FOREWORD

This manual contains maintenance and repair procedures for NISSAN FORKLIFT, model 1B1 and 1B2 series for pneumatic and cushion model.

In order to assure your safety and the efficient functioning of the lift truck, this manual should be read thoroughly. It is especially important that the PRECAUTIONS in the GI section be completely understood before starting any repair task.

All information in this manual is based on the latest product information at the time of publication. The right is reserved to make changes in specifications and methods at any time without notice.

IMPORTANT SAFETY NOTICE

The proper performance of service is essential for both the safety of the technician and the efficient functioning of the lift truck.
The service methods in this Service Manual are described in such a manner that the service may be performed safely and accurately.
Service varies with the procedures used, the skills of the technician and the tools and parts available. Accordingly, anyone using service procedures, tools or parts which are not specifically recommended by NISSAN must first be completely satisfied that neither personal safety nor the lift truck's safety will be jeopardized by the service method selected.

NISSAN MOTOR CO., LTD.
Industrial Machinery Division
Engineering Department
Tokyo, Japan

- Carefully check all removed oil seals, gaskets, packing materials, O-rings, lock washers, cotter pins and self-locking nuts against the instructions on each section to see whether or not they can be reused. If they cannot be reused, they must be replaced with new ones. If replacement parts are required, refer to the Parts Catalog distributed by Nissan Motors. Be sure that the replacement parts have the correct part number. Use only genuine Nissan parts.
- When replacing taper roller bearings or needle bearings, always replace their inner races and outer races as a set.
- Use only the specified lubricants and sealants.
- Be careful not to splash the brake fluid on the body or other painted areas; it may cause paint damage. If brake fluid is splashed on painted areas, immediately wipe it and wash the area with water.
- Never reuse drained brake fluid.
- Following repair of any system containing oil or brake fluid, carefully check the system for fluid leakage.
- Do not carelessly dispose of discarded oil from oil changes and part cleaning operations. Dispose of the oil following established procedures.

PRECAUTIONS FOR ELECTRICAL SYSTEM INSPECTION

⚠ WARNING:

- **Always raise drive tires OFF floor before working on electrical system.**
- Turn the key switch to the OFF position and disconnect the battery plugs when disconnecting or connecting the print board connectors. Disconnecting and/or connecting the main print board or meter print board connectors with the key switch ON and the battery plugs in place can damage the print board. Exercise care.
- Avoid twisting and turning the print board connectors when connecting and/or disconnecting them. This can result in poor connector connections.
- When disconnecting connectors, do not pull on the wire attached to the connector. Always hold the connector body.
- When using a circuit tester, be very careful not to use the wrong range (A, V or Ω) and/or polarity.
- Static electricity can damage the main and meter print boards. Be sure to eliminate static electrical charges when handling the print boards.
- Following completion of the inspection procedure, once again check that all of the leads are connected to their original terminals.

⚠ CAUTION:

- **Before changing any components (i.e. lamps, fuses, meter panel) or disconnecting any wiring. Always turn OFF key switch and disconnect battery. This will reduce the possibility of damage to controller system.**

Maintenance Schedule

The following tables list the servicing required to keep your forklift operating in good mechanical condition.

- Do not inspect any part of the system while the battery is being charged.
- Before checking any part of the system, be sure to turn the key switch to off position and disconnect the battery plug.
- When it is necessary to check with the battery connected, raise the drive wheels. Be extremely careful to prevent electric shocks.

NOTE:
The inspection/service timings shown below are based on the assumption that the forklift is operated for 200 hours in a month. When determining the inspection/service timing, take into account the actual working conditions of the forklift.

(1) CONTROL SYSTEM MAINTENANCE

MAINTENANCE OPERATION	MAINTENANCE INTERVAL												Page
Periodic maintenance should be performed after specified intervals have elapsed in months or hours, whichever comes first.	Months	1	2	3	4	5	6	7	8	9	10	11	12	
	Hundreds of hours	2	4	6	8	10	12	14	16	18	20	22	24	
CONTROL SYSTEM MAINTENANCE														
1. Dust from traction and pump motor							C						C	MA-11
2. Rotor							I						I	MA-11
3. Resistance between forklift body and negative/positive terminals				I			I			I			I	MA-9
4. Operation of contactor points and plungers													I	MA-10
5. Resistance of contactor coils													I	MA-10
6. Controller surface		C		C			C			C			C	MA-10
7. Operation of low-voltage detecting circuit							I						I	MA-10
8. Wiring, bolts and nuts		I		I			I			I			I	MA-10

Abbreviations: I = Inspect. Correct or replace if necessary.
C = Clean

Drive Unit (Reduction Gear)

(1) INSPECTION OF GEAR OIL LEVEL

⚠ CAUTION:
- **Place the vehicle on level ground. Ensure that the unit is cooled down.**
- **Only use the authorized genuine gear oil.**

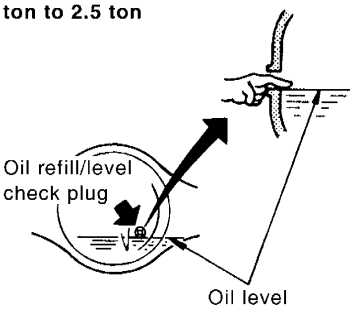
1. Remove oil refill/level check plug, then check differential gear oil level. If it is lower than the specified level, refill designated gear oil up to that level.

⚠ CAUTION:
Always check differential gear oil level when the oil is cold.

2. Before replacing oil refill/level check plug in its position, apply liquid packing to threads, then tighten securely.

Oil refill/level check plug:
: 4.4 - 5.9 N•m (0.45 - 0.60 kg-m, 3.3 - 4.3 ft-lb)

1.5 ton to 2.5 ton



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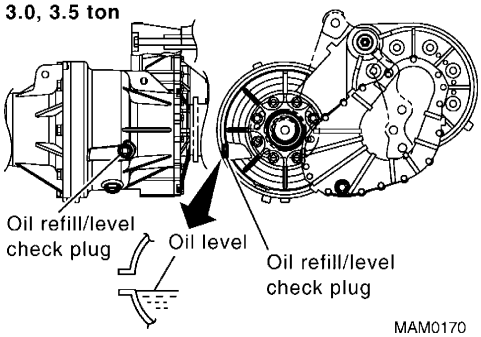
3.0, 3.5 ton



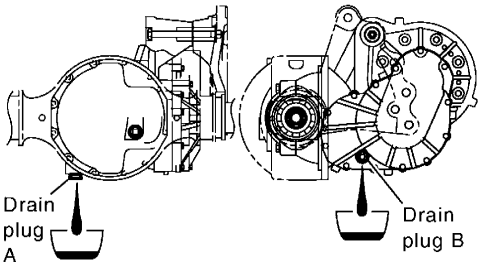
MAM0170

(2) REPLACEMENT OF GEAR OIL

1. Remove drain plug and drain oil.
2. Before installing drain plug, apply a coat of liquid packing to threads, then tighten securely.

Drain plug A:
: 4.4 - 5.9 N•m (0.45 - 0.60 kg-m, 3.3 - 4.3 ft-lb)
Drain plug B:
: 20 - 29 N•m (2.0 - 3.0 kg-m, 15 - 21 ft-lb)

1.5 ton to 2.5 ton



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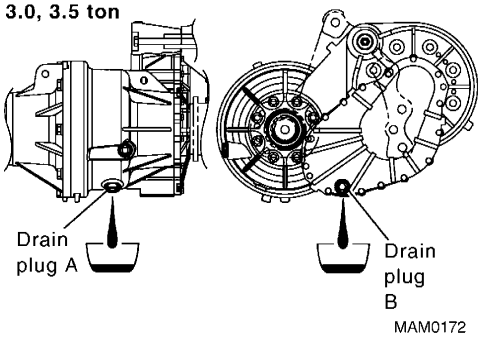
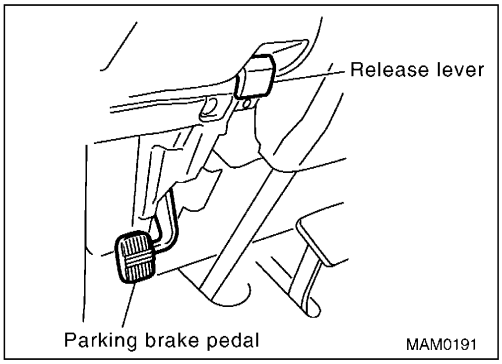
3.0, 3.5 ton



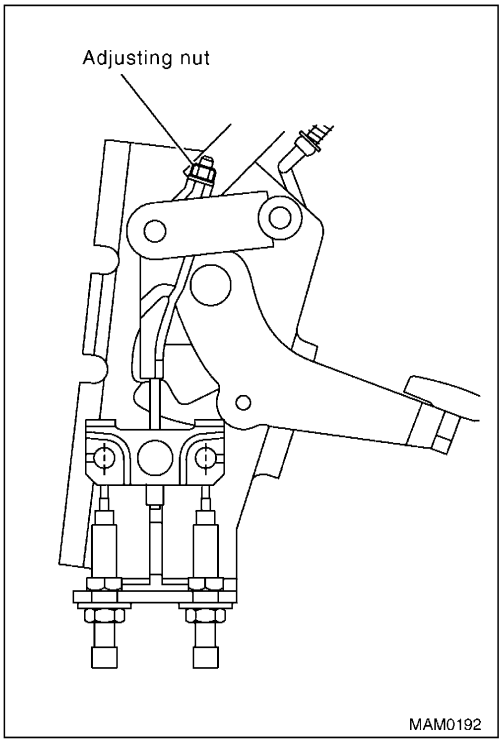
MAM0172

Brake System (Cont'd)

(6) INSPECTION/ADJUSTMENT OF PARKING BRAKE OPERATION EFFORT



1. Measure the operation force required to move the pedal to the lock position by applying force.
   Standard:
   200 - 250 N (20 - 25 kg, 45 - 56 lb)



2. If the measured operation force is not within the specified range, perform the following adjustment.

- Unlock lever.
- Adjust adjusting bolt using a screwdriver so that the operation force required to move the lever to the lock position is within the standard.

USER FORK WEAR STANDARDS

Reprinted from ASME / ANSI B56.1 - 2000

6.2.8 Inspection and Repair of Forks in Service on Fork Lift Trucks

(a) Forks in use shall be inspected at intervals of not more than 12 months (for single shift operations) or whenever any defect or permanent deformation is detected. Severe applications will require more frequent inspection.

(b) Individual load rating of forks: When forks are used in pairs (the normal arrangement), the rated capacity of each fork shall be at least half the manufacturer's rated capacity of the truck, and the rated load center distance shown on the lift truck nameplate.

6.2.8.1 Inspection. Fork inspection shall be carried out carefully by trained personnel with the aim of detecting any damage, failure, deformation, etc. which might impair safe use. Any fork which shows such a defect shall be withdrawn from service, and not returned to service unless it has been satisfactorily repaired in accordance with para. 6.2.8.2.

(a) Surface Cracks. The fork shall be thoroughly examined visually for cracks and if considered necessary, subjected to a non-destructive crack detection process, special attention being paid to heel and welds attaching all mounting components to the fork blank. This inspection for cracks must also include any special mounting mechanisms of the fork blank to the fork carrier including bolt type mounting and forged upper mounting arrangements for hook and shaft carriages. The forks shall not be returned to service if surface cracks are detected.

(b) Straightness of Blade and Shank. The straightness of the upper face of the blade and the front face of the shank shall be checked. If deviation of straightness exceeds 0.5% of the length of the blade and/or the height of the shank, respectively, the fork shall not be returned to service until it has been repaired in accordance with para. 6.2.8.2.

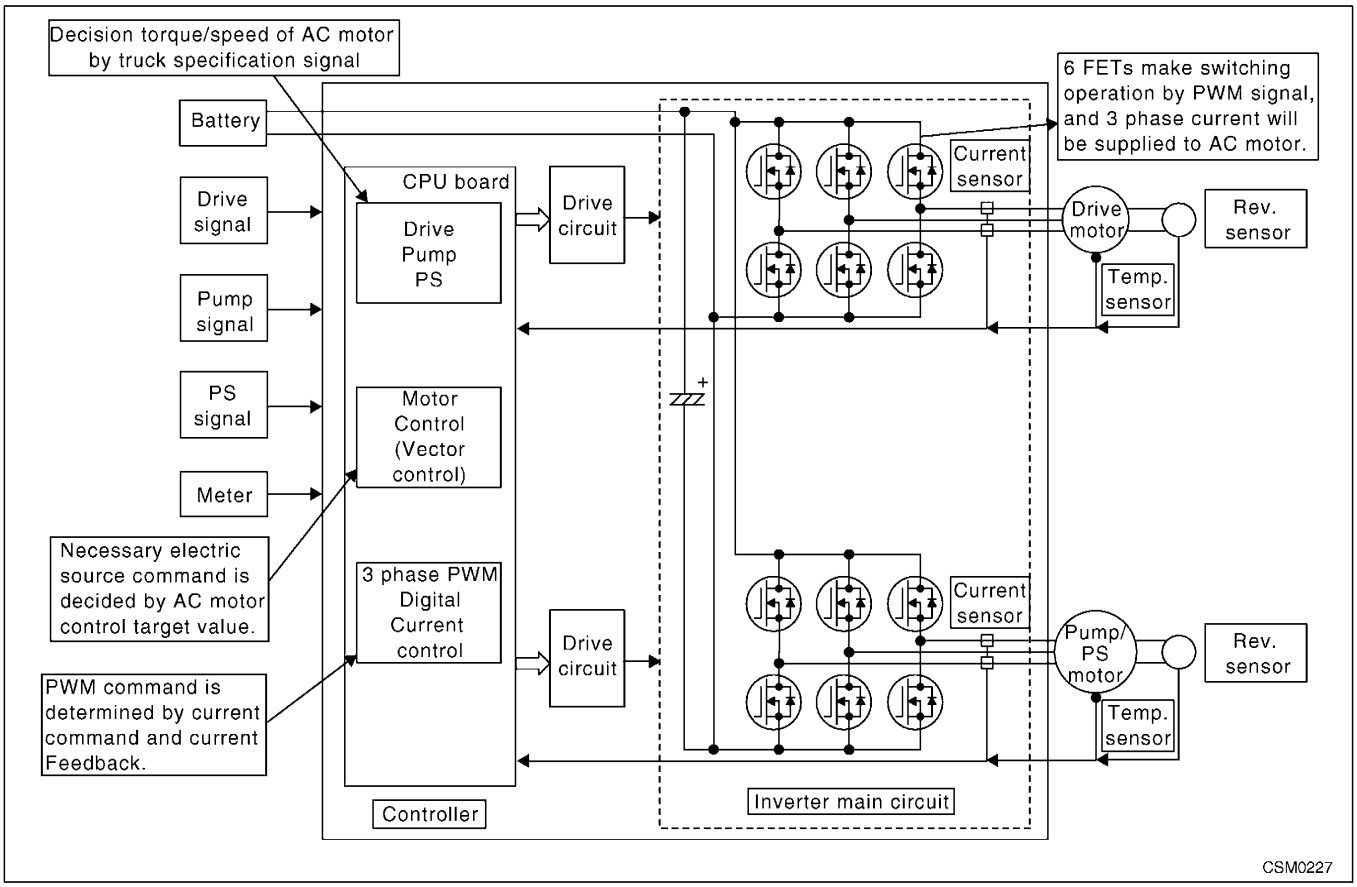
(c) Fork Angle (Upper Face of Blade to Load Face of Shank). Any fork that has deviation of greater than 3 degrees from the original specification shall not be returned to service. The rejected fork shall be reset and tested in accordance with para. 6.2.8.2.

