ARROW, CHALLENGER, COLT & SAPPORO

Arrow
Challenger
Colt
Sapporo

DESCRIPTION

Brake system is hydraulically operated using a tandem master cylinder and, in some instances, a power brake unit. All models are equipped with front disc brakes. Challenger and Sapporo models equipped with 2600 cc engine use disc brakes on rear wheels. All other models are fitted with leading/trailing drum brakes. Rear brakes are self-adjusting and incorporate a dual-piston wheel cylinder. Parking brake is cable actuated and operates on rear brakes.

ADJUSTMENT

DISC BRAKES

No adjustment required.

DRUM BRAKES

Self-adjusting

PEDAL HEIGHT & FREE PLAY

1) Back off stop light switch. Adjust pedal height (distance from top of pedal to floor board) to specifications by rotating master cylinder push rod.

NOTE – *Make sure push rod is not depressed during this procedure.*

2) Adjust stop light switch until it just contacts brake pedal lever. After making both adjustments, brake pedal free play should be as indicated in table.

Pedal Height & Free Play Specifications

Application	Pedal Height In. (mm)	Free Play In. (mm)
Arrow & Colt		
Man. Trans.	6.4 (163)	.4-.6 (10-15)
Auto. Trans.	6.5 (165)	.4-.6 (10-15)
Colt St. Wgn.	6.9 (175)	.4-.6 (10-15)
Challenger & Sapporo	6.9 (175)	.4-.6 (10-15)

PARKING BRAKE

Arrow & Colt (Exc. Colt St. Wgn.) – Fully release parking brake. Remove parking lever cover to gain access to adjustment nut. Adjust nut until clearance between lever and stop is about .003-.08" (.2-2 mm).

Challenger, Sapporo & Colt St. Wgn. (Exc. Rear Disc) – 1) Release parking brake lever. Loosen cable attaching bolt and adjusting nut. Move cable lever to the right and adjust clearance between extension lever and stopper on left rear wheel to .10" (2.5 mm) or less.

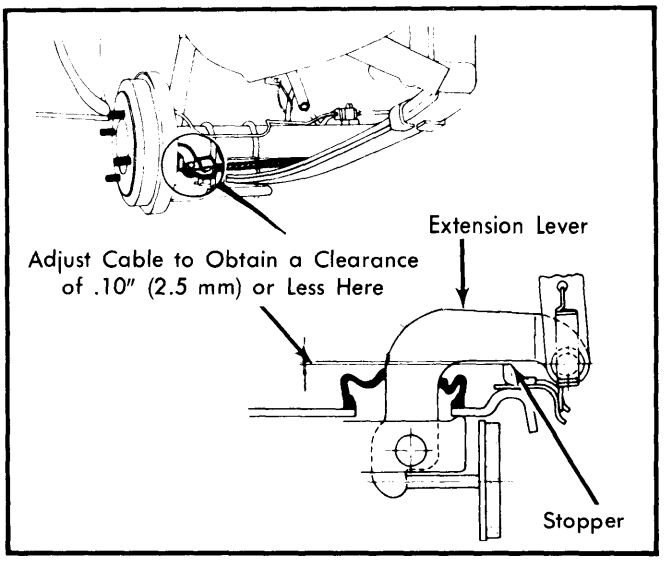

Fig. 1 Adjusting Parking Brake on Challenger, Sapporo and Colt St. Wgn.

2) With left cable adjusted, turn adjusting nut until the same clearance is obtained on right wheel extension lever. With parking brake properly adjusted lever stroke should be 5-7 notches.

Challenger & Sapporo (W/Rear Disc) – Fully release parking brake lever. Depress brake pedal to floor 2 times. Loosen parking brake cable adjusting nut at center of rear axle housing. Adjust cable so rear wheel drag is 23 lbs. (10.5 kg) or less after brake rotors have been turned several revolutions. Use spring pull scale to measure drag.

COMBINATION VALVE

NOTE – *Valve accomplishes three functions: Pressure control of rear service brakes; trouble warning; deactivating rear brake pressure control when front service brakes fail.*

Pressure Test – Use two pressure gauges that will measure at least 1,500 psi. Hook one gauge to master cylinder rear side and one to rear wheel cylinder. Pressure reading should be as shown in chart. Replace defective as required.

Brake Hydraulic Pressure Chart

Application	Pressure
Wheel Cylinder	460±28.4 psi
Master Cylinder	640 psi

Warning Light Test – Slightly loosen bleeder screw of one wheel cylinder and depress brake pedal. At this time warning light should come on. If light doesn't work, check switch and wire connector.

Combination Valve Reset – After performing necessary repairs on brake system, bleed brake lines. After lines are bled and all bleeder valves are secure, press hard on brake pedal. This will force valve to return to center position. Warning light should go out.

ARROW, CHALLENGER, COLT & SAPPORO (Cont.)

