

PROPANE, HEATING AND COOLING SYSTEMS

LP GAS BOTTLE

My Vegas 24.1 is equipped with a 40.9 lb. LP gas bottle for running the refrigerator, furnace, stove, and the hot water heater. It is in a compartment on the driver's side as shown.



Figure 38 Thor Vegas 40.9 Lb. Propane Tank

LP (Liquid Propane) gas is odorless and has Anhydrous Methanol added to it so a leak can be detected. When the tank runs empty the regulator will automatically switch off. Propane quantity can be checked on the Monitor Panel.

If there is a problem with the refrigerator and/or furnace operating off propane, be sure that the air has been purged from the gas lines. To purge the air, ensure the propane bottle is turned on and light one or two burners on the stove for a few minutes. Then go back and operate the refrigerator or furnace. Operating the burners should have ensured the gas lines are free of air.

Checking for Leaks

Since the motor coach is subjected to road vibrations, connections and fittings can develop leaks. Use a bubble solution of soapy water to check for leaks on connections and fittings. When tightening connections (not at the bottles), use two wrenches with opposing torque to prevent twisting of the copper tubing.

Main Valves

The main valve on the LP gas container should be hand tightened only, using caution not to over tighten. The valve is designed to close satisfactorily with only a reasonable amount of tightening. Continued over tightening will eventually damage the valve and require replacement. A safety check valve is built into the tank to prevent a sudden release of large quantities of gas. The gas valve should be turned on slowly to avoid activating the safety valve. If gas flow to the trailer is less than normal, it may be necessary to turn off the gas bottle valves, turn off all gas appliances, and then turn on the gas valve slowly.

LP Regulator Freeze Up

It's winter and it's cold outside. You switch your thermostat to HEAT and set the temperature for 72 degrees. You are expecting to settle in for a warm comfortable evening in your Vegas/Axis.

The furnace begins to cycle on and the burner lights but only burns for maybe 2 minutes and then shuts down. You turn the stove on, and you watch the flame fluctuate from high to low and low to high then eventually go out, almost like it was out of fuel. Gauges are showing just under $\frac{3}{4}$ full and when you checked it with hot water on the outside of the tank, it

also appears to be between $\frac{1}{2}$ and $\frac{3}{4}$ full. You check the outside temperature and it's below freezing. You might be suffering from LP regulator freeze up.

The term "regulator freeze up" is a misleading one. Regulators and LP gas do not freeze; however, the moisture that can be contained in the gas will freeze as the gas expands and cools passing through the regulator. This freezing of the moisture in the gas can build up and partially or totally block the passage of the gas through the regulator. Freezing can also occur when outside temperatures are low enough to contribute to the freezing of the moisture in the gas. The source of the moisture is varied. It can occur at the refinery or gas bulk plant, in the cars used to transport the gas, or even within your own LP tanks. Moisture in an LP tank can occur when a tank service valve is left open, allowing moist air to enter and become trapped.

A two-stage regulator helps to reduce the possibility of freeze up because of its large orifice size, and the fact that heat is transferred through the walls two regulators instead of just one.

There are several steps that can be taken to inhibit or prevent this from happening:

1. Make sure LP tank is free of moisture before refilling.
2. DO NOT overfill the LP tank.
3. Make sure to keep the service valve on an empty tank closed.
4. If freezing has occurred, have your LP dealer purge the LP tank before refilling.
5. Add anhydrous methanol or approved LP antifreeze or de-icing agent to the LP tank.
6. Keep the regulator covered at all times.

THERMOSTAT

The thermostat (located in the bedroom on the bathroom wall) controls both air conditioning and heat. It also can be used to run the fan without either cooling or heating. The thermostat functions as follows:



Figure 39 Thermostat

System Switch

COOL, HEAT, FAN or OFF.

Fan Switch

AUTO HIGH or AUTO LOW

Fan ON HIGH or ON LOW (no heat or Cooling)

Note: You can reduce the noise (somewhat) the air conditioning makes when running by placing the Fan Switch in AUTO LOW

AIR CONDITIONING

To operate the air conditioning 110 VAC power must be available from either shore power or the generator. The air conditioning is operated from the thermostat in the bedroom.

- ☐ Place the SYSTEM switch to COOL
- ☐ Set the fan switch to AUTO
- ☐ Adjust the temperature slide to the desired temperature
- ☐ Close the air outlet vents on the ceiling unit to direct cool air to all the ceiling louvers in the bedroom, bath, living room, and hallway.

The unit also has removable washable filters on each side that are accessed by turning the small black plastic screws and removing the cover and filter. The air output vents are also adjustable.

HEATING

The furnace in the Vegas/Axis is equipped with an ignition device that automatically lights the burner. To operate the furnace, use the thermostat in the bedroom:

- ☐ Place the SYSTEM switch to HEAT
 - ☐ Set the fan switch to AUTO
- Adjust the temperature slide to the desired temperature.

REFRIGERATOR

REFRIGERATOR

The refrigerator is a 2-way design that can use LP gas or 110-volt AC, electricity for power. The control panel (Figure) is located on the front of the refrigerator and is shown to the right. In general, the two modes are used as follows:



Figure 40 Refrigerator Control Panel

- ☐ **AUTO** - 110-volt AC is the primary preferred mode of operation both for pre-cooling the refrigerator before leaving from home, and when camped at a site with electrical hookups. It takes about 6-12 hours for the refrigerator to reach the desired temperature on 110-volt AC
- ☐ **LP gas** – Use this mode when at a campsite without electrical hookups or while driving down the road.

During operation the refrigerator temperature will vary as the outside temperature varies. Set the temperature using the slide on the control panel between 1 (warmest) and 5 (coldest). Within the refrigerator box, the lower portion will get colder than the upper portion. Using the small battery powered fan will help keep the refrigerator box temperature more uniform.

When the refrigerator is set to "AUTO" when plugged in to campground power the refrigerator will automatically switch to AC and when unplugged will automatically switch to propane and vice-versa. You can keep the refrigerator cold while driving by opening the propane bottle valve and letting the Refrigerator mode switch in AUTO.

NOTE: The freezer and refrigerator door latch has a small button (white circle in Figure) that extends a plastic latch pin (orange circle in Figure at right) that prevents the doors from closing. This is used to



Figure 41 Refrigerator Door Hold Open Latch

keep the doors ajar when in storage to prevent mold and mildew forming inside the freezer and refrigerator.

LP Gas Operation

- ☐ Open the valve at the gas storage tanks (if not already open)
- ☐ Turn the Thermostat to the "5" position
- ☐ Slide the Selector switch to the gas position

110-volt AC Operation

- ☐ Make sure that the coach is plugged into shore power or the generator is operating
- ☐ Slide the selector switch to the AUTO position
- ☐ Turn the thermostat to the desired temperature setting

Turning Off

- ☐ Turn the selector to the OFF position
- ☐ When storing, ensure that the door clips for the refrigerator and freezer (Figure) and out so that the doors do not fully close to prevent mold or mildew buildup.

AWNING AND FANS

AWNING

The switch to extend and retract the awning is located inside the entry door to the left down near the bottom step. The awning has a strip of blue LED lights on the outside edge under the awning's canopy. The switch for these lights is located on the triple switch located in the entry way above the awning extension/ retraction switch. When extending the awning, make sure you operate the correct switch – the switch next to the awning switch is the Use/Store switch that disconnects the batteries.

To keep water from pooling on the awning when fully extended look on the side arms -- there are latches that pop out of some holes (yellow ellipse in **Figure**).



Figure 42 Awning Side Arm Latches to Lower End of Awning to Drain Water

On one side you push in the latch and can lower the awning on that side, so the rain runs off. There are latches on both ends of the awning. I generally lower it one or two holes. It looks like a button along a line of holes; you push the button in and pull that side down until the button pops out the next hole. You can also lower both fore and aft latches to tip the entire front edge of the awning forward. (Thanks to davidgebo and JamieGeek).

If it was raining while you were camping, be sure to extend the awning when you get home to ensure it is completely dry. Rolling a wet canopy and keeping it rolled will guarantee your awning will have mold and mildew all over it. Since the underside of the awning is white, this mold will be unsightly black blotches all over the canopy.

It is a good idea to retract the awning anytime you plan to be away from the campsite for an extended period. Retracting it at night is also a good idea. This way if any unexpected storms come up, the awning won't be damaged by excess water pooling on the awning

Retracting the Awning Manually when Power and/or the Awning Motor Fails

Obtain the awning Owners' Manual from the Carefree TRAVEL'r website at: [Carefree Awning Owners' Manual](#). You will need a set of jumper cables to retract the awning using an alternate 12VDC source if power to the awning fails. These jumper cables are nothing more than two wires with alligator clips on one end and bare wire on the other to attach to the alternate 12VDC source. Disconnect power to the awning and attach the jumper cables to the rivets on the plastic housing of the motor. Attach the other end of the jumper cables to an alternate 12V source.

If the motor is still not working after trying the jump start, the awning will need to be manually rolled in. Remove the 2 screws that are holding the motorized arm to the roller tube.

*****Please note: If the awning is partially closed someone will need to hold the arm channel as the pressure from the gas shock will open the arm all the way. Once detached, you can walk the arm to the full extension and allow it to hang in place. Also, be sure to support the roller tube once it is disconnected. ** Carefully detach the roller tube from the motorized arm.

Manually roll up the fabric and tube, while someone is pushing the non-motorized arm towards the coach. Once against the coach, re-secure the motorized arm assembly to the roller tube. It may be necessary to secure the arms for travel.

BATHROOM EXHAUST FAN

The bathroom 12-volt exhaust fan is mounted above the toilet.

- ☐ Open the vent by turning the large knob
- ☐ Press the ON button

MAXXAIR FAN (OPTION)

There are two optional **MaxxAir** Fans powered air vents in the living room and bedroom. To use:

- ☐ Open the vent by turning the large knob
- ☐ Press the ON button
- ☐ Select the fan speed



HINT: Maxx-Air makes an optional washable filter available at most RV camping supply stores. Consider having your RV service center install Maxx Air covers over each vent so that the vents can be left open and used when it is raining or snowing.

Figure 43 MaxxAir Manual Exhaust Fan

TV CABLE JACK AND ANTENNA

To scan TVs:

- ☐ On remote, press MENU
- ☐ Select CHANNEL
- ☐ Select AIR (for antenna) or CABLE
- ☐ Select AUTO SCAN and Scan
- ☐ Scan will stop when channels are identified

To operate using cable:

- ☐ Connect a length of TV Coax to the campground pedestal and the other end to the coax jack.
- ☐ Be sure booster amplifier (**Figure**) in cabinet above sink is OFF by depressing the button on the amp (green LED will be off)



Figure 44 TV Antenna Booster (On top shelf of cabinet above sink)

NOTE: The TVs will not work on cable if the antenna booster is left on. Numerous owners have taken their Vegas/Axis back to the dealer complaining about their TVs not working on cable because they did not know they had to turn off the antenna booster.

To operate using standard antenna:

- ☐ Slide the TV amplifier switch to ON (a green LED will light) located on bottom shelf of cabinet above sink corner
- ☐ Watching TV rotate the large outside ring for best reception

NOTE: Don't forget, every time you hookup or raise the antenna at a new RV park, you will have to use your remote, go to MENU, and then SCAN for channels.

TELEVISION(S)

My Vegas 24.1 contains three TVs.

- ☐ Living Room – 28" Seiki LED TV. The peripheral cable connection for a game box or CD player is on the top shelf of the cabinet above sink
- ☐ Bedroom – 28" Saikyo with internal CD player.
- ☐ Outside – 32" Seiki LED TV (**Figure**). Peripheral connections are in the compartment below and aft outside TV compartment.

Note: Not all Axis/Vegas contain an outside TV since this is an option. Additionally, my Vegas contains two Seiki TVs – one in living room above entry door (model SE28HY10) and one outside (model SE32HY10). **Neither of these Seiki models contain a QAM tuner that can decode**

an encrypted cable TV signal. When I attempt to scan for channels when on cable, neither of these TVs will find cable channels. When scanning for channels on the antenna, these TVs will find normal RF frequency channels. The Saikyo TV in the bedroom will detect encoded cable TV signals. If your TV will not find cable TV channels, but will find channels on the antenna, you probably also have a non-QAM tuner TV.

Removing TVs

TV over door – there are two different systems used by Thor to mount this TV.

- (Thanks to Oneilkeys on the Thor Forum) The piece under the TV snaps out (it's on the same snaps that hold the drawers closed). Then you can reach your hand in there (or get someone with smaller hands to do this) and the TV is mounted on two hook like holders that unlock and swing toward you and then lift up and out. Having a second person there to disconnect the wires while you are holding it is a good idea. When you put it back, the two hanging hooks fit back over the rod and when you swing it towards the wall, it locks. The piece under the bottom then should snap in. When you take that piece out, pull it straight out. If you baby it, the snaps may snap back in rather than stay out, so when you try to put it back in, you must manually pry the snap out.
- If you have a 32" TV over the door, it is held on with straps and you do not have to remove the trim. (Thanks to Bruce on the Thor Forum) There are two straps that are tucked up behind the bottom of the TV. You pull the straps down to release the TV from the bracket.
- Outside TV -- The outside TV is held in by two brackets attached to the back of the TV. You can see the ends of the mounting brackets above and below the TV. Removing the 8 screws allows the TV to be removed. Be sure to hold the TV in place when removing the screws from the last 2 bracket ends.



Figure 45 Outside TV Compartment

- TV in bedroom – (Thanks to DocMike for this description) with a long stem Philips Head (magnetized tip would be great) screwdriver shine your flashlight parallel to the bathroom wall behind the TV. Remove the two screws you can see. (The second time I taped some paper to the wall just above the bed because the screw will fall out and go under the bed mattress). Once the two screws are out the fun begins. The second time I did this I taped a thick piece of cardboard to the wall on the far-left side of the TV, the cardboard extended to the outside wall and a little above and below the size of the TV. Unplug what you can reach (power, TV cable and HDMI if possible). You must slide the TV to the left while you pull the right side of the TV

towards you so you can get the left side to slide behind the side of the curtain. This will require some pressure and will scratch the paneling (hence the learned need for the cardboard). FYI: I believe if you do this the first time, you will see scratches already there due to the initial installment of the TV. Cables will be stretched, and I found it easier to have a second set of hands available while doing this. Putting it back together requires reverse steps and watch out for dropping those screws.

TV PERIPHERAL CONNECTIONS

The living room and outside TVs have peripheral connections for a game box or CD player.

Living Room TV -- Inside the cabinet above the sink, top shelf is an HDMI connection for a peripheral device. There is also an electrical plug in cabinet for power. Figure above shows the HDMI cable and electrical receptacle.

Outside TV (Option) -- The storage compartment below and aft the outside TV compartment contains the audio and video connections (**Figure**) as well as an HDMI connection to connect a peripheral device. There is a 110 VAC power receptacle on the surface of the right side just aft of the storage compartment shown in the figure above.



Figure 46 Outside TV Peripheral Connections

RADIO

The radio in my 2015 Vegas is an Axxera Multimedia unit. You should go to [Axxera Radio Website](#) and download the users' manual.

You can turn on the rear camera for use while driving by turning on the Axxera radio and then depressing and holding the MODE button for 2 or 3 seconds. While the rear camera is on, you will not be able to adjust the radio volume. To turn off the rear camera, depress the MODE switch again for 2 to 3 seconds and the radio will return to normal operation.

