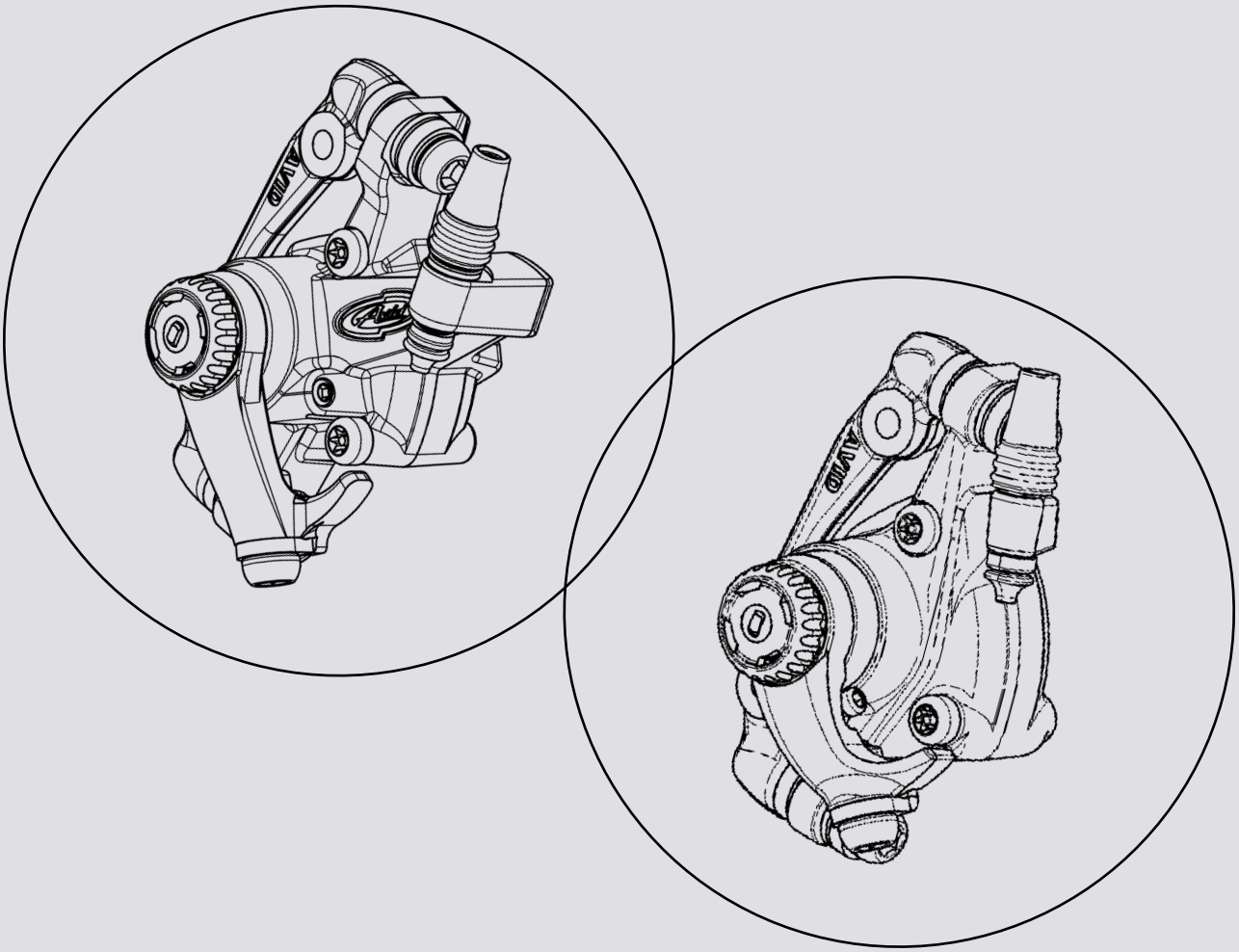
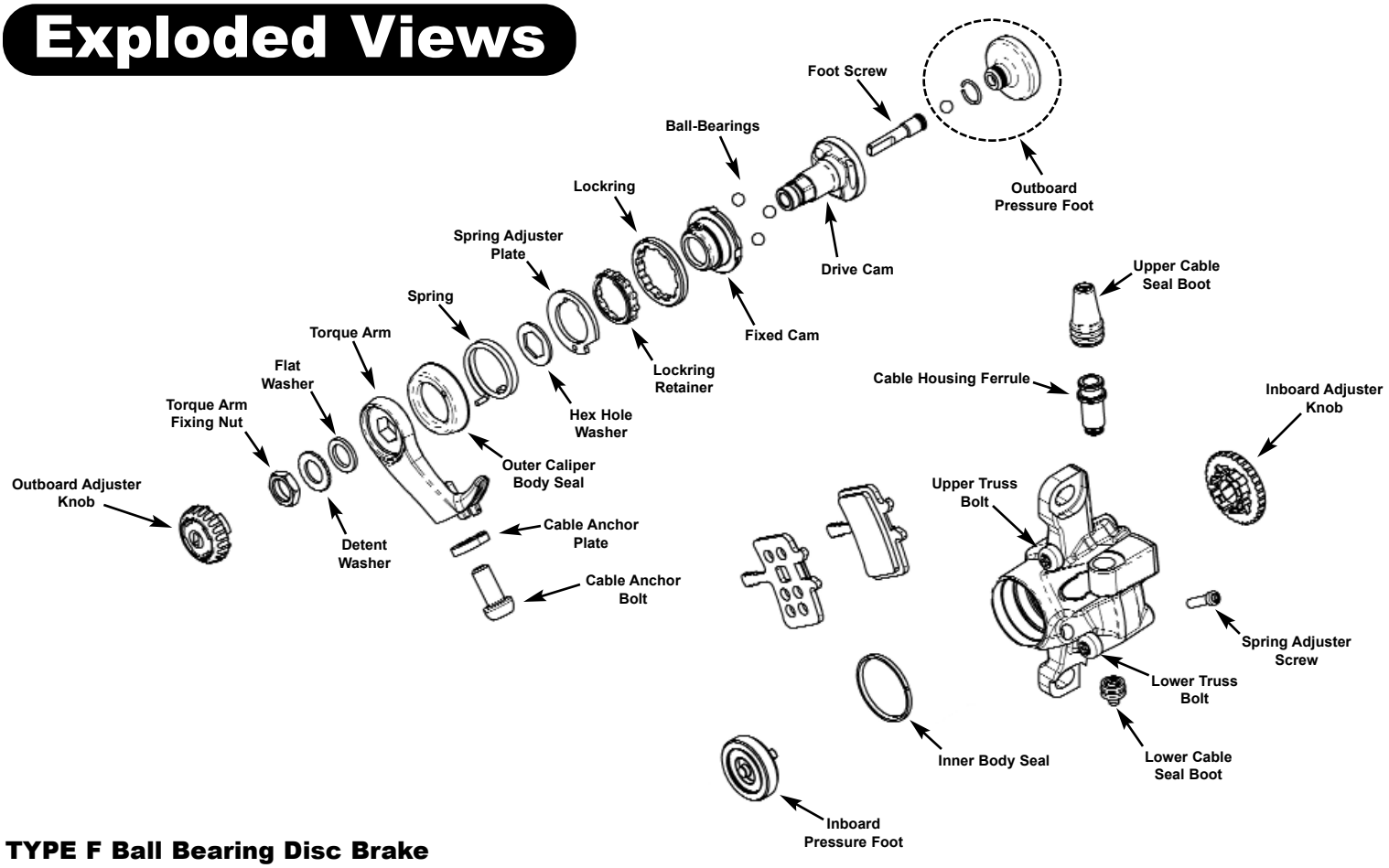