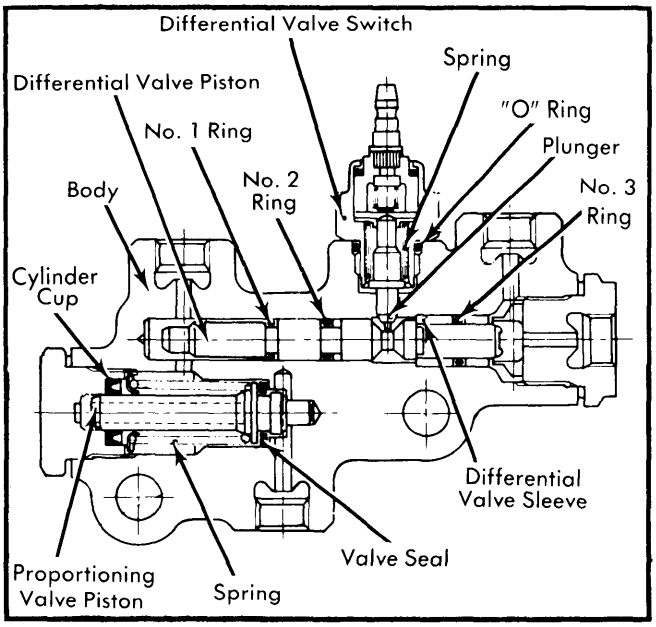

Fig. 2 Sectional View of Combination Valve Showing Detail of Internal Components. Valve Shown is for Models with Rear Drum Brakes

HYDRAULIC SYSTEM BLEEDING

Attach a bleed tube to wheel cylinder bleeder screw and immerse opposite end of tube in a container partially filled with brake fluid. Depress and release pedal several times, hold in applied position, loosen bleeder screw, allow air to escape, and tighten bleeder screw. Continue operation until air bubbles are no longer seen in discharged fluid. Repeat procedure at remaining brake lines until all air is bled from system.

REMOVAL & INSTALLATION

FRONT DISC BRAKE PADS

Removal (Arrow & Colt Exc. Colt St. Wgn.) – Raise and support vehicle. Remove front wheel. Remove protector by prying up edge of clip at center of protector. Hold center of "M" clip, detach "M" clip from pad and its ends from retaining pins; remove clip. Remove retaining pins from caliper and remove "K" spring. Remove pads from caliper by grasping backing plate area of pads with pliers.

NOTE – *Replace all pads (left and right side) at same time.*

Installation – Press piston to bottom of bore using a suitable tool, install disc pads and retaining pins. Install "K" spring and "M" clip, making sure positions are not reversed. See *Fig.* 2. Install pad protector, making sure clips face outward.

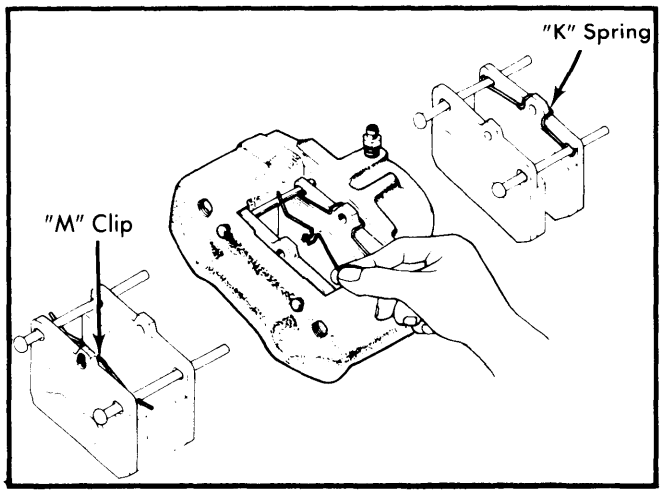

Fig. 3 Installation Direction of Spring and Clip on Brake Pads. Also, Installation Position of Retaining Pins. Caliper Shown is Used on Arrow & Colt Except Colt St. Wgn.

Removal (Challenger, Sapporo & Colt St. Wgn.) – 1) Raise and support vehicle. Remove front wheels. Remove retaining clip and pull out stopper plug.

2) Loosen caliper assembly mounting bolts. Slide caliper off rotor. Remove inner and outer pad clips, then pull pads and caliper support from caliper.

Installation – To install, reverse removal procedure and note the following: Press piston to bottom of caliper bore prior to pad installation. Ensure pad retaining clips are installed as shown in *Fig. 4*.

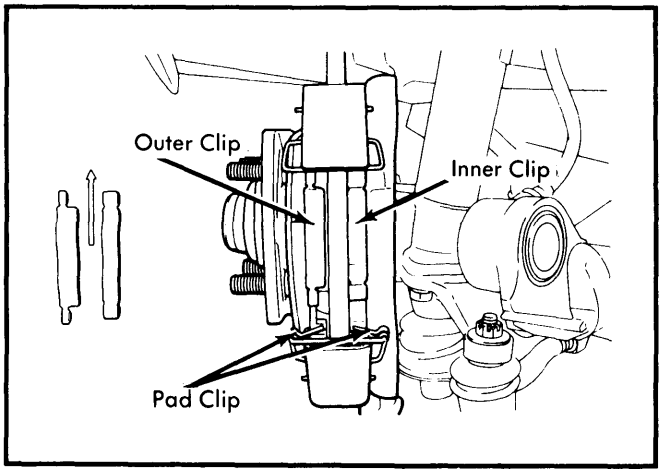

Fig. 4 Installing Pad Retaining Clips on Front Disc Brakes of Challenger, Sapporo and Colt St. Wgn.

