## 1963-73 VOLKSWAGEN

**All Models (1963-73)**

### DESCRIPTION

All brake systems are hydraulically operated with mechanical parking brakes on the rear wheels. On Type 2 vehicles, front drum brakes are two leading shoe type and all other drum brake units are leading-trailing shoe type. Disc brakes are two piston two pad type. Single circuit master cylinders used with disc brakes utilize a pressure relief port, in piston head, so residual line pressure will be relieved after application of the brakes. *NOTE — Such cylinders can be identified by a blue sticker.* Dual circuit master cylinders for disc brakes do not use residual pressure valves (at outlet ports), so line pressure will be relieved. Parking brakes for all models are hand operated, cable and lever actuated, expanding shoe type. On 1968-69 models, the brake warning light is activated by a shuttle piston acting on unequal pressure. 1970 and later models use two pole stop light switches which also activate the warning light in case of partial brake system failure. All Type 4 and Type 2 with disc brakes utilize a pressure regulator in line with rear brakes so pressure is proportional during all braking conditions.

### ADJUSTMENT

#### DISC BRAKES

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

#### DRUM BRAKES

Adjustment of all Type 1, 3 and 4 brakes and 1971 and later Type 2 rear brakes is through hole in backing plate. On all Type 2 front brakes and early Type 2 rear brakes, adjustment is through hole in drum. *NOTE — Type 2 front drum adjusters are on opposite side of backing plate.* Turn adjuster until slight drag is apparent, then back off adjuster three or four teeth until wheel turns freely.

#### PARKING BRAKE

Loosen cable adjusting nuts (at base of hand lever) and adjust brake shoes as described above. Adjust cable length so rear wheels can be turned with lever applied two or three notches, but are locked when lever is applied four or five notches.

#### BLEEDING SYSTEM

**Bleeding Sequence** — Start bleeding with wheel that is farthest from the master cylinder and work up to the cylinder closest to master cylinder. On dual circuit systems, bleed front wheels first.

**Pressure Bleeding Procedure** — Attach bleeder connector cap to reservoir and apply 43 psi (3 kg/sq. cm) to system. While bleeding each cylinder, have a tube connected to bleeder with the other end in a container partially filled with brake fluid. Open each bleed screw in turn and allow fluid to flow into container until fluid flows with no apparent air bubbles. *CAUTION — Do not allow reservoir to become dry, as air will enter system and bleeding will have to be repeated.*

### REMOVAL & INSTALLATION

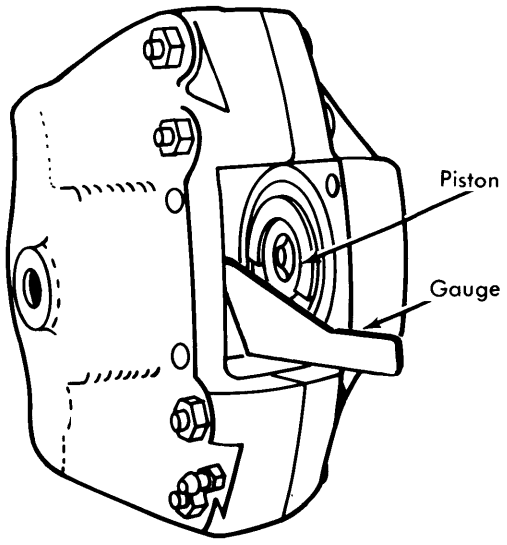
**Manual Bleeding Procedure** — This method of bleeding is performed the same as pressure bleeding except a second mechanic must pump the brake pedal to supply the pressure required. Before opening the bleed screw depress brake pedal several times (with hose in fluid container) and then open bleed screw. Close bleed screw while pedal is depressed. Repeat this procedure until fluid flows with no apparent air bubbles. Repeat the entire procedure for each wheel in sequence.

#### LINING REPLACEMENT (DISC BRAKES)

*NOTE — When pads are to be reused, mark pads for reassembly. Pads* **must** *be reused in original locations. If one or more pads require replacement, all four pads must be replaced.*

**Removal** — Raise and support vehicle and remove wheel. Using a punch, drive out pad retaining pins and remove spreader springs. Using a suitable extractor, remove pads from caliper. Inspect pads for wear or damage and replace if worn beyond specified limits.

