CX370C
CX380C
Crawler Excavator

SERVICE MANUAL

Part number 51541050
English
October 2018

CASE
CONSTRUCTION

	for Thailand, Indonesia, Laos, Cambodia, Myanmar	**33900 kg** (**74736.707 lb**)
	Operating mass - (operator mass [**75 kg** (**165.35 lb**)] + **90%** of fuel mass [**430 kg** (**947.99 lb**)] + bucket mass [**1709 kg** (**3767.700 lb**)])	
Counter weight mass	**7400 kg** (**16314.207 lb**)	
Ground pressure	**0.073 MPa** (**10.5886 psi**)	
	with **3.25 m** (**10.663 ft**) HD Arm, **1.6 m³** Sumitomo HD Bucket, **600 mm** (**23.622 in**) grouser shoe	
	with **2.63 m** (**8.629 ft**) HD Arm, **1.6 m³** Sumitomo HD Bucket, **600 mm** (**23.622 in**) grouser shoe	

Digging force (with 1.6 m³ HD Bucket) (ISO 6015)

	[**2.63 m** (**8.6286 ft**)] HD Arm	[**2.21 m** (**7.2507 ft**)] HD Arm	[**3.25 m** (**10.6627 ft**)] HD Arm
Arm digging force	**196 kN** (**44062.553 lb**)	**228 kN** (**51256.439 lb**)	**165 kN** (**37093.476 lb**)
With auto power up	**213 kN** (**47884.305 lb**)	**248 kN** (**55752.618 lb**)	**179 kN** (**40240.801 lb**)
Bucket digging force	**232 kN** (**52155.675 lb**)	**232 kN** (**52155.675 lb**)	**232 kN** (**52155.675 lb**)
With auto power up	**252 kN** (**56651.854 lb**)	**252 kN** (**56651.854 lb**)	**252 kN** (**56651.854 lb**)

Dimensions

	[**2.63 m** (**8.6286 ft**)] HD Arm	[**2.21 m** (**7.2507 ft**)] HD Arm	[**3.25 m** (**10.6627 ft**)] HD Arm
Overall length (without attachment)	**5850 mm** (**230.315 in**)	**5850 mm** (**230.315 in**)	**5850 mm** (**230.315 in**)
Overall length (with attachment)	**11230 mm** (**442.126 in**)	**11350 mm** (**446.850 in**)	**11140 mm** (**438.583 in**)
Overall height (with attachment)	**3640 mm** (**143.307 in**)	**3650 mm** (**143.701 in**)	**3420 mm** (**134.646 in**)
Overall height (to top of head guard - opt)	**3260 mm** (**128.346 in**)	**3260 mm** (**128.346 in**)	**3260 mm** (**128.346 in**)
Cab height	**3140 mm** (**123.622 in**)	**3140 mm** (**123.622 in**)	**3140 mm** (**123.622 in**)
Upper structure overall width	**3120 mm** (**122.835 in**)	**3120 mm** (**122.835 in**)	**3120 mm** (**122.835 in**)
Swing (rear end) radius	**3550 mm** (**139.764 in**)	**3550 mm** (**139.764 in**)	**3550 mm** (**139.764 in**)
Clearance height under upper structure	**1200 mm** (**47.244 in**)	**1200 mm** (**47.244 in**)	**1200 mm** (**47.244 in**)
Minimum ground clearance	**470 mm** (**18.504 in**)	**470 mm** (**18.504 in**)	**470 mm** (**18.504 in**)
Wheel base (Center to center of wheels)	**3720 mm** (**146.457 in**)	**3720 mm** (**146.457 in**)	**3720 mm** (**146.457 in**)
Crawler overall length	**4650 mm** (**183.071 in**)	**4650 mm** (**183.071 in**)	**4650 mm** (**183.071 in**)
Track gauge	**2600 mm** (**102.362 in**)	**2600 mm** (**102.362 in**)	**2600 mm** (**102.362 in**)
Undercarriage overall width [with **600 mm** (**23.622 in**) shoes]	**3200 mm** (**125.984 in**)	**3200 mm** (**125.984 in**)	**3200 mm** (**125.984 in**)
Crawler tracks height	**1090 mm** (**42.913 in**)	**1090 mm** (**42.913 in**)	**1090 mm** (**42.913 in**)

Working ranges

	[**2.63 m** (**8.6286 ft**)] HD Arm	[**2.21 m** (**7.2507 ft**)] HD Arm	[**3.25 m** (**10.6627 ft**)] HD Arm
Boom length	**6450 mm** (**253.937 in**)	**6450 mm** (**253.937 in**)	**6450 mm** (**253.937 in**)
Bucket radius	**1680 mm** (**66.142 in**)	**1680 mm** (**66.142 in**)	**1680 mm** (**66.142 in**)
Bucket wrist action	**173°**	**173°**	**173°**
Maximum reach at GRP	**10470 mm** (**412.205 in**)	**9990 mm** (**393.307 in**)	**10980 mm** (**432.283 in**)
Maximum reach	**10670 mm** (**420.079 in**)	**10200 mm** (**401.575 in**)	**11170 mm** (**439.764 in**)
Max. digging depth	**6730 mm** (**264.961 in**)	**6300 mm** (**248.031 in**)	**7340 mm** (**288.976 in**)
Max. digging height	**10320 mm** (**406.299 in**)	**9850 mm** (**387.795 in**)	**10370 mm** (**408.268 in**)
Max. dumping height	**7140 mm** (**281.102 in**)	**6770 mm** (**266.535 in**)	**7230 mm** (**284.646 in**)

	Weight or Quantity
Link	1 set
Shoe	48
Bolt	192
Nut	192

Upper component

Swing unit

Swing motor assembly		
Swing motor		
	Manufacturer	Kawasaki Precision Machinery Ltd.
	Motor type	Fixed displacement piston motor
		With parking brake
	Intake amount	**180.1 cm³/rev** (**10.99 in³/rev**)
	Operating pressure	**30.4 MPa** (**4410 psi**)
	Operating flow	**290 l/min** (**290.0000 US gpm**)
	Mechanical brake torque	**1010.8 N·m** (**745.528 lb ft**) min.
	Brake off pressure	**3.1 MPa** (**450 psi**) or less
	Relief valve set pressure	**30.4 MPa** (**4410 psi**)
	Weight	**75 kg** (**165.347 lb**)
Swing reduction gear		
	Reduction gear type	Planetary gear 2-stage reduction gear
	Weight	**360.8 kg** (**795.4278 lb**)
Turntable bearing		
	Number of teeth	92
	Weight	**540 kg** (**1190.496 lb**)
Counterweight		
	Weight	**7400 kg** (**16314.207 lb**)

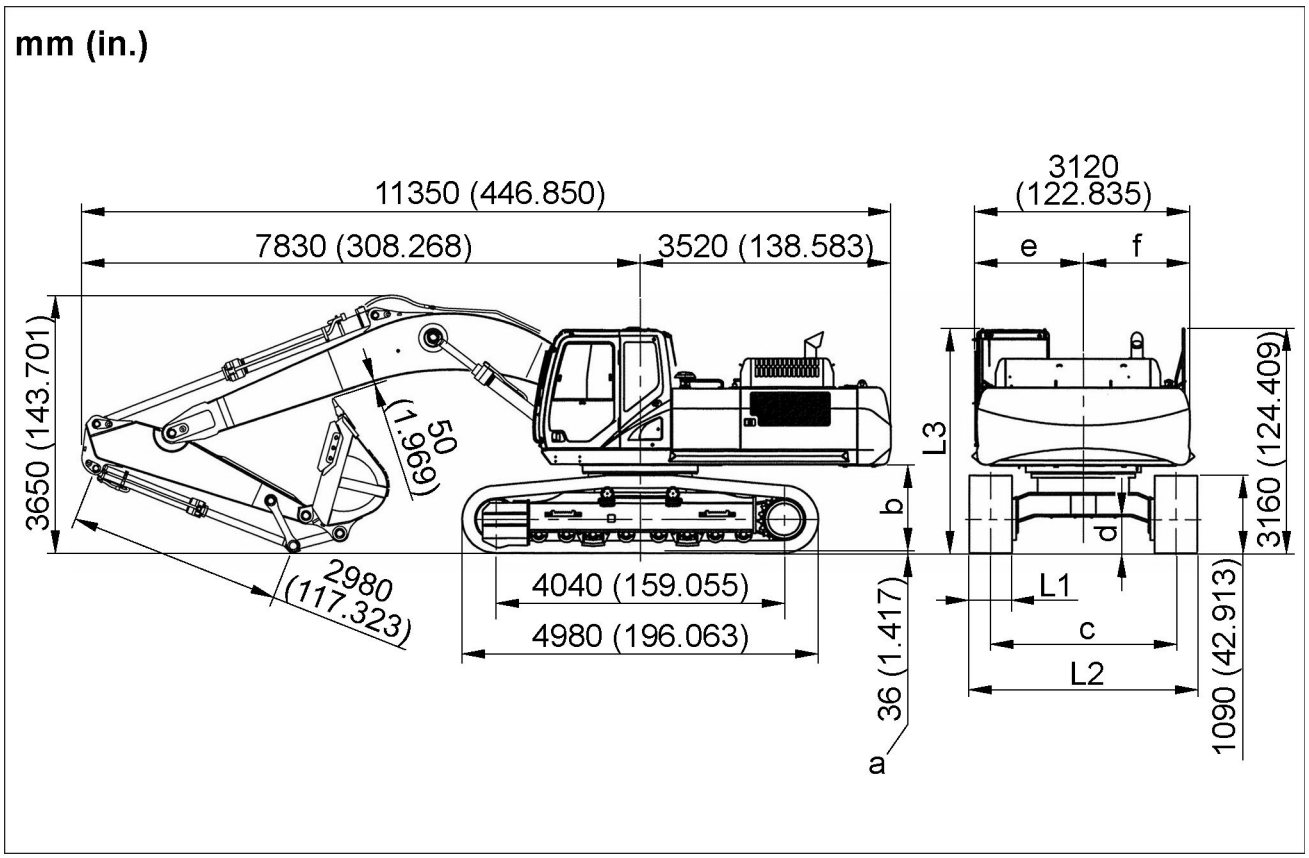
Engine-related

Engine

Engine model name	Isuzu 6HK1X diesel engine
Engine type	4-cycle, water-cooled, overhead camshaft type straight cylinder, direct fuel injection type (electronic control)
Number of cylinders-bore-stroke	6 - ∅**115 mm** (**4.53 in**) - **125 mm** (**4.92 in**)
Total displacement	**7.79 l** (**7.7900 US gal**)
Compression ratio	17.5
Rated output	**200 kW** (**271.92 Hp**) / **2000 RPM**
Maximum torque	**983 N·m** (**725.02 lb ft**) / about **1500 RPM**
Fuel consumption ratio	**236.6 g/kWh**
Engine dry weight	About **628 kg** (**1384.503 lb**)
Engine dimension	L **1362 mm** (**53.622 in**) - W **995.4 mm** (**39.189 in**) - H **1162.5 mm** (**45.768 in**)
Cooling fan	∅**850 mm** (**33.465 in**) - suction type - 6 vanes, plastic and steel
	With bell mouth-type fan guide
Pulley ratio	0.9 (reduction)
Charging generator	**24 V 50 A** AC type
Starter motor	**24 V 5 kW** (**6.8 Hp**) reduction type
Coolant capacity	**14.5 l** (**14.500 US gal**)
Oil pan capacity	Max: **38 l** (**38.000 US gal**) Min: **28 l** (**28.000 US gal**)
Direction of rotation	Right (viewed from fan side)
	Compliant with JISD 0006-2010

Ultra-short arm [2.21 m (7.2507 ft)]

NOTE: *Numbers are subject to change without notice due to design change or other reason.*
The diagrams give values that include the shoe lug height "a" [***36 mm*** *(****1.417 in****)].*



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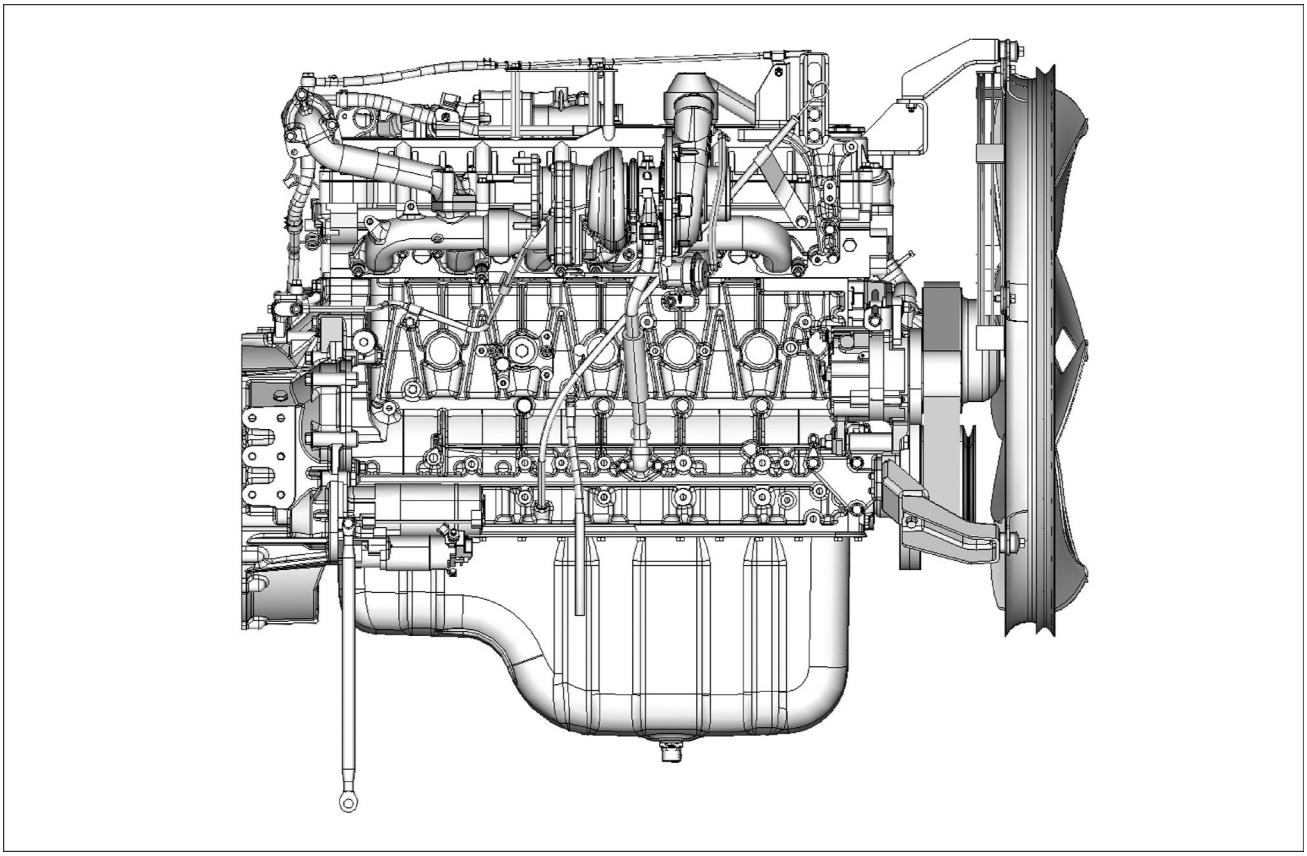
NOTE: *All the dimensions in figure are in mm (in).*

b **1200 mm** (**47.244 in**)
c **2600 mm** (**102.362 in**)
d **470 mm** (**18.504 in**)
e **1560 mm** (**61.417 in**)
f **1560 mm** (**61.417 in**)

L1	STANDARD	**600 mm** (**23.622 in**)
	OPTION1	**700 mm** (**27.559 in**)
	OPTION2	**800 mm** (**31.496 in**)
L2	STANDARD	**3200 mm** (**125.984 in**)
	OPTION1	**3300 mm** (**129.921 in**)
	OPTION2	**3400 mm** (**133.858 in**)
L3	STANDARD (NO EQUIPMENT)	**3140 mm** (**123.622 in**)
	WITH HEAD GUARD FOPS L2	**3260 mm** (**128.346 in**)

Engine - External view

Engine structural diagram



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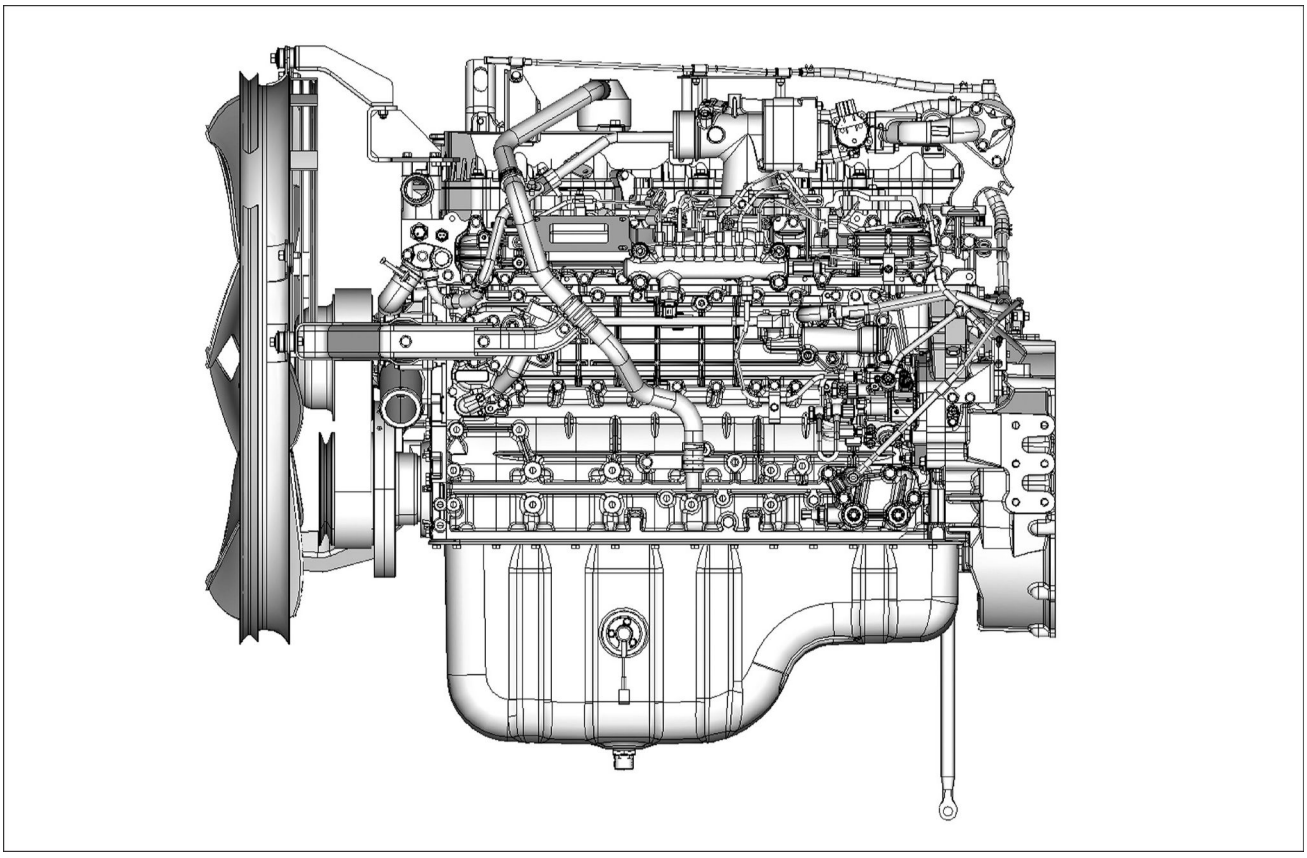

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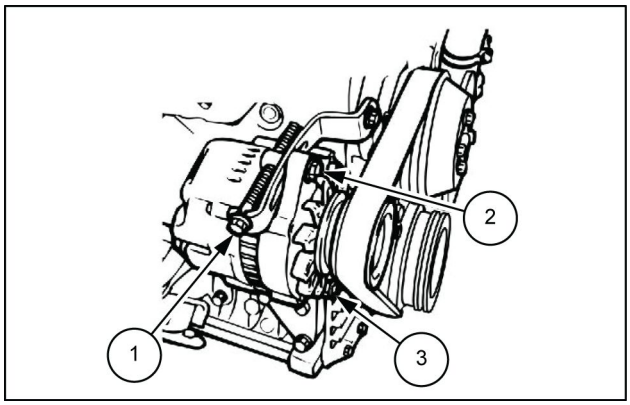
Drive belt removal

1. Remove the drive belt from the engine assembly.

    1. Adjust bolt
    2. Fixing bolt
    3. Fixing bolt



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Crankshaft pulley removal

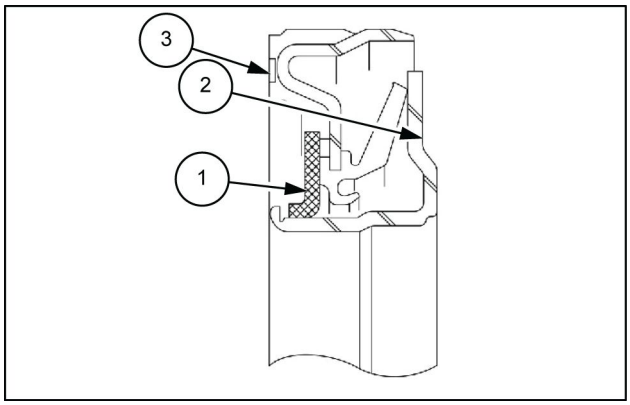
1. Remove the crankshaft pulley from the crankshaft.
2. Remove the crankshaft damper from the crankshaft pulley.

Crankshaft front oil seal removal

1. Remove the crankshaft front oil seal **(3)** from the timing gear case.

NOTICE: *Be careful not to damage the oil seal pressfitting surface of the timing gear case.*

    1. Felt
    2. Slinger



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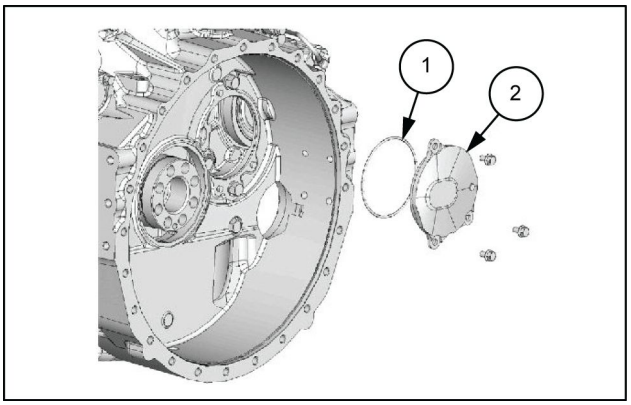
11. Install the O-ring **(1)** to the cover **(2)**.
12. Install the cover **(2)** to the flywheel housing.



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13. Install the oil pipe **(1)** to the pipe bracket **(2)** and the oil port cover.

    Tightening torque: **34 N·m** (**25 lb ft**) pipe bracket side

    Tightening torque: **28 N·m** (**21 lb ft**) oil port cover side

    Tightening torque: **24 N·m** (**18 lb ft**) clip

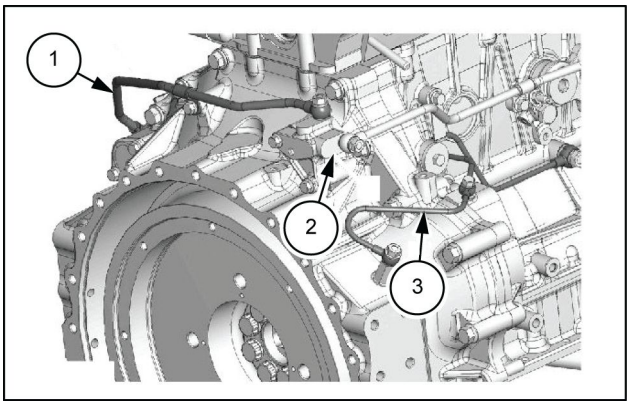
14. Install the PTO oil pipe **(3)** to the flywheel housing and the cylinder block.

    Tightening torque: **34 N·m** (**25 lb ft**) flywheel housing side

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

    Tightening torque: **41 N·m** (**30 lb ft**) cylinder block side

    Tightening torque: **24 N·m** (**18 lb ft**) clip



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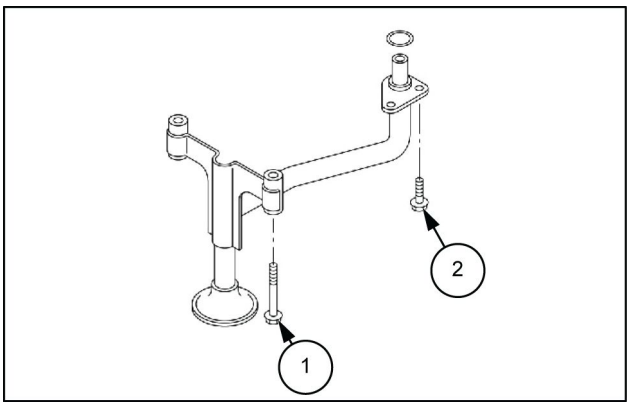
Oil strainer installation

1. Install the O-ring to the oil strainer.
2. Install the oil strainer to the crankcase.

    Tightening torque: **24 N·m** (**18 lb ft**) **M8** bolt **(2)**

    Tightening torque: **48 N·m** (**35 lb ft**) **M10** bolt **(1)**



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Engine oil pan - Remove

Battery ground cable disconnect

1. Disconnect the battery ground cable from the battery.

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

Engine oil drain

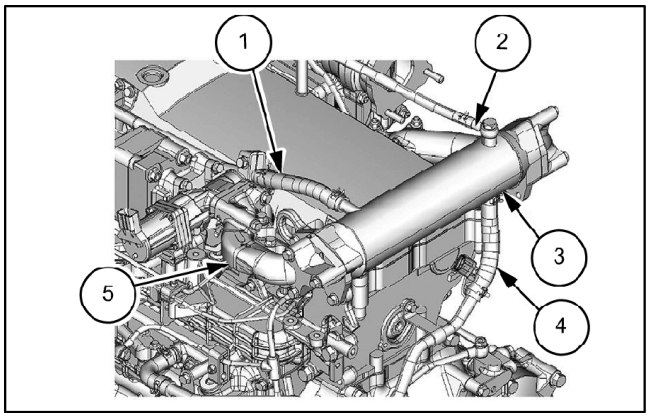
1. Remove the drain plug from the oil pan.
2. Drain the engine oil from the oil pan.
3. Install the drain plug to the oil pan.

   Tightening torque: **70 N·m** (**52 lb ft**)

Oil pan removal

1. Disconnect the harness connector from the oil level switch.
2. Remove the oil pan from the crankcase.
3. Remove the gasket from the oil pan.

3. Disconnect the rubber water hose **(1)**, and **(4)** from the EGR cooler **(3)**.
4. Disconnect the EGR cooler **(3)** from EGR pipe B **(5)**.
5. Remove the EGR cooler **(3)** from the EGR cooler bracket.



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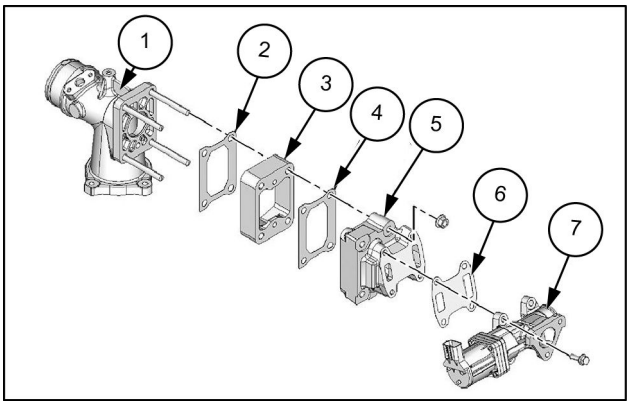
2. Air leak pipe

EGR valve removal (if equipped)

1. Remove EGR pipe B from the EGR valve **(7)**.
2. Disconnect the harness connector from the EGR valve **(7)**.
3. Remove the EGR valve **(7)** from the reed valve duct **(5)**.

NOTICE: *After removing the EGR valve **(7)**, apply sealing to prevent entry of foreign matter.*



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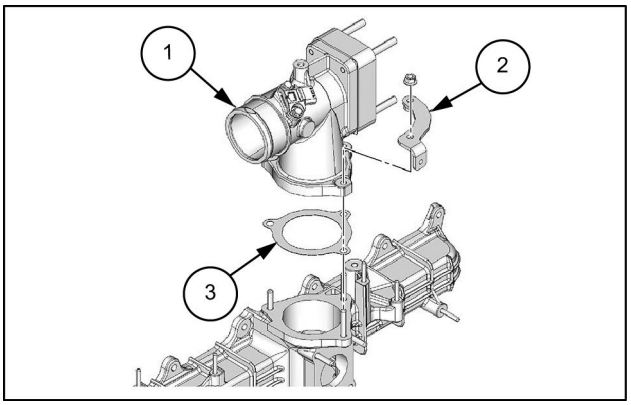
4. Remove the reed valve duct **(5)** from the case **(3)** and inlet pipe **(1)**.



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2. Gasket
4. Gasket
6. Gasket

5. Disconnect the harness connector from the boost pressure/boost temperature sensor.
6. Remove the harness clip from the inlet pipe **(1)**.
7. Remove the inlet pipe **(1)** from the inlet cover.

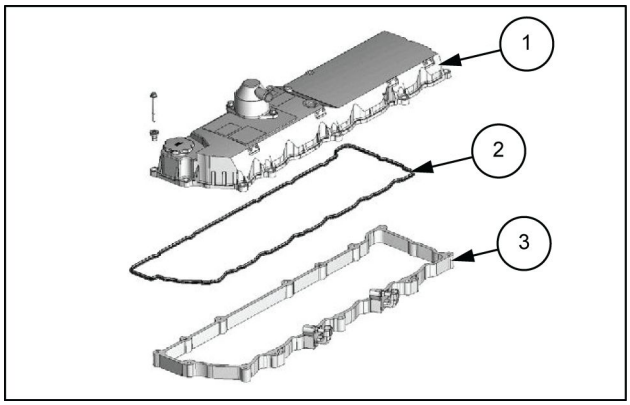
NOTE: *Remove the inlet pipe **(1)** and injection pipe bracket **(2)**.*

3. Gasket

Cylinder head cover installation

1. Align the head cover gasket **(2)** to the cylinder head cover **(1)**.
2. Install the cylinder head cover **(1)** to the lower cover **(3)**.

