SV414
SHOP MANUAL

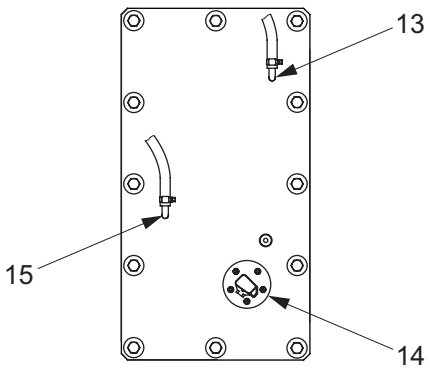
SAKAI®

3498-64214-0

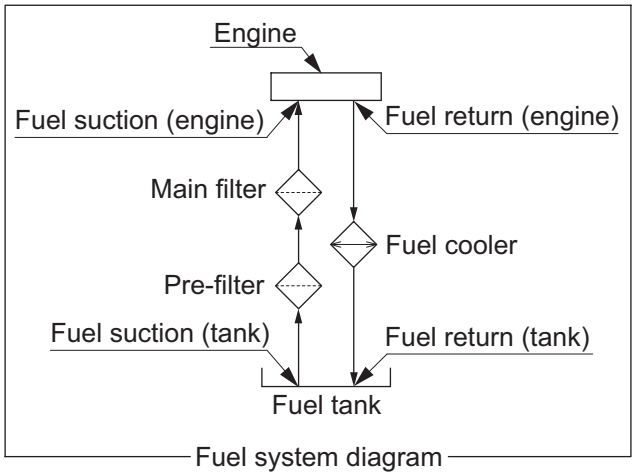
1-11. Transporting the Machine

- Use only suitable and approved trailers and haul vehicles and lifting equipment of sufficient capacity.
- Entrust to experienced personnel the fastening and lifting of loads and instructing of crane operators.
- Only experienced persons familiar with the operation of the machine may load and unload the machine.
- Use ramps or a loading dock when loading or unloading the machine. Ramps must be the proper strength, low angle and the proper height and width.
- Block the drums or tires (front and rear) of the hauling vehicle when loading and unloading the compactor. Ensure that the haul vehicle is on level ground and approach the loading ramps squarely to make sure that the compactor does not slide off the edge of the ramp.
- Keep the deck clear of mud, oil, ice or snow or other materials that can make the deck slippery.
- Position the compactor on the trailer or transport vehicle centered from side to side, and apply the brake. Shut off the engine and lock all lockable compartments.
- Block the drums or tires and lock the articulation lock bar. Chain the machine down properly using the appropriate tackle.
- Know the overall height of the compactor and hauling vehicle. Observe height and weight regulations and be sure you can pass safely at overhead obstructions.
- Obey all traffic regulations and be sure that the proper clearance flags, lights and warning signs including “Slow Moving Vehicle” emblem are displayed when traveling on public roads.
- Know the approximate stopping distance at any given speed.
- Drive Safely. Never turn corners at excessive speeds.

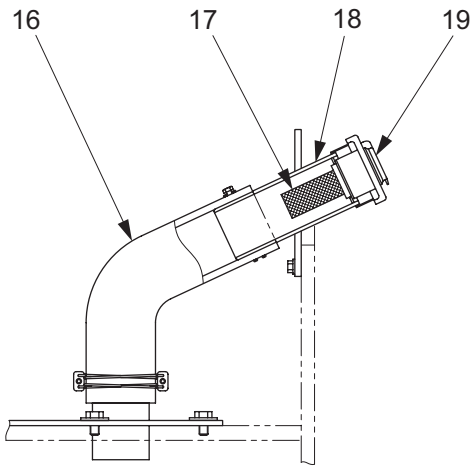
Performance	Vibrator system	Front	Centrifugal force	Low amplitude		93 kN	(20,905 lbf.)
				High amplitude		118 kN	(26,525 lbf.)
			Frequency	Low amplitude		38.0 Hz	(2,280 vpm)
				High amplitude		30.0 Hz	(1,800 vpm)
			Amplitude	Low amplitude		0.50 mm	(0.020 in.)
				High amplitude		1.00 mm	(0.039 in.)
		Rear	Centrifugal force	Low amplitude		N/A kN	(N/A lbf.)
				High amplitude		N/A kN	(N/A lbf.)
			Frequency	Low amplitude		N/A Hz	(N/A vpm)
				High amplitude		N/A Hz	(N/A vpm)
			Amplitude	Low amplitude		N/A mm	(N/A in.)
				High amplitude		N/A mm	(N/A in.)
	Linear pressure	Static linear pressure	Front drum	Operating weight		272 N/cm	(155 lbf./in.)
			Rear drum	Operating weight		N/A N/cm	(N/A lbf./in.)
		Dynamic linear pressure	Front drum	Operating weight	Low amplitude	819 N/cm	(465 lbf./in.)
					High amplitude	966 N/cm	(550 lbf./in.)
			Rear drum	Operating weight	Low amplitude	N/A N/cm	(N/A lbf./in.)
					High amplitude	N/A N/cm	(N/A lbf./in.)
	Traveling speed	Number of speed shift				3 speed	
		Speed range		1st		0 to 4 km/h	(0 to 2.5 mile/h)
				2nd		0 to 6 km/h	(0 to 3.7 mile/h)
				3rd		0 to 10 km/h	(0 to 6.2 mile/h)
	Gradeability (without vibration)					63 %	(32 °)
	Turning radius	Machine clearance radius inside				3.1 m	(123 in.)
		Machine clearance radius outside				5.1 m	(201 in.)
		Turning radius inside compacted surface				3.2 m	(126 in.)
		Turning radius outside compacted surface				4.9 m	(193 in.)



SECTION A-A



Fuel system diagram

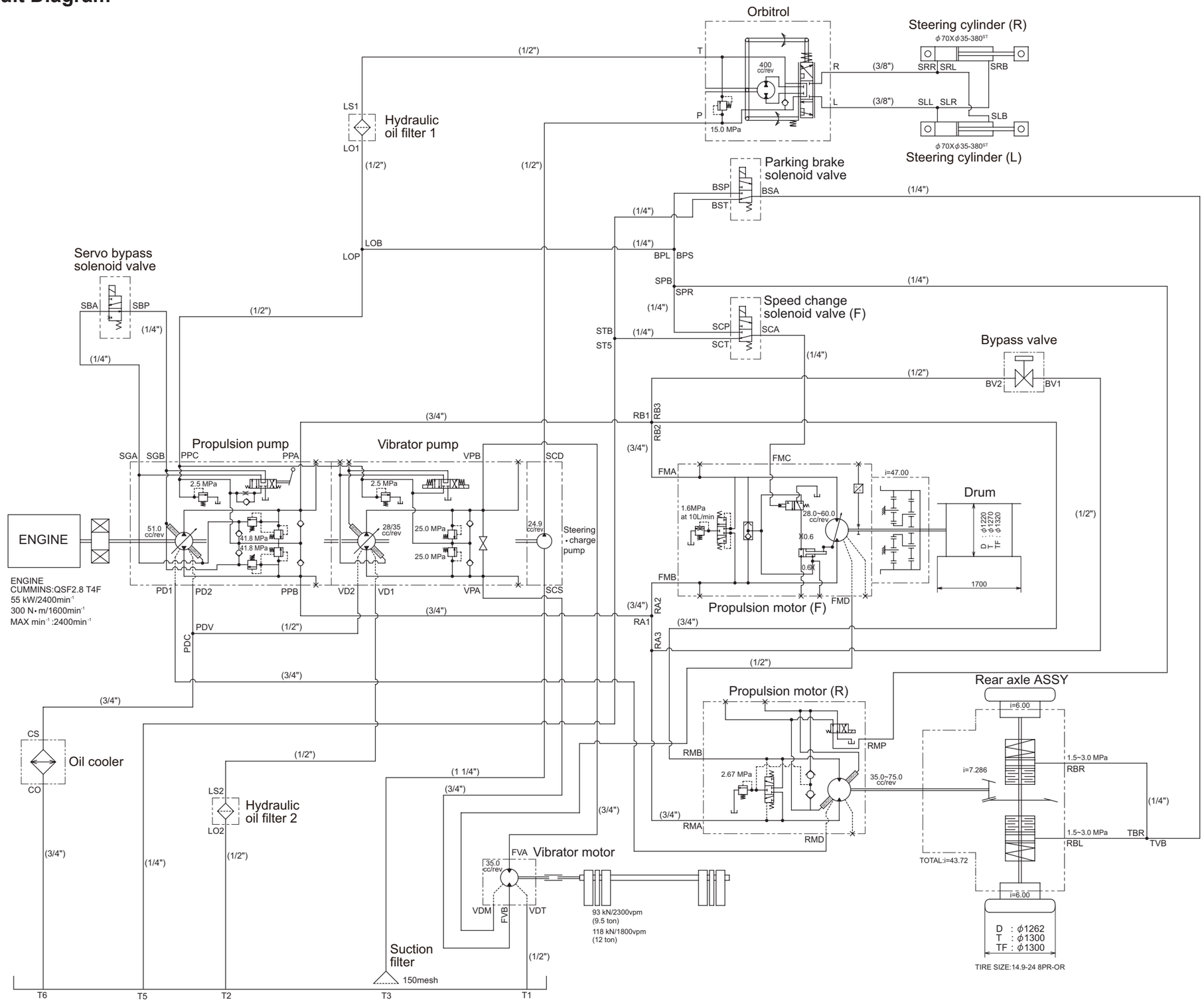


SECTION B-B

0421-02801-0-10002-B

(1) Fuel coller
(2) Hose (Fuel return (engine) → Fuel coller IN)
(3) Pre-filter
(4) Hose (Pre-filter OUT → Main filter IN)
(5) Fuel tank
(6) Main filter
(7) Hose (Fuel coller OUT → Fuel return (tank)
(8) Fuel suction (engine)
(9) Fuel return (engine)
(10) Hose (Fuel suction (tank) → Pre-filter IN)
(11) Drain plug
(12) Hose (Main filter OUT → Fuel suction (engine))
(13) Fuel suction (tank)
(14) Fuel gauge unit
(15) Fuel return (tank)
(16) Hose (Fuel supply)
(17) Strainer
(18) Fuel supply port
(19) Filler cap

1-2. Hydraulic Circuit Diagram



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(1) Servo pressure gauge port (High) : 9/16-18UNF
(2) Drain port : 7/ 8-14UNF
(3) Port B (Reverse) **[FMB]** : SAE 3/4”
(4) Control pressure gauge port **[FMC]** : 9/16-18UNF
(5) Drain port **[FMD]** : 7/ 8-14UNF
(6) Port A (Forward) **[FMA]** : SAE 3/4”
(7) Servo pressure gauge port (Low) : 9/16-18UNF
(8) Loop flushing shuttle valve
(9) Gauge port (For Port B) : 7/ 8-14UNF
(10) Loop flushing relief valve
(11) Gauge port (For Port A) : 7/ 8-14UNF

Motor specifications

- Displacement (max.) : 60.0 cm^3/rev (3.66 cu.in./rev)
  (min.) : 28.0 cm^3/rev (1.71 cu.in./rev)
- Loop flushing relief valve pressure setting : 1.6 MPa (232 psi)
- Allowable motor case pressure : 0.3 MPa (43.5 psi) or less
- Weight : 28 kg (62 lbs.)