**Installation** — Using a suitable piston retaining device, push pistons into their end positions. *NOTE — Remove some fluid from reservoir before pushing pistons back into caliper. Over flowing from reservoir may result if fluid level is too high.* Remove piston retaining plates and clean all parts with alcohol. Inspect all parts for damage. On Type 1 and 3, check position of piston, using a suitable piston 20 degree setting gauge, assuring gauge is held against lower guide surface in brake caliper. *NOTE — On Type 2, piston is automatically set by the piston retaining plate.* Install piston retaining plate (replace plate if damaged or corroded), insert pads and **new** spreader spring, using a hammer install retaining pins into caliper (damaged or corroded pins must be replaced). Depress brake pedal several times to seat pistons and pads.

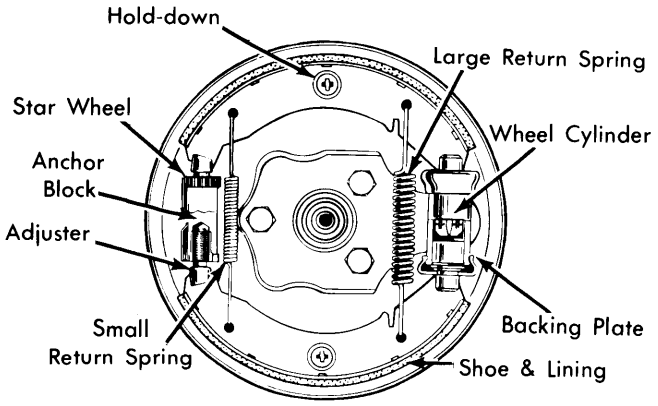



**20° PISTON POSITIONING & GAUGE**

## 1963-73 VOLKSWAGEN (Cont.)

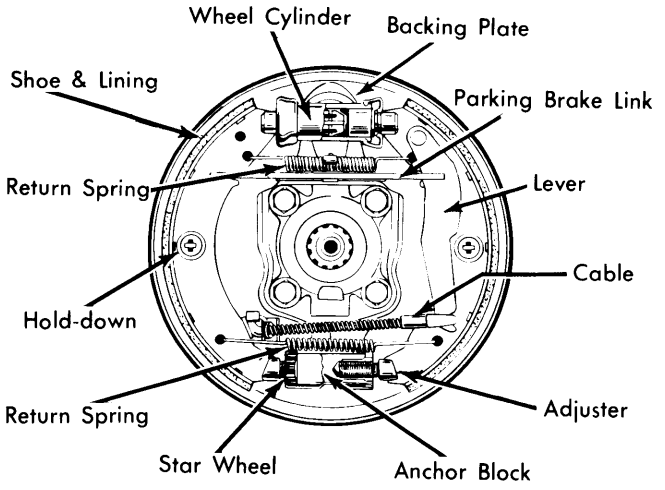
### LINING REPLACEMENT (DRUM BRAKES)

**Removal (Front)** – With drum removed *(see Brake Drum Removal & Installation)*, remove retaining springs and pins (except Type 2), detach return springs (All), pry shoes out of adjusting screws, (Type 2), and remove shoes. Inspect shoes for wear or damage and replace if worn beyond specified limits.




**FRONT DRUM BRAKE (EXC. TYPE 2) TYPICAL**

**Removal (Rear)** – With drum removed *(see Brake Drum Removal & Installation)*, remove shoe retaining springs and pins, detach lower return spring and parking brake cable from lever. Remove shoes, connecting link, upper return spring and clip. Detach brake lever from rear shoe. Inspect shoes for wear or damage and replace if worn beyond specified limits.




**REAR DRUM BRAKE (TYPICAL)**

**Installation (All)** – Reverse removal procedure and note the following: Make sure brake shoes are correctly positioned in adjusting screws as follows; Type 1, 2 (after 1970), 3 and 4, angled brake shoe ends in screws; Type 2 (before 1970), straight brake shoe ends in screws.

