

CX30C
Mini Excavator

SERVICE MANUAL

Part number 51649415

English

August 2019

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CASE
CONSTRUCTION

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Torque - Standard torque settings

BOLT AND NUT

Use following table for unspecified torque.

Coarse thread

Bolt size	Wrench	8 t	10 t
M6 x 1.0	10 mm	8.34 – 12.26 N·m (6.15 – 9.04 lb ft)	11.12 – 17.08 N·m (8.20 – 12.60 lb ft)
M8 x 1.25	13 mm	19.66 – 29.42 N·m (14.50 – 21.70 lb ft)	26.44 – 40.27 N·m (19.50 – 29.70 lb ft)
M10 x 1.5	17 mm	39.18 – 58.84 N·m (28.90 – 43.40 lb ft)	53.96 – 81.35 N·m (39.80 – 60.00 lb ft)
M12 x 1.75	19 mm	72.54 – 109.82 N·m (53.50 – 81.00 lb ft)	96.13 – 154.56 N·m (70.90 – 114.00 lb ft)
M14 x 2.0	22 mm	119.58 – 162.70 N·m (88.20 – 120.00 lb ft)	164.05 – 221.00 N·m (121.00 – 163.00 lb ft)
M16 x 2.0	24 mm	183.04 – 246.76 N·m (135.00 – 182.00 lb ft)	246.76 – 334.89 N·m (182.00 – 247.00 lb ft)
M18 x 2.5	27 mm	253.54 – 343.02 N·m (187.00 – 253.00 lb ft)	344.38 – 466.40 N·m (254.00 – 344.00 lb ft)
M20 x 2.5	30 mm	355.22 – 479.96 N·m (262.00 – 354.00 lb ft)	482.67 – 653.50 N·m (356.00 – 482.00 lb ft)
M22 x 2.5	32 mm	473.18 – 620.96 N·m (349.00 – 458.00 lb ft)	645.37 – 961.27 N·m (476.00 – 709.00 lb ft)
M24 x 3.0	36 mm	612.83 – 828.40 N·m (452.00 – 611.00 lb ft)	833.83 – 1128.04 N·m (615.00 – 832.00 lb ft)
M30 x 3.0	46 mm	1217.52 – 1645.96 N·m (898.00 – 1214.00 lb ft)	1658.17 – 2245.23 N·m (1223.00 – 1656.00 lb ft)
M36 x 4.0	55 mm	1709.69 – 2310.31 N·m (1261.00 – 1704.00 lb ft)	2451.32 – 3039.74 N·m (1808.00 – 2242.00 lb ft)

Fine thread

Bolt size	Wrench	8 t	10 t
M 8 x 1.0	13 mm	21.56 – 33.35 N·m (15.90 – 24.60 lb ft)	29.42 – 43.12 N·m (21.70 – 31.80 lb ft)
M10 x 1.2	17 mm	44.06 – 65.76 N·m (32.50 – 48.50 lb ft)	57.89 – 87.31 N·m (42.70 – 64.40 lb ft)
M12 x 1.25	19 mm	76.47 – 113.75 N·m (56.40 – 83.90 lb ft)	103.99 – 157.27 N·m (76.70 – 116.00 lb ft)
M14 x 1.5	22 mm	130.43 – 177.61 N·m (96.20 – 131.00 lb ft)	176.26 – 235.91 N·m (130.00 – 174.00 lb ft)
M16 x 1.5	24 mm	195.24 – 264.38 N·m (144.00 – 195.00 lb ft)	260.32 – 352.51 N·m (192.00 – 260.00 lb ft)
M18 x 1.5	27 mm	280.65 – 427.08 N·m (207.00 – 315.00 lb ft)	376.92 – 509.79 N·m (278.00 – 376.00 lb ft)
M20 x 1.5	30 mm	391.83 – 530.12 N·m (289.00 – 391.00 lb ft)	523.35 – 707.74 N·m (386.00 – 522.00 lb ft)
M22 x 1.5	32 mm	516.57 – 699.60 N·m (381.00 – 516.00 lb ft)	692.82 – 938.23 N·m (511.00 – 692.00 lb ft)
M24 x 2.0	36 mm	665.71 – 901.62 N·m (491.00 – 665.00 lb ft)	892.13 – 1206.68 N·m (658.00 – 890.00 lb ft)
M30 x 2.0	46 mm	1342.26 – 1815.44 N·m (990.00 – 1339.00 lb ft)	1781.54 – 2435.05 N·m (1314.00 – 1796.00 lb ft)
M36 x 3.0	55 mm	1884.59 – 2548.94 N·m (1390.00 – 1880.00 lb ft)	2567.92 – 3473.61 N·m (1894.00 – 2562.00 lb ft)

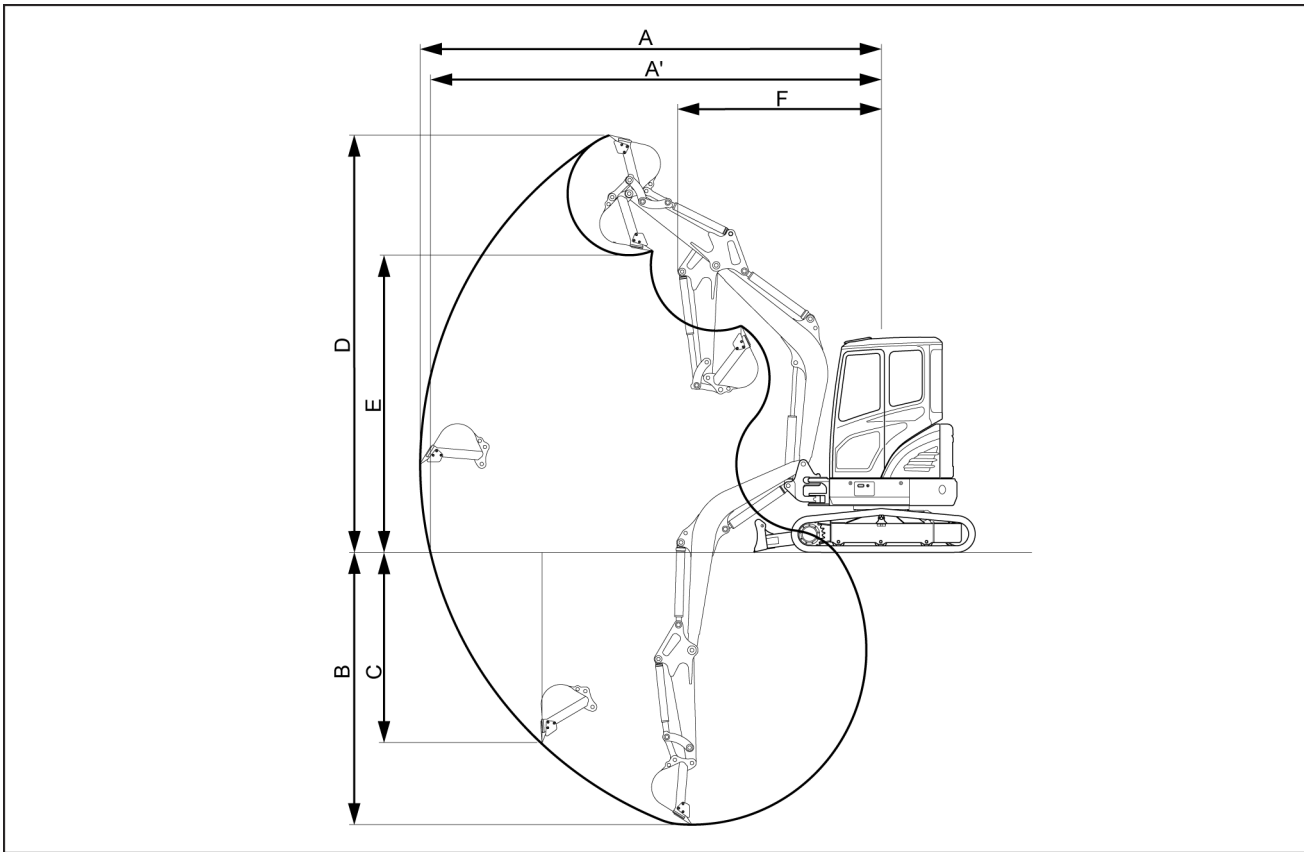
Pipe and hose (FLARE type)

Thread size (PF)	Wrench	Torque
1/4"	19 mm	39.18 N·m (28.90 lb ft)
3/8"	22 mm	49.08 N·m (36.20 lb ft)
1/2"	27 mm	93.14 N·m (68.70 lb ft)
3/4"	36 mm	176.26 N·m (130.00 lb ft)
1"	41 mm	206.08 N·m (152.00 lb ft)
1-1/4"	50 mm	343.02 N·m (253.00 lb ft)

Pipe and hose (ORFS type)

Thread size (UNF)	Wrench	Torque
9/16-18	19 mm	39.18 N·m (28.90 lb ft)
11/16-16	22 mm	49.08 N·m (36.20 lb ft)
13/16-16	27 mm	93.14 N·m (68.70 lb ft)

Working range



SMIL16MEX0049FA 3

(A) Maximum digging reach		4650 mm (183.1 in)
(A') Maximum digging reach on ground		4515 mm (177.8 in)
(B) Maximum digging depth		2500 mm (98.4 in)
(C) Maximum vertical wall digging depth		2085 mm (82.1 in)
(D) Maximum digging height		4270 mm (168.1 in)
(E) Maximum dumping height		2890 mm (113.8 in)
(F) Minimum swing radius		2055 mm (80.9 in)
Boom swing radius (left-hand/right-hand)		75° / 50°
Bucket digging force	SAE	17.9 kN (4024.1 lb)
	ISO	20.1 kN (4518.7 lb)
Arm crowd force	SAE	13.1 kN (2945.0 lb)
	ISO	13.7 kN (3079.9 lb)

Boom length: **1.945 m (76.575 in)**

Arm length: **1.120 m (44.094 in)**

With boom swing post

General specification

Biodiesel usage in CASE CONSTRUCTION products

Introduction to Fatty Acid Methyl Ester (FAME) biodiesel

FAME biodiesel, called biodiesel fuel in the following section, consists of a family of fuels derived from vegetable oils treated with methyl esters.

There are two main biodiesel fuel types: Rapeseed Methyl Ester (RME) and Soybean Methyl Ester (SME). RME is a blend of rapeseed and sunflower methyl ester, and is the preferred crop in Europe. SME is the preferred crop in the United States.

Biodiesel fuel is a renewable alternative fuel source. Its use and development is promoted worldwide, especially in Europe and in the United States.

NOTICE: *Your emissions control system is compatible with up to 7% biodiesel fuel (B7). Be aware that the use of biodiesel fuel that does not comply with the standards mentioned in this section could lead to severe damage to the engine, fuel system or after treatment system of your machine. The use of non-approved fuels may void CASE CONSTRUCTION Warranty coverage.*

Biodiesel can be used to run Stage IV diesel engines only when blended with standard diesel fuel:

- B7: indicates the blend of 7% biodiesel and 93% diesel fuels.

NOTICE: *Never use biodiesel blends higher than B7.*

Biodiesel fuel has several positive features in comparison with diesel fuel:

- Biodiesel adds lubricity to the fuel, which is beneficial in many circumstances, particularly as sulfur and aromatics are removed from the fuel.
- Biodiesel has a greater cetane number and burns cleaner.
- Biodiesel produces less particulate matter and reduces smoke emissions.
- Biodiesel is fully biodegradable and non-toxic.

Diesel and biodiesel fuel specifications

Stage IV diesel fuel specifications are covered by the following:

- **EN 590** - Specification of Diesel fuel. (10 ppm sulfur maximum.)

Biodiesel blends are covered by:

- European Diesel Fuel Specification **EN 590** allows up to 7% biodiesel since 2009. European fuel suppliers are allowed to use up to 7% biodiesel fuel (B7) to supply the network.

Pure biodiesel blend stock (B100) specification is covered by the following requirements:

- Europe: **EN14214** - Automotive fuels. Fatty Acid Methyl Ester (FAME) for diesel engines. Requirements and test methods.
- **DIN V 51606** - German standard for biodiesel.

Before raw oil can be converted into usable biodiesel fuel, it must undergo transesterification to remove glycerides. During the transesterification process, the oil reacts with an alcohol to separate the glycerine from the fat or vegetable oil. This process leaves behind two products: methyl ester (the chemical name for biodiesel) and glycerine (a byproduct usually sold for use in soaps or other products).

NOTICE: *Biodiesel fuels approved for use in the CASE CONSTRUCTION equipment must be transesterified and comply with the European Standard **EN14214** or the German standard **DIN V 51606**.*

NOTICE: *Cold Pressed Biodiesel, Cold Pressed Oil, Straight Vegetable Oil (SVO), or more generally unrefined vegetable oils used as motor fuel, are fuels that are normally made from Rapeseed oil or similar high oil content crops. These kinds of fuel are not transesterified, so they do not fulfil the **EN14214** requirements. There is no recognized quality standard available for these types of fuel. Therefore the use of Cold Pressed Biodiesel, Cold Pressed Oil,*

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DIAGNOSTIC

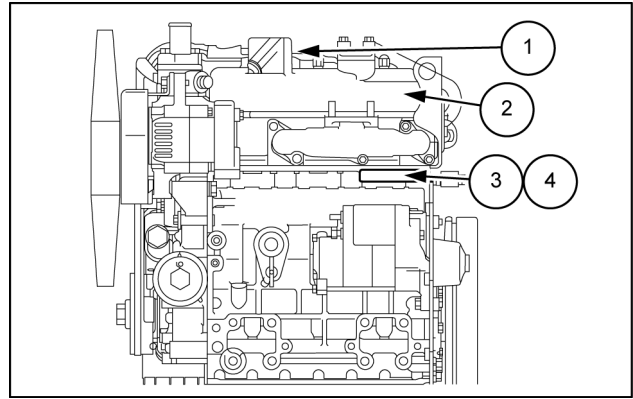
Engine

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Engine - Identification

You must identify engine model name and serial number before you start servicing.

1. Engine label
2. Emission label
3. Engine model
4. Serial number



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Engine series

Number	Series	Number	Series
1	05 series (include: WG)	5	Air cooled gasoline
2	V3 series	6	GZ, OC, AC, EA and E series
3	08 series	7	03 series
4	SM series (include: WG)	8	07 series

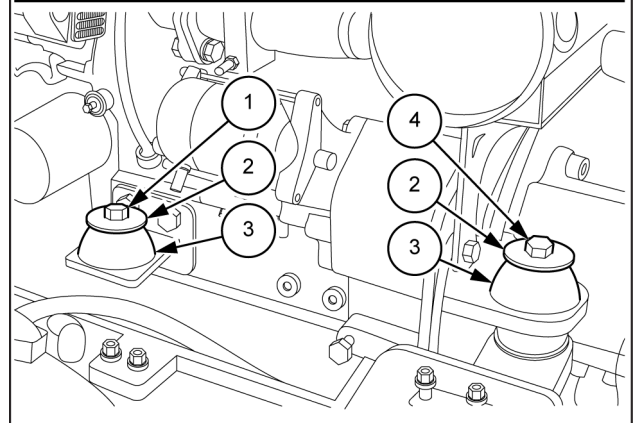
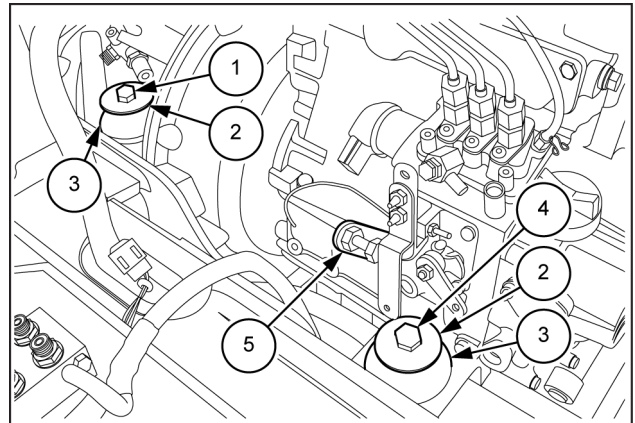
Year of manufacture

Alphabet or Number	Year	Alphabet or Number	Year
1	2001	F	2015
2	2002	G	2016
3	2003	H	2017
4	2004	J	2018
5	2005	K	2019
6	2006	L	2020
7	2007	M	2021
8	2008	N	2022
9	2009	P	2023
A	2010	R	2024
B	2011	S	2025
C	2012	T	2026
D	2013	V	2027
E	2014		

3. Install the silent blocks (3) and the washers (2).
4. Use a box wrench [19 mm] to install the bolts (1) and (4).

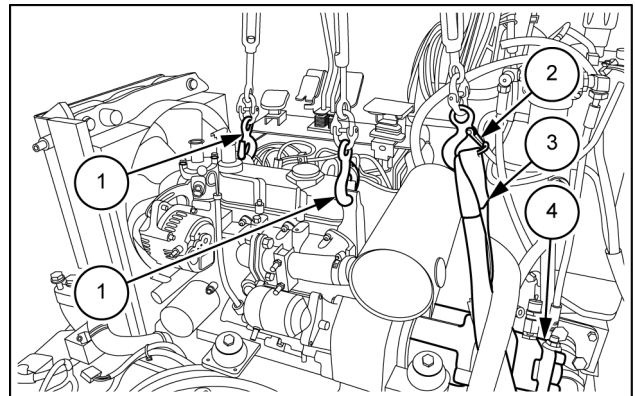
Tightening torque for bolts (1) and (4) installation:
118 – 137 N·m (87 – 101 lb ft)

NOTICE: if removed, install the bracket (5).



SMIL16MEX2866BB 2

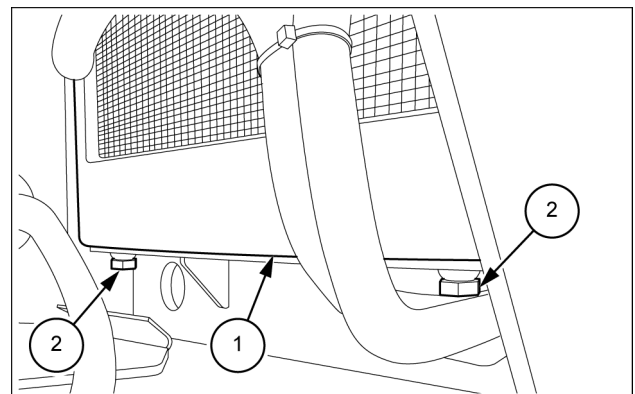
5. Remove the two hooks (1) from the engine lift bracket.
6. Remove the lift strap (3) from the hook (2) and the pump (4).



SMIL16MEX2865AB 3

7. Use a wrench [19 mm] to tighten the two bolts (2) of the radiator (1).

Tightening torque for bolts (2) installation:
96.8 – 145.2 N·m (71.4 – 107.1 lb ft)



SMIL16MEX2864AB 4

Correcting cylinder

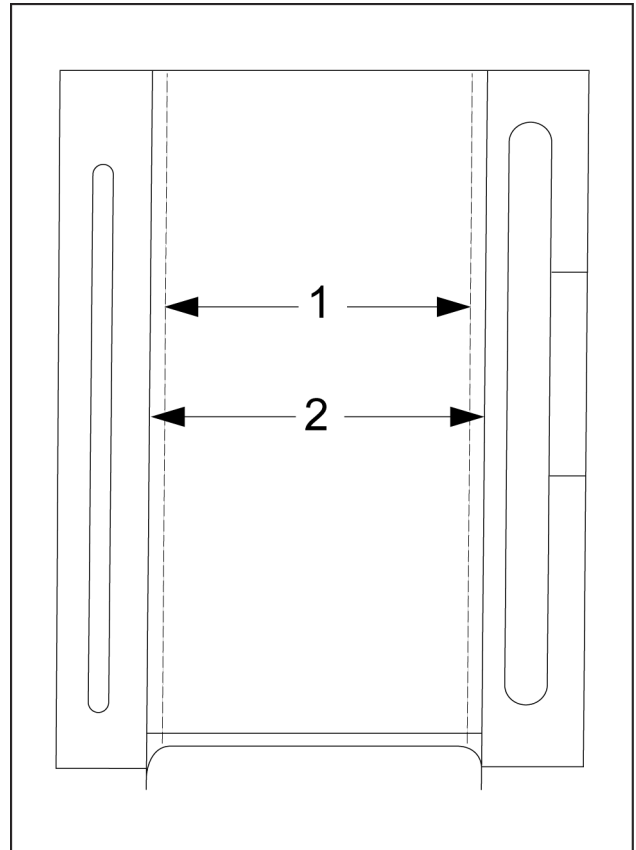
- When the cylinder is worn beyond the allowable limit, bore and hone it to the specified dimension.

Oversized cylinder liner inner diameter	Factory specification	78.500 – 78.519 mm (3.0906 – 3.0913 in)
	Allowable limit	78.650 mm (3.096 in)
Finishing	Hone to 1.2 to 2.0 µm R max. (48 to 78 µin. R max.)	

- Replace the piston and piston rings with oversize one.
Oversize: **0.5 mm (0.02 in)**

NOTE: when the oversize cylinder is worn beyond the allowable limit, replace the cylinder block with a new one.

- Cylinder inner diameter (before correction)
- Cylinder inner diameter (Oversize)



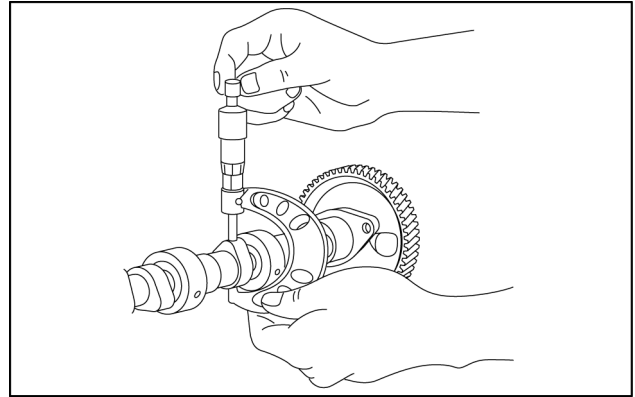
SMIL16MEX0888BB 3

Cam height

1. Measure the height of the cam at its highest point with an outside micrometer.
2. If the measurement is less than the allowable limit, replace the camshaft.

Cam height of intake	Factory specification	28.80 mm (1.134 in)
	Allowable limit	28.75 mm (1.132 in)

Cam height of exhaust	Factory specification	29.00 mm (1.142 in)
	Allowable limit	28.95 mm (1.140 in)



SMIL16MEX0862AA 5

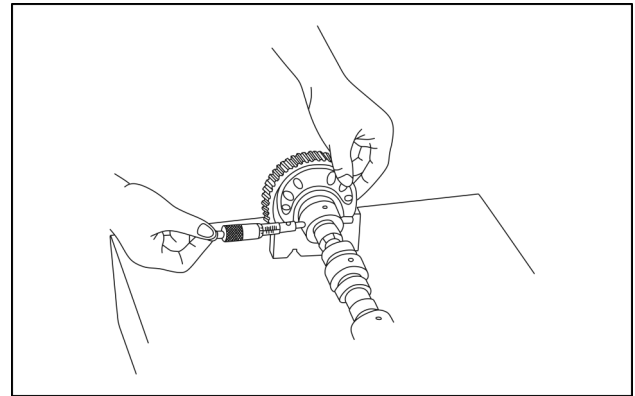
Oil clearance of camshaft journal

1. Measure the camshaft journal outer diameter with an outside micrometer.
2. Measure the cylinder block bore inner diameter for camshaft with a cylinder gauge, and calculate the oil clearance.
3. If the oil clearance exceeds the allowable limit, replace the camshaft.

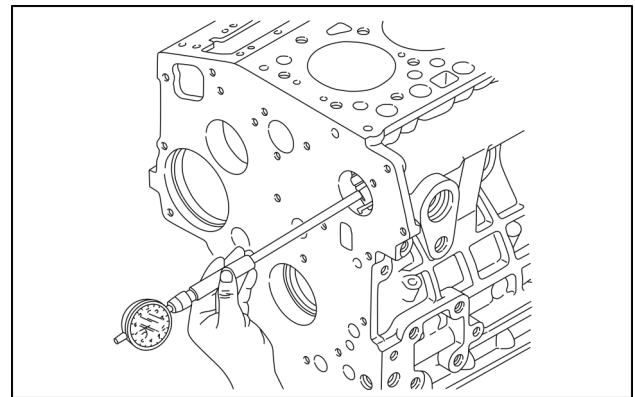
Oil clearance of camshaft journal	Factory specification	0.050 – 0.091 mm (0.0020 – 0.0036 in)
	Allowable limit	0.15 mm (0.0059 in)

Camshaft journal outer diameter	Factory specification	35.934 – 35.950 mm (1.4147 – 1.4154 in)
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Camshaft bearing inner diameter (Cylinder block bore inner diameter)	Factory specification	36.000 – 36.025 mm (1.4173 – 1.4183 in)
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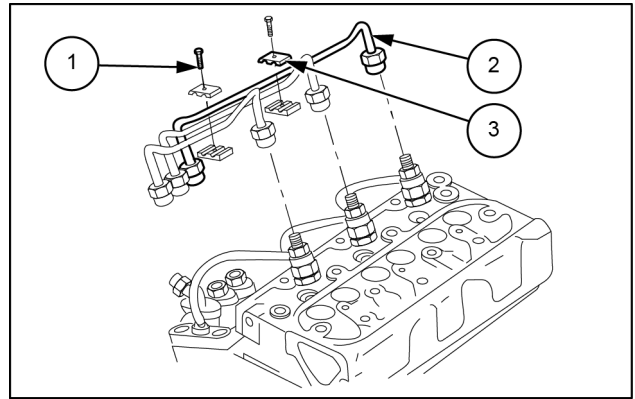
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SMIL16MEX0864AA 7

Injection pipes

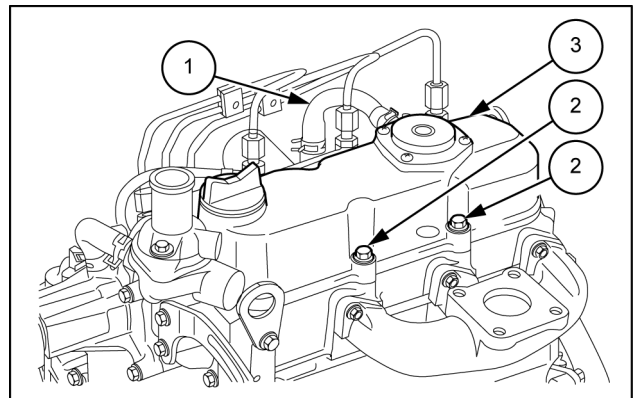
1. Send compressed air into the pipes **(2)** to blow out dust.
2. Install the injection pipes **(2)**.
Tightening torque of the Injection pipe retaining nut: **25 – 34 N·m (18 – 25 lb ft)**
3. Install the clamps **(3)** by means of the screws **(1)**.



