

BRAKEMASTERTM by ROADMASTER

PROPORTIONATE TOWED CAR BRAKING SYSTEM

roadmasterinc.com/patents for patent info

BrakeMaster 9100 and 9160

for motorhomes with air or air over hydraulic brakes

Installation Instructions



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 BrakeMaster, and to provide you with important safety information.

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

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

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WARNING

These instructions pertain to the initial installation only. Operating instructions are contained in the owner's manual.

Read all instructions before installing or operating the BrakeMaster system. Failure to understand how to install or operate BrakeMaster could result in property damage, personal injury or even death.



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.

Before you begin the installation...

1. A vehicle-specific seat adapter is necessary to attach the BrakeMaster air cylinder to the floor of the towed vehicle. **This bracket is not supplied with the kit; you must order it separately.**

Rarely, a seat adapter will not be available for a particular make and model of vehicle. In this case, you must order a universal anchor plate kit (part number 450650-01). **Regardless of whether you use a seat adapter or a universal anchor plate, you must have one or the other on hand before you begin the installation.**

To determine if a seat adapter is available for your vehicle, go to fitmaster.roadmasterinc.com – for vehicle-specific information. Select 'Towing Systems,' and enter the motorhome year, make and model, then 'Search.'

2. **If the motorhome has a Spartan chassis** – If the motorhome has a Spartan chassis with a 'Tow Brake' air fitting at the rear bumper – Use our Tow Brake Adapter Kit 921004-20. This kit will allow the BrakeMaster to plug into the 'Tow Brake' fitting on the RV.

3. **If the battery must be disconnected for towing**, a stop light switch must be installed. Brake light switch kits for a number of vehicles are available through ROADMASTER; go to fitmaster.roadmasterinc.com – for vehicle-specific information. Select 'Towing Systems,' and enter the motorhome year, make and model, then 'Search.'

Note: If a brake light switch kit is listed on the web site for any particular vehicle, it is required.

Note: A Battery Disconnect (part number 766) is available for vehicles which must be towed with the battery disconnected.

If you choose to install the Battery Disconnect, a brake light switch is still required; a Brake-Lite Relay (see "Brake light solutions") is not required.

4. **If the vehicle to be towed has an 'active' (or, 'continuous power assist') braking system, or if the vehicle is not equipped with power brakes** – order the optional brake pressure reducer (part number 900002) to adapt the vehicle to the BrakeMaster system.

Vehicles with 'active' brake systems include several hybrid vehicles, such as the Ford Escape hybrid and the Mercury Mariner hybrid, as well as the H3 Hummer. These vehicles, and others with these systems, are designed so that even when the vehicle is set to 'tow' mode, the braking system is still active, thus requiring minimal pressure to engage the brakes.

CAUTION

If the vehicle to be towed has an 'active' braking system, or if the vehicle is not equipped with power brakes, install the optional brake pressure reducer.

If the reducer is not installed, BrakeMaster will apply excessive force to the towed vehicle's brake pedal, causing severe tire and/or brake system damage, as well as other, consequential damage.

5. **If fuse(s) must be removed from the vehicle before it can be towed** – verify that removing the fuse(s) will not disrupt power to BrakeMaster, or otherwise affect the installation or operation.

(To eliminate pulling fuses to tow, purchase a FuseMaster. Information about this product is available at fitmaster.roadmasterinc.com).

6. **Check the towed vehicle's brake lights** – BrakeMaster must function with the ignition key turned to the "tow" position; however, some vehicles' brake lights only operate with the key turned to the "on" position.

Check to see if this is the case: turn the ignition key to the "tow" position, apply the brakes, and check to see if the brake lights illuminate. If the brake lights do not illuminate, a two-prong brake light switch and 10-amp fuse must be installed.

Brake light switch kits for a number of vehicles are available through ROADMASTER; to see if one is available for any specific vehicle, go to fitmaster.roadmasterinc.com – for vehicle-specific information. Select 'Towing Systems,' and enter the year, make and model, then 'Search.'

Note: Check the owner's manual to see if the vehicle is equipped with an "automatic shut down" feature. If this is the case, ensure that the vehicle is not in automatic shut down mode before performing this test.

Note: If you must install a Brake-Lite Relay – see step 7, below – a brake light switch is not required.

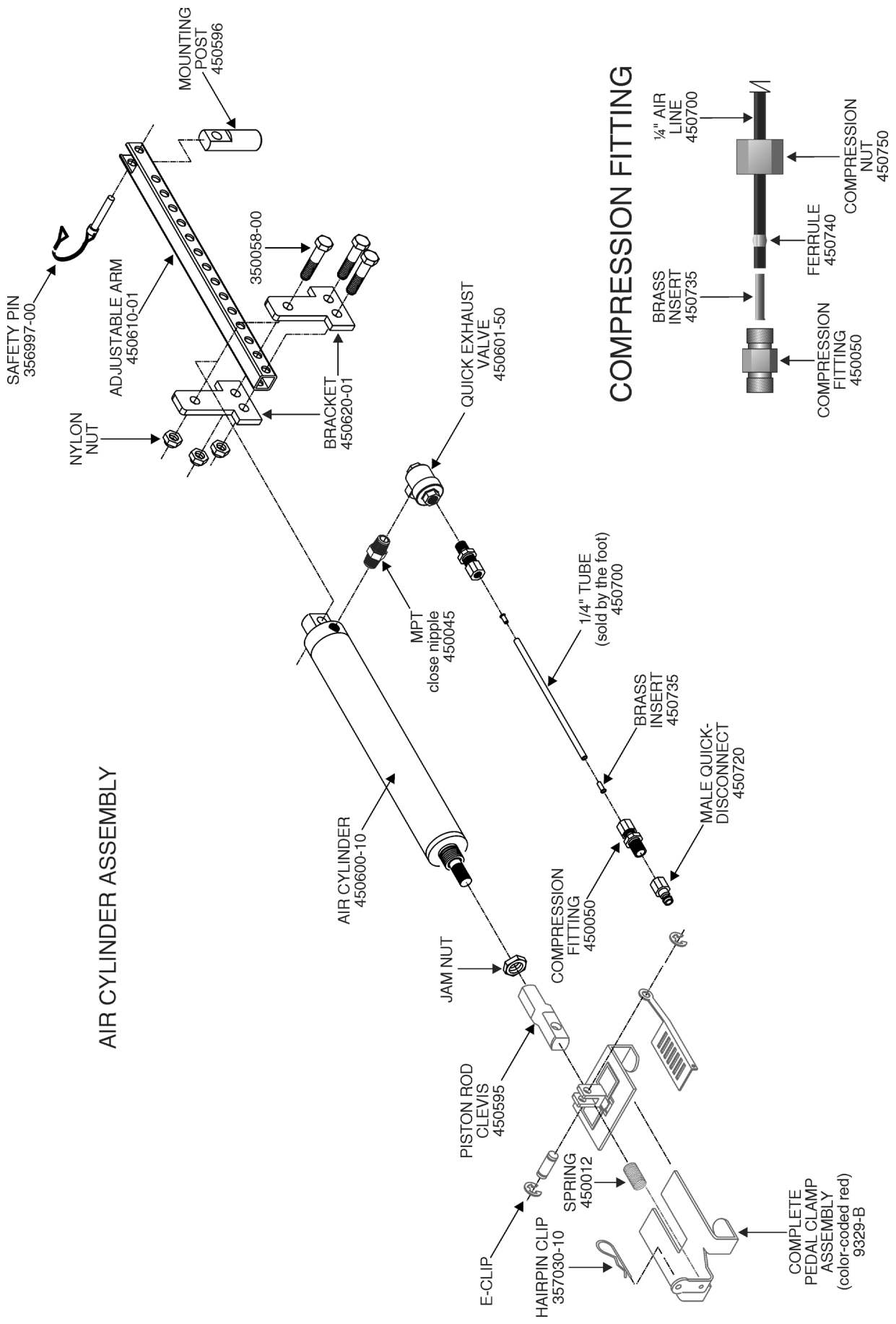
7. **An optional Brake-Lite Relay may be required.** Refer to "Brake light solutions" for instructions on how to determine if the relay must be installed.

Note: A brake light switch (see steps 3 and 6 above) and a Brake-Lite Relay are mutually exclusive – if you use one, the other is not necessary.

8. **An optional tee may be required** to connect the BrakeMaster air line to the motorhome brake relay valve or air booster housing. Refer to "Install the motorhome air line."

A 3/8" tee (part number 450077) is provided for this purpose. An optional 1/2" tee (part number 450076) is also available.

9. **If the motorhome is equipped with air over hydraulic brakes** – an additional amount of air line (part number 450700) may be required.



Install the seat adapter (or air cylinder anchor plate)

1. A vehicle-specific seat adapter is necessary to attach the BrakeMaster air cylinder to the floor of the towed vehicle. **This adapter is not supplied with the kit; you must order it separately.**

Rarely, a seat adapter will not be available for a particular make and model of vehicle. In this case you must order a universal anchor plate kit (part number 450650-01). **Regardless of whether you use a seat adapter bracket or a universal anchor plate, you must install one or the other now.**

The installation instructions for both the seat adapter brackets and for the universal anchor plate are contained in the kits.

