

WSM

WORKSHOP MANUAL
**COMPACT TRACK
LOADER**

SVL97-2

Kubota

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SAFETY FIRST

This symbol, the industry's "Safety Alert Symbol", is used throughout this manual and on labels on the machine itself to warn of the possibility of personal injury. Read these instructions carefully. It is essential that you read the instructions and safety regulations before you attempt to assemble or use this unit.



DANGER

- Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING

- Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

- Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury.

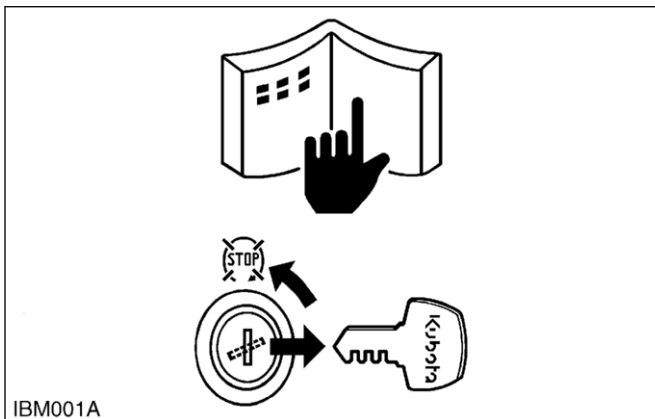
IMPORTANT

- Indicates that equipment or property damage could result if instructions are not followed.

NOTE

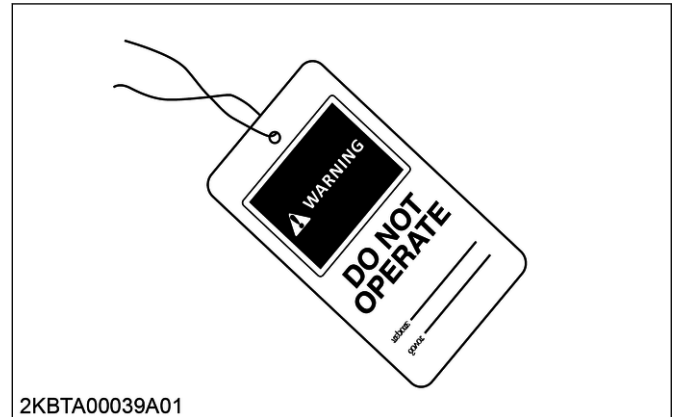
- Gives helpful information.

1. Working precautions



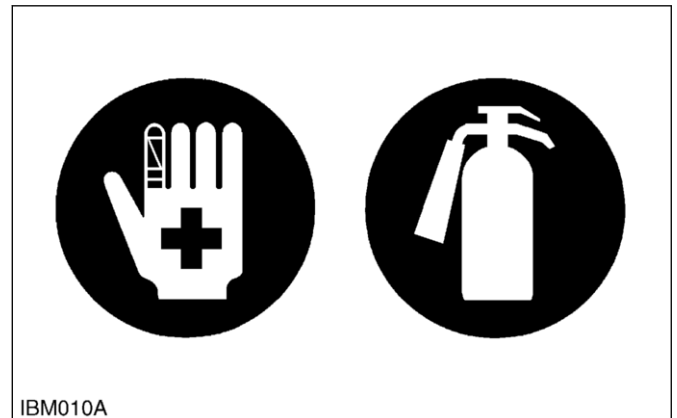
- Understand all safety instructions and safety labels in this manual.
- Park the machine on a stable and level ground then lower the attachment to check the machine safely.

- Stop the engine and remove the key when leaving the operator's seat for cleaning, maintenance, and servicing.



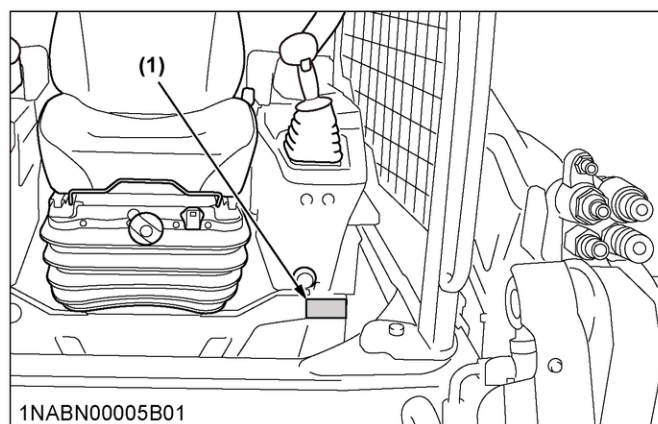
- Hang a DO NOT OPERATE tag near the operator's seat.
- Do not use worn or cracked tools. Use tools in a proper way with enough strength.
- In regards to the facility which is used in the workshop, follow each safety instruction.

2. Preparing for emergencies



- Keep a first aid kit and fire extinguisher ready at all times.
- Keep emergency numbers near your telephone at all times.

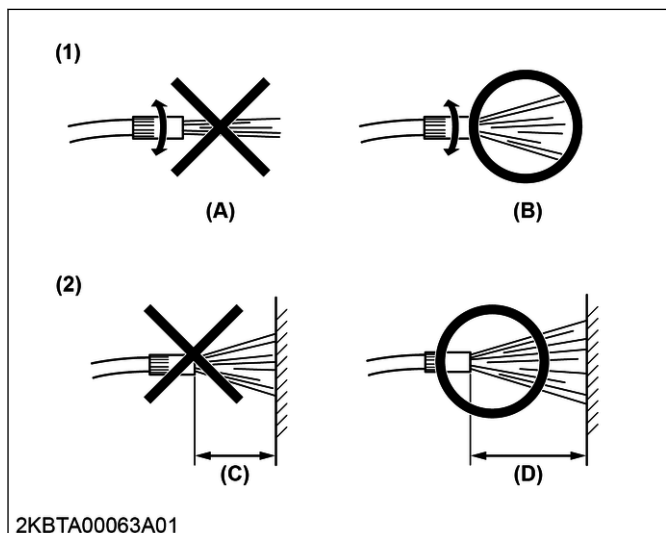
(1) Part No. V0521-5774-1



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2. Safety labels maintenance

- Keep safety labels clean and free from obstructing material.
- Clean safety labels with soap and water, dry with a soft cloth.
- Replace damaged or missing safety labels with new safety labels from your KUBOTA dealer.
- If a component with safety label(s) affixed is replaced with new part, make sure that new safety label(s) is (are) attached in the same location(s) as the replaced component.
- Mount new safety labels by applying on a clean, dry surface and pressing any bubbles to outside edge.



2KBTA00063A01

- (1) Adjusting the washer power
- (2) Washing distance
- (A) Pencil point spray
- (B) Wide spray
- (C) Less than 2 m (80 in.)
- (D) Over 2 m (80 in.)

22. Dispose fluids correctly

- Do not dispose fluids on the ground, down the drain, into a stream, pond, or lake. Obey related environmental protection regulations when you dispose of oil, fuel, coolant, electrolyte, and other dangerous materials.



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TIGHTENING TORQUES

1. Bolts and nuts tightening torque

NOTE

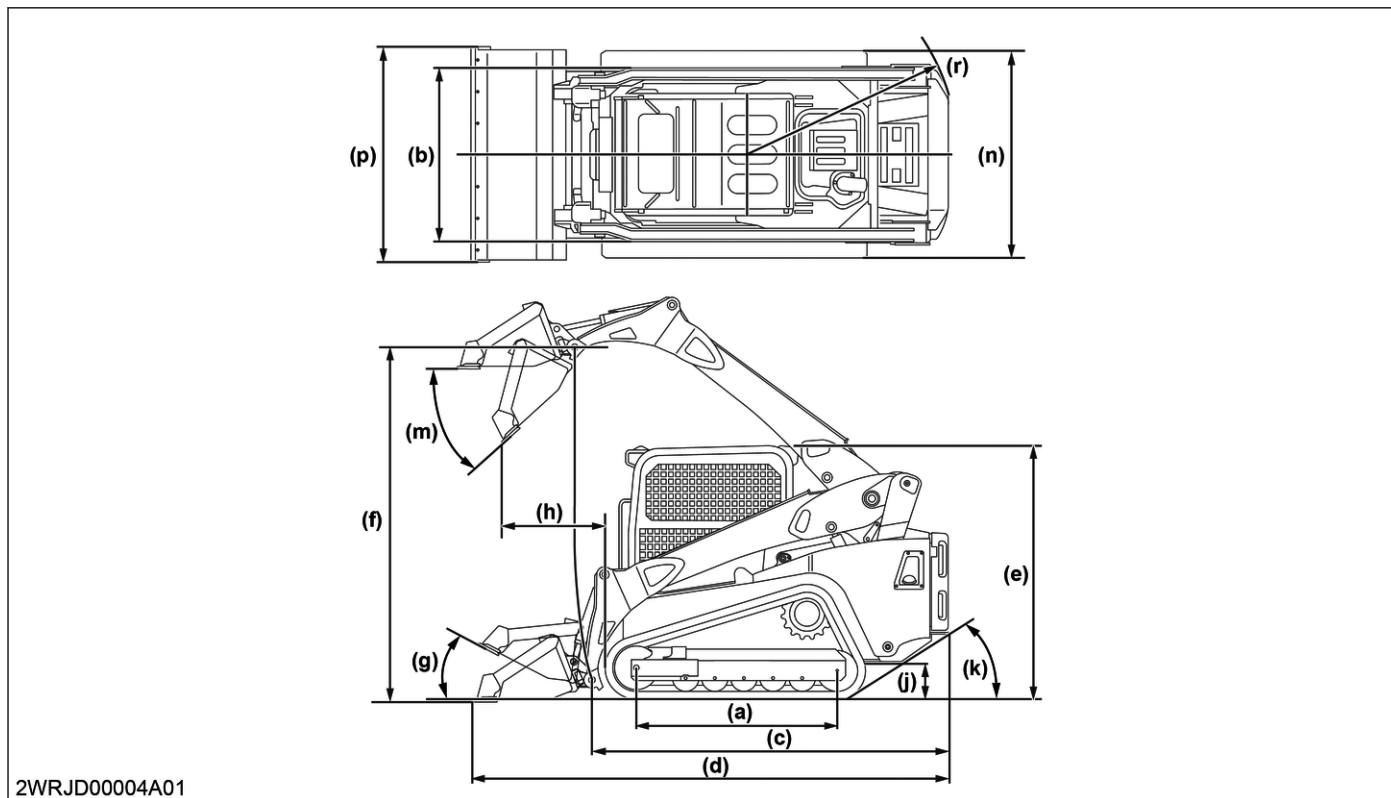
- Screws, bolts and nuts which tightening torques are not specified in this workshop manual should be tightened according to the table below.

Mark on top of bolt	No grade or 4T						7T						9T		
	No grade or 4T												6T		
Material	Steel			Aluminum			Steel			Aluminum			Steel		
	Units	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m	lbf·ft	N·m	kgf·m
M6	7.9 to 9.3	0.80 to 0.95	5.8 to 6.8	7.9 to 8.8	0.80 to 0.90	5.8 to 6.5	9.81 to 11.2	1.00 to 1.15	7.24 to 8.31	7.9 to 8.8	0.80 to 0.90	5.8 to 6.5	12.3 to 14.2	1.25 to 1.45	9.05 to 10.4
M8	18 to 20	1.8 to 2.1	13 to 15	17 to 19	1.7 to 2.0	13 to 14	24 to 27	2.4 to 2.8	18 to 20	18 to 20	1.8 to 2.1	13 to 15	30 to 34	3.0 to 3.5	22 to 25
M10	40 to 45	4.0 to 4.6	29 to 33	32 to 34	3.2 to 3.5	24 to 25	48 to 55	4.9 to 5.7	36 to 41	40 to 44	4.0 to 4.5	29 to 32	61 to 70	6.2 to 7.2	45 to 52
M12	63 to 72	6.4 to 7.4	47 to 53	-	-	-	78 to 90	7.9 to 9.2	58 to 66	63 to 72	6.4 to 7.4	47 to 53	103 to 117	10.5 to 12.0	76.0 to 86.7
M14	108 to 125	11.0 to 12.8	79.6 to 92.5	-	-	-	124 to 147	12.6 to 15.0	91.2 to 108	-	-	-	167 to 196	17.0 to 20.0	123 to 144
M16	167 to 191	17.0 to 19.5	123 to 141	-	-	-	197 to 225	20.0 to 23.0	145 to 166	-	-	-	260 to 304	26.5 to 31.0	192 to 224
M18	246 to 284	25.0 to 29.0	181 to 209	-	-	-	275 to 318	28.0 to 32.5	203 to 235	-	-	-	344 to 402	35.0 to 41.0	254 to 296
M20	334 to 392	34.0 to 40.0	246 to 289	-	-	-	368 to 431	37.5 to 44.0	272 to 318	-	-	-	491 to 568	50.0 to 58.0	362 to 419

2. Stud bolts tightening torque

Material	Steel			Aluminum		
	Units	N·m	kgf·m	lbf·ft	N·m	kgf·m
M8	12 to 15	1.2 to 1.6	8.7 to 11	8.9 to 11	0.90 to 1.2	6.5 to 8.6
M10	25 to 31	2.5 to 3.2	18 to 23	20 to 25	2.0 to 2.6	15 to 18
M12	30 to 49	3.0 to 5.0	22 to 36	31	3.2	23
M14	62 to 73	6.3 to 7.5	46 to 54	-	-	-
M16	98.1 to 112	10.0 to 11.5	72.4 to 83.1	-	-	-
M18	172 to 201	17.5 to 20.5	127 to 148	-	-	-

8. Machine dimensions

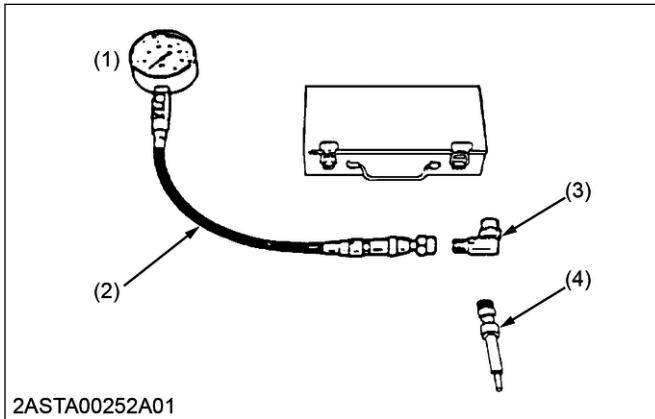


		Dimensions
(a)	Length of track on ground	1667 mm 65.6 in.
(b)	Track gauge	1512 mm 59.5 in.
(c)	Length w/o bucket	3137 mm 123.5 in.
(d)	Length w/bucket on ground	3929 mm 154.7 in.
(e)	Height to top of cab	2116 mm 83.3 in.
(f)	Bucket hinge pin height at max. lift	3264 mm 128.5 in.
(g)	Rollback angle at carry position	27°
(h)	Reach at max. lift and dump	1035 mm 40.7 in.
(i)	Ground clearance	293 mm 11.5 in.
(k)	Departure angle	31°
(m)	Max. dump angle	43°
(n)	Vehicle width	1962 mm 77.2 in.
(p)	Width with bucket	2061 mm 81.1 in.
(r)	Turning radius from center-machine rear	2587 mm 101.9 in.

SPECIAL JIGS AND TOOLS

1. Engine compression pressure measuring kit

Diesel engine compression tester



2ASTA00252A01

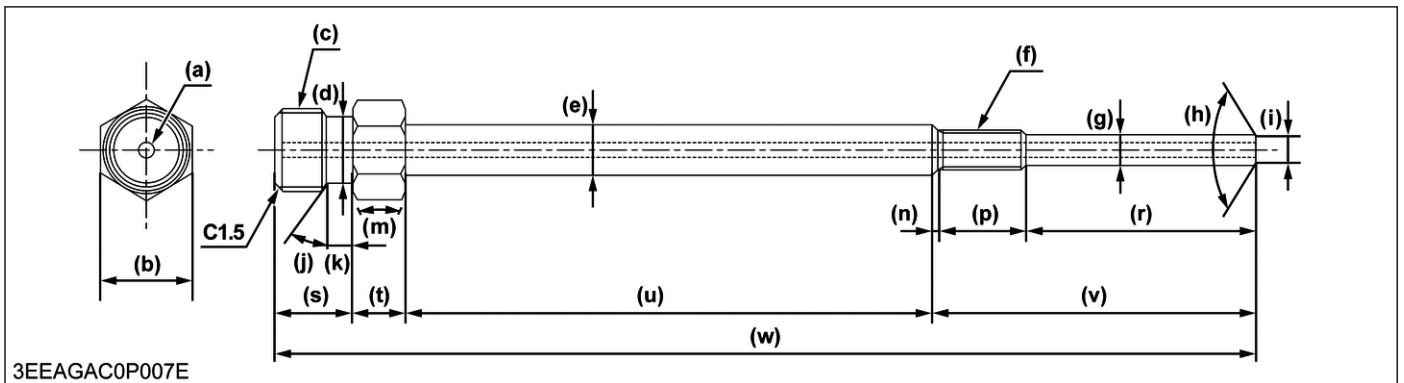
(1) Pressure gauge

(2) Hose assembly

(3) L-joint

(4) Adapter

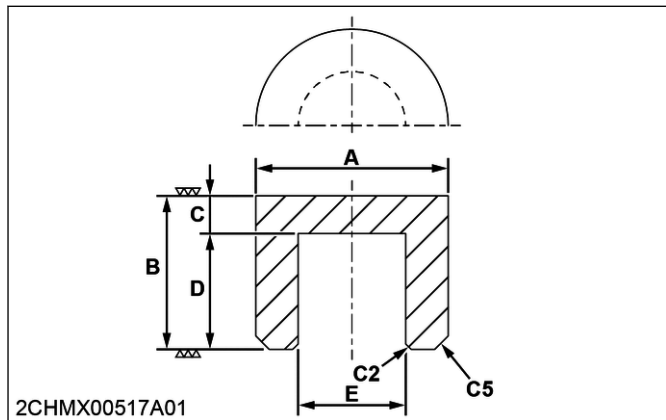
Adapter



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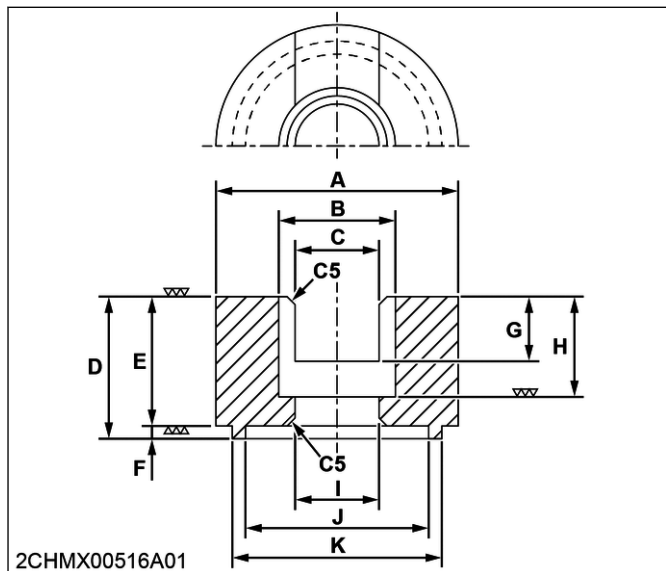
22. Piston pump dimension measuring jig

Jig A



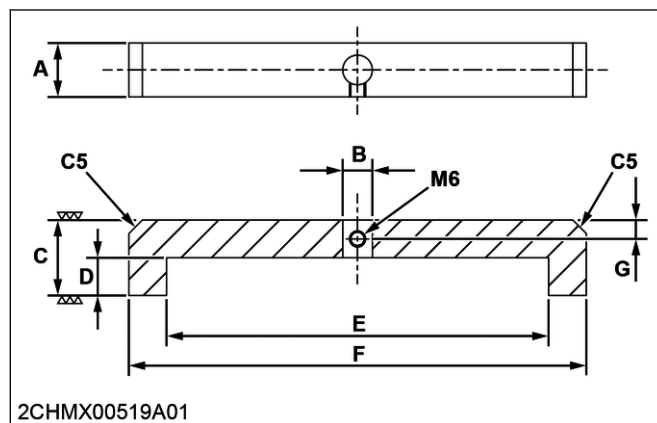
No.	Dimensions
A	φ71.5 mm (φ2.8 in)
B	57 mm (2.2 in)
C	14 mm (0.6 in)
D	43 mm (1.7 in)
E	φ40 mm (φ1.6 in)

Jig B



No.	Dimensions
A	φ150 mm (φ5.9 in)
B	φ72.2 mm (φ2.8 in)
C	52 mm (2.0 in)
D	87.9 mm (3.5 in)
E	80 mm (3.1 in)
F	7.9 mm (0.3 in)
G	40 mm (1.6 in)
H	62 mm (2.4 in)
I	φ52 mm (φ2.0 in)
J	φ113.6 mm (φ4.5 in)
K	φ129.8 mm (φ5.1 in)

Jig C



No.	Dimensions
A	20 mm (0.8 in)
B	φ11 mm (φ0.4 in)
C	28 mm (1.1 in)
D	14 mm (0.6 in)
E	φ142 mm (φ5.6 in)
F	φ170 mm (φ6.7 in)
G	7 mm (0.3 in)

3. MAINTENANCE

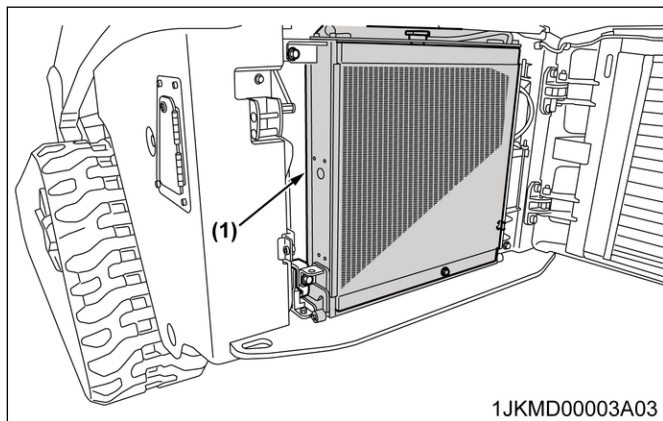
8. Checking the engine and electrical wiring

CAUTION

- Check that the rear bonnet is securely locked.

Checking

1. Check if the fins and ribs of the radiator and oil cooler are clogged.



(1) Radiator and oil cooler

2. Remove the dirt with compressed air if necessary.

IMPORTANT

- Pressure of compressed air must be under 205 kPa (2.1 kgf/cm², 30 psi).

3. Check the radiator and oil cooler for damage and replace them if necessary.
4. Check the rubber hoses and replace them if necessary.
5. Check the bolts that fix the hose clamps for any looseness and tighten them if necessary.

8. Checking the engine and electrical wiring

1. Check the function of the room light.
2. Check the function of the worklight.
3. Check the function of the blower motor.
4. Check the tightness and condition of all accessible electrical wiring and connectors.
5. Repair or replace the damaged parts.
6. Check for the rust and dirt of the fuses and clean if necessary.

9. Checking the fan belt

CAUTION

- Stop the engine, remove the key, and hang a DO NOT OPERATE tag near the operator's seat when checking or adjusting the fan belt and air conditioning belt.

Preparing

1. Lower the front attachment to the ground, and stop the engine.
2. Open the rear bonnet and insert the pin into the lock position.

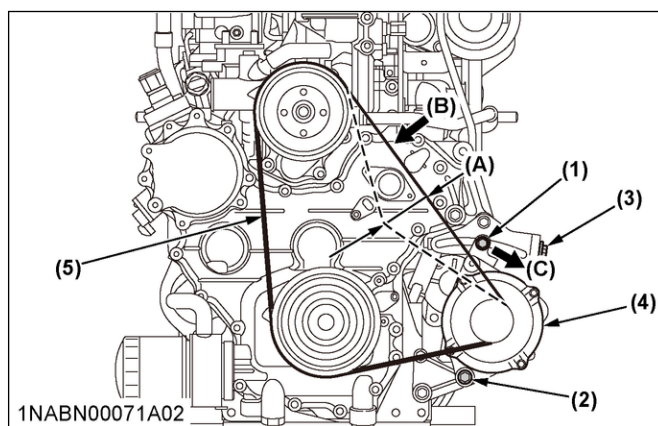
CAUTION

- Check that the rear bonnet is securely locked.

3. Open the upper bonnet.
4. Tilt the radiator.

Checking

1. Check the fan belt for crack and damage and replace it if necessary.
2. Push position (a) to check the fan belt tension.



- (1) Bolt (4) Alternator
(2) Bolt (5) Fan belt
(3) Adjuster bolt

3. Adjust the fan belt tension if necessary.

Service specification

(a) Fan belt tension	4.0 to 5.0 mm 0.16 to 0.20 in.	Push with 50 to 60 N Push with 5 to 6 kgf Push with 11.0 to 13.5 lbf
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10. Draining the water separator

WARNING

- Keep fire and flammable items away from the working area.

