PERFORMANCE FRICTION BRAKES

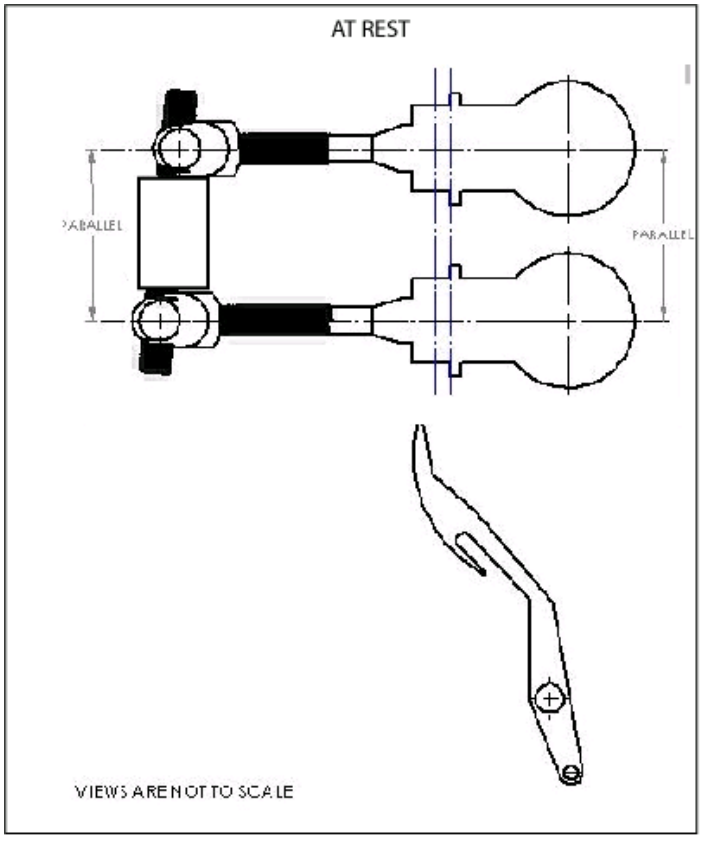
BIAS BAR SETUP AND TECHNICAL NOTES

PURPOSE:

The function of a bias bar is to allow the adjustment of brake line pressure distribution between two master cylinders. This is accomplished through moving the bias bar pivot towards one master cylinder pushrod or the other. If the pivot is perfectly centered between the pushrods, the force applied to each master cylinder will be equal. This is known as the "neutral position" of the bias adjuster. If the pivot is moved closer to one pushrod or the other, then the master cylinders will receive differential pressures (proportional to the distance between the bias bar pivot point and master cylinder center lines). This adjustment gives the driver control over the braking characteristics of the car, and to alter those characteristics to account for changes in fuel load, track conditions and handling characteristics of the car.

SETTING UP THE BALANCE BAR:

