KOMATSU

SHOP MANUAL

ELECTRIC LIFT TRUCK

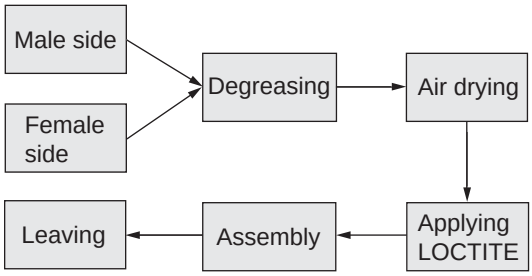
AE50/AM50 Series

FB15U/15FU-12	837898 and up
FB18U/18FU/20AU/20AFU-12	837898 and up
FB15MU/15MFU-12	826828 and up
FB18MU/18MFU/20MU/20MFU-12	826828 and up

FB18MU-12	FB20MU-12
Electric	Electric
Sitting	Sitting
1570 [3461]	1800 [3968]
600 [23.6]	600 [23.6]
405 [15.9]	425 [16.7]
1390 [54.7]	1485 [58.5]
3470 [7650]	3900 [8598]
4250 [9367]	4860 [10714]
790 [1742]	840 [1852]
1620 [3572]	1900 [4189]
1850 [4079]	2000 [4409]
Elastic Cushion	Elastic Cushion
18x7-8	200/50-10
15x4 1/2-8	15x4 1/2-8
2*/2	2*/2
940 [37.0]	950 [37.4]
170 [6.7]	170 [6.7]
6/10	6/10
1995 [78.5]	2110 [83.1]
140 [5.5]	150 [5.9]
3300 [130.0]	3300 [130.0]
4255 [167.5]	4270 [168.1]
2070 [81.5]	2070 [81.5]
3070 [120.9]	3185 [125.4]
2000 [78.7]	2115 [83.3]
1110 [43.7]	1160 [45.7]
35x100x1070 [1.4x3.9x42.1]	36x122x1070 [1.4x4.8x42.1]
Class 2, Type A	Class 2, Type A
970 [38.2]	970 [38.2]
95 [3.7]	95 [3.7]
125 [4.9]	125 [4.9]
2995 [117.9]	3115 [122.6]
3195 [125.8]	3315 [130.5]
1590 [62.6]	1690 [66.5]
15.0/17.0 [10/11]	14.0/16.0 [9/10]
320/600 [63/118]	280/500 [55/98]
450/550 [89/108]	370/440 [73/87]
9560 [2150]	9045 [2033]
16	14
Foot/Hydraulic	Foot/Hydraulic
Hand/Mechanical	Hand/Mechanical
FHPS	FHPS
4.5x2	4.5x2
9.0	9.0
48	48
600	600
950 [2094.4]	950 [2094.4]
Transistor	Transistor
176 [17.6, 180, 2560]	176 [17.6, 180, 2560]
23 [6.1]	23 [6.1]

HOW TO USE LOCTITE

Procedure for using LOCTITE



1. Degreasing and cleaning

1) Clean the parts in trichloroethylene, acetone, ether, alkaline solution, etc. which are highly volatile.
2) Degrease the parts as perfectly as possible.
3) Since gasoline, light oil, kerosene, etc. are not highly volatile, they are not recommended. If it is obliged to use them, dry them completely.
4) If the mating parts are made of thermosetting resin, treat them with LOQUICK PRIMER after degreasing them.

2. Air drying

1) Wait until the cleaning fluid dries out.
2) If the parts are treated with LOQUICK PRIMER, do not wipe them but dry them in air for 5 - 10 minutes. (If LOCTITE is used before LOQUICK PRIMER dries out, its effect is lowered.)

3. Applying LOCTITE

Apply LOCTITE to either or both of the threads or the shaft and hole to be fitted by amount to fill the clearance between them by one of the following methods.

- Applying directly from LOCTITE container nozzle
- Dipping (For threads. Use receiving pan.)
- Tumbling
- Brushing (For shaft and hole. Use receiving pan.)
- Sponge
- Automatic applier

Do not mix metallic foreign matter in LOCTITE or return LOCTITE used in a pan to the container.

4. Assembly

After applying LOCTITE, tighten the screw or fit the shaft to the hole as usual. (When using LOCTITE for structures or LOCTITE of instant glue type, press the mating parts lightly (about 49 kPa {0.5 kgf/cm^2}).

Removal of parts

When screws and shafts are secured with LOCTITE, they usually can be removed with common tools such as spanners, wrenches, pulley pullers, etc. If LOCTITE is so strong that a part may be broken when it is removed, heat it (to 200 – 250°C) with a soldering iron, gas torch, etc., and you can remove it easily. It is generally difficult to dissolve LOCTITE in chemical solutions.

When assembling again

1) If a LOCTITE film on threads is broken, it is left as white powder on the threads. In this case, you can apply LOCTITE again to the threads without removing the white powder.
2) If shafts or flanges secured with LOCTITE are disconnected, LOCTITE remaining on them may need to be removed to maintain dimensional accuracy. You can remove the remaining LOCTITE easily, however, with a wire brush, etc.
3) If plates secured with LOCTITE need to be assembled again after they are separated, be sure to remove all the hardened LOCTITE and roughen the mating surfaces with sandpaper.

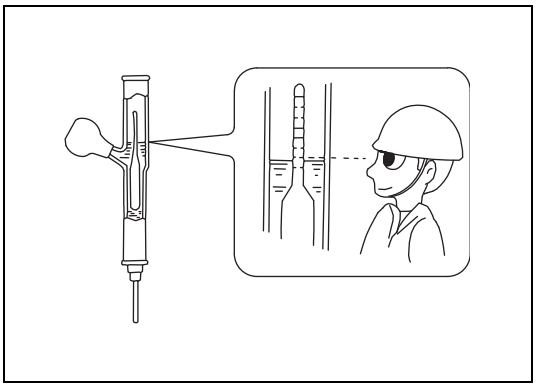
BATTERY

Check of Battery Solution

Check the battery electrolyte level. If battery electrolyte is below the standard level, refill distilled water or purified water.

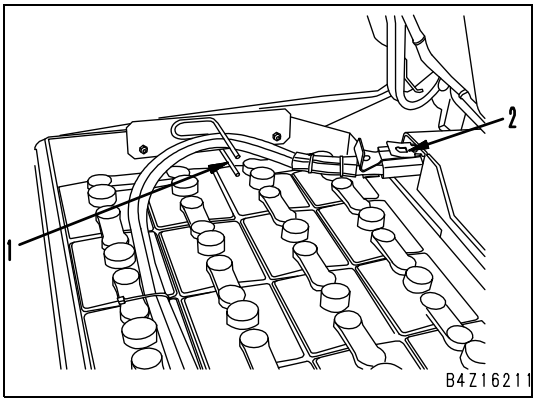
★ For information about inspecting and refilling of battery electrolyte, see “Operation & Maintenance Manual” attached to the battery.

Check of specific gravity of battery electrolyte



As the specific gravity of battery electrolyte changes, along with the temperature, read the specific gravity and electrolyte temperature and convert it to the value equivalent at 20°C [68°F], using the conversion table.

Check of battery structure



Confirm bracket (1) and stay (2) are installed on the battery. (The fire prevention/retaining plug system)

1. Bracket (3BA-55-71260)

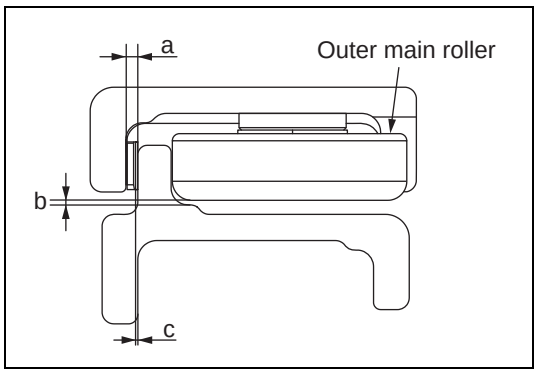
2. Stay (3BA-08-73130)

★ Bracket (1) and stay (2) are sent with the vehicle.

MAST (2.0 TON VEHICLE)

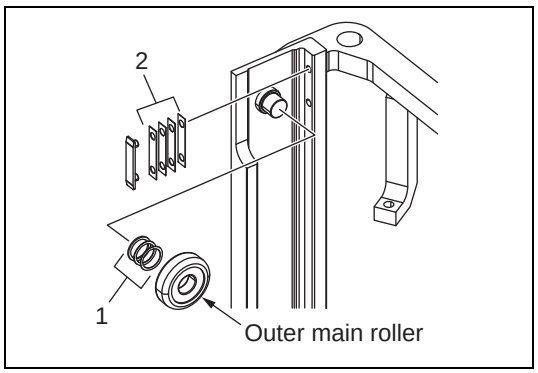
Roller Choice and Shim Adjustment

Outer Main Roller



1. Choice of Roller Size

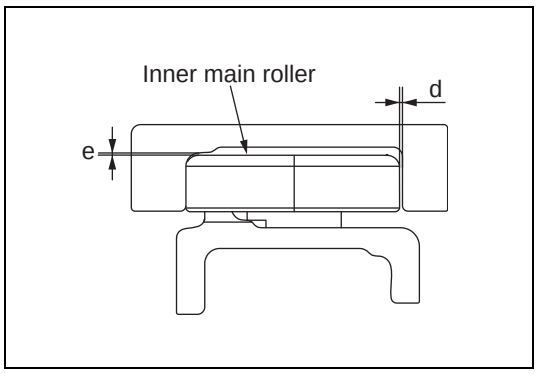
Choose the roller size (NS, NM) so that the clearances "**a**" at the left and right sides are equal.



2. Shim Adjustment

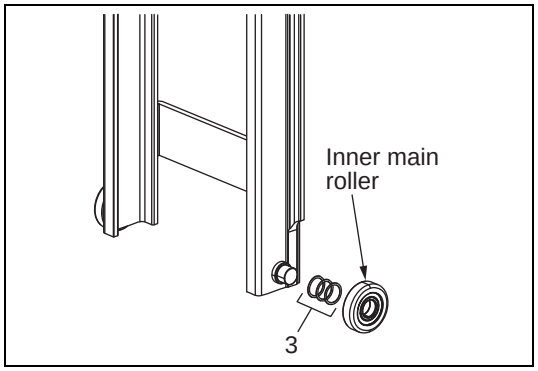
Insert the shims (1) with identical thickness at the right and left sides so that b = 0 – 0.3 mm [0 – 0.012 in] is achieved.
Insert the shim (2) so that c = 0.1 – 0.4 mm [0.004 – 0.016 in] is achieved all along the rail when pushing the roller to the rail. (The target is 0.1 mm [0.004 in].)

Inner Main Roller



1. Choice of Roller Size

Choose the roller size (S, M, L) so that d = 0.2 – 0.7 mm [0.008 – 0.028 in] is achieved.



2. Shim Adjustment

Adjust by inserting the shim (**3**) so that e = 0 – 0.5 mm [0 – 0.020 in] (when lifted up to the maximum) is achieved.

UNIT MASS (4-WHEEL VEHICLE)

Unit: kg [lb]

Unit \ Model	FB15U-12 FB15FU-12	FB18U-12 FB18FU-12	FB20U-12 FB20AFU-12	Remark
Drive Axle (Total)	165 [363.8]	165 [363.8]	165 [363.8]	
Drive Motor	40 [88.2]	40 [88.2]	40 [88.2]	
Transfer	125 [275.6]	125 [275.6]	125 [275.6]	
Pump Motor	40 [88.2]	40 [88.2]	40 [88.2]	
Rear Axle	90 [198.4]	90 [198.4]	90 [198.4]	
Front Wheel	20 [44.1]	20 [44.1]	40 [88.2]	
Rear Wheel	15 [33.1]	15 [33.1]	25 [55.1]	
Head Guard	85 [187.4]	85 [187.4]	85 [187.4]	
Counterweight	790 [1741.6]	990 [2182.6]	1270 [2799.8]	
Mast (3 m, inner and outer masts only)	300 [661.4]	300 [661.4]	365 [804.7]	
Lift Cylinder (For 3 m mast)	26 [57.3]	26 [57.3]	25 [55.1]	
Tilt Cylinder	17 [37.5]	17 [37.5]	17 [37.5]	
Finger Bar	75 [165.3]	75 [165.3]	85 [187.4]	
Fork	75 [165.3]	75 [165.3]	85 [187.4]	
Backrest	20 [44.1]	20 [44.1]	20 [44.1]	
Hydraulic Pump	5 [11.0]	5 [11.0]	5 [11.0]	
Tank and Grease	30 [66.1]	30 [66.1]	30 [66.1]	
Control Valve + Lever	20 [44.1]	20 [44.1]	20 [44.1]	
Steering Gear Box	20 [44.1]	20 [44.1]	20 [44.1]	Column included

★ The values show the standard specification.

Battery

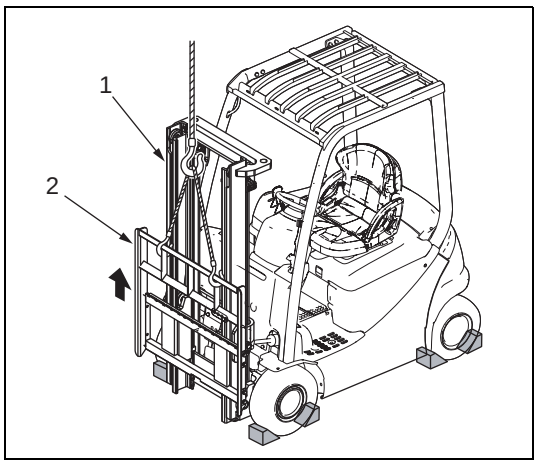
Model	Capacity Max. (Ah)	Mass (kg)	Voltage
FB15U-12, FB15FU-12, FB18U-12, FB18FU-12	600	935 [2061.3]	48 V
FB20U-12, FB20AFU-12	600	935 [2061.3]	

★ Confirm the battery capacity by reading the manufacturer plate on the front of battery case.

LIFT CYLINDER

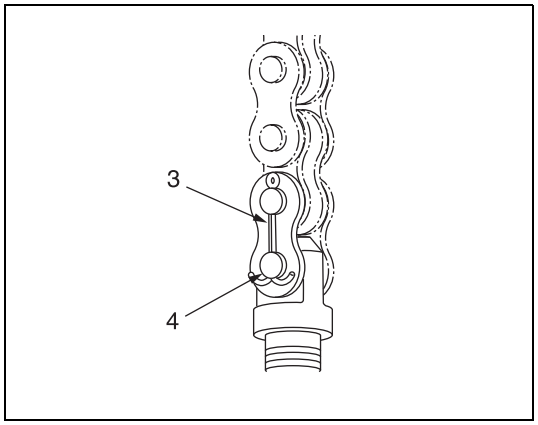
Removal

The removal of lift cylinder at one side is explained as an example.

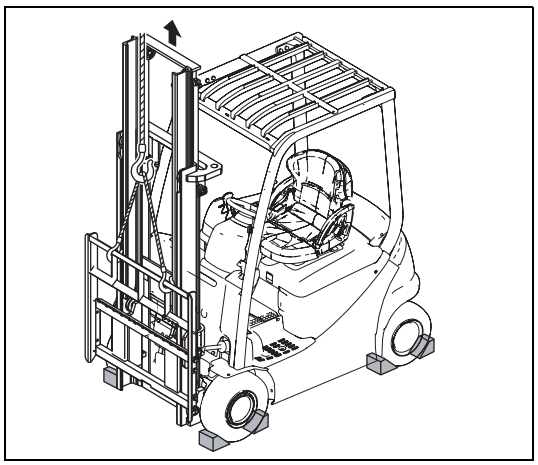


1. Erect the mast (**1**) vertically and place the wheel stoppers at the front and rear wheels.

2. Lift up the finger bar with the crane by 300 mm [11.8 in].



3. Remove the cotter pin (**3**) and pull out the pin (**4**). Then, separate the chain and remove the chain from the chain roller.

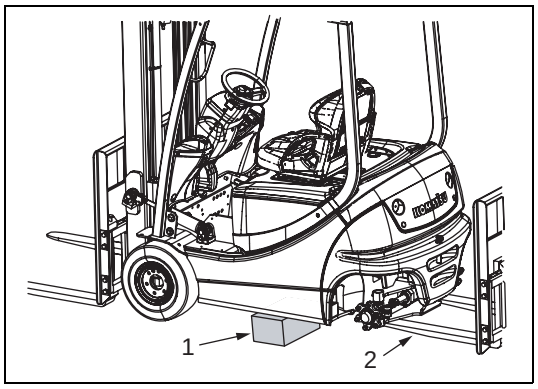


4. By operating the lift lever, lift up the mast.

★ When performing the traveling and cargo operation, be seated correctly on the operator's seat.
Unless an operator is correctly seated on the operator's seat or is out of the seat, the traveling and cargo operation cannot be performed.

