

GAS SYSTEMS, INC.

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SAFGAS[®]

THE COMPRESSED NATURAL GAS (CNG) SYSTEM

OWNERS MANUAL



INTRODUCTION

Thank you for selecting SAFGAS for use aboard your boat. Only the finest materials available were employed in the construction of our products. Please take a few minutes to read these instructions, a small investment in time against many hours of satisfied service.

IMPORTANT NOTICE TO THE CONSUMER

THE FEDERAL BOAT SAFETY ACT REQUIRES the manufacturers of boat equipment to maintain a record of the name and address of each appliance owner. PLEASE complete and mail your warranty card within ten days of purchase. The serial number is located on the top of the stove on the back face, or under the top burner lid at the rear of the burner box.

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INSTALLATION

In order to encourage safety and uniformity in installations, Gas Systems, Inc. products are manufactured in strict accordance with the American Boat and Yacht Council, Inc. (ABYC) *Standards and Recommended Practices for Small Craft*. To ensure compliance and your safety, we recommend all installations and surveys be conducted according to ABYC Project A-22, "Marine CNG—Compressed Natural Gas Systems". A copy may be obtained from American Boat and Yacht Council, Inc., P.O. Box 806, Amityville, NY 11701.

INSTALLATION INSTRUCTIONS FOR THE SAFGAS (COMPRESSED NATURAL GAS) SYSTEM

CYLINDER WITH REGULATION SYSTEM

1. Choose a cylinder location away from any potential fire hazard such as a gasoline fueled engine, hot manifold or exhaust riser. Should the cylinder be adjacent to a fire, and the valve safety rupture disc reach 212°F and 3360 psi, the disc would rupture and whatever natural gas contained in the cylinder would add to the fire already in progress.
2. SAFGAS is always a vapor, so all SAFGAS cylinders are designed without a relief valve.
3. The SAFGAS cylinder(s) should be *securely* mounted either vertically or horizontally; in an accessible area for easy operation of the SAFGAS cylinder valve, observation of the SAFGAS cylinder pressure, and for cylinder removal. Cylinder mounting brackets are optionally available.
4. **IMPORTANT:** The SAFGAS cylinder valve outlet fitting with protective cap with chain, and the regulation system nut, by law, have *left-hand threads*. The cap and nut is so marked with a slot.
5. The SAFGAS cylinder valve outlet fitting does not require pipe dope or Teflon tape and should be attached to the regulation system nut dry and clean to keep foreign materials out of the system.
6. Use a 10 inch crescent wrench to tighten the regulation system nut to the SAFGAS cylinder valve connection. Tighten the nut as you would welding tanks or a CO₂ cylinder, using approximately 50 foot pounds torque.
7. If the SAFGAS cylinder(s) is to be located on deck or exposed to water spray, point the regulation system so that water cannot run into the second stage (gray) regulator vent fitting, or into the body of the pressure gauge.
8. If the SAFGAS cylinder(s) is to be located inside a cabin or in an area with restricted overhead ventilation to the outside of the boat, be sure to install a 3/8 inch I.D. hose from the brass fitting on the gray regulator marked, "Vent" to an overboard vent. The overboard vent should be designed like a main fuel tank vent, so that water cannot flow back to the regulation system. Water, fresh or salt, will seriously damage or destroy the regulation system. As an added precaution, loop the vent hose "up" at the vent through-hull fitting so if water should start to flow into the vent or hose, it will flow back out of the hull by gravity. Do *not* loop the vent line "down" at the regulator as standing water in this "trap" will put back pressure on the regulator and adversely affect performance. See Installation Drawing: "GS-100".
9. Affix the cautionary sign in the immediate vicinity of the cylinder where the sign will be plainly visible. This sign is packaged with the regulation system.
10. Push-on *only* Gas Systems, Inc. approved SAFGAS hose on to the barbed, brass fitting on the fuel outlet connection on the regulation system. Be sure the hose is pushed to the plastic guard. Do *not* install any hose clamps.
11. Run the hose from the SAFGAS regulation system to the appliance(s) with 6 inch minimum radius turns, so the hose does not kink, cutting off the fuel supply and satisfactory operation of the appliance(s). Note: Fuel line pressure is less than 1/4 psi.
12. Use only continuous lengths of SAFGAS hose from the regulation system to the appliance with no breaks or splices. Keep the number of fittings to an absolute minimum. Every connection is a potential leak!
13. Keep hose away from heat or abrasion. Use plastic ties or clamps to secure the hose to the boat structure or bulkheads.

INSTALLATION INSTRUCTIONS FOR SAFGAS APPLIANCES

GIMBALED STOVES

Minimum clearance from burners to combustible overhead is 24 inches.