   Tightening torque: **13 N·m** (**115 lb in**)



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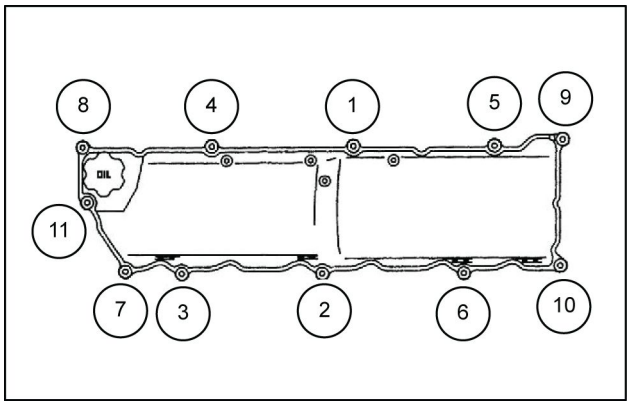
NOTE: *Referring to the tightening order in the diagram, temporarily tighten all bolts and then completely tighten them.*



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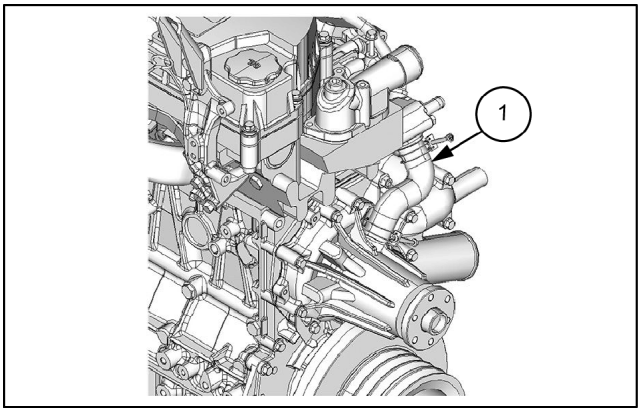
EGR cooler water pipe installation (if equipped)

1. Connect the water bypass hose **(1)** on the water pump assembly and water duct.



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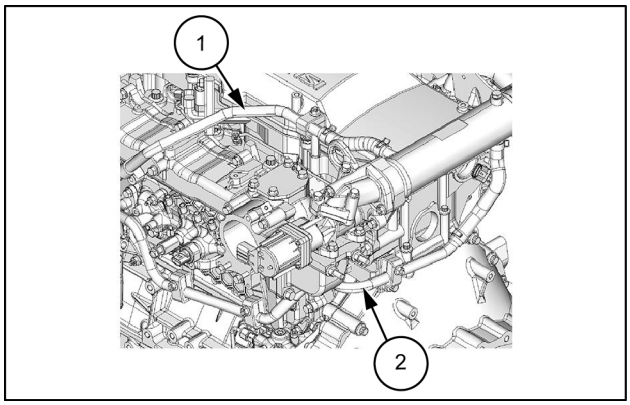
2. Install the EGR cooler water pipe **(1)**, and **(2)** on the engine assembly.

   Tightening torque: **20 N·m** (**14.75 lb ft**) Clamp
3. Connect the radiator upper hose to the water outlet pipe.



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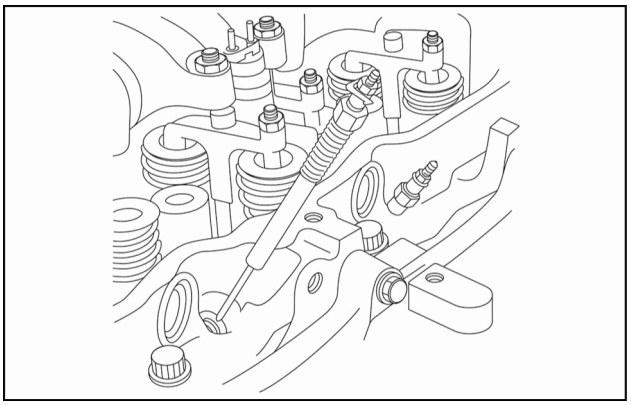
2. Remove the glow plug from the cylinder head assembly.



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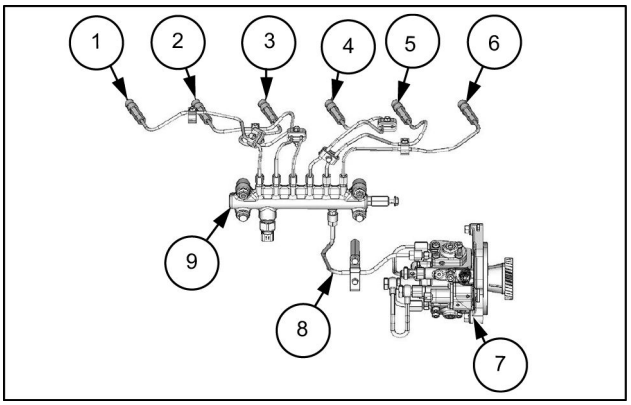
Injection pipe removal

1. Remove the clip from the inlet pipe.
2. Remove the injection pipe from the injector and the common rail assembly **(9)**.

NOTICE: *Do not reuse the removed injection pipe.*

NOTICE: *Seal the common rail **(9)** and injector to prevent foreign material from entering.*



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1. Injection pipe 1
2. Injection pipe 2
3. Injection pipe 3
4. Injection pipe 4
5. Injection pipe 5
6. Injection pipe 6
7. Fuel supply pump
8. Fuel pipe

Fuel pipe removal

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

NOTE: *Remove the clip.*

NOTICE: *Do not reuse the removed fuel pipe.*

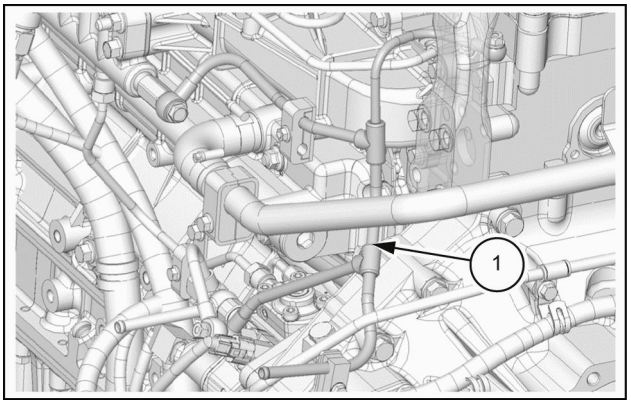
Fuel leak off pipe assembly removal

1. Disconnect the fuel leak-off pipe **(1)** from the cylinder head.
2. Remove the fuel leak-off pipe **(1)** from the fuel supply pump.

NOTE: *Remove the eyebolt tightened together with the fuel feed pipe.*

3. Disconnect the fuel leak-off pipe **(1)** from the common rail assembly.
4. Remove the fuel leak-off pipe **(1)** from the inlet pipe.

NOTE: *Remove the clip.*



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Camshaft installation

1. Align the first cylinder to the compression top dead center.
2. Apply the engine oil to the camshaft bearing.

NOTE: *Apply engine oil to the sliding surface of the bearing.*

NOTICE: *Clean the camshaft bearing and the bearing installation section of the cylinder head, and then apply engine oil.*

3. Install the camshaft bearing on the cylinder head assembly.

NOTE: *Before installing the camshaft on the cylinder head, rotate the sub-gear with a scissors gear spring wrench so that the spring force operating on the sub-gear does not affect the installation.*

4. Install the camshaft bearing to the cylinder head assembly.
5. Install the camshaft to the cylinder head assembly.

NOTE: *Mesh together the idle gear C and the camshaft gear so that the alignment mark on the camshaft gear matches the top surface of the cylinder head, and gently install the camshaft.*

NOTICE: *Align the alignment marks of the sub gear side.*

6. Check alignment mark of the camshaft gear.

NOTICE: *Confirm that the alignment mark is not misaligned before installing the camshaft bearing cap.*
If the alignment mark is not at the correct position, reinstall the camshaft.

7. Apply the engine oil to the camshaft bearing.

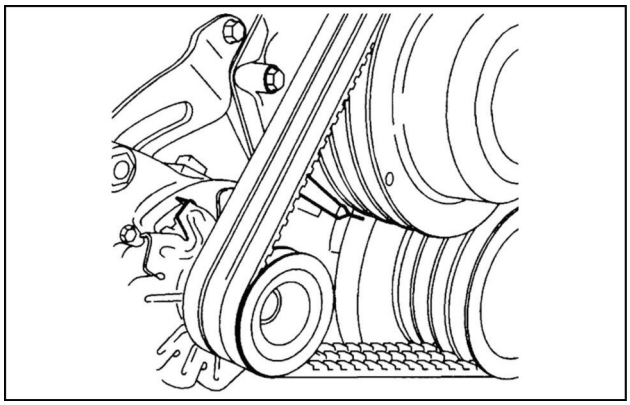
NOTE: *Apply engine oil to the sliding surface of the bearing.*

NOTICE: *Clean the camshaft bearing and the bearing installation section of the cylinder head, and then apply engine oil.*

8. Install the camshaft bearing to the camshaft bearing cap.
9. Install the camshaft bearing cap to the cylinder head assembly.

   Tightening torque: **28 N·m** (**21 lb ft**) Engine oil application

NOTE: *Turn the camshaft bearing cap so that the arrow mark on the top surface faces the engine front side, and assemble in numerical order.*



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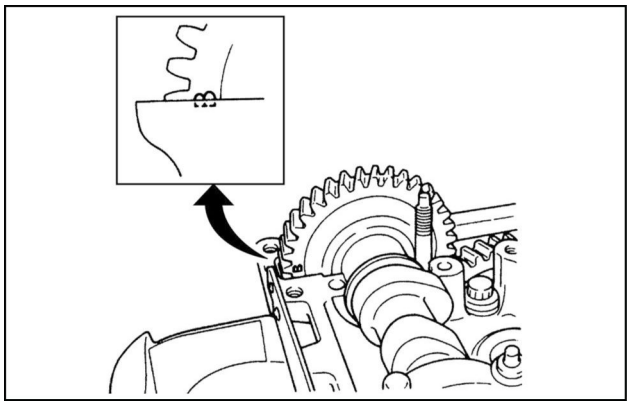

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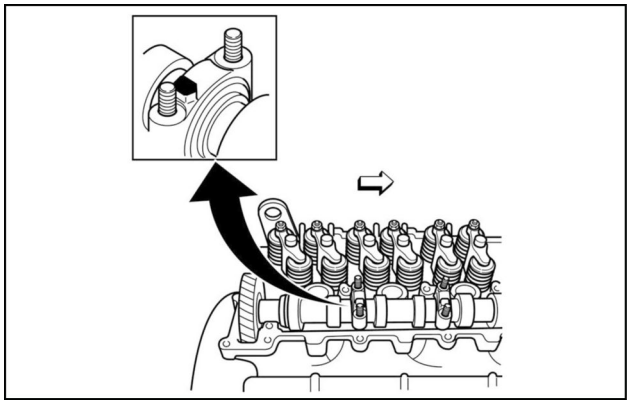

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Camshaft installation

1. Align the first cylinder to the compression top dead center.
2. Apply the engine oil to the camshaft bearing.

NOTE: *Apply engine oil to the sliding surface of the bearing.*

NOTICE: *Clean the camshaft bearing and the bearing installation section of the cylinder head, and then apply engine oil.*

3. Install the camshaft bearing to the cylinder head assembly.
4. Install the camshaft bearing on the cylinder head assembly.

NOTE: *Before installing the camshaft on the cylinder head, rotate the sub-gear with a scissors gear spring wrench so that the spring force operating on the sub-gear does not affect the installation.*

5. Install the camshaft to the cylinder head assembly.

NOTE: *Mesh together the idle gear C and the camshaft gear so that the alignment mark on the camshaft gear matches the top surface of the cylinder head, and gently install the camshaft.*

6. Check alignment mark of the camshaft gear.

NOTICE: *Confirm that the alignment mark is not misaligned before installing the camshaft bearing cap.*
If the alignment mark is not at the correct position, reinstall the camshaft.

7. Apply the engine oil to the camshaft bearing.

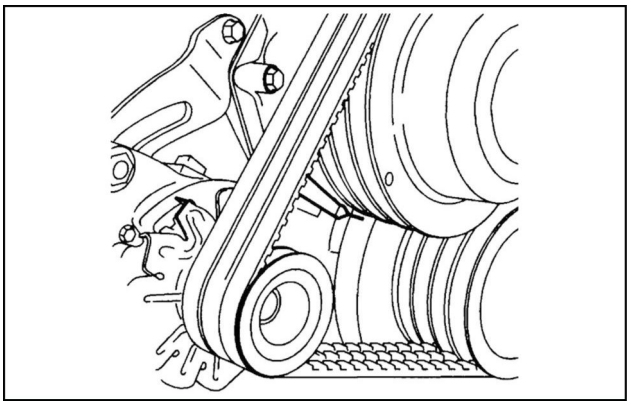
NOTE: *Apply engine oil to the sliding surface of the bearing.*

NOTICE: *Clean the camshaft bearing and the bearing installation section of the cylinder head, and then apply engine oil.*

8. Install the camshaft bearing to the camshaft bearing cap.
9. Install the camshaft bearing cap to the cylinder head assembly.

   Tightening torque: **28 N·m** (**21 lb ft**) Engine oil application

NOTE: *Turn the camshaft bearing cap so that the arrow mark on the top surface faces the engine front side, and assemble in numerical order.*



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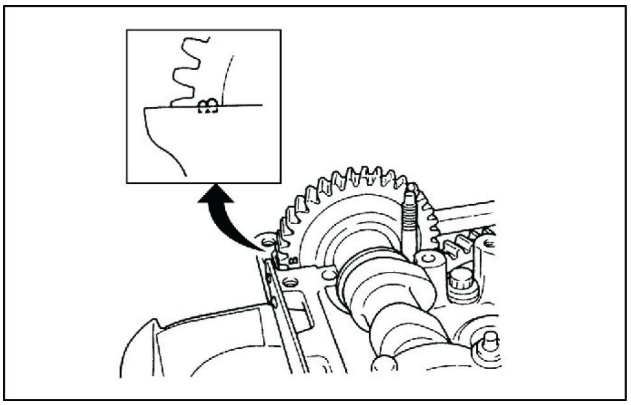
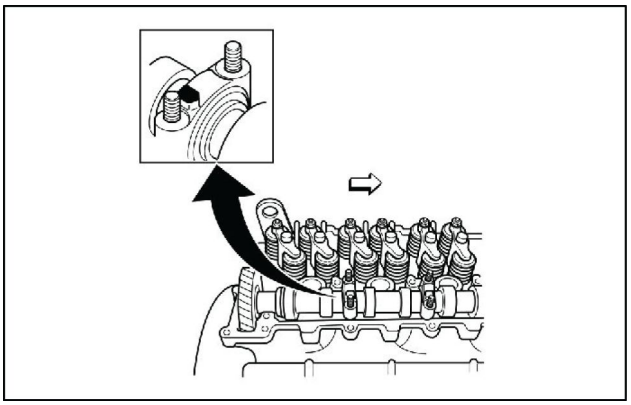


SMIL13CEX1686AA 7

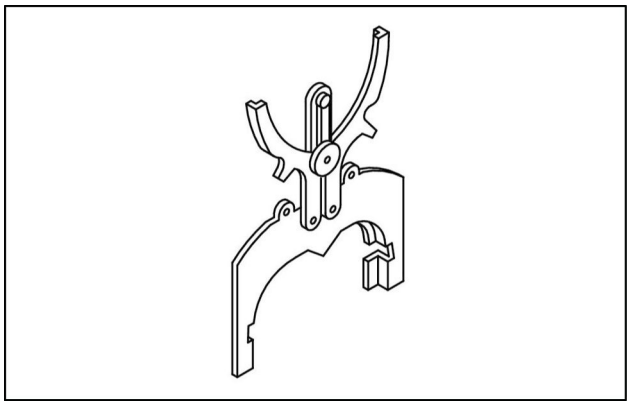


SMIL13CEX1687AA 8

9. Use the special tool to install the third ring to the piston.

NOTE: *Make the N mark point upward.*

Special tool: Piston ring setting tool (Refer to **Piston - Special tools (10.105)**)

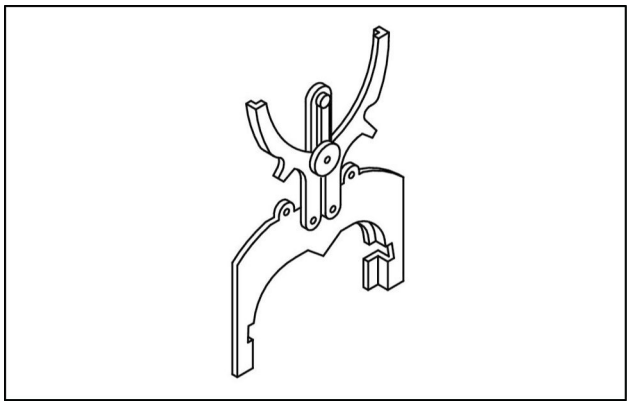


SMIL14CEX3362AA 4

10. Use the special tool to install the second ring to the piston.

NOTE: *Make the N mark point upward.*

Special tool: Piston ring setting tool (Refer to **Piston - Special tools (10.105)**)

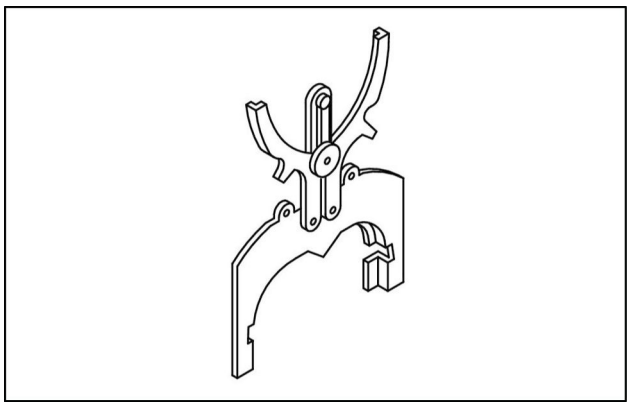


SMIL14CEX3362AA 5

11. Use the special tool to install the top ring to the piston.

NOTE: *Make the N mark point upward.*

Special tool: Piston ring setting tool (Refer to **Piston - Special tools (10.105)**)

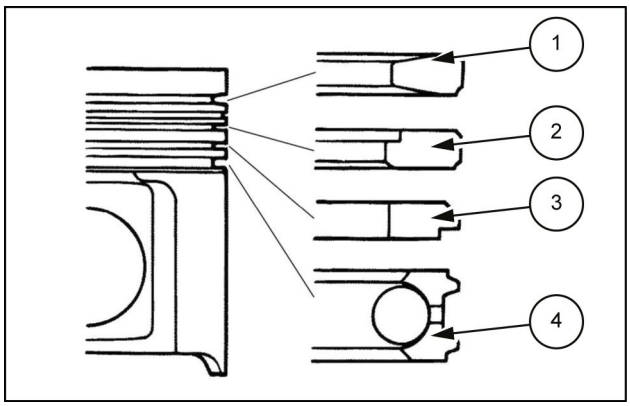


SMIL14CEX3362AA 6

12. Apply the engine oil to the piston ring.
13. Inspect the piston ring.

NOTE: *Confirm that the piston rings rotate smoothly.*

1. Top ring
2. Second ring
3. Third ring
4. Oil ring



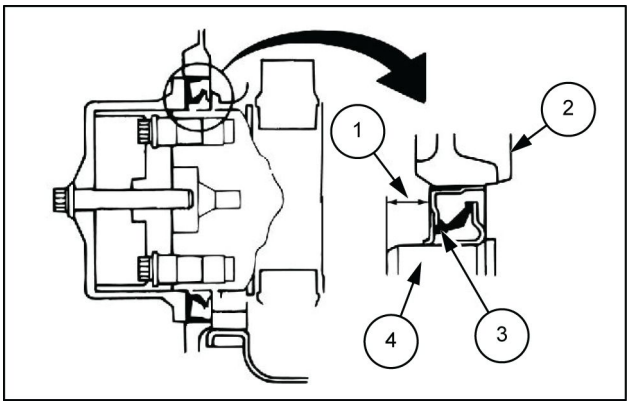
SMIL14CEX3368AB 7

14. Inspect the crankshaft front oil seal **(3)**.

    Standard value: **8.35 – 8.65 mm** (**0.33 – 0.34 in**)

NOTE: *Measure the dimension from the crankshaft **(4)** tip to the crankshaft front oil seal **(3)**.*

1. Oil seal press fitting dimensions
2. Timing gear case



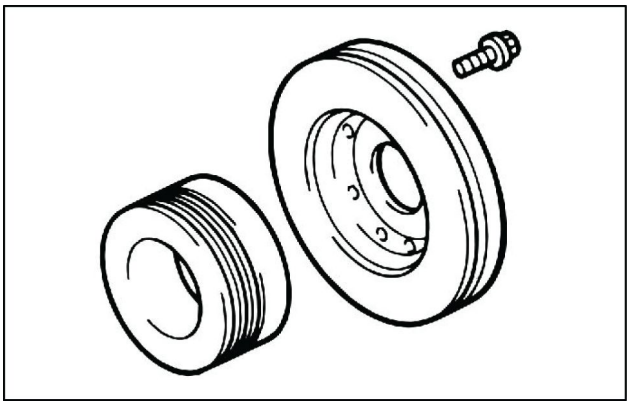
LPIL12CX03832AB 8

Crankshaft pulley installation

1. Install the crankshaft damper on the crankshaft pulley

   Tightening torque: **48 N·m** (**35 lb ft**)

NOTE: *Tighten the bolts on the diagonals.*



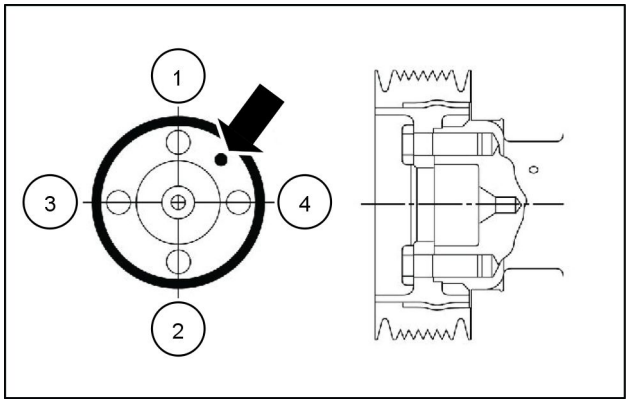
SMIL13CEX1679AA 9

2. Install the crankshaft pulley on the crankshaft.

   Tightening torque: **200 N·m** (**148 lb ft**) Bolt threaded sections
   Applying engine oil

NOTICE: *Be careful with the position of the crankshaft knock pin.*

NOTE: *Tightening order.*



SMIL13CEX1680AA 10

Drive belt installation

1. Install the drive belt on the engine assembly.

27. Remove the crankcase from the cylinder block.
28. Use the gauge to measure the plasti-gauge.

NOTE: *Measure the maximum width of the plasti-gauge.*

Crankshaft bearing oil clearance		
Journal section 3	Specified value	**0.093 – 0.124 mm** (**0.0037 – 0.005 in**)
	Limit value	**0.14 mm** (**0.0055 in**)
Other than journal section 3	Specified value	**0.063 – 0.094 mm** (**0.0025 – 0.004 in**)
	Limit value	**0.14 mm** (**0.0055 in**)

NOTE: *The following is the inspection method for the TUFFTRIDE layer on the crankshaft.*

⚠ WARNING

Hazardous chemicals!
Chemical agent may be harmful.
-Avoid contact with eyes, and prolonged/repeated skin contact.
-Wear protective goggles when handling.
-Eye contact: Flush with water for 15 minutes. Seek immediate medical assistance.
-Wash skin with soap and water after handling.
-Keep out of reach of children.
Failure to comply could result in death or serious injury.

W0370A

NOTICE: *The inspection solution is highly corrosive, so when the inspection is finished, immediately wipe it away and clean with water or steam.*

29. Clean the crankshaft using the organic solvent. Clean the crankshaft using the organic solvent.
30. Prepare the inspection solution.

    Provision concentration: **5 – 10%**

NOTE: *Dilute copper chloride ammonium solution to the specified concentration with distilled water and make inspection solution.*

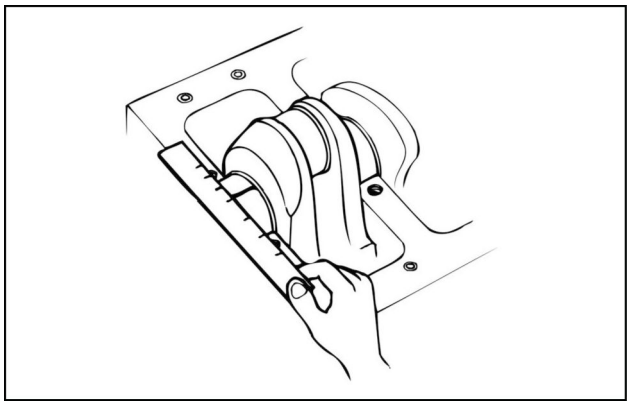
31. Inspect the crankshaft using the inspection solution.

NOTE: *Drop inspection solution on the crankshaft using a dropper.*

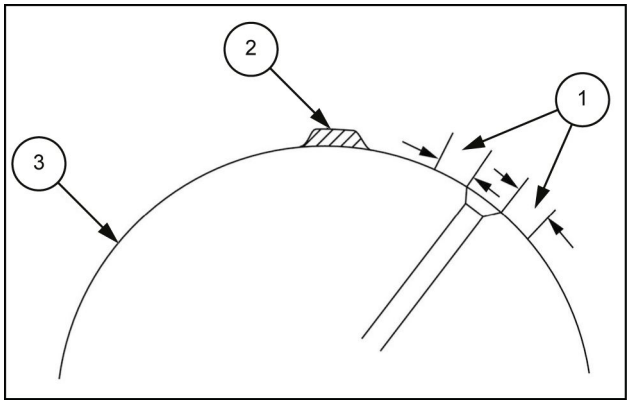
Wait time for results: **40 s**

1. Drip prohibited area
2. Inspection solution application area
3. Pin or journal sliding surface

32. Replace the crankshaft if the color of the inspection solution application area has changed to bronze after the specified time has passed.

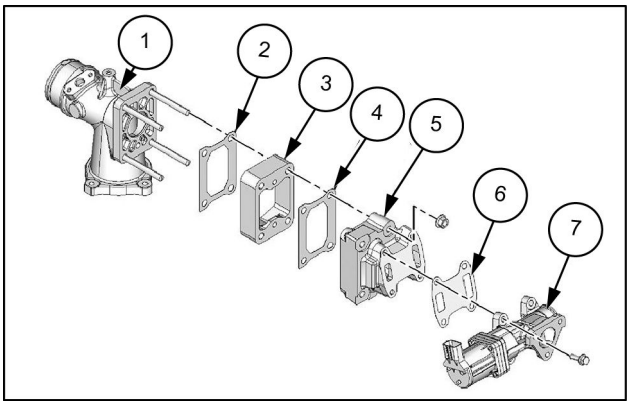


SMIL14CEX3261AA 10



SMIL14CEX3262AB 11

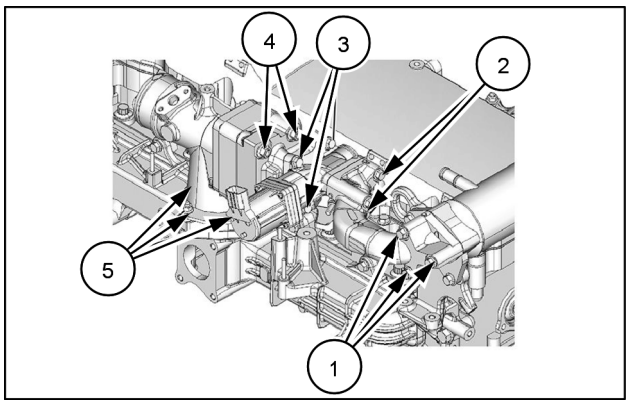
2. Connect the harness clip on the inlet pipe **(1)**.
3. Connect the harness connector to the boost pressure/ boost temperature sensor.
4. Temporarily tighten the reed valve duct **(5)** to the case **(3)** and inlet pipe **(1)**.
5. Temporary tighten the EGR valve **(7)** to the reed valve duct **(5)**.
6. Temporarily tighten EGR pipe B to the EGR valve **(7)** and EGR cooler.
    2. Gasket
    4. Gasket
    6. Gasket



SMIL15CEX6557AB 91

NOTE: *Temporarily tighten all the parts, and then fully tighten in the sequence shown in the diagram.*

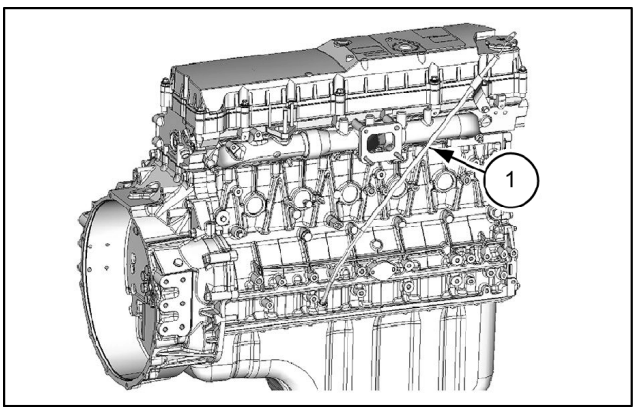
7. Fully tighten EGR pipe B to the EGR cooler.
    Tightening torque: **24 N·m** (**16 lb ft**) **(1)**
8. Fully tighten EGR pipe B to the EGR valve.
    Tightening torque: **24 N·m** (**16 lb ft**) **(2)**
9. Fully tighten the EGR valve to the reed valve duct.
    Tightening torque: **24 N·m** (**16 lb ft**) **(3)**
10. Fully tighten the reed valve duct to the case and inlet pipe.
    Tightening torque: **39 N·m** (**29 lb ft**) **(4)**
    Tightening torque: **24 N·m** (**29 lb ft**) **(4)**
11. Fully tighten the inlet pipe to the inlet cover.
    Tightening torque: **19 N·m** (**16 lb ft**) **(5)**
12. Connect the harness connector to the EGR valve (if equipped).