*NOTE – On vehicles with brake servo. Volkswagon recommends only Textar (or equivalent) brake linings be installed on front brakes, and Textar or Energit (or equivalent) linings be installed on rear brakes.*

### BRAKE CALIPER

**Removal** – With wheel removed, perform rotor-to-pad clearance check. See *Rotor To Pad Clearance Check*. Remove pads and retaining plates and measure rotor deflection. See *Rotor Deflection (Runout) Check*. With caliper at room temperature, remove and plug brake line. Brake line does not need to be disconnected if caliper is not being removed from vehicle. Bend back lock tabs on mounting bolts at steering knuckle. Remove mounting bolts and separate caliper from rotor and steering knuckle. *CAUTION – If brake line was not disconnected, do not let caliper hang from line.*

**Installtion** – To install brake caliper, reverse removal procedure. Install new lock plates and mounting bolts.

### ROTOR TO PAD CLEARANCE CHECK

Measure clearance between disc brake pads and rotor using a feeler gauge. Clearance on all models should be .002"-.008" (.05-.20 mm). Clearance on Type 2 and 4 models depends on piston movement and elasticity of cylinder to piston seal. Clearance on Type 3 models should be approximately same clearance, but these brake assemblies incorporate and automatic adjuster and rotor deflection compensator.

### ROTOR DEFLECTION (RUNOUT) CHECK

Before checking rotor deflection, check wheel bearing adustment. See *Wheel Bearing Adjustment in WHEEL ALIGNMENT Section*. Using a suitable dial indicator clamped on a fixed suspension point, or within caliper recesses, place indicator pointer one-half inch from rotor edge. Turn rotor slowly by hand and note dial reading. Replace rotor if reading is greater than specified rotor deflection.

### BRAKE ROTOR (DISC)

**Removal (Type 2)** – Remove wheel, caliper (as previously outlined), allen head screws securing rotor to hub and remove rotor. *NOTE – To remove a stuck rotor, evenly thread three bolts into holes in rotor-to-hub flange.*

**Removal (All Others)** – Remove wheel, caliper (as previously outlined), cotter pin (or C-washer) from speedometer cable (if required), dust cap, clamp nut and rotor with wheel bearings.

**Installation (All)** – Reverse removal procedure, using a new rotor, if original rotor does not meet all necessary specifications.

### BRAKE DRUM

**Removal (Front)** – Raise and support vehicle. Remove wheel, and if required, cotter pin (or C-washer) from speedometer cable, and dust cap. Bend up locking plate tabs (if required) then remove double nuts or clamp nut and outer wheel bearing. Back off adjusters (if required) and remove brake drum.

**Installation (Front)** – Reverse removal procedure, assuring wheel bearings are properly lubricated and adjusted, then adjust brakes as previously outlined.

**Removal (Rear)** – *CAUTION – Before raising vehicle, remove cotter pin and loosen (do not remove) slotted nut on end of axle.* Raise and support vehicle. Remove slotted nut and drum. If drum and/or hub is stuck, back off adjusters and if necessary use a suitable puller to remove drum and/or hub.

## 1963-73 VOLKSWAGEN (Cont.)

**Installation (Rear)** – Reverse removal procedure and note the following: Clean and lightly grease axle splines. On Type 4 hub, turn hub slightly while pushing in. Torque slotted nut (or hub bolt) to specification and adjust brakes as previously outlined. *NOTE – Lower vehicle before tightening slotted nut (or hub bolt).*

### MASTER CYLINDER

*NOTE – Removal and installation of all master cylinders is basically the same. The following variations may apply: Location of cylinder, removal of a wheel for accessability, the number of fluid connections, and the number of electrical connections.*

**Removal** – Drain or syphon fluid from reservoir(s). Raise and support vehicle and remove cover plate (if required). Disconnect reservoir and/or tubes and brake lines. *CAUTION – Do not allow brake fluid to spill from tubes or lines.* Remove electrical connections, pushrod to brake pedal connection, master cylinder retaining bolts and master cylinder. *NOTE – If spacers are used on attaching bolts, do not allow spacers to drop into pedal assembly recess.*

**Installation** – Reverse removal procedure and note the following: Reinstall spacers, moisten sealing plugs with brake fluid, and be sure dust boot is correctly installed with vent hole downward.

### BRAKE BOOSTER (SERVO) (1968 & LATER TYPE 2 ONLY)

**Removal & Installation** – Remove master cylinder from booster as previously outlined. Remove hoses and cover plate and back off pushrod lock nut at booster end. Disconnect pushrod from brake pedal, pull rod to one side and unscrew rod from booster. Remove booster from bracket and pull booster out and back. To install, reverse removal procedure.