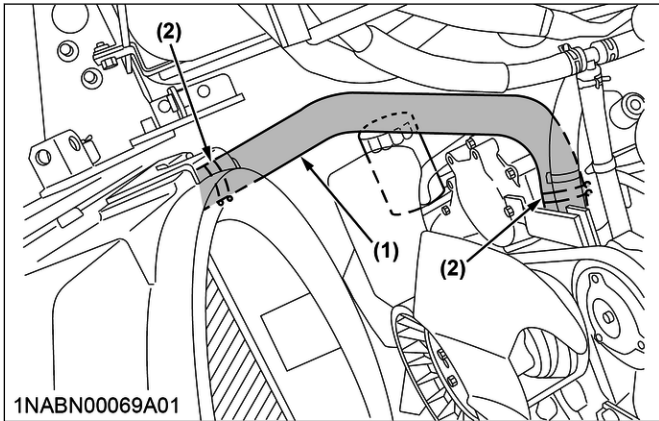
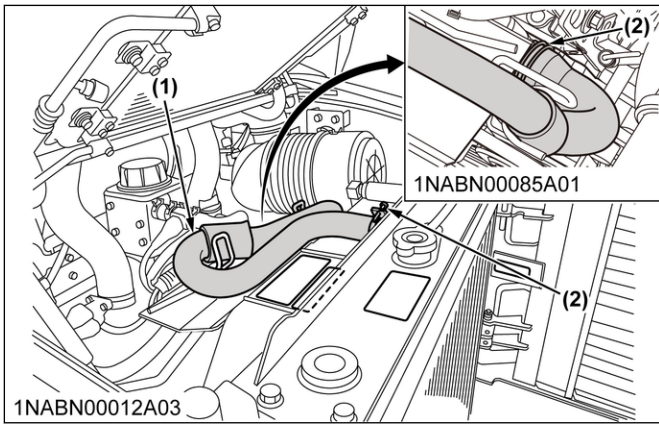
IMPORTANT

- Keep dust away from the working area.

Preparing

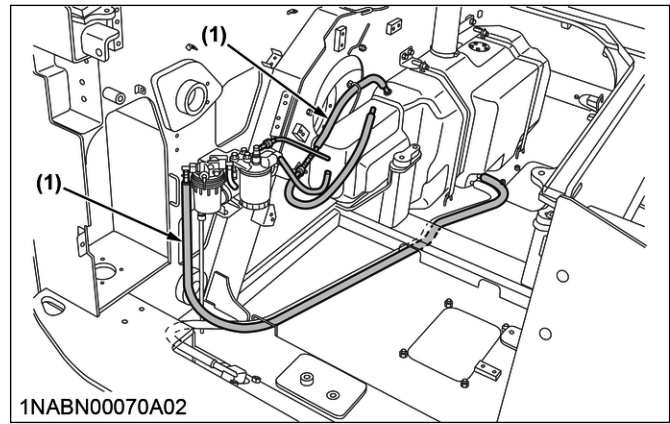
1. Lower the front attachment to the ground, and stop the engine.
2. Open the rear bonnet and insert the pin into the lock position.

3. MAINTENANCE



(1) Radiator hose

(2) Hose clamp



(1) Fuel hose

3. Checking the fuel line

CAUTION

- Do not work soon after the engine has stopped.
 - Engine, fuel, and oil are extremely hot.

Preparing

1. Lower the front attachment to the ground, and stop the engine.
2. Open the rear bonnet and insert the pin into the lock position.

CAUTION

- Check that the rear bonnet is securely locked.

3. Open the upper bonnet.
4. Tilt the radiator.

Checking

1. Check the fuel hoses and replace them if necessary.
2. Check the tightness of the hose clamps and tighten them if necessary.

4. Checking the intake air line

CAUTION

- Do not work soon after the engine has stopped.
 - Engine, fuel, and oil are extremely hot.

Preparing

1. Lower the front attachment to the ground, and stop the engine.
2. Open the rear bonnet and insert the pin into the lock position.

CAUTION

- Check that the rear bonnet is securely locked.

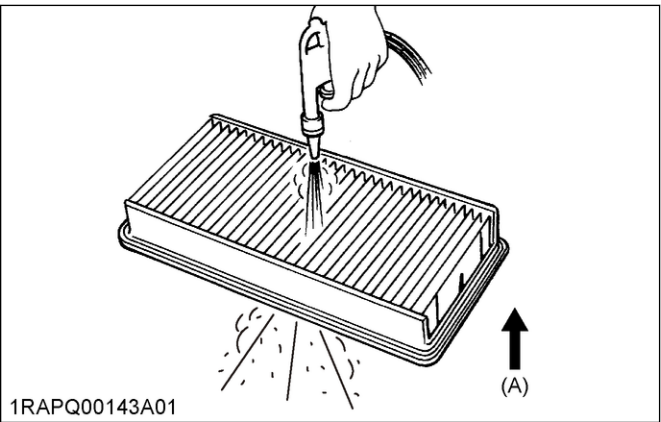
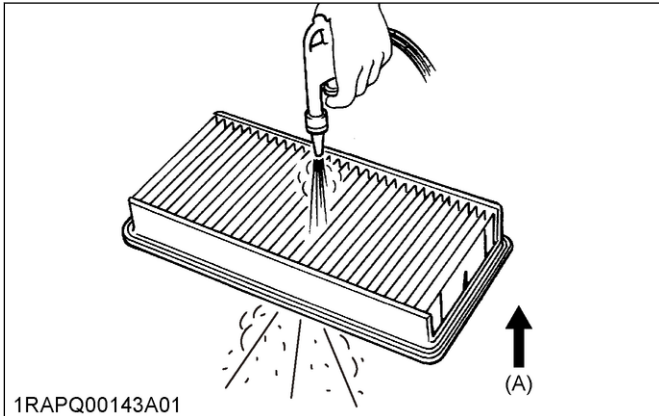
3. Open the upper bonnet.

Checking

1. Check the intake air hoses and replace them if necessary.
2. Check the bolts that fix the hose clamps for any looseness and tighten them if necessary.

IMPORTANT

- Pressure of the compressed air must be under 205 kPa (2.1 kg/cm², 30 psi).



1RAPQ00143A01

(A) Intake air flow

(A) Intake air flow

2.2 Checking the condenser

CAUTION

- Wear an eye protector when cleaning the air filter with compressed air.

Preparing

1. Lower the front attachment to the ground, and stop the engine.
2. Open the rear bonnet and insert the pin into the lock position.

CAUTION

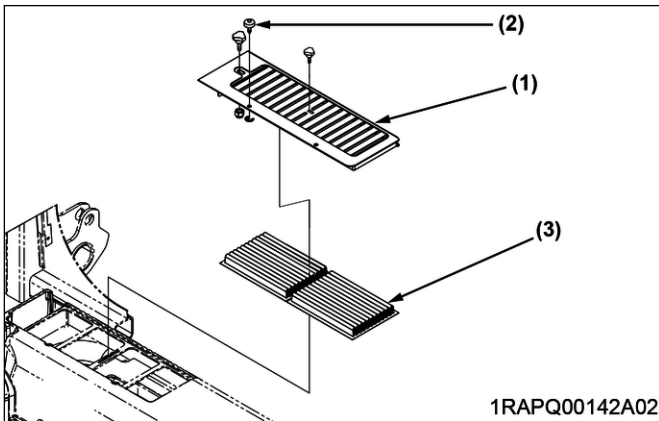
- Check that the rear bonnet is securely locked.

3. Open the upper bonnet.

Checking

1. Check the condenser and clean it if necessary.

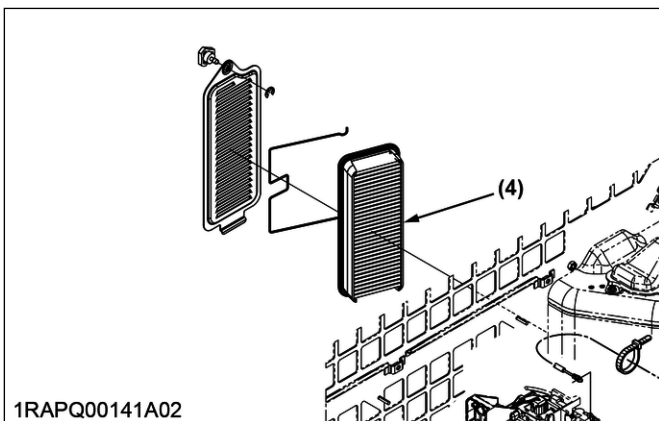
3. Install the inner air filter.



- (1) Cover (2) Screw ×2 (3) Air filter

1RAPQ00142A02

4. Remove the fresh air filter.



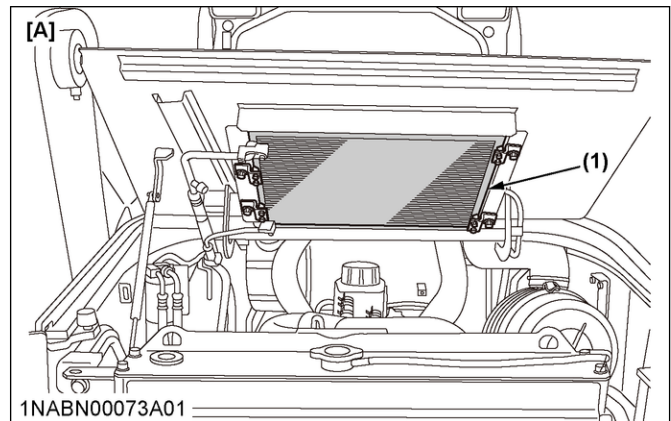
1RAPQ00141A02

(4) Fresh air filter

5. Clean the inner air filter with compressed air from the direction opposite of the intake air flow.

IMPORTANT

- Pressure of the compressed air must be under 205 kPa (2.1 kg/cm², 30 psi).



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(1) Condenser

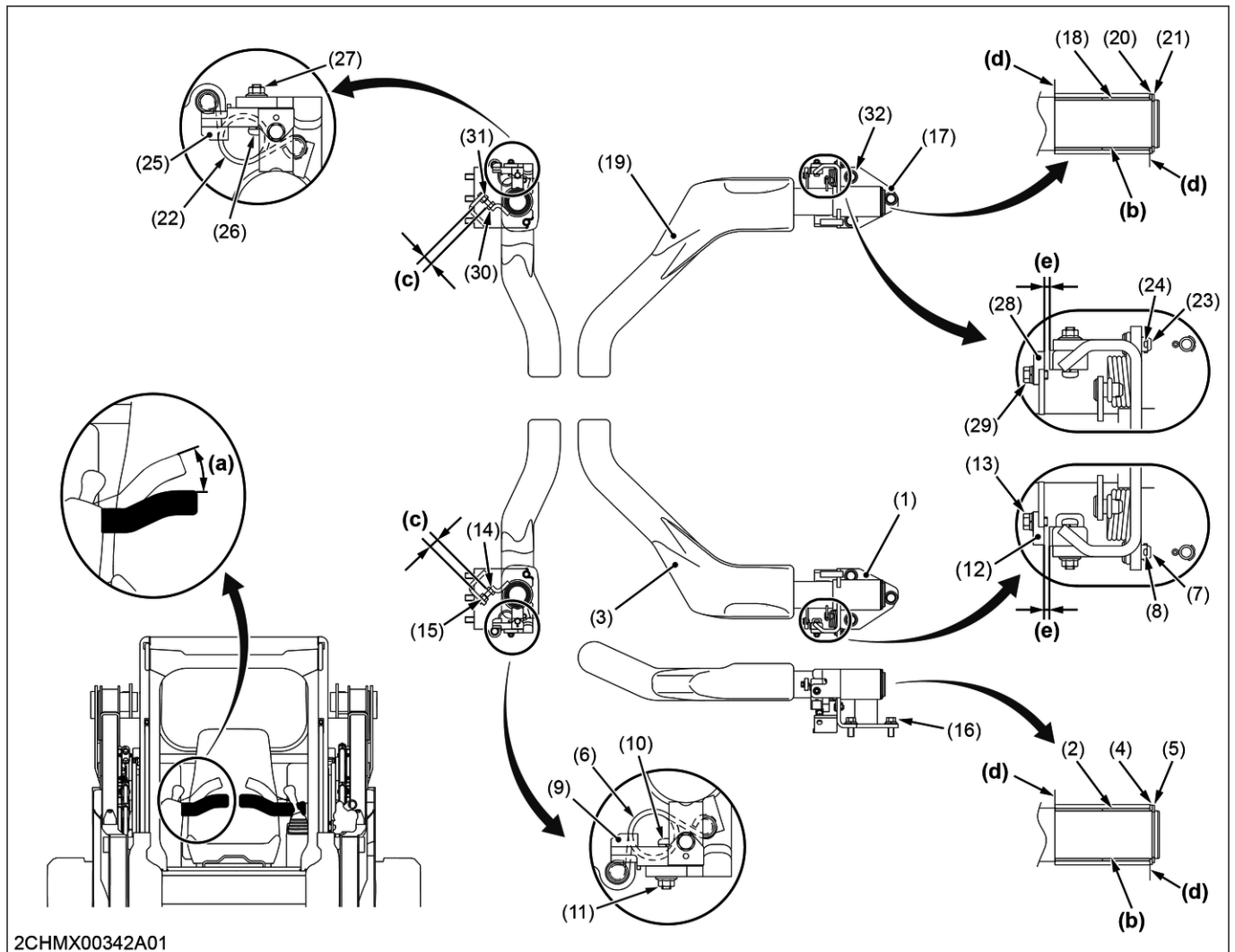
IMPORTANT

Cleaning the condenser

- Pressure of the compressed air must be under 20h5 kPa (2.1 kg/cm², 30 psi).

3. Armrest

3.1 Armrest parts drawing



2CHMX00342A01

- | | | | |
|--------------------------------|---------------------------------|--------------------------------|---|
| (1) Left armrest guard holder | (11) Flange nut | (21) Shaft circlip | (31) Nut (M8) |
| (2) Bushing ×2 | (12) Magnet | (22) Spring | (32) Bolt (M10 × 25) ×3 |
| (3) Left armrest | (13) Bolt (M5 × 10) | (23) Headed pin | (a) Lock release range 20 ± 5° |
| (4) Collar | (14) Bolt (M8 × 25) | (24) Split pin | (b) Apply grease |
| (5) Shaft circlip | (15) Nut (M8) | (25) Right armrest switch | (c) 16.5 mm, 0.65 in. (Reference value) |
| (6) Spring | (16) Bolt (M10 × 25) ×3 | (26) Machine screw with washer | (d) The bushing must not protrude from the armrest guard holder |
| (7) Headed pin | (17) Right armrest guard holder | (27) Flange nut | (e) 3 mm (0.12 in.) |
| (8) Split pin | (18) Bushing ×2 | (28) Magnet | |
| (9) Left armrest switch | (19) Right armrest | (29) Bolt (M5 × 10) | |
| (10) Machine screw with washer | (20) Collar | (30) Bolt (M8 × 25) | |

Machine screw with washer (10) (26)	Tightening torque	2.4 to 3.0 N·m 0.24 to 0.31 kgf·m 1.8 to 2.2 lbf·ft
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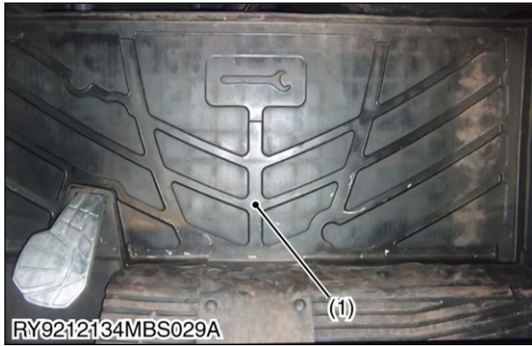
- | | | | |
|-------------------------------|--------------------------------|----------------------------|--------------------------|
| (1) Flat metal washer | (19) Collar | (37) Bolt (M10) | (55) Left roller bracket |
| (2) Nut | (20) Plate | (38) Right cable | (56) Rubber seal |
| (3) Cushion | (21) Nut | (39) Clip | (57) Nut ×2 |
| (4) Stopper cushion | (22) Roller | (40) Roller | (58) Right rear stopper |
| (5) Flange nut | (23) Handle | (41) Bolt (M8 × 20) | (59) Left rear stopper |
| (6) Blade assembly | (24) Self-tapping screw | (42) Right roller bracket | (60) Bolt (M10 × 25) |
| (7) Arm assembly | (25) Collar | (43) Clip | (61) Lock |
| (8) Blade | (26) Machine screw with washer | (44) Stud | (62) Lock |
| (9) Machine screw with washer | (27) Seal | (45) Damper | (63) Bolt (M10 × 25) |
| (10) Handrail | (28) Striker | (46) Right linkage bracket | (64) Lock |
| (11) Glass | (29) Bolt (M8 × 16) | (47) Bolt (M8 × 20) | (65) Spring |
| (12) Handle | (30) Striker | (48) Linkage | (66) Pin |
| (13) Seal | (31) Lock | (49) Left linkage bracket | (67) Lever |
| (14) Seal | (32) Cushion | (50) Lock | (68) Grip |
| (15) Plate | (33) Bolt (M10 × 25) | (51) Left cable | (69) Lock |
| (16) Grommet | (34) Bolt (M6 × 16) | (52) Cover | |
| (17) Wiper motor | (35) Bushing | (53) Bolt (M6) | |
| (18) Packing | (36) Bolt (M6 × 16) | (54) Frame | |

11. Accelerator pedal

11.1 Removing/Installing the accelerator pedal

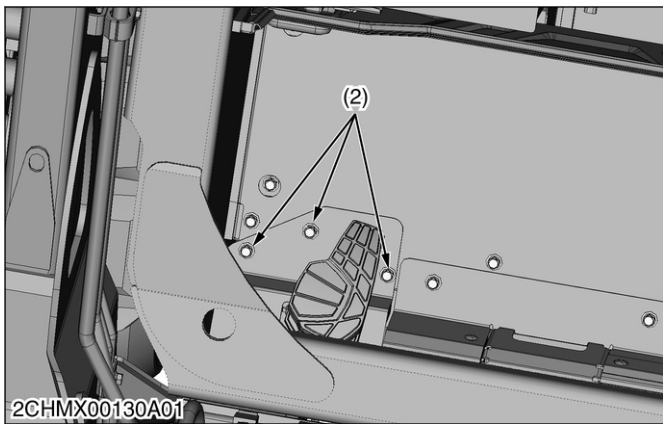
11.1.1 Removing the accelerator pedal

1. Remove the mat.



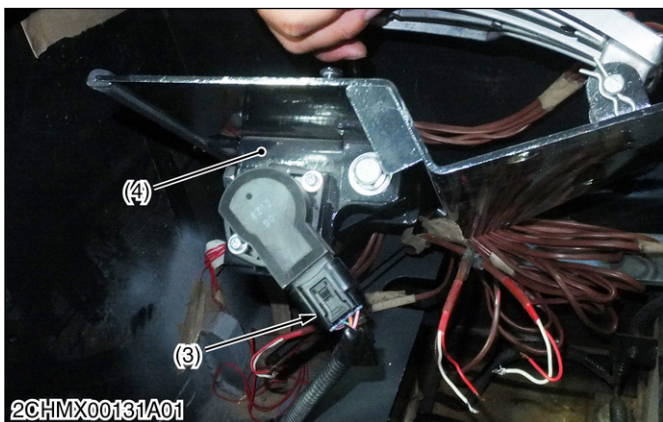
- (1) Mat

2. Remove three bolts.



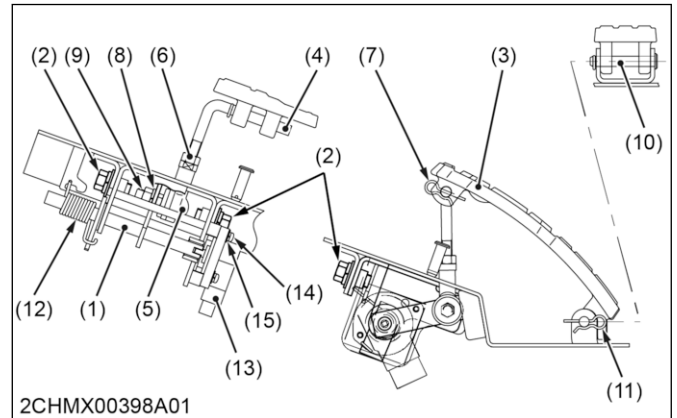
- (2) Bolt (M10 × 20) × 3

3. Remove the accelerator potentiometer connector and the accelerator pedal assembly.



- (3) Accelerator potentiometer connector
- (4) Accelerator pedal assembly connector

11.2 Accelerator pedal parts drawing



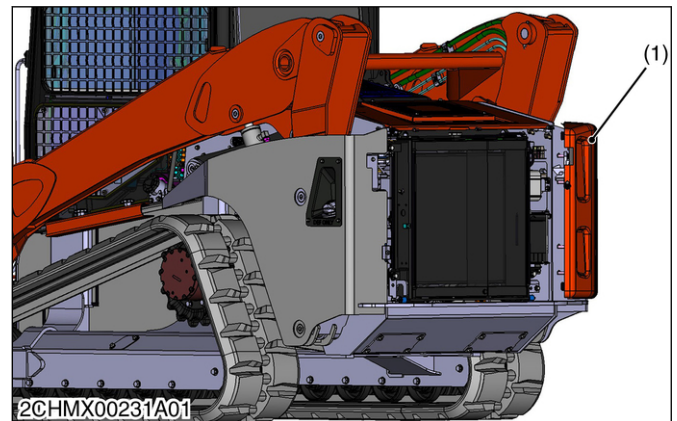
- | | |
|---------------------------|--------------------------------|
| (1) Linkage | (9) Nut |
| (2) Bolt (M10 × 20) × 3 | (10) Headed pin |
| (3) Accelerator pedal | (11) Snap pin |
| (4) Accelerator pedal rod | (12) Spring |
| (5) Rod end right screw | (13) Accelerator pedal sensor |
| (6) Nut | (14) Machine screw with washer |
| (7) Snap pin | (15) Flat metal washer |
| (8) Spring washer | |

12. Rear bonnet/rear cover

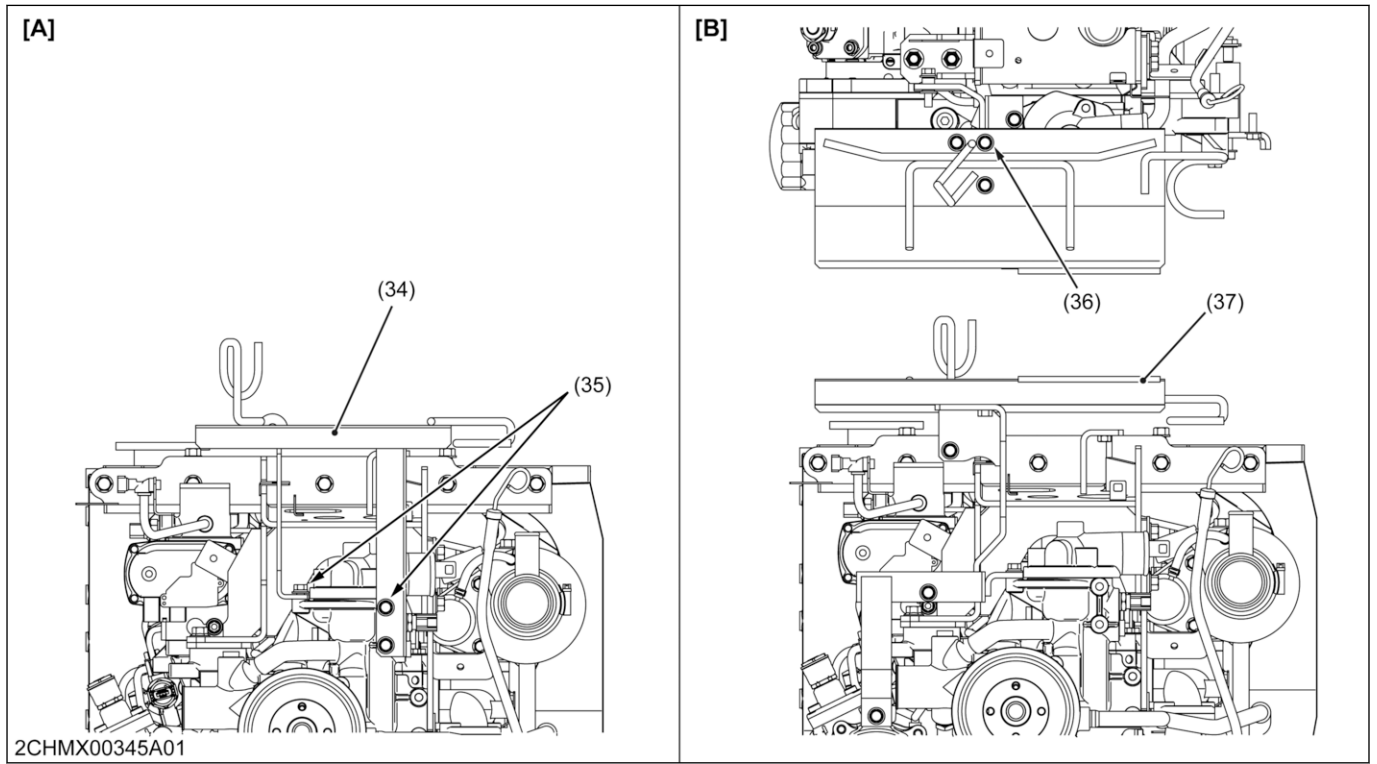
12.1 Removing/Installing the rear bonnet/rear cover

