Norcold N300.3 Refrigerator

This article is taken from the Winnebago Rialta Owners web site with the permission of the site owner. It has been modified to remove motorhome-oriented terminology, and insert TrailManor-oriented terminology. The scattered parts have been re-united and organized. And the Table of Contents has been added.

DISCLAIMER AND WARNING This article deals with disassembly, repair, and reassembly of a propane burning appliance. Propane is dangerous, and nothing in this article mitigates that danger. It is recommended that unless you are well-trained in propane burning appliances, you engage a certified repair technician to perform the work described herein.

The original article is located at http://www.rialtainfo.com/winnebago/refrigerator.htm

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Part 1 - General Information:

TM installs a Norcold model N300.3 refrigerator in every trailer model. The ".3" suffix on the model number indicates that it is capable of running on three different power sources: propane (LPG), 12 VDC, or 110 VAC.

This is the Norcold N300.3 which has 2.7 cubic foot interior volume.

Although you have 3-way power to choose from, each one has its intended purpose while traveling.

1. The **AC Mode** of operation should be chosen when you have a shore power connection either at home or at campsites that can provide 110 VAC power.

2. The **LP Mode** of operation should be chosen while the vehicle is stationary and there is no source for continued 110 VAC operation. The amount of LP consumed by the refrigerator is miniscule compared to the consumption by the furnace during cold weather. You should not use LP operation while the vehicle is in motion because most local, state, and Federal regulations prohibit its use, and usually the air currents generated by the motion usually prevent proper heating action. Although some people report that they have been able to accomplish the feat.
3. The **DC Mode** is intended only for use while driving. While in this mode, the unit operates without thermostatic control. For those willing to modify the internal wiring (and void any existing warranty), there is a modification available which will allow for thermostatic control in this mode.

When preparing for a trip, do NOT use the DC mode for the initial cool down of the refrigerator but instead use either AC or propane. It should normally take at least three hours or more to cool down the refrigerator BEFORE any food is placed into it.

Operator's Manuals for Norcold Model N300:

- **Installation & Owner's Manual** (990k)
- **Parts List** (632k)
- **Service Manual** (830k)
- **Service Bulletin - Checking for problems in LP mode** (101k)

Refrigerator FAQs:

Do I have to manually start a pilot light for LP operation?

Technically speaking, yes. But you don't need a match. The initial spark is provided by the piezo igniter that produces a spark when you push the button on the front control panel.

How level must my refrigerator be?

The refrigerator is made to operate within 3 degrees off level side-to-side and 6 degrees off level front-to-back (looking at the front of the refrigerator). For an informative and complete description of what this looks like in the real world, read "Levelling the Refrigerator below."

Why is frost on the interior cooling fins only on the right side?

It is normal to accumulate frost on the right side of the bank of cooling fins. The coldest part of the cooling fins are those on the right side of the refrigerator as viewed from the front. Gas/Electric refrigerators will build frost of varying amounts depending upon the environmental conditions (temperature and humidity), how often the doors are opened, and what is stored in them. Defrosting is not required until a decline in performance is noted. Refer to your operator's guide: "Defrosting and Cleaning the Refrigerator Interior."

Does the refrigerator perform better on gas or electric?

The refrigerator is designed to operate efficiently on both gas and AC electric. The AC electric is dependent upon the AC input voltage to the refrigerator. Be sure that the input voltage is between 108 volts AC and 132 volts AC. The efficiency of the refrigerator while operating in the gas mode is dependent upon the correct burner flame. The burner flame requires correct input gas supply pressure, air input, and burner and burner orifice cleanliness. Refer to the refrigerator's operators guide: "Refrigerator Maintenance and Care List."

Does a fan installed on the back of the refrigerator help performance?

A DC fan may help improve refrigerator performance when the refrigerator is not installed in accordance with Norcold's installation requirements or when operating the refrigerator in high ambient temperatures (see "Refrigerator Installation Manual.") A DC fan will assist in providing the necessary amount of airflow. Be sure the fan is controlled by a thermostat and begins to operate when the area behind the refrigerator reaches approximately 95 degrees F. The fan should run until the temperature lowers to about 80 degrees F. Consult with your RV dealer for the correct fan and specifications.

What maintenance should be performed on my refrigerator and how often?

Your refrigerator will give you years of trouble free service if you do the following simple checks every three to six months. Refer to the operator's guide provided with your refrigerator for more details:

► Keep the food compartment and the freezer clean. See "Defrosting and Cleaning."
► Defrost the refrigerator as necessary. See "Defrosting and Cleaning."
► Make sure the door seals correctly. See "Door Sealing."
► Be aware of any cooling changes that are not because of weather, loading, or gas control changes. If changes occur, contact your dealer or service center.
► Make sure the gas supply is LP gas only and not butane or a butane mixture.

► When in LP gas operation, examine the appearance of the flame. See "Gas Flame Appearance."
► 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.
► Make sure the area behind the refrigerator is clear. Do not use the area behind the refrigerator for storage of any combustible materials, especially gasoline and other flammable vapors and liquids.

Does it require 12VDC to operate when using LP gas?

No. The refrigerator will operate standalone on LP gas.

How long should it take to get cold after it is started?

On initial start-up, allow the refrigerator to cool between 8-12 hours before loading it with food. Warm foods, high ambient temperatures and frequent door openings will increase the cool down time.

What is the cause of my refrigerator having an ammonia smell?

An ammonia odor detected inside the refrigerator cabinet or at the rear of the refrigerator indicates the cooling unit has developed a leak and requires replacement by your dealer or an authorized Norcold service center. Remember, you are dealing with a complex appliance that operates on both LP gas and electrical power. Servicing this unit should only be done by a trained technician to avoid potential dangerous consequences!

Is my refrigerator self-defrosting?

No. Your refrigerator, unlike a home refrigerator, is not equipped with a heater that automatically eliminates the need for defrosting.

Leveling the Refrigerator:

There is an old myth that absorption refrigerators must be almost perfectly level, or they won't operate and may be harmed. Is this myth still true?

The Stated Requirement:

The manual for the Norcold refrigerator says that its "operational limits are 3 degrees off-level side-to-side and 6 degrees off-level front-to-back, as looking at the front of the refrigerator". What does this mean? Remember that the refrigerator is installed sideways in the trailer, so side-to-side for the refrig means front-to-back for the trailer. Similarly, front-to-back for the refrig means side-to-side for the trailer.

