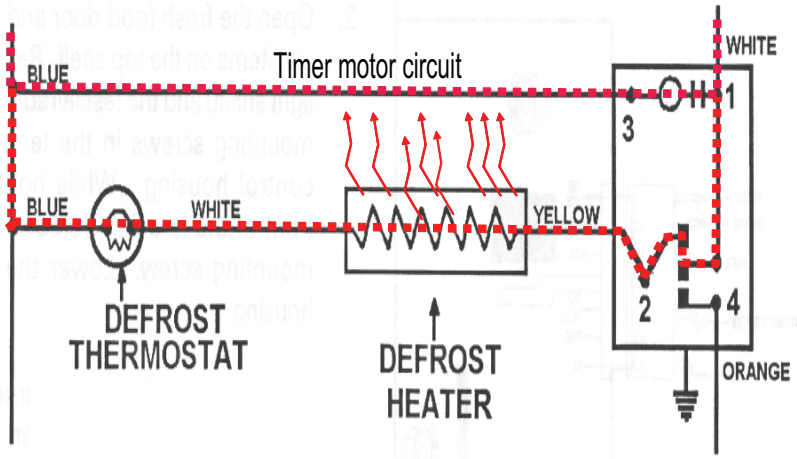
Whirlpool CORPORATION

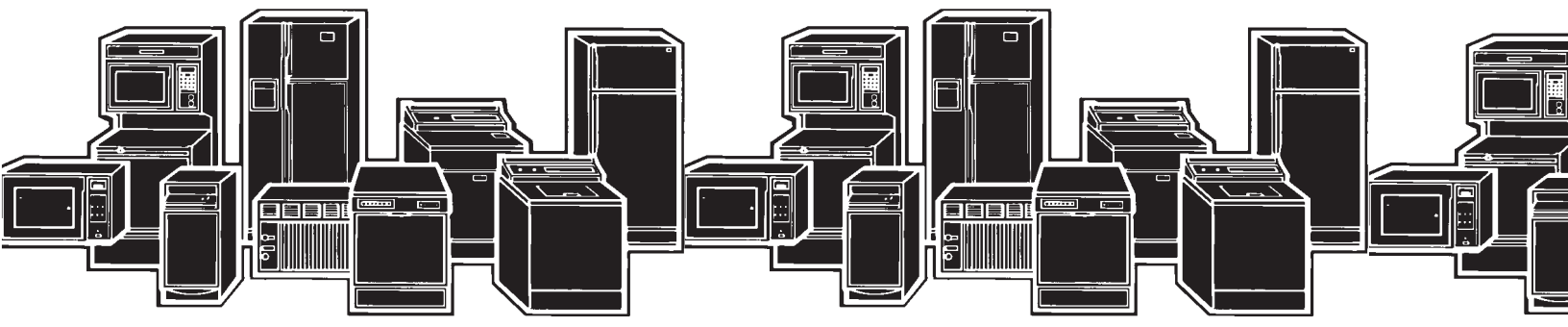
CONSUMER SERVICES TECHNICAL EDUCATION GROUP PRESENTS

R-107

DEFROST SYSTEMS



TRAINING MANUAL
Part No. 8178726



FORWARD

The following training manual information is provided to make you more knowledgeable about defrost system diagnosis.

Training manual information is designed for the experienced service specialist. It keeps you advised of the most recent improvements and product changes, and allows you to service these products more efficiently.

WHIRLPOOL CORPORATION assumes no responsibility for any repairs made on our products by anyone other than authorized In-Home Service Professionals.

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DEFROST SYSTEMS

Defrost Systems

Moisture control inside of the conditioned compartments is necessary for efficient operation. Every time a door is opened, moisture will enter the cabinet. Through either natural convection or forced air movement, the moisture will eventually condense on the coldest surface in the cabinet. The coldest surface is the evaporator. Since the evaporator in a refrigerator / freezer or freezer is well below the freezing point of water, frost will form on the evaporator.

With a plate style evaporator that relies on convection to maintain temperature, frost build-up affects the efficiency of the heat removal but will not prevent the system from maintaining temperature. The biggest issue is the loss of storage space as the thickness of the frost increased. In a forced evaporator system, the build-up of frost has more severe effects.

As the amount of frost builds, the airflow through the evaporator will decrease. If the evaporator becomes completely clogged, the airflow will stop and cooling performance will decrease to the point where the system cannot maintain the desired temperatures. In order to return cooling capacity, the frost must be removed from the evaporator.

Manual Defrost

Plate style evaporators most commonly relied on manual defrost methods. This holds true for many of today's freezers. Chest type freezers and non-automatic defrost upright freezers require manual defrosting.

To manually defrost a system, the sealed system must be off and the contents of the refrigerator stored elsewhere until the defrosting is complete. The doors can be propped open and the outside ambient air can be used to thaw the frost. To accelerate the defrosting process, a large kettle of very hot water can be set inside of the cabinet. The use of a hair dryer or a heat gun can also accelerate the frost removal. Care must be used to avoid damage to the cabinet interior if heat is applied with a heat gun.

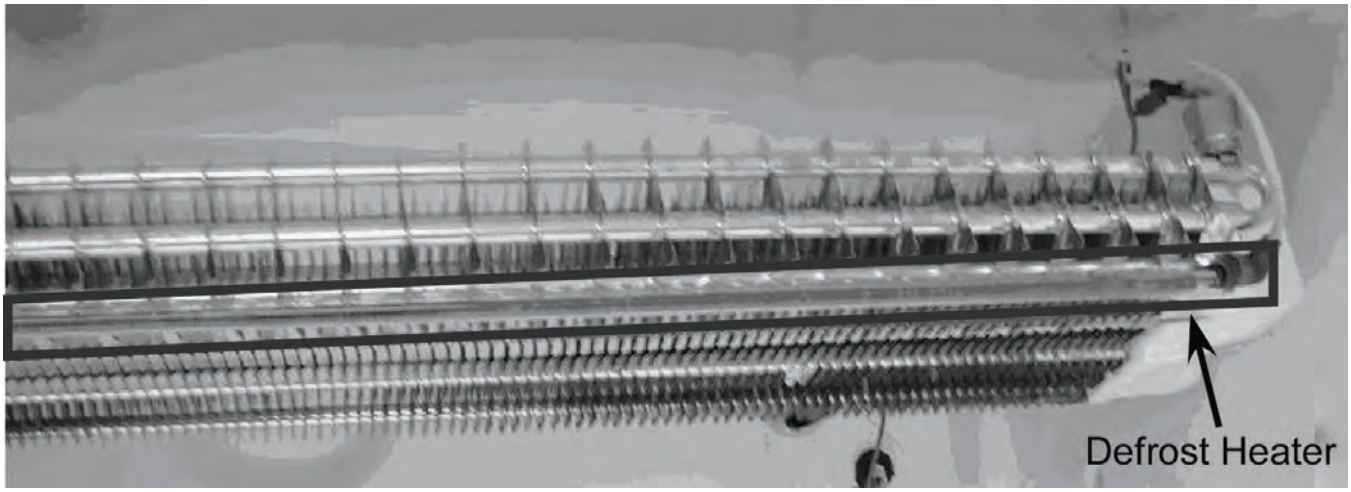
The use of scrapers, ice picks or chisels must be avoided. The chance of damaging the evaporator is too great to risk the forcible removal of the frost in an attempt to speed the process. While evaporator repair kits are available, the durability of a repaired evaporator is much less than the durability of an undamaged evaporator.

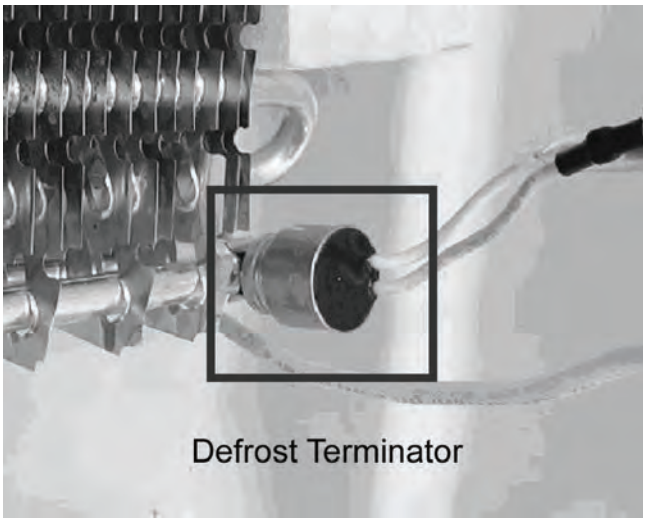
Once all of the frost has been melted, the moisture must be allowed to evaporate so that the moisture doesn't immediately refreeze when the system is powered up.

Automatic Defrost

Since the process of manually defrosting a refrigerator is time consuming and the frost affects system efficiency, most modern refrigerators incorporate an automatic defrosting system. An automatic system uses a timer to activate a defrost cycle.

In an automatic defrost system, a heater and thermostat is added to the evaporator assembly. The sealed system is de-energized and the heater is energized. The heater will heat the evaporator and melt the frost. The thermostat monitors the evaporator temperature and when it is heated sufficiently, the heater de-energizes. This thermostat is often called a defrost termination thermostat or defrost terminator. The target temperature is usually between 40 and 60 degrees Fahrenheit. The water that results from the defrost process is often directed to a condensate tray in the base of the refrigerator. This flat tray is placed in the airflow around the compressor and the condenser. This warmed air will speed evaporation of the condensate.





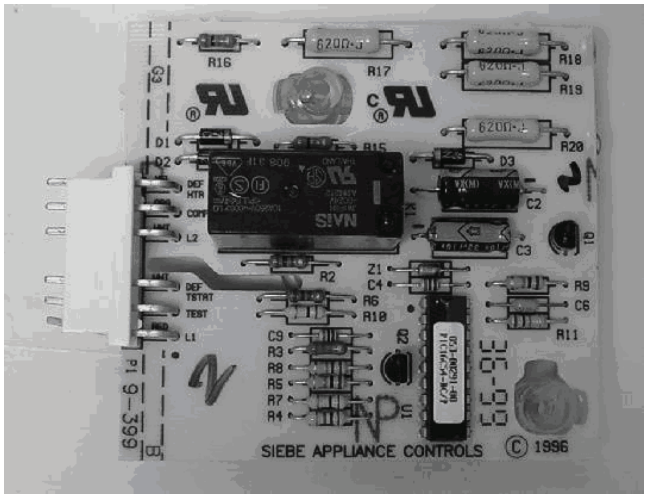
Some systems perform a defrost cycle based on elapsed time. A time is chosen as an interval between defrosts. Whenever the timer counts up the chosen amount of time, the system enters a defrost cycle. This type of system performs the defrost cycle without regard for the actual cooling demand on the sealed system.

A more efficient type of timed defrost is based on the amount of time the compressor runs. The timer only advances when the compressor is running. After the timer measures an accumulated run time equal to a predetermined amount, the system will enter into the defrost cycle. This type of defrost is often referred to as a cumulative run-time defrost.

Even the cumulative defrost systems fail to account for the number of times the door is opened and the relative humidity of the surroundings.

Adaptive Automatic Defrost

With the decreased cost of logic circuits and controllers, a more efficient method of controlling the defrost frequency has been introduced by many manufacturers. The system measures the time it takes from the start of the defrost cycle until the defrost terminator opens. This type of defrost system is known as adaptive defrost.



The theory behind an adaptive system is that an evaporator with a heavier frost load will take a longer time to reach the target defrosting temperature. An evaporator with a light frost load will reach the defrost temperature sooner. An ideal defrost time is chosen that should be reached with a frost load that is neither too light to warrant a defrost cycle nor too long to affect efficiency.

After power is applied to an adaptive defrost system, the first defrost will usually occur in six to eight hours of cumulative run time depending on manufacturer. The amount of time is measured from the start of the defrost cycle until the defrost termination thermostat opens. If the defrost cycle takes longer than the ideal defrost time, it indicates that a heavier than normal frost load was on the coil. With a heavier than normal frost load, the system calculates that the next defrost should happen sooner than the initial cumulative run time. The accumulated run time before the next defrost is shortened and the system begins to monitor run time.

If the defrost terminator opens sooner than the ideal defrost time, it indicates that the system can operate for a longer period of compressor run time before defrosting is required. The defrost control lengthens the cumulative run time before the next defrost and begins monitoring the compressor run time.

Over the course of several defrost cycles, the time between the start of the defrost cycle and the opening of the terminator will get closer to the ideal defrost time. The system has adjusted the amount of run time between defrosts to occur often enough to maintain a clean coil, but not so often as to use excessive energy.

