

# **CX130D** Crawler Excavator

## SERVICE MANUAL

Part number 47996190

English

April 2016

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**CASE**  
CONSTRUCTION

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## Operator environment

Operator's cab		
	Smooth and round shape design cab, fabricated by press work	
	Safety glass for all windows	
	Shock-less cab suspension by 4-point fluid mounting	
	Sliding front window with auto lock	
	Built-in type full-color LCD monitor display	
	Membrane switch on monitor display	
	Windshield wiper & washer	
	Floor mat	
	Polycarbonate roof hatch & Sun shade	
	Auto air-conditioner	
	Rain deflector	
	Sun visor	
	Roll-over protective structure (ROPS)	
	Top guard OPG level 1 (in CAB structure)	
	Top guard OPG level 2 (additional guard)	
Operator's seat		
	Low frequency mechanical suspension with helical springs and double acting hydraulic damper. (Achieves ISO7096 in category EM6)	
	With following features	
	Manual weight adjustment	Backrest angle adjustment
	Seat height adjustment	Adjustable pivoting armrests linked to consoles
	Adjustable headrest	Retractable seat belt
	Adjustable lumbar support	Control consoles adjust independently of seat
Others		
	Rear view mirror (Cab side & Right side)	
	Rear view Camera	

## Undercarriage

Travel motor	Variable displacement axial piston motor	
Brake	Mechanical disc brake	
Hydraulic service brake	Brake valve	
Final drive	Planetary gear reduction	
Travel speeds	High	<b>5.6 km/h (3.5 mph)</b> (Automatic travel speed shifting)
	Low	<b>3.4 km/h (2.1 mph)</b>
Drawbar pull	<b>116 kN (26077.837 lb)</b>	
Number of carrier rollers (each side)	2	
Number of track rollers (each side)	7	
Number of shoes (each side)	46	
Type of shoe	Triple grouser shoe	
Link pitch	<b>171.5 mm (6.752 in)</b>	
Width of shoe	<b>600 mm (23.622 in)</b> (S.T.D)	
Grade-ability	<b>70 % ( 35 ° )</b>	

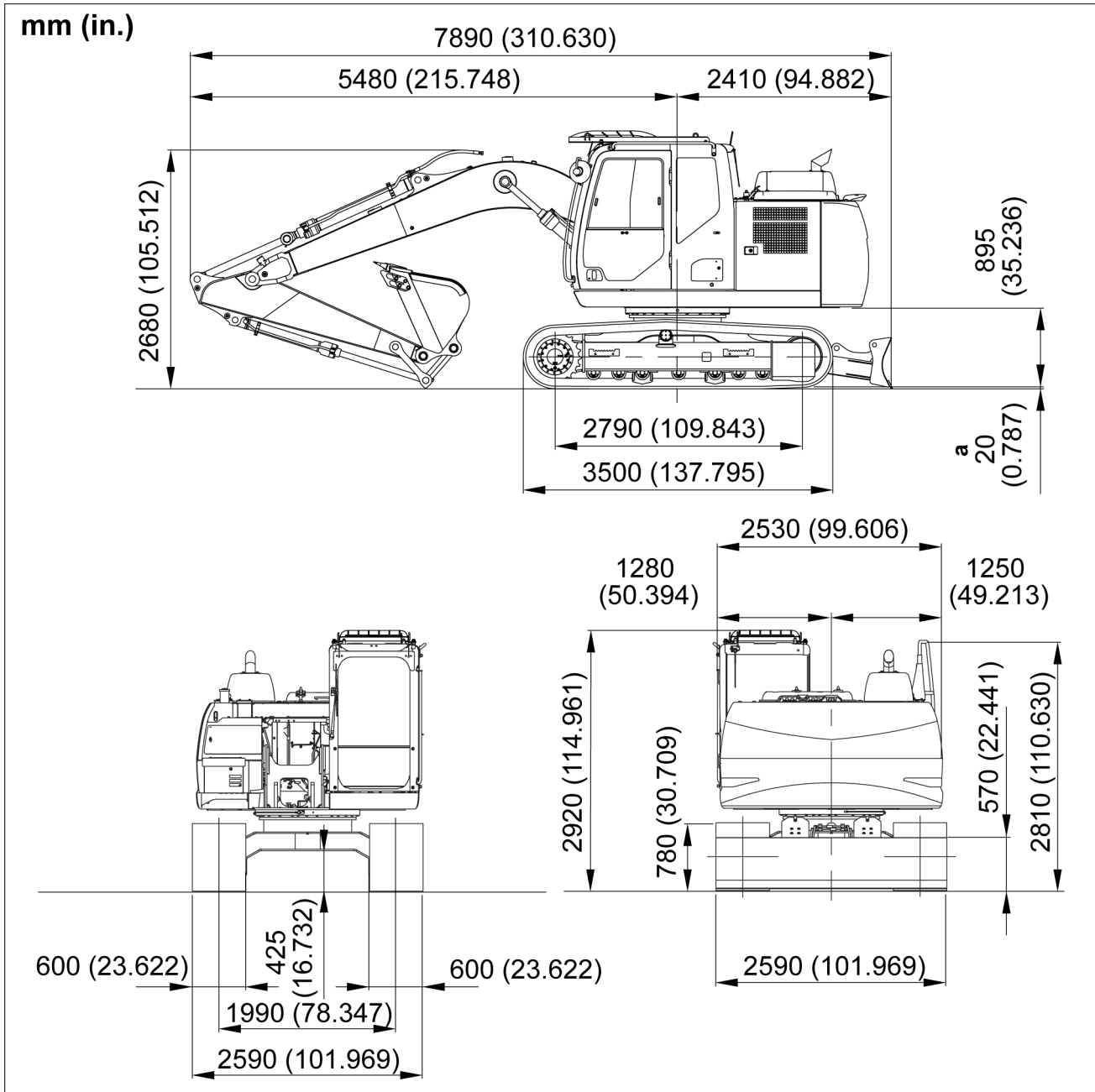
## Mass

Operating mass	<b>13400 kg (29542 lb)</b>
	with <b>2.50 m (8.20 ft)</b> Arm, <b>0.5 m<sup>3</sup></b> Bucket, <b>600 mm (23.622 in)</b> grouser shoe, operator, lubricant, coolant, full fuel tank, and top guard OPG level 2
Shipping mass	<b>12700 kg (27999 lb)</b>
	Operating mass - (operator mass [ <b>75 kg (165.35 lb)</b> ] + 90 % of fuel mass [ <b>195 kg (429.901 lb)</b> ] + bucket mass [ <b>400 kg (881.849 lb)</b> ]
Counter weight mass	<b>1990 kg (4387 lb)</b>

**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)].



SMIL15CEX4453GB 2

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## Engine - 10

### Engine and crankcase - 001

#### TECHNICAL DATA

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#### FUNCTIONAL DATA

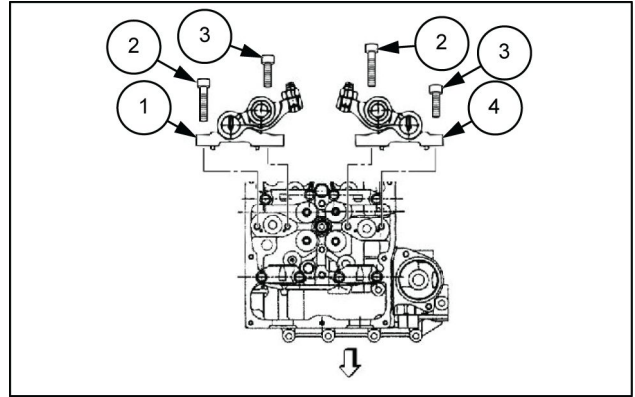
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### Rocker arm shaft assembly removal

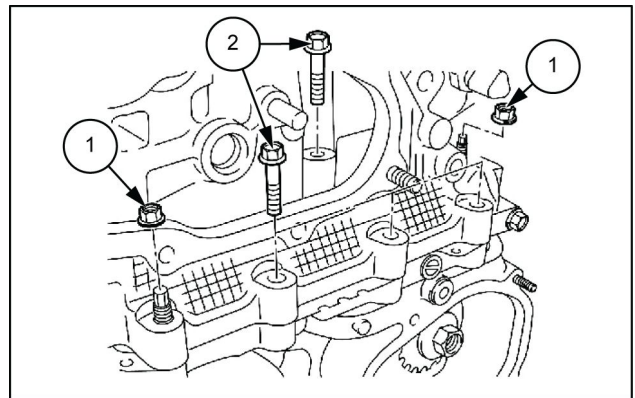
1. Remove the rocker arm shaft assembly from the cylinder head.
    - If reusing the rocker arm shaft assembly, install it to its original position.
1. Exhaust rocker arm shaft assembly
  2. Bolt
  3. Bolt
  4. Inlet rocker arm shaft assembly



LPIL12CX00732AB 35

### Cylinder head assembly removal

1. Remove the bolt (2) from the timing gear case.
2. Remove the nut (1) from the timing gear case.

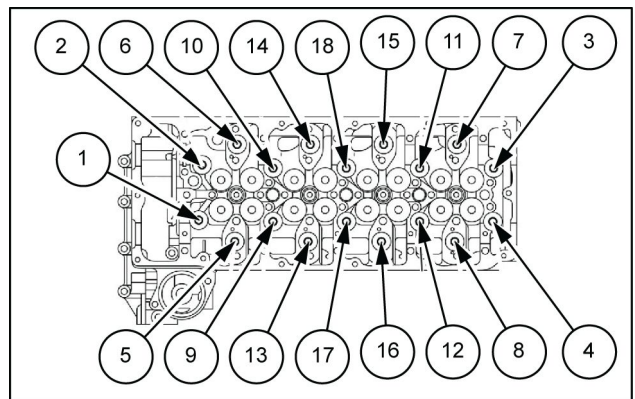


LPIL12CX00733AB 36

3. Loosen the bolt using a wrench.
  - Loosen and remove the cylinder head bolts in the order shown in the diagram.

**NOTE:** Do not reuse the bolt.

4. Remove the cylinder head from the cylinder block.
  - Remove with the inlet manifold.



LPIL12CX00734AB 37

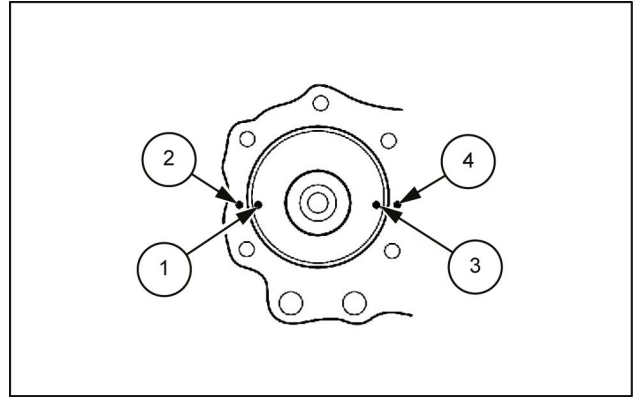
### Cylinder head gasket removal

1. Remove the cylinder head gasket from the cylinder head.

**NOTE:** Do not reuse the gasket.

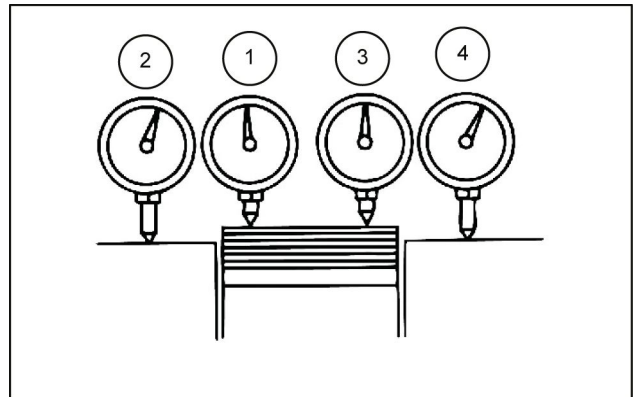
Specified value: **0.05 mm (0.0020 in)** or less

1. Measurement location
2. Measurement location
3. Measurement location
4. Measurement location



LPIL12CX01129AB 59

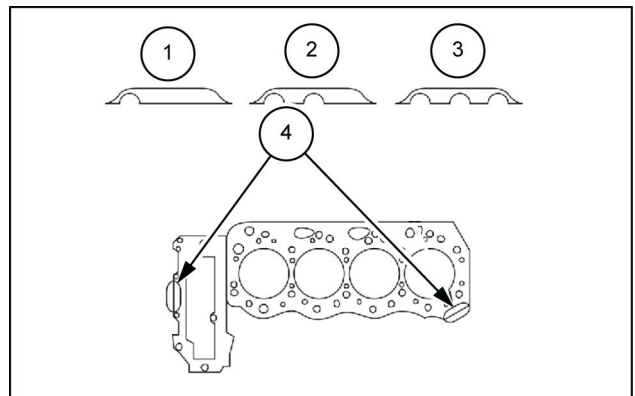
1. Measurement location
2. Measurement location
3. Measurement location
4. Measurement location



LPIL12CX01130AB 60

3. Calculate the average value from the measured value.
  - Select the required grade of cylinder head gasket using the average measured value.

1. Gasket A
2. Gasket B
3. Gasket C
4. Grade identification location



LPIL12CX01131AB 61

Gasket grade	Protrusion amount of the piston	Gasket thickness
A	<b>0.087 - 0.117 mm</b> <b>(0.0034 - 0.0046 in)</b>	<b>0.95 mm (0.0374 in)</b>
B	<b>0.117 - 0.167 mm</b> <b>(0.0046 - 0.0066 in)</b>	<b>1.00 mm (0.0394 in)</b>
C	<b>0.167 - 0.217 mm</b> <b>(0.0066 - 0.0085 in)</b>	<b>1.05 mm (0.0413 in)</b>

# Contents

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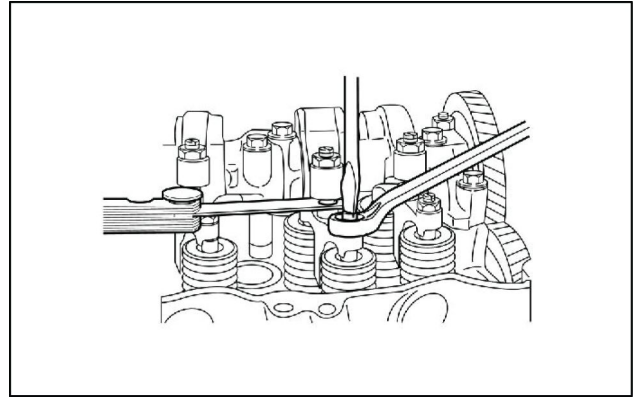
## Engine - 10

### Valve drive and gears - 106

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5. Turn the adjust screw.
6. With the thickness gauge inserted, lightly tighten the adjust screw of the bridge.
7. Confirm that the leading end of the adjust screw and valve shaft end have made contact and the movement of the thickness gauge has become stiff.
8. Check if the valve shaft end on the opposite side is floating or touching at an angle.
9. If it is floating or touching at an angle, slightly loosen the bridge adjust screw and adjust the valve shaft ends on both sides to touch properly.  
Valve bridge clearance: Less than **0.1 mm (0.0039 in)**



SMIL13CEX1692AA 34

**NOTE:** To prevent turning, fix the bridge adjust screw with a flathead screwdriver, and tighten the adjust screw nut.

Tightening torque: **22 N·m (16 lb ft)**

#### Adjustment table

Cylinder No.	1		2		3		4	
	IN	EX	IN	EX	IN	EX	IN	EX
First cylinder compression top dead center	o	o	o			o		
Fourth cylinder compression top dead center				o	o		o	o

#### Common rail assembly installation

1. Temporarily tighten the common rail bracket to the oil cooler assembly.

**NOTE:** The installation bolt and common rail assembly are tightened together.

2. Align the common rail assembly to the inlet cover.
3. Temporarily tighten the nut to the common rail assembly.

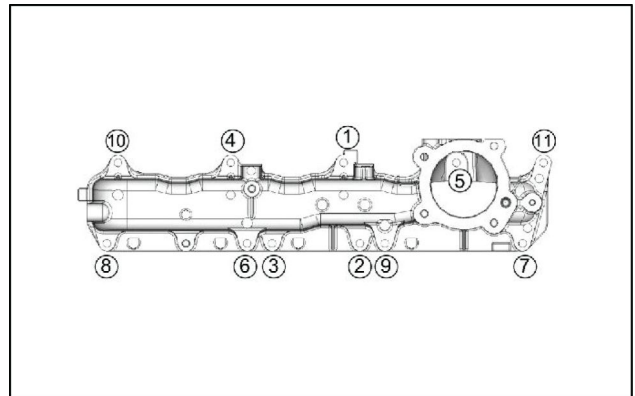
**NOTE:** The stud bolts of the inlet cover are tightened together.

4. Temporarily tighten the bolt to the common rail assembly.

5. Securely tighten the nut to the common rail assembly.

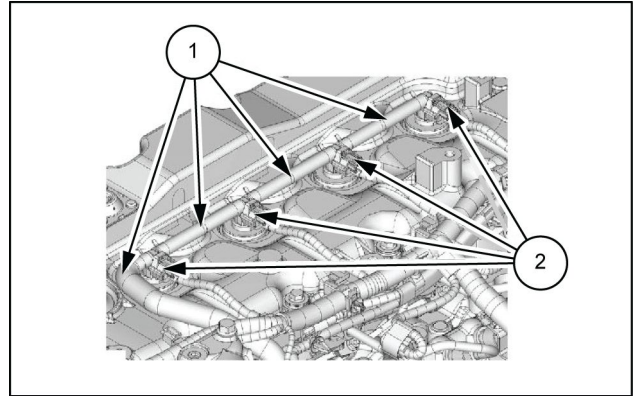
Tightening torque: **22 N·m (16 lb ft)**

**NOTE:** Refer to the tightening order in the diagram if the inlet cover is removed.



SMIL13CEX1693AA 35

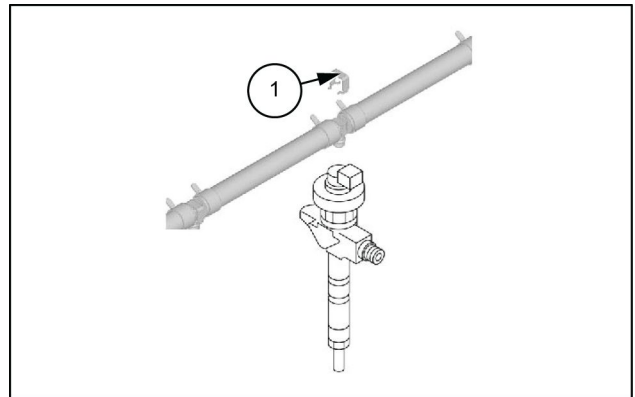
2. Remove the harness connector (2) from the injector.



LPIL12CX00067AB 5

3. Remove the nozzle leak off pipe (1) from the injector.

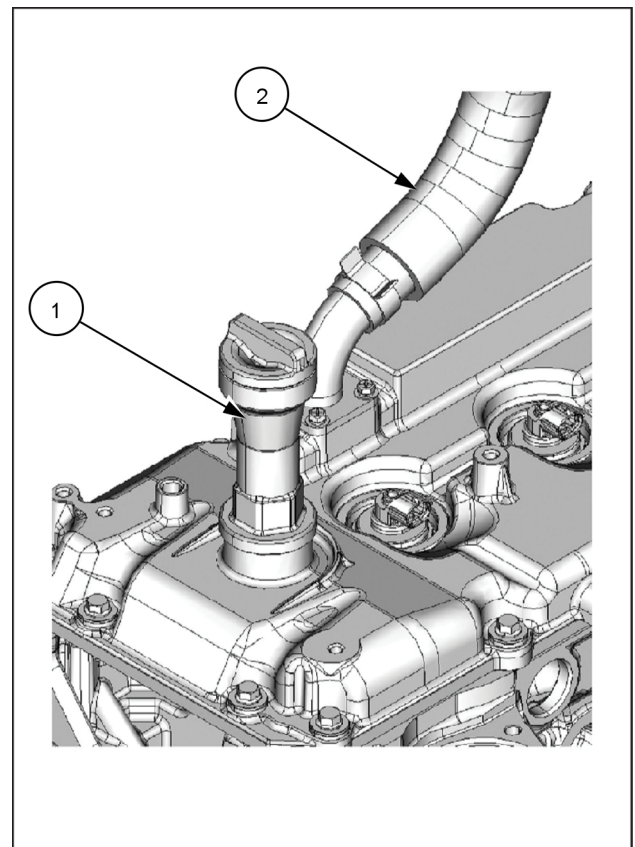
**NOTE:** Do not reuse the leak-off pipe clip (1)



LPIL12CX00068AB 6

### Cylinder head cover removal

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



SMIL15CEX9596BB 7

## Oil level gauge guide tube installation

1. Apply the engine oil to the O-ring.
2. Install the oil level gauge guide tube to the crankcase.  
Tightening torque: **25 N·m (7 lb ft)** oil cooler side  
Tightening torque: **51 N·m (38 lb ft)** cylinder head side
3. Install the oil level gauge to the oil level gauge guide tube.

## Turbocharger control solenoid installation

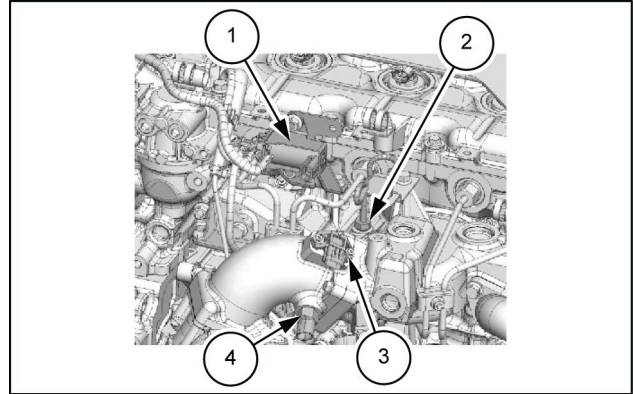
1. Install the turbocharger control solenoid (1) to the inlet manifold.
  - Install the bracket together with the turbocharger assembly control solenoid (1).  
Tightening torque: **25 N·m (7 lb ft)** bolt  
Tightening torque: **15 N·m (11 lb ft)** nut
2. Connect the vacuum hose to the turbocharger control solenoid (1).

**NOTE:** Insert the hose until it stops.

3. Connect the harness connector to the turbocharger control solenoid (1).

**NOTE:** Install the harness and hose clip to their original locations.

2. IMT sensor
3. Boost sensor
4. Boost temperature sensor



LPIL12CX00662AB 39

## Intake throttle valve installation

1. Install the gasket to the inlet manifold.
2. Install the intake throttle valve to the inlet manifold.
  - Install with the adapter pipe as a unit.  
Tightening torque: **10 N·m (7 lb ft)**
3. Connect the harness connector to the intake throttle valve.
  - Press the red claw to lock.

## Fuel cooler - 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.

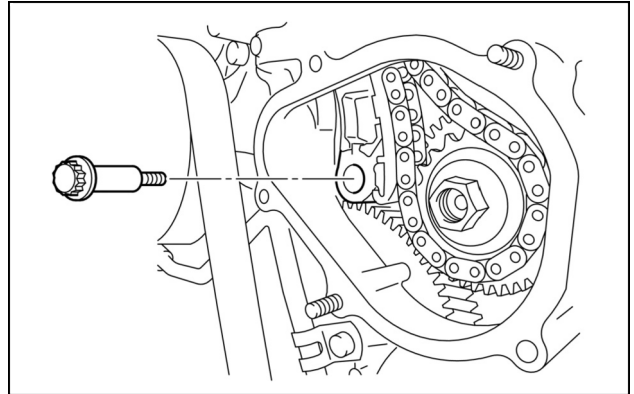
W0178A

Items to prepare:

- Wrench [ 13 mm, 17 mm ]
- Screwdriver
- Pliers
- Marking pen
- Cap
- Plug
- Rag
- Cleaning fluid
- Catching pan

### Timing chain lever pivot removal

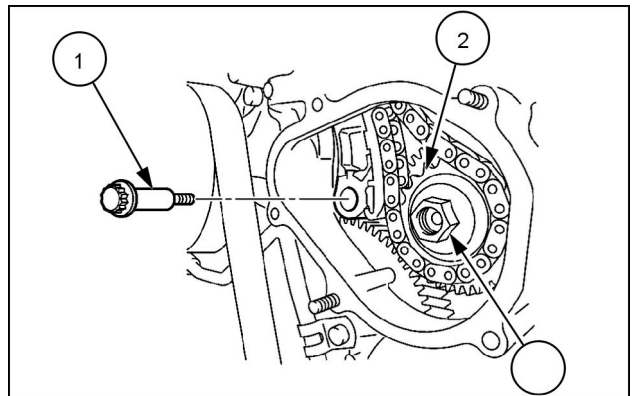
1. Remove the timing chain lever pivot from the timing gear case.



