CX130D - LC Version
CX130D - Standard with Blade Version
Tier 4B (final)
Crawler Excavator

SERVICE MANUAL

Part number 47896670
1st edition English
July 2015

CASE

Digging force (with 0.5 m³ bucket) (ISO 6015)

	[**2.50 m** (**8.2021 ft**)] Arm	[**3.01 m** (**9.8753 ft**)] Arm	[**2.11 m** (**6.9226 ft**)] Arm
Arm digging force	**62 kN** (**13938.15 lb**)	**56 kN** (**12589.30 lb**)	**70 kN** (**15736.63 lb**)
With auto power up	**66 kN** (**14837.39 lb**)	**60 kN** (**13488.54 lb**)	**74 kN** (**16635.86 lb**)
Bucket digging force	**90 kN** (**20232.80 lb**)	**90 kN** (**20232.80 lb**)	**90 kN** (**20232.80 lb**)
With auto power up	**95 kN** (**21356.85 lb**)	**95 kN** (**21356.85 lb**)	**95 kN** (**21356.85 lb**)

Dimensions

	[**2.50 m** (**8.2021 ft**)] Arm	[**3.01 m** (**9.8753 ft**)] Arm	[**2.11 m** (**6.9226 ft**)] Arm
Overall length (without attachment)	**4030 mm** (**158.661 in**)	**4030 mm** (**158.661 in**)	**4030 mm** (**158.661 in**)
Overall length (with attachment)	**7650 mm** (**301.181 in**)	**7640 mm** (**300.787 in**)	**7640 mm** (**300.787 in**)
Overall height (to top of boom)	**2770 mm** (**109.055 in**)	**2640 mm** (**103.937 in**)	**2680 mm** (**105.512 in**)
Overall height (to top of Cab)	**2830 mm** (**111.417 in**)	**2830 mm** (**111.417 in**)	**2830 mm** (**111.417 in**)
Overall height (to top of handrail)	**2810 mm** (**110.630 in**)	**2810 mm** (**110.630 in**)	**2810 mm** (**110.630 in**)
Upper structure overall width	**2530 mm** (**99.606 in**)	**2530 mm** (**99.606 in**)	**2530 mm** (**99.606 in**)
Swing (rear end) radius	**2170 mm** (**85.433 in**)	**2170 mm** (**85.433 in**)	**2170 mm** (**85.433 in**)
Clearance height under upper structure	**895 mm** (**35.236 in**)	**895 mm** (**35.236 in**)	**895 mm** (**35.236 in**)
Minimum ground clearance	**420 mm** (**16.535 in**)	**420 mm** (**16.535 in**)	**420 mm** (**16.535 in**)
Wheel base (Center to center of wheels)	**3040 mm** (**119.685 in**)	**3040 mm** (**119.685 in**)	**3040 mm** (**119.685 in**)
Crawler overall length	**3760 mm** (**148.031 in**)	**3760 mm** (**148.031 in**)	**3760 mm** (**148.031 in**)
Track gauge	**1990 mm** (**78.346 in**)	**1990 mm** (**78.346 in**)	**1990 mm** (**78.346 in**)
Undercarriage overall width [with **600 mm** (**23.622 in**) shoes]	**2590 mm** (**101.969 in**)	**2590 mm** (**101.969 in**)	**2590 mm** (**101.969 in**)
Crawler tracks height	**780 mm** (**30.709 in**)	**780 mm** (**30.709 in**)	**780 mm** (**30.709 in**)

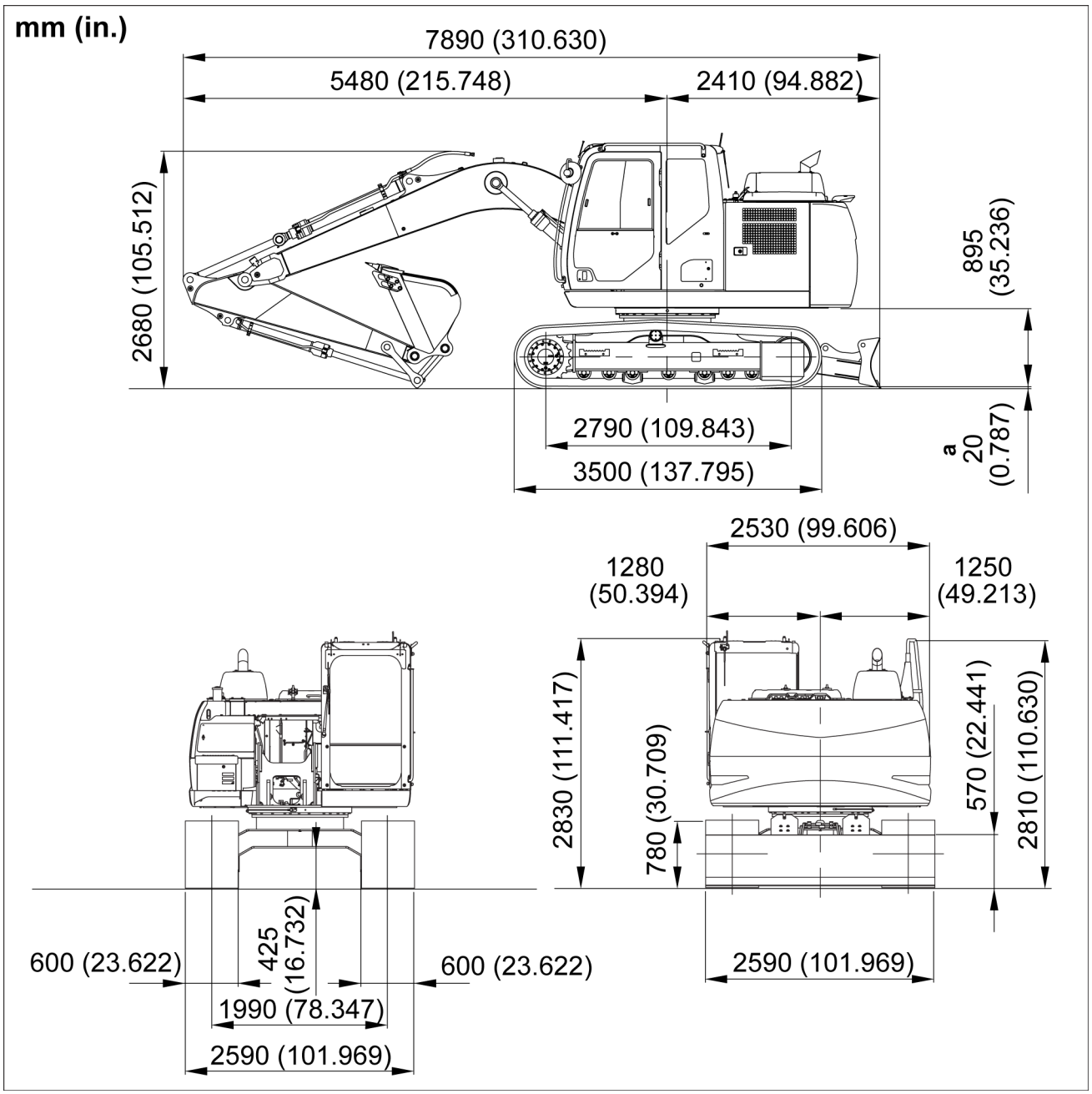
Working ranges

	[**2.50 m** (**8.2021 ft**)] Arm	[**3.01 m** (**9.8753 ft**)] Arm	[**2.11 m** (**6.9226 ft**)] Arm
Boom length	**4630 mm** (**182.283 in**)	**4630 mm** (**182.283 in**)	**4630 mm** (**182.283 in**)
Bucket radius	**1200 mm** (**47.244 in**)	**1200 mm** (**47.244 in**)	**1200 mm** (**47.244 in**)
Bucket wrist action	**178 °**	**178 °**	**178 °**
Maximum reach at GRP	**8170 mm** (**321.654 in**)	**8640 mm** (**340.157 in**)	**7810 mm** (**307.480 in**)
Maximum reach	**8310 mm** (**327.165 in**)	**8770 mm** (**345.276 in**)	**7960 mm** (**313.386 in**)
Max. digging depth	**5550 mm** (**218.504 in**)	**6050 mm** (**238.189 in**)	**5160 mm** (**203.150 in**)
Max. digging height	**8770 mm** (**345.276 in**)	**9050 mm** (**356.299 in**)	**8550 mm** (**336.614 in**)
Max. dumping height	**6390 mm** (**251.575 in**)	**6680 mm** (**262.992 in**)	**6170 mm** (**242.913 in**)

Short Arm [2.11 m (6.9226 ft)]

NOTE: *Numbers are subject to change without notice due to design change or other reason.*

NOTE: *The diagram gives values that include the shoe lug height "a" [* ***20 mm*** *(****0.787 in****)].*



SMIL15CEX4387GB 2

Contents

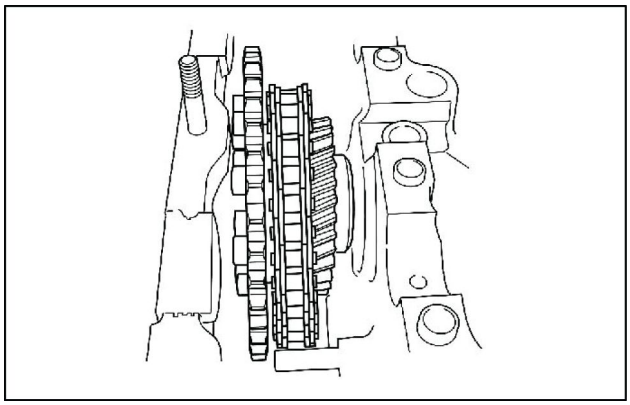
Engine - 10

Engine and crankcase - 001

Idle gear D removal

1. Remove idle gear D **(3)** from the gear case cover.
   - Remove idle gear D **(3)** together with the sprocket.

   1. Bolt
   2. Washer
   4. Idle gear shaft



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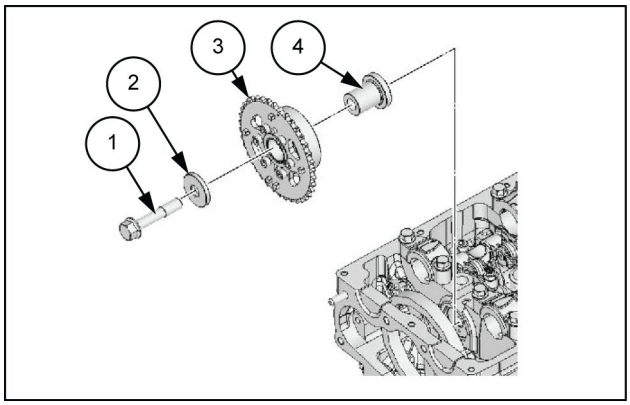

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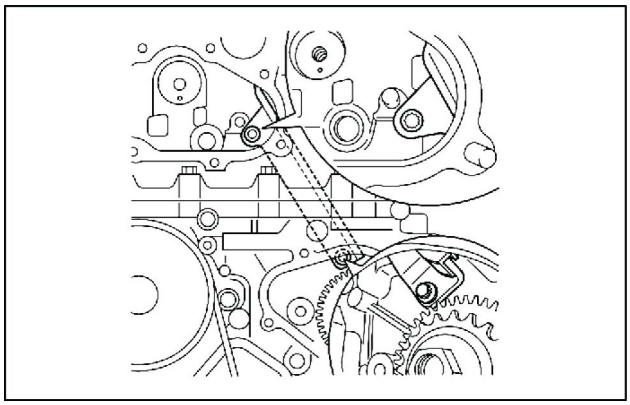
Timing chain removal

1. Remove the timing chain from the sprocket.
   - Remove from the supply pump sprocket.

Timing chain guide removal

1. Remove the timing chain guide from the cylinder head.



LPIL12CX00731AA 34

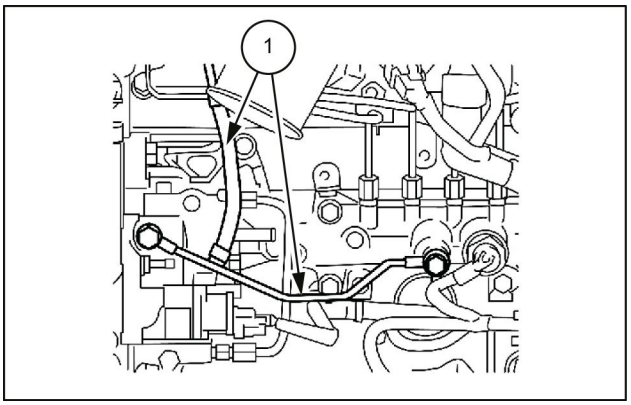
Leak-off pipe installation

1. Install the fuel leak-off pipe to the fuel supply pump and common rail assembly.
   - Also install the hose at the same time.

NOTE: *Do not reuse the gasket.*

1. Leak-off pipe, hose

   Tightening torque: **10.3 N·m** (**8 lb ft**) eyebolt



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Fuel pipe installation

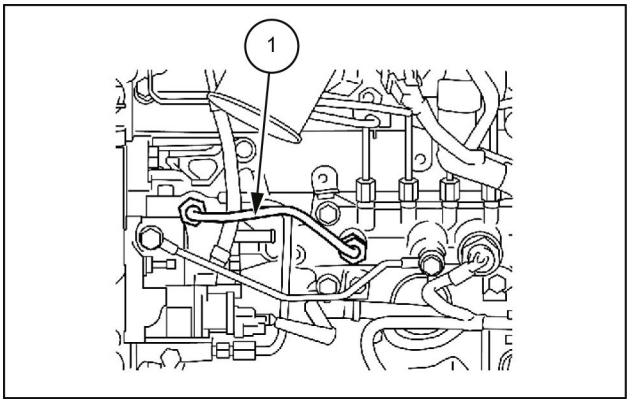
1. Temporarily tighten the fuel pipe **(1)** to the common rail assembly.

NOTE: *Do not reuse the fuel pipe **(1)**.*

2. Temporarily tighten the fuel pipe **(1)** to the fuel supply pump.
3. Securely tighten the fuel pipe **(1)** to the common rail assembly.

   Tightening torque: **44 N·m** (**32 lb ft**) sleeve nut
4. Temporarily tighten the fuel pipe **(1)** to the fuel supply pump.

   Tightening torque: **44 N·m** (**32 lb ft**) sleeve nut

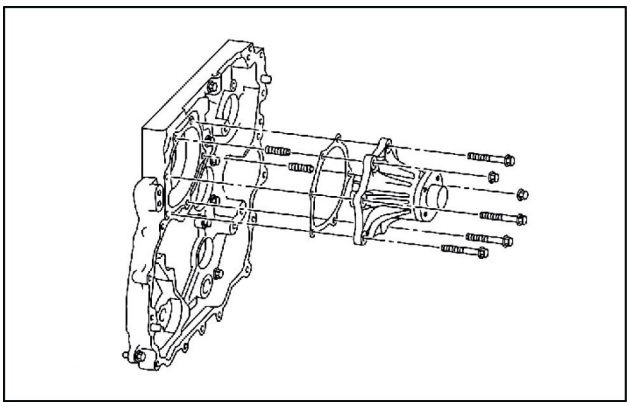


LPIL12CX01124AB 54

Water pump assembly installation

1. Install the water pump to the timing gear case.
   - Install a new gasket by aligning with the front cover stud.
   - Install the water pump by aligning with the front cover stud.
   - Tighten the installation bolt and nut to their specified torque.

     Tightening torque: **25 N·m** (**18 lb ft**)



LPIL12CX01125AA 55

Index

Engine - 10

Pan and covers - 102

5. Prepare the head bolt.

NOTE: *Apply molybdenum disulfide grease to the seat surface and threaded portion of the* ***M14*** *head bolts.*

NOTE: *Apply engine oil to the seat surface and threaded portion of the* ***M10*** *head bolts.*

6. Tighten the head bolt using the torque wrench.

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

7. Tighten the head bolt using the torque wrench.

   Tightening torque: **165 N·m** (**122 lb ft**)
   Special tool: Angle gauge (Refer to **Cylinder heads - Special tools (10.101)**)

8. Tighten the head bolt using the special tool.

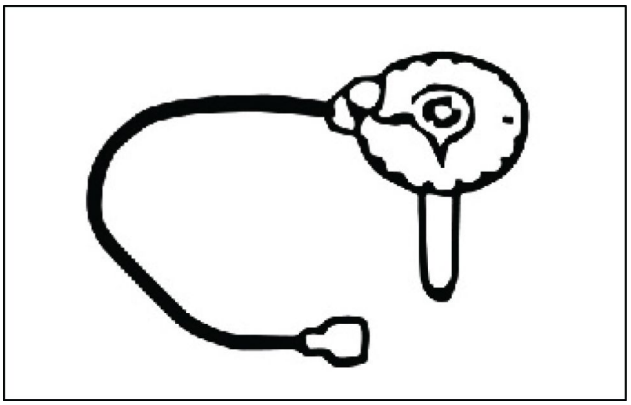
   Tightening angle: **55 ° M14** bolt

9. Tighten the head bolt using the torque wrench.

   Tightening torque: **38 N·m** (**28 lb ft**) **M10** bolt

10. Tighten the head bolt using the torque wrench.

    Tightening torque: **167 N·m** (**123 lb ft**) check the tightening **M14** bolt



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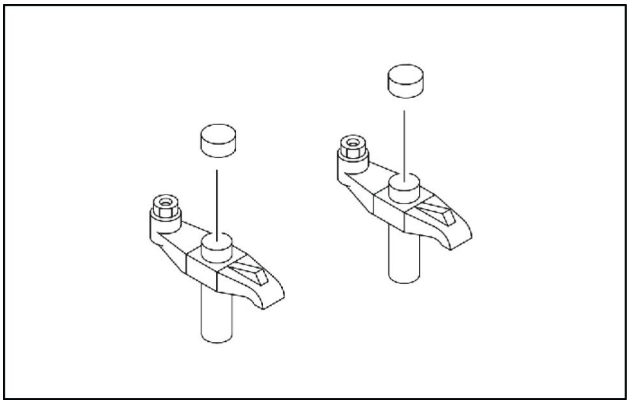
Bridge installation

1. Apply the engine oil to the bridge.
2. Install the bridge to the bridge guide.

NOTE: *Confirm that the bridge moves smoothly.*

3. Apply the engine oil to the bridge cap.
4. Install the bridge cap to the bridge.

NOTICE: *Be careful not to drop the bridge cap into the engine.*



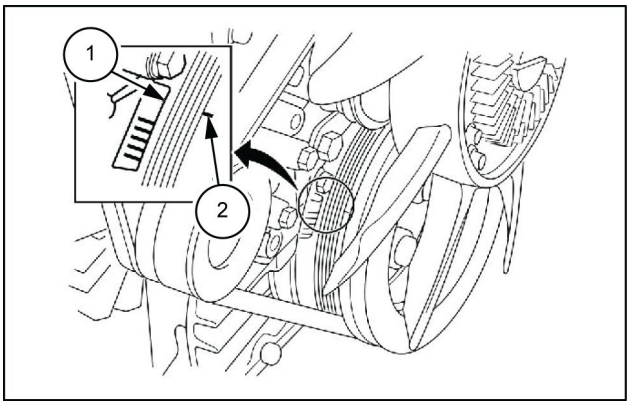
SMIL13CEX1684AA 26

Camshaft installation

1. Align No. 1 cylinder to the compression top dead center.
   1. Front cover marking
   2. 0° marking on the crankshaft damper
2. Apply the engine oil to the camshaft bearing.

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

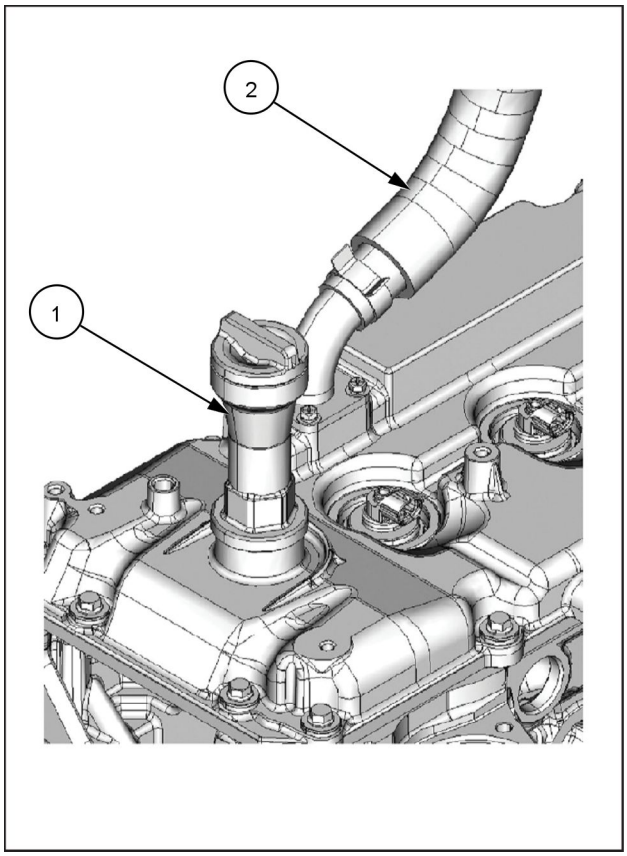
NOTE: *Apply engine oil after cleaning the bearing installation sections of the camshaft bearing and cylinder head.*



SMIL13CEX1685AB 27

Cylinder head cover removal

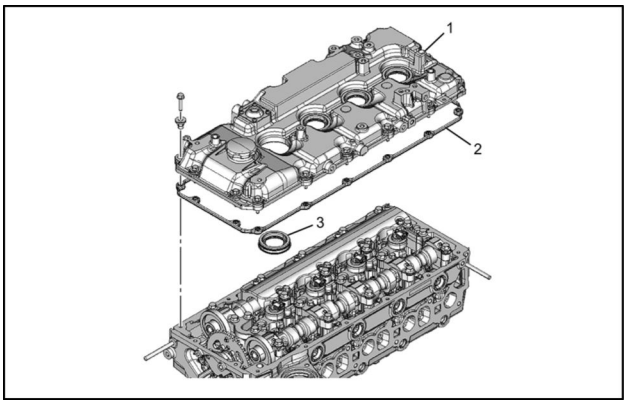
1. Disconnect the PCV hose or the oil separator hose **(2)** from the cylinder head cover.
2. Remove the oil filler pipe **(1)** from the cylinder head cover.
    1. Oil filler pipe
    2. Oil separator hose



SMIL15CEX9596BB 4

3. Remove the cylinder head cover **(1)** from the cylinder head.
    1. Cylinder head cover
    2. Cylinder head cover gasket
    3. Oil seal

NOTICE: *Do not damage the lip section of the oil seal with the connector of the injector.*



SMIL15CEX9597AB 5

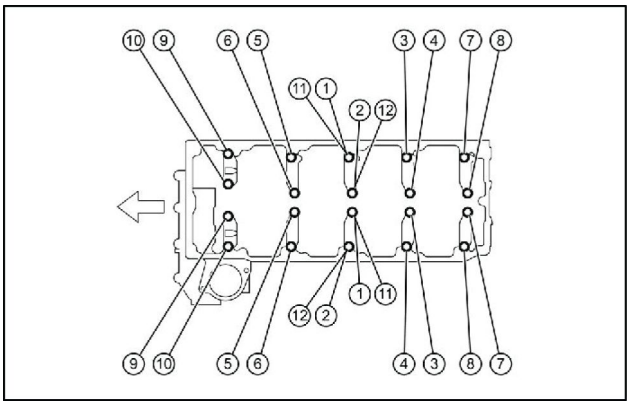
Oil seal removal

1. Remove the oil seal **(2)** from the cylinder head cover **(1i)**.

NOTE: *When removing the oil seal from the cylinder head cover, remove it from under the cylinder head cover.*

4. Apply the engine oil to the bolt.
   - Apply engine oil to the threaded portion and tighten the bearing cap.
   - Tighten the bearing cap to the specified torque in the order shown in the diagram.

     Tightening torque: **18 N·m** (**13 lb ft**)



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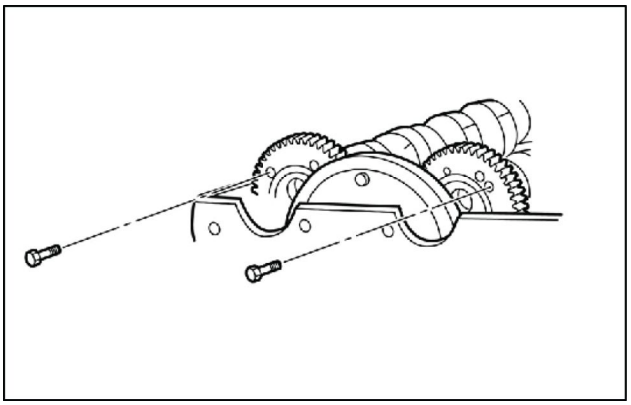
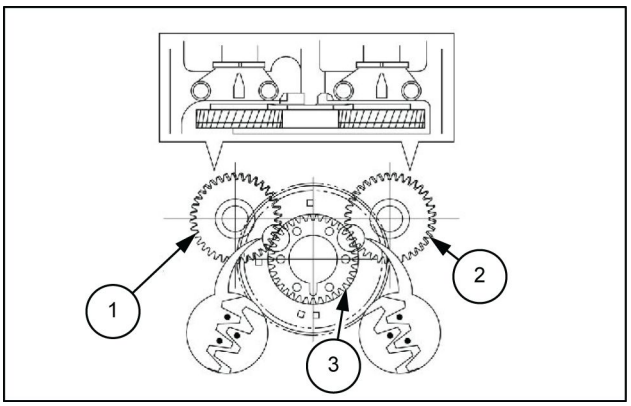
5. Remove the bolt from the camshaft gear.
   - Remove the **M5** bolt of the camshaft gear.



LPIL12CX00645AA 22

   - After rotating the crankshaft 720˚, the marks on the collared end of the crankshaft and that of the bearing cap should align.

   1. Exhaust camshaft gear
   2. Inlet camshaft gear
   3. Idle gear D

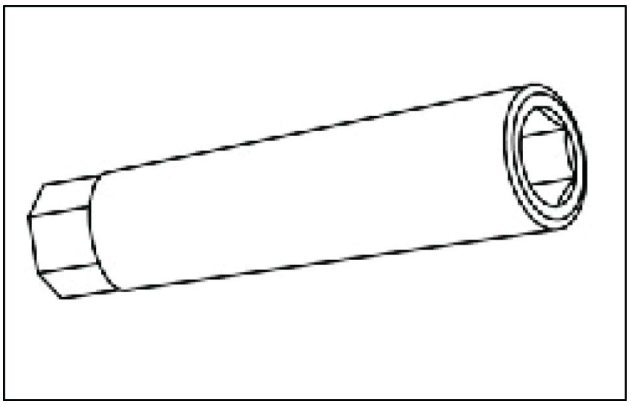


LPIL12CX00646AB 23

Rocker arm adjustment

1. Loosen the adjust screw using special tool.

   Special tool: Valve clearance adjust nut wrench (Refer to **Crankshaft - Special tools (10.103)**)



LPIL12CX00647AA 24

Fuel tank - Prepare

⚠ WARNING

Chemical hazard!
When handling fuel, lubricants, and other service chemicals, follow the manufacturer's instructions. Wear Personal Protective Equipment (PPE) as instructed. Do not smoke or use open flame. Collect fluids in proper containers. Obey all local and environmental regulations when disposing of chemicals.
Failure to comply could result in death or serious injury.