FRONT DISC BRAKE CALIPER

Removal (Arrow & Colt Exc. Colt St. Wgn.) – Remove disc pads. Disconnect hydraulic line and remove bolts attaching caliper assembly to steering knuckle. Remove caliper assembly.

ARROW, CHALLENGER, COLT & SAPPORO (Cont.)

Installation – Reverse removal procedure, tighten caliper mounting bolts evenly, and bleed hydraulic system.

Removal (Challenger, Sapporo & Colt St. Wgn.) – Remove disc pads. Pull out hose clip from strut area, then disconnect brake hose from caliper. Remove caliper.

Installation – To install, reverse removal procedure, tighten caliper mounting bolts evenly and bleed brake system.

FRONT DISC BRAKE ROTOR

Removal – With caliper assembly removed, remove hub dust cap, cotter pin, lock nut, and adjustment nut. Pull hub and rotor assembly from spindle, taking care not to drop outer wheel bearing. Remove bolts attaching rotor to hub, then separate.

Installation – 1) To install, reverse removal procedure and tighten hub-to-rotor bolts evenly. Adjust wheel bearings.

2) Begin wheel bearing adjustment by tightening adjusting nut to 14.5 lbs. (.2 mkg) to seat all parts. Back off nut completely. Tighten adjusting nut again, this time to 3.6 ft. lbs. (.5 mkg). Install lock cap and cotter pin.

NOTE – *If cotter pin cannot be installed with nut properly adjusted, loosen nut until pin can be inserted. Nut should not be loosened more than 15°.*

REAR DISC BRAKE PADS

Removal (Challenger & Sapporo W/2600 cc Eng. & Colt St. Wgn.) – 1) Raise and support vehicle. Remove rear wheels. Remove caliper assembly dust cover. Disconnect parking brake cable from caliper.

2) Remove retaining pin and pull out stopper plug. Remove caliper assembly from rotor. Pull pads from caliper support.

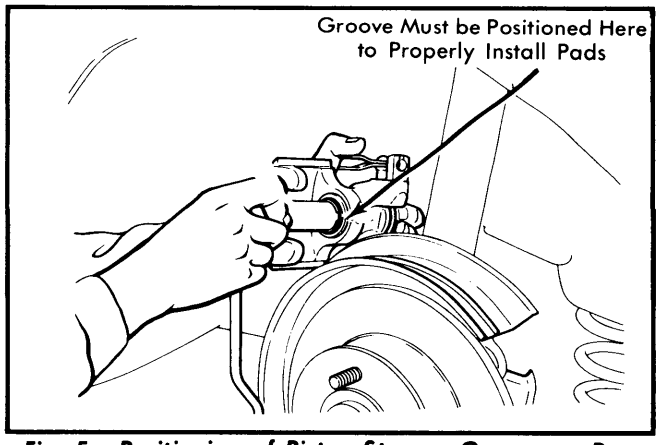

Fig. 5 Positioning of Piston Stopper Groove on Rear Disc Brakes

Installation – To install, reverse removal procedure and note the following: Press piston fully into caliper bore prior to pad installation. Ensure that groove in piston is positioned as shown in *Fig. 5* so that projection on back of pad will properly fit in groove. Ensure pad retaining clips are properly engaged.

REAR DISC BRAKE CALIPER

Removal (Challenger, Sapporo & Colt St. Wgn.) – Remove disc pads. Pull out hose lip from axle housing and disconnect brake hose from caliper assembly. Remove clevis pin connecting lever assembly to parking brake cable. Remove caliper assembly.

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

REAR DISC BRAKE ROTOR

Removal (Challenger, Sapporo & Colt St. Wgn.) – Remove disc pads. Remove caliper support-to-axle housing bolts. Remove caliper support. Remove rotor from axle shaft.

