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User Guide

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COMMUNICATING WITH TRAILER BRAKES

TUSON'S DIRECLINK NE CONTROLLER USES OBD-II MESSAGING TO PROVIDE PRECISE PROPORTIONAL STOPPING IN SYNC WITH TOW-VEHICLE DECELERATION

story by **Bill & Jenn Gehr**
photos by **Jenn Gehr**

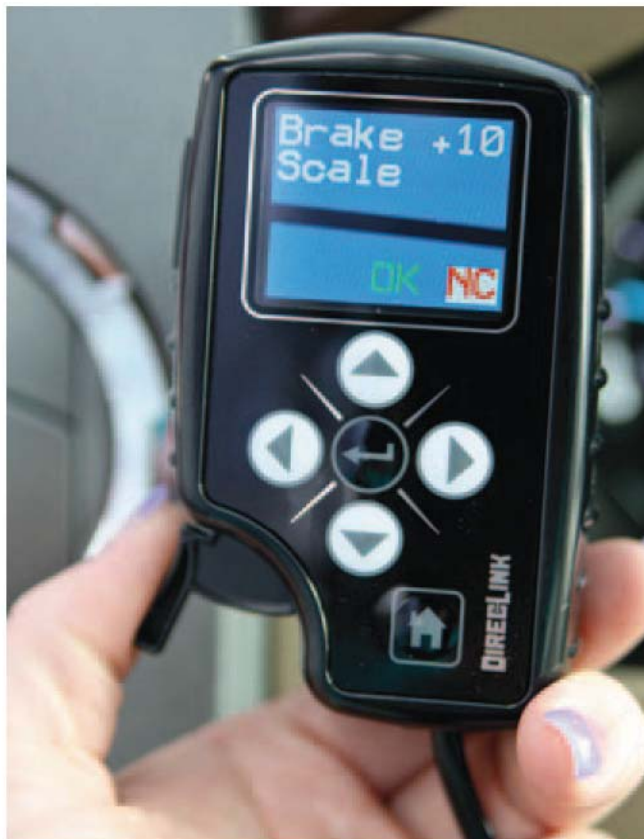
Precision handling is necessary for safe towing. And to ensure that all systems are working in harmony, you must have a good trailer-braking system that works in sync with the tow vehicle's braking.

While brake-controller technology has come a long way since Lucy and Desi took their famous honeymoon journey in "The Long, Long Trailer," Tuson RV Brakes has revolutionized brake-control design and function with its Direclink NE brake controller.

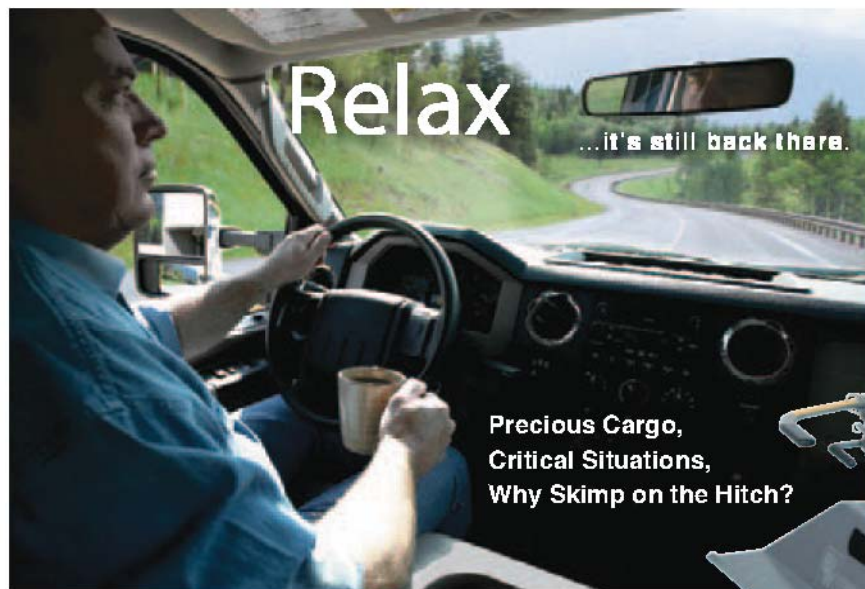
The first true network-based brake-control system, DirecLink synchronizes with the tow vehicle's computer network and uses multiple strategic data parameters to activate the trailer's brakes in precise proportion to the tow vehicle's deceleration. DirecLink works with either electric drum brakes or electric-hydraulic brakes, automatically detecting which type of brakes you have then configuring itself to work with either one. Because DirecLink monitors the tow vehicle's speed, it senses when you come to a complete stop and cuts off power to the trailer brakes.