W0371A

⚠ WARNING

Avoid injury!
Shut off the engine, remove the key, and make sure all motion is stopped before servicing the machine.
Failure to comply could result in death or serious injury.

W1128A

⚠ WARNING

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

W0178A

⚠ WARNING

Crushing hazard!
The lifting systems must be operated by qualified personnel who are aware of the correct procedures to follow. Make sure all lifting equipment is in good condition, and all hooks are equipped with safety latches.
Failure to comply could result in death or serious injury.

W0256A

⚠ WARNING

Heavy objects!
Lift and handle all heavy components using lifting equipment with adequate capacity. Always support units or parts with suitable slings or hooks. Make sure the work area is clear of all bystanders.
Failure to comply could result in death or serious injury.

W0398A

Items to prepare:

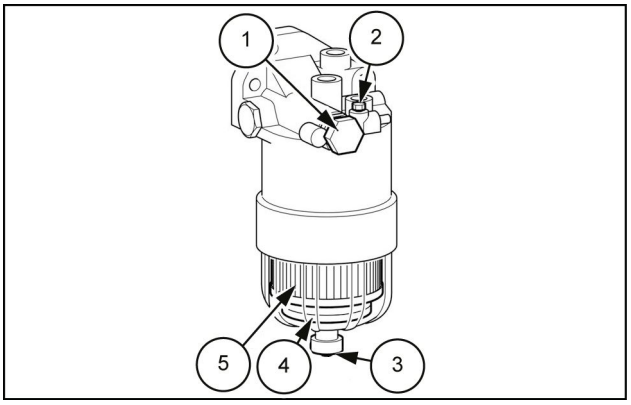
- Wrenches [**13 mm**, **19 mm**, **24 mm**]
- Eyebolts (M12 x 4)
- Shackle (with the required lifting capacity) x 4
- Wire rope (with the required breaking load)
- Lifting equipment (with the required lifting capacity)
- Cap
- Plug
- Drum can (for draining fuel)
- Rag
- Cleaning fluid
- Wood plank

Fuel injection system - Bleed

Fuel air bleed (with element replaceable specification)

NOTICE: *To prevent engine failure, be sure to perform air removal after the installation or removal of fuel system parts.*

1. Priming pump
2. Air bleeding plug
3. Drain plug
4. Case
5. Fuel filter element



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1. Prepare the pan.
2. Turn ON the ignition switch.
3. Loosen the air bleeding plug **(2)** using a wrench.
4. Operate the priming pump **(1)**.

NOTE: *Operate the priming pump **(1)** until fuel comes out from around the plug **(2)**.*

5. Tighten the air bleeding plug **(2)** using a wrench.
6. Operate the priming pump **(1)**.
   Number of times: 10 count(s) or more

NOTE: *Wait for approximately **1 min** after operating the priming pump **(1)**.*

7. Loosen the air bleeding plug **(2)** using a wrench.

NOTE: *Remove the air in the fuel filter element **(5)**.*
*Repeat steps 3 to 7 until air no longer bleeds from the air bleeding plug **(2)**.*

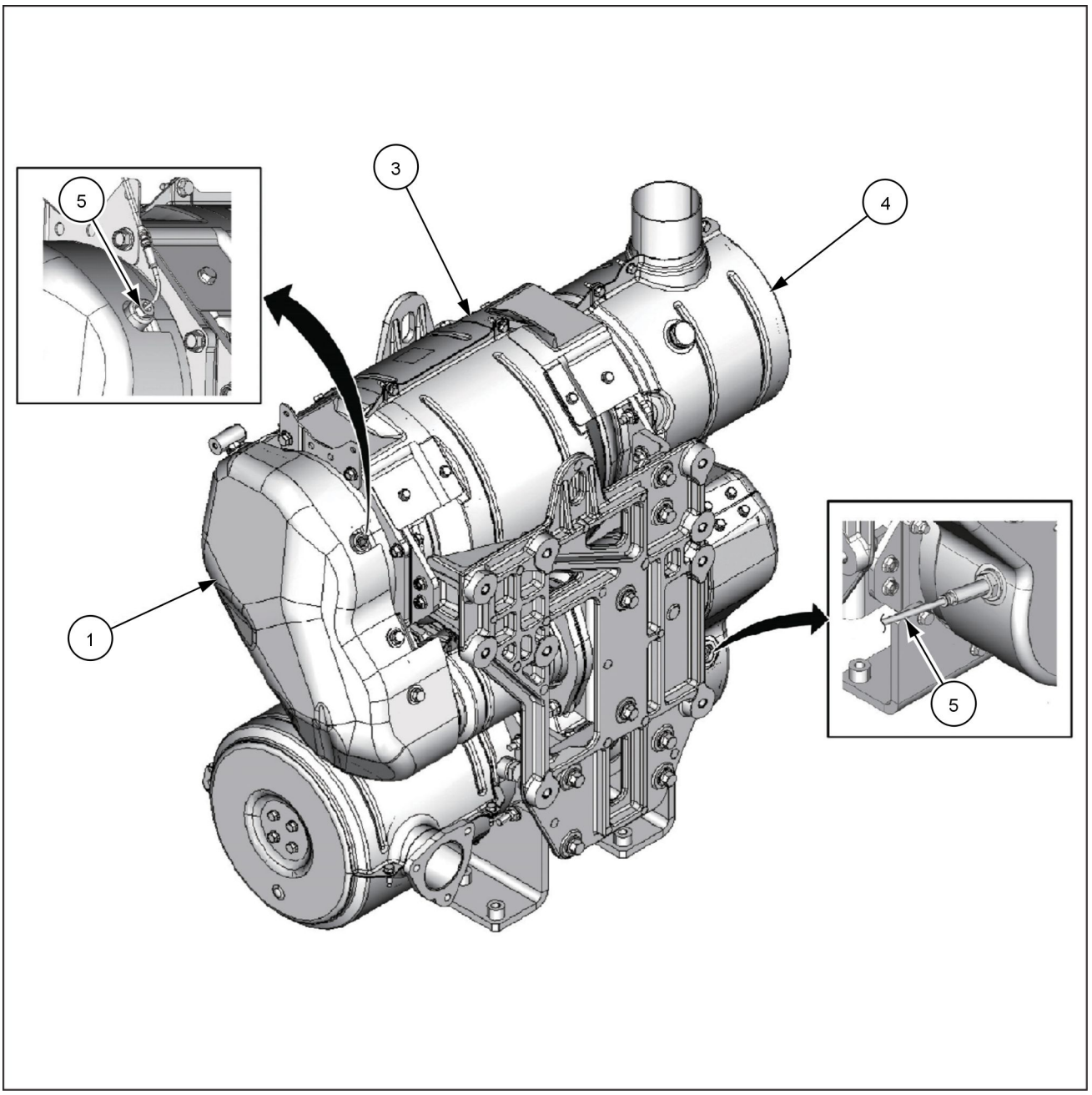
NOTE: *Perform at least 3 times.*

8. Tighten the air bleeding plug **(2)** using a wrench.
   Tightening torque: **10 N·m** (**89 lb in**)
9. Remove the fuel around the air bleeding plug **(2)** thoroughly after tightening.
10. Start the engine.
11. Idle the engine for **5 s**. Do not change the engine speed when the engine is started. If the engine does not start, repeat the process from step **2** .
12. Slowly increase the engine speed, and maintain it for **3 min**.
13. Accelerate the engine speed to maximum.
14. Stop the engine.

Index

Engine - 10

Fuel injection system - 218



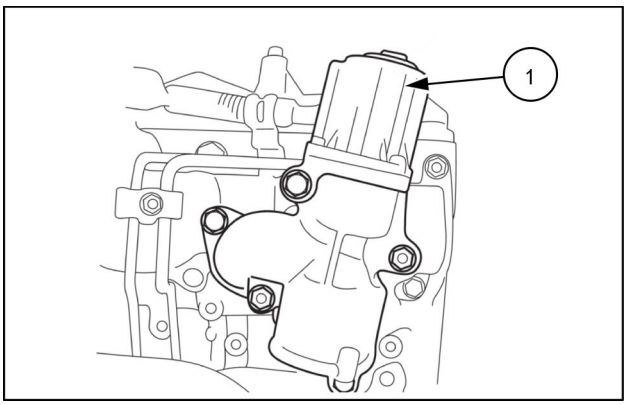
SMIL15CEX9619GB 2

1. Front chamber
2. Exhaust gas temperature sensor 3
3. SCR catalyst
4. Exhaust silencer
5. NOx sensor

Exhaust Gas Recirculation (EGR) valve - Install

EGR valve installation

1. Install the EGR valve **(1)** on the inlet manifold.
   Tightening torque: **27 N·m** (**19.9 lb ft**)
2. Connect the harness connector to the EGR valve **(1)** .



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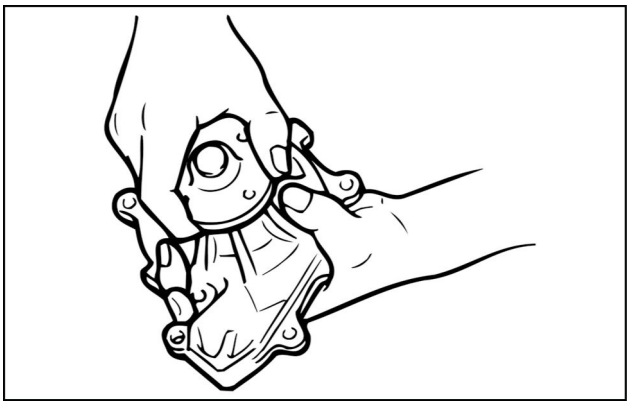
Battery ground cable connect

1. Connect the battery ground cable to the battery.

Water pump - Inspect

1. Inspect the water pump assembly for:
   - Cracks and damage on the water pump body
   - Cracks and corrosion on the impeller
   - Water leak from the seal unit
2. If any abnormality is found in the inspection, replace the water pump assembly.
3. Inspect the bearing unit.
   - Rotate the fan while pushing the fan center to the radius direction and inspect for any significant looseness or abnormal sounds.
4. If any abnormality is found in the inspection, replace the water pump assembly.



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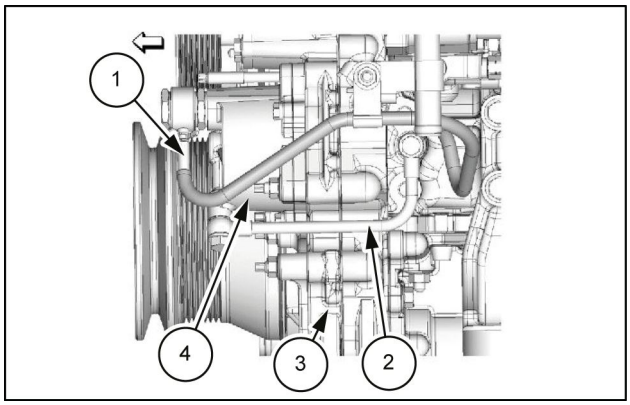
2. Disconnect the vacuum hose **(1)** from the vacuum pump **(4)**.
3. Remove the oil feed pipe **(2)** from the vacuum pump **(4)** and cylinder block.
4. Remove the vacuum pump **(4)** from the gear case cover **(3)**.



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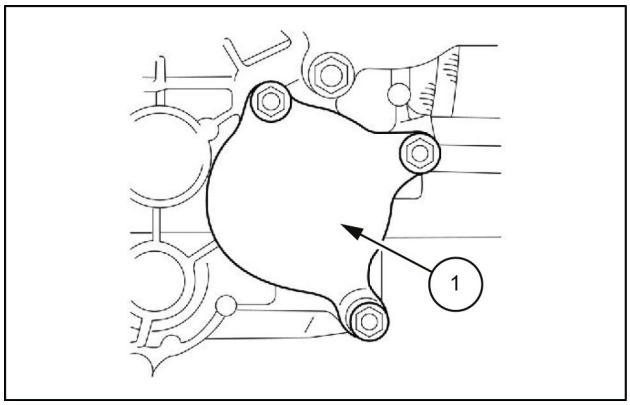
Gear case cover removal

1. Remove the cover from the gear case cover.
   1. Power steering pump hole cover



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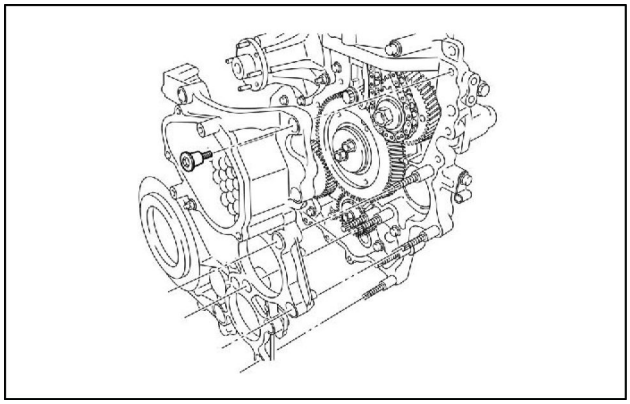
2. Remove the gear case cover from the gear case.



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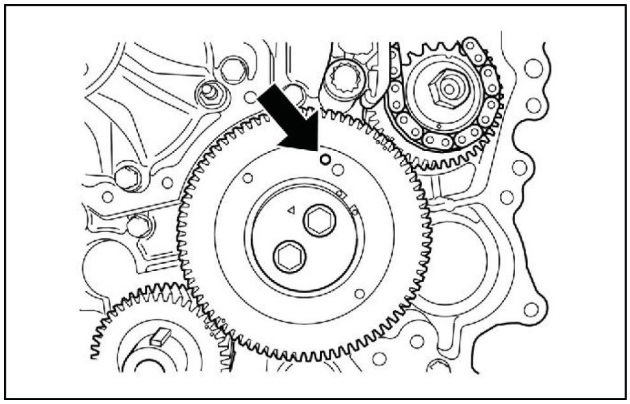
Crank gear removal

1. Install the bolt to idle gear A.
   - Install an **M6** bolt to idle gear A and fasten it while aligning the position of the sub gear.
2. Remove the crank gear from the crankshaft.



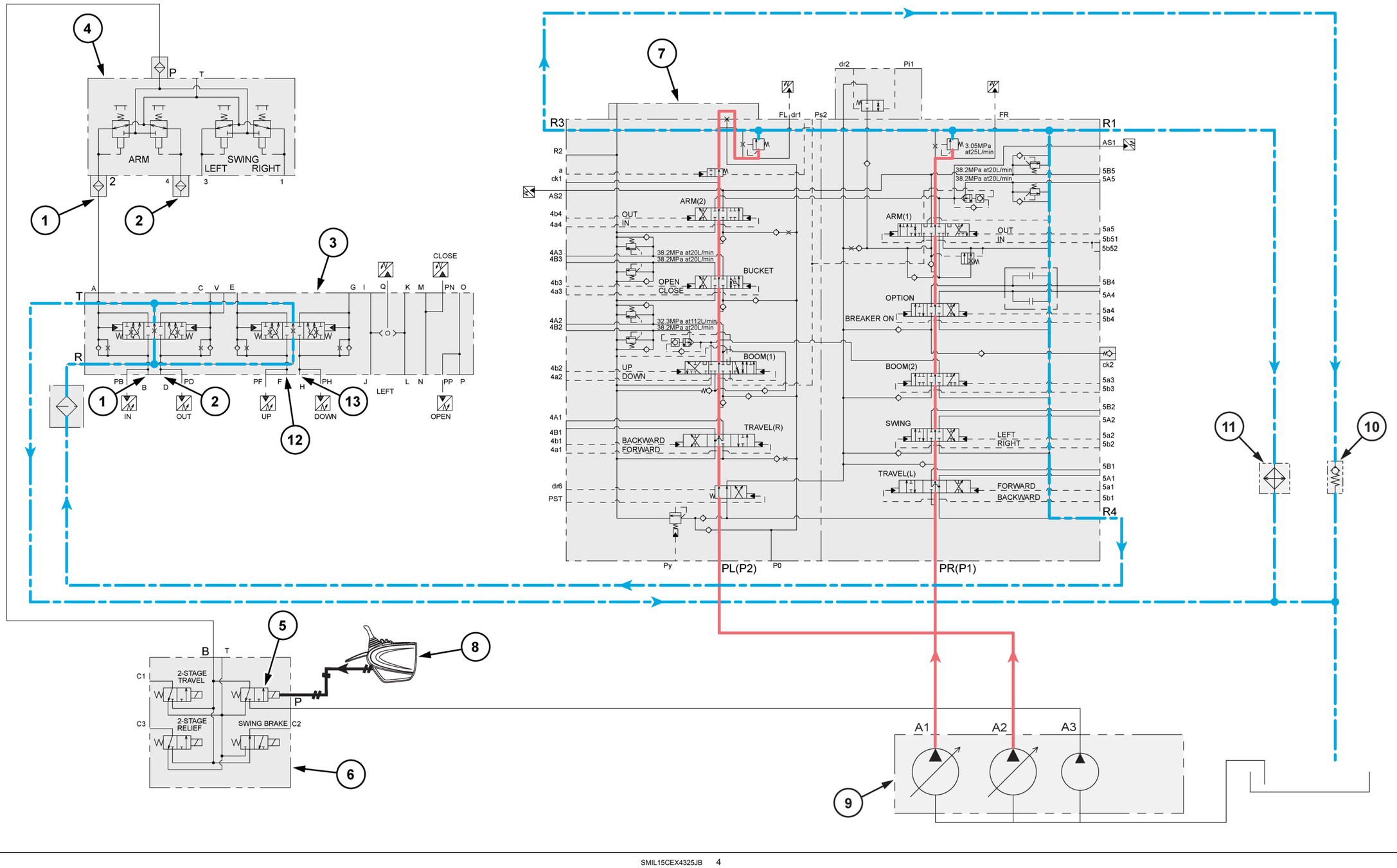
LPIL12CX00259AA 11

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

1. Travel motor
2. Boom (up)
3. Boom (down)
4. Cushion valve
5. Remote control valve (boom, bucket)
6. Control valve
7. Travel (right)
8. Travel (left)
9. Straight travel valve
10. Proportional valve
11. Check with travel merge orifice
12. Boom (down)
13. Boom (up)
14. Travel mode select switch
15. Travel high speed
16. Lever lock
17. Console lever lock switch
18. 4 stack solenoid valve
19. Hydraulic pump
20. Travel remote control valve
21. Backward left
22. Forward left
23. Forward right
24. Backward right
25. Oil cooler
26. Check valve
27. Boom cylinder
28. Main computer
29. Travel pilot pressure sensor
30. Boom-up pilot pressure sensor

BOOM-UP SPOOL STROKE CONTROL CIRCUIT (COMPOUND BOOM-UP + ARM-IN) (WITH HBCV)

As an example, this section explains the boom-up + arm-in compound operation (digging work).
The purpose is to increase the oil amount fed to the arm by pushing back the boom **(2)** spool during digging operation.
By operating the remote control valve to the boom-up side and arm-in side, the pilot pressure oil is fed via the cushion valve to the control valve 4b2, 5a3 ports and 5b52, 4a4 ports and switches the boom **(1) (2)** and arm **(1) (2)** spools.
The discharge oil from hydraulic pump A1 enters the control valve PR (P1) port and is fed from the parallel oil path to the boom **(2)** and arm **(1)** spools.
The oil goes through the arm **(1)** spool and flows into the arm cylinder bottom side.
At this time, the boom **(2)** spool is pushed back by the boom regeneration proportional valve, making arm-in operation movement smooth.
The arm cylinder rod side return oil goes through the load holding valve check valve and the arm **(1)** spool, and returns to the hydraulic tank.
The discharge oil from hydraulic pump A2 enters the control valve PL (P2) port and is fed from the parallel oil path to the boom **(1)**spool.
Switching the spool lets the oil flow through the boom load holding valve check valve and into the boom cylinder bottom side and the boom-up operation is carried out.
The boom cylinder rod side return oil goes through the boom **(1)** spool and returns to the hydraulic tank.


4
P
T
ARM
SWING
LEFT
RIGHT
2
4
3
1
1
2
3
CLOSE
T
A
C V E
G I
Q
K M
PN O
R
PB
B
D
PD
PF
F
H
PH
J
LEFT
L N
PP P
1
IN
OUT
2
UP
12
DOWN
13
OPEN
7
R3
R1
R2
a
ck1
AS2
FL dr1
Ps2
dr2
Pi1
FR
3.05MPa at25L/min
AS1
38.2MPa at20L/min
38.2MPa at20L/min
5B5
5A5
ARM(2)
4b4
4a4
OUT
IN
ARM(1)
OUT
IN
5a5
5b51
5b52
4A3
4B3
38.2MPa at20L/min
38.2MPa at20L/min
BUCKET
4b3
4a3
OPEN
CLOSE
5B4
5A4
OPTION
BREAKER ON
5a4
5b4
4A2
4B2
32.3MPa at112L/min
38.2MPa at20L/min
BOOM(1)
4b2
4a2
UP
DOWN
BOOM(2)
ck2
5a3
5b3
5B2
5A2
4A1
4B1
4b1
4a1
TRAVEL(R)
BACKWARD
FORWARD
SWING
LEFT
RIGHT
5a2
5b2
5B1
5A1
5a1
5b1
TRAVEL(L)
FORWARD
BACKWARD
dr6
PST
R4
Py
PL(P2)
P0
PR(P1)
11
10
5
8
B
T
C1
2-STAGE TRAVEL
P
C3
2-STAGE RELIEF
SWING BRAKE
C2
6
A1
A2
A3
9

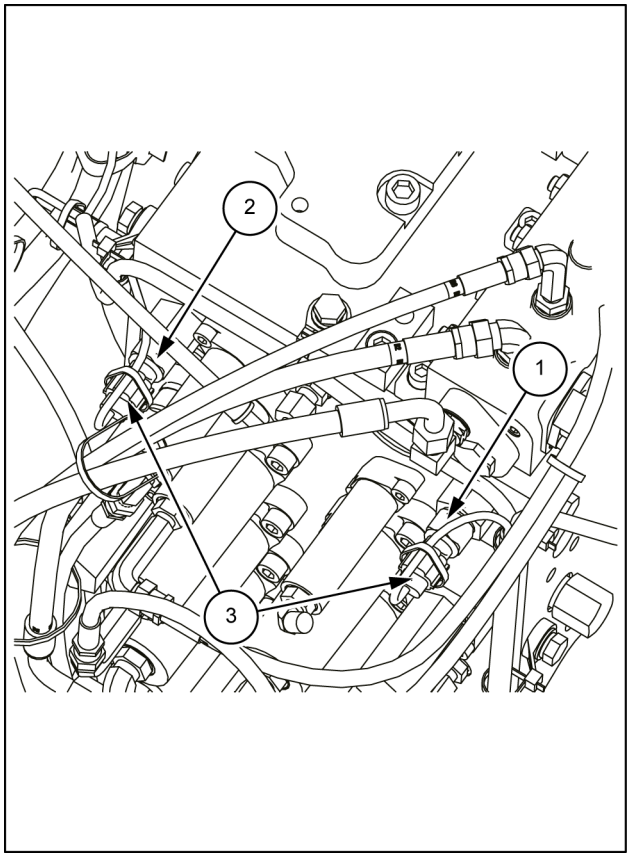
Pressure line
Tank line
Pilot pressure line
Pilot tank line
Electric line

1. 3-direction valve
2. Shut-off valve
3. Crusher
4. Option switchover solenoid valve
5. Solenoid valve for 2 pumps flow
6. Proportional switch
7. Option pilot pressure sensor
8. Monitor display
9. Main computer
10. ATT select switch
11. Port relief valve
12. Control valve
13. Neutral cut valve
14. P1 pressure sensor
15. Lever lock
16. 4 stack solenoid valve
17. Console lever lock switch
18. Hydraulic pump
19. P1 flow control proportional valve
20. Oil cooler
21. Check valve
22. 2 stack reducing valve

NEGATIVE CONTROL PRESSURE MEASUREMENT

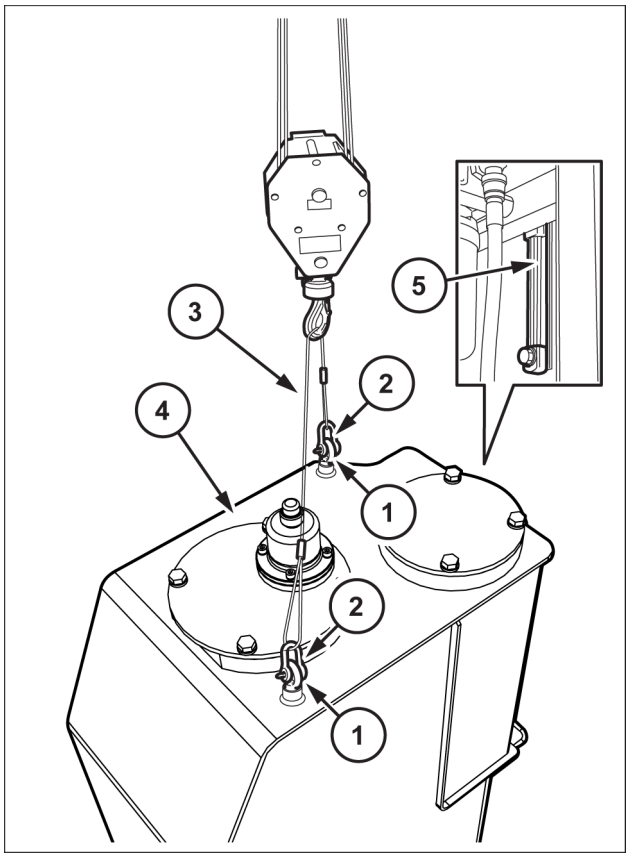
Pressure gauge installation

Disconnect the connector **(3)** from the N1 pressure sensor **(1)** or N2 pressure sensor **(2)** of the pump, and remove the pressure sensor. (N1, N2 : Pressure port) (The pressure sensor location is used as the measuring port.)