1. For a gimbaled range, make a cardboard template the same size as the side view of the appliance utilizing the dimensional drawings. Punch a hole at the gimbal location the size of the gimbal and swing the appliance template in the appliance cut-out location in the boat, on your finger. By allowing a swing of approximately 15° to 20° before interference with the hull or boat structure, the gimbal point can be located. Mark the point. See Installation Drawings.
2. Locate the companion pieces to the gimbals and install the appliance.
3. Push on the SAFGAS fuel supply hose to the barbed, brass fitting as was done on the regulation system.
4. A sliding bolt has been installed in the lower trim to prevent the range from swinging in rough weather. The bolt should lock into an adjacent cabinet or bulkhead. The bolt may be changed from the left side to the right side by removing the lower trim and reversing the direction of the bolt.

CAUTION: The appliance center of gravity will also shift from the gimbal location when pots are not balanced on the appliance or when the appliance door is opened.

5. Check all gas connections for possible leaks. Turn the valves on your appliance to their "off" positions. Open the valve on the gas supply cylinder and then close the cylinder valve to pressurize the system. If the needle on the gauge decreases from the pressurized setting after fifteen minutes, apply a soap and water solution to each gas connection, one at a time, by brushing the soap and water solution over the connection. Presence of bubbles will indicate a leak. Tighten fitting and recheck for leaks.

DO NOT USE OPEN FLAME FOR CHECKING GAS LEAKS.

6. Lower main top assembly in place. Secure burner grates into burner wells with the grate clips provided. Instructions are provided on the envelope in which the clips are shipped. These grate clips will hold the grate in place while under way.
7. Light the burner for testing.

NOTE: The appliance is now ready for use. Sometimes the burners will not ignite immediately and seem to "blow" slightly when they do ignite. This is usually due to the presence of air in the gas lines, which will clear itself within seconds.

GIMBALED MODEL, GS-2331 "RADIANT"

Please refer to the installation drawing for the proper cut-out dimensions for gimbaled service. It is VERY IMPORTANT to provide sufficient and unrestricted hose movement for proper gimbaling. Even if a gimbaled installation is not desired, a minimum of $\frac{3}{4}$ of an inch of space (clearance) is required between the surfaces of the stove and all combustible material. We recommend using the gimbal pin mounting plates even for "fixed" installations. The standard gimbal lock will serve adequately for securing the stove permanently.

NOTE: For each reduction of 5° of gimbaling motion, the depth of the cut-out may be reduced by $\frac{1}{2}$ inch.

1. For each of installation, install one gimbal mount with two #10 pan head screws as indicated on the cut out drawing.
2. Locate and drill holes for mounting the second gimbal plate directly opposite the first. DO NOT FASTEN DOWN at this time.
3. Slide the stove onto the fixed gimbal plate while holding the unmounted plate in the center hole of the stove. (Helpful hint: Taping the loose mount to the stove will ease installation.)
4. While maintaining pressure against the fixed mount, lower the stove until the predrilled holes line up with the holes in the loose plate.
5. Screw down plate by inserting a screwdriver through the holes provided in the stove (left and right side of the gimbal hole). Remove tape.
6. Push approved SAFGAS hose onto the barb at the back of the stove. Make sure that the hose is pushed up to the yellow plastic guard. DO NOT USE HOSE CLAMPS.

INSTALLATION INSTRUCTIONS (continued)

BUILT-IN STOVES

Minimum clearance from burners to combustible overhead is 24 inches.

1. Cut opening. See Installation Drawings.
2. Place range in opening and fasten to cabinet. The six screw holes that are to be used to fasten range in place are located at point AA (top of range) and BB (bottom of range). Use #8 flat head wood screws.
3. Connect gas supply line by pushing the SAFGAS hose on to the barbed, brass fitting, as was done on the regulation system. Do not use hose clamps.
4. Check all gas connections for possible leaks. Turn the valves on your appliance to their "off" positions. Open valve on the SAFGAS supply cylinder. Using a soap and water solution, check each gas connection, one at a time, by brushing the soap and water solution over the connection. Presence of bubbles will indicate a leak. Tighten fitting and recheck for leaks.

DO NOT USE OPEN FLAME FOR CHECKING GAS LEAKS.

5. Light the burner for testing.
6. The appliance is now ready for use. Sometimes the burners will not ignite immediately and seem to "blow" slightly when they do ignite. This is usually due to the presence of air in the gas lines, which will clear itself within seconds.

SAFGAS REFRIGERATORS

The following information supplements the information supplied by the manufacturer's Owner's Manual, which is enclosed with the refrigerator.

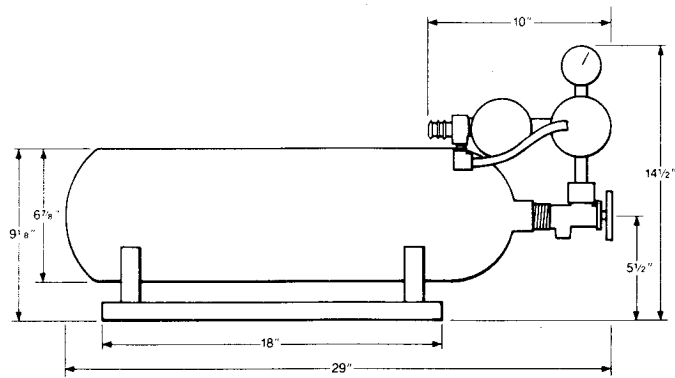
1. Be sure the refrigerator has the following minimum square inches of ventilation at both the top and bottom of the back side of the appliance.