To determine if a seat adapter bracket is available for your vehicle, go to fitmaster.roadmasterinc.com. Select the year, make and model and hit 'Submit.'

2. The BrakeMaster air cylinder will be in place after you have installed the seat bracket adapter. (For complete instructions on how to attach the air cylinder, refer to the BrakeMaster owner's manual.)

You can leave the air cylinder in position until you have attached an air line fitting (step 10, "Install air lines in the towed vehicle") or you can remove it if it interferes with the installation.

Install the break away system

Note: the break away system is not included with the model 9100 BrakeMaster.

Step A Install the air reservoir

1. First, choose a location for the air reservoir (Figure 1). The air reservoir is mounted in the towed vehicle, most often in the engine compartment, but it may be attached anywhere an air line can be routed from the top of the air reservoir to the front of the vehicle, and where the drain valve (Figure 1), at the bottom of the reservoir, is easily accessible.

Choose a location that meets the following conditions:

- An air line will be attached to the reservoir in a later step. One end will be routed to the driver's side of the passenger compartment; the other end will be routed to the front of the vehicle. This air line cannot be closer than two feet from any heat source, such as the engine or exhaust system, which might damage the air line.

- The air reservoir must be mounted away from any moving parts, so that the air reservoir will not be damaged by, or interfere with, the proper operation of any components.

- Choose a location that will allow the bottom of the air reservoir to be mounted lower than the top, so that any accumulated water can be drained from the tank. The reservoir cylinder does not have to be perfectly straight up and down, but the drain valve must be the lowest part of the reservoir.

- The reservoir will be attached with two of the supplied $\frac{1}{4}$ " x 1" hex bolts and nuts. Choose a location that will allow you sufficient access to tighten the hex nuts from the other side.

Note: because the air reservoir will be charged with compressed air, it cannot be mounted inside the passenger compartment of the vehicle.

2. Once you have chosen a location for the air reservoir, fold the two rubber clamps (Figure 1) over the cylinder. Press the ends of each clamp together, until the pre-drilled holes align.

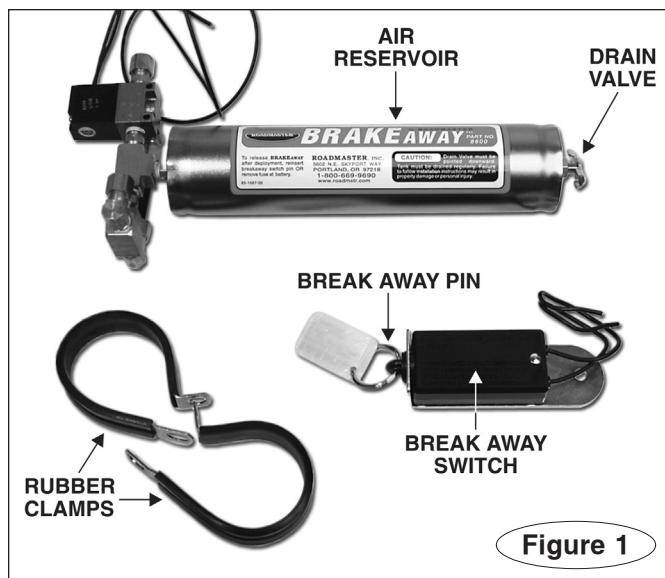
Test-fit the reservoir and slide the clamps up or down the cylinder, if necessary, until the pre-drilled holes are both over a surface where the hex bolts and nuts will hold each clamp in place. Mark the center of each hole for drilling, and set the reservoir aside.

Before drilling, make certain you will not damage any components on the other side. Then, drill a $\frac{1}{4}$ " hole through the two points you have marked.

Before attaching the clamps, rotate the top of the reservoir so that the two wires at the solenoid valve (Figure 5), as well as the two brass air compression fittings (Figure 5), will be easily accessible.

Position the reservoir and clamps over the two holes, and secure the reservoir in place with one of the $\frac{1}{4}$ " x 1" hex bolts and nuts at each clamp.

continued on next page



Install the break away system

continued from preceding page

Step B Mount the break away switch

1. Mount the break away switch (Figure 1) at the front of the vehicle, on the driver's side. Choose an area you can easily reach, with a surface of sufficient strength to hold the switch firmly in place, so that the break away pin (Figure 1) will pull freely from the switch. Mount the switch in a horizontal position, with the break away pin facing toward the motorhome.

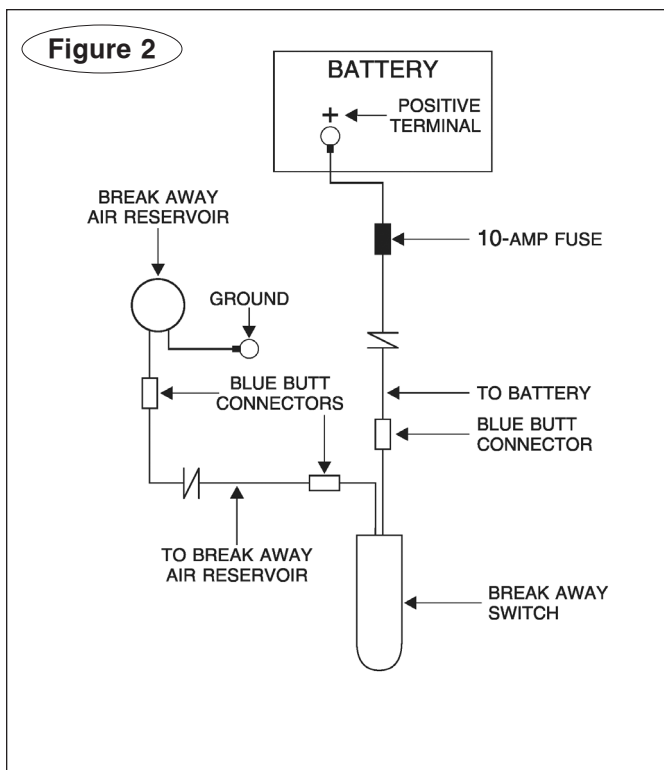
Ensure that the break away pin can be pulled freely away from the towed vehicle, without any obstructions.

⚠ WARNING

Do not attach the break away switch to the tow bar. In the unlikely event that the tow bar should separate, the break away switch will separate with it, preventing the break away system from activating. The towed vehicle's brakes will not be applied, which may cause property damage, personal injury or even death.

Step C Connect the wiring

1. Using one of the blue butt connectors, attach one end of the supplied length of black wire to the end of either one of the two wires extending from the break away switch. (If necessary, strip $\frac{1}{4}$ " to $\frac{3}{8}$ " of insulation from the end of the wires before connecting them.)



Next, route the wire to the positive terminal on the towed vehicle's battery (Figure 2), avoiding moving parts, sharp edges or "hot" components such as the engine or exhaust system. Where appropriate, use one or more of the included wire ties to secure the wire in place.

2. Cut the wire and strip $\frac{1}{4}$ " to $\frac{3}{8}$ " of insulation from the end of the wire. Crimp either end of the supplied yellow 10-amp fuse onto the end of the wire. Strip the insulation from one end of the remaining length of wire; crimp the other end of the fuse onto the wire.

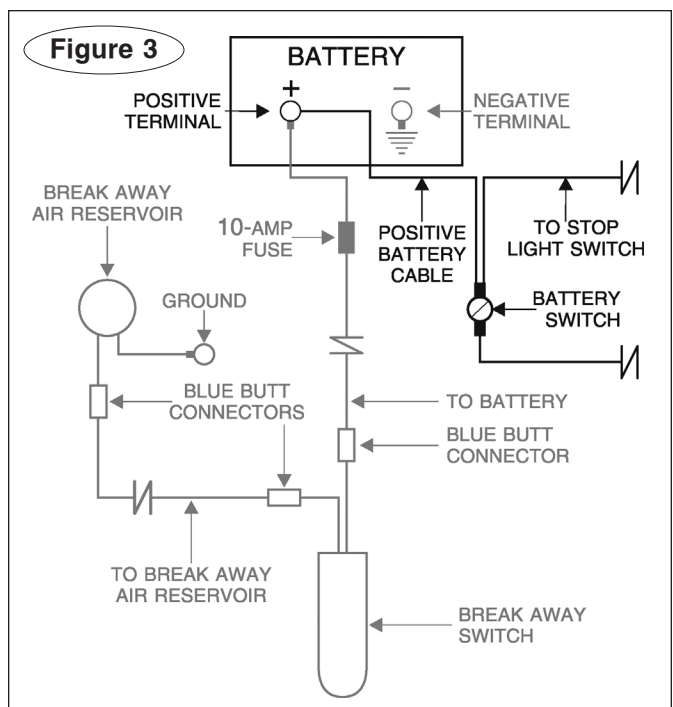
3. If necessary, cut the wire again, leaving no more than six inches, and strip $\frac{1}{4}$ " to $\frac{3}{8}$ " of insulation from the end of the wire. Crimp the larger ($\frac{3}{8}$ " ring terminal onto the end of the wire, and attach the ring terminal to the positive terminal on the towed vehicle's battery.