SMIL15CEX9766AA 16

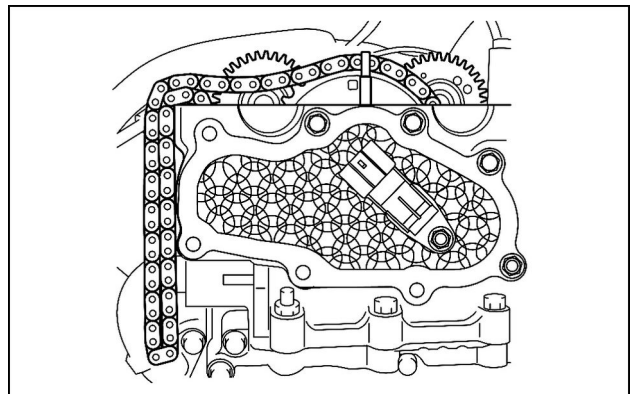
### Sprocket removal

1. Remove the nut (3) from the sprocket (2).
2. Remove the sprocket (2) from the supply pump gear.
  1. Timing chain tension lever pivot



SMIL15CEX9767AB 17

3. After removing the sprocket, move the timing chain upward.



SMIL15CEX9768AA 18

### Timing chain removal

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

## Turbocharger - Remove

### Battery ground cable disconnect

1. Disconnect the battery ground cable from the battery.

### Coolant drain

1. Drain coolant from the radiator.



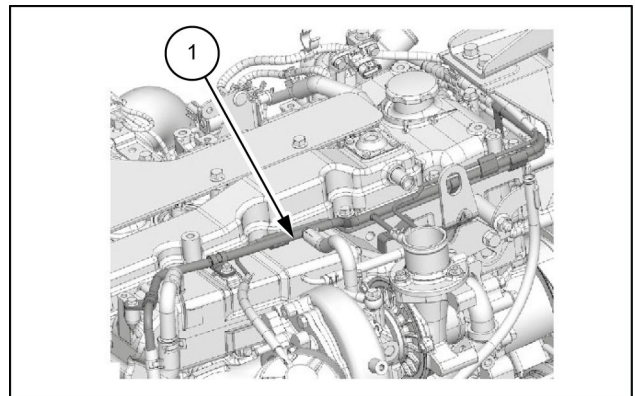
#### CAUTION:

- Do not loosen or remove the radiator cap when the coolant is hot.
- Steam and boiling water can burst out, possibly causing burns or heat related injuries.
- When opening the radiator cap, place a thick cloth over the cap when the coolant is cooled, and turn it gradually to release the pressure before opening it.

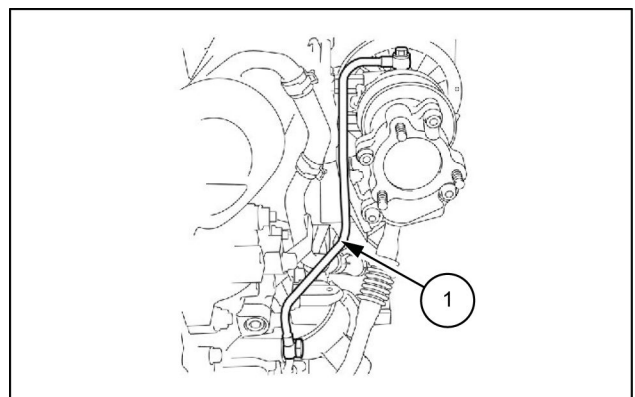
**NOTE:** Loosen the water drain plug on the rear right side of the engine, as well as the radiator drain plug. Completely drain the coolant. After completely draining the coolant, securely tighten the drain plug.

### Turbocharger assembly removal

1. Remove the return hose from the water pipe (1).
2. Remove the water feed pipe from the oil cooler assembly.
3. Disconnect the oil feed pipe from the turbocharger assembly.
4. Remove the oil feed pipe (1) from the oil cooler assembly.



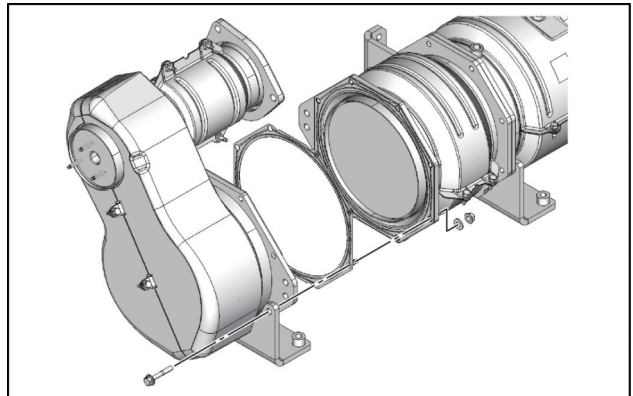
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LPIL12CX00194AB 2

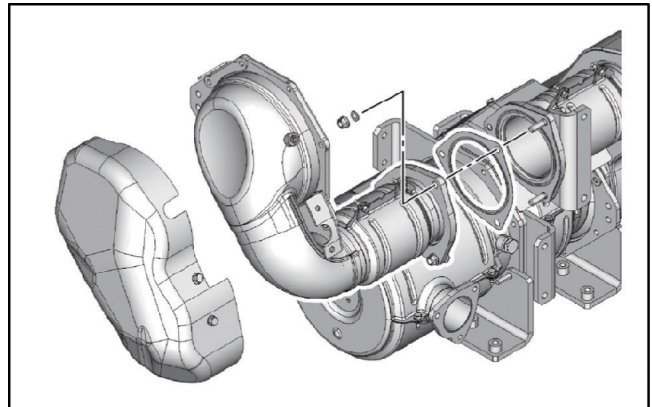
## Selective Catalytic Reduction (SCR) muffler and catalyst - Assemble

1. Install the mixing chamber on the oxidation catalyst assembly.  
Tightening torque: **29 N·m (21.4 lb ft)**



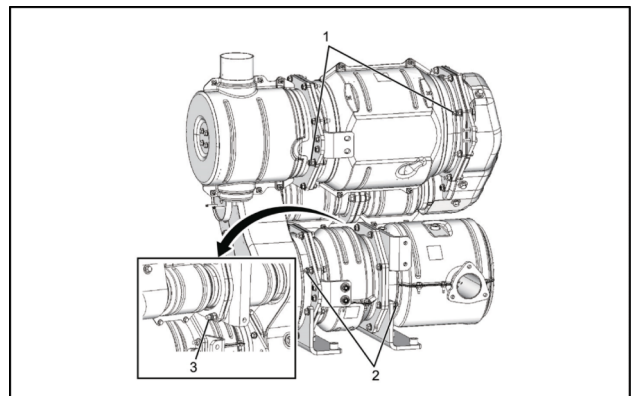
SMIL15CEX9630AB 1

2. Install the front chamber on the mixing chamber.  
Tightening torque: **64 N·m (47.2 lb ft)**



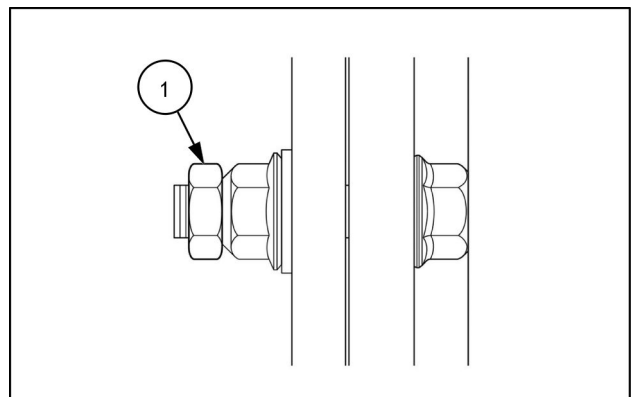
SMIL15CEX9629AB 2

3. Install the SCR catalyst
  1. Weld, SCR catalyst side
  2. Weld, oxidation catalyst side
  3. Weld, mixing chamber pipe



SMIL15CEX9605AB 3

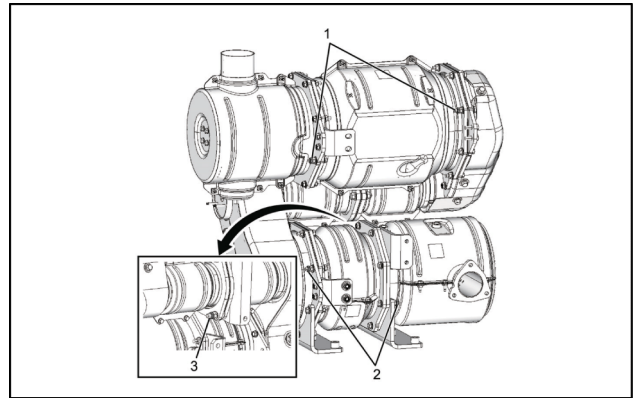
1. Weld nut



SMIL15CEX9606AB 4

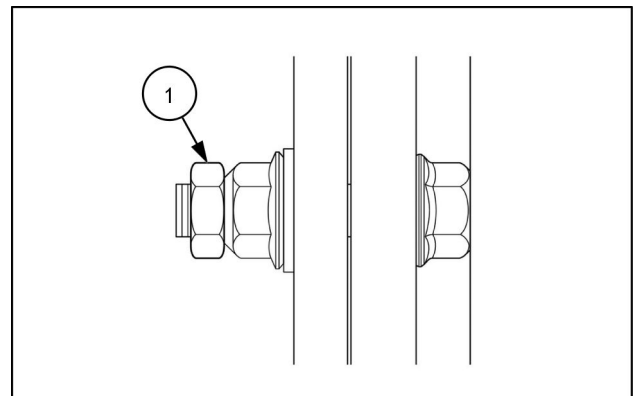
After assembling the oxidation catalyst assembly, spot-weld the catalyst removal prevention nuts on the parts shown below.

1. Weld, SCR catalyst side
2. Weld, oxidation catalyst side
3. Weld, mixing chamber pipe



SMIL15CEX9605AB 5

1. Weld nut



SMIL15CEX9606AB 6

## Exhaust gas temperature sensor installation

**NOTICE:** When installing the exhaust gas temperature sensor, do not give a shock to the tip of the sensor.

**NOTICE:** Remove the old anti-seize agent from the sleeve nut. Apply an anti-seize agent to the threads of the sleeve nut. As the anti-seize agent, apply Never-Seez High Temperature Stainless grade 5-87411-039-0 manufactured by Bostik USA.

**NOTICE:** Replace the oxidation catalyst assembly if there is any damage to the sensor mount of the oxidation catalyst assembly.

1. Temporarily tighten the exhaust gas temperature sensor to the oxidation catalyst assembly.

**NOTICE:** Tighten it by hand in order to prevent damage to the sensor mount due to poor assembly of the sensor.

Exhaust gas temperature sensor identification

- Sensor type: Exhaust gas temperature sensor 2
    - Screw size: M12x1.75
    - Connector color: dark gray
  - Sensor type: Exhaust gas temperature sensor 1
    - Screw size: M12x1.25
    - Connector color: light gray
2. Fully tighten the exhaust gas temperature sensor to the oxidation catalyst assembly.  
Tightening torque: **30 N·m (22.1 lb ft)**

# Contents

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## Engine - 10

### Fan and drive - 414

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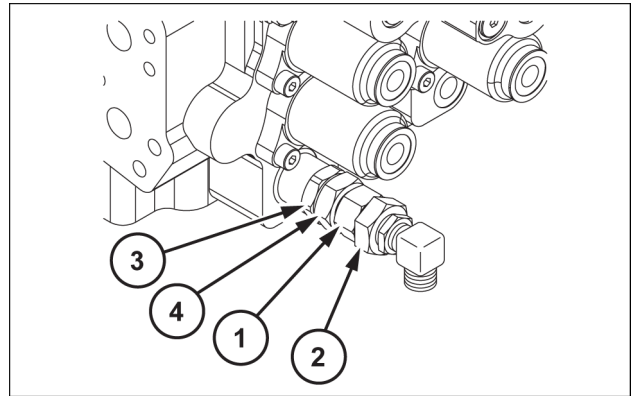






## For pressure boost

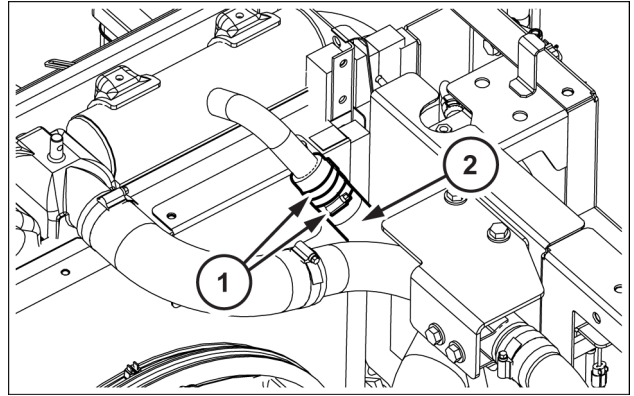
1. Loosen the standard lock nut [ **27 mm** ] (1), and tighten the adjusting screw [ **27 mm** ] (2).  
At this time, fix the pressure boost adjusting screw with a wrench [ **27 mm** ] to prevent it from turning together.
2. After tightening the adjusting screw as far as it will turn, and tighten the pressure boost lock nut (3).
3. Set the engine to the maximum speed.
4. Set the arm lever to the in position to bring about and keep a relief state.
5. Loosen the pressure boost lock nut [ **32 mm (1.260 in)** ] (3), and obtain the set pressure with the adjusting screw [ **27 mm (1.063 in)** ] (4).
  - Tighten it if pressure is lower than the set pressure.
  - If pressure is higher than the set pressure, reduce it below the set pressure, and then adjust it by tightening the screw.
6. After the adjustment, secure the adjusting screw with a wrench [ **27 mm** ], to tighten the lock nut.
7. After locking it, check the pressure on the pressure boost side.  
Repeat steps 1 to 7 until the set pressure is obtained correctly.



SMIL15CEX4345AB 3

5. Loosen the 2 hose bands (1) with a wrench [ 7 mm ] to remove the hose (2) .

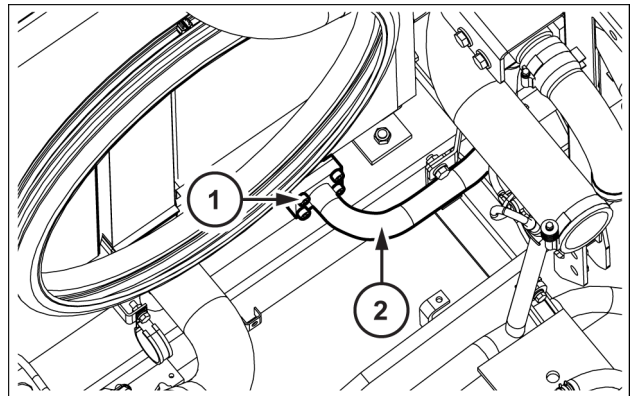
- Attach caps at each location of the oil cooler and the line so as to prevent invasion of water, dust and dirt.
- Hose bands (1) tightening torque: **5 - 6 N·m (3.688 - 4.425 lb ft)**.



SMIL15CEX4531AB 5

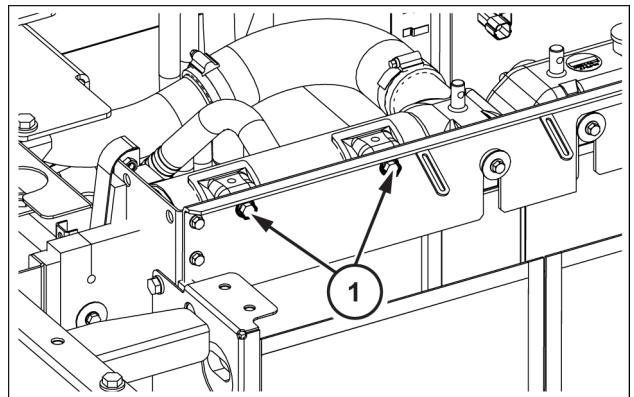
6. Remove the 4 bolts (1) with a hexagon wrench [ 6 mm ] to disconnect the line (2).

- Attach caps at each location of the oil cooler and the line so as to prevent invasion of water, dust and dirt.



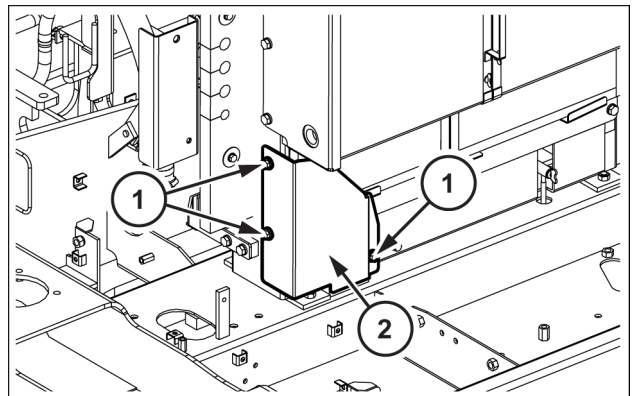
SMIL15CEX4532AB 6

7. Remove the 2 bolts (1) with a wrench [ 19 mm ].



SMIL15CEX4533AB 7

8. Remove the 3 bolts (1) with a wrench [ 13 mm ] to remove the bracket (2).

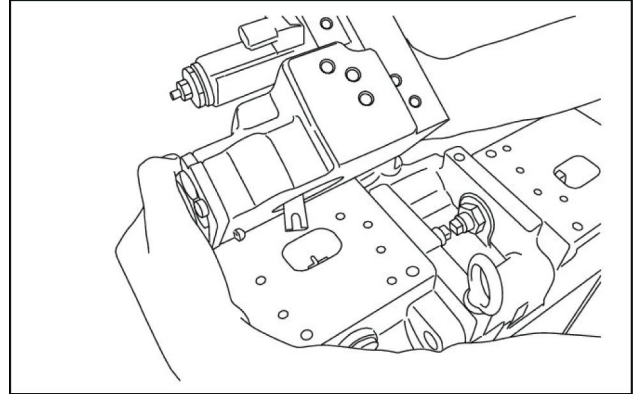


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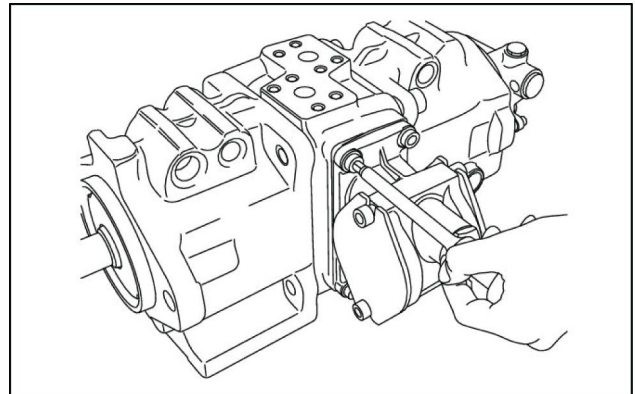
## Pump - Disassemble

When disassembling the pump, read the disassembly procedure all the way to the end before disassembling according to the sequence below. The numbers in parentheses after the part names are the part numbers used in **Pump - Sectional view (35.106)**.

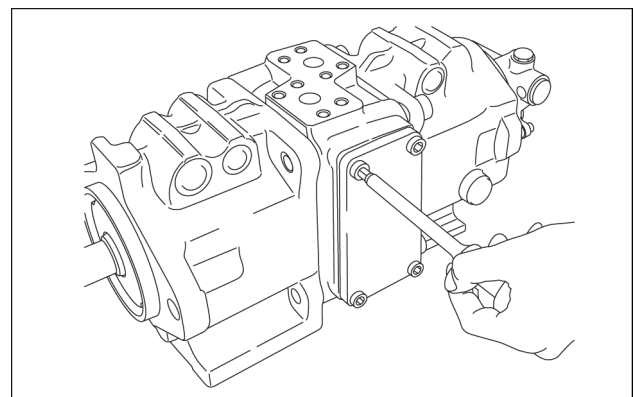
1. Choose a disassembly site.
  - Find a clean location.
  - Place a rubber plate or cloth on the work platform so as not to damage parts.
2. Use cleaning oil to remove any dirt or rust from the surface of the pump.
3. Remove the drain port plugs (**468**) and drain the oil from the pump casing (F) (**271**).
  - Remove the plugs from both the front and rear pumps.
4. Remove the hexagon socket head bolts (**415**), and remove the regulator.
  - Refer to **Pump control valve - Disassemble (35.102)** to disassemble the regulator.
5. Place the pump regulator horizontal on the work platform with the installation surface facedown, and remove the flange sockets (**435**) and PTO unit (**05**).
  - When placing the regulator with the installation surface face down, be sure to place a rubber plate or similar material on the work platform so as not to damage the regulator installation surface.
  - Refer to the PTO unit manual for disassembly of the PTO unit.
6. Remove the cover (**326**) in case of a pump without a PTO unit by removing the hexagon socket head bolt (**414**).