(d) Difference in Height of Fork Tips. The difference in height in one set of forks when mounted on the fork carrier shall be checked. If the difference in tip heights exceeds 3% of the length of the blade, the set of forks shall not be returned to service until repaired in accordance with para. 6.2.8.2.

(e) Positioning Lock (When Originally Provided). It shall be confirmed that the positioning lock is in good repair and correct working order. If any fault is found, the fork shall be withdrawn from service until satisfactory repairs have been effected.

System (Cont'd)

AC motor control



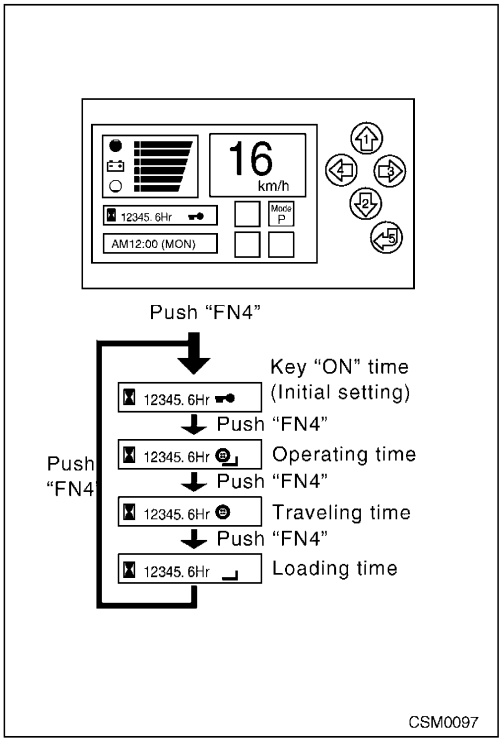
DRIVE SYSTEM FUNCTION

Item	Function	Outline
Drive control	Drive control type	Induction motor AC inverter vector control
	Drive control	Speed control (With turning speed/acceleration control)
	Regeneration control	Switchback, brake, accelerator off regeneration
	Performance adjustment	Power level (3 steps+ accurate adjustment 5 steps)/Acceleration Level (8 steps), Regeneration level (8 steps each) Anti-roll (8 steps)
	Anti-roll control	Anti-roll braking force control on slope
	Various limitation	Speed, high lift height, power cut (brake, parking brake)
Pump control	Drive control	Induction motor AC inverter vector control
	Drive control	Speed control by loading operation
	Regeneration control	Loading regeneration when loading operation stopped
	Performance adjust.	Power level (3 steps + accurate adjust 5 steps) Acceleration Level (8 steps)
	Various limitation	High lift height, high driving speed, cutout when reverse drive, pump cut
	Mast lowering control	Mast lowering lock when key switch is off
PS control	Drive control type	Electronic controlled hydraulic power steering
	Drive control method	Common pump motor control for loading
	Control function	Starting with steering operation detected/steering speed sensing control
	Knob position control (OPTION)	Compensate steering angle and tire angle offset by magnetic valve control

Meter Panel Explanation (Cont'd)

LCD CONTRAST

The display contrast (lighter or darker) can be adjusted in 11 steps. Push function key FN1, the letters are dark and the display is dimmed. Push function key FN2, the letter are light and the display is brightened.

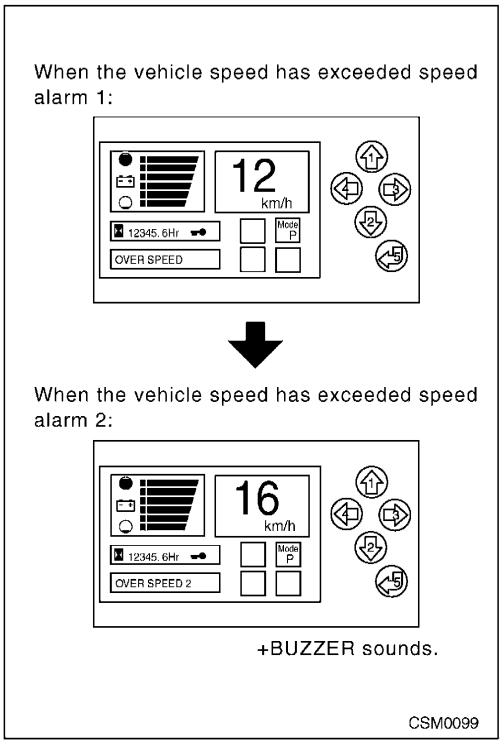


HOUR METER (4 MODE)

This hour meter has 4 modes (functions).

1. Key "ON" time : Equal to the total operating hours when the key switch is in the ON position.
2. Operating time : Equal to the traveling or loading time (the time for whichever operation in progress is displayed).
3. Traveling time : Equal to the total time that the traction motor is operational.
4. Loading time : Equal to the total time that the forks are operational (tilting and lifting).

The hour meter operates when the key switch is in the ON position, and it indicates the total operating period in hours (key "ON" time).



SPEEDOMETER

The speedometer shows forklift speed in either kilometers per hour (km/h) or miles per hour (mph). The maximum vehicle speed and speed alarm can both be set.

NOTE:
Speedometer factory settings at time of shipping:
Maximum speed: 20 km/h (12 MPH)
Setting speed range: 1 - 20 km/h (3 - 12 MPH)
Forklift speed alarm 1 - 2 setting: 25 km/h (16 MPH)
Forklift speed alarm 1 setting range (WSL1):
5 - 25 km/h (3 - 16 MPH)
Forklift speed alarm 2 setting range (WSL2):
WSL1 - 25 km/h (WSL1 - 16 MPH)

For speed alarm setting, refer to "Adjustment Mode".

Adjustment Mode (Cont'd)

MEMO

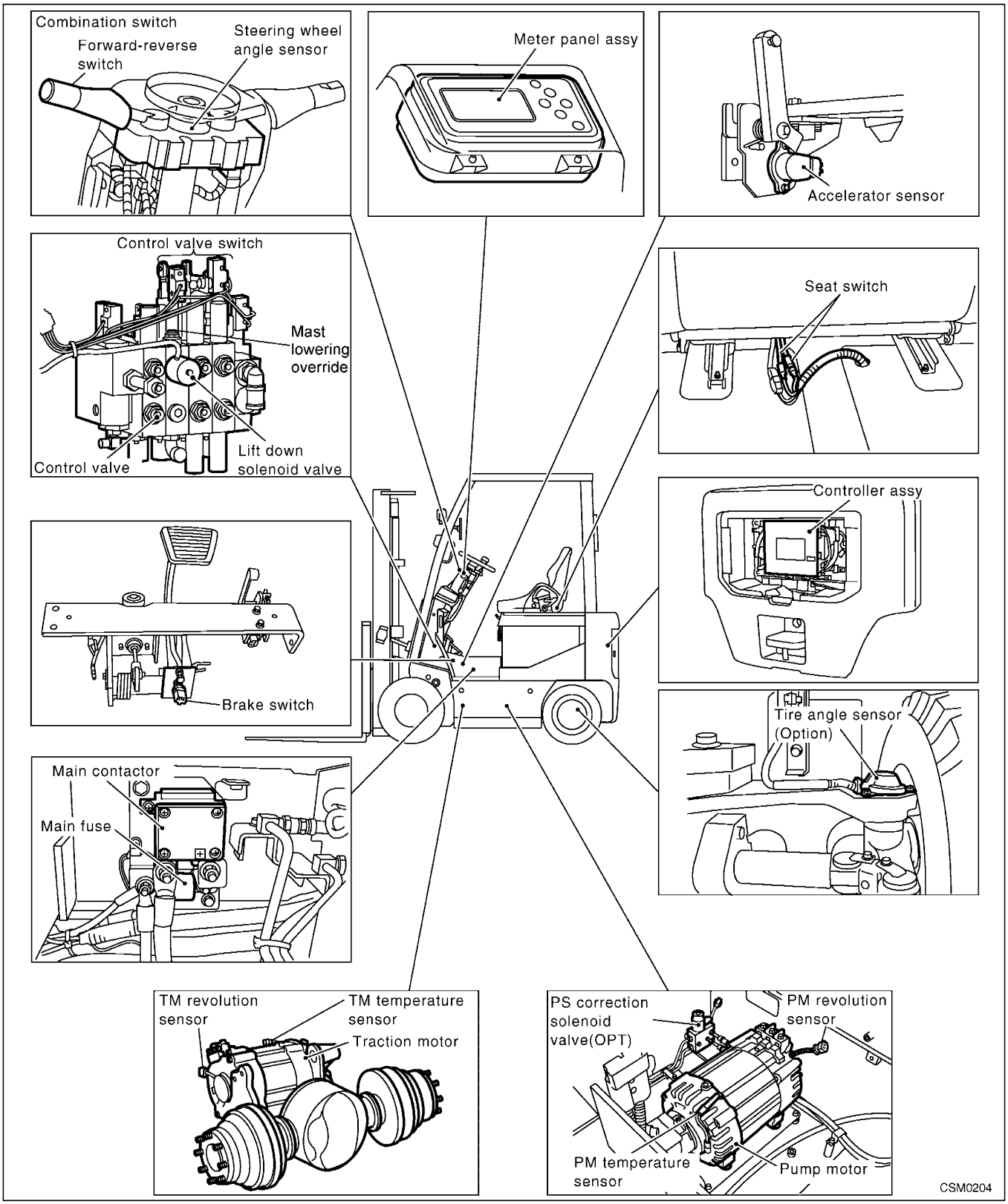
Diagnostic Mode (Cont'd)

Item	Display	Item	Remarks
1A	*.**V	Output voltage of Accelerator VR	3 digits, 2 decimal point
1B	*.**V	Output voltage of Accelerator VR2	3 digits, 2 decimal point
1C	***%	Accelerator position control value	3 digits
1D	***%/S	Accelerator open speed	3 digits
1E	*.**V	Output voltage of Lift accelerator (Special arrangement)	3 digits, 2 decimal point
1F	***%	Lift accelerator position control value (Special arrangement)	3 digits
1G	–	Output voltage of Lift sensor (JC) (Not equipped)	3 digits, 2 decimal point
1H	–	Lift sensor position control value (JC) (Not equipped)	3 digits
1I	–	Lift sensor operation speed (JC) (Not equipped)	3 digits
1J	–	Output voltage of Tilt sensor (JC) (Not equipped)	3 digits, 2 decimal point
1K	–	Tilt sensor position control value (JC) (Not equipped)	3 digits
1L	–	Tilt sensor operation speed (JC) (Not equipped)	3 digits
1M	–	Output voltage of 3rd sensor (JC) (Not equipped)	3 digits, 2 decimal point
1N	–	3rd sensor position control value (JC) (Not equipped)	3 digits
1O	–	3rd sensor operation speed (JC) (Not equipped)	3 digits
1P	–	Output voltage of 4th sensor (JC) (Not equipped)	3 digits, 2 decimal point
1Q	–	4th sensor position control value (JC) (Not equipped)	3 digits
1R	–	4th sensor operation speed (JC) (Not equipped)	3 digits
1S	*.**V	Output voltage of Tilt angle sensor (Option)	3 digits, 2 decimal point
1T	*.**V	Set angle of Tilt angle sensor voltage (Option)	3 digits, 2 decimal point
1U	*.**V	Output voltage of Mast weight (Option)	3 digits, 2 decimal point
1V	*.**V	Set voltage of Mast weight (Option)	3 digits, 2 decimal point
1W	*.**V	Output voltage of Tire angle sensor (Option)	3 digits, 2 decimal point
1X	(–)**°	Tire angle control value (Option)	±2 digits
1Y	(–)****°	Steer angle control value	±4 digits
1Z	*.**RPS	Steer speed control value	3 digits, 2 decimal point
1AA	(–)**°C	Battery ambient temperature	2 digits
2A	OFF,ON	Seat switch	
2B	OFF,ON	Forward switch	
2C	OFF,ON	Reverse switch	

Note:
JC: Joystick loading control system

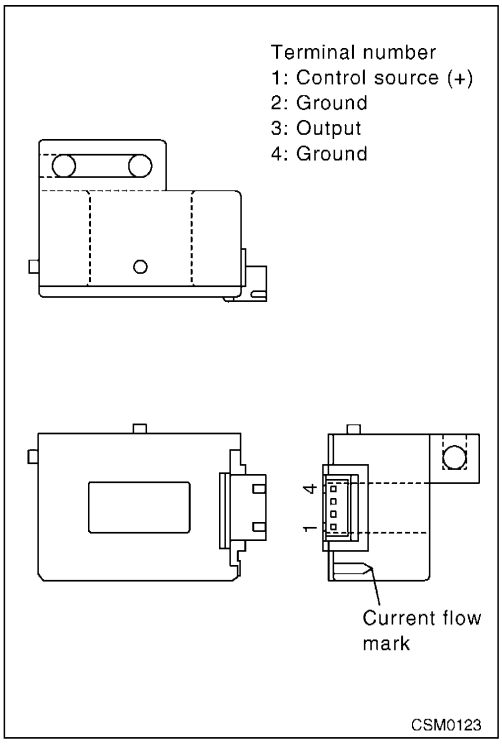
CSM0232

Standard Equipment



Controller Element Inspection (Cont'd)

CURRENT SENSOR



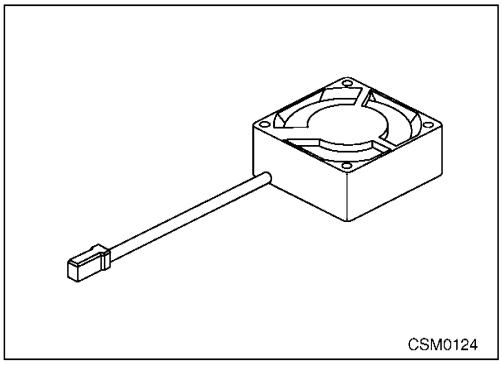
Specifications

Item	Specification
Type	HC-TSA800V2YP12AR
Actual current	±800A
Output voltage	+0.56 ~ +2.56V ~ +4.56V

Service data

Item	Normal	NG
Output V	Approx. 2.5V between 3-4	Failed sensor
Source V	Approx. 12.0V between 1-4	Failed CPU board

FAN ASSEMBLY



Specifications

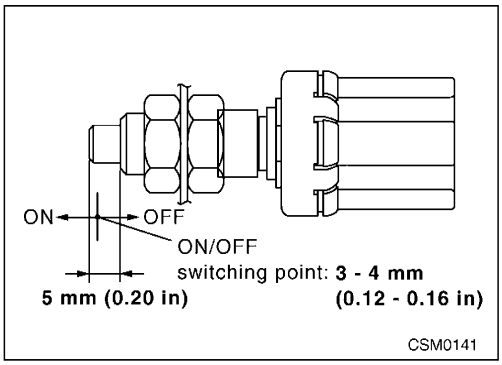
Item	Specification
Type	2410ML-05W-B40-BQ1
Numbers of fan	7 pieces/controller
Rated voltage	24V