2016 VEGAS/AXIS 24.1 REAR (BEDROOM) JENSEN RADIO PROBLEM

Several owners of a 2016 Axis/Vegas 24.1 have reported the new Jensen (JWM1A) radio in the bedroom does not appear to turn off. The screen stays lit after turning the power off. An owner (Vkb) reported on the Thor Forum:

Radios working well, albeit there is a learning curve regarding the Axxera system! The Jensen in the bedroom, is strange, as others have stated...when turned off, the screen remains illuminated. Perhaps there is an internal setting which will turn off that screen completely.

Oneilkeys also reported:

I'm out dry camping in my new Axis 24.1 this weekend and I too noticed that the Jensen radio in the bedroom is always on. Looking at the fuses, all the TVs and that radio are all tied to 12v fuse #6

under the fridge. To disconnect that radio, you can just pull fuse 6 (I just did) if you remember to put it back in to run your TV. I may hook up a disconnect switch when I get home.

Vkb subsequently sent the editor of this manual the instructions to rectify the constantly illuminated Jensen radio screen:

To dim or diminish backlight on Jensen (JWM1A) radio face found in the 2016 Axis/Vegas 24.1

- Go to MENU (hold button down until menu appears)
- Menu begins with Bass setting
- Depress the button until LIGHT setting appears (ours displayed a 3 next to Light)
- Go to volume button in upper right corner of radio
- Hit MINUS until light disappears
- Hit power button on radio and you will notice that display is no longer lighted...clock remains on by default.
- Reverse procedure to bring lighted display on to degree of brightness you desire

Editor's note: thanks to all for reporting this anomaly and especially thanks for sharing the corrective procedure.

INTERIOR CONFIGURATION

BEDS

The Vegas 24.1 is configured with twin beds (**Figure 7**) in the bedroom. The beds are configured on the sides of the coach in line with the longitudinal axis.



Figure 47 Twin Beds

The Vegas 24.1 also comes with two square bolster cushions with wood on one side of the bolster. The bolsters can be placed end to end between the beds to form a king-sized bed.

We prefer the twin beds and removed one of the bolsters. We left one bolster on top of the nightstand between the beds. We also removed the cushions and pillows that were OEM and made up the beds as shown in Figure .

BATHROOM DOOR

The bathroom door in the Vegas 24.1 is a unique feature of this floor plan. The door is formed by two doors joined by a piano hinge. The back of one door segment contains three towel racks. The other door segment contains a full-length mirror.

Figure 48 is looking down the hallway toward the rear of the coach. When the bathroom door is closed, a pin engages the latch shown on the ceiling. When opening the door this pin disengages and allows the double door to swing fully open.



**Figure 48
Bath Door
Closed**



**Figure 49
Bathroom Door
Fully Open to
Form Dressing
Area**

When the door is fully open, one section is flush with the wardrobe closet and the pin engages the second latch on the ceiling to hold the door open. **Figure** is a view from the bedroom toward the living area. It shows the half of the door with the towel racks against the refrigerator door. The second half of the door contains the full-length mirror and when fully opens walls off the hallway forming a dressing area in the bathroom. Notice the plastic latch on the ceiling holding the door in this configuration.

WINDOWS

Windows in my Vegas 24.1 are tinted and frameless. They also have screens. Windows in the kitchen, living room behind couch, and two side windows in bedroom can open by rotating the round handle. The windows do not open very far so be careful turning the knobs. The driver's and passenger windows are sliding and have screens so that they too can be opened.

When opening windows if glass tends to stick to the seal, rub the seal with talc or silicon paste or grease. In addition to

keeping the glass from sticking, the silicon will keep the seal from ageing or cracking.

The bedroom window in the driver's side is also the emergency exit. To escape out emergency window...Pull inwards on both red latches and push window out.

DRAWERS

The following tip from JamieGeek describes how to remove drawers that have travel locks. He says if the drawer has rails; open the drawer until it stops; look at the rails on either side you'll see a small black plastic piece in there. You lift one of the plastic pieces and push the other side down to remove the drawer. If the drawer has broken latching, Camping World sells replacement latches.

LEVELING AND STABILIZER JACKS

In general, most RV parks with full hookups have level parking pads. The Vegas/Axis has a slight nose down attitude and even when parked on a level pad will be slightly off level. In addition, moving around in the coach or times when winds are a bit strong will cause the coach to "bounce around a bit." Using 4 scissors jacks (2 at the rear and 2 at the front) under the chassis can help stabilize the bounce and can also be used to fine level the coach. Be sure each jack has about a 5000 lb. rating (or more), and that the plate of the jack is on the frame. Just tighten them snug to stabilize, and/or raise the frame slightly to level. Amazon has a set of 4 jacks and a handle (5,000 lb.) for about \$69.00 ([Amazon 5,000 lb. scissors jacks](#)).

The refrigerator works best when the RV is level. If RV is off level by quite a bit, the refrigerator may not work at all. Pick up a pack (or two) of *Lynx Levelers*. Back into the site, place a torpedo level on the floor of the coach. Estimate the number of blocks you will need side to side, and back to front. Assemble the leveler "pyramid" that will best level the coach in both directions. Place the pyramid behind the affected wheel and slowing back up onto the pyramid. Set the brakes, chock a wheel and check level again and it should be level. As an added level confidence, check level inside the refrigerator on the center shelf after setting up.

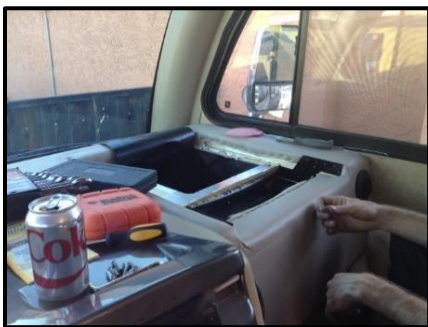
NOTE: Level initially after you take the RV home. Get it good and level and then install bubble levels at the corners to help in all future leveling. Makes it much easier than using a torpedo level each time.

Why is leveling so important? Besides the obvious... keeping you from rolling out of bed or making cakes that are crooked, leveling is extremely important to the operation of the refrigerator. The fridge is very prone to degraded operation if it is not level.

CHASSIS BATTERY REPLACEMENT

REPLACING CHASSIS BATTERY

Removing the chassis battery is not an easy task since there is no clearance to do it from the front of the coach. The battery must be removed and replaced through the cab's top of the dash. A member of the Thor Forum (srolfe) replaced his and provided a description and picture:



and then he used 4 screws to screw that metal piece. He had an extra piece of that NICOR sound-deadening that's real thin but heavy and he laid that on top and put the computer desk back. It wasn't a trapdoor, but he only must remove 4 screws to access the battery. He thinks the battery is easier to access through the dash when you're in a cold winter.

Replace chassis battery.

1. Remove deck area on dash by removing hinge screws and screws under rubber pads in the two forward desk depressions
2. Plywood under dash cut and sealed with silicone and aluminum tape
3. Cut through tape and silicone and pull plywood panel out (See **Error! Reference source not found.**)
4. Remove and replace battery, was a bit of a hassle



Figure 50 Access Panel Cut

Figure shows the access to the chassis battery after removing the computer desk and cutting through the plywood access.

Here is how revjeffrey replaced his battery:

I was dreading stories about having to cut through my Dash....I took the computer desk off the dash was already precut. As you can see from the photos it was never accessed. I had to use a knife and just cut the black waterproof tarp cloth & they left two wood tabs that I just cut through. So, 1 screwdriver, knife, drywall saw. Took 15 min. Battery removed.

In reinstalling that loose piece of dashboard (the wood square cutout is 14x14) he screwed the wooden access panel to a 16x16 piece of SS metal. The metal slides underneath the right and top side of the dash real nicely



Figure 51 Access Panel



Figure 52 Battery Access

DINGHY TOWING

TOWING A VEHICLE WITH THE VEGAS/AXIS

A motorhome provides you with the comforts of home while camping or on the road. It ensures you always have a place to stay with clean beds and shower. One disadvantage is it restricts your ability to explore the area where you are staying without, disconnecting the RV and having to drive it in towns. One solution to this restricted movement is to tow a vehicle for your mobility while the RV is parked and hooked up inside an RV park.

This should be one of the most thoroughly researched topics you ever have as an RV owner. Do not rely on the word of a salesman at a car dealership. Getting setup to tow a vehicle (TOAD or Dinghy) will be one of the most expensive modification you will ever make to your Vegas/Axis. In addition, it is potentially one of the most dangerous situations you will encounter if done improperly or without research and



Figure 53 Flat Towing (4-Wheels Down)

preparation. You could run the risk of damaging the towed vehicle transmission, SUV differentials, dangerously increase the stopping distance of the RV, or increase the risk losing control of the RV and towed vehicle. There are many factors to consider and research:

1. Towing existing vehicle or buying new vehicle?
2. Does towed vehicle transmission or differentials allow 4-wheel down flat towing?
3. Flat towing (**Figure 53**) with vehicle 4 wheels down, using a 2-wheel dolly, or trailer towing?
4. What type auxiliary braking system for the Toad?
5. What brand tow bar, towed vehicle baseplate, and electrical connections to the RV?
6. Is tow vehicle, dolly (**Figure 54**) or trailer, and towing equipment combined weight within specifications of the RV tow receiver's maximum weight and hitch weight?



Figure 54 Two-Wheel Dolly Towing

Motorhome magazine has an annual dinghy guide. These guides are the most factual and accurate in depicting the tow capability and method needed for most vehicles. The sales staff at a car dealership probably doesn't know much about towing their products with an RV. Rely on these

guides first and foremost. Here's the site with previous data for vehicles from 2000, up to 2015: [Downloadable Dinghy Guides | Motor Home Magazine](#). Appendix 7 to this manual also provides additional information and factors to consider before towing a vehicle with an Axis or Vegas.

The 7-wire plug on the rear of the Axis/Vegas was partially wired by Thor at the factory. The following is a response from Thor Customer Service involving the wiring on the 7-wire connector:

The plug should be wired all except the brake controller part which we do not do. The brake control wire should be the blue wire under the coach just below the driver's seat in the chassis harness and run back to just behind the gas tank and stop. We do not hook up or complete this portion of the plug, this is on the customer and would not be covered.

SUPPLIERS' WARRANTIES

SUPPLIERS PROVIDING SEPARATE WARRANTIES

The following list of components was contained in the Thor Owners' Manual. The bag of literature from Thor should have contained separate handouts from all the manufacturers of the various components installed on your Axis/Vegas. Consult that literature for component warranty, registration, and contact information. We recommend that you send the various warranty registration cards immediately before any time constraints on registration expire. Only those products and options which are on your motorhome should be included in the Thor packet. You should go over this literature with your dealer during the pre-delivery inspection. Any shortages of literature should be reported to the dealer at that time.

LP Regulators

Manchester Tank
800-877-8265
www.mantank.com

Ranges and Cooktops

Atwood Mobile Products
800-825-4328
www.atwoodmobile.com

Refrigerators

Norcold
800-543-1219
www.norcold.com

Slideout Systems

Lippert Components
574-534-0001
www.lci1.com

Toilets

Thetford
800-521-3032
www.thetford.com
www.aristonappliances.com

Water Heaters

Atwood Mobile Products
800-825-4328
www.atwoodmobile.com

Windows

Hehr International
574-935-5122
www.hehr-international.com

Air Conditioners

Coleman Airxcel
316-832-4357
Rvp_support@airxcel.com

Awnings

Carefree of Colorado
303-469-3324
www.carefreeofcolorado.com

Batteries

Harris Battery
800-367-7670
www.harrisbattery.com

Chassis & Chassis Components

Ford
800-392-3673
www.ford.com

Convertors

WFCO
877-294-8997
<http://wfcoelectronics.com/contact/>

Furnaces

Atwood Mobile Products
800-825-4328
www.atwoodmobile.com

Generators

Cummins
(800) 274-0336
<http://northwest.cummins.com/service>

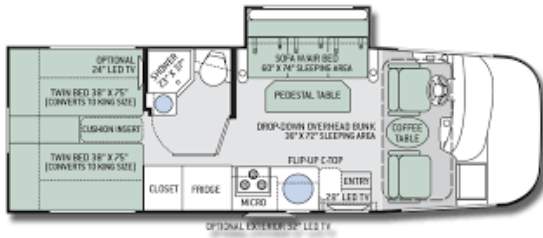
LP Gas Tanks

Manchester Tank
800-877-8265
[www.mantank](http://www.mantank.com)

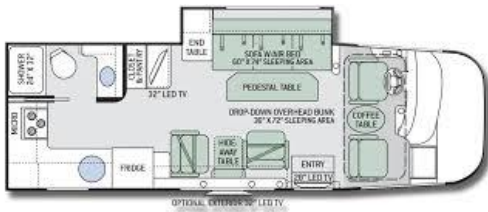
FLOORPLANS

2015 VEGAS/AXIS FLOORPLANS

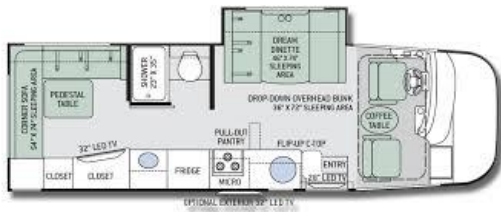
24.1 – 25'6" served as the basis for this owner's handbook is the smallest Vegas/Axis.



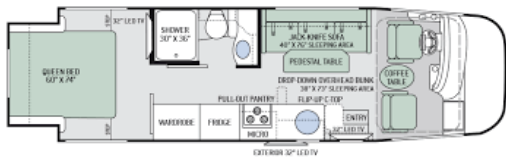
24.2 – 25'11' long, rear kitchen, sofa with air bed sleeper, large bathroom vanity sink, pantry, hideaway table with two chairs by entry.



25.1 – 26'6" long, rear L-shaped lounge that converts to 54" X 74" bed, pedestal table for lounge, pantry, entertainment center in rear lounge, side slide with dinette that converts to bed.



25-2 – 26'6" long, rear slide with queen bed, large 30" X 36" shower, pull out pantry in kitchen, L-shaped sofa in living room with no slide.



25.3 – 26'6" long, added late in the 2015 model year, rear side slide queen bed, large bath, pullout pantry, two closets in bedroom.



2016 VEGAS/AXIS MODEL YEAR

In 2016 Thor replaced the E-350 stripped Ford chassis and 5-speed transmission with the E-450 stripped Ford chassis and 6-speed transmission.

24.1 – same floor plan as 2015

24.2 – same floor plan as 2015.

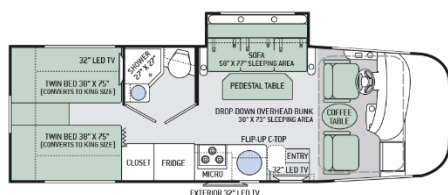
25.1 – model eliminated from lineup.

25.2 – same floor plan as 2015.

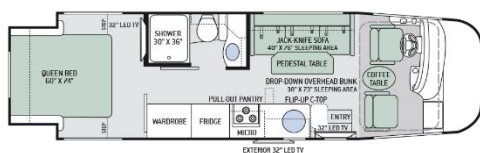
2017 VEGAS/AXIS MODEL YEAR

In the middle of the 2017 model year, Thor went to a tank-less, on-demand water heater that is all propane (no 120 VAC like the former 6-gallon tank water heater). Also added the 25.4 floor plan.

