



# DISC BRAKES FOR TRAILERS

By W. T. Ellena

## Testing Airstream's electronic disc brake system

Disc brakes have been around for many, many years. They are standard equipment on almost all cars — at least on the front wheels. And on a few of the more expensive or sporting vehicles such as Jaguar and Corvette, four-wheel discs are standard. The advantage of discs is simple enough: They resist fade because they dissipate heat more rapidly than drums. Fade occurs after the brakes have been used hard, usually in a series of applications such as one might experience driving down a mountain grade. It is, in fact, this sort of driving which serves as good reason to avoid fade whenever possible.

Because mountain driving is a good example and has direct application to travel trailers, why haven't trailers had discs until now? And why is Airstream the first trailer company to offer them?

One can only speculate, but there are two answers which seem obvious. First, electric drum trailer brakes work well enough for average use. Second, discs are more expensive than drums. Few manufacturers care to risk sales by imposing an economic penalty which might meet buyer resistance.

Fortunately, there are those consumers who are



**Two identical Airstream 31-foot trailers, differing only in their braking systems, were put through stopping paces at Riverside Raceway to compare drum vs. disc brakes.**

interested in and willing to pay for improved products. Airstream introduced its Excella-Vac electronically-controlled disc brakes on 1977 models, standard on the Excella line and an \$800 option on other Airstreams. The claims were greater safety and longer brake life, along with smoother, more pleasing to the driver operation. The new discs work somewhat differently than the drums. When the driver applies the brakes, a miniature computer in the dash controller senses car brake hydraulic pressure and converts it to an electrical impulse which signals the vacuum system in the trailer and activates the brakes. The trailer brakes respond in direct relation to the car brakes; with light application or hard braking of the car, the trailer brakes are matched. There should be no more of the jerky braking inherent in the electric drums used on most trailers. Also, adjustment is automatic for the life of the brakes.

Now all this sounds good, but who is to say that the advantages are real? Airstream management decided to get an unbiased opinion. They retained an independent testing company, Mobility Systems West, to devise a comparison test and report on the results. (The results, incidentally, correlated very well with Airstream's own engineering tests which were conducted for other purposes.)

What the personnel at MSW did was to select two brand-new and identical 31-foot Sovereign Twin Airstreams off the line from the Cerritos, California, plant. One had drum brakes, the other discs. Published weight for this model is 5040 pounds and the only difference between the two units was about 50 pounds more weight in the disc brake trailer, this due to brake control equipment. Fifty pounds will not have any significant effect on stopping distances.

Because the trailers were tested empty of butane, water and other stores which a traveling trailerist would be expected to include, the test weights were under typical towing weights which might be driven on the road. The results, then, must be considered relative rather than absolute.

One other point: All test braking was done with full



**Stop from 60 mph on Riverside's straightaway does not appear very spectacular but results were quite revealing, noting a clear superiority for disc brakes.**

pressure on the brake pedal. This was panic stop braking which is not the best way to stop in the shortest distance. Recommended technique is to apply brakes just short of wheel lock-up, and if lock-up occurs, the next step is rapidly to modulate brake pedal pressure. The truth is that few drivers have the skills or reflexes necessary to modulate brake pressures so as not to lock the wheels during that instant when the hope is that we'll get stopped short of a collision. The test objective was to keep conditions as realistic as possible so that drivers with average skills might duplicate the results.

Speeds and stopping distances were measured with a fifth wheel which electronically reads out speed and distance. The tow vehicle was a '77 Chevrolet Caprice Classic four-door equipped with a Reese hitch and controllers for both drum and disc brakes.

The test cycle was straightforward: Trailer brakes only from 30 mph; car/trailer from 30; trailer only from 60 and



**Disc brake trailer has extra vacuum line leading to trailer brakes. From the driver's viewpoint braking is smoother, stopping distances shorter.**

car/trailer from 60. There was provision for brief but not complete brake cooling between stops. Time between the 30 mph stops was two-to-three minutes, while time between the 60 mph stops included a lap of the Riverside Raceway test course — about four minutes — without using the brakes.

The object of applying trailer brakes only was twofold. First, it quickly shows up significant differences between drums and discs. Second, there are occasions when drivers will apply trailer brakes without using the tow car's brakes. On a very slippery or icy road, for example, using trailer brakes only greatly helps keep the rig in a straight line, thereby reducing the chances of a skid. Under such conditions, of course, the driver should allow more stopping distance.

The test day was hot (95° F.) and the track clean and fast — the equivalent of a good American interstate highway.

What happened? First, the subjective reaction which does not take numbers into account. It was the test crew's consensus that the disc brakes felt smoother than the drums. During the panic stops there was little discernible difference, but in normal highway and city travel during the test program there was a real difference in that the drum brakes, which go on abruptly, gave a jerkier feel. This translated into a more pleasurable ride in the tow car when hauling the disc brake trailer.

As for stopping, there was very little distance between the discs and drums at low speeds. The reason is that excessive brake heating, which is followed by brake fade, is not significant at 30 mph, so it follows that both types of brakes are about equal.

At 60, however, there was a dramatic difference. The test crew limited the trailer-only stops from 60 to two attempts because distances were quite long, reasonably consistent and clearly abusive to the equipment. The average trailer brakes only from 60 stop distances — drums at 525.65 feet vs. discs stopping in 299.95 — represent the disc brake theoretical advantage.

With combined car/trailer brakes from 60 mph the differential narrowed, but the superiority of disc brakes was clear. In feet the discs stopped an average of 32.02 feet shorter, which represents an improvement of 15.6 percent.

It is significant to note that the car/trailer (disc brake) combination average stopping distance from 60 mph is substantially under three federal standard stop distances for a passenger car alone from 60, which all new cars are required to meet. While the standards are quite complex and stop distances vary from 216 to 194 feet depending on amount of brake wear, the discs beat all three requirements. (The car/trailer rig with drums fell in the middle of the standard range.) Such numbers should be reassuring to a driver who knows that even when towing a disc brake trailer his stopping distance at highway speeds will compare favorably to the stopping distance with the car alone.

The test cycle, including the four-minute brake cooling segment from 60 mph, simulated a modest down-a-mountain run where fade could become a hazard. What the test crew determined is that the drum brakes did have a tendency to fade from 60. The test was halted after three stops because the drums became very hot. By contrast, the disc-braked trailer actually improved its stopping distances after the second stop. Five stops were made, the fifth being better than the first.

There is no question that disc brakes are substantially better than drums as they are installed on Airstream trailers. Whether or not they are worth the additional cost is a matter of individual choice. The advantage is clear and can be measured in feet. Those trailer owners who do choose disc brakes will have a margin of safety which simply is not available any other way.

Actual stopping distances are shown below:

<b>Stopping Speeds</b>		
	<b>30 mph</b>	<b>60 mph</b>
<b>DRUM BRAKES—Trailer Only</b>	72.4 feet	541.2 feet
	72.4	510.1
	72.8	
	Average 72.53 feet	525.65 feet
<b>DRUM BRAKES—Car &amp; Trailer</b>	51.8	208.5
	58.6	193.7
	54.3	211.9
	55.0	
	Average 54.92 feet	204.7 feet
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<b>DISC BRAKES—Trailer Only</b>	75.6	291.6
	68.6	308.3
	65.2	
	71.9	
	Average 70.32	299.95
	Percent Improvement +3.1%	+42.9%
<b>DISC BRAKES—Car &amp; Trailer</b>	52.2	178.6
	50.4	179.8
	58.3	170.1
		162.6
		172.3
	Average 53.63	172.68
	Percent Improvement +2.3%	+15.6%