

CHAPTER 9

BRAKES

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BRAKES Specifications

Front Brake Caliper		
Item	Standard	Service Limit
Brake Pad Thickness	.275" / 7.0mm	.150" / 3.81mm
Brake Disc Thickness	.150-.164" / 3.810-4.166mm	.140" / 3.556mm
Brake Disc Thickness Variance Between Measurements	-	.002" / .051mm
Brake Disc Runout	-	.020" / .50mm

Output Shaft Brake Caliper		
Item	Standard	Service Limit
Brake Pad Thickness	.275" / 7.0mm	.150" / 3.81mm
Brake Disc Thickness	.177-.187" / 4.496-4.750mm	.167" / 4.242mm
Brake Disc Thickness Variance Between Measurements	-	.002" / .051mm
Brake Disc Runout	-	.010" / .25mm

Torque Specifications

Item	Torque (ft. lbs. except where noted*)	Torque (Nm)
Front Caliper Mounting Bolts	18.0	25
Output Shaft Caliper Mounting Bolts	15.0	21
Master Cylinder Mounting Bolts	*55 in. lbs.	6.0
Master Cylinder Reservoir Cover Bolt	*45 in. lbs.	5.0
Brake Line Banjo Bolt	15.0	21
Front Brake Disc	18.0	25
Front Wheel Mounting Nuts	15.0	21

BRAKES

Brake System Service Notes

Brake Pad Basics

Disc brake systems are light weight, low maintenance, and perform well in the conditions ATVs routinely encounter. There are a few things to remember when replacing disc brake pads or performing brake system service to ensure proper system function and maximum pad service life.

- Optional pads are available to suit conditions in your area. Select a pad to fit riding style and environment.
- Do not over-fill the master cylinder fluid reservoir.
- Make sure the brake lever and pedal returns freely and completely.
- Adjust stop pin on front caliper after pad service.
- Check and adjust master cylinder reservoir fluid level after pad service.
- Make sure atmospheric vent on reservoir is unobstructed.
- Adjust auxiliary brake after pad service (where applicable).
- Test for brake drag after any brake system service and investigate cause if brake drag is evident.
- Make sure caliper moves freely on guide pins (where applicable).
- Inspect caliper piston seals for foreign material that could prevent caliper pistons from returning freely.
- Perform a brake burnishing procedure after installing new pads to maximize service life.

Brake Pad Kits

NOTE: Brake pad part numbers are stamped on the back of the pad for identification purposes. This part number cannot be ordered – it is included in the chart for reference only. **Part numbers on the following chart may change or supersede to a new number. Always refer to the current parts manual for part numbers.**

Part No.	Type	Description	Application
FRONT BRAKE PAD KITS*			
2201149 - Kit	Soft	Front brake pad kit. (Contains 4 pads PN 1930731)	For dry, dusty conditions.
2200465 - Kit	Medium	Front brake pad kit. (Contains 4 pads PN 1930815)	Production pad (For average use)
2200901 - Kit	Severe Duty	Front brake pad kit. (Contains 4 pads PN 1930811)	For muddy conditions.
REAR BRAKE PAD KITS			
2201150 - Kit	Soft	Rear brake pad kit. (Contains 2 pads PN 1930741)	For dry, dusty conditions.
2200464 - Kit	Medium	Rear brake pad kit. (Contains 2 pads PN 1930814)	Production Pad (For average use)
2200899 - Kit	Severe Duty	Rear brake pad kit.. (Contains 2 pads PN 1930810)	For muddy conditions.
2201093 - Kit		Sportsman 500 Rear brake pad kit (contains 2 pads 1930859 for hydraulic auxiliary brake)	Production rear pad for most Sportsman hydraulic auxiliary brake

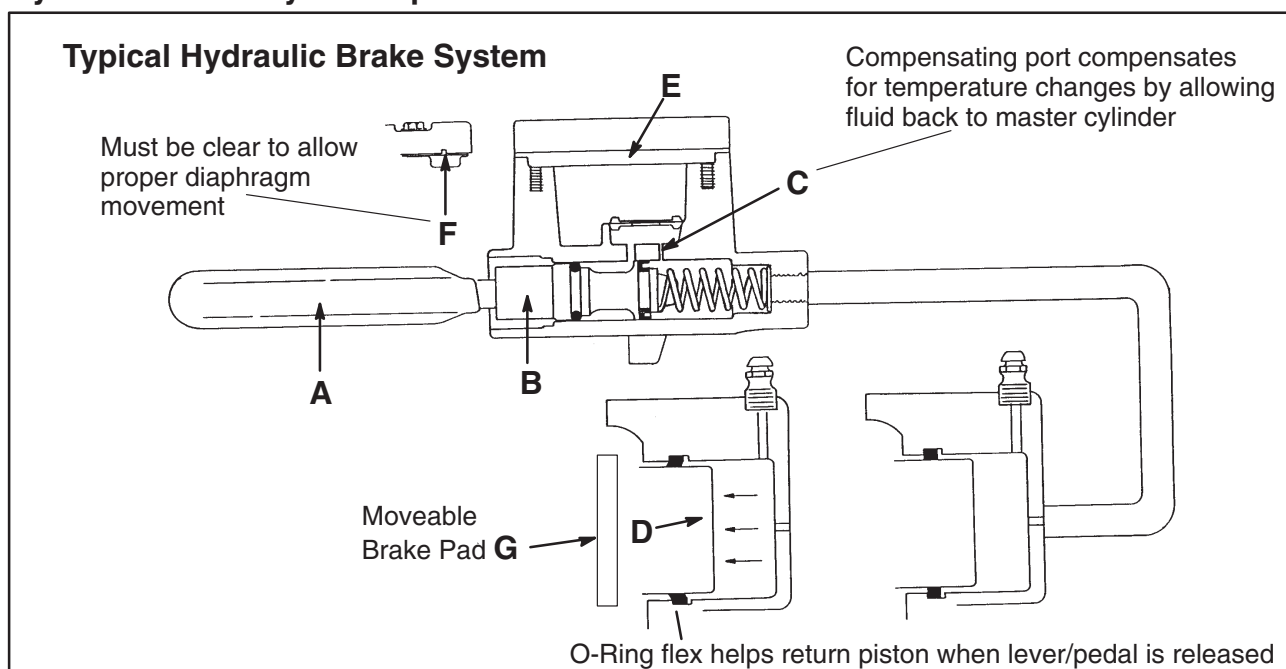
Brake Noise Troubleshooting

Dirt or dust buildup on the brake pads and disc is the most common cause of brake noise (squeal caused by vibration). If cleaning does not reduce the occurrence of brake noise, Permatex™ Disc Brake Quiet (available from most auto parts stores) can be applied to the back of the pads. Follow directions on the package. This will keep pads in contact with caliper piston(s) to reduce the chance of squeaks caused by dirt or dust.

Brake Noise Troubleshooting	
Possible Cause	Remedy
Dirt, dust, or imbedded material on pads or disc	Spray disc and pads with CRC Brakeleen™ or an equivalent non-flammable aerosol brake cleaner. Remove pads and/or disc hub to clean imbedded material from disc or pads.
<u>Pad(s) dragging on disc (noise or premature pad wear)</u> Improper adjustment Insufficient lever or pedal clearance Master cylinder reservoir overfilled Master cylinder compensating port restricted Master cylinder piston not returning completely Caliper piston(s) not returning Operator error (riding the brake / park brake applied)	Adjust pad stop (front calipers) or adjust auxiliary brake Check position of controls & switches. Set to proper level Clean compensating port Inspect. Repair as necessary Clean piston(s) seal Educate operator
Loose wheel hub or bearings	Check wheel and hub for abnormal movement.
Brake disc warped or excessively worn	Replace disc
Brake disc misaligned or loose	Inspect and repair as necessary
Noise is from other source (axle, hub, disc, shaft, or wheel)	If noise does not change when brake is applied check other sources. Inspect and repair as necessary
Wrong pad for conditions	Change to a softer or harder pad

BRAKES

Hydraulic Brake System Operation



The Polaris brake system consists of the following components or assemblies: brake lever; master cylinder; hydraulic hose; brake calipers (slave cylinder); brake pads; and brake discs, which are secured to the drive line.

When the hand activated brake lever (A) is applied it contacts a piston (B) within the master cylinder. As the master cylinder piston moves inward it closes a small opening (compensating port) (C) within the cylinder and starts to build pressure within the brake system. As the pressure within the system is increased, the piston (D) located in the brake caliper moves outward and applies pressure to the moveable brake pad. This pad contacts the brake disc and moves the caliper in its floating bracket, pulling the stationary side pad into the brake disc. The resulting friction reduces brake disc and vehicle speed. As the lever pressure is increased, the braking affect is also increased.

The friction applied to the brake pads will cause the pads to wear. As these pads wear, the piston within the caliper moves further outward and becomes self adjusting. Fluid from the reservoir fills the additional area created when the caliper piston moves outward.

Brake fluid level is critical to proper system operation. Too little fluid will allow air to enter the system and cause the brakes to feel spongy. Too much fluid could cause brakes to drag due to fluid expansion.

Located within the master cylinder is the compensating port (C) which is opened and closed by the master cylinder piston assembly. The port is open when the lever is released and the master cylinder piston is outward. As the temperature within the hydraulic system changes, this port compensates for fluid expansion (heated fluid) or contraction (cooled fluid). During system service, be sure this port is open. Due to the high temperatures created within the system during heavy braking, it is very important that the master cylinder reservoir have adequate space to allow for fluid expansion. **Never overfill the reservoir!** Fill to between MIN and MAX marks.

This system also incorporates a diaphragm (E) as part of the cover gasket; and a vent port (F) located in the cover. The combination diaphragm and vent allow for the air above the fluid to equalize pressure as the fluid expands or contracts. Make sure the vent is open and allowed to function. If the reservoir is over filled or the diaphragm vent is plugged the expanding fluid may build pressure in the brake system leading to brake failure.

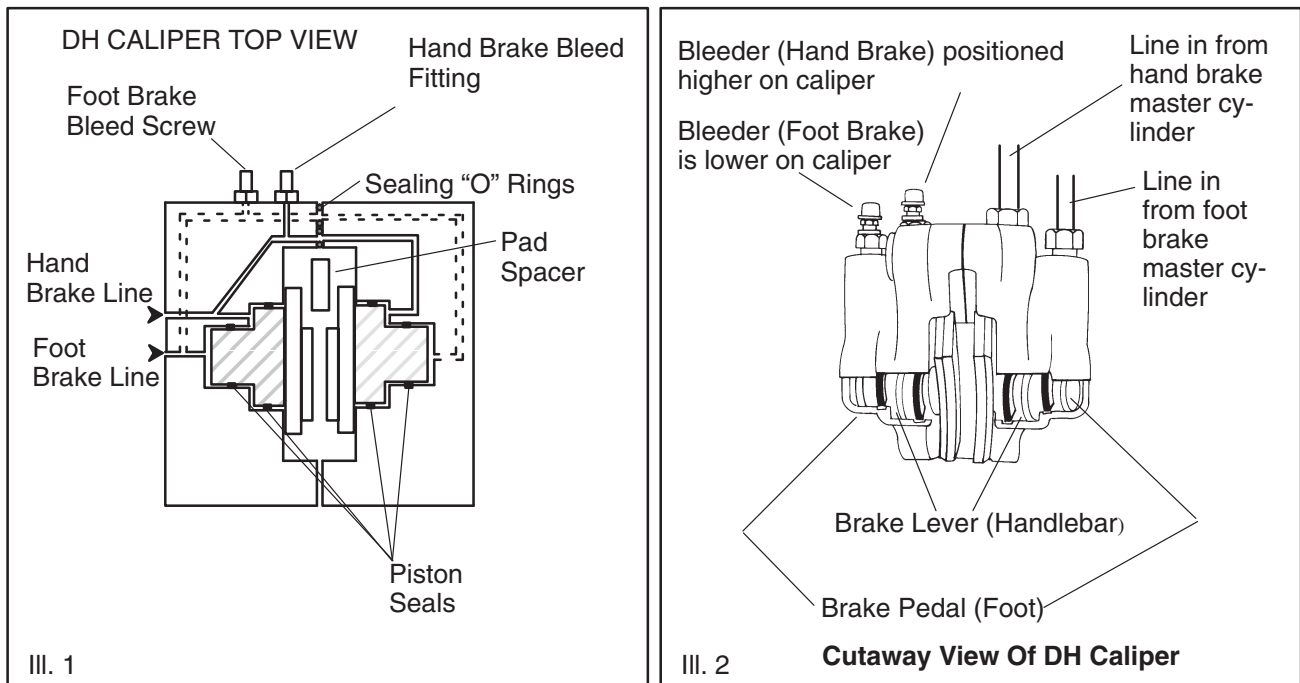
When servicing Polaris ATV brake systems use only Polaris DOT 3 high temperature brake fluid (PN 2870990). Polaris brake fluid is sold in 5.5 oz. bottles. **WARNING:** Once a bottle is opened, use what is necessary and discard the rest in accordance with local laws. Do not store or use a partial bottle of brake fluid. Brake fluid is hygroscopic, meaning it rapidly absorbs moisture from the air. This causes the boiling temperature of the brake fluid to drop, which can lead to early brake fade and the possibility of serious injury.

