

FK.FM

Service Manual

FOREWORD

This service manual contains the instructions for the servicing of the Mitsubishi Fuso FK, FM series trucks. Please make the most of this service manual to perform correct servicing and wasteless operations. Note that some of the contents of this service manual are subject to change owing to improvements, etc. that may be introduced after publication of the service manual.

For more details, consult your local Mitsubishi Fuso Dealers and Distributors.

March 1991

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COMPILATION OF THIS MANUAL – GROUP CLASSIFICATION

1. GROUP CLASSIFICATION

This manual is organized into groups as follows:

Group No.	Group Name	Contents
00	General	Exterior views, major specifications, power train table, equipment model notation, performance curves, servicing precautions, standard bolts and nuts tightening torque table, towing precautions, chassis and engine number, vehicle identification number
01	Maintenance schedule	Maintenance schedule table, simple maintenance procedures, lubrication chart, simple lubrication procedures
11	Engine	Troubleshooting, specifications, service standards, special tools, general, engine proper (cylinder head, valve mechanism, camshaft, piston, crankshaft, timing gear, flywheel)
12	Lubrication	Troubleshooting, specifications, service standards, special tools, general, lubrication system (oil pump, oil filter, oil cooler)
13	Fuel and engine control	Troubleshooting, specifications, service standards, special tools, general, fuel system (injection pump, injection nozzle, fuel filter, water separator), engine control (accelerator pedal, fuel control, stop button)
14	Cooling	Troubleshooting, specifications, service standards, special tools, general, cooling system (water pump, thermostat, radiator, fan)
15	Intake and exhaust	Troubleshooting, specifications, service standards, special tools, general, air cleaner, turbocharger, manifold, intercooler
16	Engine electrical	Troubleshooting, specifications, service standards, special tools, general, starter, alternator, glow system
21	Clutch	Troubleshooting, specifications, service standards, special tools, general, clutch proper, clutch pedal, clutch master cylinder, power cylinder, clutch booster, clutch housing, replacement of clutch fluid and bleeding of clutch system, clutch pedal adjustment, lubricating of drive pinion splines
22A	Manual transmission <M6S5>	Troubleshooting, specifications, service standards, special tools, general, removal and installation of transmission, transmission assembly, transmission proper (main shaft, counter shaft), gear shifter, rear cover, transmission control
22B	Manual transmission <M8S6, M8S2x5>	Troubleshooting, specifications, service standards, special tools, general, removal and installation of transmission, transmission assembly, transmission proper (main shaft, counter shaft), gear shifter, rear cover, splitter, power shift, transmission control, splitter control
23	Automatic transmission	Troubleshooting, specifications, service standards, special tools, general, removal and installation of automatic transmission, oil seal and speedometer, automatic transmission control system, oil cooler, oil filter, replacement of oil and oil filter
25	Propeller shaft	Troubleshooting, specifications, service standards, special tools, general, propeller shaft, center bearing, universal joint
26	Front axle	Troubleshooting, specifications, service standards, special tools, general, front axle, kingpin, knuckle, wheel hub, brake drum
27	Rear axle	Troubleshooting, specifications, service standards, special tools, general, rear axle, reduction and differential, wheel hub, brake drum
31	Wheel and tire	Troubleshooting, specifications, service standards, general, tire, disc wheel
33	Front suspension	Troubleshooting, special tools, specifications, service standards, general, leaf springs, shock absorber
34	Rear suspension	Troubleshooting, special tools, specifications, service standards, general, leaf springs
35A	Brake (air over hydraulic brake)	Troubleshooting, specifications, service standards, special tools, general, service brake [dual brake valve, brake booster, wheel brake (wheel cylinder, brake drum, brake shoe)], exhaust brake (exhaust brake valve, control cylinder)
35B	Brake (full air brake)	Troubleshooting, specifications, service standards, special tools, general, service brake [dual brake valve, relay valve, quick release valve, slack adjuster, brake chamber, wheel brake (brake drum, brake shoe)], exhaust brake (exhaust brake valve, control cylinder)
36A	Parking brake (center parking brake)	Troubleshooting, special tools, specifications, service standards, general, parking brake, parking brake control
36B	Parking brake (wheel parking brake)	Troubleshooting, service standards, general, spring brake control valve, spring brake valve

COMPILATION OF THIS MANUAL – GROUP CLASSIFICATION, DEFINITIONS OF TERMS AND UNITS USED

Group No.	Group Name	Contents
37	Steering	Troubleshooting, specifications, service standards, special tools, general, steering wheel, power steering booster, power steering oil pump, steering linkage, tie rod, steering shaft
41	Frame	Frame, rivet, inspection and correction
42	Cab	Troubleshooting, specifications, service standards, general, removal and installation of cab, cab mounting, door, seat, seat belt, floor mat, trim, instrument panel, windshield, rear window, front panel, wiper, rearview mirror
54	Chassis electrical	Troubleshooting, specifications, service standards, general, battery, fuses, fusible link, starter switch and cold starter switch, sub-starter switch, combination switch, lighting system, meter system, indicators and warning system, wiper and washer system, horn, back-up buzzer, radio and cassette stereo, cigarette lighter
55A	Air Conditioner	Air conditioner ventilation system
55B	Heater	Troubleshooting, specifications, heater, ventilation system

Page numbers start at "1" for each section.

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.