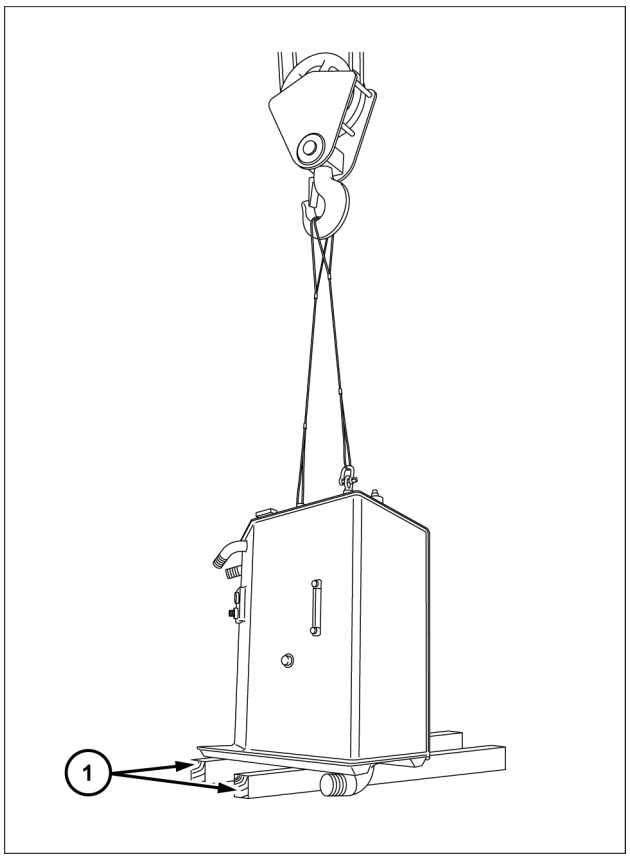
SMIL14CEX2096BB 30

16. Attach the 2 eyebolts M12 **(1)** on top of the hydraulic tank, and then lift the hydraulic tank **(4)** with shackles **(2)**, wire ropes **(3)**, and a liftcrane.
    - While lifting it, be careful not to let the level gauge **(5)** interfere with the frame beside the hydraulic tank.
    - The eyebolts should be tightened up and then loosened a half turn.



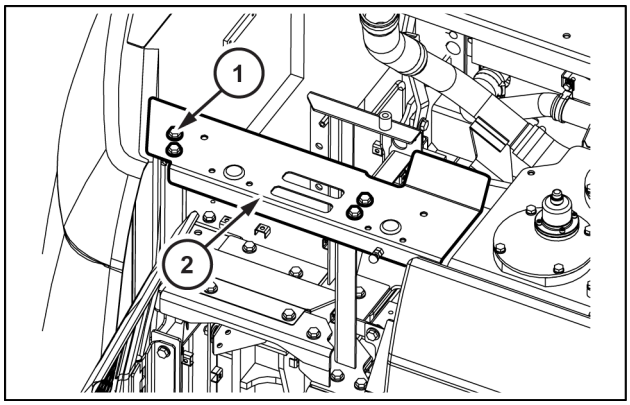
SMIL15CEX4374BB 17

17. Make sure that the area is safe, and then place the hydraulic tank on wood planks **(1)**.
    - Make sure to secure the hydraulic reservoir so as to prevent it from falling.



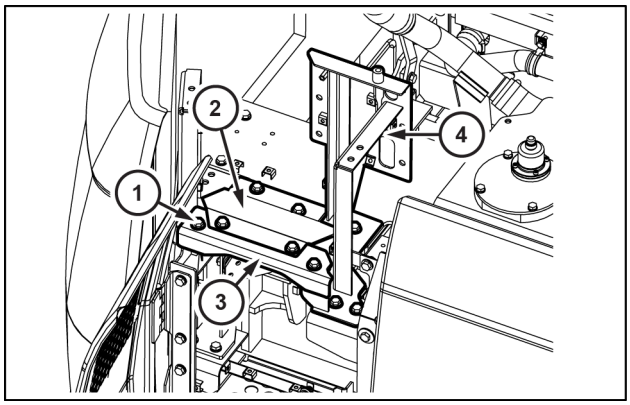
SMIL15CEX4375BB 18

5. Remove the SCR. **Selective Catalytic Reduction (SCR) muffler and catalyst - Prepare (10.500)**
Remove the 4 bolts **(1)** with a wrench [**19 mm**] to remove the bracket **(2)**.



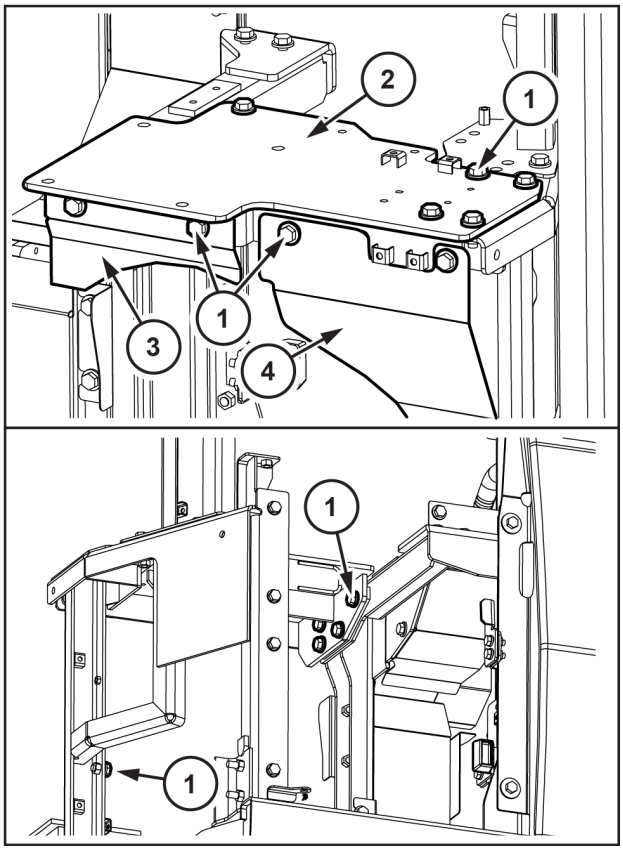
SMIL15CEX5048AB 5

6. Remove the 9 bolts **(1)** with a wrench [**19 mm**] to remove the FW upper cover **(2)** the right house frame **(3)**, and the SCR bracket **(4)**.

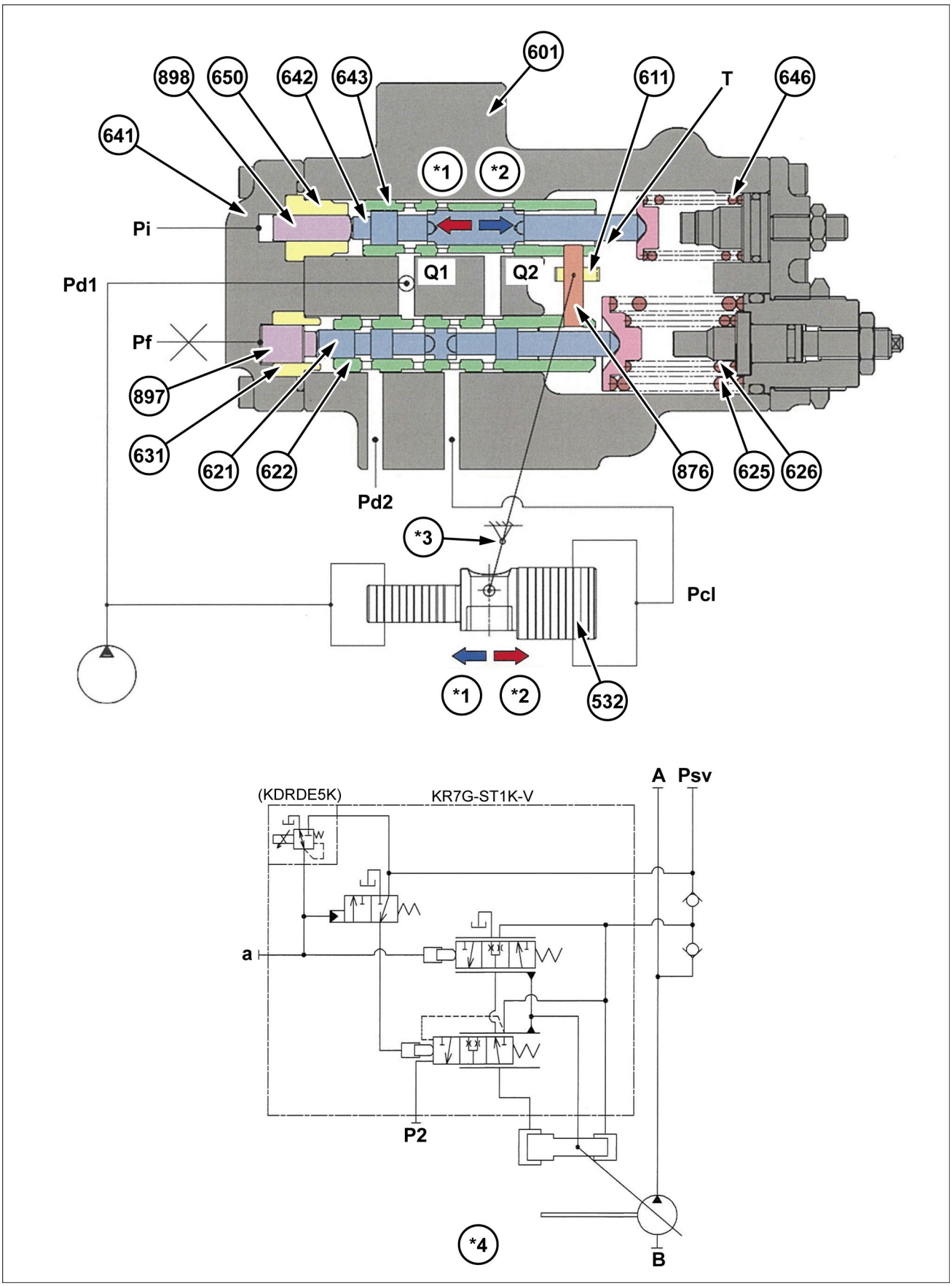


SMIL15CEX5049AB 6

7. Remove the 13 bolts **(1)** with a wrench [**19 mm**] to remove the SCR bracket **(2)** the FW center cover **(3)**, and the FW rear cover **(4)**.



SMIL15CEX5050BB 7

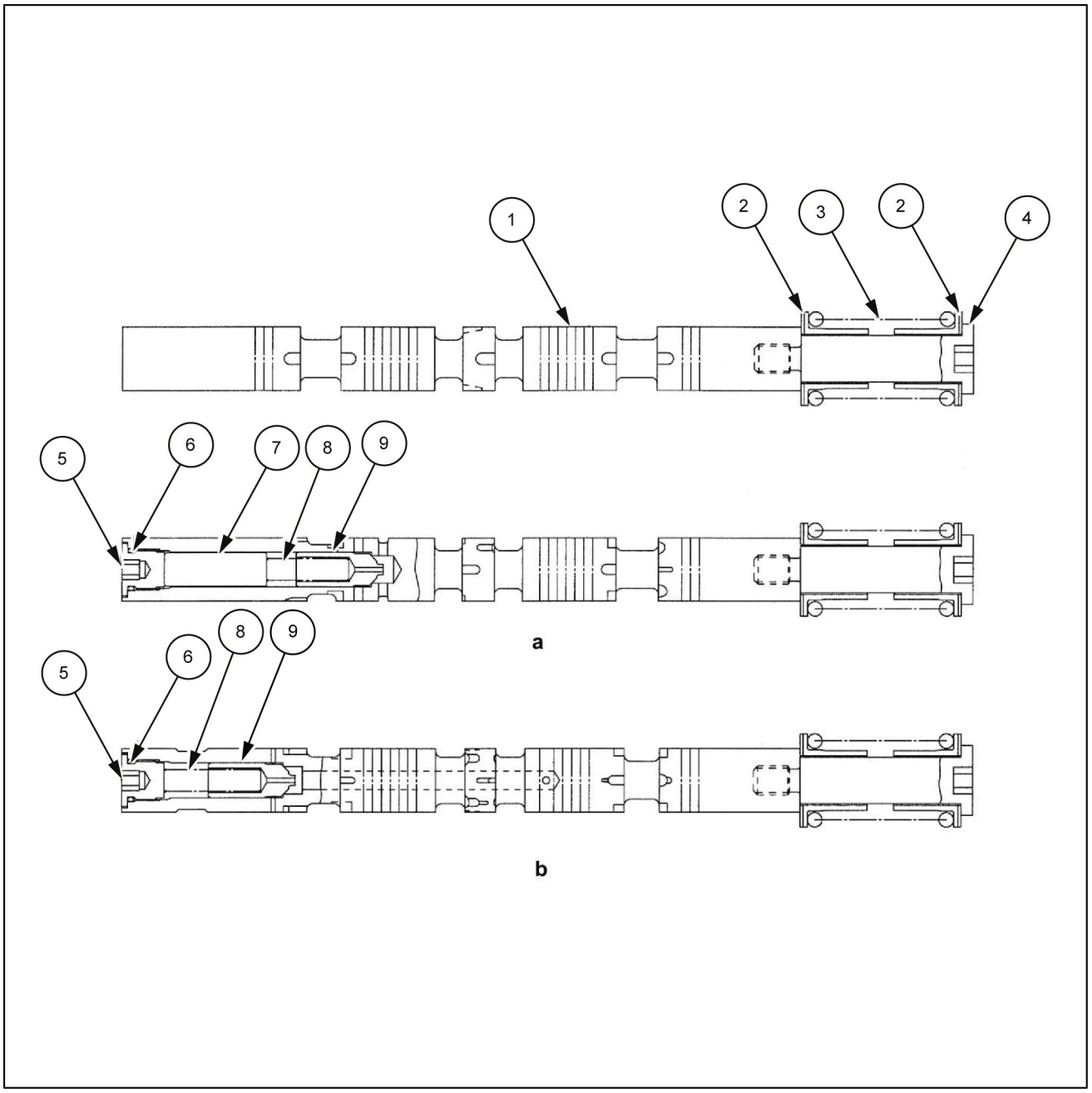


SMIL14CEX6590H 4

Regulator operation explanation diagram: actuation by flow decrease/actuation by flow increase

*1	Left direction	*3	Fulcrum A
*2	Right direction	*4	Hydraulic circuit diagram

Main plunger



LPIL12CX01791GB 7

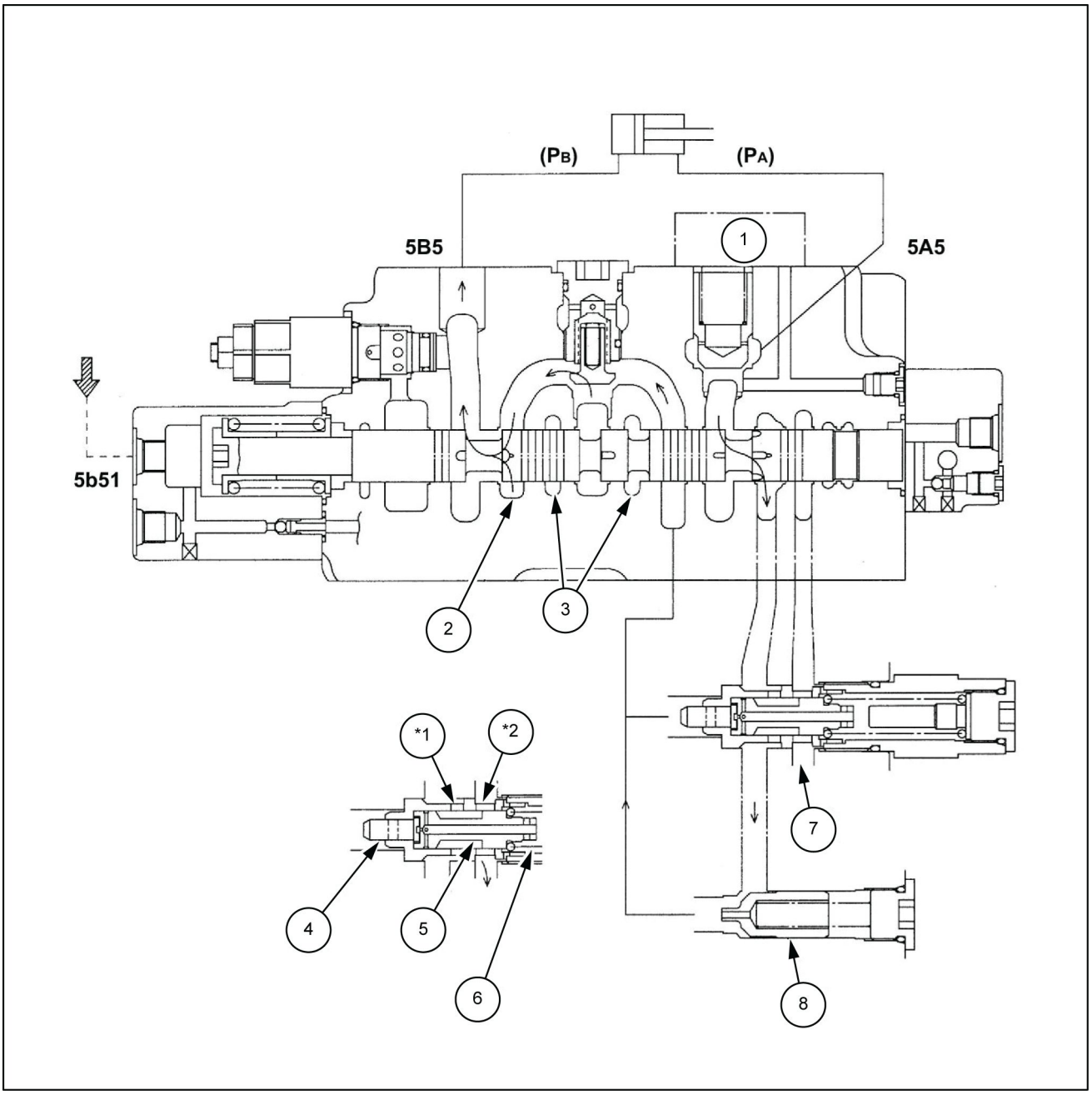
1. Plunger (Quantity 1)
2. Spring guide (Quantity 2)
3. Spring (Quantity 1)
4. Plunger cap (Quantity 1)
5. Cap (Quantity 1)
6. O-ring (Quantity 1)
7. Spacer (Quantity 1)
8. Spring (Quantity 1)
9. Check valve (Quantity 1)

a. BKT Plunger

b. BM-1 Plunger

NOTE: *1.BM-1, BKT plunger: There is a check valve incorporated at one end.*

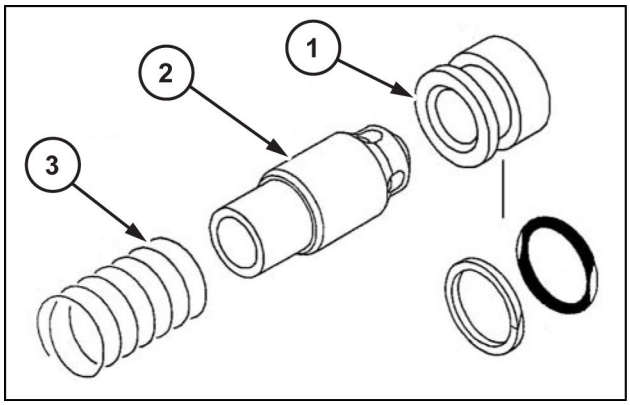
3. When the bottom side pressure is high [PB > PA]
   The head-side pressurized oil operates on check valve D from the feed path, and check valve D closes. At the same time, it also operates on piston A of the regeneration switchover section. When the pressure becomes equal to or greater than the spring C set pressure, it pushes piston A, spool B moves to the right, the path **(*2)** degree of opening increases, and the rod side return oil flows through path **(*1)** - path **(*2)** and into the tank path.



LPIL12CX01985GB 27

1. Load holding valve
2. Feed path
3. Center bypass path
4. Piston A
5. Spool B
6. Spring C
7. Tank path
8. Check valve D

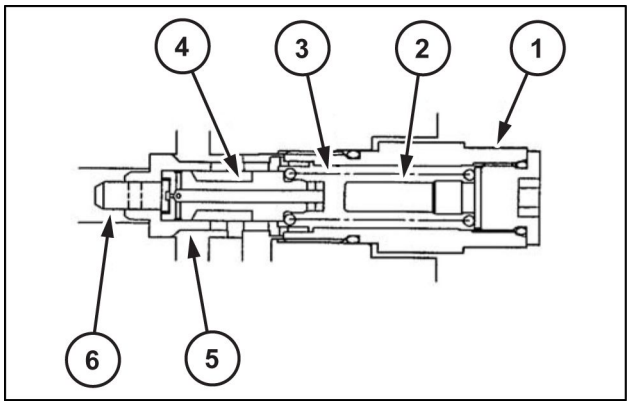
2. Remove the seat **(1)**, check **(2)**, and spring **(3)**.



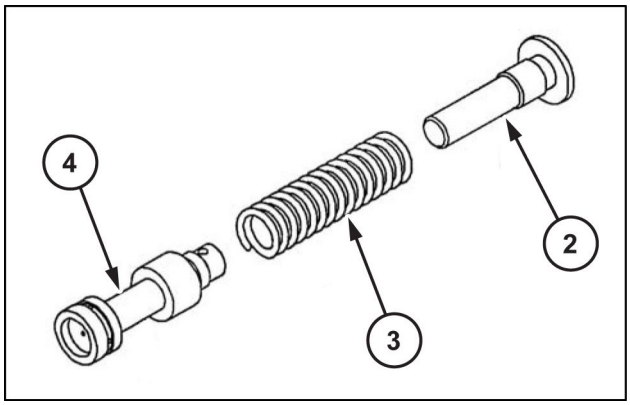
SMIL15CEX6186AB 39

Arm regeneration valve

1. Remove the cap **(1)**, spring receiver **(2)**, spring **(3)**, and spool **(4)**.
   - Cap
     Hex diameter: **24 mm** (**0.945 in**)
     Tightening torque: **60 N·m** (**44.3 lb ft**)
   - There may be a piston **(6)** attached.

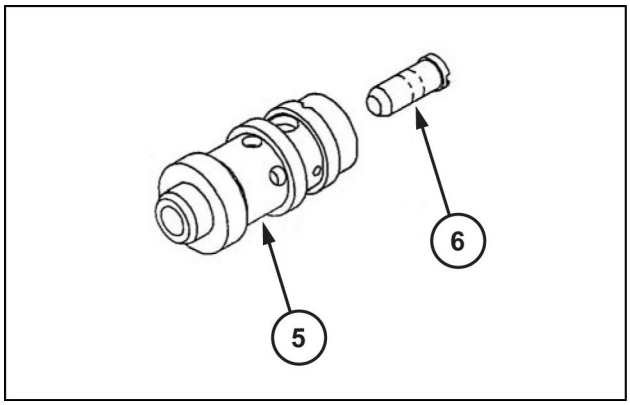


SMIL15CEX6187AB 40



SMIL15CEX6188AB 41

2. Remove the sleeve **(5)** and remove the piston **(6)**.

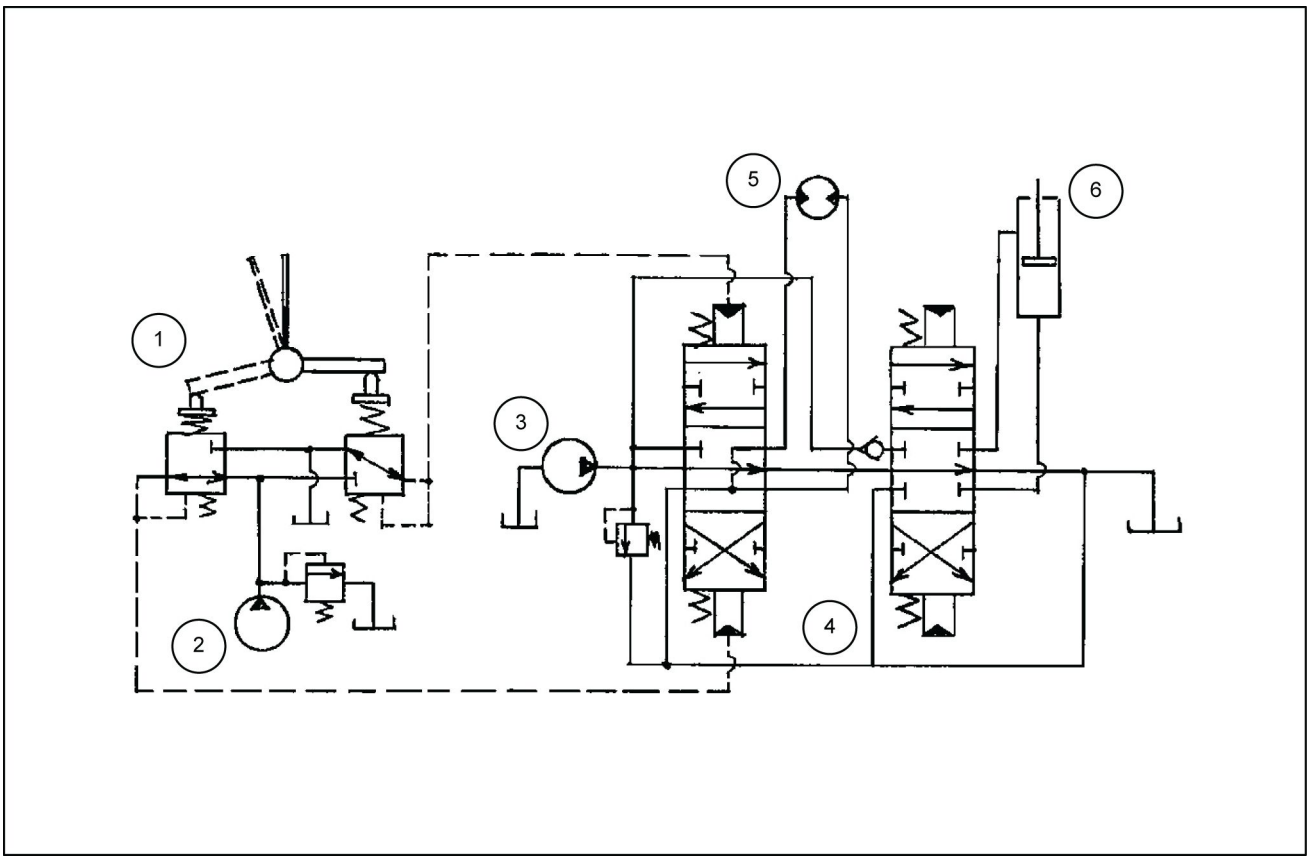


SMIL15CEX6189AB 42

Operation

Operation of the remote control valve is explained based on the hydraulic circuit diagram (Fig. **1**) and operation explanation diagrams (Fig. **2** - Fig. **4**).

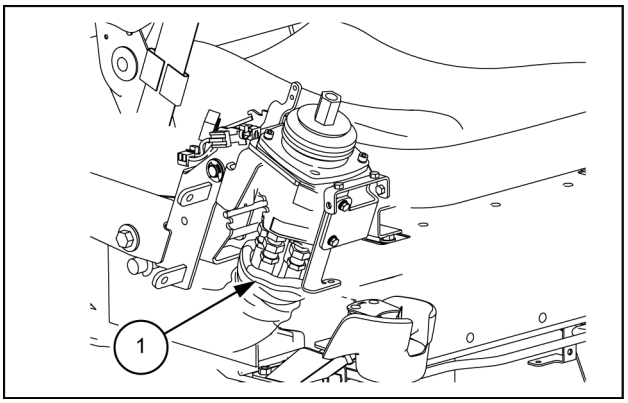
Fig. **1** is a typical usage example for the remote control valve.



