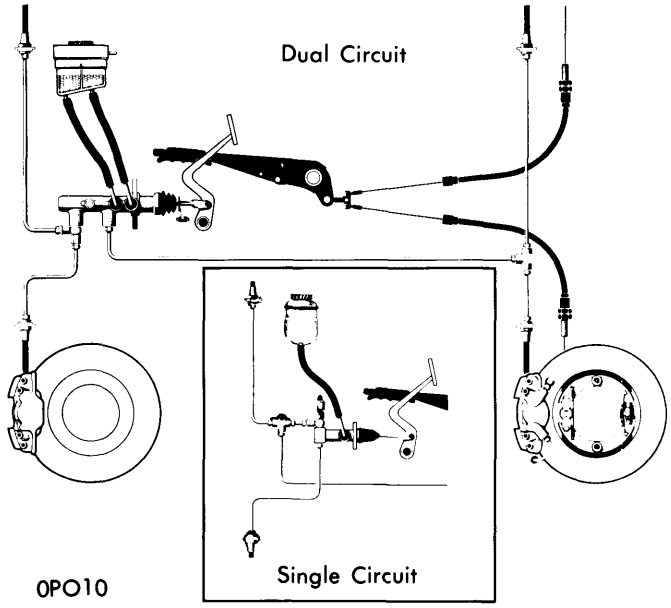
1965-73 PORSCHE DISC BRAKES

356 C (1965)
912 (1966-69)
911 (1966-73)
914 (1970-73)
914/6 (1970-71)

DESCRIPTION

All systems are hydraulically operated four wheel disc brakes utilizing a single circuit master cylinder through 1967. In 1968, dual circuit (tandem) master cylinders, with a shuttle piston to activate the warning light, were fitted to all models. *NOTE — On 1971 and later models the warning light switch device was changed to activate on low fluid level by means of a float in the fluid reservoir.* Calipers on all models use two pads with one piston per pad. Parking brakes on all models, except 914 and 914/6, are cable controlled, expanding shoe type on rear wheels. 914 and 914/6 use cable controlled levers to activate the rear caliper pistons and pads. To maintain proportional brake application pressure under all braking conditions, the 914 and 914/6 use a pressure regulator in the rear circuit brake line.



DISC BRAKE SYSTEMS (TYPICAL)

ADJUSTMENT

DISC BRAKES

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

PARKING BRAKE

All (Exc. 914 & 914/6) — Raise and support vehicle and remove rear wheels. Push pistons and pads into caliper, so rotor will turn freely. Release brake lever. Through hole in drum, turn adjusting star wheels until pads begin to drag, but rotor can still be turned by hand. Repeat this adjustment on other wheel. *NOTE — All pads must be tightened equally.* Raise cover and brake lever boot from tunnel and check position of equalizer. Equalizer should be at right angle to cable and adjusting nuts should lay against equalizer without play. Adjust cable nuts to correctly position equalizer. Adjust forward cable to remove play from brake lever. Back off each adjuster four or five teeth or until rotor turns free. Parking brakes should be locked when lever is applied 4-5 notches. Pump brake pedal to reset pistons and pads. If necessary fill fluid reservoir.

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 apparent air bubbles. Repeat at each bleed screw in turn.

REMOVAL & INSTALLATION

BRAKE PAD REPLACEMENT

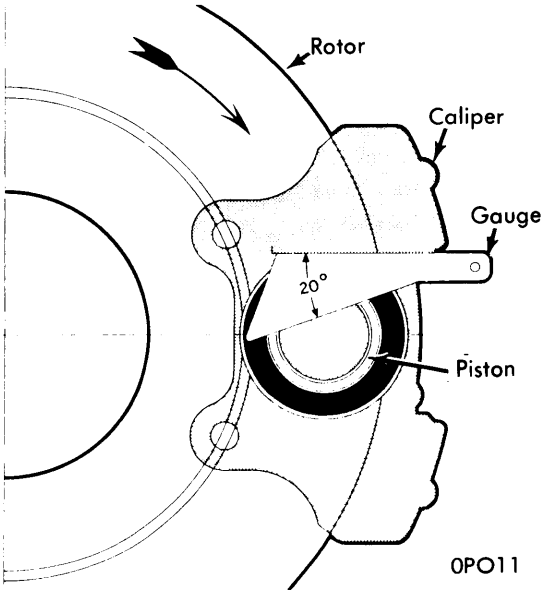
NOTE — Mark pads and calipers before removal. If pads are to be reused, they must be installed in original location. If only one pad on front or rear needs replacing, all four pads must be replaced.

