ELECTRONIC CONTROL TERMINOLOGY & COMPONENT DESCRIPTIONS

The model 648PRO utilizes an electronic control system which monitors, regulates, controls and displays a variety of functions and operations in the appliance.

The table below defines some of the basic electronic control system terminology.

Term/Component	Definition / Description
Main Control Board	(Also referred to as the Main "Controller" Board), is the printed-circuit board (PC Board) which contains a microprocessor, relays, trials and electrical connections that monitor and control all functions of the appliance.
Microprocessor	An electrical component on the control board which receives electrical signals from other components, processes the information, then sends electrical signals to relays and trials on the board to open or close, switching components in the appliance ON or OFF.
Relay	An electrical component on the control board which switches other components in the appliance ON or OFF when instructed to do so by the microprocessor.
Triac	Similar in function to the relay, the triac is a three terminal semiconductor for controlling current in either direction.
Control Panel Assembly	(Also referred to as the Control Keypad Interface), is that part of the electronic control system where all input operations are performed.
Membrane Switch	Part of the control panel assembly, which consists of the function keys.
Keys (Function Keys)	The "buttons" on the Membrane Switch used for input operations: "POWER", "ALARM", "ICE MAKER", "LIGHTS" and 3 sets of "WARMER" & "COLDER"
User Display Module	Those parts of the electronic control system, one at each bottom corner of the grille assembly, which display zone temperatures, mode and some error indicators.
Technician's Display Module	That part of the electronic control system, behind the grille assembly, which displays temperatures, along with mode, error and service text information.
LCD (Liquid Crystal Display)	A semi-liquid substance sandwiched between glass in the User and Technician's Display Modules. The molecules of this semi-liquid substance have no specific orientation. However, when electricity is applied to them, they react predictably, aligning and straightening in such a way as to control light passage.
Indicators	The words, numbers and icons that appear at the User Displays and the Technician's Display through the use of LCD's.
Error Codes	The code numbers that may appear on the Technician's Display when accessing Error Code History during Diagnostic Mode. Error Codes are logged if the unit experienced specific problems related to electrical signals supplied by electrical components. There are ninety-nine possible Error Codes, but only twenty can be stored at a time.
Temperature Units of Measure	Temperature observed at the User and Technician Displays may be in Fahrenheit units of measure (°F) or Celsius units of measure (°C). A series of key strokes allows the temperature units of measure to be switched to display as either °F or °C.
Set-Point	The desired zone temperature, established by pressing the COLDER or WARMER keys.
High Offset (Cut-in)	As the zone air temperature cycles up and down, the high offset is the maximum zone temperature that the electronic control system will allow before calling for cooling.
Low Offset (Cut-out)	As the zone air temperature cycles up and down, the low offset is the minimum zone air temperature that the electronic control system will allow before interrupting cooling.
Thermistor	(Also Referred to as a Temperature Sensor), is a resistor with which resistance changes as the temperature around it changes. For electronic control system purposes, the microprocessor measures the resistance, then displays it as a temperature reading.
Variable Speed Compressor	A compressor that runs at varying speeds depending on the temperature detected in the corresponding zone(s) of the appliance.

ELECTRONIC CONTROL SYSTEM OVERVIEW

Below is the wiring schematic for the model 648PRO, illustrating the components of the electronic control system.

- Manual input operations are performed at the Control Panel (Keypad).
- Monitoring, regulating and controlling functions take place at the Main Control Board.
- Temperatures, mode activation icons and possibly error indicators are displayed on the left and right User Displays (Left and Right Display Boards) and the Technician Display (Tech Display).

The entire electronic control system is described in greater detail on the following pages.

NOTE: *For more detailed electrical diagrams refer to the wiring diagram and schematic supplied with the unit.*

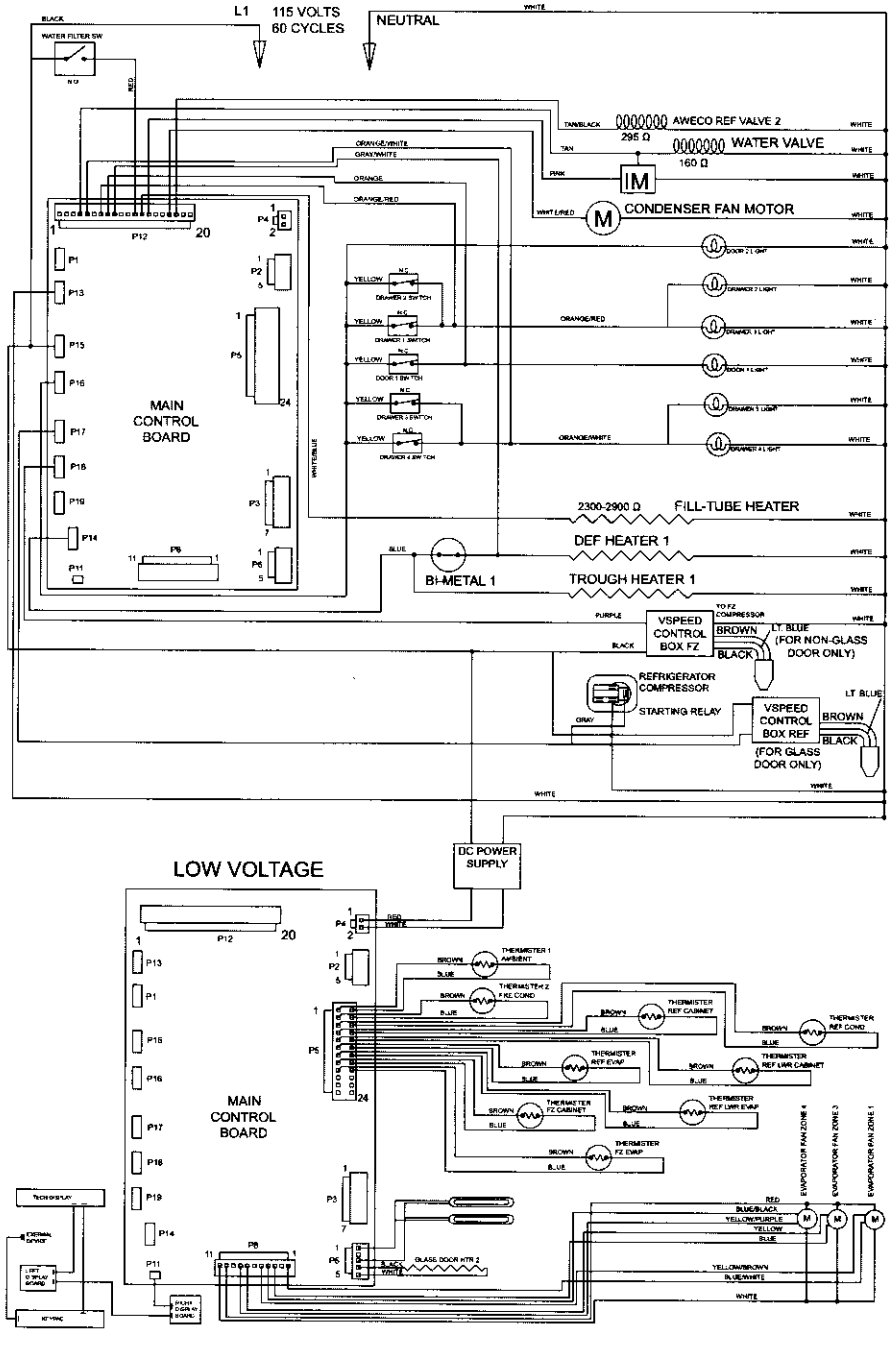


Figure 3-1. Wiring Schematic

CONTROL BOARD LAYOUT AND SUMMARY TABLE

The electrical connection points on the main control board are labeled alphanumerically. These labels correspond with the alphanumeric control board summary table, located on wiring diagrams. By referencing the summary table, it is possible to identify which components are connected at which connection points on the main control board. Below is a layout diagram of the control board and a copy of a summary table (See Figures 3-2 & 3-3).

NOTE: *All components on control board are non-replaceable. If problems with control board are identified, the complete control board must be replaced.*

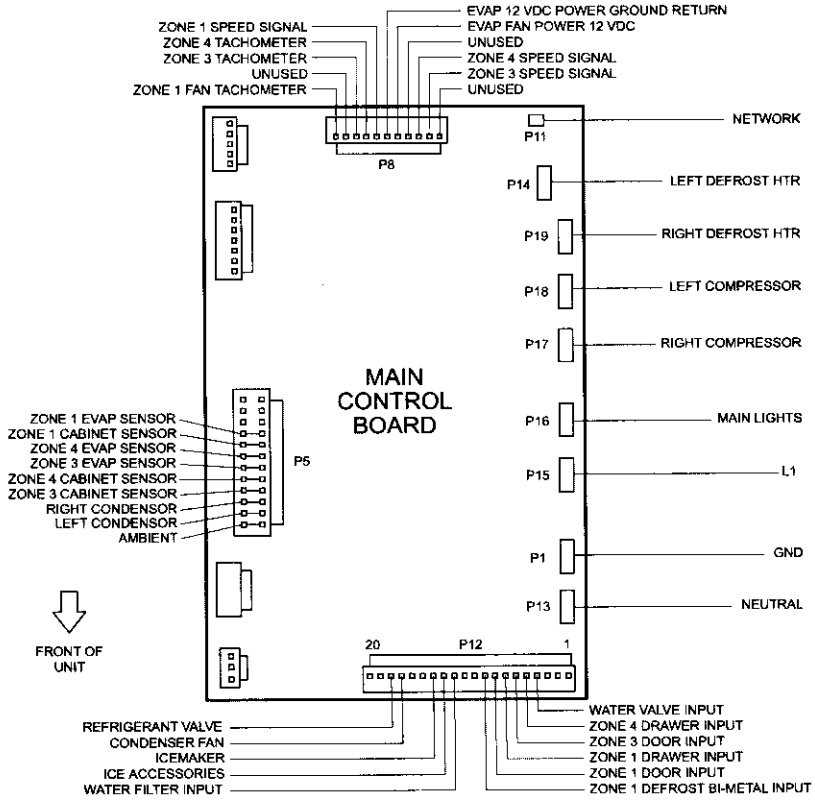


Figure 3-2. Control Board Layout

CIRCUIT	DESCRIPTION	FUNCTION	COLOR
	120 VOLT CIRCUITS		
P13	NEUTRAL	NEUTRAL INTO BOARD	WHITE
P14	DEFROST HEATER 1	POWERS DEF HTR 1	BLUE
P15	POWER IN	POWER INTO BOARD	BLACK
P16	MAIN LIGHTS	POWERS MAIN LIGHTS	YELLOW
P17	COMPRESSOR REF	POWERS REF COMPRESSOR	GRAY
P18	COMPRESSOR FREEZER	POWERS COMPRESSOR FRZ	PURPLE
P19	UNUSED	UNUSED	UNUSED
P12-1	UNUSED	UNUSED	UNUSED
P12-2	UNUSED	UNUSED	UNUSED
P12-3	UNUSED	UNUSED	UNUSED
P12-4	WATER VALVE INPUT	SENSES WATER VALVE ACTIVATION	TAN
P12-5	ZONE 4 DRAWER INPUT	SENSES IF ZONE 4 DRAWERS ARE OPEN	UNUSED
P12-6	ZONE 3 DOOR INPUT	SENSES IF ZONE 3 DOOR OPEN	UNUSED
P12-7	ZONE 1 DRAWER	UNUSED	UNUSED
P12-8	ZONE 1 DOOR	UNUSED	UNUSED
P12-9	DEF BI-METAL 1	SENSES WHEN HEATER 1 SHUTS OFF	GRAY/WHITE
P12-10	UNUSED	UNUSED	UNUSED
P12-11	UNUSED	UNUSED	UNUSED
P12-12	WATER FILTER INPUT	SENSE WATER FILTER	RED
P12-13	ICE ACCESSORIES	POWERS FILL-TUBE AND ACCESSORIES	WHITE/BLUE
P12-14	ICE MAKER	POWERS ICE-MAKER	UNUSED
P12-15	UNUSED	UNUSED	UNUSED
P12-16	UNUSED	UNUSED	UNUSED
P12-17	CONDENSER FAN	CONDENSER FAN	WHITE/RED
P12-18	AWECO VALVE 2	POWERS AWECO VALVE 2	TAN/WHITE
P12-19	UNUSED	UNUSED	UNUSED
P12-20			
	LOW VOLTAGE CIRCUITS		
P2-1	UNUSED	UNUSED	UNUSED
P2-2	UNUSED	UNUSED	UNUSED
P2-3	UNUSED	UNUSED	UNUSED
P2-4	UNUSED	UNUSED	UNUSED
P2-5	UNUSED	UNUSED	UNUSED

CIRCUIT	DESCRIPTION	FUNCTION	COLOR
	LOW VOLTAGE CIRCUITS CONTINUED		
P4-1	12 VDC POWER	12 VDC POWER	RED
P4-2	12 VDC RETURN	12 VDC RETURN	WHITE
P6-1	VERTICAL LED (REF)	12 V TO LED	BLACK/WHITE
P6-2	UNUSED	UNUSED	UNUSED
P6-3	VERTICAL LED (REF) COMMON	VERTICAL LED RETURN	WHITE
P6-4	GLASS DOOR HTR 2	12 V TO HTR 2	BLACK
P6-5	GLASS DOOR HTR 2 COMMON	HTR 2 RETURN	WHITE
P8-1	EVAPORATOR FAN ZONE 1	TACHOMETER INPUT	BLUE/WHITE
P8-2	UNUSED	UNUSED	UNUSED
P8-3	EVAPORATOR FAN ZONE 3	TACHOMETER INPUT	BLUE
P8-4	EVAPORATOR FAN ZONE 4	TACHOMETER INPUT	BLUE/BLACK
P8-5	EVAPORATOR FAN ZONE 1	PWM DRIVE OUTPUT	YELLOW/BROWN
P8-6	UNUSED	UNUSED	UNUSED
P8-7	EVAPORATOR FAN ZONE 3	PWM DRIVE OUTPUT	YELLOW
P8-8	EVAPORATOR FAN ZONE 4	PWM DRIVE OUTPUT	YELLOW/PURPLE
P8-9	UNUSED	UNUSED	UNUSED
P8-10	EVAPORATOR FAN 12 VDC POWER	ZONE FAN POWER	RED
P8-11	EVAPORATOR FAN GROUND RETURN	ZONE FAN RETURN	WHITE
	THERMISTER CIRCUITS		
P5-1	AMBIENT	SENSES TEMPERATURE	BROWN
P5-2	AMBIENT	SENSES TEMPERATURE	BLUE
P5-3	CONDENSOR LT SYSTEM	SENSES TEMPERATURE	BROWN
P5-4	CONDENSOR LT SYSTEM	SENSES TEMPERATURE	BLUE
P5-5	CONDENSOR RT SYSTEM	SENSES TEMPERATURE	BROWN
P5-6	CONDENSOR RT SYSTEM	SENSES TEMPERATURE	BLUE
P5-7	REF UPPER CABINET (ZONE 3)	SENSES TEMPERATURE	BROWN
P5-8	REF UPPER CABINET (ZONE 3)	SENSES TEMPERATURE	BLUE
P5-9	REF LOWER CABINET (ZONE 4)	SENSES TEMPERATURE	BROWN
P5-10	REF LOWER CABINET (ZONE 4)	SENSES TEMPERATURE	BLUE
P5-11	REF UPPER EVAP (ZONE 3)	SENSES TEMPERATURE	BROWN
P5-12	REF UPPER EVAP (ZONE 3)	SENSES TEMPERATURE	BLUE
P5-13	REF LOWER EVAP (ZONE 4)	SENSES TEMPERATURE	BROWN
P5-14	REF LOWER EVAP (ZONE 4)	SENSES TEMPERATURE	BLUE
P5-15	FRE CABINET (ZONE 1)	SENSES TEMPERATURE	BROWN
P5-16	FRE CABINET (ZONE 1)	SENSES TEMPERATURE	BLUE
P5-17	FRE EVAP (ZONE 1)	SENSES TEMPERATURE	BROWN
P5-18	FRE EVAP (ZONE 1)	SENSES TEMPERATURE	BLUE
P5-19	UNUSED	UNUSED	UNUSED
P5-20	UNUSED	UNUSED	UNUSED
P5-21	UNUSED	UNUSED	UNUSED
P5-22	UNUSED	UNUSED	UNUSED
P5-23	UNUSED	UNUSED	UNUSED
P5-24	UNUSED	UNUSED	UNUSED

648PRO CONTROL BOARD SUMMARY

Figure 3-3. Control Board Summary Table

CONTROL PANEL AND USER DISPLAYS LAYOUT

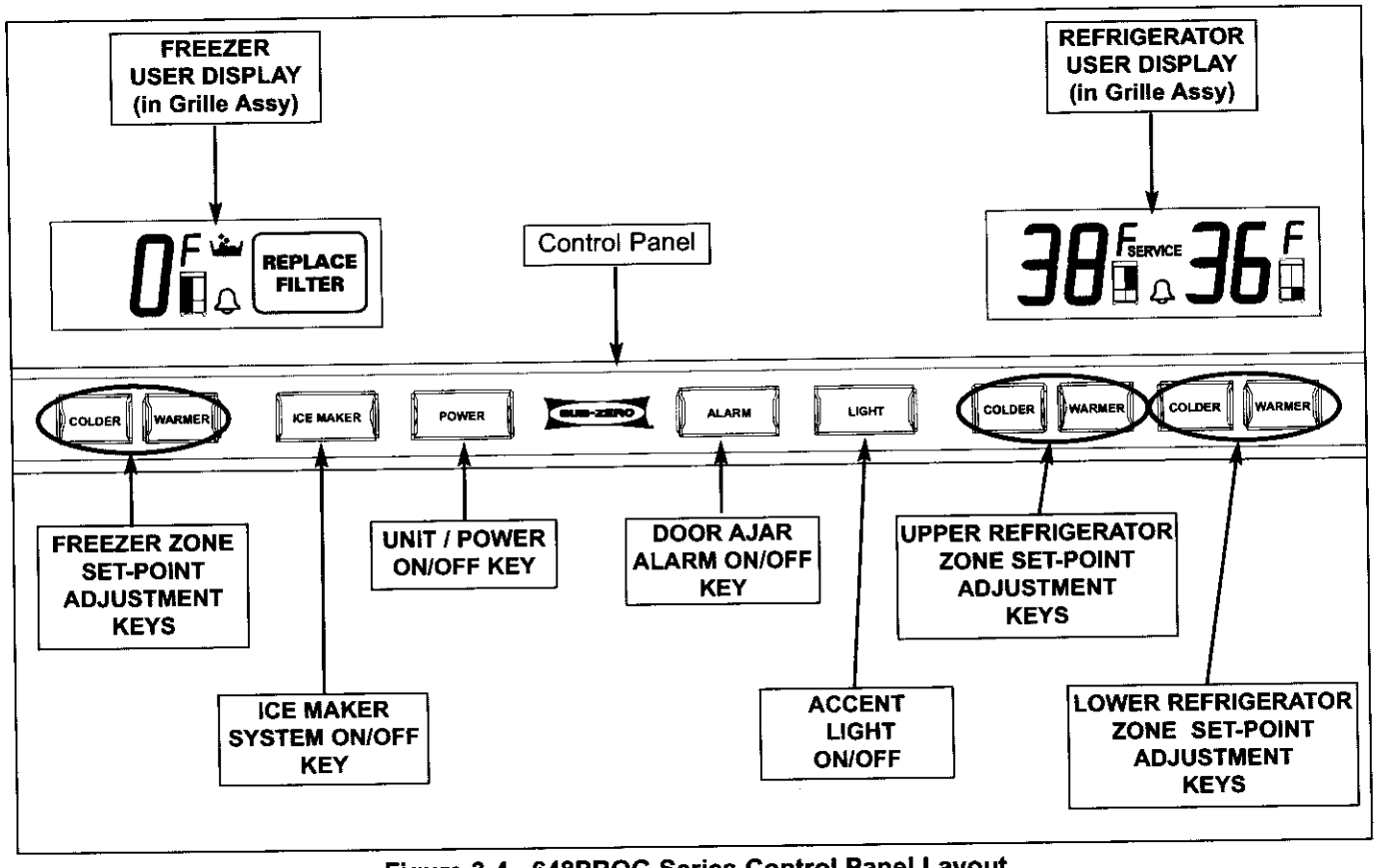


Figure 3-4. 648PROG Series Control Panel Layout

NOTE: *Figure 3-4 represents the 648PROG (with glass door). The control panel for the 648PROS (with solid door) does not have the LIGHTS on/off key.*

BASIC ELECTRONIC CONTROL INPUT OPERATIONS

The following pages describe the basic input operations performed at the control panel (switching unit ON and OFF; adjusting set-point (temperature adjustment); switching ice maker system ON and OFF; enabling and disabling door ajar alarm feature; and in models with glass doors only, accent lighting system ON and OFF). Please note that though possible to display temperatures in Fahrenheit or Celsius, in most cases Fahrenheit readings are shown.