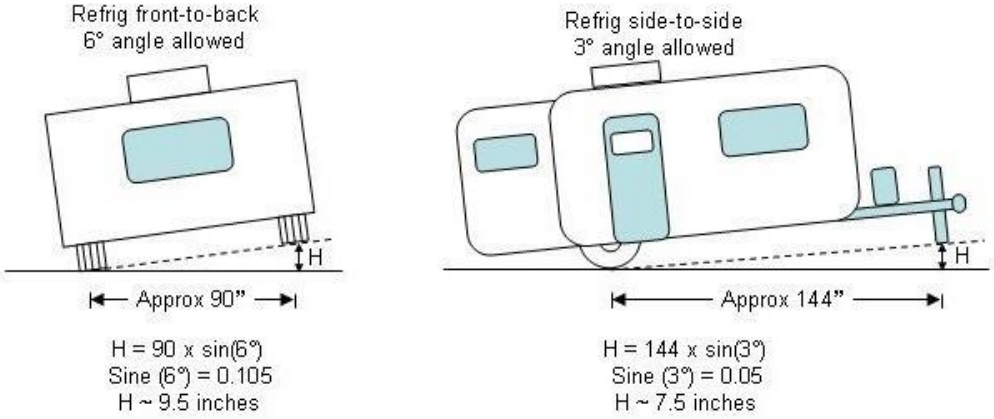
The Real World:

What does this look like in the real world when you are parked on uneven surfaces? There are two places where you can visualize or measure this tolerance:

1. At the wheels, since this is where you level the trailer itself.
2. At the flat counter-top immediately above the refrigerator using a small 24" long bubble-spirit level.

Levelling Measured at the Wheels:

Let's first take a look at the wheels and visualize the variation from level that would still allow the refrigerator to operate properly.



Conclusions:

1. The TrailManor trailer can out of level side-to-side (wheel-to-wheel) by as much as 9.5 inches without exceeding the refrigerator spec of 6 degrees. In other words, one wheel can be 9.5 inches higher than the other.

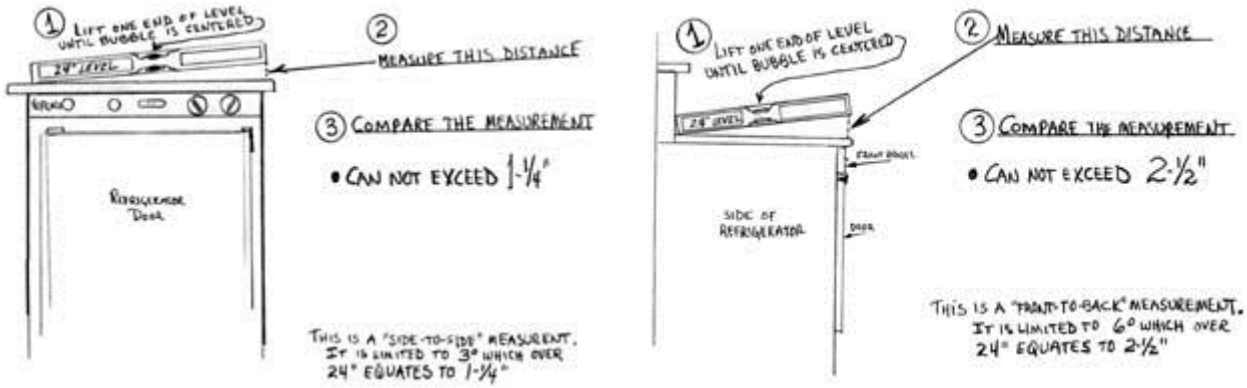
2. The TrailManor trailer can be out of level front-to-back (wheels to tongue jack) by as much as 7.5 inches without exceeding the refrigerator spec of 3 degrees. In other words, the tongue can be above or below the wheels by as much as 7.5 inches.

Levelling Measured on the Countertop:

All you need is a 24" long level easily obtained at any hardware store for under $10. I chose the 24" length because it will provide you a measurable variance that you can easily see. And it will easily store in the nearby overhead cabinets. The use of any shorter level means that an error in measuring of 1/16" can easily translate into one full inch at the wheels.

Here's how to determine you vehicle's level from inside the vehicle. Stand facing the front of your refrigerator and place the 24" long level on the flat counter above the refrigerator. You will need to check straight forward and sideways. It's as easy as 1-2-3:

1. Lift one end of the level until the bubble is centered.
2. Measure how far you had to raise that one end of the level.
3. Compare that measurement to these sketches.



It is apparent that the refrigerator is supposed to work properly even when it is well beyond what we all thought were the limits for out-of-level condition. And after viewing those sketches, you are probably asking yourself "Why bother leveling at all?" Well, Norcold states the answer simply as ***"Normal vehicle leveling to provide comfort for the occupants is satisfactory for refrigerator operation".***

Summary:

It's apparent that you seldom really need to level the vehicle in order to make the refrigerator operational. In fact, most of the time the reason to level the vehicle is so that the occupants feel more comfortable. I, for one, can not sleep in a bed that is tilted sideways even the smallest amount. Somehow my internal "human level" will tell me if its within tolerance.

Some owners use jacks to help stabilize the vehicle from rocking and at the same time help bring the vehicle into level without using blocks underneath the wheels. This makes lots of sense especially if the vehicle is going to be in the same position for more than just overnight. However, given the fact that the refrigerator can operate properly at angles we thought prohibitive, those people who are using the plastic or wood blocks to raise one or more wheels by only an inch or two are hopefully doing so for their own personal comfort, and not for the refrigerator.

The bottom line is this: "Just how sensitive are YOU to being slightly out of level?" If it doesn't bother you, then it is unlikely to bother the refrigerator.

Maintenance and Cleaning:

Very little maintenance is required of the refrigerator. Other than the cosmetic cleaning of the interior plastic, there is little else required for the normal operation of the refrigerator. The operator's manual notes that the unit is NOT self-defrosting so if over an extended period of constant usage you find frost build-up to be a problem (rare for the average RVer), then you will need to manually defrost the unit by simply turning it off, removing all food, and waiting for all accumulated ice to melt. In the meanwhile, you will need to soak up the water with towels. The operator's manual also suggests the use of a solution of liquid dish detergent and warm water to clean the refrigerator right after defrosting. Do not use abrasive cleaners, chemicals, or scouring pads because they can damage the interior of the refrigerator.

If you are considering doing a thorough cleaning of the entire heating portion of the system, then refer to the "Replacing The Thermocouple" section in this document as this details the steps necessary to remove the refrigerator, and shows the additional cleaning of the heating elements and other related parts.

Part 2 - Troubleshooting and Repair

The Norcold Operator's and Installation Manuals recommend that any of the following service procedures on the refrigerator should be performed by a qualified RV dealer or a Norcold authorized service center.

I must also state that if your problem includes the smell of leaking propane or ammonia gas, that you immediately shut off the propane tank and seek out qualified help in determining the cause of the leak. Do not travel in or occupy a coach when you can smell propane or ammonia gas.

