

# Norcold Repair Guide

## Models 865,866,868

## Section 5

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## General Information and Specification

### OPERATING LIMITS - ALL MODELS

AC Mode: 132 VAC Max., 108 VAC Min.  
15.4 VDC Max., 10.5 VDC Min.  
DC Mode: 15.4 VDC Max., 11.5 VDC Min.  
Gas Mode: 11" W.C.  
15.4 VDC Max., 10.5 VDC Min.

### MODELS 8652, 8653 RATINGS

1200 Btu/Hr Input  
LP Gas Mode:  
11" W.C.  
LP14 Orifice  
12 Volts DC control voltage  
AC Mode:  
110 Volts AC, 170 Watts  
12 Volts DC control voltage  
DC Mode (3-Way only):  
12 Volts DC

### MODELS 8662, 8663 RATINGS

1450 Btu/Hr Input  
LP Gas Mode:  
11" W.C.  
LP16 Orifice  
12 Volts DC control voltage  
AC Mode:  
110 Volts AC, 300 Watts  
12 Volts DC control voltage  
DC Mode (3-Way only):  
12 Volts DC

### MODELS 8682,8683 RATINGS

1500 Btu/Hr Input  
LP Gas Mode:  
11" W.C.  
LP16 Orifice  
12 Volts DC control voltage  
AC Mode:  
110 Volts AC, 300 Watts  
12 Volts DC control voltage  
DC Mode (3-Way only):  
12 Volts DC

### CURRENT DRAWS - 8652, 8653

Automatic ignition - Less than 250 milliamps or .25 amps  
AC Heating Element - 1.5 amps at 110 Volts AC  
1.7 amps at 120 Volts AC  
DC Heating Element - 9.2 amps at 12 Volts DC  
10.7 amps at 14 Volts DC

### CURRENT DRAWS - 8662, 8663, 8682, 8683

Automatic ignition - Less than 250 milliamps or .25 amps  
Humidity Heater - 240 milliamps or .24 amps  
Interior Lamp (when door open) - 900 milliamps or .90 amps  
AC Heating Element - 2.7 amps at 110 Volts AC  
2.9 amps at 120 Volts AC  
DC Heating Element - 13.8 amps at 12 Volts DC  
16.1 amps at 14 Volts DC



OPERATION WHERE THESE SPECIFICATIONS ARE EXCEEDED MAY CAUSE DAMAGE AND WILL VOID REFRIGERATOR WARRANTY.

## Electrical Connections - 12 Volt DC

All Norcold refrigerator models require a 12 volt DC supply (See Figure 5.1). 12 Volts DC is required to operate the Mode Selector (Eyebrow board) and temperature control circuits and maintain the automatic Ignition gas mode. The DC lead connections (1/4" male quick connects) are at terminals located on the Power Supply at the rear of the refrigerator. One terminal is marked positive (+) and the other negative (-). Correct polarity must be observed when connecting to the DC supply. Do not use the chassis or vehicle frame as one of the conductors. Connect two wires between the refrigerator and the DC supply.

The distance the current must travel from the battery to the refrigerator dictates the AWG wire size to be used. Should the wire be too small for the distance, a voltage drop will result. In the case of 3 - way models, the voltage drop affects the wattage output of the cartridge heater and resultant refrigerator performance. See the adjacent wire and fuse chart for the correct wire and fuse size.

## Electrical Connections - 120 Volt AC

All Norcold refrigerators are equipped with a three prong plug for protection against shock hazard (See Figure 5.2). They must be connected into a recognized three prong attachment receptacle. The cord must be routed so as not to come in contact with the Burner cover, flue pipe, or any other component that could damage the cord insulation.



DO NOT REMOVE (CUT) GROUNDING PRONG FROM THE REFRIGERATOR AC POWER CORD. REMOVAL OF THIS PRONG CAN RESULT IN A SEVERE ELECTRICAL SHOCK, AS WELL AS, VOIDING THE REFRIGERATOR ELECTRICAL CERTIFICATION AND WARRANTY. EX-

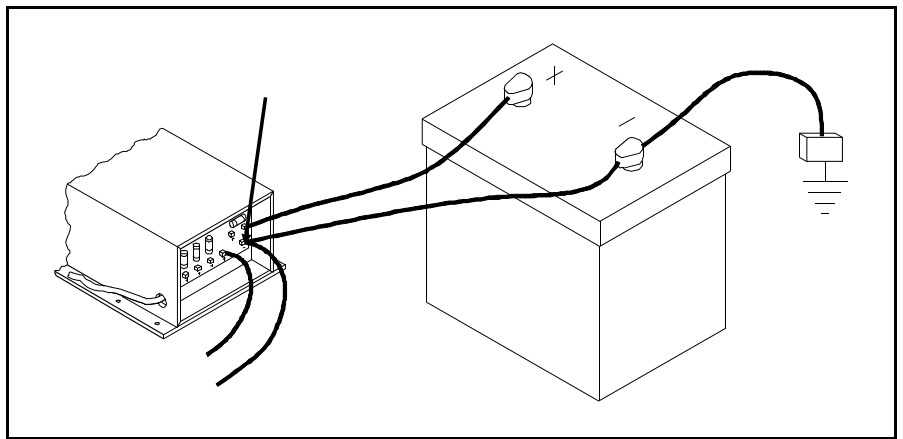


Figure 5.1 Recommended 12 Volt Connection  
TENSION CORDS ARE NOT RECOMMENDED.

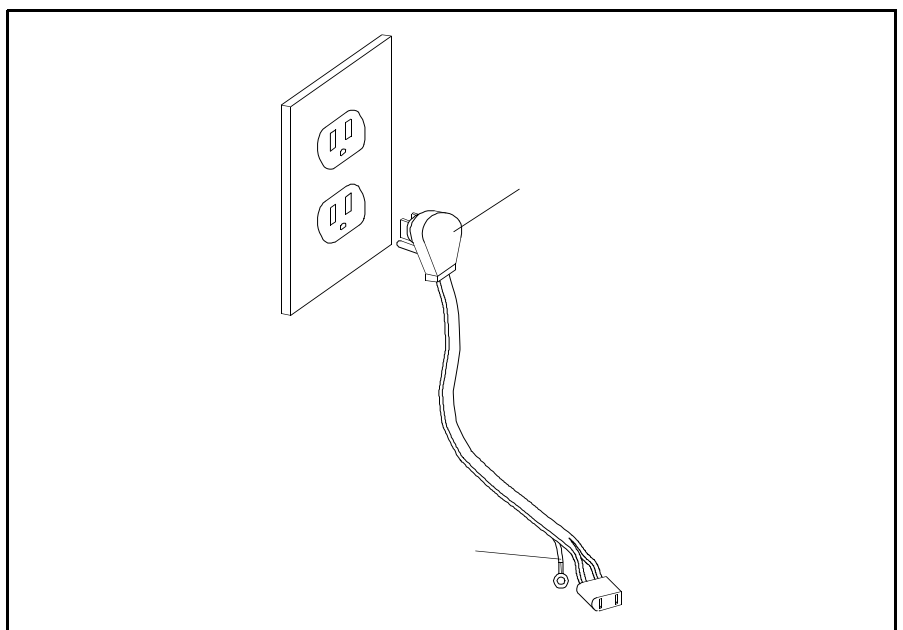


Figure 5.2 AC Supply Cord

# Operation

## Control Description

Models 865, 866 and 868 require that 12 volt DC be connected to terminals J-4 (-) and J-5 (+) of the Power Supply board located at the rear bottom left of the refrigerator. The 12 volts DC is necessary for the refrigerator to work on either LP GAS or electric operation. The 12 volt power is then routed through the 3 amp fuse, located on the Power Supply board, then to the interior light and HIGH HUMIDITY circuit. A resistor, R3, acts to limit the maximum amount of current through the cable and Eyebrow circuit.

### Note:

When defective, the temperature control circuit (Thermistor) can cause the food storage cabinet to over-freeze. The same result will occur when the Thermistor is disconnected from the Eyebrow board.

When the wiring harness is plugged in, the +12 volt DC is reduced to 5.6 Volts DC by a zener diode D12 or D13 located on the Eyebrow board. This 5.6 Volts DC is the control voltage for the temperature control circuit.

## Gas Mode

When the Mode Selector switch is set to LP, the indicator lamp will illuminate and 12 volts DC will be sent to the Ignition Module. When the Ignition Module receives 12 Volts DC, the Ignition Module will open the gas solenoid valve, allowing gas to flow to the Burner. The Ignition Module will then send energy to the Ignition electrode to spark the Burner.

If the flame is established the Ignition Module will sense the flame through the Sense electrode, and cease the sparking at the Burner.

If ignition did not occur after the trial for ignition, the Ignition Module will stop sparking and automatically close the gas valve. The Ignition Module will then send 12 Volt power to the Eyebrow board and illuminate the Red (X) CHECK lamp indicating ignition failure.

## AC Mode

120 Volts AC is supplied to the Power Supply on terminals J-9 and J-10 by the AC power cord when it is plugged into an active AC receptacle.

The neutral side of the AC J-9 is tied directly to terminal J-8 of the Power Supply and to the AC heater when connected.

The hot side is routed through a 5 amp fuse to the normally open contact of relay (K-1). The relay is energized by the 12 volt control voltage from the Temperature Control circuit.

When the Mode Selector switch is set to AC ELEC, the temperature control circuit will complete the circuit of relay (K-1) coil and the relay contacts will close. The hot side of the 120 Volts AC will be applied through the relay contacts to the AC heater terminal J-7.

## DC Mode (Three Way Models Only)

When 12 Volts DC is supplied to terminals J-4 (ground) and J-5 (+ 12 Volts DC) of the Power Supply, the power is routed directly to the normally open contact of relay (K-2) and through the 3 AMP fuse to the storage switch for the interior light and HIGH HUMIDITY circuits, then to the coil of relay (K-2). The 12 Volt power is routed through the wiring harness to the Eyebrow board.

The zener diode (D-12) or (D-13) on the Eyebrow board reduces the 12 Volts DC to 5.6 Volts DC, which is the control voltage within temperature control circuit.

When the Mode Selector switch is set to DC ELEC, it completes the circuit to the coil of relay (K-2), the relay contact closes, and 12 Volts DC is applied to terminal J-6 of the Power Supply.

Current then flows through the 20 AMP fuse and on the DC heater.

### Note:

DC operation will not initially cool down the refrigerator. The initial cooling must be done in either the GAS or AC modes. Trying to cool down the refrigerator in the DC mode will result in no cooling and battery run down.

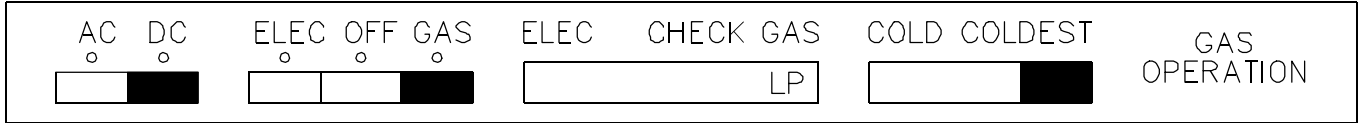


Figure 5.3

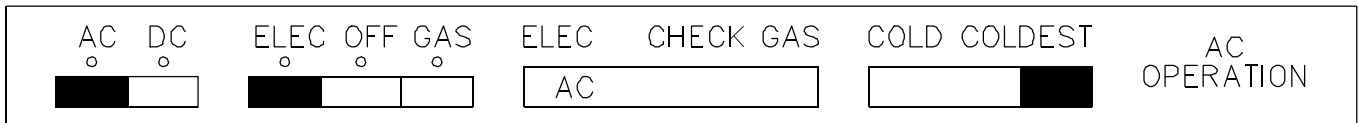


Figure 5.4

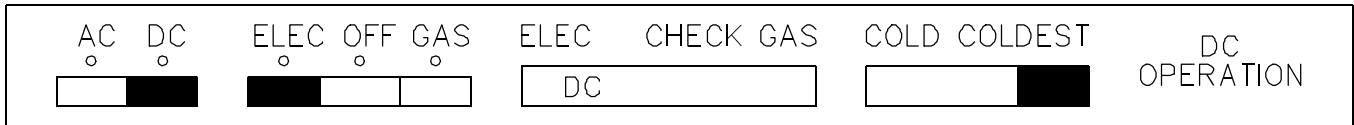


Figure 5.5

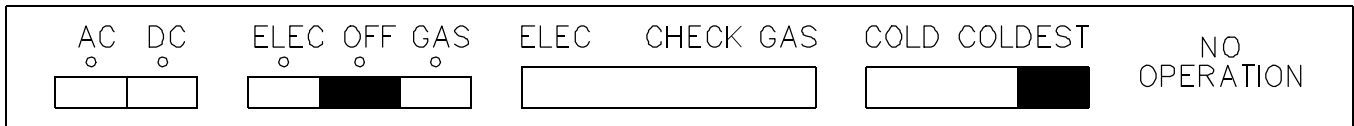


Figure 5.6

**IMPORTANT INFORMATION ON 12 VOLT DC OPERATION (3-Way models Only)**

The 12 volt DC mode is not designed for continuous DC operation - only for short "intransit" periods when gas or AC sources are not available.

The 12 volt DC mode cannot be used for the initial pull-down of the refrigerator compartment(s). The initial cooling operation must be done in either the GAS or AC modes. The refrigerator must be cooled and stabilized before the DC operation is effective.

Good battery condition is essential when operating on DC. This

implies an adequate recharging means which can handle the demands of the refrigerator along with other loads.

The wires from the battery to the refrigerator must be of large enough size to handle the load. The connections must be clean, tight and free from corrosion. If not, a resulting voltage drop will cause a decreased cooling capacity.

The following points regarding the DC operation should be considered:

- a. Operate the refrigerator in the DC mode only in periods when AC or GAS operation is unavailable.
- b. The DC operation is designed to operate during a short "hold over" period, such as a four (4) to six (6) hour period while in transit. The refrigerator should not be switched to the DC mode if the food is not completely chilled.
- c. Good battery condition is essential when operating on DC. This implies an adequate recharging means which can handle the demands of the refrigerator along with other loads.
- d. The wire from the battery to the refrigerator must be of large enough size to handle the load. The connections must be clean, tight and free from corrosion. If not, a resulting voltage drop will cause a decreased cooling capacity.

**Location of Controls  
Models 865, 866, 868**

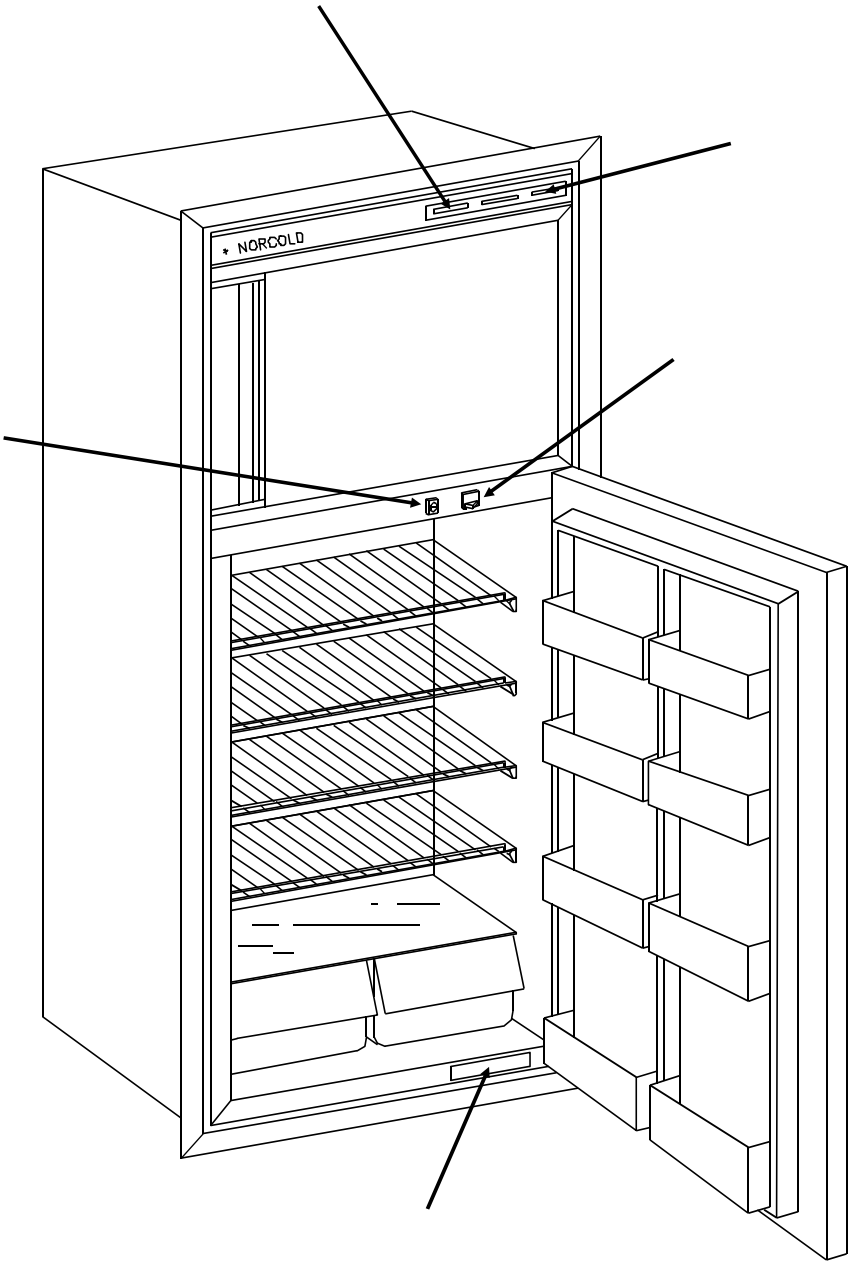


Figure 5.7 Front View - Typical 2 Door Model

## Parts and Their Function

### High Humidity Switch and Interior Light Switch

Turning the HIGH HUMIDITY switch to ON will keep the surface between the door openings dry during high humidity conditions. The switch should be left in OFF position unless condensation is observed in this area.

**Note:**

During times when the refrigerator is not in use (storage) the HIGH HUMIDITY switch must be in the OFF position. If the switch remains in the ON position, a continuous amp draw may occur, and result in battery run down.

The interior light switch turns on the light when the door is opened (two door models only) See section about power supplies.

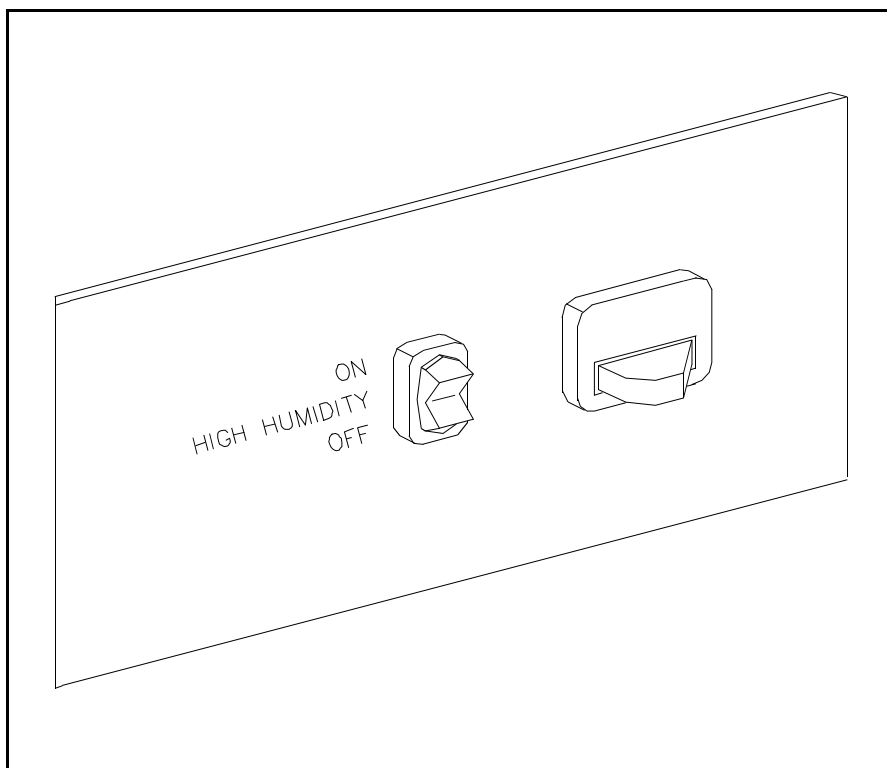


Figure 5.8 Light, Humidity Switch

### Power Supply Board

There are three versions of the Power Supply board

1. The original version Power Supply board had a storage switch located on the left side of the board. The storage switch eliminates all 12 volt DC to the refrigerator when in OFF (up) position. A transformer was on the board which allowed the refrigerator to operate on AC without 12 volt DC being applied.

**Note:**

On refrigerators with the "original version" Power Supply board, the storage switch must be in the ON (down) position in order to allow the refrigerator to operate in the GAS or DC mode and to allow the interior light and HIGH HUMIDITY circuit to operate. When the storage switch is in the OFF (up) position the refrigerator will operate in the AC electric mode, but not Gas or DC Modes.

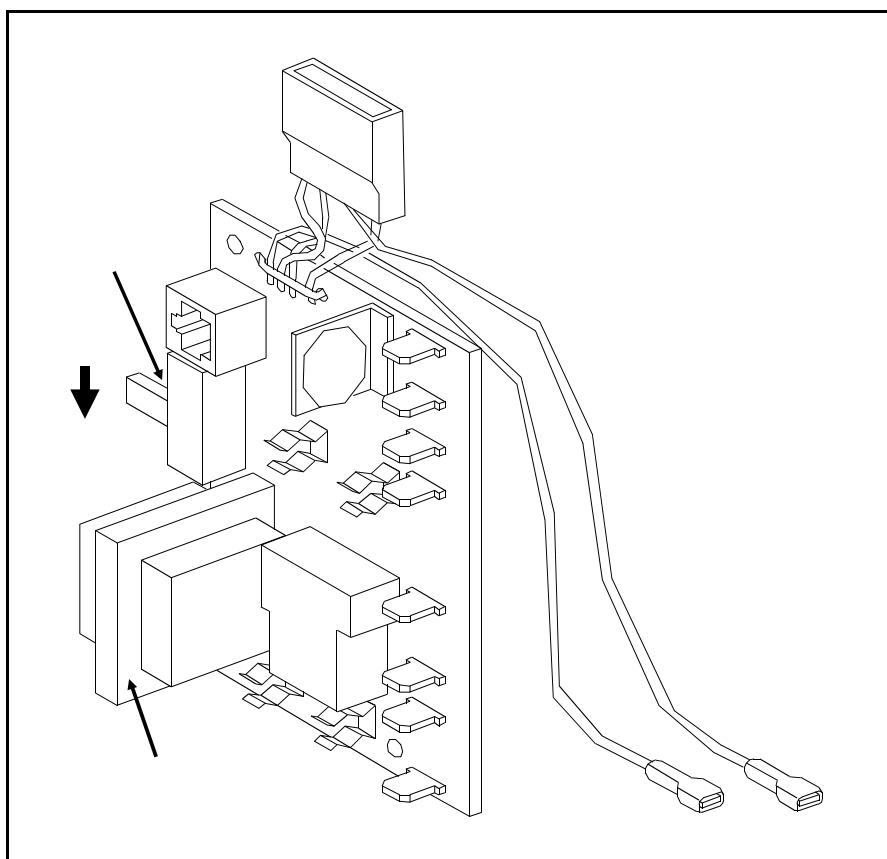


Figure 5.9 Power Supply Board - Original Version



See the identification of Power Supply versions below.

