SPECIFICATIONS

Vacuum Booster and Brake Master Cylinder

Item				Specifications		
				FG84	FE83	FE84
Vacuum booster	Boosting type			Vacuum tandem type		
	Diaphragm diameter		inch	ϕ8 + ϕ9	ϕ9 + ϕ10	
	Manufacturer			BOSCH AUTOMOTIVE SYSTEMS		
Brake master cylinder	Inner diameter		mm {in.}	ϕ30.16 {1.19}		ϕ31.75 {1.25}
	Stroke	Front	mm {in.}	17.4 {0.69}		16.0 {0.63}
		Rear	mm {in.}	14.6 {0.57}		16.0 {0.63}
	Manufacturer			NISSIN KOGYO		

Hydraulic Booster and Brake Master Cylinder

Item				Specifications
Hydraulic booster	Boosting type			Hydraulic type
	Manufacturer			BOSCH AUTOMOTIVE SYSTEMS
Brake master cylinder	Inner diameter		mm {in.}	ϕ33.34 {1.31}
	Stroke	Front	mm {in.}	17.5 {0.69}
		Rear	mm {in.}	16.0 {0.63}
	Manufacturer			BOSCH AUTOMOTIVE SYSTEMS

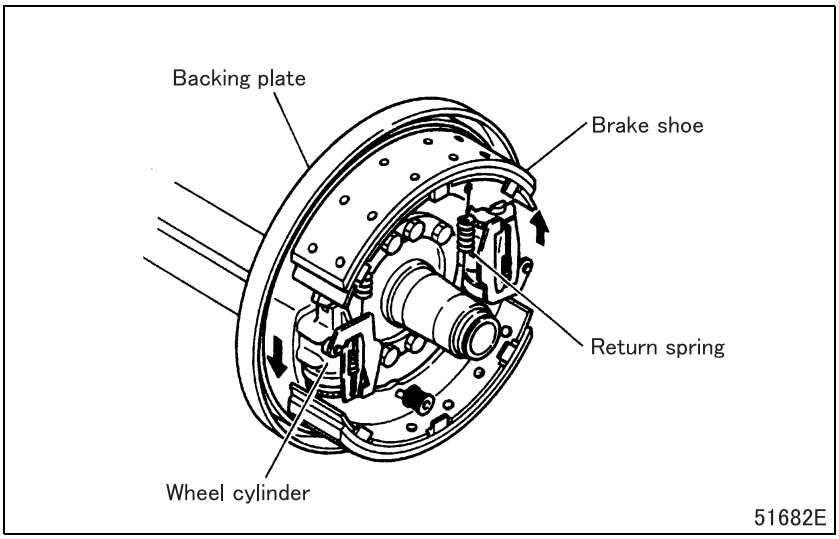
Front Disc Brake

Item		Specifications	
		FE83, FE84	FE85
Brake type		Twin caliper type	
Effective diameter for braking	mm {in.}	ϕ235 {9.25}	ϕ252 {9.92}
Disc rotor outer diameter × thickness	mm {in.}	ϕ293 × 40 {11.5 × 1.57}	ϕ310 × 40 {12.2 × 1.57}
Caliper piston inner diameter	mm {in.}	ϕ51.1 {2.01}	ϕ54 {2.13}
Thickness of pad	mm {in.}	14 {0.55}	14 {0.55}

