Machine specifications

Engine

Model	Yanmar 4TNV98C
Type	4-cycle diesel engine, low emission
Cooling method	Water cooling
Number of cylinders and arrangement	4 cylinders, in-line
Firing order	1 - 3 - 4 - 2
Combustion chamber type	Direct injection type
Cylinder bore x stroke	**98 mm** (**3.86 in**) x **110 mm** (**4.33 in**)
Piston displacement	**3319 cm³** (**203 in³**)
Compression ratio	18.5 : 1
Rated gross horse power (SAE J1995)	**49.9 kW** (**67.8 Hp**) at **2400 RPM**
Maximum torque at **1550 RPM**	**235.4 N·m** (**173.7 lb ft**)
Engine oil quantity	**11.6 L** (**3.1 US gal**)
Dry weight	**270 kg** (**595 lb**)
High idling speed	**2300 – 2350 RPM**
Low idling speed	**900 – 1100 RPM**
Rated fuel consumption	176 g/Hp·hr at **2400 RPM**
Starting motor	**12 V**, **3.0 kW**
Alternator	**12 V**, **100 A**
Battery	1 x **12 V** x **100 A·h**

Main pump

Type	Variable displacement tandem axis piston pumps
Capacity	2 x **27.5 cm³/rev** (**1.7 in³/rev**)
Maximum pressure	**21581 kPa** (**3130 psi**)
Rated oil flow	2 x **57.8 L/min** (**15.3 US gpm**)
Rated speed	**2100 RPM**

Gear pump

Type	Fixed displacement gear pump single stage
Capacity	**18.3 – 22.8 cm³/rev** (**1.1 – 0.3 in³/rev**)
Maximum pressure	**21581 kPa** (**3130 psi**)
Rated oil flow	**38.4 – 47.9 L/min** (**10.1 – 12.7 US gpm**)

Main control valve

Type	Sectional, 9 spools
Operating method	Hydraulic pilot system
Main relief valve pressure	**21581 kPa** (**3130 psi**)
Overload relief valve pressure	**23511 kPa** (**3410 psi**)

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Component	Reference
1. EGR temperature sensor	**Electrical system - Component identification - EGR and intake temperature sensor (55.000)**
2. Intake throttle valve	**Electrical system - Component identification - Intake throttle valve (55.000)**
3. Intake temperature sensor	**Electrical system - Component identification - EGR and intake temperature sensor (55.000)**
4. Crankshaft speed sensor	**Electrical system - Component identification - Crankshaft speed sensor (55.000)**
5. EGR valve connector	**Electrical system - Component identification - EGR valve (55.000)**
6. Engine oil pressure switch	**Electrical system - Component identification - Engine oil pressure switch (55.000)**
7. Fuel temperature sensor	**Electrical system - Component identification - Fuel temperature sensor (55.000)**
8. Pump discharge control valve	-
9. Camshaft speed sensor	**Electrical system - Component identification - Camshaft speed sensor (55.000)**
10. Rail pressure sensor	**Electrical system - Component identification - Rail pressure sensor (55.000)**
11. Coolant temperature sensor	**Electrical system - Component identification - Coolant temperature sensor (55.000)** **Engine coolant temperature sensor and switch - Remove (55.012)**
12. New air temperature sensor	**Electrical system - Component identification - New air temperature sensor (55.000)**
13. EGR pressure sensor	**Electrical system - Component identification - EGR pressure sensor (55.000)**
14. Exhaust temperature sensor	**Electrical system - Component identification - Exhaust temperature sensor (55.000)**
15. DPF inlet temperature sensor	**Electrical system - Component identification - DPF inlet temperature sensor (55.000)**
16. DPF middle temperature sensor	**Electrical system - Component identification - DPF middle temperature sensor (55.000)**
17. DPF differential pressure sensor	**Electrical system - Component identification - DPF differential pressure sensor (55.000)**
18. Fuel injectors	**Electrical system - Component identification - Fuel injection system (55.000)**

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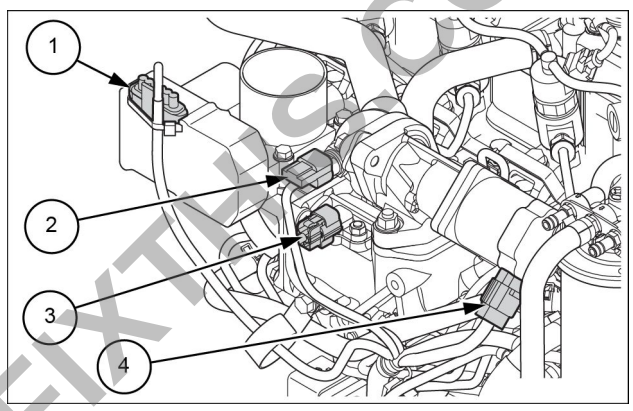
Cylinder heads - Disassemble

Prepare a clean, flat working surface on a workbench large enough to accommodate the cylinder head assembly. Discard all gaskets, O-rings and seals. Use new gaskets, O-rings and seals on reassembly of the cylinder head.

1. Drain the coolant from the engine into a suitable container.

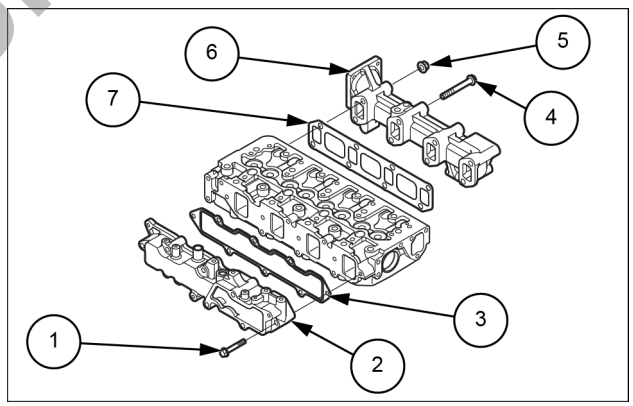
NOTE: *identify all parts and their location using an appropriate method. It is important that all parts are returned to the same position during the reassembly process.*

2. Disconnect the intake throttle connector **(1)**, the air temperature sensor **(2)**, the Exhaust Valve Recirculation (EGR) **(3)** and the EGR valve connector **(4)**.
3. Disconnect the fuel pipes from the fuel filter, if the fuel filter is mounted on the intake manifold.
4. Remove the intake air throttle, EGR valve and fuel filter on the intake manifold if required (discard the all gasket).