GS-3	30 square inches
GS-4	40 square inches
GS-6	60 square inches

2. When the boat is in calm water, the refrigerator must be bubble-level (check in the freezer compartment).
3. When plugging or unplugging the main power from dock-side or switching to generated power, turn off the refrigerator both 12 volt D.C. or 117 volt A.C. Voltage surges can burn out the refrigerator heating element.
4. When the refrigerator is running on 12 volt D.C. the engine should also be running to avoid running down the batteries.
5. If the refrigerator ties into the same system supplying the fuel to another SAFGAS appliance, obtain a "T" fitting assembly from your local SAFGAS distributor.

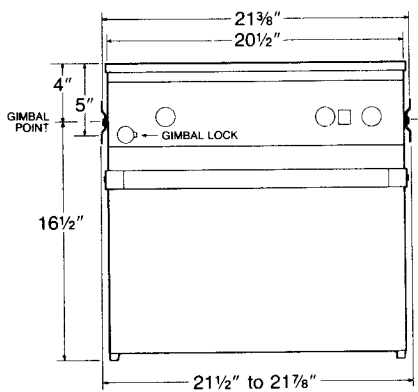
INSTALLATION SUMMARY FOR A SAFGAS SYSTEM

1. After all SAFGAS cylinders have been installed, the regulation system connected, the hose run and connected to both the appliance(s) and regulation, slowly crack open the SAFGAS cylinder valve and observe the pressure gauge on the regulation system. The gauge should read approximately 2250 psi at 70°F. (Little higher if warmer, or lower if cooler atmospheric temperature.)
2. Close the SAFGAS cylinder valve and observe the pressure gauge. It should hold a constant reading. If you can detect a falling in pressure over a 15 minute period of time, there is a leak. Leaks could be dangerous.
 - a. If a leak, check all appliance burners to see if in "off" position.
 - b. If range has an oven, make sure the oven control is in "pilot off" position.
 - c. Check all fittings with a soap and water solution. **Never use flame to check for leaks.**
3. If you cannot find the leak, contact Gas Systems, Inc. promptly.
4. Be sure to promptly fill out and mail the attached, "Appliance Owner Warranty and SAFGAS Cylinder Registration Card".

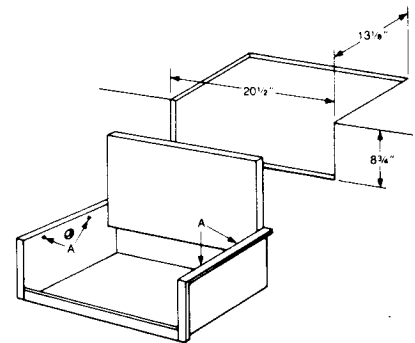
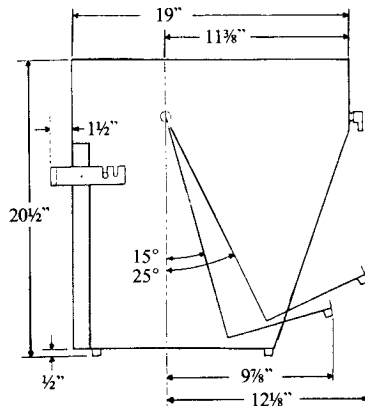


GS-100
(Shown with optional tank mount.)

