



Service Manual

Chassis & Mast

MC/FC

FG10N	F25C-00011-up	FGE10N	F25C-08011/18001-up
FG15N	F25C-50001-up	FGE15N	F25C-58001/68001-up
FG15ZN	F34-50011-up	FGE15ZN	F34-58011/68001-up
FG18N	F25C-70001-up	FGE18N	F25C-78001/88001-up
FG18ZN	F34-70001-up	FGE18ZN	F34-78001/88001-up
FG20CN	F34-20001-up	FGE20CN	F34-28001/38001-up
FG20N	F17D-00011-up	FGE20N	F17D-08011/18001-up
FG20ZN	F35-00011-up	FGE20ZN	F35-08011/18001-up
FG25N	F17D-50001-up	FGE25N	F17D-58001/68001-up
FG25ZN	F35-50001-up	FGE25ZN	F35-58001/68001-up
FG30N	F13F-30011-up	FGE30N	F13F-38011/48001-up
FG35AN	F13F-50001-up	FGE35AN	F13F-58001/68001-up

FD10N	F16D-00011/10001-up
FD15N	F16D-50001/60001-up
FD18N	F16D-70001/80001-up
FD20CN	F16D-85001/87001-up
FD20N	F18C-00011/10001-up
FD25N	F18C-50001/60001-up
FD30N	F14E-30011/40001-up
FD35AN	F14E-50001/60001-up

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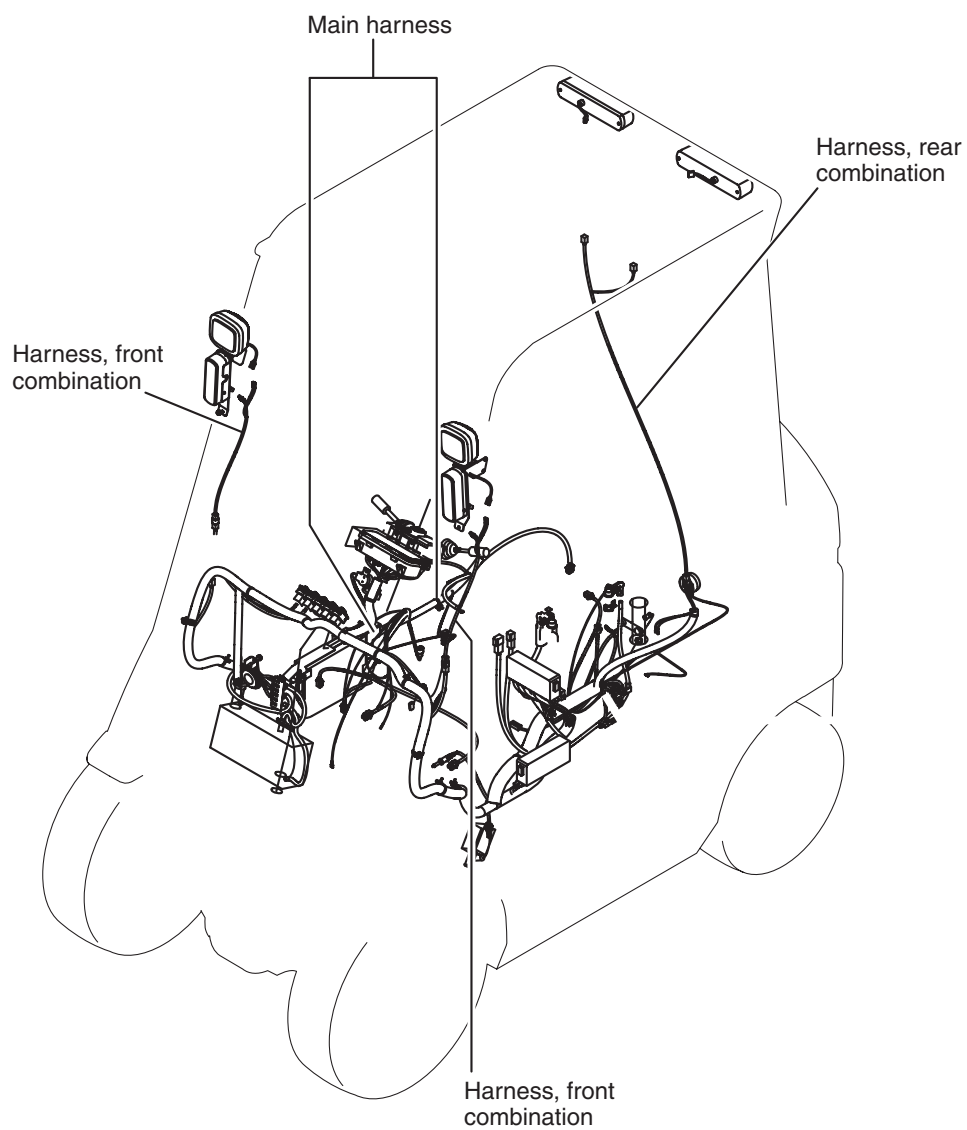


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COOLING SYSTEM

Specification	2 – 1
Structure	2 – 2
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Chassis Electrical Devices Wiring Outline (No. 1)

209620

Thermoswitch (T/C oil)

Apply an ohmmeter between the terminal and body and check for continuity (resistance value). Replace the thermoswitch if the measured insulation resistance value is not more than the value listed in the table below.

Insulation resistance value	1 M ohm or more (with contact OFF) (at 500 V megger)
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Internal resistance: 0.5 ohm or less (with contact ON)

Allowable load: 0.5 A

NOTE

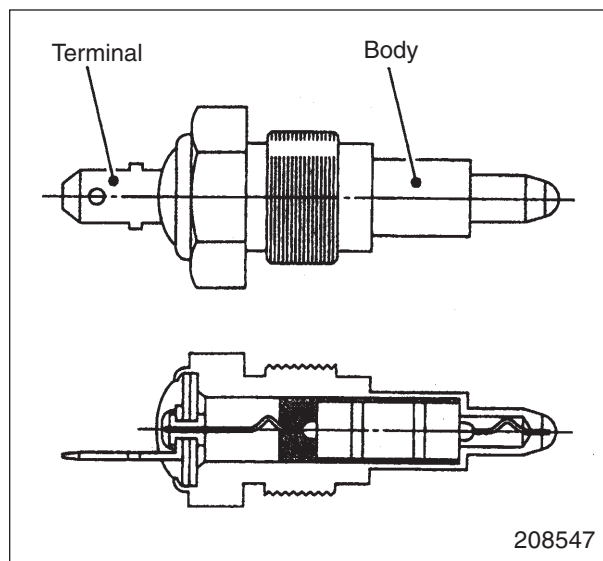
When installing the thermoswitch, tighten it to the specified torque.

Tightening torque	31.4 to 47.1 N·m (3.2 to 4.8 kgf·m) [23.2 to 34.7 lbf·ft]
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CAUTION

Replace the thermoswitch if it was dropped or abused.



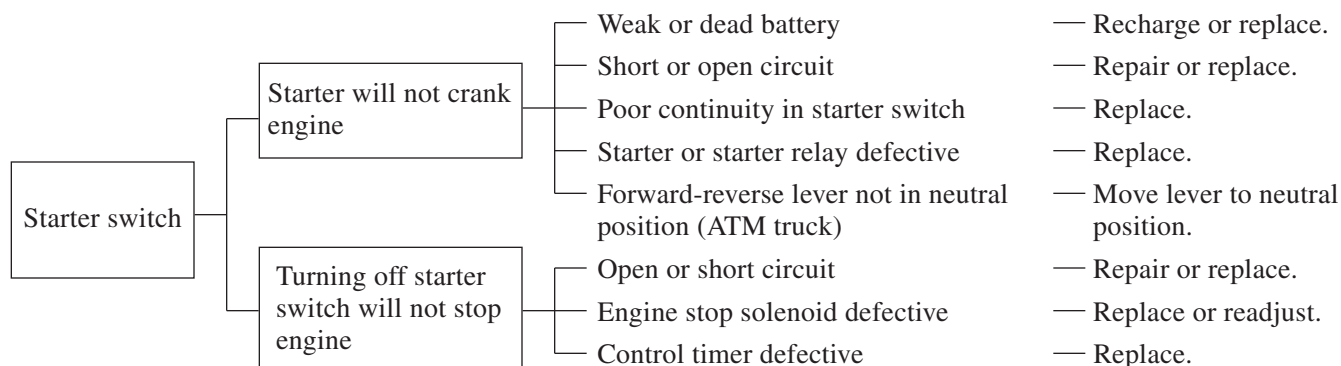
208547

Main specifications

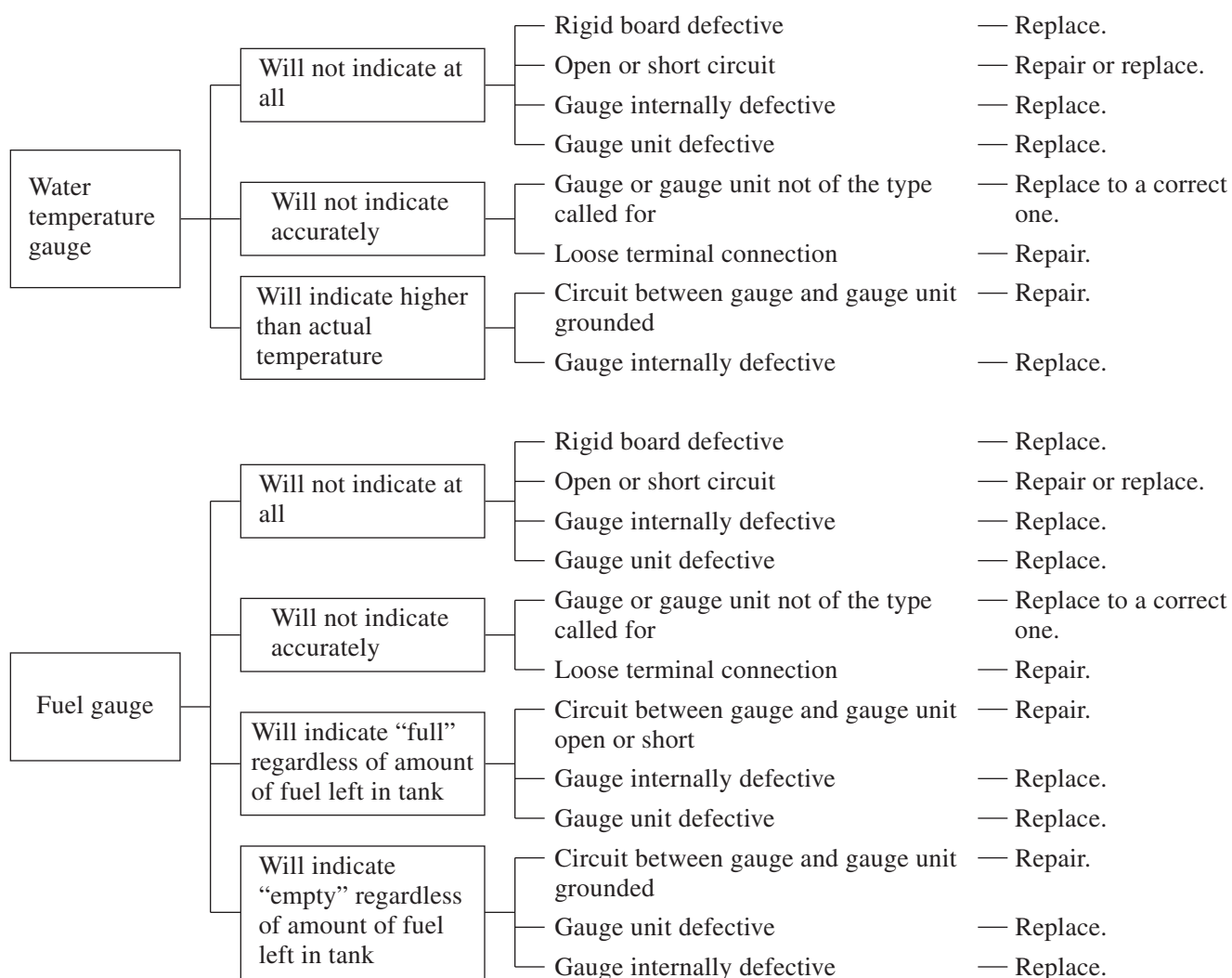
Operating temperature	OFF→ON	122 ± 3 °C (251.6 ± 5.4 °F)
	ON→OFF	115 °C (239 °F) or higher
Insulation resistance (with contact OFF)		1 M ohm or more

