

Installation Instructions

SMARTBOX™ BRAKING CONTROL



SMI Manufacturing, Inc.
7457 W. State Route 66
Newburgh, IN 47630
800-893-3763
www.smibrake.com

Model: AF0108
Rev.: 0412

SMI Air Force One Supplemental Braking System

Thank you for purchasing Air Force One: the most advanced supplemental braking system available. When installed correctly, this system will provide years of maintenance and adjustment-free service. These installation instructions are designed to guide you through the installation of your new braking system. The installation is vitally important to the proper operation and safety of both the end user, and those on the road. It is imperative that these instructions be read in their entirety before any part of the installation is attempted. This will allow for a proper understanding of the system as a whole, and will also result in a much neater, professional installation. We have compiled these instructions based on the feedback from our technicians, certified installers, and individual customers. If at any time you do not feel 100% comfortable and confident throughout the installation, you must contact the SMI toll-free tech support line immediately at 800-893-3763 to obtain the location of the nearest qualified technician for assistance.

SMARTBOX™ BRAKING CONTROL



Vacuum-Assisted Braking

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Inventory of Parts

Air Force One Packing List

Towed-Vehicle Installation Bag:

- 1 5' Length of White Wire
- 1 Air Bracket with Male Fitting
- 1 Bundle of Wire Ties
- 1 Breakaway Switch with Plug
- 1 Breakaway-Switch cable
- 1 L-Bracket Hardware Bag
 - 2 ¼"-20 Locking Nut
 - 2 ¼"-20 Bolt
 - 2 Flat Washer
- 1 Breakaway Hardware Bag
 - 1 ¼"-20 Locking Nut
 - 1 ¼"-20 Bolt
 - 1 Flat Washer
- 1 Small Parts Bag
 - 1 Fuse Holder
 - 1 Barbed Vacuum Tee
 - 1 Check Valve (green/black)
 - 2 Vacuum Hose Adapters
 - 1 20 Amp Fuse
 - 2 Blue Scotch-Lock Tap-In Connectors
 - 2 Blue Butt Connectors
 - 2 ¼" Ring Terminals



Cylinder Bag:

- 1 SMI Actuating Cylinder
- 1 Floor Anchor
- 1 Self-Drilling Screw

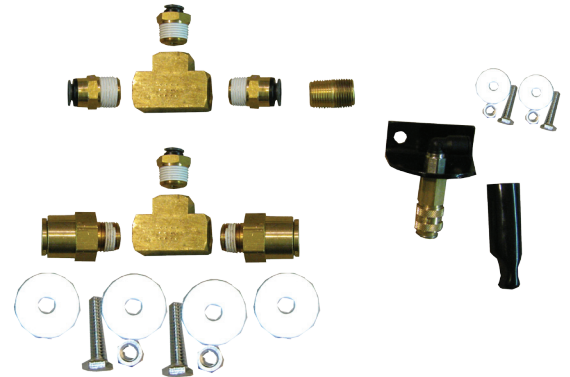


Coach Air Connection Assembly



Coach Installation Bag:

- 2 3/8" NPT Tee
- 2 3/8" NPT – 1/4" Tube Pushlock Connector
- 2 3/8" NPT – 3/8" Tube Pushlock Connector
- 1 3/8" NPT Close Nipple
- 2 3/8" NPT – 5/8" Tube Pushlock Fitting
- 1 Air Bracket with Female Fitting
- 2 1/4"x20 Bolts
- 2 3/8"x16 Bolts
- 2 Flat Washer for 1/4"x20
- 4 Flat Washer for 3/8"x16
- 2 1/4"x20 Locknut
- 2 3/8"x16 Locknut



Operating Unit



40' Roll of 1/4" DOT Air Line



Coiled Air Jumper



Coach Notification Bag:

- 1 Monitor Light
- 3 Blue Butt Connectors
- 1 Two-Lead 48" Loop
- 1 1/4" Ring Terminal
- 2 Wire Ties
- 5 Feet of Gray Wire
- 1 Flip-Over T-Tap Connector
- 1 Male Spade
- 1 3' Length of Flex Wrap



Things To Know Before You Get Started

- 1) Air Force One is designed to provide proportionate braking effort in the towed vehicle by applying proportioned air based on the pressure in the coach's braking system to the Air Force One braking system.
- 2) Federal Motor Vehicle Safety Standard (FMVSS) 121 requires that a separate air circuit and flow protection valve be installed when the towing vehicle's air supply is used for a supplemental braking system. Air Force One is the only air brake system that supplies these components as part of the installation kit. Should there be any breach in the supplemental air connection, the air supply will be shut off: allowing you to stop your coach safely in every situation, even during a breakaway.
- 3) In the event of a breakaway, the breakaway reserve air supply (located within the operating unit) is used to apply the towed vehicle's brakes. The towed vehicle's brakes remain applied until the breakaway pin is replaced.
- 4) To be sure that the breakaway tank is charged, you should apply the coach's brake pedal completely for 3 seconds after the coach has been allowed to completely "air-up."
- 5) Be sure to replace the provided dust cap on the vehicles' air connections. Failure to do so **WILL** result in improper functioning of the braking unit. Note: If a different cap is used on towed vehicle it must be allowed to vent, allowing heated air to escape during normal driving. Failure to do so **WILL** result in damage to the towed vehicle.