Dual Hydraulic Brake Caliper (DH Caliper)

Dual Hydraulic Caliper Bleeding

This caliper is a dual opposed piston design, with two independent hydraulic systems contained in the same caliper body (**see III.1**). The caliper pistons are T-shaped, which allows both hand and foot brake to use the same caliper piston, but remain separated by seals. The hand brake system applies hydraulic pressure to both front calipers and only the *outer* diameter of the rear caliper pistons. The auxiliary (foot) brake applies pressure to the inner portion of the rear caliper pistons. Because the hand and foot brake hydraulic systems are separate, there are also two bleed screws – one for the outer fluid chamber (hand brake), and one for the inner fluid chamber (foot brake). The basic procedure for bleeding the brake system is the same as outlined on page 9.7 - 9.8; however, each system must be bled separately.

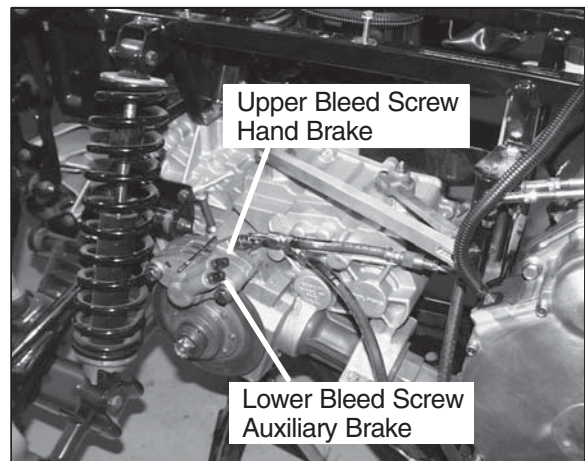
Hydraulic Auxiliary Brake inspection and adjustment is outlined on page 9.6.



NOTE: Caliper style and location of brake lines and bleeder screws may differ

Upper bleed screw and brake line (A) is for hand brake system.

Lower bleed screw and brake line (B) is for auxiliary (foot) brake system.



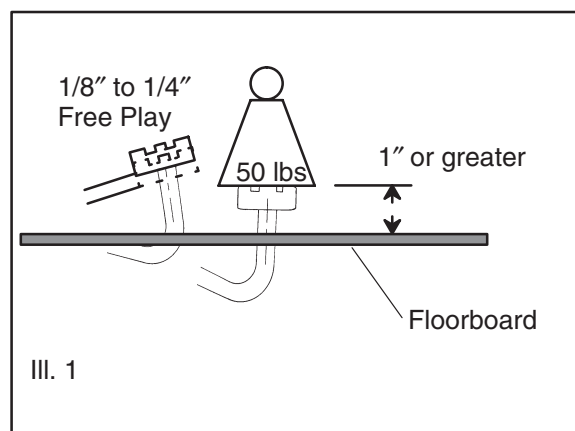
BRAKES

Dual Hydraulic Brake Caliper

Auxiliary Brake Adjustment (Hydraulic)

Use the following procedure to inspect the auxiliary (foot) brake system and bleed if necessary.

1. First check foot brake effectiveness by applying a 50 lb. (approx.) downward force on the pedal. The top of the pedal should be at least 1" (25.4mm) above the surface of the footrest (**see III. 1**).



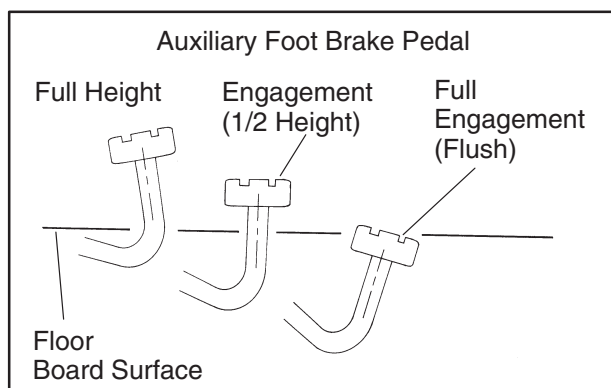
Free play of the brake pedal should be 1/8 - 1/4 inch (3.2 - 6.35 mm).

If freeplay is excessive, be sure master cylinder piston is returning to the fully extended position. If freeplay is less than 1/8" (3.2mm) be sure dust seal is fully seated in groove on master cylinder body. See photo on page 9.10.

Auxiliary Brake Testing

The auxiliary brake should be checked for proper adjustment.

1. Support the rear wheels off the ground.
2. While turning the rear wheels by hand, apply the auxiliary foot brake. This brake should not stop the wheels from turning until the lever is half way between its rest position and bottoming on the footrest.

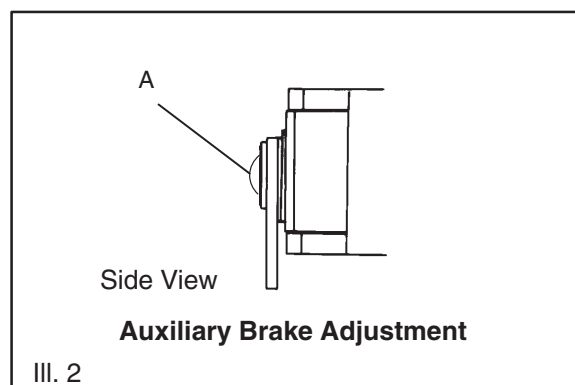


Auxiliary Brake Adjustment (Mechanical)

The auxiliary brake should be adjusted if the brake pedal deflection is under 1/2" (1.3 cm) or exceeds 3/4" (1.9 cm) prior to brake activation.

1. Put the machine in neutral. Stop engine.
2. If adjustment is necessary turn adjuster bolt (A) clockwise until disc rotation becomes difficult. Turn adjuster bolt counterclockwise until brake engagement starts at approximately 1/2 of the total pedal travel (**see III. 2**).

NOTE: Refer to auxiliary brake exploded views on pages 9.29-9.31 for model applications.



Bleeding:

If the free play is correct, but pedal travel is excessive or spongy, then air is trapped somewhere in the system. Bleeding the auxiliary brake system is accomplished in a conventional manner, except that there are two brake lines and bleeder screws on the Dual Hydraulic caliper. Refer to page 9.5 for theory of operation and bleeding procedure. The auxiliary brake line applies pressure to the small (inner) diameter of the caliper piston. Use the outermost (lower) bleed screw to purge air. See photo on page 9.5.

Fluid Replacement/Bleeding Procedure

NOTE: When bleeding the brakes or replacing the fluid always start with the furthest caliper from the master cylinder.

CAUTION:

Always wear safety glasses.

CAUTION:

Brake fluid will damage finished surfaces. Do not allow brake fluid to come in contact with finished surfaces.

Brake Bleeding - Fluid Change

This procedure should be used to change fluid or bleed brakes during regular maintenance.

1. Clean reservoir cover thoroughly.
2. Remove screws, cover, and diaphragm (C) from reservoir.
3. Inspect vent slots (A) in cover and remove any debris or blockage.
4. If changing fluid, remove old fluid from reservoir with a Mity Vac™ pump or similar tool.

NOTE: Do not remove brake lever when reservoir fluid level is low.

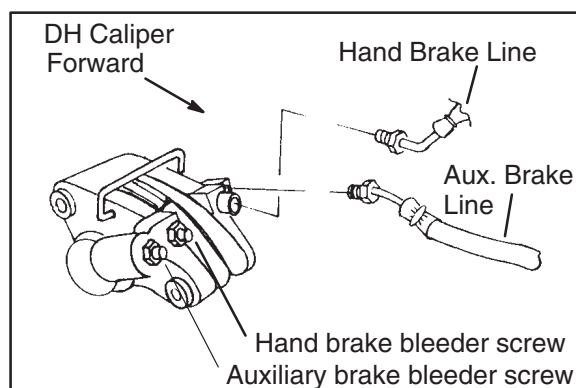
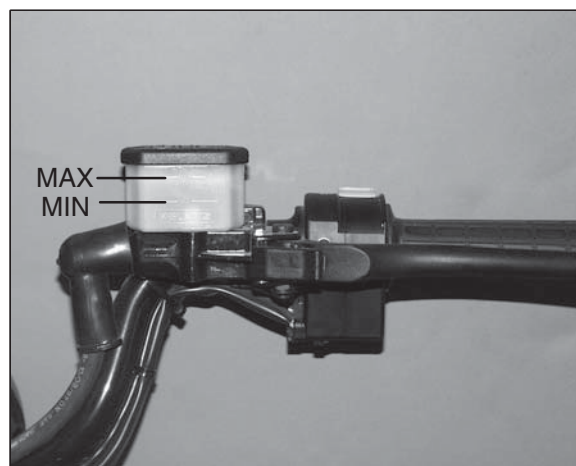
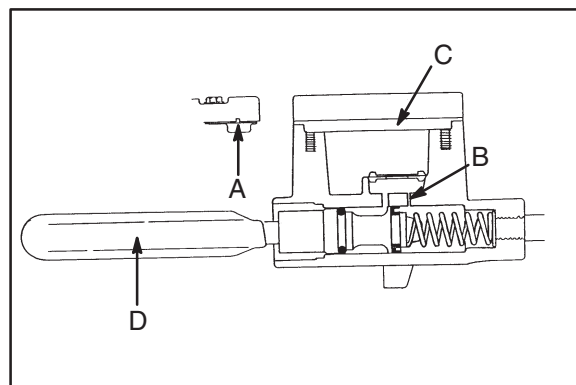
Mity Vac™ PN 2870975

5. Add brake fluid to the upper level mark on reservoir.

**Polaris DOT 3 Brake Fluid
PN 2870990**

6. Begin bleeding procedure with the caliper that is farthest from the master cylinder. Install a box end wrench on caliper bleeder screw fitting. Attach a clean, clear hose to fitting and place the other end in a clean container. Be sure the hose fits tightly on fitting.

NOTE: Fluid may be forced from compensation port (B) when brake lever is pumped. Place diaphragm (C) in reservoir to prevent spills. Do not install cover.



BRAKES

Fluid Replacement/Bleeding Procedure

Brake Bleeding - Fluid Change Cont.

7. *Slowly* pump brake lever (D) until pressure builds and holds.
8. While maintaining lever pressure, open bleeder screw. Close bleeder screw and release brake lever.
NOTE: Do not release lever before bleeder screw is tight or air may be drawn into caliper.
9. Repeat procedure until clean fluid appears in bleeder hose and all air has been purged. Add fluid as necessary to maintain level in reservoir.

CAUTION:

Maintain at least 1/2" (1.27 cm) of brake fluid in the reservoir to prevent air from entering the master cylinder.