Troubleshooting

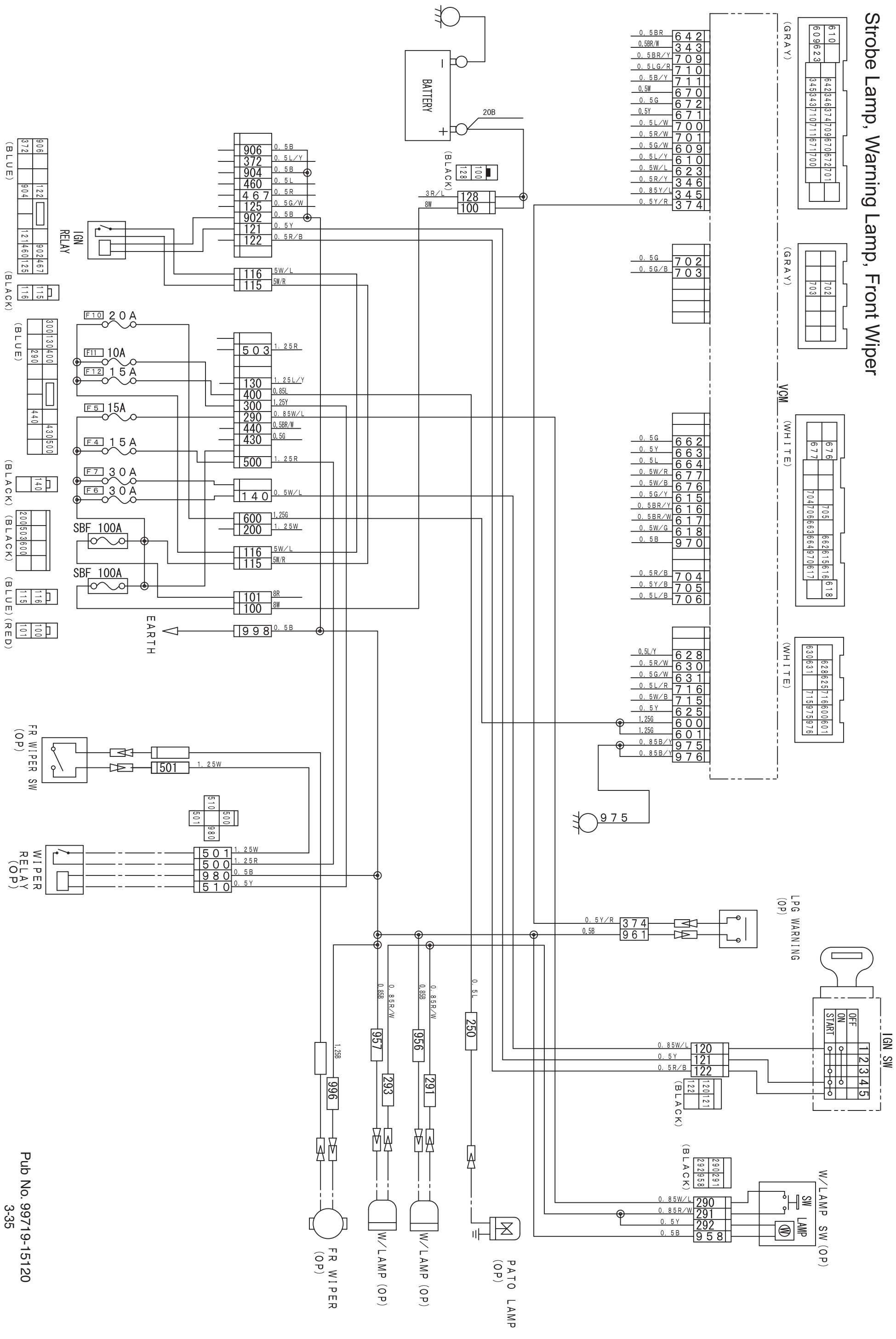
Starter System



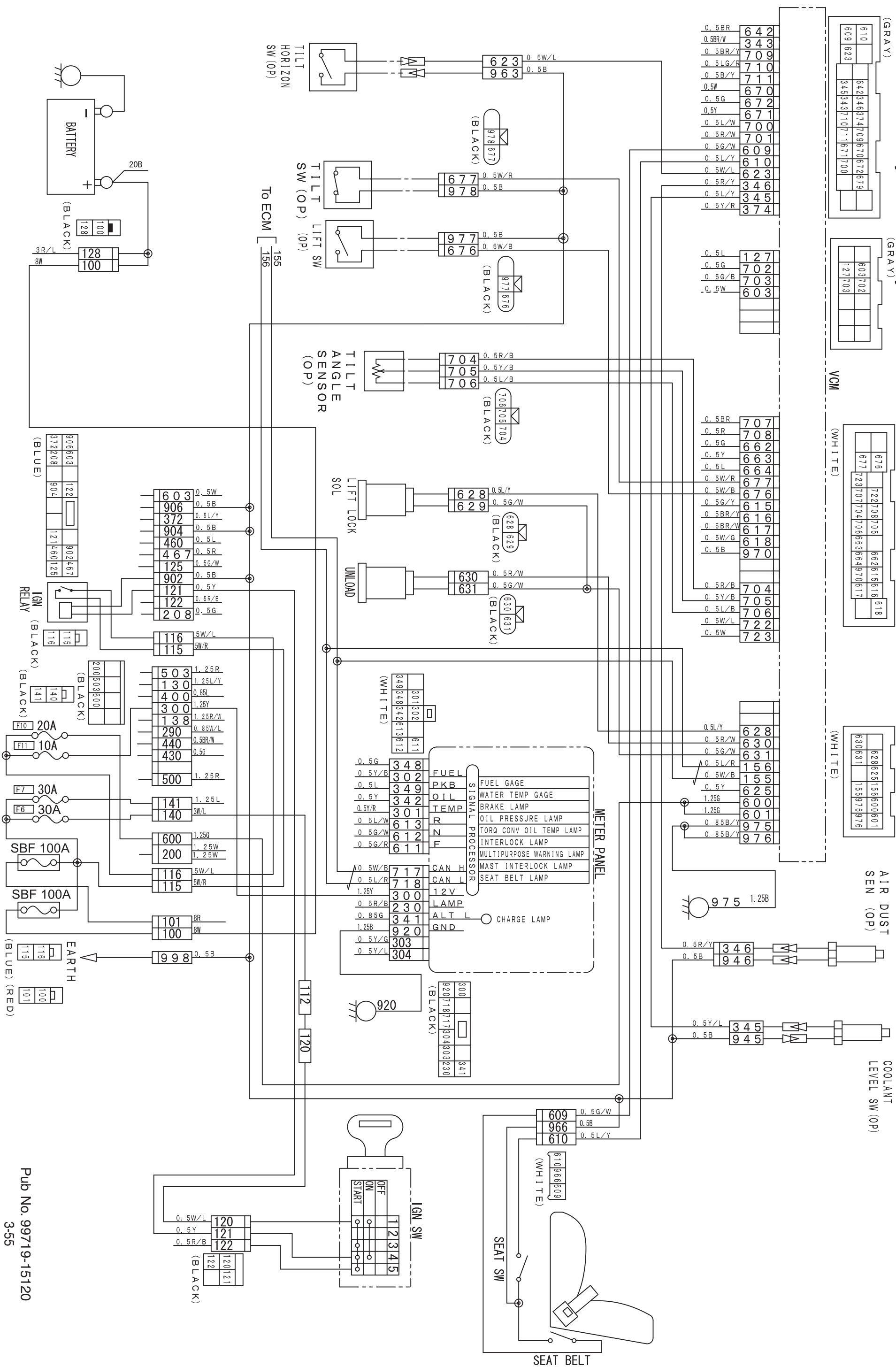
Gauges



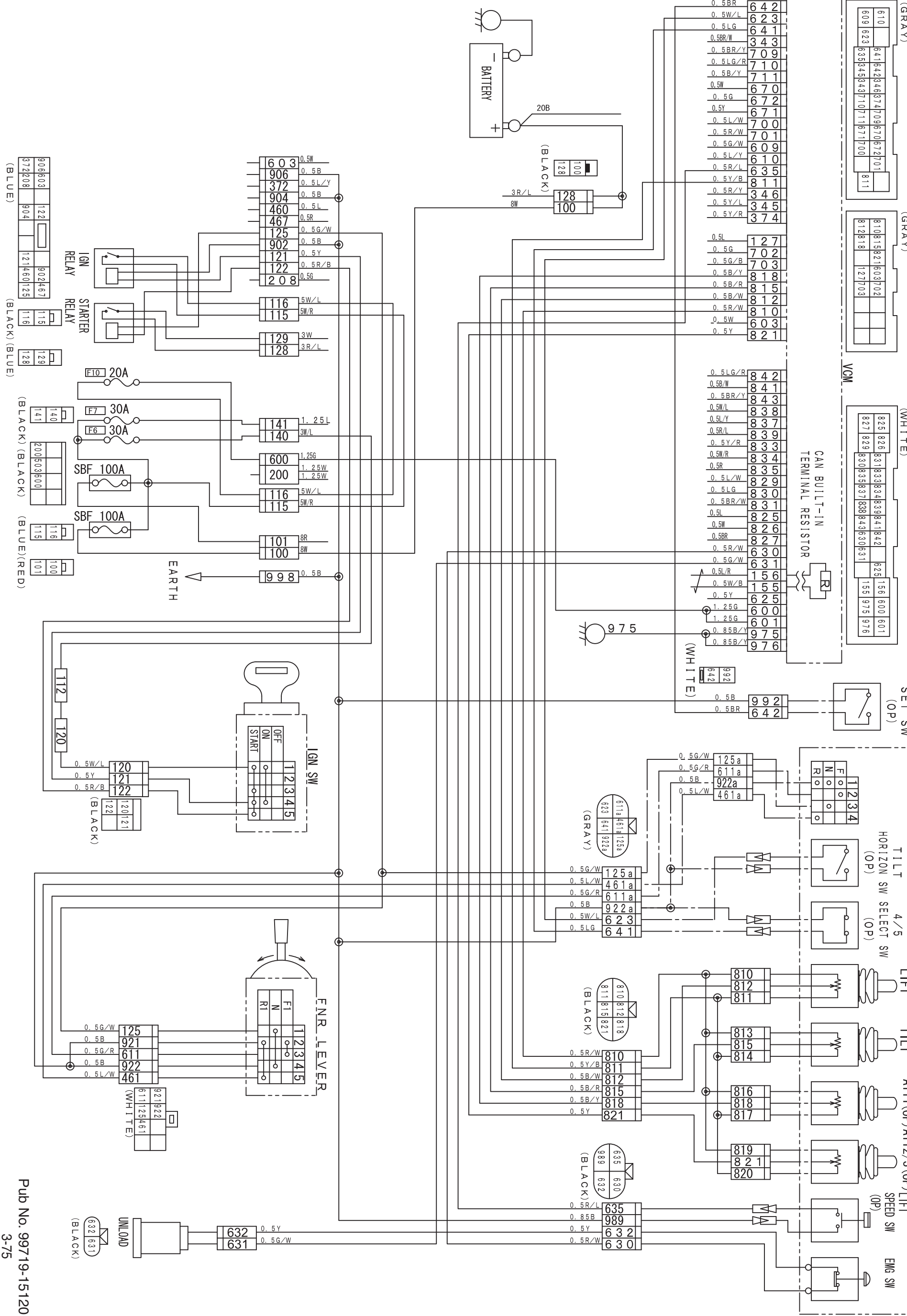
Strobe Lamp, Warning Lamp, Front Wiper



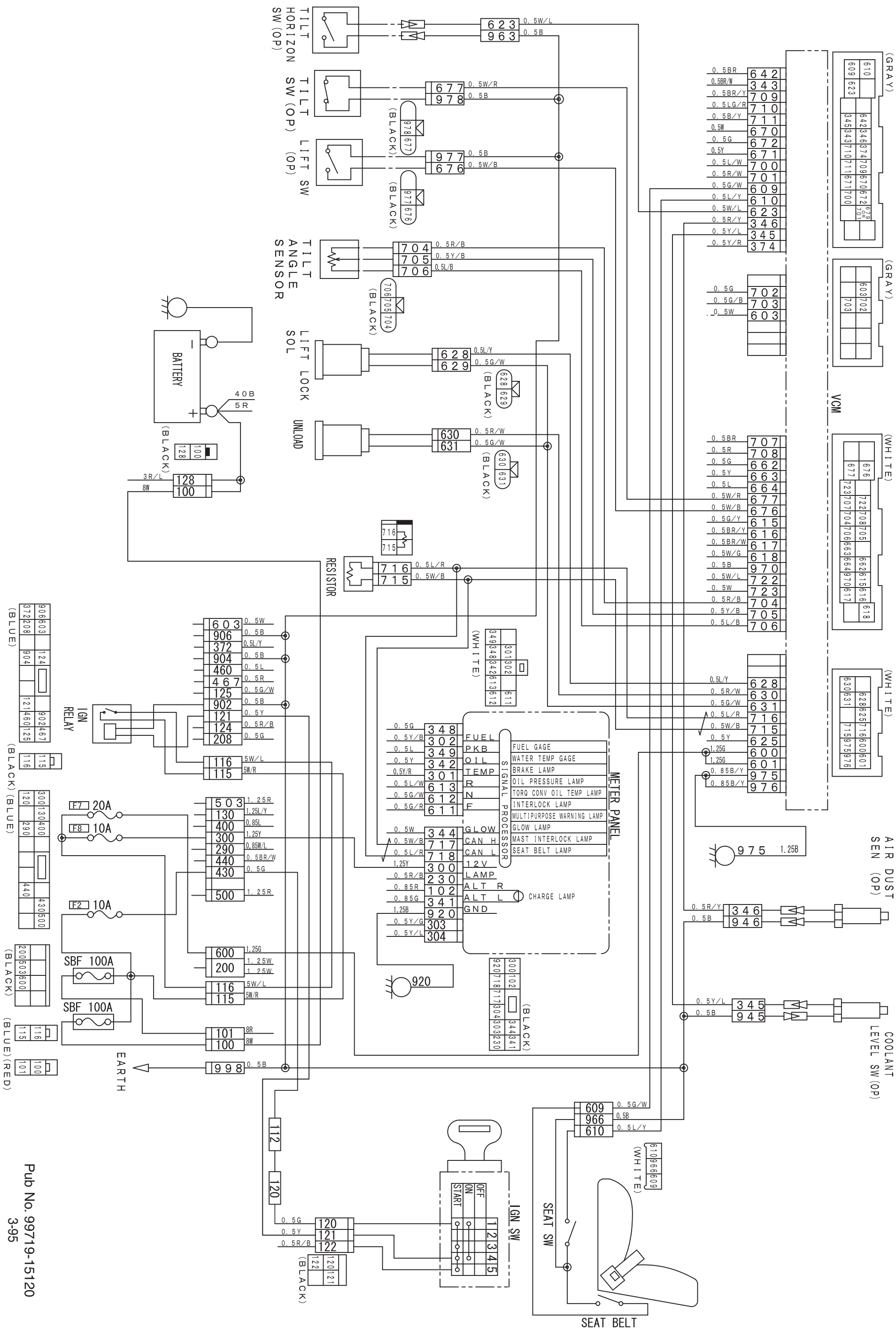
Seat Switch, Lift Cylinder, Tilt Cylinder



Armrest



Seat Switch, Lift Cylinder, Tilt Cylinder



(GRAY)



5. VCM-2 I/O Monitor: Other control 1

Oil press MAIN	[Hex, MPa]
Oil press LIFT	[Hex, MPa]
Weight 0 set SW	ON/OFF
Enter SW	ON/OFF
Next SW	ON/OFF
Auto light sig	ON/OFF
Auto light OUT	ON/OFF
Seat SW	ON/OFF
Seat SW timer	ON/OFF
Seatbelt SW	ON/OFF

GSE VCM-2 → VCM-2		×
Input/Output monitor		
Oil press MAIN	18.5[MPa]	
Oil press LIFT	14.8[MPa]	
Weight 0 set SW	OFF	
Enter SW	OFF	
Next SW	OFF	
Auto light sig	ON	
Auto light OUT	ON	
Seat SW	ON	
Seat SW timer	ON	
Seatbelt SW	ON	
<< [1][2][3][4][5][6] >>		
View Tool		

6. VCM-2 I/O Monitor: Other control 2

Park brake alarm	ON/OFF
Over load alarm	ON/OFF
Over speed alarm	ON/OFF
Coolant low SW	ON/OFF
Air cleaner SW	ON/OFF
T/M warning SW	ON/OFF
Fuel warning SW	ON/OFF
Park brake SW	ON/OFF
AUX in1	ON/OFF
AUX in2	ON/OFF
AUX out1	ON/OFF
AUX out2	ON/OFF
AUX out3	ON/OFF

GSE VCM-2 → VCM-2		×
Input/Output monitor		
Park brake alarm	OFF	
Over load alarm	OFF	
Over speed alarm	OFF	
Coolant low SW	OFF	
Air cleaner SW	OFF	
T/M warning SW	OFF	
Fuel warning SW	OFF	
Park brake SW	OFF	
AUX in1 OFF	AUX out1 ON	
AUX in2 ON	AUX out2 OFF	
	AUX out3 OFF	
<< [1][2][3][4][5][6] >>		
View Tool		

- (8) Verify the current values of unload solenoid and lift lock valve solenoid outputs on the screen.
If the values are not 2500 mA or around, there is a possibility of error.

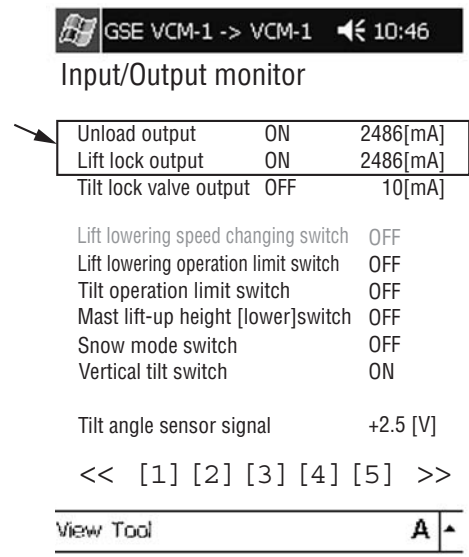


Fig. 1-22 Solenoid current value confirmation screen

- (9) After the confirmation, return the key to OFF position to release the active test.
Be sure to place the key in OFF position whenever proceeding with next procedure.
- If there is a error, see “Error Codes” of Section 5.2 and check each item listed in the error codes F-75, F-77, and F-79.

4. Parking Brake Warning Buzzer and Lamp

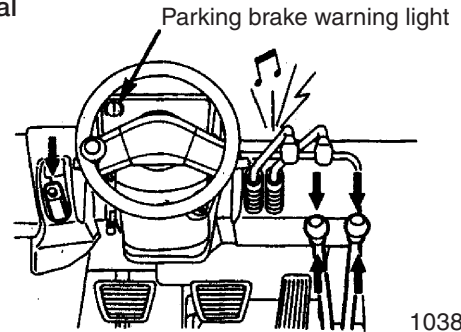
4.1 Function

The parking brake is a double action type designed to be released while pushing the lever top knob. Irrespective of the engine being stopped or running, leaving the operator's seat with the parking brake released activates the operator present switch to sound the warning buzzer and flicker the warning.

! CAUTION

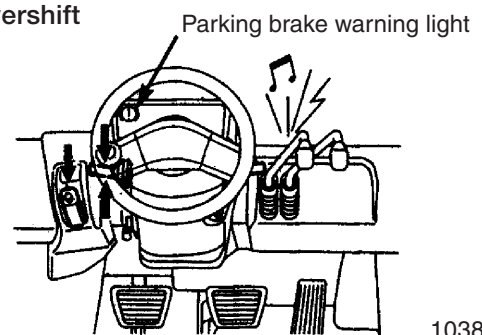
1. Prior to operating the forklift truck, be sure to check the parking brake warning buzzer and light for function.
2. The buzzer and warning light are for reminding the operator to apply the parking brake when leaving the forklift truck. Be sure to maintain them so that they are always in order.
3. When and after parking the forklift truck:
 - Select a place with level and hard surface.
 - Place the direction lever to the neutral position.
 - Lower the forks until the fork tips touch the floor.
 - Apply the parking brake.
 - Stop the engine and remove the key.
4. When replacing the operator's seat, be sure to use Mitsubishi genuine seat with operator present switch.

Manual



103884

Powershift



103885

Controller Function

Sends the warning signal to sound the buzzer when the operator is not seated in the seat with the parking brake released when the key is in ON position.

When the key is in OFF position, the controller does not activate since the power is not supplied to the controller. In such a case, the buzzer will sound by releasing the parking brake through the relay circuit.

Err code	Description	Probable cause	Check point
F54	Lift sol leak	1. Connector contact bad	1. Connector connection check
		2. Diode bad	2. Diode connection check
		3. Harness bad	3. Harness connection check
		4. Lift sol bad	4. Lift sol connection check
		5. Controller bad	
F55	Tilt FW sol err	1. Connector contact bad	1. Connector connection check
		2. Diode bad	2. Diode connection check
		3. Harness bad	3. Harness connection check
		4. Tilt FW sol bad	4. Tilt FW sol connection check
		5. Controller bad	
F57	Tilt BW sol err	1. Connector contact bad	1. Connector connection check
		2. Diode bad	2. Diode connection check
		3. Harness bad	3. Harness connection check
		4. Tilt BW sol bad	4. Tilt BW sol connection check
		5. Controller bad	
F59	Tilt sol leak	1. Connector contact bad	1. Connector connection check
		2. Diode bad	2. Diode connection check
		3. Harness bad	3. Harness connection check
		4. Tilt sol bad	4. Tilt sol connection check
		5. Controller bad	

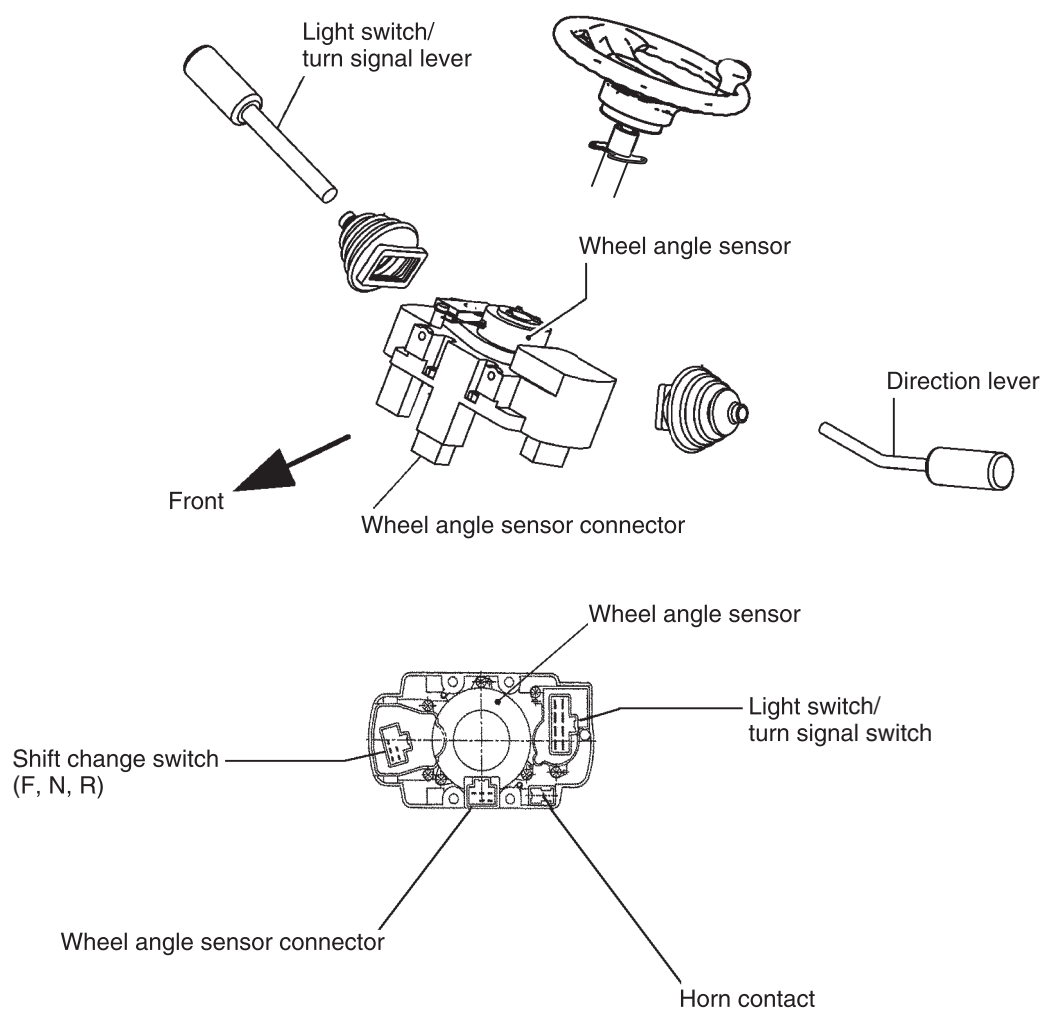


Fig. 7-7 Direction Lever

7.5 Speed Sensor

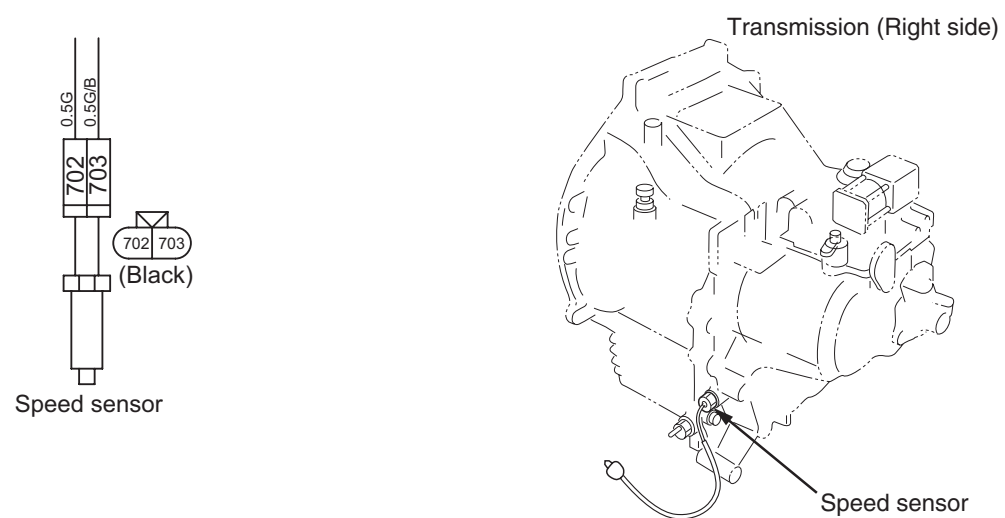
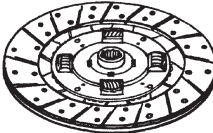
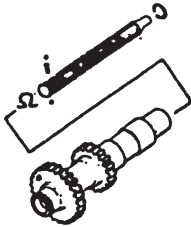
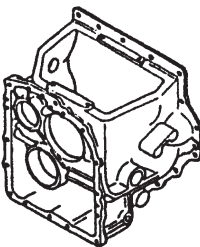
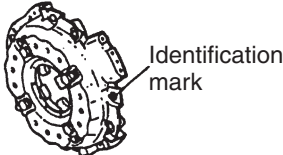
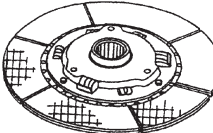
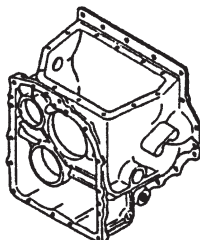
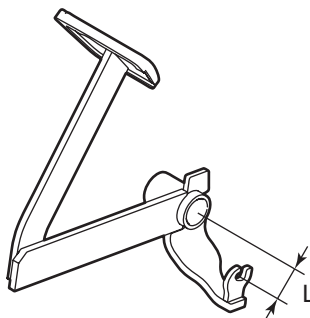
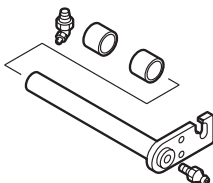
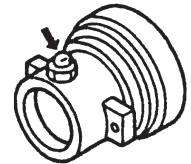
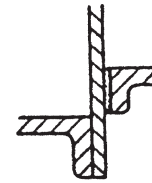
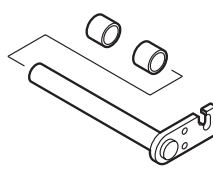
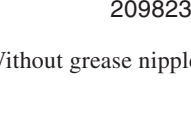
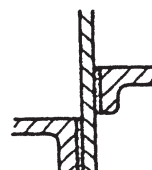