SMIL16MEX0783AB 10

Cylinder head cover

1. Install the cylinder head cover **(3)**.
NOTE: check that the cylinder head cover gasket is not damaged.
2. Install the cylinder head cover screws **(2)**.
Tightening torque : **9.81 – 11.2 N·m (7.23 – 8.26 lb ft)**
3. Connect the breather hose **(1)**.

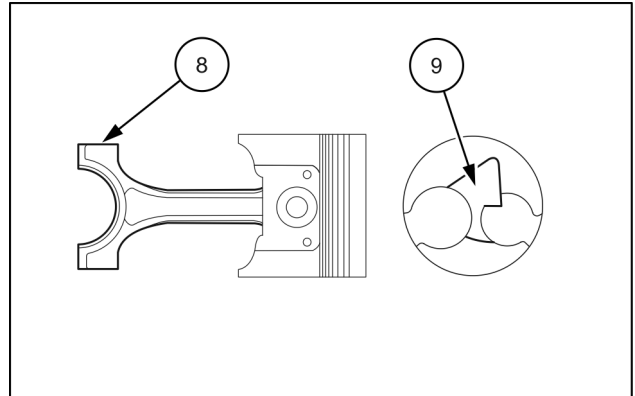


SMIL16MEX0782AB 11

Connecting rods and pistons - Assemble

Piston ring and connecting rod

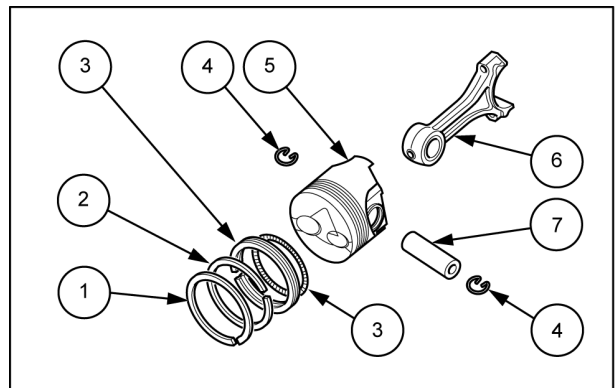
1. Immerse the piston (5) in 80 °C (176 °F) oil for 10 – 15 min.
2. Align the mark (8) on the connecting rod to the fan-shaped concave (9).



SMIL16MEX0821AB 1

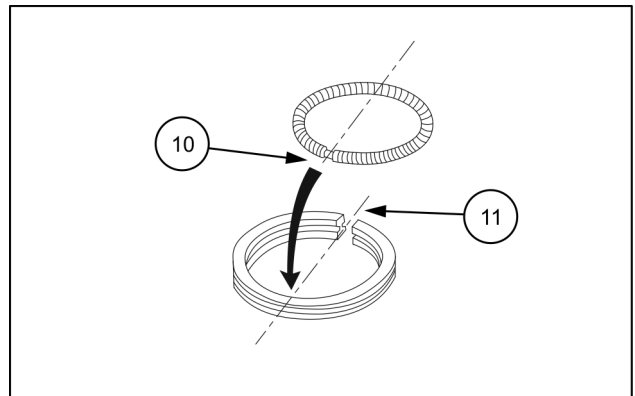
3. Apply engine oil to the piston pin (7).
4. Assemble the connecting rod (6) and the piston (5), by means of the piston pin (7) and relevant piston pin snap rings (4).

NOTE: assemble pistons (5) and connecting rods (6) marked with the same number during disassemble procedure.



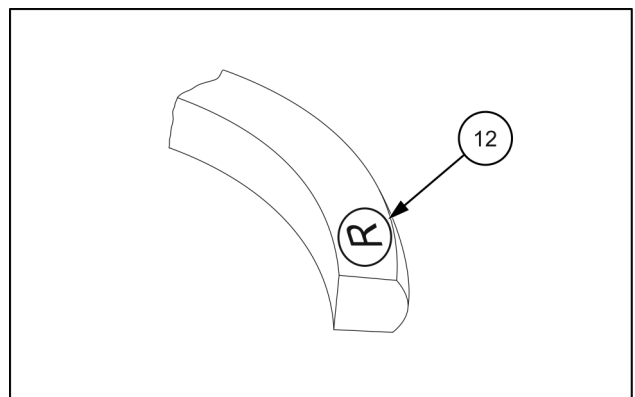
SMIL16MEX0820AB 2

5. Place the expander joint (10) on the opposite side of the oil ring gap (11), and install the oil ring (3) onto the piston (5).



SMIL16MEX0822AB 3

6. By means of a piston ring tool, assemble the rings (1), (2), and (3) so that the manufacturer's mark (12) near the gap faces the top of the piston.

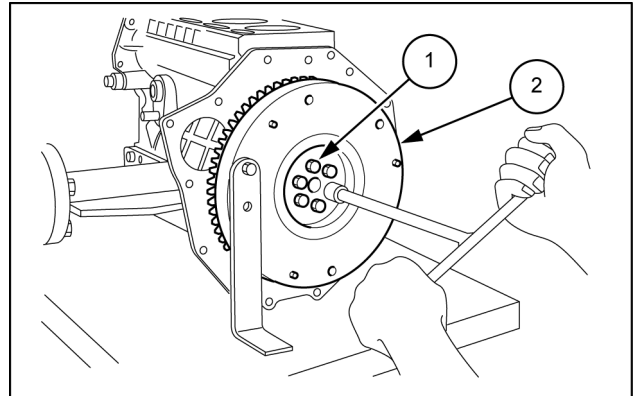


SMIL16MEX0823AB 4

Crankshaft and flywheel - Disassemble

Flywheel

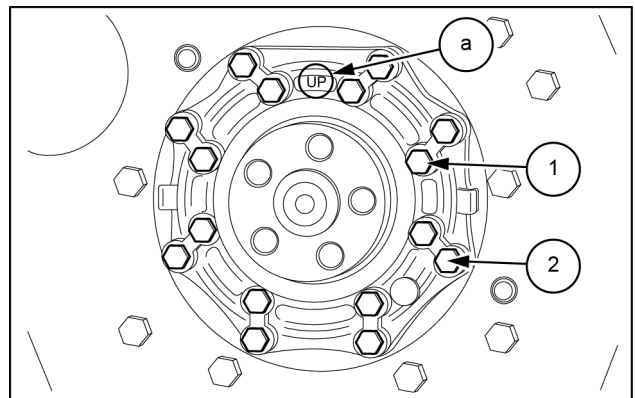
1. Use a flywheel stopper in order to secure the flywheel **(2)** and keep it from turning.
2. Remove all flywheel screws **(1)** and then remove the flywheel **(2)**.



SMIL16MEX0824AB 1

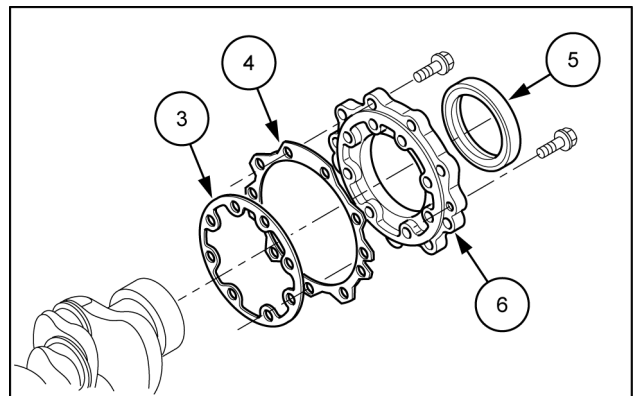
Bearing case cover

1. Remove the bearing case cover mounting long **(1)** and short **(2)** screws.



SMIL16MEX0826AB 2

2. Remove the bearing case cover **(6)**.
 3. Bearing case gasket
 4. Bearing case cover gasket
 5. Oil seal



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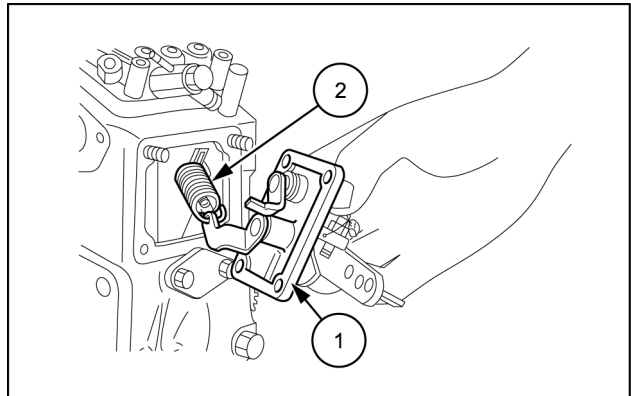
Throttle linkage - Install - Speed control plate

1. Install the speed control plate (1).

NOTICE: apply a liquid gasket (Three Bond 1215 or equivalent) to both sides of the solenoid cover gasket and control plate gasket.

NOTICE: be careful not to drop the governor spring (2) into the crankcase.

2. Install the engine stop solenoid (without R24 model).



SMIL16MEX0805AB 1

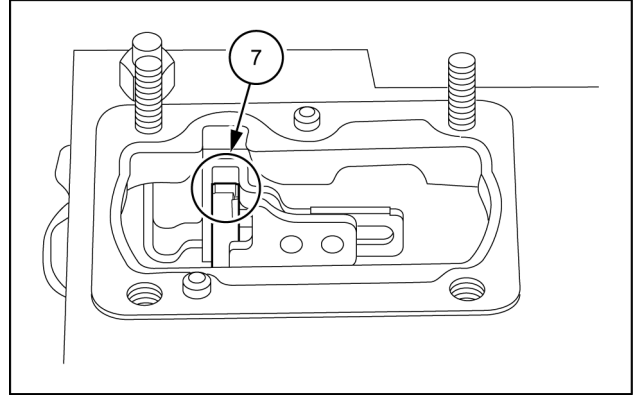
Injection pump - Install

1. Install the injection pump shims.

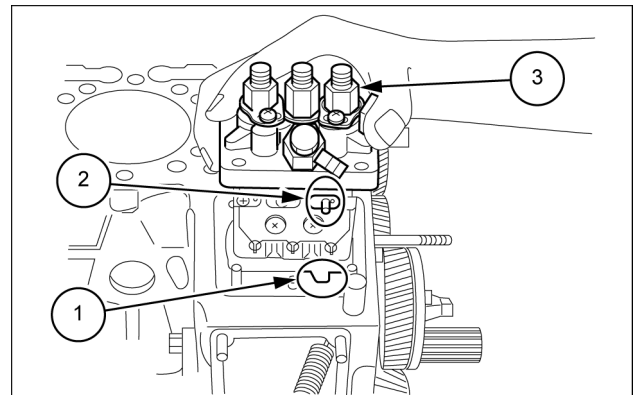
NOTICE: addition or reduction of shim **0.05 mm (0.0020 in)** delays or advances the injection timing by approximately **0.0087 rad (0.5°)**.

NOTICE: be sure to use the same number or new gasket shims with the same thickness.

2. Insert the control rack pin (2) firmly into the groove (7) of the thrust lever of fork lever.
3. Align the control rack pin (2) with the notch (1) on the crankcase, and install the injection pump (3).
4. Connect the start spring (4) on the thrust lever side (5).



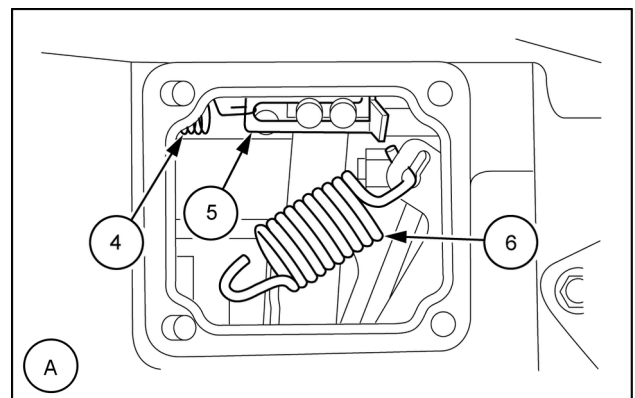
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SMIL16MEX0806AB 2

A. Basic model

6. Governor Spring



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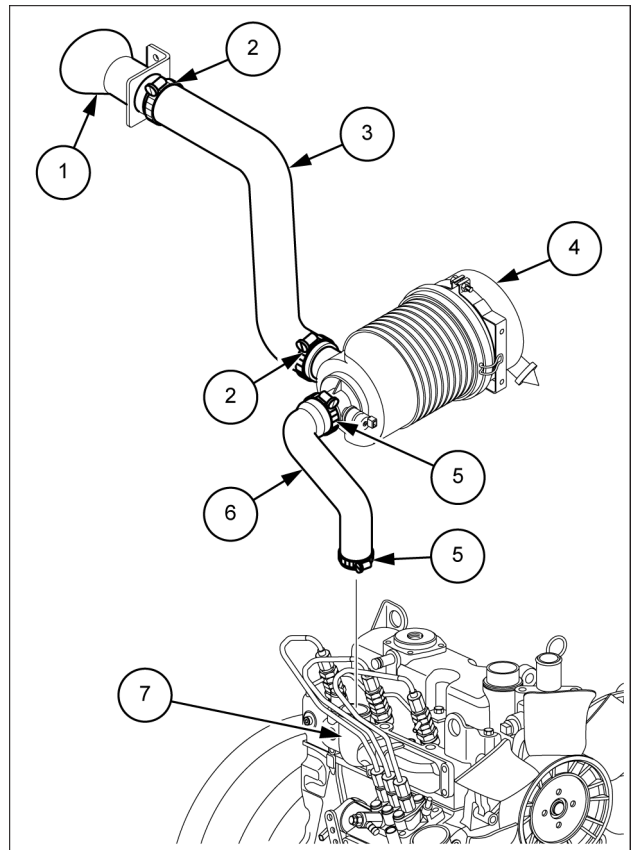
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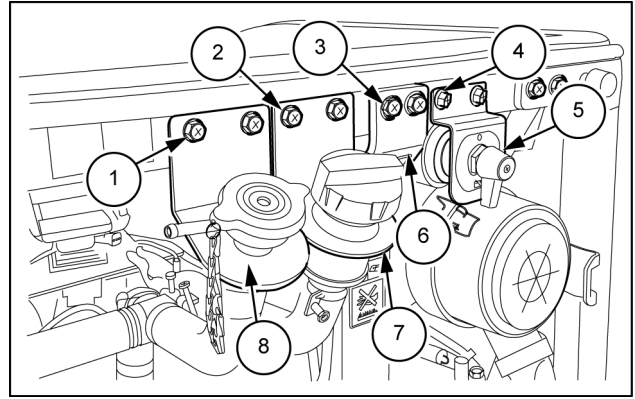
1. Loosen the clamps (2).
2. Remove the intake air hose (3) with the clamps (2) from the external air inlet (1), and the air cleaner (4).
3. Replace with a new intake air hose (1), and new clamps (2).
4. Tighten the clamps (2).
5. Loosen the clamps (5).
6. Remove the intake air hose (6) with the clamps (5) from the air cleaner (4), and the intake manifold (7).
7. Replace with a new intake air hose (6), and new clamps (5).
8. Tighten the clamps (5).

NOTE: to prevent serious damage to the engine, keep out any dust inside the intake air line.



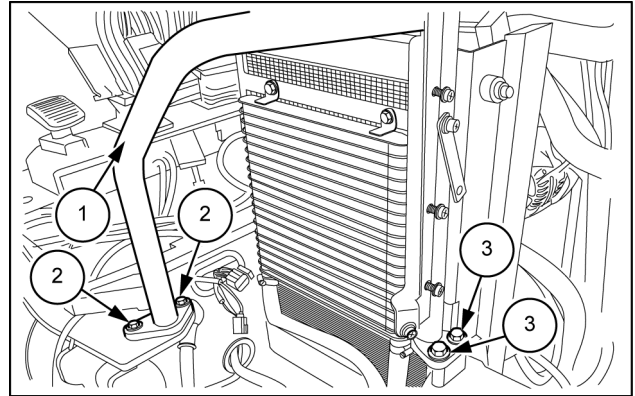
SMIL16MEX3060BB 1

10. Use a wrench [**13 mm**] to remove the two bolts (1) of the coolant filling hose bracket (8).
11. Use a wrench [**13 mm**] to remove the two bolts (2) of the engine oil filling hose bracket (7).
12. Use a wrench [**13 mm**] to remove the two bolts (3) of the bracket (6).
13. Use a wrench [**13 mm**] to remove the two bolts (4) of the battery connect and disconnect switch (5).



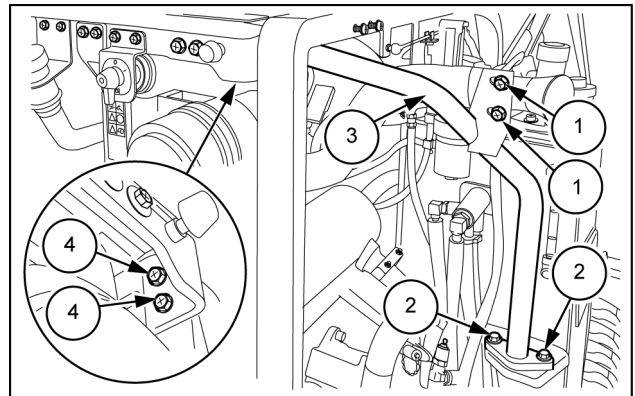
SMIL16MEX2845AB 3

14. Use a wrench [**19 mm**] to remove the bolts (2) and the bolts (3) of the cab support bracket (1).



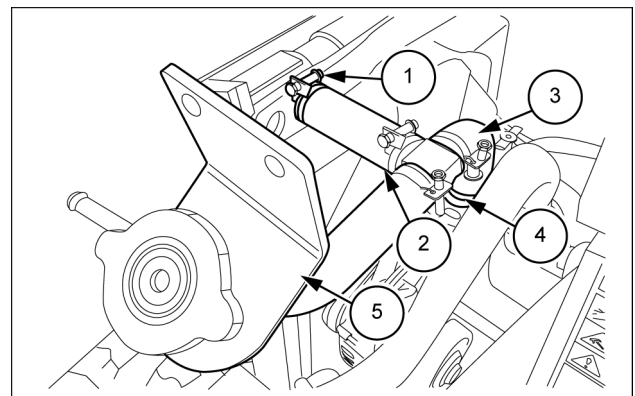
SMIL16MEX2846AB 4

15. Use a wrench [**13 mm**] to remove the bolts (1) of the air cleaner inlet hose.
16. Use a wrench [**19 mm**] to remove the bolts (2) of the cab support bracket (3).
17. Use a wrench [**13 mm**] to remove the bolts (4) of the cab support bracket (3).
18. Remove the cab support bracket (1).



SMIL16MEX2847AB 5

19. Loosen the clamp (1) to remove the hose (2) from the radiator.
20. Loosen the clamp (4) to remove the hose (3) from the cylinder head cover.
21. Remove the coolant filling assembly (5) .



SMIL16MEX2848AB 6

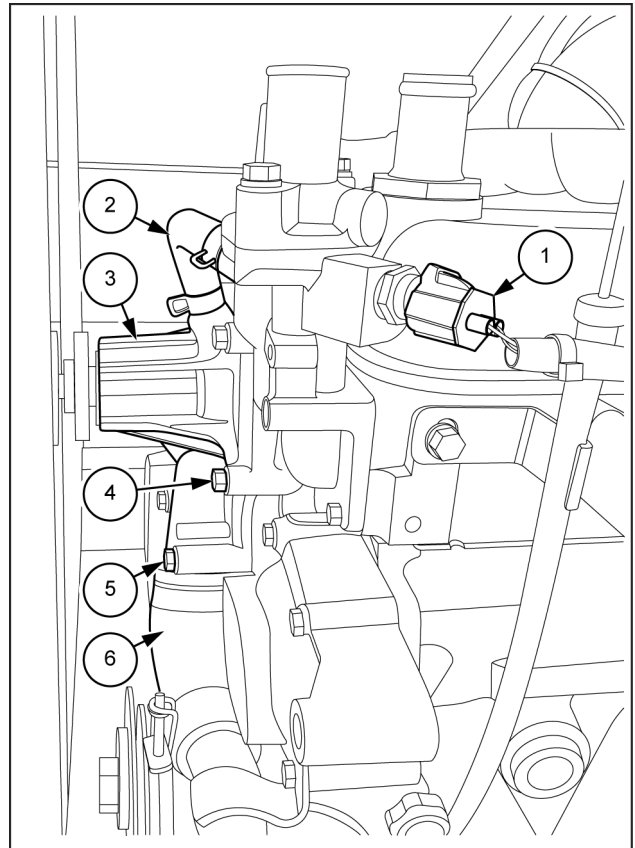
Water pump - Install

NOTICE: use new gasket.

1. Install the new gasket and the water pump (2) to the engine.
2. Use a wrench [10 mm] to install the four bolts (3), and the two bolts (4).

NOTICE: the bolts (3) and (4) have different lengths.

3. Install the cooling hose (1) to the water pump (2).
4. Install the cooling hose (5) to the water pump (2).

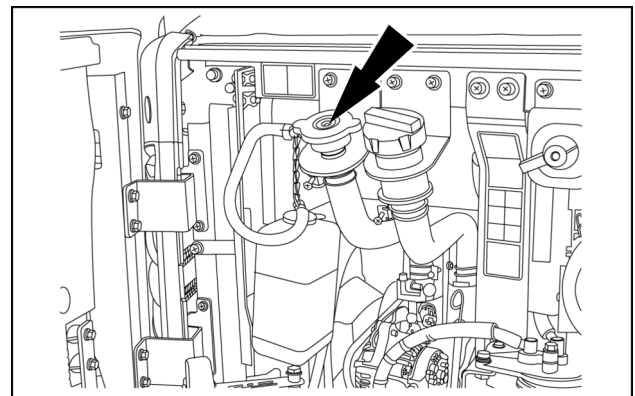


SMIL16MEX3042BB 1

5. Install the engine fan (refer to **Fan - Install (10.414)**).
6. Fill the cooling system with the specified coolant.

NOTE: the system has a maximum fill rate of 14 L/min (3.7 US gpm). Do not exceed this fill rate.

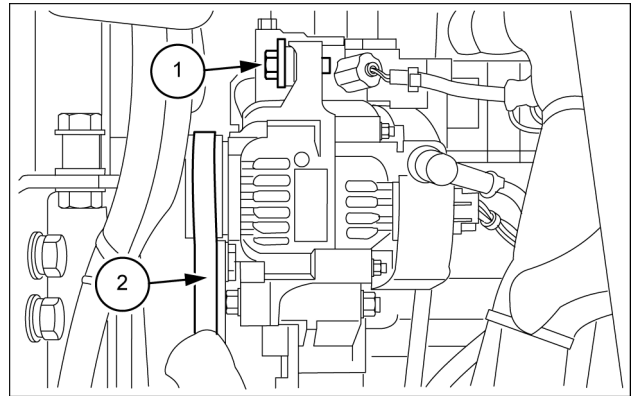
7. The system must be filled slowly to prevent air locks. Supply coolant up to the FULL mark of the expansion tank.
8. During filling, air must be vented from the engine coolant passage.
9. Install the coolant filling cap.
10. Start the engine until it reaches a temperature of 80 °C (176 °F), and check for coolant leaks.
11. Check the coolant level again to make sure the system is full of coolant.



SMIL19MEX0453AA 2

Belt - Install

1. Pass the belt through the blades of the fan and the radiator.
2. Install the belt (**2**) to the alternator pulley, engine fan pulley and engine shaft pulley.
3. Use a wrench [**17 mm**] to tighten the bolt (**1**).
4. Adjust the belt tension (refer to **Belt - Inspect (10.414)**).