12.1.1 Removing the rear bonnet

1. Open the bonnet and cover.



- (1) Rear bonnet



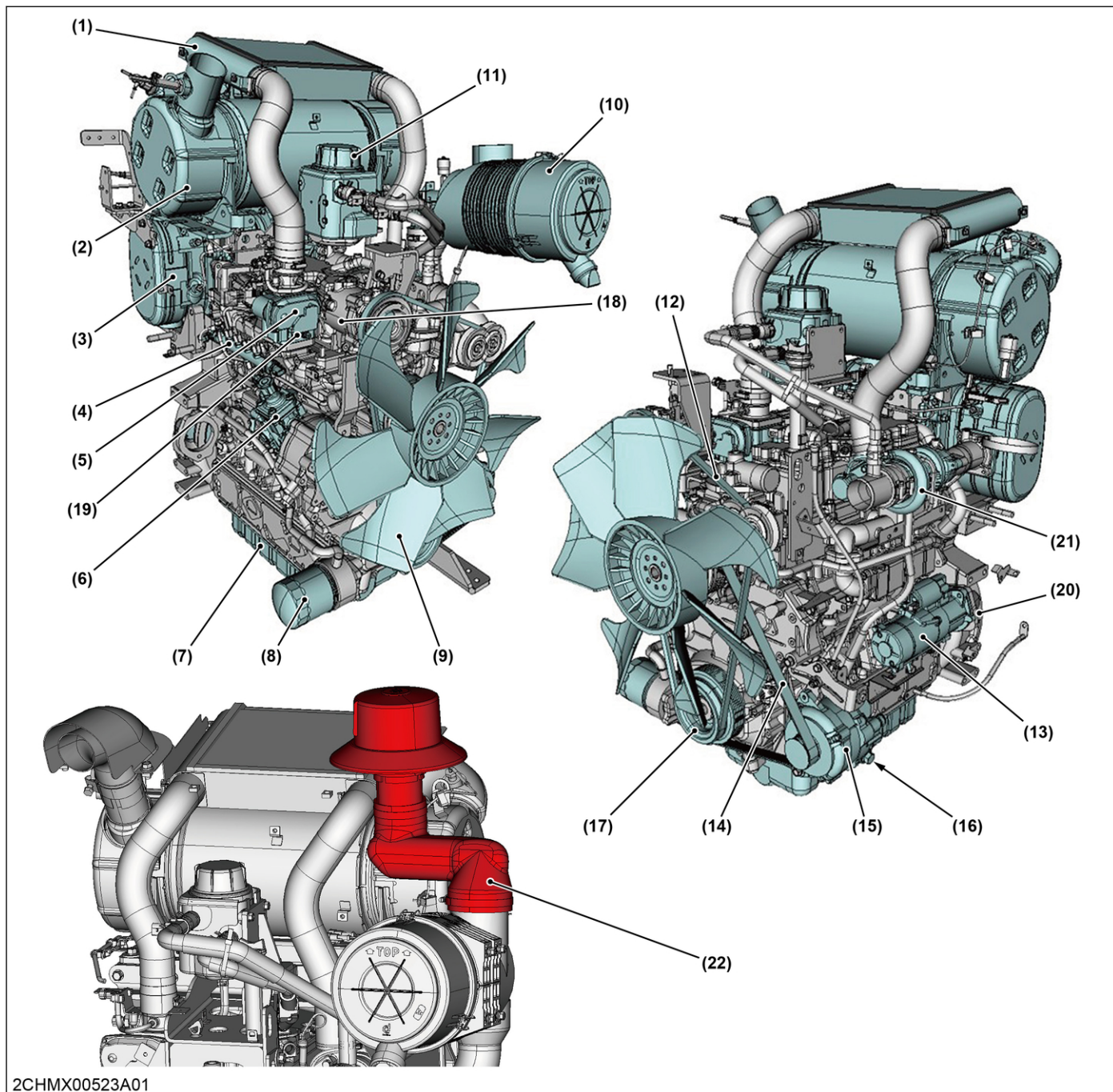
H: Open model
I: Closed model

(34) Hose guide
(35) Bolt (M8 × 25) × 4

(36) Bolt (M8 × 20) × 4
(37) AC belt cover

MECHANISM

1. Engine device layout

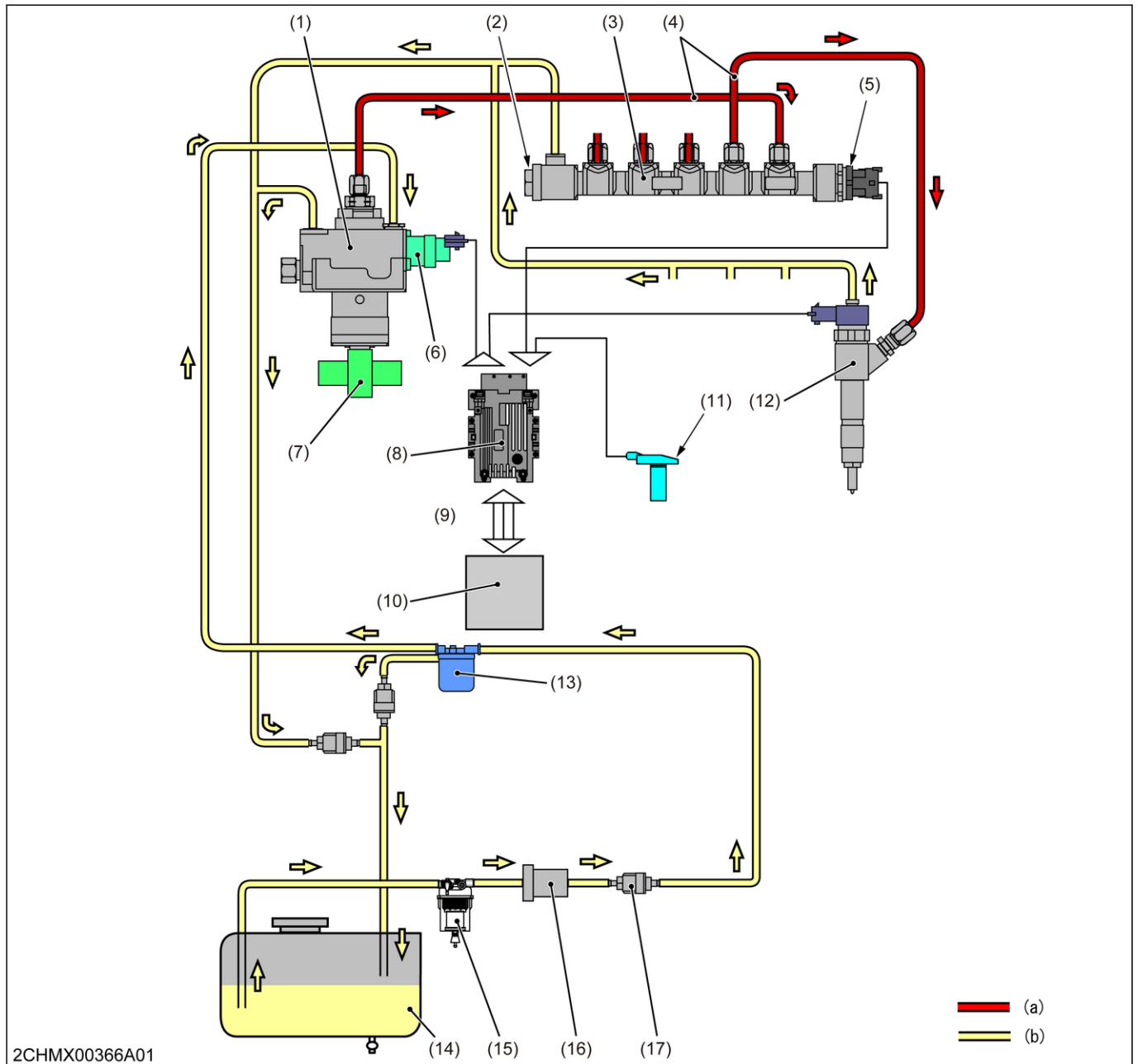


- | | | | |
|---------------------------|---------------------------|--------------------|------------------------|
| (1) Intercooler | (7) Oil pan | (13) Starter motor | (19) Intake air heater |
| (2) SCR muffler | (8) Engine oil filter | (14) Fan belt | (20) Flywheel |
| (3) DPF muffler | (9) Fan | (15) Alternator | (21) Turbocharger |
| (4) Rail | (10) Air cleaner | (16) Drain plug | (22) Pre-cleaner |
| (5) Intake throttle valve | (11) Oil separator | (17) Fan pulley | |
| (6) Supply pump | (12) Air conditioner belt | (18) Compressor | |

6. Common rail system

6.1 Common rail system general description

The supply pump is used to store pressurized fuel on the rail, and the fuel is injected by the injector at the appropriate pressure, amount and timing. This system suppresses PM generated with incomplete combustion of fuel.










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- | | | | |
|--------------------------|---------------------------------|----------------------|---------------------------|
| (1) Supply pump | (6) Suction control valve (SCV) | (11) Each sensors | (16) Fuel pump |
| (2) Pressure limiter | (7) Fuel camshaft | (12) Injector | (17) Check valve |
| (3) Rail | (8) Engine ECU | (13) Fuel filter | (a) High-pressure circuit |
| (4) High-pressure pipe | (9) CAN communication | (14) Fuel tank | (b) Low-pressure circuit |
| (5) Rail pressure sensor | (10) Main ECU | (15) Water separator | |

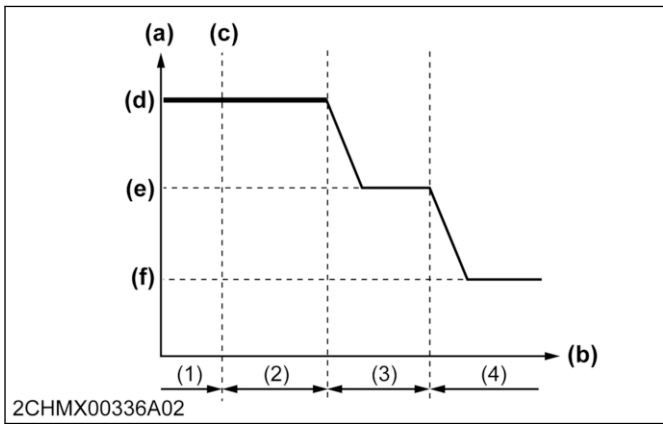
- The supply pump pressurizes the fuel and stores it on the rail.
- The injector controlled by the engine ECU injects fuel into the cylinder at the appropriate pressure, amount, and timing.
- Any fuel remaining in the injector returns from the overflow pipe to the tank via the fuel cooler.

10.2.5 SCR system error (Tampering)

Engine output limit and warning (error, lamp) due to failure (tampering) of DEF/AdBlue pump, CAN communication, DEF/AdBlue tank, electrical equipment except 5 V power.

	State	Time	Engine output, speed	Warning lamp							Error	Buzzer		
														
(1)	Normal	-	-	-	-	-	-	-	-	-	-	-	-	-
(2)	SCR system errors	0 to 195 min.	-	-	-	Blink	-	-	-	Blink	*1	Pi	Every 60 sec.	
(3)		195 to 240 min.	Limit	-	-	Blink	-	-	-	Blink	*1 E:9601	Pi...Pi	Every 20 sec.	
(4)		240 min. or more	Idling	-	-	Blink	-	-	-	Blink	*1 E:9602	Pi...Pi	Every 10 sec.	

*1 E9500, 9505, 9508, 9509, 9510, 9518, 9519, 9521, 9522, 9523, 9525, 9527



- (1) Normal state
- (2) 0 to 195 min.
- (3) 195 to 240 min.
- (4) 240 min. or more
- (a) Engine output, speed
- (b) Time
- (c) Error occurred for sensor, etc.
- (d) 100%
- (e) Limit
- (f) Idling

SCR system error detected (0 to 195 min.)

- SCR system warning lamp blinks (red), warning lamp blinks (red)

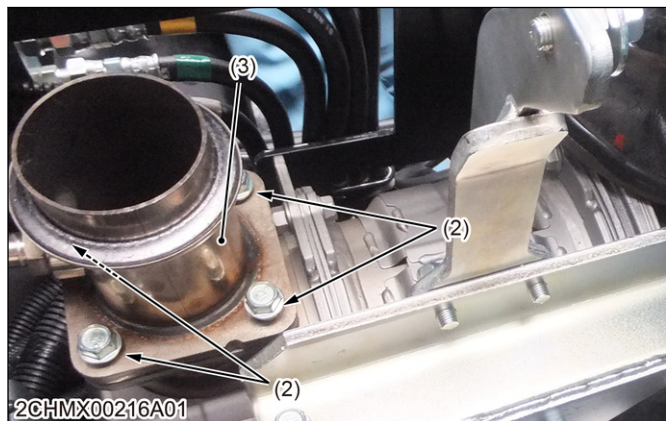
SCR system error detected (195 to 240 min.)

- Engine output, speed: Limited
- SCR system warning lamp blinks (red), warning lamp blinks (red)

SCR system error detected (240 min or longer)

- Engine output, speed: Idling
- SCR system warning lamp blinks (red), warning lamp blinks (red)

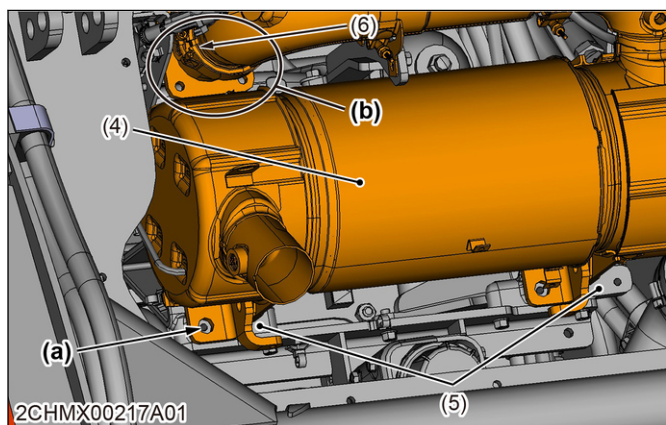
2. Assemble the inlet pipe.



(2) Bolt (M10 × 25) × 4 (3) Inlet pipe

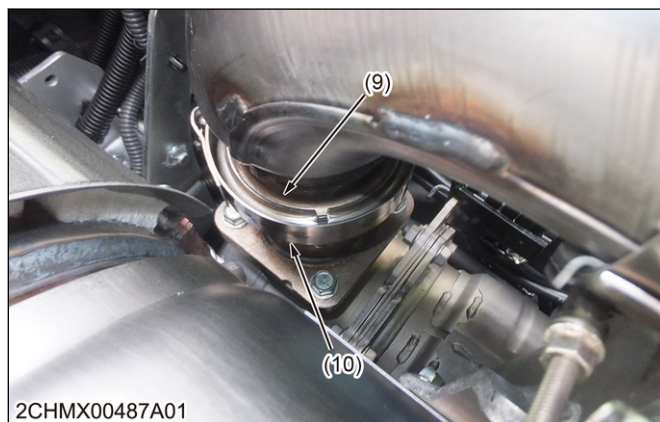
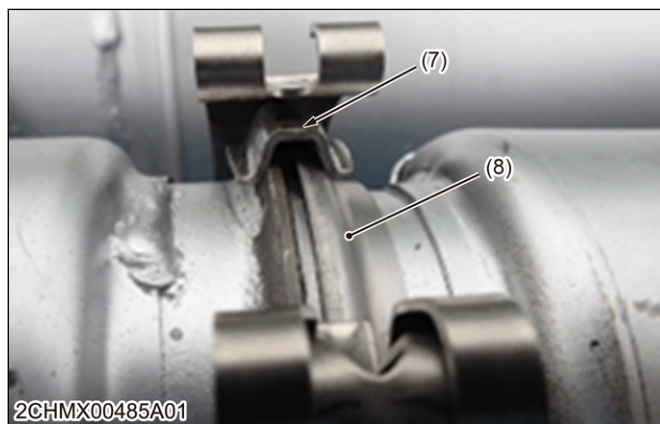
Bolt (2)	Tightening torque	48.1 to 55.9 N·m 4.9 to 5.7 kgf·m 35.5 to 41.2 lbf·ft
----------	-------------------	---

3. Mount the SCR muffler on the bracket.
4. Match the inlet pipe and SCR muffler connection after matching hole positions.



(4) SCR muffler (b) Inlet pipe and SCR muffler connection
(5) SCR muffler bracket
(6) Flange clamp
(a) Hole position

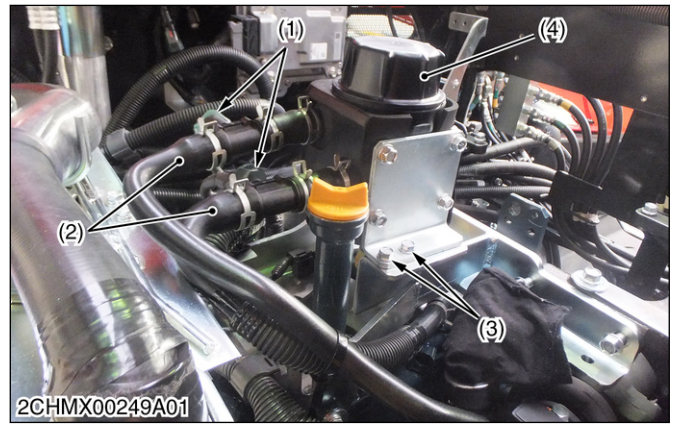
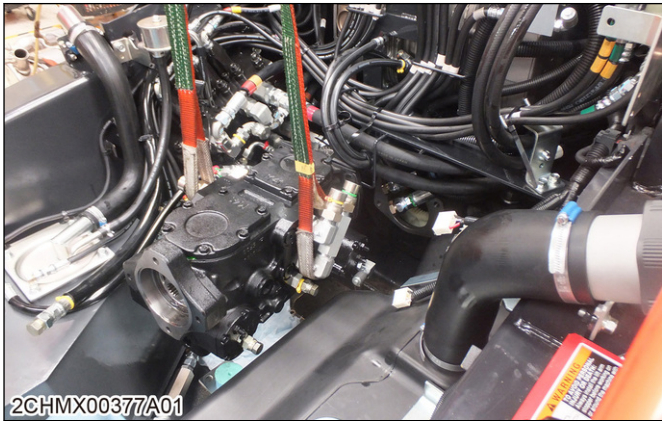
5. Tighten the flange clamp temporarily.
6. Check if SCR is mounted securely with rotating the flange clamp.



(7) Flange clamp (10) Flange clamp
(8) Gasket
(9) Gasket

5.1.7 Removing the HST pump

1. Remove the HST pump.



- (1) Connector
- (2) Hose
- (3) Bolt
- (4) Oil separator

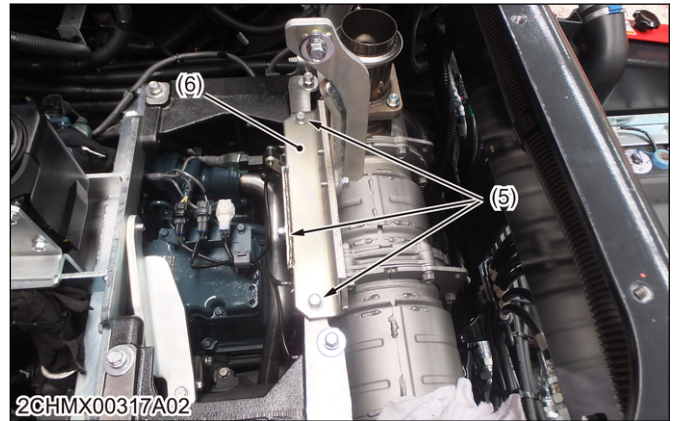
3. Remove three bolts and the bracket.

5.1.8 Removing the SCR muffler

1. Remove the SCR muffler.



- (1) SCR muffler

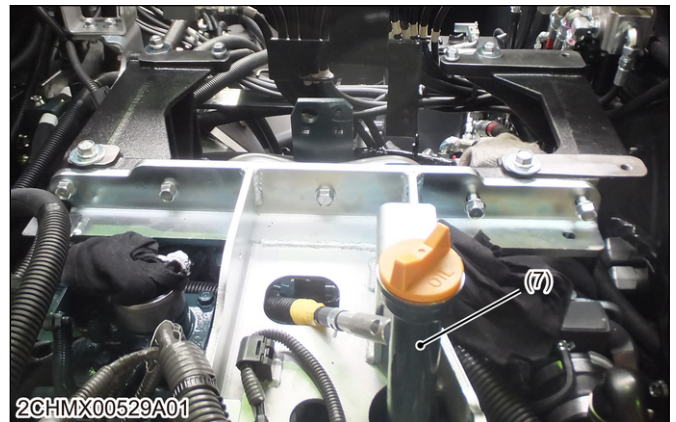


- (5) Bolt
- (6) Bracket

4. Remove the engine oil guide.

5.1.9 Removing the engine

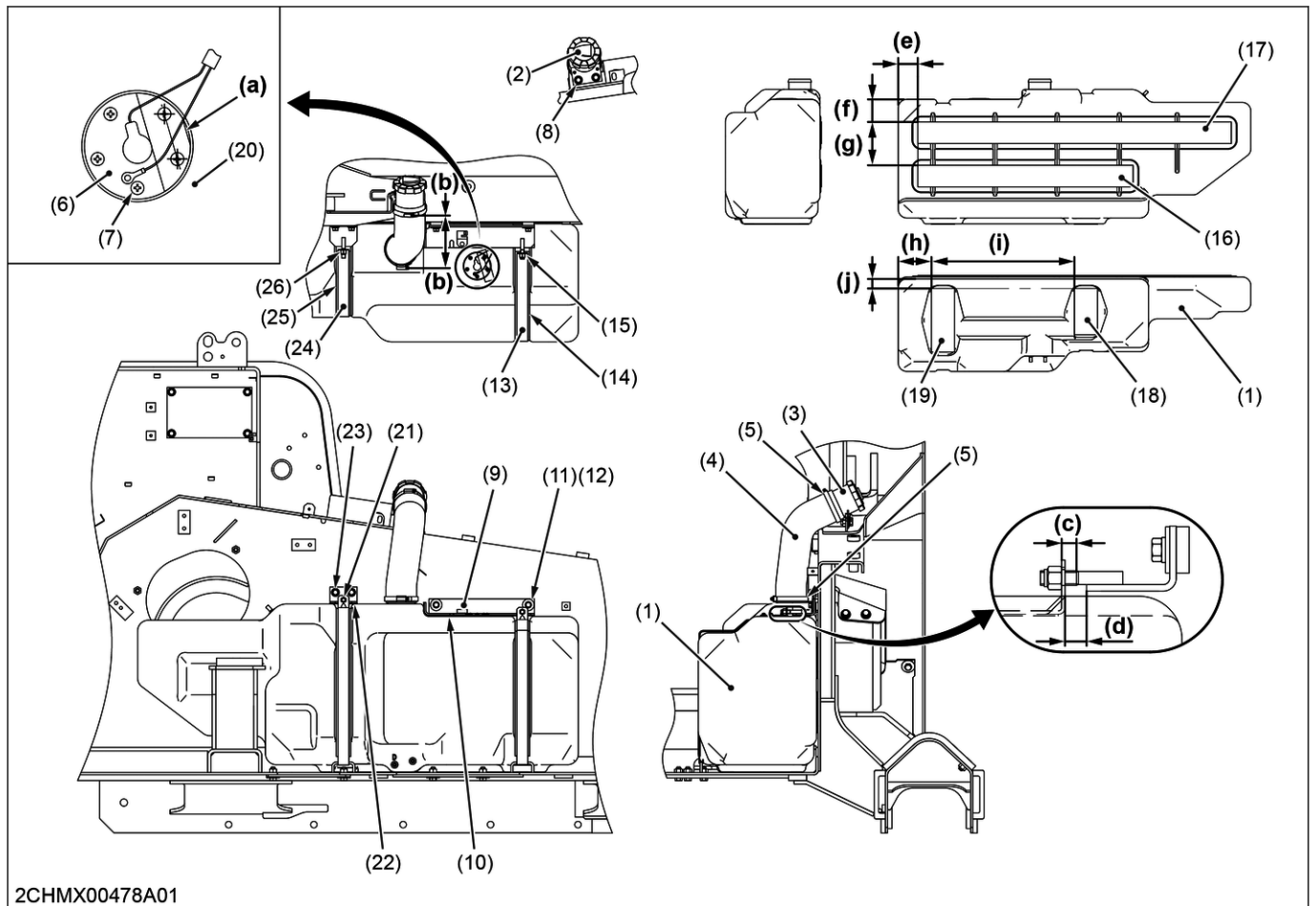
1. Disconnect two connectors and all of the oil separator hoses, and plug the hoses.
2. Remove two bolts, and the oil separator.