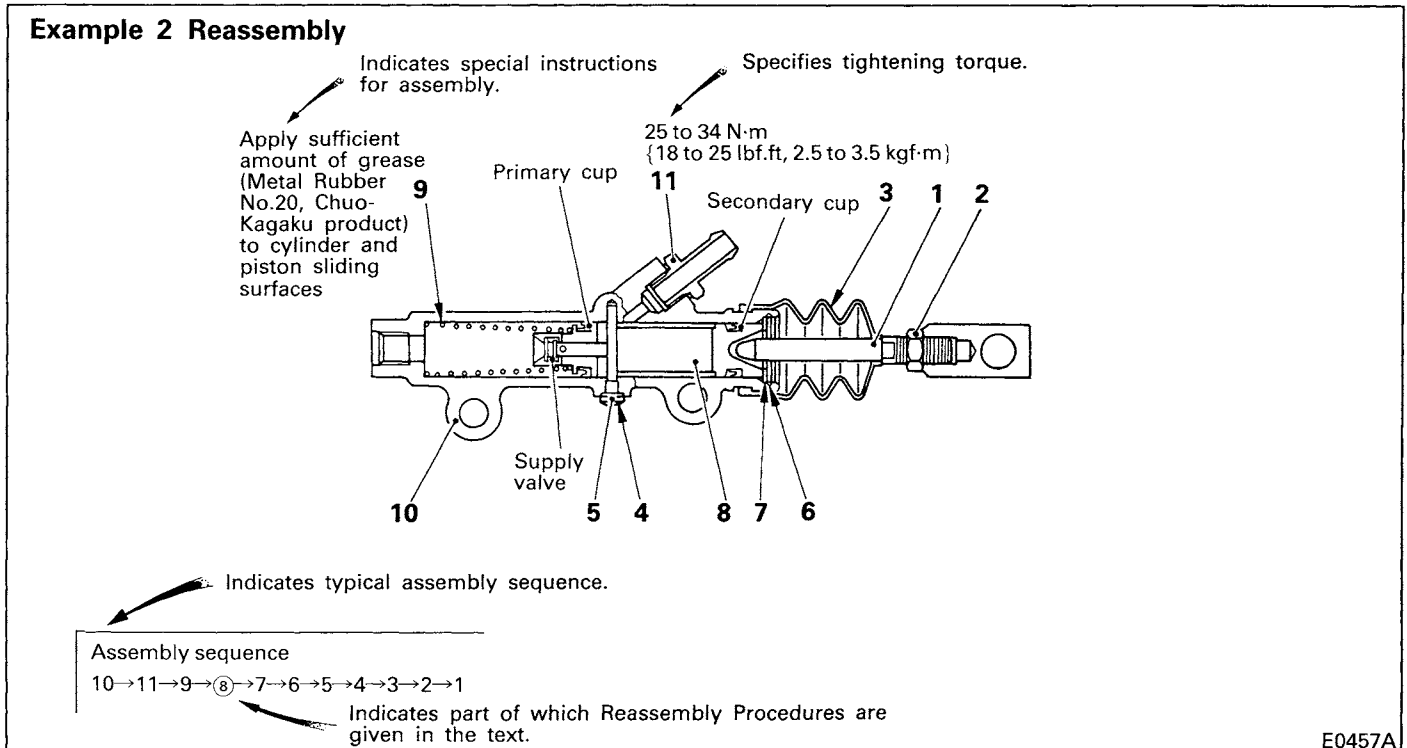
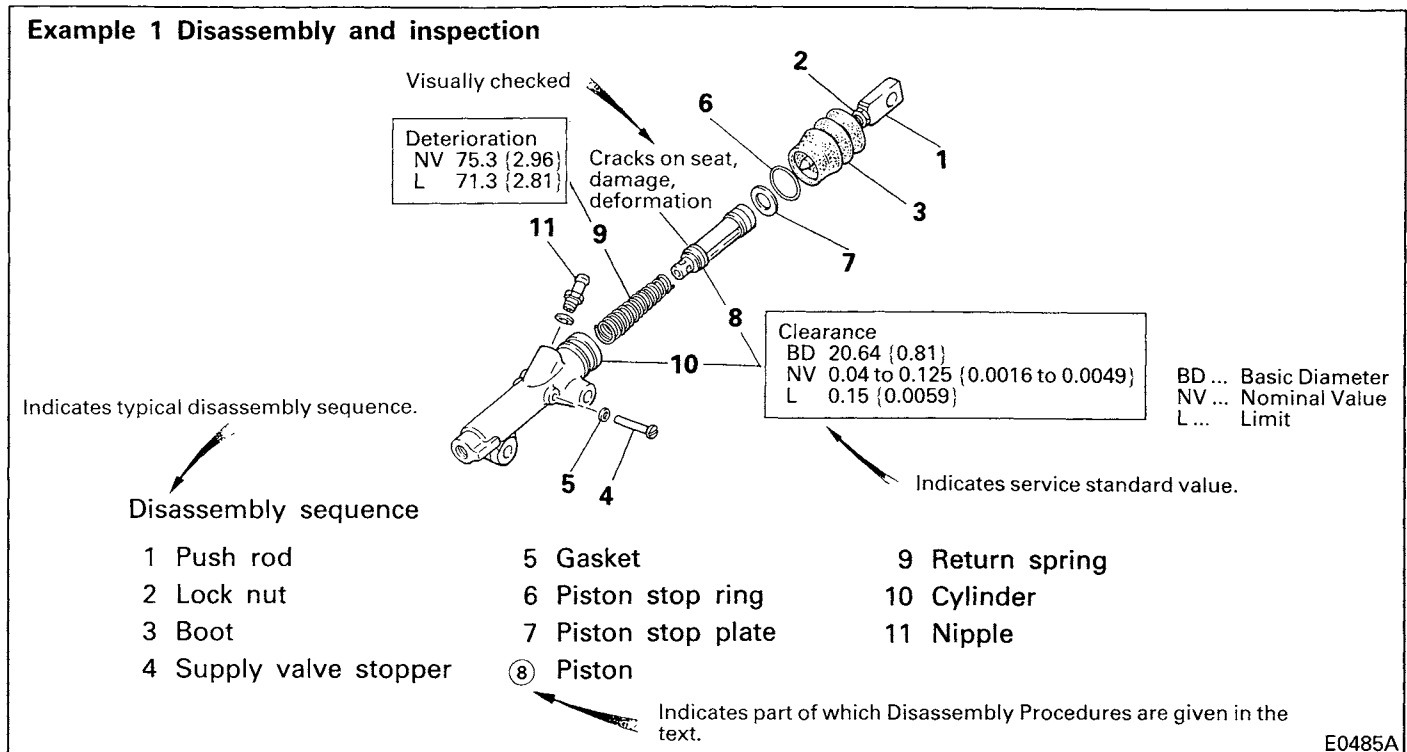
When tightening torque is not specified, tighten according to the standard bolts and nuts tightening torque table.