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.

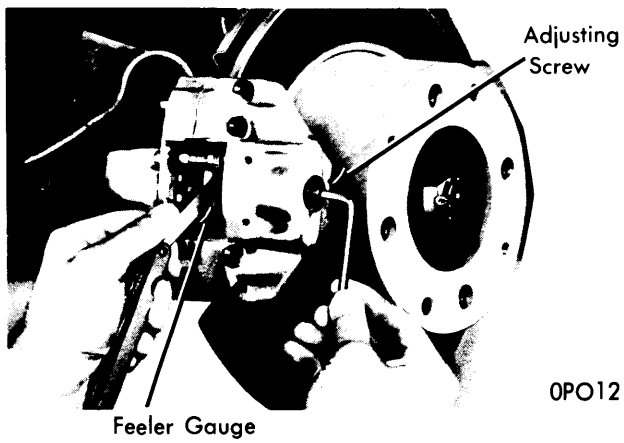
1965-73 PORSCHE DISC BRAKES (Cont.)

Installation (Exc. 914 & 914/6 Rear) – Push pistons back into caliper using a suitable tool (P83) or wood block. Remove anti-rotation locks (if equipped) and clean all parts with alcohol. Inspect all parts for damage or wear. If pads are to be reused, assure thickness is adequate (see specifications). Assure piston 20° position is correct using a suitable gauge (P84). *NOTE – On 1969 and later 911 E & S models (front only), type "S" light alloy caliper requires piston gauge P84B .* To complete installation, reverse removal procedure using new parts as required.



CALIPER & PISTON 20° POSITION

Installation (914 & 914/6 Rear) – Push pistons back into caliper using a suitable tool (P83) or wood block. Remove cap screw on outer caliper half, loosen lock nut and back off adjusting screw while maintaining a preload on pistons with expander. Repeat this on inner caliper half using an extension through hole in control arm. *NOTE – On 914/6, remove shock absorber and raise control arm for accessability to adjusting screw.* Insert pads into caliper and position with retaining pins. Adjust pads for .008" (.2 mm) clearance on both sides of rotor. Tighten lock nut and install cap screw. Remove retaining pins, insert spreader spring, retaining pins and pin clips.



ADJUSTING BRAKE PADS ON 914 & 914/6

Rotor Deflection Check – Before removing caliper or rotor, install a suitable dial indicator to a fixed suspension point, or within caliper recesses. Place indicator pointer one-half inch in from rotor edge. Turn rotor slowly by hand and note dial reading. If rotor deflection is greater than .008" (.2 mm) replace rotor at time of reassembly.

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 & Installation (Front & Rear) – Raise and support vehicle, remove wheel, and remove brake pads as previously outlined. Perform rotor deflection check and proceed as follows: Remove splash shield (if required), detach brake line, and on 914 and 914/6 detach parking brake cable from caliper and remove caliper. *CAUTION – Caliper must be at room temperature before removing.* To install, reverse removal procedure using new parts as required and replacing mounting bolt lock plates (if equipped).

BRAKE ROTOR

Removal (Front) – Remove caliper as previously outlined, then splash shield, if not already removed. Remove cotter pin from speedometer cable (if required), remove dust cap, loosen clamp nut lock screw, remove clamp nut, washer and outer bearing. Remove rotor and if required, separate rotor from hub (mark hub and rotor before separating). *NOTE – If rotor is stuck use a suitable puller for removal, do not beat on rotor with hammer or mallet.*

Removal (Rear) – Remove caliper as previously outlined, then splash shield, if not already removed. Remove screws securing rotor-to-hub and remove rotor.

Installation (Front & Rear) – Reverse removal procedure using new parts as required.