- (7) Engine oil guide

6. Fuel tank

6.1 Fuel tank parts drawing



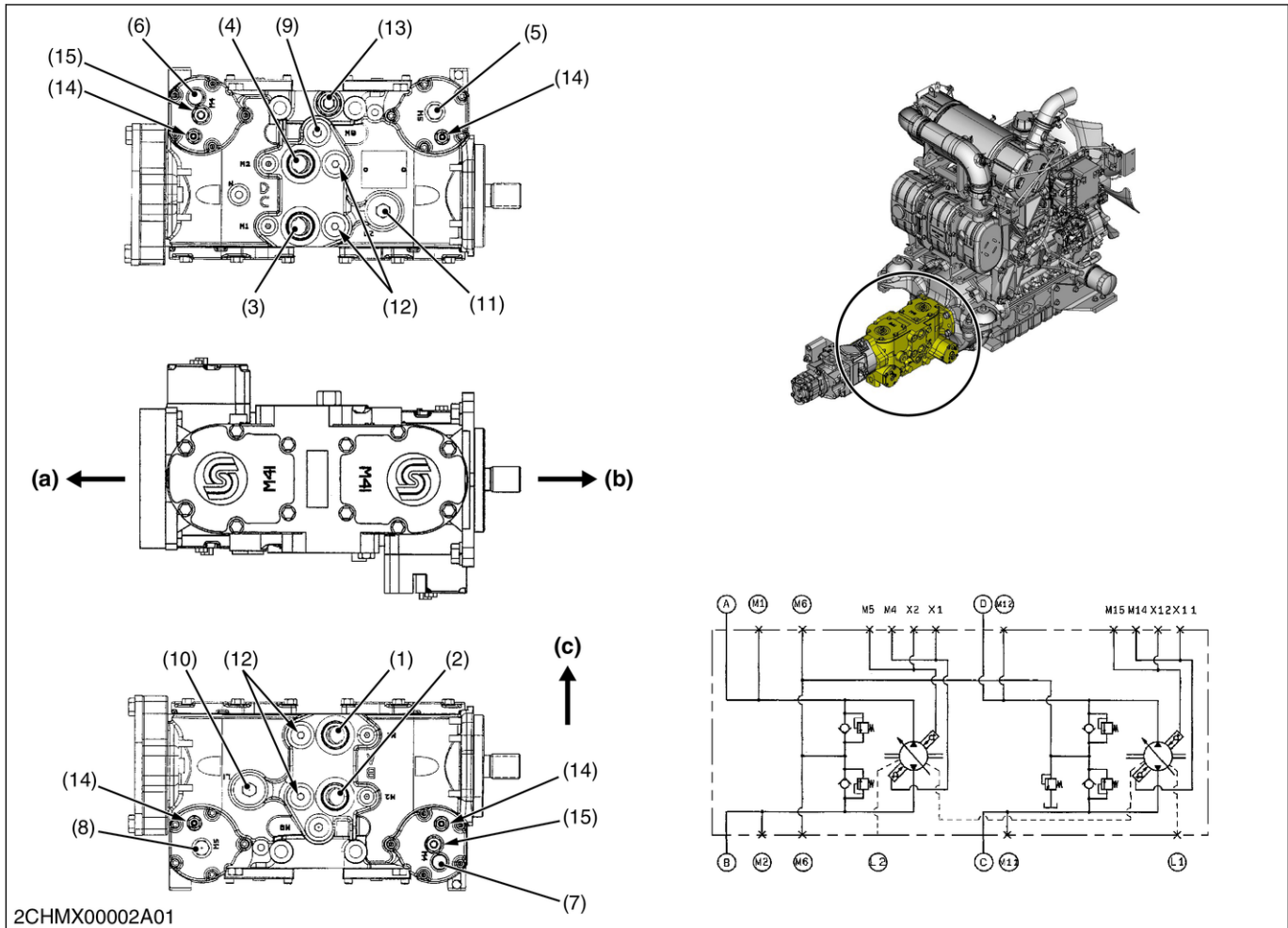
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- | | | | |
|------------------------|-------------------------|------------------------------------|----------------------------------|
| (1) Fuel tank | (10) Cushion | (19) Cushion | (b) Parallel |
| (2) Cap | (11) Bolt (M10 × 25) ×2 | (20) Cushion | (c) 5 to 10 mm (0.2 to 0.4 in.) |
| (3) Fuel pump | (12) Flat metal washer | (21) Plate | (d) 10 to 15 mm (0.4 to 0.6 in.) |
| (4) Fuel hose | (13) Band | (22) Cushion | (e) 68 mm (2.7 in.) |
| (5) Hose clamp | (14) Cushion | (23) Bolt (M10 × 25) ×2 | (f) 78 mm (3.0 in.) |
| (6) Fuel sensor | (15) Self-locking nut | (24) Band | (g) 150 mm (5.9 in.) |
| (7) Screw with washer | (16) Cushion | (25) Cushion | (h) 115 mm (4.5 in.) |
| (8) Bolt (M10 × 25) ×2 | (17) Cushion | (26) Self-locking nut | (i) 495 mm (19.4 in.) |
| (9) Plate | (18) Cushion | (a) Adjust the holes to the bolts. | (h) 33 mm (1.3 in.) |

Hose clamp (Tank side) (5)	Tightening torque	2.9 to 3.9 N·m 0.3 to 0.4 kgf·m 2.1 to 2.9 lbf·ft
Hose clamp (Pipe side) (5)		4.9 to 5.9 N·m 0.5 to 0.6 kgf·m 3.6 to 4.4 lbf·ft
Screw with washer (7)		3.0 to 4.0 N·m 0.3 to 0.4 kgf·m 2.21 to 2.95 lbf·ft
Bolt (11)		48 to 56 N·m 4.9 to 5.7 kgf·m 35.4 to 41.3 lbf·ft

2. HST pump

2.1 HST Pump specifications



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- | | | | |
|---------------------------------|-----------------------------|---------------------------------------|--------------------------------------|
| (1) Port A (high-pressure port) | (6) Port M14 (control port) | (10) Port L1 (engine stop prevention) | (14) Max swash-plate adjustment bolt |
| (2) Port B (high-pressure port) | (7) Port M4 (control port) | (11) Port L2 (drain) | (15) Neutral adjustment bolt |
| (3) Port C (high-pressure port) | (8) Port M15 (control port) | (12) High pressure relief valve | (a) Body front - Gear pump side |
| (4) Port D (high-pressure port) | (9) Port M6 (charge port) | (13) Charge relief valve | (b) Engine side |
| (5) Port M5 (control port) | | | (c) Body top |

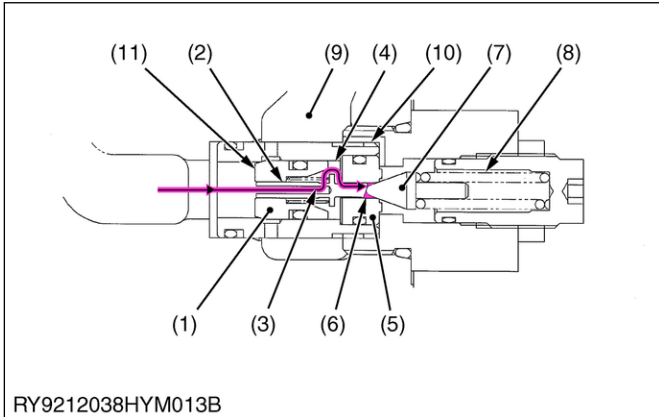
	Specifications
Manufacturer	DAIKIN SAUER DANFOSS LTD.
Rotation direction	Right turn as seen from the engine side (input shaft)
Rated RPM	2900 rpm
Max displacement	94 c/rev 5.7 in ³
High pressure relief valve setting pressure	32.5 MPa 331 kgf/cm ² 4710 psi
Charge relief valve setting pressure	2.4 MPa 24 kgf/cm ² 350 psi

5.2 Control valve functions and structures

5.2.1 Control valve "Main relief valve" functions and structures

This valve is used to prevent pressure surges inside the hydraulic circuit.

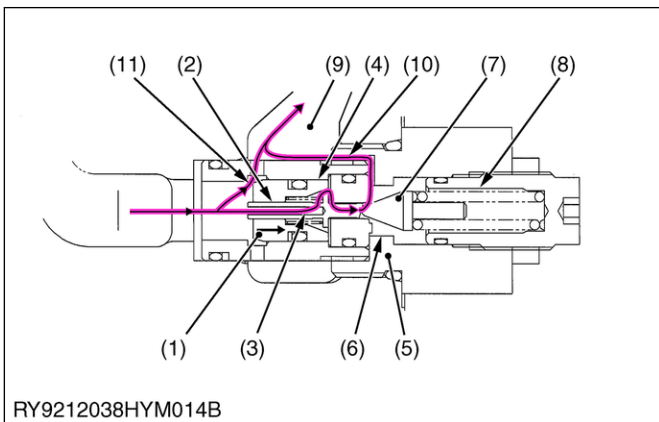
Normal (Operating pressure < Pressure setting)



- | | |
|----------------------|-----------------------|
| (1) Adjustment valve | (7) Poppet |
| (2) Piston | (8) Adjustment spring |
| (3) Throttle a | (9) Tank passage |
| (4) Spring chamber A | (10) Drain passage |
| (5) Adjustment part | (11) Seat |
| (6) Seat B | |

- The hydraulic oil is shut off by seat B.
- The poppet does not move, so the circuit will not be relieved.

Operated (Operating pressure > Pressure setting)



- | | |
|----------------------|-----------------------|
| (1) Adjustment valve | (7) Poppet |
| (2) Piston | (8) Adjustment spring |
| (3) Throttle a | (9) Tank passage |
| (4) Spring chamber A | (10) Drain passage |
| (5) Adjustment part | (11) Seat |
| (6) Seat B | |

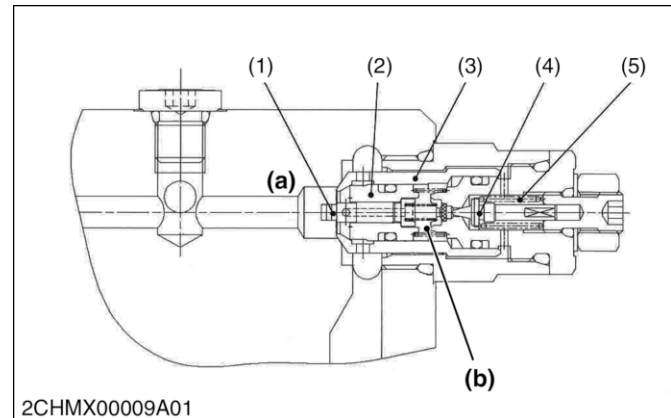
- The poppet opens, and the hydraulic oil returns to the tank via the drain passage.
- The pressure in spring chamber A drops, resulting in a difference in pressure before and after throttle a.

- This difference in pressure causes the adjustment valve to move to the right.
- Hydraulic oil is returned to the tank from the seat of the adjustment valve.

5.2.2 Control valve "LS relief valve" functions and structures

This valve sets the maximum load pressure of the LS line.

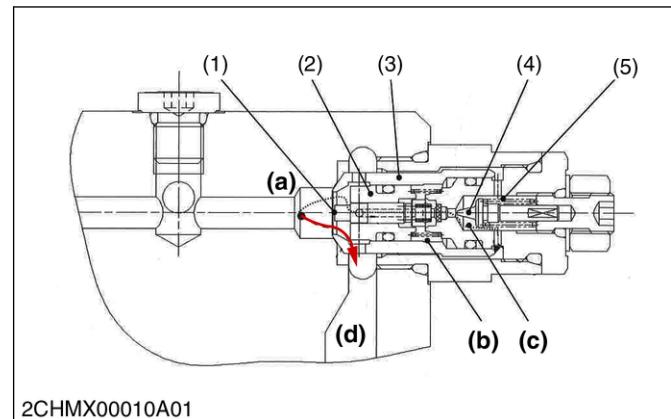
Normal (Operating pressure < Pressure setting)



- | | |
|-------------|--------------------|
| (1) Piston | (5) Spring |
| (2) Plunger | (a) LS line |
| (3) Seat | (b) Spring chamber |
| (4) Poppet | |

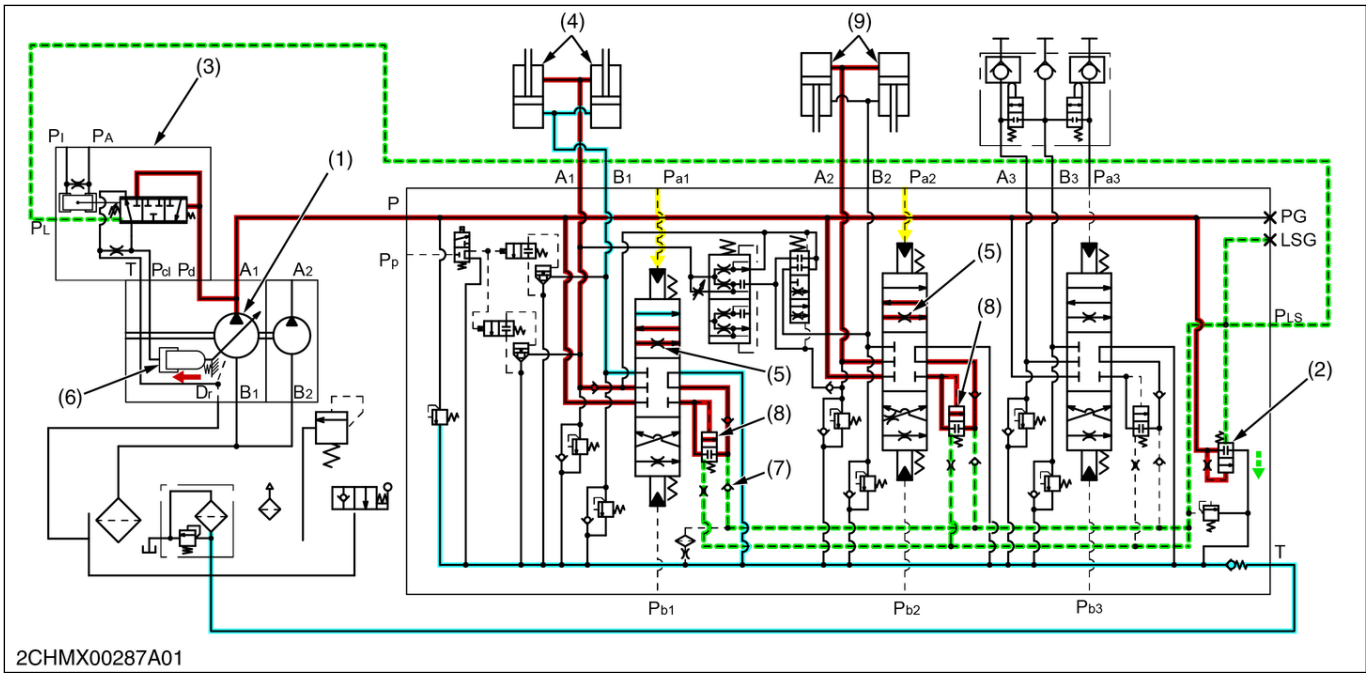
- The hydraulic oil is at or below the set pressure, so the poppet will not move.
- The LS line and spring chamber have the same pressure, so it does not relieve.

Operated (Hydraulic oil > Pressure setting)



- | | |
|-------------|------------------------|
| (1) Piston | (a) LS line |
| (2) Plunger | (b) Spring chamber |
| (3) Seat | (c) Inside the chamber |
| (4) Poppet | (d) Tank passage |
| (5) Spring | |

- The pressure of the hydraulic oil is greater than the spring force, and the poppet opens.
- The piston operates, and the hydraulic oil flows into the chamber.



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- | | | | |
|-----------------------|-----------------------------------|-------------|----------------------------------|
| (1) Piston pump | (6) Swash-plate | Red P line | Yel- Pressure oil from gear pump |
| (2) Unload LS valve | (7) High pressure selection valve | Blue T line | low: |
| (3) Regulator | (8) Compensator spool | | Gre LS line |
| (4) Lift arm cylinder | (9) Bucket cylinder | | en: |
| (5) Orifice | | | |

- The pressure with the higher operating load goes through the LS line.
- The high pressure select valve prevents pressure oil from flowing to sections with a low loads.

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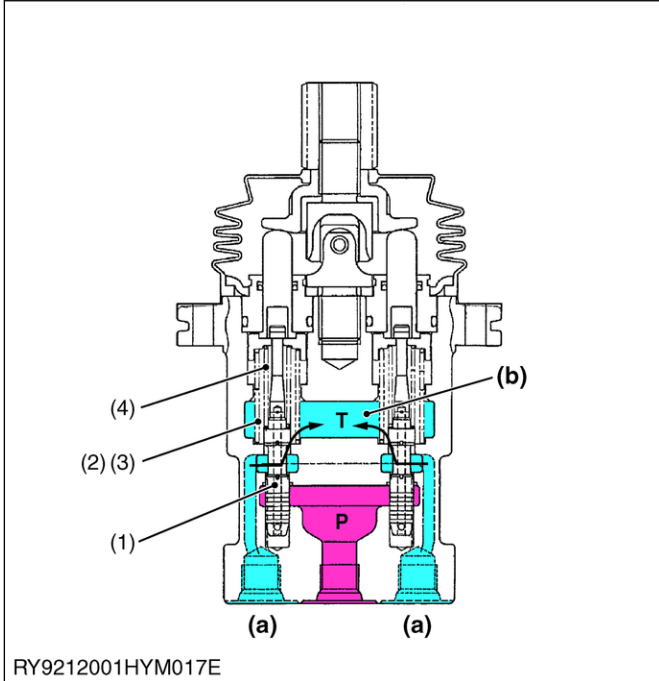
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7.2 Pilot valve (working equipment operation) functions and structures

7.2.1 Pilot valve (working equipment operation) working principles

The pressure of the pilot primary pressure oil is reduced, and the oil flows to the control valve as secondary pressure.

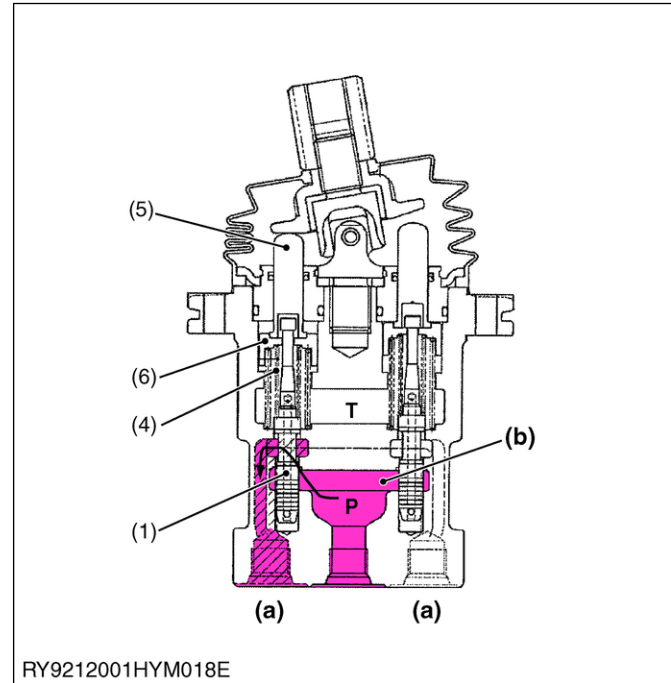
Control lever: Neutral



- | | |
|---|-----------------|
| (1) Spool | (a) Output port |
| (2) Return spring | (b) Port T |
| (3) Return spring | |
| (4) Spring for setting secondary pressure | |

- Oil from port P is shut off by the spool.
- The output port and port T are connected.

Control lever: Operated

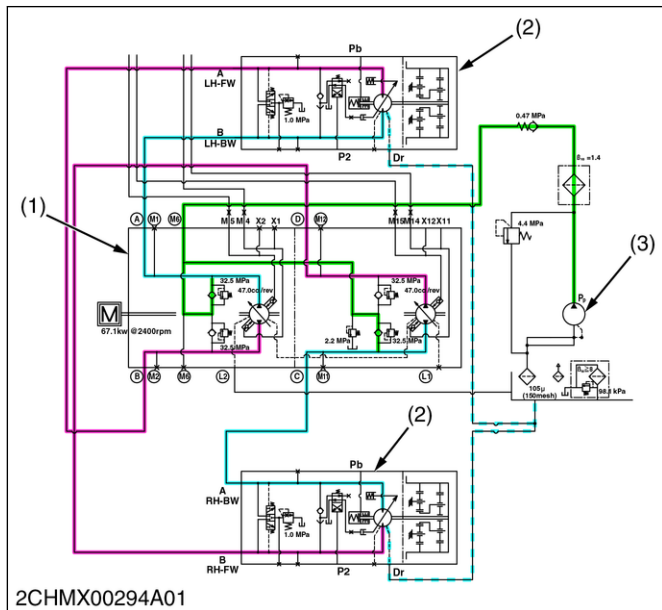


- | | |
|---|-----------------|
| (1) Spool | (6) Spring seat |
| (4) Spring for setting secondary pressure | (a) Output port |
| (5) Pushrod | (b) Port P |

- The spool is pushed by the pushrod according to how much pressure is applied by the lever.
- The pressure of the oil (primary pressure) from the gear pump is reduced according to the extent of movement by the spool.
- The secondary pressure flows to the control valve.

8.3.6 Travel system "Charge circuit" hydraulic description

Replenishes oil to circuit when the oil level of closed circuit is low.



- (1) HST pump (3) Gear pump
(2) Travel motor

- The hydraulic oil from the HST pump is returned to the HST pump via the travel motor.
- Drainage from the HST pump and travel motor returns to the tank, resulting in insufficient hydraulic oil in the closed circuit.
- Oil is supplied from the gear pump to replenish the hydraulic oil when low.

Travel speed does not shift, or too slow

Probable cause(s)	Inspection point	Remedy
Faulty charge relief valve	Check the charge relief valve Measure the charge relief valve pressure	Clean or replace the charge relief valve
Maladjustment of the HST pump swash-plate	Check the HST pump swash-plate	Adjust the HST pump swash-plate
Faulty travel relief valve of the HST pump	Measure the pressure of the travel relief valve	Replace the travel relief valve
Faulty travel speed shift valve or piston of the travel motor	Check the travel speed shift valve and piston of the travel motor	Travel speed shift valve of the travel motor Clean or replace the piston
Electrical system trouble	Check the set-up in tester mode Check the travel speed shift switch Check the connector and wiring	Replace the travel speed shift switch Replace the connector and wiring
Faulty Solenoid Valve (travel speed shift)	Check the Solenoid Valve (travel speed shift)	Clean and/or replace the Solenoid Valve (travel speed shift)

The vehicle creeps while in neutral

Probable cause(s)	Inspection point	Remedy
Maladjustment of neutral of the HST pump	Check the servo piston of the HST pump	Adjust neutral for the servo piston of the HST pump

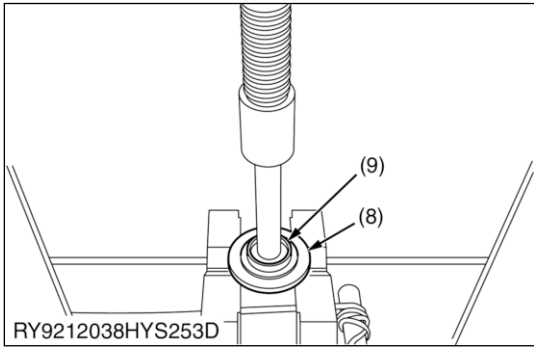
The vehicle rolls downhill when parked on a slope

Probable cause(s)	Inspection point	Remedy
Abrasion of friction plate	Check the thickness of the friction plate	Replace friction plate
Faulty parking brake spring	Check the parking brake of the travel motor	Replace the parking brake of the travel motor

The engine stalls on key start, and is easy to stall during digging

Probable cause(s)	Inspection point	Remedy
Blockage of the PPS port of the piston pump	Check the PPS port of the piston pump	Clean the PPS port of the piston pump
Faulty spring inside the piston pump LS regulator	Check the spool	Check or replace the spool
Faulty or incorrectly set Solenoid Valve (Anti-stall)	Check the Solenoid Valve (Anti-stall)	Clean or replace the Solenoid Valve (Anti-stall) Reset on the meter panel

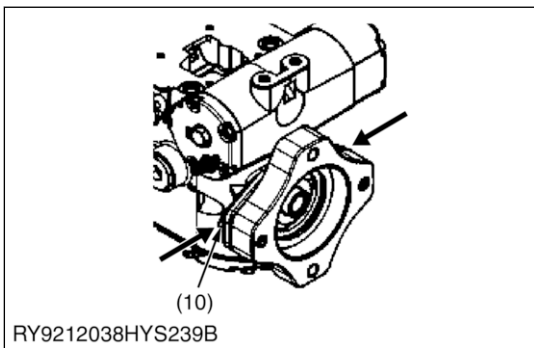
7. Remove the axis seal from oil seal with using a press machine.



