



ACCOMPANIES YOU.

Service Manual

For Australian refrigerator models:

N301 (93 liter 2-way operation with propane gas or 240 volts AC)

N301.3 (93 liter 3-way operation with propane gas, 240 volts AC, or 12 volts DC)

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Introduction

This Service Manual supplies information for the experienced repair technician. The repair technician should have working knowledge of the operation of an absorption refrigerator system and should have basic knowledge of LP gas and electrical systems.

Read and understand the "Installation and Owner's Manual", all service procedures, cautions and warnings before doing any service work on the refrigerator. If you are unable to resolve the problem by using this Service Manual, technical service support is available at (61) 03-9358-0700.

Only use genuine Thetford replacement parts on the refrigerator. Generic parts do not meet Thetford's specifications for reliability, performance, and safety and will void the Thetford Limited Warranty.

Safety Awareness

Read this manual carefully and understand the contents before you install and operate the refrigerator.

Be aware of possible safety hazards when you see the safety alert symbol on the refrigerator and in this manual. A signal word follows the safety alert symbol and identifies the danger of the hazard. Carefully read the descriptions of these signal words to fully know their meanings. They are for your safety.



WARNING: This signal word identifies a hazard, which if ignored, can cause serious personal injury, death, or much property damage.



CAUTION: This signal word identifies a hazard, which if ignored, can cause small personal injury or much property damage.

Safety Instructions



WARNING:

- This refrigerator is equipped to use only propane gas and can not be changed to use any other fuels (natural gas, butane, etc.).
- Incorrect installation, adjustment, changes to, or maintenance of this refrigerator can cause personal injury, property damage, or both.
- Obey the instructions in this manual when installing the intake and exhaust vents.
- Do not install the refrigerator directly on carpet. Put the refrigerator on a metal or wood panel that extends the full width and depth of the refrigerator.



CAUTION:

- Propane gas can cause a fire or an explosion that can result in property damage, personal injury, or death. Do not smoke or create sparks while doing any work on the propane gas supply system. Do not use an open flame to examine the gas supply piping or fittings for leaks.
 - To avoid possible propane gas leaks, always use two wrenches to tighten or loosen the gas supply line connections.
 - Make sure the electrical installation conforms to all applicable codes. See the "Certification and Code Requirements" section of the "Installation and Owner's Manual".
 - Disconnect both the AC and DC power sources before doing any maintenance work on the refrigerator.
 - Do not bypass or change the refrigerator's electrical components or features.
 - Do not spray liquids near electrical outlets, connections, or the refrigerator components. Many liquids conduct electricity which can cause a shock hazard, electrical shorts, and in some cases fire.
 - The refrigerator cooling system is under pressure. Do not try to repair or to recharge a defective cooling system. The cooling system contains sodium chromate. Breathing certain chromium compounds can cause cancer. The cooling system contents can cause severe skin and eye burns, and can ignite and burn with an intense flame. Do not bend, drop, weld, move, drill, puncture, or hit the cooling system.
 - Storing flammable materials behind or around the refrigerator creates a fire hazard. Do not use the area behind the refrigerator to store flammable materials (e.g. gasoline and cleaning supplies)
 - Do not remove the round ground prong from the refrigerator AC power cord. Do not use a two prong adapter or extension cord on the AC power cord.
 - A circuit overload can result in an electrical fire if the wires and/or fuse sizes are not correct. Use only the wire and fuse sizes listed in the "Installation and Owner's Manual".
 - To prevent child entrapment, make sure all shelf retainers are correctly fastened and remove the doors before disposing of the refrigerator.
- The rear of the refrigerator has sharp edges and corners. To prevent cuts or abrasions when working on the refrigerator, be careful and wear cut resistant gloves.
 - Make sure all fasteners and connections are tight.

Specifications

Operating limits

| | |
|---------------------------------|-------------------------------|
| AC Operation: | 216 VAC Min. - 264 VAC Max. |
| DC Operation: (3-way models) | 11.5 VDC Min. - 15.4 VDC Max. |
| Propane Gas Operation | 2.6 kPa Min. - 2.7 kPa Max. |

Ratings

| | |
|---------------------------------|---|
| AC Operation: | 240 Volts AC, 180 Watts |
| DC Operation: (3-way models) | 14 Volts DC, 150 Watts |
| Propane Gas Operation: | 1.0 MJ per Hr Input 2.7kPa Gas Supply No. 10 Orifice (LP10) |

Current draws

| | |
|--------------------------|--------------------------------|
| AC Heater: Resistance | .75 Amps @ 240 VAC 298 Ohms |
| DC Heater Resistance | 12 Amps @ 14 VDC 1.3 Ohms |

Replacement fuses

| | |
|-------------|------------------------------------|
| AC Circuit | 3 Amp Type 3AG (31.75mm x 6.35mm) |
| DC Circuit: | 20 Amp Type 3AG (31.75mm x 6.35mm) |

Ventilation Requirements



WARNING: The completed installation must:

- provide sufficient intake of fresh air for combustion.
- ensure the living space is completely isolated from the combustion system of the refrigerator.
- provide complete and unrestricted ventilation of the flue exhaust which, in gas mode, can produce carbon monoxide. Breathing carbon monoxide fumes can cause dizziness, nausea, or in extreme cases, death.

