

FH Series

SERVICE MANUAL

FOREWORD

This Service Manual contains maintenance and repair procedures for the benefit of all those who are involved in the maintenance and repair of Mitsubishi Fuso Truck FH Series. Reading this manual carefully will help you to providing correct, efficient and fast maintenance. Please note, however, that due to continued vehicle improvements, the specifications and values supplied here for your use when providing maintenance may change without notice. If you have any questions or encounter a problem, please do not hesitate to contact your nearby Mitsubishi Fuso Dealer or Distributor.

MAY 1991

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MANUAL LAYOUT – GROUP CLASSIFICATIONS

1. GROUP CLASSIFICATIONS

This Manual is divided into Groups, one for each system of the vehicle.

Gr. No.	Group Name	Description
00	General	External views, major specifications, power train table, operation performance curves, engine performance curves, servicing precautions, standard bolt and nut tightening torque table, towing precautions, vehicle identification numbers.
01	Maintenance Schedule	Maintenance schedule, simple maintenance, lubrication chart, oils and greases to use.
11	Engine	Engine remove and installation, cylinder head, valve mechanism, camshaft, pistons, crankshaft, timing gear, flywheel.
12	Lubrication	Oil pump, oil filter, oil cooler.
13	Fuel and Engine Control	Pre-stroke control injection pump system injection nozzles, fuel filter, fuel tank, water separator, engine control, accelerator pedal, throttle button.
14	Cooling	Water pump, thermostat, radiator, fan, auto-cool fan coupling.
15	Intake and Exhaust	Air cleaner, intake shutter, turbocharger, intercooler.
16	Engine electrical	Starter, alternator, vacuum pump, glow system, idle up system.
21	Clutch	Clutch, clutch control (master cylinder, power cylinder).
22	Manual Transmission	Transmission, transmission control.
23	Automatic Transmission	Maintenance and inspection, removal, installation, oil seal replacement.
24	Transfer	Transfer, transfer control.
25	Propeller Shaft	Propeller shaft, universal joint, center bearing, double cardin propeller shaft.
26A	Front Axle <FE series>	Front axle, kingpins, knuckles, hub bearings.
26B	Front Axle <FG series>	Front axle, wheel hub and brake drum, knuckle and drive shaft, reduction and differential.
27	Rear Axle	Rear axle, reduction and differential, hub bearings.
31	Wheels and Tires	Tire, disc wheel.
33	Front Suspension	Front suspension, leaf springs, shock absorbers, stabilizer.
34	Rear Suspension	Rear suspension, leaf springs, shock absorbers, stabilizers.
34	Rear suspension	Rear suspension, leaf springs, shock absorbers, stabilizers.
35	Brake	Brake pedal, master-vac, wheel brake(wheel cylinder, brake drum, brake shoes), exhaust brake(exhaust brake valve, power chamber).
36	Parking Brake	Parking brake(brake drum, brake shoe), parking brake control.
37	Steering	Steering wheel, power steering booster, power steering oil pump, steering linkage, tie-rods.
41	Frame	Frame inspection and maintenance.
42	Cab	Cab, cab mounting, window glass, doors, seats, trim.
54	Chassis electrical	Meters, gauges, switches, lamps, warning and indicator lamps, wipers.
55A	Air Conditioner	Air conditioner ventilation system.
55B	Heater	Heater, ventilation.

2. DEFINITIONS OF TERMS AND UNITS USED

Terms and units used commonly throughout this manual have specific meanings, as defined below.

(1) Front and rear

When the vehicle is travelling forward, that part of the vehicle which is in a leading position is referred to as the front; the opposite end of the vehicle referred to as the rear, or back.

(2) Left and Right

When an observer is facing in the same direction as the vehicle's forward direction of motion, the observer's right and left correspond to the right and left sides of the vehicle; i.e., that part of the car which is on the observer's right when facing forward is referred to as the right side of the car.

(3) Maintenance standards terms

- Norminal value

Indicates the design dimensions of the vehicle body and individual parts, the standard clearance between assembled parts, and the standard performance of assemblies. Values in brackets are basic diameters.

- Limit

Indicates the dimension limit of a part, at which point the part is no longer serviceable from the view point of both performance as well as strength, and requires replacement.

(4) Tightening torque

Tightening bolts and nuts too much or too little can have a large influence on performance and function.

Thus, tightening torque is specified for each location that must be tightened in a particular range. When tightening must be performed under wet conditions, this is specified. If not specified, tightening is performed dry.

When tightening torque is not specified, tighten according to the standard bolts and nuts tightening torque table.

(5) Units

Length, weight, surface area and capacity are given in International Systems of Units, with foot pounds units indicated in brackets. Temperatures are given in degrees Celsius, with degrees in Fahrenheit in brackets.



