



BLACKBIRD

ELECTRONIC BRAKE CONTROLLER
HAYES BRAKE CONTROLLER P/N 81726

INSTALLATION MANUAL
For trailers with 2-8 electric brakes and
vehicles with 12 volt negative ground
systems only.

READ AND SAVE THESE INSTRUCTIONS

- Before beginning installation, read and become familiar with these instructions.
- Leave in tow vehicle for future reference.
- **IMPROPER INSTALLATION AND OPERATION COULD CAUSE PERSONAL INJURY, AND/OR EQUIPMENT AND PROPERTY DAMAGE**
- Questions on installation, adjustment, trouble shooting or operation of Brake Controllers

SAFETY INFORMATION



WARNING: Indicates a potentially hazardous situation that, if not avoided, could result in death or serious personal injury.



CAUTION: Indicates a potentially hazardous situation that, if not avoided, could result in damage to product or property.



TIP: Contains helpful information to facilitate installation.

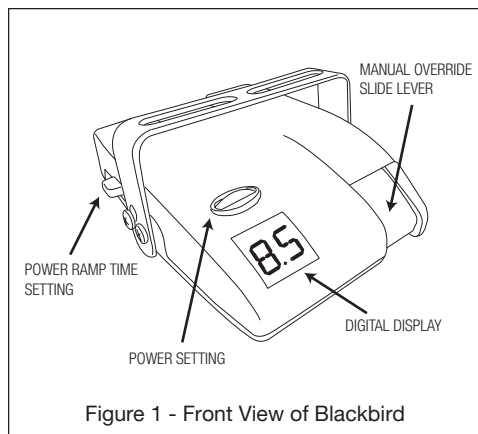


Figure 1 - Front View of Blackbird

Mounting Angle & Mounting Direction

The Blackbird can be mounted at any angle and in any direction. **It must be mounted in a location where the driver can see the display. The driver must be able to reach and operate the manual override slide lever.**

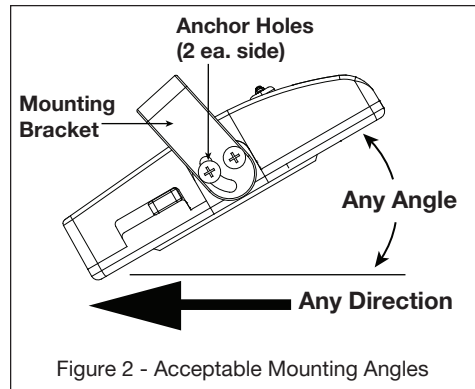


Figure 2 - Acceptable Mounting Angles

Controller Mounting and Installation

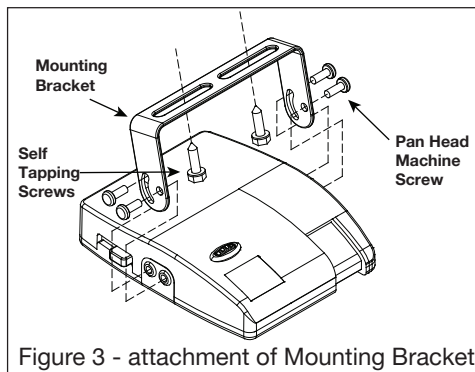


Figure 3 - attachment of Mounting Bracket

Controller and Mounting Bracket

1. Install the mounting bracket to a solid surface under the tow vehicle dash or other suitable location using the two self-tapping screws and fasteners provided. Tighten until snug. **See Figure 2- Acceptable Mounting Angles and Figure 3 - Attachment of Mounting Bracket.**
2. Insert four of the machine screws provided through the mounting bracket holes and into the desired Controller anchor holes. Tighten until snug.
3. **Mount in a location, which allows the driver to easily apply the manual override and see the digital display.**



WARNING:
Use of longer screws than those provided can damage the unit and cause loss of braking.



WARNING:

- All four Controller wires must be connected properly for the Controller to operate correctly.
- Failure to properly connect all four wires can cause loss of trailer braking.
- Improper wiring will destroy the Controller and void the manufacturer's warranty.



