

INVISI BRAKE®



Part number 8700

Owner's Manual



Time Tested • Time Proven

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Welcome to the ROADMASTER family!

This manual has been prepared to acquaint you with the installation, operation, care and maintenance of your InvisiBrake, and to provide you with important safety information.

Read your owner's manual cover to cover. Understand how to install and operate your InvisiBrake, and carefully follow the instructions and safety precautions.

We thank you for your patronage and greatly appreciate your discerning taste.

InvisiBrake specifications

Controller height2¾ inches
Controller width8¾ inches
Controller length8¾ inches
Voltage.....12 volts DC
Fuse size 20 amp
Operating temperature range
..... -2° to +150° F (-19° to +66° C)
Maximum amperage draw10.8 amps
Idle amperage draw.....6 mA
Battery recharging rate.....up to 2 amps
Approximate maximum air pressure..... 80 psi

The InvisiBrake serial number...

...is on a label on the side of the controller. You will need this number when you fill out your product registration card.

Write down the serial number in the space below and retain for future reference.

Serial number: _____

IMPORTANT

Roadmaster does not recommend installing InvisiBrake on diesel vehicles with hydroboost power assist brakes. These vehicles do not use a traditional power brake booster and InvisiBrake will not provide enough braking force.

Save this manual

Save this manual for future reference. It contains important information relative to safety and use. Therefore, make sure this manual is always with you when you're towing. You can download or print a copy of the most current manual at www.roadmasterinc.com (under 'Support').

WARNING

Read all instructions before operating InvisiBrake. Failure to understand how to operate InvisiBrake could result in property damage, personal injury or even death.



All illustrations and specifications contained herein are based on the latest information available at the time of publication. ROADMASTER, Inc. reserves the right to make changes, at any time, without notice, in material, specifications and models, or to discontinue models.

IMPORTANT NOTICE!

Safety Definitions

These instructions contain information that is very important to know and understand. This information is provided for **safety** and to **prevent equipment problems**. To help recognize this information, observe the following symbols:

WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, could result in property damage, serious personal injury or even death.

CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in property damage, or minor or moderate personal injury.