⚠ CAUTION

In order to prevent damage from a short circuit, the 10-amp fuse must be within six inches of the positive terminal. If the 10-amp fuse is farther than six inches, a short circuit may cause significant damage to the towed vehicle's electrical system, an electrical fire or other consequential, non-warranty damage.

4. Now, connect the remaining wire at the break away switch to either one of the two wires extending from the top of the solenoid valve on the air reservoir (Figures 2 and 5). If necessary, use the remaining length of black wire to reach the top of the solenoid valve. As before, strip the ends of the wires before connecting them with the supplied blue butt connectors. Where appropriate,

continued on next page



Install the break away system

continued from preceding page

use one or more of the included wire ties to secure the wire in place.

5. Crimp the smaller (#10) ring terminal onto the end of the remaining wire extending from the top of the solenoid valve, and attach the ring terminal to any good chassis ground. (If necessary, use another butt connector, and any remaining black wire, to extend the length of the ground wire.)

6. If the battery must be disconnected for towing, install a battery switch to the positive battery cable, as shown in Figure 3. Connect the stop light switch wiring to the battery switch.

WARNING

If the battery must be disconnected for towing, a battery switch must be connected as shown in Figure 3. If it is not, the break away system will not function if the towed vehicle separates, which may cause property damage, personal injury or even death.

Install air lines in the towed vehicle

1. Find a suitable location at the front of the towed vehicle to attach the preassembled male quick coupler (Figure 4). Choose an area within easy reach, with a surface of sufficient strength to hold the mounting bracket firmly in place.

WARNING

Do not attach a female quick coupler at the front of the towed vehicle. The female quick couplers have an internal check valve to prevent air from escaping. If air pressure is not released, the Brake-Master pedal clamp will not retract when the system is activated, which will cause severe brake system damage or a brake fire, as well as other consequential, non-warranty damage.

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

2. Attach the bracket with two of the supplied $\frac{1}{4}$ " nuts and bolts, with the male quick coupler pointing away from the towed vehicle.

Note: the weather covers will prevent dirt or debris from entering the lines. Keep the fittings covered when the braking system is not in use.

3. Connect one end of the air line to the male quick coupler compression fitting (Figure 4) – first, if necessary, trim the end of the air line to make a smooth and straight cut. Then slide the compression nut and the compression sleeve (Figure 4) over the air line.

Next, slide one of the brass inserts (Figure 4) onto the end of the line.

Note: if the brass inserts are omitted, the fittings will not be airtight.

Push the air line into the compression fitting, as far as it can go. Tighten the compression nut onto the fitting.

Note: if the compression nut is overtightened, the fitting will not be airtight. After completing the installation, check all the fittings for air leaks – see "System test."

4. Tape the open end of the air line. Then route the air line from the male quick coupler to the break away

air reservoir, avoiding moving parts, sharp edges or "hot" components such as the engine or the exhaust system. Do not kink the air line, or bend it to the extent that it crimps or creases.

Note: if the break away system was not installed, route the air line through the engine compartment and through the firewall – see step 7 below.

CAUTION

Do not position the air line closer than two feet from any heat source. The heat will soften the plastic, which will cause the air line to rupture.

If the air line is ruptured, the supplemental braking system will not function.

Do not kink the air line, or bend it to the extent that it crimps or creases – air pressure will be substantially reduced, or blocked entirely, at the kink in the line.

If the air pressure is reduced, the supplemental braking system will not function, or may only function intermittently.

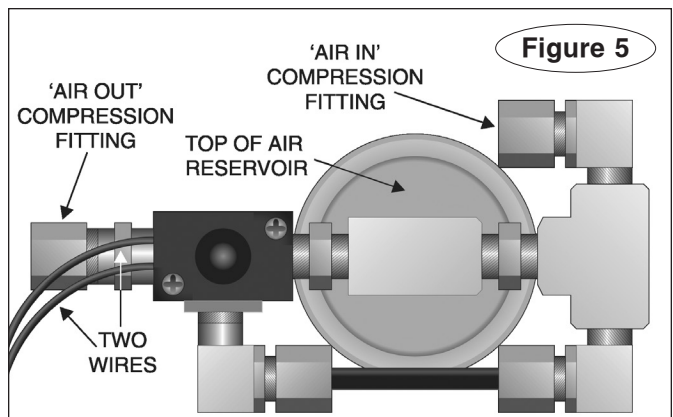
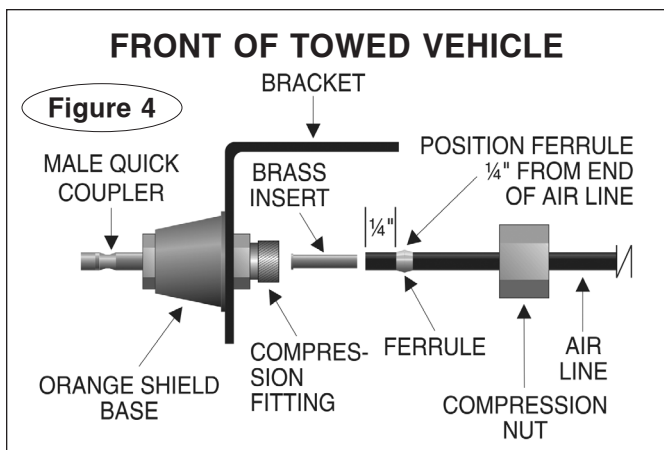
Where appropriate, use wire ties to secure the air line in place.

5. At the top of the break away air reservoir (Figure 5), cut the air line to length and attach the open end to the brass "air in" compression fitting (Figure 5). Use the same method described in step 3 (above) to attach the air line.

6. Next, attach the end of another section of air line to the brass "air out" compression fitting on the top of the break away air reservoir (Figure 5). Use the same method described in step 3 (above) to attach the air line.

7. Tape the open end of the air line. Then, route the air line from the break away air reservoir through the engine compartment and to the driver's side of the firewall. As before, avoid moving parts, sharp edges or "hot" components such as the engine or the exhaust system. Do not kink the air line, or bend it to the extent that it crimps or creases.

Where appropriate, use wire ties to secure the air line
continued on next page



Install air lines in the towed vehicle

continued from preceding page
line in place.

8. Next, look for a pre-existing hole in the firewall (or, if there is sufficient space, a pre-existing wiring grommet) on the driver's side, to route the air line through the firewall.

If there is no pre-existing hole or grommet with sufficient space, drill a 1/2" hole through the firewall.

Drill from the engine compartment or from the interior of the vehicle, whichever is more convenient. Before drilling, make certain you will not damage any components on the other side of the firewall.

9. Fit the included firewall grommet into the 1/2" hole, and push the end of the air line through.

10. The air line will be connected to the preassembled female quick coupler **without** the orange shield base (Figure 6).

Find a likely mounting point for the bracket on the driver's side – choose an area within easy reach, with a surface of sufficient strength to hold the mounting bracket firmly in place.

The bracket and quick coupler must not present an obstacle or hazard to the driver of the vehicle, or otherwise interfere with the operation of the vehicle.

Two common mounting points are: 1) under the dashboard, on the kick panel; or 2) far enough under the front of the driver's seat so that the quick coupler is accessible when the seat is slid back, but concealed when the seat is slid forward.

Or, depending on the interior design of the vehicle, there may be a more suitable mounting point.

Before attaching the bracket, first connect the BrakeMaster air cylinder assembly. Make certain that the male quick coupler at the end of the air line will reach the point you have chosen to attach the female quick coupler, without kinking either of the air lines.

Note: the quick exhaust valve on the air cylinder (see page 2) may be rotated, if this provides an easier connection.

Before attaching the coupler, make certain you will not damage any components on the other side.

If you have chosen to attach the bracket under the driver's seat, make certain that the female quick coupler

and bracket will not interfere with the normal movement of the driver's seat, or affect any adjustments to the driver's seat.

- If you have chosen to attach the bracket to the kick panel, attach it with two of the supplied 1/4" nuts and bolts, with the female quick coupler pointing toward the rear of the towed vehicle.

- If you have chosen to attach the bracket under the driver's seat, route the air line from the firewall to the front edge of the driver's seat. Remove the rocker panel or side trim (or, detach the carpeting) and conceal the air line underneath it.

Move the driver's seat back, as far as it will go.