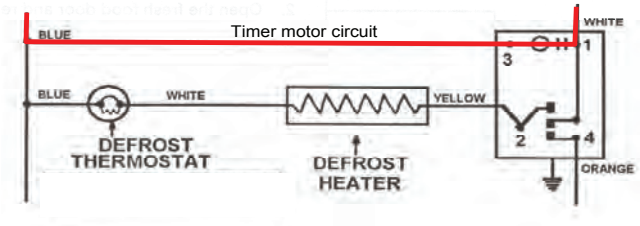
As humidity conditions change and the frost load increases or decreases, the system will adjust the cumulative run time to match the change in the frost load.

A seldom seen but possible defrost system is a hot gas defrost system. Hot gas defrost systems are used in commercial ice machines to aid the harvest process. When used in a residential refrigerator, the sealed system adds a bypass valve to the condenser at a point before the refrigerant begins to condense into a liquid state. When this valve opens, the hot gas enters the evaporator after the capillary tube inlet. This hot gas will thaw the frost from the inside. A drawback of this type of system is the addition of sealed system components. Any added components are potential sources of system failures.

Typical Defrost Circuits

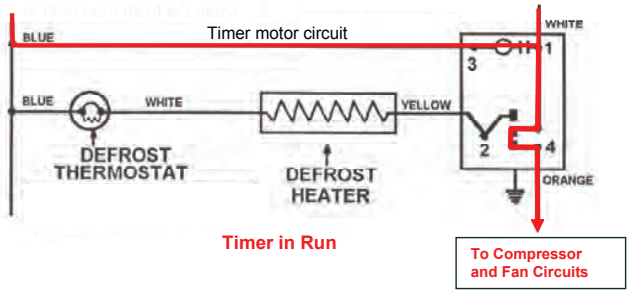
Because of energy consumption regulations, most of the refrigerators that still utilize a defrost timer are wired so that the timer only advances when the compressor is running (cumulative run). Older models that were produced before energy consumption was as great a concern were wired in a continuous run configuration. We'll examine both configurations since there are millions of these older units still in the market place today.

Continuous Run

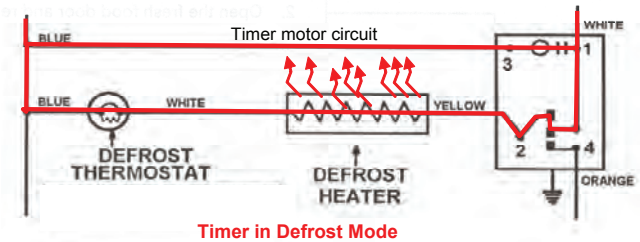


In a continuous run configuration, the timer motor is wired directly across the 120 VAC power source. The motor is energized anytime the refrigerator is plugged in and, depending on the internal timer gearing, initiates a defrost every 8,10 or 12 hours regardless of compressor run time.

During the cooling mode of operation, contacts 1 to 4 are made, providing power to the compressor and fans (if used).



Timer in Run

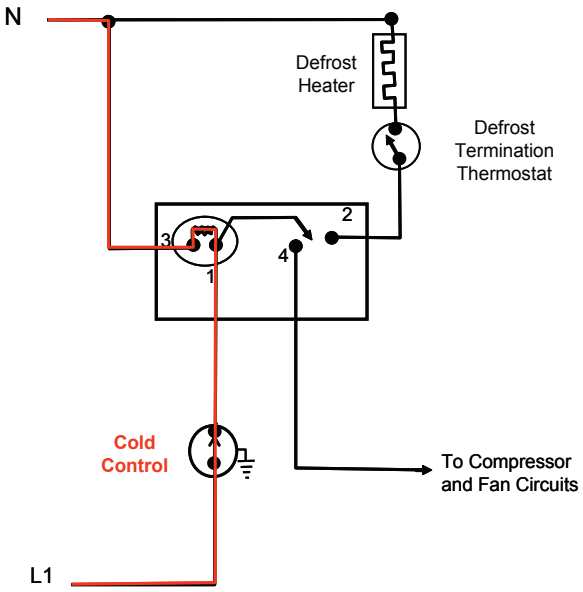


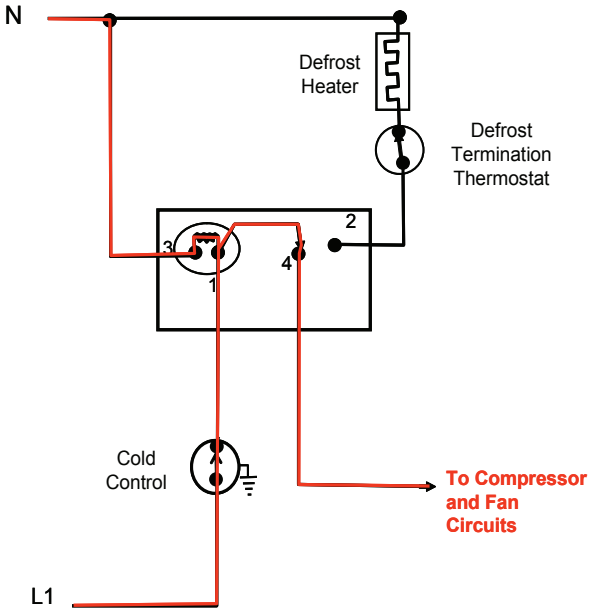
Timer in Defrost Mode

After the timer motor has run for the predetermined amount of time specified by the timer gears, the motor advances the internal cam into the defrost position. Contacts 1 to 4 open and contacts 1 to 2 close. This de-energizes the compressor and fans and energizes the defrost heater (assuming the defrost termination thermostat is closed).

Cumulative Run

When configured as a cumulative run timer, the timer motor is in series with the cold control and is only energized when the thermostat contacts are made. When the thermostat contacts close, power to the motor is supplied from L1, through the cold control, to pin 1 of timer, through the timer motor and out to neutral through pin 3.

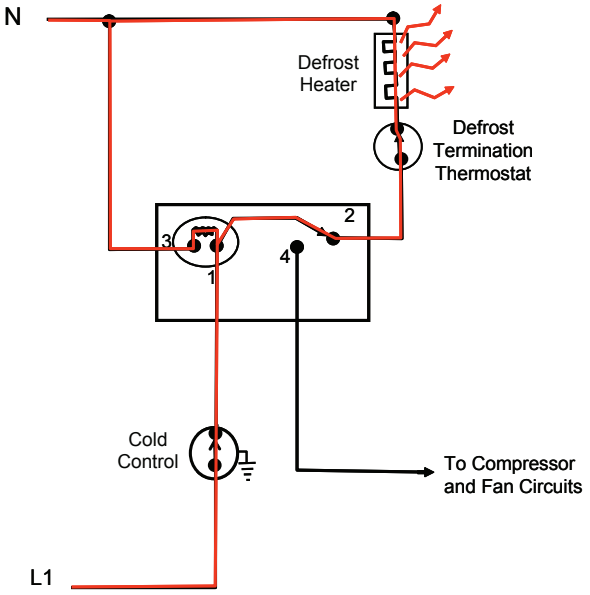




In the “cool” mode, contacts 1 and 4 of the timer are also made and this supplies power to the compressor and any fan motors that are in the circuit (evaporator and/or condenser).

After 8 hours of compressor run time, the timer advances the internal cam into the defrost position. At that time, contacts 1 and 4 break and 1 to 2 are made. This energizes the heater.

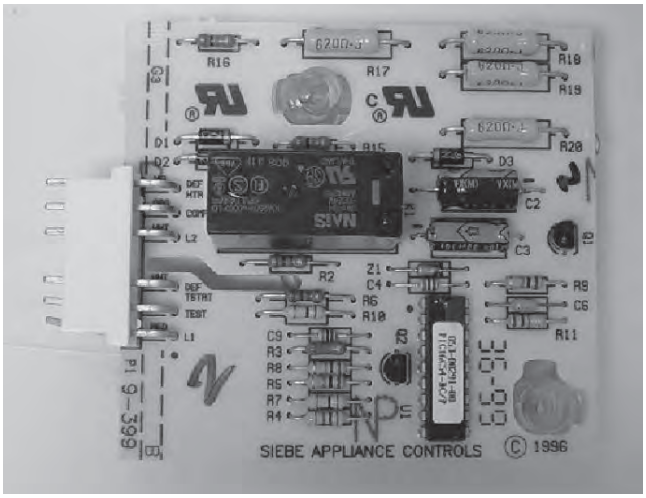
The heater remains energized until the defrost termination thermostat opens or until the defrost timer advances the internal cam out of defrost position and back into the cool mode.



Adaptive Defrost

Most of the high efficiency refrigerators being produced today utilize Adaptive Defrost. Adaptive defrost gets its name from the units' ability to adapt the defrost time and frequency to the ambient conditions in the customer's home

A computer chip on a printed circuit board monitors compressor run time, door openings, the length of time the heater was energized during the previous defrost, etc. In some of the newer, more advanced systems, the chip may even monitor ambient temperatures in the home to determine how often the evaporator needs to be defrosted.



Based on the algorithm that is programmed into the chip, the refrigerator may go into defrost as soon as six hours of run time or, if the refrigerator doors aren't opened for extended periods of time (such as when the customer goes on vacation), the unit may not defrost until 72 hours of run time have elapsed.

Every manufacturer uses a slightly different algorithm in its programming of the chip but the principle of operation of most of these units is very similar. A typical adaptive defrost cycle is described below. The steps are representative of the programming that is used but does not reflect any one model or manufacturers' adaptive defrost programming.

1. When power is applied to the refrigerator, the board begins to monitor the operation of the refrigerator. The number of door openings and the compressor run time are weighted and when the initial run time algorithm is satisfied (typically 8 or 10 hours), the board energizes the defrost heater.
2. During defrost, the board monitors how long the defrost termination thermostat keeps the heater energized.
3. If the defrost termination thermostat opens in less than the average 12 minutes, the computer chip recognizes that the amount of frost build up was very light and automatically increases the amount of run time between defrosts by 2 hours. The refrigerator will now have to run for 2 hours longer before the next defrost is initiated.
4. If it takes longer than 12 minutes for the defrost termination thermostat to open, the chip recognizes that the frost build up was heavier than normal and decreases the time between defrosts by 2 hours.

5. The computer continues to monitor all of the described conditions and adjusts the time between defrosts accordingly until either the upper or lower limits of the algorithm are met. The lower limit is typically 6 hours and the higher limit can be as high as 72 hours. This means that no matter how light or heavy the frost, the refrigerator will never defrost more often than every 6 hours. This also means that it could go as long as 72 hours between defrost if the customer never opens one of the refrigerator doors and lives in a very dry climate.

Adaptive defrost has the great advantage that it can tailor the operation of the defrost cycle to the exact conditions encountered by the refrigerator. The lighter the customer usage and humidity levels in the home, the less defrost energy refrigerator uses.

Forcing a defrost on these models varies from unit to unit and among manufacturers. In some cases, the refrigerator light switch is turned on and off a certain number of times within a specific time frame (such as 5 seconds). Other times, the cold control is cycled on and off. Because there are so many different ways to force a defrost, always refer to the technical data sheet or service manual for the model in question for instructions on how to initiate a defrost.

Defrost Timer

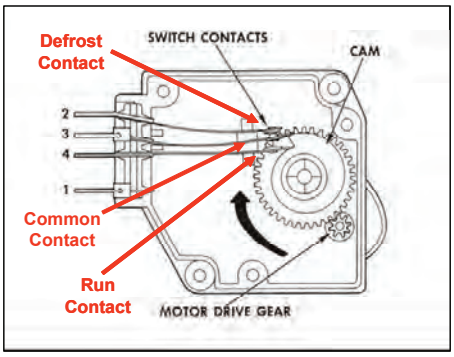
The defrost timer controls how often the refrigerator goes into defrost. (Defrosting the evaporator periodically prevents excess frost from forming and blocking air movement though the coil.) The timer also limits the maximum amount of time that the defrost heater can be energized. There are two major timer wiring configurations used on refrigerators:

- Continuous run
- Cumulative run

The difference between the two is the way the timer motor is energized. When wired as a continuous run timer, the timer motor is wired across the line and is energized anytime the refrigerator is plugged in. Typically, a continuous run timer will cycle the defrost heater every eight hours, regardless of operating conditions of the refrigerator.

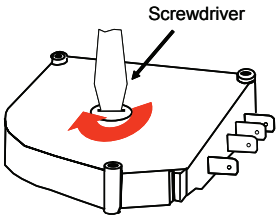
When wired as a cumulative run timer, the timer motor is wired in series with the operating thermostat and is only energized when the thermostat is calling for cooling and the compressor is energized. Thus, it can be said that cumulative run timers rely on compressor run time to determine how often to defrost. The logic behind tying defrost to compressor run time is that, for the most part, frost only forms on the evaporator when the compressor and fans are operating. The longer the compressor runs, the more frost is formed and the sooner the evaporator needs to be defrosted. Conversely, if the usage is very light, very little frost is formed and the need for defrost is reduced.