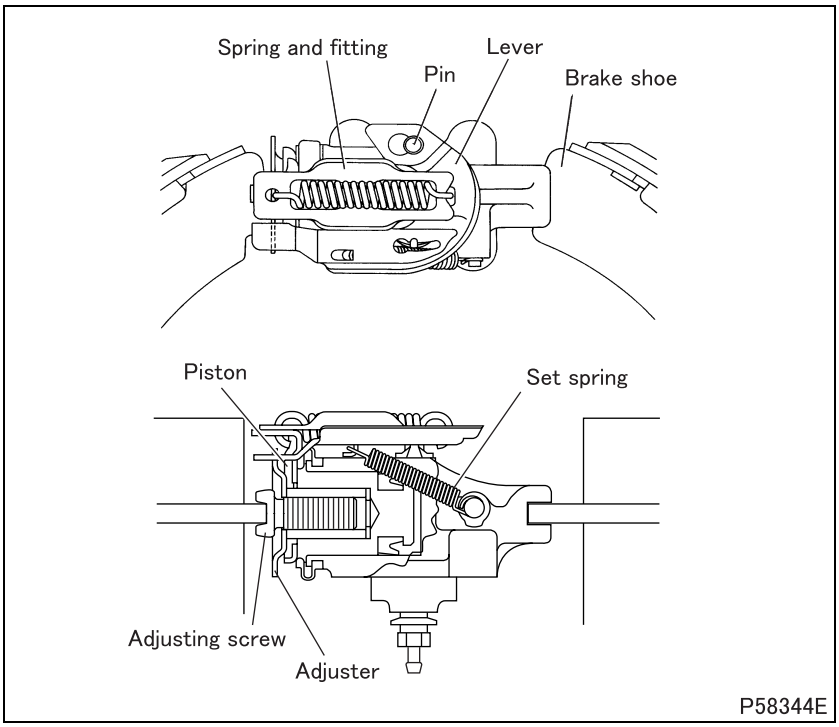
Front Drum Brake

Item		Specifications
Brake type		2-leading type (with auto adjuster)
Wheel cylinder inner diameter	mm {in.}	ϕ31.75 {1.25}
Brake drum inner diameter	mm {in.}	ϕ320 {12.6}
Brake lining width × thickness	mm {in.}	75 × 8.8 {2.95 × 0.35}

7. Front Drum Brake

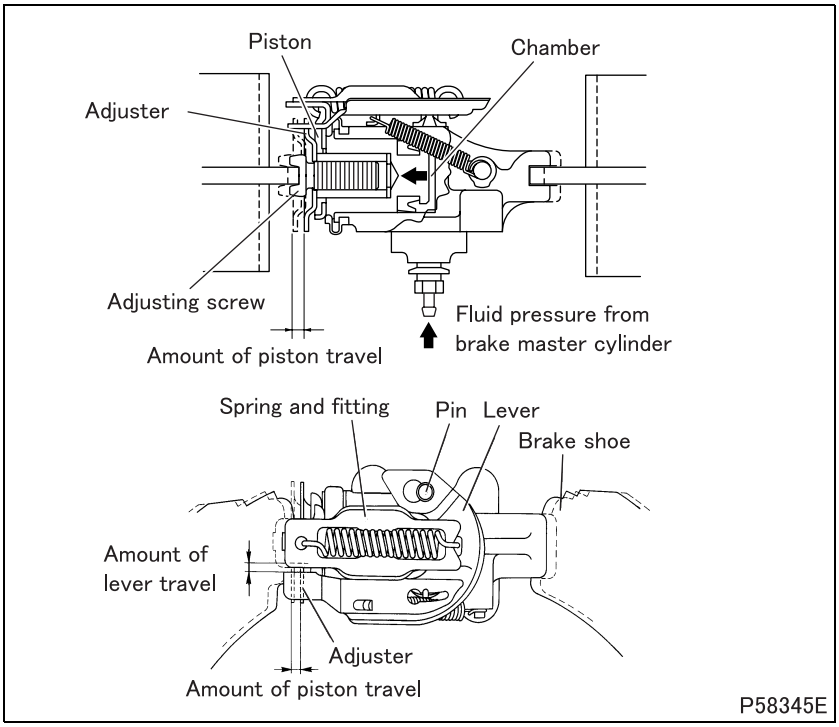


- The front drum brake is of a 2-leading type.
- Single-acting wheel cylinders activate brake shoes, both as a leading shoe, in forward-travel braking. By self-boosting effect, the 2-leading shoe brake generates a great stopping power.