2. On the second version of the Power Supply board, the storage switch and the transformer were removed. When this occurred, a 12 Volt DC supply was required for operation in all modes.

Note:

On refrigerators with the "second version" Power Supply board, the 12 volt DC must be disconnected from the Power Supply board to eliminate a constant current draw of 15 to 20 milliamps. Failure to disconnect the 12 volt DC, (during times which refrigerator is not in use (storage), can cause battery run down.

See the identification of Power Supply versions below.

3. On the third version of the Power Supply board 12 volt DC must be supplied in order for the refrigerator to operate in any mode. The "storage switch" was added back to the board but the switch itself will not totally eliminate the 12 volt DC to the refrigerator when in the OFF (up) position.

Note:

The storage switch will eliminate current to the interior light and HIGH HUMIDITY circuit only. To eliminate current draw, turn the storage switch and the Mode Selector switch to the OFF position. For added protection against battery run down, disconnect the 12 volt DC from the Power Supply board.

See the identification of Power Supply versions below.

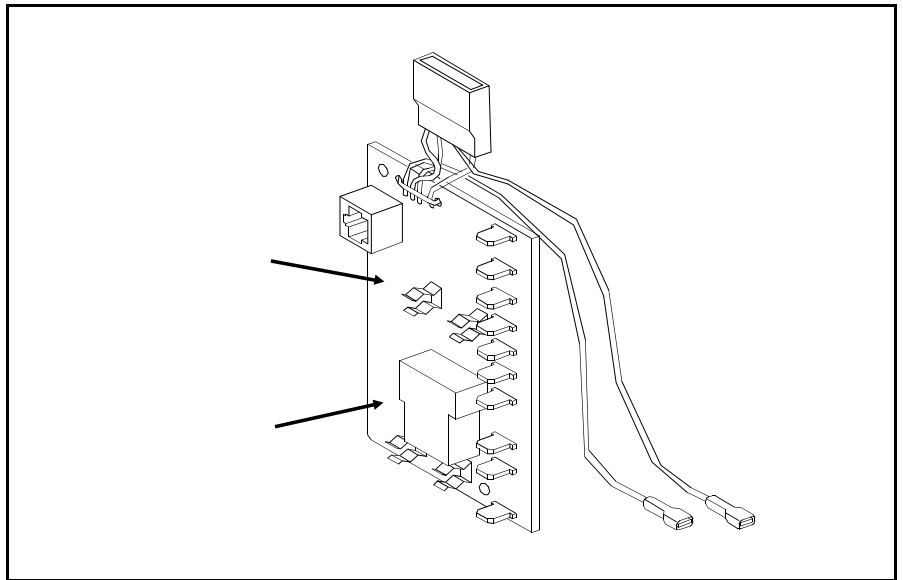


Figure 5.10 Power Supply Board - Second Version

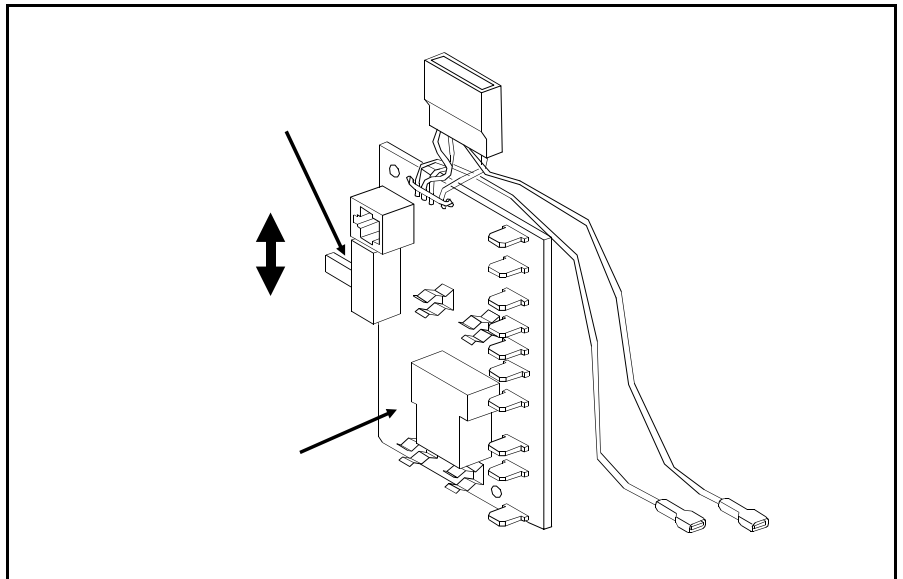


Figure 5.11 Power Supply Board - Third Version

### Power Supply Versions by Model & Serial Number

## Power Supply Board Function

In response to the Mode Selection at the Eyebrow, the Power Supply outputs power to operate the refrigerator in the proper mode:

1. 12 volts DC to the Eyebrow board through the cable.
2. 12 volts DC to the Ignition Module when LP is selected.
3. 12 volts DC to the DC heater (3 way only) when DC is selected.
4. 12 volts DC to the interior light and High Humidity heater.
5. 120 volts to the AC heater when AC is selected.

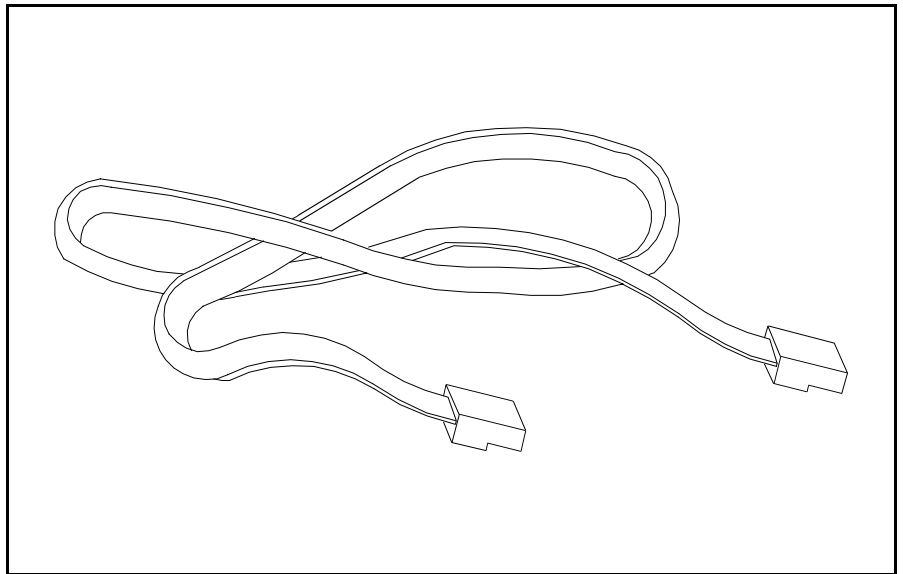


Figure 5.12 Cable

## Cable

Connects the Power Supply to the Eyebrow Board.

## Eyebrow Board

Selects the mode of operation (owners choice), indicates the mode of operation determines the operating temperature, and indicates when a trial for ignition fails.

### Note:

On some Eyebrow Boards, the AC Indicator light will illuminate even though AC is not connected. However, the refrigerator cannot cool in this mode without AC being connected. Also, a red light may be visible at times through the Thermostat slide opening; this light is for Production testing only. This information applies to the following models: Use this information as a guide.

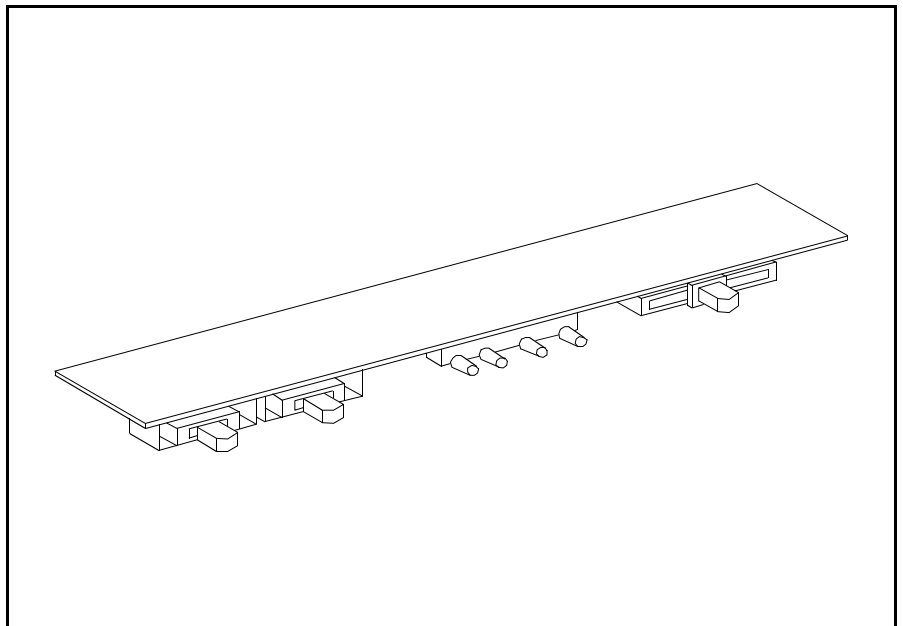


Figure 5.13 Eyebrow Board

<u>Model</u>	<u>Beginning Serial#</u>	<u>Date</u>
8652	001201	10-02-87
8653	001098	9-23-87
8662	012093	8-25-87
8663	008090	8-26-87
8682	008380	8-27-87
8683	009061	8-25-87

## Ignition Module

Used only during GAS operation, and does the following:

1. Supplies 12 volt DC to open the gas valve.
2. Supplies power to the Ignition electrode to ignite the Burner.
3. Senses the flame through the Sense electrode.
4. When the Burner ignites and stays lit, the Ignition Module turns off the spark.
5. When the Burner does not ignite, or it ignites and goes out when the sparking stops, the Ignition Module will close the gas valve, turning off the gas supply to the Burner, and illuminate the red CHECK light.

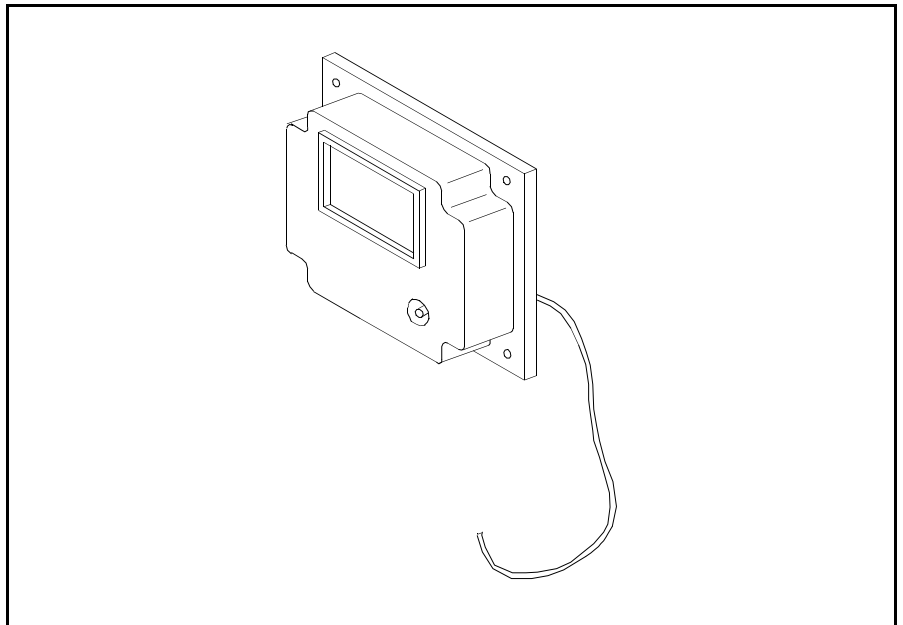


Figure 5.14 Ignition Module

## Gas Valve Assembly

The gas solenoid valve opens when 12 volts is supplied and closes when the 12 volts is removed. When it is open LP gas will flow to the Burner.

The manual shut-off valve allows the gas supply to be turned off to the refrigerator.

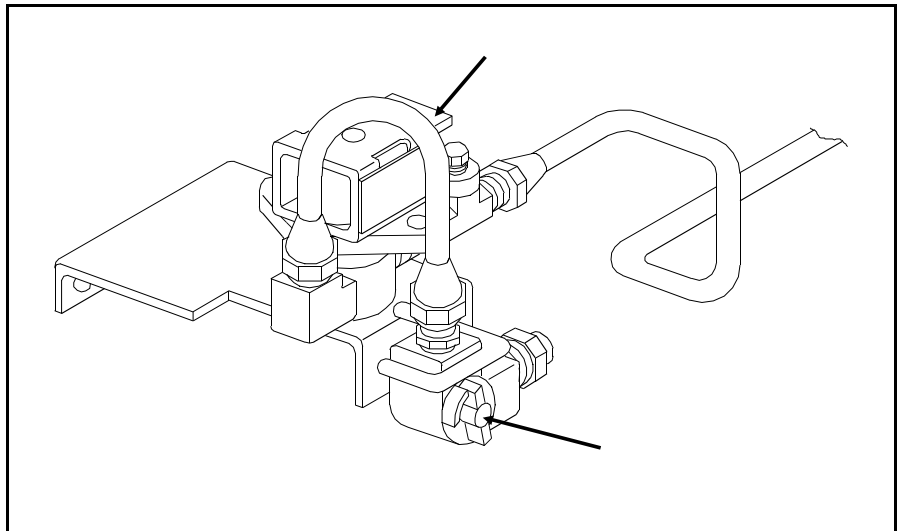


Figure 5.15 Gas Valve Assembly

## Orifice

Applies the correct amount of LP gas to the Burner provided the main line pressure is correct.



Figure 5.16 Burner Orifice

## Burner

Applies heat to the cooling unit when it has the correct amount of LP gas and air.

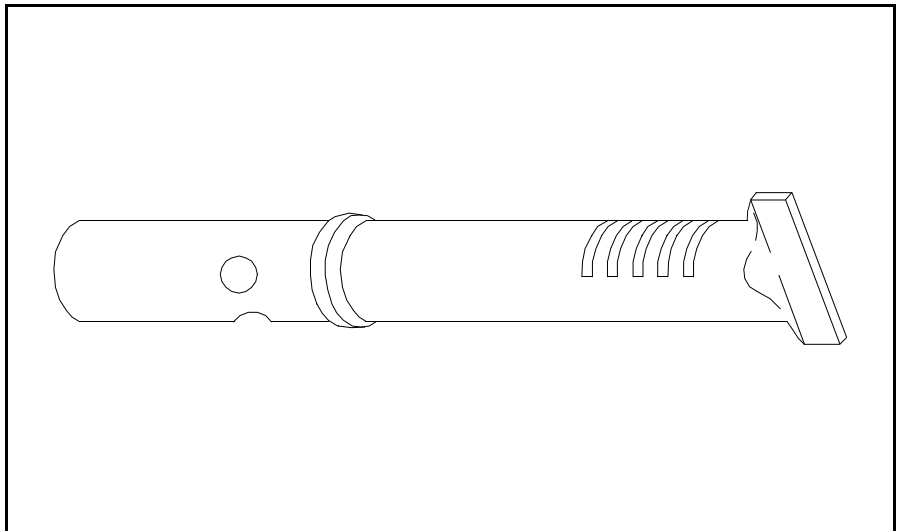


Figure 5.17 Burner

## Ignition Electrode

Sparks the Burner to ignite the flame when supplied with energy from the Ignition Module.

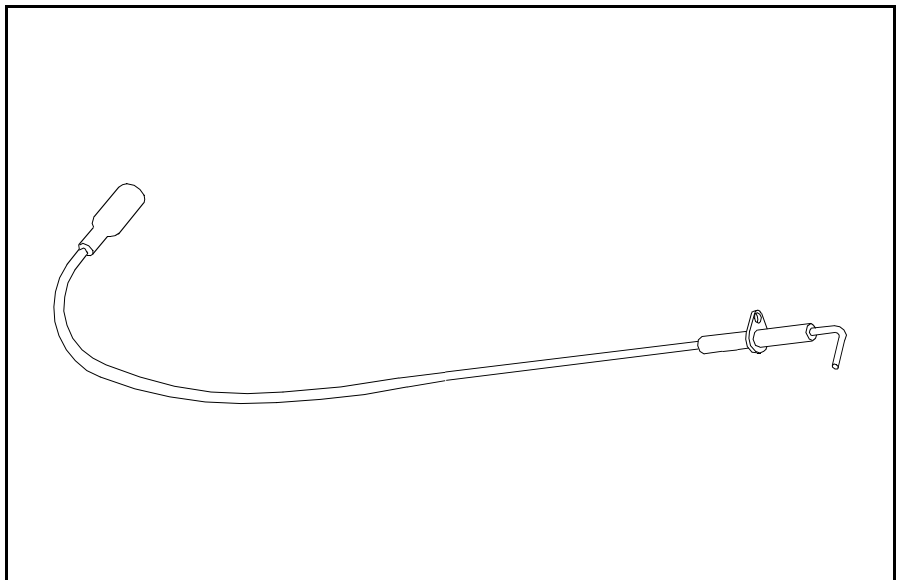


Figure 5.18 Ignition Electrode

## Sense Electrode

Senses the heat of the flame and tells the Ignition Module if a flame is present or not.

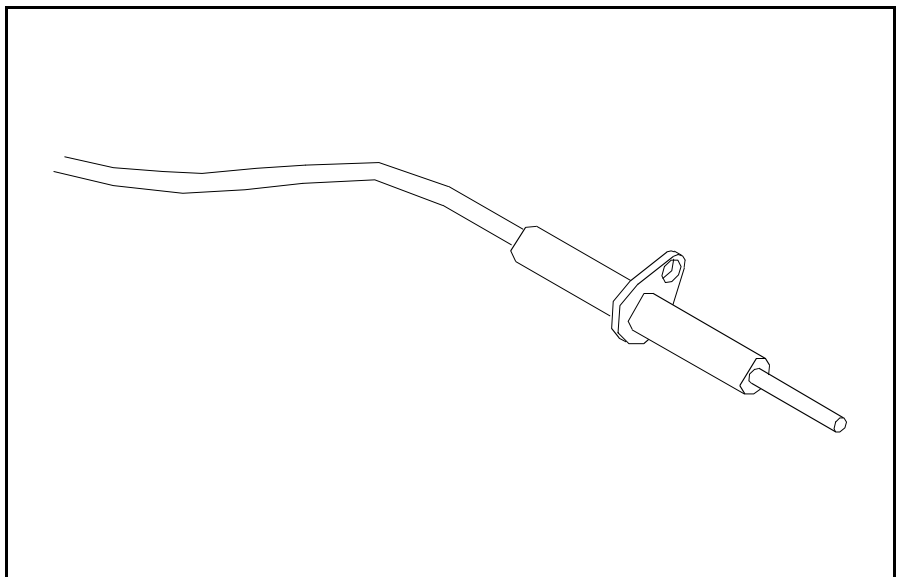


Figure 5.19 Sense Electrode

### AC Heating Element

Applies specific amount of heat to the cooling unit, providing 120 volts AC is present to the refrigerator.

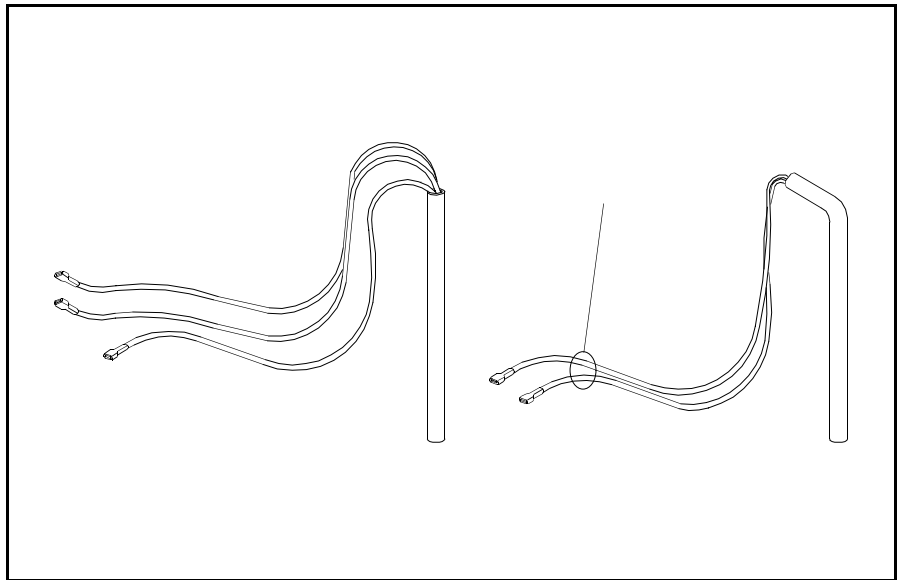


Figure 5.20 Illustration of Heater Types

### DC Heating Element

Applies specific amount of heat to the cooling unit, providing the DC input voltage is correct. The DC Heating Element does not have the capability to cool the refrigerator from an initial start, but has the capability to maintain the temperature for a short duration.

