CX350C
CX370C
Crawler Excavator

SERVICE MANUAL

Part number 48063132
English
October 2016
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CASE
CONSTRUCTION

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	Windshield wiper & washer	
	AM/FM Radio with auto-tuner	
	Floor mat	
	Polycarbonate roof hatch & Sun shade	
	Auto air-conditioner	
	Top guard OPG level 1 (in CAB structure)	
	Roll - over protective structure (ROPS)	
Operator's seat		
	KAB 835: Low frequency mechanical suspension with helical springs and double acting hydraulic damper.	
	With following features	
	Manual weight adjustment	Backrest angle adjustment
	Seat height adjustment	Adjustable pivoting armrests linked to consoles
	Adjustable headrest	Retractable seat belt
Others		
	Rear view mirror (Cab side & Right side)	
	Rear & Right side view camera	

Undercarriage

Travel motor		Variable displacement axial piston motor
Brake		Mechanical disc brake
Hydraulic service brake		Brake valve
Final drive		Planetary gear reduction
Travel speeds	High	**5.4 km/h** (**3.36 mph**) (Automatic travel speed shifting)
	Low	**3.4 km/h** (**2.113 mph**)
Drawbar pull		**263 kN** (**59124.752 lb**)
Number of carrier rollers (each side)		2
Number of carrier rollers (each side)		8
Number of shoes (each side)		48
Type of shoe		Triple grouser shoe
Link pitch		**216 mm** (**8.504 in**)
Width of shoe		**600 mm** (**23.622 in**) (S.T.D)
Grade-ability		**70 %** (**35 °**)

Mass

Operating mass	**37300 kg** (**82232.424 lb**)
	with **3.25 m** (**10.663 ft**) Arm, **1.6 m³** Bucket, **600 mm** (**23.622 in**) grouser shoe, operator, lubricant, coolant and full fuel tank
Shipping mass	**35200 kg** (**77602.716 lb**)
	Operating mass - (operator mass [**75 kg** (**165.35 lb**)]) + **90 %** of fuel mass [**430 kg** (**947.99 lb**)] + bucket mass [**1604 kg** (**3536.215 lb**)])
Counter weight mass	**7700 kg** (**16975.594 lb**)
Ground pressure	**0.070 MPa** (**10.1535 psi**)
	with **3.25 m** (**10.663 ft**) HD Arm, **1.6 m³** Bucket, **600 mm** (**23.622 in**) grouser shoe

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

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

Kilograms to pounds

kg	0	1	2	3	4	5	6	7	8	9	kg
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	
----		2.205	4.409	6.614	8.819	11.023	13.228	15.432	17.637	19.842	----
10	22.046	24.251	26.456	28.660	30.865	33.069	35.274	37.479	39.683	41.888	10
20	44.093	46.297	48.502	50.707	52.911	55.116	57.320	59.525	61.730	63.934	20
30	66.139	68.344	70.548	72.753	74.958	77.162	79.367	81.571	83.776	85.981	30
40	88.185	90.39	92.595	94.799	97.004	99.209	101.413	103.618	105.822	108.027	40
50	110.232	112.436	114.641	116.846	119.050	121.255	123.460	125.664	127.869	130.073	50
60	132.278	134.483	136.687	138.892	141.097	143.301	145.506	147.710	149.915	152.120	60
70	154.324	156.529	158.734	160.938	163.143	165.348	167.552	169.757	171.961	174.166	70
80	176.371	178.575	180.780	182.985	185.189	187.394	189.599	191.803	194.008	196.212	80
90	198.417	200.622	202.826	205.031	207.236	209.440	211.645	213.850	216.054	218.259	90
100	220.463	222.668	224.873	227.077	229.282	231.487	233.691	235.896	238.100	240.305	100

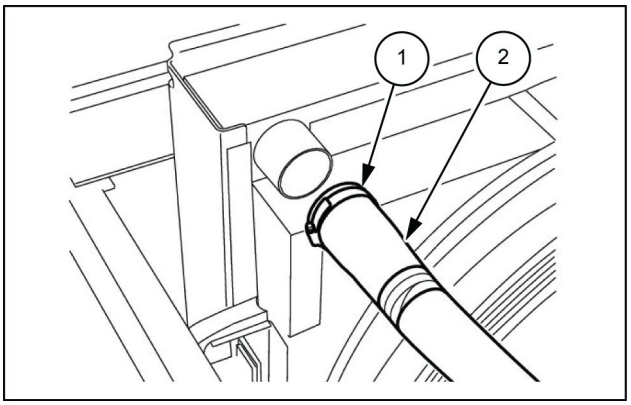
Weight kilograms to newtons

kgf	0	1	2	3	4	5	6	7	8	9	kg
	N	N	N	N	N	N	N	N	N	N	
----		9.81	19.61	29.42	39.23	49.03	58.84	68.65	78.45	88.26	----
10	98.07	107.87	117.68	127.49	137.29	147.10	156.91	166.71	176.52	186.33	10
20	196.13	205.94	215.75	225.55	235.36	245.17	254.97	264.78	274.59	284.39	20
30	294.20	304.01	313.81	323.62	333.43	343.23	353.04	362.85	372.65	382.46	30
40	392.27	402.07	411.88	421.69	431.49	441.30	451.11	460.91	470.72	480.53	40
50	490.33	500.14	509.95	519.75	529.56	539.37	549.17	558.98	568.79	578.59	50
60	588.40	598.21	608.01	617.82	627.63	637.43	647.24	657.05	666.85	676.66	60
70	686.47	696.27	706.08	715.89	725.69	735.50	745.31	755.11	764.92	774.73	70
80	784.53	794.34	804.15	813.95	823.76	833.57	843.37	853.18	862.99	872.79	80
90	882.60	892.41	902.21	912.02	921.83	931.63	941.44	951.25	961.05	970.86	90
100	980.67	990.47	1000.28	1010.08	1019.89	1029.70	1039.5	1049.31	1059.12	1068.92	100

Newtons to weight kilograms

N	0	1	2	3	4	5	6	7	8	9	N
	kgf	kgf	kgf	kgf	kgf	kgf	kgf	kgf	kgf	kgf	
----		0.1020	0.2039	0.3059	0.4079	0.5099	0.6118	0.7138	0.8158	0.9177	----
10	1.0197	1.1217	1.2237	1.3256	1.4276	1.5296	1.6315	1.7335	1.8355	1.9375	10
20	2.0394	2.1414	2.2434	2.3453	2.4473	2.5493	2.6513	2.7532	2.8552	2.9572	20
30	3.0591	3.1611	3.2631	3.3651	3.4670	3.5690	3.6710	3.7729	3.8749	3.9769	30
40	4.0789	4.1808	4.2828	4.3848	4.4868	4.5887	4.6907	4.7927	4.8946	4.9966	40
50	5.0986	5.2006	5.3025	5.4045	5.5065	5.6084	5.7104	5.8124	5.9144	6.0163	50
60	6.1183	6.2203	6.3222	6.4242	6.5262	6.6282	6.7301	6.8321	6.9341	7.0360	60
70	7.1380	7.2400	7.3420	7.4439	7.5459	7.6479	7.7498	7.8518	7.9538	8.0558	70
80	8.1577	8.2597	8.3617	8.4636	8.5656	8.6676	8.7696	8.8715	8.9735	9.0755	80
90	9.1774	9.2794	9.3814	9.4834	9.5853	9.6873	9.7893	9.8912	9.9932	10.0952	90
100	10.1972	10.2991	10.4011	10.5031	10.6050	10.7070	10.8090	10.9110	11.0129	11.1149	100

9. Use a wrench [**7 mm**] to loosen the hose band **(1)** on the radiator, and then disconnect the upper hose **(2)**.



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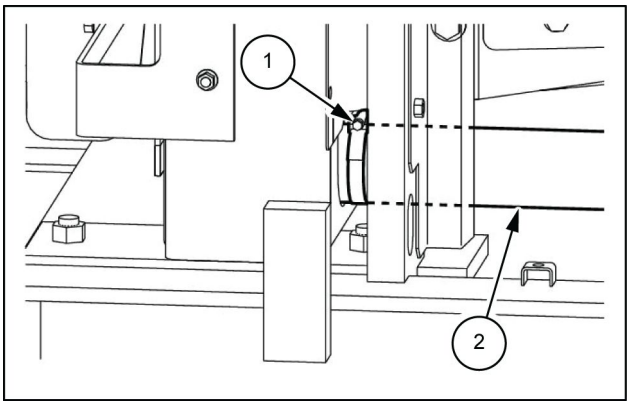
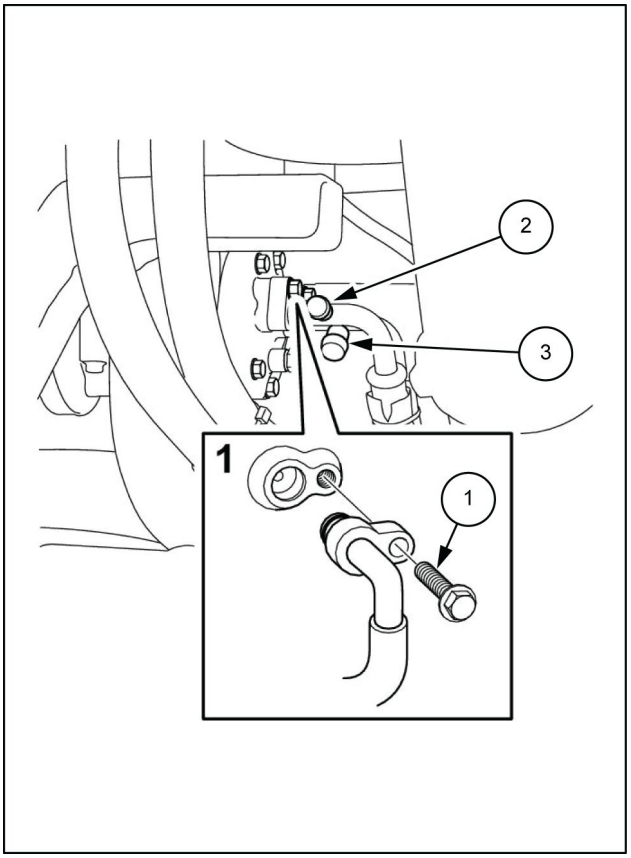
10. Use a wrench [**7 mm**] to loosen the hose band **(1)** on the radiator, and then disconnect the lower hose **(2)**.
    - Use caps to cover the radiator and hoses to prevent any entry of water, dust or dirt.
    - Before removing the radiator hose, completely drain the coolant.



SMIL13CEX3131AB 5

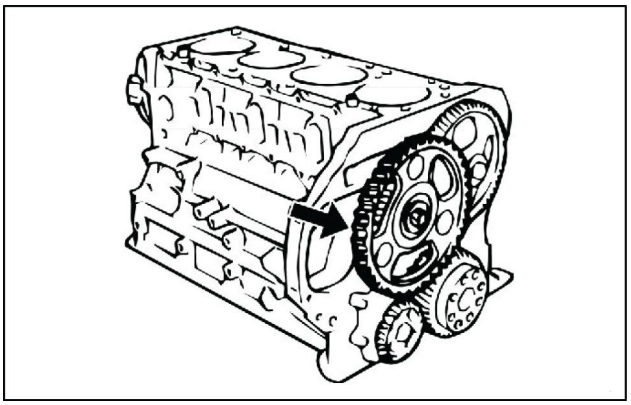
11. Use a wrench [**13 mm**] to loosen the 2 line bolts **(1)**, and then remove the 2 lines **(2)** and **(3)** from the compressor.
    - Always remove the low-pressure (suction side) line **(2)** first.
    - Install caps or plugs to the compressor and lines to prevent any entry of water, dust or dirt.
      Tightening torque for bolt installation: **19.6 - 24.5 N·m** (**14.5 - 18.1 lb ft**)



SMIL13CEX3132BB 6

Idle gear A removal

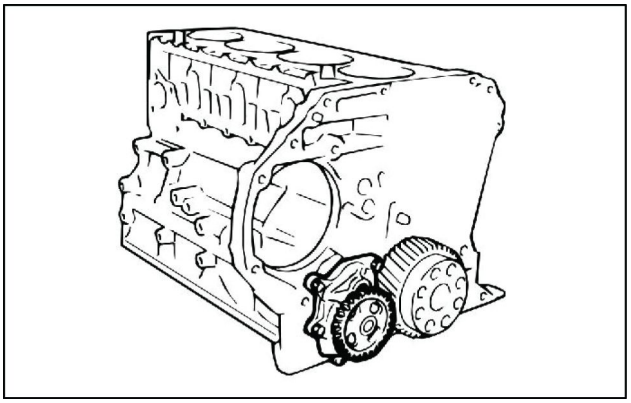
1. Remove the idle gear A from the idle gear A shaft.
2. Remove the idle gear A shaft from the cylinder block.



LPIL12CX03656AA 52

Oil pump assembly removal

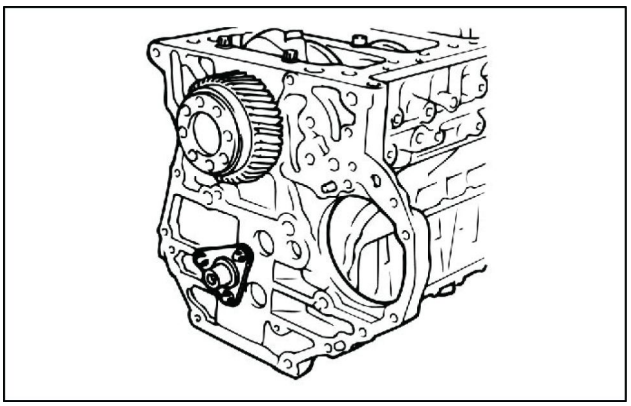
1. Remove the oil pump assembly from the cylinder block.



SMIL13CEX1614AA 53

Idle gear B removal

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



LPIL12CX03658AA 54

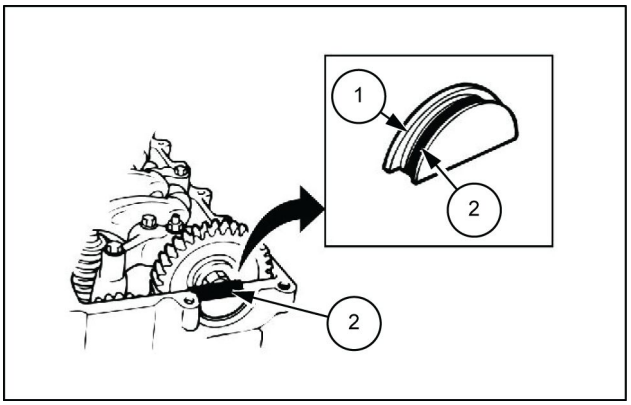
Lower cover installation

1. Apply the liquid gasket **(2)** to the rubber plug **(1)**.

NOTE: *Apply ThreeBond 1207B.*

NOTICE: *After applying the liquid gasket **(2)**, install the lower cover within **5 min**.*

2. Install the rubber plug **(1)** to the cylinder head assembly.
3. Install the gasket to the lower cover.

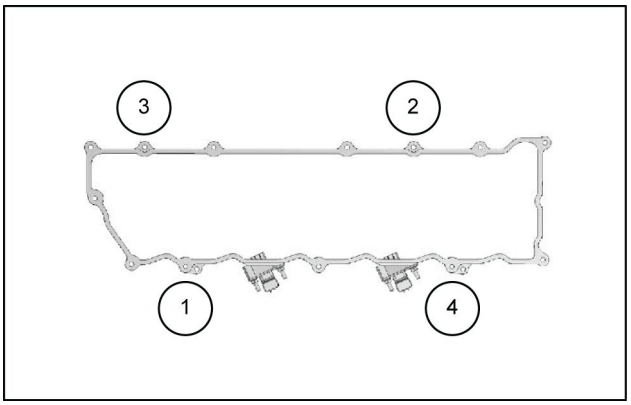


SMIL13CEX1698AB 80

4. Install the lower cover to the cylinder head assembly.

   Tightening torque: **13 N·m** (**112 lb in**)

NOTE: *Tightening order.*



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Common rail assembly installation

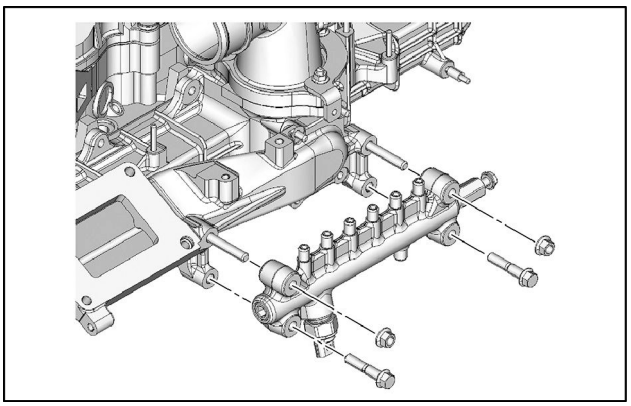
1. Align the common rail assembly **(1)** to the inlet cover.
2. Temporarily tighten the bolt to the common rail assembly **(1)**.
3. Temporarily tighten the nut to the common rail assembly **(1)**.
4. Securely tighten the bolt to the common rail assembly **(1)**.

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

5. Securely tighten the nut to the common rail assembly **(1)**.

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

6. Connect the harness connector to the fuel pressure sensor.



SMIL15CEX6563AA 82

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2. Inspect the backlash.

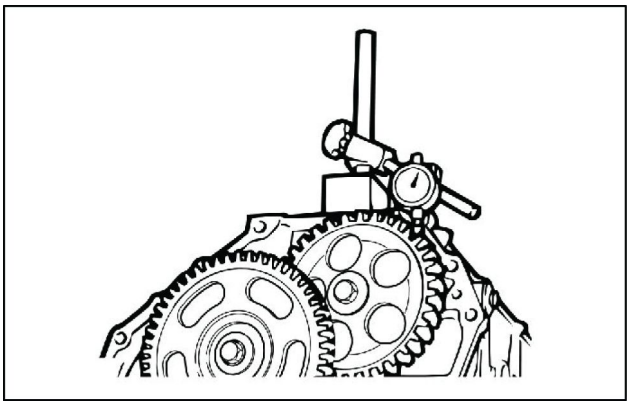
NOTE: *Gently move the gear right and left to read the inconsistency on the dial gauge.*

NOTICE: *Measure the idle gear backlash before removing the idle gear A.*

Specified value: **0.10 - 0.17 mm** (**0.0039 - 0.0067 in**)

Limit: **0.30 mm** (**0.0118 in**)

NOTICE: *Replace the idle gear if the measured value exceeds the limit value.*



SMIL13CEX1612AA 42

3. Measure the clearance using the feeler gauge.

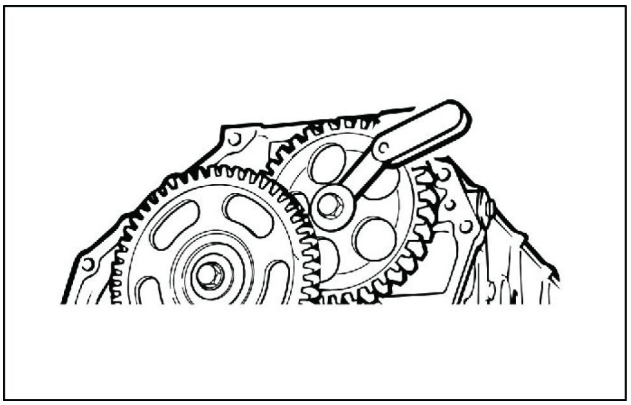
NOTE: *Measure the clearance between the idle gear and the thrust collar.*

NOTICE: *Measure the play of the idle gear in the axis direction before removing the idle gear B.*

Specified value: **0.080 - 0.155 mm** (**0.0031 - 0.0061 in**)

Limit: **0.20 mm** (**0.0079 in**)

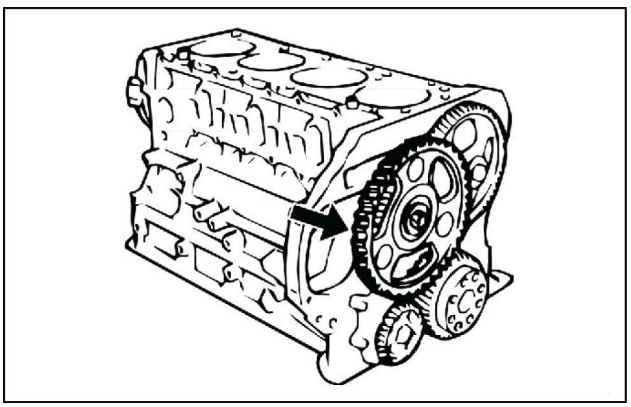
NOTICE: *Replace the idle gear if the measured value exceeds the limit value.*



SMIL13CEX1613AA 43

Idle gear A removal

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



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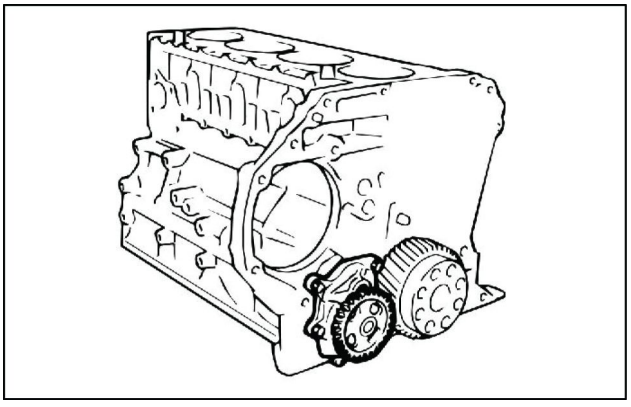
Oil pump assembly removal

1. Remove the oil pump assembly from the cylinder block.



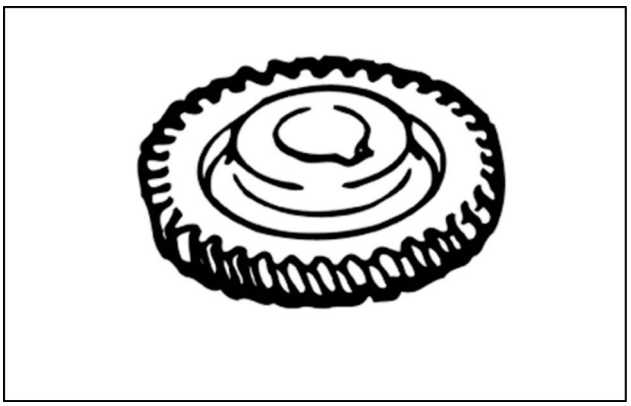
SMIL13CEX1614AA 45

Camshaft - Inspect

Camshaft gear inspection

1. Inspect the camshaft gear.

NOTE: *Inspect gears for tooth contact, peeling and pitching, etc.*



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Camshaft inspection

1. Inspect the camshaft.

NOTE: *Inspect the camshaft journal and cam sections for worn and damage.*

NOTICE: *If any abnormality is found in the inspection, replace the camshaft.*

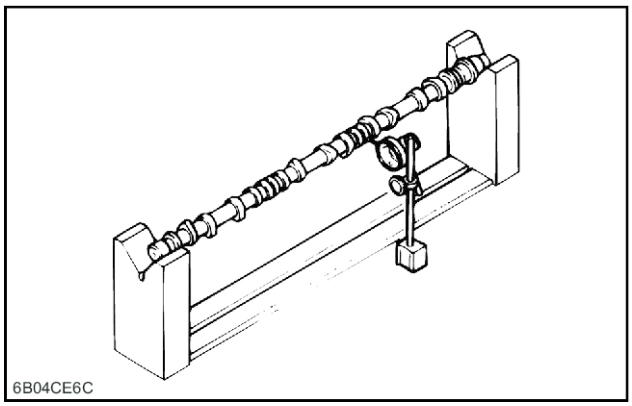
2. Put the camshaft on V-block.

NOTE: *Hold the No.1 and No.7 journal sections using the V blocks.*

3. Measure the camshaft using the dial gauge.

NOTE: *To measure the fluctuation, attach the dial gauge to the No.3 journal section and gently turn the camshaft 360 degrees.*

Limit: **0.05 mm** (**0.0020 in**)



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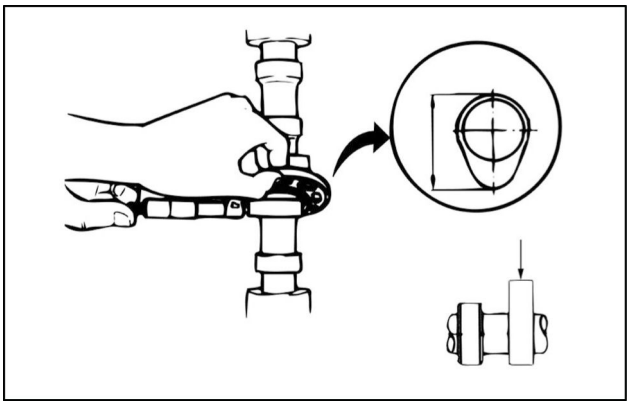
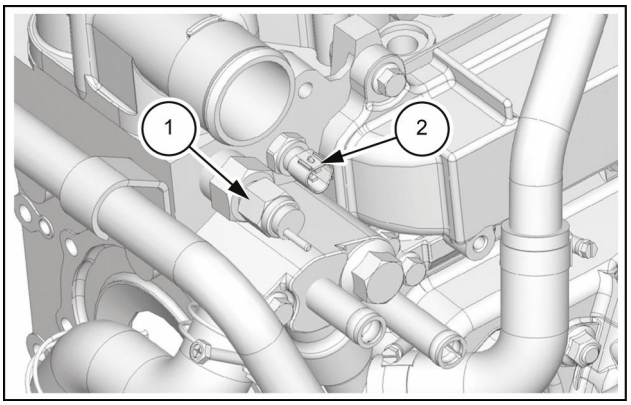
4. Measure the camshaft using the micrometer.



SMIL14CEX3390AA 3

Engine coolant temperature sensor removal

1. Remove the engine coolant temperature sensor from the cylinder head assembly.
   1. Overheat switch
   2. Coolant temperature sensor

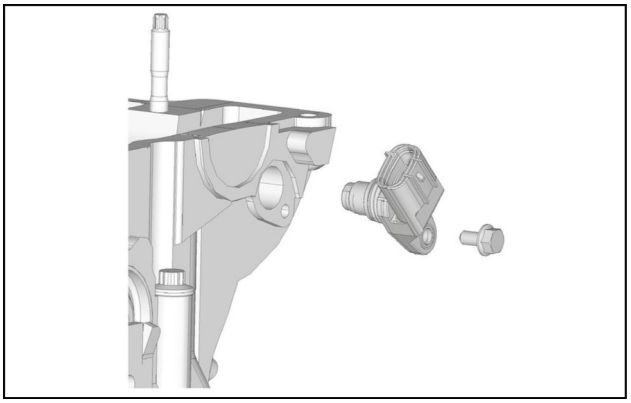


SMIL14CEX3023AB 7

CMP sensor removal

1. Disengage the harness connector from the CMP sensor.
2. Remove the CMP sensor from the cylinder head assembly.

   ⚠ CAUTION: Be careful not to subject the sensor to shock.