(8) Shaft seal (9) Oil seal

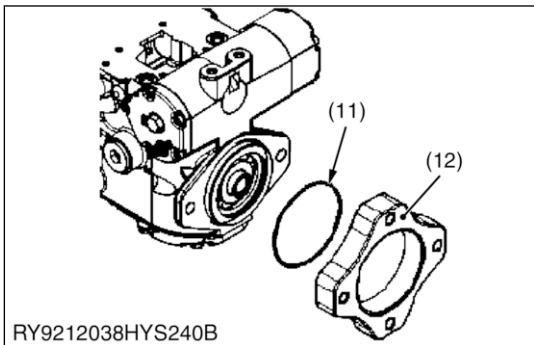
8. Remove two bolts.

- Tool: 19 mm socket wrench



(10) Bolt (M12 × 40) × 2

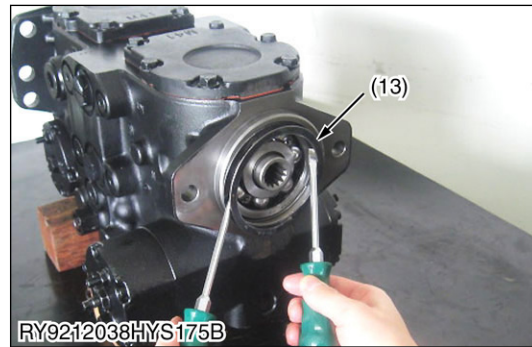
9. Remove the adapter and O-ring.



(11) O-ring (12) Adapter

10. Remove the ring.

- Tool: Flat tip screwdriver



(13) Ring

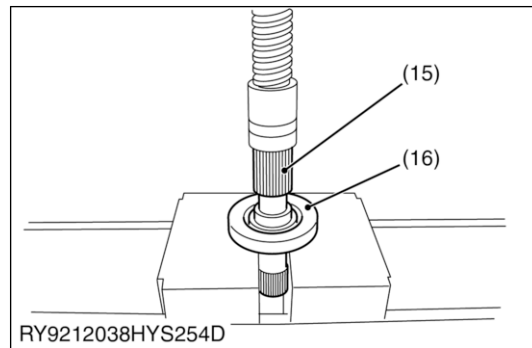
11. Remove the shaft.

- Tools: Hammer and strike rod



(14) Shaft

12. Remove the roller bearing from shaft with using a press machine.

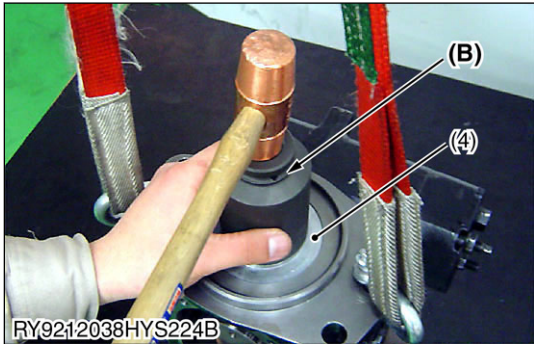


(15) Shaft (16) Ball bearing

6. After installing the Oil Seal, install the axis seal.

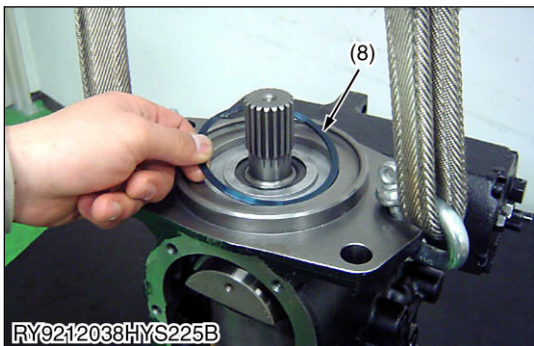
■ NOTE

- Make sure that the shaft seal faces the right direction.
- Grease the inner surface of the Oil Seal.
- Tool: Hammer
- Jig: Oil Seal press-fit jig



(4) Shaft seal (B) Axis seal press-fit jig

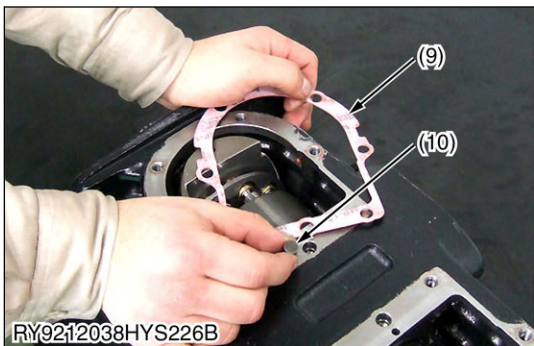
7. Install the ring.



(8) Ring

8. Lay down the HST pump with crane.

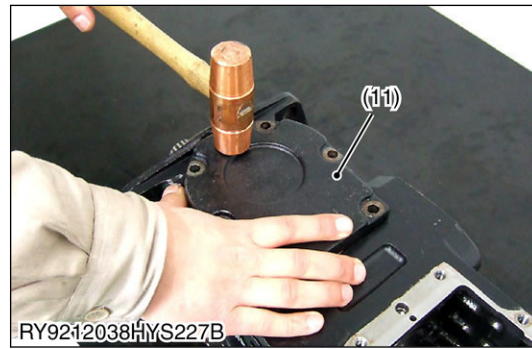
9. Install the gasket and pin, in that order.



(9) Gasket (10) Pin

10. Install the cover assembly by tapping with a hammer.

- Tool: Hammer

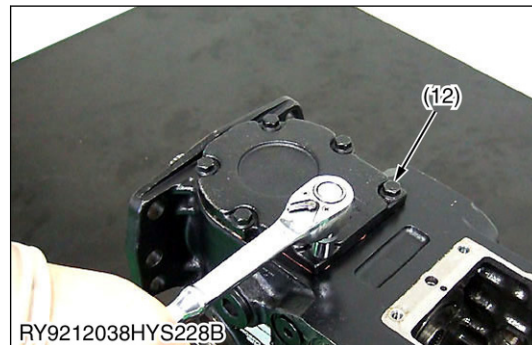


(11) Cover assembly

11. Tighten the flange bolts.

■ NOTE

- Apply SCOTCH-GRIP2353 to the flange bolts and mount the bolts.
- Tighten the flange bolts, starting from near the pin.
- Tighten the flange bolts, diagonally and evenly.
- Tool: 13 mm socket wrench



(12) Flange bolt (M8 × 20) × 6

Flange bolt (12)	Tightening torque	35 to 43 N · m 3.57 to 4.38 kgf · m 25.8 to 31.7 lbf · ft
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4. Piston pump

4.1 Measuring the piston pump

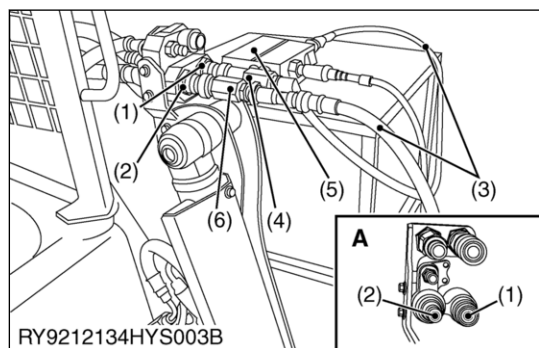
■ IMPORTANT

- When performing measurement, adjustment, or repairs, set-up the meter panel as needed.
 - Service mode / No-03 AUX start-up point setting
 - Service mode / No-12 AUX flow rate setting

4.1.1 Measuring the flow rate for piston pump

Measurement preparation

- Connect the test hose to port 2 and the IN-side of the flowmeter.
- Connect the test hose to port 1 and the OUT-side of the flowmeter.



- Port 1 (Quick connector, female)
- Port 2 (Quick connector, male)
- Test hose (G3/4-G3/4, pressure resistance: 27.5 MPa, 4000 psi or higher)
- Quick connector (male)
- Flowmeter
- Quick connector (female)

- The AUX flow rate limit is set to 9.

■ NOTE

- High-flow model only

- Warm up the engine until the hydraulic oil temperature reaches 50 ± 5 °C (122 ± 9 °F).
- Press the AUX switch to set to AUX mode.

Measurement

- Set the engine to maximum speed.
- Press the AUX knob switch to the right end.
- Gradually close the flowmeter's loading valve, then measure the flow rate and engine RPM at each pressure.
- Measure 3 times, and take the average value.

4.2 Bleeding air from the piston pump

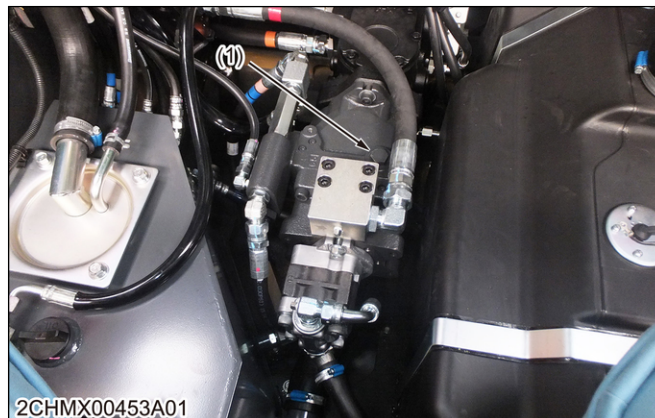
■ IMPORTANT

- After repairing the hydraulic pressure (changing, adjusting, and evacuating, hoses, oil) always bleed air from the piston pump.

- Tilt-up the cabin, and lock it.



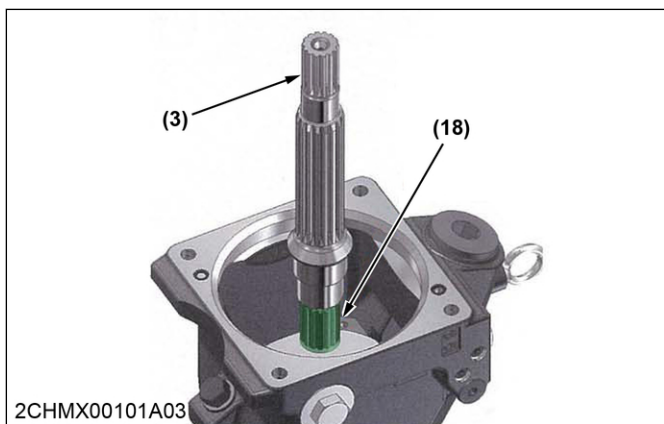
- Remove the drain plug.
- Replenish hydraulic oil to piston pump from drain port.
- Close the drain plug.



- Drain plug

Drain plug (1)	Tightening torque	90 N·m 9.2 kgf·m 66.4 lbf·ft
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- Lower the cabin, and set the engine to low idle.

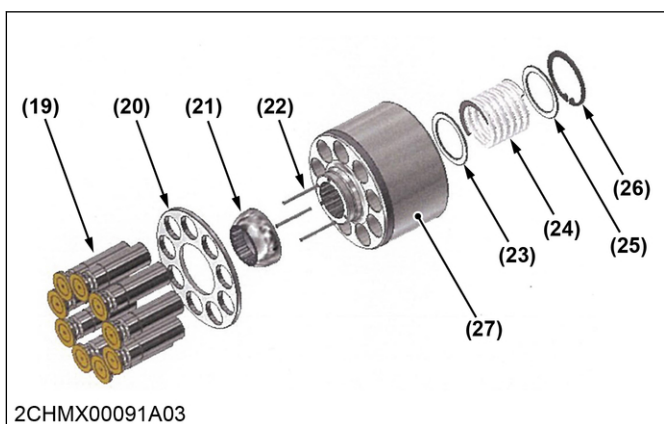


(3) Shaft (18) Protective tape

6. Install nine pistons, plate, spherical bushing, pushrod, two shims, spring, and internal circlip on the cylinder block.

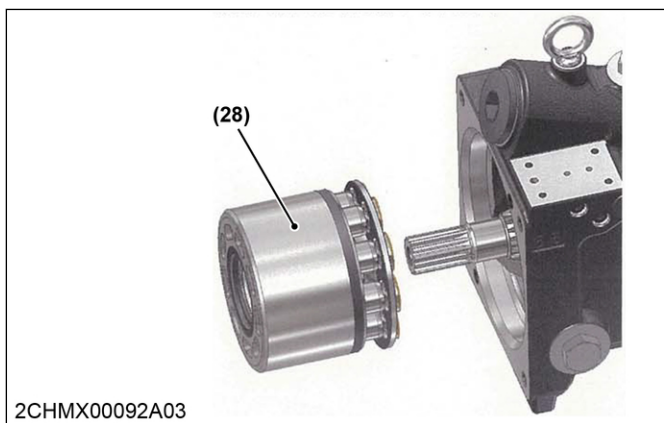
■ NOTE

- Apply hydraulic oil to the pistons, shoe, spherical bushing, and cylinder block.



(19) Piston (20) Plate (21) Spherical bushing (22) Pushrod (23) Shim (24) Spring (25) Shim (26) Internal circlip (27) Cylinder block

7. Install the cylinder block assembly to the shaft.

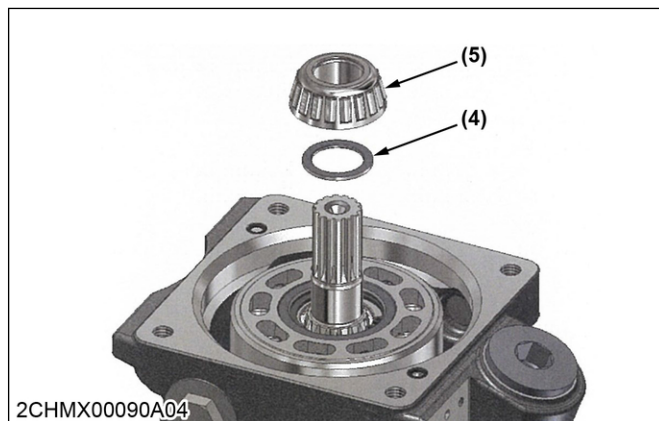


(28) Cylinder block assembly

8. Install the spacer and tapered roller bearing.

■ IMPORTANT

- Do not re-use the spacer in case of replacing either of the pump casing, valve cover, shaft or tapered roller bearings.



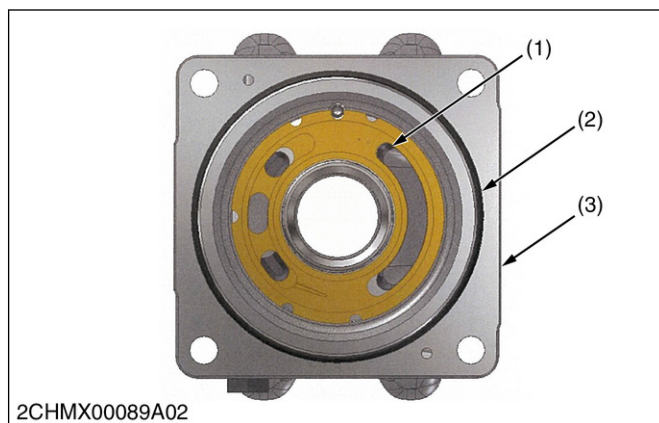
(4) Spacer (5) Tapered roller bearing

4.5.3 Assembling valve cover for piston pump

1. Install the valve plate and O-ring on the valve cover.

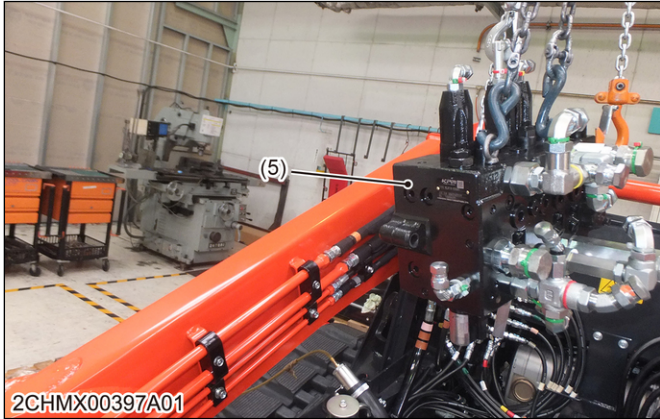
■ NOTE

- Make sure that the valve plate faces the right way.
- Grease the valve plate.



(1) Valve plate (2) O-ring (3) Valve cover

6. Lift the control valve and remove it.



(5) Control valve

Control valve weight	SVL95-2s SVL97-2	62.9 kg 138.7 lbs
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5.3 Disassembling the control valve

CAUTION

- Choose a clean place to prevent contaminants when assembling/disassembling.
- Use clean tools and new cleaning oil.
- Before separating the sections, plug in to each port and clean the exterior as an assembly.
- Work at flat and level platform to avoid bias/excess torque and residual strain when assembling/disassembling.
- Replace seals and O-rings with new ones, and install it with grease or hydraulic oil.
- Clean outside of the motor with plugging each ports after assembling.

IMPORTANT

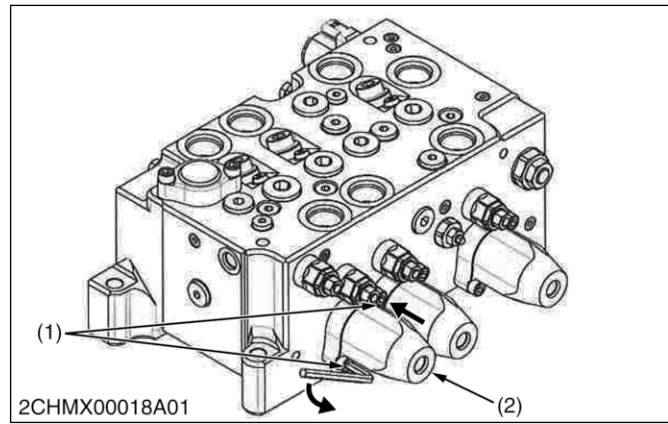
- When performing measurement, adjustment, or repairs, set-up the meter panel as needed.
 - Service mode / No-03 AUX start-up point setting
 - Service mode / No-12 AUX flow rate setting
- After repairing the hydraulic pressure (changing, adjusting, and evacuating devices, hoses, oil) always bleed air from the piston pump.

5.3.1 Removing the section for control valve

1. Remove two hex socket bolts, and the spool cover.

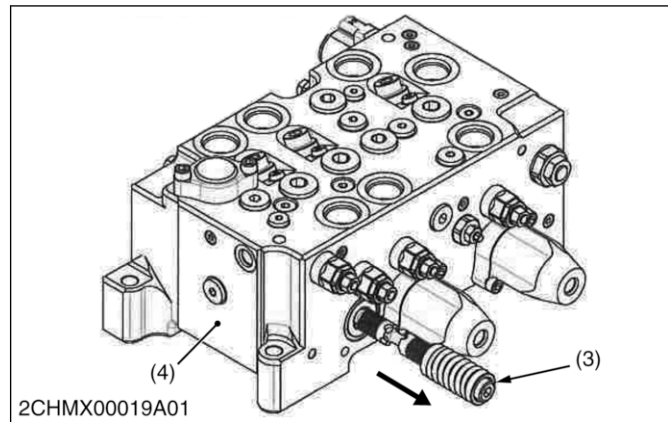
NOTE

- Tool: 6 mm hex wrench



(1) Hex socket bolt (M6 × 50) × 4 (2) Cover

2. Remove the spool assembly from the casing.

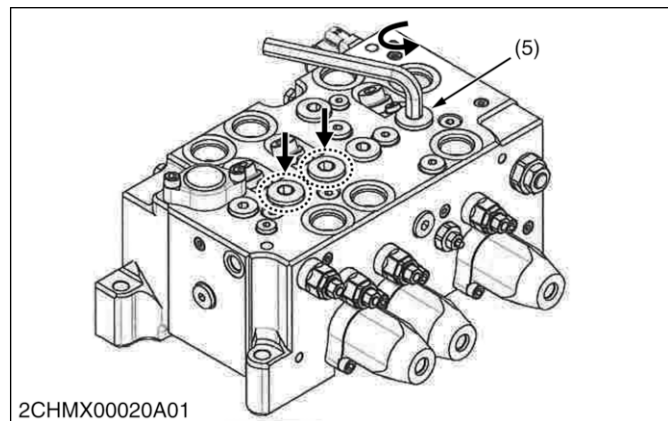


(3) Spool assembly (4) Casing

3. Remove the plug.

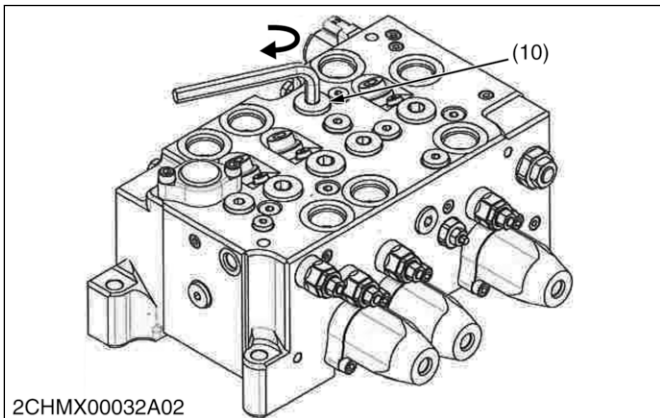
NOTE

- Tool: 12 mm hex wrench



(5) Plug

8. Tighten the plug.
• Tool: 10 mm hex wrench

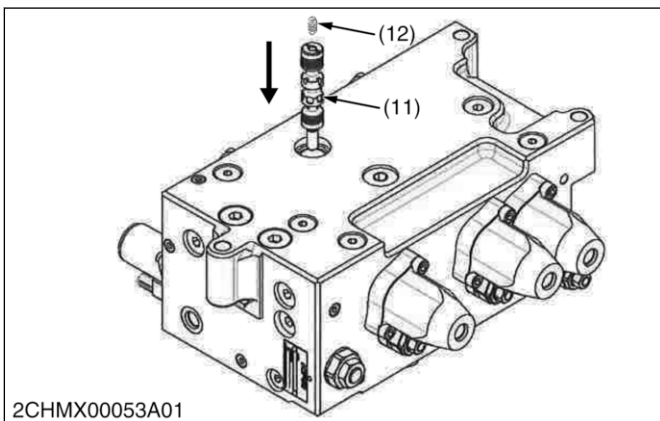


2CHMX00032A02

(10) Plug

Plug (10)	Tightening torque	127 to 147 N·m 13.0 to 15.0 kgf·m 93.7 to 108.4 lbf·ft
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9. Insert the sequence spool and piston.
• Use a crane to flip the casing over.
• Make sure the sequence spool is facing the right way.

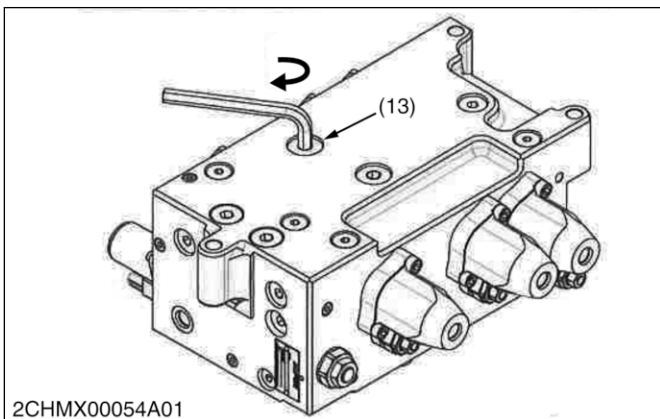


2CHMX00053A01

(11) Sequence spool

(12) Piston

10. Tighten the plug.
• Tool: 10 mm hex wrench



2CHMX00054A01

(13) Plug

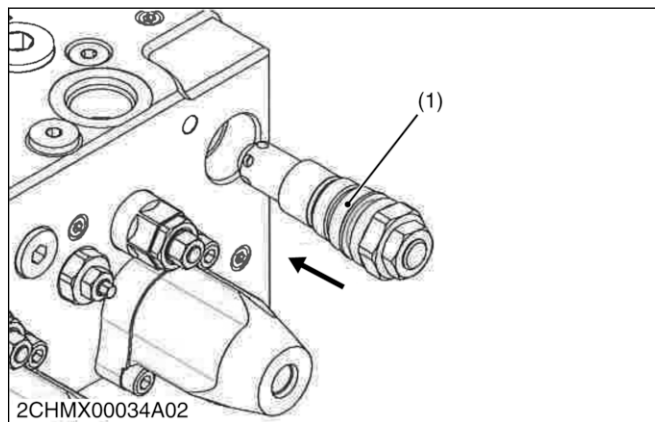
Plug (13)	Tightening torque	127 to 147 N·m 13.0 to 15.0 kgf·m 93.7 to 108.4 lbf·ft
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5.4.3 Assembling the relief valve for the control valve

1. Insert the main relief valve.

■ NOTE

- The set pressure will change, so you need to apply a spanner to the 30 mm width portion of the main relief valve.
- Tool: 30 mm spanner



2CHMX00034A02

(1) Main relief valve

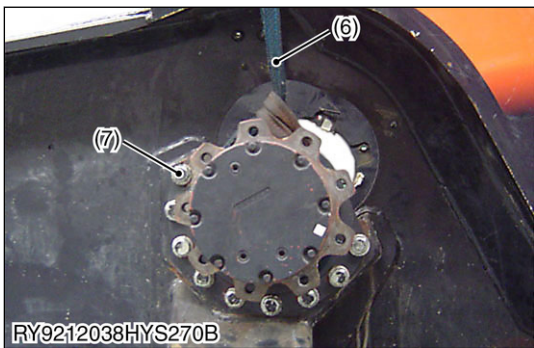
Main relief valve (1)	Tightening torque	69 to 78 N·m 7.0 to 8.0 kgf·m 50.9 to 57.5 lbf·ft
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- Remove five hoses, and plug the hoses and adapters.