Troubleshooting Electrical Operation (12 VDC & 120 VAC):

Usually either of the two electrical modes of running the refrigeration unit are problem free. The unit either gets power to heat up the ammonia gases to work properly, or it doesn't. Norcold stipulates the requirement for AC voltage as between 108-132 volts. The requirement for DC voltage is between 11.5-15.4 volts. These voltages should be measured at the refrigerator's power terminal block on the back of the refrigerator. There are two fuses located near the electrical terminal block in the wires that run to either of the 150W DC heater or the 180W AC heater. The AC holds a 3 AMP fuse while the DC line holds a 20 AMP fuse. These are glass fuses so a visual check or a continuity tester can verify the integrity of the fuse element. Make sure that the propane tank valve is closed while doing any checking of electrical contacts.

Troubleshooting Propane Gas Operation:

This is the mode of operation that causes almost all of the problems associated with the refrigerator. There is one rule to remember about troubleshooting any propane related issues with the refrigerator: "cleanliness is next to godliness". Nearly all of the problems will occur within the burner box area. My information presented here also assumes that the gas control valve and safety valve function normally. There have been very few reports of any problems with these items.

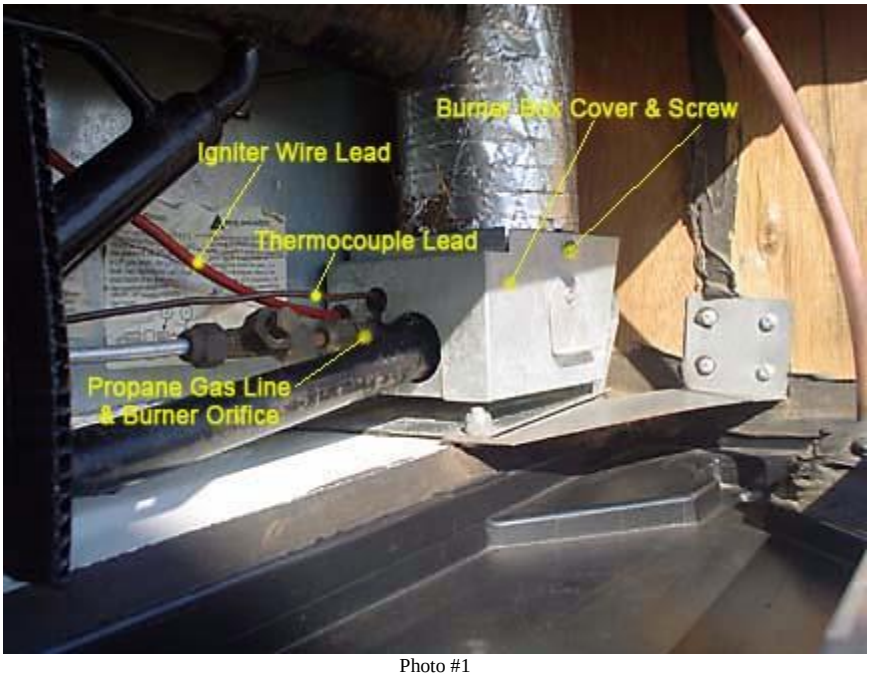


Photo #1

If you are experiencing problems running on propane, you are most likely experiencing one of two very different problems.

Bad wire connectors at the control knob:

This is a well-known problem, and Norcold has a "service fix" for it. A number of wires are connected to the back of the control switch (the one that selects AC - DC - GAS - OFF). Each wire terminates with a push-on connector, which is simply pushed onto a flat blade on the switch body. After a period of time, these push-on connectors lose their tension, and make a poor contact with the blade half of the connection. The usual result is that the propane flame will light, but will not stay lit. If you write to Norcold, they will send you two wires with new connectors on the ends. A simpler answer is to pull each connector off the blade, squeeze it closed with a pair of pliers, and replace it on the blade. Either solution requires that you pull the refrigerator a few inches out from under the countertop, in order to gain access to the wires.

This article does not present details of this fix, but because it is simple to do, it is probably the first action to take if you experience a propane flame that won't stay lit.

Dirt, grit, rust, scale accumulated in the burner area:

Over time and use, many kinds of grime can accumulate in the burner area. If they build up to a sufficient level, they can interfere with the propane burner operation, resulting in a flame that won't light, a flame that is weak, or a flame that won't stay lit. The solution for all of these is a good cleaning of the burner area. Many people have reported that simply cleaning out accumulated dirt, soot, spider webs, etc, using a long-handled brush and a vacuum cleaner, was all that was necessary to remedy their problems.

However, since many of the problems are related to a clogged or dirty burner orifice, or a dirty, contaminated, or failed thermocouple, cleaning may involve removal and cleaning of the burner parts, replacement of anything that has failed, and proper re-assembly of the burner. These items can not be cleaned without removing them from the burner box area.

Introduction To Troubleshooting The Burner

So how does one tell for sure if the gas is igniting or if the flame extinguishes? The answer is simple: you need two people. One to operate the controls on the inside of the coach while the other observes the action of the flame. First remove the outside lower vent cover. In order to fully see the flame, one needs to remove the burner box cover. It is held in place with one screw. It also helps if this work is done in the shade or in a well ventilated covered area otherwise bright sunlight will hamper one from seeing the flame. Remember, this is a VERY SMALL flame, much like nothing more than a pilot light. This is NOT a wide, large flame that you'd see on a furnace or stove. See Photos #3 and #6 below for examples.

Troubleshooting Steps - Propane Burner:

1. Remove the one screw that holds burner box cover in place. Photo #2 below shows the complete burner box with the cover removed. Note the dirt and debris laying at the bottom of and all around the burner box. Actually this one is fairly clean; yours may be much worse. The red wire is the igniter lead; the thin copper tube is the thermocouple; and the brass fittings are part of the propane gas line and burner orifice tube. These are the three items to be checked and cleaned.

Photo #2

2. Open the valve on the propane tank.

3. Turn the thermostat to its coldest or highest setting.

4. Turn the selector switch on the control panel to the gas position

5. Push and hold the safety valve button in the fully depressed position. (NOTE - This "safety valve" only allows gas to flow when there is a flame present or when the button is pressed. Any loss of flame as sensed by the thermocouple closes the safety valve and stops the flow of gas. The button that you push in and hold from the control panel actually bypasses this safety function and causes gas to flow as long as you hold in on the button.)

6. In rapid succession, push the igniter button several times for about 5 seconds.

7. While the person on the inside continues to hold in the safety valve button, the second person who is trying to observe the flame inside the burner box should be able to see a bright blue flame at the end of the burner orifice tube.

Results of Troubleshooting :

After performing these steps, you may find one of three results.

A. No flame at all. Double check to make sure the valve on the propane tank is open and that the manual valve on the back of the refrigerator is also open. This manual valve should always remain in the ON position. If you can smell propane but there still is no flame, then you probably have a faulty igniter, or the burner orifice can be fully clogged and needs to be cleaned.