While the DirecLink is monitoring your tow vehicle's computer, it's also constantly checking wiring connections as well as monitoring engine function like rpm and transmission temperature (for Ford and GM vehicles). For example, if the connector cable is left disconnected, a red screen will appear on the command module and indicate a problem.

The command module looks similar to a handheld CB; in fact, it has a similar mounting bracket that can be installed in a location of your choice on the dash. It serves as a diagnostic tool and monitor as well as a manual-brake unit for applying the trailer brakes independently of the tow vehicle's brakes. In addition to alerting you to system faults and failures, the



The large color display makes it easy to use the DirecLink as a diagnostic tool for your towable brake system.



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Just plug in the DirecLink module, and it automatically syncs to your tow vehicle.

bright blue LED color display screen can toggle into different screen menus with an easy-to-use directional keypad with up-down, left-right buttons as well as an Enter and a Home button.

Once the control and command modules have been connected and mounted, the DirecLink is ready for operation. Installation is surprisingly simple. The control module is mounted under the dash, out of harm's way, using tie wraps. Connect one end of the control cable to your tow vehicle's OBD-II connector (the scan port) then connect the other into the control module. The second cable (Delphi connector harness) is a four-wire cable that will connect to 12-volt DC, ground, brake-pedal switch and trailer-brake wire. Most trucks and SUVs come stock with a convenient four-wire connection under the dash for easy plug in. The third and last cable is a spiral cord with phone-jack connectors, which connect the control and command modules.

Once all the connections are made, the engine is started and the DirecLink will automatically configure itself after pushing the brake pedal. This process only takes about two to three seconds,

and then the brake scale will appear on the command module screen. The DirecLink is now ready for standard use.

Attention tech gurus: There are also three main menu screen options that allow you to customize various control settings for towing specifics such as trailer weight, high- and low-speed braking, intensity and more. After playing with this device for a few minutes, you'll likely agree that the DirecLink is the most advanced and extensive towing-diagnostic brake control currently available.

To evaluate the DirecLink brake control under practical conditions, we set the custom trailer weight setting to match our 15,000-pound fifth-wheel. In addition, we set the high and low speed settings and the brake scale to number 10. This number can be adjusted while towing. For best results, the brake scale is set while driving at highway speeds. Our initial setting proved to be too intense, and by adjusting the down arrow button, we found the braking to be much more comfortable. Unlike other brake controllers I've used in the past, the DirecLink can be adjusted at any time — even during a braking event. The LED display has three levels of

brightness intensity and the font is large enough to easily read at a glance.

We experienced exceptional clarity in DirecLink's communication with the trailer's braking system, which translated into excellent braking performance, reliable emergency stopping power and extraordinary safety diagnoses at the touch of a button.

Two models are available, both designed for use on 1997-present Ford, GM and Chrysler vehicles and 2008 and newer Nissan and Toyota models. The standard controller (\$295) has a number of diagnostic tools and is suitable for use with standard electric brakes. The NE model is more sophisticated and is designed for use with the company's ABS ActuLink package for electric-hydraulic disc brakes (see accompanying article, beginning on page 62). The NE model has an extensive diagnostic menu, with many features aimed at monitoring the ActuLink system. The NE version retails for \$345. Both units are backed by a 60-day satisfaction guarantee. 📞

Tuson RV Brakes, (800) 968-8766, www.direclink.com. Circle 220 on Reader Service Card.

CONTROLLED BRAKING

**TUSON'S ACTULINK SYSTEM ADDS ABS
FUNCTION AND SAFETY TO TRAILERS
EQUIPPED WITH DISC BRAKES**

Trailer brakes are not very sophisticated, but when adjusted properly they'll do the job as long as conditions remain fairly constant. However, emergency maneuvers can create instability, and total lockup can take tire tread down to the belts. And while electric-hydraulic disc brakes have much greater stopping capabilities, they aren't yet prevalent in the RV industry.

An electric-hydraulic actuator, called the ActuLink from Tuson RV Brakes, is a good way to get a leg up on stopping power. This module can be tied into an anti-lock braking system (ABS) module, making the system resistant to wheel lockup during panic stops.

The ActuLink ABS module provides four-channel independent braking, and when connected to the company's



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The ActuLink kit features a waterproof actuator and ABS Module made with high-quality, anodized aluminum. The supplied 0.02- and 0.04-inch spacers are used for setting the clearance on each individual wheel sensor.

ActuLink electric-hydraulic actuator and synchronized by its DirecLink NE controller (see page 58 for a complete review), the efficiency of the trailer's disc brakes increases dramatically.