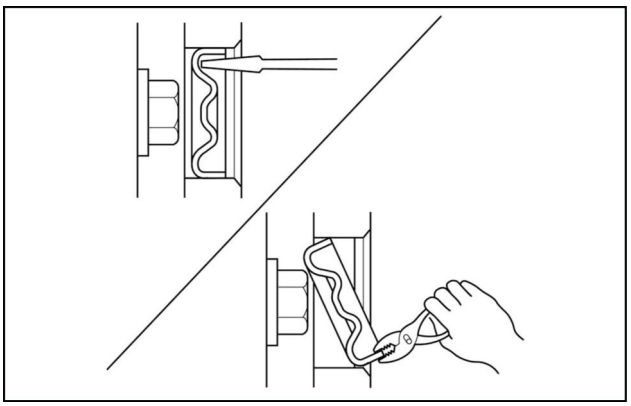
SMIL14CEX3024AA 8

Idle gear C removal

1. Press the idle gear C cover using the driver.

NOTE: *Lightly tap the outer perimeter of the cover using a screwdriver and tilt the cover.*

2. Remove the idle gear C cover from the cylinder head assembly using the pliers.



SMIL14CEX3025AA 9

Fuel leak off pipe assembly installation

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

NOTICE: *Use new gaskets.*

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

NOTICE: *Use new gaskets.*

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

NOTE: *Tighten the fuel feed pipe together.*

NOTICE: *Use new gaskets.*

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

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

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

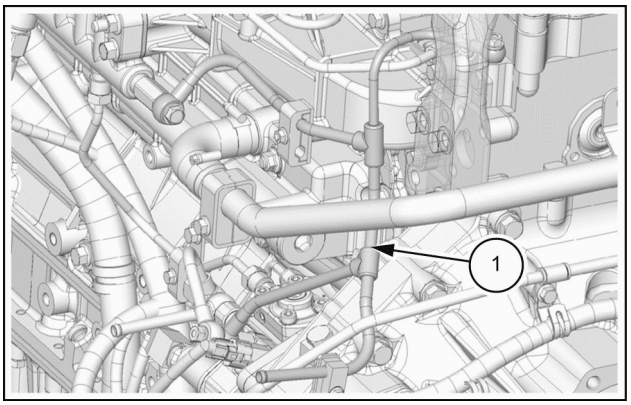
   Tightening torque: **20 N·m** (**14.8 lb ft**)

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

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

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

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



SMIL14CEX3089AB 18

Fuel pipe installation

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

NOTICE: *Use new gaskets.*

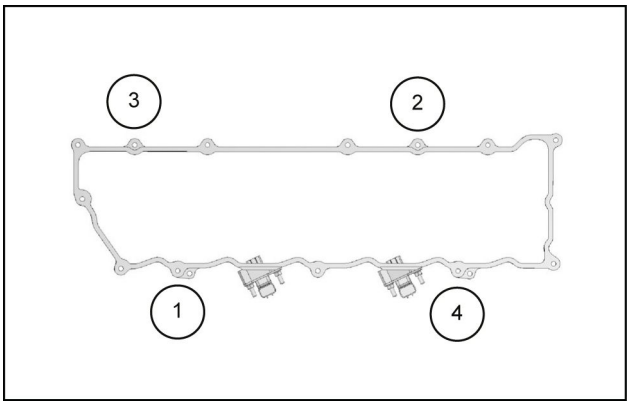
   Tightening torque: **44 N·m** (**32.5 lb ft**)

2. Install the clip to the bracket.

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

1. Application location

4. Install the gasket on the lower cover.
5. Install the lower cover on the cylinder head assembly.
   Tightening torque: **13 N·m** (**10 lb ft**)

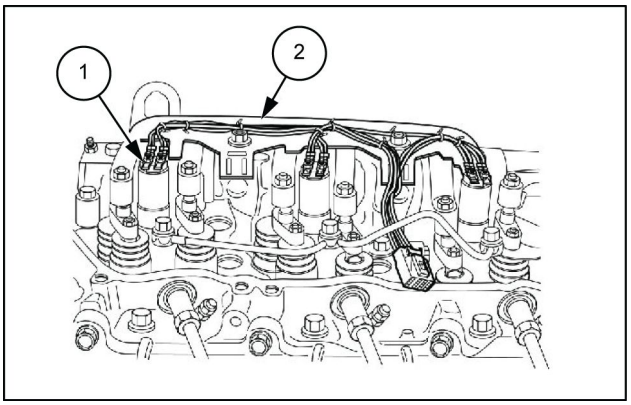


SMIL14CEX3087AB 16

6. Install the injector harness to the cylinder head assembly.
   - Tighten the bolts on the bracket and install the injector harness together with the bracket.

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

   1. Injector harness terminal
   2. Injector harness bracket



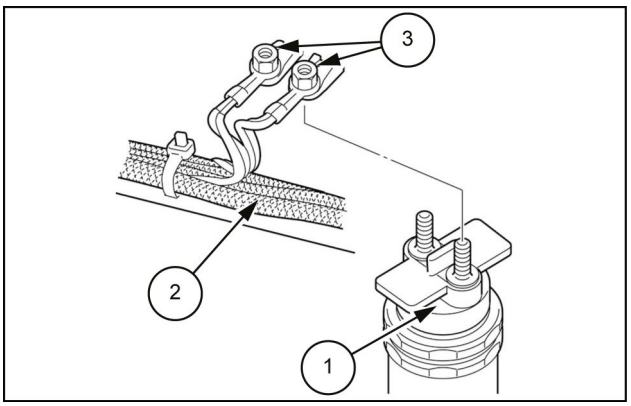
SMIL13CEX1699AB 17

7. Connect the injector harness to the injector.
   Tightening torque: **2 N·m** (**1.48 lb ft**)

NOTICE: *Be careful not to damage the injector side stud bolts.*

   1. Lower cover
   2. Connector

8. Install the connector to the lower cover.
   Tightening torque: **2 N·m** (**1.48 lb ft**)

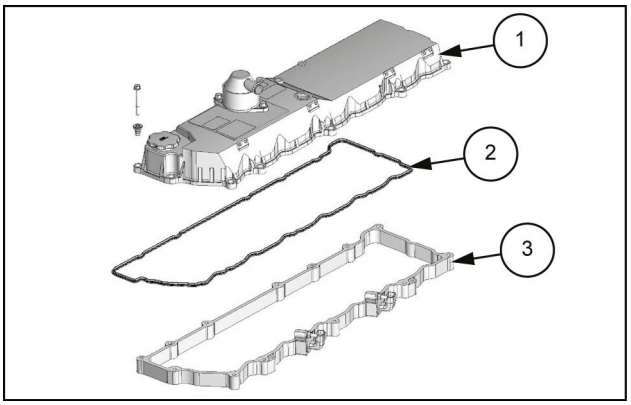


SMIL14CEX3095AB 18

Cylinder head cover installation

1. Align the head cover gasket **(2)** to the cylinder head cover **(1)**.
2. Install the cylinder head cover **(1)** to the lower cover **(3)**.
   Tightening torque: **13 N·m** (**10 lb ft**)

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



SMIL14CEX2970AB 19

Piston - Install

Piston installation

1. Install the connecting rod bearing to the connecting rod.
2. Apply the engine oil to the connecting rod bearing.

NOTICE: *Apply engine oil only to the internal diameter of the connecting rod bearing.*

3. Apply the engine oil to the piston ring.
4. Apply the engine oil to the piston.

NOTE: *Thoroughly apply engine oil to the ring grooves and piston side surface.*

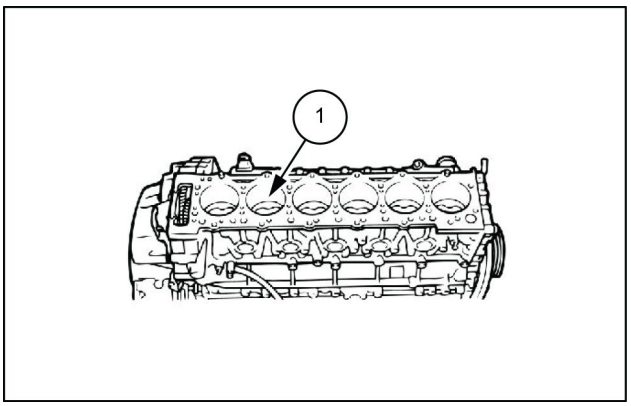
5. Adjust the piston ring.

   Specified angle : **90 °**

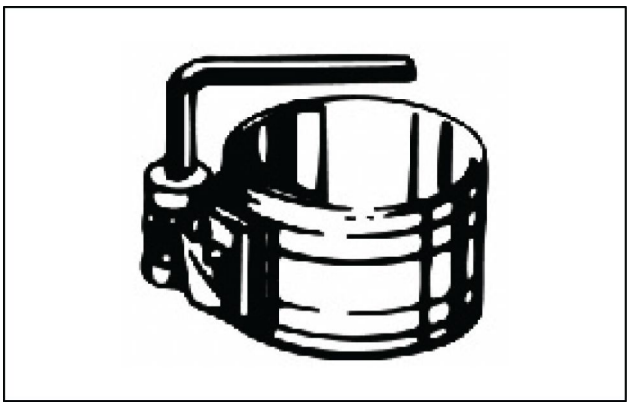
NOTE: *Shift each piston ring joint by the specified angle.*

6. Apply the engine oil to the cylinder liner.
   1. Engine oil application
7. Install the piston installer to the piston.
   Special tool: Piston setting tool (refer to **Piston - Special tools (10.105)**)
8. Align the piston to the cylinder block.

NOTE: *Turn the piston so that the front mark faces the engine front.*



LPIL12CX03685AB 1



SMIL13CEX1641AA 2

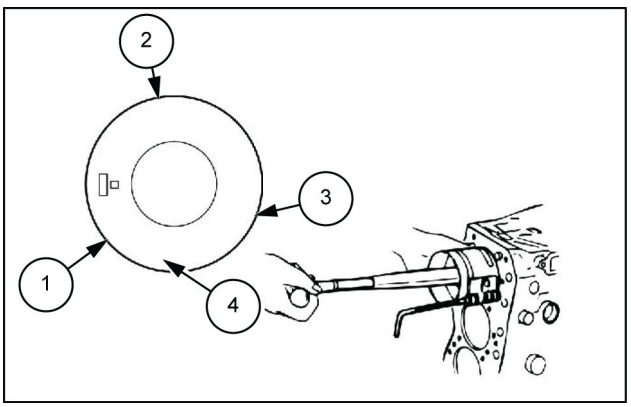
9. Press the piston.

NOTICE: *To avoid damaging the oil jet, place the crank pin on the cylinder on which the piston will be installed at top dead center.*
To avoid damaging the piston ring, firmly attach the piston installer to the cylinder block and push it.
Be careful not to damage the crank pin and cylinder liner. Attach a stopper so that the liner does not protrude.

   1. No.1 compression ring joint
   2. No.2 compression ring joint
   3. Oil ring joint
   4. Front mark

10. Install the connecting rod bearing to the connecting rod bearing cap.
11. Apply the engine oil to the connecting rod bearing.

NOTICE: *Apply engine oil only to the internal diameter of the connecting rod bearing.*

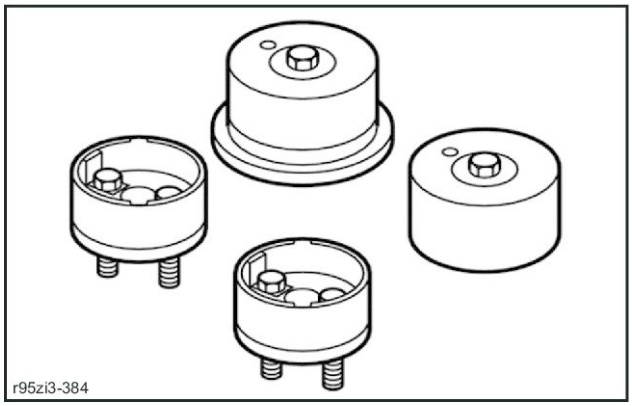


SMIL13CEX1642AB 3

Crankshaft oil seal Front seal - Install

Crankshaft front oil seal installation

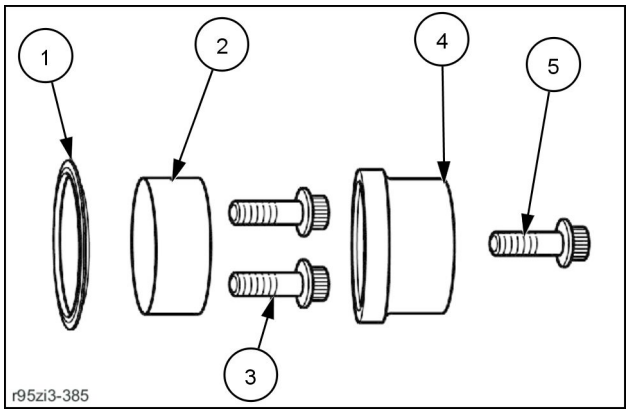
1. Prepare the special tool (Refer to **Crankshaft - Special tools (10.103)**)



R95ZI3-384 1

2.

NOTE: *Use the tools listed in the table below from the kit for front slinger installation.*



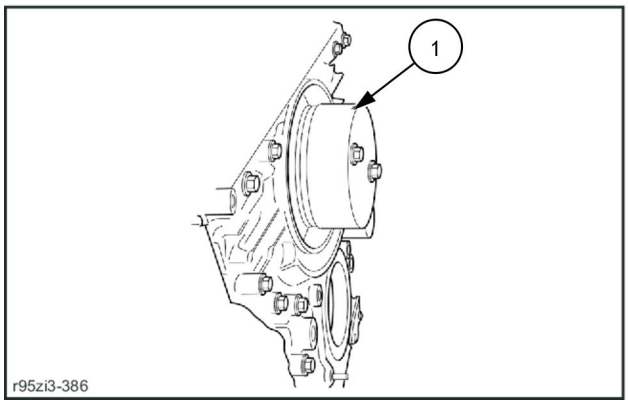
R95ZI3-385 2

	Name	Part Number
1	Slinger	–
2	Adapter	8-9439-6857-0
3	Adapter tightening bolt	8-9702-0656-0
4	Sleeve	8-9702-0623-0
5	Center bolt	8-9702-0655-0

3. Install the slinger on the adapter **(1)**.

NOTE: *Four clockwise threads are cut into the font slinger.*

NOTICE: *Be sure to install the slinger in the correction direction.*



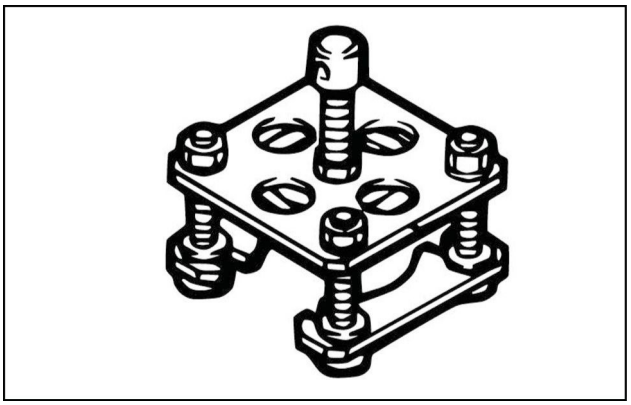
R95ZI3-386 3

4. Install the adapter **(1)** on the crankshaft.

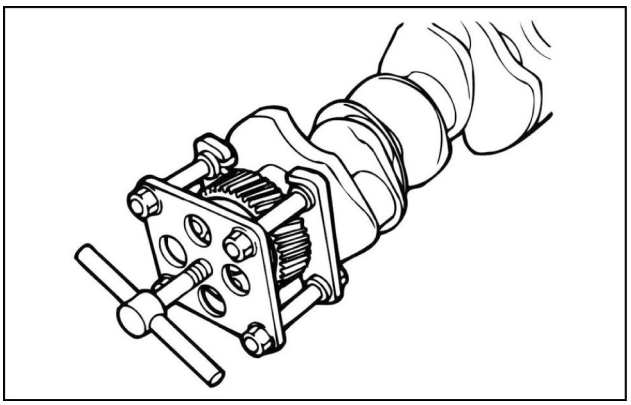
Crankshaft - Disassemble

1. Remove the crank gear from the crankshaft using the special tool.

   Special tool: Crankshaft gear puller (Refer to **Crankshaft - Special tools (10.103)**)



SMIL14CEX3251AB 1

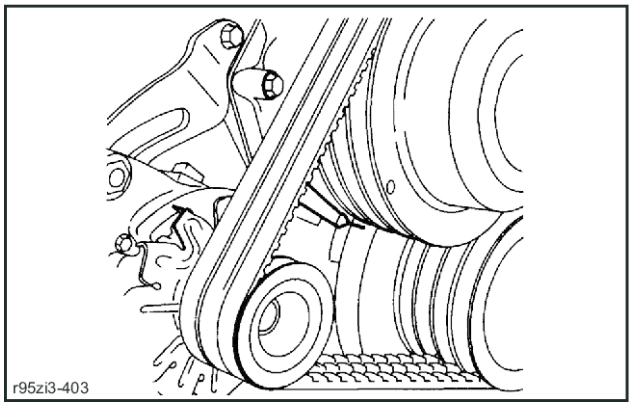


SMIL14CEX3252AA 2

2. Align first cylinder to the compression top dead center.
3. Prepare the feeler gauge.

   Thickness: **0.4 mm** (**0.0157 in**) 2 pieces

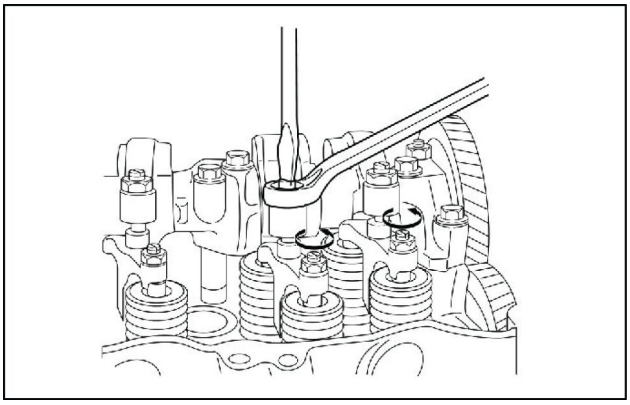
   - Insert the thickness gauge between the rocker arm and bridge cap.
   - Insert the thickness gauge between the bridge and valve.



R95ZI3-403 70

4. Turn the adjust screw.
   - When the movement of the thickness gauge becomes stiff, secure the adjust screw nut of the rocker arm.

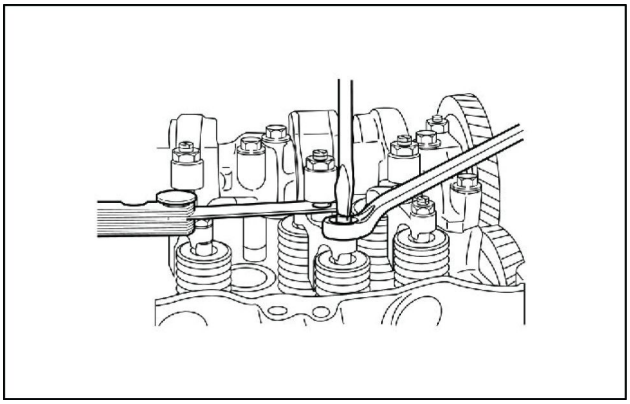
   Tightening torque: **22 N·m** (**16 lb ft**)



SMIL13CEX1691AA 71

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

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



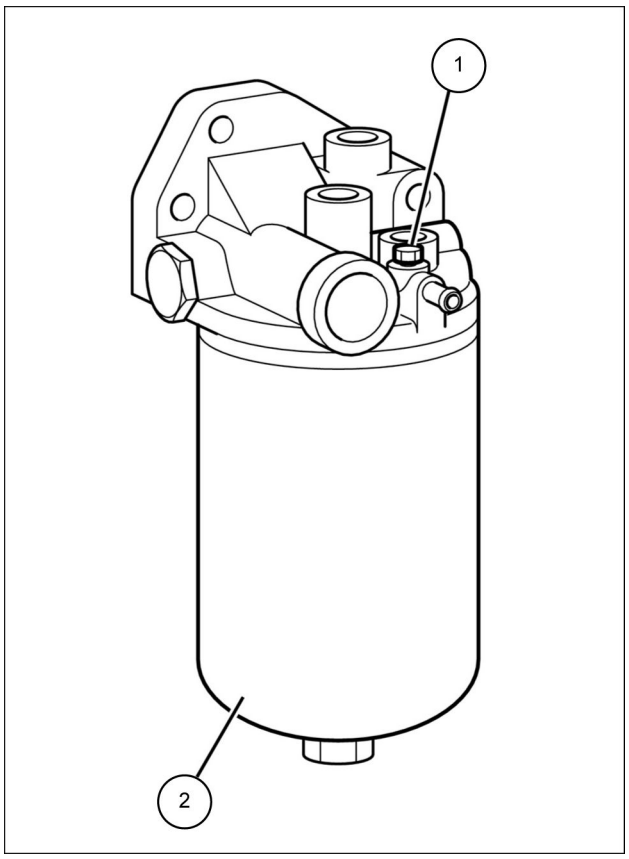
SMIL13CEX1692AA 72

Adjustment table

Cylinder No.	1		2		3		4		5		6	
	IN	EX	IN	EX	IN	EX	IN	EX	IN	EX	IN	EX
First cylinder compression top dead center	o	o	o			o	o			o		
Fourth cylinder compression top dead center				o	o			o	o		o	o

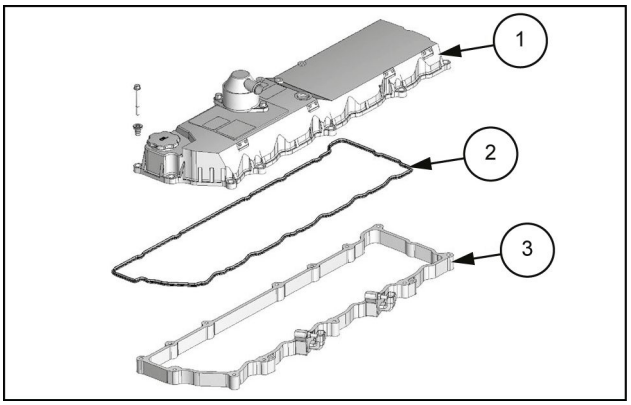
Fuel filters - Detailed view

1. Air bleed
2. Fuel filter element



SMIL15CEX6849BB 1

3. Remove the cylinder head cover **(1)** from the lower cover **(3)**.
4. Remove the head cover gasket **(2)** from the cylinder head cover **(1)**.

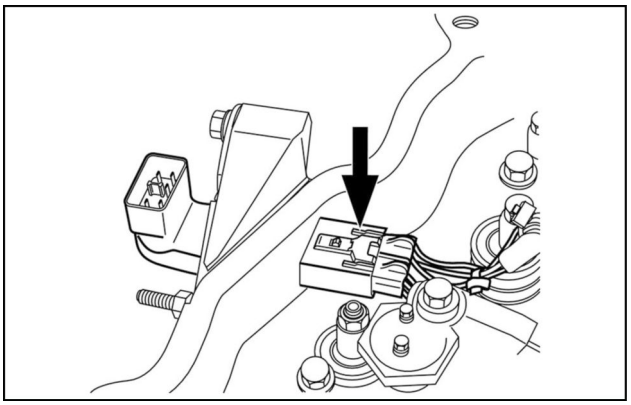


SMIL14CEX2970AB 3

Injector harness removal

1. Remove the connector from the lower cover.

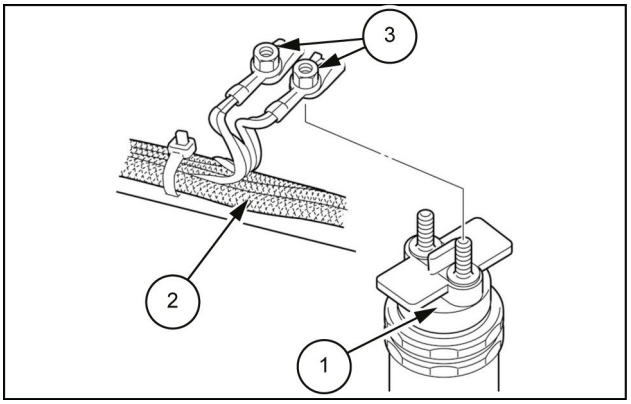
> ⚠ CAUTION: Do not pull the wire, or pry the connector with a screwdriver.



SMIL14CEX3002AA 4

2. Disengage the terminal nut **(3)** of the injector harness **(2)** from the injector **(1)**.

> ⚠ CAUTION: Be careful not to damage the injector side stud bolts.

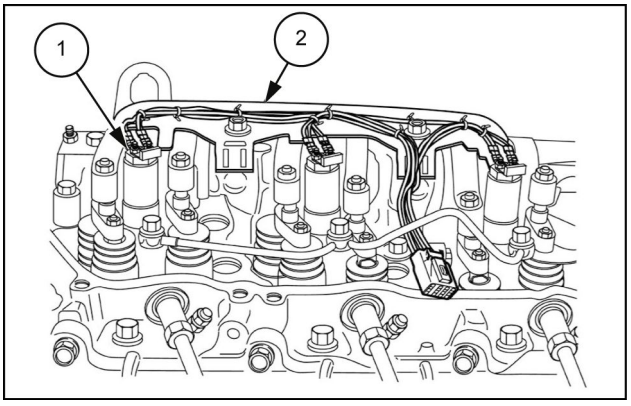


SMIL14CEX3003AB 5

3. Remove the injector harness from the cylinder head assembly.

NOTE: *Remove the bracket tightening bolts and then remove the injector harness together with the bracket.*

1. Injector harness terminal
2. Injector harness bracket



SMIL14CEX3244AB 6

Exhaust manifold - Inspect

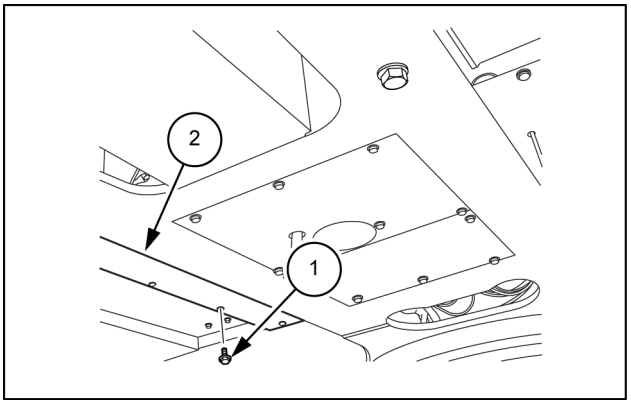
Exhaust manifold Inspection

1. Inspect the exhaust manifold.

NOTE: *Inspect the exhaust manifold for cracks.*

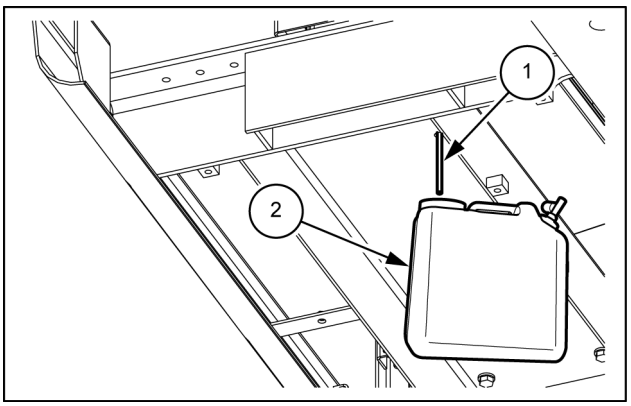
Radiator - Remove

1. Remove the engine hood (see **Hood - Remove (90.100)** and **Hood - Install (90.100)**).
2. Use a wrench [**19 mm**] to remove the 5 bolts **(1)**, and then remove the under cover **(2)**.