SMIL16MEX2490AB 1

5. Remove the intake manifold bolts **(1)**.
   Remove the intake manifold **(2)**.
   Discard the intake manifold gasket **(3)**.
6. Disconnect the electrical wire from the diesel particulate filter if mounted.
7. Remove the diesel particulate filter from the engine (discard the all gasket).
8. Remove the exhaust manifold bolts **(4)** and nuts **(5)**.
   Remove the exhaust manifold **(6)** and the exhaust manifold gasket **(7)**.
9. Remove the coolant pump. (Refer to **Water pump - Disassemble (10.400)**)
10. Remove the high-pressure lines and fuel injectors from the cylinder head. (Refer to **Fuel injectors - Remove (10.218)**)



SMIL16MEX2489AB 2

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Fuel injection system - Torque

Torque chart for major bolts and nuts

Component	Thread diameter and pitch	Tightening torque	Lubricating oil application (Thread portion and seat surface)
Fuel injector retainer bolt	M8 × 1.25	**24.4 – 28.4 N·m** (**18.0 – 20.9 lb ft**)	Not applied
Supply pump drive gear nut	M18 × 1.5	**75 – 85 N·m** (**55.3 – 62.7 lb ft**)	Not applied
Fuel high pressure pipe nut	M12 × 1.5 (Rail)	**29.4 – 34.3 N·m** (**21.7 – 25.3 lb ft**)	Not applied
	M12 × 1.5 (Injector)	**26.5 – 31.4 N·m** (**19.5 – 23.2 lb ft**)	Not applied
	M16 × 1.0 (Supply pump)	**29.4 – 34.3 N·m** (**21.7 – 25.3 lb ft**)	Not applied
Ball joint bolt	M8	**12.7 – 16.7 N·m** (**9.4 – 12.3 lb ft**)	Not applied
	M10	**19.6 – 25.4 N·m** (**14.5 – 18.7 lb ft**)	Not applied
	M12	**24.5 – 34.3 N·m** (**18.1 – 25.3 lb ft**)	Not applied
	M14	**39.2 – 49.0 N·m** (**28.9 – 36.1 lb ft**)	Not applied
	M16	**49.0 – 58.8 N·m** (**36.1 – 43.4 lb ft**)	Not applied
Hexagon bolt (7T) and nut	M6 × 1.0	**9.8 – 11.8 N·m** (**7.2 – 8.7 lb ft**)	• Apply **80%** torque when tightened to aluminum alloy. • Apply **60%** torque for 4T and check nut.
	M8 × 1.25	**22.6 – 28.4 N·m** (**16.7 – 20.9 lb ft**)	
	M10 × 1.5	**44.1 – 53.9 N·m** (**32.5 – 39.8 lb ft**)	
	M12 × 1.75	**78.4 – 98 N·m** (**57.8 – 72.3 lb ft**)	

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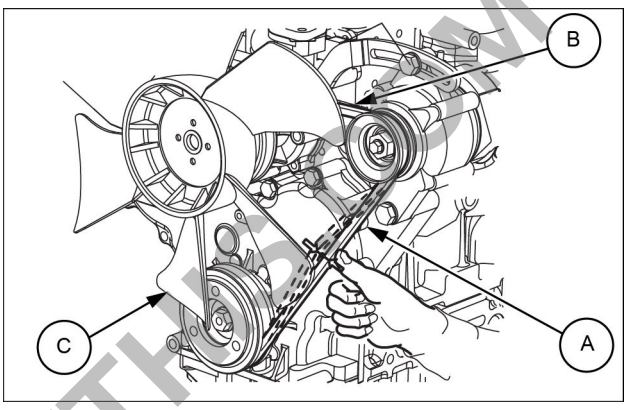
Belt - Inspect

The belt will slip if it does not have the proper tension. This will prevent the alternator from generating sufficient power. Also, the engine will overheat due to the engine coolant pump pulley slipping.

Check and adjust the belt tension (deflection) as follows:

1. Press the belt down with your thumb with a force of approximately **98 N·m** (**72 lb ft**) to check the deflection. There are three positions to check for belt tension **(A)**, **(B)** and **(C)**. You can check the tension at whichever position is the most accessible. The proper deflection of a used belt at each position is:

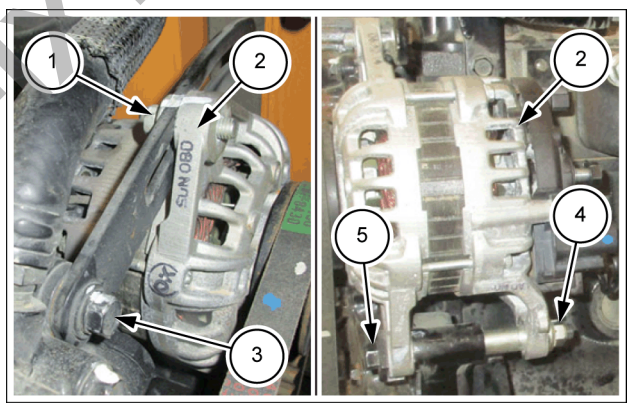
Used belt tension	
(A)	**10 – 14 mm** (**0.4 – 0.6 in**)
(B)	**7 – 10 mm** (**0.3 – 0.4 in**)
(C)	**9 – 13 mm** (**0.4 – 0.5 in**)



SMIL16MEX3356AB 1

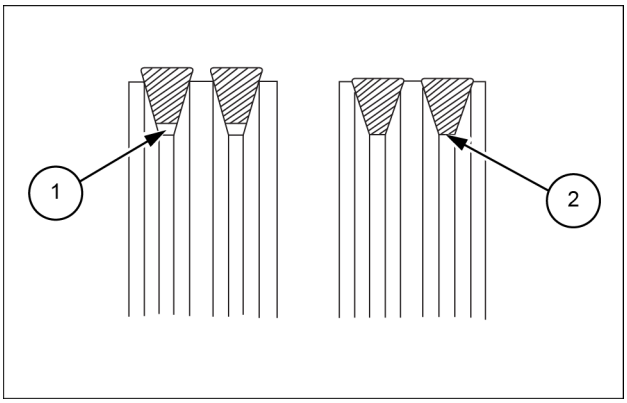
NOTE: *a used belt refers to a belt which has been used on a running engine for five minutes or more.*

2. If necessary, adjust the belt tension. Loosen the adjusting bolt **(1)** and the other related bolts **(3)** and **(5)** and/or nut **(4)**, then move the alternator **(2)** with a pry bar to tighten the belt to the desired tension. Then tighten the adjusting bolts and/or nuts.



SMIL18MEX0034A 2

3. Tighten the belt to the proper tension. There must be clearance **(1)** between the belt and the bottom of the pulley groove. If there is no clearance **(2)** between the belt and the bottom of the pulley groove, replace the belt.



SMIL16MEX3301AB 3

4. Check the belt for cracks, oil or wear. If any of these conditions exist, replace the belt.
5. Install the new belt. Refer to the table for proper tension.