CAUTION

CAUTION used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

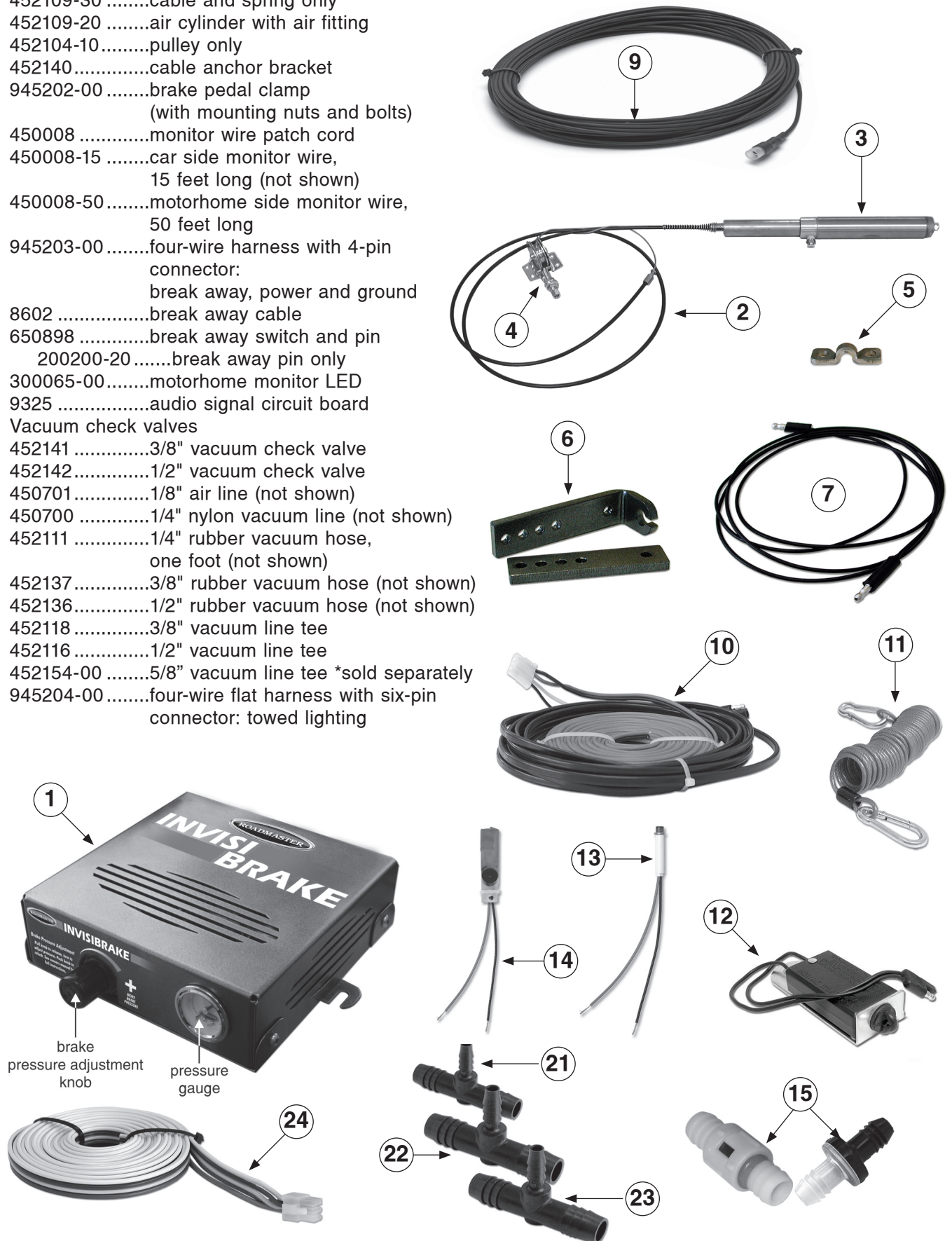
NOTE

Refers to important information and is placed in italic type. It is recommended that you take special notice of these items.

Components

part number	description
1	945201-00InvisiBrake controller, complete
2	452109-30cable and spring only
3	452109-20air cylinder with air fitting
4	452104-10pulley only
5	452140cable anchor bracket
6	945202-00brake pedal clamp (with mounting nuts and bolts)
7	450008monitor wire patch cord
8	450008-15car side monitor wire, 15 feet long (not shown)
9	450008-50motorhome side monitor wire, 50 feet long
10	945203-00four-wire harness with 4-pin connector: break away, power and ground
11	8602break away cable
12	650898break away switch and pin 200200-20break away pin only
13	300065-00motorhome monitor LED
14	9325audio signal circuit board
15	Vacuum check valves
	4521413/8" vacuum check valve
	4521421/2" vacuum check valve
16	4507011/8" air line (not shown)
17	4507001/4" nylon vacuum line (not shown)
18	4521111/4" rubber vacuum hose, one foot (not shown)
19	4521373/8" rubber vacuum hose (not shown)
20	4521361/2" rubber vacuum hose (not shown)
21	4521183/8" vacuum line tee
22	4521161/2" vacuum line tee
23	452154-005/8" vacuum line tee *sold separately
24	945204-00four-wire flat harness with six-pin connector: towed lighting

(Components not shown to scale)



WARNING

For vehicles with brake pedal presets –

Make certain that the cable and brake pedal clamp assembly were installed with the brake pedal as close to the driver's seat as possible. MAKE CERTAIN THAT THE BRAKE PEDAL IS AT THAT POSITION WHEN TOWING.

As an option, the brake pedal may be moved to the desired position and disabled. Do not rely on a mental note to never move the brake pedal.

Failure to follow these instructions may cause unintended braking and eventual brake failure, which may result in property damage, personal injury or even death.

CAUTION – check seat movement and adjustments

If the InvisiBrake controller is installed under one of the seats, carefully check to make certain that the controller will not interfere with the movement of the seat or affect any adjustments to the seat. Severe non-warranty damage to the seat and/or the controller can result if the seat comes into contact

with the controller.