7.1 Wheel cylinder

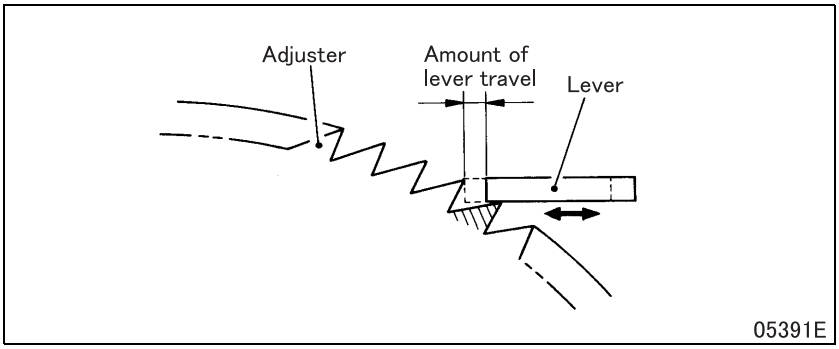
- The wheel cylinder is equipped with a self-adjusting mechanism to compensate for lining wear and maintain the correct clearance between the lining and the drum. The adjustment is made each time braking is performed.



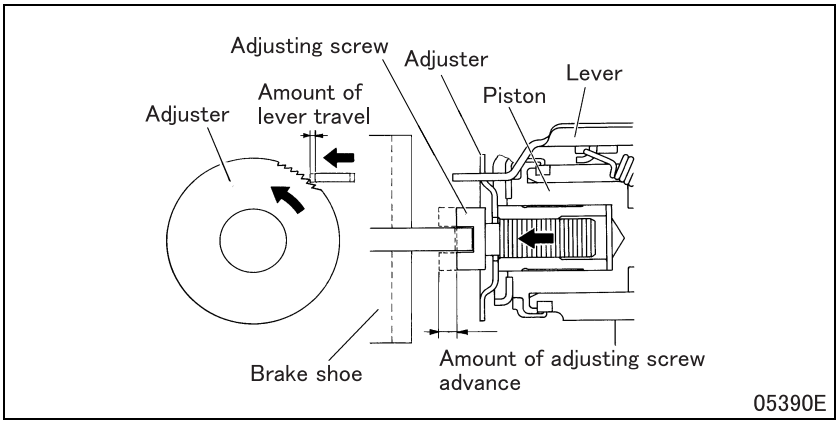
7.2 Self-adjusting mechanism

(1) Operation

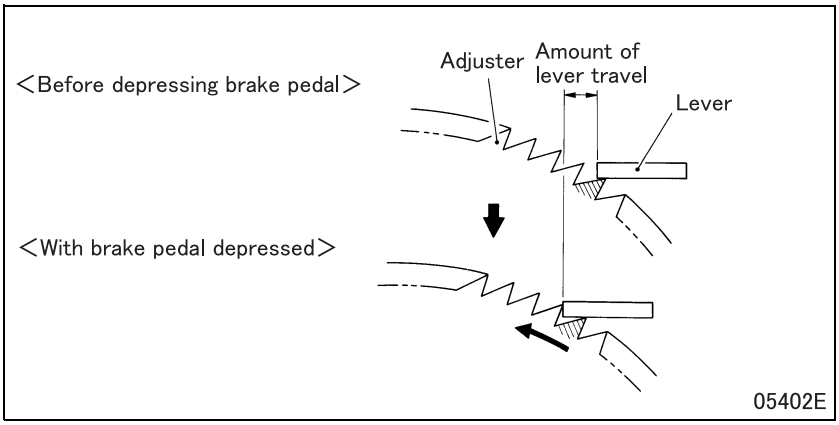
- When the brake pedal is depressed, fluid pressure from the brake master cylinder enters into chamber and pushes the piston, which then extends the spring and fitting. The lever, which is connected to the spring and fitting, pivots about the pin.

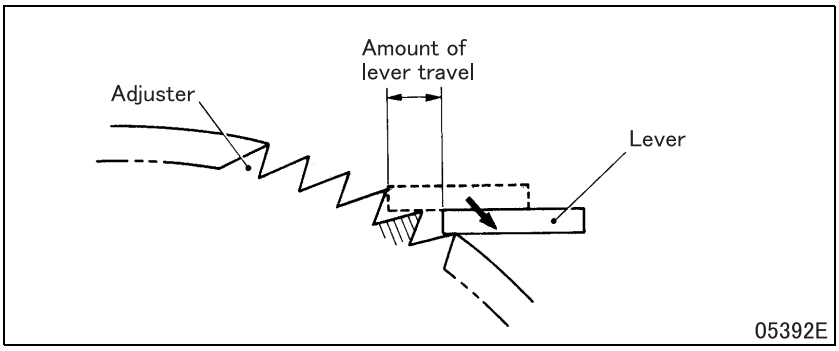


- When the brake drum-to-lining clearance is correct, the amount of lever travel when the brake pedal is depressed is not enough to turn the adjuster which therefore remains in the same place.



