# Electric Brake Controller Guide

# **INTRODUCTION**

This article is intended as a guide to electric brake controllers, how they operate and the different systems available on the market for trailers and caravans weighing between 1500kg to 3500kg.

Drawbar mounted *Break-Away* brake controller systems are required on all caravans over 2 tonne Gross Caravan Mass. *Break-away* controllers are designed to apply the caravans braking system if it becomes detached from the tow vehicle. The break-away switch module requires an onboard battery which is trickle charged via the reversing light pins on the trailer connection plug, also a check facility to ensure that the caravans' safety system is operational at all times.

## THE LAW

In December 1998 an agreement was reached by all State Ministers of Transport to implement national towing regulations throughout Australia. The uniform law states all caravans with an Aggregate Trailer Mass (including the load) over 750 kg must be fitted with brakes to comply with the national road regulations.

According to the Australian Design Rules, all caravans over 750kgs GTM, irrespective of the towing capacity or unladen mass of the tow vehicle, must have an effective brake system fitted. All brakes must be operable from the driver's seat of the tow vehicle except for over-ride brakes.

The minimum braking system required for a trailer or caravan depends on its type and weight, as well as the weight of the tow vehicle.....

• Up to 750kgs GTM: No brakes are required.

• **751 to 2,000kgs GTM**: There must be a braking system on the wheels of at least one axle and over-ride brakes are permitted. However, for caravans exceeding 1000kgs, independent brakes (electric brakes are the most common form) are strongly recommended.

• **Over 2,000kgs GTM:** A brake system operating on all wheels is required. The system must be capable of automatically activating should the caravan become detached from the tow vehicle. Under these circumstances the brakes must remain applied for at least 15 minutes. These 'break away' systems are compulsory on all caravans over 2,000kgs GTM.

# WHAT IS AN ELECTRIC BRAKE CONTROLLER

An electric brake controller is a device that supplies power from the tow vehicle to the caravans electric brake system when the vehicles brakes are applied. Any caravan with electric brakes needs a brake controller to make its braking system operational.

# HOW IT WORKS

Power is fed from the vehicles stoplights into the controller, activating the caravans' brakes via a separate heavy duty 25 amp circuit fed through the caravans connecting plug and socket. This allows the caravans' brakes to come on automatically when you apply the vehicles brakes, at a rate set by the controller. When the controller is adjusted correctly, the driver will be able to slow the tow vehicle and caravan combination just as smoothly as if the tow vehicle was by itself. Refer to your Brake Controller Manual for correct set-up procedures.

It is important the wiring is heavy enough for the power to run through to the caravan with a good earth return, not just earthed to the body. We recommend a 25 amp cable for use with all electric brake systems. Proper maintenance of the brakes with regular adjustment of the shoes & care of the magnets is also required.

# **INSTALLATION**

Most electric brake controllers are of a slimline contoured design allowing under dash placement easily within the drivers reach. From the driver's seat you can control the rate of brake application from soft to aggressive by simply moving the control forward or backward. Most controllers also have a manual over-ride device which allows the user to apply the caravans' brakes independently of the tow vehicles brakes.

# **TYPES OF CONTROLLERS**

There are two types of electric brake controllers - *motion sensing or pendulum style* and *time delay activated or solid state*. Although the controller methods are different, both types of controllers are very similar. Both allow the user to adjust output or braking power & both have a pressure sensitive manual over-ride trigger that can be used to apply the caravan brakes independent of the vehicles brakes. They also have the same wiring configuration.

**MOTION SENSING** or pendulum style controllers are enabled by the brake pedal switch and activated by a pendulum circuit that senses the vehicles stopping motion and applies a proportional voltage to the caravans' brakes. After proper adjustment the caravan will decelerate at the same speed as the tow vehicle. This increases braking efficiency and reduces brake wear. The big advantage of the pendulum style controller is that it will operate well under adverse braking conditions and has a much smoother braking action. Although most pendulum style controllers are bulky, more expensive and must be mounted and calibrated level, there are exceptions such as the new generation controllers like Tekonsha Prodigy.

**TIME DELAY** controllers operate the caravans' brakes at a pre-determined braking rate. These controllers are designed to activate the brakes at a set delay from when the stoplights are activated. In some instances the rate of brake application is no different for a gradual stop to that of an attempted emergency stop. It is important to note that while time delay controllers provide some braking, it does not provide the most efficient balanced braking for the combination of car and caravan. Time delayed controllers are inexpensive, have a low profile, and can be mounted on any angle.

# WHAT'S ON THE MARKET

## MOTION SENSING CONTROLLERS

## Tekonsha P3

Tekonsha's latest P3 electric brake controller is said to be the most advanced controller on the market. Features include easy reading LCD display with multiple colour & contrast options with highly advanced easyto-understand roadside diagnostics & easy access "Up-Front" controls. The original "Boost" feature allows for different levels of customized braking. It also has a compact, dash-hugging design & unique easy-to-use clipmounting system for quick disconnect & easy storage.

# **Tekonsha Prodigy**

The Prodigy is a technologically advanced controller. Even with its pendulum based output it requires no levelling and is equipped with a self-adjusting sensing device to compensate for varying terrain. Its digital display illustrates the voltage level delivered to the caravans' brakes whilst driving and also reports any electrical fault conditions such as power loss, short circuits. It has a plug in wiring harness for easy removal and a unique pocket mounting for flexible options. This unit has a variable power level that is further complimented by a boost feature for incremental power.

