

PORSCHE

911 & Turbo Carrera
912/E
914

DESCRIPTION

Brake system is hydraulically operated, utilizing a tandem master cylinder. All models are equipped with four wheel disc brakes. All models utilize mechanical parking brakes. 911 and 912/E models have a brake drum machined into rotor. A cable actuates shoes inside drum to lock rear wheels. On 914 models, parking brake operates directly on rear brake pads and locks rotor. All models have a brake warning light that is activated when there is a pressure drop in hydraulic system. Warning light on instrument panel comes on and will not go out until problem is corrected.

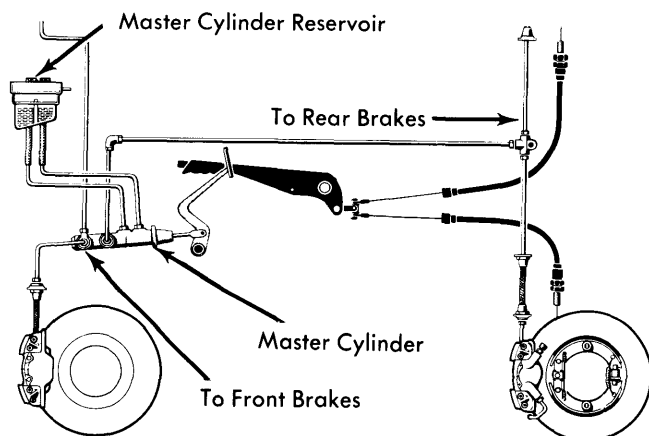


Fig. 1 Hydraulic Fluid Distribution for Dual Circuit Brake System

ADJUSTMENT

DISC BRAKES

Disc brakes are self adjusting, therefore no adjustment in service is required.

PARKING BRAKE

914 Models — Parking brake is incorporated in service brake, therefore no adjustment is required.

911 Models — Raise and support vehicle, and remove rear wheels. Release parking brake lever and push pistons and pads into caliper to allow rotor to turn freely. Loosen parking brake cable lock nuts until cable is slack. Working through access hole in parking brake drum, turn star wheel adjuster until rotor can no longer be turned by hand. Adjust parking brake cable at rear cable end until it just begins to pull and tighten lock nuts. Back off on star wheel adjuster until rotor turns freely without drag. Repeat procedure on opposite wheel and check parking brake operation.

BLEEDING SYSTEM

Bleeding Sequence — If equipped with outer and inner caliper half bleed screws, always bleed outer caliper half first and inner half second. Bleed brakes as follows: Left rear first, right rear second, right front third, and left front last.

CAUTION — When any fluid fitting is disconnected, fluid will drain from reservoir through master cylinder and out open fitting. To avoid this, depress brake pedal far enough so piston cup will pass the compensating (resupply) port.

Pressure Bleeding — Fill pressure bleeder with brake fluid and pressurize tank to 32.3 psi (2.2 atm). Connect bleeder to reservoir and connect a small bleed hose to first bleed screw. See *Bleeding Sequence*. Place other end in container partially filled with brake fluid. Open bleed screw 1/2 – 3/4 turn and allow fluid to drain until no air bubbles are apparent in fluid. Close bleed screw and repeat operation for each bleed screw in turn.

NOTE — If brake system was completely drained, it may be necessary to perform bleeding, in sequence, more than once.

Manual Bleeding — Fill reservoir with brake fluid and connect a small hose to first bleed screw. See *Bleeding Sequence*. Place other end in container partially filled with brake fluid. Have an assistant rapidly pump brake pedal until slight pressure is felt, then hold pedal depressed. Open bleed screw and allow fluid to drain. Close bleed screw before slowly releasing pedal. Repeat pedal action until fluid flows into container with no bubbles. Repeat at each bleed screw in turn.

REMOVAL & INSTALLATION

NOTE — In late 1975 a new "Type A" caliper was introduced to replace both previously used "Type M & S" calipers. All calipers are similar. The main difference is the disc pads. Because of clearance problems redesigned pads are used.

DISC PADS

NOTE — Mark pads and calipers before removal. If pads are to be reused, they must be installed in original location. If only one pad on front or rear needs replacing, all four pads must be replaced.