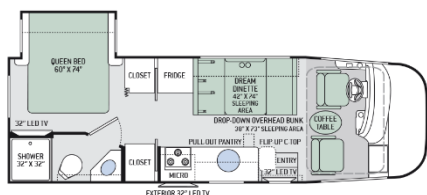
24.1 --



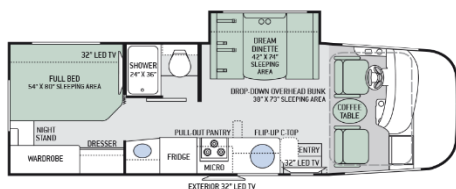
25.2 --



25.3 --



25.4 --



2018 VEGAS/AXIS MODEL YEAR

The following are **new** for the 2018 Vegas/Axis model year:

- **Exteriors** – Champagne/Bellagio, Champagne/Luxor
- **Woods** – Beech wood, Glazed Pecan
- **Interiors** – Platinum
- **Décor Upgrades** – Euro-style cabinet doors w/soft close hidden hinges, flooring, leatherette colors, furniture styling, window treatments, press tops, wood colors, interior trim design, bedding, pillows, headboards, décor mirrors
- **Feature Upgrades** – Reconfigured galley layouts w/larger galley windows, 2 burner cooktop, below counter convection microwave, new range hood, stainless steel refrigerator insert, Lavatory faucet, stainless steel galley sink, bathroom vanity height raised to 34", LED accent lighting throughout, Flip-up bed with reversible mattress and cushion seating (25.2 & 25.3)
- **Exterior Upgrades** – Front cap, grill and hood, LP connection available on all floorplans, Armless Awning (Carefree Latitude), LED running and marker lights, Pre-wired for Solar, wider storage compartment (24.1, 25.2, 25.4, 25.5)

- **Option/Features** – 12V attic fan w/vent cover in bedroom made standard, 15.0 BTU A/C now made standard in place of 13.5 BTU A/C, Porch light eliminated, LED awning lights for patio area now standard.

Owner responses and impressions of 2016 Vegas/Axis

Thor Forum participants with new 2016 model Vegas/Axis have stated the following impressions:

E-450 chassis – less noisy, 6-speed transmission shifts smoother, oil filler tube easier to reach, chassis battery lower mounted and can be removed from front.

Coach – like the 25.3 with side bedroom slide and walk around bed, like dinette option in living area, like 25.3 and 25.4 shower size, like cherry cabinet option, smaller windshield with less compound curves probably less prone to stress cracks.

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Tips and Improvements

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VEGAS 24.1 TIPS AND IMPROVEMENTS

COMPREHENSIVE LIST OF THOR/AXIS MODS

Go to [Thor/Axis Mods](#) on the Thor Forums for a comprehensive discussion with pictures of owners' mods.

SECURING STORAGE COMPARTMENTS, OUTSIDE TV COMPARTMENT, & OUTSIDE SHOWER

All the compartments on the exterior of the Axis/Vegas are secured with a CH751 keyed lock. The 751 key is the same that is found on thousands of RVs so there are thousands of keys out there. To more securely lock your exterior compartment doors FredG on the Thor Forum recommends replacing the 751 locks with tubular locks and keys from [Padlocks 4 Less](#). He recommends ordering the locks all keyed alike, non-key retaining locks. If you keep the order number, you can order additional locks in the future and they will key it to your current locks. He says they fit the hole exactly. He used the 5/8" on the outside shower access doors, the other ones were a 1-1/8". He reminded everyone to ensure they check the boxes on the order for keyed alike and non-key retaining (so you can remove the key).

ENGINE NOISE AND HEAT



Figure 55 Factory Installed Insulation

Several Vegas/Axis owners' have noticed that the engine runs loud and the cover over the engine in the cab (doghouse) gets quite hot. One owner added insulation to the doghouse and compartment above the engine. He added 3/4" *FatMat* from Amazon.

He added another 3/4" of *FatMat* on top of the factory insulation on the underside of the dog house and also installed 3/4" on the housing above the engine compartment as shown in **Figure 56**. (Source JamieGeek [Thor Owners' Forum](#))



Figure 56 FatMat Insulation Added

FatMat from Amazon is available in 34" x 54" x 3/4" Thick Self-Adhesive Automotive Sound Deadening Hood Liner for \$65.99. It reduces noise and blocks heat. It has easy peel and stick installation. The aluminum face goes toward the heat source.

MOLD & MILDEW

These two creatures are the mortal enemy of RVs. The slightest leak is going to allow water to penetrate hidden spaces and cause wooden finishes, wooden structural members, insulation, and fabrics to become damp for long periods of time. Left unchecked, mold and mildew will form. Mold growth inside an RV is unfavorable. It can lead to the breakdown of natural materials. The best prevention is to become extremely vigilant of leaks. Much of the periodic maintenance in later sections of this guide is checking seals, caulking, and fit of appliance installations that penetrate the RV structure. After repairing the leak, you must attack the mold and mildew to prevent your RV from slowly rotting away.

CONDENSATION

Condensation goes hand in hand with mold and mildew prevention. Even if your RV never has a leak, it will have condensation form on the windows and the walls. Humans breathing inside a warm space will fill the air with water vapor. Water vapor in warm air against a cold wall or window is going to result in condensation.

Condensation running down a window is the same as a leak. Keep window weep holes open. When camping in cold weather, keep a window slightly open or keep a ceiling vent open to exhaust moist air. When cooking inside, always use the stove hood ventilation fan. Always run the bathroom vent fan when showering (and let the fan run for a period after showering to evacuate the moist air).

CLEANING OUTSIDE SURFACES

Scrubbing Bubbles works well. Spray it on, let stand a few minutes, wipe off. Does a good job on black streaks as well? Other products to also consider: *Purple Power* (automotive stores), *Kaboom* (*Dollar General Store*), and *Greased*.

WAXING THE OUTSIDE

Protectall (*Camping World* or *Wal-Mart*) works well. Spray on, buff dry. Excellent shine lasts through several washings, also prevents dirt buildup. *NuFinish* is my all-time favorite – easy on and off, can be applied in direct sun, and lasts about a year. Just remember – that's a whole lot of surface area to wax and you're going to need a step ladder. It's going to be a lot of work so go slow, take it easy, keep hydrated, and be careful on the ladder. Other good waxes are *NuFinish* and *IBIZ anywhere Wax*.

CLEANING THE CURTAINS

Use *Tuff Stuff* (available at *Wal-Mart* and automotive stores) upholstery cleaner. Spray curtains while hanging. Let dry & vacuum. They'll look new and no shrinking.

BEDDING

Don't waste time with sheets & blankets. Buy a bed bag with sheets that *Velcro* inside. If you buy sleeping bags, buy the kind that zip all the way open. Zip them open and store them on the bed like a comforter. Saves time rolling them to store. When you use them, zip into them like normal?

SEWER HOSE CARRIER

Any new Axis/Vegas owner has noticed there is no place to store the sewer hose except in one of the storage compartments in a plastic bag or storage container. JamieGeek solved this problem by devising a homemade storage container from a 4" vinyl fence post.

(Source: [Thor Owners' Forum](#))

"So far I installed a home-brew sewer hose storage spot. The Axis doesn't really have a good spot for the sewer hose that drains and/or is outside and I didn't like the idea of just throwing a "freshly used hose" into one of the outside compartments. Got the idea from a friend: Went to the home depot and got some plastic 4" fence post, sawed it down to fit under the chassis at the rear, painted it black, and screwed it to the frame a few feet in front of the hitch. It's only accessible from the passenger side as the generator blocks it on the other side. Since you really can't see it unless you crawl underneath, I just used an eyebolt with a nut it to secure the end. You can't see it in the picture but there is a bolt through the holder to keep the hose in... if you look at the generator side picture, I also put one there to keep the hose from hitting the generator... You can also see the bolt in the last picture. There is enough room under there to put two side-by-side for extra hose."



Figure 57 JamieGeek's Homemade Sewer Hose Storage

ANOTHER SEWER HOSE STORAGE MOD

Source: Nursx2 Thor Owners Forums -- also installed a carrier for the sewer hose. He put the 3.5' 4-inch PVC pipe sewer storage on the rear chassis yesterday. Drilled holes on the top and bottom for drainage and air circulation.



Figure 58 Nursx2 Sewer Hose Mod

LIVING AREA STORAGE FOR KEYS & REMOTES

Source: JamieGeek [Thor Owners' Forum](#)

Here is another mod I just did to ours. With all our mobile devices (we have about 5 between phones, tablets, etc.) needing a place to charge there isn't enough chords, and places to put them in the camper. Over this summer we've ended up with the front two USB jacks in use with stuff on the table, and then chargers plugged into the two outlets above the couch in the slide with the phones stuck in the cup holders. Very inconvenient. For my fix I went to Camping World and picked up this mail organizer:

[Wall Mount Mail/Key Rack- Bronze - Interdesign 95870 - Racks & Holders - Camping World](#)

Now we just put the phones in that, coil up the chords and hang them from the key hooks. As a bonus it matches the decor of our Axis. (Also available on Amazon – Interdesign Twillo Wall Mount \$11.99)



Figure 59 Wall Mounted Storage Containers

REPLACEMENT TABLES

Source: groswald ([Thor Owners' Forum](#))

"I finished this table before Christmas, but just had a chance to take it to the bus. I think it looks pretty good. It's natural cherry with an oil finish. It's about 1/2 the weight of the original MDF and Formica table."

A replacement for the OEM MDF dining table can also be done using the same technique. The material can also be maple, butcher block, or some other hardwood.



Figure 60 Replacement Table

PASSENGER SIDE MUD FLAP

Several owners commented that the passenger side mud flat is too flexible and can touch the hot tailpipe. Several have had their mud flap burned or melted on the edge. In checking on my Vegas 24.1, I noticed there are two metal extensions sticking out in front of my mud flap. It is obvious that the intention was for the mud flap to be between these two metal extensions, not behind them. I removed the mud flap and slid it between the two extensions and reattached the mud flap. It now lacks flexibility to blow back against the hot tailpipe.

SOURCE FOR RV PARTS

One of the Thor Forum participants (dstankov) provide a link for finding RV parts. For those of you needing hardware for your RV check out RV Designer. There were posts from folks needing curtain hangers etc... And it appears these folks make most of those items. Their web site also has a "Where to Buy" selection so you can find the closest supplier. The web site is: [RV Parts from RV Designer](#). Another good source is RV Wholesaler ([RV Wholesalers](#)).

BATH MODS



Figure 61 MCR1010 Bathroom Mods

Several owners of Axis and Vegas have performed mods on their bathrooms:

- MCR1010 Single lever sink faucet and toilet sprayer -- Here are a couple of pics of the sink. It is a Peerless faucet, Model P131LF. Sells for about \$30.
- Jamiegeek Bathroom Mods -- Jamiegeek's shower comes off the sink faucet. He used a different approach. For those of us with the shower coming off of the sink we could go with something like

this: [Quick Disconnect Sprayer](#). Add that to a high sink faucet--although you wouldn't want it too high then you couldn't open the cabinet behind the mirror. Or use one designed for an RV, not sure if this one would be any better than the one we already have; [RV Lavatory Faucet with Shower Hose Diverter](#). This one may match the finish better on the Axis/Vegas: [RV Lavatory Faucet with Shower Hose Diverter in Oil Rubbed Bronze](#).



Figure 62 Oneilkeys Bathroom Mod

- Oneilkeys Bathroom Mod – Oneilkeys added a 72" X 18" piece of 1/4 " Plexiglas between the toilet and the shower (Figure 62).

CHARLOOOTTE'S IMPROVEMENTS (MEMBER OF THOR FORUM)

- 1st improvement -- Lots of storage space under the couch! Open the couch/bed. Remove the lower front decorative piece from inside by removing the screws. Hinge the bottom edge of this front piece & just use Velcro along top edge to keep it closed.
- 2nd improvement -- Access to the Gray/Black drain valve is a dumb design. Water doesn't flow uphill. The drain valve, although stiff to move, will rotate to point up, down or any point in between. I've improved the situation by cutting a large hole in the bottom of the storage area under this valve. Connect the drain hose, stuff it up into the storage/Drain valve area & leave it there. When needed it's much easier to pull the already connected hose down thru the new hole.
- 3rd improvement -- Extra length of Drain hose is always a good thing to have. To store it get a 4x4 inch x approx. 5ft. piece of round or square plastic PVC tubing. Paint to match RV and install it atop rear bumper.
- 4th improvement -- Remove that ugly plastic thing that covers the transmission area & insulate the inside of it to help reduce engine noise. Also carpet the outside of it & install a nice homemade storage shelf atop it for maps etc.
- 5th improvement -- The front of the Vegas is very low & the hood openings are large enough to allow rocks thrown up by truck to enter & possibly damage the lower part of the radiator. Install a thin wire mesh protector in front of radiator, behind the hood. I used a piece of old fireplace spark screen I had around. Easy to bend & strap in place with plastic tie wraps. Better material can be had at any home improvement store.

FRESH WATER TANK FILL MOD

MCR1010 made this mod to fill the freshwater tank from the city water system. Here are a couple of pics of the water tank fill mod (Figure 63). It requires some 1/2" pex tubing, two 1/2" tees, one 90deg. ell and one pex valve. In the pics there is a metal tee coming off the blue exterior water line supply. I would have used a poly tee like the one in the antifreeze inlet riser, but the store only had one poly tee, so had to use the metal one. It is not a "Shark Bite" brand but is similar. I bought all the fittings at Lowes and would guess most home supply stores have the items to do the job.



Figure 63 MCR1010 Fresh Water Tank Fill Mod

What took the most time was finding a suitable clamp for the valve. I found one over in the electrical area that is used on conduit. The clamp had to be bored out so the clamp would not put too much force on the valve. You may find a better way to do it or have something on hand to clamp it. The whole installation should be clamped or supported so that it does not move around while going down the road and cause a leak. I have been back there while moving along at highway speeds to grab something from the refrigerator and it is kind of rough back there.

Hope this will save you some time and effort as you get ready to head down the road.

HOUSE BATTERY STEP LATCH

This latch tends to come undone every time someone steps on the step. It's not a safety concern since the weight of the step keeps it closed – just an annoyance. To fix this annoyance:

The latch is a rotary type latch that you turn to unhook. Once you release the latch by pulling the butterfly handle out to release the hook, turn the handle to raise the hook part out of the receptacle on the step above. This is where the problem of location the latch is a problem. You need to remount the latch lower by about 3/8" below where it now. It has two screws that are self-starting. Since the latch hook will rise about 1/2" when open, this will accommodate the play in the seal under the step. (Thanks to sikorge on the Thor Forum).