2-3. Description and Operation of Propulsion System

Description

- Made up of propulsion pump (3), propulsion motor (R) (6), rear axle ASSY (7), propulsion motor (F) (17), drum (15), speed change solenoid valve (F) (8) and parking brake solenoid valve (9).
  Rear axle ASSY (7) includes differential (j), final drives (k), tires (m) and brake (n).

Basic function of propulsion pump and motor

Propulsion pump:

- A piston pump is used. By varying swashplate angle which varies the piston stroke, forward travel, bringing to neutral and backing are achieved.

Propulsion motor:

- Piston motors are used. The motor is a variable displacement type which controls the piston stroke by varying the swashplate angle.

Operation (It is assumed that the machine travels forward.)

- The parking brake is supposed to have been released.
- Assemblies such as pump ASSY and motor ASSY are indicated by numbers such as “1” and “2”, while component parts of assemblies are shown by small letters such as “a” and “b”.

- Operation of the F-R lever forward puts pump control valve (a) into function. Servo piston (c) tilts the pump swashplate in the forward travel direction.
- Propulsion pump (3) discharges oil from its port B1. Then the oil flow branches into two lines; one line connecting to forward travel port (A) of propulsion motor (R) (6) and the other line to forward travel port (B) of propulsion motor (F) (17).
- The oil fed into the forward travel ports of the motors drives the motors, flowing out from the opposite side ports (port A in propulsion moto (F) and port B in propulsion motor (R)) and joins again to flow into suction port (A1) in propulsion pump (3). At the same time, part of oil is drained to the tank via flushing valve (g), low pressure relief valve (h), and the motor casing

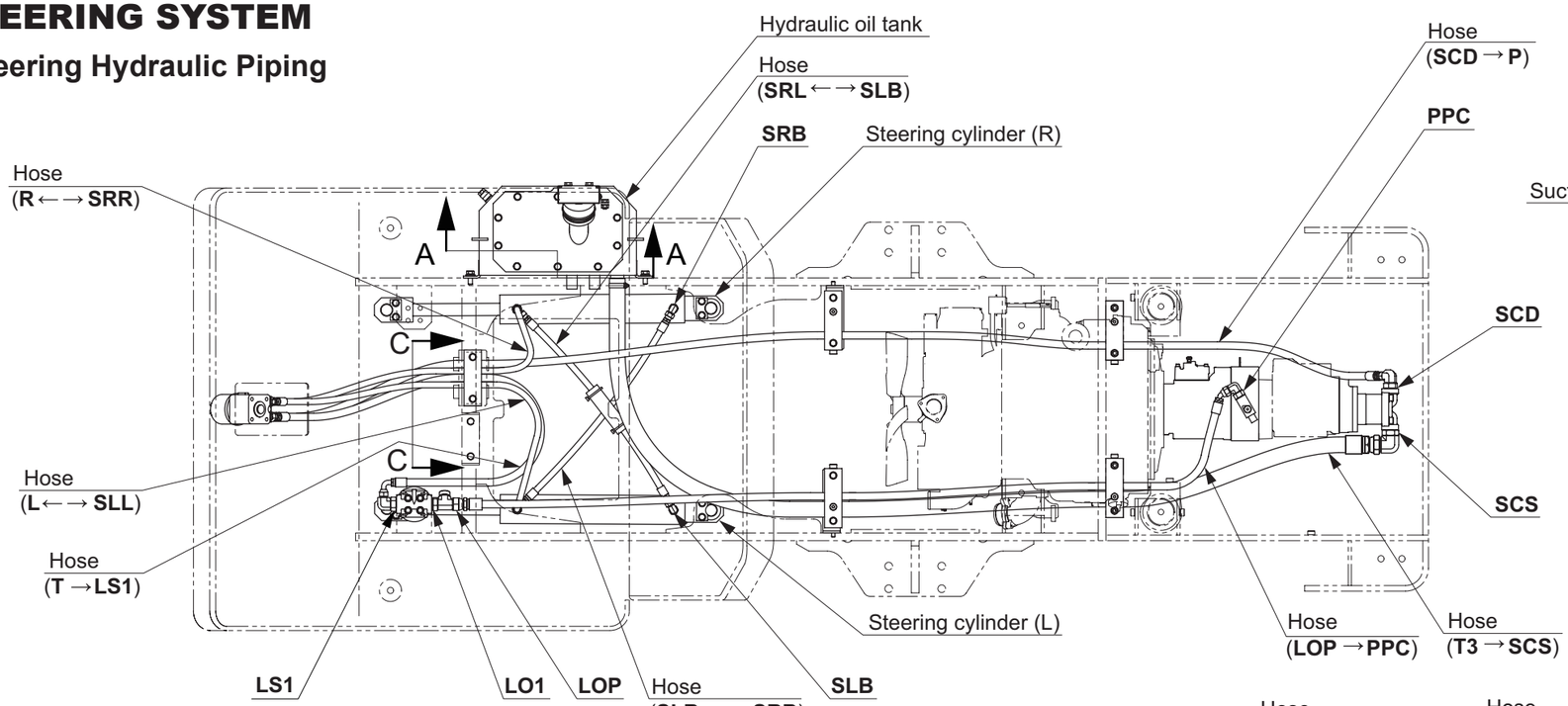
(NOTE)

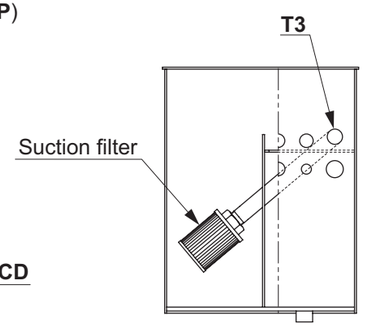
- **Because the propulsion circuit is a closed circuit, the relationship between the suction port and discharge port is reversed when the travel direction is reversed.**

- The power from propulsion motor (R) (6) is delivered to tires (m) through reduction mechanism in differential (j) and final drives (k).
- The drive from propulsion motor (F) (17) is conveyed to drum (15) via reduction gear (16).

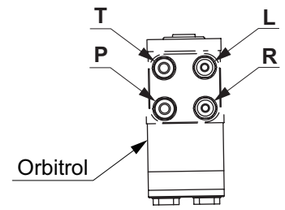
4. STEERING SYSTEM

4-1. Steering Hydraulic Piping

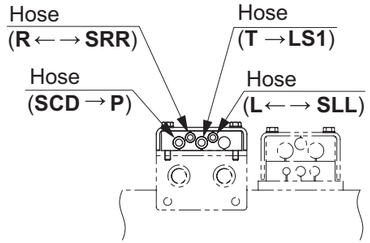




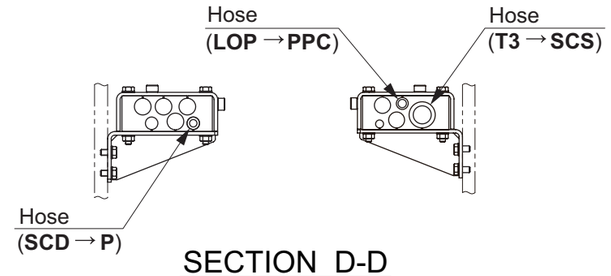
SECTION A-A



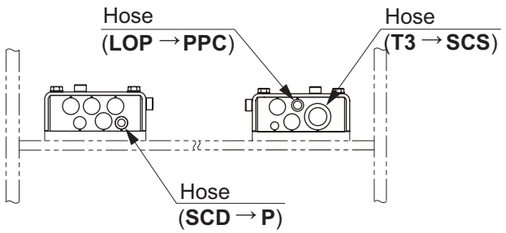
SECTION B-B



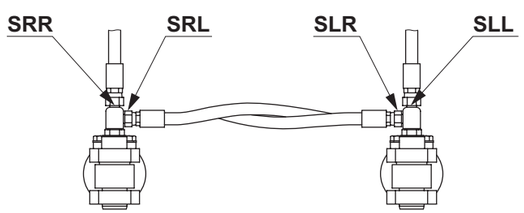
SECTION C-C



SECTION D-D



SECTION E-E



VIEW F

• The letters and numbers in the figure such as “SLR” and “SRB” show each port.
• Arrow “←→; →” symbols show the hose connection and the direction of the flow of the oil.