Certified installation requires one lower intake vent and one upper exhaust vent. Install the vents through the side wall of the vehicle exactly as instructed in this manual. Any other installation method voids both the certification and the factory warranty of the refrigerator.

The bottom of the opening for the lower intake vent, which is also the service access door, must be even with or immediately below the floor level. This allows any leaking LP gas to escape to the outside and not to collect at floor level.

Australian Gas Association (AGA) certification allows the refrigerator to have zero (0) mm minimum clearance at the sides, rear, top, and bottom. While there are no maximum clearances specified for certification, the following maximum clearances are necessary for correct refrigeration:

| | | |
|-----------|-----------|------------|
| Bottom | 0 mm min. | 0 mm max. |
| Each Side | 0 mm min | 3 mm max. |
| Top | 0 mm min. | 6 mm max. |
| Rear | 0 mm min. | 25 mm max. |

These clearances, plus the lower and upper vents, cause the natural air draft that is necessary for proper refrigeration. Cooler air goes in through the lower intake vent, passes through the refrigerator coils where it removes the excess heat from the refrigerator components, and exits through the upper exhaust vent. If this air flow is blocked or decreased, the refrigerator may not cool correctly.

Each Thetford model is certified by AGA for correct ventilation.

Propane Gas Components

This refrigerator operates on propane gas at a pressure of 2.6 kPa min. to 2.7 kPa max.



WARNING: Be very careful when working on or near the propane gas system.

- Do not smoke, or use an open flame near the propane gas system.
- Do not use an open flame to look for leaks.
- Do not connect the refrigerator to the propane gas tank without a pressure regulator between them.
- To avoid possible propane gas leaks, always use two wrenches to tighten or loosen the gas supply line connections.
- Leaking propane gas can ignite or explode and result in serious personal injury or death.

Examine the gas supply system for leaks



WARNING: Do not allow the leak detecting solution to touch the electrical components. Many liquids conduct electricity which can cause a shock hazard, electrical shorts, and in some cases fire.

Using a solution of liquid detergent and water, make sure that there are no leaks in the gas supply line or in any gas connections. Do not use any liquid that contains ammonia.

If you pressurize the system with compressed air, the following applies:

- The pressure of the compressed air at the manual shutoff valve of the refrigerator must not be more than 3.5 kPa.
- If the pressure of the compressed air is more than 3.5 kPa, remove the gas supply line from the manual shutoff valve of the refrigerator before testing.
- If the pressure of the compressed air is equal to or less than 3.5 kPa, close the manual shutoff valve of the refrigerator before testing.

Electrical Components

This refrigerator operates on these electrical sources.

AC Operation 240 volts AC voltage
(216 volts min. - 264 volts max.)

DC Operation 14 volts DC voltage
(3-way models) (11.5 volts min. - 15.4 volts max.)

Operation outside of these limits may damage the refrigerator's electrical circuitry and will void the warranty.

Examine the 240 volts AC supply



WARNING: Connect the AC power cord only to a grounded three-prong receptacle. Do not remove the round ground prong from the power cord. Do not use a two-prong adapter or an extension cord. Operating the refrigerator without a correct ground could cause dangerous electrical shock or death if you touch the metal parts of the refrigerator or the vehicle.

- Make sure the AC power cord is in a grounded three-prong receptacle.
- Make sure the receptacle is within easy reach of the lower intake vent.
- Make sure the power cord does not touch the burner cover, the flue pipe, or any hot component that could damage the power cord's insulation.

Examine the 12 volt DC supply (3-way models)

The refrigerator gets power from the 12 volt system of the vehicle; either from the battery or from an auxiliary (house) battery. The battery system not only supplies DC power to the refrigerator, but also to other components of the vehicle.

The DC heating element, which supplies power for cooling during DC operation, has a high current draw and can cause rapid battery drain.

Make sure the 12 volt DC supply is connected correctly by checking that:

- the DC negative wire from the battery is connected to the DC wire to the refrigerator.
- the DC positive wire from the battery is connected to the DC wire to the refrigerator.
- an in-line fuse is installed on the DC positive wire, as near the battery as possible, between the battery and the lead wire of the refrigerator

NOTE: This in-line fuse is necessary for added safety, even though the refrigerator has a DC fuse in the control assembly.

Controls

The thermostat [1] changes the amount of propane gas that goes to the burner (see Figure 1). This acts as the temperature control of the refrigerator. Number 5 is the coldest temperature setting.

NOTE: The thermostat is not an automatic gas control. It does not automatically change the flame from high fire to low fire as do other RV refrigerators. If the cooling load changes, you must manually change the gas control to maintain the same temperature inside the refrigerator.