LPIL12CX01993FB 1

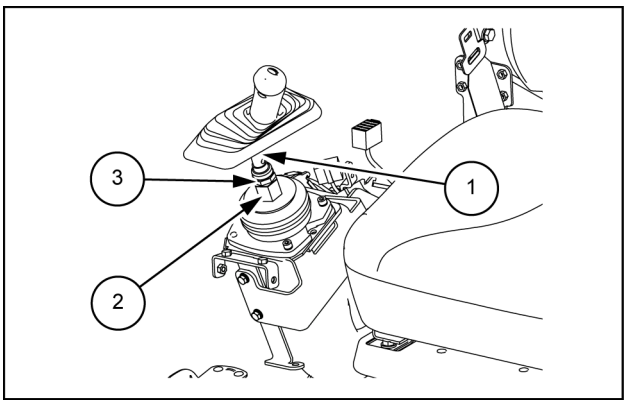
1. Pilot valve
2. Pilot pump
3. Main pump
4. Control valve
5. Hydraulic motor
6. Hydraulic cylinder

5. Put the hose cover **(1)** in place.



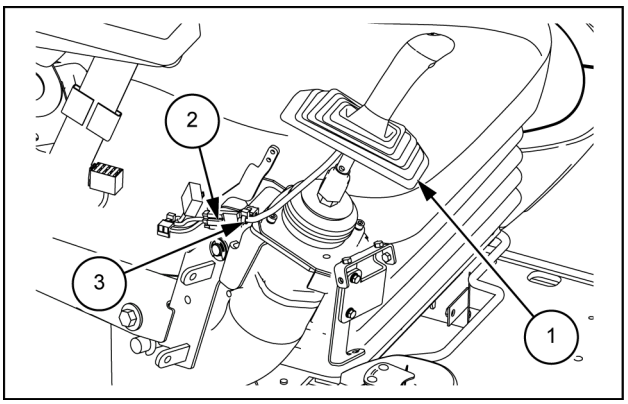
SMIL14CEX1422AB 5

6. While securing the nut **(2)** with a wrench [**22 mm**], use a wrench [**22 mm**] to install the lock nut **(3)** and install the control lever **(1)**.
   - Nut tightening torque: **38.3 - 44.1 N·m** (**28.249 - 32.526 lb ft**)



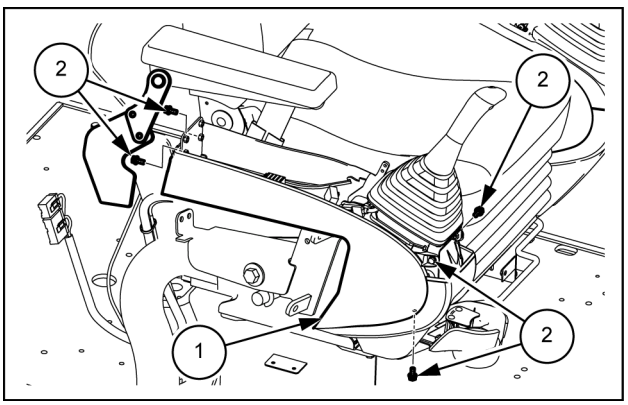
SMIL14CEX1427AB 6

7. Install the horn switch connector **(2)**, bundle with the wire band **(3)**,and then cover the control lever boot **(1)**.



SMIL14CEX1428AB 7

8. Use a Phillips screwdriver or box wrench [**10 mm**] to install the 5 bolts **(2)**, and then install the cover **(1)**.



SMIL14CEX1419AB 8

214. Push rod (Quantity 4)
217. Washer 2 (Quantity 4)
218. Spring seat (Quantity 4)
220. Hexagon socket head bolt (Quantity 2)
224. Piston 2D085 (Quantity 4)
423. Hexagon socket head retaining screw (Quantity 2)
471. Retaining screw (Quantity 4)
472. Lock nut (Quantity 4)
501. Bellows (Quantity 2)

A. Apply grease to the top

B. Fill grease cup with grease

NOTE: *Since hydraulic equipment is crucial to safety, we cannot guarantee performance and functions if disassembly and reassembly are performed.*

Tightening torque list

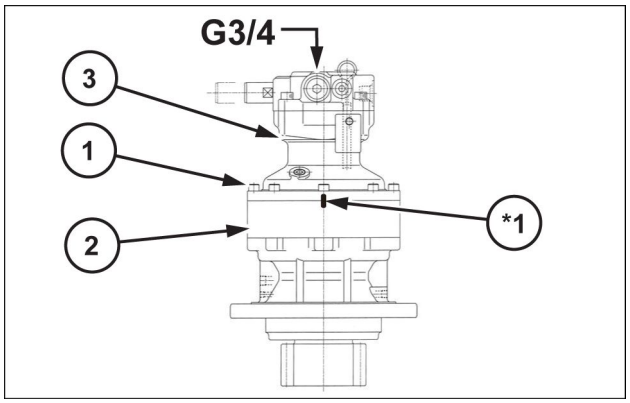
Code	Screw size	Tightening torque
220	**M6**	**7.8 - 9.8 N·m** (**5.753 - 7.228 lb ft**)
271	**M12**	**45.2 - 64.8 N·m** (**33.338 - 47.794 lb ft**)
423	**M6**	**5.9 - 7.9 N·m** (**4.352 - 5.827 lb ft**) (**LOCTITE®** coating)
472	**M10**	**29.9 - 36.7 N·m** (**22.053 - 27.069 lb ft**)

Pedal control - Troubleshooting

Problem	Possible Cause	Correction
Secondary pressure is not rising	Primary pressure is insufficient	Maintain primary pressure
	Secondary pressure spring **(324)** is worn	Replace with new part
	The gap between spool and the casing is abnormally large	Replace spool and casing assembly
	There is backlash in the operation section	Disassemble and assemble, and replace operation section parts
Secondary pressure is unstable	Sliding parts are sticking	Repair the sticking sections
	Tank line pressure is variable.	Return directly to the oil tank
	Air is getting into lines	Perform operation several times and let out air
Secondary pressure is high	Tank line pressure is high	Return directly to the oil tank
	Sliding parts are sticking	Repair the sticking sections
Damping is not working	Air is gathering in the piston chamber	Perform operation several times and let out air
	Sliding parts are sticking	Repair the sticking sections
	Damping springs **(336) (337)** are worn	Replace with new part
	The gap between piston **(224)** and the casing is abnormally large	Replace piston and casing assembly
	There are check valve operation problems	Disassemble and investigate the check valve section
	The piston metering hole is abnormally large	Replace piston
Damping torque is high	Sliding parts are sticking	Repair the sticking sections
	Piston metering hole is clogged	Repair or replace piston

5. Removal of motor
   Loosen the 8 hexagon bolts **(1)** [**10 mm** hexagon diameter] and remove the housing **(3)** from the ring gear **(2)** .
   - Use the make-up port (G3/4) to raise the motor and remove it.

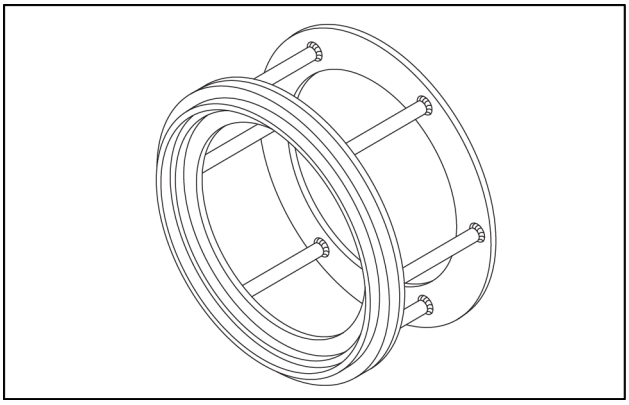
   (*1) Reference mark



SMIL15CEX4548AB 5

Floating seal fitting jig (II)

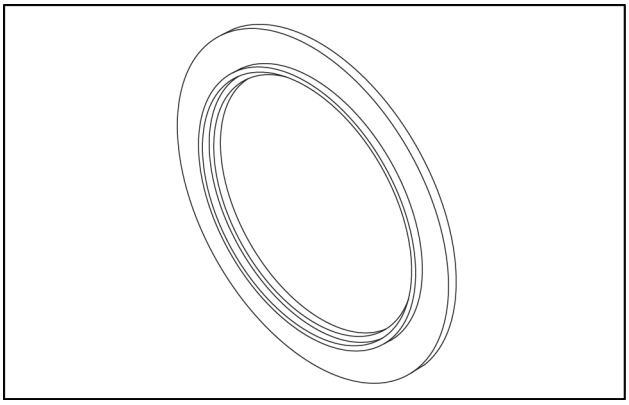
- This is for fitting the floating seal **(29)** into the hub **(1)** and the spindle **(2)**.



SMIL15CEX4744AA 13

Floating seal fitting jig (III)

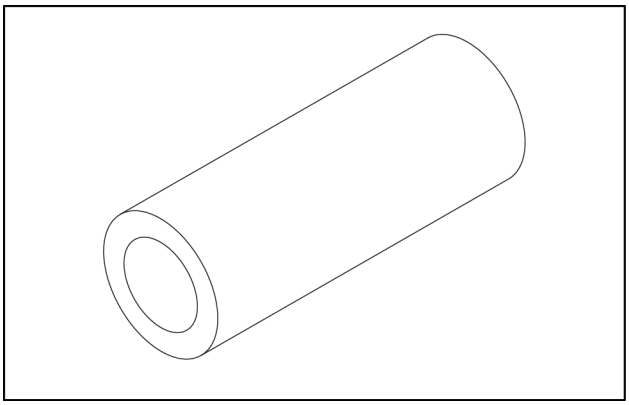
- This is for fitting the floating seal **(29)** into the spindle **(2)**.



SMIL15CEX4745AA 14

Holder fitting (II)

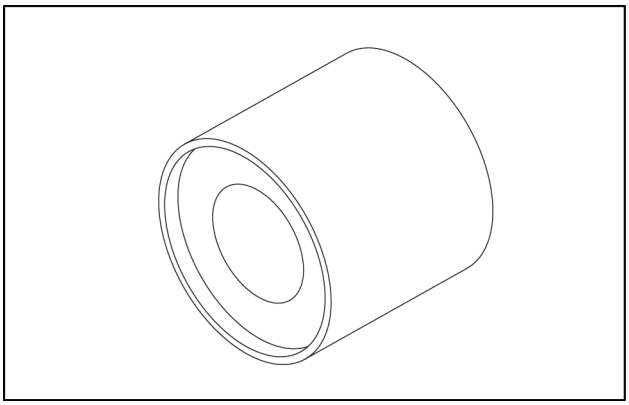
- This is for pulling out the conical roller bearing **(149)** from the shaft **(102)**.



SMIL15CEX4746AA 15

Holder fitting (III)

- This is for pressing the conical roller bearing **(149)** into the shaft **(102)**.



SMIL15CEX4747AA 16

Travel reduction gear - Filling

Lubricant

Although the lubricant for reduction gear (gear oil) is supplied prior to shipment, be sure to check that it is supplied before operation.

Selection of gear oil and recommended brands

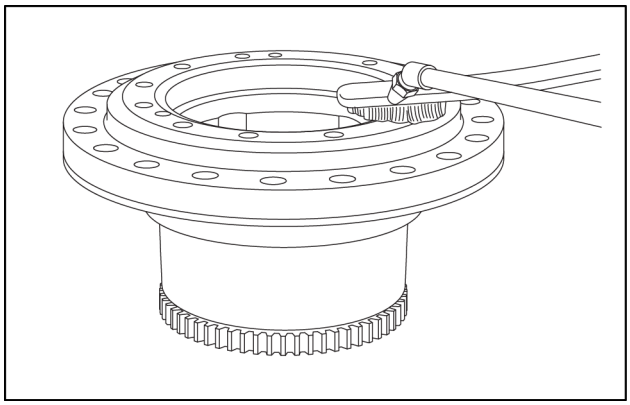
1. Use the SAE#90-equivalent gear oil with extreme-pressure additives (API category GL-4 class or more).
2. Gear oil replacement timing
   - 1st replacement (first replacement after operation starts): 500 hours
   - 2nd or later replacement: Every 1000 hours or every year
   - Replacement standard based on property analysis (reference)

			Replacement limit	Application
Viscosity change (at 40[°C])		[mm2/s]	Within 10[%] against new oil	Progress of oxidization degradation Entry of dissimilar oil
Moisture		[%]	0.2 or less	Oxides, carbon, additives, abrasion powder, dust, etc.
Pentane insoluble		[%]	1.0 or less	
Total acid value		[mgKOH/g]	Increased by 0.5 against new oil	
Metal analysis	Al	[ppm]	150 or less	
	Cr	[ppm]	20 or less	
	Cu	[ppm]	20 or less	
	Fe	[ppm]	600 or less	
	Si	[ppm]	350 or less	

Avoid the entry of dissimilar lubricant. When changing the oil type of lubricant, perform flushing inside the reduction gear.

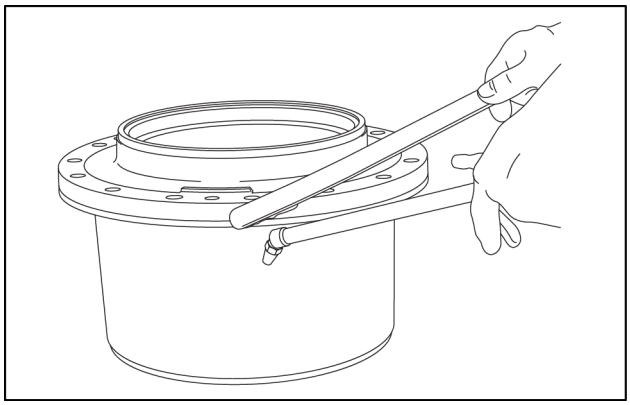
3. Gear oil replacement amount
   - **2.1 L** (**0.55 US gal**)
4. Precautions for handling gear oil
   - Before handling gear oil, be sure to read the precautions indicated on the container of gear oil for correct use. Misuse of it may lead to a severe accident.
   - Wear protective eyewear to keep gear oil out of eyes. Contact with eyes can cause inflammation.
   - Wear rubber gloves to keep gear oil out of skin. Contact with skin can cause inflammation.
   - Do not eat or put it into mouth. Intake of it will cause diarrhea and vomiting.
5. Gear oil replacement procedure

2. Wipe refined kerosene off each component with a clean rag.



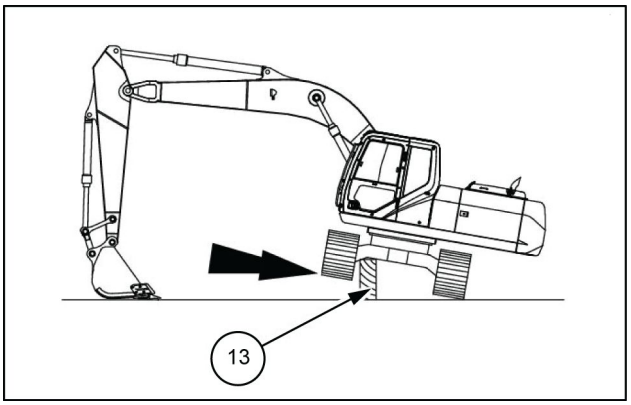
SMIL15CEX4152AA 57

NOTE: *the inner surfaces of hub* ***(1)*** *and spindle* ***(2)*** *should be dried by blowing compressed air at a place without dust or humidity. After drying the components, apply hydraulic fluid to them. The inner surface of rear flange* ***(301)****, the hydraulic motor components, and the gears should be air-dried at a place without dust or humidity. After drying the components, apply hydraulic fluid to them.*



SMIL15CEX4153AA 58

8. Raise the lower side frame while adjusting tension of the track shoe as shown in the figure.
   Place a wood plank **(13)** or other block to the lower frame to prevent falling.



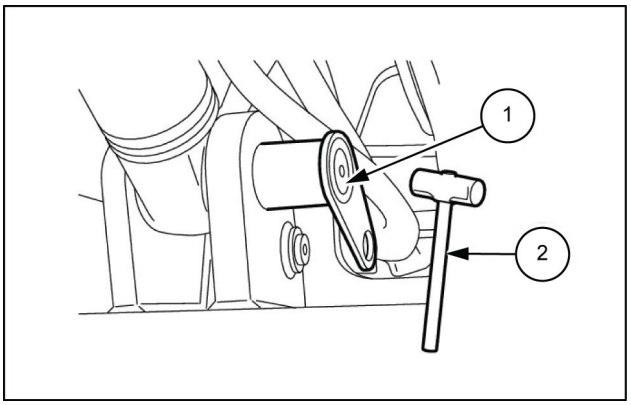
LPIL12CX01334AB 9

Hydraulic systems - 35

Boom hydraulic system - 736

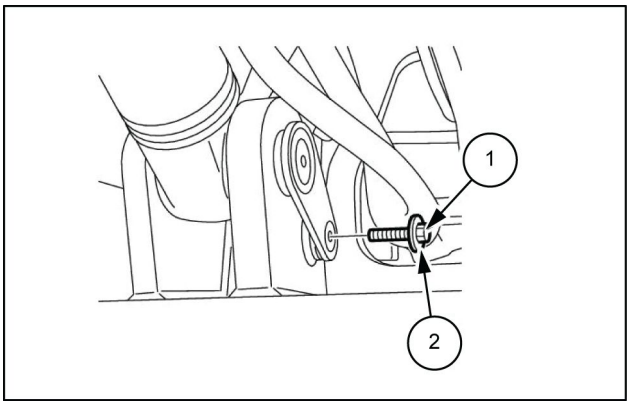
CX130D Crawler excavators LC version (TIER 4 FINAL) - NA Market
CX130D Crawler excavators Standard w/Blade version (TIER 4 FINAL) - NA market

4. Align the boom cylinders (right) (left) with the swing frame pin holes and use a hammer **(2)** to push in the pin **(1)**.
   - When inserting the pin, be careful not to damage the installed dust seals.



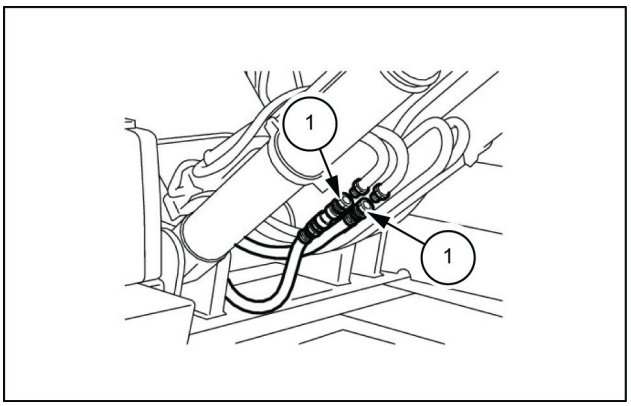
LPIL12CX01581AB 4

5. Use a wrench [**19 mm**] to tighten the bolt **(1)** and washer **(2)**.
   Also, attach the cab side in the same way.



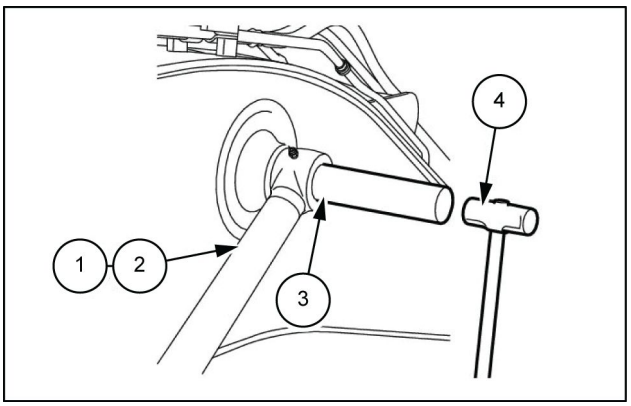
LPIL12CX01576AB 5

6. Use wrench [**36 mm**] to install the hose **(1)**.
   Also, install the cab side hose in the same way.



LPIL12CX01575AB 6

7. Start the engine, raise the boom at idle, and extend the boom cylinder (right) (left) **(1)** and **(2)** rods.
   Align the boom cylinder (right) (left) **(1)** and **(2)** with the boom pin holes and use a hammer **(4)** to push in the pin **(3)**.
   - If the insertion of a shim is possible according to the tolerance adjust the shim.



LPIL12CX01582AB 7

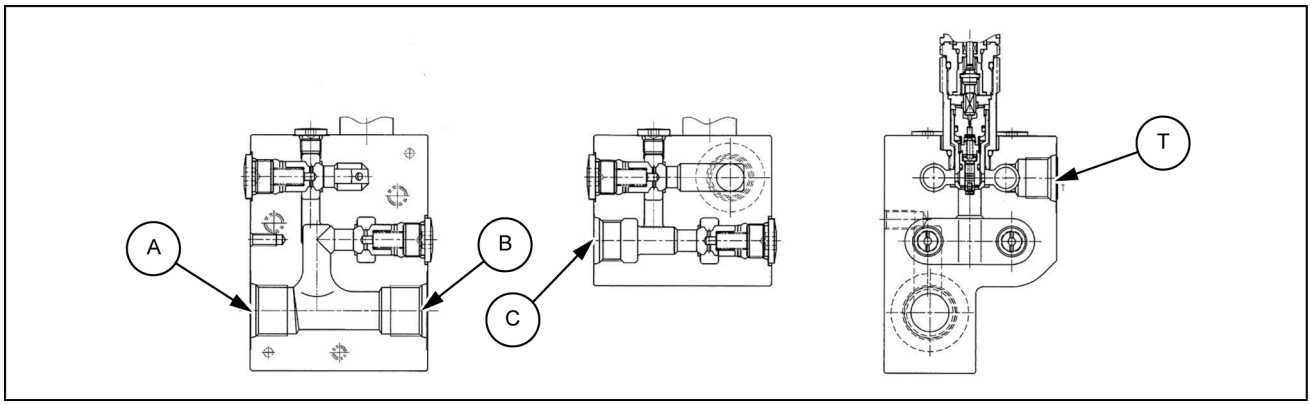
Problem	Possible Cause	Correction
Operation is unsteady	Air: There is air remaining in the cylinder	Perform air bleeding operation A. Cylinder with no air bleeding Bleed out the air by moving the cylinder back and forth a few times at low pressure and low speed B. Cylinder with air bleeding (air breather) After securing the machine so that the cylinder does not move, bleed the air from the air breather Reference The cylinder may extend or retract somewhat when the cylinder stops suddenly. This phenomenon occurs due to the compressibility of the hydraulic oil. This occurs particularly easily for cylinders with long strokes
The impact is high when switching over between extension and retraction	Pin bushing Pin: The gap between the installation section and the pin bushing is enlarged	Measure the pin and pin bushing dimensions and replace any part that exceeds its specified dimension
Cylinder sliding operations make sounds	Pin bushing Pin: The oil or grease feed is inadequate	Apply oil or grease
	Pin bushing Pin: There is seizing at matching section	Replace with a new part and apply oil or grease

Contents

Hydraulic systems - 35

Dozer blade cylinders - 741

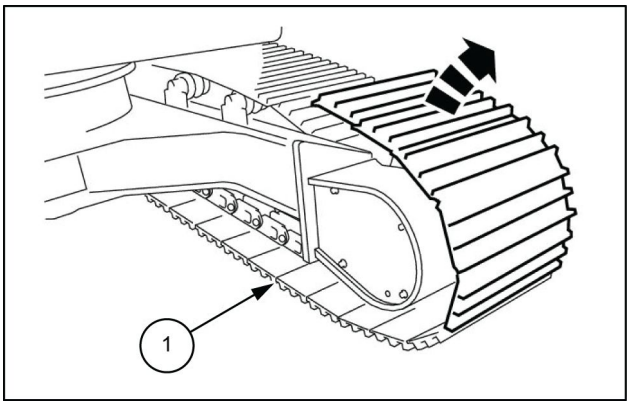
Hammer shears selection valve - Overview - Relief valve (electromagnetic proportional)



SMIL14CEX0576EB 1

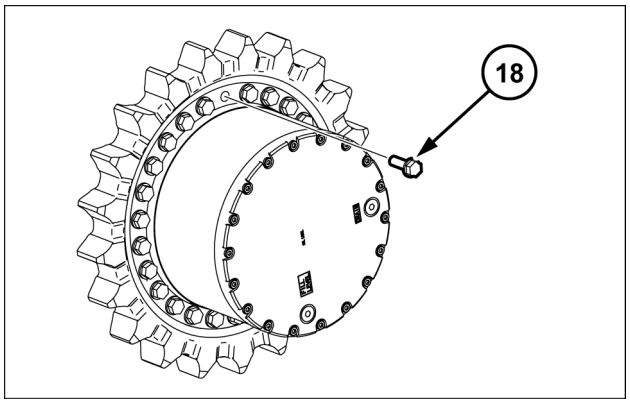
Port	Port size
A	**G1**
B	**G1**
C	**G3/4**
T	**G3/4**

6. Open the shoes **(1)** to rearward.



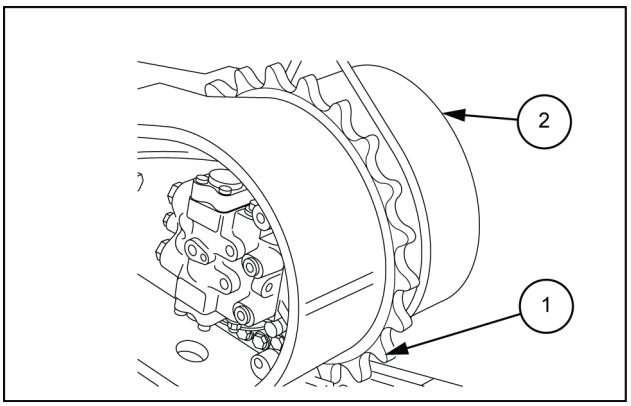
LPIL12CX01163AB 6

7. Remove the 22 bolts **(18)** with a wrench [**24 mm**].



SMIL14CEX5042AB 7

8. Remove the drive sprocket **(1)** from the travel motor **(2)** with a wire rope.



SMIL13CEX4274AB 8

Track tensioner - Install

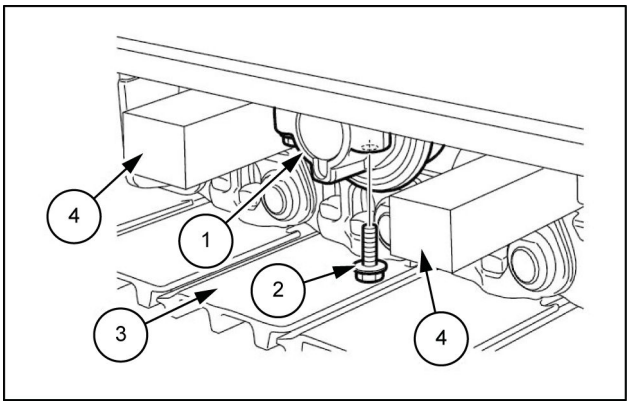
To install, perform the reverse of the removal procedure.