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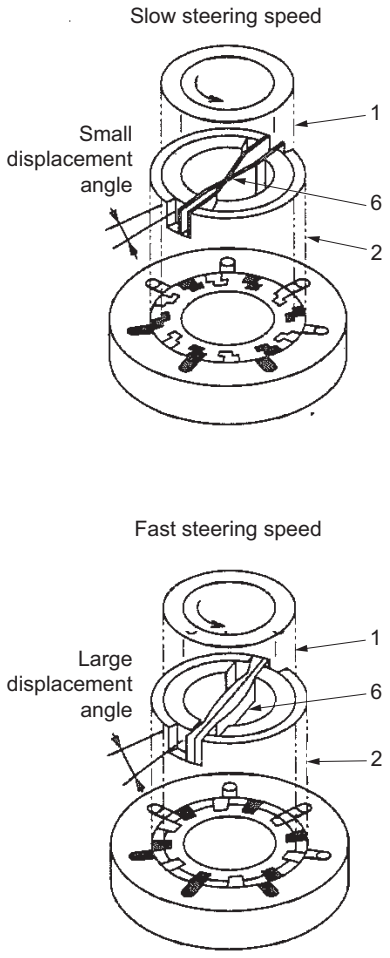
Steering speed and flow control:

- In the steering mechanism, the flow to the steering cylinder must be increased or decreased according to the rotational speed of the steering wheel.
- Orbitrol controls the flow by changing the displacement angle between spool (1) and sleeve (2). In other words, sleeve (2) follows the rotation of spool (1) during the steering wheel operation, closing the hydraulic circuit.
- When rotational speed of the steering wheel increases, the delay of sleeve (2) (displacement angle) increases, increasing the flow.

Hydraulic pump flow and operating force:

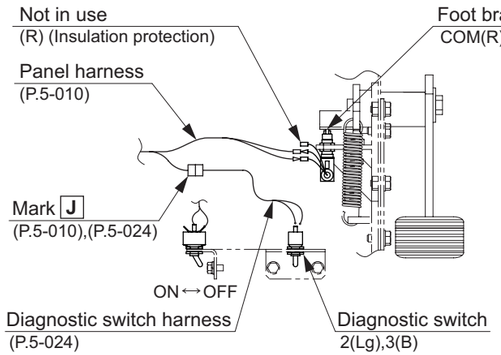
- When the hydraulic pump discharge is sufficient, the steering operating force is used simply to overcome the sliding resistance of sleeve (2) and the rotor, permitting the steering wheel to rotate easily.
- When the hydraulic pump discharge is insufficient, the displacement angle between spool (1) and sleeve (2) reaches the maximum, reducing the quantity of oil flowing from the hydraulic pump into the rotor even if the hydraulic circuit opens widely, causing the rotor to rotate slowly.
- As a result, the spool rotation becomes faster than the rotor rotation to increase the displacement angel to a maximum extent, and the spool rotates the rotor via the cross pin and drive shaft. At that time, the rotor functions as a hydraulic pump, preventing the steering wheel from rotating smoothly.



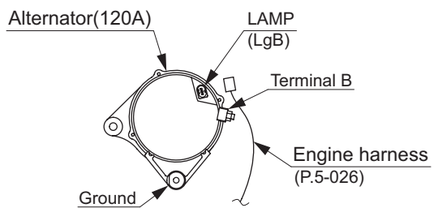
1. Spool
2. Sleeve
6. Centering spring

SV414-04012

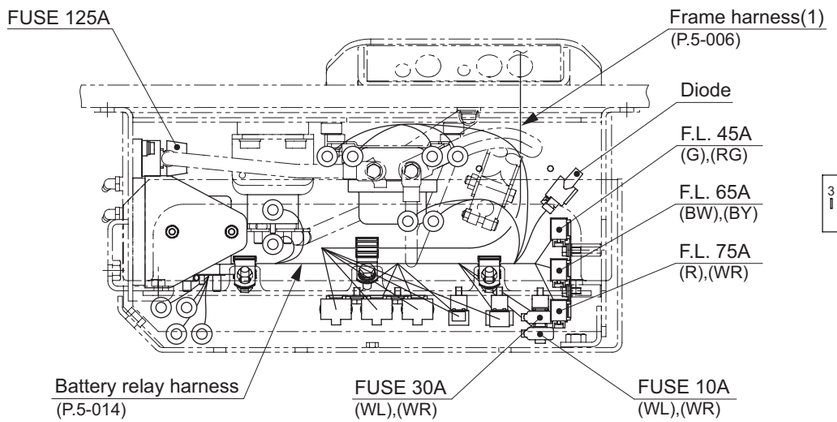
3-2. Wiring Harness Layout (2)



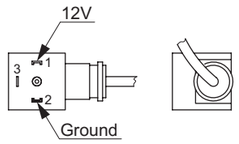
VIEW F-F



VIEW L

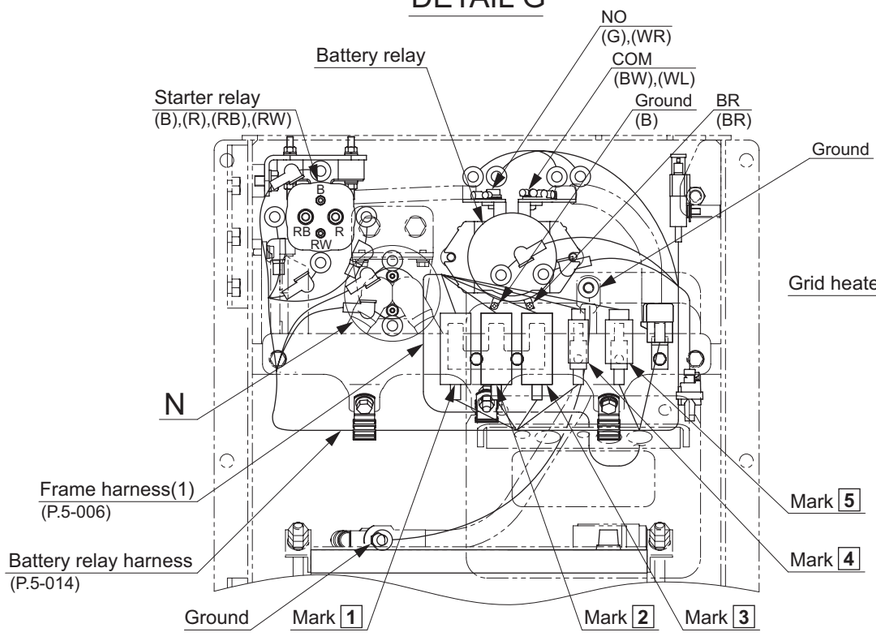


DETAIL G

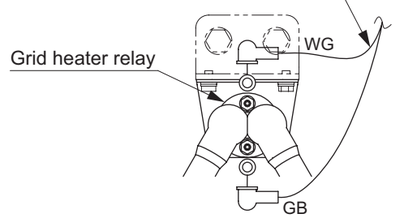


DETAIL M

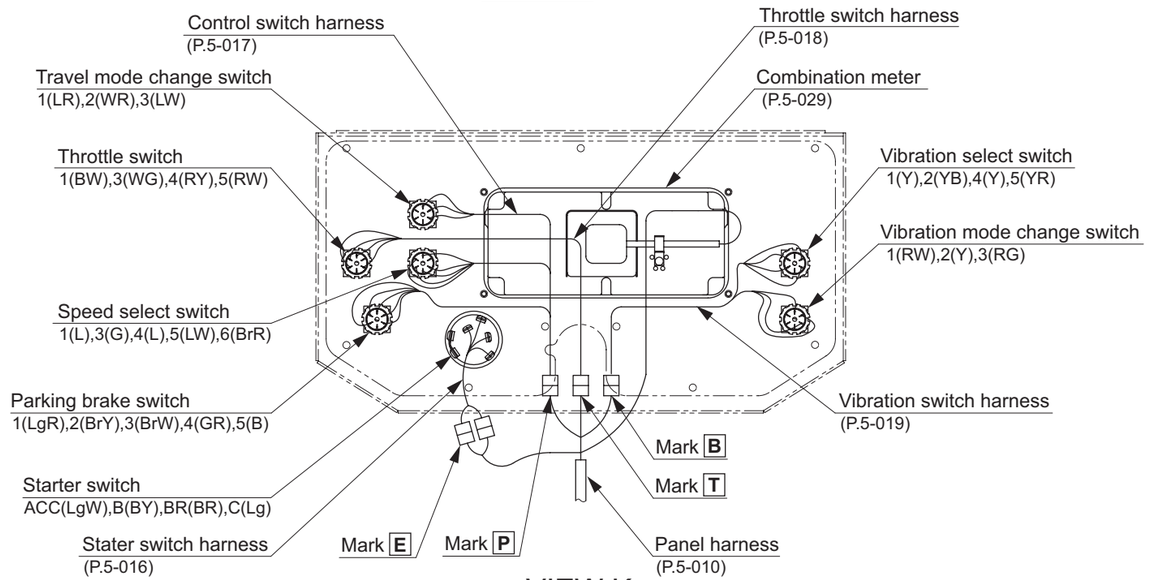
VIEW J



DETAIL H



DETAIL N



VIEW K

0421-09801-0-10029-C

No.	SIZE, COLOR	CONTACT POINTS	CONNECTION
Ⓧ	2B	2	[2], Starter relay
③	8R	2	[1], Fusible link 75A
④	5BY	2	[1], Fusible link 65A
⑦	WG	2	[5], Grid heater relay
⑭	5R	2	[3], Starter relay
⑮	5RB	2	[3], Starter relay
⑱	2RW	2	[2], Starter relay
㉓	3RG	2	[2], Fusible link 45A
㉔	BR	3	[5], Battery relay-BR, Diode-1
㉗	B	3	[4], Battery relay-Ground, Diode-2
㉕	3G	2	Battery relay-NO, Fusible link 45A
㉖	8WR	2	Battery relay-NO, Fusible link 75A
㉗	5BW	2	Battery relay-COM, Fusible link 65A
㉘	3WB	2	[2], Fuse 30A
㊱	1.25WL, 3WL	3	Battery relay-COM, Fuse 10A, Fuse 30A
㉘	GB	2	[5], Grid heater relay
㉘	1.25WR	2	[4], Fuse 10A

4-15. Hydraulic Oil Filter Harness

1405-09009-0-40195-0

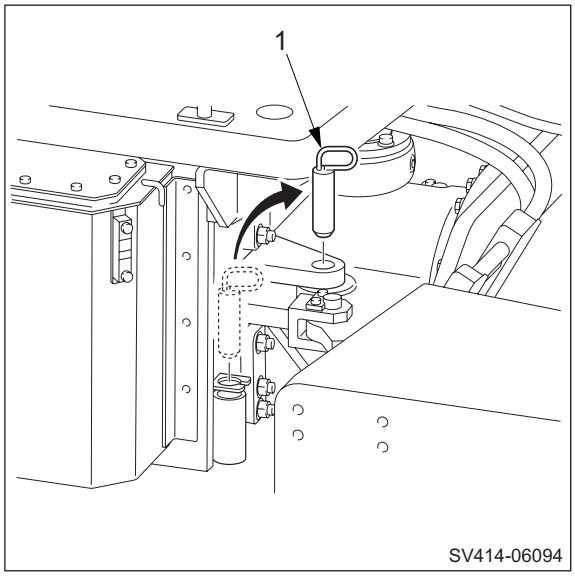
No.	SIZE, COLOR	CONTACT POINTS	CONNECTION
㉒	Y	2	Hydraulic oil filter switch, Panel harness