New belt tension	
(A)	**8 – 12 mm** (**0.3 – 0.5 in**)
(B)	**5 – 8 mm** (**0.2 – 0.3 in**)
(C)	**7 – 11 mm** (**0.3 – 0.4 in**)

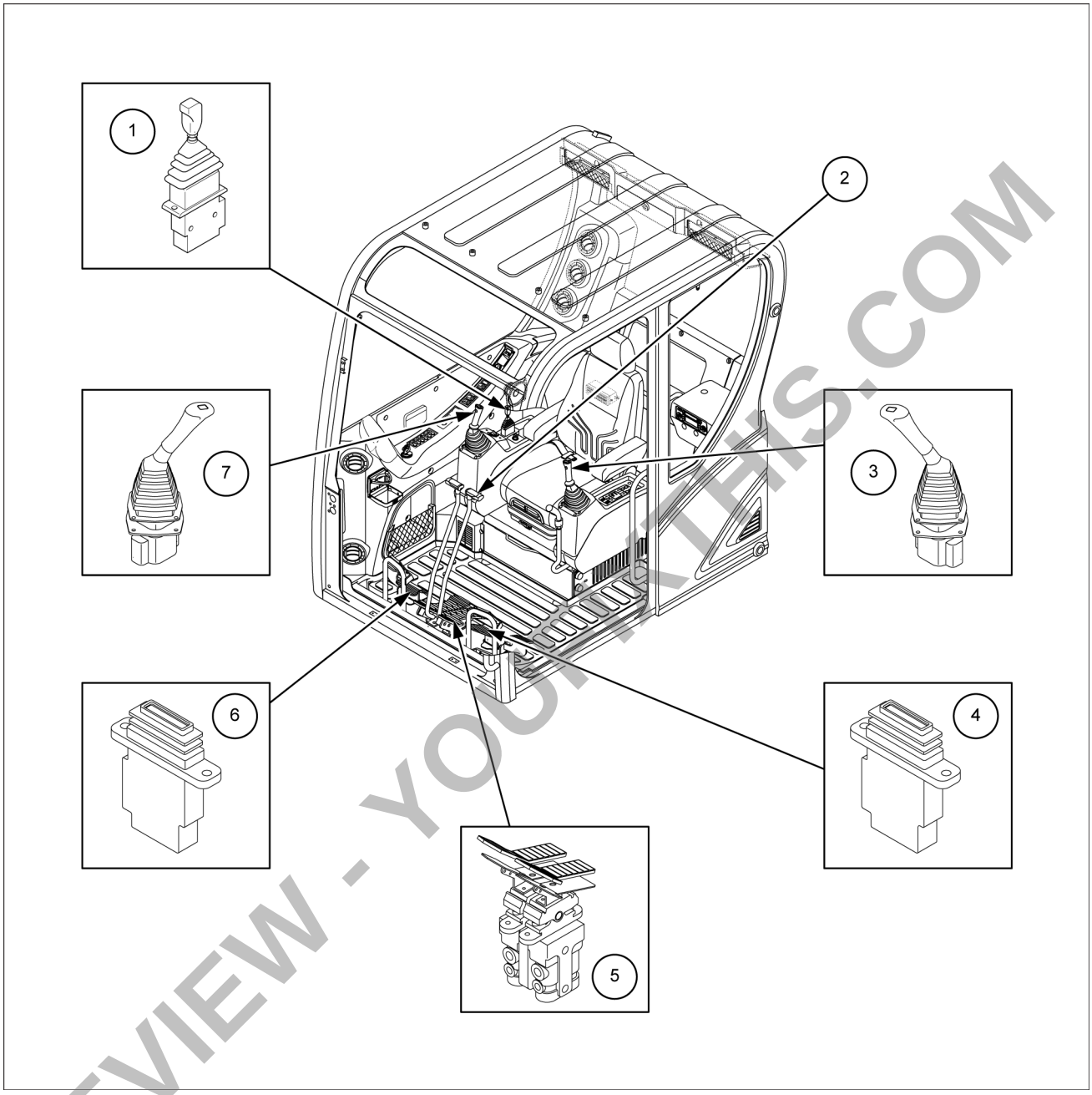
6. After adjusting, run the engine for **5 min** or more. Check the tension again using the specifications for a used belt.

Used belt tension	
(A)	**10 – 14 mm** (**0.4 – 0.6 in**)
(B)	**7 – 10 mm** (**0.3 – 0.4 in**)
(C)	**9 – 13 mm** (**0.4 – 0.5 in**)

