

## **Brake controllers**

Trailer brakes are required in many states for trailers over 1,000-3000#, so an electric brake controller becomes an important part of safe towing. In theory, the tow vehicle brakes should be strong enough to stop the tow vehicle loaded up to its GVWR. And I'm sure there is some sort of extra safety margin built in to handle some added weight from a trailer that does not have brakes. Also in theory, the trailer brakes should be strong enough to stop the trailer. How quickly the trailer would stop on its own, like in a break-away situation, I'm not sure.

The brake controller basically supplies power to the trailer brakes when the tow vehicle brakes are applied. They are adjustable to fit the particular tow vehicle and trailer combination as well as the driver's braking habits. But that's where the similarity ends. There are basically three types of brake controllers; time based, inertia based and proportional.

### **Time based controllers**

Supply an increasing amount of voltage to the trailer brakes over time. The longer a tow vehicle's brake pedal is pressed, the more voltage is sent to the trailer brakes, up to a point. How much and how fast the voltage is supplied to the trailer brakes is adjustable. Time based controllers are the most common type.

There are a few drawbacks to this type of controller. The biggest problem is consistent braking. If you can make every stop almost the same, relative to speed and stopping distance, you probably wouldn't have any noticeable problems with this type of controller. But what about those stops that are more gradual or more hurried? During the more gradual stops (or slowing), you might feel some tugging or jerking from the trailer. During the hurried (or panic) braking, you may feel like the trailer isn't stopping and is going to push you into whatever it is you are trying to avoid. Should one of these situations arise, you may want to check out the other types of controllers.

### **Inertia based controllers**

Use sophisticated electronics (some better than others) to sense how quickly the tow vehicle is slowing or stopping (a change in vehicle inertia) and supplies the appropriate voltage to the trailer brakes. This type of controller is much smoother than the time based.

I happened to have the opportunities for a little testing of the Voyager and Prodigy controllers. Coming home from one of the last trips when I still had the Voyager installed, I was driving over the crest of a hill on a curve at about 35 mph. It had rained earlier so the roads were still wet, but it wasn't raining at the time. Just over the hill and around the curve was a traffic light. As I approached, it turned yellow, and I thought I had plenty of time and space to stop, although it would be a slightly quicker stop than what I would normally do. But as I applied the brakes, I didn't feel like things were going to

stop in time. Fortunately, there was nobody in front of me so I aborted the stop and went through the intersection just as the light turned red. I had been thinking about upgrading to the Prodigy for some time before this, and this made it clear I needed something better, so I got the Prodigy and installed it a few weeks later. After a few more trips out with the Prodigy installed and without incident, guess what happened? Yep, the same thing on the same road at the same intersection, but this time it was raining. This time I was ready (but I'm always ready for a traffic light to turn yellow anyway). When the light turned yellow, I said to myself, "Okay, let's see what this Prodigy will do." This time I kept on the brakes and everything came to a nice smooth stop. That sold me on the Prodigy.

But wait, there's one more type of controller that also has other people singing praises (that I don't have any first-hand experience with).

### **Proportional based controllers**

Are connected directly to the tow vehicles braking system in various manners. For example, the Jordan Ultima 2020 (<http://www.bestbrakecontroller.com/>) uses a cable system connected to the tow vehicle's brake pedal for direct input as to how much brake pedal force is being applied. Another brand, the Brakesmart (<http://www.brakesmart.net/>), taps into the tow vehicle's hydraulic brake line to determine the braking pressure being applied to the tow vehicle. Both units then send the appropriate voltage to the trailer brakes.

The only problem I see with the Brakesmart is that it requires more technical and automotive knowledge to install (tapping into the vehicle's hydraulic system).

Other than that, once they are adjusted correctly (and all brake controllers require initial setup and adjustment), they should work just fine.

### **ABS (Anti-lock Braking Systems)**

I'm talking about the ABS on your tow vehicle, since I haven't seen any ABS on trailers. ABS comes in handy when you have to make a quick, sudden stop. Hopefully, when you are towing your trailer, you are more aware of the situations around you and have a greater following distance than you would without the trailer behind you. If so, the type of braking that would trigger the ABS to come on should be minimized. But you can't predict everything!

In the event you need to stop hard and quick, and where this type of braking could trigger your vehicle's ABS, you need to remember that the trailer does not have ABS and the trailer brakes could lock up causing the trailer tires to skid. If the trailer tires skid, you may lose some control over the trailer, or possibly worse. Once the trailer tires start to skid, you've lost some of your stopping ability and it may cause the trailer to slide to one side or the other. Should this happen, be prepared to use the manual lever on the brake controller if you release pressure on the brake pedal because this could start the trailer

tires rolling (and stop skidding), which could also lead to trailer sway. And depending on where the trailer was in relationship to the tow vehicle when all of this occurred, it could lead to some serious trailer sway!

Now that I've probably put a little fear into you, let me try to take some of it away. This type of worst-case situation is rare, but it does happen (I have seen it). The Boy Scout motto should also be applied to driving, regardless of what you're driving...Be Prepared. If you're ready for the worst possible situation, you'll hopefully be ready to deal with it correctly.

### **Installation and adjustment**

All brake controllers require some sort of adjustment after installation, and the adjustment procedures are usually spelled out in very good instructions from the manufacturer. If you've worked on automotive electrical before, you might be able to install a brake controller yourself. Newer vehicles and newer brake controllers can be a simple plug-n-play sort of installation with vehicle-specific wiring harnesses. If you haven't, or are skeptical of your skills, have a pro do it. Watch what they do so you know what they did, in case you have problems somewhere down the road. Once installed, follow the initial adjustment instructions. If you have any problems, contact the brake controller manufacturer.

A common question is, "Where should I mount it?" Most people seem to install them under the dash just above where your right knee would be. This puts it within easy reach should you need to use the manual lever on the brake controller. Installing it above your left knee may cause problems with getting in to or out of the vehicle and hitting it with your leg/knee (ouch!). Wherever you mount it, make sure it is within easy reach, and if there is some sort of display on it, that you can see it easily. Make sure you read the installation instructions before trying to install it yourself or having someone else install it. Many controllers have limits as to what angle they can be installed at when the tow vehicle is on level ground. For example, the Voyager and Prodigy units can be installed from 0 degrees (horizontal) up to a 70 degree angle (almost vertical). Anything outside of this range may cause the controller to not function properly.

### **Manual lever**

All brake controllers that I've seen have a lever you can use to manually activate the trailer brakes separate from the tow vehicle brakes. This manual lever can be used when making initial or subsequent adjustments, when you want to use just the trailer brakes and not the tow vehicle brakes (such as when going downhill), or in the event the trailer starts to sway. Make sure you can reach the lever easily while driving.