Unit ON/OFF

All units are shipped in the OFF Mode. When power is supplied to the unit the word "OFF" is visible in the right User Display. By pressing the POWER key (See Figure 3-5), power is allowed past the main control board to the rest of the unit, indicated by the appliance running through a self test, in which the lights and all the LCD's in the User Displays energize, then the User Displays show temperatures.

NOTE: *If the unit is switched OFF using the POWER key, the word "OFF" will be visible on the right User Display.*

⚠ WARNING

WHEN IN "OFF" MODE, AC LINE VOLTAGE IS STILL PRESENT AT THE MAIN CONTROL BOARD AND DC POWER SUPPLY! AND, LOW DC VOLTAGE IS PRESENT IN THE LOW VOLTAGE ELECTRICAL SYSTEM.

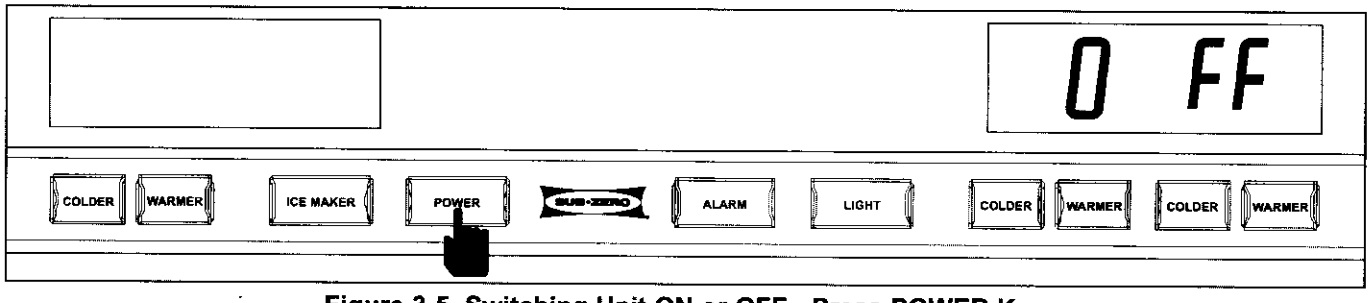


Figure 3-5. Switching Unit ON or OFF - Press POWER Key

Adjusting Set-Point (Temperature Adjustment)

To adjust set-points, press the appropriate WARMER or COLDER key on control panel in multiple key strokes until desired set-point is achieved (See Figure 3-6). One key stroke equals one degree change.

NOTES:

- *To the right of each temperature reading is an icon representing the appliance. The darkened portion of the appliance icon indicates which zone is associated with the temperatures to its left.*
- *The temperature range in a freezer zone is -5°F (-20°C) to +5°F (-15°C). The temperature range in a refrigerator zone is +34°F (+1°C) to +45°F (+7°C).*
- *The initial stroke of the WARMER or COLDER key will change the previous set-point by one degree.*
- *The set-point will be displayed on the User Display for ten (10) seconds after the last key stroke, then the zone temperature will be displayed. As the zone temperature changes, the temperature displayed will change by no more than one degree per minute.*

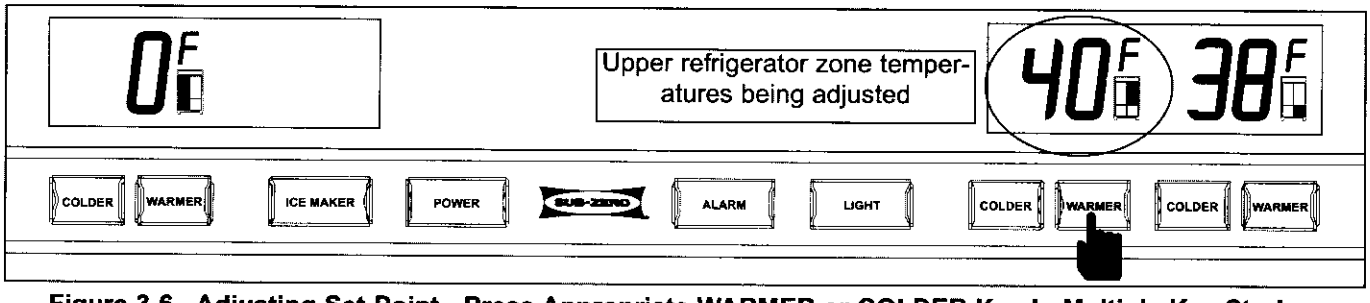


Figure 3-6. Adjusting Set-Point - Press Appropriate WARMER or COLDER Key In Multiple Key Strokes

Icemaker System ON/OFF

All units are shipped with the icemaker system is OFF. By pressing the ICE MAKER key on the control panel, power is allowed to the icemaker system and the ice making icon appears in the left User Display (See Figure 3-7). To switch the ice maker system OFF, press the ICE MAKER key again and the ice making icon disappears.

NOTES:

- *When in "Sabbath Mode," the icemaker system is deactivated. Sabbath Mode will be explained later.*
- *To allow ice to freeze fully and reduce effects of low water pressure, power to the icemaker system is interrupted for forty-five (45) minutes after each ice harvest. This can be bypassed for service purposes by switching the ice-maker system OFF, then back ON with the ICE MAKER key.*

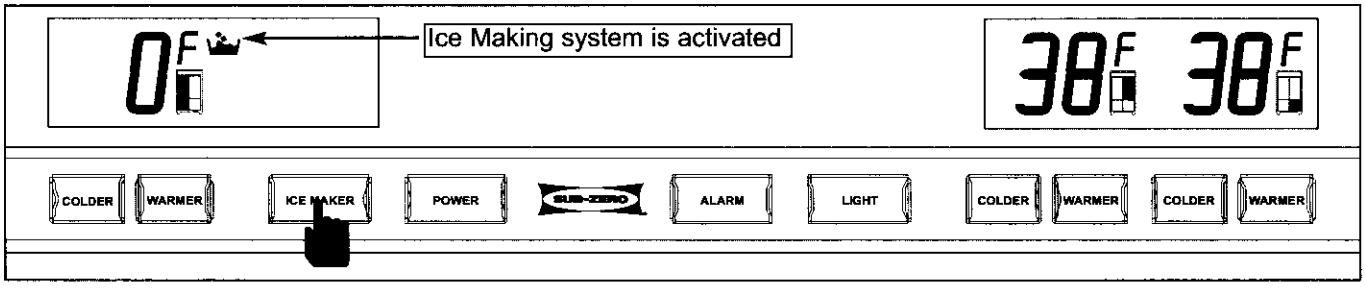


Figure 3-7. Switching Icemaker System ON or OFF - Press ICE MAKER Key

Door Ajar Alarm Feature

All units are equipped with a door ajar alarm feature. To enable the door ajar alarm, press the ALARM key on the control panel (See Figure 3-8). The bell icon appears in both User Displays indicating the alarm is enabled. With the alarm enabled, the bell icon will flash and an audible alarm will beep whenever a door or drawer is left open for more then thirty (30) seconds. To disable the door ajar alarm, press the ALARM key again and the bell icon disappears from the displays.

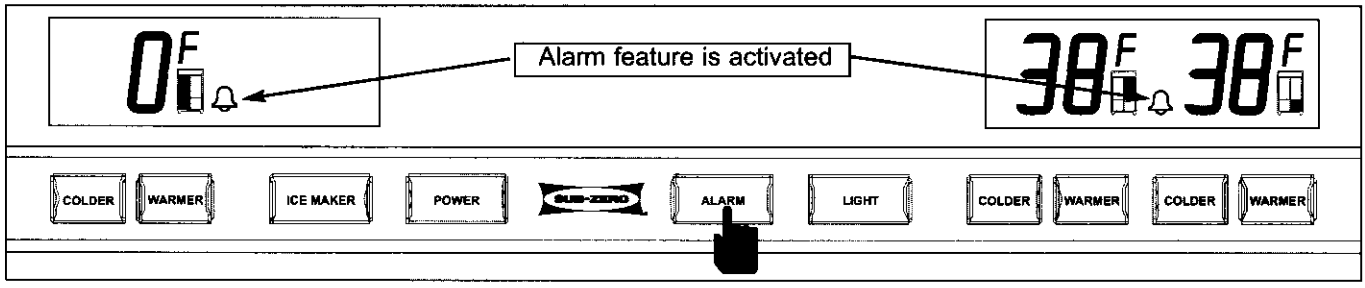


Figure 3-8. Switching Door Ajar Alarm ON or OFF - Press the ALARM Key

Accent Lighting System ON/OFF (Model 648PROG)

Models produced with glass doors possess an accent lighting system, which allows the lights on each side of the upper refrigerator zone to stay ON when the door is closed. To make this happen, press the LIGHT key (See Figure 3-9). To switch back to normal operation, so that the lights on each side of the upper refrigerator zone switch ON and OFF with light switch activation, press the LIGHT key again.

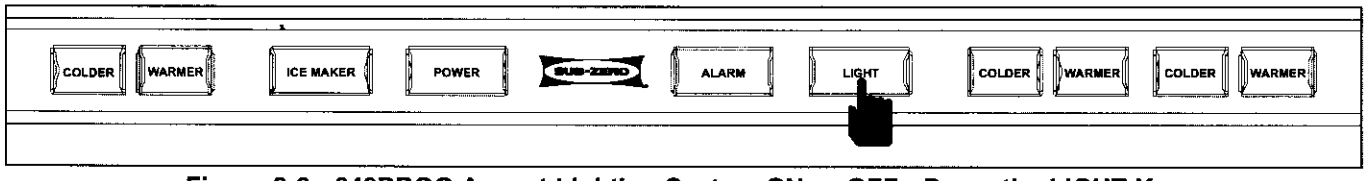


Figure 3-9. 648PROG Accent Lighting System ON or OFF - Press the LIGHT Key

UNIQUE ELECTRONIC CONTROL INPUT OPERATIONS

The following pages illustrate unique customer input operations performed at the control panel. The input operations described are: Temperature Unit Selection Mode, Sabbath Mode, Showroom Mode, Manual Zone Disable Mode and Manual Freezer Evaporator Defrost.

Temperature Units Selection Mode *(Selecting Degrees Fahrenheit or Degrees Celsius Display)*

The appliance is initially set to display temperatures in Fahrenheit temperature units of measure, indicated by the "F" on the User Displays above the appliance icons. This can be changed so Celsius units of measure are displayed by initiating Temperature Units Selection Mode.

NOTE: *Temperature Units Selection Mode must be initiated within the first (1) minute after switching the unit ON.*

To convert Fahrenheit (°F) temperature units of measure to Celsius (°C), press and hold the ALARM key and the POWER key simultaneously for five (5) seconds, then release the keys (See Figure 3-10). A "c" will appear on the User Displays above the appliance icons, indicating that temperatures will now be displayed in Celsius units of measure. Please note that changing from Celsius temperature units of measure to Fahrenheit is the same procedure (See Figure 3-11).

NOTES:

- *Temperature Units Selection Mode will end ten (10) seconds after the last key stroke.*
- *Do not press and hold the POWER key first, that will simply switch the unit OFF.*

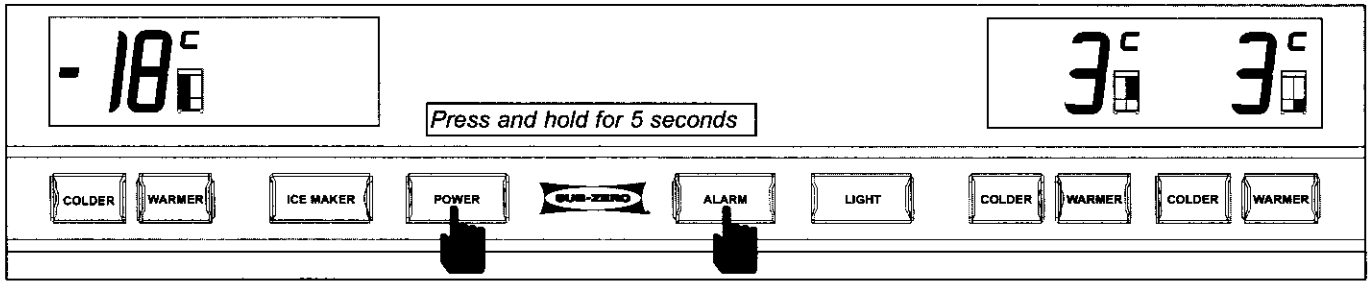


Figure 3-10. Converting Temperature Units of Measure to °C *(within first minute after switching unit ON)* - Press and Hold ALARM Key and POWER Key for five (5) seconds

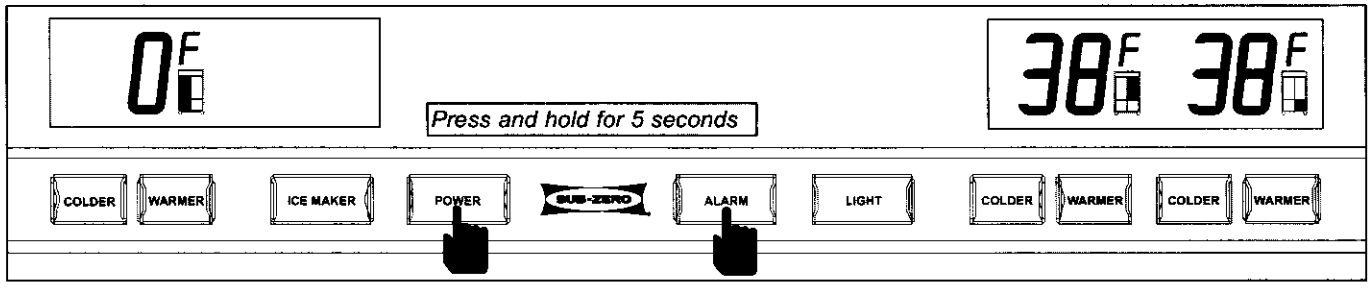


Figure 3-11. Converting Temperature Units of Measure to °F *(within first minute after switching unit ON)* - Press and Hold ALARM Key and POWER Key for five (5) seconds

Showroom Mode

Showroom Mode was incorporated into the electronic control system so that these appliances could be displayed in a showroom setting. When in Showroom Mode, all cooling, defrosting, and ice making functions are disabled, but the lighting system, displays and door ajar alarm are operational.. Set-points will appear on the User Displays, and "Showroom Mode" will appear on the Technician Display.

To initiate Showroom Mode, the unit must first be switched OFF using the POWER key (See Figure 3-12), then press and hold any pair of WARMER and COLDER keys, then the POWER key, then release all three keys (See Figure 3-13). To return the unit to normal operation, repeat the steps above.

NOTES:

- *Always check set-points after returning unit to normal operation.*
- *One unique operation that is possible when in Showroom Mode is to force the "REPLACE FILTER" icon to appear. Do this by pressing and holding the ICE MAKER key for five seconds, but only if the filter is in place. And, to deactivate the "REPLACE FILTER" icon, the filter must be removed, then replaced.*

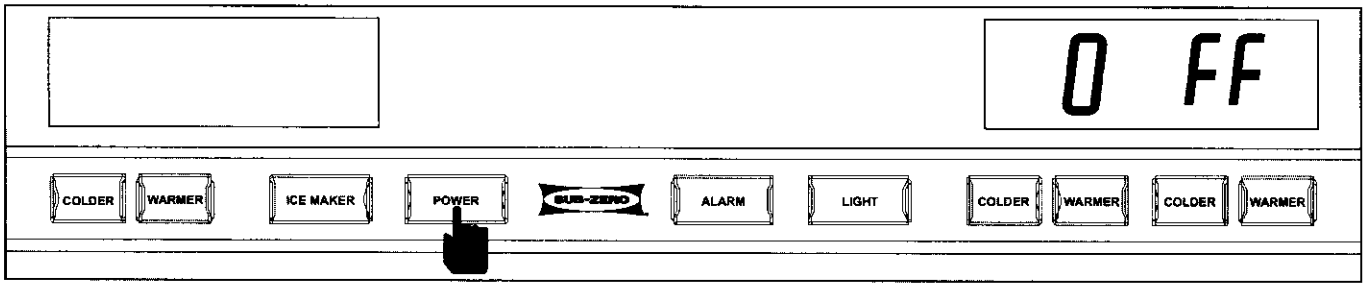


Figure 3-12. To Enter (or Exit) Showroom Mode, Switch Unit OFF First

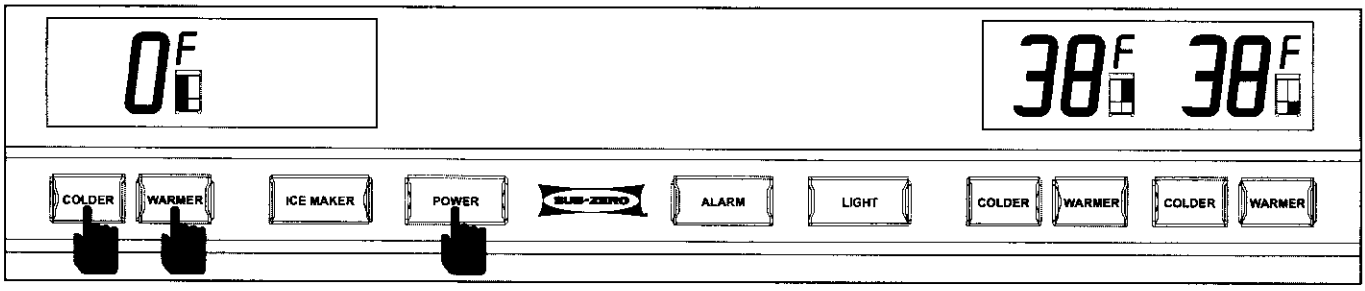


Figure 3-13. Then Press and Hold Any Pair of WARMER and COLDER Keys, Then the POWER Key

Sabbath Mode

Sabbath Mode was incorporated into the electronic control system for the observance of certain religious days. Initiating Sabbath Mode disables the lighting systems, ice making system, alarm system and the User Displays, and "Sabbath Mode" will appear on the Technician Display.

To initiate Sabbath Mode, the unit must first be switched OFF using the POWER key (See Figure 3-14), then press and hold the POWER key until the User Displays and lights switch OFF, the alarm emits a quick series of beeps, and "Sabbath Mode" appears on the Technician Display (See Figure 3-15). This will take approximately ten (10) seconds. To return to normal operation, switch the unit OFF, then back ON.

NOTE: *During Sabbath Mode, set-points cannot be changed and manual defrost cannot be initiated.*

NOTE: *When in Sabbath Mode, the following holds true in accordance with Star-K requirements:*

- Freezer defrosting functions will convert to a fixed time base sequence instead of adaptive defrosting, which is usage based.
- The zone thermistors will still detect high off-set, which is the determining factor to start the cooling process, but there will be a random 15 to 25 second delay before cooling begins.