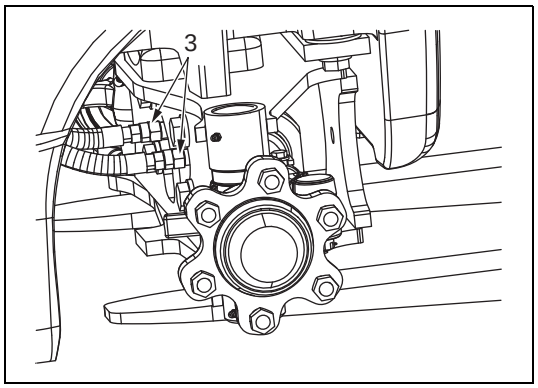
REAR AXLE

Removal

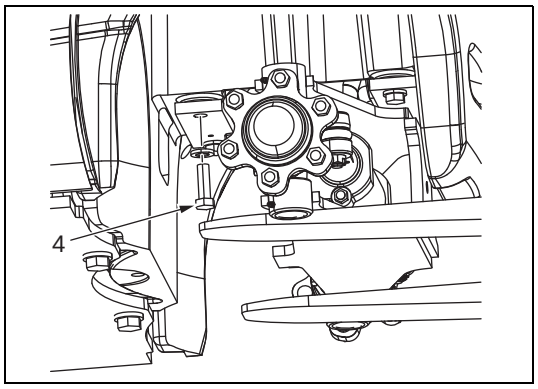


1. Lift up the lower side of counterweight rear with the crane and place the wooden blocks (1) under the right and left frames.

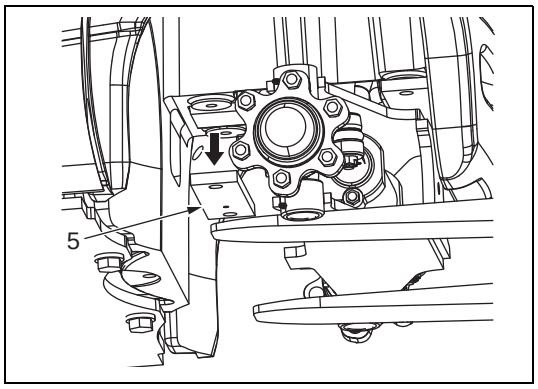
2. Place the fork (**2**) (Something movable up and down) under rear axle.



3. Remove the power steering piping (**3**).



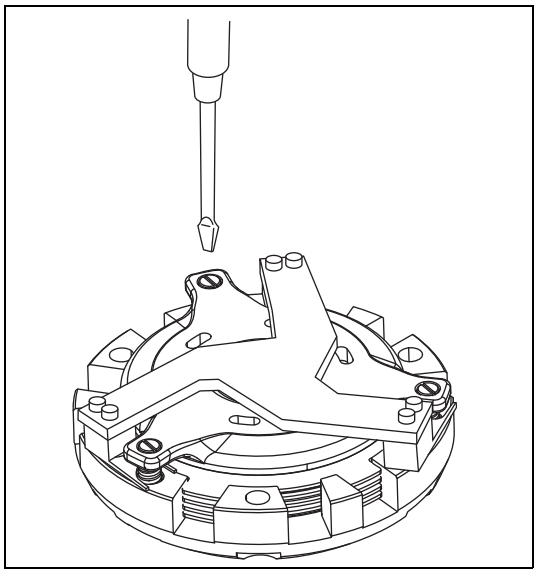
4. Remove four plate fixing bolts (**4**).



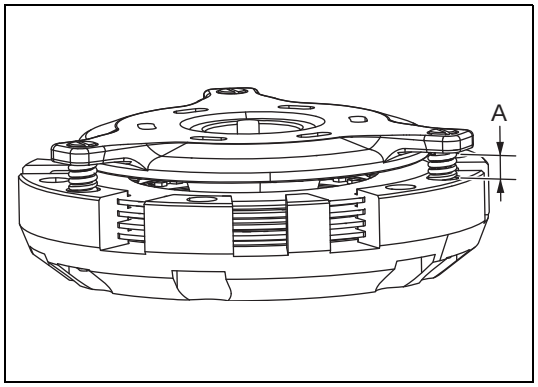
5. Remove two plates (**5**).

Judging Standard Unit: mm [in]

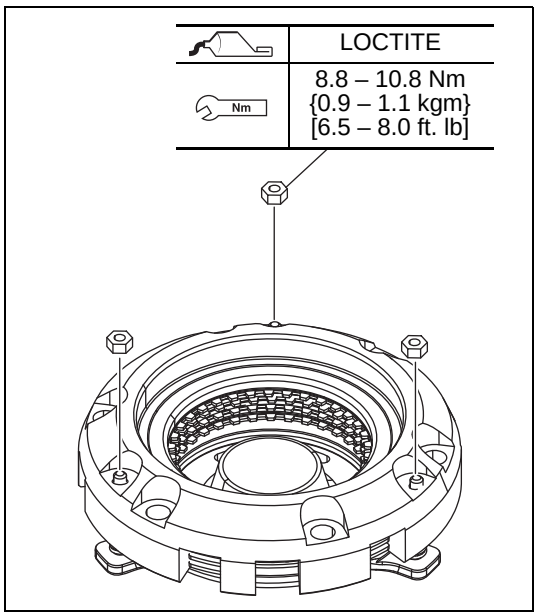
Mark	Part	Check Item	Criteria		Remedy
			Standard Dimension	Limit allowed	
A	Brake (In drive axle)	Diameter of piston shaft	19.96 – 19.98 [0.786 – 0.787]	19.9 [0.783]	Replacing parts
B		Inner diameter of piston shaft sliding part of cover	20 – 20.033 [0.787 – 0.789]	20.1 [0.791]	
C		Inner diameter of piston sliding part	35 – 35.039 [1.378 – 1.379]	35.1 [1.382]	
D		Outer diameter of sliding part of cover and piston	34.950 – 34.975 [1.376 – 1.377]	34.9 [1.374]	
E		Thickness of wet type disc	2.32 – 2.47 [0.091 – 0.097]	2.1 [0.083]	
F		Thickness of plate *	1.7 – 1.8 [0.067 – 0.071]	–	
G		Free length of spring	29.5 – 30.5 [1.16 – 1.20]	28 [1.10]	
H	Drive Axle	Thrust washer **a**	0.95 – 1.05 [0.037 – 0.041]	0.85 [0.033]	
I		Thrust washer **b**	2.23 – 2.37 [0.088 – 0.093]	2.13 [0.084]	
J		O-ring, seals	–	–	Replace with a new one at disassembly/assembly.



5. Tighten fully the bolts with the flat blade screwdriver and turn them back by 1/2 turns.

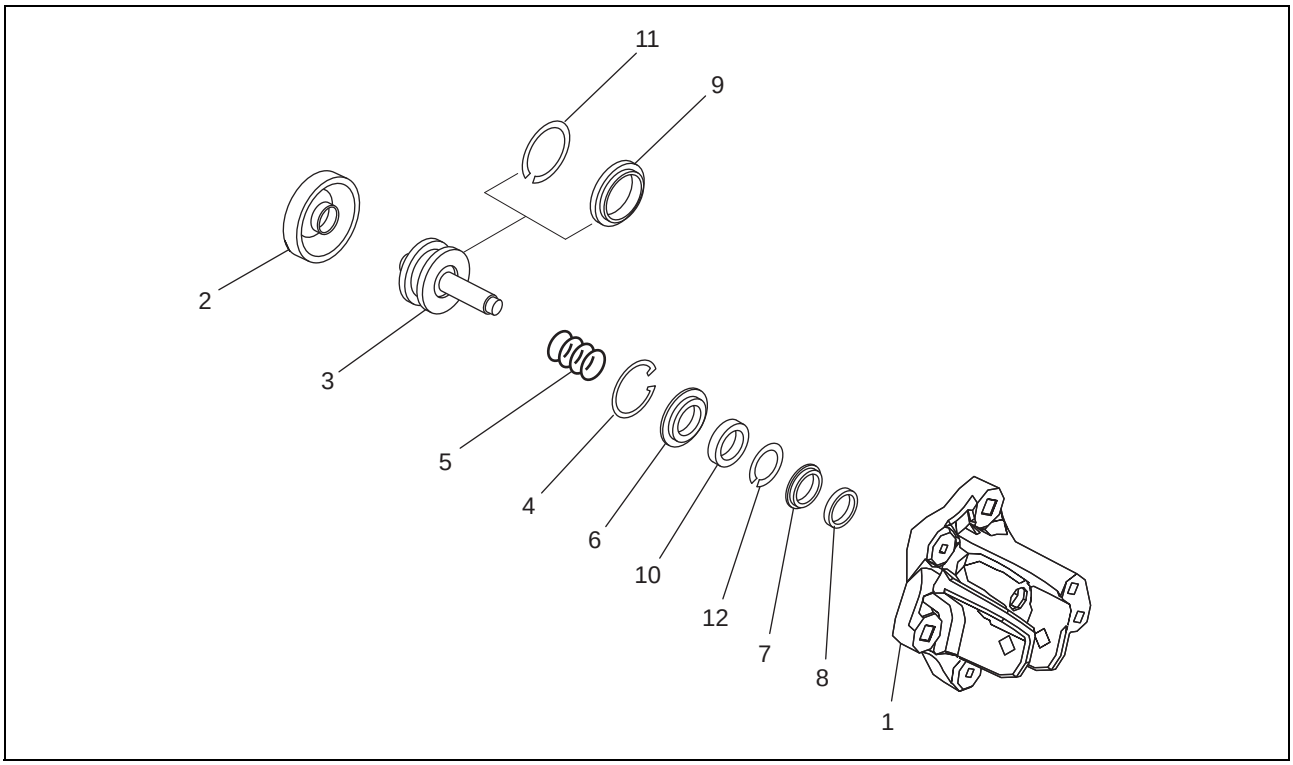


6. Remove the special jig and confirm that the gap **A** is 6 ± 0.3 mm (at three locations).



7. Apply LOCTITE (#271) to the screwed portions and tighten the nuts with specific torque.

BRAKE WHEEL CYLINDER



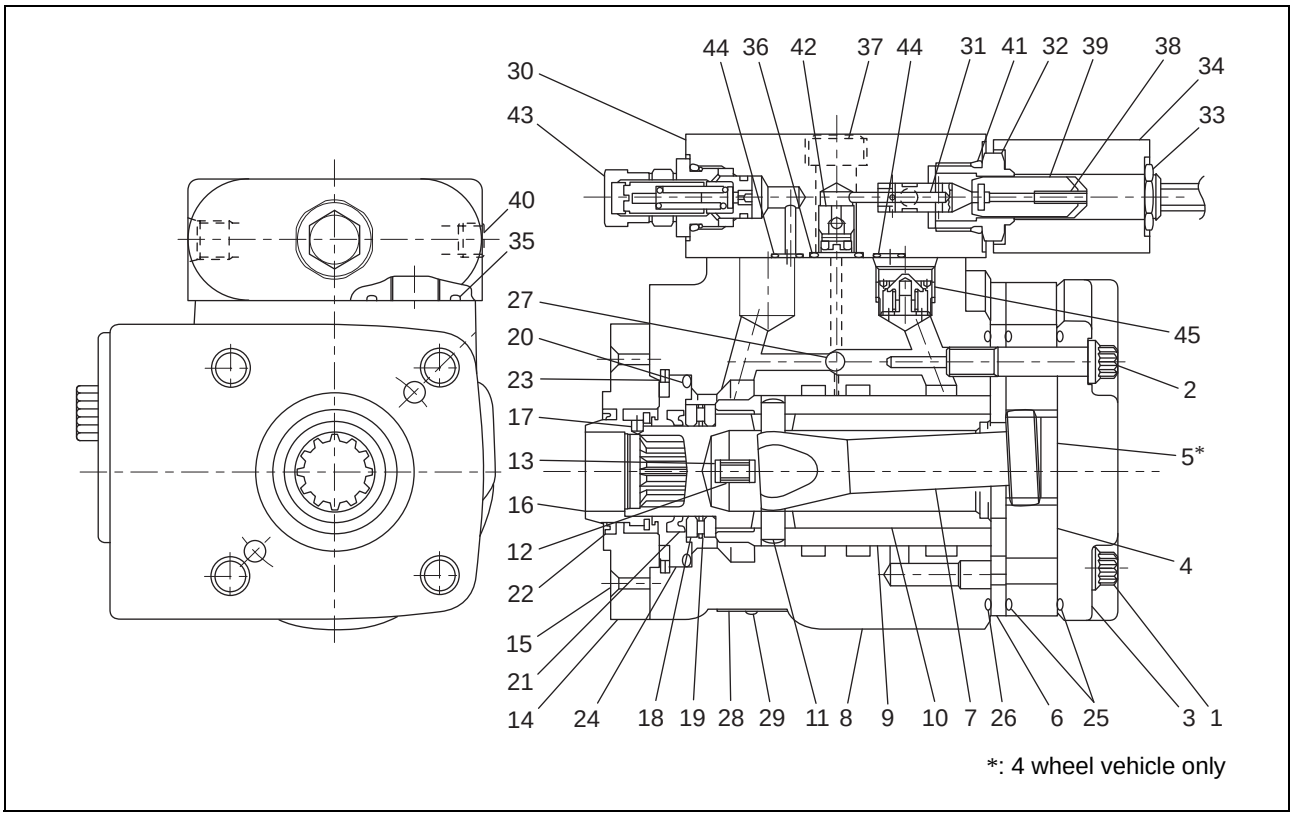
1.	Cylinder	5.	Spring	9.	Cup
2.	Boot	6.	Holder A	10.	Cup
3.	Piston	7.	Holder B	11.	Backup Ring
4.	Snap Ring	8.	Dust Seal	12.	Backup Ring

Judging Standard

Unit: mm [in]

No.	Check Item	Standard Value	Limit allowed	Remedy
1	Clearance between cylinder and piston	Inner diameter of cylinder: ϕ 40.0 – 40.062 [1.575 – 1.577] Outer diameter of piston: ϕ 39.911 – 39.950 [1.571 – 1.573] Clearance: 0.05 – 0.151 [0.002 - 0.006]	0.2 [0.0079] at the maximum	Replace individual part or cylinder assembly.
2	Clearance between holder and piston rod part	Inner diameter of holder A/B: ϕ 12.0 – 12.043 [0.472 – 0.474] Outer diameter of rod: ϕ 11.957 – 11.984 [0.471 – 0.472] Clearance: 0.016 – 0.086 [0.001 – 0.006]	0.15 [0.006] at the maximum	
3	Interference of cup (large diameter)	About 1.7 – 1.8 [0.067 – 0.071]	0.75 [0.030]	
4	Interference of cup (small diameter)	About 1.0 – 1.2 [0.039 – 0.047]	0.40 [0.016]	
5	Free length of spring	25.8 [1.016] ± 3 % (25.03 – 26.57 [0.985 – 1.046])	22.5 [0.886]	

ORBITROL

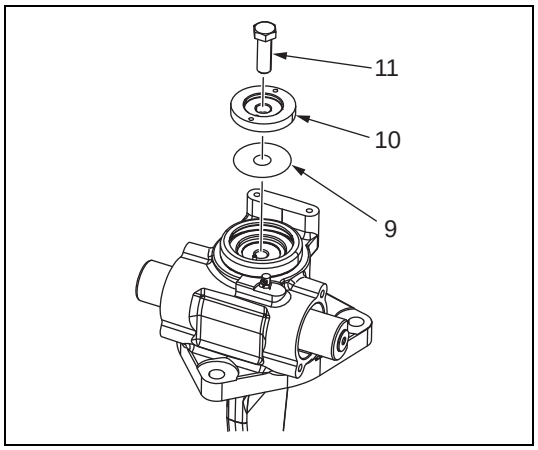


No.	Part Name
1	Screw
2	Retainer Screw Assembly
3	Roll End Cap
4	Gerotor
5	Spacer
6	Spacer Plate
7	Drive
8	Housing
9	Sleeve
10	Spool
11	Pin
12	Centering Spring
13	Flat Spring
14	Handle Angle Sensor
15	Cross-Recessed Flat Head Screw

No.	Part Name
16	Rotor
17	Hexagon Socket Head Stopper Screw (Tip of stick)
18	Race Bearing
19	Thrust Needle
20	O-ring
21	Oil Seal (Y Packing)
22	Dust Seal
23	Retaining Ring
24	Seal Ground Bushing
25	O-ring
26	O-ring
27	Ball
28	Name Plate
29	Rivet
30	Valve Block

No.	Part Name
31	Spool
32	Tube Assembly
33	Nut
34	Coil with connector
35	O-ring
36	O-ring
37	Hexagon Socket Head Bolt
38	Spring
39	Core
40	Plug with hexagon hole
41	O-ring
42	Check Valve Assembly
43	Relief Valve Cartridge
44	O-ring
45	Check Valve Assembly