## OVERHAUL

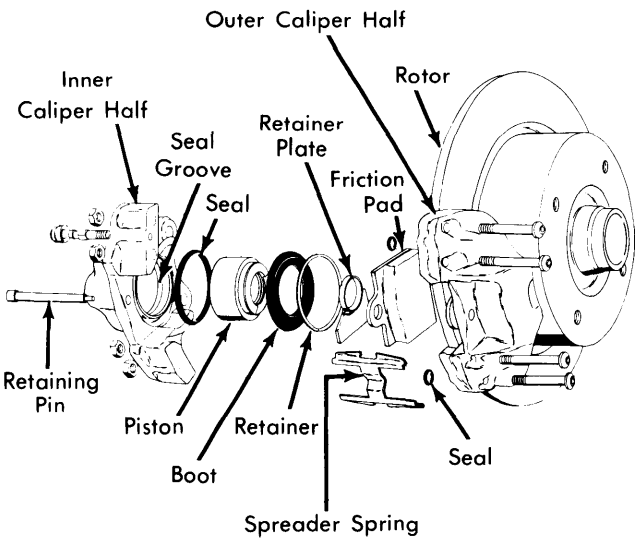
### BRAKE CALIPER

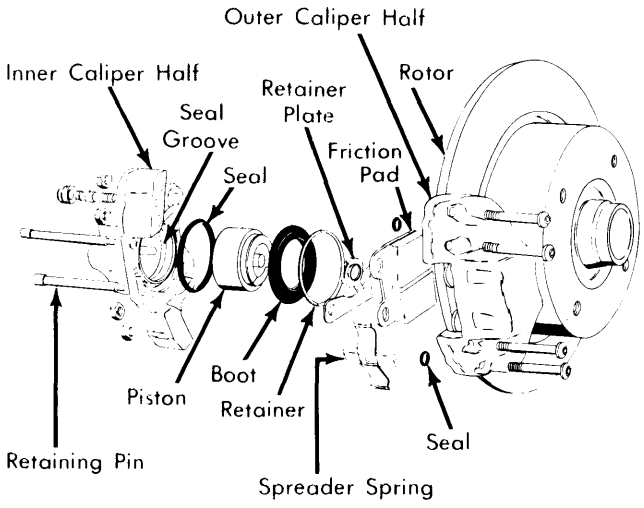
*NOTE – Cylinders can only be overhauled one at a time, because, with one piston removed air pressure is unattainable in second cylinder.*

**Disassembly** – With pads and piston retaining plates removed, clamp caliper (mounting flange) in vise. Remove seal spring ring (ring not used on Type 2) and using a plastic or hard rubber rod remove seal. Install suitable piston retaining tool to one piston and place a thin rubber or 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 rod.

**Cleaning & Inspection** – Clean all parts with brake fluid or 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 reassembly using new bolts with short bolts in outside holes. Bolt tightening sequence: Inside left, inside right, outside left, outside right, first to 7 ft. lbs. then to 25 ft. lbs. (Type 2), 14 ft. lbs. (All Others).




**DISC BRAKE ASSEMBLIES**

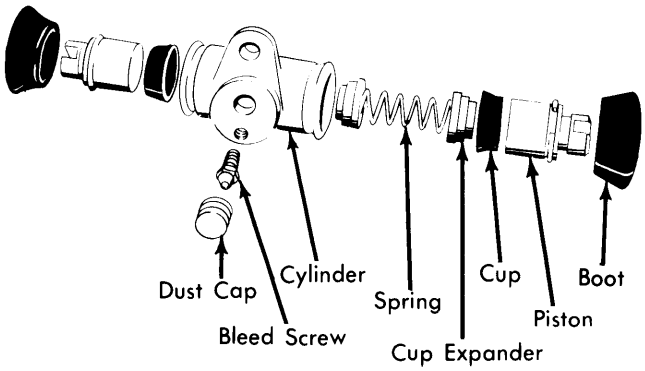
**Reassembly** – Reverse disassembly procedure and note the following: Use new rubber components, seal spring ring and pad retaining plates. Apply brake cylinder paste to piston, and cylinder seal. Assure piston is straight with cylinder by using a suitable piston installing clamp. Check 20° position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

### WHEEL CYLINDER (DRUM BRAKE)

**Disassembly** – As required, remove dust boot(s), piston(s), expander spring and cups. On Type 2, remove adjuster assembly.