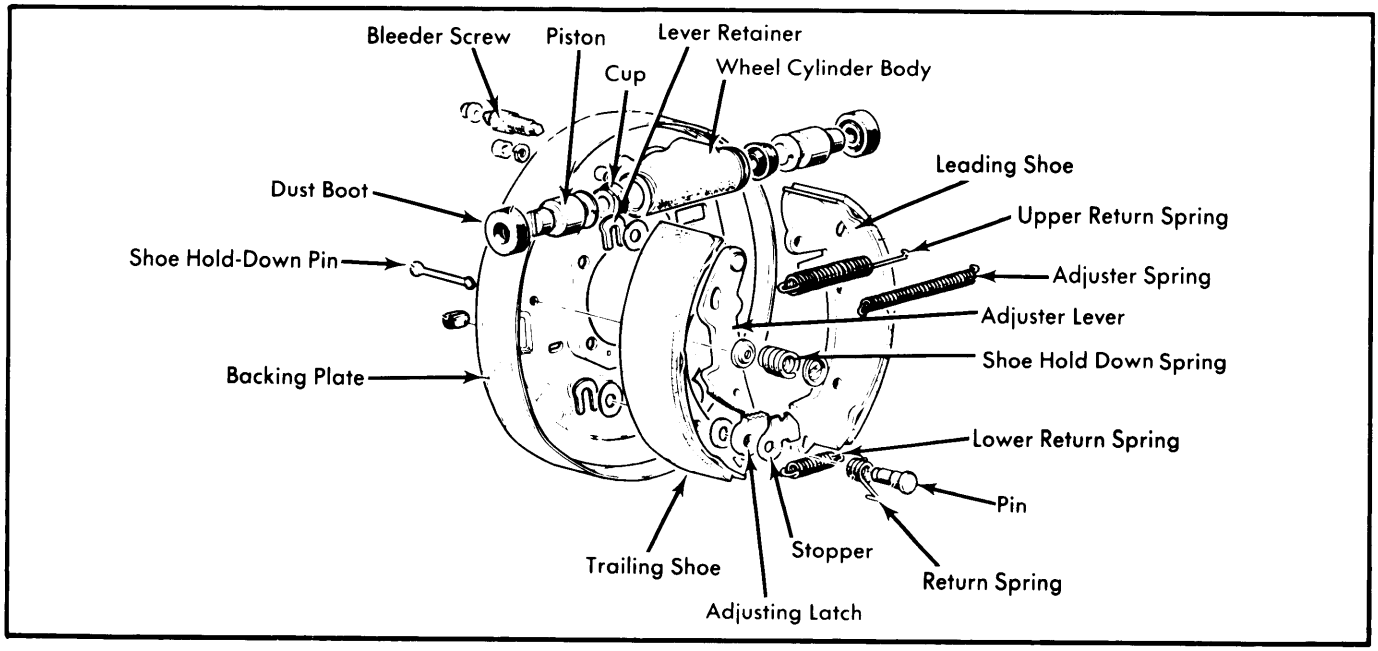

Fig. 6 Exploded View of Rear Brake Assembly for Component Relationship

ARROW, CHALLENGER, COLT & SAPPORO (Cont.)

Installation – To install, reverse removal procedure and tighten bolts evenly.

REAR BRAKE SHOES

Removal (Except Challenger, Sapporo & Colt St. Wgn.) – 1) Raise and support vehicle. Remove brake drum. Remove shoe hold-down springs. Disconnect strut-to-shoe spring and upper shoe return spring end from trailing shoe. Remove trailing shoe and lower return spring.

2) Hold adjuster latch down, Pull adjusting lever toward center of brake, and remove leading shoe assembly. Remove upper shoe return spring and strut-to-shoe spring.

Installation – Reverse removal procedure and note the following: Apply brake grease to all shoe contact points of backing plate, adjuster assembly, and wheel cylinder. Adjust amount of engagement of adjusting lever with strut only after pulling lever fully toward center of brake. Note that adjusting lever and latch spring differ between right and left sides.

REAR WHEEL CYLINDER

Removal – With rear drum and brake shoes removed, disconnect hydraulic line from wheel cylinder at rear of backing plate, remove bolts attaching cylinder, and remove wheel cylinder.

Installation – Reverse removal procedure, tighten mounting bolts evenly, and bleed hydraulic system.

MASTER CYLINDER

Removal – Disconnect brake lines from master cylinder. Depress brake pedal slowly several times to empty master cylinder housing of brake fluid. Separate master cylinder reservoir hoses from cylinder body. On models not equipped with power brakes, remove clevis bolt retaining master cylinder push rod to brake pedal. On all models, remove mounting hardware and lift off cylinder.

Installation – Reverse removal procedure, check and adjust pedal height, and bleed hydraulic system.

POWER BRAKE UNIT

NOTE – *Before removal or overhaul test check valve. Pull off vacuum hose, place finger over check valve and crank engine; vacuum should be created.*

Removal – With master cylinder removed, disconnect vacuum hose from power brake unit. Remove clevis bolt retaining power unit operating rod to brake pedal. Remove mounting hardware and lift off power unit.

Installation – Reverse removal procedure and note the following: Apply a suitable sealer to power unit mounting surface and vacuum line connections. Adjust pedal height and bleed hydraulic system.

OVERHAUL

FRONT DISC BRAKE CALIPER

Disassembly (Arrow & Colt Exc. Colt St. Wgn.) – Remove caliper attaching bridge bolts. Separate outer and inner halves. Remove retaining ring and dust seal. Apply compressed air to fluid inlet to remove piston. Remove piston seal, but be careful not to damage caliper bore or seal groove.