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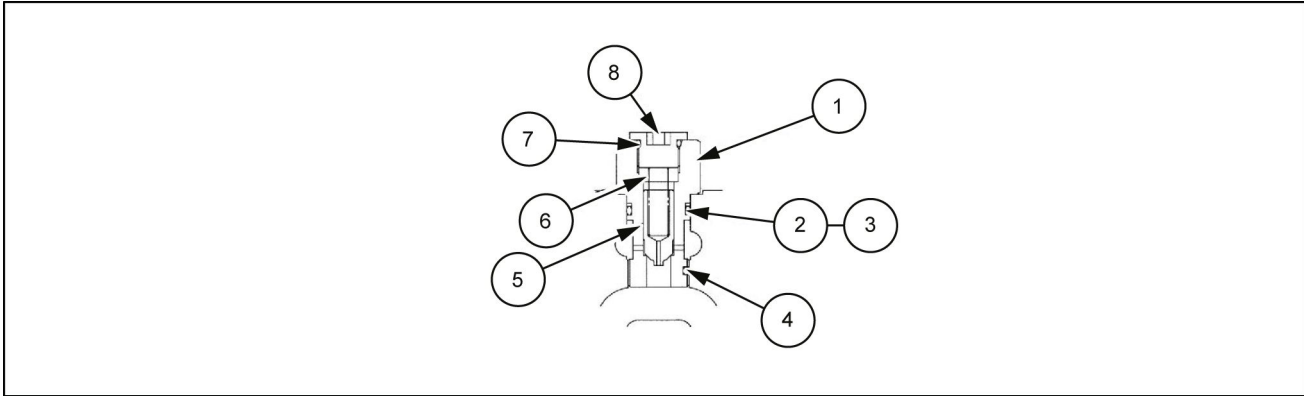
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SMIL15CEX4449AA 3



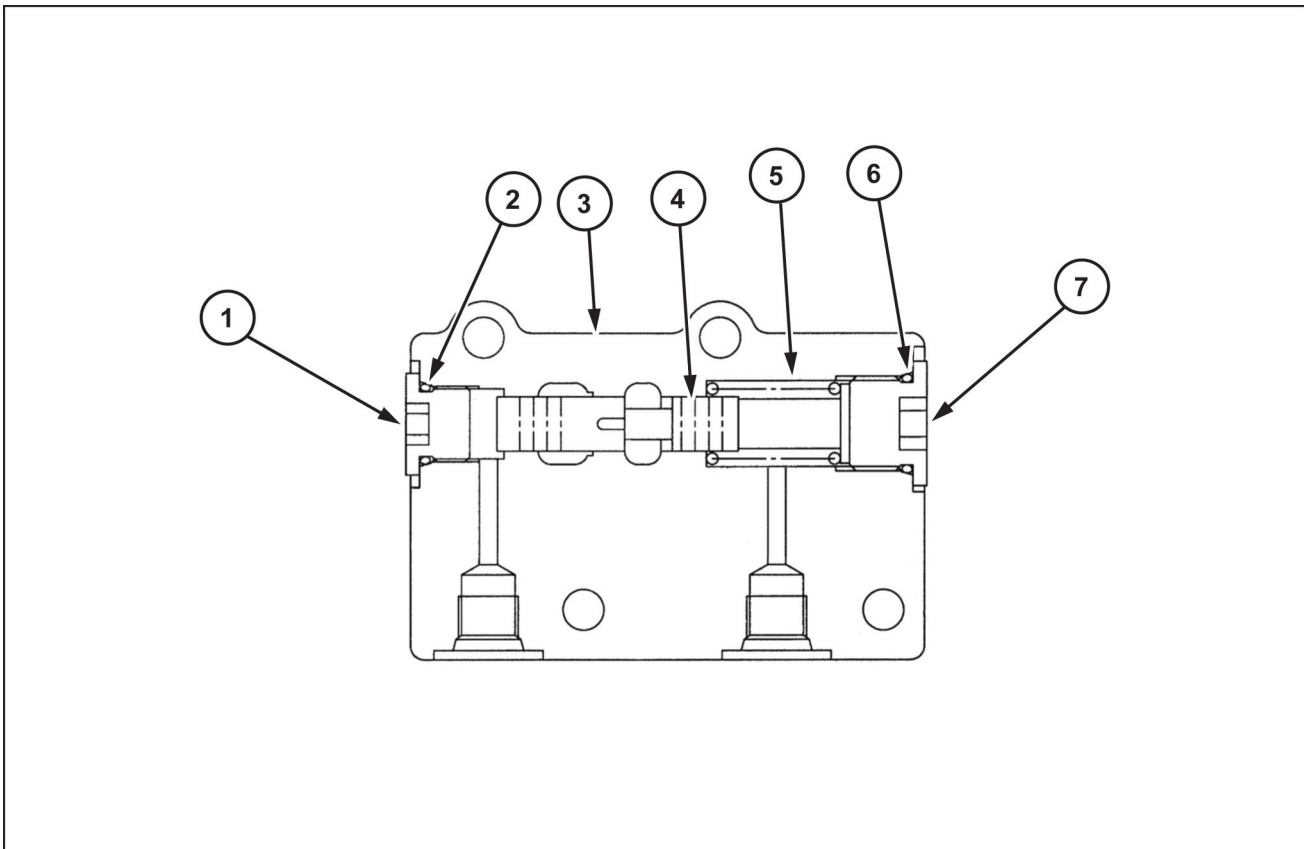
### Check valve (TRV(TR))



LPIL12CX02202EB 17

- |                             |                             |
|-----------------------------|-----------------------------|
| 1. Cap (Quantity 1)         | 5. Check valve (Quantity 1) |
| 2. Backup ring (Quantity 1) | 6. Spring (Quantity 1)      |
| 3. O-ring (Quantity 1)      | 7. O-ring (Quantity 1)      |
| 4. Nylon tip (Quantity 1)   | 8. Cap (Quantity 1)         |

### Swing priority valve



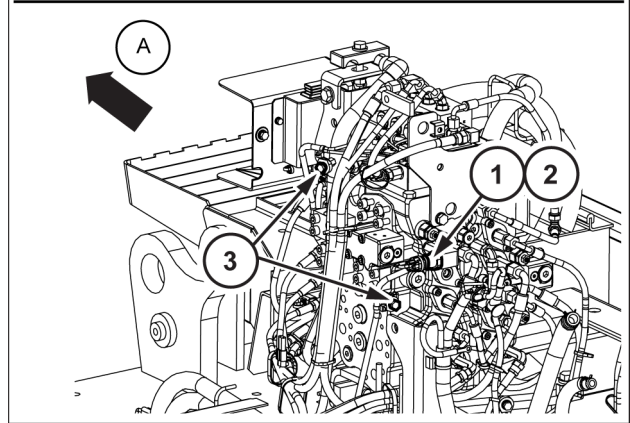
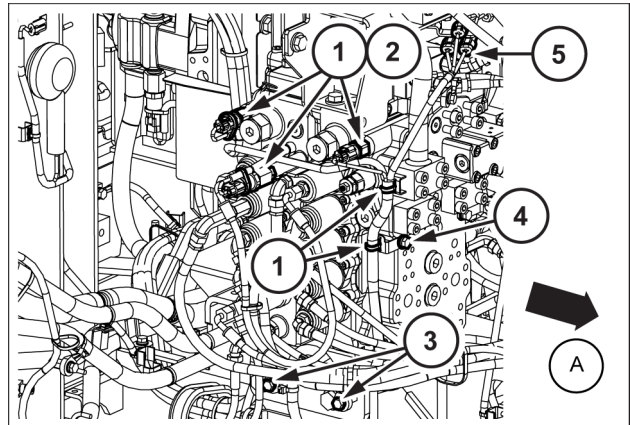
SMIL15CEX6032FB 18

- |                          |                        |
|--------------------------|------------------------|
| 1. Cap (Quantity 1)      | 5. Spring (Quantity 1) |
| 2. O-ring (Quantity 1)   | 6. O-ring (Quantity 1) |
| 3. Manifold (Quantity 1) | 7. Cap (Quantity 1)    |
| 4. Spool (Quantity 1)    |                        |

5. Cut the 6 wire bands (1) to remove the 4 pressure sensors (2) from the control valve.

- Pressure sensor tightening torque: **16 - 20 N·m (11.80 - 14.75 lb ft)**  
Remove the 4 bolts (3) with a wrench [ 13 mm].
- Bolt tightening torque: **21.6 - 37.2 N·m (15.931 - 27.437 lb ft)**  
Remove the bolt (4) with a wrench [ 13 mm].  
Disconnect the 3 connectors (5).

(A): left

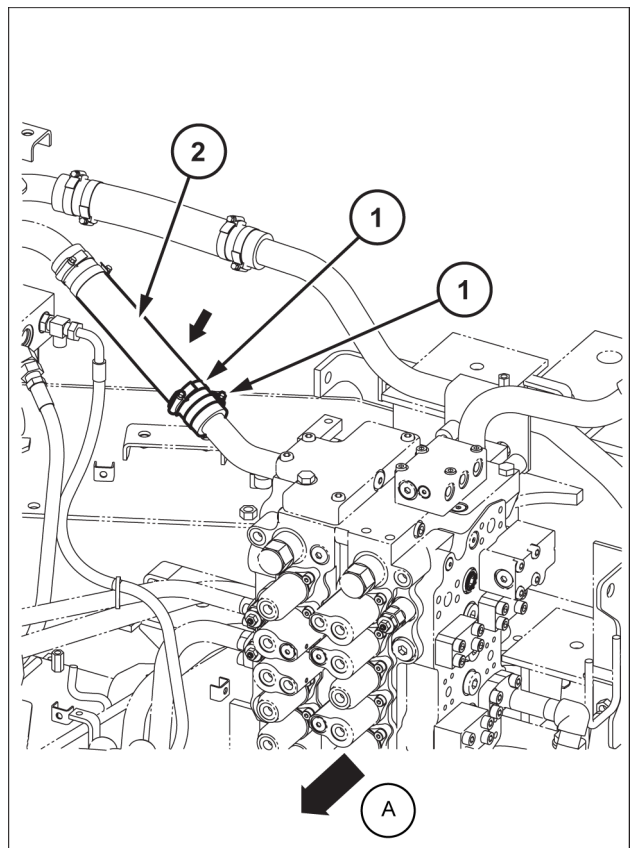


SMIL15CEX4395BB 4

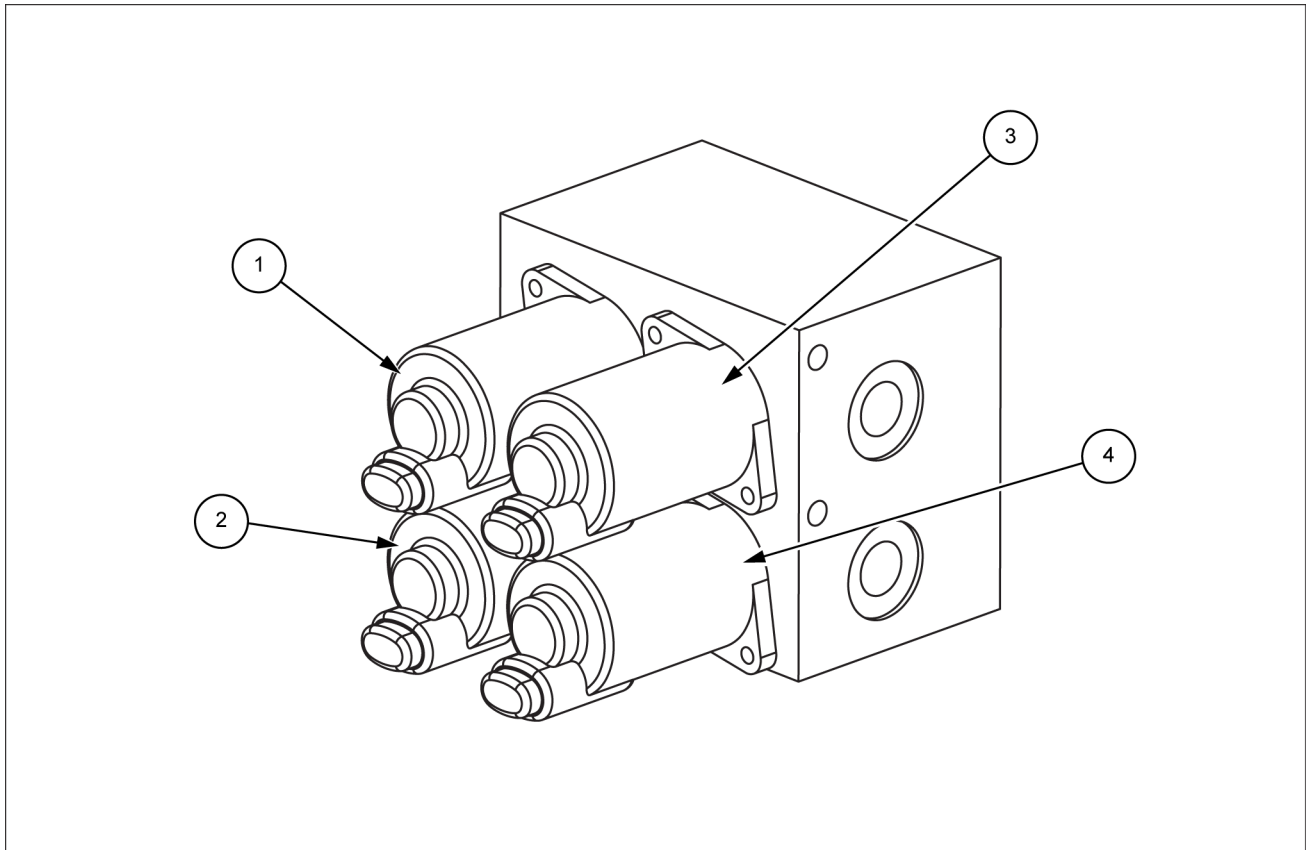
6. Loosen the 2 hose bands (1) with a wrench [ 7 mm] to disconnect the hydraulic hose (2).

- When tightening the hose bands, access them in the direction of the arrow.
- Hose band tightening torque: **5 - 6 N·m (3.69 - 4.43 lb ft)**

(A): front



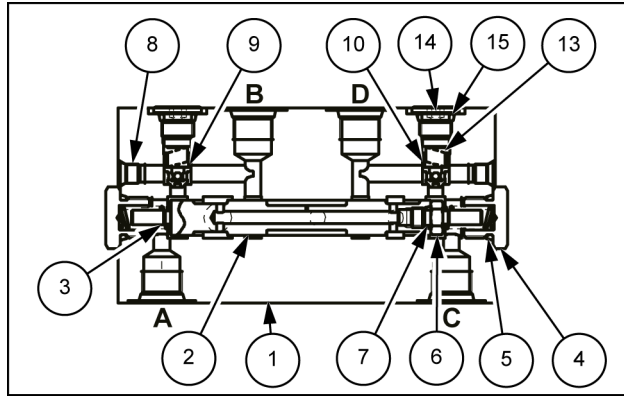
SMIL15CEX4396BB 5



SMIL15CEX4408FB 2

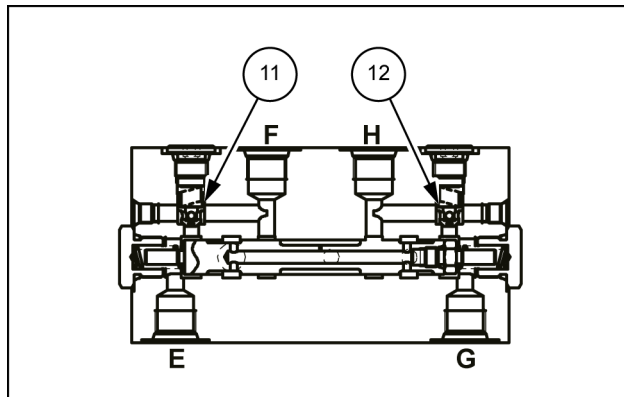
1. Swing brake
2. Lever lock
3. 2-stage relief
4. 2-stage travel

Cross section X



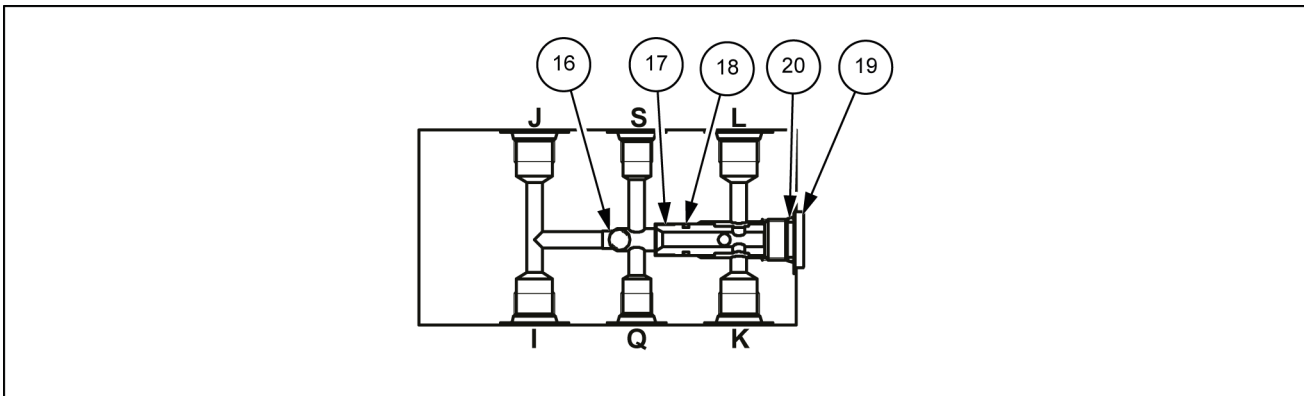
SMIL14CEX1335AB 2

Cross section Y



SMIL14CEX1336AB 3

Cross-section V



SMIL14CEX1337EB 4

- |                   |                 |
|-------------------|-----------------|
| 1. Body           | 13. Spring      |
| 2. Spool          | 14. Plug        |
| 3. Spring         | 15. O-ring      |
| 4. Plug           | 16. Steel ball  |
| 5. O-ring         | 17. Seat        |
| 6. Cap screw      | 18. O-ring      |
| 7. O-ring         | 19. Plug        |
| 8. Plug           | 20. O-ring      |
| 9. Check plunger  | 21. Name plate  |
| 10. Check plunger | 22. Drive screw |
| 11. Check plunger | 23. Plug        |
| 12. Check plunger | 24. Plug        |

## Cleaning

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

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

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

- Scratching can easily occur if cleaning of a part is begun just after parts are immersed in white kerosene, so let each part sit in white kerosene until debris and grease sufficiently loosen from the surface of the part and float to the surface.
- If the white kerosene is dirty, this will encourage damage to parts and result in reduced performance after reassembly. Thoroughly manage the level of cleanliness of the white kerosene.
- Do not dry parts with compressed air, as this will damage parts and cause rust to form due to debris and moisture being dispersed into the atmosphere.

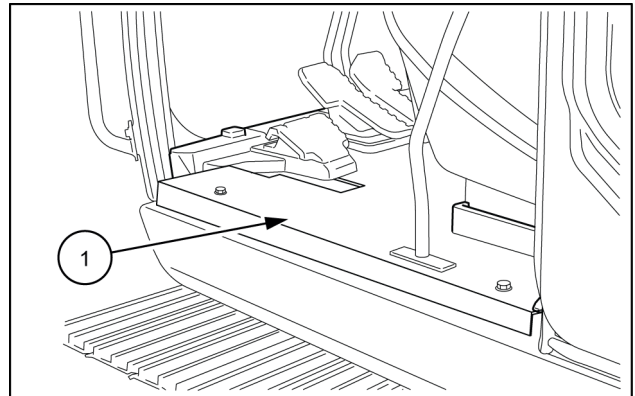
## Preventing rust on parts

Apply an anti-rust agent to each part.

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

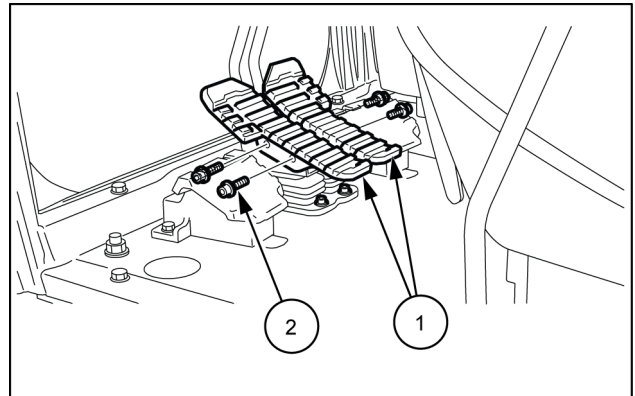
## Hydraulic foot control - Remove

1. Remove the floor mat (1).



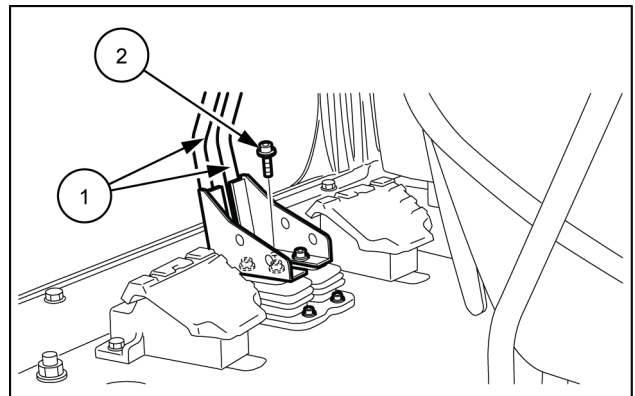
SMIL14CEX1543AB 1

2. Remove the respective 2 bolts (2) in left and right with a hexagon wrench [ 8 mm] to remove the travel pedals (1) in left and right.



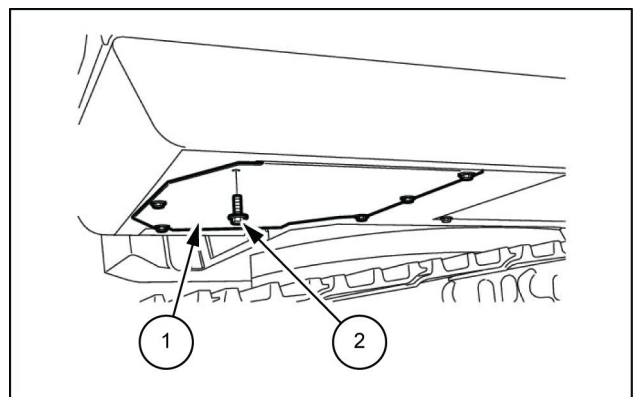
SMIL14CEX1528AB 2

3. Remove the respective 2 bolts (2) of levers in left and right with a hexagon wrench [ 8 mm] to remove the levers (1).



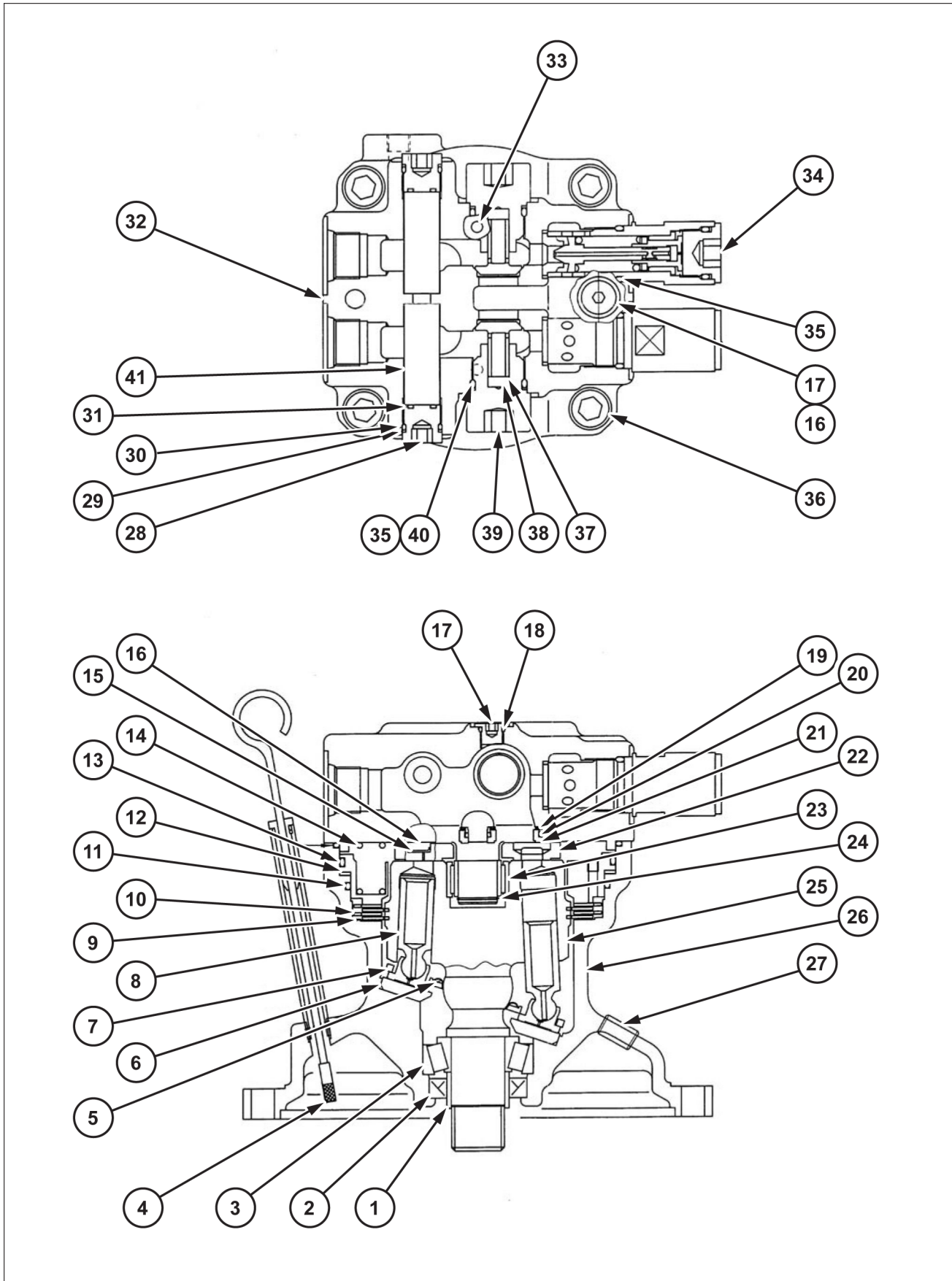
SMIL14CEX1530AB 3

4. Remove the 6 bolts (2) with a wrench [ 19 mm] to remove the under cover (1).



LPIL12CX01599AB 4

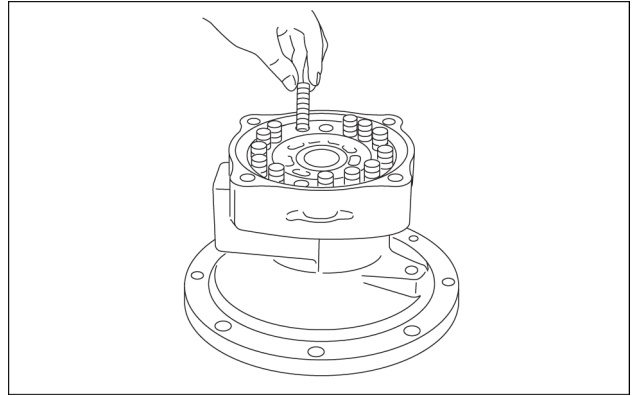
## Hydraulic swing system - Sectional view



SMIL15CEX4543HB 1

13. Installation of spring (14) (brake section) Install the springs (14) in the brake section piston (12).

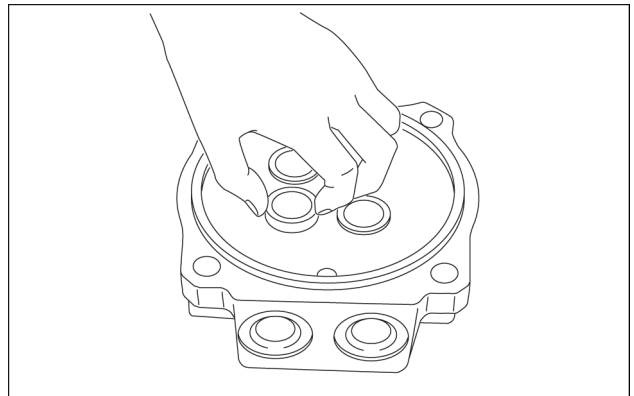
- Install the springs (14) in the same locations they were in before disassembly.