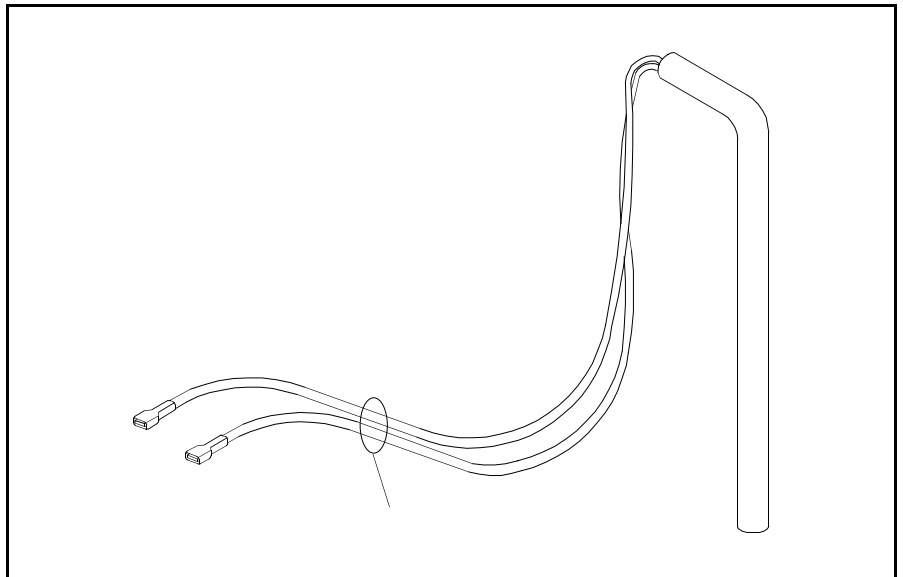


Figure 5.21 DC Heater (current)

## Thermistor

Senses the temperature of the refrigerator interior and changes the resistance to the temperature sensing circuit telling the refrigerator when to turn off and on.

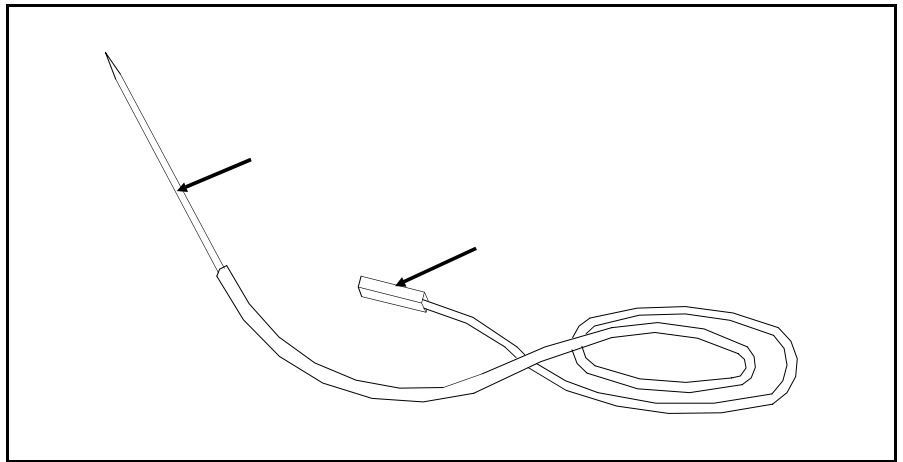


Figure 5.22a Type A Thermistor

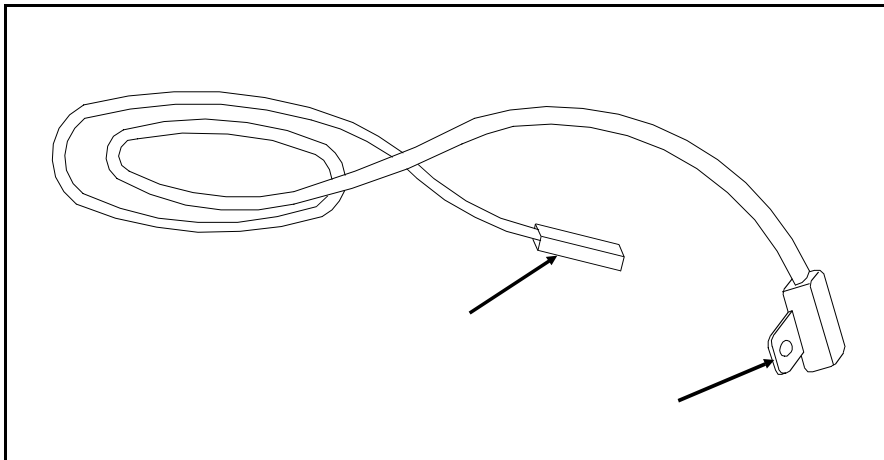


Figure 5.22b Type B Thermistor

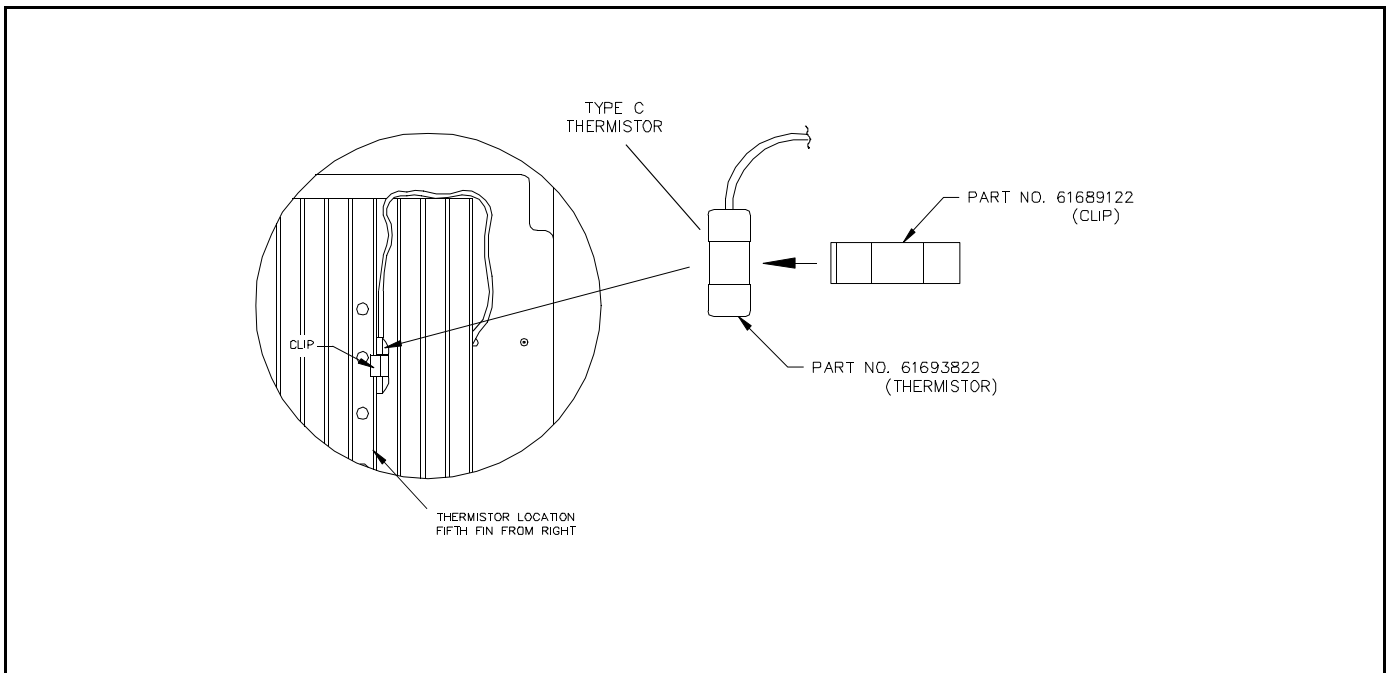


Figure 5.22c Type C Thermistor And It's Fin Location

## Troubleshooting

### **IMPORTANT:**

The trouble shooting procedures which follow require that each check be performed in sequence. Conclusions made at any point in the procedure presumes that all preceding steps have been followed.

### **Problem Solving Steps - LP Gas Operation**

Answer these questions before calling Norcold's Technical Number.

1. Is the refrigerator installed and vented in accordance with Norcold's Product Specification. See Section 1.
2. Is the refrigerator being operated in a comfortably level position?
3. Do you have 11" water column pressure (LP pressure tap point, located at the rear of the refrigerator, at the 12V solenoid valve)?
4. Is the combustion chamber which houses the spiral baffle clean and free from obstruction?
5. Is the spiral baffle in place?
6. Is the Burner Orifice clean and the correct size?
7. Have you checked all electrical connections?
8. Is 12 Volts DC being supplied to terminals (J-4) ground and (+J-5)?
9. Is 3 amp fuse good? (Located under Power Supply board Cover)
10. Is storage switch located on the Power Supply board in the "On" position?
11. Is the modular connector on the wire harness connected at the Power Supply board and the Eyebrow board?
12. Is Mode Selector set to LP?

### **Step by Step Trouble Shooting Guide L/P GAS Mode Of Operation**

1. Check the 12 volt DC input to the Power Supply as shown in Figure 5.23. Refrigerator must have 12 Volts to operate in any mode.

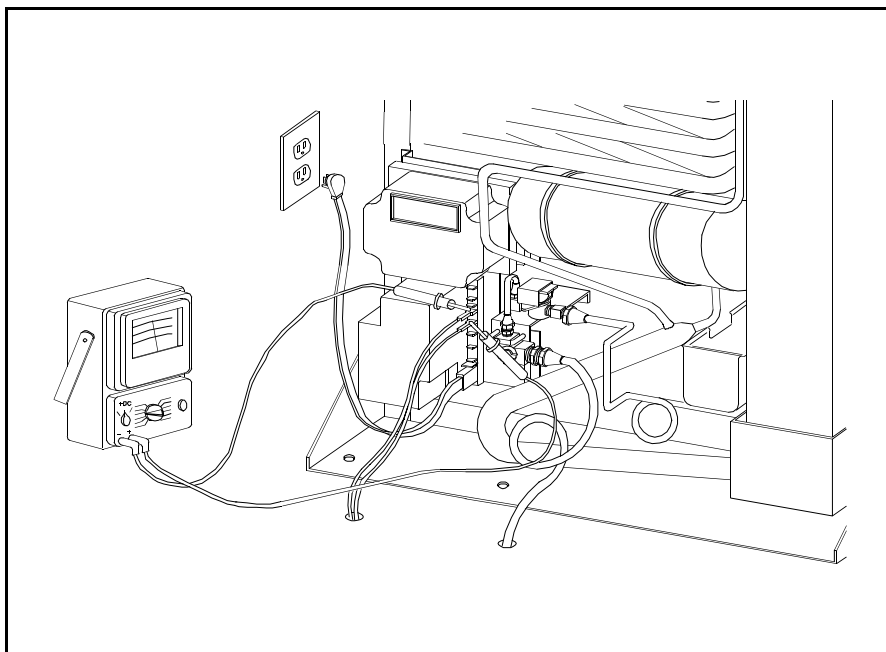


Figure 5.23 12 Volt DC Supply Check

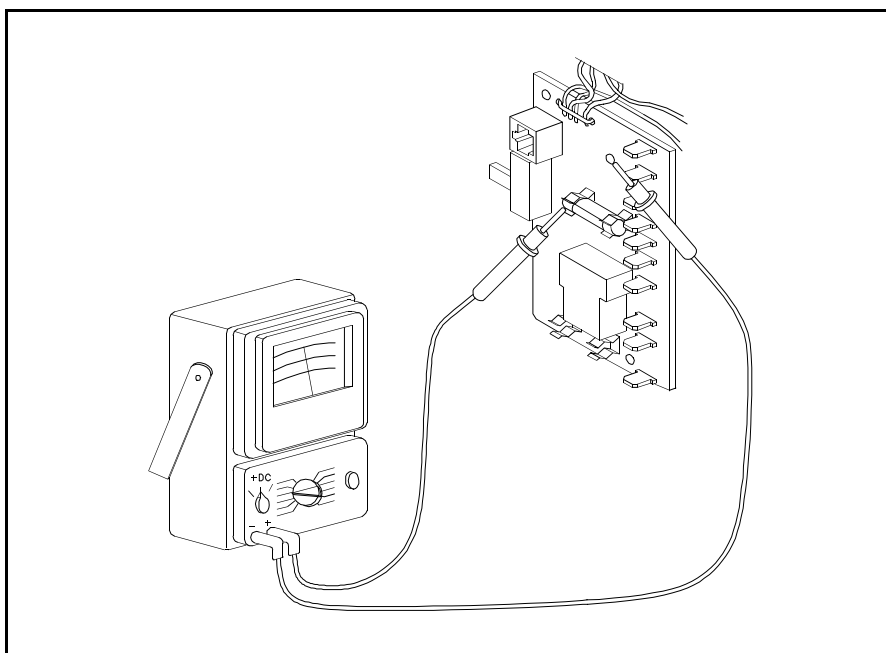
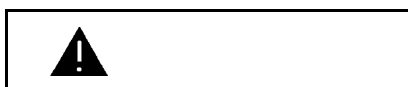


Figure 5.24 3 Amp Fuse Check



**DC OPERATION: USE EXTREME CAUTION WHEN REPLACING ANY DC ELECTRICAL COMPONENTS, CAUTION MUST BE TAKEN WHEN DISCONNECTING THE DC SUPPLY. THE DC SUPPLY IS CLOSE TO THE PROPANE GAS SUPPLY TO THE REFRIGERATOR. ARCING CAN EXIT WHEN DISCONNECTING THE DC SUPPLY WHICH CAN IGNITE A LEAK IN THE PROPANE SUPPLY LINE. RESULTS CAN BE SEVERE ELECTRIC SHOCK OR DEATH.**

2. Remove the wire connections from the Power Supply terminals.
3. Disconnect the cable from the Power Supply.
4. Remove the Power Supply cover to gain access to the Power Supply.
5. Reconnect the DC supply wires to terminals J-4(-) and J-5(+).
6. Check for 12 volts DC at the 3 amp fuse as shown in Figure 5.24.
7. If you do not have 12 volts as



shown. Replace the 3 amp fuse.

NEVER OVERFUSE A CIRCUIT. REPLACE BLOWN FUSE WITH EXACT REPLACEMENT INDICATED BY NORCOLD. OVERFUSING OF A CIRCUIT CAN RESULT IN A FIRE.

8. Reconnect the cable to the Power Supply. Set the Mode Selector to OFF as shown in Figure 5.29.
9. Be sure the storage switch is in the down position as shown in Figure 5.25. (original and third versions)
10. Using the volt meter, check for 12 volts DC at the locations 1, 2, 3 shown in Figure 5.26.
11. If you do not have 12 volts (10.5 Volts min.), replace the Power Supply.

Note:

A two way Power Supply will not have the D-4 diode, and the original version diodes will be D-6 and D-7.

12. Remove the screws shown in Figure 5.27, and pull the Eyebrow assembly away from the refrigerator as shown.

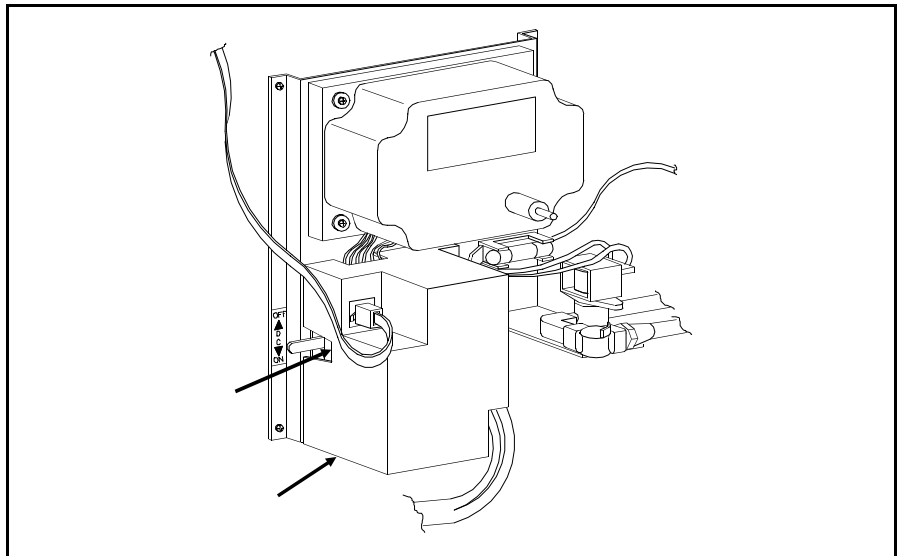


Figure 5.25 Storage Switch Location

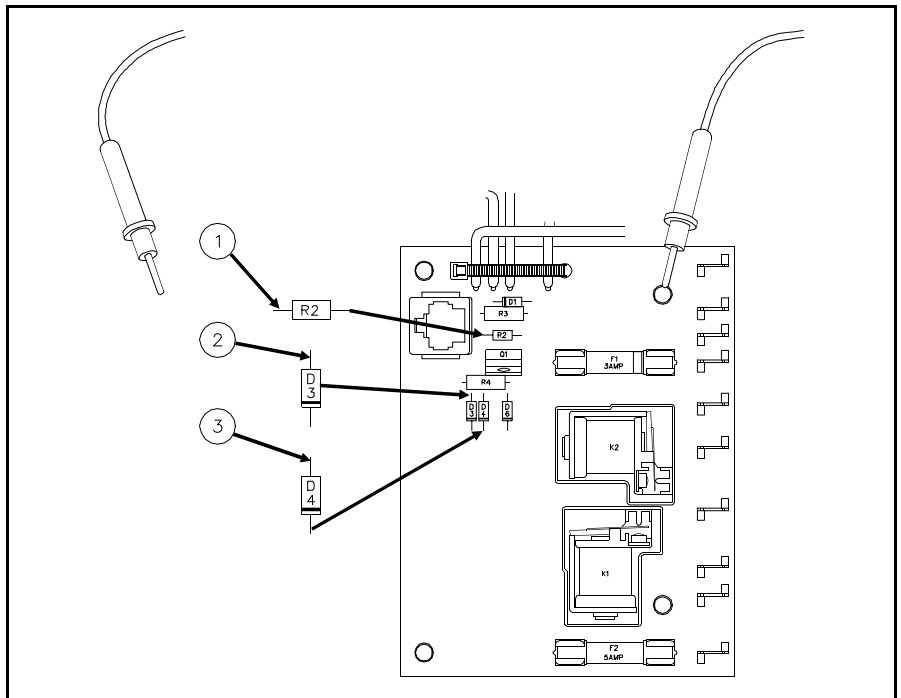


Figure 5.26 12 Volt DC Voltage Check

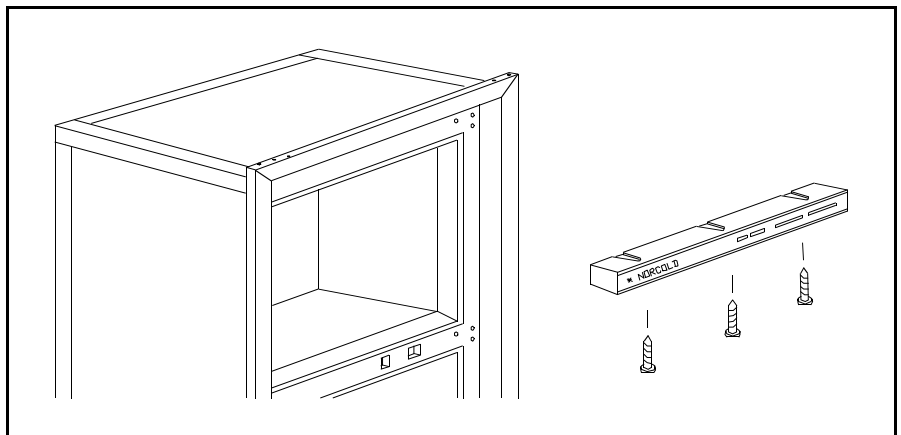


Figure 5.27 Eyebrow Removal



13. Remove the Eyebrow board from the Eyebrow shown in Figure 5.28.
14. Do not disconnect the cable or Thermistor wire.

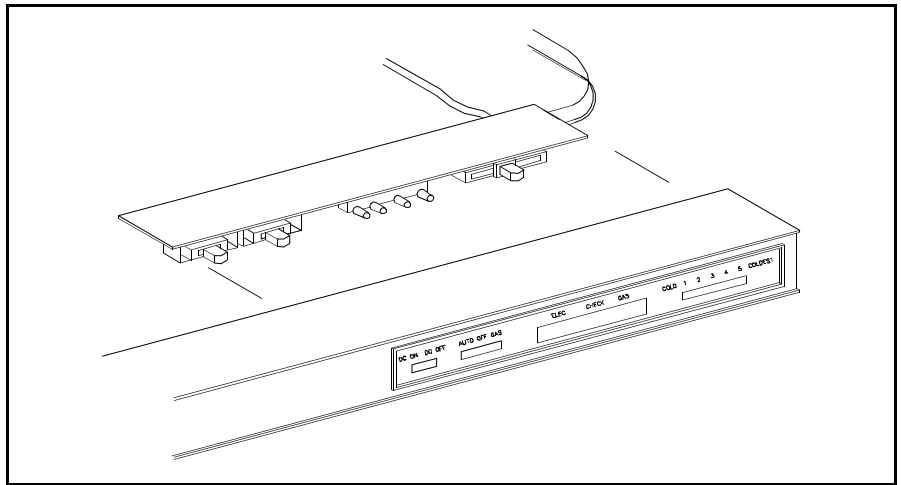


Figure 5.28 Eyebrow Board Removal

15. Set the Mode Selector switch to the OFF position as shown by Figure 5.29.

**Note:**

These checks cannot be performed unless the Eyebrow Board has the L.E.D. as shown.

16. Connect a volt meter as shown in Figure 5.29.
17. You should measure 12 Volts DC (10.5 Volts min.) at the emitter of Q11.
18. If you do not have 12 volts, replace the cable.
19. Set the Mode Selector to GAS. The voltage should now drop to 5-7 volts DC.
20. If it does not, replace the Eyebrow board.
21. Set the Mode Selector switch to OFF.