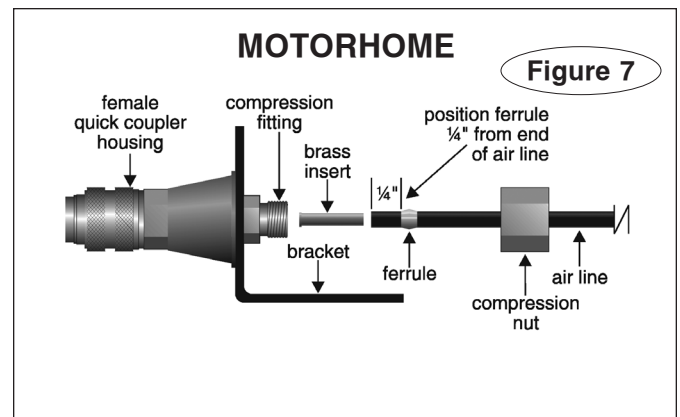
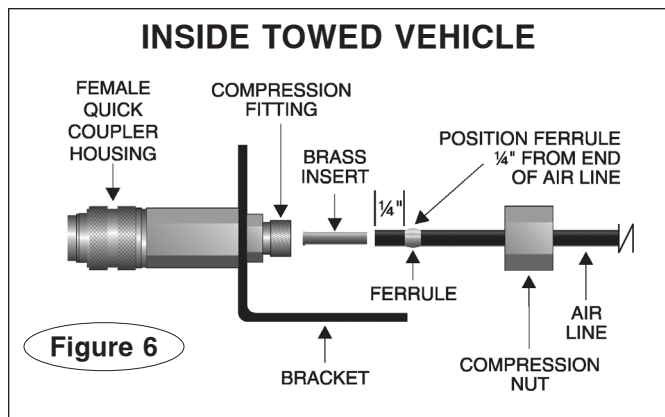
Attach the bracket with two of the supplied 1/4" nuts and bolts, with the female quick coupler pointing toward the front of the vehicle.

11. Cut the air line to length and attach it to the compression fitting on the female quick coupler. Use the same method described in step 3 (above) to attach the air line.

12. Seal the firewall grommet with a silicone sealant. Reattach the rocker panel (or side trim or carpeting), if it was removed.

13. Find a suitable location at the rear of the motorhome, near the center, to attach the remaining preassembled female quick coupler (**with** the orange shield base – Figure 7). Attach the bracket with two of the supplied 1/4" nuts and bolts, with the female quick coupler pointing away from the motorhome.

Note: the weather covers will prevent dirt or debris from entering the lines. Keep the fittings covered when the braking system is not in use.



Install the motorhome monitor system

Step A

Wire the towed vehicle

Note: there are two lengths of black wire in this kit, each with a female bullet connector at one end. Use the short length of wire in this step.

1. Choose a mounting point at the front of the vehicle, near the male quick coupler you attached in step 2, "Install air lines in the towed vehicle," for the end of the harness with the female bullet connector. Attach the connector with one or more of the included wire ties. Allow enough slack so that a male bullet connector can be plugged into and out of it.

2. Once the female bullet connector is attached, route the monitor wiring harness through the engine compartment, to the driver's side of the firewall. Use the same route as the air line, if that is convenient. As before, avoid lines, hoses, moving parts or "hot" components such as the engine or exhaust systems. Where appropriate, use wire ties to secure the wiring harness in place.

3. Route the monitor wiring harness through the same hole as the air line.

4. Before connecting the monitor wiring harness to the brake light wire, determine if the optional Brake-Lite Relay must be installed – refer to "Brake light solutions," in these instructions, for information on how to identify the type of brake and turn signals in the vehicle. Then, test the towed vehicle's brake lights, as described in "Brake light solutions."

Several wiring alternatives are available to you, based on the type of brake and turn signals in the vehicle, and the results of the test.

5. Next, locate the towed vehicle's brake light switch and, with a test light, find the "cold" side of the brake light switch. (The "cold" side of the switch does not register voltage unless the brakes are applied.) With a 12-volt meter, verify that you have found 12 VDC+.

Then, remove the vehicle's brake light fuse, located in the vehicle's fuse panel.

CAUTION

Failure to remove the brake light fuse from the vehicle's fuse panel may cause the vehicle's theft deterrent system, or other electrical system indicators, to be activated if the brake pedal is depressed during the installation. This may require non-warranty repair to the vehicle.

6. Cut the brake light wire, a few inches downstream from the "cold" side of the brake light switch.

If the Brake-Lite Relay is required...

(see step 4, above)

Install the Brake-Lite Relay now. The instructions are included with the kit. After the Brake-Lite Relay is installed, proceed to Step B, "Wire the motorhome" (below).

If the Brake-Lite Relay is not required...

(see step 4, above)

7. If necessary, trim the monitor wiring harness, then attach the monitor wire to the brake light wire, using the supplied yellow butt connector.

8. Ensure that the monitor wiring harness will not present an obstacle or hazard to the driver of the vehicle, or interfere with the operation of the vehicle. Use one or more wire ties, if necessary, to secure the wiring harness out of the way.

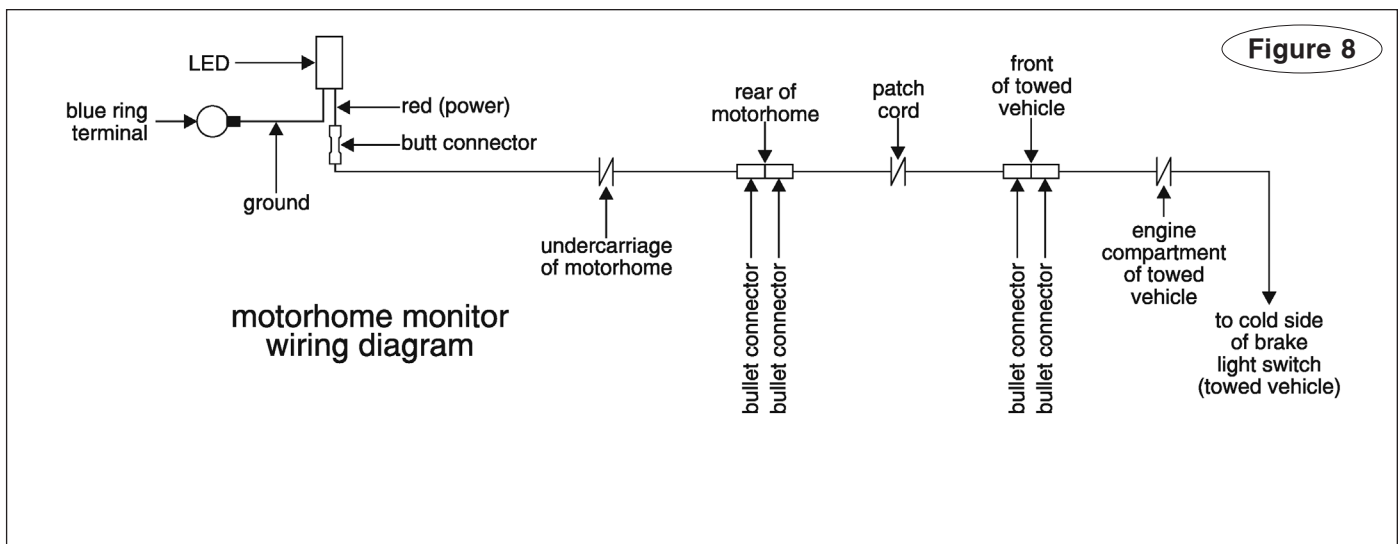
9. Reinstall the brake light fuse, which you removed in step 5.

Step B

Wire the motorhome

Note: there are two lengths of black wire in this kit, each with a female bullet connector at one end. Use the long length of wire in this step.

Note: some motorhomes are manufactured with aux-continued on next page



Install the motorhome monitor system

Wire the motorhome

continued from preceding page

iliary wires pre-strung from the rear of the motorhome to the dashboard, for aftermarket accessories such as this. Call the manufacturer.

1. Attach the end of the black wire with the female bullet connector to the back of the motorhome, near the female quick coupler you attached in step 13, "Install air lines in the towed vehicle."

Attach the connector with one or more of the included wire ties. Allow enough slack so that a male bullet connector can be plugged into and out of it.

2. Once the female bullet connector is attached, route the wire from the back of the motorhome to the underside of the dashboard. Avoid lines, hoses, moving parts (slideouts, sliding generators, sliding battery trays) or "hot" components such as exhaust systems. Where appropriate, use wire ties to secure the wire to the undercarriage.

Step C Attach the LED

1. Choose an area on the motorhome dashboard to mount the LED. Look for a mounting point away from pre-existing wires or components, where the LED can be easily seen by the driver.

2. Drill a 5/16" hole through the dashboard at the point you have chosen. Before drilling, make certain you will not damage any components on the other side.

3. Center the LED decal (Figure 9) over the hole, and press it down. Or, you may choose to omit the decal, depending on your preferences.

4. From the top of the dashboard, slide the LED through the hole, wires first, until the base of the bulb (Figure 9) is flush to the top of the dash.

5. From the underside of the dash, fit both of the wires through the speed nut (Figure 9). Then push the speed

nut up, against the dash, to secure the LED in place.