(5) Travel motor

- Support the travel motor with a crane, and remove nine bolts.



(6) Nylon sling

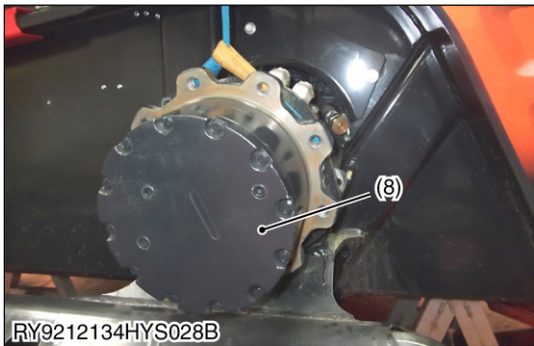
(7) Bolt (M16 × 50) × 9

Tightening torque

Bolt (7)	259.9 to 304.0 N · m 26.5 to 31 kgf · m 192 to 224 lbf · ft
----------	---

Apply a threadlock (Loctite® 271).

- Remove the travel motor



(8) Travel motor

Travel motor weight	SVL95-2s SVL97-2	83 kg 180 lbs
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6.2 Disassembling the travel motor

CAUTION

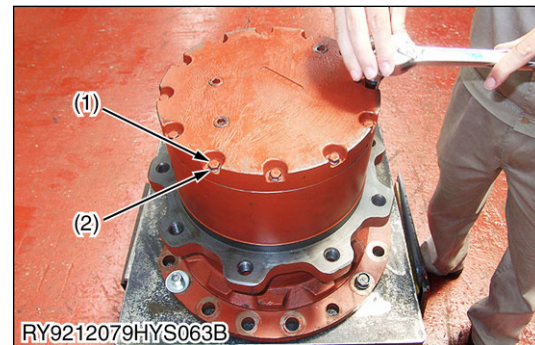
- Choose a clean place to prevent contaminants when assembling/disassembling.
- Use clean tools and new cleaning oil.
- Replace seals and O-rings with new ones, and install it with grease or hydraulic oil.
- Clean outside of the motor with plugging each ports after assembling.

IMPORTANT

- After repairing the hydraulic pressure (changing, adjusting, and evacuating, hoses, oil) always bleed air from the piston pump.

6.2.1 Disassembling the gear case for travel motor

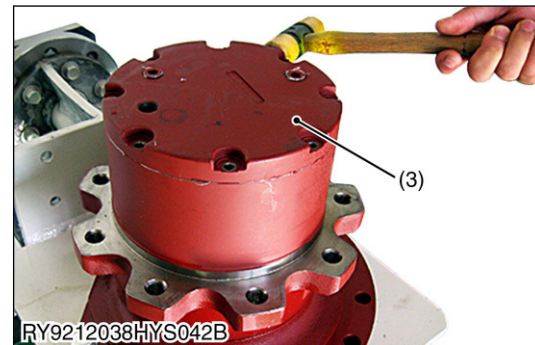
- Remove twelve bolts and washers.
 - Tool: 10 mm socket wrench



(1) Bolt

(2) Washer

- Remove the cover with hammering the side of it.
 - Tool: Hammer



(3) Cover

17. Install the thrust plate, needle bearing (2nd), and planetary gear (2nd).

■ NOTE

- When installing the thrust plate, the R surface should be facing downwards.



(12) Planetary gear (2nd)

18. Install the plate (2nd), and tighten four bolts.
• Tool: 5 mm hex socket

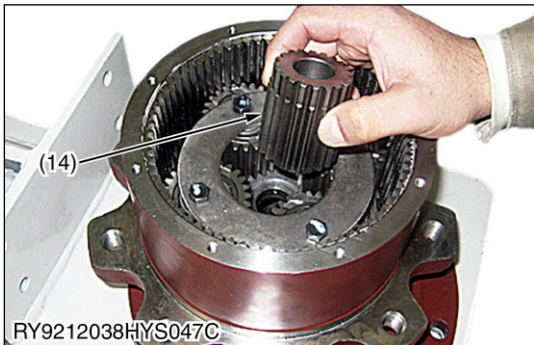


(13) Bolt

Bolt (13)	Tightening torque (reference value)	20 N · m 2.0 kgf · m 15 lbf · ft
-----------	-------------------------------------	--

Apply a threadlock (ThreeBond 1324)

19. Install the sun gear (2nd).

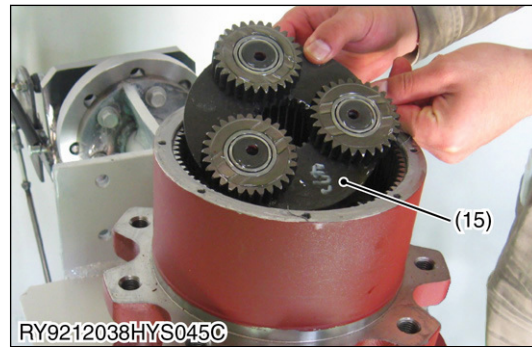


(14) Sun gear (2nd)

20. Install the carrier plate assembly.

■ NOTE

- Pass a tap through the carrier sub-assembly before installation. (M8 × 1.25 mm)



(15) Carrier plate assembly

21. Install the sun gear (1st).

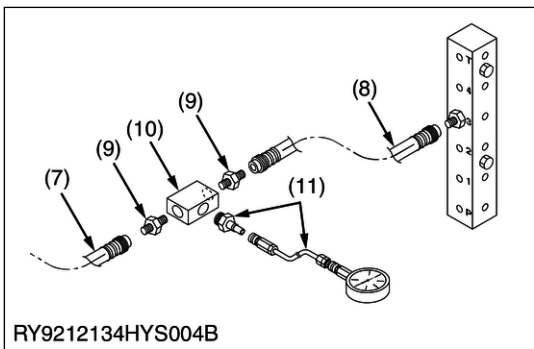


(16) Sun gear (1st)

22. Install the stopper plate.



(17) Stopper plate



- (7) Hydraulic hose (10) Pipe joint
(8) Test hose (11) Pressure gauge
(9) Pipe joint

- Tilt-down the cabin
- Warm up the engine until the hydraulic oil temperature reaches $50 \pm 5 \text{ }^\circ\text{C}$ ($122 \pm 9 \text{ }^\circ\text{F}$).

Measurement

- Set the engine to maximum speed, and release the hydraulic lock.
- Travel forward and measure the pressure.
- Perform measurement 3 times, and take the average value.
- Similarly, connect a pressure gauge to the pilot hoses of port 1, port 2, port 3 and port P, and measure the pressure.

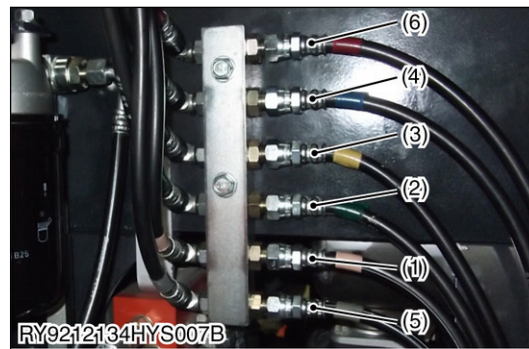
7.1.2 Measuring pressure for the pilot valve (Lift arm, bucket)

■ IMPORTANT

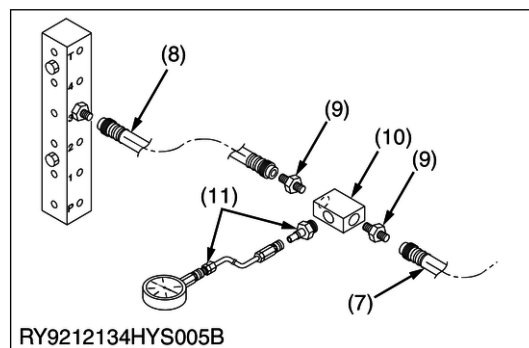
- When performing measurement, adjustment, or repairs, set-up the meter panel as needed.
 - Service mode / No-03 AUX start-up point setting
 - Service mode / No-12 AUX flow rate setting

Measurement preparation

- Place the vehicle on a jack stand on firm and flat ground.
- Tilt-up the cabin.
- Remove the lift arm up pilot hose from port 4, and connect a test hose, pilot hose and pressure gauge to the pipe joint.



- (1) Port: 1
Bucket crowd
(2) Port: 2
Lift arm down
(3) Port: 3
Bucket dump
(4) Port: 4
Lift arm up
(5) Port P
(6) Port T



- (7) Hydraulic hose (10) Pipe joint
(8) Test hose (11) Pressure gauge
(9) Pipe joint

- Tilt-down the cabin
- Warm up the engine until the hydraulic oil temperature reaches $50 \pm 5 \text{ }^\circ\text{C}$ ($122 \pm 9 \text{ }^\circ\text{F}$).

Measurement

- Set the engine to maximum speed, and release the hydraulic lock.
- Raise the lift arm, and measure the pressure.
- Measure 3 times, and take the average value.
- Similarly, measure the pressure of lift arm down, bucket crowd, bucket down, and port P.

7.2 Disassembling the pilot valve

⚠ CAUTION

- Handle the parts very carefully due to its precision, do not hit or drop them.
- Hitting the parts too hard will result in performance degradation, oil leak, generating burrs, and breaking.
- Pay extra attention for rust and dust when leaving the parts disassembled.

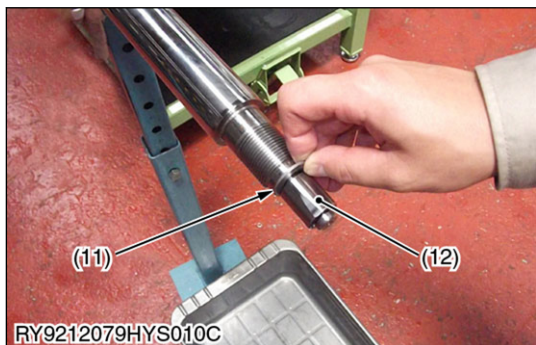
■ IMPORTANT

- When performing measurement, adjustment, or repairs, set-up the meter panel as needed.

9. Remove stopper ring.

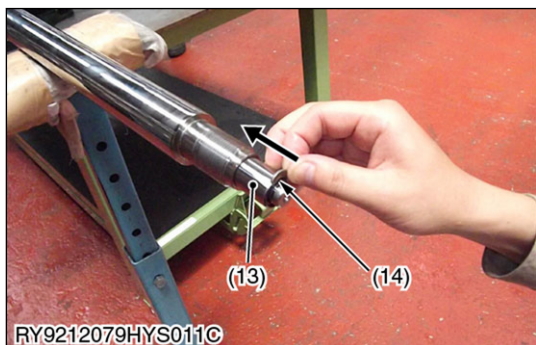
■ **IMPORTANT**

- **Make sure not to damage the cushion bearing.**



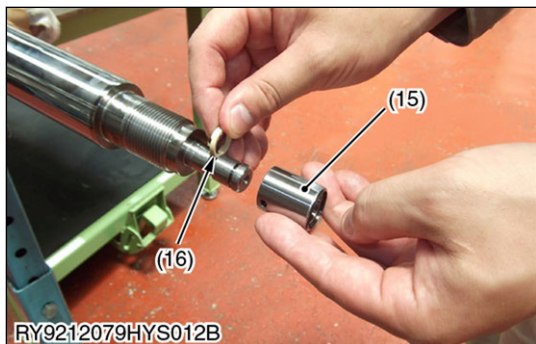
(11) Stopper ring (12) Cushion bearing

10. Remove the stopper with sliding the cushion bearing.



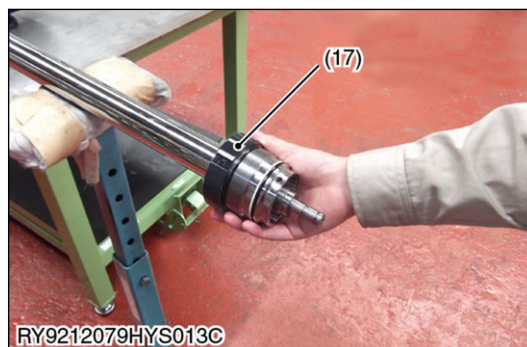
(13) Cushion bearing (14) Stopper

11. Remove the cushion bearing and cushion seal.



(15) Cushion bearing (16) Cushion seal

12. Remove the cylinder head.

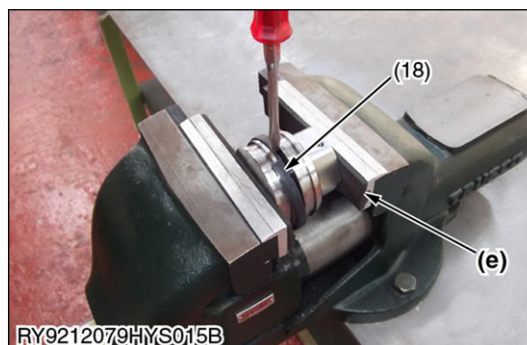


(17) Cylinder head

13. Remove the slide ring by hand, split the seal ring assembly by tapping it with a flat tip screwdriver, and remove the O-ring.

■ **NOTE**

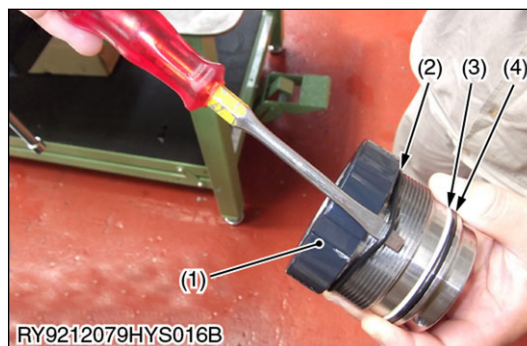
- **Set a cushion plate on the vice so that the piston does not become scratched.**
- Tools: Flat tip screwdriver and hammer



(18) Seal ring assembly (e) Cushion plate

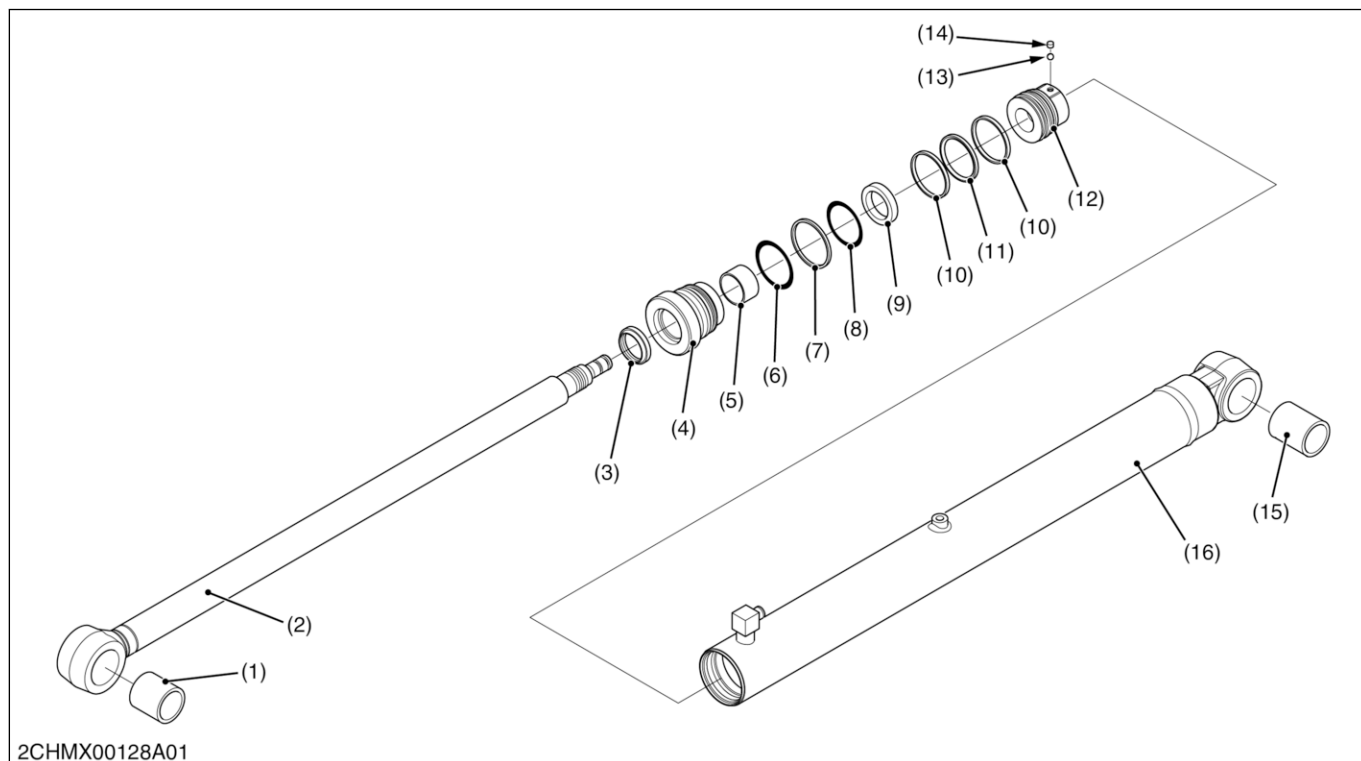
8.2.2 Disassembling the cylinder head for lift arm cylinder

1. Remove two O-rings and backup ring.
 - Tool: Flat tip screwdriver



(1) Cylinder head (2) O-ring (3) Backup ring (4) O-ring

9.2 Bucket cylinder components

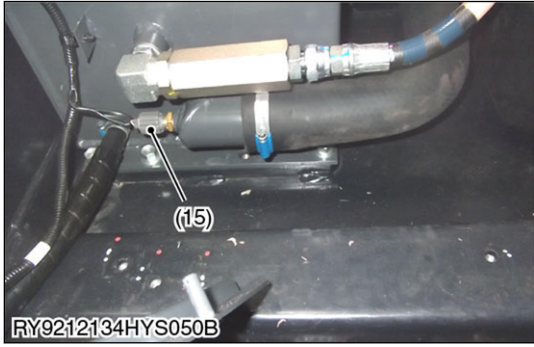


- | | | | |
|-------------------|-----------------|-------------------------|----------------|
| (1) Bushing | (5) Bushing | (9) U-ring | (13) Ball |
| (2) Piston rod | (6) O-ring | (10) Slide ring | (14) Set screw |
| (3) Wiper ring | (7) Backup ring | (11) Seal ring assembly | (15) Bushing |
| (4) Cylinder head | (8) O-ring | (12) Piston | (16) Tube |

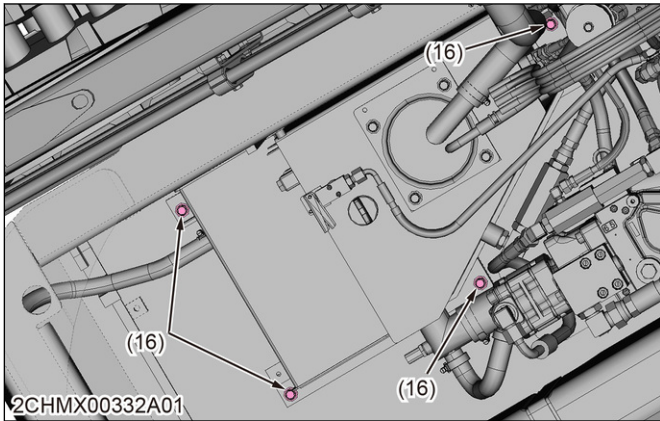
Cylinder head (4)	Tightening torque	569 N·m 58.1 kgf·m 420 lbf·ft
Piston (12)		975 N·m 99.4 kgf·m 719 lbf·ft
Set screw (14)		16.2 N·m 1.7 kgf·m 12 lbf·ft

6. HYDRAULIC SYSTEM

- Remove four mounting bolts of the connector and hydraulic oil tank, and the hydraulic oil tank.



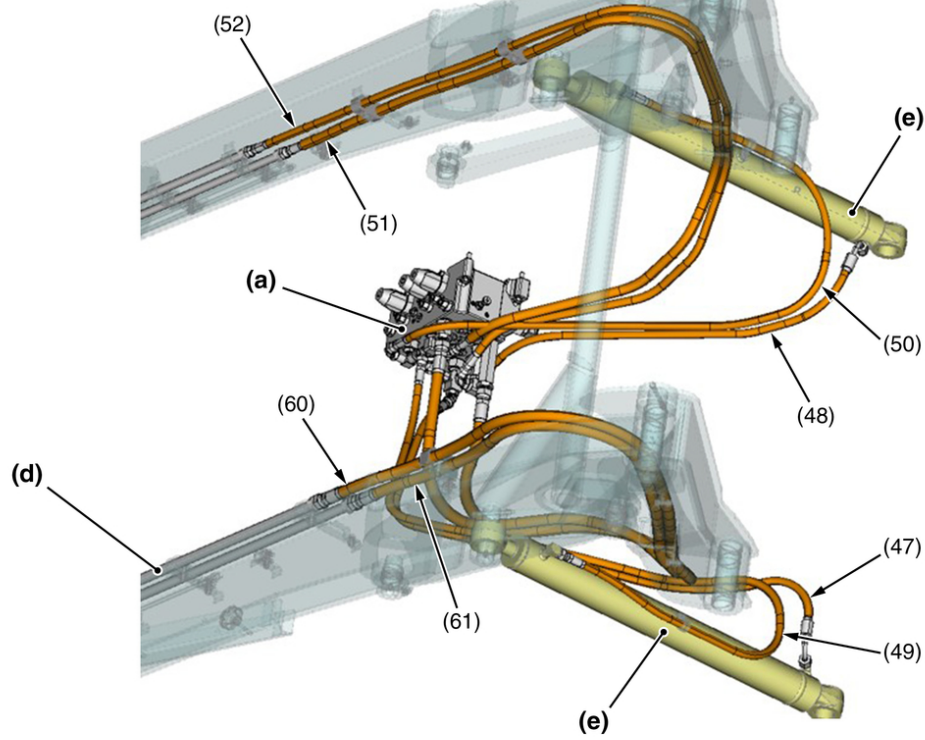
(15) Connector



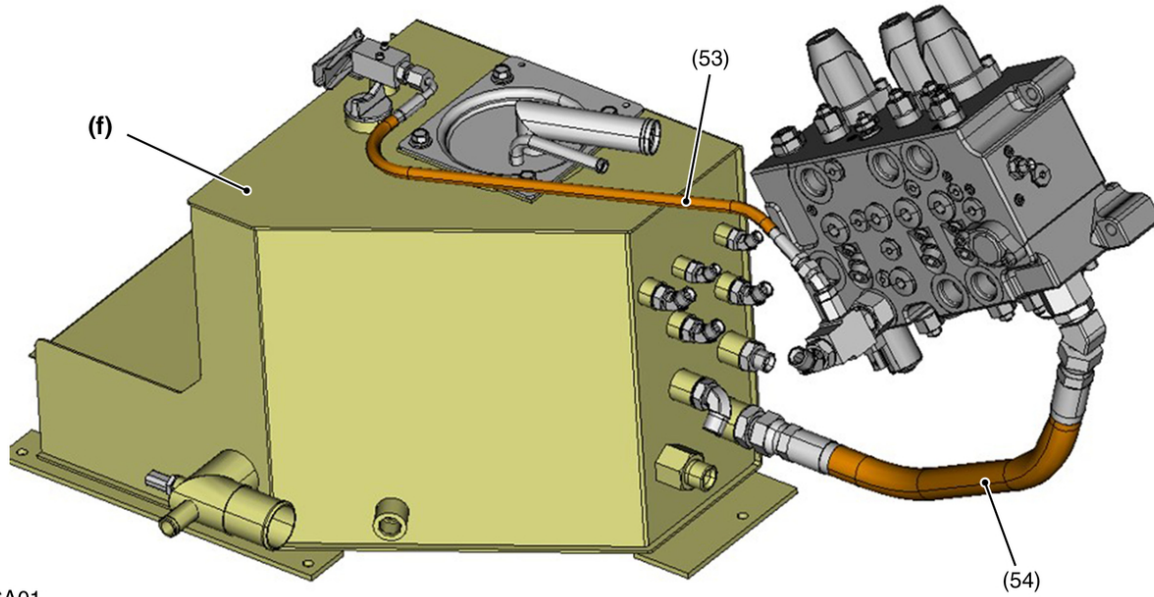
(16) Bolt (M10 × 25) × 4

Hydraulic tank weight	22.8 kg 49.6 lbs
-----------------------	---------------------

