

INSTRUCTION & TECH SHEET ***F5 TORNADO™ RACING CALIPER***

PROTECTED UNDER U.S. PATENT NO. 5,515,948

OTHER PATENTS PENDING

002-0492 / 002-0493 / 002-0494



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INSTRUCTION SHEET

F5 TORNADO™ Racing Caliper



This caliper was built and tested on _____ by: _____

Caliper torque specifications.

“C - section” bolts	3/8” 12 point, 3/8 x 16 x 1” long	torque to 40 foot pounds
Banjo Bolts	3/16” Hex hd, 3/8” x 24 x 1” long	torque to 18 foot pounds
Banjo Bleed Screw Assembly	9/16” Hex hd, 3/8” x 24 x 1” long	torque to 18 foot pounds
Bulkhead Inlet Fitting	5/8” Hex hd, 3/8” x 25 x 1” long	torque to 18 foot pounds
Pad Retainer Bolts	Allen hd #10 x 24 x (length varies)	torque to 10 foot pounds

There are five different sizes of bolts on this caliper. They are:

Warning: Do not torque the banjo, banjo bleed screws or the bulkhead bolts to more than 18 foot pounds. They contain a fluid transfer hole that will cause failure if over torqued! Never assemble this caliper without being sure that the copper crush washers are in place under the heads of these bolts! These are seals and fittings, and therefore, must be treated with the same respect as any other hydraulic fitting.

General Information:

This patented caliper (No. 5,515,948), is the first truly new racing caliper design in many years.

Designed by Warren Gilliland, with over 31 years designing and developing high performance brake components, this caliper is the strongest, best built caliper for its size on the market today.

Here are the main advantages:

1. **Forged billet** high strength aluminum alloy is far stronger than any cast or machined billet caliper. It has a special high corrosion resistant coating and can be easily cleaned with a damp cloth, and to allow you to see the quality you get!
2. **Patented dual transfer tubes** allow 4 times the flow rate to the outboard pistons. This creates faster, more even piston application, a major benefit to improved corner entry. It is even more important in that it allows for more efficient cooling of the brake fluid without risking damage as in the conventional crossover tubes.
3. **Steel structural center** makes the caliper more rigid than conventional bolt-together calipers and protects against caliper damage from pad to caliper contact. Our steel “C-section” means longer life & better pedal feel than bolt-together calipers. It also means far less deflection than our competitors, even the expensive European brands!
4. **Dual adaptability** allows this caliper to be used as a left or right side caliper by interchanging bleed screw and inlet fitting. Now you can carry just one spare!
5. **Full modular construction** allows the owner to purchase any piece separately to easily rebuild, or to convert to different size, such as thicker or thinner rotors, or smaller or larger piston bores. Now you can run the lightest rotors at all tracks without extra calipers!
6. **Tighter tolerance control** creates more consistent pedal height and consequently, far better driver confidence.
7. **All components highly corrosion protected**, creating a caliper that will service the buyer for a great deal longer than the competition. This, combined with our modular construction greatly reduces the brake operating costs over the entire season, as well as greatly reducing upkeep and maintenance. If you value your time and want to eliminate excessive upkeep and maintenance, then these calipers are just what the doctor ordered!

MAXIMUM OPERATING PRESSURE IS 1500 PSI. DO NOT USE OVER THIS PRESSURE RATING!

EVERY CALIPER IS PRESSURE TESTED TO 1500 PSI AND SOAK TESTED FOR 24 HOURS PRIOR TO SHIPMENT!