6. Connect to power – trim the black wire, which you routed from the back of the motorhome. (Save the excess; you may use it in the next step.) Then, connect the black wire to the red LED wire, using one of the included butt connectors.

7. Connect to ground – connect the ground wire from the LED to any good chassis ground, using the included ring terminal. (If necessary, use any excess wire from the preceding step to extend the length of the ground wire.)

Step D

Connect the patch cord between the motorhome and the towed vehicle

Note: the patch cord is the six-foot length of air line and wiring, covered in blue plastic loom.

1. Connect the male and female quick couplers at either end of the air line to the corresponding quick couplers on the motorhome and towed vehicle.

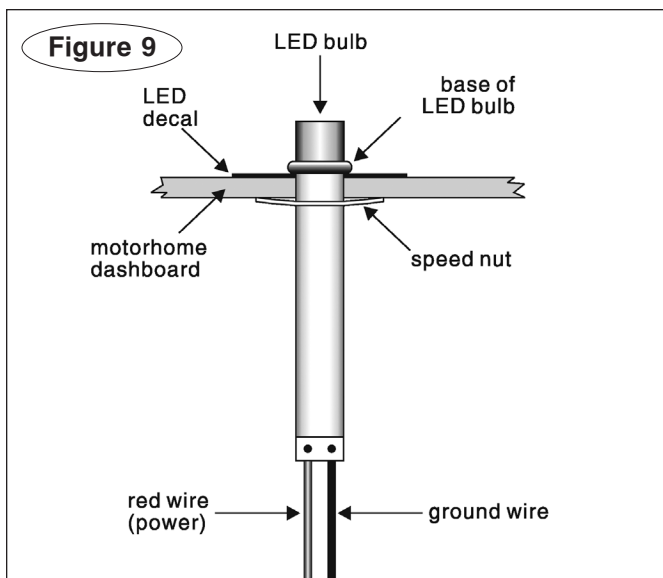
Push the couplers together until the housing (Figures 6 and 7) on the female coupler slides forward and 'clicks,' locking the couplers together.

(To disconnect the couplers, pull back on the housing on the female coupler until the couplers release.)

CAUTION

Never pull back on the housing to connect the couplers – this will prevent the couplers from locking. The couplers may disconnect during towing, preventing the supplemental braking system from functioning.

2. Connect the male bullet connectors at either end of the monitor wire to the female bullet connectors on the motorhome and towed vehicle monitor wiring harnesses.



Install the motorhome air line

There are three possible connection points for the motorhome air line –

- If the motorhome has air brakes, the line can be attached to an open port at the air brake relay valve.
- If the motorhome has air over hydraulic brakes, the line can be attached to an open port at the main brake air booster housing.
- If there is no open port, a tee must be used.

In this step, you will attach the motorhome air line at one of these three points, then route it to the rear of the motorhome.

1. Support and block the motorhome. Then, release the parking brake.

⚠ WARNING

The motorhome must be safely and securely supported and blocked.

With the parking brake released, the motorhome may unexpectedly roll forward or backward, especially if it is on an incline, if it is not blocked.

If the motorhome is equipped with an air suspension system and a line to the air suspension system is inadvertently opened, or if the motorhome's air suspension system is turned off, the motorhome will lower to the ground.

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

CAUTION

The motorhome's parking brake must be released, in order to test and identify the correct port.

If an incorrect port is chosen, the motorhome brake system will be severely damaged. A brake fire or other non-warranty damage may also occur.

2. Start the motorhome engine and allow the air brake system to completely charge up to operating pressure.

3. **If the motorhome has air brakes** – find the air brake relay valve (Figure 10), which is typically located

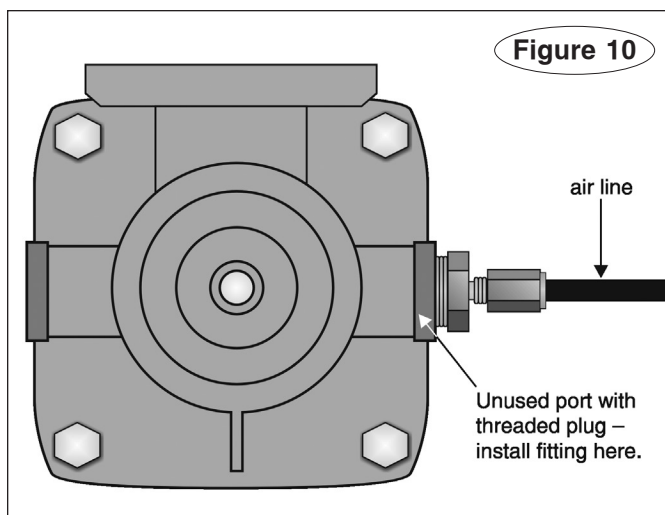


Figure 10

near the master cylinder. There should be one or more open ports with threaded plugs (Figure 10).

If the motorhome has air over hydraulic brakes – find the main brake air booster housing (Figure 11), which is typically located near the front axle. There should be an open plug (Figure 11) threaded into the air booster housing.

4. Test to verify that you have located the correct port (an assistant will be necessary for this test, to press and release the motorhome brake pedal)...

⚠ WARNING

The air brake system contains pressurized air, which may cause severe eye or ear injury when it is released. Wear appropriate eye and ear protection before loosening any plugs, and while attaching the air line.

5. First, slowly loosen the plug – do not remove it entirely. Then instruct the assistant to depress the motorhome brake pedal several times. Pressurized air should escape from the port each time the brake pedal is depressed.

If pressurized air is only released when the brake pedal is depressed, you have located a port to attach the BrakeMaster air line.

6. Turn the motorhome engine off. Remove the original fitting from the port, and thread the appropriate-sized fitting (1/2" and 3/8" fittings are provided) into the port.

Use a liquid Teflon® sealant to seal the pipe threads. (Do not use liquid Teflon on any compression fittings.)

Proceed to step 8 (below).

7. **If an open port is not available** – Not all relay valves or air booster housings will have an empty port available. If this is the case, the BrakeMaster air line must be connected with a tee to the service port at the relay valve or air booster housing. A 3/8" tee (part number 450077) is provided for this purpose. An optional 1/2" tee (part number 450076) is also available.

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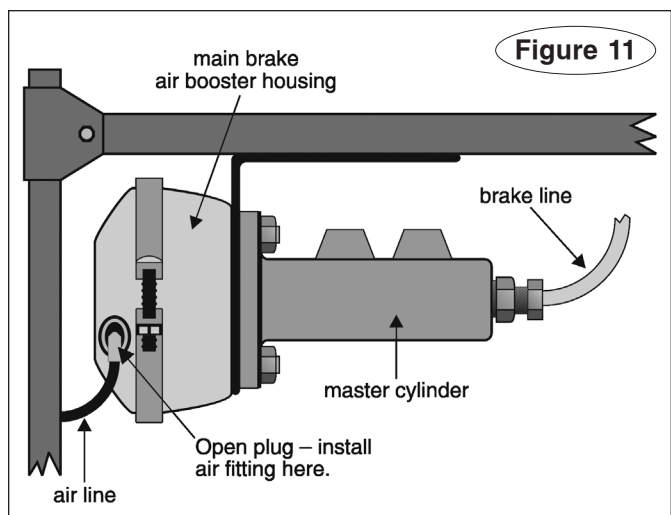


Figure 11

Install the motorhome air line

continued from preceding page

Matching compression fittings are provided in the BrakeMaster kit.

The correct port should be identified as the “service brake” port. (If the ports are not identified, follow steps 4 and 5 above to identify the service port.) First, with the motorhome brakes released, disconnect the factory air line from the service port – push down on the locking collar and then pull out. Next, remove the factory fitting from the service brake port.

Clean the factory fitting. Apply a liquid Teflon sealant to the threads on the male fitting of the new tee, and thread it into the port. Use either one of the two female fittings on the new tee to reinstall the factory fitting, and then the factory air line.

Use the compression fitting provided with the ROADMASTER tee to attach the BrakeMaster air line to the remaining female fitting. Use the same method described in step 3 under “Install air lines in the towed vehicle” to attach the air line.

Proceed to step 9 (below).

To finish the installation...

8. Now that the fitting is in place, connect one end of the remaining length of air line to the fitting. Use the same method described in step 3 under “Install air lines in the towed vehicle.”

9. Tape the open end of the remaining length of air line. Then, route the air line from the relay valve (or air booster housing) to the female quick coupler at the rear of the motorhome. As before, avoid moving parts, sharp edges or “hot” components such as the engine or the exhaust system. Do not kink the air line, or bend it to the extent that it crimps or creases.

CAUTION

Do not position the air line closer than two feet from any heat source. The heat will soften the plastic, which will cause the air line to rupture.

If the air line is ruptured, the supplemental braking system will not function.

