

Manufacturing
CURT
BRAKE CONTROL
Navigator 3

**Electronic Brake Controller
Curt Manufacturing P/N I-1770**

**FOR TRAILERS WITH 2-8 ELECTRIC BRAKES AND VEHICLES WITH 12 VOLT
NEGATIVE GROUND SYSTEMS ONLY.**

INSTALLER AND OWNER: Read and follow these installation and adjustment instructions carefully. Leave in tow vehicle for future reference. If there are questions on installation, adjustment, trouble shooting or operation of brake controllers call 800-892-2676 Monday through Friday between 8:00 a.m. and 5 p.m. Eastern Time.

Automatic Operation

During braking the Navigator 3 functions on its ability to sense deceleration of the tow vehicle. An internal sensor measures the amount of deceleration and sends a proportional amount of power to the trailer brakes. The maximum braking supplied depends on the set up of the controller. The digital display will indicate the amount of power being sent to the trailer brakes. Once the brake pedal is released, the unit will return to "stand by" mode. While standing by, the controller will display the currently selected mode of display (% power, voltage, or current). Further explanation of these modes is included in this document.

WARNING: In the automatic mode, the trailer brakes are energized only when the pendulum sensor detects deceleration. With the vehicle at rest and the brake pedal depressed, there should be no or slight output to the trailer brakes.

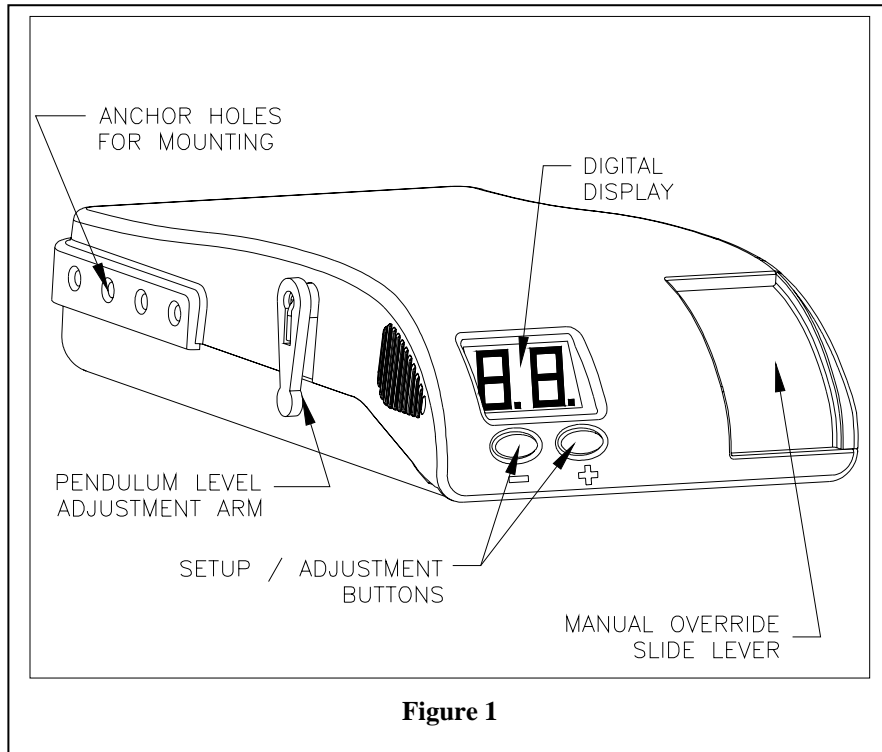


Figure 1

1.0 Controller Mounting & Installation

- **Mounting angle**

Mounting angles between -35 and $+90$ degrees can be accommodated by the controller. The unit must, however, be installed so that it is parallel with the travel of the tow vehicle and trailer.