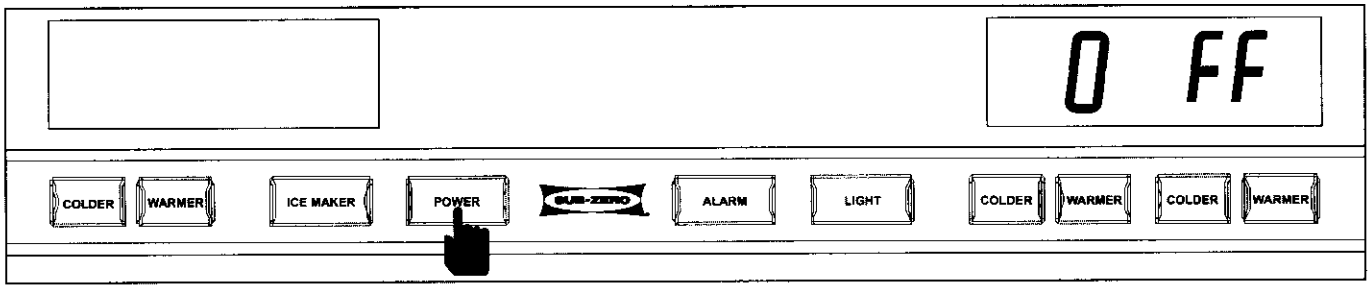


Figure 3-14. To Enter Sabbath Mode, Switch Unit OFF First

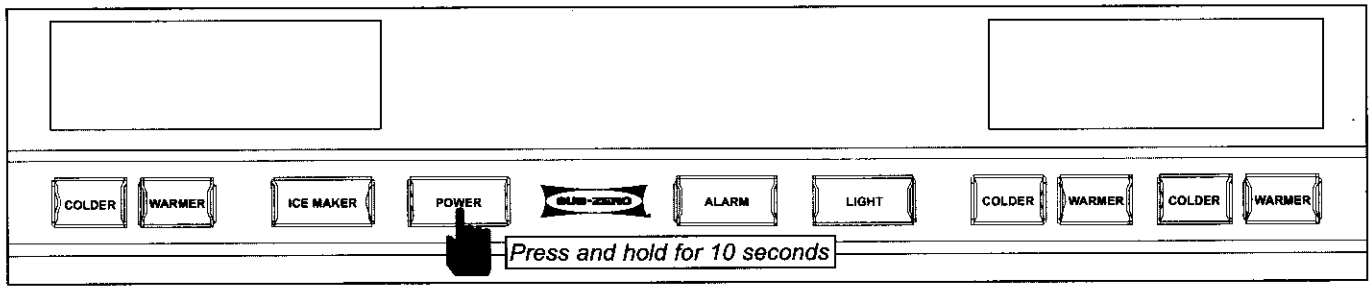


Figure 3-15. Then Press and Hold POWER Key for ten (10) seconds

Manual Zone Disable Mode

Manual Zone Disable Mode allows a customer or Service Technician to switch one zone, or "compartment" OFF for interior cleaning, defrosting, or diagnostic purposes, while allowing the other zones to continue cooling.

To initiate Manual Zone Disable Mode, the unit must be ON. With the unit ON, press and hold the WARMER key for the zone being disabled, then press the POWER key, then release both keys (See Figure 3-16). When a zone is disabled, "- -" (double dashes) will appear on the User Display in place of zone temperatures, indicating all cooling functions for that zone are disabled.

There are two ways to exit Manual Zone Disable Mode and return the unit to normal operation. Repeating the WARMER and POWER key strokes is one way. The other way is to switch the unit OFF, then back ON.

NOTE: *Always check set-points after returning unit to normal operation.*

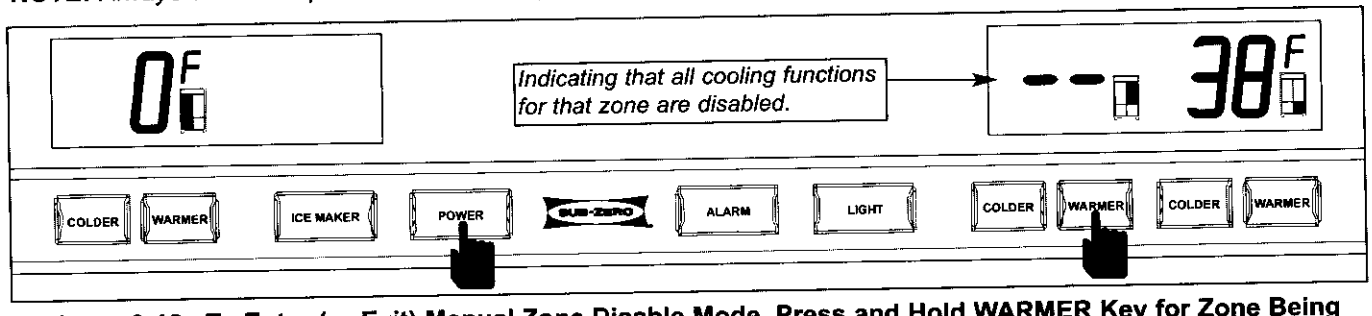


Figure 3-16. To Enter (or Exit) Manual Zone Disable Mode, Press and Hold WARMER Key for Zone Being Disabled, Then Press POWER Key.

Manual Freezer Evaporator Defrost

Manual Freezer Evaporator Defrost was incorporated into the electronic control to assist in servicing and diagnostics.

To initiate manual freezer evaporator defrost, press and hold the ICE MAKER key for five (5) seconds (See Figure 3-17).

NOTE: *Manual Freezer Evaporator Defrost will not operate if unit is in Sabbath Mode.*

NOTE: *The defrost terminator opens at fifty-five (55°F/13°C) degrees and closes at thirty (30°F/-1°C) degrees, so it will not allow power to the defrost heater if the evaporator is above thirty degrees.*

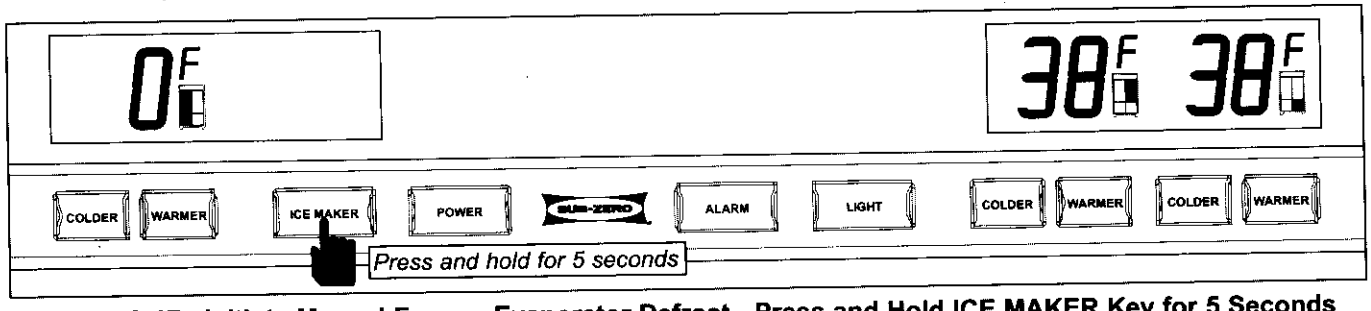


Figure 3-17. Initiate Manual Freezer Evaporator Defrost - Press and Hold ICE MAKER Key for 5 Seconds

FUNCTIONS OF THE ELECTRONIC CONTROL SYSTEM

The following pages explain monitoring, regulating and controlling functions of the electronic control system. Signal traces on a model 648PRO wiring schematic are used to show current flow for functions being explained.

Supply Power to the Lighting System

Power is supplied to the lighting system through the control board when the unit is switched ON by pressing the POWER key. With a door or drawer open, light switches allows power to the lights (See Figure 3-18).

NOTES:

- *Power to the upper refrigerator lights is monitored by the microprocessor to control switching ON and OFF of the accent lights. This information is ignored if the accent lighting system has been switched to 100% ON.*
- *Power to all lights is monitored by the microprocessor to control the door ajar alarm feature.*
- *If in Sabbath Mode, the lighting system is disabled. Sabbath Mode will be covered later.*

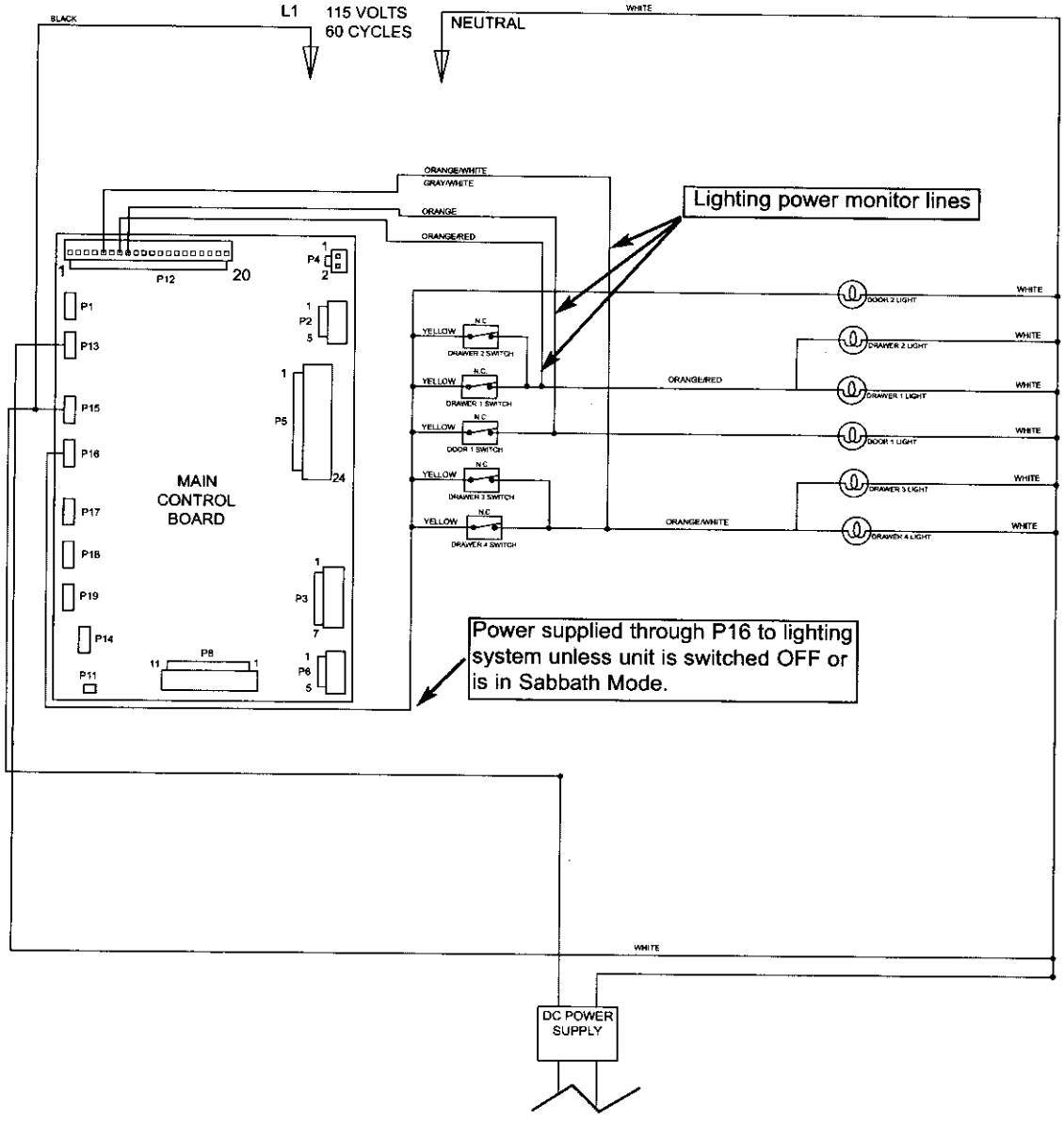


Figure 3-18. Signal Trace Schematic of Lighting System

Monitor, Display and Regulate Zone Temperatures

Temperature signals from thermistors in each zone are monitored and displayed on the User Displays. When a zone temperature reaches high offset (calling for cooling), the compressor and evaporator fan are switched ON, and if a refrigerator zone, the refrigerant valve is switched to the appropriate side. (See Figure 3-19). When a zone reaches low offset (cut-out) temperature, the compressor and evaporator fan are switched OFF. Though zone air temperature fluctuates from off and on cycles, the "average" temperature is displayed.

NOTES:

- *Freezer zone temperature range is: -5°F (-21°C) to +5°F (-15°C); Refrigerator zone temperature range is: +34°F (+1°C) to +45°F (+7°C).*
- *If average zone temperature changes, the display will change by only one degree per minute.*
- *If a freezer zone thermistor is faulty, the compressor defaults to 20 minutes on, 20 minutes OFF cycling, the evaporator fan will cycle with the compressor at medium fan speed, EE appears in appropriate User Display, SERVICE flashes and the Error Code is logged.*
- *If a freezer evaporator thermistor is faulty, the freezer compressor and evaporator fan will not energize until zone air temperature exceeds high offset by 5°F (3°C). SERVICE flashes and the Error Code is logged.*
- *If a refrigerator zone thermistor is faulty, the compressor defaults to 10 minutes ON, 10 minutes OFF cycling, the evaporator fan will cycle with the compressor and/or the refrigerant valve at medium fan speed, EE appears in appropriate area of User Display, SERVICE flashes and the Error Code is logged.*
- *If a refrigerator evaporator thermistor is faulty, the refrigerator compressor and evaporator fan will not energize and/or the refrigerant valve will not switch sides until zone air temperature exceeds high offset by 5°F (3°C). SERVICE flashes and the Error Code is logged.*
- *If in Sabbath Mode, the zone thermistors still control compressor operation, except that when high offset is reached, there is a random 15 to 25 second delay before a compressors is energized.*

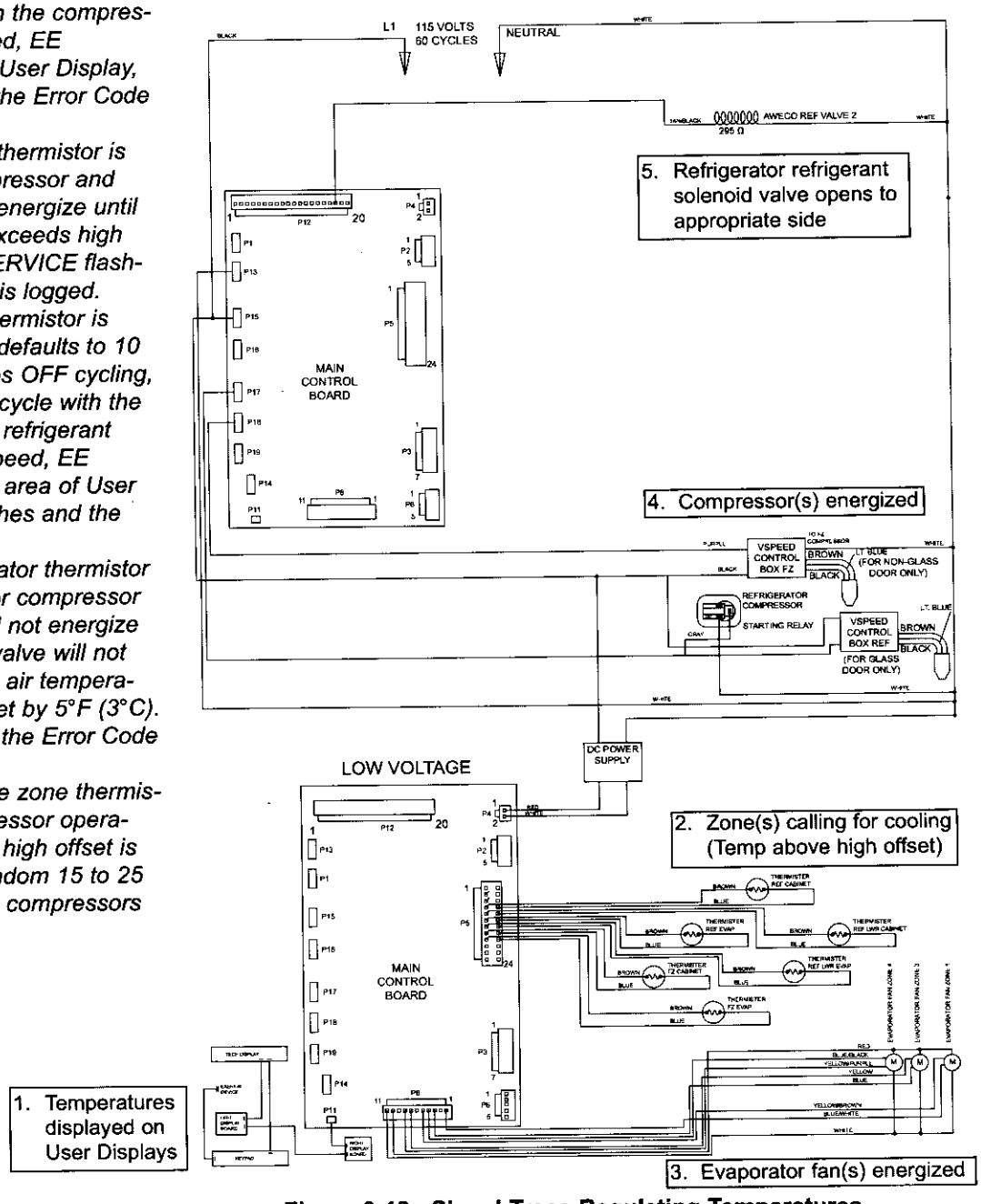


Figure 3-19. Signal Trace Regulating Temperatures

Assist in Control of Variable Speed Compressors

As mentioned on the previous page, temperature signals from the thermistors in the zones/compartments are monitored by the microprocessor and then displayed on the User displays.

When a zone reaches high-offset (calling for cooling), a start command is sent to the inverter, which is supplied with AC power at all times. The inverter then provide high DC voltage (3-phase, 50 - 150 Hz), outputs to the compressor. The inverter in turn senses the compressor load. If the the compressor load is high, the speed command from the inverter will be for high speed compressor operation; if medium compressor load, speed command from the inverter will be for medium speed; if low compressor load, speed command from the inverter will be for low speed. If/when a zone reaches low-offset, a stop command signal is sent to the inverter, which then cuts DC power to the compressor.

NOTE:

- *Variable speed compressors, evaporator fans and the condenser fan will run a great majority of the time. This is normal. These components will only cycle off during defrost and may also cycle off for short periods of time if the ambient temperature is low enough.*
- *Initial speed command from an inverter to a compressor are always for High speed.*
- *The refrigerator compressor will not be variable speed on solid door units.*
- *The refrigerator service replacement compressor is non-variable speed, regardless of the unit configuration (glass door or solid door).*

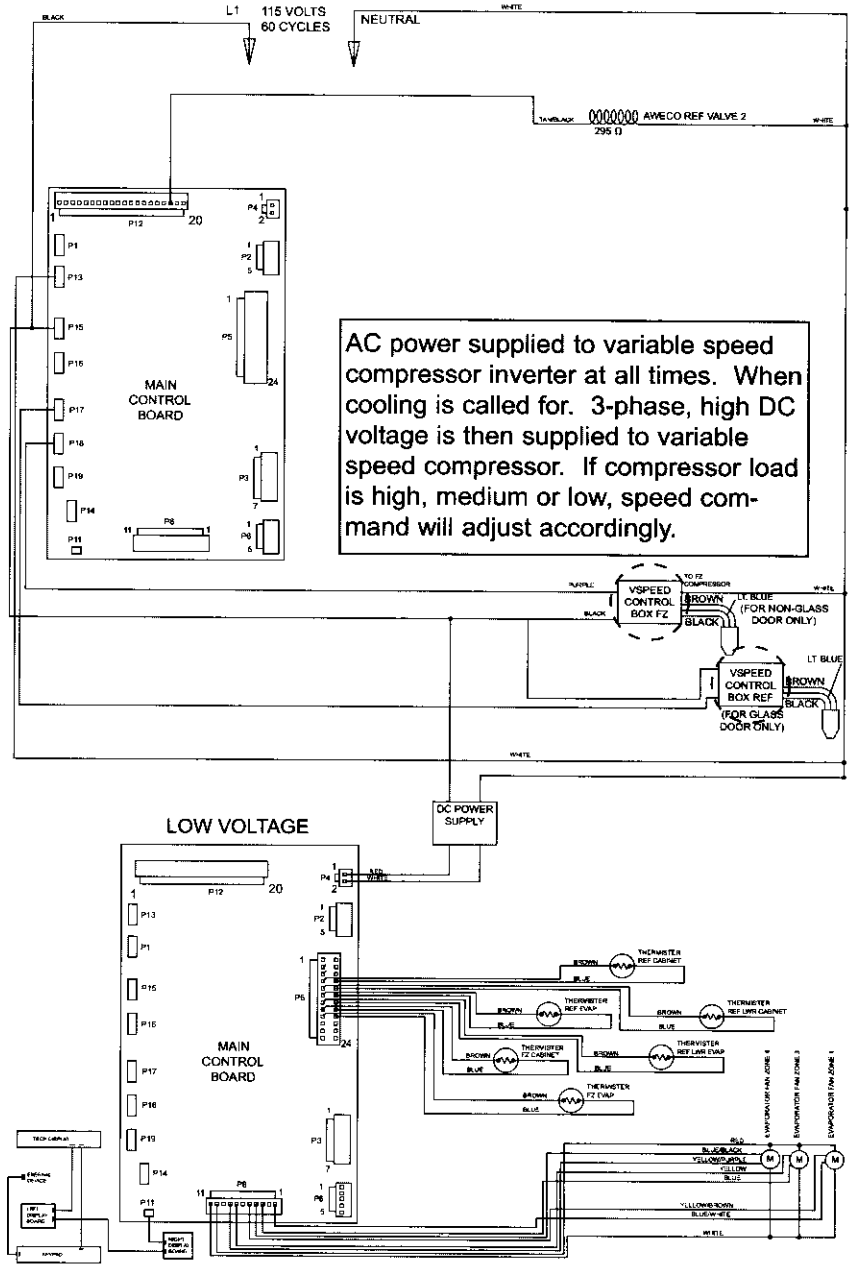


Figure 3-20. Signal Trace Variable Speed Compressor Control

Control Refrigerator Dual Refrigerant Solenoid Valve

The electronic control senses refrigerator zone temperatures via thermistors, one in each of two refrigerator zones (Zones 3 and 4). If either zone reaches high-offset (calling for cooling), then two parallel circuits on the control board (1 relay per circuit, with 1 common triac) are used to control the dual refrigerant valve. Depending on which zone is calling for cooling, its corresponding relay supplies power to the triac, a positive (+) polarity, or a negative (-) polarity pulse signal (500ms / 30 pulses per 1/2 second) is delivered to the dual refrigerant valve, forcing the bead inside the valves T-connection to one side or the other. If the pulse signal is positive (+), the upper evaporator is supplied with refrigerant; If the pulse signal is negative (-), the lower evaporator is supplied with refrigerant. (See Figure 3-21).