The timer is made up of leaf switches that ride a cam. The motor and gear are typically configured for the internal contacts to switch from the run mode into defrost after 8 hours of timer run time (regardless of how the timer is wired). The switches drop into a groove in the cam and the contacts #2 to #3 make. This energizes a heater that is imbedded in or positioned underneath the evaporator coil. After about 20 minutes, the timer motor advances the gear so that the leaf switch no longer sits in the groove and the contacts transfer back into the run position (#3 to #4).



Although the contact numbers may differ from one timer to the next, all mechanical defrost timers work on the principle described above.

Most mechanical timers are equipped with a studded shaft that allows the technician to manually advance the unit in and out of defrost.

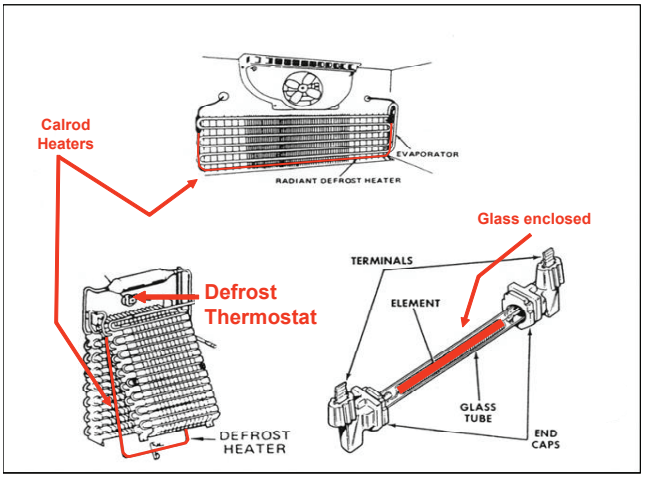


Defrost Heaters

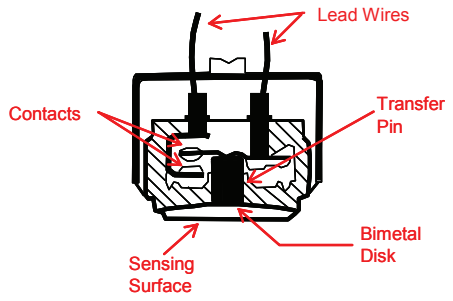
Defrost heaters are high wattage electrical elements that generate a great deal of heat when power is applied to them. When energized, the heater melts any frost that has accumulated on the evaporator coil.

Defrost heaters come in two varieties:

- Calrod heaters look much like the spiral burners found on electric ranges.
- Many new refrigerators models today use glass enclosed heaters.



Defrost Termination Thermostat (Bimetal)



The defrost termination thermostat utilizes a bimetal disc to sense temperature. The disc is made of two dissimilar metals that expand at different rates. When exposed to temperature changes, the disc warps, making or breaking a set of electrical contacts.

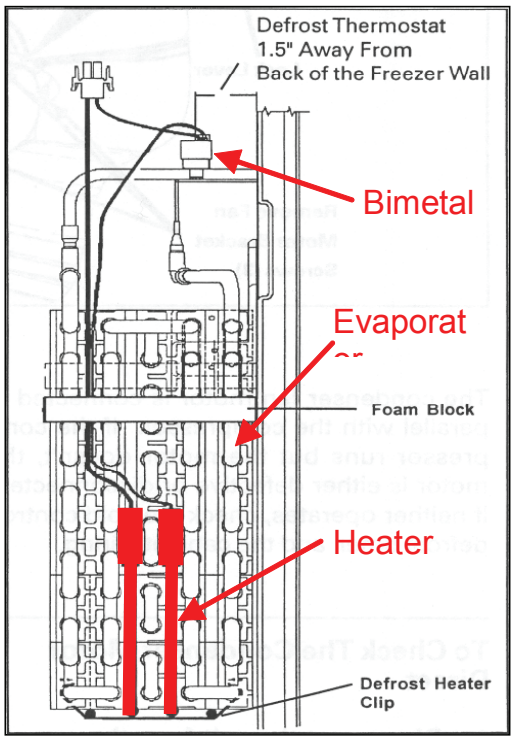
Even though the defrost timer allows a maximum defrost of about 20 minutes, the length of defrost actually depends on the amount of frost on the evaporator. As soon as the bimetal senses that the coil temperature is somewhere between 45-60° F, the bimetal disc warps and opens the internal contacts and the heater is disabled. The heavier the frost, the longer it takes for the frost to melt and for the bimetal to open.

Once the bimetal opens, the defrost cycle continues with no heat until the defrost timer cycles back into the cool mode. This allows the defrost water to drain completely before the compressor is energized and brings the evaporator back down to freezing temperatures.

The thermostat is physically clamped to the uppermost pass of the evaporator. By placing the thermostat at the very top of the evaporator, we're assured that the entire coil will be defrosted by the time the thermostat opens.

Under normal frost conditions, the bimetal opens in about 12-15 minutes of defrost time. Heavier frost buildup may take longer. If the frost formation is greater than the heater can remove in the 20 minutes the defrost timer allows, the timer advances from defrost back into the cool mode before all of the frost is removed.

The purpose of the defrost termination thermostat is twofold. One, it prevents the defrost heater from energizing unless the freezer is at the correct temperature. More specifically, the thermostat senses the temperature of the evaporator coil and completes the circuit to the heater only if the coil is around 5° F or lower. Two, it opens the circuit to the heater at the completion of the defrost cycle.



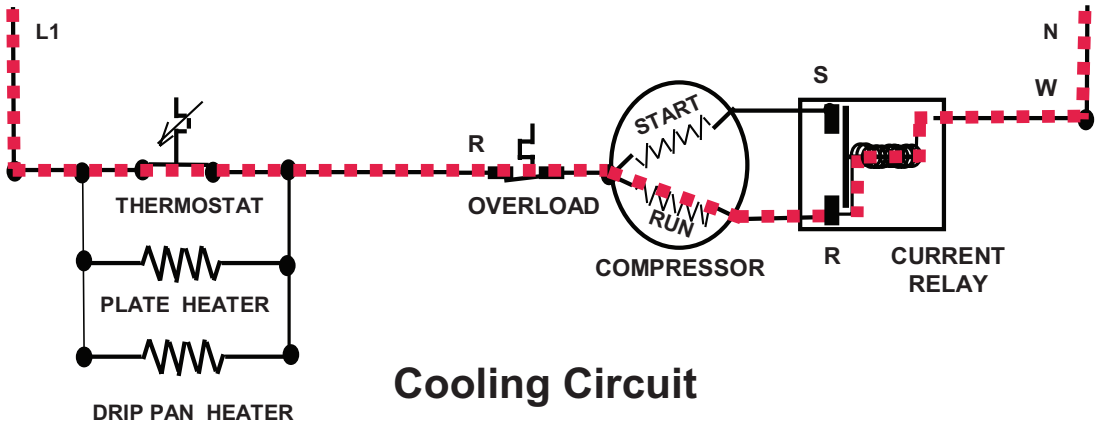
Automatic Defrost Systems

In a forced evaporator system, the build-up of frost has more severe effects.
As the amount of frost builds, the airflow through the evaporator will decrease. If the evaporator becomes completely clogged, the airflow will stop and cooling performance will decrease to the point where the system cannot maintain the desired temperatures. In order to return cooling capacity, the frost must be removed from the evaporator.

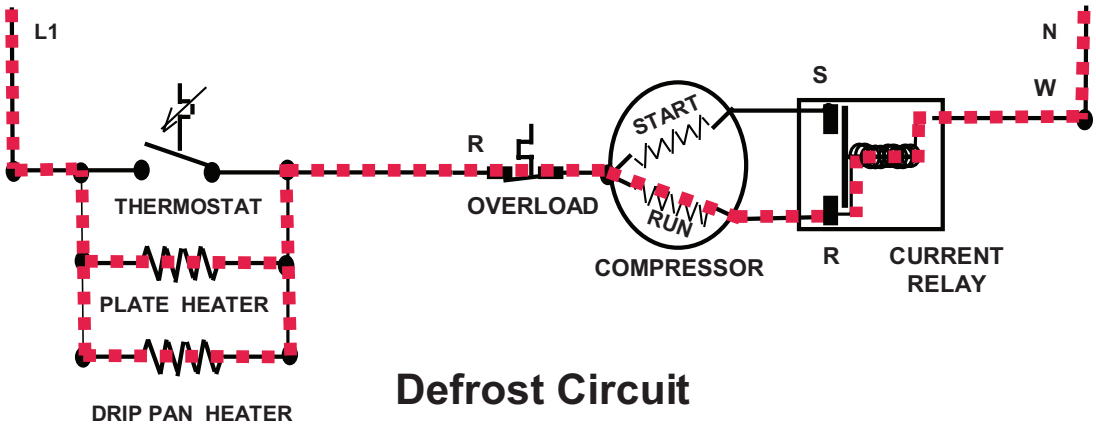
Automatic Defrost

Since the process of manually defrosting a refrigerator is time consuming and the frost affects system efficiency, most modern refrigerators incorporate an automatic defrosting system. An automatic system uses a timer to activate a defrost cycle. In an automatic defrost system, a heater and thermostat is added to the evaporator assembly. The sealed system is de-energized and the heater is energized. The heater will heat the evaporator and melt the frost.

Example - Cycle Defrost Circuitry



Cooling Circuit



Defrost Circuit

Cycle Defrost System

This type of defrost system is used on inexpensive refrigerators. The freezer evaporator is manual defrost but the refrigerator evaporator is defrosted every time the compressor cycles off. A special thermostat and two low wattage heaters are used.

Cycle Defrost Thermostat

When the thermostat is closed, current flow bypasses the evaporator plate heater and the drip pan heater energizing the compressor. When the plate evaporator reaches temperature, the thermostat contacts open. Current flows through the heaters and the cooling circuit. The resistance of the heater circuit limits the current flow to the compressor circuit. The compressor will not operate. The thermostat closes when the temperature reaches 36 degrees, this insures the plate evaporator is cleared of ice.

Whirlpool Automatic Defrost Control

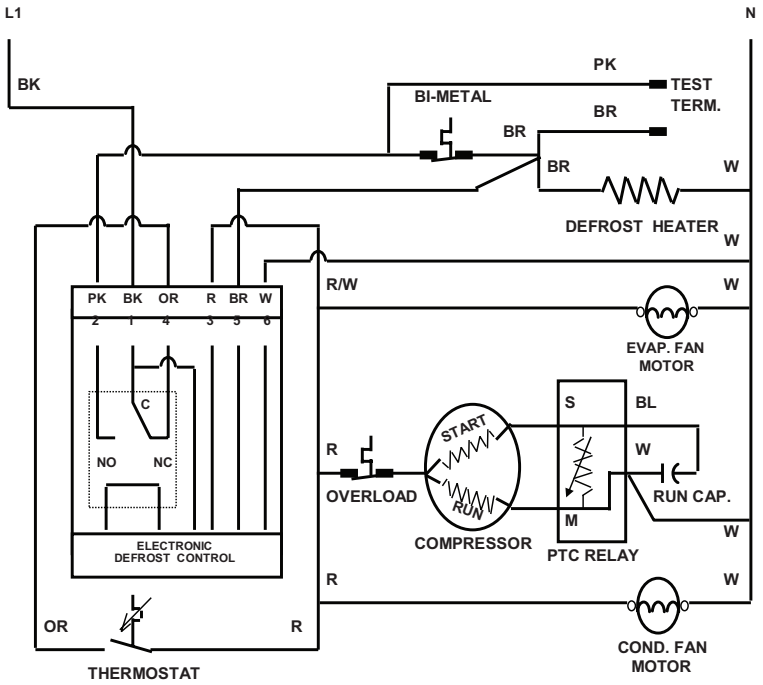
- Initiates defrost only when necessary
- Mounts same as electromechanical timer
- 4-wire connector is the same
- Also connects to brown and white wires
- ADC board has no serviceable components
- Cannot be substituted for regular timer

Operation

- When first plugged in, unit will defrost after 6 hours of compressor run time
- Defrost mode lasts 21 or 25 minutes depending on model
- After initial defrost the ADC:
- Monitors compressor run time
- Monitors defrost heater-on time
- Adapts from 8 to 100 hours between defrosts