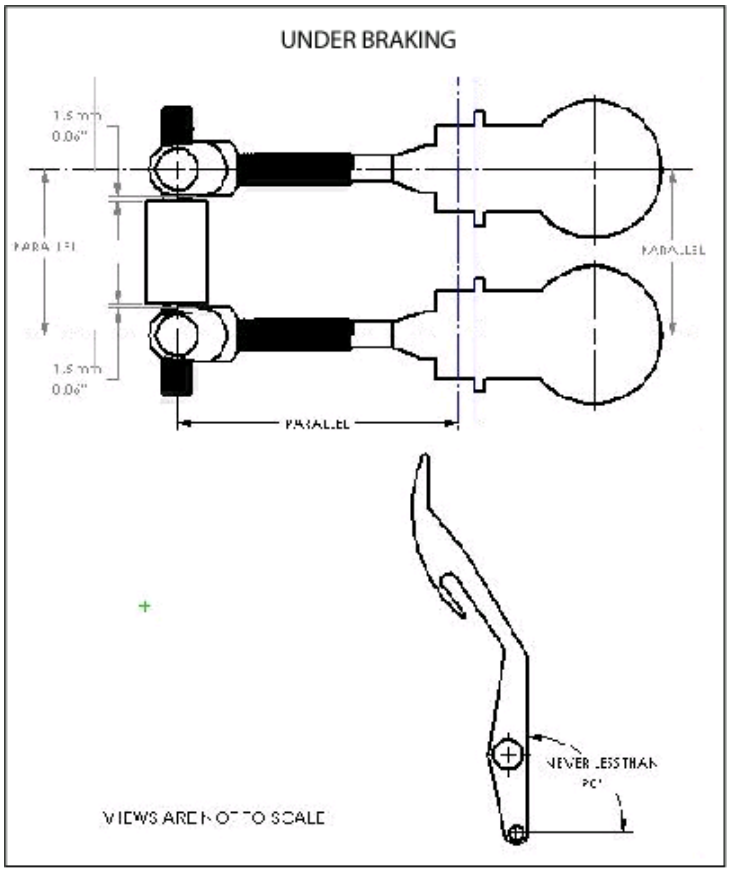
The balance bar is one of the most overlooked, and least understood, components on almost any racecar. As with all aspects of racecar assembly and preparation, careful attention to the geometry of the balance bar and brake pedal will yield great benefits. To start, we need to look at the proper installation of the bias bar adjuster.



First, we must insure that the bias bar pivot bearing is free to move within the pedal tube. Often this tube becomes distorted during installation. If this is the case, then the tube may be honed, until the bearing slides smoothly from one end of the tube to the other. The tube must be clean, and may be lubricated with a light oil or dry Teflon spray.

Next, we need to know the distance between the centerlines of the front and rear master cylinders. Typically, this is 2.5 inches, though this is not critical. What is critical is that this dimension (whatever it may be) is duplicated in the center-to-center distance of the clevises threaded onto the bias bar adjuster rod. This insures that the master cylinder pushrods are actuated properly, minimizing any side loads applied to the master cylinder piston and bore.

With the clevises set on the adjuster, measure the distance between them and the bias tube itself. If the clearance between each clevis and the bias tube is more than 1.5mm, then shims must be added until the proper airgap is achieved. This prevents the bias bar from



shifting while on the track, and altering in an unpredictable manner, the brake bias of the car. With the bias bar connected to the master cylinders, and brake lines connected, the brakes should be bled. It is critical that front and rear brake circuits be bled simultaneously. This will allow both master cylinders to use their full travel, and prevent binding the bias adjuster *(the fluid reservoir must always be located above the level of the bleed screws).*

With the pedal tube and clevises squared away, we now look at master cylinder pushrod length. The key is to set up the bias adjuster so that it is perpendicular to the master cylinder centerlines with the brake pedal under compression. Typically, this means that the front master cylinder pushrod will be 3mm-5mm longer than the rear master cylinder pushrod at rest. This is due to the fact that the front braking circuit has a larger fluid volume, due to the larger piston diameters in the front calipers. As a result the front master cylinder requires a higher feed rate than does the rear. If the pushrod length is equal front and rear, than the feed rate of the rear master cylinder is too high relative to the front. The result in this case is the rear circuit "hitting" before the front. With the pushrod lengths adjusted properly, the bias bar will be square under compression and the front and rear circuits will "hit" approximately at the same time.

BRAKE PEDAL GEOMETRY:

With the bias bar geometry correct, we now turn our attention to the brake pedal geometry. In order for the brake system to work properly, it is important that the brake pedal get hard before it crosses the vertical plane of the brake pedal pivot. If the brake pedal crosses the vertical plane of the pedal pivot (goes "over center"), the mechanical advantage of the pedal, over the pushrods, will be lost, causing a loss of pedal feel and braking force. This can be adjusted with a separate pedal height adjuster (if available), or by lengthening both master cylinder pushrods the same amount, until the desired pedal height is achieved. As a result, the throttle pedal may need to be adjusted to restore the proper "heel and toe" pedal relationship. If there is insufficient adjustment available, this can be accomplished through attaching a simple spacer to the throttle pedal.