FH

Service Manual

Group 00 Supplement
1995 Minor Changes
1994 Minor Changes
1993 Minor Changes
1992 Group 00 - General

 **MITSUBISHI FUSO TRUCK OF AMERICA, Inc.**



FH

Service Manual

Group 00
General

Supplement

 **MITSUBISHI FUSO TRUCK OF AMERICA, Inc.**

Pub. No. TWME9412

FOREWORD

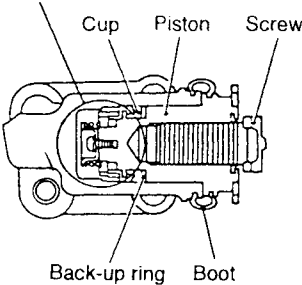
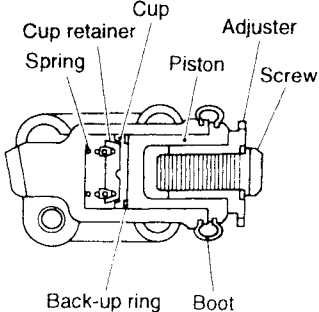
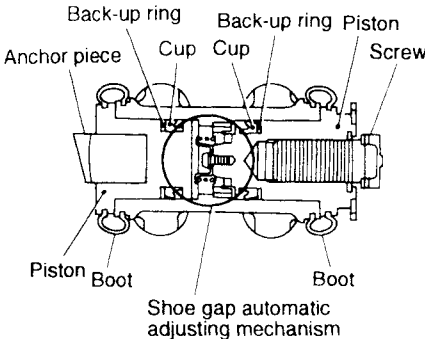
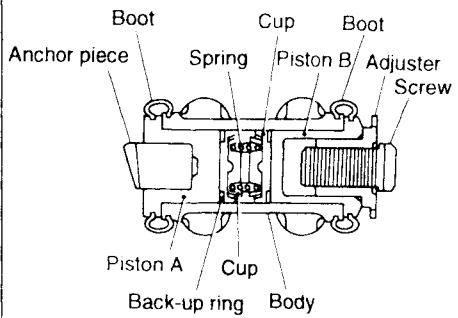
The brake shoe clearance auto adjuster is adopted to meet the Federal regulation. For the other component, refer to the Service Manual (Pub. No. TWME9106), Group 00 General '93 Minor Change (Pub. No. TWME9202) , Group 00 General '94 Minor Change (Pub. No. TWME9307) and Group 00 General '95 Minor Change (Pub. No. TWME9410).

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SUMMARY OF MODIFICATIONS

Summary of Modifications

Item	New	←	Old
<p>Group 01 Maintenance Schedule</p> <p>The time of inspection and maintenance and the inspection procedure are changed. For details, refer to page 3.</p>	<p>Time of inspection and maintenance 30,000 km/18,000 miles</p>		<p>10,000 km/6,000 miles</p>
<p>Group 35 Brake</p> <p>The shoe gap automatic adjusting mechanism is added to the wheel cylinder of the wheel brake. For the servicing information, refer to page 5.</p> <p>(1) Front Wheel Cylinder</p>	<p>Shoe gap automatic adjusting mechanism</p> 		
	10648		10651
<p>(2) Rear Wheel Cylinder</p>			
	10927		10652

Group 01 Maintenance Schedule

This section describes only the changed item of the maintenance schedule.

For other items, refer to Group 01 Maintenance Schedule, 1992 FH Service Manual (Pub. No. TWME9106-01).

2. Maintenance Schedule

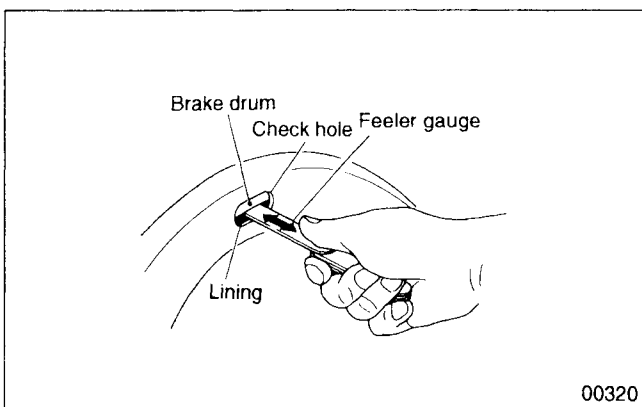
Because of the adoption of the shoe gap automatic adjusting mechanism, the time of inspection for item No. 56 Brake shoe clearance is changed from 10,000 km/6,000 miles to 30,000 km/18,000 miles.

In addition to it, the inspection procedure is changed as follows.

*1: 30000 km/18000 miles or 6 months, whichever occurs first.
 *2: 60000 km/36000 miles or 12 months, whichever occurs first.
 (E): Exhaust emission items.
 (N): Noise control items.