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Cabin view



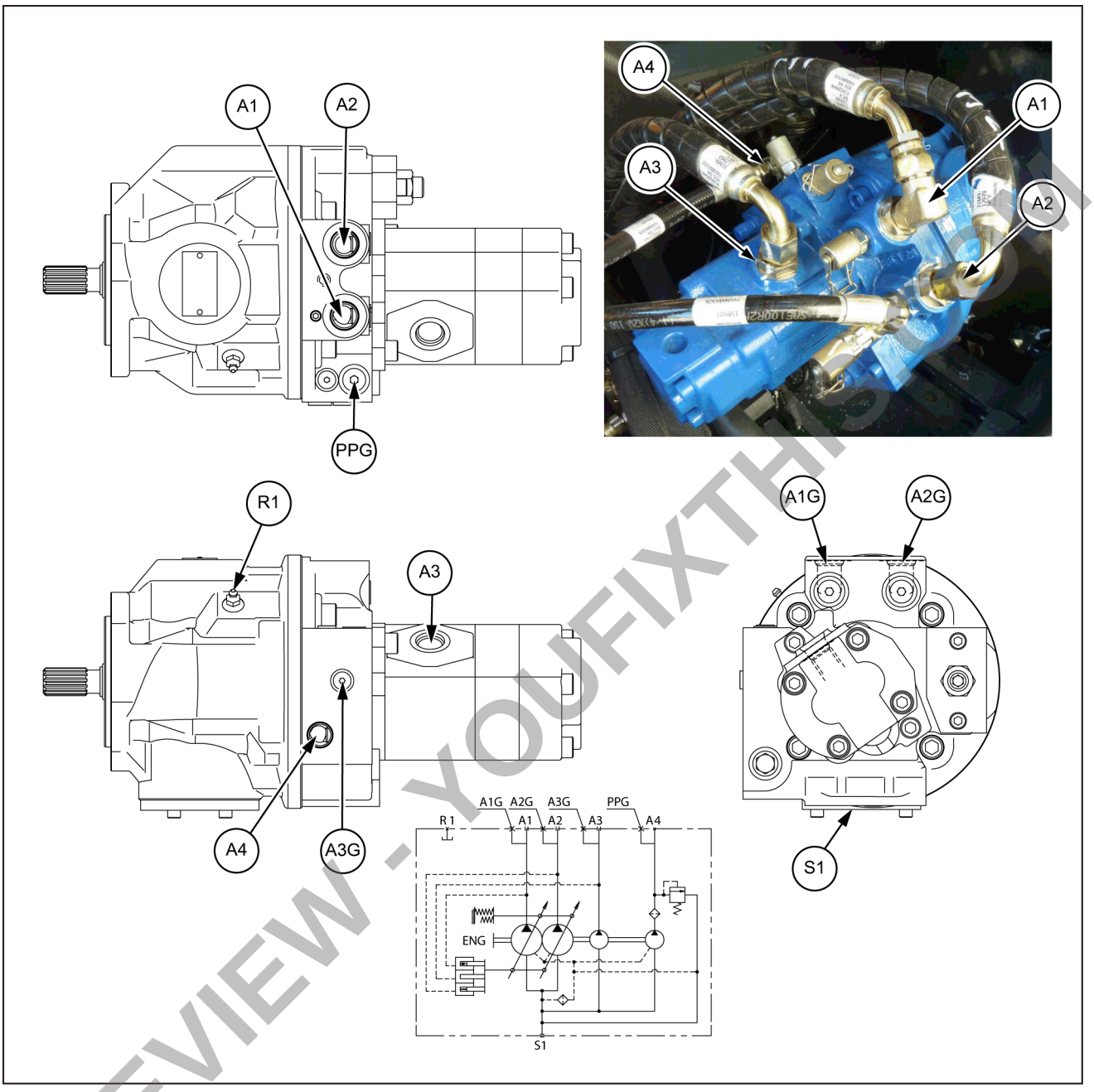
SMIL17MEX3044GB 3

	Component	Reference
1.	Dozer blade hand control lever	–
2.	Travel control levers	–
3.	Left-hand control lever	• **Hand control - Overview (35.355)**
4.	Auxiliary pedal (optional)	–
5.	Travel control pedals	–
6.	Boom swing pedal	–
7.	Right-hand control lever	• **Hand control - Overview (35.355)**

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Pump - Overview



SMIL17MEX3037GB 1

Port	Port name	Port size
S1	Suction port	SAE 1 1/2 (standard)
A1, A2	Discharge port	PF 1/2
A3	Discharge port	PF 1/2
A4	Discharge port	PF 1/4
A1G, A2G	Gauge port	PF 1/4 With quick coupler
A3G	Gauge port	PF 1/8 With quick coupler
A4G	Gauge port	PF 1/4 With quick coupler
R1	Air bleeder port	M10 × 1.0 (with bleeder valve)

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Hand control - Dynamic description

Basic functions

The pilot valve is a valve that controls the spool stroke, direction, etc of a main control valve. This function is carried out by providing the spring at one end of the main control valve spool and applying the output pressure (secondary pressure) of the pilot valve to the other end.
For this function to be carried out satisfactorily, the pilot valve is composed of the following elements.

1. Inlet port P where oil is supplied from hydraulic pump.
2. Output ports 1, 2, 3 and 4 to apply pressure supplied from inlet port to ends of control valve spools.
3. Tank port (T) necessary to control the above output pressure.
4. Spool to connect output port to inlet port or tank port.
5. Mechanical means to control output pressure, including springs that work on the above spools.

Functions of major sections

The functions of the spool **(3)** are to receive the supply oil pressure from the hydraulic pump at its port P, and to change over oil paths to determine whether the pressure oil of port P is led to output ports 1, 2, 3 & 4 or the output port pressure oil to tank port T.
The spring **(5)** works on this spool to determine the output pressure.
The change the deflection of this spring, the push rod **(8)**, **(10)** is inserted and can slide in the plug **(13)**.
For the purpose of changing the displacement of the push rod through the swash plate **(19)** and adjusting nut **(20)** are provided the handle **(22)** that can be tilted in any direction around the fulcrum of the universal joint **(18)** center.
The spring **(9)** works on the case **(1)** and spring seat **(6)**, **(12)** and tries to return the push rod **(8)**, **(10)** to the zero-displacement position irrespective of the output pressure, securing its resetting to the center position.
This also has the effect of a reaction spring to give appropriate control feeling to the operator.

Operation

The operation of the pilot valve will be described on the basis of the hydraulic circuit diagram shown below and the attached operation explanation drawing.
The diagram shown below is the typical application example of the pilot valve.

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Swing reduction motor - Disassemble

⚠ WARNING

Pressurized system!
Before attempting any service procedure, it is your responsibility to know the number of accumulators on the machine, and the correct procedure for releasing the pressure of each accumulator.
Failure to comply could result in death or serious injury.

W0136A

⚠ 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

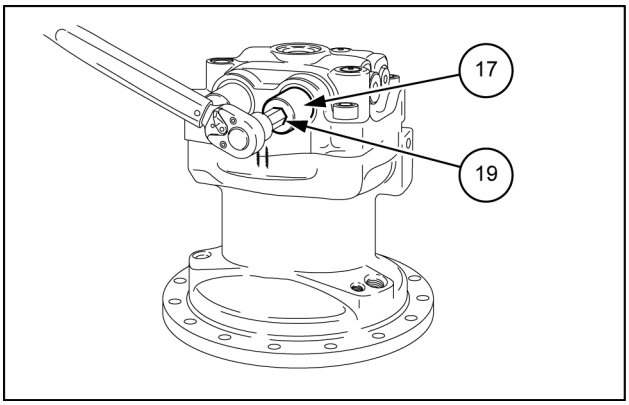
Chemical hazard!
When handling fuel, lubricants, and other service chemicals, follow the manufacturer's instructions. Wear Personal Protective Equipment (PPE) as instructed. Do not smoke or use open flame. Collect fluids in proper containers. Obey all local and environmental regulations when disposing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

W0371A

For the numbering refer to **Swing reduction motor - Sectional view (35.352)**.

Removal of relief valve assembly

1. Use an hexagonal wrench [**14 mm**] to remove plug **(19)** of relief valve assembly **(17)**.
   - Assemble the removed relief valve assembly **(17)** to original state when reassembling.



SMIL16MEX1978AB 1

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Boom hydraulic system - Service instruction - Troubleshooting

Boom, arm or bucket cylinder extends or contracts itself and attachment falls

1. Check the quality of the hydraulic oil or equivalent.
   A. If the quality of the hydraulic oil or equivalent is high, proceed to step 2.
   B. If the quality of the hydraulic oil or equivalent is low, replace with genuine hydraulic oil or equivalent.
2. Measure the temperature of the hydraulic oil.
   A. If the temperature of the hydraulic oil is equal or lesser than **80 °C** (**176.0 °F**) , proceed to step 3.
   B. If the temperature of the hydraulic oil is more than **80 °C** (**176.0 °F**), locate the cause of the hydraulic oil temperature rise and lower it to proper level.
3. Check the variation of the symptom when the port relief valve is replaced with a normal valve.
   A. If the symptom does not change, proceed to step 4.
   B. If the symptom does change, the port relief valve is faulty. Disassemble and repair or replace it.
4. Check the return spring of the control valve.
   A. If the return spring of the control valve is normal, proceed to step 5.
   B. If the return spring of the control valve is not normal, the return spring of the control valve is faulty. Disassemble and replace it.
5. Measure the internal leakage of the cylinder.
   A. If the internal leakage of the cylinder is within the standard value, proceed to step 6.
   B. If the internal leakage of the cylinder is not within the standard value, the cylinder is faulty. Disassemble and repair it. Refer to **Boom cylinder - Disassemble (35.736)**.