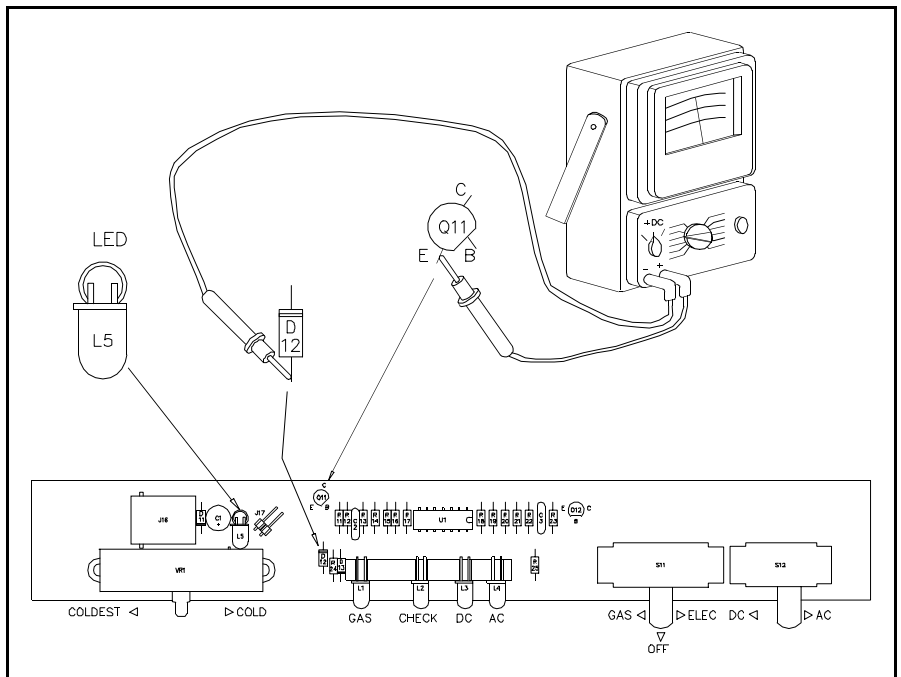


Figure 5.29 12 Volt Check On Eyebrow Board

22. With the volt meters negative lead connected as shown in Figure 5.29, check the switch terminals shown in Figure 5.30.
23. There must be 12 volts on all the terminals shown. If you do not have 12 volts the cable is defective and must be replaced.
24. Set the Mode Selector to Gas Mode. With the Volt meter negative lead connected as shown in Figure 5.29, check Point A shown in Figure 5.30. You should measure approximately .5 Volts DC. If not, replace the Eyebrow Board.

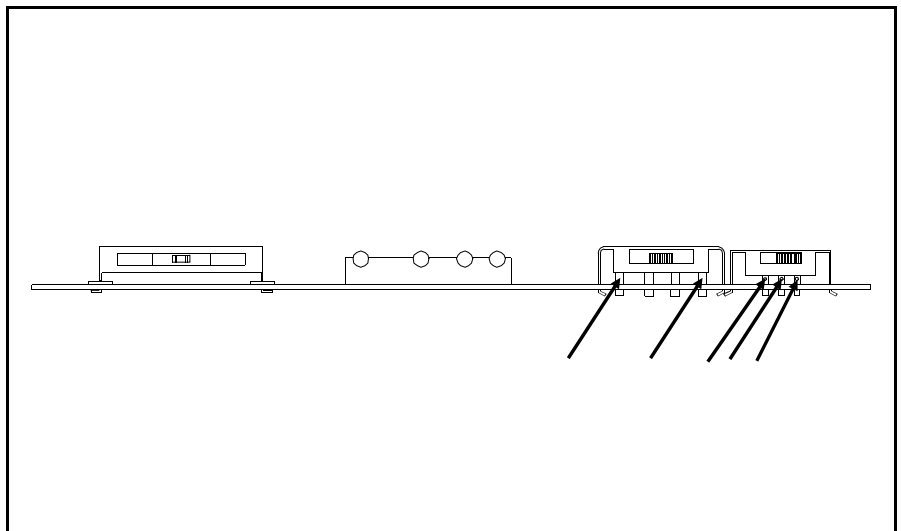


Figure 5.30 Control Voltage Check

25. With Mode Selector still set to Gas Mode, check for 12 Volts DC at the connector between the Power Supply board and Ignition Module (first wire from left) as shown in Figure 5.31. If you do not have 12 volts, replace the Power Supply.
26. If you have 12 volts and the gas solenoid valve did not open or the Ignition electrode did not spark the Burner, proceed to next step.

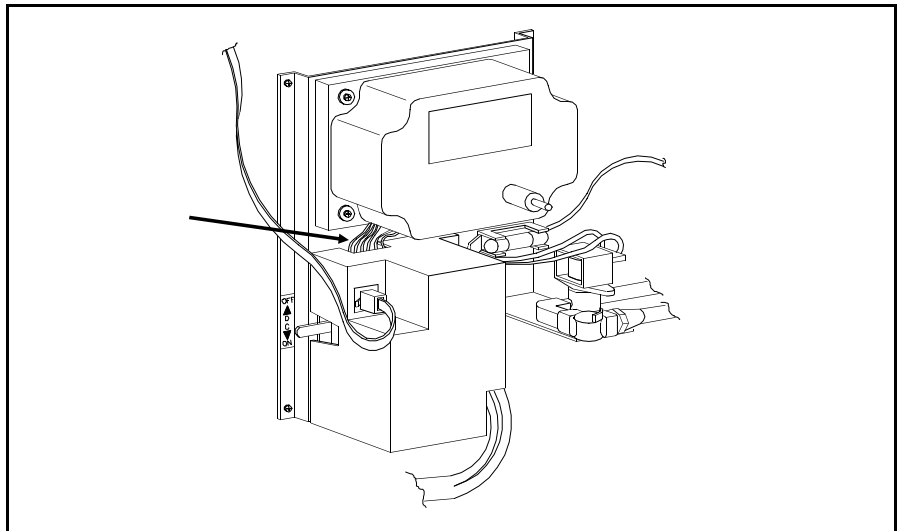


Figure 5.31 12 Volt Check At Ignition Module

27. Check for 12 Volts DC across the terminals of the gas valve. If 12 volts (10.5 volts min.) is present and the valve did not open, replace the valve. If wiring is proper and 12 Volts (10.5 Volts min) is not present, replace the Ignition Module.

Note:

The valve will only have 12 volts when the flame is burning or during a trial for ignition.

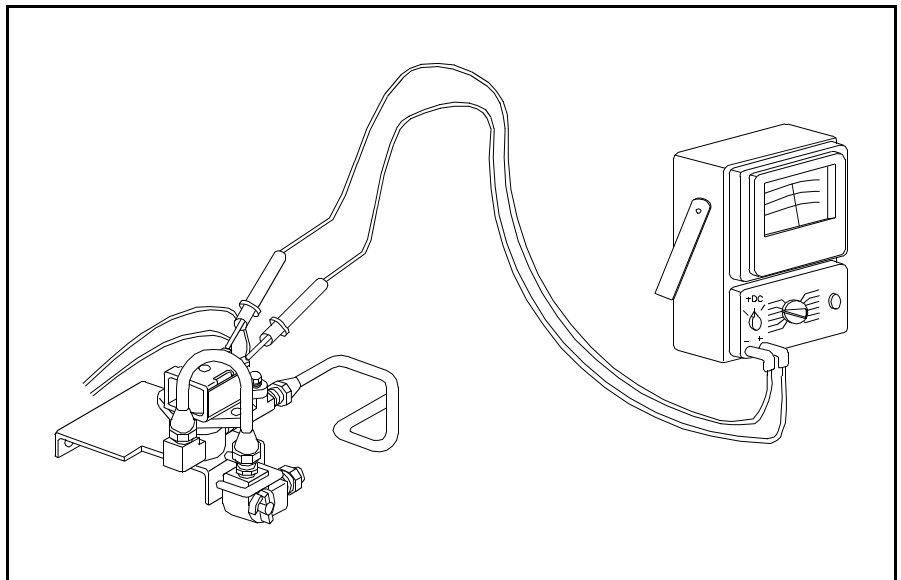


Figure 5.32 12 Volt Check At Gas Valve

28. If the Ignition electrode did not send sparks to the Burner, check the electrode wire for continuity as shown in Figure 5.33. If Electrode wire shows continuity, proceed to next step.

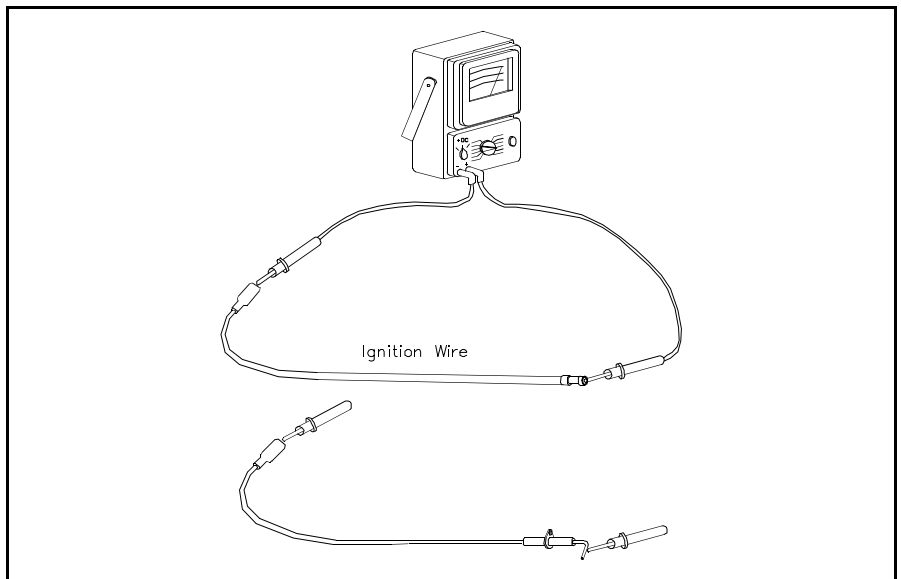


Figure 5.33 Continuity Check Of Electrode Wire

- 29. Check the alignment of the electrodes as shown in Figure 5.34.
- 30. Check for a loose wire connection at the electrodes and Ignition Module. If all checks are proper and still no spark at Burner, proceed to next step.

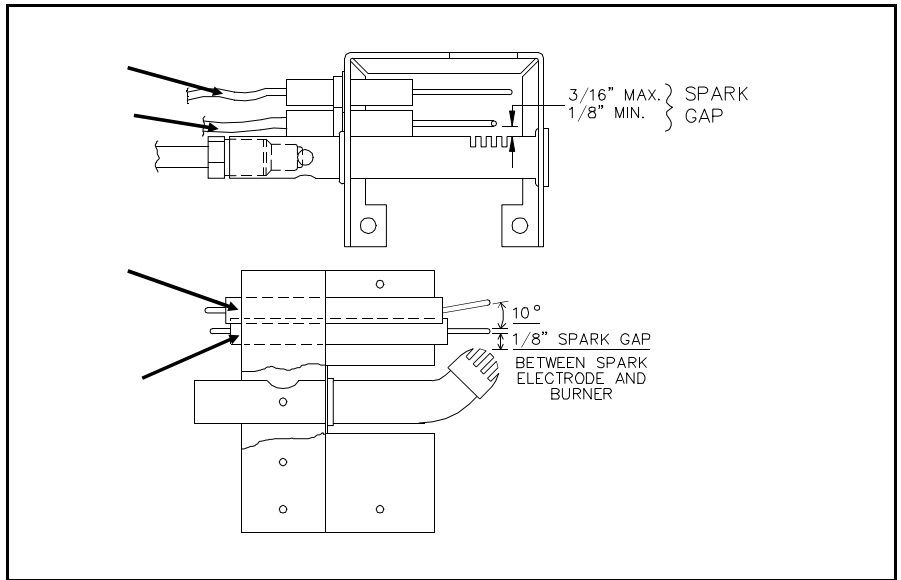


Figure 5.34 Proper Spark Gaps

- 31. Check the Sense and Ignition electrodes shown in Figure 5.35 for a short to ground.
  - A. Turn the Mode Selector to OFF.
  - B. Set the Volt-Ohm-meter to the Rx10K scale
  - C. Disconnect the wires to the electrodes
  - D. Check the continuity to ground
  - E. Any needle movement indicates a defective electrode and it must be replaced.
- 32. Reconnect the electrodes and set the Mode Selector back to gas.

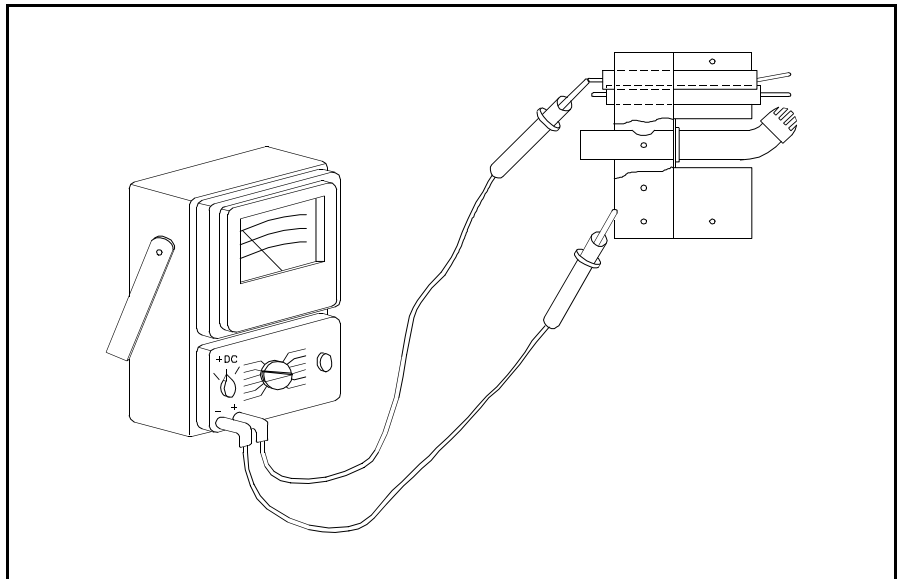


Figure 5.35 Electrode Grounding Check

- 33. Make sure the main line LP gas is on as shown in Figure 5.36.

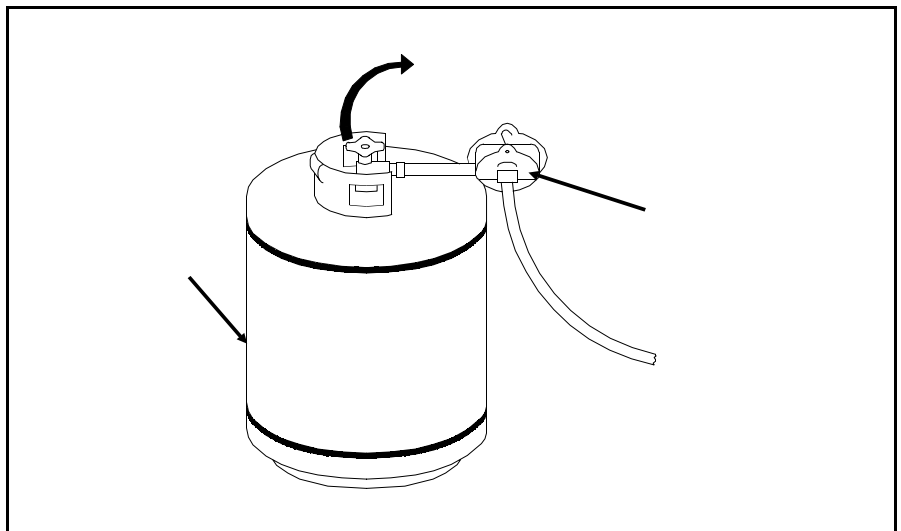


Figure 5.36 Main Gas Valve Check

34. Check the manual shut-off valve shown in Figure 5.37 to be sure it is in the ON position.

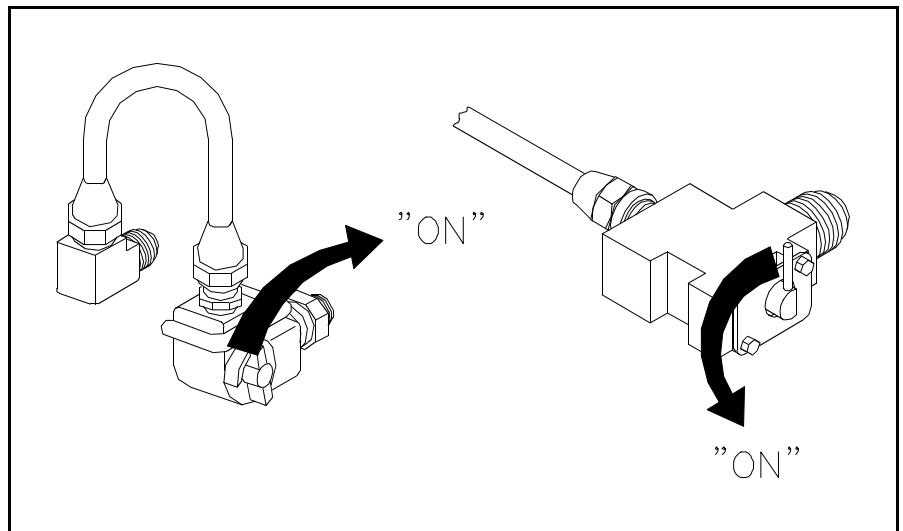


Figure 5.37 Manual Valve (alternate versions)

35. Check the Burner and Orifice shown in Figure 5.38 for any obstructions.  
36. Check the main line gas pressure (See gas pressure section) for 11" WC.

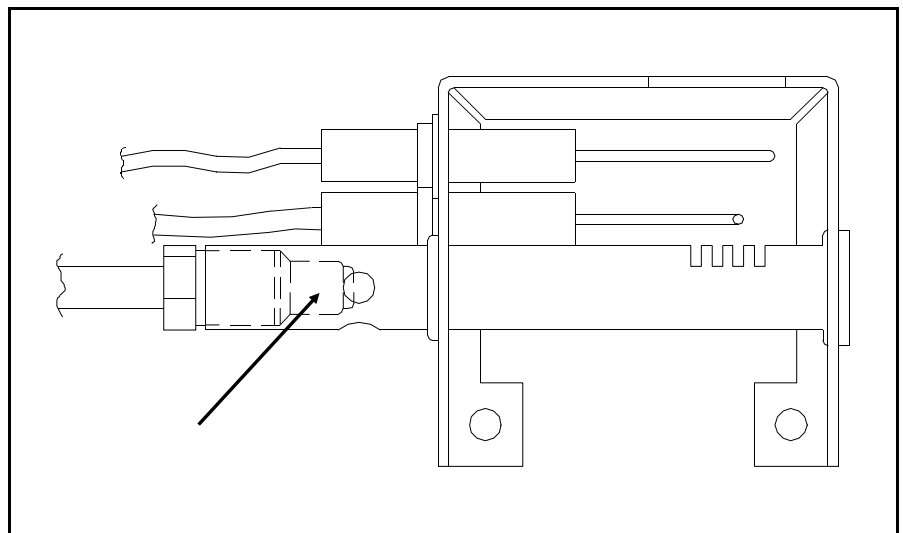


Figure 5.38 Burner Assembly

37. Check for corrosion on the pins of the Ignition Module as shown in Figure 5.39. Clean the pins with an eraser.  
38. If the flame will not light and stay lit replace the Ignition Module.

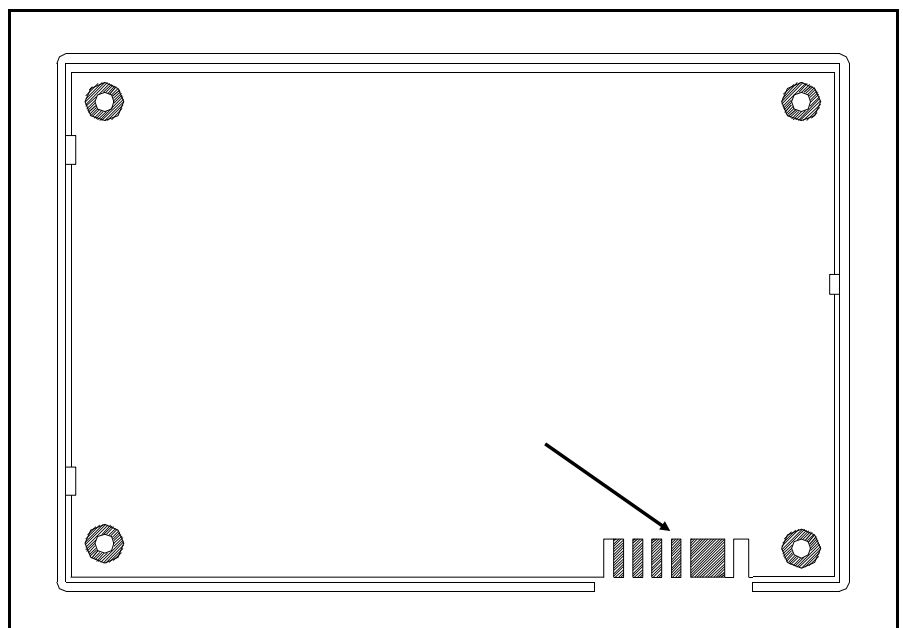


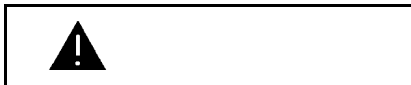
Figure 5.39 Edge Connector Visual Inspection

## Problem Solving Steps - AC Electric Operation

Answer these questions before calling Norcold's Technical Service Number.

1. Is the refrigerator installed and vented in accordance with Norcold Product Specification. See Section 1.
2. Is the refrigerator being operated in a comfortably level position?
3. Is the refrigerator plugged into AC power?
4. Do you have 12 Volts DC power to terminals (J-4) ground and (+ J-5)?
5. Do you have 12 Volts DC across the 3 amp fuse?
6. Do you have 120 Volts AC across the 5 amp fuse?
7. Did you check for loose wire connections or pinched wires?
8. Is the modular connector on the wire harness (cable) plugged into the Power Supply board and the Eyebrow board?
9. Is the Mode Selector set to AC ELEC?
10. Is the AC heater element the proper voltage and wattage?

### Step by Step Trouble Shooting Guide - AC Electric Mode of Operation



AC OPERATION: USE EXTREME CAUTION WHEN WORKING ON THE AC ELECTRICAL COMPONENTS OF THE REFRIGERATOR. BEFORE REPLACING ANY ELECTRICAL COMPONENTS, DISCONNECT THE AC POWER SOURCE TO THE REFRIGERATOR. ELECTRICAL VOLTAGES CAUSE SEVERE INJURY AND DEATH.

1. Check the 120 volt AC supply as shown in Figure 5.40.
2. Check for 120 volts AC across the power cord as shown in Figure 5.41. If you do not have 120 volts the power cord must be replaced.