Inspection and maintenance	Time of inspection and maintenance					Working procedures	Remarks
	Pre-operational checks	Inspection interval			New vehicle at 4000 km/2500 miles		
		Every 10000 km /6000 miles	Every 30000 km /18000 miles *1	Every 60000 km /36000 miles *2			
50 Service brake effectiveness	X	X				While driving the vehicle at low speed, check braking effect and check for uneven braking.	See Gr. 35
55 Operation of exhaust brake and air control cylinder	X	X				Check for exhaust brake operation and inspect its operation. When more than 1/5 of the drying agent is discolored, replace it.	See Gr. 35
Air dryer drying agent replacement		Every 12 months				Disassemble the air dryer and replace the drying agent and rubber parts.	
56 Brake shoe clearance		X	X			Measure clearance with thickness gauge.	See Gr. 35
57 Brake lining wear			X			Check for lining wear.	See Gr. 35
Brake drum wear				X		Disassemble and inspect.	

Inspection Procedure



- (1) Jack up the wheel and make sure that there is no drag when the wheel is turned by hand.
- (2) Remove the check hole plug from the backing plate.
- (3) Make sure that a 1 mm {0.039 in.} feeler gauge cannot be inserted between the brake drum and lining. If it can be inserted, replace the wheel cylinder.

Group 35 Brake

This section describes only the modified wheel brake.

For other information, refer to Group 35 Brake, 1992 FH Service Manual (Pub. No. TWME9106-35).

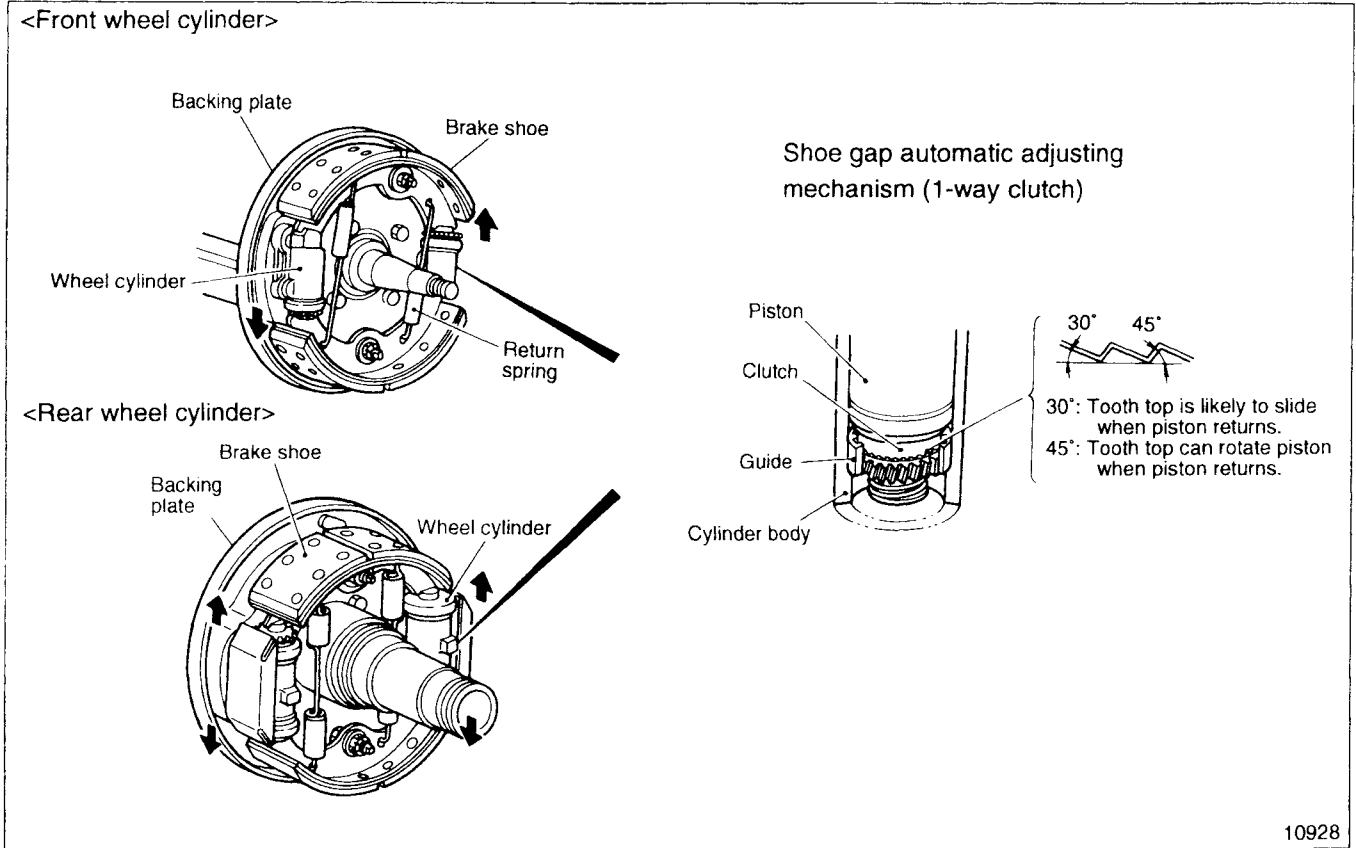
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1. CONSTRUCTION AND OPERATION