Fig. 7-8 Speed Sensor

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- (4) Connect the accelerator pedal link on the floor plate to the throttle cable. Check that the throttle lever is at the full-open position when the accelerator pedal is fully depressed.
- (5) Bleed the air out of the brake fluid circuit after connecting the brake pipe.
- (6) When installing the exhaust pipe, use a new gasket.
- (7) Connect the ground (negative) cable to the battery only after making sure that all wiring is connected properly.
- (8) Refill the engine, radiator, and transmission with oils/coolant, and check for leakage. Unless otherwise specified, use soft water (tap water) mixed with antifreeze at a concentration of 35%.
- (9) Bleed the air out of the fuel circuit of the engine.
- (10) After checking the parts, start the engine and check that the clutch booster functions properly (wet-type clutch transmission trucks only). Operate the mast lifting/tilting and steering, and check the hydraulic oil level. Also recheck the engine oil, coolant and transmission oil levels.

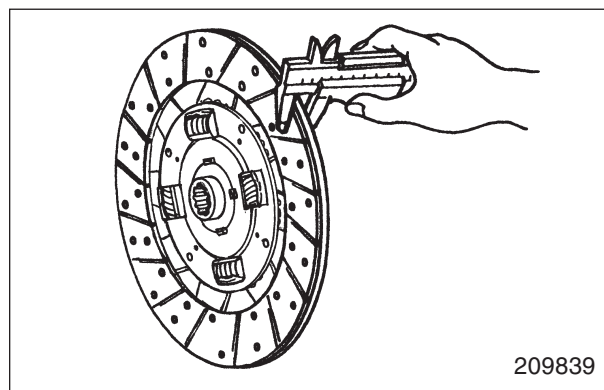
Principal Differences between Dry-type and Wet-type Clutches

Clutch cover assembly					Clutch disc	Input shaft	Clutch housing																
Dry-type	<table><tr><td>Engine mounted</td><td>S4Q2 K21</td><td>S4S K25</td><td>K15</td></tr><tr><td>Items</td><td></td><td></td><td></td></tr><tr><td>Identification mark</td><td>Yellow</td><td>Blue</td><td>Black</td></tr><tr><td>Spring</td><td>12 pieces</td><td>12 pieces</td><td>8 pieces</td></tr></table>				Engine mounted	S4Q2 K21	S4S K25	K15	Items				Identification mark	Yellow	Blue	Black	Spring	12 pieces	12 pieces	8 pieces			
	Engine mounted	S4Q2 K21	S4S K25	K15																			
	Items																						
Identification mark	Yellow	Blue	Black																				
Spring	12 pieces	12 pieces	8 pieces																				
Wet-type	 209814																						
	<table><tr><td>Engine mounted</td><td>S4S K25</td><td>S4Q2 K21, K15</td></tr><tr><td>Items</td><td></td><td></td></tr><tr><td>Identification mark</td><td>Brown</td><td>Pink</td></tr><tr><td>Spring</td><td>12 pieces</td><td>10 pieces</td></tr></table>							Engine mounted	S4S K25	S4Q2 K21, K15	Items			Identification mark	Brown	Pink	Spring	12 pieces	10 pieces	209816	209617	209819	
	Engine mounted	S4S K25	S4Q2 K21, K15																				
Items																							
Identification mark	Brown	Pink																					
Spring	12 pieces	10 pieces																					
Clutch pedal					Clutch shifter shaft	Release bearing	E/G packing																
Dry-type	Dry-type: L = 40.6 mm (1.60 in.) 				Grease lubricated type 	With grease nipple 																	
	Wet-type	Wet-type: L = 40.6 mm (1.60 in.) 							Without grease nipple 														
209820				209821	209823	209824																	
209820				209822		209825																	

Inspection and Repair

(1) Clutch disc assembly

(a) Clutch disc thickness



209839

A: Standard value B: Repair or service limit

Item		Dry-type	Wet-type
Clutch disc thickness mm (in.)	A	Both sides: 9.2 ± 0.3 (0.362 ± 0.0118)	Both sides: 6.0 ± 0.3 (0.236 ± 0.0118)
	B	Each side: 1.5 (0.059) Both sides: 2.1 (0.08)	Each side: 0.4 (0.016) Both sides: 0.8 (0.031)

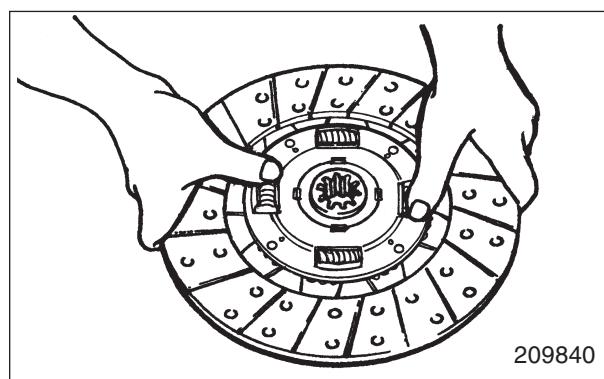
Replace the clutch disc if wear exceeds the service limit.

NOTE

If the facings are badly worn beyond the service limit, the release cylinder is no longer effective in compensating for facing wear, causing the clutch to slip. In such a case, replace the clutch disc immediately.

(b) Tightness of facing rivets

Check the clutch disc for broken or fatigued torsion springs and loose rivets. Also check for hardened friction surfaces and oil or grease on the surfaces. Replace the clutch disc if defective.



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(c) Disc face runout

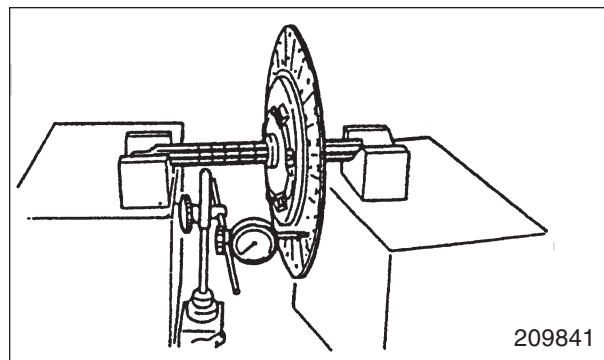
Measure the clutch disc for face runout. Replace the clutch disc if defective.

A: Standard value

Face runout (at rim)	A	1.0 mm (0.039 in.) max.
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(d) Others

Check for hub spline wear, worn damper and scratches on the friction surfaces.



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Inspection and Repair

(1) Cylinder body

- (a) Check the inside surfaces for scratches, uneven wear and corrosion.
- (b) Check the inlet and relief ports for condition. Also check the joint for damaged threads.

(2) Piston assembly



CAUTION

The piston assembly is a periodic replacement part. For safety, however, its replacement at each time of disassembly is recommended.

- (a) Check the piston assembly for scratches, uneven wear and damage on the sliding contact surface. Repair it if defect is minor or replace if damaged.
- (b) Check the piston cups for damaged lip, chafed base, wear and swelling. Replace if defective using the repair kit.
- (c) Measure the clearance between the piston assembly and cylinder body. Replace the piston assembly together with the cylinder body if the measurement exceeds the service limit.

A: Standard value B: Repair or service limit

Clearance between piston and cylinder mm (in.)	A	0.016 to 0.086 (0.0006 to 0.0034)
	B	0.15 (0.0059)

- (d) Check the piston cups for interference. Replace them using the repair kit if the interference is less than the service limit.

A: Standard value B: Repair or service limit
Unit: mm (in.)

Piston cup interference	Primary cup	A	Approx. 1.0 (0.039)
		B	0.4 (0.016)
	Secondary cup	A	Approx. 1.1 (0.043)
		B	0.4 (0.016)

(3) Return spring

- (a) Check the return spring for scars, wear and perpendicularity. Replace if defective.
- (b) Measure the free length of the return spring. Replace if the measurement exceeds the service limit.

A: Standard value B: Repair or service limit

Free length of return spring	A	81 mm (3.19 in.)
	B	74.2 mm (2.92 in.)

(4) Push rod

- (a) Check the push rod for bending and deformation. Replace if defective.

(5) Boot

- (a) Check the boot for cracks, damage and tear. Replace if defective.
- (b) Check the boot for interference with the cylinder and push rod. Replace the boot if it has no or little interference.

(6) Filler union

- (a) Check the filler union for cracks and scars. Replace if any size of crack or scar is found.
- (b) Check the filler union for deformation. Replace if excessively deformed.

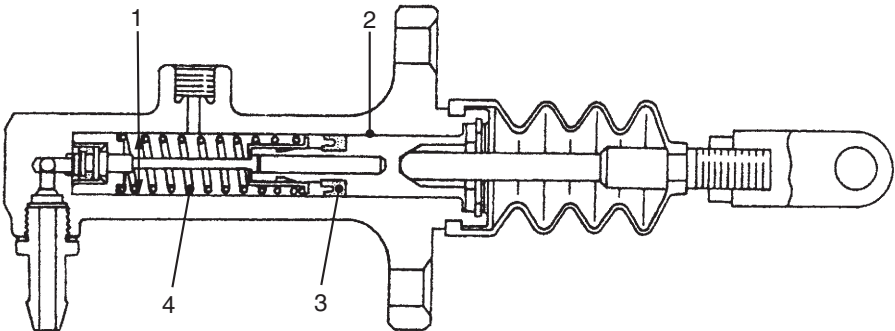
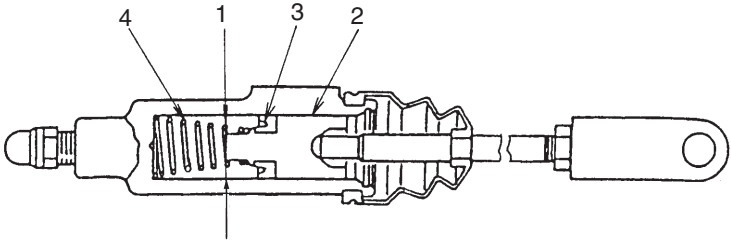
Reassembly

To reassemble, follow the reverse of disassembly sequence performing the following with particular care.

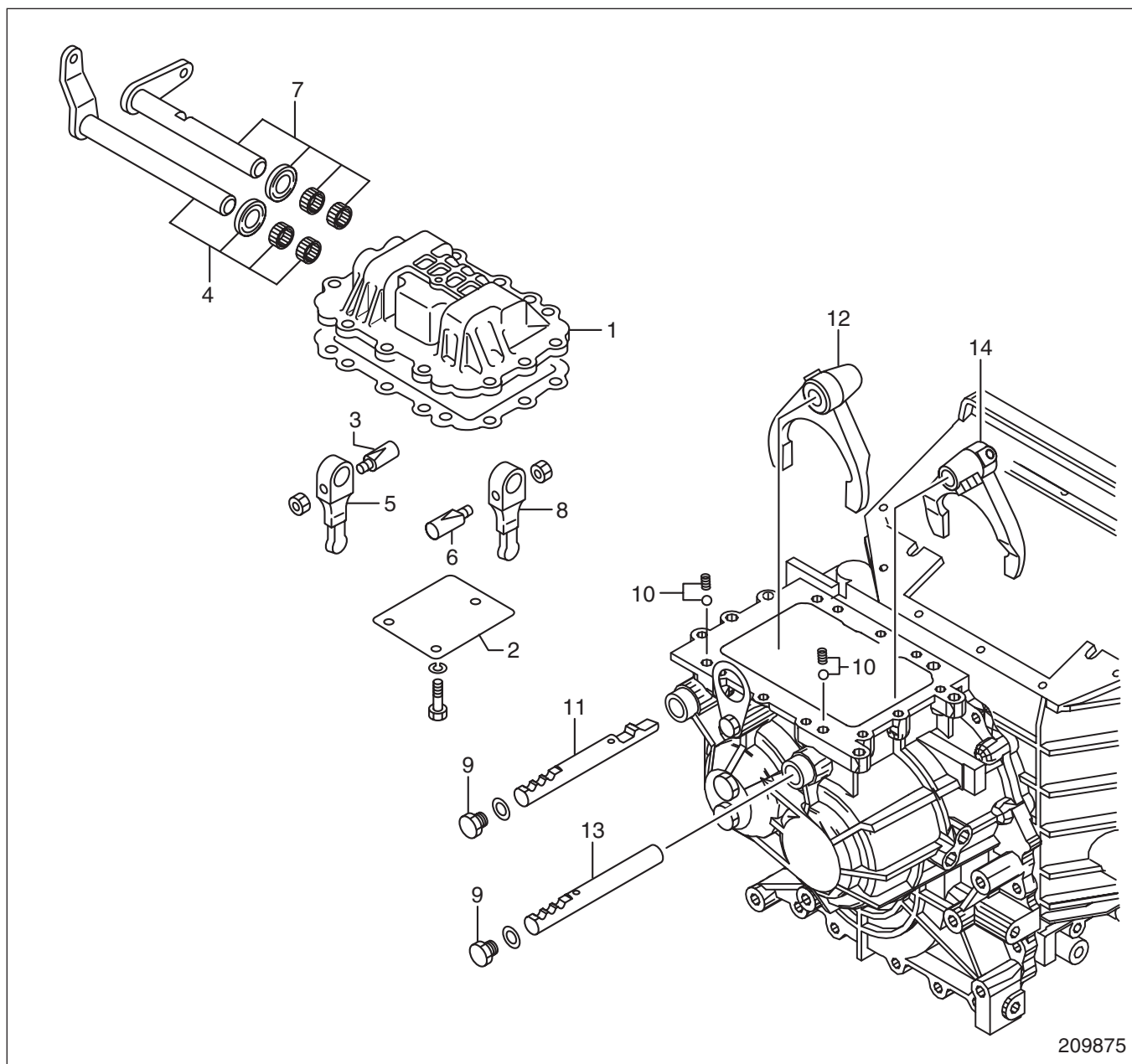
- (1) Wash all metal parts with volatile cleaning solvent. After washing, blow off the solvent completely with compressed air.
- (2) Apply a thin coat of rubber grease (METAL RUBBER #20) or brake fluid to the inside surface of cylinder body and the peripheral surface of piston cups.
- (3) Be careful not to damage the lip of piston cups.

A: Standard value B: Repair or service limit

Unit: mm (in.)

Item		Truck Model	1 ton class	2 ton class	3 ton class
Clutch master cylinder (common to dry- and wet-types)	Inside diameter 1	A	15.875 (0.625)		
	Clearance between piston and cylinder 2	A	0.016 to 0.086 (0.0006 to 0.0034)		
		B	0.15 (0.0059)		
	Diameter of piston cup 3	A	17.0 ± 0.2 (0.669 ± 0.008)		
	Free length of return spring 4	A	81 (3.19)		
					204807
Clutch release cylinder (common to dry- and wet-types)	Inside diameter 1	A	22.22 (0.875)		
	Clearance between piston and body 2	A	0.020 to 0.105 (0.00079 to 0.00414)		
		B	0.15 (0.0059)		
	Diameter of piston cup 3	A	24 ± 0.2 (0.94 ± 0.008)		
	Free length of return spring 4	A	43 (1.69)		
					206436

Control Covers, Shift Rails and Forks



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Sequence

- | | |
|---|--------------------------|
| 1 Control cover | 8 Shift lever |
| 2 Control plate cover, Bolts, Washers | 9 Plug, Gasket |
| 3 Lock pin, Nut | 10 Spring and steel ball |
| 4 Shift lever, Needle bearing, Oil Seal | 11 Shift rail (F – R) |
| 5 Shift lever | 12 Shift fork (F – R) |
| 6 Lock pin, Nut | 13 Shift rail (H – L) |
| 7 Shift lever, Needle bearing, Oil Seal | 14 Shift fork (H – L) |

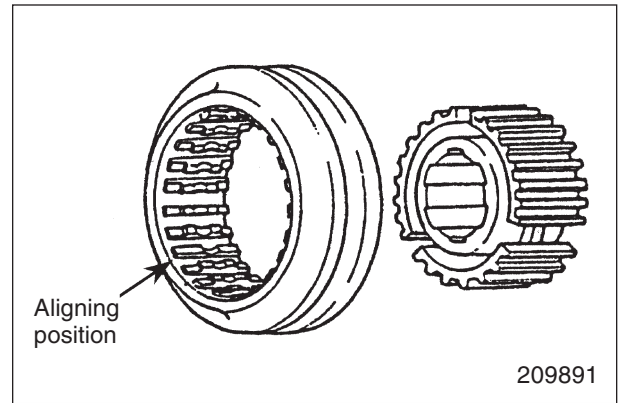
Suggestions for Reassembly

(1) Needle bearing

- (a) Apply gear oil to the needle bearings before they are installed.

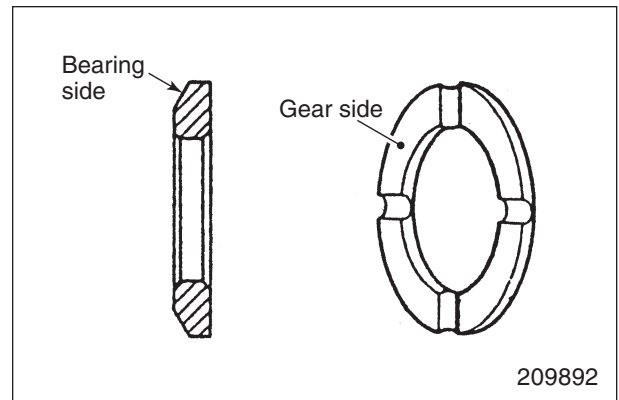
(2) Synchromesh assembly

- (a) Align three grooves on the outer circumference of the synchronizer hub with the synchronizer sleeve before the sleeve and hub are assembled together.
- (b) Apply molybdenum disulfide grease to the contact faces of the cone on the gear and the cones of the synchronizer rings.