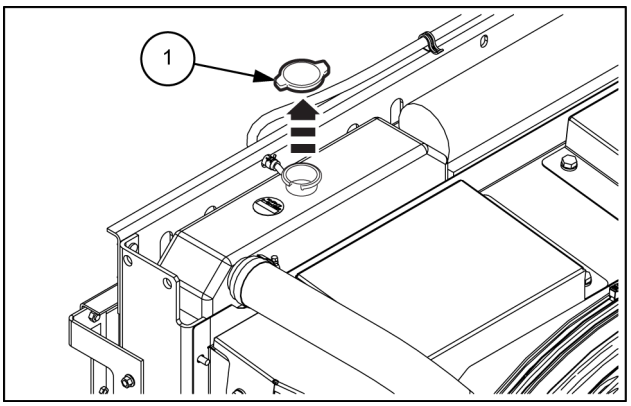
SMIL14CEX0783AB 1

3. Install the drain hose **(1)**, and then prepare the drain tank **(2)**.



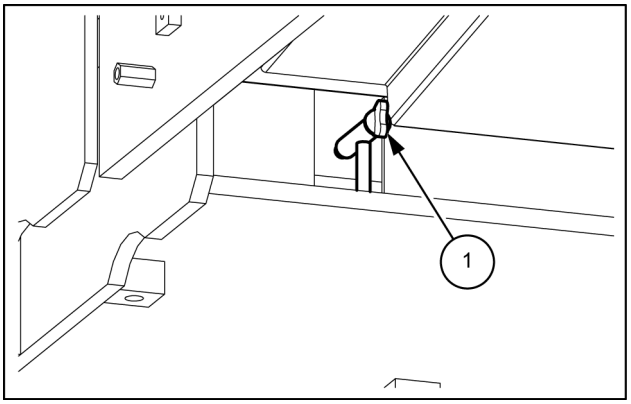
SMIL14CEX0784AB 2

4. To make it easier to drain the coolant, remove the radiator cap **(1)**.



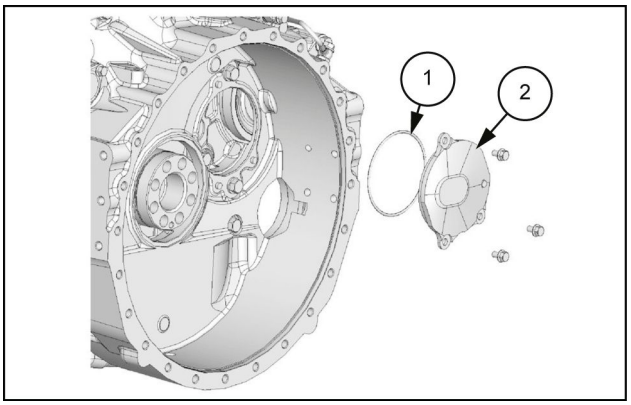
SMIL14CEX0785AB 3

5. Loosen the drain plug **(1)**, and then drain the coolant.



SMIL14CEX0786AB 4

12. Install the cover on the flywheel housing.
    1. O-ring
    2. Cover



SMIL14CEX3181AB 9

13. Install the oil pipe on the pipe bracket and oil port cover.

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

    Tightening torque: **28 N·m** (**20.65 lb ft**) Oil port cover side

    Tightening torque: **24 N·m** (**17.70 lb ft**) Clip

14. Install the PTO oil pipe on the flywheel housing and cylinder block.

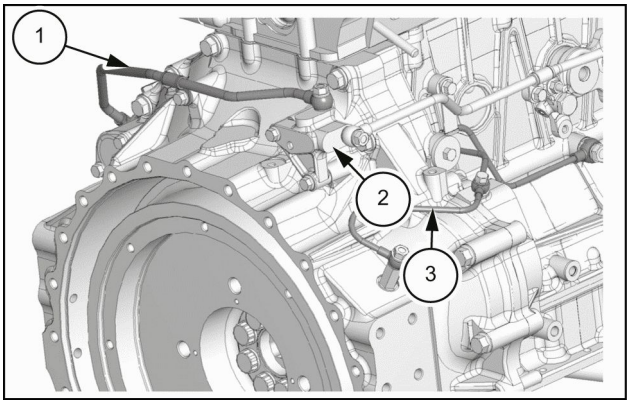
    Tightening torque: **34 N·m** (**25.08 lb ft**) Flywheel housing side

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

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

    Tightening torque: **24 N·m** (**17.70 lb ft**) Clip

    1. Oil pipe
    2. Pipe bracket
    3. PTO oil pipe



SMIL14CEX3135AB 10

Oil pan installation

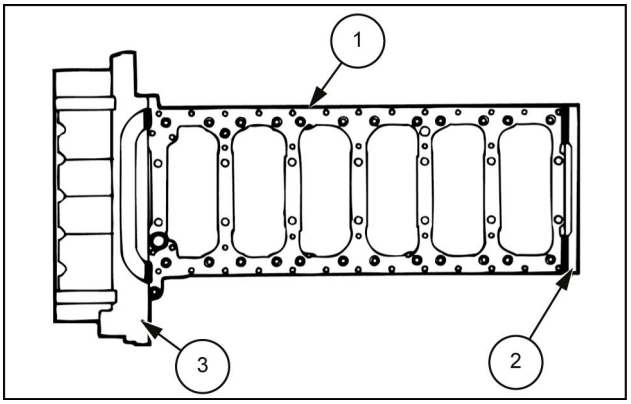
1. Apply liquid gasket to the crank case.

NOTE: *Apply ThreeBond 1207B to the matching surfaces of the crank case, flywheel housing, and gear case.*

Bead width: **3 mm** (**0.118 in**)
Bead height: **2 mm** (**0.079 in**)

1. Crankcase
2. Timing gear case
3. Flywheel housing

NOTICE: *Install the oil pan within **5 min** of applying the liquid gasket.*



SMIL14CEX3183AB 11

Heat exchanger - Install

1. Apply liquid gasket to the oil cooler assembly.

NOTE: *Apply ThreeBond 1207B around the groove of the oil cooler.*

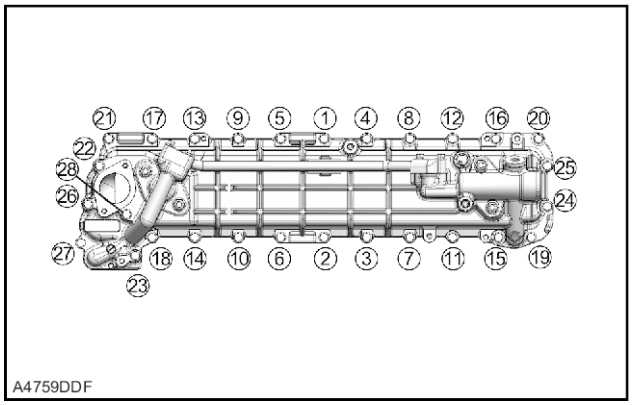
Bead diameter: **2.0 - 3.0 mm** (**0.079 - 0.118 in**)

NOTICE: *Install within **5 min** of applying the liquid gasket.*

2. Install the oil cooler assembly on the cylinder block.

Tightening torque: **25 N·m** (**18.44 lb ft**)

NOTE: *Check the cylinder block guide pin Tightening sequence*



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Installing the water duct

1. Install the water duct **(1)** on the oil cooler assembly and water pump assembly.

Tightening torque: **20 N·m** (**14.75 lb ft**)

NOTICE: *Use a new gasket.*

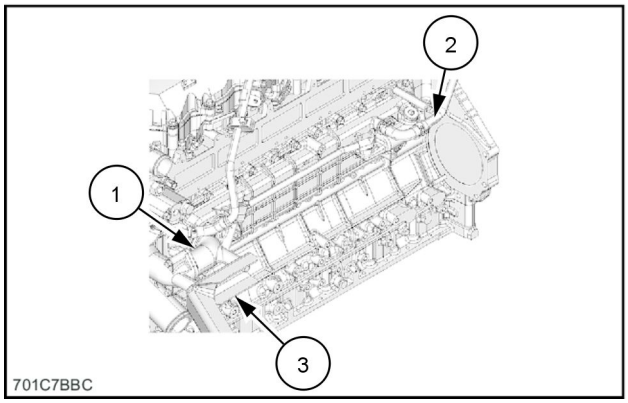
2. Install the fan guide bracket **(3)** on the water duct **(1)**and water pump assembly.

Tightening torque: **40 N·m** (**29.50 lb ft**)

3. Connect the fan guide bracket **(3)** to the fan guide.

Tightening torque: **30 N·m** (**22.13 lb ft**)

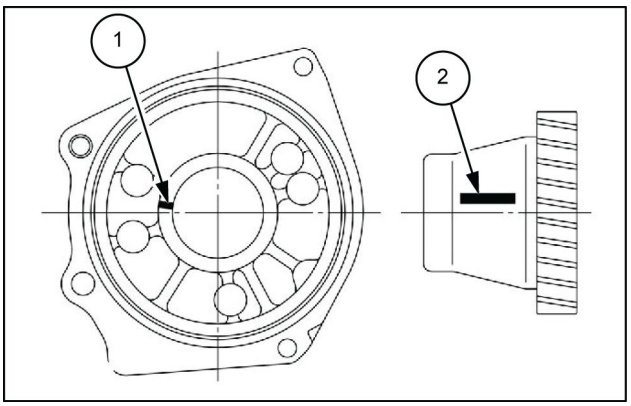
4. Connect the EGR cooler water pipe **(2)** to the oil cooler assembly.



701C7BBC 2

Fuel supply pump installation

1. Align 1st cylinder to the compression top dead center.
2. Align alignment mark to the bracket.
   1. Supply pump bracket side slit
   2. Supply pump gear side alignment mark



LPIL12CX03814AA 3

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

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

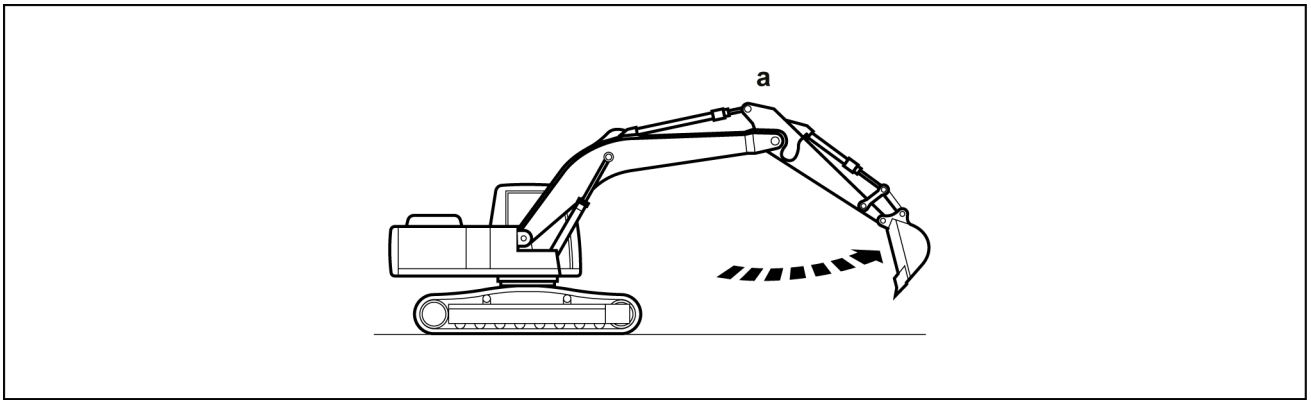
Pressure line
Tank line
Pilot pressure line
Pilot tank line
Electric line

1. Regeneration check valve
2. Oil cooler
3. Regeneration orifice
4. Cushion valve
5. Bucket (close)
6. Bucket (open)
7. Remote control valve (boom, bucket)
8. Lever lock
9. Pressure boost relief
10. 4 stack solenoid valve
11. Control valve
12. Bucket
13. Bucket cylinder
14. Travel pilot pressure sensor
15. Upper pilot pressure sensor
16. Console lever lock switch
17. Monitor display
18. Computer A
19. P1 pressure sensor
20. P2 pressure sensor
21. Hydraulic pump
22. Check valve

A. Attachment pressure measurement

Example: Arm-out pressure measurement
Measure with the following operations.

Engine speed	**1950 RPM**
Work mode	SP mode
Lever operation	Arm-out relief
Oil temperature	**45 - 55 °C** (**113 - 131 °F**)
Measuring port	1 pumps: P1 port
	2 pump: P2 port
Set pressure	Boosted pressure: **37.3 MPa** (**5411 psi**)
	Standard pressure: **34.3 MPa** (**4975 psi**)



SMIL15CEX3568EA 20

a. Arm-out relief

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

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

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

Lever operation	Arm out	Arm in	Bucket open	Bucket close	Boom up	Boom down
Engine speed	**1950 RPM**					
Work mode	SP mode					
Oil temperature	**45 - 55 °C** (**113 - 131 °F**)					
1 pump flow measuring port	P1	P1	P2	P2	P2	P2
2 pumps flow measuring port	P2	P2	No	No	P1	P1
Boosted pressure	**37.3 MPa** (**5411 psi**)					**27.4 MPa** (**3974 psi**)
Standard pressure	**34.3 MPa** (**4975 psi**)					**27.4 MPa** (**3974 psi**)

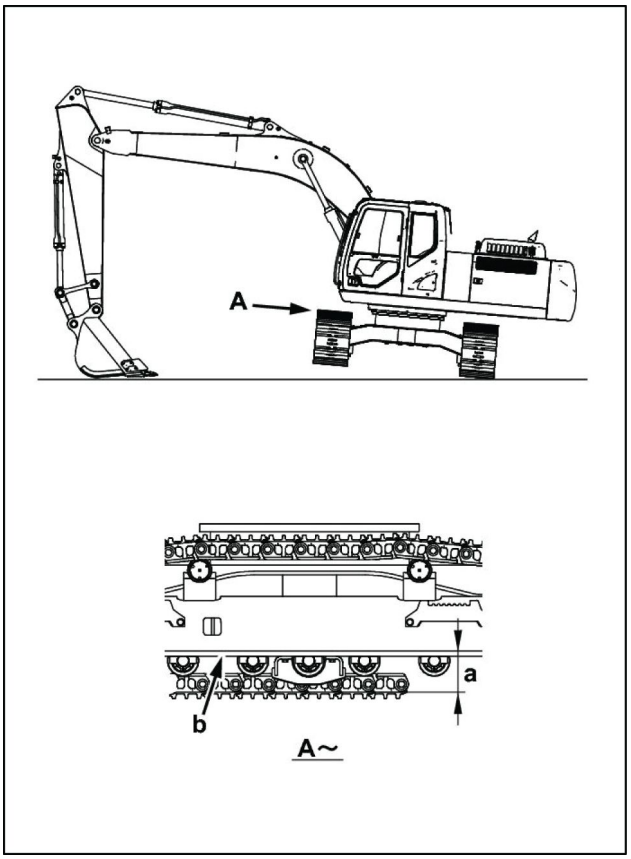
Shoe tension amount

Measurement method

1. Raise the shoe and, at the central position of the track, measure the gap between the underside of lower side frame and the topside of the shoe plate.
2. Measure for both the left and right sides.

Main unit posture

a. Topside of shoe plate
b. Underside of lower side frame



LPIL12CX00052BA 12

Swing ball race bearing movement amount and bucket tip movement amount

Measurement method

1. Up and down direction measurement
   A. Measure the up and down movement amount at two locations in front of and behind the ball race.
   B. Move the arm cylinder out and close the bucket cylinder, and move the bottom surface of the bucket **30 cm** (**11.81 in**) above the ground. Attach a dial gauge to the lowering section as shown in the figure below and do zero point adjustment.
   C. Jack up the main unit and measure the amount of movement with the dial gauge.
      * Jack up the main body until the swinging of the dial gauge becomes constant.

Main unit posture

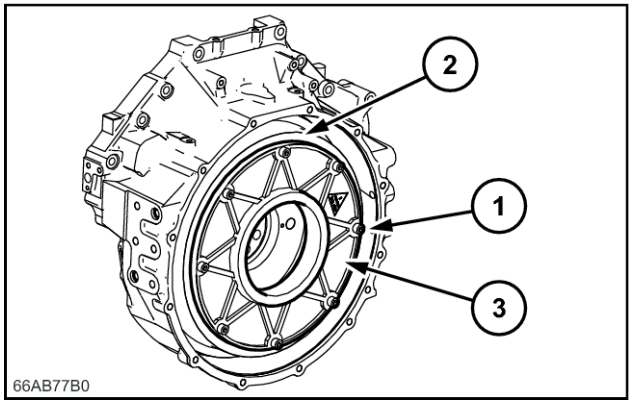
Contents

Hydraulic systems - 35

Variable displacement pump - 106

Pump - Remove - Pump coupling

1. Remove the hydraulic pump. (For details, see **Pump - Remove (35.106)**).
2. Remove the 8 hexagon socket head bolts M10 **(1)**, and then remove the pump coupling **(3)** from the engine flywheel **(2)**.



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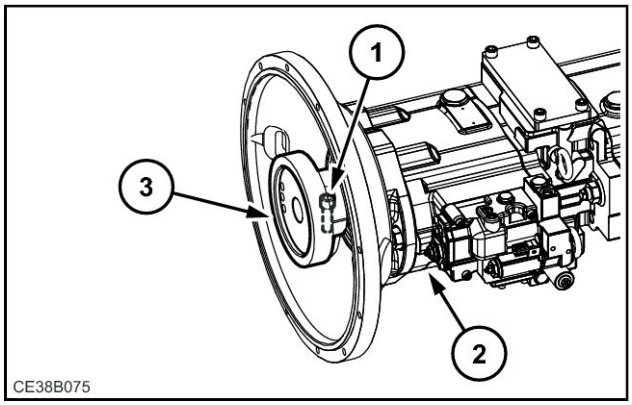
3. Remove the hexagon socket head bolt M14 **(1)**, and then remove the coupling hub **(3)** from the hydraulic pump **(2)**.



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Main control valve - Dynamic description

Basic configuration

This valve is based on the main unit housing which combines the P1 side housing and P2 side housing with the rear surfaces against each other and has a configuration that makes it possible to mount the inlet, add-on section, and outlet on the P2 side housing top.

Operation

1. When all spools in neutral

Neutral path

A. When Pn1 and Pn2 ports are pressurized

The oil fed from the P1 port enters the tank path (Ta) from the neutral path (L1) through the low-pressure relief orifice (Lc1) and returns to ports T1 - T8.

The oil fed from the P2 port enters the tank path (Ta) from the neutral path (R1) through the low-pressure relief orifice (Rc1) and returns to the T1 - T8 ports.

The pressure in the pressure chambers (L2) (R2) upstream from the low-pressure relief valve is led into the pump from the ps1 and ps2 ports and controls the P1 and P2 pump discharge volume.

Also, if excess oil flows into the neutral path (L1), the poppet opens to provide low-pressure relief.

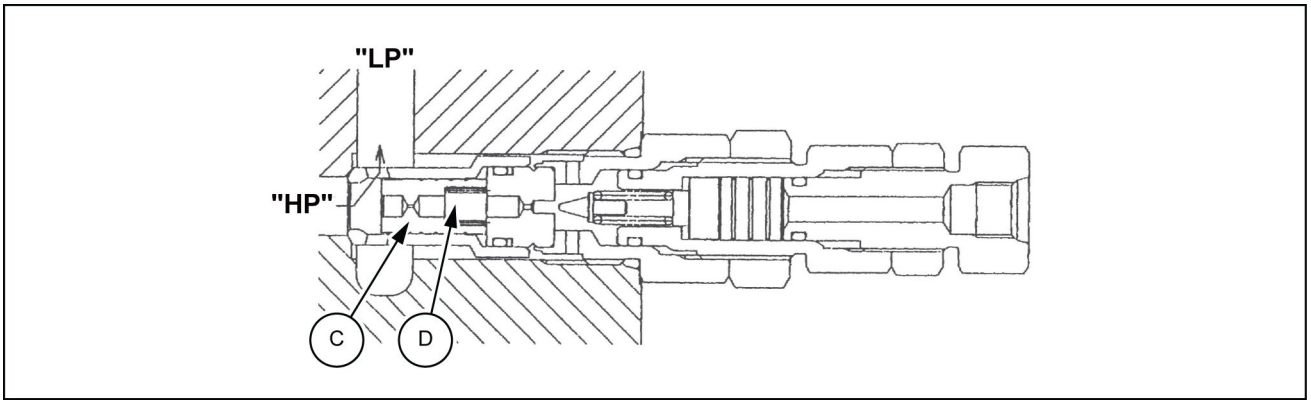
This prevents the ps1 and ps2 port pressures from becoming abnormally high.

B. When Pn1 and Pn2 ports are not pressurized

In this case, the low-pressure relief poppets open at lower pressure than in “a”.

Therefore, the oil fed from the P1 port enters the tank path (Ta) from the neutral path (L1) primarily through the low-pressure relief valve discharge port (L3) and returns to the T1 - T8 ports.

Also, the oil fed from the P2 port enters the tank path (Ta) from the neutral path (R1) primarily through the low-pressure relief valve discharge port (R3) and returns to the T1 - T8 ports.

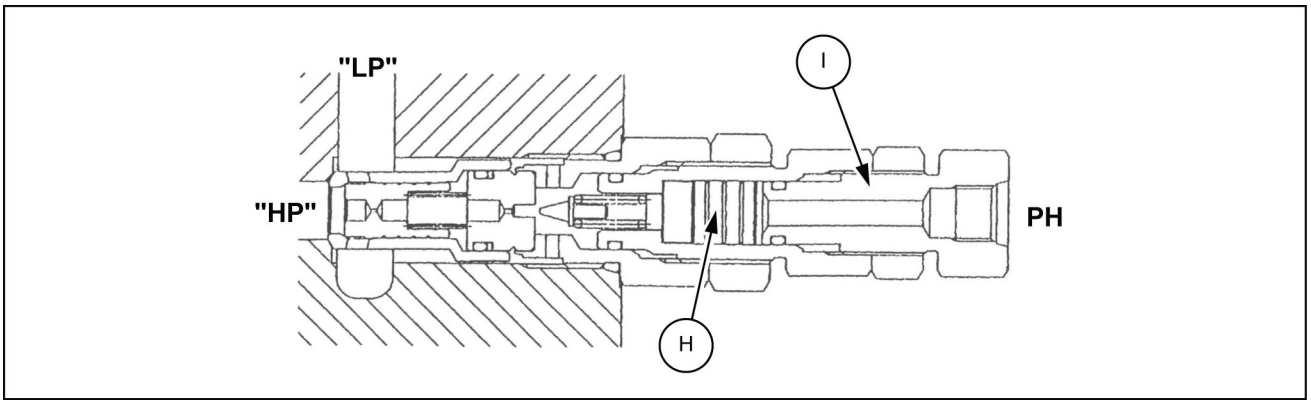


SMIL15CEX3656EB 30

"Boosted pressure operation"

When pressure is applied to the pilot port "PH" , the piston **(H)** is moved to the set position by the plug **(I)**.

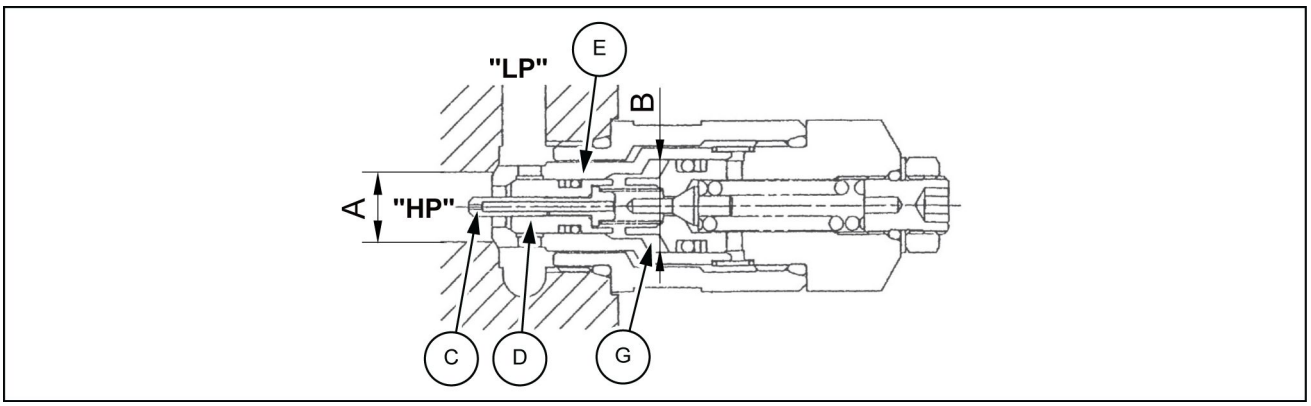
Because of this, the pilot spring force rises and the "HP" pressure rises.



SMIL15CEX3657EB 31

2. Overload relief valve operation

A. This relief valve is incorporated between the cylinder port "HP" and the low-pressure path "LP". The oil passes through the metering hole of the piston **(C)** and charges the interior space **(G)**. The sleeve **(K)** and the main poppet **(D)** seat securely operating on the different surface areas [A] and [B].



SMIL15CEX3658EB 32

B. When the cylinder port "HP" pressure reaches the set pilot poppet spring force, the pilot poppet **(E)** opens. The oil flows around the poppet, passes through the notch hole **(H)**, and is led to the low-pressure path "LP".