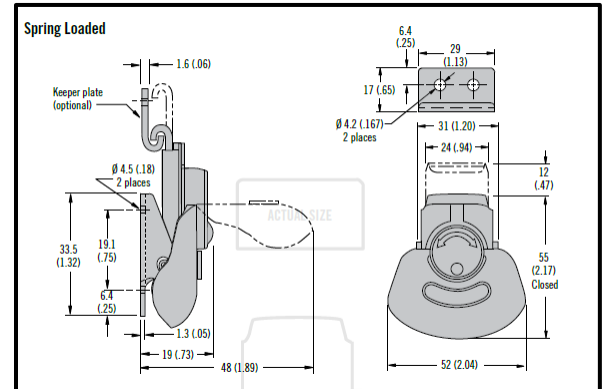


Figure 64 Battery Compartment Snap Latch

BATTERY FILL SYSTEMS

Source: groswald [Thor Owners' Forum](#)

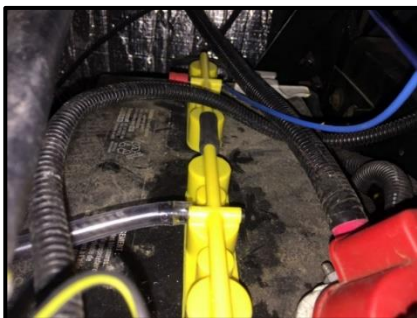


Figure 65 Chassis Battery Watering System

I ordered a Pro-Fill battery watering device for the chassis battery and installed it today. As usual, Amazon was cheaper than CW, even with the Good Sam Discount. I want to do the same for the house batteries, but I wasn't sure there was enough headroom. Having the device in-hand I checked, and it should fit fine. I'll be ordering the set for twin batteries soon. If you order the system don't forget that you must order the pump separately. The install was simple and took about 15 minutes. The hardest part was getting the old caps off. One went flying down in the engine bay and I never did find it.

I finally added one to the coach batteries before the trip. It was either that or pull the batteries to add water to the forward one. When I got done the pair of batteries took nearly a half-gallon of water!



Figure 66 Coach Battery Watering System

ENTRY DOORSTOP

Source: jamiegeek ([Thor Owners' Forum](#))

When opening the door on my Vegas, the door opener installed on the bottom of the door forces it into the awning support bars. This results in the door frequently hitting the awning support quite hard. Jamiegeek came up with a good solution to the problem:

"Here is an easy mod. Various people get pool noodles for cushioning/protecting slide edges, doors, etc. I really didn't want a bright red, green or blue pool noodle for this purpose so I stopped at The Home Depot and picked up some pipe insulating foam which is dark grey, cut a section about 2ft long, and slit down the length so I could slide it over the awning arm. Now when the door flies open it hits the foam instead of the awning arm (sorry about the contrast it is a rather bright day today).



Figure 67 Door Bumper Guard

REAR SKIDS



Figure 68 Rear Skid before Mod

Gmccorrigan had a problem with the back end of his Axis 24.1 dragging the ground on the incline access to his driveway.

"Our 2016 Axis 24.1 had a bit of a dragging problem accessing our incline driveway. The third time that I left the driveway the right metal skid bent a bit backwards a bit driving as slowly as possible. I had my local RV repair shop completely handle the fix. They cut off the long metal skids located just forward of the tow bar and they welded on Jumbo 3"x2" fixed metal rollers. These rollers also have zerck fittings for periodic grease. I can now enter and exit my driveway with no problems. The wheels cost about \$65 each plus labor."



Figure 69 Rear Skid after Mod

RADIATOR SCREEN GUARD

Several owners installed screen guard from either Lowes or Home Depot to protect the radiator and oil cooler from road debris. Below is the installation done by RV1863 on the Thor Forum. He used the screen guard from Home Depot and used the existing bolts to lock it into place. His screen guard may have been bigger to allow him to do this. He did have to bend the bottom of the screen guard back on itself so it would fit. He was careful not to pinch any existing wires.



Figure 71 Axis Earl's Radiator Protection



Figure 70 Radiator and Oil Cooler Protection Mod

Axis Earl did an even easier protection installation.

No holes drilled, no zip ties, didn't go the direction of Home Depot with the screen door guard. I used 1/2" expanded aluminum that I bought at my local metal supply company. I measured the approximate size to cover the radiator at 23 1/2" high and 30 1/2" wide and used a piece of cardboard as a template. Put the sized template in place to see how it would fit as well as flexibility behind the windshield washer reservoir. Seemed like all was a go so I used the template to mark off the sheet of expanded aluminum and then cut it with a pair of tin snips. Placed the sized expanded aluminum in front of the radiator and noted that there are two 6mm holes at the top that already have nuts welded behind them. I used two 6 mm stainless steel Allen head bolts 1/2" long fender and lock washers to secure the sized panel. Since there are vertical supports in front of the radiator, there is ample support from the inward force of the airstream. I tucked the bottom of the panel inboard of the windshield washer reservoir so it can be easily accessed. I didn't like the look of the bright aluminum behind the grill opening... Looked a bit busy as they say. Removed the expanded aluminum and spray painted it semi-gloss black. Much better.

SHOWER ROD MODIFICATION

One of the constant complaints from 2014-2015 Axis/Vegas 24.1 owners is the size of the shower area. The biggest annoyance about the size is how the shower curtain liner tends to stick to the wet body whenever you turn around in the shower. Thor recognized these owner complaints and beginning in 2016 replaced the roof mounted shower curtain track with a cantilevered ARC track. The arc track allows the shower curtain to stand out from the shower pan about 6-8". This keeps the shower curtain away from your wet body while still maintaining the small footprint of the shower pan.

After seeing the new Thor 2016 design, several owners of 2014 – 2015 Axis/Vegas 24.1s explored replacing their existing shower curtain tracks with the new 2016-17 Arc track. What follows is a compilation of this modification based on the collective inputs of several Axis/Vegas owners from the Thor Forum based on this forum thread: [Shower Rod 2016 Axis 24.1](#). (Thanks to Vkb (Ron & Kay), DocMike, Squid, JamieGeek)



Figure 72 2016 Thor Axis/Vegas 24.1 Arc Shower Curtain Track

1. **Drilling** – this modification involves a procedure that puts fear into the heart of Axis/Vegas owners; namely, drilling into the interior wall surface. The procedure will involve drilling either 2 or 3 holes for each mounting bracket of the cantilevered Arc track. The exterior wall of an Axis/Vegas is comprised of an outer fiberglass surface covering a thin luan plywood sheathing. There is an approximate 1" space filled with block Styrofoam insulation and finally the interior wall surface made up of thin aluminum sheeting covered with an interior "wallpaper" covering. When drilling the interior surface start with an approximate 1/16" pilot hole to penetrate the interior sheathing ONLY. Do not exert too much pressure – you do not want to lose control of the drill and penetrate completely through the entire wall putting a hole in the exterior fiberglass surface. More on this later.
2. **Thor Parts** – the cantilevered Arc rod can be obtained from Thor through your dealer. It is Thor part number **0340281**. The cost is approximately \$70 plus shipping and handling. This part number does not include the hardware or mounting brackets. Vkb ordered the brackets from Focus (1-866-290-1851) item number HBA00NCID91, "ARC Mounting brackets - brushed finish/pa. He does not remember the price. In addition, you will still have to obtain screws and or molly bolts. In all the cost would be around \$100.
3. **Alternate Parts Source** -- Squid found a more practical Arc rod on Amazon ([Amazon Arc Curtain Rod](#)) for \$55. The package contained the rod, two brackets and assorted mounting hardware, to include Molly bolts. The description that follows uses the Amazon Arc rod.
4. **Measuring to Mount Rod** – Vkb provided pictures of his installation with measurements. The distance from the bottom of the mounting bracket (both sides) to top edge of the fiberglass shower enclosure is 2 1/2". Left hand bracket to the edge of the medicine cabinet is 2 3/8". Distance from edge of bracket to edge of cabinet above toilet is 3". After marking where both brackets go, also mark the location of the mounting holes. Before drilling the holes for the mounting brackets, the rod must be cut to length. The rod in the Amazon kit is 60" long. Cut its length to 52", insert the ends in the mounting brackets, and check the locations where the mounting brackets are marked.
5. **Drilling Holes and Mounting Hardware** – Drill pilot holes at the location of each mount hole. Use a 1/16" drill bit as noted above to determine thickness of interior sheathing and to determine if there is an aluminum wall "stud" behind the sheathing where any of the holes are drilled. DocMike provides the following guidance. He checked with Thor Customer Service asking where the power or water lines are in the wall:

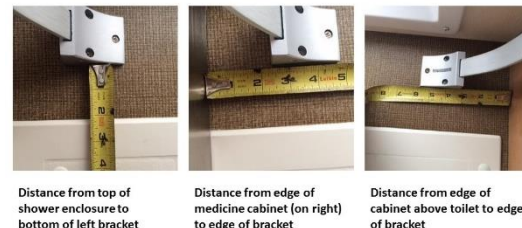


Figure 73 Measuring for Mounting

"The power lines are run lower in the walls and behind the drawers and cabinets. I used the toggle bolts, shortened to 1 1/2 inches (as recommended by Thor's tech). Where I hit the aluminum stud there on the outside wall, I used two self-tapping 1 1/4-inch metal screws. Getting the Teflon plugs (used to seal the holes cut in the wall with the back of the mounting bracket) was easy for 5 out of 6, one required a bit of twitching and cursing to get it to line up - but it did. Oh yeah, if you hit the stud and choose to mount to the metal stud you will need to shave the length of the two Teflon plugs that fill in the hole drilled for the toggle bolt or else the bracket will not fit flush against the wall...when you first try putting it together. Get the 72-inch length curtain and if you mount it as Ron showed his (bottom of the bracket 2 1/8" above the top of the plastic shower wall) all will be well. It has been noted that some mounts have 3 holes and some 2 holes. During my install the mounts on the wall between the bathroom and bedroom were not too much of a problem after shortening the toggle bolts as much as I could. I also backed some paper towel into the hole and below it than squirted in a blob of clear silicone caulk before the final assembly...wanted to be sure to make it watertight. The outside wall just has little Styrofoam particles that exist behind the thin wall board surface. I used the one toggle bolt and two self-tapping metal screws (since I did manage to hit one of the wall studs) also used caulk blobbed in to help secure a sealed fit with the Teflon plugs. It passed the inspection by the DW this weekend, but she wants a prettier curtain - plain white did not work for her. The caulking was a little messy and probably not really needed."

JamieGeek cut off 8" from the rod and provided the following mounting guidance:

"I hacked off 8" off one side to get a more satisfactory arc. I ended up having to use the toggle bolts on either side (there was no stud in that spot). I did pick up some 1 1/2" 6-32 screws for the toggle bolts but they turned out to be too short: They didn't go far enough through the wall to allow the bolts to open up (really needed at least 2" screws). So I got out my dremel and trimmed down the 4" screws that came with the mounts to a length that would fit all the way through the wall but no further (measured using the mount and seeing how big of a gap was there between the mount & the wall when I hit the other side of the wall with the bolts). There is aluminum framing on the outside walls but that framing simply consists of aluminum studs spaced throughout the walls. If you don't happen to hit one (like I didn't) then you're left dealing with the wall board, insulation, outer wall sandwich. The insulation is Styrofoam. When I drilled into the wall, I pulled out a bunch of insulation. I believe the toggle bolts on the outside wall opened as I could feel the screws tighten down (my suspicion is that they opened and compressed a bunch of the foam down against the inside wallboard). The wallboard is very thin, probably about 3/16" or so. I wouldn't try supporting anything very heavy. The ARC is solid aluminum and not very heavy -- the shower curtain we put on it is much heavier than the ARC itself. Normally when I attach things to the camper wall, I use wood screws dipped in wood glue with a small pilot hole drilled in the wall. So far nothing that I have put up in this manner has fallen off the wall, but nothing has been as heavy or substantial as a shower rod. I did use this method to hold up some day/night shades and the chord tie downs at the bottom which stayed up for as long as we had that camper (our old 5th wheel). For the shower rod Doc mentioned that Thor had recommended the toggle bolts which is why I went with that method."



Figure 74 Arc Curtain Rod Modification Complete

The finished product provides about 6 to 8" of additional space inside the shower. The shower curtain is still inside the shower pan at the bottom so that water does not get on the floor. You do have to be careful you don't step on the bottom of the curtain or that small children pull down on the curtain. Remember it is cantilevered and not supported in the middle like the OEM installation.

REPLACING KITCHEN SINK

Craiglang 1 replaced the plastic sink in his Axis 24.1. A full description with pictures of the mod can be found on the Thor Forum at [Stainless Steel kitchen sink replacement](#).

"I just ordered a sink on Amazon manufactured by Dawn 3235 Top Mount Round Single Bowl Bar Sink, Polished Satin Finish \$119.95. It is 16.5" Outside of Trim Ring same as existing plastic sink. It is 7" deep same as existing and accepts a 3.5" basket Strainer like existing. Drain hole is 3.5" off center which can be rotated to use the existing "P-Trap" and fittings. Inside sink dimension is 14 15/16". Existing sink is 14 3/8". The plastic sink is thicker material than the 20-gauge stainless steel.

Removing the stock plastic sink was easy. There are 3 studs with wing nuts that are under the countertop and need to be removed before sink will come out. I had to take out the top drawer to access one of the wing nuts. Once the wing nuts were off, I unscrewed the "P-Trap" from the sink. Then I just tapped my HYDE putty knife under the lip of the sink and tapped it gently with a hammer. The sink popped up and came out easily. Unfortunately, the new Dawn Sink required I enlarge the opening. The Dawn Sink came with a cardboard template. I centered it over the existing hole and traced the template with a pencil. The new opening requires you to cut off about 3/8" off the countertop. I used a Craftsman Vibrating Saw to cut the countertop. A Saber Saw (Handheld Jig Saw) would probably work with a fine tooth saw blade. The countertop is hard to cut. I went thru 2 blades and it took about 30 minutes to cut the larger hole. Dawn Sink fit great, just put some E6000 Adhesive under the rim and set it in place. I had to rotate the hole to line up with the existing P-Trap. Everything fit perfectly. Installed a new stainless sink strainer with plumbers' putty and was done. Attached photos show old sink with wing nuts and 2 of the 3 pieces I had to cut out. All tools used and finished sink and under sink. Total project took about 2 hours including about an hour to vacuum up saw dust (fine powder)."



Figure 75 Stainless Steel Kitchen Sink Replacement

MAINTAINING A HEALTHY BLACK TANK

Given the conditions upon which the black tank lives, it is imperative to keep it clean. Keeping the tank clean eliminates odors, helps the drain valve function correctly, prevents buildup of undigested material on the level sensors, and prevents buildup of hardened solids from forming in the tank. There are myriad suggestions contained in the Thor Forum from Vegas/Axis owners

At the top of the list is adding a black tank flush system to the black tank. This consists of some type of spray mechanism attached to the tank to spray clean water into the tank at high pressure to remove undissolved material, deposits, or undissolved toilet paper. One type of flush system is the Camco Tornado Rotary Tank Sprayer. As the cleaning nozzle rotates it will clean and undissolved toilet paper or other material from the tank level sensors.

NOTE: A typical symptom that the sensors might be dirty or have undissolved deposits in them is they will read some level of full when the black tank is empty.

A simpler method of is using a flushing rod in the toilet. This rod connects to a garden hose and is inserted through the toilet rain. Turning on the water to the hose allows a spray to dislodge undissolved material.

Another method is to “back flush” the black tank when getting ready to disconnect from the RV park shore facilities. To do so, you would open the black tank valve and drain the tank. When the tank is empty, raise the corrugated sewer hose so that it is above the level of the sewer Y-connection. Leave the black tank valve open and open the gray tank valve allowing the gray water to back flush into the black tank because you have the drain hose above the level of the RV sewer connection. After a few minutes of the gray water rushing into the black tank, while continuing to hold the hose raised, close the gray tank valve. Lower the hose and allow the water to drain from the black tank. Close the black tank valve and disconnect as described in the Teardown Checklist.