REPLACEMENT PARTS LISTING:

PART #	DESCRIPTION	# OF PISTON	PISTON DIA	ROTOR WIDTH	WT.	DIM (A)	DIM (B)	SEAL KIT	TRANSFER TUBE	PISTON	HOUSING INBOARD	HOUSING OUTBOARD	C-SECTION	PAD RETAIN BOLT KIT
002-0492	200 F5 Tornado™	4	2.000	1.000	6.0	4.750	1.095	007-0184	2-0016C	006-0186	202-0471	202-0472	2-0015C	009-0082
002-0493	200 F5 Tornado™	4	2.000	1.250	6.1	5.060	1.250	007-0184	2-0016B	006-0186	202-0471	202-0472	2-0015B	009-0083
002-0494	200 F5 Tornado™	4	2.000	1.375	6.2	5.500	1.470	007-0184	2-0016A	006-0186	202-0471	202-0472	2-0015A	009-0083

INSTALLATION TIPS

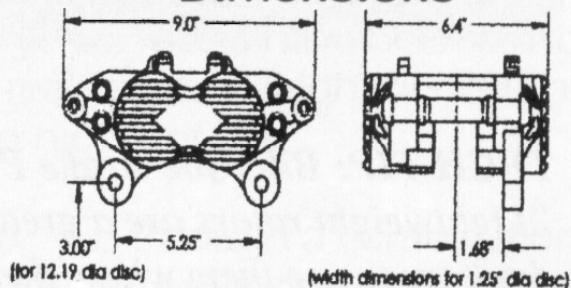
1. For best results, use our brake pads and fluid with this caliper. Although other pads and fluid will work, use of an im proper fluid can damage seals or increase pedal travel, substantially altering the "pedal feel". Also, our pads have a very consistent coefficient of friction that will allow the race car to react much more consistently on corner entry. Use the entire package to get the best brake!
2. For improved pedal height, use a 2 pound residual valve, part number 12-1092, available through your dealer. Since the caliper is far more rigid than others, it does not deflect as much, therefore, when the brake is released, you will not see the severe brake drag you have noticed with other calipers.
If your master cylinder is mounted lower than the caliper, you must run a residual valve.
3. Make sure your brake bracket is perfectly parallel to the rotors. You may use a pair of calipers as a depth gage and measure from the mounting ear to the rotor face. Both ears must be within .010 inches of each other. If they are not, remount the brackets until they are within tolerance.
4. Mount calipers at either 3:00 or 9:00 mounting position. If calipers are mounted other than here, they may need to be rotated into this position for bleeding.
5. Plumb your race car in 3/16" steel line, terminating the lines as closely as possible to the wheels. Use 3/16" steel braid supported hoses. Make sure that hose is long enough on the front wheel to allow for full wheel turn and droop.
6. Make sure you have the right caliper for your application. If you are unsure, contact the brake tech hotline at: 805-604-0339
7. Use only genuine hardware from "The Brake Man, Inc.", to repair this caliper. Although other hardware will fit, these components have been designed to give you the best results. Other hardware could significantly weaken the caliper, or cause failures altogether. Special note: although the inlet fitting is similar to your AN bulkhead bolts, DO NOT use a standard bulkhead fitting, especially ALUMINUM!
8. Mount this caliper using 7/16" bolts through the mounting ears. We suggest grade 8. This caliper should mount in virtually any location where a similar size competitor's caliper will mount. Hole spacing is 3.5"

DO NOT GRIND ON THIS CALIPER!

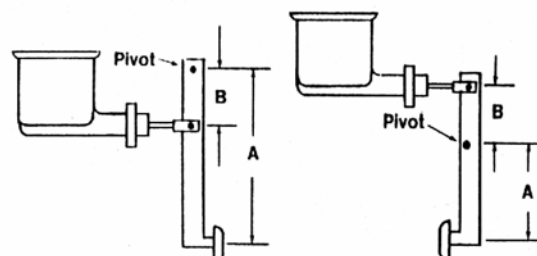
9. Do not pump the brakes during bleeding. This will aerate the fluid making it impossible to get the air out. Stroke slowly and smoothly. Think of the master cylinder as a hypodermic needle and squeeze the fluid into the lines. This caliper only has one bleed screw. All of the air will evacuate through this hole. Once a steady stream of fluid is noted, you are probably finished. For more tips, see the back of this instruction sheet.