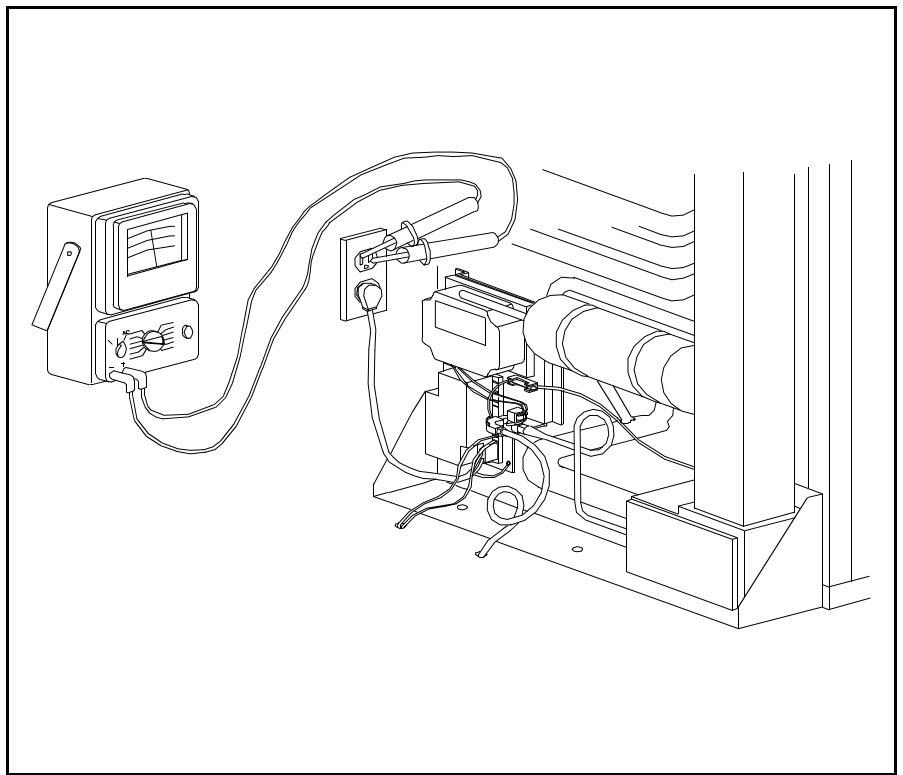


Figure 5.40 120 Volt AC Supply Check

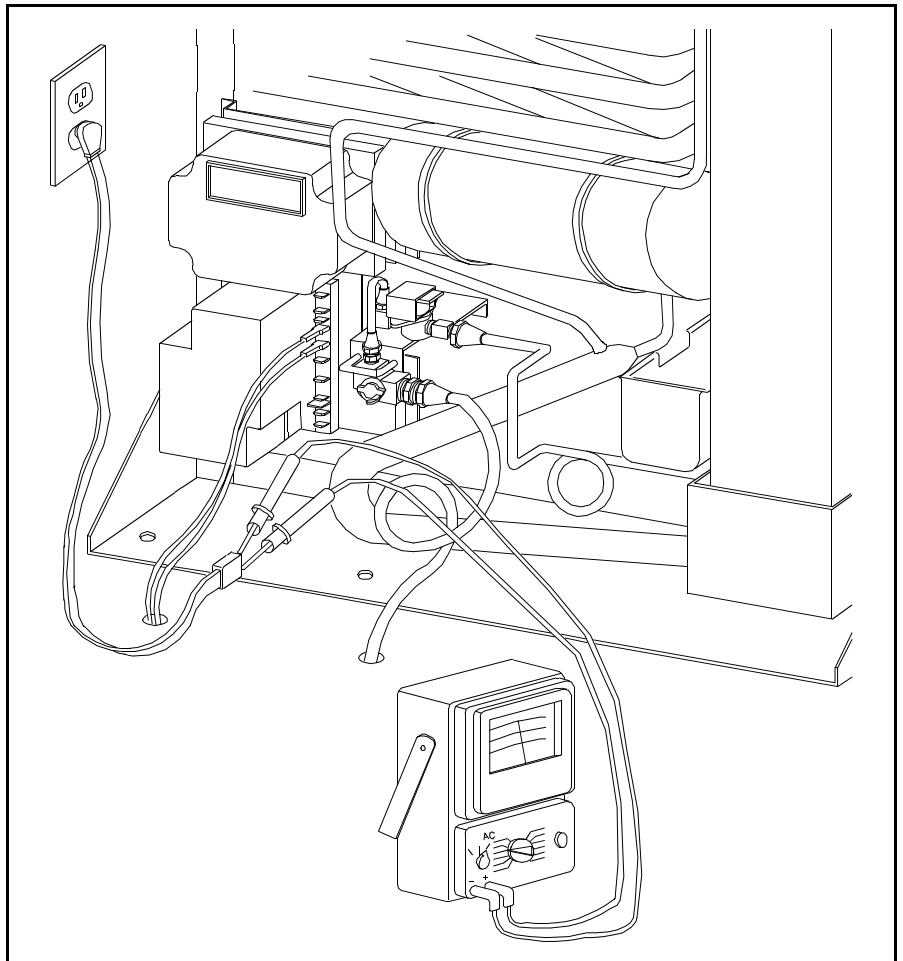


Figure 5.41 120 Volt AC Check At Power Cord

3. Check the 12 volt DC input to terminals J4 and J5 as shown in Figure 5.42. If you do not have +12 volts, repair the 12 volt supply.

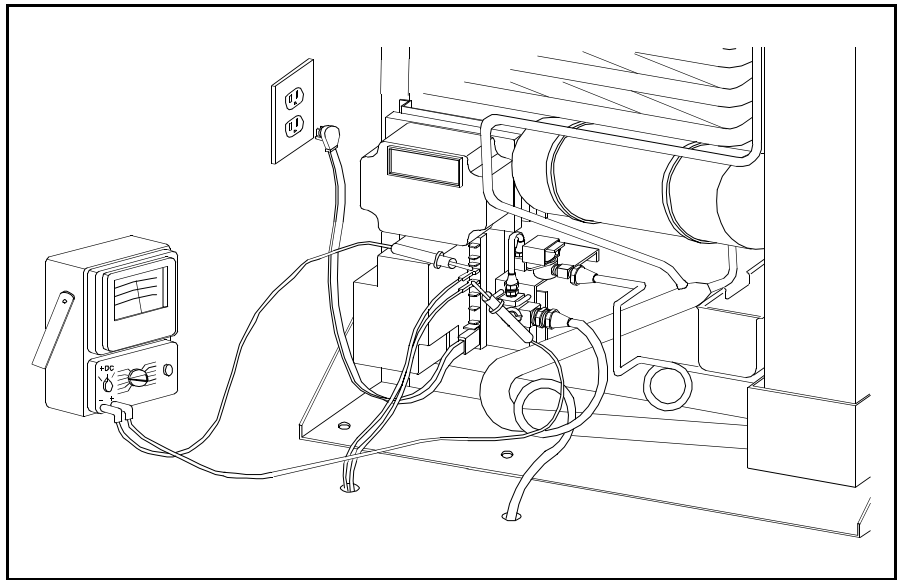


Figure 5.42 12 Volt DC Supply Check

4. Remove the cable from the Power Supply shown in Figure 5.43.
5. Remove all the wires from the terminals on the Power Supply.
6. Remove the Power Supply cover to gain access to the Power Supply.
7. Reinstall the AC and DC inputs to their terminals on the Power Supply.

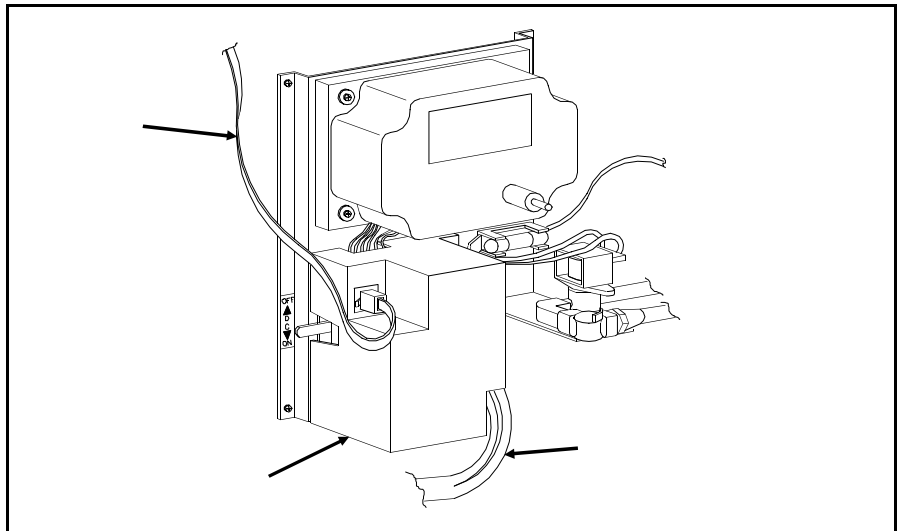


Figure 5.43 Power Supply

8. Check for 120 volts across the 5 amp fuse as shown by Figure 5.44.
9. You should have 120 volts as shown. If you do not have 120 volts, replace the 5 amp fuse.



NEVER OVERFUSE A CIRCUIT. REPLACE BLOWN FUSE WITH EXACT REPLACEMENT INDICATED BY NORCOLD. OVERFUSING OF A CIRCUIT CAN RESULT IN A FIRE.

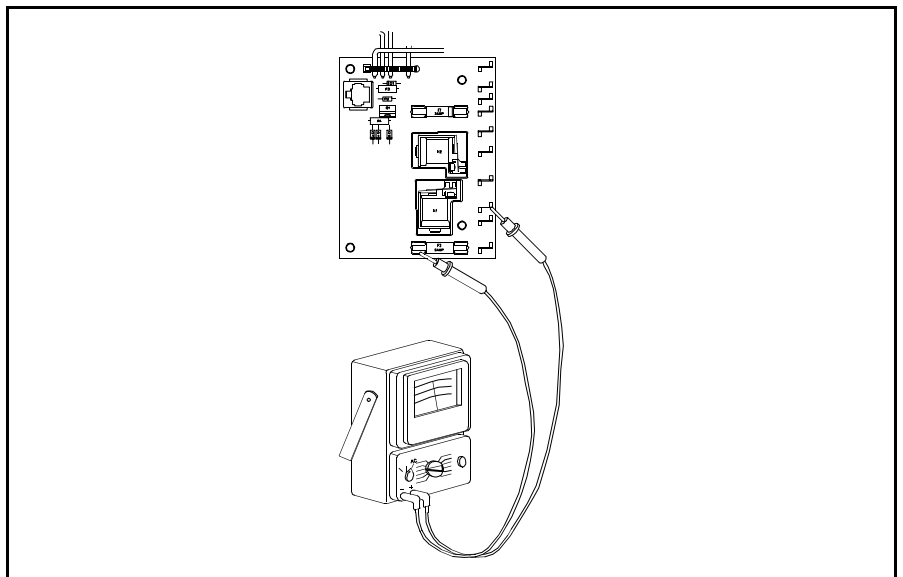


Figure 5.44 5 Amp Fuse Check

10. Check the 3 amp fuse as shown in Figure 5.45. To be sure you have 12 volts DC across it. If you do not have 12 volts, replace the 3 amp fuse.



NEVER OVERFUSE A CIRCUIT. REPLACE BLOWN FUSE WITH EXACT REPLACEMENT INDICATED BY NORCOLD. OVERFUSING OF A CIRCUIT CAN RESULT IN A FIRE.

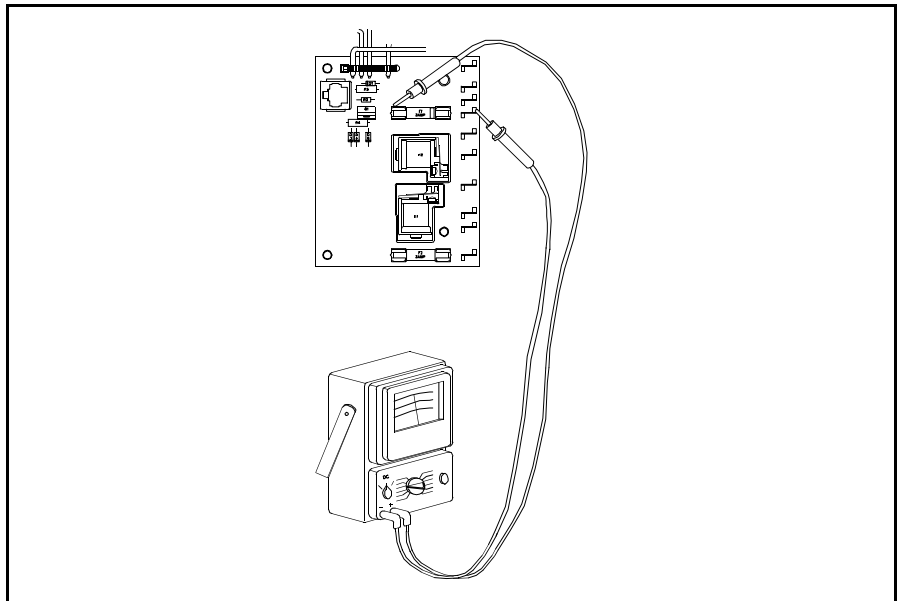


Figure 5.45 3 Amp Fuse Check

11. With the volt meter set to measure DC, check Points 1, 2 and 3 shown in Figure 5.46 for 12 volts DC. If you do not have 12 volts, replace the Power Supply.

Note:

Be sure the storage switch is in the down position "On" and remember that the diodes will be numbered D6 and D7 on the original power supplies.

12. Reconnect the cable to the Power Supply.

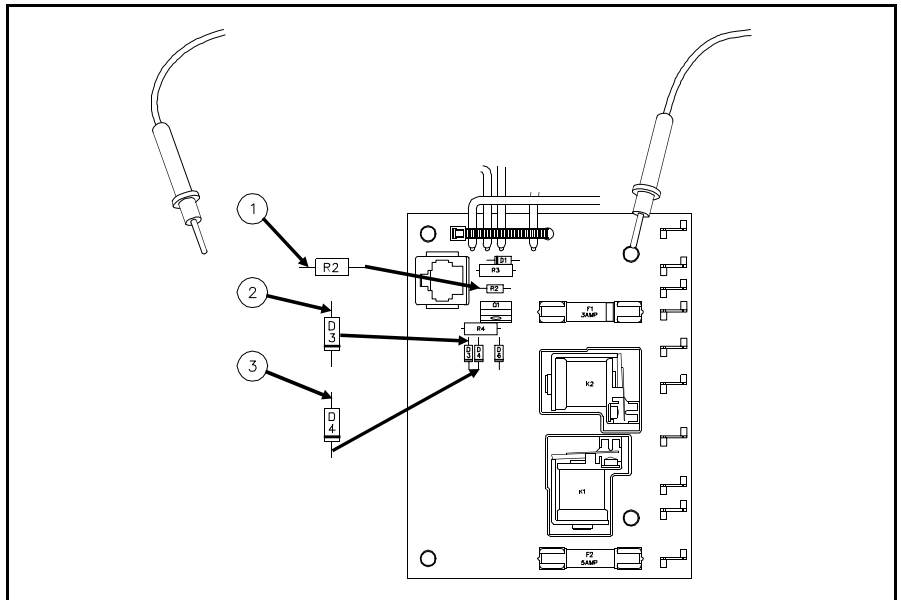


Figure 5.46 12 Volt DC Check

13. Remove the screws shown in Figure 5.47 and pull the Eyebrow assembly away from the refrigerator.

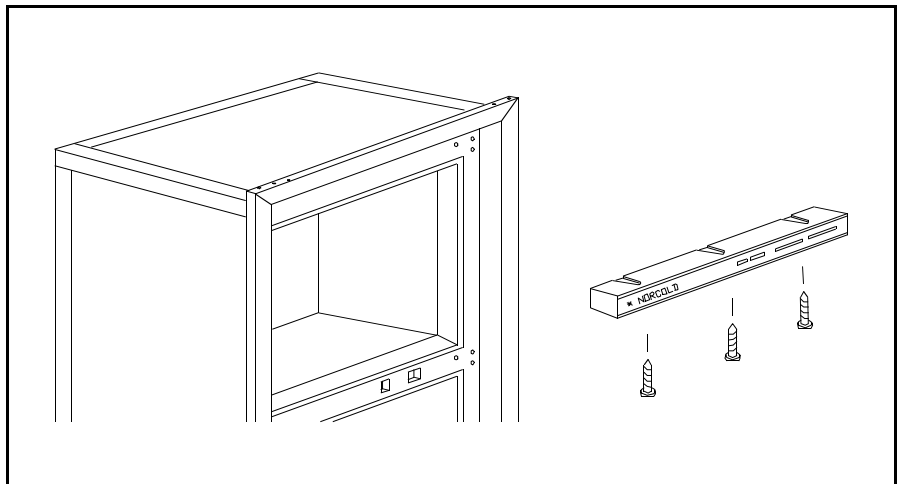


Figure 5.47 Eyebrow Removal

- Remove the Eyebrow board from the Eyebrow as shown by Figure 5.48.

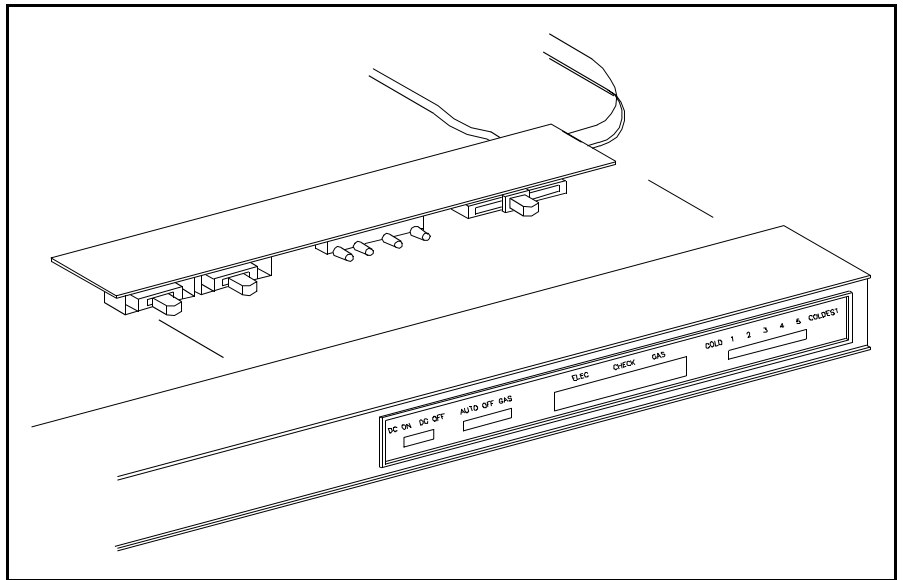


Figure 5.48 Eyebrow Board Removal

- Set the Mode Selector switch to the OFF position as shown by Figure 5.49.

Note:

These checks cannot be performed unless the Eyebrow board has the LED as shown.

- Connect a volt meter as shown in Figure 5.49.
- You should measure 12V DC at the emitter of Q11. If 12 volts is not indicated, replace the wire harness.
- Set the Mode Selector to gas, the voltage should now drop to 5.6 volts DC. If it does not, replace the Eyebrow board.
- Set the Mode Selector switch to OFF.

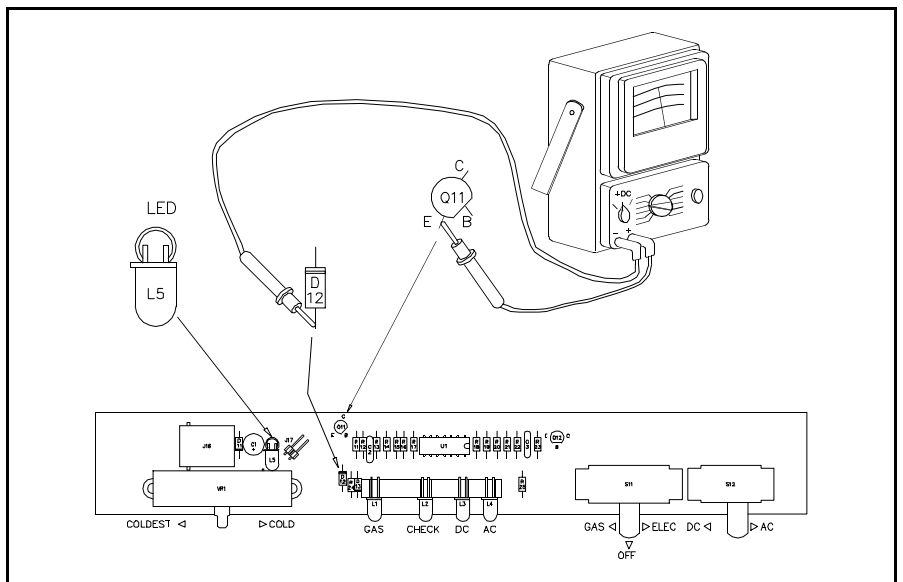


Figure 5.49 12 Volt DC Check

- With the volt meter's negative lead at D12, as shown in Figure 5.49, check the switch terminals shown in Figure 5.50.
- You must have 12 volts on all the terminals shown. If you do not have 12 volts the cable is defective and must be replaced.
- Set the Mode Selector switch (es) to AC ELECTRIC Mode. Use the Volt meter (with negative lead still connected per Figure 5.49) and check Points B, D and E as shown in Figure 5.50. You should measure approximately 2 Volts DC. If not, replace the Eyebrow Board.

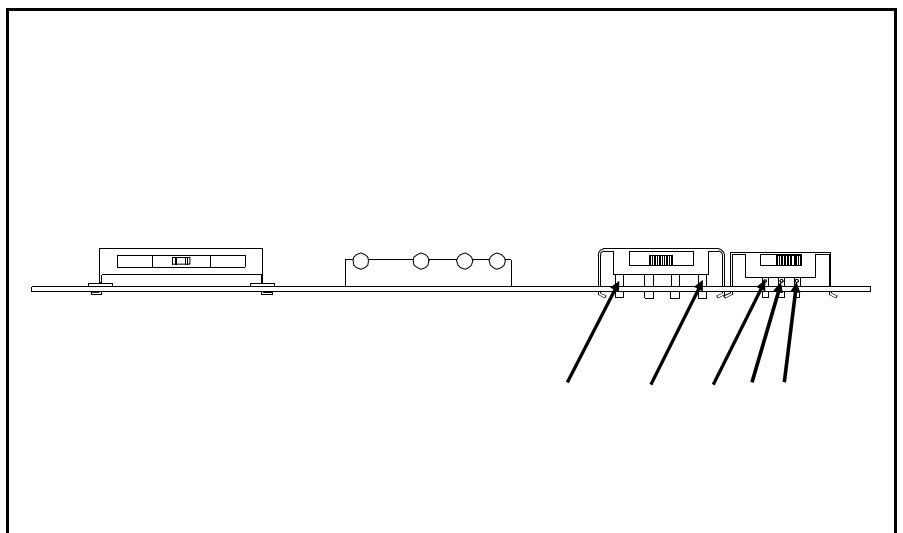


Figure 5.50 Control Voltage Check



23. Check for 120 volts AC on terminals J-7 and J-8 of the Power Supply as shown by Figure 5.51. If you do not measure 120 volts, replace the Power Supply.