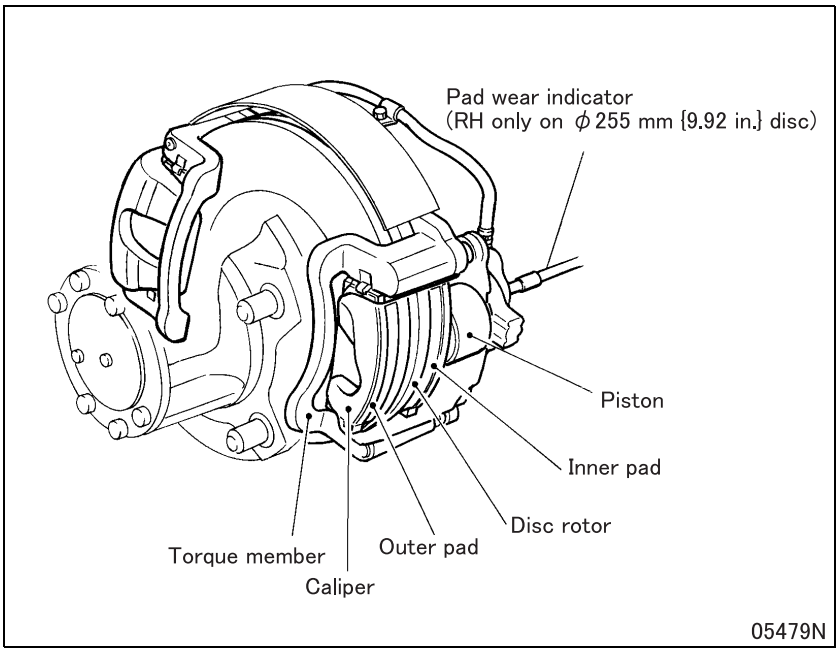
- As the brake drum-to-lining clearance grows, the amount of piston travel, and therefore the amount of lever travel, becomes greater.
- When the lever travels far enough to turn the adjuster, the threads on the adjuster causes the adjusting screw to advance. As a result, the brake shoe extends.





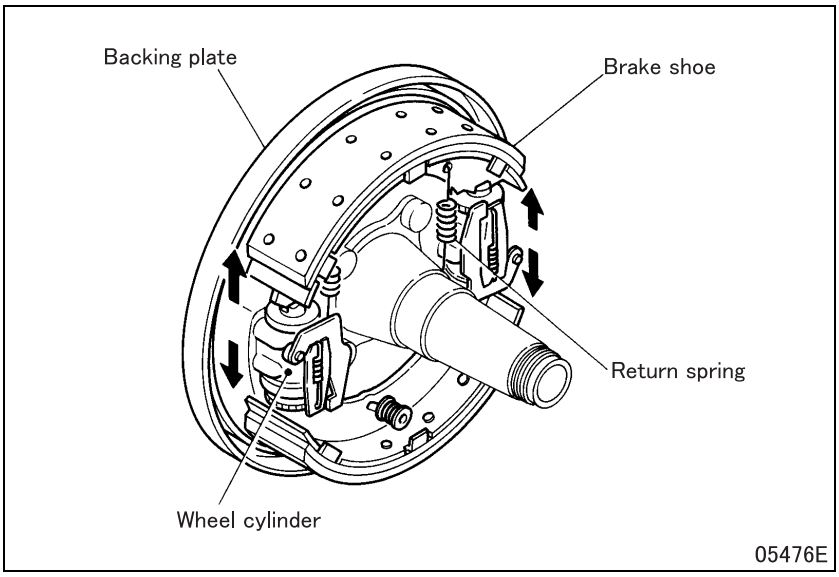
- As the brake pedal is released, the adjuster remains in the new position while the lever retracts by one tooth. The brake drum-to-lining clearance is now correctly adjusted.