Clearance & Mounting Dimensions



PEDAL RATIO



TECH TIP: Billy Joe Brake Puck Says:

Pedal ratios are important for proper pedal feel. If you are unsure if yours are correct, measure the "A" and "B" dimensions shown in the illustration on the right and call "The Brake Man, Inc", technical hotline. We want your brakes to be as good as they can be!



TROUBLE SHOOTING CHART

TECH TIP: Billy Joe Brake Puck Says:
 “Brake pads are very confusing for the average racer. A simple reminder that may help you avoid some of the confusion is to remember that there is a very definite reason that brake pads have a big variation in price. Wear, coefficient of friction and the rate of abrasiveness varies greatly. Our pads cost a little more, but actually cost less to use because of improved life, less damage to your rotors, and superior performance. That’s why The Brake Man family keeps growing!”



TROUBLE SHOOTING CHART

<i>SYMPTOM</i>	<i>CHECK THE FOLLOWING:</i>
UNEVEN PAD WEAR	1. CALIPERS NOT MOUNTED SQUARE TO ROTOR 2. STICKING PISTON IN CALIPER 3. BRAKE PAD DIGGING INTO ALUMINUM HOUSING
BRAKE DRAG	1. PRESSURE IN SYSTEM FROM RESIDUAL VALVE 2. LACK OF FREE PLAY IN BRAKE PEDAL LINKAGE 3. CALIPERS NOT MOUNTED SQUARE TO ROTOR 4. EXCESSIVE ROTOR RUN OUT 5. SILICONE BRAKE FLUID PRESENT 6. MOUNTING BRACKETS WEAK OR DEFLECTING 7. MASTER CYLINDER PUSHROD NOT RETURNING
EXCESSIVE PEDAL TRAVEL	1. MASTER CYL. MOUNTED LOWER THAN CALIPER 2. AIR TRAPPED IN FLUID 3. MASTER CYLINDER TOO SMALL 4. PEDAL RATIO TOO HIGH 5. CALIPERS NOT MOUNTED SQUARE TO ROTORS 6. SPINDLE DEFLECTION CAUSING PISTON KNOCK-BACK 7. WARPED ROTORS
PEDAL DROPS DURING RACE	1. FLUID BOILING FROM: A. BRAKE DRAG B. OLD BRAKE FLUID C. INSUFFICIENT ROTOR SIZE OR DUCTING CAUSING OVERHEAT 2. LEAK IN HYDRAULICS 3. MASTER CYL. FLUID BYPASS FAILURE
CAR PULLS	1. FROZEN PISTON IN CALIPER 2. OIL ON BRAKE LININGS 3. CASTER ALIGNMENT OUT 4. MISMATCHED PADS 5. DIFFERENT PISTON SIZES IN CALIPERS
PEDAL OSCILLATES	1. EXCESSIVE ROTOR RUNOUT OR NOT PARALLEL 2. LOOSE WHEEL BEARING 3. LINING TRANSFER TO ROTOR 4. TIRE FLAT SPOTTED 5. CRACKED ROTOR
EXCESSIVE PEDAL EFFORT	1. PEDAL RATIO TOO LOW 2. MASTER CYLINDER TOO LARGE 3. CALIPERS TOO SMALL 4. PAD MATERIAL NOT AGGRESSIVE ENOUGH 5. FROZEN PISTON IN CALIPER 6. BRAKE PAD FADE 7. ROTOR DIA. TOO SMALL

TECH TIP: Billy Joe Brake Puck Says:
 “If you have ever lost a race because your brake pedal went to the floor, it was probably because you boiled the fluid. This is because your fluid was old, or of poor quality. Either way, you lost a race that could have been won for under \$7.00. Don’t let it happen again! Ours is even less expensive when purchased as a case of 12!”