PARKING BRAKE ASSEMBLY (EXC. 914 & 914/6)

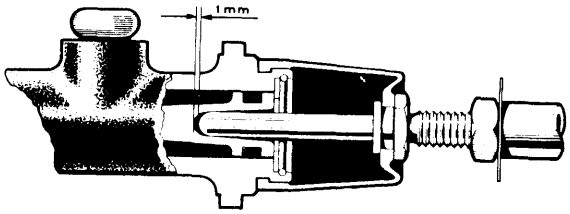
Removal & Installation – Remove cotter pin, castle nut and washer from cable and remove cable from brake assembly. Remove expander and springs and shoe retaining pins and springs from upper shoe. Raise upper shoe and withdraw adjuster and spring. Remove shoe retainer from lower shoe and remove both shoes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

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.

1965-73 PORSCHE DISC BRAKES (Cont.)



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PUSH ROD-TO-PISTON CLEARANCE

OVERHAUL

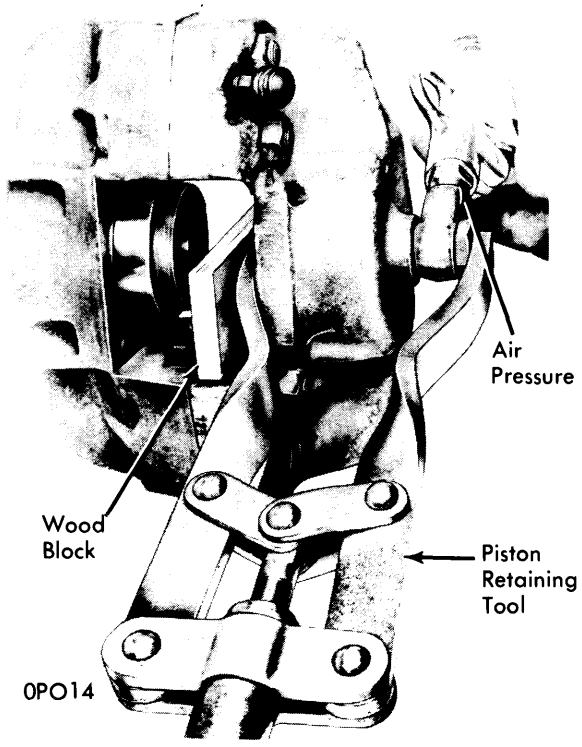
BRAKE CALIPER

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 with alcohol. Check piston and cylinder for out-of-round, corrosion or damage. Repair or replace (as required) caliper as an assembly. Do not repair only one piston and cylinder.

Separating Caliper Halves – Caliper halves should only be separated if leaking is apparent. Remove bolts, separate halves, replace "O" rings and reassemble using new bolts, nuts, and washers with short bolts in outside holes. Bolt tightening sequence: Inside left, inside right, outside left, outside right, first to 50% of torque value, then to 100% of torque value.



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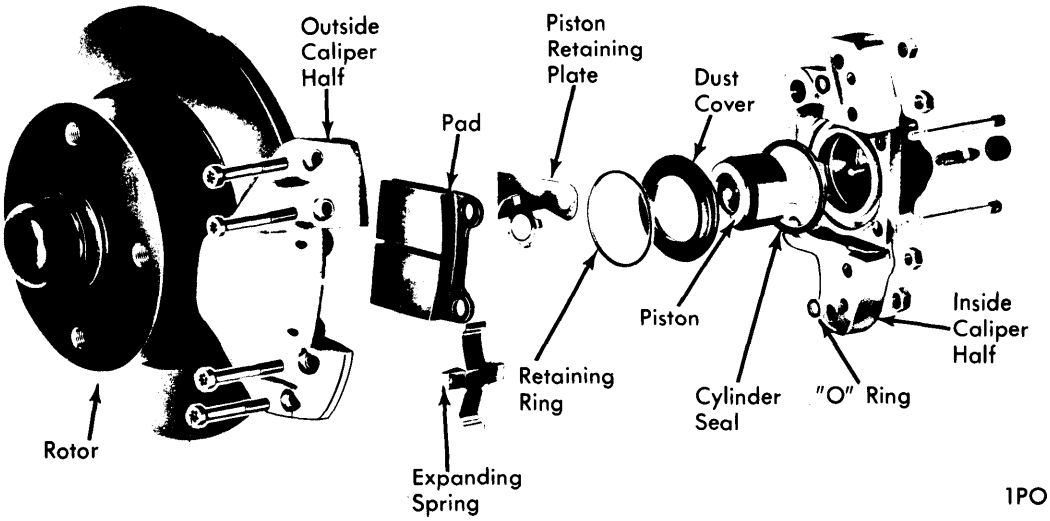
REMOVING PISTON FROM CALIPER