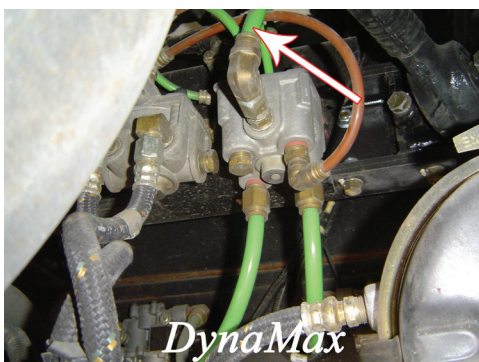
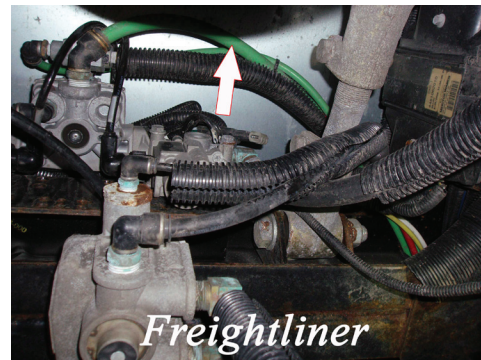
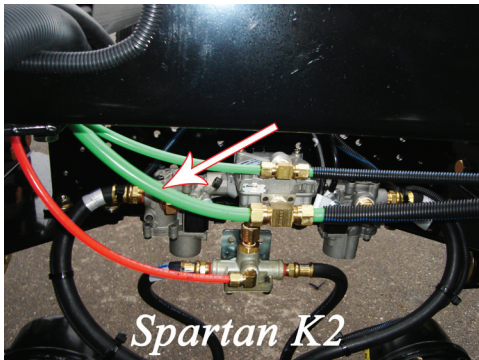
Coach Installation

Step 1: Mount the Coach Air Tank Assembly



1. Select an appropriate location for the Coach Air Connection Assembly. The air lines to be connected must not be near any direct heat source or moving parts and must not be routed in such a manner that they will kink. In many cases the Coach Air Connection Assembly may be mounted to the same cross-member as the coach's relay-valve assembly. Note: The diaphragm on the bottom of the relay valve must not face upward.
2. Mount the Coach Air Connection Assembly in this location using the provided hardware or suitable existing hardware.

Step 2: Supply-Air Connection



1. Locate the coach's supply air hose. This line goes from the service relay valve to the

braking air tank. It is 5/8" in outside diameter. Although it is normally green, it may be any color. Do not confuse this hose with the treadle-valve hose. This line is only 3/8" in outside diameter and should not be tampered with.

2. Cut this line with an appropriate hose cutter so that the cut is straight and clean. A straight, clean edge is necessary to prevent leaks in the coach's air system. Remember, you must drain the coach's air tanks before cutting this line.
3. Attach the provided 3/8" NPT tee with the appropriate connectors. Thread the pushlock connector into the unused port of the tee.

Step 3: Metered-Air Connection

Locate the spring-brake/quick-release valve. In most applications it is mounted directly below the service brake relay. In most applications, the metered-air port is directly in the center of the top of the valve (just like on the SMI assembly).

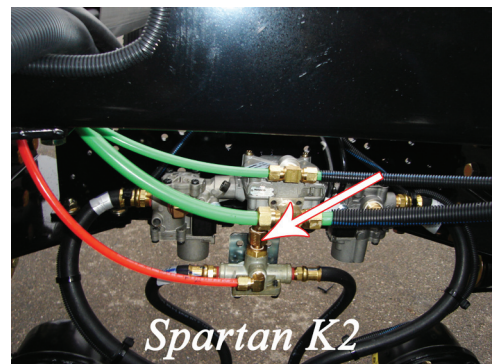
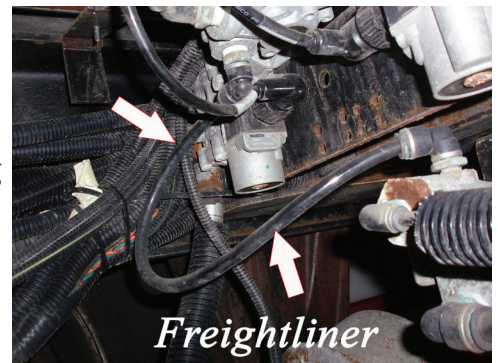
Most Freightliners:

The valve is connected via a 3/8" airline below the service-brake relay valve, simply cut the hose and insert the tee using the provided pushlock fittings. Thread the provided 1/4" pushlock fitting into the unused port of the tee.