SMIL15CEX4794AA 13

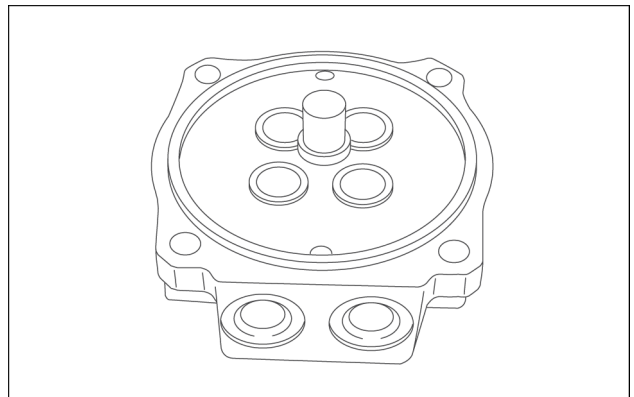
14. Install bushings (21) with teflon rings (20) attached and conical springs (19) to the cover (32) bushing holes.

- Due to the viscosity of the grease, sufficiently coating both end surfaces and the outer diameter of bushings (21) and the teflon rings (20) with grease makes it less likely that parts will fall from the cover when the entire cover is installed on the housing, which makes assembly easier.



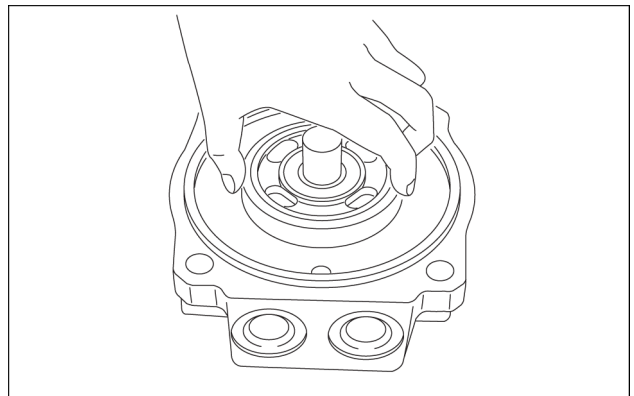
SMIL15CEX4795AA 14

15. Sufficiently apply grease to the cover (32) pins (33) (for balance plate (22) baffling).



SMIL15CEX4796AA 15

16. Installation of balance plate  
Install the pistons (16) in the balance plate (22) and the balance plate on the cover (32) .



SMIL15CEX4797AA 16

Hydraulic systems - Hydraulic travel system

Code	Part name	Quantity	Code	Part name	Quantity
1	Hub	1	161	Piston	1
2	Spindle	1	167	Pivot	2
3	Carrier (1)	1	171	Parallel pin	2
4	Sun gear (1)	1	185	Spring	1
5	Planetary gear (1)	3			
7	Carrier (2)	1		Relief assembly	2
8	Sun gear (2)	1	201	· Valve seat	1
9	Planetary gear (2)	4	202	· Valve	1
11	Thrust washer (1)	3	203	· Sleeve	1
12	Thrust washer (2)	4	204	· Collar	1
13	Thrust plate	2	205	· Plug	1
14	Cover	1	206	· Spring	1
22	Lock washer	2	207	· O-ring	1
23	Shim (rank)	2	208	· Backup ring	2
24	Angular ball bearing	2	209	· O-ring	1
25	Inner ring	3	210	· Backup ring	2
26	Inner ring	4	211	· O-ring	1
27	Needle pin roller bearing with retainer	3	212	· O-ring	1
28	Needle pin roller bearing with retainer	4	213	· Shim (rank)	1 - 2
30	Plug	2			
31	O-ring	2		Body kit	1
32	O-ring	1		· Body, Piston kit	1
33	O-ring	2	214	· · Body	1
34	Parallel pin	2	215	· · Piston (rank)	1
35	Hexagon socket head bolt	12	216	· Plug	1
41	Steel ball	1	217	· Plug	2
51	Hexagon bolt	4	218	· Steel ball	2
			219	· Orifice	2
	Floating seal kit	1	220	· Hexagon socket head plug	4
29	· Floating seal kit	2	221	· O-ring	1
			222	· O-ring	2
	Cylinder, Piston kit	1		Rear flange assembly	1
	· Piston kit	1	301	· Rear flange	1
	· · Piston assembly	9	323	· Spool	1
105	· · · Piston	1	324	· Plug	2
106	· · · Shoe	1	325	· Spring retainer	2
104	· Cylinder block	1	326	· Plug	3
			327	· Valve	2
102	Shaft	1	328	· Spring	2
103	Swash plate	1	329	· Spring	2
107	Retainer plate	1	330	· Spring	2
108	Thrust ball	1	336	· O-ring	2
109	Timing plate	1	337	· O-ring	5
110	Washer	2	346	· Hexagon socket head plug	5
112	Piston	1	354	· Hexagon socket head plug	5
113	Spring	10	363	· Spool	1
114	Spring	1	366	· Spring	1
115	Friction plate	3	376	· Orifice	1
116	Partner plate	4	377	· Orifice	1
119	Collar	1	378	· Steel ball	1
132	Oil seal	1	379	· Flanged plug	1
135	O-ring	1	399	· Name plate	1
139	O-ring	1			
145	THS snap ring	1	341	Parallel pin	1

## Removal of cover

1. Invert the travel motor.(The reduction gear side faces upward.)
2. Loosen and remove the 12-M10 bolts (35).

**NOTE:** Do not reuse the removed cover bolt (35).

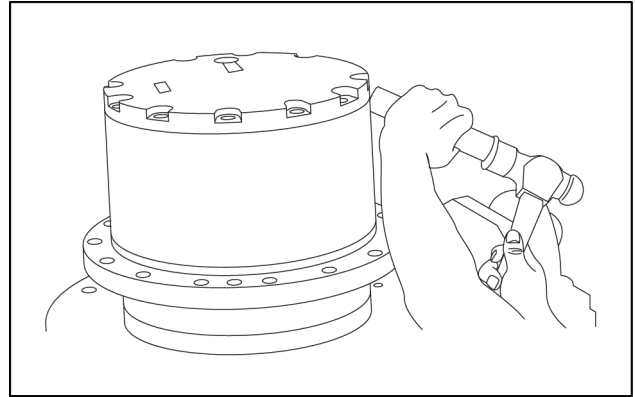
3. Since a sealing compound is applied on the mating surface between cover (14) and hub (1), put a dolly block on the projection of cover, and hit it obliquely upward to remove the cover.



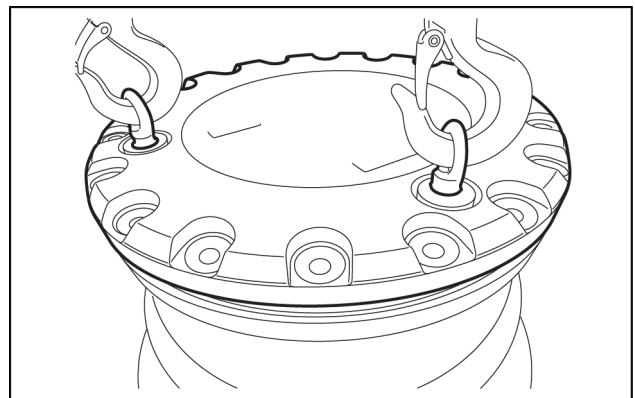
### CAUTION:

When it is hit obliquely upward, the cover may leap up and drop.Be careful not to drop the cover onto feet etc.

4. Attach eyebolts to the PF1/2 ports, and lift and move the cover (14) from the hub.



SMIL15CEX4096AA 1



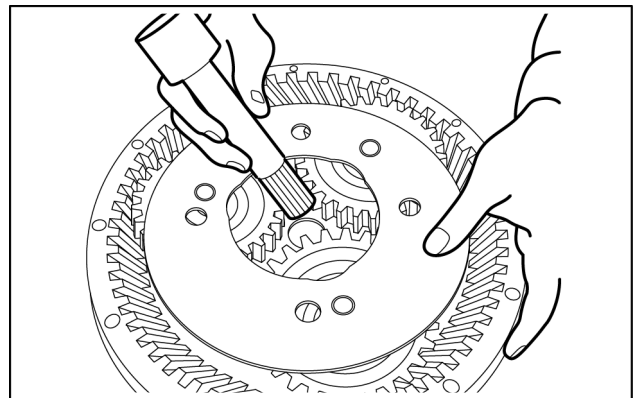
SMIL15CEX4097AA 2

## Removal of sun gear (1)

1. Hold the sun gears (1) (4), and remove them.

**NOTE:** be careful not to drop the sun gear (1) because it is slippery with lubricant.

2. Remove the steel ball (41) from the sun gears (1) (4).Use a magnet if it is hard to remove the steel ball.



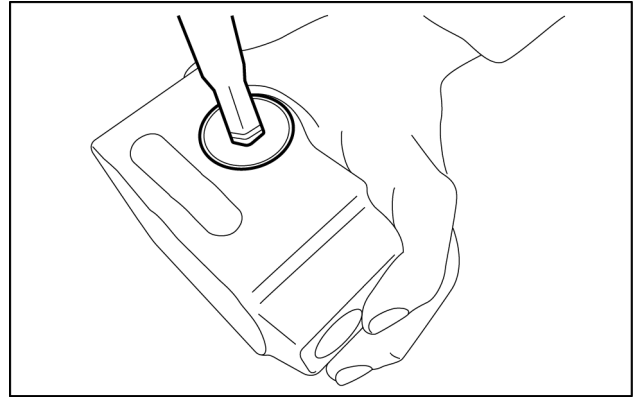
SMIL15CEX4098AA 3

3. Attach the plug (216) to the body (214), and tighten it with the specified torque. Tightening torque: **78.5 - 117.7 N·m (57.90 - 86.81 lb ft)**.

**NOTE:** to tighten the component more easily, put it in a vise.

**NOTE:** apply grease to the O-rings (207) (209) (212).

4. Attach the O-rings (207) (209) (212), the backup rings (208) (2 pieces), and (208) (2 pieces) to the sleeve (203).



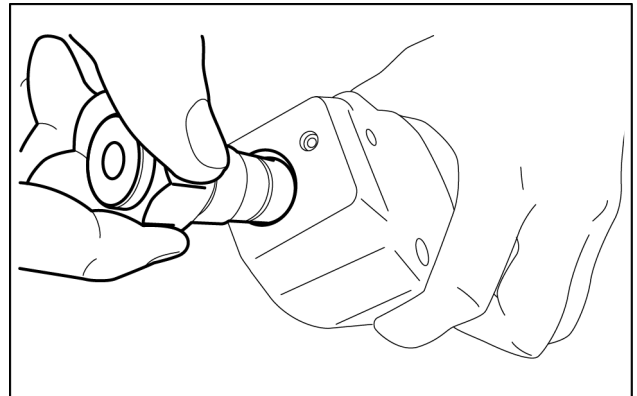
SMIL15CEX4694AA 35

5. Assemble the sleeve (203) to the body (214), and tighten it with the specified torque. Tightening torque: **78.5 - 117.7 N·m (57.90 - 86.81 lb ft)**

**NOTE:** to tighten the component more easily, put it in a vise.

6. Fit also the other sleeve (203) into the body (214) in the same manner.

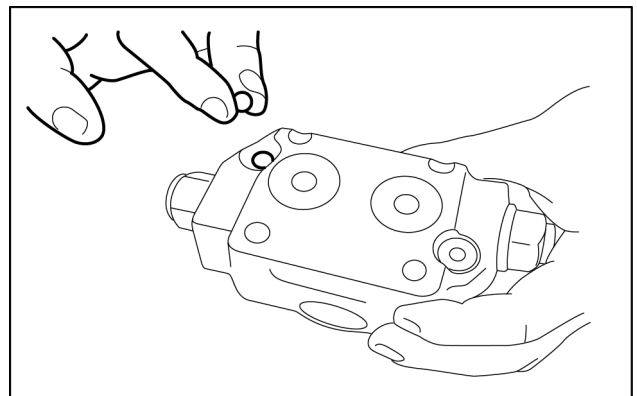
7. Put the steel balls (218) (2 pieces) into the body (214).



SMIL15CEX4695AA 36

8. Attach the O-ring (222) to the plug (217) (2 pieces)

**NOTE:** apply grease to the O-ring (222).



SMIL15CEX4696AA 37

## Hydraulic swivel - Prepare

### **⚠ 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**

**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.**

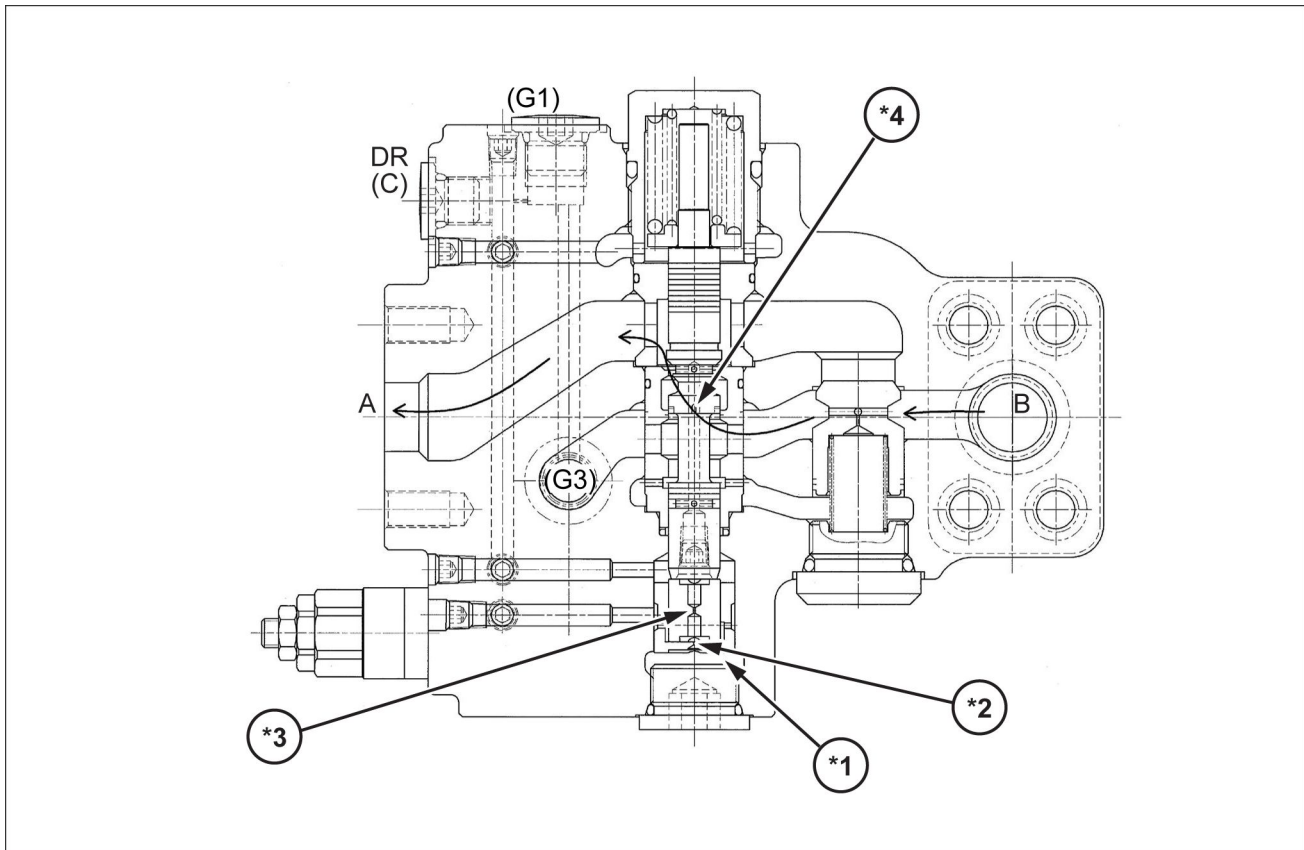
W0398A

Items to prepare:

- Wrenches [ **17 mm, 19 mm, 27 mm, 36 mm**]
- Box wrench [ **19 mm**]
- Specialty adapter for vacuum pump connection
- Vacuum pump (vacuum pump power supply)
- Extension cable
- Marking pen
- Cap
- Plug
- Wire rope (with the required breaking load)
- Lifting equipment (with the required lifting capacity)
- Wood planks, etc.
- Rag
- Cleaning fluid
- Waste oil can

When oil flows from the port B to the port A. (When oil flows from the cylinder to the main control valve)

- When the pilot pressure is added, pressure in the pilot chamber (**e**) will rise.  
Since oil in the pilot line flows from the pilot chamber through the orifices (**f**) and (**g**) into the drain port, air in the pilot line is discharged automatically.
- By the pilot pressure, the piston (**631**), the piston (**632**), and the spool are given strokes against the spool's return spring force. The return oil from the actuator is discharged from the port B (cylinder side) through the spool's control section (**h**) into the port A (main control valve side).
- When the pilot pressure becomes still higher, the poppet spring chamber (**i**) will be connected to the port A side through the passage inside the spool. At this time, the poppet opens because a pressure difference arises between the port B and the poppet spring chamber by the poppet orifice (**j**).



SML15CEX5790FB 3

\*1 Chamber (**e**)

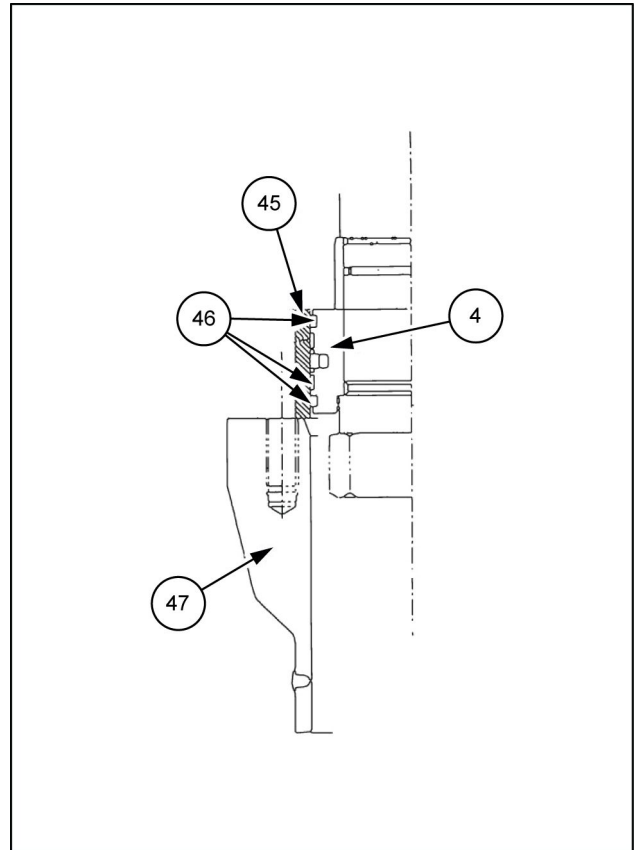
\*2 Orifice (**f**)

\*3 Orifice (**g**)

\*4 Control section (**h**)

### Insertion of piston rod into the tube

1. Secure the tube (47) vertically or horizontally.
2. Insert the piston rod (4) into the tube (47).
  - If the tube is secured vertically, the piston rod enters the tube due to its own weight.
  - When the piston section is entering the tube, be careful that the slide rings (46) do not fall out.
45. Jig, Nylon pipe (split in two)
46. Slide ring (shift the abutment phase 180° from one ring to the next.)

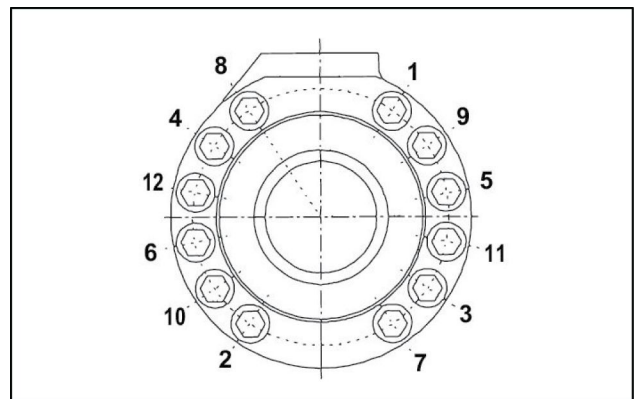


LPIL12CX02948BB 11

### Cylinder head tightening

Align the cylinder head with the position on the assembly diagram, and then tighten the bolts to the specified torque given on the assembly diagram in the order shown in the diagram right.

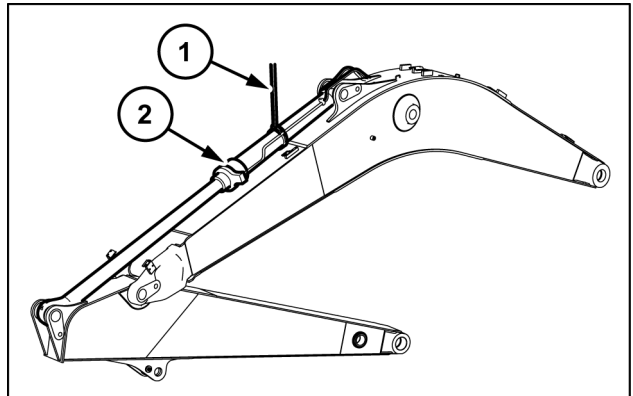
Bolt tightening order



LPIL12CX02949AA 12

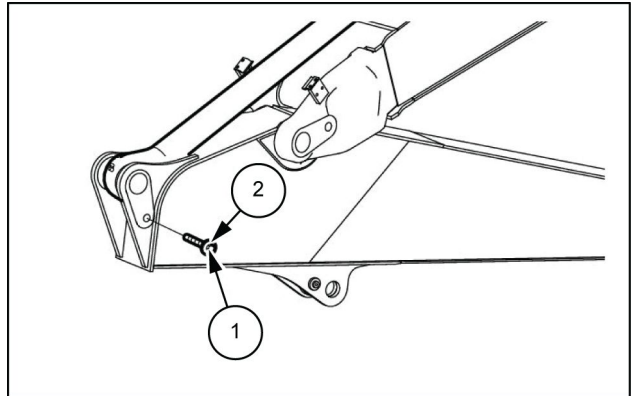
## Dipper cylinder - Remove

1. Secure the arm cylinder (2) with a liftcrane and a nylon sling (1).



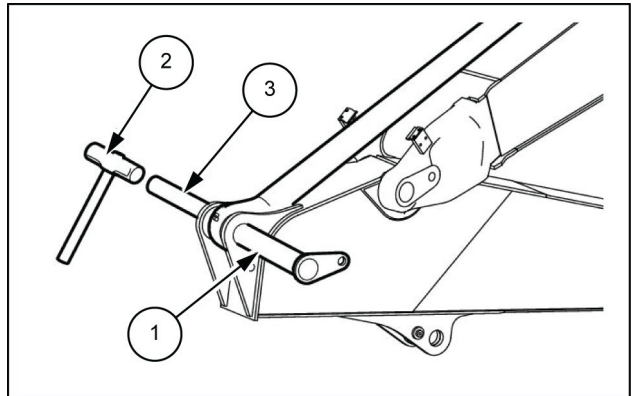
SMIL15CEX4610AB 1

2. Remove the bolt (1) and washer (2) with a wrench [ 19 mm].



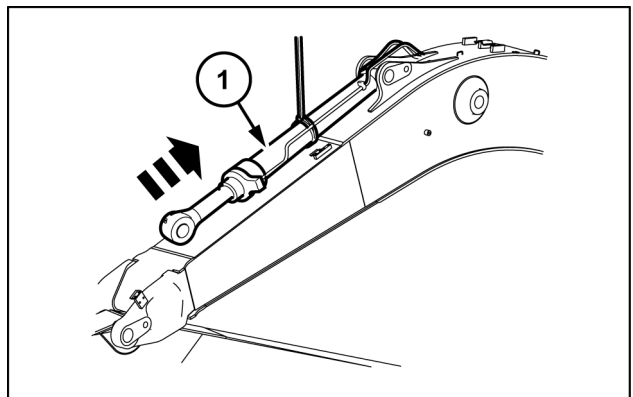
LPIL12CX01547AB 2

3. Pull out the pin (1) with a hammer (2) and a striking rod (3).  
During this time, be aware that the arm and the arm cylinder rod may be displaced.



