

CX490D
CX500D
Crawler Excavator

SERVICE MANUAL

Part number 47937806

English

December 2015

© 2015 CNH Industrial Italia S.p.A. All Rights Reserved.

CASE
CONSTRUCTION

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: www.heydownloads.com by clicking the link below



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

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

INTRODUCTION

Intercooler capacity		40.0 kW
	fin type	Straight fin
	fin space	2.0 mm (0.08 in)
Fuel cooler capacity		3.72 kW
	fin type	Corrugated fin (wavy type)
	fin space	2.25 mm (0.09 in)
Cooling fan drive system		
Pump	1 gear pump	
Motor	Fixed displacement axial piston motor	
Filters		
Suction filter	105 µm	
Return filter	6 µm	
Pilot line filter	8 µm	

Hydraulic controls

Boom/Arm/Bucket/Swing	Pilot pressure control system (ISO control pattern)	
Travel	Pilot pressure control system	
Work mode select	SP - mode	
	H - mode	
	Auto - mode	
Travel mode select	2-speed travel	
Attachment cushion control		
Hydraulic lock (gate lock, left side tilt console)		
Fan reverse rotation system		

Electrical system

Engine control		
	Dial type throttle control	
	One touch idle / Auto deceleration / Auto idle shutdown system	
	Emergency stop	
Monitor system		
	Message display (Caution, condition, etc.)	
	Work mode display (SP, H, Auto)	
	Machine condition (Power boost, etc.)	
	Alarm display and buzzer	
	Water temperature	
	Hydraulic oil temperature	
	Fuel level	
	Diagnosis system	
	Rear view camera image	
	Urea water level	
Wire harness		
	Waterproof type connector	
Safety		
	Double horn	
Battery	2 X 12 V 128 A·h/5HR	
Lights		
Working light	Upper	24 V 70 W X 1
	Boom	24 V 70 W X 2
	Cab	24 V 70 W X 2
Operator's cab room	24 V 70 W X 1	

Fuel

Use only Ultra-Low Sulphur Diesel (S10) that meets **EN 590** specifications.

Using other types of fuel may lead to stalled engine output or deterioration in fuel economy.

NOTICE: *The warranty shall be invalid if any serious defect is caused by usage of any other fuel. Using fuel other than recommended may cause damage to the fuel injection pump, injector, DOC (Diesel Oxidation Catalyst), and other fuel supply system or the engine. CASE CONSTRUCTION may not be responsible to any of such damages.*

If the temperature drops below the fuel cloud point, output deficiency or engine start problems may occur due to wax crystals.

NOTICE: *If operating in severe winter climate, consult the fuel supplier or the CASE CONSTRUCTION dealer for specific diesel fuel according to the **EN 590** to be used.*

Conditions applicable to diesel fuel. The diesel fuel used must:

- be free from dust particles, even minute ones,
- have the proper viscosity,
- have a high cetane number,
- present great fluidity at low temperatures,
- have low sulphur content,
- have very little residual carbon.

It is recommended that the following safety information be considered in order to prevent damage to the engine fuel supply system.

- Some fuel suppliers mix old engine oil and diesel fuel.
- Makers of larger engine permit the use of this kind of fuel.
- However, do not use diesel fuel contaminated with engine oil in customer's engines.
- Not only will this fuel damage the engine, it may also have a negative impact on the exhaust gas purification function.
- Before using diesel fuel, confirm with the supplier whether the fuel complies with the above specifications.

NOTICE: *consult the supplier or the CASE CONSTRUCTION Dealer regarding appropriate use of fuel additives.*

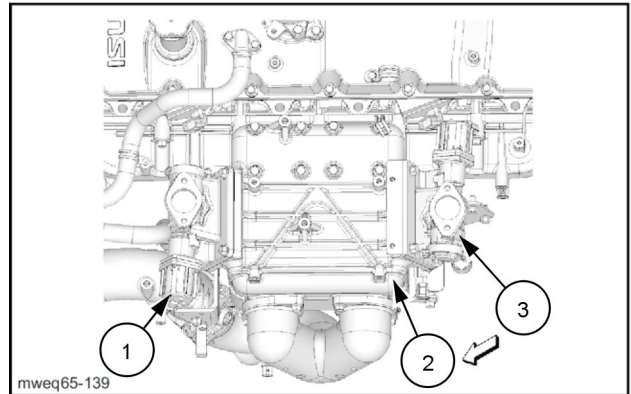
NOTICE: *in order to prevent condensation during cold weather, fill the fuel tank to full after the completing the day's work.*

Fuel storage:

Long storage can lead to the accumulation of impurities and condensation in the fuel. Engine trouble can often be traced to the presence of water in the fuel. The storage tank must be placed outside and the temperature of the fuel should be kept as low as possible. Drain off water and impurities regularly.

EGR valve removal

1. Disconnect the connector from the EGR valve.
2. Remove the EGR valve from the EGR mixing chamber (2).
3. Remove the lead valve from the EGR mixing chamber (2).
 1. EGR valve A
 3. EGR valve B



MWEQ65-139 11

Intake throttle valve removal

1. Remove the intake duct from the intake throttle valve.
2. Remove the intake throttle valve from the inlet duct.
3. Remove the O-ring from the intake throttle valve.

Inlet duct removal

1. Remove the inlet duct from the EGR mixing chamber.
2. Remove the O-ring from the inlet duct.

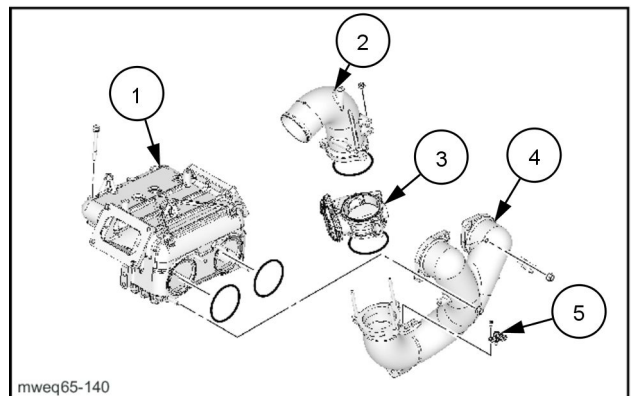
NOTE: Do not remove the boost pressure sensor/ boost temperature sensor except when necessary.

EGR mixing chamber removal

1. Remove the EGR mixing chamber (1) from the inlet cover.
2. Remove the O-ring from the EGR mixing chamber (1).

NOTE: Seal the inlet cover opening to prevent foreign material from entering.

2. Intake duct
3. Intake throttle valve
4. Inlet duct
5. Boost pressure sensor/boost temperature sensor



MWEQ65-140 12

Ventilation hose removal

1. Disconnect the ventilation hose from the cylinder head cover.
2. Disconnect the ventilation hose from the air duct.

Fuel suction pipe removal

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

Fuel leak-off pipe removal

1. Disengage the fuel leak-off pipe from the cylinder head.

10. Tighten the head bolt using the torque wrench.

NOTE: Tighten bolts 1 through 26 shown in the diagram in numerical order.
Confirm that the bolts are tightened to the torque or higher as described below.

Tightening torque: **230 N·m (170 lb ft)**.

NOTICE: Be careful not to drop foreign materials into the timing gear hole.

NOTE: The cylinder head installation bolts should not be reused exceeding 2 times.

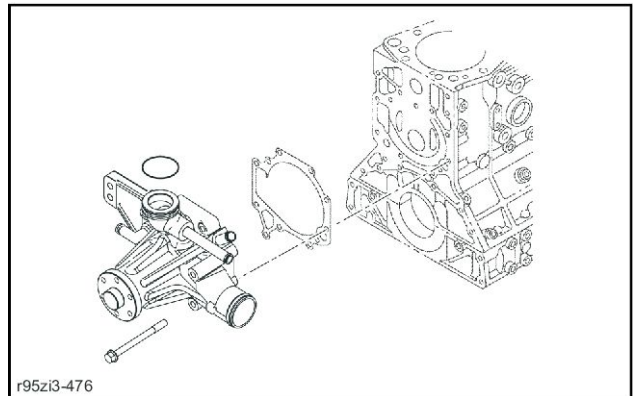
Water pump assembly installation

1. Install the O-ring to the water pump assembly.
2. Install the water pump assembly to the cylinder block.

NOTE: Use the stud bolts as a guide to prevent displacement of the gasket.

NOTICE: Clean the installation surface of the gasket, and install the gasket so that it is not displaced.

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



r95zi3-476

R95Z13-476 39

Thermostat housing installation

1. Install the thermostat housing to the cylinder head assembly.

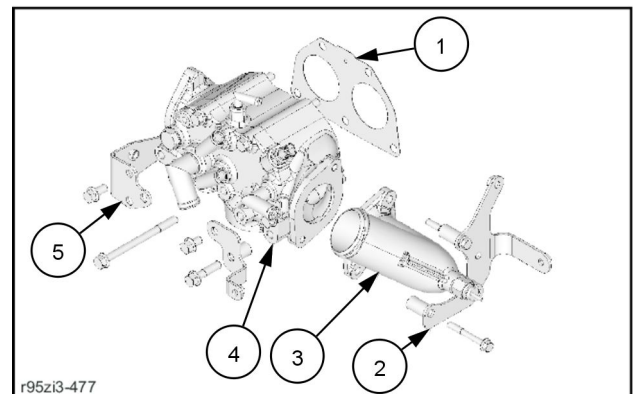
NOTE: Insert the gasket, and insert the thermostat housing into the water pump assembly to install it.

NOTICE: Assemble the thermostat housing after assembling the water pump assembly and cylinder head assembly.

NOTE: A small amount of ThreeBond 1521 can also be applied to the gasket.

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

1. Gasket
2. Bracket
3. Water outlet pipe
4. Thermostat housing
5. Bracket

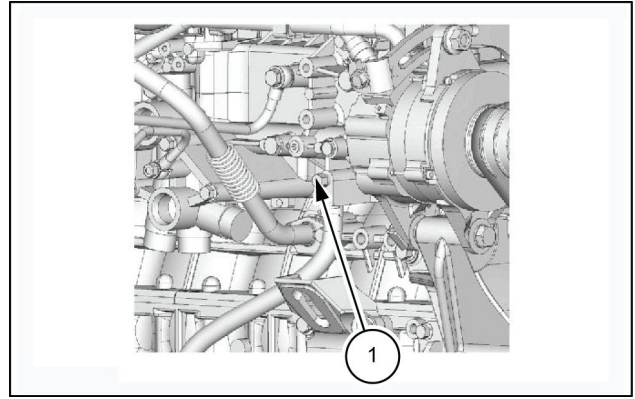


r95zi3-477

R95Z13-477 40

4. Discharge coolant from the cylinder block.
 - Loosen the drain plug **(1)** on the cylinder block, and drain the coolant.

NOTICE: Do not forget to tighten the drain plug.



SMIL13CEX6477AB 2

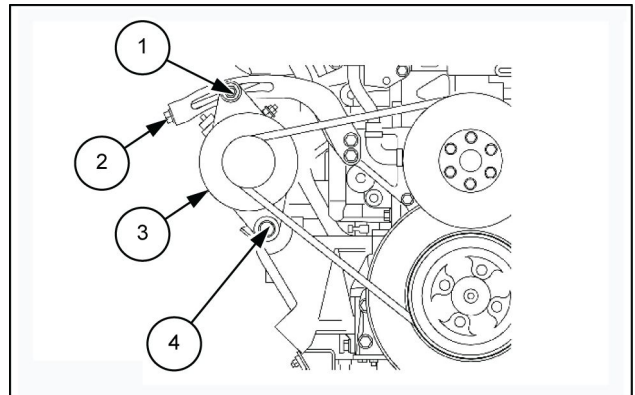
Oil level gauge guide tube removal

1. Remove the oil level gauge guide tube from the cylinder block

NOTICE: Be careful not to damage the O-ring.

Generator drive belt removal

1. Remove the generator drive belt from the pulley.
 - Loosen the lock nut **(1)** and penetration bolt **(4)**, and then loosen the adjust bolt **(2)** to remove the generator drive belt **(3)**.



SMIL13CEX6888AB 3

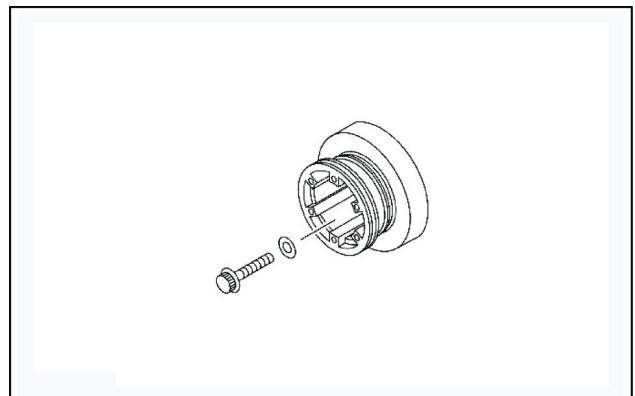
Water outlet pipe removal

1. Remove the water outlet pipe from the water pump.

Crankshaft pulley removal

1. Remove the crankshaft pulley from the crankshaft.

NOTICE: Be careful not to scratch the seal surface or not to apply excessive force to the water pump body when removing it.

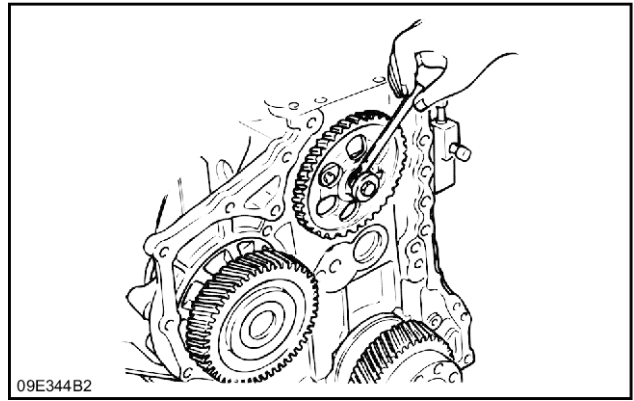


SMIL13CEX7002AA 4

Oil pan removal

1. Remove the oil pan from the cylinder block.

Idle gear clearance in the axis direction		
Idle gear	Standard value	Limit
A	0.140 - 0.229 mm (0.0055 - 0.0090 in)	0.35 mm (0.0138 in)
B	0.040 - 0.190 mm (0.0016 - 0.0075 in)	0.30 mm (0.0118 in)
C	0.135 - 0.190 mm (0.0053 - 0.0075 in)	0.30 mm (0.0118 in)
D	0.052 - 0.107 mm (0.0020 - 0.0042 in)	0.2 mm (0.0079 in)



09E344B2 37

Idle gear removal

1. Remove the idle gear from the cylinder block.

NOTE: Remove the idle gear A (3).

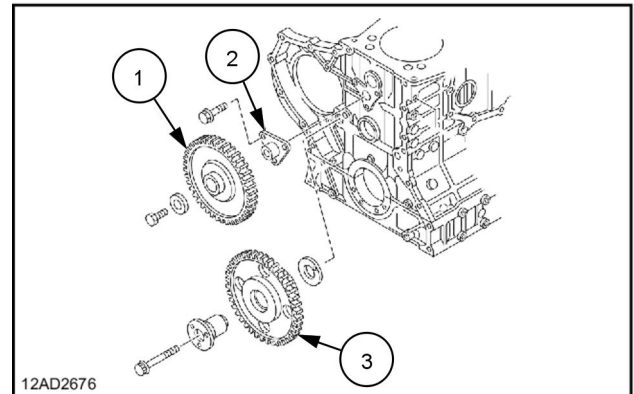
Idle gear shaft removal

1. Remove the idle gear from the idle gear shaft.

NOTE: Remove the idle gear B (1) from the idle gear B shaft (2).

2. Remove the idle gear shaft from the cylinder block.

NOTE: Remove the idle gear B shaft from the cylinder block.



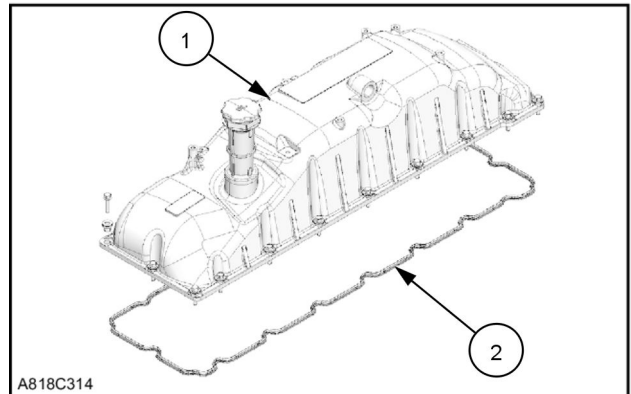
12AD2676 38

Ventilation hose disconnect

1. Disengage the ventilation hose from the air breather.

Cylinder head cover removal

1. Remove the cylinder head cover (1) from the camshaft carrier.
2. Remove the gasket (2) from the cylinder head cover.

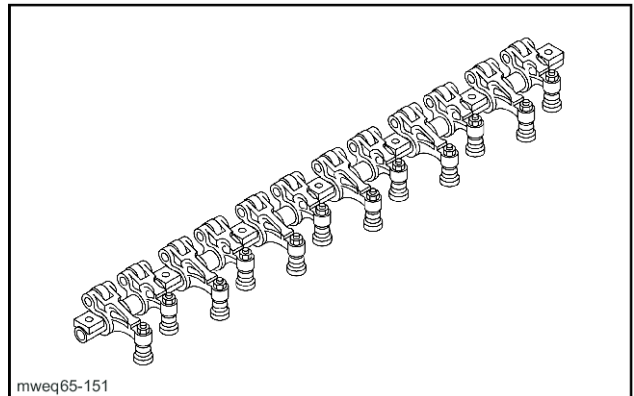


A818C314 3

Rocker arm shaft removal

1. Remove the rocker arm shaft from the camshaft carrier.

NOTE: Evenly loosen the rocker arm shaft installation bolts on both ends to remove them.



MWEQ65-151 4

Bridge removal

1. Remove the bridge from the bridge guide.

NOTE: Store the removed bridges in numerical order.

Camshaft measurement

1. Measure the clearance using the feeler gauge.

NOTE: Measure the camshaft clearance in the axis direction.

Camshaft clearance in the axis direction:

Standard value: **0.085 - 0.170 mm (0.0033 - 0.0067 in)**

Limit: **0.25 mm (0.0098 in)**

Camshaft removal

1. Remove the cam holder from the camshaft carrier.

NOTE: Evenly loosen them on both sides to remove them.

Camshaft measurement

1. Measure the clearance using the feeler gauge.

NOTE: Measure the camshaft clearance in the axis direction.

Camshaft clearance in the axis direction:

Standard value: **0.085 - 0.170 mm (0.0033 - 0.0067 in)**

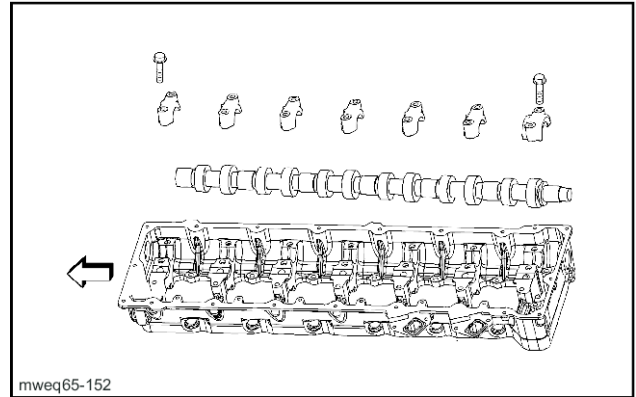
Limit: **0.25 mm (0.0098 in)**

Camshaft removal

1. Remove the cam holder from the camshaft carrier.

NOTE: Evenly loosen them on both sides to remove them.

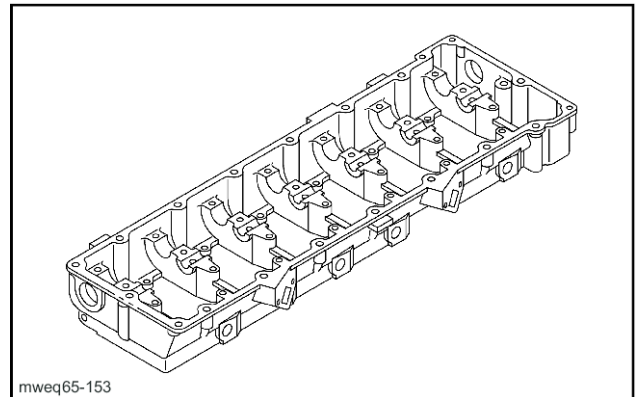
2. Remove the camshaft from the camshaft carrier.



MWEQ65-152 22

Camshaft carrier removal

1. Remove the camshaft carrier from the cylinder head assembly.

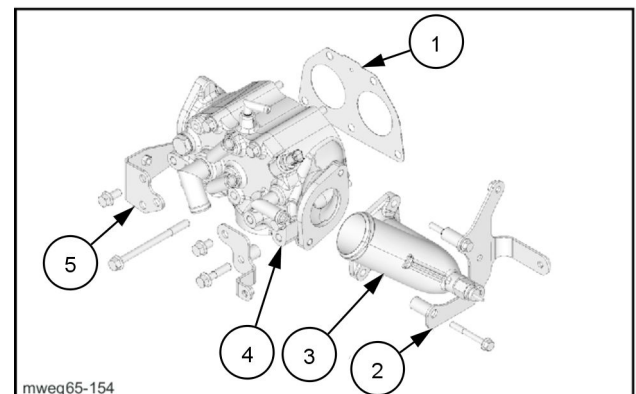


MWEQ65-153 23

Thermostat housing removal

1. Remove the thermostat housing from the cylinder head.

1. Gasket
2. Bracket
3. Water outlet pipe
4. Thermostat housing
5. Bracket



MWEQ65-154 24

Coolant filling

⚠ WARNING

Burn hazard!

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

W0367A

NOTICE: Work while taking care to prevent excess coolant from splashing onto the exhaust system parts. Wipe off any excess coolant.

1. Connect the hose to the pipe (1).

NOTE: Insert the opposite side hose into a container, such as a plastic container. Set the container at a higher place than the radiator.

2. Loosen the plug (1) using a wrench.

3. Air bleeding cock

3. Replenish the radiator with coolant.

NOTE: Add up to the inlet of the radiator filler neck.

NOTICE: Slowly add coolant so that no air intrudes.

4. Tighten the plug using a wrench.

NOTE: Apply **LOCTITE® 271™**.

Temporary tightening torque: **10.8 N·m (96 lb in)**

5. Replenish the radiator with coolant.

NOTE: Add while pressing the radiator upper hose manually several times to bleed the air from the hose.

NOTICE: Repeat the operation until the coolant level no longer drops.

6. Install the radiator cap to the radiator.

NOTICE: Securely install the radiator cap.

7. Add coolant to the radiator reserve tank.

NOTE: Add up to the MAX line of the radiator reserve tank.

8. Install the cap to the radiator reserve tank.

NOTE: Perform the urea SCR dosing module coolant piping air bleeding process while referring to the owner's manual from the machinery manufacturer.

NOTICE: Wipe off any excess coolant.

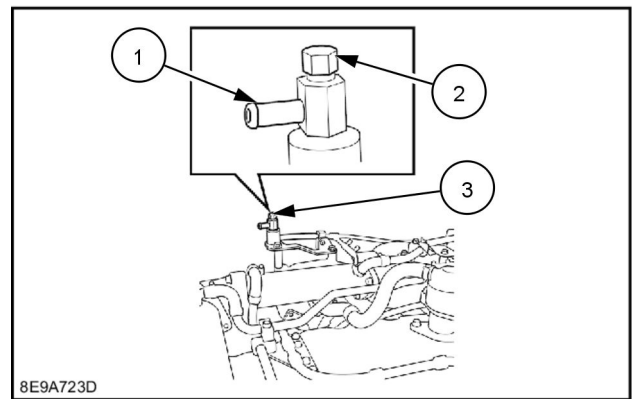
9. Start the engine.

NOTE: Idle the engine for 5 minutes.

10. Stop the engine.

11. Remove the radiator cap from the radiator.

NOTICE: Confirm that the engine has cooled.



8E9A723D

8E9A723D 43

11. Install the connecting rod bearing cap to the connecting rod.

NOTE: Tighten the bolts in the order shown in the diagram using a torque wrench and angle wrench.

NOTICE: When tightening the connecting rod cap, conduct work with the crank pin at the bottom dead position of each cylinder.

Tightening torque : **58.0 N·m (42.8 lb ft)** first step, right side bolt

Tightening torque : **58.0 N·m (42.8 lb ft)** second step, left side bolt

Specified angle : **60 °** third step, right side bolt

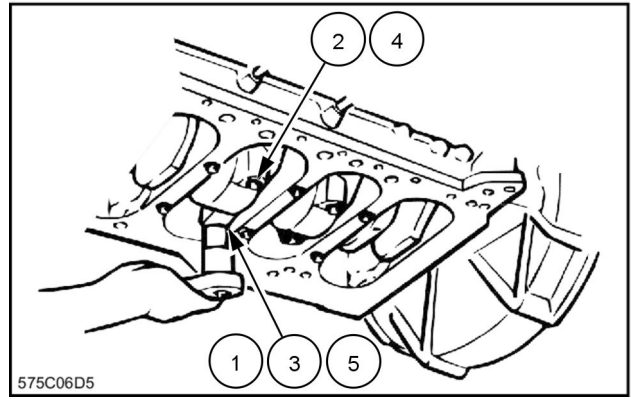
Specified angle : **120 - 150 °** fourth step, left side bolt

Specified angle : **60 - 90 °** fifth step, right side bolt

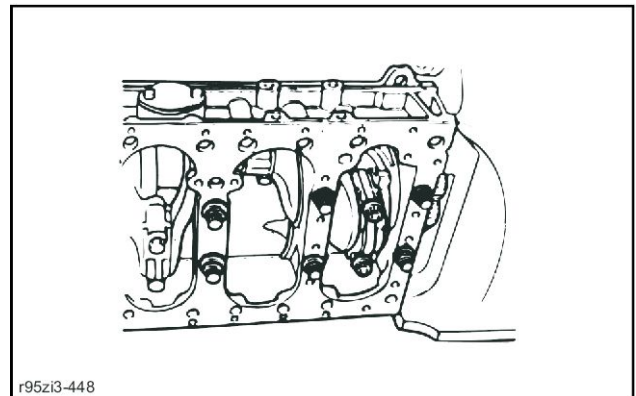
12. Turn the crankshaft.