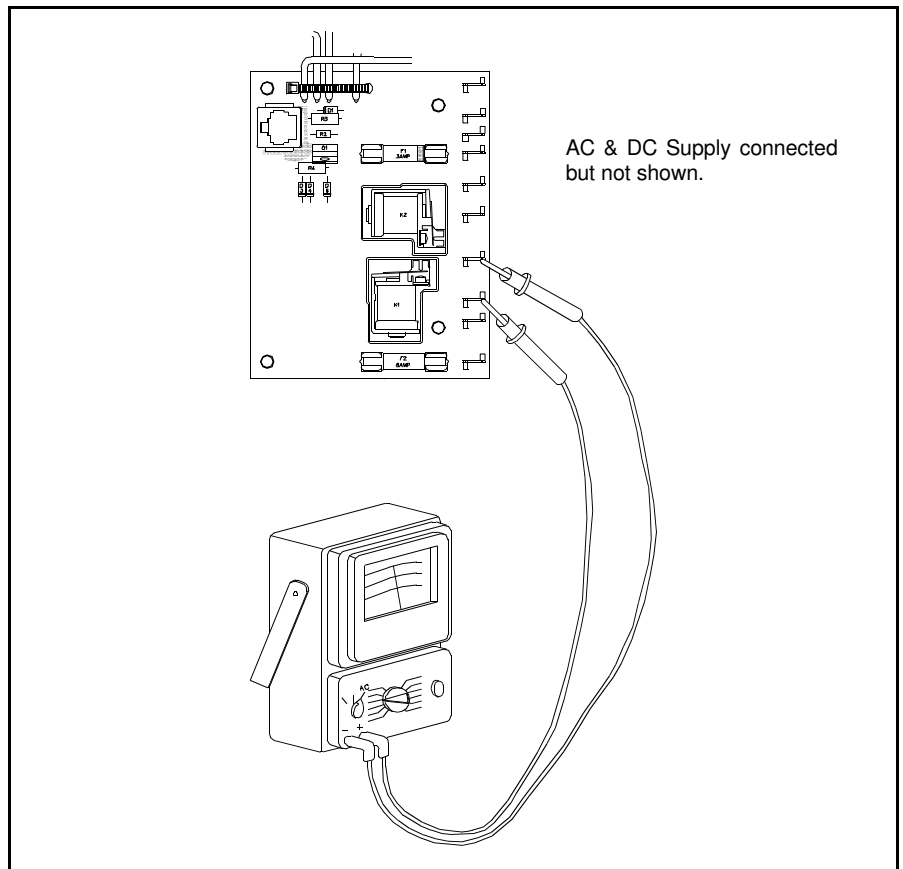


Figure 5.51 120 Volt Output Check

24. If 120 Volts AC is present, check resistance of AC Heater element as shown in Figure 5.52. If not within the allowable specification (see Technical Data section), replace with one of the correct size and wattage.

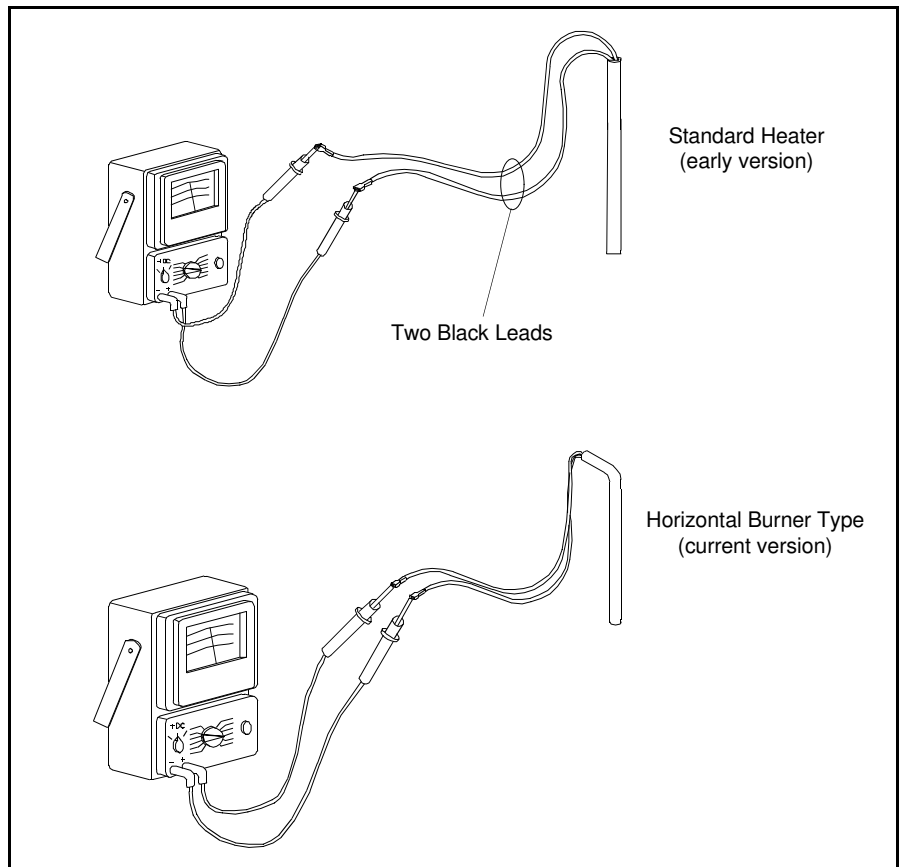


Figure 5.52 Heater Resistance Check

## Problem solving steps - DC Electric Operation

Answer these questions before calling Norcold's Technical Service Number.

1. Remember this mode of operation is not designed to cool the refrigerator.
2. Do you have 12 Volts DC to terminals (J-4) ground and (+J-5)?
3. Is the 3 amp fuse (located under the Power Supply board cover) good?
4. Do you have 12 Volts DC to the 20 (15) amp fuse?
5. Did you check for loose wire connections?
6. Is the modular connector on the wire harness (cable) plugged into the Power Supply board and the Eyebrow board?
7. Is the Mode Selector set to the DC mode of operation?

## Step by Step Trouble Shooting Guide - DC Electric Mode of Operation

1. Check for 12 volt DC at terminals J4 and J5+ on the Power Supply as shown by Figure 5.53. If +12 volts is not present, repair the 12 volt supply.
2. Remove the wires from the Power Supply terminals.
3. Disconnect the cable from the Power Supply.
4. Remove the Power Supply cover to gain access to the Power Supply.
5. Reconnect the 12 volt wires to terminals J4 and J5+.

6. Check for 12 volts DC as shown in Figure 5.54. If you do not have 12 volts replace the 3 amp fuse.

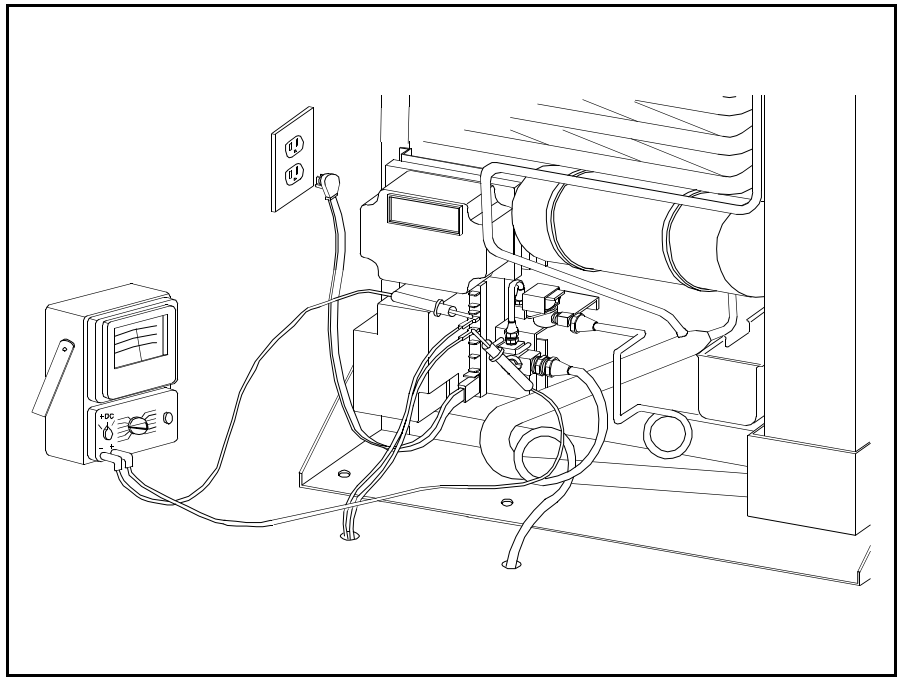


Figure 5.53 12 Volt DC Supply Check

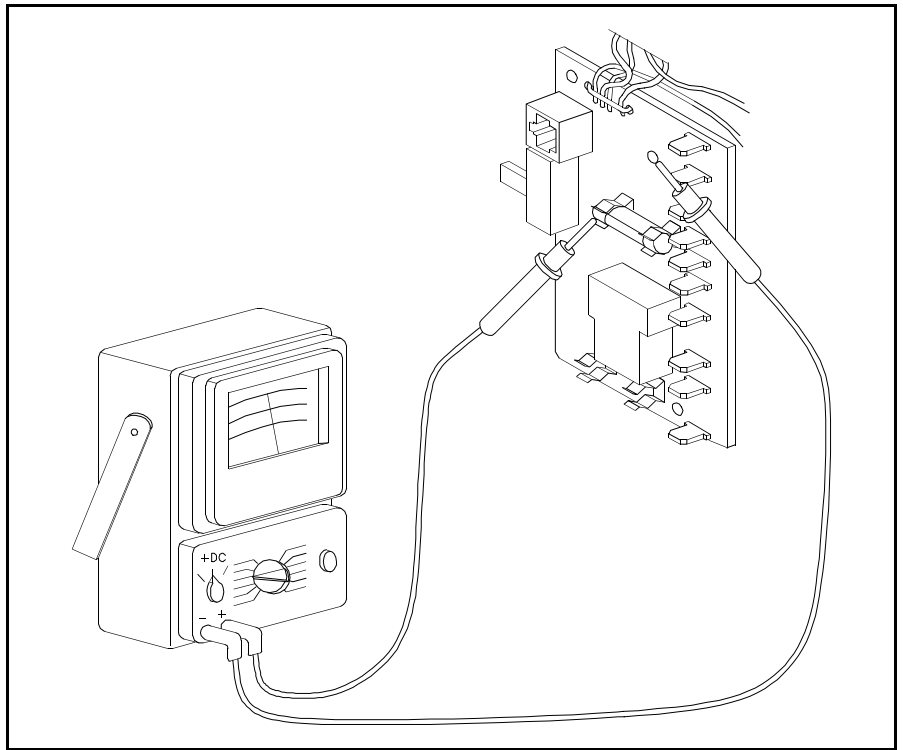


Figure 5.54 3 Amp Fuse Check



NEVER OVERFUSE A CIRCUIT. REPLACE BLOWN FUSE WITH EXACT REPLACEMENT INDICATED BY NORCOLD. OVERFUSING OF A CIRCUIT CAN RESULT IN A FIRE.

7. Check the three places indicated by Figure 5.55 for 12 volts. If you do not have 12 volts as shown replace the Power Supply.

Note:

On the original version Power Supply the diodes will be marked D6 and D7 and the storage switch must be in the down position "ON".

8. Reconnect the cable to the Power Supply.

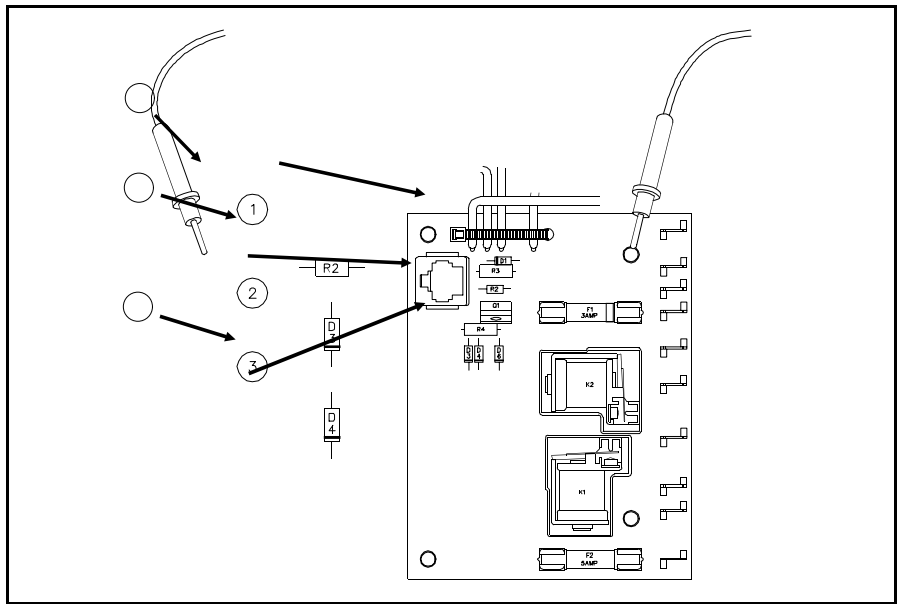


Figure 5.55 12 Volt DC Circuit Check

9. Remove the screws shown in Figure 5.56 and pull the Eyebrow assembly away from the refrigerator.

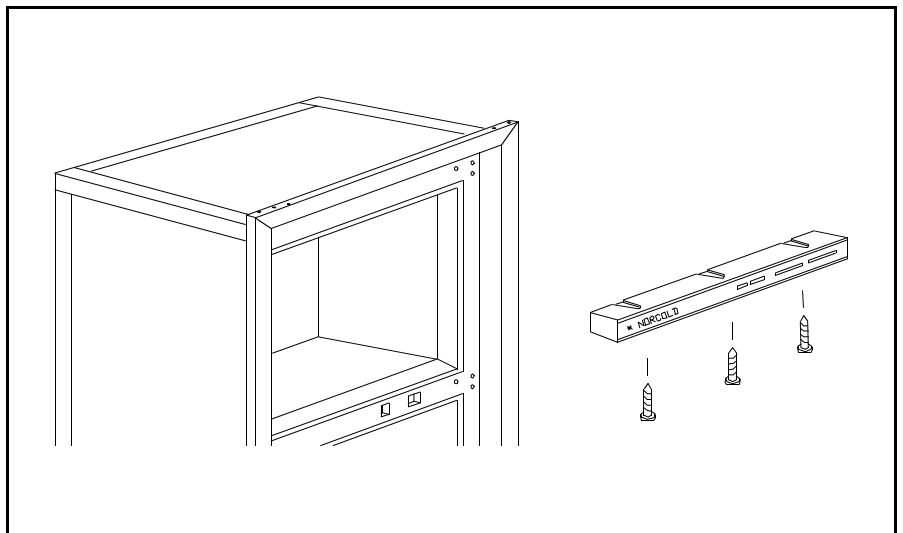


Figure 5.56 Eyebrow Removal

10. Remove the Eyebrow board from the Eyebrow as shown by Figure 5.57.

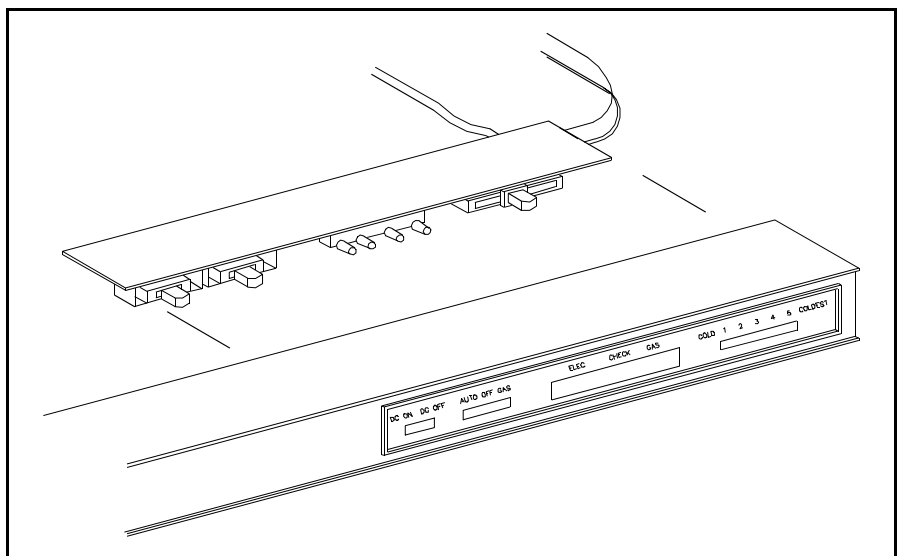


Figure 5.57 Eyebrow Board Removal

- Set the Mode Selector switch to the OFF position as shown by Figure 5.58.

Note:

These checks cannot be performed unless the Eyebrow board has the led as shown.

- Connect a volt meter as shown in Figure 5.58.
- You should measure 12 Volts DC at the emitter of Q11.
  - If you do not have 12 volts, replace the wire harness.
- Set the Mode Selector to gas. The voltage should now drop to 5.6 volts DC. If it does not, replace the Eyebrow board.
- Set the Mode Selector switch to off.
- With the voltmeter's negative lead connected as shown in Figure 5.58, check the switch terminals shown in Figure 5.59.
- You must have 12 volts on all the terminals shown. If you do not have 12 volts the cable is defective and must be replaced.
- Set the Mode Selector switch(es) to DC ELECTRIC Mode. Use the volt meter (with negative lead still connected per Figure 5.58) to check Points B, C and D as shown in Figure 5.59. You should measure approximately 2 volts DC. If not, replace the Eyebrow Board.
- Set the Mode Selector to DC ELEC.

- Check the DC heater terminals on the Power Supply for 12 volts as shown in Figure 5.60. J-3 is -, J-6 is +. If 12 volts is not measured, replace the Power Supply.

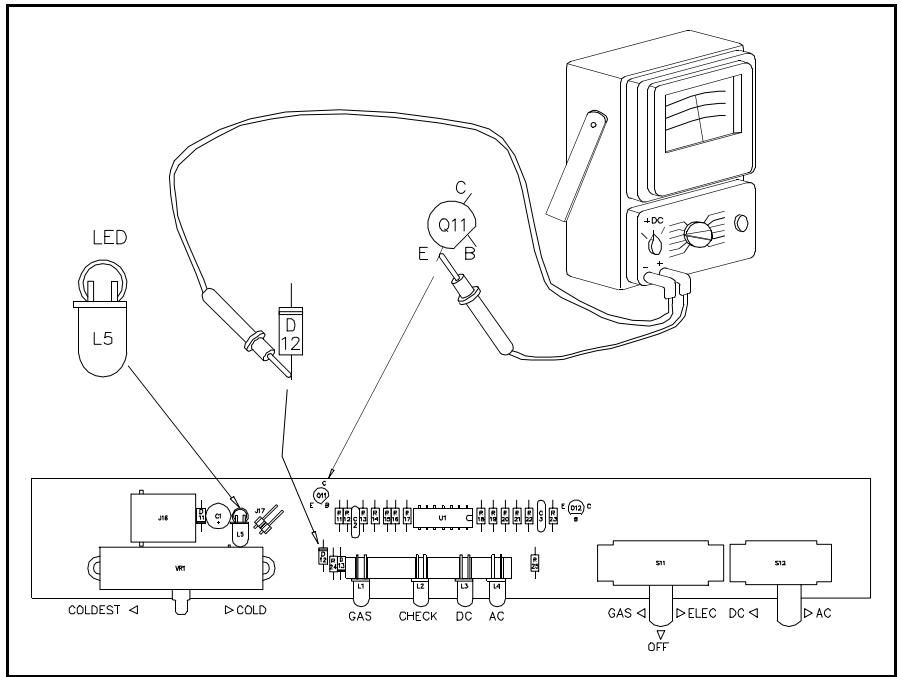


Figure 5.58 12 Volt DC Check

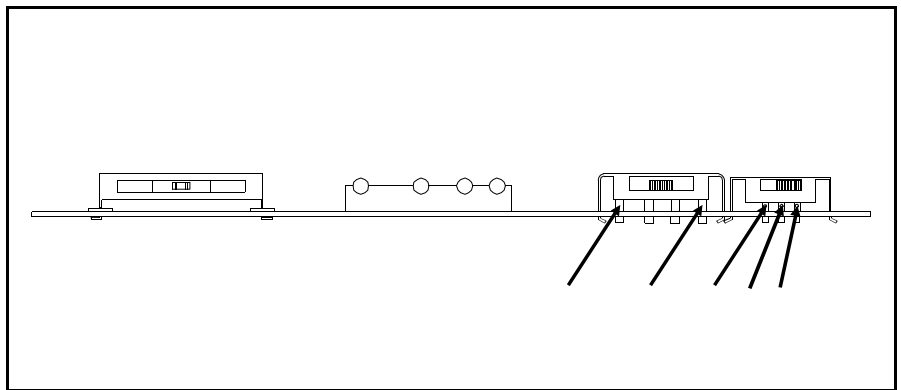


Figure 5.59 Control Voltage Check

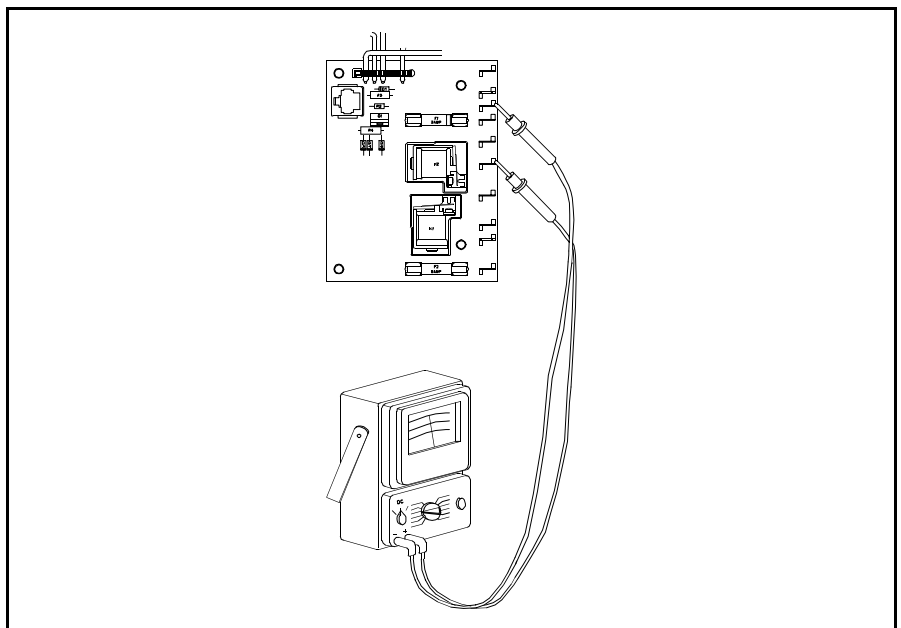


Figure 5.60 12 Volt DC Output Check

21. Check for 12 volts across the DC heater fuse as shown by Figure 5.61. If 12 volts is not measured, the fuse is blown and must be replaced.