(3) Thrust washer

- (a) One side of the thrust washer faces the bearing and the other side faces the gear. Make sure that the thrust washers are installed correctly.



(4) Nut

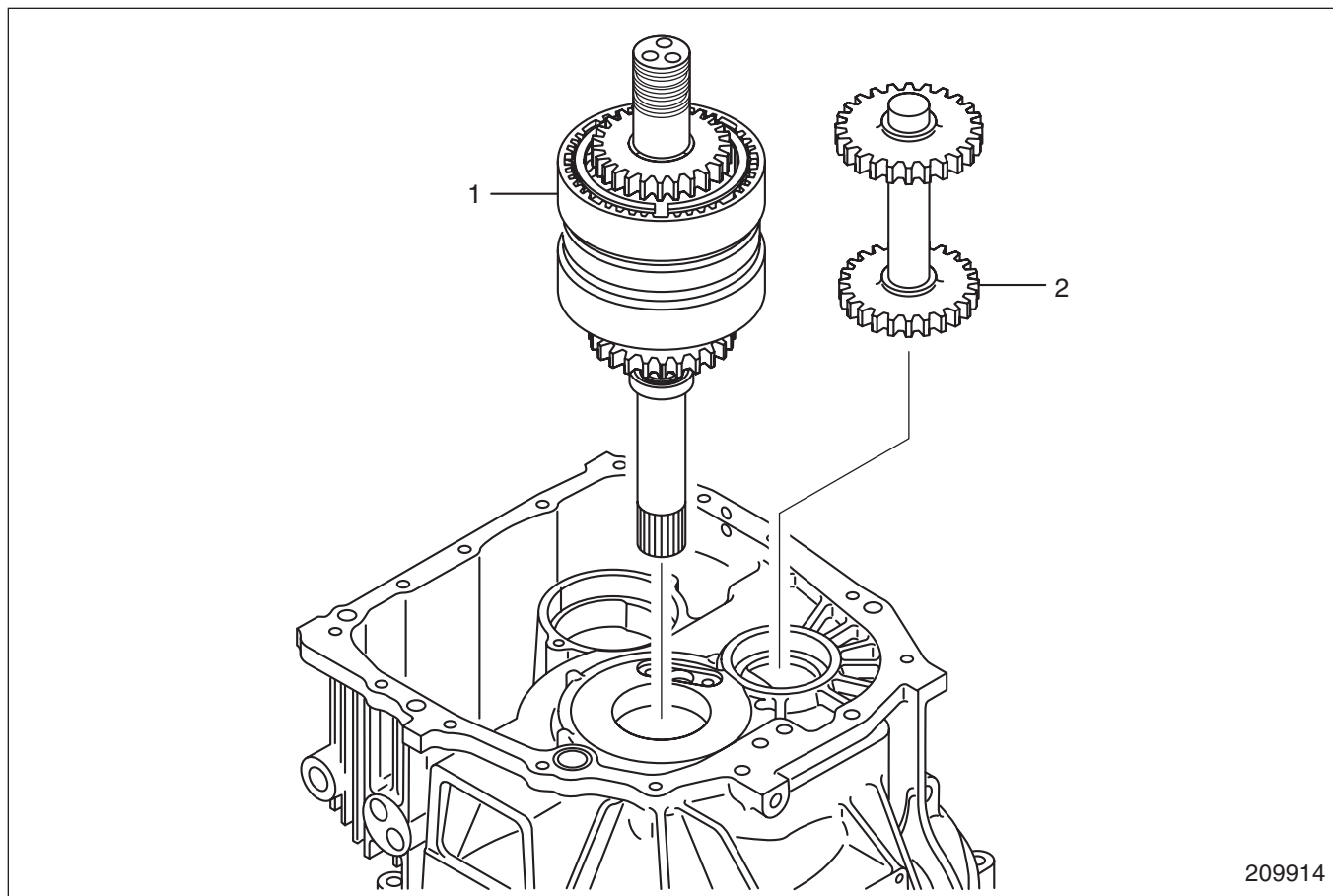
- (a) Tighten the nuts to the specified torque. Never use an impact wrench.

A: Standard value

Tightening torque	A	$245 \pm 24.5 \text{ N}\cdot\text{m}$ $(25.0 \pm 2.5 \text{ kgf}\cdot\text{m})$ $[180 \pm 18 \text{ lbf}\cdot\text{ft}]$
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Output Gear Assembly and Idler Shaft

Disassembly



Sequence

1 Input gear assembly

2 Idler shaft

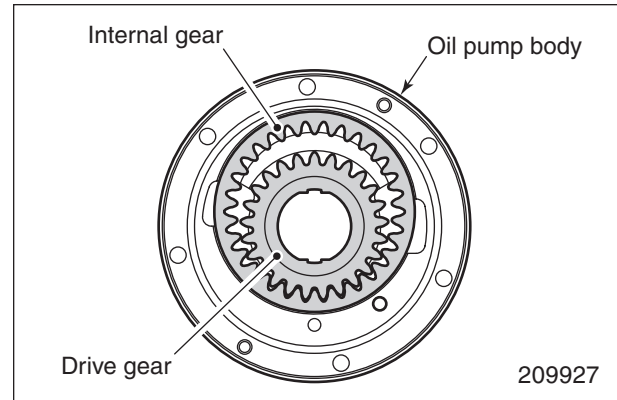
Inspections after Disassembly

- (1) Torque converter housing and transmission housing
 - (a) Check for crack or wear.
- (2) Magnet strainer
 - (a) Check for clogging and damage.
- (3) Gear and shaft
 - (a) Check for wear and other damage.
- (4) Output flange
 - (a) Check the splines for wear and other damage.
 - (b) Check the sliding surface to the oil seal for damage.

MEMO

(2) Lubricating internal parts

- (a) Apply ATF to the internal gear, drive gear and the inside surfaces of the oil pump body before reassembling them.



(3) Operation check

- (a) Turn the drive gear of the reassembled oil pump assembly with your fingers to check that it turns smoothly.

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Stall speed out of specification	Lack of engine power if the speed is slightly low in both forward and reverse drive	— Tune up engine.
	Stator and freewheel damaged if the speed is excessively low in both forward and reverse drive	— Replace stator assembly.
	Inching pedal linkage defective, or clutch slipping if the speed is too high	— Repair or replace.

Removal and Installation

Front Wheels

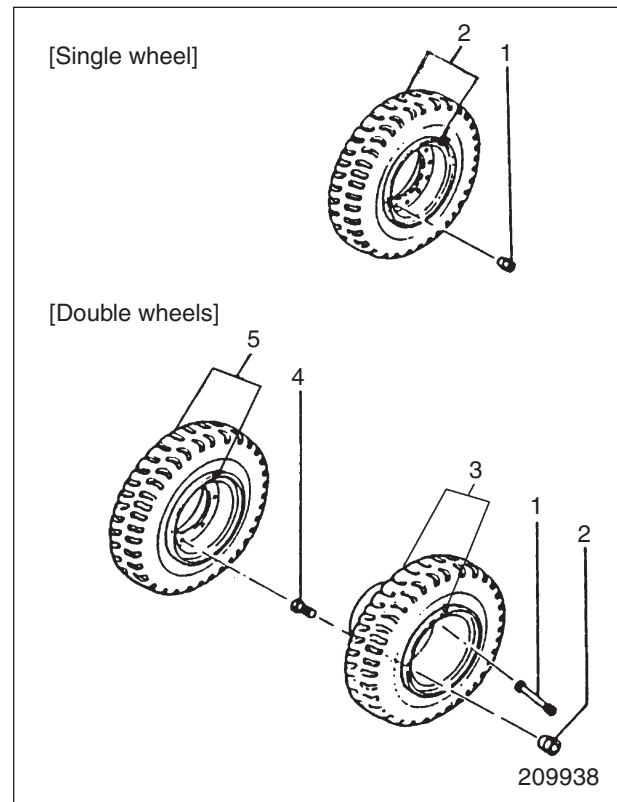
Removal

[Single wheel]

- 1 Wheel nuts
- 2 Front wheel

[Double wheels]

- 1 Extension valve
- 2 Outer wheel nuts
- 3 Front wheel (outer)
- 4 Inner wheel nuts
- 5 Front wheel (inner)

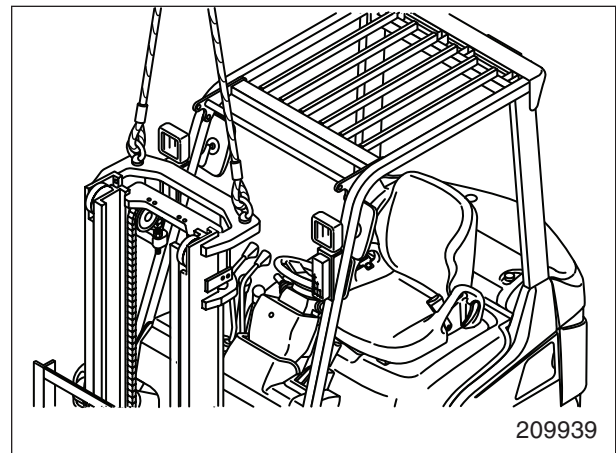


Start by:

- (a) Pull the parking brake lever and block the rear wheels.
- (b) Loosen the wheel nuts 1 by two turns. Then, raise the front end of the truck using a hoist or the hydraulic system.

(1) Hoisting

Using slings and eye-bolts at both ends of the top cross member on the outer mast, lift the front end of the truck with a hoist.



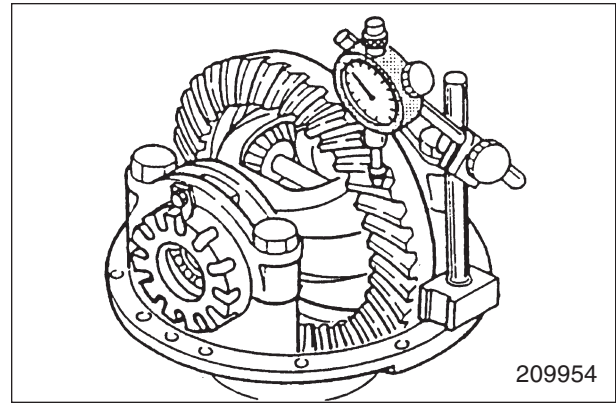
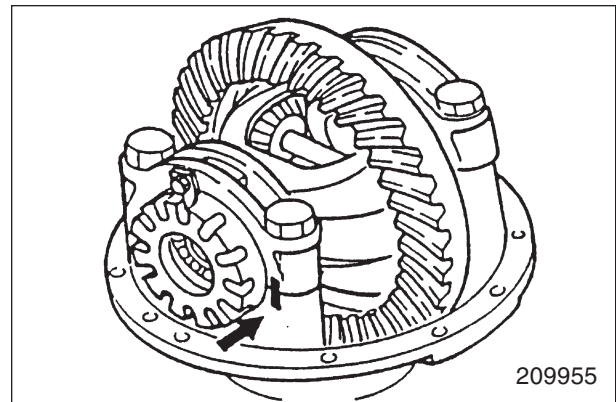
FRONT AXLE AND REDUCTION DIFFERENTIAL

Suggestions for Disassembly

NOTE

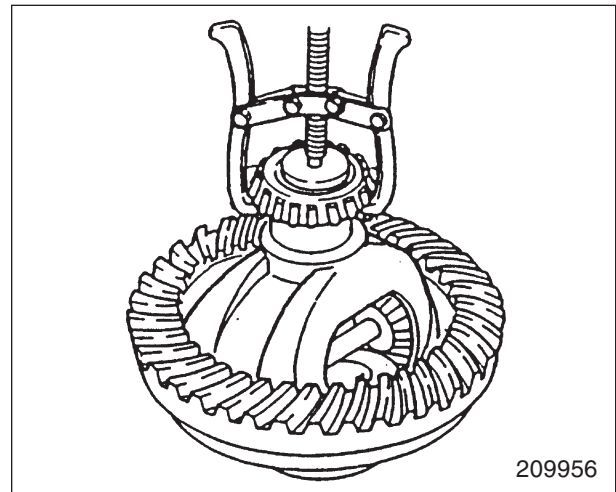
- (a) Before disassembling the differential, except for replacement of the reduction gear set, be sure to measure the gear backlash to ensure correct backlash at the time of reassembly.
- (b) Provide a matching mark across the bearing cap, adjusting screw and carrier on each side to ensure correct refitting.

Truck Model Item	1, 2 ton classes	3 ton class
Backlash between reduction gear and reduction pinion	0.20 to 0.28 mm (0.0079 to 0.0110 in.)	0.25 to 0.33 mm (0.0098 to 0.0130 in.)



(1) Removing bearing

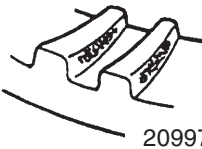
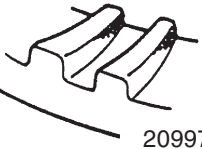
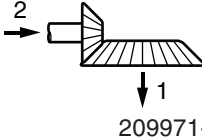
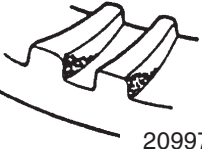
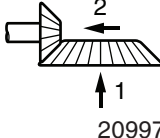
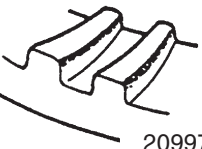
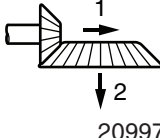
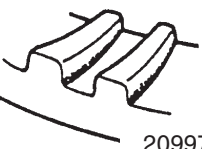
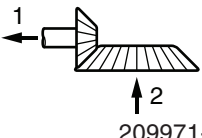
Use a bearing puller to remove the inner bearing.



(2) Removing shims

After removing the lock nut 5 and shims, check and record the total thickness of the shims. Tie the shims to the lock nut so as not to be lost.

Tooth Contact Patterns and Adjustment

	Tooth contact		Adjustment	
1	 209971-1	Extends from toe to middle portion, covering 50% or more of tooth length.	Correct tooth contact	
2	 209971-2	Short contact at toe of tooth (Toe)	 209971-6	1. Move gear away from pinion. 2. Move pinion toward gear for correct backlash by increasing shim thickness.
3	 209971-3	Short contact at heel of tooth (Heel)	 209971-7	1. Move gear toward pinion. 2. Move pinion away from gear for correct backlash by decreasing shim thickness.
4	 209971-4	Heavy contact on face or top half (addendum) of tooth (Face)	 209971-8	1. Move pinion toward gear by increasing shim thickness. 2. Move gear away from pinion for correct backlash.
5	 209971-4	Heavy contact on bottom half (dedendum) of tooth (Flank)	 209971-9	1. Move pinion away from gear by decreasing shim thickness. 2. Move gear toward pinion for correct backlash.

Notice: For “Toe” or “Heel” contact, see the contact pattern on the outside (convex) of the reduction gear tooth. In the case of “Face” or “Flank” contact, repeat the above adjustment until the correct tooth contact is obtained.

Disassembly and Reassembly

1. Disassembly and Reassembly of Wheel Hub

Suggestions for Disassembly

1. Remove rear wheels as preparatory work.
2. Check the hub for looseness. If there is looseness, the bearing may be worn.
3. If the bearing is not damaged, it is not necessary to remove it.
4. The cup and the cone of the bearing make a pair. When replacing, replace them as a set.
5. When removing the oil seal 8, replace it with a new one. Do not reuse it.
6. Use a special service tool to remove the bearing.

Inspection after disassembly

1. Bearing

Replace the bearing if damage, seizure, peel, rotation failure or abnormal noises are found.

2. Hub

Replace the hub if cracks are detected by dye check.

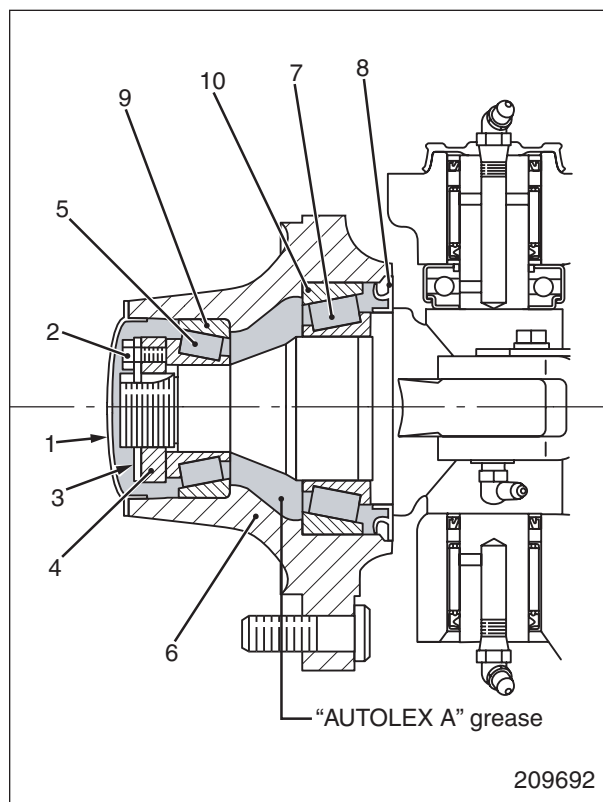
3. Oil seal

Replace a damaged or worn oil seal with a new one.

Reassembly

Follow the sequence of disassembly in reverse, paying attention to the following points.

1. Fill "AUTOLEX A" grease or equivalent wheel bearing grease in the shaded area in the illustration on the right. Be careful to sufficiently fill it in the roller retainer. Apply grease also to the oil seal lip groove.
2. Adjust the bearing. Refer to "Adjusting procedure of wheel bearing reassembly" on the following page.
3. Fill grease in the inside of the hub cup 1 before pushing in the hub cup 1.



Disassembly sequence

- 1 Hub cup
- 2 Bolt
- 3 Lock plate
- 4 Lock nut (hexagon nut)
- 5 Bearing cone
- 6 Hub (with bearing cup)
- 7 Bearing cone
- 8 Oil seal
- 9 Bearing cup
- 10 Bearing cone

Inspection after disassembly

1. Cylinder

- (1) Check the cylinder bore for rusting, erosion, abnormal wear, or scoring.
- (2) Check the inlet and relief ports for restriction. Check the threads on each joint for damage. Also, check the boot and other parts for damage.

2. Piston

Check the piston for damage. Replace if it is damaged. Insert the piston into the cylinder, and measure the piston-to-cylinder clearance. If the clearance is in excess of the service limit, replace the cylinder and piston.

A: Standard value B: Service limit

Clearance between cylinder and piston	A	0.020 to 0.105 mm (0.00079 to 0.00413 in.)
	B	0.15 mm (0.0059 in.)

3. Return spring

Replace the spring if it is severely damaged or its free length is at or less than the service limit.

A: Standard value B: Service limit

Spring free length	A	59.2 mm (2.3 in.)
	B	53.9 mm (2.1 in.)

4. Cups in piston assembly

Check the rubber parts for damage or swelling. If the lips are damaged even slightly, the base is bitten, or abnormal fatigue, wear or swelling is evident, replace the piston assembly. If the cup tightness is 0.4 mm (0.0157 in.) or less, replace the piston assembly.

NOTE

The cups must be replaced periodically. It is a safe and good practice to replace them whenever the master cylinder is disassembled.

Reassembly

To reassemble, follow the disassembly procedure in reverse, paying attention to the following points.

- (1) Wash all metal parts clean with volatile cleaning solvent, and completely dry them with compressed air.
- (2) Apply a thin coat of rubber grease exclusively designed for brake components or brake fluid to the cylinder bore, piston cups, and the inner face of the filler union bushing mounting hole.