SMIL16MEX2830AB 1



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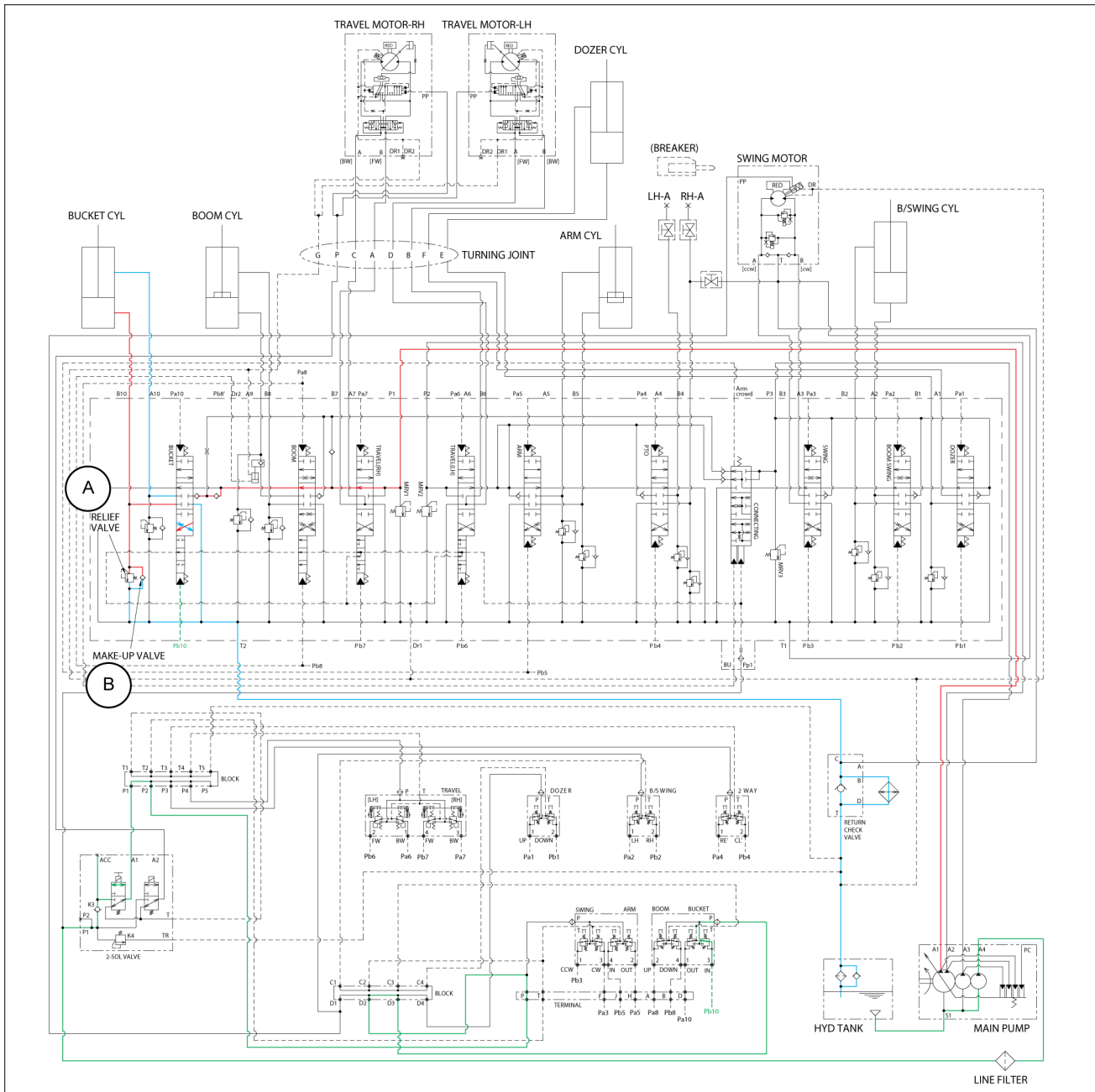
Hydraulic systems - Hydraulic schema

- | | | | |
|------|---|-------|--|
| 1. | Main pump | 16. | Return check valve |
| 2-1. | Main control valve | 17. | Return filter |
| 3. | Swing motor | 18. | Suction strainer |
| 4. | Travel motor (quantity 2) | 19. | Hydraulic oil tank |
| 5-1. | Remote control valve lever (left-hand) | 20. | Stop valve (left-hand) |
| 6-1. | Remote control valve lever (right-hand) | 21. | Stop valve (right-hand) |
| 7. | Safety solenoid valve | 22. | Remote control valve pedal (boom swing/2-way option)
(quantity 2) |
| 8. | Hydraulic swivel | 23. | Remote control valve pedal/lever (travel) |
| 9. | Bucket cylinder | 24. | Remote control valve lever (dozer) |
| 10. | Boom cylinder | 25. | 3-way valve (hammer/shears selector valve) |
| 11. | Blade lifting cylinder | 29. | Block P |
| 12. | Dipper cylinder | 30. | Block |
| 13. | Boom swing cylinder | 31-1. | Terminal |
| 14. | Line filter | 34. | Last guard filter (quantity 6) |
| 15. | Oil cooler | | |

Hydraulic systems - Hydraulic schema - Bucket circuit

Bucket roll in circuit

When the right control lever is pulled left, the bucket spool in the main control valve is moved to the roll in position by the pilot oil pressure from the remote control valve. The oil from the A1 pump flows into the main control valve and then goes to the large chamber of bucket cylinder. At the same time, the oil from the small chamber of bucket cylinder returns to the hydraulic oil tank through the boom spool in the main control valve. When this happens, the bucket rolls in. The excessive pressure in the bucket cylinder bottom side is prevented by relief valve **(A)**. The cavitation which will happen to the bottom of the bucket cylinder is also prevented by the make-up valve **(B)** in the main control valve.



SMIL17MEX2597GB 1

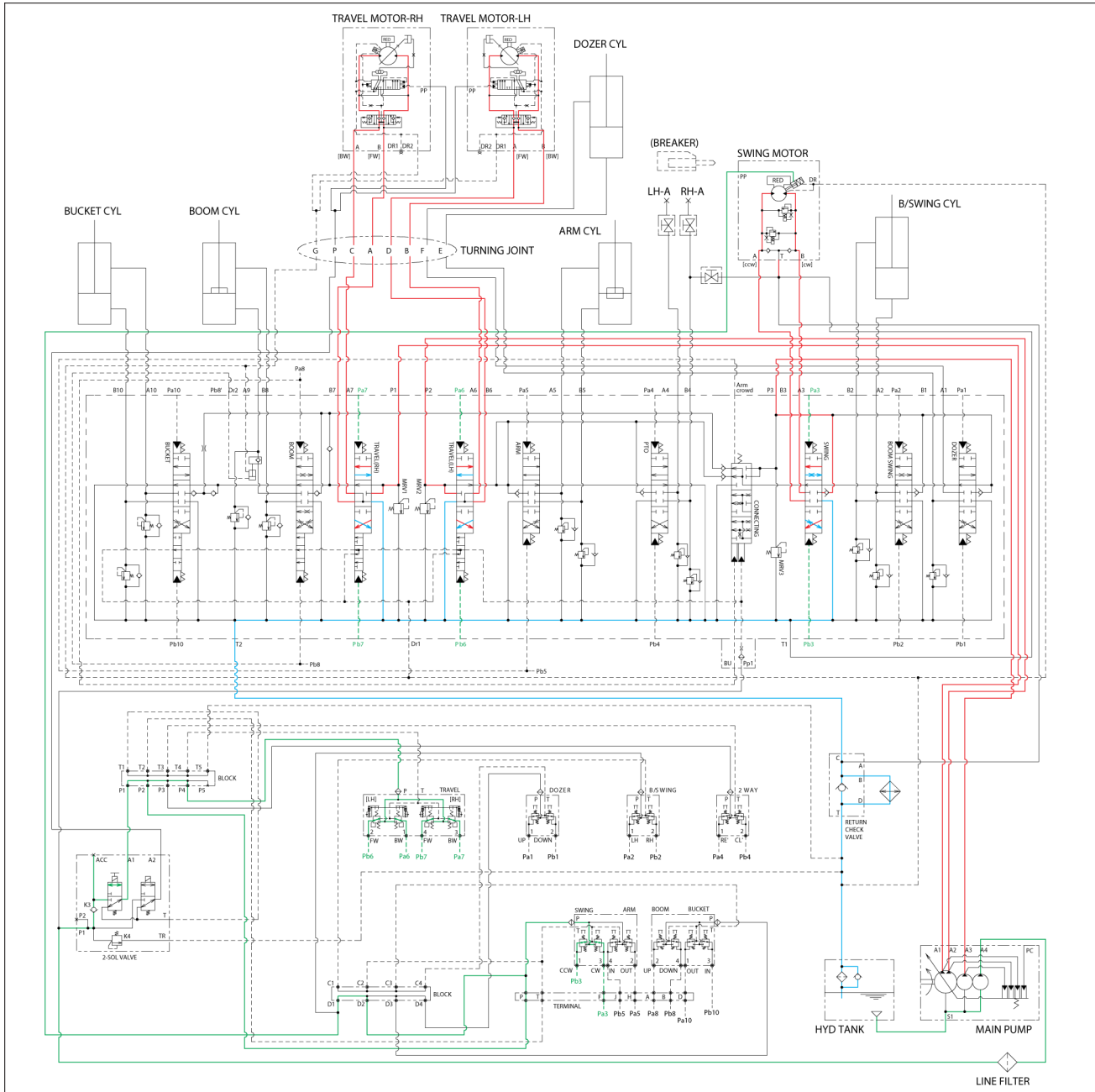
- Pressure line
- Tank line
- Pilot pressure line
- - - Secondary pilot pressure line

A. Relief valve

B. Make-up valve

Combined swing and travel circuits

When the swing and travel functions are operated simultaneously, the swing spool and travel spools in the main control valve are moved to the functional position by the pilot oil pressure from the remote control valve. The oil from the A3 pump flows into the swing motor through the swing spool. The oil from the A1 pump flows into the right-hand travel motor through the right-hand travel spool. The oil from the A2 pump flows into the left-hand travel motor through the left-hand travel spool. The superstructure swings and the machine travels straight.



SMIL17MEX2680GB 6

- Pressure line
- Pilot pressure line
- Tank line
- - - Secondary pilot pressure line

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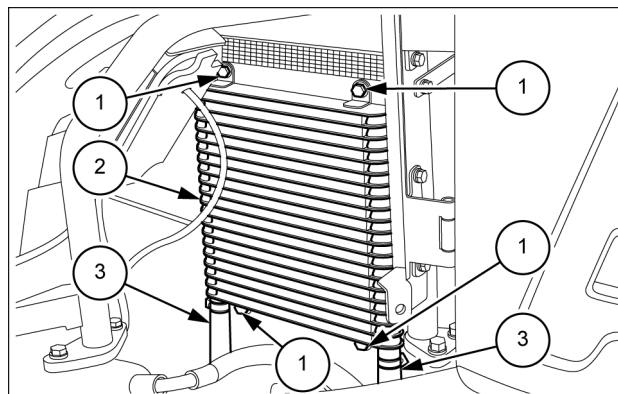
Oil cooler/Heat exchanger - Install

NOTICE: for bolts for which the torque is not specified, see *Torque - Standard torque settings ()* .

1. Install the hydraulic oil cooler (2).
2. Use a wrench [17 mm] to install the bolts (1) of the hydraulic oil cooler (2).

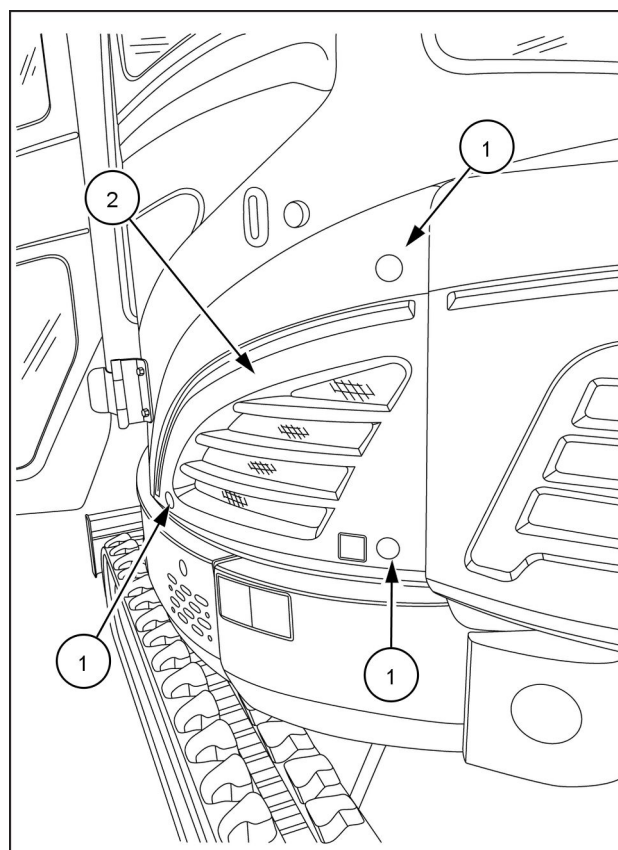
Tightening torque for bolts (1) installation:
54.0 – 81.4 N·m (39.8 – 60.0 lb ft)

3. Install the hoses (3) and tighten the clamps.



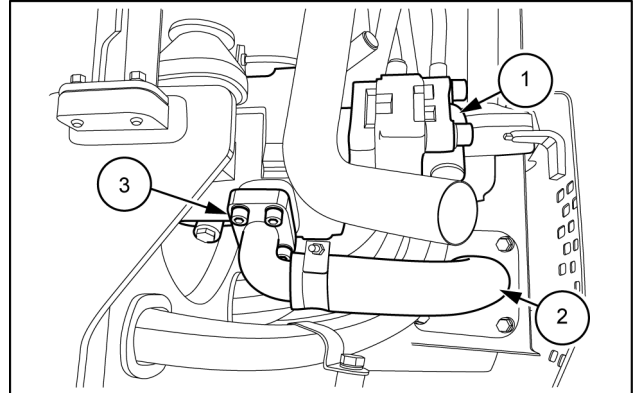
SMIL16MEX3027AB 1

4. Install the left side battery shield (2).
5. Use a wrench [13 mm] to tighten the three bolts, and then insert the protective caps (1).
6. Refill the hydraulic oil circuit with the recommended hydraulic oil.

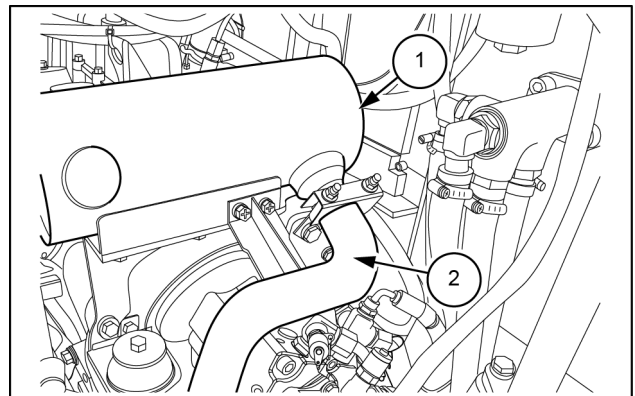


SMIL16MEX1286BA 2

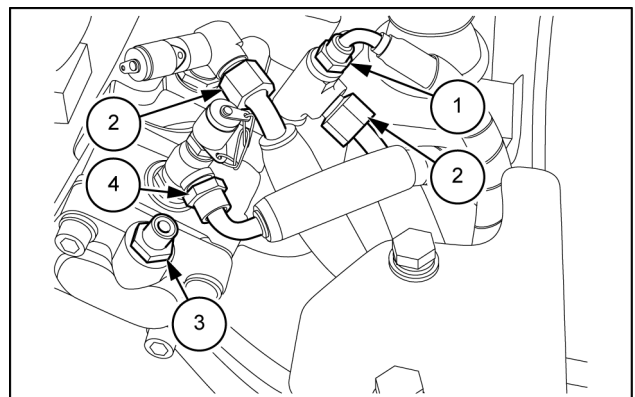
1. Set the battery disconnect switch to O position (OFF position) to cut off any power supply in the electrical system of the machine (refer to **Mechanical battery isolator - Dynamic description (55.302)**).
2. Remove the side hood (refer to **Hood - Remove (90.100)**).
3. Remove the counterweight (refer to **Counterweight - Remove (39.140)**).
4. Drain the hydraulic oil.
5. Use a hexagon wrench [**8 mm**] to remove the four bolts (**3**) and disconnect the suction pipe (**2**) from the pump (**1**).



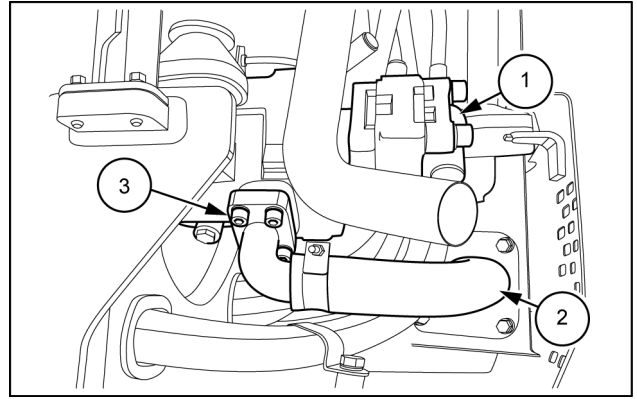
6. Remove the exhaust pipe (**2**) from the muffler (**1**).



7. Use a wrench [**22 mm**] to disconnect the hose (**3**).
8. Use a wrench [**22 mm**] to disconnect the hose (**4**).
9. Use a wrench [**24 mm**] to disconnect the hoses (**2**).
10. Use a wrench [**19 mm**] to disconnect the hose (**1**).
 - Mark the pump and hoses so that the connectors match at the time of assembly.
 - Use caps and plugs to cover the pump and hoses to prevent any entry of water, dust or dirt.
 - Clean the pump and hoses by spraying them with a parts cleaner to prevent scratches and prevent dirt from accumulating on the connectors.



10. Use a hexagon wrench [**8 mm**] to tighten the four bolts (**3**) and then install the suction pipe (**2**) to the pump (**1**).
11. Refill the hydraulic oil circuit with the recommended hydraulic oil.



SMIL16MEX2824AB 4

12. Install the counterweight (refer to **Counterweight - Install (39.140)**).
13. Install the side hood (refer to **Hood - Install (90.100)**).

Hydraulic systems - Main control valve

Port	Port name	Port size	Tightening torque	Port	Port name	Port size	Tightening torque
P1	(A1) pump port	PF 1/2	59 – 69 N·m (44 – 51 lb ft)	A10	Bucket out port	PF 3/8	39 – 49 N·m (29 – 36 lb ft)
P2	(A2) pump port			B10	Bucket in port		
T1	Tank return port			PF 3/8	39 – 49 N·m (29 – 36 lb ft)	Pa1	Dozer down pilot port
T2	Tank return port	Pb1	Dozer up pilot port				
P3	P3 (A3) pump port	Pa2	Boom swing (right-hand) pilot port				
A1	Center joint F port	Pb2	Boom swing (left-hand) pilot port				
B1	Center joint E port	Pa3	Swing (right-hand) pilot port				
A2	Boom swing (right-hand) port	Pb3	Swing (left-hand) pilot port				
B2	Boom swing (left-hand) port	Pa4	Auxiliary (Aux) 2-way				
A3	Swing (left-hand) port	Pb4	Auxiliary (Aux) 2-way				
B3	Swing (right-hand) port	Pa5	Arm out pilot port				
A4	Option port	Pb5	Arm in pilot port				
B4	Option port	Pa6	Travel [left-hand/rearward] pilot port				
A5	Arm out port	Pb6	Travel [left-hand/forward] pilot port				
B5	Arm in port	Pa7	Travel [right-hand/rearward] pilot port				
A6	Travel [left-hand/rearward] port	Pb7	Travel [right-hand/forward] pilot port				
B6	Travel [left-hand/forward] port	Pa8	Boom up pilot port				
A7	Travel [right-hand/rearward] port	Pb8	Boom down pilot port				
B7	Travel [right-hand/forward] port	Pb8'	Holding valve release signal				
A9	Boom up port	Pa10	Bucket out pilot port				
B8	Boom down port	Pb10	Bucket in pilot port				

ARM

Arm in

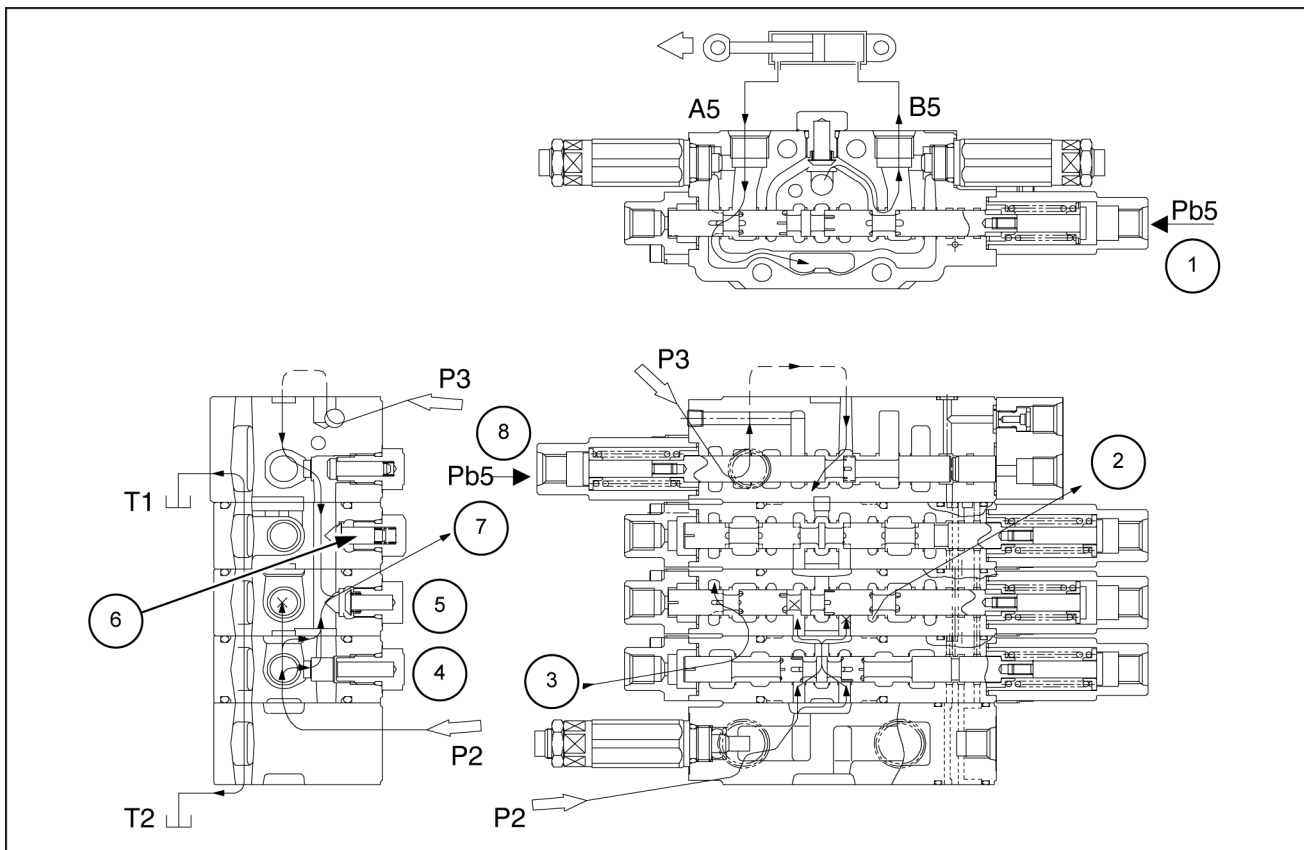
When the arm in operation is carried out, the secondary pressure from the remote control valve is applied to Pb5 port to change over the arm spool. The secondary pressure is also applied to the pilot chamber (arm in port) on the connecting section spring chamber side that has been connected through the piping. Therefore, when the operation is carried out together with the boom up operation at the same time, the connecting spool is hard to change over against the pilot pressure for arm in operation.

Since the P2 port bypass passage is shut off at the arm section after the arm spool change over, the oil flowed from P2 port flows through the travel section and a passage between travel section and arm section into the P2 side parallel passage.

Also, since the oil flowed from P3 port flows through the direction of dozer → boom swing → swing section and then into the P2 side parallel passage via the check valve in the P3 supply section, the connecting flow of P2 pump and P3 pump is supplied to the P2 side parallel passage. [Although the P3 side bypass passage is also connected to the P1 side parallel passage through the check valve in the P3 section, there is no oil flow into the P1 side as long as the P1 side sections (boom , bucket) are not operated.]

Since a passage between B5 port and the bridge passage is opened after the spool changeover, the oil flowed into the P2 side parallel passage flows through the load check valve in the arm section into B5 port via the bridge passage and then into the head side of the arm cylinder.

On the other hand, the oil returned from the rod side of the arm cylinder flows into A5 port to the tank passage that has opened with the spool's notch after the spool changeover. Then, the arm cylinder extends to make the arm in.