Service data

Item	Normal	NG
Operation	Operation check with Constant voltage	Failed cooling fan

Control System (Cont'd)

BRAKE SWITCH



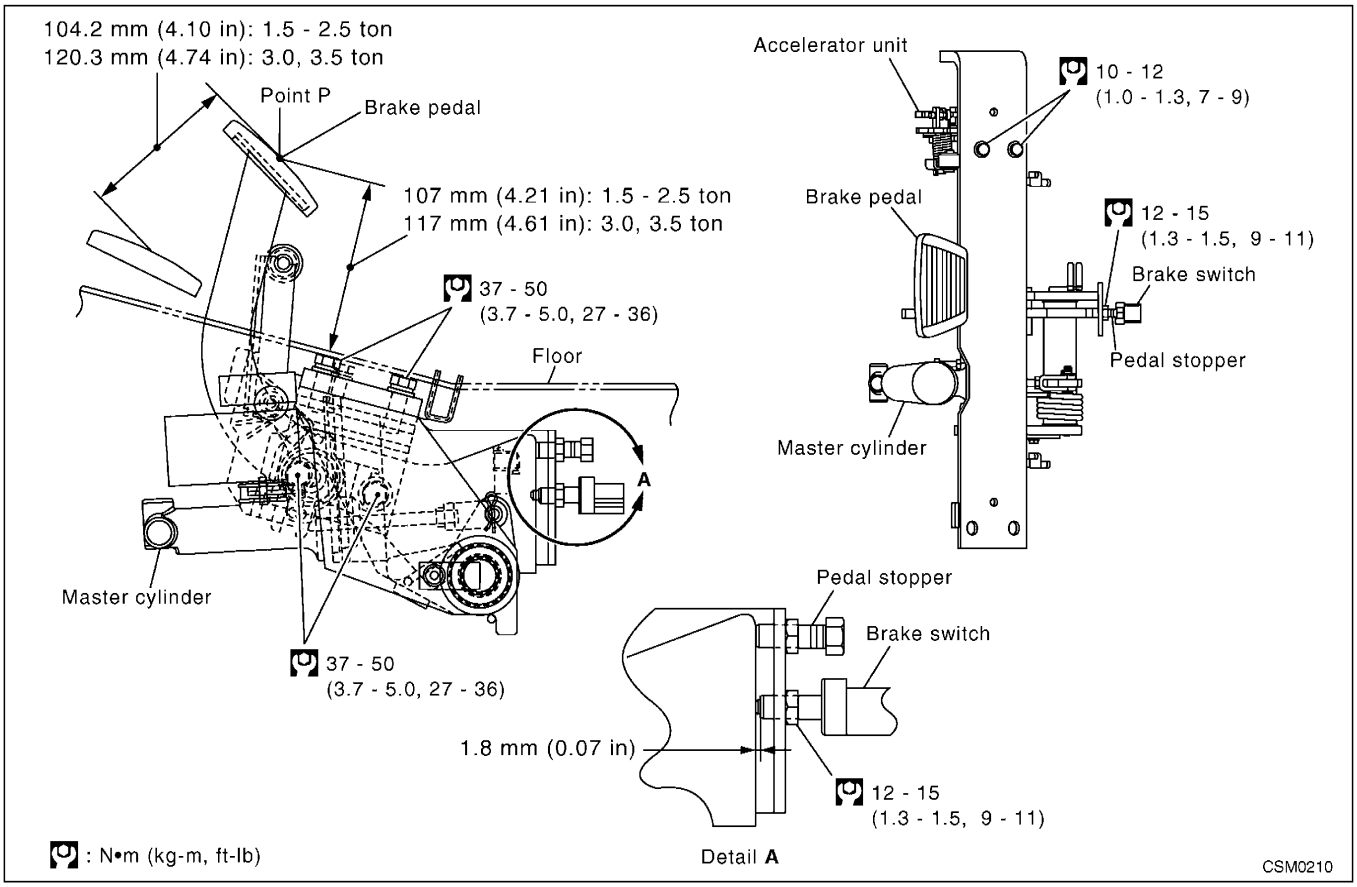
Inspection

Check continuity between brake switch terminals when the brake pedal is depressed 8 to 12 mm (0.31 to 0.47 in). Continuity must exist.

<Reference data>

Brake switch ON/OFF switching point	Pedal height: 100 mm (3.94 in) (1.5 - 2.5 ton) 111 mm (4.37 in) (3.0, 3.5 ton) (from floor upper surface)

Adjustment



1. Adjust the height of brake pedal point P to 107 mm (4.21 in) (1.5 - 2.5 ton), 117 mm (4.61 in) (3.0, 3.5 ton) from the floor upper surface by the stopper bolt, and then tighten the lock nut.
   : 12 - 15 N•m (1.3 - 1.5 kg-m, 9 - 11 ft-lb)
2. When depressing the pedal within 8 - 12 mm (0.31 - 0.47 in) (pedal height: 100 mm (3.94 in) (1.5 - 2.5 ton), 111 mm (4.37 in) (3.0, 3.5 ton)), adjust the brake switch so that the brake switch is "ON", and then tighten the lock nut.
   : 12 - 15 N•m (1.3 - 1.5 kg-m, 9 - 11 ft-lb)
3. Make sure that the brake switch is "OFF" when the pedal is released.

How To Follow Flow Chart

Trouble diagnostic procedures for controllers (including charging system) are indicated in flow charts. Inspection and confirmation procedures are shown in illustrations, making the respective flow charts more comprehensive. Circuit diagrams are also included where necessary, along with applicable flow charts.

NOTE:
The entire system wiring diagram and circuit diagram are included at the end of this manual. Refer to these diagrams as necessary during diagnostic procedures.

MALFUNCTIONING SYMPTOMS

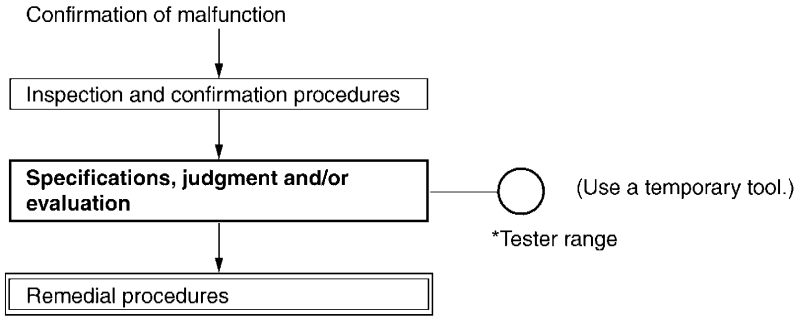
Typical trouble symptom entries are treated as titles.

PROBABLE TROUBLE AREAS CAUSING MALFUNCTIONS

Probable trouble areas or parts are indicated in relation to malfunctions that may occur.

Inspection and/or confirmation procedures must be explained as required in the illustration.

WORK FLOW



* Examples of tester range selection

: Voltage measurement in 100-volt range (DC)

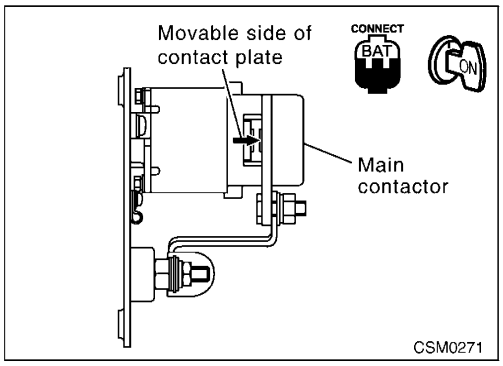
: Voltage measurement in 500-volt range (AC)

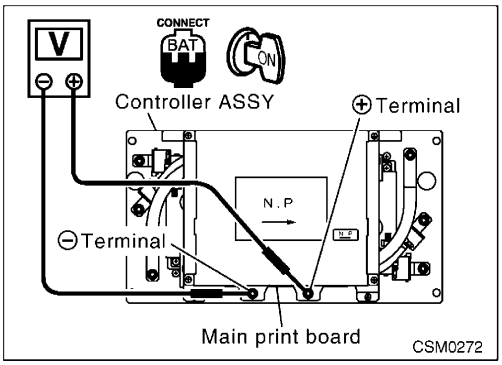
: Resistance measurement in 1Ω range

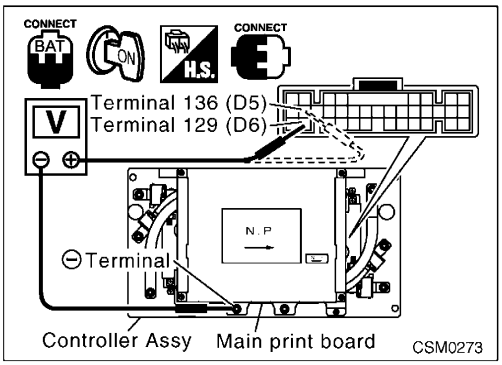
⚠ CAUTION:
Always use the digital tester to measure the resistance of the sensor (potentiometer). If the analog tester is used, the sensor (potentiometer) may be damaged by the internal battery of the analog tester.

: Current measurement in 50-ampere range (AC)

About temporary tool:
A temporary tool refers to a circuit tester whose test probe ends are temporarily wrapped with thin conductive wires. The tip ends of respective wires are attached to connector terminals on the print board side during required voltage measurements. Refer to “Precautions” on page 74.







Ⓓ

Is the battery voltage normal?
NO → Check Main fuse. (Refer to page 57 in CS section)
YES

Check the main contactor operation.

When the key switch is ON, does the main contactor operate?
NO → Check the main contactor. (Refer to page 56 in CS section) Check the cable and harness condition.
YES

Measure the voltage between controller VB (+) terminal and (-) terminal. — V/100

Is the battery voltage normal?
NO → Check the cable connection condition.
YES

When the key switch is ON, measure the voltage between controller terminals 136 (D5), 129 (D6), and (-) terminal. — V/100

Is the battery voltage normal?
NO → Check Fuse 10A (IGN side). (Refer to page 19 in EL section) Check the harness condition.
YES

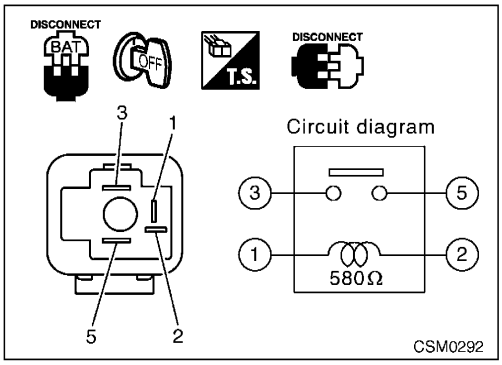
Go to Ⓔ on page 86.

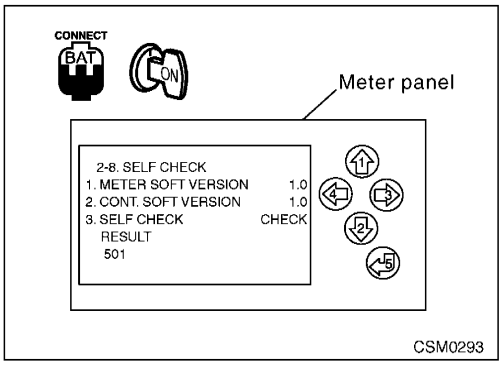
SYMPTOM:
The mast does not lower (but can be raised).

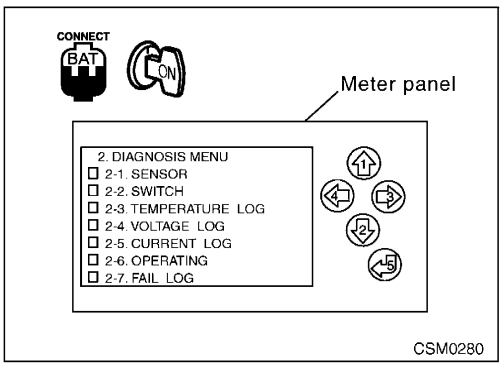
PROBABLE TROUBLE AREAS CAUSING MALFUNCTIONS

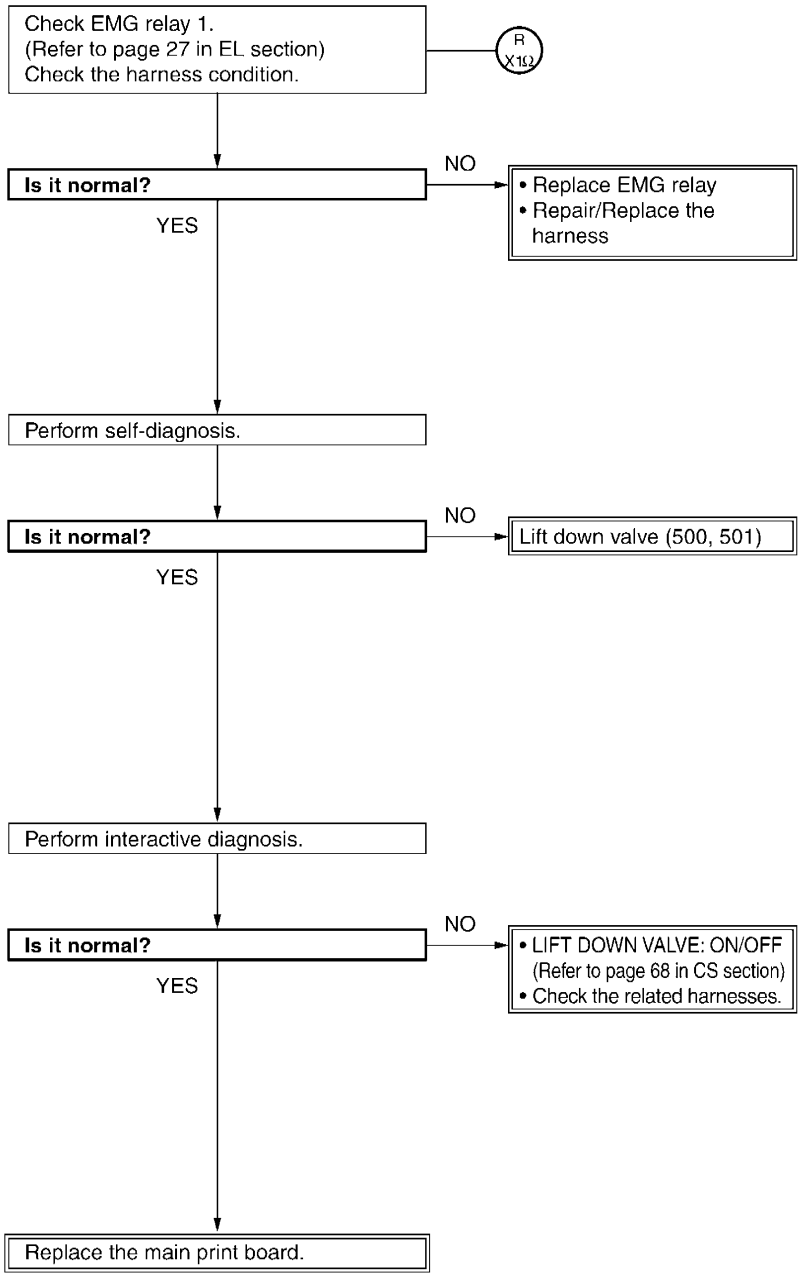
EMG relay, Lift down valve, Main print board and Harness

⚠ CAUTION:
The self-diagnosis results in flowchart describe the possible parts (error code), but all of them are not always displayed. Only the parts that can be checked with interactive diagnosis are displayed from these parts as the interactive diagnosis item. Always check the malfunctioning parts of interactive diagnosis even if it is a unit. Then, check the related harness condition.