Procedure of Shim Adjustment



1. Tighten tentatively the plate (**10**) with the center bolt (**11**) without shim.

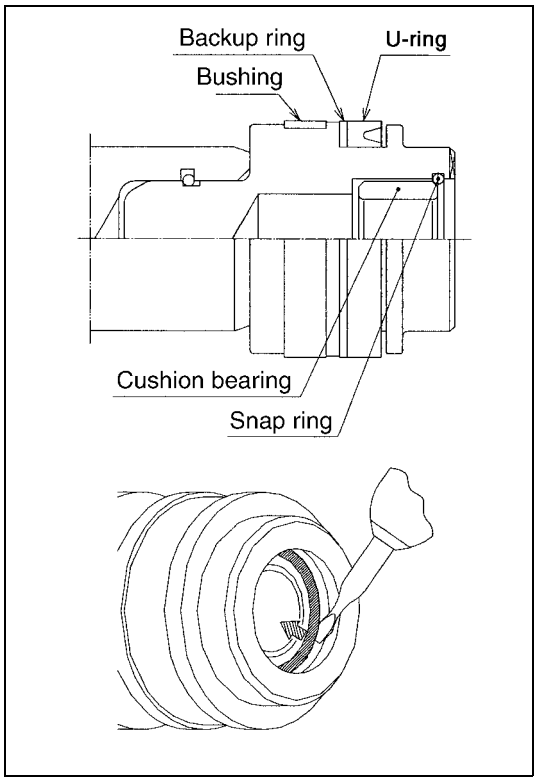
Nm	15 Nm {1.53 kgm} [11.1 ft. lb]

2. Pull out the center bolt (**11**) and remove the plate (**10**).
Measure the height from the end face of pinion shaft to the end face of bearing inner race by the unit of 5/100.
(Dimension = α)

3. Calculate the clearance S.
S = α – 4.8 (mm)

4. According to the table below, determine the thickness and quantity of shim. Then, install the shims.

Clearance S (mm)	Thickness and quantity of shim		
	t = 0.2 (mm)	t = 0.3 (mm)	t = 1.0 (mm)
1.04 – 1.13			1
1.14 – 1.23	1	3	
1.24 – 1.33	1		1
1.34 – 1.43		1	1
1.44 – 1.53	2		1
1.54 – 1.63	1	1	1
1.64 – 1.73		2	1
1.74 – 1.83	2	1	1
1.84 – 1.93	1	2	1
1.94 – 2.03		3	1
2.04 – 2.13			2
2.14 – 2.23	1	3	1
2.24 – 2.33	1		2
2.34 – 2.43		1	2
2.44 – 2.53	2		2

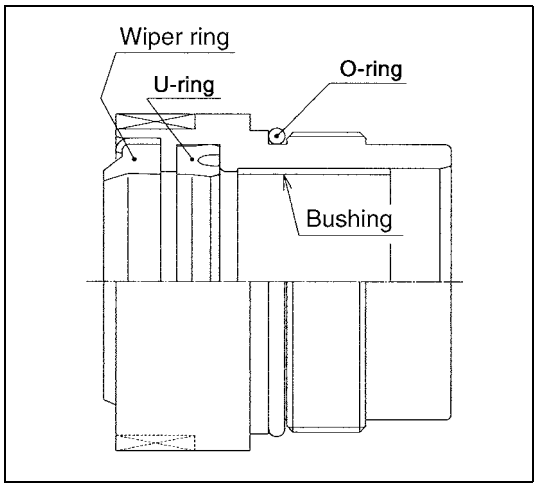


6. Disassembly of Piston Block

Remove the U-ring (**8**), backup ring (**9**), bushing (**10**) and cushion bearing (**11**).

★ Do not disassemble the piston rod and piston.

1) Draw out the U-ring (**8**) and backup ring (**9**) with knife or screwdriver.
2) Remove the bushing (**10**) with the screwdriver while widening the joint.
   ★ Do not re-use the seal removed.
3) Remove the snap ring (**12**), and draw out the cushion bearing (**11**). Draw the snap ring (**12**) out of the groove with the tool of sharp tip.



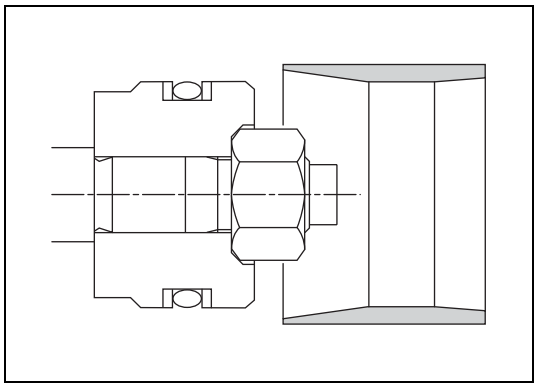
7. Disassembly of seal in cylinder head (3) block

Remove the U-ring (**5**), wiper ring (**6**) and O-ring (**7**).

1) Remove the U-ring (**5**) with the knife or screwdriver.
2) As the wiper ring is press-fitted, stick the screwdriver in the rubber from the bushing side and pull out by hitting.
3) In the same manner, remove the O-ring (**7**) and U-ring (**5**) with the knife or screwdriver.
   ★ Do not re-use the seal removed.

8. Scrubbing and store

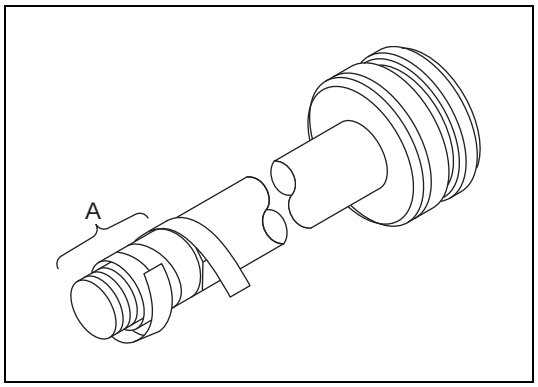
1) After scrubbing the removed parts with kerosene, apply the hydraulic oil to them and store them, being covered.
2) If the disassembled parts are left as are, due to rust and dust, they may not function well after assembled.



3. Assembly of piston block seal

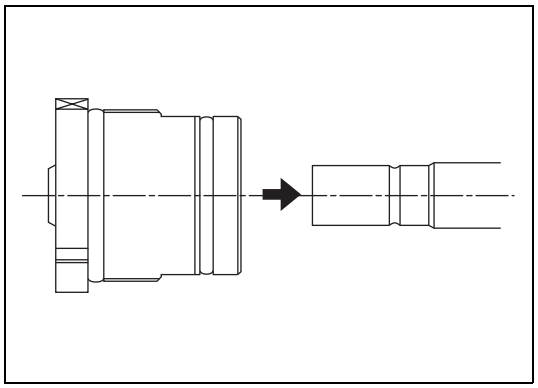
1) Install the O-ring in the installation groove with caution not to twist the O-ring.
2) Install the backup ring in the installation groove with the knife.
   - ★ To make it easier to install the O-ring, warm it up to 80°C [176°F].
   - ★ When the backup spring is installed, it is stretched. Therefore, after installed, correct it with the correction jig.

Confirm that the correction jig and the tip of knife are flawless, clean and smooth.

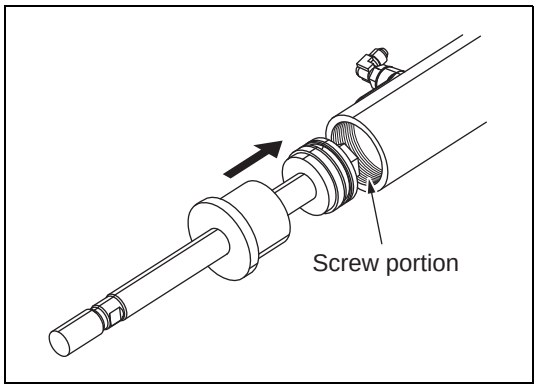


4. Installation of cylinder head

1) Wind the tape around the screwed portion of piston rod.



2) Insert the cylinder head with caution to prevent the wiper ring of cylinder head and lip portion of U-ring from being scratched by the screwed portion of piston rod.
   - ★ Fix the tube with the vice horizontally or vertically.

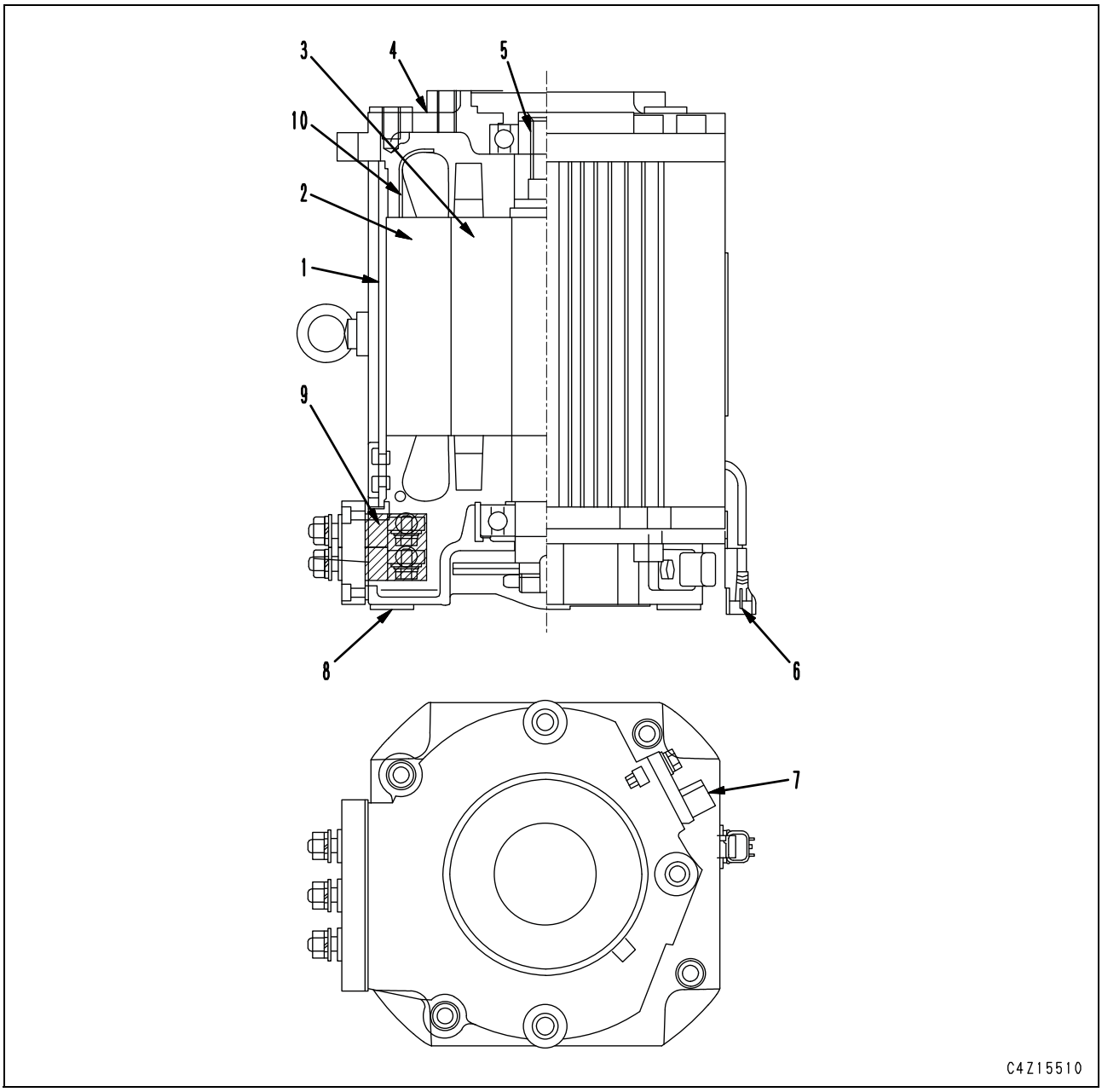


3) Insert the piston rod in the tube.

When the piston block and cylinder block are inserted in the tube, insert them with caution for seals not to be damaged by the inner screw portion of tube.

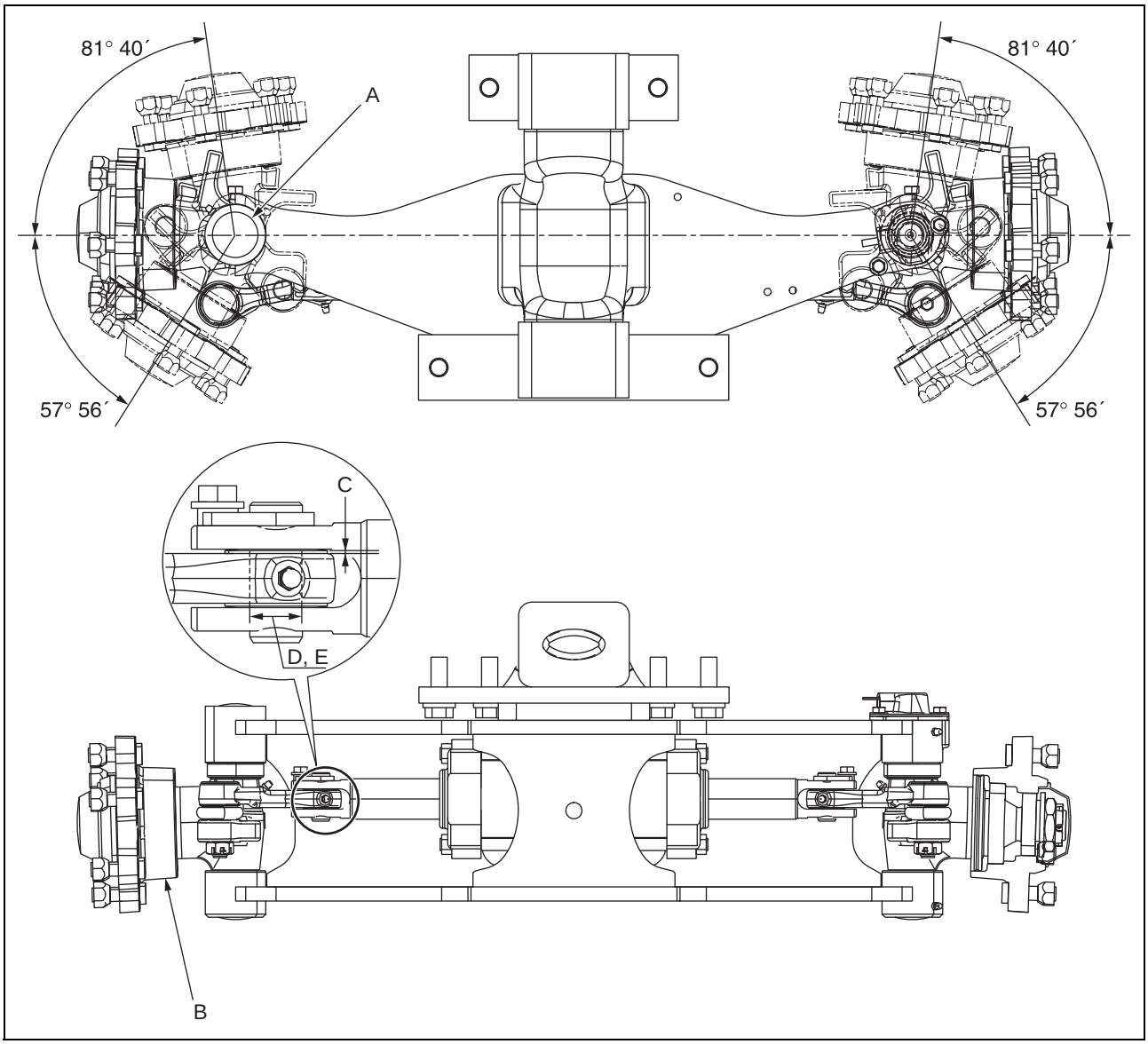
PUMP MOTOR

Name of each block



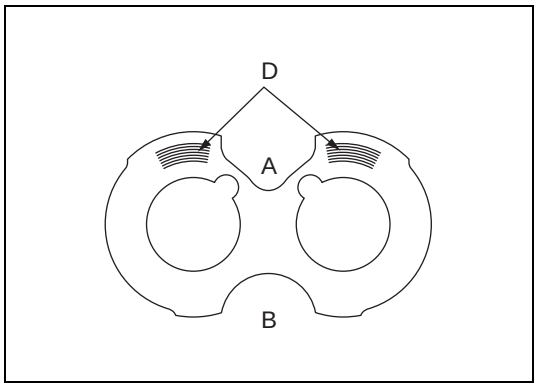
1. Frame
2. Stator
3. Rotor
4. Bracket (Connection side)
5. Shaft
6. Temperature Sensor
7. Speed Sensor
8. Bracket (Opposite to the connection side)
9. Tube
10. NOMEX Paper

REAR AXLE



Judging Standard Unit: mm [in]

Mark	Check Item	Criteria		Remedy
		Standard Dimension	Limit allowed	
A	Diameter of king pin	28 [1.10]	27.8 [1.09]	Replace
B	Rattle of knuckle at the top and bottom	–	0.2 [0.008]	Shim Adjustment
C	Thickness of tie-rod (cylinder side)	2 [0.079]	–	Replace
D	Diameter of tie-rod hole	18 [0.71]	17.8 [0.70]	
E	Outer diameter of cylinder pin	18 [0.71]	17.8 [0.70]	
–	Mounting rubber of center pin	Crack, fatigue		
–	Rear axle, hub, knuckle, bearing	Crack, damage, peeling, burn, rotation defect, foreign noise		



5. Side Plate

If the contact (**D**) of sliding surface (copper alloy side) of side plate is strong at the suction side (**A**) and is very weak at the high pressure side, it is normal.