Most people are familiar with ABS, which is a standard feature on later-model cars, SUVs and motorhomes. Vehicles equipped with ABS typically stop shorter and skidding is kept under control, even on slick roads. When applying the Tucson ABS components to a travel trailer, such as we did to our 15,000-pound fifth-wheel, braking at each wheel becomes completely independent and self-regulating. This is important because braking is optimized solely on the road conditions and the wheel itself.

For example, in hazardous conditions — such as bad weather and loose or slippery road surfaces — Tucson's system will adjust individual rolling resistance braking while preventing wheel lockup. The ActuLink ABS installed in our fifth-wheel greatly reduced stopping distance and prevented the trailer from jackknifing under severe simulated emergency situations.

Several key components make up the ActuLink system. The DirecLink NE brake controller (the model used with this system) closely monitors the ABS system as well as vehicle speed and rpm via the tow vehicle's network computer — connected via the OBD-II port. Its fast-responding electric-hydraulic

actuator provides the necessary pressure (approximately 1,600 psi) to enable the ABS module to quickly release and reapply the trailer brakes when necessary. The actuator communicates with the DirecLink NE Brake controller and the ABS module and real-time information and warnings are displayed on the controller's LED color screen. The ABS module monitors the rotation and braking behavior of each wheel hundreds of times per second via individual wheel-speed sensors that are installed at each trailer wheel. Using the information sent by the sensors, the system can rapidly and independently control braking sessions. The ABS module has four dual-valve hydraulic channels that tightly control the braking level at each wheel. Installation of the Tuson ActuLink ABS system is complicated and should be done by a trained professional.

We recognized the need for more efficient braking on our fifth-wheel and upgraded to the MOR/ryde IS Suspension and high-quality Kodiak disc brakes. Having the disc brakes already in place made a good portion of the job easier and quicker. All of the wheels need to be removed to gain access to all hydraulic lines and for the installation of the wheel sensors. The ActuLink electric-hydraulic actuator was swapped for the existing actuator provided when the disc brakes were installed. This is necessary so that the actuator will be compatible with the new system. Next, we installed the ABS module about 5 feet from the actuator. We were able to use most of the existing hydraulic lines; however, some needed to be rerouted



The wheel sensor is mounted on its own bracket with the spacers in place, ready to be mounted onto the brake-caliper bracket.

from the ABS module to the actuator. This process took roughly five hours.

Wiring the actuator to the ABS Module with the provided waterproof harness took 30 minutes, with another half hour to wire the battery cables, break-away switch and brake wires. Installation and routing of the wheel sensors took another 45 minutes. The wheel sensors install in the preexisting holes in the caliper brackets and pick up signals from the rotor tone rings. The gap can be no more than 0.05 inch.

After double-checking the hydraulic and electrical connections, DOT₃ brake fluid was added in the actuator. Now it was time to enlist the help of our tow

vehicle to assist in bleeding the brake lines and set wheel-speed data by backing up the truck close enough so that the seven-way trailer connector can be plugged into the truck. With one person in the cab of the truck and another person adding brake fluid during the brake-bleeding process, we were able to monitor hydraulic pressure through the DirecLink NE brake controller. Once the LED screen displayed the desired 1,600-psi level, we were certain that all air had been purged from the lines. Forty-five minutes later we replaced the tires and wheels and hitched for our test drive.

Pulling away, we set several preliminarily settings on the brake controller.

With the installation of the spring-loaded, adjustable wheel-sensor assembly, the use of some type of thread lock is absolutely critical. All of the bolts and nuts must be secured using thread lock for maximum safety, security and to ensure performance.







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Wheel sensors are mounted in their brackets with the prong-loaded plunger in place, allowing the sensors to move in and out when necessary.

At 10 mph we adjusted the low-speed brake setting, and while on the freeway at 55 mph we adjusted the high-speed setting — both by applying the brakes several times and monitoring the controller. Although the DireLink NE brake controller is somewhat complicated, it's also incredibly accurate.

The brake settings felt secure, and we were confident with the adjustments. We exited the freeway and headed for a large empty parking lot to test the ABS system. At 35 mph I hit the brakes hard enough for a lockup of all four wheels and to create skidding. We experienced no wheel lockup or skidding and stopping distance was noticeably shorter — plus there were no skid marks on the pavement.

I also tested the braking on a section of long gravel road. Slamming on the brakes at 40 mph produced no wheel lockup and no skidding or lateral trailer movement on the loose surface.

The hardware from Tucson is not inexpensive, but the price is well worth the confidence of knowing that the fifth-wheel will be in complete control during braking maneuvers, including unexpected emergency situations. The Actulink system package msrp is \$3,800, which includes the NE brake controller, actuator, ABS module, wheel sensors and all hardware necessary for complete installation. 🚗

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