Grease cylinder installation bolt tightening torque: **267 - 312 N·m** (**196.93 - 230.12 lb ft**)

When installing bolts, coat the threaded sections with **LOCTITE® 262™**.

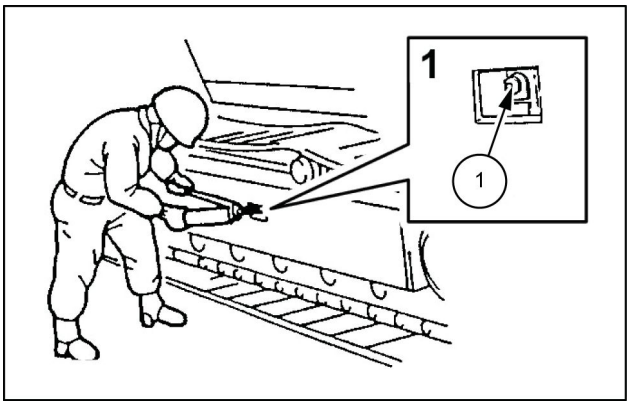
Track frame roller - Install

1. Insert wood planks **(4)** between the side frame and the link show **(3)**, use a box wrench [**24 mm**] to install 4 bolts **(2)** and then install the lower roller **(1)** with 4 bolts **(2)**.
   - Bolt **(2)** tightening torque: **267 - 312 N·m** (**196.9 - 230.16 lb ft**)



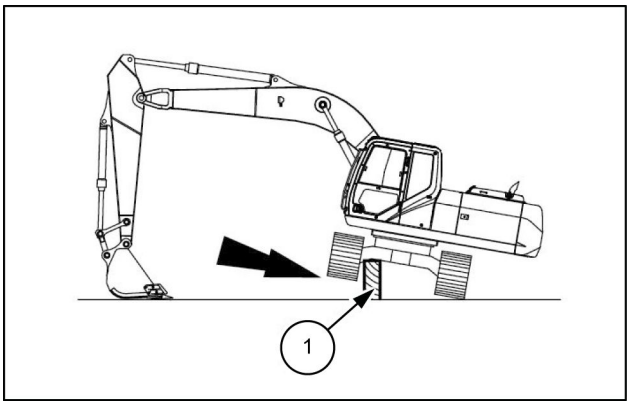
LPIL12CX01276AB 1

2. Tighten the check valve **(1)**.
   While monitoring the track shoe tension, inject grease into the grease cylinder.



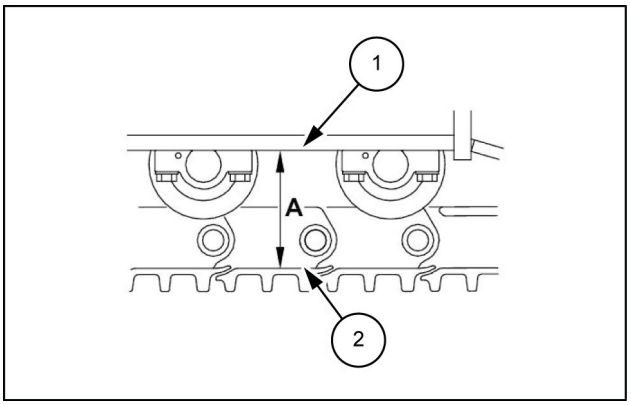
LPIL12CX01277AB 2

3. To adjust the track shoe tension, raise the lower side frame as shown in the diagram.
   Place a wood plank **(1)** under the lower frame to prevent falling.



LPIL12CX01278AB 3

4. Adjust the tension so that the distance indicated with A between the lower frame **(1)** of the center area of the lower side frame and the lowest hanging part of the shoe plate **(2)** is as follows
   Steel shoe **220 - 240 mm** (**8.66 - 9.44 in**)
   Link chain **200 - 220 mm** (**7.87 - 8.66 in**)



LPIL12CX01279AB 4

Cab climate control - 50

Air conditioning - 200

CX130D Crawler excavators LC version (TIER 4 FINAL) - NA Market
CX130D Crawler excavators Standard w/Blade version (TIER 4 FINAL) - NA market

Air-conditioning condenser - Install

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

   Tighten lines and bolts to the specified torque.

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

2. Make sure to resupply and check the compressor oil quantity.

   The compressor contains **135 cm³** (**8.2 in³**) of oil.

   The oil quantity being low will cause compressor seizing and a reduction in durability.

   The oil quantity being high will cause a reduction in cooling capabilities.

   Make sure to check the oil quantity and adjust if needed.

   Resupply quantity: **40 cm³** (**2.4 in³**)

   Resupply oil: SP-10 or SP-20 (**CNH PAG OIL**)

3. Perform air conditioner gas charging.
   For details, refer to **Air conditioning - Filling (50.200)**.

Pressure sensor

(P1) (P2)

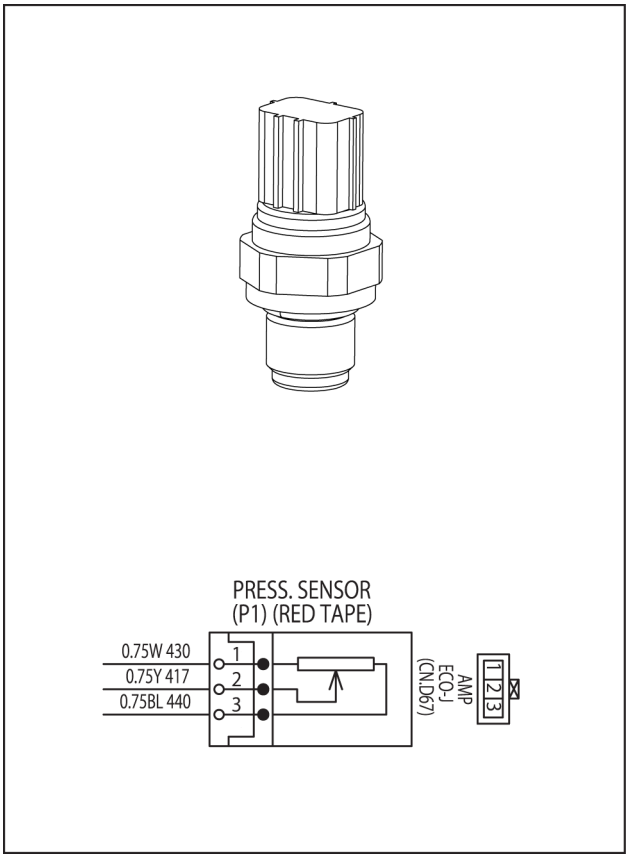
(boom bottom)

(arm bottom)

(arm rod)

Specification: **50 MPa** (**7252.5 psi**)

Part No.: KHR10290



SMIL15CEX4376BA 29

Pressure sensor

(N1) (N2)

(swing)

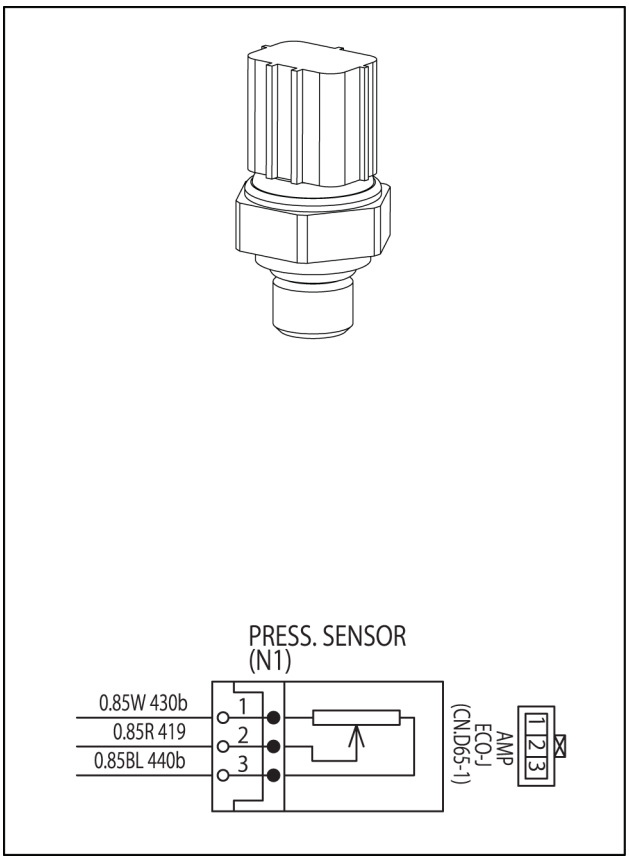
(upper)

(travel)

(option)

Specification: **5 MPa** (**725.2 psi**)

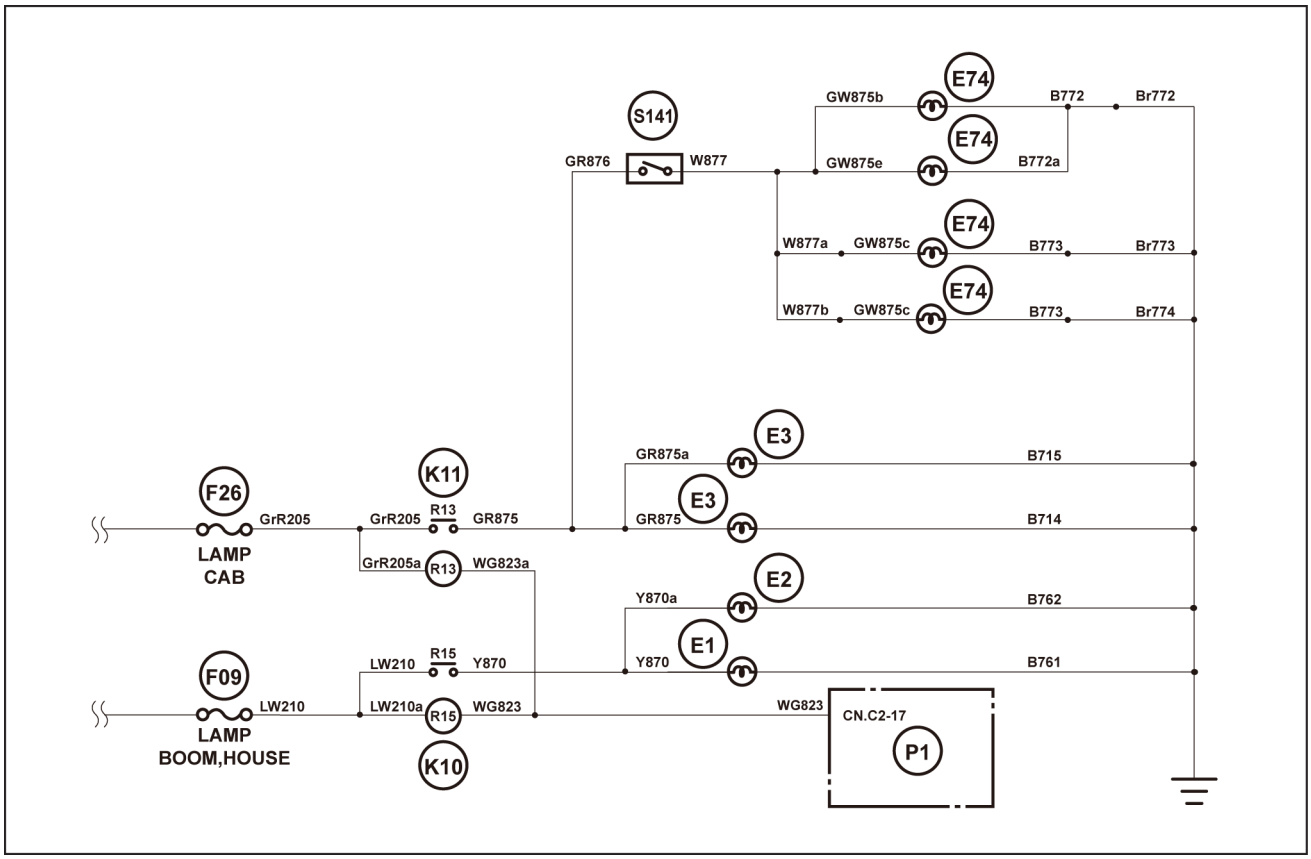
Part No.: KHR26940



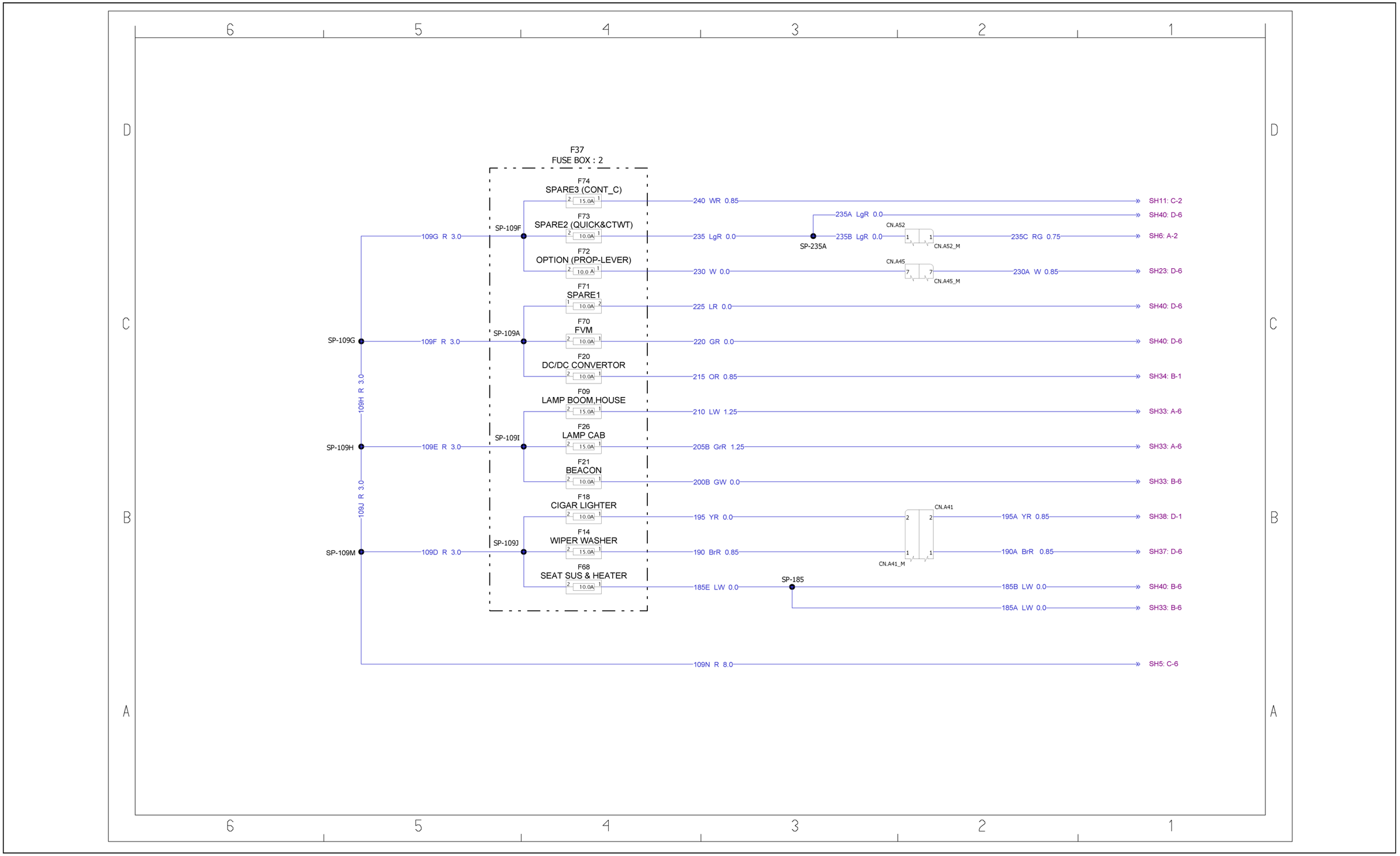
SMIL14CEX4123BA 30

1. Glow relay
2. Fusible link **50 A**: safety relay
3. Fuse **20 A**: SCR
   Fuse **20 A**: spare
4. Fuse **10 A**: fuel pump
   Fuse **15 A**: fuel pump
5. Fuse **60 A**: time delay
   Fuse **100 A**: time delay
6. Starter relay
7. Battery relay
8. Fusible link **50 A**: back-up
9. Dual Pressure Switch
10. Battery disconnect switch
11. Travel alarm
12. Battery

Working light



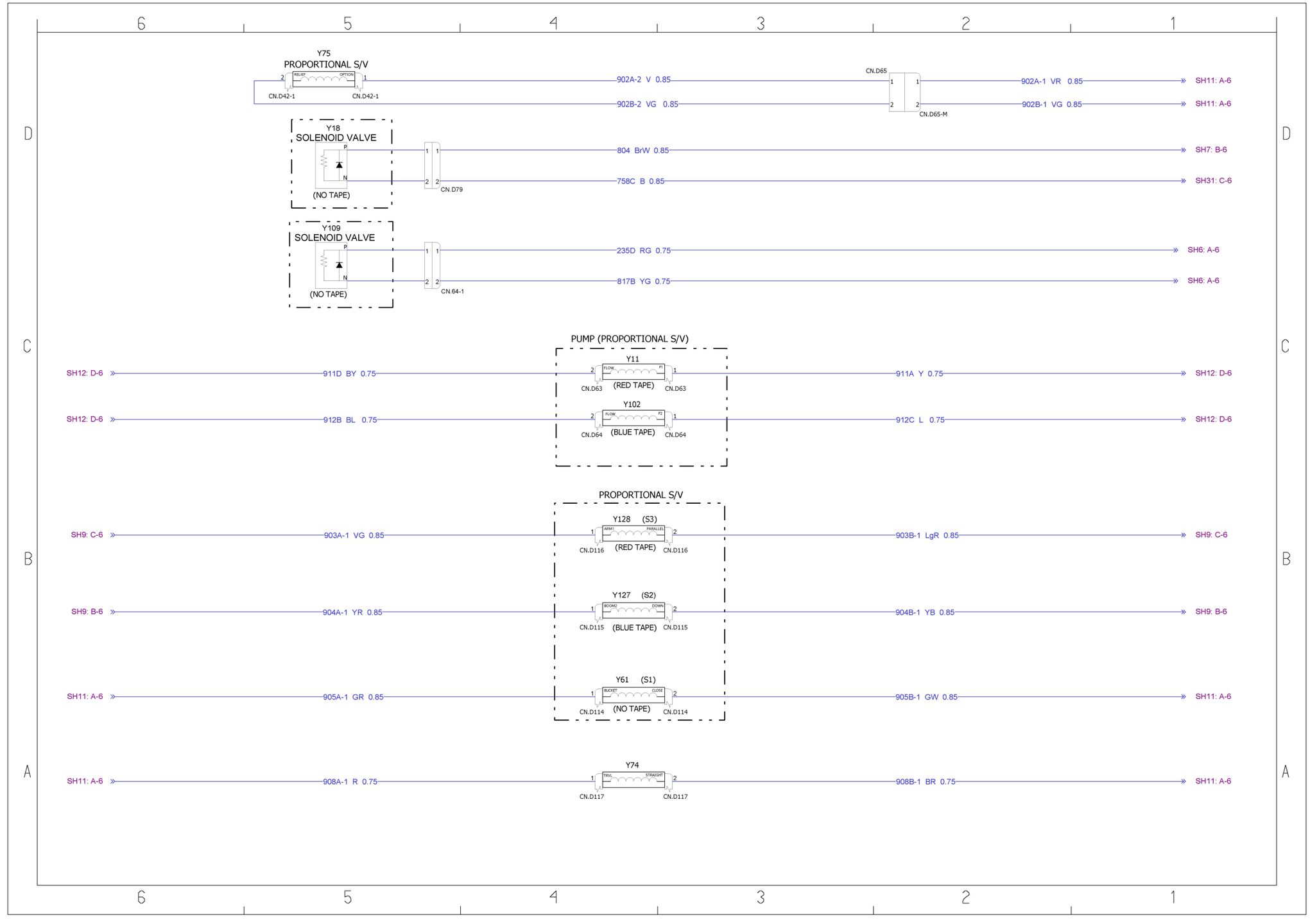
SMIL15CEX0626FA 8



SMIL15CEX5160JA 1

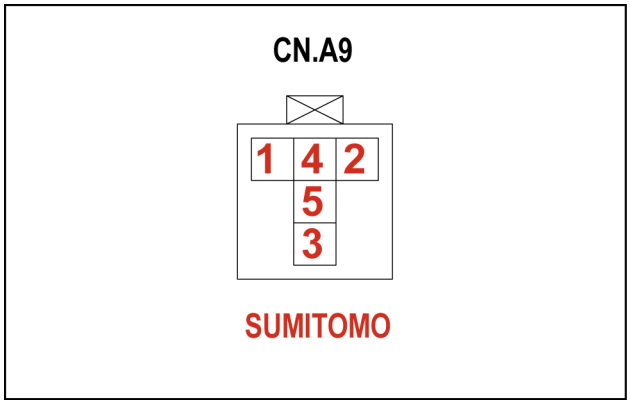
Wiring harnesses - Electrical schematic sheet 19 - Sensors and suction valve

Type	Components	Connectors/link	Description
Sensor	B1		Coolant temperature sensor
Sensor	B3		Fuel temperature sensor
Sensor	B87		Cam angle sensor
Sensor	B119		EGR cooler-out temperature sensor
Sensor	B120		EGR cooler-in temperature sensor
Sensor	B142		Manifold temperature sensor (Intake & EGR)
Sensor	B143		Fuel filter sensor
Pump	M20		Fuel pump
Valve	Y35		Suction control valve
Valve	Y116		Coolant control valve
Connector	CN.E9	**CN.E9**	Fuel temperature sensor
Connector	CN.E8	**CN.E8**	Coolant temperature sensor
Connector	CN.E10	**CN.E10**	Manifold temperature sensor (Intake & EGR)
Connector	CN.E13	**CN.E13**	EGR cooler-out temperature sensor
Connector	CN.E14	**CN.E14**	EGR cooler-in temperature sensor
Connector	CN.E15	**CN.E15**	Cam angle sensor
Connector	CN.E16	**CN.E16**	Suction control valve
Connector	CN.D36	**CN.D36**	Fuel pump
Connector	CN.D37	**CN.D37**	PN diode
Connector	CN.D40	**CN.D40**	Coolant control valve
Connector	CN.D90	**CN.D90**	
Connector	CN.D90-7	**CN.D90-7**	Fuel filter sensor

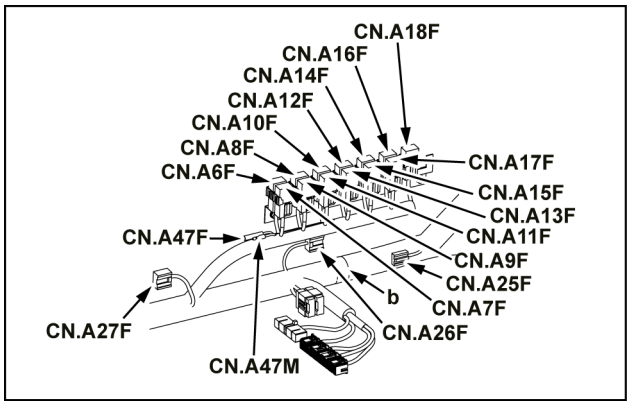


SMIL15CEX5191JA 1

CONNECTOR CN.A9: RELAY ACC:1 (Male)



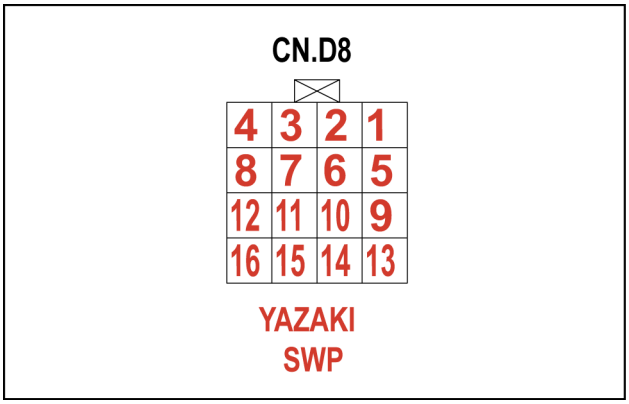
SMIL15CEX5212AA 17



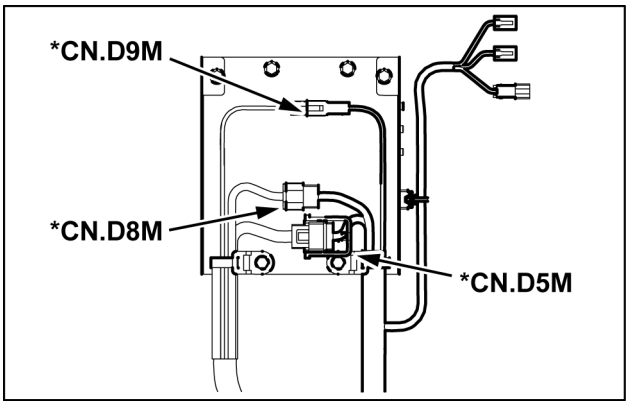
SMIL15CEX5208AA 18

Pin	From	Wire	Description	Color-Size	Frame
1	CN.A42-P-2	290		RB-0.85	**SHEET 05**
2	CN.A37_M-P-4	706		B	**SHEET 30**
3	SP-115B-P-X	115		RW	**SHEET 33**
5	CN.A10-P-3	116		RY	

CONNECTOR CN.D8: (Male)



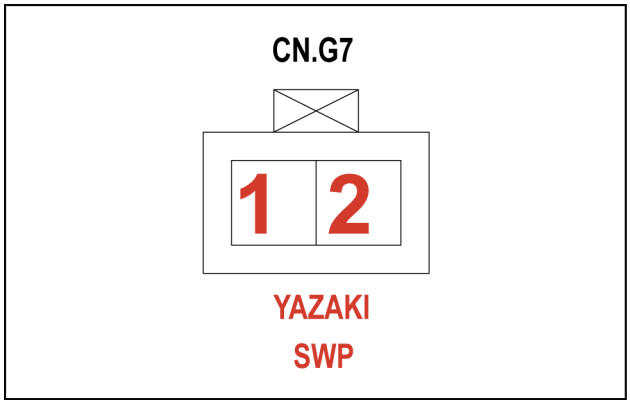
SMIL15CEX5242AA 56



SMIL15CEX9639AB 57

Pin	From	Wire	Description	Color-Size	Frame
1	CN.E12-P-1	353-A		GB-0.75	**SHEET 20**
2	CN.E12-P-2	354-A		GW-0.75	
3	CN.E12-P-3	355-A		GY-0.75	
4	CN.E12-P-4	352B		L-0.75	
5	CN.E12-P-5	386-A		WR-0.75	
6	CN.E12-P-6	387-A		WB-0.75	
7	CN.E12-P-7	388-A		WR-0.75	
8	SP-356-C-P-X	356-C		LW-0.75	
9	CN.E13-P-1	306A		BR-0.75	**SHEET 19**
10	CN.E13-P-2	327J		LR-0.75	
11	CN.E14-P-2	327M		BW-0.75	
12	CN.E14-P-1	304A		RW-0.75	
13	CN.E25-P-1	308		R-0.75	**SHEET 21**
14	CN.E25-P-2	347E		B-0.75	