SMIL15CEX6568AB 92

Oil level gauge guide tube installation

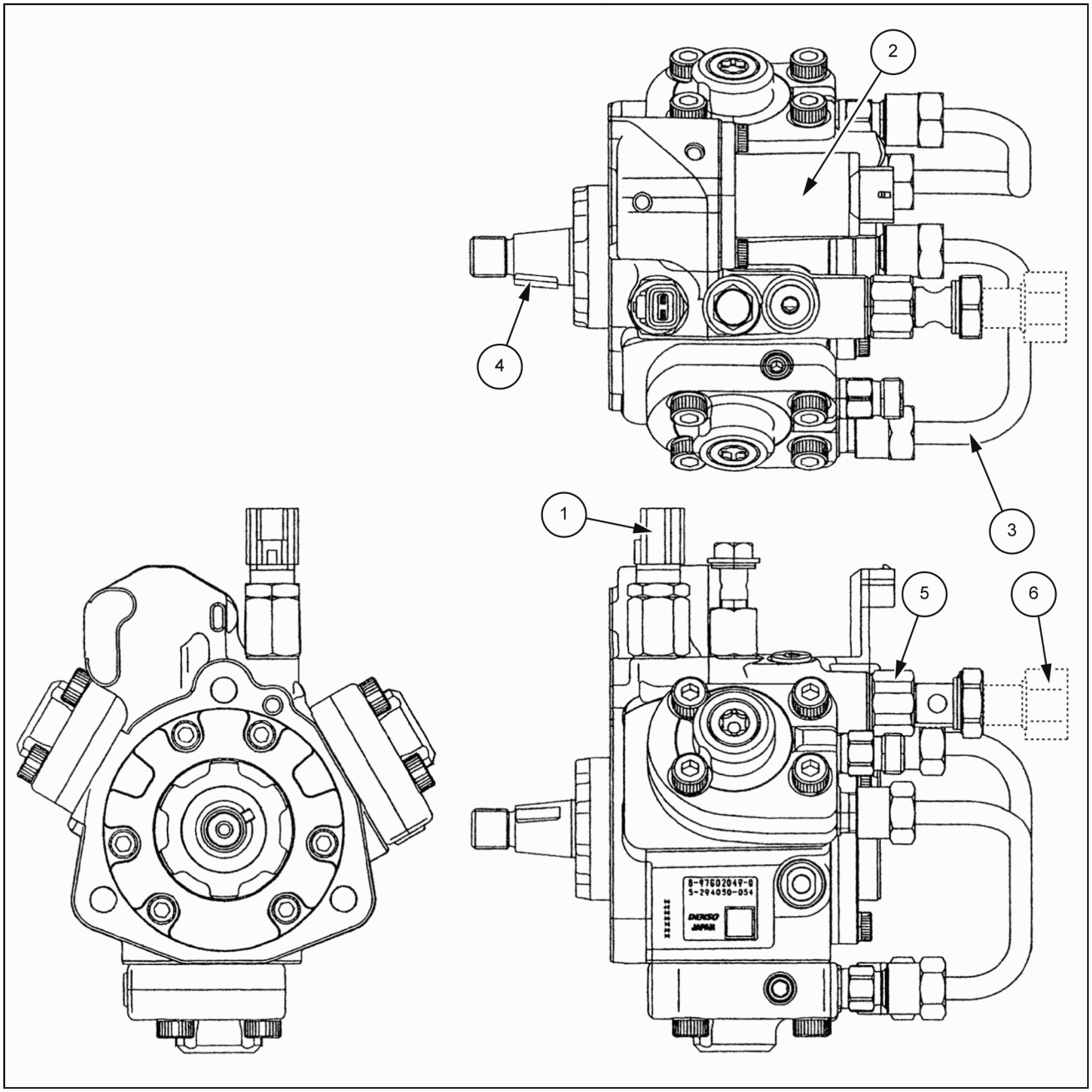
1. Install the oil level gauge guide tube **(1)** to the cylinder block.
    Tightening torque: **24 N·m** (**18 lb ft**)
2. Connect the oil level gauge guide tube **(1)** to the cylinder head assembly.
    Tightening torque: **24 N·m** (**18 lb ft**)
3. Install the oil level gauge to the oil level gauge guide tube **(1)**.



SMIL15CEX6561AB 93

High pressure pump - Component identification

Fuel supply pump (type 1)



SMIL14CEX3967GB 1

1. Fuel temperature sensor
2. Suction control valve
3. High pressure pipe
4. Camshaft nut
5. Union
6. Joint bolt

Turbocharger - Remove

Battery ground cable disconnect

1. Disconnect the battery ground cable from the battery.

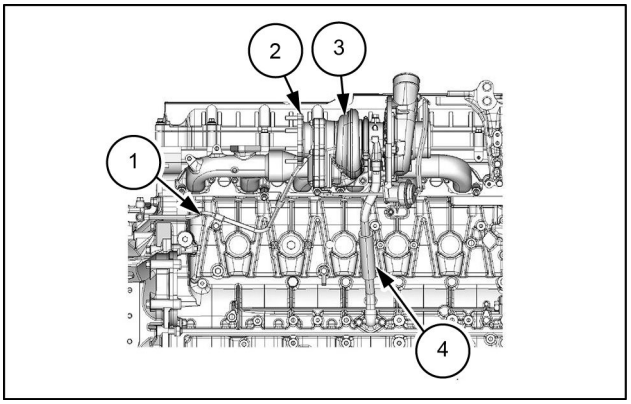
NOTICE: *Do not disconnect the battery cable at least for* ***1 min*** *after turning the starter switch OFF.*

Turbocharger assembly removal

1. Remove the air cleaner duct from the air cleaner assembly and turbocharger assembly **(3)**.
2. Remove the air intake hose from the turbocharger assembly **(3)** and intercooler.
3. Remove the exhaust pipe from the turbocharger.
4. Disconnect the oil feed pipe **(1)** from the turbocharger assembly **(3)**.

NOTE: *Remove the clips.*

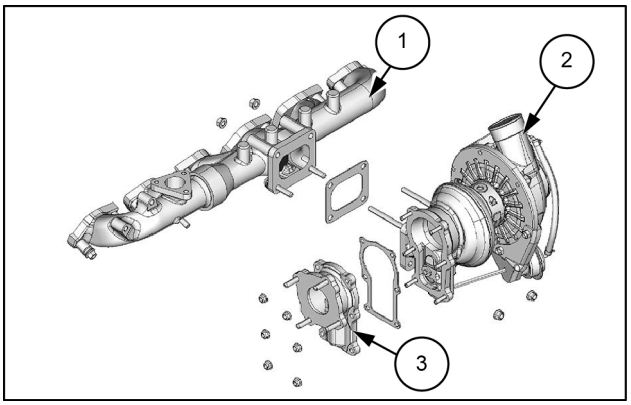
5. Disconnect the oil return pipe **(4)** from the turbocharger assembly **(3)**.



SMIL15CEX6553AB 1

2. Exhaust pipe adapter

6. Remove the exhaust pipe adapter **(3)** from the turbocharger assembly **(2)**.
7. Remove the turbocharger assembly **(2)** from the exhaust manifold **(1)**.



SMIL15CEX6554AB 2

Exhaust Gas Recirculation (EGR) valve - Remove (if equipped)

Battery ground cable disconnect

1. Disconnect the battery ground cable from the battery.

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

Coolant drain

1. Drain the coolant from the radiator.

NOTICE: *After draining the coolant, be sure to tighten the drain plug.*

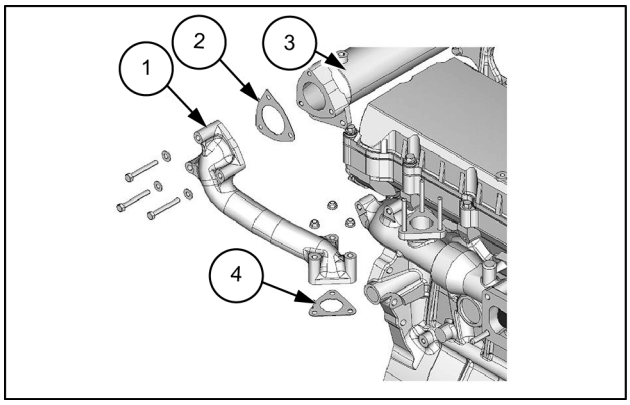
EGR cooler removal

1. Disconnect the air leak pipe from the EGR cooler **(3)**.

NOTE: *The machines from some manufacturers do not have this installed.*

2. Remove EGR pipe A **(1)** from the exhaust manifold and EGR cooler.

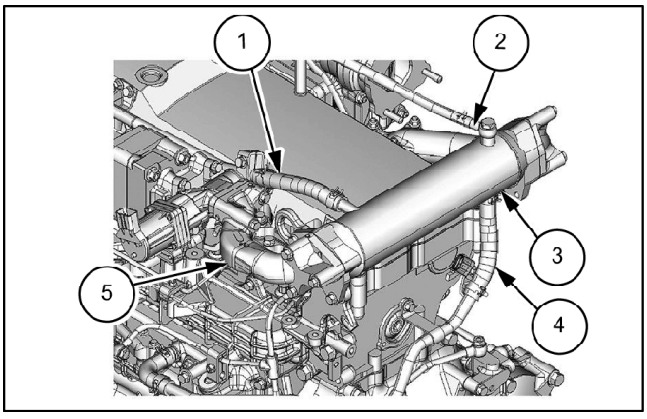
NOTICE: *After removing the EGR pipe, apply sealing to prevent entry of foreign matter.*



SMIL15CEX6555AB 1

2. Gasket
4. Gasket

3. Disconnect the rubber water hose **(1)**, and **(4)** from the EGR cooler **(3)**.
4. Disconnect the EGR cooler **(3)** from EGR pipe B **(5)**.
5. Remove the EGR cooler **(3)** from the EGR cooler bracket.



SMIL15CEX6556AB 2

2. Air leak pipe

Radiator - Install

To install, follow the removal procedure in reverse.

When installing the bolts, tighten them to the specified torque.

If the torque is not specified, see **Torque - Bolt and nut ()** .

Coolant capacity is **35.40 L** (**9.35 US gal**).

Finally, check that the level of coolant is correct.

Turbocharger assembly removal

1. Remove the air cleaner duct from the air cleaner assembly and turbocharger assembly **(3)**.
2. Remove the air intake hose from the turbocharger assembly **(3)** and intercooler.
3. Remove the exhaust pipe from the turbocharger.
4. Disconnect the oil feed pipe **(1)** from the turbocharger assembly **(3)**.

NOTE: *Remove the clips.*

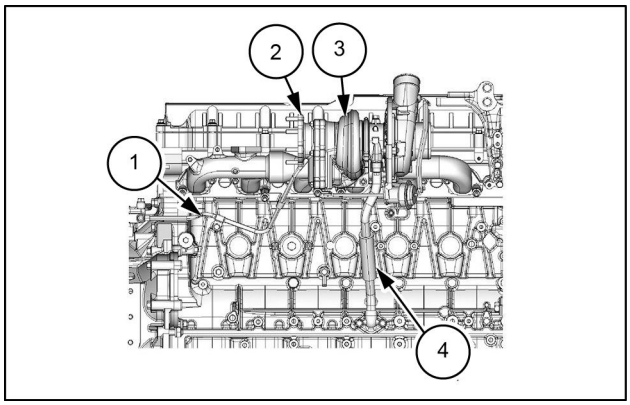
5. Remove the oil feed pipe **(1)** from the pipe bracket.

NOTE: *Remove the clips.*

6. Disconnect the oil return pipe **(4)** from the turbocharger assembly **(3)**.
7. Remove the oil return pipe **(4)** from the cylinder block.

2. Exhaust pipe adapter

8. Remove the exhaust pipe adapter **(3)** from the turbocharger assembly **(2)**.
9. Remove the turbocharger assembly **(2)** from the exhaust manifold **(1)**.



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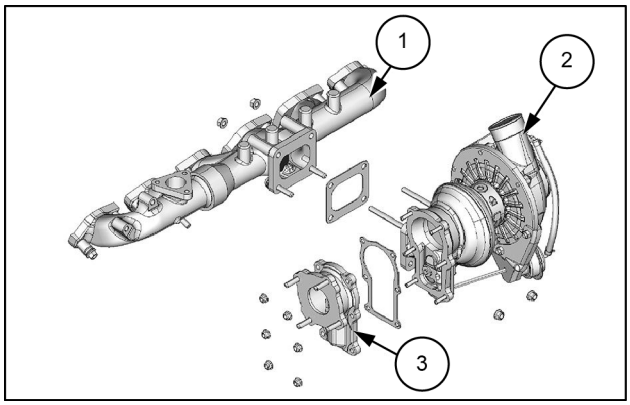


SMIL15CEX6554AB 3

EGR cooler removal (if equipped)

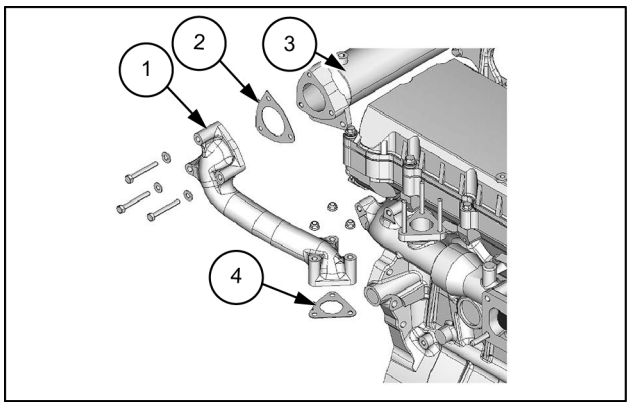
1. Disconnect the air leak pipe from the EGR cooler **(3)**.

NOTE: *The machines from some manufacturers do not have this installed.*

2. Remove EGR pipe A **(1)** from the exhaust manifold and EGR cooler **(3)**.

NOTICE: *After removing the EGR pipe, apply sealing to prevent entry of foreign matter.*

2. Gasket
4. Gasket



SMIL15CEX6555AB 4

Fuel leak off pipe assembly installation

1. Temporarily tighten the fuel leak-off pipe **(1)** to the common rail assembly.

NOTICE: *Use new gaskets.*

2. Temporarily tighten the fuel leak-off pipe **(1)** to the common rail assembly.

NOTICE: *Use new gaskets.*

3. Temporarily tighten the fuel leak-off pipe **(1)** to the fuel supply pump.

NOTE: *Tighten the fuel feed pipe together.*

NOTICE: *Use new gaskets.*

4. Securely tighten the fuel leak-off pipe **(1)** to the cylinder head assembly.

   Tightening torque: **14 N·m** (**123.9 lb in**)

5. Securely tighten the fuel leak-off pipe **(1)** to the common rail assembly.

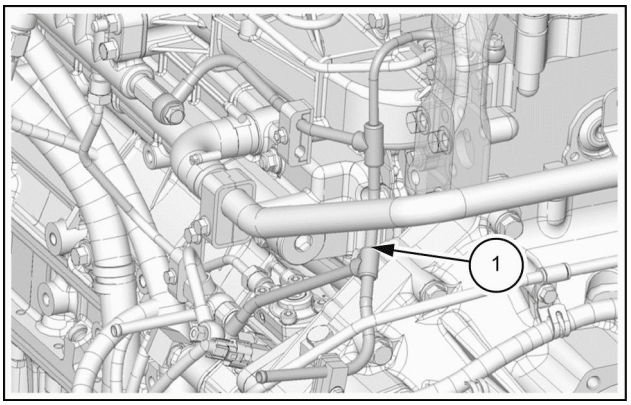
   Tightening torque: **20 N·m** (**14.8 lb ft**)

6. Securely tighten the fuel leak-off pipe **(1)** to the fuel supply pump.

   Tightening torque: **10 N·m** (**88.5 lb in**)

7. Install the clip to the fuel leak-off pipe **(1)**.

   Tightening torque: **9 N·m** (**79.7 lb in**)



SMIL14CEX3089AB 41

Fuel pipe installation

1. Install the fuel pipe to the fuel supply pump and the common rail assembly.

   Tightening torque: **44 N·m** (**32.5 lb ft**)

NOTICE: *Use new fuel pipes.*

2. Install the clip to the bracket.

   Tightening torque: **9 N·m** (**79.7 lb in**)

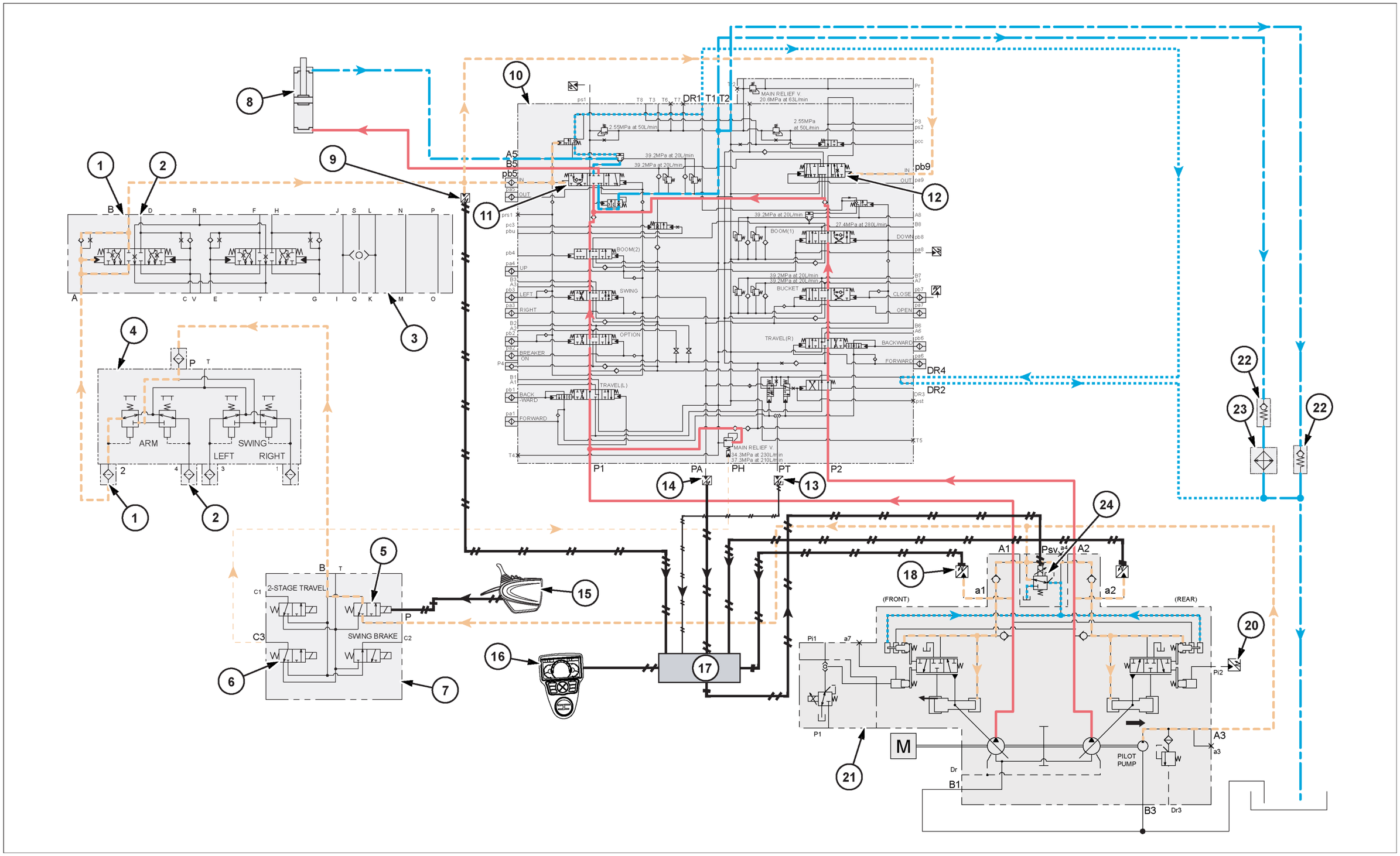
1. Left side housing
2. Swing body center section
3. Pump chamber
4. Hydraulic oil tank
5. Fuel tank

SWING PARKING CIRCUIT (BRAKE RELEASE)

As an example, this section explains the right swing operation.
When the swing lever is in neutral after the engine is started, the swing brake solenoid **(9)** comes ON and the pressure oil to the swing motor **(1)** PR port is cut off. The swing parking brake **(18)** is being applied.
When the remote control valve **(6)** is operated to the right swing side, the pilot pressure oil is fed to the control valve **(13)** pa3 port via the shuttle valve **(19)** and switches the swing spool to the right swing side.
At the same time, the computer A **(12)** detects the electrical signal from the swing pilot pressure sensor **(5)** and judges that there is a swing operation.
The electrical signal output from the computer A **(12)** goes OFF to switch the swing brake solenoid **(9)**.
The pilot pressure oil is fed to the swing motor **(1)** PR port from the 4 stack solenoid valve **(10)** C2 port to release the swing parking brake **(18)**.
The discharge oil from the hydraulic pump **(15)** A1 flows into the swing motor **(1)** A port through the control valve **(13)** P1 port, parallel oil path, and swing spool, and the right swing operation is carried out.
The pressure oil that passed through inside of the swing motor **(1)** returns to the hydraulic tank through B port and the swing spool.
When this is followed by an attachment operation, the pilot pressure is detected by the upper pilot pressure sensor **(14)** at the control valve **(13)** PA port and the swing parking brake **(18)** stays released.
After the swing operation ends, if about **5 s** pass with no upper operation, the electrical signal output from the computer A **(12)** to the swing brake solenoid **(9)** turns ON and the swing parking brake **(18)** is applied again.
When an upper operation is performed after the swing operation, the swing parking brake **(18)** is applied again about **1 s** after the end of the upper operation.
When an independent upper operation is performed, the swing parking brake **(18)** is released.
Also, the swing parking brake **(18)** is applied again about **1 s** after the end of the upper operation.

Key switch	Swing pilot pressure sensor	Upper pilot pressure sensor	Swing brake solenoid valve	Swing motor mechanical brake
OFF	OFF	OFF	OFF	ON
ON	OFF	OFF	ON	ON
ON	Higher than specified pressure	OFF	OFF	OFF
ON	OFF	Higher than specified pressure	OFF	OFF
ON	Higher than specified pressure	Higher than specified pressure	OFF	OFF

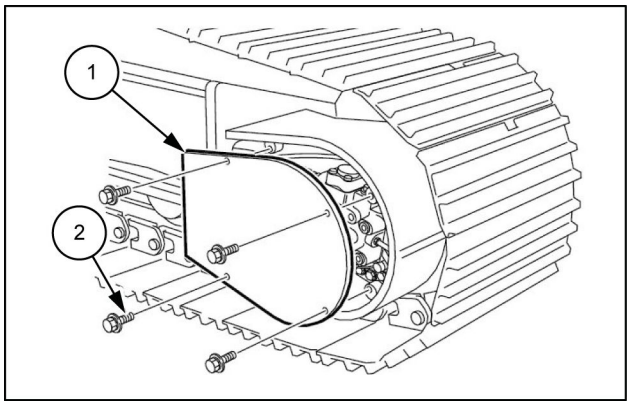
1. Swing motor
2. Cushion valve
3. Right swing
4. Left swing
5. Swing pilot pressure sensor
6. Remote control valve (arm, swing)
7. Swing
8. Lever lock
9. Swing brake
10. 4 stack solenoid valve
11. Console lever lock switch
12. Computer A
13. Control valve
14. Upper pilot pressure sensor
15. Hydraulic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



SMIL18CEX1012JB 1

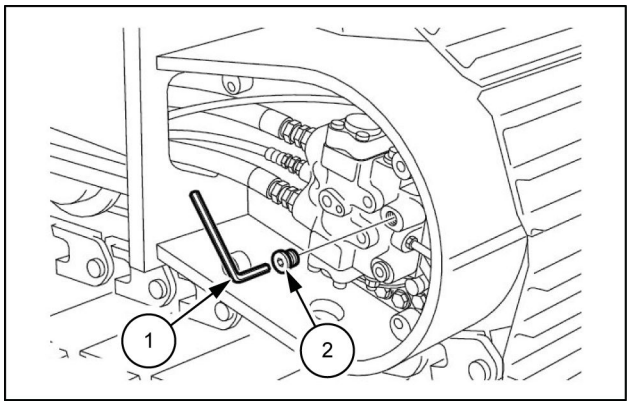
Travel motor

1. Remove the bolts **(2)**, then remove the cover **(1)**. Tightening torque for bolt installation : **63.7 – 73.5 N·m** (**47.0 – 54.2 lb ft**)



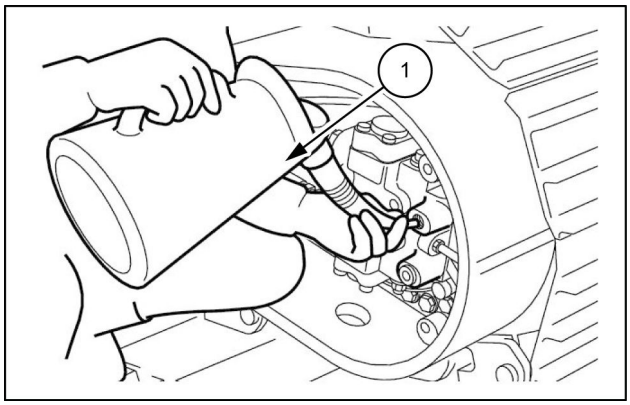
LPIL12CX01673AB 2

2. Use a hexagon wrench [**6 mm mm**] **(1)** to remove the air bleed plug **(2)** as in the figure on the left.



LPIL12CX01674AB 3

3. Pour in about 500 cc hydraulic oil **(1)** from the air bleed port.
4. When inside the motor is filled with hydraulic oil **(1)**, tighten the elbow and hose.
5. Start the engine and execute a slow travel operation.
6. Repeatedly travelling forward and backward bleeds off the air.

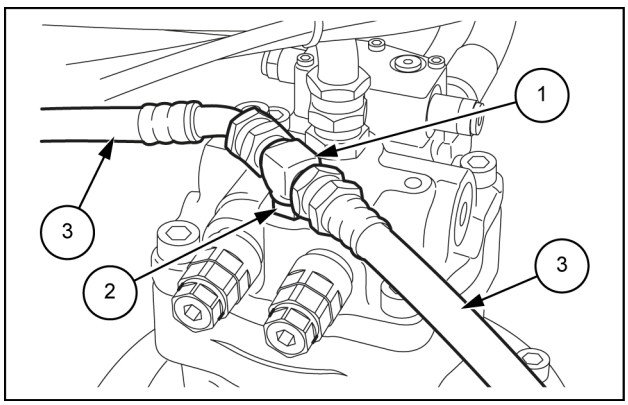


LPIL12CX01675AB 4

Swing motor

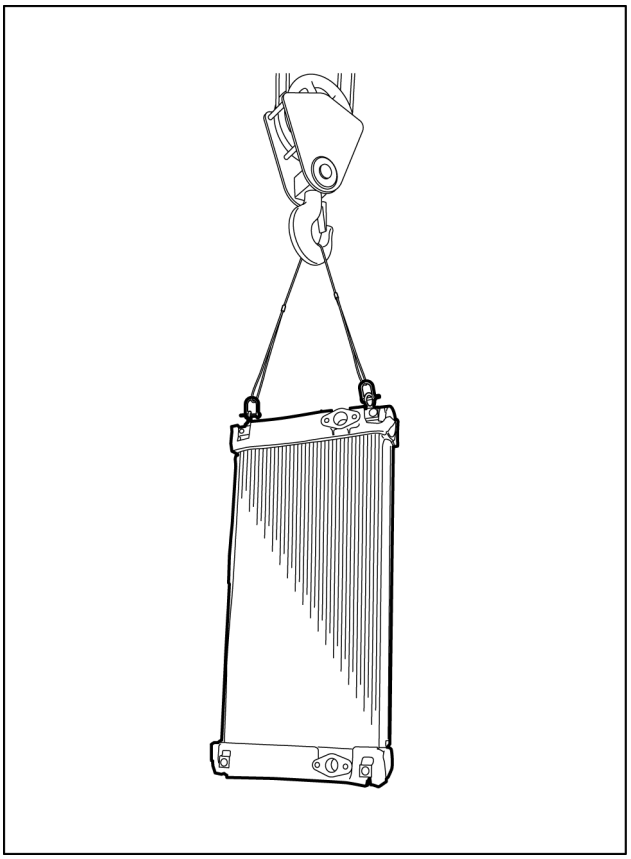
1. Run the engine at low idle, loosen the tee **(1)** of drain hose **(3)** , and check that oil oozes from the air bleed port section **(2)**.

NOTE: *Do not execute a swing operation.*



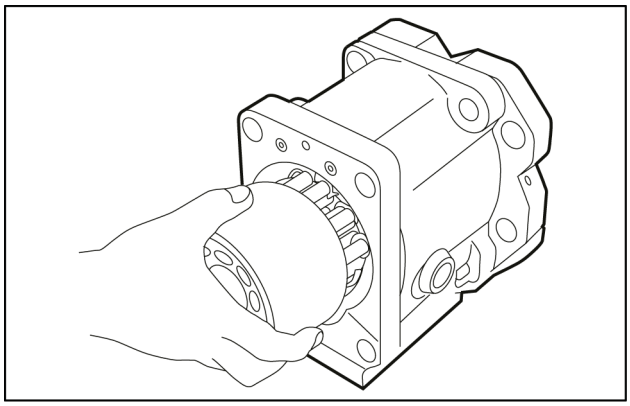
SMIL14CEX2135AB 5

9. Thoroughly check that the location is safe before lowering the oil cooler on wood planks, etc.



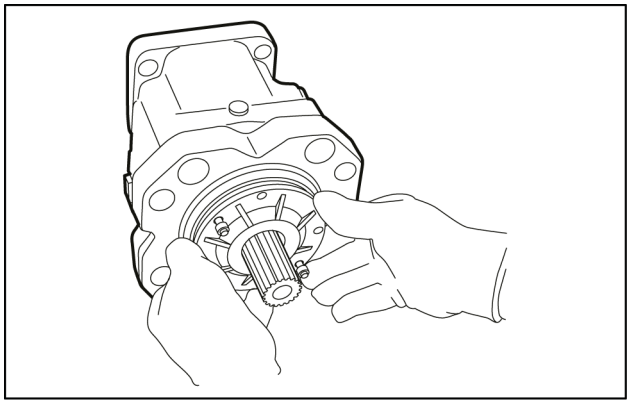
SMIL14CEX1001BA 8

7. Remove the cylinder blocks **(141)** out from the pump casings **(271)** in a straight line in relation to the drive shafts **(111)**, and remove the pistons **(151)**, holder plates **(153)**, spherical bushings **(156)**, and cylinder springs **(157)** at the same time.
   - Be careful not to damage the sliding surfaces of the cylinder, spherical bushing, shoe, and swash plate.



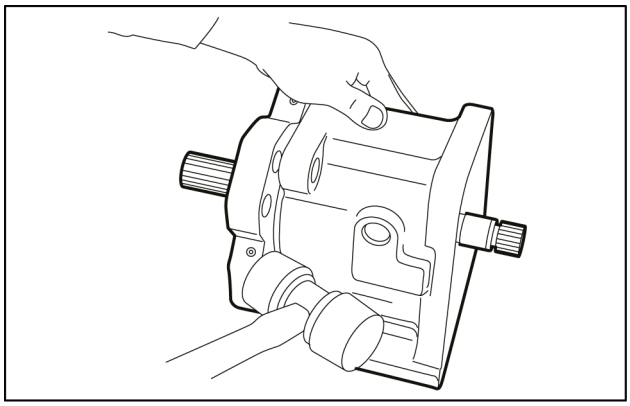
SMIL14CEX1557AA 3

8. Remove the hexagon socket head bolt **(406)** and remove the seal cover **(F) (261)**.
   - Removal can be performed easily by inserting a bolt into the hole on the seal cover **(F)** and then pulling the bolt out.
   - The seal cover **(F)** has an oil seal, so be careful not to damage the oil seal when removing the seal cover.