Removal — Raise and support vehicle and remove wheels. Remove retaining pin clips and using a punch, drive retaining pins out of caliper (toward center of vehicle). **NOTE** — Depress spreader spring if required. Using a suitable extractor (P86) pull pads from caliper.

CAUTION — If fluid level is too high in reservoir, overflow will result when pistons (during installation) are pushed back into calipers.

Installation (Except 914 Rear) — Push pistons back into caliper using suitable tool (P83), or wooden block. Remove anti-rotation locks (if equipped) and clean all parts with alcohol. Inspect all parts for damage or wear. Ensure piston 20° position is correct using suitable gauge (P84). Install remaining parts in reverse order of removal, replacing parts as necessary.

PORSCHÉ (Cont.)

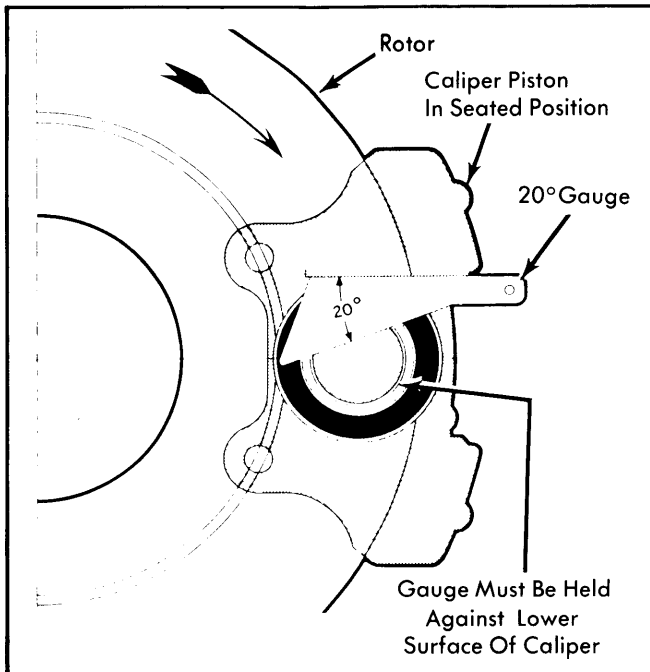


Fig. 2 Using a 20° Gauge to Properly Position Caliper Piston

Installation (914 Rear) — Push pistons back into caliper using suitable tool (P83) or wooden block. Remove cap screw on outer caliper half, loosen lock nut, and back off adjusting screw while maintaining a preload on piston with expander. Repeat procedure on inner caliper half, using an extension through hole in control arm. Insert disc pads into caliper and position with retaining pins. Adjust pads for .008" clearance on both sides of rotor. Tighten lock nut and install cap screw. Remove retaining pins, insert spreader spring, retaining pins, and pin clips.

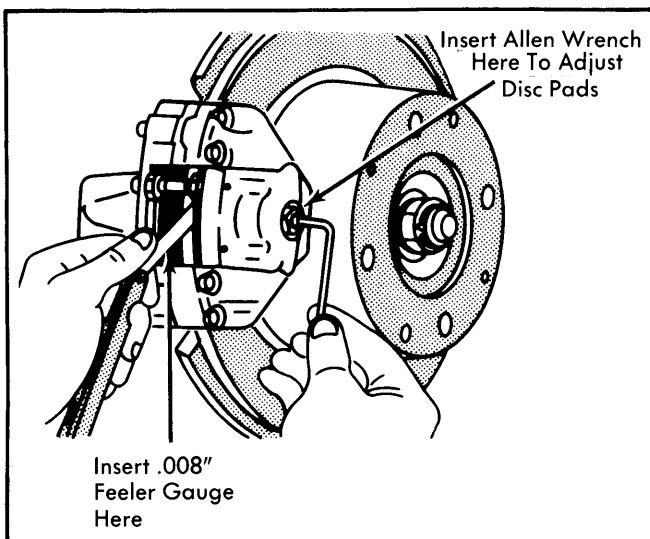


Fig. 3 Adjusting Rear Disc Brake Pads on 914 Models

BRAKE CALIPER

CAUTION — When any fluid fitting is disconnected, fluid will drain from reservoir through master cylinder and out open fitting. To avoid this, depress brake pedal far enough so piston cup will pass the compensating (resupply) port.