**Cleaning & Inspection** – Clean all parts with brake fluid or alcohol. Check piston and cylinder for out-of-round, corrosion or damage.

## 1963-73 VOLKSWAGEN (Cont.)

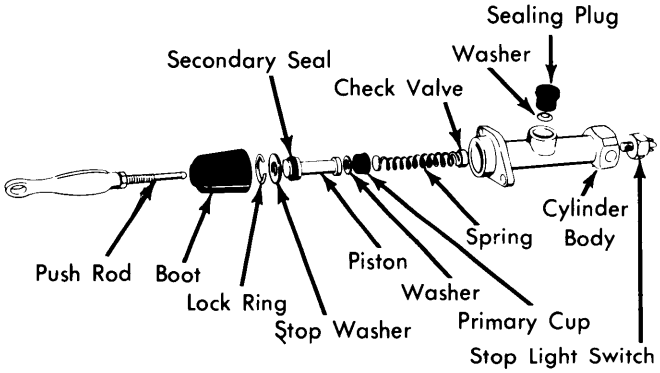



**WHEEL CYLINDER ASSEMBLY (EXC. TYPE 2) TYPICAL**

**Reassembly** – Reverse disassembly procedure using new rubber components and replacing piston(s) and spring as required. Use brake cylinder paste on pistons and cups.

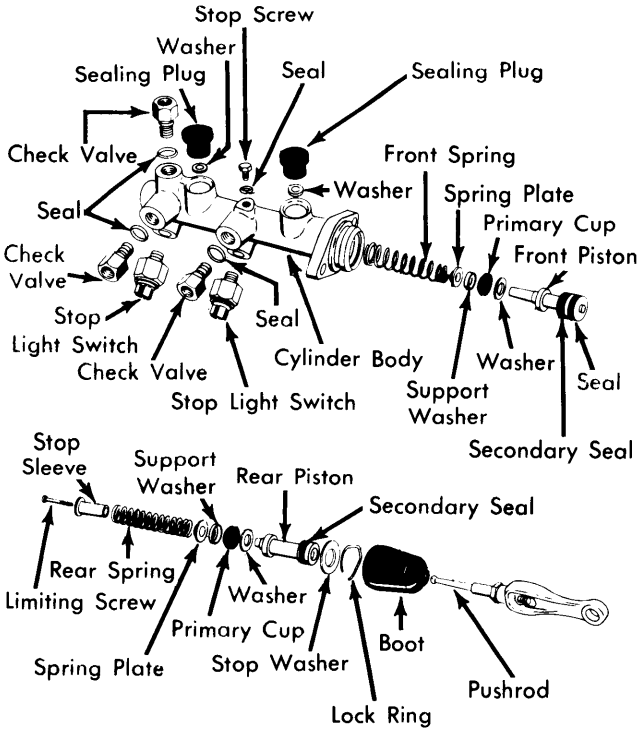
### MASTER CYLINDER

**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 cut of cylinder. Remove stop light switch, inlet elbow and/or sealing plug.




**SINGLE CIRCUIT MASTER CYLINDER (TYPICAL)**

**Disassembly (Dual Circuit Type)** – Remove front brake circuit piston stop screw. On Type 2 with booster, remove circlip and stop washer. On all others, 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. *NOTE angle and location of fluid inlet elbows.*




**DUAL CIRCUIT MASTER CYLINDER (TYPICAL)**

**Disassembly – (1968-69 Shuttle Piston Assembly)** – With warning light switch and end plug removed, tap cylinder on a wood surface to remove springs, pistons and cups.

**Cleaning & Inspection** – Clean all parts with brake fluid or alcohol. Check all pistons and cylinder for out-of-round, corrosion or damage. If a light honing will not remove blemishes from cylinder, replace cylinder. Inspect all other parts for scoring, excessive wear, corrosion or other damage.