Spartan:

Some Spartans have a similar setup to most Freightliners. Some (such as the K2) thread the valve directly into the bottom of the service relay valve. In this case, remove the connection between the relay-valve assembly and the spring-brake valve and insert the tee with the 3/8" close nipple between them. Remove the two lines going from the spring-brake valve to the air cans on either side of the drive axle. Caution – *It is possible for the quick release valve to un-thread incorrectly resulting in disassembly of the valve.*

*It is safest to use a wrench on the hex nipple to loosen them. The nipple should remain connected to the quick release valve. It is usually necessary to first remove the lines from the air cans when removing the valve, as this will allow it to freely turn. Caution – If you remove both lines from the air can, be sure to replace them correctly. Note: The right and left air-can hose locations are reversed. **Be sure there is sufficient clearance between the quick-release valve and other chassis components when the air is released from the air***



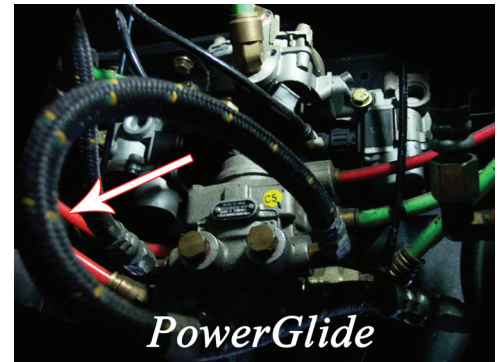
bags of the coach, especially if the coach has a tag axle. If there is a clearance issue you must call the SMI Help Line.

Roadmaster:

Some Roadmasters (especially older models) have a similar configuration to the Freightliners. Most (especially newer models) have the service relay valve (for the supply air connection) in front of the drive axle and the spring brake valve behind the drive axle. In this case the spring brake valve is mounted to the frame cross member. The correct line goes from the top surface of the relay valve directly to the driver's side frame rail. It is a 3/8" line and is normally red in color.

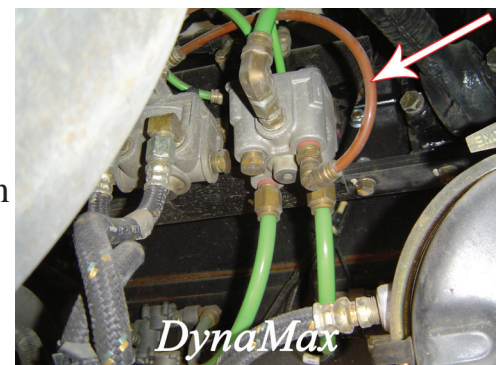
Tiffin:

Starting in 2008 Tiffin Motorhomes began using their own proprietary chassis. Tiffin coaches incorporate an inversion relay valve rather than a conventional spring brake valve. The ports on the valve are numbered. Either port 41 or 42 will work for the Air Force One system. In this case the port is NOT on the top of the valve. Select the line in either port that is 3/8" so it will work with the provided fittings. Any further questions may be directed to the Help Line or Brad Warner of Tiffin at 256-356-8661 ext. 2267.



DynaMax:

In most cases the DynaMax (Country Coach) chassis have two valves mounted side-by-side. In some cases the service brake relay is on the right (as pictured) and other times it's on the left. In either case the metered line goes from the bottom of the service valve to the top of the spring-brake valve.



Others:

Virtually all other chassis will fall into one of the above configurations; however, if there are any questions or concerns contact the SMI Help Line at 800-893-3763.

Step 4: Route the Air Line

1. Straighten out the 1/4" DOT air hose behind the coach.

2. Route the air hose to the “Coach Air Tank Assembly” being careful to avoid sharp bends, moving parts, and any heat source. Secure it with ties. NOTE: It is often helpful to follow existing wiring harnesses.

Step 5: Plumbing

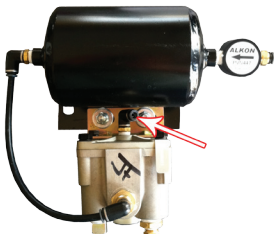
1. Using the provided ¼” DOT air hose, connect the supply air (from Step 2) to the pushlock fitting on the pressure-protection valve on the “Coach Air Connection Assembly.” When connecting the pushlock connectors, use the following method.