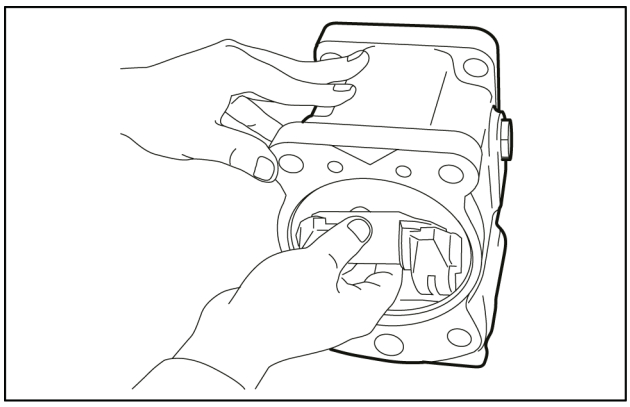
SMIL14CEX1558AA 4

9. Tap the installation flange section of the swash plate support board **(251)** on the pump casing side, and separate the swash plate support board and the pump casing.



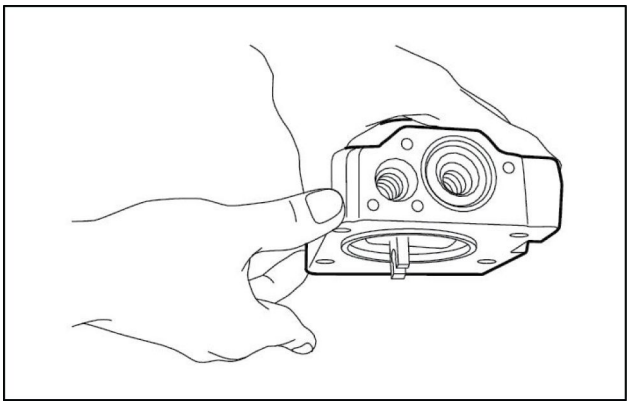
SMIL14CEX1559AA 5

10. Remove the shoe plate **(211)** and the swash plate **(212)** from the pump casing **(271)**.



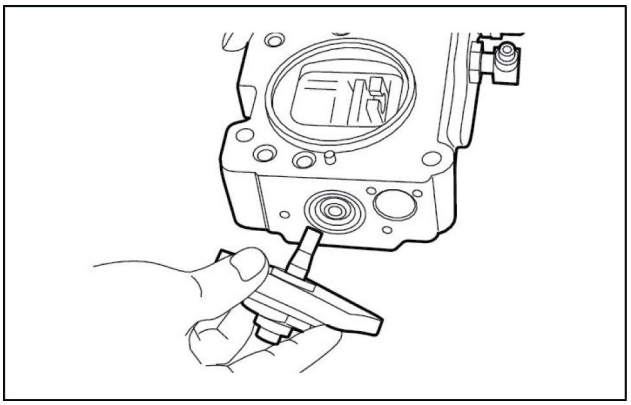
SMIL14CEX1560AA 6

11. Install the spring seating **(644)**, pilot spring **(646)**, and adjusting ring **(645)** into the pilot hole, and install the spring seating **(624)**, inner spring **(626)**, and outer spring **(625)** into the compensation hole.
    - Be careful to install the spring seating in the correct direction.

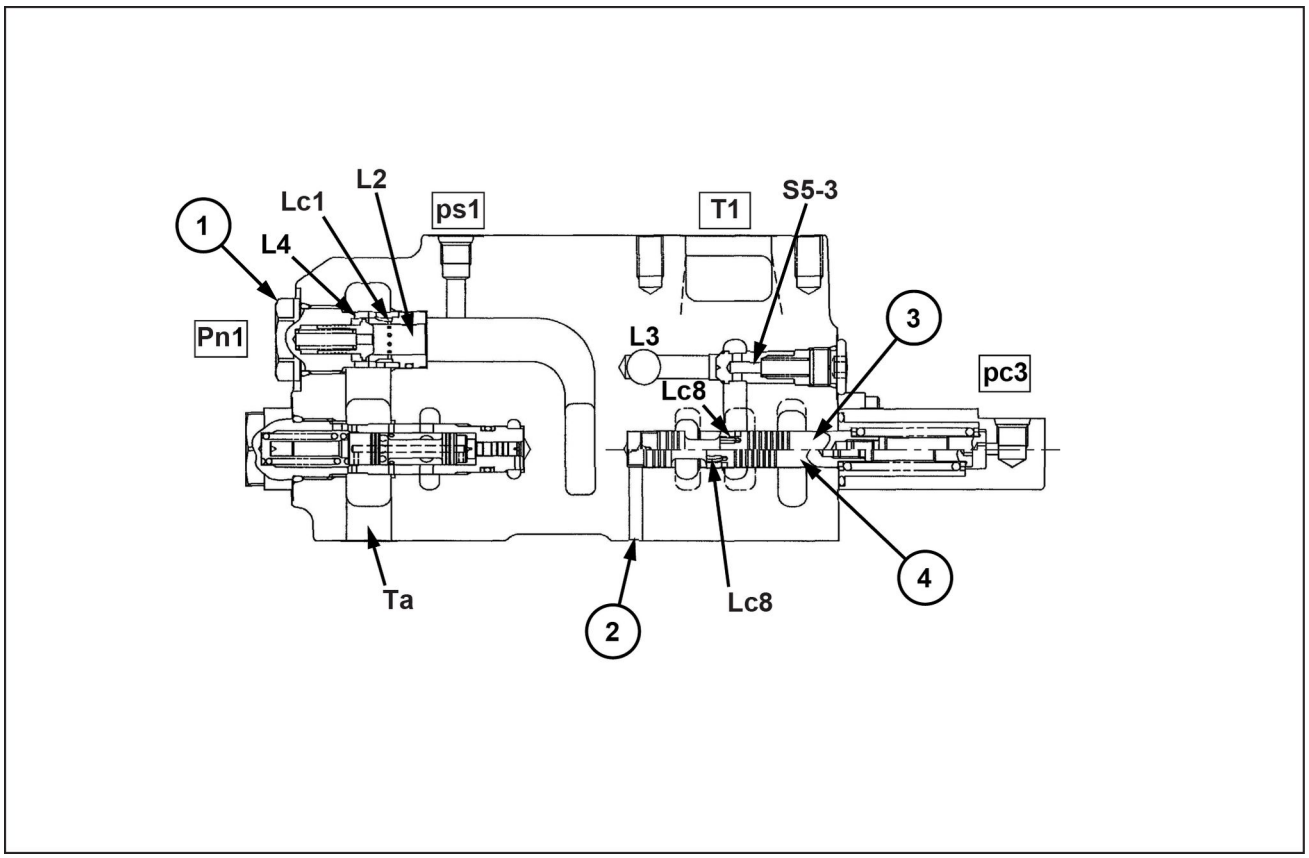


SMIL13CEX0973AA 7

12. Assemble the cover **(C) (629)** set with the adjusting screw **(628)**, adjusting ring **(C) (627)**, lock nut **(630)**, hexagon nuts **(801)** and **(802)**, and the hexagon socket head locking screw **(924)**, and tighten the hexagon socket head bolts **(438)**.



SMIL13CEX0974AA 8



SMIL15CEX5884FB 20

1. Low-pressure relief valve (L)
2. Pbu signal path
3. For boom up (for Pbu pressurization)
4. For neutral

8. Relief valve

A. Main relief valve

The oil fed from the P1 port passes through the poppet (LP) and the oil fed from the P2 port passes through the poppet (RP) and path **(3)** and is led to the main relief valve.

The maximum pressure of the P1 and P2 side pumps is controlled by the operation of the main relief valve.

Main control valve - Install

To install, perform the reverse of the removal procedure.

Tighten bolts to the specified torque.

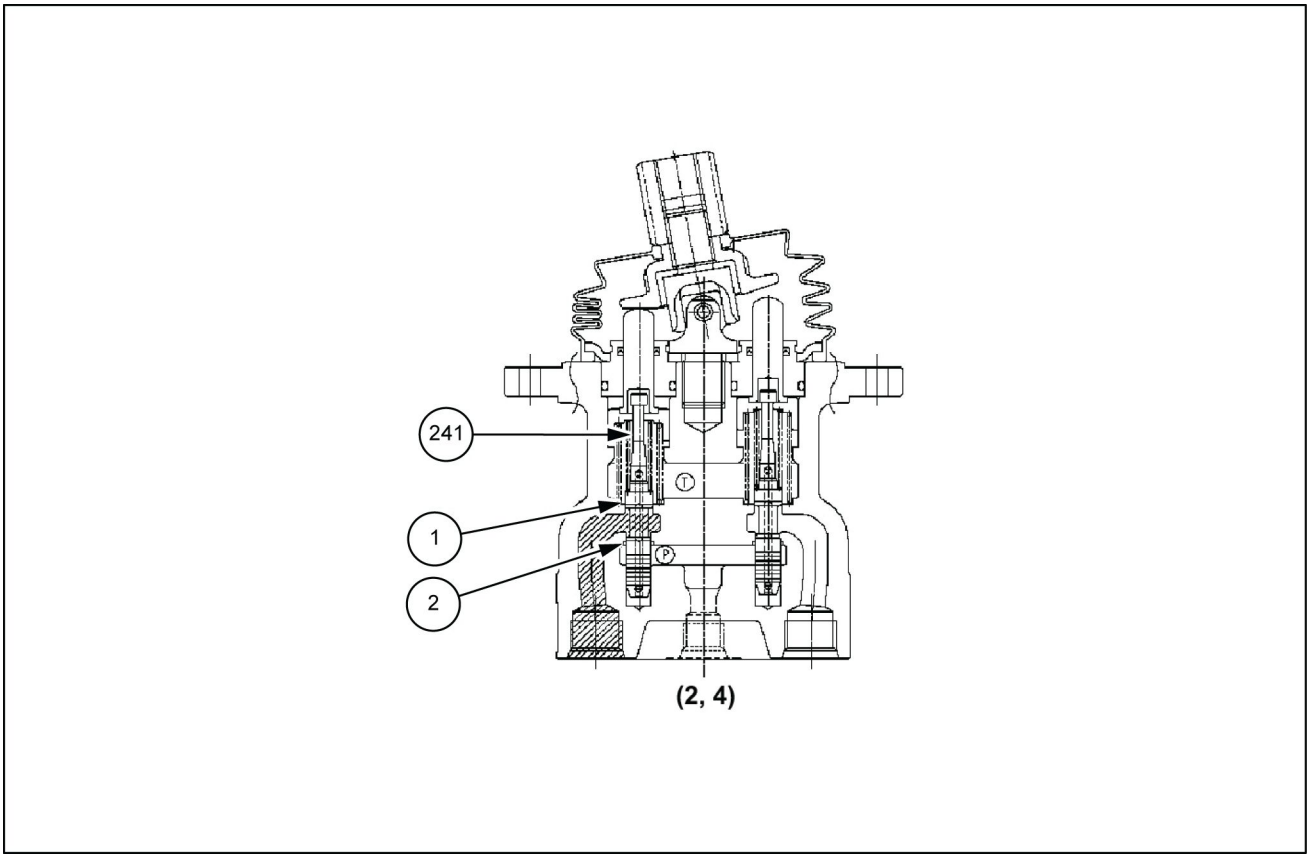
For bolts for which the torque is not specified, see **Torque - Bolt and nut ()** .

Main pressure control valve - Troubleshooting

Problem	Possible Cause	Correction
Pressure does not rise at all	Either the main poppet, sleeve, or pilot poppet is stuck open or there is debris jammed in the valve seat section	Replace the relief valve
The relief pressure is unstable	The pilot poppet seat section is damaged	Replace the relief valve
	The piston or main poppet is stuck	Replace the relief valve
The relief pressure is wrong	Seat section worn by debris	Replace the relief valve
	The lock nut and adjuster are loose	Set the pressure again, then tighten the lock nut to the specified torque
Oil leak	Relief valve seat section damage	Replace the relief valve
	Each part is stuck due to debris	Replace the relief valve
	An O-ring is worn	Replace the adjuster or installation section O-ring

When the handle is held (See Fig. 4)

When the handle is tilted and the pressure of the ports (2, 4) rises to a pressure equivalent to the set spring force **(241)**, the hydraulic pressure and the spring force are in balance. When the ports (2, 4) pressure becomes higher than the set pressure, the ports (2, 4) and the P port **(2)** close and the ports (2, 4) and the T port **(1)** open. When the ports (2, 4) pressure becomes lower than the set pressure, the ports (2, 4) and the P port **(2)** open and the ports (2, 4) and the T port **(1)** close, so the secondary pressure is held constant.



LPIL12CX01996FB 4

1. T port
2. P port

Operation in area in which the handle tilt is large (depends on the model)

For certain models, when the handle is flipped down beyond a certain angle, the spool top end section touches the push rod bore bottom section and the output pressure goes into the state of still being connected with the P port pressure.

Furthermore, with the structure in which the spring seating and spring are installed inside the push rod, when the handle is flipped down beyond a certain angle, the push rod bore bottom section and the spring touch. That spring force changes the 2nd pressure gradient and after that the push rod bore bottom section and the spring seating top end section touch, and the output pressure remains connected to the P port.

Hand control - Cleaning

Clean all parts by placing them in a rough cleaning container filled with white kerosene. (rough cleaning)

Clean each part by placing it in a finish cleaning container filled with white kerosene, and thoroughly clean each part, including the interior, while slowly rotating the part. (finish cleaning)

Use a clean rag to thoroughly remove any white kerosene stuck to parts.

NOTICE: *Scratching can easily occur if cleaning of a part is begun just after parts are immersed in white kerosene, so let each part sit in white kerosene until debris and grease sufficiently loosen from the surface of the part and float to the surface.*

NOTICE: *If the white kerosene is dirty, this will encourage damage to parts and result in reduced performance after reassembly. Thoroughly manage the level of cleanliness of the white kerosene.*

NOTICE: *Do not dry parts with compressed air, as this will damage parts and cause rust to form due to debris and moisture being dispersed into the atmosphere.*

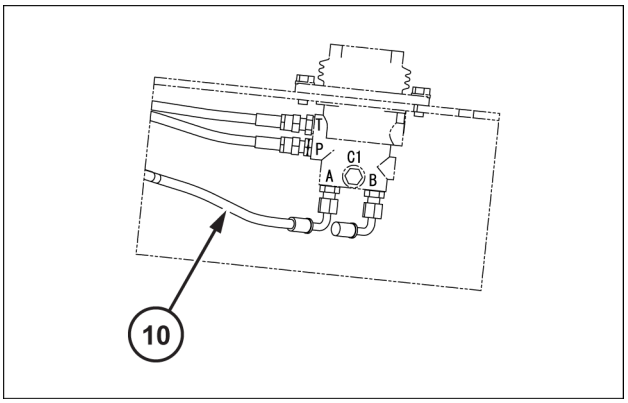
Preventing rust on parts

Apply an anti-rust agent to each part.

NOTICE: *Rust will form on parts if they are left as is after cleaning, and this will cause reduced performance of functions after reassembly.*

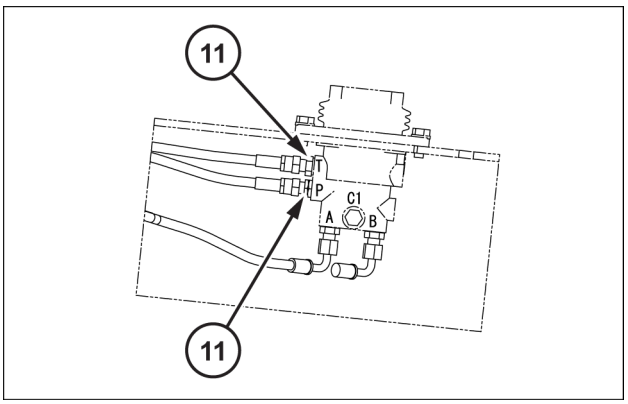
*1. Neutral
*2. Full stroke **12.5°**
*3. (⇒ during operation)
*4. Oil drains to T.

5. Use a wrench [**19 mm**] to remove the 4 hoses **(10)**.
   - Mark the valve and hoses so that the connectors match at the time of installation.
   - Install caps or plugs to the valve and hoses to prevent any entry of water, dust or dirt.



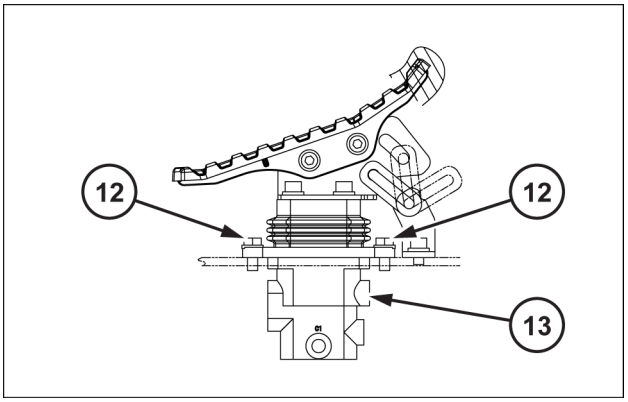
SMIL15CEX3208AB 5

6. Use a wrench [**19 mm**] to remove the 2 hose adapters **(11)**.



SMIL15CEX3209AB 6

7. Use a wrench [**16 mm**] to remove the 2 bolts **(12)** and then remove the option remote control valve **(13)**.



SMIL15CEX3210AB 7

Relief valve operation explanation (relief valve model: KRD22EK10)

Operation explanation for when the relief valve is pressurized

In the case where the P port is pressurized with the tank pressure,the P and R ports are initially at the tank pressure and the valve status is as shown in Diagram 4 **(1)**.

At the pressure where there is balance between the hydraulic pressure determined by the product of the pressure P and the pressurized area A1 of the plunger **(301)** on the one hand and the hydraulic pressure determined by the product of the spring **(321)** load FSP and plunger **(301)** pressurized area A2 and the g chamber pressure Pg on the other, the relief valve starts to operate.
After that, the g chamber pressure rises and the piston **(302)** starts its stroke.
Accompanying this movement, the load on the spring **(321)** increases.
Through the operation above, the relief pressure P is increased from P1 to Ps in the pressure boost time t1.

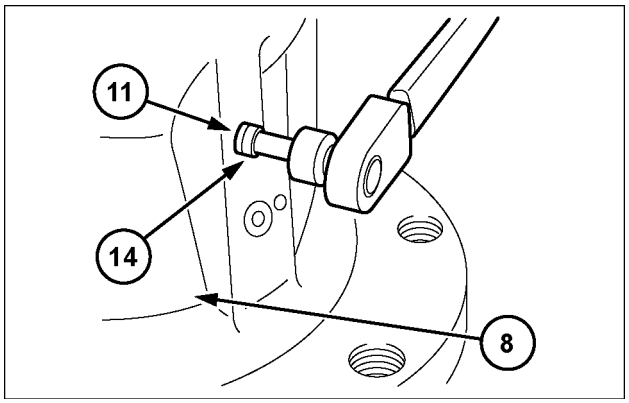
This process is explained below in terms of the relationship between the movement state of the parts in diagrams 4- **(2)** - **(4)** and the relief pressure.

1. State shown in Diagram 4- **(2)**
   When the relief valve P port is pressurized, pressure is generated in the g chamber via the orifice m in the plunger **(301)**.
   When the hydraulic pressure operating on the plunger **(301)** increases and reaches the pressure at which it balances the spring **(321)** load FSP, the relief valve carries out the relief operation at pressure P1.
   The relationship at this time is expressed by the following equation.
   P1 x A1 = FSP1 + Pg1 x A2 FSP1: Initial set load for the spring **(321)**
2. State shown in Diagram 4- **(3)**
   The g chamber pressure operates on pressurized areas A3 and A4 of the piston **(302)**. When this hydraulic pressure becomes larger than the load on the spring **(321)**, the piston starts to move to the left.
   At this time, the oil in the h chamber formed between the piston and the adjusting plug **(401)** is discharged into the g chamber via the orifice n set up on the piston **(302)** while the piston moves to the left, so the h chamber functions as a damping chamber.
   Through this, the spring load gradually increases until the piston reaches the adjusting plug end section and the relief pressure P rises smoothly.
3. State shown in Diagram 4- **(4)**
   When the piston **(302)** reaches the adjusting plug **(401)** end section, it does not move farther to the left, so the constant relief state is reached and the relief pressure is held at P2.
   Through the processes **(1)** - **(4)** above, the relief pressure varies as in Diagram 5.

2. Operation explanation for when the relief valve is depressurized

In the case where the P port pressure falls, the P port pressure and the g chamber pressure fall together to the tank pressure when the pressurization of the P port ends.
Through this process, the plunger **(301)** which was open moves to the left and is placed in the seat **(401)**.
At the same time, the piston **(302)** also is moved to the right by the spring **(321)** and returns to the state in Diagram 4- **(1)**.

10. Screw in the plugs **(11)** and **(14)** in the drain port on the gear case **(8)** side.

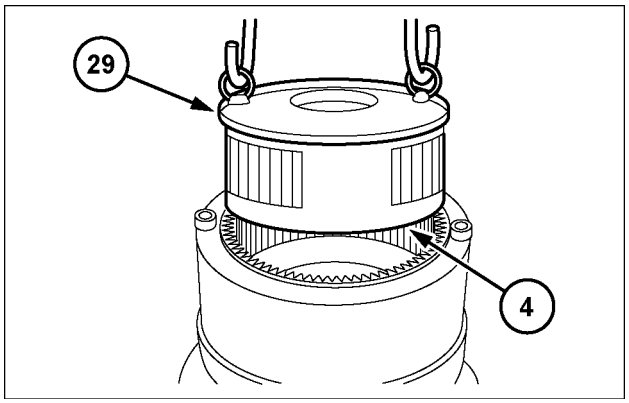


SMIL18CEX1234AB 27

Swing reduction gear assemble

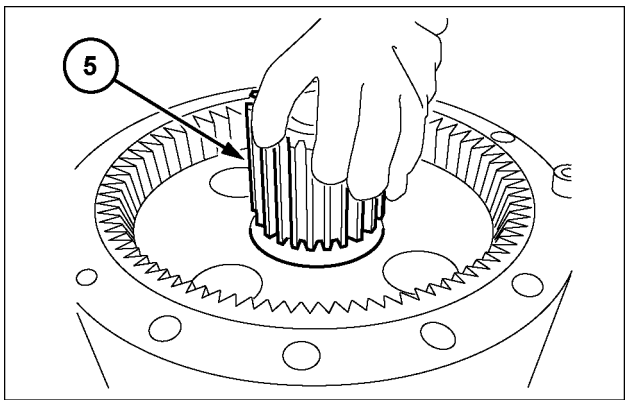
1. Set the case subassembly 1. - 4. on the jig.
2. Use lifting taps (M10, 2 locations) of the planetary carrier 2 **(29)** to install the case subassembly 1. - 4. while lifting the planetary carrier 2 subassembly **(4)** with a liftcrane.

NOTE: *If installation is difficult, rotate the carrier a little to make installation easier.*



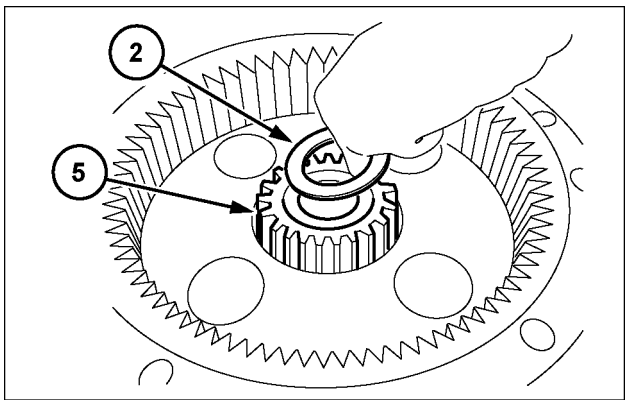
SMIL18CEX1235AB 28

3. Insert the sun gear 2 **(5)**.

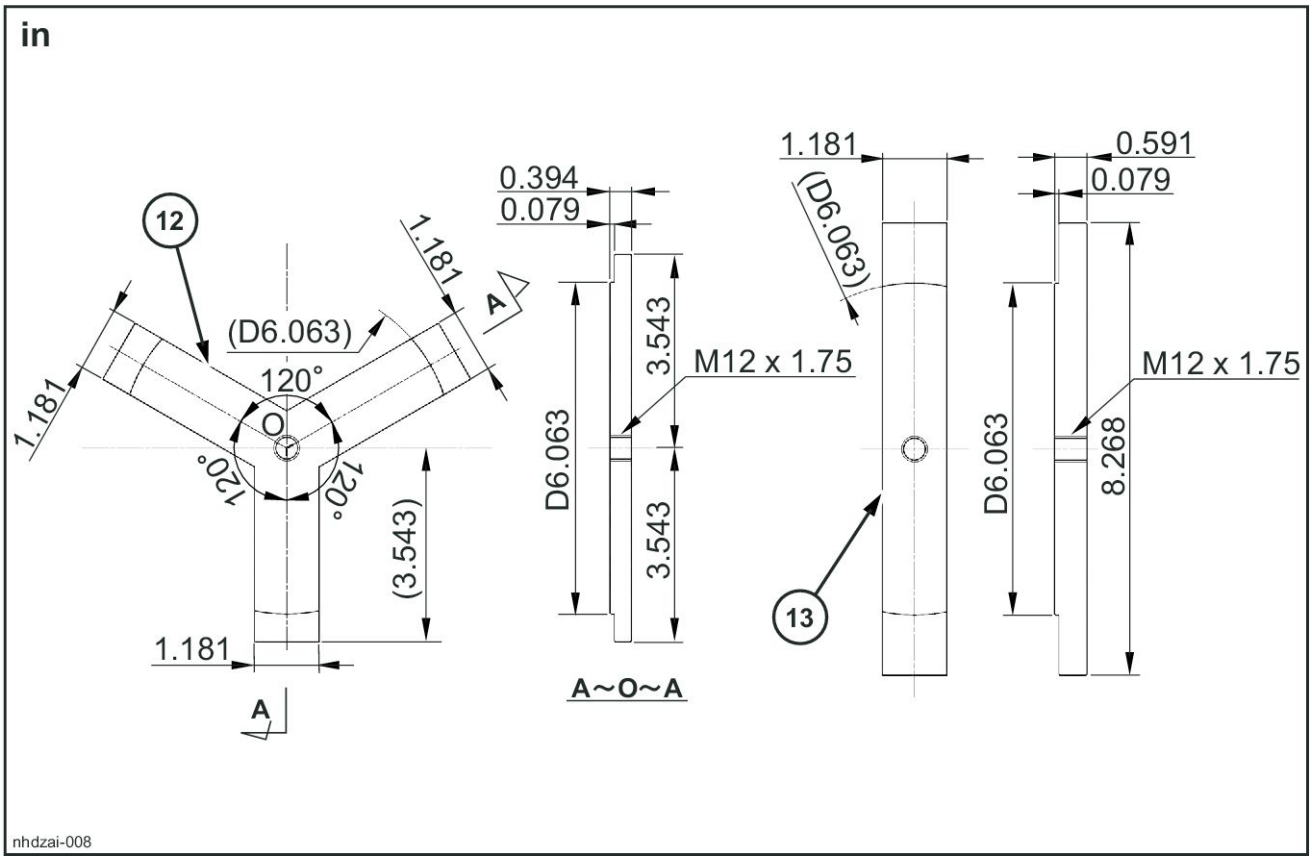


SMIL18CEX1236AB 29

4. Insert the thrust plate **(2)** into the grooves on the sun gear 2 **(5)** end surface.



SMIL18CEX1237AB 30



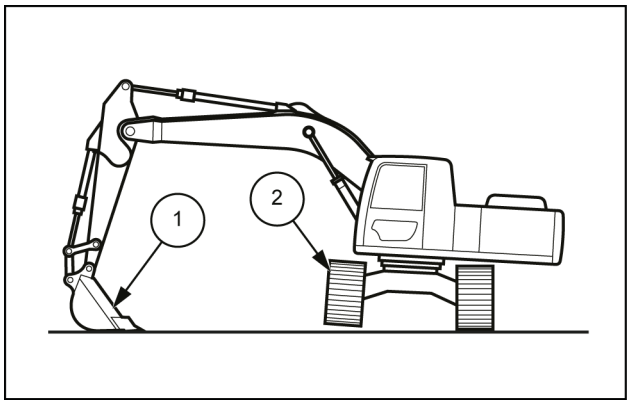
NHDZAI-008 4

NOTE: *All the dimensions in figure are in in.*

Code	Jig name	Remarks
12	Holder A subassembly lifting jig	
13	Holder B subassembly lifting jig	

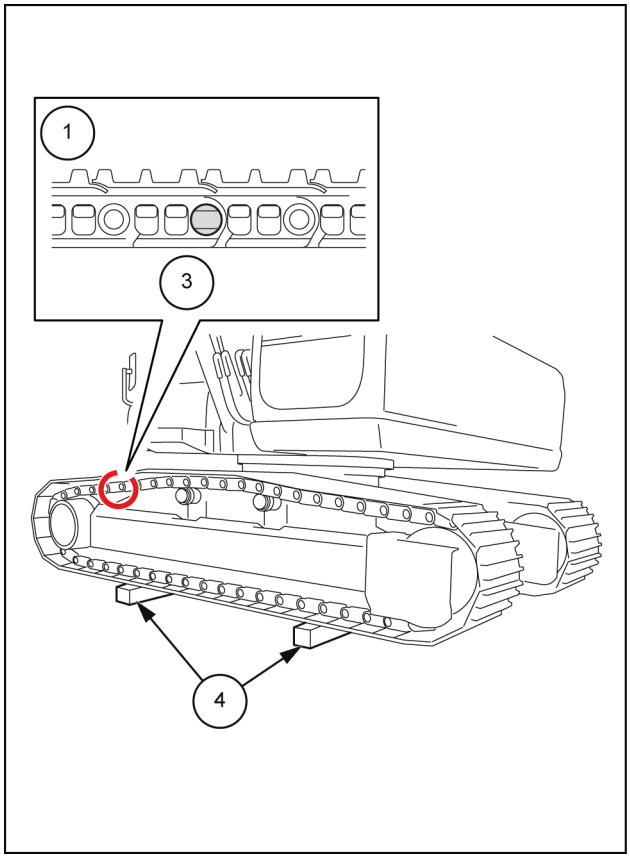
Travel motor - Remove

1. Allow the bucket **(1)** to touch the ground so as to elevate the shoe **(2)** of the side to be removed as in the diagram on the right.



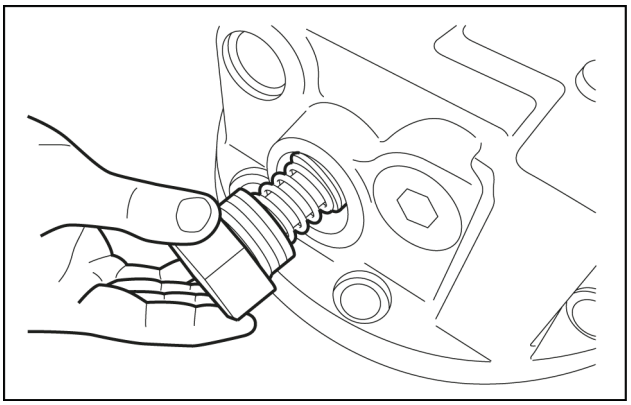
SMIL14CEX3265AB 1

2. Slowly rotate the shoe so that the shoe joint section **(3)** is aligned as in the diagram on the right.
3. Place wood planks **(4)** under the shoe and return the bucket to its original position.
4. Perform air bleeding for the hydraulic line (Refer to " **Hydraulic systems - Bleed (35.000)**".