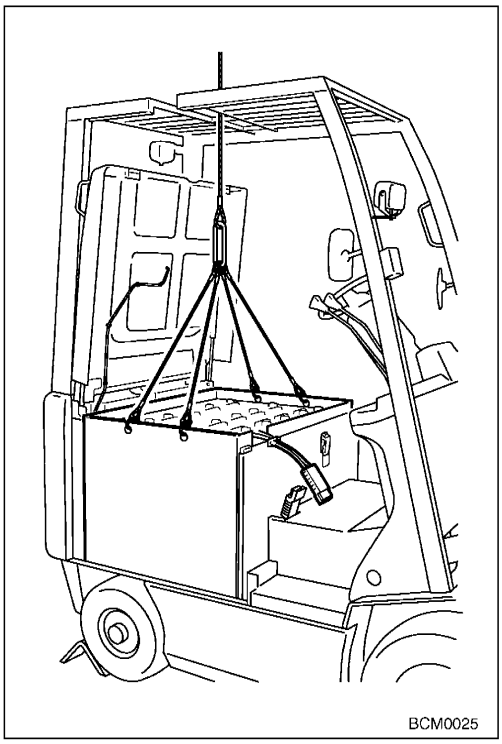




Main Print Board (Cont'd)

Terminal No. (Print board side)	Items	Characteristic/Specification	Possible error mode/ Related symptom	Related trouble diagnosis
D3	MAIN CONTACTOR DRIVE +	VB level	• The controller does not operate • The main contactor is not input	• Main contactor open: 401 • Main contactor short: 400
D4	MAIN CONTACTOR DRIVE -	PWM drive (VB-GND)		
D68 D70 D71 D72	Traction current sensor power supply	12.5±1V	• The controller does not operate	• Traction U-phase current sensor output large: 415 • Traction U-phase current sensor output small: 414 • Traction V-phase current sensor output large: 417 • Traction V-phase current sensor output small: 416
D73	U-phase traction current sensor signal	At no motor driving: 2.5±0.1V		
D75	W-phase traction current sensor signal			
D62 D69 D74 D80	Traction current sensor power supply GND	GND		
P70 P71 P72	Loading current sensor power supply	12.5±0.1V	• The controller does not operate	• Loading U-phase current sensor output large: 431 • Loading U-phase current sensor output small: 430 • Loading V-phase current sensor output large: 433 • Loading V-phase current sensor output small: 432
P73	Loading U-phase traction current sensor signal	At no motor driving: 2.5±0.1V		
P75	Loading V-phase traction current sensor signal			
P74 P78	Loading current sensor power supply GND	GND		
D64 D65	Cooling fan power supply	At fan driving: 24.0±3V	• Internal cooling fan malfunction	• Drive Cont. temperature sensor malfunction: 426 • Loading Pump Cont. temperature sensor malfunction: 436
D102	Traction controller temperature +	Voltage between D102 and D103: Approx. 3.8V (25°C)	• The controller does not operate • Traction speed decrease	• Drive Cont. temperature sensor rise: 427 • Drive Cont. temperature sensor malfunction: 426
D103	Traction controller temperature -			
P85	Loading controller temperature +	Voltage between P85 and P86: Approx. 3.8V (25°C)	• The controller does not operate • Loading speed decrease	• Pump Cont. temperature rise: 437 • Pump Cont. temperature sensor malfunction: 436
P86	Loading controller temperature -			

Removal (Cont'd)

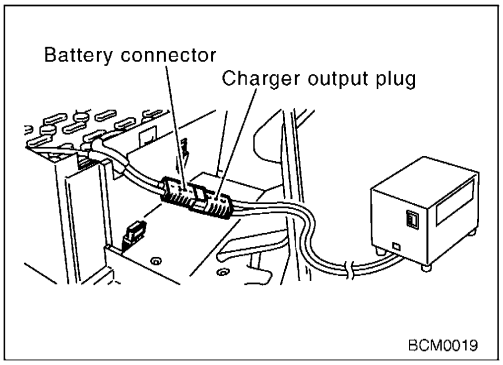


6. Align the battery raising tool with the hook and the notch in the overhead guard.
7. Lift the battery box vertically out of its lodging.

⚠ WARNING:
Use extra care with hanger. Never let it make contact with terminal of battery when placing it. If contact is made, sparks, leading to burns and explosions occur.

8. Carefully remove to one side and place it on the ground.

How to Charge the Battery (JAPAN STORAGE BATTERY CO., LTD. made separate-type) (Cont'd)



⚠ WARNING:
Before selecting the correct taps for charging the battery, ensure that the input plug (4P) is disconnected.

3. Connect the charger output plug to the battery connector.

⚠ CAUTION:
Do not connect the charger output plug to the body harness connection. The battery will not charge through this connection.

4. Connect the charger input plug to the wall outlet (in the service shop).

⚠ CAUTION:
To prevent a short circuit, install a no-fuse breaker on the wall outlet side (in the service shop) to connect the charger input plug.

5. Push the NORMAL or EQUAL button to select normal or equalizing charge, respectively.
   When an equalizing charge is desired, press the EQUAL button to set the charger in that mode. The NORMAL pilot lamp will go out and the EQUAL pilot lamp will come on.
   Make sure only the pilot lamp of the selected charging mode is lit.
   At this time, charging will be started automatically.

NOTE:

a. Push the NORMAL or EQUAL button for about 2 seconds. Do not push it more than 5 seconds.
   If the button is pushed for extended periods of time, the timer will enter test mode. The test lamp will come on. The test mode will end in 10 seconds to 2 minutes and the test lamp will go off.
   When the test mode is operating, charging will not start because the charging mode is not selected.
b. After charging is started, it is not possible to change the charging mode (NORMAL or EQUAL). If it is necessary to change the mode, stop charging (push the STOP button), and then select the charging mode again.
c. It is advisable to charge the battery using the equalize charging mode at least two or three times a month.

6. While charging, the charge indicator lamp will come on sequentially and remain lit. Firstly, the Initial (1st) lamp comes on, then the 2nd lamp, and they remain lit. Finally, the Final lamp will come on.

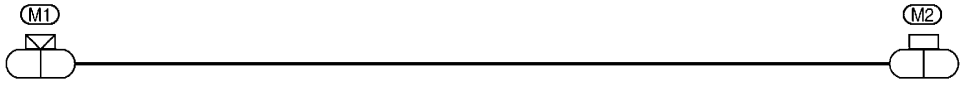
NOTE:
When the FINAL lamp comes on, the timer will activate.

7. When charging has been completed, the charging circuit automatically opens. At this point, the Initial (1st) lamp, 2nd lamp, Final lamp and OK (charge completion) lamp will all come on to indicate that charging has been completed.
   At this time, the charging mode lamp will go out.
8. After ensuring that the Initial (1st and 2nd), Final and OK lamps are on, disconnect the charger output plug from the battery connector. All lamps will then go out.

Tilt Leveling Device (Option) (Cont'd)

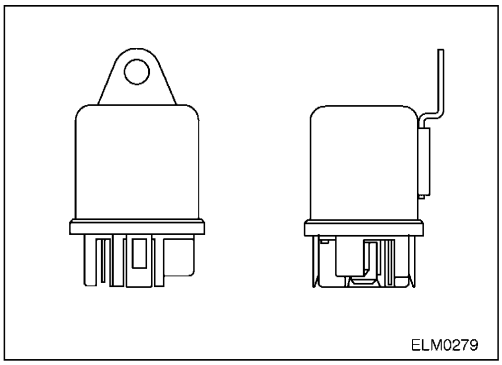
MEMO

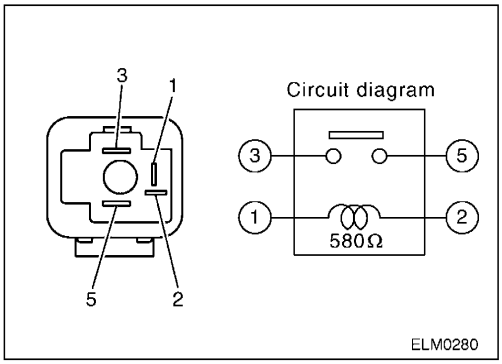
Mast Harness for Tilt Leveling Device (Option)



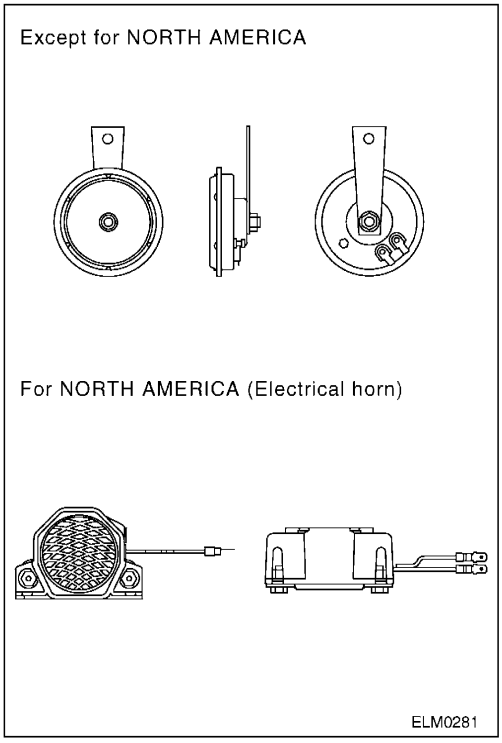
M1 : To body harness B42
M2 : To mast height switch

ELM0307


ELM0279



ELM0280



ELM0281

Tail Lamp, Auto Power Off, Battery Switch Relay

SPECIFICATIONS

Rated voltage	(V)	48
Rated load	(A)	4
Minimum operating voltage	(V)	25

INSPECTION

- Check for broken coil using circuit tester.
- Check continuity between contacting side terminals using circuit tester (Ω range) while applying or releasing battery voltage to/ from coil side terminals.

	Terminal	
Coil	① - ②	Continuity
Contacting point	③ - ⑤	Continuity

Horn

SPECIFICATIONS

		Horn	
		Except for NORTH AMERICA	For NORTH AMERICA
Rated voltage	(V)	48	24 - 48
Operating voltage	(V)	36 - 58	19.6 - 55
Sound pressure level (At 2 m)	dB (A)	97 - 115	103 - 111
Frequency	Hz	337 - 363	880 - 1,320

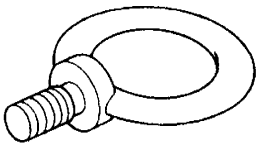
Precautions

⚠ **CAUTION:**

- **Be extremely careful when hoisting and moving heavy objects. These can be extremely dangerous operations.**
- **When removing or installing motor assembly, be sure to turn the key switch OFF and disconnect battery plug to cut power supply in advance. This prevents motors from unexpectedly rotating, avoiding danger.**
- **Always assemble parts in a clean work place to prevent foreign matter from entering assembly.**
- **Before disassembling, be sure to clean off the parts.**
- **Do not use water or cleaning oil to clean any part. Use compressed air or wipe with dry rag.**
- **Carefully handle removed motor so as not to drop or impact the motor.**

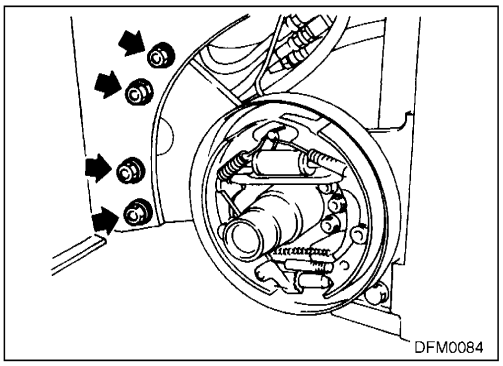
NOTE:
Be sure to use the special service tool when lifting and supporting traction motor.

Special Service Tool

Tool number Tool name	Description
Eyebolt	Lifting and supporting traction motor and pump motor.  MMT0001 M8×1.25

⚠ **CAUTION:**
The following table lists only typical examples. To perform an accurate diagnosis, carefully listen to the user's complaints and check the actual vehicle to fully understand under what conditions the symptoms occur.

Condition	Probable cause	Corrective action
Oil leakage or oil seepage (Locate the part experiencing oil loss and determine whether the problem is with oil seepage or oil leakage.)	• Deteriorated or improper type of gasket • Loose differential carrier-to-axle housing case securing bolts • Loose drain plug	• Replace. • Tighten or replace gasket. • Tighten.
Failure of differential carrier to rotate	• Seized or damaged bearing • Excessive bearing preload • Insufficient gear backlash • Insufficient or improper grade/type of gear oil	• Replace. • Disassemble and adjust. • Disassemble and adjust. • Refill or replace with proper grade/type of gear oil.
Abnormal noise during vehicle starts (Positively determine noise source is in differential carrier.)	• Improperly adjusted differential gear backlash • Insufficient final reduction gear bearing preload • Worn or damaged gear teeth faces • Loose bolts • Insufficient or improper grade/type of gear oil	• Adjust. • Adjust. • Replace. • Tighten. • Refill or replace with proper grade/type of gear oil.
Abnormal noise during turns (Positively determine noise source is in differential carrier.)	• Excessively worn or damaged differential gear • Seized, damaged or excessively worn thrust washer • Worn or damaged pinion mate shaft • Seized or damaged side bearing • Insufficient or improper grade/type of gear oil	• Replace. • Replace. • Replace. • Replace. • Refill or replace with proper grade/type of gear oil.
Gear squeaks (To check for gear squeaks, proceed as follows: Raise front wheels using a jack and run the traction motor. Determine when gear squeaking occurs—during acceleration, deceleration or constant-speed driving.)	• Improperly adjusted differential gear contact • Abnormal differential gear contact pattern • Cracked or damaged differential gear teeth faces • Improperly adjusted final reduction gear preload • Seized or damaged final reduction gear bearing • Seized or damaged side bearing • Excessive gear runout • Loose nuts and bolts	• Adjust or replace gears as a set. • Adjust or replace gears as a set. • Replace gears as a set. • Adjust. • Replace. • Replace. • Replace. • Tighten.



Installation (Cont'd)

10. Install axle mounting bracket to frame.

- Tighten securing nuts and bolts to specified torque.