8. Rear Disc Brake

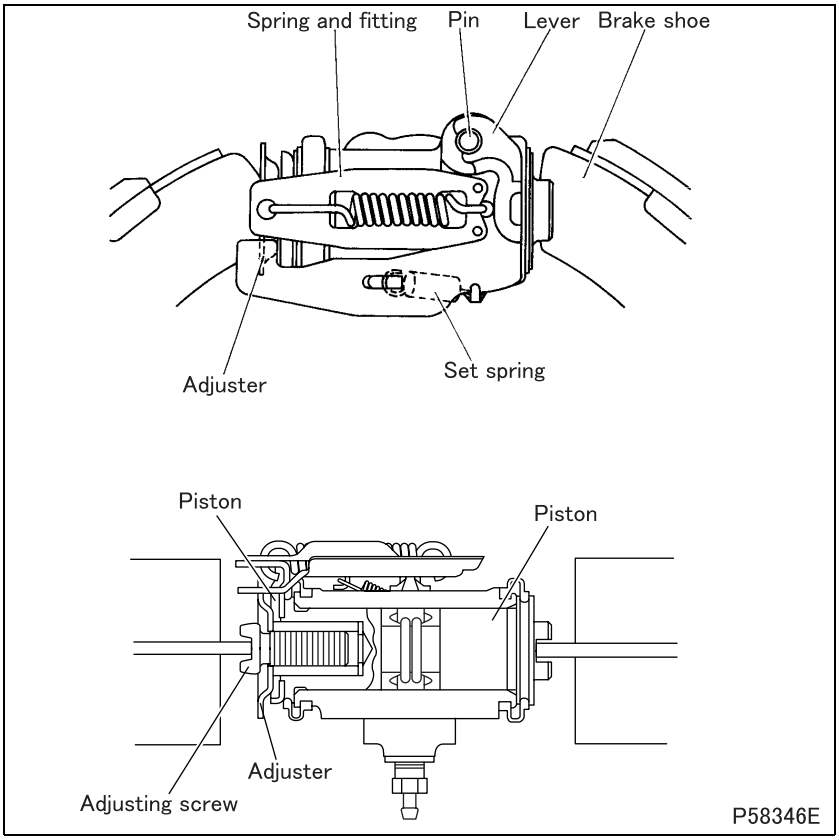


- The rear disc brake uses a twin floating-type calipers.
- The caliper houses one each of cylinder and piston. Stopping power is generated by squeezing the disc rotor between the pads, with the outer pad pressed against the disc rotor by reaction.
- The inner pad is equipped with wear indicator which serves to indicate replacement timing for both the inner and outer pads.
- The rear disc brake is equipped with a self-adjusting mechanism to compensate for pad wear and maintain the correct clearances between the disc rotor and the inner and outer pads. The adjustment is made each time braking is performed.
- The self-adjusting mechanism operates in the same manner as that of the front disc brake.

9. Rear Drum Brake



- The rear drum brake is of a dual 2-leading type.
- Double-acting wheel cylinders activate brake shoes, both as a leading shoe, in forward- and rearward-travel braking. By self-boosting effect, the dual 2-leading shoe brake generates a great stopping power.



9.1 Wheel cylinder

- The wheel cylinder is equipped with a self-adjusting mechanism to compensate for lining wear and maintain the correct clearance between the lining and the drum. The adjustment is made each time braking is performed.
- The self-adjusting mechanism operates in the same manner as that of the front drum brake.

Rear Disc Brake

Item		Specifications	
		FE83, FE84	FE85
Brake type		Twin caliper type	
Effective diameter for braking	mm {in.}	ϕ235 {9.25}	ϕ252 {9.92}
Disc rotor outer diameter × thickness	mm {in.}	ϕ293 × 40 {11.5 × 1.57}	ϕ310 × 40 {12.2 × 1.57}
Caliper piston inner diameter	mm {in.}	ϕ51.1 {2.01}	ϕ54 {2.13}
Thickness of pad	mm {in.}	14 {0.55}	14 {0.55}