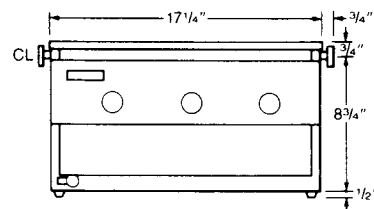
GIMBALLED STOVES WITH OVENS INSTALLATION DRAWINGS



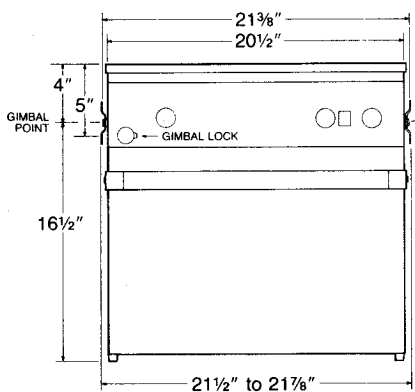
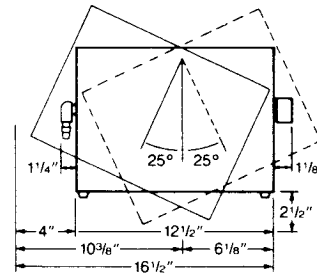
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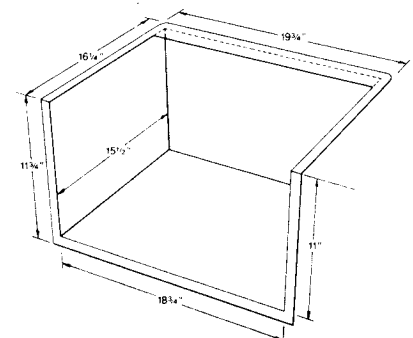
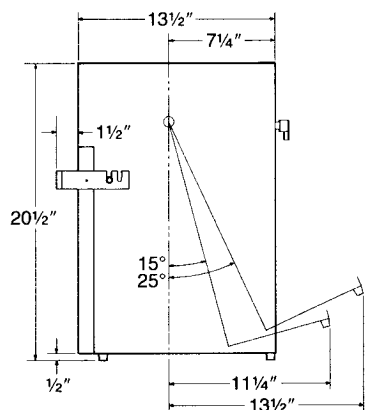
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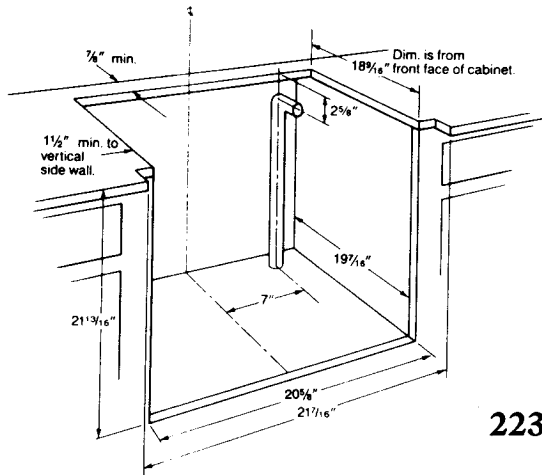


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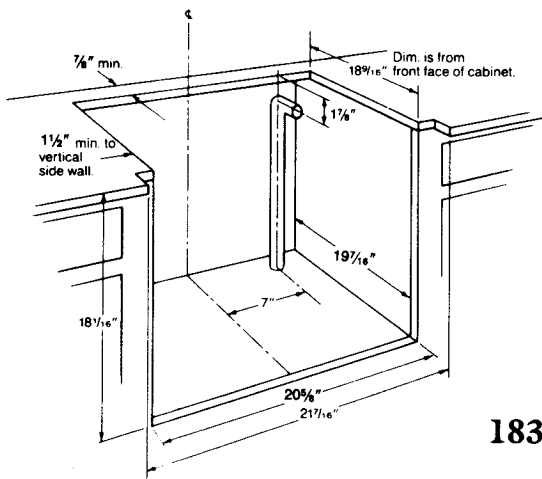
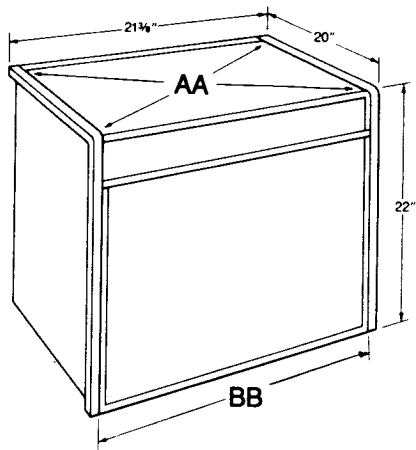


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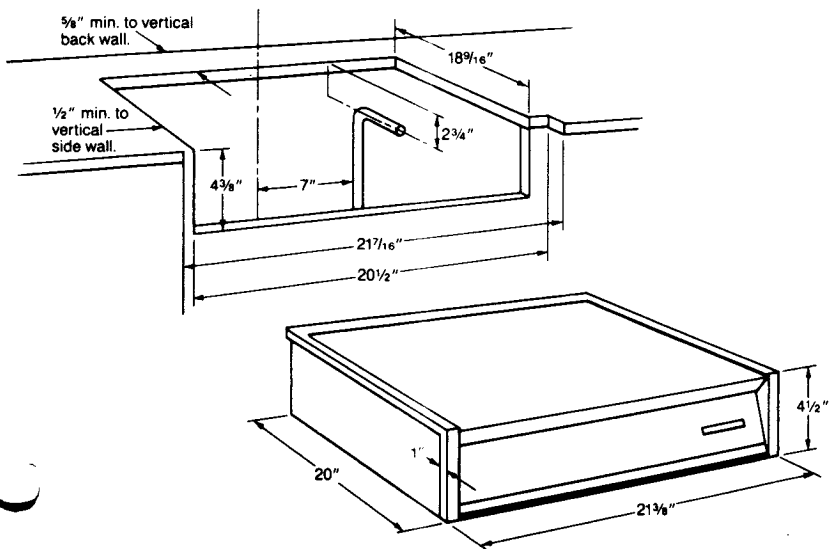
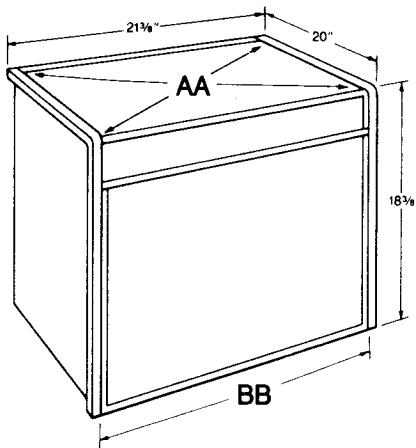
BUILT-IN INSTALLATIONS