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).



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CALIPER ASSEMBLY (TYPICAL)

1965-73 PORSCHE DISC BRAKES (Cont.)

MASTER CYLINDER

Disassembly (Single Circuit Type) – Remove dust boot, lock ring and stop washer. Tap cylinder opening on a wood surface, or using low air pressure applied to fluid outlet port (with all other openings plugged), force piston, cups, springs and check valve out of cylinder. Remove stop light switch and sealing plug.

Disassembly (Dual Circuit Type) – Remove front brake circuit piston stop screw. Remove dust boot, stop ring and stop washer. Tap cylinder opening on a wood surface, or using low air pressure applied at front brake circuit fluid outlet port, with all other openings plugged, force both piston assemblies and springs out of cylinder. Remove all externally mounted fittings and switches from cylinder housing.

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 (Single Circuit Type) – Install light switch and sealing plug. Insert into cylinder: Check valve, spring, cup, washer, piston with seal installed, piston stop washer and lock ring. Install dust boot with vent hole downward.

Disassembly (Shuttle Piston Assembly) – With warning light switch and end plug removed, tap cylinder on wood surface to remove springs, pistons and cups.

Reassembly (Shuttle Piston Assembly) – Assemble pistons, springs and cups and install them into cylinder with springs at opposite ends of cylinder. Install plug and seal.

Reassembly (Dual Circuit Type) – 1) Install cups on pistons. Place cup washer, primary cup, support washer, spring retainer and spring onto secondary piston and insert this assembly vertically (cylinder opening held downward) into cylinder.

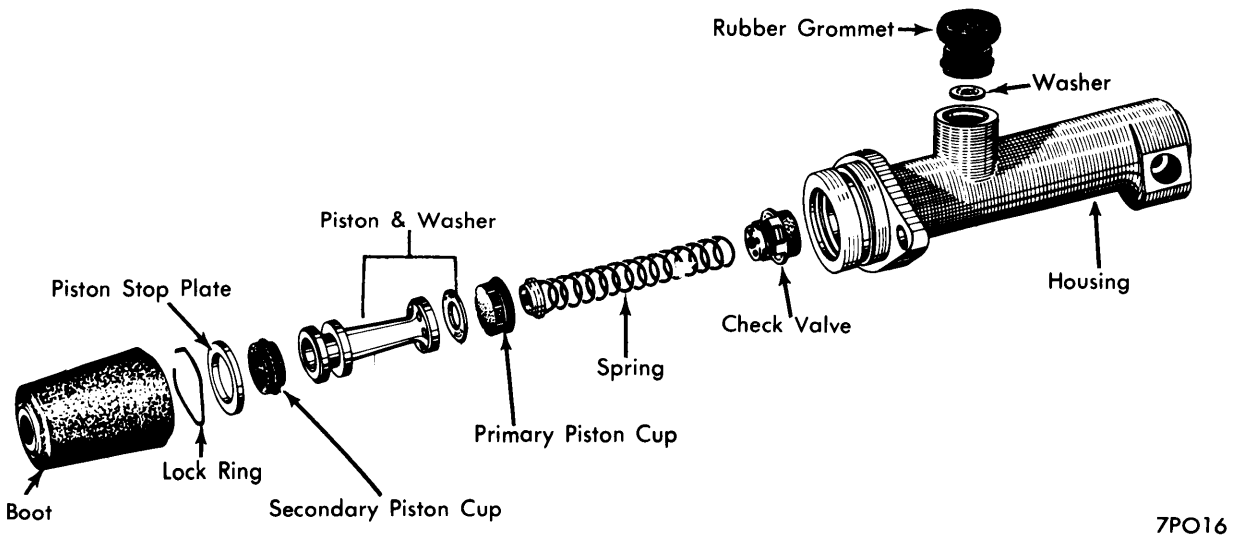
2) Install stop screw, pushing piston assembly forward as required to clear stop screw hole.

