Service Manual
Gas / Electric Refrigerators

MODELS

N611v Series

N811v Series

WARNING: DO NOT install this refrigerator in below deck marine applications. Do not install this refrigerator in fixed indoor cabin or other dwelling applications. This refrigerator must use only NORCOLD designed and approved outside air intake and exhaust ventilation for correct and safe operation. Any other ventilation could cause lethal combustion exhaust fumes and/or explosive propane gas fumes to be in the living area and/or below deck.

Questions?/Des questions?/¿Preguntas? 1-800-444-7210

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INTRODUCTION

About this Manual

This service manual provides maintenance, diagnostic, and repair information for **NORCOLD**® models N611v, N811v gas absorption refrigerators. It is a reference tool designed for technicians who are knowledgeable in the theory and operation of gas/electric absorption refrigerators, liquefied petroleum (LP) gas–propane–systems, and AC/DC electrical systems as installed in a variety of recreational vehicles (RV).

All information, illustrations, and specifications contained in this publication are based on the latest product information available at the time of publication. **NORCOLD**® reserves the right to make changes at any time without notice.

Model Identification

Models N611v and N811v are 2-way refrigerators that operate on AC power or LP gas.

Letter(s) appended to the model number identify factory installed accessories. See Fig. 1.

Information Label

The information label is located in the upper right corner of the fresh food compartment just below the divider. See Fig. 1. The label provides the following information:

- Serial number.
- Model number.
- LP gas (propane) pressure.
- Btu/h.
- AC voltage and amperage.
- DC voltage and amperage.
- Design certification.
- Vent kit requirement.

Certification and Code Requirements

NORCOLD® N611v, N811v gas/electric absorption refrigerators are certified under the latest edition of *ANSI Z21.19B* standards for installation in mobile homes or recreational vehicles, and with the Canadian Standards Association *CAN/CGA-1.4-M94.*

Electrical components are UL compliant.

About Installation

Refrigerator installation must conform with the N611v, N811v *Installation Manual* for the **NORCOLD**® limited warranty to be in effect. Installation must also comply with applicable local codes and standards set by the relevant certification agency.

Replacement Parts

Use only authorized **NORCOLD**® replacement parts. Generic parts do not meet **NORCOLD**® specifications for safety, reliability, and performance. The use of unauthorized aftermarket or generic replacement parts voids the refrigerator's limited warranty coverage.

Technical Assistance

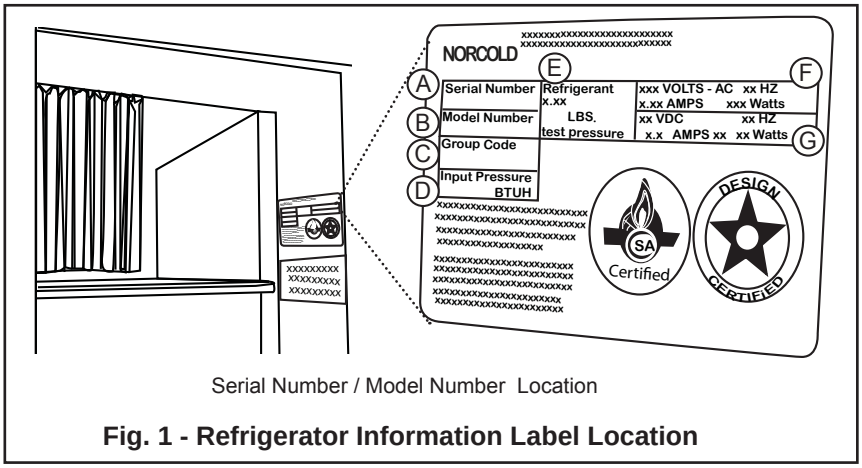
If unable to resolve technical issues using the information provided in this manual, technical support is available through **NORCOLD**® Customer Service Center:

☎	Telephone:	1-800-444-7210
	Fax:	1-734-769-2332
	World Wide Web:	www.norcold.com

The following information is required to process technical support requests; refer to the following page:

- Refrigerator Model Number
- Refrigerator Serial Number
- Refrigerator Cooling Unit Serial Number
- Recreational Vehicle (RV) Make/Model/Year

MODEL IDENTIFICATION



Serial Number / Model Number Location

Fig. 1 - Refrigerator Information Label Location

A. Serial Number

B. Model Number

C. Group Code

D. Btu/h

E. Amount of refrigerant in cooling unit

F. AC Voltage/amperage

G. DC Voltage/amperage

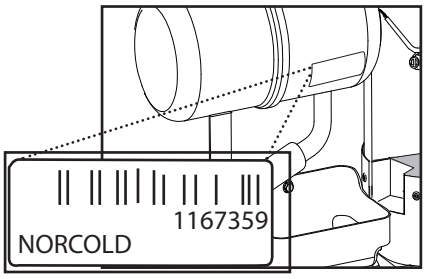
N X 6 1 0.3 IM C BK X R P T

	Explanation
1	N = Norcold
2	X = Sequence number indicating custom features
3	6 or 8 = Approximate storage volume in cubic feet
4	X = Sequence number indicating custom features
5	Models available. Blank = 2-Way operation
6	Icemaker unit. Blank = does not have ice maker, IM = has icemaker
7	Blank = Is not equipped for low ambient operation, C = Is equipped for low ambient operation
8	Door design: Blank: Insert panel doors, SS: Stainless steal wrapped, BK: Black wrapped, WH: White wrapped, WPM: Pewter Royce wrapped
9	Fan: Blank: No fan, F = Equipped (1) Fan, F2 = Equipped (2) Fans, J = Equipped (1) High Velocity Fan
10	Door swing: L = Left-hand door swing, R = Right-hand door swing
11	P=Black acrylic door panels
12	Packaging Type: Blank: Corrugated packaging, T = Returnable packaging tray, M6 = 6-unit multi-pack

Note: The actual refrigerator label specifies the features applicable to that unit.

Cooling Unit Serial Number

The cooling unit serial number appears on the cooling unit bar code label. The label is affixed to the surface of the cooling unit leveling chamber.



Cooling Unit Bar Code Location

Be sure to have the cooling unit serial number available if you need technical support on this component.

Fig. 2 - Cooling Unit Bar Code Label Location.

SAFETY AWARENESS

Safety Notice

It is not possible to anticipate all of the conceivable ways or conditions under which the refrigerator may be serviced or to provide cautions as to all of the possible hazards that may result. Standard and accepted safety precautions and equipment should be used when working on electrical circuits and handling toxic or flammable materials. Safety goggles and other required protection should be used during any process that can cause material removal, such as when removing a leaking cooling unit and cleaning components.

Attention Statements

The safety alert symbol ⚠ followed by the word ***WARNING*** or ***CAUTION*** identifies potential safety hazards or conditions.

The safety alert symbol with the appropriate heading appears on all safety labels posted on the refrigerator and safety awareness notices presented throughout this manual.

> ⚠ ***WARNING:***
>
> The above heading identifies hazards or conditions, which if ignored can cause serious injury, death, and/ or extensive property damage.

> ⚠ ***CAUTION:***
>
> The above heading identifies hazards, which if ignored can cause injury and/or property damage.

Safety Statements

⚠ **Do not** modify, alter, or equip the refrigerator to the use of any other fuel (natural gas, butane, etc.). N611v, N811v refrigerators are designed and equipped for the use of LP gas–*propane gas*–only.

⚠ Incorrect installation, adjustment, alteration, or maintenance of the refrigerator can cause personal injury, property damage, or both.

⚠ **Do not** smoke, light fires, or create sparks when working on the propane gas system.

⚠ **Do not** use an open flame for leak testing any of the propane gas system components. Propane gas is highly flammable and explosive.

⚠ Always use two wrenches to tighten or loosen LP gas connections. Damaged connections, piping, and components create the potential for gas leaks.

⚠ All electrical connections and repairs to the refrigerator must comply with all applicable codes. Refer to the certification and code requirements section of the *N611v, N811v Installation Manual*.

⚠ **Do not** work on live electrical circuits. Turn off AC power and DC power sources before attempting to remove, service, or repair any of the refrigerator's electrical or electronic components.

⚠ **Do not** modify, bypass, or eliminate any of the refrigerator's electrical components, electronic circuits, or propane gas system components.

⚠ **Do not** wet or spray liquids on or near electrical connections or electronic components. Most liquids, including leak detection solutions, are electrically conductive and pose the potential for an electric shock hazard, short electrical components, damage electronic circuits, and/or ignite a fire.

⚠ **Do not** use leak test solutions that contain ammonia or chlorine. Ammonia and chlorine degrade copper and brass components.

⚠ **The cooling unit is a sealed system under pressure! Do not** try to repair or recharge the cooling unit. **Do not** bend, drop, weld, drill, puncture, saw, or strike the cooling unit.

⚠ **Handle a leaking cooling unit with extreme caution!** The cooling unit contains ammonia, hydrogen, and sodium chromate. Ammonia can cause severe skin and eye burns. Hydrogen is highly flammable, can ignite and burns with an intense flame. Certain chromium compounds, such as sodium chromate, are carcinogenic.

⚠ **Do not** use extension cords. **Do not** remove the grounding prong from the refrigerator AC power cord. **Do not** use a two prong adapter to connect the refrigerator to the AC outlet.

⚠ **Do not** over-fuse electrical circuits. Use specified fuses and AWG wire sizes. The specification section of this manual provides fuse size information. Refer to the *N611v, N811v Installation Manual* for the correct AWG wire size specifications.

⚠ **Prevent child entrapment!** Before disposing of the refrigerator, remove all doors and fasten all shelves with retainers.

⚠ Some of the refrigerator's metal components have sharp corners and edges. Wear hand protection, such as cut resistant gloves, and exercise extreme care when handling the refrigerator.

⚠ Make sure all hardware such as hinges and fasteners (retaining screws, etc.), are properly fastened.

SPECIFICATIONS

N611v / N811v - Electronic
Push Button - On/Off
LED Indicator Lights
Self-Diagnostic with Fault Indicators
2-Way Operation

Rough opening dimensions (H x W x D)
N611v ---------- 52 7/8 in. x 23 1/2 in. x 24 in.
N811v ---------- 59 7/8 in. x 23 1/2 in. x 24 in.

Decorative panels dimensions
Thickness ---------- 3/16 in.
Freezer door (H x W, both models) ---------- 15 11/16 in. x 21 19/32 in.
Upper panel ---------- 15 11/16in. x 21 19/32in.
Fresh food compartment (H x W)
N611v ---------- 32 25/32 in. x 21 19/32 in.
N811v ---------- 39 25/32 in. x 21 19/32 in.

DC power
DC input voltage requirements ---------- 10.5VDC to 15.4VDC
DC Fuse, F1 on Power Board ---------- Automotive Blade, Type APR-5A-Tan
Divider Heater ---------- 3.1W/12VDC, (43Ω to 50Ω), Current ≈ 240mA to 279mA @ 12VDC
Gas Valve ---------- 1.75W/12VDC, (74Ω to 92Ω), Current ≈ 130mA to 162mA @ 12VDC
Interior Light ---------- GE #214, Miniature Automotive Light Bulb, ½ A @ 13.5VDC

AC power
AC input voltage requirements ---------- 108VAC to 132VAC
AC Fuse, F2 on Power Board ---------- AGC Series, 8A, Fast Acting, Glass Tube (1/4 in. x 1-1/4 in.)
AC Heater ---------- 300W/120VAC, (46Ω to 51Ω), Current ≈ 2.3A to 2.6A @ 120VAC

LP gas (propane)
Operating pressure (Input pressure to gas valve) ---------- 10.5 to 11.5 in. W.C.
Burner rating (Heat output) ---------- 1420 Btu/h @ 11 in. W.C.
Burner orifice size ---------- LP15
Gas ignition ---------- Electronic with flame sensing
Electrode tip-to-burner gap ---------- 1/8 to 3/16 in.

Off-level operating limits
Side-to-side ---------- 3 degrees-maximum
Front-to-back ---------- 6 degrees-maximum

Temperature Sensor ---------- Thermistor, Fin mounted (10th fin from the right)

THEORY OF OPERATION

Overview

The N611v, N811v MODEL gas absorption refrigerators are comprised of two separate systems that together allow the refrigerator to cool. When performing service it is important to have a basic understanding of each system and their interaction with one another and how this interaction provides for cooling/refrigeration.

These two “systems” are the:

- Cooling Unit
- Refrigerator Controls (Electronic Controls)

Cooling Unit

The cooling unit is a self-contained gravity flow absorption refrigeration system. The refrigerant charge is a solution of water, ammonia, sodium hydroxide, and sodium chromate. In order to produce cooling a precise heat must be applied to the boiler area which in turn initiates a chemical reaction that extracts heat from the freezer and fresh food compartments, thus providing "cooling."