2. VIBRATORY DRUM

2-1. Removal and Installation of Vibratory Drum

2-1-1. Removal of vibratory drum

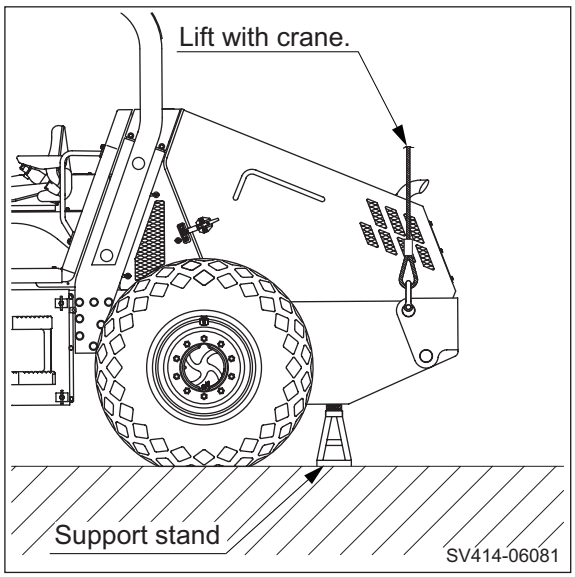
1) Securing machine
   - Hold drum with chocks.
   - Joint front frame and rear frame with lock pin (1).



⚠WARNING

When lifting the machine body, use an appropriate hoist of sufficient strength. Confirm that the surrounding area is safe, and work in a natural, unstrained posture.
Also, to firmly secure the machine body, use a support stand of sufficient strength.

2) Supporting rear frame
   - Lift rear frame with a crane.
   - Place support stands under rear frame when rear wheel tires is slightly off ground to support machine body.

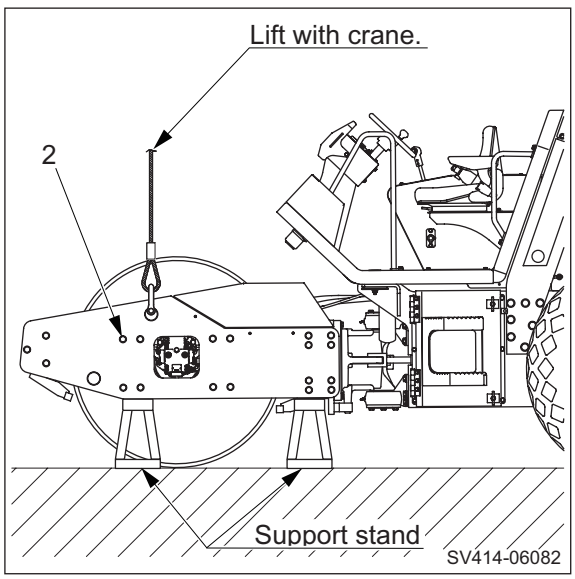


Rear axle weight

SV414D : 3,600 kg (7,935 lbs.)
SV414T : 3,600 kg (7,935 lbs.)
SV414TF : 3,600 kg (7,935 lbs.)

(NOTICE)
- **Do not allow rear wheel tires to leave the ground. (The tires must support the machine's body weight, too.)**

3) Lift front frame with a crane.
   - Ensuring that no load is applied to bolts (2) (left and right sides), place support stands at right and left sides of front frame. Firmly secure machine body.



Front axle weight

SV414D : 3,490 kg (7,695 lbs.)
SV414T : 3,490 kg (7,695 lbs.)
SV414TF : 4,720 kg (10,405 lbs.)

⚠WARNING

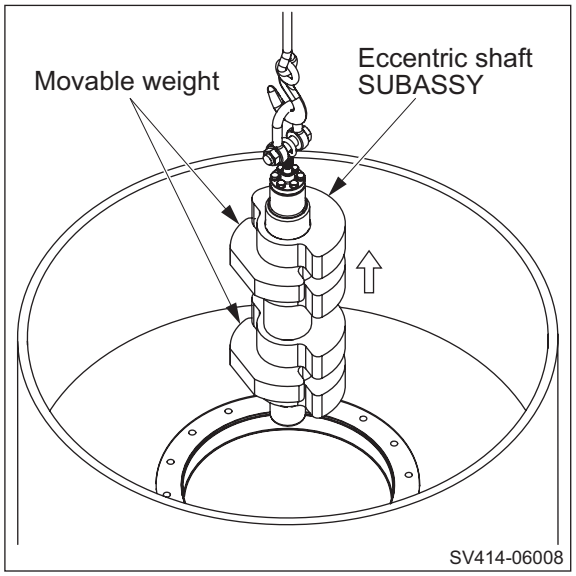
Take care not to get your fingers caught in movable weights.

13) Remove eccentric shaft SUBASSY.

Eccentric shaft SUBASSY : 135 kg (298 lbs.)

(NOTICE)

- **Put the movable weight at its outmost position.**



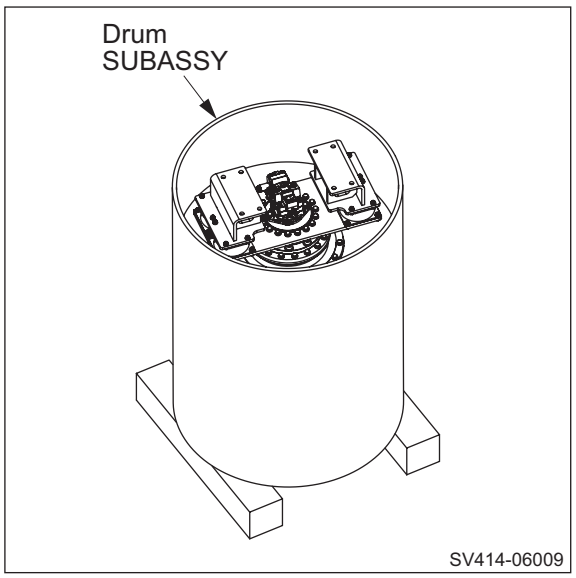
⚠WARNING

Be careful because reversing the vibratory drum involves risk. Confirm that the surrounding area is safe, and work in a natural, unstrained posture.

14) Reverse drum SUBASSY.

Drum SUBASSY

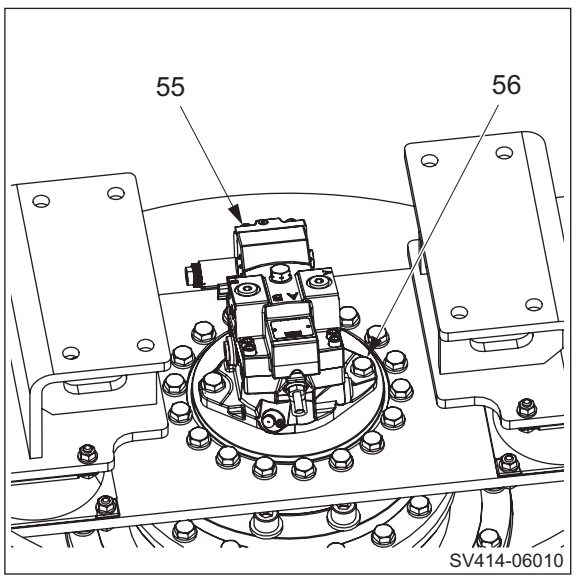
SV414D : 2,055 kg (4,530 lbs.)
SV414T : 2,045 kg (4,508 lbs.)
SV414TF : 3,325 kg (7,330 lbs.)



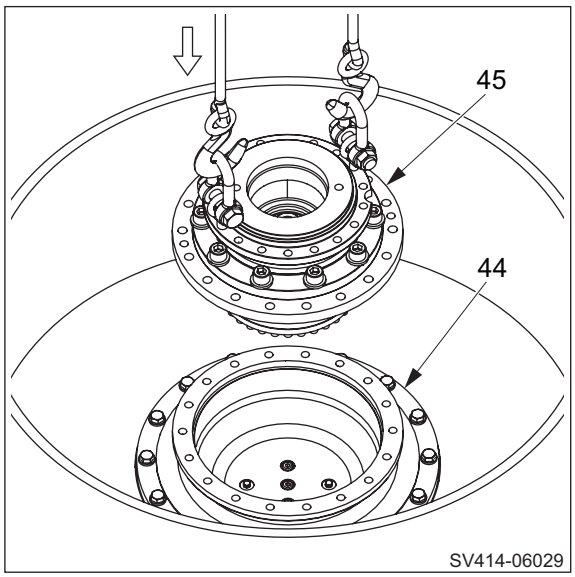
15) Remove bolts (56).

- Remove propulsion motor (55).

(55) Propulsion motor : 30 kg (66 lbs.)

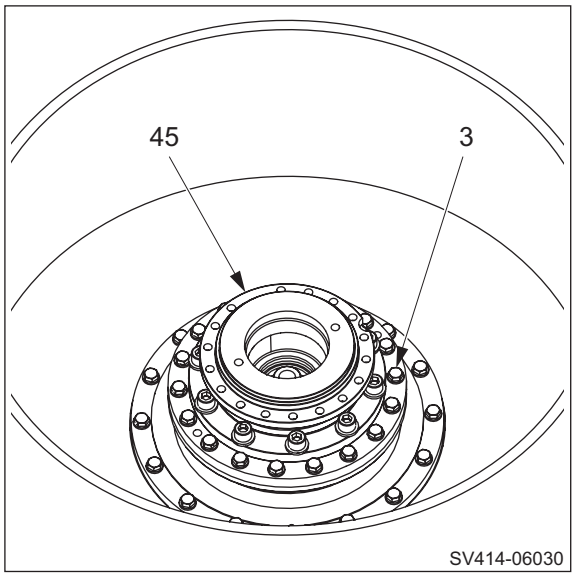


10) Lower gear box (45) on mounting surface of housing (44).