3) Assemble cup washer, primary cup, support washer, spring retainer, spring and stop sleeve onto primary piston and secure this assembly with stroke limiting screw. Install primary piston assembly into cylinder and secure with stop washer and lock ring.

4) Install and tighten all externally mounted fittings and switches.

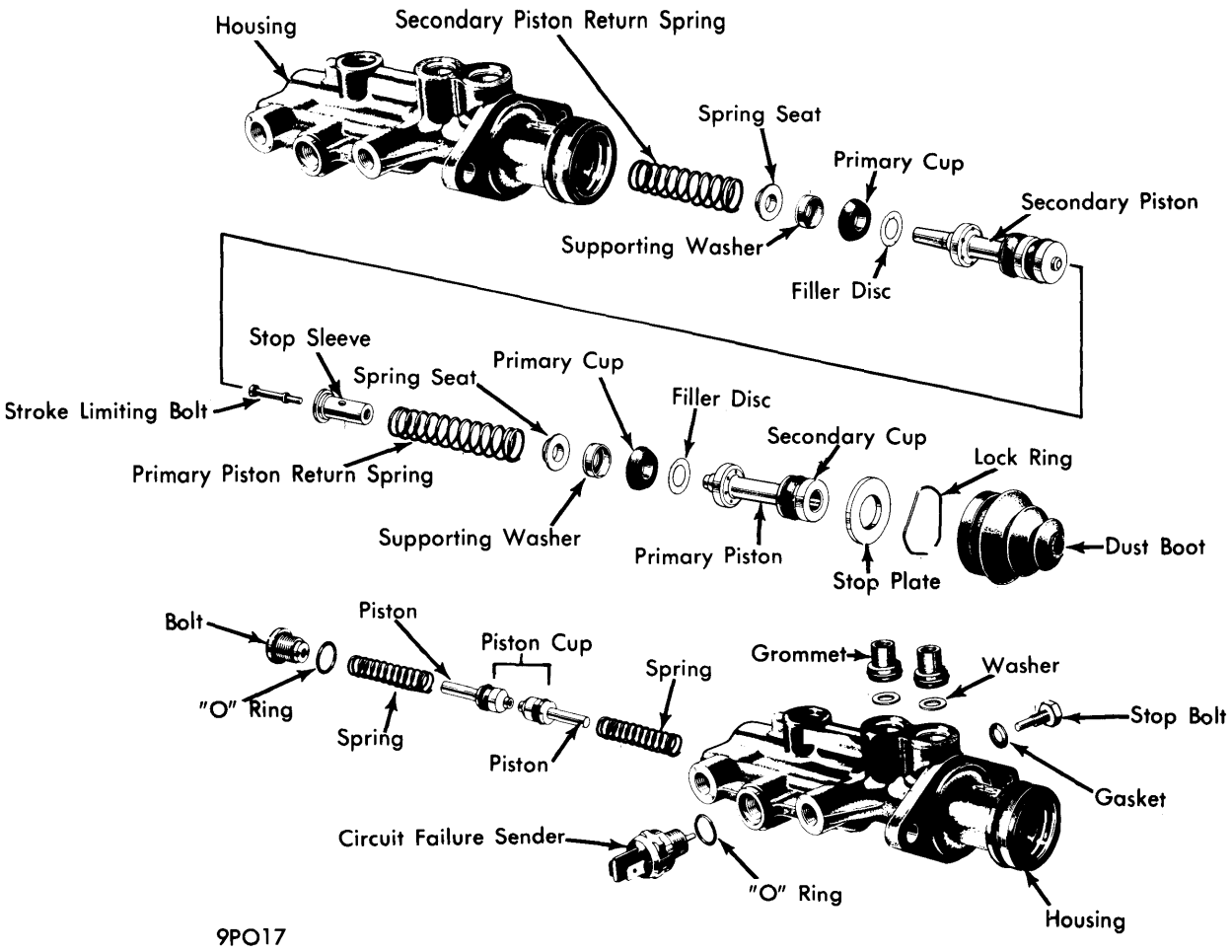
TIGHTENING SPECIFICATIONS

Application	Ft. Lbs. (mkg)
Master Cylinder Mounting Nuts	18 (2.4)
Underpanel Attaching Nuts	47 (6.5)
Underpanel Attaching Bolts	33 (4.5)
Rotor-to-Hub	17 (2.3)
Brake Carrier Bolts	33 (4.5)
Splash Shield Attaching Bolts	18 (2.4)
Caliper Mounting Bolts	
Front	51 (7.0)
Rear	43 (5.9)
Axle End Castle Nuts	235 (32.4)
Caliper Halfs (Allen Head Bolts)	
Front	26 (3.6)
Rear	14 (1.9)
Brake Line Fittings	14 (1.9)
Wheel Lug Nuts	94 (12.9)



SINGLE CIRCUIT MASTER CYLINDER

1965-73 PORSCHE DISC BRAKES (Cont.)



DUAL CIRCUIT MASTER CYLINDER WITH SHUTTLE PISTON ASSEMBLY

BRAKE SYSTEM SPECIFICATIONS				
Application	Drum Diam. In. (mm)	Wheel Cylinder Diameter		Master Cylinder Diameter In. (mm)
		Front In. (mm)	Rear In. (mm)	
All Models (Exc. 914)				
1965-68	.....	1.89 (48.0)	②1.38 (35.0)	.75 (19.0)
1969-73	.....	1.89 (48.0)	1.49 (38.0)	①.75 (19.0)
914 (All)	.....	1.70 (42.0)	1.30 (33.0)	.69 (17.5)
914/6 (All)	.....	1.90 (48.0)	1.50 (38.0)	.75 (19.0)