When the outside air temperature is less than 10°C, the refrigerator may have a tendency to freeze food at the colder temperature settings. To reduce the tendency to freeze food:

- Turn the thermostat to a warmer temperature setting.
- Keep the refrigerator full.
- Put foods that are more likely to freeze on the upper shelf.

The selector switch [2] changes the energy source of the refrigerator between propane gas (🔥), AC electric (⚡), and DC electric (🔋), and shuts down the refrigerator at the OFF (○) position.

The gas safety valve [3] is built into the control panel. As long as a flame is present, the valve is open and allows propane gas to flow into the burner. Any loss of flame (empty propane gas tank, blow out, etc.) closes the valve and stops the flow of propane gas.

The igniter [4] makes a spark which ignites the flame in the burner.

The flame meter [5] shows if a flame is present in the burner.

Ignition and Start Up

Before ignition or start up of the refrigerator:

- Make sure the air flow into the lower intake vent, through the refrigerator coils and condenser, and out of the upper exhaust vent is not blocked or decreased.
- Make sure there are no combustible materials in or around the refrigerator.

Ignition - propane gas operation

1. Open the valve at the propane gas storage tank.
2. Open the manual shut off valve of the refrigerator.
3. Turn the thermostat [1] to the 5 position (see Figure 1).
4. Turn the selector switch [2] to the gas position (🔥).
5. Push and hold in the safety valve [3] and in rapid succession push in the igniter several times for about five seconds:



WARNING: Do not hold the safety valve in for more than 30 seconds. If there is no flame in this time, wait at least five minutes before you try again to ignite the unit. If you continue to hold in the safety valve, gas will collect in the burner area. This could cause a fire or explosion and result in serious personal injury or death.

6. When a flame is present, and the flame meter [5] moves into the green area, release the safety valve.
7. If the flame meter does not move into the green area or does not remain in the green area, wait five minutes and repeat steps 5 and 6.
8. Once a flame is present and the flame meter moves into the green area, turn the thermostat to the desired temperature setting.

Start up - AC electric operation

1. Connect the refrigerator to the AC source. Make sure that 240 volts AC is available.
2. Turn the selector switch to the AC position (⚡).
3. Turn the thermostat to the desired temperature setting.

Start up - DC electric operation (3-way models)

1. Connect the refrigerator to the DC source. Make sure that 12 volts DC is available.
2. Turn the selector switch to the DC position (🔋).
3. Turn the thermostat to the desired temperature setting.

Shut down

1. Turn the selector switch to the OFF position (○).
2. Turn the thermostat to the 1 position.

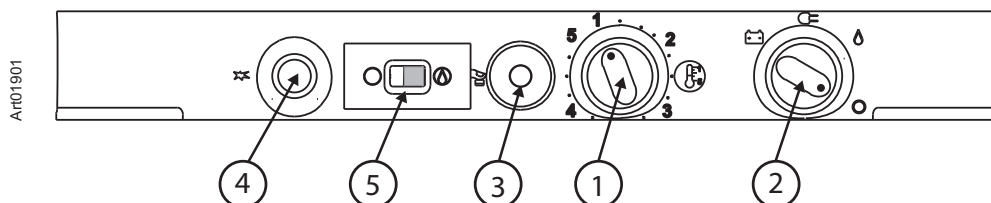


Figure 1. Controls

Battery drain

- In AC operation, there is no battery drain.
- In DC operation, the refrigerator draws 10-13 amps at 14 - 15.4 volts.
- If the battery stops charging during DC operation, change the refrigerator to gas or AC operation until the battery starts charging again.
- Check the voltage when in DC operation. The voltage should never drop below 13.5 volts.

Refrigerator Maintenance

Gas flame appearance

While in LP gas operation, examine the appearance of the gas flame:

1. Turn the thermostat to the 5 position.
2. Open the lower intake vent.



CAUTION: The burner box cover can be hot. Wear gloves to avoid burns.

3. Open the burner box door [3] and look at the gas flame [1] (see Figure 2 and Figure 3).
4. The flame should be a darker blue inside and a lighter blue outside and should be a constant and steady shape.
5. The flame should not be yellow and should not have an erratic and unstable shape.
6. Make sure the flame does not touch the inside of the flue tube [2].
7. Close the burner box door.