CAUTION:

- Care must be taken to ensure that the mounting surface is rigid enough to prevent excessive vibration.
- Excessive vibration may result in poor performance.

Read all wiring instructions prior to making electrical connections to the tow vehicle.



WARNING

To reduce the risk of injury or damage to property:

- Always connect the white wire first and the black wire second.
- All four Controller wires must be connected properly for the Controller to operate correctly.
- Failure to connect the wires correctly can cause loss of trailer braking.



WARNING:

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



WARNING:

Follow wiring instructions.

- Improper wiring will destroy the Controller and void the manufacturer's warranty.



WARNING:

- **DO NOT** connect the black wire to any vehicle power supply line or fuse panels that could cause circuit overload or damage to tow vehicle wiring and vehicle electronics.
- Route the black wire through a grommet hole in the fire wall to prevent grounding and away from the radio antenna to reduce any possible AM radio interference.

**TIP:**

• Special Dual - Mated “Quik-Connect” Wiring Harnesses are available for all Hayes Brake Controllers fitted with a connector on the wire leads, making connection a snap. Harnesses are available through all dealer resources. Ask specifically for the Hayes Brake Controller Company (HBCC) brand harnesses to match your vehicle application.

The following chart describes the function of each of the Controller’s wires:

Order	Color	Function	Wire Size (AWG)	Connect To
1st 2nd	White Black	Ground + connection to the vehicle’s power system	1. 14	Grounded metal part of the firewall or directly to the negative (-) terminal of the battery. Connect this wire first. 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. Route the black wire through a grommet hole in the fire wall to prevent wire grounding and away from the radio antenna to reduce any possible AM radio interference. Connect this wire second. Non-powered stop lamp wire (of the stop lamp switch) or trailer tow wiring harness. It is recommended that a 20-amp inline fuse be installed between the Controller’s redwire and the stop lamp switch. The fuse is required in 1999 & later Fords. The trailer brake wire or tow vehicle / trailer connector.
3rd	Red	Stoplight	1.	
4th	Blue	Output to trailer brakes.	14	

IMPORTANT: Make all Controller wiring connections to the wiring harness before connecting the harness to the vehicle.

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.

APPENDIX OEM TOW VEHICLE WIRING CONVERSIONS

CHRYSLER (THROUGH 2002) RED W/BLACK TRACE WHITE W/TAN TRACE BLUE BLACK	CONTROLLER BLACK RED BLUE WHITE	FUNCTION +12 VOLT SUPPLY STOPLIGHT TRAILER BRAKES GROUND	CHRYSLER (NEW) WHITE W/ RED TRACE BLUE W/WHITE TRACE BLUE GREEN W/BLACKTRACE
FORD (THROUGH 2002) RED LIGHT GREEN BLUE WHITE BROWN	CONTROLLER BLACK RED BLUE WHITE NOT USED	FUNCTION +12 VOLT SUPPLY STOPLIGHT TRAILER BRAKES GROUND ILLUMINATION	FORD (NEW) PINK RED BLUE WHITE BROWN
FORD EXPEDITION RED RED/GREEN TRACE BLUE BLACK	CONTROLLER BLACK RED BLUE WHITE	FUNCTION +12 VOLT SUPPLY STOPLIGHT TRAILER BRAKES GROUND	
GENERAL MOTORS RED LIGHT BLUE DARK BLUE BLACK BROWN	CONTROLLER BLACK RED BLUE WHITE NOT USED	FUNCTION +12 VOLT SUPPLY STOPLIGHT TRAILER BRAKES GROUND ILLUMINATION	
2004 INFINITY RED RED/GREEN BROWN/WHITE BLACK RED/BLUE	CONTROLLER BLACK RED BLUE WHITE NOT USED	FUNCTION +12 VOLT SUPPLY STOPLIGHT TRAILER BRAKES GROUND ILLUMINATION	
RANGE ROVER REMOVE TAIL LIGHT AND CONNECT RED CONTROLLER WIRE TO BLACK/BLUE TRACE, NO LIGHT WITH MANUAL	CONTROLLER BLACK RED BLUE WHITE NOT USED	FUNCTION +12 VOLT SUPPLY STOPLIGHT TRAILER BRAKES GROUND ILLUMINATION	
2004 TITAN/ARMADA RED RED/GREEN BROWN/WHITE BLACK RED/BLUE	CONTROLLER BLACK RED BLUE WHITE NOT USED	FUNCTION +12 VOLT SUPPLY STOPLIGHT TRAILER BRAKES GROUND ILLUMINATION	
2004 TOYOTA TUNDRA BLACK-RED GREEN-WHITE RED BROWN	CONTROLLER BLACK RED BLUE WHITE	FUNCTION +12 VOLT SUPPLY STOPLIGHT TRAILER BRAKES GROUND	