1. Loosen and remove the overload relief valve **(69)** [**32 mm** (**1.26 in**) hexagon diameter].
2. Loosen and remove the main relief valve **(68)** [**32 mm** (**1.26 in**) hexagon diameter].
3. Loosen and remove the 2 relief valve assemblies **(70)** [**32 mm** (**1.26 in**) hexagon diameter]. Remove the O-rings (70-5) and (70-8).

Option section

1. Loosen and remove the hexagon socket head bolts **(75)** [**8 mm** (**0.31 in**) hexagon socket diameter] for the 2 caps **(88)**, and remove the O-rings **(89)**.
2. Loosen and remove the 2 plug assemblies **(93)** [**24 mm** (**0.94 in**) hexagon diameter], and remove the O-rings and backup rings.

Straight travel signal control valve

1. Remove the hexagon socket head bolts **(83)** [**5 mm** (**0.20 in**) hexagon socket diameter] and remove the body assembly **(42)**.
2. Loosen and remove the plug assembly (42-5) [**5 mm** (**0.20 in**) hexagon socket diameter] and remove the O-ring.
3. Pull out the spools (42-2) and (42-3) and spring (42-4).
4. Loosen the orifice plug (42-7) [**36 mm** (**1.42 in**) hexagon diameter] and remove it from the body (42-1).

Other plugs

1. Loosen and remove the plug assembly **(71)** [**10 mm** (**0.39 in**) hexagon socket diameter] and remove the O-ring.
2. Loosen and remove the plug assembly **(72)** [**8 mm** (**0.31 in**) hexagon socket diameter] and remove the O-ring.
3. Loosen and remove the orifice plug **(40)** [**5 mm** (**0.20 in**) hexagon socket diameter]. (D-D cross section)
4. Loosen and remove the plug assembly **(92)** [**36 mm** (**1.42 in**) hexagon diameter] and remove the O-ring.
5. Loosen and remove the plug assembly **(73)** [**6 mm** (**0.24 in**) hexagon socket diameter] and remove the O-ring.

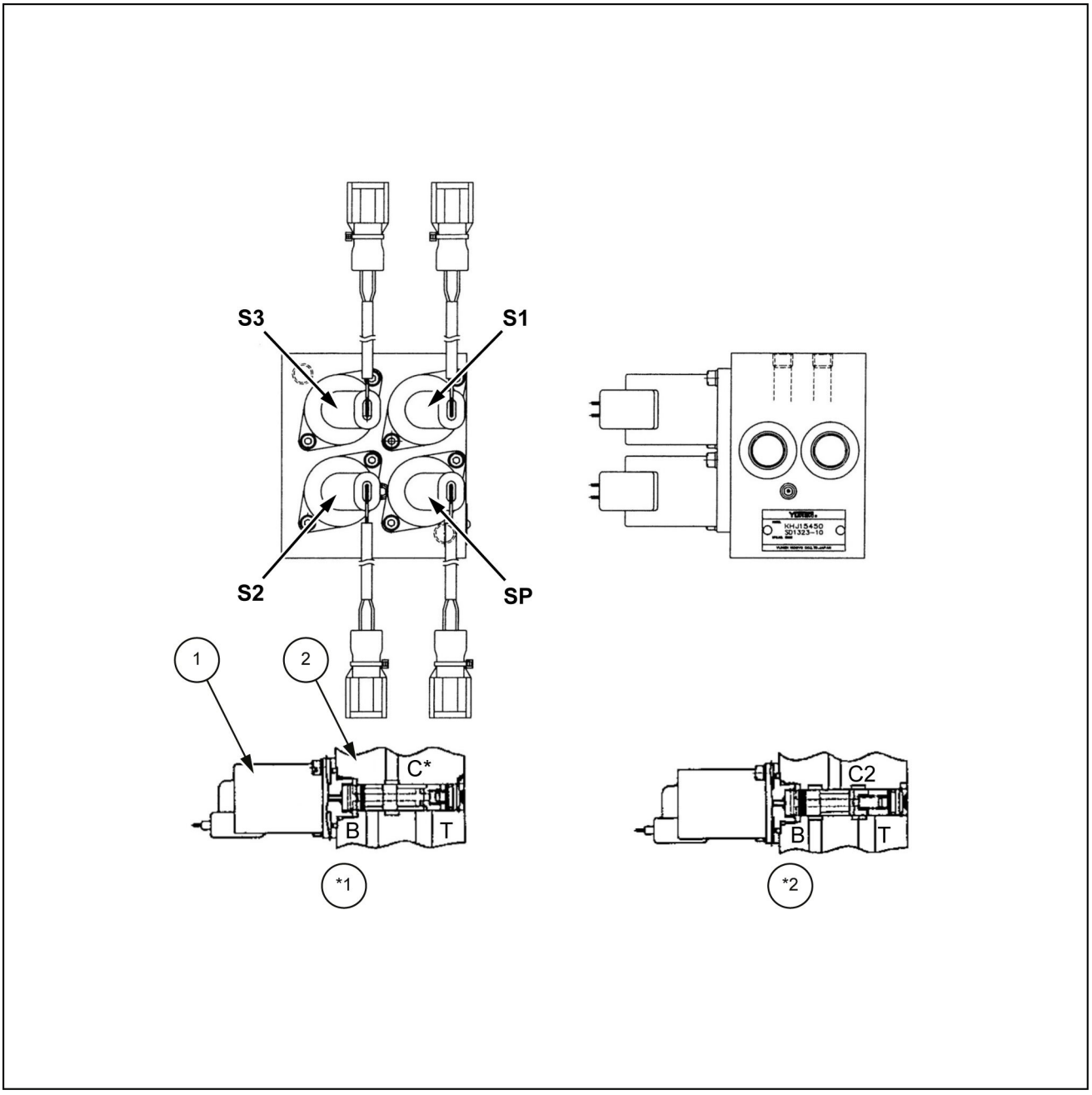
Add-on section

1. Loosen and remove the 4 hexagon nuts **(97)** [**22 mm** (**0.87 in**) hexagon diameter].
2. Remove the outlet housing **(95)**. Execute Steps **2** - **4** below as necessary.
3. Remove the spool section assembly **(98)** and remove the matching surface O-rings (98-10) and (98-11).

Pilot solenoid valve block - Sectional view

External shape diagram and component parts

This valve is made up of the body and the electromagnetic switchover valve.



SMIL15CEX3607GB 1

*1. Normal closed type solenoid: SP, S1, S3
*2. Normal open type solenoid: S2

1. Electromagnetic switchover valve
2. Body

Cushion valve - Dynamic description

Structure

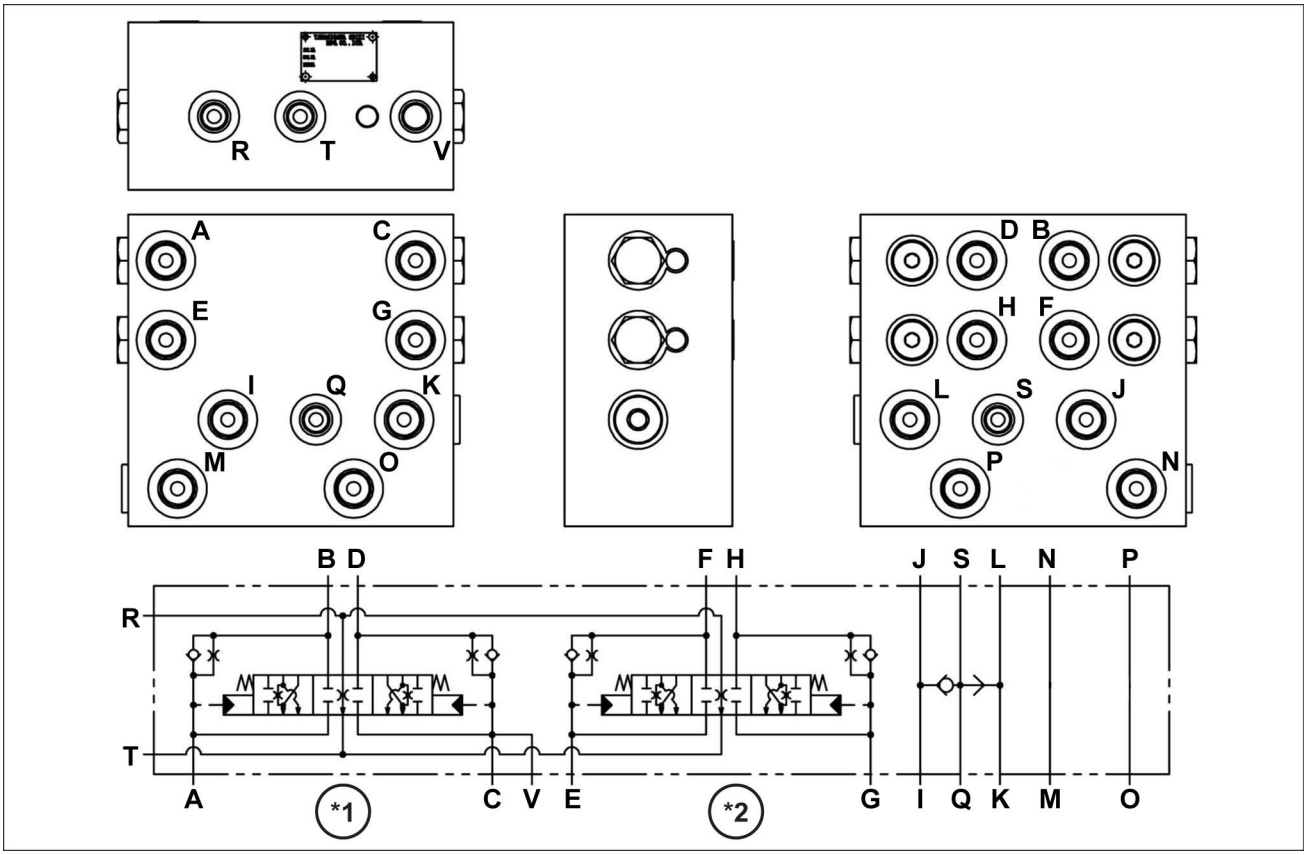
This valve is made up of a shuttle valve section and cushion valve section with heat circuit.

The cushion valve with a heat circuit is connected between the hydraulic shovel car control valve and the pilot operation valve to reduce body shaking (cushion function) caused by emergency stop operations by the operator.

This valve is also equipped with a circuit with which the operator can deliberately disable the cushion function for reverse operations.

The shuttle valve selects the high-pressure signal pressure from 1 signal pressure systems.

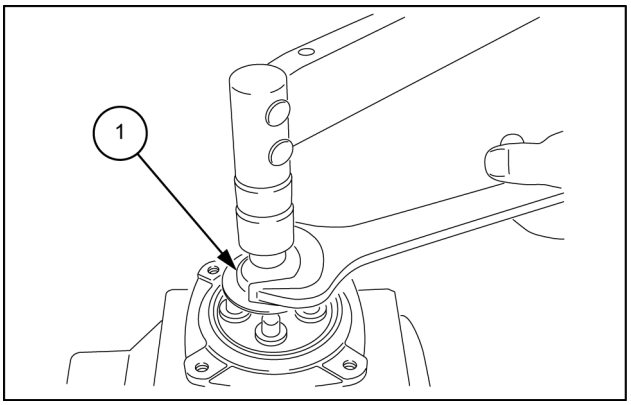
This valve has 1 circuits.



SMIL15CEX1753FB 1

*1. Arm
*2. Boom

12. Install the adjusting nut, use a wrench on the bolt width of the disk **(1)** to secure it, and tighten the adjusting nut to the specified torque.
    - Tightening torque: **63.7 - 73.5 N·m** (**46.983 - 54.211 lb ft**)
    - During tightening, do not move the disk position.



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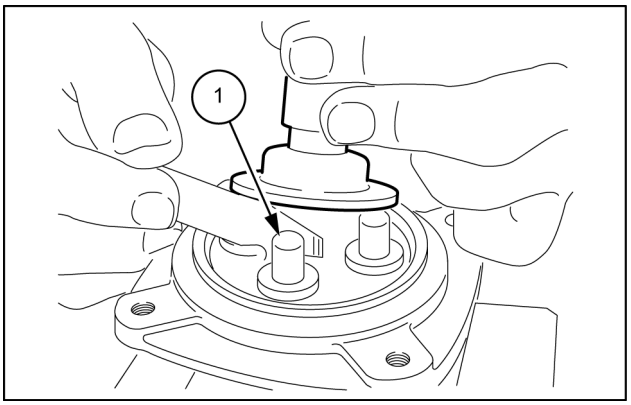
13. Apply grease to the rotating section of the joint and to the top of the push rods **(1)**.



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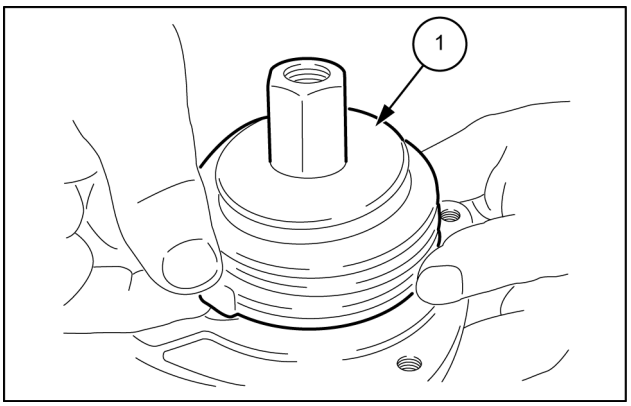
14. Install the bellows **(1)**.
    - Be careful not to tear the bellows.
    - Inject vapor corrosion inhibitor into each port, and then place plugs in the ports.



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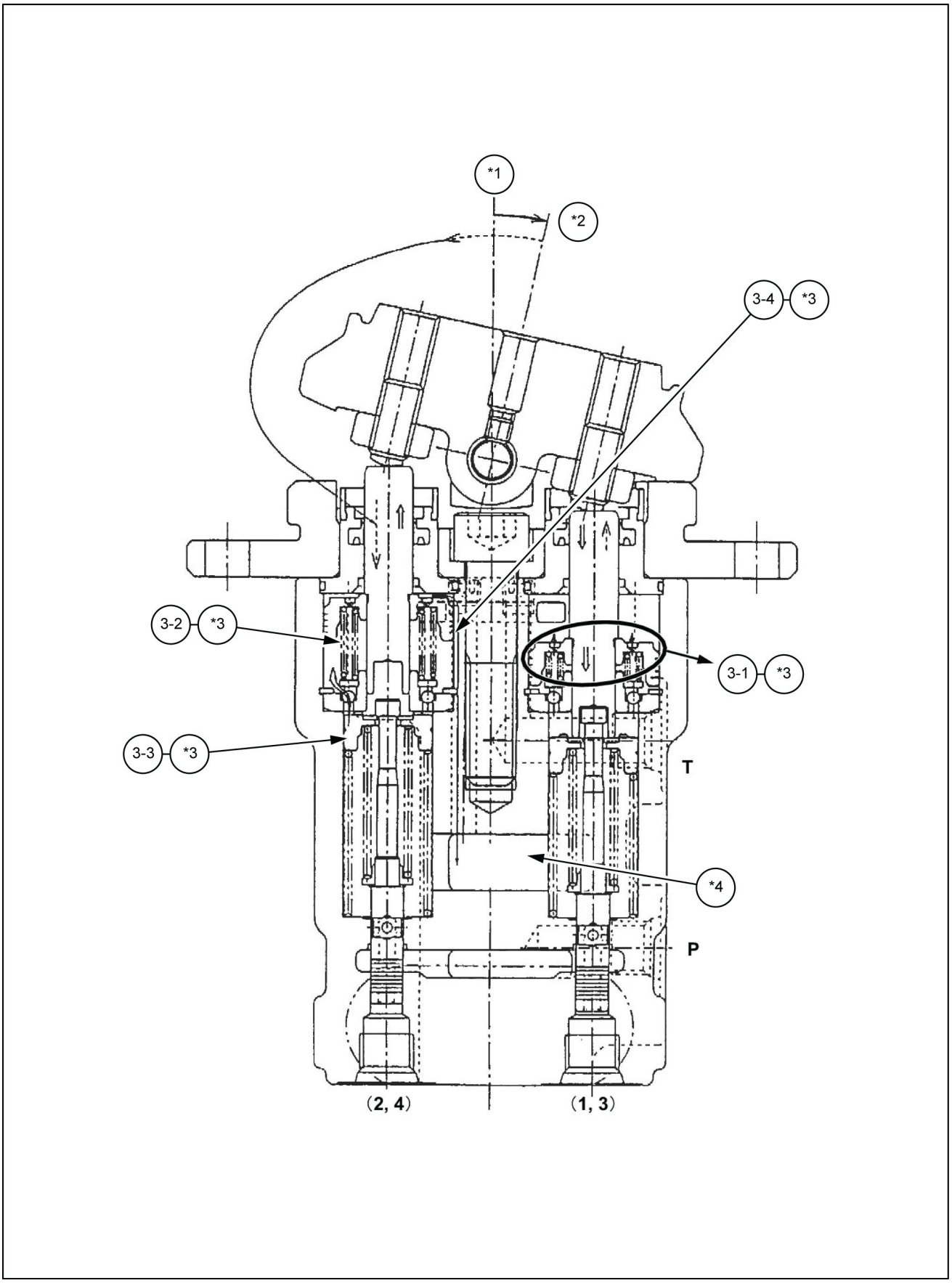
Lever stroke state and operation when lever is moved back



LPIL12CX02000HB 3

Options pedal - Prepare

NOTICE: *Be sure to release hydraulic pressure before beginning work. Refer to pressure bleeding operations.*

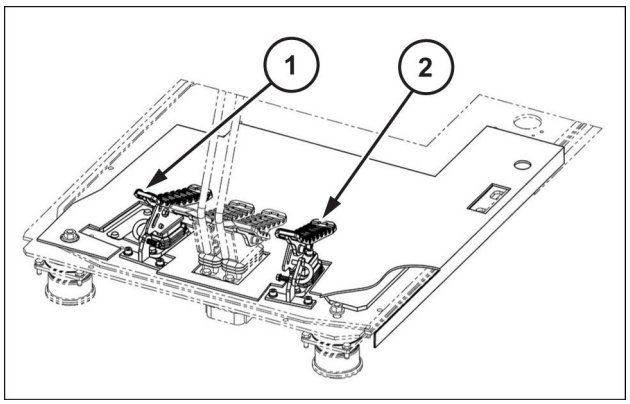
NOTICE: *Be sure to stop the engine before beginning work.*

Items to prepare

- Wrenches [**19 mm**, **16 mm**]
- Hexagon wrench [**8 mm**]
- Phillips screwdriver
- Marking pen
- Cap
- Plug
- Rag
- Cleaning fluid

The procedure is explained using the first option pedal. The same procedure applies to the second option pedal.

1. First option pedal
2. Second option pedal



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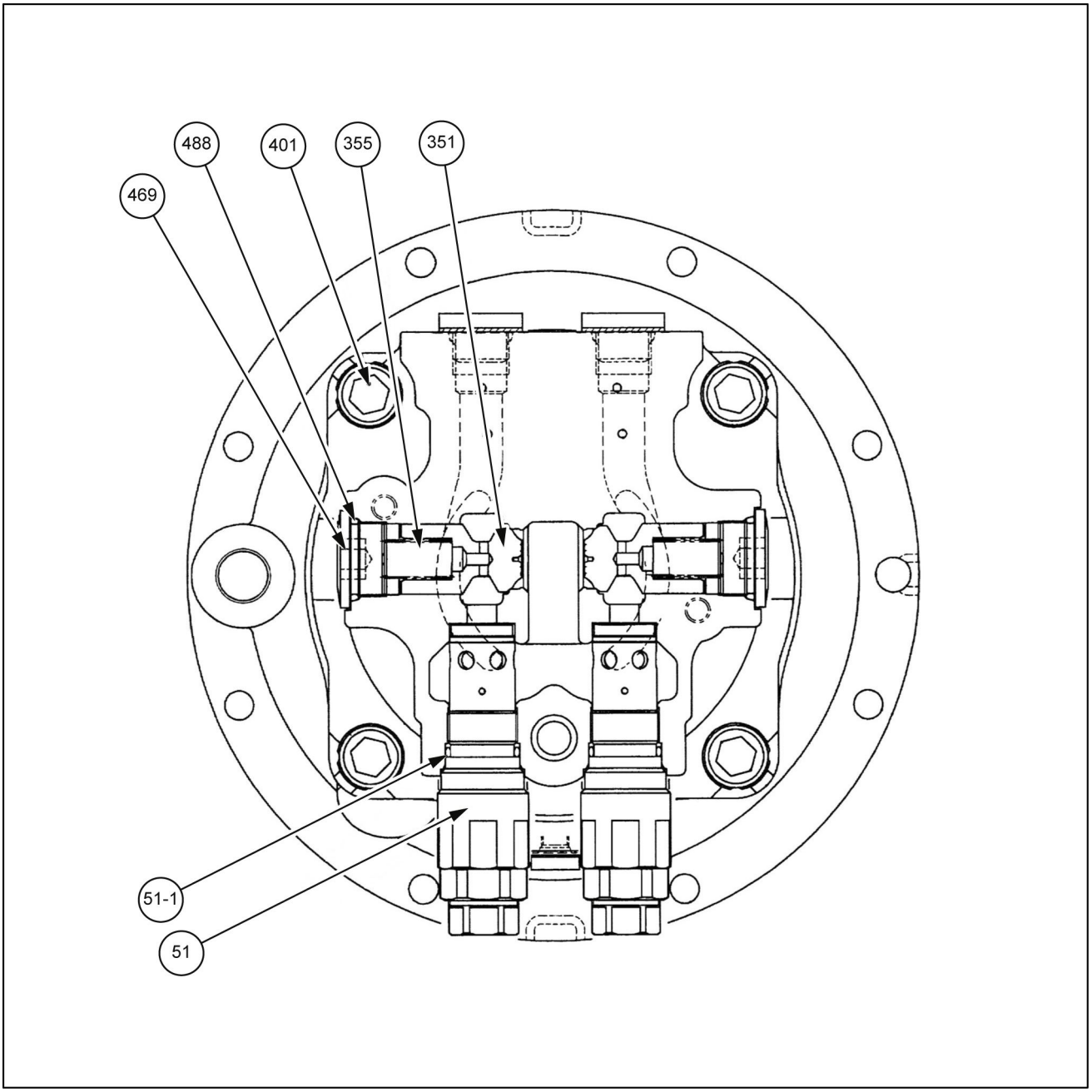

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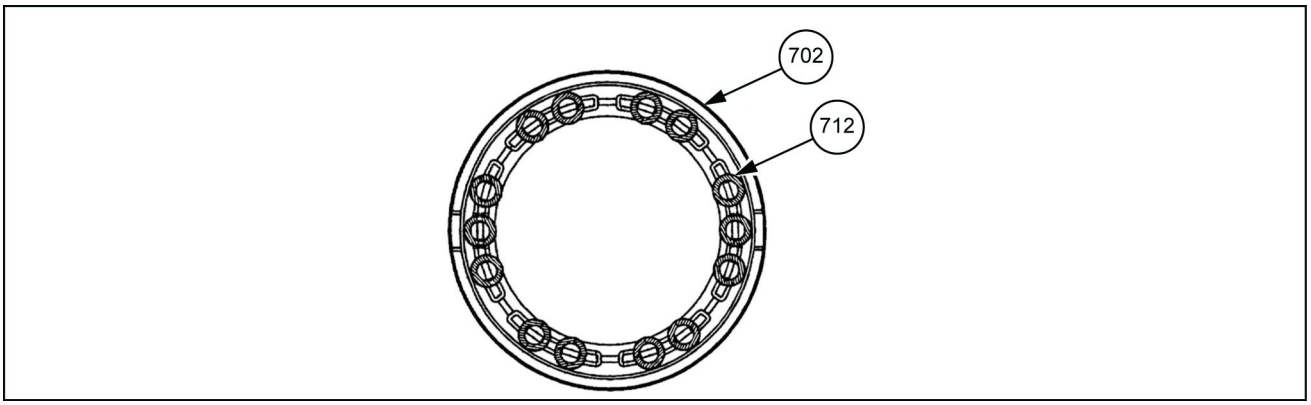

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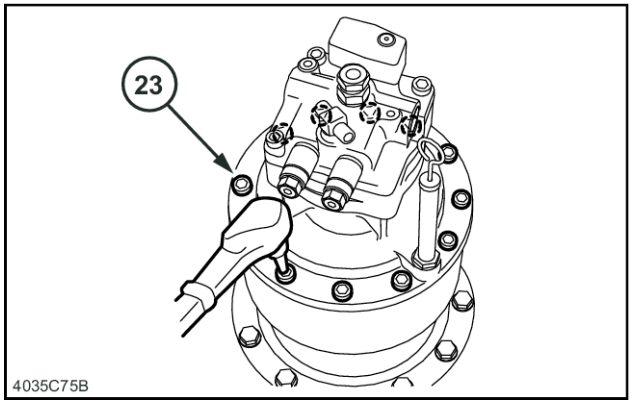
Brake spring layout diagram

Swing reduction gear - Disassemble

1. Remove the plug **(11)**, and then drain the gear oil.
   Remove all bolts **(23)**.
   Use a liftcrane to carefully suspend and remove the swing motor.



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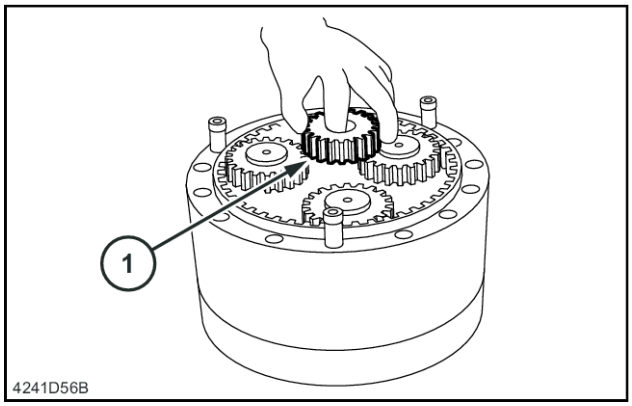
2. Remove the sun gear No.1 **(1)** and the planetary carrier No.1 assembly **(3)**.