Other tips include:

- Always leave about 2 or 3 gallons of water in the black tank after draining. You can do this by running water in the bathroom vanity for a few minutes. The reason to leave water in the tank is to keep solid “pyramids” from building up directly under the toilet drain.
- Always add a black tank treatment to the tank after emptying. I prefer the Walex Bio Paks because they come in a dissolvable packet, contain no formaldehyde, and are a deodorizer and digester.
- Additionally, to help clean the black tank periodically add a dishwashing pod (like Cascade Platinum) to the tank. Sometimes these pods do not dissolve completely, so pour the dry contents of the pod into a milk carton and add water. Wait until the dry material dissolves and then pour the liquid down the toilet drain.
- Do not use bleach to clean the black tank. The bleach will kill the good bacteria contained in biological black tank additives, thus cancelling the reason for using the biological in the first place. These bacteria are designed to digest solids in the tank.
- Toilet paper – we do not use RV toilet paper because it is extremely expensive. Use any single ply or commercial toilet paper that says it is safe for septic systems. You want a paper that readily dissolves. To test, put some toilet paper in a jar or cup, add water and shake. If the toilet paper turns into a slurry or disappears – you have the right kind. Avoid multi-ply and those treated with softening chemicals (like Charmin) because those are extremely slow to dissolve. Scott single ply and Kirtland (from Costco) are two good brands.
- Never throw any paper towels or children’s diapers (like Pampers) into the toilet. They almost never dissolve and will really cause problems in your black tank.
- In our own case, since we do not dry camp or boondock, and only use RV parks with full hookups, we do not put any solids in our toilet, except for toilet paper. We use the campgrounds bathrooms for solid waste removal.

REPLACING BROKEN HEADLIGHT ON 2016 AXIS

(Thanks to Ron Tanner for this information – You will need to check with Thor Customer Service to ensure this also applies to other model years and to Vegas models with the vertically oriented headlights)

First remove the nut holding the bezel cover to the motorhome. It is located at the large end of the bezel and can be reached by opening the motorhome engine cover. The bezel is also held in by the parking light unit. The whole parking light must be removed to remove the bezel.

Once the bezel is removed you will have access to the metal ring which holds the lens to the lighting unit bracket. Remove the three screws holding the ring and light to the metal bracket unit, this will allow the lens unit to be removed. Disconnect the headlight bulb connector so the lens unit can be completely removed, and the replacement unit installed. The little hole in the reflector should be located to the top of the metal bracket.

The replacement unit can be purchased through Thor Motor Coach, Amazon Prime or directly from Kaper II, Inc. the lighting unit manufacture. The unit is a Kaper II L01-0035 Clear 5 ¾ inch Headlight. This unit does not include the metal bracket unit, which isn’t needed unless it is damaged which is unlikely if you haven’t had a major hit. See purchase and part information in the table below.

The installation of the headlight lens is accomplished in the reverse order.

Replace the bezel loosely attaching the bolt on the bezel first, this allows for adjustment while securing the parking light. Finish tightening the bezel bolt nut and you are done

Good luck with your repair and beware of the pokey fiber glass fibers well working behind the front cowling. I had to have my wife pull several fiberglass splinters from my fingers when I was done.

I hope this will be helpful to anyone unlucky enough to have a broken headlight unit. I know I will likely have to do this again; I must drive the Alaska Highway to get the lower 48 and it’s always under some sort of construction. I plan to carry an additional unit with me in the future.



Figure 76 Headlight on 2016 Axis



The bezel must also be removed to get to the headlight adjusting screws if unit needs adjusting.

You can purchase the lighting unit from the following places:

Figure 77 Headlight Removal

Source	Unit Description	Cost
Thor Motor Coach	Kaper II L01-0013 (includes bracket unit)	\$89.00
Amazon Prime	Kaper II L01-0035 (w/o bracket unit)	\$39.00
Kaper II, Inc. www.kaperii.com (800) 336-2011 or (360) 501-2151 John Miranda, Sales Executive	Kaper II L01-0035 (w/o bracket unit)	@25.95 plus shipping
Kaper II, Inc. (see above contact info)	Kaper II L01-0013 (includes bracket unit)	\$45.00 plus shipping

REINFORCING BOTTOM HINGE ON NORCOLD REFRIGERATOR



Figure 78 Bottom Hinge as Is Without Reinforcement

Thanks to Jamie geek for this tip and upgrade. Several owners have pointed out that the hinges on the refrigerator are plastic. Additionally, several owners have had the hinge break and the door fall off. Super gluing the broken pieces of the hinge is an inadequate solution to the problem.

Jamie reports there is a refurb kit available at Amazon (for around \$35) to reinforce the hinge ([Norcold Refrigerator Hinge Reinforcement Kit](#)). He reports it is really is a simple job; if it takes you longer than 1 minute, you're doing it wrong (well if you are starting with an empty refer that is -- you'd want to at least take everything out of the door).

[Here is link to kit installation instructions.](#)

Remove the door with a few turns of the flathead screw on the top hinge. Jamie's door wouldn't lift off until he had it open about 90 degrees from the fridge. After removing the door, turn it over so the bottom of the door is up and slip the metal reinforcement piece over the hinge on the door. Reinstall the door with the piece on the bottom.

If it takes you longer than 1-minute Jamie says you are doing it wrong (well if you are starting with an empty refer that is--you'd want to at least take everything out of the door). Easy peasy.



Figure 80 Door Reinstalled with Hinge Reinforced



Figure 79 Door with Reinforcement Piece Installed

TOOL & REPAIR KIT

- Couple sizes of straight, square-drive, and Phillips screwdrivers, some pliers (needle nosed, channel lock, and common), wrenches (open end and box end), vise grip pliers, a small hammer. Just make up what you would use at home.
- Socket set (1/4" and 3/8" drives). *Wal-Mart* has a nice inexpensive socket set with both English and metric sockets, for less than \$10. It is in a green canvas zip-up case and carries nicely.

- Spare fuses. Make sure you have spare 12-volt fuses for every fuse you can identify. Most are the automotive flat-blade fuses - get some rated at 5 amp, 10 amps, 15 amps, and 20 amps.
- 12-volt test light is handy. A multi-meter or Digital Voltmeter (DVM) is even better.
- Spare LED bulbs for the interior and exterior lights.
- 10-foot length of #10 insulated wire, along with an assortment of crimp terminals, splices, and a crimp tool.
- Wire cutter/stripper.
- Wire nuts, assorted sizes.
- Dozen nylon cable ties, various lengths.
- Two or three sizes of stainless-steel worm-type hose clamps.
- Duct tape.
- Box-cutter type of retractable knife.
- 12-volt air compressor and 20' cord adapter. Extension cord allows you to plug into the cab lighter plug and reach anywhere on the coach exterior.
- Misc. incidentals: Latex gloves. Baby wipes. A small can WD-40 & silicon spray.
- Finally, always carry the Thor Owner's manual, appliance manuals, your checklists, and tool kit in the coach. You never know when you might need the information.

ADVICE WHILE MOTORHOME IS IN WINTER STORAGE

This comes from Taking Flight on the Thor Forum:

While the MH is in storage, I keep it in store mode. First step I do is check the battery water levels and do a voltage check. For once a month interval I put the switch in use. My Onan says once a month run it once a month. I generally start the generator let it warm up and run it for an hour. I check to make sure no water leaks from rain, or snow melt, look for anything that's not supposed to be there, condensation, mold, etc. It only takes a few minutes. I do run the heater or sometimes the small space heater. I turn on the TV and watch it, putz around looking and measuring what I'm going to improve from ideas on this forum, e.g. doors on the seat bench. A hinged lid for the bench seat tops. All that empty space without easy access. Then I run the engine for about 20 minutes too. I usually bring the dog along. He loves it because he thinks we are going somewhere. He lays on the passenger seat floor staring out that little window waiting for Mom to get there.

SOURCE FOR REPLACEMENT WINDSHIELD WIPER BLADES

The company that makes the replacement wiper blades that fit is:

Tru Vision, PO Box 4112, Elkhart, Indiana, 46514-0112. Tel. 574-266-9430. The model # is **TV8-32**, their 32" model. (Thanks to Bruce on the Thor Forums)

IMPROVEMENT LIST

HANDLING

- Saf-T-Plus steering damper
- Rear Hellwig heavy duty sway bar
- Front Hellwig heavy duty sway bar

ELECTRICAL

- Replace outdoor porch light with amber bulb.
- ✓ Clean up wiring using UV proof zip ties for a neater appearance.
- Install battery powered "moon light" inside cabinets and wardrobe
- Battery watering system for house and chassis batteries
- ✓ Plug-in LED lights with motion sensor under cabinet above couch, in entryway
- Replace WFCO converter with PD4655 Converter

LIVABILITY

- Insulate doghouse, dash, and engine compartment
- Install 4 scissors jacks for stability to keep coach from bouncing
- *Scotch Guard* furniture, curtains, carpeting.
- Install indoor/outdoor thermometer
- Make maple butcher block dining table and side table to replace heavy OEM tables
- ✓ Line drawers & cabinets with perforated, spongy, sticky liner (absorbs noise and items move less easily)
- ✓ Door mats outside entry and at top of stairs inside
- ✓ Wooden 2-step stool to match maple, doubles as shelves in living area
- ✓ Outside portable propane grill
- ✓ Outside folding canvas chairs with table arms
- ✓ Cover for couch that matches bedspreads on twin beds

BEDROOM

- ✓ Decorative bedspreads and pillow shams for twin beds

KITCHEN

- ✓ Add paper towel holder on sink
- Glue plastic knife safe inside long vertical door under sink
- ✓ Wooden cutting boards
- ✓ Keurig coffee maker (black)
- ✓ Electric toaster (black)
- ✓ Decorative dish towels for handle on cook top
- ✓ Decorative potholder mitten
- ✓ Decorative flatware, china, and mugs
- Replace dining table and side table composite tops with wood
- Replace plastic sink with stainless steel
- Install refrigerator bottom hinge reinforcement

BATH

- ✓ Replace shower curtain liner and curtain with heavier liner so it doesn't stick to your body
- ✓ Silicon sealer around edge of vanity chest facing shower
- ✓ Plug-in LED light with motion sensor for plug above toilet
- ✓ Shower mat for floor
- Add small 18" wide Plexiglas walls at toilet and sink end of shower

- Three large Command™ brushed nickel hooks for towels on wall above toilet on left side
- Replace faucet with one with single handle valve
- Arc shower curtain rod

PLUMBING

- Sewer hose carrier under frame
- Whole house water filter

APPLIANCES & HEATER

- Add mud dauber screen kit to cover outside heater openings.

A/C & VENTILATION

- Add *Max-Air* cover kits to roof vents.
- Upgrade A/C filter to an electrostatic one.

Periodic Maintenance

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PERIODIC MAINTENANCE

The maintenance described below seems like an awful lot to do. The appliances used in RVs need “tender loving care” to ensure their longevity. Most of the maintenance described below involves checking, lubricating, cleaning, or adjusting. If the tasks become overwhelming, you can always have the maintenance performed at an RV service center. Remember, using that convenience can cost well over \$100 an hour for labor. Look at the list decide on what you can do on your own. An investment of time doing preventative maintenance goes a long way in reducing the cause of corrective maintenance at an RV service center.

FORD CHASSIS

7500 miles or 6 months

- ☐ Oil & filter change
- ☐ Rotate tires; check wear & pressure
- ☐ Inspect wheels & related components for abnormal noise, wear, looseness or drag
- ☐ Perform Multipoint inspection (accessory drive belt; horn; battery performance; radiator, cooler, heater, & A/C hoses; engine oil filter; suspension components; exhaust system; steering & linkage; exterior light & hazard warning; tires wear & pressure; fluid levels; windshield for cracks or chips; oil & fluid leaks; washer spray and wiper operation

15000 miles or 12 months

- ☐ Transmission fluid level
- ☐ Check brake pads, shoes, rotors, drums, brake lining, hoses & parking brake
- ☐ Check coolant strength and hoses
- ☐ Inspect exhaust system and heat shields
- ☐ Inspect steering, ball joints, suspension, tie-rod ends, drive shaft, U-joints. Lubricate if equipped with grease fittings

30000 miles

- ☐ Replace air filter

60000 miles

- ☐ Change automatic transmission fluid and filter
- ☐ Replace front wheel bearing grease and grease seal

97500 miles

- ☐ Replace spark plugs

105000 miles

- ☐ Change engine coolant
- ☐ Change rear axle fluid
- ☐ Inspect accessory drive belt

150000 miles

- ☐ Change rear axle fluid
- ☐ Replace accessory drive belt
- ☐ Replace front wheel bearings and seals

GENERATOR

Maintain a maintenance log and hours run for the generator. The following is the manufacturer's recommended periodic maintenance schedule

- ☐ Daily or every 8 hours – general inspection & check oil
- ☐ First 20 hours – break in period, change oil after first 20 hours of operation
- ☐ Every 50 hours -- clean spark arrester
- ☐ Every 150 hours (or annually) – change oil, replace air filter element
- ☐ Every 450 hours – oil change, replace air filter element, replace spark plug, replace fuel filter, adjust valve lash, clean and replace cylinder heads

PERIODIC/ BEFORE USE/ AS REQUIRED

- ☐ **Water System** – Check drains for leaks, sanitize and flush as required
- ☐ **Safety Equipment** – Test & check CO detector, smoke detector, propane detector & fire extinguisher
- ☐ **Carpeting** – Shampoo (as needed) and vacuum

- ☐ **Chassis components** – Check fluid levels (oil, brake fluid, transmission fluid, engine coolant, washer fluid)
- ☐ **Tires** – Inspect wear; 75 psi front, 65 psi rear
- ☐ **Wheels** – Check lug nut tightness
- ☐ **Air Conditioner** –Very little periodic maintenance is required except for the air filters. Inspect the air filter and clean it with warm water every two weeks of operation.
- ☐ **Awning** - Clean and inspect frequently. Ensure awning is closing at both ends.
- ☐ **Batteries**: Check water level and fill with distilled water if necessary. Check and clean the terminals as necessary.
- ☐ **Exterior Lights** - remove lenses and check for any corrosion and clean.
- ☐ **Roof** – Inspect and reseal roof and exterior attachment areas; lubricate roof vent motors and clean as needed
- ☐ **Propane System** – Check for leaks & damage
- ☐ **Front End alignment** – Align as required
- ☐ **Seats** – Lubricate and inspect for proper operation; check seat belts, webbing, and releases
- ☐ **Upholstery** – Clean as required
- ☐ **Holding Tanks** - Clean and thoroughly flush tanks after each use. Avoid the use of any harsh chemicals as they may damage the valve seals.
- ☐ **Lug Nuts** - Tighten every 50 miles when new until 200 miles; then tighten every 500 miles thereafter; use star pattern. Check for proper tightness periodically. At least once a year spray the lugs and nuts with rust inhibitor.
- ☐ **Refrigerator** – Keep food compartment & freezer clear. Defrost refrigerator as required (consult Norcold manual). Make sure doors seal; insert dollar bill around gasket and try to pull out with the door closed – there should be some resistance. Examine the color of the gas flame when in gas operation (refer to Norcold Manual).

Make sure the air flow in the lower intake vent, through the refrigerator coils and condenser, and out the upper exhaust vent is not blocked or decreased.