NOTE: Confirm that the crankshaft rotates smoothly.

13. Inspect the piston oil jet.



575C06D5 7



r95zi3-448 8

Oil pump assembly installation

NOTICE: Install the oil pipe and the oil strainer after installing the oil pump assembly.

1. Install the oil pump assembly to the cylinder block.

Tightening torque: **22 N·m (16 lb ft)** M8.

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

2. Apply the engine oil to the O-ring.
3. Install the oil pipe to the oil pump assembly.

NOTICE: All bolts must be temporarily tightened, and after being confirmed that they are seated, they must be tightened to the specified torque.

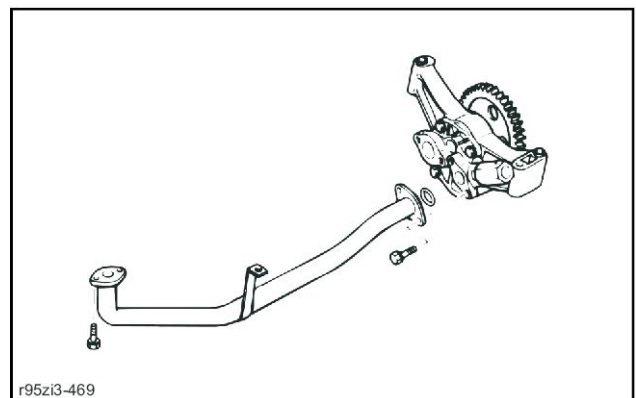
Tightening torque: **22 N·m (16 lb ft)**.

4. Install the O-ring to the oil strainer.

NOTICE: Do not reuse the O-ring.

5. Apply the engine oil to the O-ring.
6. Install the oil strainer to the oil pump assembly.

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



r95zi3-469 9

Engine flywheel - Inspect

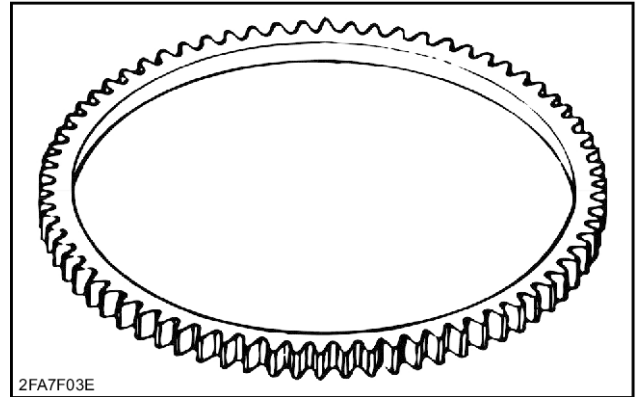
Flywheel inspection

1. Inspect the ring gear.

NOTE: *Inspect the ring gear tooth surface for worn and damage.*

2. Inspect the flywheel.

NOTE: *Inspect the flywheel for wear and cracks.*



2FA7F03E 1

12. Install the connecting rod assembly to the crankshaft.

NOTE: Align the connecting rod marking with the cap marking.

Install so that the marking faces the exhaust side.

13. Apply molybdenum disulfide grease to the bolt.

NOTE: Apply on the seat surface and threaded portion of the connecting rod cap installation bolt.

14. Install the connecting rod bearing cap to the connecting rod.

NOTE: Tighten the bolts in the order shown in the diagram using a torque wrench and angle wrench.

NOTICE: When tightening the connecting rod cap, conduct work with the crank pin at the bottom dead position of each cylinder.

Tightening torque : **58.0 N·m (42.8 lb ft)** first step, right side bolt

Tightening torque : **58.0 N·m (42.8 lb ft)** second step, left side bolt

Specified angle : **60 °** third step, right side bolt

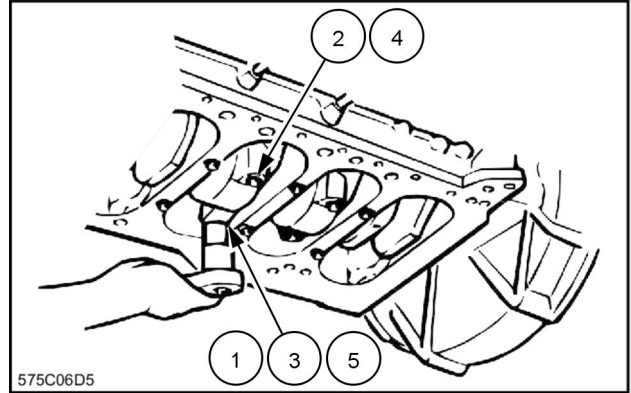
Specified angle : **120 - 150 °** fourth step, left side bolt

Specified angle : **60 - 90 °** fifth step, right side bolt

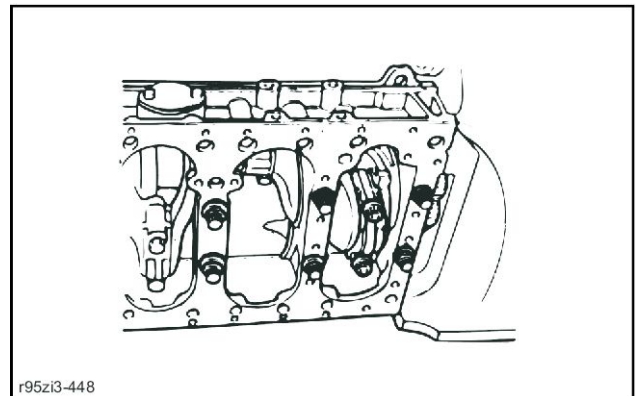
15. Turn the crankshaft.

NOTE: Confirm that the crankshaft rotates smoothly.

16. Inspect the piston oil jet.



R95Zi3-448 20



R95Zi3-448 21

Fuel injection system - Bleed

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

1. Priming pump
2. Air bleeding plug
3. Fuel filter element

1. Prepare the pan.
2. Loosen the plug using the wrench.

NOTE: Start with the fuel filter that is nearest to the fuel tank.

3. Operate the priming pump.

NOTE: Bleed the air from the fuel filter and fix the priming pump.

4. Tighten the plug using the wrench.
5. Operate the priming pump.

NOTE: Repeat the operation 10 times or more until fuel is filled.

Wait for about **1 min** after operating the priming pump.

6. Loosen the plug using a wrench.

NOTE: Remove the air in the fuel filter.

7. Tighten the plug using a wrench.

NOTICE: Continue air removal work until no air comes out.

8. Loosen the plug using the wrench.

NOTE: Loosen the plug (1) of the fuel supply pump.

9. Operate the priming pump.

NOTE: Operate the priming pump until no air bubbles come out.

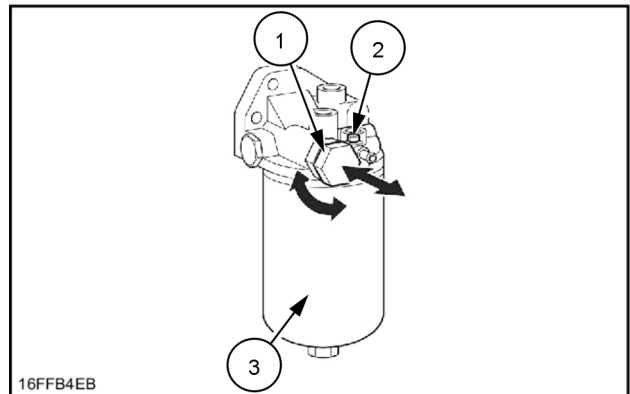
10. Tighten the plug using the wrench.

NOTE: Tighten the plug of the fuel supply pump.

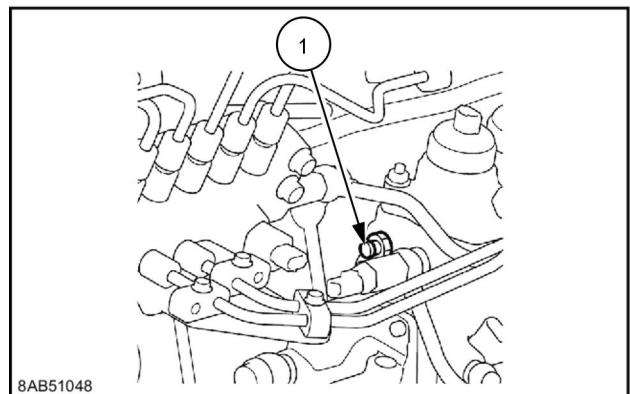
NOTICE: Do not over-tighten the plug.

11. Operate the priming pump.

NOTE: Operate the priming pump until it becomes heavy.



16FFB4EB 1



8AB51048 2

8. Install the cap to the radiator reserve tank.

NOTE: Perform the urea SCR dosing module coolant piping air bleeding process while referring to the owner's manual from the machinery manufacturer.

NOTICE: Wipe off any excess coolant.

9. Start the engine.

NOTE: Idle the engine for **5 min**.

10. Stop the engine.

11. Remove the radiator cap from the radiator.

NOTICE: Confirm that the engine has cooled.

12. Replenish the radiator with coolant.

NOTE: Add up to the inlet of the radiator filler neck.

NOTICE: Slowly add coolant so that no air intrudes. If the coolant amount is excessively low, inspect for coolant leakage.

13. Install the radiator cap to the radiator.

NOTICE: Securely install the radiator cap.

14. Start the engine.

NOTE: For models with heaters, the set temperature and blower speed are set to the maximum, and warm up the engine at approximately **1500 - 2000 RPM**.

With the engine running, confirm that the thermostat valve is open by touching the radiator upper hose to see if it is warm.

NOTICE: If the radiator upper hose is not warm, perform step 15 again.

NOTE: Continue to idle the engine for **5 min** or more.

15. Stop the engine.

16. Remove the radiator cap from the radiator.

NOTICE: Confirm that the engine has cooled.

17. Replenish the radiator with coolant.

NOTE: Fill with coolant up to the brim of the radiator cap mouth with an amount of coolant equal to the difference between the current coolant level and the radiator cap.

NOTICE: Slowly add coolant so that no air intrudes. If the coolant amount is excessively low, inspect for coolant leakage.

18. Install the radiator cap to the radiator.

NOTICE: Securely install the radiator cap.

19. Add coolant to the radiator reserve tank.

NOTE: Add up to the **MAX** line of the radiator reserve tank.

NOTICE: If the coolant level of the radiator reserve tank has fallen the next morning, add coolant up to the **MAX** line.

Water feed pipe installation

1. Install the water feed pipe to the cylinder block.

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

2. Connect the water feed pipe to the turbocharger assembly.

Tightening torque: **50 N·m (36.88 lb ft)**

Turbocharger feed oil pipe installation

1. Temporarily tighten the turbocharger feed oil pipe (3) onto the turbocharger assembly.

2. Temporarily tighten the turbocharger feed oil pipe (3) to the oil port cover.

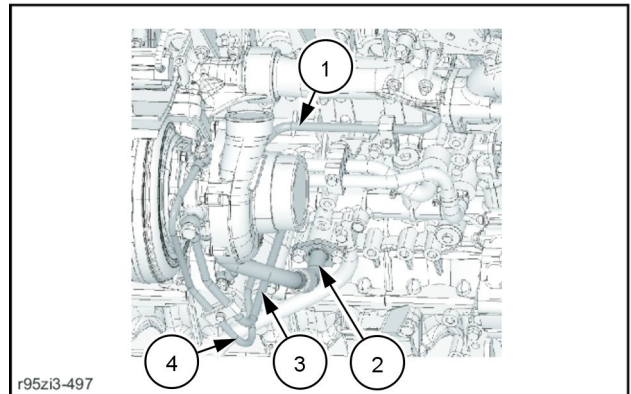
3. Securely tighten the turbocharger feed oil pipe (3) onto the turbocharger assembly.

Tightening torque: **34 N·m (25.08 lb ft)**

4. Final tighten the turbocharger feed oil pipe (3) to the oil port cover.

Tightening torque: **34 N·m (25.08 lb ft)**

1. Water return pipe
2. Oil return pipe
3. Turbocharger feed oil pipe
4. Water feed pipe



R95Zi3-497 3

Oil return pipe installation

1. Install the O-ring to the oil return pipe (4).

NOTE: Install them on both ends of the oil return pipe.

2. Temporarily tighten the oil return pipe (4) onto the turbocharger assembly (1).

3. Temporarily tighten the oil return pipe (4) onto the cylinder block.

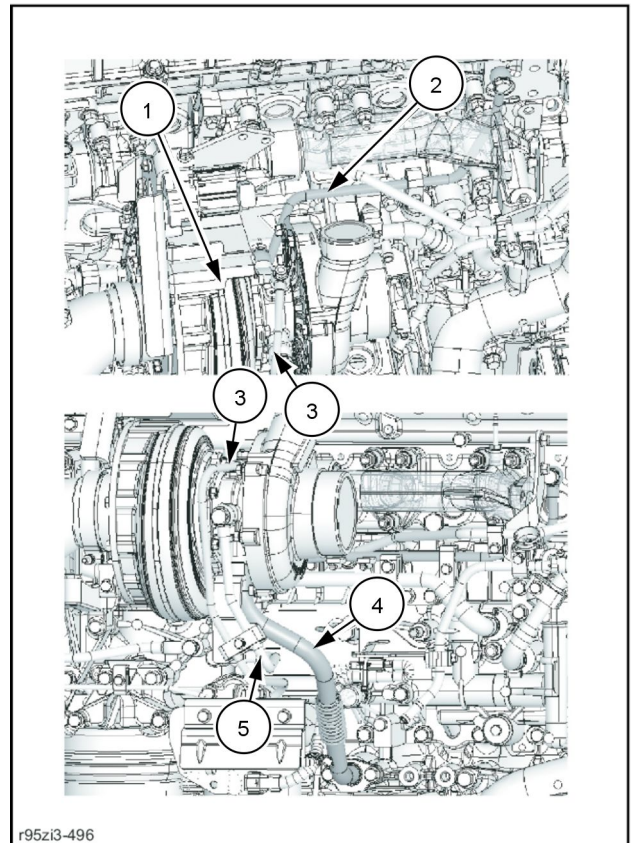
4. Securely tighten the oil return pipe (4) onto the turbocharger assembly (1).

Tightening torque: **22 N·m (16.23 lb ft)**

5. Securely tighten the oil return pipe (4) onto the cylinder block.

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

2. Water return pipe
3. Water feed pipe
4. Oil return pipe
5. Oil feed pipe



R95Zi3-496 4

Index

Engine - 10

Selective Catalytic Reduction (SCR) exhaust treatment - 500

Coolant control valve - Install	21
Coolant control valve - Remove	19
Diesel Exhaust Fluid (DEF)/AdBlue® tank - Install - DEF sensor	18
Diesel Exhaust Fluid (DEF)/AdBlue® tank - Prepare	14
Diesel Exhaust Fluid (DEF)/AdBlue® tank - Remove	15
Diesel Exhaust Fluid (DEF)/AdBlue® tank - Remove - DEF sensor	17
Diesel Oxidation Catalyst (DOC) - Install	25
Diesel Oxidation Catalyst (DOC) - Remove	24
Selective Catalytic Reduction (SCR) exhaust treatment - Component identification	5
Selective Catalytic Reduction (SCR) exhaust treatment - Overview	3
Selective Catalytic Reduction (SCR) muffler and catalyst - Assemble	11
Selective Catalytic Reduction (SCR) muffler and catalyst - Disassemble	8
Selective Catalytic Reduction (SCR) muffler and catalyst - Inspect	10
Selective Catalytic Reduction (SCR) muffler and catalyst - Install	13
Selective Catalytic Reduction (SCR) muffler and catalyst - Prepare	6
Selective Catalytic Reduction (SCR) muffler and catalyst - Remove	7

Engine cooling system - Filling

Coolant filling

⚠ WARNING

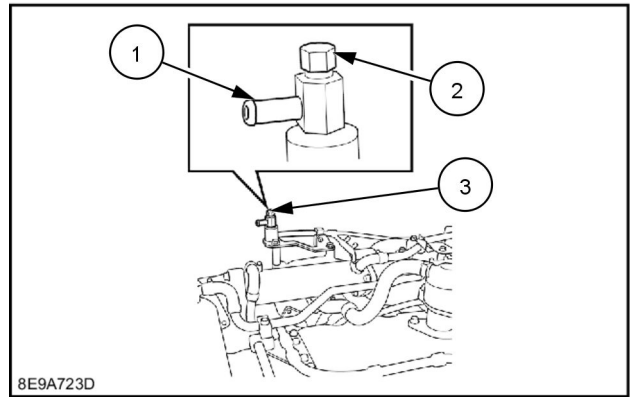
Burn hazard!

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

W0367A

NOTICE: Work while taking care to prevent excess coolant from splashing onto the exhaust system parts. Wipe off any excess coolant.

1. Remove the cap from the pipe.
2. Connect the hose to the pipe.
 - Insert the opposite side hose into a container, such as a plastic container.
 - Set the container at a higher place than the radiator.
3. Loosen the plug using a wrench.
 - (1) Pipe
 - (2) Plug
 - (3) Air bleeding cock



8E9A723D 1

4. Replenish the radiator with coolant.

NOTE: Add up to the inlet of the radiator filler neck.

NOTE: Slowly add coolant so that no air intrudes.

5. Tighten the plug using a wrench.

Tightening torque: **10.8 N·m (7.97 lb ft)**

NOTE: Apply **LOCTITE® 271™**.

6. Replenish the radiator with coolant.

NOTE: Add while pressing the radiator upper hose manually several times to bleed the air from the hose.

NOTE: Repeat the operation until the coolant level no longer drops.

7. Install the radiator cap to the radiator.

NOTE: Securely attach the radiator cap.

8. Add coolant to the radiator reserve tank.

NOTE: Add up to the **MAX** line of the radiator reserve tank.

Coolant thermostat - Inspect

1. Inspect the thermostat.

- Shake the thermostat pellet section to inspect for looseness and damages in the caulking sections.
- Place the thermostat in water, and gradually raise the water temperature to inspect the opening temperature, full open temperature and lift amount.

Opening temperature: **80 - 84 °C (176 - 183 °F)**

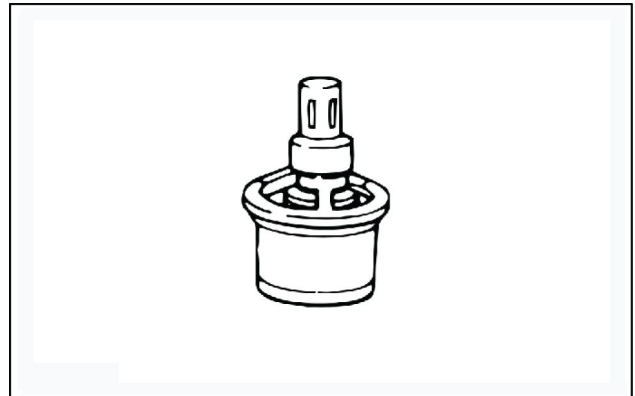
Full open temperature: **95 °C (203 °F)**

Lift amount: **11 mm (0.433 in)**

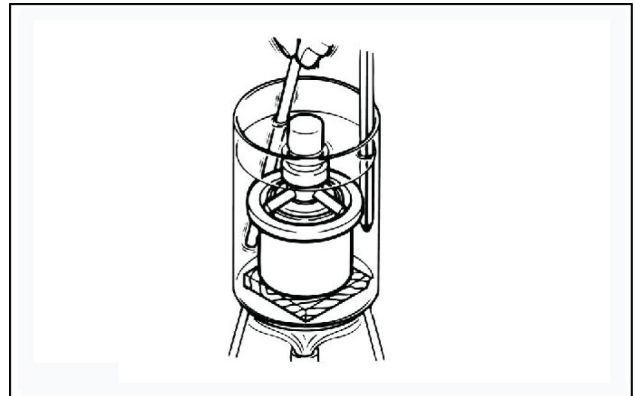
- Since the heat capacity is high for wax type thermostats, there is a slight difference in valve operations for the fluctuations of water temperature.

NOTICE: Place a wood piece on the bottom of the container so that the thermostat is not directly heated, or suspend the thermostat.

NOTICE: Constantly stir the hot water so that there is no difference in temperature.



SMIL13CEX7067AA 1

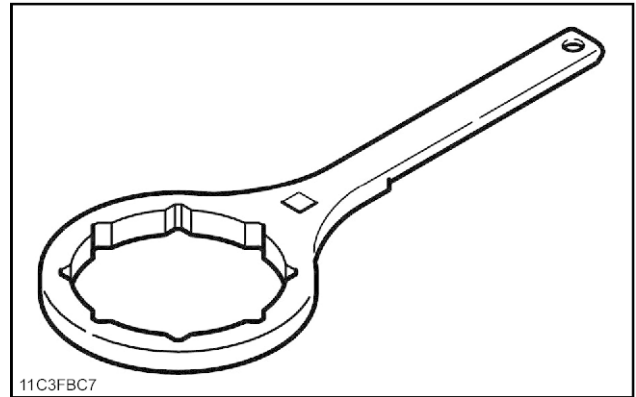


SMIL13CEX7068AA 2

Engine oil filter - Install

1. Install oil filter element to oil filter body using a special tool (see **Engine oil filter - Special tools (10.304)**).

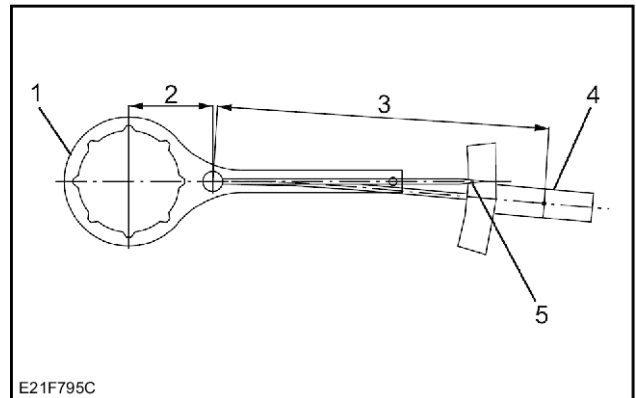
NOTE: $Actual\ torque = Reading\ torque \times (Effective\ length + 87) / Effective\ length$



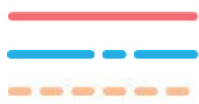
11C3FBC7 1

Tightening torque : **64 N·m (47.2 lb ft)**

1. Filter wrench
2. 87 mm {3.4252 in}
3. Effective length
4. Torque wrench
5. Reading torque



E21F795C 2

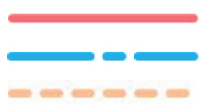


Pressure line
Tank line
Pilot pressure line



Pilot tank line
Electric line

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



Pressure line
Tank line
Pilot pressure line



Pilot tank line
Electric line

1. Hydraulic pump
2. 5 stack solenoid valve
3. Remote control valve (arm, swing)
4. Cushion valve
5. Control valve
6. 5 stack proportional pressure reducing valve
7. Main computer
8. Arm cylinder
9. HBCV
10. Control lever lock switch
11. Lever lock
12. Arm out
13. Arm in
14. Arm [1] spool
15. Arm [2] spool
16. Arm load holding valve check valve
17. Arm semi-parallel [1] spool
18. Arm semi-parallel [1] spool control
19. Boom [1] spool
20. Boom [2] spool
21. Boom cylinder
22. HBCV
23. Boom load holding valve check valve
24. Boom [2] spool control
25. Remote control valve (boom, bucket)
26. Boom (up)
27. Boom (down)
28. Arm [2] spool control
29. HBCV check valve
30. Load holding valve spool