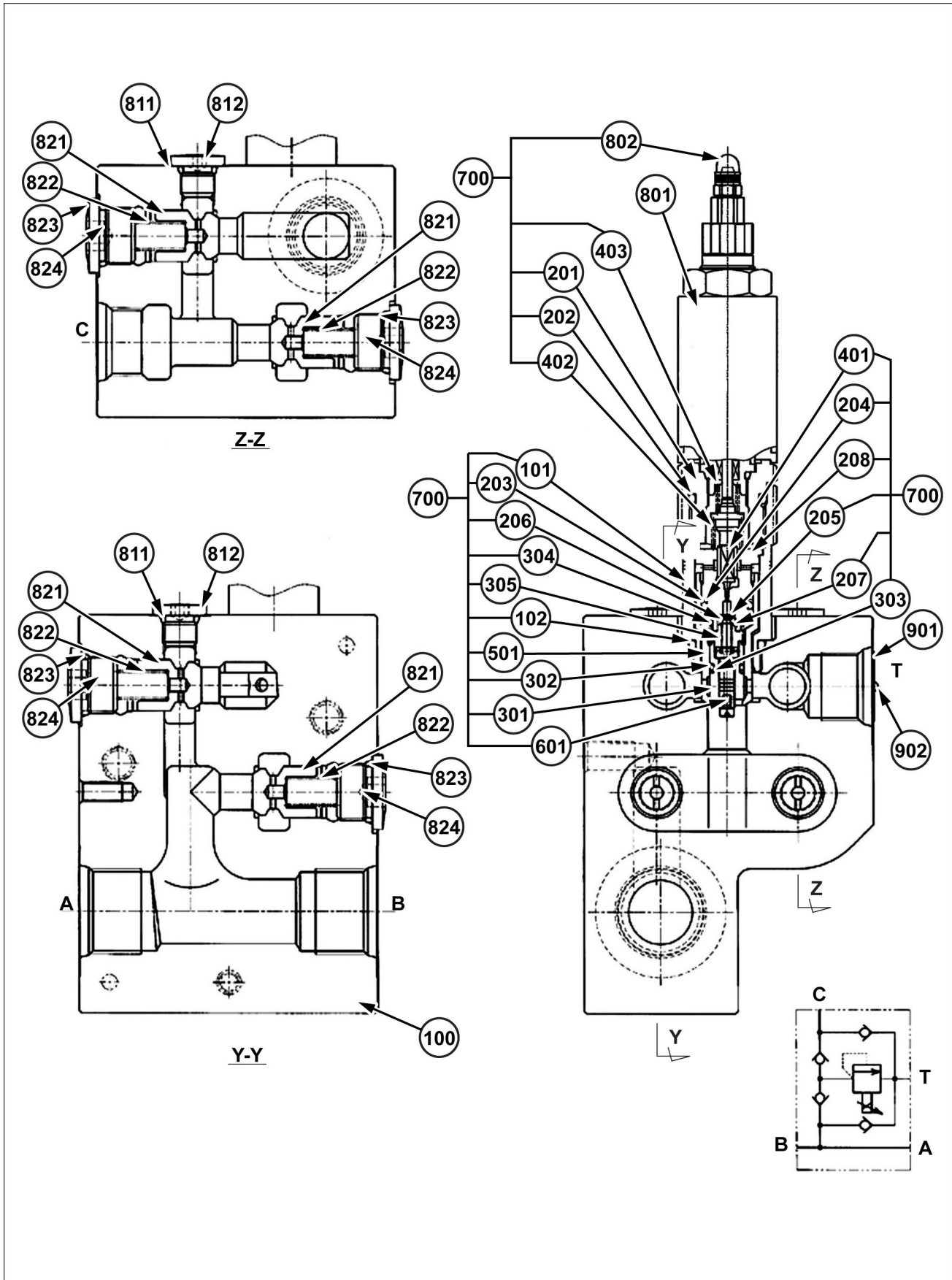
LPIL12CX01548AB 3

4. Start the engine, and perform arm-out operation at idling speed to retract the rod of the arm cylinder (1).



SMIL15CEX4611AB 4

# Hammer shears selection valve - Sectional view - Relief valve (electromagnetic proportional)



SMIL15CEX4433H 1



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## Track chain - Prepare

### **⚠ WARNING**

Pressurized fluid can penetrate the skin and cause severe injuries.  
The grease in the track tensioning mechanism is under high pressure. Keep face and body away from grease nipple. Never loosen the grease nipple more than one complete turn.  
Failure to comply could result in death or serious injury.

W0959A

### **⚠ WARNING**

Tip-over hazard!  
Only raise the track as little as necessary.  
Failure to comply could result in death or serious injury.

W0276A

### **⚠ 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

**NOTICE:** Be sure to adjust the shoe tension appropriately. If the shoe tension is insufficient, the shoe may come off when the machine enters on a bad road and it is very dangerous.

**NOTICE:** The check valve adjustment procedure should not be done in front of the check valve.

**NOTICE:** Do not get under the main unit when it is jacked up. Make sure to place the main unit on crossties to prevent falling.

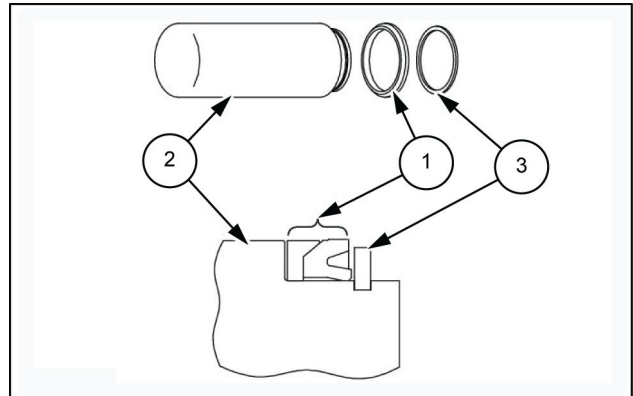
**NOTICE:** Before installing the shoe, always remove any dirt, gravel, etc. stuck to the travel unit.

Items to prepare:

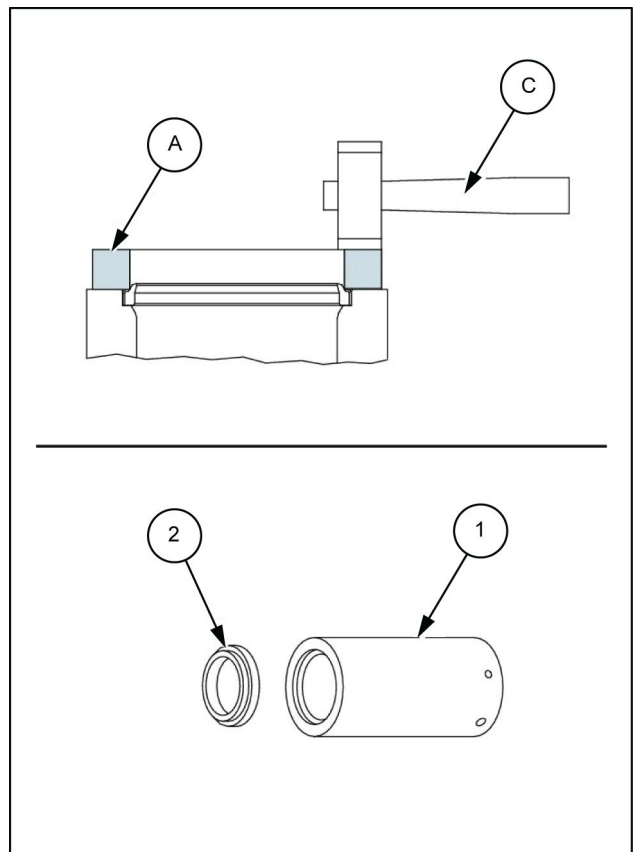
- Wrench [ 17 mm, 19 mm]
- Box wrench [ 19 mm]
- Hammer
- Wood planks, etc.
- Striking jig
- Crowbar
- Rag
- Lifting equipment (with the required breaking load)
- Lifting equipment (with the required lifting capacity)

## Track tensioner - Assemble

1. Place parts in a rough cleaning container filled with kerosene to clean off any adhered matter that can form sharp points and cause scratches.
  - Immerse in kerosene until dust, grease, and other adhered matter comes off and floats to the surface.
2. Place parts in a finish cleaning container filled with kerosene and clean while gently moving the parts. After cleaning, wipe away the kerosene with a clean rag.
  - Place the parts in a location free of dust and moisture and use compressed air to dry the parts. After drying, coat parts with engine oil.
3. Install the U-packing **(1)** coated with grease onto the piston rod **(2)**, and then install the retaining ring **(3)**.
  - Use a new U-packing **(1)**.
  - Be careful that the U-packing **(1)** faces correctly.
4. Use the jig **(A)** and hammer **(C)** to install the dust seal **(2)** on the grease cylinder **(1)**. Apply grease to the lip section of the dust seal **(2)**.
  - Use a new dust seal **(2)**.

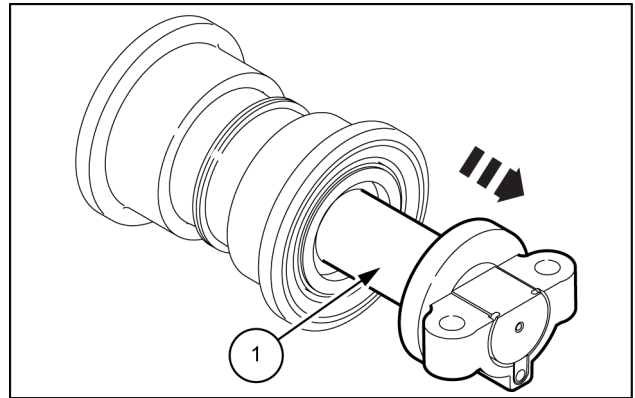


LPIL12CX01309AB 1



LPIL12CX01310BB 2

9. Remove the shaft (1).

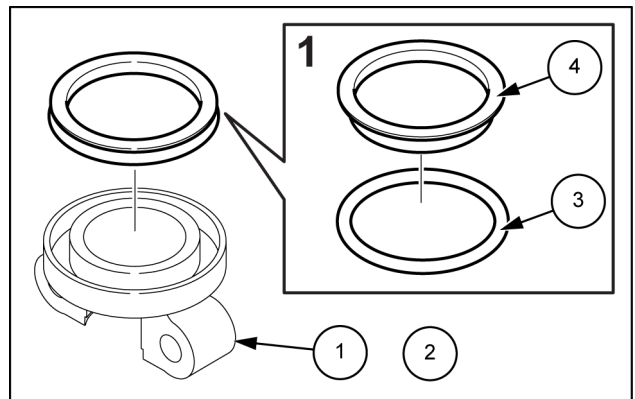


SMIL14CEX1294AB 9

10. Check whether the sliding surface of the floating seal (2) against the removed collar (1) on the opposite side has rusted or is damaged.

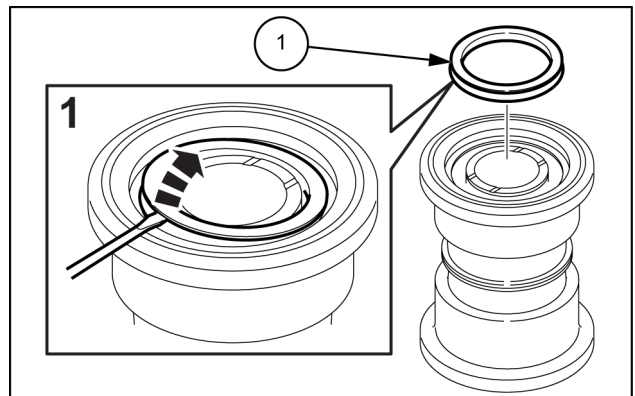
Also make sure the O-ring (3) on the seal ring (4) is not twisted.

- The O-ring cannot be reused. Replace it with new part.




SMIL14CEX1291AB 10

11. As described in Steps 6 and 7, remove the floating seal (1) on the opposite side.



SMIL14CEX1295AB 11

- |   |  |
|---|--|
| a. Air-conditioner unit                                       | f. Heater (unit outlet)  |
| b. Engine   | g. Heater (unit inlet)   |
| c. Heater (engine return)                                     | h. Connect to air-conditioner unit                               |
| d. White making   | i. White making  |
| e. Heater (engine output)                                     | Connect to air-conditioner unit                                  |
|   | j. Clamp   |
| 1. Cooler hose (liquid 2) (Quantity 1)                        | 8. Tension pulley (with cover) (Quantity 1)                      |
| 2. Cooler hose (suction) (Quantity 1)                         | 9. Air condenser (Quantity 1)                                    |
| 3. Rubber hose <b>16 mm (0.630 in) x 2600 mm (102.362 in)</b> | 10. Receiver dryer [D <b>60.5 mm (2.382 in)</b> ] (Quantity 1)   |
| 4. Rubber hose <b>16 mm (0.630 in) x 2800 mm (110.236 in)</b> | 11. Cooler hose (liquid 1) (Quantity 1)                          |
| 5. Cooler hose (discharge) (Quantity 1)                       | 12. Bracket receiver [D <b>60.5 mm (2.382 in)</b> ] (Quantity 1) |
| 6. Compressor air conditioner (Quantity 1)                    | 13. V belt   |
| 7. Slide shaft (Quantity 1)                                   |  |

**NOTE:**  in the hose connection table indicates clamping location and the numerical value indicates hose length.

# Index

---

## Cab climate control - 50

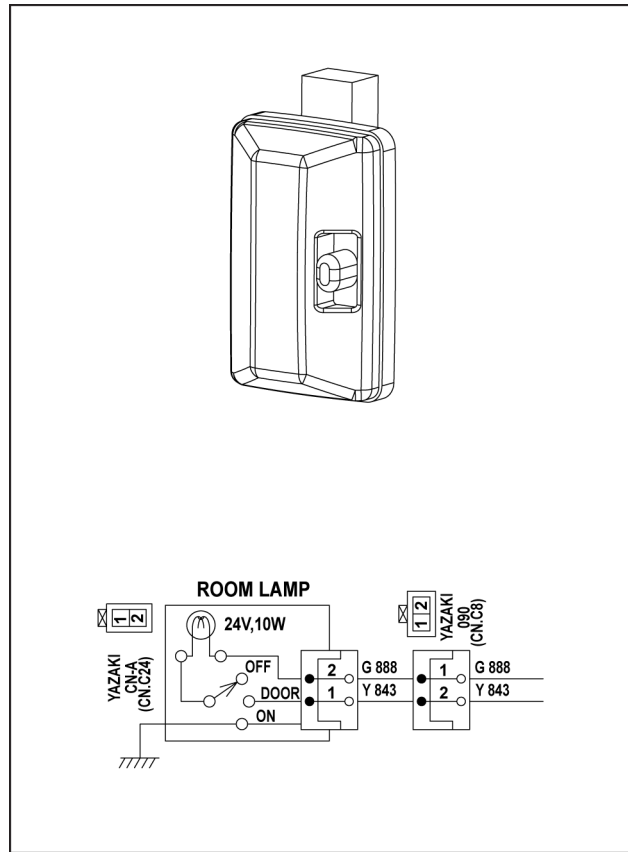
### Air conditioning - 200

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### Lamp (room lamp)

Specification: **24 V 10 W**

Part No.: KHN2714

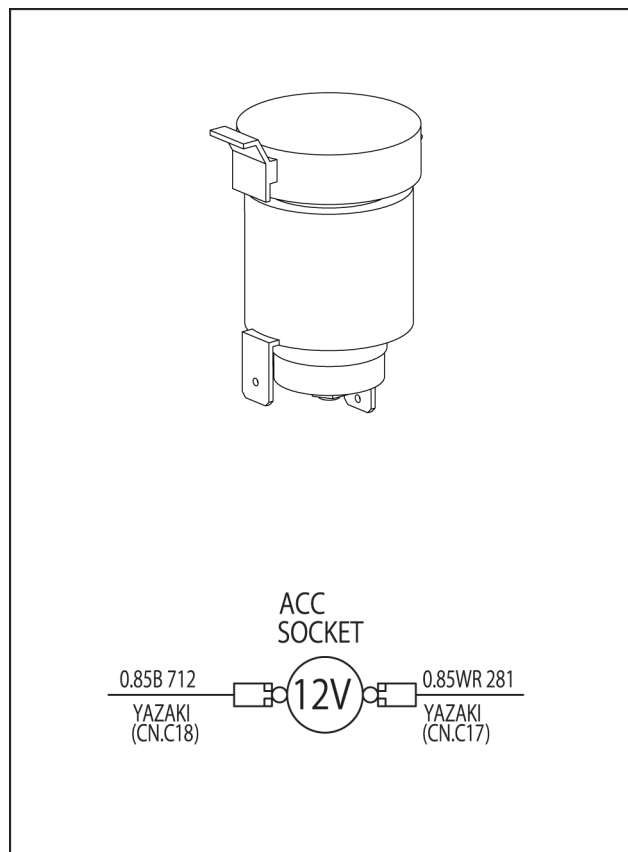


SMIL15CEX4568BA 43

### Accessory socket

Model: **12 V DC**

Part No.: KHR2501



SMIL15CEX0587BA 44

1. Fuel filter pressure sensor
2. Hydraulic Pump
3. P1 pressure sensor
4. P2 pressure sensor
5. Hydraulic oil temperature sensor
6. 4 stack solenoid valve
7. Reducing valve
8. P1 flow control proportional valve
9. P2 flow control proportional valve

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## Engine and pump

**NOTE:** 1. Before fitting, clean the terminal of the connectors marked with \* using a cleaning agent and coat it with an anti-rust agent.

2. When installing the ground terminals marked with #, check that the frame seating surface is not coated. If the surface is coated, remove the coating before installation.

3. Adjust the clamp positions of the electrical wiring that comes out from connectors so that the wiring does not form sharp rounded shapes. [R = 10 mm (0.394 in) or more]

\*1. Engine ground (engine accessory)

\*2. KNR13790 Frame main harness

\*3. NOx sensor (engine accessory)

\*4. Engine harness (engine accessory)

\*5. Battery cable (starter)

Code	Part name	Code	Part name
1	Pressure sensor [ 50 MPa (7253 psi)] M18 (Quantity 2)	3	SCR wire harness (Quantity 1)
2	Oil temperature sensor (Quantity 1)		

*CN.D5F	Engine harness; A (32-pin)	CN.D64F	P2 flow proportional valve; 2-pin (ID: Blue tape)
*CN.D6M	Engine harness; B (16-pin)	CN.D67F	P1 pressure sensor; 3-pin (ID: Red tape)
*CN.D7M	Engine harness; C (14-pin)	CN.D68F	P2 pressure sensor; 3-pin (ID tape: Blue)
*CN.D8M	Engine harness; D (20-pin)	CN.D78F	Oil temperature sensor; 2-pin
*CN.D9M	Engine harness: H	CN.D90-1 F	NOx sensor; 5-pin
CN.D10	Starter motor: S	CN.D90-2 F	EST; 3-pin
CN.D11	Alternator: B	CN.D90-3 F	Dosing valve; 2-pin
CN.D12F	Alternator; L/R (2-pin)	CN.D90-4 M	SCR temperature sensor; 2-pin
CN.D13	Alternator: E	CN.D90-5 M	Exhaust gas temperature sensor (CFS-IN); 2-pin
CN.D14	Alternator GND	CN.D90-6 M	Exhaust gas temperature sensor (DOC-IN); 2-pin
CN.D36F	Fuel pump; 2-pin	CN.D90-7 F	Fuel filter sensor; 3-pin
CN.D45F	Lever lock solenoid valve; 2-pin (ID: Blue tape)	CN.D90F	SCR harness; 16-pin
CN.D46F	Swing brake solenoid valve; 2-pin (ID: Pink tape)	CN.D90M	Frame main harness; 16-pin
CN.D47F	Travel high-speed solenoid valve; 2-pin (ID: Red tape)	CN.D93F	Joint connector; GND (8-pin)
CN.D48F	Pressure boost relief solenoid valve; 2-pin (ID: Yellow tape)	CN.D95	GND G2
CN.D63F	P1 flow proportional valve; 2-pin (ID: Red tape)	CN.D99F	Light (right); 2-pin

**Wiring harnesses - Electrical schematic sheet 07 - Controller A1**

Type	Components	Connectors/link	Description
Controller	A1		Controller
Connector	CN.A4	<b>CN.A4</b>	Controller
Connector	CN.A45	<b>CN.A45</b>	
Connector	CN.A56	<b>CN.A56</b>	
Connector	CN.A93	<b>CN.A93_M</b>	
Connector	CN.D95	<b>CN.D95</b>	Ground-113

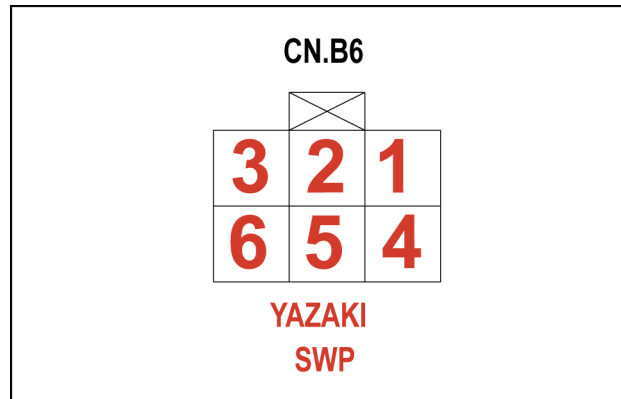
### Wiring harnesses - Electrical schematic sheet 23 - Option pedal, solenoid, proportional circuit

Type	Components	Connectors/link	Description
Sensor	B110		Pilot option 1 pressure sensor (5Mpa)
Valve	Y27		1st option solenoid valve (Red tape)
Valve	Y67		1st option solenoid valve (Blue tape)
Valve	Y135		1st option solenoid valve (Red tape)
Valve	Y136		1st option solenoid valve (Blue tape)
Valve	Y137		2nd option solenoid valve S2
Valve	Y138		2nd option solenoid valve S1
Connector	CN.G1	<b>CN.G1</b>	1st option solenoid valve (Red tape)
Connector	CN.G2	<b>CN.G2</b>	1st option solenoid valve (Blue tape)
Connector	CN.G4	<b>CN.G4</b>	
Connector	CN.G5	<b>CN.G5</b>	PN diode
Connector	CN.G5-A	<b>CN.G5-A</b>	PN diode
Connector	CN.G6-A	<b>CN.G6-A</b>	PN diode
Connector	CN.G6-B	<b>CN.G6-B</b>	PN diode
Connector	CN.G7	<b>CN.G7</b>	1st option solenoid valve (Red tape)
Connector	CN.G8	<b>CN.G8</b>	1st option solenoid valve (Blue tape)
Connector	CN.G11	<b>CN.G11</b>	Pilot option 1 pressure sensor (5Mpa)
Connector	CN.G16	<b>CN.G16</b>	2nd option solenoid valve S2
Connector	CN.G17	<b>CN.G17</b>	2nd option solenoid valve S1
Connector	CN.B19	<b>CN.B19</b>	
Connector	CN.D83	<b>CN.D83</b>	
Connector	CN.D94-A	<b>CN.D94-A</b>	Ground-123