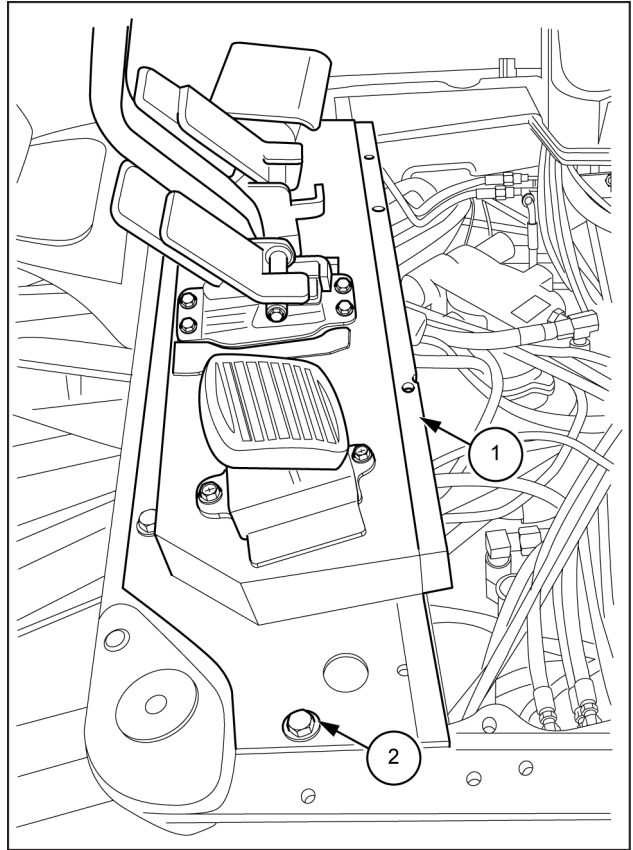


SMIL16MEX0247FB 10

- | | |
|--------------------------------------|----------------------|
| 1. Spool changeover direction | 5. Arm |
| 2. To cylinder head side via B5 port | 6. Auxiliary (Aux) |
| 3. To A5 port via cylinder rod side | 7. To bridge passage |
| 4. Travel | 8. Arm in |

2-3 Poppet	4-11 O-ring
2-4 Spring	4-12 Plug
2-5 O-ring	4-13 Piston
2-6 Plug	4-14 O-ring
2-7 O-ring	4-15 Body
2-8 Pilot cover	4-16 Hexagon socket head bolt (with washer)
2-9 Pilot cover	4-17 Orifice
2-10 Hexagon socket head bolt (with washer)	4-18 Filter (coin type)
3 Swing work block	14 Relief valve
3-1 Body	15 Overload relief valve
3-2 Spool assembly	17 O-ring
3-3 Poppet	22 O-ring
3-4 Spring	23 Tie bolt
3-5 O-ring	24 Hexagonal nut
3-6 Plug	
3-7 O-ring	

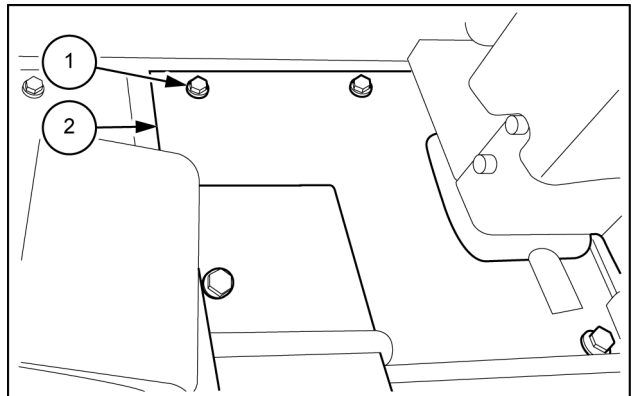
13. Install the pedals group (1) and then Use a wrench [17 mm] to tighten the five bolts (2).



SMIL16MEX3043BB 11

14. Install the right-hand bottom plate (2) and then use a wrench [17 mm] to tighten the four bolts (1).

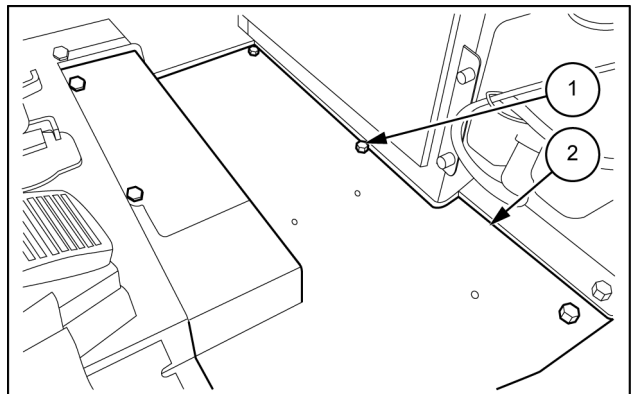
Tightening torque for bolts (1) installation:
54.0 – 81.3 N·m (39.8 – 60.0 lb ft)



SMIL16MEX2587AB 12

15. Install the left-hand bottom plate (2) and then use a wrench [17 mm] to tighten the six bolts (1).

Tightening torque for bolts (1) installation:
54.0 – 81.3 N·m (39.8 – 60.0 lb ft)

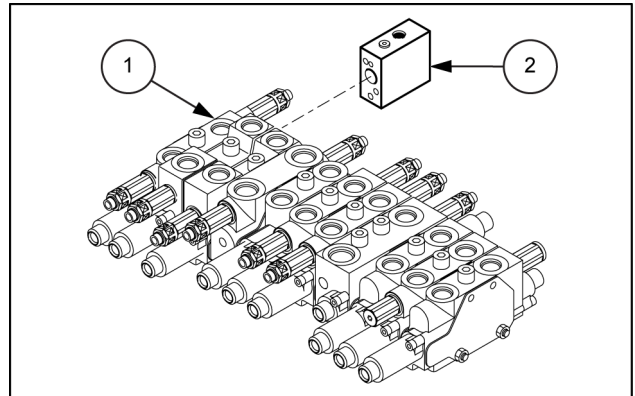


SMIL16MEX2586AB 13

16. Install the cab (refer to **Cab and platform - Install (90.150)**).

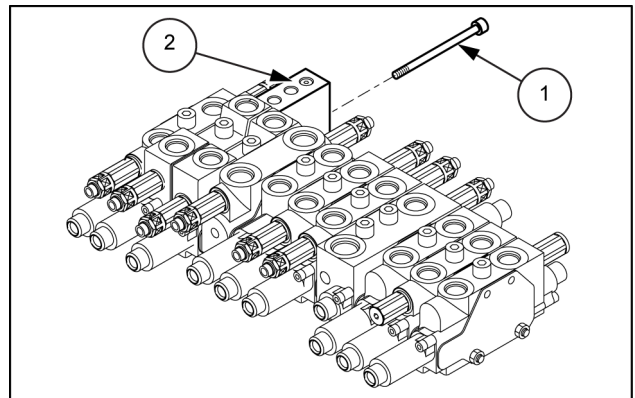
Assemble of the holding valve

1. Install the holding valve (2) onto the stacked control valve (1).



SMIL16MEX1144AB 8

2. Use a hexagon wrench [5 mm] and tighten the hexagon socket head bolts (1) securing the holding valve (2) to the torque of 11 N·m (8.11 lb ft).

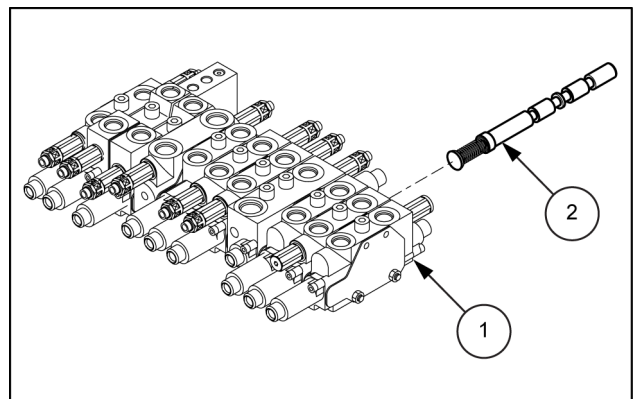


SMIL16MEX1143AB 9

Assemble of the main spools (pilot type)

1. Carefully insert the previously assembled spool assemblies (2) into their respective bores within of the body (1).

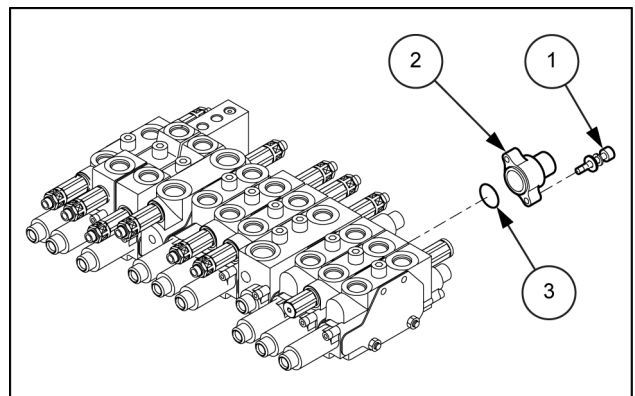
NOTICE: fit the spool assemblies into the body carefully and slowly. In any circumstances push them forcibly.



SMIL16MEX1142AB 10

2. Install the spool cover (2) and use a hexagonal wrench [5 mm] to tighten the hexagonal socket head bolts (1) with washer to a torque of 11 N·m (8.11 lb ft).

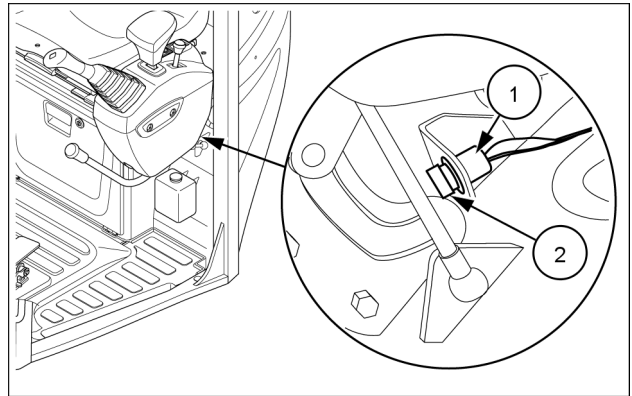
NOTICE: confirm that O-rings (3) have been fitted.



SMIL16MEX0350AB 11

Pilot solenoid valve block - Replace - Safety switch

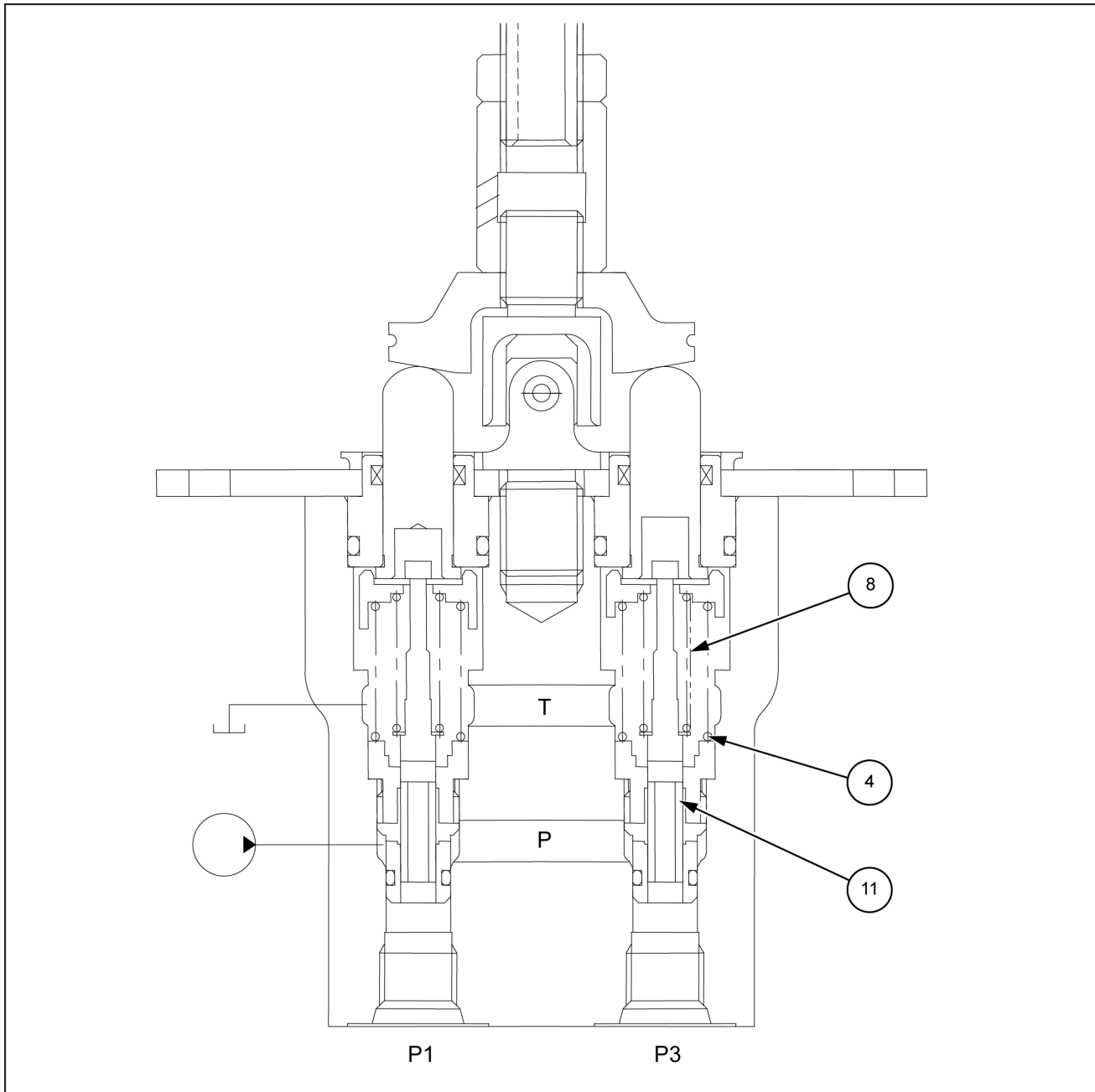
1. Disconnect the connector (1) from the safety switch (2).
2. Remove the safety switch (2).
3. Install a new safety switch (2).
4. Connect the connector (1) to the safety switch (2).



SMIL19MEX0283AA 1

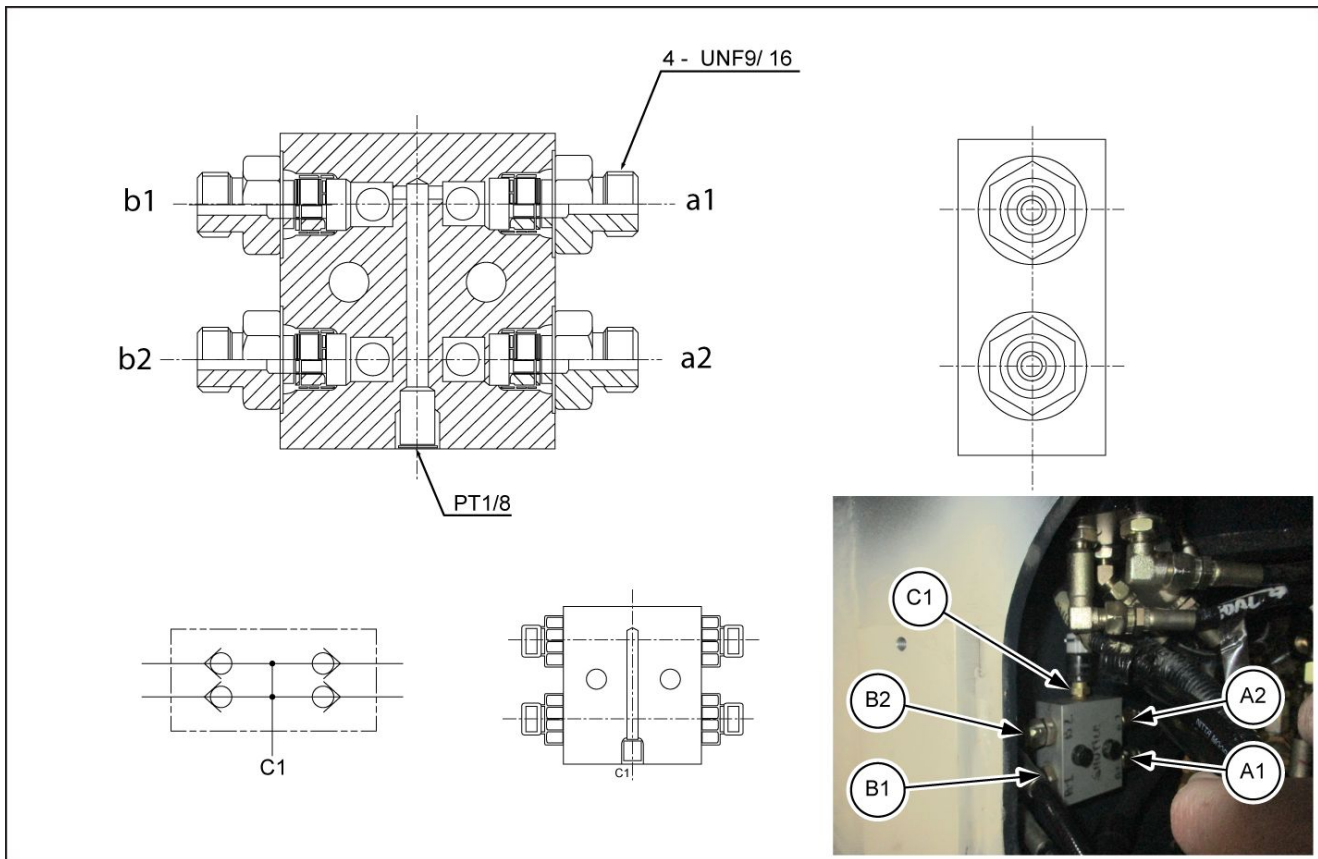
When the handle is in neutral (See Fig. 2)

The force of the secondary pressure setting spring (8) that determines the remote control valve output pressure does not operate on the spool (11). Therefore, the spool (11) is pushed up by the return spring (4) and the output ports (1, 3) are connected with the T port. Therefore, the output pressure is the same as the tank pressure.



SMIL16MEX0315GB 2

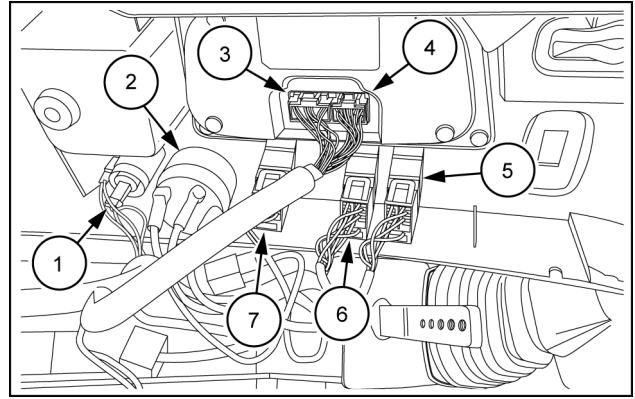
Drainage block - Overview - Shuttle valve



SMIL19MEX0257FB 1

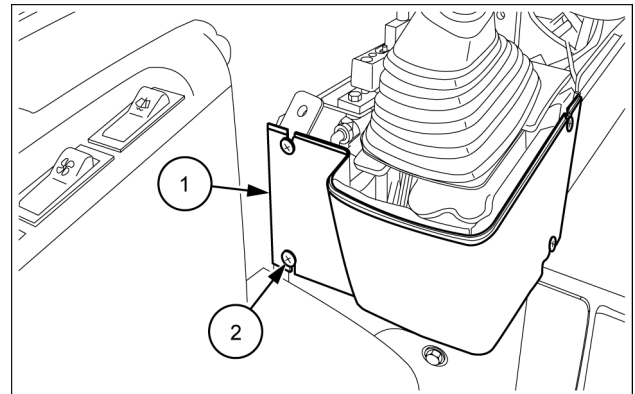
Port	Port size
a1, a2, b1, b2	UNF 9/16
C1	PT 1/8

9. Connect the electrical connectors: CL-2 (1), CN-56A (3), CN-56B (4), CS-50 (5), CS-16 (6), and CS-23 (7).
10. Connect the starter key connectors CS-2 and CS-46 (2).



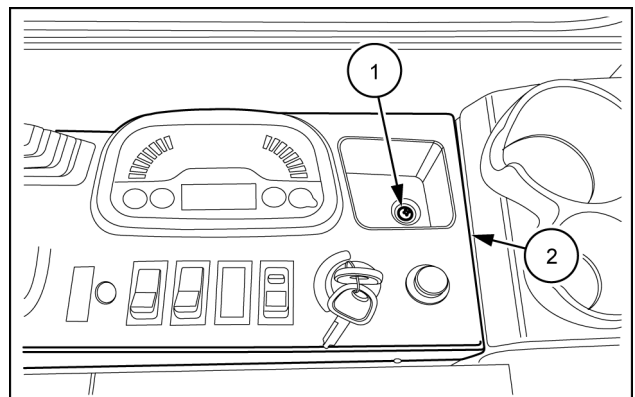
SMIL19MEX0328AB 10

11. Install the panel (1) and tighten the four screws (2).



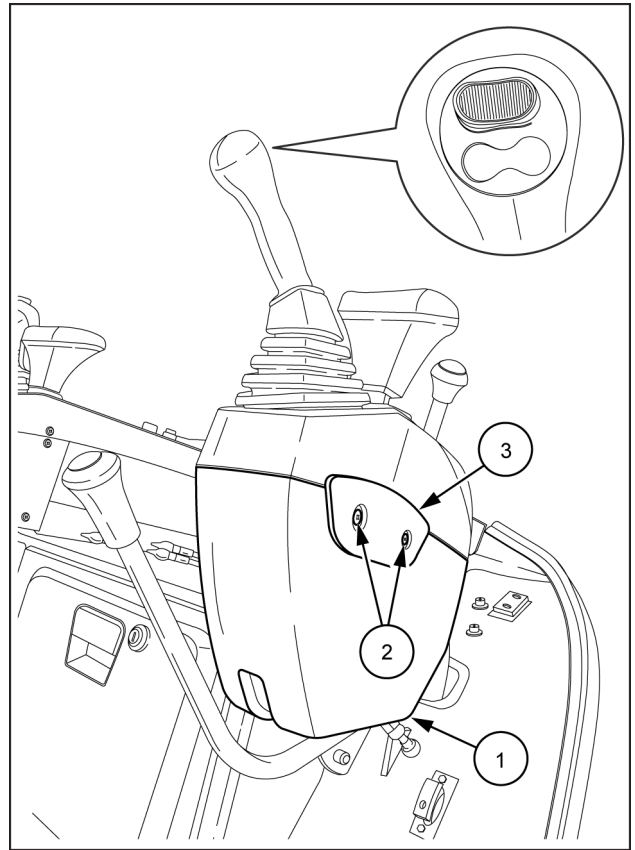
SMIL19MEX0335AB 11

12. Tighten the screw (1) that fix the rear side of the right-hand console (2).



SMIL19MEX0302AB 12

14. Install the plate **(3)** to the cover **(1)** and use a screwdriver to tighten the two screws **(2)**.

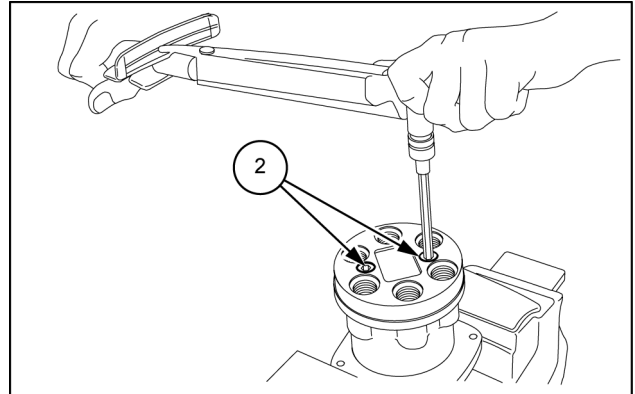


SMIL19MEX0289BB 12

Hand control - Assemble

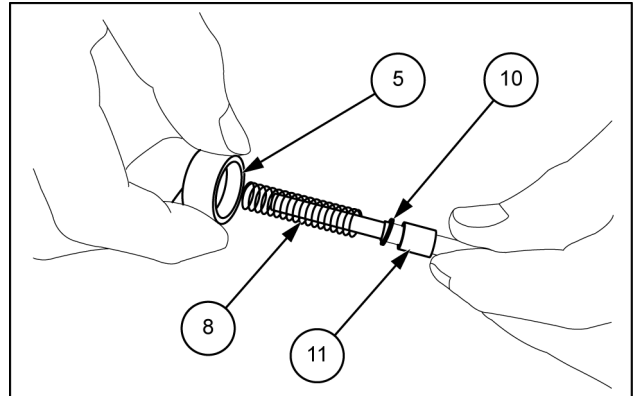
1. Use a hexagon wrench to install the two plugs (2).

NOTE: tighten the two plugs alternately and slowly.



SMIL16MEX0224AB 1

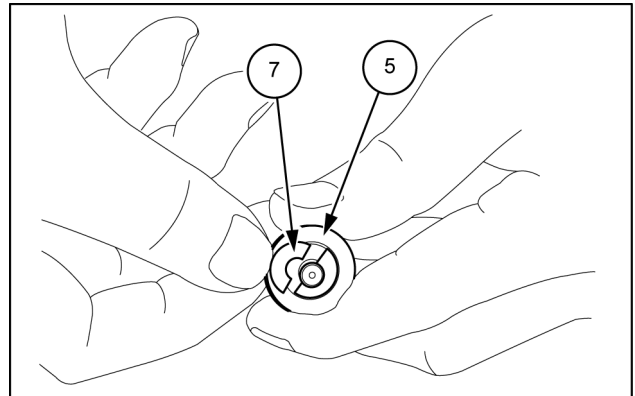
2. Insert the spring seat (10), the secondary pressure spring (8), and the spring seat (5) onto the each of the spools (11) in that order.