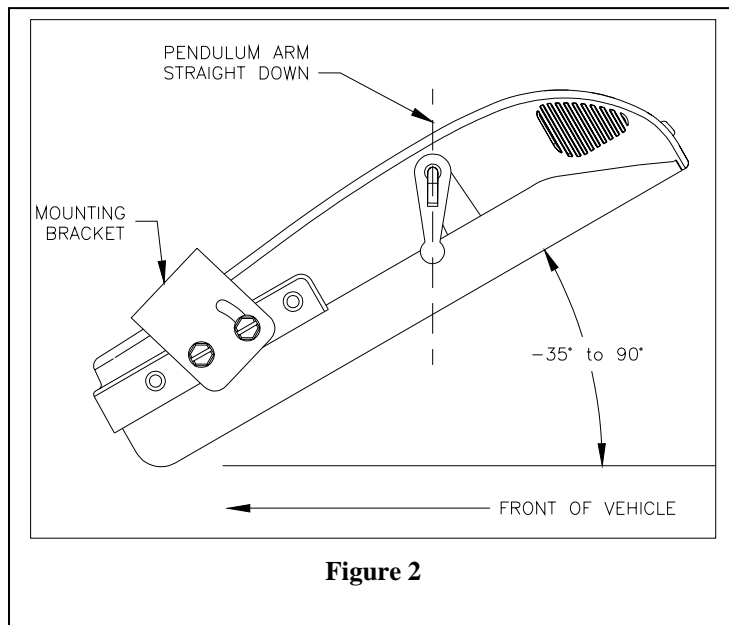


Figure 2

- **Controller and Bracket mounting**

The bracket provided is to be used for mounting the controller to the dashboard or other suitable location in the tow vehicle. Care must be taken to ensure that the mounting surface is rigid enough to prevent excessive vibration, which may result in poor performance. Use the reversible slotted bracket. Do not mount upside down or sideways. If the controller is mounted incorrectly, the pendulum cannot operate correctly and may cause loss of braking.

1. Install the mounting bracket to a solid surface under the tow vehicle dash using the two sheet metal screws or the two machine screws and fasteners provided. Tighten until snug.
2. Insert four of the sheet metal screws provided through the mounting bracket holes and into the desired controller anchor holes. Tighten until snug. Use of longer screws than those provided or drilling may damage the unit.
3. Mount in a location, which allows the driver to easily apply the manual override and see the digital display.