Rear Drum Brake

Item		Specifications
Brake type		Dual 2-leading type (with auto adjuster)
Wheel cylinder inner diameter	mm {in.}	ϕ28.57 {1.12}
Brake drum inner diameter	mm {in.}	ϕ320 {12.6}
Brake lining width × thickness	mm {in.}	75 × 8.8 {2.95 × 0.35}

Vacuum Pump

Item		Specifications
Type		Vane type
Output	cm^3 {cu.in.}	60 {3.66}
Manufacturer		Mitsubishi Electric Corporation

Exhaust Brake

Item	Specifications
Control type	Combined electric and vacuum control
Valve type	Butterfly valve type

Wheel Brake

Possible causes	Symptoms	Brake application one sided							Noise and shock when brake pedal depressed			Reference Gr
		Brake drag (slow disengagement after pedal release)	Stopping power different from right to left	Unstable stopping power	Locking point varies	Other	Insufficient stopping power	Reduced pedal travel	Noise generated when wheels are turned with jacked-up vehicle	Continuous noise during brake application (at low vehicle speed)	Other	
	Backing plate surface rough	O		O								
	Backing plate deformed or incorrectly installed			O								
	Lubricant or moisture on brake pad/lining surface		O		O							
	Deterioration or incorrect material used for brake pad/lining		O									
	Brake pad/lining unevenly worn or with rough surface		O									
	Fade (pad/lining surface deterioration)				O							
	Brake pad/lining worn to limit									O		
	Incorrect contact of brake pad/lining		O		O		O					
	Brake lining worn radius uneven				O							
Wheel brake	Wheel cylinder malfunction	O	O					O	O			
	Shoe return spring fatigued or broken	O							O			
	Disc rotor/brake drum worn unevenly		O									
	Disc rotor/brake drum deformed			O								
	Disc rotor/brake drum worn				O							
	Disc rotor/brake drum surface rough						O					
	Disc rotor/brake drum inaccurately machined										O	
	Brake drum cracked										O	
	Foreign matter in brake drum							O				
	Brake shoe deformed or damaged							O				
	Shoe hold cup broken								O			
	Movable parts insufficiently lubricated										O	

Possible causes	Symptoms	Brake application one sided							Noise and shock when brake pedal depressed			Reference Gr
		Brake drag (slow disengagement after pedal release)	Stopping power different from right to left	Unstable stopping power	Locking point varies	Other	Insufficient stopping power	Reduced pedal travel	Noise generated when wheels are turned with jacked-up vehicle	Continuous noise during brake application (at low vehicle speed)	Other	
Brake pedal	Incorrect pedal travel						O					
	Incorrectly adjusted, too much play							O				
Brake fluid	Fluid level low							O				
	Fluid leakage							O				
	Air ingress							O				
	Vapor lock							O				
Vacuum system	Vacuum drop						O					
Vacuum booster	Faulty						O	O				
Hydraulic booster	Faulty hydraulic booster						O	O				
	Faulty piston cup							O				
Tire	Tire pressure uneven between wheels					O						Gr31
	Different tire sizes from left to right					O						
Axle	Wheel hub bearing incorrectly adjusted					O				O		Gr26, 27
	Wheelbase different from left to right					O						
	Incorrect wheel alignment					O						Gr26

Possible causes	Symptoms	Brake drum overheating		Brake noise						Reference Gr
		Overheating on all wheels	Overheating on specific wheel(s)	Noisy when vehicle is new, or after brake lining/pad replacement	Brakes used under severe conditions	Other	Judder	Abnormal brake pedal return	Brake drag	
Wheel brake	Backing plate surface rough								O	
	Shoe trapped on backing plate surface		O							
	Backing plate deformed or incorrectly installed				O					
	Lubricant or moisture on brake pad/lining surface				O					
	Wear powder attached on brake pad/lining					O				
	Brake pad/lining worn					O				
	Incorrect contact of brake pad/lining			O						
	Wheel cylinder malfunction		O						O	
	Faulty wheel cylinder piston cup		O						O	
	Shoe return spring fatigued or broken		O						O	
	Disc rotor/brake drum glazed				O					
	Brake drum deformed or center deviation						O			
	Disc rotor thickness uneven						O			
	Brake shoe deformed or damaged				O					
	Brake shoe twisted or sagged		O							
Brake pedal	Abnormal pedal return	O								
	Pedal play insufficient								O	
	Linkage rusted or deformed							O		
	Return spring fatigued or broken							O		
	Vacuum/hydraulic booster operating rod thrust							O		
Brake fluid	Brake pipe over-tightened, resulting in poor fluid return		O							
Vacuum booster	Faulty	O								
Hydraulic booster	Faulty hydraulic booster	O								
Brake master cylinder	Faulty piston cup								O	
	Clogged return port	O								
Axle	Wheel hub bearing incorrectly adjusted		O			O	O			Gr26, 27
	King pin bushing worn						O			Gr26A
	Trunnion bearing worn						O			Gr26B