SMIL14CEX3266BB 2

9. Temporarily tighten the plugs **(324)** (2 pieces) to the rear flange **(301)**.

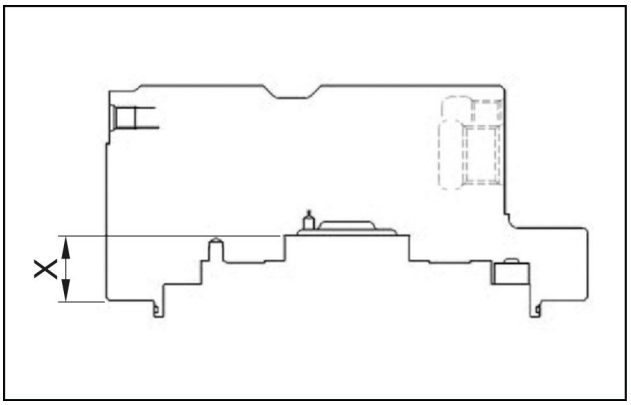


SMIL14CEX3508AA 19

Pre-load adjustment of conical roller bearing

NOTE: *After the rear flange **(301)**, the spindle **(101)**, the shaft **(102)**, or the conical roller bearings **(149)** and **(150)** are replaced, perform pre-load adjustment. If pre-load is not proper, the conical roller bearings **(149)** and **(150)** may get damaged in a short time.*

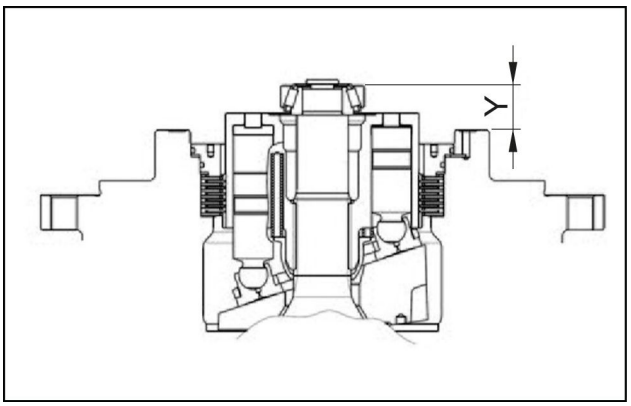
1. Measure the dimension X of the conical roller bearing **(150)** mount of rear flange **(301)**.
2. Attach the conical roller bearing **(150)** to the shaft **(102)**, and measure the dimension Y.



SMIL14CEX3509AA 20

3. Subtract the dimension Y from X, and select a shim **(119)** from the following ranks to create clearance of **0 – 0.1 mm** (**0 – 0.004 in**)

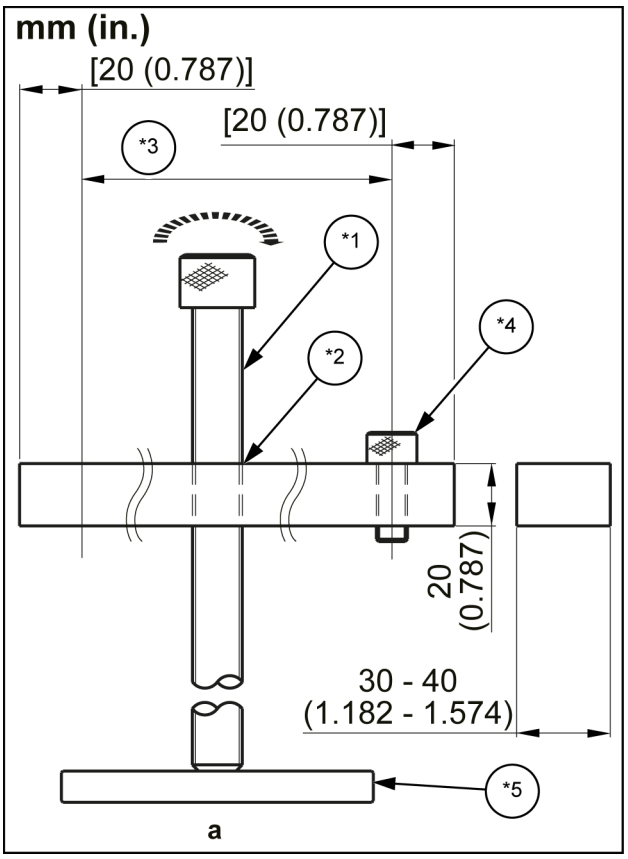
Code	mm (in)
06	**0.9 mm** (**0.035 in**)
05	**0.8 mm** (**0.031 in**)
04	**0.7 mm** (**0.028 in**)
03	**0.6 mm** (**0.024 in**)
02	**0.5 mm** (**0.020 in**)
01	**0.4 mm** (**0.016 in**)



SMIL14CEX3510AA 21

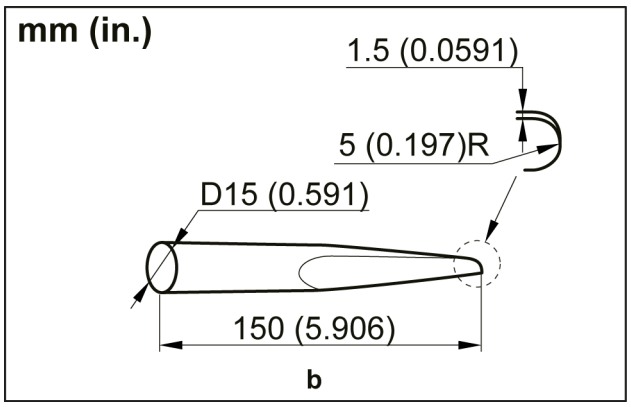
Hydraulic swivel - Special tools

a. Axle removal jig
*1. **M16** - **M20** full threaded bolt
L = **370 – 420 mm** (**14.57 – 16.54 in**)
*2. **M16** - **M20** female thread
*3. Cover **(9)** installation dimensions
*4. Hexagon socket head bolt **(7) M10 x 25**
*5. Backing plate
Axle **(1)** outer diameter - about **5 mm** (**0.20 in**)
t = about **5 mm** (**0.20 in**)



SMIL14CEX1350BB 1

b. Removal jig (for O-ring and V-ring)



SMIL14CEX1351AB 2

NOTE: *All the dimensions in figure are in mm (in).*

Boom cylinder - Prepare

⚠ WARNING

Improper operation or service of this machine can result in an accident.
Raised equipment or machine movement without an operator can cause serious injury. Always do the following before performing any maintenance:
Park the machine on flat, level ground.
Lower the attachment to the ground.
Shut down the engine and remove the ignition key.
Lock the tracks.
Failure to comply could result in death or serious injury.

W0944D

⚠ WARNING

Improper operation or service of this machine can result in an accident.
Assign a supervisor to direct worksite operations. Agree on all safety measures, procedures, and suitable hand signals.
Failure to comply could result in death or serious injury.

W0287A

⚠ WARNING

Avoid injury!
Use Personal Protective Equipment (PPE), including protective goggles, gloves, and safety footwear.
Failure to comply could result in death or serious injury.

W1036A

⚠ 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.

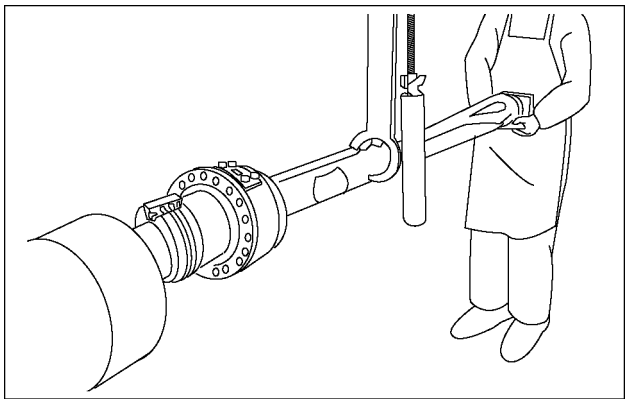
W0398A

NOTICE: *When working together with others, always be sure to exchange signals and pay adequate attention to safety.*

Insertion of rod assembly into cylinder tube

1. Lift the rod assembly by its center of gravity, shake the rod vertically and horizontally and insert into the cylinder tube.
2. While inserting, the wear ring and dust ring may come out of the groove and get caught. Therefore, carefully insert the rod such that the rings do not get caught.

NOTE: *If the rod is too heavy to insert, arrange a plastic hammer under the rod cover bolt installation surface and tap the plastic hammer with a steel hammer.*



SMIL18CEX1463AB 16

Assembly and tightening of rod cover bolt

1. Pay attention to the plumbing flange direction of the rod cover, and align the positions of the bolt hole of the rod cover and the screw hole on the cylinder tube. Screw in the bolt and tighten.
2. When tightening bolts, tighten the bolts in the sequence for target position to avoid uneven tightening.
3. While inserting, the wear ring and dust ring may come out of the groove and get caught. Therefore, carefully insert the rod such that the rings do not get caught.

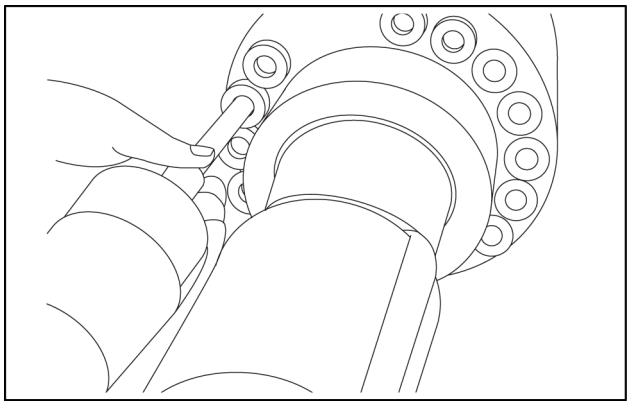
NOTE: *When assembling and tightening the bolt, work carefully to avoid damaging the front surface of the rod. (Wrapping scratch preventing cloth (even a rag can be used) on the front surface of the rod facilitates the work.)*

Tools:

- Wrench [**17 mm**]

  Tightening torque: **628 – 677 N·m** (**463.19 – 499.33 lb ft**)

  Tightening torque: **471 – 490 N·m** (**347.39 – 361.41 lb ft**)



SMIL16CEX1555AA 17

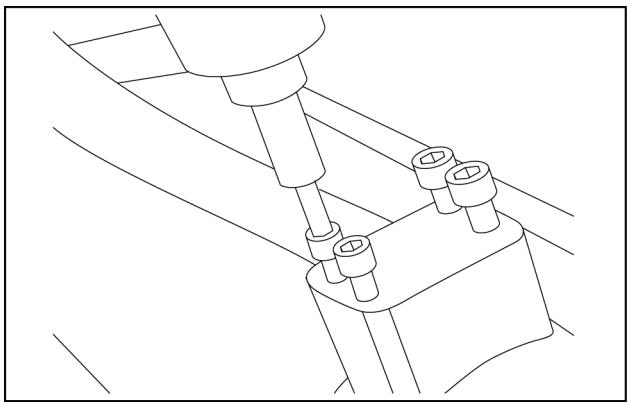
Assembly of plumbing pipe

1. After installing o-ring on the mating surface of the plumbing flange, align and temporarily fasten the positions of the flange surface on the cylinder side and the piping clamping locations.
2. Once the positions are aligned, fully tighten the plumbing flange bolt and plumbing clamp bolt.

   Tools:

   - Hexagonal wrench [**12 mm**]

     Tightening torque: **137 – 147 N·m** (**101.05 – 108.42 lb ft**)



SMIL16CEX1552AA 18

Dipper cylinder - Prepare - For disassemble and assemble

NOTICE: *Before disassembly, wipe off any earth or dust, and grease adhered to the outer region of the cylinder.*

NOTICE: *Because the components are made with precision, handle the components carefully to avoid bumping or dropping of the components.*

NOTICE: *During work, ensure that unnecessary tapping or prying for hard components is avoided, as such tapping and prying may result in burring or damage, rendering the components not suitable for reuse. Also, such tapping and prying may cause oil leakage or performance deterioration.*

NOTICE: *While disassembled, or when left in-between the disassembly, the components may get rusted due to moisture or dust. When it is unavoidable to stop or interrupt the work, take rust-prevention or dust-proof measures.*

NOTE: *Working environment*
It is important that foreign matter (hard materials such as sand, chipping, and welding slag) does not affect the hydraulic cylinder, and sliding surface is not damaged (depending on the degree of damage, the sliding surface may be rendered irreparable or not fit for use). Because the hydraulic cylinder is heavy, it is important that the plant where disassembly and reassembly is to be performed and the environment must be clean. Such a plant must be a hoisting or liftcrane facility, has sufficient amount of supplies required for maintaining cleanliness such as cleaning oil, air, and rags, and includes generic tools. (Moreover, it is desirable that such a plant includes hydraulic power source and provides for simple testing)

NOTE: *Work platform preparation*
The work platform must be wide enough to put the parts on, and sturdy to preventing wobbling such that no components fall or move during work.

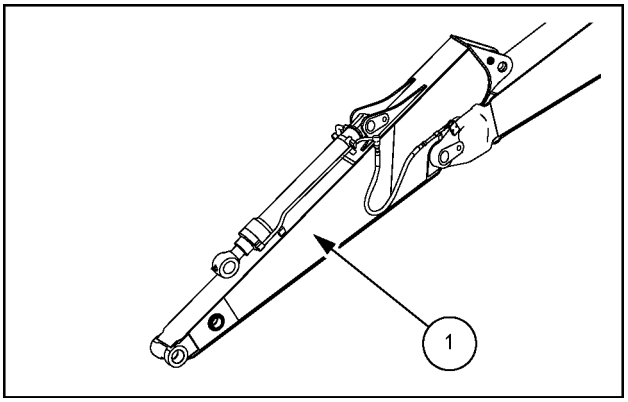
Items to prepare:

- Steel hammer
- Plastic hammer
- Screwdriver (small and large flathead)
- Vise (can grip the rod cover)
- Hexagon wrench [**8 mm**, **10 mm**, **17 mm**]
- Standard wrench
- Closed wrench
- Torque wrench
- Pipe (for extending wrench handle)
- Spatula
- Gimlet

Bucket cylinder - Remove

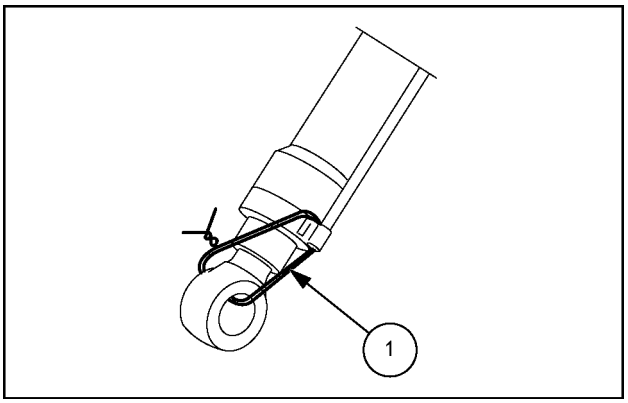
- Remove the bucket. (For details, see " **Bucket - Remove (84.100)**".)
- Remove the bucket link. (For details, see " **Link and rod - Remove (84.100)**".)

1. Bring the arm **(1)** top in contact with the ground. Retract the bucket cylinder rod.



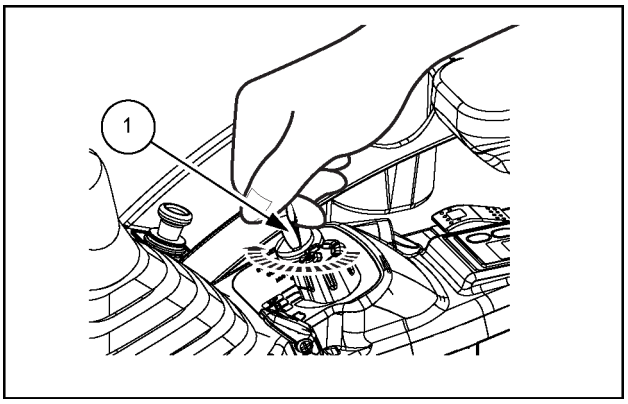
SMIL14CEX2139AB 1

2. Tie the cylinder rod with wire **(1)** so that it cannot come out.



SMIL14CEX2140AB 2

3. Turn the key switch **(1)** "OFF" and stop the engine.



SMIL14CEX2141AB 3

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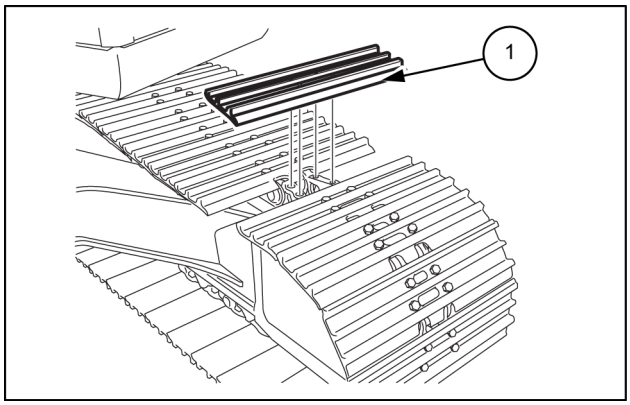
Availability of some models and equipment builds varies according to the country in which the equipment is being used. For exact information about any particular product, please consult your CASE CONSTRUCTION dealer.

Track chain - Install - Shoe plate

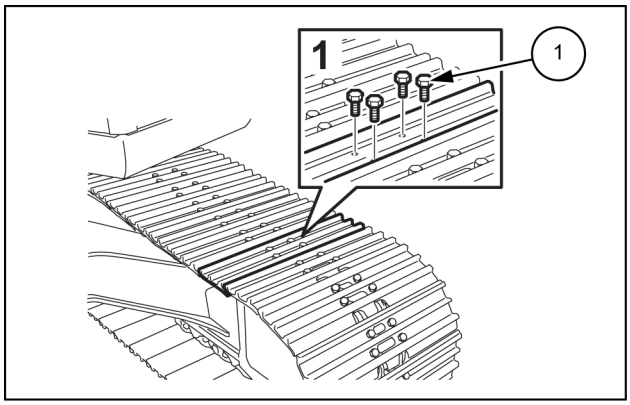
1. Install the shoe plate **(1)**.



SMIL14CEX1255AB 1

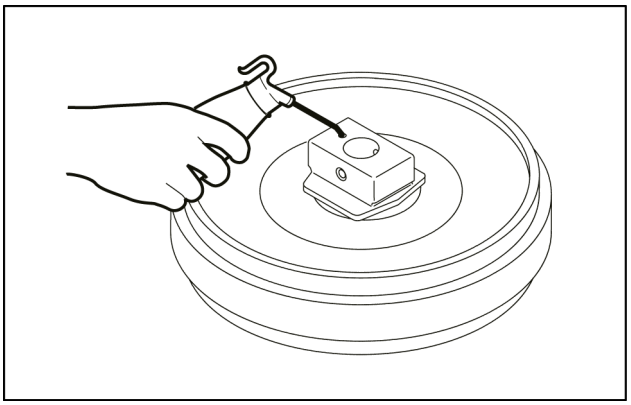
2. Use a box wrench [**32 mm**] to install the 4 shoe bolts **(1)**.

   Bolt **(1)** tightening torque: **1236 – 1510 N·m** (**911.63 – 1113.72 lb ft**).



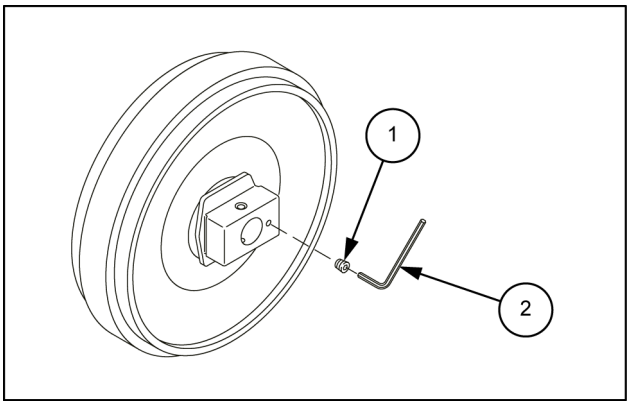
SMIL14CEX1254AB 2

13. Fill engine oil (**190 cm³** (**11.59 in³**)) into the roller main unit).
    - The roller main unit can be very unstable, so be careful in securing it.



SMIL14CEX1151AA 13

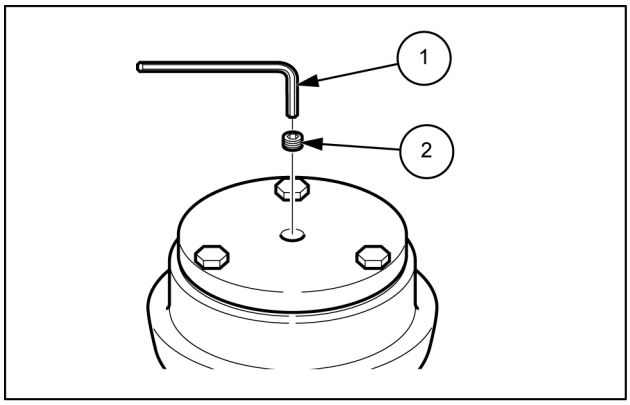
14. After filling the oil, use a hexagon wrench [**6 mm**] **(2)** to tighten the plug **(1)** with the nylon seal applied.
    - To reuse a plug, wrap it with seal tape.



SMIL14CEX1152AB 14

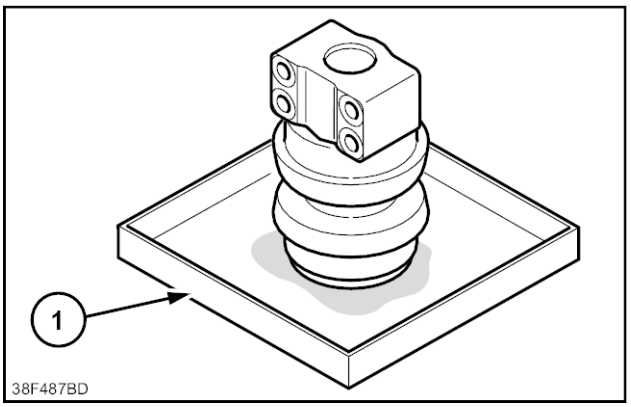
Track roller support - Disassemble

1. Place the roller vertically on its bottom and pull out the plug **(2)** with a hexagon wrench [**6 mm**] **(1)**.
   - You will need a seal tape to re-use the plug since the seal nylon applied to the plug will be removed.



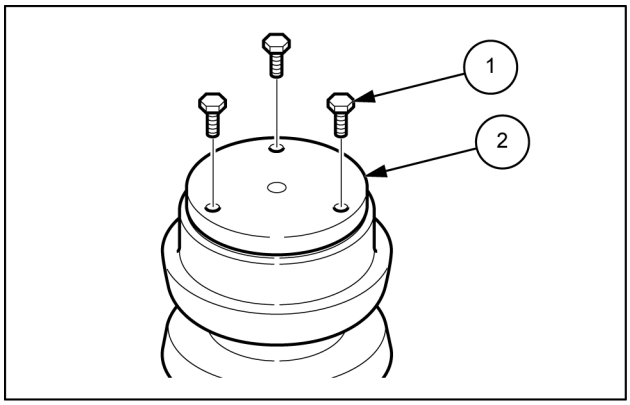
SMIL14CEX1259AB 1

2. Drain oil inside the roller by standing it on its side of removing the plug.
   - Draining oil completely will take a couple of hours.
   - Place the oil pan **(1)** or other container to catch oil running out.



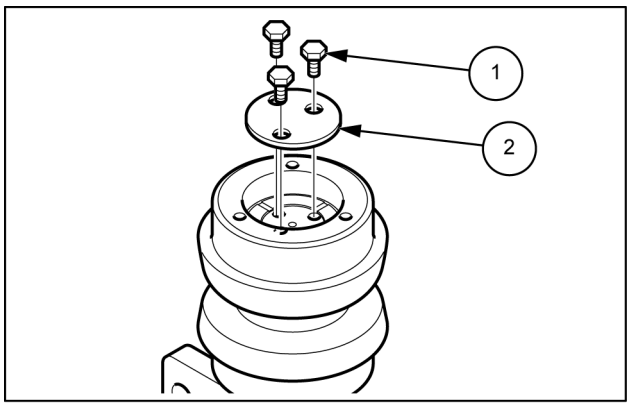
38F487BD 2

3. Use a wrench [**17 mm**] to remove the 3 bolts **(2)** from the cover **(1)**, and then remove the cover.

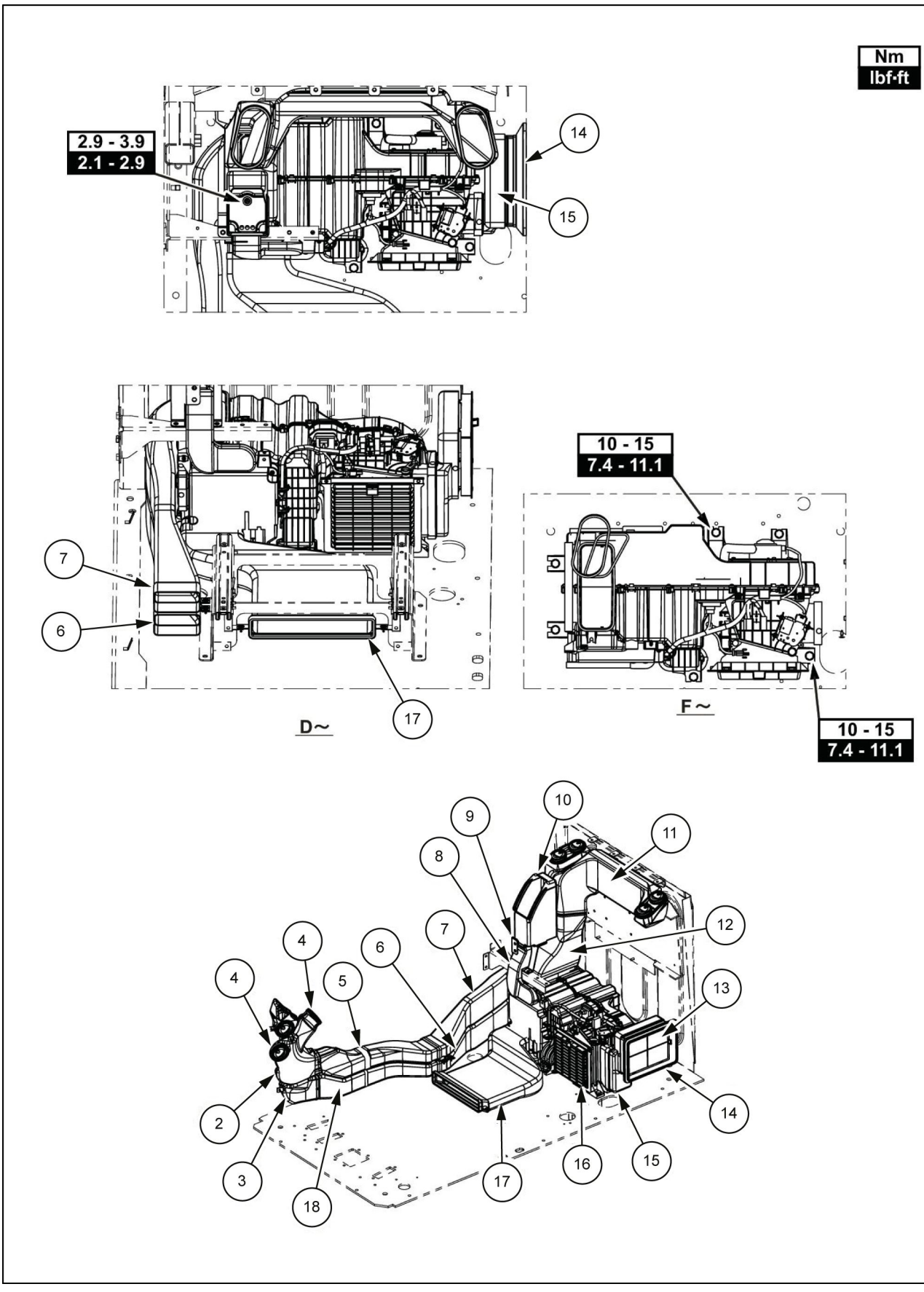


SMIL14CEX1261AB 3

4. Use a box wrench [**17 mm**] to remove the 3 bolts **(1)** inside the roller, and then remove the thrust plate **(2)**.