Removal (Front & Rear) — Raise and support vehicle, and remove wheels. Remove brake pads as previously outlined. Remove splash shield (if necessary), disconnect hydraulic line, and on 914 models disconnect parking brake cable from rear caliper. Remove caliper mounting bolts and remove caliper assembly.

Installation (Front & Rear) — To install, reverse removal procedure and note the following: Clean and inspect all parts for wear or damage and replace as necessary. Tighten all bolts and fittings to specifications and bleed complete brake system.

BRAKE ROTOR

Removal (Front) — Remove caliper assembly as previously outlined. Remove dust cap from wheel hub, loosen clamp lock screw, then remove clamp nut and thrust washer. Remove rotor and wheel bearings as a unit. On 911 models, mark rotor and hub for reassembly reference, remove attaching bolts and separate rotor from hub.

Removal (Rear) — Remove caliper assembly as previously outlined. Remove the two rotor attaching screws and pull rotor from hub. **NOTE** — If rotor cannot be removed by hand, insert two 8mm bolts into attaching screw holes and alternately tighten bolts to press rotor from hub.

Installation (Front & Rear) — To install, reverse removal procedure, bleed brakes and adjust front wheel bearing free play. See *Wheel Bearing Adjustment* in *WHEEL ALIGNMENT* Section.

PARKING BRAKE ASSEMBLY

Removal & Installation, 911 Models — Remove cotter pin, castle nut and washer from cable, then remove cable from brake assembly. Remove expander and springs and shoe retaining pins, then springs from upper shoes. Raise upper shoe, withdraw adjuster and spring. Remove shoe retainer from lower shoe and remove both shoes from vehicle. To install, reverse removal procedure.

BRAKE PRESSURE REGULATOR

Removal — Disconnect brake lines at pressure regulator. Remove bolts from regulator flange and take out unit.

Checking — Step down hard on the brake pedal while feeling the regulator body; note if piston in regulator is moving. When the brake pedal is released, a slight "knock" should be felt on regulator body.

Installation — To install, reverse removal procedure and bleed brake system.

NOTE — Brake pressure units can not be overhauled.

PORSCHE (Cont.)

MASTER CYLINDER

Removal — Raise and support vehicle and drain fluid from reservoir. Pull back on accelerator pedal to detach pedal from rod. Remove floor mat and floor board and withdraw boot from master cylinder. Remove underpanel, covering front axle, remove brake lines, electrical leads and reservoir tubes from cylinder and remove master cylinder from vehicle.

Installation — Reverse removal procedure and note the following: Be sure push rod is correctly installed and that clearance between push rod and piston is about .04" (1 mm). Use a sealing material on cylinder flange to prevent water leakage into drivers compartment. Bleed system as previously outlined.

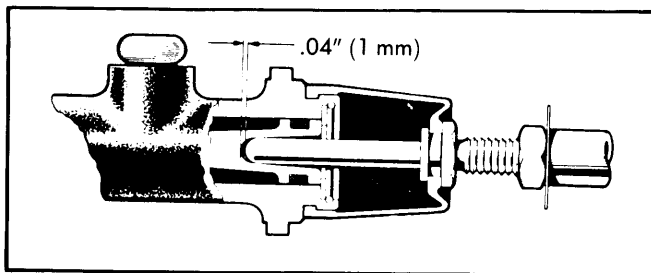


Fig. 4 Illustrating Push Rod-to-Master Cylinder Piston Clearance

OVERHAUL

BRAKE CALIPER

NOTE — Cylinders can only be overhauled one at a time, because with one piston removed air pressure is unattainable in second cylinder.

Disassembly — With pads and piston retaining plates removed, clamp caliper (by mounting flange) in vise. Remove dust cover retaining ring and dust cover. Install suitable piston

retaining tool (P83) to one piston and place a thin wood block between tool and piston to be removed. Apply air pressure to fluid inlet hole to remove piston. Remove cylinder to piston seal using a plastic or hard rubber tool.