Special Conditions

For tow vehicles equipped with factory trailer towing package:

- Refer to your vehicle owner’s manual or other information provided by the manufacturer to determine the correct connection points for the Controller.
- See Appendix section for partial list of manufacturer wiring harness to Controller conversions.

For vehicles without a trailer-towing package: refer to the wiring diagram in Figure 4.

**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 to the stoplight switch.
- Connecting to the stoplight switch will break the switch and result in no stoplights and no trailer braking.

**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.
- Failure to install a 20-amp inline fuse can destroy the Controller and void the manufacturing warranty.

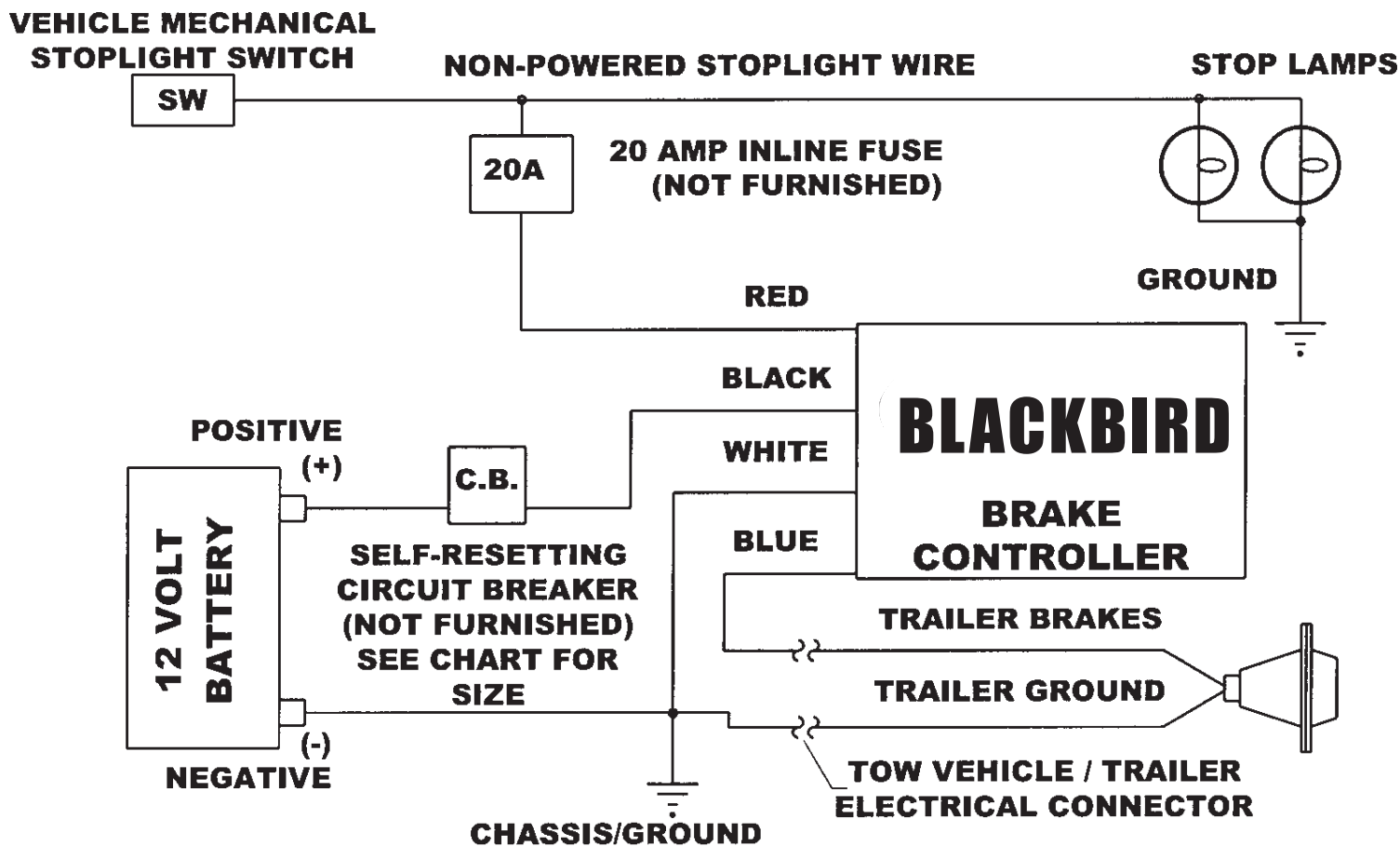


Figure 4 – Wiring Diagram



BLACKBIRD

Electronic Brake Controller Hayes Brake Controller Company P/N 81726

OPERATION MANUAL

For trailers with 2-8 electric brakes and vehicles with 12 volt negative ground systems only.

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Automatic Operation

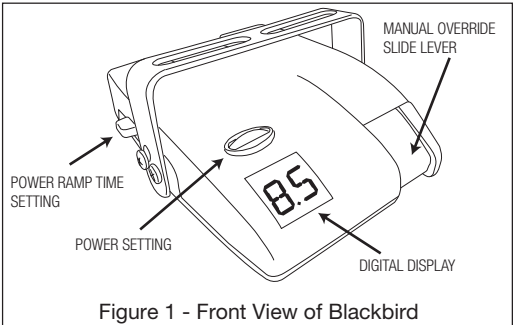
During braking, the Blackbird operates on a **time-based circuitry**. The longer the brake pedal is depressed, the greater the amount of current delivered to the trailer brakes.

The **“power ramp time”** and **power** is adjustable to achieve trailer brake responsiveness.

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 in “stand by” mode, the controller will display two dots. After 10 mins it will go to **“sleep mode”**, the display will shut off.