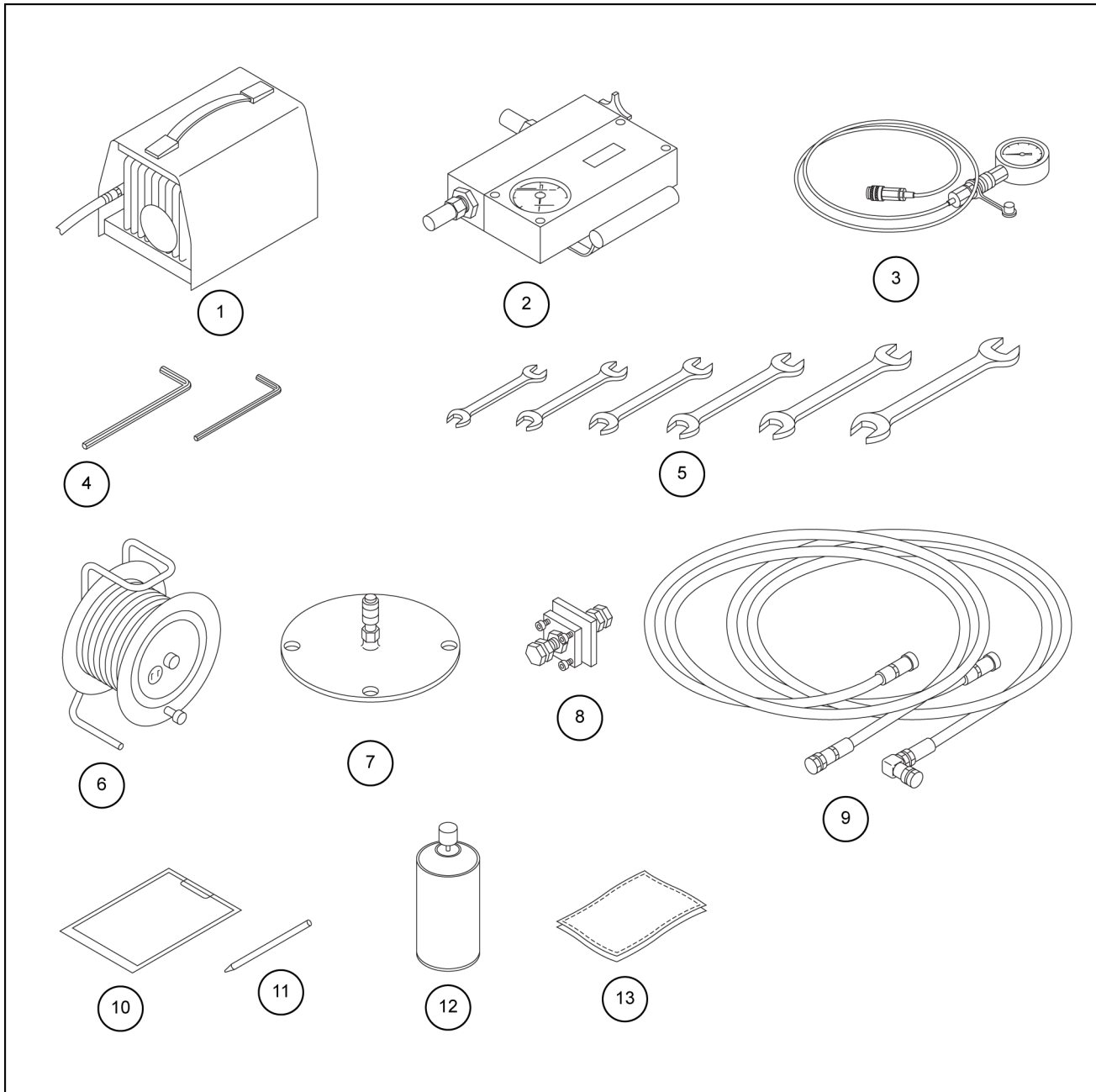
Item		Standard value	
Engine speed measurement	Engine speed (At no load)	SP mode	1990 - 2010 RPM
		H mode	1790 - 1810 RPM
		A mode	1640 - 1660 RPM
		Low idle	890 - 910 RPM
	Engine speed (At 2 relief)	SP mode	1990 - 2010 RPM
		H mode	1790 - 1810 RPM
		A mode	1640 - 1660 RPM
		Low idle	890 - 910 RPM
Pump Command Displacement	Displacement (At no load)	SP mode	P1,P2 0 - 5 %
		H mode	P1,P2 0 - 5 %
		A mode	P1,P2 0 - 5 %
	Displacement on P2 side (At 1 relief) Bucket open At normal pressure	SP mode	P1 0 - 5 % P1 71 - 81 %
		H mode	P1 0 - 5 % P1 66 - 76 %
		A mode	P1 0 - 5 % P1 59 - 69 %
	Displacement (At 2 relief) Boom up At normal pressure	SP mode	P1,P2 44 - 54 %
		H mode	P1,P2 48 - 58 %
		A mode	P1,P2 42 - 52 %
Attachment free-fall amount measurement	At no load Displacement for 10 min Each cylinder displacement is a reference value.	Boom cylinder	10.0 mm (0.394 in) or less
		Dipper cylinder	25 mm (0.984 in) or less
		Bucket cylinder	20.0 mm (0.787 in) or less
		Tip (fall amount)	250.0 mm (9.843 in)
Attachment speed measurement	Boom	Up	3.6 - 4.8 s
		Down	2.6 - 3.6 s
	Dipper	Open	2.7 - 3.7 s
		Close	3.1 - 4.1 s
	Bucket	Open	2.3 - 3.3 s
		Close	2.4 - 3.4 s
High Soil Volume Specifications	Boom	Up	3.8 - 5.0 s
		Down	2.8 - 3.8 s
	Dipper	Open	2.7 - 3.7 s
		Close	3.1 - 4.1 s
	Bucket	Open	2.7 - 3.7 s
		Close	3.1 - 4.1 s
Swing speed measurement	Right/Left swing (every revolution)		6.1 - 7.1 s 8.5 - 9.7 RPM
Swing brake performance	Swing brake angle 180 ° swing	Minimum operating radius at no load	50 ° or less
Travel speed measurement	Forward/Backward	High speed [every 6 m (19.69 ft)]	3.6 - 4.6 s 4.7 - 5.9 km/h (2.9 - 3.7 mph)
		Low speed [every 6 m (19.69 ft)]	6.1 - 7.5 s 2.8 - 3.6 km/h (1.7 - 2.2 mph)
Zigzag amount measurement	Zigzag amount while traveling 20 m (65.62 ft) Forward/Backward	High speed	1000 mm (39.37 in) or less
		Low speed	1000 mm (39.37 in) or less
Shoe tension condition	Measured with one side frame raised (both right and left)	Iron	350 - 370 mm (13.78 - 14.57 in)
Sprocket rotation	Forward/Backward (10 rotations) SP mode	High speed	15.0 - 19.0 s
		Low speed	27.1 - 31.1 s
Drain amount (MAX)	Travel Motor Very slow during a stall		3 L/min (0.79 US gpm)
	Swing motor Very slow during a stall		2.5 L/min (0.66 US gpm)

Hydraulic systems - Flow test

Preparations

Workers 3 Role (worker 1: work supervisor, pressure adjustment)
 Role (worker 2: operator)
 Role (worker 3: flow, pressure measurement, recording)

Items to prepare



SMIL14CEX2109GB 1

1	Vacuum pump and power supply	8	Adapter (flange type)
2	Flow meter	9	Hydraulic hose (for flow measurement)
3	Pressure gauge (60 MPa x 2)	10	Recording sheet
4	Hexagon wrenches (6 mm , 10 mm)	11	Pen
5	Wrenches (17 mm , 19 mm , 24 mm , 27 mm x 2, 32 mm , 36 mm x 2)	12	Cleaning fluid

Contents

Hydraulic systems - 35

Fixed displacement pump - 104

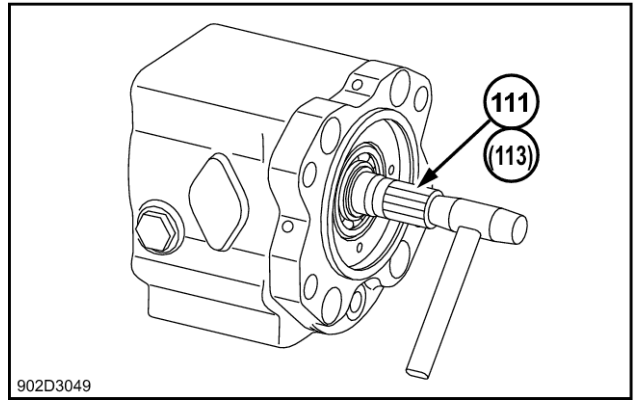
FUNCTIONAL DATA

Pump

Dynamic description	3
---------------------------	---

9. Install the drive shaft **(111)** with a bearing **(123)**, bearing spacers **(127)**, and stop ring **(824)** attached on the swash plate support board **(251)**.

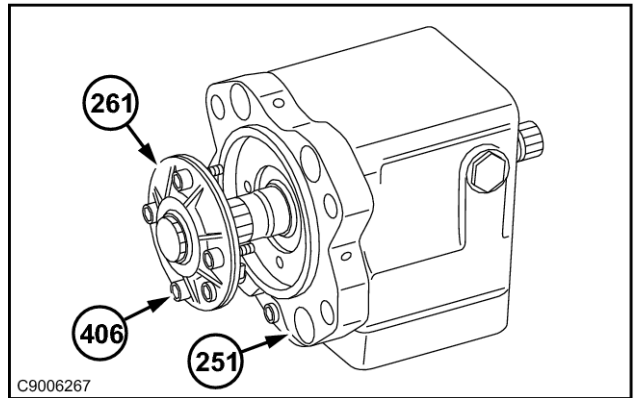
- Do not strike the drive shaft with a hammer, etc.
- Lightly strike the outside ring of the bearing with a plastic hammer to install it, and use a steel rod, etc. to tightly insert it all the way in.



902D3049 3

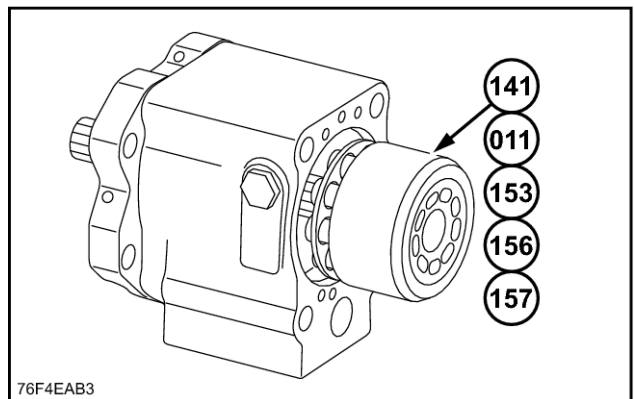
10. Install the seal cover **(F) (261)** to the swash plate support board **(251)**, and secure with the hexagon socket head bolts **(406)**.

- Be careful not to damage the oil seal when installing it.



C9006267 4

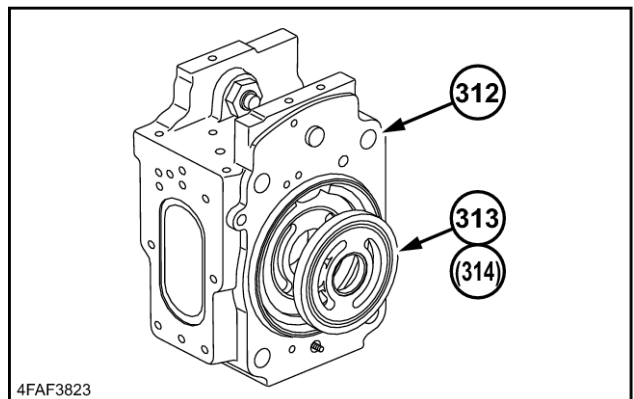
11. Assemble the piston cylinder subassembly [cylinders **(141)**, pistons **(151)** and **(152)**, holder plates **(153)**, spherical bushings **(156)**, spacers **(158)**, cylinder springs **(157)**], and then insert it into the pump casing in alignment with the phase of the splines of the spherical bushings and cylinder blocks.



76F4EAB3 5

12. Install the valve plate **(313) (314)** on the valve block **(312)** while aligning it with the pin **(885)**.

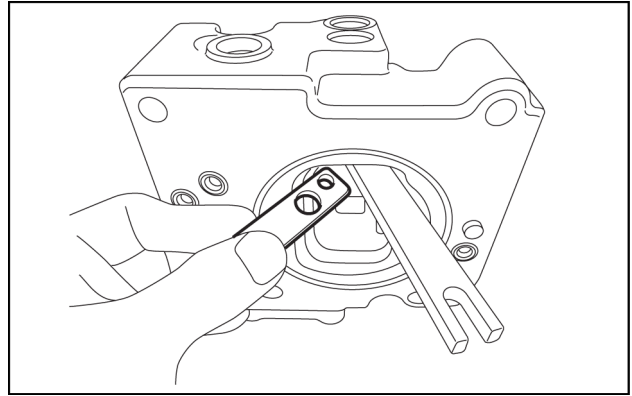
- Be careful not to mistake the suction and discharge directions of the valve plates.



4FAF3823 6

8. Remove the lever **(2) (613)**. Do not remove the pin **(875)**.

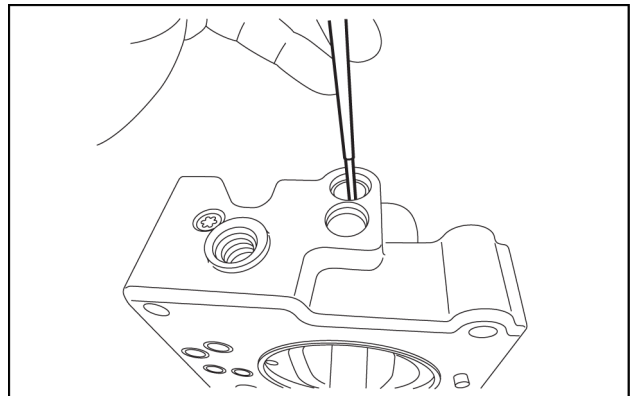
- To facilitate work, you are recommended to use tweezers.



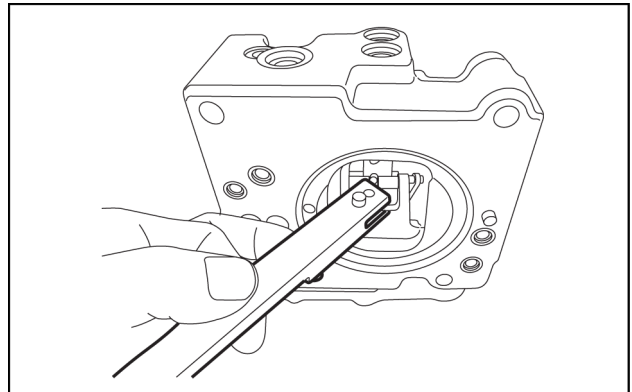
SMIL14CEX2206AA 8

9. Remove the pin **(874)** to remove the feedback lever **(611)**.

- The pin **(874)** (pin diameter: $\varnothing 4$) should be pushed out from above with a thin steel rod so as not to interfere with the lever **(1) (612)**.



SMIL14CEX2207AA 9



SMIL14CEX2208AA 10

10. Remove the lever **(1) (612)**. Do not remove the pin **(875)**.

11. Remove the pilot piston **(643)** and the spool **(652)**.

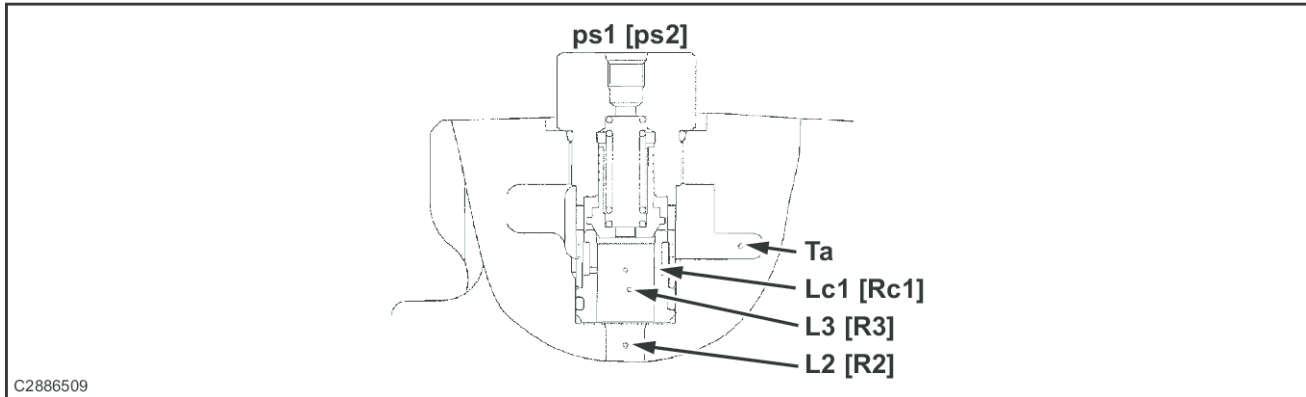
12. Remove the piston case **(622)**, the compensation piston **(621)**, and the compensation rod **(623)**.

- The piston case **(622)** can be removed by pushing out the compensation rod **(623)** from the opposite side of the piston case **(622)**.

3. Low-pressure relief valve

Generation of signal pressure

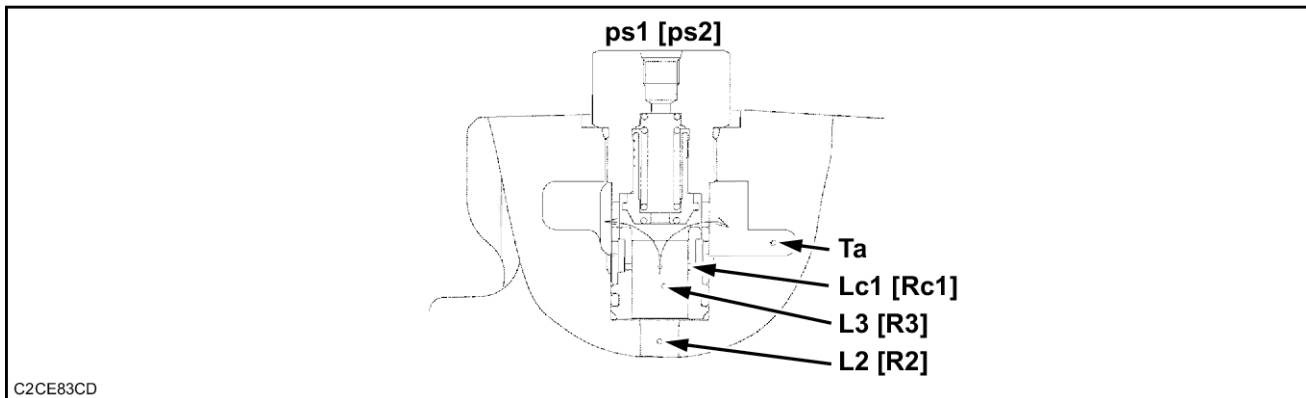
Oil fed from the pump port (P1 [P2]) flows out to the tank path (Ta) via the neutral path (L2 [R2]), the low-pressure relief path (L3 [R3]), and the orifice (Lc1 [Rc1]). During this time, a pressure generated at the path (L3 [R3]) due to the orifice (Lc1 [Rc1]) is led to the low-pressure relief signal port (ps1 [ps2]). Activating the main spool in the upper stream of L2 [R2] reduces the volume of oil flowing through L2 [R2] to lower the signal pressure of ps1 [ps2].



C2886509 26

Low-pressure relief valve activation

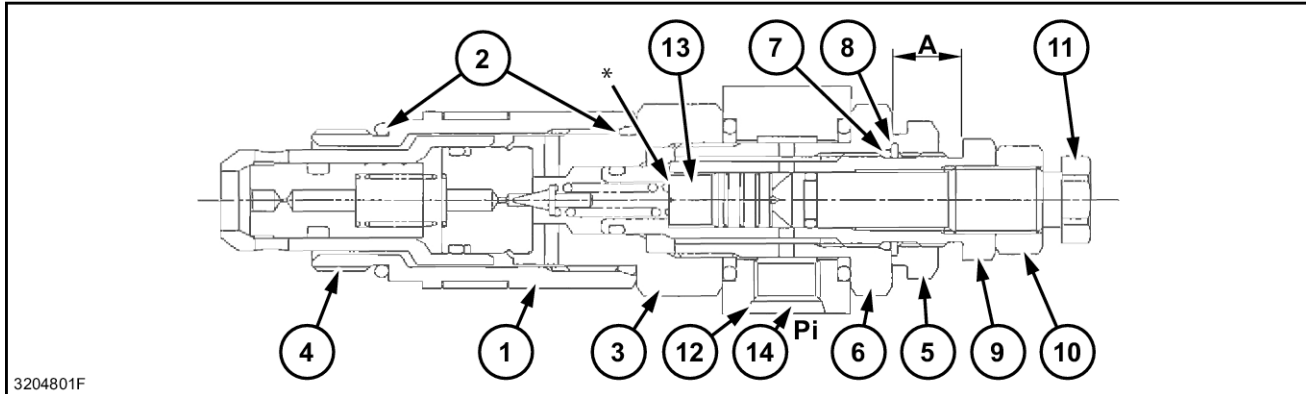
- A. The poppet is activated by a pressure generated in the path (L3 [R3]) due to the orifice (Lc1 [Rc1]) when excessive volume of oil flows in the path (L3 [R3]). The activation of this poppet makes oil flow out to the tank path (Ta) via a drill hole in the plug from the path.



C2CE83CD 27

Main pressure control valve - Disassemble

Disassemble procedure of main relief valve



3204801F

3204801F 1

- | | |
|--------------------------------------------------------|-----------------------------------------------------------|
| 1. Clap
[Hexagon diameter 38 mm (1.496 in)] | 8. B/U ring |
| 2. O-ring | 9. Plug
[Hexagon diameter 26 mm (1.024 in)] |
| 3. Plug
[Hexagon diameter 41 mm (1.614 in)] | 10. Plug
[Hexagon diameter 22 mm (0.866 in)] |
| 4. 1-15/16-12UN-2A | 11. Plug
[Hexagon diameter 19 mm (0.748 in)] |
| 5. Nut
[Hexagon diameter 32 mm (1.260 in)] | 12. Spacer
[Hexagon diameter 19 mm (0.748 in)] |
| 6. Plug
[Hexagon diameter 41 mm (1.614 in)] | 13. Piston |
| 7. O-ring | 14. PF1/4 JIS O-ring type |

This unit needs to be replaced as an assembly.

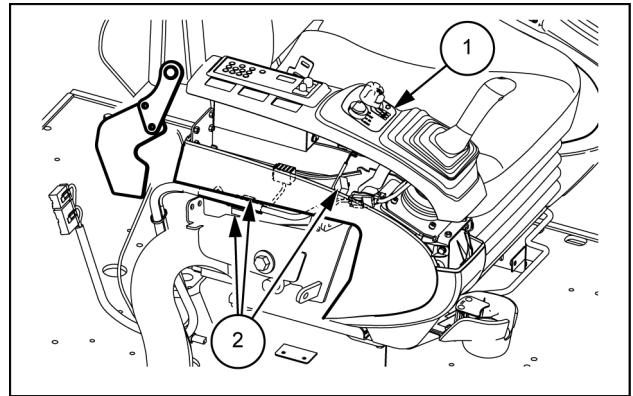
During replacement, loosen the cap (1) [hexagon diameter **38 mm (1.496 in)**] with a wrench to remove the O-ring (2). If oil is leaking from the nut (5), loosen the nut (5) and the plug (9), and then replace the O-ring (7) and the backup ring (8).

Hydraulic systems - Hydraulic hand control

Code	Part name	Code	Part name
101	Casing (Quantity 1)	217	Washer (Quantity 4)
151	Plate (Quantity 1)	221-1	Return spring (port 1) (Quantity 1)
201	Spool (Quantity 4)	221-2	Return spring (port 3) (Quantity 1)
211	Plug (Quantity 4)	221-3	Return spring (ports 2, 4) (Quantity 2)
212-1	Push rod (ports 1, 3) (Quantity 2)	241-1	Secondary pressure spring (ports 1, 3) (Quantity 2)
212-2	Push rod (ports 2, 4) (Quantity 2)	241-2	Secondary pressure spring (ports 2, 4) (Quantity 2)
213	Seal (Quantity 4)	301	Joint (Quantity 1)
214	O-ring (Quantity 4)	302	Disk (Quantity 1)
216-1	Spring seating (ports 1, 3) (Quantity 2)	312	Adjusting nut (Quantity 1)
216-2	Spring seating (ports 2, 4) (Quantity 2)	501	Bellows (Quantity 1)

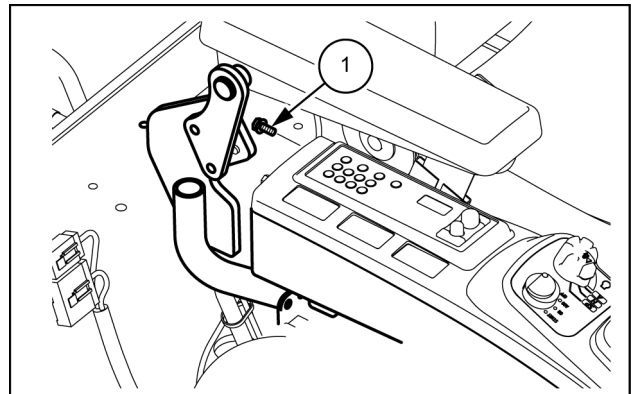
Code	Screw size	Tightening torque
301	M14	44.2 - 50.0 N·m (32.600 - 36.878 lb ft)
302 312	M14	63.7 - 73.5 N·m (46.983 - 54.211 lb ft)

9. Install the 3 connectors (2) and install the console top cover (1).



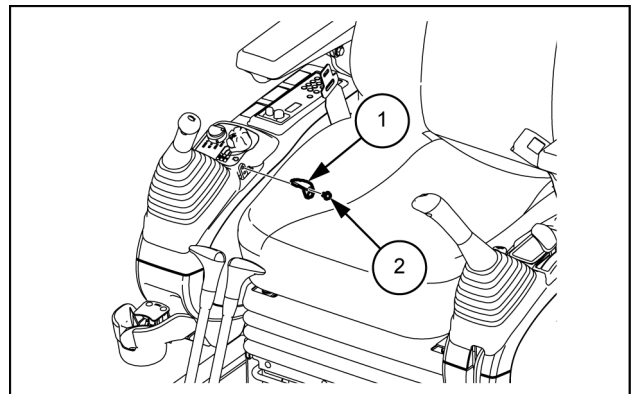
SMIL14CEX1429AB 9

10. Use a Phillips screwdriver to install the 2 screws (1) on the console top cover.



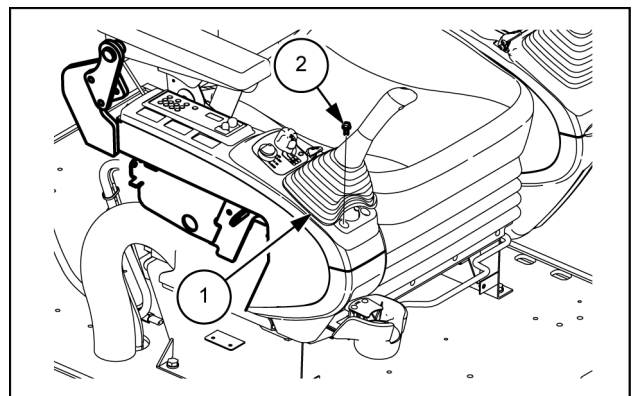
SMIL14CEX1430AB 10

11. Use a Phillips screwdriver to install the 2 screws (2), and then install the handle of the tilt lever (1).



SMIL14CEX1431AB 11

12. Use a Phillips screwdriver or box wrench [10 mm] to install the 2 bolts (2) on the console top cover and cover the control lever boot (1).



