

# INSTALLATION - SERVICE INSTRUCTIONS



Bulletin NO. 0086  
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**SEPTEMBER 27**  
2007

[www.markwilliamks.com](http://www.markwilliamks.com)

## GENERAL DISC BRAKE INSTALLATION INSTRUCTIONS

**ALIGNMENT & SPACING:** Rear axle stand out controls the alignment of the brake system and as a result is very critical. To check stand out first verify that the housing ends are perfectly aligned. Install axles and check axle stand out (face of axle flange to face of housing end) as accurately as possible. The split line of the caliper should be in the center of the disc within 1/32". See the chart on the catalog for axle stand out dimensions for MW brake kits. Stand out should be within + or - .015 of the dimension listed. A shim, P/N 71019 is available to correct the alignment that moves the disc outward .015" per shim. Multiple shims can be used. A .015" round shim that goes between the caliper and the caliper mount P/N 71018, will move the caliper inboard. Misaligned (crooked) housing ends can cause caliper and mounting bracket deflection. This is one of the causes of a "spongy" pedal. Install the wheels and check for caliper to wheel clearance a minimum of 3/16" is recommended. The calipers should be positioned at 3 or 9 o'clock. This allows the bleeder to be highest point, ensuring that all air is removed from system. If the calipers are mounted in a different clock angle it may be necessary to remove the calipers to bleed the air. Shims are available for Floater Kits that move the caliper mounting bracket outward by .015" P/N 55099.

**Pedal Ratio & Master Cylinder:** The master cylinder bore size influences the obtainable brake line pressure. Recommended master cylinder size when using two typical 4 piston calipers only in the rear is a single outlet, 7/8" bore master cylinder. If single 2 piston front brakes are used in conjunction with two 4 piston calipers in the rear a dual outlet, tandem 1" bore master cylinder is recommended. When using 4 piston calipers front and rear a dual outlet, tandem 1-1/8" bore master cylinder is recommended. Mounting the master cylinder to a frame rail or roll bar is recommended to ensure a solid mount. With the correct master cylinder in place the pedal ratio must be great enough to produce 1200 PSI system pressure under severe braking conditions. A pedal ratio verses line pressure calculator is available on the MW website, [www.markwilliams.com](http://www.markwilliams.com). We recommend using a pressure gauge (MW P/N 81105) connected to the system to verify the maximum available pressure before running the car. If the desired pressure can not be easily attained the pedal ratio must be increased until the minimum pressure of 1000 psi is easily reached.

**Proportioning Valve (Pressure Reducing):** The front brake kits with the integral hub and adapter are designed for Drag Race applications. The main advantage is the reduction of weight compared to the stock braking system they replace. Several considerations must be taken into account when installing these kits. When the dual 4 piston caliper kits are used with drum brakes on the rear, **a pressure reducing valve must be installed for front pressure control.** Because of the small front tire contact area compared to the rear large slick contact area, the rear brakes must absorb more of the stopping energy than the front (contrary to a normal street car). A starting point would be 70% of the rear line pressure to the front brakes. This is especially important when using drum brakes on the rear. With discs on both the front and rear the percentage could be higher depending on the weight distribution and tire size **but you must use the pressure reducing valve.** We have a pressure reducing valve, P/N 260-2200, and we recommend its installation with front brakes. The pressure bias should be adjusted using two gauges, MW P/N 81105, in the front and rear to confirm the pressure differential and then do brake lock up test. When doing a lock up test, for a Drag race car, the front tires should skid equally or slightly after the rear tires. This test can be simulated at a very low speed (approximately 5 mph) by using a wet surface and observing the lock up sequence.

**Brake Lines and Fluid:** MW calipers come with steel -3 male fitting installed in the caliper. Aircraft AN-3 brake lines and fittings that mate to this fitting are recommended. Only stainless steel braided Teflon hose, stainless or seamless steel tubing (3/16" X .028") should be used for brake lines. MW has available swaged Teflon Stainless flexible braided line with straight 90 degree and 45-degree end fittings that can be fabricated and shipped on a same day basis.

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### **Brake Lines and Fluid continued**

Lines should be secured to chassis rails to resist vibration and routed in such a way to avoid possible contact with wheels, tires and other moving parts. At points where the hard line and Teflon braided connects use a bulkhead fitting and a small tab welded or bolted to the chassis. Long runs should be done with hard tubing to avoid expansion of flexible line. The amount of flexible braided hose in the system should be kept to a minimum. See MW catalog for fittings and brake line. Always use of DOT 4 or 5.1 fluids. Never use (DOT 5) silicone fluids.