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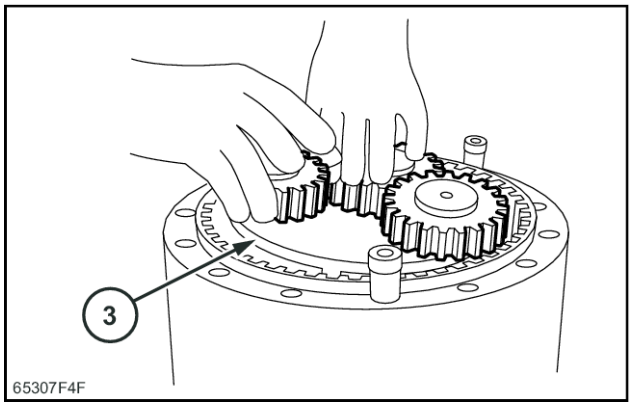
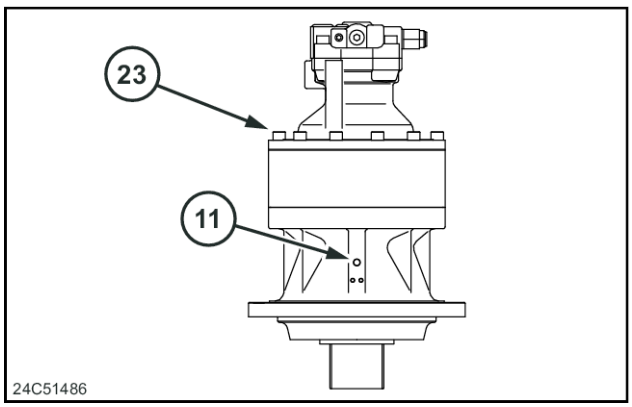


65307F4F 3

3. Use 2 lifting taps (M10) of the carrier No. 2 **(29)** to remove the planetary carrier No.2 assembly **(4)** while lifting gently with a liftcrane.
   Remove all bolts **(23)**.
   Use a liftcrane to carefully suspend and remove the swing motor.



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Travel motor - Special tools

Standard tools

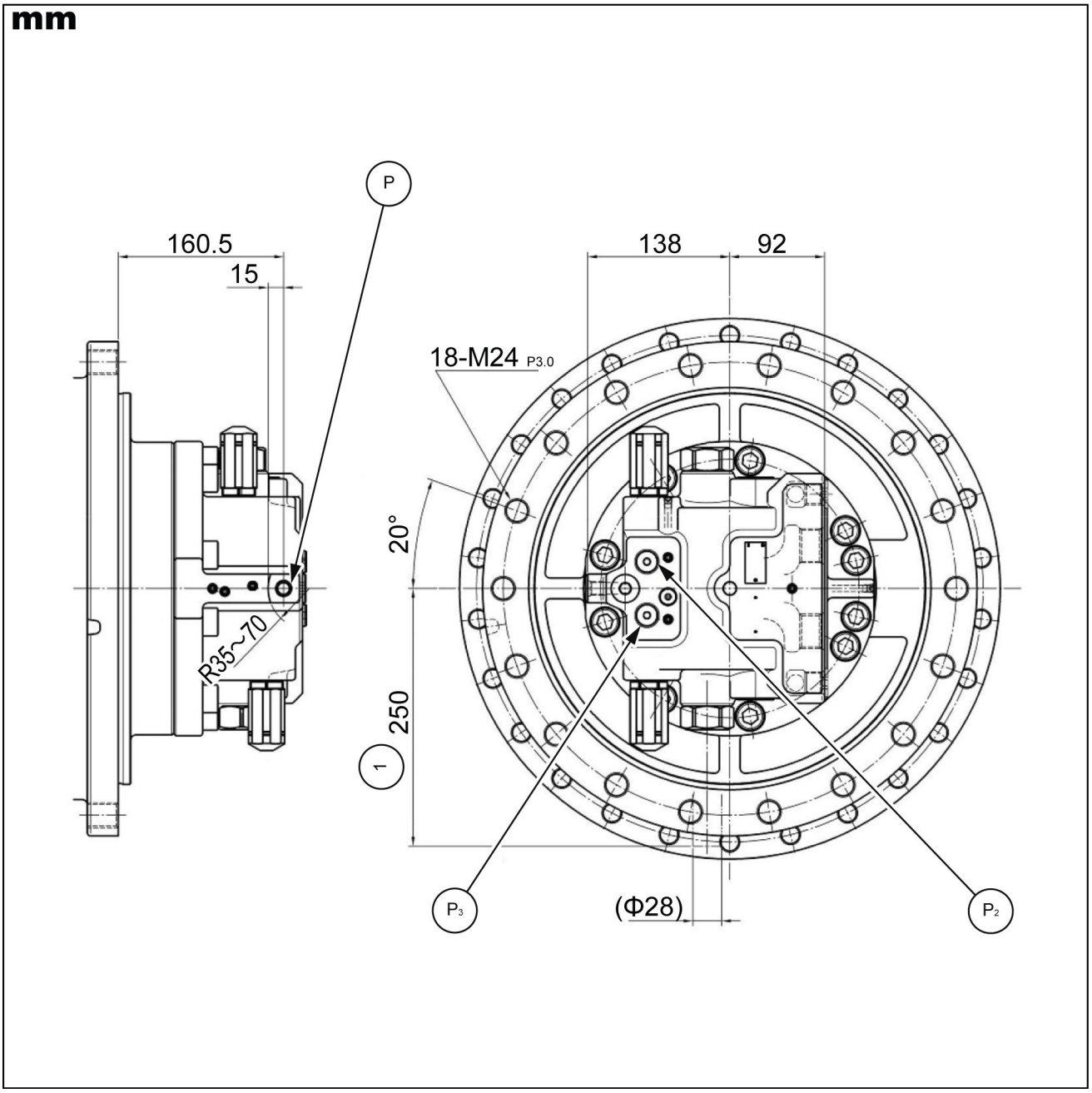
No.	Name	Type and dimension	Quantity
1	Hexagon wrench and hexagon socket	4 (for PT 1/16, for M6), 5 (for PF 1/8), 6 (for PF 1/4), 10 (for PF 1/2), 12 (for PF 3/4), 14 (for M18), 17 (for PF 1)	1 each
2	Socket for torque wrench	19 (for M12), 35 (for ORV), 46 (for M38)	1
3	Socket wrench (ratchet handle) (JIS B 4641)	Oval	1
4	Torque wrench (JIS B 4650)	Dial: **50 N·m** (**36.88 lb ft**) Dial: **200 N·m** (**147.51 lb ft**) Dial: **300 N·m** (**221.27 lb ft**) Dial: **400 N·m** (**295.02 lb ft**)	1 each
5	Adapter for torque wrench		1 each
6	Extension bar (JIS B 4637)	**150 mm** (**5.906 in**)	1
7	Hammer	Various	1 each
8	Plastic hammer	**400 mm** (**15.7480 in**)	1
9	Flathead screwdriver (JIS B 4609)	About **150 mm** (**5.906 in**)	1 each
10	Pliers for retaining ring	For holes	1 each
11	Magnet		1 each
12	Lifting equipment	Lifting load **9800 N** (**2203.13 lb**) or more Eyebolt (for M10) Eyebolt (for M12) Eyebolt (for M20) Eyebolt (for M24) Eyebolt (for PF 3/4) Wire with hook (2-wire sling, 3-wire sling)	1 set (3) (2) (2) (2) (2) (1 each)
13	Container	General-purpose vat W **450 mm** (**17.717 in**) x D **300 mm** (**11.811 in**) x H **120 mm** (**4.724 in**)	2
14	Leather glove		1 pair

Bolts

No.	Name	Type and dimension	Quantity
1	hexagon	About M24 (P3.0) x **50 mm** (**1.969 in**)	2

Equipment

Applicable component (usage or component number)	Name	Type and standards	Quantity
Disassembly and assembly of product	General work platform		1 set
Washing of product and each component	Washing tank	Rough washing / Final washing	1 set
22, 24, 149	Press work platform	22, 24: Press capacity **9800 N** (**2203.13 lb**) or more 149: Press capacity **1960 N** (**440.63 lb**) or more	1 set
149	Heating tank	Heating capacity **100 °C** (**212.0 °F**) or more Volume 500 x 500 x 500 or above	1 set



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

P. Pilot port (PF 1/4)

P2. Pressure detection port (2-PF 1/4)

P3. Pressure detection port (2-PF 1/4)

1. C/V spool removal allowance

Travel motor - Service instruction

Maintenance standards

Follow these maintenance standards when disassembling or inspecting the travel motor. Make sure that especially the moving and the sliding section are free from any flaw.

Seals

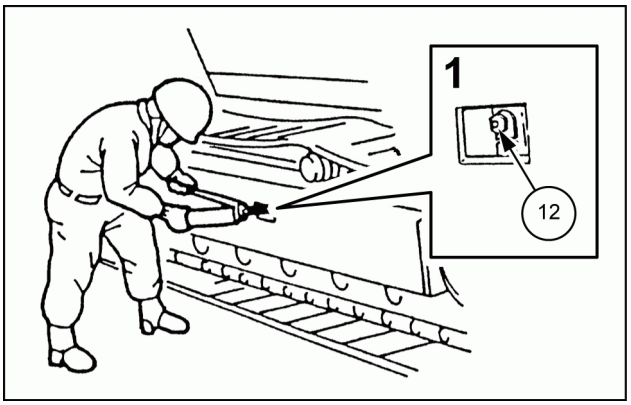
All seals (each O-ring, oil seal **(132)**, floating seal **(31)**) should be replaced with new ones after disassembly, even if no damage is found.

Maintenance standards for worn components

1. Replace any component with significant damage on its exterior.
2. Replace any component with one of the following abnormalities (phenomena).

Part number	Part name	Phenomenon	Standard value (gauge)	Tolerance (criterion)
1	Ring gear	• Serious damage on the exterior • Pitching has occurred in the ring gear **(1)** tooth flank • Abnormal wear such as seizing is found	-	-
101	Spindle	• Serious damage on the exterior • Abnormal wear such as seizing is found	-	-
3, 7	Carrier	• Abnormal wear such as seizing is found	-	-
4 8 5 9	Sun gear 1 Sun gear 2 Planetary gear 1 Planetary gear 2	• Pitching has occurred in the tooth flank • Flaking has occurred on the bearing rolling contact surface	-	-
24	Angular ball bearing	• An impression is found • Flaking has occurred • Partial wear is found	-	-
301	Rear flange	• The sliding section between spools **(323)** and **(363)** is flawed	-	-
102	Shaft	• The working face against oil seal **(132)** is worn out • The spline is worn out	-	-
103	Swash plate	• The shoe **(106)** sliding surface has seized up • The piston **(170)** working face is abnormally worn out	-	-
104	Cylinder block	• The spline section is worn out • The bore inner surface is significantly worn out. • The sliding surface against the valve plate **(109)** is flawed or partially worn out	-	-

8. Tighten the check valve **(12)**.
   Fill grease to the grease cylinder while checking tension of the track shoe.



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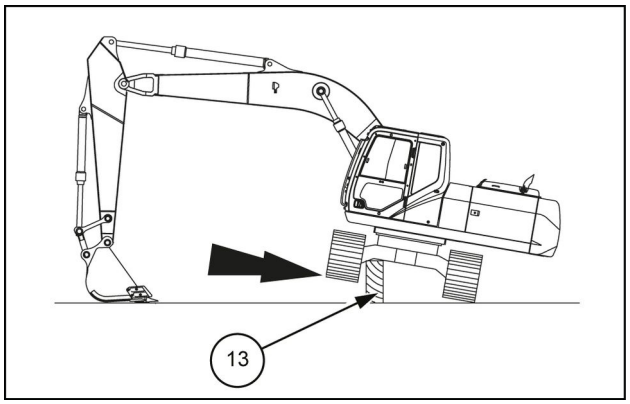
9. To adjust the track shoe tension, raise the lower side frame as shown in the diagram. Place a wood plank **(13)** under the lower frame to prevent falling.



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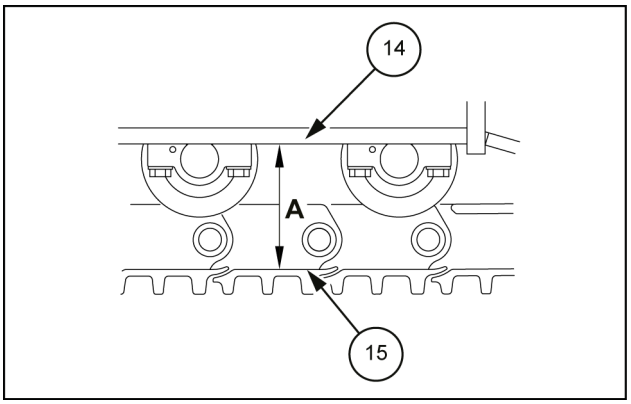
10. Adjust the tension so that the distance indicated with A between the frame bottom **(14)** of the center area of the lower side frame and the lowest hanging part of the top of the shoe plate **(15)** is as follows.

    - Steel shoe: **340 - 360 mm** (**13.386 - 14.173 in**)

    For solid ground, having slightly more tension than the value above (with less deflection) is the best.
    On the other hand, for weak ground or ground with sand, gravel, or cobble, having a little less tension than the value above (with more deflection) is the best.



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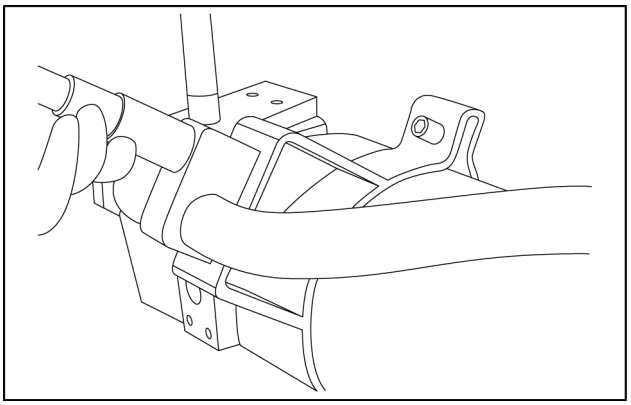
Boom hydraulic system - 736

2. Use a pipe to extend the handle as necessary.



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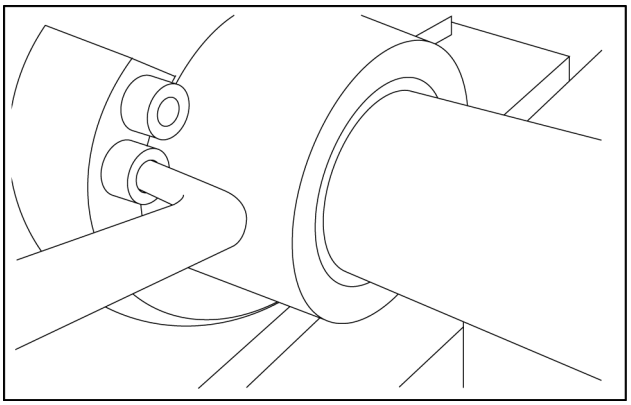
Loosening and removal of rod cover bolt

1. Use an hexagon wrench [**10 mm**] to loosen and remove the tightening bolt on the rod cover.



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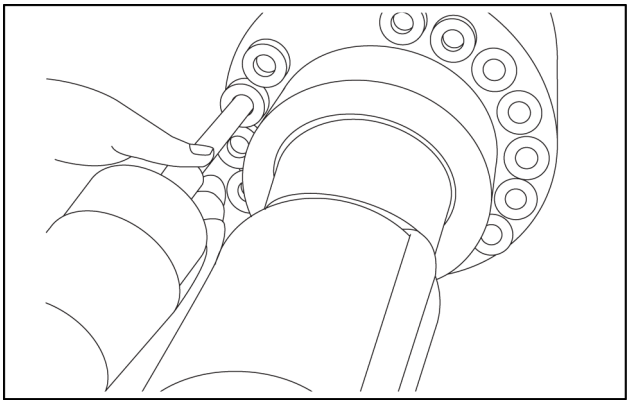
2. Use a pipe to extend the handle as necessary.
   Be particularly careful not to damage the rod surface when loosening or removing bolts. (Wrapping a cloth (even a rag is fine) around the rod surface to prevent damage to the surface makes the work easier.)



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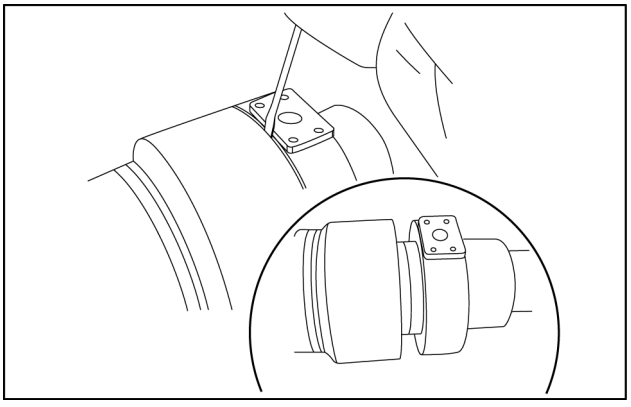
Disassembly of rod cover

1. Before starting rod cover disassembly, lift up the rod with the liftcrane so that the rod and the cylinder tube form a straight line and support the weight of the extended rod.
   Place a plastic hammer against the rod cover line port flange section corner, and then strike the plastic hammer with a steel hammer to open up a gap between the mating surfaces.
   Then, insert a flathead screwdriver into the gap and pry to gradually widen the gap and take out the rod cover fitting section.



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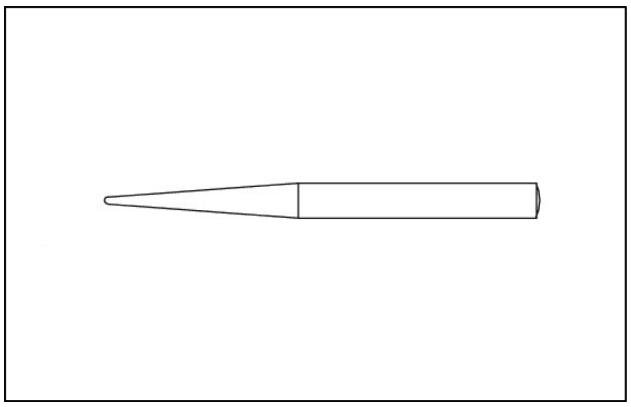
5. Punch (Quantity 1)



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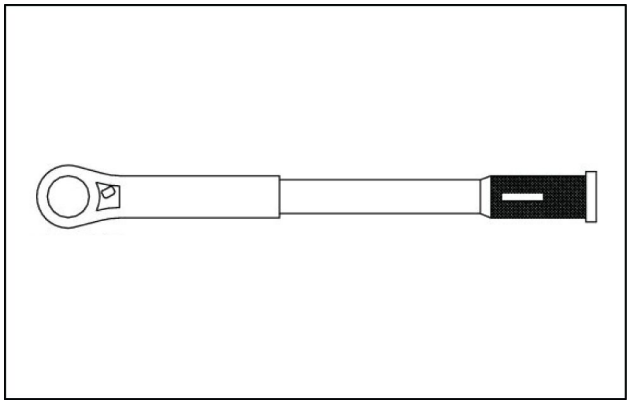
6. Torque wrench (Quantity 1 set)



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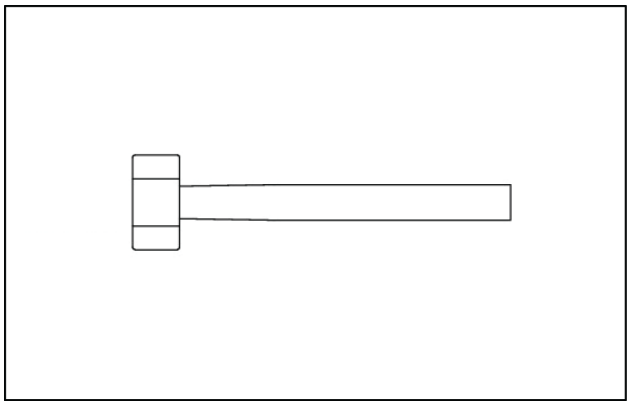
7. Hammer (plastic hammer) (Quantity 1)



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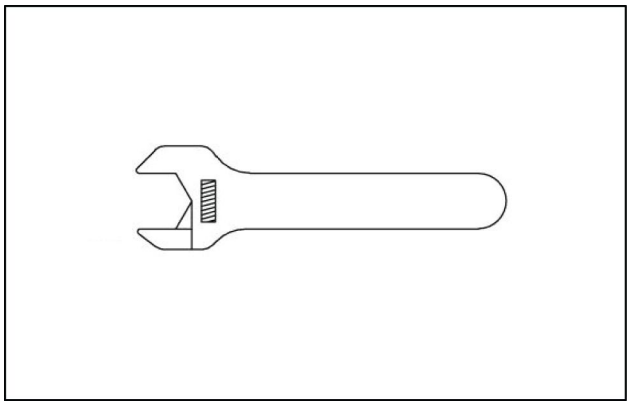
8. Monkey wrench (Quantity 1)



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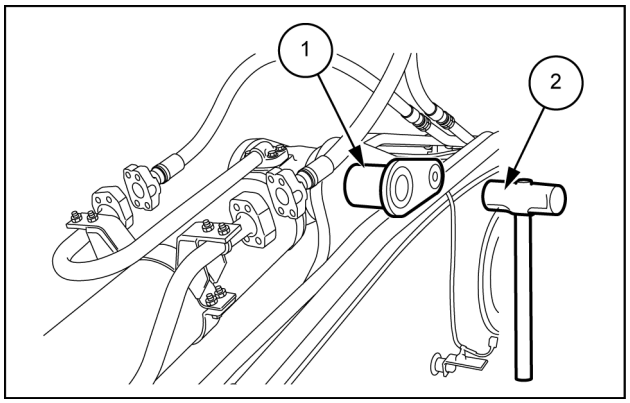
4. Align the arm cylinder with the boom and use a hammer **(2)** to push in the pin **(1)**.
   - If the pin is hard to insert, there is a load on the pin.
   - When inserting the pin, be careful not to damage the installed dust seals.



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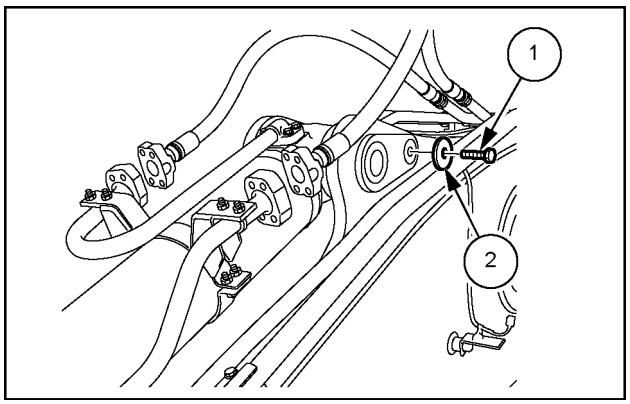
5. Use a wrench [**30 mm** (**1.181 in**)] to tighten the bolt **(1)** and spacer **(2)**.



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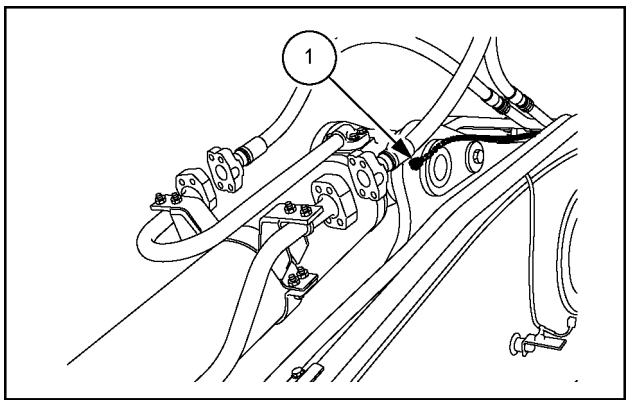
6. Use a wrench [**19 mm** (**0.748 in**)] to install the grease hose **(1)**.



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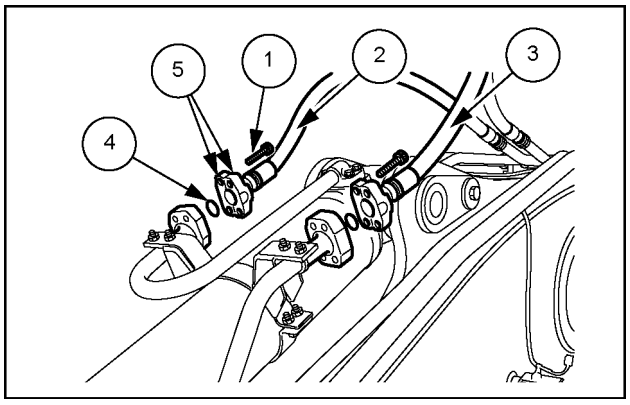
7. Set the O-ring **(4)** on the line side, and then install the hose **(2)** with 2 split flanges **(5)** and 4 hexagon socket head bolts **(1)**.
   - Install the hose **(3)** with the same procedure.
   - The O-rings cannot be reused. Use a new part.

   Tightening torque for installation: **85.2 - 101.2 N·m** (**62.840 - 74.641 lb ft**)



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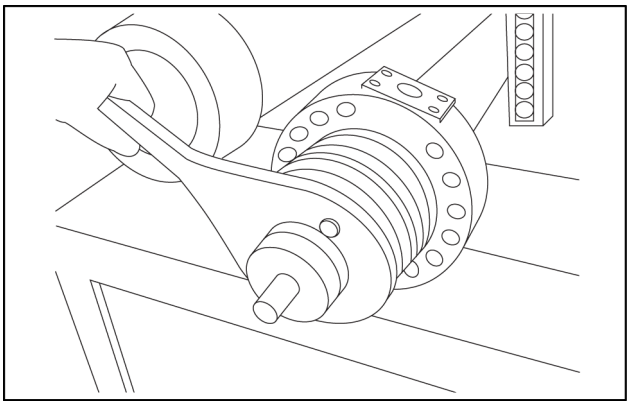
Installation and tightening of piston assembly

1. Before installation, apply a small amount of hydraulic oil to the O-ring and threads of the inner diameter surface section. Also, when screwing in, be careful with biting in on the first thread. Forcing it in can cause seizing and make assembly impossible.

   Tightening torque for piston: **883 - 1079 N·m** (**651.27 - 795.83 lb ft**)



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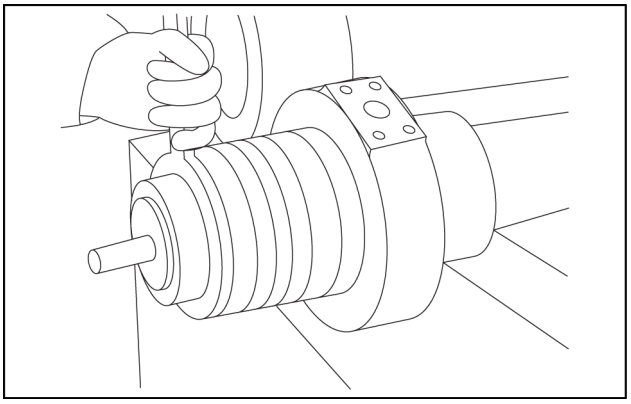
Installation and tightening of piston nut

1. Screw in and tighten the piston nut.
   Before installation, apply a small amount of hydraulic oil to the threads. Also, when screwing in, be careful with biting in on the first thread. Forcing it in can cause seizing and make assembly impossible.