A DETAILED EXPLANATION OF THESE MODES IS INCLUDED IN THIS DOCUMENT.



WARNING:

- Improper adjustment of the controller could result in loss of trailer brakes, aggressive, grabby, pulsating, or delayed trailer brakes.
- Power adjustments may be required based upon speed, trailer load and road conditions.
- Maximum 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.

Controller Features and Settings

The controller features the following options, selections and settings. Use illustration in Figure 1 to assist in adjustment of settings.

Brake Controller Item # 81726 Quick Reference		
Option	Available Selections	Change Procedure
Power Ramp Time	1.o. - Slowest 2.o. 3.o. 4.o. 5.o. 6.o. 7.o. 8.o. 9.o. - Fastest	• Slide the “Power Ramp Time Setting” towards the rear to increase the ramp time (slow ramp). • Slide the “Power Ramp Time Setting” towards the front to decrease the ramp time (faster ramp). • The display will blink the selected setting for several seconds. • After several seconds, the display will revert back to showing 2 dots when trailer is connected, or 1 dot when no trailer is connected.
Maximum Power (Automatic Braking and Manual Override)	1% increment from 5% to 99% Power Setting.	• Rotate the “Power Setting” counter-clockwise to decrease maximum power output. • Rotate the “Power Setting” clockwise to increase the maximum power output. • The display will blink the selected setting for several seconds. • After several seconds, the display will revert back to showing 2 dots when trailer is connected, or 1 dot when no trailer is connected.

