[Update Nov 15, 2004]

Q: My TrailManor has several gas appliances. What do I need to know about gas and gas appliances?

GENERAL INFO

When you're talking about a camper or RV and you mention "gas", you are talking about propane. Propane is a hydrocarbon fuel that is commonly obtained as one of the by-products of petroleum refining. It is sometimes called "liquefied petroleum gas", or LP gas. Although the terms "propane" and "LP gas" are not strictly equivalent (butane is also an LP gas), you can use them interchangeably for RV-related purposes.

It is worth mentioning that propane is not the same thing as "natural gas", which runs many electric power plants and heats many homes in the US. Natural gas, which is mostly methane, has some similarities to propane, but is usually supplied from a gas main under the street. It is generally not suitable for inexpensive portable applications.

Propane gas is also not the same thing as the "gas" that powers your car. That is "gasoline", a completely different substance.

Propane is a gas at room temperature and pressure, but under moderate additional pressure it turns to a liquid. It is much more practical to carry liquid propane, since 250 gallons of propane gas turns into about 1 gallon of liquid propane. In RVs, liquid propane is carried in pressurized tanks, which are also referred to as "cylinders" or "bottles". Most RVs, including TMs, carry two tanks. The most common tank size, and the one used by all TMs, holds 20 pounds of propane (about 4 ¼ gallons). Larger sizes - 30 or even 40 pounds - are found on larger trailers. Beyond that, tanks starting at 100 pounds are used in fixed installations.

THE TANKS

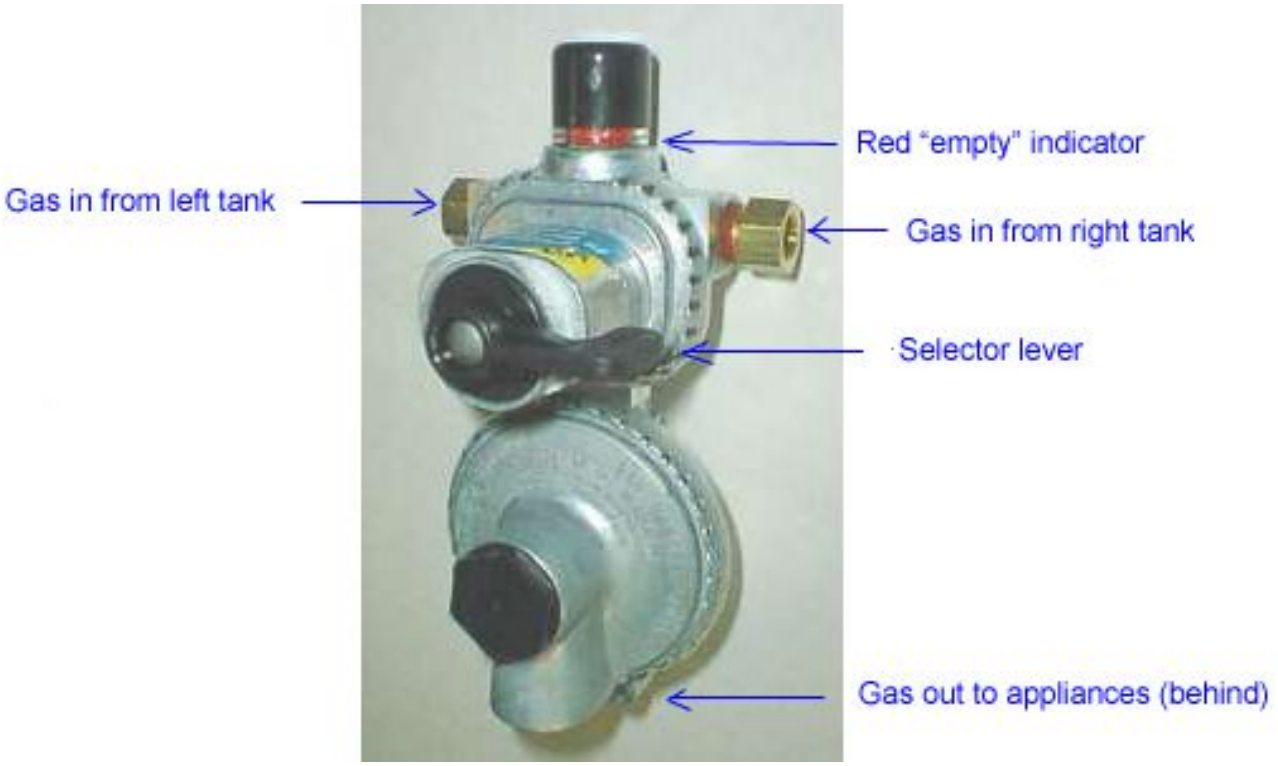
TM's propane tanks, like most, are made by Manchester Tank http://www.manchestertank.com. Manchester has a nice web site with a lot of information about propane, tanks, regulators, and so forth. Among other nuggets to be found there is the need to purge a new tank. When a tank is manufactured, it is not filled with propane. Instead, it is pressurized with an inert gas that absorbs any water vapor that may be in the tank. The first time the tank is filled, the technician must "purge" it (remove the inert gas) through a special valve at the fill station. According to Manchester, if a tank is not purged, it will be hard to fill. In addition, the inert gas will mix with the propane vapor, and the mixture will burn poorly. Appliances then require constant adjustment, and pilot lights won't stay lit, until the inert gas is finally gone. So when you first fill a new tank, be sure to tell the propane tech that you have a new tank and it must be purged.