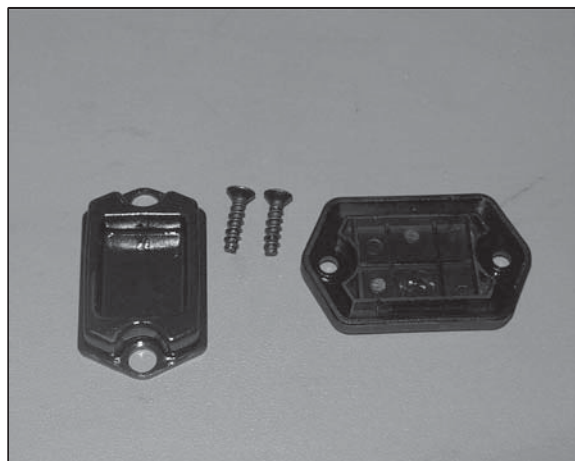
10. Tighten bleeder screw securely and remove bleeder hose.
11. Repeat procedure steps 5-9 for the front right caliper.
12. Repeat procedure steps 5-9 for the front left caliper.
13. Add brake fluid to the proper level.

Master Cylinder Fluid Level
Between MIN and MAX lines



14. Install diaphragm, cover, and screws. Tighten screws to specification.

Reservoir Cover Torque -
45 in. lbs. (.52 kg-m)



15. Field test machine at low speed before putting into service. Check for proper braking action and lever reserve. With lever firmly applied, lever reserve should be no less than 1/2" (1.3 cm) from handlebar.
16. Check brake system for fluid leaks and inspect all hoses and lines for wear or abrasion. Replace hose if wear or abrasion is found.

BRAKES

Master Cylinder Disassembly

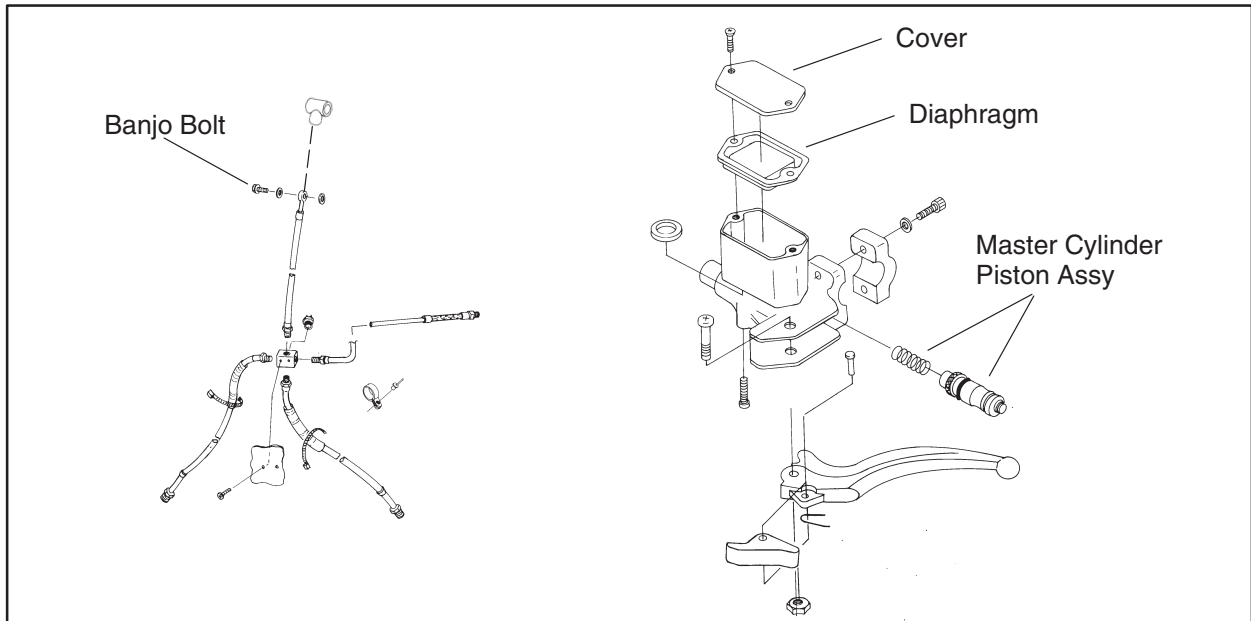
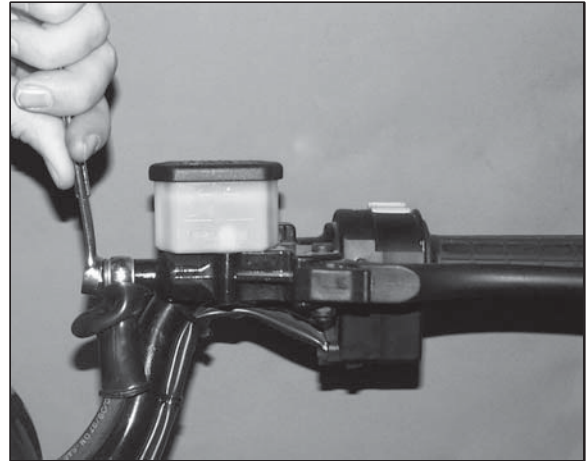
Disassembly

1. Clean master cylinder and reservoir assembly. Make sure you have a clean work area to disassemble brake components.
2. Place a shop towel under brake line connection at master cylinder. Loosen banjo bolt; remove bolt and sealing washers.

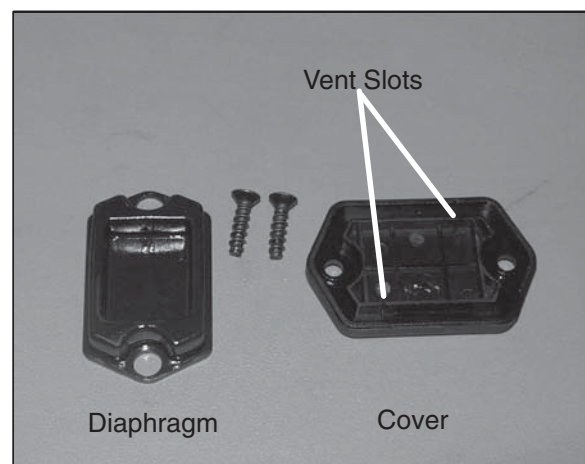
CAUTION:

Brake fluid will damage finished surfaces. Do not allow brake fluid to come in contact with finished surfaces.

3. Remove master cylinder from handlebars.



4. Remove cover and diaphragm from master cylinder and dispose of the fluid properly.
5. Be sure vents in cover are clean and unobstructed.
6. Remove brake lever.

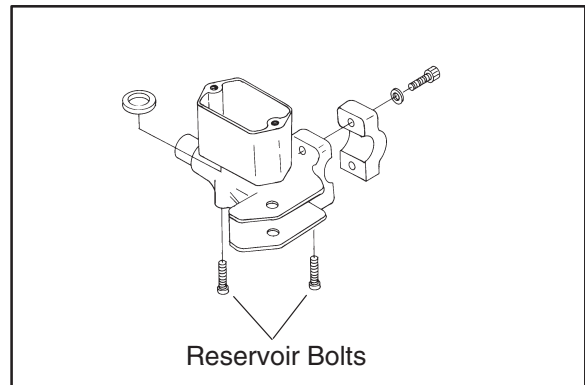


BRAKES

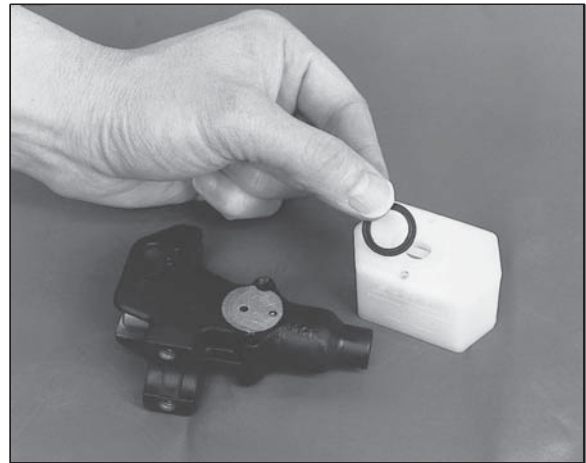
Master Cylinder

Disassembly Cont.

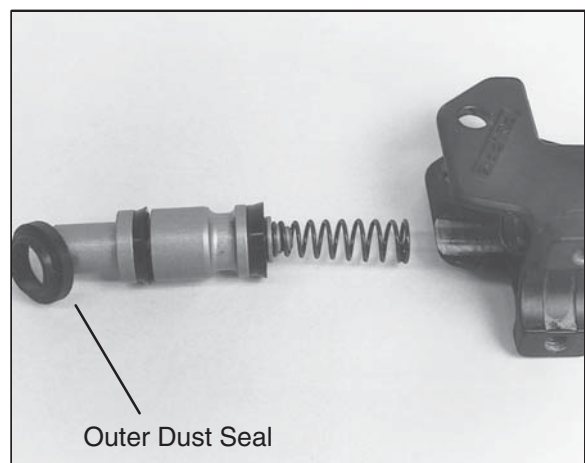
7. Remove reservoir screws and reservoir.



8. Inspect reservoir seal and replace if worn or damaged. Clean surfaces of the reservoir and master cylinder body. Be sure compensating (A) and supply (B) ports are clean before reassembly.



9. Remove outer dust seal. Be ready to catch piston assembly. **NOTE:** The return spring may force piston out when dust seal has been removed.
10. Remove piston assembly and return spring from master cylinder. Replace piston assembly and spring.



BRAKES

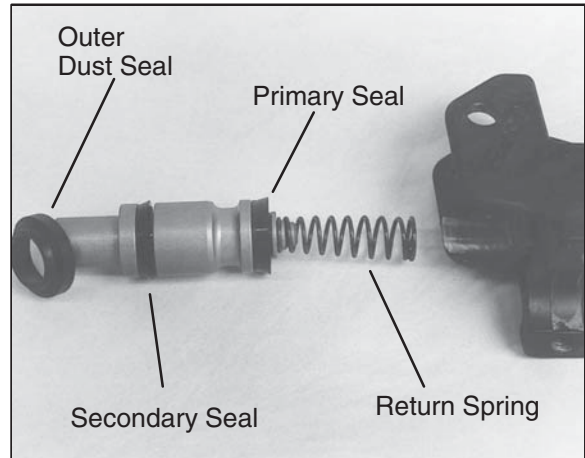
Master Cylinder Assembly

Inspection

1. Clean the master cylinder assembly with clean Dot 3 brake fluid, brake parts cleaner, or denatured alcohol. Dry thoroughly. Inspect the bore for nicks, scratches or wear. Replace if damage is evident or if worn.
2. Inspect parking brake for wear. If teeth or locking cam are worn, replace lever.

Assembly

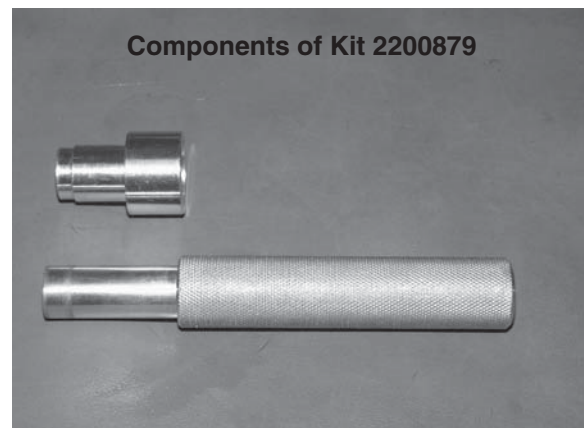
1. Install new primary and secondary seals on the piston.