11) Secure gear box (45) with eighteen bolts (3) and washers.

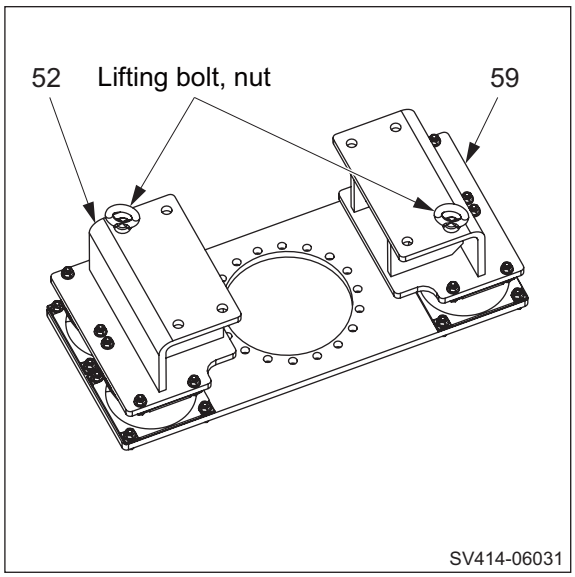
N•m (3) Bolts M16×50 : 265 N·m (195 lbf·ft)



⚠WARNING

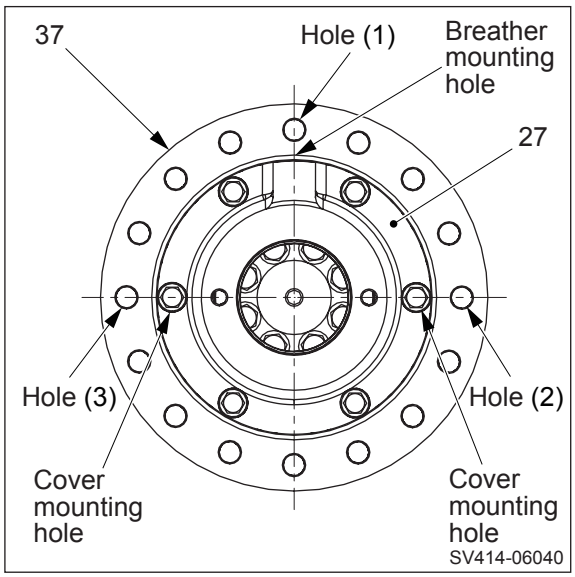
When installing lifting bolts, secure them with nuts.

12) Install lifting bolts and nuts (M20) to holders (52) and (59).

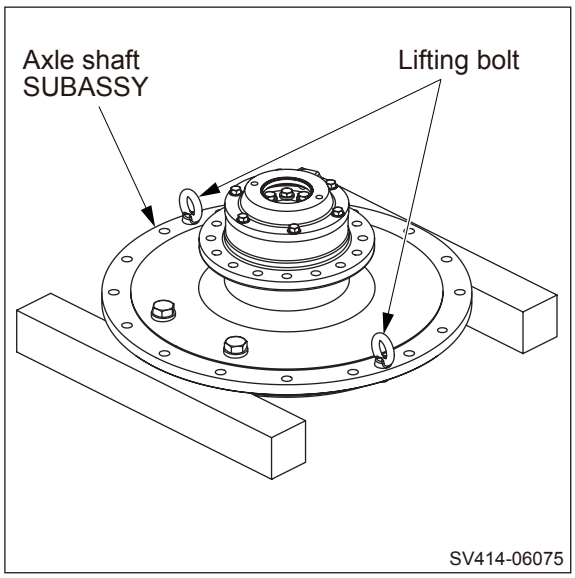


(NOTICE)

- **The hole (1) in housing and breather mounting hole in cover, holes (2), (3) in housing and two cover mounting holes must be arranged as shown on the right.**



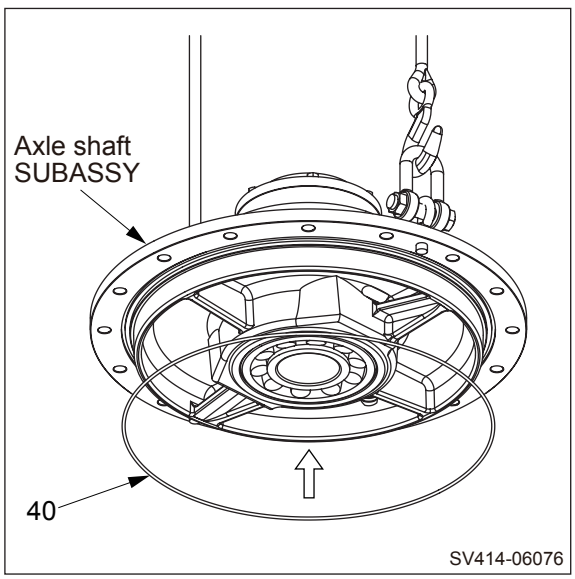
22) Install lifting bolts (M16) to axle shaft SUBASSY.



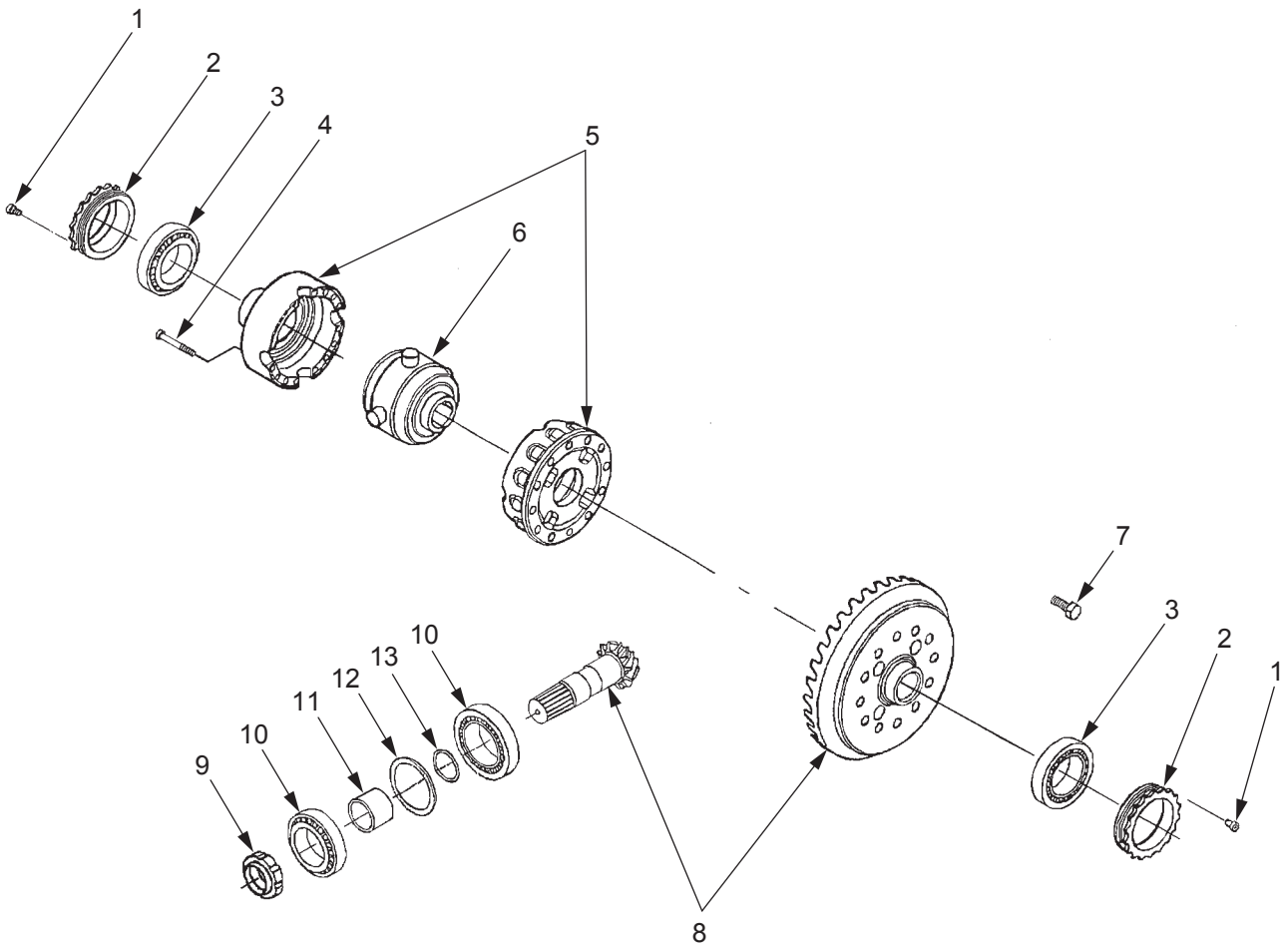
23) Lift axle shaft SUBASSY.

Axle shaft SUBASSY : 150 kg (331 lbs.)

- Apply grease to O-ring (40).
- Install O-ring to axle shaft (41).



4-3-2. Differential



(1) Bolt
(2) Ring nut
(3) Taper roller bearing
(4) Bolt
(5) Differential carrier
(6) No spin differential
(7) Bolt
(8) Bevel gear set
(9) Ring nut
(10) Bearing
(11) Spacer
(12) Shim
(13) Shim

3. BRAKE SYSTEM

3-1. Description and Operation of Brake Circuit

Description

- Made up of parking brake switch pedal (1), foot brake switch (2), diode unit (3), F-R lever switch (4), pump neutral relay (A3) (5), pump neutral holding relay (A4) (6), parking brake solenoid valve (7) and brake (8).The foot brake switch is ON with the brake pedal released and OFF if pushed down on.