NOTES:

- *On initial pull-down, the refrigerant valve will receive a (+) pulse signal, then switch back and forth between (+) and (-) on thirty (30) minute intervals until a zone achieves set-point.*
- *If neither compartment is calling for cooling, the compressor and evaporator fans are switched off.*
- *Refrigerator evaporator fans cycle with the refrigerant valve.*

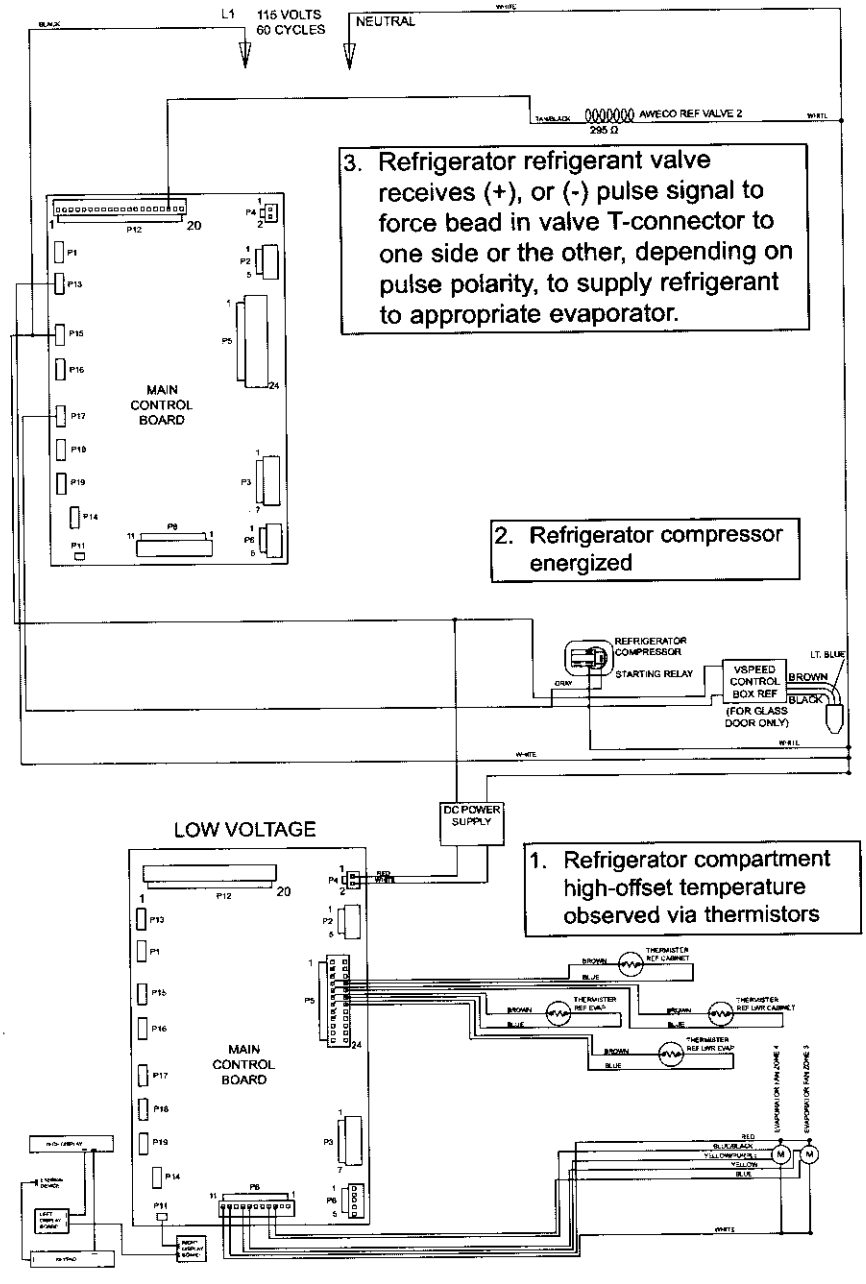


Figure 3-21. Signal Trace Refrigerant Valve Activation

Control Condenser Fan Operation

The microprocessor observes the condenser outlet temperatures of both systems. If either compressor is running and a condenser outlet temperature is>= 90°F (32°C), a signal is sent to the condenser fan relay on the control board to close, supplying power to the condenser fan (See Figure 3-22). If both compressors are off, the condenser fan will be off.

NOTES:

- *If both* condenser outlet temperatures are < 90°F (32°C), no power is supplied to the condenser fan motor, regardless of compressor operational state.
- *Currently, the condenser fan operates at 1350 RPM, whenever it is energized. In the near future, the condenser fan will operate at a variable speed as follows:*
  1. *Compressor running and condenser outlet temperature >= 90°F (32°C), condenser fan speed will be Low = 1100 RPM.*
  2. *Compressor running and condenser outlet temperature >= 95°F (35°C), condenser fan speed will be High = 1350 RPM.*
- *If a condenser outlet thermistor is defective, the condenser fan will run at high speed whenever a compressor is energized.*

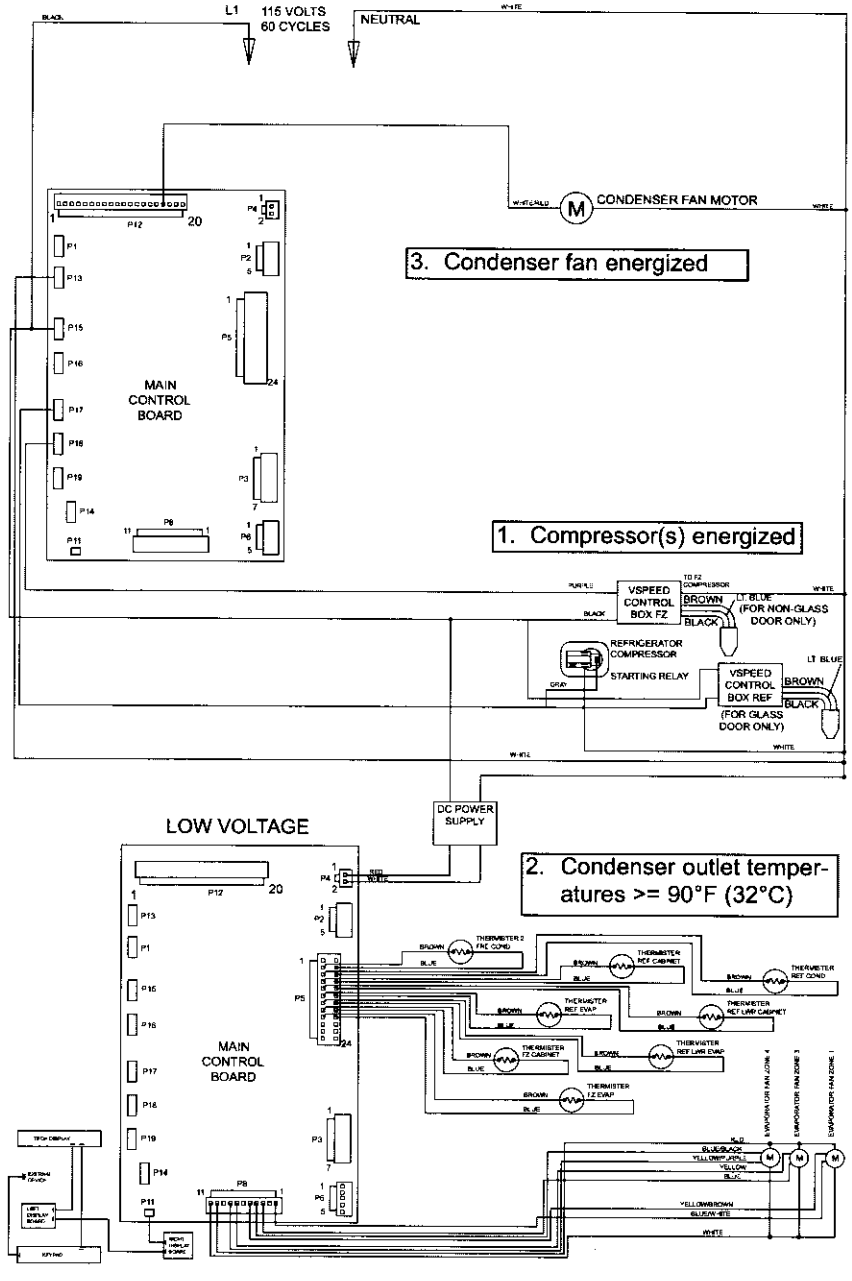


Figure 3-22. Signal Trace Schematic of Condenser Fan Operation

Minimize Condensation on Refrigerator Door Glass

On units produced with glass doors, the microprocessor detects when the refrigerator door is opened, via the light switch, so when the door closes, the evaporator fan is energized for five (5) minutes, regardless of compressor operational status. This draws any warmer moist air away from the door glass. (See Figure 3-23). To further assist in minimizing condensation on the glass, the door is equipped with a braided wire heater around the glass perimeter.

NOTES:

- *Refrigerator evaporator fans also cycle with the refrigerant valve.*
- This door heater on glass door models is powered off of the condenser fan circuit relay.

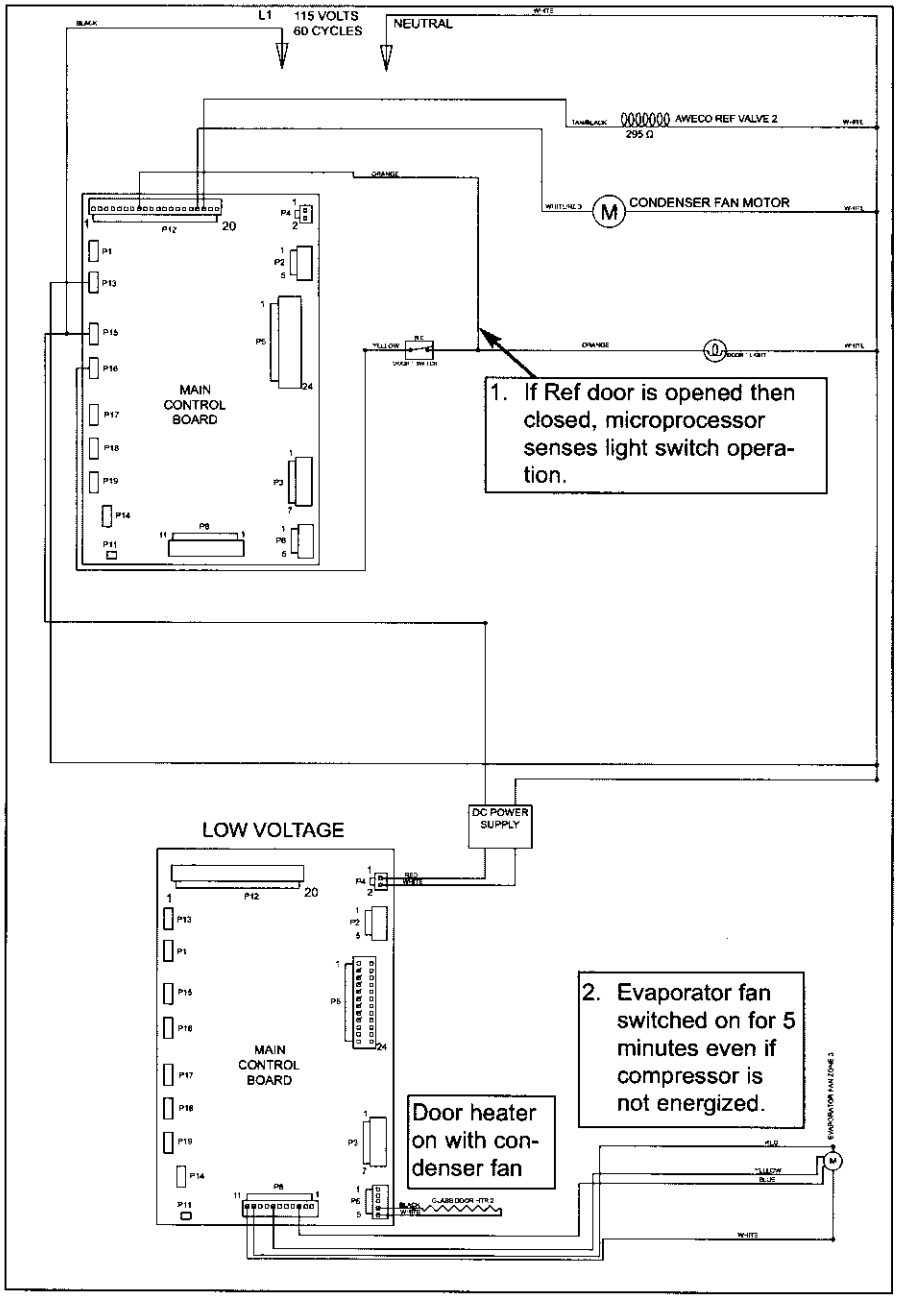


Figure 3-23. Signal Trace Schematic of Refrigerator Evaporator Fan Operation & Door Heater

Monitor and Control Refrigerator Fan-Assisted, Off-Cycle Defrost

Temperature signals from refrigerator evaporator's thermistor's are observed by the microprocessor. During off cycle defrost, if a refrigerator zone temperature reaches high offset (calling for cooling) before evaporator temperature rises to 38°F (3°C), no power will be supplied the the compressor, and/or no (+) or (-) pulse signal will be supplied to the refrigerant valve. But, the the zone evaporator fan will switch ON at low speed. Once the evaporator temperature reaches 38°F (3°C), normal cooling functions begin. (See Figure 3-24).

NOTES:

- *If a refrigerator zone thermistor is faulty, the refrigerator compressor defaults to 10 minutes ON, 10 minutes OFF cycling, the evaporator fan will cycle with the compressor at medium fan speed, EE appears in appropriate area of User Display, SERVICE flashes and the Error Code is logged.*
- *If a refrigerator evaporator thermistor is faulty, the refrigerator compressor will not energize and/or the refrigerant valve will not switch sides until zone air temperature exceeds high offset by 5°F (3°C). SERVICE flashes and the Error Code is logged.*

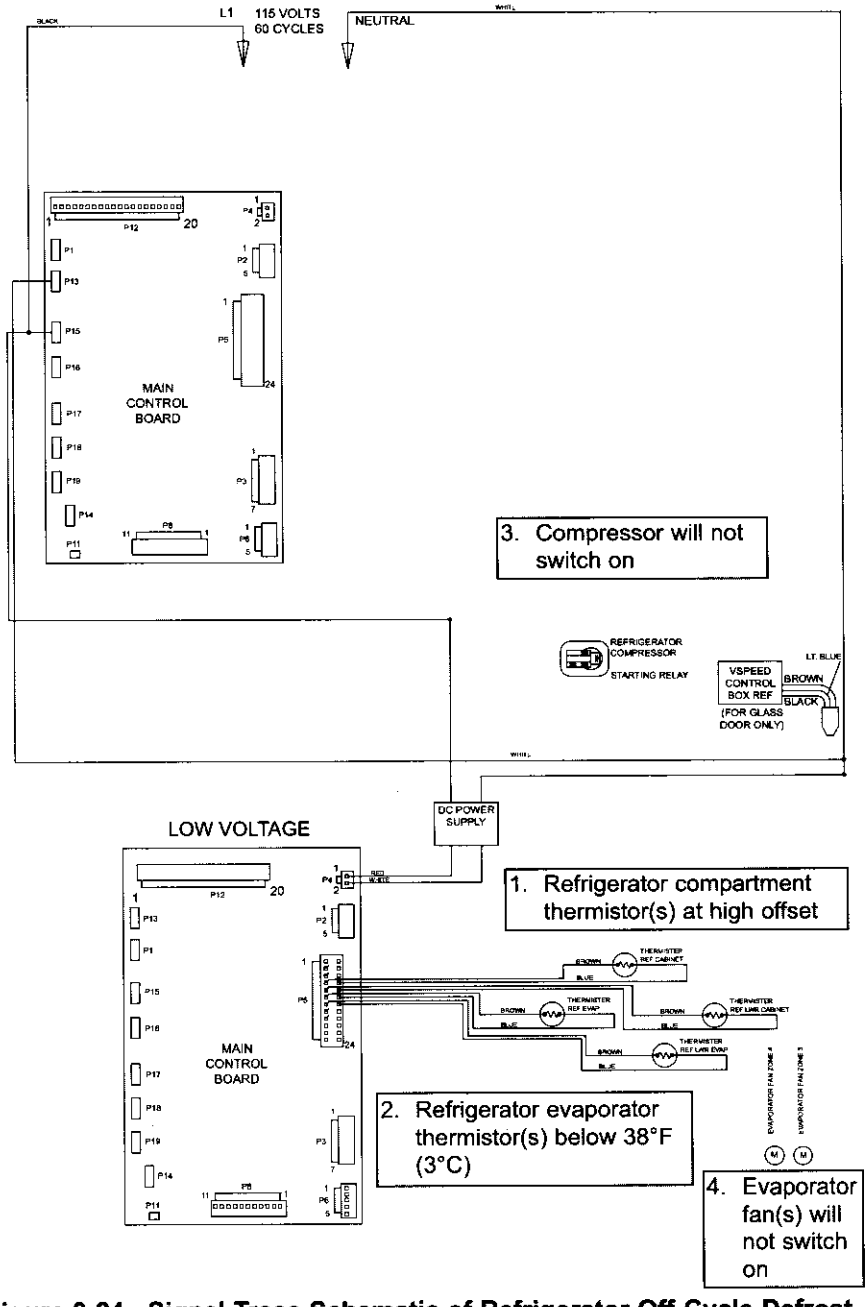


Figure 3-24. Signal Trace Schematic of Refrigerator Off-Cycle Defrost

Monitor and Control "Adaptive Defrost" of Freezer Evaporator

Initially, the freezer compressor cycle-runs 12 hours. The control board defrost relay is then closed, supplying power to the defrost and drain trough heaters. The compressor and evaporator fan are switched OFF.

With "Adaptive Defrost", the length of time the defrost heater stays on to open the defrost terminator bimetal (55°F/13°C), is observed by the microprocessor via the grey w/white stripe wire to P12-9. This length of time is used to calculate the number of hours before the next defrost (defrost interval). If the heater then stays on for a shorter time period, the microprocessor increases the next defrost interval. If the heater stays on for a longer time period, the microprocessor decreases the defrost interval. (See Figure 3-25) This is an ongoing process whereby the defrost time and the defrost interval will vary by unit use.