2. Select the appropriate master cylinder piston installation tool and insert into master cylinder bore.

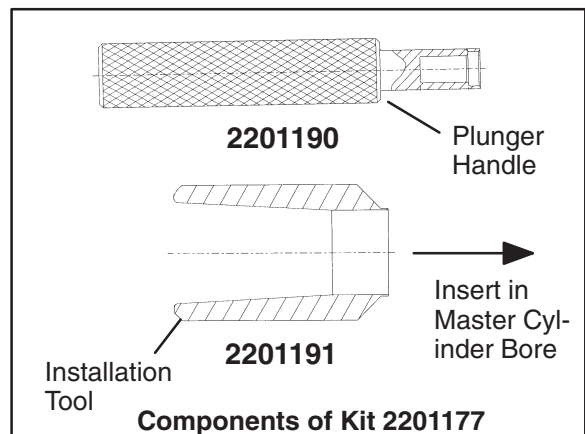
Type IV Master Cylinder (Hand Brake)
.750 (19mm)

Installation Tool #2200879



Master Cylinder (Aux. Brake)
.500 (13 mm)

Installation Tool #2201177



BRAKES

Master Cylinder

Assembly

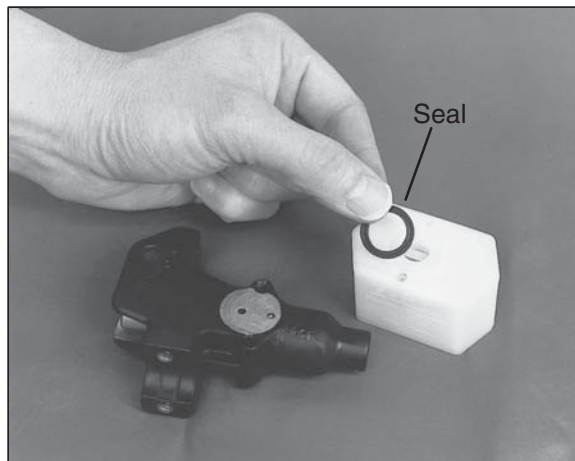
3. Dip piston in clean DOT 3 brake fluid, attach spring to piston, and install assembly into installation tool.

CAUTION:

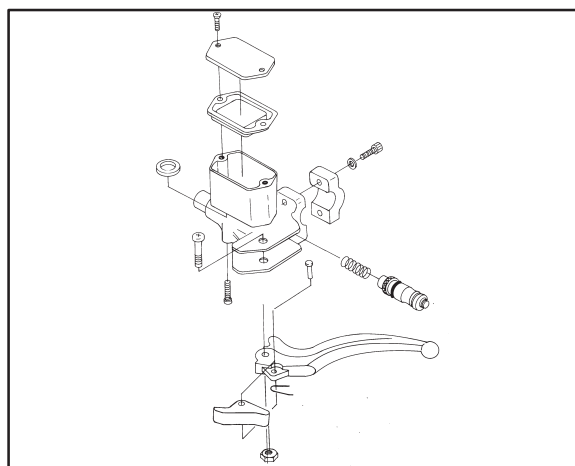
Do not attempt to install the piston without the required installation tool. Do not allow the lip of the seals to turn inside out or fold.

4. Push the piston assembly through the installation tool sleeve using the plunger handle (included with installation tool kit). Continue pushing until plunger is solid against installation tool. Both tools can now be removed.
5. Hold piston assembly inward, and install a new dust seal. Be sure dust seal is completely seated in the groove.

NOTE: The Piston assembly should spring back against the seal when compressed.



6. Install reservoir with new seal. Be careful to install and torque screws evenly.
7. Apply a light film of grease to the lever bolt. Install lever and tighten bolt securely.
8. Install parking brake lever assembly.



Installation

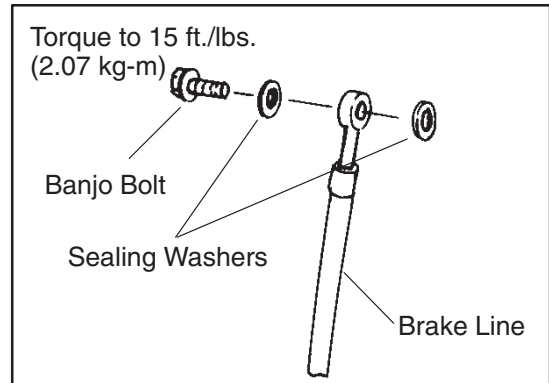
1. Install master cylinder on handlebars. Torque mounting bolts to 55 in. lbs. (6 Nm).

NOTE: To speed up the brake bleeding procedure the master cylinder can be purged of air before brake line is attached. Fill with DOT3 brake fluid and pump lever slowly two to three times with finger over the outlet end to purge master cylinder of air.

2. Place new sealing washers on each side of banjo line and torque banjo bolt to specification.

Master Cylinder Mounting Bolt
Torque 55 in. lbs. (6 Nm)

Brake Line Banjo Bolt Torque
15 ft. lbs. (21 Nm)



3. Fill reservoir with DOT 3 fluid.
4. Follow bleeding procedure on pages 9.7-9.8. Check all connections for leaks and repair if necessary.

Polaris DOT 3 Brake Fluid

PN 2870990

BRAKES

Front Pad Brake Service

Front Pad Removal

1. Elevate and support front of machine.

CAUTION:

Use care when supporting vehicle so that it does not tip or fall. Severe injury may occur if machine tips or falls.

2. Remove the front wheel. Loosen pad adjuster screw 2-3 turns.
3. Remove caliper from mounting bracket.

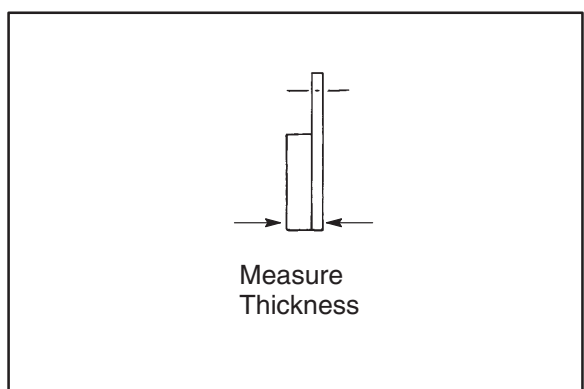
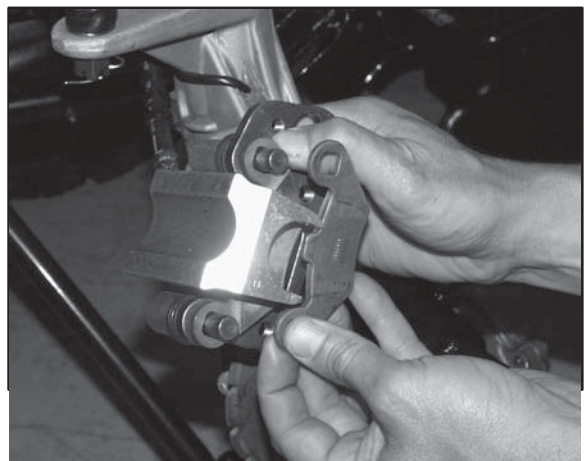
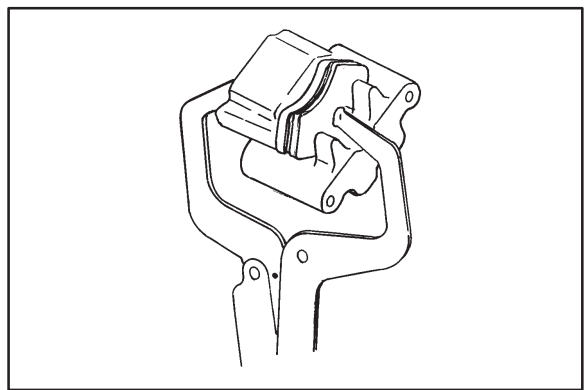
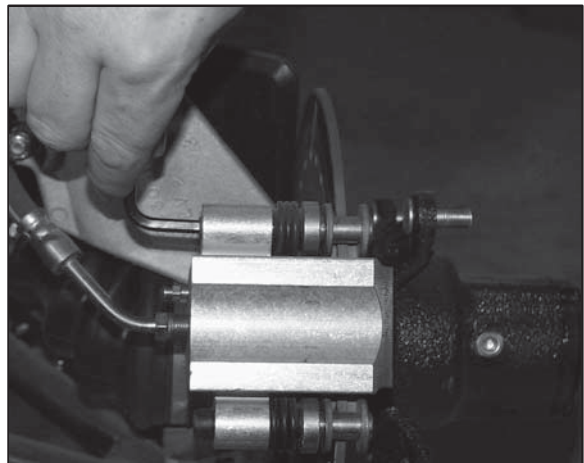
4. Push caliper piston into caliper bore slowly using a C-clamp or locking pliers with pads installed.

NOTE: Brake fluid will be forced through compensating port into master cylinder fluid reservoir when piston is pushed back into caliper. Remove excess fluid from reservoir as required.

5. Push upper pad retainer pin inward and slip outer brake pad past edge. Remove inner pad.

6. Measure the thickness of the pad material. Replace pads if worn beyond the service limit.

Front Brake Pad Thickness
New .275"/7.0 mm
Service Limit .150" / 3.81 mm

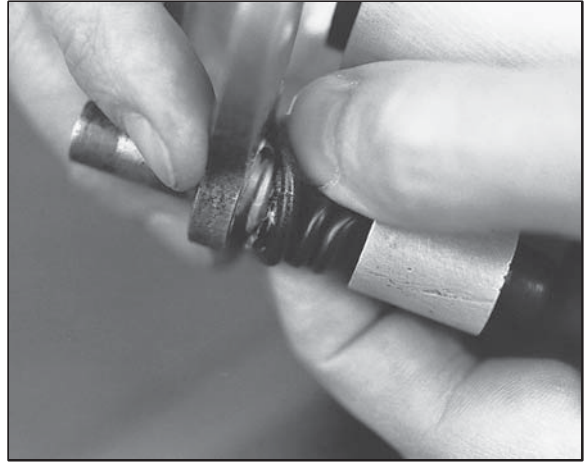


Assembly

1. Lubricate mounting bracket pins with a light film of Polaris Premium All Season Grease, and install rubber dust seal boots.

Polaris Premium All Season Grease
PN 2871423

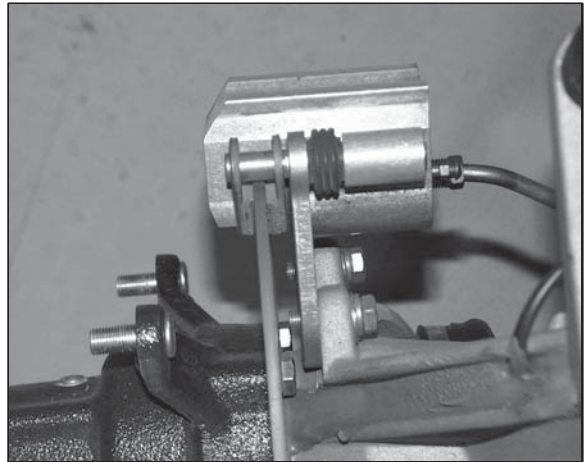
2. Compress mounting bracket and make sure dust seals are fully seated. Install pads with friction material facing each other. Be sure pads and disc are free of dirt or grease.



3. Install caliper on hub strut, and torque mounting bolts.

Front Caliper Mounting Bolts
Torque 18 ft. lbs. (24 Nm)

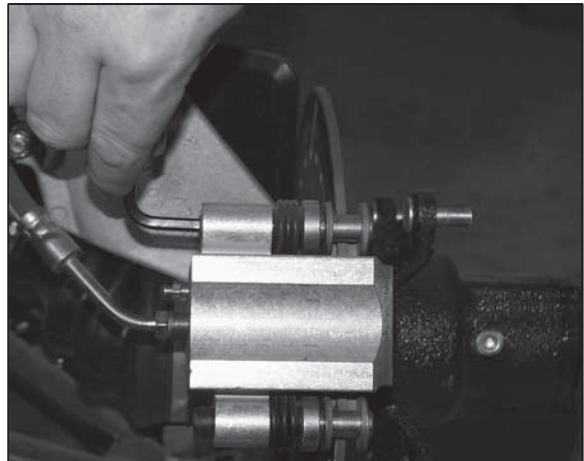
4. Slowly pump the brake lever until pressure has been built up. Maintain at least 1/2" (12.7 mm) of brake fluid in the reservoir to prevent air from entering the brake system.