THE PRESSURE REGULATOR

In RVs, propane is used by a number of heating appliances (furnace, water heater, stove top, oven), and by the refrigerator. Some RVs (but not the TM) also have propane lights. None of these appliances can use liquid propane - it must be allowed to vaporize. This is done by gradually releasing the pressure in the tank, much like slowly unscrewing the cap from a bottle of soda. Tiny bubbles of propane gas rise through the liquid and are collected at the top to supply a steady stream of pressurized propane gas. Some appliances (so-called "high pressure appliances", which are usually designed for the little 14-ounce cylinders) can use this stream of gas directly, but most are designed to operate from a much lower and

steadier pressure. The job of creating and maintaining that low pressure is done by a device called a pressure regulator, or "regulator" for short.

TMs use the regulator shown in the picture below, made by Marshall Brass. It actually performs two functions. The first is to create and maintain the low-but-constant pressure described above. The second is to switch automatically between two propane tanks, so that the propane supply is never interrupted. That is, the regulator takes propane from only one of the tanks, until that tank is empty. Then it switches over and begins to draw gas from the full one, automatically. It also raises a red indicator, to let you know that one tank is empty. When you see the red indicator, you can remove the empty tank, refill it, and put it back in service, without ever interrupting the propane supply to the appliances. BUT FIRST you must flip the selector lever to point at the full tank! If you disconnect an "empty" tank while the lever is still pointed at it, propane will escape. That's unnerving, to say the least.



Two stage automatic changeover propane regulator

In the picture above, the selector lever points to the right. This means that the regulator will use gas from the right-hand tank until it is empty, and then automatically switch to the left tank and raise the red indicator as shown. (Although the regulator switches to the backup tank, the selector lever doesn't move). When you are ready to refill the empty right-hand tank, you move the selector to the left. This tells the regulator that the left tank is now the primary one. You can then shut off the valve on the empty right-hand tank, remove it, have it refilled, and reinstall it. Don't reset the selector lever - leave it pointed to the left. The regulator will continue to draw gas from the left tank until it is empty, and then switch back to the right tank. With this approach, you alternate back and forth between tanks - a good thing to do.

SAFETY

Whenever you replace a propane tank, you should check the connection for leaks using a soapy water solution. Spray it or dab it on the connection. If there is a leak, it will blow bubbles. And sniff!