SMIL14CEX1432AB 12

Hydraulic foot control - Prepare

⚠ WARNING

Escaping fluid!

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

Failure to comply could result in death or serious injury.

W0178A

⚠ WARNING

Avoid injury!

Shut off the engine, remove the key, and make sure all motion is stopped before servicing the machine.

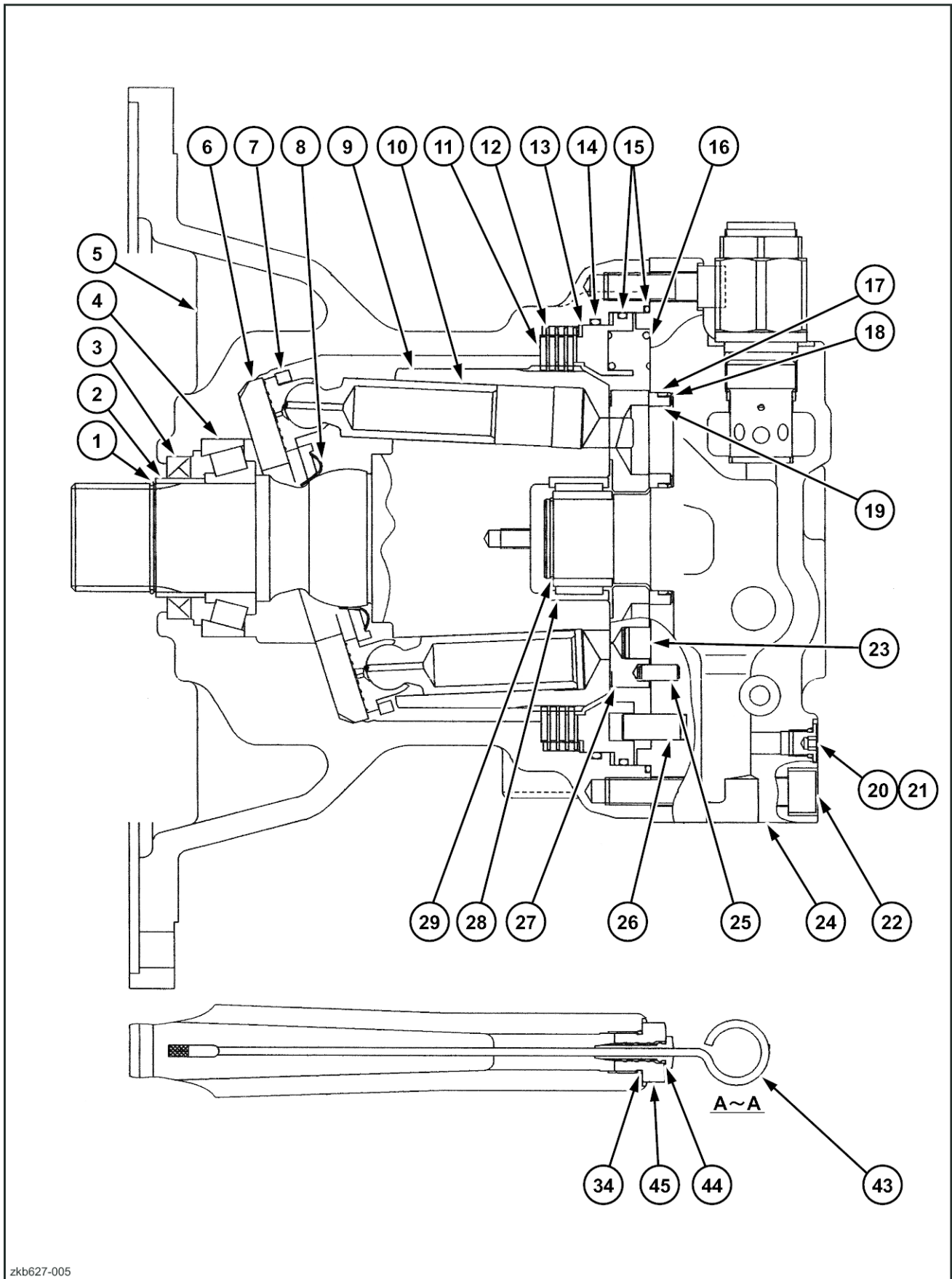
Failure to comply could result in death or serious injury.

W1128A

Items to prepare:

- Wrench [**19 mm**]
- Hexagon wrench [**8 mm**]
- Phillips screwdriver
- Marking pen
- Cap
- Plug
- Rag
- Cleaning fluid

Hydraulic swing system - Sectional view



zkb627-005

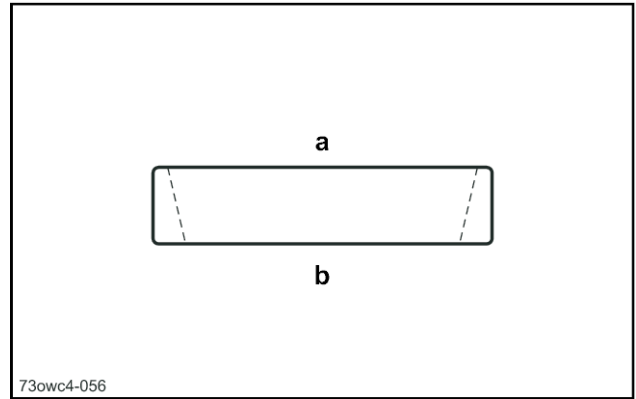
ZKB627-005 1

7. Installation of tapered roller bearing outer race Install the tapered roller bearing (4) outer race on the housing (5).

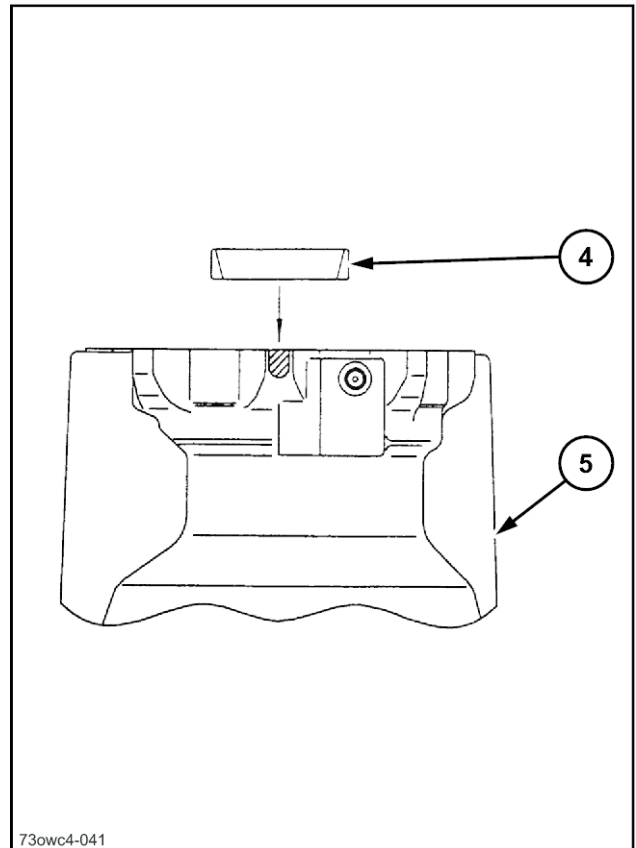
- Be careful to install the tapered roller bearing outer race in the correct direction.

(a) Cylinder assembly installation side

(b) Cylinder output shaft side

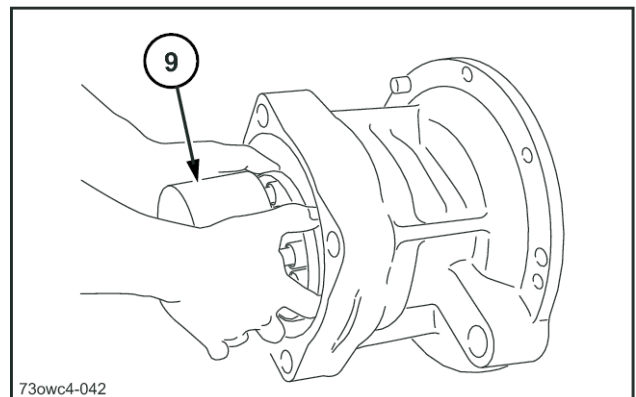


73OWC4-056 8

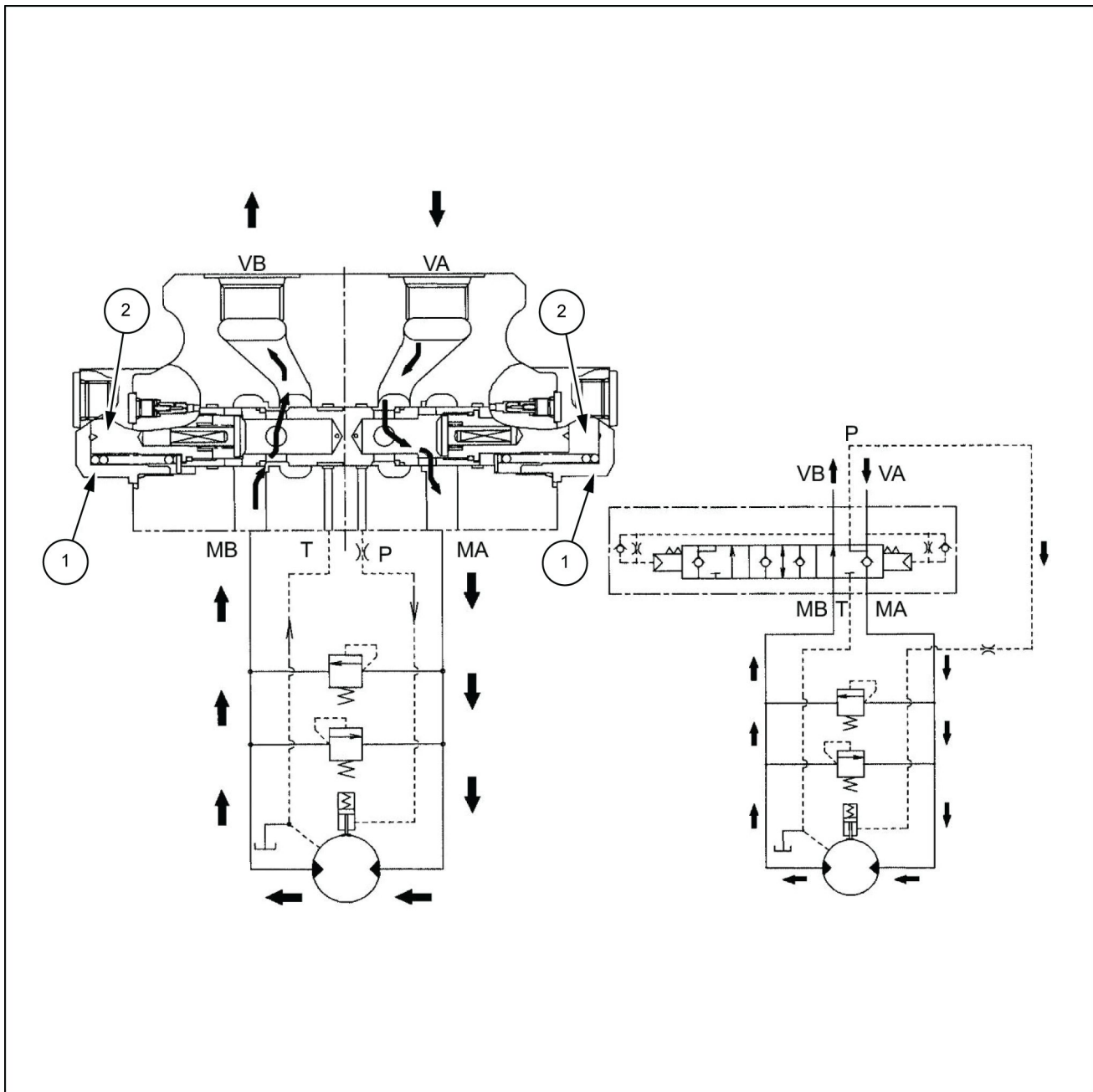


73OWC4-041 9

8. Align the cylinder (9) with the drive shaft spline and insert into the housing.



73OWC4-042 10



LPIL12CX05167GB 10

When accelerating

3. When stopping (See Fig. 11)

When the switchover valve returns to the neutral position during hydraulic motor rotation, the feed oil is cut-off, and the VA and VB ports connect to the tank, the pressure in the pilot chamber of both ends of the spool becomes equal and the spool (26) is returned to the neutral position by the spring force.

As a result the path from the MB port to the VB port is closed.

However, because the hydraulic motor tries to continue to rotate by the inertial force of the load, the hydraulic motor causes pump operation and continually discharges hydraulic oil to the MB port. Because the path is cut-off, the pressure rises, the overload relief valve operates, and the hydraulic motor gradually decelerates and finally comes to a stop.

Also, because the parking brake release pressure is narrowed, the pressure slowly decreases, the brake finally operates, and rotation of the hydraulic motor is mechanically stopped.

Travel motor - Assemble

Precautions before motor assembly

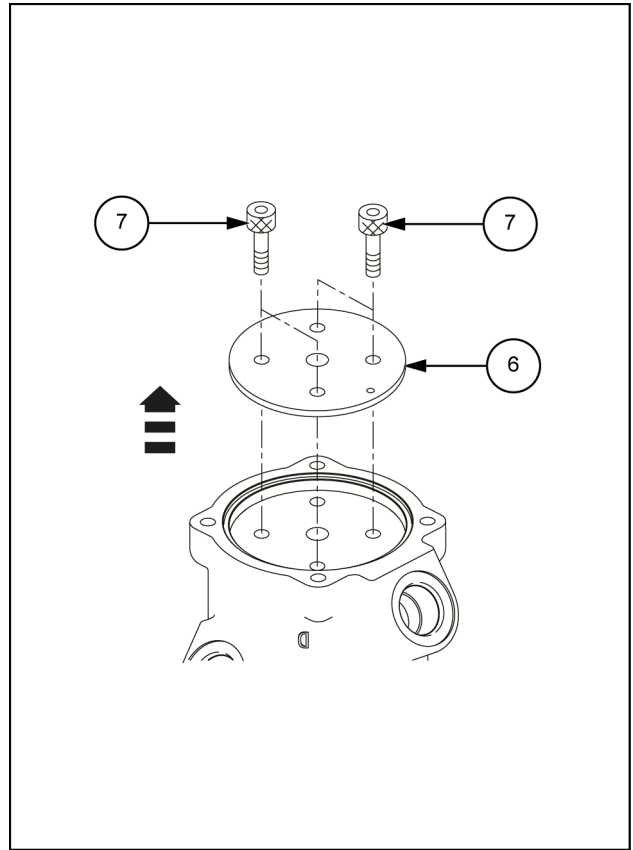
Begin motor assembly only after thoroughly reading the precautions below.

1. When performing assembly, always wear protective devices such as a helmet, goggles and safety shoes.
2. Use the specified tools when performing assembly.
3. To prevent injuries during disassembly, prepare a waist-high, stable work platform to perform work on.
4. The motor comprises high-precision parts. For this reason, foreign matter adhering to parts can be damaging. Motor assembly should be done in an inside space without dust, and mud and dirt should be prevented from adhering to parts.
5. The motor comprises high-precision parts. For this reason, dents and scratching on part surfaces can be damaging. Be very careful when handling parts during assembly and do not create any dents or scratching.
6. Be sure to repair any damage discovered during disassembly and prepare replacement parts before beginning assembly.
7. Remove metal fragments and foreign matters from all parts and check that there are no burrs or dents on parts before beginning assembly. If there are burrs or dents, use a whetstone to remove them.
8. When performing assembly, apply clean hydraulic oil to each sliding and rotating sections before assembly.
9. Thoroughly degrease areas where Loctite and liquid packing is used and remove oil and water before assembly.
10. Replace all seal parts such as O-rings and backup rings with new parts.
11. Be careful not to damage O-rings and backup rings during assembly. When assembling O-rings and backup rings, apply a small amount of grease for assembly.
12. It is recommended that petroleum jelly or grease be used to prevent parts from falling during assembly.
13. Tighten the bolts and other fastening sections to the tightening torque. Tightening torque should be controlled with a torque wrench.
14. After assembly is complete, plug all ports leading into the motor to prevent dirt from entering.

Motor assembly procedure

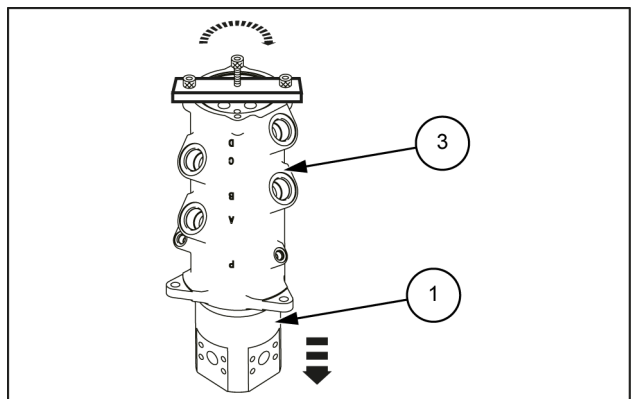
Installation of oil seal and shoe plate.

3. Use a hexagon wrench [**6 mm**] to remove the 4 hexagon socket head bolts (**7**), and then remove the thrust plate (**6**).



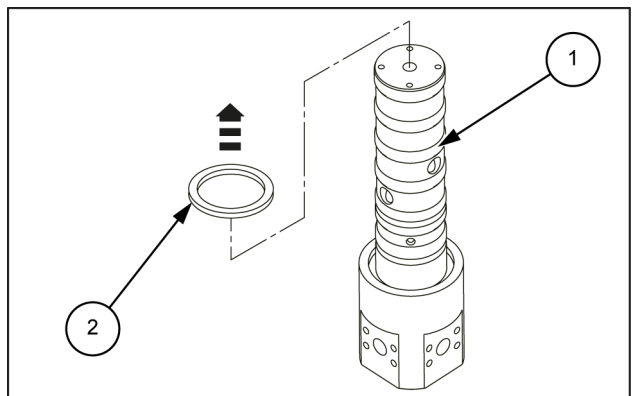
SMIL14CEX1354BB 3

4. Use the axle removal jig "a" to push out the axle (**1**) from the rotor (**3**).
- Do not strike it with a hammer at this time.



SMIL14CEX1355AB 4

5. Use the removal jig "b" or the like to remove the V-ring (**2**) from the axle (**1**).

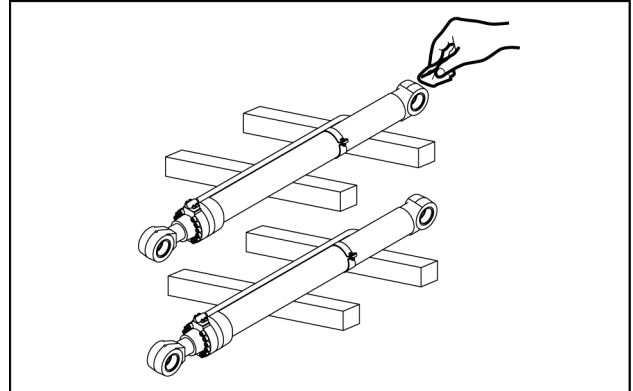


SMIL14CEX1356AB 5

Boom cylinder - Install

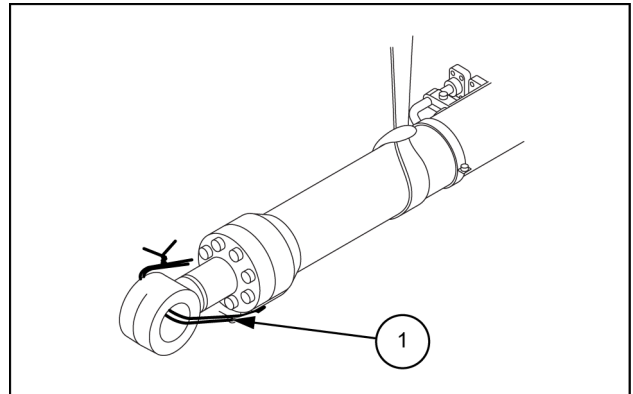
- When installing the bolts, tighten them to the specified torque.
- When the torque is not specified, check the “**Torque – Bolt and nut ()**”.

1. Clean each pin and pin hole.



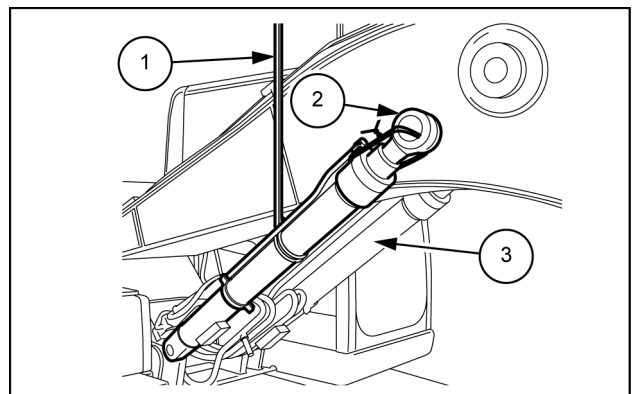
SMIL14CEX2181AA 1

2. Tie the cylinder rods on the left and right sides with wire (1) so that they cannot come out.



SMIL14CEX2176AB 2

3. Use a lifting equipment and a nylon sling (1) to lift the boom cylinders (right) (left) (2), (3).



SMIL14CEX2180AB 3

Index

Hydraulic systems - 35

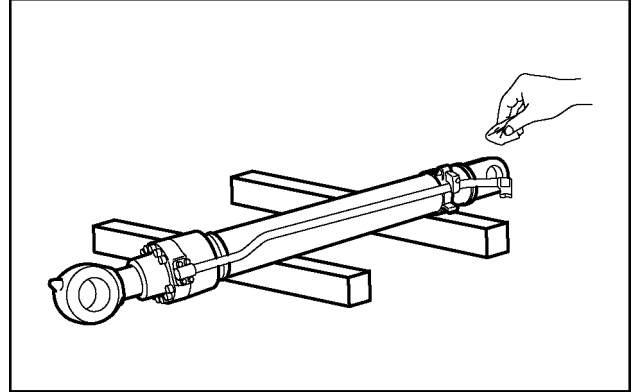
Boom hydraulic system - 736

Boom cylinder - Assemble	41
Boom cylinder - Disassemble	35
Boom cylinder - Inspect	47
Boom cylinder - Install	26
Boom cylinder - Prepare	20
Boom cylinder - Prepare – For disassemble	34
Boom cylinder - Remove	22
Boom cylinder - Sectional view	10
Boom cylinder - Service instruction	17
Boom cylinder - Service instruction	29
Boom cylinder - Service limits	8
Boom cylinder - Special tools	6
Boom cylinder - Static description	9
Boom cylinder - Storing	49
Boom cylinder - Test	50
Boom cylinder - Troubleshooting	56
Boom hydraulic system - Special tools	4
Boom lifting cylinder holding valve - Hydraulic schema	16
Boom lifting cylinder holding valve - Install	54
Boom lifting cylinder holding valve - Overview	12
Boom lifting cylinder holding valve - Overview	13
Boom lifting cylinder holding valve - Prepare	51
Boom lifting cylinder holding valve - Remove	52

Bucket cylinder - Install

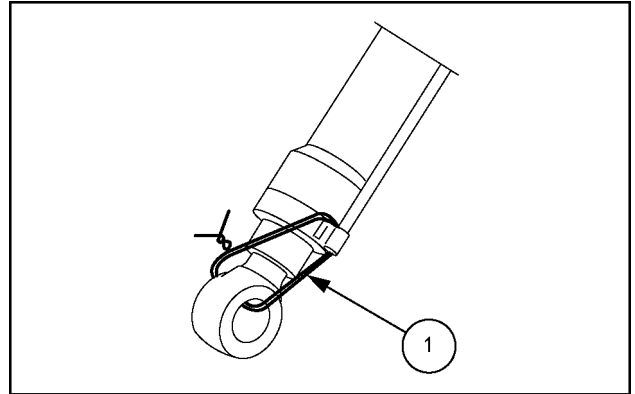
- Tighten lines and bolts being installed to the specified torque.
- When the torque is not specified, refer to “**Torque – Bolt and nut ()**”.

1. Clean each pin and pin hole.



SMIL14CEX2150AA 1

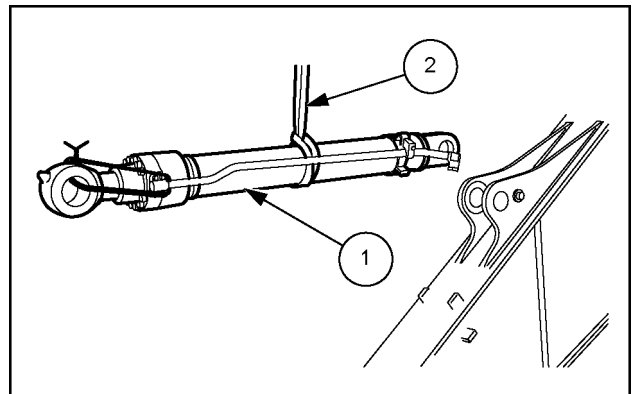
2. Tie the cylinder rod with wire (1) so that it cannot come out.



SMIL14CEX2151AB 2

3. Use a lifting equipment and nylon sling (2) to lift the bucket cylinder (1).

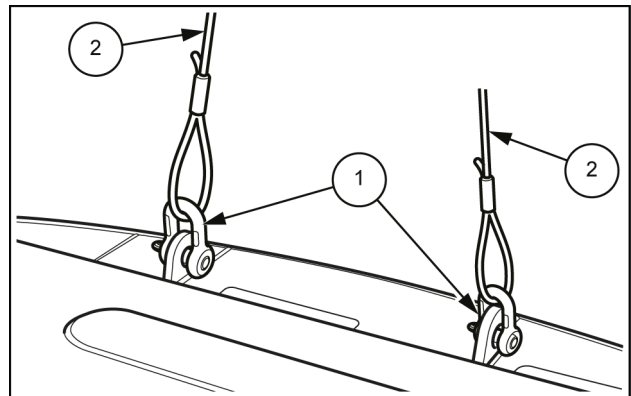
- Wrap the nylon sling to the inside of the line so that it is not crushed.