If there is interference, make certain that the seat is not moved beyond the point that would cause damage.

Failure to follow these instructions may cause property damage.

Preparations for towing

The installer should have pre-set the braking pressure to a level appropriate to your vehicle. If the InvisiBrake brake pressure is ever adjusted, or if InvisiBrake is transferred to another vehicle, follow all instructions in the section titled "How to change the brake pressure."

1. Connect the monitor wire patch cord – plug the monitor wire patch cord (Figure 1) into the front of the towed vehicle and the rear of the motorhome.

Allow enough slack to prevent the patch cord from being pulled loose when the motorhome turns. If the cord is too long, wrap it around or through the umbilical cord.

2. Connect the break away cable – Attach one of the snap hooks (Figure 2) to the break away pin (Figure 2) at the front of the towed vehicle, then clip the other end of the break away cable to the rear of the motorhome, close to the center.

Note: see the break away warnings beginning on this page.

3. Turn the motorhome park lights on – this will activate the InvisiBrake charge circuit, which will provide a constant trickle charge to the vehicle's battery during towing.

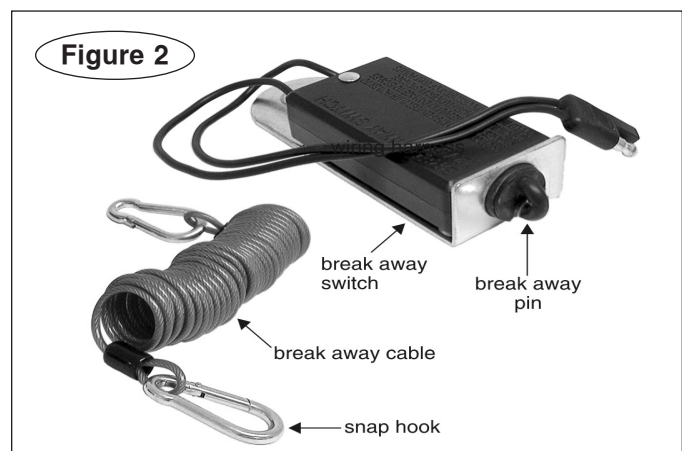
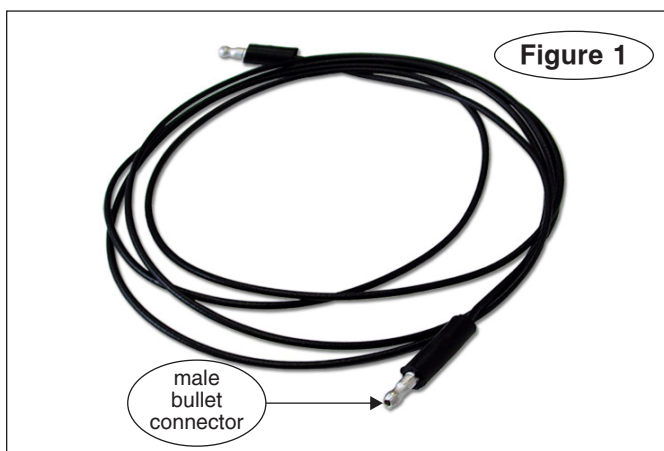
4. Inspect the brake lights – make sure the vehicle is not braking unintentionally. Check the brake lights of the towed vehicle. If you are not braking, and they are on, then the system is 'riding the brakes.' Towing in this condition will result in severe brake damage. Troubleshoot and resolve this issue before towing.

5. Enjoy your travels.

WARNING

When connecting the break away system, always

continued on next page



Preparations for towing

continued from previous page

check the following:

- Connect the cable at the rear of the motorhome, close to the center. Connecting the cable toward either side of the motorhome may cause the break away pin to be pulled when the motorhome turns, activating the break away system.
- Be certain there are no obstructions which would prevent the cable from pulling freely away from the break away switch. Do not wrap the cable around anything – doing so could keep the cable from pulling the break away pin, preventing the system from activating in a break away.
- Make certain the cable is the correct length –
 - The cable must be long enough to prevent the break away pin from being pulled out during normal towing – make certain there is enough slack to allow for sharp turns. If the cable is not long enough, the break away system will activate even though the towed vehicle has not detached.
 - The break away cable must be longer than the safety cables. This will prevent the break away system from activating if a component of the towing system has separated, but the towed vehicle

is still held by the safety cables.