Inspection and Repair

(1) Cylinder body

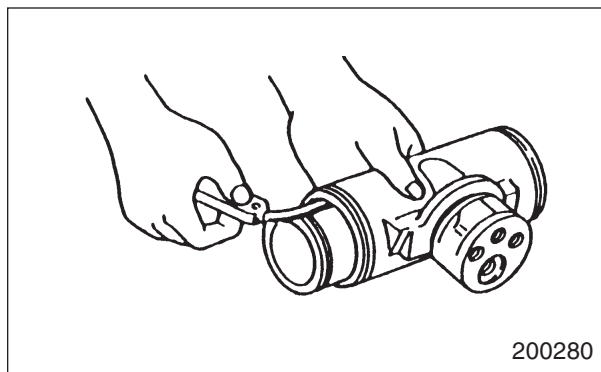
- (a) Check the bore for rusting, erosion or scoring.
- (b) Check the threads of bleeder screw and oil pipe for damage.

(2) Pistons

- (a) Check the sliding surface for rusting or scratching.
- (b) With the piston installed in the cylinder body, measure the piston-to-cylinder clearance. Replace if the clearance is in excess of the service limit.

A: Standard value B: Service limit

Clearance between piston and cylinder	A	0.020 to 0.105 mm (0.00079 to 0.00413 in.)
	B	0.15 mm (0.0059 in.)



(3) Piston cups

Check for swelling, damage or other defects. Replace the cup if defective even slightly.

A: Standard value B: Service limit

Tightness between piston cup and cylinder body	A	1.85 mm (0.07 in.)
	B	0.65 mm (0.025 in.)

(4) Boots

Replace the boots if they show damage or aged deterioration. In any event, the boots must be replaced every year.

Reassembly

To reassemble, follow the disassembly procedure in reverse, paying attention to the following points.

- (1) Wash all metal parts clean with volatile cleaning solvent, and completely dry them with compressed air.
- (2) Apply a thin coat of rubber grease exclusively designed for brake components or brake fluid to the cylinder bore and piston cups.
- (3) Be careful not to damage the lips of the cups.
- (4) Make sure that the cups face the correct directions when reassembled.
- (5) Tighten the bleeder screw to the specified torque.

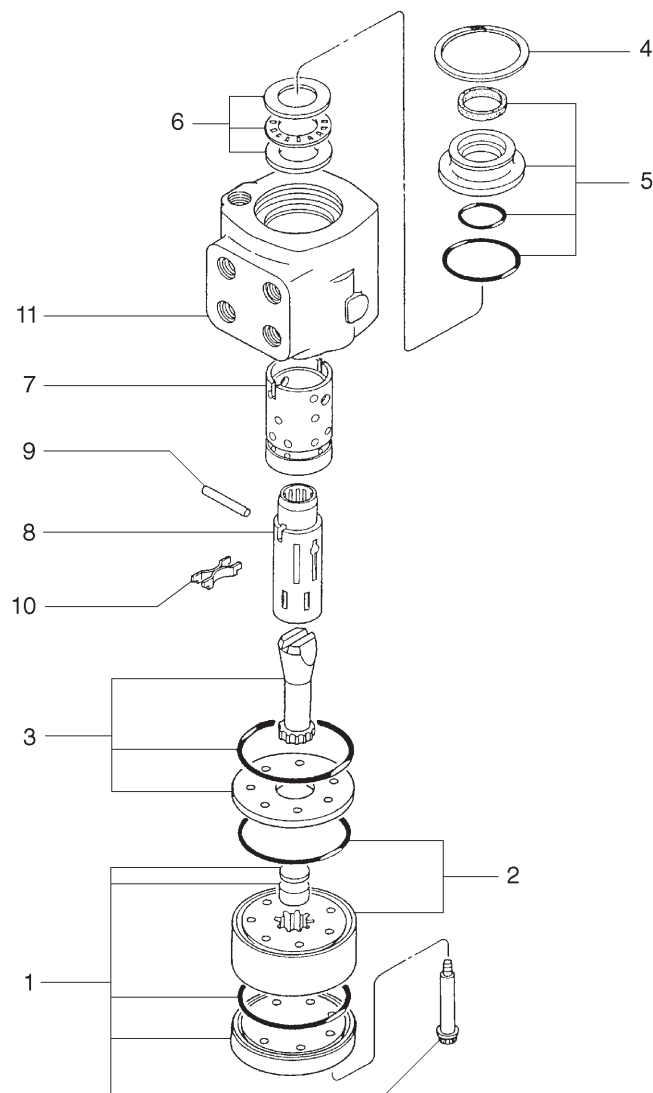
Tightening torque	5.9 to 8.8 N·m (0.6 to 0.9 kgf·m) [4.3 to 6.5 lbf·ft]
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STEERING SYSTEM

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Steering Valve

Disassembly



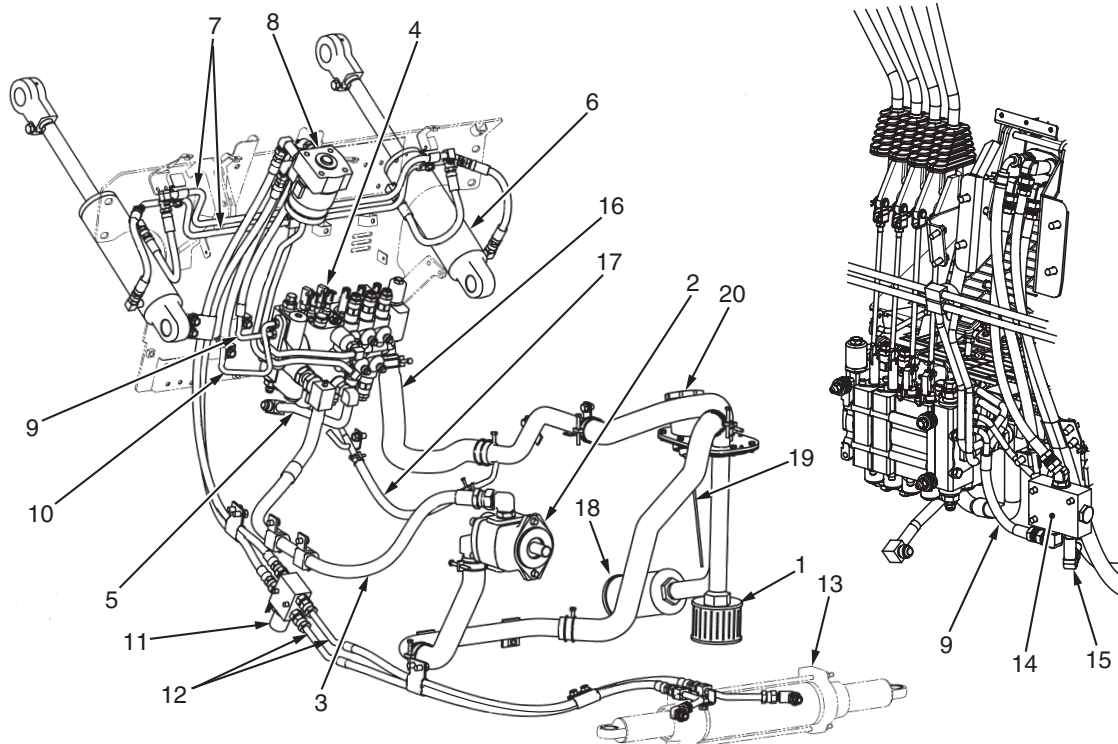
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Sequence

- | | |
|---|----------------------|
| 1 End cap, Bolts, O-ring, Spacers | 7 Control sleeve |
| 2 "Gerotor" set, O-ring | 8 Control spool |
| 3 Drive shaft, Spacer plate, O-ring | 9 Pin |
| 4 Retaining ring | 10 Centering springs |
| 5 Seal gland bushing, O-ring, Oil seal, Dust seal | 11 Long housing |
| 6 Thrust needle, Race bearing | |

Structure and Functions

Outline



The illustrations show the load handling (pump motor) hydraulic system on a 2 ton class truck with S4S diesel engine and MC valves.

209752

Main components

- 1 Pump suction strainer:
150-mesh metal strainer
- 2 Hydraulic pump (gear pump):
A regular gear pump is directly coupled to the engine PTO. See the "Hydraulic Pump" section for details.
- 3 Hydraulic pump delivery hose:
The shape of this hose for the diesel-engine models is different from that of the gasoline-engine models, as the hydraulic pump locations of these two models are different.
- 4 Hydraulic control valve:
All trucks come standard with an MC valve, but an FC valve is also available as an option. The MC valve has a built-in flow regulator valve, but the FC valve does not.
MC trucks and FC trucks have roughly the same piping. See the "Piping" section (page 13-31) for details.
- 5 Oil feed line to lift cylinder:
FC trucks have a flow regulator valve in a downstream section of this line. This line also has a hydraulic pressure sensor.
- 6 Tilt cylinder
- 7 Piping to tilt cylinder
- 8 Steering valve
- 9 Oil feed line to steering valve P port:
This line constitutes a part of the PF flow passage.
- 10 Return line from steering valve
- 11 Knob control valve (solenoid valve)
- 12 Oil feed line to steering cylinder
- 13 Steering cylinder
- 14 Flow divider valve:
This valve allows a certain amount of the PF flow from line 9 to flow into the booster of the wet clutch. The remainder of the PF flow is passed on to the steering valve.
- 15 Oil feed line to clutch booster:
The oil will ultimately return to the oil tank through the dedicated passage.
- 16 Return line
- 17 Line leading to top of lift cylinder piston:
This line is only installed in trucks that have a lift cylinder with a return line. It is not installed in trucks with 3.3 m (10.8 ft) or smaller lift. If this line is not installed, the branching hole from return line 16 is closed with a blind plug.
- 18 Return filter:
This cartridge-type filter should be replaced at every oil change.
- 19 Level gauge
- 20 Oil filter cap

Action

Pressure oil first flows through the hollow area inside piston rod 2 and enters the first lift cylinder. As the inside diameter of the first lift cylinder is larger than that of the second lift cylinder, the first lift cylinder ascends first. The second lift cylinder starts to ascend after the first lift cylinder has completed ascent.

This cylinder is provided with a cushion mechanism which prevents the piston bottom from impulsively contacting the cylinder bottom during piston descent. (Refer to the illustration below.)

Bleed valve 9 is a valve for bleeding air when the hydraulic system is overhauled.

Action during piston descent

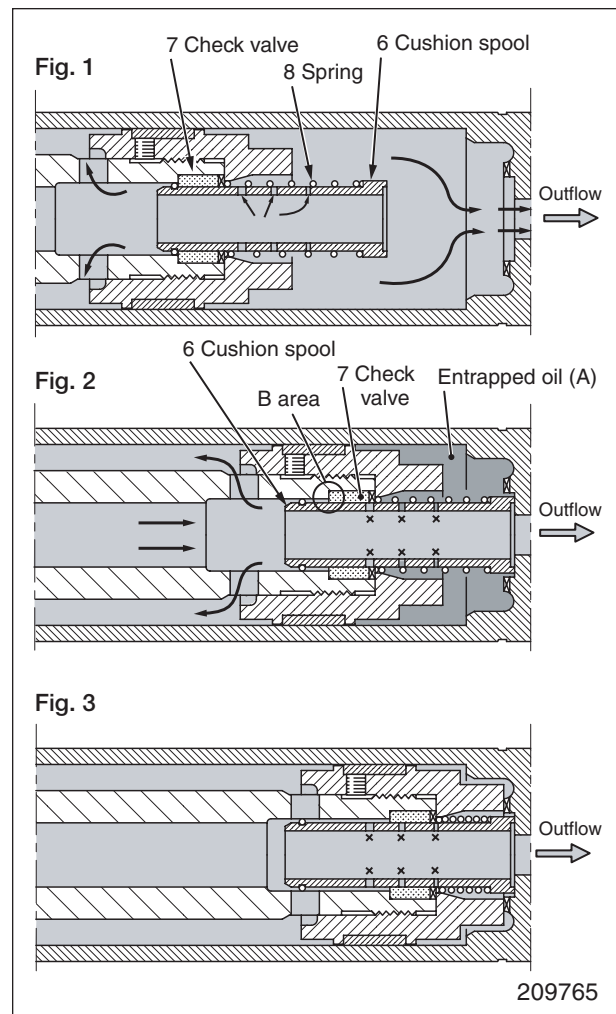
The illustration on the right explains movement of cushion spool 6 when the piston descends. (To the right of the illustration is the piston bottom.)

Fig. 1: This illustration shows a condition in which cushion spool 6 does not contact the cylinder bottom. Cushion spool 6 extends out by spring 8.

Fig. 2: This illustration shows a condition in which cushion spool 6 contacts the cylinder bottom and gets under check valve 7 slightly. The check valve moves to the left, blocking the B area. Oil (A) below the underside of the piston is discharged through holes (two rows on the right) of cushion spool 6.

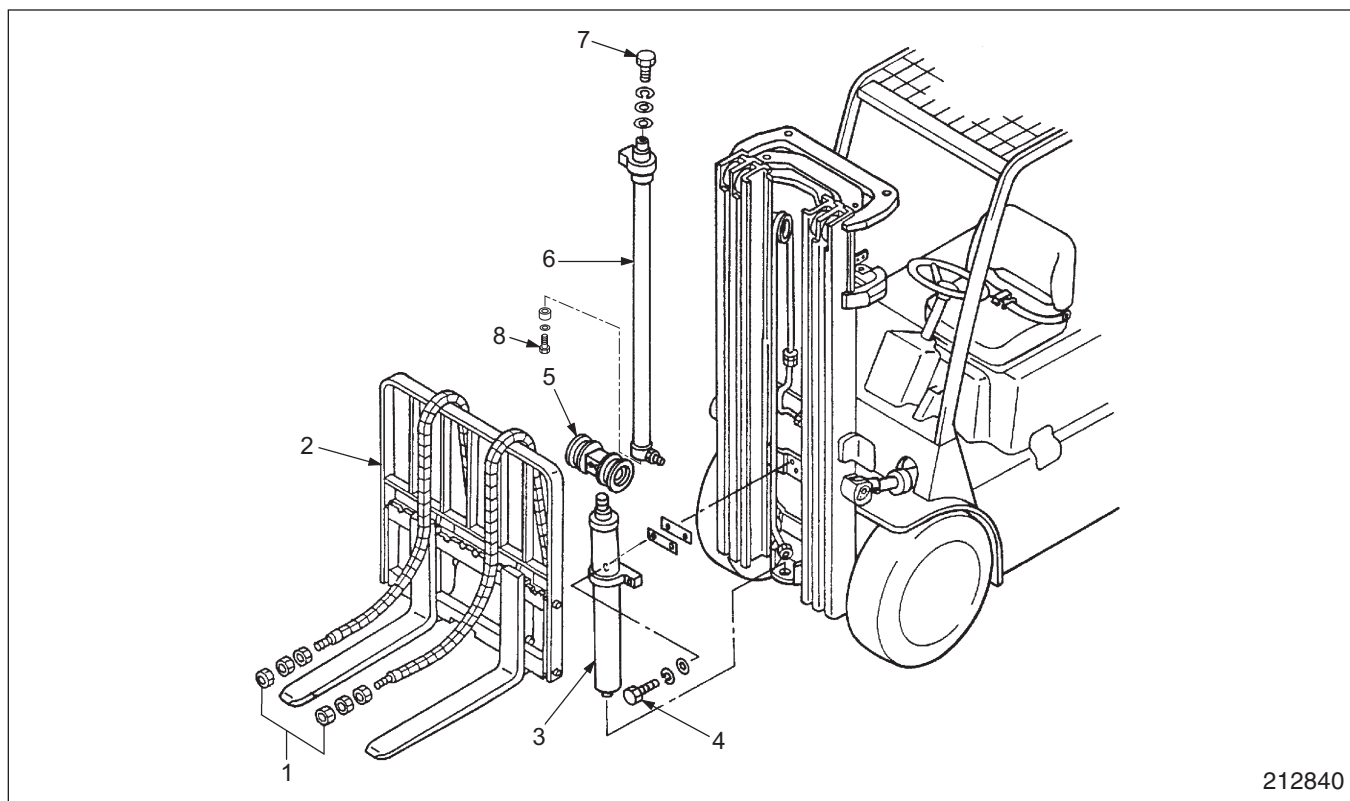
For the shape of the check valve, refer to the image drawing on the following page.

Fig. 3: As the piston descends, cushion spool 6 gets under the check valve further. As a result, the number of holes through which oil can pass decreases and discharge of entrapped oil (A) is restricted. The descending speed of the piston becomes slower and impulsive contact is avoided.



Duplex and triplex mast removal

Note that the triplex mast is used as an example.



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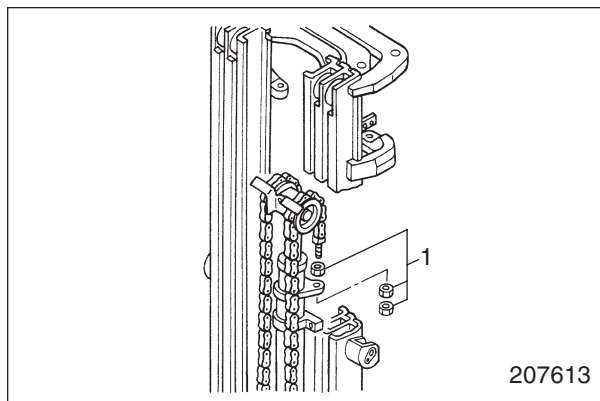
Sequence

- | | |
|-------------------------|--------------------------------|
| 1 Nuts | 5 Chain wheel support assembly |
| 2 Lift bracket assembly | 6 Second lift cylinder |
| 3 First lift cylinder | 7 Set bolt |
| 4 Mounting bolt | 8 Mounting bolt |

Suggestions for Removal

1. Removing lift bracket assembly

- (1) Lower the lift bracket assembly and place wood blocks under the assembly. Tilt the mast forward, lower the inner mast to the bottom, then remove nuts 1 from the anchor bolts of the first lift chains.