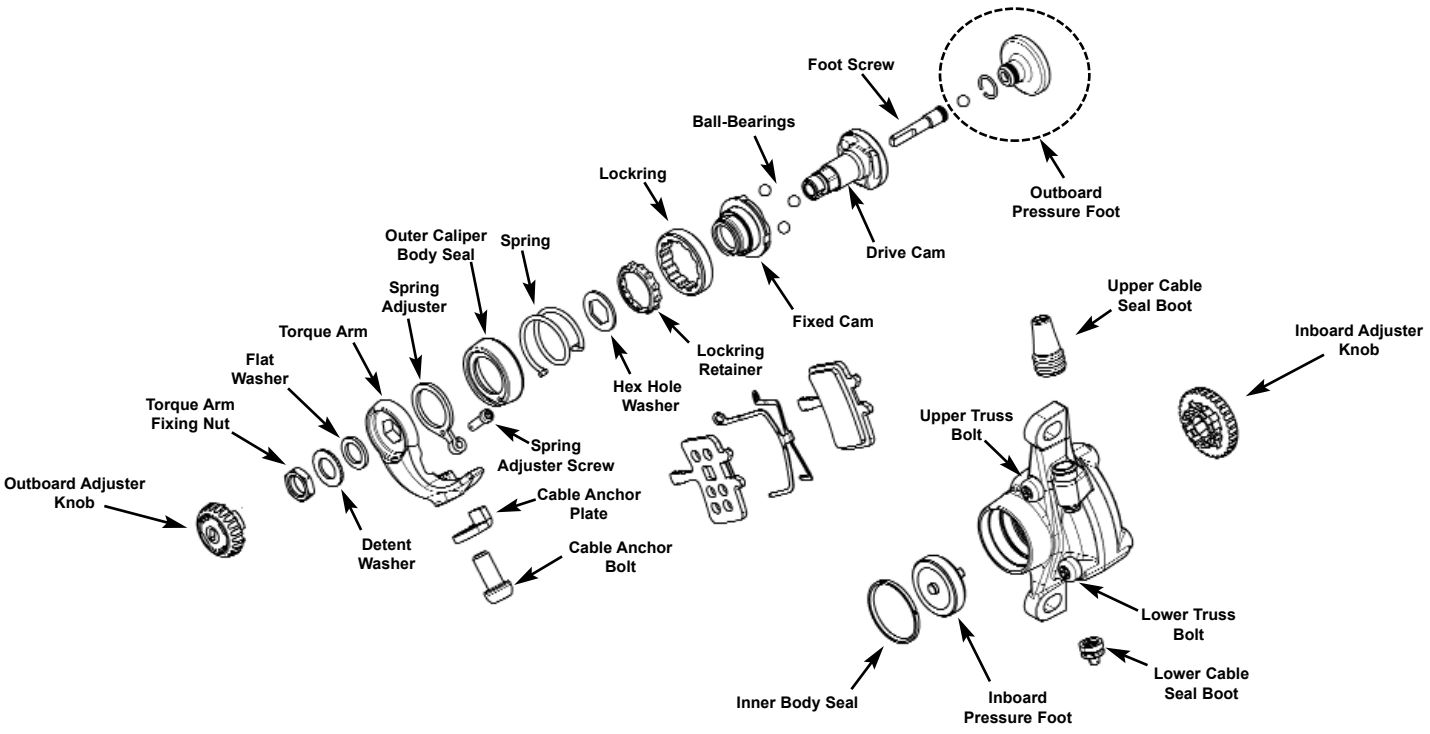