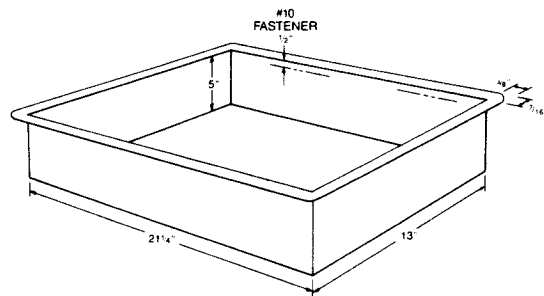
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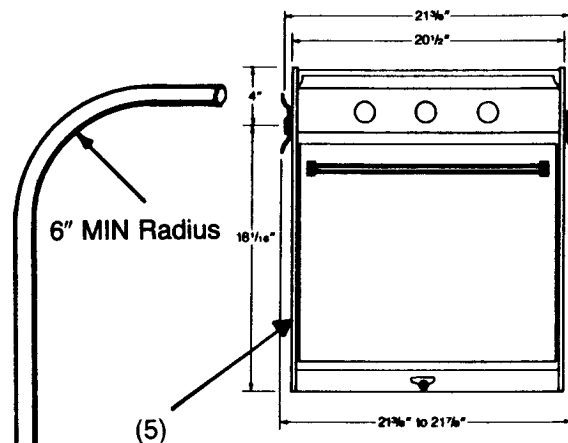


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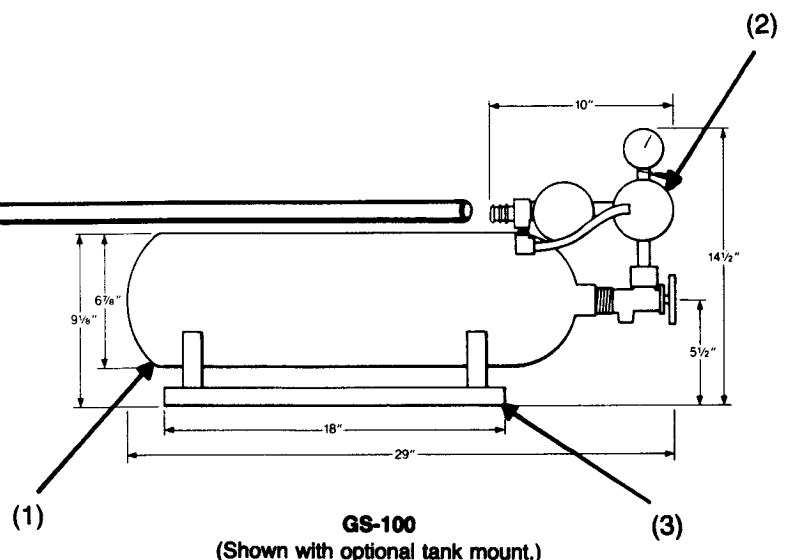
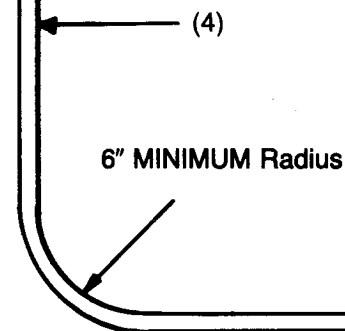
SAFGAS INSTALLATION WITH CYLINDER LOCATED IN A LAZARET OR WELL VENTILATED AREA



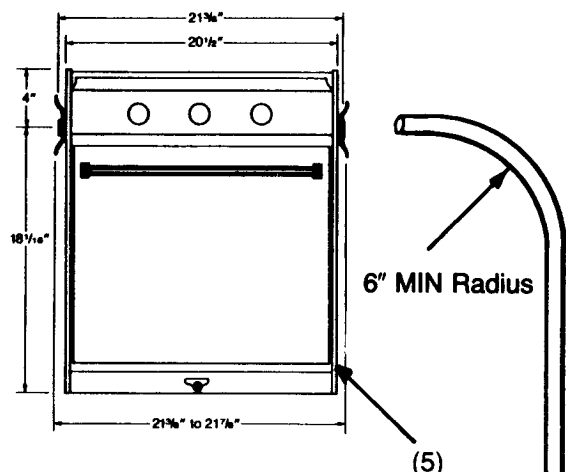
- (1) SAFGAS cylinder, GS-50 may be mounted in either horizontal or vertical position
- (2) SAFGAS regulation system, GS-50R
- (3) Cylinder mount
- (4) SAFGAS hose: 3/8" I.D.
- (5) SAFGAS stove, GS-3132-SS

NOTE: SAFGAS hose is designed with "push-on" barbed brass fittings. DO NOT USE HOSE CLAMPS.