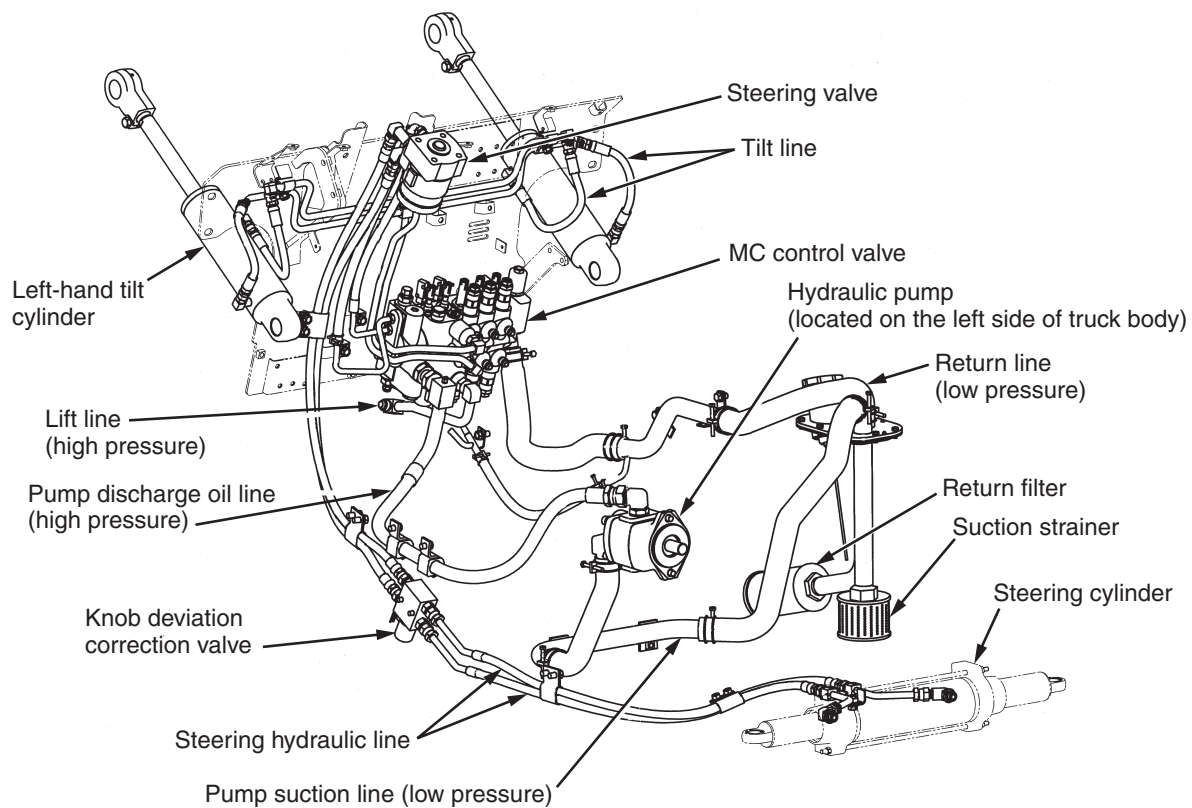


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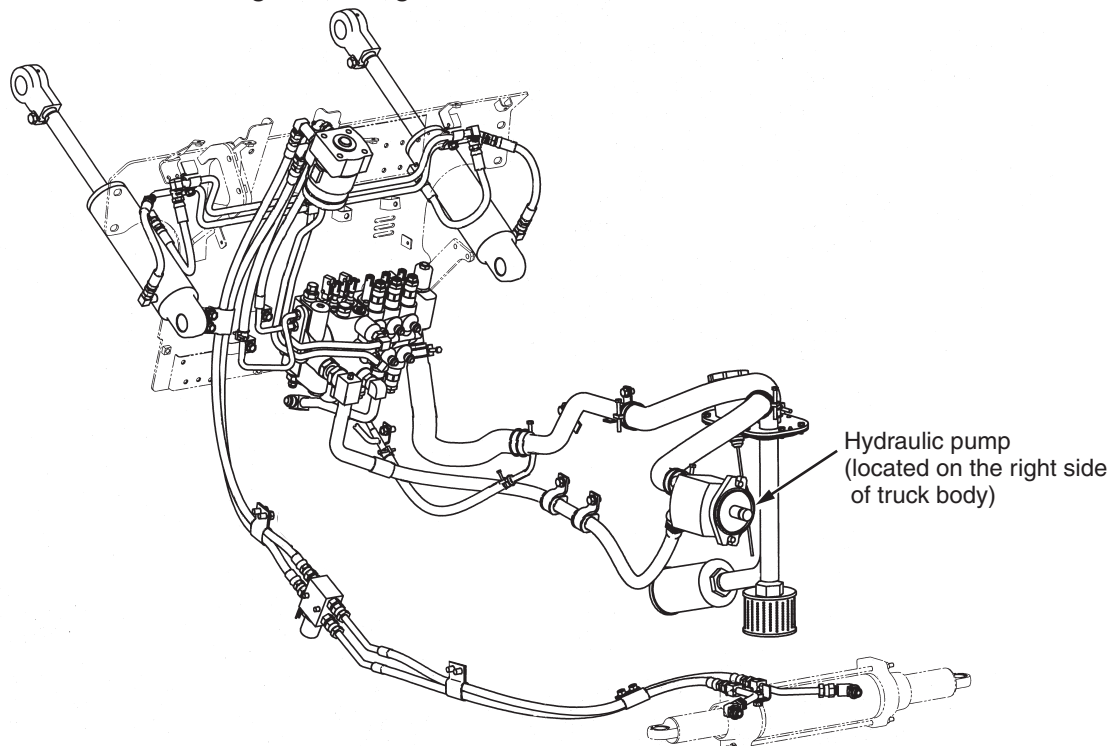
Piping

(For piping around the mast, refer to "GROUP 14 MAST AND FORKS.")

1. Piping of MC control valve for diesel-engine truck



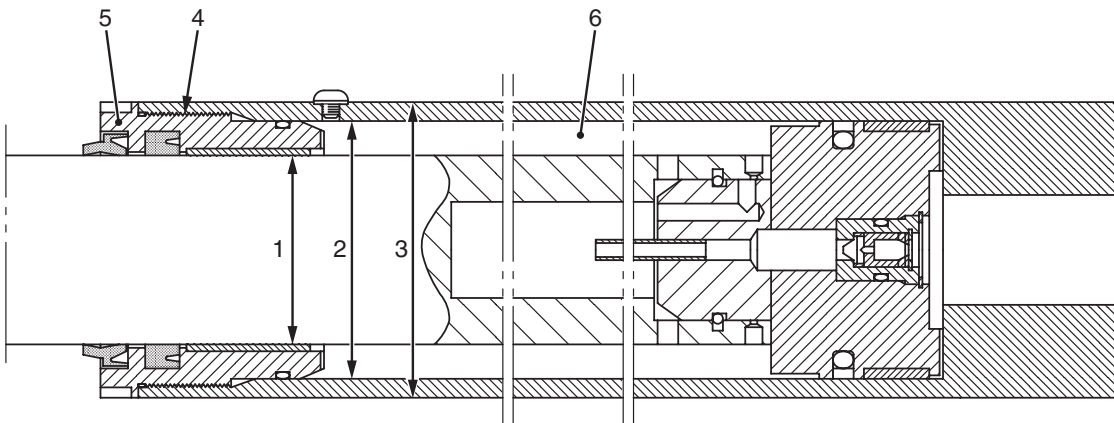
2. Piping of MC control valve for gasoline-engine truck



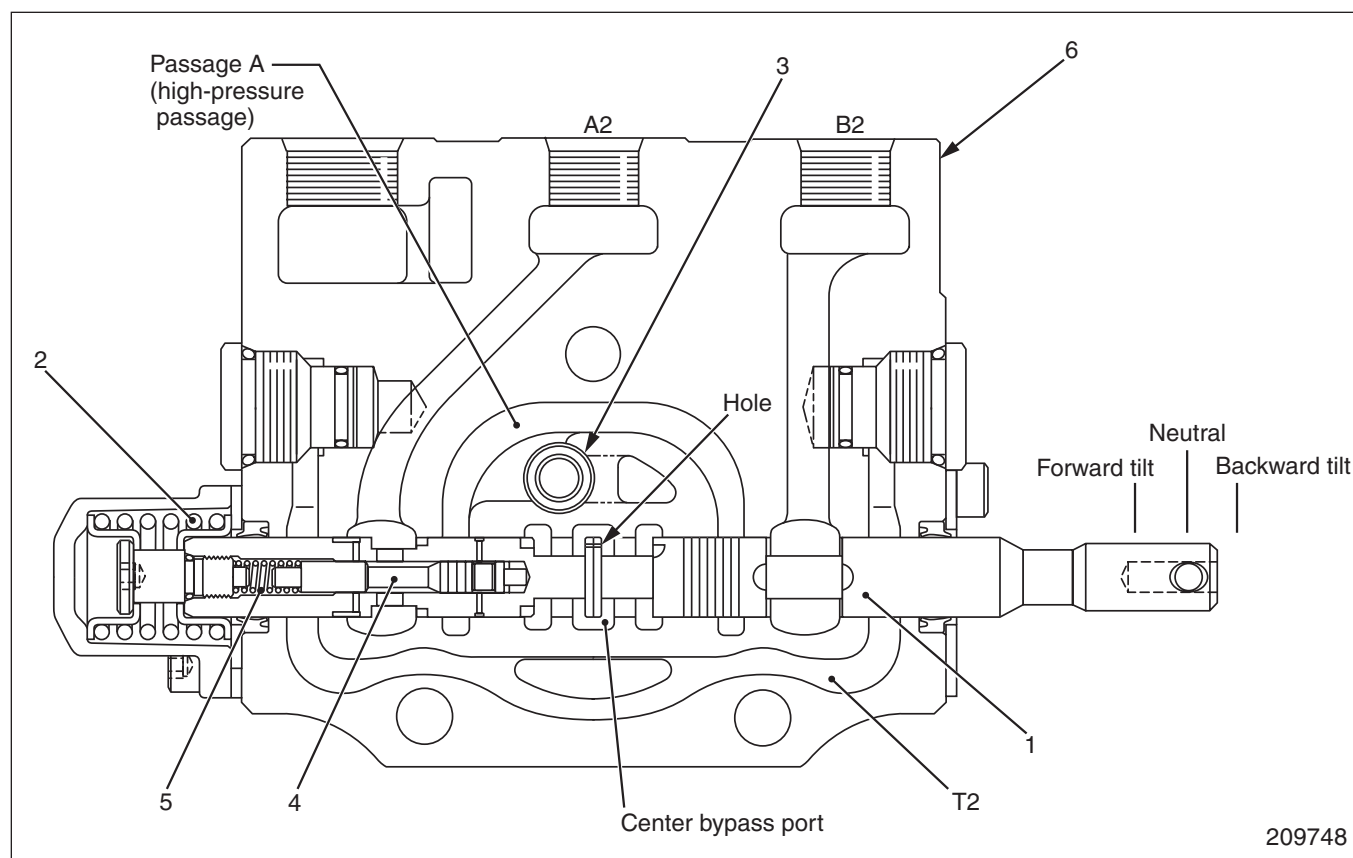
209773

A: Standard value

Unit: mm (in.)

Items		Truck Models	1 ton class	2 ton class	3 ton class
First cylinder for duplex mast and triplex mast	Rod outside diameter 1	A	55 (2.17)	55 (2.17)	65 (2.56)
	Cylinder inside diameter 2	A	70 (2.76)	75 (2.95)	85 (3.35)
	Cylinder outside diameter 3	A	82 (3.23)	86 (3.39)	97 (3.82)
	Thread size of cylinder head 4	A	M75	M80	M90
	Tightening torque of cylinder head 5 N·m (kgf·m) [lbf·ft]	A	382 (39) [282]	422 ± 96.1 (43 ± 9.8) [311 ± 70.9]	490 ± 113 (50 ± 12) [361 ± 83]
	Sealed-in amount of cushion oil 6 cc (cu in.)	A	75 to 85 (4.6 to 5.2)	75 to 85 (4.6 to 5.2)	90 to 100 (5.5 to 6.1)
			209767B		

Tilt Valve



Main components

- 1 Tilt spool
- 2 Return spring
- 3 Check valve
- 4 Tilt lock valve
- 5 Tilt lock valve spring
- 6 Valve body

A2 : To tilt cylinder rod
 B2 : To tilt cylinder head
 T2 : Tank port (return passage)

The above illustration shows the tilt control valve when spool 1 is at the “neutral position.”

Neutral position:

Spool 1 is placed at the “neutral position” by return spring 2, and both the A2 port and B2 port are blocked by the spool.

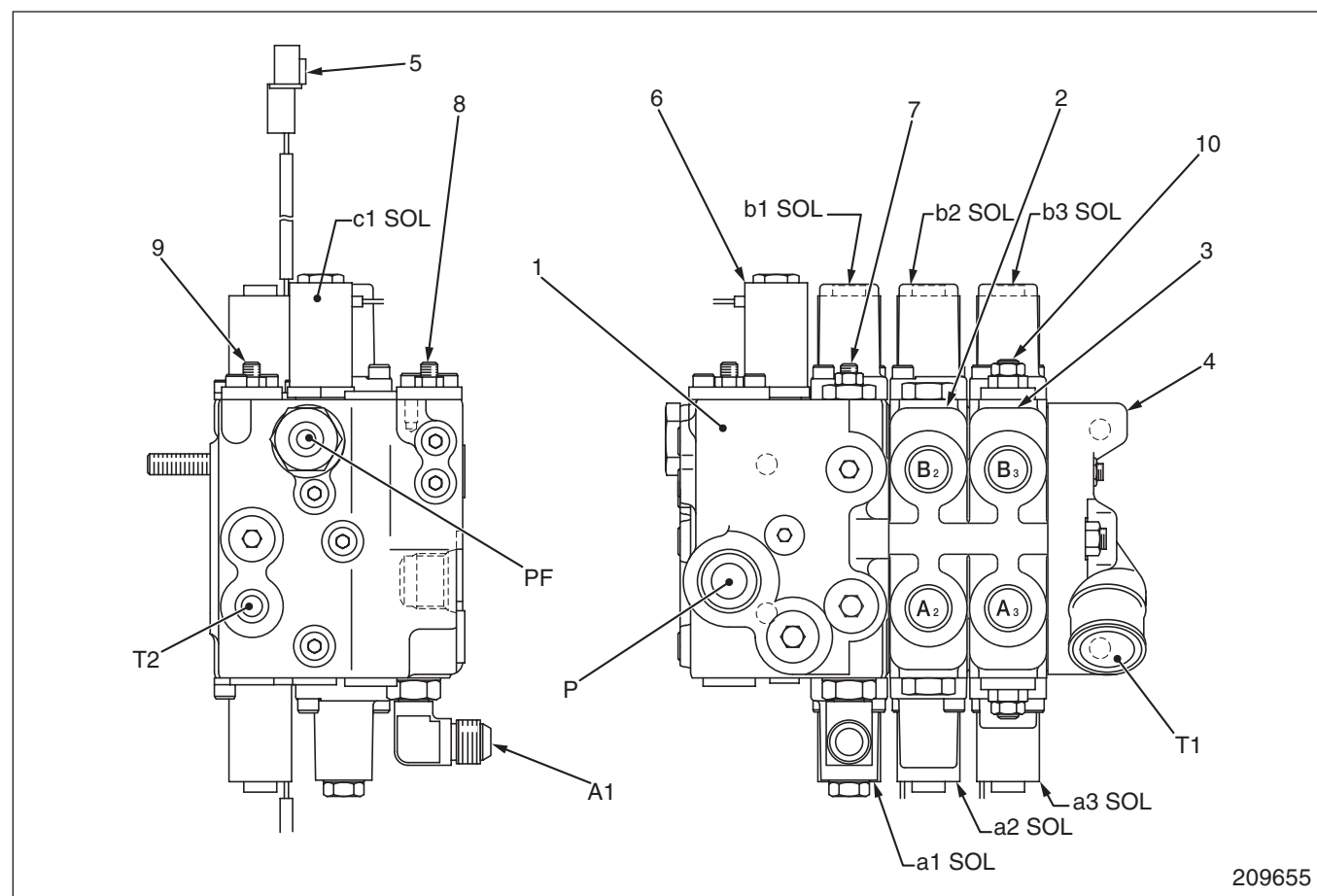
As the center bypass valve is open, oil in the bypass port flows in the attachment valve.

Most backward tilt position:

Spool 1 moves to the right. The B2 port is connected to the T2 port and the A2 port is connected to passage A. The spool is positioned to block the center bypass port, but as the spool is provided with a hole under the land, it does not block completely. This is designed to prevent a large amount of oil from flowing at a time to avoid abrupt movement of the cylinder, a characteristic of this valve. When the center bypass port is blocked, pressure in the parallel feeder rises. Pressure oil pushes open check valve 3, flows in passage A and flows to the tilt cylinder rod from the A2 port. At the same time, oil in the tilt cylinder head flows to the T2 passage. These two actions pull the rod into the tilt cylinder.

Structure and Operation

FC Control Valve – General



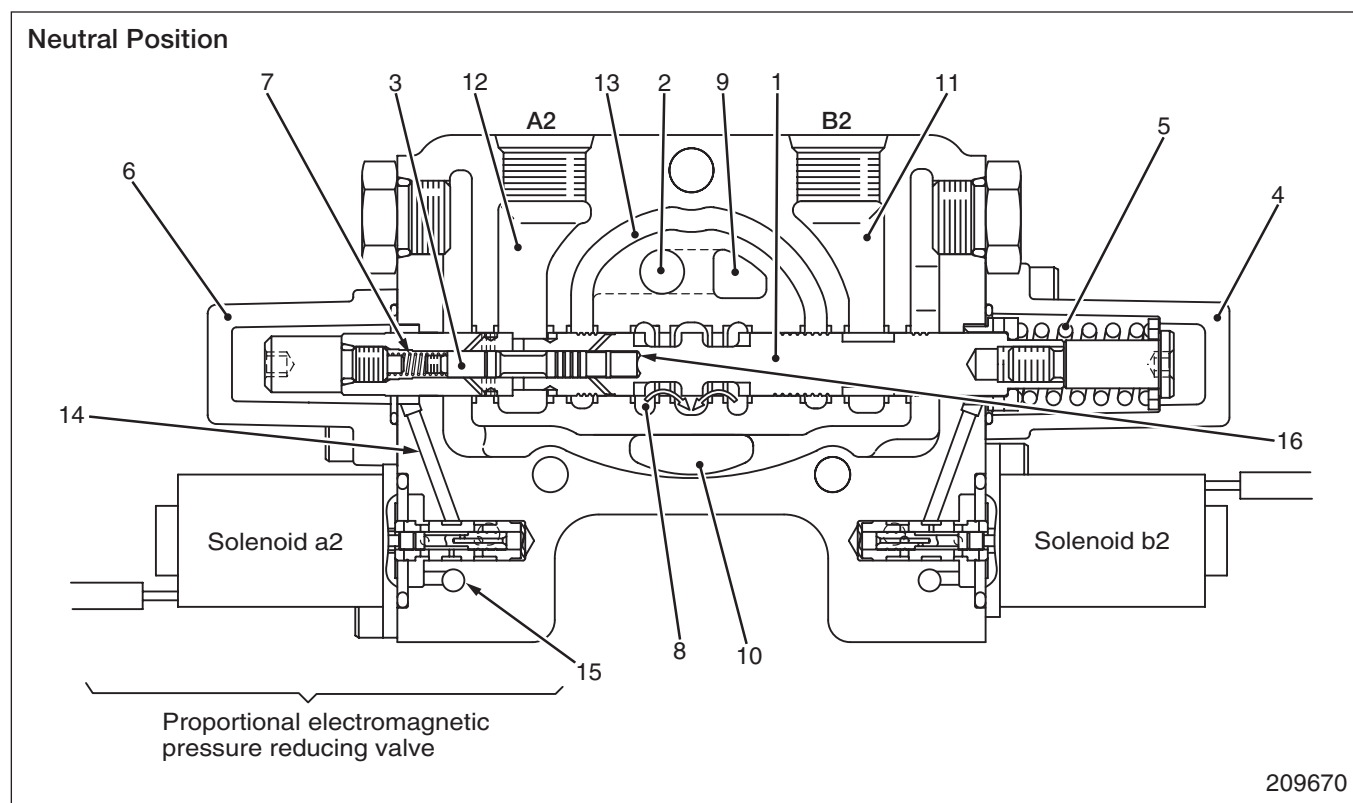
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- 1 Inlet valve assembly
- 2 Tilt valve assembly
- 3 Attachment valve assembly
- 4 End cover assembly
- 5 Solenoid lead wire and connector
- 6 Solenoid for unloader valve
- 7 Emergency shut-off valve (for release of lift lock)
- 8 Main relief valve (pilot)
- 9 PF relief valve (steering system relief valve)
- 10 Emergency shut-off valve (for use as attachment)

- P : Supplied oil from hydraulic pump (oil inlet port)
 T1 : To hydraulic tank (return oil)
 T2 : Return from steering valve (oil return port)
 PF : To steering system
 A1 : To lift cylinder
 A2 : To tilt cylinder rod end
 B2 : To tilt cylinder head end
 A3 : To actuator for attachment valve
 B3 : To actuator for attachment valve
 c1 SOL : Solenoid for unloader valve
 a1 SOL, b1 SOL : Solenoids for lift valve
 a2 SOL, b2 SOL : Solenoids for tilt valve
 a3 SOL, b3 SOL : Solenoids for attachment valve

Notice: The above illustration shows a three-valve type FC control valve. For a two-valve type control valve, eliminate the attachment valve. For four-valve type and five-valve type control valves, add the attachment valve(s) as appropriate.