SMIL14CEX1262AB 4

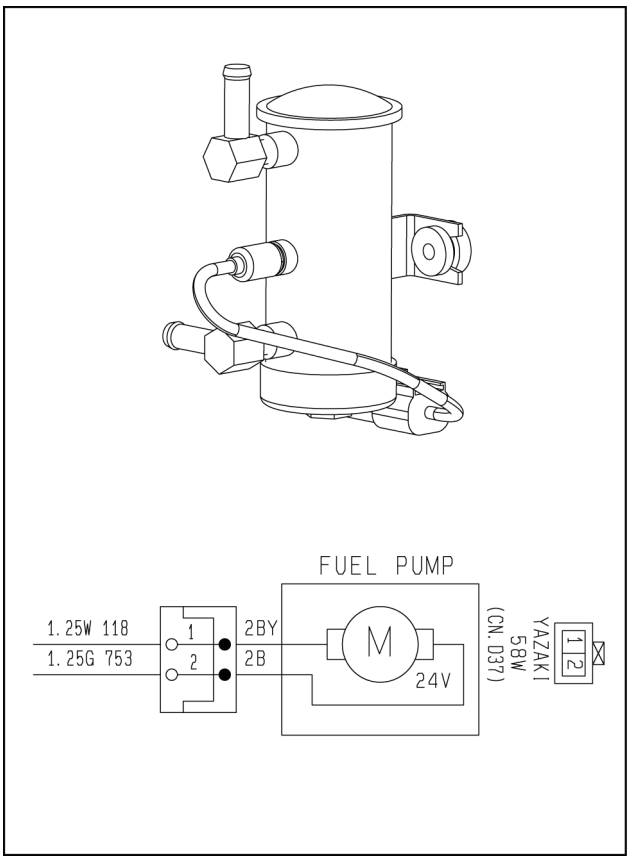


LPIL12CX02269HB 2

Charge fuel pump

Model: **24 V** DC

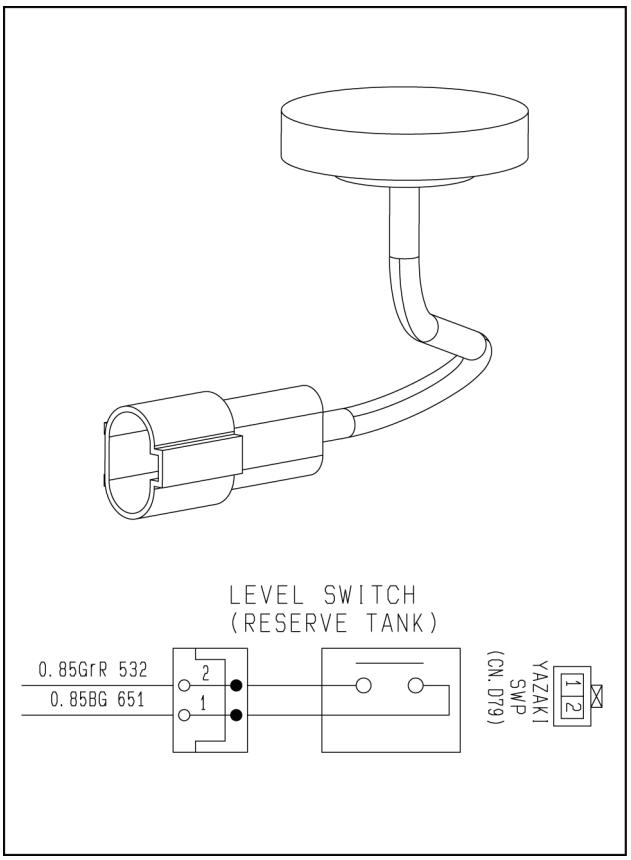
Part No.: KHH11882



SMIL15CEX3731BA 16

Reserve tank limit switch

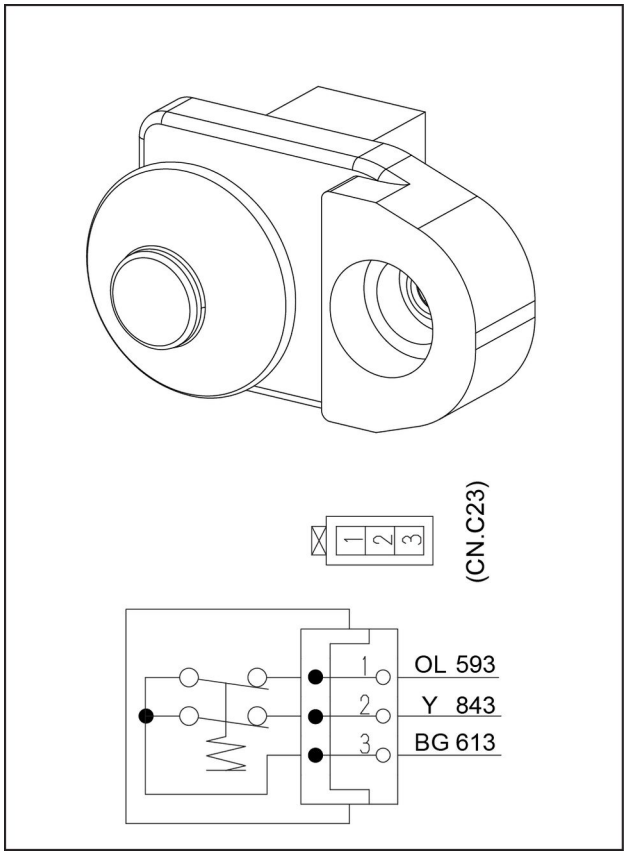
Part No.: KHH10850



SMIL15CEX3732BA 17

Limit switch (door)

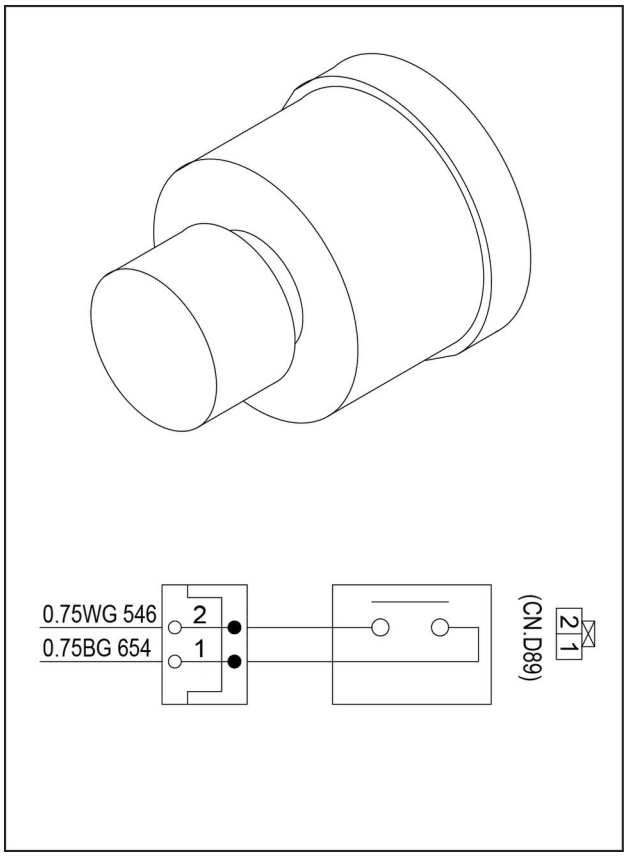
Part No.: KHR2950



SMIL15CEX5102BA 78

Level switch

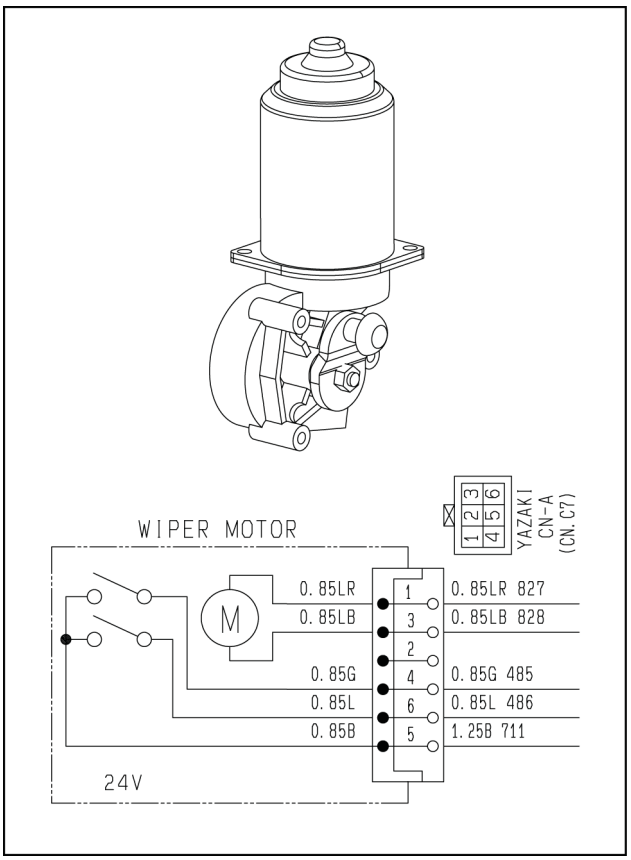
Part No.: KHH18230



SMIL15CEX5104BA 79

Wiper motor

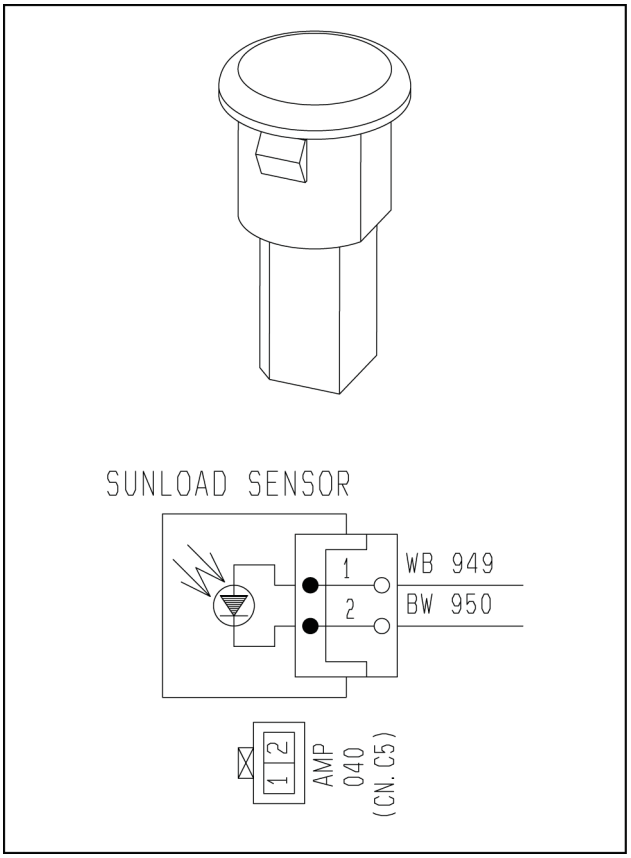
Part No.: KHN25780



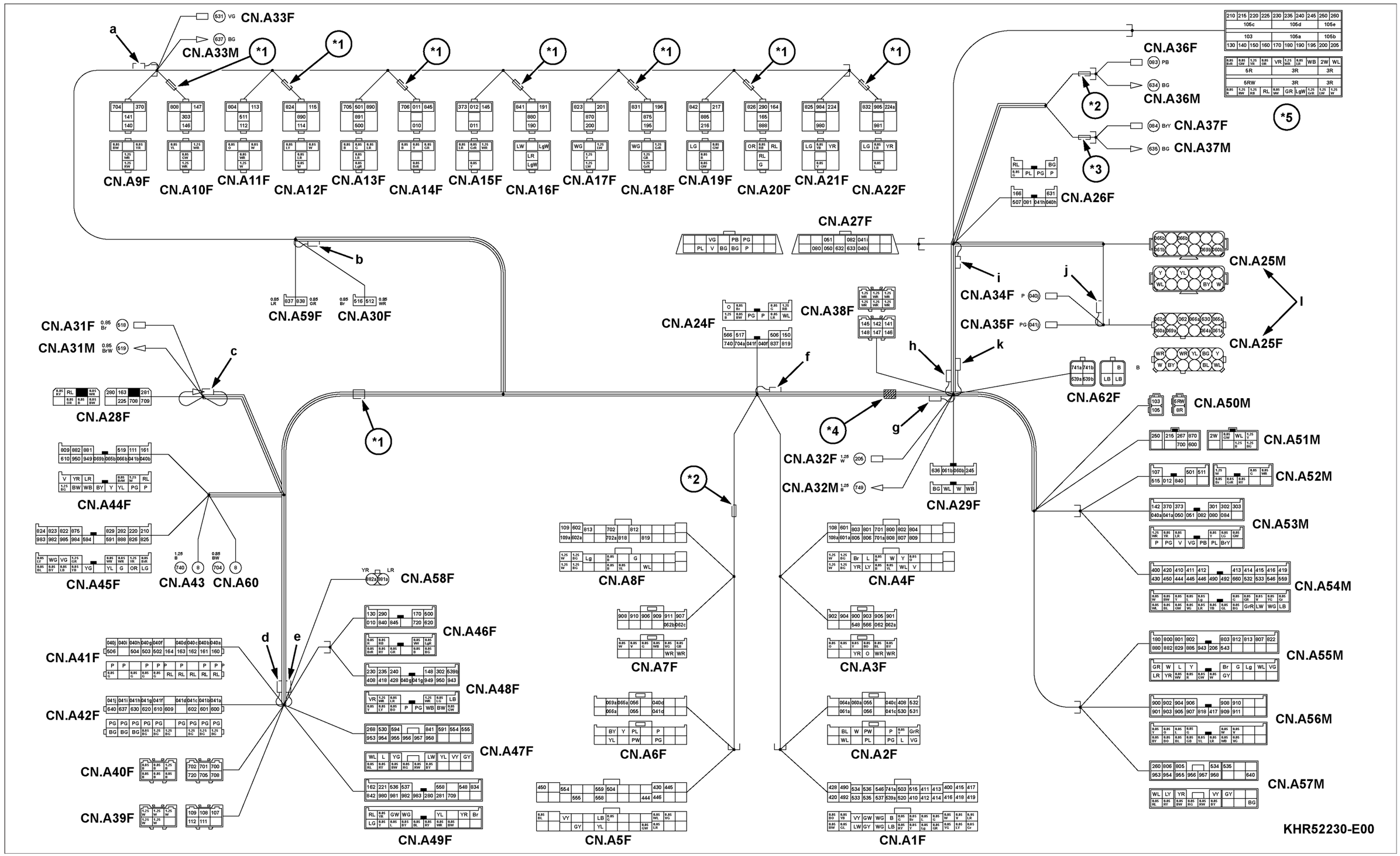
SMIL15CEX4899BA 58

Solar radiation sensor

Part No.: KHR10540



SMIL15CEX4900BA 59



SMIL18CEX1475JB 2

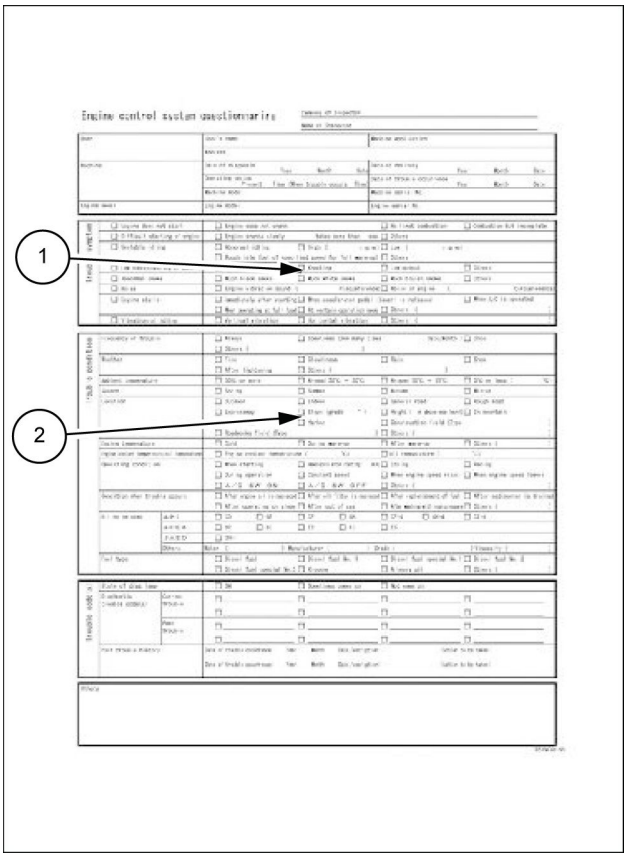
CN.A39	Joint computer; 6-pin	CN.B26	Right knob option switch; 6-pin (Fasten with red tape.)
CN.A40	Joint; GND (6-pin)	CN.B27	Left knob option switch; 6-pin (Fasten with red tape.)
CN.A41	Joint; A (20-pin)	CN.B28	Right knob option switch; 4-pin (Fasten with red tape.)
CN.A42	Joint; B (20-pin)	CN.B29	Left knob option switch; 4-pin (Fasten with red tape.)
CN.A43	Cab ground: M8 round terminal	CN.B30	Free swing switch; 10-pin (ID: None)
CN.A44	Cab harness; A (14-pin) (Connect with supplied cab harness.)	CN.F7F	Fuse connector; 2-pin (Fasten with red tape.)
CN.A45	Cab harness; B (18-pin) (Connect with supplied cab harness.)		

Engine control system check sheet

When receiving the actual unit from the customer at the service factory, the failure symptoms and the data on occurrence of failure must be confirmed with the customer based on the engine control check sheet.

- Failure symptoms **(1)** may not be able to be reproduced at the service factory.
- The customer's complaint may not always be a malfunction.
- Notification of incorrect malfunction conditions to the person in charge of repairs may result in unnecessary man-hours for repairs.
- The check sheet assists actual unit diagnosis, repair, and repair confirmation at the vehicle servicing station.

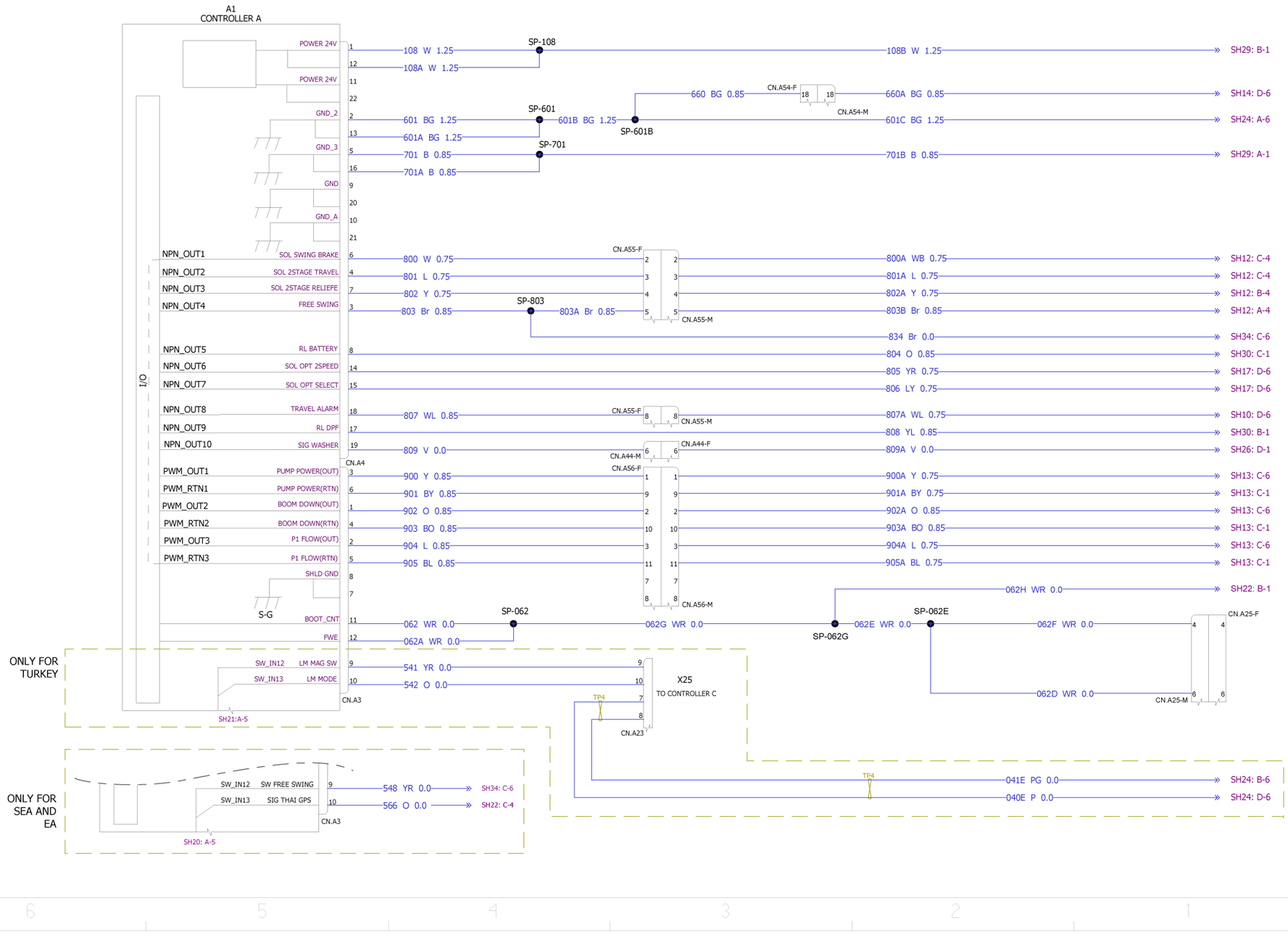
2. Failure frequency · failure conditions



LPIL12CX00863BB 1

Wiring harnesses - Electrical schematic sheet 06 - Engine controller

Type	Components	Connectors/link
Controller	A2	
Connector	CN.D1-2	**CN.D1-02** CONNECTOR - ENGINE CONTROLLER
Connector	CN.D7	**CN.D7** CONNECTOR
Connector	CN.D9	**CN.D9** CONNECTOR

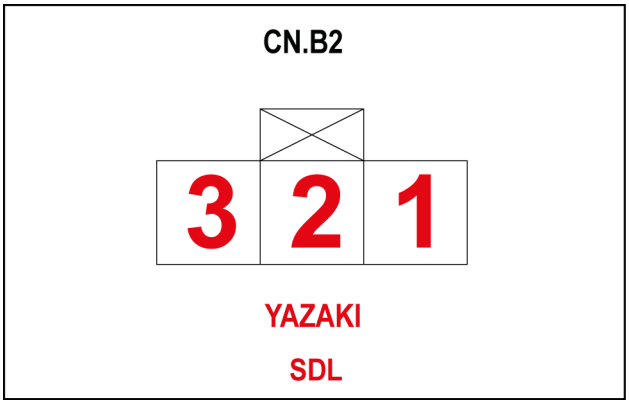


SMIL18CEX1610JA 1

Wiring harnesses - Electrical schematic sheet 36 - Air-conditioner unit

Type	Components	Connectors/link
Panel	A9	
Connector	CN.B21	**CN.B21** CONNECTOR - AIR CONDITIONER SWITCH PANEL
Connector	CN.B22M	**CN.B22 M** CONNECTOR CN.B22M - AIR CONDITIONER SWITCH PANEL

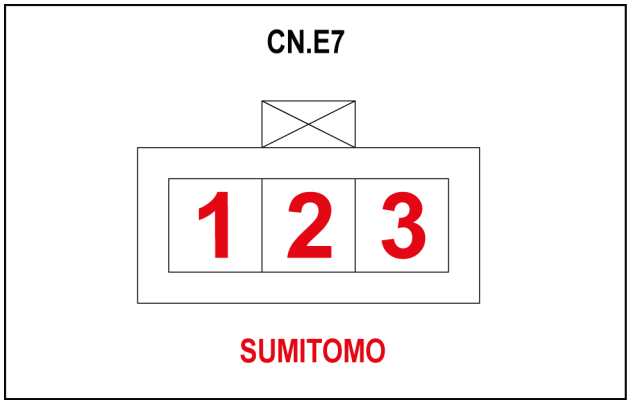
CONNECTOR CN.B2 - THROTTLE VOLUME (Female)



SMIL15CEX3925AA 11

Pin	From	Wire	Description	Color-Size	Frame
1	CN.A48-M-P-7	408A		Y -0.85	**SHEET 21 - Main cab-controller A**
2	CN.A48-M-P-8	418A		LY -0.85	
3	CN.A48-M-P-9	428A		BO -0.85	

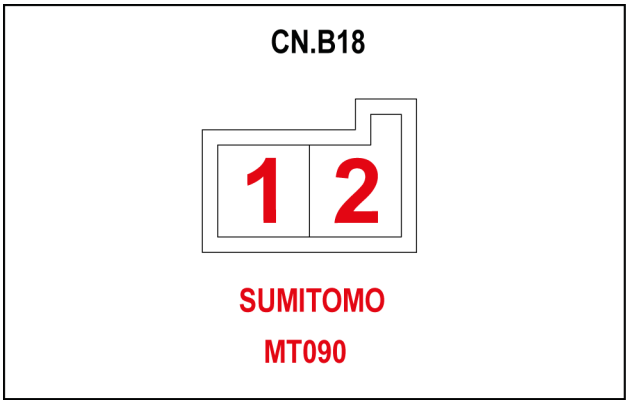
CONNECTOR CN.E7 - OIL PRESSURE SENSOR (Male)



SMIL15CEX4026AA 41

Pin	From	Wire	Description	Color-Size	Frame
1	CN.D7-F-P-9	322A		WB-0.75	**SHEET 06 - Engine controller**
2	CN.D7-F-P-10	323A		LY-0.75	
3	CN.D7-F-P-11	324B		BY-0.75	

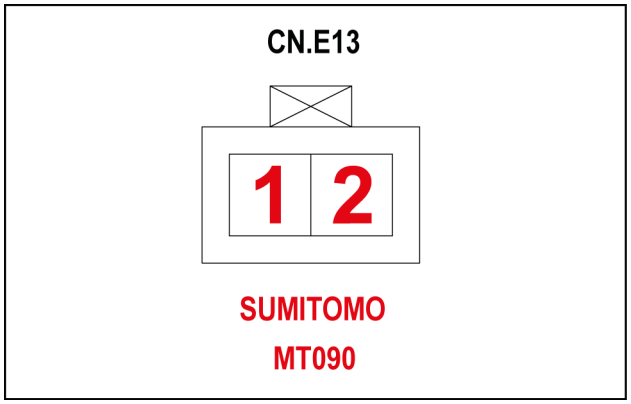
CONNECTOR CN.B18 - PN DIODE (Male)



SMIL15CEX3934AA 16

Pin	From	Wire	Description	Color-Size	Frame
1	SP-221C-P-X	222		YR-0.85	**SHEET 34 - Radio and converter**
2	SP-720G-P-X	721		B-0.85	

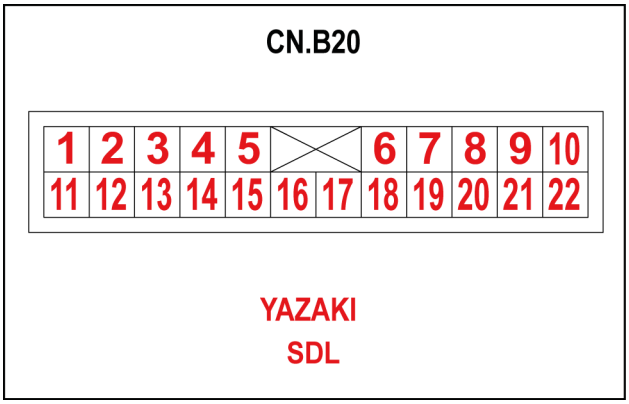
CONNECTOR CN.E13 - SUCTION CONTROL VALVE (Male)



SMIL15CEX4034AA 35

Pin	From	Wire	Description	Color-Size	Frame
1	CN.D10-F-P-3	396B		RB-0.75	**SHEET 07 - Engine controller**
2	CN.D10-F-P-2	394B		RW-0.75	

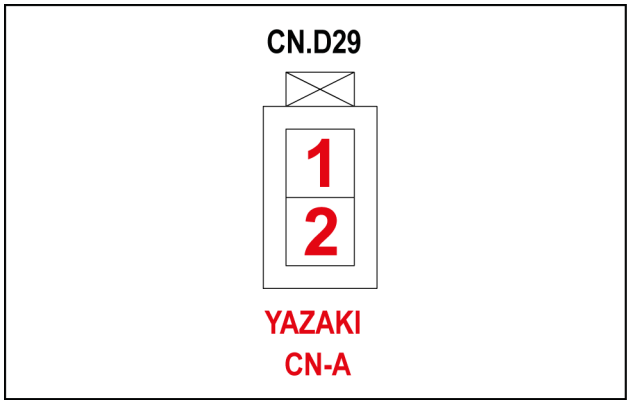
CONNECTOR CN.B20 (Male)



SMIL15CEX4045AA 17

Pin	From	Wire	Description	Color-Size	Frame
1	CN.B22M-P-15	942		BrW	**SHEET 36 - Air-conditioner unit**
2	CN.B22M-P-16	936		VW	
3	CN.B22M-P-14	940		BrY	
4	CN.B22M-P-1	939		RL	
8	CN.B21-P-19	945		Sb	
9	CN.B21-P-18	947		L	
10	SP-946-P-X	946A		BW	
11	CN.B21-P-7	920		GR	
12	CN.B21-P-6	921		GW	
13	CN.B21-P-5	922		YR	
14	CN.B21-P-4	923		YW	
15	CN.B21-P-3	924		LR	
16	CN.B21-P-2	925		LW	
18	CN.B21-P-15	926		LY	
19	CN.B22M-P-4	929		GL	
20	CN.B22M-P-3	930		YL	
21	CN.B22M-P-2	931		LG	
22	CN.B21-P-13	932		BL	

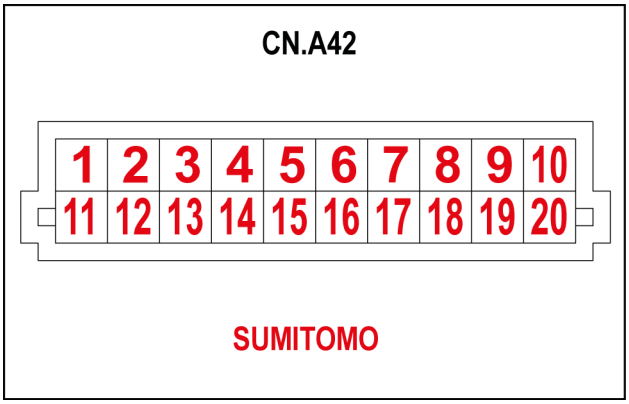
CONNECTOR CN.D29 - RELAY GLOW (Male)



SMIL15CEX3956AA 37

Pin	From	Wire	Description	Color-Size	Frame
1	SP-501B-P-X	509		G-0.85	**SHEET 01 - Starting circuit**
2	CN.D01-02-P-10	372		L-0.85	**SHEET 05 - Engine controller**

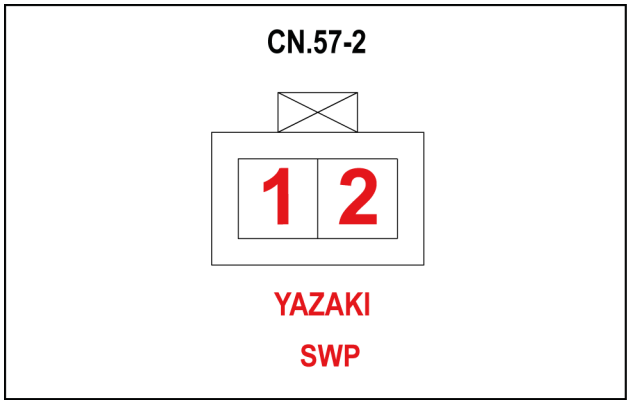
CONNECTOR CN.A42 (Male)



SMIL15CEX3894AA 3

Pin	From	Wire	Description	Color-Size	Frame
1	CN.A53-F-P-8	041A		PG	**SHEET 24 - Main cab-inter connector**
2	CN.A44-M-P-8	041B		PG	**SHEET 25 - Main cab-monitor display**
3	CN.A2-P-14	041C		PG	**SHEET 21 - Main cab-controller A**
4	CN.A6-P-14	041D		PG	**SHEET 22 - Main cab-controller B**
5	CN.A23-P-8	041E	Only for Turkey	PG	**SHEET 20 - Main cab-controller A**
6	CN.A24-M-P-8	041F		PG	**SHEET 28 - Main cab-can circuit**
7	CN.A48-F-P-11	041G		PG	**SHEET 35 - Console inter connector**
8	CN.A26-M-P-4	041H		PG	**SHEET 28 - Main cab-can circuit**
9	CN.A27-M-P-11	041T		PG	
10	CN.A35F-P-1	041J		PG	
11	CN.A51-F-P-8	600		BG-1.25	**SHEET 24 - Main cab-inter connector**
12	SP-601B-P-X	601C		BG-1.25	**SHEET 20 - Main cab-controller A**
13	SP-602-P-X	602B		BG-1.25	**SHEET 22 - Main cab-controller B**
14	CN.A23-P-14	603	Only for Turkey	BG-1.25	**SHEET 24 - Main cab-inter connector**
15	SP-610E-P-X	609		BG-1.25	
16	SP-610E-P-X	610F		BG-1.25	
17	CN.A46-F-P-10	620		BG-0.85	**SHEET 32 - Main cab-switches**
18	SP-630-P-X	630		B	**SHEET 24 - Main cab-inter connector**
19	CN.A33M-P-1	637		BG	
20	CN.A57-F-P-16	640		BG-0.75	**SHEET 17 - Option line circuit**