- If many scratches detected by nail-scratching in the circumference direction are found, replace it.
- If the thickness of side plate is greater than 1.95 mm [0.077 in] (≦ 1.95 mm [0.077 in]), replace it.

The gasket, oil seal and snap ring should be replaced with new ones when disassembled.

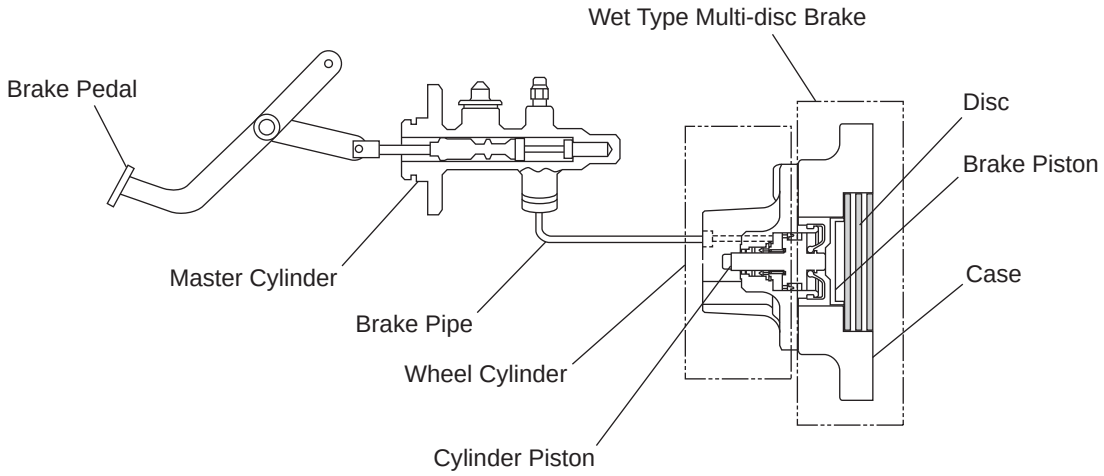
Overview of Function

Overview

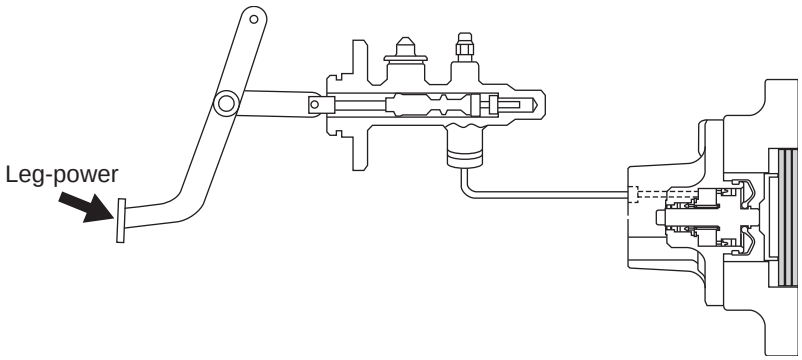
This brake equipment converts the fluid pressure generated by the operation of master cylinder in to a pushing force for braking. Besides, the function, which generates the pushing force mechanically by operating the parking lever, is built in the brake equipment.

Operation of Fluid Pressure

When the brake is open



When the brake is applied



1. When stepping on the brake pedal, the brake fluid is transferred from the master cylinder to the power cylinder.

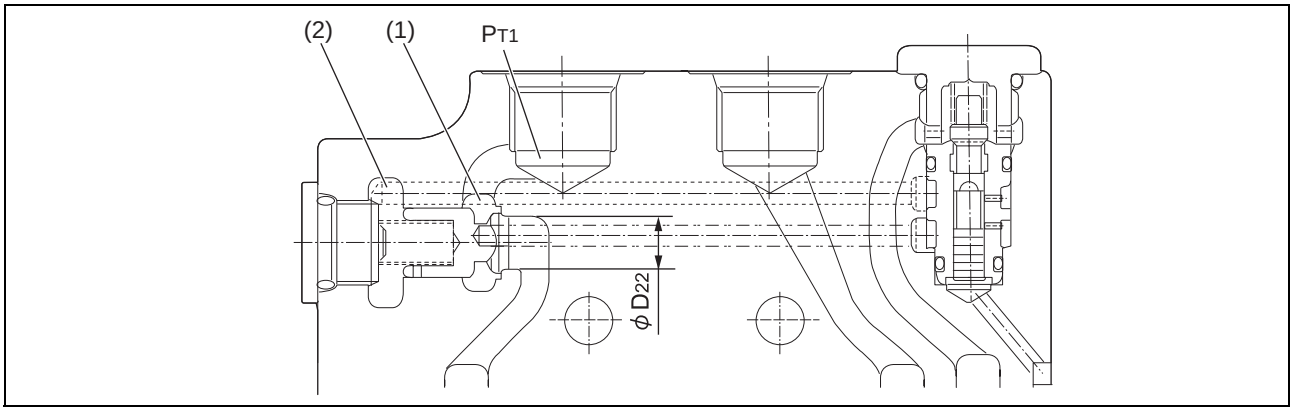
2. The fluid pressure is generated in the brake fluid that is transferred from the master cylinder. Then, the cylinder piston, that receives the fluid pressure, pushes the brake piston.

3. The brake piston pushed by the cylinder piston pushes the multi-disc, causing the friction of multi-disc simultaneously.
Eventually the braking effort is generated.

3) Operation of Tilt Lock Valve

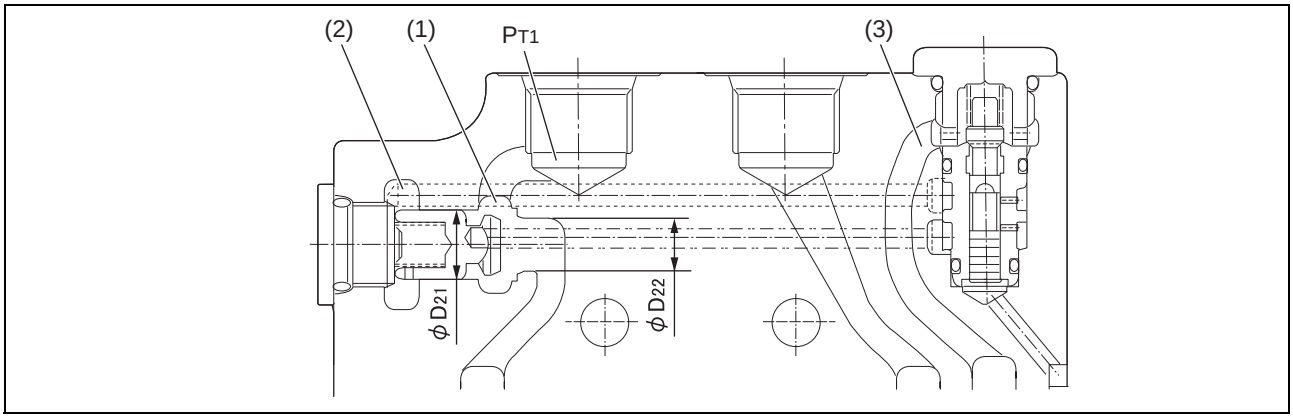
a) When in neutral

When in neutral, the pressure at (**1**) and (**2**) becomes identical (holding pressure) by the oil flowing through the throttle hole of lock valve plunger, the lock valve plunger is pushed to the sheet by the load pressure $\mathbf{P_{T1}}$ worked on $\phi\mathbf{D_{22}}$.



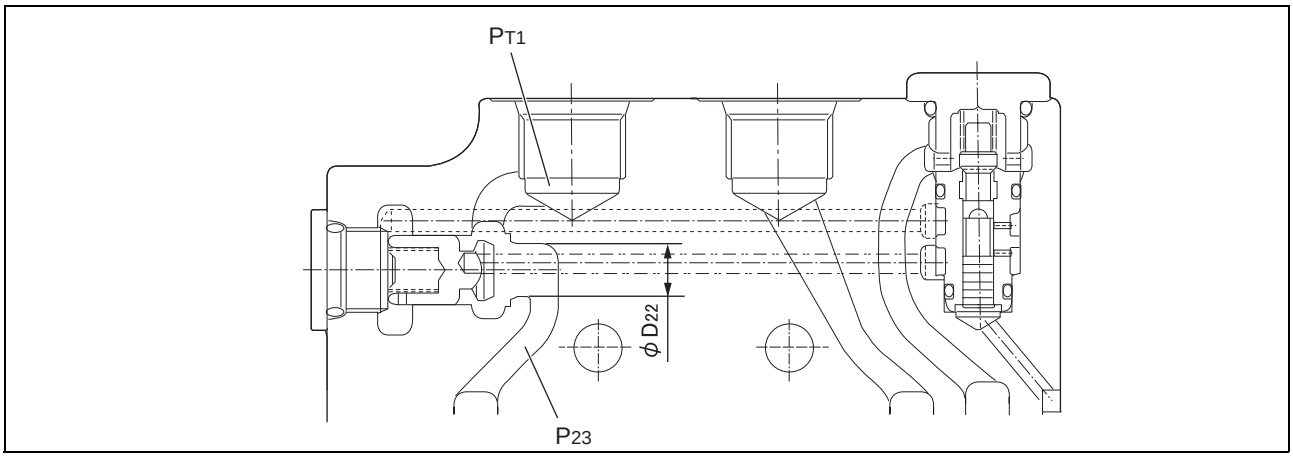
b) When forward-tilting

Due to the 2nd pressure increase of proportional pressure reducing valve, the lock valve pilot spool strokes, and (**2**) and tank path (**3**) are linked, being blocked by the (**1**). Therefore, the load pressure $\mathbf{P_L}$, which is worked by the differential-area of $\phi\mathbf{D_{22}}$ and $\phi\mathbf{D_{21}}$, pushes up the lock valve plunger.



c) When backward-tilting

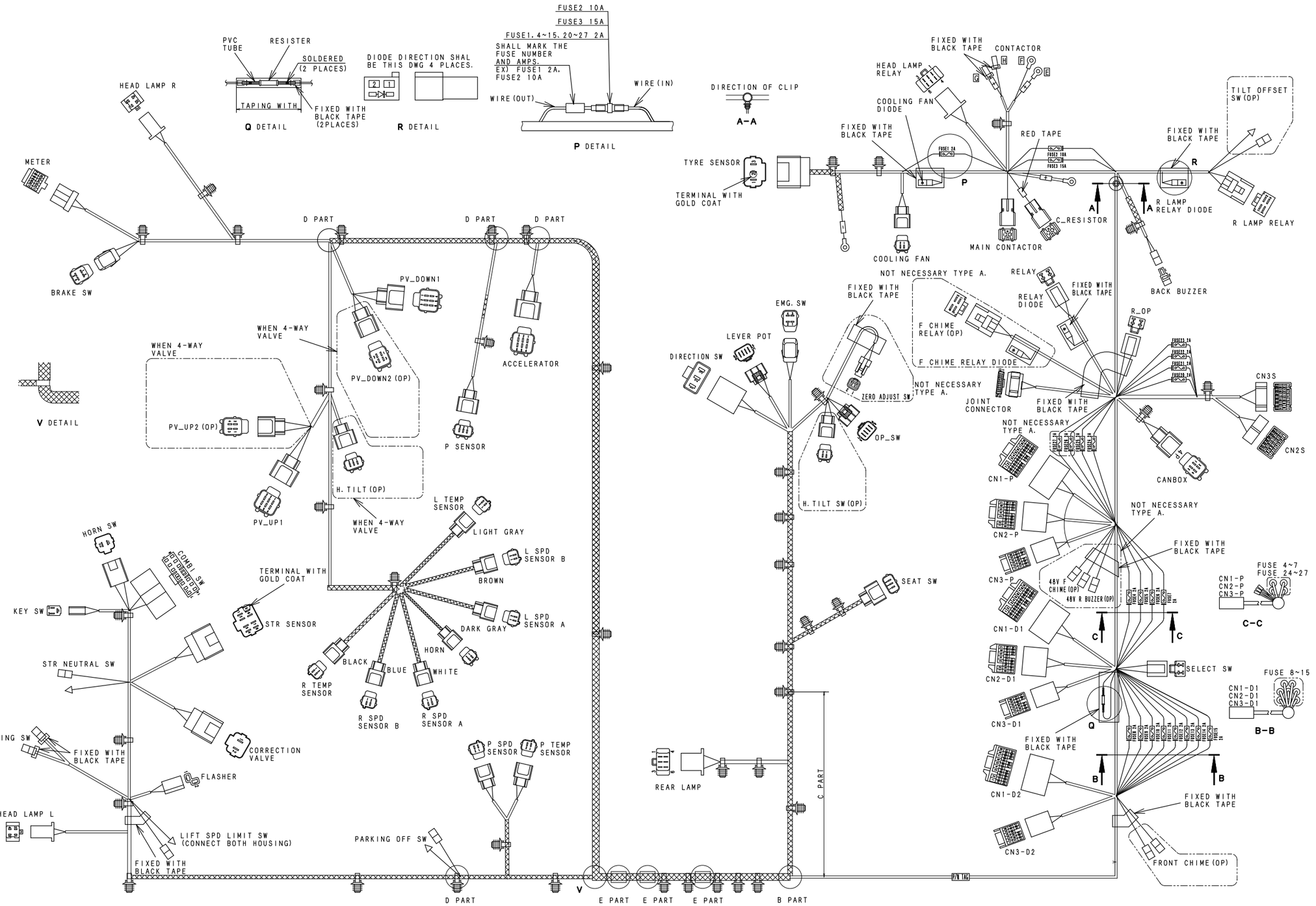
When the pump pressure increases and $\mathbf{P_P}$ (= $\mathbf{P_{23}}$) exceeds the load pressure $\mathbf{P_{T1}}$, the lock valve plunger opens.



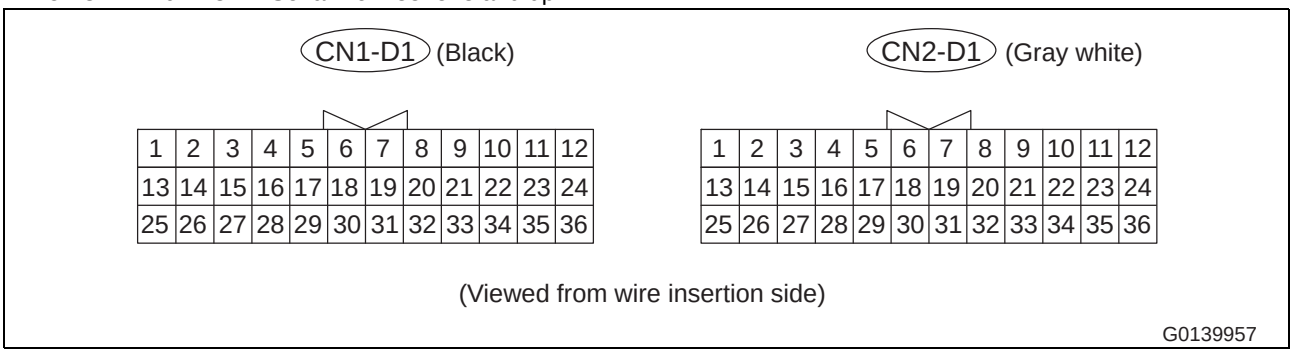
HARNESS LIST

FB15U – FB20AFU-12 Serial No. : 837898 to 857040
FB15MU - FB20MFU-12 Serial No. : 826828 to 832517

Main harness



FB15U - FB20AFU-12 Serial No. : 857041 and up
FB15MU - FB20MFU-12 Serial No. : 832518 and up



Connector No.	Terminal No.	Signal Name	Input/Output (Switch ON, Vehicle stopped, Reference Voltage)
CN1-D1	1	CAN_L1	
	2	—	
	3	CAN_H1	
	4	Model select SW2	
	5	High lifting SW	
	6	Backward-run SW	
	7	Forward-run SW	
	8	KEY SW	
	9	Overcurrent detection circuit input	
	10	DS 1 realy	
	11	Quick chargingu resistor (+)	
	12	Quick chargingu resistor (-)	
	13	CAN_L2	
	14	CAN2 (termination resistor)	
	15	CAN_H2	
	16	Seat (floor) SW	
	17	Parking Sw	
	18	Brake SW	
	19	Accelerator pedal IVS SW	
	20	Travel speed limit SW 2	
	21	Model select SW 1	
	22	Main contact coil (+)	
	23	—	
	24	Battery voltage	
	25	—	
	26	—	
	27	CAN(COM)	
	28	Accelerator pedal IVS GND	
	29	—	
	30	Model select SW3	
	31	Seat SW B	
	32	—	
	33	—	

4. Proportional Solenoid Valve Controller

(Viewed from wire insertion side)

Connector No.	Terminal No.	Signal Name	Input/Output (Switch ON, Vehicle stopped, Reference Voltage)
CN1S	1	Lift Sensor	
	2	Lift Lever	
	3	Tilt Lever	
	4	ATT1 Lever	
	5	ATT2 Lever	
	6	ATT3 Lever	
	7	SENS +5V	+5 V
	8	A GND	
	9	Reserve	
	10	Tilt Angle	
	11	A GND	
	12	Pump Motor COM	
	13	A GND	
	14	Tilt Offset	
	15	Tilt Shisei	
	16	Select 1	
	17	Select 2	
	18	—	
	19	GND	
	20	+48 V	+48 V (From Key Switch)
	21	CANBUS H1	
	22	CANBUS L1	
	23	CANBUS TMR	
	24	CANBUS H2	
	25	CANBUS L2	
	26	GND	

Meter Display Code: ALA-5229

Content of Detection

The tilt horizontal stops at the position before or after the completion position.