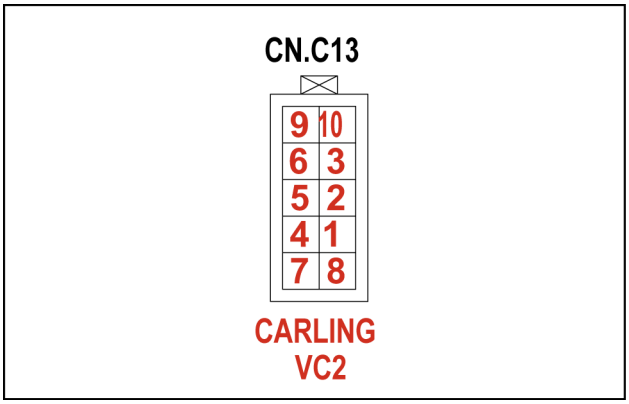
CONNECTOR CN.G7: 1st OPTION SOLENOID VALVE (RED TAPE) (Male)



SMIL15CEX5266AA 87

Pin	From	Wire	Description	Color-Size	Frame
1	SP-351-P-X	230J		W-0.85	**SHEET 22**
2	SP-850A-P-X	850		GR-0.85	

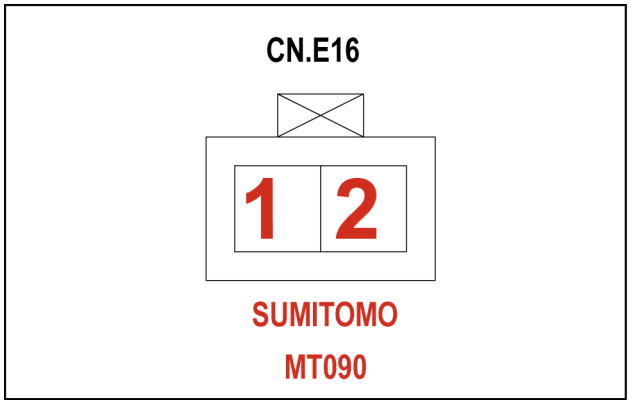
CONNECTOR CN.C13: QUICK COUPLER (Male)



SMIL15CEX5294AA 48

Pin	From	Wire	Description	Color-Size	Frame
2	SP-616-P-X	616		BG-0.85	**SHEET 36**
3	CN.A40-P-6	547A		WR-0.85	**SHEET 10**

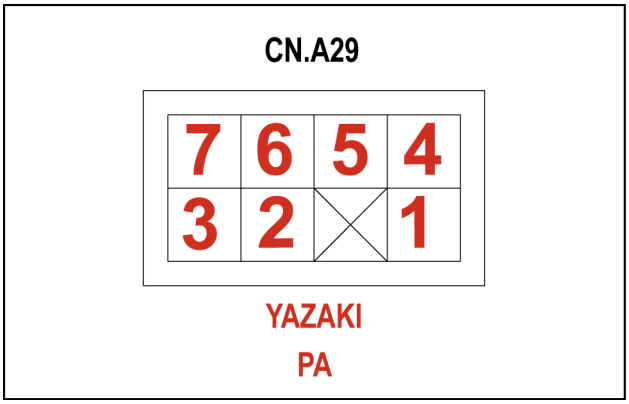
CONNECTOR CN.E16: SUCTION CONTROL VALVE (Male)



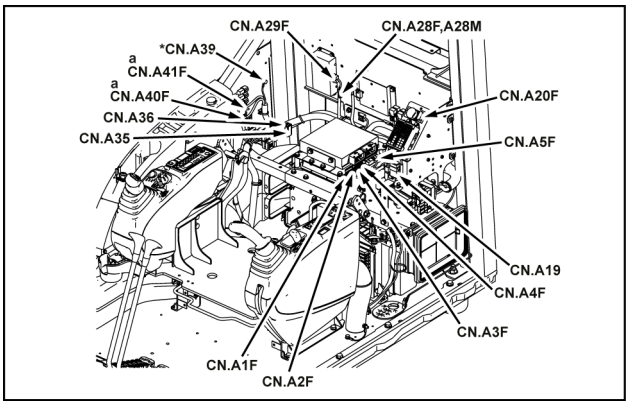
SMIL15CEX5308AA 82

Pin	From	Wire	Description	Color-Size	Frame
1	CN.D8-A_M-P-16	396C		RW-0.75	**SHEET 14**
2	CN.D8-A_M-P-20	394C		RB-0.75	

CONNECTOR CN.A29: CAB HEAD LAMP 3 (HALOGEN) (Male)



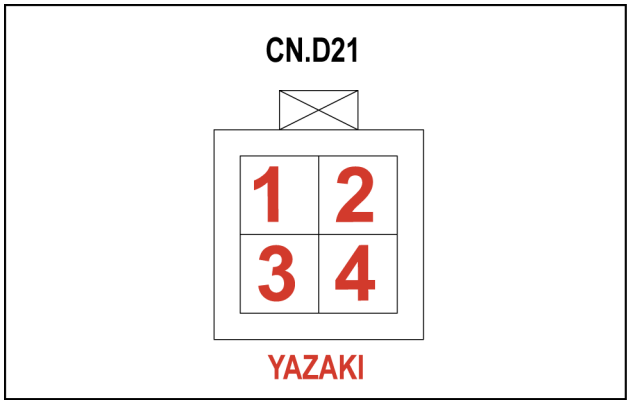
SMIL15CEX5323AA 13



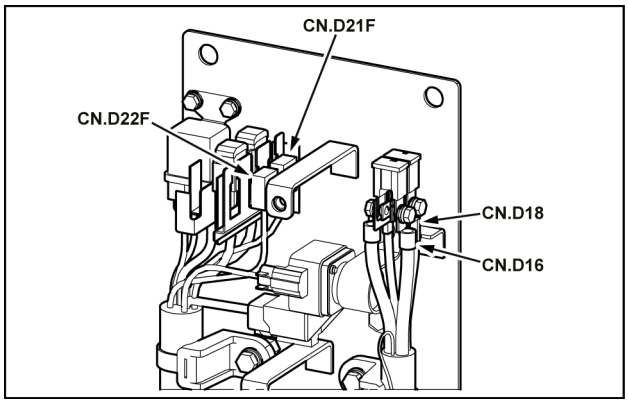
SMIL15CEX5202AA 14

Pin	From	Wire	Description	Color-Size	Frame
1	SP-281A-P-X	281		WR-0.85	**SHEET 33**
2	CN.A35_M-P-15	135D		RL	**SHEET 31**
3	CN.A45-P-14	280		RY-0.85	**SHEET 09**
4	CN.A45-P-16	735		BW-0.85	
5	CN.A38_M-P-2	709		B-0.85	**SHEET 30**
6	F20-P-1	215		OR-0.85	**SHEET 03**

CONNECTOR CN.D21: SCR/SPARE (Male)



SMIL15CEX5337AA 37



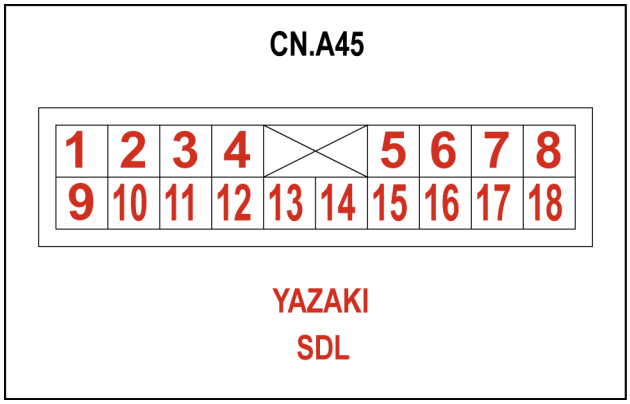
SMIL15CEX5301AA 38

Pin	From	Wire	Description	Color-Size	Frame
1	CN.D91-P-1	265		R-1.25	**SHEET 02**
2	SP-106A-P-X	106		R-3.0	
3	SP-105A-P-X	105D		R-2.0	**SHEET 15**
4	CN.D25-M8	104		R-2.0	**SHEET 01**

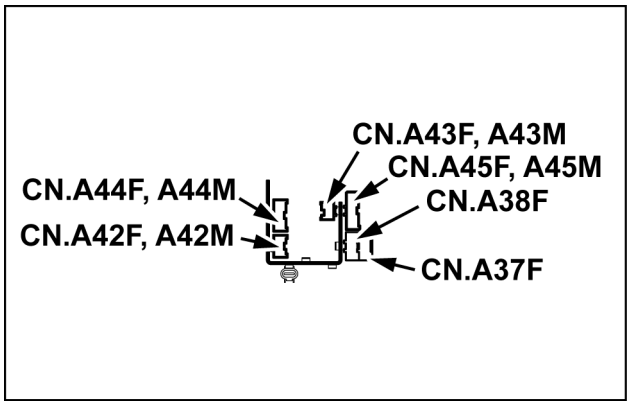
CONNECTOR CN.A31-1: CAB HEAD LAMP 4 (Male)

Pin	From	Wire	Description	Color-Size	Frame
1	SP-715–P-X	815		BG-0.25	**SHEET 38**

CONNECTOR CN.A45: (Female)



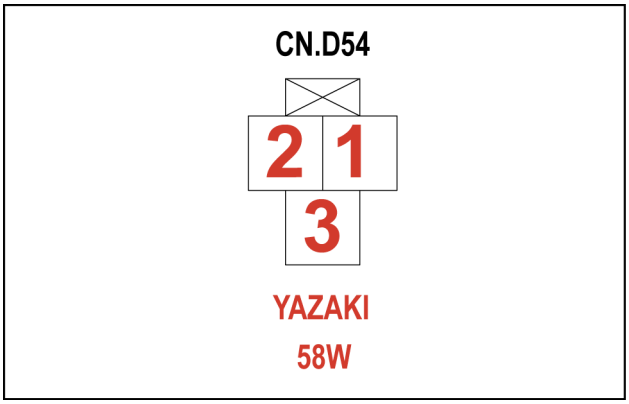
SMIL15CEX5377AA 23



SMIL15CEX5357AA 24

Pin	From	Wire	Description	Color-Size	Frame
1	CN.A35_M-P-14	135C		RL	**SHEET 31**
2	SP-185-P-X	185B		LW	**SHEET 03**
3	CN.A3-P-26	536		GR	**SHEET 09**
4	CN.A3-P-21	538		WG	
5	CN.A3-P-14	544		LY	
6	CN.A3-P-23	540		YL	
7	F72-P-1	230		W	**SHEET 03**
8	SP-804-P-X	804A		Br	**SHEET 06**
9	SP-842A-P-X	842B		LG	**SHEET 09**
10	CN.A17-P-3	980B		Y-0.85	**SHEET 32**
11	CN.A16-P-3	981B		L-0.85	
12	CN.A41_M-P-17	982C		BY-0.85	**SHEET 15**
13	CN.A41_M-P-18	983B		BL-0.85	
14	CN.A29-P-3	280		RY-0.85	**SHEET 33**
15	SP-281A-P-X	281B		WR-0.85	
16	CN.A29-P-4	735		BW-0.85	
17	SP-117A-P-X	117C		R	
18	CN.A3-P-24	543		GW	**SHEET 09**

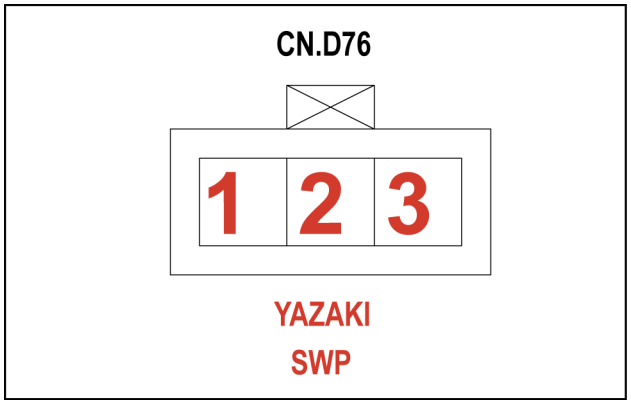
CONNECTOR CN.D54 (Female)



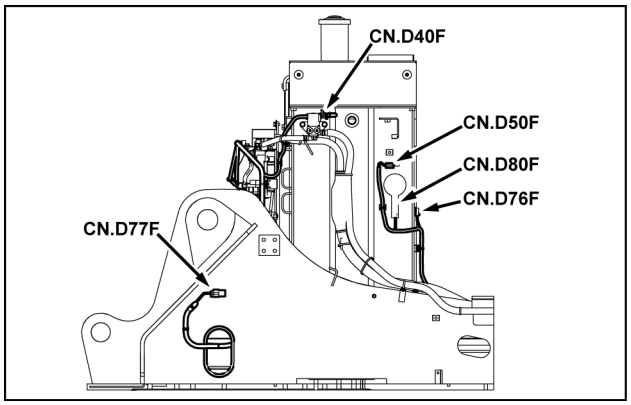
SMIL15CEX5402AA 32

Pin	From	Wire	Description	Color-Size	Frame
1	SP-251-P-X	255C		W-1.25	**SHEET 28**
2	SP-764-P-X	768A		B-1.25	
3	CN.D54-4-P-2	815B		VG-0.85	

CONNECTOR CN.D76: (Male)



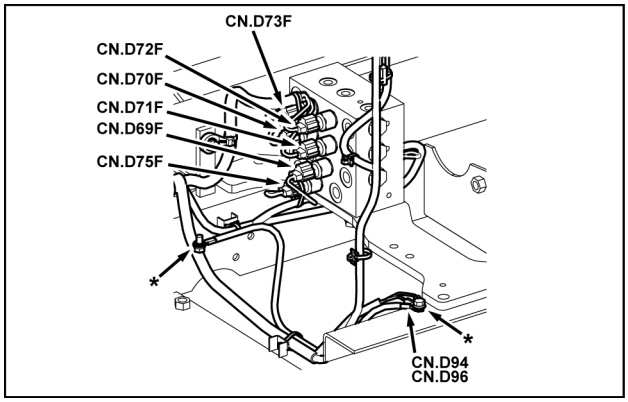
SMIL15CEX5432AA 13



SMIL15CEX5378AA 14

Pin	From	Wire	Description	Color-Size	Frame
1	SP-435K-P-X	435L		WL-0.75	**SHEET 17**
2	CN.A54_M-P-16	414A		L-0.75	**SHEET 11**
3	SP-445K-P-X	445R		BW-0.75	**SHEET 17**

CONNECTOR CN.D96: (Male)



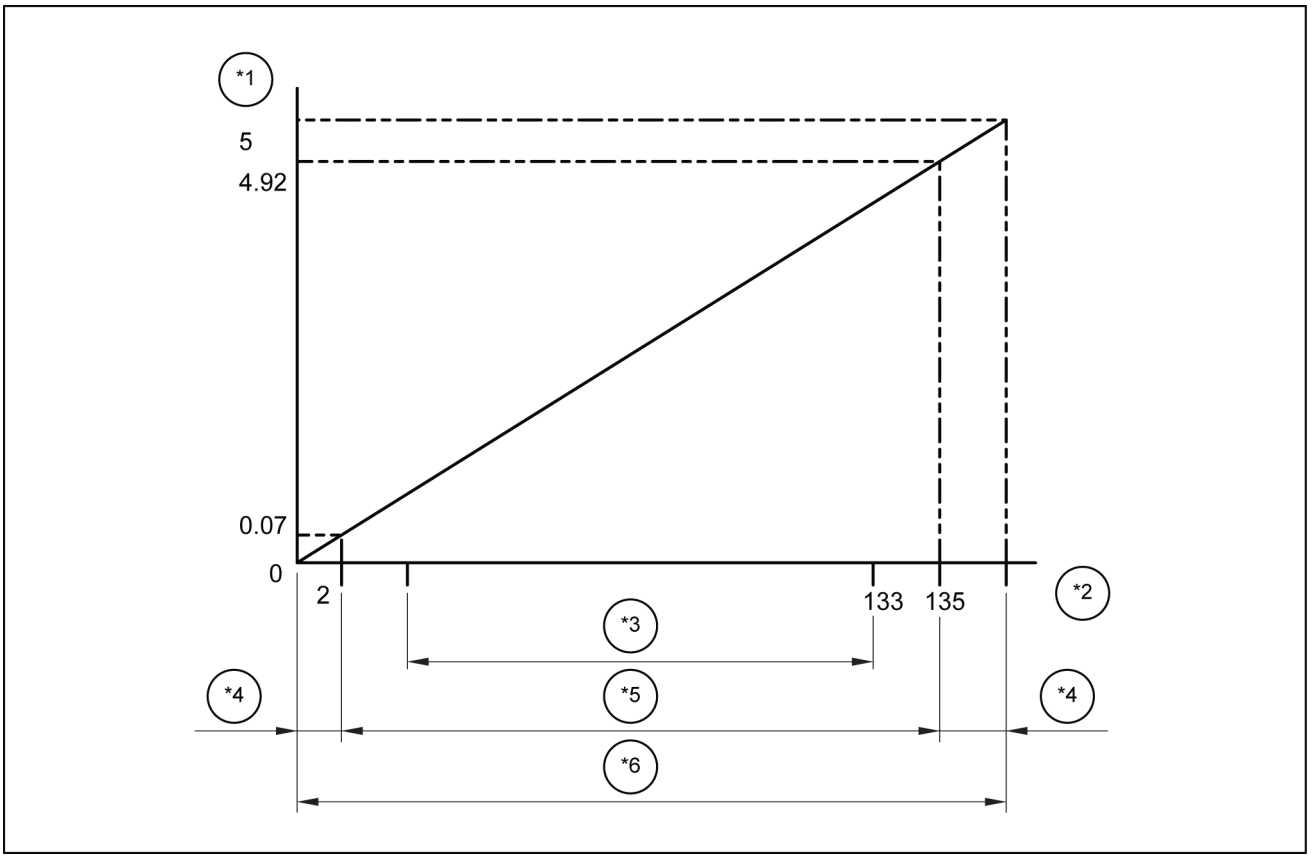
SMIL15CEX5424AA 22

Pin	From	Wire	Description	Color-Size	Frame
1	SP-785A-P-X	785E		B-2.0	**SHEET 15**

- Lower limit of speed:
  If the speed after offset is lower than the lower-limit speed, the output speed should be obtained by increasing it up to the lower-limit speed so that it may not fall below the lower limit speed.
- Upper limit of speed:
  If the speed after offset is higher than the upper-limit speed, the output speed should be obtained by discarding that higher than the upper-limit speed so that it may not exceed the upper-limit speed.

3. Change of lower/upper limit of speed
   - When lifting magnet mode is ON:
     If the target speed is lower than the lifting magnet mode speed, it is increased up to the lifting magnet mode speed (the lifting magnet mode speed acts as the lower-limit speed).
   - When idle up is ON:
     If the target speed is lower than the idle up speed, it is increased up to the idle up speed (the idle up speed acts as the lower-limit speed).
   - When crane mode is ON:
     If the target speed is higher than the crane mode speed, it is decreased down to the crane mode speed (the crane mode speed acts as the upper-limit speed).

a. Characteristics of potentiometer



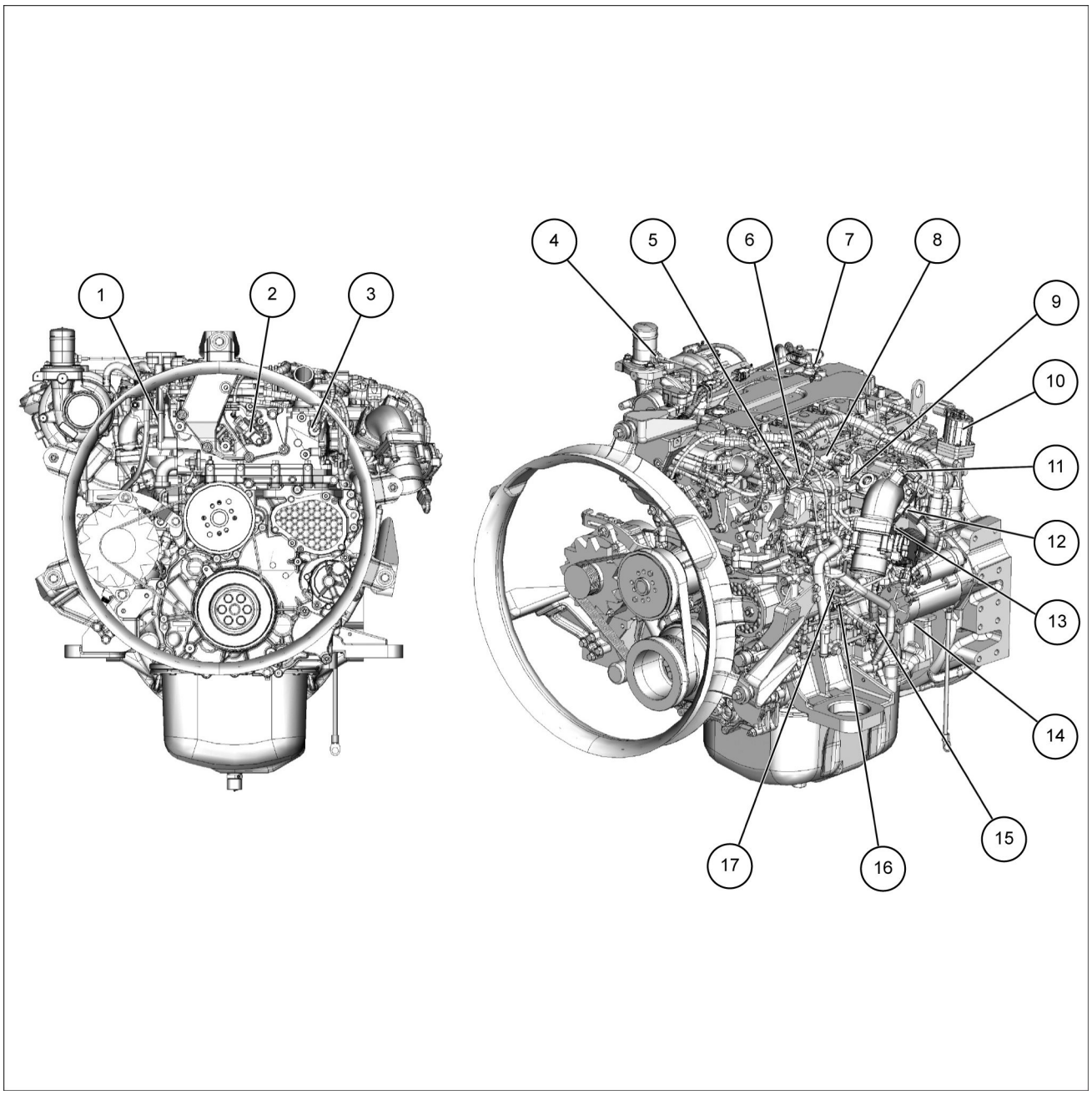
SMIL14CEX1030FB 4

*1 Voltage [V]
*2 Angle [deg]
*3 Throttle operation range
*4 Abnormality
*5 normal
*6 Potentiometer operation range

b. Calculation of degree of opening of throttle volume

The degree of opening (%) of the throttle volume, which can be checked on the CHK screen, is calculated on the following criteria.
100%: When the detent is in the position 1+
0%: When the detent is in the position 15-
Therefore, even if the detent is in the position 1 (SP), the degree of opening is not always 100%.
Likewise, even if the detent is in the position 15, it is not always 0%.

Engine control system - Component localization



SMIL15CEX9013G 1

1. EGR gas temperature sensor 1
2. CMP sensor
3. Coolant temperature sensor
4. Inter-cooler inlet temperature sensor
5. Glow plug
6. Overheat switch
7. EGR gas temperature sensor 2
8. Turbocharger control solenoid
9. IMT sensor
10. EGR valve
11. Boost sensor
12. Boost temperature sensor
13. Fuel pressure sensor
14. CKP sensor
15. Oil pressure sensor
16. Suction control valve
17. Fuel temperature sensor

Engine timing sensors Camshaft sensor - Remove

Battery ground cable disconnect

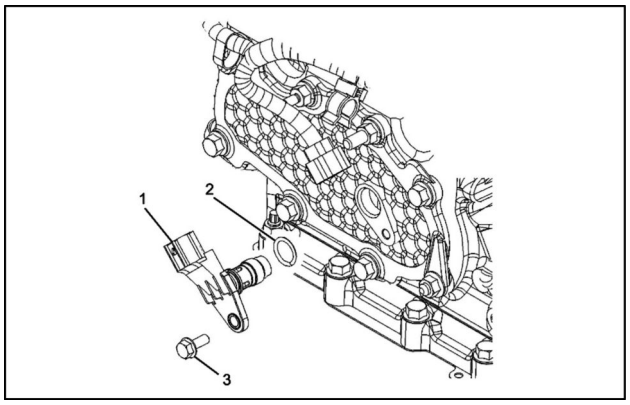
1. Disengage the battery ground cable from the battery.

Camshaft position sensor removal

1. Remove the camshaft position sensor **(1)** from the timing chain upper cover.

NOTICE: *Be careful not to subject the sensor to shock.*

2. 1. Camshaft position sensor
   2. O-ring
   3. Bolt



SMIL15CEX9636AB 1

The ECM and monitor are operating correctly.

Check DTCs.

The scan tool data is within the normal operation range.

Check the condition of the actual machine and find applicable symptoms.

Confirm with the customer that the stipulated engine oil and fuel are being used.

Visual inspection

Some symptoms detection procedures require careful visual inspection.

This allows for problems to be repaired without performing further inspection, which saves valuable time.

The following items are included in this inspection.

Check whether the air filter element is dirty or clogged.

Check for correct wiring connections, tightness, and disconnections.

Check whether the power supply for commercially-available accessories is being diverged from the ECM power supply.

Check whether the ECM ground is dirty and check that it is securely installed in the correct location.

Check that pipes and hoses for fuel, air, and oil are not broken or twisted and that they are correctly connected.

Thoroughly check for any leaking or clogging.

Check for fuel leaks and damage and denting on pipes in the fuel system.

Suction air system parts abnormality.

Exhaust system parts abnormality.

Diagnostic aid

Fuel quality, for example non-regulation product being used.

Filter clogging, suction air line abnormality and other suction air system abnormalities.

EGR control system abnormality.

Exhaust pipe abnormality and other exhaust system abnormalities.

Coolant temperature sensor abnormality.

Boost sensor trouble.