A. Cut the air hose using an appropriate hose cutter. Make sure the cut is straight. Air leaks can exist if the air hose is not cut straightly.

B. Push the air hose in all the way. These fittings are tight, and the hose will snap into place with two “clicks.”



Note: Should you find it necessary to remove an air hose, push the air hose in with one hand, push on the outside ring of the pushlock connector with the other hand, and then pull the air hose out. The ring will release the air hose.



2. Connect the metered air (from Step 3) to the pushlock connector on the Air Force One relay valve labeled “SER.”

3. Connect the towed-vehicle air hose (from Step 4) to the pushlock connector on the relay valve labeled “DEL.”



Step 6: Mount the Female “L” Bracket

1. Using the provided hardware, mount the female “L” bracket to the back of the coach as close to the center as possible. Make sure it is not the lowest point so that it is protected from being bottomed-out.
2. Insert the ¼” air hose (from Step 4) into the pushlock fitting.

Towed-Vehicle Installation

Step 1: Mount the Operating Unit



1. Select a suitable location for the operating unit in the engine compartment. It must be away from any extreme heat source and the connections must be easily accessible. The unit can often be installed behind the grill provided it doesn't restrict air flow to the radiator. Moisture will not harm the unit, but it should not be in the direct path of rainwater or road spray.

2. Secure the box with either screws or wire ties through the mounting flanges on the box.

Step 2: Mount the Male “L” Bracket

1. Using the provided hardware, mount the male “L” bracket to front of the towed vehicle as close to the center as possible. If the coach's “L” bracket was offset, offset the towed's to the same side if possible.
2. Route a length of DOT air hose from the “L” bracket to the operating unit and connect it to the blue bulkhead pushlock connector.

Step 3: Mount the Breakaway Switch

1. Mount the breakaway switch to the front of the towed vehicle as close to the center of the towed vehicle as possible using the provided hardware. In many cases it can be mounted to the front fascia in a manner that allows it to turn 90° when not in tow.
2. Insert the plug into the switch. This will prevent dirt and water from getting into the switch.
3. Attach the orange/black wire to the fuse holder and to a 12 volt power source in the towed vehicle.
4. The blue wire is attached to the blue wire from the operating unit.
5. At this time attach the white wire from the operating unit to a frame ground.



**The breakaway system will not function until the operating unit has been charged with air from the coach.*

Step 4: Go Through the Firewall

Locate the main-wire-harness grommet of the car or another suitable place and route the ¼” air hose into the passenger compartment. One end of this hose will go to the activation cylinder, and the other end will go to the red bulkhead connector on the operating unit under the hood.



Step 5: Install the Monitor Light

Note: If the vehicle has a “dead” brake-light switch when in the towed position (the brake lights are inoperable with the key in the tow position) or the vehicle’s battery is disconnected while in tow, an air pressure switch kit is needed to power the monitor light. Most 2009+ GM’s use a multiplex wiring system and cannot be tapped into. Contact the Help Line for special instruction. Some newer vehicles (e.g. 2011+ Jeep Grand Cherokee) have a functional brake switch even though the brake lights don’t come on in the towed position.

The following instructions are written with a labor-saving installation method of the monitor light. At the customer’s preference the monitor light may be installed on the dash of the coach. Contact the Help Line for specifics.

**All parts needed for this step are located in the “Coach Notification Bag”*

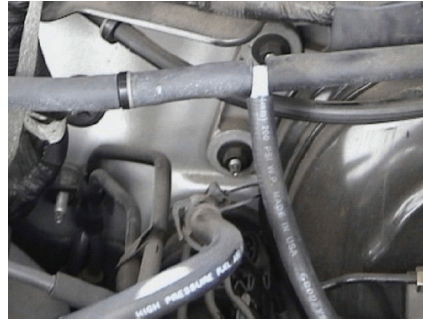
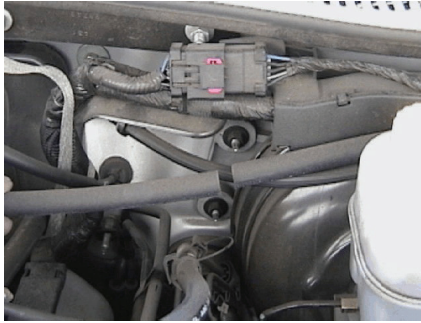
1. Locate the cold side of the brake-light switch (BLS). This is the wire that is normally cold, but has 12 volts (+) when the brake pedal is depressed.
2. Connect the spade to the length of wire and then place the spade into the flip-over connector
3. Clip the flip-over connector onto the cold side of the brake-light switch wire.
4. Cut the two-lead loop approximately in the middle. Locate the end that has the Brown wire shielded (female). This end will be positioned in an accessible location under the dash (tilt lever, etc.).
5. Attach the Brown wire to the wire from the BLS. Connect the Red wire to a frame ground. Note: Be sure to select the side of the jumper that has the Brown wire in the protected-female plug. This will prevent shorting against the frame during normal driving.
6. On the other side of the jumper, attach the Brown wire on the plug to the Black wire on the light. Attach the Red wire on the plug to the Red wire on the light.