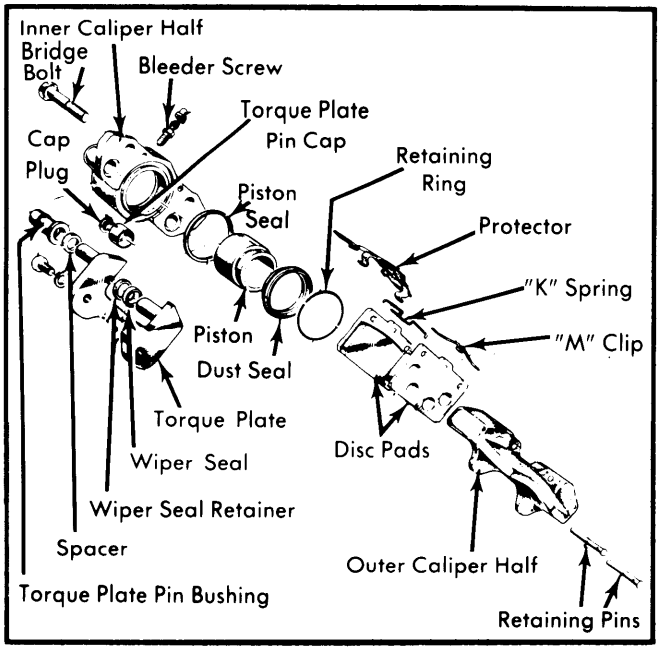

Fig. 7 Disassembled View of Disc Brake Caliper Used on Arrow and Colt (Exc. Colt St. Wgn.)

Cleaning & Inspection – Clean all metal parts in trichloroethylene, alcohol, or brake fluid; clean piston seal in brake fluid or alcohol; clean dust seal and other rubber parts in alcohol only. Inspect caliper bore and piston for wear, damage or rust; replace parts as necessary.

NOTE – *Manufacturer recommends replacing piston seal and dust seal whenever piston has been removed.*

Reassembly – Reverse disassembly procedure and note the following: Apply rubber grease to piston seal and brake fluid to piston when reassembling. If torque plate was removed from inner caliper half, clean torque plate shaft and shaft bore in caliper, then apply special rubber grease to rubber bushing, wiper seal inner surface, and torque plate shaft before reassembly. Tighten bridge bolts of caliper halves evenly.

NOTE – *Possible cause of increased pedal stroke is: Insufficient fit between piston and piston seal. Correct by manually levering piston to seat several times. This will create a better fit between piston and seal. Make sure brake pad is removed during this procedure.*

Disassembly (Challenger, Sapporo & Colt St. Wgn.) – Remove dust boot. Force compressed air into fluid inlet to expel piston. Dig out piston seal, being careful not to gouge cylinder bore or caliper groove.

Inspection – Wash all components in suitable solution (clean brake fluid). Inspect cylinder and piston for obvious signs of

ARROW, CHALLENGER, COLT & SAPPORO (Cont.)

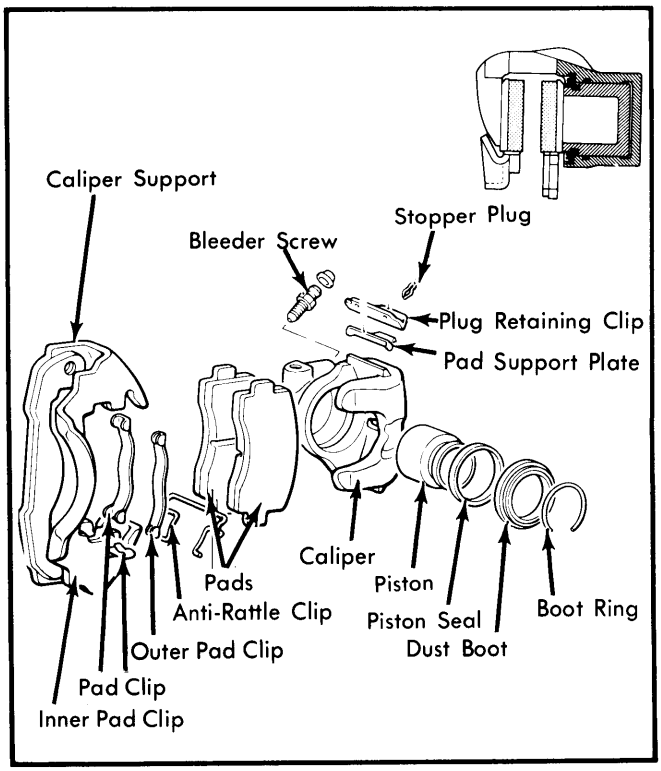

Fig. 8 Exploded View of Front Disc Brake Caliper Used on Challenger, Sapporo & Colt St. Wgn.

wear or rust; replace worn parts. Always replace piston seal and dust boot.

Reassembly – Coat piston seal with suitable rubber grease. Slide seal into groove in cylinder bore. Slip piston into bore making sure seal is not twisted. Lightly coat dust seal groove with recommended rubber grease. Fit dust boot into place. Refit cylinder to caliper.

REAR DISC BRAKE CALIPER

Disassembly (Challenger & Sapporo W/2600 cc Eng.) – **1)** Remove cap ring and take off lever cap. See *Fig. 9*. Remove retaining ring and spring, then pull out lever assembly. Slightly rotate automatic adjuster spindle and pull out assembly.