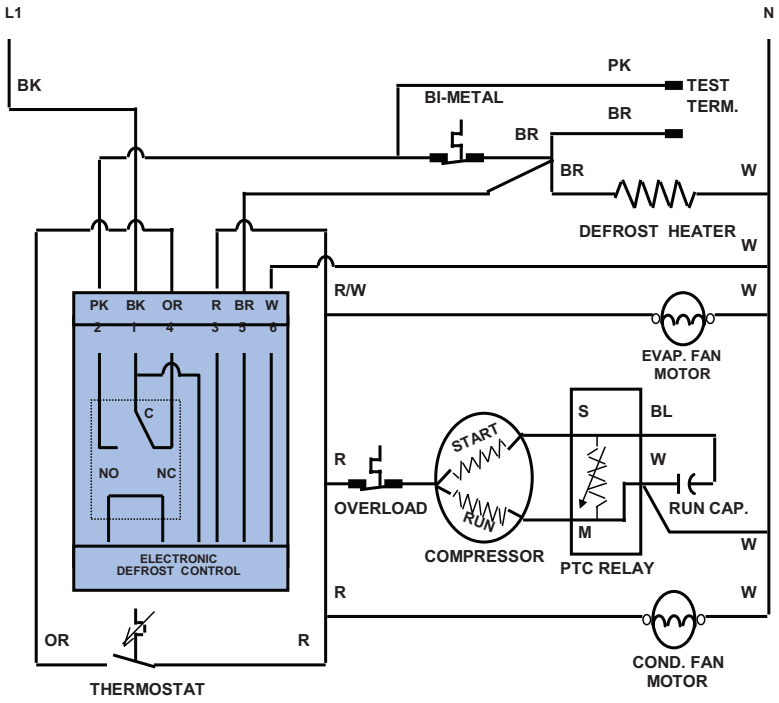
ADC - Basic Wiring Diagram

Basic Wiring Diagram



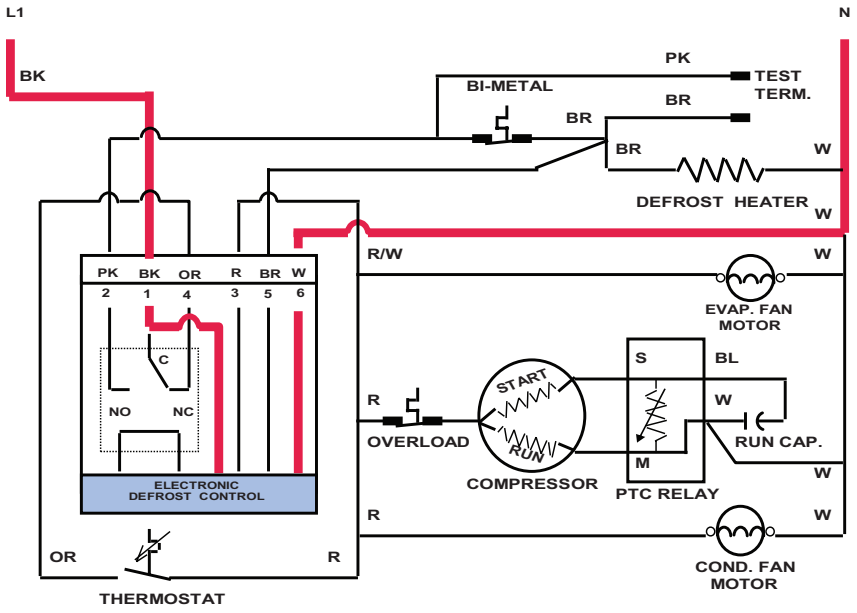
ADC - Control Board Highlighted

ADC Circuit Board Assembly



ADC Energized

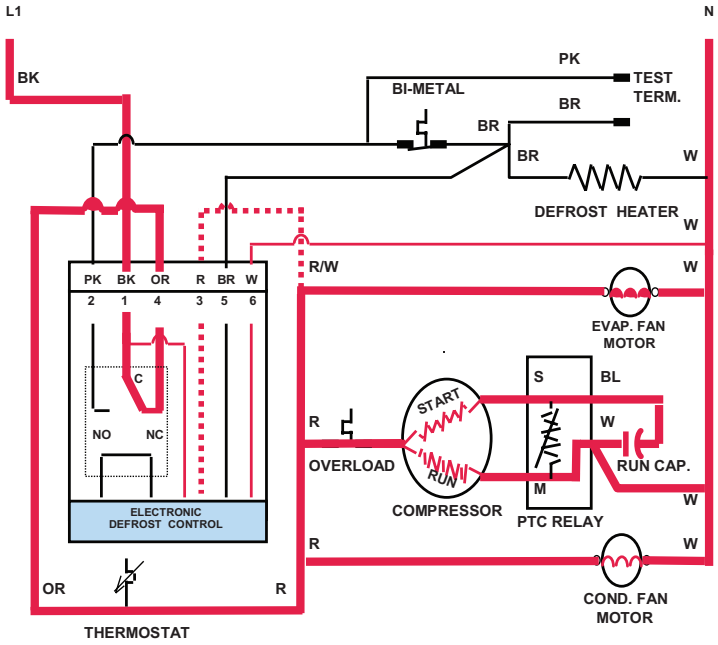
Electronic Control Energized



The ADC control is supplied 120 VAC at pins#1 and 6

Cooling Mode Circuitry

Cooling Mode

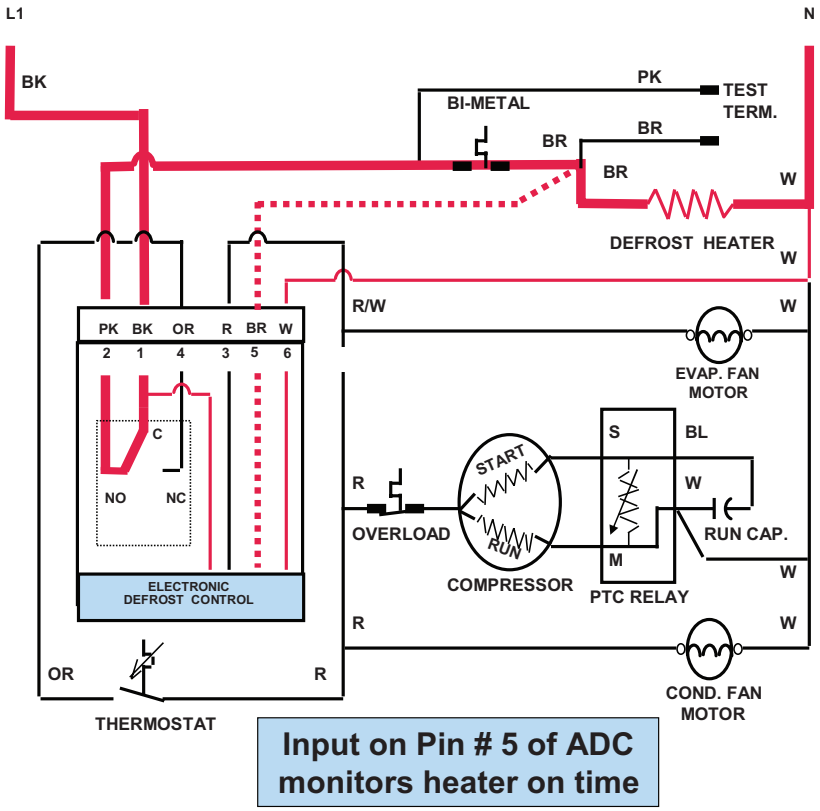


Input on Pin # 3 of ADC monitors Compressor run time

The ADC control supplies 120 VAC to the cooling circuit out of pin #4

The control monitors the compressor run time using an input signal on pin #3

Defrost Mode Circuitry



The ADC supplies 120 VAC to the defrost circuit from pin #2

The ADC monitors the amount of time the heater is energizes using an input signal on pin #5

Testing and Diagnosis

First ADC Test Method:

- Turn thermostat off for 15 seconds
- Turn thermostat on for 5 seconds
- Repeat the above two more times
- In 3 to 8 seconds ADC goes into defrost mode
- If ADC fails to go into test mode, try second test mode

Second ADC Test Method:

- Unplug unit from wall outlet for 30 seconds
- Turn thermostat off
- Plug in unit
- In 3 to 8 seconds ADC goes into defrost mode
- If ADC fails to go into test mode, check the bimetal

Maytag Adaptive Defrost Systems

Maytag produced refrigerators with adaptive defrost were produced in two different locations. The adaptive defrost systems were different. To determine the manufacturing site, check the model number tag. Products produced at the Galesburg refrigeration site include the numbers 361A near the UL certification on the model number tag. Products produced at the Amana manufacturing site include the numbers 165A near the UL certification.

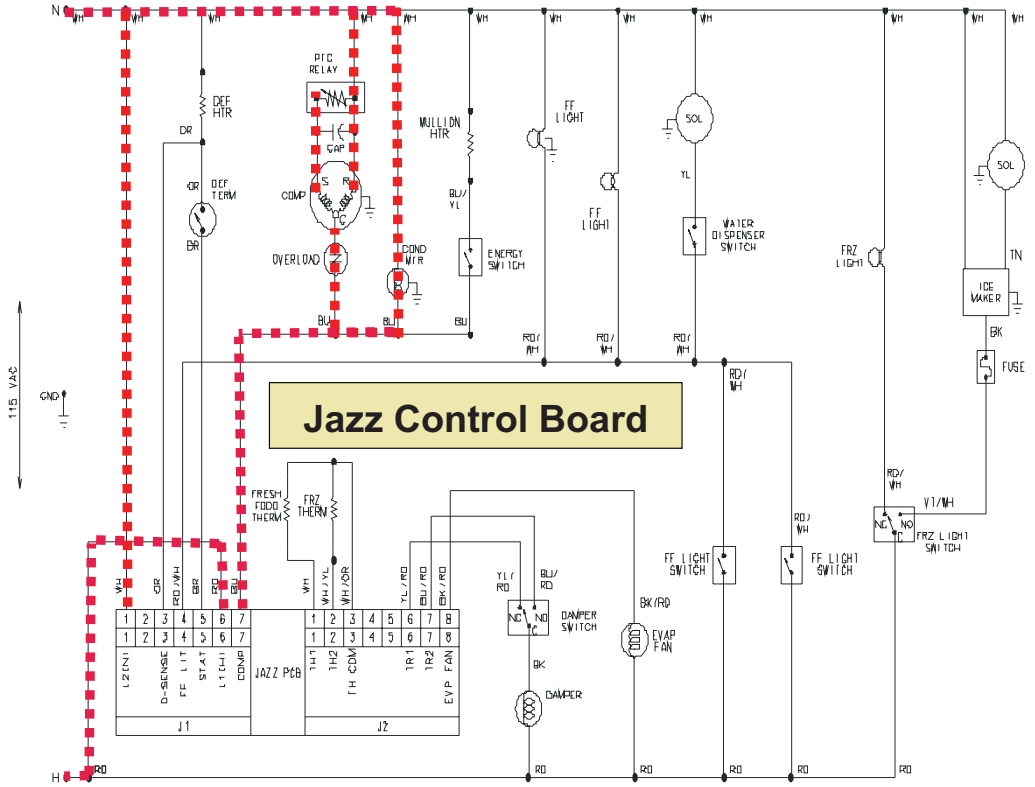
Maytag produced refrigerators can carry many more brand names than just the Maytag owned brands. The Manufacturing site number on the model tag is the guide to follow.

Maytag Refrigeration Jazz Control

Always refer to the Technical Data Sheet supplied with the refrigerator for specific details on the product you are servicing.

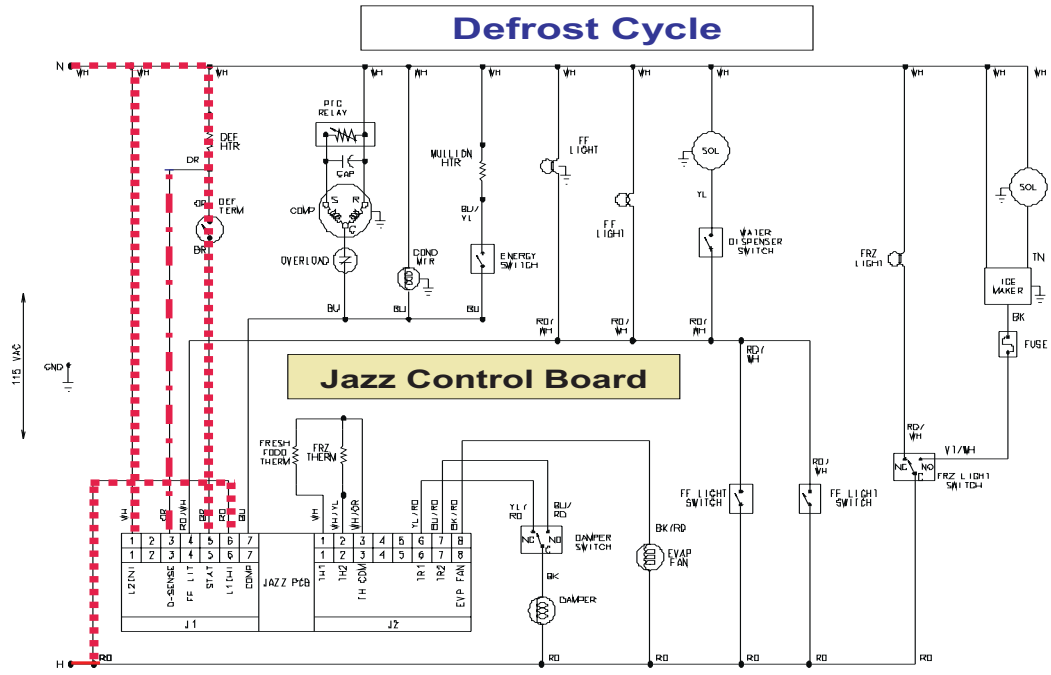
In the example Tech Sheet depicted on the following pages, not only is there information on the diagnosis, programming and troubleshooting of the defrost system but all other electrical components and accessing the built in diagnostics.