This precise heat is supplied to the cooling unit via heaters and/or a LP gas burner which are controlled by the refrigerators electronic controls. The refrigerant transfers the heat from the freezer and fresh food cabinets to the absorber coils. At the absorber coils the metal surface absorbs the heat and air flow over the external surfaces of the coils carries the heat away. A more detailed description of the absorption process can be found under the heading “Cooling Unit Detailed Description" on the following pages.

A thermal air current created by the rising hot air flows out of the enclosure through either a roof exhaust vent or a sidewall exhaust vent (depending on installation). The flowing air mass passes over the surface of the condenser fins where it absorbs heat transferred from the ammonia vapors flowing through the condenser. The thermal airflow process creates a "chimney effect" that creates a continuous draft of cooling and combustion air. The fresh air drafted by the chimney effect removes rejected heat, supports combustion, and expels the exhaust gases produced by the combustion process. Obstructions, restrictions, or modifications to vents or the enclosure will affect the heat absorption cycle. Poor cooling unit performance may be due to:

- Loose insulation interfering with the ventilation process
- Construction material or debris left in the enclosure
- Insect screen covering vents
- Plastic sheeting covering vents
- Items stored in the enclosure
- Modifications to vents or enclosure
- No roof or sidewall vent openings

Leveled Operation

The circulation of the refrigerant through the cooling unit is accomplished by gravity flow; therefore, the refrigerator must be operated leveled. Off-level operation affects the flow of the refrigerant through the cooling system. The maximum off-level operation limits are:

- 3° (Degrees) from side-to-side
- 6° (Degrees) from front-to-back

Exceeding the maximum off-level limits can permanently damage the cooling unit. The cooling unit or its performance is not affected when the vehicle is in motion.

Gradual Decrease in Cooling Efficiency

A gradual decrease in cooling efficiency is not a clear indication of cooling system failure. Other factors that affect cooling efficiency include ventilation, the heat input, off-level operation, lack of service and maintenance, inadequate repairs, or unauthorized field modifications. If any of these factors exist and are not corrected, a replacement cooling unit will also perform inefficiently or fail. Step-by-step troubleshooting is the best approach when dealing with a gradual decrease in cooling. It is important to consider that, though not efficiently, the cooling unit is working. Troubleshooting should always begin by checking ventilation, then thoroughly checking the cooling unit, and heat sources. In the majority of reported cases, the problem is related to the installation, which in turn hinders cooling unit ventilation. Additionally, ambient air temperature plays a significant role if the unit is not installed correctly. Incorrect installation can lead to poor ventilation, which in turn relates to poor cooling performance.

The unit's service and maintenance history should be considered when checking a cooling unit for poor cooling performance. The service history and the scope of service work performed may lead directly to cause and resolution of a cooling problem. The cooling unit has to reach normal operating temperatures before troubleshooting can take place. It takes an average of four hours for the refrigerant to reach normal operating temperatures. The time frame to reach operating temperatures depends on ambient air temperature.

Gas Absorption System

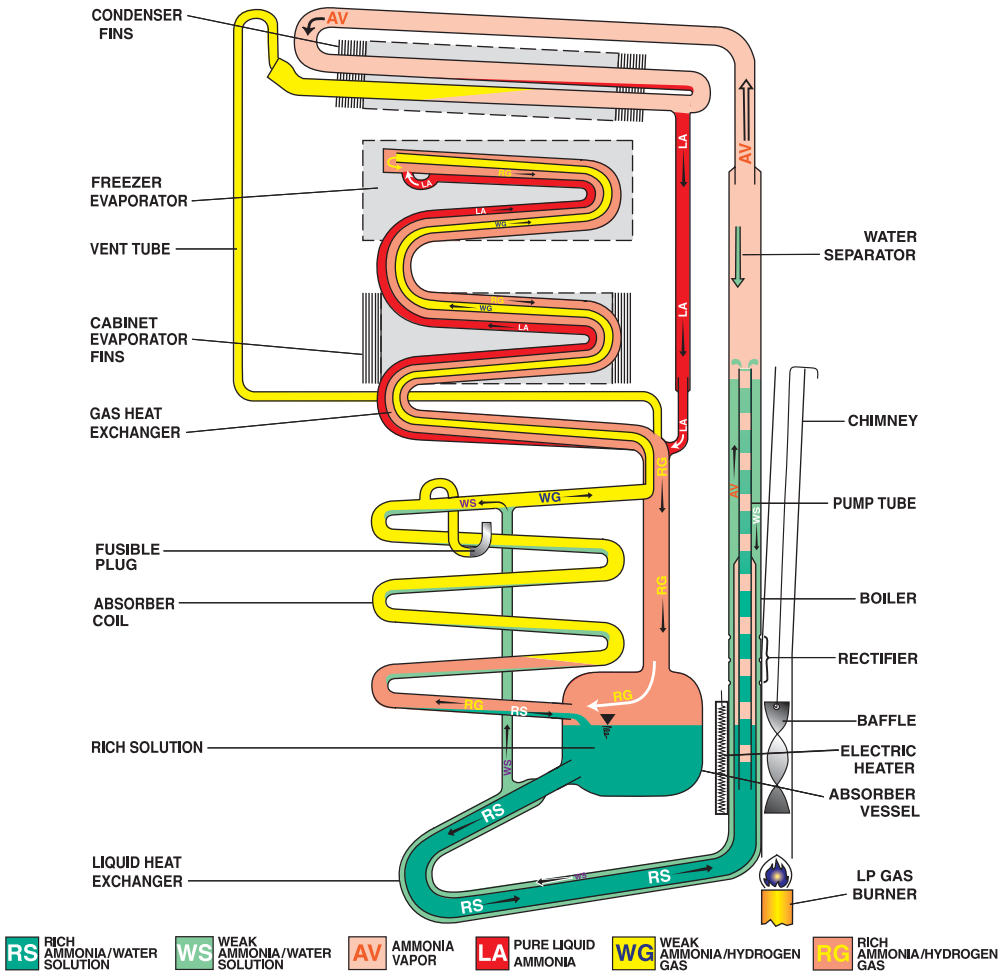


Fig. 3 - Gas Absorption System

A rich solution (RS) leaves the absorber vessel and passes through the liquid heat exchanger to the bottom of the pump tube. Utilizing an AC cartridge heater or a LP gas burner, a precise heat is applied to this area which in turn causes the temperature of the solution to rise. This temperature increase causes ammonia and some water vapor to be driven out of the solution, forming vapor bubbles which push columns of liquid up the pump tube.

As these columns of liquid exit the pump tube the liquid falls downward through the rectifier where the temperature is increased causing additional ammonia vapor to be released. The remaining liquid, now a weak ammonia-water solution (WS), flows through the external shell of the liquid heat exchanger where it transfers its residual heat to the rich solution (RS) and enters the top of the absorber coil at a reduced temperature. The ammonia-water vapor passes through the water separator whose reduced temperature causes any water vapor to condense and drop back down to the boiler mixing with the existing weak solution (WS). The ammonia vapor (AV) rises and enters the condenser where it condenses (liquefies) into pure liquid ammonia (LA). The liquid ammonia, via gravity, drops into the tubular coil of the freezer and cabinet evaporators and wets the internal surface of the tubes.

The weak ammonia-hydrogen gas that was previously released at the top of the absorber coil passes over the wetted surfaces of the evaporator tubing causing the liquid ammonia to evaporate into the hydrogen. The now rich ammonia-hydrogen gas mixture (RG) draws heat from inside the refrigerator. The weight of the hydrogen-ammonia gas mixture (RG) is heavier than that of the weak gas (WG). Consequently, it falls through the gas heat exchanger into the top of the absorber vessel. From this point it enters the bottom of the absorber coil.

The rich ammonia-hydrogen gas mixture (RG) travels up through the absorber and makes contact with the weak solution (WS) traveling down from the top of the absorber. As the weak solution (WS) drops through the absorber it absorbs the ammonia from the rich ammonia-hydrogen gas mixture (RS). The relatively pure hydrogen (WG) exits the top of the absorber coils to the evaporator and the rich solution falls to the bottom of the absorber vessel where the cycle starts again.

Electronic Controls

A precise heat is applied to the boiler area of the cooling unit causing a chemical reaction within the cooling unit that ultimately results in the refrigerator cooling. The heat applied is done so by means of:

- AC cartridge type heater positioned in heater wells welded to the surface of the boiler
- LP Gas burner positioned below the boiler such that the heat from the flame is directed across the surface of the boiler

These heat sources are turned on/off via a factory preset Auto mode. The unit will attempt to operate the heat source requirements in the following order of priority:

- 1st Priority Choice - Auto AC Mode
  While in the Auto AC Mode, the AC cartridge heater is operated to provide heat to the boiler area of the cooling unit.

- 2nd Priority Choice - LP Gas Mode
  While in the Auto LP Gas Mode, the LP gas burner is operated to provide heat to the boiler area of the cooling unit.

A thermistor is mounted on the fin assembly located inside the fresh food compartment. The thermistor acts as a temperature sensor, reporting the temperature sensed to the optical display. The optical display then relays this information to the power board that then turns on/off the appropriate heat source accordingly. The optical display board, power board, thermistor, and other components within the refrigerator are interconnected via a wire harness.

Refrigerator Temperature Control

The temperatures of the freezer and refrigerator compartments are automatically kept at a fixed setting that is within the established guidelines for safe food storage. If you wish to change the fixed setting, you must move the thermistor.

To move the thermistor:

- Pull the thermistor and clip off of the fin.
- Push the thermistor and clip onto a different fin.
  - Move the thermistor to the left for a colder temperature setting or to the right for a warmer temperature setting.
    - Move the thermistor and clip only three or four fins at a time.
    - Allow the temperature of the freezer and refrigerator compartments to become stable before making another adjustment.

NOTE

You may wish to use a thermometer inside the freezer or refrigerator compartment to help with this process.

  - If more adjustments are necessary, repeat this procedure.

Theory of Operation - Auto Modes

AC voltage is applied to the power board via the AC power cord at terminals L1 (Hot) and L2 (Neutral). This AC voltage will pass through the AGC Series, 8A, Fast Acting, Glass Tube Fuse (F2) where it is then measured. This measurement is communicated to the optical display board which determines if the applied voltage is below or above 85VAC. If the voltage is above 85VAC the determination is that AC voltage is available and the optical display board will request the power board to operate via the Auto AC Mode. If the voltage is below 85VAC the determination is that AC voltage is NOT available and the optical display board will automatically default to the Auto LP Gas Mode and request the power board to operate via the Auto LP Gas Mode (see below). If the control is not able to establish a flame while operating in the Auto LP Gas Mode the optical display board will:

Automatically default back to the Auto AC mode and wait for AC voltage to return, displaying the following fault code

- Solid RED power indicator light

Auto AC Mode

When operating in the Auto AC mode the power board measures the thermistor value and communicates it to the optical display board. The thermistor, a temperature device whose internal resistance goes down as the temperature goes up, is connected to the power board via terminals P2-1 and P2-6. The optical display board compares the actual thermistor value to preset cut-in and cut-out temperature values. Should the thermistor value fall below the cut-in value it will request the power board to turn ON the AC heater relay (K2). Should the thermistor value go above the cut-out value it will request the power board to turn OFF the AC heater relay.

Anytime relay K2 is turned ON, AC voltage is applied to the AC heater via the now closed K2 contacts. Anytime AC voltage is applied to the AC heater, AC current is produced. This AC current is measured by the power board and its value communicated to the optical display board. The optical display board determines if the AC current is within specified limitations. If below the minimum specified limit, the optical display board will automatically default to the Auto LP Gas Mode and request the power board to operate via the Auto LP Gas Mode. AC related faults (Voltage or Current) are not displayed while operating in the Auto Mode of operation.

Auto LP Gas Mode

When operating in the Auto LP Gas mode the power board measures the thermistor value and communicates it to the optical display board. The thermistor, a temperature device whose internal resistance goes down as the temperature goes up, is connected to the power board via terminals P2-1 and P2-6. The optical display board compares the actual thermistor value to the factory preset cut-in and cut-out temperature values. Should the thermistor value fall below the cut-in value, the optical display board simultaneously requests the power board to turn ON gas valve relay (K1) and high voltage transformer (T1) outputs.

Anytime relay K1 is turned ON, 12VDC passes through the now closed K1 contacts to terminal P1-10 of the power board and out to the gas valve solenoid, energizing the gas valve. With the gas valve energized, LP gas flows to the burner tube. Simultaneously, energy pulses from the high voltage transformer (T1) are carried out to the burner via the spark sense electrode wire. As the energy pulses reach the end of the electrode they jump across the gap between the electrode and the burner creating sparks. The sparks ignite the LP gas and a flame is established.