Pad Adjustment

5. Install the adjuster screw and turn clockwise until stationary pad contacts disc, then back off 1/2 turn (counterclockwise).

Master Cylinder Fluid
Between MIN and MAX lines



BRAKES

Front Brake Disc Service

Assembly Cont.

6. Install wheels and torque wheel nuts.
7. It is recommended that a burnishing procedure be performed after installation of new brake pads to extend service life and reduce noise. Start machine and slowly increase speed to 30 mph. Gradually apply brakes to stop machine. Repeat procedure 10 times.

Front Wheel Nut Torque

15 ft. lbs. (20 Nm)

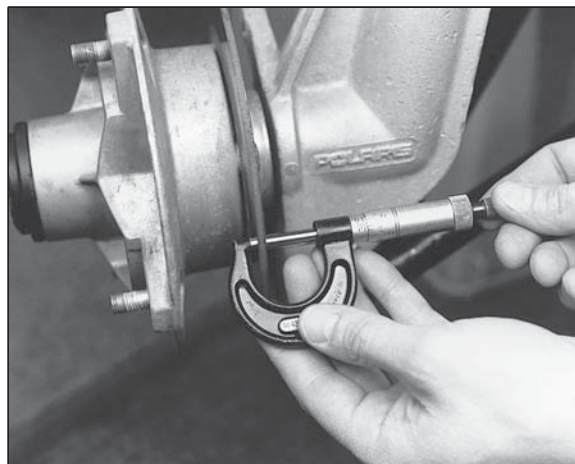
Front Disc Inspection

1. Visually inspect the brake disc for nicks, scratches, or damage.
2. Measure the disc thickness at 8 different points around the pad contact surface using a 0-1" micrometer. Replace disc if worn beyond service limit.

Brake Disc Thickness

New .150-.164" (3.810-4.166 mm)

Service Limit .140" / 3.556 mm



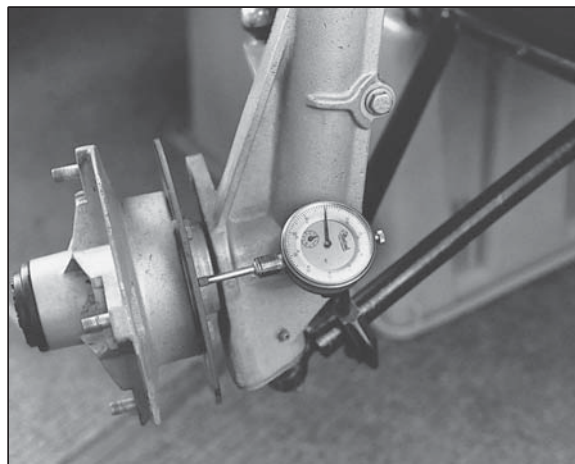
Brake Disc Thickness Variance

**Service Limit .002" (.051 mm)
difference between measurements.**

3. Mount dial indicator as shown to measure disc runout. Slowly rotate the disc and read total runout on the dial indicator. Replace the disc if runout exceeds specifications.

Brake Disc Runout

Service Limit .020" (.50 mm)



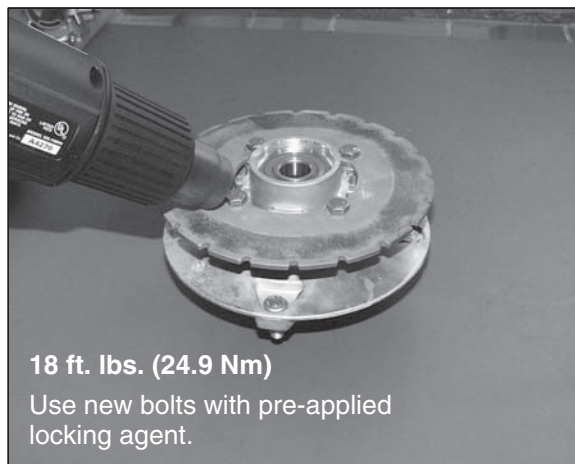
Front Brake Disc Removal / Replacement

1. Apply heat to the hub in the area of the brake disc mounting bolts to soften the bolt locking agent.
2. Remove bolts and disc.
3. Clean mating surface of disc and hub.
4. Install disc on hub.
5. Install new bolts and tighten to specified torque.

CAUTION: Always use new brake disc mounting bolts. The bolts have a pre-applied locking agent which is destroyed upon removal.

Front Brake Disc Mounting Bolt Torque

18 ft. lbs. (24.9 Nm)



BRAKES

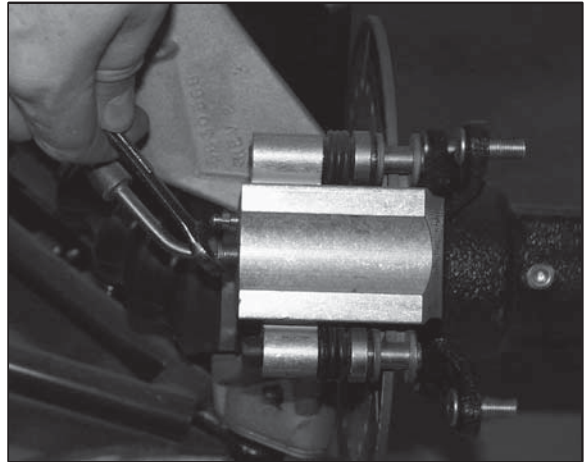
Front Caliper

Caliper Removal

CAUTION:

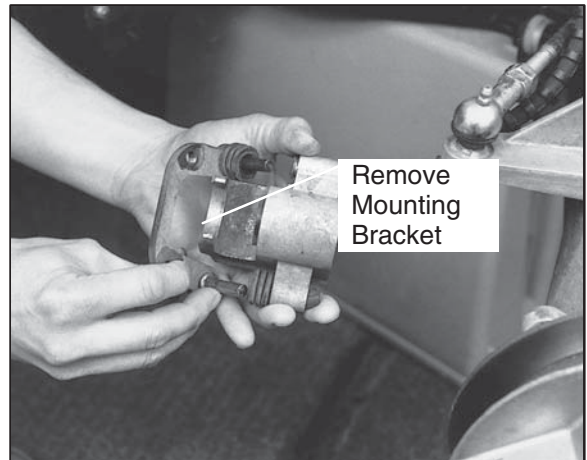
Use care when supporting vehicle so that it does not tip or fall. Severe injury may occur if machine tips or falls.

1. Remove brake pads. See page 9.14.
2. Using a line wrench, loosen and remove brake line to caliper. Place a container under caliper to catch fluid draining from brake line.
3. Remove brake caliper and drain fluid into container.



Caliper Disassembly

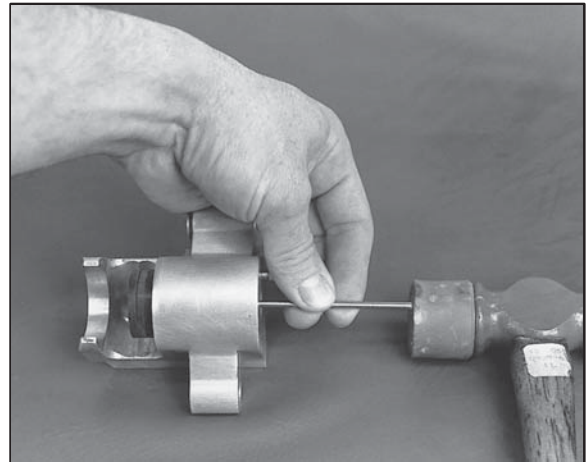
1. Remove brake pad adjuster screw.
2. Push upper pad retainer pin inward and slip brake pads past edge.
3. Remove mounting bracket, pin assembly and dust boot.



Disassembly Cont.

4. Remove piston, dust seal and piston seal.
5. Clean the caliper body, piston, and retaining bracket with brake cleaner or alcohol.

NOTE: Be sure to clean seal grooves in caliper body.

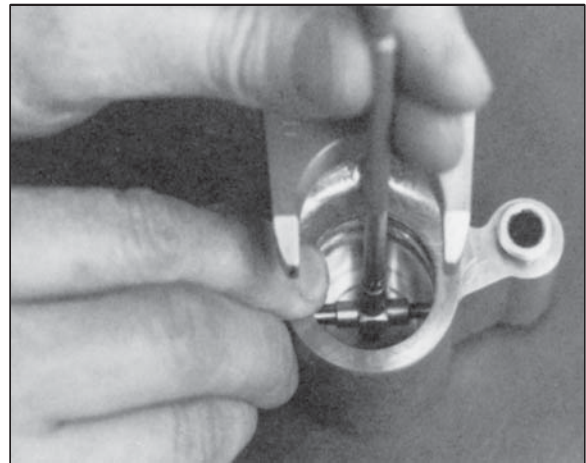


Inspection

1. Inspect caliper body for nicks, scratches or wear. Measure bore size and compare to specifications. Replace if damage is evident or if worn beyond service limit.

Front Caliper Piston Bore I.D.

Std. 1.191-1.192" (30.25-30.28 mm)
Service Limit 1.193" (30.30 mm)



2. Inspect piston for nicks, scratches, wear or damage. Measure diameter and replace if damaged or worn beyond service limit.

Front Caliper Piston O.D.

Std. 1.186-1.1875" (30.13-30.16 mm)
Service Limit 1.1855" (30.11 mm)



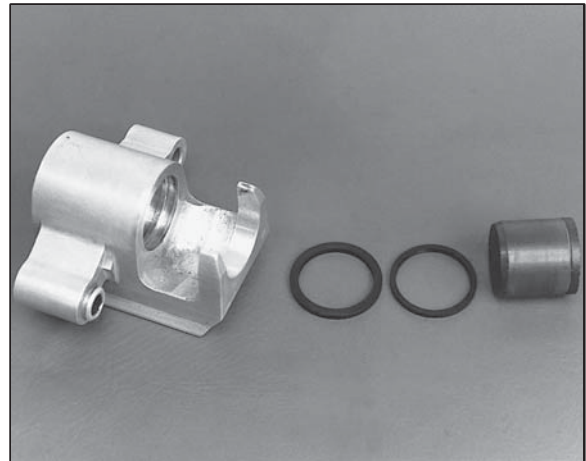
3. Inspect the brake disc and pads as outlined for brake pad replacement this section. See page 9.16.

BRAKES

Front Caliper

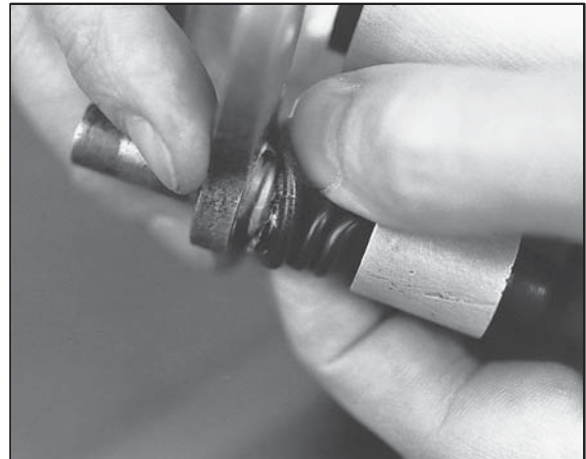
Assembly

1. Install new O-rings in the caliper body. Be sure groove is clean and free of residue or brakes may drag.
2. Coat piston with clean DOT 3 brake fluid. Install piston with a twisting motion while pushing inward. Piston should slide in and out of bore smoothly, with light resistance.