(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.

COMPILATION OF THIS MANUAL – NOTES ON ILLUSTRATIONS

3. NOTES ON ILLUSTRATIONS



CAUTION

1. The unit mm (in.) is omitted in the illustrations.

2. Only a typical equipment illustration is given regardless of availability of type variations if there is only one applicable service procedure.



FK/FM

Service Manual

**Group 00 Supplement
1995 Model Changes
1994 Minor Change
1993 Minor Change
1992 Group 00 - General**

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



FK.FM

Service Manual

Group 00

General

Supplement

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

Pub. No. TWME9413

FOREWORD

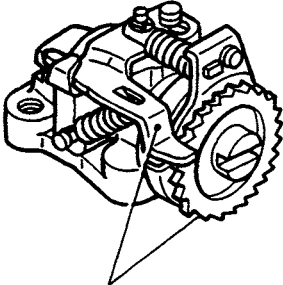
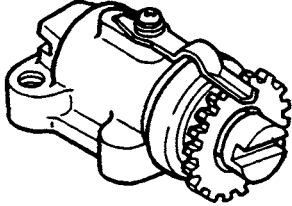
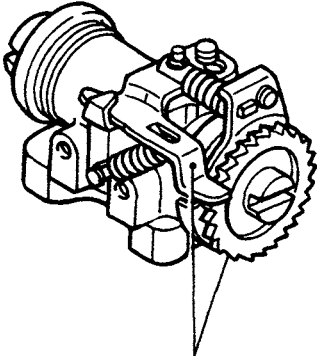
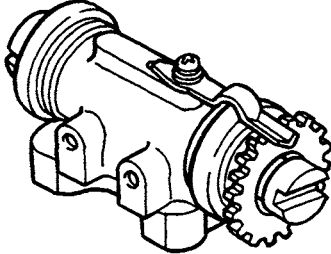
The brake shoe clearance auto adjuster is adopted to meet the Federal regulation. For the other component, refer to the Service Manual (Pub. No. TWME9107), Group 00 General '93 Minor Change (Pub. No. TWME9201) and Group 00 General '94 Minor Change (Pub. No. TWME9308).

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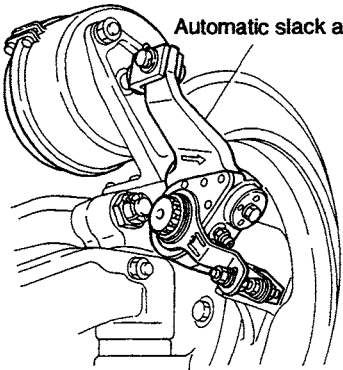
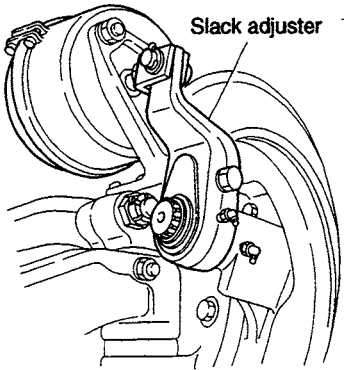
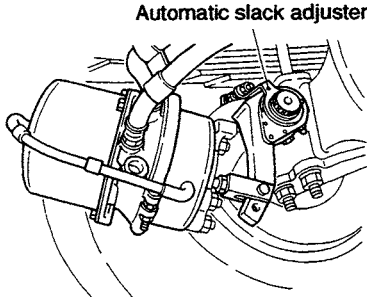
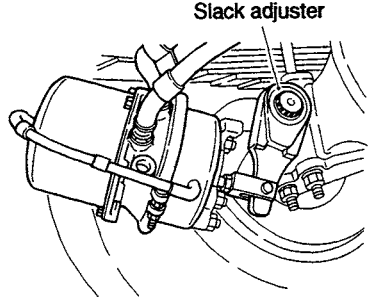
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SUMMARY OF MODIFICATIONS

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 5.</p>	<p>Time of inspection and maintenance 30,000 km/18,000 miles</p>	<p>10,000 km/6,000 miles</p>
<p>Group 35A Brake (Air Over Hydraulic 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 9.</p> <p>1) Front Wheel Cylinder</p>	 <p>Shoe gap adjustment mechanism</p> <p>11144</p>	 <p>11146</p>
<p>2) Rear Wheel Cylinder</p>	 <p>Shoe gap adjustment mechanism</p> <p>11145</p>	 <p>11147</p>

SUMMARY OF MODIFICATIONS

Item	New ←	Old
<p>Group 35B (Full Air Brake)</p> <p>The automatic slack adjuster (automatic shoe gap adjustment mechanism) is equipped on the wheel brake. For the service procedure, refer to page 21.</p> <p>(1) Front automatic slack adjuster</p>	 <p style="text-align: right;">11148</p>	 <p style="text-align: right;">11150</p>
<p>(2) Rear automatic slack adjuster</p>	 <p style="text-align: right;">11149</p>	 <p style="text-align: right;">11151</p>

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 FK.FM Service Manual (Pub. No. TWME9107-01).