SMIL16MEX0218AB 2

3. For assembly of the pressure reducing valve, stand it vertically with the spool bottom placed on flat work-bench. Push down the spring seat (5) and install the two pieces of semicircular stopper (7) on spring seat without piling them on.

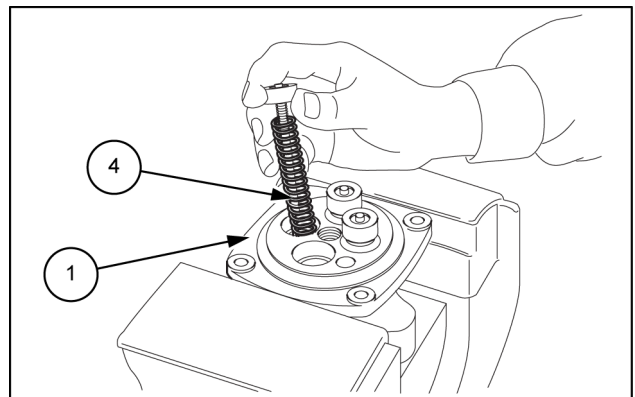
NOTICE: be careful not to scratch the surface of the spools. Do not press in the spring seating by 6 mm (0.236 in) or more.



SMIL16MEX0225AB 3

4. Install the return springs (4) and the pressure reducing valve assembly into the casing (1).

NOTE: install the parts into the casing hole to their original positions.



SMIL16MEX0215AB 4

Hand control - Test

CONTROL LEVER OPERATING FORCE

Use a spring scale to measure the maximum resistance of each control lever at the middle of the grip.

Preparation

1. Keep the hydraulic oil temperature at **45 – 55 °C (113 – 131 °F)**.

Measurement

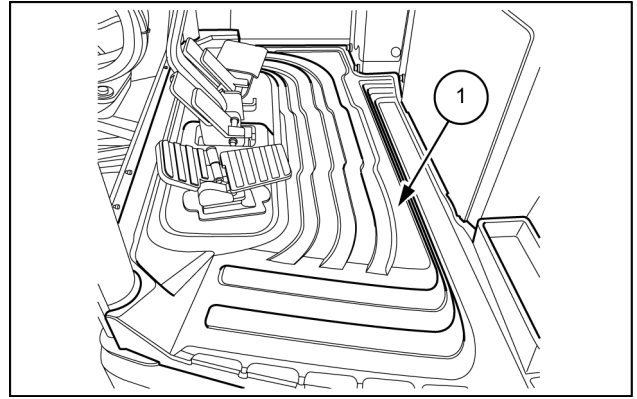
1. Start the engine.
2. Operate each boom, arm, bucket and swing lever at full stroke and measure the maximum operating force for each.
3. Lower the bucket to the ground to raise one track off the ground. Operate the travel lever at full stroke and measure the maximum operating force required. When finished, lower the track and then jack-up the other track.
4. Repeat steps 2 and 3 three times and calculate the average values.

Evaluation

The measured operating force should be within the following specifications.

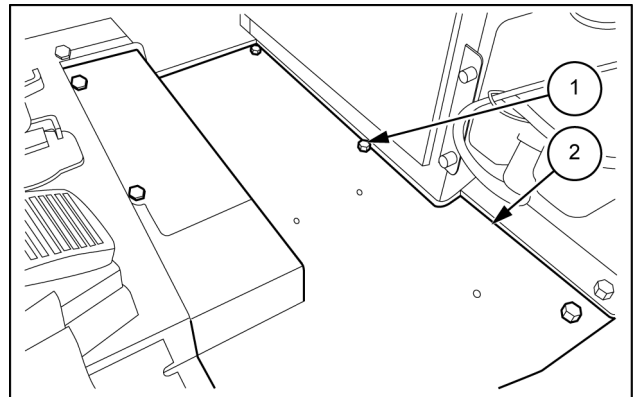
Kind of lever	Standard value	Maximum allowable
Boom lever	13.7 N (3.1 lb) or below	18.6 N (4.2 lb)
Arm lever	13.7 N (3.1 lb) or below	18.6 N (4.2 lb)
Bucket lever	13.7 N (3.1 lb) or below	18.6 N (4.2 lb)
Swing lever	13.7 N (3.1 lb) or below	18.6 N (4.2 lb)
Travel lever	19.6 N (4.4 lb) or below	24.5 N (5.5 lb)

4. Remove the floor mat (1) and the soundproofing panels.



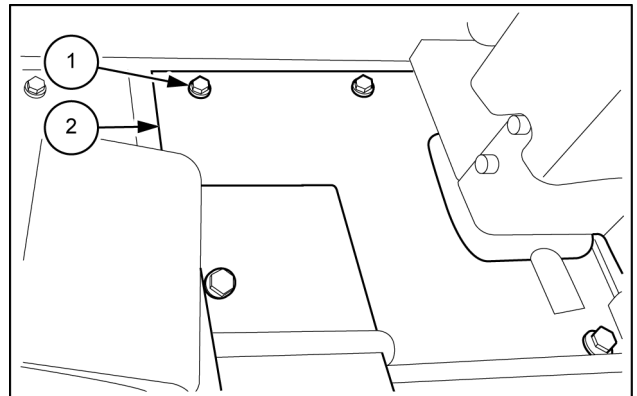
SMIL16MEX1196AB 2

5. Use a wrench [17 mm] to remove the six bolts (1) and then remove the left-hand bottom plate (2).



SMIL16MEX2586AB 3

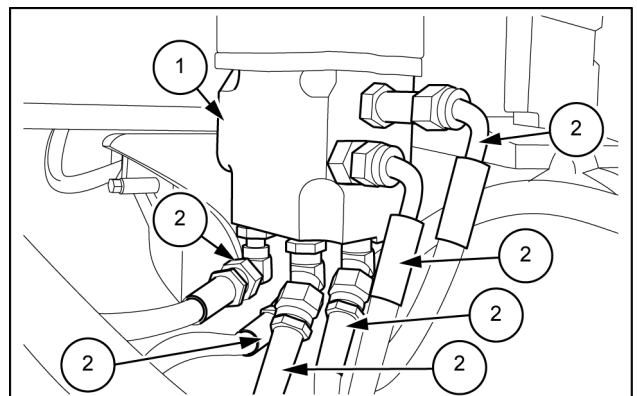
6. Use a wrench [17 mm] to remove the four bolts (1) and then remove the right-hand bottom plate (2).



SMIL16MEX2587AB 4

7. Use a wrench [19 mm] to remove the six hoses (2) from the travel remote control valve (1).

- Mark the hoses so that the connectors match at the time of assembly.
- Use caps or plugs to cover the hoses and lines to prevent any entry of water, dust or dirt.
- Clean the hoses by spraying with a parts cleaner to prevent scratches and prevent dirt from accumulating on the connectors.



SMIL16MEX2590AB 5

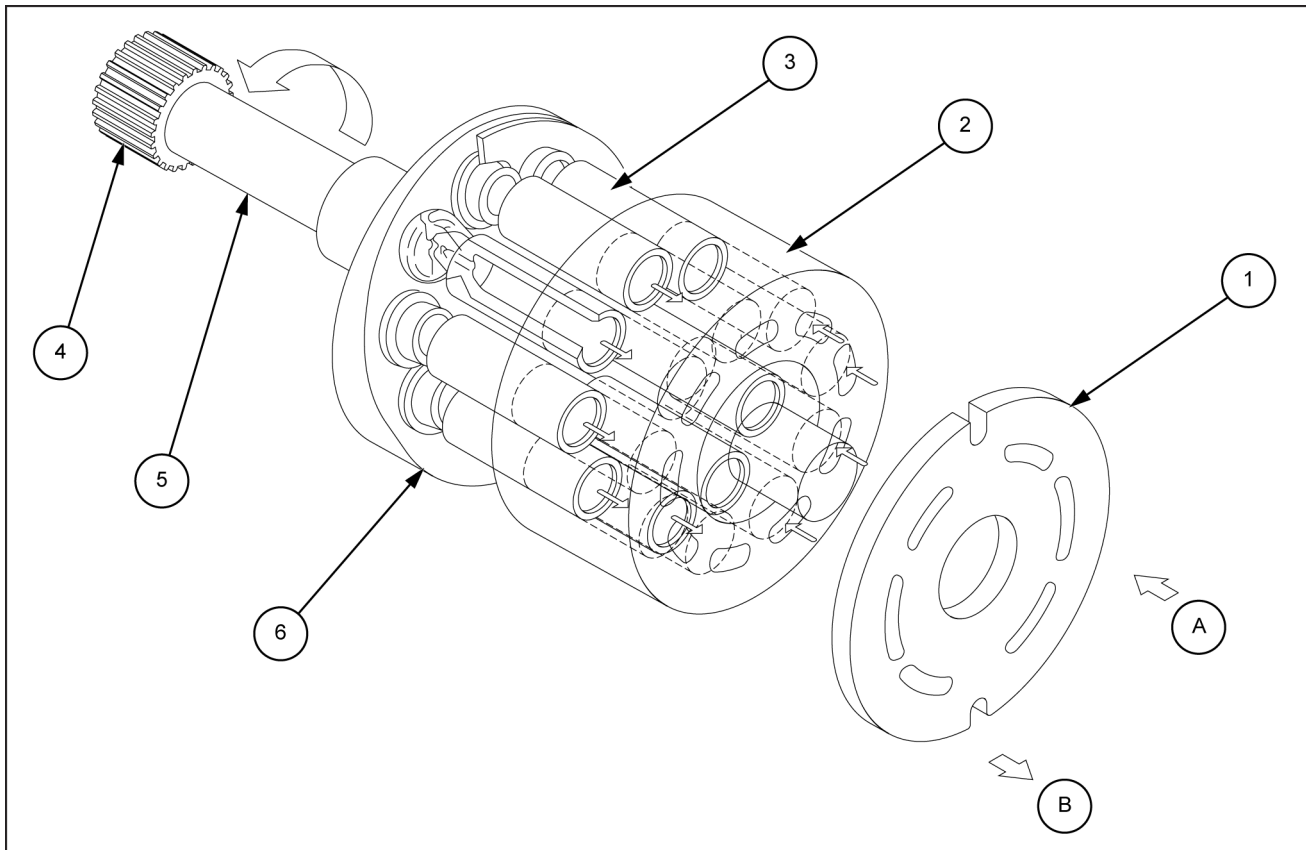
HYDRAULIC MOTOR SECTION

Function

This hydraulic motor is an axial piston type, and changes the hydraulic energy supplied from the pump to the rotary motion.

Structure

Through a hydraulic valve, the pressurized oil is supplied to the valve plate (1). When the pressurized oil is supplied to the A port, this pressurized oil pushes the piston (3) in the cylinder barrel (2). This pushing force is changed to the rotational power by the swash plate (6) and transmitted to the shaft (5) which is connected to the cylinder barrel (2) with the spline. The return flow from the cylinder port is going out through the B port of the valve plate (1). To reverse rotation, pressurized oil is supplied to the B port and returning oil exits through the A port.

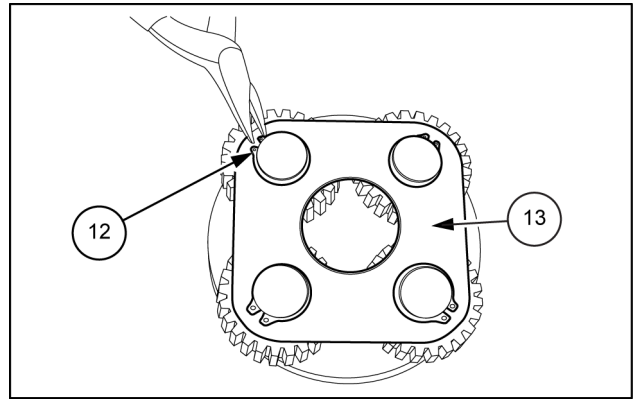


SMIL16MEX0308FB 2

- | | |
|--------------------|---|
| 1. Valve plate | 4. Connected to motor shaft with spline |
| 2. Cylinder barrel | 5. Shaft |
| 3. Piston | 6. Swash plate |

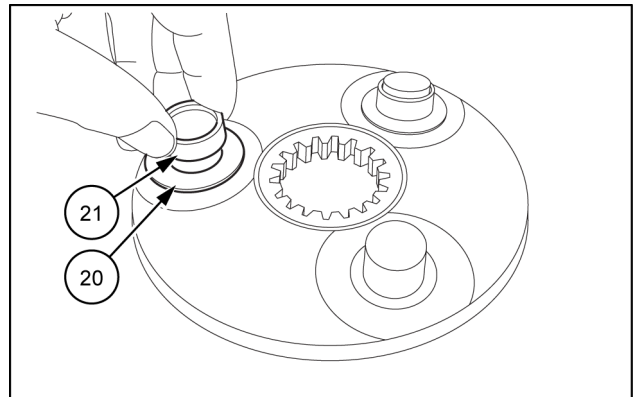
11. Measure the drain rate of the swing motor.
 - A. If the drain rate of the swing motor is not equal to standard value, swing motor is broken. Disassemble and repair it.
12. Check the pilot piping.
 - A. If the pilot piping is clogged or there is oil leakage from it, clean the pilot piping interior or repair the piping.
 - B. If the pilot piping is not clogged or there is not oil leakage from it, the pilot valve or the shuttle valve is faulty. Disassemble and repair it.
13. Check the gear pump in terms of delivering oil.
 - A. If the gear pump is delivering oil, the pilot relief valve is defective. Disassemble and repair or replace it.
 - B. If the gear pump is not delivering oil, the gear pump is broken. Disassemble and repair it.
14. Check the variation of the symptom when left-hand and right-hand pilot hoses are exchanged.
 - A. If the symptom does change, the hydraulic pump is broken. Disassemble and repair it.
 - B. If the symptom does not change, the shuttle valve is faulty. Repair or replace it.
15. Measure the gear pump output pressure.
 - A. If the gear pump output pressure is within the standard levels, the pilot relief valve is faulty. Repair or replace it.
 - B. If the gear pump output pressure is not within the standard levels, the gear pump is faulty. Repair or replace it.

6. Install the thrust plate 1 (**13**).
Use a plier to install the four snap rings (**12**) to make up a carrier 1 assembly.



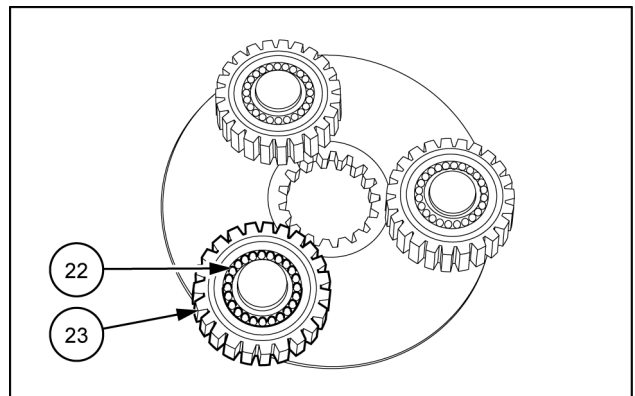
SMIL16MEX0108AB 9

7. Install the three thrust washers 2 (**20**) and the three rings 2 (**21**) in that order onto the three pins of the carrier 2 (**19**).



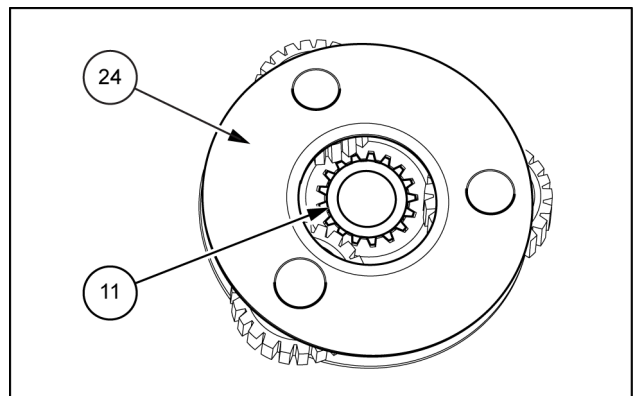
SMIL16MEX0107AB 10

8. Install the three b2 gears (**23**) and the 72 (24 for pin) needles 2 (**22**) in that order onto the three pin of the carrier 1 assembly.



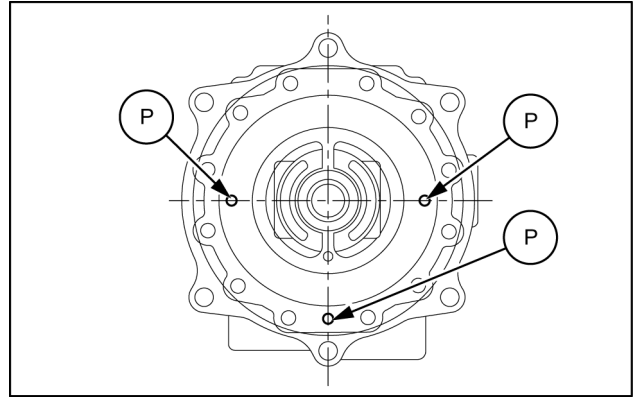
SMIL16MEX0106AB 11

9. Place the thrust plate 2 (**24**) and the S1 gear (**11**) to make up a carrier 2 assembly.



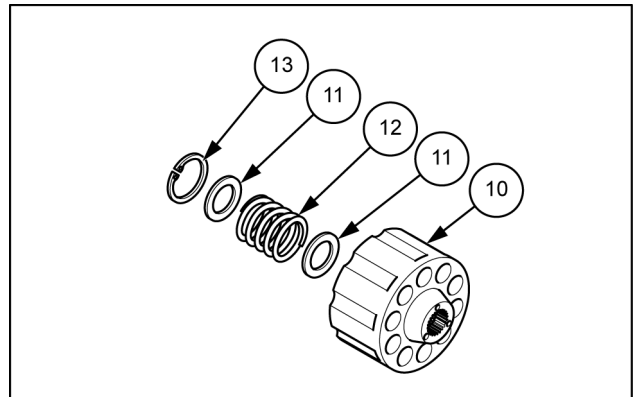
SMIL16MEX0105AB 12

- install the brake piston assembly with the plate S **(1)** onto the body H **(19)** as matched pin holes position **(P)**;
- press-fit it the brake piston assembly by tightening hexagon screws **(17)** little by little; at this time, check no pushed out, scratches and dust the O-rings;
- after the installation of the brake piston assembly, remove the plate S.



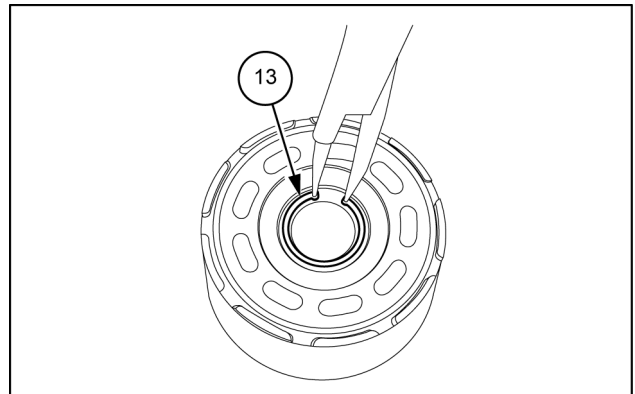
SMIL16MEX0114AB 9

9. Install the retainer **(11)**, the spring C **(12)** and the other retainer **(11)** in that order into the cylinder barrel **(10)**.



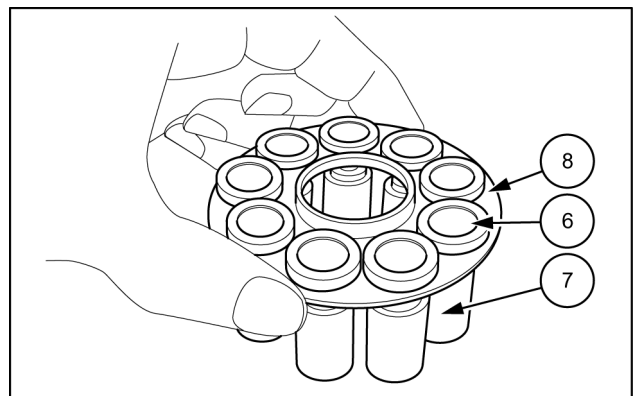
SMIL16MEX0093AB 10

10. Use a plier to secure them with the snap ring **(13)**.



SMIL16MEX0092AB 11

11. Make the shoe holder assembly which has the nine piston **(7)** -shoe **(6)** assemblies installed on the shoe holder **(8)**.



SMIL16MEX0115AB 12

Hydraulic travel system - Dynamic description

The hydraulic travel system consists of a hydraulic motor (1) "Fixed parts" and a planetary gear speed reducer (2) "Rotating parts".

The hydraulic motor includes the counterbalance valve, the parking brake and the high/low speed changeover mechanism.

REDUCTION GEAR SECTION

Function

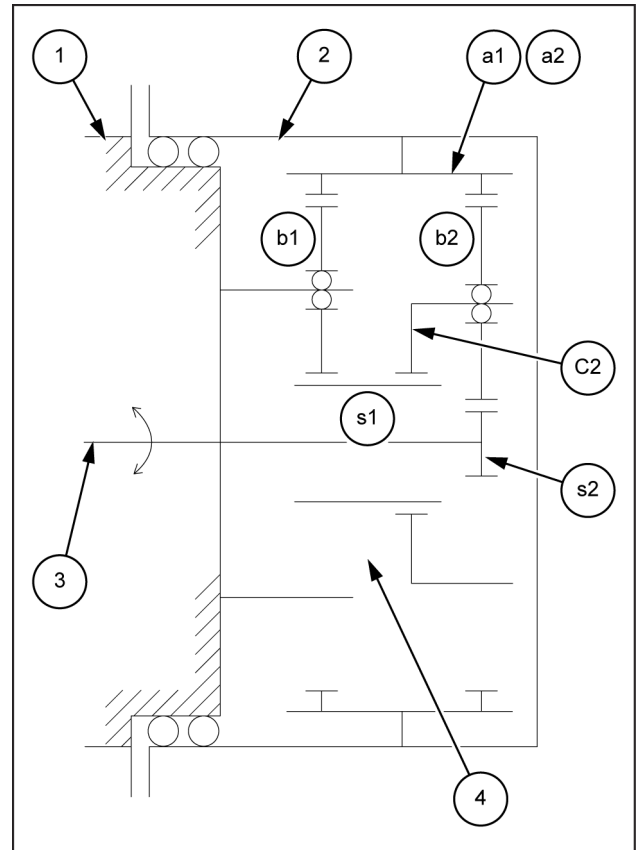
The speed reducer of the travel motor is a simple planetary gear type with two stages. The high output speed of the hydraulic motor (1) is reduced to low speed with high torque.

Operation

The S2 gear (s2) is attached to the hydraulic motor shaft (3) and the S2 output speed is reduced between the gears (s2), (b2), (a2) as a first stage speed reducer.

The reduced output speed of this first stage is reduced again between the gears (s1), (b1) and (a1) which are connected to the carrier 2 (C2) with the spline.

This reduced output speed of the second stage (4) is transmitted to the body case "rotating parts" through the inner gears (a1), (a2) and drives the machine.



SMIL16MEX0321BB 1

Travel reduction gear - Prepare for disassemble and assemble

⚠ WARNING

Crushing hazard!

The lifting systems must be operated by qualified personnel who are aware of the correct procedures to follow. Make sure all lifting equipment is in good condition, and all hooks are equipped with safety latches.

Failure to comply could result in death or serious injury.

W0256A

⚠ WARNING

Heavy objects!

Lift and handle all heavy components using lifting equipment with adequate capacity. Always support units or parts with suitable slings or hooks. Make sure the work area is clear of all bystanders.

Failure to comply could result in death or serious injury.

W0398A

⚠ WARNING

Chemical hazard!

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

Failure to comply could result in death or serious injury.

W0371A

General precautions

1. Before disassemble the travel reduction gear and the travel motor, accurately examine the cause of problem in order to realize if disassembling is really needed.
2. Before disassembly, select a clean place. Place a rubber or vinyl sheet or other such protective materials on your working bench to protect the surface of the motor to be serviced.
3. During disassembly, give a match mark to the mating surfaces of each part.
4. Arrange removed parts in order so that they will not become damaged or missing during disassembly.
5. Always replace seals, even the damage is not observed.

Tools

Tool name	Information
Torque wrenches	45 N (JIS B4650) 90 N (JIS B4650) 280 N (JIS B4650)
Hexagon socket	5 mm 8 mm
Socket wrenches	36 mm
Hexagon socket wrenches	5 mm 8 mm
Screwdrivers	6 – 10 mm
Snap ring pliers	Diameter 28 mm for hole Diameter 25 mm for shaft Diameter 28 mm for shaft Diameter 30 mm for shaft Diameter 130 mm for shaft
Plastic hammer	-
Other	Grease Oil Sand paper C-clamps

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Travel motor - Remove

⚠ WARNING

Avoid injury!

Shut off the engine, remove the key, and make sure all machine motion stops before you service the machine.

Failure to comply could result in death or serious injury.

W1128B

⚠ WARNING

Avoid injury!

Use Personal Protective Equipment (PPE), including protective goggles, gloves, and safety footwear.

Failure to comply could result in death or serious injury.

W1036A

⚠ WARNING

Crushing hazard!