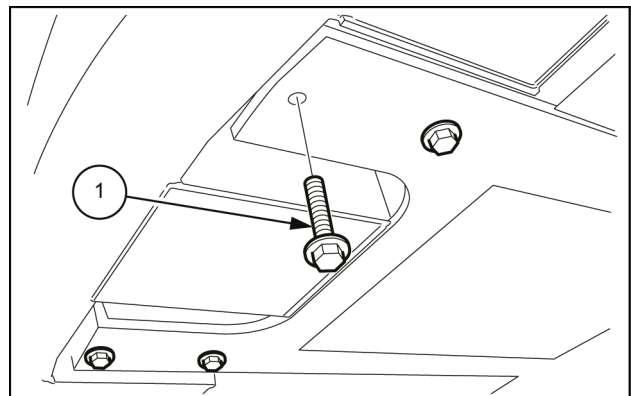
SMIL14CEX2152AB 3

Counterweight - Remove

1. Remove the following before beginning work.
 - Engine hood, gas damper and lock stay
 - Rear view camera and electrical components bracket
2. Install the shackles (1), and then use the wire ropes (2) and lifting equipment to secure the counterweight so that it does not fall during removal and installation operations.
3. Use a box wrench [50 mm] to remove the 4 bolts (1) at the bottom section of the counterweight.



SMIL14CEX3870AB 1



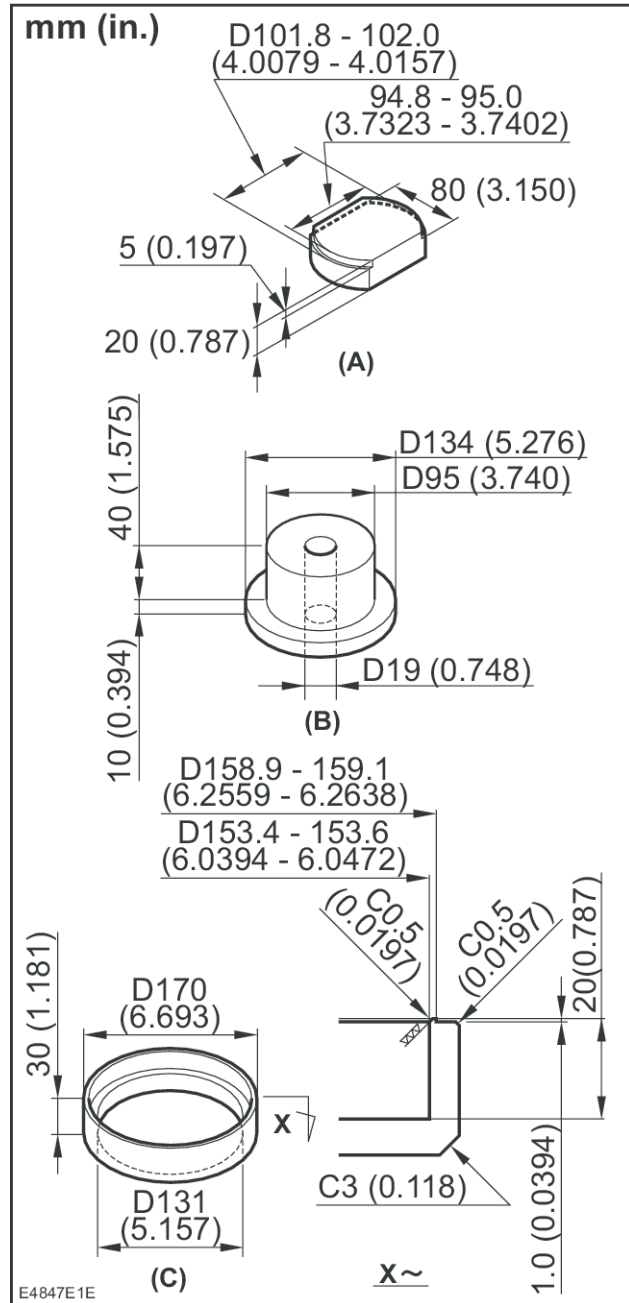
SMIL14CEX3871AB 2

Idler wheel - Special tools

Jig dimension diagram

- A. Bushing removal jig
- B. Bushing press-fit jig
- C. Floating seal installation jig

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

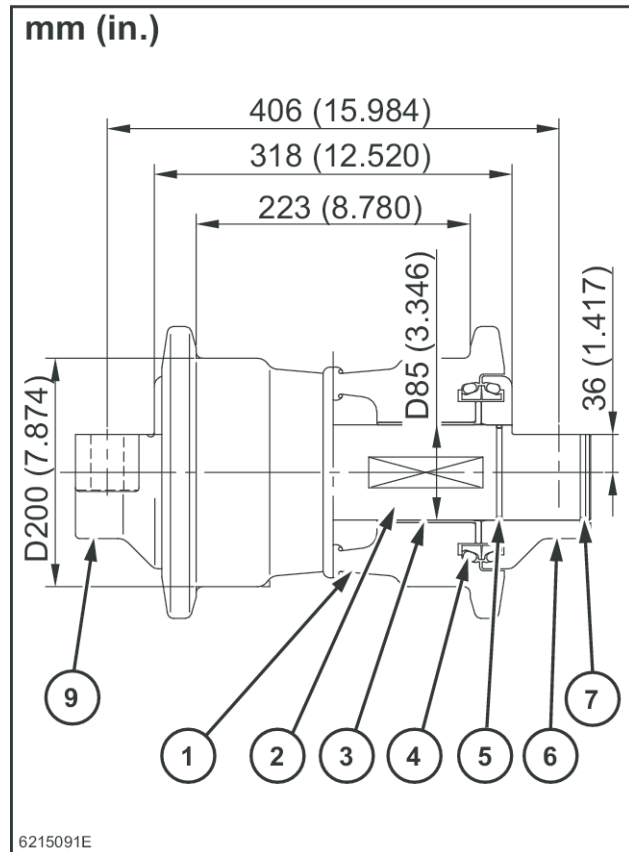


E4847E1E 1

Track frame roller - Component identification

1. Roller
2. Shaft
3. Bushing
4. Floating seal
5. O-ring
6. Collar (with plug)
7. Wire clip
8. Plug
9. Collar (without plug)

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



6215091E 1

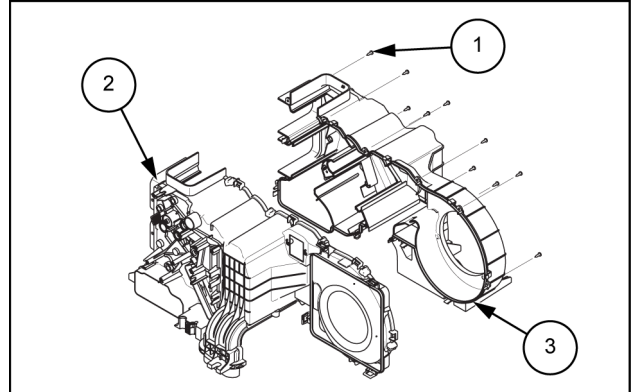
Heating, Ventilation, and Air-Conditioning (HVAC) unit - Remove

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

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

Removal of right heater case and left heater case

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



SMIL14CEX1813AB 1

Receiver/Dryer - Prepare

 WARNING:

- Use extra care for loosening piping joints. The circuit of the air conditioner is filled with high pressure gas so that it is dangerous with bursting injection of gas.

 CAUTION:

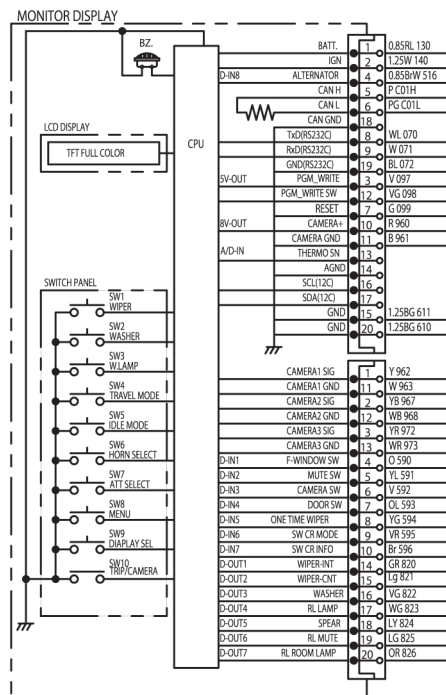
- Make sure to stop the engine before starting work.
- Check and fill compressor oil if the receiver dryer has been replaced.

Items to prepare:

- Wrench [**10 mm**]
- Cap
- Plug
- Rag
- Cleaning fluid

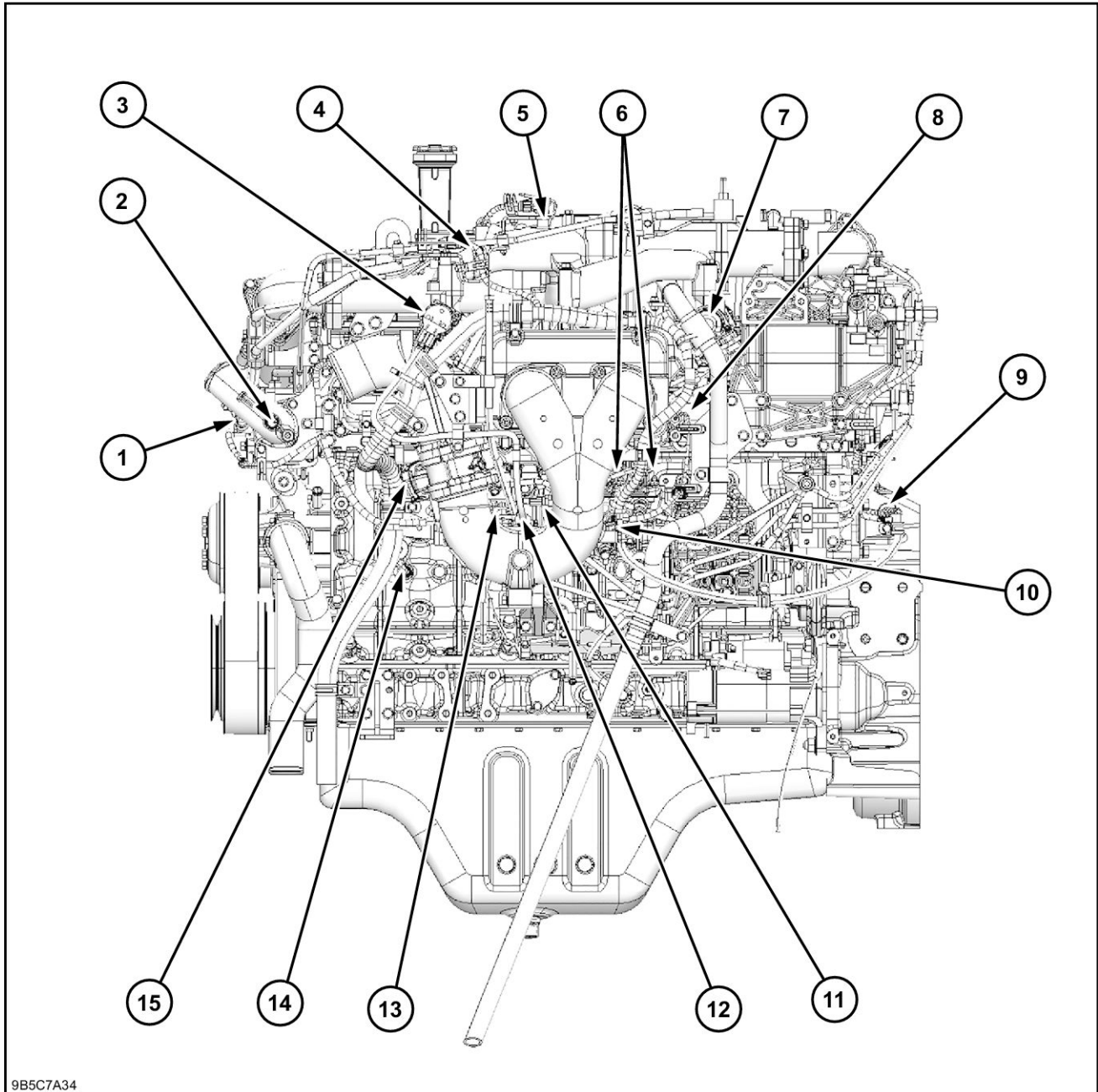
Monitor display

Part No.: KHR43201
KHR43221



SMIL14CEX4121CA 41

1. EGR gas temperature sensor 3
2. Charge air cooler temperature sensor 1
3. EGR gas temperature sensor 1
4. MAF / IAT sensor
5. Oil level switch



9B5C7A34

9B5C7A34 4

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

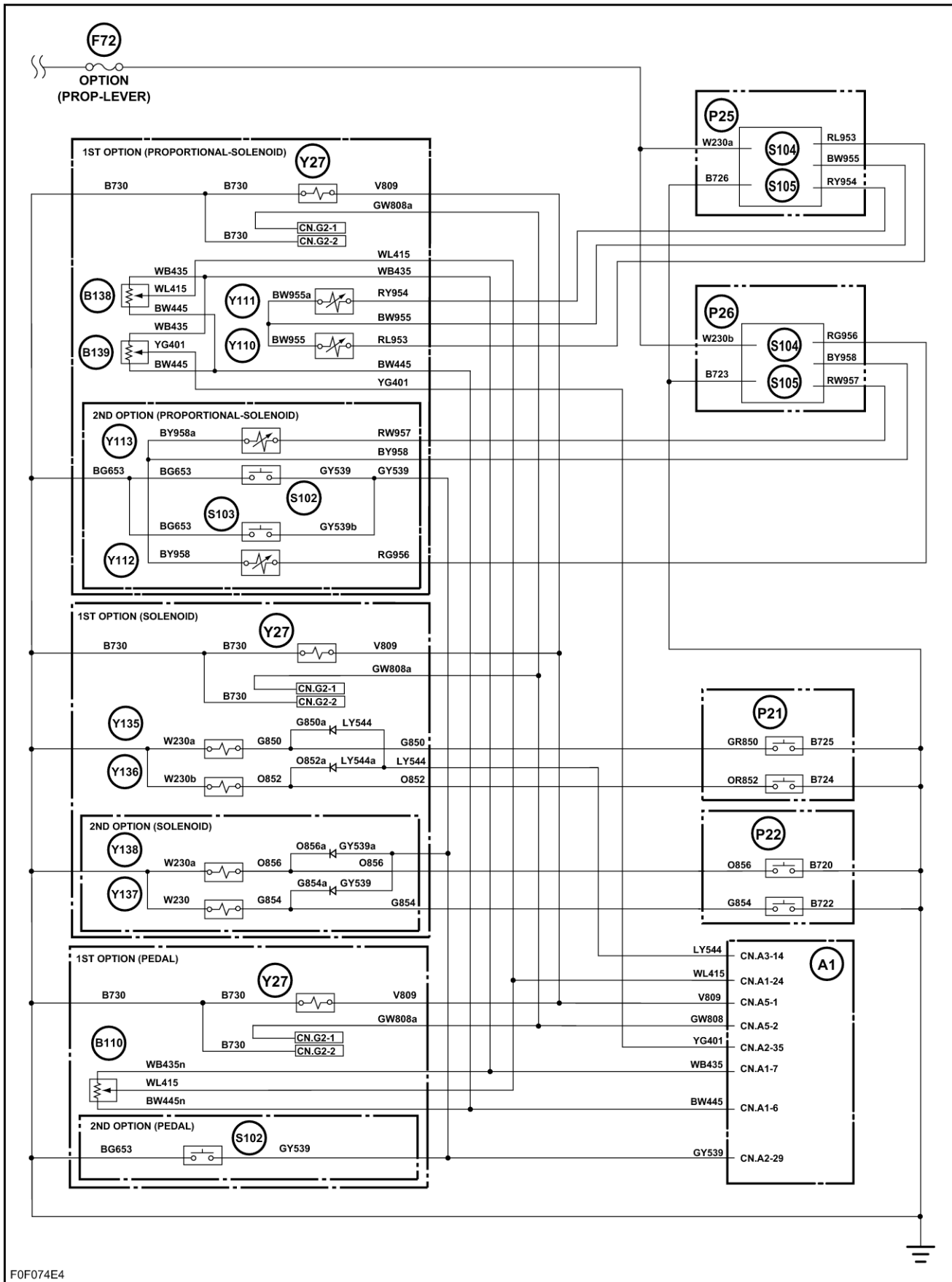
- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: www.heydownloads.com by clicking the link below



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

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

Option



Electrical system - Wiring schema

Frame

CN.A50F	Cab main harness: A (2-pin)	CN.D39F	Horn (low) +
CN.A51F	Cab main harness: B (8-pin)	CN.D40F	Horn (low) -
CN.A52F	Cab main harness: C (8-pin)	CN.D41F	Horn (high) +
CN.A53F	Cab main harness: D (14-pin)	CN.D42F	Horn (high) -
CN.A54F	Cab main harness: E (22-pin)	CN.D43F	Beacon harness: 2-pin
CN.A55F	Cab main harness: F (20-pin)	CN.D43M	Beacon harness; 2-pin
CN.A56F	Cab main harness: G (18-pin)	CN.D44F	Receiver dryer: 2-pin
CN.C18F	CCD harness (rear): 4-pin	CN.D45F	Air-conditioner compressor
CN.D1F	DCU: 1 (53-pin)	CN.D46F	Travel alarm: 2-pin
CN.D2F	DCU: 2 (86-pin)	CN.D47F	Coolant tank switch: 2-pin
CN.D3F	ECM: 1 (105-pin)	CN.D48M	Air cleaner switch: 2-pin
CN.D3F	Turbo computer; 16-pin	CN.D51F	Return room pressure sensor; 3-pin
CN.D4F	ECM; 2 (91-pin)	CN.D51M	Return room pressure sensor; 3-pin
CN.D18F	Supply module: 12-pin	CN.D52F	Boom bottom cylinder pressure sensor; 3-pin
CN.D19F	Coolant control valve: 2-pin	CN.D53F	Fuel level sensor: 2-pin
CN.D20F	UREA sensor: 4-pin	CN.D60	Free swing solenoid valve: 2-pin
CN.D21F	MAF sensor: 5-pin	CN.D60M	Free swing solenoid valve; 2-pin
CN.D23F	Floor harness: 1 (6-pin)	CN.D61F	Quick coupler solenoid valve: 2-pin
CN.D23F	Floor harness: 1 (6-pin)	CN.D61M	Quick coupler solenoid valve; 2-pin
CN.D23M	Frame harness; 6-pin	CN.D62F	Proportional valve option harness; 2-pin
CN.D2 3-1 F	Travel pressure sensor (right); 3-pin	CN.D65F	Sensor control valve; 8-pin
CN.D2 3-2 F	Travel pressure sensor (left); 3-pin	CN.D65M	Frame main harness: 1
CN.D2 3-3 F	1-pedal travel pressure sensor; 3-pin	CN.D65-1F	N1 pressure sensor: 3-pin
CN.D24F	Floor harness; 2 (8-pin)	CN.D65-2F	N2 pressure sensor: 3-pin
CN.D25F	Swing pressure sensor; 3-pin (ID: Black tape)	CN.D65-3F	Arm cylinder (rod) pressure sensor; 2-pin (ID: Red tape)
CN.D26F	Boom (up) pressure sensor: 3-pin (ID: Yellow tape)	CN.D65-4 F	Arm cylinder (bottom) pressure sensor; 3-pin
CN.D27F	Boom (down) pressure sensor: 3-pin (ID: Blue tape)	CN.D66-1 F	Bucket-open solenoid valve; 2-pin (ID: Red tape)
CN.D28F	Arm (open) pressure sensor: 3-pin (ID: Red tape)	CN.D66-2 F	Arm 2 in solenoid valve; 2-pin (ID: Yellow tape)
CN.D29F	Arm (close) pressure sensor: 3-pin (ID: White tape)	CN.D66-3 F	Boom 2 up solenoid valve; 2-pin (ID: Green tape)
CN.D30F	Bucket (open) pressure sensor: 3-pin	CN.D66-4 F	Arm 1 parallel solenoid valve; 2-pin (ID: Pink tape)
CN.D31F	Bucket (close) pressure sensor: 3-pin (ID: Green tape)	CN.D66-5 F	Straight travel solenoid valve; 2-pin (ID: Blue tape)
CN.D32F	Urea solution pump; 2-pin	CN.D66F	Control valve PWM; 12-pin (ID: Red tape)
CN.D32M	Urea solution pump; 2-pin	CN.D66M	Frame main harness: 2 (ID: Red tape)
CN.D33F	Lubricator: 2-pin	CN.D89F	Option power supply; 2-pin
CN.D33M	Lubricator; 2-pin	CN.D89M	Option power supply; 2-pin
CN.D34F	Refueling pump harness: 3-pin	CN.D92	GND G1
CN.D35F	Boom light harness: 2-pin	CN.D94M	Hydraulic motor fan; 4-pin
CN.D36F	House light: 2-pin	CN.D99	GND G3
CN.D37F	Washer motor: 2-pin	CN.D100 M	Left light harness; 2-pin (ID: Blue tape)

Wiring harnesses - Electrical schematic sheet 04 - POWER DISTRIBUTION

Type	Components	Connectors / link	Description
Fuse	F09		Lamp boom, house
Fuse	F14		Wiper washer
Fuse	F18		Cigar lighter
Fuse	F21		Beacon
Fuse	F26		Lamp cab
Fuse	F37		Spares 3 (cont_c)
Fuse	F68		Seat suspension and heater
Fuse	F69		DC/DC converter
Fuse	F70		FVM
Fuse	F71		Spare 1
Fuse	F72		Option (proportional-lever)
Fuse	F73		Spare2 (quick & CTWT)
Connector	CN.A41	CN.A41	Cab main harness
Connector	CN.A45	CN.A45	Cab main harness
Connector	CN.A52	CN.A52	Cab main harness

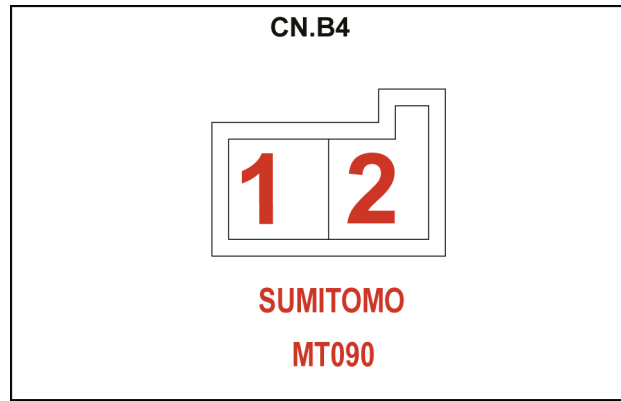
**Wiring harnesses - Electrical schematic sheet 21 - ENGINE, VGS TURBO,
EGR VALVE, THROTTLE MOTOR**

Type	Components	Connectors / link	Description
Sensor	B118		Manifold air pressure and boost temperature sensor
Sensor	B140		Urea sensor
Sensor	M23		VGS turbo
Sensor	M24		Intake throttle DC-motor
Sensor	M28		EGR valve A
Sensor	M29		EGR valve B
Connector	CN.D9	CN.D9	Engine harness
Connector	CN.D20	CN.D20	Urea sensor
Connector	CN.E1	CN.E1	VGS Turbo
Connector	CN.E2	CN.E2	Intake throttle DC-motor
Connector	CN.E6	CN.E6	Manifold air pressure and boost temperature sensor
Connector	CN.E11	CN.E11	EGR valve A
Connector	CN.E12	CN.E12	EGR valve B

**Wiring harnesses - Electrical schematic sheet 38 - OPTION POWER /
FVM, KEY SWITCH**

Type	Components	Connectors / link	Description
Speaker	H12		Speaker
Sensor	R3		Throttle volume
Switch	S1		Key switch
Switch	S51		Limit switch (Gate)
Connector	CN.A24-1	CN.A24-1	Throttle volume
Connector	CN.A24-2	CN.A24-2	Throttle volume
Connector	CN.A25	CN.A25	Option power/FVM
Connector	CN.A42	CN.A42	Key switch
Connector	CN.A45	CN.A45	
Connector	CN.B1	CN.B1	Key switch
Connector	CN.B2	CN.B2	Throttle volume
Connector	CN.B3	CN.B3	Limit switch (Gate)
Connector	CN.B4	CN.B4	
Connector	CN.B20	CN.B20	Seat
Connector	CN.B21	CN.B21	Seat
Connector	CN.B24	CN.B24	For radio
Connector	CN.B25	CN.B25	For radio
Connector	CN.B26	CN.B26	For radio

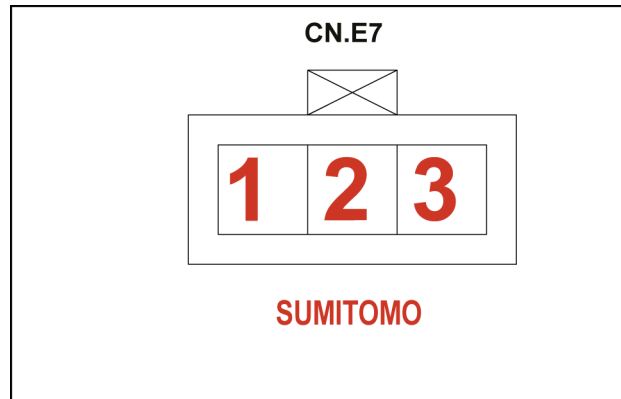
CONNECTOR CN.B4 – DIODE SWITCH (2-PIN) (Female)



SMIL14CEX6482AA 25

Pin	From	Wire	Description	Color-Size	Frame
1	CN.A42-M-P-7	845D		GR-0.85	SHEET 06
2	SP-840A-P-X	840E		RY-0.85	SHEET 38