Via the flame rectification process a signal is then sent back to the power board through the spark sense electrode wire letting the power board know there is a flame present. Knowing a flame is present; the power board deactivates the spark output. At the same time; the power board communicates to the display letting it know a flame is now present.

When the thermistor value reaches a particular cut-out value the optical display will request the power board to turn OFF the gas valve output, allowing the flame to extinguish. If for some reason the flame goes away while there is a call for cooling, the power board will turn the high voltage transformer back on and attempt to re-ignite the propane. For safety reasons the sparking at the burner (trial for ignition time) will last a maximum of 30 seconds, at which time the gas valve/high voltage transformer outputs will be turned off and the LP Gas mode will be locked out.

The electronic controls will automatically default back to the Auto AC mode and wait, indefinitely, for AC voltage to return. The optical display board will display:

- Solid RED power indicator light

Background Operations

Interior Light / Door Switch

The interior-light/door switch is a normally open reed switch that is an integral component of the optical display board.

Theory of Operation - Interior Light / Door Switch

The magnetic pull from a permanent magnet located in the top of the fresh food door maintains the reed switch (N) contacts closed (light off) when the door is fully closed. Opening the door breaks the magnetic pull, which in turn causes the reed switch contacts to open (light on). The optical display board senses the reed switch contacts are open and in turn:

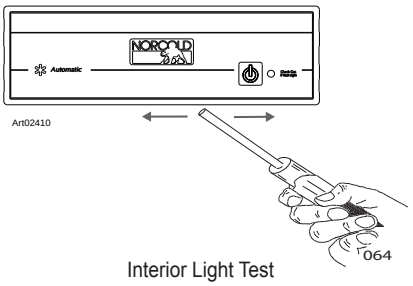
- Requests that the power board turn ON the K4 relay. Anytime relay K4 on the power board is turned ON, 12VDC passes through the now closed K4 contacts to terminal P1-7 of the power board and out to the interior light.
- Initiates a 2-minute timer that once timed out requests the power board to turn off the K4 relay. This prevents the interior light from being left on in the event the door is not completely shut.

NOTE

Anytime the door is sensed open the divider heater output will be turned off.

Interior Light Test Procedure:

- Place a magnetic tipped screwdriver or small magnet beneath the optical control
- Move the magnetic tipped screwdriver from side-to-side as shown below



Interior Light Test

Verify:

- The interior light turns ON-OFF as the magnet is passed below the optical control
- Contact Customer Service for further instructions.

Moisture Reduction Heater (Divider Heater)

The divider heater is a low wattage heater used to reduce/eliminate sweating on the surface of the plastic area between the freezer and fresh food compartments, i.e. the divider area. Due to the cooling nature of the refrigerator, the divider area, especially on hot humid days, tends to be cooler than that of the air around it. This causes the divider surface to be below the dew point of the surrounding air and as a result moisture or sweating develops. The divider heater, which is not replaceable because it is foamed into place, consists of a resistance wire placed atop one side of an adhesive backed piece of foil adhered to the back of the divider area. Applying 12VDC to the resistance wire causes the wire to warm up. As the wire warms up heat is transferred throughout the area of the foil and subsequently the divider area. The added heat to the divider area keeps the surface temperature above the dew point of the surrounding air thus eliminating the occurrence of sweating.

Theory of Operation - Moisture Reduction Heater (Divider Heater)

The divider heater is connected between the power board at P1-8 and the optical display board at P1-5. When the refrigerator is first powered on the power board measures the value of the DC input voltage and communicates this value to the optical display board. Providing the value of the DC input voltage is greater than 10.5VDC the optical display board will request the power board to turn ON relay K5. Anytime relay K5 on the power board is turned ON, 12VDC passes through the now closed K5 contacts to terminal P1-8 of the power board and out to one side of the divider heater. The other side of the divider heater is tied to 12 volt ground via the white/violet wire connected between P1-4 of the optical display and P2-4 of the power board. Anytime the optical display senses the door is open, it requests the power board to turn off K5. Once the door is closed the optical display will request the power board to turn K5 back on. Anytime the DC input voltage falls below 10.5VDC the optical display will request the power board to turn off K5. Anytime K5 is turned off due to low DC voltage it will not be turned back on until the DC input voltage has gone above 11.5VDC.

Backup Operating System (BOS) Mode

The refrigerator has the ability to continue cooling in the event the thermistor (temperature sensor) becomes inoperable. Should the thermistor become electrically open or shorted the electronic controls will revert to this backup operating mode, allowing the refrigerator to continue cooling until it can be serviced.

Theory of Operation - Backup Operating System (BOS) Mode

The power board measures the thermistor value and communicates it to the optical display board. Should it sense the thermistor is inoperable (electrically shorted/open, unplugged, damaged, etc.) the optical display board will activate the BOS mode. While operating in the BOS mode the thermistor will be ignored and the temperature set point will be interpreted as a duty cycle instead of a temperature setting. This duty cycle will maintain refrigerator cooling by controlling the length of time the heat source outputs (AC heater, LP burner) are energized.

While operating in the BOS mode the unit will operate on an 80% duty cycle. The cycle period is 1 hour, translating to an ON time of 42 minutes and an OFF time of 12 minutes.

Defrost Operation

Although the refrigerator is NOT frost free, it is designed to limit frost build up on the fresh food fins (metal fins mounted on the back wall of the fresh food compartment). This is done by simply turning off the heat source output, which in turn, momentarily suspends cooling. As the fin temperature rises, the frost melts.

Theory of Operation - Defrost Operation

Every 49 hours of operation the refrigerator will enter a defrost mode. While in the defrost mode the power board monitors the thermistor value, reporting it to the optical display board. If the thermistor value is greater than 38°F the optical display will exit the defrost mode, reset the 49 hour timer, and continue normal operation. If the thermistor value is less than 38°F the optical display will request that the power board turn OFF the applicable heat source output, be it the AC heater or the LP gas burner, until the thermistor value reaches 38°F. Once the 38°F requirement is met the optical display will exit the defrost mode, reset the 49 hour timer, and continue normal operation.

Auxiliary Output

The auxiliary output is used to power auxiliary loads such as a fan or waterline heater. The voltage at this output is whatever the DC input voltage connected to power board terminals 12VDC and GND is. That is to say, if the DC input voltage to the refrigerator is 11VDC then the auxiliary output voltage will be 11VDC.

Theory of Operation - Auxiliary Output

When the ON button of the optical display board is pressed, relay K3 on the power board is turned ON; see On-Off Theory of Operation (page 16) for detailed explanation. Anytime relay K3 is ON, the DC input voltage connected at the refrigerator (terminal 12VDC) passes through the now closed K3 contacts to terminal P1-5 of the power board. The DC ground connection (terminal GND) is electrically tied to power board terminal P1-3. This auxiliary output will be present anytime the refrigerator is ON.

FAULT CODES

NOTE

The refrigerator is not cooling if the indicator light is either on solid red or flashes on red.

Light Indicator	Possible Cause	Action to Take
Green, flashes off once every 20 seconds	The refrigerator is operating on AC electric power. The thermistor sensed inoperable, so temperature is being controlled by backup operating system.	■ Refer to "Thermistor Fault" on page 15.
Amber, flashes off once every 20 seconds.	The refrigerator is operating on propane gas. The thermistor sensed inoperable, so temperature is being controlled by backup operating system.	■ Refer to "Thermistor Fault" on page 15.
Red, on solid.	120VAC power not available. Refrigerator defaulted to propane gas operation, but did not establish a flame (gas lockout).	■ Refer to "Solid Red Indicator Light" on page 13.
Red, flashes on two (2) times every five (5) seconds.	This is a fault within the refrigerator controls.	■ Refer to "Fault / Flash Pattern 2 Service Error" on page 14.
Red, flashes on three (3) times every five (5) seconds.	The temperature high limit switch is open.	■ Refer to "Fault / Flash Pattern 3 Open High Limit" on page 14.
Red, flashes on four (4) times every five (5) seconds.	This is a problem with the AC heater circuit.	■ Refer to "Fault / Flash Pattern 4 AC Relay Error" on page 14.
Red, flashes on five (5) times every five (5) seconds.	A flame is present at the burner when there should none.	■ Refer to "Fault / Flash Pattern 5 Flame Should Not Be On" on page 14.
Red, flashes on eight (8) times every five (5) seconds.	The DC voltage to the refrigerator is too low to support cooling when operating on propane gas.	■ Refer to "Fault / Flash Pattern 8 LOW DC (1) Error" on page 15.
Red, flashes on nine (9) times every five (5) seconds.	The DC voltage to the refrigerator is too low.	■ Refer to "Fault / Flash Pattern 9 LOW DC (2) Error" on page 15.

Diagnostic Prechecks

Prior to performing the diagnostic steps called out in the following pages; first verify these four important diagnostic pre-checks. In most cases doing so, in and of itself, will remedy the problem at hand.

1. The refrigerator is plugged into a known working AC outlet with a voltage between 108VAC and 132VAC
2. Extension cords are not being used to supply AC power to the refrigerator
3. The refrigerator is connected to a known working DC power supply and/or battery supplying between 10.5 and 15.4VDC
4. LP gas is available to the refrigerator and is regulated between 10.5 and 11.5"WC (Inches of Water Column)

Fault Code Flash Patterns

The N611v, N811v model refrigerators have the ability to recognize various fault conditions and will display a unique error/fault code accordingly.

Should none of the heat source inputs be available, the power ON indicator light will be ON continuously and will be red in color.

ALL other fault codes will be displayed using flash patterns. The term "flash pattern" means the power ON indicator light is turned ON and OFF to create a numeric pattern. These flash patterns directly correspond to particular fault codes. That is to say, for example, fault code 3 will be indicated by flashing the power ON indicator light RED 3-times, followed by a 5-second pause, and then repeated as long as the fault condition is present. See Fig. 4 below.

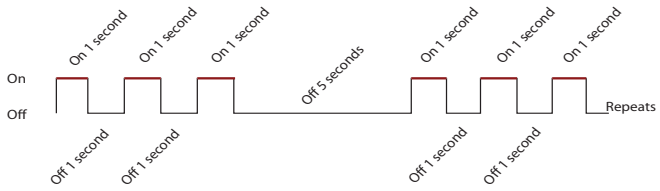
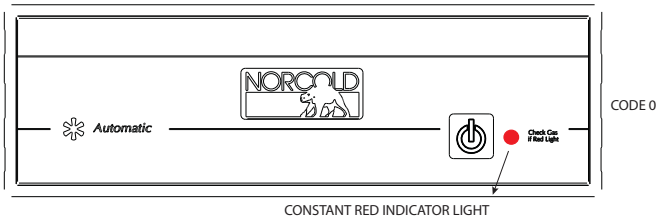


Fig. 4 - Flash Patterns

Solid Red Indicator Light



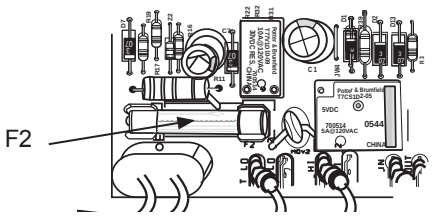
NOR000127-0A

The following conditions will cause the power ON indicator to be solid RED:

- The AC input voltage to the refrigerator was sensed to be less than 85VAC.

  Verify:

  - The refrigerator is plugged into a known working AC outlet supplying a minimum of 85VAC
  - The AC power cord is in good operating condition
  - The glass 8-amp fuse (F2) on the Power Board is intact.

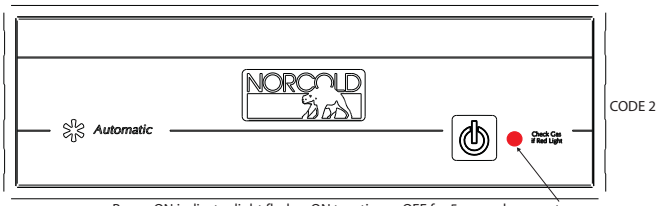


- Because the AC voltage was sensed to be out of tolerance, the refrigerator defaulted to LP gas mode. While in Auto LP gas mode, either a flame was not established or a flame was not sensed-a gas lockout condition now exists (solid red light).