BALL BEARING DISC BRAKE SERVICE GUIDE

Exploded Views



TYPE F Ball Bearing Disc Brake



TYPE N Ball Bearing Disc Brake

TABLE OF CONTENTS

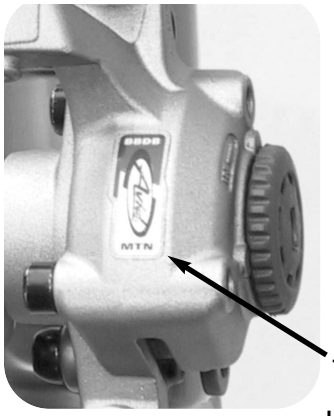
Introduction

WARNING

Brakes are a safety-critical item on a bicycle. Improper re-assembly of this or any other brake component can result in loss of control or an accident, which could lead to a serious injury or death. The work detailed in this guide is intended for and should only be performed by professional bike mechanics.

This overhaul guide covers the TYPE F and TYPE N models of Avid's Ball Bearing Disc Brake. While these brakes are very similar in design, there are some differences in assembly and internal parts. As you follow the guide, any steps that are the same will only contain pictures for the TYPE N brake. One easy way to tell if you are working on a TYPE F or TYPE N caliper is this:

TYPE F calipers have a red Avid logo badge here



TYPE N calipers have a red and white Avid logo decal on the back of the body.

The most common problem that doesn't require disassembly:

A common BBDB call we get is about a caliper with the outboard pressure foot dislodged. If the outboard adjustment knob is turned too far clockwise without the rotor in the caliper (wheel off or caliper removed), the outboard pressure foot can be pushed out of the drive cam and float free in the caliper body. The brake is not broken and it doesn't need to be disassembled to replace the pressure foot.

To replace the pressure foot, turn the outboard adjuster knob counter clockwise until it stops. If the knob doesn't stop, then the footscrew (you can see the end of the footscrew in the center of the knob) has become disengaged from the knob, and possibly from the threads inside the drive cam. In this case, remove the knob, then use some small needle-nosed pliers or a Schrader-valve tool to turn the foot screw all the way back out until it stops. Once this is accomplished the pressure foot can be replaced. Relocate the pressure foot into the bore, then give it a firm push in the center. It will "click" back into place.

If you removed the outer knob, replace it, and you're done!

Torque Specs:

Lockring	***140-150 In. Lbs***
Torque Arm Fixing Nut	***55-60 In. Lbs***
Truss Bolts	***50-55 In. Lbs***

Tools needed:

3/8 drive ratchet, Avid MDT-1 lockring tool, 11mm socket, 11mm box-end wrench, 1.5mm and 5mm hex wrenches, flat-blade screwdriver, torque wrench (50-150 In. Lbs range), small needle-nose pliers or a Schrader-valve tool.

Shop supplies:

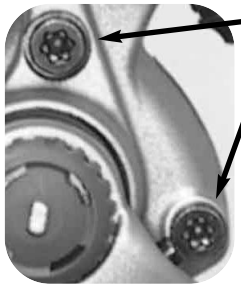
Degreaser or solvent, mild soap, grease (see below for grease recommendations), a small brush, and thread-lock such as *Loctite 272*.

Recommended Grease:

Use a grease with a minimum temperature rating of 400 degrees Farenheit such as *Tri-Flow™ High Performance Synthetic Grease with Teflon®* or *Pro-Gold EPX Cycle Grease.*

About the Truss Bolts:

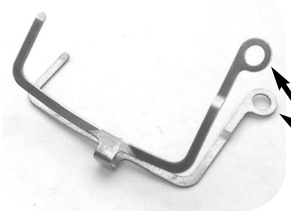
Avid's Ball Bearing Disc Brake calipers are a one piece body that incorporate 2 Truss Bolts for strength. These bolts have tamper-proof heads, and are not be removed for any reason.

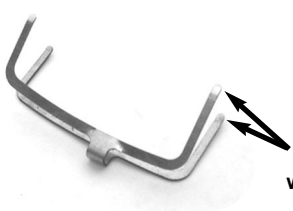


These bolts should not be removed for any reason! If you have the proper tool, you can check that the torque is 50-55 In. Lbs. Otherwise, don't touch them!

About the Spreader Clip:

Avid's TYPE N Ball Bearing Disc Brakes utilize a pad spreader clip that sits between the pads (instead of magnets) to keep them retracted. The original spreader clip had two ears with loops that protruded from the caliper, but we have since changed the design. The new clip works exactly the same way, but has nothing sticking out of the caliper.





Disassembly

STEP 1: PREPARE FOR DISASSEMBLY

Remove the cable anchor bolt and plate, then pull the cable housing and inner wire free of the caliper. Remove the boots, and, if working on a TYPE F caliper, the separate housing ferrule in the cable stop. Also on TYPE F calipers, use a 2.5mm hex wrench to completely remove the spring tension adjustment screw.

TYPE F

TYPE N

STEP 2: REMOVE THE OUTBOARD KNOB

A.Turn the outboard pad knob counter-clockwise until it stops, then back in clockwise 3 full turns to recess the footscrew in the knob.

NOTE:
Turning the outboard knob more than 3 full turns can dislodge the outer pressure foot from the drive cam. If this happens, proceed with removing the knob. After step 2-C, the pressure foot can be pressed back into place.

B. Remove the knob with a small flat-blade screwdriver, being careful not to mar the surface of the torque arm.

C. Turn the now exposed footscrew back out (counter-clockwise) until it stops.

TYPE F *TYPE N*

STEP 3: INSTALL PAD SPACER

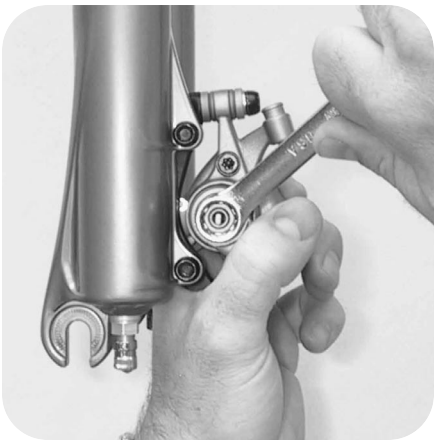
Turn out the inboard adjuster (counter-clockwise) until there is enough clearance between the pads for a 2mm pad spacer. Insert the spacer, then turn in the inboard knob (clockwise) until it stops. Check the torque arm for movement. If it moves, turn the footscrew clockwise until it is secure.