NOTE – *It may be necessary to use pliers to remove spindle.*

2) Using suitable bearing remover tool (MB990665), pull bearings from caliper. Take off piston boot. Working through vacant area where automatic adjuster spindle has been removed, force piston out of caliper. Use a blunt tool to push out piston.

3) Dig out piston seal using a pointed tool. Be careful not to mar the cylinder bore or seal groove.

Inspection – **1)** Wash all components in suitable solution (clean brake fluid). Inspect cylinder and piston for obvious signs of wear or rust; replace worn parts. Always replace piston seal, adjuster seal, and piston boot.

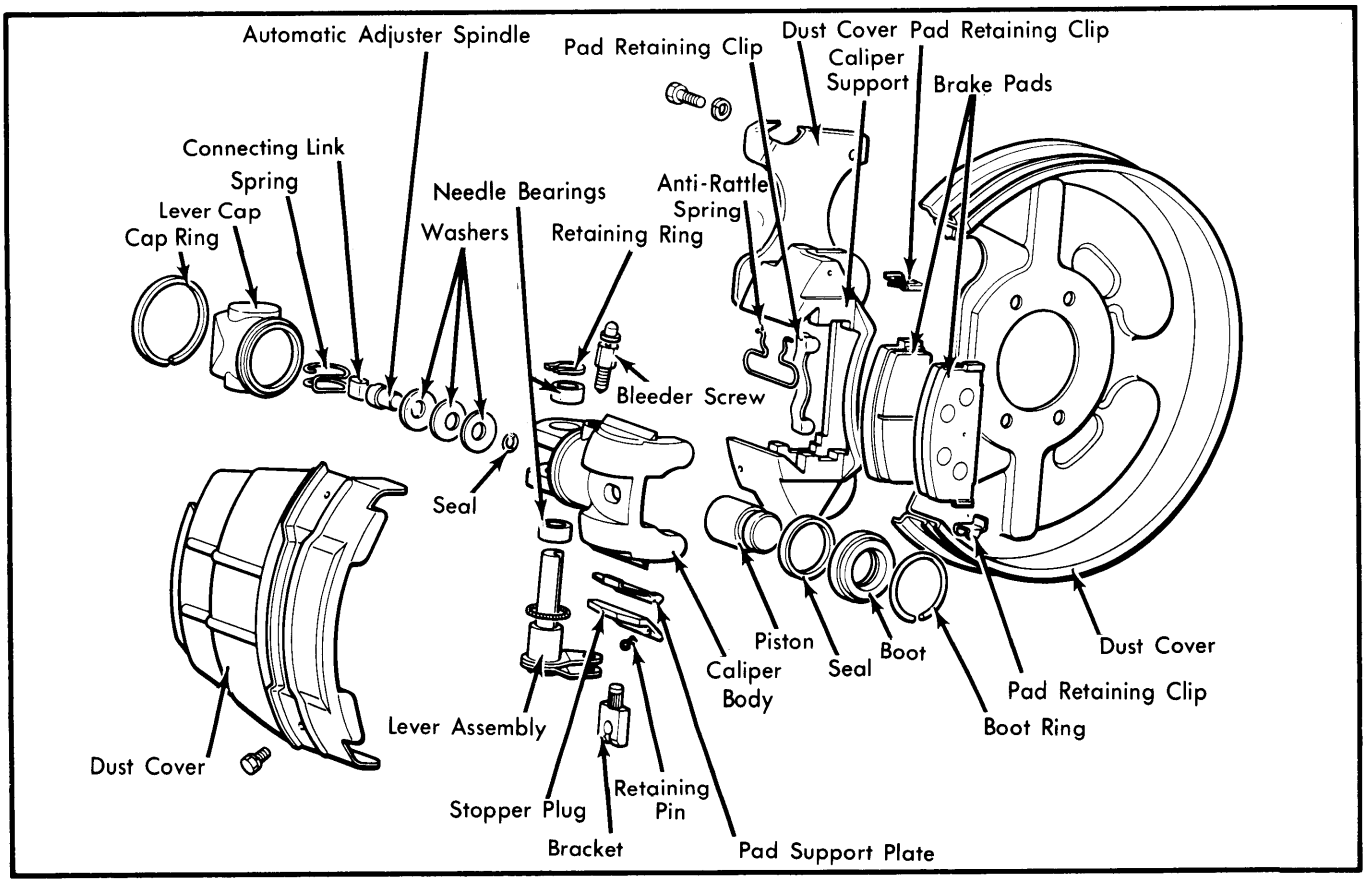

Fig. 9 Exploded View of Rear Disc Brake Caliper Assembly Used on Challenger and Sapporo Models with 2600 cc Engine

ARROW, CHALLENGER, COLT & SAPPORO (Cont.)

2) Check bearings, connecting link, automatic adjuster spindle, and lever assembly for wear damage or rust. Make sure lever assembly does not have excessive play between shaft and bearing. Ensure clearance between automatic adjuster spindle and piston. Clearance should be .013-.017" (.33-.42 mm).

Reassembly – **1)** Lightly coat piston seal and piston with lubricant. Slide piston and seal into place, ensuring seal does not twist in groove. Lubricate boot and slide boot into position making sure it engages groove in cylinder bore.