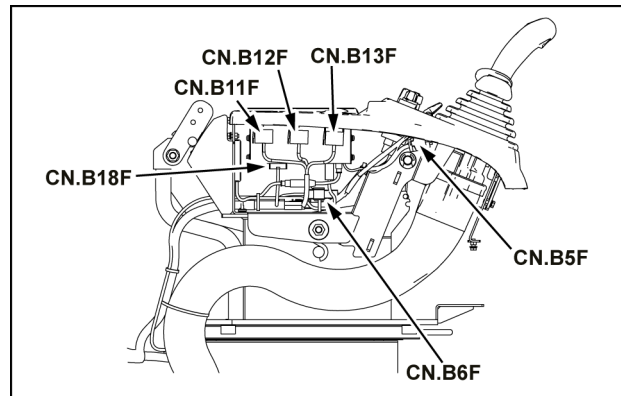
**Wiring harnesses - Electrical schematic sheet 39 - CAB head lamp**

Type	Components	Connectors/link	Description
Lamp	E3		Cab head lamp 1 (Halogen)
Lamp	E3-4		Cab head lamp 3 (Halogen)
Lamp	E3-A		Cab head lamp 1 (Halogen)
Lamp	E3-B		Cab head lamp 3 (Halogen)
Lamp	E74-D		Cab head lamp 2
Lamp	E74-E		Cab head lamp 1
Lamp	E74-F		Cab head lamp 4
Lamp	E74-G		Cab head lamp 4
Connector	CN.A28M	<b>CN.A28</b>	Cab head lamp 1 (Halogen)
Connector	CN.A28M-1	<b>CN.A28-1</b>	Cab head lamp 1 (Halogen)
Connector	CN.A28M-2	<b>CN.A28-2</b>	Cab head lamp 4
Connector	CN.A28M-3	<b>CN.A28-3</b>	Cab head lamp 4
Connector	CN.A28M-4	<b>CN.A28-4</b>	Cab head lamp 3 (Halogen)
Connector	CN.A28M-5	<b>CN.A28-5</b>	Cab head lamp 3 (Halogen)
Connector	CN.A29M	<b>CN.A29</b>	Cab head lamp 1 (Halogen)
Connector	CN.A29M-1	<b>CN.A29-1</b>	Cab head lamp 1 (Halogen)
Connector	CN.A29M-2	<b>CN.A29-2</b>	Cab head lamp 4
Connector	CN.A29M-3	<b>CN.A29-3</b>	Cab head lamp 4
Connector	CN.A29M-4	<b>CN.A29-4</b>	Cab head lamp 3 (Halogen)
Connector	CN.A29M-5	<b>CN.A29-5</b>	Cab head lamp 3 (Halogen)
Connector	CN.A30M	<b>CN.A30</b>	Cab head lamp 1 (Halogen)
Connector	CN.A30M-1	<b>CN.A30-1</b>	Cab head lamp 1 (Halogen)
Connector	CN.A31M	<b>CN.A31</b>	Cab head lamp 4
Connector	CN.A31M-1	<b>CN.A31-1</b>	Cab head lamp 4
Connector	CN.C32	<b>CN.A28</b>	Cab head lamp 3 (Halogen)
Connector	CN.D98-3	<b>CN.A29</b>	Cab head lamp 3 (Halogen)
Connector	CN.D98-4	<b>CN.D98-4</b>	Cab head lamp 1 (Halogen)
Connector	CN.D98-5	<b>CN.D98-5</b>	Cab head lamp 1 (Halogen)
Connector	CN.D98-6	<b>CN.D98-6</b>	Cab head lamp 4

**CONNECTOR CN.B6: KNOB-RIGHT PROPORTIONAL LEVER (Male)**



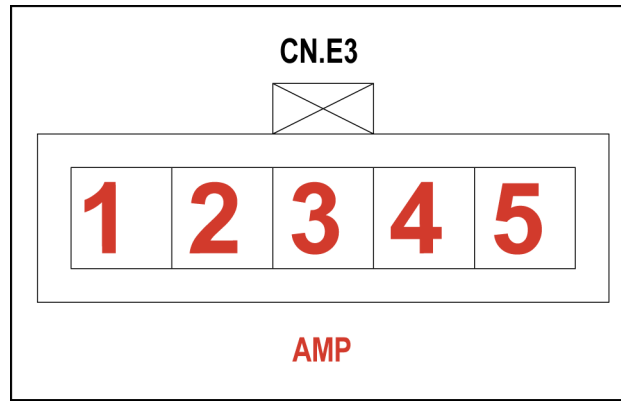
SMIL15CEX5221AA 28



SMIL15CEX5219AA 29

Pin	From	Wire	Description	Color-Size	Frame
1	SP-230C-P-X	230C		W-0.85	<b>SHEET 23</b>
2	CN.B19-P-9	953A		RL-0.85	
3	CN.B19-P-10	954A		RY-0.85	
4	CN.B19-P-11	955B		BW-0.85	
6	SP-726-P-X	726		B-0.85	<b>SHEET 25</b>

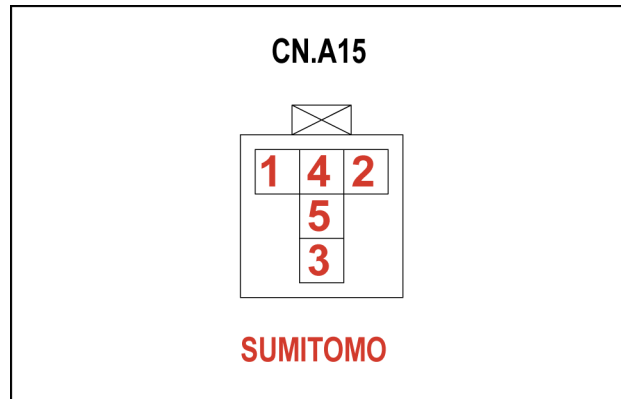
**CONNECTOR CN.E3: INTAKE THROTTLE DC- MOTOR (Male)**



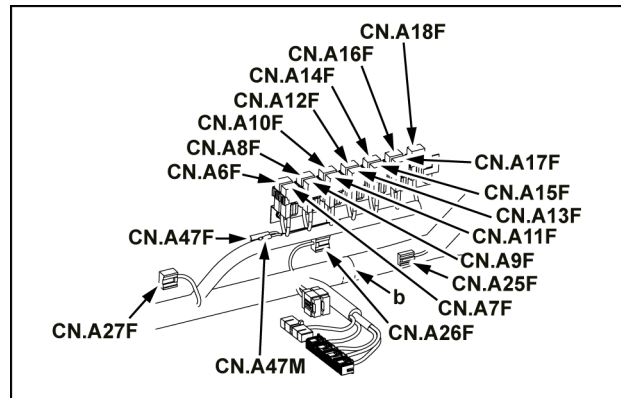
SMIL15CEX5244AA 64

Pin	From	Wire	Description	Color-Size	Frame
1	CN.D9_M-P-13	393-A		G-0.75	<b>SHEET 14</b>
2	CN.D9_M-P-12	392-A		RW-0.75	
3	CN.D9_M-P-11	326A		VW-0.75	
4	CN.D9_M-P-14	327H		LW-0.75	<b>SHEET 15</b>
5	CN.D9_M-P-10	325C		L-0.75	<b>SHEET 14</b>

**CONNECTOR CN.A15: RELAY UPPER LAMP (Male)**



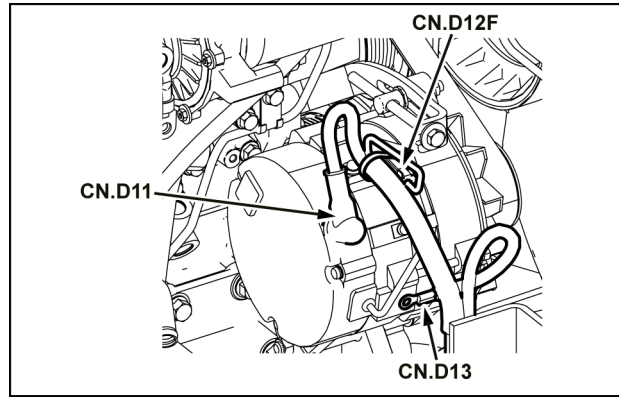
SMIL15CEX5274AA 11



SMIL15CEX5208AA 12

Pin	From	Wire	Description	Color-Size	Frame
1	SP-210A-P-X	210A		LW-1.25	SHEET 33
2	SP-823A-P-X	823C		WG	
3	SP-210A-P-X	210B		LW-1.25	
5	CN.A51-P-4	870		Y-1.25	SHEET 32

**CONNECTOR CN.D11: ALTERNATOR (Male)**



SMIL15CEX5297AA 51

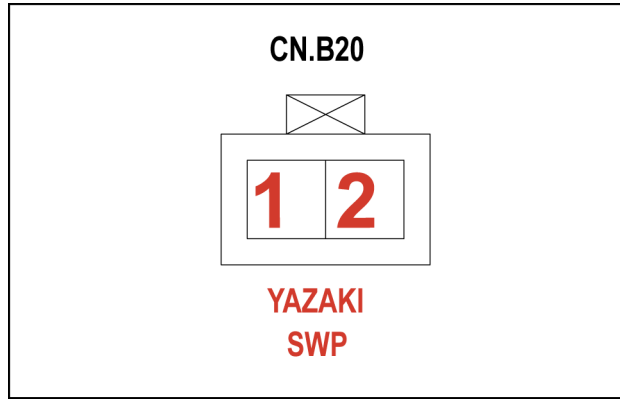
Pin	From	Wire	Description	Color-Size	Frame
M8	CN.D15-P-1	30		R-20.0	<b>SHEET 03</b>

---

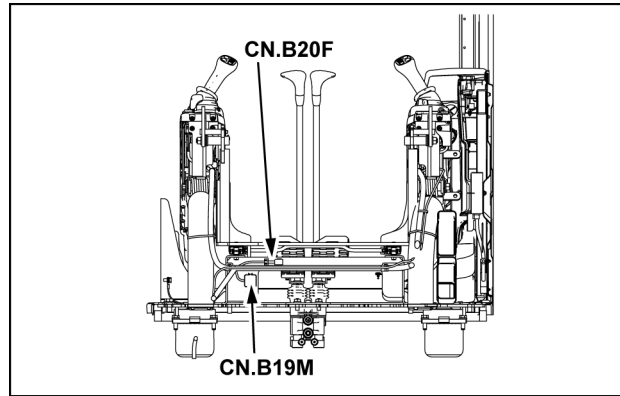
**CONNECTOR CN.G11-A: PILOT OPTION 1 UP PRESSURE SENSOR (5Mpa) (Male)**

Pin	From	Wire	Description	Color-Size	Frame
1	SP-435-D-P-X	435S		WB-0.85	<b>SHEET 24</b>
2	CN.D83-P-3	415C		WL-0.85	<b>SHEET 23</b>
3	SP-445Z-P-X	445AE		BW-0.85	<b>SHEET 24</b>

**CONNECTOR CN.B20: SEAT HEATER (Female)**



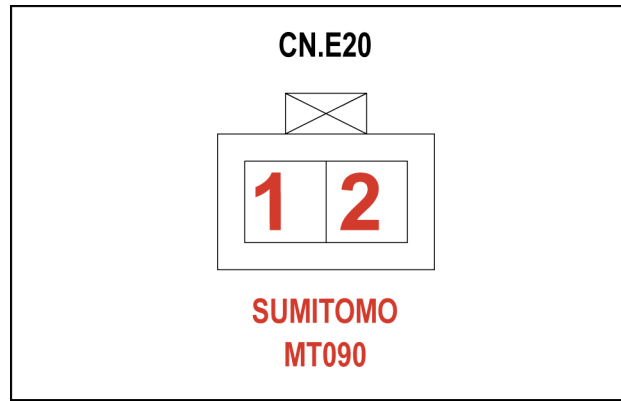
SMIL15CEX5324AA 21



SMIL15CEX5289AA 22

Pin	From	Wire	Description	Color-Size	Frame
1	SP-185J-P-X	185J		R	SHEET 45
2	SP-728B-P-X	728B		B	

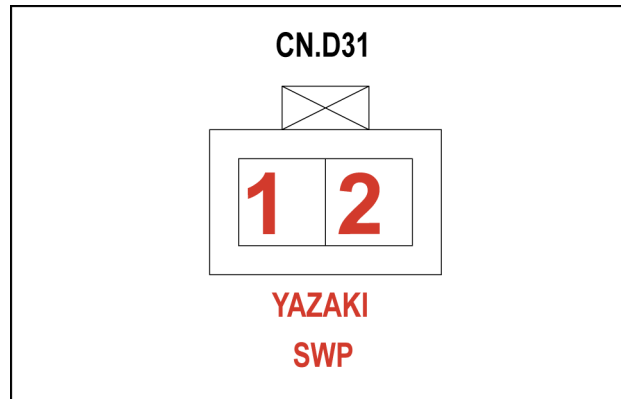
**CONNECTOR CN.E20: INJECTOR 2 (Male)**



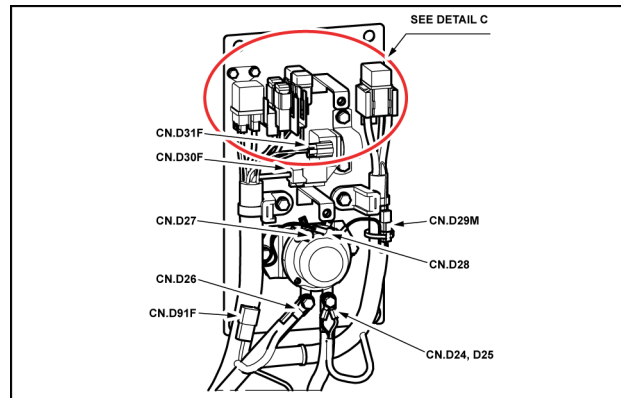
SMIL15CEX5344AA 54

Pin	From	Wire	Description	Color-Size	Frame
1	CN.D8-A_M-P-8	376		B-1.25	<b>SHEET 15</b>
2	CN.D8-A_M-P-4	377		WL-1.25	

**CONNECTOR CN.D31: RELAY STARTER (Male)**



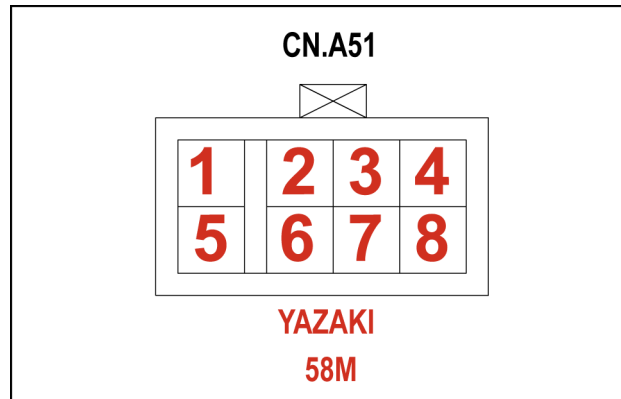
SMIL15CEX5361AA 17



SMIL15CEX5342AA 18

Pin	From	Wire	Description	Color-Size	Frame
1	SP-012-P-X	12		GrR-0.85	<b>SHEET 02</b>
2	SP-750-P-X	750		B-0.85	
2	SP-780-P-X	750B		B-0.85	<b>SHEET 13</b>

**CONNECTOR CN.A51 (Female)**

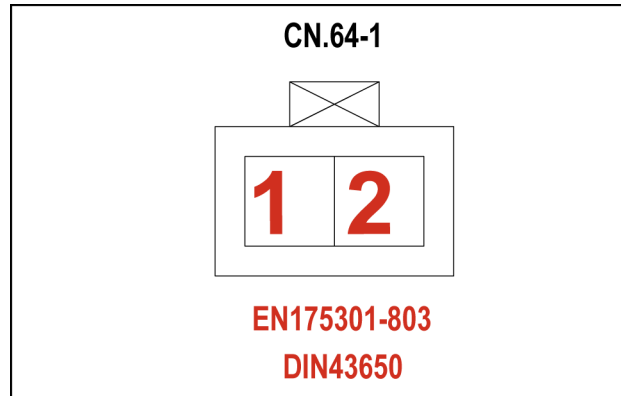


SMIL16CEX5391AA 7

Pin	From	Wire	Description	Color-Size	Frame
1	CN.A44-P-14	943C		GW-0.85	<b>SHEET 28</b>
2	SP-880A-P-X	880D		LR	<b>SHEET 33</b>
3	SP-881A-P-X	881B		YR	<b>SHEET 11</b>
4	CN.A15-P-5	870		Y-1.25	<b>SHEET 33</b>
5	CN.A14-P-5	885		R	
6	CN.A41_M-P-4	829B		WV-0.85	<b>SHEET 16</b>
7	CN.A38_M-P-6	700		B-1.25	<b>SHEET 31</b>
8	SP-600A-P-X	600B		BG-1.25	<b>SHEET 32</b>

## Wire connectors - Component diagram 06

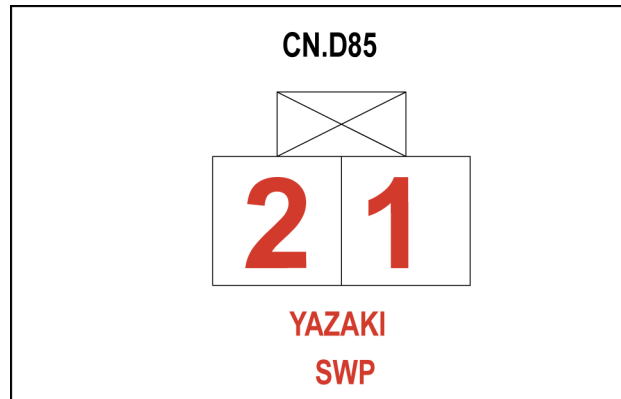
CONNECTOR CN.64-1:SOLENOID VALVE (Male)



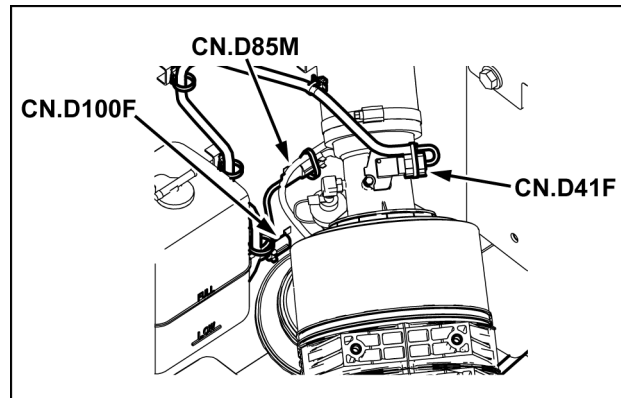
SML15CEX9478AA 1

Pin	From	Wire	Description	Color-Size	Frame
1	CN.D50-P-1	235D		RG-0.75	SHEET 06
2	CN.D50-P-2	817B		YG-0.75	

**CONNECTOR CN.D85: AIR CLEANER PRESSURE SWITCH (Male)**



SMIL15CEX5442AA 16



SMIL15CEX5380AA 17

Pin	From	Wire	Description	Color-Size	Frame
1	SP-651-P-X	650		BG-0.85	<b>SHEET 32</b>
2	CN.A56 M-P-11	534A		LW-0.85	<b>SHEET 10</b>

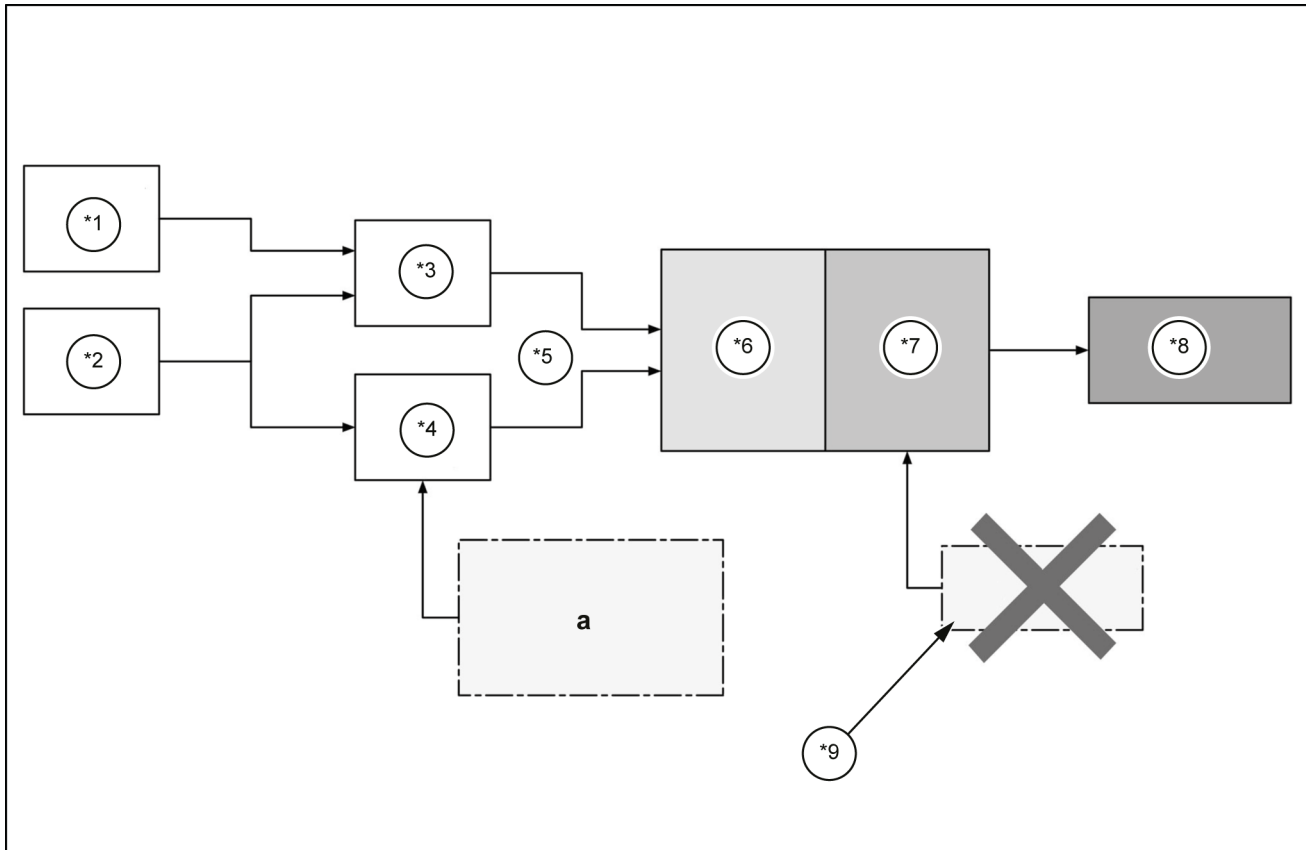


## Electronic control fuel injection system

This is the system in which the ECM obtains information such as engine speed and engine load, and sends electrical signals based on this information to the supply pump, injectors, etc., to properly control the fuel injection quantity and the injection timing for each cylinder.

### Injection quantity control

To optimize the injection quantity, the fuel injection quantity is controlled by regulating the injector based mainly on the signals from the engine speed and the accelerator opening position or the instructed rotation from the control unit in the machine.



SMIL14CEX3898FB 3

- Boost pressure
- a.
  - Engine coolant temperature
  - Barometric pressure
- \*1. Accelerator pedal position
- \*2. Engine speed
- \*3. Basic fuel injection quantity
- \*4. Maximum fuel injection quantity
- \*5. Fuel reduction ratio

- \*6. Final fuel injection quantity
- \*7. Fuel injection quantity correction
- \*8. Injector on time determination
- \*9. Cylinder by cylinder correction

---

*1.	CKP sensor	*17.	Starter
*2.	CMP sensor	*18.	Tachometer
*3.	Fuel pressure sensor	*19.	Tool
*4.	Boost pressure sensor	*20.	OEM unit
*5.	Intake throttle position sensor	*21.	Terminator
*6.	Coolant temperature sensor	*22.	DCU
*7.	IMT sensor	*23.	Terminator
*8.	Exhaust gas temperature sensor 2	*24.	Turbocharger control solenoid
*9.	Exhaust gas temperature sensor 1	*25.	EGR DC motor
*10.	Boost temperature sensor	*26.	Intake throttle motor
*11.	EGR position sensor	*27.	Fuel injector 1 activation signal (Cylinder #1)
*12.	Oil pressure sensor	*28.	Fuel injector 4 activation signal (Cylinder #2)
*13.	Fuel temperature sensor	*29.	Fuel injector 2 activation signal (Cylinder #3)
*14.	ECM	*30.	Fuel injector 3 activation signal (Cylinder #4)
*15.	Starter cut relay	*31.	Suction control valve
*16.	Hour meter relay		

---

## P0089-Fuel pressure regulator performance

### Control Module : ECM

#### Solution:

1. Check and diagnose the below fault codes before you proceed with the diagnostics code 0089.

- Diagnostic trouble code 0091
- Diagnostic trouble code 0092
- Diagnostic trouble code 0192
- Diagnostic trouble code 0193
- Diagnostic trouble code 0201
- Diagnostic trouble code 0202
- Diagnostic trouble code 0203
- Diagnostic trouble code 0204
- Diagnostic trouble code 2146
- Diagnostic trouble code 2149

2. Wait for **2 min** until the fuel pressure is released from the common rail.

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

- A. If the fuel rail pressure sensor display is outside the **0.9 - 1.0 V**, inspect the fuel pressure sensor harness connector **CN.E5** for a poor connection.
  - B. If a problem is found, repair the harness connector **CN.E5**.
  - C. If there are no problems, proceed to Step 3.
3. 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 there are no problems, proceed to Step 4.
  4. Inspect each circuit for high resistance.
    - A. If a problem is found, repair the circuit.
    - B. If the harness connector **CN.E5** and each circuit are normal, replace the fuel pressure sensor. (Refer to “**Common rail - Remove (10.218)** and **Common rail - Install (10.218)**”)
    - C. If there are no problems, proceed to Step 5.