Exhaust Brake

Symptoms / Possible causes		Exhaust brake not effective	Exhaust brake does not disengage	Reference Gr
Vacuum system	Insufficient vacuum	O		
	Collapsed piping	O		
Faulty 3-way magnet valve		O	O	Gr54
Exhaust brake unit	Faulty valve	O	O	
	Stuck valve shaft	O	O	
	Faulty valve chamber	O		
Faulty electric system		O	O	Gr54

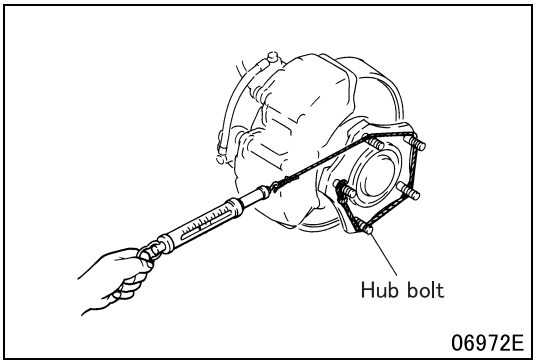
7. Measurement of Disc Brake Drag Torque

Service standards

Location	Maintenance item		Standard value	Limit	Remedy
–	Drag torque of disc brake (tangential force at hub bolts)	Approx. 5 sec. after releasing brake pedal	9.8 N·m {7.2 ft.lbs, 1.0 kgf·m} or less	–	Inspect
		After turning disc rotor 10 revolutions	6.9 N·m {5.1 ft.lbs, 0.7 kgf·m} or less	–	

Table of tangential forces

		Approx. 5 sec. after releasing brake pedal	After turning disc rotor 10 revolutions
FE	Front	81 N {8.3 kgf}	57 N {5.8 kgf}
	Rear	83 N {8.5 kgf}	59 N {6 kgf}
FG	Front	85 N {8.7 kgf}	60 N {6.1 kgf}
	Rear	83 N {8.5 kgf}	59 N {6 kgf}



- Ensure that the starting torque of the wheel hub bearings conforms to the standard value.
- Using a spring balance, measure the tangential force at the hub bolts.
- The tangentizl force is calculated by the following formula.
  Tangential force = Dragging torque / (Hub bolt P.C.D. / 2)
- If the measured tangential force conforms to the specified value, this means that the drag torque of the disc brake conforms to the standard value.
- If the measured value does not conform to the specified torque, check the sliding portions of the piston and piston seal.

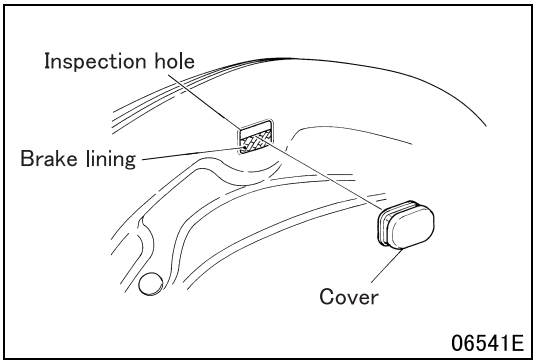
8. Inspection of Drum Brake Lining Thickness

CAUTION ⚠

- **To ensure correct operation of the brakes, be sure to inspect both linings on each wheel.**

Service standards (Unit: mm {in.})

Location	Maintenance item		Standard value	Limit	Remedy
–	Brake lining thickness	ϕ320 {12.6} drum	–	4.0 {0.16}	Replace



- Remove the cover from the backing plate. Through the inspection hole, check the thickness of the brake lining.
- If the measured value is equal to or less than the limit, replace all of the brake linings or shoes on the same axle.
- After the inspection, be sure to install the cover.