① – Model 911 (1969) – .815" (20.6 mm).
② – Model 911 (1966-68) – 1.49" (38.0 mm).

1965-73 PORSCHE DISC BRAKES (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)
356 C (1965)						
Front	.....	.008	.0012	.40	.37	③
	.....	(.20)	(.03)	(10.1)	(9.4)	.....
Rear	.....	.008	.0012	.38	.32	③
	.....	(.20)	(.03)	(9.7)	(8.1)	.....
911 & 912 (Before 1973)						
Solid Rotors						
Front	.....	.008	.0012	.50	.43	③
	.....	(.20)	(.03)	(12.7)	(11.0)	.....
Rear	.....	.008	.0012	①.41	②.35	③
	.....	(.20)	(.03)	(10.5)	(9.0)	.....
Vented Rotors						
Front & Rear	.....	.008	.0012	.80	.70	③
	.....	(.20)	(.03)	(20.3)	(17.7)	.....
911 (1973)						
Solid Rotors						
Front	.....	.008	.0012	.50	.43	.41
	.....	(.20)	(.03)	(12.7)	(11.0)	(10.4)
Rear	.....	.008	.0012	.39	.31	.30
	.....	(.20)	(.03)	(10.0)	(7.9)	(7.6)
Vented Rotors						
Front & Rear	.....	.008	.0012	.79	.70	③
	.....	(.20)	(.03)	(20.1)	(17.7)	.....
914 (Before 1973)						
Front	.....	.008	.0008	.43	.37	③
	.....	(.20)	(.02)	(11.0)	(9.4)	.....
Rear	.....	.008	.0008	.37	.33	③
	.....	(.20)	(.02)	(9.4)	(8.3)	.....
914 (1973)						
Front & Rear	.....	.008	.0008	.37	.35	.33
	.....	(.20)	(.02)	(9.4)	(9.0)	(8.3)
914/6 (All)						
Front	.....	.008	.0008	.80	.70	③
	.....	(.20)	(.02)	(20.3)	(18.0)	.....

① – Early Models – .39" (10.0 mm).
② – Early Models – .33" (8.3 mm).
③ – Smaller than minimum refinish thickness.