  Verify:

  - All LP gas shutoff valves (including manual shutoff on gas valve itself) are open
  - LP Gas pressure at refrigerator is 11.5" W.C. (water column)
  - LP gas supply line is free of air
  - Burner is clean
  - Electrode-to-burner air gap is between 1/8" and 3/16"
  - Spark-sense igniter wire is installed correctly and in good operating condition / continuity
  - Gas valve solenoid is in good operating condition (Coil resistance ≈74Ω to 92Ω)
  - Wires to the gas valve are connected and in good operating condition / continuity
  - Power Board supplies 12VDC to gas valve when required

Fault / Flash Pattern 2
Service Error



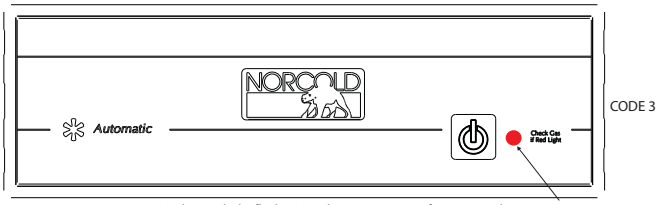
Power ON indicator light flashes ON two times, OFF for 5-seconds, repeats

NOR000127-2A

Flash Pattern "2" - Power Board detected an internal fault.

- To reset fault power refrigerator OFF and back ON.
- If problem continues, replace Power Board.

Fault / Flash Pattern 3
Open High Limit



Power ON indicator light flashes ON three times, OFF for 5-seconds, repeats

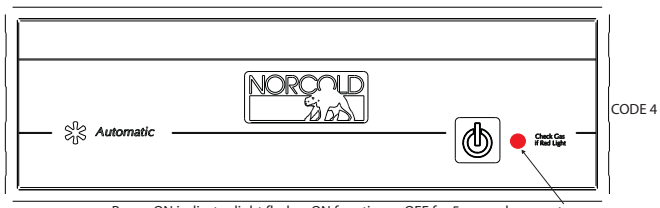
NOR000127-3A

Flash Pattern "3" - high limit thermal switch is open. The thermal switch is mounted to the metal insulation pack above the burner.

Verify:

- Is thermal switch electrically open, i.e. has it tripped?
- If no, verify wiring is connected properly. Refer to Fig. 25 and Fig. 26 for proper connection.
- Contact Customer Service.

Fault / Flash Pattern 4
AC Relay Error



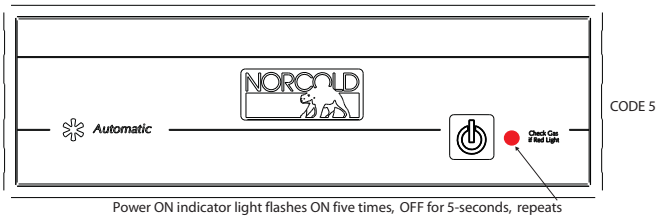
Power ON indicator light flashes ON four times, OFF for 5-seconds, repeats

NOR000127-4A

Flash Pattern "4" - AC heater relay contacts of relay K2, on the Power Board, are stuck closed.

- Replace Power Board

Fault / Flash Pattern 5
Flame On, Should Not Be On



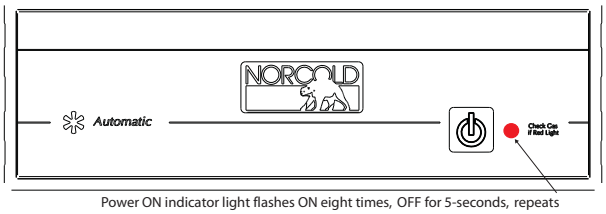
Power ON indicator light flashes ON five times, OFF for 5-seconds, repeats

NOR000127-5A

Flash Pattern "5" - gas valve is "mechanically" stuck open and subsequently the Power Board has sensed a flame present when there should not be.

- Replace the gas valve

Fault / Flash Pattern 8
LOW DC (1) Error



NOR000127-8A

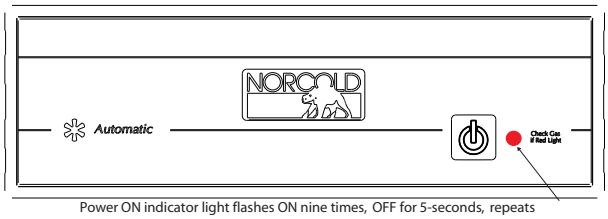
Flash Pattern "8" - refrigerator attempted to ignite or re-ignite the burner when the DC input voltage was less than 10.0VDC. Gas valve/igniter outputs are inhibited when attempting to cool with DC voltage less than 10.0VDC.

If cooling begins when DC input voltage is greater than 10.0VDC and then falls below 10.0VDC, the gas valve will remain energized and no fault will be displayed.

Verify:

- Battery charging equipment of the vehicle is operational
- AC/DC converter is operational (if applicable)
- Voltage is ≥10.0VDC replace power board

Fault / Flash Pattern 9
LOW DC (2) Error



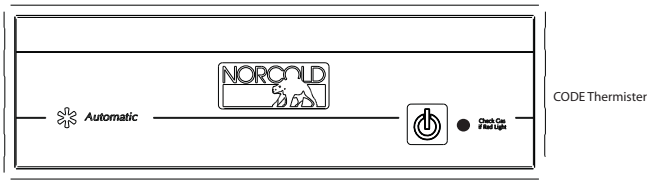
NOR000127-9A

Flash Pattern "9" - DC voltage to refrigerator is less than 8.5 volts DC. All outputs are inhibited. This fault automatically resets; outputs are allowed to operate once DC input voltage rises above 9.0VDC.

Verify:

- Battery charging equipment of the vehicle is operational
- AC/DC converter is operational (if applicable)
- Contact Customer Service for further instructions.

Thermistor Fault



NOR000127-10A

If there is a problem sensed with the thermistor, the electronic controls will ignore the thermistor and revert to a backup operating system (BOS). Refer to "Backup Operating System (BOS) Mode" on page 11. This error is displayed as follows:

- Auto AC Mode -
  If there is a problem sensed with the thermistor while operating in the Auto AC mode, the GREEN power indicator light will flash OFF once every 20 seconds, repeating until thermistor is sensed operable.

- Auto LP Gas Mode -
  If there is a problem sensed with the thermistor while operating in the Auto LP Gas mode, the AMBER power indicator light will flash OFF once every 20 seconds, repeating until thermistor is sensed operable.

Verify:

- The lamp-thermistor wire assembly is plugged in and that the connections are not dirty or broken (see Fig. 5A on page 16).
- Thermistor resistance (see Fig. 5B on page 16).

Door Fault

There is no displayed fault for an open door however; the interior light will automatically be turned off in the event the door has been sensed open for more than 2-minutes. The light switch, a magnetically activated reed switch attached to the optical display board, is activated by a magnet located beneath the refrigerator doors top trim piece. When the magnet is close to the reed switch (door closed) the light remains off; when the magnet is away from the reed switch (door open) the light is turned on. The open/closed status of the reed switch is monitored by the optical display board and communicated back to the power board which in turn activates the interior light output accordingly. Because the switch operates via the proximity of the magnet, it is important that the door alignment is correct. To test for interior light operation, refer to "Interior Light Test Procedure" on page 10.

On-Off Theory of Operation:

Blank Display

Continuous 12-Volts:
See Fig. 6 on page 17.

12VDC is supplied to the refrigerator at Power Board terminals 12VDC & GND [A]. This 12VDC travels through the Power Board to fuse F1 [B] and then out to P1-6 [C]. Via the green wire, the 12VDC exits the Power Board and enters the Display Board at P1-1 [D]. The 12VDC travels through the Display Board to one side of the normally open On-Off switch [E]. This 12VDC is referred to as the continuous 12-volts because it is always present at the one side of the On-Off switch when 12VDC power is applied to the refrigerator.

Switched 12-Volts:
See Fig. 7 on page 17.

Pressing the On-Off switch [E] will allow 12VDC to pass through the On-Off switch and back to the Power Board via the blue wire [F] connected between the Display Board at P1-3 and the Power Board at P2-3. Once the 12VDC reaches the Power Board, a signal is sent out to the coil of relay K3 [G] via the U1 microprocessor. This signal allows the K3 relay to energize thus closing the normally open contacts [H].

Temperature (°F)	Resistance (k ohms)
85	8.1 - 9.0
80	9.1 - 10.0
75	10.1 - 11.0
70	11.1 - 12.0
60	12.1 - 13.0
50	15.5 - 16.5
40	22.5 - 23.5
35	24.5 - 25.5
33	28.5 - 29.5
32	30.0 - 32.0

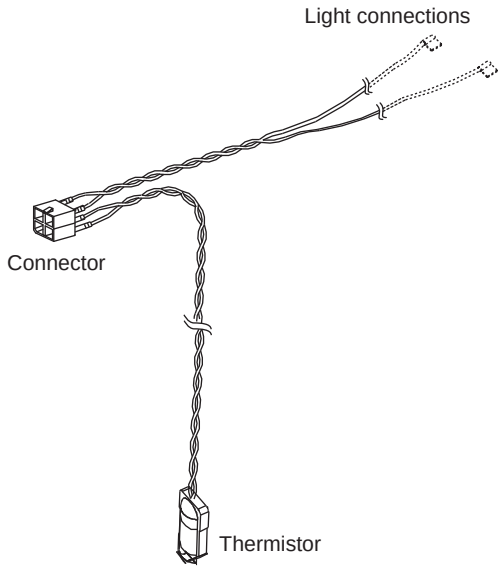


Fig. 5A - Thermistor

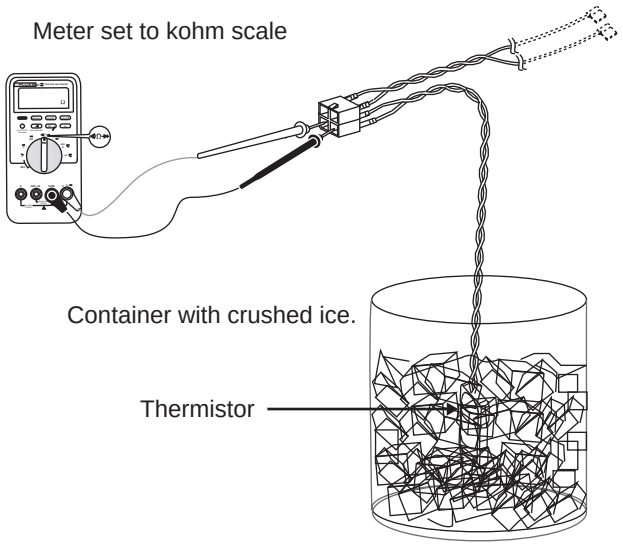


Fig. 5B - Thermistor in Ice

NOTE

K3 is a latching relay. Once the relay coil is energized the contacts close and remain closed even when the 12VDC is removed, hence the term "latching relay". With the K3 contacts now closed, 12VDC is passed back to the Display Board via the White-Red wire [J] between P1-9 of the Power Board and P1-2 of the Display Board. This 12VDC will remain at P1-2 until the latching relay is "un-latched", which will not take place until the On-Off button is depressed again. This 12VDC is termed the switched 12-volts and is used to power ON the display.