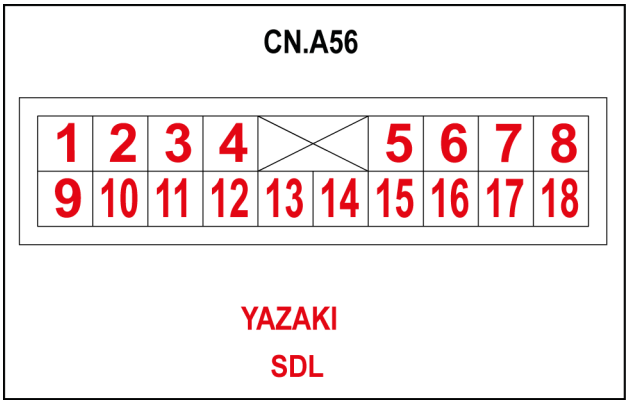
CONNECTOR CN.57-2 - OPTION 2 SPEED SOLENOID VALVE (Male)



SMIL15CEX4165AA 5

Pin	From	Wire	Description	Color-Size	Frame
1	SP-260C-P-X	261		WL-0.75	**SHEET 18 - Option circuit pedal type**
2	CN.A57-M-P-3	805A		YR-0.75	

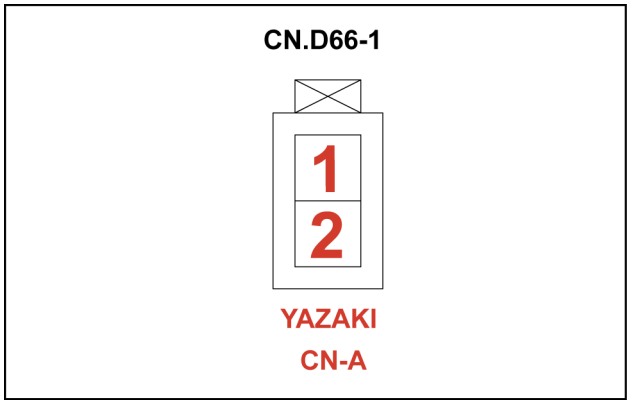
CONNECTOR CN.A56 (Female)



SMIL15CEX3946AA 36

Pin	From	Wire	Description	Color-Size	Frame
1	CN.A3-P-3	900		Y-0.85	**SHEET 20 - Main cab-controller A**
2	CN.A3-P-1	902		O-0.85	
3	CN.A3-P-2	904		L-0.85	
4	CN.A7-P-3	906		G-0.85	**SHEET 22 - Main cab-controller B**
5	CN.A7-P-1	908		W-0.85	
6	CN.A7-P-2	910		V-0.85	
9	CN.A3-P-6	901		BY-0.85	**SHEET 20 - Main cab-controller A**
10	CN.A3-P-4	903		BO-0.85	
11	CN.A3-P-5	905		BL-0.85	
12	CN.A7-P-6	907		GB-0.85	**SHEET 22 - Main cab-controller B**
13	CN.A8-P-17	818		YL-0.85	
14	CN.A1-P-13	417		LR-0.85	**SHEET 21 - Main cab-controller A**
15	CN.A7-P-4	909		WB-0.85	**SHEET 22 - Main cab-controller B**
16	CN.A7-P-5	911		VG-0.85	

CONNECTOR CN.D66-1A - LAMP (BOOM LEFT) (Male)

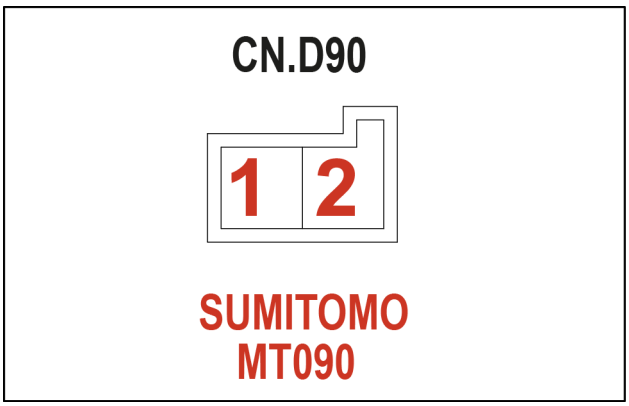


SMIL15CEX7273AA 14

Pin	From	Wire	Description	Color-Size	Frame
1	SP-871B-P-X	872B		Y-1.25	**SHEET 11 - Engine lamp and fuel pump**
2	SP-758B-P-X	759B		B-1.25	

Wire connectors - Component diagram 09

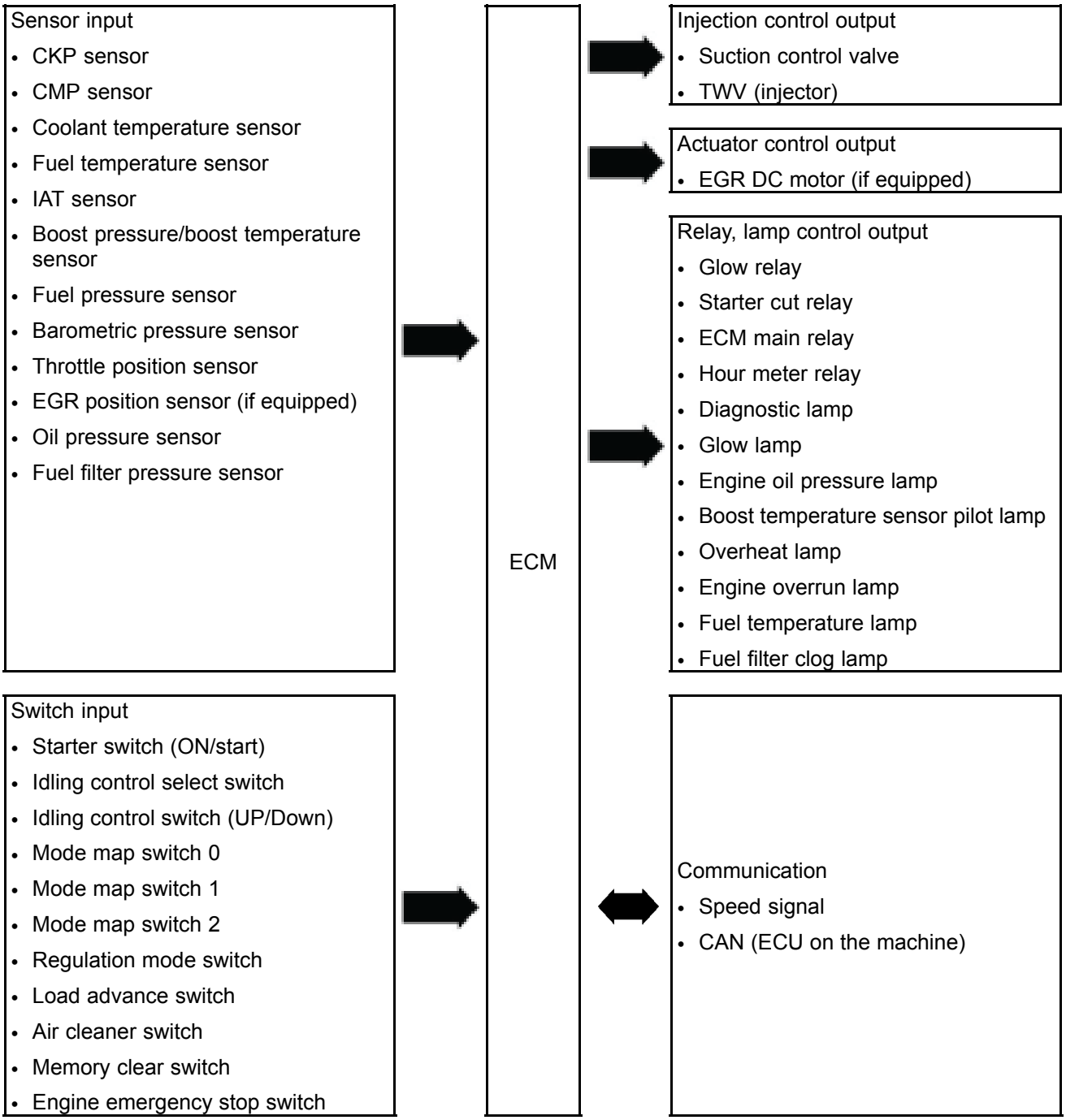
CONNECTOR CN.D90 - PN DIODE (Male)



SMIL16CEX0606AA 1

Pin	From	Wire	Description	Color-Size	Frame
1	SP-897-P-X	768		B-0.85	**SHEET 43 - Air conditioner condenser**
2	SP-767-P-X	898		GR-0.85	

Input/output chart



Electronic control fuel injection system

This is a system in which the engine speed, engine load, and other information are acquired by the ECM and, based on that information, the ECM sends electrical signals to the supply pump, injectors, or the like to appropriately control the fuel injection quantity and timing of each cylinder.

Injection quantity control

To provide the optimum injection quantity, the ECM controls the injectors based mainly on signals from engine speed and throttle opening and the speed indicated by the machine control unit.

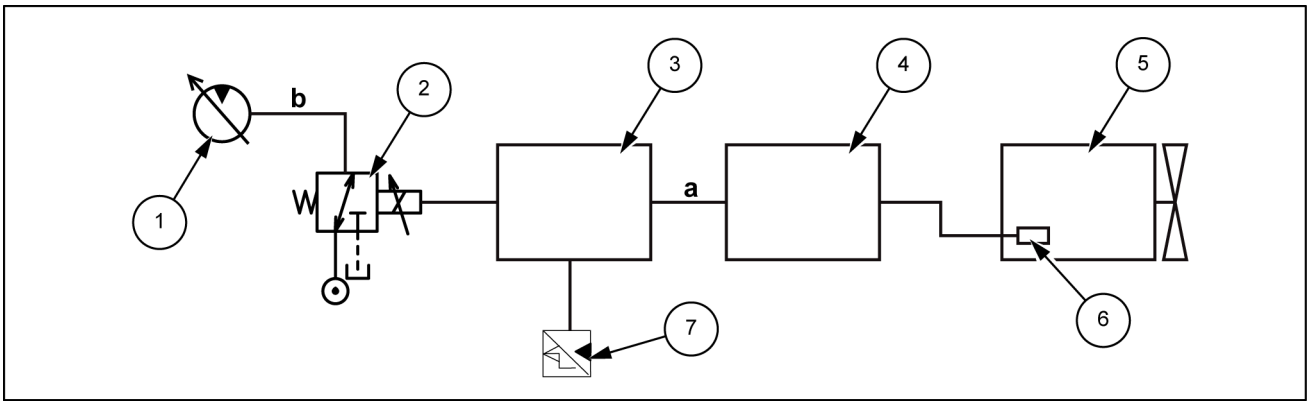
Engine Control Unit (ECU) - Fault code index

Diagnostic trouble code	
U0001	CAN bus error (ISO-CAN)
P0016	Abnormally correlation between crankshaft position and camshaft position
U0073	CAN bus error
P0087	Fuel rail system pressure low pressure error
P0089	Fuel rail pressure regulator characteristics error
P0091	Fuel rail pressure regulator control system low input
P0092	Fuel rail pressure regulator control system high input
U0101	TCM communication error
P0112	Intake temperature sensor system low input
P0113	Intake temperature sensor system high input
P0117	Engine coolant temperature sensor system low input
P0118	Engine coolant temperature sensor system high input
P0182	Fuel temperature sensor system low input
P0183	Fuel temperature sensor system high input
P0192	Fuel rail pressure sensor system low input
P0193	Fuel rail pressure sensor system high input
P0201	Injector first cylinder system error
P0202	Injector second cylinder system error
P0203	Injector third cylinder system error
P0204	Injector fourth cylinder system error
P0205	Injector fifth cylinder system error
P0206	Injector sixth cylinder system error
P0217	Engine coolant high temperature error
P0219	Engine high rpm error
P0234	Turbocharger high boost pressure state
P0237	Boost sensor circuit low input
P0238	Boost sensor circuit high input
P0335	Crankshaft position sensor system error
P0336	Crankshaft position sensor system characteristics error
P0340	Camshaft position sensor system error
P0380	Glow plug system error
P0381	Glow lamp system error
P0404	EGR1 control system error
P0409	EGR1 position sensor system error
P0521	Engine oil low pressure error
P0522	Oil pressure sensor system low input
P0523	Oil pressure sensor system high input
P0563	System voltage high input
P0601	Control module memory checksum error
P0602	Control module program error
P0604	Control module RAM error
P0606	Control module processing device error
P060B	Control module A/D converter processing system characteristics error
P0615	Starter relay system error
P0641	Sensor voltage system error (reference 1)
P0650	Check engine lamp system error
P0651	Sensor voltage system error (reference 2)
P0685	ECM main relay control system low input
P0687	ECM main relay control system high input
P0697	Sensor voltage system error (reference 3)
P06AF	Injector IC error, checksum error, communication error
P1093	Fuel rail pressure low pressure error
P1097	Boost temperature sensor system low input (intercooler outlet)

Engine starting system - Dynamic description - Static horsepower control

Purpose

To set the appropriate horsepower according to the engine actual speed and target speed. (Engine stop prevention/ energy saving)



SMIL14CEX0437EB 1

1. Hydraulic pump
2. Horsepower control proportional valve
3. Computer A
4. ECM
5. Engine
6. Crank position sensor
7. Pressure sensor (travel)

a. Engine target speed
b. Discharge increase/decrease

Operation explanation

1. Select the Min and Max milli-amps from milli-amps set for each engine speed.
2. When the engine actual speed falls **30 RPM** or more below the target engine speed, the milli-amp is gradually lowered to the Min.
3. When the engine actual speed falls less than **30 RPM** below the target engine speed, the milli-amp is gradually raised to Max.
4. When the engine speed is set to low speed, the milli-amp is lowered.
5. When the engine speed returns from low speed, the milli-amp is raised.

Engine starting system - Inspect - Starter circuit system

Description of function

The starter relay is turned “ON” when the starter switch is shifted to the START position. When the starter relay is turned “ON”, the starter is actuated and the engine is started.

Inspection

Inspection when the starter does not operate.

1. Turn “OFF” the emergency stop switch.
   - Confirm the diagnostic trouble code.
2. Check the DTC.
   - If a diagnostic trouble code is detected, inspect for the relevant diagnostic trouble code.
3. Turn “OFF” the starter switch.
4. Remove the starter cut relay.
5. Inspect the starter cut relay.
   - Check the continuity between the terminals at the switch.
     Specified value: **100 Ω** or below
6. If a problem is found, replace the relay.
7. Remove the starter cut relay.
8. Inspect the starter relay.
   - Connect the battery between the terminals at coil side, and confirm the continuity between the terminals at switch side.
     Specified value: **100 Ω** or below
9. If a problem is found, replace the relay.
10. Inspect the starter switch start signal circuit.
    - There should be no open circuit or high resistance between the starter switch and ECM.
      Specified value: **100 Ω** or below
    - There should be no short circuit with GND between the starter switch and ECM.
      Specified value: **10 M Ω** or higher
11. If a problem is found, repair the circuit.
12. Inspect the starter circuit.
    - Make sure that there is no open circuit between the starter switch and starter cut relay.
    - Make sure that there is no open circuit between the starter cut relay and starter relay.
    - Make sure that there is no open circuit between the starter relay and GND.
    - Make sure that there is no open circuit between the starter relay and starter.
13. If a problem is found, repair the circuit.
14. Inspect the starter.

Speed limit milli-amp (QMAX cut)	**370 mA**

(*1): The speed is reduced for independent travel operation
(*2): Y indicates control is enabled, N indicates disabled.

Intake manifold pressure sensor - Remove

1. Disconnect the harness connector from the barometric pressure sensor.
2. Remove the barometric pressure sensor from the machine.

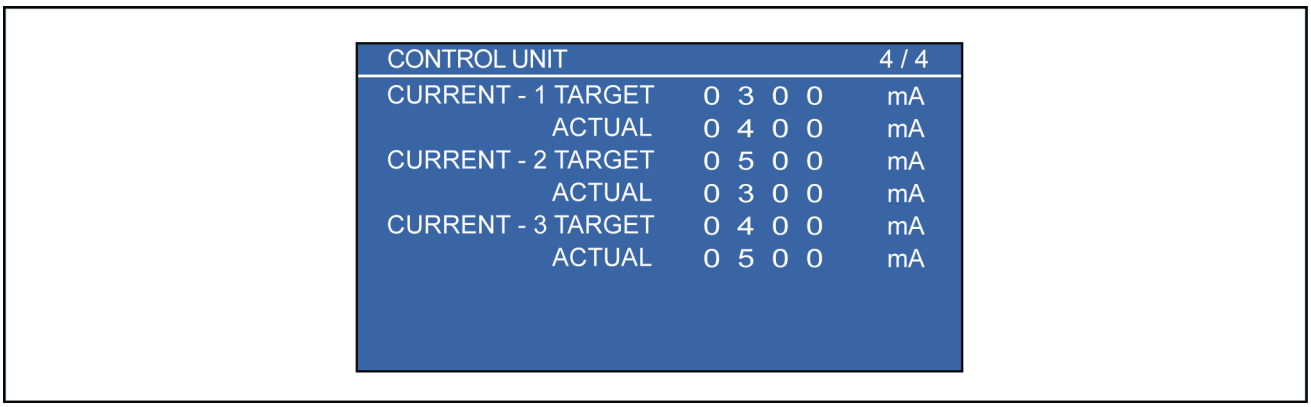
Remarks

The coolant temperature ranges are shown in the table below.

Temperature	Meter indicator angle	Remarks
:	180°	Red zone
107 °C (**225 °F**)	180°	Red zone
106 °C (**223 °F**)	175°	Red zone
105 °C (**221 °F**)	166°	Red zone
100 °C (**212 °F**)	135°	-
94 °C (**201 °F**)	90°	-
73 °C (**163 °F**)	45°	-
50 °C (**122 °F**)	16°	-
38 °C (**100 °F**)	0°	Blue zone
:	0°	Blue zone

SENSOR-1	V	Hydraulic oil temperature sensor
SENSOR-2	V	Fuel level sensor
FREQUENCY IN	Hz	-

Solenoid current

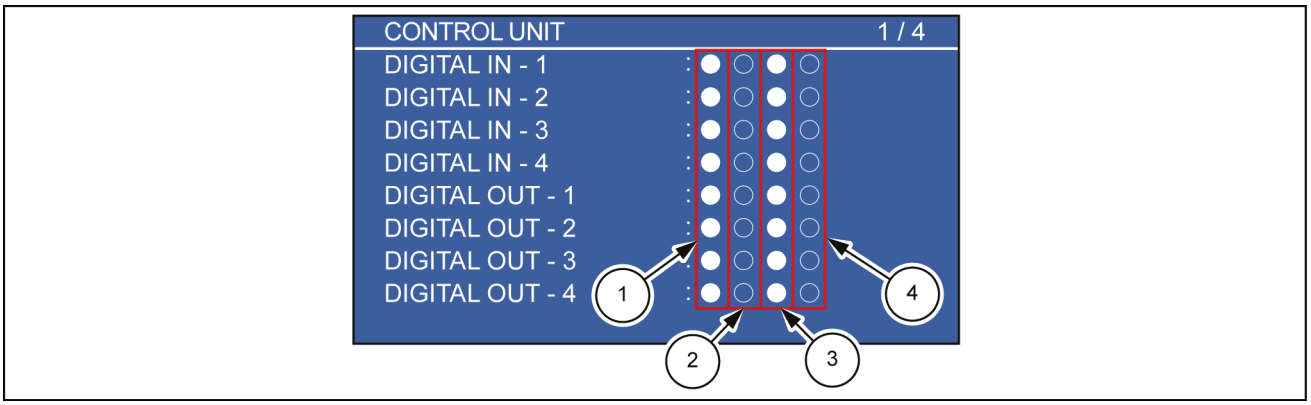


SMIL14CEX0622EA 5

CURRENT-1	TARGET	mA	Target milli-amp for pump power supply proportional solenoid
	ACTUAL	mA	Actual current for pump power supply proportional solenoid
CURRENT-2	TARGET	mA	Target milli-amp for boom-down proportional solenoid
	ACTUAL	mA	Actual current for boom-down proportional solenoid
CURRENT-3	TARGET	mA	Target milli-amp for pump flow proportional solenoid
	ACTUAL	mA	Actual current for pump flow proportional solenoid

Controller B

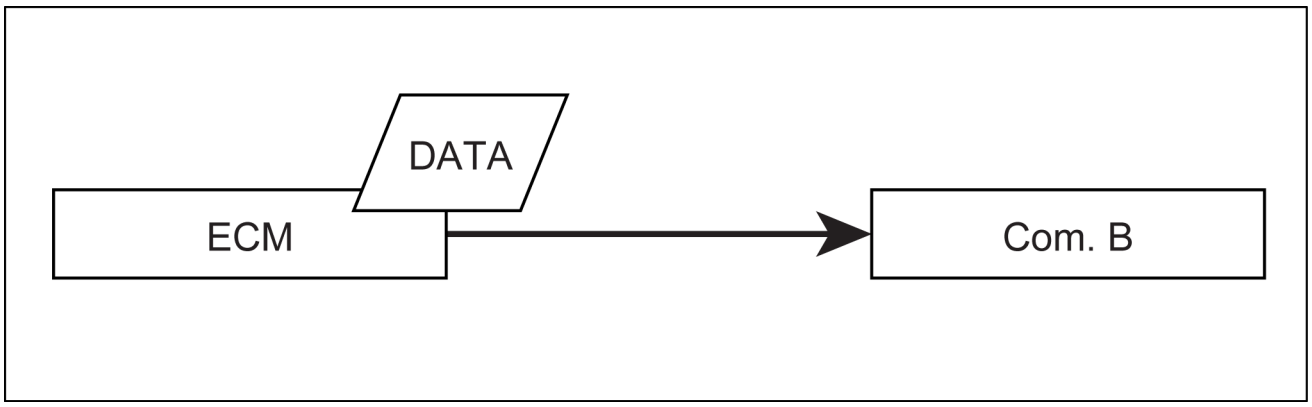
Digital In/Out



SMIL15CEX4928EB 6

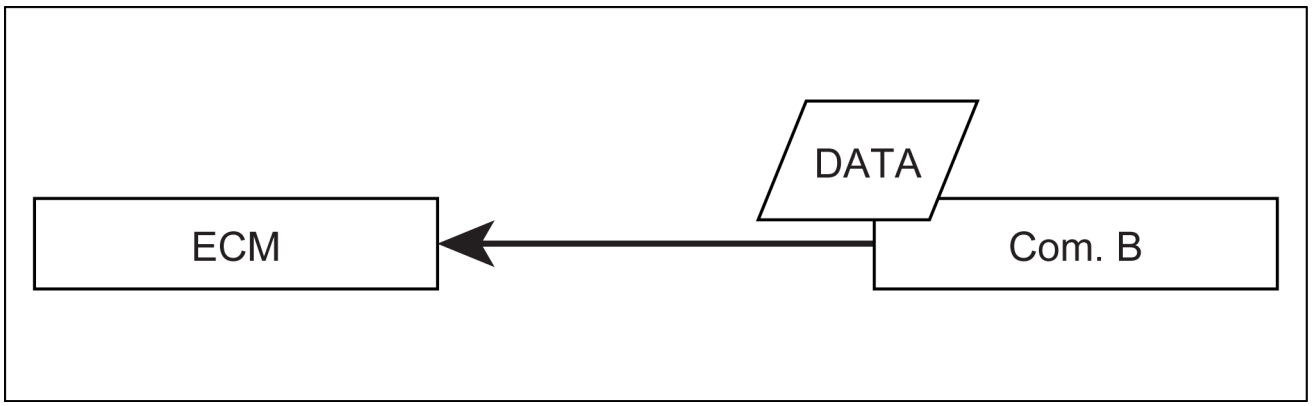
●	ON
○	OFF

DIGITAL IN-1	1	Lifting magnet trouble received 1
	2	Lifting magnet trouble received 2
	3	Lifting magnet trouble received 3
	4	Lifting magnet trouble received 4
DIGITAL IN-2	1	-
	2	-
	3	-
	4	-



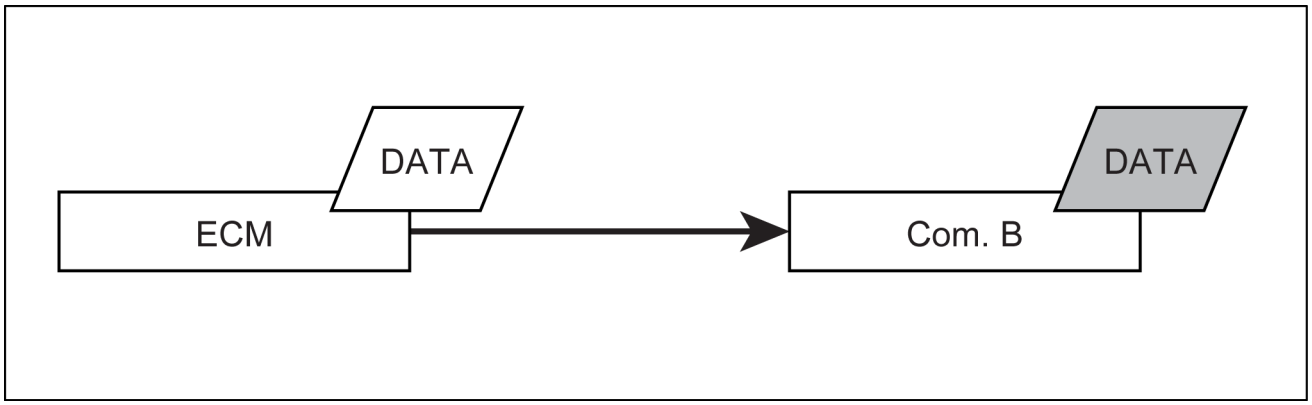
SMIL14CEX0512EA 6

2. Computer B to Empty ECM
   Press SW **(5)** for **3 s**.



SMIL14CEX0513EA 7

3. ECM to edited computer B
   Press SW **(1)** and **(2)** both for **3 s**.



SMIL14CEX0514EA 8

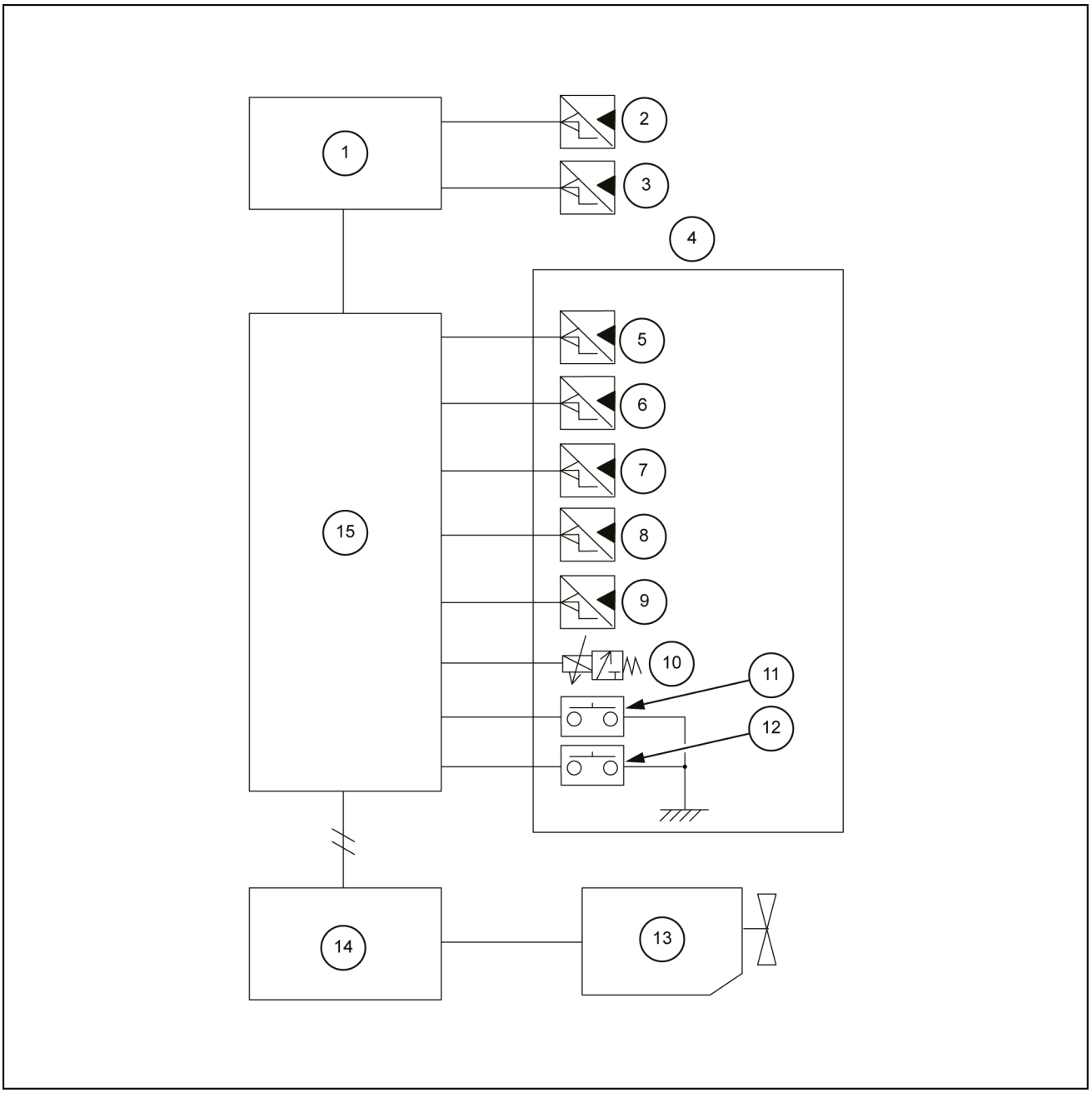
Power boost pressure solenoid - Dynamic description - Pump horsepower cut control

Purpose

The pump milli-amp is controlled in order to prevent black smoke during excess loads and engine speed drops and in order to improve energy saving.

The control methods are the following 5.