B. Flame present but it is yellow instead of blue or flickers erratically. You probably have a clogged burner orifice tube which needs to be removed and cleaned.

C. Flame is deep blue in color: This indicates that the burner orifice is OK. So far, so good. Photo #3 shows the deep blue flame touching the tip of the thermocouple and the end of the igniter is glowing red.

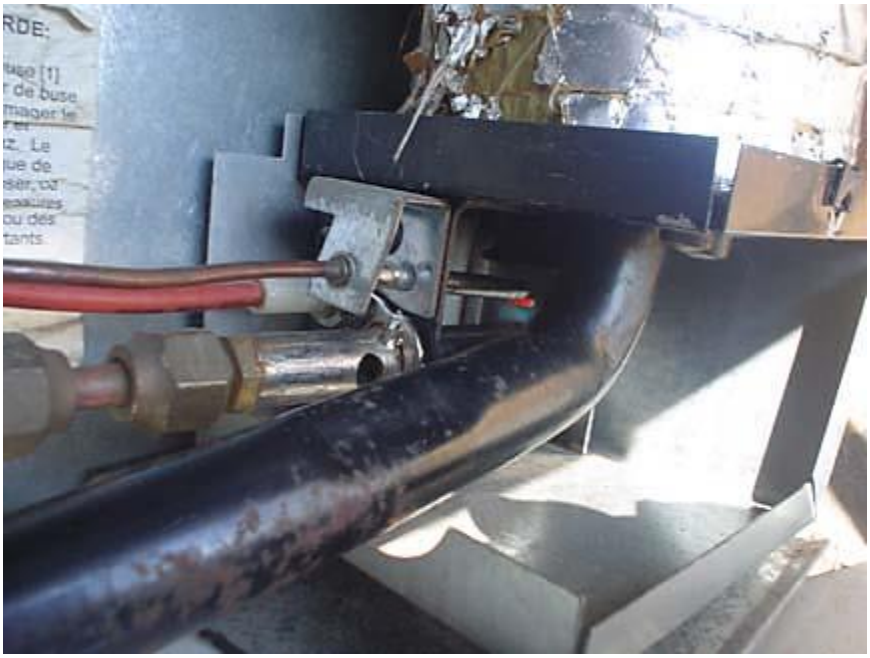


Photo #3

Once you see a flame present, have the person on the inside continue to hold the button on the safety valve for about 30 seconds. On a properly adjusted burner assembly, you would normally need to hold the safety valve in for only a few seconds. The purpose of this extra time during this troubleshooting procedure is to ensure that the thermocouple is being brought up to full temperature. A thermocouple that is improperly positioned may require this extra time. After 30 seconds, the person on the inside should release the safety valve button while the person on the outside watches to see what happens to the flame. If the flame goes out slowly or goes out immediately, you probably have a dirty or faulty thermocouple. Try cleaning the tip before buying a new one.

Cleaning tne Burner Area and Components:

At this point, you may have determined that you need to remove some items, clean them, and reinstall them to check for proper action. Even if you think that you may have a problem with only one item, I still recommend that you remove and clean the **thermocouple**, the **igniter**, and the **burner orifice** tube. Once you get one item removed, it is much easier to get to the remaining two. So while you're in there, why not check and clean all three items?

Your task is simple. First, shut off both propane tank valves! Step number two: double check to make sure that you have shut off the propane tank valves! Then, remove all three items from the burner box, and clean out any and all dirt or debris that remain in the burner box area. Then clean each of the items you have removed. Finally, re-assemble everything. Photo #14 below shows all three items reattached to the burner box with only the gas line fittings remaining to be installed. Once complete, repeat the **Troubleshooting Steps** listed above to confirm that everything works properly. Compare the cleanliness of this photo to photo #1 above.

Photo #4

Gaining access in order to remove and re-install any of these items with a screwdriver in this cramped area may be difficult. Stubby screwdrivers are of little use because they generally have big, fat handles that prevent them from being in the correct alignment with the screw to be removed. Perhaps a ratcheting right-angle screwdriver might work, but I was able to use one of those Phillips tipped screwdriver bits with a hex shank that is normally designed to be inserted into the end of a screwdriver shank or other similar holding tool. Without using any such holding tool, I merely held the screwdriver bit in place with a finger or two of one hand, while a 1/4" open end wrench was used to turn the hex portion of the bit with the other hand. It takes a while because you can only get about a 1/4 turn with each movement of the wrench.

You may also find that the gas line connectors tend to get in the way while trying to remove the screws, so you may wish to disconnect the gas fittings in order to gain some needed work space. Note that photo #4 above shows the gas line fittings are the last item to be re-installed. This makes for a little more maneuvering room when trying to re-install the screw to any of the hardware items.

Cleaning the Tip of the Thermocouple:

The thermocouple probe will probably have to be removed just to gain access to the screws that hold in the igniter and the burner orifice so start by removing the thermocouple and it holding bracket. It is all held in place with one small Phillips head screw. Once the screw is removed, the entire holding bracket and thermocouple can be removed from the burner box. Try not to disturb the position of the thermocouple relative to its holding bracket. There is no need to remove or reroute the remainder of the copper line of the thermocouple that leads up to the control panel because there should be enough slack to examine and clean the tip of the thermocouple in place. Photo #5 below shows the thermocouple and its holding bracket removed from the burner box.