Cleaning & Inspection — Clean all parts in alcohol or clean brake fluid. Check all parts for wear or damage and replace as necessary. If caliper piston or bore show any signs of wear or damage, complete caliper assembly must be replaced.

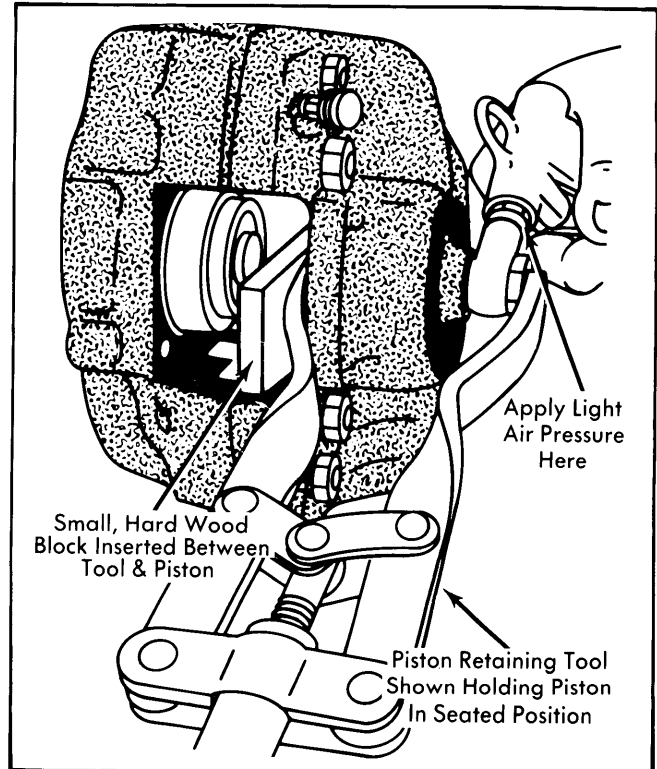


Fig. 5 Using Air Pressure to Remove Piston from Caliper Assembly

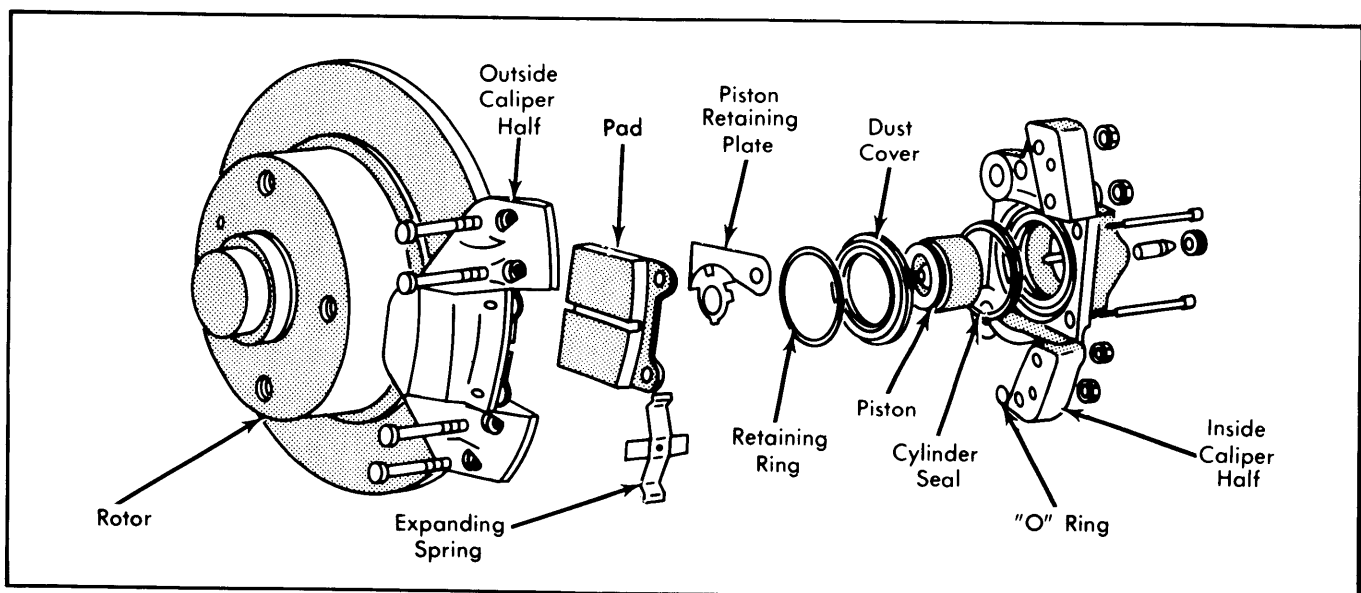


Fig. 6 Exploded View of 914 Front Disc Brake Assembly

PORSCHÉ (Cont.)

Separating Caliper Halves — Caliper halves should only be separated if "O" ring seals between caliper halves show signs of leaking. To separate, remove bolts attaching caliper halves, separate caliper and discard "O" ring seals. To reassemble, install new "O" ring seals and reassemble caliper using new bolts, spring washers and nuts. **NOTE** — Install shorter bolts in outside holes. Tighten two inside bolts first and then tighten outside bolts. Bolts must be tightened in two stages; first to 50% of torque value, then to 100% of torque value.

Reassembly — Reverse disassembly procedure and note the following: Use new rubber components, dust cover retaining ring and pad retaining plates. Apply brake cylinder paste to piston, and cylinder seal. Assure piston is straight with cylinder by using a suitable piston installing clamp. Check 20° position of piston with suitable gauge and correct using piston rotating pliers (if required).

MASTER CYLINDER

Disassembly — Push in on primary piston to remove lock ring, then remove stop plate and primary piston assembly. Remove piston stop screw, and using compressed air, remove secondary piston. Remove secondary piston support washer, spring seat and return spring. To remove hydraulic warning system assembly, remove sending unit and retaining bolt from master cylinder, and using compressed air, remove pistons and springs.

Cleaning & Inspection — Clean all parts with alcohol. Check all pistons and cylinders for out-of-round, corrosion or damage. Inspect all other parts for scoring, excessive wear, corrosion or other damage.

Reassembly — To install reverse disassembly procedure using illustration as a reference and note the following: Lightly coat all parts with a suitable brake cylinder paste before installation. Use new "O" ring seals on warning system sending unit and retaining bolt. Tighten all brake lines and fittings and bleed complete brake system.