7. Secure the light using the provided Velcro to the rear view mirror of the towed vehicle aimed towards the backup camera of the towed vehicle.

** The light may be permanently routed (behind a-pillar) or temporarily mounted and removed after towing (use provided flex wrap to conceal wires). In either case, careful attention must be given to disabling the light before driving the towed vehicle on public streets.*

Step 6: Make the Vacuum Connection



First, locate the vacuum line coming from the brake booster and determine its size. Then, select from one of the following options.

Note: This portion of the installation is for vehicles with vacuum-assisted brakes ONLY. If you have hydra-boost brakes or are uncertain of your vehicle's braking configuration, call the Help Line for assistance.

Some newer Ford products incorporate two vacuum lines from the booster and require an addition check valve. Contact the Help Line for details.

Special Concerns:

1. Special care must be given to installing the check valve in the proper orientation. (Motor, Check Valve [black/green], Tee, Booster).
2. Exercise care in routing the hose so that no kinks, sharp edges, heat, etc., will effect the operation of the system.
3. Lubricate the check valve and tee with dish soap or silicone spray. This will help them slide easily into the vacuum hose.

11/32-3/8 I.D. HOSE SIZE (does not require hose clamps)

1. Locate the existing vacuum hose and determine where the check valve and the tee will be inserted into the hose.
2. Route the hose coming from the operating unit to the location where the tee will be installed. (Stay away from sharp edges, heat sources and kinks).
3. Cut the existing hose where the check valve will be inserted and install the check valve.

3. Take care not to cut too close to a bend in the hose that will not allow the check valve to be inserted fully into the hose. (Black end toward the motor).
4. Cut the hose where the tee will be inserted and install the tee. Take care not to cut too close to a bend in the hose that will not allow the tee to be inserted fully into the hose.
5. Cut the hose coming from the SMI unit to the proper length and slide onto the tee. Make sure enough excess is left to avoid kinks.

HARD PLASTIC VACUUM LINES

1. Cut a length of hose from the end of the operating unit and slide one end onto the green end of the check valve. Insert the tee into the other end.
2. Cut another length of hose and insert the open end of the tee into it. (The open end of the hose will slip over the smaller hard plastic tubing). Cut another length of hose and insert the open (black end) of the check valve.
3. Cut out a portion of the existing hard plastic tubing and slip the open ends of the hose and hose clamps over the plastic tubing. Make sure the black end of the check valve is toward the motor.
4. Put the enclosed clamps on the hose that the hard plastic tubing is inserted into (do not overtighten).
5. Cut the hose coming from the SMI unit to the proper length and slide onto the tee. Make sure enough excess is left to avoid kinks.



1/2-5/8 I.D. VACUUM LINES

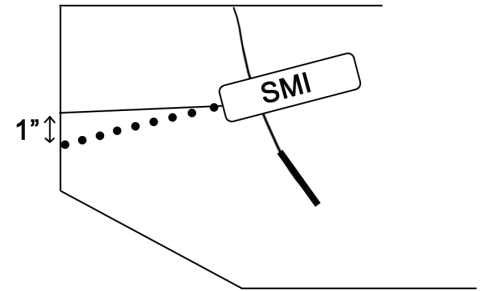
1. Cut a length of hose from the end of the operating unit and slide one end onto the green end of the check valve. Insert the tee into the other end.
2. Cut another length of hose and insert the open (black) end of the check valve. Slide the hose adaptor into the other end.
3. Cut another length of hose and insert the open end of the tee into it. Slide the other hose adaptor into the other end.
4. Cut out a portion of the existing larger vacuum hose out and slip adaptors and hose clamps into the open ends of the hose. Make sure the black end of the check valve is toward the motor.
5. Cut the hose coming from the SMI unit to the proper length and slide onto the tee. Make sure enough excess is left to avoid kinks.



