



MASTER CYLINDER	REBUILD KITS
6620110	6690110
6620111	6690111
6620112	6690112

## Integral Reservoir Master Cylinder Installation Information & Rebuild Procedure

### Please read the following information before installing any AFCO master cylinder:

Only qualified persons experienced in the procedures of proper installation and operation of disc brake systems should attempt to perform master cylinder installation. This product is intended for off-road use. The installer is responsible for determining the suitability and application of this part.

### Master cylinder bench bleeding procedure

The cylinder should be bled before installing the brake line to the cylinder.

- A) Place master cylinder into jig or vise.
- B) Tightly plug the outlet port of the master cylinder with a 1/8" barbed tube fitting (not provided).
- C) A clear bleed tube should be attached to the 1/8" barbed tube fitting (not provided).
- D) Loosen or remove the master cylinder lid.
- E) Fill reservoir to full line with AFCO HT or HTX. It is not recommended to use D.O.T. 5 silicone fluid in racing applications.
- F) Clip or support clear tube so that tube end remains submerged in brake fluid in the reservoir.
- G) Stroke master cylinder until fluid runs clear.
- H) Repeat steps E-G until fluid exiting the master cylinder is free of air. Do not allow the fluid level to uncover the orifice in the bottom of the reservoir.
- H) Remove clear tube from reservoir and fill the master cylinder to the max line. Replace and tighten the master cylinder cap.
- J) A systematic caliper bleeding process should be performed upon installation of the master cylinder into the vehicle.

Note: If you are bleeding the master cylinder in the vehicle with a dual master cylinder application, it is advisable to adjust the balance bar to favor the greatest pushrod movement to the master cylinder that you are bleeding at the time or completely disconnect the pushrod of one master cylinder. Bleed only one master cylinder at a time.

Caution: If push rod is too long, brake lock-up could occur. Trim push rod as needed to ensure the master cylinder piston can move to full relaxed position without interference.

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## **Bleeding the calipers and brake lines**

A brake caliper clear bleeding tube inserted into the bottom of a bleed bottle should be used for the following steps. Place enough new brake fluid into the bottle to assure that air cannot be drawn into the tube while bleeding. Dual master cylinder application should be bled independently of each other.

Start the bleeding process with the caliper furthest from the master cylinder.

1. Loosen or remove the master cylinder cap from the reservoir.
2. Connect the bleed tube to the bleeder screw. If bleeding a caliper with two bleed screws, begin with the bleed screw closest to the wheel. Bleeder screws must point straight up to prevent air from being trapped in the top of the caliper.
3. *Slowly* pump and hold the brake pedal until the pedal begins to feel solid. Don't allow the fluid level to uncover the orifice in the bottom of the reservoir.
4. Open the bleed screw. A small amount of fluid and air should be noticed. Close the bleed screw.
5. Repeat steps 2, 3, and 4 until a large volume of air-free fluid is noticed.
6. Connect the bleed tube to the inboard bleeder, if equipped with two bleeder screws, and repeat the bleeding process.
7. Repeat the bleeding process until all of the calipers are free of air. The last caliper bled should be the closest caliper to the cylinder.
8. Replace and tighten the master cylinder cap.