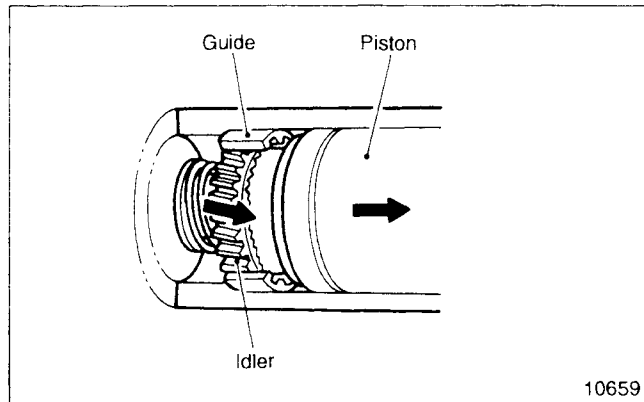
This section describes only the wheel cylinder with the shoe gap automatic adjusting mechanism.

Operation

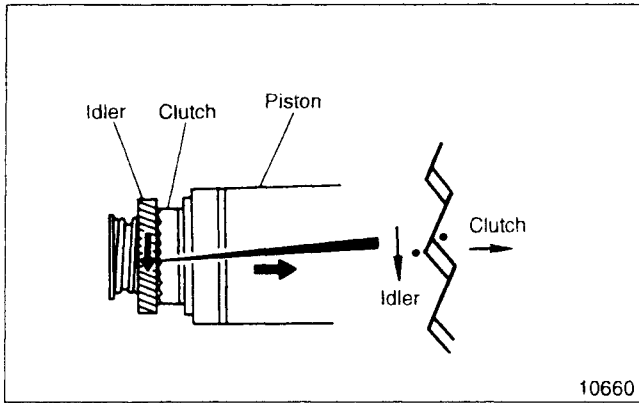


The shoe clearance increases as the lining is worn away. If a shoe clearance is larger than the limit, the shoe gap automatic adjusting mechanism automatically reduces the clearance to an appropriate level when the service brake is applied while travelling forward.

(1) When brake is actuated



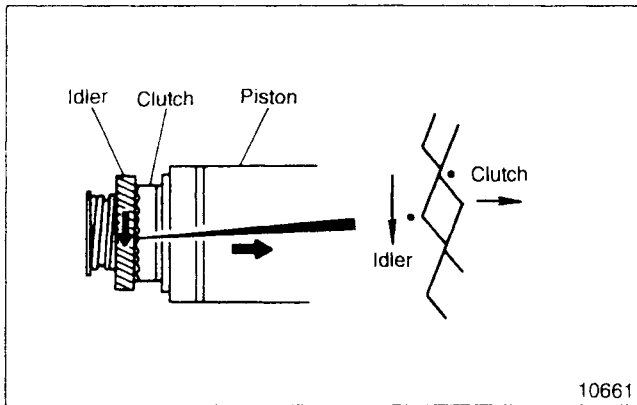
- (a) If the brake fluid pressure is applied to the wheel cylinder, the piston is pushed forward.
- (b) The idler is engaged with the gear formed aslant inside the guide of the body. Therefore, the idler rotates while moving forward.



(c) Due to this rotation, the idler's teeth causes some disengagement with those of the 1-way clutch.

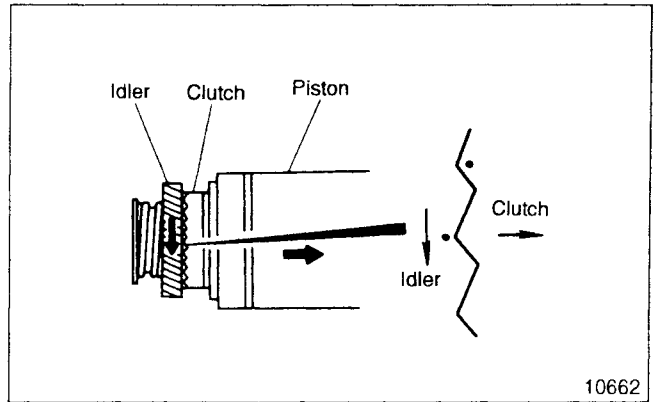
(2) When braking becomes effective

(a) When brake shoe clearance within limit



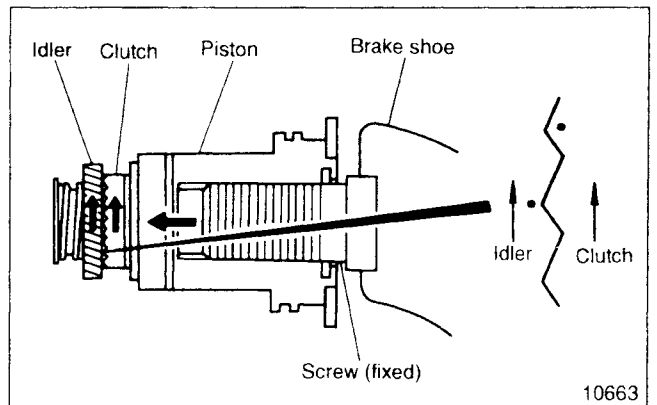
1) The amount of the idler's rotation is proportional to the amount of the piston's displacement. As long as the brake shoe clearance is not larger than the limit, the idler's each tooth doesn't exceed the corresponding one of the 1-way clutch.