NOTE:
If you need to fabricate a pad spacer, be sure to use cardboard or something similar that will not damage the surface of the friction material.

STEP 4: REMOVE TORQUE ARM

A. Place your thumb over the spring loaded torque arm as shown and hold securely.

B. Remove the torque arm fixing nut using an 11mm wrench.



C. While continuing to hold the torque arm, remove the indexed washer and flat washer.

TYPE F ***TYPE N***

D. **TYPE F** - Remove the torque arm, outer body seal, and spring together, then remove the hex-hole washer.

E. **TYPE F** - Tip the bike to allow the spring adjuster plate and lockring retainer to fall into your hand.

D. **TYPE N** - Remove the torque arm, spring adjuster, outer body seal, and spring together, then remove the hex-hole washer.

E. **TYPE N** - Tip the bike and allow the lockring retainer to fall into your hand.

TYPE F ***TYPE N***

STEP 5: FREE LOCKRING
Using the Avid MDT-1 Lockring Tool and a 3/8 drive ratchet, break the lockring free. Now remove the caliper from the bike.

STEP 6: REMOVE LOCKRING
Using the MDT-1 by hand, completely remove the lockring.

STEP 7: REMOVE CAMS
Pull out the cam/outboard pressure foot assembly. Once this assembly is out, remove the pads and pad spacer from the caliper.

STEP 8: REMOVE INBOARD ADJUSTER KNOB
Using a small flat blade screwdriver, remove the inboard adjuster knob.

TYPE F *TYPE N*

STEP 9: REMOVE INBOARD PRESSURE FOOT

Turn the inboard pressure foot clockwise until it is free, then remove it through the main body bore.

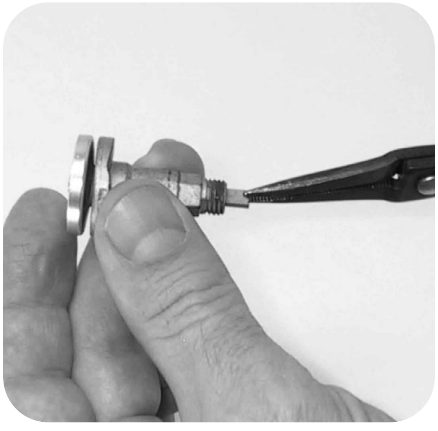
STEP 10. REMOVE INNER BODY SEAL

There is one split in this seal for installation and removal purposes. Engage the seal at the split with an x-acto knife or other small sharp tool and carefully remove it.

STEP 11: CAM DISASSEMBLY

A. Lift the fixed cam off of the drive cam, being careful not to lose the 3 ball bearings.

B. Use small needle-nose pliers or a Schrader valve core tool to turn the foot screw clockwise until the outboard pressure foot is driven out of the drive cam. Continue turning the foot screw until it is completely unthreaded from the drive cam.

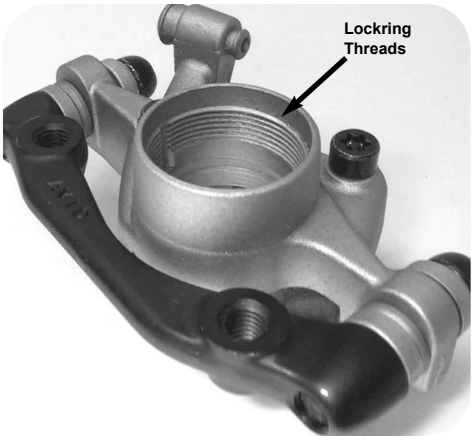


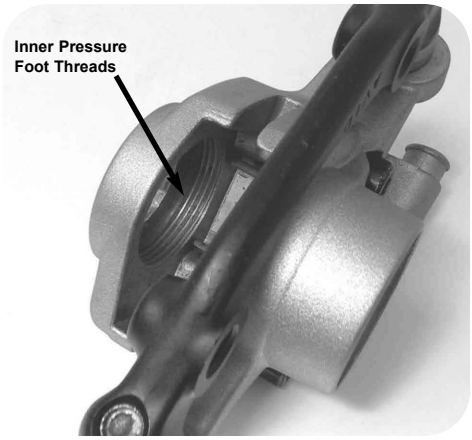
Cleaning&Inspection

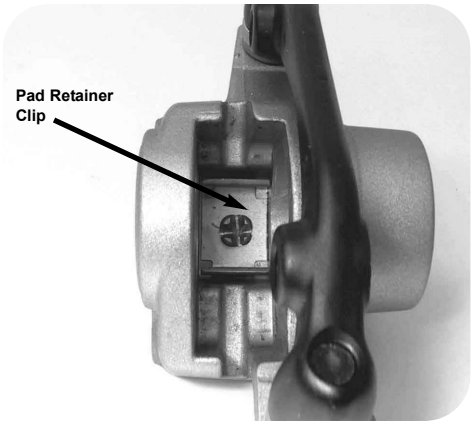
STEP 1: CLEANING
Clean all metal parts in solvent, including the cable anchor bolt and plate, and for TYPE F brakes, the separate cable housing ferrule. Clean the cable seal boots, outer caliper body seal, and inner body seal in mild soap and water.

Rinse and dry all parts completely.