1. Overload reduction control
2. Engine stalling prevention control
3. PID control
4. Backup control
5. Control during low temperatures



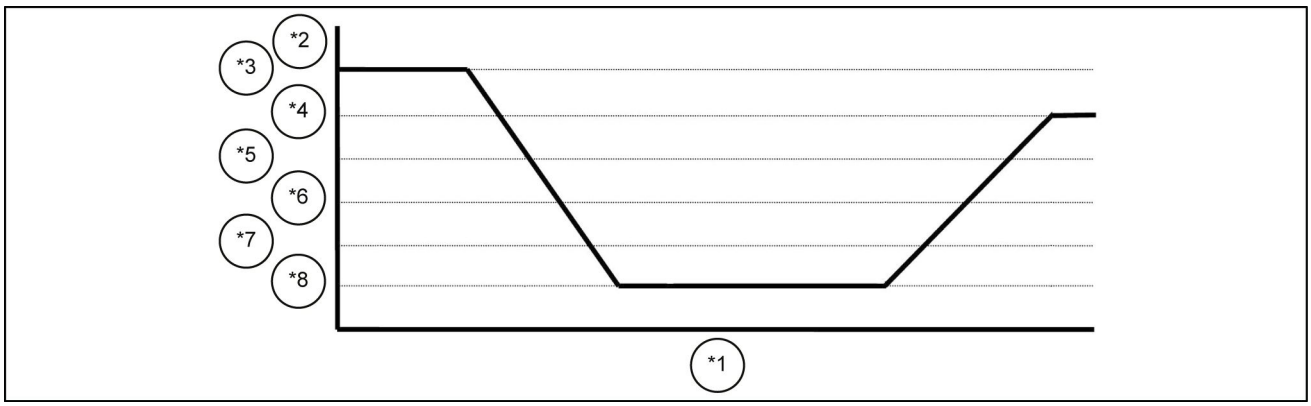
SMIL15CEX3513GB 1

Relationship between air flow and display during manual operation							
Display							

3. Auto air flow control

When it is recognized that the AUTO switch has been closed, the air flow is controlled automatically and AUTO is displayed.

1. During auto air flow control, the air flow is set according to the target blowing temperature as shown in the diagram below.
2. Auto air flow control continues until closing of either the air flow UP or air flow DOWN switch is recognized.
3. The auto air flow amount calculation results are continuous, not divided into levels.
4. When it is recognized that the AUTO switch has been closed, the display becomes as in the table below according to the results of the auto air flow amount calculation.
5. The normal auto air flow output change is roughly **5 V**.
6. Auto air flow control is restricted by the cold blast prevention control described in **(4)**, which is the next item.



SMIL14CEX1903EB 2

Relationship between air flow and target blow temperature

*1. Target blow temperature
*2. Auto air flow
*3. Hi
*4. M4
*5. M3
*6. M2
*7. M1
*8. Lo

Display refreshing and air flow output correspondence table		
Current display	**Item**	**Target % (about)**
Lo display	Output range changed to M1	When 44 % or higher
M1 display	Output range changed to Lo	When 40 % or lower
M1 display	Output range changed to M2	When 52 % or higher
M2 display	Output range changed to M1	When 48 % or lower
	Output range changed to M3	When 61 % or higher
M3 display	Output range changed to M2	When 57 % or lower
	Output range changed to M4	When 74 % or higher
M4 display	Output range changed to M3	When 70 % or lower
	Output range changed to Hi	When 88 % or higher
Hi display	Output range changed to M4	When 84 % or lower

Contents

Electrical systems - 55

Travel control system - 417

Index

Electrical systems - 55

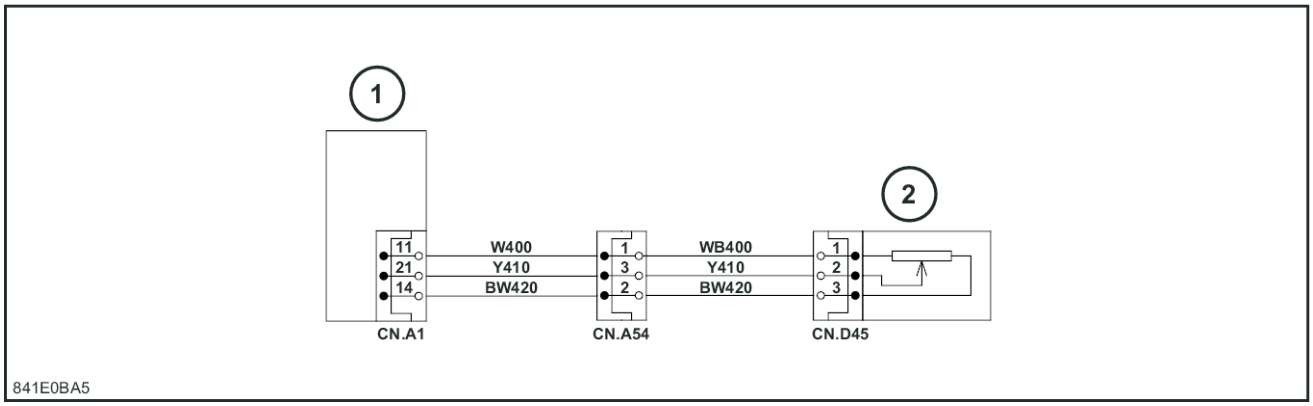
Wiper and washer system - 518

7000 - P1 Pressure sensor signal abnormality

Control Module: MCM

Solution:

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



841E0BA5 1

1. Computer A
2. P1 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 7000 is displayed, proceed to Step **2**.

2. Check the P1 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 P1 pressure sensor connector **CN.D45**.

Turn ON the key switch.

Measure the voltage between the ground and terminal 1 of the P1 pressure sensor connector **CN.D45** harness side.

A. If the voltage is not about **5 V**, find and replace the wire ID W400 or WB400.

B. If the voltage is about **5 V**, proceed to Step **4**.

4. Measure the voltage between the ground and terminal 2 of the P1 pressure sensor connector **CN.D45** harness side.

A. If the voltage is more than **4.75 V**, find and replace the wire ID Y410.

B. If the voltage is equal or lesser than **4.75 V**, proceed to Step **5**.

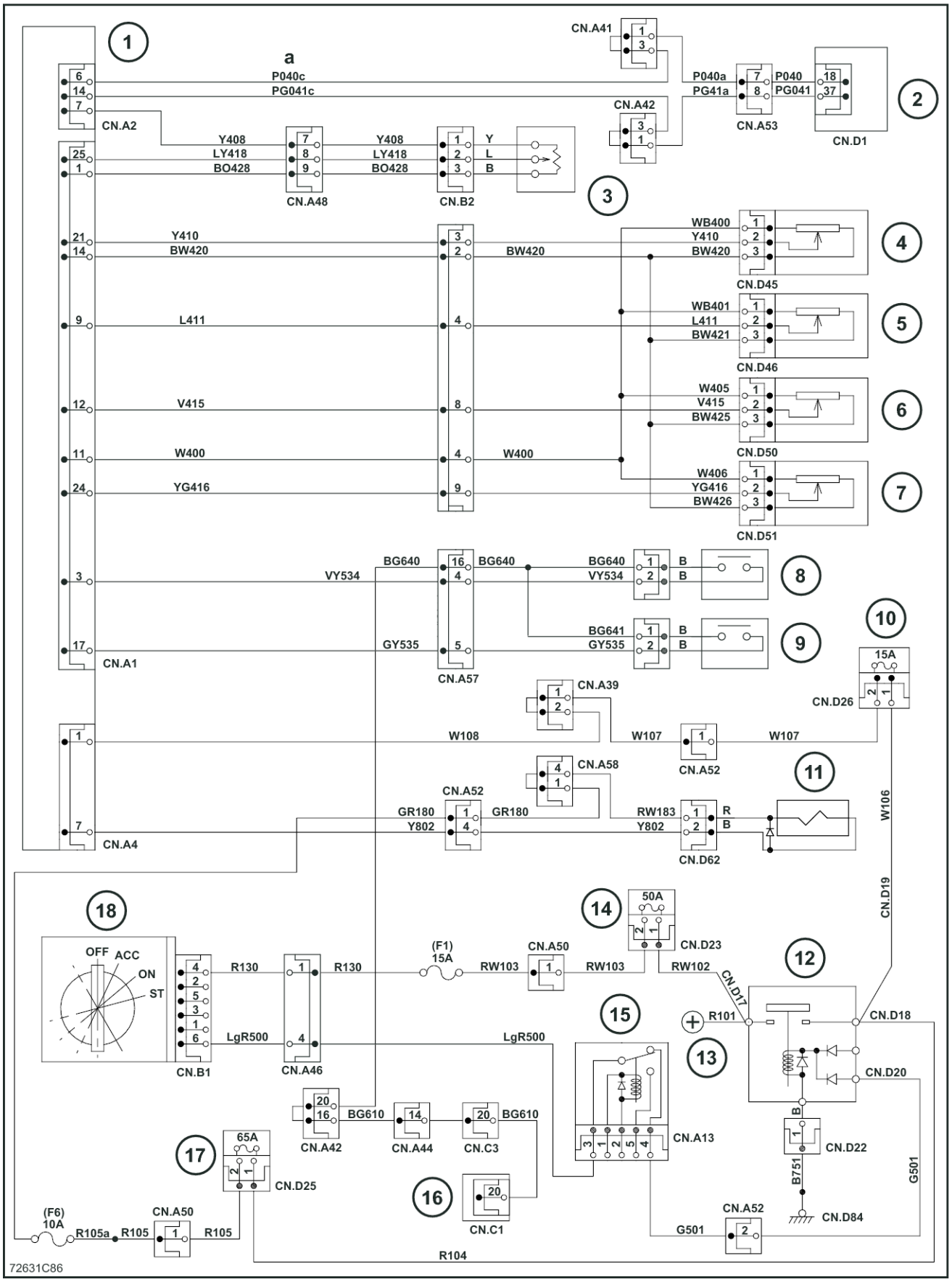
5. Measure the voltage between the ground and terminal 3 of the P1 pressure sensor connector **CN.D45** harness side.

A. If the voltage is more than **0.25 V**, find and replace the wire ID BW420.

B. If the voltage is equal or lesser than **0.25 V**, replace computer A **(1)**.

6. Turn OFF the key switch.

Disconnect the P1 pressure sensor connector **CN.D45**.


1
a
CN.A2
P040c
PG041c
CN.A41
CN.A42
P040a
PG41a
CN.A53
P040
PG041
CN.D1
2
Y408
LY418
BO428
CN.A48
CN.B2
Y
L
B
3
Y410
BW420
WB400
CN.D45
4
L411
WB401
BW421
CN.D46
5
V415
W405
BW425
CN.D50
6
W400
YG416
W406
BW426
CN.D51
7
BG640
VY534
BG641
GY535
CN.A57
CN.A1
8
9
10
15A
CN.D26
CN.A39
W108
W107
CN.A52
CN.A58
11
GR180
Y802
RW183
CN.D62
W106
CN.D19
CN.A4
18
OFF
ACC
ON
ST
CN.B1
R130
LgR500
CN.A46
14
50A
CN.D23
(F1)
15A
CN.A50
RW103
RW102
12
CN.D17
R101
CN.D18
15
13
CN.D20
CN.A42
BG610
CN.A44
CN.C3
CN.A13
CN.D22
B751
G501
17
65A
CN.D25
16
CN.C1
CN.D84
(F6)
10A
R105a
R105
R104
72631C86

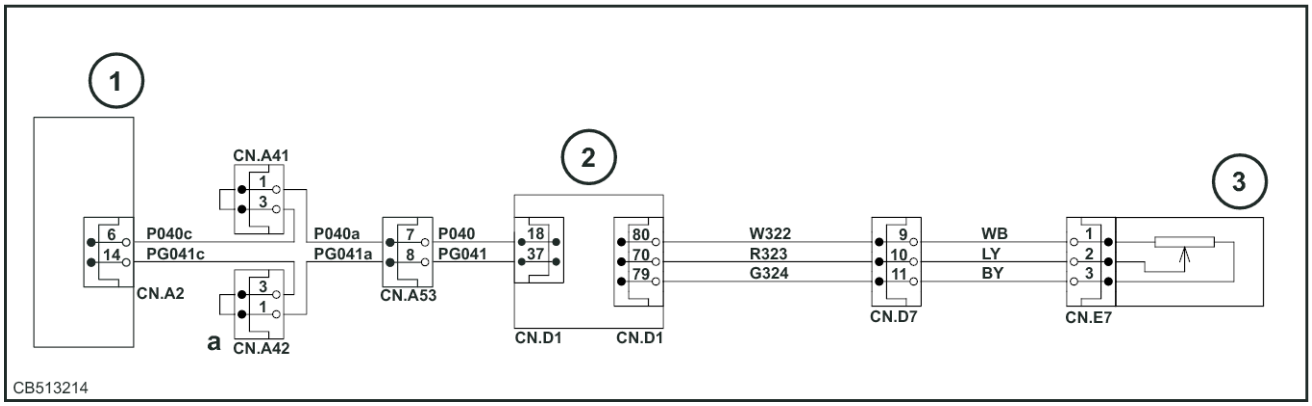
72631C86 1

7422 - Abnormally low engine oil pressure

Control Module: MCM

Solution:

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



CB513214 1

1. Computer A
2. Engine computer
3. Oil pressure sensor

Start the engine and wait for **30 s**.

Check the Diagnostic Trouble Code 7422 (●) on the service support DIAG screen.

A. If Diagnostic Trouble Code 7422 (●) is displayed, proceed to Step **2**.

2. Inspect the engine unit.

P0118 - Engine coolant temperature sensor, high input

Control Module: ECM

Solution:

1. Check the trouble code setting conditions before you proceed with the diagnostics code P0118.
   - Diagnostic trouble codes P060B, P160B and P1655 are not detected.
   - The engine has been running for **3 min** or longer.
   - The ECM detects that the signal voltage of the coolant temperature sensor is **4.9 V** or higher for **5 s**.
2. Check and diagnose the below fault codes before you proceed with the diagnostics code P0118.

   Diagnostic trouble code P1655
3. Turn OFF the starter switch.

   Disconnect the water temperature sensor harness connector **CN.E11**.

   Turn ON the starter switch.

   Measure the voltage between the water temperature sensor signal circuit and normal ground.

   A. If the voltage is more than equal to **5.5 V**, proceed to Step **4**.

   B. If the voltage is lesser than **5.5 V**, proceed to Step **5**.
4. 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 water temperature sensor.

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

   B. If there are no problems, proceed to Step **5**.
5. Connect the test cable with fuse between the water temperature sensor signal circuit and the ground circuit.

   Check the coolant temperature sensor display with the trouble diagnosis scan tool.

   A. If the voltage is less than or equal to **0.1 V**, proceed to Step **6**.

   B. If the voltage is more than **0.1 V**, proceed to Step **8**.
6. 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 water temperature sensor.

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

   B. If there are no problems, proceed to Step **7**.
7. Inspect to see if there is a poor connection with the water temperature sensor harness connector **CN.E11**.

   A. If a problem is found, repair the water temperature sensor harness connector **CN.E11**.

   B. If the water temperature sensor harness connector **CN.E11** is normal, replace the water temperature sensor. (Refer to " **Engine coolant temperature sensor and switch - Remove (55.012)**" and " **Engine coolant temperature sensor and switch - Install (55.012)**")
8. Connect the test cable with fuse between the water temperature sensor signal circuit and the normal ground.

   Check the coolant temperature sensor display with the trouble diagnosis scan tool.

   A. If the voltage is less than or equal to **0.1 V**, proceed to Step **9**.

   B. If the voltage is more than **0.1 V**, proceed to Step **11**.
9. Inspect to see if there is an open circuit or high resistance with the water temperature sensor ground circuit.

Make sure that there are no open circuit or high resistance.

Make sure that there is no short circuit to the ground.

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

B. If there are no problems, proceed to Step **9**.

9. Connect a test lamp between the signal circuit of the crankshaft position sensor harness connector **CN.E4** and normal ground.

   Measure the voltage between the test lamp probe and normal ground.

   A. If the voltage is more than **4.5 V**, proceed to Step **10**.

   B. If the voltage is lower than or equal to **4.5 V**, proceed to Step **11**.

10. Inspect for a short circuit to the **5 V** power supply circuit in the signal circuit between the ECM and crankshaft position sensor.

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

    B. If there are no problems, proceed to Step **11**.

11. Measure the voltage between the **5 V** power supply circuit of the crankshaft position sensor harness connector **CN.E4** and ground circuit.

    A. If the voltage is more than **4.5 V**, proceed to Step **12**.

    B. If the voltage is lower than or equal to **4.5 V**, proceed to Step **13**.

12. Inspect for a contact defect in the crankshaft position sensor harness connector **CN.E4**.

    A. If a problem is found, repair the crankshaft position sensor harness connector **CN.E4**.

    B. If the crankshaft position sensor harness connector **CN.E4** is normal, proceed to Step **13**.

13. Inspect the crankshaft position sensor. (Refer to " **Engine speed/RPM sensor - Inspect (55.015)**")

    A. If a problem is found, replace the crankshaft position sensor. (Refer to " **Engine speed/RPM sensor - Remove (55.015)**" and " **Engine speed/RPM sensor - Install (55.015)**")

    B. If there are no problems, proceed to Step **14**.

14. Inspect for a disconnection or high resistance in the ground circuit between the ECM and crankshaft position sensor.

    NOTE: *The crankshaft position sensor shares use of the ground circuit with other sensors.*

    NOTE: *A diagnostic trouble code may be detected for the sensors sharing use of this circuit.*

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

    B. If there are no problems, proceed to Step **15**.

15. Inspect for a contact defect in the ECM harness connector **CN.D1-02**.

    A. If a problem is found, repair the ECM harness connector **CN.D1-02**.

    B. If the harness connector is normal, replace the ECM.

    NOTE: *Set the injector ID code and engine serial number in the ECM.*

16. Confirm resolution:

    1. Display RESET on the service support screen on the monitor and reset FAULTY HISTORY. See "Service Support - RESET Screen List".

    NOTE: *All the generated Diagnostic Trouble Codes will be cleared.*

B. If the voltage is lesser than **4.5 V**, proceed to Step **8**.

8. Inspect for a short circuit to ground in the accelerator position sensor **5 V** power supply circuit between the ECM and accelerator position sensor.

   A. If a problem is found, repair the throttle position sensor **5 V** power supply circuit.

   B. If there are no problems, proceed to Step **9**.

9. Inspect for a short circuit to the ground in the fuel filter pressure sensor **5 V** power supply circuit between the ECM and fuel filter pressure sensor.

   A. If a problem is found, repair the fuel filter pressure sensor **5 V** power supply circuit.

   B. If there are no problems, proceed to Step **10**.

10. Inspect for a short circuit to the ground in the boost pressure/boost temperature sensor **5 V** power supply circuit between the ECM and boost pressure/boost temperature sensor.

    A. If a problem is found, repair the boost pressure/boost temperature sensor **5 V** power supply circuit.

    B. Replace the ECM.

    NOTE: *Set the injector ID code and engine serial number in the ECM.*

11. Confirm resolution:

    1. Display RESET on the service support screen on the monitor and reset FAULTY HISTORY. See "Service Support - RESET Screen List".

    NOTE: *All the generated Diagnostic Trouble Codes will be cleared.*

    2. Turn OFF the starter switch and keep it OFF for **1 min** or longer.

    3. Start the engine.

    4. Perform a test-run under the conditions for running the Diagnostic Trouble Code.

    5. Display FAULTY HISTORY on the service support screen on the monitor and check that no Diagnostic Trouble Code has been detected. See "Service Support - FAULTY HISTORY".
    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 15 (55.100)
Wiring harnesses - Electrical schematic sheet 21 (55.100)

P20DE - Fuel filter clog error (first stage)

Control Module: ECM

Solution:

1. Check the trouble code setting conditions before you proceed with the diagnostics code P20DE.
    - Diagnostic trouble codes P0182, P0183, P20DF and P20E0 are not detected.
    - Fuel temperature is **5 °C** (**41.0 °F**) or higher.
    - At least **3 min** have passed after engine start.
    - When the fuel filter clog sensor pressure is below **-30 kPa** (**-4.35 psi**) for **60 s** or longer.
2. Check and diagnose the below fault codes before you proceed with the diagnostics code P20DE.

    Diagnostic trouble code P20E0
3. Replace the fuel filter.

    Turn ON the starter switch.

    Display RESET on the service support screen on the monitor and reset FAULTY HISTORY.

    See "Service Support - RESET Screen List".

    NOTE: *All the generated Diagnostic Trouble Codes will be cleared.*

    Turn OFF the starter switch and keep it OFF for **1 min** or longer.

    Start the engine.

    Test the operation under the conditions set for the diagnostic trouble code.

    Conditions for setting the Diagnostic Trouble Codes such as engine run time or coolant temperature, etc., vary depending on the Diagnostic Trouble Codes.

    Check for diagnostic trouble codes on the monitor screen.

    See "Basic Functions - Diagnostic Trouble Code Indicator".

    Inspect the fuel pipe between the fuel tank and fuel filter for clogging, twisting, and bending.

    A. If a problem is found, repair or replace the fuel pipe.

    B. If there are no problems, proceed to Step **4**.
4. Turn OFF the starter switch.

    Disconnect the harness connector from the fuel filter pressure sensor.

    Inspect for a contact defect in the harness connector of the fuel filter pressure sensor.

    A. If a problem is found, repair the fuel filter pressure sensor harness connector.

    B. If there are no problems, proceed to Step **5**.
5. Disconnect the ECM harness connector **CN.D1-02**.

    Inspect for a contact defect in the ECM harness connector **CN.D1-02**.

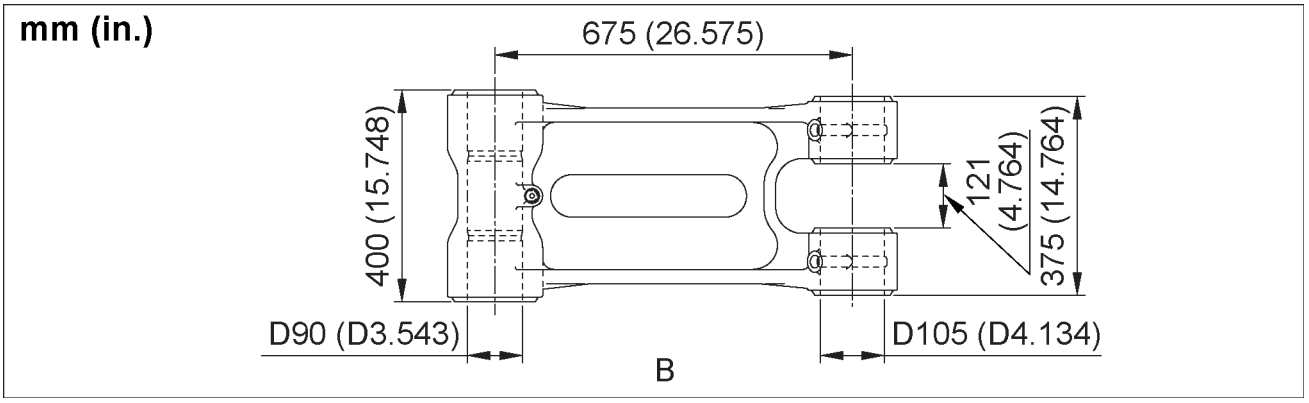
    A. If a problem is found, repair the ECM harness connector **CN.D1-02**.

    B. If there are no problems, proceed to Step **6**.
6. Inspect for high resistance in the circuits between the ECM and fuel filter pressure sensor.

SERVICE MANUAL

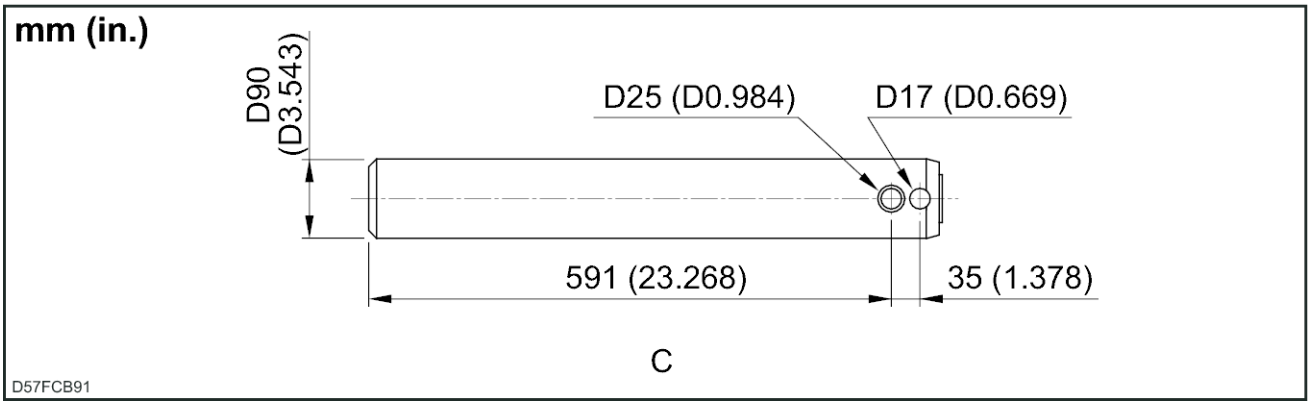
Booms, dippers, and buckets

CX370C Crawler excavator standard (STD) version (Tier 3) - East Asian market
CX370C Crawler excavator standard (STD) version (Tier 3) - Southeast Asian market
CX380C Crawler excavator LC version (Tier 3) - East Asian market
CX380C Crawler excavator LC version (Tier 3) - Southeast Asian market



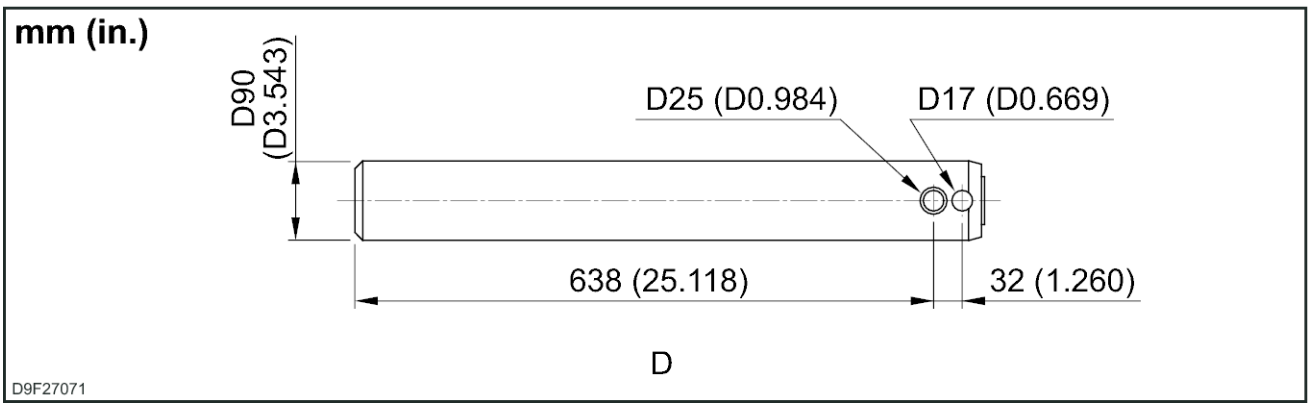
SMIL18CEX1260EA 3

NOTE: *All the dimensions in figure are in mm (in).*



D57FCB91 4

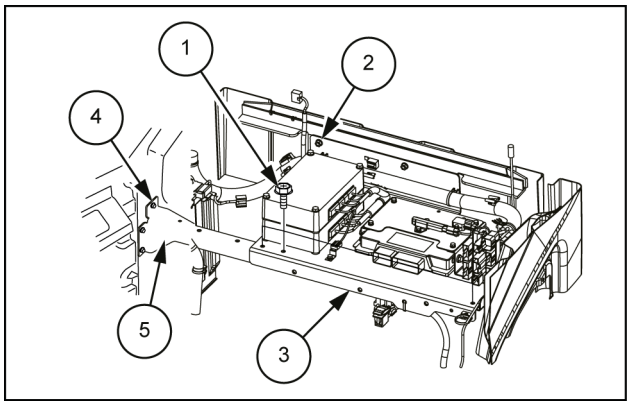
NOTE: *All the dimensions in figure are in mm (in).*



D9F27071 5

NOTE: *All the dimensions in figure are in mm (in).*

12. Use a wrench [**13 mm**] to remove the 4 bolts **(1)**, use a wrench [**12 mm**] to remove the 3 bolts **(4)** and 2 nuts **(2)**, and then remove the rear brackets **(3)** and **(5)**.



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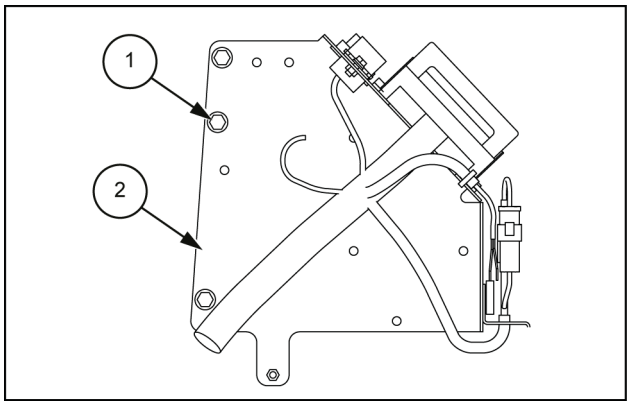
13. Use a wrench [**13 mm**] to remove the 3 bolts **(1)**, and then remove the bracket **(2)**.



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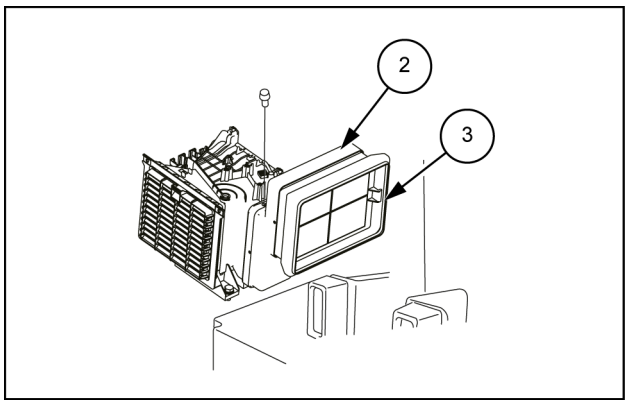
14. Use a flathead screwdriver or longnose pliers to remove the 1 clip **(1)**, and then remove the suction ducts **(2)** and **(3)**.



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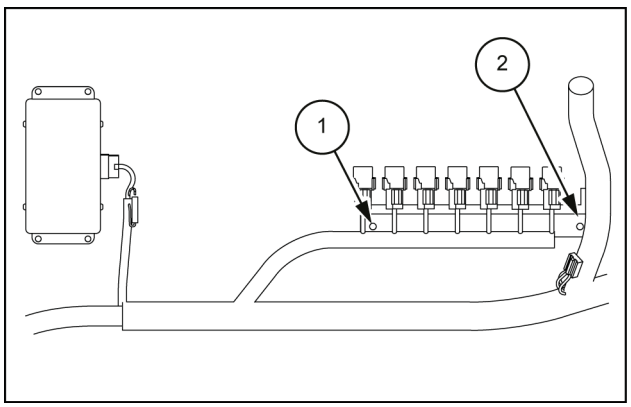
15. Use a wrench [**10 mm**] to remove the 2 bolts **(1)**, and then remove the bracket **(2)**.



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