Do not kink the air line, or bend it to the extent

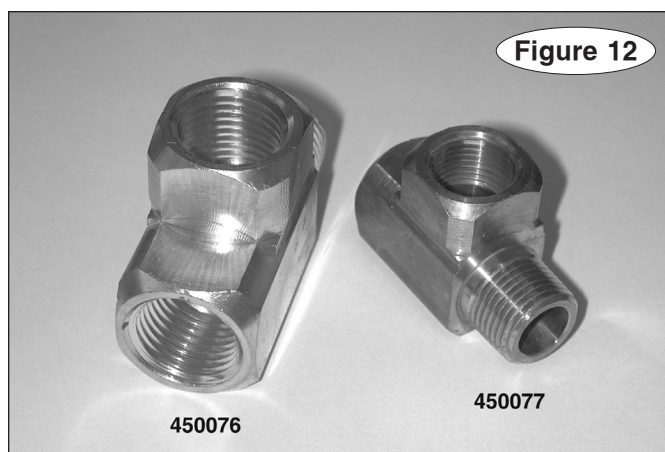
that it crimps or creases – air pressure will be substantially reduced, or blocked entirely, at the kink in the line.

If the air pressure is reduced, the supplemental braking system will not function, or may only function intermittently.

Where appropriate, use wire ties to secure the air line in place.

10. Connect the air line to the female quick coupler at the rear of the motorhome. Use the same method described in step 3 under “Install air lines in the towed vehicle.”

11. The BrakeMaster installation is complete. Before the supplemental braking system is operated for towing, proceed to the next section – “System test.”



System test

CAUTION

Always deplete the stored vacuum in the towed vehicle's power brake system before towing – pump the brake pedal several times.

Depending on the make and model of the towed vehicle, it may be necessary to pump the brake pedal repeatedly to deplete the vacuum.

If the vacuum is not released, the supplemental braking system will apply excessive braking force when it is activated, which will cause severe tire and/or brake system damage to the towed vehicle.

1. The motorhome and towed vehicle must be stationary for the system test, and ready for towing...

- Connect and attach the tow bar to the motorhome and towed vehicle.
- According to the manufacturer, make all adjustments necessary to prepare the vehicle for towing. These adjustments may include: turning the ignition key to the "tow" position; pulling fuses; disconnecting the battery; and setting the transmission to a particular gear or in a particular sequence.

CAUTION

To prevent the towed vehicle from rolling, connect and attach the tow bar to both vehicles before shifting the towed vehicle's transmission into the proper gear for towing.

- Connect the patch cord between the two vehicles – both the air line quick couplers and the motorhome monitor bullet connectors – see Step D, "Connect the patch cord between the motorhome and the towed vehicle," under "Install the motorhome monitor system."

- Attach the air cylinder to the brake pedal and mounting post (or seat bracket adapter) – refer to the owner's manual. Connect the male quick coupler at the end of the air line on the air cylinder to the female quick coupler at the end of the air line mounted in the passenger compartment.

- Clip one end of the steel break away cable to the break away pin (Figure 1); clip the other end of the cable to the rear of the motorhome, close to the center.

2. Block the motorhome's wheels, then release the parking brake. Turn the motorhome engine on, and leave it running.

3. After the air brake system is completely charged, check for leaks in the air system: Have an assistant apply the motorhome brakes and continue to hold the brake pedal down.

Cover each joint, fitting and connection in the air system with a leak check solution.

CAUTION

The air system now contains pressurized air, which may cause severe eye or ear injury if it is

inadvertently released. Wear appropriate eye and ear protection before adjusting the air system connections and fittings.

Tighten any fittings, if necessary, and repeat until all connections are airtight.

4. Confirm the proper operation of the braking system: depress and hold the motorhome brake pedal down. At the towed vehicle, the air cylinder shaft and pedal clamp will extend. Then, release the brake pedal. The air cylinder shaft and pedal clamp will retract.

5. Confirm that the motorhome monitor is functioning: the LED will illuminate after the motorhome brake pedal is depressed, and stop when the brake pedal is released.

WARNING

If the LED does not turn on and off as described above, identify and correct the cause before using the supplemental braking system. Refer to the Troubleshooting section for possible causes.

The LED is the only indication of braking activity at the motorhome. Severe damage to the towed vehicle, a loss of vehicular control or other consequential, non-warranty damage can occur if the driver of the motorhome is unaware that the supplemental braking system is not functioning properly.

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

6. Confirm the proper operation of the break away system –

First, charge the break away air reservoir – with the motorhome engine on, the air compressor completely charged and the parking brake released, depress the brake pedal for 15 seconds – apply firm pressure.

WARNING

The break away air reservoir must be charged, as described above, every time the motorhome and towed vehicle are connected.

If the air reservoir is not charged, the break away system will not apply braking pressure if the towed vehicle separates from the motorhome, which may cause property damage, personal injury or even death.

Next, remove the break away pin (Figure 1) at the front of the break away switch. The air cylinder and pedal clamp will extend, confirming the proper operation of the break away system.

To retract the air cylinder and pedal clamp, reconnect the break away pin.

Before towing, charge the break away air reservoir, as described above.

continued on next page

System test

continued from preceding page

7. Confirm the proper operation of the towed vehicle's brake lights and turn signals –

A. Depress the motorhome brake pedal; confirm that the towed vehicle's brake lights illuminate. Activate both of the motorhome turn signals; confirm that the towed vehicle's turn signals activate.

If the towed vehicle's brake lights and turn signals do not operate in tandem with the motorhome's, you must install a non-intrusive lighting system or re-wire the towed vehicle. See "Brake light solutions."

B. With one of the motorhome turn signals activated, depress the motorhome brake pedal. Confirm that the towed vehicle's brake lights and turn signal both illuminate.

If the towed vehicle's brake lights override the turn signal, you must install a non-intrusive lighting system or re-wire the towed vehicle. See "Brake light solutions."

WARNING

By law, a towed vehicle's turn signals and brake lights must operate in tandem with the motorhome's, as described above. If they do not, drivers behind the towed vehicle will not be alerted when the motorhome stops or turns, which may cause an accident.

If the towed vehicle's brake lights and turn signals do not operate in tandem with the motorhome's, either install a non-intrusive lighting system or re-wire the towed vehicle according to the next section, "Brake light solutions." Then, test for proper operation, as described in step 7, above.

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

Brake light solutions

A supplemental braking system will affect the operation of the vehicle's tow lighting system. Use the information below to determine if optional components must be installed in a vehicle which has been wired for towing – or, if no lighting system has been installed, which systems are appropriate.

1. First, identify the type of brake and turn signals in the vehicle. There are two types – combined or separate. In a **combined** system (Figure 13), the brake light does the flashing for the turn signal; in a **separate** system (Figure 13), there are amber or red turn signal lights which are separate from the brake lights.

2. Next, test to see if the towed vehicle's brake lights will illuminate with the engine off – with the ignition key at the "tow" position, press the brake pedal and check the brake lights.

3. Based on whether or not the brake lights illuminate, and the type of brake and turn signals, there are three possibilities:

- the brake lights illuminate and the towed vehicle has combined lighting;
- the brake lights illuminate and the towed vehicle has separate lighting; or
- the brake lights do not illuminate.

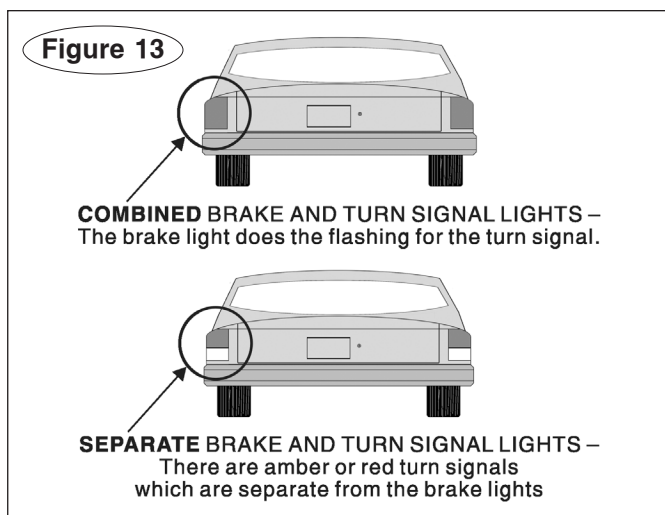
There are a number of lighting methods available for each of these three possibilities; they are described below.

(If you choose to install a Universal Wiring Kit, a Taillight Wiring Kit, magnetic tow lights or the Brake-Lite Relay, complete installation instructions and wiring diagrams are included with the kits; this information is also available online at www.roadmasterinc.com.)

If the brake lights illuminate and the towed vehicle has combined lighting...

...one of the three alternatives below is required:

- A Universal Wiring Kit (part number 154) **with** a Brake-Lite Relay – a system of diodes is installed to rewire the vehicle's turn signals, taillights and brake lights for towing.



- Install an optional "bulb and socket set" (also called a "taillight wiring kit," part number 155).
- Install an optional magnetic tow light system (part number 2100 or 2120).