   Tightening torque for piston nuts: **1674 - 2046 N·m** (**1234.68 - 1509.05 lb ft**)

   For cylinder with cushion: After tightening the piston nut to the specified torque, check that the cushion ring is not stuck but has a gap of about **0.5 mm** (**0.0197 in**) in the shaft direction and can move freely.
   If it is stuck, disassemble again and check its dimensions.

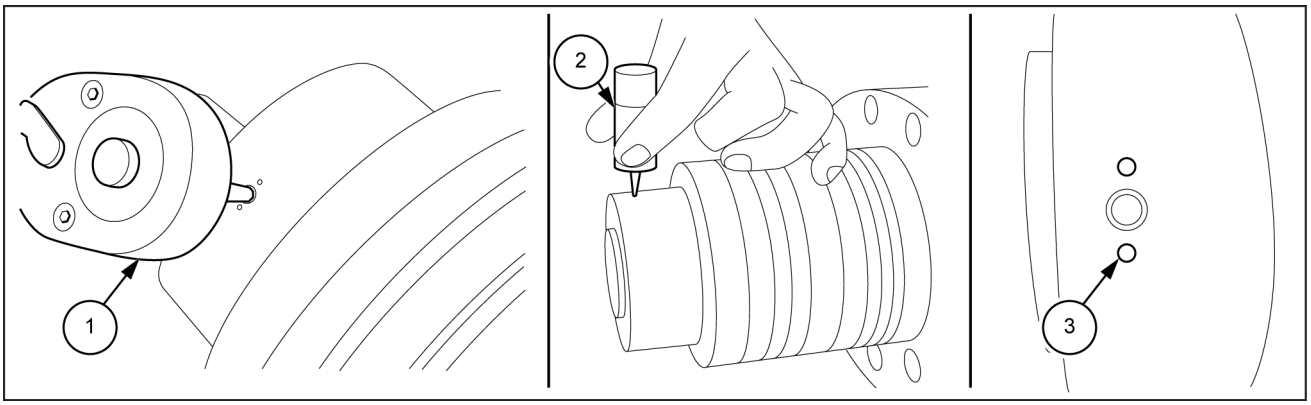


SMIL16CEX1567AA 14

Installation of locking screw and handling looseness after tightening

1. Apply an appropriate amount of **LOCTITE® 242®** to 2 or 3 threads, of the locking screw. Use a wrench [**8 mm**] to install the locking screw into the screw hole in the outer circumference of the piston nut.
   After tightening, wipe away any extruded **LOCTITE® 242®**. After tightening, use a center punch to perform lock caulking at 2 locations (target positions) near the screw hole.

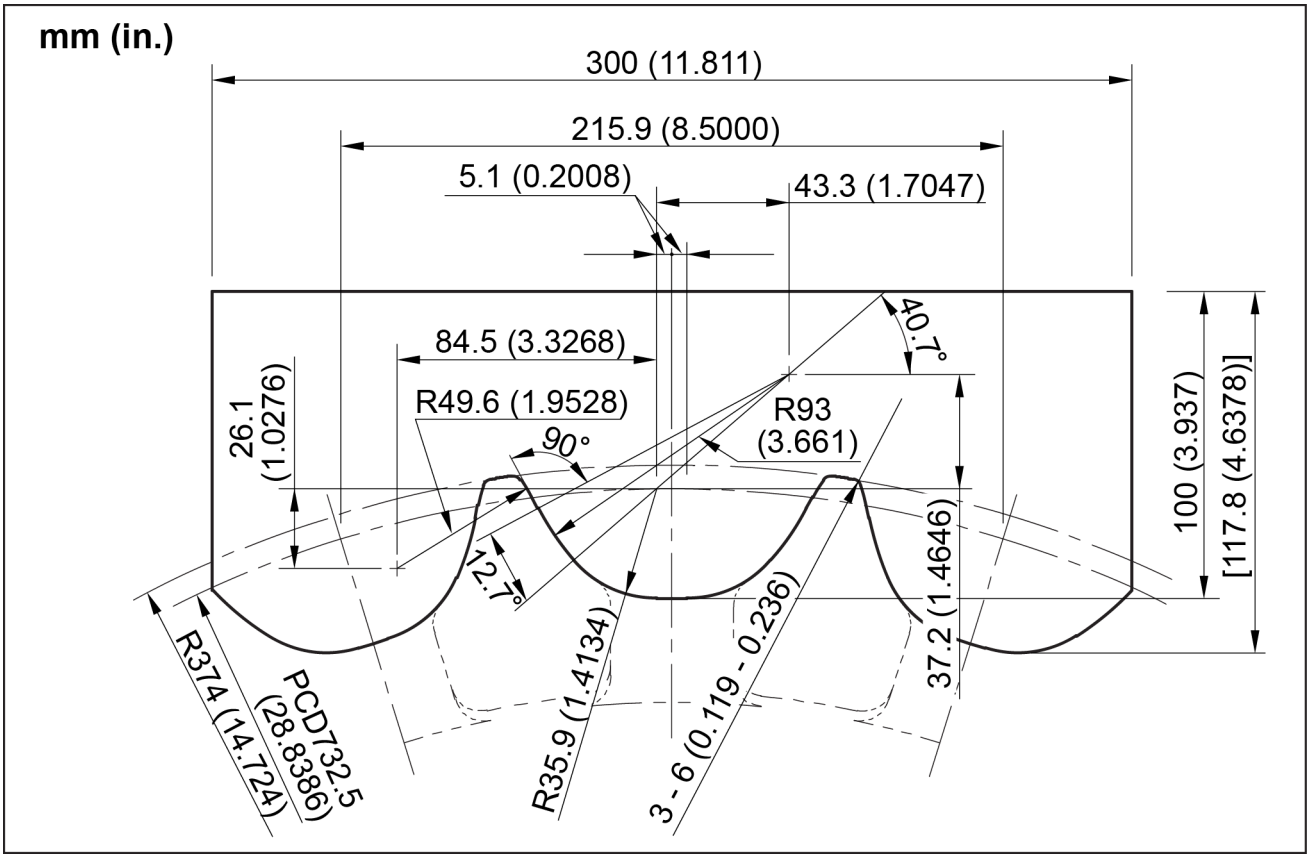
   Tightening torque for locking screw: **64 N·m** (**47.20 lb ft**)



SMIL16CEX1568EB 15

Driving wheel - Dimension

Inspection gauge for drive sprocket



SMIL15CEX5074FA 1

Track tensioner - Prepare

⚠ WARNING

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

W0959A

⚠ WARNING

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

W1128A

⚠ WARNING

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

W0398A

⚠ WARNING

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

W0256A

NOTICE: *Do not get under the machine when the main unit is jacked up.*

NOTICE: *Make sure to place the main unit on wood planks or the like to prevent falling.*

NOTICE: *Align the shoe assembly feed location and stop the engine except when working.*

NOTICE: *Before removing the shoes, be sure to bleed off any air in the hydraulic circuits.*

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

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

Items to prepare:

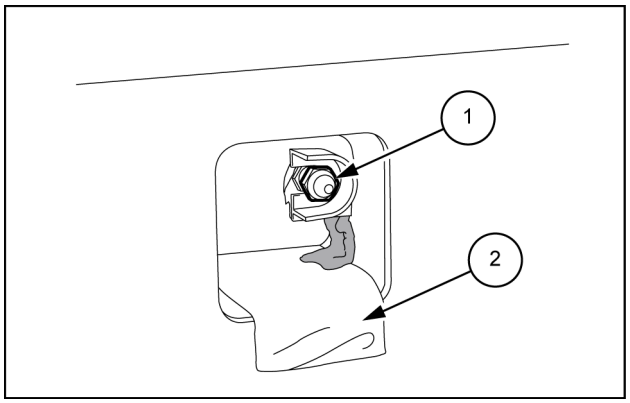
- Wrenches [**24 mm**, **36 mm**]
- Hammer
- Lifting equipment
- **LOCTITE® 262™**
- Striking jig
- Crowbar
- Wood plank
- Rag

Track frame roller - Remove

1. Use a box wrench [**19 mm**] to loosen the check valve **(1)**, and then loosen the shoe tension.

   Do not loosen the check valve all at once. Loosen it slowly while monitoring the grease output and shoe loosening.

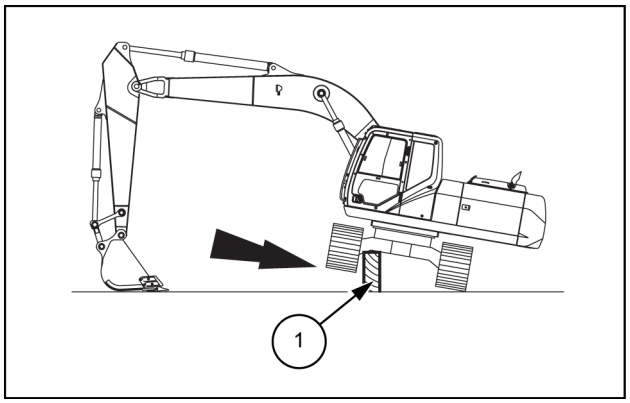
   - Grease drains out, so provide rag **(2)** close to the drain port.



SMIL14CEX2064AB 1

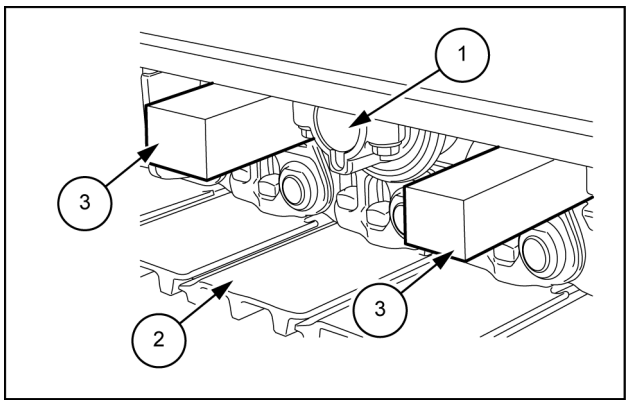
2. Jack up the side frame on the side where the roller is being replaced as shown in the diagram.

   Jack up so that the shoe is floating about **30 cm** (**11.8 in**), and insert wood planks **(1)** under the lower frame to prevent falling.



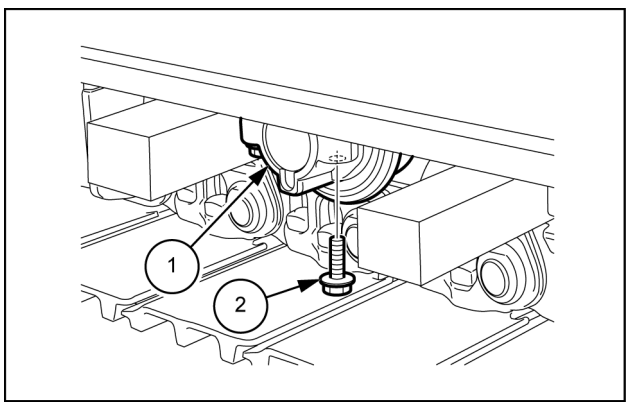
SMIL14CEX2065AB 2

3. If it is impossible to insert wood planks **(3)** under the lower frame, insert wood planks **(3)** between the side frame and the link shoe **(2)** to separate the link shoe and lower roller **(1)** by about **15 mm** (**0.6 in**).



SMIL14CEX2066AB 3

4. Use a box wrench [**36 mm**] to remove the 4 bolts **(2)**, and then remove the lower roller **(1)**.



SMIL14CEX2067AB 4

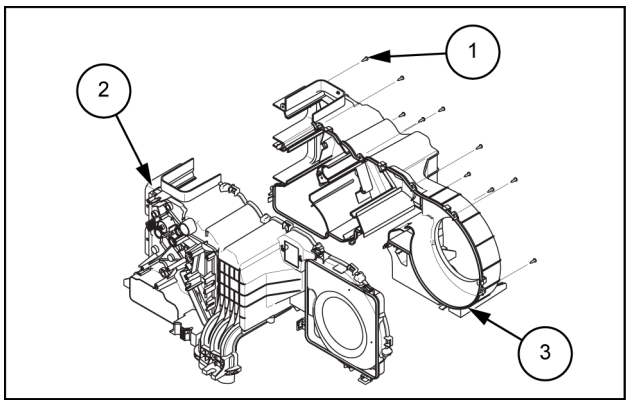
Heating, Ventilation, and Air-Conditioning (HVAC) unit - Remove

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

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

Removal of right heater case and left heater case

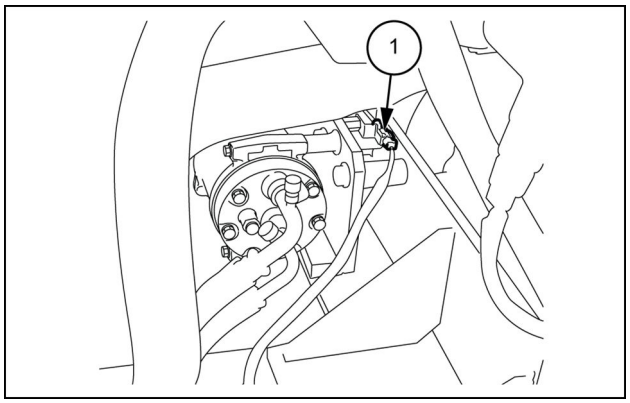
1. Remove the 10 Phillips screws **(1)** and remove the right heater case **(2)** and left heater case **(3)**.
   - Phillips screws **(1)**: M4 x 16



SMIL14CEX1813AB 1

Air-conditioning compressor - Remove

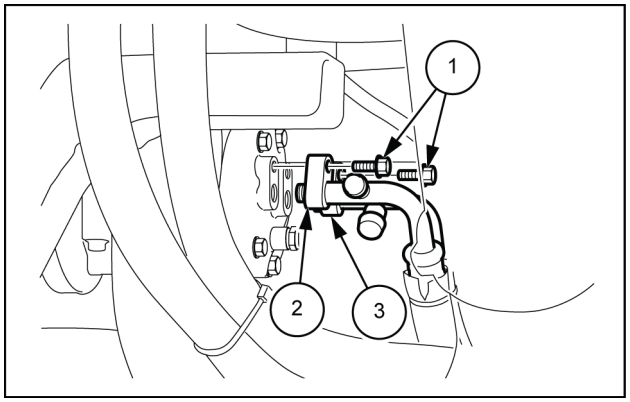
1. Remove the connector **(1)**.



SMIL14CEX1820AB 1

2. Use a box wrench [**13 mm**] to loosen the bolts **(1)** on the lines in the 2 locations, and then remove the 2 lines **(2)** and **(3)**.
   - Always remove the low-pressure side line **(2)** first.
   - Install caps or plugs to the compressor and lines to prevent any entry of water, dust or dirt.

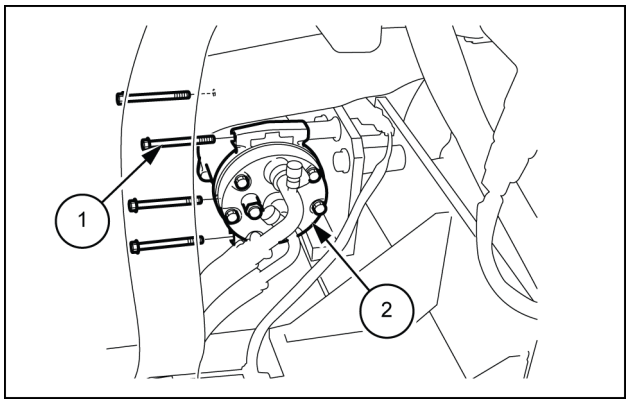
   Tightening torque for bolt installation: **19.6 - 24.5 N·m** (**14.46 - 18.07 lb ft**)



SMIL14CEX1821AB 2

3. Use a wrench [**13 mm**] to remove the 4 bolts **(1)**, and then remove the compressor **(2)**.

   Tightening torque for bolt installation: **19.6 - 29.4 N·m** (**14.46 - 21.69 lb ft**)

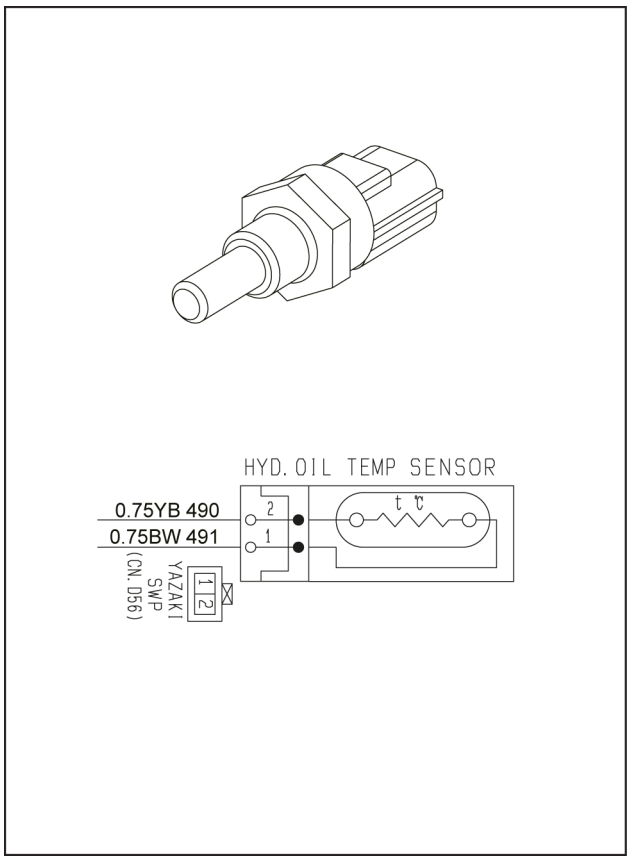


SMIL14CEX1822AB 3

1. Upper pressure sensor
2. Travel pressure sensor
3. Bucket pressure sensor
4. Intake air temperature sensor
5. N1 pressure sensor
6. Arm pressure sensor

Hydraulic oil temperature sensor

Part No.: KHR2433

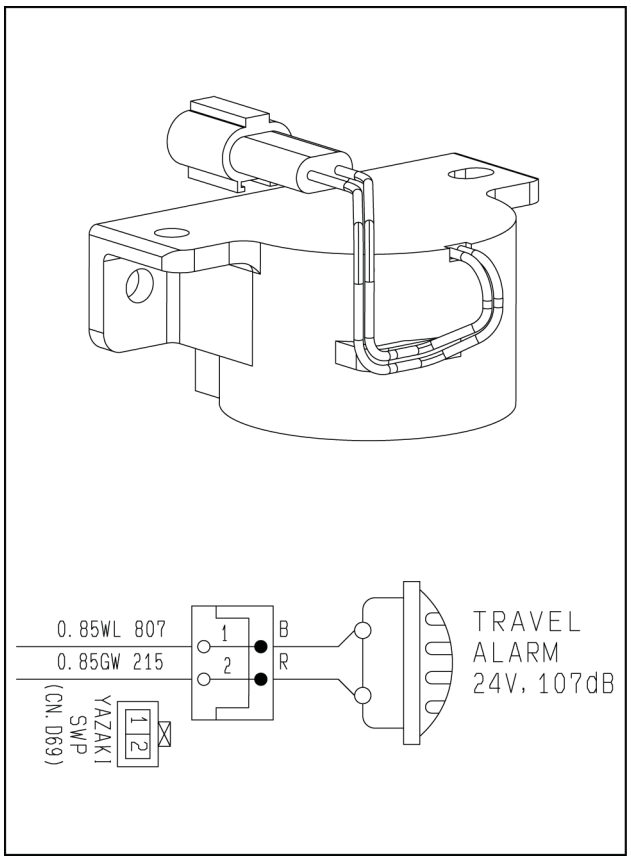


SMIL16CEX1416BA 47

Travel alarm

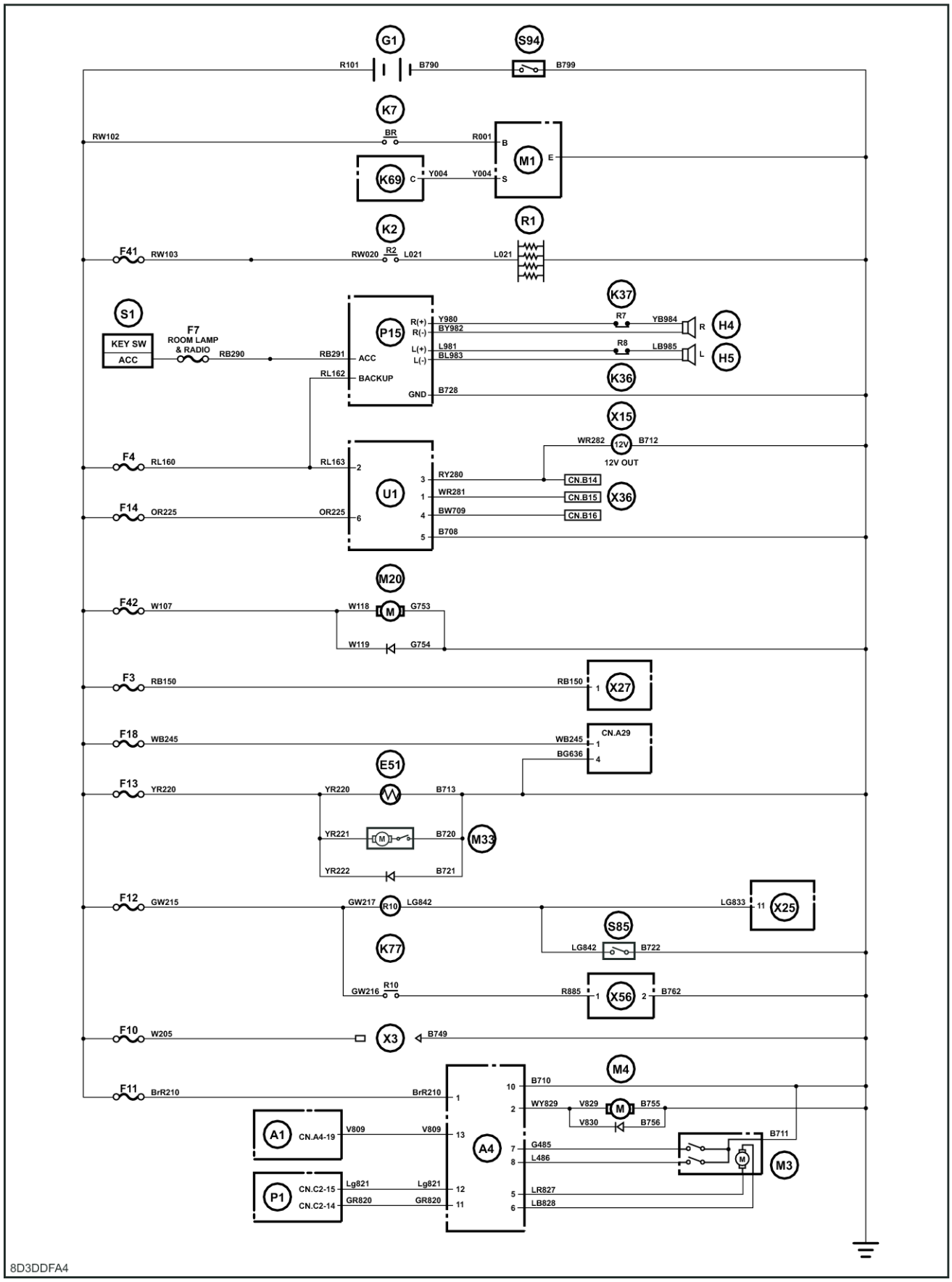
Basic frequency: **2560 Hz**

Part No.: KHR3852



SMIL15CEX4887BA 48

Other



8D3DDFA4 10

DTC reading procedure

Reading DTC with monitor

Current and past DTCs recorded in the ECM can be displayed by connecting the diagnostic switch and blinking the monitor.

- Switch the starter switch “ON” and check that the monitor shows an abnormality display.
- Turn the starter switch “ON”, but the engine “OFF”.
- Connect the diagnostic switch.
  For an actual unit with no diagnostic switch, short the DLC No. 1 and No. 4 or No. 5.
- Read the blinking count of the monitor.
- The DTC determines the failure contents from the diagnostic trouble code list.

If the trouble diagnostic scan tool is connected, the diagnostic codes can be read by operating the trouble diagnostic scan tool.

- As for the installation position of the monitor, refer to the manual of the actual unit.

Display code when no DTC is recorded

Code 1 (indicating the start of code display) continues to be displayed.

Display when a DTC is recorded

The recorded trouble codes are displayed 3 times.

If more than 2 or more trouble codes have been recorded, the DTCs will be output in ascending order with each DTC being displayed three times.

After displaying all codes, the codes will be displayed again starting with the smallest code number.

This display continues while the diagnosis connector is connected.