**⚠ WARNING**

NEVER OVERFUSE A CIRCUIT. REPLACE BLOWN FUSE WITH EXACT REPLACEMENT INDICATED BY NORCOLD. OVERFUSING OF A CIRCUIT CAN RESULT IN A FIRE.

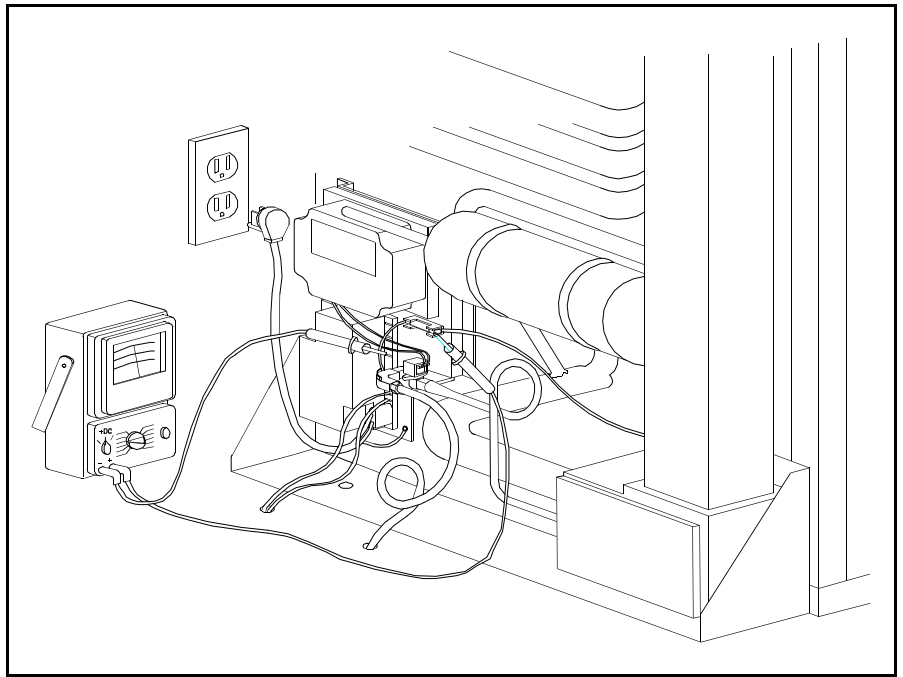


Figure 5.61 DC Heater Fuse Check

22. If 12 Volts DC is present, check resistance of the DC Heater element as shown in Figure 5.62. If not within allowable specification (see Technical Data section), replace heater.

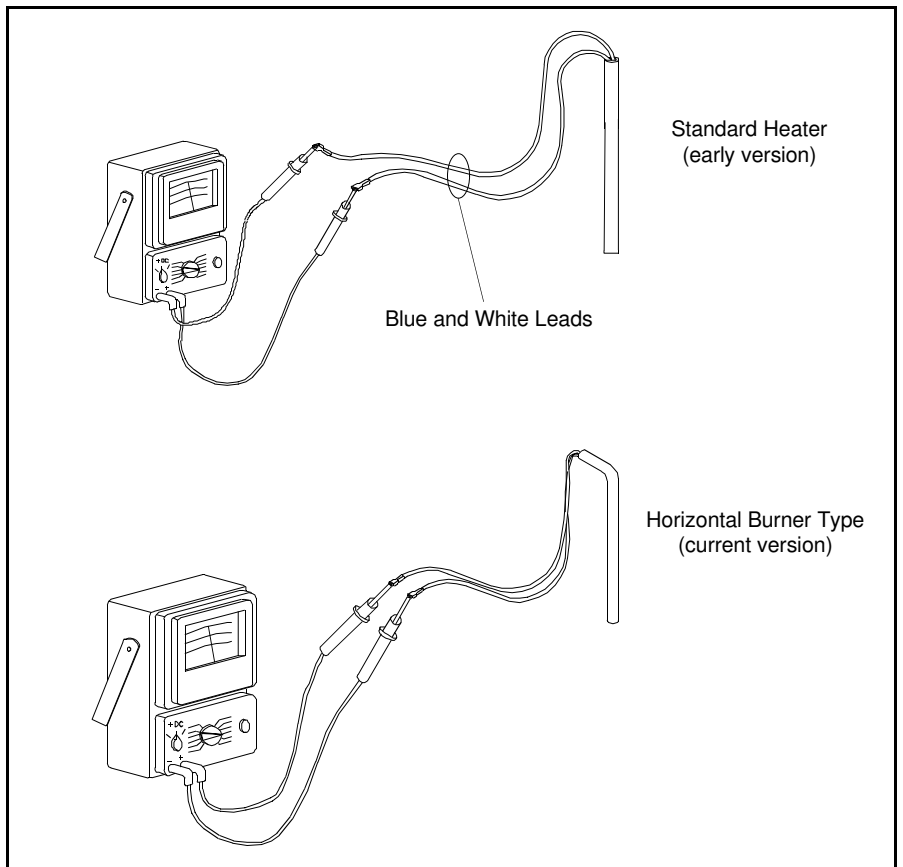


Figure 5.62 Heater Resistance Check

# Illustrations Showing Normal and Abnormal Conditions of the Mode Selector

## Normal Condition

Mode Selector set to GAS, LP light illuminated, and refrigerator operating on gas.

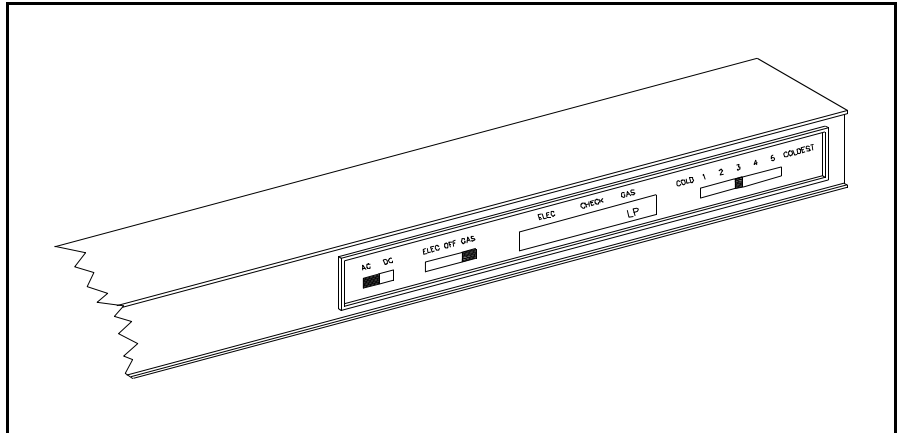


Figure 5.63

## Normal Condition

Mode Selector set to AC ELEC, AC light illuminated, and refrigerator operating on AC.

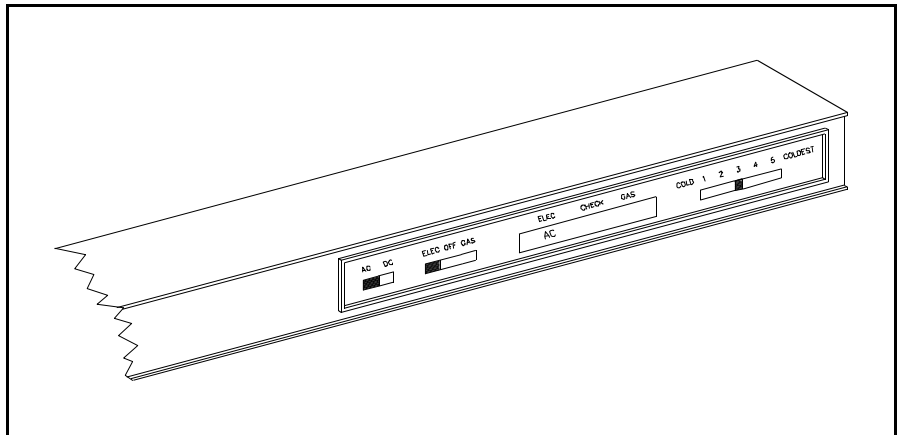


Figure 5.64

## Normal Condition

Mode Selector set to DC ELEC, DC light illuminated, and refrigerator operating on DC.

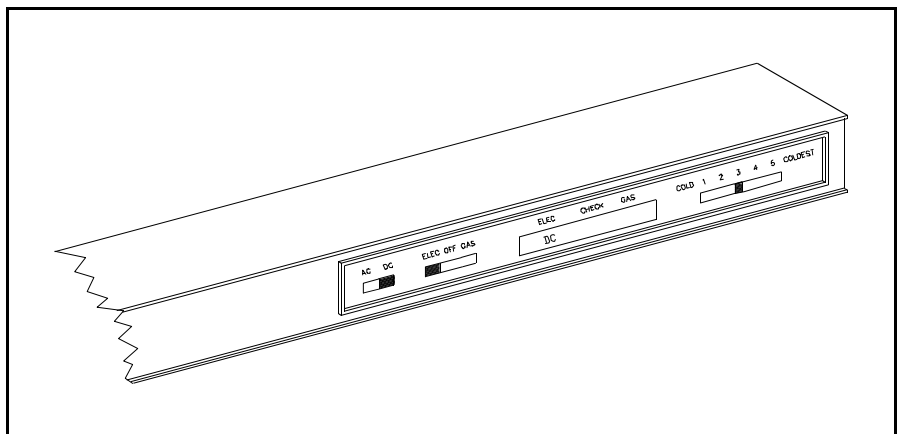


Figure 5.65

## Abnormal condition

Mode Selector set to gas, LP and CHECK light illuminated. Refrigerator will not light the Burner, or the Burner lights for a few seconds and goes out.

Probable Cause:

- A. Low input voltage
- B. LP turned off at main tank or shut-off valve
- C. LP pressure not adjusted correctly
- D. Air in the LP gas lines
- E. Gas valve did not open
- F. No sparks to the Burner
- G. Electrodes not adjusted correctly
- H. Orifice & Burner obstructed
- I. Loose or corroded connection
- J. Defective Ignition Module

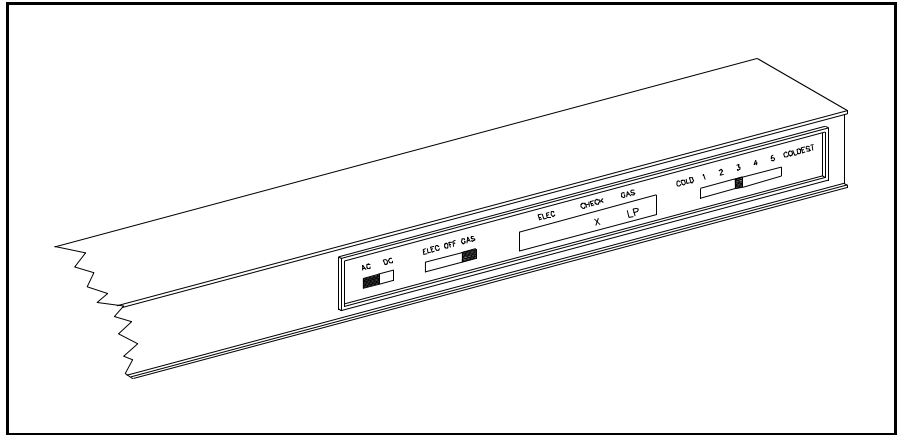


Figure 5.66

## Abnormal condition

Mode Selector set to gas, LP and CHECK light illuminated, and the Flame is Burning

Probable Cause:

- A. Low input voltage
- B. Corrosion in the cable connectors
- C. Moisture on the Eyebrow board
- D. Defective Ignition Module
- E. Defective cable

## Abnormal Condition

Mode Selector set to AC ELEC, AC and CHECK lights are illuminated.

Probable Cause:

- A. Defective fluorescent light
  - (1) Turn off all fluorescent lights. If the CHECK light goes out, one of the fluorescent lights is defective.
  - (2) Replace the light or wire the refrigerators 12 volt DC input to the battery
- B. Corrosion in the cable connectors
- C. Defective Power Supply
- D. Defective cable

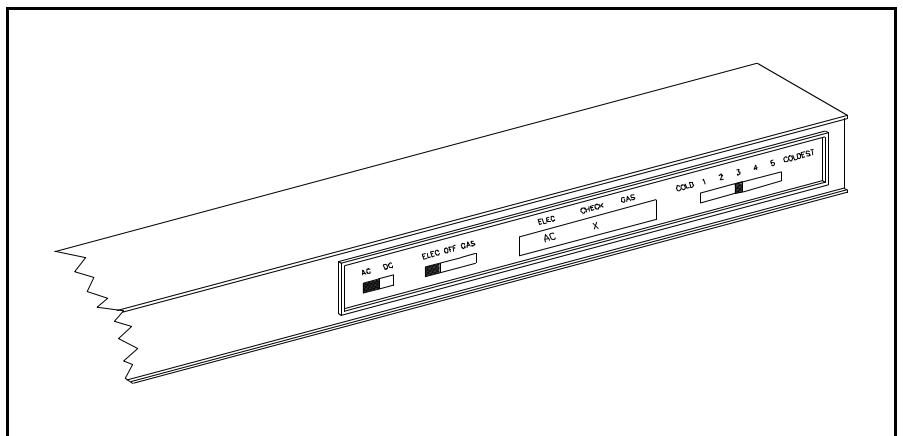


Figure 5.67

**Abnormal Condition**

Mode Selector set to off, CHECK light illuminated.

Probable Cause:

- A. Defective fluorescent light (see probable cause on page 5-31)
- B. Defective Power Supply
- C. Corrosion in cable connectors
- D. Defective cable

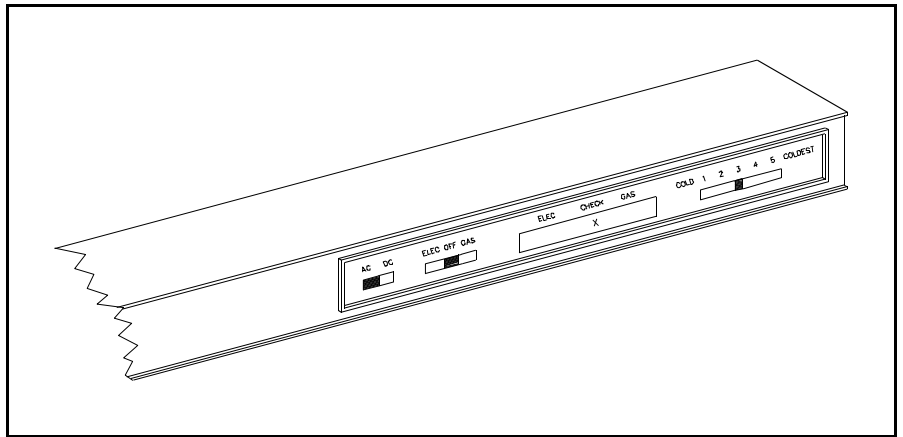


Figure 5.68

**Abnormal Condition**

Mode Selector set to GAS, LP light is not illuminated, refrigerator working on gas

Cause: Defective Eyebrow board

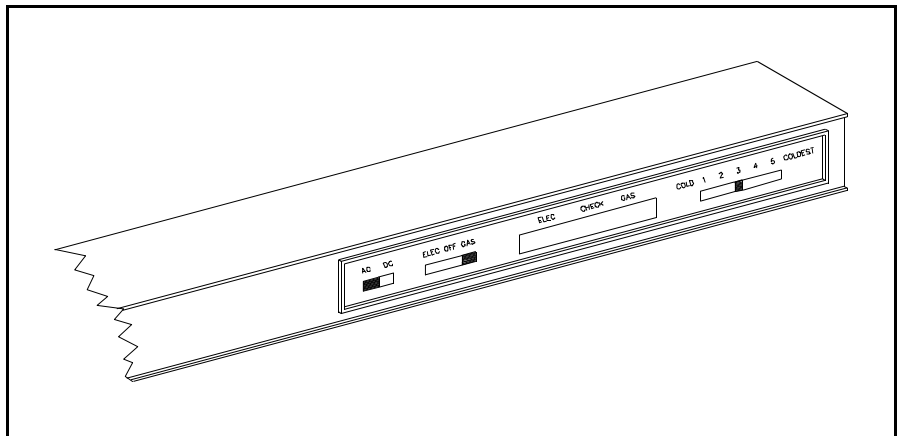


Figure 5.69

**Abnormal Condition**

Mode Selector set to GAS, LP light is illuminated, the flame did not light, and the CHECK light is not illuminated

Probable Cause:

- A. Defective Eyebrow board
- B. Defective Ignition Module
- C. Defective cable

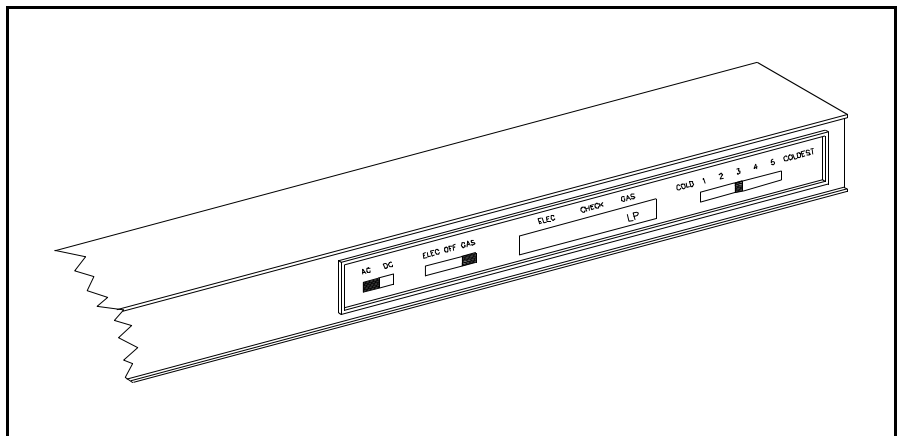


Figure 5.70



### Abnormal Condition

Mode Selector set to AC ELEC, AC light is not illuminated, refrigerator working on AC.

Cause: Defective Eyebrow board

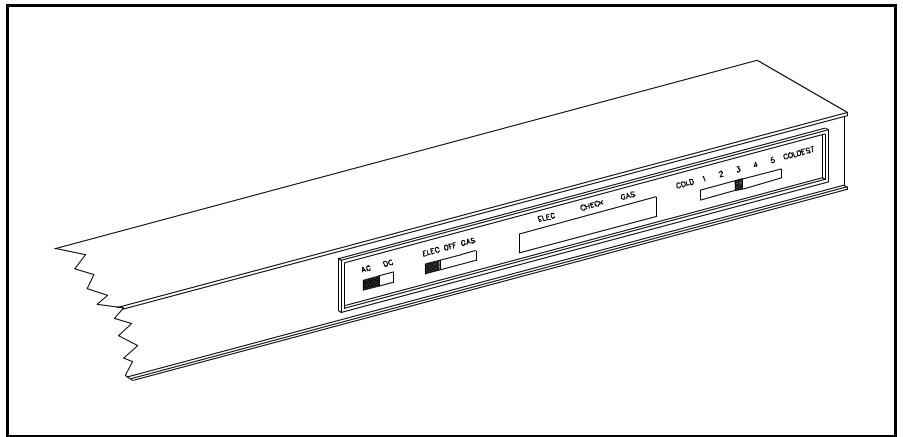


Figure 5.71

### Abnormal Condition

Mode Selector set to DC ELEC, DC light is not illuminated, refrigerator working on DC.