**NOTE:** Do not replace the fuel pressure sensor separately. If a problem is found, replace the common rail assembly.

5. Inspect the suction control valve harness connector **CN.E16** for a poor connection.
  - A. If a problem is found, repair the harness connector **CN.E16**.
  - B. If there are no problems, proceed to Step 6.
6. 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 there are no problems, proceed to Step 7.
7. Inspect each circuit for high resistance.
  - A. If a problem is found, repair the circuit.
  - B. If there are no problems, proceed to Step 8.

---

## P0193-Fuel rail pressure sensor, high input

### Control Module : ECM

#### Solution:

1. Check and diagnose the below fault codes before you proceed with the diagnostics code 0193.

Diagnostic trouble code 06A7

2. Turn OFF the ignition switch.

Disconnect the harness connector **CN.E5** from the fuel pressure sensor.

Turn ON the ignition switch.

Measure the voltage between the fuel pressure sensor signal circuit and normal GND.

- A. If the reading is more than or equal to the **5.5 V**, inspect to see if there is a short circuit to the battery or ignition power supply with the signal circuit between the ECM and the fuel pressure sensor.
  - B. If a problem is found, repair the signal circuit.
  - C. If there are no problems, proceed to Step 3
3. Measure the voltage between the fuel pressure sensor signal circuit and normal GND.
    - A. If the reading is more than or equal to the **4.5 V**, inspect to see if there is a short circuit to the **5 V** power supply circuit with the signal circuit between the ECM and the fuel pressure sensor.
    - B. If a problem is found, repair the signal circuit.
    - C. If there are no problems, proceed to Step 4
  4. Connect the test cable with fuse between the fuel pressure sensor signal circuit and GND circuit.

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

- A. If the reading is less than or equal to the **0.1 V**, inspect to see if there is a poor connection with the fuel pressure sensor harness connector **CN.E5**.
- B. If a problem is found, repair the harness connector **CN.E5**.
- C. If the harness connector **CN.E5** is normal, replace the fuel pressure sensor. (Refer to “**Common rail - Remove (10.218)** and **Common rail - Install (10.218)**”)
- D. If there are no problems, proceed to Step 5

**NOTE:** Do not replace the fuel pressure sensor separately. If a problem is found, replace the common rail assembly.

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

#### **NOTE:**

- The fuel pressure 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 7
6. Inspect to see if there is an open circuit or high resistance in the signal circuit between the ECM and the fuel pressure sensor.
    - A. If a problem is found, repair the signal circuit.

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 21 (55.100)**

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. 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 20 (55.100) Wiring harnesses - Electrical schematic sheet 19 (55.100)**

---

## U2106-Lost CAN communications with wheel loader transmission control system

### Control Module : ECM

#### Solution:

1. Turn OFF the ignition switch.  
  
Inspect the CAN circuit between the machine control unit and the ECM for a short circuit, an open circuit, or high resistance.
    - A. If a problem is found, repair the applicable circuit.
    - B. If there are no problems, proceed to Step 2.
  2. Inspect for poor connections at the harness connector **CN.A4**.
    - A. If a problem is found, repair the harness connector **CN.A4**.
    - B. If there are no problems, proceed to Step 3.
  3. Inspect for poor connections at the ECM harness connector **CN.D3**.
    - A. If a problem is found, repair the harness connector **CN.D3**.
  4. 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. Observe the diagnostic trouble code information with the trouble diagnosis scan tool.

**Wiring harnesses - Electrical schematic sheet 07 (55.100) Wiring harnesses - Electrical schematic sheet 08 (55.100) Wiring harnesses - Electrical schematic sheet 13 (55.100) Wiring harnesses - Electrical schematic sheet 14 (55.100)**

# Contents

---

## Electrical systems - 55

### Engine starting system - 201

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#### SERVICE

##### Engine starting system

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##### Engine starter

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## Diagnostic aid

Fuel cut-off, fuel freezing, air entering fuel line, filter abnormality, line abnormality, fuel quality, fuel tank and other fuel system abnormalities. Filter clogging, suction air line abnormality and other suction air system abnormalities. Exhaust pipe abnormality and other exhaust system abnormalities. Throttle position sensor, harness, and other sensor input circuit system abnormalities. Switch input circuit system abnormality. Engine abnormalities such as compression pressure deficiency and other mechanical troubles which includes valve clearance, turbocharger, supply pump, injector, and common rail. Troubles related to the hydraulic pump and other device on the machine. Effect of wireless devices, lights, or other electrical components installed after purchase. Inspect for connector connection problems, abnormalities involving friction or breaking in harnesses, any wires inside harnesses separated and touching another circuit and causing a short.

Also, perform functional diagnosis inspection, check operations and control in each area, and repair any abnormalities.

Output reduction due to fuel flow restriction resulting from overheating, insufficient output due to fuel flow restriction resulting from high altitude operation.

## Control for overheating

In order to protect the engine, the ECM starts controlling the fuel flow if the engine coolant temperature exceeds **100 °C (212 °F)**.

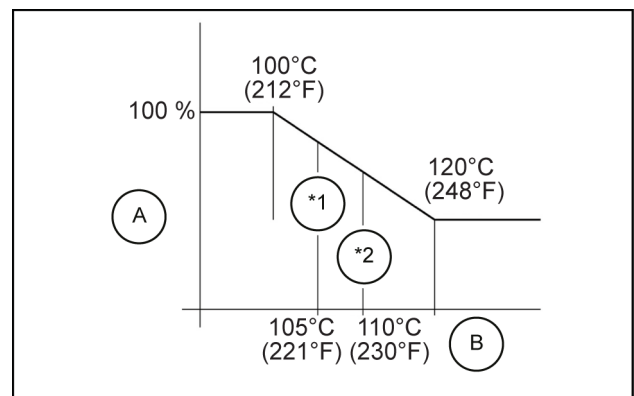
If the engine coolant temperature rises further, the fuel flow is further restricted.

Near **120 °C (248 °F)**, the fuel flow is restricted to a constant level.

Varies depending on the manufacturer of the actual machine.

The system emits a warning through the actual machine from **105 °C (221 °F)**.

By lowering the load applied to the actual machine in addition to the warning, it is possible to avoid an operation condition in which the fuel flow is restricted.

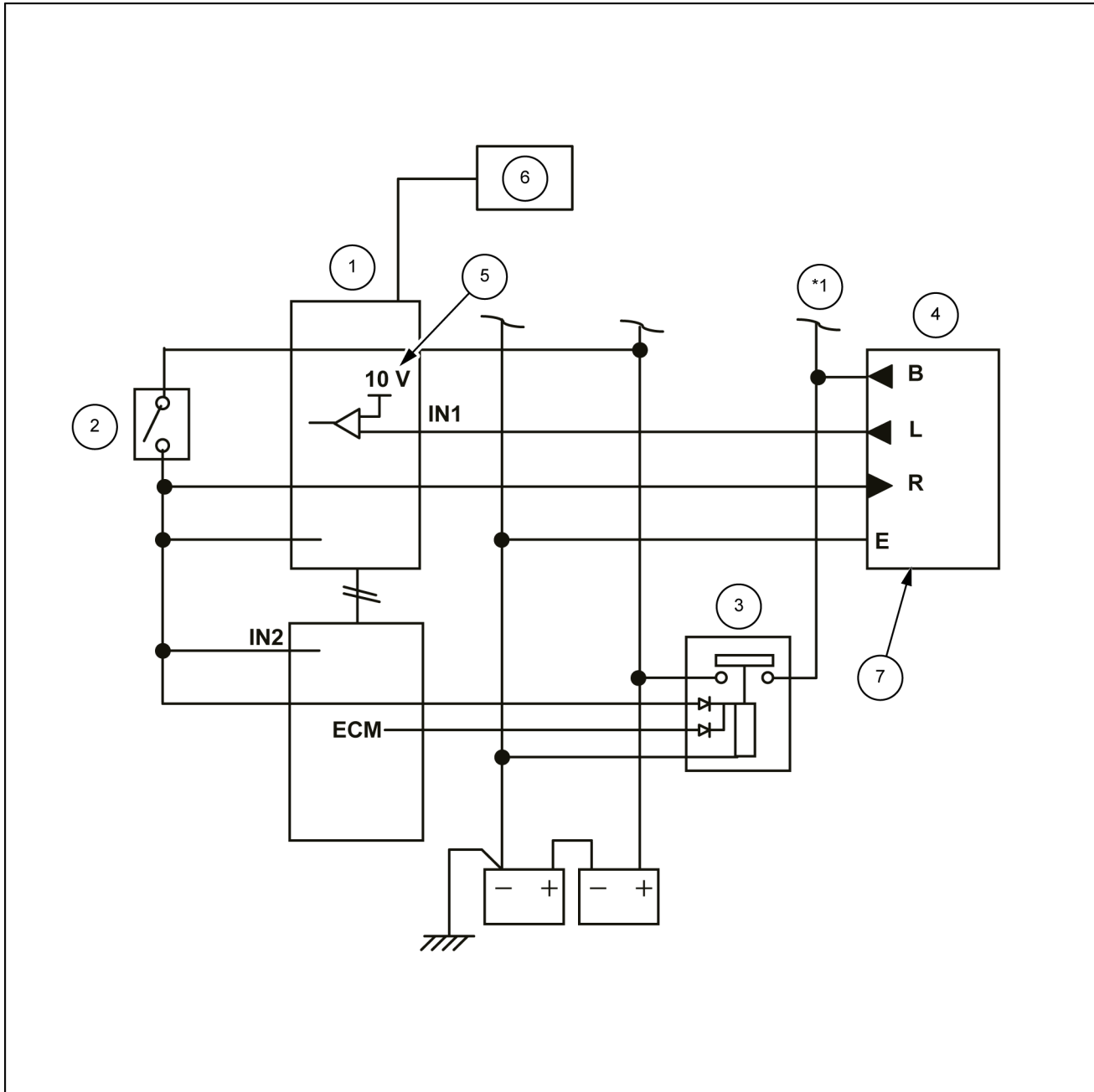


SMIL14CEX3442AB 9

- A. Fuel flow
- B. Engine coolant temperature
- \*1. Warning display
- \*2. DTC set

## Battery - Service instruction - Battery charge abnormality

Configuration (with fuses omitted)



SMIL14CEX0907GB 1

\*1 To load

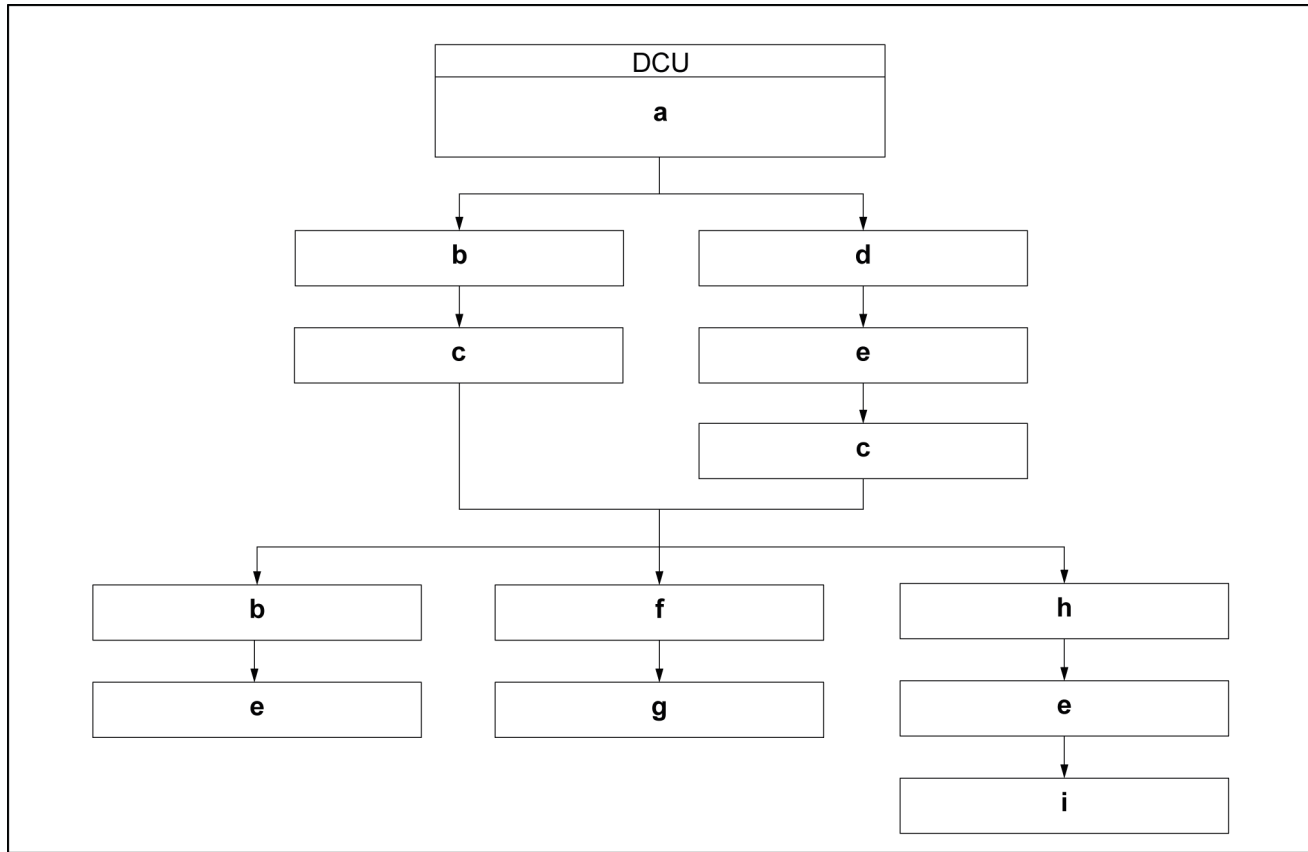
1. Main controller
2. Key switch
3. Battery relay
4. Alternator

5. 10 V comparator
6. Monitor  
B: Charge  
L: Running signal  
R: Initial energization  
E: GND
- 7.

### Operation

In **10 s** after the engine starts, detection of a battery charge warning starts.





SMIL14CEX4032FA 15

- DEF (Urea fluid) tank temperature sensor
- a. • DEF (Urea fluid) pump temperature sensor
- Outside air temperature sensor
- b. All temperatures are at or above the specified values
- c. Defrosting control termination
- d. Any of them is under the specified temperature
- e. DEF (Urea fluid) tank heater coolant control valve opened
- f. The temperatures other than the outside air temperature are at or below the specified values
- g. Defrosting control is started again
- h. The outside air temperature is at or below the specified value
- i. Thermal control

### About startup control

After the ignition switch is turned ON, if the heater control defrosting control is completed (including if the DCU judges that the defrosting control is not required), the SCR catalyst temperature is the specified value or more, and the engine is running, then the DCU operates the urea fluid supply module and dosing module in order to fill the urea fluid piping between the urea fluid supply module and the dosing module with urea fluid and pressurize the urea fluid up to **900 kPa (131 psi)**. After the pressure is increased, it is maintained at **900 kPa (131 psi)** using the urea fluid pressure sensor built into the urea fluid supply module.

Does SCR catalyst degradation or ammonia slip due to ammonia storage amount saturation occur?

### **White crystalline powder visible description of symptom**

White crystal powder adheres to the exhaust pipe or the urea SCR system related parts.

### **White crystalline powder visible diagnostics**

**NOTE:** *Preliminary inspection.*

When refilling the urea fluid, verify it is not refilled above the F line of the level gauge.

Check for related Service Bulletins.

**NOTE:** *Urea fluid piping system inspection.*

Is the urea fluid tank drain off or loose?

Is the urea fluid tank broken?

Is there urea fluid leaking from the urea fluid tank?

Is the urea fluid supply pump broken?

Is there urea fluid leaking from the urea fluid supply pump?

Is the filter cover of the urea fluid supply pump loose?

Is the urea fluid piping or the joint broken?

Is there urea fluid leaking from the urea fluid piping or the joint?

Are the urea fluid piping and the coolant piping for the urea fluid supply pump assembled incorrectly?

If there are crystals adhering inside the urea fluid tank, is the coolant control valve stuck open?

**NOTE:** *Sensor inspection.*

Is the NOx sensor value appropriate?

Is the EGT sensor 3 value appropriate?

**NOTE:** *Dosing module inspection.*

Is the dosing module broken, damaged by heat, or corroded?

Is it time for regular replacement of the dosing module?

**NOTE:** *Other inspections.*

If the urea SCR-related parts have been replaced, was the urea SCR system data reset as necessary?

Has an SCR catalyst that was installed to another machine been installed recently?

6. 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. Turn ON the ignition switch without starting the engine.

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 16 (55.100)**

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, replace the DCU. (Refer to “ **Dosing control unit - Remove (55.988)** and **Dosing control unit - Install (55.988)**”)

7. 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. Turn ON the ignition switch without starting the engine.

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 16 (55.100)**

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

3. Confirm that the temperature differences **5 °C (41 °F)** between the engine coolant temperature, intake air temperature, and fuel temperature are all the specified value or less, and start the engine.

**NOTE:** *If the reading is not within the specified requirements, soak until it is.*

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

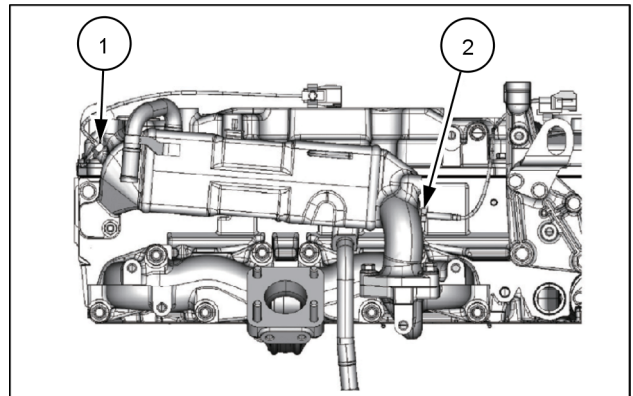
**Wiring harnesses - Electrical schematic sheet 16 (55.100)**

## Exhaust Gas Recirculation (EGR) temperature sensors - Remove - Temperature sensor 1

1. Disconnect the battery ground cable from the battery.

**NOTICE:** Do not disconnect the battery cable for 3 minutes after the ignition switch is OFF.

2. Disconnect the harness connector from EGR gas temperature sensor 1 (2).
  1. EGR gas temperature sensor 2
  2. EGR gas temperature sensor 1
3. Remove EGR gas temperature sensor 1 (2) from the EGR cooler.



SMIL15CEX9632AB 1

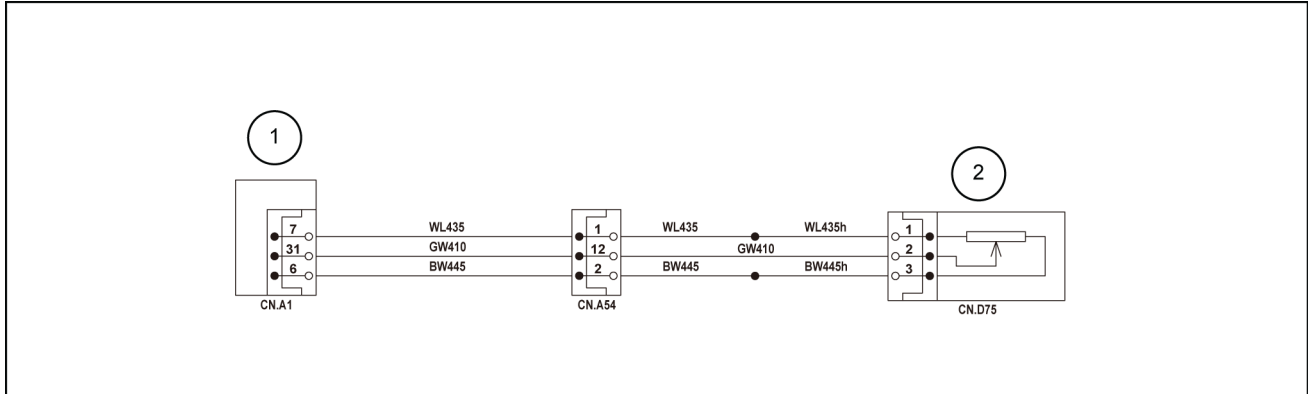
7615-Sub-Controller Communication Abnormality [MCM] .....	107
7618-DCU Communication Abnormality [MCM] .....	109

## 7067-Bucket-close pilot pressure sensor signal abnormality

### Control Module : MCM

#### Solution:

- Use the below image for the fault code resolution process:



SMIL15CEX1880EB 1

- Main controller
- Pressure sensor (bucket close pilot)
 

Turn the key switch ON.

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

  - If diagnostic trouble code 7067 is displayed, proceed to Step 2.
- Check the bucket close pilot pressure sensor (2) voltage on the service support screen.
  - If the voltage is more than or equal to **4.75 V**, proceed to Step 3.
  - If the voltage is less than or equal to **0.25 V**, proceed to Step 6.
- Turn the key switch OFF and disconnect the bucket close pilot pressure sensor (2) connector (3-pin) **CN.D75**.
 

Turn the key switch ON.

Measure the voltage between the ground and terminal 1 of the bucket close pilot pressure sensor (2) connector (3-pin) **CN.D75** (harness side).

  - If the voltage is not about **5 V**, find and replace the short circuit on the wire ID WL435h and WL435.
  - If the voltage is about **5 V**, proceed to Step 4.
- Measure the voltage between the ground and terminal 2 of the bucket close pilot pressure sensor (2) connector (3-pin) **CN.D75** (harness side).
  - If the voltage is more than **4.75 V**, find and replace the short circuit on the wire ID GW410.
  - If the voltage is less than or equal to **4.75 V**, proceed to Step 5.
- Measure the voltage between the ground and terminal 3 of the bucket close pilot pressure sensor (2) connector (3-pin) **CN.D75** (harness side).
  - If the voltage is more than **0.25 V**, find and replace the short circuit on the wire ID BW445h and BW445.
  - If the voltage is less than or equal to **0.25 V**, replace the main controller (1).
- Inspect the bucket-close pilot pressure sensor (2).
 

Turn the key switch OFF.

Inspect for continuity between the terminal 1 of the connector **CN.D114** harness side and terminal 6 of the connector **CN.A2** harness side.

A. If there is no continuity, repair or replace the GR905a harness.

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

7. Inspect for continuity between the terminal 2 of the connector **CN.D114** harness side and terminal 27 of the connector **CN.A2** harness side.