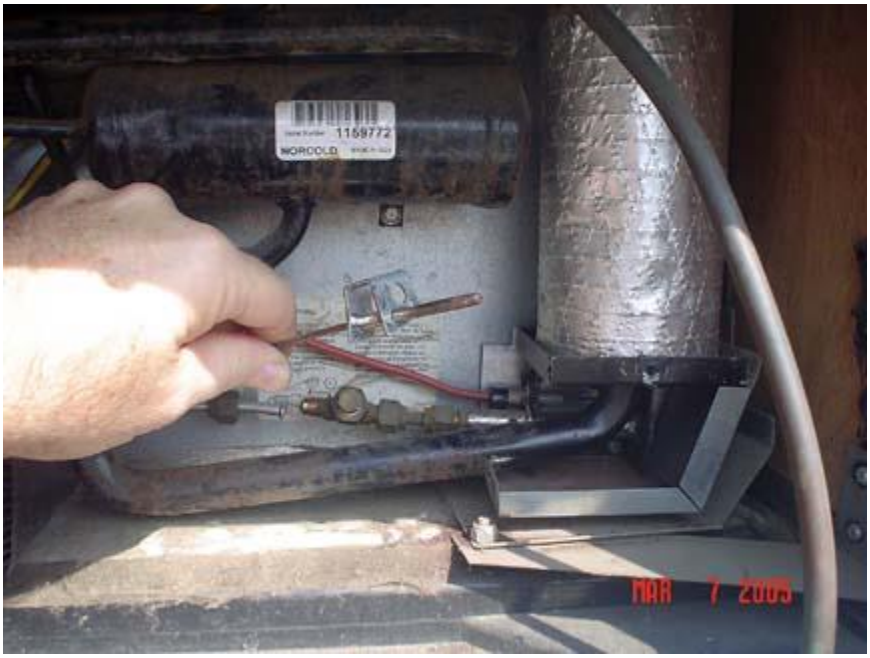


Photo #5

The tip of the thermocouple will be discolored due to heat from the flame and this is normal. However, the tip should be uniform in shape, not distorted, and without any particles or debris clinging to the end. Use the fine emery cloth or green scratch pad to thoroughly clean and smooth the tip. I used one of those green "scratch pads" generally found in the sandpaper section of a hardware store. These scratch pads are similar to, but the not the same as the pads sold for cleaning and washing pots and pans. They have no sponge and no embedded detergent.

Normally you should not have to re-position the thermocouple in relation to where it sits with the flame. However, repair attempts by others may have left the thermocouple holding bracket either distorted or bent. The final position of the thermocouple tip is not absolutely critical but at least 1/4" of the tip must be fully immersed in the blue flame. Photo #6 below shows the thermocouple and igniter both in the midst of the deep blue flame. A much lighter colored blue flame extends slightly over these items but it is barely discernable in the photo. Also note the holding bracket for the thermocouple and how it is slightly bent to achieve the proper position.

Photo #6

If the bracket is bent or distorted and the tip of the thermocouple just barely touches the flame or doesn't touch it at all, then it will not be brought up to full temperature and therefore no signal to signify the presence of a flame will be generated. And then once you release the safety valve button, it will automatically stop the flow of gas because it thinks there is no flame present. The presence of debris and burnt particles on the tip of the thermocouple form an insulating jacket or pull heat from the tip of the thermocouple and prevent it from being brought up to full temperature. Then the same shut down procedure will happen once the safety valve button is released.

Cleaning the Igniter:

The igniter is held in place with one small Phillips head screw which is probably the most difficult screw to access as it tends to be blocked by the thermocouple which may need to be temporarily removed. There is no need to remove or re-route the wire itself as there will be enough slack to examine and clean the tip as needed. The tip should be L-shaped with the shortest portion of the L being held in the flame area just over the flame area of the burner orifice. Photo #7 below shows the igniter with it screw mounting flange being removed from the burner box.

Photo #7

Once the igniter is removed from the burner box, use a fine piece of emery cloth or granite sandpaper to clean the end that normally sticks into the flame. This end will normally be discolored from the heat but try to make it as clean as possible without any debris or particles being burned onto the tip. Once the igniter tip is cleaned thoroughly, simple replace it in the burner box and re-install the screw.

The igniter should be properly positioned with the correct gap automatically unless the tip has been bent. Normally the gap between the igniter tip and the burner orifice tube should be between 1/8" and 3/16".

Cleaning the Burner Orifice Assembly:

The orifice assembly has two major parts - the orifice itself, which is a round brass plug with a small hole drilled down the center of it, and a sheet metal tube containing air holes and a series slits where the gas burns. Both of these may need cleaning. Photo #9 below is a close up of the gas outlet slits in the burner orifice tube once it has been removed from the burner box. Just to the left of the screw mounting flange are the three air inlet holes. The brass orifice is just off the left side of the photo and is part of a brass fitting.

If the flame is yellow or flickers erratically, then the burner orifice is probably plugged and/or dirty. Removal is similar to the igniter and thermocouple in that one screw holds it in place on the burner box bracket. In addition, the gas line must be disconnected so that the burner orifice can be removed for cleaning.

Always use two wrenches on all gas line fittings: one to loosen a fitting and another to hold the mating piece stationary. Failure to do this may cause the copper gas line to bend or create a leak at another fitting. Photo #8 below shows the gas line disconnected and the retaining screw being removed from the flange around the burner orifice tube.

Photo #8

Photo #9

Once the burner orifice assembly has been removed from the burner box, examine the gas outlet slits that are cut into the metal. Soot and other debris may eventually build up here blocking one or more of the slits. In Photo 9, note the debris and small particles around the slits, especially the slit closest to the mounting flange. This one is not particularly dirty but the slits still need to be perfectly cleaned out. Use fine emery cloth, the green scratch pad, or a stiff fiber brush to remove the debris and thoroughly clean the tip. Shake out any debris that remains in the tube.

Use only alcohol to clean the brass burner orifice. Do not use gasoline or any other type of solvent. Any residual of those chemicals may burn off with excess soot and carbon build-up. Do

not use a pin or wire to poke into the orifice tube. You can fill up a small drinking glass with alcohol and allow the burner orifice to soak for several hours if there is any build-up of soot or carbon. To make sure the orifice is not plugged, try holding your fingers over the three air inlet holes and blowing into the brass fitting while holding the extended portion of the orifice tube in the alcohol. You should see bubbles coming out of the gas outlet slits. If not, things are still plugged up. Photo #10 below shows the cleaned burner orifice tube ready to re-install in the burner box.

Photo #10

Once the burner orifice assembly is attached, then reattach the gas line fittings using two wrenches. These are flare nuts and compression fittings and no pipe dope or Teflon tape is needed.

There are no positional adjustments to the burner orifice and there are no provisions for adjusting the size of the orifice or air mixture. Once you go through the troubleshooting steps again, everything should work just perfectly. If a yellow flame continues to appear after cleaning the burner orifice, then the air mixture is still not correct which means something is wrong with the mechanical set-up of the burner orifice and the only remedy is to purchase a replacement burner orifice.

If everything checks out and the propane lights on first try and stays lit, then pat yourself on the back for doing a good job. You just saved about $100 to $200 in charges and you have the peace of mind knowing that you did a complete and thorough job.

If you are still have problems keeping the flame lit and you know for sure that the burner orifice is clean along with the burner box , then the thermocouple may need replacement.

Part 3 - Replacing the Thermocouple

If all burner parts have been cleaned and properly re-assembled, and the burner lights but still will not stay lit, then it is likely that you have a bad thermocouple. This unit cannot be repaired, and must be replaced.

Background

Recently, our refrigerator stopped working in the propane mode. As it had previously worked during a recent trip on both 12 volts and 120 volts, I knew that there could not be anything wrong with the cooling unit. The problem therefore must be somewhere in the propane workings. I had nearly a full tank of propane. I lit a burner on the stove for a minute or so and I tried to start the refrigerator in the gas mode. The needle on the front panel meter moved upscale very shortly after depressing the igniter button several times, but dropped back towards the low end as soon as I released the right hand red button. Apparently, the flame was starting but then going out after I released the button. To confirm this, I went outside, removed the lower vent grill and opened the cover to the combustion box. I then had my wife go through the motions of attempting to start the refrigerator once again. Sure enough, as soon as she punched the igniter button with the right red button depressed, the proper flame started immediately in the burner box. But as I suspected, as soon as she released the right hand button, the flame went out. Conclusion, our refrigerator had a bad thermocouple.