- Make certain that the cable is not too long – it should not hang down to the extent that it may catch on obstructions, or drag on the ground. This much slack could allow the cable to be pulled inadvertently, activating the break away system.
- If you have a telescoping tow bar, allow enough slack for the tow bar arms to be fully extended.
- Except to test the break away system or adjust the braking pressure, leave the break away pin in place, even when the vehicle is not being towed. As soon as the pin is pulled, the break away system will be activated. The towed vehicle's brakes will be applied and will not be released until the pin is replaced. Severe non-warranty damage to the vehicle will occur if driven with the break away pin removed.

Additionally, the InvisiBrake compressor will run constantly until the pin is replaced, which will damage the compressor and drain the vehicle's battery.

Removing the pin will also expose the interior of the break away switch to damage from the elements. If the components of the switch are corroded, the switch may only function intermittently or not at all.

Protection modes

Extended braking protection

To protect the towed vehicle's brakes, InvisiBrake will automatically release braking pressure after an extended period (approximately 15 seconds) of continuous braking – for example, someone who constantly drives with their foot on the brakes.

To regain supplemental braking in the towed vehicle, release and depress the motorhome brake pedal.

Note: motorhomes with exhaust brakes may activate the brake lights, causing InvisiBrake to brake the towed vehicle. InvisiBrake automatically protects the towed vehicle's brakes by releasing braking pressure after 15 seconds of continuous braking.

When the exhaust brakes disengage, InvisiBrake resumes normal operation.

Responding to an audio alert

If, for any reason, the towed vehicle's brakes are applied continuously (for approximately 20 seconds), you will hear an audible alarm.

In addition to the audio alert, the monitor LED will be illuminated continuously.

Stop immediately. The audio alert and illuminated LED are indicating that the towed vehicle's brake pedal is being constantly depressed. Significant brake system damage to the towed vehicle will occur.

Identify and correct the cause of the audio alert before using InvisiBrake.

If you are unable to determine the cause of the au-

dible alarm, disconnect the cable from the brake pedal arm in the towed vehicle.

CAUTION

If InvisiBrake signals you with an audio alert, stop immediately. Identify and correct the cause of the alarm before using InvisiBrake.

Failure to respond to an audio alert, as indicated above, may cause significant non-warranty damage to the towed vehicle's tires and brake system, as well as other consequential damage.

How to change the brake pressure

If increased/decreased braking pressure is desired, follow the steps below. Read this section completely before changing the brake pressure.

For vehicles with full-time ('active') power braking systems...

IMPORTANT – Some late model vehicles have 'active' braking systems, which will activate even when the ignition is off.

If your towed vehicle has full-time ('active') power brakes, the brake pressure setting **must** be lower than the factory setting.

This step is included in the installation instructions.

If InvisiBrake was professionally installed, make certain that the installer has lowered the brake pressure setting.

CAUTION

A full-time or "active" power brake system applies full power brakes even when the ignition is turned off. For this reason, we recommend setting the initial InvisiBrake pressure at 20 psi. This step is included in the installation instructions.

NOTE TO CONSUMER: If this InvisiBrake system is to be professionally installed, make certain that the installer begins with an initial pressure of no more than 20 psi. An initial pressure higher than 20 psi will cause the brakes to lock during each brake application and will flat spot the vehicle's tires. The following vehicles have active power brake systems as of this writing*

- Ford C-Max
- Ford Escape hybrid
- Hummer H3
- Lexus GX 470
- Mazda Tribute hybrid
- Mercury Mariner hybrid
- Toyota Tacoma

**The above vehicles are among those that have active power brake systems. If you are unsure about your particular vehicle application, check with the vehicle manufacturer.*

The degree to which the brake pressure setting will affect the motorhome will vary, depending on the size and weight of the motorhome in comparison to the size and weight of the towed vehicle –

• **Brake pressure set too high** – a sharp pull at the motorhome may indicate that the brake pressure is set too high – in this case, you may choose to lower the setting until the towed vehicle brakes with less force. See "If necessary, change the brake pressure setting."