Engine main unit abnormalities caused by compression pressure deficiency, piston-related problems, turbocharger problems, and rise of oil.

Abnormal noise - symptoms

The engine combustion noise is abnormal.

Alternator - Prepare

⚠ WARNING

Battery gas can explode!
To prevent an explosion: 1. Always disconnect the negative (-) battery cable first. 2. Always connect the negative (-) battery cable last. 3. Do not short circuit the battery posts with metal objects. 4. Do not weld, grind, or smoke near a battery.
Failure to comply could result in death or serious injury.

W0011A

⚠ WARNING

Avoid injury!
Shut off the engine, remove the key, and make sure all motion is stopped before servicing the machine.
Failure to comply could result in death or serious injury.

W1128A

Items to prepare:

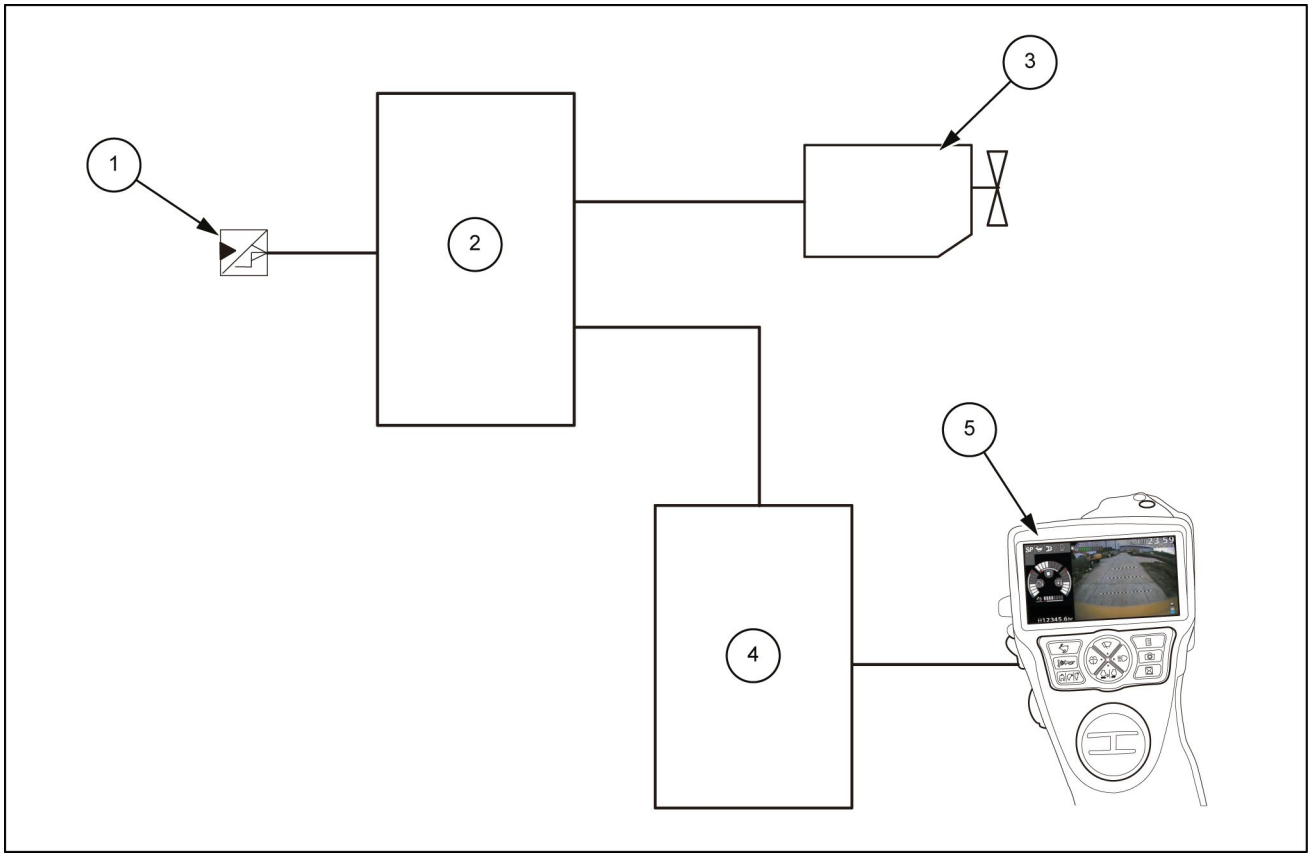
- Wrenches [**10 mm**, **13 mm**, **17 mm**]
- Rag
- Cleaning fluid

Fuel filter restriction sensor - Service instruction - Fuel filter clogging

Purpose/overview

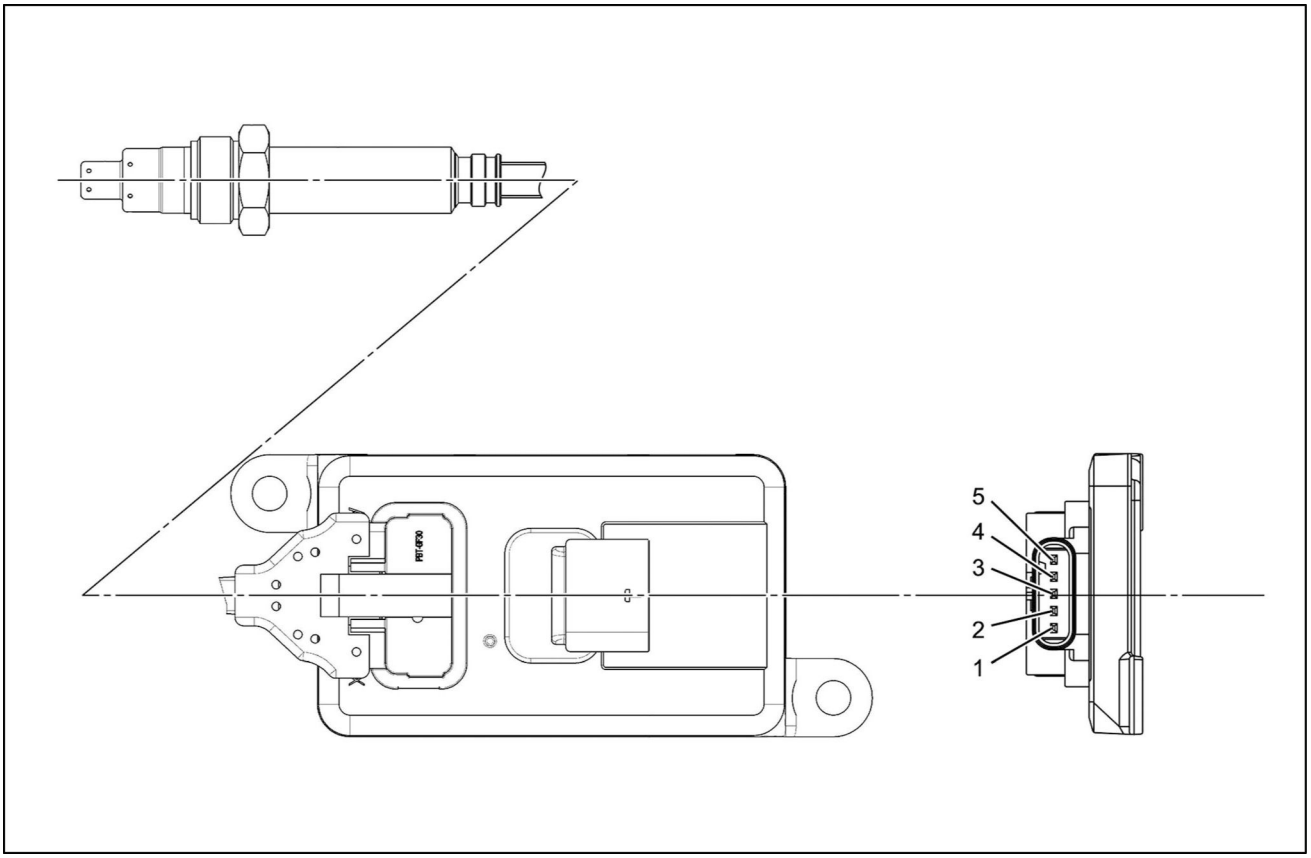
Excessive clogging of the fuel filter may cause cavitation in fuel to damage the engine.

Therefore, the system generates a message to prompt replacement of the fuel filter as necessary as well as it lowers engine speed automatically to protect the engine if it is kept used without filter replacement.



SMIL14CEX4197FB 1

1. Fuel filter negative pressure sensor
2. ECM
3. Engine
4. Main controller
5. Monitor



SMIL14CEX4026FA 9

1. NOx sensor power supply
2. NOx sensor GND
3. CAN Low
4. CAN High
5. –

EGT sensor 3

EGT sensor 3 is a resistance temperature detector, and is installed at the inlet of the SCR catalyst. It measures the temperature of exhaust gas in front of the SCR catalyst, and sends the temperature signal to the DCU. Based on the signal from the exhaust temperature sensor, the DCU controls the urea SCR.

7. Check whether the customer's concern is related to the engine.

NOTE: *If there is a concern relating to the engine, inspect the engine control system.*

8. Check for excessive urea fluid consumption.
9. Check for a significant ammonia odor.
10. Check for the adherence of white crystal powder.

Intermittent conditions of urea selective catalytic reduction system description of symptom

NOTE: *Important preliminary inspections before starting.*

Before using the symptom list, inspect the urea SCR control system and verify all of the following items.

The warning light and indicator light operate normally.

The trouble diagnosis scan tool data is within the normal range of operation values.

Verify the customer's complaint, and locate the appropriate symptom in the table of contents. Inspect the items presented for the symptom.

NOTE: *Visual inspection and actual inspection.*

Careful visual inspection and actual inspection are required for some symptom procedures. This procedure is extremely important. By conducting visual and actual inspections, it is possible to save valuable time by fixing problems without performing further inspections. Check for the following items.

The GND of the DCU should be clean and firmly secured in the correct position.

The exhaust pipe should not be crushed or damaged.

The wiring and terminals of the urea SCR system harness should be appropriately connected, and they should not be pinched or disconnected.

NOTE: *Intermittent conditions.*

If an intermittent condition exists, inspect for improper installation of electronic equipment. Inspect for any additionally installed electronic equipment, lights, mobile phones, wireless devices, etc.

Verify that any device that was additionally installed is not connected to a serial data circuits such as CAN.

Depending on the problem, the warning light may illuminate or DTCs may be recorded. An intermittent condition is often caused by an improper electrical connection or wiring. Conduct a careful visual inspection, or conduct an actual inspection to see whether the following conditions exist in the suspected connector.

Incomplete connection between connectors Seating failure of terminal Damage or deformation of terminal Repair or replace the connector terminal of the circuit with the problem, and appropriately connect. Remove the terminals from the connector body and inspect the wires of the terminals for poor connections.

Contents

Electrical systems - 55

Exhaust Gas Recirculation (EGR) electrical system - 989

SERVICE

Engine oil level sensor - Install

Oil level sensor installation

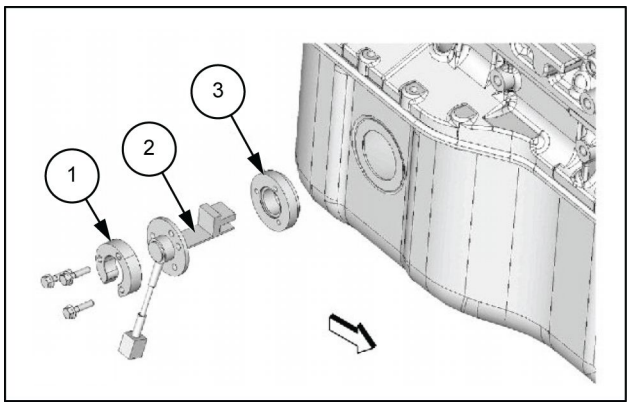
1. Install the oil level sensor **(2)** to the oil pan.

   CAUTION: Use new O-rings.

   Tightening torque: **10 N·m** (**7.38 lb ft**)

2. Connect the harness connector to the oil level sensor **(2)**.

   1. Spacer
   3. Spacer



SMIL13CEX1832AB 1

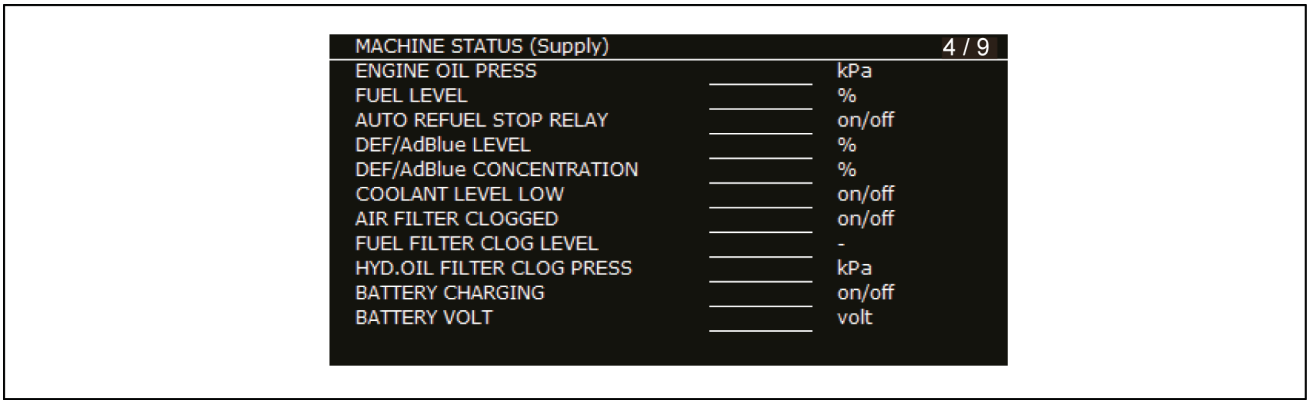
Engine oil filling

1. Replenish the engine oil with the engine assembly.

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

CAUTION: Confirm the tightening of the oil pan drain before adding engine oil.

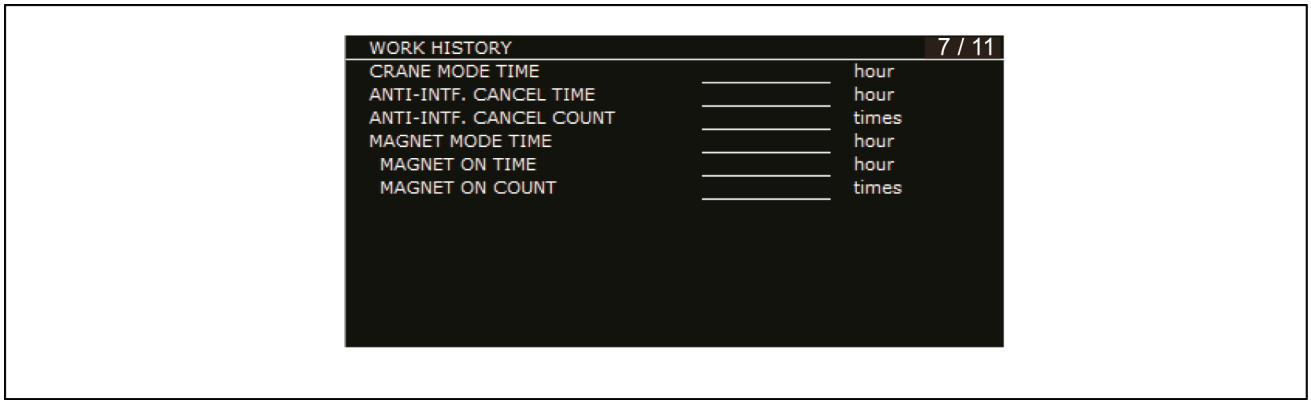
4/9



SMIL14CEX0918EA 5

Display	Explanation	Range
ENGINE OIL PRESS	Engine oil pressure	**0 - 1000 kPa** (**0 - 145 psi**)
FUEL LEVEL	Level sensor; fuel	**0 - 100 %**
AUTO REFUEL STOP RELAY	Refueling stop REL	ON/OFF
DEF/AdBlue LEVEL	Remaining urea level	**0 - 100 %**
DEF/AdBlue CONCENTRATION	Urea concentration	**0 - 100 %**
COOLANT LEVEL LOW	Coolant level SW	ON/OFF
AIR FILTER CLOGGED	Air cleaner clogging signal	ON/OFF
FUEL FILTER CLOG LEVEL	Fuel filter clogging status 0: OFF 1: Step1 2: Step2	0 - 2
HYD.OIL FILTER CLOG PRESS	Pressure sensor; hydraulic oil F clogging	**0 - 1 MPa** (**0 - 145 psi**)
BATTERY CHARGING	Alternator voltage	ON/OFF
BATTERY VOLT	Battery voltage	**0 - 100 V**

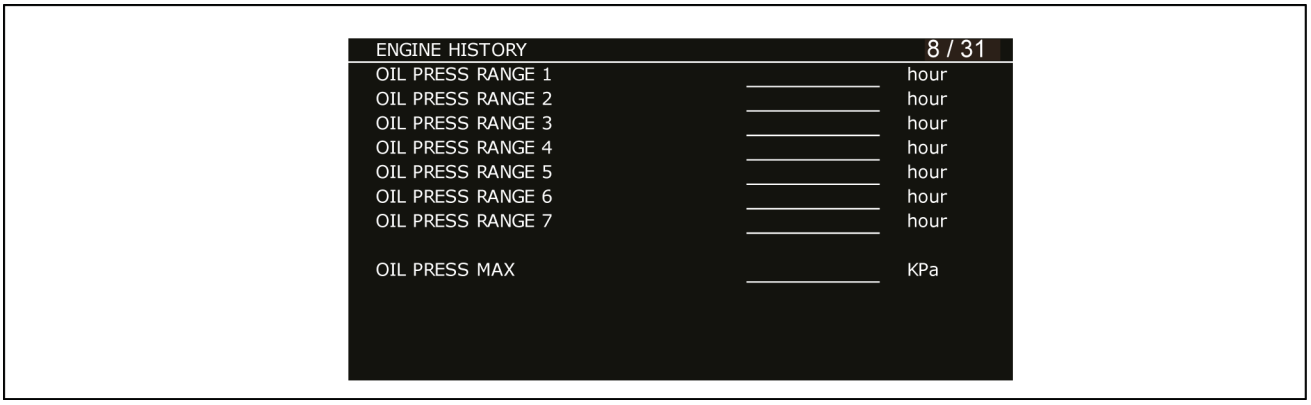
7/11



SMIL14CEX0949EA 36

Display	Explanation	Unit	Judgment condition	Judgment start condition
CRANE MODE TIME	Crane mode ON time	hour	Crane mode = ON	Engine in operation
ANTI-INTF. CANCEL TIME	Anti-interference temporary cancellation time	sec	Anti-interference temporary cancellation SW = ON	Engine in operation
ANTI-INTF. CANCEL COUNT	Anti-interference temporary cancellation count	times	Anti-interference temporary cancellation SW OFF → ON	Engine in operation
MAGNET MODE TIME	Lifting magnet mode ON time	hour	Lifting magnet SW = ON	Engine in operation
MAGNET ON TIME	Lifting magnet suctioning time	hour	Lifting magnet suction SW = ON	Engine in operation
MAGNET ON COUNT	Lifting magnet suction operation count	times	Lifting magnet suction SW OFF → ON	Engine in operation

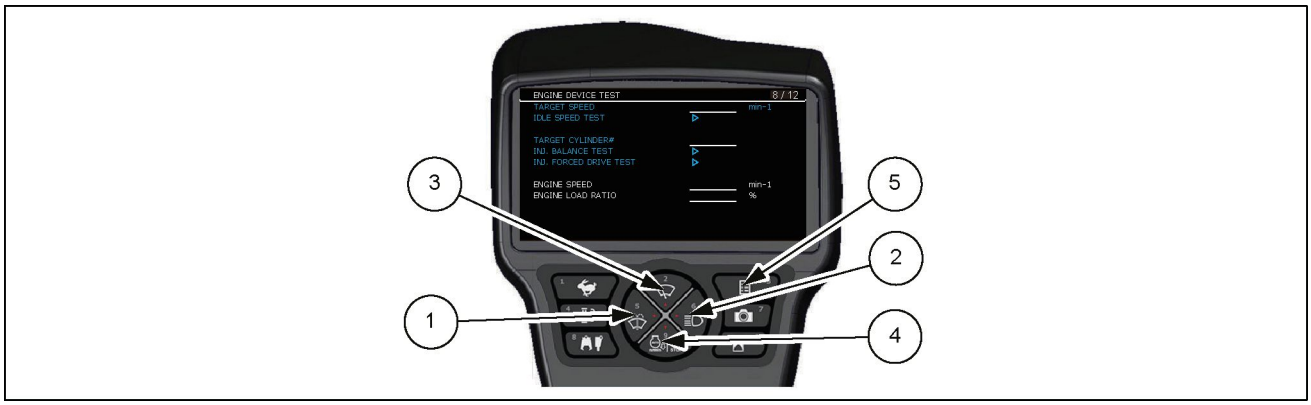
8/31



SMIL14CEX0980EA 67

Display	Explanation	Unit	Judgment condition	Judgment start condition
OIL PRESS RANGE 1	Oil pressure; time distribution	hour	Less than **0 kPa**	In **10 s** after the engine starts
OIL PRESS RANGE 2	Oil pressure; time distribution	hour	Less than **150 kPa**	In **10 s** after the engine starts
OIL PRESS RANGE 3	Oil pressure; time distribution	hour	Less than **300 kPa**	In **10 s** after the engine starts
OIL PRESS RANGE 4	Oil pressure; time distribution	hour	Less than **450 kPa**	In **10 s** after the engine starts
OIL PRESS RANGE 5	Oil pressure; time distribution	hour	Less than **600 kPa**	In **10 s** after the engine starts
OIL PRESS RANGE 6	Oil pressure; time distribution	hour	Less than **750 kPa**	In **10 s** after the engine starts
OIL PRESS RANGE 7	Oil pressure; time distribution	hour	**750 kPa** or more	In **10 s** after the engine starts
OIL PRESS MAX	Maximum value of oil pressure	kPa (psi)	–	In **10 s** after the engine starts

Idle Speed Test / Injector Test



SMIL14CEX1107EB 98

Display	Explanation	Unit	Remarks
TARGET SPEED	target engine speed	min-1 (rpm)	Items selectable. The engine speed can be increased or decreased from the current one.*
IDLE SPEED TEST	Idle speed test	–	The engine is driven at the specified idle speed (for **100 s**).
TARGET CYLINDER#	Injector selection	–	Items selectable. The injector to test can be selected. (Selectable up to 4 and 6 for the 4-cylindered and the 6-cylindered one respectively.)
INJ. BALANCE TEST	Injector balance test	–	The selected injector is stopped (for **10 s**).
INJ. FORCED DRIVE TEST	Injector forced drive	–	The selected injector is driven (for **10 s**).
ENGINE SPEED	Actual engine speed	min-1 (rpm)	
ENGINE LOAD RATIO	Engine torque (load ratio)	%	

1. Idle speed test

Purpose

- The desired engine speed can be attained.

NOTE: *For example, when the current engine speed is* ***1000 RPM*** *, selecting -200 can attain* ***800 RPM****.*

Condition for the test

- The engine is running [**300 - 1500 RPM**].

Setting of target engine speed (RPM)

- Select "TARGET SPEED" (idle speed) using SW **(3)** and **(4)**.
- Press SW **(1)** and **(2)** to specify the target idle speed.
- Available set range: **-500 RPM** (low idle speed) to **+500 RPM**
- After the setting is completed, press SW **(5)**.

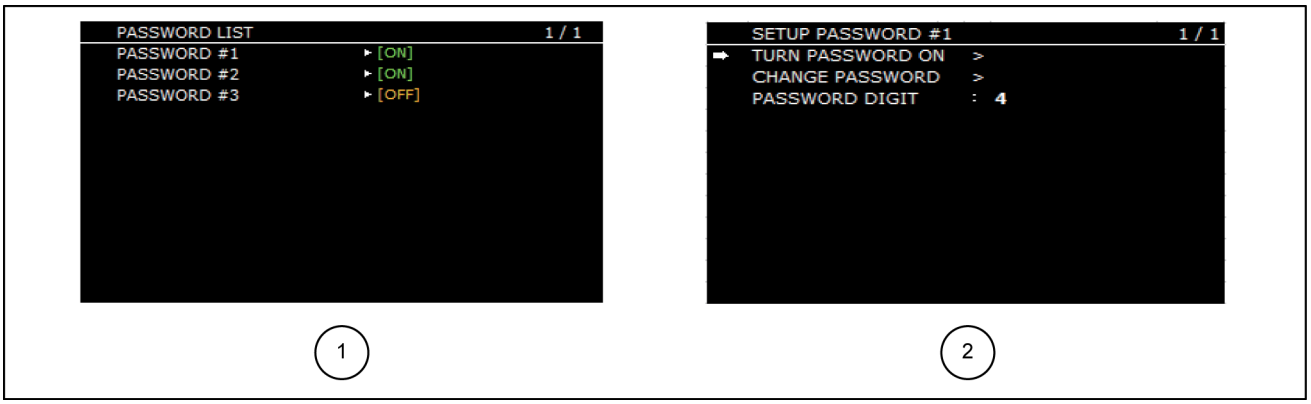
Test execution

- Select "IDLE SPEED TEST" (idle speed test) using SW **(3)** and **(4)**.
- Hold down SW **(2)** for **3 s**, then "▷" changes to "▶". Then, the set engine speed is attained and maintained for **100 s**.

PASSWORD

Summary

Set an anti-theft password.



SMIL14CEX1077EB 19

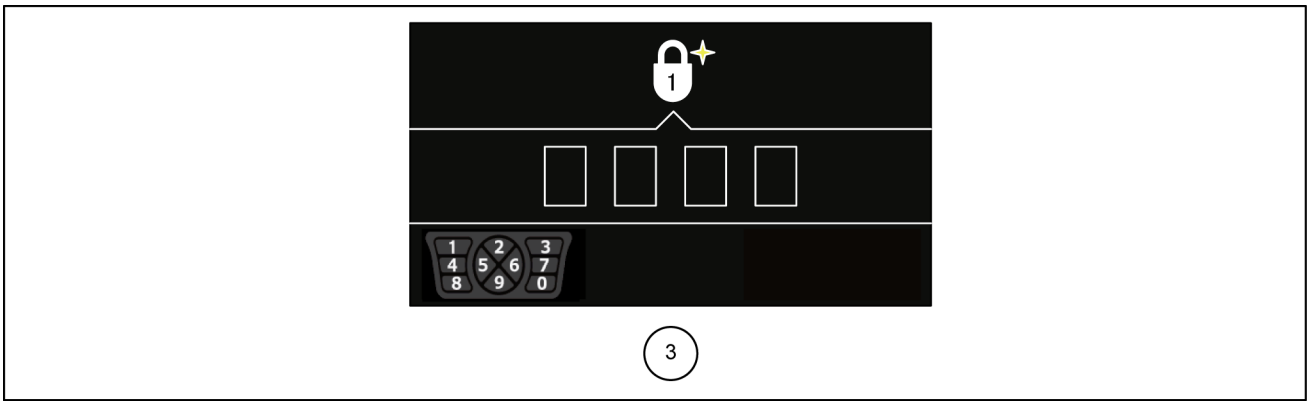
1. Password management screen
2. Setting screen

Meanings of the numbers on the password management screen

Item	Contents
Password#1	Manual lock
Password#2	Geofence / Curfew / Remote lock
Password#3	Service support screen lock

Operation explanation

Register a new password



SMIL14CEX1078EB 20

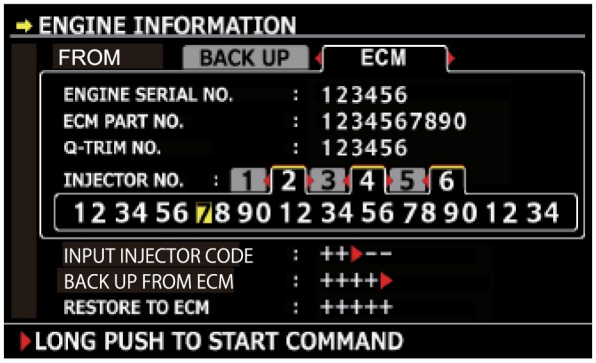
3. New registration screen

A. Enter the password management screen **(1)**.
B. Choose the desired item for password setup.
C. Choose "TURN PASSWORD ON."
D. Enter the password to register. (Enter it on the new registration screen **(3)**.)
E. On completion of the process, the password management screen **(1)** will be redisplayed.