(b) When brake shoe clearance beyond limit



1) If the brake shoe clearance becomes larger than the limit, the idler's each tooth moves over the corresponding one of the 1-way clutch and engages with the next one.

(3) When brake is released



(a) If the brake fluid pressure is reduced, the piston and idler return. Note that, in this return process, the idler rotates reversely due to the guide.
 (b) If the brake shoe clearance was within the limit, the piston doesn't rotate because the idler's each tooth didn't exceed the corresponding tooth of the 1-way clutch.
 (c) If the brake shoe clearance was beyond the limit, the piston rotates by one tooth in this return process because the idler's each tooth moved over the corresponding tooth of the 1-way clutch.
 As the result, because the piston's screw doesn't rotate as it is fixed to the brake shoe, the brake shoe clearance falls within the limit.

2. SERVICE STANDARDS

2.1 Service Standards Table

Unit: mm {in.}

Maintenance item			Nominal value (Basic diameter in [])		Limit	Remedy and remarks
Front wheel brake	Brake drum	Inner diameter	320 {12.60}	*321 {12.64}	322 {12.68}	Replace
		Cylindricity	0.05 {0.0020}		0.2 {0.0079}	Correct
	Return spring	Load/installed length	325 N {73 lbf, 33 kgf}/192 {7.65}		Clearance between coils or between coils and cover	Replace
	Brake lining thickness		12 {0.47}		5 {0.20} (Side ridge shows the wear limit)	Replace
Front wheel cylinder	Body to piston clearance	[34.93 {1.38}] 0.03 to 0.09 {0.0012 to 0.0035}		0.2 {0.0079}	Replace piston	
Rear wheel brake	Brake drum	Inner diameter	320 {12.60}	*321 {12.64}	322 {12.68}	Replace
		Cylindricity	0.05 {0.0020}		0.2 {0.0079}	Correct
	Return spring	Load/installed length	390 N {88 lbf, 40 kgf}/217 {8.54}		Clearance between coils or between coil and cover	Replace
	Brake lining thickness		12 {0.47}		5 {0.20} (Side ridge shows the wear limit)	Replace
Rear wheel cylinder	Body to piston clearance	[36.51 {1.44}] 0.03 to 0.09 {0.0012 to 0.0035}		0.2 {0.0079}	Replace piston	