Symptom of vehicle

- The tilt horizontal stops at the position before or after the completion position.
  (The manual operation is possible.)

Cause of trouble

- Mechanical trouble.

Repair Procedure

1. It is not abnormal. But, if the symptom appears frequently, check and repair the mechanical cause that hinder the movement.

Remark

Condition of abnormal detection:
It is shifted from the horizontal position.

1. Always wrong same position stop:
Wrong adjustment of potentio.

2. Always stop position move:
Stick tilt lock valve or tilt spool at hydraulic control valve.

Note

It is not electrical failure.

ERR-5085: Abnormal communication between cargo handling controller and proportional solenoid valve controller (Pair to the proportional solenoid valve controller)

FB15U - FB20AFU-12 Serial No. : 857041 and up
FB15MU - FB20MFU-12 Serial No. : 832518 and up

Content of Trouble

- Cannot communicate with the cargo handling controller.

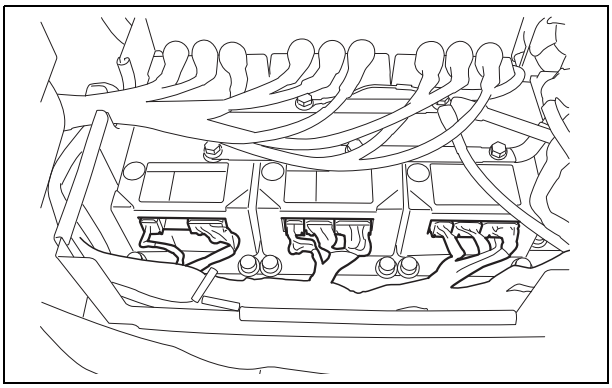
Symptom of vehicle

- Functions normally.

Repair Procedure

1. Check visually that the connectors and terminals of cargo handling controller and proportional solenoid valve controller are not disconnected or not loosened.

Judging: No disconnection of connector and no looseness of terminal.



OK: Go to step 2.

NG: After cleaning the connector with the contact refreshing agent, re-connect the connector.

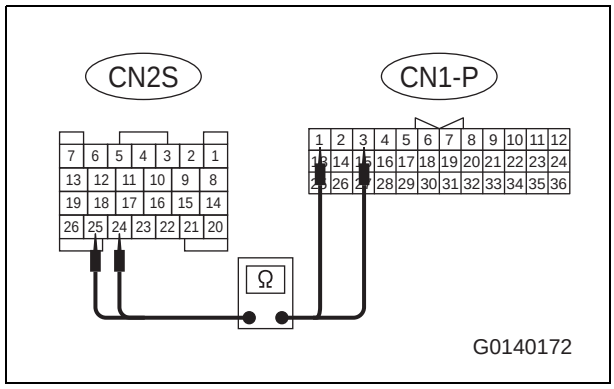
Quick Check

If connector of proportional controller is proper, proportional controller is defective.

2. Disconnect the harness from the harness controller and measure the resistance of harness between proportional solenoid valve controller and cargo handling controller.

Judging: Between CN2S terminal No.24 (green/white) and CN1-P terminal No.3 (green/white): 0 Ω

Between CN2S terminal No.25 (blue/white) and CN1-P terminal No.1 (blue/white): 0 Ω



OK: Go to step 3.

NG: Repair or replace the harness.

3. Replace the proportional solenoid valve controller and turn ON the key switch.

Judging: The trouble does not occur.

OK: The repair is finished.

NG: Replace the cargo handling controller.

How to reset

Turn OFF the key switch.

ERR-5218: Abnormal Lift Proportional Solenoid Valve Operation

Case 3: Solenoid valve power supply is short circuit.

Content of Trouble

- All operations are inoperable.
- When operating the lever, the error appears. (The pump motor rotates momentarily.)

Symptom of vehicle

- Shorted proportional solenoid valve coil
- Shorted drive circuit of proportional solenoid valve in the proportional solenoid valve controller

Repair Procedure

1. Measure the resistance at terminals of lift proportional solenoid valve (both of ascent and descent).

Judging: Between terminals No.1 and No. 4: 17 – 18 Ω

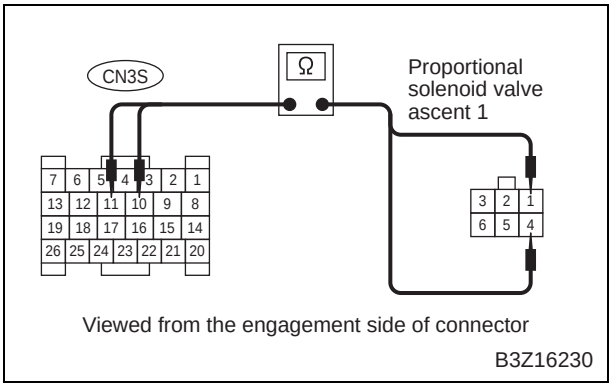
OK: Go to step 2.

NG: Replace the lift proportional solenoid valve.

2. Disconnect the harness from the controller and measure the resistance of harness between proportional solenoid valve controller and the proportional solenoid valve (ascent).

Judging: Between CN3S terminal No.11 (green/black) and terminal of proportional solenoid valve ascent 1 No.4 (green/black): 0 Ω

Between CN3S terminal No.10 (yellow/red) and terminal of proportional solenoid valve ascent 1 No.1 (yellow/red): 0 Ω
If resistance is infinity, check the fuse No.20.



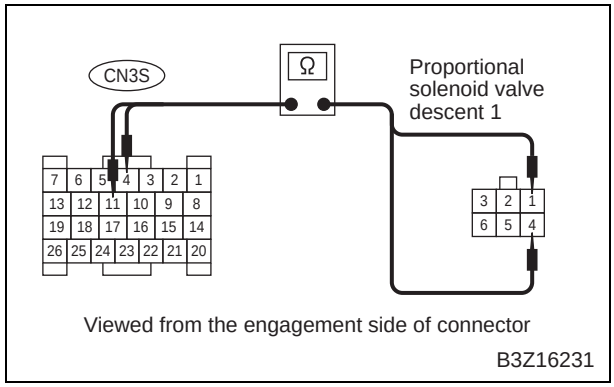
OK: Go to step 3.

NG: Repair or replace the harness.

3. Disconnect the harness from the controller and measure the resistance of harness between proportional solenoid valve controller and the lift proportional solenoid valve (descent).

Judging: CN3S terminal No.11 (green/black) – terminal of proportional solenoid valve descent 1 No.4 (green/black): 0 Ω

CN3S terminal No.4 (yellow) – terminal of proportional solenoid valve descent 1 No.1 (green/red): 0 Ω
If resistance is infinity, check the fuse No.21.



OK: Replace the proportional solenoid valve controller.

NG: Repair or replace the harness.

How to reset

Turn OFF the key switch.

ERR-5292: Abnormal Power Supply in Proportional Solenoid Valve Controller

(This error is less or more than 5 V of controller)

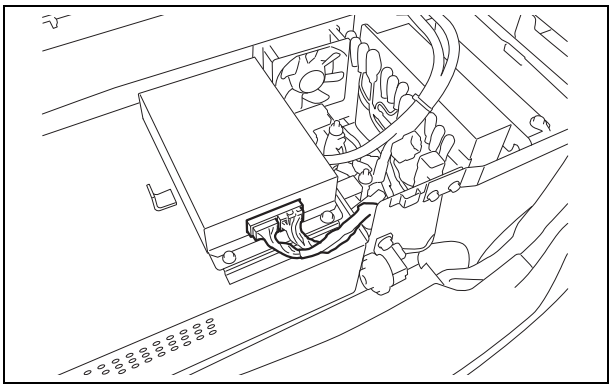
Content of Trouble

- All operations are inoperable.
- When turning ON the key switch, the abnormal code appears.

Repair Procedure

1. Check visually that the connectors and the terminals of connector of proportional solenoid valve controller are not disconnected or not loosened.

Judging: No disconnection of connector and no looseness of terminal.



OK: Go to step 2.

NG: Clean the connector with the contact restorer and re-connect the connector.

Quick Check

In case of 2-spool valve (Lift & Tilt)

If this error code will be displayed, error code 5206, 5207, 5211, 5212 (2-spool valve) will be displayed.

In case of 3-spool valve (Lift, Tilt, ATT1)

If this error code will be displayed, error code 5206, 5207, 5208, 5211, 5212, 5213 will be displayed.

Solution

Only replace new print card of proportional valve controller.

Note

Forklift truck showes only 5 error codes, PC shows 10 error codes.

So 4-spool, 5-spool valve may not show all error codes.

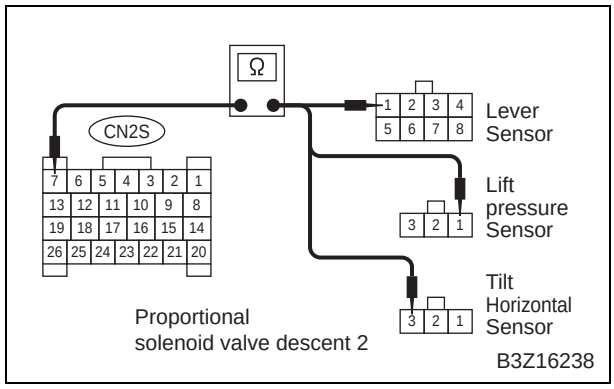
2. Disconnect the harnesses from the controller. Measure the resistance of harnesses between proportional solenoid valve controller and lift lever sensor, lift pressure sensor and tilt horizontal sensor respectively.

Judging:

Between CN2S terminal No.7 (green/white) and lever sensor terminal No.1 (green/white): 0 Ω

Between CN2S terminal No.7 (green/white) and lift pressure terminal No.1 (green/white): 0 Ω

Between CN2S terminal No.7 (green/white) and tilt horizontal terminal No.3 (green/white): 0 Ω



OK: Replace the proportional solenoid valve controller.

NG: Repair or replace the harness.

ERR18-8110: Abnormal CAN Communication Process of Travel (L) Controller

Not available. Too long data received.

FB15U - FB20AFU-12 Serial No. : 837898 to 857040
FB15MU - FB20MFU-12 Serial No. : 826828 to 832517

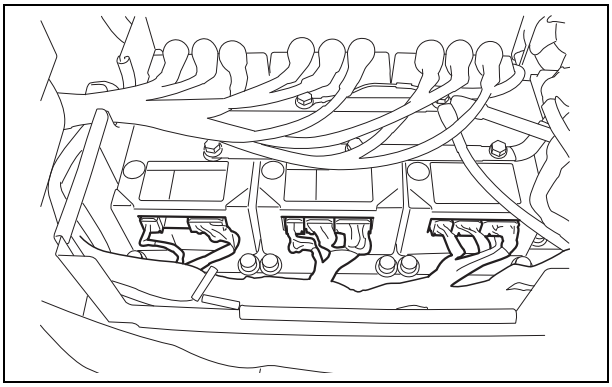
Content of Trouble

- Poor contact or short circuit of CAN communication harness

Repair Procedure

1. Check visually that the connectors and terminals of travel (L) controller are not disconnected or not loosened.

Judging: No disconnection of connector and no looseness of terminal.

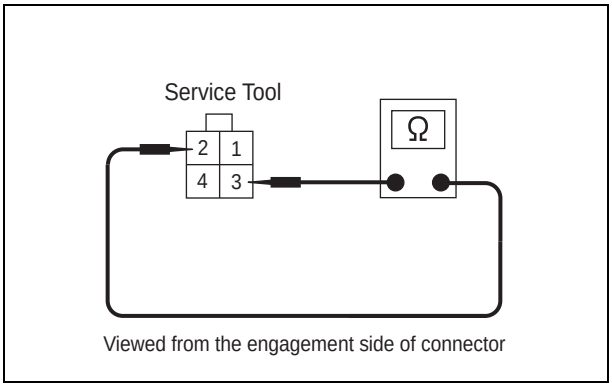


OK: Go to step 2.

NG: Clean the connector with the contact restorer and re-connect the connector.

2. In the state that connectors of all equipments are connected, measure the resistance at the terminals of service tool.

Judging: Between service tool terminal No.2 (green) and service tool terminal No.3 (blue): 40 – 70 Ω

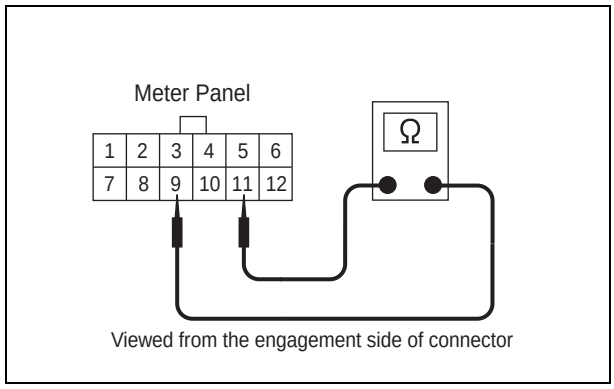


OK: Perform step 3 and later. Perform the short circuit test of CAN communication line of harness.

NG: Repair or replace the harness.

3. Disconnect the harness and measure the resistance of CAN communication line at the meter panel side.

Judging: Between meter panel terminal No.11 (green) and meter panel terminal No.9 (blue): 20 kΩ – 100 kΩ

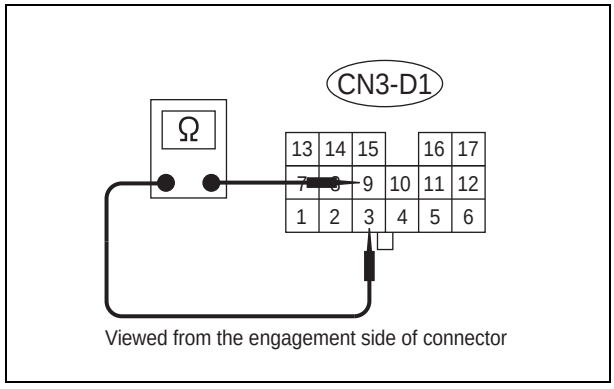


OK: Go to step 4.

NG: Repair or replace the equipment.

4. Disconnect the harness and measure the resistance of CAN communication line at the travel (R) controller side.

Judging: Between CN3-D1 terminal No.9 (green) and CN3-D1 terminal No.3 (blue): 20 kΩ – 100 kΩ



OK: Go to step 5.

NG: Repair or replace the equipment.

ERR34-8110: Abnormal CAN Communication Process of Proportional Solenoid Valve Controller

Not available. Too long data received.

FB15U - FB20AFU-12 Serial No. : 857041 and up
FB15MU - FB20MFU-12 Serial No. : 832518 and up

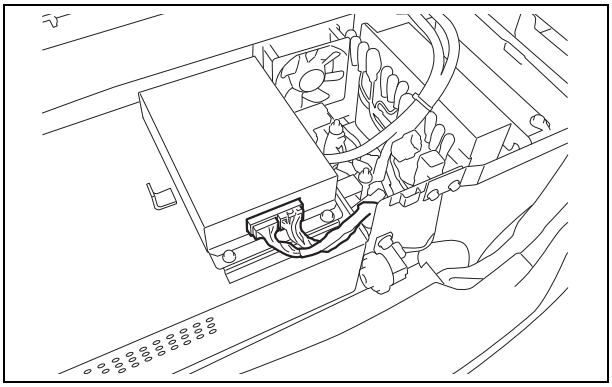
Content of Trouble

- Poor contact or short circuit of CAN communication harness

Repair Procedure

1. Check visually that the connectors and terminals of proportional solenoid valve controller are not disconnected or not loosened.