Instrument cluster - Dynamic description - Engine information

Engine information

- When ECM is replaced, the data on the old ECM can be transferred to the new ECM.
- When the controller is replaced, the engine information can be obtained again.
- When the injector is replaced, the injector code can be updated.



SMIL14CEX1057EA 1

Display	Detail
FROM	• Source of the information displayed (Two types including “BACK UP” and “ECM”)
ENGINE SERIAL NO	• 6-digit engine serial number • When the FROM tab is set to "BACK UP" and the backup has not been obtained, entire digits are displayed as zero. • When the FROM tab is set to “ECM” and communication is established with ECM, entire digits are displayed as zero.
ECM PART NO.	• 10-digit ECM part number • When the FROM tab is set to “BACK UP” and the backup has not been obtained, entire digits are displayed as zero. • When the FROM tab is set to “ECM” and communication is established with ECM, entire digits are displayed as zero.
Q-TRIM NO.	• 6-digit Q resistance code • When the FROM tab is set to “BACK UP” and the backup has not been obtained, entire digits are displayed as zero. • When the FROM tab is set to “ECM” and communication is established with ECM, entire digits are displayed as zero.
INJECTOR NO.	• Injector number
INJECTOR CODE (Not displayed on screen)	• 24-digit injector code • The cursor moves to this line only during the injector code edit mode. (FROM tab set to “BACK UP”) • When the FROM tab is set to “BACK UP” and the backup has not been obtained, entire digits are displayed as zero. • When the FROM tab is set to “ECM” and communication is established with ECM, entire digits are displayed as zero.
INPUT INJECTOR CODE	• Edit the injector code (Backup value). • This line is displayed when the FROM tab is set to “BACK UP”. • This line is not displayed when the FROM tab is set to “ECM”.
BACK UP FROM ECM	• Obtain the engine information from ECM again. • This line is displayed when the FROM tab is set to “BACK UP”. • This line is not displayed when the FROM tab is set to “ECM”.

Index

Electrical systems - 55

Hydraulic system control - 036

In the hexadecimal display, when the value of a sensor changes in monitor mode, the hexadecimal display changes with it.
If the display before entering monitor mode was [HL.*], the error judgment value is displayed. (In other words, the detected value before the abnormality was detected) In the same way, if the display before entering monitor mode was [**.E], the display becomes **.E and the error judgment value is displayed.

B. Decimal display
From **-99.9 - 99.9 °C** (**-147.8 - 211.8 °F**) is displayed with decimals.
Also, the "-" minus display is displayed on the left side of the 3 digit segment.

5. Air-conditioner operation in monitor mode
When the system enters monitor mode, all output (operation) through control is stopped and until monitor mode is ended, operations and settings of basic control through all the switches are not possible.

6. Ending monitor mode
In monitor mode, if the operation panel ON/OFF switch closed path continues for **1 s** while the refresh/recirculate select switch closed path is ongoing, monitor mode is ended and the system returns to the basic control state.
The same also occurs if the vehicle main key power supply is switched OFF.

Table A

Exclusively for monitor mode 7-segment	Display contents			
0	Inside air sensor temperature data			
1	Evaporator sensor temperature data			
2	Solar radiation compensation data			
3	Outside air data			
4	–			
C	Coolant temperature signal status data			
	Abnormal	Lower than **30 °C** (**86 °F**)	**30 °C** (**86 °F**) or higher Lower than **45 °C** (**113 °F**)	**45 °C** (**113 °F**) or higher
	4	1	2	3
5 – F	Data (sensor diagnosis etc.)			

Table B

Sensor name	Short	Disconnection
Inside air sensor	F6H	0CH
Evaporator sensor	F6H	0CH

Table C

Sensor name	5 V short	Ground short
Solar radiation sensor	D5H	0CH

Door switch control

1. Summary explanation
This control adds a restriction to air-conditioner operation with the door switch or front window switch. Its purpose is to prevent overheating of the vehicle main unit.
Concretely, it suppresses condenser heating and controls in a way restricted in order to obtain a feeling of comfort.

2. Door switch/front window switch signal
Due to data sent from CAN communication.

Message ID: 0x18FF1028

Send node: Monitor Display

Send cycle: **10 ms**

Data: Open door signal and open window signal data

Camera - Prepare - Right side

Items to prepare:

- Wrench [**13 mm**]
- Wrench [**17 mm**]

Electrical systems - 55

External lighting - 404

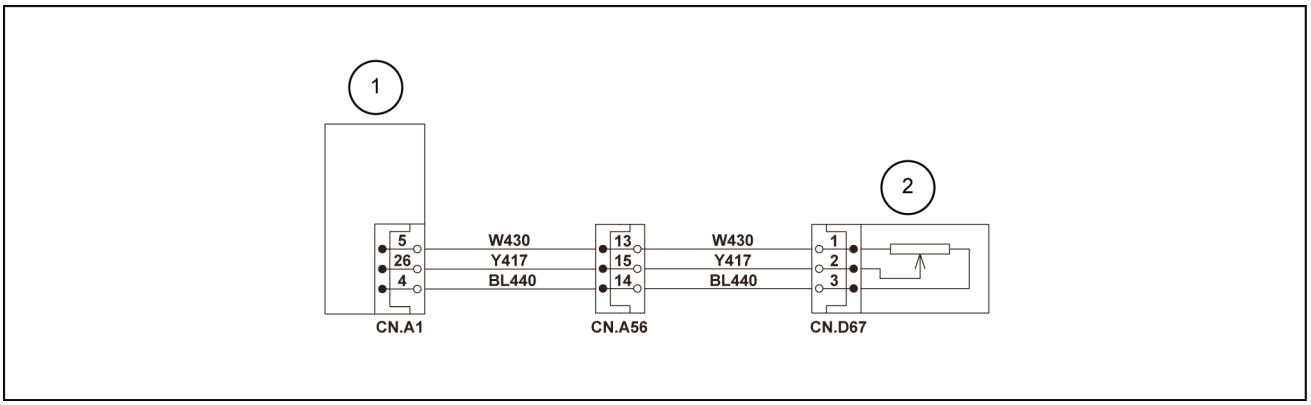
CX130D Crawler excavators LC version (TIER 4 FINAL) - NA Market
CX130D Crawler excavators Standard w/Blade version (TIER 4 FINAL) - NA market

7000-P1 Pressure sensor signal abnormality

Control Module : MCM

Solution:

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



SMIL15CEX1870EB 1

1. Main controller
2. P1 Pressure sensor

Turn the key switch ON.

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 less than or equal to **0.25 V**, proceed to Step **6**.

3. Turn the key switch OFF and disconnect the P1 pressure sensor **(2)** connector **CN.D67**.

Turn the key switch ON.

Measure the voltage between the ground and terminal 1 of the P1 pressure sensor **(2)** connector **CN.D67** (harness side).

A. If the voltage is not about **5 V**, find and replace the short circuit on the wire ID W430.

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 **(2)** connector **CN.D67** (harness side).

A. If the voltage is more than **4.75 V**, find and replace the short circuit on the wire ID Y417.

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

5. Measure the voltage between the ground and terminal 3 of the P1 pressure sensor **(2)** connector **CN.D67** (harness side).

A. If the voltage is more than **0.25 V**, find and repair the short circuit on the wire ID BL440.

B. If the voltage is less than or equal to **0.25 V**, replace the main controller **(1)**.

6. Inspect the P1 pressure sensor **(2)**.

Turn the key switch OFF.

6. Measure the voltage between the ground and terminal 3 of the travel right pilot pressure sensor **(2) CN.D23-1** (harness side).

   A. If the voltage is more than **0.25 V**, find and replace the short circuit on the wire ID BW445m and BW445.

   B. If the voltage is less than or equal to **0.25 V**, replace the main controller **(1)**.

7. Inspect the travel right pilot pressure sensor **(2)**.

   Turn the key switch OFF.

   Disconnect travel right pilot pressure sensor **(2) CN.D23-1**.

   Measure the resistance between the terminal 1 and terminal 3 of the travel right pilot pressure sensor side connector **CN.D23-1**.

   A. If the resistance is not about **10 kΩ**, replace the travel right pilot pressure sensor **(2)**.

   B. If the resistance is about **10 kΩ**, proceed to Step **8**.

8. Inspect for continuity between the ground and terminal 1 of the travel right pilot pressure sensor **(2) CN.D23-1** (harness side).

   Inspect for continuity between the ground and terminal 2 of the travel right pilot pressure sensor **(2) CN.D23-1** (harness side).

   A. If there is continuity, find and replace the short circuit on the wire ID WL435m, WL435, WB435 and OR411.

   B. If there is no continuity, proceed to Step **9**.

9. Inspect for continuity between the ground and terminal 3 of the pressure **CN.D23-1** (harness side).

   A. If there is no continuity, find and repair/replace the open circuit on the wire ID BW445m and BW445.

   B. If there is continuity, proceed to Step **10**.

10. Turn the key switch ON.

    Measure the voltage between the ground and terminal 1 of the travel right pilot pressure sensor **(2) CN.D23-1** (harness side).

    A. If the voltage is not about **5 V**, find and repair/replace the open circuit on the wire ID WL435m, WL435 and WB435.

    B. If the voltage is about **5 V**, proceed to Step **11**.

11. Measure the voltage between the ground and terminal 2 of the travel right pilot pressure sensor **(2) CN.D23-1** (harness side).

    A. If the voltage is lower than **0.25 V**, find and repair/replace the open circuit on the wire ID OR411.

    B. If the voltage is **0.25 V** or higher, replace the main controller **(1)**.

B. If there is no continuity, replace the proportional valve **(2)**.

6. Remove the **CN.A1**.

   Inspect for continuity between the terminal 1of the connector **CN.D64** harness side and terminal 3 of the connector **CN.A1** harness side.

   A. If there is continuity, proceed to Step **7**.

   B. If there is no continuity, repair or replace the L912a harness.

7. Inspect for continuity between the terminal 2 of the connector **CN.D64** harness side and terminal 1of the connector **CN.A1** harness side.

   A. If there is continuity, replace the main controller **(1)**.

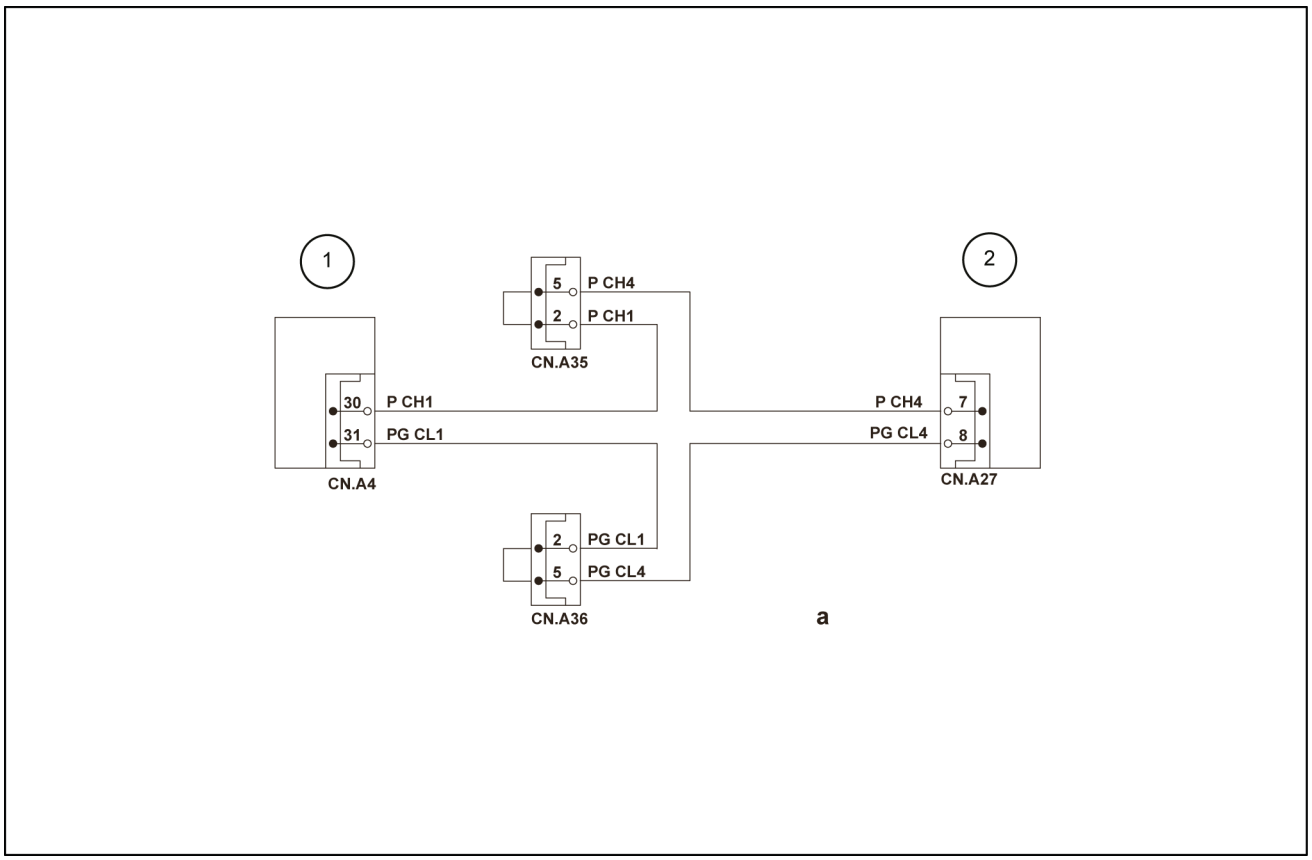
   B. If there is no continuity, repair or replace the BL912b and LY912b harnesses.

7615-Sub-Controller Communication Abnormality

Control Module : MCM

Solution:

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



SMIL14CEX3640FB 1

1. Main controller
2. Sub-controller
a. CAN communication

2. Turn the key switch ON.

   Inspect the connection status of each connector. Make sure that all the connectors are secured.

   A. If diagnostic trouble code 7615 is displayed, proceed to Step **3**.

3. Turn the key switch OFF.

   Disconnect the connectors **CN.A4** and **CN.A27**.

   Inspect the continuity between terminal 30 of the connector **CN.A4** harness side and terminal 7 of the connector **CN.A27** harness side.

   A. If there is continuity, repair or replace the P CH1 and P CH4 harnesses.

   B. If there is no continuity, proceed to Step **4**.

4. Inspect the continuity between terminal 31 of the connector **CN.A4** harness side and terminal 8 of the connector **CN.A27** harness side.

   A. If there is continuity, repair or replace the PG CL1 and PG CL4 harnesses.

P0117-Engine coolant temperature sensor, low input

Control Module : ECM

Solution:

1. Check and diagnose the below fault codes before you proceed with the diagnostics code 0117.

   Diagnostic trouble code P06A8

2. Turn OFF the ignition switch.

   Disconnect the harness connector **CN.E8** from the engine coolant temperature sensor.

   Observe the engine coolant temperature sensor display on a trouble diagnosis scan tool.

   A. If the reading is more than or equal to **4.5 V**, replace the engine coolant temperature sensor. (Refer to " **Engine coolant temperature sensor - Remove (55.012)**" and " **Engine coolant temperature sensor - Install (55.012)**")

   B. If the reading is less than **4.5 V**, proceed to Step **3**.

3. Inspect to see if there is a short circuit to the GND with the signal circuit between the ECM and the engine coolant temperature sensor.

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

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

4. Inspect the ECM harness connector **CN.D4** for a poor connection.

   A. If a problem is found, repair the harness connector **CN.D4**.

   B. If the harness connector **CN.D4** is normal, replace the ECM. (Refer to " **Engine Control Unit (ECU) - Remove (55.015)** and **Engine Control Unit (ECU) - Install (55.015)**")

5. Set the Injector ID Code, fuel delivery rate and engine number for the ECM.

6. Confirm resolution:

   1. Clear the diagnostic trouble code using the trouble diagnosis scan tool.

   2. Turn OFF the ignition switch for at least **30 s**.

   3. Start the engine.

   4. Perform a test-run under the conditions for running the diagnostic trouble code.

   NOTE:
   • Conditions for setting engine run time or coolant temperature vary depending on the diagnostic trouble codes.
   • For the conditions for setting the diagnostic trouble code, refer to the applicable code listed in 15E diagnostic trouble code information.

   5. Use the trouble diagnosis scan tool to confirm that a diagnostic trouble code has not been detected.

Wiring harnesses - Electrical schematic sheet 19 (55.100) Wiring harnesses - Electrical schematic sheet 14 (55.100)

A. If the reading is more than or equal to the **4.5 V**, inspect to see if there is a poor connection with the CKP sensor harness connector **CN.E4**.

B. If a problem is found, repair the harness connector **CN.E4**.

C. If the harness connector **CN.E4** is normal, inspect the CKP sensor. (Refer to " **Engine speed/RPM sensor - Inspect (55.015)**")

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

E. If there are no problems, proceed to Step **7**.

7. Inspect the GND circuit between the ECM and the CKP sensor for an open circuit and high resistance.

NOTE:
• The CKP sensor shares the GND circuit with other sensors.
• The diagnostic trouble code set on a sensor which shares this circuit may be detected.

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

B. If there are no problems, proceed to Step **8**.

8. Inspect the ECM harness connector **CN.D4** for a poor connection.

A. If a problem is found, repair the harness connector **CN.D4**.

B. If the harness connector **CN.D4** is normal, replace the ECM. (Refer to " **Engine Control Unit (ECU) - Remove (55.015)** and **Engine Control Unit (ECU) - Install (55.015)**")

9. Set the Injector ID Code, fuel delivery rate and engine number for the ECM.

10. Confirm resolution:

1. Clear the diagnostic trouble code using the trouble diagnosis scan tool.

2. Turn OFF the ignition switch for at least **30 s**.

3. Start the engine.

4. Perform a test-run under the conditions for running the diagnostic trouble code.

NOTE:
• Conditions for setting engine run time or coolant temperature vary depending on the diagnostic trouble codes.
• For the conditions for setting the diagnostic trouble code, refer to the applicable code listed in 15E diagnostic trouble code information.

5. Use the trouble diagnosis scan tool to confirm that a diagnostic trouble code has not been detected.

Wiring harnesses - Electrical schematic sheet 14 (55.100) Wiring harnesses - Electrical schematic sheet 19 (55.100)

P060A-Internal control module CPU IC error

Control Module : ECM

Solution:

1. Replace the ECM. (Refer to " **Engine Control Unit (ECU) - Remove (55.015)** and **Engine Control Unit (ECU) - Install (55.015)**")
2. Set the Injector ID Code, fuel delivery rate and engine No. for the ECM.
3. Confirm resolution:
    1. Clear the diagnostic trouble code using the trouble diagnosis scan tool.
    2. Turn OFF the ignition switch for at least **30 s**.
    3. Start the engine.
    4. Perform a test-run under the conditions for running the diagnostic trouble code.

    NOTE:
    • Conditions for setting engine run time or coolant temperature vary depending on the diagnostic trouble codes.
    • For the conditions for setting the diagnostic trouble code, refer to the applicable code listed in 15E diagnostic trouble code information.

    5. Use the trouble diagnosis scan tool to confirm that a diagnostic trouble code has not been detected.

P1098-Compressor outlet temperature sensor circuit high

Control Module : ECM

Solution:

1. Check and diagnose the below fault code before you proceed with the diagnostic code 1098.

   Diagnostic trouble code 06A8

2. Turn OFF the ignition switch.

   Disconnect the harness connector **CN.E24** from the boost temperature sensor.

   Turn ON the ignition switch.

   Measure the voltage between the boost temperature sensor signal circuit and a known good GND.

   If the reading is more than or equal to **5.5 V** inspect the signal circuit between the ECM and the boost temperature sensor for a short to the battery or a short to the ignition power supply.

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

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

3. Connect a fused jumper wire between the boost temperature sensor signal circuit and GND circuit.

   Observe the boost temperature sensor display on the trouble diagnosis scan tool.

   If the reading is less than or equal to **0.1 V**, inspect the signal circuit between the ECM and the boost temperature sensor for a short to the **5 V** power supply circuit.

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

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

4. Inspect for poor connections at the boost temperature sensor harness connector **CN.E24**.

   A. If a problem is found, repair the harness connector **CN.E24**.

   B. If the harness connector **CN.E24** is normal, replace the boost temperature sensor, (Refer to " **Intake air pressure and temperature sensor - Remove (55.014)** and **Intake air pressure and temperature sensor - Install (55.014)**")

5. Connect a fused jumper wire between the boost temperature sensor signal circuit and a known good GND.

   Observe the boost temperature sensor display on the trouble diagnosis scan tool.

   If the reading is less than or equal to **0.1 V**, inspect the GND circuit between the ECM and the boost temperature sensor for an open circuit or high resistance.

   NOTE:
   • The boost temperature sensor shares the GND circuit with other sensors
   • Diagnostic trouble codes on sensors that share this circuit may be set.

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

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

6. Inspect the signal circuit between the ECM and the boost temperature sensor for an open circuit or high resistance.

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

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

7. Inspect for poor connections at the ECM harness connector **CN.D4**.

P2229-Barometric pressure circuit high

Control Module : ECM

Solution:

1. Replace the ECM. (Refer to " **Engine Control Unit (ECU) - Remove (55.015)** and **Engine Control Unit (ECU) - Install (55.015)**")

   Set the Injector ID Code, fuel delivery rate and engine number for the ECM.
2. Confirm resolution:

   1. Clear the diagnostic trouble code using the trouble diagnosis scan tool.
   2. Turn OFF the ignition switch for at least **30 s**.
   3. Start the engine.
   4. Perform a test-run under the conditions for running the diagnostic trouble code.

      NOTE:
      • Conditions for setting engine run time or coolant temperature vary depending on the diagnostic trouble codes.
      • For the conditions for setting the diagnostic trouble code, refer to the applicable code listed in 15E diagnostic trouble code information.

   5. Use the trouble diagnosis scan tool to confirm that a diagnostic trouble code has not been detected.

4. Observe the diagnostic trouble code information with the trouble diagnosis scan tool. A diagnostic trouble code should not be set.

Wiring harnesses - Electrical schematic sheet 19 (55.100) Wiring harnesses - Electrical schematic sheet 15 (55.100)

P20AC-Urea fluid pump temperature sensor performance

Control Module : DCU

Solution:

1. Check and diagnose the below fault codes before you proceed with the diagnostics code 20AC.

   Diagnostic trouble code 208A
   Diagnostic trouble code 208C
   Diagnostic trouble code 208D

2. Turn OFF the ignition switch.

   Disconnect the urea fluid supply module harness connector **CN.D38**.

   Inspect the urea fluid supply module harness connector **CN.D38**.

   NOTE:
   • Make sure that there is no intermittent conditions, poor connections, or corrosion.
   • Make sure that there is no water intrusion or adhering foreign material.
   • Make sure that there is no open circuit, high resistance, or short to any of the circuits.

   A. If a problem is found, repair the connector **CN.D38**.

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

3. Disconnect the DCU harness connector **CN.D1-D2**.

   Inspect the DCU harness connector **CN.D1-D2**.

   NOTE:
   • Make sure that there is no intermittent conditions, poor connections, or corrosion.
   • Make sure that there is no water intrusion or adhering foreign material.

   A. If a problem is found, repair the connector **CN.D1-D2**.

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

4. Inspect the urea fluid pump power supply circuit between the DCU and the urea fluid supply module for an open circuit or high resistance.

   A. If a problem is found, repair the pump power supply circuit.

   B. If there are no problems, proceed to Step **5**.

5. Inspect the GND circuit between the DCU and the urea fluid supply module harness connector **CN.D38** for an open circuit or high resistance.

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

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

6. Inspect the urea fluid pump control circuit between the DCU and the urea fluid supply module for abnormal harness appearances.

   NOTE: *Make sure that should be no damage, deformation, etc.*

   A. If a problem is found, repair the urea fluid pump control circuit.

   B. If the control circuit is normal, replace the urea fluid supply module. (Refer to " **Diesel Exhaust Fluid (DEF)/ AdBlue® supply module - Remove (55.988)** and **Diesel Exhaust Fluid (DEF)/AdBlue® supply module - Install (55.988)**")

   NOTE: *Make sure that there is no damage, deformation, etc.*

P2207-NOx sensor heater control circuit high voltage sensor 1

Control Module : DCU

Solution:

1. Replace the NOx sensor. (Refer to " **Nitrogen Oxides (NOx) sensor - Remove (55.988)** and **Nitrogen Oxides (NOx) sensor - Install (55.988)**")

   NOTE: *If the NOx sensor is replaced, perform NOx sensor data 1 reset with the trouble diagnosis scan tool.*

2. Confirm resolution:

   1. Clear the diagnostic trouble code using the trouble diagnosis scan tool.

   NOTE:
   • After clearing the DCU diagnostic trouble code, observe whether ECM diagnostic trouble code 20C9 is set.
   • If diagnostic trouble code 20C9 is set, clear it.

   2. Turn OFF the ignition switch until communication with the trouble diagnosis scan tool is discontinued.

   3. Start the engine and warm up until the NOx Sensor 1 NOx Detection display changes to Enabled on the scan tool.

   4. Check whether each display is the specified value on the trouble diagnosis scan tool.

      NOx sensor 1 heater system malfunction: No

      NOx sensor 1 NOx detection system malfunction: No

      NOx sensor 1 O2 detection system malfunction: No

   5. Observe the diagnostic trouble code information with the trouble diagnosis scan tool. A diagnostic trouble code should not be set.

Contents

Booms, dippers, and buckets - 84