## Tekonsha Voyager

The Voyager unit is a pendulum based controller with an indicator light to confirm that the caravan is connected and the circuit is complete. The indicator light also changes colour as an indication of the amount of power going to the caravans brakes. The Voyager controller has a manual-braking slide lever and variable gain control. It provides smooth braking but can be a bit fiddly to adjust.







### **Tekonsha Primus**

The Primus has a totally proportional electric caravan brake control applying power to the caravan brakes in proportion to vehicles deceleration. It utilizes the primary sensor technology from Prodigy and features a One step set up system allowing the driver maximum flexibility when determining how the caravan should respond to a braking event. Snap in dash mounting clip and removable electrical connector allow unit to be quickly stored when not in use. It shows a digital readout depicting a secure electrical connection and the amount of voltage delivery to the caravan brakes.

#### **Tekonsha Sentinel**

The Sentinel is the product of extensive consumer research by Tekonsha. It is inertia activated using integrated circuitry for safe, smooth stops. The ergonomic design allows contour installation on dash for maximum visibility with comfortable access to the manual override slide lever. The LED power delivery display shows the amount of current delivery to the caravan brakes and glows green when a complete connection is made to the caravan.

## Tekonsha Envoy

The Envoy is built with simplicity and reliability in mind. It's easy to install and easier to set and use & easily adjustable to accommodate different caravan weights. Envoy is equipped with a inertia activated sensor that detects the tow vehicles rate of deceleration and applies proportional braking to the caravan. It has a pivot mount & is ideal for installation in newer model tow vehicles.

## AccuPower AccuTrac

The AccuTrac is an inertia activated brake controller. The AccuTrac is especially suited for constantly changing load conditions as. The dual action slide controls allow customized stopping power both in town and on the highway. It features dual brake action setting controls, solid state electronics, easy to set up and adjust, positive LED indicator confirms brake connection.









## AccuPower DigiTrac II

The AccuPower DigiTrac II is a good choice for your constantly changing heavy load conditions. It is able to detect the difference between a gradual deceleration like slowing to a traffic light and the stopping power required when braking for an unexpected event. Its advanced electronics and patented Inertia Sensing System are designed for consistent and predictable stopping power. The Inertia Sensing System uses two separate power delivery controls - one for the "around town" gradual stopping and one for the urgent sudden stops.

## Hayes Lemmerz Energize III

The Energize III unit is a simple to use pendulum based controller. It has a manual pendulum level which is highly visible and easy to set. A roller gain wheel allows easy tuning of braking quantity and the manual braking slide overrides gain settings for full emergency braking. An LED indicator light intensifies as braking power increases, which is a useful control feature. It is simple, reliable and provides smooth brakes.

## Hayes Lemmerz Endeavour

The Endeavour is an advanced Energize III. It has a manual pendulum level but the digital readout guarantees a precise set. An increase/decrease button sets braking levels and a digital display indicates the amount of power being sent to the caravan brakes. The digital display also provides visual warning of several fault conditions, including current limit and short or open circuit. The easy to use manual override slide operates independently of the power setting to allow full braking output when desired.







#### TIME DELAY CONTROLLERS

#### **AccuPower Pilot**

The AccuPower Pilot mounting options are very flexible as you are able to mount it in any direction even upside down. It has a large digital two-digit display making it easy to read the voltage output to brakes (vs. a percentage output) as well as connection to the caravan.

Features include microprocessor allowing control to be mounted upside down and still have a readable display, protection against short circuit and loss of ground & with an optional ball mount available.

#### **AccuPower POD**

The POD (Power On Demand) can be mounted in any direction, even upside down. It features solid state electronics, power on LED for a positive tow vehicle to caravan connection & manual over-ride controls.

#### Hayman Reese

The Hayman Reese controller features simple operation, slim design and unlimited mounting positions. Not being a pendulum based controller its power level is varied by adjusting the Sync and Output controls on the unit. The sync relates to the timing of the brakes, (advanced or delayed) and the output level control adjusts the power. Because there is no internal pendulum sensor the Hayman Reese controller will deliver the same braking performance every time you apply the vehicle brakes which limits its ability to deliver smooth and effective braking in all stopping scenarios. The unit also has a manual control that allows variable independent application of the caravans' brakes.

#### Note:

Independent recommendations should be sort from your local towing parts supply specialist before making your purchase. You must also declare if you are intending to tow a tri-axle caravan as this will have an impact on the controller selection.







# **DEFINITIONS**

#### ATM (Aggregate Trailer Mass)

The total laden weight of a trailer or caravan, which includes the tow ball mass and whatever you add as payload (E.g. water, gas, luggage). The ATM is specified by the caravan manufacturer and must not be exceeded.

#### GCM (Gross Combination Mass)

The maximum laden mass of a motor vehicle plus the maximum laden weight of any caravan it can tow. The GCM is specified by the vehicle manufacturer.

#### **GTM (Gross Trailer Mass)**

The total permissible mass which includes whatever you add as payload (E.g. water, gas and luggage) that can be supported by the wheels of a caravan. This does not include the mass supported by the tow ball. The GTM is specified by the manufacturer and must not be exceeded.

#### **Tare Mass**

The unladen weight of the caravan.

#### **Tow Ball Mass**

The weight imposed on the rear of the tow vehicle's tow ball from the coupling of a trailer or caravan.

#### Payload

Payload is specified by the manufacturer. It must not be exceeded under any circumstances. Safety, insurance & warranty may be affected if the specified payload is exceeded.