### **Trouble Shooting and Maintenance Spongy Pedal:**

1. Air in system. Bleed brakes, making sure that the bleed valve is the highest point.
2. Disc warped (saucer shaped). Replace rotors and pads.
3. Calipers not square with disc. Check housing end alignment, both concentricity and parallel with disc.
4. Lining worn on taper. Make sure that caliper is centered over the rotor and the caliper bracket is not deflecting.
5. Master cylinder bore too small creating excessive high line pressure. Match master cylinder to system.
6. Master cylinder deflection. Stiffen master cylinder mounts

### **Brakes are locked up after run:**

The piston in the master cylinder is not being allowed to return to the full retract location, when released. This condition will maintain line pressure and prevents the car from moving. Re-adjust the linkage so that the piston completely returns to the retract location.

**Excessive pad wear, disc shows excess heat:** System pressure is too low causing a longer pressure applied time to stop. Pressure needs to be high enough to allow wheel lock at any time. Check the ability of the system to generate 1200 PSI. Pistons sticking in caliper clean and overhaul calipers. Excessive wear or heat in front or rear rotors, but not both. Install a pressure reducing valve perform the brake lock up test.

**No Brake pedal After Run:** Lining too thin causing rapid heat transfer to calipers, boiling the fluid. Install new Lining and re-bleed system. Fluid contaminated with moisture causing boiling of fluid in caliper. Flush old fluid and replace with DOT 5.1 fluid re-bleed system.

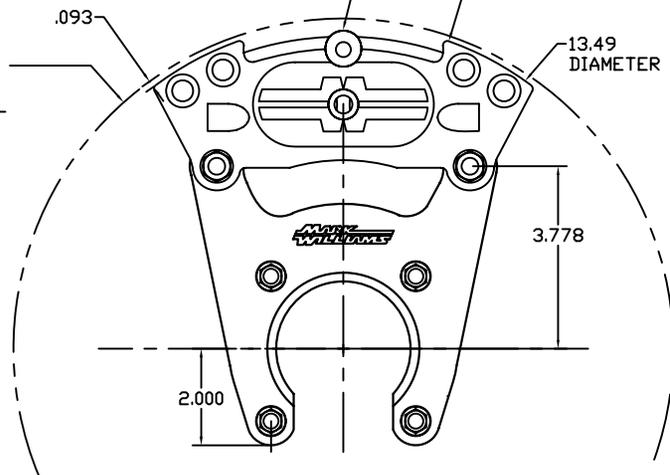
### **MAINTENANCE REQUIREMENTS:**

**DISC CONDITION:** Periodically check for rotor warping due to excessive heat (metal smearing). Check the rotor run out with a dial indicator of fixed disc systems for maximum of .008" for used rotors (.005" new rotor run-out.). Disc thickness can be measured with a micrometer and should be parallel within .002". Check the rotor with a straight edge, it should be flat within .010" Any condition in excess of these values requires disc replacement. We do not recommend re-surfacing the discs.

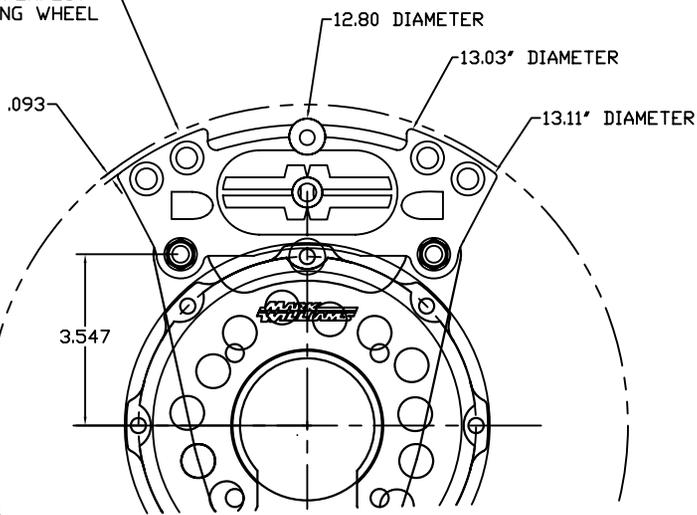
**FASTENER CHECKS:** Check and torque the disc mounting bolts (18 ft/lbs with #620 Green Hi-temperature locking compound applied to clean parts), and caliper mounting bolts (35 ft/lbs no locking compound). Tighten other fastener to recommended torques.