Bolt : 360 - 480 N•m (37 - 49 kg-m, 266 - 354 ft-lb)
Nut : 339 - 416 N•m (35 - 42 kg-m, 250 - 306 ft-lb)

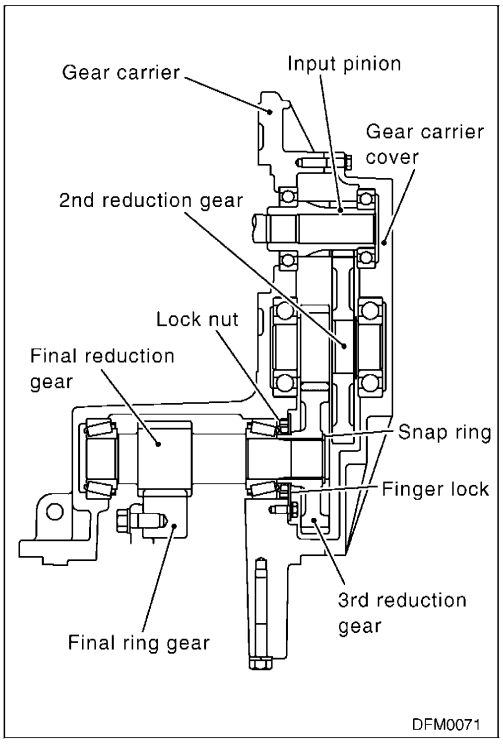
NOTE:
To facilitate installation of axle mounting bracket, insert a bar rod into the hole at frame (A), then pry as required to align the frame with the bolt holes in drive mounting bracket.

11. Connect motor cables and harness to traction motor.
12. Connect parking brake cable to parking brake pedal.
13. Install brake pedal bracket assembly. Refer to BR section for details.
14. Connect brake tube to brake cylinder, then bleed air from brake line. Refer to MA section for details.
15. Install front wheels and axle shaft. Refer to FA section.
16. Refill specified amount of gear oil. Refer to MA section.
17. Install mast assembly to vehicle. Refer to LM section.
18. Remove wooden blocks used to support vehicle, then lower the vehicle to the floor. Refer to GI section for details.

Disassembly

Before disassembling differential carrier assembly, clean its entire surface using a cloth and approved parts cleaning solvent.

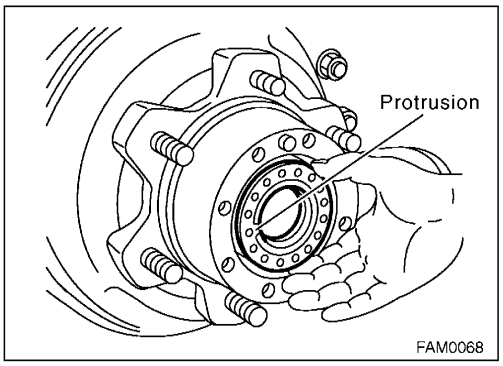
1. Before disassembling differential carrier, check and/or measure the following items to approximate trouble areas and ascertain disassembly and/or maintenance work to be performed.
2. Remove gear carrier cover.
3. Remove input pinion and 2nd reduction gear.
4. Remove snap ring from shaft of 3rd reduction gear. Then remove 3rd reduction gear.
5. Remove finger lock, then remove lock nut.
6. Remove final reduction gear.



⚠ **CAUTION:**
The following table lists only typical examples. To perform an accurate diagnosis, carefully listen to the user's complaints and check the actual vehicle to fully understand under what conditions the symptoms occur.

Condition	Probable cause	Corrective action
Abnormal noise Make sure that noise is emitting from the front axle. (Axle noise is prone to be confused with differential gear noise.)	• Loose axle mounting bracket securing bolts • Improperly adjusted or excessive backlash of wheel bearing • Worn or damaged wheel bearing • Worn or damaged axle shaft splines • Insufficient lubrication • Loose securing nuts and bolts	• Tighten. • Adjust wheel bearing preload. If a bearing is worn, replace bearings as a set. • Replace wheel bearings as a set. • Replace axle shaft and check differential side gear. • Apply grease. • Tighten.
Unstable driving and vehicle vibration (Symptom related to steering axle is likely. Also refer to RA section.)	• Loose wheel nuts • Deformed road wheels • Unequal right and left tire pressure • Different type tire or wheel on right or left • Differently worn right and left tires • Excessive wheel bearing backlash • Loose axle mounting • Loose nuts and bolts	• Tighten. • Replace. • Adjust. • Replace. • Check and replace. • Adjust wheel bearing preload. If a bearing is worn, replace bearings as a set. • Tighten mounting bracket securing nuts. • Tighten.
Oil leakage	• Worn or damaged axle shaft oil seal • Improperly installed differential carrier • Loose filler plug and/or drain plug • Cracked axle housing	• Replace. • Replace gasket and apply sealant. • Tighten. • Replace.

Wheel Hub (Cont'd)



6. Install lock washer while mating protrusion of lock washer and groove in axle tube. Set wheel bearing nut on lock washer and tighten with two lock screws.

⚠ **CAUTION:**

- **If lock washer hole does not match bearing nut hole properly, turn over lock washer or turn lock nut, within preload specification range, to adjust. When turning lock nut, turn it in tightening direction if a lighter preload, within specification, is set. Turn lock nut in loosening direction if a higher preload is set.**

7. Install oil seal and axle shaft. On 1B1, C1B1 and C1B2 series models, be sure to align axle shaft with dowel pin during installation.

- Apply a coat of multi-purpose grease to oil seal before installation.
- Apply a coat of liquid packing (Nissan Genuine Liquid Gasket or equivalent) to mating surface axle shaft before installation.

1B1, C1B1:
: 41 - 57 N•m (4.2 - 5.8 kg-m, 31 - 42 ft-lb)
C1B2:
: 71 - 97 N•m (7.3 - 9.8 kg-m, 53 - 71 ft-lb)

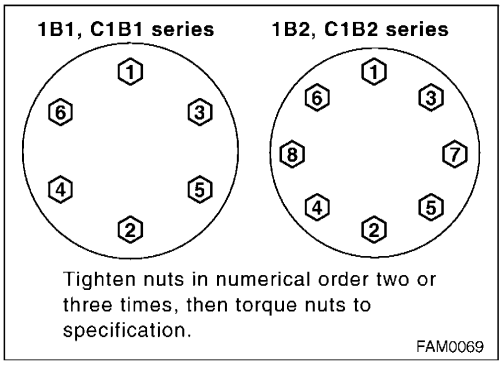
NOTE:
On 1B2 series models, axle shaft is secured by using screws and wheel nuts.

8. Install wheel and tire as a unit.

- On vehicles equipped with special double tires, install inner wheel, outer hub and outer wheel in that order.

: Refer to "Tightening Torque", "SERVICE DATA AND SPECIFICATIONS".

NOTE:
Tighten wheel nuts to a lesser value than specification, making sure it is enough to keep component installation stable when the vehicle is lowered to the ground.



9. Carefully lower vehicle to ground. Tighten wheel nuts to specified torque.

1B1, C1B1:
: 167 - 226 N•m (17 - 23 kg-m, 124 - 166 ft-lb)
1B2, C1B2:
: 196 - 245 N•m (20 - 25 kg-m, 145 - 181 ft-lb)
3.0, 3.5 ton:
: 324 - 373 N•m (34 - 38 kg-m, 239 - 275 ft-lb)

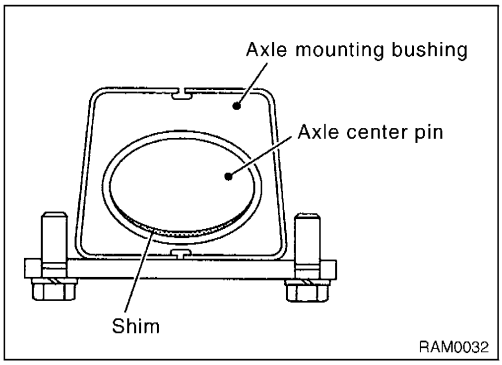
⚠ **CAUTION:**

- **Always tighten wheel nuts in a criss-cross fashion.**
- **After properly tightening wheel nuts, inflate pneumatic tires to specified pressure.**

Installation

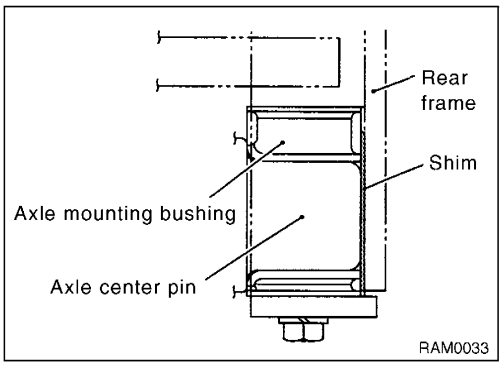
Note the following, and install in the reverse order of removal.

⚠ **CAUTION:**
Be sure to prevent axle center from tilting or slipping off of jack during installation.



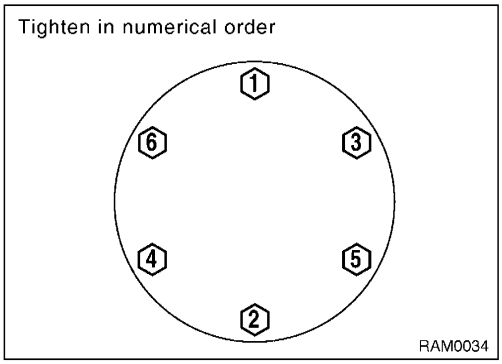
1. Axle center pin top and bottom clearance adjustment.
- Put shim downward to adjust when there is top and bottom clearance between axle center pin and bushing.

Shim thickness:
1.2 mm (0.05 in)
1.6 mm (0.06 in)



2. Axle center pin front and rear clearance adjustment.
- Adjust shim so that front and rear clearance between axle center pin and rear frame becomes less than 0.6 mm (0.02 in).

Shim thickness:
0.6 mm (0.02 in)
1.0 mm (0.04 in)
2.3 mm (0.09 in)



3. Axle mounting cap installation.
- Axle mounting cap bolt

: 50 - 70 N•m (5.1 - 7.1 kg-m, 37 - 51 ft-lb)

4. Tire installation (Pneumatic model).
- Tighten wheel nuts to a lesser value than specification, making sure it is enough to keep component installation stable when the vehicle is lowered to the ground.
- Carefully lower vehicle to ground. Tighten wheel nuts to specified torque.

⚠ **CAUTION:**
Tighten wheel nuts to the specified torque evenly.
- Inflate pneumatic tires to specified air pressure (if so equipped).

NOTE:
Tire installation for cushion model is refer to "Wheel bearing adjustment".

Unit: N•m (kgf-m, ft-lb)

Wheel nut \ Model			1B1 series	1B2 series	C1B1 series	C1B2 series
Front	Single tire		167 to 226 (17 to 23, 123 to 166)	196 to 245 (20 to 25, 145 to 180)	167 to 226 (17 to 23, 123 to 166)	196 to 245 (20 to 25, 145 to 180)
	Double tire	Inner	167 to 226 (17 to 23, 123 to 166)	196 to 245 (20 to 25, 145 to 180)	-	-
		Outer	167 to 226 (17 to 23, 123 to 166)	196 to 245 (20 to 25, 145 to 180)		
Rear			167 to 226 (17 to 23, 123 to 166)	78 to 98 (8 to 10, 58 to 72)	-	-

BRAKE SYSTEM

SECTION BR

CONTENTS

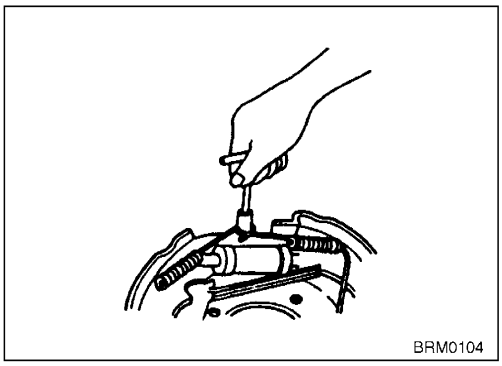
⚠ **CAUTION:**

- **Before changing any components (i.e. lamps, fuses, meter panels) or disconnecting any wiring. Always turn OFF the key switch and disconnect battery. This will reduce the possibility of damage to the controller system.**

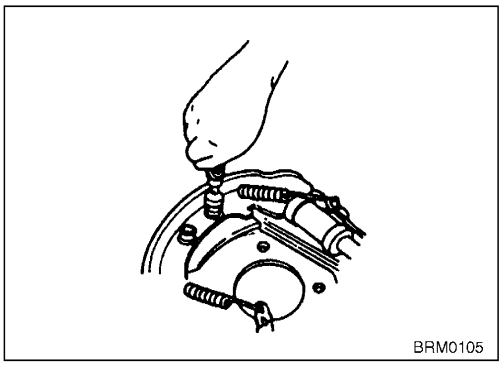
⚠ **CAUTION:**

- **Whenever towing this truck ensure key is in OFF position and battery is disconnected (unplugged) to reduce possible damage to electrical system.**

Disassembly (Cont'd)


BRM0104

1. Removal of return spring.
- Remove the return spring from the anchor pin using a spring remover.


BRM0105

2. Removal of shoe hold spring.
- Remove the shoe hold part from the backing plate using a spring retainer.

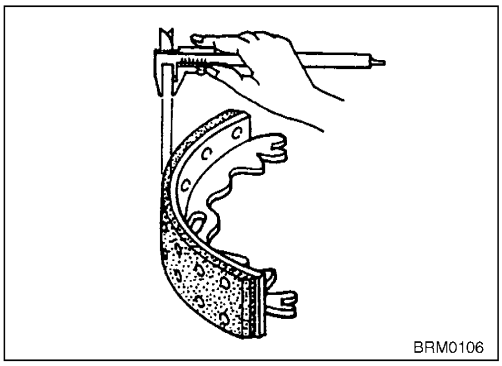
Inspection

BACK PLATE

Check for cracks in the backing plate.

SHOE AND LINING ASSEMBLY

- Check for cracks/damage in the lining and shoe.
- Replace if the lining is noticeably dirty with oil, burned, or otherwise deteriorated.
- Inspect the thickness of the lining, and replace if the usable limit is exceeded.


BRM0106

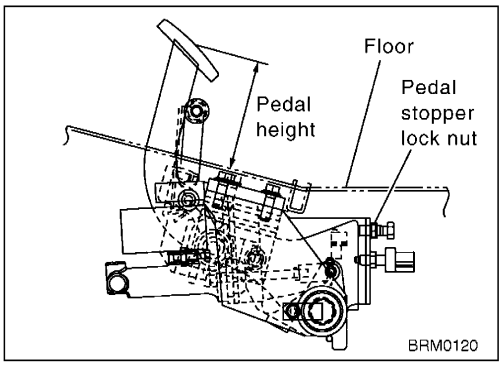
Standard:

1B1, 1B2, C1B1	**4.87 mm (0.19 in)**
C1B2	**5.70 mm (0.23 in)**

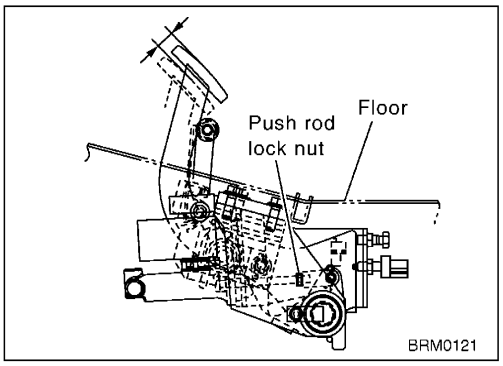
Usable limit:

1.0 mm (0.04 in) or less

Adjustment

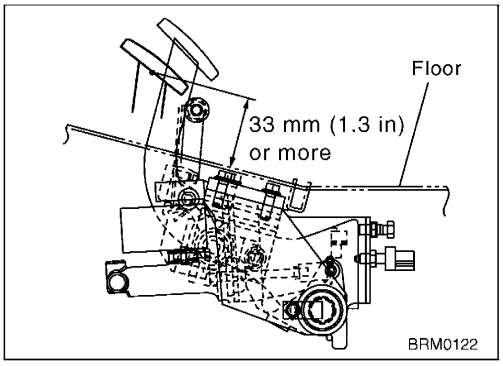


1. Adjust pedal height (distance between floor panel and pedal pad surface) to the standard by adjusting pedal stopper. Then, securely tighten lock nut.
   Standard:
   107 mm (4.21 in) (Except for 3.0, 3.5 ton)
   117 mm (4.61 in) (3.0, 3.5 ton)
   : 12 - 14 N•m (1.2 - 1.5 kg-m, 8.9 - 10.3 ft-lb)



2. Adjust play at push rod to the standard by adjusting push rod. Then tighten adjusting nut and check pedal play at pedal pad.
   Free play:
   At push rod
   1.0 - 1.3 mm (0.04 - 0.05 in)
   At pedal pad
   6.0 - 8.0 mm (0.24 - 0.31 in)
   (Except for Cushion model 2.0, 2.5 ton)
   5.0 - 6.5 mm (0.20 - 0.26 in)
   (Cushion model 2.0, 2.5 ton)
   : 7.8 - 11.8 N•m (0.8 - 1.2 kg-m, 5.8 - 8.7 ft-lb)

⚠ CAUTION:
Always properly adjust play. If play is much less than standard, push rod is continuously applied with load. This results in blocking master cylinder return port, causing brake dragging. Also, excessive play may cause push rod to come out of place.