Compressor Circuit



Example; Jazz control circuitry, compressor energized

Defrost Cycle



Example; Jazz control circuitry, defrost energized

Side-by-Side Refrigerator□ Technical Information

ASD2627KE* ASD2627KE*0, JSD2690HE* JSD2690HE*2, MSD2656KE* MSD2656KE*0, MSD2656KG* MSD2656KG*0, MZD2666KE* MZD2666KE*0

⚠ CAUTION

Due to a possibility of personal injury or property damage, always contact an authorized technician for service or repair of this refrigerator. All safety information must be followed as provided in Service Manual 16025628.

⚠ WARNING

To avoid risk of electrical shock that can cause death or severe personal injury, disconnect unit from power before servicing unless testing is required. Discharge capacitors through a 10,000 ohm resistor before handling. Wires removed during disassembly must be replaced on correct terminals to ensure proper grounding and polarization.

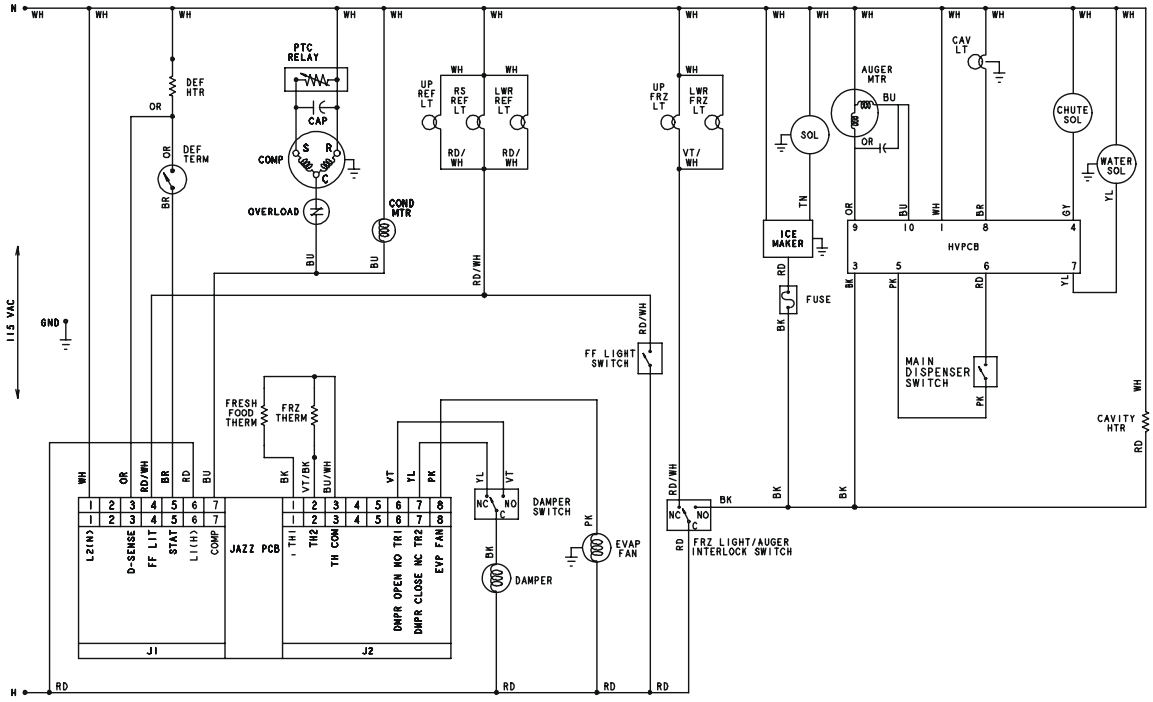
No-Load Performance, Controls in Normal Position

	Kw/24 hr ± 0.4			Percent Run Time ± 10%			Cycles/24 hr ± 25%			Refrigerator Center Compartment Average Food Temperature ± 3°F			Freezer Compartment Average Food Temperature ± 3°F		
Ambient °F	70°	90°	110°	70°	90°	110°	70°	90°	110°	70°	90°	110°	70°	90°	110°
26 cu ft	1.2	1.85	2.6	35	55	75	24	24	19	37	39	42	0	0	-2

Temperature Relationship Test Chart

	Evaporator Outlet ± 3°F		Evaporator Inlet ± 3°F		Suction Line ± 7°F		Average Total Wattage ± 10%		Suction Pressure ± 2 PSIG		Head Pressure ± 5 PSIG	
Ambient °F	70°	90°	70°	90°	70°	90°	70°	90°	70°	90°	70°	90°
26 cu ft	-15	-15	-16	-16	72	98	132	138	6"(Vac.)	0	87	137

Schematic



Component Specifications

⚠ WARNING

To avoid risk of electrical shock that can cause death or severe personal injury, disconnect unit from power before servicing unless tests require power. Discharge capacitors through a 10,000-ohm resistor before handling. Wires removed during disassembly must be replaced on correct terminals to ensure proper grounding and polarization

Component	**Specifications all parts 115VAC/60HZ unless noted**	
Compressor run capacitor	Volt	220 VAC
	Capacitance	15 μfd ± 10%
Compressor	BTUH	905 BTUH
	Watt	60 Hz / 153 watts
	Current Lock rotor	19.0 amps± 15%
	Current Full load	1.26 amps± 15%
	Resistance Run windings	3.33 ohms± 15%
	Resistance Start windings	4.28 ohms± 15%
Electric damper control	Maximum closing time	8 seconds
	Temperature Rating	20°F- 110°F
	RPM	5
Thermistor	Temperature	Resistance
	77°F	10,000 ohms± 1.8%
	36°F	29,500 ohms± 1.0%
	0°F	86,300 ohms± 1.8%
Condenser motor	Rotation (facing end opposite shaft)	Clockwise
	RPM	1120 RPM
	Watt	3.4 watts± 15%@115VAC
	Current	0.085 amps± 15%@115VAC
Evaporator fan motor	Rotation (facing end opposite shaft)	Clockwise
	RPM	2800 RPM
	Watt	5.9 ± 15% watts@115VAC
	Note: Fan blade must be fully seated on shaft to achieve proper airflow.	
Overload/Relay	Ult. trip amps @ 158°F (70°C)	2.40 amps± 15%
	Close temperature	140°F ±10°F
	Open temperature	230°F ±5°F
	Short time trip (seconds)	17 seconds ± 5
	Short time trip (amps @77°F (25°C)	12 amps ± 2amps
Thermostat (Defrost)	Volt	120/240 VAC
	Watt	475 watts
	Current	10/5 amps
	Resistance across terminals:	
	Above 42°F ±5°	Open
	Below 12°F ±7°	Closed
Evaporator heater	Volt	115 VAC
	Wattage	450 ± 5% watts @ 115VAC
	Resistance	29 ± 7.5% ohms
Control board	Volt	120VAC, 60 HZ See Control board troubleshooting section
Auger Motor	Rotation (facing end opposite shaft)	Power to blue and white is clockwise. Power to orange and white is counterclockwise.
	RPM	17± 3 RPM
Water Valve	Watts	Brown side 35w,Yellow side 20w
Light switch	Type	SPST NC
	Volt	125/250 VAC
	Current	8/4 amps
Light switch / Interlock	Type	SPDT NO/NC
	Volt	125/250 VAC
	Current	8/4 amps
Solenoid (Ice Chute)	Resistance across leads	101ohms ± 10%

Control Board Troubleshooting

⚠ WARNING

To avoid risk of electrical shock that can cause death or severe personal injury, disconnect unit from power before servicing unless tests require power. Discharge capacitors through a 10,000-ohm resistor before handling. Wires removed during disassembly must be replaced on correct terminals to ensure proper grounding and polarization.

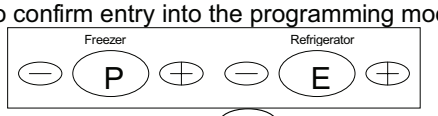
Programming Mode:

Note: The Program Code is located on the Serial Plate on this unit after the word Code.

1. Open the Fresh Food door and hold the Fresh Food door light switch closed while pushing the Freezer Temperature Down ⊖ Key pad 3 times consecutively.

Note: The 3 Keystrokes must be done consecutively and within 10 seconds.

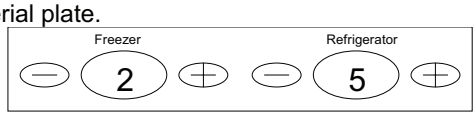
2. Release the Fresh Food door light switch.
3. The control will display PE to confirm entry into the programming mode.



4. Entry is confirmed by pressing the Freezer Down ⊖ key once more.

Note: All control functions will be turned off (Compressor, Defrost, Evaporator Fan, the damper will remain in its current position).

5. The control will display the current Program Code. This value should be validated with the Program Code printed on the unit serial plate.



Note: If the Program Code is correct, the Programming Mode is exited by closing the Refrigerator door(s).

6. To set the desired Program Code number press the Freezer and Refrigerator UP ⊕ keys. The corresponding digit will be advanced with each key press.
7. Once the desired Program Code is displayed, press the Freezer DOWN ⊖ Key until the Program Code begins flashing indicating it has been saved.

Note: If you attempt to enter an invalid Program Code the control will not save the new code, but will flash the old code and this will be displayed. (The unit will NOT run with a Program Code of 00).

8. Once the Program Code has been saved the Programming Mode is exited by closing the Refrigerator door(s). If the new code is incorrect this process should be repeated after closing the Refrigerator door(s).

The Programming mode can be exited at any time by closing the Refrigerator Door(s).

Defrost Operation:

The Control Board adapts the compressor run time between defrosts to achieve optimum defrost intervals by monitoring the length of time the defrost heater is on.

After initial power up, defrost interval is 4 hours compressor run time. Defrost occurs immediately after the 4 hours.

Note: Once unit is ready to defrost there is a 4 minute wait time prior to the beginning of the defrost cycle. Optimum defrost is 15 minutes. Each additional minute the defrost thermostat remains closed, 1 hr. is subtracted from the previous defrost interval. Each minute the thermostat opens prior to optimum defrost, it extends the next defrost interval 1 hr. When defrost thermostat opens there is a 4-6 minute drip time before compressor restarts or Control Board will terminate defrost at 25 minutes if defrost thermostat has not opened and will reset the defrost interval to the 8 hr. minimum setting.

4 hours of continuous compressor run resets the next defrost interval to 8 hours and will initiate a defrost, if 8 hours of compressor run time has also occurred.

Forced Defrost Mode:

Power up Refrigeration mode will occur unless both the cold control and defrost terminator are open, in that case the defrost mode will occur for 2 minutes.

The forced defrost function is performed using the refrigerator display and keypad. Enter the Forced Defrost Mode by performing the following sequence of events:

1. Hold the refrigerator door light switch closed.
2. Press the Refrigerator Temperature Down ⊖ keypad 3 times consecutively.

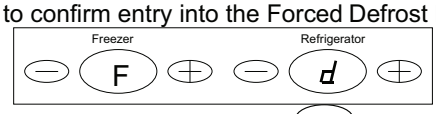
Note: The 3 keystrokes must be consecutive and within 10 seconds.

Control Board Troubleshooting

WARNING

To avoid risk of electrical shock that can cause death or severe personal injury, disconnect unit from power before servicing unless tests require power. Discharge capacitors through a 10,000-ohm resistor before handling. Wires removed during disassembly must be replaced on correct terminals to ensure proper grounding and polarization.

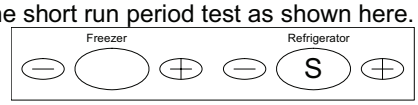
3. Release the refrigerator door light switch.
4. The control will display Fd to confirm entry into the Forced Defrost Mode.