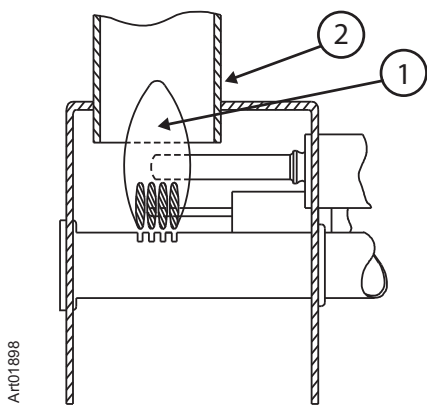


Figure 2. Burner Box

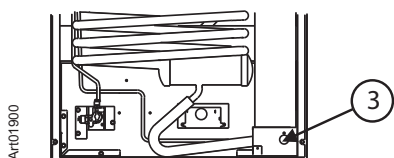



Figure 3. Burner Box Location

Remove and clean the burner orifice

To remove and clean the burner orifice:

1. Close the valve at the propane gas tank(s).
2. Open the lower intake vent.
3. Close the manual shut off valve of the refrigerator.
4. Turn the gas control to the OFF position ().
5. Remove the burner box cover by removing one screw.



WARNING: To avoid possible propane gas leaks, always use two wrenches to loosen and tighten the gas supply line at the refrigerator's manual shut off valve.

6. Remove the flare nut from the orifice assembly [1] (see Figure 4).
7. Remove the orifice assembly from the burner [2]



WARNING: When cleaning, do not try to remove the orifice [3] from the orifice adapter [4]. Removal will damage the orifice and can cause a propane gas leak. Leaking propane gas can ignite or explode and result in serious personal injury or death. Do not clean the orifice with a pin or other objects.

8. Clean the orifice assembly with air pressure and alcohol only.
9. Using a wrench, fit the orifice assembly to the burner.
10. Place the flare nut onto the orifice assembly.
11. Examine all of the gas connections for leaks.

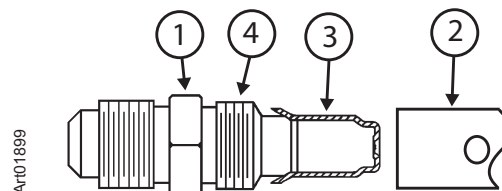


Figure 4. Orifice Assembly

Diagnosing Cooling Problems



WARNING: The refrigerator cooling system is under pressure. Do not try to repair or to recharge a defective cooling system. The cooling system contains sodium chromate. Breathing certain chromium compounds can cause cancer. The cooling system contents can cause severe skin and eye burns, and can ignite and burn with an intense flame. Do not bend, drop, weld, move, drill, puncture, or hit the cooling system.

Make sure the cooling unit has the correct ventilation

1. Make sure that the intake and exhaust vents are not blocked.
2. Make sure that the air flow through the back of the refrigerator is not decreased or blocked.
3. Make sure the ventilation baffle is correctly installed.

Examine the cooling unit for leaks



WARNING: If you think that the cooling system has a leak, do not operate the refrigerator. Replace the cooling unit before operating the refrigerator.

- If you smell ammonia, the cooling unit has a leak and must be replaced.
- If you see a yellow powder or residue anywhere at the rear of the refrigerator or in the enclosure, the cooling unit has a leak and must be replaced.

Determine which cooling source is causing the problem

Conduct the following test for each of the following cooling sources: propane gas, AC electric, and DC electric:

1. Determine if the selected energy source is operating and heating correctly:



CAUTION: Touch only the outside of the insulation sleeve. During normal operation, some tubes of the cooling unit are hot. Do not touch any tubes of the cooling unit.

2. Within 20 minutes of starting the refrigerator, touch the outside of the insulation sleeve. The outside of the insulation sleeve should be warm to the touch.
If the insulation sleeve is warm, proceed to step 5.
3. If the outside of the insulation sleeve is not warm, the selected energy source may not be operating correctly.
4. Start up the refrigerator on a different energy source and repeat steps 1 and 2. Repeat this process for all energy sources.
5. If the outside of the insulation sleeve is warm to the touch, make sure the unit is properly cooling:
 - Within one hour after starting up the refrigerator, touch the fins on the inside of the fresh food compartment. The fins should feel cold to the touch.
 - If the fins do not feel cold to the touch after two hours, the cooling unit is not operating correctly.
 - If the cooling problem does not occur when operating on all energy sources, the problem is not the cooling unit.
6. Use the “Troubleshooting Charts” to determine the cause of the cooling problem.