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.

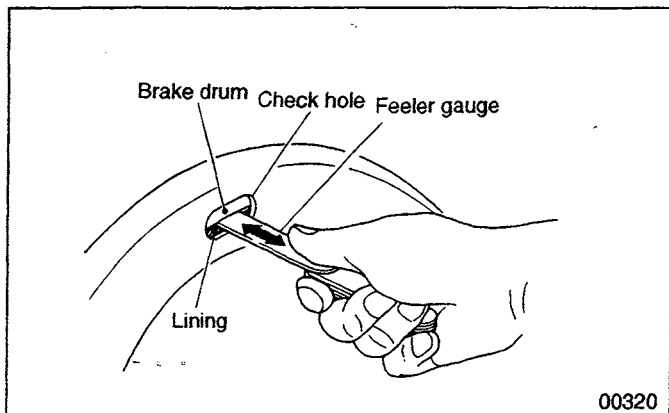
In addition to it, the inspection procedure is changed as follows.

	Place of inspection and maintenance	Time of inspection and maintenance					Working procedures	Remarks
		Pre-operation 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			
51	Exhaust brake control cylinder packing replacement					Every 12 months	Check exhaust brake control cylinder packing; replace if necessary.	Except vehicle with automatic transmission
52	Operation of air drier		X				Open drain cock of air tank and make sure that, there is no drainage.	Air drier equipped vehicle.
53	Check drain from air drier exhaust port		X				Check to see that oil is not discharged abnormally from exhaust port of air drier. On FK series, if a small quantity of drainage is found, remove plug from indicator and check indicator color. If indicator color is pink, replace desiccant.	
54	Air drier disassembly and inspection				X		FK series: Remove plug from indicator and check indicator color. If indicator color is pink, disassemble air drier and replace desiccant. FM series: Disassemble air drier and check each part. If more than 1/5 of desiccant has discolored, replace desiccant.	
55	Replacement of desiccant in air drier					Every 24 months ↓	Disassemble air drier and replace desiccant and rubber parts.	
56	Brake shoe clearance		X	X			Measure clearance with thickness gauge.	FK series
							Measure brake chamber push rod stroke	FM series
57	Brake lining wear			X			Check for lining wear.	
58	Brake drum wear				X		Disassemble and check drum for wear, cracks and damage.	
59	Parking brake operation	X	X				(1) Check for operation of parking brake control valve (2) Check operation with brake air pressure decreased	FM series

Inspection Procedure

<FK Series>

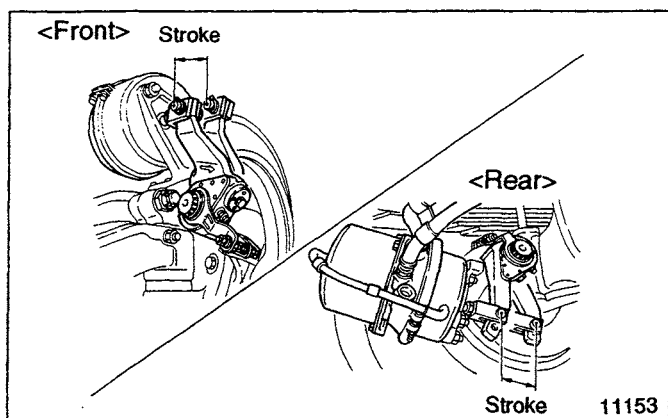
- (1) Jack up the wheel, and while turning the tire, make sure that it does not drag.
- (2) Remove the check hole plug from the backing plate.



- (3) Check that a feeler gauge of 1 mm {0.039 in.} cannot be inserted between the brake drum and the lining. If it can be inserted, disassemble the wheel cylinder and inspect its parts.

<FM Series>

- (1) Jack up the wheel, and while turning the tire, make sure that it does not drag.



- (2) Press down the brake pedal to the end of its stroke, and check that the brake chamber push rod has the following nominal stroke length.

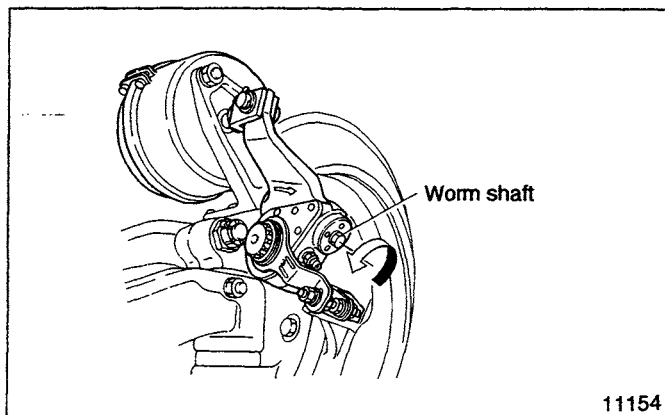
Applicable wheel	Nominal value
Front	25 to 40 mm {0.98 to 1.57 in.}
Rear	30 to 50 mm {1.18 to 1.97 in.}

Also, check whether or not the red paint appears on the brake chamber push rod. If it appears, the automatic slack adjuster may be faulty.