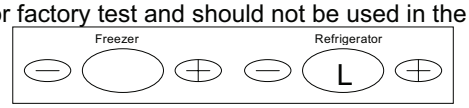
5. Entry is confirmed by pressing the Refrigerator Down ⊖ key once more. The unit is off and in the Defrost Mode.

Note: All control functions will be turned off (Compressor, Defrost, Evaporator Fan, the damper will remain in its current position).

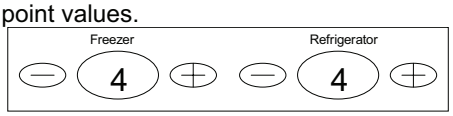
6. The control will default to the short run period test as shown here.



Note: You can toggle between the (S)hort and (L)ong test mode by pressing the Refrigerator UP ⊕ Key. Long Test mode is used for factory test and should not be used in the field.



7. Once the desired mode is displayed, confirm the forced defrost by pressing the Refrigerator ⊖ down Key once. The defrost will begin immediately and the display will return to a normal operating display with set point values.



8. Close the Refrigerator door(s). You are in the defrost mode.

Note: Forced Defrost mode can be exited at any time prior to step 7 by closing the Refrigerator Door(s).

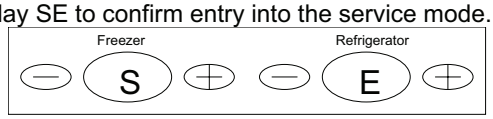
Service Test Mode:

The service test functions are performed using the refrigerator display and keypad. Enter the Service Test Mode by performing the following sequence of events:

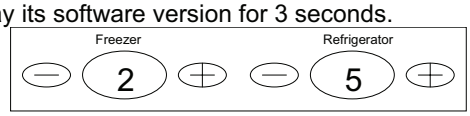
1. Hold the refrigerator door light switch closed.
2. Press the Refrigerator Temperature Up ⊕ keypad 3 times consecutively.

Note: The 3 Keystrokes must be done consecutively and within 10 seconds.

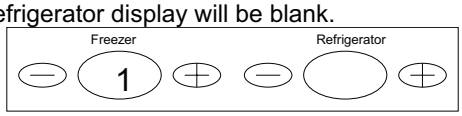
3. Release the refrigerator door light switch.
4. The control will display SE to confirm entry into the service mode.



5. Entry to the Service Menu is confirmed by pressing the Refrigerator Up ⊕ key once more.
6. The control will display its software version for 3 seconds.



7. Following the software revision display the freezer display will read the first test number in the diagnostic tree. The refrigerator display will be blank.



Note: All control functions will be turned off (Compressor, Defrost, Evaporator Fan, the damper will remain in its current position).

8. You are now in the SERVICES TEST operational mode and may use the diagnostic tests.

The Service Test Mode can be exited at any time by closing the Refrigerator Door(s).

Control Board Troubleshooting

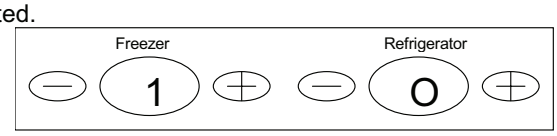
WARNING

To avoid risk of electrical shock that can cause death or severe personal injury, disconnect unit from power before servicing unless tests require power. Discharge capacitors through a 10,000-ohm resistor before handling. Wires removed during disassembly must be replaced on correct terminals to ensure proper grounding and polarization.

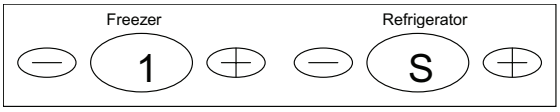
Service Test 1 – Defrost Thermostat & Defrost Circuit Test

When selected this test will display the state of the defrost thermostat. In order to perform this test the defrost heater will be energized. The test is activated and deactivated using the Refrigerator Up ⊕ key. Once activated, this test must be deactivated to move to another test number. The Freezer Up ⊕ / Down ⊖ keys allow selection of the test to be performed.

This test also allows observation and measurement of proper defrost function. You can observe defrost heat and voltages while the test is activated.



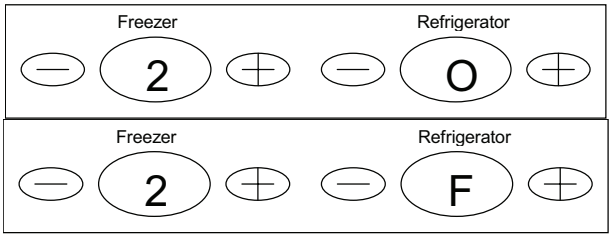
DEFROST THERMOSTAT OPEN



DEFROST THERMOSTAT SHORTED (CLOSED)

Service Test 2 – Compressor/Condenser Fan Test

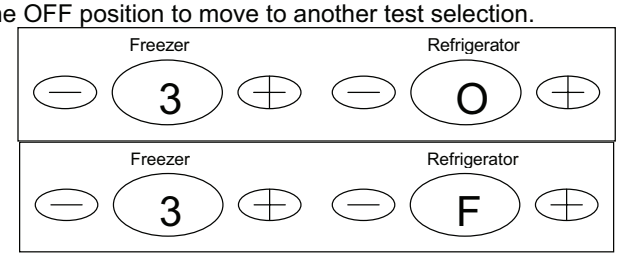
When selected and activated this test will operate the Compressor/Condenser Fan circuit. You should evaluate proper operation of the compressor and condenser fan. The Refrigerator Up ⊕ key will toggle between "O" / "F" (ON & OFF) the compressor drive circuit. The test must be "deactivated" or in the OFF position to move to another test selection.



OBSERVE COMPRESSOR & CONDENSER FAN FUNCTION

Service Test 3 – Evaporator/Freezer Fan Test

When selected and activated this test will operate the freezer fan. The Refrigerator Up ⊕ key will toggle between "O" / "F" (ON & OFF) the fan drive circuit. You will have to inspect the fan for proper function. The test must be "deactivated" or in the OFF position to move to another test selection.



OBSERVE FAN OPERATION

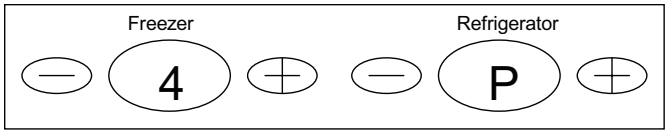
Control Board Troubleshooting

⚠ WARNING

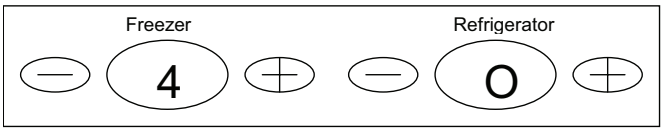
To avoid risk of electrical shock that can cause death or severe personal injury, disconnect unit from power before servicing unless tests require power. Discharge capacitors through a 10,000-ohm resistor before handling. Wires removed during disassembly must be replaced on correct terminals to ensure proper grounding and polarization.

Service Test 4 – Fresh Food Thermistor Test

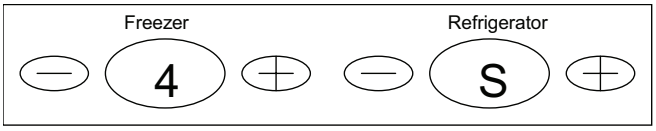
When selected and activated this test will display Pass, Open, Short result for a test on the Fresh Food Thermistor circuit as shown below. The test is activated and deactivated via the Refrigerator Up ⊕ key, and must be deactivated to move to another test selection.



PASS RESULT



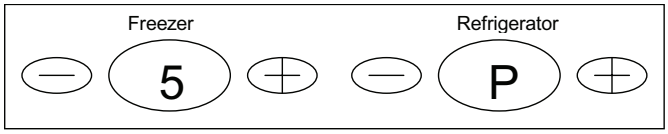
OPEN RESULT



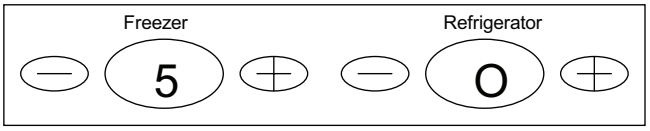
SHORT RESULT

Service Test 5 – Freezer Thermistor Test

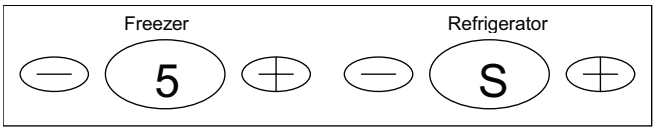
When selected this test will display Pass, Open, Short result for a test on the Freezer Thermistor circuit as shown below. The test is activated and deactivated via the Refrigerator Up ⊕ key, and must be deactivated to move to another test selection.



PASS RESULT



OPEN RESULT



SHORT RESULT

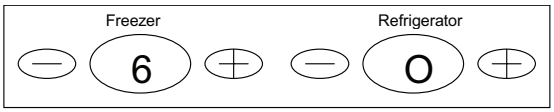
Control Board Troubleshooting

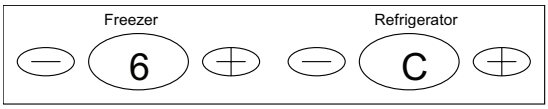
WARNING

To avoid risk of electrical shock that can cause death or severe personal injury, disconnect unit from power before servicing unless tests require power. Discharge capacitors through a 10,000-ohm resistor before handling. Wires removed during disassembly must be replaced on correct terminals to ensure proper grounding and polarization.

Service Test 6 – Open Damper Test

When selected this test will indicate the current position “O” / “C” (OPEN / CLOSED) of the refrigerator damper. The Refrigerator Up ⊕ key will toggle the damper open and closed. You must allow 1 minute for each attempt to change the damper position. You should observe proper damper function.





OBSERVE DAMPER FUNCTION

CAUTION

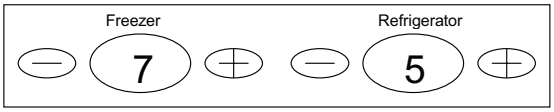
Adjustments of Service Test 7 or Service Test 8 will alter the performance of the unit.

Service Test 7 – FF Performance Adjustment

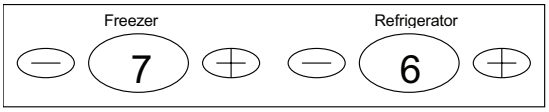
This test will allow adjustment of the control performance points. Each step will incrementally change the Refrigerator performance warmer (towards 1) or colder (towards 9) as adjusted. The default value is 5.

The refrigerator ⊕/⊖ Up/Down keys are used to adjust the Performance Offset value.

WARMER ←(1 2 3 4 (**5**) 6 7 8 9) → COLDER.



DEFAULT



COLDER

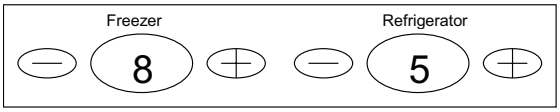
The last FF Performance Offset value displayed before leaving test 7 will be saved when the refrigerator door(s) is closed.

Service Test 8 – FZ Performance Adjustment

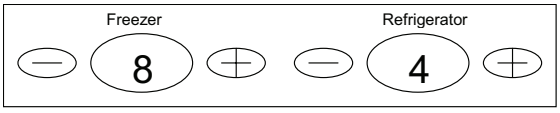
This test will allow the adjustment of the control performance points. Each step will incrementally change the Freezer performance warmer (towards 1) or colder (towards 9) as adjusted. The default value is 5.

The refrigerator ⊕/⊖ Up/Down keys are used to adjust the Performance Offset value.

WARMER ←(1 2 3 4 (**5**) 6 7 8 9) → COLDER.