WARNING

It is possible to lower the brake pressure setting to the point that it negates the benefit of the supplemental braking system and break away. Insufficient brake pressure will lengthen stopping distance.

• **Brake pressure set too low** – if the combination of vehicles takes longer to stop than the motorhome alone, you may choose to raise the setting. See "If necessary, change the brake pressure setting" (below).

WARNING

If brake pressure is set too high, InvisiBrake will apply excessive force to the towed vehicle's brake pedal, which will cause tire and brake system damage, as well as other consequential, non-warranty damage.

If necessary, change the brake pressure setting

1. Pull the break away pin (Figure 2). The pressure gauge on the controller (see page one) will display the current braking pressure.

CAUTION

Reinsert the brake away pin within five minutes, or premature compressor failure may result.

2. Pull out on the brake pressure adjustment knob (see page one) to unlock it. Turn the knob clockwise to increase the braking pressure or counterclockwise to decrease the braking pressure.

3. Adjust the pressure by no more than 10 psi.
4. Push the brake pressure adjustment knob in to lock it in place. Reinsert the break away pin.

5. Test drive the motorhome and towed vehicle for a short distance, making six to eight stops. If necessary, adjust again until you are satisfied with the brake pressure setting.

WARNING

Every time you adjust the brake pressure, you must test drive the motorhome and towed vehicle. After repetitive braking, check for excessive heat near the center of the towed vehicle's wheels – this indicates that the brakes are overheating and that the brake pressure is set too high.

You must lower the braking pressure and retest until the brakes are not excessively hot.

Failure to follow these instructions may cause brake failure, resulting in property damage, personal injury or even death.

Test InvisiBrake

Following is a comprehensive test of InvisiBrake functions. We recommend that you perform this test before each towing season.

Test InvisiBrake main functions

The following tests can be performed with the motorhome and towed vehicle stationary.

1. Confirm braking – with the motorhome engine running, depress and hold the motorhome brake pedal down. The towed vehicle's brake pedal will be depressed. Then, release the motorhome brake pedal. At the towed vehicle, the brake pedal will retract.

2. Confirm that the motorhome monitor is functioning – the LED will illuminate after the motorhome's brake pedal is depressed and stop illuminating when the brake pedal is released.

3. Confirm the proper operation of the extended braking protection mode – depress and hold the motorhome's brake pedal down. The towed vehicle's brake pedal will be depressed. After approxi-

mately 15 seconds, the brake pedal will retract, even though the motorhome brake pedal is still depressed.

4. Confirm the proper operation of the audio alert – in the **towed vehicle**, depress and hold the brake pedal down. After approximately 20 seconds, the audio alert will sound in the motorhome. (To cancel the audio alert, release the towed vehicle's brake pedal.)

WARNING

If InvisiBrake fails any of the above tests, you must refer to the “Troubleshooting” section and repair the fault before towing.

Test the break away system

1. Use the snap hook to pull the break away pin out of the break away switch (Figure 2). The towed vehicle's brake pedal will be depressed when the pin is pulled. Insert the pin back into the switch. The brake pedal will be released.