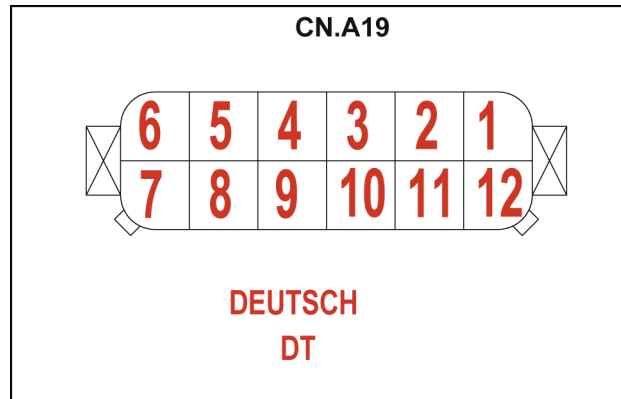
CONNECTOR CN.E7 – FUEL PRESS SENSOR (3-PIN) (Female)



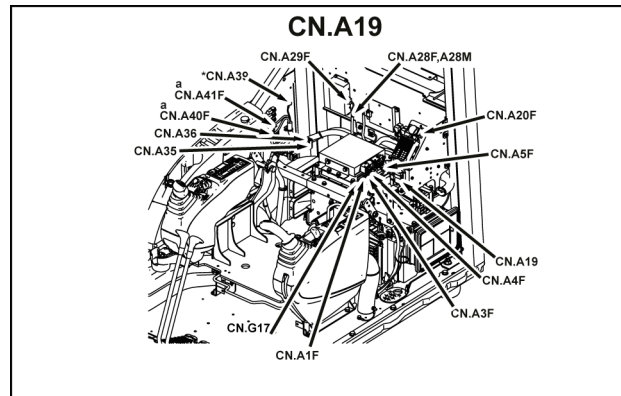
SMIL14CEX5904AA 68

Pin	From	Wire	Description	Color-Size	Frame
1	CN.D7-P-22	349C		B-0.75	SHEET 14
2	CN.D7-P-27	335A		W-0.75	
3	CN.D7-P-32	334A		RG-0.75	

CONNECTOR CN.A19 – EST CONNECTOR B (Male)



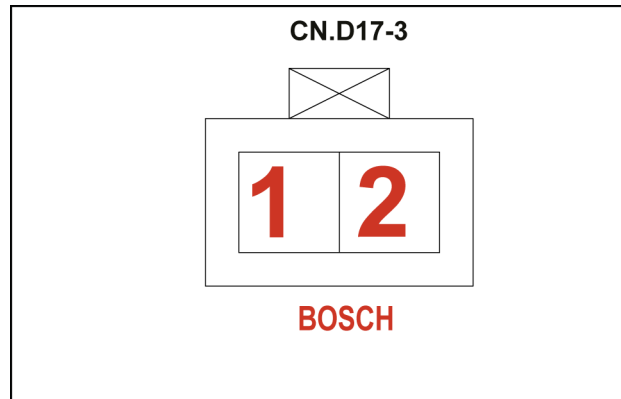
SMIL14CEX6494AA 19



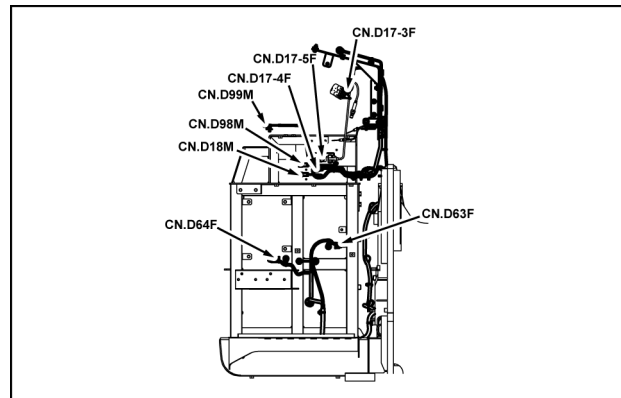
SMIL14CEX6505AA 20

Pin	From	Wire	Description	Color-Size	Frame
1	SP-BH0-P-X	BH5		L	SHEET 09
2	CN.A36-M-P-16	631		BG	SHEET 31
3	SP-BL0-P-X	BL5		LG	SHEET 09
4	CN.A4-P-27	063		GR	SHEET 08
7	CN.A4-P-11	060		R	
8	CN.A4-P-20	066		LW	
9	CN.A4-P-10	064		YL	
10	CN.A4-P-21	065		GW	
11	CN.A4-P-22	062		BR	
12	CN.A4-P-12	061		RL	

CONNECTOR CN.D17-3 – DOSING VALVE (2-PIN) (Female)



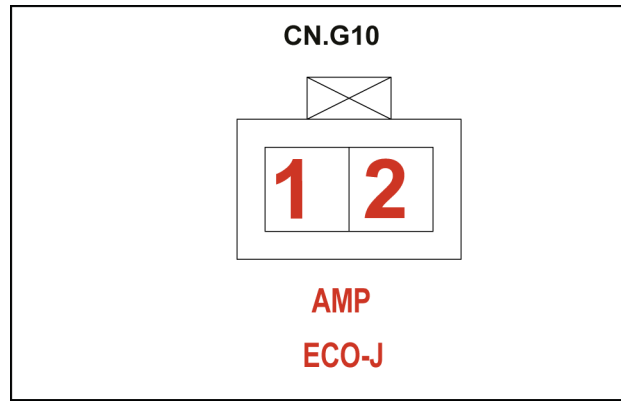
SMIL14CEX5894AA 67



SMIL15CEXZ217AA 68

Pin	From	Wire	Description	Color-Size	Frame
1	CN.D17-P-8	580		Y-0.75	SHEET 16
2	CN.D17-P-7	581		BY-0.75	

CONNECTOR CN.G10 – OPTION 1 (LEVER DOWN) (2-PIN) (Female)



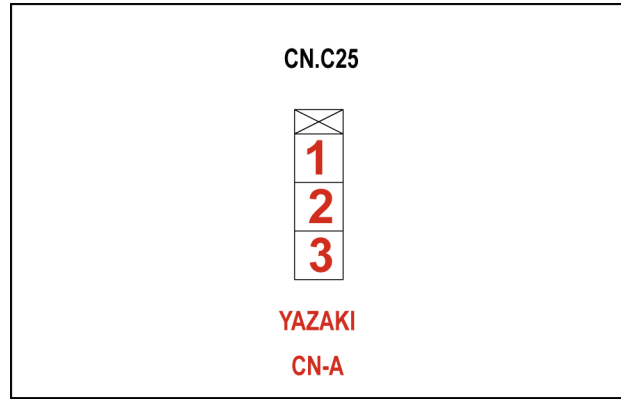
SMIL14CEX5946AA 102

Pin	From	Wire	Description	Color-Size	Frame
1	Y111-P-1	954		RY-0.85	SHEET 24
2	Y111-P-2	955A		BW-0.85	

CONNECTOR CN.A27-4 – LAMP (Female)

Pin	From	Wire	Description	Color-Size	Frame
1	SP-714A-P-X	714J		B-1.25	SHEET 46

CONNECTOR CN.C25-A – LIMIT SWITCH (DOOR)



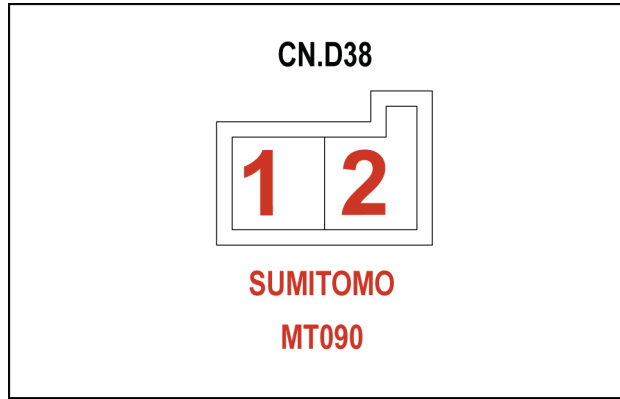
SMIL15CEXZ254AA 25

Pin	From	Wire	Description	Color-Size	Frame
1	CN.C9-P-2	593B		OL	SHEET 37
2	CN.C9-P-4	843B		Y	
3	CN.C9-P-1	613		BG	

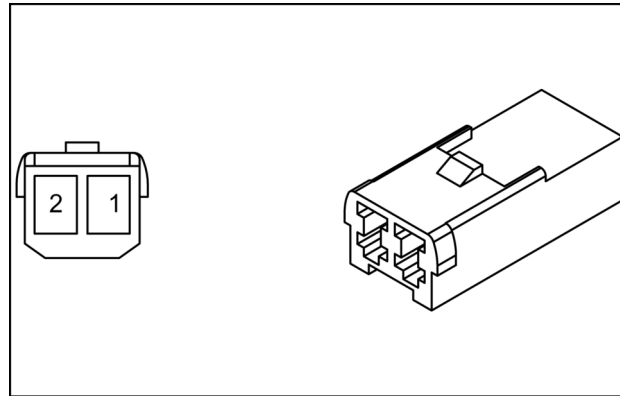
CONNECTOR CN.D210 – BATTERY (Female)

Pin	From	Wire	Description	Color-Size	Frame
M10	CN.D209-P-M10	100		R-60.0	SHEET 02

CONNECTOR CN.D38 – DEV449 DIODE (2-PIN) (Male)



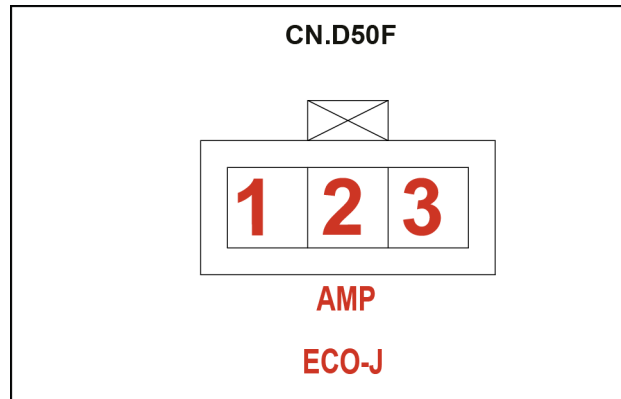
SMIL14CEX6451AA 43



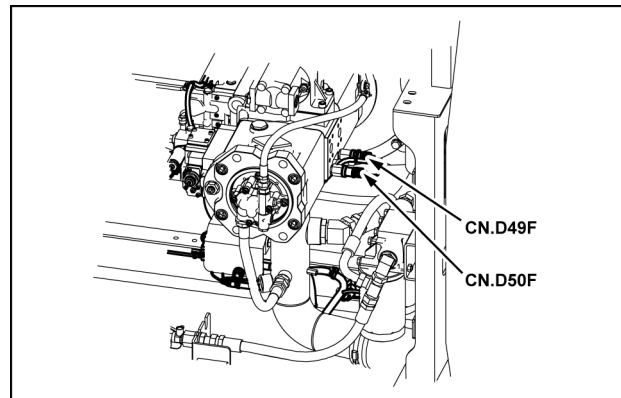
84182901 44

Pin	From	Wire	Description	Color-Size	Frame
1	SP-829A-P-X	829A		WG-0.85	SHEET 40
2	SP-771A-P-X	771A		B-0.85	

CONNECTOR CN.D50 – PRESSURE SENSOR (BLUE TAPE) (Male)



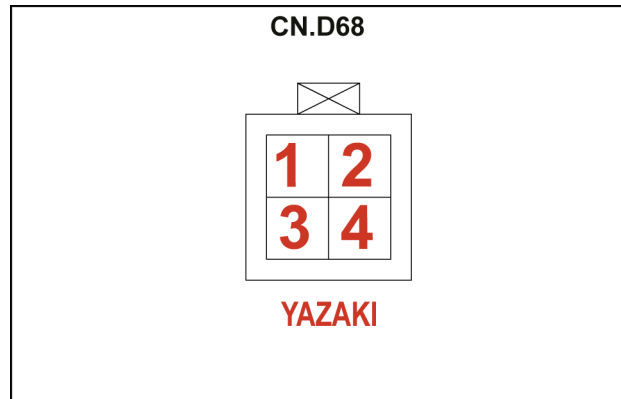
SMIL14CEX6183AA 16



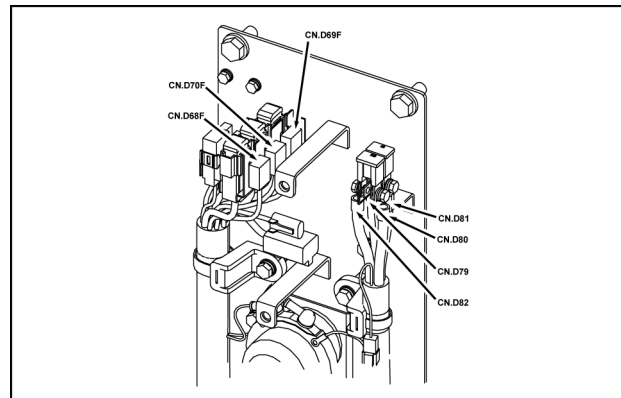
SMIL15CEXZ246AA 17

Pin	From	Wire	Description	Color-Size	Frame
1	SP-430A-P-X	430W		W-0.75	SHEET 19
2	CN.A56-M-P-16	418A		L-0.75	SHEET 12
3	SP-440H-P-X	440D		BL-0.75	SHEET 19

CONNECTOR CN.D68 – SCR CONTROL UNIT FUSE (Male)



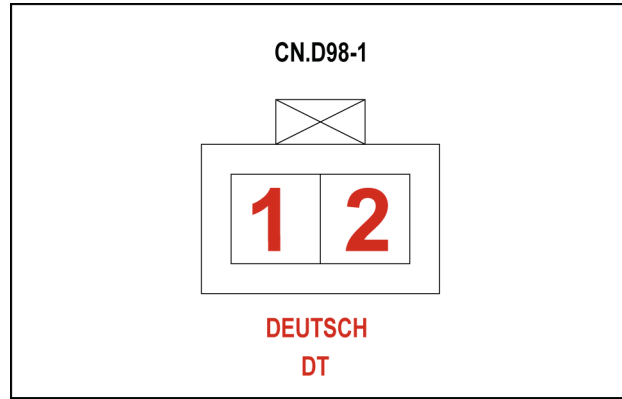
SMIL14CEX5333AA 42



SMIL15CEXZ199AA 43

Pin	From	Wire	Description	Color-Size	Frame
3	SP-105B-P-X	105F		R-2.0	SHEET 16
4	CN.D77-P-1	104		R-2.0	SHEET 02

CONNECTOR CN.D98-1A – CAB HEAD LAMP 2 (Male)



SMIL15CEXZ215AA 19

Pin	From	Wire	Description	Color-Size	Frame
1	CN.A28M-5-P-1	875N		GR 1.25	SHEET 45
2	CN.A29F-3-P-1	714G		B-1.25	

Engine control system - Static description

Engine control system overview and implementation.

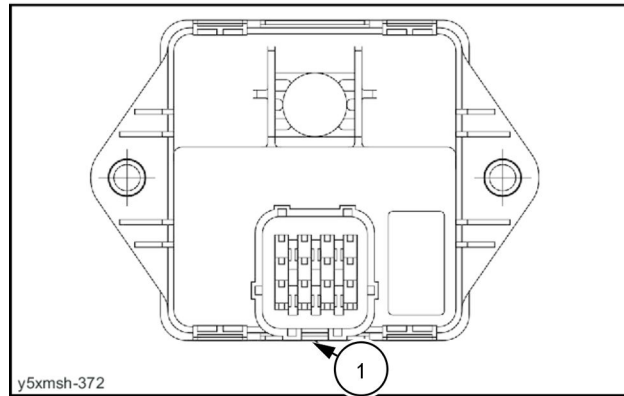
The engine control system is an electronic control system that controls the engine so as to always be in the optimal combustion state according to the driving condition, and consists of the electronic control fuel injection system, the EGR, and the idling control.

Also, besides controlling the engine, the engine control system has a QOS system, engine speed signal output, self diagnosing functionality, and CAN communication SAE J1939/21 and SAE J1939/11 system control functions.

Turbo control unit

The turbo control unit is installed to the machine.
The ECM communicates with the turbo control unit based on the engine load, etc, and the turbo control unit performs control by operating the motor built into the turbo actuator.

1. Connector lock position



Y5XMSH-372 26

Diagnostic light

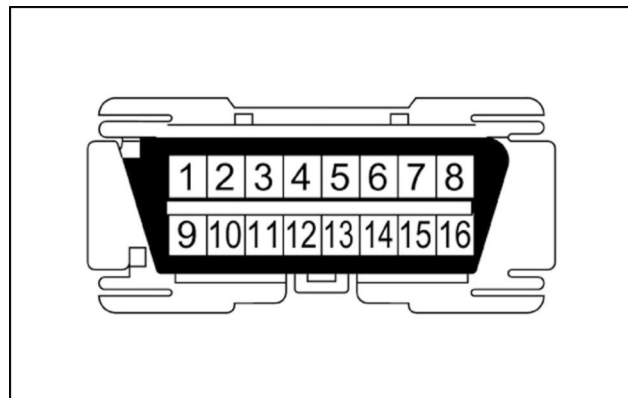
By turning ON the diagnostic switch, the DTC is indicated by flashing.

NOTE: As for the installation position of the diagnostic light, refer to the manual of the machine.

DLC

The DLC is the connector for communication and connection between the trouble diagnosis scanning tool and various controllers.

NOTE: As for the DLC installation position, refer to the manual of the machine.



SMIL14CEX4014AA 27

Diagnostic switch

The diagnostic switch shorts DLC terminal No. 12 and No. 4 or No. 5 and flashes the diagnostic light to indicate the DTC.

NOTE: As for the installation position and shape of the diagnostic switch, refer to the manual of the machine.

Mode change switch (0, 1, 2)

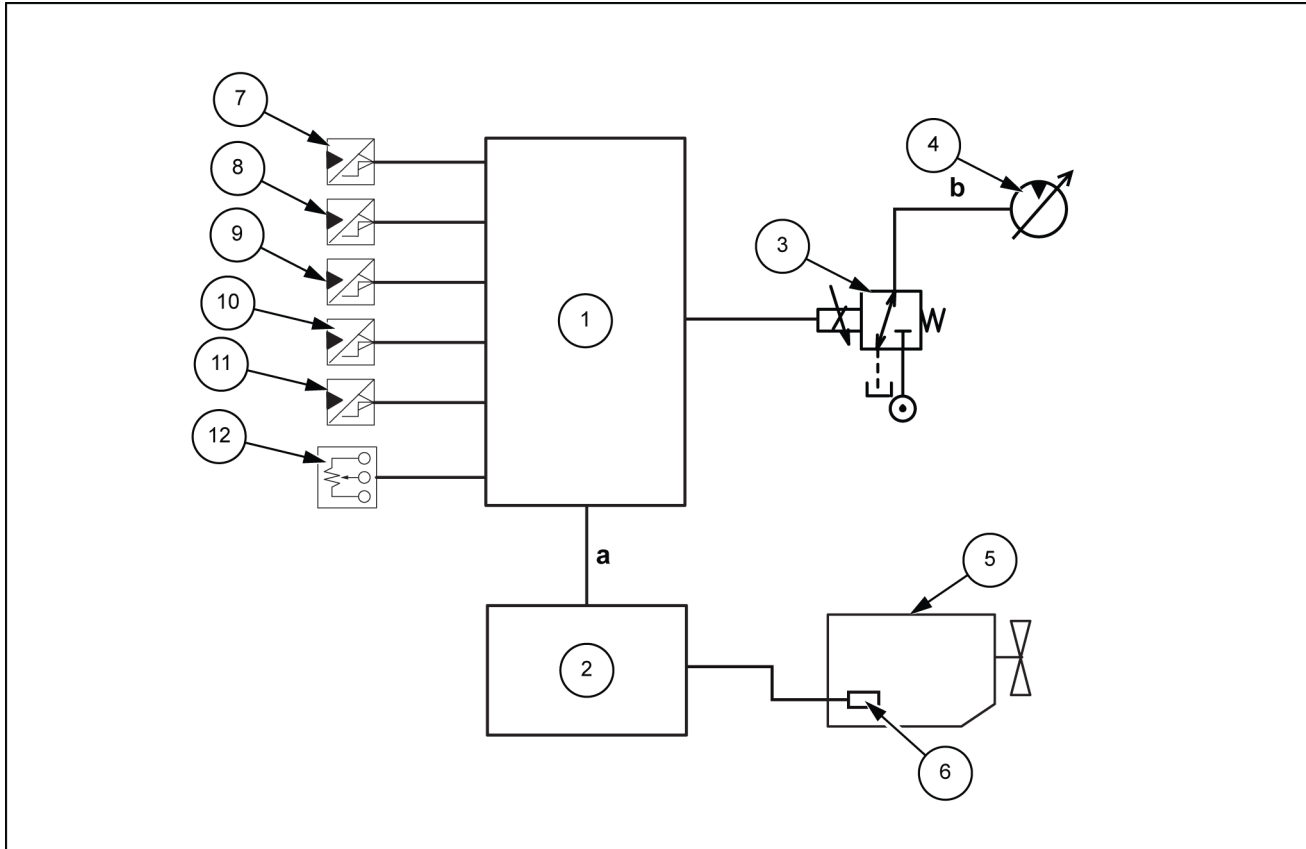
The operation can be performed at the engine speed specified for each mode by switching the mode change switch.

NOTE: As for the installation position of the mode change switch, refer to the manual of the machine.

Engine starting system - Dynamic description - Static horsepower control

Purpose/overview

The system allows the pump to absorb the maximum engine horsepower by the pump (as much as not to cause stall) by controlling horsepower absorbed by the hydraulic pump in accordance with amount of engine down (Engine stop prevention and energy-saving).



SMIL14CEX1034FB 1

- | | |
|--------------------------------------------|---------------------------------------|
| 1. Main controller | 8. Hydraulic pressure sensor (swing) |
| 2. ECM | 9. Pressure sensor (travel) |
| 3. Electromagnetic load proportional valve | 10. Pressure sensor (option 1) |
| 4. Hydraulic pump | 11. Pressure sensor (option 2) |
| 5. Engine | 12. Throttle volume |
| 6. Crank position sensor | a. Target RPM to the engine |
| 7. Hydraulic pressure sensor (upper) | b. Discharge volume increase/decrease |

Operation

- The system gradually decreases pump horsepower to the lower limit based on judgment that absorbing horsepower of the hydraulic pump exceeds output horsepower of the engine when an amount of engine down becomes **30 RPM** or more due to a load on the engine by the manipulation of the lever.
- It gradually increases the pump horsepower when amount of down becomes less than **30 RPM** due to recovery of the engine.

Calculation for amount of engine down: Engine down amount = Target engine RPM - Actual engine RPM

* Amount of down is 0 when the actual RPM exceeds the target RPM.

13. Remove the armature from the gear shaft.

NOTE: *The ball usually also comes out when the armature is removed. However, in some cases, the ball may not come out because it is stuck in grease.*

The bearing can be removed using a general puller.

14. Remove the plate from the gear shaft.

NOTE: *Remove the plate of the planetary gear to remove the gasket.*

15. Remove the plate from the lever.

NOTE: *Remove the gasket and the plate of the lever support area.*

16. Remove the planetary gear from the gear shaft.

17. Disengage the overrunning clutch from the front bracket.

NOTE: *Pull out the internal gear, gear shaft, overrunning clutch and lever together from the front bracket.*

18. Remove the lever from the overrunning clutch.

NOTICE: *Make sure to remember the direction of the lever.*

19. Remove the E-ring from the gear shaft.

NOTICE: *Do not reuse the removed E-ring.*

20. Remove the overrunning clutch from the gear shaft.

NOTE: *Remove the overrunning clutch from the gear shaft by rotating it by 1 spline tooth.*

21. Remove the internal gear from the gear shaft.

22. Remove the washer from the gear shaft.

23. Remove the bearing from the front bracket.

24. Remove the brush from the yoke.

Index

Electrical systems - 55

Battery - 302

Battery - Service instruction - Battery charge abnormality	4
Battery connect and disconnect system - Static description	3

Common rail pressure sensor - Remove

Fuel safety information

⚠ WARNING

Escaping fluid!

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

Failure to comply could result in death or serious injury.

W0178A

⚠ WARNING

Fire hazard!

Leaking fuel could cause a fire. DO NOT perform the bleed procedure while the engine is hot.

Failure to comply could result in death or serious injury.

W1119A

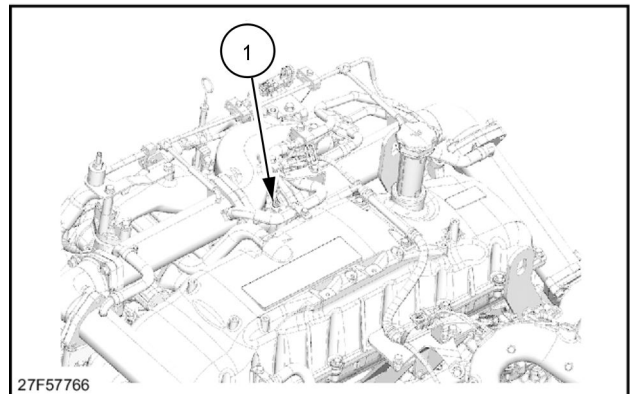
Battery ground cable disconnect

1. Disengage the battery ground cable from the battery.

NOTICE: Do not disconnect the battery cable for 3 min after turning OFF the ignition switch.