Tee fitting may be installed to also operate refrigerator, BBQ or water heater



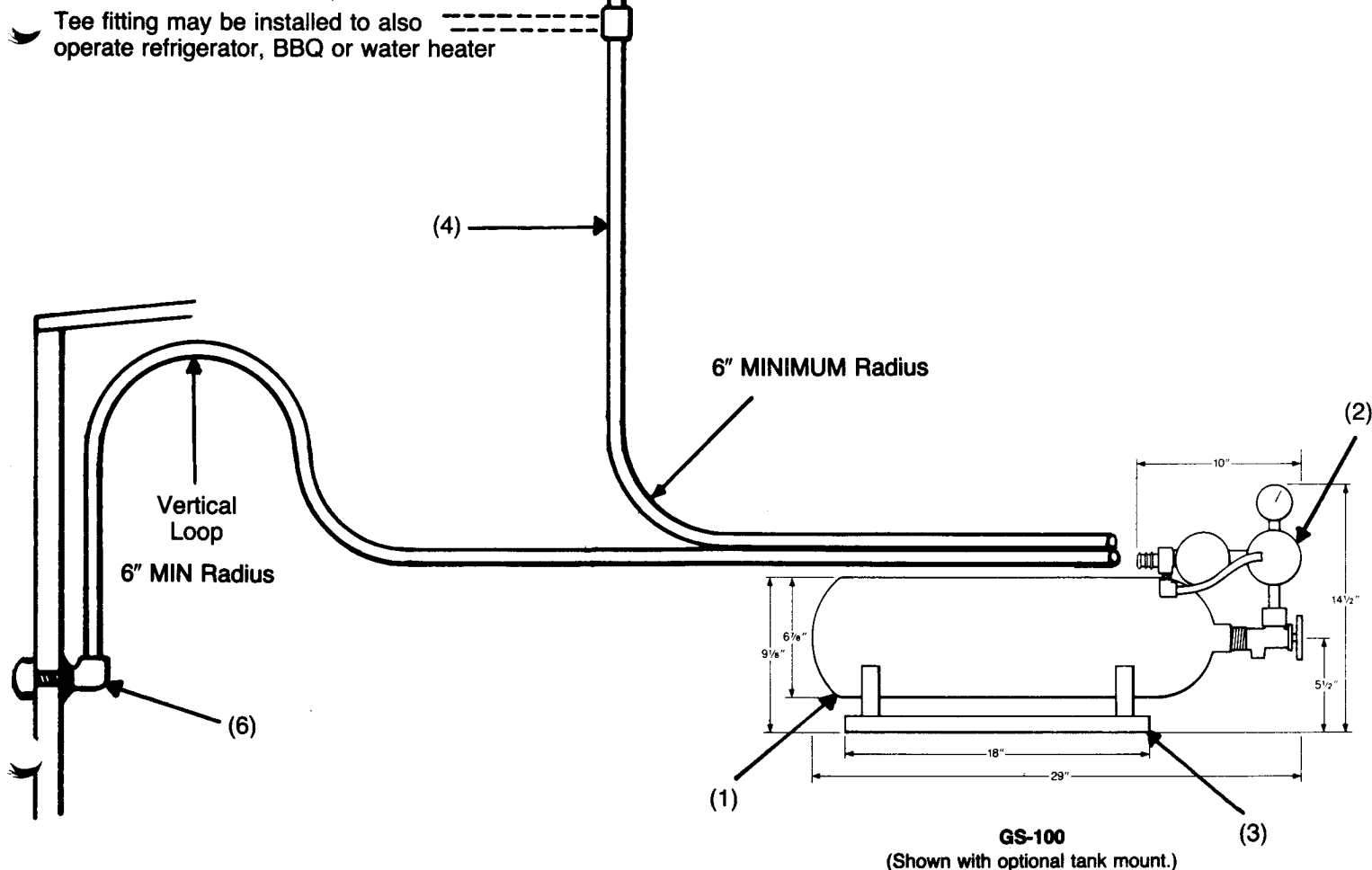
SAFGAS INSTALLATION WITH CYLINDER INSIDE A CABIN WITH RESTRICTED VENTILATION



- (1) SAFGAS cylinder, GS-50 may be mounted in either horizontal or vertical position
- (2) SAFGAS regulation system, GS-50R
- (3) Cylinder mount
- (4) SAFGAS hose: 3/8" I.D.
- (5) SAFGAS stove, GS-3132-SS
- (6) Overboard vent

NOTE: SAFGAS hose is designed with "push-on" barbed brass fittings. DO NOT USE HOSE CLAMPS.

Tee fitting may be installed to also operate refrigerator, BBQ or water heater



GS-100
(Shown with optional tank mount.)