3. Check pedal depressed height. If it is excessively outside the standard, check brake system other than brake pedal assembly.
   Standard:
   33 mm (1.3 in) or more
4. Depress and release brake pedal several times to see if it travels smoothly over its entire stroke without binding, twisting or interfering with adjacent parts.
5. **Depress and release brake pedal several times. Make sure that brake switch comes on when the pedal is depressed 8.0 to 12.0 mm (0.315 to 0.472 in) and goes off when it is released.**

STEERING SYSTEM

SECTION ST

CONTENTS

⚠ **CAUTION:**

- **Before changing any components (i.e. lamps, fuses, meter panels) or disconnecting any wiring. Always turn OFF the key switch and disconnect battery. This will reduce the possibility of damage to controller system.**

⚠ **CAUTION:**

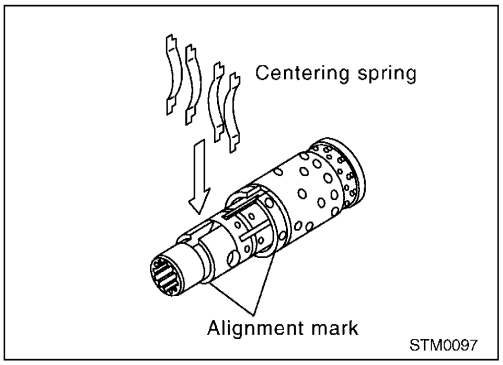
- **Whenever towing this truck always ensure key is in OFF position and battery is disconnected (unplugged) to reduce possible damage to electrical system.**

Assembly

⚠ **CAUTION:**
- **Assemble a new O-ring and seal when assembling.**
- **Apply a small amount of clean grease to O-rings before assembly.**
- **Do not confuse O-rings and because they are sizes very near.**

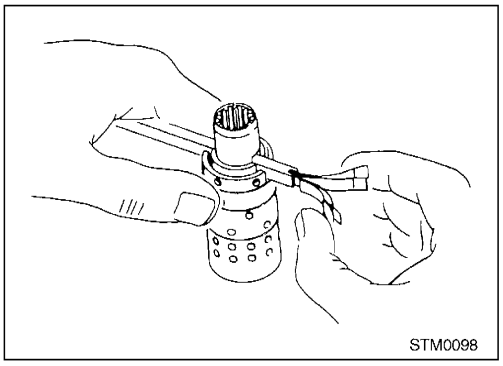
1. Slowly insert the spool in the sleeve while turning the spool. After that, hold the spool spline and try to turn it. The spool should turn smoothly in the sleeve.

⚠ **WARNING:**
Make sure to align the two parts correctly by referring to the alignment marks that have been placed during disassembly. Misalignment may cause malfunctions, resulting in serious accidents.



2. Position the spool and sleeve correctly by aligning the two opposite spring grooves. Insert the spring inserting tool in the spring grooves. Arrange the centering springs as shown in the figure and fit them to the inserting tool so that the end cutouts face downward.

⚠ **CAUTION:**
Ensure that the centering springs are arranged and positioned correctly. Incorrect positions or arrangement may lead to malfunctions.



3. Slightly lift the spool from the sleeve. While pressing and holding the opposite end of the centering spring, push them into the grooves of the spool and sleeve. At that time, make sure to slide the inserting tool at the same speed as pushing the springs. After inserting the springs, align the spring ends to the sleeve periphery.

⚠ **CAUTION:**
Always wear safety goggles. The centering spring may pop up from the spool.

4. Insert the pin in the sleeve hole and align both ends of the pin with the sleeve periphery.
5. Place the housing on a clean fabric so that the axial direction of the main body is held in a horizontal direction. Insert the spool and sleeve assembly from the opposite end to the housing flange.
   Verify that the spool and sleeve assembly can turn smoothly in the housing in this status.

Disassembly (Cont'd)

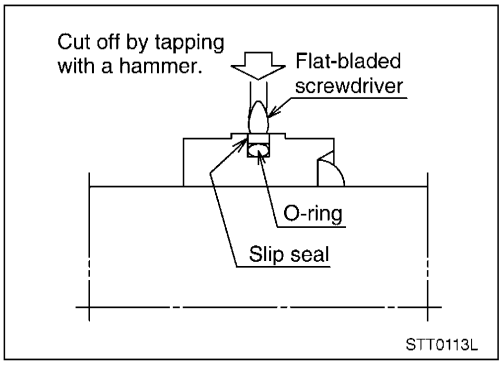
DISASSEMBLY

1. Extract fluid.
2. Place the cylinder on a horizontal surface.
3. Set the piston rod in the neutral position.
4. Loosen the nut and remove the tie rod.
5. Remove the cylinder heads.

⚠ **CAUTION:**
There are two cylinder heads. Before removing each cylinder head, prepare an appropriate container to collect oil drained from the joint between cylinder head and cylinder tube.

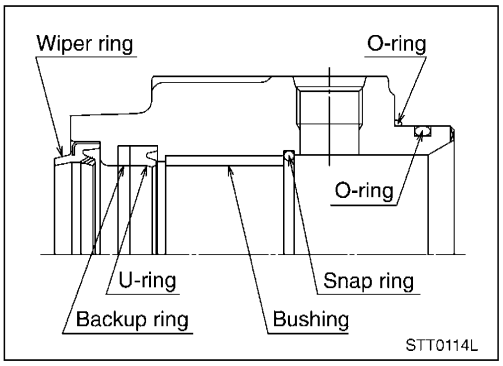
6. Pull out the piston rod.

⚠ **CAUTION:**
When removing the piston rod, make sure to hold the rod in a horizontal position and pull it with great care. The piston rod may drop abruptly as soon as it comes off from the cylinder, resulting in component damage.



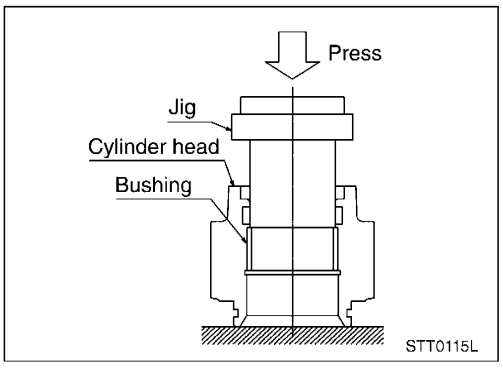
7. Remove the piston seal.
- To remove the slip seal, place a flat-bladed screwdriver as shown in the figure, and then hit the end of the screwdriver with a hammer to cut the seal.
- To remove the O-ring, use a spatula.

⚠ **CAUTION:**
Do not reuse sealing parts.



8. Disassemble the U-ring and wiper ring.
- To remove the U-ring and backup ring, use a screwdriver or an equivalent tool.
- The wiper ring is press-fit. To remove it, apply the tip of a screwdriver to the rubber portion and tap on the screwdriver to take out the ring.

⚠ **CAUTION:**
Do not reuse sealing parts.



9. Disassemble the bushing.
- Insert a screwdriver in the open end of the snap ring, and pry out the ring.
- To remove the bushing, use the jig and a press to push it out.

HYDRAULIC SYSTEM

SECTION HD

CONTENTS

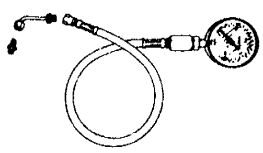
⚠ CAUTION:

- **Before changing any components (i.e. lamps, fuses, meter panels) or disconnecting any wiring. Always turn OFF the key switch and disconnect battery. This will reduce the possibility of damage to controller system.**

⚠ CAUTION:

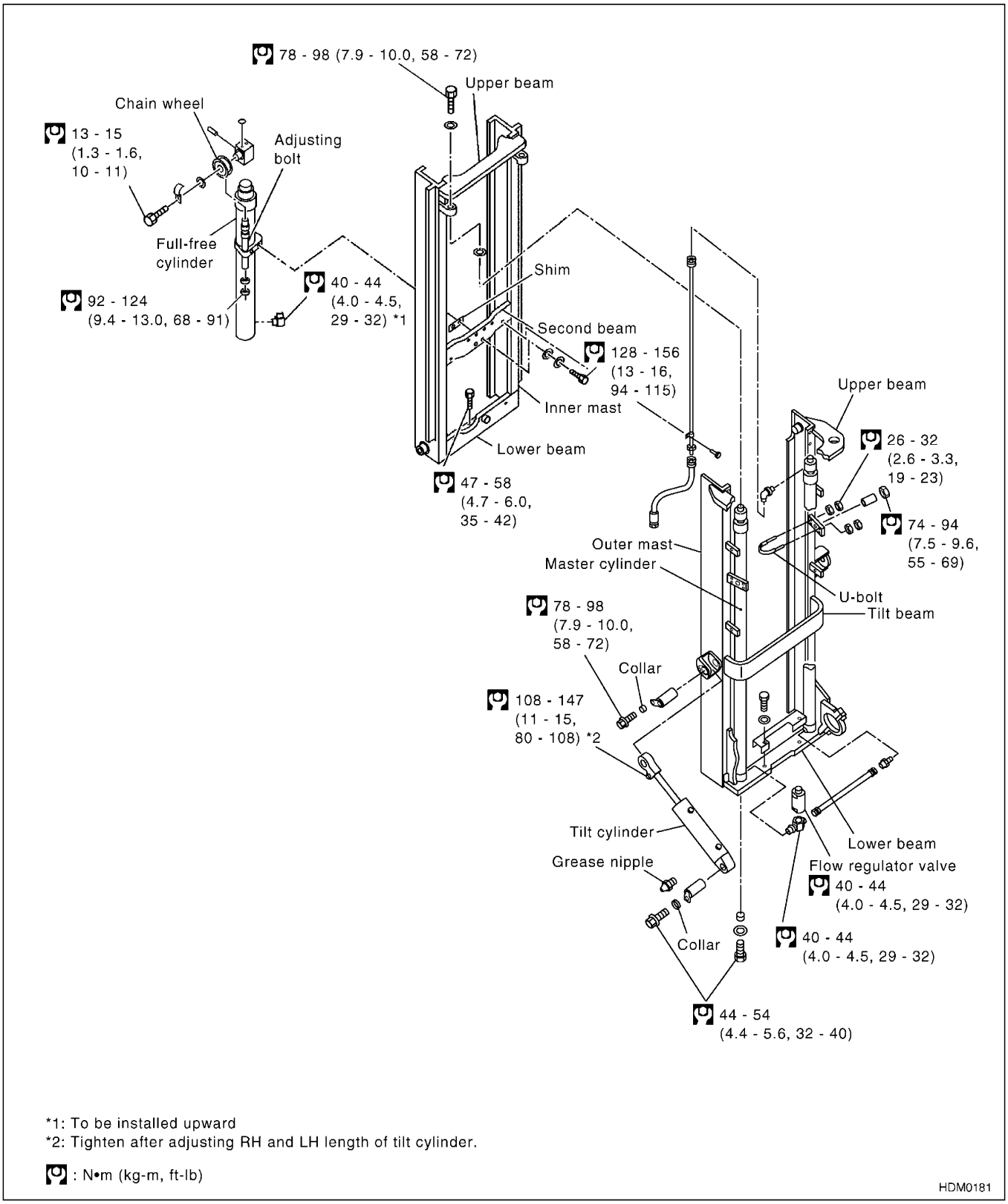
- **Whenever towing this truck always ensure key is in OFF position and battery is disconnected (unplugged) to reduce possible damage to electrical system.**

Special Service Tool

Tool number Tool name	Description
KV991009S1 Pressure gauge	 HDT0001 Measuring oil pressure

Disassembly and Assembly (Cont'd)

2F mast for 1.5 ton to 2.5 ton



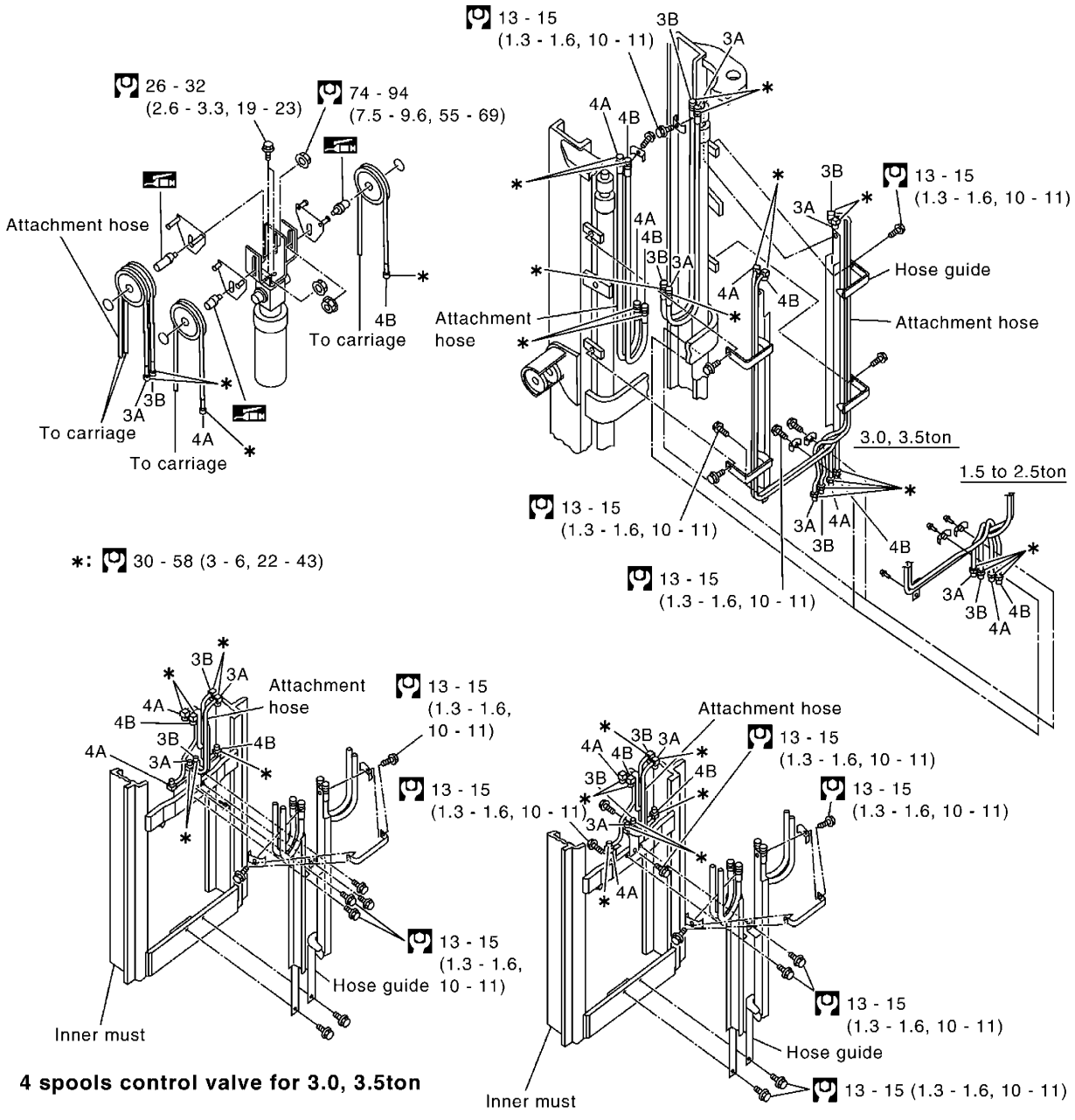
*1: To be installed upward
*2: Tighten after adjusting RH and LH length of tilt cylinder.