STEP 2: CALIPER BODY INSPECTION
Inspect the caliper body for any damage, paying special attention to all threaded surfaces and the pad retainer clip in the top of the caliper body.







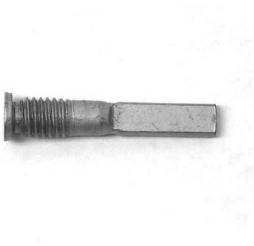
STEP 3: SMALL PART INSPECTION

Inspect the small parts as follows:

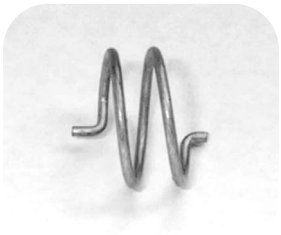
-check ball bearings and cam ramps for excessive wear.

NOTE: It is normal to see ball tracks in the cam ramps.

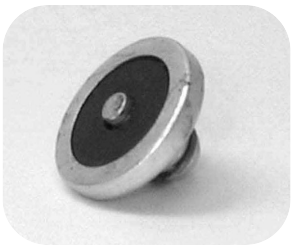
-check the threads of the drive cam, foot screw, lockring, inner pressure foot, cable anchor bolt, and torque arm fixing nut for damage.

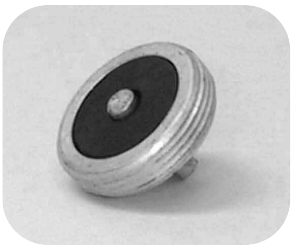


-check the spring for any signs of damage.



-on TYPE F calipers, make sure the pressure foot magnets are present and working.



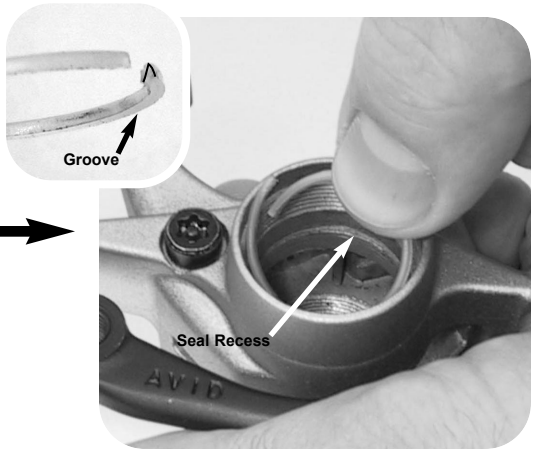


-check the inner body seal, outer body seal, and cable seal boots for nicks, tears, or cracking.

Assembly

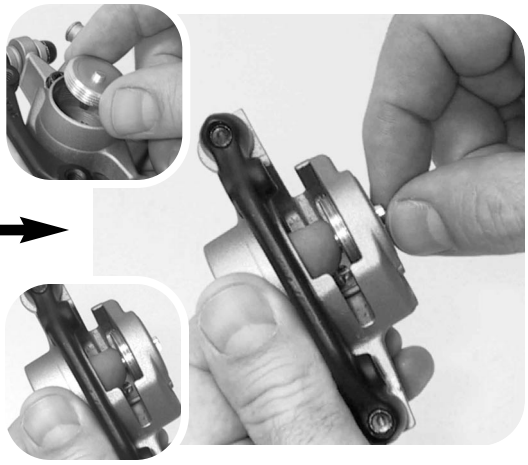
TYPE F *TYPE N*

STEP 1: INSTALL INNER BODY SEAL
Orient the inner body seal with the groove facing down, then insert it into the main body bore. Locate the seal into its recess and seat it completely with your finger.



STEP 2: GREASE THE BODY
Very lightly grease the entire body bore, including the lockring threads, the inner pressure foot threads, and the inner knob detents.

STEP 3: INSTALL INNER PRESSURE FOOT
Drop the inner pressure foot in through the main body bore, then thread it in counter-clockwise until it bottoms out.

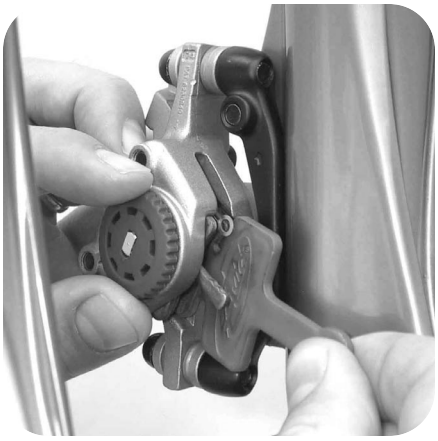


STEP 4: INSTALL INNER KNOB
Install the inboard adjuster knob by lining up the rectangular tab on the back of the pressure foot with the hole in the knob, then pressing it on firmly.

TYPE F ***TYPE N***

STEP 5. RE-MOUNT CALIPER
Re-mount the caliper onto the bike.

STEP 6: INSTALL PADS & SPACER
Install the pads and spacer into the caliper and turn the inboard adjuster knob clockwise to lock into place.

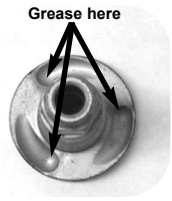


STEP 7. GREASE CAM PARTS
Grease ***very lightly*** the following parts in preparation for assembly:

-footscrew threads

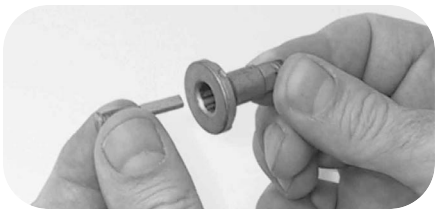
-tip of stem-end on outer pressure foot

-ramps of drive cam and fixed cam



TYPE F *TYPE N*

STEP 8. INSTALL FOOT SCREW
Using small needle-nose pliers or a Schrader valve tool, thread the footscrew into the drive cam completely, but do not tighten.