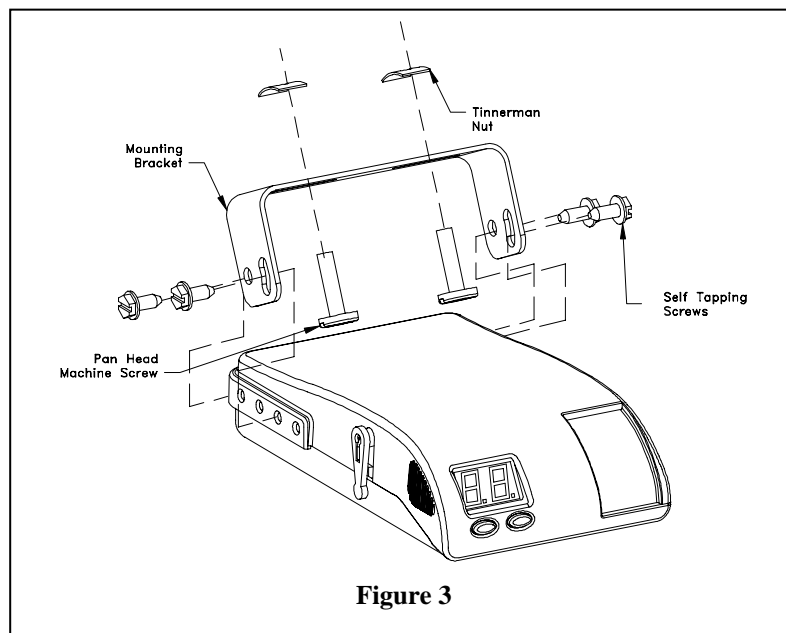


Figure 3

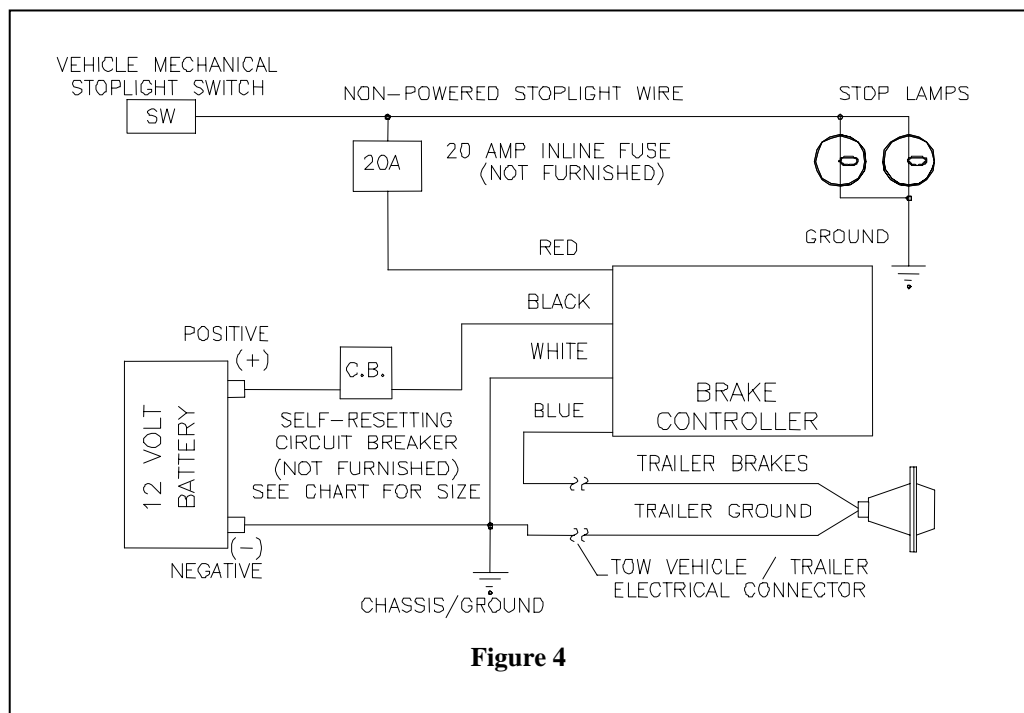


Figure 4

1.1 **Controller Wiring Chart.**

Read all wiring instructions prior to making electrical connections to the tow vehicle. The following chart describes the function of each of the controller's wires:

Color	Function	Wire Size (AWG)	Connect To
White	Ground	18	Grounded metal part of the firewall or directly to the negative (-) terminal of the battery.
Black	+ connection to the vehicle's power system	10	Positive (+) terminal of the battery. MUST have a self-resetting Circuit Breaker in-line between the controller and the battery. See chart for proper size.
Red	Stoplight	14	Non-powered stop lamp wire of the stop lamp switch or trailer tow wiring harness. It is recommended that a 20-amp inline fuse is between the controller's red wire and the stop lamp switch.
Blue	Output to trailer brakes	12	Directly to the trailer brake wire or tow vehicle / trailer connector.

WARNING: All four controller wires must be connected properly for the controller to operate correctly. Failure to do so can cause loss of trailer braking. Reverse polarity, i.e., reversing black battery (+) wire and white ground (-) wire or improper wiring will destroy the controller and void the manufacturer's warranty.

For tow vehicles equipped with factory trailer towing package refer to your vehicle's owners manual or other information provided by the manufacturer in determining the correct connection points for the controller. For vehicles without a trailer-towing package refer to the schematic diagram in Figure 4.

**SELF-RESETTING CIRCUIT BREAKER
SIZE CHART**

Number of Brake Light Bulbs (tow vehicle Plus trailer)	Number of Trailer Brakes			
	2 Brakes	4 Brakes	6 Brakes	8 Brakes
4 Bulbs (minimum)	20 AMP	30 AMP	30 AMP	40 AMP
5 Bulbs	20 AMP	30 AMP	30 AMP	40 AMP
6 Bulbs	20 AMP	30 AMP	40 AMP	40 AMP
7 Bulbs	30 AMP	30 AMP	40 AMP	40 AMP
8 Bulbs	30 AMP	30 AMP	40 AMP	50 AMP
9 Bulbs	30 AMP	40 AMP	40 AMP	50 AMP

Note: Each trailer brake magnet is assumed to draw 3 amps of current and each brake lamp bulb is assumed to draw 2 amps.