**PAD & CALIPER CONDITION:** Periodically check brake pads for wear and tapered condition. Do not install new pads on rotors that are warped (saucer shaped), if you do you will not have satisfactory pedal feel and can break (crack in two) the caliper. Pads should be changed when the friction material is down to approximately .250". When pads are changed the entire caliper should be thoroughly cleaned, especially the pistons before they are pushed back into the bores. New pads on warped rotors will cause problems replace with new rotors. Everything must be flat to work properly. Calipers should be disassembled periodically and overhauled as per the instructions on service bulletin #0044. Racing calipers are highly susceptible to the dust generated by brake pads and need to be frequently disassembled and cleaned to prevent piston sticking.

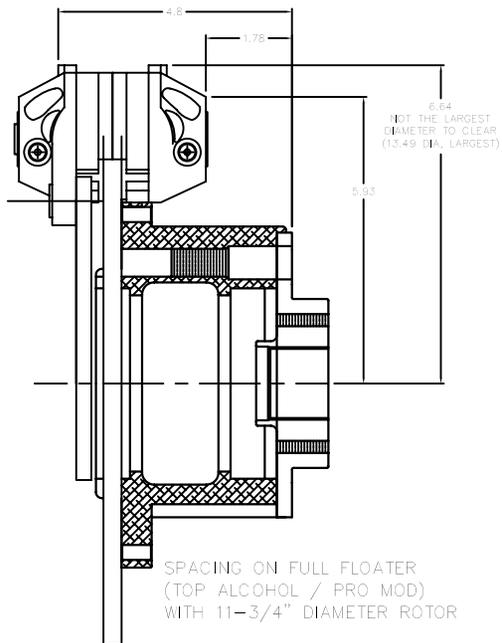
Ø13.677  
MINIMUM WHEEL  
CLEARANCE  
WITH PERFECT  
RUNNING WHEEL



Ø13.297  
MINIMUM WHEEL  
CLEARANCE  
WITH PERFECT  
RUNNING WHEEL

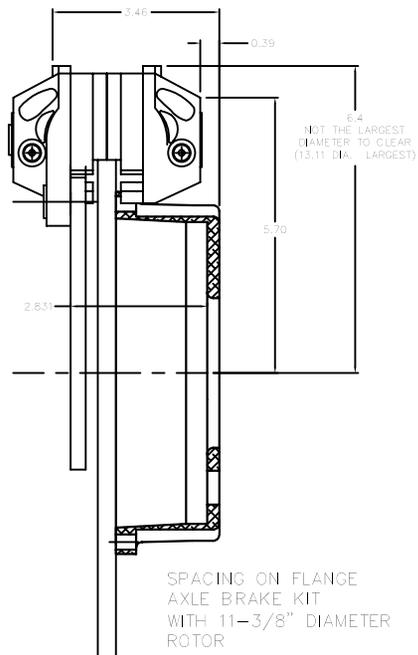


11 3/4" ROTOR DIAMETER  
(.093" CLEARANCE)



SPACING ON FULL FLOATER  
(TOP ALCOHOL / PRO MOD)  
WITH 11-3/4" DIAMETER ROTOR

11 3/8" ROTOR DIAMETER  
(.093" CLEARANCE)



SPACING ON FLANGE  
AXLE BRAKE KIT  
WITH 11-3/8" DIAMETER  
ROTOR

**MARK  
WILLIAMS**  
*Entertainment*

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|-------------------------|---------|-------------------------------------|-------------------|------|---------|
| CAD NO.                 | 002728  | SIZE: "A" OR "C"<br>PLOT PROPORTION | DRAWN BY          | MLW  |         |
| PLOT DATE               | 3-13-08 | PART NUMBER                         | SB0086 - Addendum | DATE | 3-13-09 |
| TITLE                   |         |                                     |                   |      |         |
| CALIPER-WHEEL CLEARANCE |         |                                     |                   |      |         |
| CHANGE                  |         |                                     |                   |      |         |