If the standard stroke value is not satisfied or the red paint is found on the push rod, check the automatic slack adjuster as instructed below.

Check of Automatic Slack Adjuster Function

- (1) Increase air pressure to approx. 685 kPa {100 lbf/in², 7 kgf/cm²}.

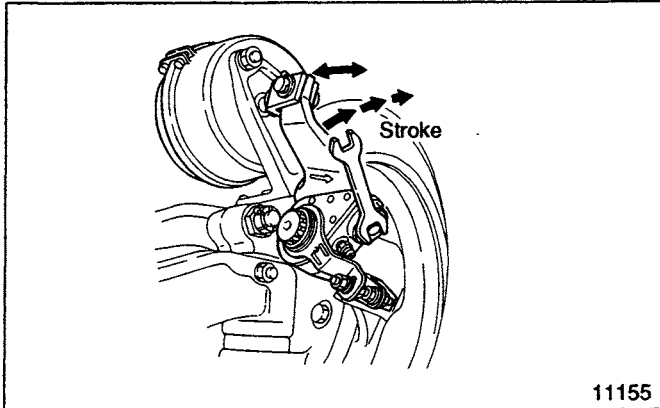


- (2) Turn the worm shaft of the automatic slack adjuster in → direction (counterclockwise) to widen the brake shoe clearance to approx. 1.5 mm {0.059 in.}.

CAUTION

A large working force is exerted to turn the worm shaft.

- (3) Attach a wrench to the worm shaft of the automatic slack adjuster so that its working can be checked by observing the movement of the wrench.
- (4) Push down the brake pedal to the end of its stroke for complete braking, and then release the brake pedal.



- (5) Check that the worm shaft of the automatic slack adjuster turns clockwise when the brake is released. While repeating step (4), check that the rotational stroke decreases each time. If the worm shaft does not work as mentioned above, replace the automatic slack adjuster with a new one.

Group 35A Brake (Air Over Hydraulic Brake)

This section describes only the modified wheel brake.

For other information, refer to Group 35A Brake (Air Over Hydraulic Brake), 1992 FK.FM Service Manual (Pub. No. TWME9107-35A).

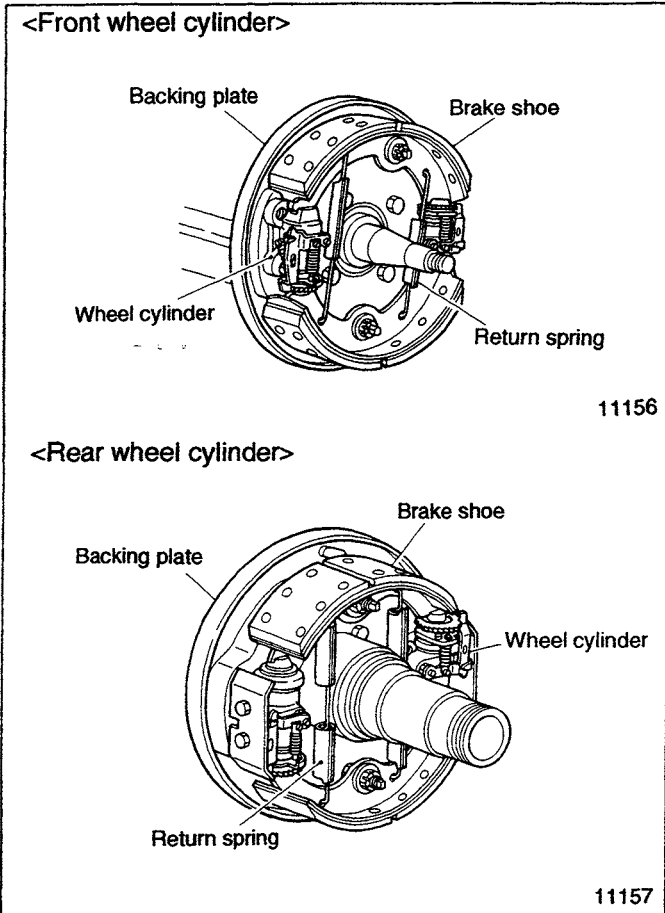
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1. CONSTRUCTION AND OPERATION