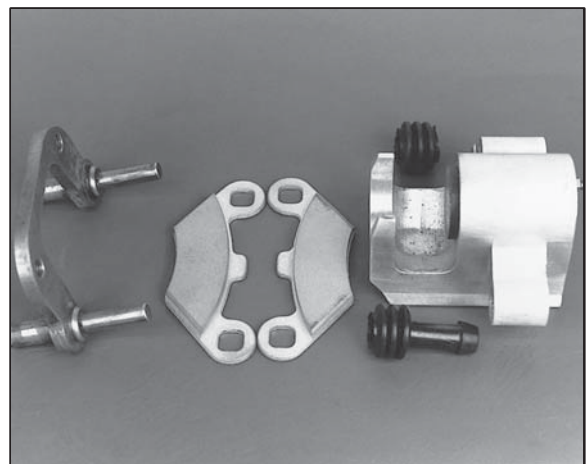


3. Lubricate the mounting bracket pins with Polaris Premium All Season Grease, and install the rubber dust seal boots.

Polaris Premium All Season Grease
PN 2871423



4. Compress the mounting bracket and make sure the dust seals are fully seated. Install the pads as shown on page 9.15. Clean the disc and pads with brake parts cleaner or denatured alcohol to remove any dirt, oil or grease.



Installation

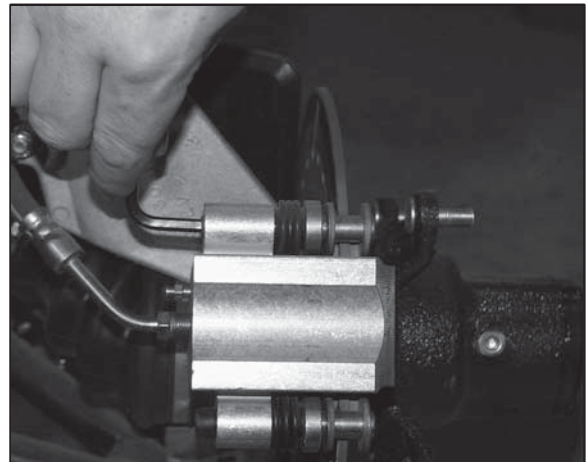
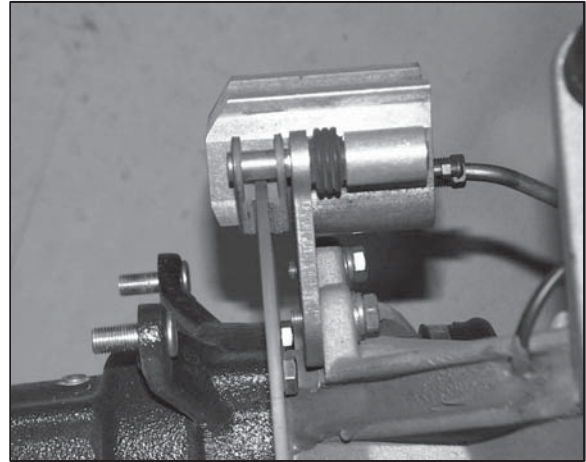
1. Install caliper on hub strut, and torque mounting bolts.

Front Caliper Mounting Bolt Torque
18 ft. lbs. (24.9 Nm)

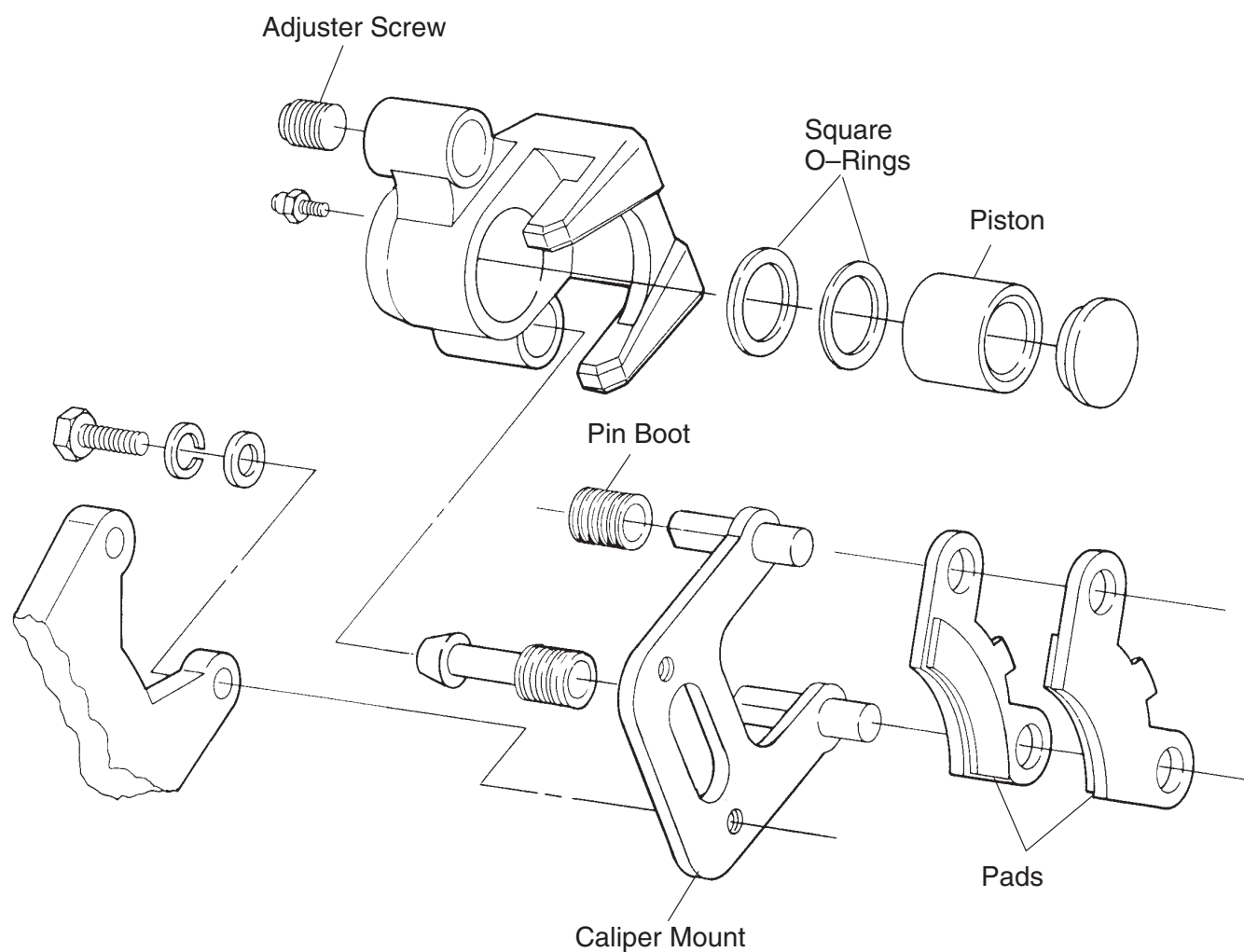
2. Install brake line and tighten securely with a line wrench.
3. Install the adjuster screw and turn until stationary pad contacts disc, then back off 1/2 turn.
4. Follow brake bleeding procedure outlined on pages 9.7-9.8.
5. Install wheels and torque wheel nuts to specification.

Front Wheel Nut Torque
15 ft. lbs. (20 Nm).

NOTE: If new brake pads are installed, it is recommended that a burnishing procedure be performed to extend pad service life and reduce noise. Start machine and slowly increase speed to 30 mph. Gradually apply brakes to stop machine. Repeat procedure 10 times.



BRAKES
Front Brake Caliper Exploded View



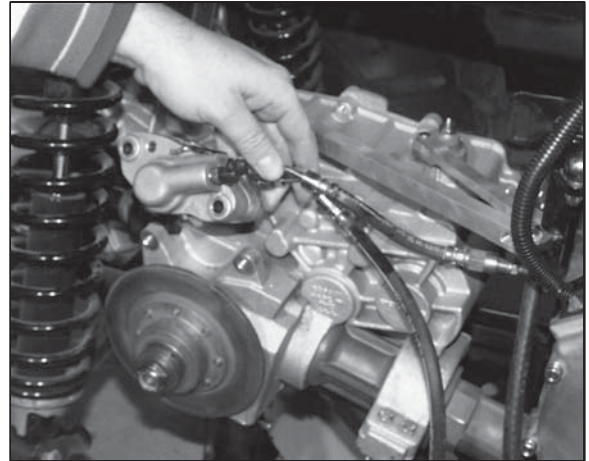
Brake Pad Removal

1. Remove caliper mounting bolts and lift caliper off of disc.

NOTE: When removing caliper, be careful not to damage brake line. Support caliper so as not to kink or bend brake line.

2. Push caliper piston into caliper bore slowly with pads installed.

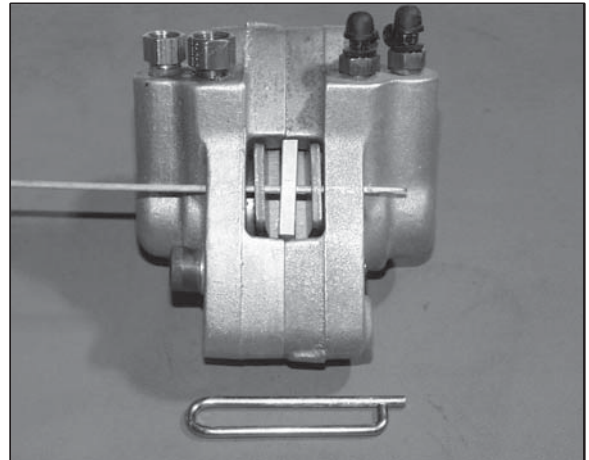
NOTE: Brake fluid will be forced through compensating port into master cylinder fluid reservoir when piston is pushed back into caliper. Remove excess fluid from reservoir as required.



3. Remove brake pad retaining pin, and pad spacer.

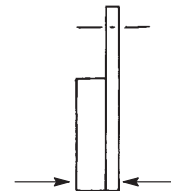
NOTE: This is a spring pin, do not spread apart farther than necessary to remove it.

4. Clean pad retainer pins with a wire brush.
5. Clean the caliper w/ brake cleaner or alcohol.



6. Measure the thickness of the pad material.
Replace pads if worn beyond the service limit.

Rear Brake Pad Thickness
New .275" (7.0 mm)
Service Limit .150" (3.81 mm)



Measure
Thickness

BRAKES

Dual Hydraulic Brake Caliper

Brake Pad Installation

1. Install new pads in caliper body. Be sure to put aluminum spacer between pads.
2. Install caliper and torque mounting bolts.

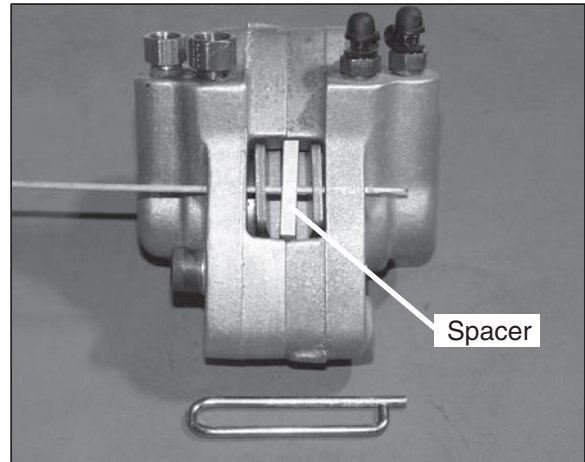
DH Brake Caliper

Torque 18 ft. lbs. (24.9 Nm)

3. Slowly pump the brake lever until pressure has been built up. Maintain at least 1/2" (12.7 mm) of brake fluid in the reservoir to prevent air from entering the master cylinder.