NOTES:

- *A five (5) minute time delay/dwell follows all defrosts, during which the drain trough and fill tube heaters remain energized. At the end of the dwell, the compressor and evaporator fan are energized, and the drain trough heater switches OFF.*
- *If the freezer is at high offset (calling for cooling) after the five (5) minute time delay/dwell, the compressor will switch ON, but the evaporator fan will remain OFF until the evaporator has fallen below 20°F (-7°C).*
- *Minimum defrost interval = 6 hours of compressor run time; Maximum defrost interval = 80 hours of compressor run time; Maximum defrost duration = 30 minutes, plus 5 minute dwell.*
- *If the defrost sensing line is open, defrost operation defaults to 30 minute defrost time / 6 hour build time, and an Error Code is logged. If the evaporator thermistor detects an under-heat or overheat situation at the same time, another Error Codes is logged.*
- *During defrost, the displayed temperature is locked.*

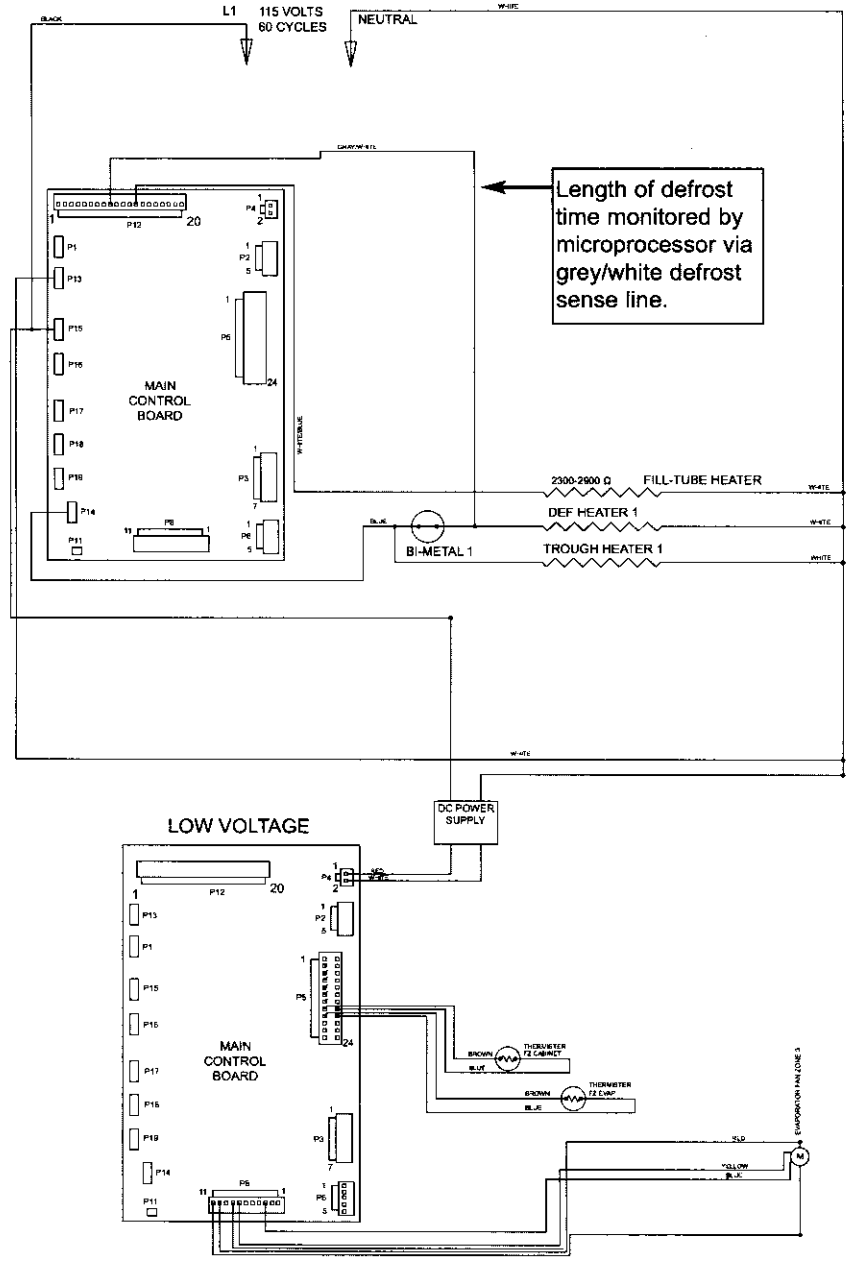


Figure 3-25. Signal Trace Schematic of Freezer Adaptive Defrost

Monitor Compressor Run Duration, Displays If Service is Needed

The microprocessor observes the changing state of the compressor relays to determine the length of compressor run time (See Figure 3-26). If a compressor runs 100% (Fre = 6 hours / Ref = 4 hours), an error code is logged, and defrost is initiated, but SERVICE will not flash.

If several 100% run periods occur, and the compartment temperature does not fall to at least the set point / low off-set temperature average (and the door is not opened during the last run period), then SERVICE alone will flash (See Figure 3-27).

NOTE: *To clear a flashing SERVICE, the problem must be corrected, the Error Code must be cleared from memory while in Service Mode, and the unit must be switched OFF, then back ON.*

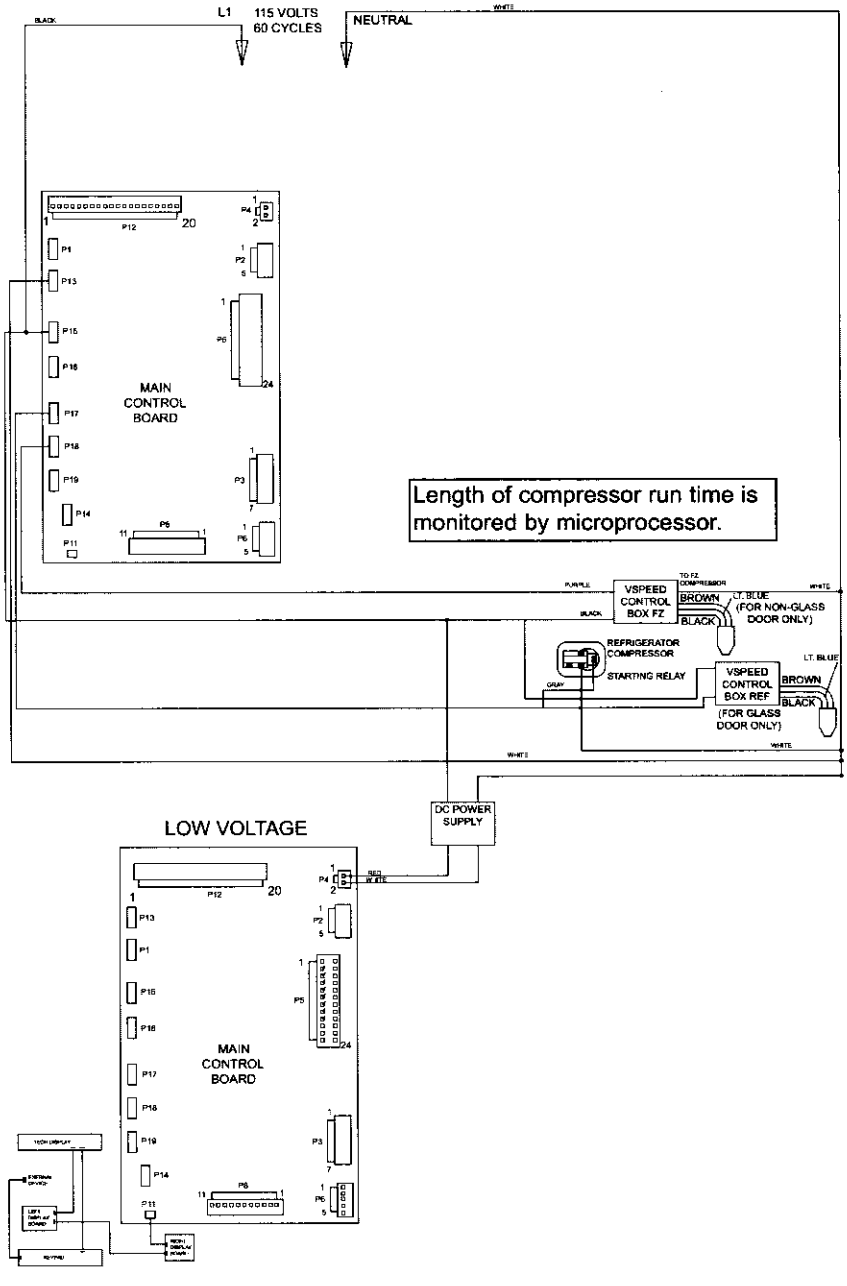


Figure 3-26. Signal Trace Schematic of Compressor Electrical System

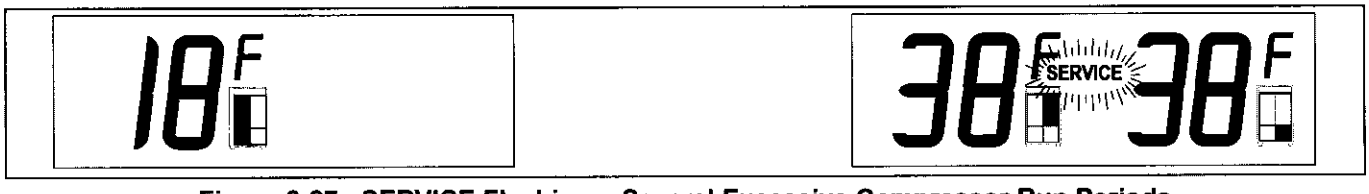


Figure 3-27. SERVICE Flashing = Several Excessive Compressor Run Periods

Monitor Icemaker System and Display If Service is Needed

The microprocessor observes the voltage supplied to the icemaker water valve solenoid. If the solenoid is energized for more than fifteen (15) seconds, power to the icemaker system is disabled for 12 hours (See Figure 3-28), and an error code is logged. If this happens five consecutive times, ice making icons in both User Displays and the SERVICE icon in the right User Display will flash, indicating the ice making system is now disabled (See Figure 3-29).

NOTES:

- *To clear this error indicator from the User Displays and reactivate the ice making system, the problem must be corrected, the Error Code must be cleared from memory while in Service Mode, and the unit must be switched OFF, then back ON.*
- *To allow ice to freeze fully and reduce effects of low water pressure, power to the ice making system is interrupted for forty-five (45) minutes after each ice harvest. This can be bypassed for service diagnostic purposes by switching the icemaker system OFF, then back ON using the ICE MAKER key.*
- *When in Sabbath Mode, the ice making system is disabled. Sabbath Mode will be covered later.*

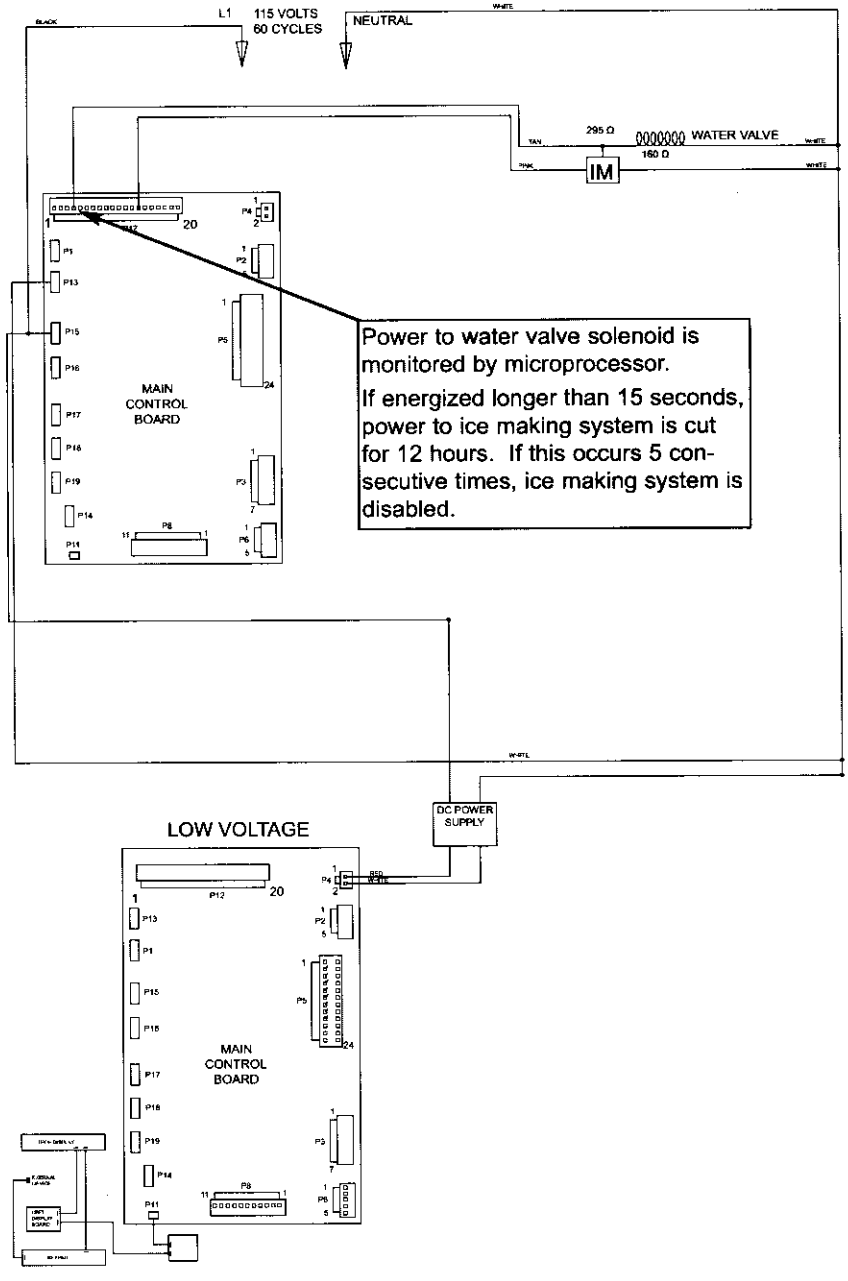


Figure 3-28. Signal Trace Schematic of Icemaker Electrical System

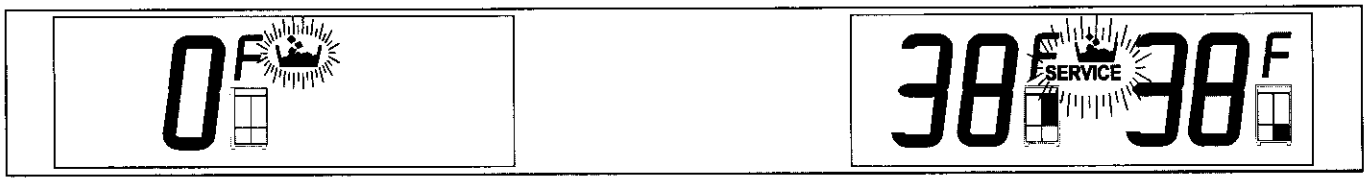


Figure 3-29. ICE & SERVICE Flashing = Solenoid Energized 15 sec., every 12 hrs., 5 Consecutive Times

Monitor Water Filter Time in Use and Display When it's Time to Replace it

The microprocessor observes the switch behind the water filter. When the filter is installed, the switch behind the filter is depressed/closed, telling the microprocessor to start the filter timer countdown (see Figure 30). After approximately one (1) year of use, the REPLACE FILTER icon on the left User Display will appear (See Figure 3-31). Removing the filter will will open the switch and replacing the filter with a new one will re-close the switch. When this is done, the REPLACE FILTER icon will disappear and the countdown will start over.

NOTES:

- If removing the filter for service purposes, it is possible to avoid restarting the filter timer by depressing the filter switch five (5) times within five (5) seconds before replacing the filter. If this is done, the timer will resume counting from when the filter was removed.
- *One unique operation that is possible when in Showroom Mode is to force the "REPLACE FILTER" icon to appear. Do this by pressing and holding the ICE MAKER key for five seconds, but only if the filter is in place. And, to deactivate the "REPLACE FILTER" icon, the filter must be removed, then replaced.*

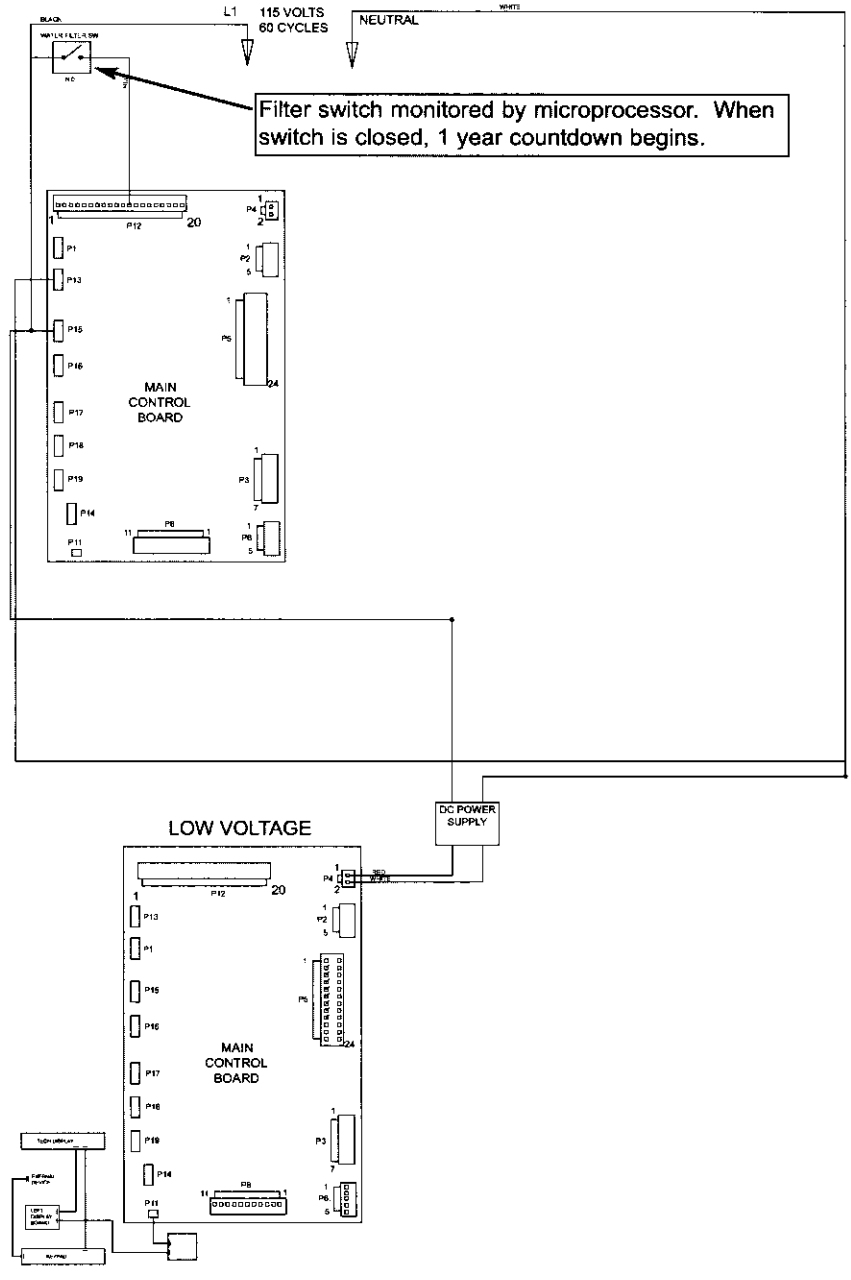


Figure 3-30. Signal Trace Schematic of Icemaker Electrical System

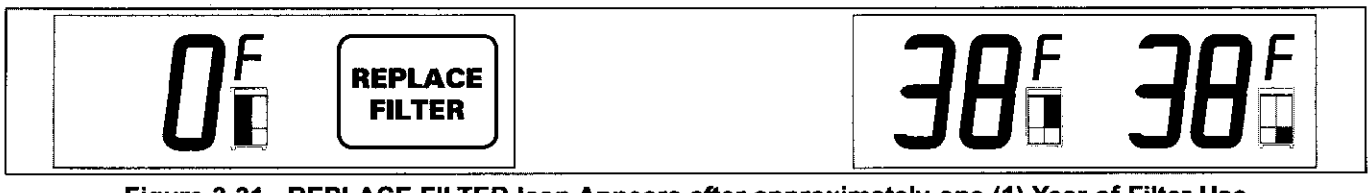


Figure 3-31. REPLACE FILTER Icon Appears after approximately one (1) Year of Filter Use

Self Diagnostics of the Electronic Control System

The electronic control system automatically runs through self diagnostics at predetermined time intervals and in the event of an excessive run condition. During this self test, the control cycles the loads and checks the inputs for failures. The following components are energized for a few seconds during the self diagnostic program:

- Thermistors
- Glass Door Heater
- Evaporator Fans
- RS485 Transceiver
- Aweco (Refrigerant) Valve
- Condenser Fan
- Accent Lights
- Power Relays and trials
- Digital AC Inputs

If there is a problem with the electronic control system or an electrical component, the appropriate Error Code will be logged. If the problem causes the inability of the appliance to maintain temperature, SERVICE will flash on the right User Display (See Figure 3-33).