Step 7: Mount the Cylinder

- *Special attention must be given to vehicles with moveable pedals. Check for proper clearance in all positions. When adjusting the cable, be sure that the pedals are positioned closest to the driver's seat. This will allow normal operation of the adjustable*

- *pedals. Be sure to return the pedals closest to the driver's seat when preparing to tow, or the braking system will not function properly. As an option, the pedals may be moved to the desired position and disabled. Do not depend on the fact that "no one moves them."*
1. Find a location on the brake arm that will position the cylinder as low as possible but as high as necessary not to interfere with normal driving. The higher the cylinder is mounted, the less effective it is. *Note: Some vehicles are equipped with a "hush panel" under the dash which may need to be removed or modified. The cylinder should be about 1-2" above the driver's foot location while operating the vehicle. Remember, during normal operation the brake pedal is depressed with the ball of the foot.*
 2. Hold the cylinder in place and mark the firewall location. The cylinder should be mounted so that when the brake pedal is depressed about two inches the cylinder is perpendicular to the firewall. This equates to about 1" above straight-in line. Cut away any sound deadening material before attempting to mount the clamp.
 3. Use the provided self-drilling screw to mount the clamp to the firewall. Visually verify from the engine side that the chosen location is acceptable for the self-drilling screw. Often a small pilot hole is helpful in verifying the location. Mount the clamp. If the firewall is found to be too thin to properly secure the mounting clamp, a nut and bolt may be needed to firmly secure the clamp. Mount the cylinder. The cable should be fed through the inside (closest to the mounting hole) of the clamp. Feeding from the outside may result in cable breakage. Be sure to "double loop" the cable through the clamp by putting the cable through, pulling the slack out, and then looping it back through. Tighten but do not over tighten leaving approximately $\frac{1}{4}$ "- $\frac{1}{2}$ " of slack in the cable. The amount of slack has no effect on the amount of pressure or proportionality. It only reduces the available stroke of the cylinder. Excessive slack will result in premature wear of the cylinder and cable.



**Cable breakage can only occur if there is an improper angle or if the cable is not properly secured in the clamp. Review this step carefully after the cylinder is mounted to ensure proper installation.*



Testing the Installation

1. Connect the air hose between the car and the coach and plug in the two-wire connection for the notification light. Start the coach and allow the air to build completely. It will take longer than usual, as the tanks are completely empty.
2. Apply the coach brake about $\frac{1}{4}$ of the way down. Have an assistant verify the brakes are being applied in the towed vehicle, and verify the notification light is on and visible from the backup camera in the coach. If not, and the brakes are applied in the towed vehicle, verify the notification light connections.
3. Apply increasingly more pressure to about $\frac{1}{2}$ of the way down. Verify that the brakes are applied in the towed vehicle by an increasing amount.
4. While in a safe location, release the parking brake without depressing the service brake. Verify the towed brake is not active. If it is, the Coach Air Connection Assembly is incorrectly configured. Call the Help Line.
5. The application of the brake in the above steps has now charged the breakaway tank. Pull the breakaway pin and verify that the brakes are applied in the towed vehicle.