*NOTE – When assembling master cylinder, use all components supplied in repair kit, make sure check valve on single circuit system is correct, apply brake cylinder paste to cups, seals and pistons, apply brake fluid to elbows and sealing plugs, and use a suitable cup installation sleeve (see table) when installing cups on pistons.*

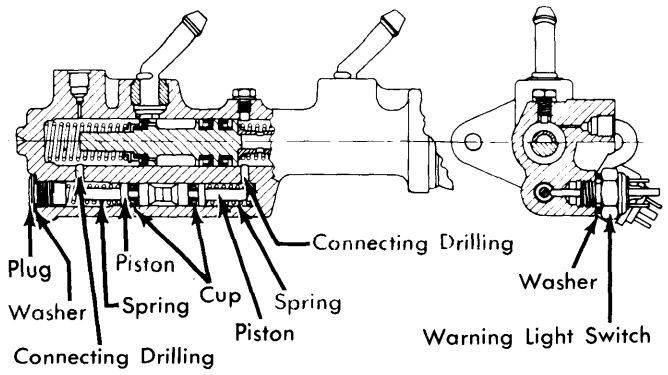
**CUP INSTALLING SLEEVES**

| Application | VW Tool Number | Diameter (mm) |
|---|---|---|
| Mast. Cyl. Pistons | | |
| Type 1,3,4 | US 4225 | 19.05 |
| Type 2 | US 4426 | 22.20 & 23.81 |
| Shuttle Pistons | | 10.50 |

**Reassembly (Single Circuit Type)** – Install light switch, elbow and/or 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 facing downward. Torque stop light switch to specifications.

**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. Tighten plug without collapsing seal.

## 1963-73 VOLKSWAGEN (Cont.)




**1968-69 SHUTTLE PISTON ASSEMBLY**

**Reassembly (Dual Circuit Type)** – *NOTE – Except for rear piston secondary cup, all cups are interchangeable.*

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

2) Assemble cup washer, primary cup, support washer, spring retainer, spring and stop sleeve onto rear piston and secure this assembly with stroke limiting screw.

3) Except on Type 2 with booster, install rear piston assembly into cylinder. Install stop washer and lock ring.

4) On Type 2 with booster, install rear piston assembly with washer, cup, plastic washer, second cup, and second washer on rear of piston into cylinder, followed by circlip.

5) Install stop screw, pushing front piston assembly forward as required to clear stop screw hole. Install, and tighten to specifications, all externally mounted fittings and switches. *NOTE – Verify correct installation of fluid inlet elbows.*

### BRAKE BOOSTER & PRESSURE REGULATING VALVE

Replace these units as an assembly, do not try to overhaul. When installing booster, use new filter, damping washer, boot and sealing ring. Tighten attaching bolts to specifications.

### TIGHTENING SPECIFICATIONS

| Application | Ft. Lbs. (mkg) |
|---|---|
| Brake Booster | |
| Maste Cyl.-to-Booster | 9 (1.2) |
| Pushrod-to-Brake Pedal | 14 (1.9) |
| Pressure Regulator | |
| Regulator-to-Mount | 12 (1.6) |
| Brake Line Fitting | 13 (1.8) |
| Master Cylinder | |
| Cylinder-to-Mount | 31 (4.2) |
| Piston Stop Screw | 5 (0.7) |
| Residual Pressure Valves | 15 (2.0) |
| Stop & Warning Light Switches | 14 (1.9) |
| Brake Line Fitting | 13 (1.8) |
| Front Brakes | |
| Backing Plate-to-Steering Knuckle | |
| Type 2 | 41 (5.6) |
| All Others | 36 (4.9) |
| Clamp Nut Allen Screw | |
| Type 2 | 14 (1.9) |
| All Others | 8 (1.1) |
| Caliper-to-Steering Knuckle | 7 (0.9) |
| Caliper-to-Steering Knuckle | 60 (8.2) |
| Splash Shield-to-Steering Knuckle | 7 (0.9) |
| Brake Line Fittings | 13 (1.8) |
| Rear Brakes | |
| Backing Plate-to-Housing | 25 (3.5) |
| Bearing Cover/Backing Plate-to-Housing | 43 (5.9) |
| Drum-to-Hub | 10 (1.3) |
| Slotted Nut | 253 (51.0) |

### BRAKE SYSTEM SPECIFICATIONS

| Application | Drum Diam. In. (mm) | Wheel Cylinder Diameter | | Master Cylinder |
|---|---|---|---|---|
| | | Front In. (mm) | Rear In. (mm) | Diameter In. (mm) |
| Front | | | | |
| Type 1 | 9.06 (230.1) | .87 (22.2) | ..... | .75 (19.0) |
| Super Beetle | 9.77 (248.1) | .94 (23.8) | ..... | .75 (19.0) |
| Type 2 | 9.84 (250.0) | 1.0 (25.4) | ..... | .88 (22.2) |
| Rear | | | | |
| Type 1 | 9.06 (230.1) | ..... | .69 (17.5) | .75 (19.0) |
| Type 2 | ①9.92 (252.0) | ..... | .94 (23.8) | .88 (22.2) |
| Type 3 & 4 | 9.77 (248.1) | ..... | .88 (22.2) | .88 (22.2) |