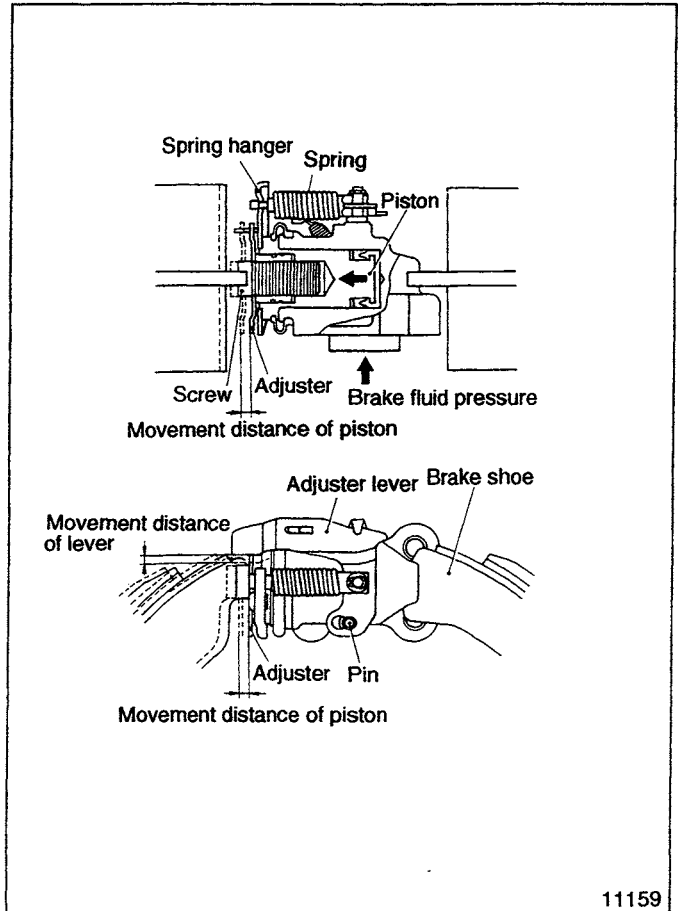
Described below are the construction and operation of only the wheel cylinder equipped with the automatic shoe gap adjustment mechanism.

Operation



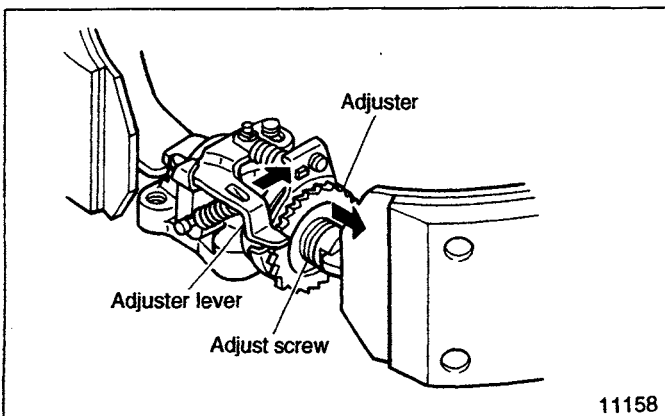
In automatic adjustment operation, the adjuster lever turns the adjuster to extend the adjust screw. Thus, the shoe clearance is adjusted to a proper dimension.

(1) At braking

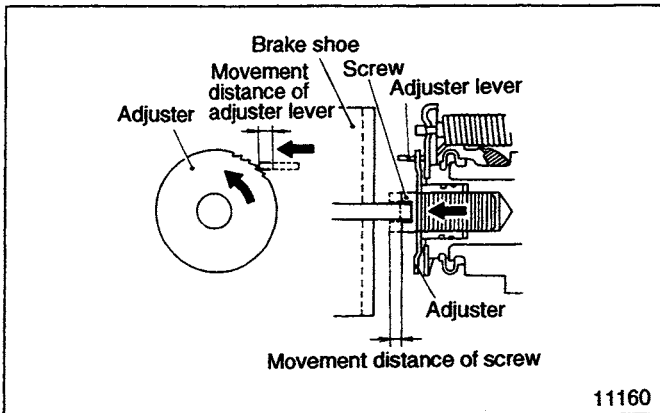


- (a) When the pressure of brake fluid is exerted onto the wheel cylinder, the piston is moved forward.
- (b) In forward movement of the piston, the spring connected with the spring hanger is pulled to turn the adjuster lever around the pin.

Automatic shoe gap adjustment is performed when the shoe clearance increases beyond the specified limit due to wear of the lining. The shoe clearance can thus be kept proper.

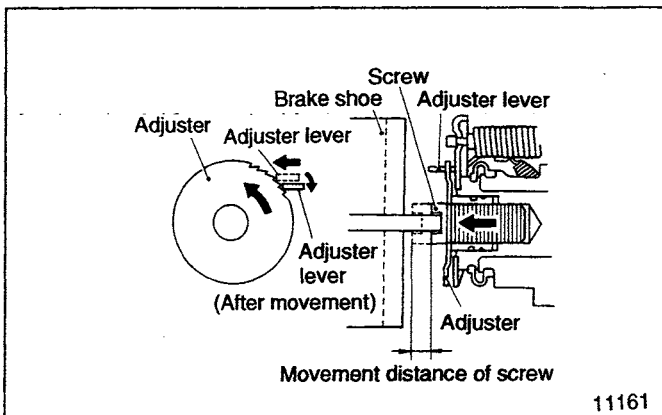


- (2) In case the brake clearance is within the specified range



- a) In case that the brake shoe clearance is within the specified range, the movement of the piston is small. Therefore, the movement of the adjuster lever is kept within the single-tooth pitch range of the adjuster. Since the adjuster is not turned in this case, automatic adjustment is not performed.
- b) At release of the brake pedal, the adjuster lever does not go to the next tooth step and its current engagement remains unchanged.

- (3) In case the brake clearance is more than the specified limit



- a) In case that the brake shoe clearance is more than the specified limit, the movement of the piston is large. Therefore, the rotation angle of the adjuster lever becomes large to turn the adjuster accordingly.
- b) As the rotation angle of the adjuster increases, the extending movement distance of the adjust screw increases to adjust the brake shoe clearance to less than the specified limit.
- c) At release of the brake pedal, the adjuster is kept at the rotated position and the adjuster lever is moved to

the next tooth step of the adjuster by the set spring. The adjuster lever thus changes its engagement and restores itself to the home position.