2) Using suitable bearing installation tool (MB990665), press in bearings until ends are flush with caliper body. Make sure mark on end of bearing faces out.

3) Coat automatic adjuster seal with recommended grease. Fit adjuster spindle and hardware in place until spindle turns freely. Make sure spring faces proper direction.

4) Press in connecting link spring washers. Special tool MB990666 may be helpful. Fit automatic adjuster spindle into place (spindle is not a press fit). Insert connecting link and lever assembly.

5) Fill lever cap with Niglube RX-2 (or equivalent), making sure all areas have significant amount of grease. Lightly grease stopper plug and caliper sliding surface. Assembly is ready for installation.

MASTER CYLINDER

Disassembly – Remove dust boot, retaining ring, stop washer, and piston stop bolt, and withdraw primary piston assembly, secondary piston assembly, and secondary return spring from master cylinder. NOTE – *Do not disassemble primary piston assembly.* Remove check valve caps, tube seats, check valves, and check valve springs.

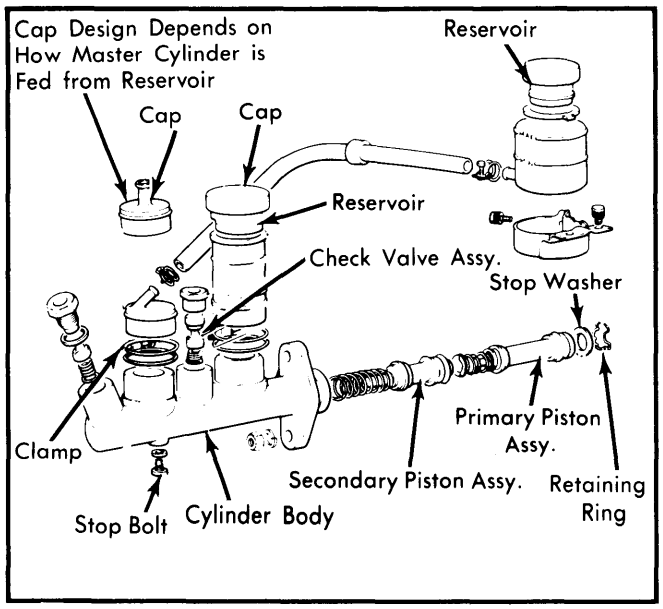

Fig. 10 Disassembled View of Master Cylinder

Inspection – Check master cylinder bore and piston for wear or other damage and replace as necessary. Check clearance between cylinder bore and piston; if clearance exceeds .006", replace parts as necessary. Check all parts of secondary piston assembly; if any parts are found defective, replace complete secondary piston assembly.

Reassembly – Reverse disassembly procedure and note the following: Apply rubber grease to all parts (except boots) before reassembly. When assembled, check that return port is not blocked by piston cup when piston is located at return position.

POWER BRAKE UNIT

Disassembly – **1)** Hold front shell flange (master cylinder end of power unit) in a vice and remove clevis and lock nut. Scribe alignment mark on front and rear shells for reassembly reference. Holding neck of rear shell on both sides with pipes, remove rear shell by turning it counterclockwise. NOTE – *The diaphragm spring can be removed at the same time.* Remove diaphragm plate assembly from rear shell.

2) Using suitable driver, remove rear shell retainer and lift out bearing and valve body seal. Pull diaphragm from diaphragm plate assembly, then using a screwdriver, remove silencer retainer and lift out silencer and filter. Hold valve plunger, with key hole facing down and remove stop key by lightly pushing valve rod while shaking unit, then remove valve rod and plunger assembly. Remove reaction disc. NOTE – *Valve rod plunger assembly can not be disassembled.* Remove flange from front shell, then pull off plate and seal assembly.

Cleaning & Inspection – Thoroughly clean and dry each part. NOTE – *Cups and plastic parts must be wiped off only.* Inspect diaphragm plate for damage and cracks. NOTE – *Diaphragm plate is made of plastic and should be handled carefully at all times.* Check push rod for damage and straightness. Check front and rear shells for cracks, damage and deformation. Repair or replace any defective part.

Reassembly – **1)** Apply a sufficient amount of silicone grease to the following parts (see illustration): Front shell seal and push rod sliding surfaces (A); push rod and seal contact surfaces (B); diaphragm lug-to-rear shell contacting surface (C); outside surface of reaction disc (D); reaction disc inserting part of diaphragm plate (E); rear shell seal and diaphragm plate sliding surfaces (F); interior of piston plate into which plunger assembly is inserted and seal sliding surfaces (G).