Operation

To release parking brake:

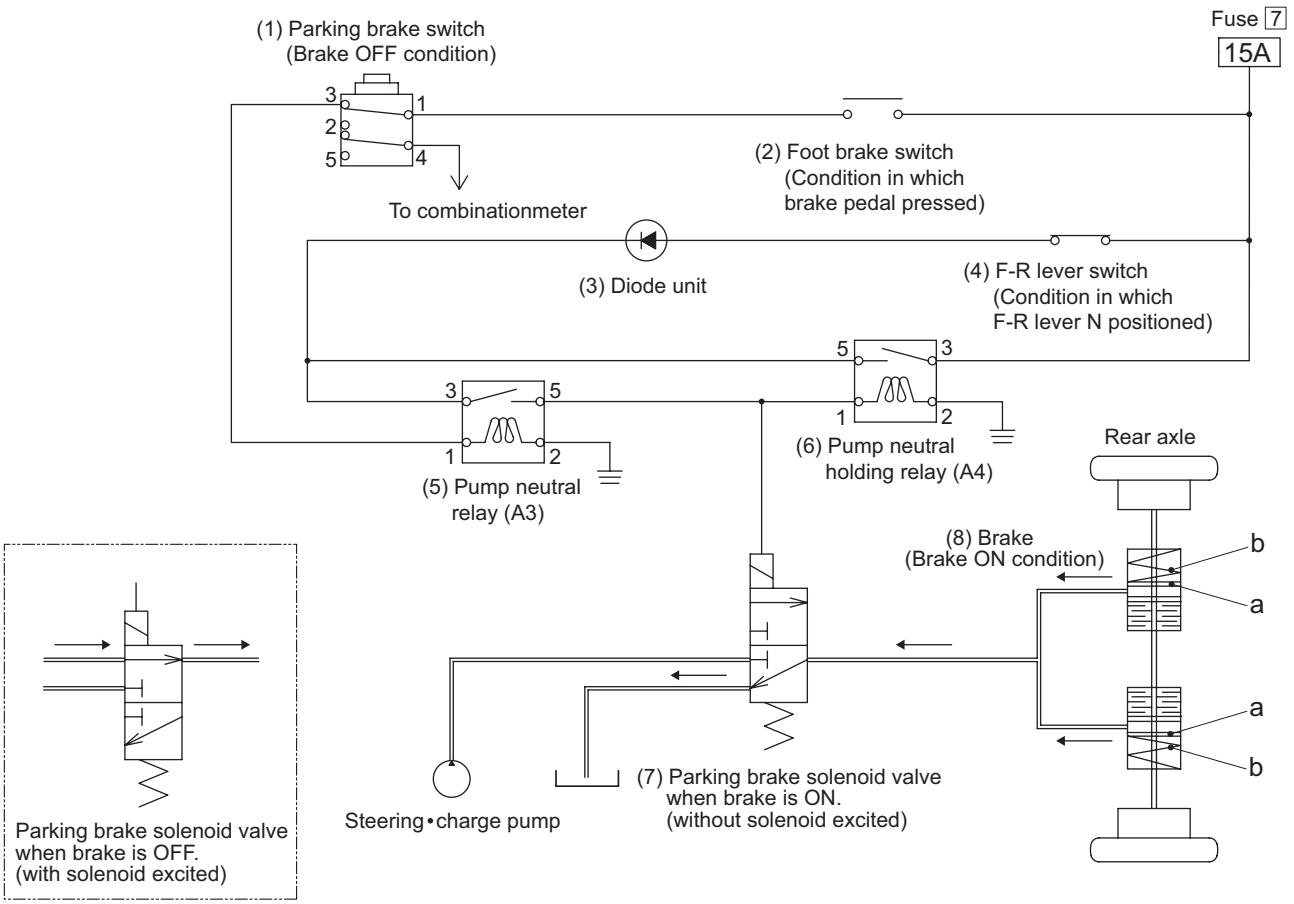
- When parking brake switch (1) is set to the OFF position, the contacts of parking brake switch (1) close the circuit to parking brake solenoid valve (7) and breaks the circuit to the brake indicator lamp.
- This leads the pressurized fluid through parking brake solenoid valve (7) to pistons (a) of brake (8) to compress springs (b). Brake is freed.

To apply parking brake (Brake pedal not depressed):

- If parking brake switch (6) is put in the ON position, the contacts of parking brake switch (6) break the circuit to parking brake solenoid valve (7) and close the brake indicator lamp circuit.
- This stops feeding the fluid from parking brake solenoid valve (7) to brake (8). Springs (b) move pistons (a) toward the brake discs and plates so that they make a close contact with each other. The brake is applied.The indicator lamp comes on simultaneously.

When brake pedal is pushed down on:

- If brake pedal is depressed, foot brake switch (2) is switched off to break the circuit to parking brake switch (1). This applies the brake even if parking brake switch is in the OFF position.



•The arrow (→) symbol shows the direction of the hydraulic oil flow.

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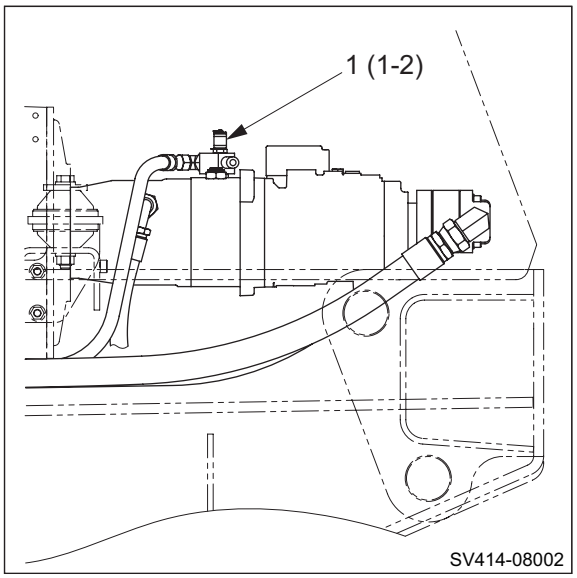
3-1. Measurement

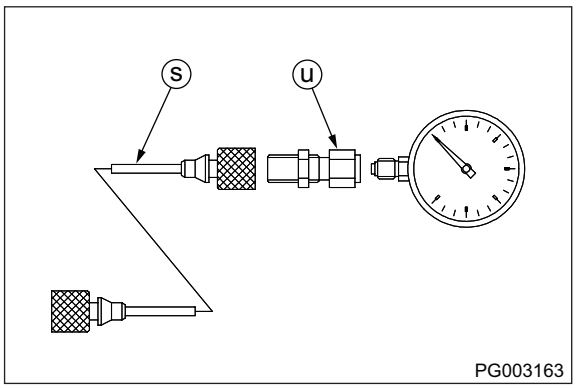
- Oil temperature during measurement : 50 ± 5°C (122 ± 9°F)

① Remove plug from coupling (1) of propulsion pump.
Attach pressure gauge with hose ⓢ and connector ⓤ .
- Coupling : 9/16-18UNF×M16
- Adapter for hose ⓢ : M16 P=2.0
- Pressure gauge connector ⓤ : M16×G3/8
- Pressure gauge : 0 to 5 MPa (0 to 725 psi)

② Confirm that F-R lever is “N”.
③ Apply parking brake by pressing parking brake switch button.
④ Start the engine and set throttle switch to “FULL”.
⑤ Read pressure indicated by pressure gauge.

★ Standard charge relief valve setting
: 2.5 ± 0.2 MPa (363 ± 29 psi)





- The number “1-2” appearing in above illustrations is consistent with lead line numbers shown in illustration of pump ASSY in “2-2. Hydraulic Component Specifications” (page 4-006).

8-2. Adjustment

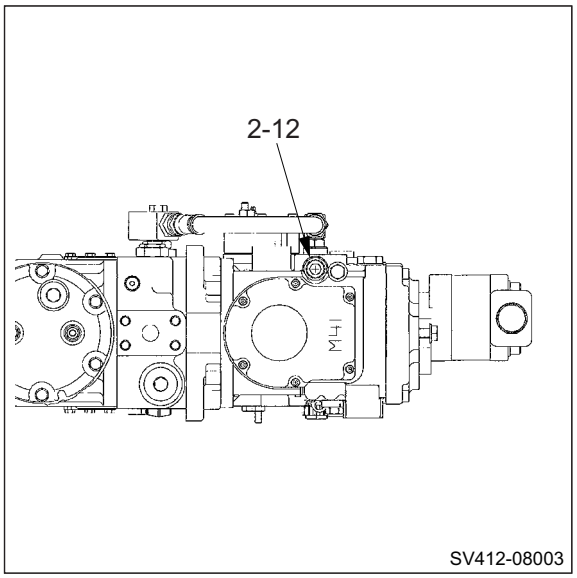
- If measurement results indicate the pressure deviating from standard charge relief pressure setting range, make an adjustment in accordance with procedure described below.

① Check nut (1) of charge relief valve (2-12) for evidence of having loosened.
② If there is evidence of nut having loosened, adjust charge relief valve so that pressure becomes within standard charge relief valve pressure setting range while watching pressure gauge.
- To adjust pressure, loosen nut and turn adjustment screw (2).

Adjustment screw turned clockwise
: Pressure rise
Adjustment screw turned counterclockwise
: Pressure drop
Pressure change rate
: 0.54 MPa/ 1/2 turn (78.3 psi/ 1/2 turn)

③ If there is no evidence of nut having loosened, remove charge relief valve.
④ Check removed charge relief valve for trapped dirt and scratches on its seat.
⑤ If trapped dirt is present, disassemble and clean charge relief valve.
⑥ If a scratch is found on seat, replace charge relief valve.
⑦ After adjustment, measure pressure again and check that pressure reaches standard charge relief valve setting range.