The following is a list of potential trouble codes. Refer to the installation guide for complete explanation of the codes.		
Display	Code	Possible Cause
OL	Overload	This indicates a direct short to ground in the blue wire (output) circuit.
OC	Disconnect	Indicates that the trailer connection got disconnected.
.	Open Circuit	Indicates that there is no trailer connection detected.
. .	Close Circuit	Indicates that there is miswiring of blue wire to ground if no trailer is connected.

Definitions of Options

Maximum Power: (Automatic Braking and Manual Override)

Under automatic braking (via brake pedal), the maximum power is the % available power that is sent to the trailer brakes upon completion of the Power Ramp Time.

Under manual override (via manual slide lever), the maximum power is the % available power that is sent to the trailer brakes when the manual slide lever is moved all the way to the left.

Changing Maximum Power for automatic braking and manual override

The maximum power may be changed from by doing the following:

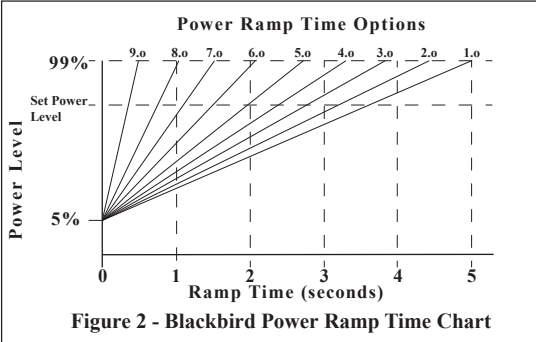
1. **With the vehicle at rest**, Rotate the “Power Setting” clockwise to increase or counter-clockwise to decrease to make changes to the power setting. The power percentage will change in increments of 1%.
2. The Controller is instantly set to the newly displayed value
3. When Controller is inactive for several seconds, the system will become idle and the display will change to standby mode (2 dots when trailer is connected, 1 dot when no trailer is connected).

Power Ramp Time:

The Controller applies power to the trailer brakes based on a time-based circuitry.

- The number displayed indicates the selected power ramp time to deliver power to the trailer brakes.
- When the controller senses that the brake pedal has been depressed

* 5% of the available power is immediately applied to the trailer brakes.
* This power level continues to increase until it reaches a user-selectable setting (see **Changing Maximum Power** section).
* **Power Ramp Time** - The elapsed time from the point that the brakes are first applied until the point that the power level reaches its maximum
• Power Ramp Time can be adjusted (0.5 -5 seconds at 99% Power Setting) to obtain optimum trailer brake responsiveness between the tow vehicle brakes and the trailer brakes.
• Figure 2 illustrates the effect of varying Power Ramp Time vs. the Controller’s output.



Changing Maximum Power for automatic braking and manual override

The maximum power may be changed from by doing the following:

1. **With the vehicle at rest**, Slide the “Ramp Time Power Setting” towards the front of the Controller to decrease (faster) the ramp time or towards the rear to increase (slower) the ramp time.
2. The Controller is instantly set to the newly displayed value
3. When Controller is inactive for several seconds, the system will become idle and the display will change to standby mode (2 dots when trailer is connected, 1 dot when no trailer is connected).

Manual Operation

- The **“Manual Slide Lever”** (Figure 1) is located on the front right side of the Controller.
- The further the manual slide lever is moved from the right to the left, the greater amount of trailer braking effort.

- The manual override slide lever operation is affected by the “Power Setting”, when the manual slide lever is moved all the way to the left, the maximum power output is the “Power Setting” set by the user.
- Manual override slide lever is used to apply the trailer brakes independently of the tow vehicle brakes or to override the automatic trailer brakes when less braking is required.
- The manual override slide lever is used in emergency stop of for control of excessive trailer sway,
- The tow vehicle and trailer brake stoplights will be illuminated during the manual lever activation.

**WARNING:**

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

**TIP:**

It is normal to hear the trailer brake magnets “hum” when operating the trailer brakes.