Tilt Valve Assembly



Main Components

- | | |
|-----------------------------|---|
| 1 Main spool | 9 High-pressure passage (parallel feeder) |
| 2 Check valve | 10 Low-pressure passage (to T1) |
| 3 Tilt lock valve | 11 Passage to port (B2) |
| 4 Cap (solenoid b2 side) | 12 Passage to port (A2) |
| 5 Spring (solenoid b2 side) | 13 Oil passage |
| 6 Cap (solenoid a2 side) | 14 Passage of pilot oil for valve spool |
| 7 Spring | 15 Drain passage |
| 8 Neutral passage | 16 Damper |

Action of Valve with Tilt Lever in “Neutral” Position

When the tilt lever is in the “neutral” position, the proportional solenoids a2 and b2 are inactive.

The proportional electromagnetic pressure reducing valve releases oil in the caps 4 and 6 into the drain passage 15 via the passage 14 so that there is oil pressure in the cap.

Therefore, the main spool 1 is maintained in the position shown in the illustration above, with the passages to ports A2 and B2 closed.

Extra flow of oil diverted by the priority valve of the inlet valve assembly goes to the tank through the neutral passage.

As pressure oil does not come in the chamber 16, the tilt lock valve 3 is pressed to the right by the spring 7.

Pilot Relief Valve

- (1) Insert the spring 1 and valve 2 into place in the housing.
- (2) Fit the O-rings 4 and 5 on the sleeve 3. Apply grease around the O-rings and push the sleeve 3 into place in the housing.
- (3) If the screw 7 for set pressure adjustment was disassembled, drive the screw in the plate 6 and install the lock nut 8 handtight.
- (4) Install the plate completed as above using the bolt 9. Tighten the bolt to the specified torque.
- (5) Install the valve to the truck and connect necessary pipes. Finally, adjust set pressure for the relief valve. Refer to “Inspection and Adjustment.”

If the screw for set pressure adjustment is intact and set pressure for the relief valve remains unchanged, check for relief pressure only.

Priority Valve

- (1) Complete the spool set 10. Apply grease around the completed spool set 10 and insert it carefully into place in the housing.
- (2) Insert the spring 13 into place. Fit the O-ring 15 on the plug 14. Screw in the plug to the specified torque.
- (3) Fit the O-ring 12 on the plug 11. Screw in the plug to the specified torque.

Resistance Valve

- (1) Install the spring 17 and slug 18 in the spool 16. Apply hydraulic oil to the spool and insert it carefully into place in the housing.
- (2) Fit the O-ring 20 on the plug 19, and screw in the plug to the specified torque.

PF Relief Valve (Steering Relief Valve)

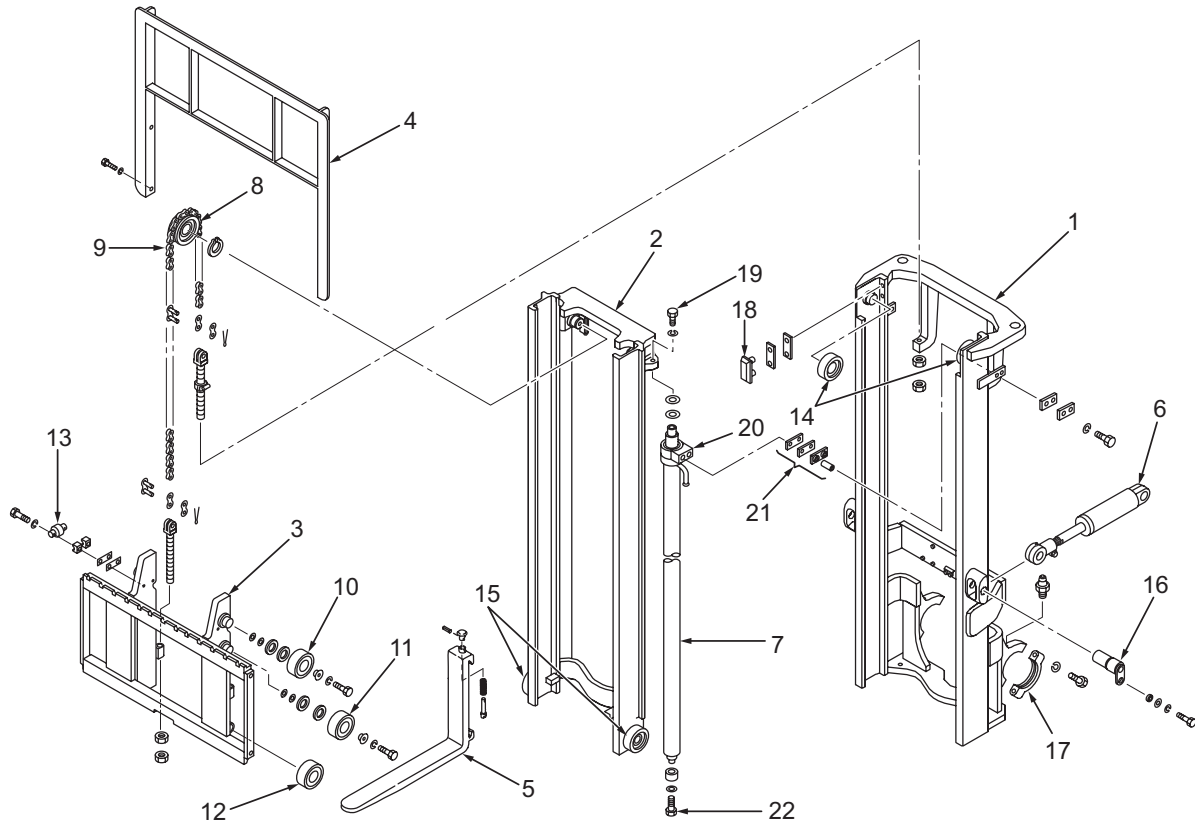
- (1) Insert the spring 21 and poppet 22 into place in the housing.
- (2) Fit the O-ring 24 on the relief valve 23. Apply grease around the O-ring and insert the relief valve 23 into place in the housing.
- (3) If the screw 26 for set pressure adjustment was disassembled, drive the screw in the plate 25 and install the lock nut 27 handtight.
- (4) Install the plate completed as above using the bolt 28. Tighten the bolt to the specified torque.
- (5) Fit the O-ring 30 on the plug 29, and screw in the plug to the specified torque.
- (6) Install the valve to the truck and connect necessary pipes. Finally, adjust set pressure for the relief valve. Refer to “Inspection and Adjustment.”

If the screw for set pressure adjustment is intact and set pressure remains unchanged, check for relief pressure only.

Structure and Function

Simplex (Dual Panoramic) Mast (5V15D to 5V35D)

Notice: For hydraulic lines, refer to “Installing Hydraulic Lines” on page 14-15.



211530

Major Components (most parts come in pairs, left and right)

1 Outer mast	9 Chain	17 Mast support cap
2 Inner mast	10 Lift bracket upper roller	18 Mast strip
3 Lift bracket	11 Lift bracket middle roller	19 Lift cylinder upper mounting bolts
4 Backrest	12 Lift bracket lower roller	20 Cylinder bracket
5 Forks (2)	13 Side roller	21 Cylinder clamps
6 Tilt cylinder	14 Outer mast roller	22 Lift cylinder lower mounting bolts
7 Lift cylinder	15 Inner mast roller	
8 Chain wheel	16 Tilt socket mounting pin	

The simplex mast features two lift cylinders placed behind the mast columns, right and left, to provide maximum visibility.

Mast strips are fitted to the top end of outer mast. These strips are for backing up the inner mast when the mast is tilted backward.

Lift cylinder 7 of a lift height of 3300 mm (130 in.) or less is the internal drain type, and is equipped with no

return hose.

The lift cylinder of a lift height of 3500 mm (138 in.) or more is equipped with the drain hose.

The lift cylinder of all of lift height is equipped with the down cushioning.

For mast operation, refer to “Mast Operation” on page 14-3.

2. Installing Mast Rollers

Mast rollers are identical in shape and size with lift bracket lower rollers.

Therefore:

- Clearance **F** should be 1.0 mm (0.04 in.) or less.
- Clearance **G** should be 0.1 to 0.5 mm (0.004 to 0.020 in.).

(1) Measure clearance **F** between the rollers' rolling contact surfaces and masts. If the measured clearances do not conform to the standard value, replace with rollers of correct diameters listed in the table below.

Notice: For measuring procedures, refer to "Inspection and Adjustment."

Unit: mm (in.)

Truck Model Size (Diameter)	1 ton class	2, 3 ton classes
S	99 (3.90)	113.8 (4.48)
M	100 (3.94)	115 (4.53)
L	101 (3.98)	116 (4.57)
LL	102 (4.02)	117 (4.61)

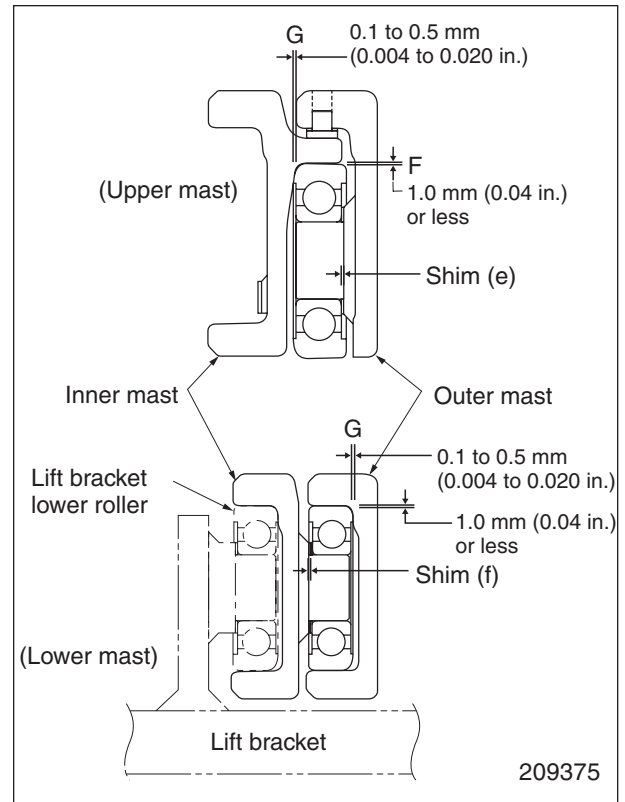
- Installation of mast rollers follows the same procedures for the lift-bracket rollers.

(2) Measure clearance **G** between the rollers and masts. If the measured clearances exceed the standard value, increase the thicknesses of shims **(e)** and **(f)** under the roller seats as required.

Remarks: At the manufacturing facility, shims **(e)** and **(f)** are usually adjusted to the values shown in the table below for the shipment.

Unit: mm (in.)

Truck Model Item	1 ton class	2, 3 ton classes
Shim (e)	2 (0.079)	1 (0.039)
Shim (f)	2 (0.079)	1 (0.039)

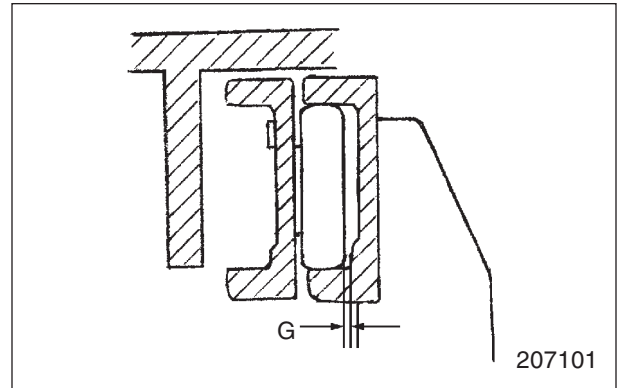


MAST AND FORKS

- (d) Insert a bar between the outer and inner masts on the indicator side, and push the inner mast to the opposite side.
- (e) Read the indicator. This reading is clearance G between the inner mast roller and outer mast.

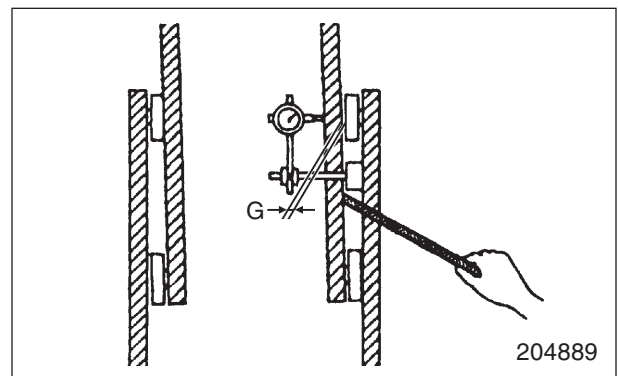
Clearance G	0.1 to 0.5 mm (0.004 to 0.020 in.)
---------------	------------------------------------

- (f) If clearance G is out of specification, it is necessary to add shims to the seat of the roller to adjust to correct clearance. For adjustment and installation procedures, refer to “Installing mast rollers” on page 14-12.



(3) Right-to-left clearance check on outer mast main rollers

- (a) Raise the mast to the top.
- (b) Set a dial indicator on the outer mast with its contact point rested on the inner mast.
- (c) Go over to the opposite side of the mast, and push the outer mast against the inner mast with a bar. Set the indicator to zero.

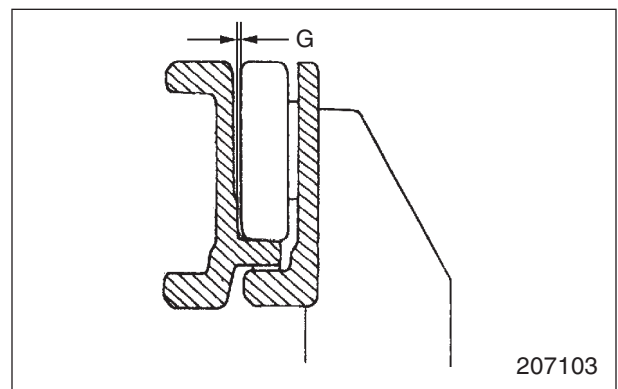


- (d) Insert a bar between the outer and inner mast, and push the inner mast to the opposite side.
- (e) Read the indicator. This reading is clearance G between the outer mast roller and inner mast.

Clearance G	0.1 to 0.5 mm (0.004 to 0.020 in.)
---------------	------------------------------------

- (f) If clearance G is out of specification, adjust it by shims.

It is necessary to add or remove shims at the seat of the roller to adjust to correct clearance. For adjustment and installation procedures, refer to “Installing mast rollers” on page 14-12.



2. Disconnecting high-pressure hoses for lift cylinder

Place the mast in the bottom position, disconnect hose 3 at the arrow position in the illustration on the previous page.

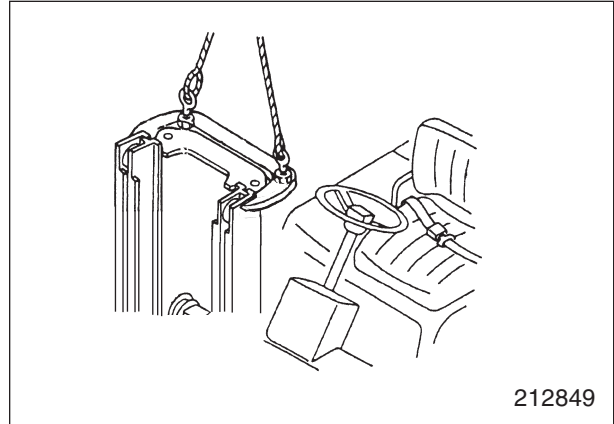
3. Separating tilt cylinders

- (1) Hitch a sling to the upper cross-member of the outer mast, then lift with a hoist.



CAUTION

Be sure to use a hoist having a capacity enough to support the mast assembly.



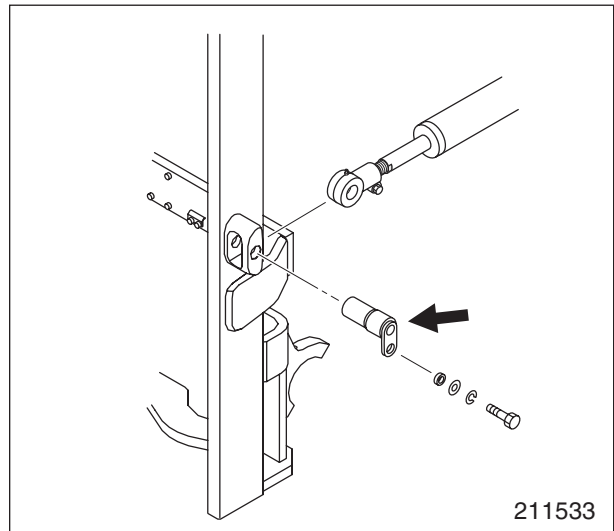
212849

- (2) Place wood blocks under the tilt cylinder mounting section and remove the tilt socket pins, and separate the mast from the tilt cylinders.
- (3) Start the engine, and pull back the tilt lever to retract the tilt cylinder rods.



CAUTION

Do not touch any levers except the tilt lever while the engine is running.



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CAUTION

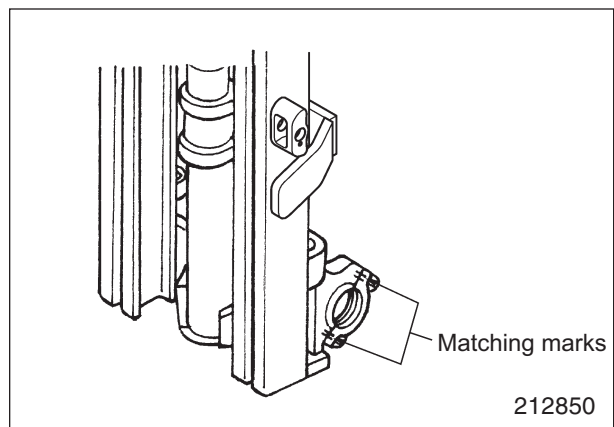
Never loosen tilt socket bolts except for tilt cylinder disassembling.

4. Removing mast support bearing caps

- (1) Mark caps to ensure the caps are reinstalled in original positions during reassembly.
- (2) Remove cap mounting bolts. Dismount the mast assembly from the truck in the suspended condition. With the lift bracket side facing up, place the mast assembly horizontally on wooden blocks on the level ground.

NOTE

Lay the mast assembly on a space large enough to disassemble the parts.