Blank Display – Continuous 12-Volts Operation Overview

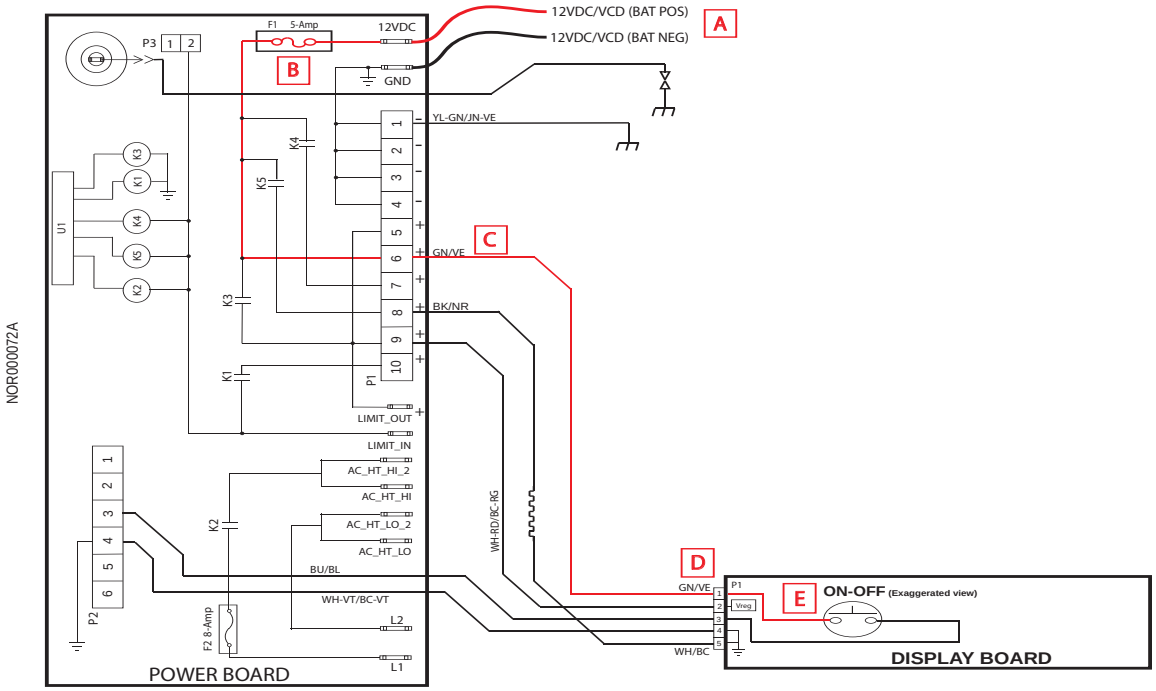


Fig. 6 - Continuous 12-Volt

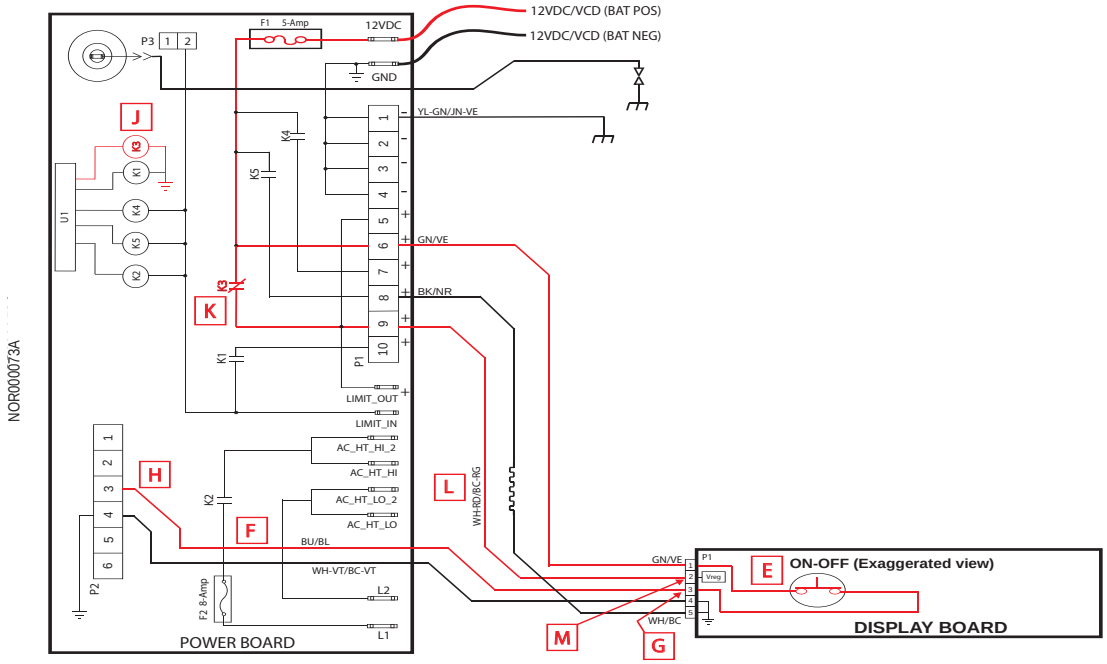


Fig. 7 - Switch 12-Volt

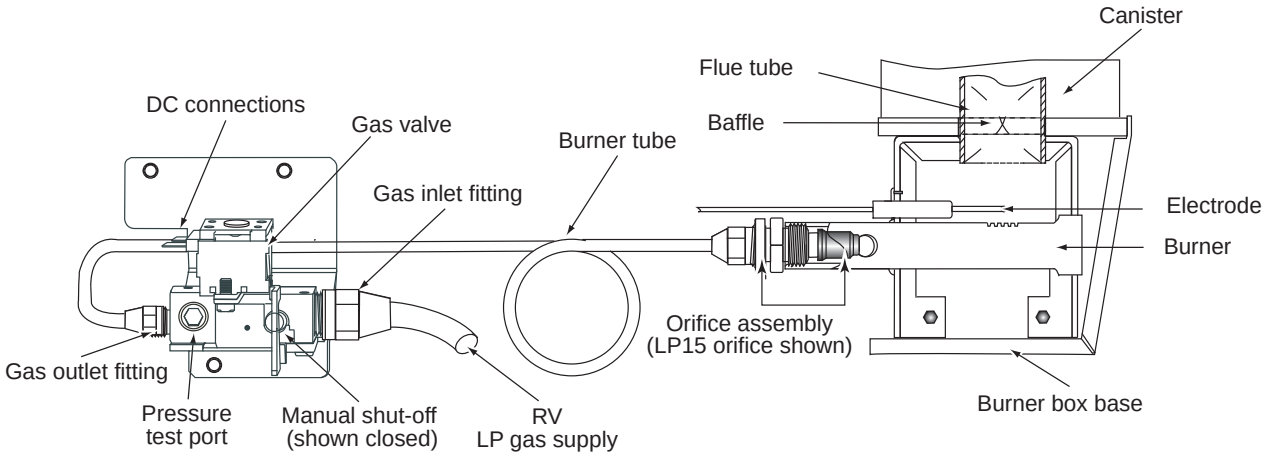


Fig. 8 - LP Gas System Components.

Pressure Requirements

WARNING:

When working on or near the LP gas system:

- Do not smoke or light fires! Extinguish all open flames!
- Do not use an open flame to leak test any of the LP gas system components. LP gas is highly flammable and explosive.
- Do not connect the refrigerator directly to the LP gas tank. Always use an approved pressure regulator between the LP gas tank and the refrigerator LP gas system.
- To prevent damage to connections, piping, and components, always use two wrenches to tighten or loosen connections. Damaged connections, piping, and components create the potential for gas leaks.

The refrigerator LP gas system, shown in Fig. 8, is for propane gas use only. The system working pressure is 10.5 to 11.5 in. water column. Propane gas pressures below 10.5 in. W.C. or above 11.5 in. W.C. will affect heat output which in turn will affect cooling efficiency.

Testing for LP Gas Leaks

WARNING:

Do not wet or spray liquids on or near electrical connections or electronic components. Many liquids, including leak detection solutions, are electrically conductive and can create an electric shock hazard, short electrical components, and/or damage electronic circuits.

CAUTION:

Do not use leak test solutions that contain ammonia or chlorine. Ammonia and chlorine attack copper and brass components.

Leak testing can be accomplished using an electronic leak detector or a commercial grade leak test solution. The use of home made soap and water leak test solution should be avoided if possible. When applying leak test solutions, apply the solution over the entire joint using a small brush or spray applicator.

Due to low system operating pressure, it may take a few minutes for bubbles to appear if the connection is leaking. Hidden joints should be examined thoroughly using an inspection mirror.

Components

When working on the refrigerator LP gas system:

- Do not alter or modify the burner tube anti-vibration loop.
- Do not cross thread fittings. Exercise extreme care when connecting and disconnecting propane gas components.
- Leak test all of the refrigerator propane gas system fittings after servicing, replacing, or repairing any LP gas system component.

Solenoid Gas Valves

The manual shut-off valve and the pressure tap are integrated into the solenoid gas valve. To manually shut-off gas to the burner, rotate the knurled shut-off knob one-quarter turn (90 degrees) clockwise until the screw slot on the face of the knob is vertical or perpendicular to the flow of gas. Refer to Fig. 9 below.

Solenoid Gas Valve Connections

The solenoid gas valve inlet fitting is 3/8 inch, male threads; the outlet fitting is 1/4 inch, male threads.

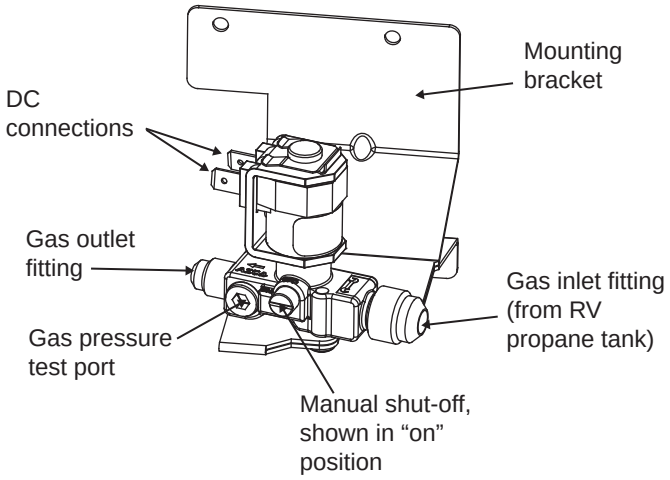


Fig. 9 - Solenoid Gas Valve.

Orifice

The orifice controls the flow of propane gas to the burner. When replacing the orifice always use the size orifice specified. Using the wrong size or a damaged orifice will alter the amount of propane flowing to the burner. Refer to Fig. 10.

> ***WARNING:***
>
> Do not separate cap style LP15 orifice from its adapter. Separating the assemblies breaks the seal and causes an LP gas leak.

Burner

The burner, see Fig. 11, provides primary air access and acts as the fuel mixing chamber to support ignition and the combustion of propane gas. Primary combustion air flows into the burner through three circular openings. Any obstruction blocking any of the three openings will have an effect on the fuel/air mixture. Insufficient combustion air will cause carbon deposits to clog the burner slots. Carbon clogged burner slots along with heavy dirt deposits in the burner are the main cause of no cooling or poor cooling performance when the refrigerator is operating in LP gas mode.

Burner Tube

The burner tube is 1/4 inch OD aluminum tubing with an anti-vibration loop and a double flare at each end. See Fig. 12.

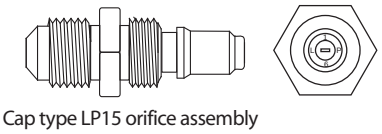


Fig. 10 - LP15 Orifice Assemblies

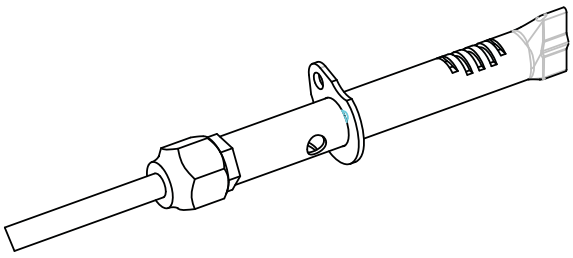


Fig. 11 - Burner

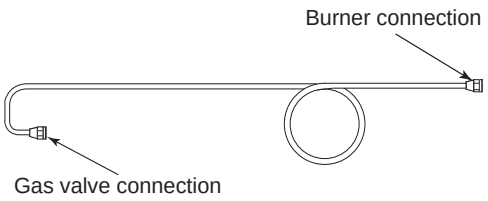


Fig. 12 - Burner Tube

Flue

The flue on all N611v, N811v terminates a few inches above the canister. See Fig. 13. The flue comes equipped with a removable baffle ("spiral baffle") and a metal heat deflector.

The flue and its components should be checked annually. In roof exhaust venting applications, the refrigerator must be removed from the enclosure to check or service the flue or any of its components.

In most sidewall exhaust venting applications, removal of the side wall exhaust vent provides clear access to service the flue or any of its components.

A one inch diameter, loop-handle, twisted wire brush with a 27 inch wire handle is recommended for sweeping clean the flue.

Heat Deflector

The heat deflector, deflects hot exhaust gases to the sides. See Fig. 13. It also keeps dirt and debris from getting into the flue. Cooling performance may be affected if the heat deflector is not installed or is not installed correctly.

Spiral Baffle

The spiral baffle, traps and transfers heat to the cooling unit generator. See Fig. 13.

A retaining wire suspends the spiral baffle in the flue just above the flame. See Fig. 14. The spiral baffle should be checked annually. To remove the spiral baffle from the flue:

1. Remove the heat deflector.
2. Unclip the baffle retaining wire from the rim of the flue.
3. Pull the baffle out of the flue tube.

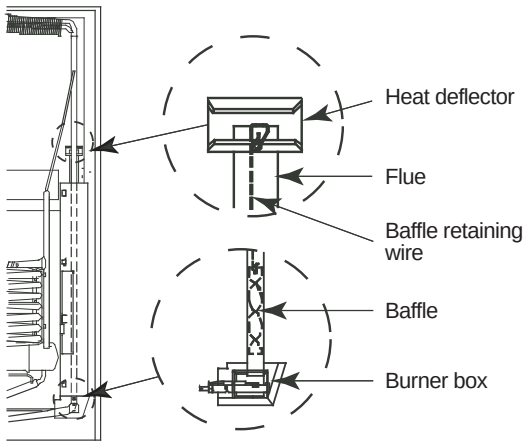


Fig. 13 - Flue and Components

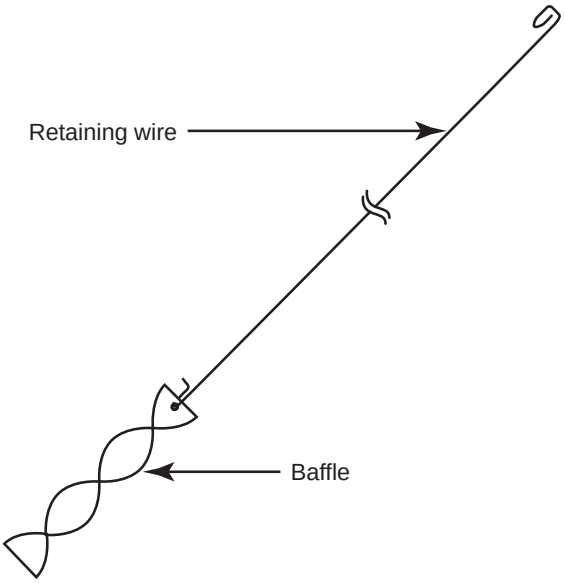


Fig. 14 - Flue Baffle

CAUTION:

Do not cut or modify the spiral baffle retaining wire! The wire positions the baffle for optimal heat transfer.