*: Repair limit

2.2 Tightening Torque Table

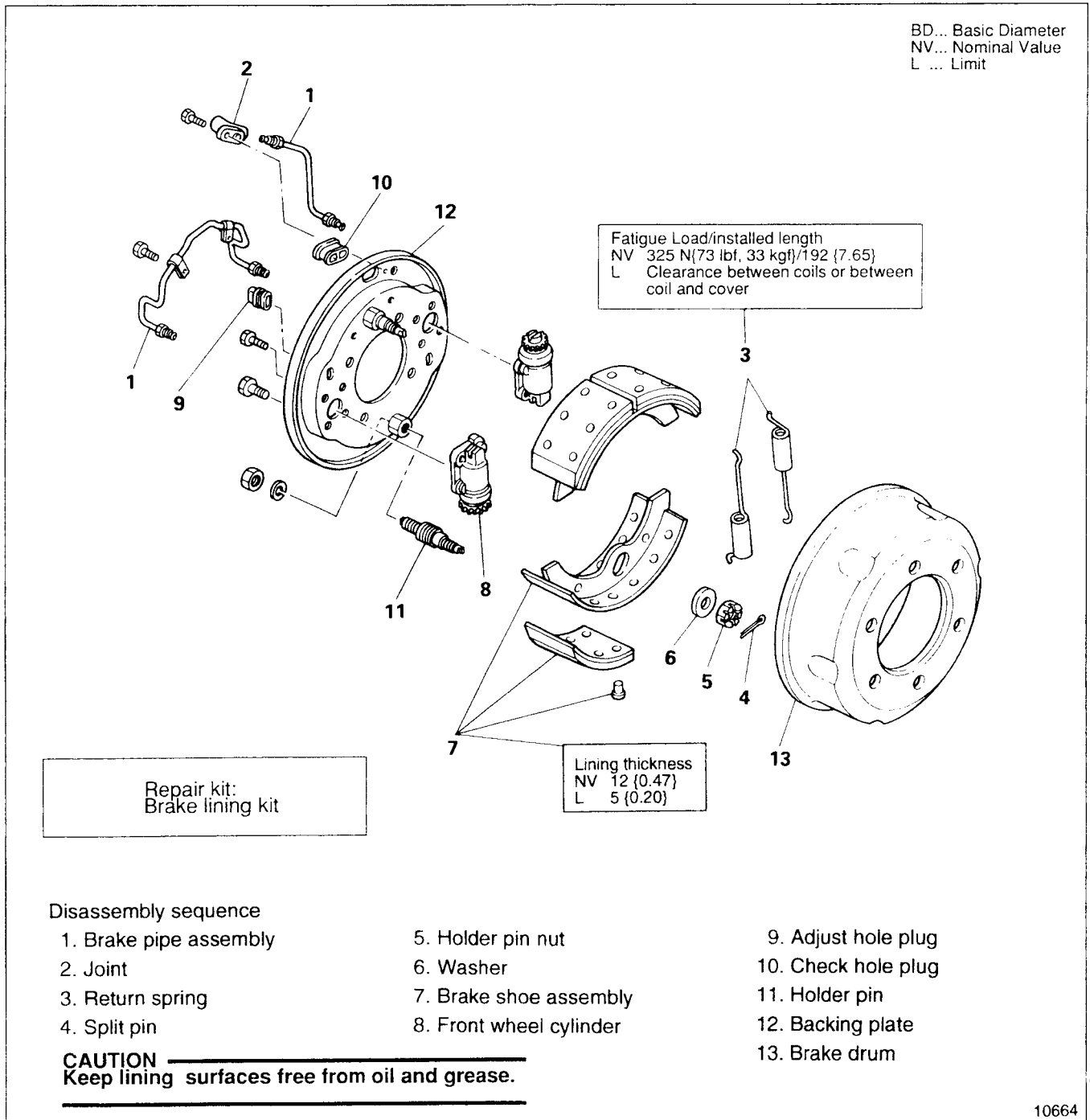
Location tightened		Screw size O.D. x pitch mm	Tightening torque N·m {lbf·ft, kgf·m}
Front wheel brake	Joint mounting bolt	M8 x 1.25	9.8±2.0 {7.2±1.4, 1.0±0.2}
	Brake pipe assembly flare nut	M10 x 1.0	14±2.0 {10±1.4, 1.4±0.2}
	Clamp mounting bolt	M6 x 1.0	4.9±1.0 {3.6±0.72, 0.5±0.1}
	Wheel cylinder mounting bolt	M10 x 1.5	44±8.8 {33±6.5, 4.5±0.9}
		M12 x 1.75	78±16 {58±12, 8.0±1.6}
	Holder pin mounting nut	M10 x 1.25	29±5.9 {22±4.3, 3.0±0.6}
Front wheel cylinder	Air bleeder	M10 x 1.0	9.8±2.0 {7.2±1.4, 1.0±0.2}
Rear wheel brake	Brake pipe assembly flare nut	M10 x 1.0	14±2.0 {10±1.4, 1.4±0.2}
	Clamp mounting bolt	M6 x 1.0	4.9±1.0 {3.6±0.72, 0.5±0.1}
	Wheel cylinder mounting bolt	M12 x 1.75	78±16 {58±12, 8.0±1.6}
	Holder pin attaching nut	M10 x 1.25	29±5.9 {22±4.3, 3.0±0.6}
Rear wheel cylinder	Air bleeder	M10 x 1.0	9.8±2.0 {7.2±1.4, 1.0±0.2}

3. SERVICE PROCEDURE

This section describes how to service the assemblies which relate to the wheel cylinders provided with automatic shoe gap adjustment. For the other items, refer to Group 35 Brake, 1992 FH Service Manual (Pub. No. TWME9106-35).

3.1 Front Wheel Brake

3.1.1 Disassembly and inspection



10664

3.1.2 Reassembly

Apply brake grease

T: 29 ± 5.9 N·m
(22 ± 4.3 lbf.ft.,
 3.0 ± 0.6 kgf·m)

T: 14 ± 2.0 N·m
(10 ± 1.4 lbf.ft.,
 1.4 ± 0.2 kgf·m)

T: 9.8 ± 2.0 N·m
(7.2 ± 1.4 lbf.ft.,
 1.0 ± 0.2 kgf·m)

T: 4.9 ± 1.0 N·m
(3.6 ± 0.72 lbf.ft.,
 0.5 ± 0.1 kgf·m)

<Holder pin>

T: 78 ± 16 N·m
(58 ± 1.2 lbf.ft.,
 8.0 ± 1.6 kgf·m)

T: 44 ± 8.8 N·m
(33 ± 6.5 lbf.ft.,
 4.5 ± 0.9 kgf·m)

T: 78 ± 16 N·m
(58 ± 1.2 lbf.ft.,
 8.0 ± 1.6 kgf·m)

Reassembly sequence
 12→11→10→9→⑧→7→6→5→4→3→2→1

For parts with an encircled number, reassembly procedure that follows.