The lifting systems must be operated by qualified personnel who are aware of the correct procedures to follow. Make sure all lifting equipment is in good condition, and all hooks are equipped with safety latches.

Failure to comply could result in death or serious injury.

W0256A

⚠ WARNING

Heavy objects!

Lift and handle all heavy components using lifting equipment with adequate capacity. Always support units or parts with suitable slings or hooks. Make sure the work area is clear of all bystanders.

Failure to comply could result in death or serious injury.

W0398A

⚠ WARNING

Burn hazard!

Before performing any service on the hydraulic system, you must allow it to cool. Hydraulic fluid temperature should not exceed 40 °C (104 °F).

Failure to comply could result in death or serious injury.

W0241A

⚠ WARNING

Escaping fluid!

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

Failure to comply could result in death or serious injury.

W0178A

⚠ WARNING

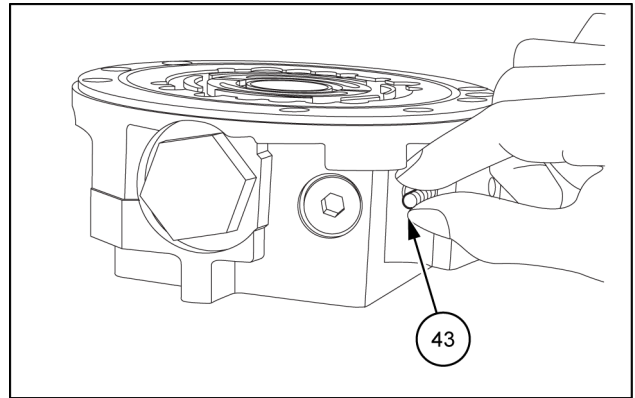
Chemical hazard!

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

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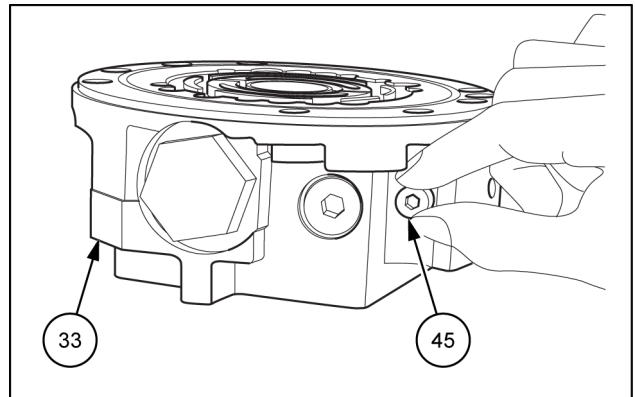
W0371A

9. Install the shuttle spool (43) into the body 1.



SMIL16MEX0180AB 8

10. Use a hexagon wrench [5 mm] to install the two plugs (45) (one for side) with O-rings into the body 1 (33) and tighten to a torque of 12 – 18 N·m (8.851 – 13.276 lb ft).

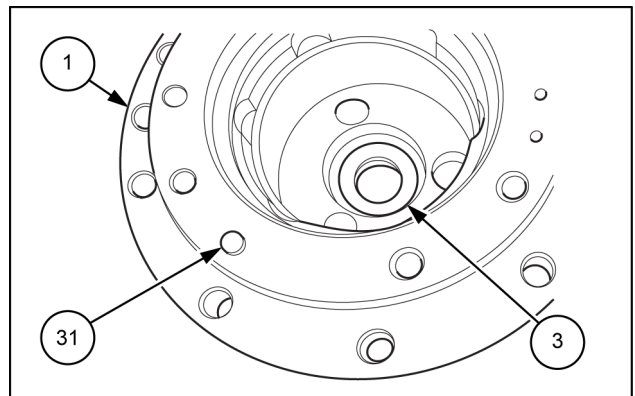


SMIL16MEX0179AB 9

11. Press-fit the oil seal (3) into the body 2 (1).

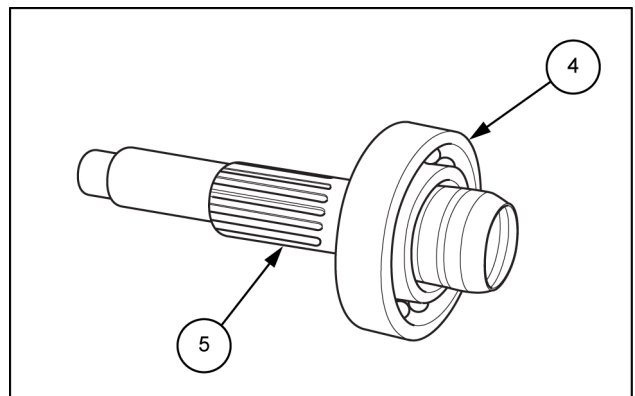
NOTICE: apply grease to the periphery of the oil seal. Pay attention to the direction of the oil seal, and do not slant it.

12. Install the pin (31) into the body 2 (1).



SMIL16MEX0172AB 10

13. Press-fit the bearing (4) with the shaft (5).

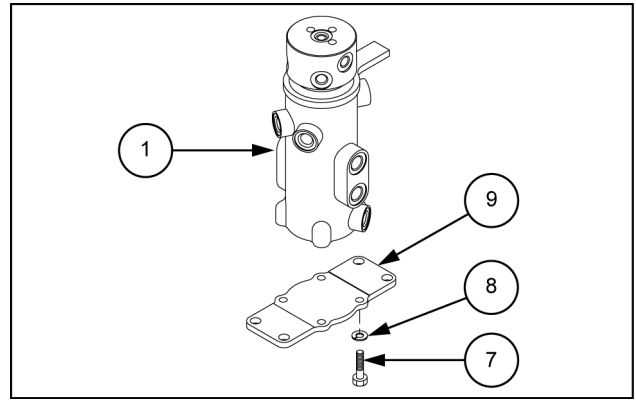


SMIL16MEX0181AB 11

Travel motor - Troubleshooting

Problem	Possible Cause	Correction
Doesn't start	Operating defect in hydraulic equipment except travel motors	Inspect and repair or replace each equipment. Check that normal working pressure is supplied to the motor inlet port.
	Defect in reducer - Damage of inner parts	Replace the damaged part (kit).
	Defect in hydraulic motor - Oil leakage due to abnormal wear of the sliding parts	Replace the worn part (kit).
	- Damage of inner parts	Replace the damaged part (kit).
	Defect in hydraulic valve - Spool doesn't move	
	Foreign object is caught in the spool sliding part.	Remove the foreign object. In case of much leakage, replace the body 1 kit.
	Choke is clogged	Remove the foreign object.
Doesn't stop or stop slowly	Defect in hydraulic valve - Spool doesn't return	
	Foreign object is caught in the spool sliding part.	Remove the foreign object. In case of much leakage, replace the body 1 kit.
	Choke is clogged.	Remove the foreign object.
	Spring is damaged.	Replace the body 1 kit.
	Check valve doesn't close due to foreign object being caught on the seat.	Remove the foreign object. In case of much leakage, replace the body 1 kit.
Rotating speed is slow	Prescribed flow rate is not supplied to the motor due to operating defect in the pump.	Inspect and repair or replace the pump.
	Volumetric efficiency declines due to defect in the motor.	
	- Abnormal wear of sliding parts	Replace the worn part (kit).
	Volumetric efficiency declines due to defect in the hydraulic valve.	
	- Abnormal wear of main spool and two speed spool sliding part	Replace body 1 kit.
Doesn't change to two speed	Operating defect in hydraulic equipment except travel motors	Inspect and repair or replace each equipment. Check that normal pressure is supplied to the pilot port.
	Defect in the hydraulic valve	
	- Two speed spool doesn't move due to foreign object being caught in the spool sliding part.	Remove the foreign object. In case of much leakage, replace the body 1 kit.
	- Choke in the two speed pilot line is clogged.	Remove the foreign object.
	Defect in the hydraulic motor - Control piston doesn't move.	
	Foreign object is caught in the piston sliding part.	Remove the foreign object. In case of much leakage, replace the body 2 kit.
	Oil leakage due to abnormal wear of the sliding part.	Replace the worn part (kit).
	Oil leakage due to damage of O-ring located between body 1 and body 2.	Replace the O-ring.
Doesn't change to one speed	Operating defect in hydraulic equipment except travel motors	Inspect and repair or replace each equipment. Check that normal pressure is supplied to the pilot port.
	Defect in the hydraulic valve	
	- Two speed spool doesn't move. Foreign object is caught in the spool sliding part.	Remove the foreign object. In case of much leakage, replace the body 1 kit.
	Damage of spring	Replace the body 1 kit.
	- Choke in the two speed pilot line is clogged.	Remove the foreign object.
Oil leakage	Oil leakage due to damage of O-rings.	

6. Install the cover (9) and use a hexagon wrench to tighten the hexagon bolts (7) with washer (8) securing the cover (9) to the rotor (1).



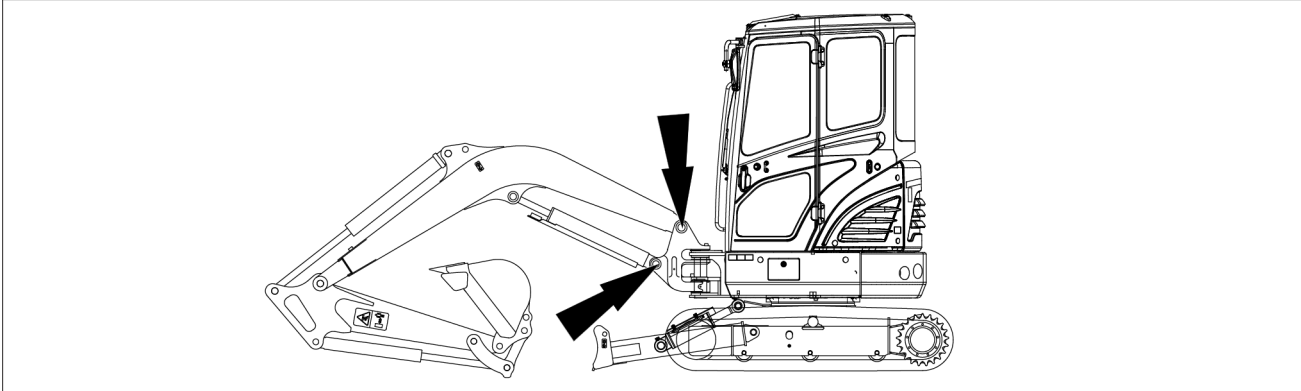
SMIL16MEX0345AB 4

Boom cylinder - Service instruction - Troubleshooting

Operating boom noise abnormality

The boom makes a squeaking noise when the boom is operating.

1. Check the foot pin of the boom in terms of greasing.
 - A. If the foot pin of the boom is sufficiently greased, the frictional noise occurs between the sliding faces of the oil seal of the boom cylinder and boom.



SML16MEX0363EA 1

NOTE: the frictional noise will disappear if they are kept used.

- B. If the foot pin of the boom is not sufficiently greased, the foot pin of the boom has run out of the grease. Supply grease to it.

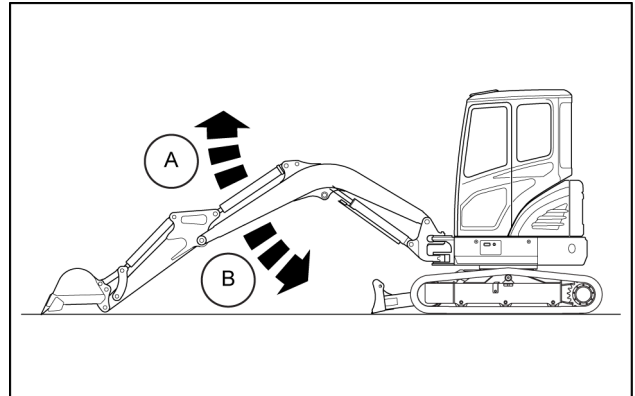
NOTE: if seizure is in an initial stage, supply sufficient grease.
If seizure is in a grown state, correct it by paper lapping or with an oil stone.

Boom cylinder - Test

BOOM CYLINDER CYCLE TIME

Measure the cycle time of the boom cylinder.

- A. Raise
- B. Lower



SMIL16MEX1158AB 1

Preparation

1. With the arm rolled out and the empty bucket rolled out, lower the bucket to the ground, as shown.
2. Keep the hydraulic oil temperature at **45 – 55 °C (113 – 131 °F)**.

Measurement

1. Measure the time it takes to raise the boom (**A**), and the time it takes to lower the boom (**B**). To do so, position the boom control lever at one stroke end then move the control lever to the other stroke end as quickly as possible.
2. Repeat each measurement 3 times and calculate the average values.

Evaluation

The average measured time should meet the following specifications.

Function	Standard value	Maximum allowable
Boom raise	2.3 – 3.1 s	3.3 s
Boom lower	2.3 – 3.1 s	3.3 s

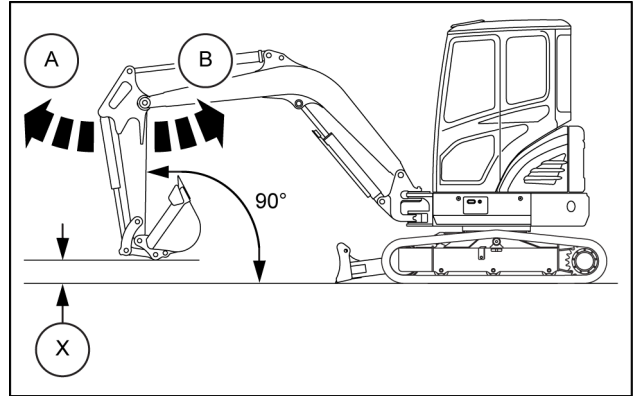
Dipper cylinder - Test

ARM CYLINDER CYCLE TIME

Measure the cycle time of the arm cylinder.

Preparation

1. With the empty bucket rolled in, position the arm so that it is vertical to the ground.
Lower the boom until the bucket is **500 mm (19.69 in)** above the ground (**X**).
2. Keep the hydraulic oil temperature at **45 – 55 °C (113 – 131 °F)**.



SMIL16MEX1159AB 1

Measurement

1. Measure the time it takes to roll in the arm, and the time it takes to roll out the arm. To do so, position the arm control lever at one stroke end, then move the control lever to the other stroke end as quickly as possible.
2. Repeat each measurement 3 times and calculate the average values.

Evaluation

The average measured time should meet the following specifications.

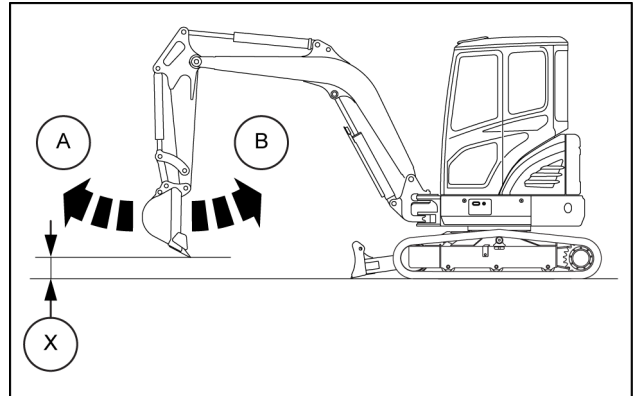
Function	Standard value	Maximum allowable
Arm in	2.5 – 3.3 s	3.7 s
Arm out	1.5 – 2.3 s	2.5 s

Bucket cylinder - Test

Measure the cycle time of the bucket cylinder.

Preparation

1. The empty bucket should be positioned at midstroke between roll-in (**B**) and roll-out (**A**), so that the sideplate edges are vertical to the ground. Lower the boom until the bucket is **500 mm (19.69 in)** above the ground (**X**).
2. Keep the hydraulic oil temperature at **45 – 55 °C (113 – 131 °F)**.



SMIL16MEX1160AB 1

Measurement

1. Measure the time it takes to roll in the bucket (**B**), and the time it takes to roll out the bucket (**A**). To do so, position the bucket control lever at one stroke end, then move the control lever to the other stroke end as quickly as possible.
2. Repeat each measurement 3 times and calculate the average values.

Evaluation

The average measured time should meet the following specifications.

Function	Standard value	Maximum allowable
Bucket roll in	2.5 – 3.3 s	3.6 s
Bucket roll out	1.5 – 2.3 s	2.4 s

Solenoid valve - Remove - Quick coupler

⚠ WARNING

Avoid injury!

Shut off the engine, remove the key, and make sure all machine motion stops before you service the machine.

Failure to comply could result in death or serious injury.

W1128B

⚠ WARNING

Avoid injury!

Use Personal Protective Equipment (PPE), including protective goggles, gloves, and safety footwear.

Failure to comply could result in death or serious injury.

W1036A

⚠ WARNING

Burn hazard!

Before performing any service on the hydraulic system, you must allow it to cool. Hydraulic fluid temperature should not exceed 40 °C (104 °F).

Failure to comply could result in death or serious injury.

W0241A

⚠ WARNING

Escaping fluid!

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

Failure to comply could result in death or serious injury.

W0178A

⚠ WARNING

Chemical hazard!

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

Failure to comply could result in death or serious injury.

W0371A

Hydraulic shears (2-way – clamp)

Change the setting of the 3-way selector valve (25) to the position for shears. Pressing the remote control valve 2-way auxiliary pedal (22) upward or, if equipped, sliding to right-hand the 2-way proportional switch on the right-hand remote control lever, the secondary pilot pressure flows out from port 2 of remote control valve 2-way auxiliary pedal (22), or from port A2 of 2-EPPR solenoid valve (26) or 4-EPPR solenoid valve (38). The pressurized oil which entered into Pb4 port of main control valve (2-1) switches the PTO auxiliary spool. The oil delivered from ports A2 and A3 of main pump (1) flows in the ports P2 and P3 of main control valve (2-1). Flow is led to the port B4 of the main control valve (2-1) through the PTO auxiliary spool, thus feeding the hose on right-hand side of attachment (clamp inlet). The return oil flows through the port A4 of main control valve (2-1), and the oil returns to hydraulic oil tank (19).

- | | |
|--|---|
| 1. Main pump | 15. Oil cooler |
| 2-1. Main control valve | 16. Return check valve |
| 2-2. Main control valve (rotating) | 17. Return filter |
| 3. Swing motor | 18. Suction strainer |
| 4. Travel motor (quantity 2) | 19. Hydraulic oil tank |
| 5-1. Remote control valve lever (left-hand) | 20. Stop valve (left-hand) |
| 5-2. Remote control valve lever (left-hand, proportional) | 21. Stop valve (right-hand) |
| 5-3. Remote control valve lever (left-hand, rotating proportional) | 22. Remote control valve pedal (boom swing/2-way option) (quantity 2) |
| 6-1. Remote control valve lever (right-hand) | 23. Remote control valve pedal/lever (travel) |
| 6-2. Remote control valve lever (right-hand, proportional) | 24. Remote control valve lever (dozer) |
| 7. Safety solenoid valve | 25. 3-way valve (hammer/shears selector valve) |
| 8. Hydraulic swivel | 26. 2-EPPR valve |
| 9. Bucket cylinder | 29. Block (A) |
| 10. Boom cylinder | 30. Block (B) |
| 11. Blade lifting cylinder | 31-1. Terminal |
| 12. Dipper cylinder | 34. Last guard filter (quantity 6) |
| 13. Boom swing cylinder | 38. 4-EPPR valve |
| 14. Line filter | 39. Nipple |



Hammer and rotating bucket hydraulic system - Remove - 4-way EPPR valve

⚠ WARNING

Avoid injury!

Shut off the engine, remove the key, and make sure all machine motion stops before you service the machine.

Failure to comply could result in death or serious injury.

W1128B

⚠ WARNING

Avoid injury!

Use Personal Protective Equipment (PPE), including protective goggles, gloves, and safety footwear.

Failure to comply could result in death or serious injury.

W1036A

⚠ WARNING

Burn hazard!

Before performing any service on the hydraulic system, you must allow it to cool. Hydraulic fluid temperature should not exceed 40 °C (104 °F).

Failure to comply could result in death or serious injury.

W0241A

⚠ WARNING

Escaping fluid!

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

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W0178A

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W0371A

Swing cylinder - Install

NOTICE: for bolts for which the torque is not specified, see **Torque - Standard torque settings ()** .

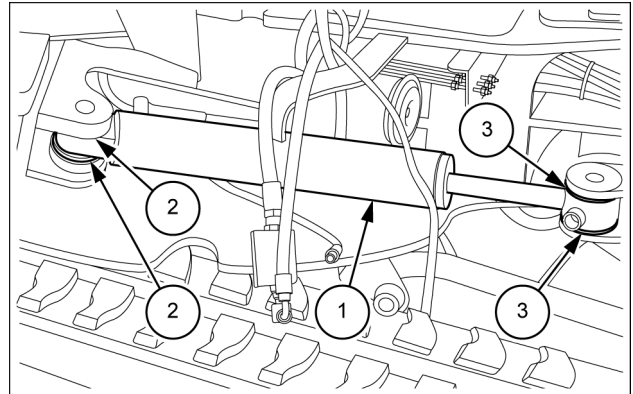
1. Use a lift-crane and nylon sling to secure the swing cylinder. Wrap the nylon sling to the inside of the line so that it is not crushed.

- Swing cylinder weight: **23 kg (50.7 lb)**

2. Install the swing cylinder (1) with the shims-round (2) and (3).

Shim-round (2): quantity 2 - thickness 1 mm

Shim-round (3): quantity 2 - thickness 1 mm



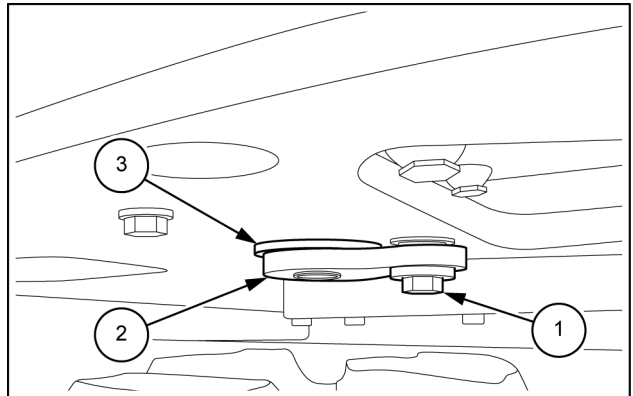
SMIL16MEX3020AB 1

3. Install the pin (2) with the spacer (3) through the shims-round and the eye of the bottom side swing cylinder.

4. Use a wrench [19 mm] to install the bolt (1).

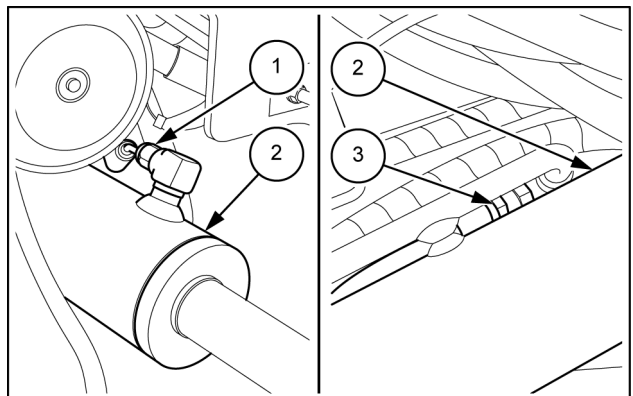
Tightening torque for bolt (1) installation:

96.8 – 145.2 N·m (71.4 – 107.1 lb ft)



SMIL16MEX2756AB 2

5. Install the hose (1) to the rod side swing cylinder (2).
6. Install the hose (3) to the bottom side swing cylinder (2).



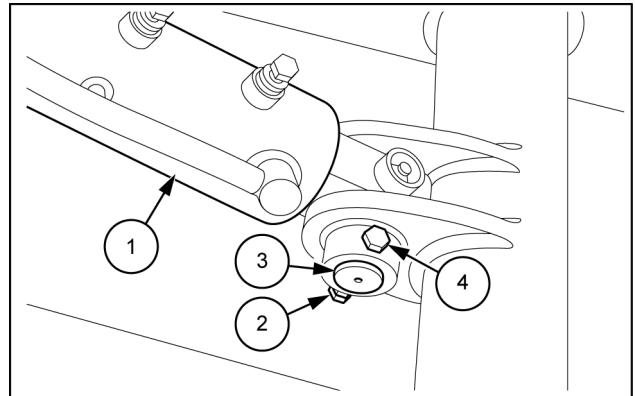
SMIL16MEX2757AB 3

7. Install the fuel tank (refer to **Fuel tank - Install (10.216)**).

8. Install the hydraulic oil reservoir (refer to **Oil reservoir - Install (35.300)**).

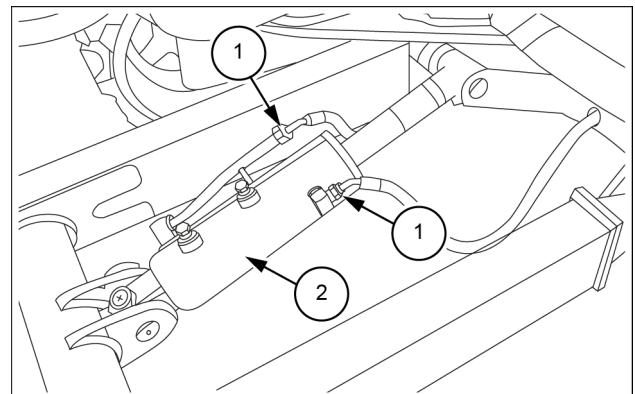
Blade lifting cylinder - Install

1. Use a suitable lift-crane and a nylon sling to secure the blade lifting cylinder (1).
 - Dozer cylinder weight: **21 kg (46.3 lb)**
2. Align the blade lifting cylinder (1) to the blade support and insert the pin (3).
3. Insert the bolt (4) and use two wrenches [17 mm] to tighten the two nuts (2).