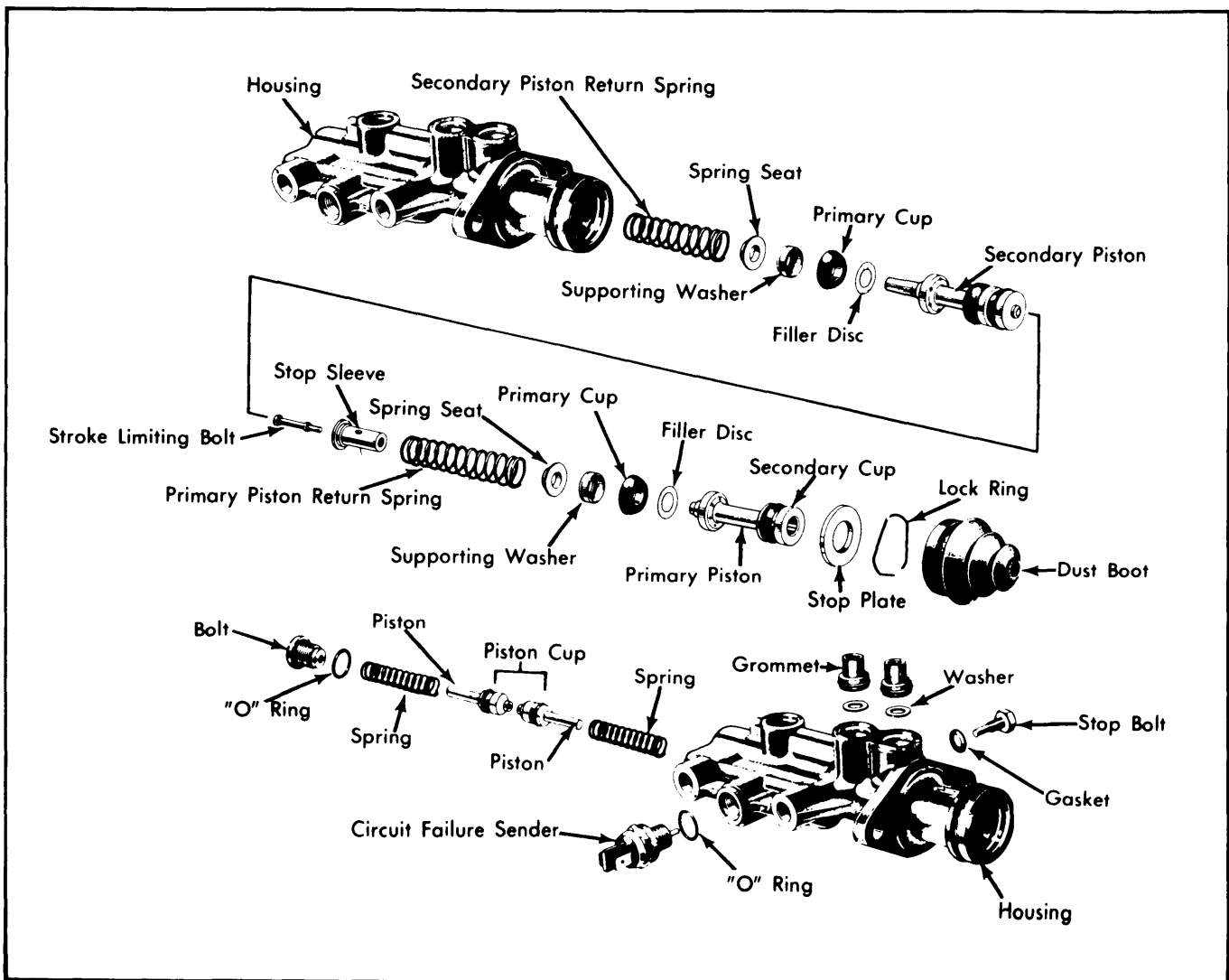


Fig. 7 Master Cylinder Housing, Pistons, and Internal Components

PORSCHE (Cont.)

DISC BRAKE ROTOR SPECIFICATIONS						
Application	Disc Diameter In. (mm)	Lateral Runout In. (mm)	Parallelism In. (mm)	Original Thickness In. (mm)	Minimum Refinish Thickness In. (mm)	Discard Thickness In. (mm)
911 Models						
Front	11.122 (282.5)	.008 (.2)	.0012 (.03)	.787 (20)	.732 (18.6)	.709 (18)
Rear	11.417 (290)	.008 (.2)	.0012 (.03)	.787 (20)	.732 (18.6)	.709 (18)
912/E						
Front	11.10 (282)	.008 (.2)	.0012 (.03)	.500 (12.7)	.453 (11.5)
Rear	11.4 (290)	.008 (.2)	.0012 (.03)	.413 (10.5)	.374 (9.5)	.354 (9.0)
914 Models						
Front	11.063 (281)	.008 (.2)	.0008 (.02)	.433 (11)	.394 (10)	.374 (9.5)
Rear	11.102 (282)	.008 (.2)	.0008 (.02)	.374 (9.5)	.350 (8.9)	.335 (8.5)

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (mkg)
Master Cylinder Mounting Bolts.....	18 (2.5)
Brake Line Connections.....	11 (1.5)
Caliper Mounting Bolts	
911 (Front & Rear).....	50 (7.0)
914 (Front).....	61 (8.5)
914 (Rear).....	50 (7.0)
Caliper Housing Bolts.....	① 16 (2.2)
Rotor-to-Hub.....	17 (2.3)
Brake Carrier Bolts.....	34 (4.7)
Splash Shield Bolts.....	18 (2.5)

① — Tighten 911 front caliper housing bolts to 25 ft. lbs. (3.4 mkg).