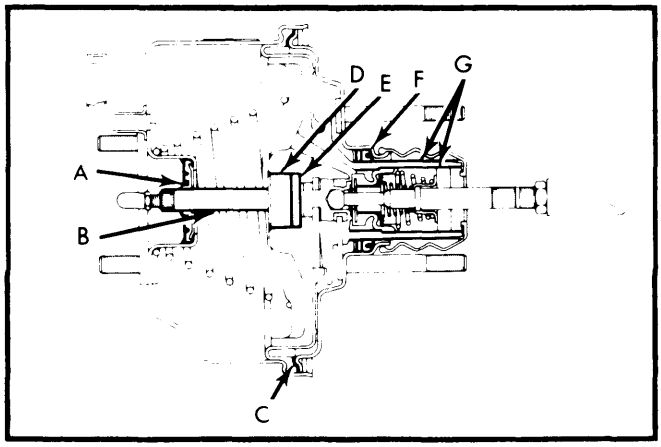

Fig. 11 Lubricate at Points Indicated in Illustration

ARROW, CHALLENGER, COLT & SAPPORO (Cont.)

2) Install seal and bearing into rear shell, then press in retainer. Gently install valve rod and plunger, then install stop key with chamfered end toward piston side. NOTE – *After installing stop key, pull plunger assembly to ensure plunger is securely locked by stop key.* Install reaction disc and diaphragm in diaphragm plate assembly, then install silencer filter and silencer into rear of diaphragm plate and press in retainer.

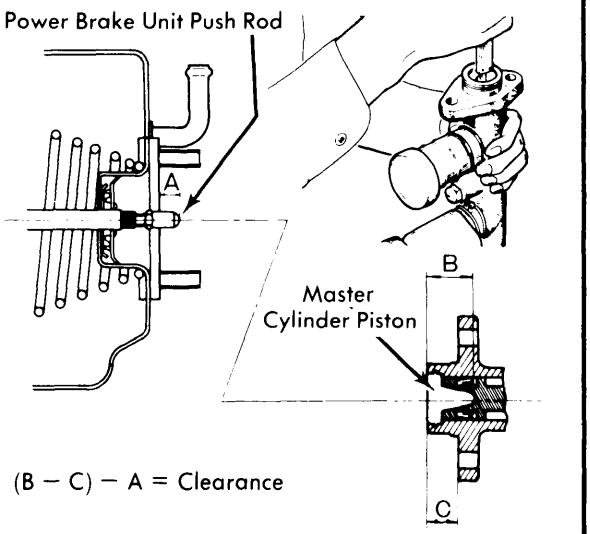

Fig. 12 Locations for Measuring Master Cylinder Rod-to-Piston Clearance

3) Install diaphragm plate assembly into rear shell, then install valve body guard (rear end first) into end of seal retainer. Install rear shell into front shell, then install push rod and front shell flange. Align marks made at disassembly, then turn rear shell until its notch touches stopper fully. Check clearance between power unit push rod and master cylinder piston (see illustration); clearance should be .30" (7.6 mm) or less. If clearance is not to specifications, correct by adjusting push rod length. Install yoke onto threaded end of power unit operating rod.

TIGHTENING SPECIFICATIONS

Application	Ft. Lbs (mkg)
Master Cylinder	
Check Valve Caps	18-25 (2.5-3.5)
Piston Stop Bolt	1-2 (.14-.28)
Retaining Nuts	6-9 (.83-1.2)
Hydraulic Lines	9-12 (1.2-1.7)
Rotor-to-Hub Bolts	25-29 (3.5-4.0)
Hydraulic Line-to-Caliper	9-12 (1.2-1.7)
Wheel Cylinders & Bleeders	4-7 (.55-.97)
Caliper	
Adaptor (Front)	29-36 (4.0-5.0)
Torque Plate (Front)	50-65 (8.0-9.0)
Caliper Assembly (Rear)	29-36 (4.0-5.0)
Bridge Bolts (Caliper Halves, Front)	58-69 (8.0-9.5)

BRAKE SYSTEM SPECIFICATIONS

Application	Drum Diam. In. (mm)	Wheel Cylinder Diameter		Master Cylinder
		Front In. (mm)	Rear In. (mm)	Diameter In. (mm)
Arrow & Colt (Exc. Colt St. Wgn.)	9 (229)	2.012① (51.5)	.750 (19.1)	.815 (20.70)
Challenger & Sapporo Exc. with 2600 cc Eng.	9 (229)	2.00① (50.8)	.811 (20.59)	.813 (20.65)
All Others	.....	2.00① (50.8)	1.375① (34.9)	.875 (22.2)

① – Caliper bore diameter.

BRAKE DRUM SPECIFICATIONS

Application	Drum Diameter In. (mm)	Original Diameter In. (mm)	Maximum Refinish Diameter In. (mm)	Discard Diameter In. (mm)
All Models	9 (229)	9.000 (229)	.....	9.079 (230.6)

ARROW, CHALLENGER, COLT & SAPPORO (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)
Arrow & Colt (Exc. Colt St. Wgn.)	.....	.006 (.15)	.....	.507 (12.9)	.....	.448 (11)
Challenger & Sapporo Exc. with 2600 cc Eng.	7.87 (200)	.006 (.15)	.....	.492 (12.5)	.....	.433 (11)
All Others						
Front	.787 (200)	.006 (.15)	.....	.492 (12.5)	.....	.433 (11)
Rear	8.07 (205)	.006 (.15)	.....	.393 (10)	.....	.330 (8.4)