N•m (1) Nut : 40 N·m (30 lbf·ft)



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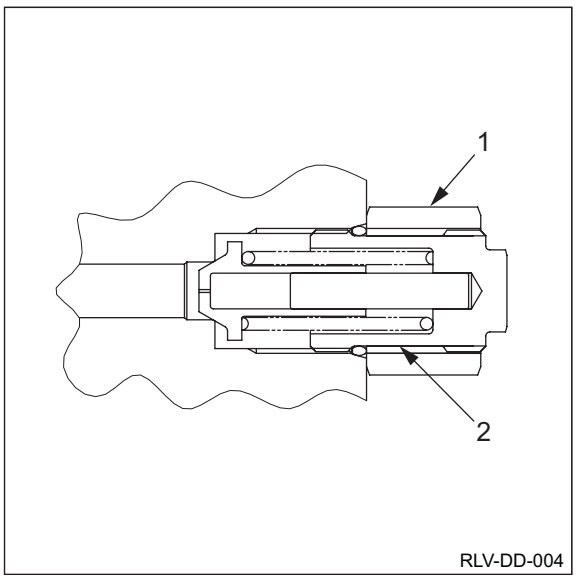

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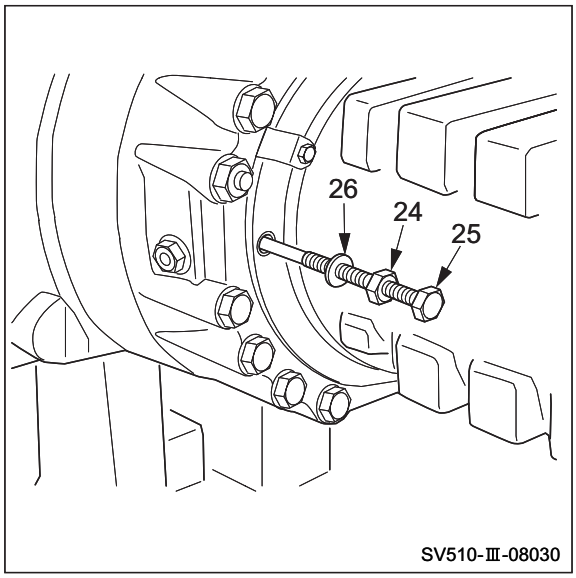
(NOTICE)
- **Carefully disassemble and reassemble after taking steps to prevent foreign material from getting in.**

- The number “2-12” appearing in above illustrations is consistent with lead line numbers shown in illustration of pump ASSY in “2-2. Hydraulic Component Specifications” (page 4-006).

15-2. Adjustment after Manual Release of Brake

① Remove bolt (25), nut (24), and seal washer (26).
② Replace seal washer (26) with a new one.
③ Apply grease to bolt (25) threads.
④ As shown on the right, install bolt (25), nut (24), and seal washer (26).



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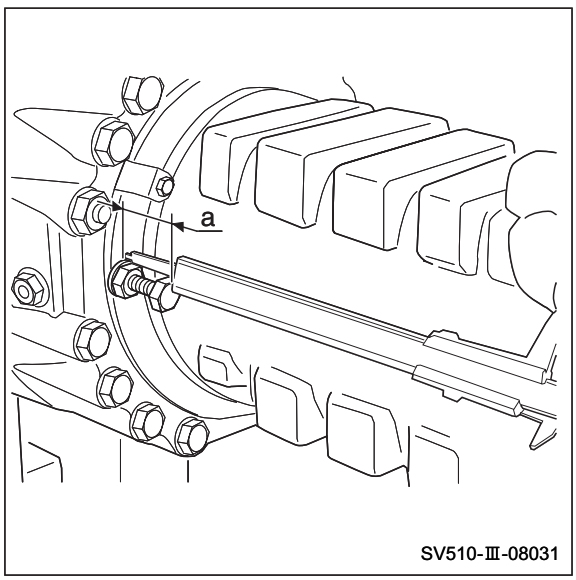
⑤ Adjust bolt (25) to the dimensions as shown on the right.
• Similarly, adjust the bolt on the opposite side.

★ Specified dimension a : $34^{+0.5}_{0}$ mm ($1.34^{+0.02}_{0}$ in.)



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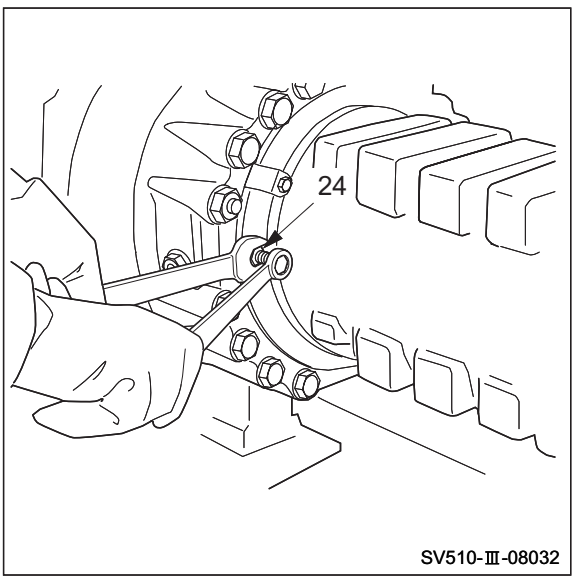
⑥ Tighten nut (24), and firmly secure bolt (25).

★ When tightening nut (24), make sure that bolt (25) does not move. After securing bolt, check the dimensions of bolt again.



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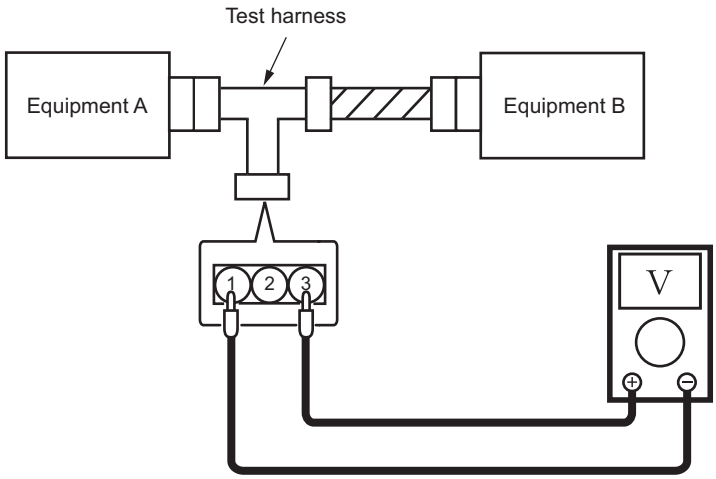
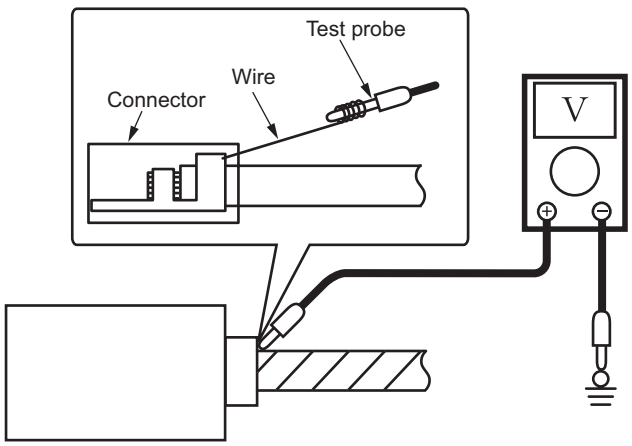
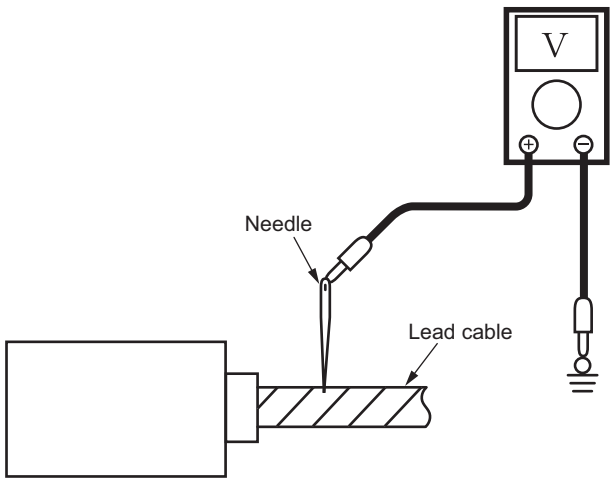
・Measurement using a test harness



・Measurement from the backside of connector



・Measurement on a lead cable



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Measurement method

For measurement of voltage, connect the tester probes in parallel to the portion to be measured. Because the voltage can be measured only when the connector is connected in position, contact the tester probes to the terminals without disconnecting the connector. The following methods are available:

- Measurement using a test harness
  Prepare the test harness for the measurement.
- Measurement from the backside of connector
  Insert a wire from the backside of the connector.
- Measurement on a lead cable
  Remove the bundling tape from the harness to separate each cable, and stick the needle into the relevant cable.

(NOTICE)

- **Except for preparing the test harness, proper protection must be made after the measurement to prevent corrosion in the connector terminals or harnesses.**

Fault Code	SPN	FMI	Cummins Description	Effect
2186	3512	4	Sensor Supply 4 Circuit • Voltage below normal, or shorted to low source	Engine will only idle.
2271	27	3	EGR Valve Position Circuit • Voltage above normal, or shorted to high source	EGR valve actuation will be disabled.
2272	27	4	EGR Valve Position Circuit • Voltage below normal, or shorted to low source	Possible reduced engine performance.
2273	411	3	Exhaust Gas Recirculation Differential Pressure Sensor Circuit • Voltage above normal, or shorted to high source	Possible reduced engine performance.
2274	411	4	Exhaust Gas Recirculation Differential Pressure Sensor Circuit • Voltage below normal, or shorted to low source	Possible reduced engine performance.
2311	633	31	Electronic Fuel Injection Control Valve Circuit • Condition Exists	Possible reduced engine performance.
2321	190	2	Engine Crankshaft Speed/Position • Data erratic, intermittent or incorrect	Possible reduced engine performance.
2322	723	2	Engine Camshaft Speed / Position Sensor • Data erratic, intermittent or incorrect	None on performance.
2349	2791	5	EGR Valve Control Circuit • Current Below Normal or Open Circuit	Possible reduced engine performance.
2351	2791	4	EGR Valve Control Circuit • Voltage below normal, or shorted to low source	Possible reduced engine performance.
2352	2791	3	EGR Valve Control Circuit • Voltage above normal, or shorted to high source	Possible reduced engine performance.
2353	2791	6	EGR Valve Control Circuit • Current Above Normal or Grounded Circuit	Possible reduced engine performance.
2357	2791	7	EGR Valve Control Circuit • Mechanical System Not Responding or Out of Adjustment	Possible reduced engine performance.
2375	412	3	Exhaust Gas Recirculation Temperature Sensor Circuit • Voltage above normal, or shorted to high source	Possible reduced engine performance.
2376	412	4	Exhaust Gas Recirculation Temperature Sensor Circuit • Voltage below normal, or shorted to low source	Possible reduced engine performance.
2377	647	3	Fan Control Circuit • Voltage above normal, or shorted to high source	The fan can stay on continuously or not run at all.
2442	651	13	Injector Solenoid Driver Cylinder 1 • Out of Calibration	Possible reduced engine performance.
2443	652	13	Injector Solenoid Driver Cylinder 2 • Out of Calibration	Possible reduced engine performance.