WARNING: Improper grounding will result in poor controller performance or lack of performance altogether. The white wire must be connected to a known good ground (preferably the negative battery post). Improper or no ground will destroy the controller and void the factory warranty.

WARNING: 1989-1991 Ford Bronco, Econoline, F-Superduty, and F150-350 Series: The red stoplight wire **MUST** splice into the turn signal connector harness and **NOT** in the stoplight switch.

WARNING: All 1999 and later Ford vehicles without the trailer wiring package: The red controller wire must be connected to the light green wire of the brake stop lamp through a 20-amp inline fuse.

WARNING: Refer to the vehicle manufacturer or Curt Manufacturing for the latest controller red stoplight wire to stop lamp switch connections. Improper connections may result in no trailer brakes or destroy the controller and void the manufacturer's warranty.

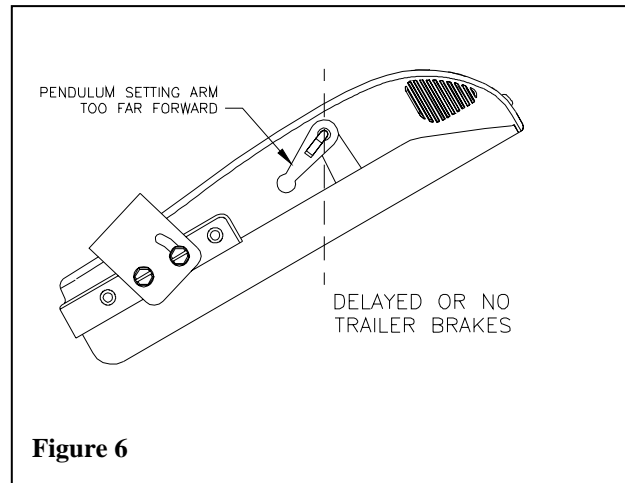
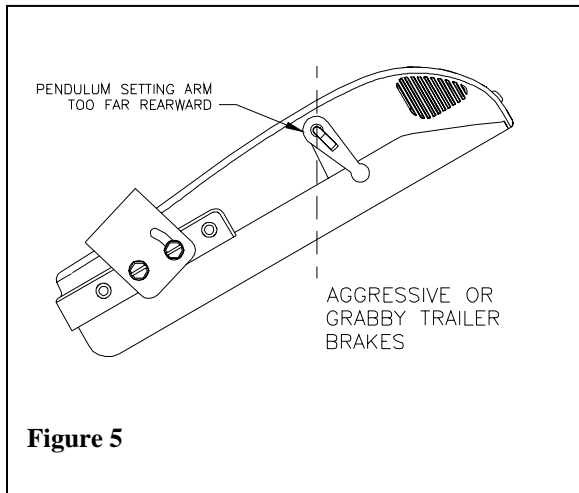
WARNING: Do not connect the black wire to any vehicle power supply lines or fuse panels that could cause circuit overload or damage to tow vehicle wiring and vehicle

2.0 Leveling the Pendulum

1. Connect the trailer to the tow vehicle for this adjustment. If a load leveling hitch system is used, it should be connected and operational. Locate the tow vehicle and trailer on a flat level surface. Make sure the tow vehicle stop lamps are operating correctly and disconnect the tow vehicle/trailer electrical connector between the tow vehicle and the trailer.
2. Set the power level to maximum (100%). See section 2.1.3
3. Set the display mode to "P" (% power output). See section 2.1.1
4. Depress the brake pedal to turn on the vehicle stoplights. Hold this position.
5. Pull the pendulum-leveling arm (Fig. 1) fully toward the rear of the tow vehicle. display should increase in numerical value greater than 10.
6. Push the pendulum forward until it reads 10. The pendulum should now be directly downward. (Fig. 2) Repeat steps 4, 5, and 6 several times to make sure display has just reached the minimum number.
7. The minimum turn on power level may be changed after the initial set-up from 10 (pre-set) to 15, 20, or 25 percent. Reference section 2.1.2.

WARNING: Improper adjustment of the pendulum may result in poor performance of trailer brakes. Brakes may be unresponsive, grabby, delayed, or pulsating.