A thermocouple is a device consisting of a junction of two dissimilar metals usually that will generate low levels of electrical current in the millivolt range when the junction is exposed to heat or cold. In RV refrigerators, the thermocouple is used as a safety device to shut down the flow of gas should the flame be inadvertently extinguished. The lower end of the thermocouple has a probe housing the junction. This is positioned in the combustion box directly above the flame which heats the coils. The low voltage signal thus created by the flame is transferred by the thermocouple to the interrupter. This voltage signal activates a low level magnet which will hold the interrupter and the safety valve open. The magnet itself will not pull the safety valve open but once opened, the magnet is strong enough to hold it in the open position. The valve is initially opened by pressing the right hand red button on the front panel. If the flame lights and the thermocouple sends a signal to the interrupter, the flow of gas will continue when the right red button is released. If the flame goes out when the red button is released, then the thermocouple is bad.

Purchase Of The Replacement Thermocouple

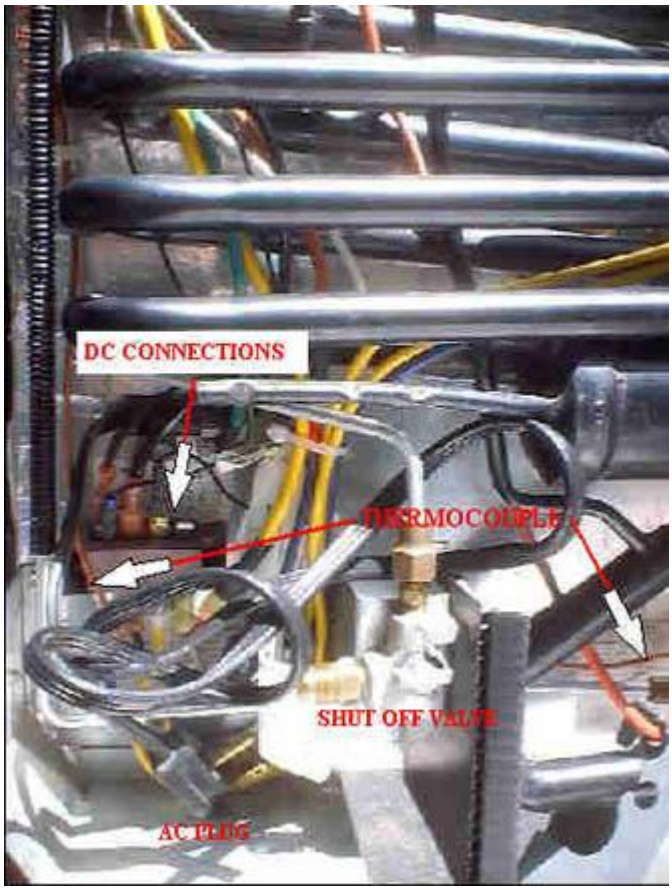
Because we live in a remote rural area, I find it more convenient and less expensive to purchase replacement parts on-line or by phone. I called Lichtsinn's and they had a replacement Thermocouple – Norcold part number 619154 The cost was $25.95 with their summer discount of 5% [winter discount is 10%]. The part arrived a few days later via UPS to my door.

Removing The Refrigerator From The Trailer

I decided that it would be easier to replace the thermocouple if I removed the refrigerator from the trailer. This would provide unlimited physical access to the parts involved in the replacement. The thermocouple, or TC for short, [a 54" long copper tube] has its probe positioned inside the burner box at the lower left rear of the cabinet. From there the tubing goes horizontally across the rear of the cabinet to the right side and then up to the top of the cabinet, where it follows across the top to the center of the cabinet to the interrupter. The interrupter is directly behind the right red button on the control panel. The upper end has a brass fitting which threads into a mating hole in the interrupter.

I began by turning off the gas supply at the tank, making sure that the valve was tight. I removed the lower outside vent grille to gain access to the rear portion of the refrigerator. I unplugged the

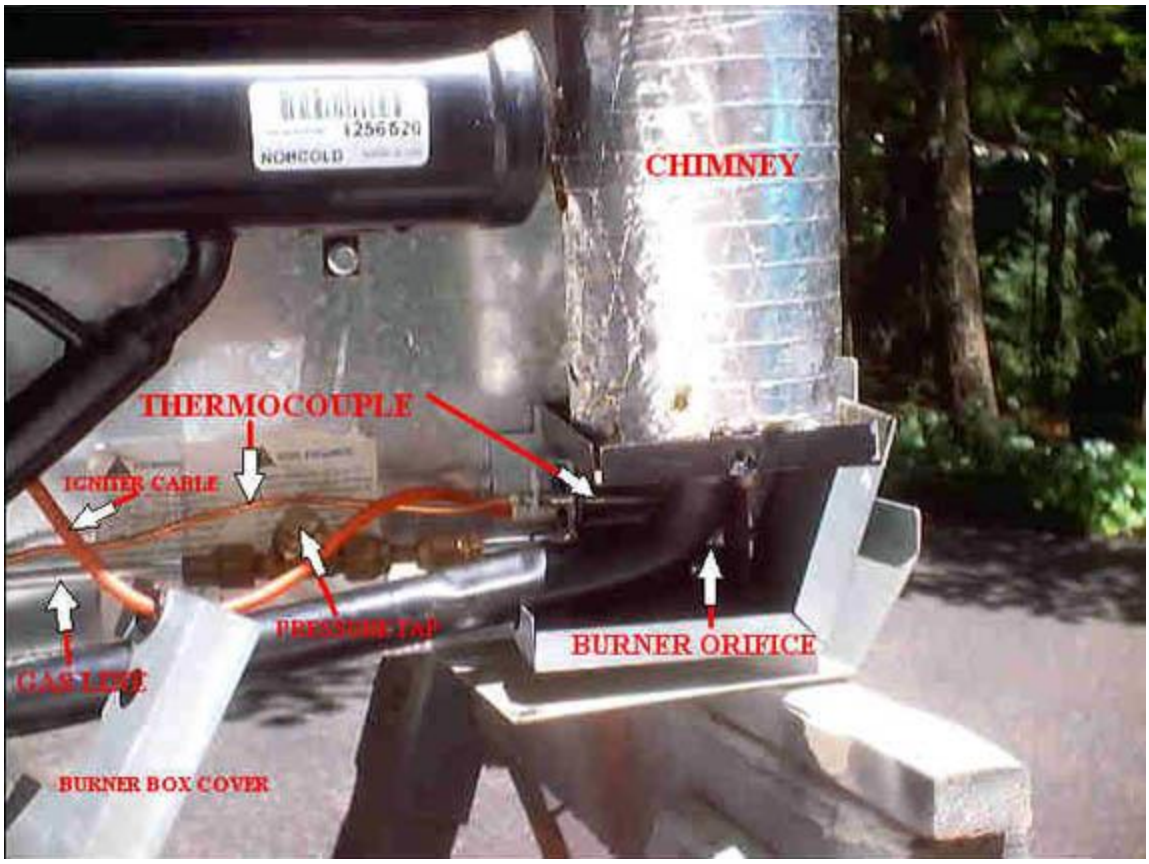
120 volt supply cord from the receptacle on the left. The 12 volt wires were removed from the terminal block (yellow and white wires). I turned the gas valve that is part of the refrigerator to the "OFF" position. I removed the two lock nuts on the bolts that fasten the refrigerator to the hold down brackets. The bolts are positioned with the heads down, the threads up and the nut on top. Some bending of the brackets was necessary to remove the bolts. I disconnected the gas supply line at the junction of the copper supply tube and the gas line that goes to the refrigerator. I used two wrenches, one on each side of the connection to avoid damage to the fitting. I went inside the coach and removed the refrigerator door by removing the top screw on the hinge, noting the position of a plastic washer. I also took out the six Phillips head screws from the side of the refrigerator case and it was ready to be removed. I initially pushed on the back of the refrigerator case from the outside until I moved it inward about 4 -6 inches. Working from inside the trailer, I pulled it out of the cabinet the rest of the way. It is not particularly heavy but its bulk makes it a bit cumbersome. I tried not to grab the piping in the back for use as a handle to avoid any possible damage to the cooling portion. With the door off, I could position one hand partially inside the box in order to lift the refrigerator. Once it was out if the cabinet, I carried it out of the trailer. I positioned it on two saw horses which gave me easy access to all of the parts.