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	400 {15.75}	*401 {15.79}	402 {15.83}	Replace
		Cylindricity	0.025 {0.00098}		0.2 {0.0079}	Correct
	Return spring	Load/installed length	380 N {86 lbf, 39 kgf}/228.4 {8.99}		Clearance between coils or between coils and cover	Replace
	Brake lining thickness		15 {0.59}		5.5 {0.22} (Side ridge shows the wear limit)	Replace
Front wheel cylinder		Cylinder body to piston clearance	[34.93 {1.38}] 0.03 to 0.13 {0.0012 to 0.0051}		0.2 {0.0079}	Replace piston
Rear wheel brake	Brake drum	Inner diameter	400 {15.75}	*401 {15.79}	402 {15.83}	Replace
		Cylindricity	0.025 {0.00098}		0.2 {0.0079}	Correct
	Return spring	Load/installed length	420 N {95 lbf, 43 kgf}/266.5 {10.5}		Clearance between coils or between coil and cover	Replace
	Brake lining thickness		15 {0.59}		5.5 {0.22} (Side ridge shows the wear limit)	Replace
Rear wheel cylinder		Cylinder body to piston clearance	[38.10 {1.50}] 0.03 to 0.13 {0.0012 to 0.0051}		0.2 {0.0079}	Replace piston

*: Repair limit

2.2 Tightening Torque Table

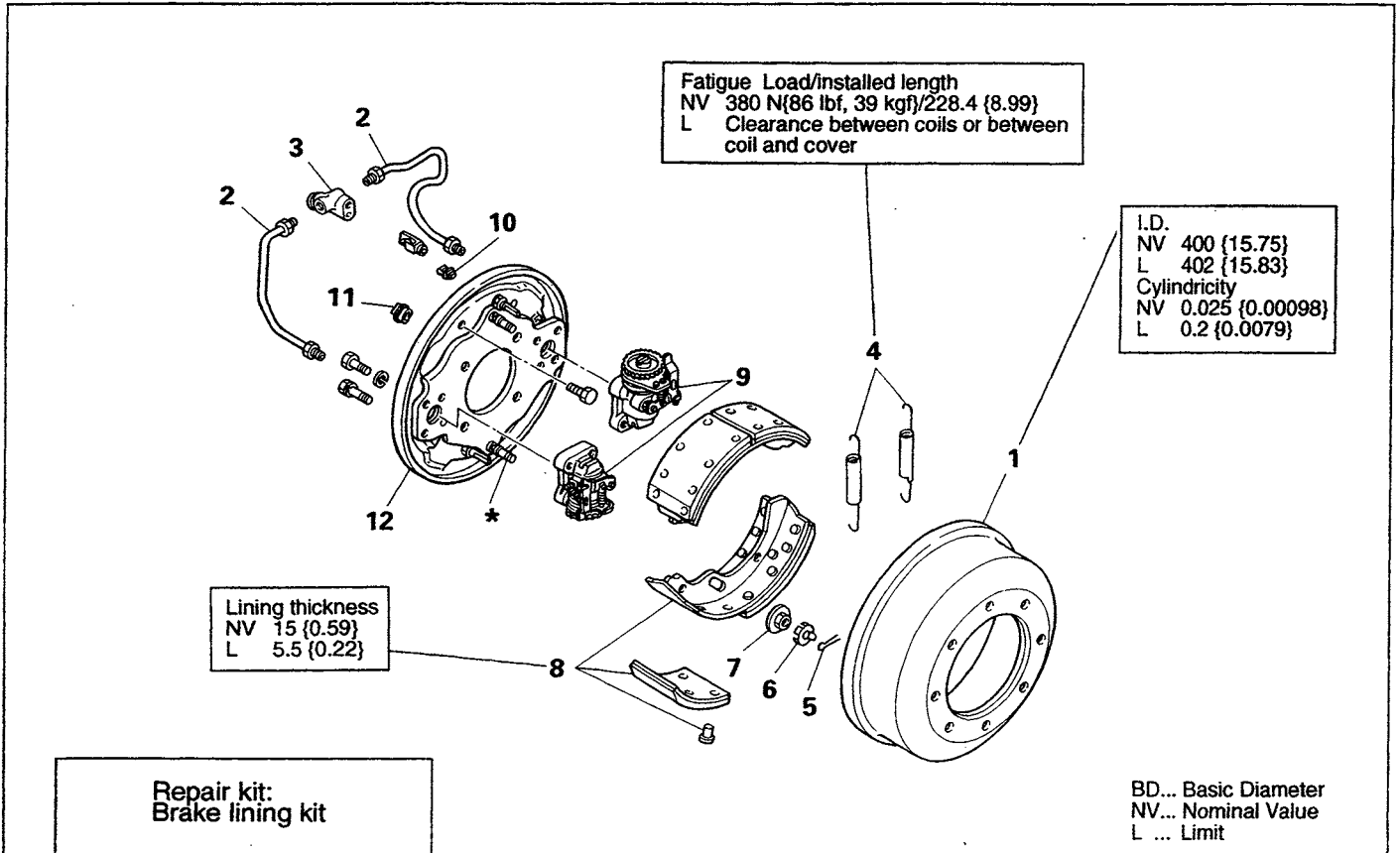
Location tightened		Screw size O.D. x pitch mm	Tightening torque N·m {lb·ft, kgf·m}
Front wheel brake	Brake pipe assembly flare nut	M10 x 1.0	12.75 to 17.65 {9.4 to 13, 1.3 to 1.8}
	Joint mounting bolt	M10 x 1.25	37.27 to 49.03 {27 to 36, 3.8 to 5.0}
	Wheel cylinder mounting bolt	M10 x 1.25	37.27 to 49.03 {27 to 36, 3.8 to 5.0}
		M14 x 1.5	122.58 to 166.7 {90 to 120, 12.5 to 17.0}
Front wheel cylinder	Air bleeder	M10 x 1.0	6.86 to 11.77 {5.1 to 8.7, 0.7 to 1.2}
Rear wheel brake	Brake pipe assembly flare nut	M10 x 1.0	12.75 to 17.65 {9.4 to 13, 1.3 to 1.8}
	Wheel cylinder cover mounting bolt	M6 x 1.0	7.85 to 11.77 {5.8 to 8.7, 0.8 to 1.2}
	Wheel cylinder mounting bolt	M14 x 1.5	122.58 to 166.7 {90 to 120, 12.5 to 17.0}
Rear wheel cylinder	Air bleeder	M10 x 1.0	6.86 to 11.77 {5.1 to 8.7, 0.7 to 1.2}