Wiring harnesses - Electrical schematic sheet 09 - Engine-VGS turbo, EGR valve

Type	Components	Connectors/link	Description
Sensor	B3		Fuel temperature sensor
Sensor	B6		Air intake temperature sensor
Valve	M25		EGR valve
Switch	X35		Over heat switch
Valve	Y35		Suction control valve
Connector	CN.D35	**CN.D35**	Air intake temperature sensor
Connector	CN.E3	**CN.E3**	EGR valve
Connector	CN.E8	**CN.E8**	Fuel temperature sensor
Connector	CN.E13	**CN.E13**	Suction control valve
Connector	CN.E19-A	CN.E19-A	Over heat switch
Connector	CN.E100	CN.E100	Ground 26

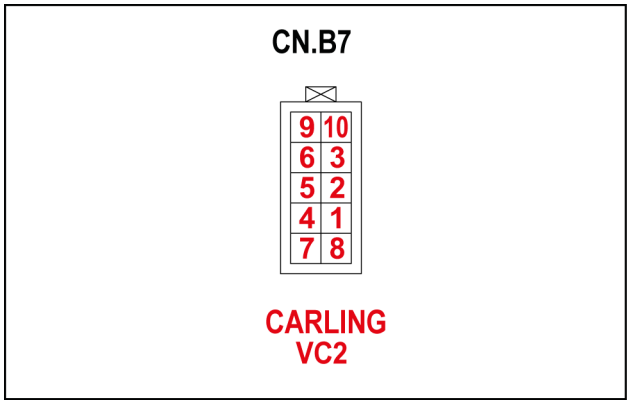
Wiring harnesses - Electrical schematic sheet 24 - Main cab-inter connector

Type	Components	Connectors/link	Description
Connector	CN.A33	**CN.A33**	Immobilizer
Connector	CN.A23	**CN.A23**	To controller C
Connector	CN.A24	**CN.A24**	To GPS unit
Connector	CN.A25	**CN.A25**	
Connector	CN.A41	**CN.A41**	
Connector	CN.A42	**CN.A42**	
Connector	CN.A51	**CN.A51**	
Connector	CN.A53	**CN.A53**	

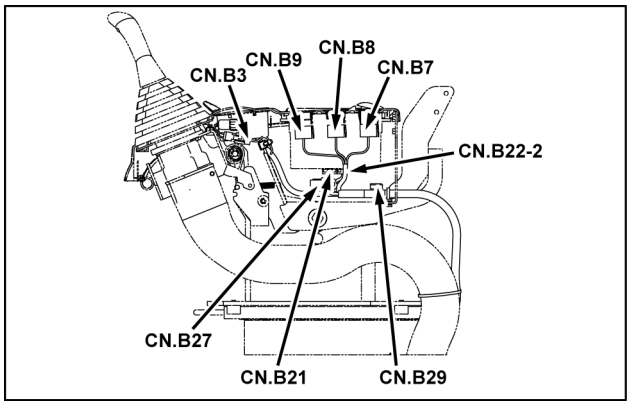
Wiring harnesses - Electrical schematic sheet 39 - Camera

Type	Components	Connectors/link	Description
Camera	H10		Camera 1 (rear)
Camera	H11		Camera 2 (right side)
Connector	CN.C18	**CN.C18**	
Connector	CN.C19	**CN.C19**	
Connector	CN.C20	**CN.C20**	
Connector	CN.C26	**CN.C26**	
Connector	CN.C27	**CN.C27**	Camera 1 (rear)
Connector	CN.C28	**CN.C28**	Camera 2 (right side)
Connector	CN.C29	**CN.C29**	

CONNECTOR CN.B7 - ENGINE STOP (Male)



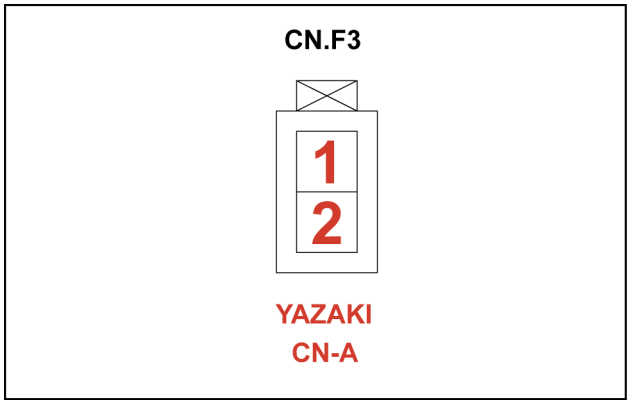
SMIL15CEX3936AA 30



SMIL15CEX3926AA 31

Pin	From	Wire	Description	Color-Size	Frame
2	CN.A48-M-P-5	302B		LG-0.85	**SHEET 35**
3	CN.A48-M-P-4	148A		WR-0.85	
5	SP-622B-P-X	620D		BG-0.85	**SHEET 32**
6	CN.A48-M-P-6	539C		LB-0.85	**SHEET 35**

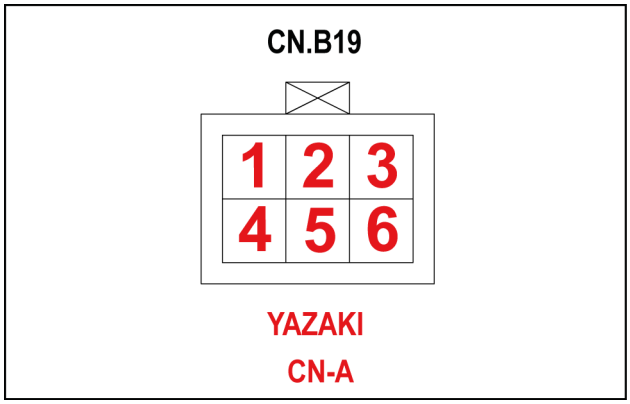
CONNECTOR CN.F3 - BLOWER MOTOR (Male)



SMIL15CEX7239AA 66

Pin	From	Wire	Description	Color-Size	Frame
1	CN.F2-P-3	937		LR-2.0	**SHEET 37**
2	SP-939A-P-X	938		RL-2.0	

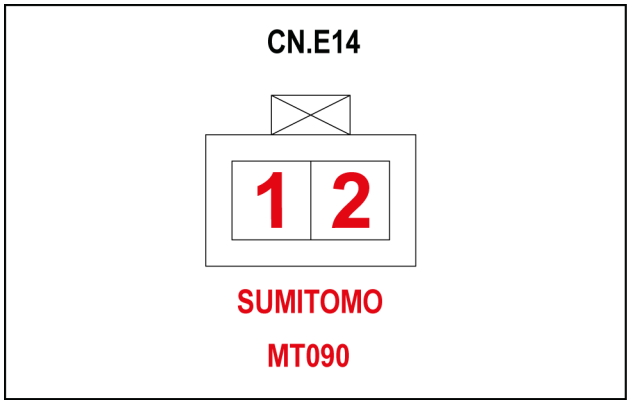
CONNECTOR CN.B19 (Female)



SMIL15CEX4044AA 38

Pin	From	Wire	Description	Color-Size	Frame
1	CN.F2-P-1	235B		WR-2	**SHEET 37**
2	SP-240C-P-X	240C		LR-0.85	
3	CN.F2-P-2	230C		VR	
4	CN.F1-P-3	943C		GW-0.85	
6	CN.F4-P-1	730B		B-2.0	

CONNECTOR CN.E14 - INJECTOR 1(#1) (Male)



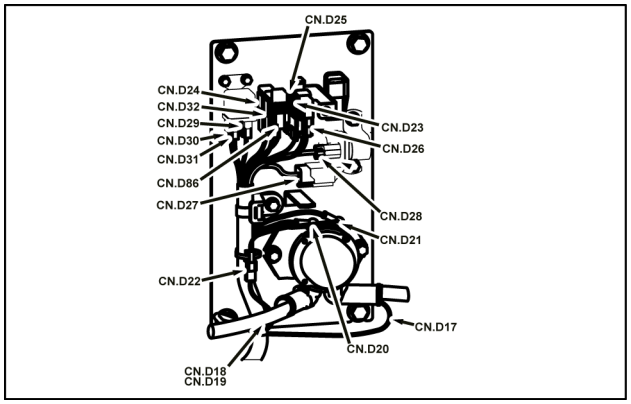
SMIL15CEX4037AA 66

Pin	From	Wire	Description	Color-Size	Frame
1	SP-374C-P-X	374E		R-1.25	**SHEET 08**
2	CN.E20-F-P-5	375B		L-1.25	

CONNECTOR CN.A28-1 - LAMP (CAB) (Female)

Pin	From	Wire	Description	Color-Size	Frame
1	SP-876-P-X	876A		GR-1.25	**SHEET 27**

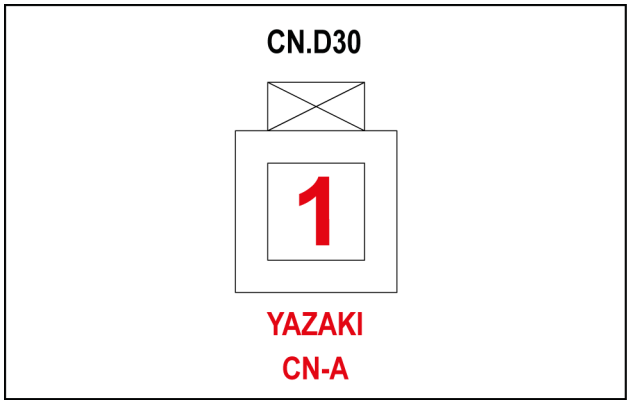
CONNECTOR CN.D20 - RELAY BATTERY (Male)



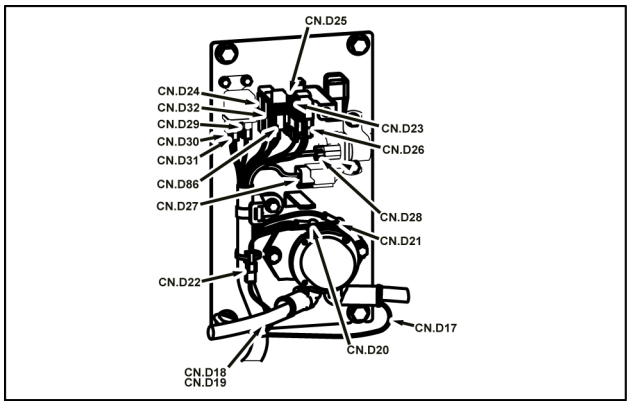
SMIL16CEX1628AA 46

Pin	From	Wire	Description	Color-Size	Frame
M4	CN.A52-M-P-3	511		WR-1.25	**SHEET 30**

CONNECTOR CN.D30 - RELAY GLOW (Male)



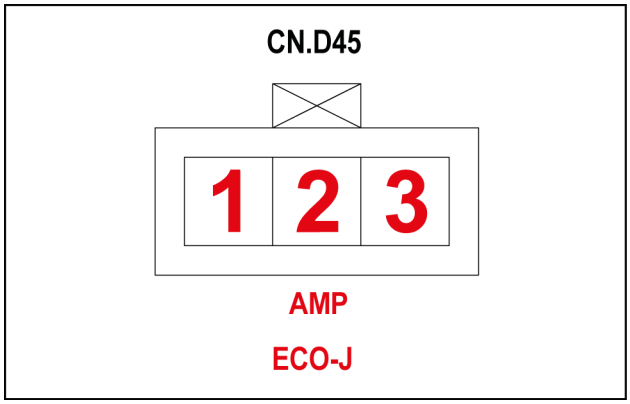
SMIL15CEX3955AA 12



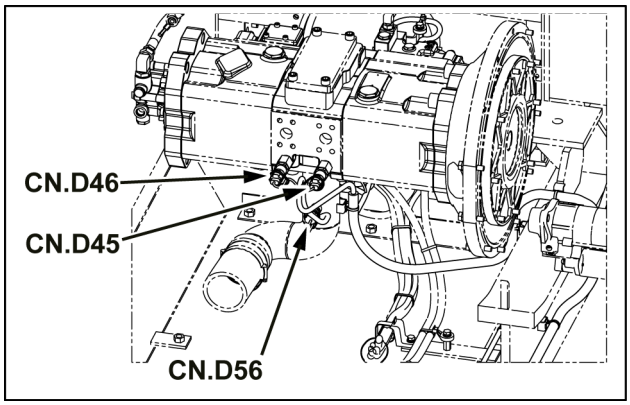
SMIL16CEX1628AA 13

Pin	From	Wire	Description	Color-Size	Frame
1	SP-103-P-X	020		RW-5.0	**SHEET 01**

CONNECTOR CN.D45 - PRESSURE SENSOR (P1) (Male)



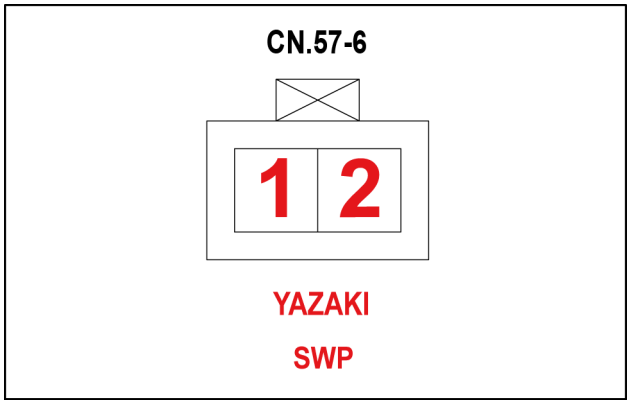
SMIL15CEX3973AA 38



SMIL16CEX1630AA 39

Pin	From	Wire	Description	Color-Size	Frame
1	SP-400A-P-X	400B		WB-0.75	**SHEET 14**
2	CN.A54-M-P-3	410A		Y-0.75	**SHEET 21**
3	SP-420B-P-X	420C		BW-0.75	**SHEET 14**

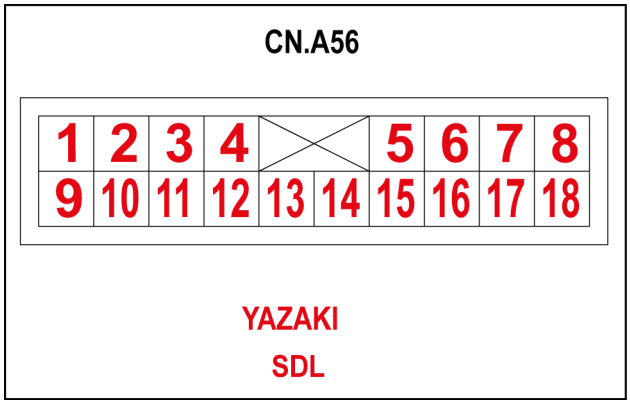
CONNECTOR CN.57-6A - PRESSURE SWITCH (OPTION 1 LEVER DOWN) (Male)



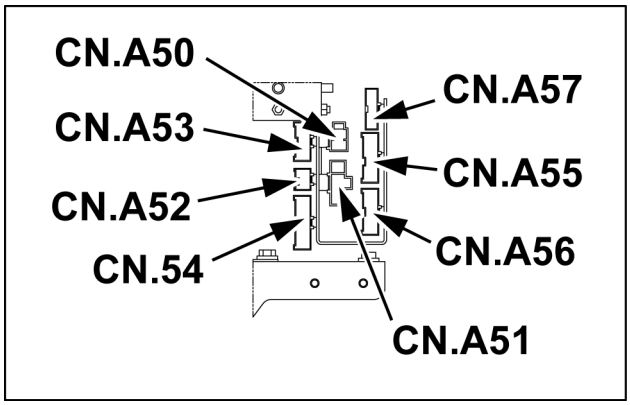
SMIL16CEX0250AA 26

Pin	From	Wire	Description	Color-Size	Frame
1	SP-640D-P-X	640K		BG-0.75	**SHEET 19**
2	SP-534A-P-X	534H		VY-0.75	

CONNECTOR CN.A56 (Male)



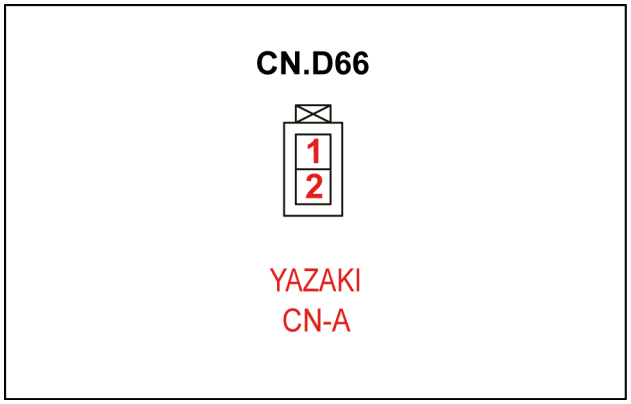
SMIL15CEX3946AA 62



SMIL16CEX0418AA 63

Pin	From	Wire	Description	Color-Size	Frame
1	CN.D39-P-1	900A		Y-0.75	**SHEET 13**
2	CN.D41-P-1	902A		O-0.85	
3	CN.D40-P-1	904A		L-0.75	
4	CN.D42-P-1	906A		G-0.85	
6	CN.D44-M-P-1	910A		V-0.85	
9	CN.D39-P-2	901A		BY-0.75	
10	CN.D41-P-2	903A		BO-0.85	
11	CN.D40-P-2	905A		BL-0.75	
12	CN.D42-P-2	907A		GB-0.85	
13	CN.D43-P-2	818A		YL-0.85	
14	CN.D85-M-P-2	417A		LR-0.75	**SHEET 14**
16	CN.D44-M-P-2	911A		VG-0.85	**SHEET 13**

CONNECTOR CN.D66 - LAMP (BOOM) (Female)



SMIL16CEX1443AA 20

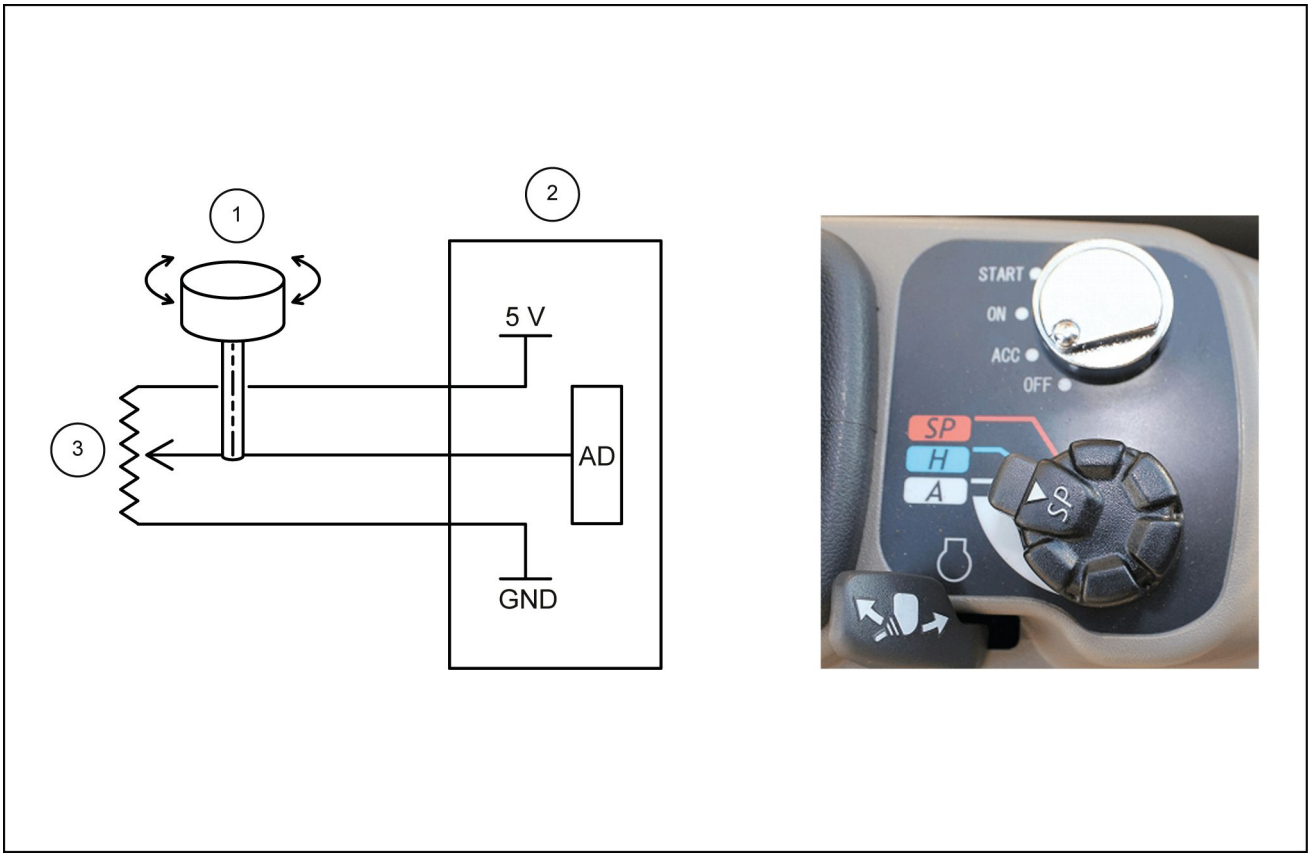
Pin	From	Wire	Description	Color-Size	Frame
1	SP-871A-P-X	871A		Y-1.25	**SHEET 11**
2	SP-758A-P-X	758A		B-1.25	

CONNECTOR CN.D80-A - GROUND 21 (Male)

Pin	From	Wire	Description	Color-Size	Frame
M8	SP-600D-P-X	600E		BG-2.0	**SHEET 10**
M8	SP-700L-P-X	700M		B-2.0	

Throttle control - Dynamic description - Throttle volume position detection

Configuration

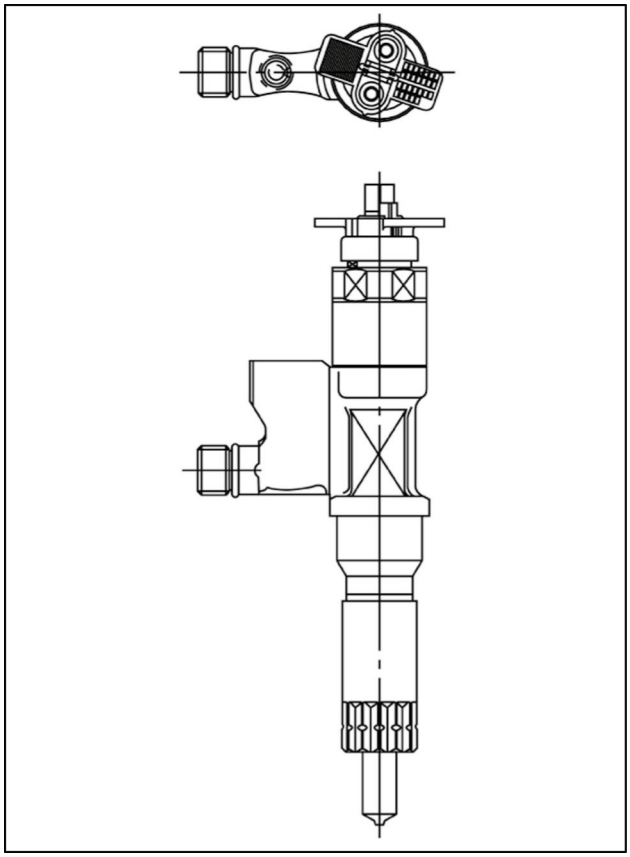


SMIL15CEX3449FB 1

1 Engine throttle switch
2 Computer A
3 Potentio-meter

Injector

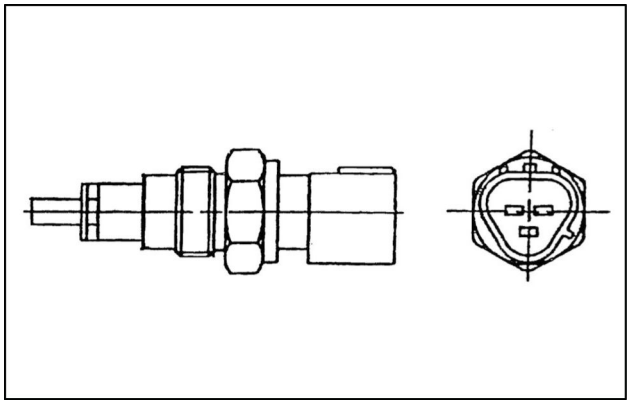
The injector is installed on the cylinder head portion, and is controlled by the ECM to perform fuel injection. The ECM internally increases the voltage for driving the injectors and applies this voltage to the injectors. Then, by controlling the period of time in which the injectors are energized, the ECM performs fuel injection quantity control, as well as control of the fuel injection period.



SMIL14CEX3999BA 8

Coolant temperature sensor

The coolant temperature sensor is installed on the engine block, and the thermistor changes the resistance in accordance with the temperature. The sensor resistance is high when the engine coolant temperature is low, and low when the engine coolant temperature is high. The ECM applies **5 V** to the engine coolant temperature sensor through the pull-up resistor, and calculates the engine coolant temperature from changes in the voltage. This value is used in various control mechanisms, such as fuel injection control. The voltage becomes lower when the resistance is lower, and it becomes higher when the resistance is higher.



SMIL14CEX4000AA 9

Contents

Electrical systems - 55

Engine starting system - 201

FUNCTIONAL DATA

SERVICE

Engine starting system - Service instruction - Engine hunching, rough idling

Description of symptom

The engine idling speed varies or the engine idling speed changes.

When the problem is severe, the engine or the machine may vibrate.

When these problems become worse, the engine may stall.

Preliminary inspection

Before performing this diagnosis, check all of the following items by performing functional inspections and OBD system check.

The ECM and monitor are operating correctly.

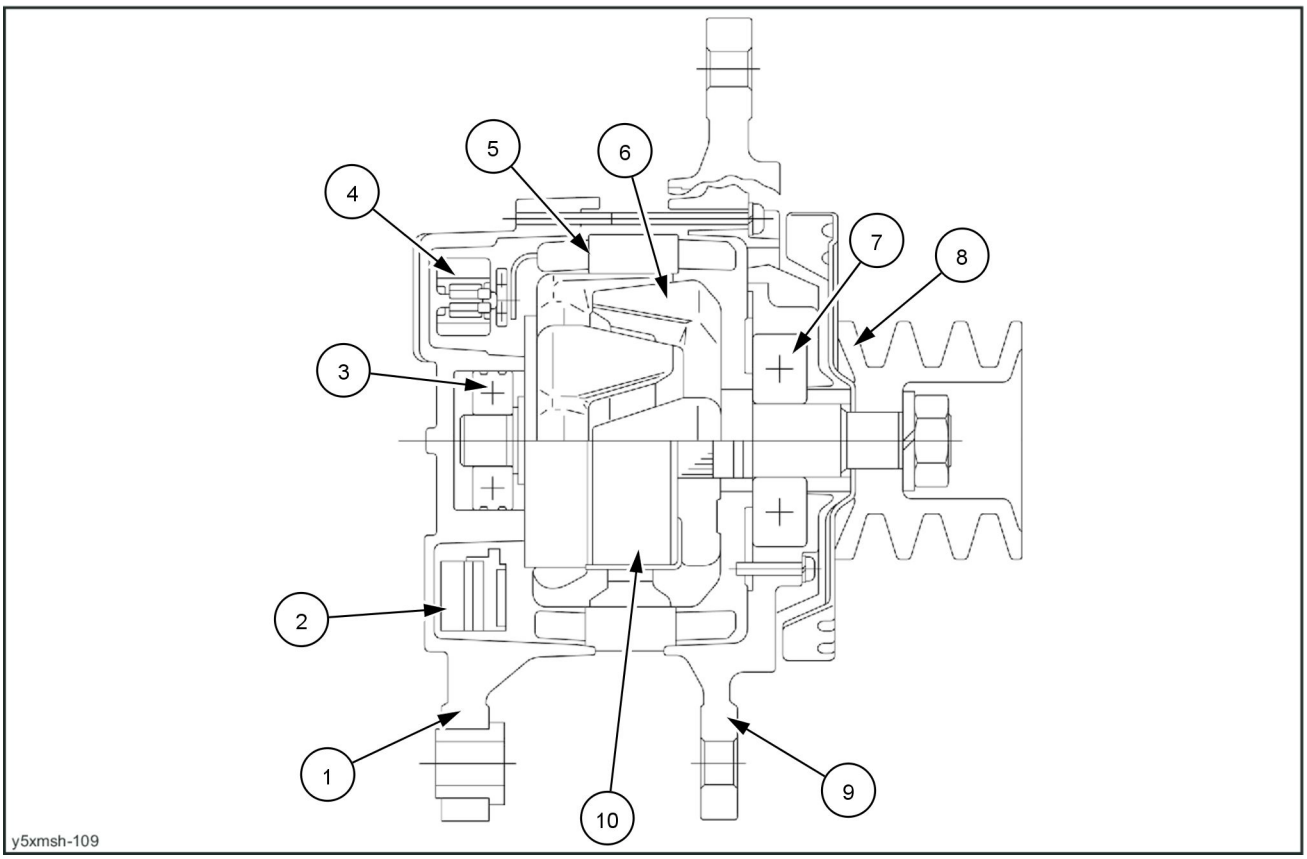
Check for Diagnostic Trouble Codes.