      NOTE: *for the standard value, see* ***Hydraulic systems - Test - Dig function drift (35.000)****.*
6. Disassemble the check valve in the hydraulic circuit.
   Check for any faulty of the valve.
   A. If the check valve is not faulty, the pressure tightness between the control valve casing and the spool is poor. Disassemble and repair it.
   B. If the check valve is faulty, the contact surface between poppet and the seat is poor. Disassemble and repair it.

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Track chain - Adjust

⚠ WARNING

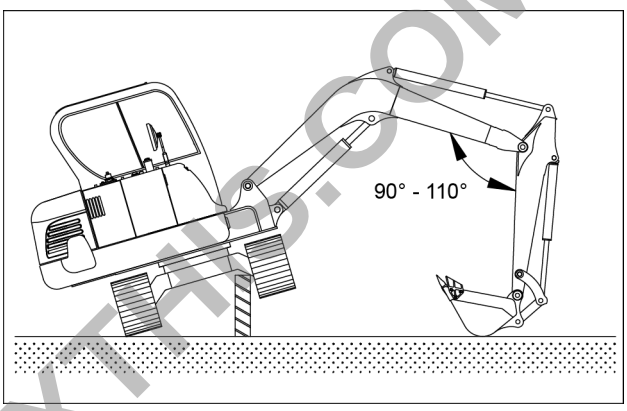
Tip-over hazard!
Only raise the track as little as necessary.
Failure to comply could result in death or serious injury.

W0276A

NOTICE: *if the tracks are too tight, they wear quickly. If tracks are not tight enough, they wear quickly and the links can catch on the sprocket wheel or slide off the idler wheel or the sprocket wheel. Clean the tracks after work.*

To check the tracks tension, proceed as follows:

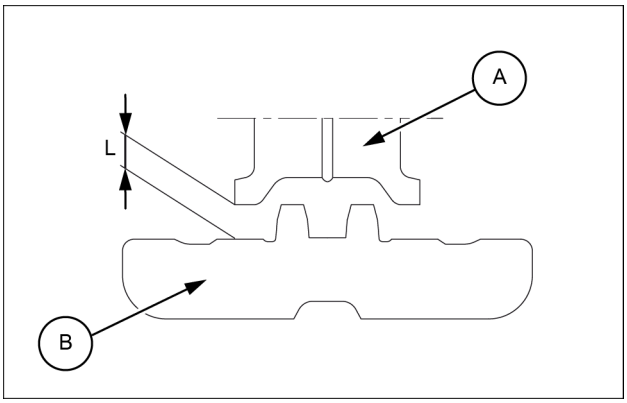
1. Swing the upper structure perpendicular to the undercarriage. Lower the attachment to the ground, then lower the boom until the track is raised off the ground. Place a block under the undercarriage and raise the attachment off the ground.
2. Set the engine speed knob to the maximum speed position.
3. Operate the travel control lever to move the raised track forward and backward and shake off the mud.
4. Repeat the same operations for the other track.



SMIL16MEX0603AB 1

Checking the tension

1. Stop the engine, then remove the key from the starter switch.
2. At the center of the track, measure the slack **(L)** between the bottom of the lower roller **(A)** and the rubber track shoe **(B)**.
   The value must be within:
   130 – 150 mm (**5.1 – 5.9 in**) for steel track;
   39 – 44 mm (**1.5 – 1.7 in**) for rubber track.
3. Adjust the tension as necessary, then lower the track to the ground.
4. Repeat the same operations for the other track.



SMIL16MEX0423AB 2

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

⚠ WARNING

Pressurized system!
Refrigerant under pressure. Service, repair, or recharging must be performed only by trained service technician.
Failure to comply could result in death or serious injury.

W1180A

⚠ WARNING

Escaping refrigerant may cause frostbite!
Always wear protective goggles when handling refrigerant. If you get refrigerant in your eye, immediately flush your eyes with water for 15 minutes. Seek medical assistance immediately.
Failure to comply could result in death or serious injury.

W0339A

⚠ WARNING

Explosion hazard!
Air-conditioning refrigerant boils at -26 °C (-15 °F)!
-NEVER expose any part of the air-conditioning system to a direct flame or excessive heat.
-NEVER disconnect or disassemble any part of the air-conditioning system.
Discharging refrigerant gas into the atmosphere is illegal in many countries.
Failure to comply could result in death or serious injury.

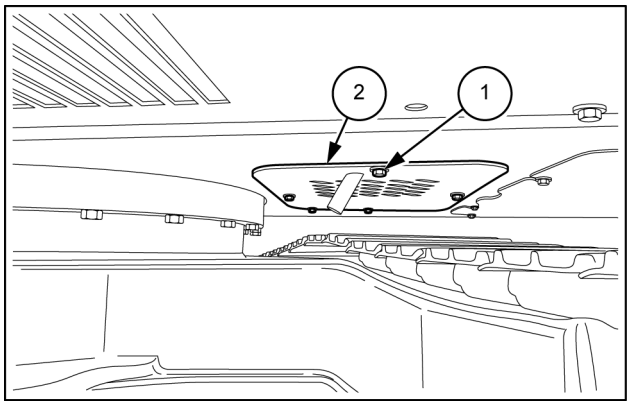
W0340B

⚠ WARNING

Escaping refrigerant may cause frostbite!
If you get refrigerant on your skin:
-Warm the area with your hand or lukewarm water, 32 - 38 °C (90 - 100 °F).
-Cover the area loosely with a bandage to protect the area and the prevent infection.
-Seek medical assistance immediately.
Failure to comply could result in death or serious injury.

W0341A

1. Discharge the air conditioning system (refer to **Air conditioning - Discharging (50.200)**).
2. Set the battery disconnect switch to O position (OFF position) to cut off any power supply in the electrical system of the machine. (For details, see **Mechanical battery isolator - Dynamic description (55.302)**).
3. Use a wrench [**17 mm**] to remove the bolts **(1)** and then remove the under cover **(2)**.