EGR gas temperature sensor 2 removal

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

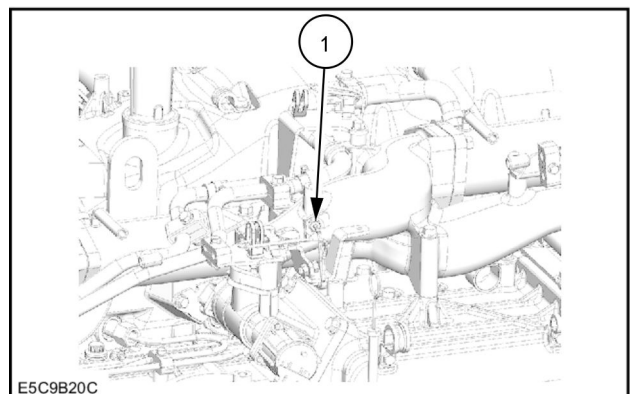


27F57766

27F57766 1

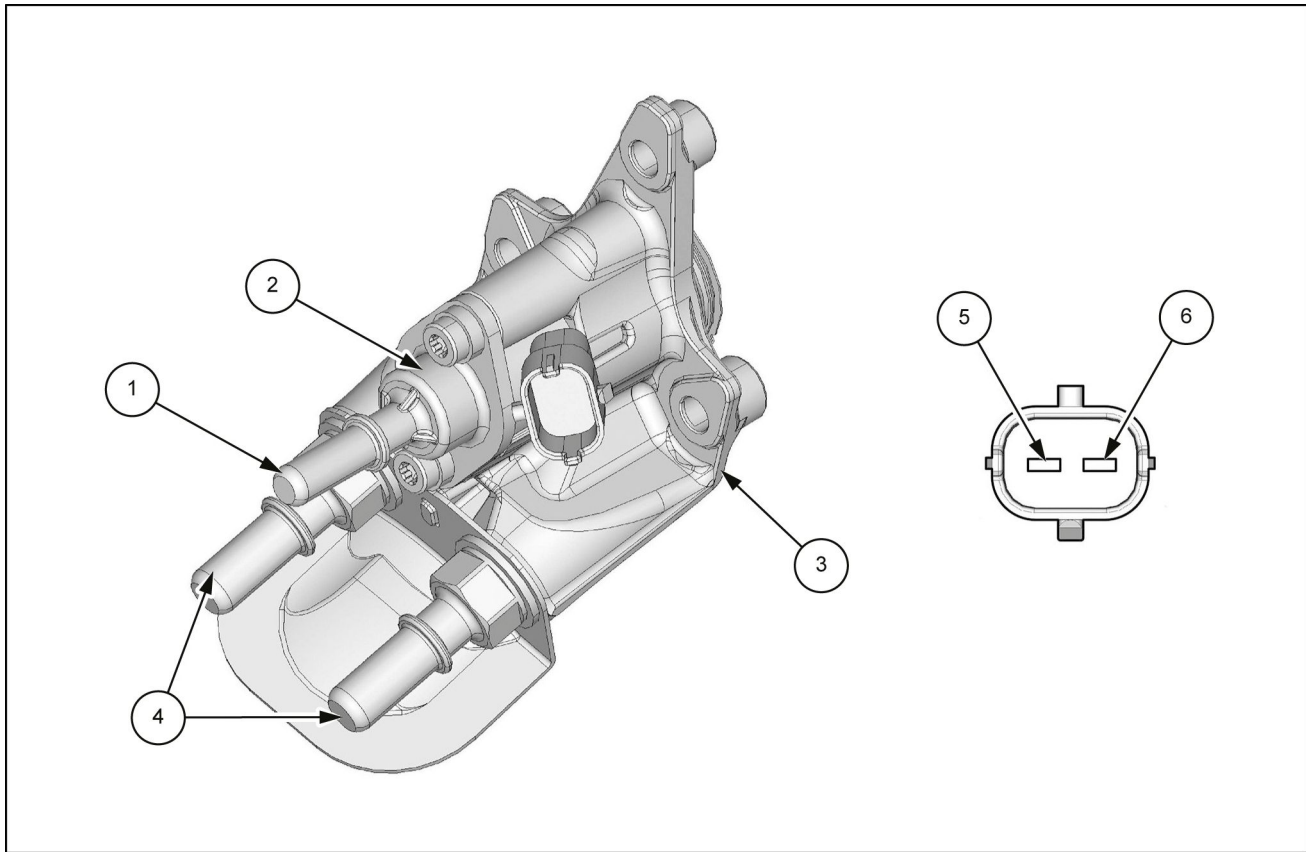
EGR gas temperature sensor 3 removal

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



E5C9B20C

E5C9B20C 2



SMIL14CEX4022FA 5

- | | |
|-------------------------|----------------------|
| 1. Urea fluid connector | 4. Coolant connector |
| 2. Injector | 5. Injector High |
| 3. Housing | 6. Injector Low |

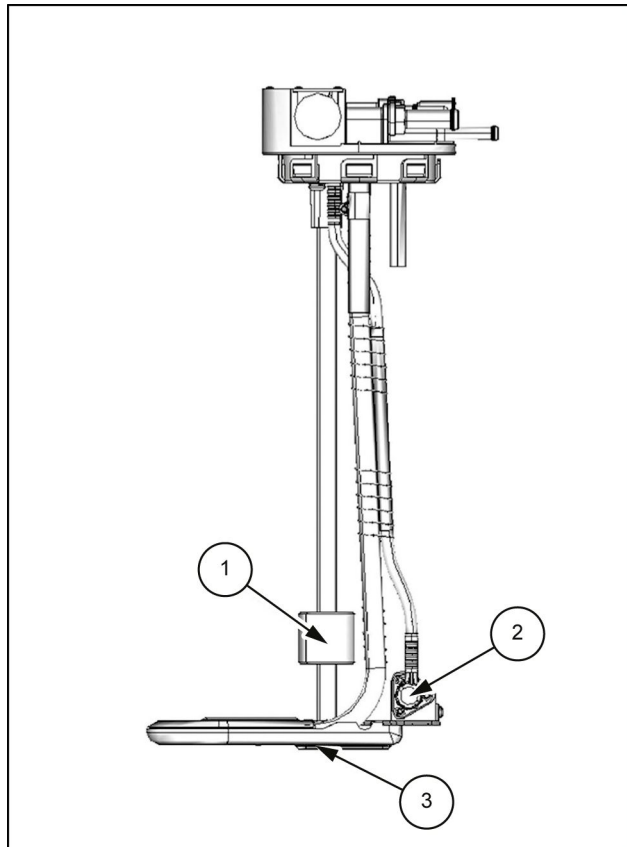
Urea fluid sensor

The urea fluid sensors are installed in the urea fluid tank, and consist of the urea fluid temperature sensor, urea fluid level sensor, and urea fluid quality sensor.

Information for the urea fluid in the urea fluid tank obtained from each sensor is sent to the DCU via the CAN circuit.

NOTE: The specifications vary depending on the machine manufacturer.

1. Urea fluid level sensor
2. Urea fluid quality sensor
3. Urea fluid temperature sensor



SMIL14CEX4023BA 6

Connect the DMM to the suspected circuit and perform a test-run of the machine. If an abnormal value is displayed when the malfunction occurs, it can be determined that there is a problem in the monitored circuit. The trouble diagnosis scan tool is useful in detecting intermittent conditions. The trouble diagnosis scan tool has the following convenient functions.

The snapshot function records the engine parameters at the time when a malfunction occurs. It is possible to review the recorded information and know the particular operation condition that resulted in the malfunction.

By using the plot function on the trouble diagnosis scan tool, it is possible to graph the selected data parameters.

This recorded information can be reviewed, and the location of the intermittent condition can be checked.

Check for improper installation of optional electronic accessories such as lights or mobile phones.

Under the following conditions, DTCs are not recorded, and the warning light may illuminate intermittently.

The GND of the DCU is loose or dirty.

Intermittent short circuit to the GND circuit in the warning light.

Interference exists in the electric system due to a failure in a relay, in a solenoid driven by the DCU, or in a switch.

Electronic components may cause sharp increases in voltage. Normally, a problem occurs when a component that is malfunctioning is in operation.

The diode has an open circuit.

In the following list of symptoms, causes for each symptom are organized. There is no significance to the order of this procedure. If the value on the trouble diagnosis scan tool does not indicate a malfunction, the next procedure to perform should be the one that can be most easily inspected or is most likely to be the cause.

Use the following list when diagnosing symptoms of complaints.

Excessive urea fluid consumption
Significant ammonia odor
Adherence of white crystal powder
There is no current problem, but a past DTC exists. Or, there is a complaint from the customer not related to a DTC, and that symptom cannot be reproduced.

Intermittent conditions of urea selective catalytic reduction system diagnostics

NOTE: *Preliminary inspection.*

Inspect the urea SCR control system.

NOTE: *Harness and connector.*

Intermittent open circuits or short circuits are often caused by the harness or connector moving due to vibrations, engine torque, or bumps in the road.

Move the related connectors and wiring while observing the applicable scan tool data.

Nitrogen Oxide (NOx) sensor - Remove

Battery ground cable disconnect

1. Disconnect the battery ground cable from the battery.

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

NOx sensor removal

1. Disconnect the connector from the NOx sensor controller.

NOTICE: Do not disconnect the NOx sensor or NOx sensor controller.

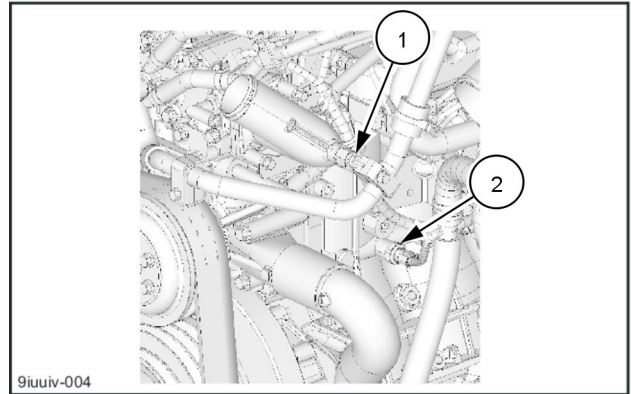
2. Remove the NOx sensor from the mixer chamber.

NOTICE: Immediately after turning OFF the ignition switch, be careful of burns as the temperature of the sensor measurement section is high due to the heater.

Coolant high temperature sensor - Remove

Overheat switch removal

1. Disconnect the harness connector from the overheat switch **(1)**.
2. Remove the overheat switch **(1)** from the water outlet pipe.
2. Oil pressure sensor



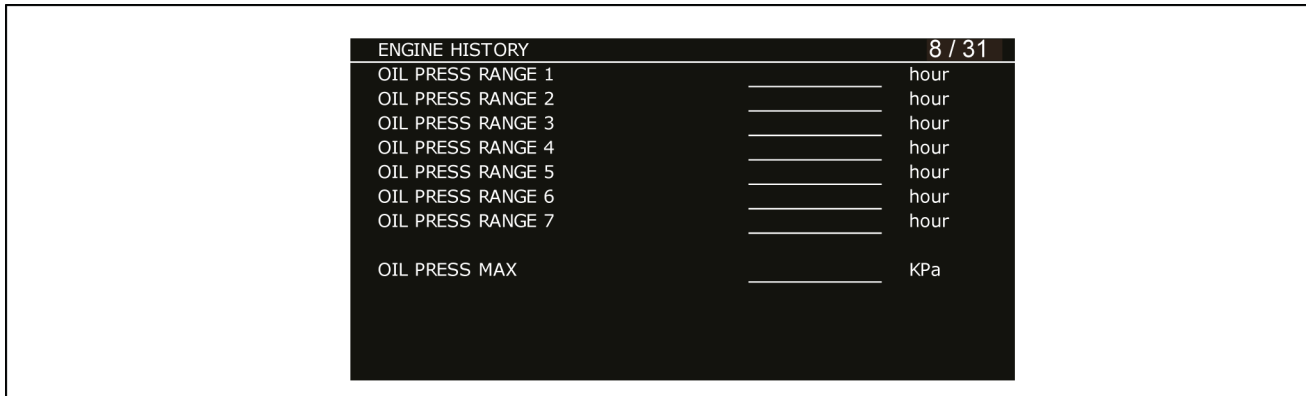
9iuviv-004 1

- a. Hold down for **3 s**.
- 1. Travel speed select switch
- 2. Attachment selection switch
- 3. Menu switch
- 4. Light switch
- 5. Wiper switch
- 6. Auto idle switch

WORK HISTORY		4 / 11
TRAVEL OPR. TIME RANGE 1	_____	times
TRAVEL OPR. TIME RANGE 2	_____	times
TRAVEL OPR. TIME RANGE 3	_____	times
TRAVEL OPR. TIME RANGE 4	_____	times
TRAVEL OPR. TIME RANGE 5	_____	times
TRAVEL OPR. TIME RANGE 6	_____	times
TRAVEL OPR. TIME RANGE 7	_____	times
TRAVEL OPR. TIME MAX 1st	_____	sec
TRAVEL OPR. TIME MAX 2nd	_____	sec
TRAVEL OPR. TIME MAX 3rd	_____	sec
TRAVEL OPR. TIME MAX 4th	_____	sec
TRAVEL OPR. TIME MAX 5th	_____	sec

SMIL14CEX0946EA 33

Display	Explanation	Unit	Judgment condition	Judgment start condition
TRAVEL OPR. TIME RANGE 1	Frequency distribution of continuous travel time	times	Continuous travel time < 10 s.	Engine in operation
TRAVEL OPR. TIME RANGE 2	Frequency distribution of continuous travel time	times	Continuous travel time < 30 s.	Engine in operation
TRAVEL OPR. TIME RANGE 3	Frequency distribution of continuous travel time	times	Continuous travel time < 1 min.	Engine in operation
TRAVEL OPR. TIME RANGE 4	Frequency distribution of continuous travel time	times	Continuous travel time < 3 min.	Engine in operation
TRAVEL OPR. TIME RANGE 5	Frequency distribution of continuous travel time	times	Continuous travel time < 10 min.	Engine in operation
TRAVEL OPR. TIME RANGE 6	Frequency distribution of continuous travel time	times	Continuous travel time < 30 min.	Engine in operation
TRAVEL OPR. TIME RANGE 7	Frequency distribution of continuous travel time	times	Continuous travel time \geq 30 min.	Engine in operation
TRAVEL OPR. TIME MAX 1st	Continuous travel time ranking	sec	Continuous travel time: 1st rank	Engine in operation
TRAVEL OPR. TIME MAX 2nd	Continuous travel time ranking	sec	Continuous travel time: 2nd rank	Engine in operation
TRAVEL OPR. TIME MAX 3rd	Continuous travel time ranking	sec	Continuous travel time: 3rd rank	Engine in operation
TRAVEL OPR. TIME MAX 4th	Continuous travel time ranking	sec	Continuous travel time: 4th rank	Engine in operation
TRAVEL OPR. TIME MAX 5th	Continuous travel time ranking	sec	Continuous travel time: 5th rank	Engine in operation



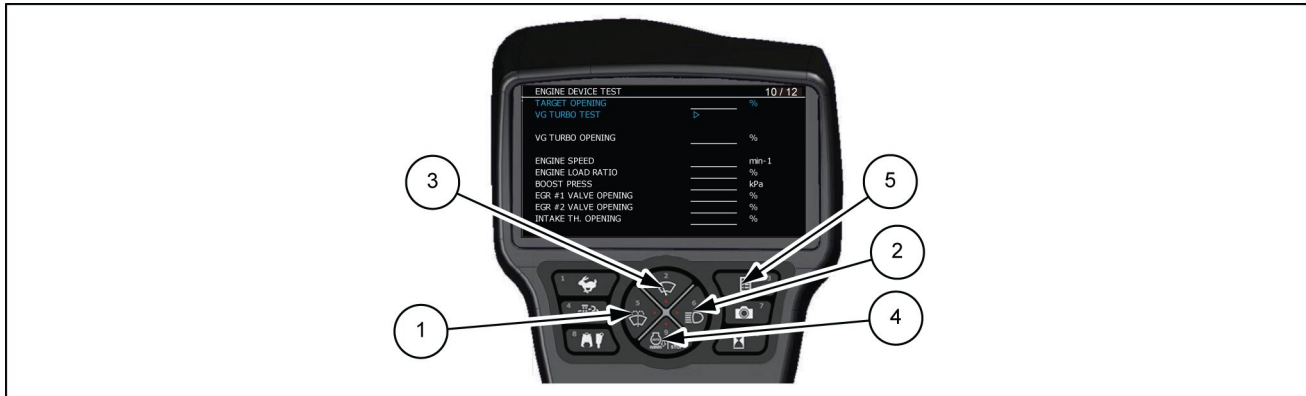
SMIL14CEX0980EA 67

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

VG turbo control test

Purpose

- To check the VG turbo operation.



SMIL14CEX4186EB 100

Display	Explanation	Unit	Remarks
TARGET OPENING	Degree of opening of target VG turbo	%	Items selectable. The degree of opening of the VG turbo can be specified. Initial value: 50.0
VG TURBO TEST	G turbo test	—	The VG turbo is driven (for 10 s).
VG TURBO OPENING	Degree of opening of EGR #1	%	
ENGINE SPEED	Actual engine speed	min-1 (rpm)	
ENGINE LOAD RATIO	Engine torque (load ratio)	%	
BOOST PRESS	Boost pressure	kPa (psi)	
EGR #1 VALVE OPENING	Degree of opening of EGR #1	%	
EGR #2 VALVE OPENING	Degree of opening of EGR #2	%	
INTAKE TH. OPENING	Intake throttle opening (degree)	%	

Condition for the test

- The key is ON, or the engine is running [**1500 RPM** or less].

Set the target VG turbo (%).

- Select "TARGET OPENING" (degree of opening of target VG turbo) using SW **(3)** and **(4)**.
- Press SW **(1)** and **(2)** to set the target test position.
- Available set range: **0 - 100 %**
- After the setting is completed, press SW **(5)**.

Test execution

- Select "VGT TURBO TEST" (VG turbo test) using SW **(3)** and **(4)**.
- Hold down SW **(2)** for **3 s**, then "▷" changes to "▶" and the test starts.
- The test will be continued for **10 s**.

Test finish

- After **10 s**, the engine automatically returns to the normal state.

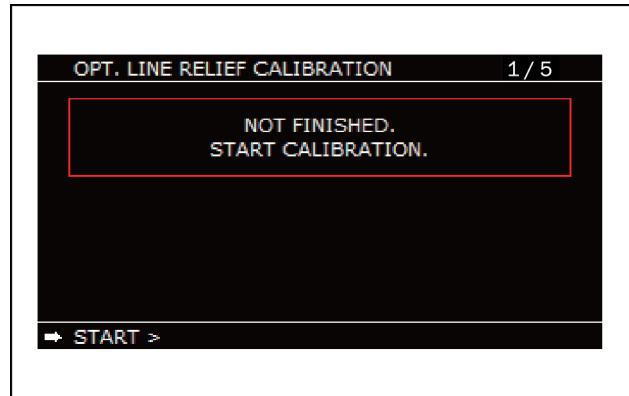
OPT.line relief

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.

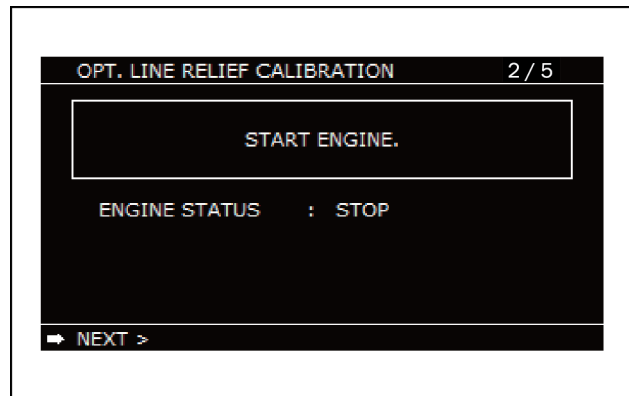
This is disabled unless the calibration setup and adjustment for the hydraulic pump are completed in advance. (You cannot enter the screen.)

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




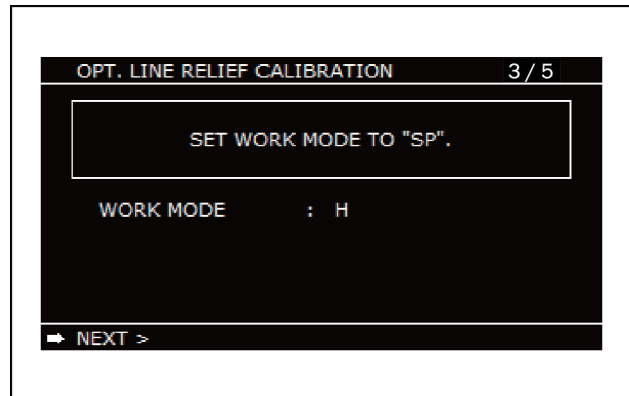
SMIL14CEX6791AA 9

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




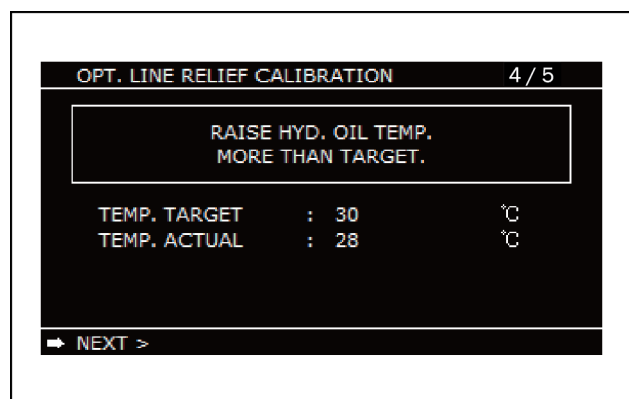
SMIL14CEX6792AA 10

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



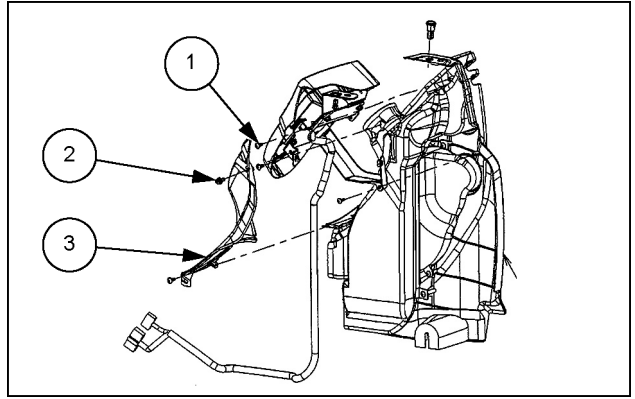
SMIL14CEX6793AA 11

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



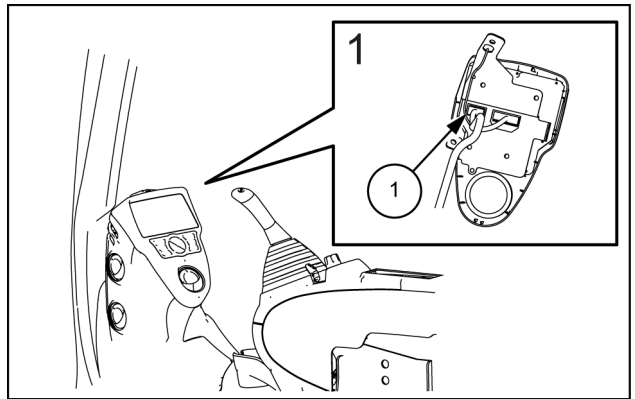
SMIL14CEX6794AA 12

5. Use a flathead screwdriver or longnose pliers to remove the truss head tapping screw (1), use a wrench [10 mm] remove the 1 bolt (2), and then remove the side front right trim (3).



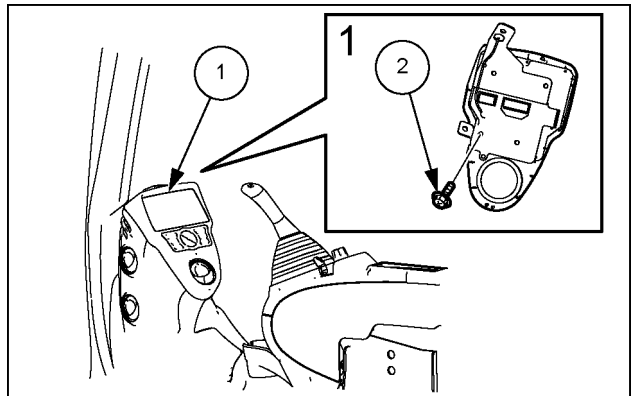
SMIL14CEX1931AB 5

6. Remove the connectors (1).



SMIL14CEX1932AB 6

7. Use a wrench [10 mm] to remove the 4 bolts (2), and then remove the monitor (1).
- Bolt (1) tightening torque: **4.5 - 5.0 N·m (3.319 - 3.688 lb ft)**



SMIL14CEX1933AB 7

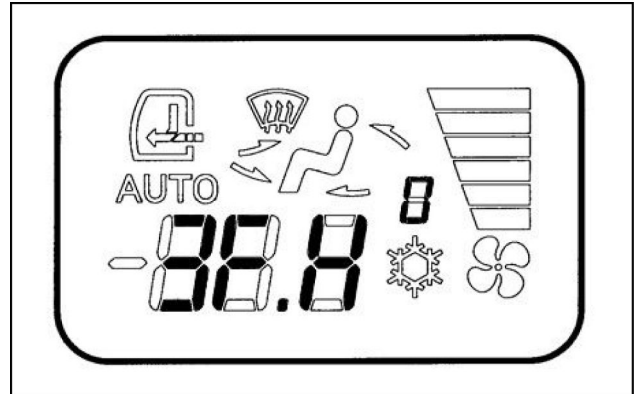
Display contents in monitor mode

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.

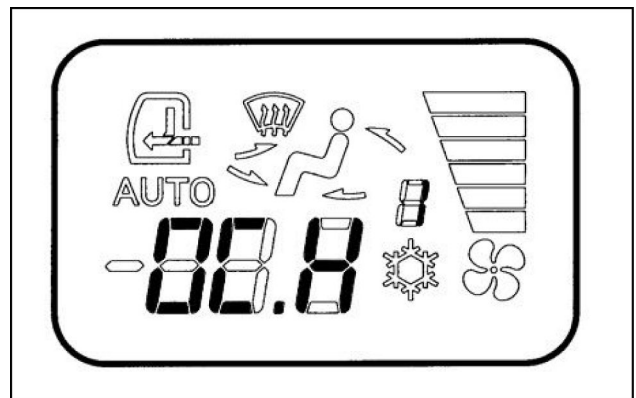


SMIL14CEX1962AA 10

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.