DEFAULT



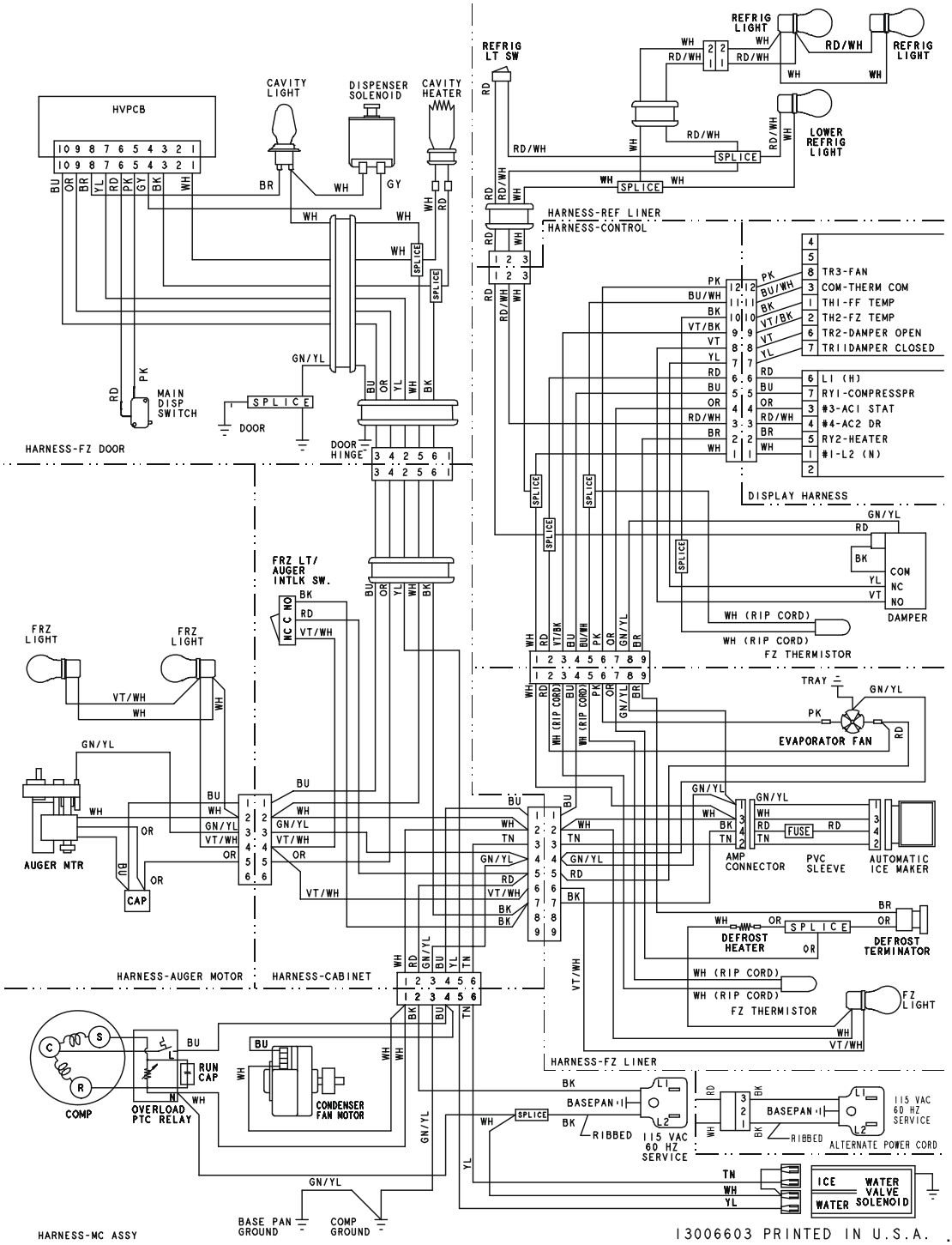
WARMER

The last FZ Performance Offset value displayed before leaving test 8 will be saved when the refrigerator door(s) is closed.

Wiring Diagram

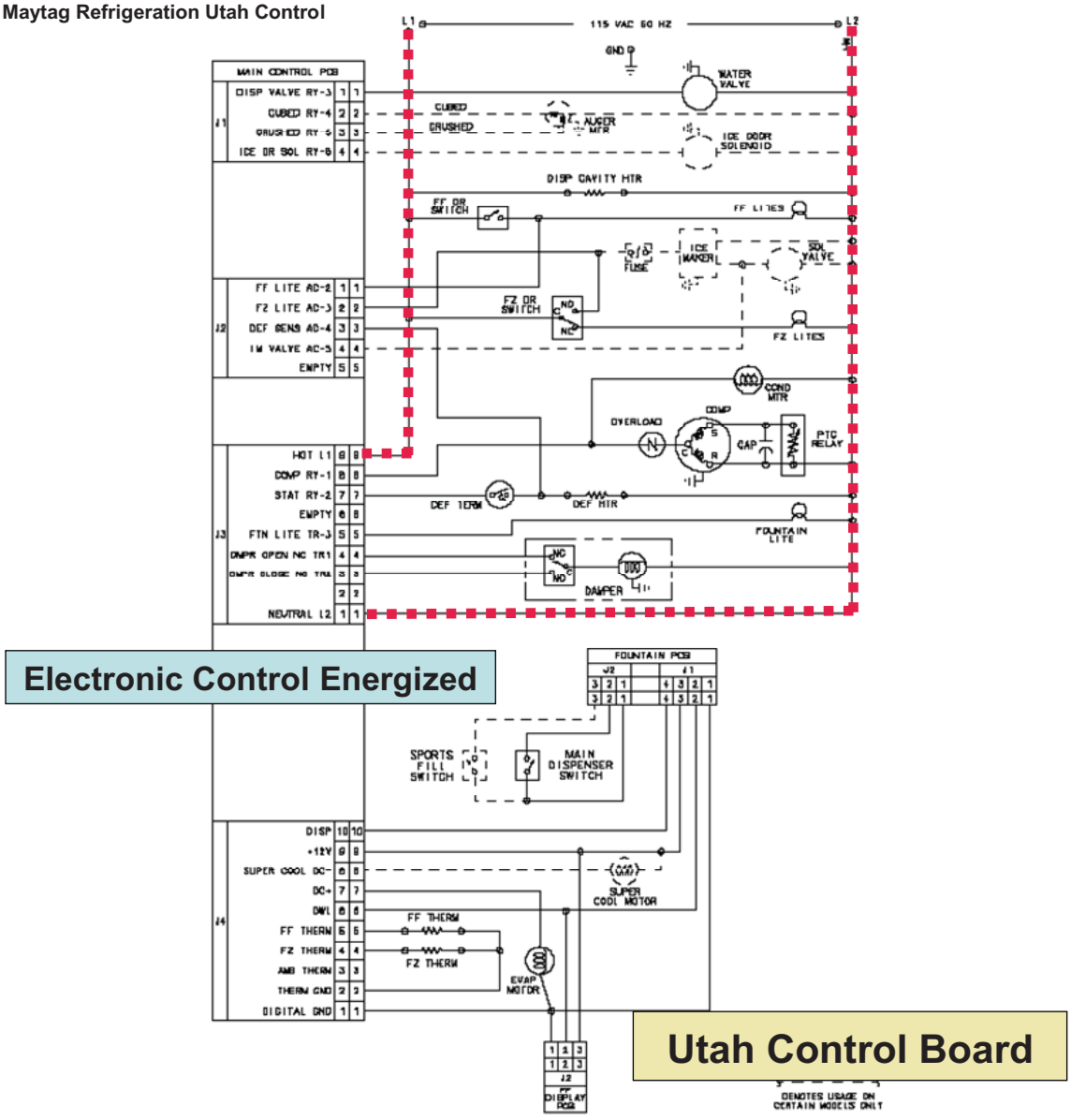
WARNING

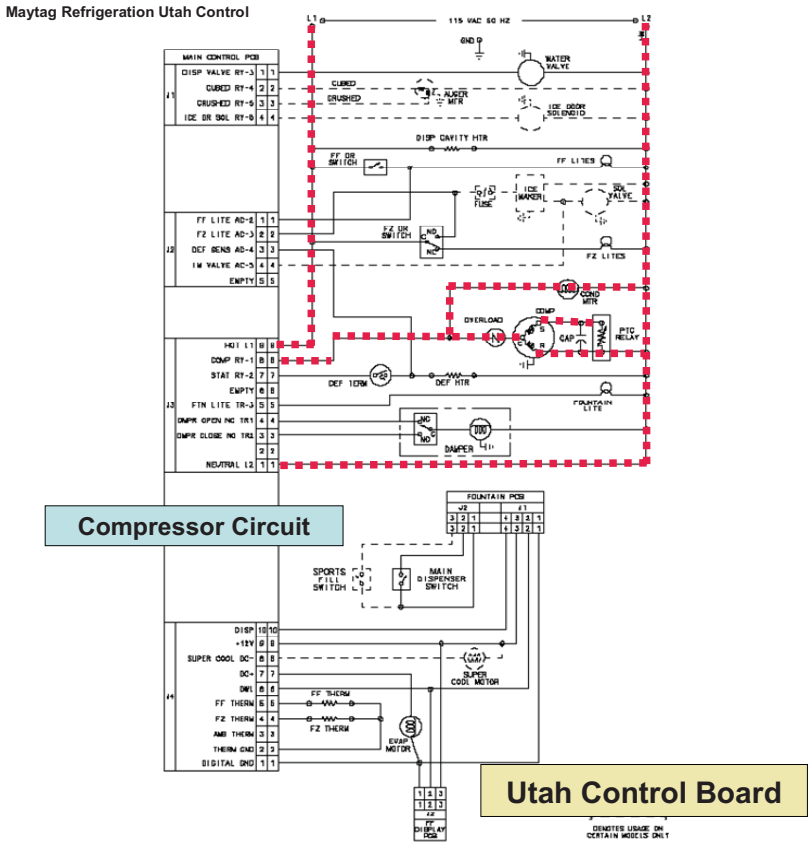
To avoid risk of electrical shock that can cause death or severe personal injury, disconnect unit from power before servicing unless tests require power. Discharge capacitors through a 10,000-ohm resistor before handling. Wires removed during disassembly must be replaced on correct terminals to ensure proper grounding and polarization.



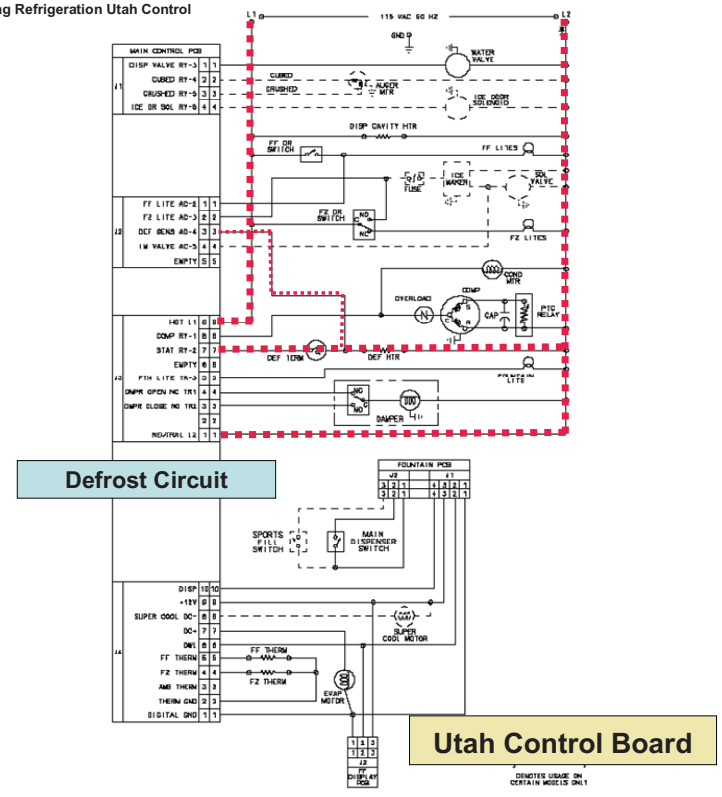
Maytag UTAH Control / Jenn-Air Refrigerator User Interface

Maytag Refrigeration Utah Control





Example; Maytag Utah circuitry, compressor energized



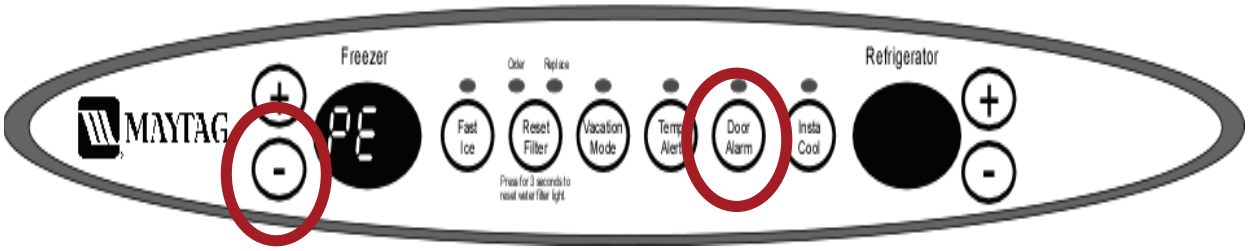
Example; Maytag Utah circuitry, defrost energized

Maytag Refrigeration
Utah Control Service Modes

Mode	Activation Buttons	Freezer Display	Ref Display
Programming	Door Alarm Freezer Temp Down	PE	
Showroom	Door Alarm Freezer Temp Up	SH	On/Off
Forced Defrost	Door Alarm Refrigerator Temp Down	Fd	SH
Service Test	Door Alarm Refrigerator Temp Up	SE/001	_ _ _