Flame Appearance

The flame should be light blue with sharp blue root cones and a steady burning flame plume. See Fig. 15.

A flame that is mostly orange or yellow, is erratic, and unstable, indicates a "dirty" burner. Burner cleaning procedures appear on page 21.

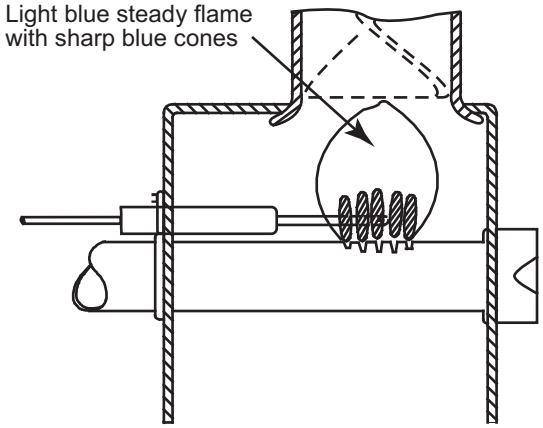


Fig. 15 - Flame Appearance

Burner Cleaning Procedure

> ***WARNING:***
>
> **Burn hazard!** Allow the burner box and burner components to cool before attempting to service the burner assembly or components.

1. Turn OFF power to the refrigerator.
2. Close the LP gas tank valve.

Step 3 through Step 5, refer to Fig. 16.

3. Close the combination gas control valve manual shut-off.
4. Remove the drip cup.
5. Remove the burner box cover.

> ***CAUTION:***
>
> To prevent damage to connections, piping, and components, always use two wrenches to loosen the burner tube. A damaged burner tube creates a potential for gas leaks.

Step 6 through Step 8, refer to Fig. 17.

6. Disconnect the burner tube from the orifice assembly.
7. Remove the orifice assembly from the burner.
8. Remove the burner retaining screw.
9. Remove the burner from the burner box frame.
10. Clean the burner.
11. Visually inspect the orifice. If dirty, wash the assembly with alcohol then allow to air dry. Replace the orifice assembly if the cleaning fails to remove dirt or if the condition of the orifice assembly is questionable.
12. Clean any accumulation of dirt or debris from the burner box base.

NOTE

The burner slots may be cleaned with a small flat file. The inner bore of the burner body may be cleaned with a 3/16 in., double-spiral wire brush. Do not damage the threads when cleaning the inner bore of the burner.

NOTE

Do not insert any type of cleaning tool or wire into the orifice. Do not drill or ream the orifice opening to clean it. Insertion of any type of cleaning tools, reaming, or drills through the opening will alter the volume of LP gas flow to the burner and create a fire hazard potential.

13. Reinstall the burner. Do not over tighten the burner's retaining screw.
14. Install the orifice assembly. First thread the orifice assembly into the burner finger tight, then finish tightening using two wrenches.
15. Connect the burner tube. First thread the fitting finger tight, then finish tightening using two wrenches.
16. Install the burner box cover. Do not overtighten the cover retaining screw.
17. Open the LP gas tank valve.
18. Open the solenoid gas valve manual shut-off.

> ***CAUTION:***
>
> To avoid gas leaks and prevent damage to connections, piping, and components, always use two wrenches to tighten the burner tube. A damaged burner tube creates a potential for gas leaks.

19. Turn ON the refrigerator.
20. Leak test LP gas connections during the 30 second trial-for-ignition.

> ***WARNING:***
>
> Do not attempt to repair LP gas leaks with the refrigerator in operation. Before attempting to repair a gas leak:
>
> - Turn OFF the refrigerator.
> - Close the LP gas valve and the solenoid gas valve manual shut-off.

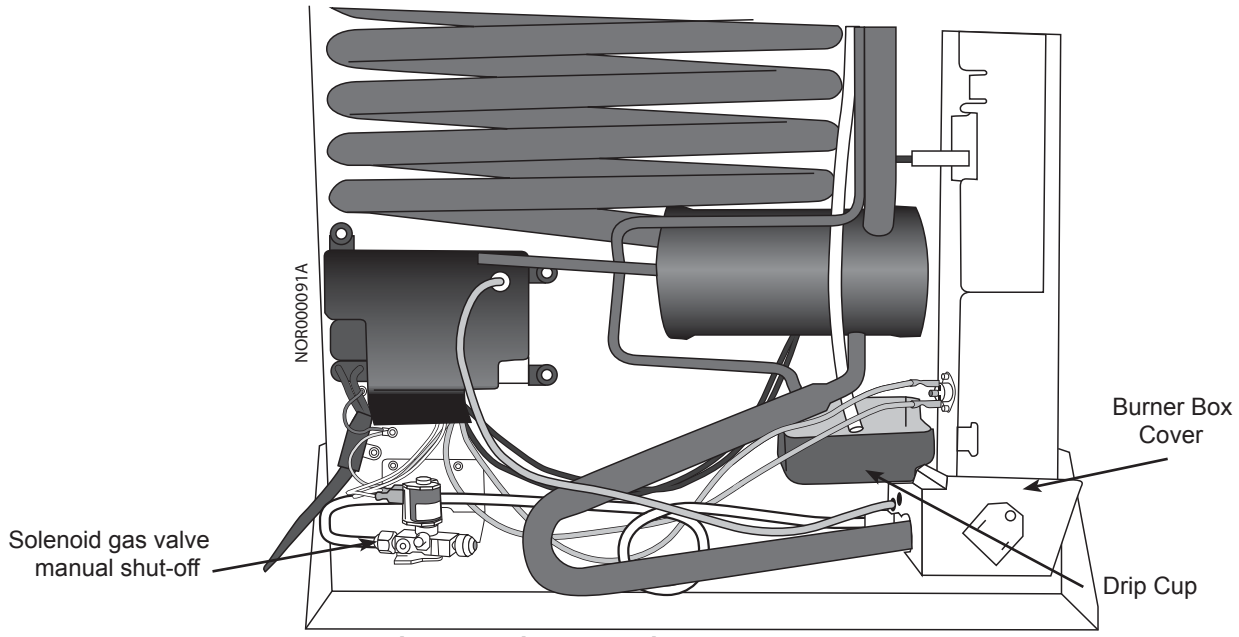


Fig. 16 - Drip Cup and Burner Box Cover

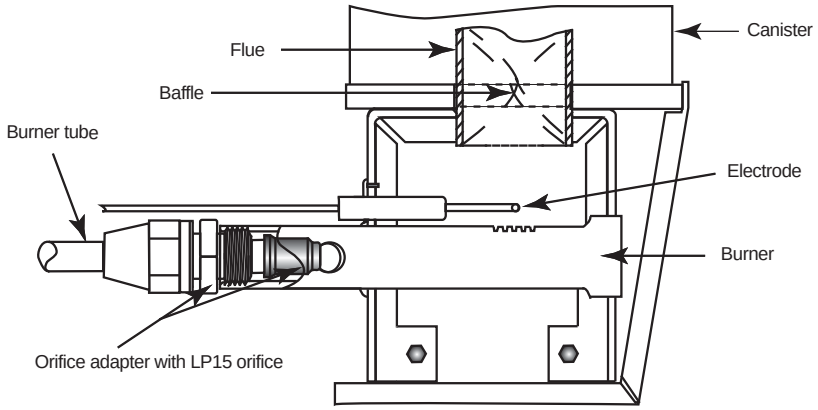


Fig. 17 - Burner and Components

Gas Lockout

For safety reasons, the refrigerator's electronic controls are designed so the ignition trial (maximum amount of time the gas valve and igniter can be left on) is limited to 30-seconds when operating in the LP GAS mode. Certain conditions can cause air in the gas supply line which may result in a gas lockout condition.

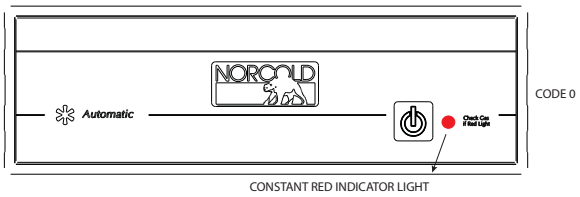
Conditions That Cause Air in Gas Supply Lines

- When starting the refrigerator for the first time
- After storage
- After replacing the propane gas tank

Results of Air in Gas Supply Lines:

- Gas valve and igniter outputs will be turned off
- LP Gas mode will be "locked out"
- Power ON indicator is SOLID RED

Solid Red Indicator Light



Refer to Fig. 4 for additional details.

Reset a Gas Lockout Condition - All Models

To reset a gas lockout condition, power the refrigerator Off and back ON. The amount of air in the LP gas supply lines determines if the procedure needs to be repeated several times.

Gas Safety Valve Test

1. Open lower intake vent at refrigerator rear.
2. Remove both white wires from gas valve solenoid
3. Insert volt ohm meter leads into white wires and set meter to read DC volts.
4. Unplug AC cord from unit to select LP Mode.
5. Verify meter reads approximately 12 volts DC and igniter sparks at burner
6. After approximately 30 seconds, 12 volt output measured at white wires is 0 volts and sparking at burner will stop. This means the gas valve safety circuit is operating correctly. The appropriate error will display on the optical display
7. Reconnect white wires to the gas valve solenoid (it doesn't matter what wire is attached to what terminal)
8. Close lower intake vent.

DC Voltage Requirements and Polarity

Operating controls require 10.5 to 15.4VDC to operate. The positive wire lead (**+**) connects to power board terminal **12VDC**; the negative wire lead (**–**) connects to terminal **GND**.

Power Board DC Fuse

> ***WARNING:***
>
> Never replace a fuse with a higher amp rated fuse. Always use the specified fuse.

The controls circuit fuse is a standard 5 amp (tan color) automotive blade type fuse. It is located on the power board, labeled **F1.**

DC Power Wiring Requirements

> ***WARNING:***
>
> Never use undersized wires to supply DC power to the power board. The use of undersized wires can cause low voltage and high amp draw conditions. The high amp draw caused by a circuit using undersized wires will cause the wire to overheat and creates an electrical fire hazard.

18 AWG is the minimum AWG size wire that can be used for connecting DC power to 2-way models. The in-line fuse for overload protection must not exceed 6 amps.

The distance between the RV DC power source and the power board DC power connection terminals dictates the AWG size wire that must be used. If the distance from the DC power source is:

- 20 feet or less – 10 AWG or a larger gauge wire must be used. The size fuse for circuit overload protection must not exceed 30 amps.
- Over 20 feet – AWG 8 or a larger wire gauge must be used. The size fuse for circuit overload protection must not exceed 40 amps.

AC/DC Converter as Power Source

The power board must be supplied with 12VDC only from the filtered output (battery side) of a converter.

Unfiltered voltage (commonly referred to as AC ripple) output of AC/DC converters can cause the electronic controls to set false fault codes. It can also turn off the refrigerator or prevent the refrigerator from turning off.

AC Power Cord

The AC power cord shown in Fig. 18 is used on units without ice maker. On all AC power cords the round side of the plug that connects to the power board faces the left side of the power board. The cord's grounding prong on the AC outlet connector must be left intact and never be modified or cut. The cord's ground wire (green wire) must always be fastened to the refrigerator cabinet metal plate.

12VDC Ventilation Fan

The 12VDC ventilation fan, shown in Fig. 19, enhances ventilation in sidewall venting installations (unit installed in RV slide out enclosures). The letter "F" in a model number is used to identify refrigerators with a factory installed 12VDC ventilation fan. All sidewall vented units must be equipped with a ventilation fan to prevent combustion gases and hot ventilation air from stagnating in the enclosure.

Ventilation fans are supplied 12VDC through power board connections. Fan operation is automatically controlled by a thermostatic switch mounted on the condenser fin. **The thermostat will be on the first fin from the left (as seen looking from the back).** See Fig. 20 and 21. The switch turns the fan on when the temperature on the first condenser fin is approximately 130 °F. The switch turns the fan off when fin temperature falls to approximately 115 °F.