OPERATING INSTRUCTIONS FOR A SAFGAS SYSTEM

SAFGAS CYLINDER WITH REGULATION SYSTEM

1. It is recommended that every time the SAFGAS cylinder valve is opened for use, the operator close the valve and watch that the gauge needle remains constant.
2. If leaks occur, correct. If leaks cannot be corrected, **do not operate appliance(s)**.
3. Always test light a top burner after opening the cylinder valve, to dispose of air in the supply line. This could be caused by someone's opening the system to change a SAFGAS cylinder or by opening a burner valve.
 - a. Instruction number 3 makes lighting the oven safety heater pilot much easier.
 - b. Instruction number 3, makes lighting the burner in the refrigerator easier.
4. In an emergency, close the SAFGAS cylinder valve, immediately.
5. The pressure gauge on the SAFGAS regulation system, aside from being a safety check, reads SAFGAS cylinder pressure. By reading the cylinder pressure, you know exactly how much SAFGAS fuel is still available. For example: 2250 psi is a full cylinder, 1125 psi is a half-full cylinder, and 0 pounds indicates an empty cylinder.
6. Before exchanging an empty or near empty SAFGAS cylinder for a full cylinder:
 - a. **IMPORTANT:** Always close the SAFGAS cylinder valve. Compressed gas can be dangerous if not contained.
 - b. With the SAFGAS cylinder valve closed, remove the *left-hand* threaded nut connecting the regulation system to the cylinder. Carefully stow the regulation system until a full SAFGAS cylinder is mounted and secured.
 - c. Remove the red, "Full" label from the protective guard cap to indicate that the cylinder has been used and is no longer full.
 - d. Unscrew the protective cap from the full cylinder allowing the cap to dangle from its chain. *Left-hand* thread. Reconnect the regulation system. Use no Teflon tape or pipe dope.
7. When transporting a SAFGAS cylinder, always screw the threaded guard cap on to the valve. This protects the thread and will keep foreign materials out of the SAFGAS system. Remember, **LEFT-HAND THREAD**.
8. When securing the boat or leaving it unattended, close the main gas valve on the SAFGAS cylinder supplying fuel to the appliance(s).
9. Installation of electronic solenoid "shut off devices" are *not recommended*. Restrictions in the SAFGAS fuel supply line caused by partially opened solenoids will adversely affect appliance performance.

IMPORTANT:

SAFGAS cooking appliances incorporate child-proof "push before you turn" control knobs.

All stoves with ovens have a "pilot on" position. To avoid wasting fuel, be sure knob is in "off" position when not in use.

TO OPERATE THE OVEN OR BROILER OF THE REGAL (MODEL 2133)

1. **CHECK FOR IGNITION SPARK**, by depressing the ignition button on the value panel while observing the oven or broiler burner. (Both burners will spark regardless of which one is intended for use.)

Note: Your Regal range is equipped with a state of the art electronic ignition, which is powered by a single 1.5V "penlight" size AA battery. Although the appliance can be "matchlit" if the battery fails, it is recommended you carry a spare for added convenience.

2. **TO LIGHT THE OVEN:**

- A). Partially DEPRESS oven/broiler CONTROL KNOB, and turn COUNTERCLOCK-WISE to the desired temperature setting.
- B). While PUSHING the IGNITION BUTTON, FULLY DEPRESS and HOLD the oven control knob until the burner lights, then release the ignition button only.
- C). CONTINUE to HOLD control knob for 10-15 seconds after burner has ignited. (This procedure overrides the flame safety thermocouple until the sensor is sufficiently hot to allow the gas to flow).
- D). SLOWLY RELEASE CONTROL after initial warmup and observe that the burner has remained lit, (if not, repeat steps a, b, & c).

3. **TO EXTINGUISH OVEN**

- A). TURN control knob CLOCKWISE until it comes to the positive "stop" (the knob will "pop out" to its original off position).

4. **TO LIGHT BROILER:**

***IMPORTANT NOTICE:** When using the Broiler, lock the oven compartment door in its 2nd (semi closed) position.

- A). Partially DEPRESS oven/broiler CONTROL KNOB and turn CLOCKWISE to the stop.
- B). Repeat steps b, c & d as in "TO LIGHT THE OVEN" procedure.

5. **TO EXTINGUISH BROILER**

- A). It is necessary to DEPRESS KNOB while turning slightly COUNTERCLOCKWISE until the knob stops in its "off" position.

6. **TO REPLACE IGNITION BATTERY ON "REGAL" MODEL 2133**

If your ignition is no longer able to spark all of the burners simultaneously, suspect the battery is weak, and replace it.

- A). Starting with a "cool" oven, open the oven door to expose the battery compartment located on the underside of the stove control panel.
- B). Using a small screwdriver, first pry the negative (-) pole of the battery out of the holder. (This will be the end closest to the center line of the appliance.)
- C). Grab the loose end of the battery with fingers or needle nose pliers and pull it the rest of the way out.
- D). Position the new size AA battery so that the positive (+) "button" is inside of the plastic ring on the right hand side of the holder.

Note: The battery holder is equipped with a plastic protective shield over the positive (+) contact. If the battery is put in backwards the ignition will not work.