A. If there is no continuity, repair or replace the GW905b harness.

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

## 7606-EEPROM data abnormality

### Control Module : MCM

#### Solution:

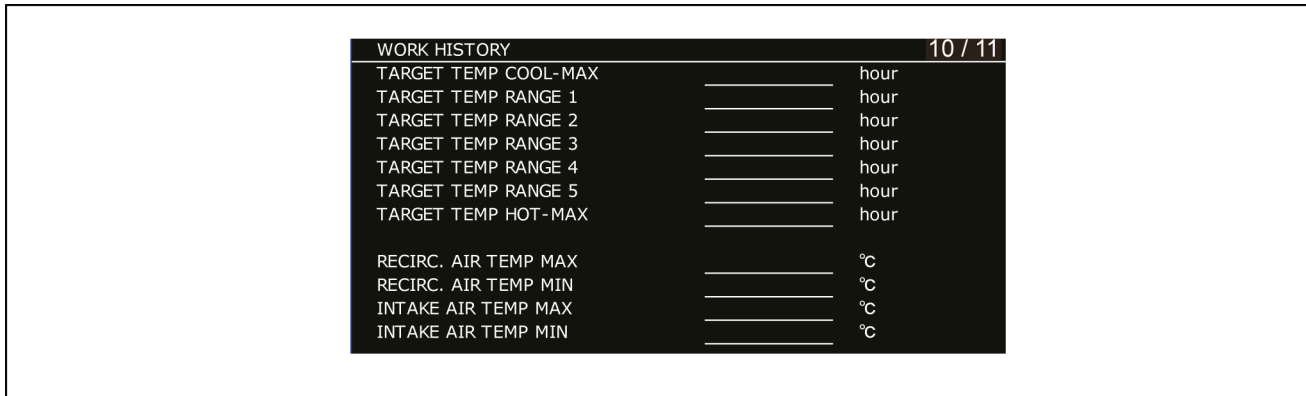
1. Turn the key switch ON.
  - A. If diagnostic trouble code 7606 is displayed, proceed to Step 2.
2. Check whether rewriting was performed on main controller before the diagnostic trouble code was displayed.
  - A. If there was rewriting performed on main controller before the diagnostic trouble code was displayed, rewriting of the computer changed the used space of the EEPROM. Turn the key switch OFF, and then turn the key switch ON again.
  - B. If there was rewriting performed on main controller before the diagnostic trouble code was not displayed, replace main controller.

MACHINE STATUS (Accessory 2)		6 / 9
ONE-TIME WIPER SW	_____	on/off
WIPER-INT OUT	_____	on/off
WIPER-CNT OUT	_____	on/off
WASHER OUT	_____	on/off
WORKING SIGNAL OUT	_____	on/off
RADIO MUTE RELAY	_____	on/off
ROOM LAMP RELAY	_____	on/off
WORKING LIGHT RELAY	_____	on/off
AUTO REFUEL STOP RELAY	_____	on/off

SMIL14CEX0920EA 7

Display	Explanation	Range
ONE-TIME WIPER SW	One-time wiper SW	ON/OFF
WIPER-INT OUT	Wiper INT output	ON/OFF
WIPER-CNT OUT	Wiper CNT output	ON/OFF
WASHER OUT	Washer output	ON/OFF
WORKING SIGNAL OUT	-	-
RADIO MUTE RELAY	Radio mute REL	ON/OFF
ROOM LAMP RELAY	Room lamp REL	ON/OFF
WORKING LIGHT RELAY	Working light REL	ON/OFF
AUTO REFUEL STOP RELAY	Refueling stop REL	ON/OFF

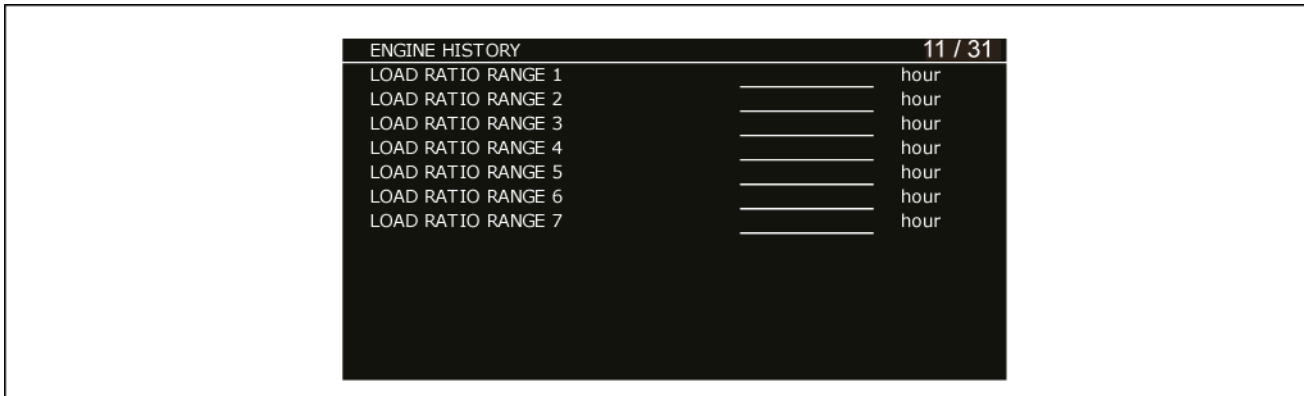
10/11



SMIL14CEX0952EA 39

Display	Explanation	Unit	Judgment condition	Judgment start condition
TARGET TEMP. COOL- MAX	AC set temperature; time distribution	hour	Set temperature < <b>18.5 °C (65.3 °F)</b>	Key ON
TARGET TEMP. RANGE 1	AC set temperature; time distribution	hour	Set temperature < <b>22 °C (71.6 °F)</b>	Key ON
TARGET TEMP. RANGE 2	AC set temperature; time distribution	hour	Set temperature < <b>24 °C (75.2 °F)</b>	Key ON
TARGET TEMP. RANGE 3	AC set temperature; time distribution	hour	Set temperature < <b>26.5 °C (79.7 °F)</b>	Key ON
TARGET TEMP. RANGE 4	AC set temperature; time distribution	hour	Set temperature < <b>28.5 °C (83.3 °F)</b>	Key ON
TARGET TEMP. RANGE 5	AC set temperature; time distribution	hour	Set temperature < <b>32 °C (89.6 °F)</b>	Key ON
TARGET TEMP. HOT-MAX	AC set temperature; time distribution	hour	Set temperature $\geq$ <b>32 °C (89.6 °F)</b>	Key ON
RECIRC.AIR TEMP MAX	Highest inside air temperature	C (°F)		Key ON
RECIRC.AIR TEMP MIN	Lowest inside air temperature	C (°F)		Key ON
INTAKE AIR TEMP MAX	Highest outside air temperature	C (°F)		Key ON
INTAKE AIR TEMP MIN	Lowest outside air temperature	C (°F)		Key ON

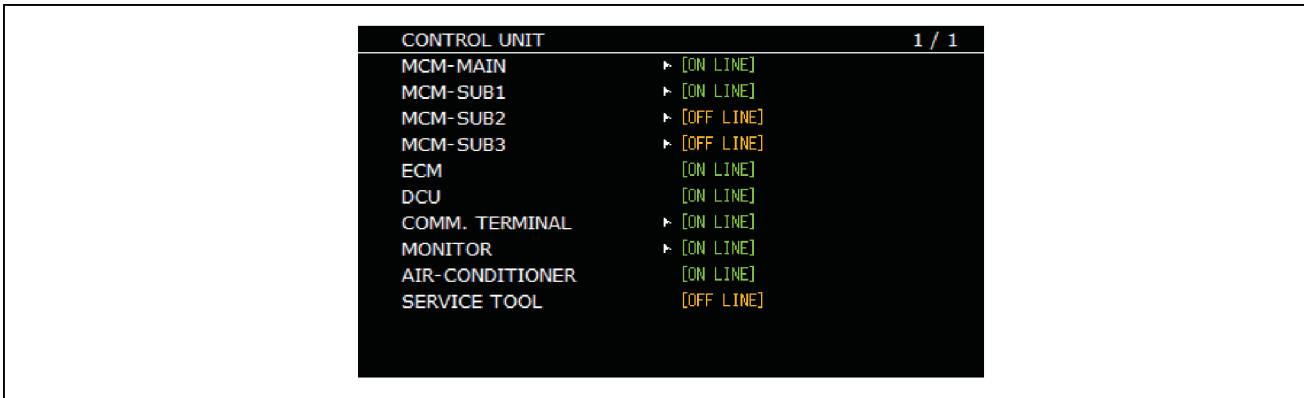
12/31



SMIL14CEX0983EA 71




Display	Explanation	Unit	Judgment condition	Judgment start condition
LOAD RATIO RANGE 1	Load ratio; time distribution	hour	Less than 30%	In <b>10 s</b> after the engine starts
LOAD RATIO RANGE 2	Load ratio; time distribution	hour	Less than 40%	In <b>10 s</b> after the engine starts
LOAD RATIO RANGE 3	Load ratio; time distribution	hour	Less than 50%	In <b>10 s</b> after the engine starts
LOAD RATIO RANGE 4	Load ratio; time distribution	hour	Less than 60%	In <b>10 s</b> after the engine starts
LOAD RATIO RANGE 5	Load ratio; time distribution	hour	Less than 70%	In <b>10 s</b> after the engine starts
LOAD RATIO RANGE 6	Load ratio; time distribution	hour	Less than 80%	In <b>10 s</b> after the engine starts
LOAD RATIO RANGE 7	Load ratio; time distribution	hour	80% or more	In <b>10 s</b> after the engine starts

## CONTROL UNIT



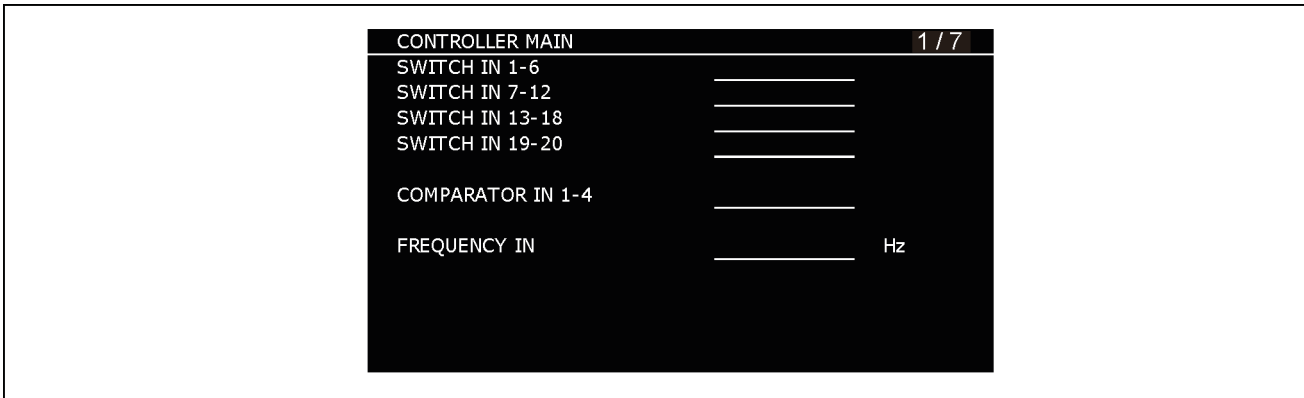
SMIL14CEX1109EA 102

Refer to the attached sheet for the types of sections in the "CONTROL UNIT" mode and their descriptions.

By pressing  and  on the monitor, MCM-MAIN, MCM-SUB1, etc. can be selected. Detailed data for the selected item can be seen by pressing .

## MCM-MAIN

1/7



SMIL14CEX1110EA 103

Display	Explanation	Unit
SWITCH IN 1-6	Switch input (0: OFF, 1: ON)	—
SWITCH IN 7-12	Switch input (0: OFF, 1: ON)	—
SWITCH IN 13-18	Switch input (0: OFF, 1: ON)	—
SWITCH IN 19-20	Switch input (0: OFF, 1: ON)	—
COMPARATOR IN 1-4	Comparator input (0: OFF, 1: ON)	
FREQUENCY IN	Frequency input	Hz

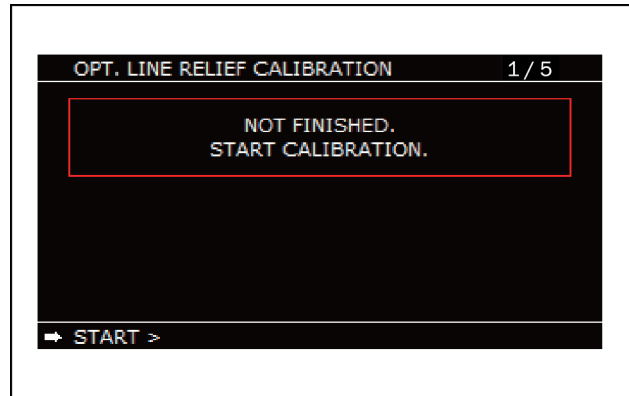
## OPT.line relief

Adjust the option line relief pressure (only applicable for the models with electromagnetic relief valve).


The calibration setup is required when the option relief proportional valve is replaced or the pump is replaced.

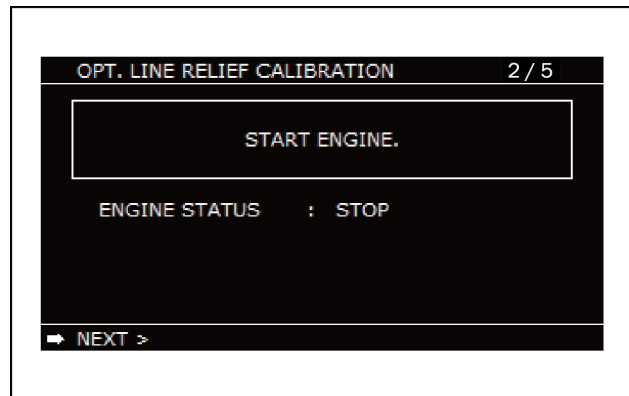
This is disabled unless the calibration setup and adjustment for the hydraulic pump are completed in advance. (You cannot enter the screen.)

1. If the relief pressure adjustment is not finished, the (red) initial screen is displayed.




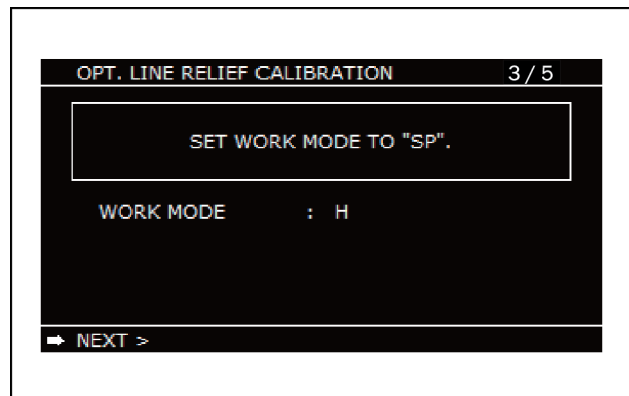
SMIL14CEX6791AA 9

2. When  is pressed, the system displays the engine start screen.




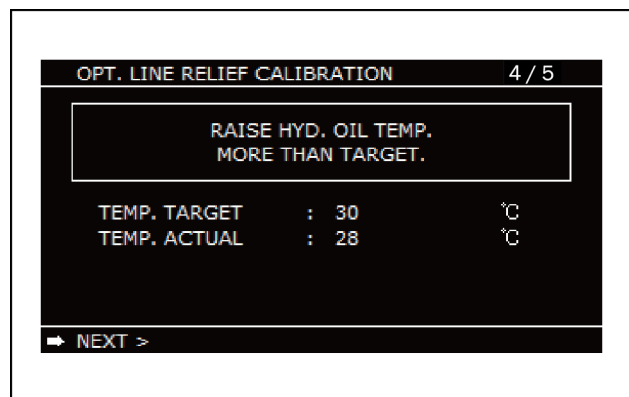
SMIL14CEX6792AA 10

3. When the engine is started and  is pressed, the system displays the SP mode screen.



SMIL14CEX6793AA 11

4. When the work mode is turned to the SP mode and  is pressed, the system displays the oil temperature raise screen.



SMIL14CEX6794AA 12

## Instrument cluster - Prepare

Items to prepare:

- Wrench [ **10 mm**]
- Hexagon wrench
- Phillips screwdriver

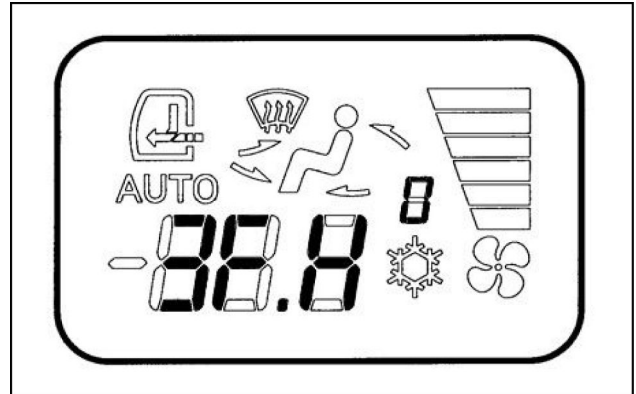
## Display contents in monitor mode

See the dedicated monitor 7-segment display table and 3-digit 7-segment table.

### 1. Display example 1

The dedicated monitor 7-segment display is 0 (indicates the inside air sensor state).

From the 3-digit 7-segment table 3F → The sensor is normal. → The inside air sensor is normal.

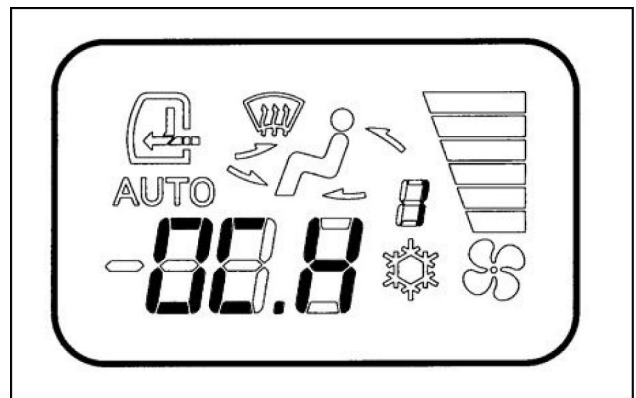


SMIL14CEX1962AA 10

### 2. Display example 2

The dedicated monitor 7-segment display is 1 (indicates the evaporator sensor state).

From the 3-digit 7-segment table 0C → The sensor is disconnected. → The evaporator sensor is disconnected.

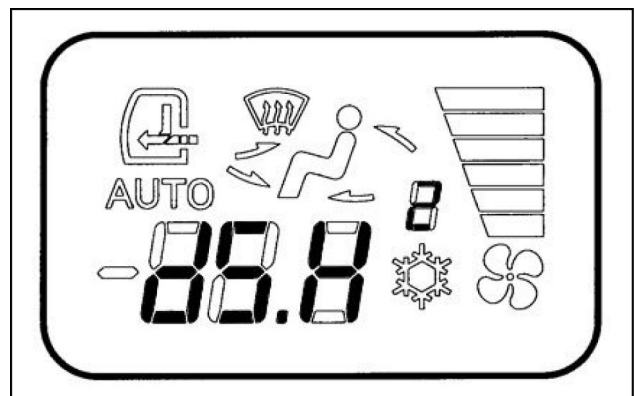


SMIL14CEX1963AA 11

### 3. Display example 3

The dedicated monitor 7-segment display is 2 (indicates the solar radiation sensor state).

From the 3-digit 7-segment table D5 → The sensor is shorted on the 5 V side. → The solar radiation sensor is shorted.



SMIL14CEX1964AA 12

## Cab heater blower unit - Replace

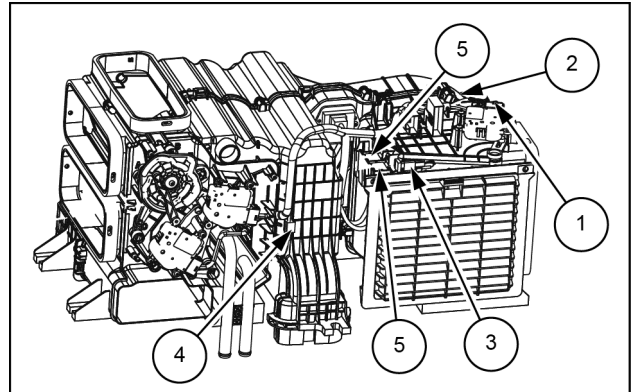
### ⚠ WARNING

**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.**

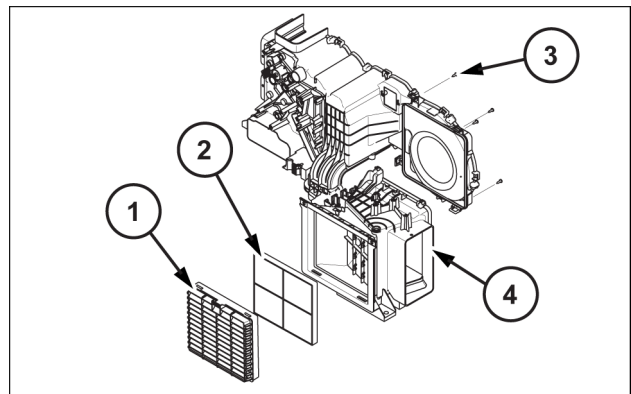
W1128A

1. Remove the connectors connected to the refresh/recirculate motor actuator connector (1), blower motor connector (2), inside air sensor connector (3), evaporator sensor connector (4) and relay connector (5).



SMIL14CEX1809AB 1

2. Remove the filter cover (1) and inside air filter (2).
  - Remove the 4 Phillips screws (3) M4x16 and remove the intake case (4).



SMIL15CEX4539AB 2

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

## Camera - Prepare - Field View Monitor (FVM) controller

Items to prepare:

- Wrench [ 15 mm]

# Contents

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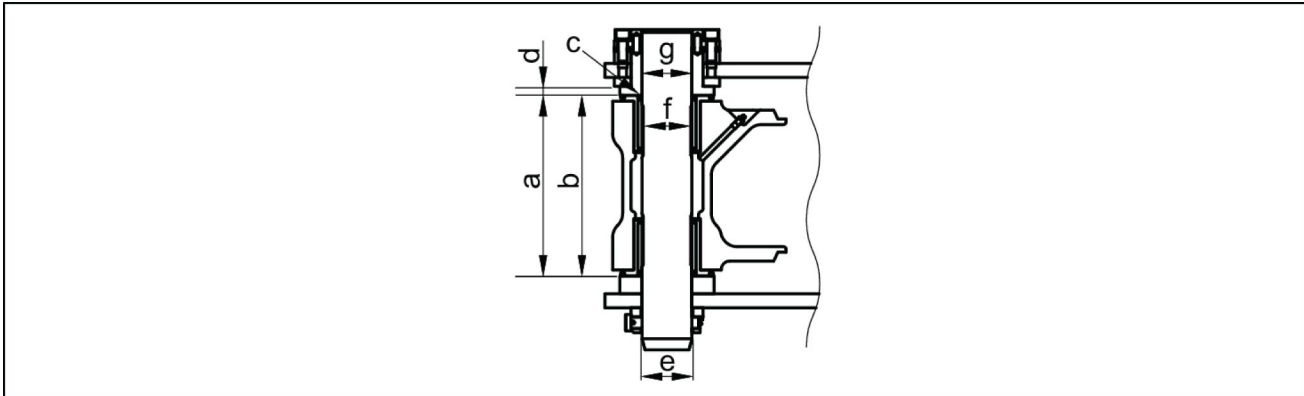
## Electrical systems - 55

### Cab lighting - 514

#### FUNCTIONAL DATA

Cab lighting	
Dynamic description - LED Light .....	3
Cab interior light	
Dynamic description - Room lamp .....	4

## 11. Bucket and arm installation section



SMIL13CEX2719EA 12

Part name	Code	Standard value	Usage limits	Judgment	Solution
Bucket	a	<b>255 mm</b> (10.039 in)	<b>261 mm (10.276 in)</b>	Acceptable/ Unacceptable	Replacement
Arm	b	<b>254 mm</b> (10.000 in)	<b>252 mm (9.921 in)</b>	Acceptable/ Unacceptable	Replacement
Clearance	c	<b>1.0 - 3.5 mm</b> (0.039 - 0.138 in)	Shim adjustment	Acceptable/ Unacceptable	Adjustment with shims
Bushing (bucket)	d	<b>16.0 mm</b> (0.630 in)	<b>8.0 mm (0.315 in)</b>	Acceptable/ Unacceptable	Replacement
Pin	e	<b>Ø 65 mm</b> (2.559 in)	<b>Ø 64 mm (2.520 in)</b>	Acceptable/ Unacceptable	Replacement
Bushing (arm)	f	<b>Ø 65 mm</b> (2.559 in)	<b>Ø 66.5 mm</b> (2.618 in)	Acceptable/ Unacceptable	Replacement
Bushing (bucket)	g	<b>Ø 65 mm</b> (2.559 in)	<b>Ø 66.5 mm</b> (2.618 in)	Acceptable/ Unacceptable	Replacement



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