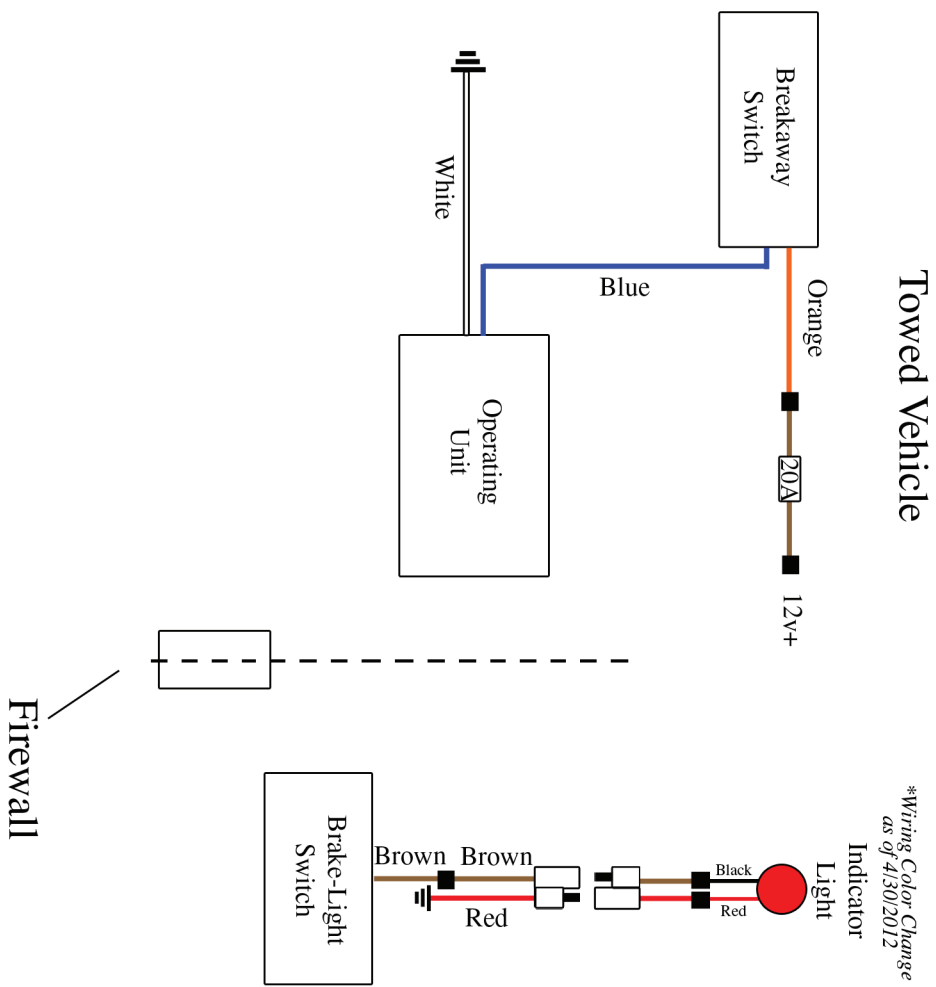
Operation

The SMI Air Force One requires no adjustments or maintenance. Under all circumstances and in all towed vehicles it will always mirror the brake pedal of the coach. When preparing to tow, connect the Air Force One jumper, breakaway cable, and the notification light. Start the coach and allow it to air-up completely. After the coach's tanks are at full pressure, depress the brake pedal completely and hold it for at least three seconds. This will do two things: allow you to verify that the unit is connected properly and fully charge the breakaway-reserve tank. This completes the setup and pretest of the Air Force One system.