STEP 9. INSTALL OUTBOARD PRESSURE FOOT
Engage the stem-end of the outer pressure foot into the hole in the end of the drive cam and install by firmly pressing it straight in.

STEP 10: ASSEMBLE THE CAMS
Place the ball-bearings into the ramps of the drive cam, then install the fixed cam over the shaft of the drive cam. Rotate the cams against each other to ensure the ball-bearings are seated properly in both sets of ramps.

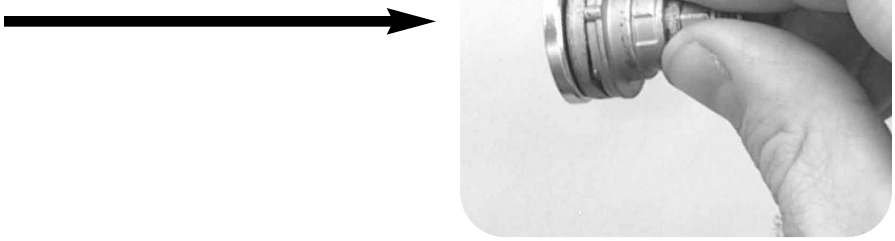
TYPE F *TYPE N*

STEP 11: INSTALL CAM ASSEMBLY

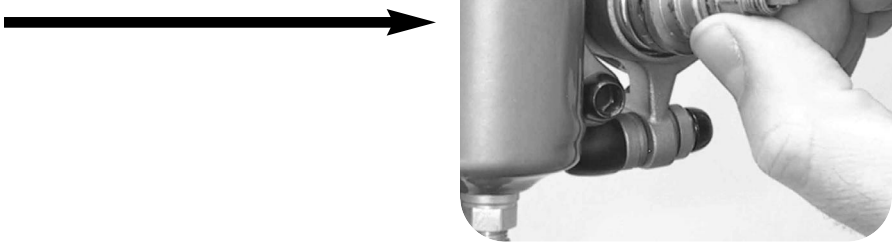
A. Hold the cam assembly by the drive cam while keeping pressure on the fixed cam with your thumb and index finger. This serves two functions:

1. It keeps the ball-bearings properly positioned in their ramps.

2. It ensures the drive cam is not pushed past the inner body seal. If the drive cam is pushed past the inner body seal and then pulled back, the edge of the inner body seal rolls back. If this occurs, the seal must be replaced.

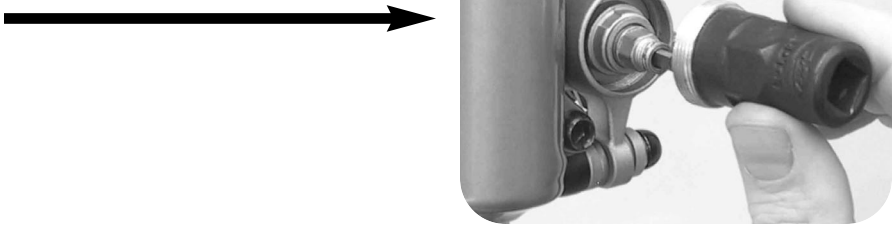


B. Align the tab on the fixed cam to the corresponding groove in the caliper body. Install the assembly, being sure to press it in by the fixed cam, not the shaft of the drive cam.



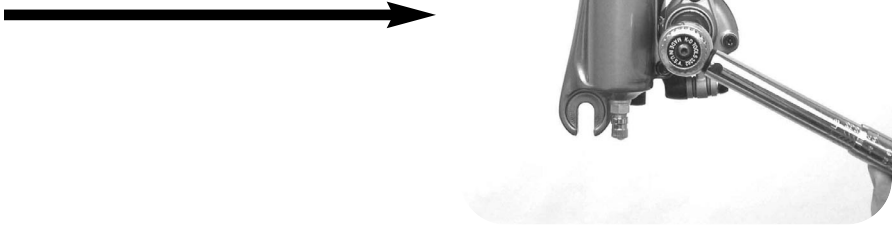
STEP 12: INSTALL LOCKRING

Install the lockring by hand with the MDT-1.



STEP 13: TORQUE LOCKRING

Torque the lockring with the MDT-1 to 140-150 In. Lbs.

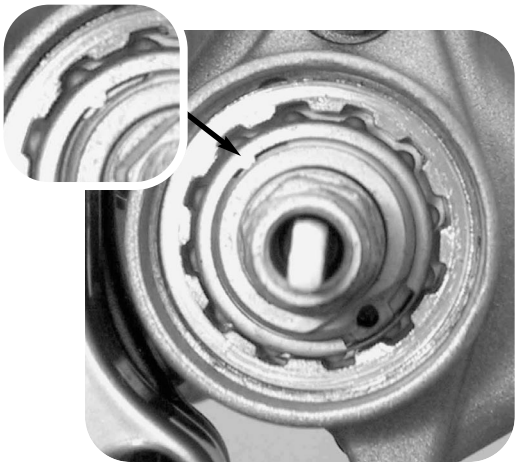


TYPE F *TYPE N*

STEP 14: INSTALL LOCKRING RETAINER

TYPE F - Install the lockring retainer, aligning the cut-out in the retainer with the tab on the fixed cam.

TYPE N - Install the lockring retainer, aligning the tab on the retainer with the cut-out in the fixed cam.