NOTES:

- *It is possible to force the appliance to run self diagnostics when in Service mode. Service Mode is explained later in this section.*
- *A Service Technician should always initiate Service Mode and view Error Code History when the SERVICE icon is flashing. Service Mode is explained later in this section.*

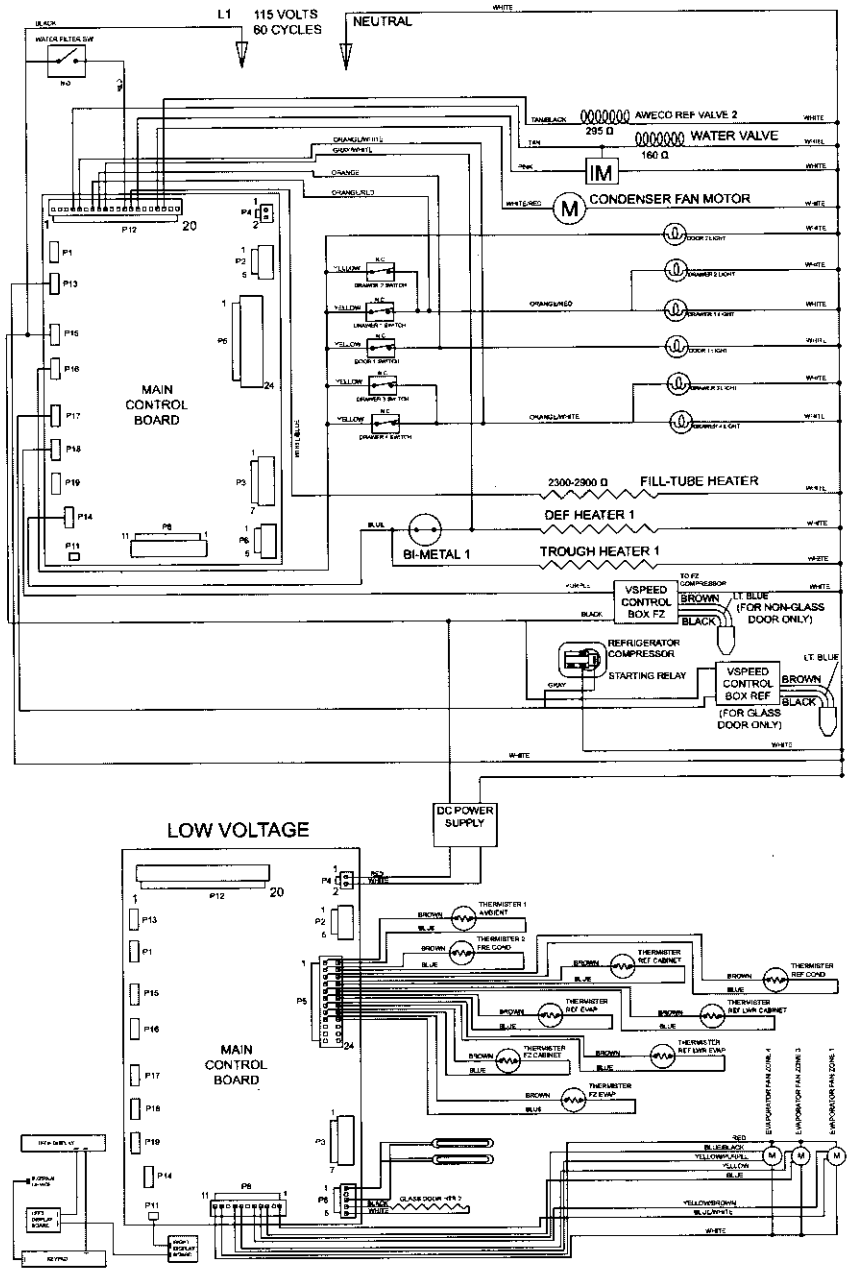


Figure 3-32. Signal Trace Schematic E-Control System Components

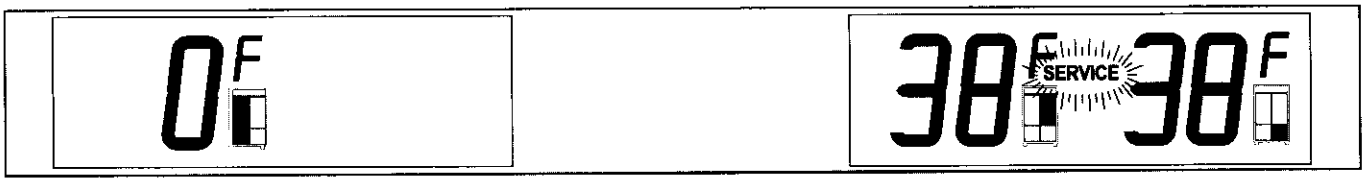


Figure 3-33. "SERVICE" Flashing = Multiple Possibilities; See Error Code History

POSSIBLE ERROR INDICATORS

This page contain diagrams illustrating what a customer may see on the User Displays, alerting them that there is a problem with the appliance.

NOTE: *A Service Technician should always initiate Service Mode and view Error Code History when error indicators are observed.*

NOTE: *For thermistor errors described below, thermistors can be tested by submersing them in a glass of ice water for two (2) to five (5) minutes, and checked for 30,000 to 33,000 ohms.*

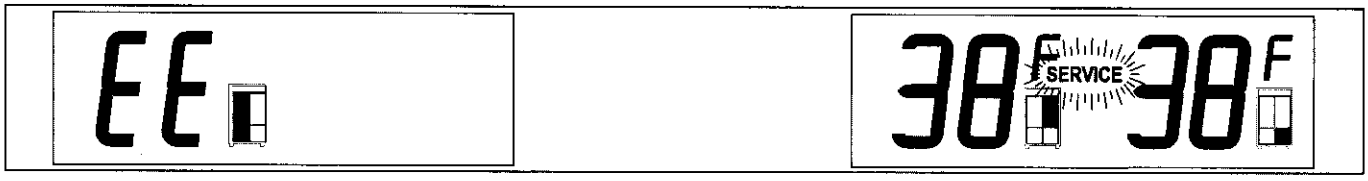


Figure 3-34. "EE" in Left User Display, SERVICE Flashing in Right = Freezer Zone Thermistor Fault

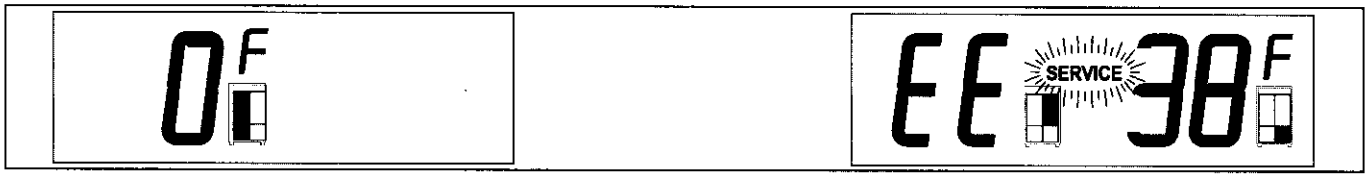


Figure 3-35. "EE" at Left of Right User Display & "SERVICE" Flashing = Upper Ref. Zone Thermistor Fault

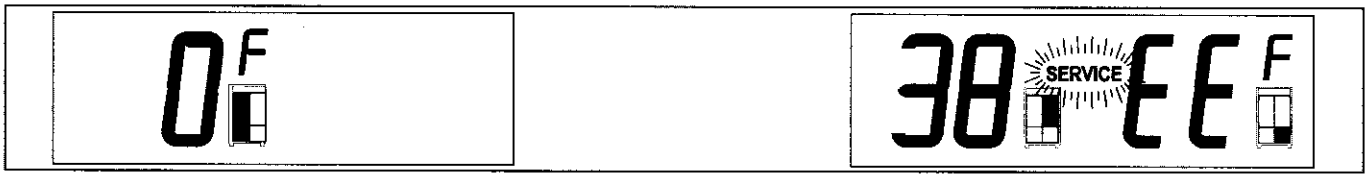


Fig. 3-36. "EE" at Right of Right User Display & "SERVICE" Flashing = Lower Ref. Zone Thermistor Fault

Fig. 3-37. Ice Making Icon & "SERVICE" Flashing = Water Valve Powered 15 Sec.; Icemaker System Disabled

Figure 3-38. "SERVICE" alone Flashing = Multiple Possibilities; See Error Code History

Figure 3-39. " - - " Double Dashes Displayed = Zone Manually Disabled

SERVICE MODE (Troubleshooting Input Operations)

The service features in this electronic control system allow the technician to perform a series of key strokes at the control panel in order to verify, configure, query and troubleshoot the appliance and its electronic control system. These service features are activated while in the four sub-modes of the Service Mode.

The four sub-modes of the Service Mode are:
1) Diagnostics Mode
2) Operational Status Mode
3) Model Information Mode
4) Version Information Mode.

The technicians display, located behind the top grille assembly, utilizes a two (2) line X sixteen (16) character LCD. While in Service Mode, this display will indicate which sub-mode is active, the data being searched for, and what other data can be accessed. When not in the Service mode, the Technician's display will indicate system information as defined for each particular operational mode.

Basic instructions for working through the Service Mode menu can be found on the Technician's Display cover (See Figure 3-40). These basic instructions (the Key Symbol and Arrows), correspond with keys on the control panel, thus directing the technician as to what keys need be pressed in order to move in the direction indicated by the arrow closest to each key symbol.

NOTES:

- *A complete Service Mode Menu can be found on the back of the wiring diagram and on the next page of this manual.*
- *Since it is possible to initiate, bypass, an/or step back through the four different sub-modes while in Service Mode, initiating Service Mode will always be the first step when explaining how to work through the Service Mode menu for the sub-modes.*

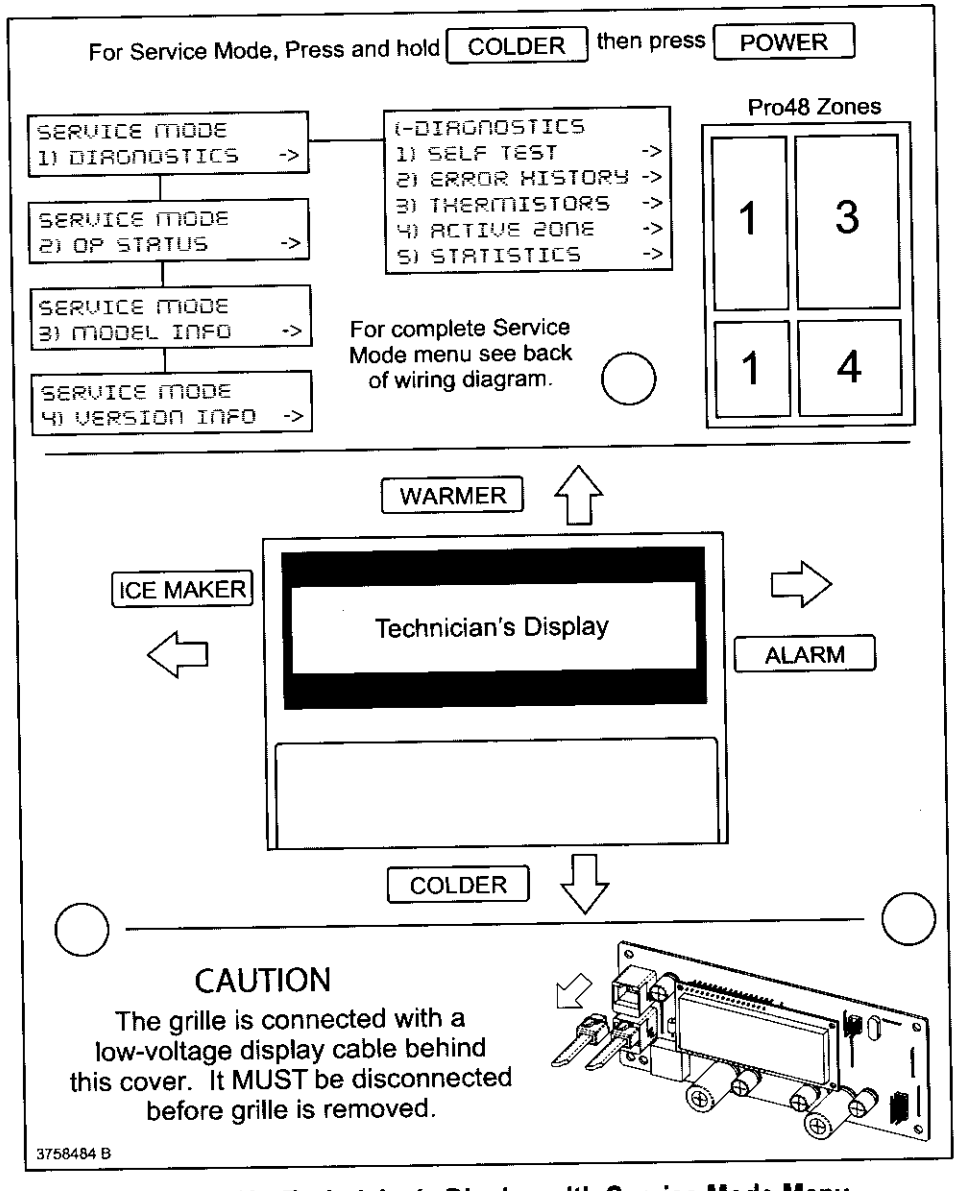
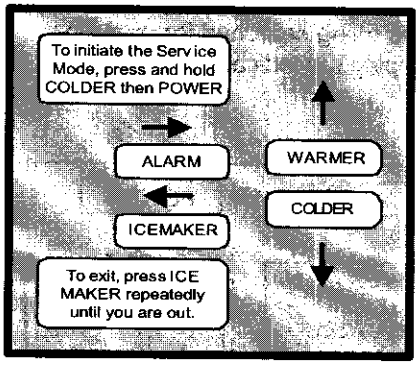
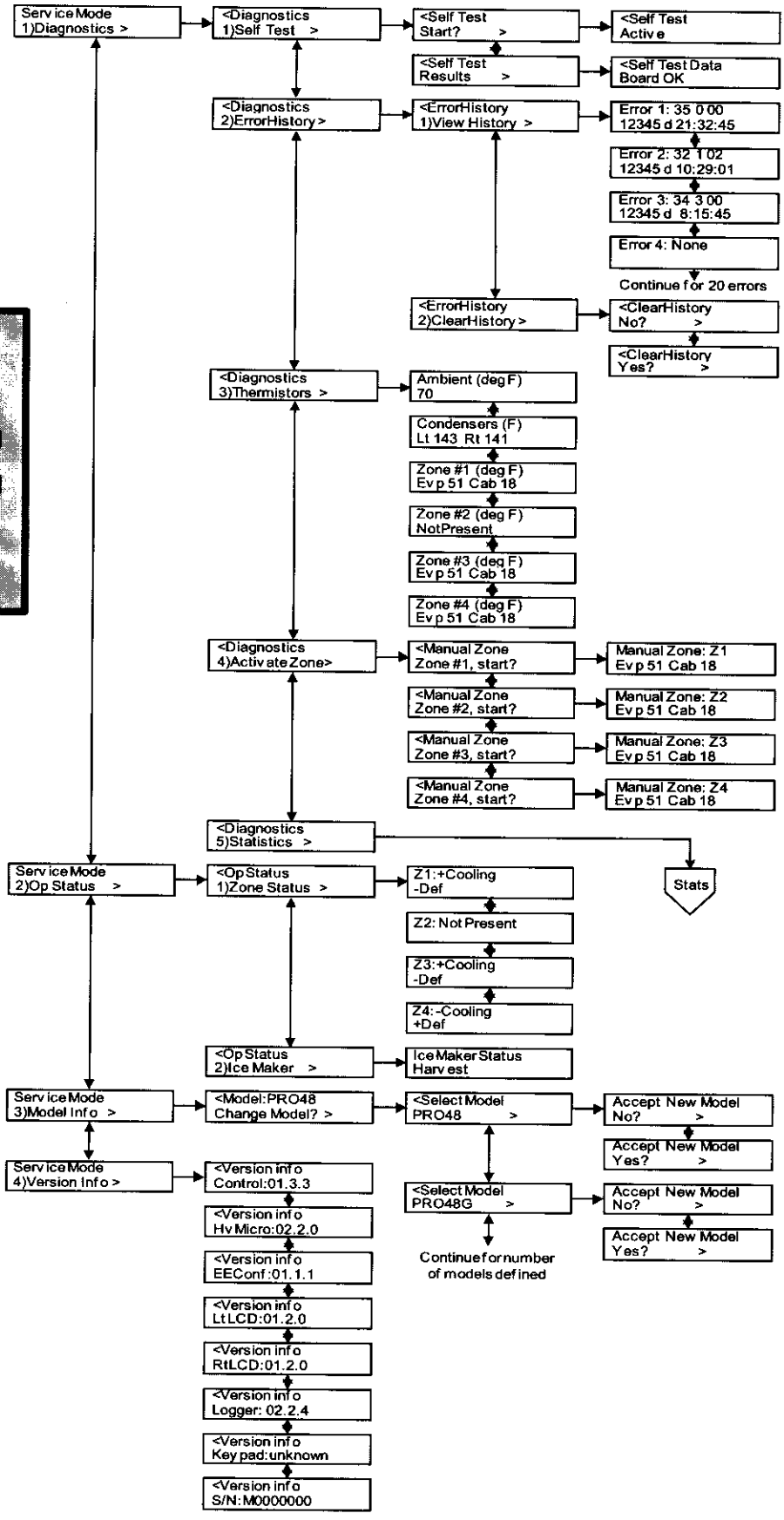


Figure 3-40. Technician's Display with Service Mode Menu

Service Mode Menu





Non-Service Mode Display Information

Prior to initiating Service Mode, the following information will appear on the Technician's Display, depending on operational mode.

Operational Mode	LCD Line #1	LCD Line #2
Power Up	Scrolling Messages (every 2s) 1) Model ID # 2) Main Software Version # 3) Left Display Version # 4) Keyboard Version #	Scrolling Messages (every 2s) 1) Unit ID # 2) E2 Version # 3) Right Display Version # 4) Tech Display Version #
Off		
Showroom	Sub Zero	Showroom mode
Sabbath	Sub Zero	Sabbath mode
Normal	Scrolling Messages (every 2s) 1) Model Name 2) Zone #1 Status 3) Zone #2 Status 4) Zone #3 Status 5) Zone #4 Status	Scrolling Messages (every 2s) 1) S/N: XXXXX 2) Status 3) Status 4) Status 5) Status

Initiating Service Mode

To initiate Service Mode, press and hold any COLDER key, then press the POWER key, then release both keys (See Figure 3-41). "Service Mode, 1) Diagnostics" is the first sub-mode to appear in the Technician's Display, with a small arrow in the bottom right corner pointing right.

NOTES:

- *By following the basic directions on the Technicians Display cover and the prompts that appear in the Technician's Display, a Service Technician will be able to work through the Service Mode menu, to the desired verification point, configuration portion, and troubleshooting section of the menu.*
- *For sake of space, the directions that follow will not explain or show what is seen in the display after each key stroke. Only the final, and/or desired result will be explained and illustrated.*
- There are three (3) ways to exit Service Mode:
  1. To exit the Service Mode at any time, press the ICE MAKER key repeatedly until completely out of Service Mode menu.
  2. Pressing the POWER key will switch the unit OFF and exit Service Mode.
  3. If no keys are pressed for five (5) minutes after initiating Service Mode, the electronic control will automatically exit the mode.