**Auxiliary Brake Master Cylinder
Fluid Level**

Between MIN and MAX lines



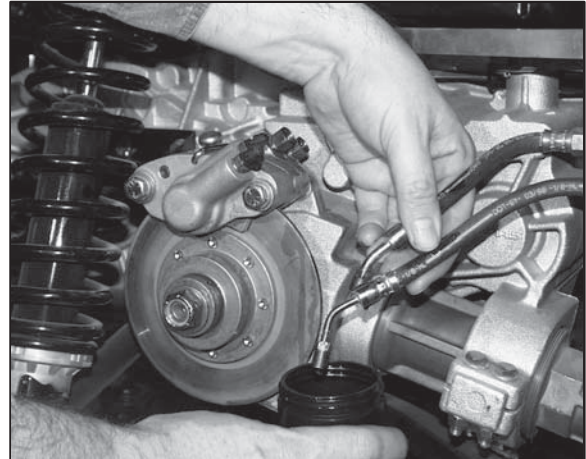
4. It is recommended that a burnishing procedure be performed after installation of new brake pads to extend service life and reduce noise. Start machine and slowly increase speed to 30 mph. Gradually apply brakes to stop machine. Repeat procedure 10 times.

BRAKES

Dual Hydraulic Brake Caliper

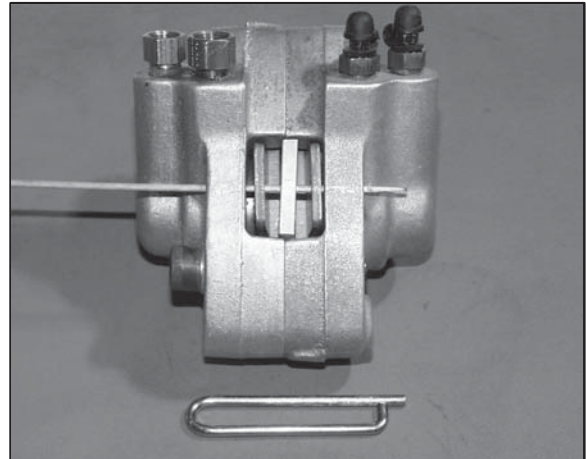
Removal/Inspection

1. Clean caliper area before removal.
2. Using a flare nut wrench, remove hand brake (inner) and auxiliary brake (outer) lines. Place a container to catch brake fluid draining from brake lines.
3. Remove caliper.

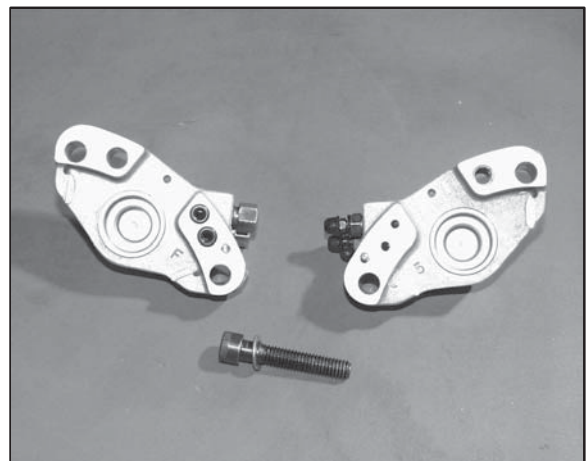


4. Remove brake pad retaining pin pads, and pad spacer.

NOTE: This is a spring pin. Do not spread apart farther than necessary to remove it.



5. Remove Allen head screw and separate caliper halves and remove pistons with piston pliers.
6. Remove O-rings and clean O-ring grooves.
7. Clean disc, caliper body, and pistons with brake cleaner or alcohol.

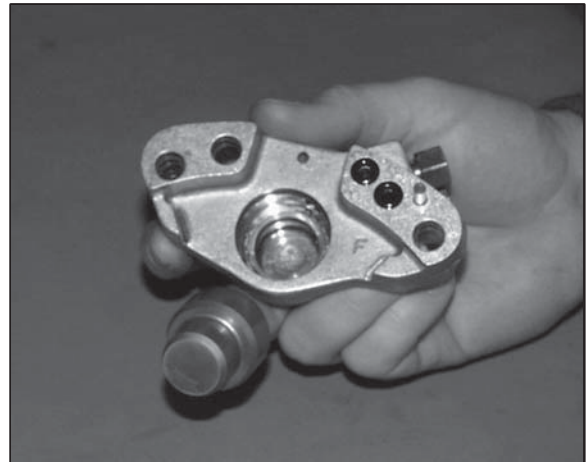


BRAKES

Dual Hydraulic Brake Caliper

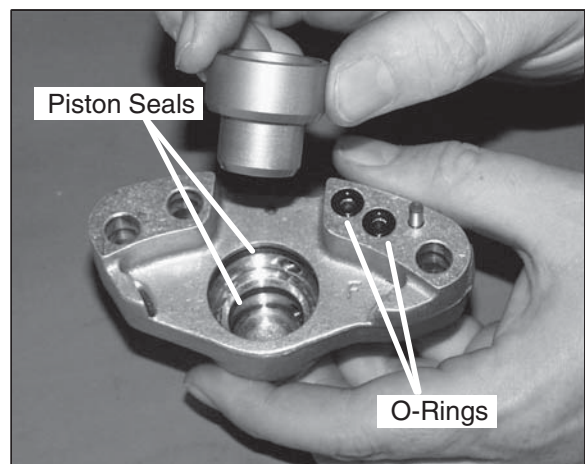
Removal/Inspection Cont.

8. Inspect caliper piston bore for scratches, severe corrosion, or galling and replace if necessary.
9. Inspect surface of caliper piston for nicks, scratches, or damage and replace if necessary.



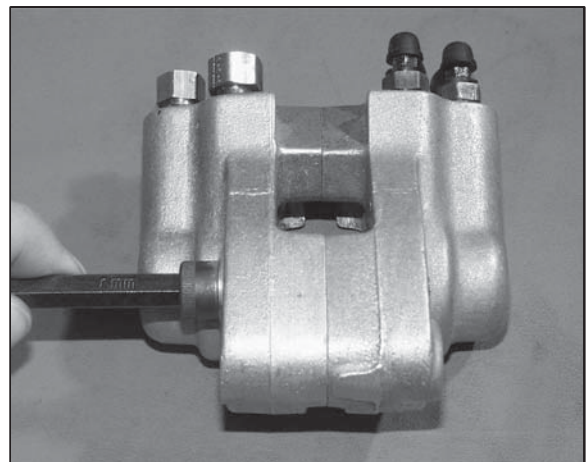
Assembly

1. Install new O-rings in caliper body (2 piston seals per caliper half). Be sure O-ring grooves are thoroughly cleaned of all residue, or piston may bind in bore. Apply brake fluid to pistons and install carefully with a twisting motion to ease assembly until fully seated.
2. Install new O-rings between caliper halves.
3. Carefully assemble caliper body, making sure O-rings are properly positioned in groove. Torque body screw evenly to 18 ft. lbs.



Caliper Body Torque

18 ft. lbs. (24.9 Nm)



BRAKES

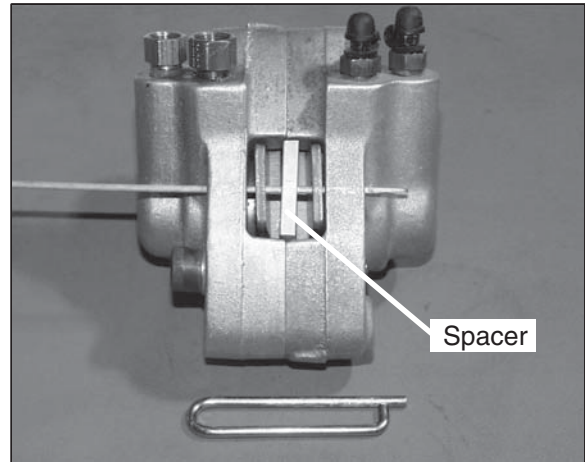
Dual Hydraulic Brake Caliper

Assembly Cont.

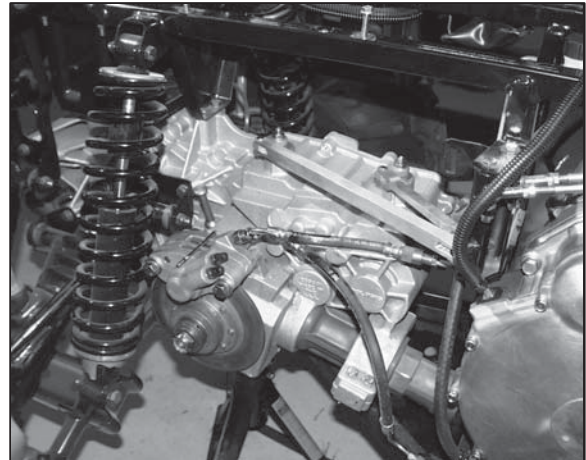
4. Install brake pads in caliper body with friction material facing each other. If equipped with a pad spacer, install the spacer between the pads. Install retaining pin through outer pad, pad spacer and inner pad.
5. Install caliper and torque mounting bolts.

Caliper Mounting Bolt Torque

18 ft. lbs. (24.9 Nm)



6. Install brake lines and tighten with a flare nut wrench.
7. Follow bleeding procedure outlined on pages 9.7-9.8 of this section and refer to system overview and illustration on page 9.5.
8. Field test unit for proper braking action before putting into service. Inspect for fluid leaks and firm brakes. Make sure the brake is not dragging when lever is released. If the brake drags, re-check assembly and installation.



BRAKES

Dual Hydraulic Brake Disc

Inspection

1. Visually inspect disc for scoring, scratches, or gouges. Replace the disc if any deep scratches are evident.
2. Use a 0-1" micrometer and measure disc thickness at 8 different points around perimeter of disc. Replace disc if worn beyond service limit.

Brake Disc Thickness

New .177-.187" (4.496-4.750 mm)

Service Limit .167" (4.242 mm)