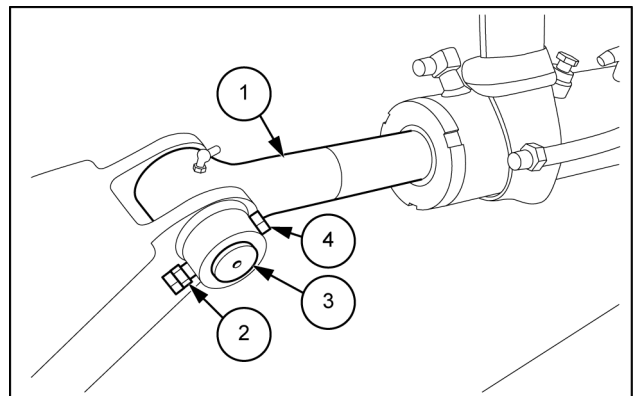
SMIL16MEX2557AB 1

4. Remove the caps or the plugs from the hoses.
5. Use two wrenches to connect the hoses (1) on the blade lifting cylinder (2).
6. Start the engine and extract the blade lifting cylinder.
7. Stop the engine.



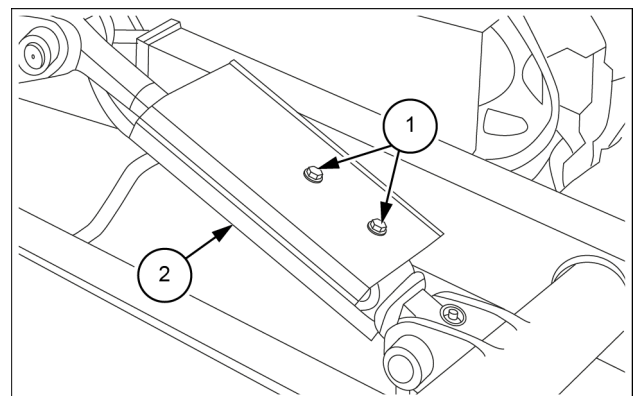
SMIL16MEX2556AB 2

8. Use a suitable lift-crane and a nylon sling to secure the blade lifting cylinder (1).
9. Align the blade lifting cylinder (1) to the blade support and insert the pin (3).
10. Insert the bolt (4) and use two wrenches [17 mm] to tighten the two nuts (2).



SMIL16MEX2558AB 3

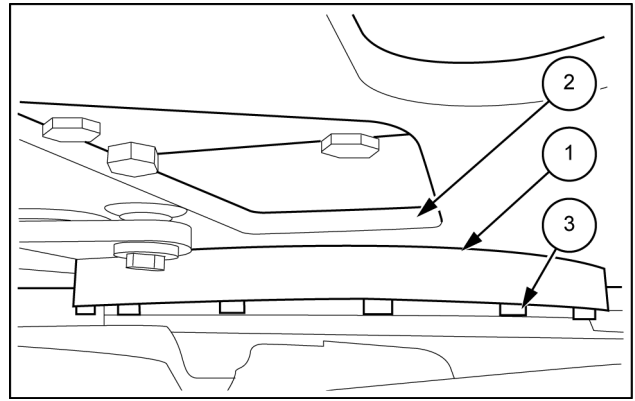
11. Use a hexagon wrench [19 mm] to tighten the two bolts (1) and then install the cylinder protection (2).



SMIL16MEX2555AB 4

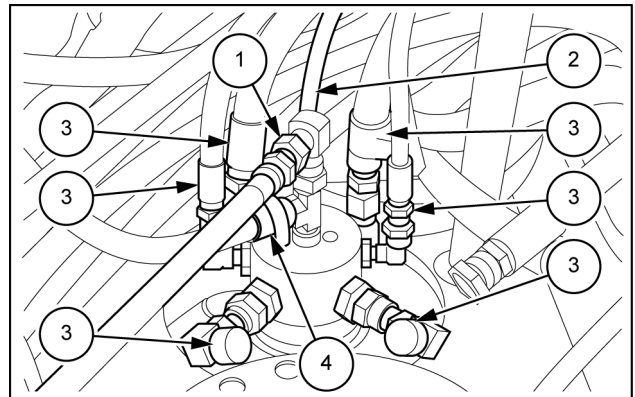
9. Use a wrench [**19 mm**] to install the 16 bolts (**3**) to secure the swing bearing (**1**) to the upperstructure (**2**).

Tightening torque for bolts (**3**) installation:
109 – 132 N·m (80.4 – 97.4 lb ft)



SMIL16MEX2751AB 6

10. Install the main control valve hoses (**3**) to the center joint (A, B, C, D, E, F ports).
11. Install the pilot solenoid valve hose (**2**) to the center joint (P port).
12. Install the hydraulic oil tank drain hose (**4**), and then use a screwdriver to tighten the clamp.
13. Install the swing motor drain hose (**1**) to the center joint (G port).



SMIL16MEX2750AB 7

14. Install the hydraulic swing system (refer to **Hydraulic swing system - Install (35.352)**).
15. Install the boom (refer to **Boom - Install (84.910)**).

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Track frame and driving wheels - 130

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Tracks and track suspension - 48

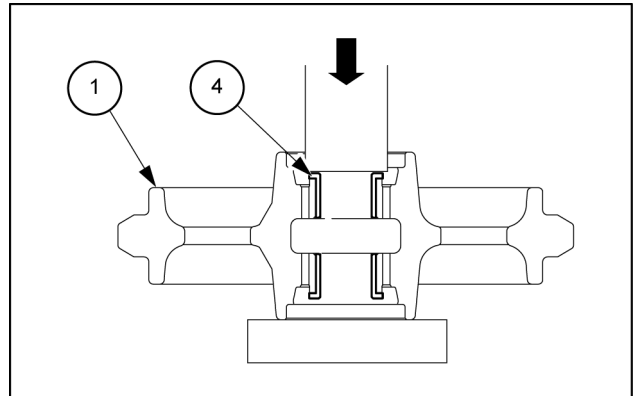
Tracks - 100

Rubber track - Adjust	8
Rubber track - Install	7
Rubber track - Remove	6
Rubber track - Service limits - Shoe	3

Idler wheel - Assemble

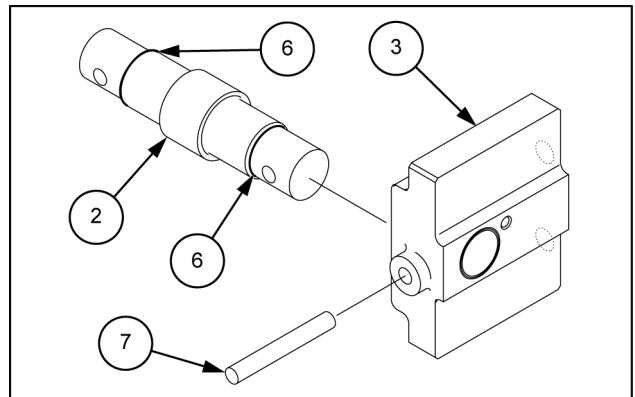
1. Clean all parts.
2. Coat the sliding surfaces of all parts with oil.
3. Cool up the bushing (4) fully by some dry ice and use a press to press it into idler wheel (1).

NOTICE: do not press the bushing (4) at the normal temperature, or not knock in with a hammer even after the cooling.



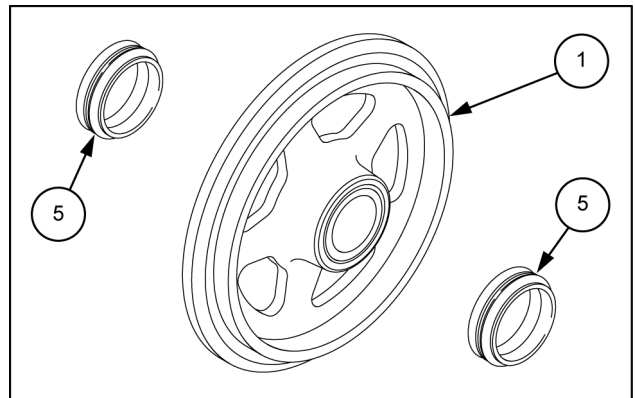
SMIL16MEX1214AB 1

4. Coat the O-ring (6) with grease thinly and install it onto the shaft (2).
5. Install the shaft (2) into the hub (3) and fasten it with the spring pin (7).



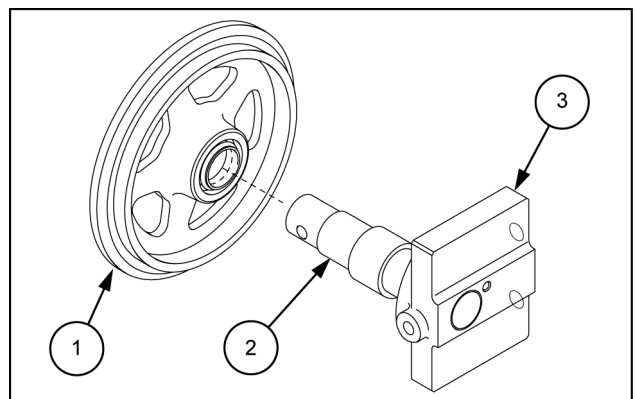
SMIL16MEX1215AB 2

6. Install the seal (5) into the idler wheel (1).



SMIL16MEX1216AB 3

7. Install the shaft (2) and the hub (3) into the idler wheel (1).



SMIL16MEX1217AB 4

Contents

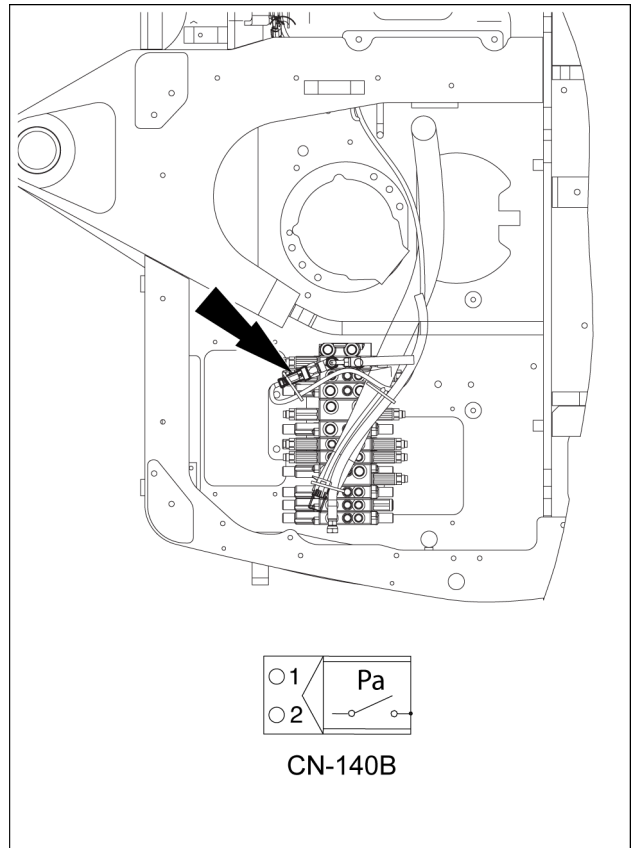
Electrical systems - 55

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[55.201] Engine starting system	55.4
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Electrical system - Component identification - Pressure switch (HQ01 2-way option)

Nominal pressure: **190 bar**

Connector: **CN-140B**



SMIL19MEX0404BB 1

Electrical system - Component identification - Cigar lighter and 12 V socket

Specification: **12 V – 10 A – 1.4 W**

Check coil resistance

Normal: About **1 M Ω**

Check contact

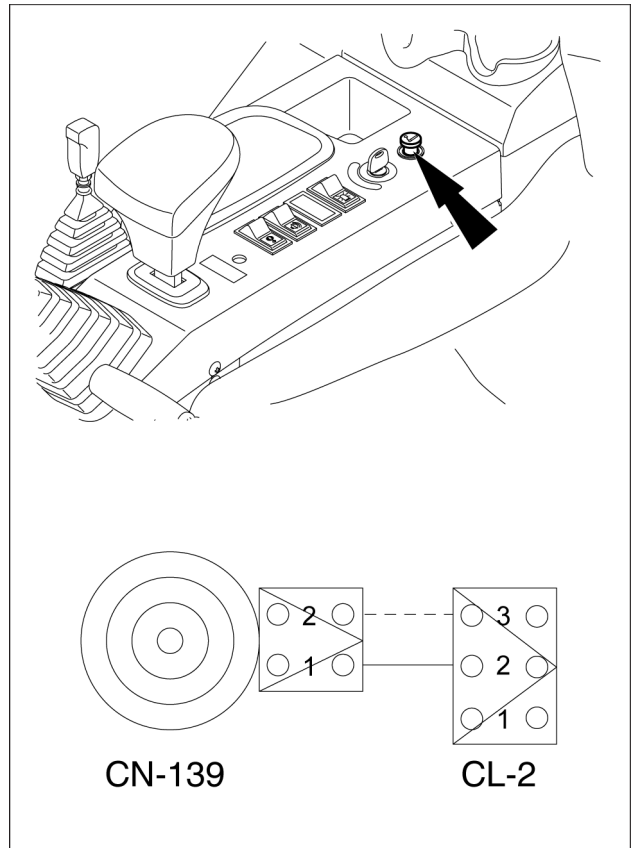
Normal: $\infty \Omega$

Operating time: **5 – 15 s**

Connector:

CL-2 (cigar lighter)

CN-139 (**12 V** socket)

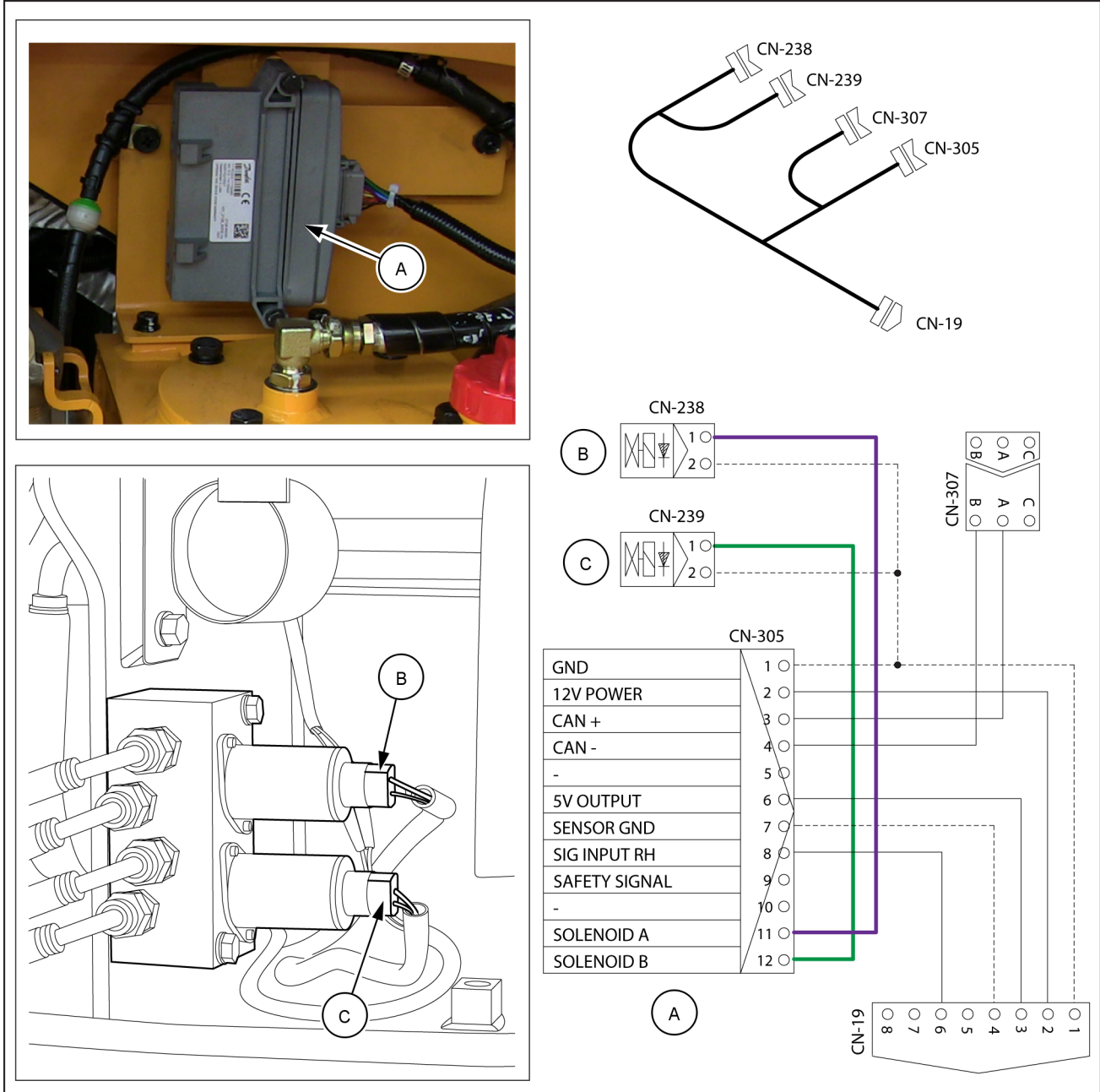


SMIL17MEX2341BB 1

Electrical system - Component identification - First auxiliary system (2-way, option)

Specification: 12 V

- A. EPPR controller (**CN-305A**)
- B. EPPR solenoid (release) (**CN-238A**)
- C. EPPR solenoid (clamp) (**CN-239A**)



SMIL19MEX0213G 1

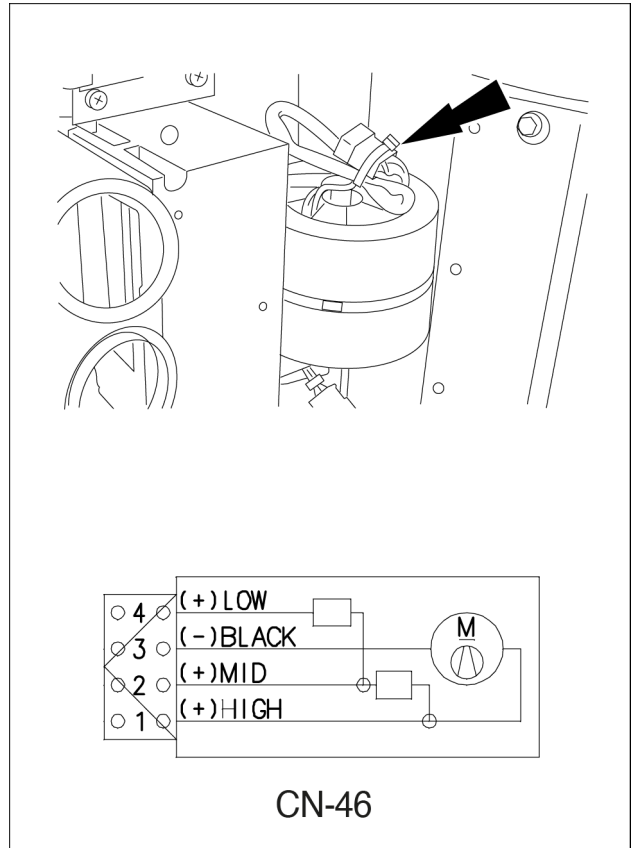
Electrical system - Component identification - Heater

CX30C Cab version

MEA --- WE

Specification: **12 V**

Connector: **CN-46**



SMIL16MEX2441BB 1

Electrical systems - Electrical system

Component	Connector	Connector type
Cab lamp (cab version)	CL-3	–
Work lamp	CL-5	DEUTSCH
Cab lamp (canopy version)	CL-9	KET
Cab lamp (canopy and options version)	CL-10	KET
Intermediate connector: main harness - fuse box	CN-2	AMP
Intermediate connector: main harness - left-hand console harness	CN-3	AMP
Intermediate connector: right-hand console harness - main harness	CN-4	AMP
Intermediate connector: main harness - cab lamp harness	CN-10	AMP
Intermediate connector: right-hand console harness - cab harness	CN-11	KET
Radio/USB player	CN-27	–
Fuse box	CN-36	–
Light switch	CS-21	SWF

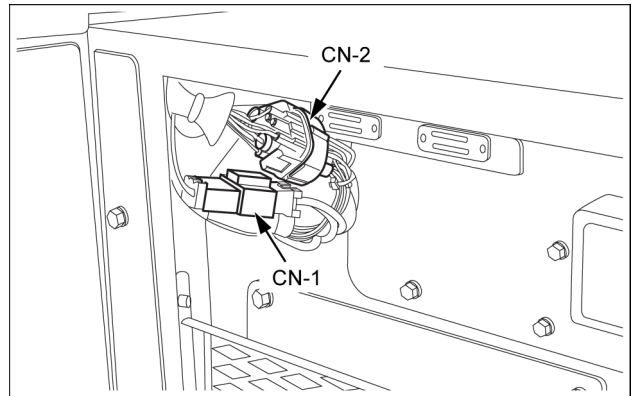
Electrical systems - Electrical system

Component	Connector	Connector type
Intermediate connector: main harness - fuse box	CN-2	AMP
Intermediate connector: main harness - left-hand console harness	CN-3	AMP
Intermediate connector: right-hand console harness - main harness	CN-4	AMP
Intermediate connector: main harness - right-hand console harness	CN-5	AMP
Intermediate connector: right-hand console harness - cab harness	CN-11	KET
Light switch	CS-21	SWF
Speaker (left-hand)	CN-23	KET
Speaker (right-hand)	CN-24	KET
Radio/USB player	CN-27	-
Fuse box	CN-36	-

Detailed view of intermediate connectors location

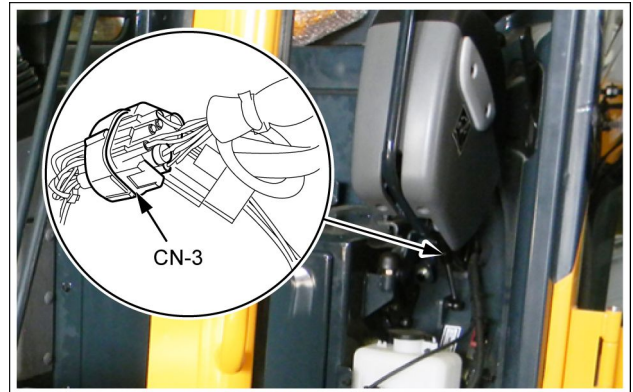
CN-1 - Connection between battery and fuse box

CN-2 - Connection between fuse box and machine devices



SMIL17MEX1245AB 6

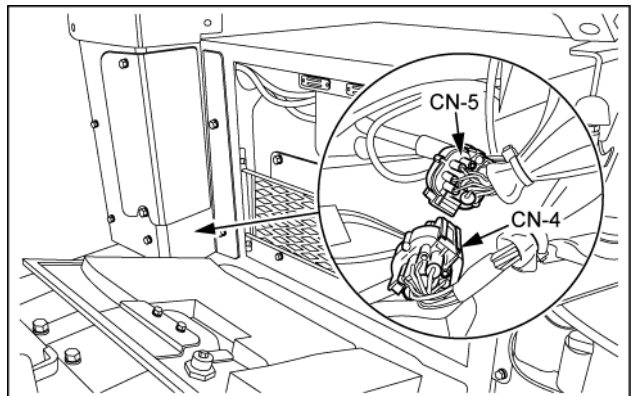
CN-3 - Connection between main harness and left-hand console harness



SMIL17MEX1246A 7

CN-4 - Connection between right-hand console harness and main harness

CN-5 - Connection between main harness and right-hand console harness



SMIL17MEX1247AB 8

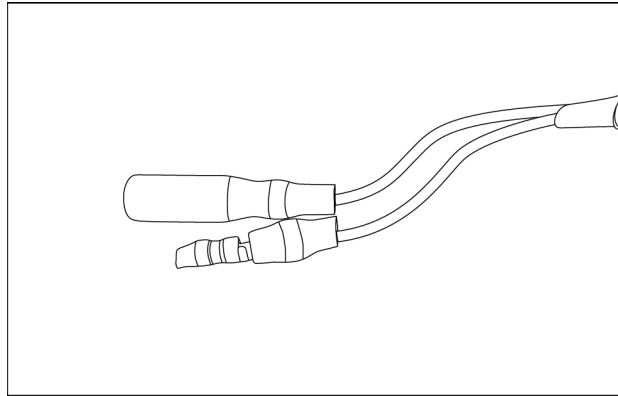
Wiring harnesses - Electrical schematic sheet 07 - Lighting switch

Type	Component	Connector/link
Connector	CN-3	CN-3 CONNECTOR : LH CONSOLE
Connector	CN-22	CN-22 CONNECTOR : WASHER P/P
Connector	CN-140	CN-140 CONNECTOR : QUICK COUPLER SOLENOID VALVE
Connector	CS-21	CS-21 CONNECTOR : LIGHT SWITCH
Connector	CS-67	CS-67 CONNECTOR : QUICK COUPLER SWITCH

Wiring harnesses - Electrical schematic sheet 14 - Option

Type	Component	Connector/link
Connector	CN-19A	CN-19A CONNECTOR
Connector	CN-19B	CN-19B CONNECTOR
Connector	CN-238A	CN-238A CONNECTOR : EPPR SOLENOID LH
Connector	CN-238B	CN-238B CONNECTOR : EPPR ROTATE L
Connector	CN-239A	CN-239A CONNECTOR : EPPR SOLENOID RH
Connector	CN-239B	CN-239B CONNECTOR : EPPR ROTATE R
Connector	CN-305A	CN-305A CONNECTOR : EPPR CONTROLLER
Connector	CN-305B	CN-305B CONNECTOR : EPPR CONTROLLER
Connector	CN-306B	CN-306B CONNECTOR : EPPR CONTROLLER
Connector	CN-307A	CN-307A CONNECTOR : SERVICE TOOL
Connector	CN-307B	CN-307B CONNECTOR : SERVICE TOOL
Connector	CN-309B	CN-309B CONNECTOR : EPPR CLAMP
Connector	CN-310B	CN-310B CONNECTOR : EPPR RELEASE

CONNECTOR CL-7A: BEACON LAMP

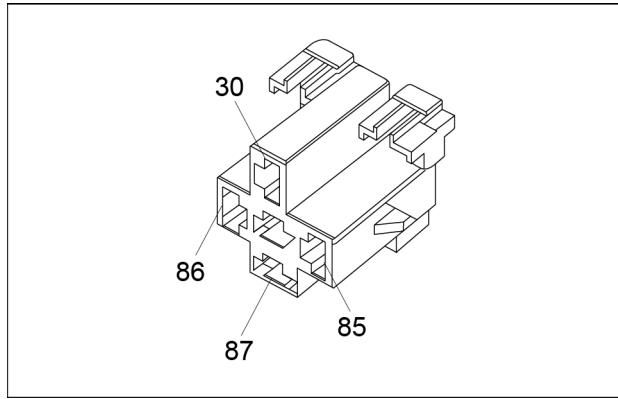


S822-014002 10

Pin	From	Wire	Description	Color-Size	Frame
1	SP546-P-X	G5B		BK-1.2	SHEET 08 - Lighting
2	CN-11M-P-8	6E		GY-1.25	

To locate the connector refer to **Harnesses and connectors - Component localization (55.100)**.