Cause: Defective Eyebrow board

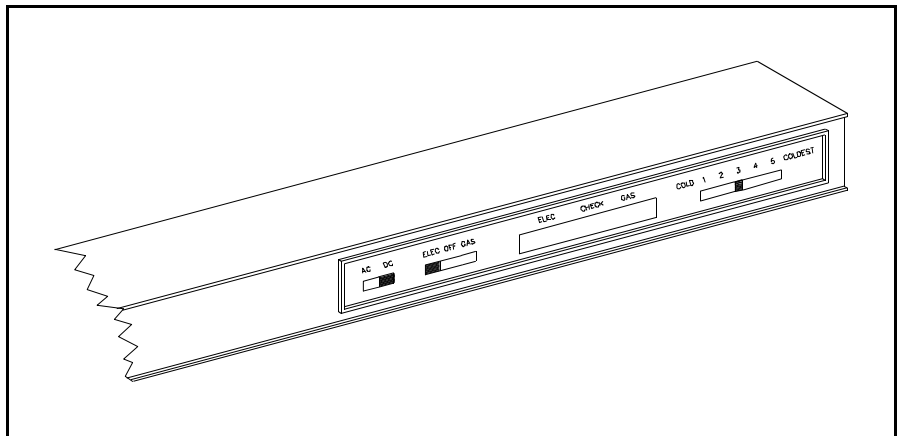


Figure 5.72

### Abnormal Condition

A. Mode Selector set to off, no lights illuminated refrigerator operating on DC

Cause: Defective Power Supply

B. Mode Selector set to off, refrigerator operating on AC

Cause: Defective Power Supply

C. Mode Selector set to off, refrigerator operating on LP gas

Cause: Defective Power Supply or the gas value is hung in the open position

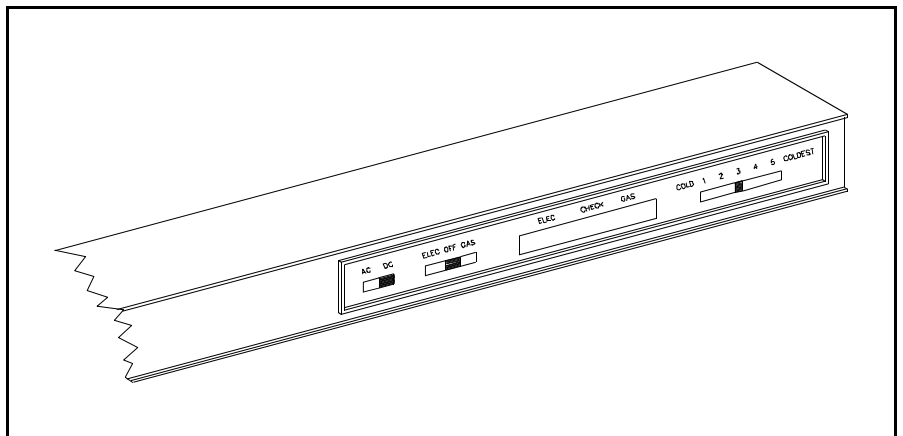
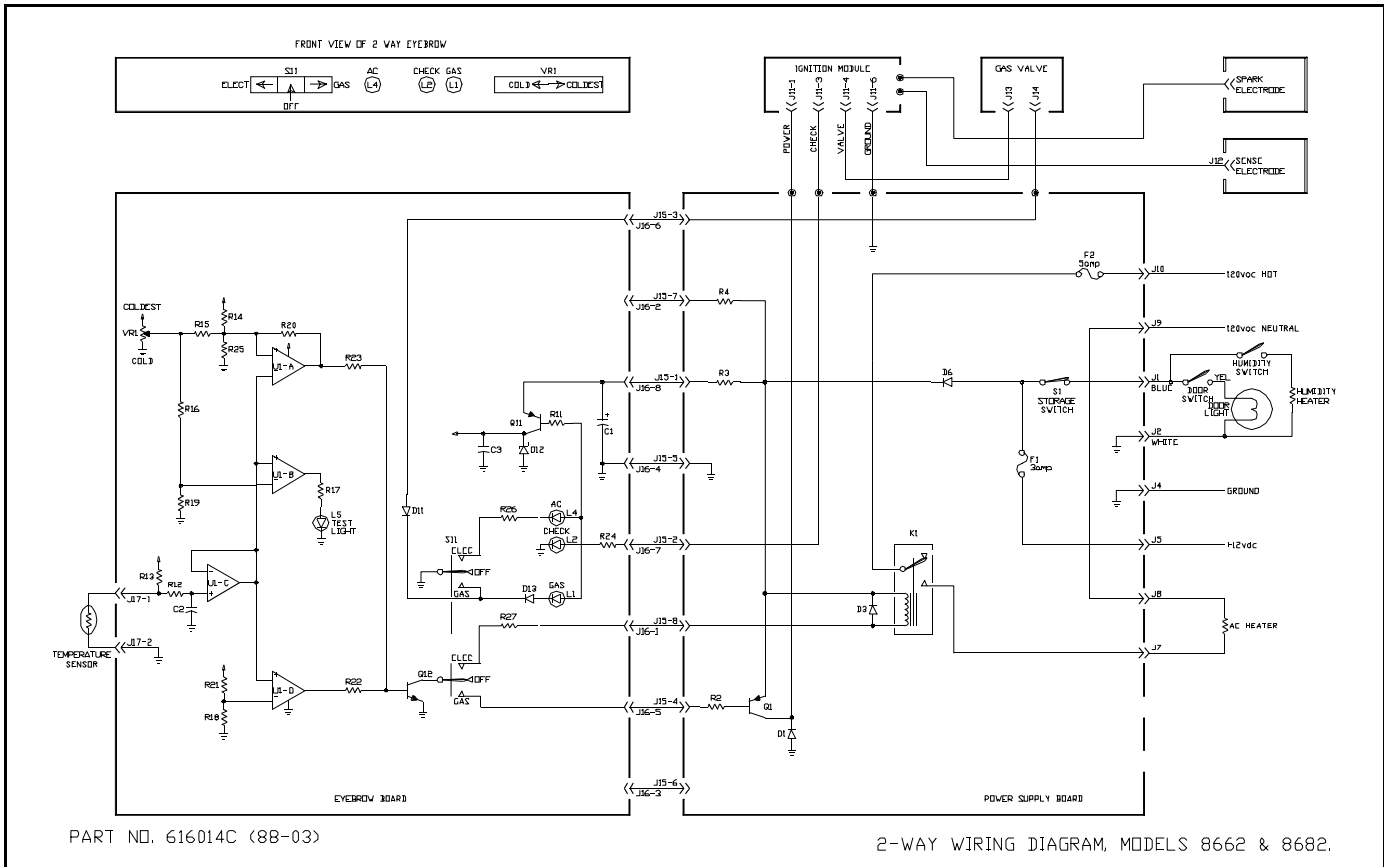
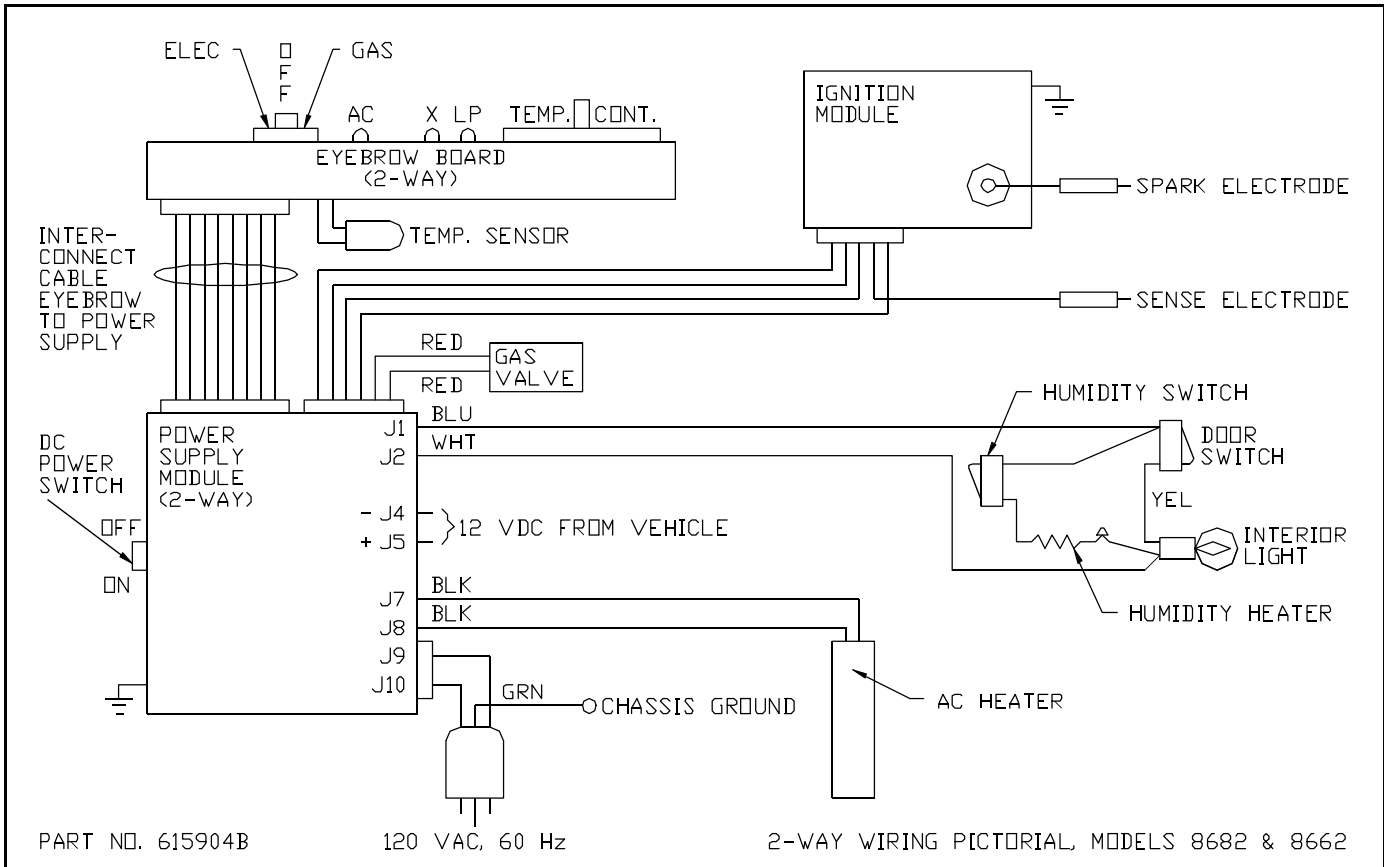
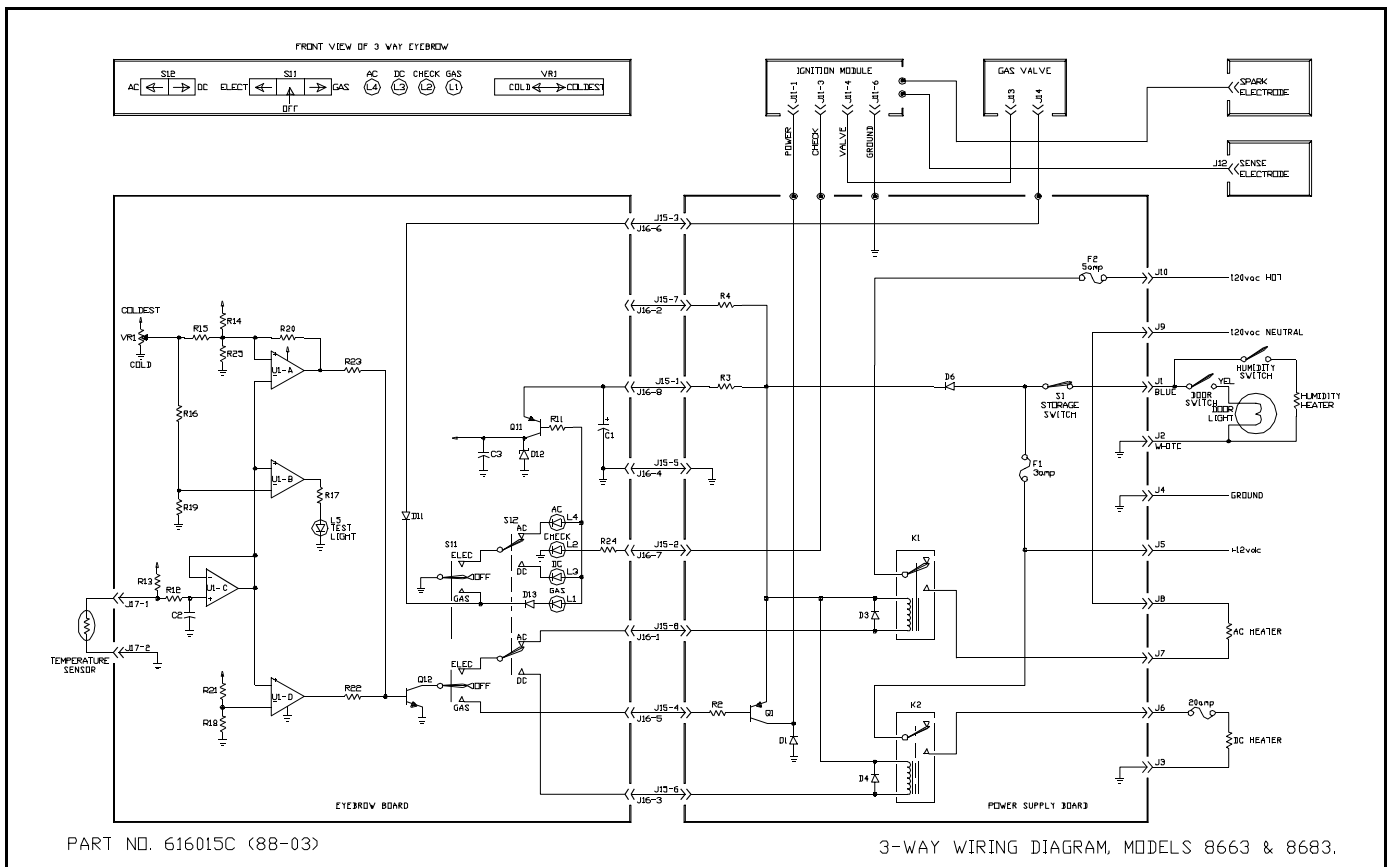
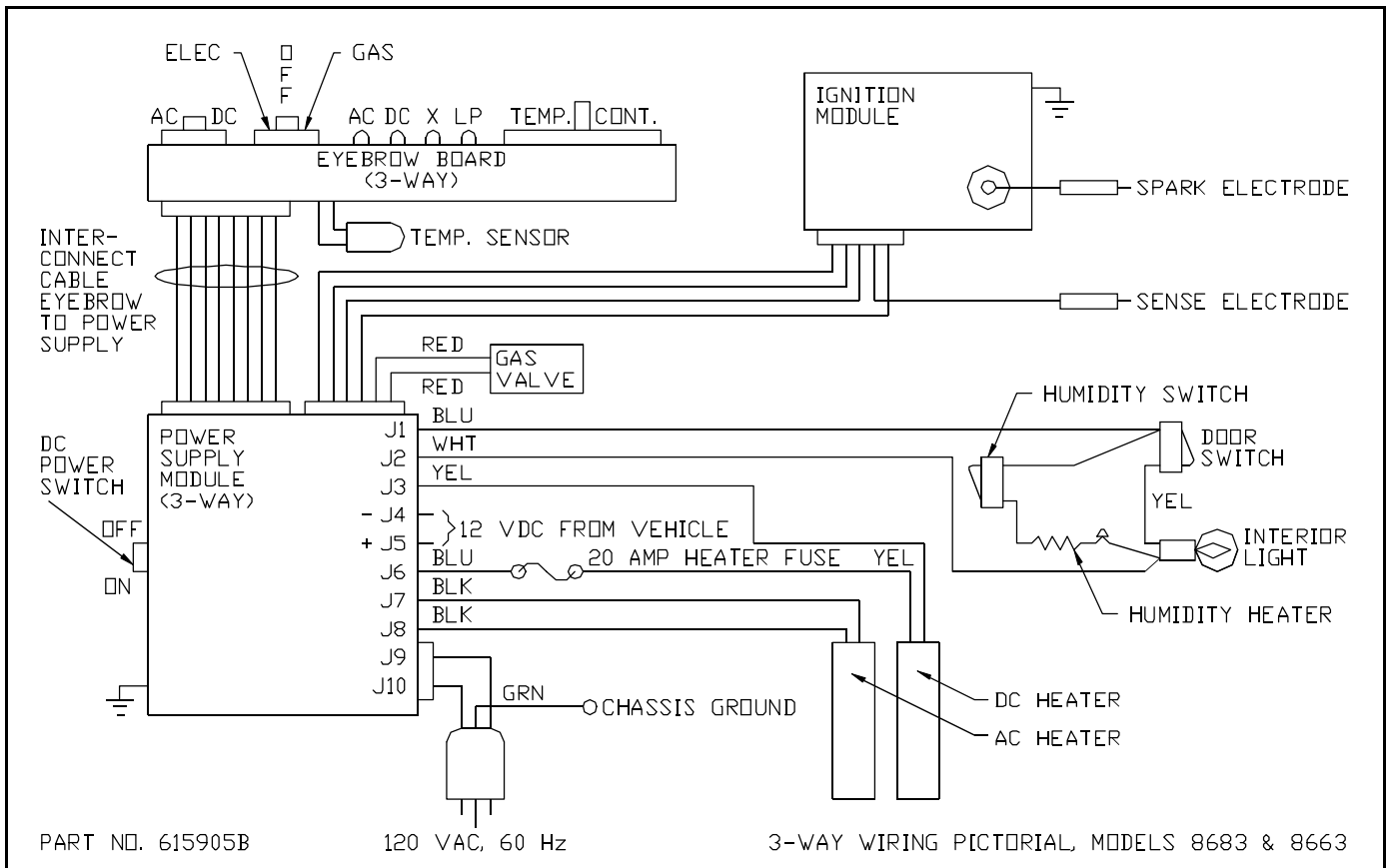
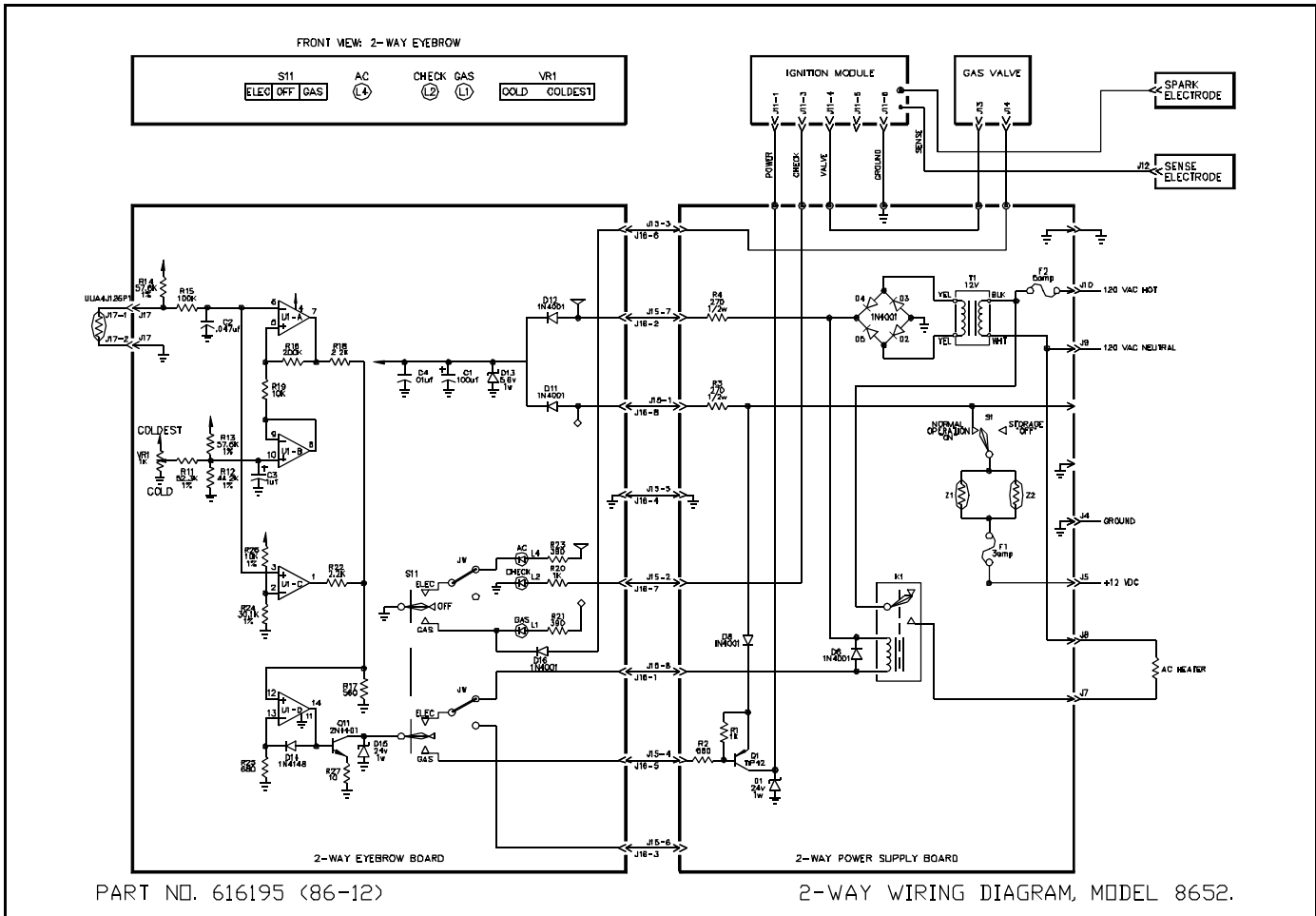
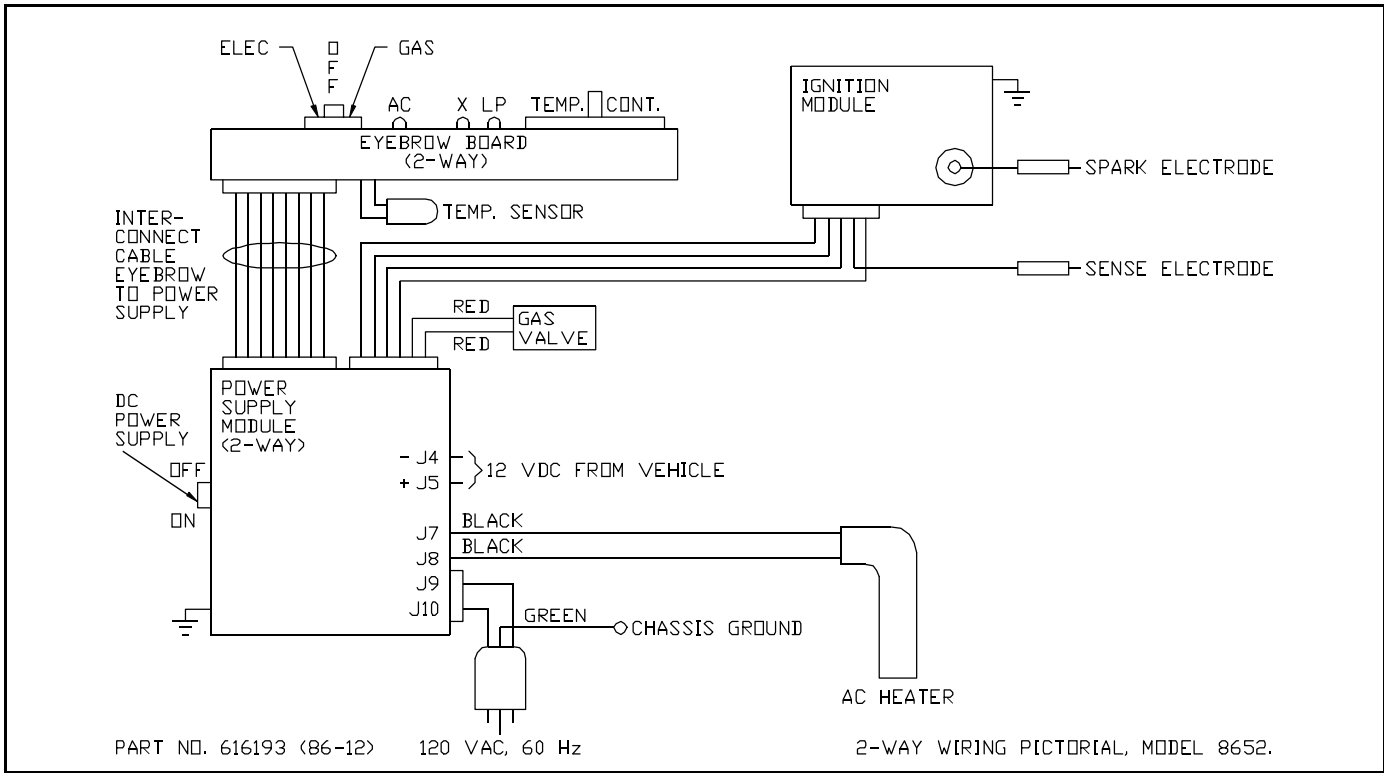


Figure 5.73









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All manuals are believed to be released for distribution, and/or in the public domain.

Service manuals provided with the understanding that persons using them are well versed in proper safety practices, and are familiar with basic safety procedures, including, but not limited to safety procedures dealing with 120 volt electricity, high amperage 12 volt circuits an LPG (propane) systems.

If in doubt, consult a professional (better safe than sorry).