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 35A Brake (Air Over Hydraulic Brake), 1992 FK.FM Service Manual (Pub. No. TWME9107-35A).

3.1 Front Wheel Brake

3.1.1 Disassembly and inspection



Disassembly sequence

- | | | |
|-----------------|--------------|------------------------|
| ① Brake drum | 5 Cotter pin | 9 Front wheel cylinder |
| 2 Brake pipe | 6 Lock plate | 10 Adjust hole plug |
| 3 Joint | 7 Nut | 11 Check hole plug |
| 4 Return spring | 8 Brake shoe | 12 Backing plate |

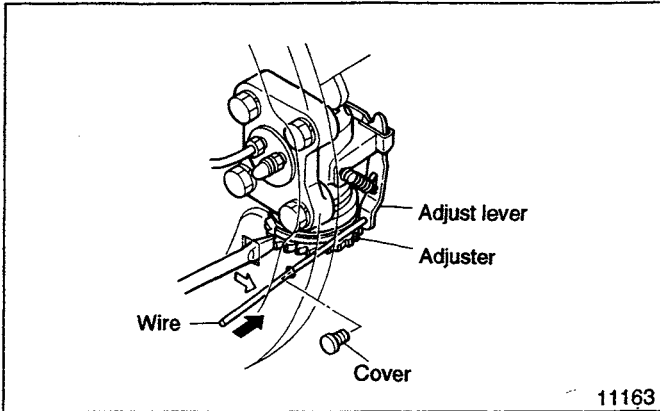
For the part with an encircled number, refer to Disassembly Procedure that follows.

CAUTION

1. To maintain brake shoe squareness, do not turn or remove the asterisk(*)-marked bolt.
2. Avoid attaching any oil or grease to the surface of lining, or the braking effect will deteriorate.

Disassembly Procedure

If the brake drum cannot be removed due to stepwise wear, take the following procedural steps.



- (1) Remove the rear cover from the backing plate.
- (2) Insert a wire of approx. $\phi 5$ mm { $\phi 0.20$ in.} through the cover cutout, and lift the adjust lever of the wheel cylinder.
- (3) In the direction opposite to the arrow marked on the backing plate, turn the adjuster of the wheel cylinder through the adjust hole. After contracting the brake shoe in this manner, remove the brake drum.

3.1.2 Reassembly

T: 37.27 to 49.03 N-m
{27 to 36 lbf.ft.,
3.8 to 5.0 kgf-m}

Section A-A

Apply brake grease to the anchor and screw groove that come in contact with the brake shoe.

Mount as shown here.

Apply brake grease to the face that comes in contact with the brake shoe.

T: 122.58 to 166.7 N-m
{90 to 120 lbf.ft.,
12.5 to 17.0 kgf-m}

T: 37.27 to 49.03 N-m
{27 to 36 lbf.ft.,
3.8 to 5.0 kgf-m}

T: 12.75 to 17.65 N-m
{9.4 to 13 lbf.ft.,
1.3 to 1.8 kgf-m}

T: 12.75 to 17.65 N-m
{9.4 to 13 lbf.ft.,
1.3 to 1.8 kgf-m}

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

CAUTION

Avoid attaching any oil or grease to the surface of lining, or the braking effect will deteriorate.

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 0.13 (0.0012 to 0.0051)
 L 0.2 (0.0079)

Repair kit:
 Wheel cylinder kit

Disassembly sequence

1 Set spring	11 Adjuster
2 Cover	12 Washer (thin)
3 Retainer	13 Washer (thick)
4 Waved washer	14 Piston cup
5 Washer	15 Backup ring
6 Pin	16 Piston
7 Spring	17 Boot
8 Adjust lever	18 Air bleeder
9 Screw	19 Cylinder body
10 O-ring	

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

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3.2.2 Reassembly

Apply rubber grease. 7 A

Apply rubber grease.
 Apply rubber grease.

Apply rubber grease.

(thin)(thick)

Apply rubber grease.

Fix the closed hook onto the pin.

T: 6.86 to 11.77 N-m (5.1 to 8.7 lbf.ft, 0.7 to 1.2 kgf.m)

Reassembly sequence:

```

    19→18→17
    16→15→14
    13→12
    →11→10→9
    →8→7→6→5→4 →3→2→1
    
```

CAUTION

1. Mount the piston cup 14 in the direction as shown above.
2. Mount the backup ring 15 so that the non-chamfered inner side will come in contact with the piston cup.

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Thanks for your reading.

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