Values indicated in MACHINE STATUS on the service support screen are within the normal operation range. See "Service Support - MACHINE STATUS".

Check the condition of the machine and find applicable symptoms.

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

Alternator - Component identification



Y5XMSH-109 1

1. Rear bracket
2. IC regulator
3. Bearing
4. Rectifier
5. Stator
6. Rotor
7. Bearing
8. Pulley
9. Front bracket
10. Field coil

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Electrical systems - 55

Exhaust Gas Recirculation (EGR) electrical system - 989

- Bucket-close P-SOL

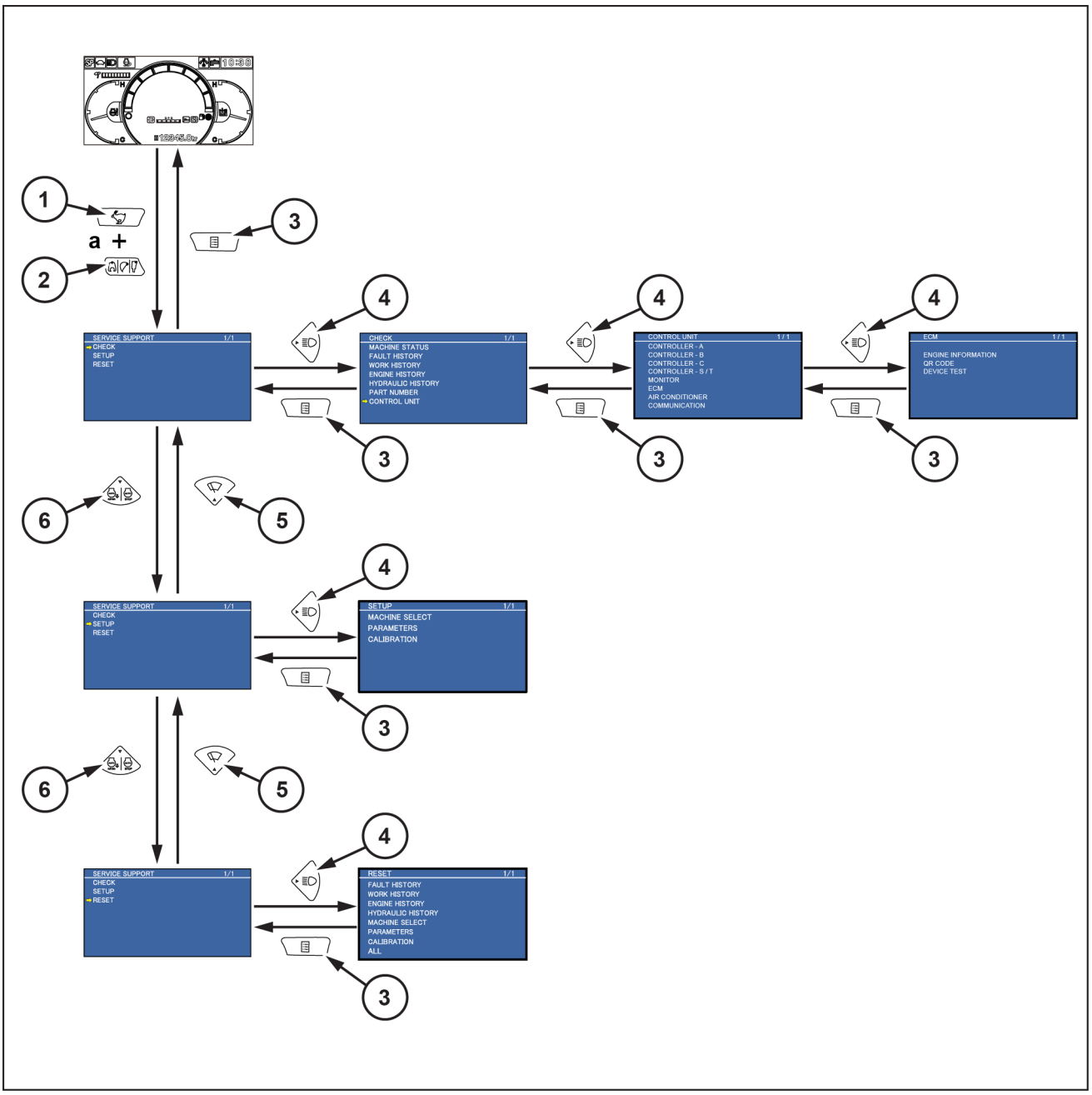
· Proportional solenoid circuit controlled by computer B

- Arm in
- Fan speed (45 t only)
- Option line relief pressure

5 V circuit items

- Boom-up pressure sensor
- Arm-in pressure sensor
- Bucket-close pressure sensor

Instrument cluster - Static description - Screen display list



SMIL16CEX0271GB 1

a. Hold down for **3 s**

1. Travel speed select switch
2. Attachment select switch
3. Menu switch
4. Light switch
5. Wiper switch
6. Auto idling switch

Value	Contents	Remarks
5	No number	
6	CHINA	
7	Australia	

Brand

Value	Contents	Remarks
0	SUMITOMO	Background color = Blue, SUMITOMO logo appears after the model is selected.
1	LBX	Background color = Black, LBX logo appears after the model is selected
2	CASE	Background color = Black, CASE logo appears after the model is selected
3	No number	
4	New Holland	Compatible with monitor ver. 5.0 or later.

Language

Changeable with "LANGUAGE" on the menu screen.

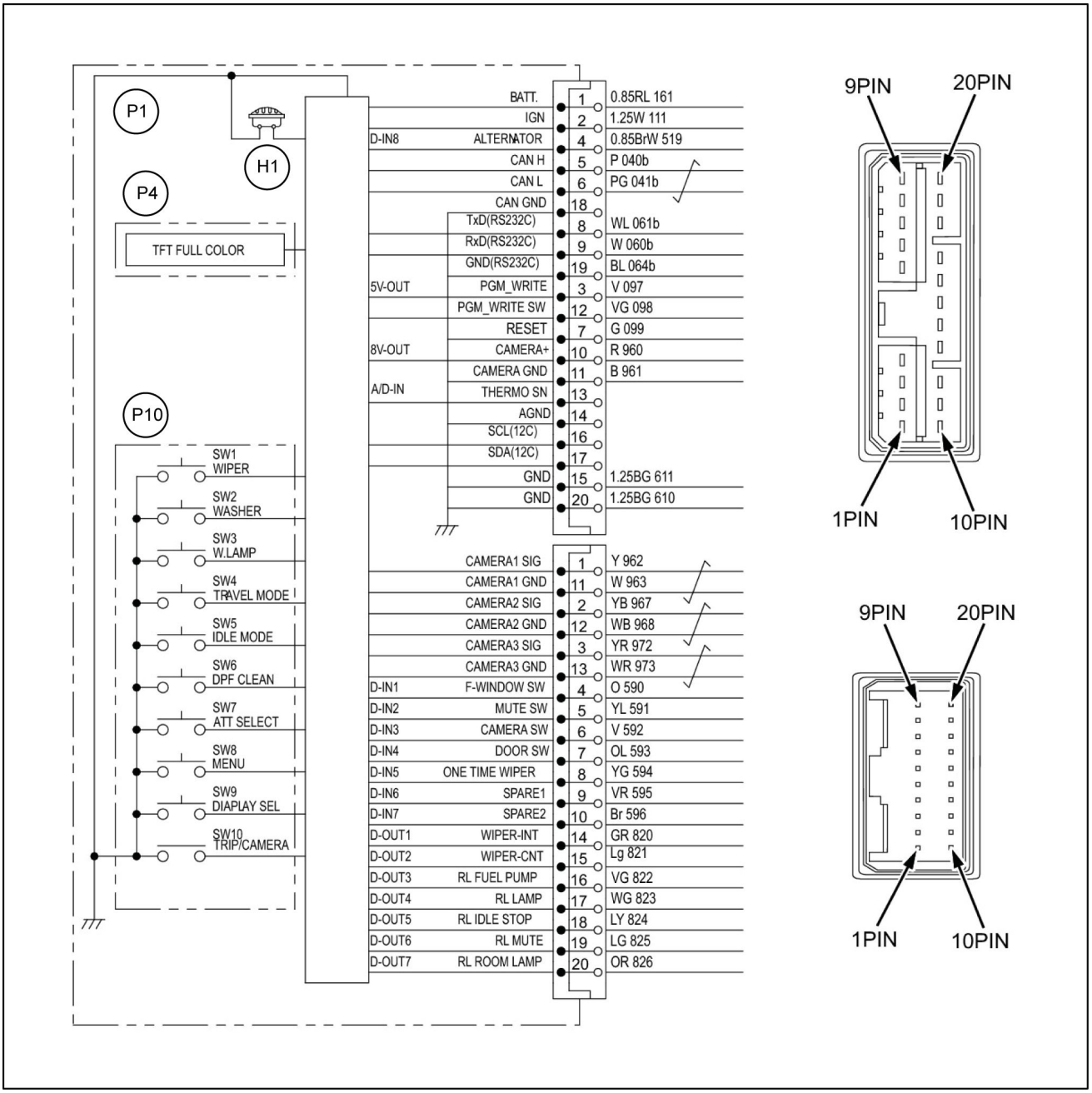
Value	Contents	Remarks
0	Japanese	
1	English	
2	Thai	Compatible with monitor ver. 5.0 or later.
3	Chinese	
4	German	
5	French	
6	Italian	
7	Spanish	
8	Portuguese	
9	Dutch	
10	Danish	
11	Norwegian	
12	Swedish	
13	Finnish	
14	Turkish	
15	Arabic	
16	Malay	Compatible with monitor ver. 5.0 or later.
17	Indonesian	Compatible with monitor ver. 5.0 or later.
18	Russian	
19	French@Canada	
20	Pictographs only	

Unit

Value	Contents	Remarks
0	Domestic and Europe (SI unit system) (MPa, °C)	
1	North America (psi, °F)	
2	Gravitational unit system (kgf/cm2, °C)	

Instrument cluster - Electrical schema

Monitor



LPIL12CX00828GB 1

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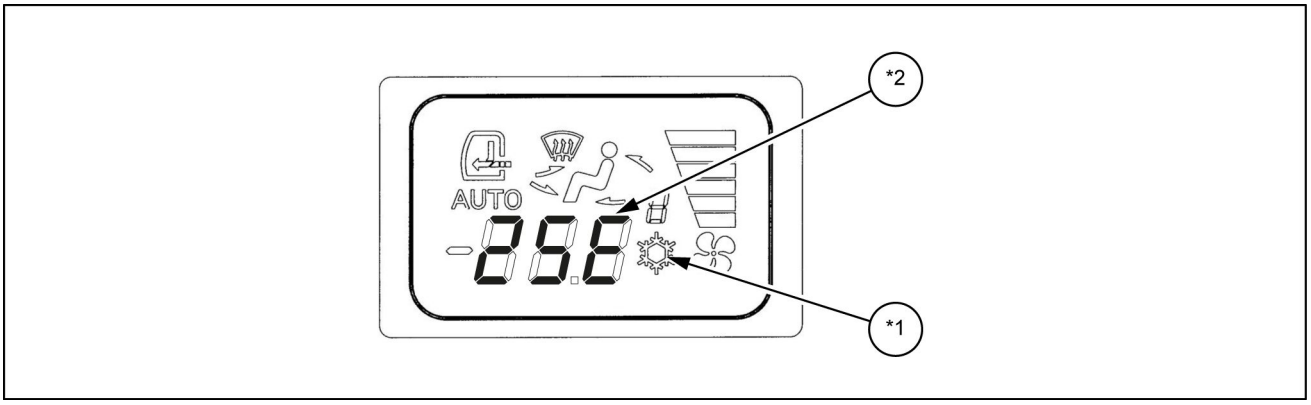
Electrical systems - 55

Cab Heating, Ventilation, and Air-Conditioning (HVAC) controls - 051



SMIL14CEX1906EB 6

Disconnection or short in the inside evaporator sensor or its input circuit

*1. The AC mark flashes
*2. E is not displayed

Disconnection or short in the solar radiation sensor or its input circuit

A. The solar radiation compensation data is set to 0.

B. E is not displayed in the first fraction position of the set temperature display LCD as it is for other sensors.

Coolant temperature signal trouble.
Cold blast prevention control does not work and normal control is used.

4. CAN communication abnormality processing

Recovery from bus off

A. Initial retry processing: **5 ms**.

B. Re-retry processing: every **1 s**.

C. Bus off retry processing is performed at the above rate.

Receiving data abnormality

A. Definition: The data field is outside the prescribed range regardless of whether the receiving data is operating normally or abnormally.

B. Processing: In the case of the former, all data that time are discarded and the previous data are retained.

C. In the case of the latter, data is discarded only for those items determined to be abnormal.

Communication interruption abnormality

A. Interruption judgment
Monitor Display: When normal reception is not possible **1 s** or more since the previous normal reception.
Engine: When normal reception is not possible **10 s** or more since the previous normal reception.

B. Internal use data: Shift to alternate data (processing).

C. Sending process: Continue.

D. Recover: As soon as valid data is received.

Alternate data (processing)

Send node: ENGINE ECU

A. Outside air data abnormality
Perform estimated outside air control.
*However, once there is a shift to estimated outside air, estimated outside air control continues until the ignition is switched OFF.

B. Coolant temperature data abnormality
Control the internal coolant temperature data to **45 °C** (**113 °F**) (the temperature at which to avoid cold air prevention control).

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Electrical systems - 55

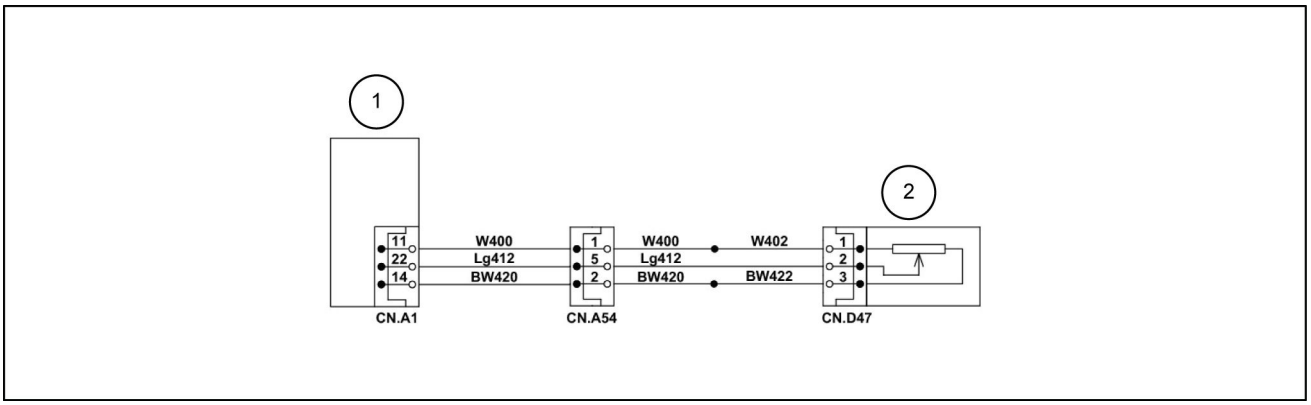
External lighting - 404

7002-N1 Pressure sensor signal abnormality

Control Module : MCM

Solution:

1. Use below image for the fault code process:



LPIL12CX00886EB 1

1. Computer A
2. N1 Pressure sensor

Turn ON the key switch.

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

A. If Diagnostic Trouble Code 7002 is displayed, proceed to Step **2**.

2. Check the N1 pressure sensor **(2)** voltage on the service support screen.

A. If the voltage is more than or equal to **4.75 V**, proceed to Step **3**.

B. If the voltage is equal or lesser than **0.25 V**, proceed to Step **6**.

3. Turn OFF the key switch and disconnect the N1 pressure sensor connector **CN.D47**.

Turn ON the key switch.

Measure the voltage between the ground and terminal 1 of the N1 pressure sensor connector **CN.D47** harness side.

A. If the voltage is not about **5 V**, find and replace the wire ID W400 or W402.

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

4. Measure the voltage between the ground and terminal 2 of the N1 pressure sensor connector **CN.D47** harness side.

A. If the voltage is above **4.75 V**, find and replace the wire ID Lg412.

B. If the voltage is **4.75 V** or lower, proceed to Step **5**.

5. Measure the voltage between the ground and terminal 3 of the N1 pressure sensor connector **CN.D47** harness side.

A. If the voltage is more than **0.25 V**, find and replace the wire ID BW420 or BW422.

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

6. Turn OFF the key switch.

Disconnect N1 pressure sensor connector **CN.D47**.

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

   Inspect the fusible link (**65 A**) fuse **(9)** and fuse box F6 (**10 A**) fuse to see if either is blown.

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

3. Turn OFF the key switch and disconnect the travel alarm connector **CN.D69**.

   Connect the terminal 1 of the travel alarm connector **CN.D69** alarm side to the negative terminal of the battery and terminal 2 to the positive terminal, and inspect the operation of the travel alarm **(4)**.

   A. If there is no travel alarm sound, replace travel alarm **(4)**.

   B. If there is travel alarm sound, proceed to Step **4**.

4. Turn ON the key switch.

   Measure the voltage between the ground and terminal 1 of the travel alarm connector **CN.D69** harness side.

   A. If the voltage is not about **0 V**, find and replace the wire ID WL807.

   B. If the voltage is about **0 V**, proceed to Step **5**.

5. Turn OFF the key switch.

   Inspect for continuity between the ground and terminal 2 of the travel alarm connector **CN.D69** harness side.

   A. If there is continuity, find and replace the wire ID GW215, R105c, R105 or R104.

   B. If there is no continuity, proceed to Step **6**.

6. Turn ON the key switch.

   Inspect for continuity between the ground and terminal 1 of the travel alarm connector **CN.D69** harness side for **0.4 s**.

   A. If there is no continuity, find and repair or replace the open circuit on the wire ID WL807.

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

7. Turn ON the key switch.

   Measure the voltage between the ground and terminal 2 of the travel alarm connector **CN.D69** harness side.

   A. If the voltage is not about **24 V**, find and repair or replace the open circuit on the wire ID GW215, R105c, R105 or R104.

   B. If the voltage is about **24 V**, replace computer A **(1)**.

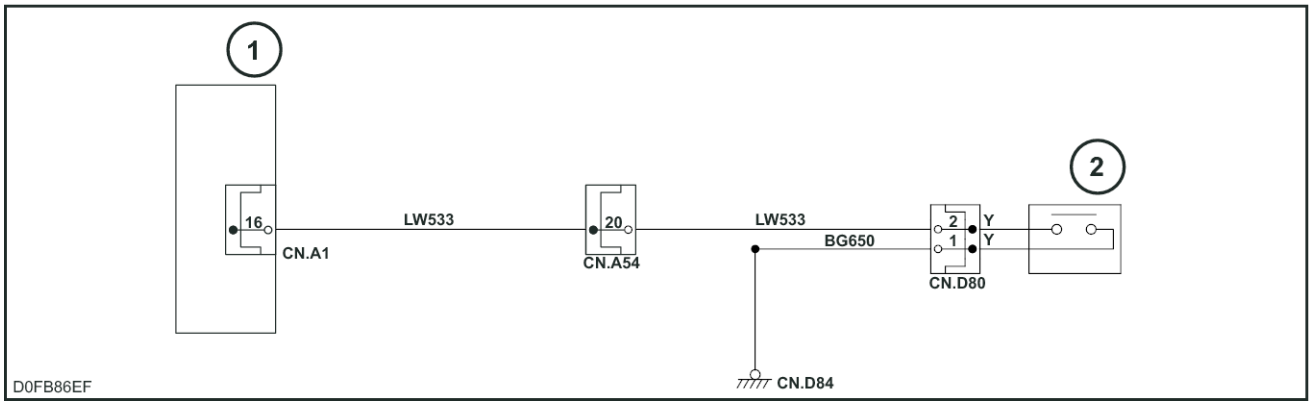
Wiring harnesses - Electrical schematic sheet 10 (55.100)

7428-Fuel filter water level

Control Module : MCM

Solution:

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



D0FB86EF 1

1. Computer A
2. Level switch

Check that the “FUEL FILTER” display appears.

Drain the fuel filter.

Turn ON the key switch.

Check for the Diagnostic Trouble Code 7428.

A. If Diagnostic Trouble Code 7428 is displayed, proceed to Step **2**.

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

A. If Diagnostic Trouble Code 7428 is displayed, proceed to Step **3**.

3. Turn OFF the key switch and disconnect the fuel filter water level switch connector **CN.D89**.

Inspect for continuity between the terminals 1 and 2 of the fuel filter water level switch connector **CN.D89** switch side.

A. If there is no continuity, replace the fuel filter water level switch **(2)**.

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

Wiring harnesses - Electrical schematic sheet 13 (55.100)

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

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

8. Inspect the ECM harness connector **CN.D1-02** for a poor connection.

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

B. If the harness connector **CN.D1-02** is normal, replace the ECM. (Refer to " **Engine Control Unit (ECU) - Remove (55.015)** " and " **Engine Control Unit (ECU) - Install (55.015)**").
Set the injector ID code and the engine serial number on the ECM.

9. Confirm resolution:

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

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

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

3. Start the engine.

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

5. Display FAULTY HISTORY on the service support screen on the monitor and check that no Diagnostic Trouble Code has been detected. See "Service Support - FAULTY HISTORY".
Conditions for setting the Diagnostic Trouble Codes such as engine run time or coolant temperature, etc., vary depending on the Diagnostic Trouble Codes.

Wiring harnesses - Electrical schematic sheet 07 (55.100) Wiring harnesses - Electrical schematic sheet 15 (55.100)

Measure the voltage between the probe of the test light and a normal ground.

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

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

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

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

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

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

   B. If the harness connector **CN.E4** is normal, inspect the crankshaft position sensor. (Refer to " **Engine speed/RPM sensor - Inspect (55.015)**").
   If a problem is found, replace the crankshaft position sensor and then proceed to Step **8**. (Refer to " **Engine speed/RPM sensor - Remove (55.015)**" and " **Engine speed/RPM sensor - Install (55.015)**").

8. Inspect the ground circuit between the ECM and the crankshaft position sensor for an open circuit and high resistance.

   NOTE:
   • The crankshaft position sensor shares the ground circuit with other sensors.
   • The Diagnostic Trouble Code set on a sensor which shares this circuit may be detected.

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

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

9. Inspect the ECM harness connector **CN.D1-02** for poor connections.

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

   B. If the harness connector **CN.D1-02** is normal, replace the ECM. (Refer to " **Engine Control Unit (ECU) - Remove (55.015)**" and " **Engine Control Unit (ECU) - Install (55.015)**").
   Set the injector ID code and the engine serial number on the ECM.

10. Confirm resolution:

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

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

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

    3. Start the engine.

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

    5. Display FAULTY HISTORY on the service support screen on the monitor and check that no Diagnostic Trouble Code has been detected. See "Service Support - FAULTY HISTORY".
    Conditions for setting the Diagnostic Trouble Codes such as engine run time or coolant temperature, etc., vary depending on the Diagnostic Trouble Codes.

Wiring harnesses - Electrical schematic sheet 07 (55.100) Wiring harnesses - Electrical schematic sheet 15 (55.100)

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

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

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

3. Start the engine.

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

5. Display FAULTY HISTORY on the service support screen on the monitor and check that no Diagnostic Trouble Code has been detected. See "Service Support - FAULTY HISTORY".
Conditions for setting the Diagnostic Trouble Codes such as engine run time or coolant temperature, etc., vary depending on the Diagnostic Trouble Codes.

Wiring harnesses - Electrical schematic sheet 05 (55.100) Wiring harnesses - Electrical schematic sheet 06 (55.100) Wiring harnesses - Electrical schematic sheet 07 (55.100)

P20DF-Fuel filter clog sensor error (abnormally low voltage)

Control Module : ECM

Solution:

1. Check the trouble code setting conditions before you proceed with the diagnostics code P20DF.
   - Diagnostic trouble code P060B is not detected.
   - The ECM detects that the fuel filter pressure sensor voltage is **0.1 V** or lower for **5 s**.
2. Check and diagnose the below fault codes before you proceed with the diagnostics code P20DF.

   Diagnostic trouble code P0641
3. Turn OFF the starter switch.

   Disconnect the harness connector from the fuel filter pressure sensor.

   Turn ON the starter switch.

   Measure the voltage between the **5 V** power supply circuit of the harness connector of the fuel filter pressure sensor and normal ground.

   If voltage is equal or lesser than **4.5 V**, inspect for a disconnection or high resistance in the **5 V** power supply circuit between the ECM and fuel filter pressure sensor.

   NOTE:
   *• The fuel filter pressure sensor shares use of the **5 V** power supply circuit with other sensors.*
   • A Diagnostic Trouble Code may be detected for the sensors sharing use of this circuit.

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

   B. If there are no problems, proceed to Step **4**.
4. Connect a test cable with fuse between the **5 V** power supply circuit of the harness connector of the fuel filter pressure sensor and signal circuit.

   Check the indicated fuel filter pressure sensor (clog) with the trouble diagnosis scan tool.

   If voltage is more than **4.5 V**, inspect for a contact defect in the harness connector of the fuel filter pressure sensor.

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

   B. If the harness connector is normal, replace the fuel filter pressure sensor and then proceed to Step **5**. (Refer to " **Fuel filter restriction sensor - Remove (55.010)**" and " **Fuel filter restriction sensor - Install (55.010)**").
5. Inspect the signal circuit between the ECM and fuel filter pressure sensor.

   Make sure that there is no the disconnection or high resistance.

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

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

   B. If there are no problems, proceed to Step **6**.
6. Inspect for a contact defect in the ECM harness connector **CN.D1-02**.

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

   B. If the harness connector **CN.D1-02** is normal, replace the ECM. (Refer to " **Engine Control Unit (ECU) - Remove (55.015)**" and " **Engine Control Unit (ECU) - Install (55.015)**").
   Set the injector ID code and the engine serial number on the ECM.
7. Confirm resolution:

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