Periodically clean debris (e.g., spider webs) out of the burner unit. Take special care as these parts are delicate. Remove, clean in alcohol and then blow dry with compressed air (or by mouth using straw). When reinstalling, ensure that the burner flame is centered directly below the flue. Also clean out the refrigerator's roof exhaust vent. Bird nests, leaves twigs or other debris can lodge there.

If you have noticed erratic cooling when operating on gas, check for kinks or clogging in the gas line. It is important to check LP-gas pressure at the refrigerator when other appliances are turned on. This will reveal whether the refrigerator gets enough pressure when other appliances are operating. Using a test manometer, pressure should read 11 inches of water column pressure. Probably need to have a shop perform this test because of the equipment involved.

Periodically have the regulator diaphragm replaced to ensure maximum efficiency. The diaphragm can load up with a waxy substance after much use, and that changes the way the pressure is controlled. If the pressure vacillates, the refrigerator will suffer irregular operation.

The flue, which is directly above the burner flame, should be cleaned periodically to remove rust, scale and soot especially if operated in areas of great humidity or salt air. After removal of the flue tube, the spiral baffle inside the tube must be carefully removed. Then a shotgun-bore brush or a special brush available from the refrigerator manufacturer is used to clean the tube. When everything is clean, the baffle must be replaced exactly as it was (you may have to remove the refrigerator from its recess). This cleaning is important to get the final few percentage points of efficiency, but its benefits will only be noticed in extremely hot weather.

Clean the absorber coils and condenser fins.

Periodically, the electric heating element should be checked for proper resistance. It will deteriorate with age, leaving the refrigerator with a slowly diminishing capacity for cooling when used in the electric mode. Have this test performed by a shop due to instruments required.

- ☐ **Tires** - before each trip check pressure in tires (75 psi front, 65 psi rear)
- ☐ **Water Heater** – Spiders, mud wasps and other insects can build nests in the burner tube. This will cause poor combustion, delayed operation or ignition, or ignition outside the combustion tube. Listen for a change in burner sounds or in flame appearance from a hard-blue flame to a soft lazy flame or one that is very yellow. These are indications of an obstruction in the combustion tube. To clean, refer to the Atwood manual or have your RV service department take care of it.

MONTHLY

- ☐ **Fiberglass Exterior** – Wash with mild detergent
- ☐ **Windows** – Check vinyl seals and spray slide tracks with silicon
- ☐ **Seals & adhesives** – Check seals and reseal as required
- ☐ **Water system** – Check hoses, fittings, and connections for leaks
- ☐ **Electrical System** – Check GCFI circuit
- ☐ **Exterior appliance vents** - clean / remove obstructions
- ☐ **Fire extinguisher** - check pressure

- ☐ **Range exhaust hood filter** – wash (during use)
- ☐ **Roof** - inspect and reseal as needed
- ☐ **Ford Chassis** – engine oil level; interior & exterior lights; tire wear & pressure, windshield washer fluid level

QUARTERLY (EVERY 3 MONTHS)

- ☐ **Roof** – Clean roof
- ☐ **Windows & door** – Check seals for damage and repair as necessary; lubricate door hinges with spray grease
- ☐ **Compartment Hinges** – Lubricate with silicon spray
- ☐ **Compartment Locks** – lubricate with silicon spray

EVERY 6 MONTHS

- ☐ **Roof** – Inspect and reseal roof and exterior attachment areas
- ☐ **Exterior** – wash and wax with a good grade of wax for boats such as Maguire's Flagship, or NuFinish; inspect vinyl seals
- ☐ **Ford Chassis** – battery connections; cooling system level; hinges & latches lubrication; parking brake operation; seat belts & latches; safety warning lamps; windshield washer spray; clean or replace wiper blades

ANNUALLY

- ☐ **Roof** -- Inspect and reseal roof and exterior attachment areas; lubricate roof vent motors and clean as needed
- ☐ **Fiberglass Exterior** – Wax
- ☐ **Windows and door** – Adjust and lubricate with graphite or light oil; lubricate door locks and strike pockets and exterior components
- ☐ **Propane** – Check for leaks and damage; check line pressure (checked by technician)
- ☐ **Water System** – Sanitize and flush; winterize as required
- ☐ **Detectors** – Propane/Smoke - vacuum dust-off detector cover using soft brush attachment; wipe with a damp paper towel and dry with a soft cloth. Never clean with solvents. Change batteries
- ☐ **Exterior storage and access doors** - lubricate
- ☐ **Furnace** - have heating system inspected annually by a qualified service technician. See Suburban User's Information Manual for details.
- ☐ **Water Heater** - Drain and flush tank to prevent sediments from collecting in the bottom of the tank. Turn the power off before draining tank and keep it off until the tank is refilled. Otherwise the element could burn out.

ROOF CAULKING & SEALING

The roof on the Vegas is constructed from thermoplastic polyolefin (TPO).

TPO roofs are comparable to EPDM yet are smoother and shinier. TPO also has a less porous finish that will not absorb dirt and mold as easily as EPDM roofs. TPO doesn't chalk up by oxidizing so you won't have the unsightly streaks. TPO also tends to be significantly less slippery when wet. If you find it hard to keep your footing on the wet roof, then you are most likely dealing with EPDM.

The process for RV roof maintenance doesn't really change between EPDM and TPO. TPO traditionally has seams that are longer lasting and less prone to separation than EPDM. This makes it easier to maintain from that regard. This also means they are more expensive to repair given traditional rubber roof sealants may not work as TPO seams are heat welded and become harder to adhere to over time. They also tend not to be as porous and require as much cleaning to keep away stains. TPO can be cleaned and cared for in much the same way as the EPDM.

Dicor™ Ultra Sealant is best for TPO roofs. It is a two-part system (primer and sealant (Source: [Dicor Ultra Sealant](#)):

1. Ultra-Sealant Primer prepares the TPO surface for enhanced sealant bonding and is applied easily with a common paintbrush. No mixing. No measuring. Simply apply and let dry.
2. Ultra-Sealant is then applied like any traditional sealant. It's self-leveling and requires only a standard caulking gun. Simply gun it and you've done it. Due to its advanced chemistry, the Ultra Primer System has exceptional adhesion to vent caps, plumbing caps, exterior trim, and plastic components. For additional convenience, Ultra Sealant is engineered to stick to itself allowing you to reapply confidently for added assurance.

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Appendix

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APPENDIX 1 – MY THOR VEGAS 24.1

Thor Thor Motorcoach 701 Country Road 15 Elkhart, IN 46516 Toll-Free: 800-860-5658 http://www.thormotorcoach.com	<u>Thor Dealer</u> General RV Center 13396 E US Highway 92 Dover, FL 33527 (813) 305-2500
Year: 2015	Owner: Ed & Bev Felker
Make: Thor	Address:
Model: Vegas 24.1	City:
RV Type: Class A	Phone:
VIN: 1FC3E3KS4FDA11325	Price \$: 74910.41 (out the door)
License Plate: DXD-T45 (FL-Aug15)	Mileage: 1371 (Factory to dealer)
External length: 25'6" w/o ladder	Fresh water tank (1): 42 gal (350 lbs.)
Wheelbase: 188"	Gray water tank (1): 37 gal (333 lbs.)
External width: 94" w/o mirrors	Black water tank (1): 30 gal (250 lbs.)
Top clearance (ft. & in): 11'3" w/ A/C	Propane bottle size: 40.9 lbs.
Engine fuel tanks: 55 gal (336 lbs.)	
Entry Door Key Codes (TriMark Corp): Key blanks TriMark KS101 & KS 201 [Lock (1138) Dead Bolt (2144)]	

Weights

GVWR: 12,500 lbs.
GCWR: 18,500 lbs.
Curb Weight (GVW - fluids already in GVW + all tanks full): 11410.1 lbs.
Expected personal cargo weight (items you will add to RV): 200 lbs.
Persons weight (avg. 150 lbs. x # persons): 320 lbs.
Adjusted GVW (add above 3 items): 11930.1 lbs.
Max tongue weight (lesser of [GVWR - Adj. GVW]: 569.9 lbs. For towing a trailer behind this RV.
Max tow capacity (lesser of [GCWR - Adj. GVW]: 6569.9 lbs.

My Thor Vegas 24.1 Production Build Sheet

Production #	Unit #	Sales Order	Model	Name	VIN
13219482	1812	0296709	VS24.1-15.5	2015 24.1 Vegas	1FC3E3KS4FDA11325
Item	Mfg.	Model	Serial #	Description	
Micro-wave	High Pointe	ECO288MR	Replaced	Micro/convection, 1.1 CF w/trim kit	
Toilet	Thetford	42055	141212 42055 7278	Aqua Magic, Style II, Low, Bone	
A/C	Airxcel	48254C969	141217909	Roof, 15,000 BTU, MACH 15, Black	
Refrigerator	Norcold	N611RT	20861347	SM, DBL DR, Valueline, RT	
Awning	TRAVEL'r Care-free	EKPF006E	2114592020	Patio, Power, 12VDC, 16.5 ft, Black Shade Fade Vinyl, Single-sided	
Awning		LEO766242	2114651017	Slideout, 80", Black vinyl	
Camera	Sony	RVS 770	236714100465	Rear Observation System, 130-degree CCD camera	
TV, 28"	Seiki	SE2BHY10	2890M0420S0202001	LED	
Furnace	Atwood	AFMD30141	303840000003495	30,000 BTU	
TV, 32"	Seiki	SE32HY10	3220M0427X02823	LED	
Cooktop	Atwood	CV-35BP	5217602612826	3-burner, slide in, Black, piezo	
Water Pump	Shurflo	4008 101 A65	902173	Revolution, 3 GPM, 55 psi, 12 VDC, ½ M-NPT ports, Thermo protector	
Water Heater	Atwood	GC6AA 10E	9616003049924	6-Gal, Gas/Electric, w/electronic ignition, DSI, 110 VAC	
Fire Ext		KIDDE	Replaced	10BC, w/bracket, white, 6PX	
Converter	WFCO	WF-8900	AC04W146607872	Power, 55 Amp, 30 Amp AC, 11 DC Circuits	
Awning Hardware	TRAVEL'r	OVJVAPMP	KR1293607	Adjustable pitch, Black, Master pack for parts	
Generator	Cummins	4KYFA26100P	L140775959	4.0 KW, Microquiet	
Multi-media Rcvr	Axxera	AV614BH	NSG0007379	DBL DIN, Touch Screen, Bluetooth, MHL, DCD, CD, AM/FM,	
TV, 24"	Saikyo	SC0M2412	SCO2412140608700396	LED/DVD Combo, 1080P	

Options installed:

- 12VDC Attic fans in Living and Bedroom area
- 15K BTU rooftop A/C
- Heat pads on holding tanks
- Second house battery

APPENDIX 2 – FORD WARRANTY ADJUSTMENT FCS-900 FORM PROCESS

Paper FCS-900 Form Process

Customer Process:

Follow the process below to submit a paper FCS-900 Form. (An example of a completed paper FCS-900 Form is also included in this section.)

1. Access the FCS-900 Program website at www.fordwsd.com.
2. Review the Delayed Warranty Start Date and/or In-Transit Mileage Accumulation Warranty Start Policies and other information contained within the website.
3. Download and print the paper FCS-900 Form.
4. If an individual vehicle qualifies for a Delayed Warranty Start Date and/or In-Transit Mileage warranty coverage extension, the customer completes the paper FCS-900 Form. Be sure to include:

Required Information

- Form completion date
- Vehicle Identification Number (VIN)
- Name, address and contact information of the retail seller
- Date vehicle received at retail seller
- Miles on date vehicle received at retail seller
- Name, address and contact information of retail buyer / vehicle owner
- Date of purchase
- Miles at purchase
- Reason for the requested Delayed Warranty Start Date and/or In-Transit Mileage Accumulation warranty coverage extension
- Signature of the retail buyer / vehicle owner

Optional Information

- Body Company/Motor Home Manufacturer information block (Ford Motor Company may request this information later if supporting documentation is needed.)
5. The completed paper FCS-900 Form along with any supporting documentation is then faxed to 734-374-8460 or mailed to the address shown at the bottom of the form.

Note: Prior to mailing, the customer should retain a copy of the completed form and any supporting documentation for their records. On-line or paper FCS-900 Forms submitted on newer vehicles take approximately ten (10) business days to process. Forms submitted on older vehicles may take up to thirty (30) business days to process.

Ford Motor Company Process

Submission of an on-line or paper FCS-900 Form does not imply an automatic approval of a request for a Delayed Warranty Start Date and/or In-Transit Mileage Accumulation warranty coverage extension by Ford Motor Company on an individual vehicle. Information submitted on these Forms is closely evaluated, and after review, the request may be accepted or denied.

- If the request has been accepted, Ford Motor Company's databases will be updated; however, the customer will not receive any formal notification.
- If a request has been denied, Ford Motor Company databases will not be updated. We will attempt to contact requestors to alert them to this action; however, this cannot be guaranteed.

Therefore, it is the customer's responsibility to verify that a submitted request, on-line or paper FCS-900 Form, has been accepted and that Ford Motor Company's database has been updated. This can be done by verifying that the requested warranty start date as submitted on the FCS-900 Form is properly listed in Ford Motor Company's Online Automotive Service Information System (OASIS). OASIS information on an individual vehicle may be accessed by a Ford or Lincoln / Mercury Dealer, or if you are a recognized commercial fleet, from the Fleet website at www.fleet.ford.com.

Ford Motor Company reserves the right to:

- Modify its policies and procedures regarding the Delayed Warranty Start Date and/or In-Transit Mileage Accumulation warranty coverage extensions and/or the format, content and/or scope of this website.
- Suspend and/or prevent individuals or organizations from becoming Registered Participants or submitting FCS-900 Forms for failure to comply with the Roles and Responsibilities or other issues.
- Deny any request for a Delayed Warranty Start Date and/or In-Transit Mileage Accumulation warranty coverage extension that was submitted through either the on-line or paper FCS-900 Form process.
- Establish a warranty start date and/or starting miles other than those requested if:
 - a request for Delayed Warranty Start Date and/or In-Transit Mileage Accumulation was not submitted in a timely fashion (within 90 days of a vehicle's sale or in-service date)
 - information provided on requests does not adhere to Ford's Delayed Warranty Start Date and/or In-Transit Mileage Accumulation policies.

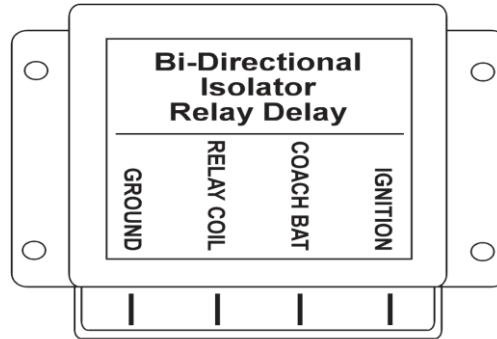
Paper FCS-900 Form Process @ 05-01-2005.doc Page 2 of 2

APPENDIX 3 – THOR VEGAS 24.1 CONSTRUCTION DRAWINGS

Contact Thor Customer Service and ask for the followings construction drawings and schematics for your model year/ floor plan/ VIN. The list below was for my 2015 Vegas 24.1. The name would be the same for your Vegas/Axis and the number of the drawing would start with the same three letters (the numbers after the letters might be different for your RV). Thor will send you the drawings in an email as attachments. All files will be .PDF files.