Troubleshooting

Symptom	Solution
Nothing happens after proper installation, or InvisiBrake only operates sporadically.	<ul style="list-style-type: none">• Make certain the 20-amp fuse was installed during the installation.• Make certain that InvisiBrake is connected to a full-time power supply – some vehicles have an automatic shut off feature, some require you to pull a fuse for towing and some require the battery to be disconnected for towing.• Make certain that the check valve was installed with the arrow pointing toward the engine.• Check all electrical connections, with particular attention to the ground between the motorhome and towed vehicle.<ul style="list-style-type: none">• Pull the break away switch. Does InvisiBrake activate? If not, you likely have a bad ground. Test the ground by connecting a temporary wire between both vehicles' chassis, then apply the motorhome's brakes. If InvisiBrake now activates, you have a bad ground.• Make certain that InvisiBrake is receiving a brake light signal from the motorhome. (Is the motorhome engine on? Many motorhomes do not supply enough voltage to activate InvisiBrake unless the engine is running.)• The InvisiBrake wiring was connected downstream of the diodes. Reconnect the wiring upstream of the diodes.• Inspect the brake pedal clamp, pulley and cable anchor bracket. Make certain that they are installed correctly and that the cable is routed properly.• The operating temperature range is between -2° and +150° F (-19° to +66° C). InvisiBrake will not operate at temperatures above or below this range.
InvisiBrake activates unexpectedly.	Is the monitor wiring conducted through the power cord? (The monitor wiring on both vehicles has been attached to open terminals on both vehicles' electrical sockets.) If so, a silicone sealant must be applied to both attachment points. Otherwise, moisture and/or corrosion may cause unintended activation.

continued on next page

Troubleshooting

continued from preceding page

Symptom	Solution
The motorhome monitor LED does not illuminate, even though the brakes in the towed vehicle are being applied.	<ul style="list-style-type: none">• Make certain the brake light fuse was replaced in the towed vehicle.• Make certain that the monitor wire patch cord between the two vehicles is securely connected.• Make certain that there is an electrical ground between the motorhome and the towed vehicle.• Check for power at the stop light switch, at the front of the vehicle and at the LED in the motorhome.• Check for power at the back side of the LED light when the brake pedal is held down in the towed vehicle for approximately 20 seconds. You should hear an audible alert after 20 seconds which proves there is power to the harness just before the LED. If you hear the audible alert, verify proper power and ground connections at the LED light. You can also provide positive 12 volts and ground to the LED to determine if the LED has failed.• The monitor LED is connected to the towed vehicle's brake light circuit. If the fuse in the circuit is blown, the LED will not operate. Check the towed vehicle's brake lights – if they illuminate when the brake pedal is depressed, the fuse is good.• Was the optional Brake-Lite Relay installed? If so, make certain that the monitor wire is connected to the towed vehicle's brake light wire after the brake light switch, but before the Brake-Lite Relay – connecting the wire anywhere else will prevent the monitor LED from functioning.
InvisiBrake doesn't stop braking when the motorhome brakes are released. It keeps braking for about 15 seconds.	<ul style="list-style-type: none">• If the towed vehicle has been wired for towing (as opposed to installing a bulb and socket kit), diodes must be attached to the wires. If diodes are not attached, electrical feedback through the brake light wire will prevent InvisiBrake from releasing until the extended braking protection mode overrides the brake light signal, after approximately 15 seconds. Likewise, if a 'plug and play' electrical harness has been used, diodes must be installed to protect the towed lighting harness. (Most harnesses of this type only have diodes to protect the towed vehicle's electrical circuits.)
Turning the hazard lights on causes InvisiBrake to cycle on and off with the lights for a few seconds.	<ul style="list-style-type: none">• This is normal – the hazard lights use the brake light circuit, which is what activates InvisiBrake. It takes InvisiBrake three or four cycles to recognize that this is not a brake light signal. This cycle will start over each time the hazard lights are turned on.
I'm not braking the motorhome, but the motorhome monitor light stays on.	<ul style="list-style-type: none">• Readjust the brake pedal clamp.• The cable is bound or obstructed. Inspect the cable assembly from the brake pedal to the cable anchor bracket.• Incorrect cable adjustment – refer to the installation instructions for proper adjustment.
The air compressor is running, but the pressure gauge is not showing any air pressure.	<p>The air pressure is set at maximum. At this setting, the needle has rotated completely around the gauge, making you believe it is at zero.</p> <p>To confirm that the compressor is operating properly, pull out on the brake pressure adjustment knob and rotate it counterclockwise. The needle will move as you lower the pressure. Adjust to desired pressure setting.</p>
Brake lights are on when the vehicle is not braking.	<p>Check the brake lights of the towed vehicle. If you are not braking, and they are on, then the system is 'riding the brakes.' Towing in this condition will result in severe brake damage. Troubleshoot and resolve this issue before towing.</p>