① – Type 2 (1971-73). For earlier Type 2, drum dia. is 9.84" (250.0 mm)

## 1963-73 VOLKSWAGEN (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) |
|---|---|---|---|---|---|---|
| Type 1 | 10.91 (277.0) | .008 (.2) | .0008 (.02) | .37 (9.5) | .34 (8.5) | .32 (8.0) |
| Type 2 | 10.95 (278.2) | .008 (.2) | .0008 (.02) | .51 (13.0) | .47 (12.0) | .45 (11.5) |
| Type 3 & 4 | 11.06 (281.0) | .008 (.2) | .0008 (.02) | .43 (11.0) | .40 (10.2) | .38 (9.6) |

**BRAKE DRUM SPECIFICATIONS**

| Application | Drum Diameter In. (mm) | Original Diameter In. (mm) | Maximum Refinish Diameter In. (mm) | Discard Diameter In. (mm) |
|---|---|---|---|---|
| Front | | | | |
| Type 1 | 9.06 (230.1) | 9.06 (230.1) | 9.11 (231.5) | ① |
| Super Beetle | 9.77 (248.1) | 9.77 (248.1) | 9.82 (249.5) | ① |
| Rear | | | | |
| Type 1 | 9.06 (230.1) | 9.06 (230.1) | 9.11 (231.5) | ① |
| Type 2 | 9.92 (252.0) | 9.92 (252.0) | 9.98 (253.4) | ① |
| Type 3 & 4 | 9.77 (248.1) | 9.77 (248.1) | 9.82 (249.5) | ① |

① — More than Maximum Refinish Diameter.

### BRAKE SYSTEM NOTES

*BRAKE SYSTEM APPLICATION* — Front drum brakes on all models, except Type 2, utilize one wheel cylinder (dual servo), and Type 2 utilizes two, single piston wheel cylinders. Front disc brakes are applied to the following models: All Type 3 & 4, 1967 and later Karmann Ghia, and 1971 and later Type 2. In 1967, master cyliders for all models, changed from single piston (single circuit) type to dual piston (dual circuit) type. Disc brakes may be optional on some models not indicated and a booster (servo) brake unit may be used on some 1968 and later Type 2.

*REAR BRAKE DRUM* — On 1971 and later Type 2, 1966 and later Type 3, and all Type 4, brake drum can be separated from axle hub by removing drum-to-hub attaching bolts. For easier accessibility to brake components and also when removing backing plate, remove hub with drum.

*TYPE 4 REAR DRUM TURNING* — To avoid damaging Type 4 hub, use a Type 3 hub when clamping drum in lathe.

*TYPE 2 MASTER CYLINDER CHANGE* — On 1971 and later models tandem master cylinders have only one outlet hole (formerly two) for the front wheel cylinders and a "T" fitting is used in connecting the brake lines. Do not interchange single and dual outlet cylinders as brake failure may occur, even if one of the two outlet holes is plugged.

*BLEEDING PROCEDURE* — If possible, pressure bleeding method is recommended, and on dual circuit systems, it is only required to bleed circuit(s) (front, rear, or both) that work is performed on.

*TYPE 2 BLEEDING PRECAUTION* — Air may get trapped in hose between refill container and reservoir and slow fluid flow will result. To avoid this, keep refill container full at all times. To fill an empty reservoir, first fill refill container, then raise front of vehicle to allow any trapped air to escape. Top off refill container, lower vehicle and proceed with bleeding. If pressure bleeding method is used this precaution is not required.

*MASTER CYLINDER INTERCHANGE* — Cylinders and repair kits are supplied by two manufacturers. To repair a cylinder, use only a repair kit supplied by the manufacturer of that cylinder. To interchange a cylinder with that of the other manufacturer is permissable, as long as the design of the cylinders is identical. Single circuit/disc brake cylinders are marked with a blue sticker.