NORCOLD® fan kit is wired to the power board 12VDC connections using "Y" type wire connector. The fan circuit is protected by an in-line fuse (included in the kit). The fuse, part of the fan kit wiring is a fast acting 1 amp, $^1/_4$" x $1^1/_4$" AGC type. See Fig. 21. The wiring pictorial for field installed fan is shown in Fig. 22.

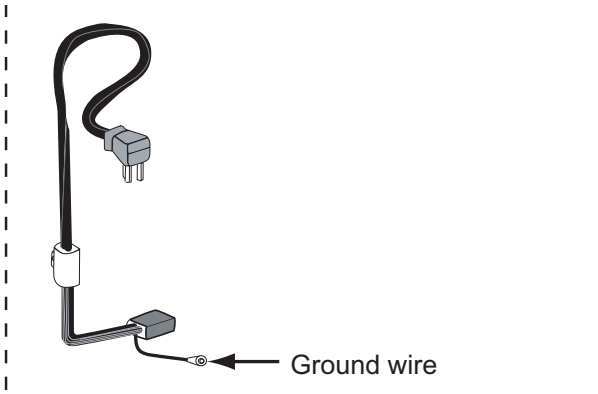


Fig. 18 - AC Power Cord.

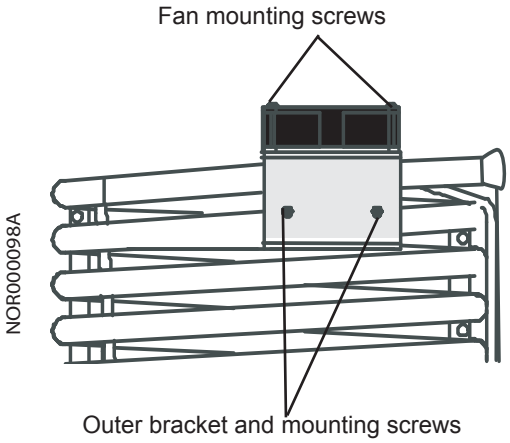


Fig. 19 - Fan Mounted on Top of Absorber Coil.

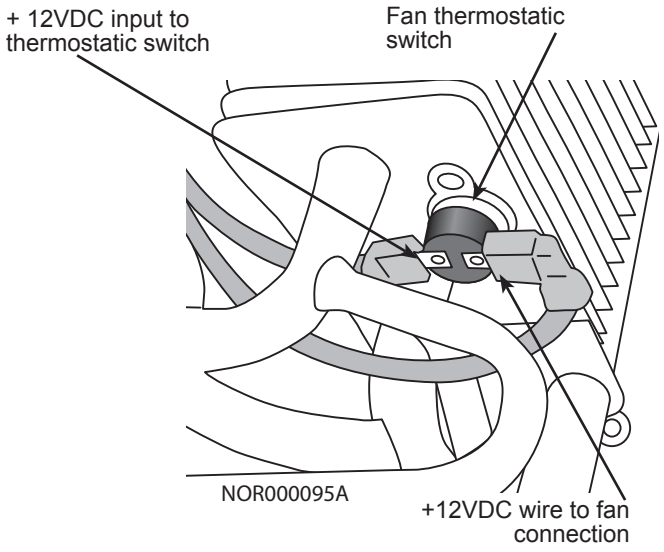


Fig. 20 - Fan Thermostat.

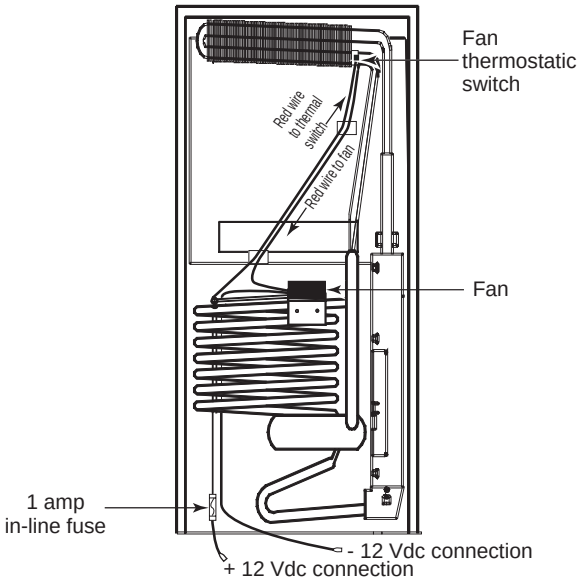


Fig. 21 - Fan with Installed NORCOLD Fan Kit.

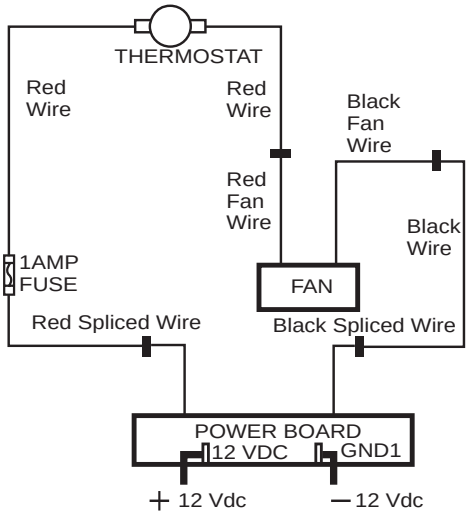


Fig. 22 - NORCOLD Fan Kit Wiring Pictorial.

Cooling System Monitoring

Hardware Monitoring

All refrigerators are factory equipped with a high limit thermal switch mounted to the insulation canister just above the burner box. Should an abnormally high temperature occur the thermal switch will OPEN. Anytime the thermal switch opens, the electronic controls will disable ALL heat source outputs and the Open High Limit error/fault code will be displayed on the optical display (Refer to Fault Codes page 12).

Reset the thermal switch by pressing the red reset-button located between the two terminals on the back of the switch. Refer to Fig. 23. When successfully reset, the resistance between the two terminals will be less than 1 ohm.

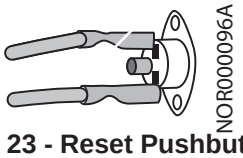


Fig. 23 - Reset Pushbutton

WARNING:

The thermal switch is not intended to be reset more than once. Multiple trips of thermal switch may indicate a more serious over-temperature condition inside the cooling system and must be handled by an authorized Norcold Service technician.

Troubleshooting Cooling Faults

A high percentage of cooling units returned labeled “faulty” are fully operational units. To troubleshoot cooling units see Fig. 24.

Poor or No Cooling on AC Mode

WARNING:

Do not work on live circuits! Turn off and disconnect AC power and DC power supplies before attempting to remove, service, or repair any of the refrigerator's electrical or electronic circuits or components.

When troubleshooting poor or no cooling, check AC voltage input to the power board, then check voltage output to the heater, and the heater's amperage draw.

AC voltage problems, high or low voltages, can be caused by the RV AC power supply circuit. To troubleshoot AC faults, refer to Fault Codes on page 12.

Poor or No Cooling on LP Gas Mode

WARNING:

LP gas (propane) is highly flammable and explosive! Do not smoke, light fires, or create sparks when working on the LP gas system.

Do not use an open flame to leak test any propane gas system component.

When troubleshooting poor or no cooling, always check the burner flame appearance first. Most faults on LP gas operation relate to a "dirty burner."

WARNING:

Do not operate the refrigerator if the cooling unit is leaking or leakage is suspected.

Refrigerant Leakage

Yellow powder or liquid deposits at the rear of the refrigerator or ammonia smell inside the refrigerator indicate refrigerant leakage. Exercise extreme care when handling a leaking or a suspected leaking cooling unit. The cooling system refrigerant solution consists of water, ammonia, sodium hydroxide, and sodium chromate.

Disposal of Cooling Unit

Dispose of cooling unit according to local, state, and federal guidelines and regulations. Dispose of any liquid waste or residue, according to pre-emergency planning and all applicable local, state, and federal regulations.

Do not, under any circumstances, release any waste or residue directly into sewers, or surface waters. If any liquid leaks or spills from the cooling unit, contact the nearest environmental services for guidance.

Cooling System Diagnostic Flowchart

WARNING:

Do not bypass or modify the refrigerator's controls or components to diagnose the cooling system. Do not wire the heater(s) direct. The heater is supplied power through a fused circuit.

WARNING:

Do not operate the refrigerator if the cooling unit is leaking or a leak is suspected.

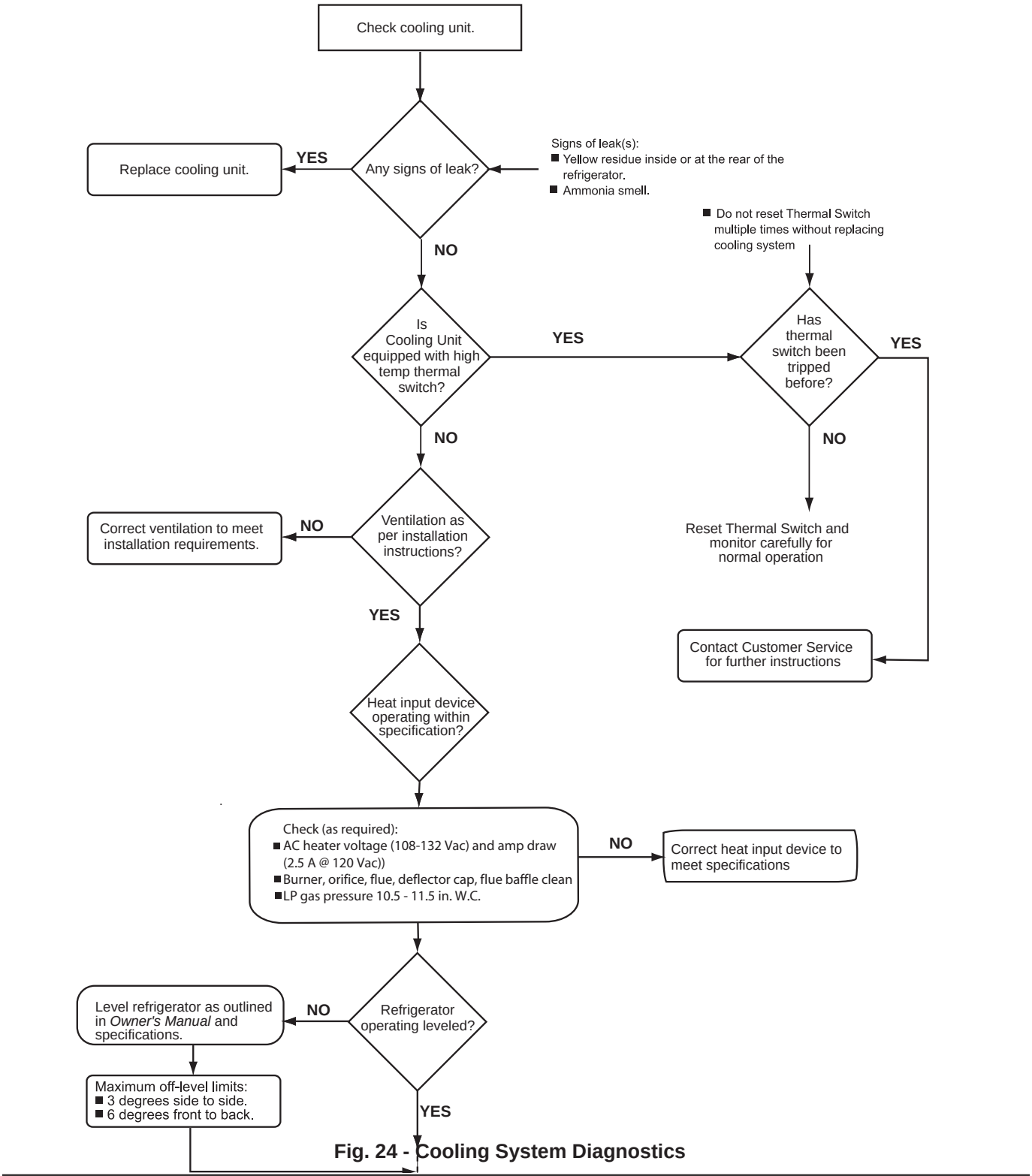
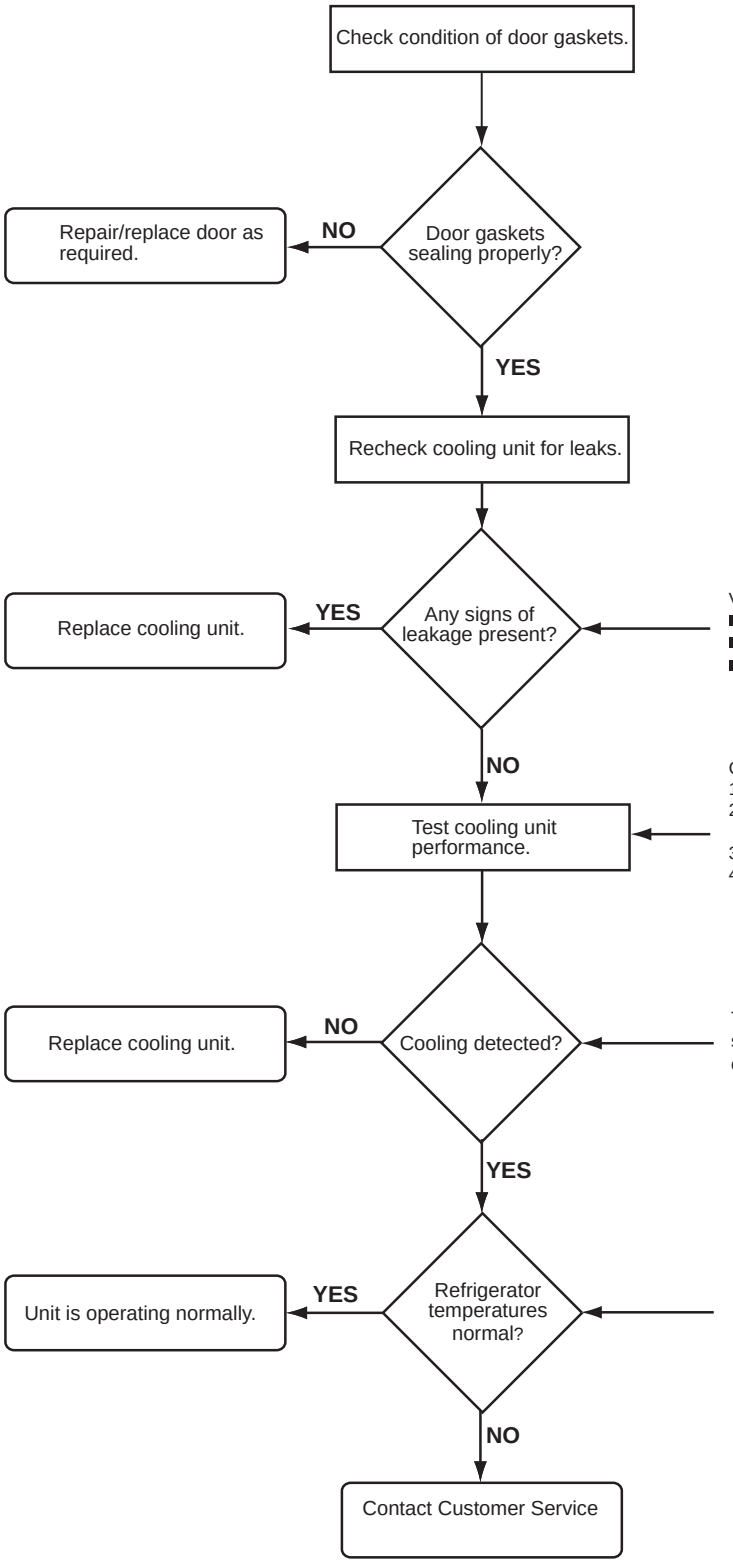