: N•m (kg-m, ft-lb)

HDM0181

Disassembly and Assembly (Cont'd)

2F mast for all



- Grease shall be filled in around the bearing when assembling the pulley. (Grease: NWB-2)
- Work procedure
  1) Secure pulley bracket onto the mast, and assemble the shaft with pulley and protector so that it slides freely.
  2) Attention shall be paid to ensure that the high-pressure hose is not twisted when assembling it.
  3) For assembling the high-pressure hose, lift up the protector and arrange it along the pulley, and then lower the protector as far as the upper oblong round hole of the protector that contacts the shaft.
     In addition, attention shall be paid to ensure that the hose does not have excess waving.

: N•m (kg-m, ft-lb)

: Apply grease.

HDM0188

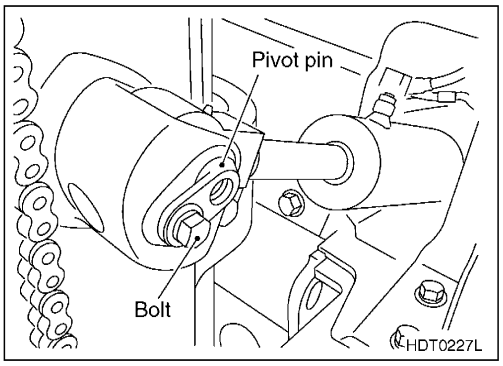
Test Procedures (Cont'd)

4. Perform pump delivery test.
   Measure fork lifting speed without load. If the speed is within standard value, pump delivery is correct.

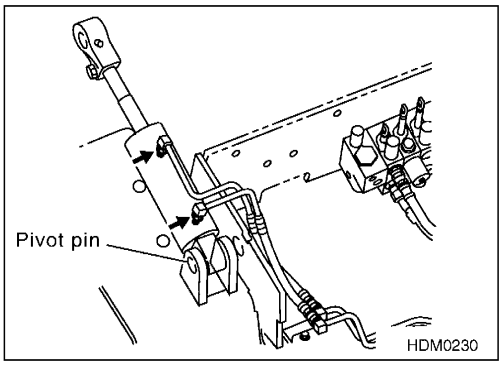
Model			Lifting speed without load (2W mast) mm/s (in/s)	Lowering speed without load (2W mast) mm/s (in/s)
1B1			640 (25.20)	495 (19.49)
1B2			640 (25.20)	495 (19.49)
Except for North America	C1B1		640 (25.20)	495 (19.49)
	C1B2	2.0, 2.5 ton	607 (23.90)	495 (19.49)
		3.0 ton	516 (20.31)	495 (19.49)
For North America	C1B1	48V/S model	639 (25.16)	495 (19.49)
		36V/S model	533 (20.98)	495 (19.49)
		48V/E model	547 (21.54)	495 (19.49)
		36V/E model	533 (20.98)	495 (19.49)
	C1B2 (2.0, 2.5 ton)	48V/S model	607 (23.90)	495 (19.49)
		36V/S model	548 (21.57)	495 (19.49)
		48V/E model	520 (20.47)	495 (19.49)
		36V/E model	500 (19.69)	495 (19.49)
	C1B2 (3.0 ton)	48V/S model	516 (20.31)	495 (19.49)
		36V/S model	470 (18.50)	495 (19.49)
		48V/E model	427 (16.81)	495 (19.49)
		36V/E model	412 (16.22)	495 (19.49)
	C1B2 (3.5 ton)	48V/S model	431 (16.97)	495 (19.49)
		36V/S model	396 (15.59)	495 (19.49)
		48V/E model	357 (14.06)	495 (19.49)
		36V/E model	347 (13.66)	495 (19.49)

5. Move fork up and down with and without load, and check that it operates correctly.

Removal (Cont'd)



1. Lower fork fully.
2. Remove pivot pin attaching bolt from the joint of outer mast and pull out pivot pin.
3. Turn key switch to ON and set tilt cylinder to the maximum backward tilt, then tilt forward to extend cylinder by about 10 mm (0.39 in). Turn key switch to OFF and disconnect battery plug.



4. Disconnect two pipes connected to tilt cylinder at pipe connectors.

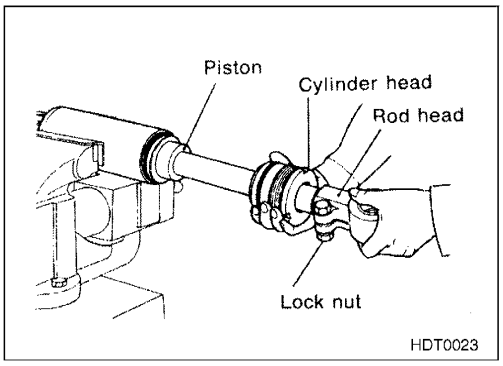
⚠ **CAUTION:**
- **Since oil tends to spill when pipes are disconnected, cover the surrounding area with rag.**
- **Stuff stoppers into disconnected pipes to prevent oil spills.**

5. Remove pivot pin attaching bolt from joint of body frame and pull out pivot pin to remove tilt cylinder.

NOTE:
To separate left tilt cylinder on body side, first remove tilt cylinder cover, then go to next step.

Disassembly

1. Hold cylinder in a vise with piping port down and put a plate under port. Apply compressed air alternately to two ports and activate piston rod to discharge oil from cylinder.



2. Loosen head lock nut, then remove rod head from piston rod assembly.
3. Loosen cylinder head, then remove cylinder head from cylinder tube assembly.

⚠ **CAUTION:**
Use care not to damage O-ring.

4. Remove piston rod assembly from cylinder tube assembly.

⚠ **CAUTION:**
Use care not to damage O-ring.

Removal

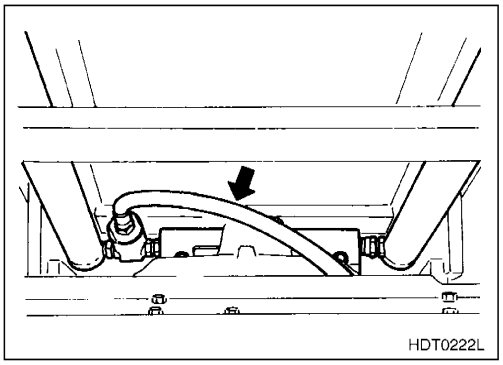
⚠ **CAUTION:**
Be sure to keep hands and feet out of danger.

PREPARATION

1. Remove from mast carriage assembly with fork.
2. Jack up the front of vehicle to keep about 120 mm (4.72 in) of clearance from lower end of outer mast to floor (refer to GI section).
3. After setting mast vertical and lower lift cylinder at the lower end, turn key switch OFF and disconnect the battery cable.

⚠ **CAUTION:**
Be sure to lower lift cylinder fully to discharge remaining pressure in pipes.

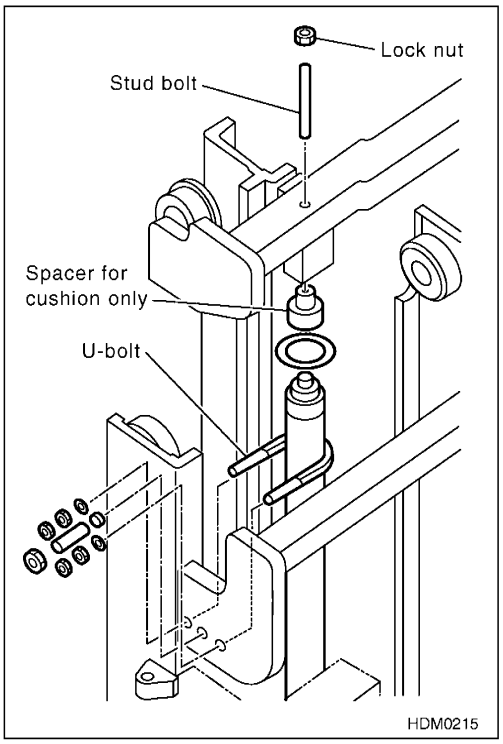
2W, 2H LIFT CYLINDER


HDT0222L

1. Remove lift hose from lift cylinder.

⚠ **CAUTION:**
Oil tends to spill if hoses are disconnected, so be sure to block the end with stoppers.

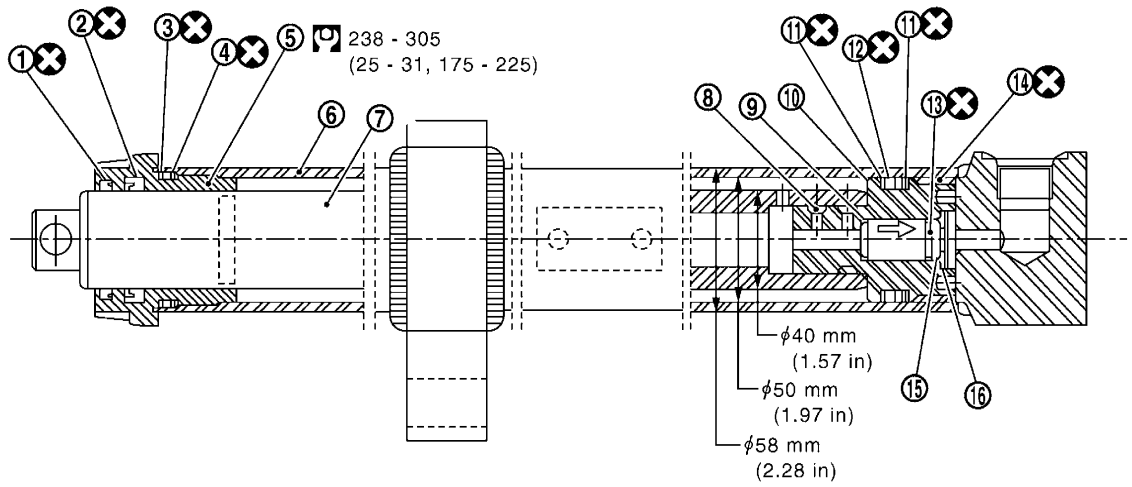
2. Disconnect the hose between the lift cylinders.



3. Remove lock nut on the upper plane of lift cylinder to separate lift cylinder from inner mast.
4. Lift up inner mast with lifting wire/nylon sling.
   For 2H mast, lift up both inner mast and chain wheel support with lifting wire/nylon sling.

Construction (Cont'd)

3V MAST, RIGHT HAND



: Always replace after every disassembly.

: N•m (kg-m, ft-lb)

NOTE: In a left cylinder, the cylinder installation bracket is right symmetry.

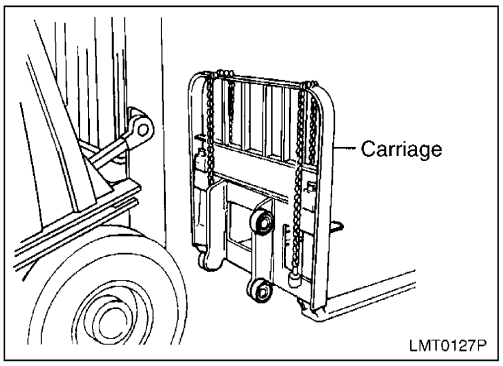
HDM0231

① Wiper ring
② U-ring
③ Backup ring
④ O-ring
⑤ Cylinder head
⑥ Cylinder tube assembly
⑦ Piston rod
⑧ Pull in wire
⑨ Check valve
⑩ Piston
⑪ Backup ring
⑫ Seal
⑬ O-ring
⑭ Wear ring
⑮ Washer
⑯ Circlip

Inspection and Adjustment (Cont'd)

Item					Pneumatic model		Cushion model	
					1B1	1B2	C1B1	C1B2
Inner mast and outer mast roller pitch (3.5 ton for North America only) mm (in)	3F	3850, 4300 (151.57, 169.29)			369 (14.53)			519 (20.43)
		4750 (187.01)						504 (19.84)
		5154 (202.91)						494 (19.45)
		5500 (216.54)			384 (15.12)			574 (22.60)
		6000 (236.22)			419 (16.50)			669 (26.34)
		6500 (255.91)			504 (19.84)			754 (29.68)
		7000 (275.59)			604 (23.78)			854 (33.62)
		3.5 ton	3550, 4000, 4450, 4854 (139.76, 157.48, 175.20, 191.10)		—			469 (18.46)
			5200 (204.72)		—			484 (19.06)
			5700 (224.41)		—			519 (20.43)
			6200 (244.09)		—			604 (23.78)
			6700 (263.78)		—			704 (27.72)
	3V	3600, 4050, 4500, 4900 (141.73, 159.45, 177.17, 192.91)			—		369 (14.53)	
		5250 (206.69)			—		384 (15.12)	
		5750 (226.38)			—		419 (16.50)	
		6330 (249.21)			—		504 (19.84)	
		6880 (270.87)			—		604 (23.78)	
		3.0, 3.5 ton	3850, 4300, 4700 (151.57, 169.29, 185.04)		—			469 (18.46)
			5050 (198.82)		—			484 (19.06)
			5550 (218.50)		—			519 (20.43)
			6000 (236.22)		—			609 (23.98)
			6500 (255.91)		—			794 (31.26)
			7000 (275.59)		—			854 (33.62)
Clearance between inner mast and carriage roller side surface mm (in)					0.1 - 0.6 (0.004 - 0.024)			
Clearance between inner mast and carriage roller rolling surface mm (in)					0.1 - 0.6 (0.004 - 0.024)			
Mast tilting angle	Forward				5°			
	Backward	2W, 2H	- 4000 (157.48)		10°			
			4500 - 5000 (177.17 - 196.85)		5°			
		2F	ALL		10°			
		3F, 3V	ALL		5°			
Distance from carriage lower end to ground mm (in)					76 (2.99)			
Difference between inner mast lower end and outer mast lower end (3F, 3V mast) mm (in)					0 (0)			
Lift chain tension mm (in)					25 - 30 (0.98 - 1.18)			

Removal (Cont'd)



4. Back up the forklift, and then remove the carriage from the mast.

⚠ **CAUTION:**
Be sure to lower the inner mast to the ground after backing the forklift up.