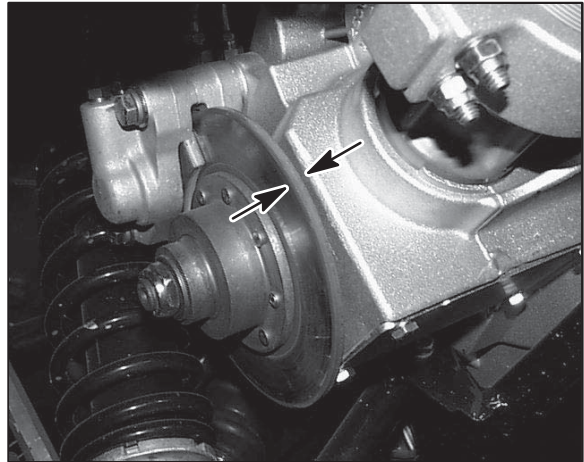
Brake Disc Thickness Variance

**Service Limit .002" (.051 mm)
difference between measurements**

3. Mount dial indicator and measure disc runout. Replace the disc if runout exceeds specifications.

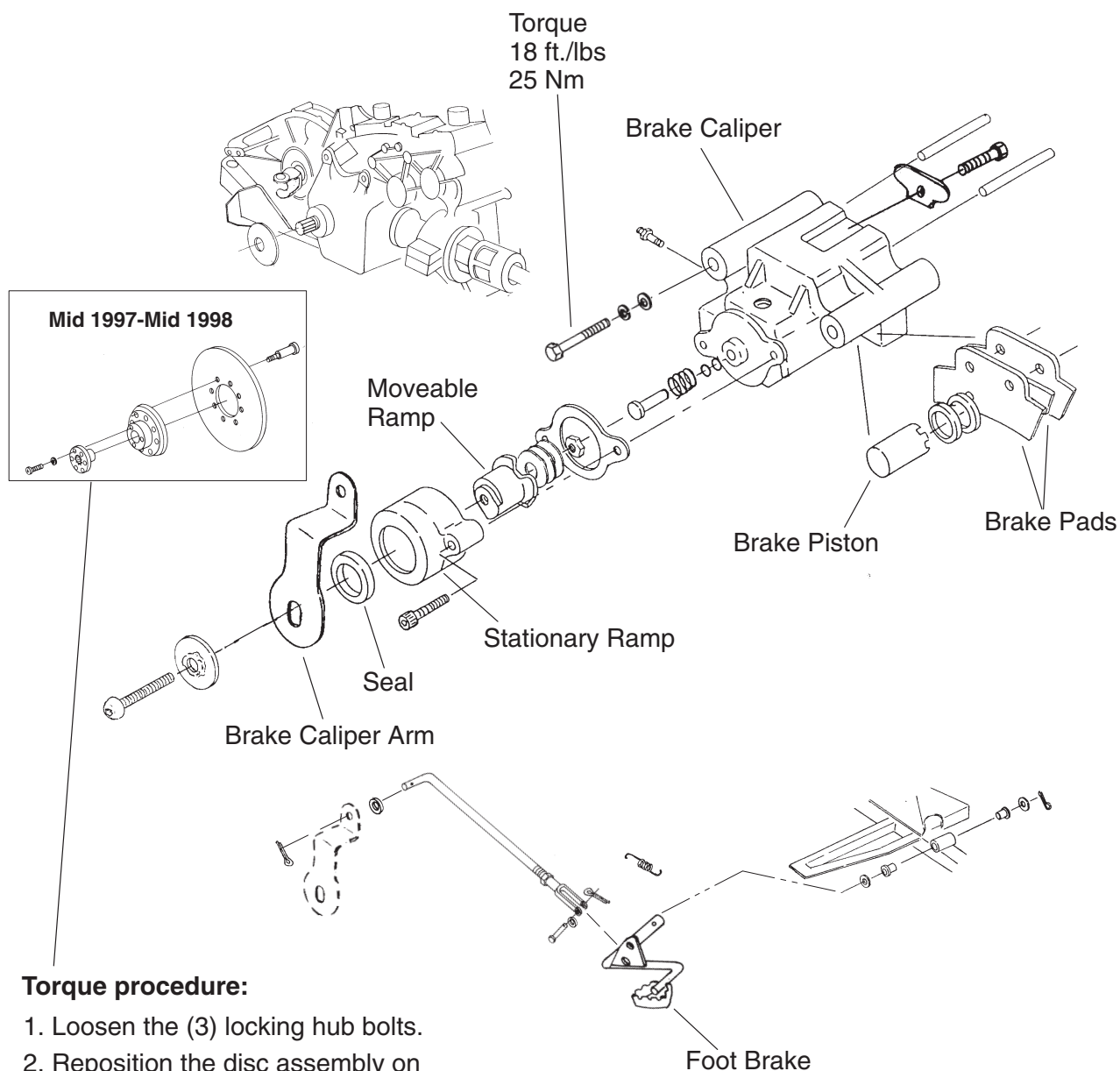
Brake Disc Runout

Service Limit .010" (.25 mm)



BRAKES

1996-1997 Rear Auxiliary Brake Exploded View

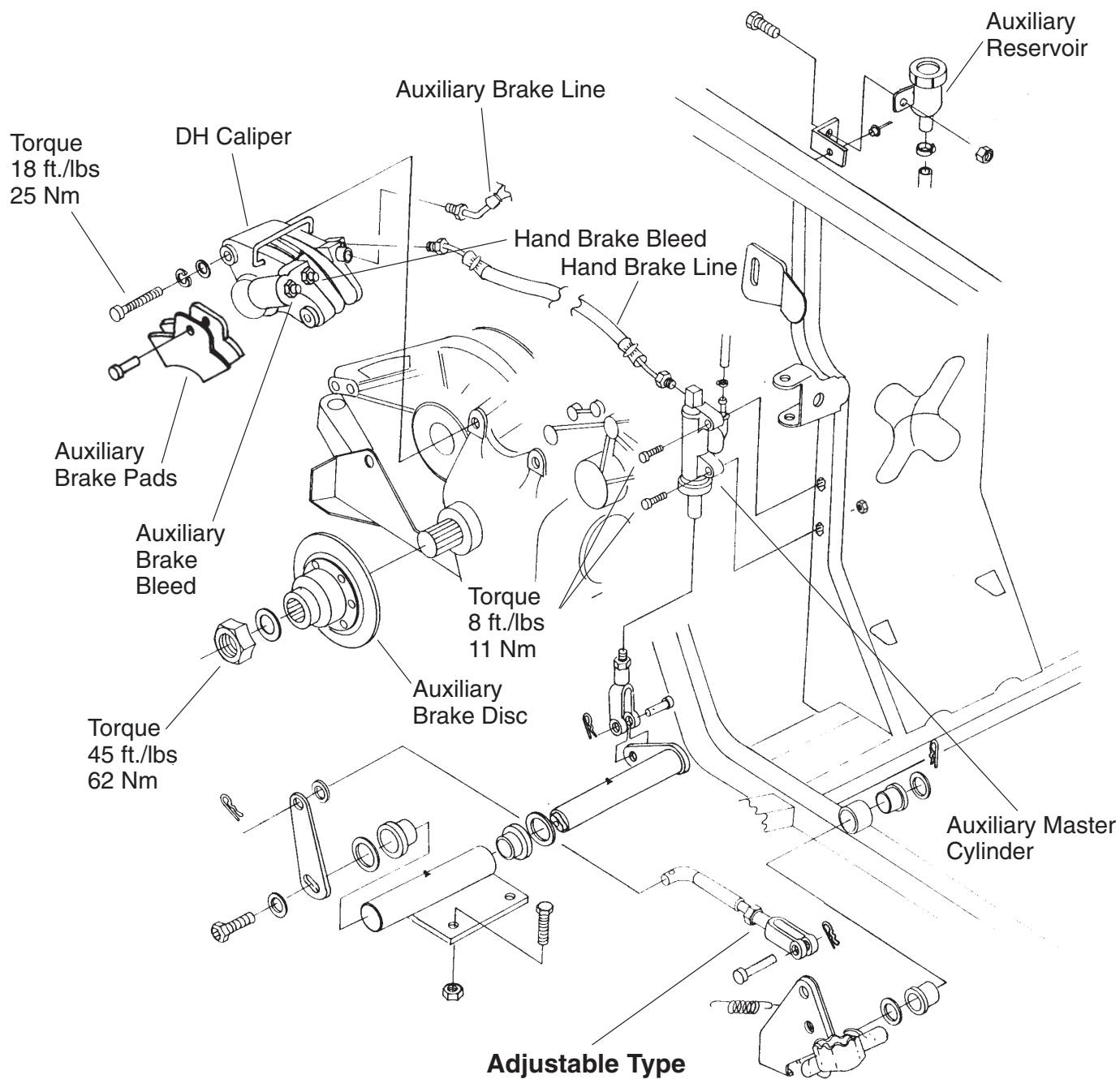


Torque procedure:

1. Loosen the (3) locking hub bolts.
2. Reposition the disc assembly on the shaft so the disc contacts the fixed pad on one side and the brake hub on the other.
3. Tighten the bolts finger tight, then torque the bolts in sequence to 8 ft. lbs. (11 Nm), then 12 ft. lbs. (17 Nm), then 16 ft. lbs. (22 Nm)

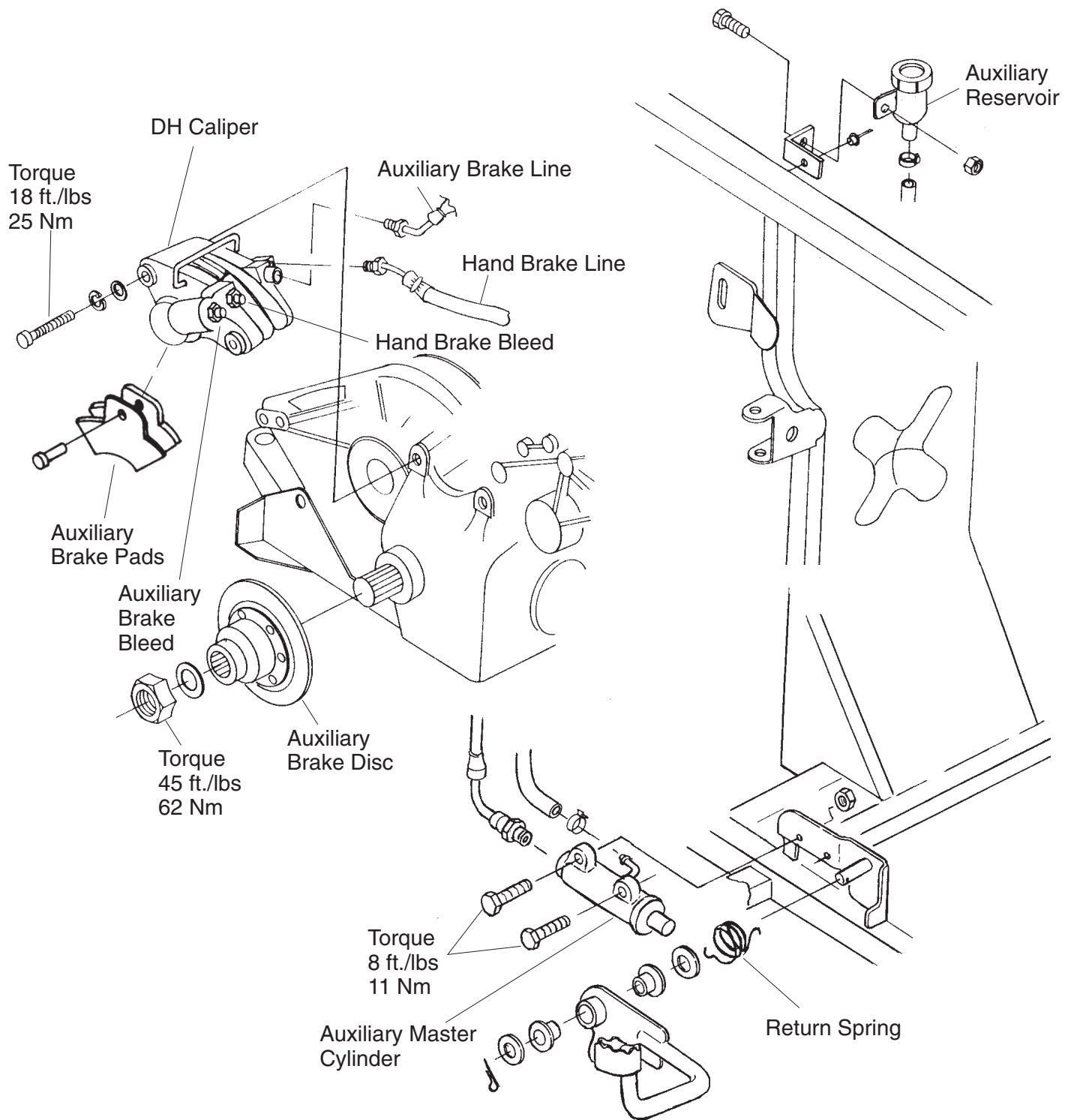
BRAKES

Mid 1997-1998 Rear Auxiliary Brake Exploded View



BRAKES

1998, 1999, 2000 Rear Auxiliary Brake Exploded View



Non-Adjustable Type

BRAKES

Troubleshooting

Brakes Squeal

- Dirty/contaminated friction pads
- Improper alignment
- Worn disc
- Worn disc splines

Poor Brake Performance

- Air in system
- Water in system (brake fluid contaminated)
- Caliper/disc misaligned
- Caliper dirty or damaged
- Brake line damaged or lining ruptured
- Worn disc and/or friction pads
- Incorrectly adjusted lever
- Incorrectly adjusted stationary pad
- Worn or damaged master cylinder or components
- Improper clearance between lever and switch

Lever Vibration

- Disc damaged
- Disc worn (runout or thickness variance exceeds service limit)

Caliper Overheats (Brakes Drag)

- Compensating port plugged
- Pad clearance set incorrectly
- Auxiliary brake pedal incorrectly adjusted
- Brake lever or pedal binding or unable to return fully
- Parking brake left on
- Residue build up under caliper seals
- Operator riding brakes

Brakes Lock

- Alignment of caliper to disc.