CONNECTOR CR-2: HORN RELAY (Female)

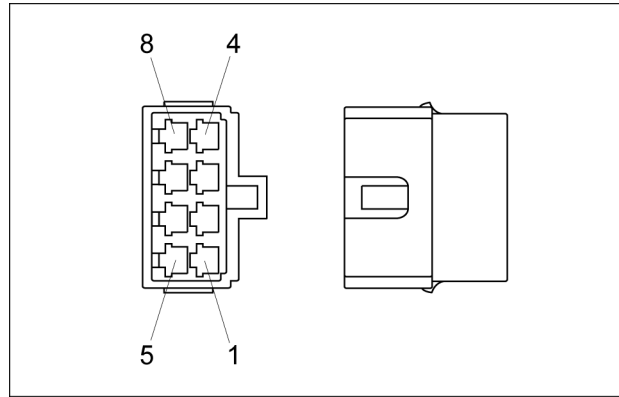


MG640927_A 24

Pin	From	Wire	Description	Color-Size	Frame
30	SP576-P-X	14C		BL/WH-0.85	SHEET 11 - Accessories
85	CN-4M-P-12	22A		OR-0.85	
86	SP576-P-X	14D		BL/WH-0.85	
87	CN-20-P-2	49		BL-0.85	

To locate the connector refer to **Harnesses and connectors - Component localization (55.100)**.

CONNECTOR CN-11: CABIN HARNESS (Male)

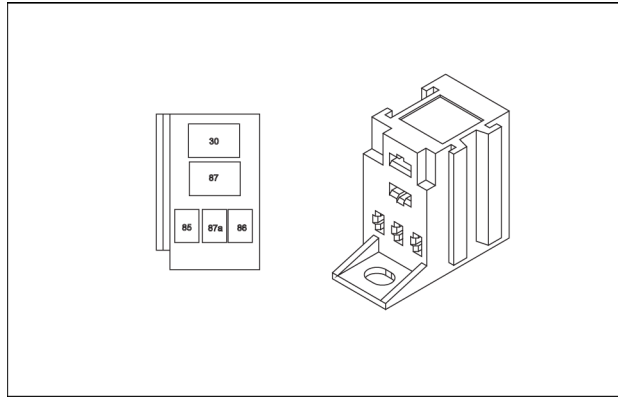


S810-108202 7

Pin	From	Wire	Description	Color-Size	Frame
1	SP541-P-X	1P		BR/WH-0.8	SHEET 08 - Lighting
2	CN-27-P-1	2H		RD/WH-0.8	
3	SP549-P-X	3C		RD-2.0	
7	SP548-P-X	G1C		BK-2.0	
8	CL-7A-P-2	6E		GY-1.25	

To locate the connector refer to **Harnesses and connectors - Component localization (55.100)**.

CONNECTOR CN-140A: QUICK COUPLER RELAY

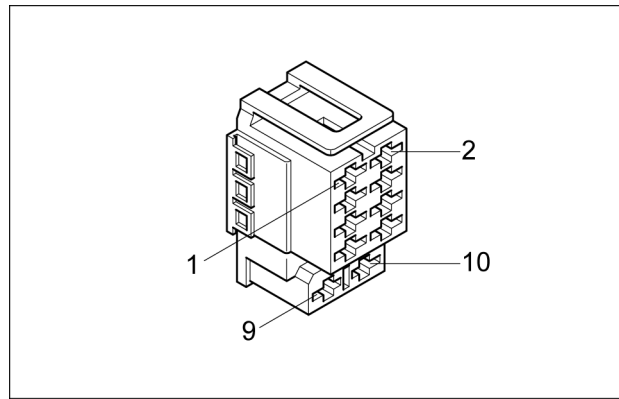


SMIL19MEX0399AA 21

Pin	From	Wire	Description	Color-Size	Frame
30	CN-140C-P-2	003		WH-0.75	SHEET 15 - Quick coupler HQ01 2-way option
30	CN-140A-P-86	003		WH-0.75	
85	CN-140-P-1	002		WH-0.75	
85	CN-140C-P-1	002		WH-0.75	
86	CN-140B-P-2	003		WH-0.75	
86	CN-140A-P-30	003		WH-0.75	
87	CN-140B-P-1	001		WH-0.75	
87	CN-140-P-2	001		WH-0.75	
87A	-	-		-	

To locate the connector refer to **Electrical system - Component identification - Quick coupler relay (HQ01 2-way option) (55.000)**.

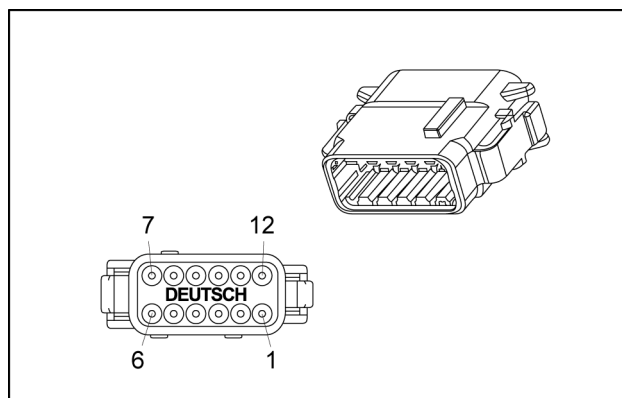
CONNECTOR CS-23: BEACON SWITCH (Female)



SWF593757 11

Pin	From	Wire	Description	Color-Size	Frame
1	SP644-P-X	32B		GY-0.85	SHEET 06 - Lighting switch
5	SP530-P-X	10E		BL-0.85	
9	SP644-P-X	32C		GY-0.85	
10	SP715-P-X	G14		BK-0.85	SHEET 04 - Grounding

To locate the connector refer to **Harnesses and connectors - Component localization (55.100)**.

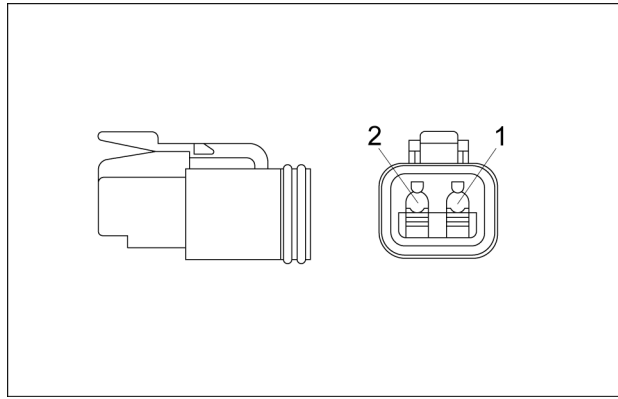
CONNECTOR CN-305B: EPPR CONTROLLER (Female)

DTM06-12SX 6

Pin	From	Wire	Description	Color-Size	Frame
1	SP665-P-X	G7AB		BK-1.25	SHEET 05 - Drives-solenoid
2	CN-19B-P-2	1AB		GN-1.25	
3	CN-307B-P-A	6AB		BL/WH-0.85	
4	CN-307B-P-B	7AB		YE/WH-0.85	
6	SP666-P-X	G2AB		BK-1.25	
8	CN-19B-P-3	2AB		RD-0.85	
9	CN-19B-P-4	3AB		BK/RD-0.85	
10	CN-19B-P-5	4AB		WH/RD-0.85	
11	CN-19B-P-6	5AB		WH-0.85	
12	SP666-P-X	G3AB		BK-1.25	

To locate the connector refer to **Harnesses and connectors - Component localization (55.100)**.

CONNECTOR CN-68: SAFETY SOLENOID VALVE (Female)



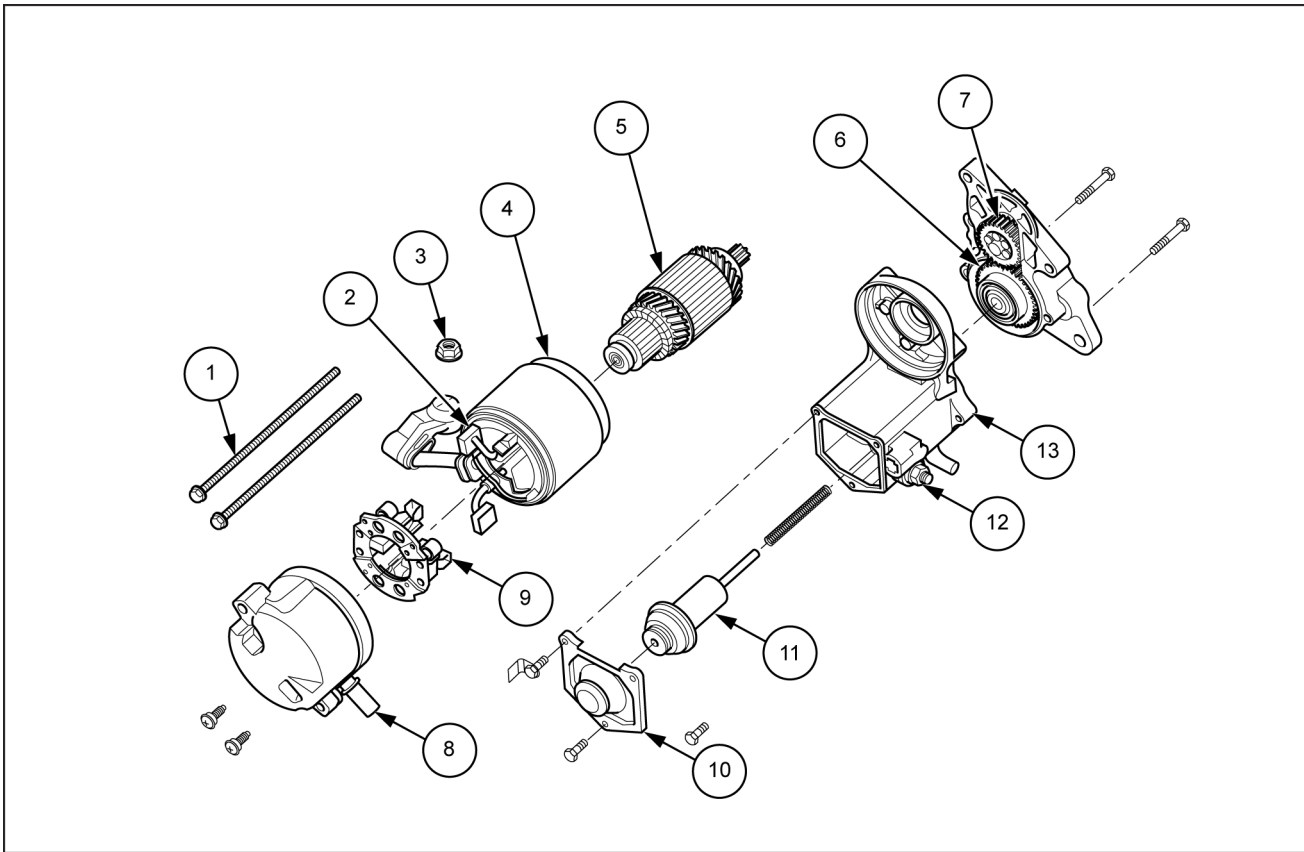
DT06-2S 2

Pin	From	Wire	Description	Color-Size	Frame
1	SP604-P-X	G44		BK-0.85	SHEET 04 - Grounding
2	SP603-P-X	37		BL-0.85	SHEET 05 - Drives-solenoid

To locate the connector refer to **Harnesses and connectors - Component localization (55.100)**.

- A. If the solenoid is not operative, proceed to step 4.
 - B. If the solenoid is operative, the hydraulic system is defective. Check the hydraulic system.
4. Turn OFF the starter switch.
Disconnect the connector **CN-70**.
Measure the resistance between terminal 1 and 2 of the connector **CN-70**.
- A. If the resistance is within **15 – 25 Ω** , the cluster is defective. Replace it (refer to **Instrument cluster - Remove (55.408)**).
 - B. If the resistance is not within **15 – 25 Ω** , the solenoid is defective. Replace it (refer to **Pilot solenoid valve block - Remove (35.357)**).

Gear reduction type



SMIL16MEX0836FB 2

NOTE: apply grease (*DENSO.CO.LTD. No. 50 or equivalent*) to the idle gear and overrunning clutch portions.

1. Install the plunger (11).
2. Install the magnet switch cover (10).
3. Install the overrunning clutch (6) and the idle gear (7).
4. Install the housing (13).
5. Draw in the armature (5) into the yoke (4).
6. Install the brush holder (9).
7. Install the brush (2) into the brush holder (9) while holding the brush spring up.

NOTE: make sure not to damage the brush (2) and the commutator.

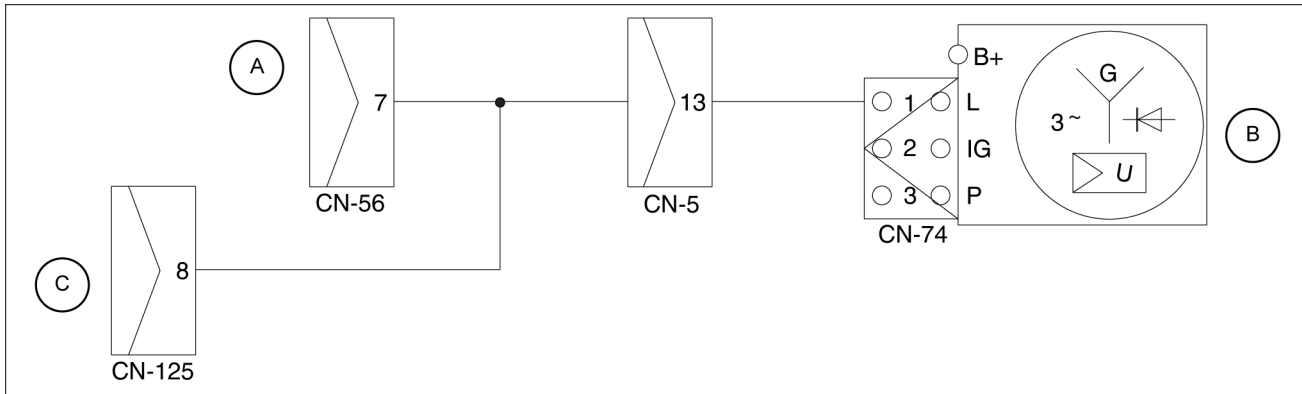
8. Install the end frame (8).
9. Install the motor by means of the two screws (1).
10. Connect the connecting lead by means of the C terminal nut (3).
11. Connect the B terminal.

B terminal nut (12) tightening torque: **5.88 – 11.8 N·m (4.3369 – 8.7032 lb ft)**

Battery - Service instruction - Troubleshooting

Battery charging warning lamp lighting up

- Before disconnecting the connector, always turn OFF the starter switch.
- Before carrying out below procedure, check all the related connectors are properly inserted.
- After checking, insert the disconnected connectors again immediately unless otherwise specified.



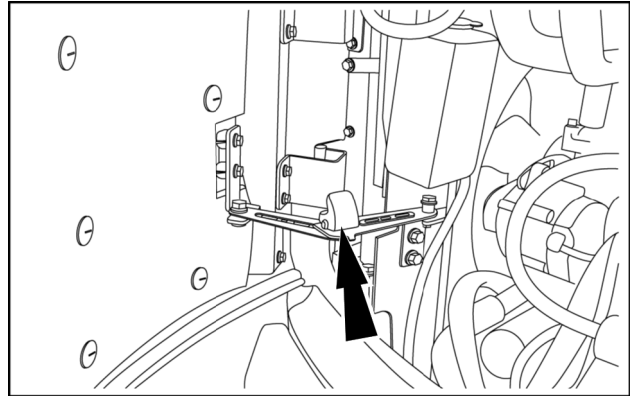
SMIL17MEX2316EB 1

- A. Cluster
 B. Alternator
 C. GPS Telematics

Engine is running.

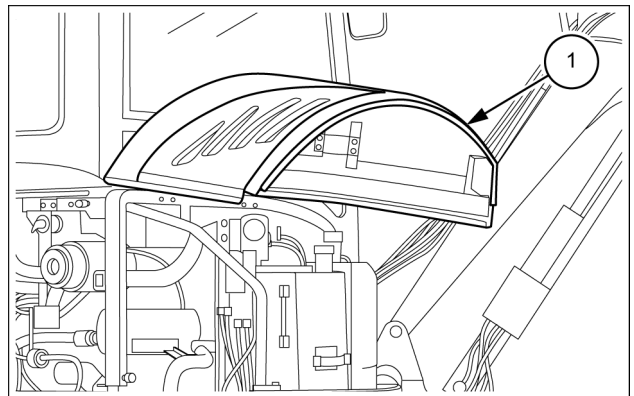
1. Measure the voltage between alternator terminal 1 of the connector **CN-74** and the ground.
 - A. If the voltage is within **10 – 12.5 V**, proceed to step 2.
 - B. If the voltage is not within **10 – 12.5 V**, the alternator is defective. Replace it (refer to **Alternator - Remove (55.301)**).
2. Measure the voltage between terminal 13 of the connector **CN-5** and the ground.
 - A. If the voltage is within **10 – 12.5 V**, proceed to step 3.
 - B. If the voltage is not within **10 – 12.5 V**, there is a disconnection in the wiring harness or a poor contact between terminal 13 of the connector **CN-5** and the alternator terminal 1 of the connector **CN-74**. Repair or replace it, after clean.
3. Measure the voltage between terminal 7 of the connector **CN-56** and the ground.
 - A. If the voltage is within **10 – 12.5 V**, the cluster is defective. Replace the cluster (refer to **Instrument cluster - Remove (55.408)**).
 - B. If the voltage is not within **10 – 12.5 V**, there is a disconnection in the wiring harness or a poor contact between terminal 7 of the connector **CN-56** and terminal 13 of the connector **CN-5**. Repair or replace it, after clean.

2. Use the starter key to unlock the engine door.
3. Use the handle to open the door and press the hook until the door is completely secured.



SMIL16MEX0929AA 2

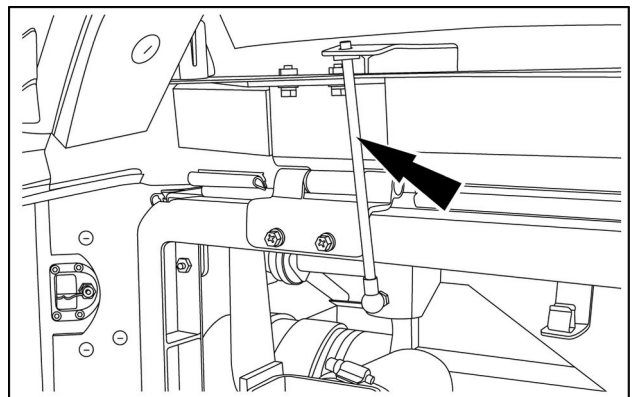
4. Use the starter key to unlock the side hood (1).
5. Use the hook to gently lift up the hood (1).



SMIL16MEX3040AB 3

6. Use the lifting stem to secure the hood.

NOTICE: while lifting the hood, make sure the hood does not contact the cab. Machine damage could result.



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Windshield wiper motor	
Replace	4
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Wiper switches	
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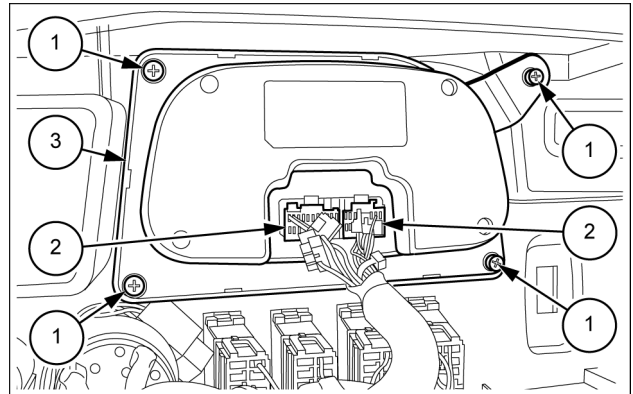
External lighting switches and relays - 405

SERVICE

Work light switch	
Replace	3

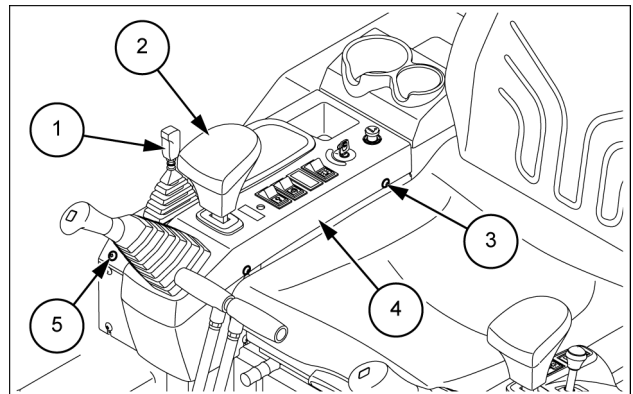
Instrument cluster - Install

1. Use a screwdriver to install the cluster by means of the four screws **(1)**.
2. Connect the connectors **CN-56 (2)** to the cluster **(3)**.



SMIL17MEX2325AB 1

3. Install the panel **(4)** by means of the screws **(3)** and the screw **(5)**.
4. Install the knob **(1)** of the dozer blade control lever and the armrest **(2)**.



SMIL17MEX2315AB 2

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Dipper - Remove

⚠ WARNING

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

W0944D

⚠ WARNING

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

W0287A

⚠ WARNING

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

W1036A

⚠ WARNING

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

W0256A

⚠ WARNING

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

W0398A

5. Install the arm links (9). Insert the O-ring and the shims, and then push the pin (6) on the arm links (9) and the arm (8).

- When inserting the pin, be careful not to damage the installed O-rings or dust seals.

6. Install the bolt (5), and then use two wrenches [17 mm] to tighten the two nuts (7).

Tightening torque for bolt (5) and nuts (7) installation: **54.4 – 81.6 N·m (40.1 – 60.2 lb ft)**

NOTICE: pay attention to the bolt (5) head's direction.

7. Install the bucket link (4).

8. Insert the O-ring and the shim, and then push the pin (2) on the links (4) (9) and the bucket cylinder (10).

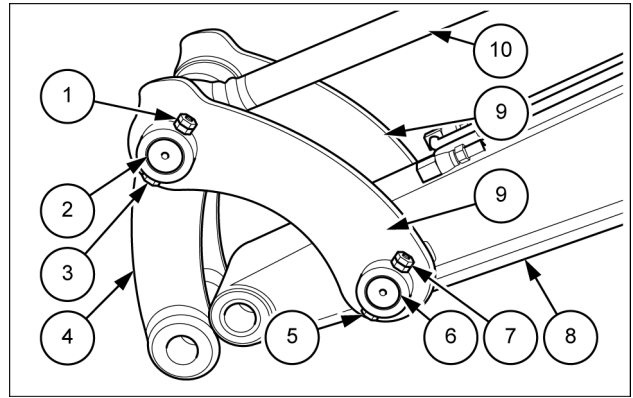
- When inserting the pin, be careful not to damage the installed O-rings or dust seals.

9. Install the bolt (3), and then use two wrenches [17 mm] to tighten the two nuts (1).

Tightening torque for bolt (3) and nuts (1) installation: **54.4 – 81.6 N·m (40.1 – 60.2 lb ft)**

NOTICE: pay attention to the bolt (3) head's direction.

10. Install the bucket (refer to **Bucket - Install (84.100)**).



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