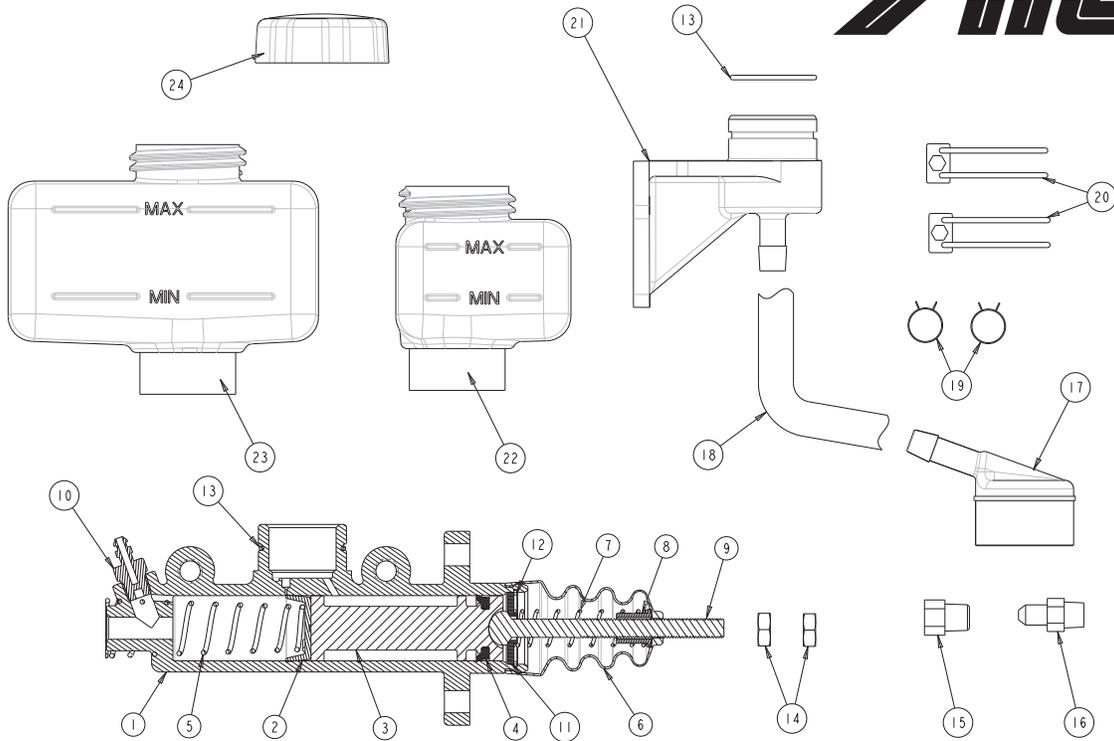
The system should now be completely bled. Repeat the above steps if the pedal is not firm. Refill the reservoir. Soft, sinking pedals may be caused by leaks. Inspect the system, then repeat the bleeding process.

Fluid back-flow may occur in systems where the master cylinders are mounted lower than the calipers, making it necessary to pump the pedal several times before a hard pedal is noted. The use of a two-pound residual pressure valve may correct this problem. See the Brake System Troubleshooting Guide (back page) for more information.

## **Master cylinder rebuilding procedures**

- A) Drain master cylinder bore and reservoir of all fluid.
- B) Place cylinder into jig or vise.
- C) Apply slight tension to the pushrod and remove the c-clip.
- D) Release pushrod tension slowly and allow internal parts to follow pushrod out of the cylinder bore. Note the order in which the internal parts are taken out. Place components on a clean surface in the order in which they were removed.
- E) Wipe bore and components with a clean, lint-free cloth to remove excess fluid and debris and inspect bore and components for scratches and wear.
- F) Inspect and replace components as needed with AFCO replacement parts only. Coat the internal components that are being re-installed with new, clean racing brake fluid to protect the bore from damage. Install the internal parts in the order they were removed.
- G) Bench bleeding the master cylinder is the recommended bleeding procedure versus an on-car method (see bench bleeding instructions).

Note: NEVER use silicone-based fluid or reuse old brake fluid.



BORE SIZE	3/4"	7/8"	1"
MASTER CYLINDER PART NUMBER	6620110	6620111	6620112

ITEM	DESCRIPTION
1	MASER CYLINDER BODY
2	PRIMARY SEAL
3	PISTON
4	SECONDARY SEAL
5	INTERNAL SPRING
6	MASTER CYLINDER BOOT
7	SECONDARY SPRING
8	SPRING RETAINER
9	PUSH ROD
10	BLEED VALVE 1/8" NPT
11	PISTON RETAINER
12	SNAP RING
13	ORING
14	JAM NUT 5/16-24
15	FITTING, 1/8" NPT TO 3/16' INV FL
16	FITTING, 1/8" NPT TO #3AN
17	ADAPTER, CYLINDER TO HOSE
18	HOSE, 30"
19	CLAMP, 5/8"
20	CLAMP, TWIN RING
21	ADAPTER, REMOTE RESERVOIR
22	RESERVOIR 4OZ
23	RESERVOIR 10.7OZ
24	CAP, REMOTE MASTER CYLINDER

SERVICE PARTS		
ITEM	PART #	DESCRIPTION
9	6690044	PUSH ROD
7	6690045	SECONDARY SPRING
6	6690046	MASTER CYLINDER BOOT
10	7010-0022	BLEED VALVE 1/8" NPT
15	7010-0026	FITTING, 1/8" NPT TO 3/16' INV FL
16	40253	FITTING, 1/8" NPT TO #3AN
24	6690047	CAP, REMOTE MASTER CYLINDER