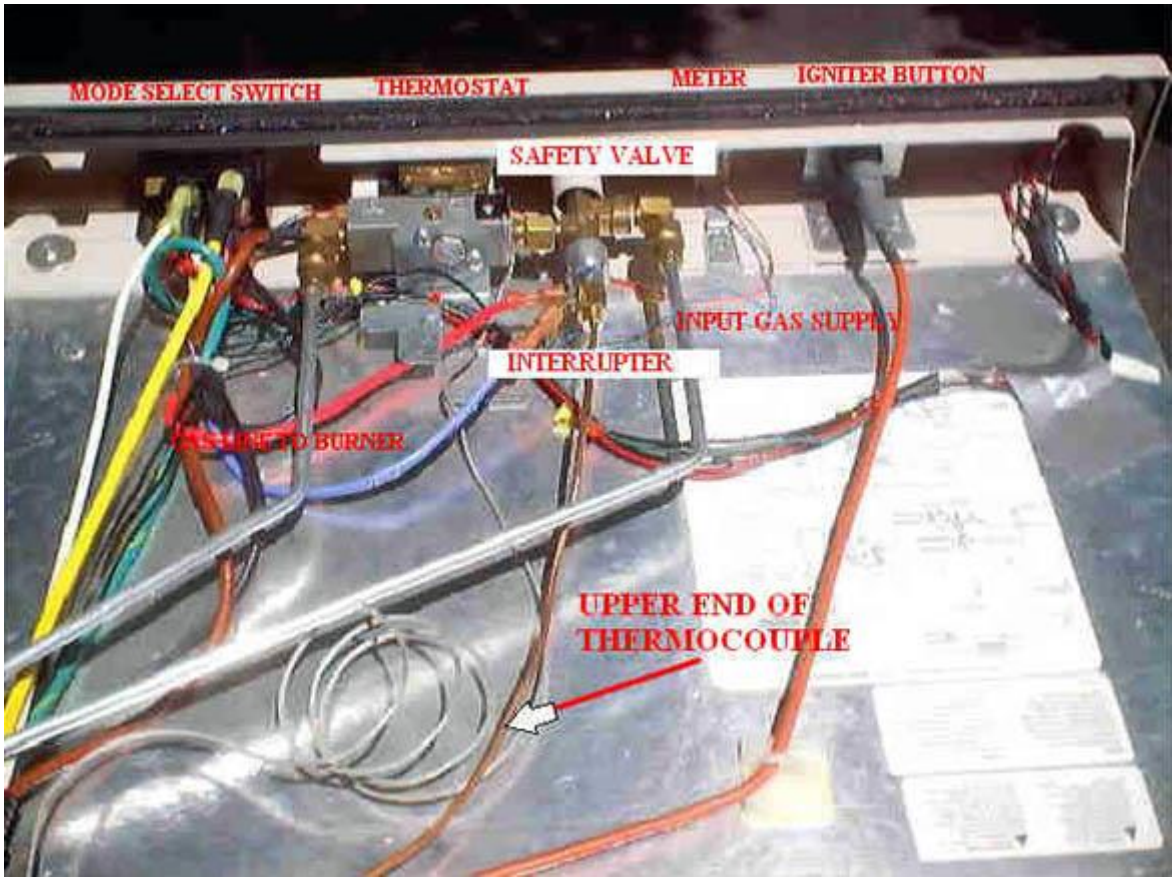


Old Thermocouple Removal

I made mental notes on how the TC was routed before actually taking it out. There are three nylon cable ties holding it in position along the vertical run along the right side of the box. I snipped those loose, pulled the probe end out of the burner box, unthreaded the brass fitting from

the interrupter and pulled the TC out of its position. I was then ready for the installation of the replacement TC.