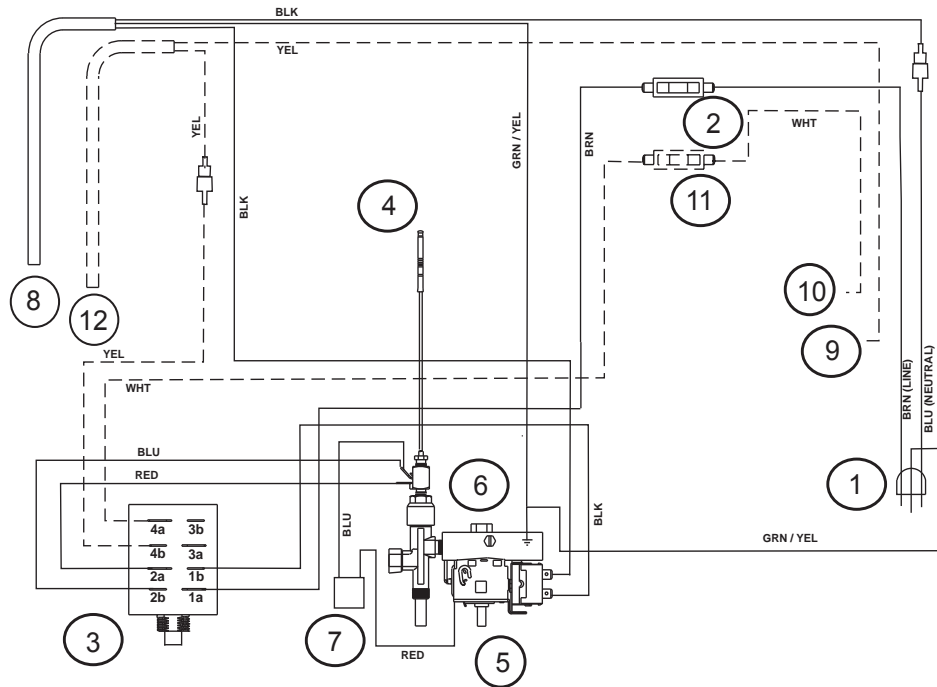
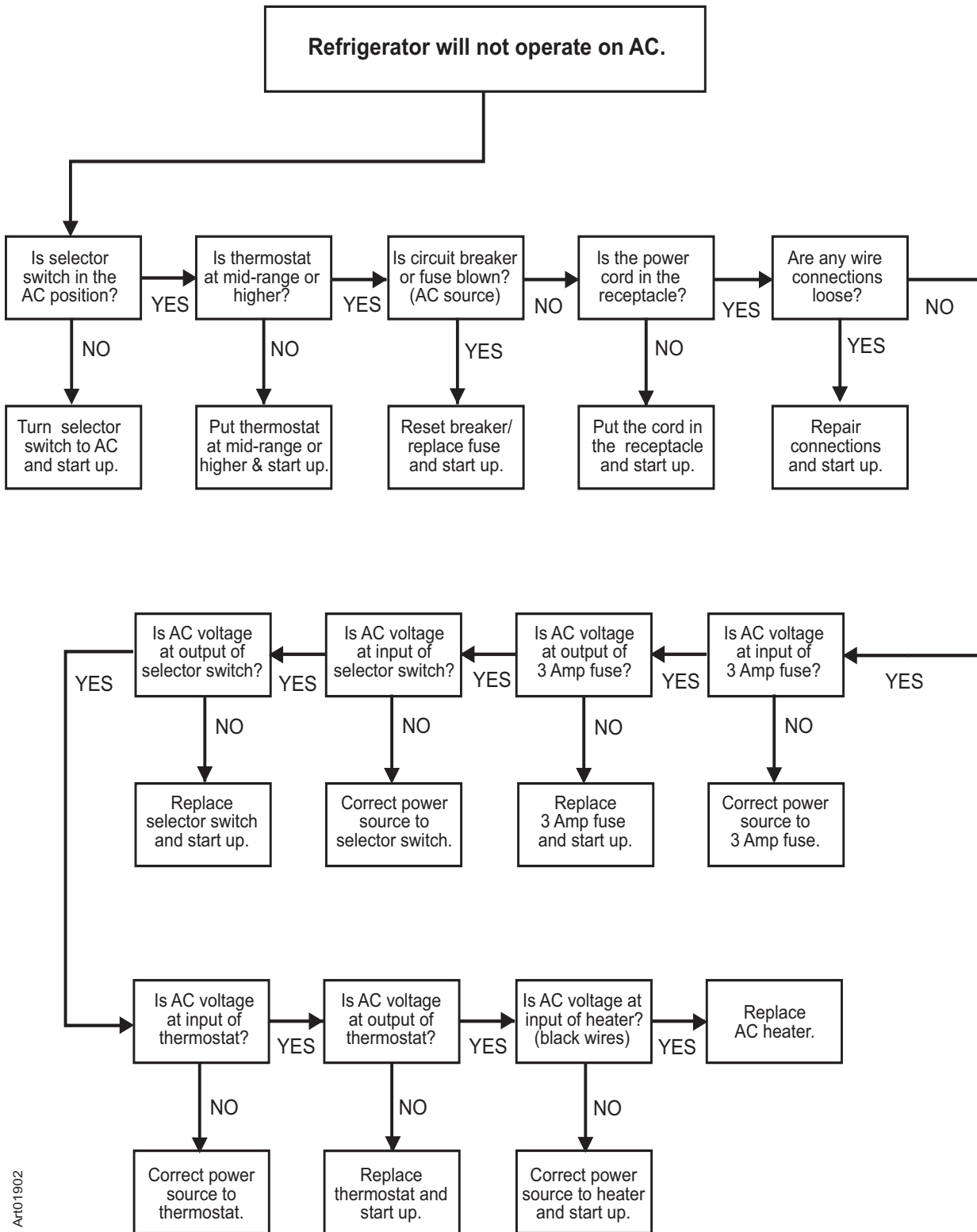