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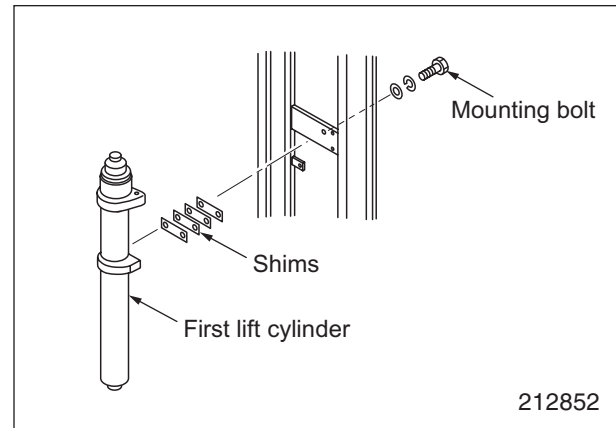
5. Installing First Lift Cylinder

- (1) With the masts set vertically and fully lowered, temporarily install the first lift cylinder complete with the original shims to the inner mast.
- (2) Set the first lift cylinder vertically, and measure the clearance, if any, between the cylinder brackets and the cylinder mounts on the inner mast. Remove any clearance by adding shims.
 - The perpendicularity of cylinder in the lateral direction can be checked by measuring the distances between the cylinder and the side face of the inner mast. Difference of the distance at the top and bottom should be 1 mm (0.04 in.) or less.
 - The perpendicularity of cylinder in the longitudinal direction can be checked by visually inspecting for the parallelism between the cylinder and the front face of the inner mast. The cylinder slightly inclined to the rear is acceptable. The cylinder should not be inclined forward even slightly.
 - Each shim is 1 mm (0.04 in.) thick.

Remarks: At the manufacturing facility, plant, a shim pack of 2.0 mm (0.08 in.) is usually inserted between the cylinder bracket and the inner mast for the shipment.

- (3) After shimming is completed, install and tighten the mounting bolts.

Notice: Depending on the truck model, the direction in which the mounting bolts are inserted may be different from what is shown in the illustration.

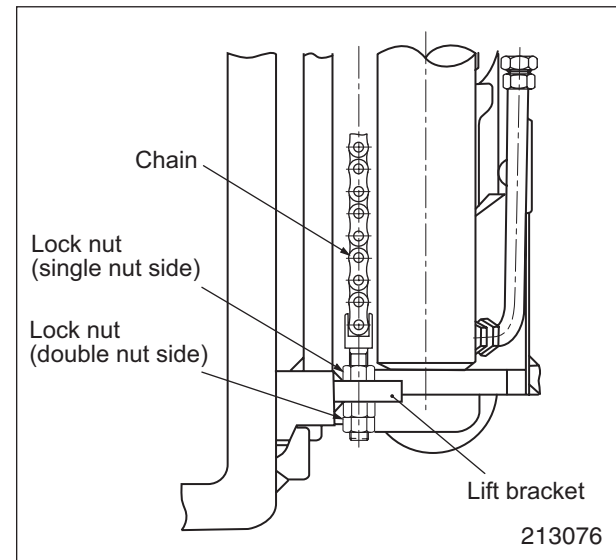


6. Connecting Chains

Assemble each chain to the lift bracket as shown in the right illustration.

Tightening torque Unit: N·m (kgf·m) [lbf·ft]

Truck Model Item	1, 2 ton classes	3 ton class
Lock nut (single nut side)	56.8 ⁰ _{-9.8} (5.8 ⁰ _{-1.0}) [42 ⁰ _{-7.2}]	84.3 ⁰ _{-11.8} (8.6 ⁰ _{-1.2}) [62 ⁰ _{-8.7}]
Lock nut (double nut side)	98 ⁺⁴⁹ ₀ (10 ⁺⁵ ₀) [72 ⁺³⁶ ₀]	147 ⁺⁴⁹ ₀ (15 ⁺⁵ ₀) [108 ⁺³⁶ ₀]

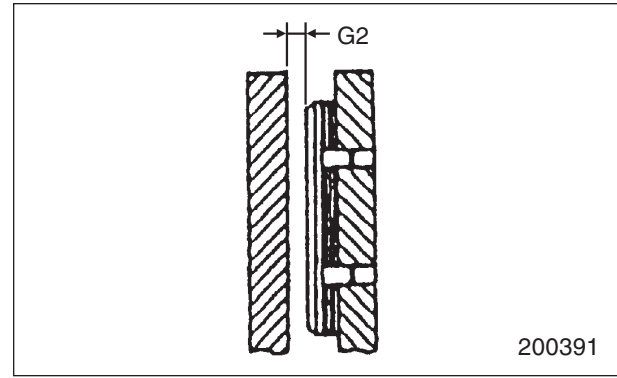


6. Mast Strip Clearance Inspection and Adjustment

- (1) Check clearance G2 with the clearance between the outer mast rollers and inner mast rolling contact surface setting to zero (0) in maximum lift position.

Clearance G2	0.1 to 0.5 mm (0.004 to 0.020 in.)
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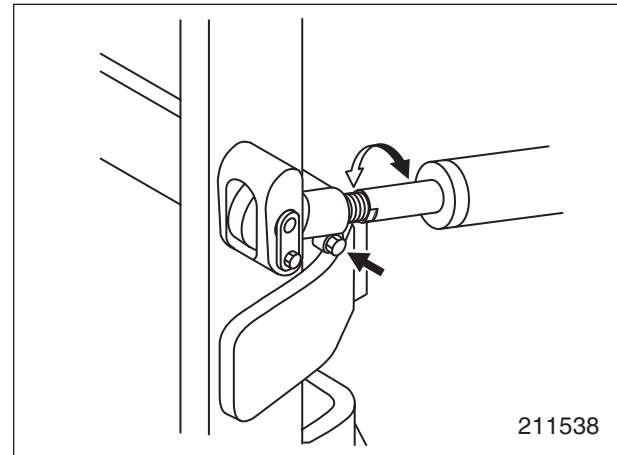
- (2) If clearance G2 is out of specification, adjust it by adding or removing shims. For adjustment procedure, refer to “Measuring and adjusting clearance G2 between the mast strip and inner mast” on page 14-41.
- (3) After adjusting the all clearance, move the mast and lift bracket slowly to ensure that they move smoothly through their full stroke.



7. Tilt Angle Adjustment

- (1) Adjust the tire pressure correctly and park the truck on a level ground.
- (2) Tilt the mast fully backward and stop the engine.
- (3) Measure the backward tilt angle of the mast at both sides.
- (4) To adjust the tilt angle, loosen the bolt of tilt cylinder socket, and adjust the rod length by turning the rod. Adjust the cylinder so that there is no difference in tilt angle between the cylinders, right and left.

Notice: It is not necessary to adjust the forward tilt angle if the backward tilt angle is properly adjusted.



Standard tilt angle

Mast model	Forward	Backward
Duplex Mast	6°	12°

- (5) After adjusting the tilt angle, tighten the socket bolts to the specified torque.

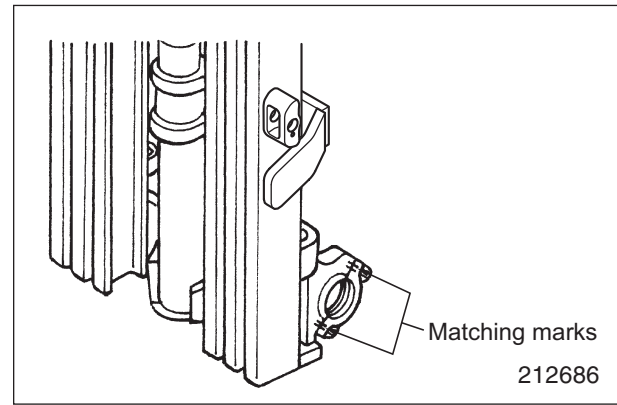
Tightening torque for tilt cylinder socket bolt	157 to 182 N·m (16.0 to 18.6 kgf·m) [116 to 134 lbf·ft]
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4. Removing mast support bearing caps

- (1) Mark caps to ensure the caps are reinstalled in original positions during reassembly.
- (2) Remove cap mounting bolts. Dismount the mast assembly from the truck in the suspended condition. With the lift bracket side facing up, place the mast assembly horizontally on wooden blocks on a level ground.

NOTE

Lay the mast assembly on a space large enough to disassemble the parts.



Triplex Mast Installation

To install, follow the removal sequence in reverse with followings in mind.

1. Mast Support

- (1) Apply grease to the inner surfaces of caps and mast support bushings.
- (2)-a 1 ton class:
When installing caps, make sure the wider chamfered side faces toward the center of the chassis.
- (2)-b 2,3 ton classes:
Chamfering is the same both in the right and left sides. Be sure to reassemble in the same position as it was.
- (3) When applying grease, place wood blocks under the mast. By doing so, it is easily greased.

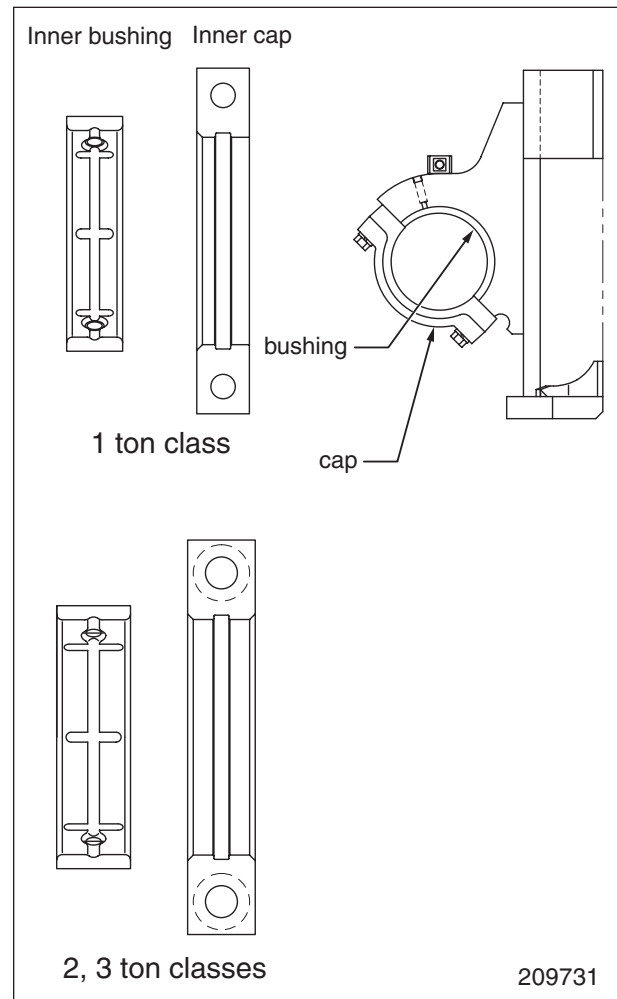
2. Adjusting chain tensions

Refer to the "Chain Tension Adjustment."

3. Bleeding lift cylinders

Start the engine, raise and lower the lift bracket with several strokes to bleed the cylinder.

After proper operation is confirmed, check the oil level in the hydraulic tank.



- (5) With the cylinder rods fully retracted and the cylinders set vertically, measure clearance **H**. Adjust the clearance at 1.6 mm (0.063 in.) or less by adding or removing shims (**m**).

Clearance H	1.6 mm (0.063 in.) or less
--------------------	----------------------------

- Adjustment

If clearance **H** is excessive, add shims (**m**). Normally on a new truck, the second lift cylinders are not fitted with shims (**m**). If the clearance is 3.2 mm (0.126 in.) or more, make sure to include a 3.2 mm (0.126 in.) thick sheet in the shim pack that is to be installed.

- (6) After reassembly, perform an operation test to check if the stroke of the left and right cylinders is the same. For the checking procedure, refer to page 14-84.

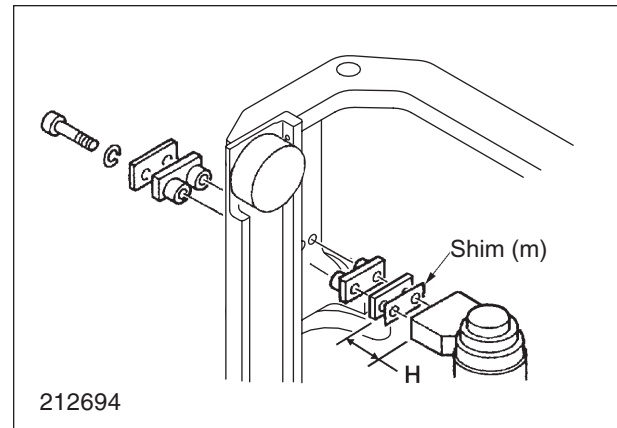
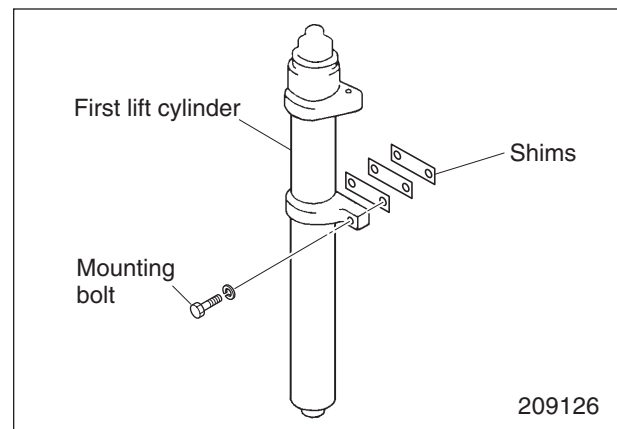
5. Installing First Lift Cylinder

- (1) With the masts set vertically and fully lowered, temporarily install the first lift cylinder complete with the original shims to the inner mast.
 - (2) Set the first lift cylinder vertically, and measure the clearance, if any, between the cylinder brackets and the cylinder mounts on the inner mast. Remove any clearance by adding shims.
- The perpendicularity of cylinder in the lateral direction can be checked by measuring the distances between the cylinder and the side face of the inner mast. Difference of the distance at the top and bottom should be 1 mm (0.04 in.) or less.
 - The perpendicularity of cylinder in the longitudinal direction can be checked by visually inspecting for the parallelism between the cylinder and the front face of the inner mast. The cylinder slightly inclined to the rear is acceptable. The cylinder should not be inclined forward even slightly.
 - Each shim is 1 mm (0.04 in.) thick.

Remarks: At the manufacturing facility, a shim pack of 2.0 mm (0.08 in.) is usually inserted between the cylinder bracket and the inner mast for the shipment.

- (3) After shimming is completed, install and tighten the mounting bolts.

Notice: Depending on the truck model, the direction in which the mounting bolts are inserted may be different from what is shown in the illustration.

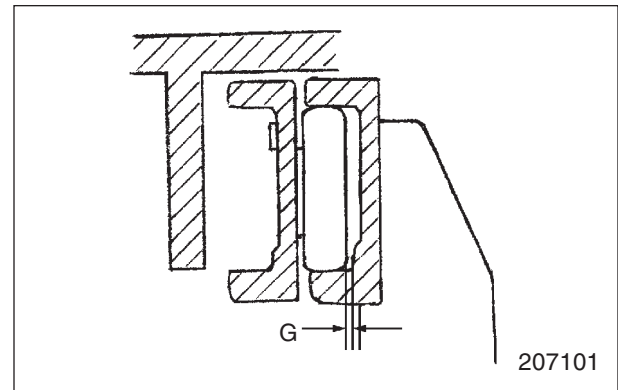


MAST AND FORKS

- (d) Insert a bar between the outer and inner masts on the indicator side, and push the inner mast to the opposite side.
- (e) Read the indicator. This reading is clearance G between the inner mast roller and outer mast.

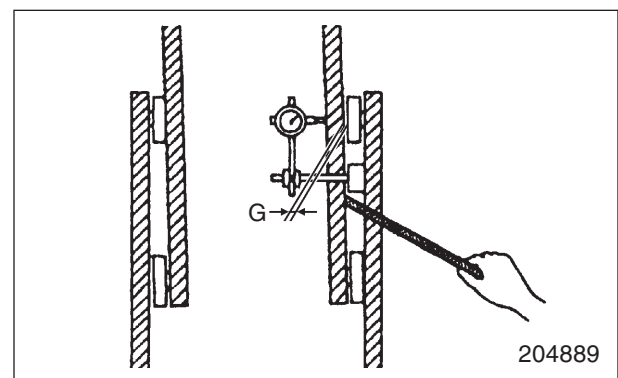
Clearance G	0.1 to 0.5 mm (0.004 to 0.020 in.)
---------------	------------------------------------

- (f) If clearance G is out of specification, it is necessary to add shims to the seat of the roller to adjust to correct clearance. For adjustment and installation procedures, refer to "Installing mast rollers" on page 14-70.



(3) Right-to-left clearance check on outer mast main rollers

- (a) Raise the mast to the top.
- (b) Set a dial indicator on the outer mast with its contact point rested on the inner mast.
- (c) Go over to the opposite side of the mast, and push the outer mast against the inner mast with a bar. Set the indicator to zero.

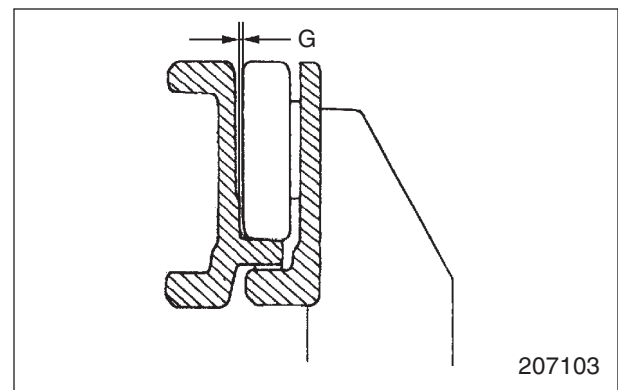


- (d) Insert a bar between the outer and inner mast, and push the inner mast to the opposite side.
- (e) Read the indicator. This reading is clearance G between the outer mast roller and inner mast.

Clearance G	0.1 to 0.5 mm (0.004 to 0.020 in.)
---------------	------------------------------------

- (f) If clearance G is out of specification, adjust it by shims.

It is necessary to add or remove shims at the seat of the roller to adjust to correct clearance. For adjustment and installation procedures, refer to "Installing mast rollers" on page 14-70.



Abbreviation..... X: Check, C: Clean, D: Drain, L: Lubricate, R: Replace

Inspection point		How to check	Pre-start (daily/10 hours)	Weekly (50 hours)	1st month (200 hrs) only	3 months (500 hours)	6 months (1000 hours)	12 months (2000 hours)	Others (see Note 1)	Service data
Fuel	Tar in vaporizer (see Note 3)	Check & drain			D	D				
	Fuel hose, pipes & joints (see Note 5)	Visual		X						
	Fuel level	Meter panel	X							
	Check injection nozzle (for D engine)							X		
	Injection nozzle (for G, LP & G/L dual engines with electronic control)				X	X				
	Clean gasoline fuel filter (for G & G/L dual engines w/o elec. cont.) (see Note 3)					C				
	LPG fuel filter (see Note 3)					C				
	Change diesel fuel filter (see Note 3)				R		R			
	Fuel hose								R**	
	Change gasoline fuel filter (for G & G/L dual engine w/o elec. cont.) (see Note 3)				R		R			
	LPG fuel filter (see Note 3)							R		
	Vaporizer rubber parts							R		
Hydraulic	Control valve	Oil pressure gauge						X		
	Hydraulic hose, pipes & joints	Visual		X						
	Hydraulic oil	Visual	X							
	Hydraulic pump	Visual/aural						X		
	Hydraulic tank strainer	Visual					C			
	Hydraulic hose (high-pressure hose)								R*	
	Hydraulic oil							R		1 ton: 28 liter (7.398 U.S. gal.) 2, 3 ton: 39 liter (10.30 U.S. gal.)
	Hydraulic tank return oil filter				R		R			
Ignition	Check distributor point, cap & rotor (for G & G/L dual engine w/o elec. cont.)				X	X				
	Check ignition timing (for G & G/L dual engine w/o elec. cont.)				X	X				
	Spark plug gap	Plug gauge			X	X				
	Clean distributor inside (for G & G/L dual engine w/o elec. cont.)							C		

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