New Thermocouple Installation

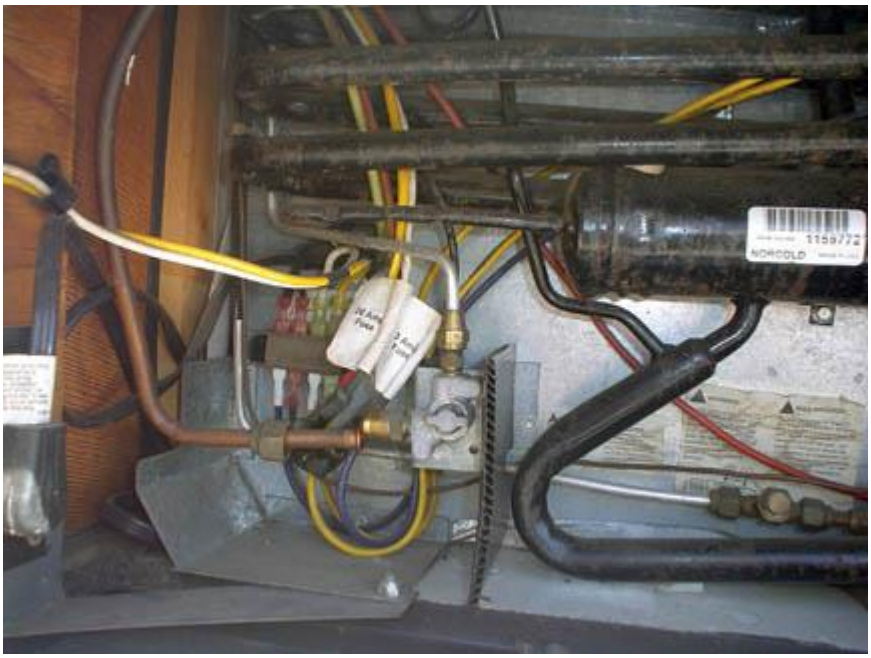
I uncoiled the new Thermocouple and straightened it out to its full length….54". I inserted the probe end into the burner box and routed the rest of it similarly to the old one and positioned the upper end near the interrupter so that I could thread it into the interrupter opening. I snugged the fitting gently but firmly. I installed three new cable ties in approximately the same position as the old ones and the refrigerator was ready to go back into the coach. I would like to have tested the refrigerator operation before reinstalling it. However, I did not have any means of supplying gas to the refrigerator while it was out.

Cleaning And Repainting The Rest Of The Mechanism

At this point, you have installed the new thermocouple and are ready to re-install the refrigerator. However, take a good look at the back side. As long as you have the entire thing out and sitting on the bench, why not consider doing a complete maintenance of the burner and heating tube assemblies and at the same time, cleaning up some of that rust so the thing will look new again.

If you'd like to consider this option, just continue on. On the other hand, if you think everything is clean enough and you just want to put the thing back together, then jump ahead to the next section entitled "Putting the refrigerator back in the trailer".

Take a good look at these two pictures. This is the same identical refrigerator but only one day later, after the black metal parts were cleaned of the surface rust and a new coat of paint applied.



OK, what's so important about having a nice black shiny paint job on the parts of the refrigerator that you don't even see? These parts are painted black for a reason: heat transfer. Technically, your refrigerator makes things cool by first heating up some of its parts. After some magic is done with the ammonia gas to create the cooling inside the refrigerator, these black painted parts must now shed some of that heat. Take a look towards the top of the refrigerator and notice one tube with a bunch of cooling fins on it just like a radiator. Metal finishes that are smooth and black will transfer away more heat energy than a metal finish that is rusty and covered with dirt.

To accomplish this refurbishment, a lot depends on just how detailed you want to get. To be done thoroughly, you will need to remove the insulation around the heat pipes and chimney. There you will also see the actual 12V heat element and the 110V heat element. Both can be removed and a little emery cloth used to shine up the working end of the heat elements.

You can begin by carefully cutting the aluminized foil wrap around the insulation. Look at the next photo and you will see that this insulation is really two half round pieces that are held together by nothing more than the aluminized foil. You can see or feel exactly where the pieces join together. Use a razor blade or sharp knife to cut right along this joint. Remove the two halves of insulation to expose the heat pipe area.

With the insulation removed, you can see where the two heating elements are attached to the heat pipe. Now the design of the entire heating area becomes obvious. Either the propane flame or one of the electrical heating elements are used to heat up the gas inside the large tube. The two electrical heating elements merely sit in a round tube of there own. All of these vertical heat tubes are welded to the main tube that contains the ammonia gas. The idea here is simple: whatever form of energy is used, it's only function is to apply heat to this area of the tube with the ammonia gas. The insulation is only used to concentrate the heat in one area and to keep ambient air from cooling off this area.

You can remove the electrical heating elements and used some emery cloth to remove surface rust. With the entire heating area now exposed, its clear that a lot of rust forms in this area. Use a stiff wire brush wheel on an electric drill to remove as much of the surface rust as possible. Use sandpaper or emery cloth to get into the areas the wire wheel can't reach. Continue to clean up as much of the black painted areas of the refrigerator as you determine to be necessary.

When you are satisfied (you won't get everything down to bare smooth metal), you are now ready to apply a new coat of black paint. Try to be neat here as you don't want black overspray all over the other areas of the refrigerator covering wires and other gas tubing parts. Use newspaper to cover those areas and mask off with tape. It only takes a few minutes where you can protect everything. Here's a tip: it will take three or more light coats of a gloss black enamel to get a good looking coat. Use a fast drying paint so that you don't have to wait a day between coats. With a little patience, you finished product should look something like the photo on the right. And when you first use your thoroughly

cleaned refrigerator, it'll bake the new paint as it heats up so it sort of smells just like a new one.

Another Cleaning Idea

Here's a tip from another owner whose fridge did not work at all on gas and barely got cool on electric:

These old absorption units can be real troublesome if not kept clean and mine was full of rust so I removed the burner and cleaned it. Now for an old trick from my days as a refer repair man. Go to Wally World and purchase a 12 gage shotgun cleaning kit. It will contain a round wire brush on a metal pole. Attach the brush to an electric drill and polish out the heat riser tube in the fridge. Be sure to remove the spiral heat deflector inside the tube it hangs on a wire that is attached to the top of the tube. Polish out all the rust in the tube also remove any rust from the heat deflector. Now put it all back together and then turn the refrigerator upside down and let it set over night. This causes the fluids to circulate in the system and dissolve any of the solids that may have formed due to the refrigerator being run unleveled. It is not as much of a problem in these small fridges but the larger ones can get “vapor locked “if run unleveled. Turn the unit right side up and let it set for another 12 hrs then it is ready to reinstall.

Cleaning tool

Burner Assembly

Putting the refrigerator back in the trailer

This was basically the reverse procedure of removing it. After it was positioned in the cabinet, I connected the two tie down bolts in the back first and then reinstalled the screws around the front of the cabinet. I did not install the door until after I had checked operation of the refrigerator. After making the electrical connections (the white wire is -12 volts while the yellow wire is +12 volts; there are + and – markings on the terminal strip where the 12 volts connections attach), I reconnected the gas supply line. I opened the refrigerator valve, then the tank valve and went inside for a test. As the tank had been off for a bit, I first lit a range burner to allow the gas to refill the supply lines. I set the mode switch to gas, held the right red button down and then pressed the igniter button repeatedly until I saw the meter read upscale. After I was sure that it was well upscale, I released the right red button and the meter held its position. As a further check, I went outside, peeked in the inspection hole in the burner box and sure enough the gas flame was burner merrily. It was a nice blue flame and properly positioned. I repeated the startup process several more times. Each time the refrigerator started quickly and the flame stayed lit. I went back inside the coach and reinstalled the refrigerator door.