Figure 5. Wiring Diagram

Wiring Pictorial

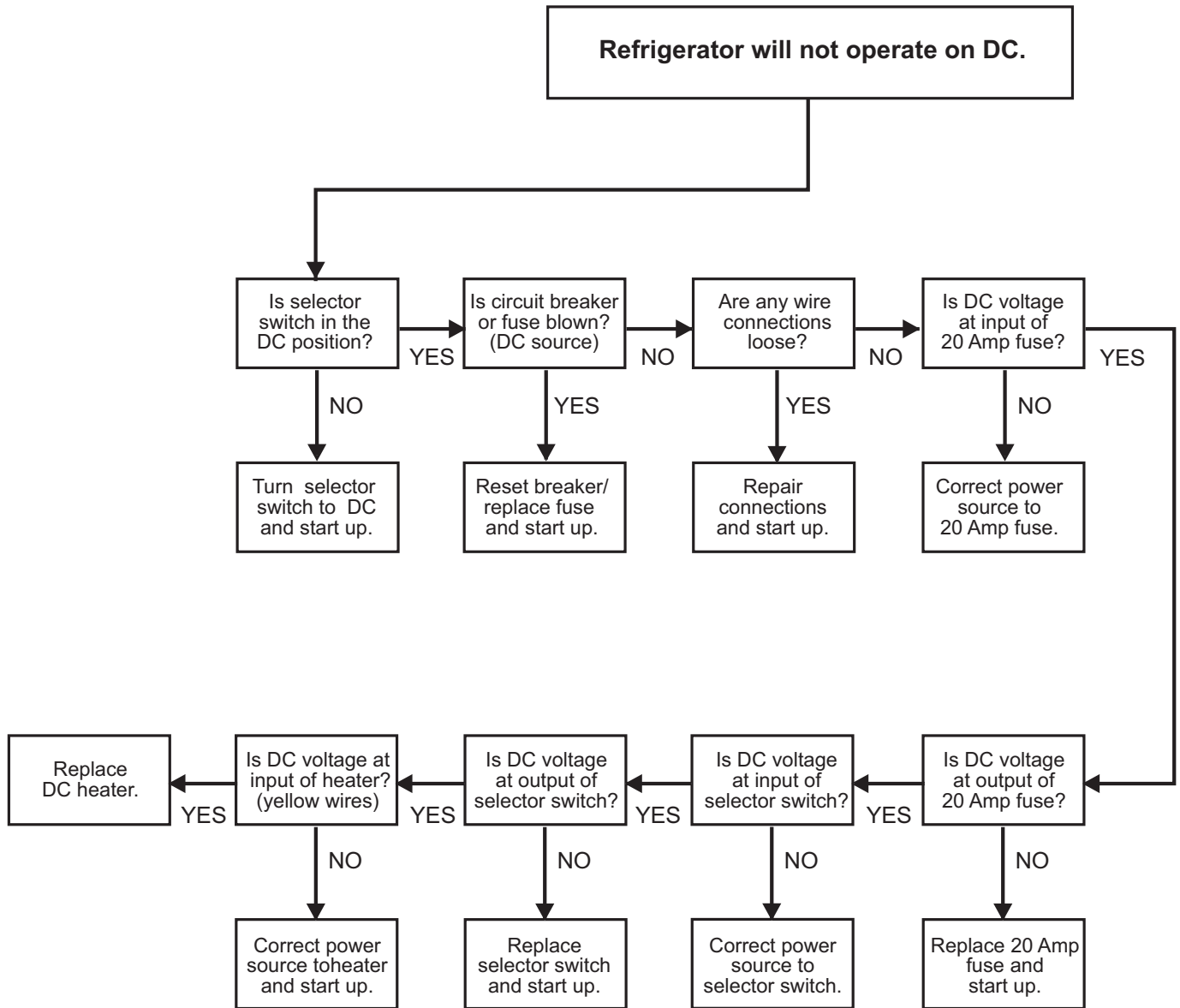
The parts of the wiring pictorial are (see Figure 5):

- | | | | |
|--------|-------------------------------|---------|-------------------------------------|
| 1..... | 240 VAC Power cord | 7..... | Flame meter |
| 2..... | 3 Amp fuse | 8..... | AC heater |
| 3..... | Selector switch | 9..... | -12 VDC Power supply (3-way models) |
| 4..... | Thermocouple | 10..... | +12 VDC Power supply (3-way models) |
| 5..... | Thermostat / gas safety valve | 11..... | 20 Amp fuse (3-way models) |
| 6..... | Thermocouple interrupter | 12..... | DC heater (3-way models) |



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Figure 6. AC Troubleshooting Flowchart



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Figure 7. DC Troubleshooting Flowchart