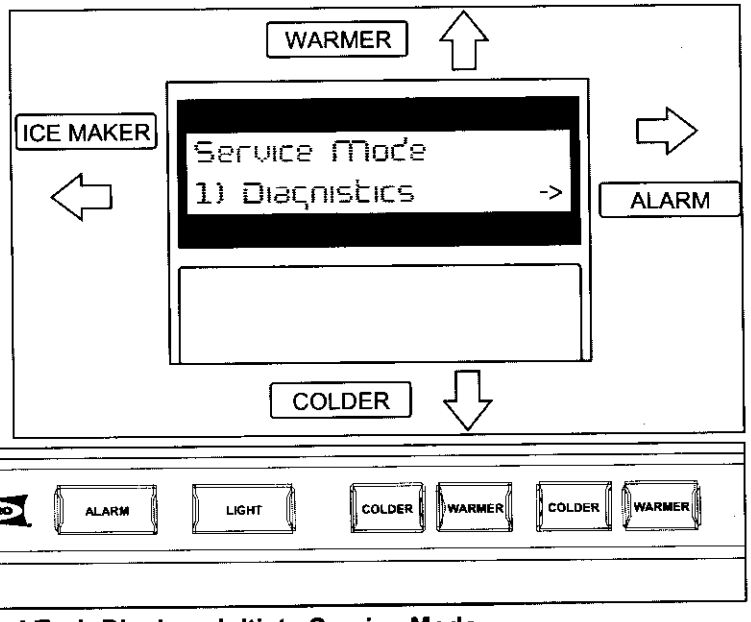


Figure 3-41. Key Strokes and Tech Display - Initiate Service Mode

Service Mode, 1) Diagnostics (Sub) Mode

There are five levels under Diagnostics Mode, they are:
1) Self Test
2) Error Code History
3) Thermistor Read
4) Activate Zone
5) Statistics

The next few pages explain the steps for working through the five levels of Diagnostics Mode. For sake of space, the directions that follow will not explain or show what is seen in the display after each key stroke. Only the final, and/or desired result will be explained and illustrated.

Diagnostics 1) Self Test - As mentioned, when Service mode is initiated "Service Mode, 1) Diagnostics" appears in the Technician's Display, with a small arrow in the bottom right corner pointing right. That is the prompt to enter Diagnostics Mode. Follow the steps below to work through Diagnostics Mode 1) Self Test:

1. After initiating Service Mode, press ALARM key three (3) consecutive times; "Self Test, Active" appears on display (See Figure 3-42).
   During Self Test, which lasts approximately ninety (90) seconds, the main controller board cycles through all relays and trials, switching components ON and OFF, and checking for correct feedback information from various electrical components. For example: each evaporator fan will be energized for a few seconds, regardless of the door being opened or closed. Then, if a relay or triac fails to function properly, or incorrect feedback is received, a message will appear on the Technician's Display, headed by the words ":Self Test Data", with words indicating where the problem exists.
2. To see if multiple problems were detected, press the COLDER key to toggle down through the Self Test Data.
   If there are no problems, the display will read "Self Test Data, Board OK"

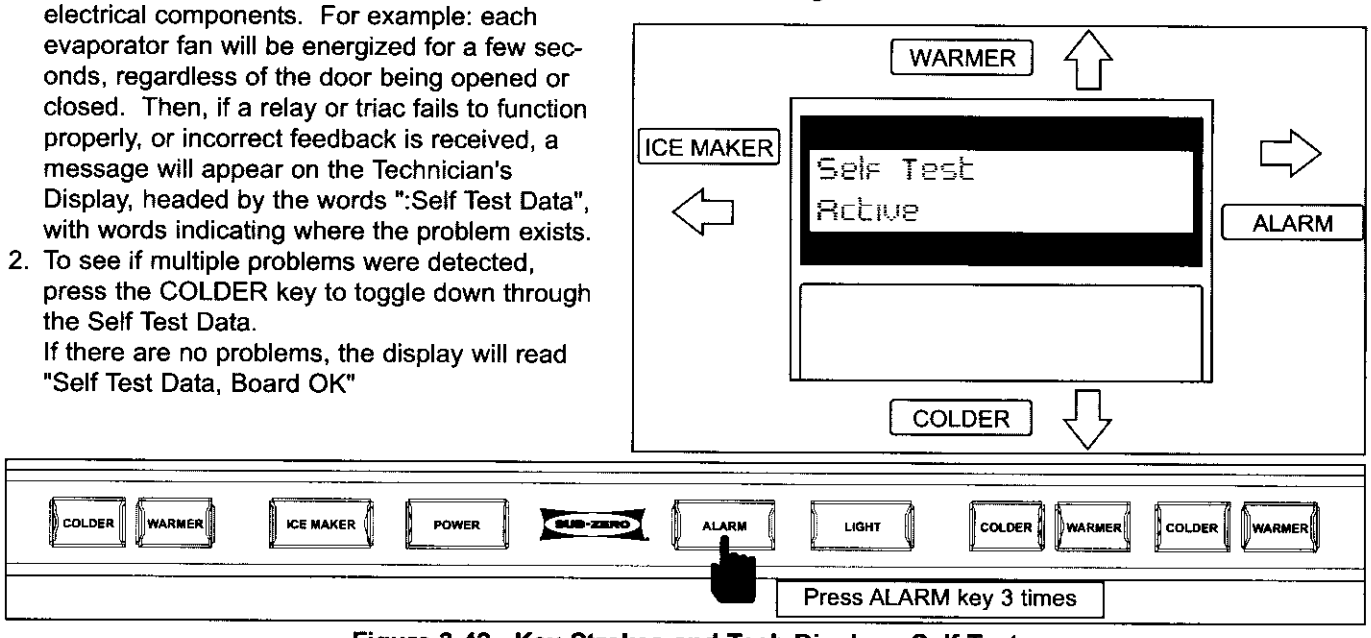


Figure 3-42. Key Strokes and Tech Display - Self Test

Diagnostics 2) Error History - As mentioned, when Service mode, is initiated "Service Mode, 1) Diagnostics" appears in the Technician's Display, with a small arrow in the bottom right corner pointing right. That is the prompt to enter Diagnostics Mode. Follow the steps below to work through Diagnostics Mode 2) Error History:

1. After initiating Service Mode, press ALARM key once.
2. Press the COLDER key once.
3. Press the ALARM key two (2) times. Now, if error codes are present, the most recent will be displayed (See Figure 3-43). Below the Error Code will be the number of days, hours and minutes since the error was logged.

NOTE: *Though there are ninety-nine possible Error Codes, twenty is the most that can be stored. If over twenty occur, the newest error code over-writes the oldest.*

4. To see if multiple error codes are logged, press the COLDER key to toggle down through the Error History.

NOTE: *See following page for Error Code Table. See directions below to clearing Error Codes.*

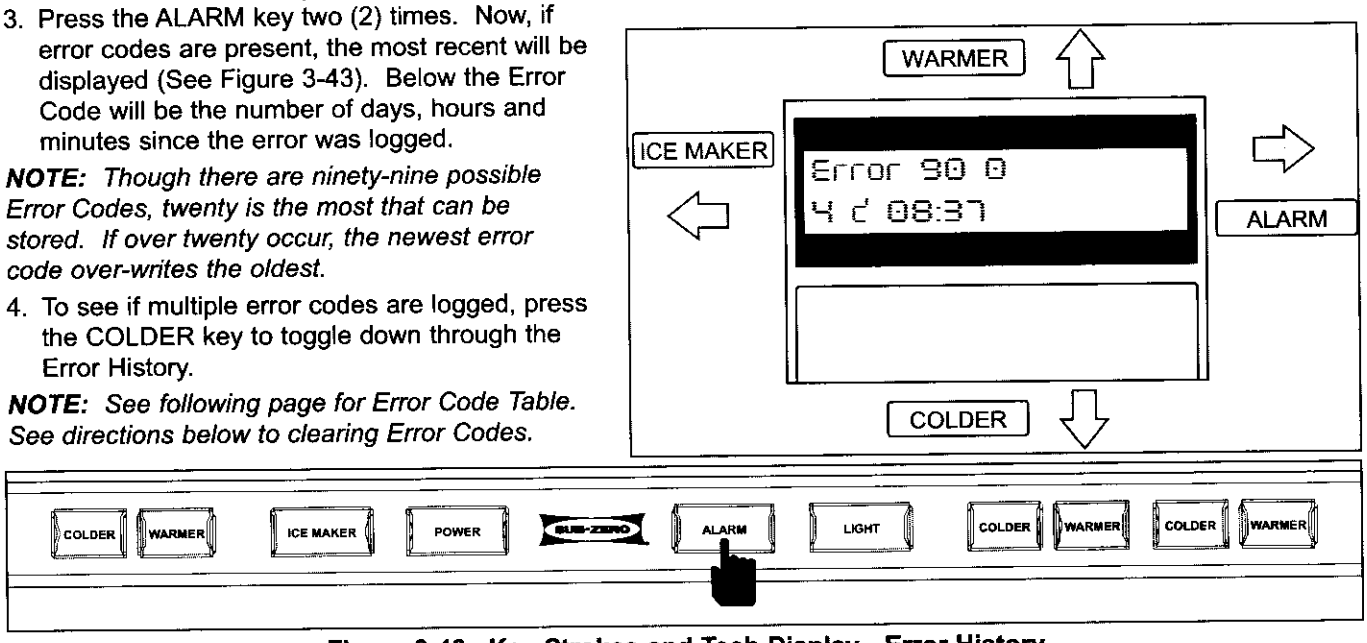


Figure 3-43. Key Strokes and Tech Display - Error History

Before attempting to clear Error History, the cause must first be corrected. If this is not done, the Error Codes will be re-logged. After repairs, follow the steps below to clear Error History:

1. After initiating Service Mode, press ALARM key once.
2. Press the COLDER key once.
3. Press ALARM key once.
4. Press the COLDER key once.
5. Press ALARM key once.
6. Press the COLDER key once, and "Clear Error History, Yes? ->" appears (See Figure 3-44).
7. Press ALARM key now and all Error Codes will be cleared from memory.

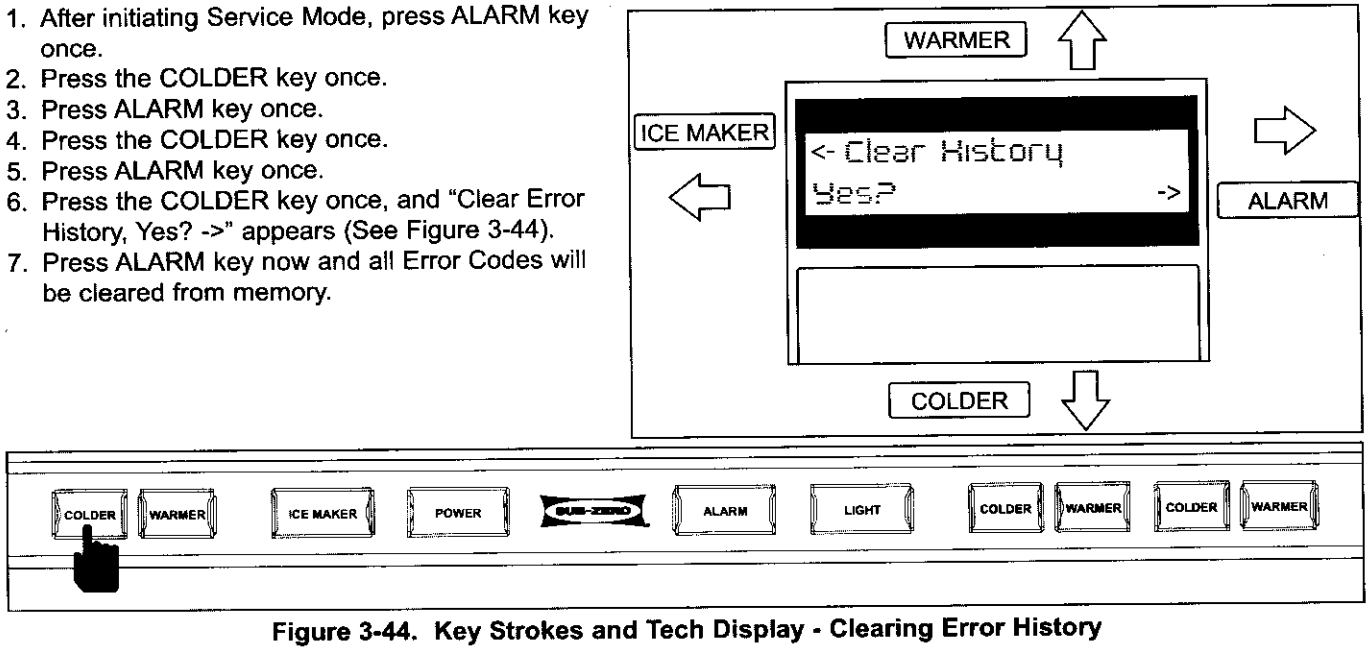


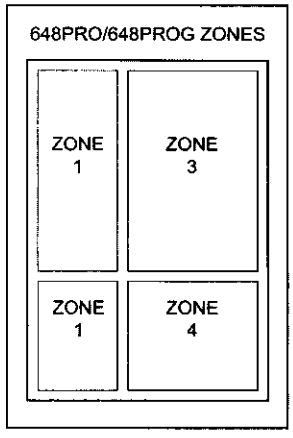
Figure 3-44. Key Strokes and Tech Display - Clearing Error History

Error Code Table		
CODE	ZONE	SERVICE INSTRUCTION
01	X	Zone "X" Cabinet Thermistor Failure (Device or Wiring)
02	X	Zone "X" Evaporator Thermistor Failure (Device or Wiring)
03	X	Zone "X" Condenser Thermistor Failure (Device or Wiring)
04	0	Ambient Thermistor Failure (Device or Wiring)
20	X	Check Zone "X" Defrost Bi-metal for Proper Operation
21	X	Check Zone "X" Defrost Bi-metal for Proper Operation
22	X	Check Zone "X" Defrost Wiring
23	X	Check Zone "X" Defrost Wiring
24	X	Check Zone "X" Defrost Heater Ohms
30	0	Check for Stuck Icemaker or Water Valve Failure
35	X	Check Zone "X" Fan, Fan Speed Error
40	X	Zone "X" Excessive Run
41	X	Check Zone "X" Compressor and Wiring
42	0	Check Condenser Fan and/or Wiring
43	X	Check Left Refrigerant Valve and Wiring
44	X	Check Zone "X" Glass Door Heater and Wiring
45	X	Errors Detectable with Red Door Switches-Disabled Now. Check Overhead Lighting
46	0	Check Ice Accessory Wiring for Open Circuit
47	3	Check Accent Lighting Wiring for Short Circuit
80	X	Check Power to Compressor Controller for Zone "X", Troubleshoot with Manual Activation Mode
83	X	Replace Zone "X" VS Compressor and Filter-Drier
84	X	Check Zone "X" VS Compressor Wiring
85	X	Zone "X" VS Compressor Control Overheat
86	X	Check Communication Wiring, Replace Zone "X" VS Controller
87	X	Check for Broken Wiring or Open Defrost Heater
89	X	Check Icemaker Solenoid Valve and Wiring
90	X	Change Main Control Board
92	0	Check Keypad Wiring
93	0	Replace Keypad
94	1	Check Wiring / Replace User Display #1
94	3	Check Wiring / Replace User Display #2
96	0	Datalogger Malfunction
97	0	Check Communications Cables / Connectors
98	0	Brownout Check Input Power Supply

Explanation of zone error codes

If "X" = 0, Failure was with a common component.
If "X" = 1, Failure occurred in Zone 1 or left system.
If "X" = 2, Failure occurred in Zone 2.
If "X" = 3, Failure occurred in Zone 3 or right system.
If "X" = 4, Failure occurred in Zone 4.

Note: *Zone 2 and zone 4 may or may not be present depending on model.*



Diagnostics 3) Thermistors - As mentioned, when Service mode, is initiated "Service Mode, 1) Diagnostics" appears in the Technician's Display, with a small arrow in the bottom right corner pointing right. That is the prompt to enter Diagnostics Mode. Follow the steps below to work through Diagnostics Mode 3) Thermistor Read:

1. After initiating Service Mode, press ALARM.
2. Press COLDER two (2) times.
3 Press ALARM now, and the ambient thermistor is the first to be read (See Figure 3-45).
4. Press the COLDER key to toggle down through the other thermistor readings.

These readings are real time temperatures, with no temperature averaging as seen on the User Displays.

Note: *Zones 2 and 4 may or may not be present depending on model. If not present, "Zone #X (°F), Not Present" will appear in display.*

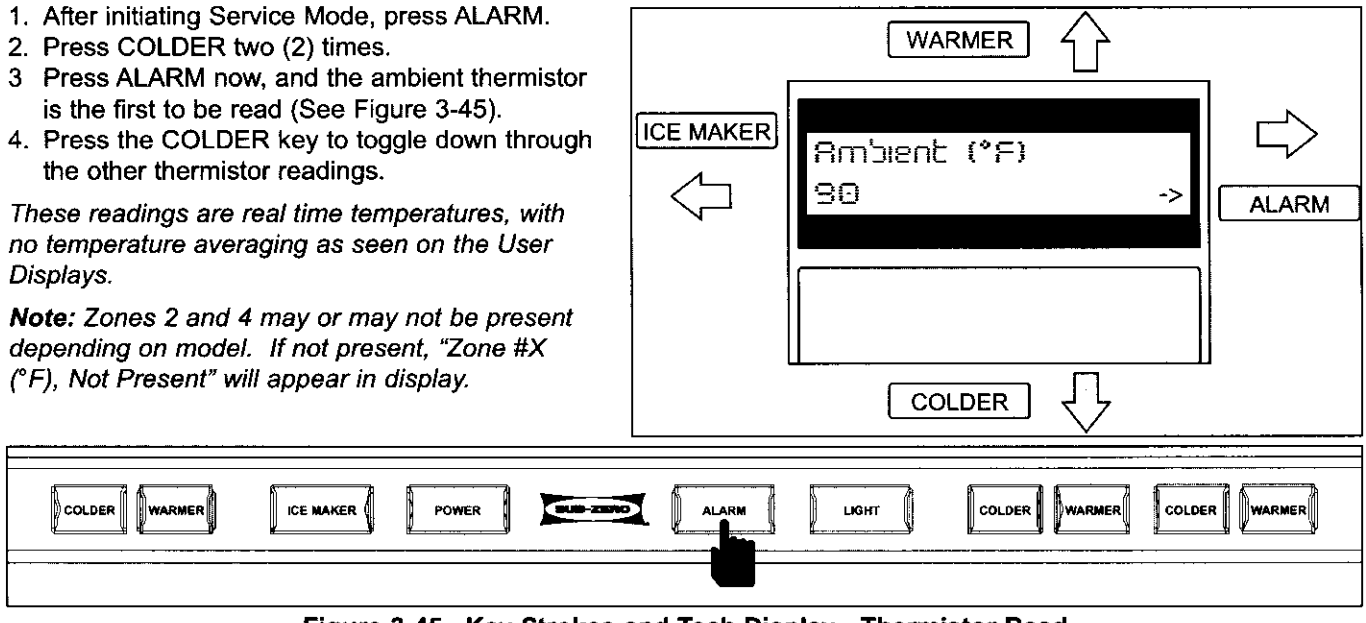


Figure 3-45. Key Strokes and Tech Display - Thermistor Read

Diagnostics 4) Activate Zone - As mentioned, when Service mode, is initiated "Service Mode, 1) Diagnostics" appears in the Technician's Display, with a small arrow in the bottom right corner pointing right. That is the prompt to enter Diagnostics Mode. Follow the steps below to work through Diagnostics Mode 4) Activate Zone:

1. After initiating Service Mode, press ALARM.
2. Press COLDER three (3) times.
3 Press ALARM now, and "Manual Zone, Zone #1, Start ? ->" appears on the display (See Figure 3-46).
4. If Zone #1 is the desired zone to activate, press ALARM. If Zone #1 is NOT the desired zone to activate, press COLDER until desired zone appears, then press ALARM.

When a zone is activated, the compressor will run at high speed and the compartment's evaporator fan will energize for five minutes. During this five minute run, the activated zone's evaporator and cabinet real time temperatures will be displayed on the Technician's Display.