Liquid propane expands with rising temperature. Typically, a "full" tank of propane is actually filled to the 80% line. The other 20% is "head space" to allow expansion of the liquid propane. If there is less head space, the tank is considered overfilled. For years, propane was sold by weight. If the refill station puts the proper weight of propane in the tank, then there is enough "head space" at the top. However, if the refiller was careless, or tried to do you a favor by putting in a little extra, and then the tank heated up in the sun, the excess would be released through an automatic valve on the top of the tank. Needless to say, the unexpected release of a "whoosh" of propane can be quite dangerous. Newer tanks have a built-in float valve that prevents overfilling. This overfill prevention device, or OPD, is now mandatory on most portable tanks. Horizontal tanks, used on TM's slideout models, are exempt for a while, but will be required to come into compliance within a few years.

LEAK DETECTION: Propane is colorless, so you can't see it, and by itself it is odorless. However, at some point in the distribution cycle, a smelly sulfur compound (methyl mercaptan) is added. Most people can detect methyl mercaptan at about 0.5% concentration. Fortunately, propane will not burn until it reaches about 2.5% concentration - below that, the mixture is too "thin" to burn – so you smell it before it has built up to the danger point. If you smell propane, you should immediately get out of the trailer, leaving the door open, and turn off the main valves on the tanks. Let everything air out, then investigate the source.

Propane gas is slightly heavier than air. Left to itself (no other air movement), it will slowly sink to the floor. Your TM has a propane gas detector mounted near the floor to detect this condition. It will detect propane at about the same concentration as your nose, but it's near the floor and it never sleeps! Unlike most smoke detectors, it is powered by the TM – it does NOT have its own internal battery. If the TM battery gets really REALLY low, the propane detector will begin to beep to warn you that it can no longer do its job, but by this point, all the other appliances will have died too, so it is unlikely that this will be your first warning of a dead battery.

USING THE GAS APPLIANCES - GENERAL NOTES

It is considered a bad idea (and is illegal in some places) to leave any of your propane appliances lit when you are on the move. Turn off the furnace and water heater, switch the refrig to 12 volts DC, and turn off the propane valves on the tanks. When you arrive at your campsite, switch everything back. You'll be safer.

When you shut off the tanks, the propane that is in the lines gradually bleeds away, of course. When you arrive at the campsite, the propane pipes are filled with air, not propane, and that can make it frustrating to try to light the appliances. They won't light until the propane reaches them, and that can take a long time! Once you have set up the TM at your new campsite and you are ready to light the appliances, TM recommends (and my experience confirms) that you turn on the propane at the tanks, and then turn on the front burner of the stove and match-light it. It will take several seconds to light as the air is purged from the lines, but it will bring propane to the stove, and at least closer to the other appliances. Once it lights, you can shut it off - the purge is done.

LIGHTING THE FURNACE

The furnace has an electronic spark ignition, and lights itself. There is no pilot light, and no need for a match. Once the gas line is purged, lighting the furnace is simply a matter of raising the thermostat to the desired temperature. The blower will start within 10 seconds or so, but the gas flame won't light for another 10 or 15 seconds. This is a safety feature - be patient. By the way, when you break camp and get ready to close the TM, be SURE that the thermostat is switched off. You don't want the furnace to come on while the trailer is closed! The safety switch under the bathroom wall does NOT cut off the furnace power, so this is another good reason to shut off the propane at the tanks while travelling!

LIGHTING THE WATER HEATER

Like the furnace, the water heater is self-lighting. Just flip the switch on the panel in front of the sink. The red light comes on, indicating that it is trying to light. When it is successful, the light goes out. Three things are worth noting.

1. DON'T turn on the water heater until it is full of water. Turning on the flame under an empty heater can damage it.
2. DON'T try to light the water heater until you have purged the propane lines as described above. Unlike the furnace, the water heater will try to light itself for a while, and then give up. Once it has given up, you have to turn it off for a while before trying again.
3. The water heater has two sources of heat - an electric heating element, and the propane flame. The manufacturer's web site states that it is perfectly OK to run both simultaneously, to increase the recovery rate.