Inspection

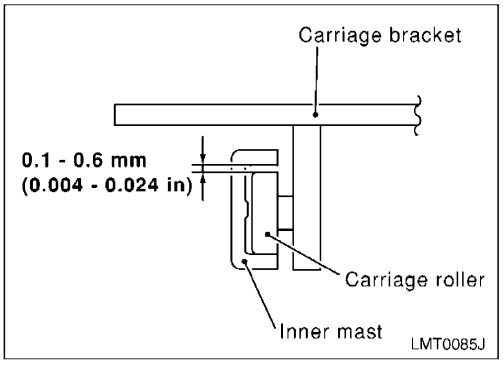
CARRIAGE ROLLERS, SIDE ROLLERS, AND SHIMS

- If the carriage roller does not operate smoothly or has undergone deformation, stepped wear or damage, replace it.

CARRIAGE ASSEMBLY

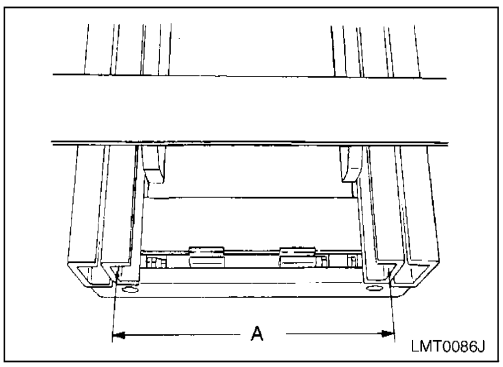
- Visually check the forks for cracks, deformation or separation of welds. Replace if necessary.
- Check the fork using a dye penetration method. If they are cracked, replace with new ones.

Adjustment



1. Select suitable carriage rollers so that the clearance between the inner mast rail and the carriage roller rolling surface are within the standard.
   Standard:
   0.1 - 0.6 mm (0.004 - 0.024 in)
   Roller type:
   1B1, C1B1: 97.0, 97.5, 98.0 mm (3.819, 3.839, 3.858 in)
   1B2, C1B2: 102.0, 102.5, 103.0 mm (4.016, 4.035, 4.055 in)
   3.0 ton, 3.5 ton:
   115.0, 115.5, 116.0 mm (4.528, 4.547, 4.567 in)

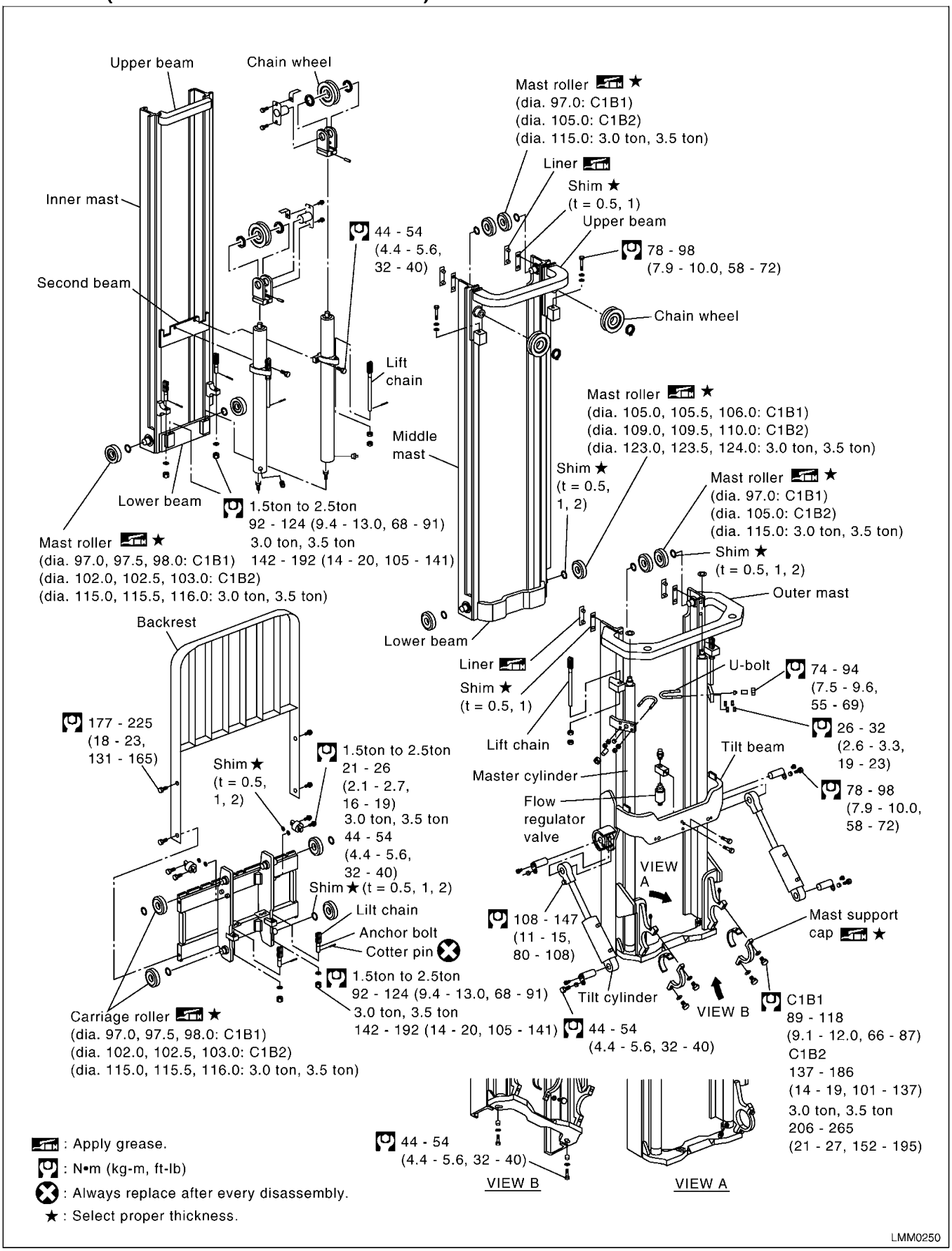
NOTE:
On the 6-roller type, select upper/lower carriage roller only. Center roller is not necessary to be selected. Use the smallest one of the available rollers as a center roller.



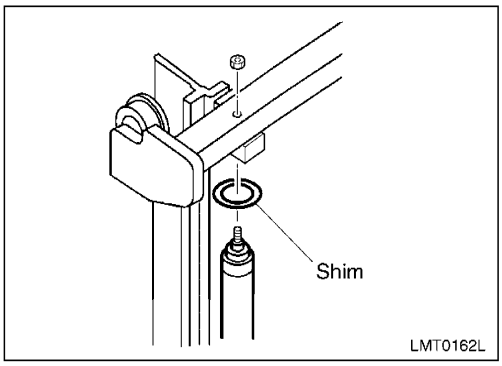
2. Measure the inner wall width (A) of the inner mast. Measuring points are upper/lower ends of the inner mast and center of the crossbeam.

Mast Assembly (Cont'd)

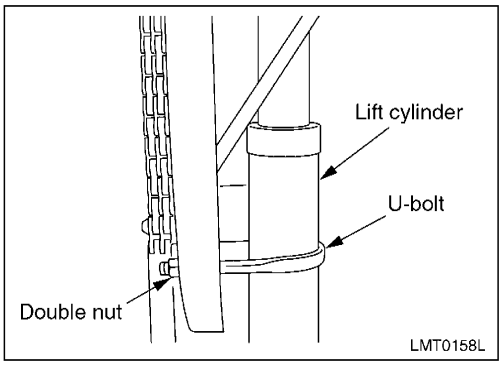
3V MAST (FOR NORTH AMERICA ONLY)



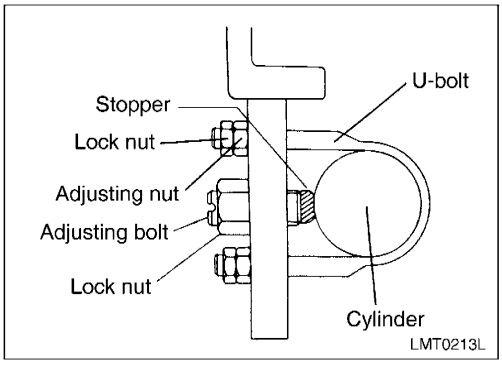
Assembly (Cont'd)



7. Position the lift cylinder to the lower beam hole of the outer mast and set the piston rod to the cylinder-retaining bracket of the inner mast, and tighten mounting bolts and nuts of cylinder upper and lower ends.
   : 44 - 54 N•m (4.4 - 5.6 kg-m, 32 - 40 ft-lb)



8. Install the U-bolt into the cylinder, and then secure it with U-bolt adjusting nuts by tightening by hand. Then tighten the lock nut.
   : 26 - 32 N•m (2.6 - 3.3 kg-m, 19 - 23 ft-lb)



9. Tighten the adjusting bolts using a screwdriver, and then tighten more 1/2 to 1 turn after contacting the stopper on the tip with lift cylinder.
10. Tighten adjusting bolt lock nut to the specified torque.
    : 74 - 94 N•m (7.5 - 9.6 kg-m, 55 - 69 ft-lb)
11. Install pipes.
12. For the mast assembly and carriage which were removed as a unit, adjust the carriage lift rollers. After adjusting carriage lift rollers, attach a lifting wire or nylon sling to the carriage, and then install it to the inner mast using a hoist. Refer to "CARRIAGE ASSEMBLY" for adjustment of lift roller.
13. Place the lift chains on the chain wheels, engage the lift chains at the chain joint links and adjusting bolts, and then install to the outer mast.

⚠ CAUTION:
Replace cotter pins with new ones.

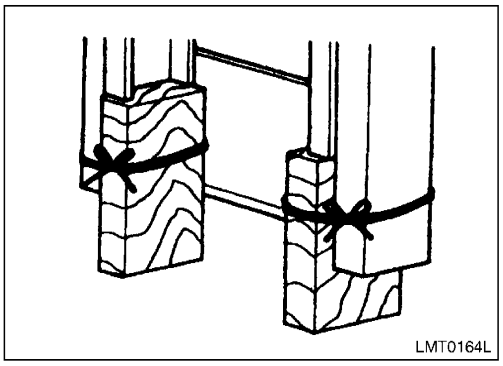
Adjustment

ADJUSTMENT OF CYLINDER HEIGHT

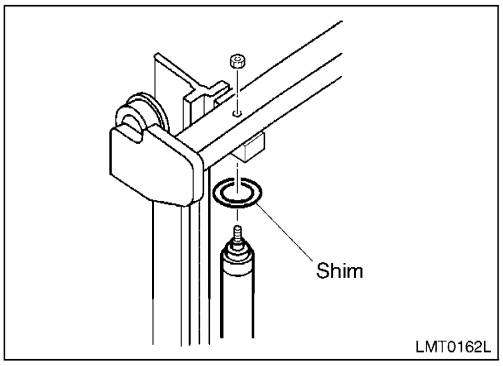
NOTE:
To prevent mast from being twisted and deformed, adjust the cylinder height. Be sure to adjust when reassembling the mast, especially when replacing only one cylinder.

1. Check that forklift is placed horizontally and that tire air pressure is correct.
2. Slowly raise mast without load, and then check that right and left lift (mast) cylinders reach to its stroke end simultaneously.
3. If one cylinder is delayed, adjust delayed cylinder by inserting shims.
   Thickness of shims: 1.0 mm (0.039 in)
4. Repeat the adjustment above until there is no difference between the right and left cylinders.

ADJUSTING PROCEDURE


LMT0164L

1. The rectangular lumber [250 mm (9.84 in) or more] is put on the bottom of the inner mast.
2. Lower mast until it touches the rectangular lumber.



LMT0162L

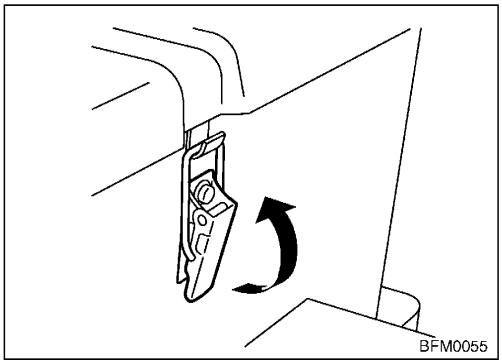
3. Remove cylinder fixing nut.

4. Turn the key switch to ON position, and lower the cylinder using the lift lever.

Seat and Top Panel (Cont'd)

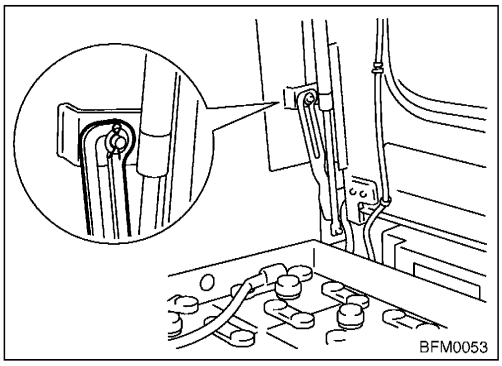
⚠ **CAUTION:**
- **Be careful not to drop the operator's seat during removal.**
- **Have someone assist in removal of the battery hood.**
- **When opening or closing the battery hood, be careful not to catch your hands or fingers between the battery hood and the case.**

TOP PANEL OPENING/CLOSING PROCEDURE



NOTE:
On forklifts equipped with a restraint seat, tilt the steering wheel forward and move the seat to the rearmost position before opening the top panel.

When opening and closing the top panel, use its handle.
1. Unlock the top panel latch.

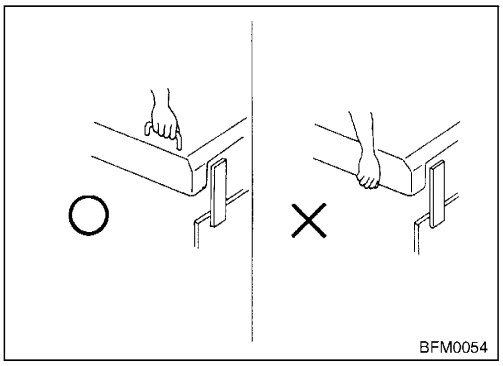


2. Open the top panel with the seat in the rearmost position.

⚠ **CAUTION:**
- **Since the top panel is heavy, exercise caution in handling it.**
- **Be sure that the top panel is locked securely with the lock bar.**

3. Unlock the lock bar, and close the top panel.

⚠ **CAUTION:**
Since the top panel is heavy, exercise caution in handling it.



4. Lock the top panel latch.

⚠ **WARNING:**
- **Close the top panel slowly, keeping a firm hold on the handle. Never place your hand under the top panel. This is very dangerous.**
- **Make sure that the top panel latch is securely locked.**