Troubleshooting using the manual slide

To verify the Brake Controller is properly wired, follow these steps:

- A. Disconnect the tow vehicle/trailer electrical connector. Move the manual override slide lever (Figure 1) to the left. The display should show (1) Dot and the tow vehicle stop lamps must illuminate.
- B. If OL is displayed, the tow vehicle has a short to ground in the trailer brake circuit or the white ground wire is not connected to ground. Check and/or repair wiring and tow vehicle/trailer connector.
- C. If stop lamps do not illuminate, check the red stoplight wire connection of the Brake Controller for connections to the non-powered stop lamp wire of the vehicle stop lamp switch.
- D. Connect the tow vehicle/trailer electrical connector.
- E. If the display flashes OC, or showing (1) Dot check and repair blue wire connections and brake coil connections. The Contrllor does not see a brake coil connection.
- F. Move the manual override slide lever to the left.The displayed value should increase and the trailer stop lamps must illuminate.
- G. If OL is displayed, check the trailer brake magnets and trailer brak circuit (including the tow vehicle/trailer connector) for a short to ground.
- H. If the trailer stop lamps do not illuminate, check and repair trailer wires, bulbs, bulb ground connections, and the tow vehicle/trailer connector.
- I. Also check the red stop light wire connection of the Brake Controller for connections to the non-powered stop lamp wire of the vehicle stop lamp switch.

Road Test and Performance Adjustment

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

- A. Position vehicle on a hard, flat, dry surface.
- B. Adjust the ramp time setting to “5.0”. See “**Changing Power Ramp Time**” section.
- C. Adjust the power setting to 50%. See “**Changing Power Ramp Time**” section.
- 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.
- F. If more braking power is needed, increase the power.
- G. Repeat this process until the desired amount of braking is achieved.
- H. If needed, follow the instructions in “**Changing Power Ramp Time**” section to increase or decrease the Power Ramp Time.

There are two methods of adjusting the output and responsiveness of your Blackbird Brake Controller.

They are listed here in the order in which they should be modified:

1. **Power Adjustment**

The power is adjustable from 5% to 100%. 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. **Power Ramp Time Adjustment**

As described earlier in this document, this is the amount of the time the controller takes to raise the output from 5% to the selected user-seleceted Maximum Power Level.

**TIP:**

Warm trailer brakes tend to be more responsive than cold brakes.

Troubleshooting using the display

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

DISCONNECT: The display will flash “OC”. This is an indication the trailer connection is disconnected. Flashing “OC” will display for a few seconds or until a trailer is connected to the tow vehicle. The display will show 1 Dot when no trailer is detected after several seconds.

OPEN CIRCUIT: The display will show (1) Dot when brake pedal is depressed or manual override slide lever is used when no trailer is connected to the tow vehicle. The display will go blank when no load is detected after 10 minutes.

CLOSE CIRCUIT: The display will show (2) Dots during stanby mode when a trailer is connected. If no trailer is connected while showing this, the blue wire is misconnected to the wrong place or a short in the wiring or connector.

Troubleshooting

Symptom	Possible Cause	Remedy
Trailer Brakes "Lock Up"	Power set too high	Reduce maximum power setting
Low output to trailer brakes	Power set too low	Increase maximum power setting
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.
	Improperly grounded	Ensure that the following are grounded: • 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 "OL" 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 resets to “0.5” and ramps back up and resets again 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 lockup when trailer connector and cable is attached.	Faulty break-away switch	Test / replace switch
Display shows Power Output when Brake Pedal is depressed or Manual Slide lever is used and shows (2) dots on standby mode when no trailer is connected.	Blue controller wire not connected to correct wire.	Inspect and repair wiring
Controller displays flashing “OC” or (2) dots during standby mode when no trailer is connected.	No trailer connected	Flashing will stop in a few seconds. Display will turn off after 10 minutes of no activity,
	Blue controller wire not connected to correct wire.	Inspect and repair wiring
Display doesn't activate when controls is used or when brakes are applied.	No power to Brake Controller	Inspect and repair wiring