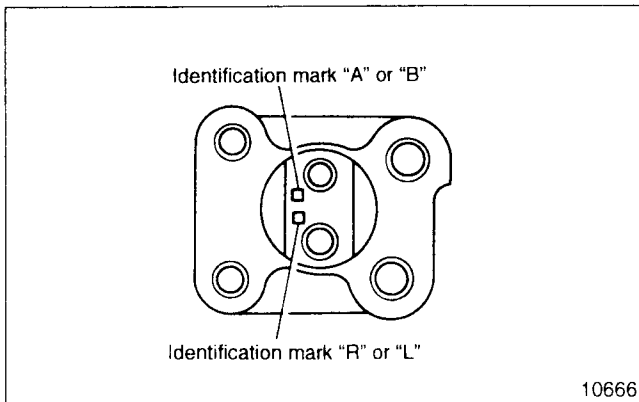
CAUTION

1. Apply brake grease to the wheel cylinder surface facing the brake shoe.
2. Keep lining surfaces free from oil and grease.

10665

Reassembly Procedure

(1) Wheel cylinder installation position



Each wheel cylinder is provided with identification marks on its body. Install the wheel cylinders to the corresponding places of the backing plate.

Identification mark combination	Installation position
RA	Front of front right wheel
RB	Rear of front right wheel
LA	Front of front left wheel
LB	Rear of front left wheel

3.2 Front Wheel Cylinder

3.2.1 Disassembly and inspection

Clearance between piston and cylinder body
 BD 34.93 {1.38}
 NV 0.03 to 0.09 {0.0012 to 0.0035}
 L 0.2 {0.0079}