C



D



2CHMX00306A01

(a) Control valve
(d) Lift arm

(e) Lift arm cylinder
(f) Hydraulic oil tank

C: C/V - Lift arm
D: C/V - Tank

No.	Point used	Hose				Fitting	
		Total length	Size	Tape color	Max. pressure	Left	Right
(66)	HST filter - QC valve (P)	830 mm 32.7 in.	3/8	Brown 1 - Nothing	70 kgf 995 psi	G3/8, Straight	G3/8, 90°
(67)	Hydraulic oil tank - QC valve (T)	1190 mm 46.9 in.	3/8	Blue 1/Gray 1 - Nothing	70 kgf 995 psi	G3/8, Straight	G3/8, 90°
(68)	QC valve (A) - QC piping bottom side	3110 mm 122.5 in.	3/8	N/A	70 kgf 995 psi	G3/8, Straight	G3/8, Straight
(69)	QC valve (B) - QC piping rod side	3125 mm 123.0 in.	3/8	Gray 1 - Gray 1	70 kgf 995 psi	G3/8, Straight	G3/8, Straight
(70)	Relay (QC) - QCcyl rod	1210 mm 47.6 in.	1/4	Nothing - Yellow 1	70 kgf 995 psi	G1/4, Straight	G1/4, Straight
(71)	Relay (QC) - Qccyl bottom	950 mm 37.4 in.	1/4	N/A	70 kgf 995 psi	G1/4, Straight	G1/4, Straight

SERVICING

1. Troubleshooting electrical issues









1.1 Troubleshooting electrical

Engine does not start

Probable cause(s)	Inspection point	Remedy
Blowing slow-blow fuses and fuses	Check slow-blow fuses and fuses	Check the cause of blowing fuses, and replace them.
Ground disconnection	Check the connecting ground wire to the machine.	Tighten GND wire bolt(s)
Faulty battery	Check battery voltage and specific gravity	Recharge or replace the battery
Faulty key switch	Check conduction between key switch terminals	Replace the key switch
Breaking harness or starter relay	Measure voltage on terminal B of the starter	Repair the harness Replace the harness, starter relay and/or fuses
Breaking harness, starter relay and/or fuses	Measure voltage on S terminal of the starter	Repair the harness Replace the harness, starter relay and/or fuses

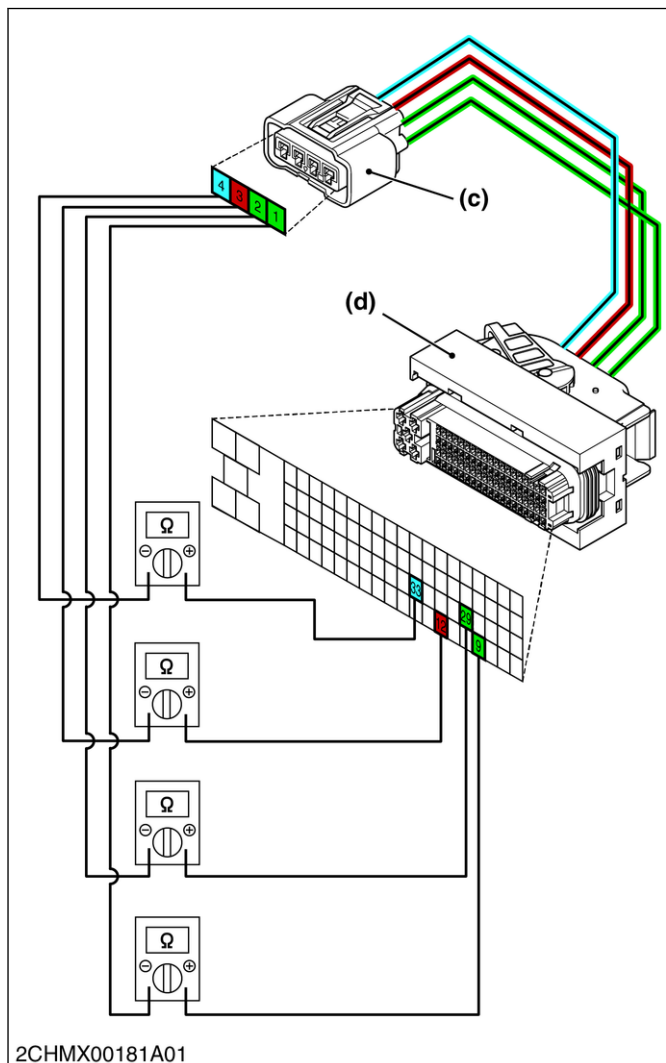
2. Troubleshooting errors

2.1 Error warning list

Display	Lamp	Error	Probable cause(s)	Remarks
		Meter CAN non-communication	<ul style="list-style-type: none"> Does not communicate between the main ECU and the meter 	
		High hydraulic oil temperature advance warning	<ul style="list-style-type: none"> The hydraulic oil temperature is higher than 103 °C and lower than 108 °C 	<ul style="list-style-type: none"> Hydraulic oil lamp blinks
		High hydraulic oil temperature warning	<ul style="list-style-type: none"> The hydraulic oil temperature is higher than 108 °C 	<ul style="list-style-type: none"> Hydraulic oil lamp blinks at high speed
		Fuel sensor error	<ul style="list-style-type: none"> Connector disconnected Breaking in harness 	

(Continued)

3. Check conduction for the wire harness.
 - Disconnect the accelerator dial connector and the main ECU connector.



2CHMX00181A01

(c) Accelerator dial connector (d) Main ECU connector

	Accelerator dial connector	Main ECU connector
5V (Red)	3	12
GND (Blue)	4	33
Main (Green)	2	29
Sub (Green)	1	9

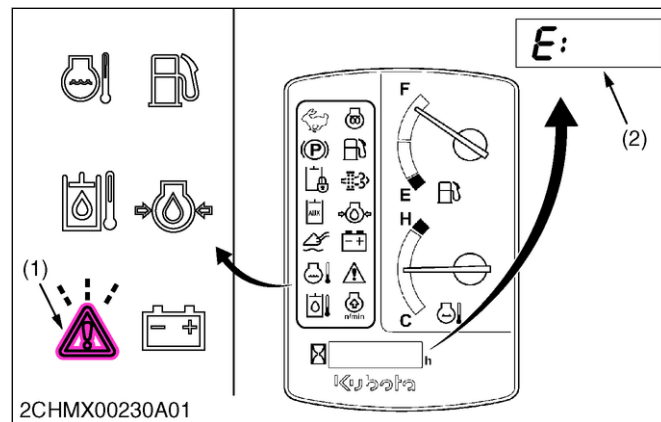
Normal	Conduction
--------	------------

2.7 E:010 Travel speed shift solenoid error

During travel speed shift Solenoid Valve output, the detection port is low (short in solenoid or harness) or high (break in solenoid or harness)

2.7.1 Checking on the meter panel for E:010 travel speed shift solenoid error

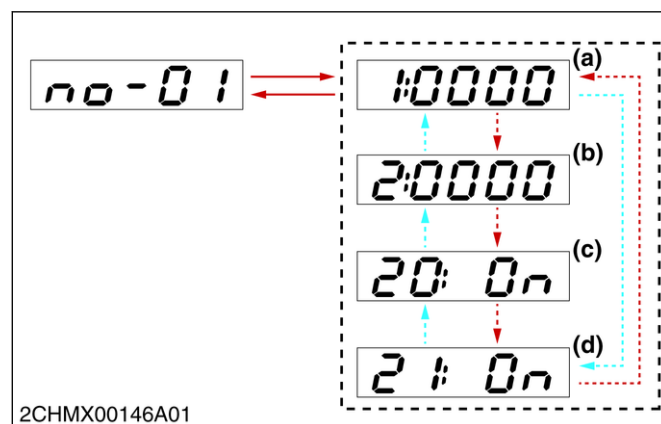
1. Check the meter panel.



(1) Warning lamp

(2) Error code E:010

2. Check condition of the travel speed shift SOL in tester mode.



2CHMX00146A01

(a) Engine speed
(b) Battery voltage

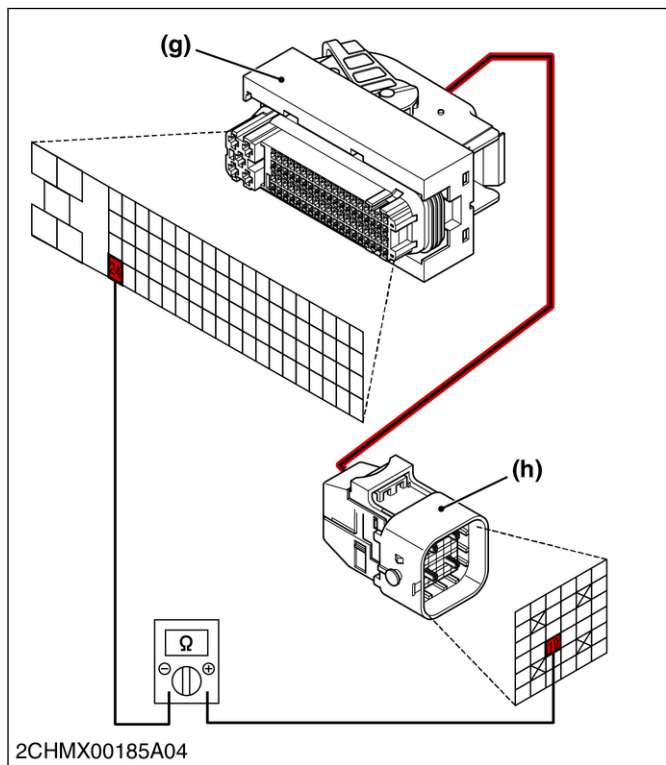
(c) no-20: Travel speed shift switch

(d) no-21: Travel speed shift SOL

		Travel speed shift switch ON	Travel speed shift switch OFF
Normal	Travel speed shift switch	ON	OFF
	Travel speed shift SOL	ON	OFF

3. Check conduction for the wire harness.

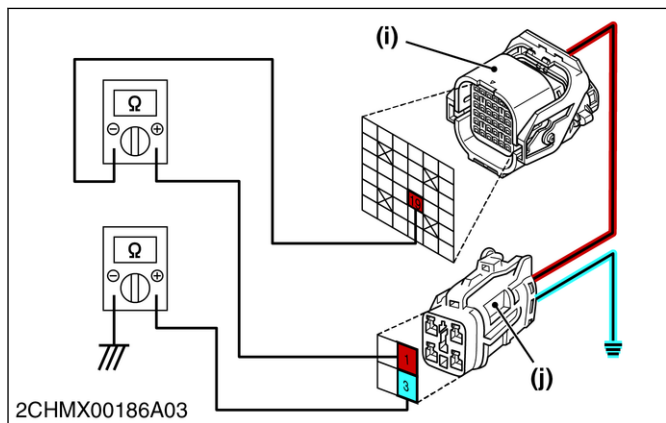
- Disconnect the main ECU connector and engine harness relay 1 connector.



(g) Main ECU connector (h) Engine harness relay 1 connector

	Main ECU connector	Engine harness relay 1 connector
+12 V (Red)	24	19

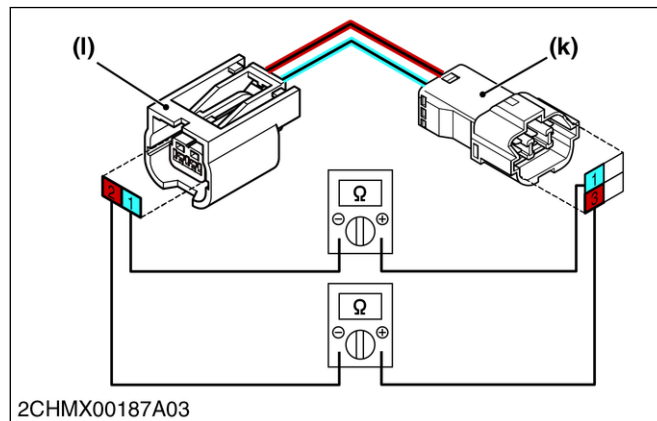
- Disconnect the main harness relay 1 connector and unload valve relay connector.



(i) Main harness relay 1 connector (j) Unload valve relay connector

	Main harness relay 1 connector	Unload valve relay connector	Body GND
+12 V (Red)	19	1	
GND (Blue)		3	○

- Disconnect the engine valve relay 5 connector and parking brake SOL connector.



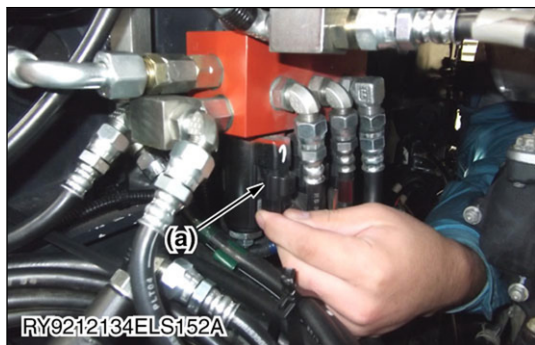
(k) Engine harness relay 5 connector (l) Hydraulic hitch release SOL connector

	Engine harness relay 5 connector	Hydraulic hitch release SOL connector
+12 V (Red)	1	1
GND (Blue)	3	2

Normal	Conduction
--------	------------

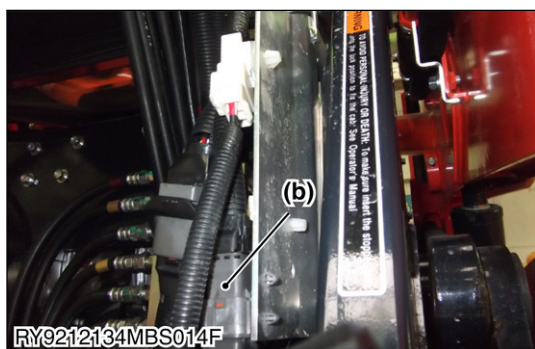
2.18.2 Checking devices for E:019 AUX left solenoid error

1. Check the AUX right SOL.
 - Check connection for the connector. (loose or poor)
 - Disconnect/reconnect the connector, and recheck in tester mode.
 - Check damage of cover for the wiring, and not touching the body.



(a) AUX left SOL

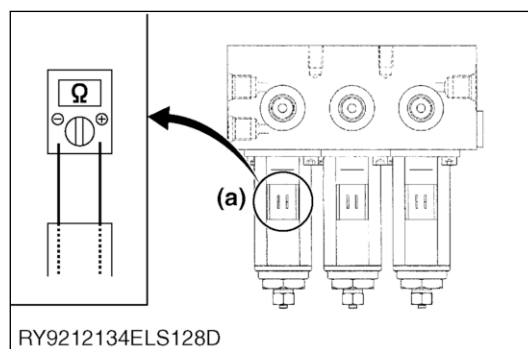
2. Check the main harness to engine harness.
 - Check connection for the connector. (loose or poor)
 - Disconnect/reconnect the connector, and recheck in tester mode.
 - Check damage of cover for the wiring, and not touching the body.



(b) Relay 2 connector

2.18.3 Checking with circuit tester for E:019 AUX left solenoid error

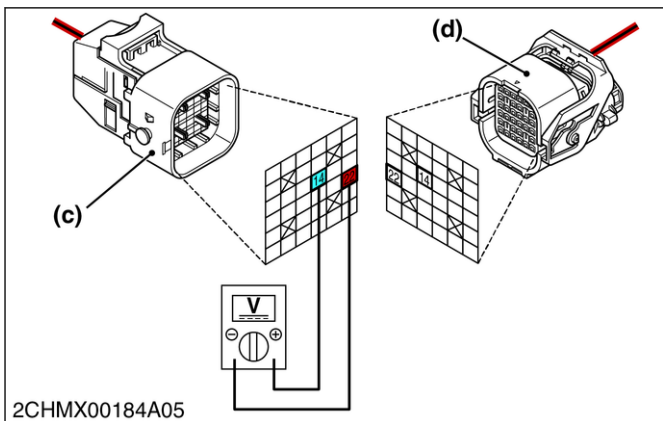
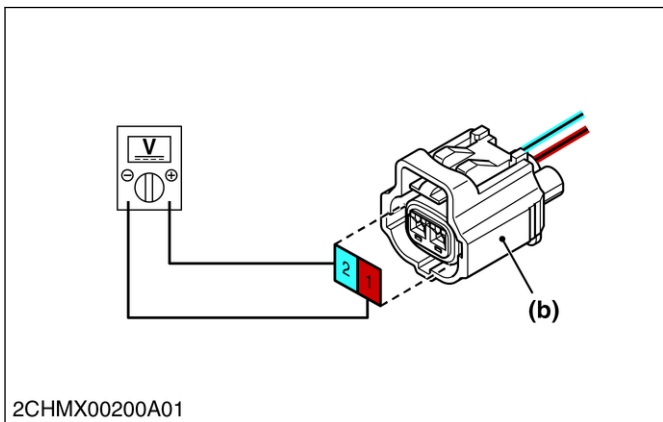
1. Measure the resistance of the AUX left SOL.
 - Remove the AUX left SOL.



(a) AUX left SOL connector

Normal	$3.2 \pm 0.5 \Omega$ Oil temperature: At 20 °C
--------	---

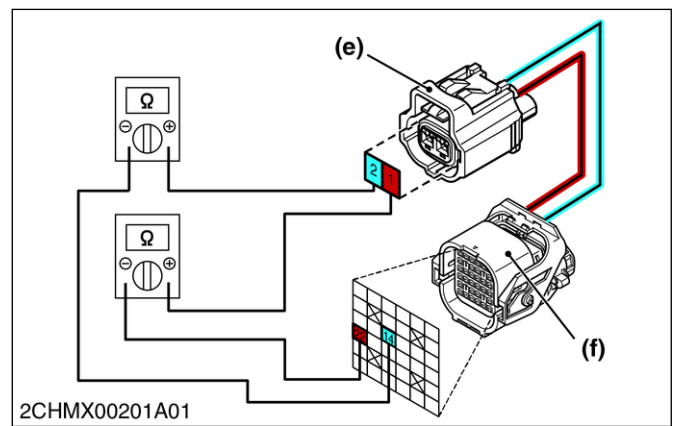
2. Check the voltage of the wire harness.
- Disconnect the hydraulic oil temperature sensor connector, and measure the voltage
 - Disconnect the engine harness relay 1 connector, and measure the voltage



- (b) Hydraulic oil temperature sensor connector
 (c) Engine harness relay 1 connector
 (d) Main harness relay 1 connector

Normal	Key OFF	Key ON
	0 V	5 V

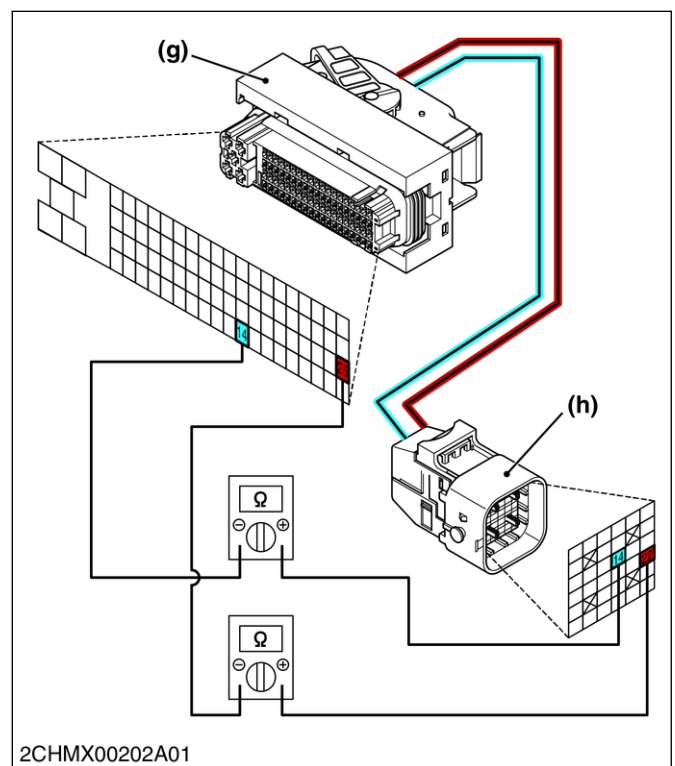
3. Check conduction for the wire harness.
- Disconnect the hydraulic oil temperature sensor connector and main harness relay 1 connector.



- (e) Hydraulic oil temperature sensor connector
 (f) Main harness relay 1 connector

	Hydraulic oil temperature sensor connector	Main harness relay 1 connector
+12 V (Red)	1	22
GND (Blue)	2	14

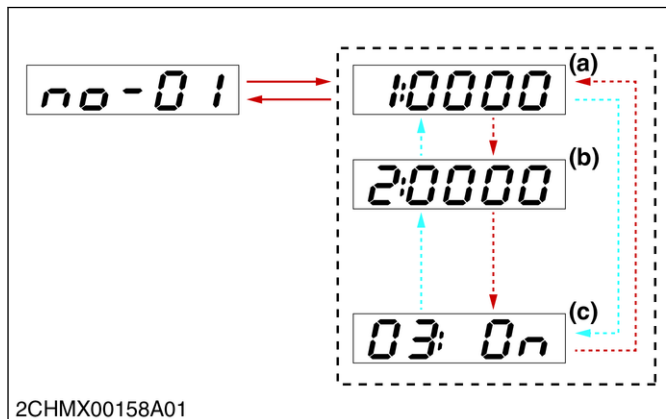
- Disconnect the engine harness relay 1 connector and main ECU connector.



- (g) Engine harness relay 1 connector
 (h) Main ECU connector

	Engine harness relay 1 connector	Main ECU connector
+12 V (Red)	22	25
GND (Blue)	14	14

2. Check the status of the oil switch in tester mode.



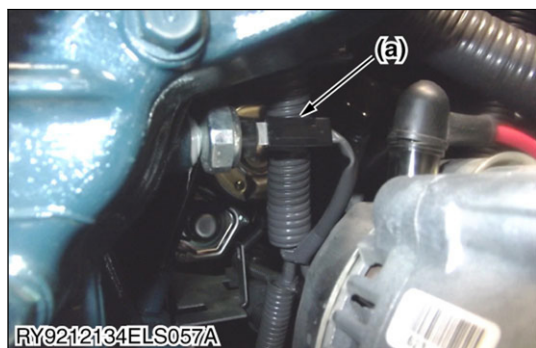
2CHMX00158A01

- (a) Engine speed
(b) Battery voltage
(c) no-03: Oil switch

No-03	Engine stop	Engine start
Normal	ON	OFF

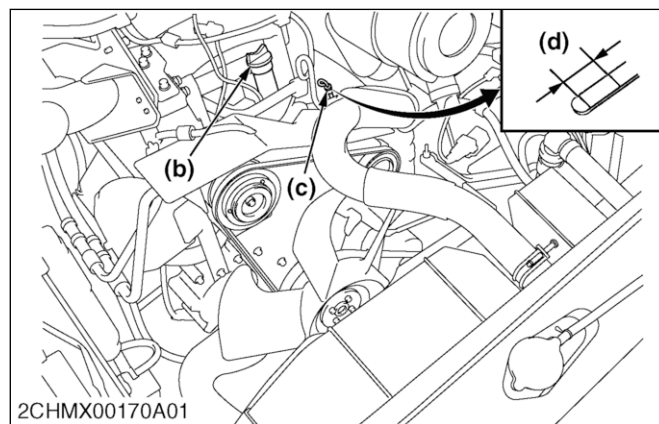
2.27.2 Checking devices for E:9118 engine oil pressure error

- Check the oil switch.
 - Check connection for the connector. (loose or poor)
 - Disconnect/reconnect the connector, and recheck in tester mode.
 - Check damage of cover for the wiring, and not touching the body.



(a) Oil switch connector

- Check the engine oil.
 - Check the remaining of engine oil.



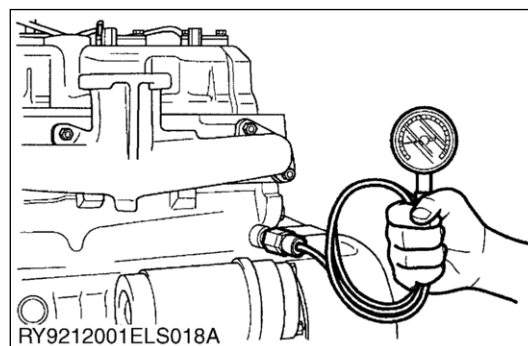
2CHMX00170A01

- (b) Cap
(c) Oil checker
(d) Oil level range

- Measure the engine oil pressure

NOTE

- The oil pressure switch will turn on if the pressure is lower than 49 kPa.