If the controller does not perform properly, check for one of the conditions shown in Figures 5 and 6



2.1 Performance Adjustments

The controller features the following options, selections and settings.



For technical assistance with setup or operation, call toll free: 800-892-2676

Brake Controller Item # I -1770 Quick Reference

Option	Available Selections	Change procedure
Display Mode	P : % of available power being sent to trailer brakes E : Voltage (DC) being sent to trailer brakes C : Current (DC) being applied to trailer brakes	<ul style="list-style-type: none"> • Press "+" button until the display flashes and release • Display mode will flash (P,E, or C) • Press "+" button to cycle through optional display modes. • When desired display mode is displayed, press "-" button until flashing stops and release. • The new display mode is now set
Minimum Turn-on Power	10%, 15%, 20%, 25%	<ul style="list-style-type: none"> • Press "-" button until the display flashes and release • Min Turn-on power will flash (10, 15, 20, or 25) • Press "-" button to cycle through optional settings. • When desired percentage is displayed, press "+" button until flashing stops and release. • The new Minimum Turn-on Power is now set • The newly selected value will be displayed for several seconds. • After several seconds, the display will revert back to showing the display mode (P,E,or C)

Maximum Power (Gain)	5% increments from the set Min Turn-On setting to 100%	<ul style="list-style-type: none"> • Press “+” or “-” button and release • The current power setting will be displayed • To raise the displayed power setting, press “+” button and release • To lower the displayed power setting, press “-” button and release. When no change is made for several seconds, the display setting will be stored as the current Maximum Power and the display will revert back to showing the display mode (P,E, or C) & stored last selected power level.
The following is a list of potential trouble codes. Refer to the installation guide for complete explanation of the codes		
Display	Code	Possible Cause
SC	Short Circuit	This indicates a direct short to ground in the blue wire (output) circuit
CL	Current Limit	Indicates that the brake controller is attempting to provide more than it's maximum rated power.
OC	Open Circuit	Indicates that there is no trailer connection detected.
HF	Hazard Flash	Will display while hazard flashers are on.
bF	Voltage on blue wire	Blue wire connected to wrong place, short in wiring / connector. Faulty or disconnected breakaway switch.

Display mode: The controller is factory pre-set to % of maximum output (P). This means that under braking conditions, the number displayed indicates the % of power being applied to the trailer brakes. The scale for this is “0”-“99.” Other available display modes are voltage (E) and current (C). It is recommended that % (P) is used while operating the vehicle. Voltage (E) can be used in operation, but it should be noted that the actual voltage supplied to the trailer brakes may vary from the displayed value by up to 1 Volt. The Current (C) reading can be used in troubleshooting and setup to ensure that the amperage draw of the trailer brakes is in the proper range based on the number of axles on the trailer, but should not be used while operating the vehicle. The current reading may vary significantly due to temperature swings in the brake magnets. Warm trailer brakes tend to be more responsive than cold brakes which results from braking and changes in the environment. See section 2.1.1 for details on changing the display mode.

Minimum Turn-on Power: The controller is factory pre-set to 10%. When the brake pedal is applied, the MINIMUM amount of power that will be immediately applied to the trailer brakes is 10%. See section 2.1.2 for details on changing and adjusting the “Turn-on” power to obtain optimum trailer braking performance.

Maximum Power: The controller is factory pre-set to 50%. When the controller senses maximum deceleration, the most power that the controller will send to the trailer brakes will be 50%. See section 2.1.3 for details on changing the Maximum power setting.

WARNING: Improper adjustment of the controller could result in loss of trailer brakes, aggressive, grabby, pulsating, or delayed trailer brakes. Gain (power) adjustments may be required based upon speed, trailer load, and road conditions. Optimum trailer braking occurs just prior to lockup of the trailer wheels. Trailer brake lockup could cause loss of control of the trailer and / or the tow vehicle.

2.1.1 Changing Display Mode. The symbols (P, E, C) that are displayed under normal non-braking conditions may be changed as follows: With the vehicle at

rest, press the “+” button until the display flashes and release. The display will flash a letter, which corresponds to the set display mode (P,E, or C).