Judging: No disconnection of connector and no looseness of terminal.

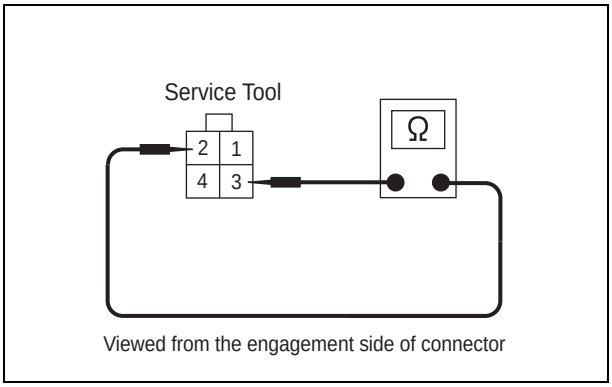


OK: Go to step 2.

NG: Clean the connector with the contact restorer and re-connect the connector.

2. In the state that connectors of all equipments are connected, measure the resistance at the terminals of service tool.

Judging: Between service tool terminal No.2 (green) and service tool terminal No.3 (blue): 40 – 70 Ω

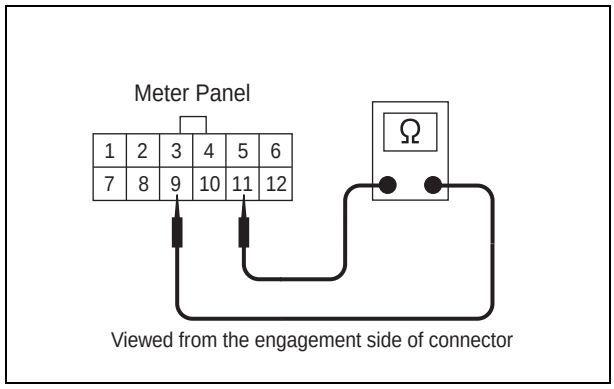


OK: Perform step 3 and later. Perform the short circuit test of CAN communication line of harness.

NG: Repair or replace the harness.

3. Disconnect the harness and measure the resistance of CAN communication line at the meter panel side.

Judging: Between meter panel terminal No.11 (green) and meter panel terminal No.9 (blue): 20 kΩ – 100 kΩ

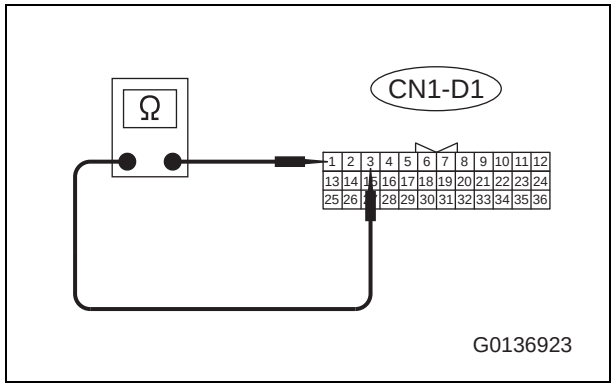


OK: Go to step 4.

NG: Repair or replace the equipment.

4. Disconnect the harness and measure the resistance of CAN communication line at the travel (R) controller side.

Judging: Between CN1-D1 terminal No.3 (green) and CN1-D1 terminal No.1 (blue): 20 kΩ – 100 kΩ



OK: Go to step 5.

NG: Repair or replace the equipment.

ERR30-8120: Abnormal CAN Transmission/Reception Process of Cargo Handling Controller

Intermittent connection at connector of cargo handling controller.

FB15U - FB20AFU-12 Serial No. : 837898 to 857040
FB15MU - FB20MFU-12 Serial No. : 826828 to 832517

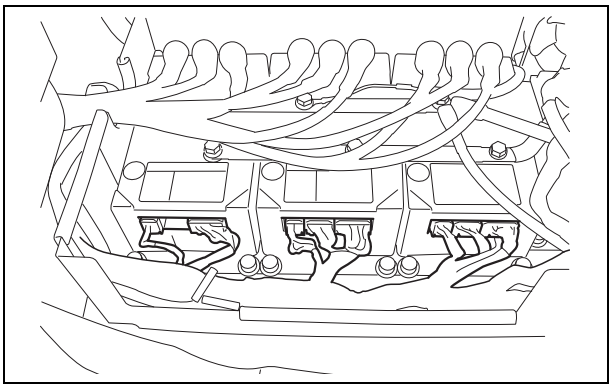
Content of Trouble

- Poor contact or short circuit of harness connector of cargo handling controller
- Abnormal cargo handling controller

Repair Procedure

1. Check visually that the connectors and terminals of cargo handling controller are not disconnected or not loosened.

Judging: No disconnection of connector and no looseness of terminal.

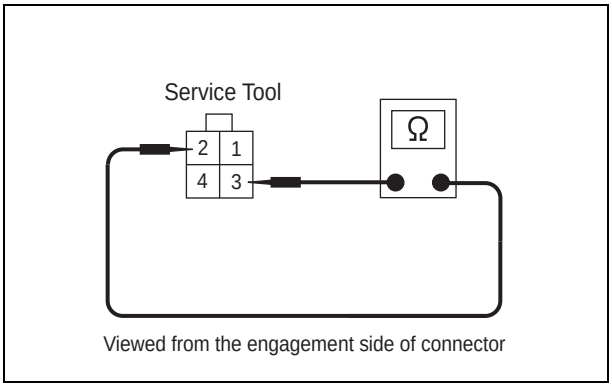


OK: Go to step 2.

NG: Clean the connector with the contact restorer and re-connect the connector.

2. In the state that connectors of all equipments are connected, measure the resistance at the terminals of service tool.

Judging: Between service tool terminal No.2 (green) and service tool terminal No.3 (blue): 40 – 70 Ω



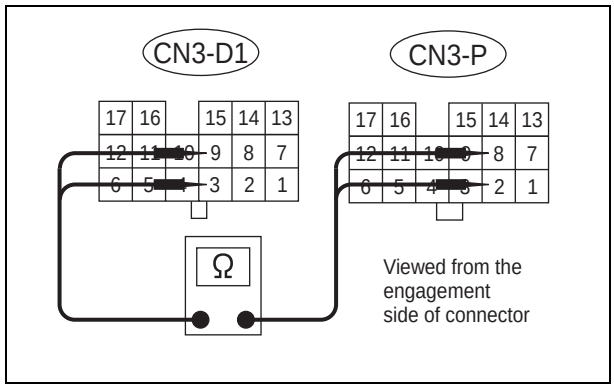
OK: Go to step 3.

NG: Repair or replace the harness.

3. Disconnect the harness and measure the resistance of CAN communication line between cargo handling controller and travel (R) controller.

Judging: Between CN3-P terminal No.8 (green) and CN3-D1 terminal No.9 (green): 0 Ω

Between CN3-P terminal No.2 (blue) and CN3-D1 terminal No.2 (blue): 0 Ω



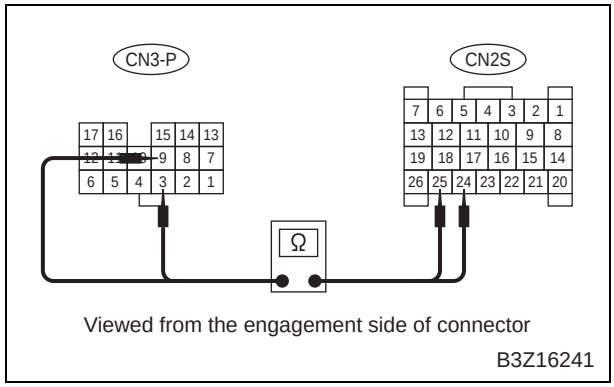
OK: Go to step 4.

NG: Repair or replace the harness.

4. Disconnect the harness and measure the resistance of CAN communication line between cargo handling controller and proportional solenoid valve controller.

Judging: Between CN3-P terminal No.9 (green/white) and CN2S terminal No.24 (green/white): 0 Ω

Between CN3-P terminal No.3 (blue/white) and CN2S terminal No.25 (blue/white): 0 Ω



OK: Replace the cargo handling controller.

NG: Repair or replace the harness.

ERR30-8130: Abnormal CAN Communication between Cargo Handling Controller and Meter Panel

FB15U - FB20AFU-12 Serial No. : 837898 to 857040
FB15MU - FB20MFU-12 Serial No. : 826828 to 832517

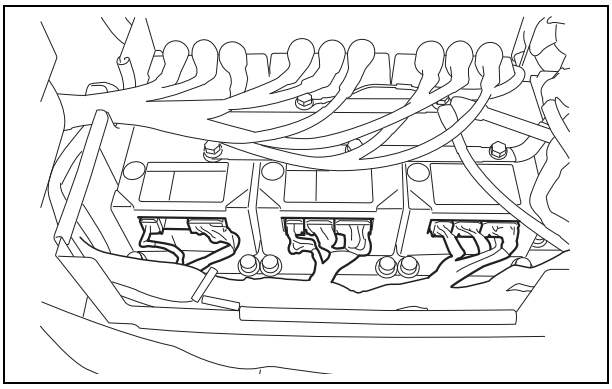
Content of Trouble

- Poor contact or short circuit of harness connector between cargo handling controller and meter panel
- Abnormal cargo handling controller

Repair Procedure

1. Check visually that the connectors and terminals of cargo handling controller and meter panel are not disconnected or not loosened.

Judging: No disconnection of connector and no looseness of terminal.



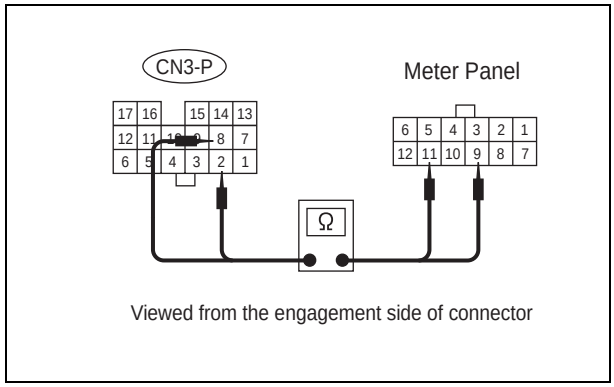
OK: Go to step 2.

NG: Clean the connector with the contact restorer and re-connect the connector.

2. Disconnect the harness and measure the resistance of CAN communication line between cargo handling controller and meter panel.

Judging: Between CN3-P terminal No.8 (green) and meter panel terminal No.11 (green): 0 Ω

Between CN3-P terminal No.2 (blue) and meter panel terminal No.9 (blue): 0 Ω



OK: Replace the cargo handling controller.

NG: Repair or replace the harness.

ERR34-8140: Abnormal CAN Transmission of Proportional Solenoid Valve Controller

FB15U - FB20AFU-12 Serial No. : 857041 and up
FB15MU - FB20MFU-12 Serial No. : 832518 and up

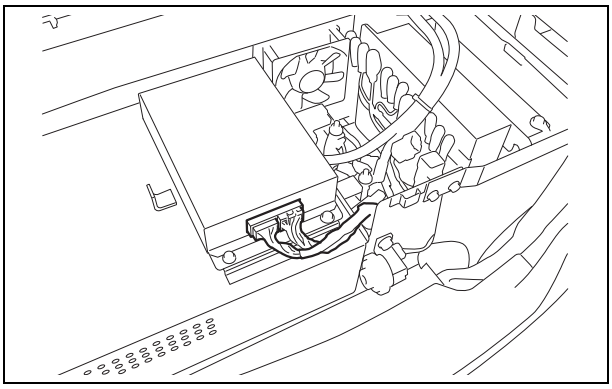
Content of Trouble

- Poor contact or short circuit of harness connector of proportional solenoid valve controller
- Abnormal proportional solenoid valve controller

Repair Procedure

1. Check visually that the connectors and terminals of proportional solenoid valve controller are not disconnected or not loosened.

Judging: No disconnection of connector and no looseness of terminal.

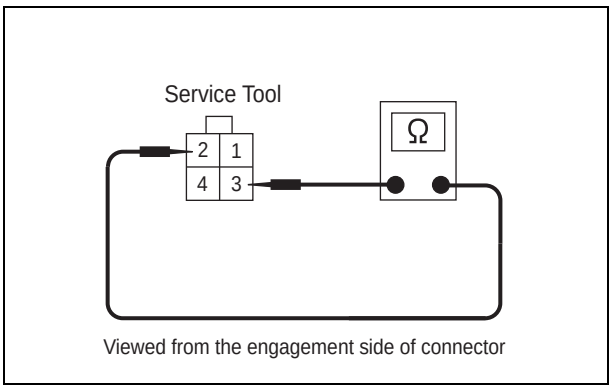


OK: Go to step 2.

NG: Clean the connector with the contact restorer and re-connect the connector.

2. In the state that connectors of all equipments are connected, measure the resistance at the terminals of service tool.

Judging: Between service tool terminal No.2 (green) and service tool terminal No.3 (blue): 40 – 70 Ω



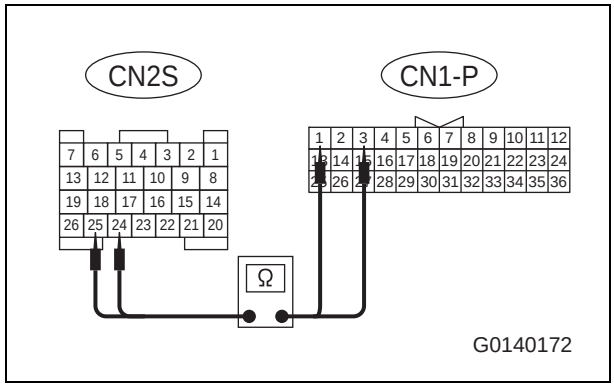
OK: Go to step 3.

NG: Repair or replace the harness.

3. Disconnect the harness and measure the resistance of CAN communication line between proportional solenoid valve controller and cargo handling controller.

Judging: Between CN2S terminal No.24 (green/white) and CN1-P terminal No.3 (green/white): 0 Ω

Between CN2S terminal No.25 (blue/white) and CN1-P terminal No.1 (blue/white): 0 Ω



OK: Replace the proportional solenoid valve controller.

NG: Repair or replace the harness.

ERR40-8510: Abnormal CAN Communication of Meter Panel After Turning ON the Key Switch

FB15U - FB20AFU-12 Serial No. : 837898 to 857040
FB15MU - FB20MFU-12 Serial No. : 826828 to 832517

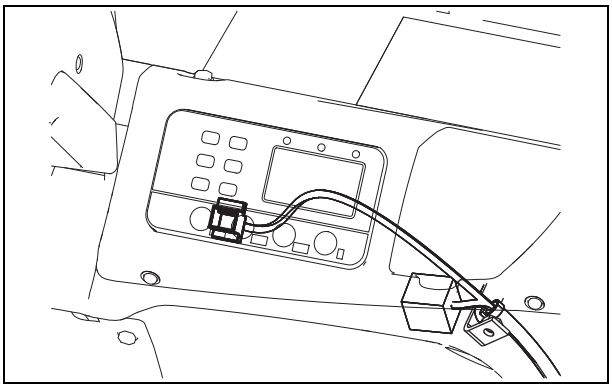
Content of Trouble

- Abnormal communication after turning ON the key switch
- Poor contact or short circuit of harness connector of meter panel
- Abnormal meter panel

Repair Procedure

1. Check visually that the connectors and terminals of meter panel are not disconnected or not loosened.

Judging: No disconnection of connector and no looseness of terminal.

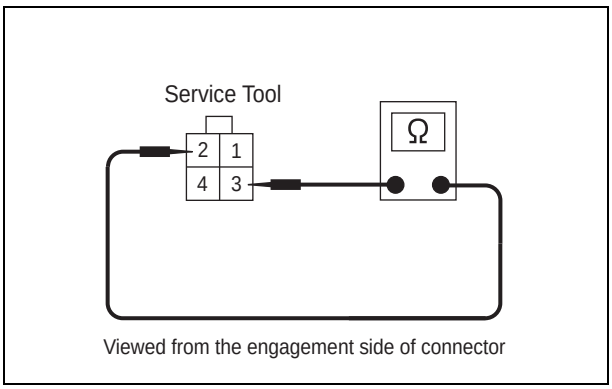


OK: Go to step 2.

NG: Clean the connector with the contact restorer and re-connect the connector.

2. In the state that connectors of all equipments are connected, measure the resistance at the terminals of service tool.