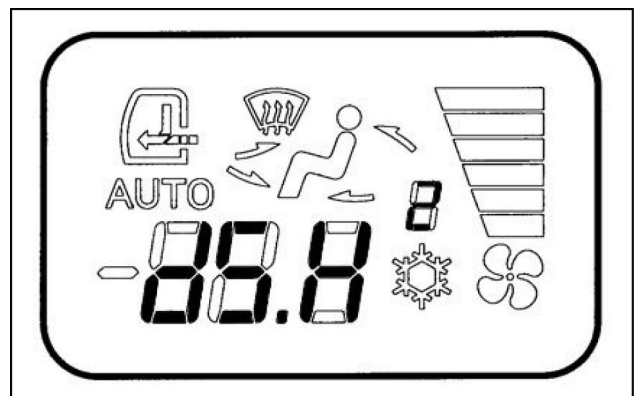


SMIL14CEX1963AA 11

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.

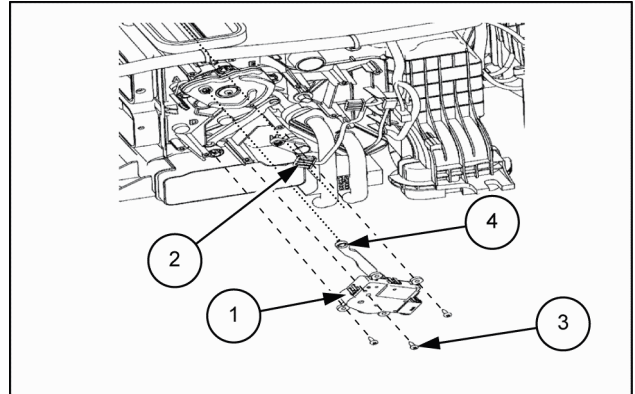


SMIL14CEX1964AA 12

Blower - Replace - Motor actuator

1. Replacement of mode motor actuator

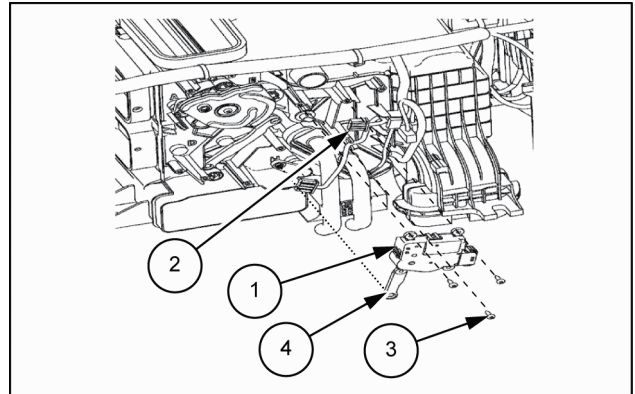
- Remove the link cover.
- Remove the connector **(2)** from the motor actuator **(1)**.
- Remove the 3 Phillips screws **(3)** M4x16 securing the motor actuator **(1)**, remove the rod **(4)** attached to the motor actuator **(1)** from the rod hole on the mode cam, and then install the new motor actuator **(1)**. The installation procedure is the reverse of the removal procedure.



SMIL14CEX1817AB 1

2. Replacement of air mix motor actuator

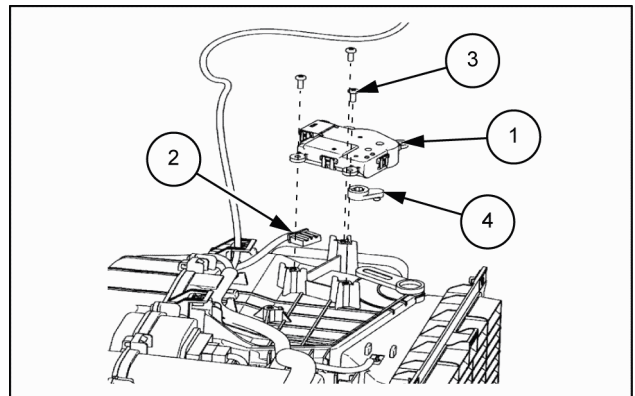
- Remove the link cover.
- Remove the connector **(2)** from the motor actuator **(1)**.
- Remove the 3 Phillips screws **(3)** M4x16 securing the motor actuator **(1)**, remove the rod **(4)** attached to the motor actuator **(1)** from the rod hole on the damper lever, and then install the new motor actuator **(1)**. The installation procedure is the reverse of the removal procedure.



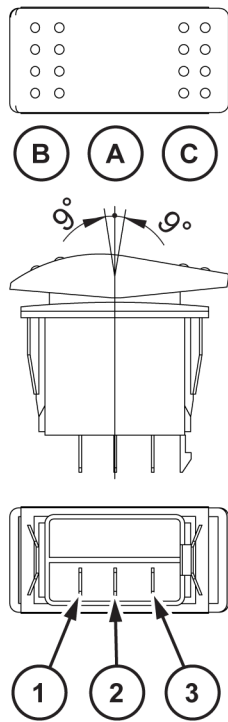
SMIL14CEX1818AB 2

3. Replacement of refresh/recirculate motor actuator

- Remove the link cover.
- Remove the connector **(2)** from the motor actuator **(1)**.
- Remove the 3 Phillips screws **(3)** M4x16 securing the motor actuator **(1)**, remove the lever pin **(4)** attached to the motor actuator **(1)** from the slot hole, and then install the new motor actuator **(1)**. The installation procedure is the reverse of the removal procedure.



SMIL14CEX1819AB 3



a

		b		
		1	2	3
c	A			
	B		○ — ○	
	C	○ — ○		

SMIL15CEX5802FB 3
Code 3: Rocker switch (ON)-OFF-(ON) (model/specification select switch)

- a. Connection table
- b. Terminal
- c. Select position

Contents

Electrical systems - 55

Warning indicators, alarms, and instruments - 408

SERVICE

Warning indicators, alarms, and instruments	
Inspect	3

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) Wiring harnesses - Electrical schematic sheet 03 (55.100)

205C-Urea fluid tank temperature sensor low voltage

Control Module : DCU

Solution:

1. Turn OFF the ignition switch.

Disconnect the harness connector **CN.D20** from the urea fluid sensor.

Inspect the urea fluid sensor harness connector **CN.D20**.

Make sure that there should be no intermittent conditions, poor connections, or corrosion.

Make sure that there should be no water intrusion or adhering foreign material.

A. If a problem is found, repair the harness connector **CN.D20**.

B. If there are no problems, proceed to Step 2.

2. Turn ON the ignition switch.

Connect a test lamp between the urea fluid sensor power supply circuit and the DCU harness GND connection.

A. If the test lamp does not illuminate, repair the open circuit or high resistance in the urea fluid sensor power supply circuit.

B. If the test lamp illuminates, proceed to Step 3.

3. Connect a test lamp between the power supply circuit and the GND circuit.

A. If the test lamp does not illuminate, repair the open circuit or high resistance in the urea fluid sensor GND circuit.

B. If the test lamp illuminates, proceed to Step 4.

4. Inspect the signal side circuit between the DCU and urea fluid tank temperature sensor.

Make sure that there is no short to ground.

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

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

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

5. Disconnect the harness connector **CN.D1-2** from the DCU.

Inspect the DCU harness connector **CN.D1-2**.

NOTE: Make sure that there is no intermittent conditions, poor connections, or corrosion.

A. If a problem is found, repair the harness connector **CN.D1-2**.

B. If there are no problems, Replace the urea fluid sensor. (Refer to “ Diesel Exhaust Fluid (DEF)/AdBlue® supply module - Remove (55.988)” and “ Diesel Exhaust Fluid (DEF)/AdBlue® supply module - Install (55.988)”)

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.

20EA-Urea fluid pressure reduction malfunction

Control Module : DCU

Solution:

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

Diagnostic trouble code 204B
Diagnostic trouble code 204C
Diagnostic trouble code 204D
Diagnostic trouble code 208B
Diagnostic trouble code 20A0
Diagnostic trouble code 20A2
Diagnostic trouble code 20A3

A. If there are diagnostic trouble codes that were set at the same time, treat those first.

NOTE: If a diagnostic trouble code other than 20EA is set, perform the diagnosis for diagnostic trouble code 1464 first.

2. Make sure that there is no damage to or clogging of the supply module filter.

 **CAUTION:**

Do not blow air onto the urea fluid connector on the urea fluid supply module.

A. If a problem is found, replace the supply module filter. (Refer to “ **Diesel Exhaust Fluid (DEF)/AdBlue® supply module - Remove (55.988)**” and “ **Diesel Exhaust Fluid (DEF)/AdBlue® supply module - Install (55.988)**”)

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

3. Inspect the suction piping between the urea fluid supply module and the urea fluid tank.

Make sure that there is no clogging caused by twisting or bending.

Make sure that there is no clogging caused by foreign material.

Make sure that there is no layout in the urea fluid piping that differs from the specified layout.

Make sure that there is no clogging caused by urea fluid freezing.

A. If a problem is found, repair or replace.

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

4. Disconnect the harness connector **CN.D18** from the urea fluid supply module.

Inspect for poor connections at the urea fluid supply module harness connector **CN.D18**.

A. If a problem is found, repair the harness connector **CN.D18**.

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

5. Inspect each circuit between the DCU and the urea fluid supply module.

Make sure that there is no open circuit, breakage, or high resistance.

Make sure that there is no short circuit.

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

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

Measure the voltage between the ground and terminal 2 of the fuel level sensor connector **(2) CN.D53** harness side.

A. If the voltage is not about **5 V**, repair or replace the GL426 harness.

B. If the voltage is about **5 V**, replace the main controller **(1)**.

7. Turn the key switch OFF.

Connect the fuel level sensor connector **(2) CN.D53**.

Inspect for continuity between the ground and terminal 2 of the fuel level sensor connector **(2) CN.D53** harness side.

A. If there is continuity, replace the GL426 harness.

B. If there is no continuity, proceed to Step 8.

8. Turn the key switch ON.

Measure the voltage between the ground and terminal 1 of the fuel level sensor connector **(2) CN.D53** harness side.

A. If the voltage is not **0 V**, replace the BG660, BG600, BG605 and BG601 harnesses.

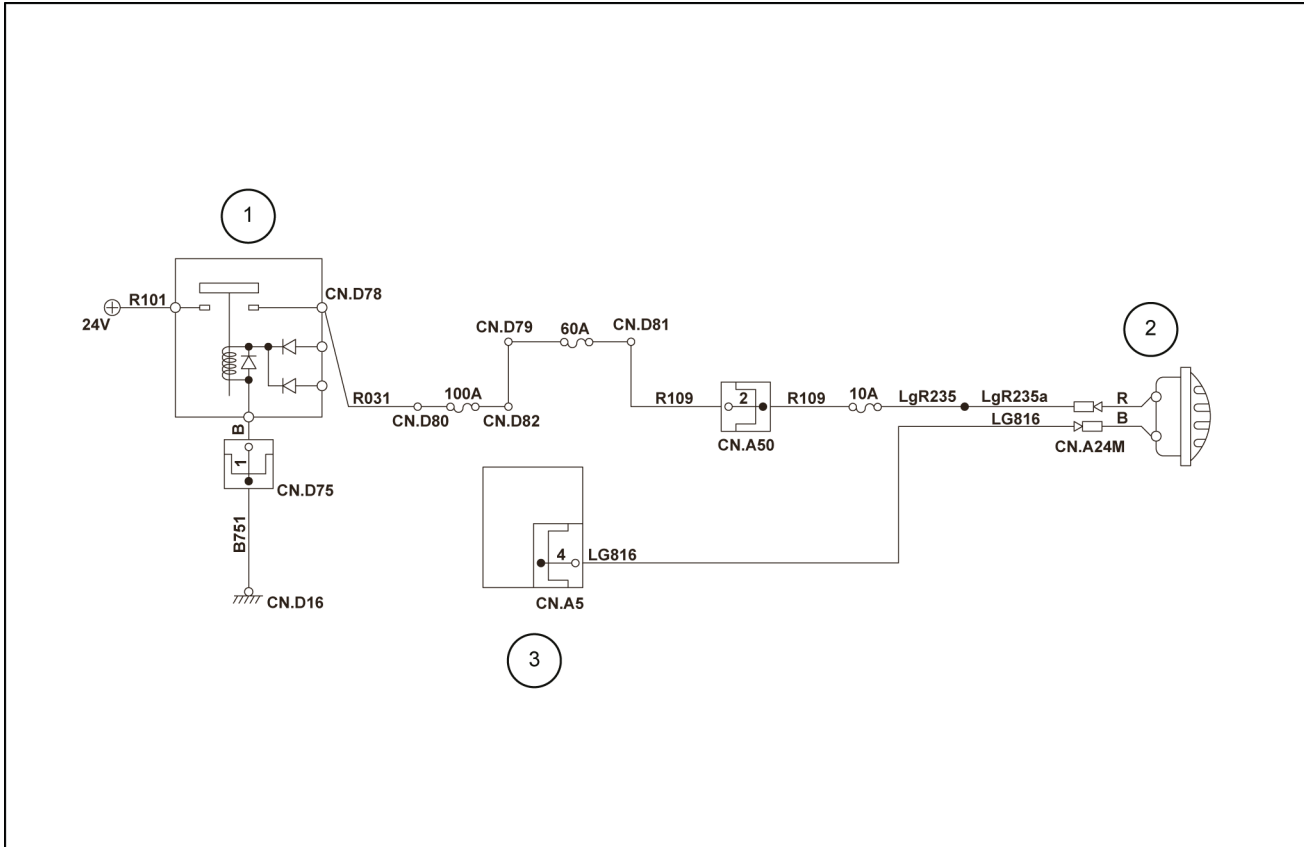
B. If the voltage is **0 V**, replace the main controller **(1)**.

7213-Quick coupler buzzer abnormality

Control Module : MCM

Solution:

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



SMIL14CEX3616FB 1

1. Battery relay
 2. Quick coupler buzzer
 3. Main controller
2. Turn the key switch ON.

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

- A. If diagnostic trouble code 7213 is displayed, proceed to Step 3.
3. Check whether the fuse (**100 A**, **60 A**, or **10 A**) is blown.
 - A. If diagnostic trouble code 7213 is displayed, proceed to Step 4.
 4. Turn the key switch OFF.

Remove the quick coupler buzzer connector (2) **CN.A24-2**.

Connect the quick coupler buzzer connector (2) **CN.A24-2** buzzer side male terminal to the battery's negative, connect its female terminal to the positive, and inspect whether the buzzer sounds.

- A. If the buzzer does not sounds, replace the quick coupler buzzer (2).
- B. If the buzzer sounds, proceed to Step 5.

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

5. Turn the key switch OFF.

Remove the connector **CN.D3-A**.

Inspect for continuity between the terminal V16 of the connector **CN.D3-A** harness side and terminal 2 of the connector CN.D17-6 harness side.

A. If there is no continuity, replace the defective harness.

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

6. Inspect the continuity between terminal V17 of the connector **CN.D3-A** harness side and terminal 3 of the connector CN.D17-6 harness side.

A. If there is no continuity, replace the defective harness.

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

7. Inspect the continuity between terminal V35 of the connector **CN.D3-A** harness side and terminal 1 of the connector CN.D17-6 harness side.

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

B. If there is continuity, replace defective sensor (**3**).

P0091-Fuel rail regulator control system low input

Control Module : ECM

Solution:

1. Check and diagnose the below fault codes before you proceed with the diagnostics code 0091.
2. Disconnect the harness connector **CN.E14** from the suction control valve.
Connect the test light between the suction control valve High side circuit and a normal GND.
Turn ON the ignition switch.
Check if the test light comes on and then goes off.
If it does not turn off, inspect the High side circuit between the ECM and the suction control valve.
Make sure that there is no open circuit or high resistance.
Make sure that there is no short to GND.
Make sure that there is no short to the Low side circuit.
 - A. If a problem is found, repair the High side circuit.
 - B. If there are no problems, proceed to Step 3.
3. Turn OFF the ignition switch for at least **30 s**.
Connect the test light between the suction control valve Low side circuit and battery power supply.
Turn ON the ignition switch.
Check if the test light comes on and then goes off.
If it does not turn off, inspect the Low side circuit between the ECM and suction control valve.
Make sure that there is no open circuit or high resistance.
Make sure that there is no short to the battery or ignition power supply.
 - A. If a problem is found, repair the Low side circuit.
 - B. If there are no problems, proceed to Step 4.
4. Inspect the suction control valve harness connector **CN.E14** for a poor connection.
 - A. If a problem is found, repair the harness connector **CN.E14**.
 - B. If the harness connector **CN.E14** is normal, replace the suction control valve. (Refer to “Fuel shutoff solenoid - Remove” and “Fuel shutoff solenoid - Install”)
 - C. If there are no problems, proceed to Step 5.
5. Inspect the ECM harness connector **CN.D4** for a poor connection.
 - A. If a problem is found, repair the harness connector **CN.D4**.
 - B. If the harness connector **CN.D4** is normal, replace the ECM. (Refer to “**Engine Control Unit (ECU) - Remove (55.015)**” and “**Engine Control Unit (ECU) - Install (55.015)**”)
6. Set the Injector ID Code, fuel delivery rate and engine No. for the ECM.
7. Confirm resolution:
 1. Clear the diagnostic trouble code using the trouble diagnosis scan tool.

P0204-Injector circuit - Cylinder 4

Control Module : ECM

Solution:

1. Check and diagnose the below fault codes before you proceed with the diagnostics code 0204.
2. Turn OFF the ignition switch.

Disconnect the injector harness intermediate connector **CN.E21** from the cylinder head cover case.

Measure the resistance between No.4 cylinder injector power supply terminal and No.4 cylinder injector drive signal terminal of the injector harness intermediate connector **CN.E21**.

If the reading is less than or equal to the **2.0 Ω**, inspect the circuit between the ECM and the injector harness intermediate connector **CN.E21** for an open circuit or high resistance.

- A. If a problem is found, repair the circuit.
 - B. If there are no problems, proceed to Step 3.
3. Remove the cylinder head cover. (Refer to “**Valve cover - Remove (10.101)**”)
Inspect the tightening nut of No.4 cylinder injector harness for looseness.
 - A. If looseness is found in the tightening nut of No.4 cylinder injector harness, tighten the nut.
 - B. If there are no problems, proceed to Step 4.
 4. Inspect for foreign material coming in contact with No.4 cylinder injector terminal.
 - A. If foreign material comes in contact with No.4 cylinder injector terminal, remove the foreign material.
 - B. If there are no problems, proceed to Step 5.
 5. Inspect for poor connections at the injector harness intermediate connector **CN.E21**.
 - A. If a problem is found, repair the connector **CN.E21**.
 - B. If there are no problems, proceed to Step 6.
 6. Inspect the circuit between No.4 cylinder injector **CN.E21-A** and the intermediate connector **CN.E21**.
Make sure that there is no open circuit or high resistance.
Make sure that there is no short together between the injector circuits.
 - A. If a problem is found, repair the circuit.
 - B. If the circuit is normal, replace No.4 cylinder injector. (Refer to “**Fuel injectors - Remove (10.218)**” and “**Fuel injectors - Install (10.218)**”)
If an injector has been replaced, set the Injector ID Code on the ECM.
 7. Inspect the ECM harness connector **CN.D4** for a poor connection.
 - A. If a problem is found, repair the harness connector **CN.D4**.
 - B. If the harness connector **CN.D4** is normal, replace the ECM. (Refer to “**Engine Control Unit (ECU) - Remove (55.015)**” and “**Engine Control Unit (ECU) - Install (55.015)**”)
 8. Set the Injector ID Code, fuel delivery rate and engine No. for the ECM.
 9. 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**.

P0546-EGR cooler inlet 1 temperature sensor circuit high

Control Module : ECM

Solution:

1. Check and diagnose the below fault codes before you proceed with the diagnostics code 0546.

Diagnostic trouble code 06A8

2. Turn OFF the ignition switch.

Disconnect the harness connector **CN.E23** from EGR gas temperature sensor 1.

Turn ON the ignition switch.

Measure the voltage between the EGR gas temperature sensor 1 signal circuit and a known good GND.

If the reading is more than or equal to the **5.5 V**, inspect the signal circuit between the ECM and EGR gas temperature sensor 1 for a short to the battery or a short to the ignition power supply.

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

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

3. Connect a fused jumper wire between the EGR gas temperature sensor 1 signal circuit and the GND circuit.

Observe the EGR gas temperature sensor **5 V** adjustment display on the trouble diagnosis scan tool.

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

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

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

4. Inspect for poor connections at the EGR gas temperature sensor 1 harness connector **CN.E23**.

A. If a problem is found, repair the harness connector **CN.E23**.

B. If the harness connector **CN.E23** is normal, replace EGR gas temperature sensor 1. (Refer to “**Exhaust Gas Recirculation (EGR) temperature sensors - Remove - Temperature sensor 1 (55.989)**” and “**Exhaust Gas Recirculation (EGR) temperature sensors - Install - Temperature sensor 1 (55.989)**”)

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

5. Connect a fused jumper wire between the EGR gas temperature sensor 1 signal circuit and a known good GND.

Observe the EGR gas temperature sensor **5 V** adjustment display on the trouble diagnosis scan tool.

If the reading is less than or equal to the **0.1 V**, inspect the EGR gas temperature sensor 1 GND circuit for an open circuit or high resistance.

NOTE:

- EGR gas temperature sensor 1 shares the GND circuit with other sensors.
- Diagnostic trouble codes on sensors that share this circuit may be set.

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

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

6. Inspect the EGR gas temperature sensor 1 signal circuit for an open circuit or high resistance.

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

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

- A. If a problem is found, repair the harness connector **CN.D4**.
- B. If the harness connector **CN.D4** is normal, replace the ECM. (Refer to “ **Engine Control Unit (ECU) - Remove (55.015)**” and “ **Engine Control Unit (ECU) - Install (55.015)**”)
8. Set the Injector ID Code, fuel delivery rate, and engine No. for the ECM.
9. 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 20 (55.100) Wiring harnesses - Electrical schematic sheet 14 (55.100)

P2458-Purge time out error

Control Module : ECM

Solution:

1. Check and diagnose the below fault code before you proceed with the diagnostic code 2458.

Diagnostic trouble code 0427

Diagnostic trouble code 0428

Diagnostic trouble code 042C

Diagnostic trouble code 042D

2. Inspect the exhaust system.

Make sure that there is no absence or damage of the exhaust pipe gasket.

Make sure that there is no exhaust gas leak from the exhaust system.

The exhaust system should not be modified.

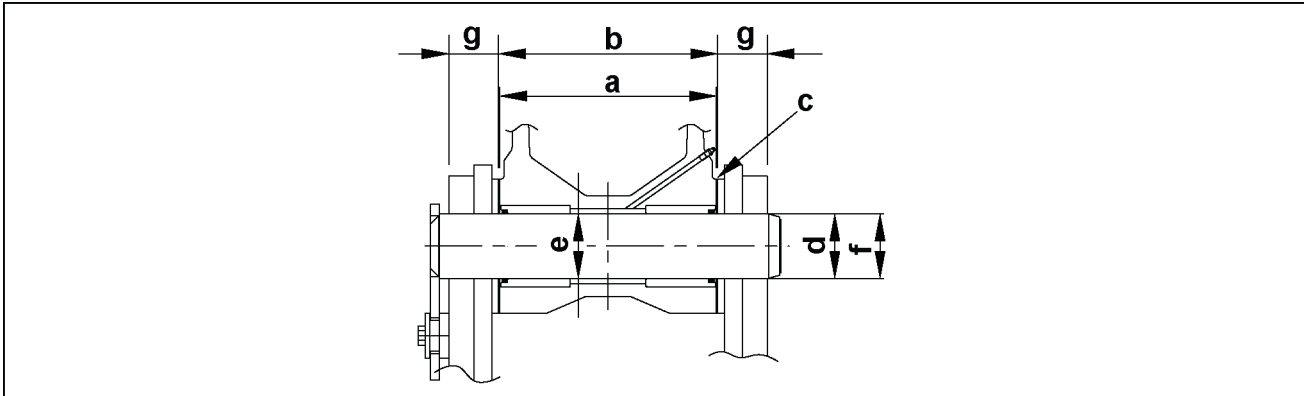
Make sure that there is no incorrect detection or slow response from the exhaust gas temperature sensor.

A. If a problem is found, repair or replace the exhaust system.

3. Turn ON the ignition switch.

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

5. Boom and arm installation section



SMIL14CEX2918EA 6

Part name	Code	Standard value	Usage limit	Judgement	Solution
Boom	a	437 mm (17.20 in)	440 mm (17.32 in)	Acceptable/ Unacceptable	Replace
Arm	b	432.7 mm (17.04 in)	430.7 mm (16.96 in)	Acceptable/ Unacceptable	Replace
Clearance	c	1 mm (0 in) or lower	Shim adjustment	Acceptable/ Unacceptable	Adjust with shims
Pin	d	Ø 130 mm (5.12 in)	Ø 129 mm (5.08 in)	Acceptable/ Unacceptable	Replace
Bushing (arm)	e	Ø 130 mm (5.12 in)	Ø 131.5 mm (5.18 in)	Acceptable/ Unacceptable	Replace
Boom	f	Ø 130 mm (5.12 in)	Ø 131.5 mm (5.18 in)	Acceptable/ Unacceptable	Replace

Link and rod - Prepare

⚠ WARNING

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

W0944D

⚠ WARNING

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

W0287A

⚠ WARNING

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

W1036A

Items to prepare:

- Wrenches [36 mm] x 2
- Hammer
- Striking rod
- Grease
- Rag
- Cleaning fluid

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL

- Thank you very much for reading the preview of the manual.
- You can download the complete manual from: www.heydownloads.com by clicking the link below



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

CLICK HERE TO **DOWNLOAD** THE COMPLETE MANUAL