If the brake lights illuminate and the towed vehicle has separate lighting...

...one of the four alternatives below is required:

- A Universal Wiring Kit (part number 154) **with** a Brake-Lite Relay – a system of diodes is installed to rewire the vehicle's turn signals, taillights and brake lights for towing.
- Install six diodes, and jump the diodes. See page 15.
- Install an optional "bulb and socket set" (also called a "taillight wiring kit," part number 155).
- Install an optional magnetic tow light system (part number 2100 or 2120).

If the brake lights do not illuminate...

...an optional brake light switch **must** be installed. Stop light switch kits for many vehicles are available through ROADMASTER; visit fitmaster.roadmasterinc.com for the most current list.

Any one of the following tow lighting systems must also be installed with the stop light switch:

- A Universal Wiring Kit (part number 154) – a system of diodes is installed to rewire the vehicle's turn signals, taillights and brake lights for towing.
- An optional "bulb and socket set" (also called a "taillight wiring kit," part number 155)
- An optional magnetic tow light system (part number 2100 or 2120)

Install six diodes

Note: this wiring method can only be used if the brake lights illuminate with the engine off and the towed vehicle has separate lighting. See page 14.

Note: if the motorhome has combined brake and turn signals, use Figure 14 to wire the towed vehicle. If the motorhome has separate brake and turn signals, visit www.roadmasterinc.com. Use the 'Separate towed vehicle to separate motorhome' wiring diagram under 'Support.'

Note: if a 3-to-2 converter has been installed in a motorhome with separate brake and turn signals, wire the towed vehicle according to Figure 14.

To test for a 3-to-2 converter, use a test light to find the turn signal and brake light circuits on the motorhome electrical socket. If the same circuit energizes both the turn signals and the brake lights, a 3-to-2 converter has been installed. If the turn signal and brake lights have separate circuits, a 3-to-2 converter has not been installed.

1. Cut the factory turn signal, taillight and brake light wires, as close to the lights as possible.
2. Install the six diodes in line, as shown in Figure 14. Install the diodes as close to the lights as possible.

CAUTION

Attach the diodes as close to the vehicle's

lights as possible, to avoid interaction with other circuits which may be tied into the center brake light, the running lights, the turn signals or the brake light wires.

Attaching the diodes farther away may cause the towed vehicle's lights to work improperly and may also cause damage to other electrical components in the vehicle.

3. On each side, jump the brake and turn signal diodes, as shown in Figure 14.

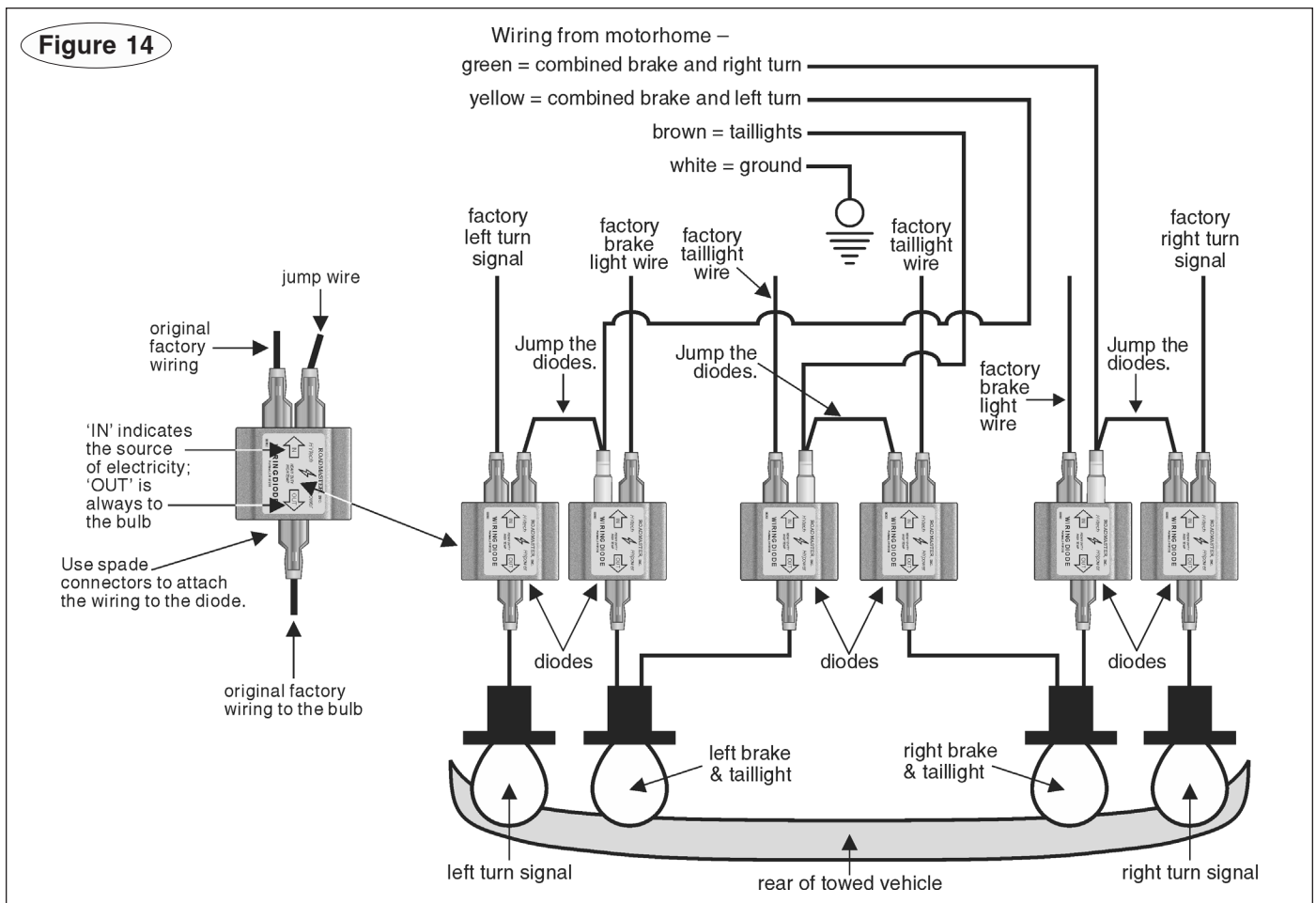
CAUTION

Unless the brake and turn signal diodes are jumped, the towed vehicle's brake light circuits will override the motorhome's turn signals – the towed vehicle's turn signals will not operate in conjunction with the motorhome's turn signals, as required by law.

4. Test the installation...
 - A. If the motorhome has a combined lighting system (Figure 13)...

1. The towed vehicle's turn signals and brake lights will both flash (each side) when the motorhome's

continued on next page



Install six diodes

continued from preceding page

turn signal is on; and

2. When the motorhome's turn signal and brake signal are both on (each side), the towed vehicle's brake lights will stay illuminated, while the turn signal flashes.

B. If the motorhome has a separate lighting system (Figure 13), the towed vehicle's turn signals and brake lights will illuminate identically to the motorhome's.

Troubleshooting

Symptom

The motorhome monitor LED does not illuminate, even though the brakes in the towed vehicle are being applied.

Solution

1. The monitor LED will not illuminate during very light braking.
2. Make certain that the monitor patch cord is securely connected between the two vehicles.
3. The towed vehicle-to-motorhome electrical cord must also be connected – the monitor system uses it for the ground wire.
4. 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 illuminate. Check the towed vehicle's brake lights – if they illuminate when the brake pedal is depressed, the fuse is good.
5. Did you install the optional Brake-Lite Relay? 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.

Symptom

Nothing happens after proper installation.

Solution

1. The motorhome engine must be running, and the parking brake must be released. If the engine is off, there may be insufficient air pressure to activate BrakeMaster. If the parking brake is on, pressurized air is prevented from entering the BrakeMaster air lines.
2. Check the air line connections. Remove the weather covers from the quick couplers at both vehicles, and gently tug on the air line to verify that the quick couplers are connected.
Check to make certain that the air cylinder quick coupler is connected to the air line in the passenger compartment.
3. Follow the air lines from the motorhome back to the air cylinder in the towed vehicle. Inspect the entire line for deformities caused by excessive heat, and/or kinks in the line, which would restrict the air flow – replace the entire section of air line if any are found.
Disconnect the quick couplers to confirm that they are allowing air to flow through them.

Symptom

The BrakeMaster air cylinder will extend and depress the towed vehicle's brake pedal. However, it will not retract when the motorhome brake pedal is released.

Solution

1. One of the air lines may be damaged or kinked. Follow the air lines from the motorhome back to the air cylinder in the towed vehicle. Inspect the entire line for deformities caused by excessive heat, and/or kinks in the line, which would restrict the air flow – replace the

entire section of air line if any are found.

2. Make certain that the air cylinder has been installed directly in line with the brake pedal. If it is mounted at an angle to the brake pedal (to one side or the other), the air cylinder may jam in the extended position.