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Color abbreviations

SYMBOL	COLOR
B	Black
BR	Brown
W	White
P	Pink
V	Violet
G	Green
Or	Orange
R	Red
Y	Yellow
L	Blue
GR	Gray
LG	Light green
SB	Sky blue

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Wiring harnesses - Electrical schematic sheet 02 - Battery, start switch, start motor

Type	Components	Connectors/link
Battery		
Switch	CD-18	**CD-18** CONNECTOR : ENGINE OIL PRESSURE
Fuse	CN-258	**CN-258** CONNECTOR : AIR COPM POWER
Motor	CN-45	**CN-45** CONNECTOR : START MOTOR
Fuse	CN-60	**CN-60** CONNECTOR : FUSIBLE LINK
Alternator	CN-74	**CN-74** CONNECTOR : ALTERNATOR
Heater	CN-80	**CN-80** CONNECTOR : PRE-HEATER
Fuse	CN-95	**CN-95** CONNECTOR : FUSIBLE LINK
Relay	CR-1	**CR-1** CONNECTOR : BATTERY RELAY
Relay	CR-23	**CR-23** CONNECTOR : START RELAY
Relay	CR-24	**CR-24** CONNECTOR : AIR-HEATER RELAY
Relay	CR-45	**CR-45** CONNECTOR : ECU IGNITION POWER
Switch	CS-2	**CS-2** CONNECTOR : START SWITCH
Switch	CS-74A	**CS-74A** CONNECTOR : MASTER SWITCH
Diode	DO-1	**DO-1** CONNECTOR : DIODE
Resistor	RS-1	**RS-1** CONNECTOR : RESISTOR
Resistor	RS-2	**RS-2** CONNECTOR : RESISTOR
Connector	CN-13	**CN-13** CONNECTOR
Connector	P1	**P1** CONNECTOR : BATTERY
Connector	P2	**P2** CONNECTOR : BATTERY
Connector	P13	**P13** CONNECTOR : GROUND
Connector	P295	**P295** CONNECTOR : GROUND

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Wire connectors - Component diagram 00

CONNECTOR DO-1: DIODE (Female)

Pin	From	Wire	Description	Color-Size	Frame
1	CN-4M-P-19	26C		RD-0.75	**SHEET 26 - Engine interconnectors**
2	SP3-P-X	125		GY-0.75	**SHEET 02 - Battery, start switch, start motor**

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A. Air compressor power
B. Circuit breaker manual reset
C. Battery **12 V**
D. Battery relay
E. Master switch
F. Starter switch
G. ECU IGNITION power
H. Engine starter
I. Engine start relay
L. Resistor
M. Alternator
N. ECU
O. MCU
P. Accelerator dial
Q. Anti-restart relay
R. Fuse

Turn ON the starter switch.

1. Check the operation of the engine starter.
   A. If the engine starter is operative, the battery is defective. Check the engine system charge or replace the battery, after checking the specific gravity of the battery (refer to **Battery - Remove (55.302)**).
   B. If the engine starter is not operative, proceed to step 2.

2. Turn START the starter switch.
   Check the operation of the engine start relay.
   A. If the engine start relay is operative, proceed to step 3.
   B. If the engine start relay is not operative, proceed to step 4.

3. Measure the voltage between the starter magnet coil and ground.
   A. If the voltage is within **10 – 12.5 V**, the magnet of the engine starter is defective. Replace the engine starter (refer to **Engine starter - Remove (55.201)**).
   B. If the voltage is not within **10 – 12.5 V**, the engine start relay is defective. Replace the engine start relay (refer to **Engine start relay - Remove (55.201)**).

4. Turn ON the starter switch.
   Check the operation of the starter safety relay.
   A. If the starter safety relay is operative, proceed to step 5.
   B. If the starter safety relay is not operative, proceed to step 6.

5. Turn START the starter switch.
   Measure the voltage between the terminal 30 of the **CR-5** connector and the ground.
   A. If the voltage is within **10 – 12.5 V**, proceed to step 7.
   B. If the voltage is not within **10 – 12.5 V**, there is a disconnection in the wiring harness or a poor contact between the terminal 30 of the **CR-5** connector and the terminal 19 of the **CN-4** connector. Repair or replace it, after clean.

6. Measure the voltage between the terminal 87 of the **CR-5** connector and the ground.
   A. If the voltage is within **10 – 12.5 V**, the anti-restart relay is defective. Replace it (refer to **Fuse and relay box - Replace - Anti-restart relay (55.100)**).
   B. If the voltage is not within **10 – 12.5 V**, there is a disconnection in the wiring harness or a poor contact between the terminal 87 of the **CR-5** connector and the terminal 12 of the **CN-8** connector. Repair or replace it, after clean.

7. Turn ON the starter switch.
   Measure the voltage between the **CR-23** connector and the ground.
   A. If the voltage is within **10 – 12.5 V**, the engine start relay is defective. Replace it (refer to **Engine start relay - Remove (55.201)**).
   B. If the voltage is not within **10 – 12.5 V**, there is a disconnection in the wiring harness or a poor contact between the terminal 87 of the **CR-5** connector and the terminal 2 of the **CR-23** connector. Repair or replace it, after clean.

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Electrical systems - 55

FAULT CODES - DTC

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CX57C Cab - Tier IV final engine

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651-3 - Injector 1: Cylinder No. 4, Port: 1-2 – Short-circuit

Context:
The injector 1 detects a voltage above normal or it is shorted to power supply (or there is an open circuit). Cam/crank pulse is detected. Engine derates immediately to the maximum injection amount of **85%**. After **120 min** the maximum injection amount is limited to **50%**. The EGR is fully closed. The fuel injection of failed cylinder terminates. The fault mode is released when the ECU power is turned off.

Cause:
The Engine Control Unit (ECU) detects a short circuit to power supply in the injector 1 low side drive circuit.

Possible failure modes:

1. The harness or the connectors are damaged or the connectors are not fully installed.
2. There is an open circuit between ECU **CN-93B** and the injector 1.
3. The low side signal of the injector 1 is shorted to high source.
4. The injector 1 is defective.
5. The ECU is defective.

Solution:

1. Verify that the fault is present and active.

   Use the diagnostic tool to check the status of this fault.

   A. If the fault is no longer present or in an inactive state, the fault may be intermittent and not currently active.

   B. If the fault is present and active, continue with Step **2**.
2. Check the integrity of the harness and the connectors.

   Visually inspect the relevant harness and connector for damage, bent or dislocated pins, corroded terminals or broken wires. Verify that the connectors are fully installed. Flex the harness involved to revel intermittent breaks or shorts in the wiring concerned. Operate the machine while you monitor the display.

   A. If you find damage or the display indicates other than normal display readings, rerepair the damage discovered during the inspection or locate and repair the other than normal display condition and verify that the error has been resolved.

   B. If you do not find damage and the display indicates only normal readings, continue with Step **3**.
3. Check the integrity of the injector 1.

   The key must be in the OFF position.

   Disconnect **P174** connector.

   Using a multimeter, measure the resistance value between the following injector 1 terminals:

From	To	Value
Connector **P174** pin 1	Connector **P174** pin 2	Resistance **0 Ω** < R < **1 MΩ**

   A. If the resistance is out of range, the injector 1 is defective. Replace the component (refer to **Fuel injectors - Remove (10.218)**) and proceed with both ECU rewrite and DPF regeneration.

   B. If the resistance is in the range, continue with Step **4**.
4. Check the integrity of the harness.

   The key must be in the OFF position.

   Disconnect **CN-93B**, **CN-304** and **P174** connectors.

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522596-9 - CAN communication 2 (CAN 2) - CAN 2 (TSC1): Time out error (received message)

Context:

An abnormal update rate is detected on TSC1 signal. The key switch in ON. Not in cranking status. Battery voltage is **10 V** or higher. Engine control is not obstructed. The following operations are selectable by application settings:

- ECU power OFF
- TSC1 message reception recoveries.