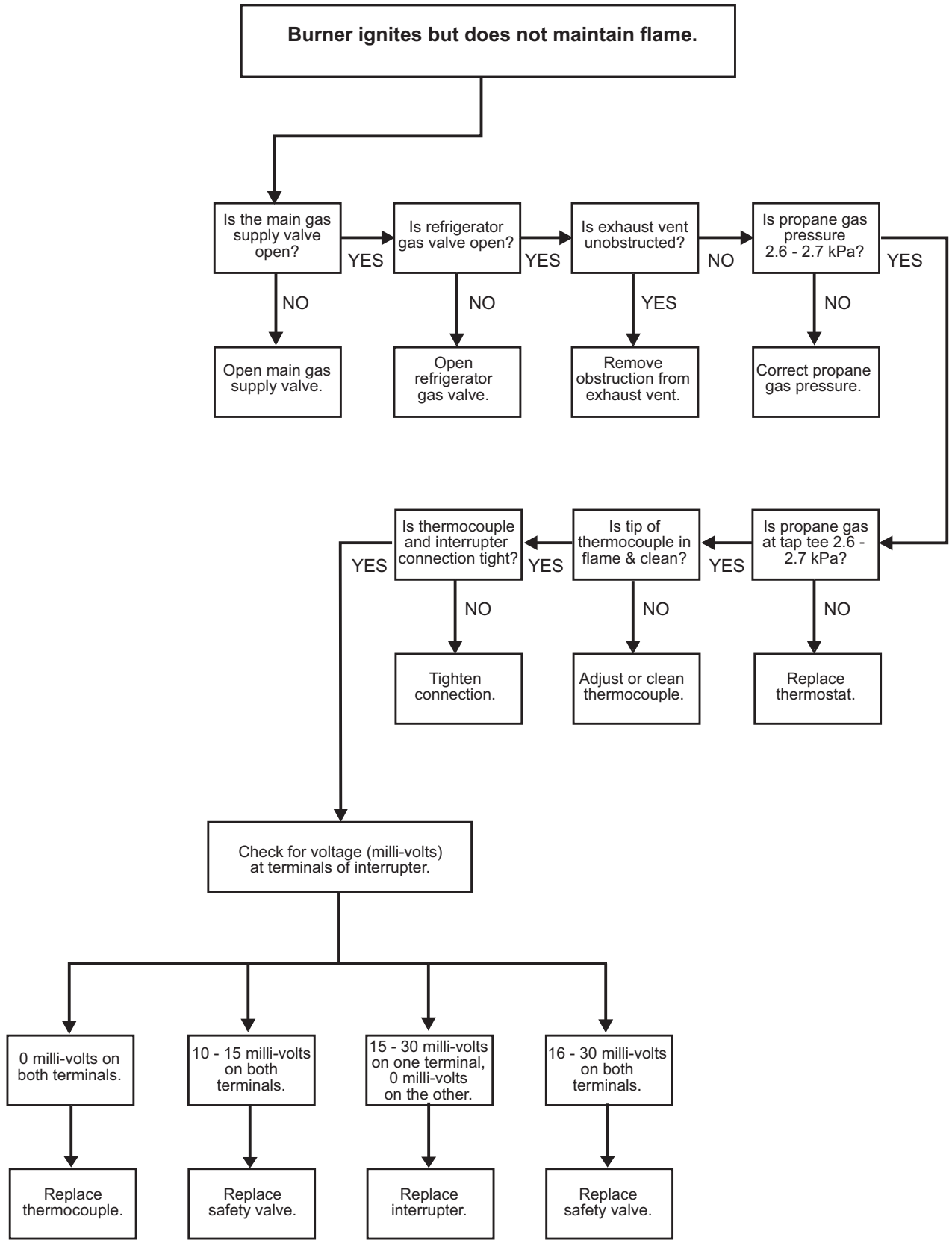


Figure 8. No Flame Troubleshooting Flowchart

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Replacement Instructions

If the "Troubleshooting Charts" tell you to replace a part, use the following instructions.


Selector switch

1. Close the valve of the propane gas tank(s).
2. Pull the knob off the selector switch.
3. Remove the two screws that attach the selector switch.
4. Gently pull the selector switch away from the back of the control panel.
5. Remove each wire, one at a time, from the selector switch.
6. Connect each wire onto the replacement selector switch, using Figure 5 as a guide.
7. To install the replacement selector switch, reverse steps 1 - 4.

Thermostat


1. Close the valve of the propane gas tank(s).
2. Pull the knob off the thermostat.
3. Remove the gas supply line from the inlet flare fitting of the thermostat.
4. Remove the safety valve from the thermostat. (Refer to the "Safety Valve" replacement process on page 12.)
5. Remove the two screws that attach the thermostat to the bracket.
6. Remove the two red wires from the thermostat.
7. Remove the clips that attach the capillary tube to the cooling fin inside the refrigerator.
NOTE: The capillary tube is located on the fifth cooling fin from the right.
8. Gently pull the capillary tube through the back of the refrigerator cabinet.
9. To install the replacement thermostat, reverse steps 1 - 8.
NOTE: Make sure the capillary tube is flat against the cooling fin.
10. Examine all the gas connections for leaks.