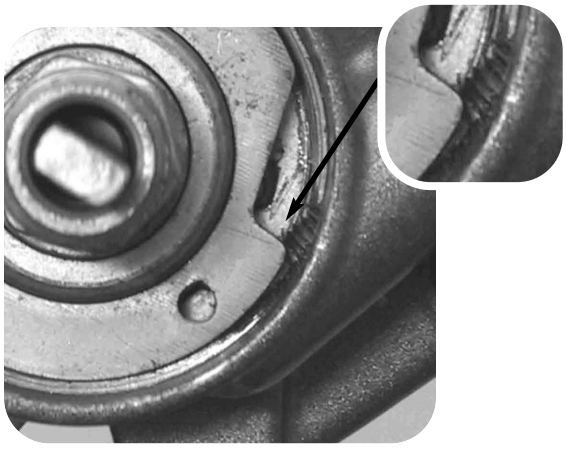


STEP 15 (TYPE F ONLY): INSTALL SPRING ADJUSTER PLATE

Install the spring adjuster plate, rotating it to the lowest spring tension setting. This position will make it easier to install the torque arm later.

STEP 16 (TYPE F ONLY): INSTALL SPRING ADJUSTER SCREW

Install the spring adjuster screw, turning it in just far enough to engage the spring adjuster plate.



TYPE F *TYPE N*

STEP 17: INSTALL HEX-HOLE WASHER
Place the hex-hole washer over the drive cam shaft, engaging the flats on the shaft.

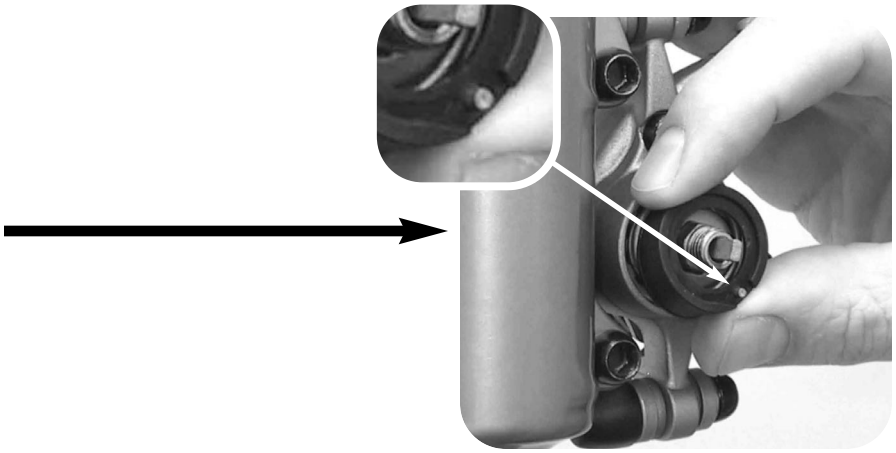
STEP 18: APPLY THREAD-LOCK
Apply a high-strength thread-lock such as Loctite 272 to the drive cam threads. Be careful not to allow any thread-lock to enter the area around the footscrew.

STEP 19: INSTALL SPRING
TYPE F - Install the spring with the short spring tab engaging the hole of the spring adjuster plate.

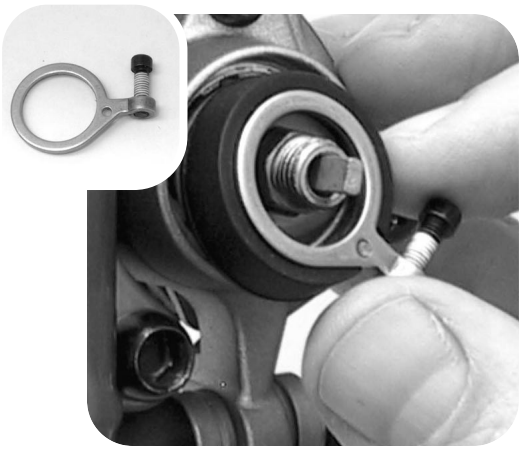
TYPE N - Install the spring with the long spring tab engaging the hole in the fixed cam.

TYPE F ***TYPE N***

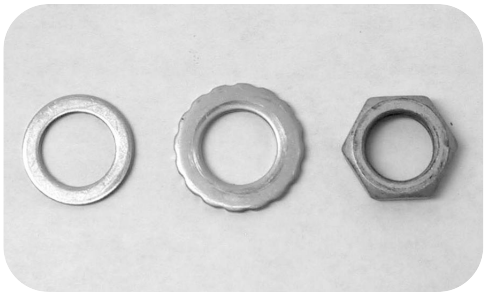
STEP 20: INSTALL OUTER SEAL
Place the outer body seal on the spring, engaging the spring tab into the hole in the boot.



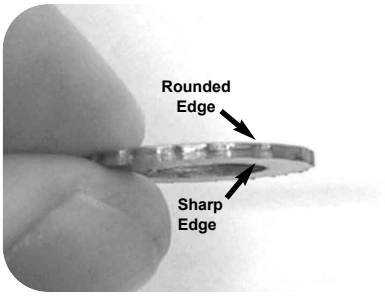
STEP 21 (TYPE N ONLY): INSTALL SPRING ADJUSTER
Turn the spring adjuster screw counter-clockwise until the bottom is flush with the bottom of the adjuster. Then install the spring adjuster on top of the outer body seal, engaging the spring tab into the hole in the spring adjuster.



STEP 22: PART & TOOL ORIENTATION
At this time, take a moment to arrange and orient the flat washer, detent washer, and torque arm fixing nut for installation. If they are ready to go, they will be much easier to install while holding the spring-loaded torque arm in place.
After the torque arm is on, the installation order will be as stated above (flat washer, then detent washer, then torque arm fixing nut.)



Of these pieces, the detent washer is the only one with a “right-side up” and “up-side down.” If you look at the profile, there is a sharp edge and a rounded edge. The rounded edge goes up. This allows the outboard adjustment knob to be installed fairly easily as it is pressed on over the rounded outer edge, while the sharp inner edge keeps it firmly in place.