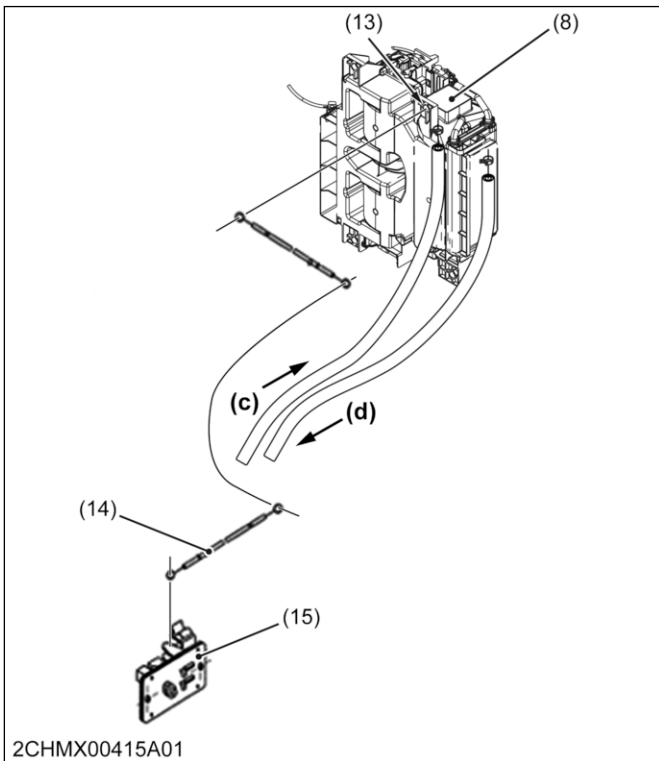
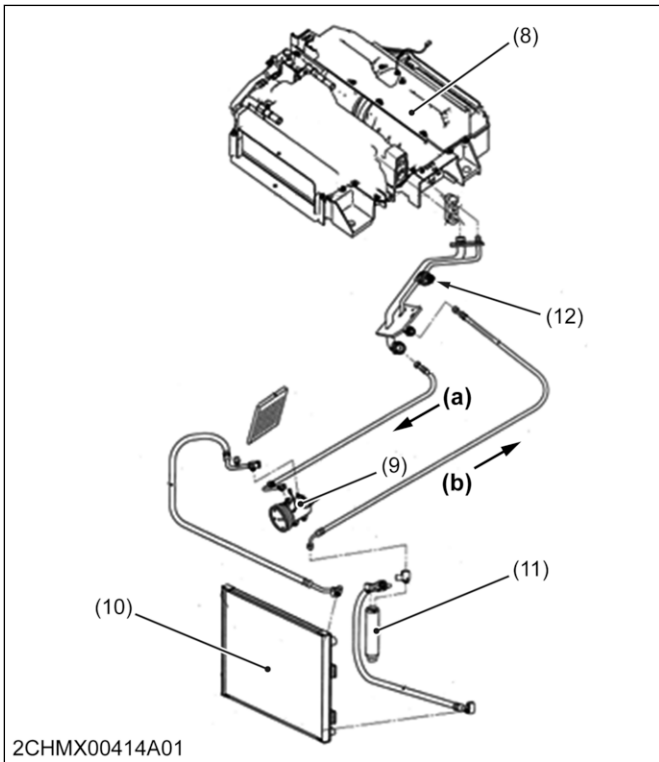
RY9212001ELS018A

Normal	Idling speed	Rated speed
	98kPa 1.0 kgf/cm ² 14.2 psi or greater	196 to 392 kPa 2.0 to 4.0 kgf/cm ² 28.4 to 56.9 psi

Display list

Number	Item	Display	Explanation
1	Engine speed	xxxx	xxxx rpm When engine stopped: 0 rpm
2	Battery voltage	xx.x	V Battery voltage ± 0.5 V
3	Engine oil	ON OFF	Engine start: OFF Engine stop: ON
4	Charge	ON OFF	Engine start: OFF Engine stop: ON
5	Starter position	ON OFF	Key switch START: ON Other: OFF
6	Work lamp	ON OFF	Switch ON: ON OFF: OFF
7	Coolant temperature	xxx.x	$^{\circ}$ C
8	Hydraulic oil temperature	xxx.x	$^{\circ}$ C
9	Accelerator pedal main voltage	x.xx	V
10	Accelerator pedal sub voltage	x.xx	V
11	Accelerator dial main voltage	x.xx	V
12	Accelerator dial sub voltage	x.xx	V
13	Accelerator pedal main voltage (MIN setting)	x.xx	V
14	Accelerator pedal main voltage (MAX setting)	x.xx	V
15	Accelerator dial main voltage (MIN setting)	x.xx	V
16	Accelerator dial main voltage (MAX setting)	x.xx	V
17	Fuel voltage	x.xx	V
18	Fuel resistance	xxx	x.xx Ω Full tank (F): $3 \pm 1 \Omega$ Remaining (F): $56.5 \pm 1 \Omega$ Empty (E): $110 \pm 1 \Omega$
19	Water separator full of water switch	ON OFF	When full of water: ON Other: OFF
20	Travel speed shift switch	ON OFF	Press switch: ON Release: OFF
21	Travel speed shift solenoid	ON OFF	Solenoid started: ON Solenoid stopped: OFF
22	Hydraulic lock release switch	ON OFF	Press switch: ON Default state: OFF
23	Hydraulic lock release SOL	ON OFF	Solenoid started: ON Solenoid stopped: OFF
24	-	ON OFF	Always: OFF
25	AUX relay	ON OFF	Press switch: ON Release: OFF
26	AUX switch	ON OFF	Press switch: ON Release: OFF
27	-	ON OFF	Always: OFF
28	Seat bar right switch	ON OFF	Seat bar down: ON Seat bar up: OFF

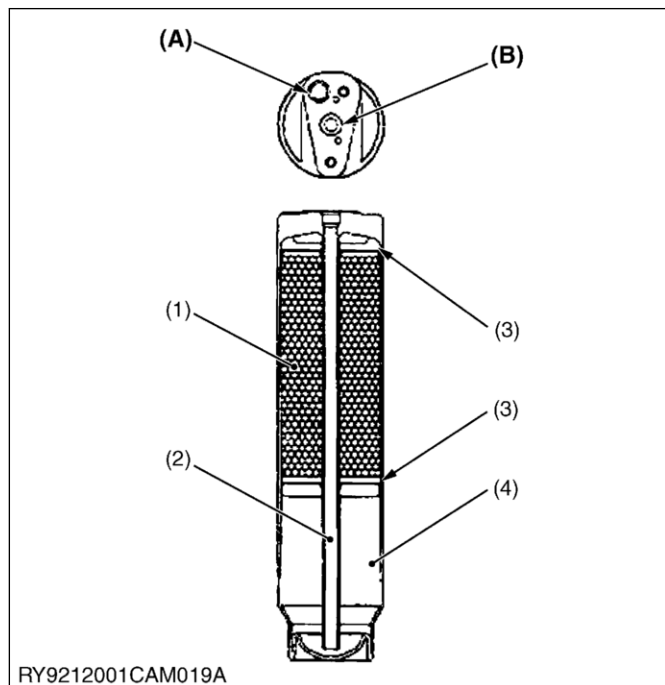
(Continued)



- | | |
|--------------------------|---------------------|
| (8) Air Conditioner Unit | (14) Control cable |
| (9) Compressor | (15) Control panel |
| (10) Condenser | (a) Refrigerant IN |
| (11) Receiver | (b) Refrigerant OUT |
| (12) Pressure sensor | (c) Coolant IN |
| (13) Water valve | (d) Coolant OUT |

5.2 Receiver functions and structures

Removes moisture, impurities and air from liquid refrigerant. The receiver stores liquid refrigerant.



- (1) Dryer
- (2) Receiver tube
- (3) Strainer
- (4) Receiver tank
- (A) Refrigerant inlet
- (B) Refrigerant outlet

[Receiver tank]

- The rotating speed of the compressor changes with engine speed, so that the required amount of refrigerant also changes.
- The refrigerant is stored or supplied according to the required amount of refrigerant.

[Dryer]

- Synthetic zeolite absorbs moisture that has entered the circuit.
- Replace the receiver in case of expansion valve freezing, it means the dryer is not absorbing moisture.

[Strainer]

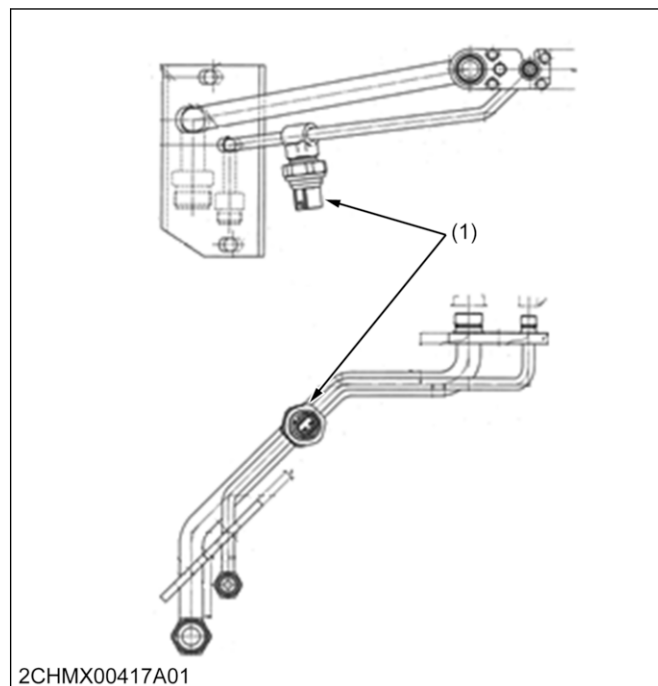
- Strainer collects the contamination to prevent breaking the compressor or clogging the expansion valve.
- Replace receiver in case of clogged strainer since the strainer is not cleanable.

[Sight glass]

- You can visually check the refrigerant amount in the circuit.

6. Pressure switch

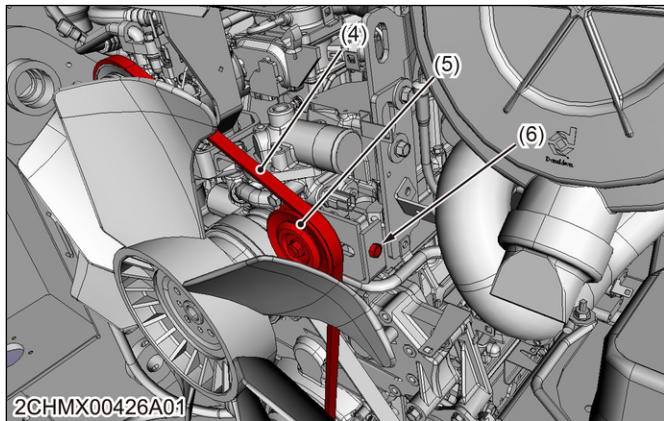
6.1 Pressure switch specifications



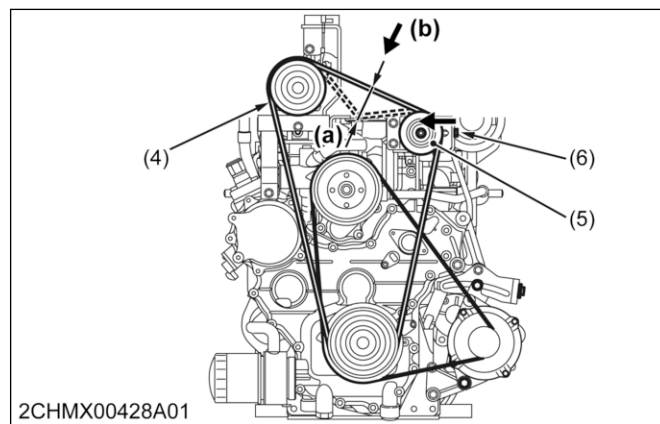
(1) Pressure switch

Pressure switch	
Low-pressure side OFF pressure	0.196 ± 0.02 MPa
High-pressure side OFF pressure	3.14 ± 0.2 MPa or higher
Airtight	3.53 MPa
Pressure resistance	5.30 MPa

5. Loosen the tension pulley and remove the air conditioner belt.



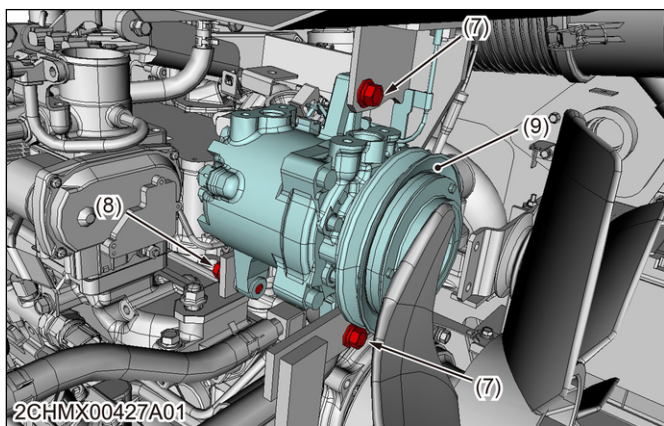
(4) Air conditioner belt (6) Adjustment bolt
(5) Tension pulley



(4) Air conditioner belt (a) Adjusting tension
(5) Tension pulley (b) Adjusting force
(6) Adjustment bolt

Adjusting tension (a)	7 to 9 mm 0.27 to 0.35 in.
Adjusting force (b)	50 to 60 N 5.1 to 6.1 kgf 11 to 13.5 lbf

6. Remove the compressor from the bracket.



(7) Bolt (M8 × 25) × 2 (9) Compressor
(8) Bolt (M8 × 35)

5.3 Oil amount in the compressor

A specified amount of compressor oil is sealed in the new compressor.

1. Drain the oil from the old compressor and measure it.
2. Drain all of the oil from the new compressor.

Installing

■ IMPORTANT

- Apply compressor oil to the O-rings of the lines.
- After tightening the 2 bolts (7), tighten bolt (8).
- After charging the refrigerant, check there is no leakage.

Bolt (7)	Tightening torque	16.7 to 19.6 N · m
Bolt (8)		1.7 to 2.0 kgf · m 12.3 to 14.5 lbf · ft

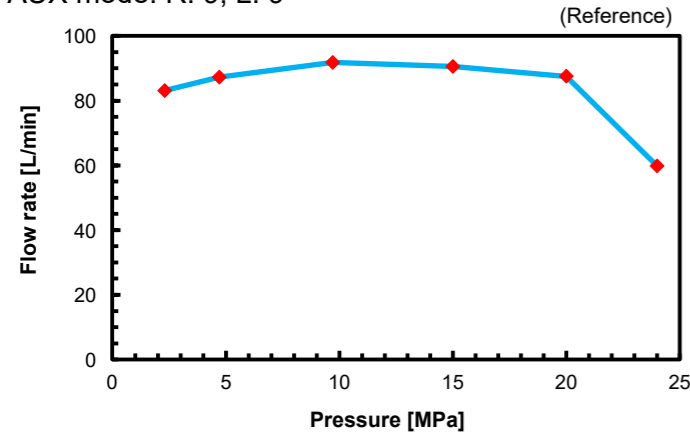
1. Assemble and adjust the air conditioner belt.

1. SERVICE REFERENCE DATA

[1] PISTON PUMP FLOW RATE

<Condition>

- Machine: SVL97-2 (Hi-flow model)
- Hydraulic oil temperature: 50.4 °C (122.7 °F)
- Engine speed: 2480 rpm
- AUX mode: R: 9, L: 9

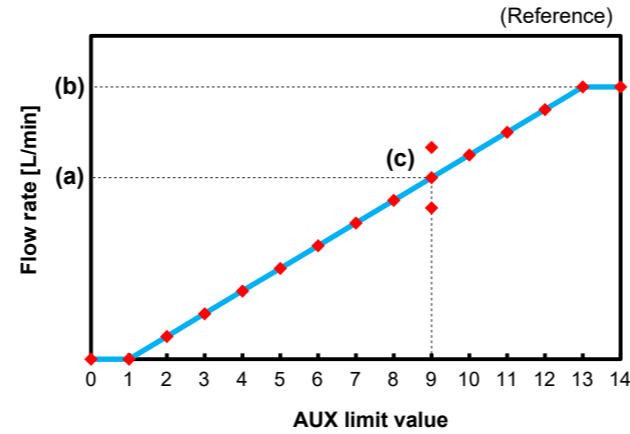


Pressure (MPa)	Engine speed (RPM)	Flow rate (L/min)
2.5	2480	82
5	2480	86
10	2480	92
15	2471	91
20	2455	87
24	2465	60

[2] AUX FLOW RATE

<Condition>

- Machine: SVL97-2 (Hi-flow model)
- Hydraulic oil temperature: 50±5 °C (122.7±41 °F)
- Engine speed: 2480 rpm



- (a) 90 L/min (23.3 gal/min)
- (b) 152 L/min (40 gal/min)
- (c) ±13 L/min (3.4 gal/min)

[3] SPECIFICATIONS

Items		Specifications	Remarks	
Engine speed	MIN	1125 to 1175 rpm	-	
	MAX	2455 to 2505 rpm		
Hydraulic cylinder (Stroke)	Lift arm	Raise	3.6 to 4.8 sec	E/G speed: MAX Oil temp: 50±5 °C (122±41 °F)
		Lower	2.9 to 3.9 sec	
	Bucket	Crowd	1.9 to 2.7 sec	
		Dump	1.6 to 2.4 sec	
Hydraulic cylinder (Drift)	Lift arm	Standard	≤ 15.5 mm ≤ 0.61 in.	Bucket: Full Time: 10 min
		Limit	≤ 77.5 mm ≤ 3.05 in.	
	Bucket	Standard	≤ 10.5 mm ≤ 0.41 in.	
		Limit	≤ 52.5 mm ≤ 2.07 in.	
Travel block performance		0 mm 0 in.	-	
Travel straightness		≤ 600 mm ≤ 23.6 in.	Distance: 20 m Forward, Backward, High speed	
Travel speed	Low speed	Forward	8.2 to 10.0 sec/20m	-
		Backward		
	High speed	Forward	5.6 to 6.9 sec/20m	
		Backward		
HST pump flow rate	Low speed	100 L	E/G speed: MAX Oil temp: 50±5 °C Pressure: 9.0 Mpa (92 kgf/cm ² , 1300 psi) Forward, Backward	
	High speed	98 L	E/G speed: MAX Oil temp: 50±5 °C Pressure: 12.0 Mpa (120 kgf/cm ² , 1700 psi) Forward, Backward	
Pilot valve input pressure	Travel pilot valve	2.7 MPa 27.5 kgf/cm ² 391.5 psi	E/G speed: MAX Oil temp: 50±5 °C	
	Attachment pilot valve	3.7 MPa 37.7 kgf/cm ² 537 psi		

[4] RELIEF PRESSURE

Items		Specification	Measurements
Main relief valve		27.5±0.5 MPa 280.5±5.1 kgf/cm ² 3771±73 psi	-
Over load relief valve	Lift arm	Rod A1	-
		Bottom B1	
	Bucket	Rod A2	
		Bottom B2	
AUX	A3		
B3			
LS relief valve		23.1±0.6 MPa 235.62±6.1 kgf/cm ² 3350±90 psi	23.1 MPa 235.6 kgf/cm ² 3350 psi
HST pump relief valve	Right	Forward	37 MPa 377.2 kgf/cm ² 5366 psi
		Backward	
	Left	Forward	
		Backward	
Charge relief valve		2.4±0.07 MPa 24.0±0.7 kgf/cm ² 350±10 psi	-
Pilot relief valve		3.5±0.29 MPa 36.0±3.0 kgf/cm ² 510±42 psi	3.7 MPa 37.7 kgf/cm ² 537 psi

<p>SW(A/C)</p> <p>YAZAKI_090 II 7283-1080-80</p>	<p>SW(SETTING/DISPLAY)</p> <p>SUMITOMO_MT/HM090 6180-4181</p>	<p>TO_(ENGINE_ARM_H1)</p> <p>YAZAKI_58M 7123-6040</p>	<p>TO_(MAIN_H5)</p> <p>YAZAKI_58 7122-1640 CLC_A_24346-79902_1</p>	<p>COOLANT_VALVE</p> <p>AMP 1-1418448-1</p>	<p>RELAY(1)</p> <p>SUMITOMO 6400-0829</p>	<p>SBF(1)</p> <p>YAZAKI 7254-5909-30</p>	<p>TO_(ENG1)</p> <p>YAZAKI_090 II 7182-8745-10</p>	<p>TO_(ENG2)</p> <p>YAZAKI_SWP 7222-7923-40</p>	<p>ACU</p> <p>AMP_040/070_HYBRID_I/O 1747140-1</p>	<p>TO_(REGISTOR)</p> <p>YAZAKI_CN(A) 7123-2820</p>
<p>SW(ARM_DOWN)</p> <p>SUMITOMO 6189-0158</p>	<p>SW(WIPER)</p> <p>YAZAKI_SDL 7123-8307</p>	<p>TO_(ARM_H2)</p> <p>YAZAKI_58M 7122-6060</p>	<p>TO_(TAIL_L)</p> <p>YAZAKI CB</p>						<p>CCV_PRESSURE_SW</p> <p>YAZAKI CB</p>	
<p>SW(ARM_UP)</p> <p>SUMITOMO 6189-0156</p>	<p>SW(WORK_LIGHT)</p> <p>YAZAKI_SDL 7123-8307</p>	<p>TO_(ENGINE_ARM_H2)</p> <p>YAZAKI_58M 7123-6060</p>	<p>TO_(TAIL_L_H2)</p> <p>YAZAKI CA</p>	<p>LEVER_L</p> <p>YAZAKI_SWP 7123-7923-40</p>	<p>RELAY(2)</p> <p>SUMITOMO 6400-0829</p>	<p>SBF(2)</p> <p>YAZAKI 7254-5909-30</p>	<p>TO_(MAIN1)</p> <p>YAZAKI_090 II 7183-8745-10</p>	<p>TO_(MAIN2)</p> <p>YAZAKI_SWP 7123-7923-40</p>	<p>FUSEBOX</p> <p>SUMITOMO 6353-0125</p>	
<p>SW(BACK_PRESSURE)</p> <p>SUMITOMO 6189-0158</p>	<p>TANK_SENSOR</p> <p>DEUTSCH DT06-4S-CE06</p>	<p>TO_(BAT_H)</p> <p>YAZAKI_58 7122-4123-30</p>	<p>TO_(TAIL_L_H3)</p> <p>YAZAKI_090 7123-1520</p>							
<p>SW(DPF_INHIBIT)</p> <p>YAZAKI_SDL 7123-8307</p>	<p>THERMOSTAT</p> <p>YAZAKI_4.8(187) 7283-1050</p>	<p>TO_(E-OUT_ROOM)</p> <p>YAZAKI_58 7122-6060</p>	<p>WASHER_MOTOR</p> <p>YAZAKI 7323-9327</p>	<p>LEVER_R</p> <p>YAZAKI_SWP 7123-7923-40</p>	<p>RELAY(3)</p> <p>SUMITOMO 6420-0050</p>	<p>LEVER_L(STANDARD)</p> <p>SUMITOMO_DL090 6195-0051</p>	<p>LEVER_R(STANDARD)</p> <p>SUMITOMO_DL090 6195-0051</p>	<p>ECU(CRS_91P)</p> <p>AMP 3-2109431-2</p>		
<p>SW(FLOW_SET)</p> <p>SUMITOMO_HM090 6180-2451</p>	<p>TO_(AIRRIE+)</p> <p>YAZAKI 7114-2100</p>	<p>TO_(ENG3)</p> <p>YAZAKI_8.0(312) 7282-3030</p>	<p>WATER_SEPARATOR</p> <p>AMP 174352-2</p>			<p>R&FBOX</p> <p>YAZAKI 7154-0089-30</p>				
<p>SW(HITCH)</p> <p>YAZAKI_SDL 7123-8307</p>	<p>TO_(MAIN_AIRRIE+)</p> <p>YAZAKI_250 7116-2270-02</p>	<p>TO_(ENG4)</p> <p>YAZAKI_312 7282-3040</p>	<p>CAP(RADIO_CONVERT)</p> <p>SUMITOMO_MTW110 6040-9111</p>	<p>POWER_SOCKET</p> <p>DEUTSCH_HD30 HD34-18-14PE</p>	<p>RELAY(4)</p> <p>SUMITOMO 6420-0050</p>	<p>ECU(CRS_105P)</p> <p>AMP 2-2109432-2</p>				
<p>SW(HYDRAULIC_LOCK)</p> <p>YAZAKI_SDL 7123-8307</p>	<p>TO_(AIRRIE-)</p> <p>YAZAKI_250 7116-2270-02</p>	<p>TO_(MAIN4)</p> <p>YAZAKI_312 7283-3040</p>	<p>RADIO_CONVERT</p> <p>SUMITOMO_MTW110 6030-9991</p>	<p>RELAY_CASSETTE</p> <p>YAZAKI 7154-5798-30</p>	<p>RELAY(5)</p> <p>SUMITOMO 6400-0829</p>	<p>ECU(MAIN)</p> <p>AMP 1473244-1</p>				
<p>SW(PARKING)</p> <p>YAZAKI_SDL 7123-8307</p>	<p>TO_(MAIN_AIRRIE-)</p> <p>YAZAKI 7114-2100</p>	<p>TO_(ENGINE_H5)</p> <p>YAZAKI_SWP 7222-7444-40</p>								
<p>SW(ROOM_LAMP)</p> <p>SUMITOMO_HM090 6187-2801</p>	<p>TO_(ARM_H1)</p> <p>YAZAKI_58M 7122-6040</p>	<p>TO_(UNLOAD)</p> <p>YAZAKI_SWP 7123-7444-40</p>								

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