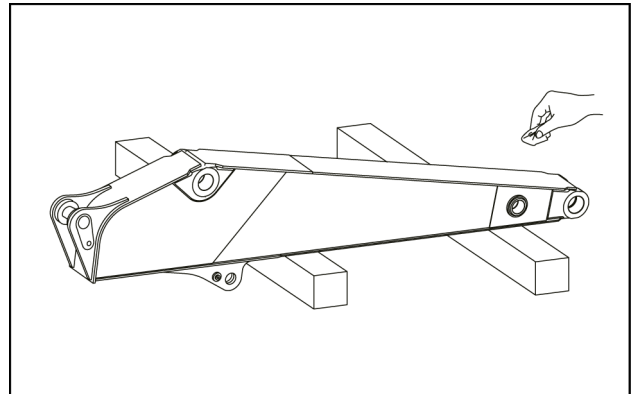
SMIL13CEX3111EB 8

Part name	Code	Standard value	Usage limits	Judgment	Solution
Arm	a	141 mm (5.55 in)	147 mm (5.79 in)	Acceptable/ Unacceptable	Replacement
Bucket cylinder (foot section)	b	140 mm (5.51 in)	138 mm (5.43 in)	Acceptable/ Unacceptable	Replacement
Clearance	c	1.2 mm (0.047 in) max.	Shim adjustment	Acceptable/ Unacceptable	Adjustment with shims
Pin	d	Ø110 mm (4.331 in)	Ø109 mm (4.291 in)	Acceptable/ Unacceptable	Replacement
Bushing (bucket cylinder)	e	Ø110 mm (4.331 in)	Ø111.5 mm (4.390 in)	Acceptable/ Unacceptable	Replacement

Dipper - Install

- When installing the bolts, tighten them to the specified torque.
- When the torque is not specified, check the **Torque - Bolt and nut ()**.

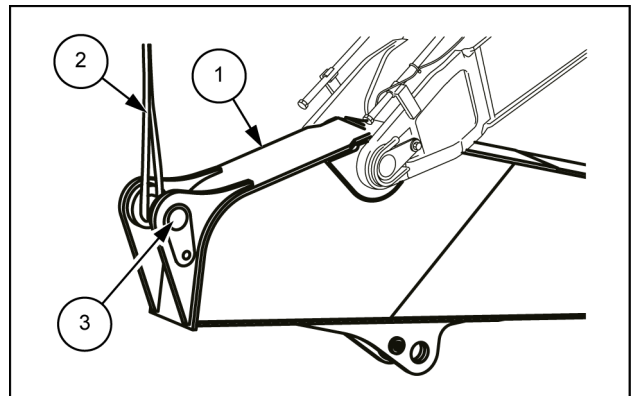
1. Clean each pin and pin hole.



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2. Bring the arm (1) end in contact with the ground and use a lifting equipment and nylon sling (2) to fasten it.

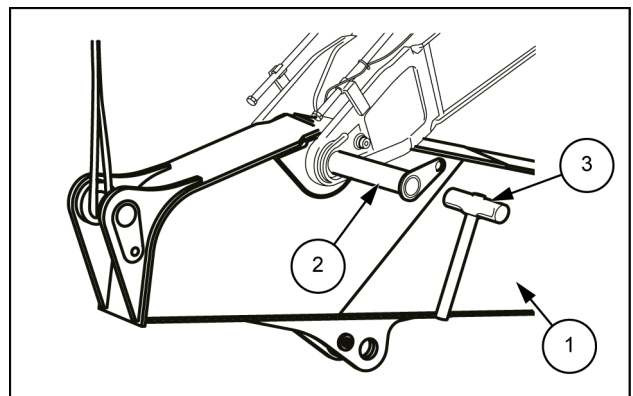
At this time, insert the arm cylinder pin (3) and fasten with the nylon sling.



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3. Align the arm (1) with the boom, use a hammer (3) to push in the pin (2), and then install the arm (1).

- If the pin is hard to insert, there is a load on the pin.
- When inserting the pin, be careful not to damage the installed dust seals.



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