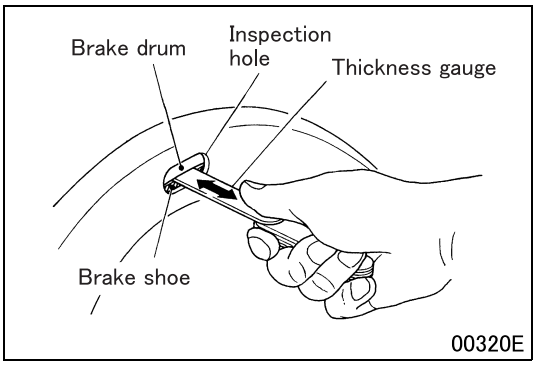
9. Initial Setting of Clearance between Brake Drum and Shoe

CAUTION ⚠

- **To ensure correct operation of the brakes, be sure to inspect both shoes on each wheel.**

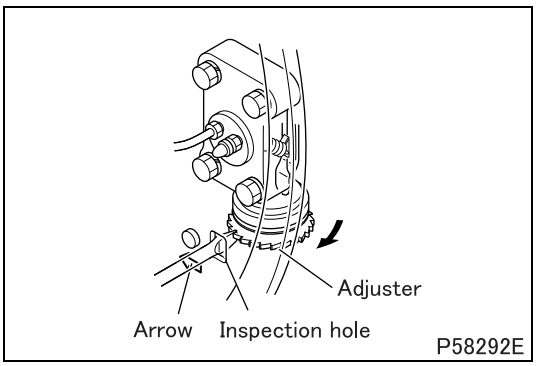
Service standards (Unit: mm {in.})

Location	Maintenance item	Standard value	Limit	Remedy
–	Clearance between brake drum and shoe	0.2 {0.0079}	–	Inspect, and adjust as required



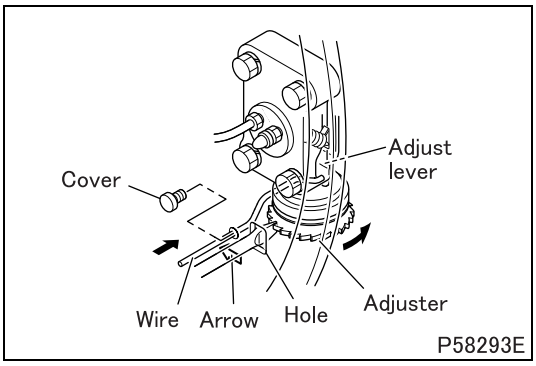
[Inspection]

- Cycle the brake pedal a couple of times to bring the brake shoes to conditions appropriate for the inspection.
- Through the inspection hole, insert a thickness gauge between the brake drum and lining. The gauge should be able to be inserted and out with slight resistance.
- If the clearance does not conform to the standard value, perform the following adjustment.



[Adjustment]

- Jack up the wheel being adjusted. Ensure that the wheel hub bearings are not loose.
- With a 0.3 mm {0.012 in.} thickness gauge inserted through the inspection hole, adjust the drum-to-lining clearance in the following manners such that the gauge can be inserted and out with slight resistance.
- If the thickness gauge can be inserted and out with no resistance, turn the adjuster through the inspection hole in the direction of the arrow on the backing plate.



- If the clearance is too small to insert the thickness gauge or there is considerable resistance when inserting the gauge, remove the cover and insert a ϕ2 mm {0.079 in.} wire through the hole to lift the adjust lever for the wheel cylinder. Then, through the inspection hole turn the adjuster in the direction opposite to the arrow on the backing plate to increase the clearance between the brake drum and shoe.
- Then, cycle the brake pedal a couple of times. This will automatically bring the brake drum-to-shoe clearance to 0.2 mm {0.0079 in.}.
- Insert a 0.2 mm {0.0079 in.} thickness gauge between the brake drum and lining. It should be able to be inserted and out with slight resistance.
- Check the disc brake for normal operation. If faulty, disassemble and inspect the wheel cylinders.