Coach

Jumper

Towed Vehicle

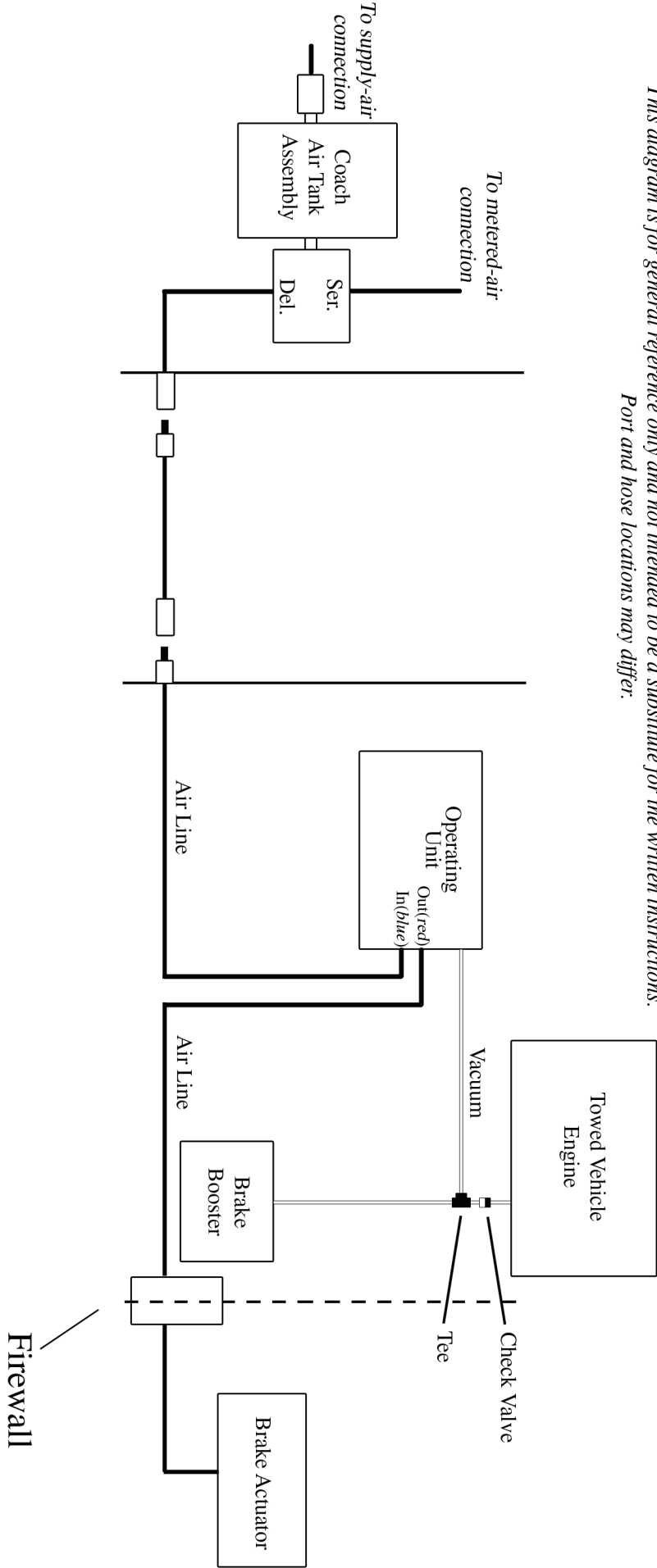


Coach

Jumper

Towed Vehicle

*This diagram is for general reference only and not intended to be a substitute for the written instructions.
Port and hose locations may differ.*



Warranty Information

Refund Policy

If, for any reason, you should decide to return your SMI product to your SMI dealer (including Rally or Trade show purchases) within 30 days, the SMI dealer will refund the purchase price of your product. Product must be complete, in the original carton, and in marketable condition. All returns are subject to a variable restocking fee not to exceed 20%.

Limited Five (5) Year Warranty

We are confident that our product will perform well and therefore warrant you, as the original purchaser, that your new product will be free from mechanical and electrical defects in material and workmanship during the warranty period. The Warranty period begins on the original purchase date. The warranty is for current production models and the original purchaser only. SMI does not warrant any part of the installation nor failure related to improper installation. Cable breakage can only occur if there is an improper angle or if the cable is not properly secured in the clamp. As a courtesy, SMI, at their sole discretion, will replace the cable as a non-warranty procedure on the originally described one time during the warranty period, and also evaluate the exact cause of breakage so that the installation problem can be fixed.

The Warranty Period

1st Year

If, during the first 12 months of the warranty period, your SMI product should be found defective, SMI will repair or replace the product at its discretion. SMI will refund to the original purchaser freight charges incurred in returning the product to the factory during this portion of the warranty period. (This does not include repackaging charges incurred to a third party) All warranty shipping & freight charges are for normal delivery, expedited freight charges are not included.

2nd - 3rd Year

If, during the 2nd through the 3rd year of the Warranty Period, your SMI product should be found defective, SMI will, upon receipt of post prepaid SMI product, repair or replace the product at its discretion. Your SMI product will be returned free of charge in the shipping manner of SMI's choosing.

RETURN THIS CARD BY MAIL OR REGISTER ONLINE.

SMI MANUFACTURING INC.

MODEL: AFO108

Title: _____

Name: _____

Street: _____ Apt.No.: _____

City: _____ St.: _____ Zip Code: _____

E-mail: _____

Home Phone: _____ Mobile Phone: _____

Date of Birth: _____ Use of RV (circle one) Full-time-Part-time

Motor Home-Make: _____ Model: _____

Length: ____ ft. Year: _____ Engine Type (circle one) Gas-Diesel

Towed Vehicle-Make: _____ Model: _____ Year: _____

Place of Purchase

Name: _____ City: _____ St.: _____

Date Purchased: _____ Price Paid: _____

Installer

Name: _____ City: _____ St.: _____

Date Installed: _____ Price Paid: _____

4th - 5th Year

If, during the 4th and 5th years of the Warranty period, your SMI product should be found defective, SMI will, upon receipt of post prepaid SMI product, repair or replace the product at its discretion. SMI reserves the right to charge for labor on required repairs of the SMI product depending on condition of the product received. Customer will be responsible for return shipping during this portion of the Warranty period.

What is Not Covered

Our warranty for your product will not cover damage resulting from set-up for towing, installation, neglect or misuse, use contrary to operating instructions, charges associated with removal/replacement of components, distortion and/or damage caused by weather or heat, or disassembly, repair, or alteration by any person other than an authorized service center. Any implied warranty of merchantability or fitness for a particular purpose of your product is limited to the duration of this written warranty. We shall not be liable for any incidental or consequential damages for breach of any express or implied warranty.

Your State Laws

Some states do not allow limitation on how long an implied warranty lasts or the exclusion or limitations of incidental or consequential damages, so the above may not apply to you. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state.

SMARTBOX™ BRAKING CONTROL



MODEL: AF0108

First-Class
Postage
Required
Post Office will
not deliver
without proper
postage.

**SMI Manufacturing, Inc.
Warranty Registration
7457 W. State Route 66
Newburgh, IN 47630**



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Professional resources for the whole RV industry — free.

We put manuals, wiring diagrams and hard-won tech knowledge in every technician's hands, so repairs get done right the first time, techs work faster, and RV owners everywhere get better service.



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Follow proper safety practices. If in doubt, consult a professional RV technician.