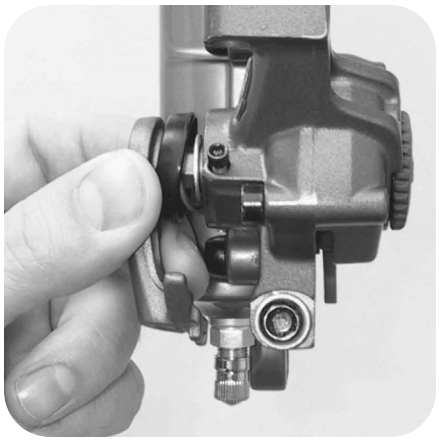


TYPE F *TYPE N*

STEP 23: INSTALL TORQUE ARM

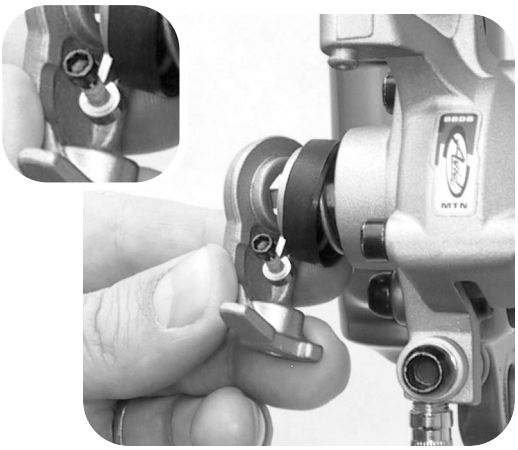
TYPE F - Install the torque arm by first engaging the spring tab into the hole on the back side of the arm, then pressing the arm onto the flats of the drive cam shaft. Make sure the arm is fully seated, and hold it firmly in place with your thumb.

NOTE:
Proper orientation will place the top of the torque arm just below the bottom truss bolt.



TYPE N - Install the torque arm, aligning the spring adjuster tab and screw with the relieved area on the back of the torque arm. When engaged correctly, the spring adjuster screw will be driven against the shelf on the back of the torque arm. Press the torque arm onto the flats of the drive cam shaft. Make sure the arm is fully seated and hold firmly with your thumb.

NOTE:
Proper orientation on a 2002 MTB caliper will place the top of the torque arm just below the bottom truss bolt. If working on a ROAD caliper, the torque arm will be directly in front of the truss bolt.



MTB Caliper

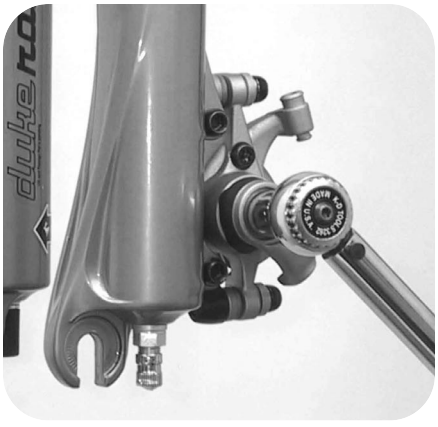
Road Caliper

TYPE F ***TYPE N***

STEP 24: INSTALL FLAT WASHER
Place the flat washer over the drive cam shaft and against the torque arm.

STEP 25: INSTALL DETENT WASHER
Place the detent washer over the drive cam shaft and against the flat washer with the rounded edge up.

STEP 26: INSTALL TORQUE ARM FIXING NUT
Thread on the torque arm fixing nut by hand, then torque to 55-60 In. Lbs. ***Be careful not to over-tighten!***



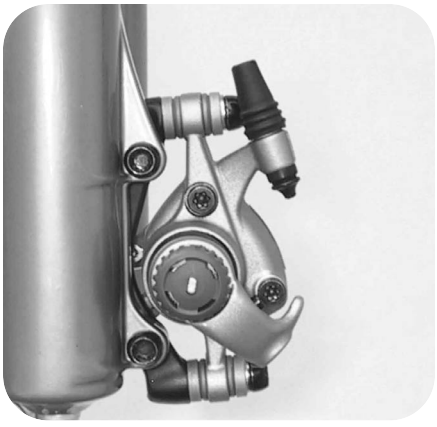
TYPE F *TYPE N*

STEP 27: INSTALL OUTER KNOB
Install the outboard adjuster knob by aligning the rectangle tab of the foot screw with the rectangular hole in the knob then pressing it on firmly.

STEP 28: INSTALL CABLE SEALS
TYPE F - Push the upper cable seal on to the cable ferrule and place it into the cable stop.

Push the lower cable seal on to the bottom of the ferrule.

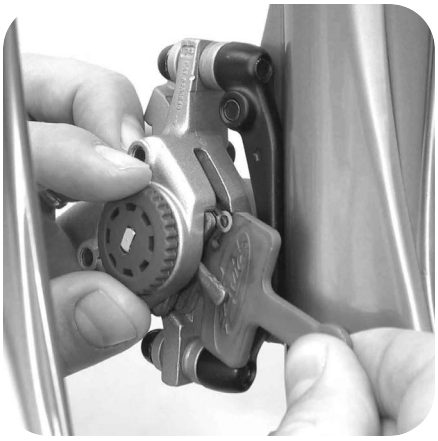
TYPE N - Push the upper and lower boots on to the integrated cable stop.



TYPE F *TYPE N*

STEP 29: INSTALL CABLE ANCHOR BOLT & PLATE
Place the cable anchor plate on the cable anchor bolt, grease the bolt lightly, and install into the torque arm.

STEP 30: REMOVE PAD SPACER
Turn both pad adjuster knobs completely counter-clockwise and remove the pad spacer.



STEP 31: SET UP
Set up the brake by following the procedures in Avid's BBDB Installation Guidelines.