LIGHTING THE REFRIGERATOR

If you haven't purged the gas line as described above, do it now. Lighting the refrig will take forever if you haven't purged, and it's pretty leisurely even if you have. Turn the rotary switch to the GAS position. Push in on the right hand button labeled "Push While Lighting", hold it in, and wait a few seconds. Then, still holding that button in, push the left "Push While Lighting" button several times. Each time you push it, it goes SNAP. Although you can't see it, each SNAP creates a spark which will light the pilot light if the gas has reached the pilot light assembly. You can't see the pilot light, either, but when it lights, the red needle on the little meter will start to rise. When the needle reaches the green area, hold the right button depressed for at least ten more seconds, and then release it. If the needle stays in the green area, you are done. If it drops back into the red, the pilot has gone out. Push and hold the right button again, and snap it a few more times. Eventually it will stay green.

LIGHTING THE STOVETOP

All three burners on the stovetop must be lit with a match. Actually, I use a long-snout butane lighter, such as is used to light a BBQ grill. Works great, and prevents burned fingers.

LIGHTING THE OVEN

For me, anyway, the oven is by far the most frustrating appliance to light. Open the oven door and look at the solid shelf in the middle. The burner is under this shelf. Grab a flashlight and a fistful of matches (or your long-snout butane lighter), get down on your knees, peer under this shelf, and locate the pilot-light assembly about halfway back. Turn the oven control to PILOT, push in on the knob, and hold it in. At this point, you are using one hand to hold the flashlight and the other hand to hold the pilot knob depressed. With your third hand, stick a lit match under the pilot-light assembly, and wait patiently until

you see a small blue flame pop up. KEEP THE KNOB PUSHED IN for another 15-30 seconds! If you release it too soon, the little blue pilot flame will go out and you have to start again.

This process seems to take forever, and it takes even longer if you haven't purged the line as described above. I have actually found that after I push the knob in, there is no point in lighting a match for at least 15 seconds. It takes that long for the gas to get to the pilot light, and the match has gone out by then.

SPIDERS

After long storage, it occasionally happens that an appliance will simply refuse to light. Believe it or not, there is a type of tiny spider that likes propane, and it is not uncommon for one to take up residence in the gas orifice for the appliance and clog it with web stuff. If this is the case, you need to clean the orifice, and the entire area where the air and gas mix.

To locate the orifice, consult the appliance manual that came with your TM, or go to the appliance manufacturer's web site. Clean it carefully, the parts are delicate. The best method is to blow compressed air through it. If you don't have access to compressed air, you can clean the larger areas with a dry Q-tip, and run a piece of nylon monofilament fishing line through the tiny hole (the orifice) in the brass piece. Don't force anything! In particular, do not use a pin or a metal wire to clean it! The steel pin or copper wire is harder than the brass, and may scratch or score the walls of the orifice, destroying it.

THE DISCLAIMER:

I am not a certified propane technician. The material here is gathered from many sources, including the TM manual and my own experience. In particular, the appliance information centers around the appliances in my 2002 2720SL. TM, of course, may use different appliances in different models and years. The information here is correct to the best of my knowledge, but not guaranteed. For more detailed information, consult the appliance manufacturer, or a certified propane technician at a bulk propane supplier (NOT a retail cylinder exchange cage). And do NOT attempt to do propane plumbing or appliance repair yourself unless you have specific training.

AND A FINAL B IT OF TRIVIA

In some parts of the southern US, a propane supplier may actually give you a mix of propane and butane - or even pure butane – without telling you. Most of the time, this is a good thing, since butane contains about 11% more energy per gallon than propane, and the regulator and appliances are perfectly happy with it. But surprise! Butane won't vaporize when it is chilly (below about 32 degrees F). The liquid just lies there in the tank. If you fill up with butane in Texas, for example, and then drive to a cold campsite in the mountains of New Mexico, you'll be unhappy to find that your appliances won't work because the butane won't flow. The only solution may be to get out and hug the tank to warm it up. Brrr!

Bill