- To change the set mode, press the “+” button and release. The display will change from P to E to C with sequential presses of the “+” button.
- Continue pressing the “+” button until the desired display mode is shown on the LED.
- Press the “-“ button and hold until display stops flashing and release.
- The new display mode is now set.

2.1.2 Changing Minimum Turn On Procedure

The minimum Turn on power may be changed from 10% (default) to 15, 20, or 25%. To do this, following these steps:

- With the vehicle at rest, press the “-“ button until the display flashes and release. The display will flash a number, which corresponds to the set turn-on as a percentage of total available power (10, 15, 20, or 25).
- To change the set value, press the “-“ button and release. The display will change to the next highest available value with sequential presses of the “-“ button.
- Continue pressing the “-“ button until the desired turn-on power level is displayed on the LED.
- Press the “+“ button until display stops flashing and release.
- The new turn-on level is now set.

Changing the Turn on power is designed to allow more or less power to be delivered to the brakes when the controller senses deceleration. See section 2.4.H for loaded trailer weight guidelines. Select the power setting required for your loaded trailer weight.

2.1.3 Changing Maximum Power

The maximum power may be changed from the default 50% value by doing the following:

Note: To change the power, the controller must be in “normal” operating mode. (i.e., displaying P, E, or C – not flashing)

- With the vehicle at rest, press either the “+” or “-“ button momentarily and release. The set maximum power will display while flashing.
- While this maximum power value is flashing, press either the “+” (increase) or “-“ (decrease) button to make changes to the power setting. The power percentage will change in increments of 5% with each sequential button push.
- The controller is instantly set to the newly displayed value.
- When no button has been pressed for 15 seconds, the system will become idle and the display will change to mode (P,E, or C).

NOTE: when the value reaches 100%, the display will read “99.”

2.2 Manual Operation

The manual slide lever is used in emergency stop situations when more braking may be required than is available with the controller setup. The manual slide lever located on the front side of the controller is used to apply the trailer brakes independently of the tow vehicle or to override the trailer brakes. The further the manual slide lever is moved from the right to the left, the greater the amount trailer braking effort is applied. The manual lever operation is an independent circuit and overrides the power adjustment to allow full braking effort when required. *The tow vehicle and trailer brake stoplights will be illuminated during the manual lever activation.*

WARNING: Manual operation via the manual slide lever may not disengage the Cruise Control on some vehicles.

2.3 Digital Display

The digital display shows various symbols and numbers that are used for set up and to monitor the trailer brake performance. It is also used when trouble-shooting. This controller will “flash” a symbol to indicate a problem with the trailer, the tow vehicle, or the brake controller.

2.3.1 **Short Circuit:** The display will flash “**SC**”. This is an indication that the controller has sensed a direct short between the controller’s output and ground. This condition must be cleared before the controller is used. It is usually an indication that a “hot” wire is connected to ground.

2.3.2 **Current Limit:** The display will flash “**CL**”. This is an indication that the controller has sensed a power requirement greater than its recommended output. When this occurs, the controller will limit its output to approximately 30 amps. This could be an indication of an intermittent short to ground in the trailer wiring, a faulty (shorted) brake coil, or too many brake coils connected to the controller.

2.3.3 **Open Circuit:** The display will flash “**OC**”. This is an indication that there is no trailer connected to the tow vehicle. Flashing “OC” will display for five minutes unless a trailer is connected to the tow vehicle. After a few minutes, the display will go blank when no load is detected.

2.3.4 **Hazard Flash:** The display will flash “**HF**”. This occurs when the controller senses a distinct cycling of power in the brake light circuit. The controller will continue to display “HF” until the cycle is broken either by a braking event or a discontinuation of the power cycling.

2.3.5 **Blue Wire Fault:** The display will flash “**bF**”. This occurs when external voltage is detected on the blue wire. The controller will continue to display “bF” until external voltage is removed. Possible causes can be the blue wire being connected to the wrong place, short in wiring or connector, or a faulty or disconnected brakeaway switch.

NOTE: During the time that the controller senses the Hazard Flash, no power will be sent to the trailer brakes. Therefore, there should be no pulsing of the brakes.