BD... Basic Diameter
 NV... Nominal Value
 L ... Limit

Disassembly sequence

1. Screw
2. Seal
3. Piston cup
4. Back-up ring
5. Piston
6. Boot
7. Air bleeder
8. Cylinder body

Repair kit:
 Wheel cylinder kit

03398

3.2.2 Reassembly

Apply rubber grease

Apply rubber grease to outer surface

Apply rubber grease

T: 9.8 ± 2.0 N·m
 { 17.2 ± 1.4 lbf.ft,
 1.0 ± 0.2 kgf·m }

Reassembly sequence

```

            8 → 7 → 6
            |
            | → 2 → 1
            |
            5 → 4 → 3
        
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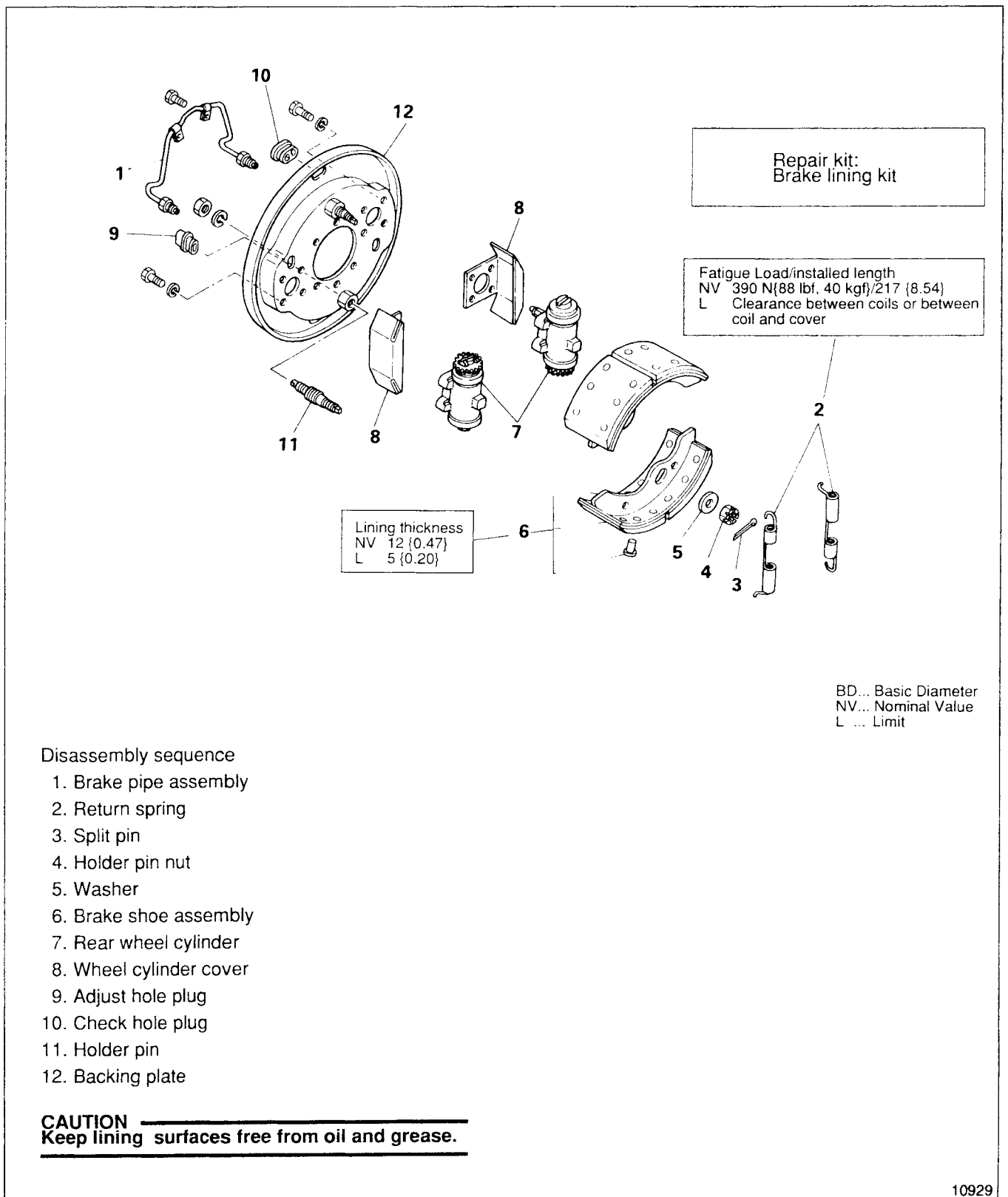
CAUTION

Install piston cup (3) in the direction shown in the illustration.

10667

3.3 Rear Wheel Brake

3.3.1 Disassembly and inspection



3.3.2 Reassembly

Install so that the middle portion is positioned as shown in the illustration.

T: 4.9 ± 1.0 N·m
(3.6 ± 0.72 lbf.ft,
 0.5 ± 0.1 kgf·m)

T: 29 ± 5.9 N·m
(22 ± 4.3 lbf.ft,
 3.0 ± 0.6 kgf·m)

T: 78 ± 16 N·m
(58 ± 1.2 lbf.ft,
 8.0 ± 1.6 kgf·m)

T: 14 ± 2.0 N·m
(10 ± 1.4 lbf.ft,
 1.4 ± 0.2 kgf·m)

CAUTION

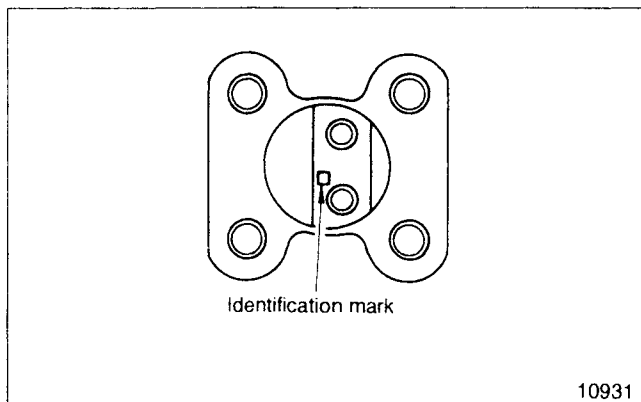
1. Apply brake grease to the wheel cylinder surface and washer facing the brake shoe assembly.
2. Keep lining surfaces free from oil and grease.

Reassembly sequence
 $12 \rightarrow 11 \rightarrow 10 \rightarrow 9 \rightarrow 8 \rightarrow 7 \rightarrow 6 \rightarrow 5 \rightarrow 4 \rightarrow 3 \rightarrow 2 \rightarrow 1$
 For parts with an encircled number, reassembly procedure that follows.

10930

Reassembly Procedure

(1) Wheel cylinder installation position



Each wheel cylinder is provided with an identification mark on its body. Install the wheel cylinders to the corresponding places of the backing plate.

Identification mark combination	Installation position
L	Front of rear left wheel
R	Front of rear right wheel
None	Rear of rear right or left wheel

BRAKE

3.4 Rear Wheel Cylinder

3.4.1 Disassembly and inspection

Clearance between piston and cylinder body
 BD 36.51 {1.44}
 NV 0.03 to 0.09 {0.0012 to 0.0035}
 L 0.2 {0.0079}

BD... Basic Diameter
 NV... Nominal Value
 L ... Limit

Disassembly sequence

1. Screw
2. Seal
3. Piston cup
4. Back-up ring
5. Piston
6. Boot
7. Anchor piece
8. Piston cup
9. Back-up ring
10. Piston
11. Boot
12. Air bleeder
13. Cylinder body

Repair kit:
Wheel cylinder kit

03399

3.4.2 Reassembly

Reassembly sequence

```

    13→12→11→6
    10→9→8
    5→4→3
    →7
    →2→1
    
```

CAUTION
 Install piston cups (3) and (8) in the directions shown in the illustration.

10932