- TCS0114-08 Layout, Chassis, Ford
- DOC021615-004(1) – Dash Radio Harness
- TDW0195-00 – Sewer Termination
- TDW0230-04 – Sewer Layout
- TEE00135 1 26 12 – Radio Pigtail
- TEE1071 – Battery Schematic
- TEE1287-0 11151 – 110VAC & 12VDC Layout
- TEE288-00 11151 – Coach Harness
- TEE1312-01 11151 – Dash Harness
- TEW0410 – End Wall
- TFP0242-01 – Floor plan
- TFW0117 – Fresh Water Layout
- THL0079-01 – Heat Layout
- THL0126-00 – Dash HVAC Layout
- TLP0084-03 – Manifold Liquid Propane
- TRF0385-04 – Roof
- TSL0078-02 – Layout Safety
- TTL0103-03 – Layout Trunk
- TWL0767 – Left Wall
- TWL0872 – Right Wall

APPENDIX 4 – ALTERNATOR CHARGE/HOUSE BATTERY BI-DIRECTIONAL ISOLATOR RELAY DELAY (BIRD)



00-00362-100 BIRD GAS

Product Description

The BIRD (BI-DIRECTIONAL ISOLATOR RELAY DELAY) performs two important functions. It provides a method of charging the coach battery from the engine alternator and charges the chassis battery from the converter when the coach is plugged into shore power. When neither battery is being charged, the batteries are isolated from each other to prevent the loads of one battery from inadvertently discharging the other battery. The unit is housed in a plastic enclosure suitable for mounting under the hood, out of direct water spray. It operates in combination with a continuous duty solenoid to connect the two batteries at the proper times for charging.

Note: The BI-DIRECTIONAL ISOLATOR RELAY DELAY controls the Isolator Relay which is connected directly to the chassis and coach batteries. Power from both the batteries is fed into the module. The full power of the battery may be available at this module. Inadvertent shorts at this box could result in damage and/or injury. All servicing of this module should be done only by a qualified Service Technician.

Tools required: Low current Test Light, Accurate Voltmeter (digital read-out preferred)

How It Works

The BIRD operates in conjunction with a continuous duty solenoid to provide the isolator/battery charging functions of a motor home. It senses voltage on the coach and chassis batteries. If the voltage on either one is above 13.1 volts, indicating the battery is being charged, it closes the isolator relay (also known as the Trombetta), paralleling the batteries, charging both. It operates in two directions, charging the batteries from the engine alternator and charging the batteries from the converter. These functions are similar but operate at different thresholds.

Engine Alternator Charging the Batteries

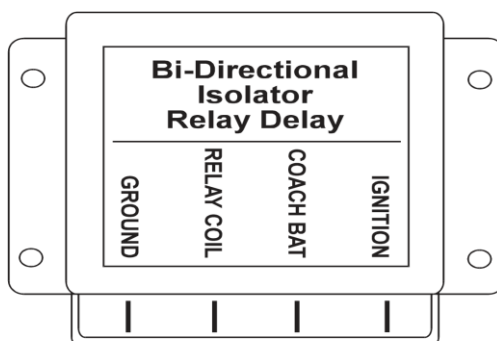
When the ignition switch is turned on and the engine is running, the system senses the level of voltage on the chassis 12-volt system. When this voltage goes *above* 13.1 volts for approximately 2.5 minutes, as happens when the engine is running normally (normal alternator output voltage of a cold engine is approximately 14.4 volts), it will close the isolator relay providing charging current to the coach battery. This delay allows a cold engine an opportunity to start and warm up before having the heavy load of a discharged coach battery placed on it.

If the voltage should fall *below* 12 volts for more than about 1 minute, the relay will drop out to feed all the alternators available output to the chassis battery to keep the engine running. This might happen when the alternator is not able to supply enough current to all the loads and charge the coach battery at the same time. When the chassis voltage goes *above* 13.1volts again, the relay will again close in about 2.5 minutes to retry to charge the coach battery. The resultant flickering of lights would alert the driver of the system overload.

Converter Charging the Batteries

When the coach is plugged into shore power and the ignition is off, the unit senses the voltage on the coach batteries. When this voltage goes *above* 13.1 volts for approximately 2.5 minutes, as happens when the converter isn't heavily loaded, it will close the isolator relay providing charging current to the chassis battery.

If the voltage should fall *below* 12.6 volts for more than about 1 minute, the relay will drop out to prevent the coach loads from discharging the chassis battery. This might happen when the converter is heavily loaded by coach loads. When the coach battery voltage goes *above* 13.1 volts again, the relay will again close in about 2.5 minutes to retry to charge the chassis battery.

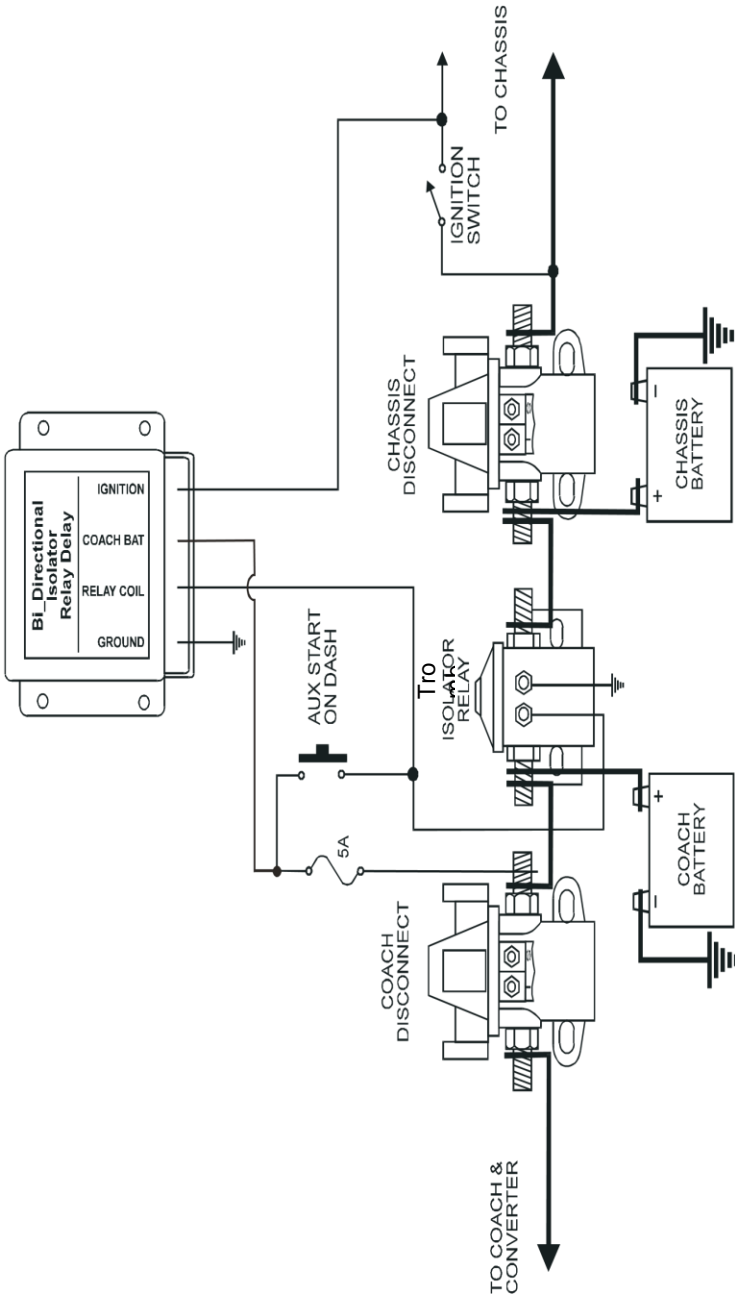


00-00362-100 BIRD GAS

Trouble Shooting

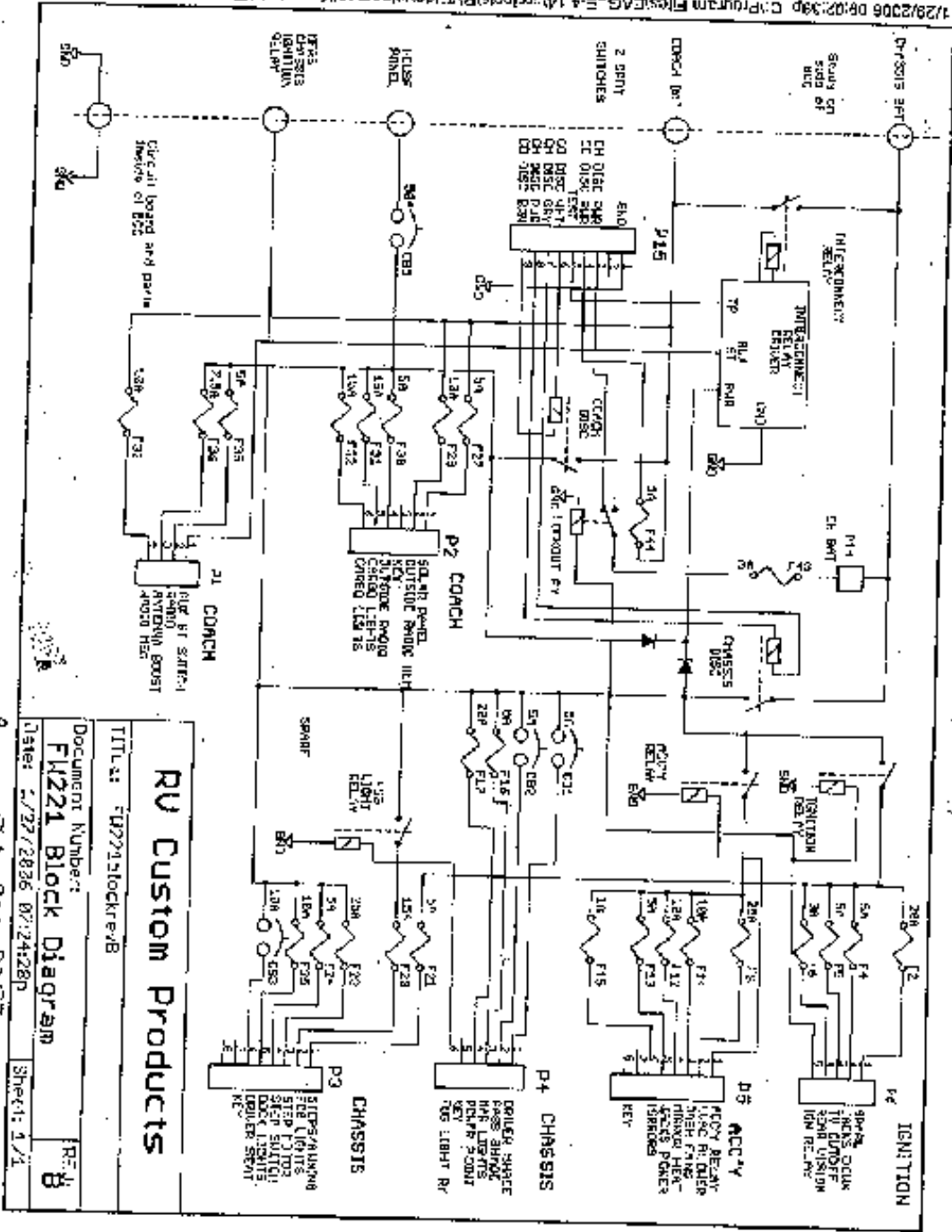
<i>Problem</i>	<i>Possible Cause/Solution</i>
Coach battery not charging from engine	Check for open circuit breaker to coach battery
	With engine running, chassis voltage must be above 13.5 volts. If less than 13.1 volts, check vehicles charging system
	Check ground on module
	Check for voltage on coil of Trombetta isolator relay after engine has been running for at least 20 seconds. Voltage should be approximately 12 Volts. If no voltage, replace BIRD
	If 12 volts is applied to isolator relay coil, check for voltage drop across the isolator relay contacts. If the drop is greater than 0.2 volts, replace relay
Chassis battery drains into coach	Check for ignition voltage on module with ignition off. Should be 0 volts. If not check wiring
	Check for continuity across the isolator relay contacts, the relay should be open with no voltage applied to coil
Isolator relay "clicking" on and off	Battery voltage falling below 12.6 when plugged in or 12.0 when engine is running. This is normal with heavy loads or low batteries

TYPICAL INSTALLATION DIAGRAM



APPENDIX 5 -- FUSE PANEL BATTERY CONTROL CENTER UNDER DRIVER'S SEAT SCHEMATIC

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Features Disturber Lock-out Relay

Phone = 562-921-8353
Fax = 562-921-1669
E-Mail = service@rvengr.com

RV Custom Products	
Title: FW221blockrevB	
Document Number:	FW221 Block Diagram
Date: 5/27/2006 07:24:28P	Sheet: 1/1
Rev:	B

APPENDIX 6 – SCHWENTEK-LIPPERT SLIDES

Operation

Extending Slide-out Room

1. Level the unit.
2. Verify the battery is fully charged and hooked up to the electrical system.
3. Remove the transit bars (if so equipped).
4. Press and hold the IN/OUT switch in the OUT position until the room is fully extended and stops moving.

NOTE: It is important to continue to press the slide-out switch for a few seconds after the room is fully extended until the motor shuts off. The control will sense that the room has stopped and will shut off the motor after a few seconds.

5. Release the switch, which will lock the room into position.



Figure 81 Schwentek Controller for Living Room Slide (in Storage Compartment under Driver's Seat)

Retracting Slide-out Room

1. Verify the battery is fully charged and hooked-up to the electrical system.
2. Press and hold the IN/OUT switch in the IN position until the room is fully retracted and stops moving.

NOTE: It is important to continue to press the slide-out switch for a few seconds after the room is fully retracted until the motor shuts off. The control will sense that the room has stopped and will shut off the motor after a few seconds.

3. Release the switch, which will lock the room into position.
4. Install the transit bars (if so equipped).



Figure 82 Schwentek Bunk Controller (in Cabinet above Sink, Behind False Left Side Wall on Top Shelf)

Trouble Shooting

Slide controller located in storage bay under driver's seat on rear wall.

Status LEDs: 2 LEDs, 1 green and 1 red, are provided to indicate current controller status and faults.

Mode Button: Used to engage the electronic manual override.

Power Connection: 12V DC input. Unit will operate from 8V DC to 18V DC.

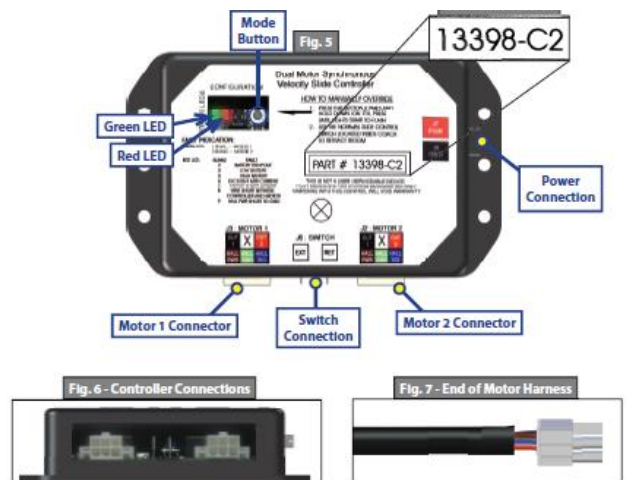
Switch Connection: Spade connection for the switch wiring.