- E). Push the negative pole of the new battery into the holder until it "snaps" in place.
- F). Test by pushing ignition button; all electrodes should spark.

TO OPERATE THE OVEN OF A SAFGAS STOVE:

1. Turn the temperature control knob from the "off" position to the "pilot on" position. After this has been done, light the pilot in the oven (constant pilot).
2. After the oven pilot is lit, turn the oven temperature control knob to the desired temperature (example: 350 degrees).
3. You will notice the constant pilot grow in size. It is now being used as a heater pilot. The heater pilot will heat the sensing bulb and the mercury control valve. Once this sensing bulb has reached a sufficient temperature, it will open the mercury valve permitting it to release gas to the main burner.
4. When the oven has reached the desired temperature, the thermostat will stop the supply of gas to the heater pilot, and once again it will become the constant pilot, thus causing the sensing bulb from the mercury control valve to cool. The mercury valve will close and stop the gas supply to the main burner.
5. When the oven requires more heat, the same cycle will again repeat itself. The only time the oven will operate differently would be when the thermostat is in the "Broil" position. The main burner flame would then increase in size and not shut off until the thermostat was turned down or to the "off" position.

To operate the broiler of a SAFGAS oven:

1. The broiler is located under the oven and is separated from the oven cavity by a divider. Follow instructions for lighting the oven. When the heater pilot is lighted, turn the thermostat knob to "Broil".

IMPORTANT: The oven thermostat on the SAFGAS stove is designed to enable you to turn off the oven constant pilot by simply turning the thermostat dial to the "off" position. When the dial is in this position, you cannot light the constant pilot. When the dial is in the "pilot on" position, the pilot is on.

It is always a good idea to have an approved, ABC type fire extinguisher in the galley area.

WARNING: Porcelain enamel is glass which has been fused to metal. It is thoroughly inspected and will give good service if carefully handled, but it is breakable and cannot be guaranteed. Like all glass or porcelain articles, we cannot replace enamel parts that are damaged after delivery to carriers, except at customer's expense.

CAUTION: If a commercial oven cleaner is used, protect gas supply tubing, thermostat, and mercury sensing bulb from cleaner (masking tape is good for this). Thoroughly rinse oven with a solution of one tablespoon vinegar to one cup of water.

"RADIANT" COOKTOP WITH INFRARED BROILER

To operate the infrared broiler:

1. Hold a lit "long" stick match or a gas lighter directly under the front of the ceramic burner surface. Then turn on the middle gas knob to $\frac{2}{3}$ open position. When burner ignites, open gas knob to the full position.

OPERATING INSTRUCTIONS SUMMARY FOR A SAFGAS SYSTEM

1. Keep SAFGAS cylinder valves closed when boat is unattended. Close valve immediately in any emergency.
2. Be sure all appliance valves are closed before opening cylinder valve.
3. Always apply lit match or other flame to burner before opening burner valve.
4. Close cylinder valve whenever appliance is not in use.
5. Test system for leakage at least twice a month and after any emergency in accordance with the following procedure:

With appliance valves closed and with cylinder valve open, note pressure on gauge. Close cylinder valve. If the pressure drops, as indicated on the gauge, this tells you that there is a leak in the system. Locate leakage by application of liquid detergent or soap and water solution to all connections. After leak has been repaired, recheck system by repeating the above test.

CARE AND CLEANING OF APPLIANCES

Cleaning after each use (when appliance is cool) with a soft cloth and dishwasher detergent solution will afford years of lasting beauty of your appliance. Do not use steel wool or abrasive cleaners as these will mar the surface.

PORCELAIN ENAMEL SURFACES

Porcelain enamel is glass fused onto steel at very high temperatures. It is not extremely delicate, but must be treated as glass. Sharp blows and radical changes in temperatures will cause the enamel to chip or crack. Some foods contain acid which will dull the finish of enamel such as vinegar, lemon juice, tomatoes and milk. To avoid dulling, wipe the surface clean immediately after any food has been spilled on the enamel.

STAINLESS STEEL SURFACES

Stubborn spots caused by spillage and discoloration from heat may be removed by the use of lemon juice or vinegar. Care must be used to keep these items away from porcelain enamel surfaces. Always wipe "with the grain" of the stainless finish to lessen possibility of scratching the surface. Scratches cannot be removed.

INSIDE OVEN AND BROILER

Oven racks and broiler pan may be removed for cleaning in your sink as with other cooking utensils. The inside oven surface is porcelain and should be cleaned accordingly.

The capillary tube in the oven is *not* removable. Gently wipe off this tube with warm soapy water. Care must be taken to protect this tube from oven spray cleaners to maintain accurate oven temperatures.

USE OF ALUMINUM FOIL

Never use aluminum foil in your oven to cover racks or oven bottom. (Also, do not bake with oversized utensils which may restrict the even flow of heat and oxygen circulation).

Aluminum foil may be used to line the bottom piece of the two-piece broiler pan; but if the foil is placed over the slotted broiler tray, be sure to cut through the foil at each slot so that drippings and grease can drain into the pan below.