Cause:
A reception timeout is detected at a fixed time (**50 ms**).

Possible failure modes:

1. The harness or the connectors are damaged or the connectors are not fully installed.
2. The battery voltage is reduced due to the battery life or the battery voltage is too high.
3. There is an open circuit or a short circuit between ECU **CN-93A** and MCU **CN-51**.
4. The ECU is defective.

Solution:

1. Verify that the fault is present and active.

   Use the diagnostic tool to check the status of this fault.

   A. If the fault is no longer present or in an inactive state, the fault may be intermittent and not currently active.

   B. If the fault is present and active, continue with Step **2**.
2. Check the battery condition.

   Check the battery charging or the battery capacity.

   A. If the battery charging or the battery capacity is insufficient, inspect the battery and replace if necessary.

   B. If the battery is under operating conditions, continue with Step **3**.
3. Check the integrity of the harness and the connectors.

   Visually inspect the relevant harness and connector for damage, bent or dislocated pins, corroded terminals or broken wires. Verify that the connectors are fully installed. Flex the harness involved to revel intermittent breaks or shorts in the wiring concerned. Operate the machine while you monitor the display.

   A. If you find damage or the display indicates other than normal display readings, repair the damage discovered during the inspection or locate and repair the other than normal display condition and verify that the error has been resolved.

   B. If you do not find damage and the display indicates only normal readings, continue with Step **4**.
4. Check the integrity of the harness.

   The key must be in the OFF position.

   Disconnect **CN-93A** and **CN-51** connectors.

   Use a multimeter to perform the following continuity check:

From	To	Value
Connector **CN-93A** pin 53	Connector **CN-51** pin 60	There should be continuity
Connector **CN-93A** pin 75	Connector **CN-51** pin 61	There should be continuity

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Dipper - Prepare

⚠ WARNING

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

W0944D

⚠ WARNING

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

W0287A

⚠ WARNING

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

W1036A

⚠ WARNING

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

W0256A

⚠ WARNING

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

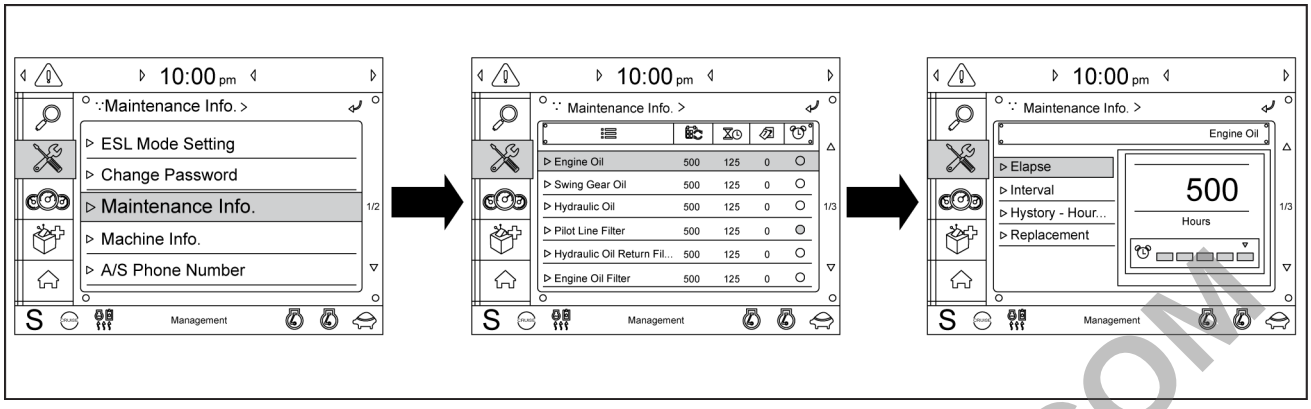
W0398A

Items to prepare:

- Wrenches
- Soft hammer
- Striking rod
- Nylon sling (with the required lifting capacity)
- Lift-crane (with the required lifting capacity)
- Grease
- Rag
- Cleaning fluid
- Crosstie

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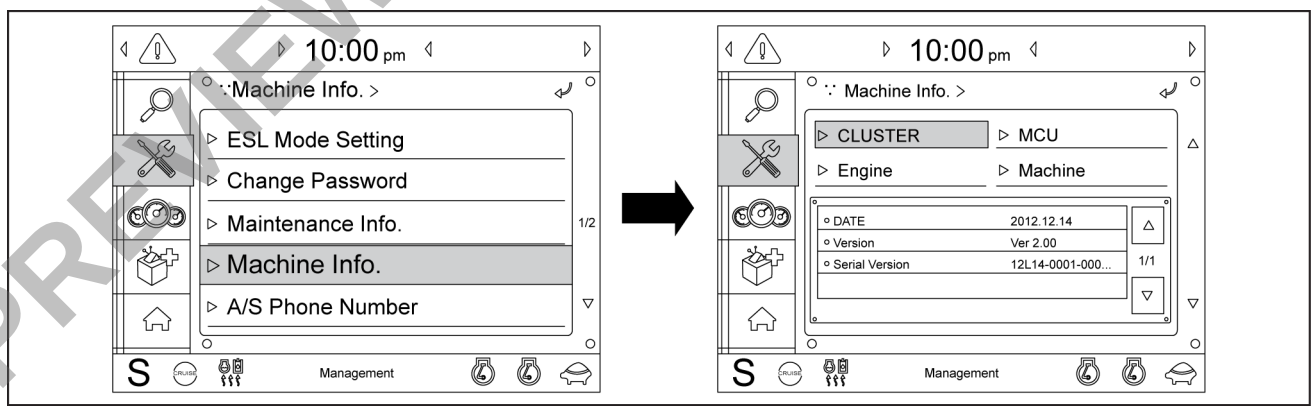
SMIL16MEX0531EA 42

(D) Maintenance information

- Elapse: maintenance elapsed time
- Interval the change or replace interval can be changed in the unit of **50 h**
- History-hour: maintenance replacement history
- Replacement: the elapsed time will be reset to zero (0)

Change or replace interval

	Item	Interval
1	Engine oil	**500 h**
2	Travel reduction gear oil	**1000 h**
3	Swing gear oil	**1000 h**
4	Hydraulic oil	**5000 h**
5	Pilot line filter	**1000 h**
6	Hydraulic oil return filter	**1000 h**
7	Engine oil filter	**500 h**
8	Fuel filter	**500 h**
9	Pre-filter	**500 h**
10	Hydraulic tank breather	**1000 h**
11	Air cleaner	**1000 h**
12	Radiator coolant	**2000 h**
13	Swing gear pinion grease	**1000 h**



SMIL16MEX0532EA 43

(E) Machine information

This menu confirms the identification of the cluster, the MCU, the engine and the machine.