2.4 Road Test and Performance Adjustment

To set the controller up for optimum performance with your tow vehicle / trailer combination, follow these steps:

- A. Find a hard, flat, dry surface.
- B. Set the display mode to % (P). See section 2.1.1.
- C. Adjust the power to 50% setting using the instructions in section 2.1.3.

- D. Accelerate to approximately 25 mph and apply the brakes in a normal manner. The vehicle should come to a stop without the trailer “pushing” the tow vehicle. A firm braking action should occur.
- E. If the trailer brakes lock, decrease the power level.
- F. If more braking power is needed, increase the power level.
- G. Repeat this process until the desired amount of braking is achieved.
- H. If needed, follow the instructions in section 2.1.2 to increase or decrease the minimum turn-on power. The following guidelines should be used as a starting point for selecting this option:

If the Loaded Trailer weight is...	Then set the Minimum Turn-on Power to:
Less than the tow vehicle	10 %
Roughly equal to the tow vehicle	15 %
Slightly greater than the tow vehicle	20%
Much greater than the tow vehicle	25%

There are three methods of adjusting the output and responsiveness of the Navigator 3 Brake Controller. They are listed here in the order in which they should be modified:

1. **Power Adjustment:** The power is adjustable from 10% to 100%. (if minimum power is set at 10%). This figure is based on the amount of power available for delivery to the trailer brakes. The total amount of power available is determined by the size and condition of the vehicle’s charging system.
2. **Minimum Turn-on Power Adjustment:** - Changing the Turn on power is designed to allow more or less power to be delivered to the brakes when the controller senses deceleration.
3. **Pendulum Adjustment:** The pendulum can be either pushed slightly forward to give a delayed feel or pulled backward to give a more aggressive feel. This adjustment is somewhat coarse as compared to the other two options, so it is not preferred. (Reference Fig. 5 and 6.)

3.0 Troubleshooting

Symptom	Possible Cause	Remedy
Trailer Brakes "Lock Up"	Power level set too high	Reduce maximum power level setting
	Minimum turn-on power set too high	Reduce minimum turn-on power level
	Pendulum positioned too "aggressive"	Re-level pendulum
Low output to trailer brakes	Power level set too low	Increase maximum power level setting
	Minimum turn-on power set too low	Increase minimum turn-on power level
	Pendulum positioned too "delayed"	Re-level pendulum
Weak / Ineffective Brakes	Overloaded trailer	Check weight rating
	Loose or poor quality connections	Inspect connections / check with meter
	Insufficient wire gauge	Inspect / replace
No output to trailer brakes (manual or automatic)	Improper Wiring	Check color codes of all wires. If unsure, contact your vehicle dealership or our customer support department.
	Improperly grounded	Ensure that the following are grounded: <ul style="list-style-type: none"> • Controller (white wire) • Tow vehicle connector • Trailer umbilical cord • Each brake magnet
No output to trailer brakes (automatic only)	Faulty Brake Light Circuit on tow vehicle	Troubleshoot / repair brake light circuit
Intermittent or surging brakes	Improperly grounded	Check and repair all ground connections
	Out of Round brake drums	Repair / replace
	Worn wheel bearings	Repair / replace
No output to trailer brakes, display reads "SC" when brakes are applied	Direct short to ground either in tow vehicle wiring or in trailer wiring.	Inspect and repair wiring
	Faulty brake magnets	Test / replace brake magnets
Reduced output to trailer brakes, display reads "CL" when brakes are applied	Too many brake magnets are attached to controller	Controller only handles 1-4 axles with brakes.
	Intermittent short to ground in tow vehicle or trailer wiring	Inspect and repair wiring
	Defective brake magnets	Test / replace brake magnets
Trailer brakes lock up when trailer connector cable is attached.	Faulty breakaway switch	Test / replace switch
Controller displays flashing "bF"	Indicates presence of an unexpected 12V on the blue (output) wire due to one of the following: <ul style="list-style-type: none"> • Faulty wiring • Malfunctioning break-away switch 	Inspect wiring and breakaway switch. Ensure that there is no voltage on the blue wire when the brake pedal is not depressed.