Fig. 24 - Cooling System Diagnostics

From previous page

WARNING:

Do not operate the refrigerator if the cooling unit is leaking or a leak is suspected.



Visual and audible signs of leak(s):
- Yellow residue on the rear of the refrigerator.
- Ammonia smell.
- Gurgling noise (not always present).

Cooling unit performance test:
1. Turn refrigerator ON.
2. Disconnect thermistor from fin; position so it hangs **without interference from any other object**.
3. Allow unit to operate for 8-10 hours.
4. Measure temperature.

The back of the freezer plate should be cool after 3-4 hours of continuous operation.

Temperatures given below are based on 90°F ambient temperature, correct ventilation, and operation at coldest setting for a period of 8-12 hours.
- Freezer -5°F to -10°F.
- Fin temperature 18°F to 25°F.

Wiring Pictorial

Fig. 25 - Wiring

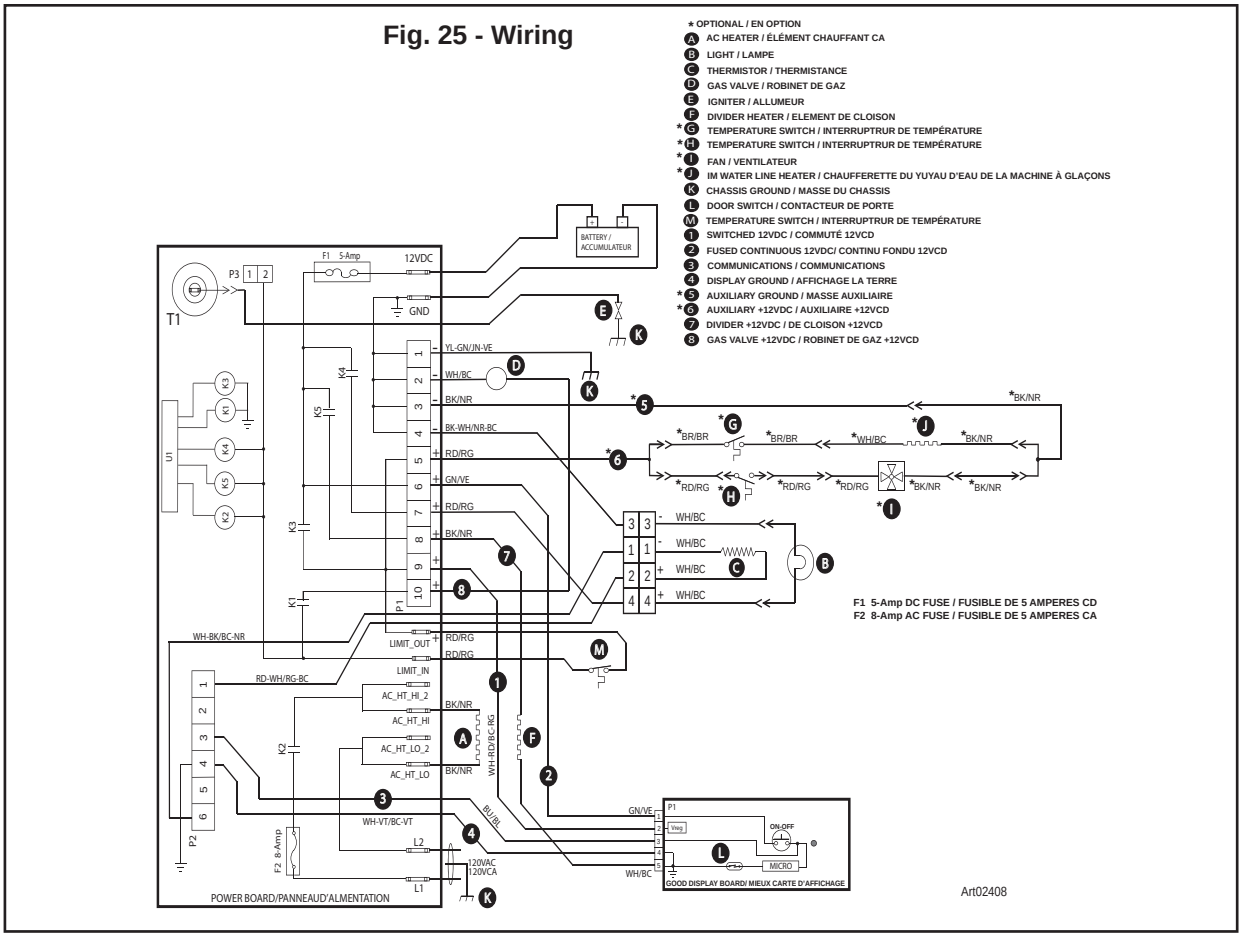
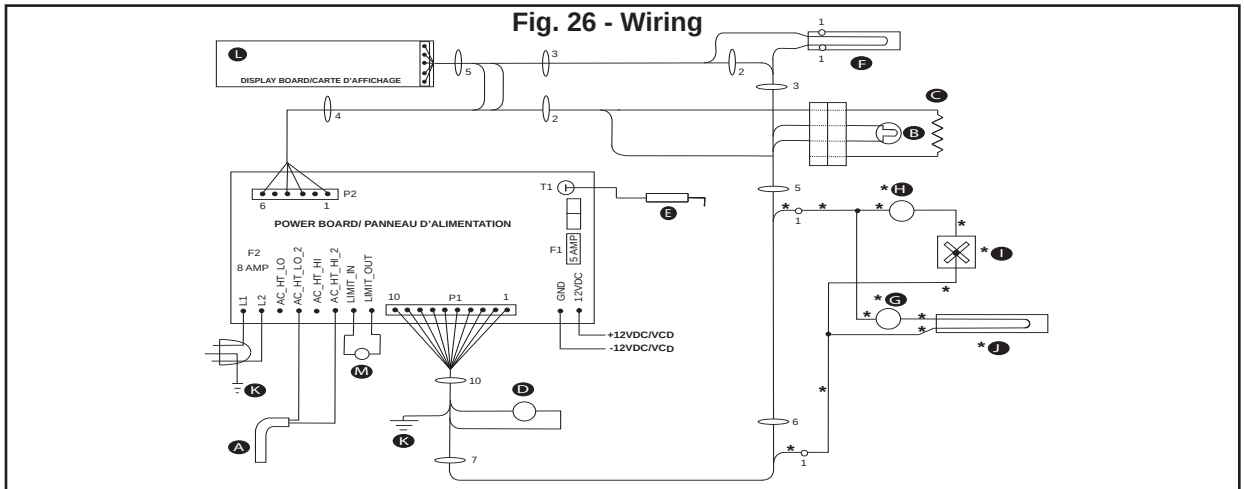
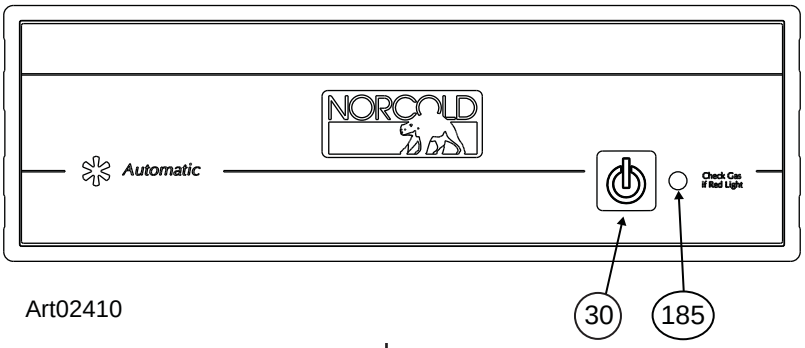


Fig. 26 - Wiring





Art02410

Refrigerator Start-Up

Push and release the ON/OFF button [30] to start the refrigerator (See Art02410). Light [185] indicates operation:

- Solid green:
  - 120 volt AC power is available to refrigerator.
  - Refrigerator is operating on AC electric power.
- Solid amber:
  - 120 volt AC power is not available to refrigerator.
  - Refrigerator is operating on propane gas.
- Solid or Flashing Red:
  - There is a problem and the refrigerator is not cooling.
  - Refer to "Fault Codes" on page 12.

Refrigerator Shut-Down

To shut down the refrigerator, push and release the ON/OFF button.

Effects of High Altitude on Propane Gas Operation

When you operate the refrigerator on propane gas at altitudes higher than 5500 feet above sea level:

- You may experience reduced cooling performance of the refrigerator.
- You may experience burner outages.

To avoid these possible problems, Norcold recommends that you operate the refrigerator on AC when at altitudes higher than 5500 feet above sea level.

Effects of Freezing Temperatures on Refrigerator Operation

A gas absorption refrigerator is not necessarily equipped for freezing temperature operation:

- If refrigerator is equipped for low temperature operation, the refrigerator will operate in temperatures down to 0° F.
- If refrigerator is NOT equipped for low temperature operation, and cooling system of refrigerator is exposed to temperatures of 32° F. or lower for an extended period of time, refrigerator operation may be disrupted. Refrigerator operation will resume when refrigerator cooling system warms sufficiently.

Disrupted operation of the refrigerator, due to extended exposure to temperatures of 32° F. or lower, and any costs incurred to warm the cooling system of the refrigerator are not covered by the Norcold limited warranty. Please contact your local RV dealer for information about how to resume refrigerator operation or about how to equip your refrigerator for operation in freezing temperatures.

> ***CAUTION:***
>
> Do NOT change the installation or venting of your refrigerator. Refrigerator failures, which are the result of changes to either the refrigerator installation or to the venting, are not covered by the Norcold limited warranty.