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CX57C EXCAVATOR ELECTRICAL SCHEMATIC

51452106EN - 2/2

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[35.736] Boom hydraulic system 35.11
[35.737] Dipper hydraulic system 35.12
[35.738] Excavator and backhoe bucket hydraulic system 35.13
[35.734] Tool quick coupler hydraulic system 35.14
[35.360] Hammer and rotating bucket hydraulic system 35.15
[35.739] Swing arm hydraulic system 35.16
[35.741] Dozer blade cylinders 35.17
Pneumatic system 36
[36.100] Pneumatic system 36.1
Frames and ballasting 39
[39.140] Ballasts and supports 39.1
Tracks and track suspension 48
[48.100] Tracks 48.1
[48.130] Track frame and driving wheels 48.2
[48.134] Track tension units 48.3
[48.138] Track rollers 48.4
Cab climate control 50
[50.100] Heating 50.1
[50.200] Air conditioning 50.2
Electrical systems 55
[55.000] Electrical system 55.1
[55.100] Harnesses and connectors 55.2
[55.525] Cab engine controls 55.3
[55.015] Engine control system 55.4
[55.201] Engine starting system 55.5
[55.301] Alternator 55.6
[55.302] Battery 55.7
[55.011] Fuel tank system 55.8

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Working of brake

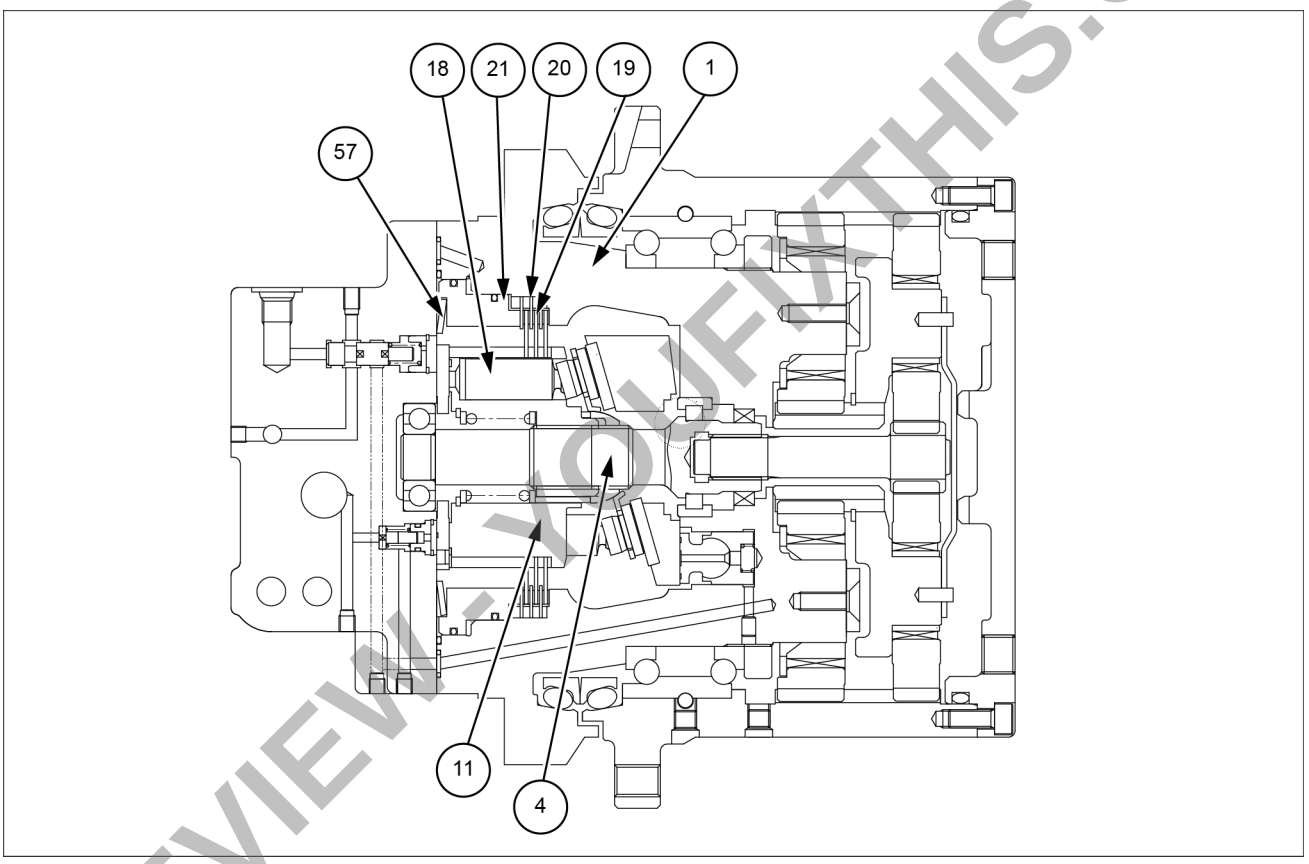
Brake operates the pressure supplied through SPOOL (Simultaneous Peripheral Operation Online) installed in valve casing **(26)** to the part of the parking piston **(21)** and releases a brake.

When the pressure does not work, the brake always runs.

The force of a brake is generated by the frictional force among a plate **(20)**, brake piston **(21)** and a cylinder block **(11)** that is connected through spline which are fixed by the shaft casing **(1)** with the friction plate **(19)**.

When a pressure does not work on the part of piston, brake spring presses brake piston; oil in a brake room flows into the drain of a motor through an orifice; in that time, brake piston compresses a frictional plate **(19)** and a detached plate in the middle of shaft casing and brake piston according to the force plate springs **(57)**; finally, it makes a frictional force.

This frictional force helps the brake fixing a turning axis **(3)** connected by a cylinder and spline operated.



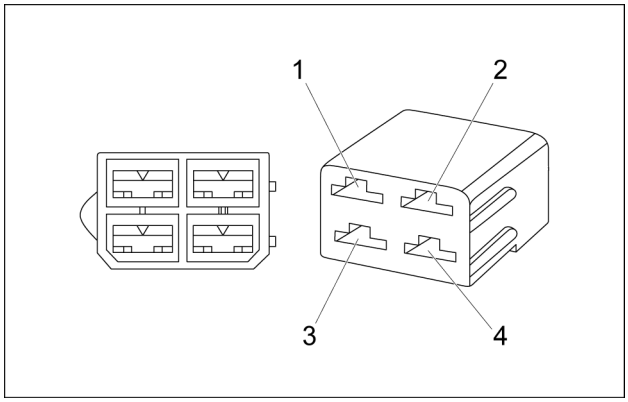
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4. Shaft
18. Piston

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CONNECTOR CN-21: WIPER MOTOR (Female)



180900-0 2

Pin	From	Wire	Description	Color-Size	Frame
1	CR-4-P-87A	75		VT-0.75	**SHEET 17 - Wiper motor, wiper relay and washer circuits**
2	SP96-P-X	G1K		BK-0.75	
3	SP94-P-X	29E		OR-1.0	
4	CR-4-P-30	74		WH-0.75	

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