2-3-1. Engine will not start (Starter motor does not run) 3/3

- F-R lever must be in “N”.
- Parking brake switch must be applied.
- Brake pedal is not depressed.

Reference Fig.: 2-3-1

Check point	Check/Cause	Action
9. Parking Brake Switch	(1) When starter switch is ON, measure voltage between parking brake switch terminal 1 inlet wire LgR and chassis ground. Standard voltage : 12 V or more (2) When starter switch is ON, measure voltage between parking brake switch terminal 2 outlet wire BrY and chassis ground. Standard voltage : 12 V or more • If above item (1) is OK and item (2) is NG, parking brake switch is faulty.	Replace parking brake switch.
10. Parking Interlock Relay (A2)	(1) When starter switch is ON, measure voltage between parking interlock relay terminal 3 inlet wire LgR and chassis ground. Standard voltage : 12 V or more (2) When starter switch is ON, measure voltage between parking interlock relay terminal 1 inlet wire BrY and chassis ground. Standard voltage : 12 V or more (3) When starter switch is ON, measure voltage between parking interlock relay terminal 5 outlet wire BW and chassis ground. Standard voltage : 12 V or more • If above items (1) and (2) are OK and item (3) is NG, parking interlock relay is faulty.	Replace parking interlock relay (A2).
11. Starter Lockout Relay Relay (A5)	(1) When starter switch is ON, measure voltage between starter lockout relay terminal 3 inlet wire W and chassis ground. Standard voltage : 12 V or more (2) When starter switch is ON, measure voltage between starter lockout relay terminal 1 inlet wire LgY and chassis ground. Standard voltage : 12 V or more (3) When starter switch is ON, measure voltage between starter lockout relay terminal 5 outlet wire RW and chassis ground. Standard voltage : 12 V or more • If above items (1) and (2) are OK and item (3) is NG, starter lockout relay is faulty.	Replace starter lockout relay (A5).
12. Harness Connecting Between Terminals	• Measure resistance of harness connecting between terminals. Standard resistance : 10 Ω or less • If resistance is abnormal, harness is faulty.	Repair or replace harness.

2-4-2. Machine speed cannot be changed

• Speed select switch must be “  ”.

Reference Fig.: 2-4-1

Check point	Check/Cause	Action
1. Speed Change Solenoid (F)	• Disconnect harness and measure resistance of coil. Standard resistance : 12.3 ± 1.2 Ω • If measured resistance is abnormal, speed change solenoid (F) is faulty.	Replace speed change solenoid (F).
2. Speed Change Solenoid (R)	• Disconnect harness and measure resistance of coil. Standard resistance : 5.1 Ω • If measured resistance is abnormal, speed change solenoid (R) is faulty.	Replace speed change solenoid (R).
3. Speed Select Switch	(1) When starter switch is ON, measure voltage between speed select switch terminal 1, 4 inlet wire L and chassis ground. Standard voltage : 12 V or more (2) When starter switch is ON, measure voltage between speed select switch terminal 3 outlet wire G and chassis ground. Standard voltage : 12 V or more (3) When starter switch is ON, measure voltage between speed select switch terminal 5 outlet wire LW and chassis ground. Standard voltage : 12 V or more • If above item (1) is OK and item (2) or (3) is NG, speed select switch is faulty.	Replace speed select switch.
4. Harness Connecting Between Terminals	• Measure resistance of harness connecting between terminals. Standard resistance : 10 Ω or less • If resistance is abnormal, harness is faulty.	Repair or replace harness.

2-4-5. Brake does not work

- Parking brake switch must be applied.
- Brake pedal is depressed.

Reference Fig.: 2-4-1

Check point	Check/Cause	Action
1. Parking Brake Solenoid	• Disconnect harness and measure resistance of coil. Standard resistance : 12.3 ± 1.2 Ω • If measured resistance is abnormal, parking brake solenoid is faulty.	Replace parking brake solenoid.
2. Parking Brake Switch	• When starter switch is ON, measure voltage between parking brake switch terminal 3 outlet wire BrW and chassis ground. There is no electricity in normal condition. • If there is electricity, parking brake switch is faulty.	Replace parking brake switch.
3. Foot Brake Switch	• When starter switch is ON, measure voltage between foot brake switch terminal NO outlet wire LgR and chassis ground. There is no electricity in normal condition. • If there is electricity, foot brake switch is faulty.	Replace foot brake switch.
4. Pump Neutral Relay (A3)	(1) When starter switch is ON, measure voltage between pump neutral relay terminal 1 inlet wire BrW and chassis ground. There is no electricity in normal condition. (2) When starter switch is ON, measure voltage between pump neutral relay terminal 5 outlet wire LY and chassis ground. There is no electricity in normal condition. • If above items (1) is OK and item (2) is NG, pump neutral relay is faulty.	Replace pump neutral relay (A3).
5. Pump Neutral Holding Relay (A4)	(1) When starter switch is ON, measure voltage between pump neutral holding relay terminal 1 inlet wire LY and chassis ground. There is no electricity in normal condition. (2) When starter switch is ON and F-R lever is “F” or “R”, measure voltage between pump neutral holding relay terminal 5 outlet wire GW and chassis ground. There is no electricity in normal condition. • If above items (1) is OK and item (2) is NG, pump neutral holding relay is faulty.	Replace pump neutral holding relay (A4).
5. Harness Connecting Between Terminals	• Measure resistance of harness connecting between terminals. Standard resistance : 10 Ω or less • If resistance is abnormal, harness is faulty.	Repair or replace harness.

2-6-2. Combination meter warning lamp or indicator lamp is abnormal

Reference Fig. : 2-6-1

Check point	Check/Cause	Action

1. Harness	• Disconnect connectors between combination meter and lamp check relay.
	• Measure resistance between terminals and chassis ground.
	  • Combination meter connector terminal wire No. 32 wire BY and chassis ground
	  • Lamp check relay terminal 3 wire BY and chassis ground
	  Standard resistance: 100 kΩ or more
	• If resistance is abnormal, harness is faulty.
		Repair or replace harness.

2. Lamp Check Relay (A9)	(1) When starter switch is ON, measure voltage between lamp check relay terminal 1 outlet wire LgW and chassis ground.
	  Standard voltage : 12 V or more
	(2) After starting engine, measure voltage between lamp check relay terminal 2 inlet wire LB and chassis ground.
	  Standard voltage : 12 V or more
	(3) After starting engine, check continuity between lamp check relay terminal 3 inlet wire BY and chassis ground.
	  There is no continuity in normal condition.
	• If above items (1) and (2) are OK and item (3) is NG, lamp check relay is faulty.
	• If above item (1) is OK and item (2) is NG, alternator is faulty.
		Repair or replace lamp check relay (A9) or alternator.

3. Combination Meter (Lamp check)	(1) When starter switch is ON, measure voltage between combination meter terminal wires and ground terminal wire.
	  • Continuous power (+) terminal wire No.70 inlet wire WR and ground (-) terminal wire No.X wire B
	  • Power (+) terminal wire No.35 inlet wire YW and ground (-) terminal wire No.X wire B
	  Standard voltage : 12 V or more
	(2) When starter switch is ON, check that parking brake indicator lamp, hydraulic oil filter warning lamp and charge warning lamp illuminate and then go out after starting engine.
	• If above item (1) is OK and item (2) is NG, combination meter is faulty.
	(NOTICE)
	• Since engine cannot start unless parking brake switch is applied, parking brake indicator lamp does not go out even after starting engine.
		Replace combination meter.

2-6-8. Horn does not sound

Reference Fig. : 2-6-3

Check point	Check/Cause	Action
1. Horn	• Disconnect horn and directly connect battery positive terminal to horn terminal wire LgW side and negative terminal to horn terminal wire B side. • If horn does not sound, horn is faulty.	Replace horn.
2. Horn Relay (A8)	(1) When starter switch is ON, measure voltage between horn relay terminal 1, 3 inlet wire RY and chassis ground. Standard voltage : 12 V or more (2) When starter switch is ON and horn switch pressed, measure voltage between horn relay terminal 5 outlet wire LgW and chassis ground. Standard voltage : 12 V or more • If above item (1) is OK and item (2) is NG, horn relay is faulty.	Replace horn relay (A8).
3. Horn Switch	• When horn switch is ON, check continuity between horn switch terminals. There is continuity in normal condition. • If there is no continuity, horn switch is faulty.	Replace horn switch.
4. Harness Connecting Between Terminals	• Measure resistance of harness connecting between terminals. Standard resistance : 10 Ω or less • If resistance is abnormal, harness is faulty.	Repair or replace harness.

2-6-9. Backup buzzer does not sound

Reference Fig. : 2-6-3

Check point	Check/Cause	Action
1. Backup Buzzer	• Disconnect backup buzzer and directly connect battery positive terminal to backup buzzer terminal wire GB side and negative terminal to backup buzzer terminal wire B side. • If backup buzzer does not sound, backup buzzer is faulty.	Replace backup buzzer.
2. Backup Buzzer Switch	(1) When starter switch is ON, measure voltage between backup buzzer switch terminal COM inlet wire R and chassis ground. Standard voltage : 12 V or more (2) When starter switch is ON and F-R lever is “R” , measure voltage between backup buzzer switch terminal NO outlet wire GB and chassis ground. Standard voltage : 12 V or more • If above item (1) is OK and item (2) is NG, backup buzzer switch is faulty.	Replace backup buzzer switch.
3. Harness Connecting Between Terminals	• Measure resistance of harness connecting between terminals. Standard resistance : 10 Ω or less • If resistance is abnormal, harness is faulty.	Repair or replace harness.