Motor 1 Connector: Power and encoder input for motor 1.

Motor 2 Connector: Power and encoder input for motor 2.

NOTE: Motor harnesses have Molex® connectors at the controller and the molded connector at the motor end (Figs. 6 and 7 above). Wire colors match with color codes on control board. It does not matter which motor is 1 or 2.

NOTE: See (Fig. 5 above) for locations of the mode button and LEDs.



1. Press the mode button on the controller six times and hold on the seventh for five seconds to enter electronic manual override mode.
2. Use the extend/retract switch to move both motors in or out.

NOTE: Over-current and short circuit detection are disabled. Electronic manual override provides 12V directly to both motors.

3. To exit the mode, push and hold the mode button until the LEDs begin to blink simultaneously. Exiting the override mode resets the motor positions.

Error Codes

During operation when an error occurs the board will use the LEDs to indicate where the problem exists. For motor-specific faults the green LED will blink 1 time for motor 1, and 2 times for motor 2. The red LED will blink from 2 to 9 times depending on the error code.

Error Code	Name	Description
2	Battery Drop Out	Battery capacity low enough to drop below 6 volts while running
3	Low Battery	Voltage below 8 volts at start of cycle
4	High Battery	Voltage greater than 18 volts
5	Excessive Motor Current	High amperage, also indicated by 1 side of slide continually stalling
6	Motor Short Circuit	Motor or wiring to motor has shorted out
8	Wire Short Between Controller and Motor	Encoder is not providing a signal, which is usually a wiring problem
9	Hall Power Short to Ground	Power to encoder has been shorted to ground, which is usually a wiring problem
When an error code is present, the board needs to be reset. Energizing the extend/retract switch resets the board. Energize the extend/retract switch again for normal operation.		

Resynchronizing the Slide-out Motors

1. Fully extend the slide room using the switch. Keep the switch engaged until the motors shut down on their own.
2. Retract the room 1-2 inches.
3. Repeat steps 1 and 2 until both motors shut down at the same time. In many cases, two or three repetitions are necessary to re-sync the system.
4. Fully extend and then retract the room. Again, always let the motors shut down on their own before releasing the switch.

Room Stuck Out

Electronic Manual Override

1. Locate the controller.
2. Press the "mode button" six times quickly. Press and hold a seventh time for approximately five seconds.
3. The red and green LED lights will begin to flash, confirming the override mode.
4. Release mode button.
5. Use the normal slide-out control switch to retract the room.

Note: If wall switch is not pushed within 60 seconds of entering the electronic manual override mode, the controller will revert to normal operating mode. No action is required to return to normal operating mode.

Manual Room Retraction

Disengage Motors, Manually Retract Room and Travel Lock

1. Bend back wipe seal. Visually locate motor and motor retention screw. Remove the screw (Figs. 4, 5 and 7 below).
2. Pull the motor up until disengaged. Replace the motor retention screw to hold the motor in this position (Fig. 6 below).
3. Repeat this process for both sides of the slide room.
4. Push or pull room back into the opening while keeping the sides relatively even.
5. The room must be travel locked to keep room in place for road travel.

Fig. 4 - Retention Screw



Fig. 7

Retention
Screw

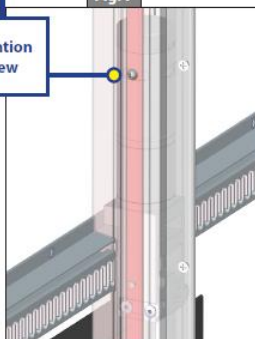
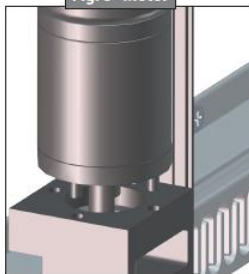


Fig. 5 - Motor



Fig. 6 - Motor



APPENDIX 7 TOWING A VEHICLE WITH THE VEGAS/AXIS

Below is a description of the myriad factors to consider in choosing a vehicle, method, and equipage for towing.

In general towing with a trailer is the easiest and requires the least number of decisions. In general, all that is needed is a trailer with ramp, a brake controller for mounting in the coach cabin, 7-way wiring from the brake controller to the trailer electrical connection at the RV's hitch receiver. The towed vehicle can have any power train configuration. When it is tied down on the trailer the transmission can be placed in park and the emergency brake set. The trailer should be equipped with a surge brake or electrical brakes and the trailer will be equipped with all lights required by most states.

Flat towing or towing with a dolly requires research for all the specific requirements to tow a vehicle. Those considerations include the type of tow bar (vehicle base plate) and/or type dolly. What position the ignition switch on the towed vehicle must be into tow. Does towed vehicle battery require being disconnected or wiring from motorhome to towed vehicle battery to ensure it stays charged? What position must the transmission be in? Must the steering be unlocked? Most states require brakes on ANY towed vehicle over 2000 lbs. What type of supplemental braking system will you use on the towed vehicle? What type of breakaway system? These are just some of the considerations or questions you must address in flat towing or towing with a dolly.

Examples below use my Vegas to demonstrate calculations and considerations:

Factor	Value	Axis/Vegas Example
RV	Will RV require a brake controller and 7-way electrical connection?	
GVWR	12,500 lbs.	Vegas 24.1
GCWR	18,500 lbs.	Vegas 24.1
Curb Weight	CVWR – fluids already in GVWR + all tanks full	11410.1 (Vegas 24.1)
Expected personal cargo weight	200 lbs.	(Vegas 24.1)
Persons weight	Average 150 lbs./person X # persons	320 lbs. (24.1)
Adjusted GVW	Add three values above	11930.1 lbs. (24.1)
Max Tongue weight	GVWR- adj. CVW	569.9 (24.1)
Max Tow Capability	GCWR- adj. GVW	6569.9 lbs. (24.1)
Vehicle Make/Model	Year, make, model used in Motor Home Magazine towing guide to determine towing capabilities/requirements, check with vehicle manufacturer for any Technical Service Bulletins (TSBs) regarding recreational vehicle towing	
Vehicle transmission	Standard	Generally, only requires transmission in neutral
	Automatic (especially electronic transmissions	Generally, ignition in Auxiliary, transmission in neutral, steering unlocked
	4Wand all-wheel drive	Check guide – some can flat tow, some can't (especially AWD)
Mode of towing	Determine whether you want to flat tow with all 4 wheels down, use a 2-wheel dolly, or tow with all 4 wheels on trailer	
Flat Wheel Towing	Determine equipment	Tow bar Base plate to connect tow bar to vehicle Electrical hook up for vehicle lights Electrical hookup to keep vehicle battery charged Vehicle supplemental braking system
Two-wheel dolly	Determine equipment	Drop down connection to RV receiver required? Brakes – surge or electric (if electric, determine the type/model brake controller)
Trailer	Determine equipment	Brakes – surge or electrical

What follows is an illustrative example of an owner's decisions regarding selecting and equipping a Vegas 24.1 for towing a Kia Soul. It is provided for illustrative purposes only. It shows the considerations, to include cost considerations as well:

RV: 2014 Vegas 24.1

Vehicle: 2016 Kia Soul

1. Obtained Kia Technical Service Bulletin for Recreational Vehicle Towing. Determined Kia Soul could be flat towed following certain procedures
2. Steps to tow Kia Soul

STEP 1: VERIFY TOWING CAPACITY OF THE RV.

STEP 2: BE SURE TRANSMISSION FLUID FULL.

STEP 3: BE SURE OIL LEVEL IS FULL.

STEP 4: VERIFY TIRE PRESSURE CORRECT.

STEP 5: VERIFY CONNTECTIONS TO TOW VEHICLE.

STEP 6: KEY IN IGNITION SWITCH.

STEP 7: IGNITION SWITCH TO ACCESSORY POSITION.

STEP 8: VERIFY STEERING WHEEL IS UNLOCKED.

STEP 9: TRANSMISSION IN NEUTRAL.

STEP10: RELEASE BRAKE.

STEP 11: BE SURE TO REMOVE KEY UPON ARRIVAL.

3. Flat Towing equipment needed for Kia Soul example:

Tow Bar – Avanta BlueOx - \$850

Drop Hitch – BlueOx - \$120

Diode wiring and cable ends - \$137

Cable from Motorhome to towed vehicle - \$65

Base Plate – BlueOx - \$350

Battery maintainer - \$55

Shackles (4) for Safety cable - \$40

Braking removable type \$900 - \$1400 (considered but rejected)

Braking permanent type \$800 (selected) but install can be as much as \$600- \$800

Cover for tow bar (if you leave it on the MH you need this) - \$50

Four keyed alike locks for hitch - \$60

Brake-a-way switch if not included with brake purchase

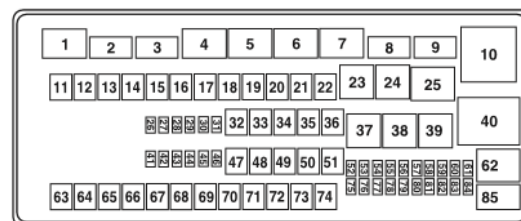
TOTAL COST (with all dealer installations): \$3327

The example above was intended to be illustrative only. It shows that there is a lot to consider and research before deciding to tow a vehicle with your motorhome. You need to consider convenience, safety, and cost. Each situation is different depending on Vegas/Axis model; vehicle year, make, and model; vehicle specifications; and desired method of towing. One thing to keep in mind above all others – do not go cheap on safety.

APPENDIX 8 2015 FORD E-350 STRIPPED CHASSIS ELECTRICAL RELAY AND FUSE LOCATIONS

Power Distribution Box

The power distribution box is in the engine compartment. It has high-current fuses that protect your vehicle's main electrical systems from overloads.



LOC	FUSE AMP RATING	PROTECTED COMPONENTS
1	HC micro relay	Powertrain control module
2	HC micro relay	Starter solenoid
3	HC micro relay	Wiper
4	HC micro relay	Trailer tow battery charge
5	HC micro relay	Fuel pump
6	HC micro relay	Trailer tow park lamp
7	HC micro relay	Auxiliary switch #4
8	HC micro relay	Auxiliary switch #3
9	HC micro relay	Modified vehicle and stripped chassis run/start
10	Not used	
11	Not used	
12	40A**	Modified vehicle and stripped chassis run/start
13	30A**	Starter solenoid relay
14	40A**	Run start relay
15	40A**	Modified vehicle and stripped chassis battery
16	50A**	Auxiliary air conditioning blower
17	50A**	Trailer tow battery charge, Trailer tow park feed
18	30A**	Electric trailer brake, Trailer brake controller
19	30A**	Auxiliary switch #1
20	30A**	Auxiliary switch #2
21	Not used	
22	Not used	
23	G8VA relay	Air conditioning clutch
24	G8VA relay	Horn relay (stripped chassis)
25	HC micro relay	Run/start
26	Not used	
27	Not used	
28	20A*	Back-up lamp
29	10A*	Air conditioning clutch
30	10A*	Brake on/off switch
31	10A*	Cluster battery (stripped chassis)
32	50A**	Blower
33	40A**	Anti-lock brake system pump motor
34	20A**	Stripped chassis horn
35	40A**	Powertrain control module relay
36	20A**	Ignition switch (stripped chassis)
37	G8VA relay	Trailer tow stop — left turn signal
38	G8VA relay	Trailer tow stop — right turn signal
39	G8VA relay	Back up lamp
40	ISO relay	Blower motor
41	Not used	
42	15A*	Diagnostic connector (stripped chassis)
43	20A*	Fuel pump
44	10A*	Auxiliary switch #3
45	15A*	Auxiliary switch #4
46	10A*	Powertrain control module keep alive power, Canister vent, Powertrain control module relay coil
47	40A**	Anti-lock brake system coil
48	20A**	Trailer tow stop lamp/turn signal
49	30A**	Wiper motor
50	Not used	
51	20A**	Cutaway
52	10A*	Stripped chassis and modified vehicle run/start relay coil
53	10A*	Anti-lock brake system run/start feed
54	10A*	Fuel pump relay coil
55	Not used	
56	Not used	
57	20A*	Trailer tow park lamp
58	15A*	Trailer tow backup lamp
59	Not used	
60		One-touch integrated start (diode)
61	Not used	
62	HC micro relay	Auxiliary switch #2
63	30A**	Trailer tow battery charge
64	Not used	
65	20A**	Power point 2 (glove box)

LOC	FUSE AMP RATING	PROTECTED COMPONENTS
66	20A**	Power point 3 (cutaway B+)
67	20A**	Power point 1 (instrument panel)
68	50A**	Modified vehicle
69	Not used	
70	30A**	Stripped chassis
71	Not used	
72	20A**	Cigar lighter / Power point
73	Not used	
74	30A**	Power seat
75	20A*	Vehicle power 1, Powertrain control module power
76	20A*	Vehicle power 2, Powertrain control module – emission related powertrain components
77	10A*	Vehicle power 3, Powertrain control module – general powertrain components
78	15A*	Vehicle power 4, Fuel pump relay coil
79	10A*	Vehicle power 5, Transmission
80	10A*	Cluster run/start (stripped chassis)
81	Not used	
82	Not used	
83		Fuel pump (diode)
84	Not used	
85	HC micro relay	Auxiliary switch #1

* Mini fuses ** A1S fuses

Passenger Compartment Fuse Panel

The fuse panel is located to the left of the brake pedal and mounted onto the lower left cowl panel. Remove the fuse panel cover to access the fuses

LOC	FUSE AMP RATING	PROTECTED COMPONENT
1	30A	Inverter B+
2	15A	Not used (spare)
3	15A	Not used (spare)
4	30A	Not used (spare)
5	10A	Passenger compartment fuse panel, Brake-shift interlock
6	20A	Turn signal, Hazard, Stop lamps
7	10A	Left low beam
8	10A	Right low beam
9	15A	Courtesy lamps
10	15A	Switch illumination
11	10A	Not used (spare)
12	7.5A	Not used (spare)
13	5A	Mirrors
14	10A	SYNC, Global positioning system module
15	10A	Not used (spare)
16	15A	Not used (spare)
17	20A	Door locks
18	20A	Not used (spare)
19	25A	Not used (spare)
20	15A	Diagnostic connector (except stripped chassis)
21	15A	Not used (spare)
22	15A	Park lamps, License plate lamps
23	15A	High beams
24	20A	Horn (except stripped chassis)
25	10A	Demand lighting
26	10A	Cluster (except stripped chassis)
27	20A	Ignition switch feed
28	5A	Audio mute (start)
29	5A	Cluster (except stripped chassis)
30	5A	Not used (spare)
31	10A	Not used (spare)
32	10A	Restraints module
33	10A	Trailer brake controller
34	5A	Not used (spare)
35	10A	Cutaway run/start
36	5A	Passive anti-theft system radio frequency module
37	10A	Climate control, Stripped chassis instrument panel #1 run/start
38	20A	Not used (spare)
39	20A	Radio
40	20A	Not used (spare)



LOC	FUSE AMP RATING	PROTECTED COMPONENT
41	15A	Radio, Switch illumination, Automatic dimming rear view mirror, Inverter
42	10A	Auxiliary switch
43	10A	Stripped chassis instrument panel connector #1
44	10A	Trailer tow battery charge relay
45	5A	Wipers, Stripped chassis Engine connector 3
46	7.5A	Passenger airbag deactivation indicator
47	30A circuit breaker	Windows accessory delay
48	Relay	Delayed accessory