3. Dirt or debris can enter the air lines if the weather covers are not used over the quick couplers. It may accumulate at the quick exhaust valve (see page two) on the air cylinder, preventing the valve from venting air out of the air cylinder. Disassemble the quick exhaust valve and make certain it is not jammed.

Symptom

The towed vehicle brakes abruptly the first time BrakeMaster is activated, 'flat-spotting' the tires. Also, after towing, there may be excessive brake dust on the wheels of the towed vehicle, and/or an unusual odor near the towed vehicle's brakes.

Solution

1. The stored vacuum in the towed vehicle's power brake system **must** be depleted before towing – pump the brake pedal several times. Depending on the make and model of the towed vehicle, it may be necessary to pump the brake pedal repeatedly.

Deplete the vacuum in the power brakes every time the towed vehicle's engine has been started – typically, when the vehicle is connected for towing.

The engines in some vehicles, such as the Saturn Vue, must be started periodically during towing. If the towed vehicle's engine must be started periodically, always deplete the vacuum in the vehicle's power brake system **before** you resume towing.

Refer to the caution statement on page 12.

2. If the towed vehicle has an 'active' (or, 'continuous power assist') braking system, order the optional Brake Pressure Reducer (part number 900002) to adapt the vehicle to the BrakeMaster system.

Vehicles with 'active' brake systems include several hybrid vehicles, such as some models of the Ford Escape hybrid and the Mercury Mariner hybrid, as well as the H3 Hummer. These vehicles, and others with 'active' braking systems, are designed so that even when the ignition is turned to the 'tow' position, the braking system is still active.

If the Brake Pressure Reducer is not installed, BrakeMaster will apply excessive force to the towed vehicle's brake pedal.

3. If the towed vehicle does not have power brakes, order the optional Brake Pressure Reducer (part number 900002) to adapt the vehicle to the BrakeMaster system.

BrakeMaster is designed to work with vehicles that have a power brake system (even though the power brakes are not activated while towing).

If the reducer is not installed, BrakeMaster will apply excessive force to the towed vehicle's brake pedal.

Vehicle-specific components

Remote Battery Disconnect

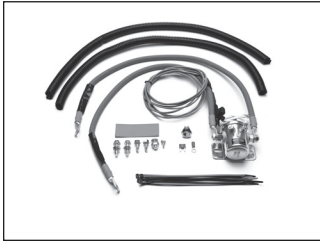
If you tow a Jeep Liberty, Jeep Wrangler or any other vehicle which must be towed with the battery cable disconnected, install the Remote Battery Disconnect (part number 766).

Fully automatic 'connect and forget' operation eliminates the necessity to disconnect the cable – the vehicle can be towed, then disconnected and driven, without any further adjustment to the battery.

The Remote Battery Disconnect also provides:

1) a constant charged current to the battery while the vehicle is being towed, preventing supplemental braking systems or other aftermarket accessories from draining the battery; and 2) a positive current source for break away systems or other accessories which must be connected to the battery.

- preassembled for easy installation
- marine-grade high-amperage solenoid and contacts
- 100% duty cycle
- extends battery life
- works on virtually all 12-volt batteries

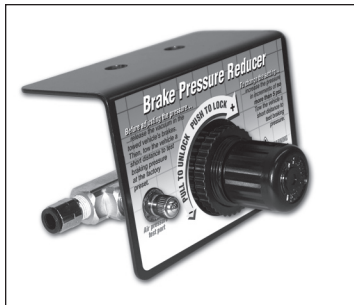


Brake Pressure Reducer

With the Brake Pressure Reducer (part number 900002), you can install BrakeMaster in a hybrid, a Hummer H3, or in any vehicle with an 'active' (or, 'continuous power assist') braking system.

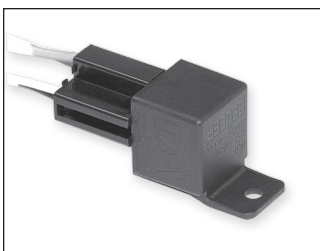
Working in conjunction with these braking systems, the Brake Pressure Reducer delivers a correspondingly reduced braking pressure that eliminates over-braking issues associated with these hybrids and Hummers.

In addition to BrakeMaster, the Brake Pressure Reducer will work in other supplemental braking systems which use pressurized air to brake the towed vehicle.



Brake-Lite Relay

Necessary in the majority of towed vehicles, the Brake-Lite Relay (part number 88400) allows the towed vehicle's brake lights and turn signals to both work in tandem with the motorhome's, as required by law.



Brake light switch kits

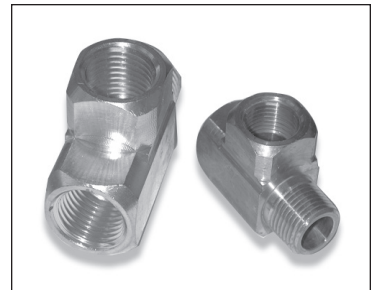
If a towed vehicle's brake lights do not function, install this brake light and 10-amp fuse. With the brake light switch in place, the towed vehicle's brake lights will work in tandem with the motorhome's, and the motorhome monitor will transmit accurate braking information.



Brake light switch kits for most popular towed vehicles are available through ROADMASTER; for the most current list, visit the ROADMASTER web site at fitmaster.roadmasterinc.com – for vehicle-specific information. Select 'Towing Systems,' and enter the motorhome year, make and model, then 'Search.'

Air line tees

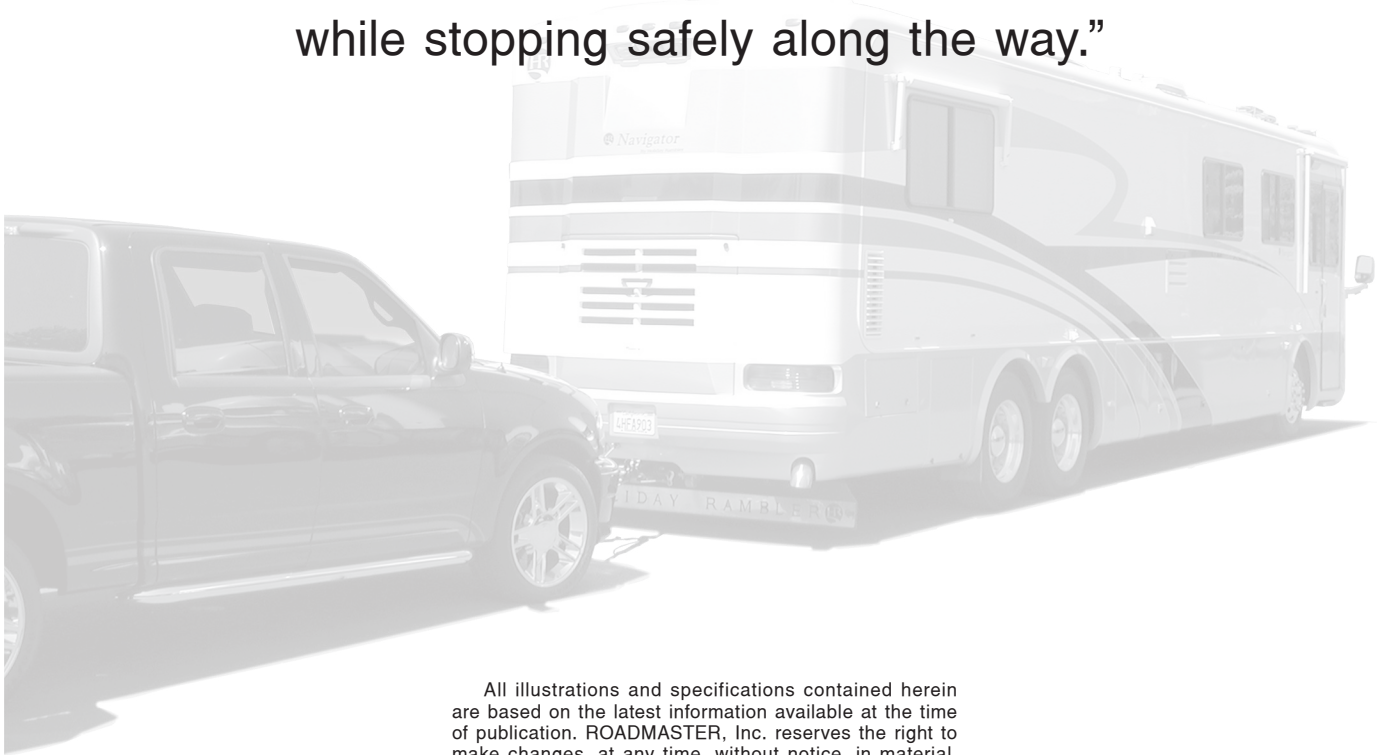
If the motorhome's air brake relay valve (or air booster can) does not have an open port, use either a 1/2" tee (part number 450076) or a 3/8" tee (part number 450077) to attach the BrakeMaster air line.



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“We get your towed car there,
while stopping safely along the way.”



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.



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