3/4" REBUILD KIT: #6690110	
7/8" REBUILD KIT: #6690111	
1" REBUILD KIT: #6690112	
ITEM	DESCRIPTION
2	PRIMARY SEAL
3	PISTON
4	SECONDARY SEAL
5	INTERNAL SPRING
12	SNAP RING

## BRAKE SYSTEM TROUBLESHOOTING GUIDE

TROUBLE	SYSTEM PART	PROBABLE CONDITION
<b>1. Low pedal (Lack of reserve) Pedal comes up when pumped</b>	Master cylinder	Low fluid level
	Pedal linkage	Excess free play in adjustable linkage
	Disc brake	Pad knock-back: Check rotor lateral run out, parallelism, bearing adjustment, caliper bolts, misaligned caliper brackets
<b>2. Pedal fades as brakes are applied</b>	Master cylinder	Fluid pressure leak at primary seal (internal): Rebuild or replace master cylinder
	Hoses, piping	Leakage at hose or pipe joints, cracked hose or broken flare
	Disc brake	Leakage at piston seals
<b>3. Pedal pulsation (chatter, fight, or vibration while braking)</b>	Disc brake	1. Rotor distortion: Check lateral runout, parallelism, bearing adjustment 2. Steering and suspension: Check wear and alignment, tie rods, ball joints, A-frame bushings
<b>4. Spongy or springy pedal</b>	Master cylinder	1. Air in system: refill and bleed, check for leaks at the primary cup seal, bleed screws 2. Fluid boil: Check by opening bleed screw when condition is first noticed • Contaminated fluid: Drain and replace with racing fluid • Overheated brakes: Thin rotors, wrong pads for application, misaligned calipers, brake drag 3. Cylinders too close to headers: overheating
	Brake hose	Weak hose ballooning under pressure: Replace
	Disc brake	Misaligned caliper: Check for tapered wear on pads, loose caliper bolts, bearing adjustments
<b>5. Brakes drag, lock, or overheat (All wheels drag or lock)</b>	Master cylinder	Cylinder bypass blocked
	Pedal linkage	Cylinder bypass port blocked by pedal interference • Bind prevents return of pedal against its stop • Insufficient pedal free play • Weak or missing pedal return spring
	Brake system	Residual pressure valve holding line pressure
<b>(Individual wheels drag or lock)</b>	Disc brake	Pads held applied or wedged against rotor; check for: • Seized caliper piston • Improper caliper alignment • Distorted pads • Rotor too thin • Abnormal expansion rates of alloy or aluminum hats and caliper brakes
<b>6. Excessive stopping distance or pedal effort</b>	Pedal linkage	1. Linkage connected to pedal too far from pivot point: not enough leverage 2. Distortion of master cylinder mount, causing movement
	Master cylinder	Bore too large
	Disc brake	1. Pads worn out 2. Pads overheated, "faded": Check for too-soft pads, glazed condition, brake drag 3. Unbalanced brake pressures can lengthen stop distance 4. Seal leaking grease on rotors 5. Pads too hard for conditions
<b>7. Rear or front wheel skid</b>	Brake system	Proportioning valve out of adjustment or malfunctioning • Check front and rear line pressures
	Brake pedal	Balance bar frozen or out of adjustment
	Disc brake	1. Rusted or rough rotor surfaces 2. Mismatched pads front to rear 3. Foreign matter (water, lubricant, dirt) on rotor surface
	Suspension & tires	1. Worn or bound shocks 2. Excessive wedge in car 3. Excessive difference in tire sizes 4. Front end alignment 5. Extremely unbalanced wheels
<b>8. Rapid lining wear</b>	Disc brake	1. Too-soft pads 2. Roughened or cracked rotor surface
<b>9. System won't bleed (Little or no fluid at calipers)</b>	Master cylinder	Piston not fully retracted in cylinder, which prevents fluid from entering bore • Bind in pushrod, stuck piston • Blocked fill hole prevents piston from entering bore
	Pedal linkage	Insufficient free play prevents piston from retracting in cylinder
	Hoses, piping	Leakage at hose or pipe joints, cracked hose or broken flare
<b>10. System appears to be bled but pedal is spongy</b>	Caliper brackets	Bent or misaligned
	Brake pads	Pads worn at angle or warped