AC heater

1. Unplug the AC power cord from the receptacle.
2. To make sure the other energy sources do not activate, turn the selector switch to the OFF () position.
3. Remove the black and green wires that connect the AC heater.
4. Using a utility knife, vertically cut through the insulation that surrounds the flue tube.
5. Remove the insulation.
6. Pull the AC heater up and out of the heater well.
7. Push the replacement AC heater down into the heater well.
NOTE: Make sure the bead of weld on the AC heater touches the top of the heater well.

8. Put the insulation around the flue tube.
NOTE: Make sure the insulation is completely around the flue tube.
9. Tape the insulation closed.
10. Attach the one AC heater wire to the thermostat, and attach the other AC heater wire to the power cord.
11. Attach the green and yellow AC heater ground wire to the side of the thermostat.
12. Plug the AC power cord into the receptacle.

DC heater (3-way models)

1. Remove the DC input leads from the refrigerator.
2. To make sure the other energy sources do not activate, turn the selector switch to the OFF () position.
3. Remove the two yellow wires that connect to the DC heater.
4. Using a utility knife, vertically cut through the insulation that surrounds the flue tube.
5. Remove the insulation.
6. Pull the DC heater up and out of the heater well.
7. Push the replacement DC heater down into the heater well.
NOTE: Make sure the bead of weld on the DC heater touches the top of the heater well.
8. Put the insulation around the flue tube.
NOTE: Make sure the insulation is completely around the flue tube.
9. Tape the insulation closed.
10. Attach the two yellow wires of the DC heater.
11. Make sure that a 20 Amp fuse is in the fuse holder.
12. Attach the DC input leads from the refrigerator.

Thermocouple

1. Close the valve at the main propane gas tank(s).
2. Remove the thermocouple from the thermocouple interrupter.
3. Remove the burner box cover.
4. Remove the two screws that attach the thermocouple bracket to the burner box.
5. Remove the thermocouple from the thermocouple bracket.
6. Remove the wires from the thermocouple interrupter.
7. Using two wrenches, loosen the thermocouple interrupter from the safety valve.
8. Turn the thermocouple interrupter about half way out of the safety valve.
9. Turn the replacement thermocouple about half way into the thermocouple interrupter.
10. Using two wrenches, fully tighten the thermocouple interrupter onto the safety valve.
11. Fully tighten the thermocouple onto the thermocouple interrupter.
12. Attach the wires to the thermocouple interrupter.
13. Reverse steps 1 - 5 to complete the process.
14. Examine all the gas connections for leaks.

Thermocouple interrupter

1. Close the valve at the main propane gas tank(s).
2. Remove the thermocouple from the thermocouple interrupter.
3. Remove the wires from the thermocouple interrupter.
4. Using two wrenches, remove the thermocouple interrupter from the safety valve.
5. Turn the replacement thermocouple interrupter about half way into the safety valve.
6. Turn the thermocouple about half way into the replacement thermocouple interrupter.
7. Using two wrenches, fully tighten the thermocouple interrupter onto the safety valve.
8. Fully tighten the thermocouple onto the thermocouple interrupter.
9. Attach the wires to the thermocouple interrupter.
10. Open the valve at the main propane gas tank(s).
11. Examine all the gas connections for leaks.

Safety valve

1. Close the valve at the main propane gas tank(s).
2. Remove the thermocouple from the thermocouple interrupter.
3. Remove the wires from the thermocouple interrupter.
4. Using two wrenches, remove the thermocouple interrupter from the safety valve.
5. Remove the gas outlet fitting from the safety valve.
6. Remove the safety valve from the thermostat.
7. Assemble the replacement safety valve to the thermostat.
NOTE: Put a thread sealer product on the threads of the gas outlet fitting to make sure the connection does not leak.
8. Assemble the replacement safety valve to the gas outlet fitting.
9. Turn the thermocouple interrupter about half way into the replacement safety valve.
10. Turn the thermocouple about half way into the thermocouple interrupter.
11. Using two wrenches, fully tighten the thermocouple interrupter onto the safety valve.
12. Fully tighten the thermocouple onto the thermocouple interrupter.
13. Attach the wires to the thermocouple interrupter.
14. Examine all the gas connections for leaks.

Refrigerator

1. Close the valve at the main propane gas tank(s).
2. Remove the gas supply line from the bulkhead fitting of the refrigerator.
3. Unplug the AC power cord from the receptacle.
4. Remove the DC input leads from the refrigerator.
5. Remove the screws that attach the refrigerator to the floor.
6. Remove the screws that attach the refrigerator to the wall.
7. Remove the refrigerator from the opening.
8. To install the refrigerator, reverse steps 1 - 7.
9. Examine all the gas connections for leaks.