Note: *Zones 2 and 4 may or may not be present depending on model. If not present, "Manual Zone, Not Present" will appear in display.*

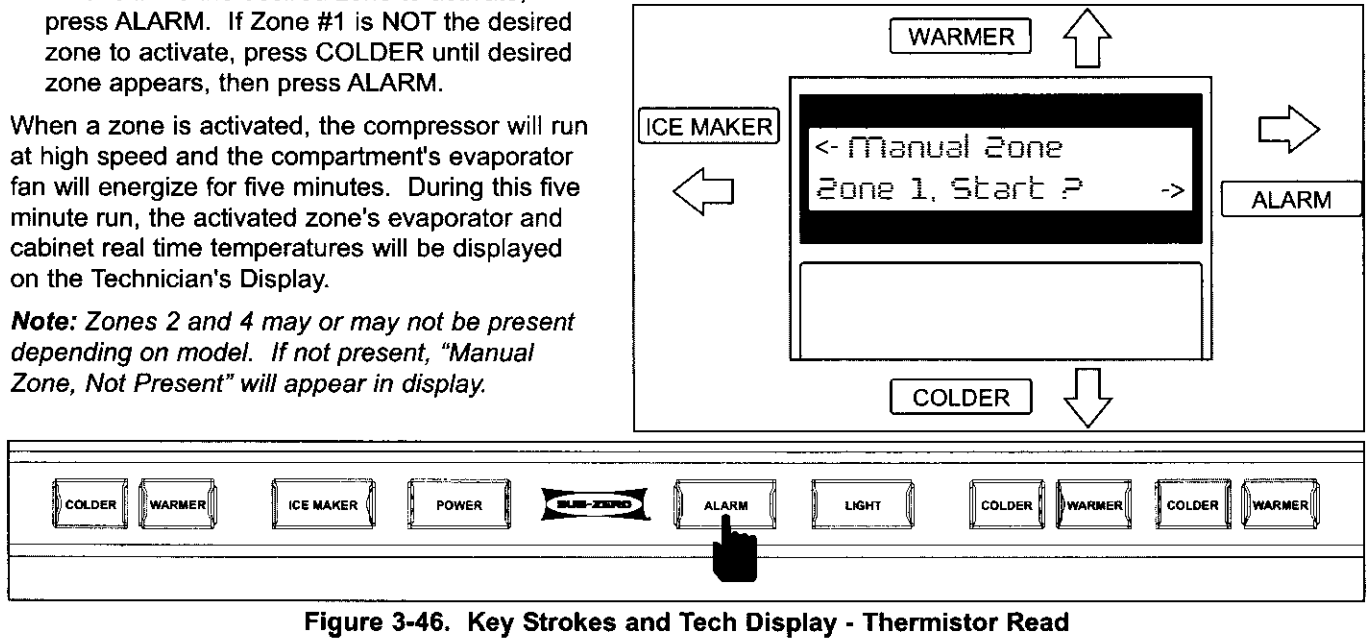


Figure 3-46. Key Strokes and Tech Display - Thermistor Read

Diagnostics 5) Statistics - As mentioned, when Service mode, is initiated "Service Mode, 1) Diagnostics" appears in the Technician's Display, with a small arrow in the bottom right corner pointing right. That is the prompt to enter Diagnostics Mode. Follow the steps below to work through Diagnostics Mode 5) Statistics:

1. After initiating Service Mode, press ALARM.
2. Press COLDER four (4) times.
3 Press ALARM now (See Figure 3-47), and it is possible to work through the following ten (10) levels:
   1) "Running Time ->" = Total days, hours and minutes unit has been operating.
   2) "Power Cycles ->" = Total number of power cycles unit has performed.
   3) "% Run Btwn Def ->" = % of freezer compressor run time between freezer defrosts(four possible zones).
   4) "% Run 50 Cycles ->" = % of each of four possible zone's run time, based on 50 cycles (% and duration).
   5) "Comp Cycles ->" = Total number of compressor cycles for left and right compressor.
   6) "Defrost ->" = Last defrost interval in hours and minutes; Last defrost duration in minutes.
   7) "Average Temps ->" = Average temperature of: Ambient, left/right condenser, 4 cabinet & evaporators.
   8) "Door Open Tim ->" = Greatest non-cumulative duration of light switch open readings (four possible zones).
   9) "Ice Maker ->" = Number of ice harvests in 14 days; Number of minutes ON in 14 days.
   10) "Self Test ->" = Amount of time since last self test was implemented,

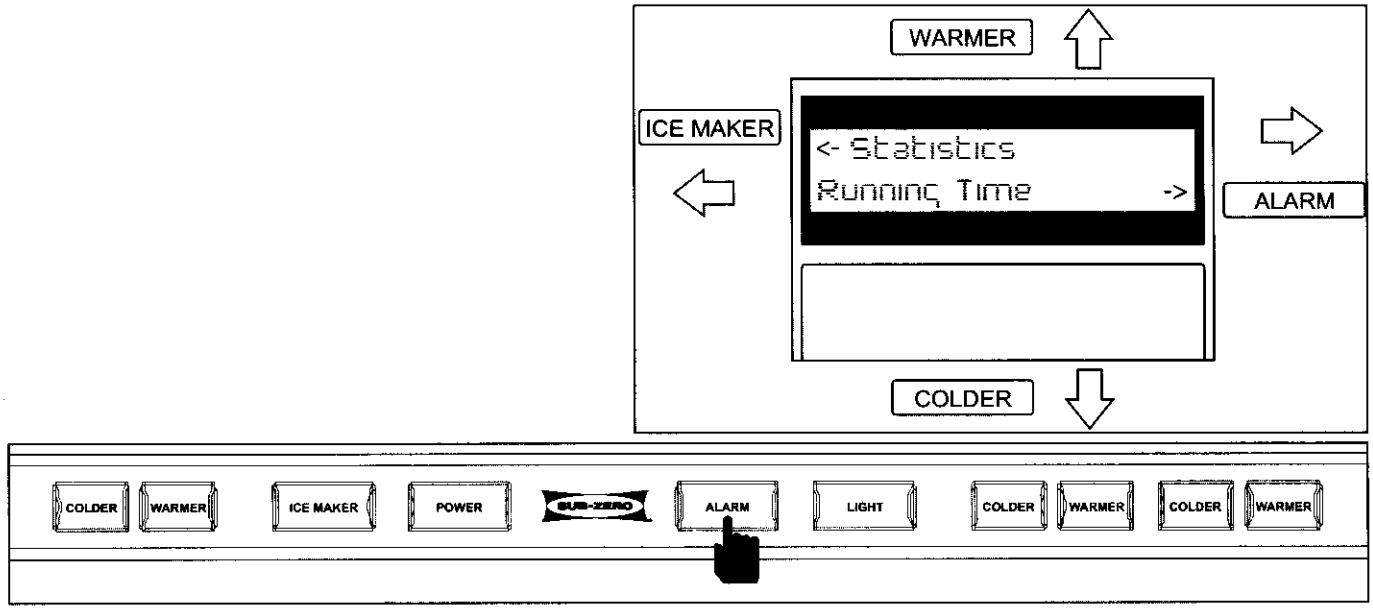


Figure 3-47. Key Strokes and Tech Display - Statistics

Service Mode, 2) Operational Status (Sub) Mode

There are two levels under Op (Operational) Status Mode, they are:
1) Zone Status - Accessing Operational Status, Zone Status will show a zone's cooling and defrost status.
2) Ice Maker - Accessing Operational Status, Ice Maker shows ice maker status as Harvest or Production.

The next few pages explain the steps for working through the two levels of Op Status Mode. For sake of space, the directions that follow will not explain or show what is seen in the display after each key stroke. Only the final, and/or desired result will be explained and illustrated.

Op Status 1) Zone Status - As mentioned, when Service mode is initiated "Service Mode, 1) Diagnostics" appears in the Technician's Display. Follow the steps below to work to and through Op Status Mode 1) Zone Status:

1. After initiating Service Mode, press COLDER key one (1) time; "Service Mode, 2) Op Status" appears on display.
2. Press ALARM key two (2) times (See Figure 3-48), and it is now possible to work through the following four (4) levels:
   1) "Z1 +/- Cooling; +/- Def" = Zone 1 is cooling, or defrosting.
   2) "Z2 Not Present" = Zone 2 is currently not present in this appliance.
   3) "Z3 +/- Cooling; +/- Def" = Zone 3 is cooling, or defrosting.
   4) "Z4 +/- Cooling; +/- Def" = Zone 4 is cooling, or defrosting.

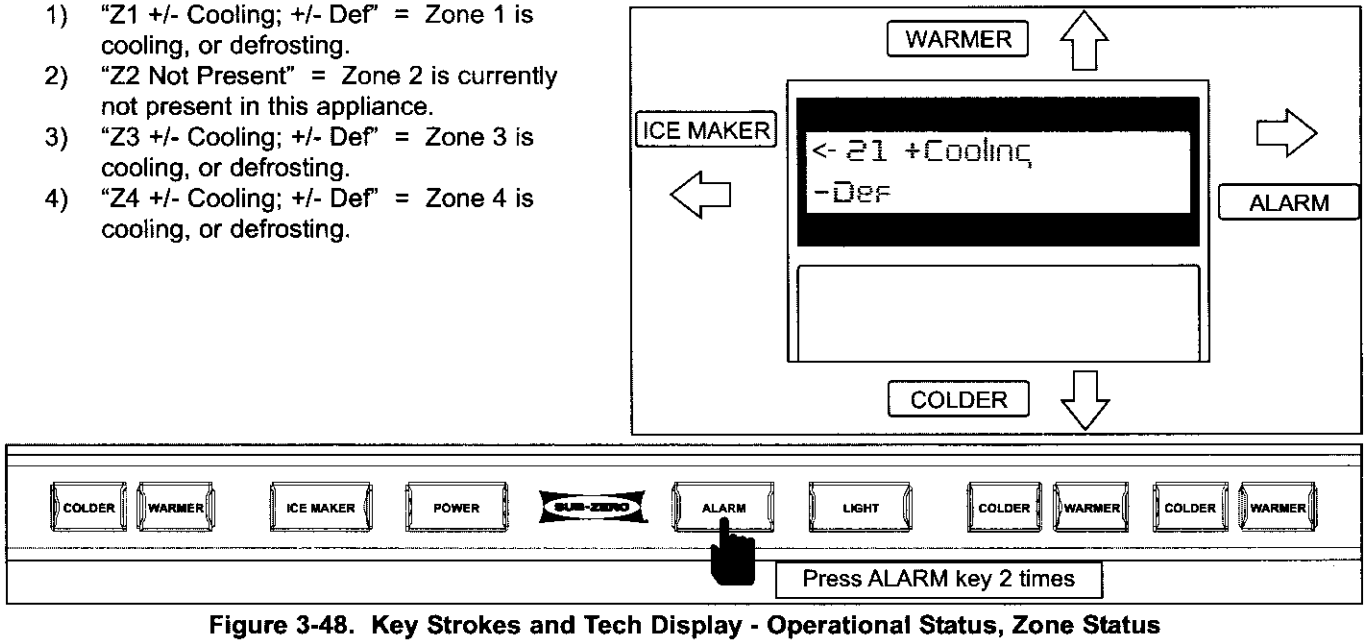


Figure 3-48. Key Strokes and Tech Display - Operational Status, Zone Status

Op Status 2) Ice Maker - As mentioned, when Service mode is initiated "Service Mode, 1) Diagnostics" appears in the Technician's Display. Follow the steps below to work to Op Status Mode 2) Ice Maker:

1. After initiating Service Mode, press the COLDER key one (1) time; "Op Status, 1) Zone Status" appears on display.
2. Press COLDER key one (1) time.
3. Press the ALARM key one (1) time (See Figure 3-49); "Ice Maker Status, Harvest (or Production)" appears on display.

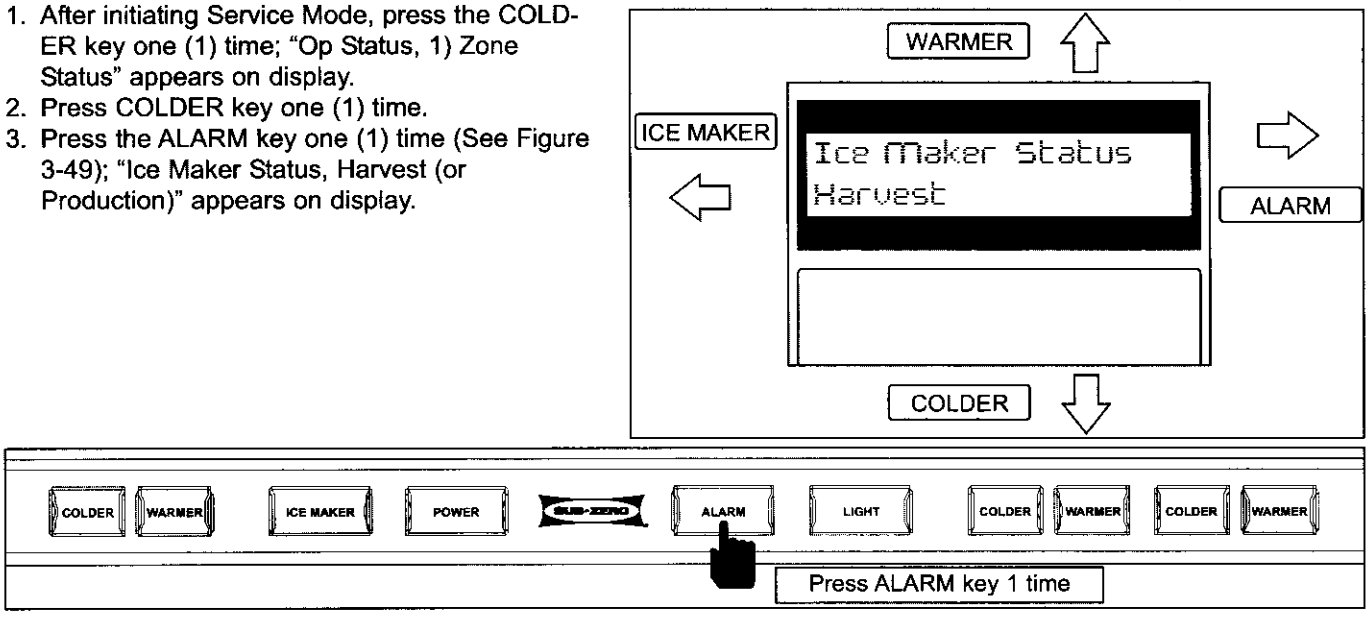


Figure 3-49. Key Strokes and Tech Display - Operational Status, Ice Maker

Service Mode, 3) Model Information (Sub) Mode

Accessing Model Information allows the Service Technician to verify, or change model configuration.

This page explains the steps for working through Model Information Mode. For sake of space, the directions that follow will not explain or show what is seen in the display after each key stroke. Only the final, and/or desired result will be explained and illustrated.

As mentioned, when Service mode is initiated "Service Mode, 1) Diagnostics" appears in the Technician's Display. Follow the steps below to work to and through **Service Mode, 3) Model Information (Sub) Mode**:

1. After initiating Service Mode, press the COLDER key two (2) times; "Service Mode, 3) Model Info" appears on display.
2. Press ALARM key two (2) times (See Figure 3-50), and it is now possible to select, change, or verify model configuration.

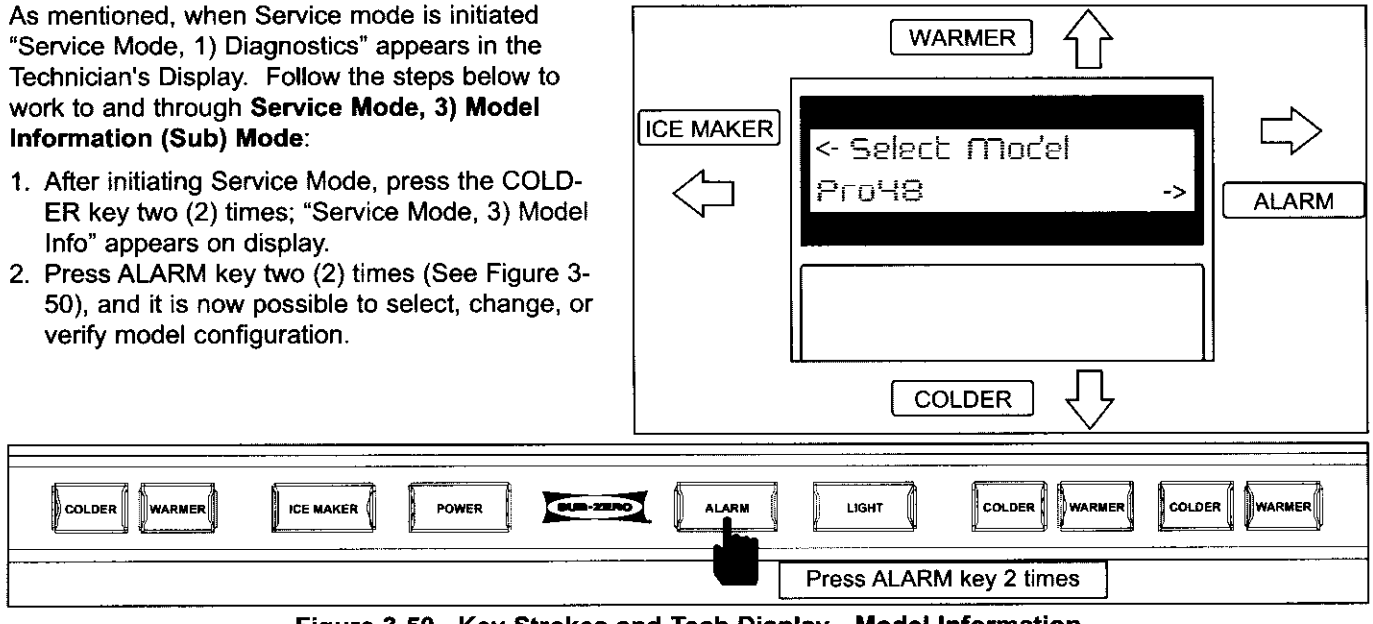


Figure 3-50. Key Strokes and Tech Display - Model Information

Service Mode, 4) Version Information (Sub) Mode

Accessing Version Information allows the Service Technician to recall all the electronic control modules software versions and the E2 version of the main control board.

This page explains the steps for working through Version Information Mode. For sake of space, the directions that follow will not explain or show what is seen in the display after each key stroke. Only the final, and/or desired result will be explained and illustrated.

As mentioned, when Service mode is initiated "Service Mode, 1) Diagnostics" appears in the Technician's Display. Follow the steps below to work to and through **Service Mode, 4) Version Information (Sub) Mode**:

1. After initiating Service Mode, press the COLDER key three (3) times; "Service Mode, 4) Version Info" appears on display.
2. Press ALARM key one (1) time (See Figure 3-51), and it is now possible to toggle down through the software version information.

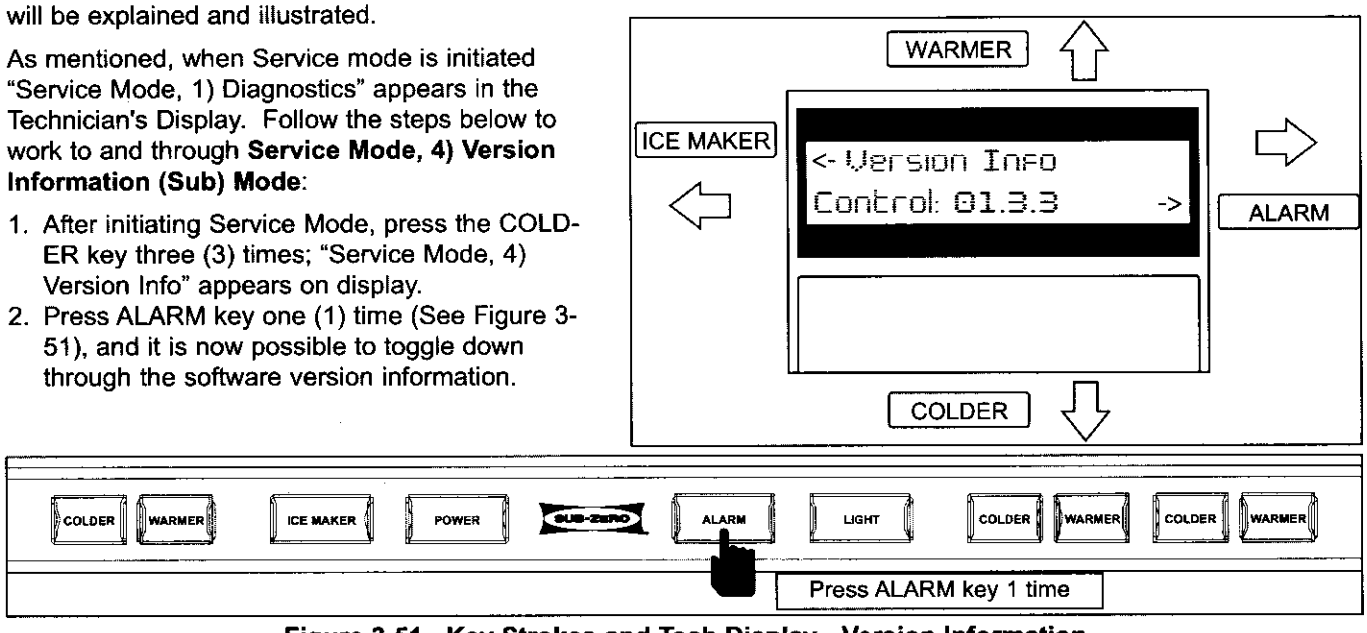


Figure 3-51. Key Strokes and Tech Display - Version Information