Judging: Between service tool terminal No.2 (green) and service tool terminal No.3 (blue): 40 – 70 Ω



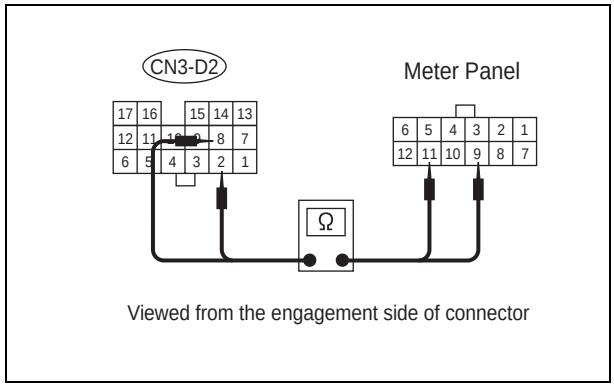
OK: Go to step 3.

NG: Repair or replace the harness.

3. Disconnect the harness and measure the resistance of CAN communication line between meter panel and travel (L) controller.

Judging: Between meter panel terminal No.11 (green) and CN3-D2 terminal No.8 (green): 0 Ω

Between meter panel terminal No.9 (blue) and CN3-D2 terminal No.2 (blue): 0 Ω

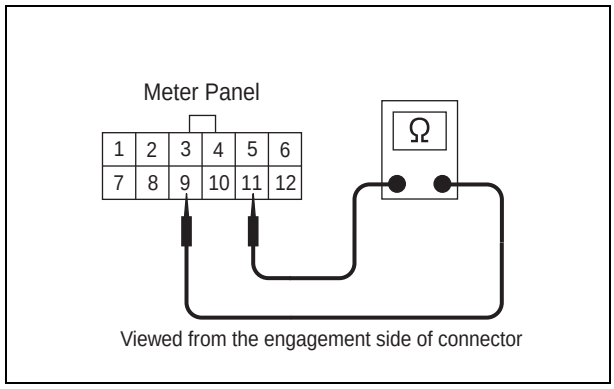


OK: Go to step 4.

NG: Repair or replace the harness.

4. Disconnect the harness and measure the resistance of CAN communication line at the meter panel side.

Judging: Between meter panel terminal No.11 (green) and meter panel terminal No.9 (blue): 20 – 100 kΩ



OK: Replace the meter panel.

NG: Repair or replace the harness.

ERR-3013 (Travel R) / ERR-3213 (Travel L)
ERR-3014 (Travel R) / ERR-3214 (Travel L)
ERR-3015 (Travel R) / ERR-3215 (Travel L)

Content of Trouble

Travel controller (Breaking of U phase wire) (3013, 3213)
Travel controller (Breaking of V phase wire) (3014, 3214)
Travel controller (Breaking of W phase wire) (3015, 3215)

Symptom of vehicle

Unable to travel

Repair Procedure

1. Disconnect the battery connector and leave the vehicle for 10 minutes.
2. Check the loosened cable tightening at the motor terminal and the breaking of cable.
3. Remove the cable from the motor terminal and check the breaking of wire between phases.
   Between U and V phases, Between V and W phases, Between W and U phases
   (The resistance between phases of motor is normally several tens mΩ.)
   - Breaking of wire: Replace the motor.
   - Normal: Return the cables to the original terminals. Be careful not to misconnect the cables at the right and left terminal.
4. Prepare for removing the travel (R) controller and travel (L) controller.
5. Swap the travel (R) controller and travel (L) controller. At this moment, ensure to set the select switch in the travel controller.
6. To apply the power, return the wiring of travel (R) controller, travel (L) controller, cargo handling controller and proportional solenoid valve controller again.
7. After connecting the battery connector, be seated on the seat and turn ON the key switch.
8. Confirm that the error code issuing controller is displayed on the same position (right or left).
   - Displayed on the same position:
     Loosened motor and motor wiring
   - Displayed on the different position:
     Replace the error issuing controller.

How to reset

Turn OFF the key switch.

Remark

None

ERR-3053 (Travel R)

FB15U - FB20AFU-12 Serial No. : 837898 to 857040
FB15MU - FB20MFU-12 Serial No. : 826828 to 832517

Content of Trouble

Defective travel accelerator.

Abnormal accelerator switch.

Symptom of vehicle

Unable to travel

Repair Procedure

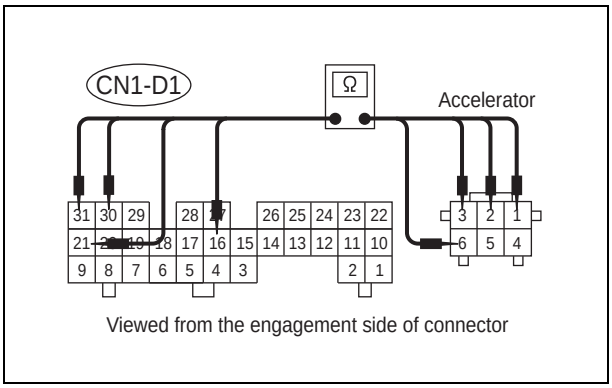
1. Confirm that the connectors and terminals of accelerator are not disconnected or not loosened.
2. Check the resistance of harness between travel (R) controller and accelerator.

Judging: Between CN-D1 terminal No.16 (red) and accelerator terminal No.6 (red): 0 Ω

Between CN-D1 terminal No.21 (black) and accelerator terminal No.1 (black): 0 Ω

Between CN-D1 terminal No.30 (green) and accelerator terminal No.3 (green): 0 Ω

Between CN-D1 terminal No.31 (yellow) and accelerator terminal No.2 (yellow): 0 Ω



OK: Replace the travel (R) controller.

NG: Repair or replace the harness.

How to reset

Turn OFF the key switch.

Remark

The voltage of accelerator in the normal condition
- When stepping on the accelerator: 0 V
- When releasing the accelerator: about 4.6 V

ERR-3053 (Travel R)

FB15U - FB20AFU-12 Serial No. : 857041 and up
FB15MU - FB20MFU-12 Serial No. : 832518 and up

Content of Trouble

Defective travel accelerator.

Abnormal accelerator switch.

Symptom of vehicle

Unable to travel

Repair Procedure

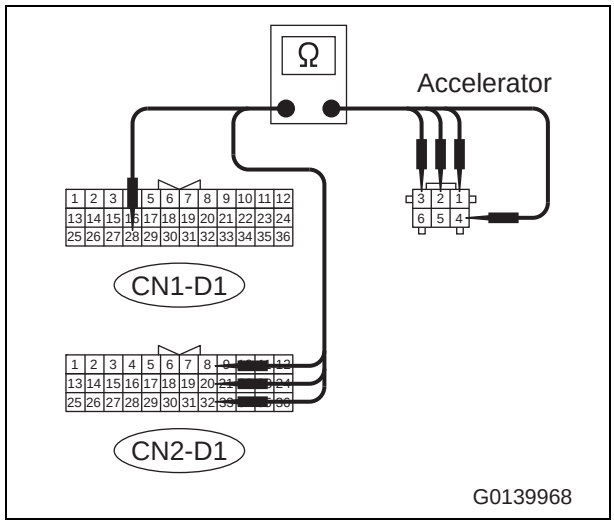
1. Confirm that the connectors and terminals of accelerator are not disconnected or not loosened.
2. Check the resistance of harness between travel (R) controller and accelerator.

Judging: Between CN1-D1 terminal No.28 (white) and accelerator terminal No.4 (white): 0 Ω

Between CN2-D1 terminal No.32 (black) and accelerator terminal No.1 (black): 0 Ω

Between CN2-D1 terminal No.20 (green) and accelerator terminal No.3 (green): 0 Ω

Between CN2-D1 terminal No.8 (yellow) and accelerator terminal No.2 (yellow): 0 Ω



OK: Replace the travel (R) controller.

NG: Repair or replace the harness.

How to reset

Turn OFF the key switch.

Remark

The voltage of accelerator in the normal condition
- When stepping on the accelerator: 0 V
- When releasing the accelerator: about 4.6 V

ALA-5005 (Cargo Handling)

FB15U - FB20AFU-12 Serial No. : 837898 to 857040
FB15MU - FB20MFU-12 Serial No. : 826828 to 832517

Content of Trouble

Warning of incorrect teaching operation
(Incorrect steering speed of steering wheel or incorrect steering wheel knob position)

Symptom of vehicle

Operable

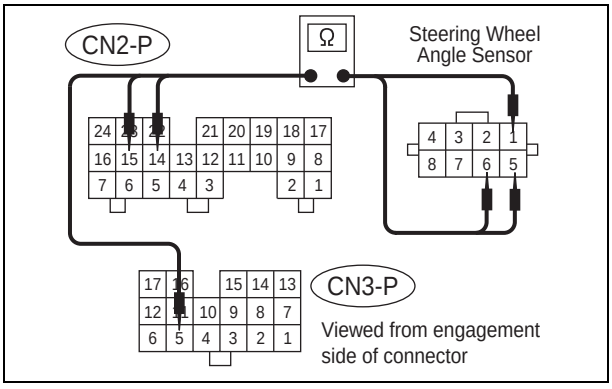
Repair Procedure

1. Perform the teaching operation in the normal procedure.
2. Change the road condition and perform the teaching operation in the normal procedure again.
3. Measure the resistance of harness between the cargo handling controller and steering wheel angle sensor.

Judging: Between CN2-P terminal No.14 (blue/yellow) and steering wheel angle terminal No.6 (blue/yellow): 0 Ω

Between CN2-P terminal No.15 (green/red) and steering wheel angle sensor terminal No.5 (green/red): 0 Ω

Between CN3-P terminal No.5 (red) and steering wheel angle sensor terminal No.1 (red): 0 Ω



OK: Check the next item.

NG: Repair or replace the harness.

4. Check the steering wheel angle sensor and replace it.
5. If normal in the above check, replace the cargo handling controller.

How to reset

Turn OFF the key switch.

Remark

When warning, it functions in the initial setting value. (Not memorized in the EEPROM)

The error appears in teaching when the rear tire is locked or in teaching on the rough road where the road friction is large.

ERR-5031 (Cargo Handling)

FB15U - FB20AFU-12 Serial No. : 857041 and up
FB15MU - FB20MFU-12 Serial No. : 832518 and up

Content of Trouble

Pump Motor (Abnormal Temperature)

Symptom of vehicle

Unable to handle the cargo
The error is detected over 175°C [347°F].
The error is released below 175°C [347°F].

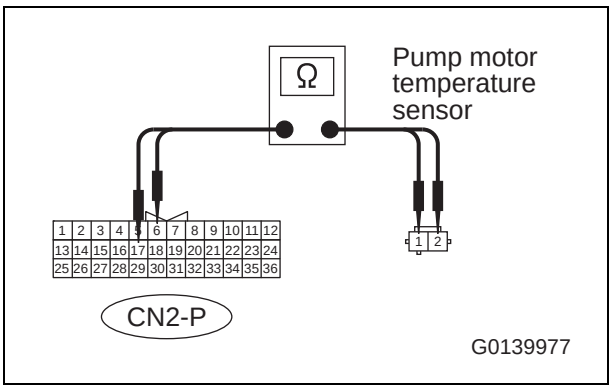
Repair Procedure

1. Stop the vehicle and cool down the pump motor.

2. Measure the resistance of harness between the cargo handling controller and the pump motor temperature sensor.

Judging: Between CN2-P terminal No.17 (yellow/green) and pump motor temperature sensor terminal No.1 (yellow/green): 0 Ω

Between CN2-P terminal No.6 (yellow/black) and pump motor temperature sensor terminal No.2 (yellow/black): 0 Ω



OK: Check the next item.

NG: Repair or replace the harness.

3. Measure the resistance / voltage of pump motor temperature sensor.
(Check at the terminals No.20 and No.29 of CN1-P connector of controller.)

4. If normal in the above check, replace the cargo handling controller.

How to reset

Lower the temperature below 175°C [347°F] and turn OFF the key switch.

Remark

Resistance / voltage of travel motor temperature sensor in normal condition

25°C [77°F]: 10.7 kΩ / 3.5 V (± 10 %)
50°C [122°F]: 4.4 kΩ / 2.4 V (± 10 %)
100°C [212°F]: 1.0 kΩ / 0.9 V (± 10 %)
150°C [267°F]: 0.3 kΩ / 0.3 V (± 10 %)

Even if the direction switch or accelerator is operated, the vehicle does not normally travel. (Continued)

Content of Trouble

The tire angle sensor and its signal circuit are abnormal. (Between travel R unit and tire angle sensor)

Repair Procedure

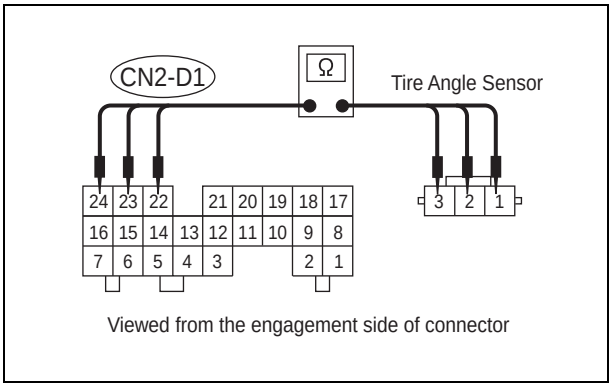
1. Confirm that the tire angle sensor voltage (at terminal No.23 of connector CN2-D1) is around 2.5 V when the tires are located in the position of straight forward of vehicle.
Confirm that the voltage increases when turning the steering wheel right and the voltage decreases when turning the steering wheel left.
If abnormal, repair or replace it.

2. Measure the resistance of harness between connector CN2-D1 and tire angle sensor.

Judging: Between CN2-D1 terminal No.22 (black/yellow) and tire angle sensor terminal No.1 (black/yellow): 0 Ω

Between CN2-D1 terminal No.23 (yellow) and tire angle sensor terminal No.2 (yellow): 0 Ω

Between CN2-D1 terminal No.24 (red/blue) and tire angle sensor terminal No.3 (red/blue): 0 Ω



OK: Replace the tire angle sensor.

NG: Repair or replace the harness.

How to reset

Normal recovery

Remark

No leakage from the signal line.
An error is detected when the wire is broken.

Content of Trouble

The accelerator unit and its signal circuit are abnormal. (Between travel R unit and accelerator)

Repair Procedure

1. Confirm that the accelerator VR voltage inputted to the controller normally increases when the accelerator is opened gradually and the accelerator switch is inputted. If abnormal, repair or replace the accelerator unit.

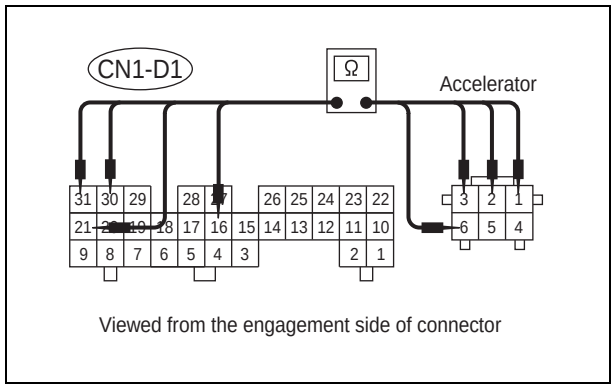
2. Measure the resistance of harness between connector CN1-D1 and accelerator unit.

Judging: Between CN1-D1 terminal No.16 (red) and accelerator unit terminal No.6 (red): 0 Ω

Between CN1-D1 terminal No.21 (black) and accelerator unit terminal No.1 (black): 0 Ω

Between CN1-D1 terminal No.30 (green) and accelerator unit terminal No.3 (green): 0 Ω

Between CN1-D1 terminal No.31 (yellow) and accelerator unit terminal No.2 (yellow): 0 Ω



OK: Replace the accelerator unit.

NG: Repair or replace the harness.

How to reset

Normal recovery

Remark

No leakage from the signal line.
An error is detected when the accelerator VR wire is broken.

The pump motor does not rotate.

FB15U - FB20AFU-12 Serial No. : 837898 to 857040
FB15MU - FB20MFU-12 Serial No. : 826828 to 832517

Content of Trouble

- The work switch circuit in the proportional solenoid valve controller is defective.
- The detection circuit in the main controller is defective.
- The work equipment switch signal harness is defective.

Repair Procedure

Check when operating the lift lever to the full ascent.
(In the state that the pump motor is rotating)

1. Measure the voltage between pin 16 of CN1S (white) and pins No. 10, 11, 12, 21 and 22 of CN2S (gray) of proportional solenoid valve controller respectively.
If higher than 4 V, replace the proportional solenoid valve controller board.

2. If lower than 4 V in step **1**, measure the voltage at pins No.16, 17 and 19 of connector CN1-P of main controller and the voltage between pin 15 of CN1-P (white) and pins No. 10 and 11 of connector CN2-P of main controller.
If higher than 4 V in step **1**, check the wire-breaking.

3. If lower than 4 V in step **2**, check the short of wire,

4. If normal in step **3**, replace the main controller board.

How to reset

None

Remark

None

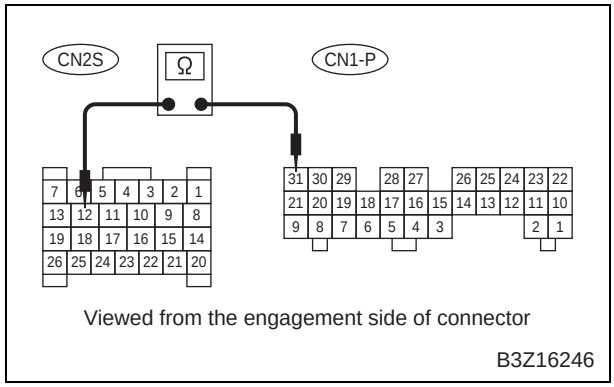
Content of Trouble

- The harness of pump motor DUTY signal is shorted.
- The directive IC in the proportional solenoid valve controller is defective.

Repair Procedure

1. Check the short of harness between proportional solenoid valve controller and cargo handling controller.

Judging: Between CN2S terminal No.12 (green) and CN1-P terminal No.31 (green)



Viewed from the engagement side of connector

B3Z16246

OK: Replace the proportional solenoid valve controller.

NG: Repair or replace the harness.

How to reset

None

Remark

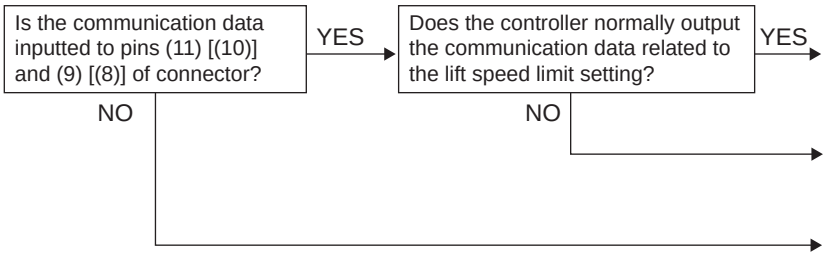
None

METER PANEL

Symptom-wise Trouble Diagnosis of Meter Panel

No.	Symptom	Page
1	When turning ON the key switch, the meter panel does not function at all.	70-198
2	When connecting the battery, the entire meter panel keeps lighting.	70-198
3	Some segments and warnings do not light when all displays are lit at battery connection.	70-198
4	When turning ON the key switch, the LCD backlight does not light.	70-199
5	The buzzer does not beep during meter operation.	70-199
6	Some parts of LCD segments do not light during meter operation.	70-199
7	The LCD display is not renewed.	70-199
8	When turning OFF the key switch, the meter panel does not go off.	70-199
9	All of LCDs and warning lamps light and go off repeatedly, meter panel does not function.	70-200
10	The neutral safety warning does not light or go off.	70-200
11	The parking warning does not light or go off.	70-200
12	The battery electrolyte warning lamp lights. (Without electrolyte level sensor)	70-200
13	The warning lamp of travel system trouble lights (blinks).	70-201
14	The warning lamp of travel system trouble does not light (blink).	70-201
15	The warning lamp of cargo handling system trouble lights (blinks).	70-201
16	The warning lamp of cargo handling system trouble does not light (blink).	70-201
17	The warning lamp of trouble lights (blinks).	70-201
18	The warning lamp of trouble does not light (blink).	70-202
19	The display of battery remaining goes off or is different from actual remaining.	70-202
20	The display of power is obviously different from the actual power.	70-202
21	The display of forward-run/backward-run goes off or is different from the actual traveling state.	70-202
22	The display of travel speed goes off or is different from the actual speed.	70-203
23	The display (turtle icon) of travel speed limit is different from the actual state,	70-203
24	The display of tilt horizontal is different from the state of vehicle.	70-203
25	The display cannot be changed to the clock or time cannot be set.	70-203
26	When turning ON the key switch, the display of clock is incorrect.	70-204
27	The display cannot be switched to the key ON time.	70-204
28	The display of key ON time is incorrect or shows [Tol----].	70-204
29	The display cannot be switched to the [Travel R] time.	70-204
30	The [Travel R] time on the display is not accumulated or [0.0h] remains displayed.	70-204
31	The display cannot be switched to the cargo handling time.	70-204
32	The cargo handling time on the display is not accumulated or [0.0h] remains displayed.	70-205
33	The display cannot be switched to the load meter.	70-205
34	When displaying the load, the value displayed is different from the actual state of vehicle.	70-205
35	The load meter cannot be adjusted to zero.	70-205
36	The history of trouble cannot be displayed.	70-205
37	Even if the button is pressed, the display of trouble history code and hour time at the occurrence cannot be switched.	70-206
38	Even if the button is pressed, the travel speed limit setting (user adjustment mode) cannot be displayed.	70-206
39	The set value of travel speed limit (user adjustment mode) cannot be incremented or decremented with the UP and DOWN buttons.	70-206
40	Even if the MODE button is pressed after changing the value, the travel speed setting (user adjustment mode) cannot be reflected.	70-206
41	Even if the button is pressed, the lift speed setting (user adjustment mode) cannot be displayed.	70-206
42	The set value of lift speed (user adjustment mode) cannot be incremented or decremented with the UP and DOWN buttons.	70-206
43	Even if the MODE button is pressed after changing the value, the lift speed setting (user adjustment mode) cannot be reflected.	70-207
44	Even if the LMH button (UP button) is pressed, the display of power setting cannot be switched.	70-207
45	Even if the MODE button is pressed after changing the value, the power setting cannot be reflected.	70-207
46	Even if the turtle icon button (DOWN button) is pressed, the OF/OFF of travel speed limit cannot be changed.	70-207
47	The meter panel communication error is displayed. ([Err---????] is displayed on LCD.)	70-208
48	The controller communication error is displayed. ([Err---????] is displayed on LCD.)	70-208

43. Even if the MODE button is pressed after changing the value, the lift speed limit setting (user adjustment mode) cannot be reflected.

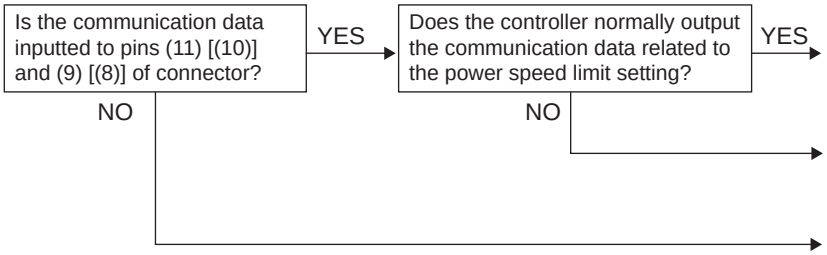


Cause	Remedy
Defective meter panel	Replace
Abnormal controller	Check
Breaking of harness Poor contact of connector	Check

44. Even if the LMH button (UP button) is pressed, the lift power setting (user adjustment mode) cannot be switched.

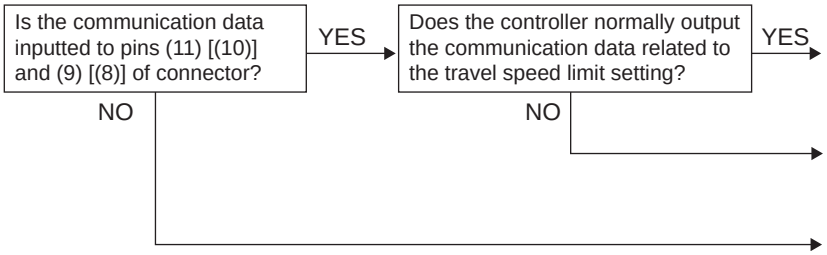
Cause	Remedy
Defective meter panel	Replace

45. Even if the MODE button is pressed after changing the value, the power setting (user adjustment mode) cannot be reflected.

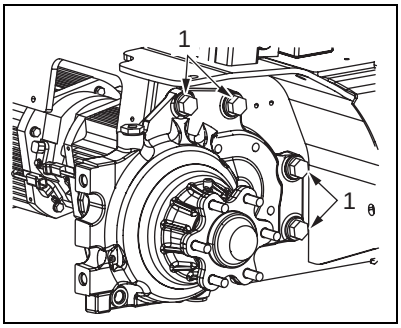
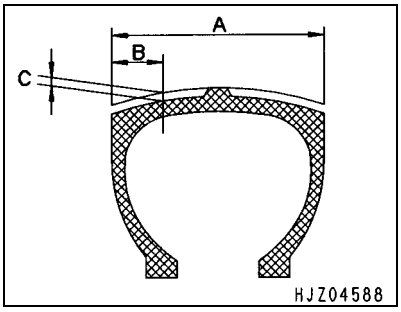


Cause	Remedy
Defective meter panel	Replace
Abnormal controller	Check
Breaking of harness Poor contact of connector	Check

46. Even if the turtle icon button (DOWN button) is pressed, the ON/OFF of travel speed limit cannot be changed.



Cause	Remedy
Defective meter panel	Replace
Abnormal controller	Check
Breaking of harness Poor contact of connector	Check

Equip-ment	Check Item	Check Content
Traveling equipment	**25. Front axle**	**1. Deformation, Crack, Damage** Check visually. If necessary, check in the crack search method. **2. Loose mounting bolt** The bolts should be tightened with the specific torque. 
	26. Rear axle	**1. Support Mounting Bolt (4-wheel vehicle, 3-wheel vehicle)** Nm: 175 – 215 Nm {18 – 22 kgm} [130.2 – 159.1 ft. lb]
	27 – 28. Tire	**1. Crack and damage of tire** Check visually the crack, defect of tread and side wall. If serious, replace the tire. **2. Depth of groove** In case of pneumatic (air inflated) tire, measure the depth of groove C at the location B of tread width 1/4 and confirm that the dimension C is more than 1.6 mm [0.06 in]. **3. Abnormal wear of tire** Check visually the abnormal wear, eccentric wear and stepped wear. **4. Biting of foreign matters, sticking** Check visually the biting of metal fragment, stone, foreign matters and sticking. 
	28. Hub bolt, nut rim set volt, nut	**1. Looseness** Tighten with the hub nut wrench and check. If loosened, tighten with the torque listed on the table below. **2. Damage** Check visually that no damage exists.

Item		Unit	1.5 – 2.0 ton vehicle
Hub nut tightening torque	Front Rear	Nm {kgm } [fb. lb]	157 – 245 {16 – 25} [116 – 181]
Rim set nut tightening torque	Rear	Nm {kgm } [fb. lb]	157 – 245 {16 – 25} [116 – 181]

Equip-ment	Check Item	Check Content
Body, Safety Equipment, etc	**75. Frame, Body**	**1. Crack, deformation** **2. Mounting bolt, loose nut, drop**
	76. Cab	**1. Crack, deformation** **2. Corrosion, rainwater leakage** **3. Close/open, lock, rattle and damage of door**
	77. Seat	**1. Operation** **2. Loose mounting bolt**
	78. Lifting equipment, anti-slipping	**1. Crack, damage, deformation** **2. Loose mounting bolt**
	79. Display	**1. Damage** **2. State of installation**
	80. Head Guard	**1. Looseness of installation block** **2. Deformation, crack and damage**
	81. Backrest	**1. Looseness of installation block** **2. Deformation, crack and damage**
	82. Lighting system, meters, Alarm	**1. Operation of light** **2. State of installation, damage, water penetration** **3. Operation of meters**
	83. Mirror, reflector	**1. Dirt, damage** **2. Mirrored image**
	84. Greasing	**1. Greased state** **2. Operation of automatic greasing equipment**
Total test	**85. Function of each equipment**	Confirm by traveling and work test.

Temperature

Fahrenheit–Centigrade Conversion. –A simple way to convert a Fahrenheit temperature reading into a Centigrade temperature reading or vice versa is to enter the accompanying table in the center or boldface column of figures. These figures refer to the temperature in either Fahrenheit or Centigrade degrees.

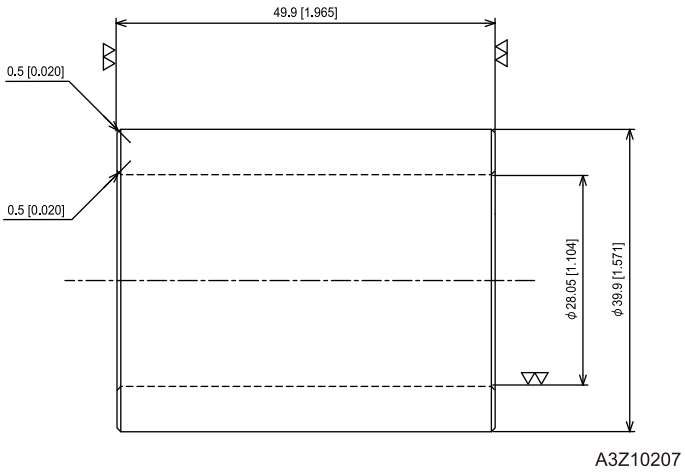
If it is desired it convert from Fahrenheit to Centigrade degrees, consider the center column as a table of Fahrenheit temperatures and read the corresponding Centigrade temperature in the column at the left.

If it is desired to convert from Centigrade to Fahrenheit degrees, consider the center column as a table of Centigrade values, and read the corresponding Fahrenheit temperature on the right.

°C		°F	°C		°F	°C		°F	°C		°F
–40.4	–40	–40.9	–11.7	11	51.8	7.8	46	114.8	27.2	81	117.8
–37.2	–35	–31.0	–11.1	12	53.6	8.3	47	116.6	27.8	82	179.6
–34.4	–30	–22.0	–10.6	13	55.4	8.9	48	118.4	28.3	83	181.4
–31.7	–25	–13.0	–10.0	14	57.2	9.4	49	120.2	28.9	84	183.2
–28.9	–20	–4.0	–9.4	15	59.0	10.0	50	122.0	29.4	85	185.0
–28.3	–19	–2.2	–8.9	16	60.8	10.6	51	123.8	30.0	86	186.8
–27.8	–18	–0.4	–8.6	17	62.6	11.1	52	125.6	30.6	84	188.6
–27.2	–17	1.4	–7.8	18	64.4	11.7	53	127.4	31.1	88	190.4
–26.7	–16	3.2	–7.2	19	66.2	12.2	54	129.2	31.7	89	192.2
–26.1	–15	5.0	–6.7	20	68.0	12.8	55	131.0	32.2	90	194.0
–25.6	–14	6.8	–6.1	21	69.8	13.3	56	132.8	32.8	91	195.8
–25.0	–13	8.6	–5.6	22	71.6	13.9	57	134.6	33.3	92	197.6
–24.4	–12	10.4	–5.0	23	73.4	14.4	58	136.4	33.9	93	199.4
–23.9	–11	12.2	–4.4	24	75.2	15.0	59	138.2	34.4	94	201.2
–23.3	–10	14.0	–3.9	25	77.0	15.6	60	140.0	35.0	95	203.0
–22.8	–9	15.8	–3.3	26	78.8	16.1	61	141.8	35.6	96	204.8
–22.2	–8	17.6	–2.8	27	80.6	16.7	62	143.6	36.1	97	206.6
–21.7	–7	19.4	–2.2	28	82.4	17.2	63	145.4	36.7	98	208.4
–21.1	–6	21.2	–1.7	29	84.2	17.8	64	147.2	37.2	99	210.2
–20.6	–5	23.0	–1.1	30	86.0	18.3	65	149.0	37.8	100	212.0
–20.0	–4	24.8	–0.6	31	87.8	18.9	66	150.8	40.6	105	221.0
–19.4	–3	26.6	0	32	89.6	19.4	67	152.6	43.3	110	230.0
–18.9	–2	28.4	0.6	33	91.4	20.0	68	154.4	46.1	115	239.0
–18.3	–1	30.2	1.1	34	93.2	20.6	69	156.2	48.9	120	248.0
–17.8	0	32.0	1.7	35	95.0	21.1	70	158.0	51.7	125	257.0
–17.2	1	33.8	2.2	36	96.8	21.7	71	159.8	54.4	130	266.0
–16.7	2	35.6	2.8	37	98.6	22.2	72	161.6	57.2	135	275.0
–16.1	3	37.4	3.3	38	100.4	22.8	73	163.4	60.0	140	284.0
–15.8	4	39.2	3.9	39	102.2	23.3	74	165.2	62.7	145	293.0
–15.0	5	41.0	4.4	40	104.0	23.9	75	167.0	65.6	150	302.0
–14.4	6	42.8	5.0	41	105.8	24.4	76	168.8	68.3	155	311.0
–13.9	7	44.6	5.6	42	107.6	25.0	77	170.6	71.1	160	320.0
–13.3	8	46.4	6.1	43	109.4	25.6	78	172.4	73.9	165	329.0
–12.8	9	48.2	6.7	44	112.2	26.1	79	174.2	76.7	170	338.0
–12.2	10	50.0	7.2	45	113.0	26.7	80	176.0	79.4	175	347.0

3BA-97-99760 (3-WHEEL REAR AXLE SENSOR ALIGNMENT JIG)

Unit: mm [in]



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