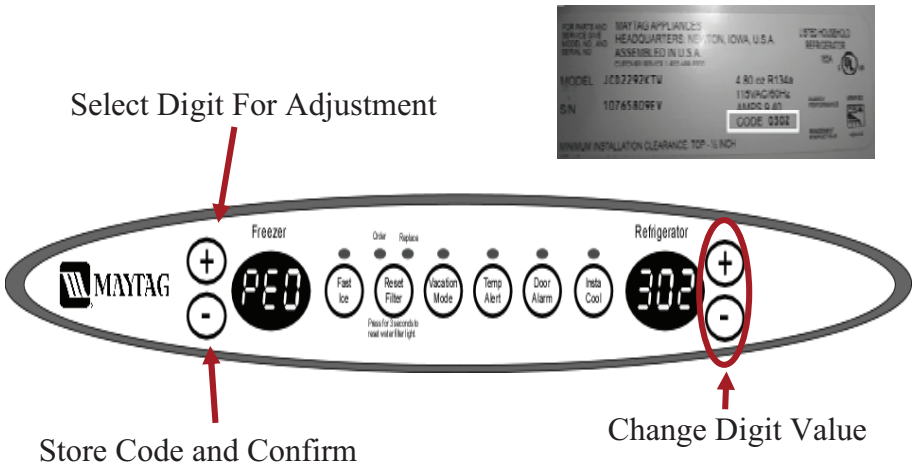
Utah Programming Mode

- Programming mode is entered through the door alarm key and the freezer temperature down key.
- PE will appear in the freezer display



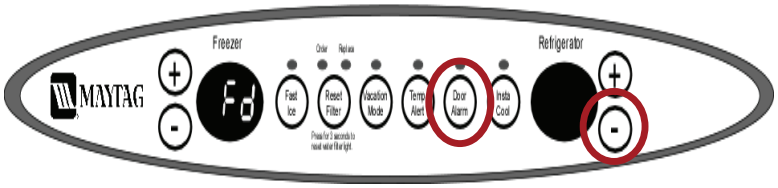
Utah programming mode

- After entering the programming mode PE and the code will be displayed in the freezer and refrigerator display.



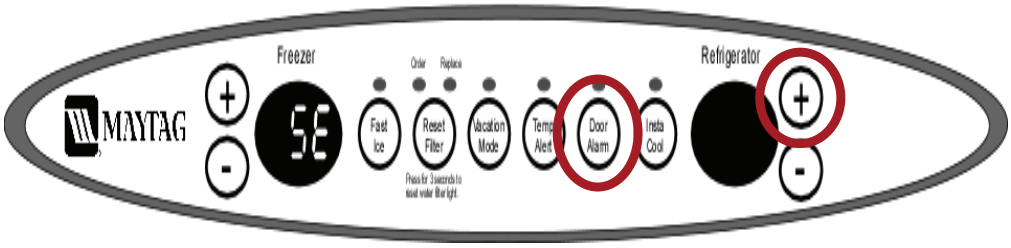
Forced Defrost Mode

- Forced defrost mode is entered through the door alarm key and the refrigerator temperature down key.



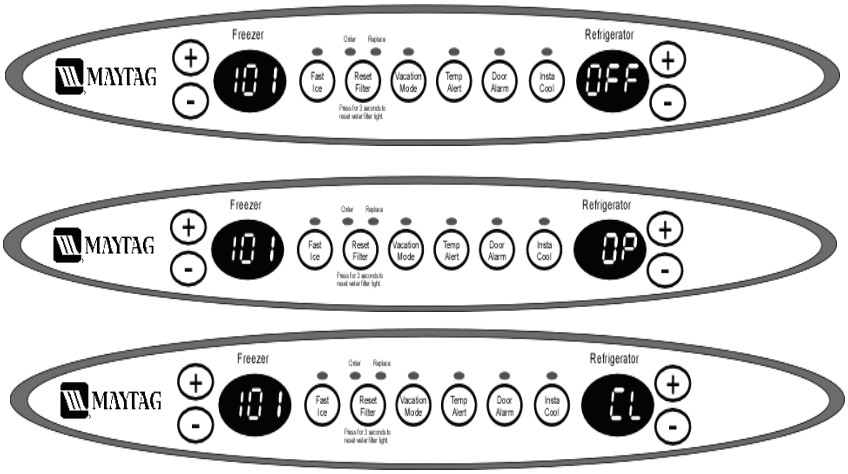
Service Test Mode

- Service test mode is entered through the door alarm key and the refrigerator temperature up key.



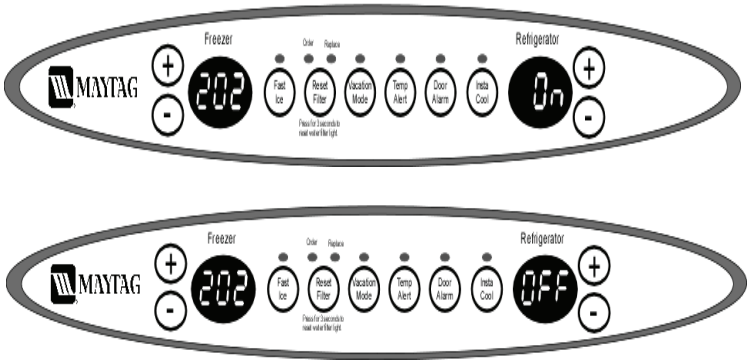
Service Test 101

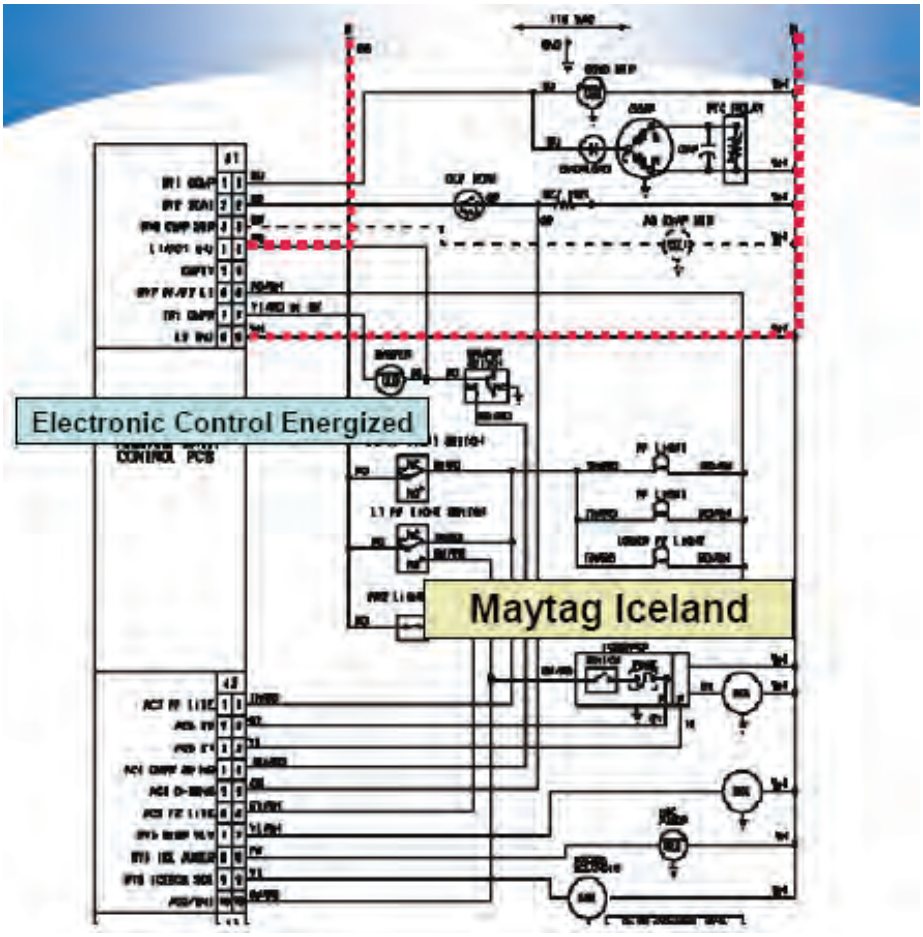
101	Defrost Heater & Defrost Circuit	This test will either energize or de-energize the defrost circuit. The refrigerator display will show: ▪ OFF when de-energized ▪ OP when energized with an open defrost thermostat ▪ CL when energized with a closed defrost thermostat



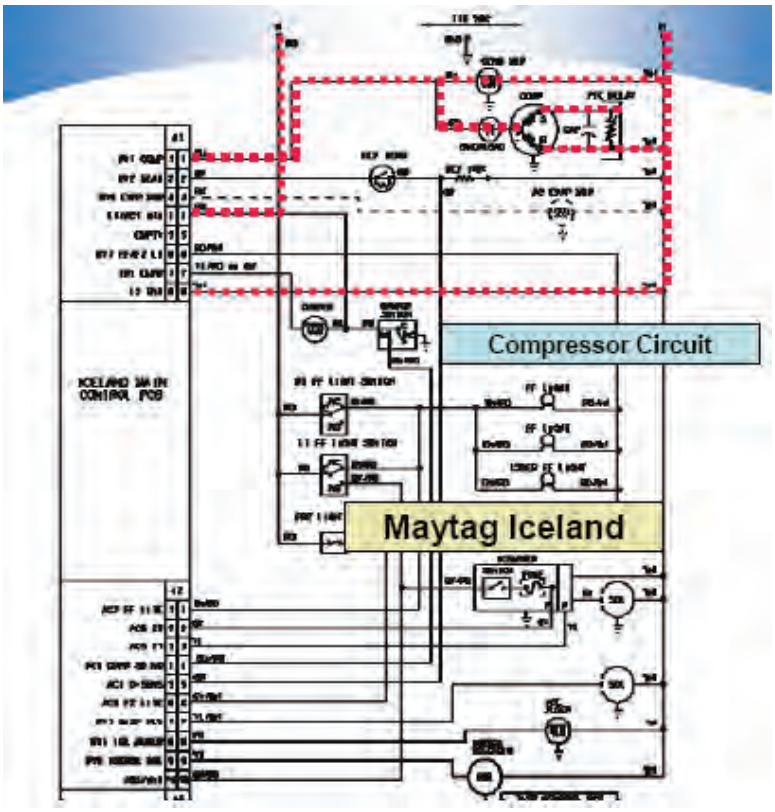
Service Test 202

202	**Default Defrost Operation**	**Change defrost operation from normal adaptive defrost in the OFF position to minimum time defrost in the On position.**

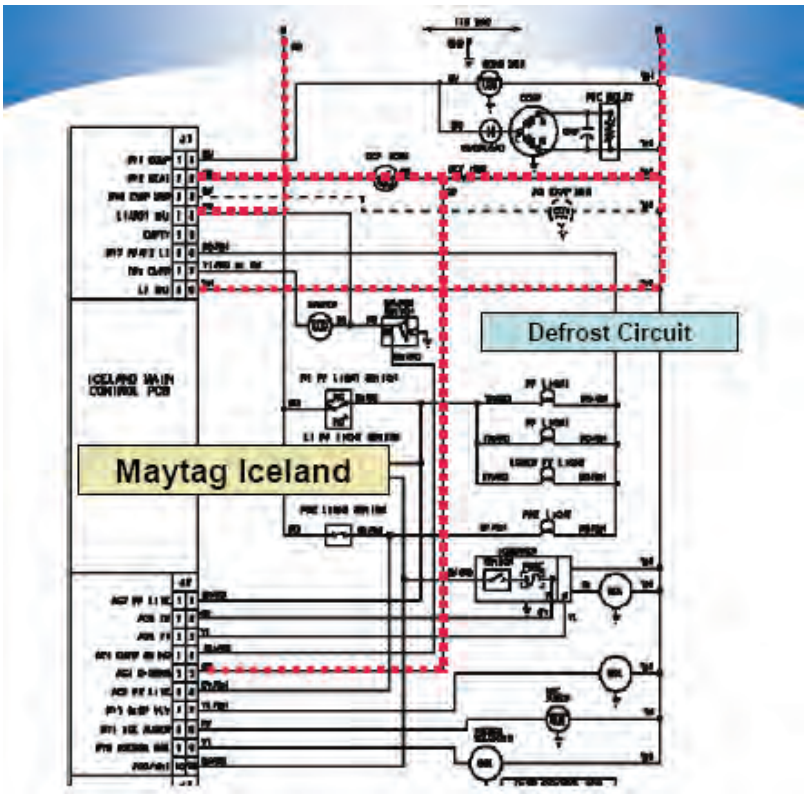




Example; Maytag Iceland Circuitry; Electronic Control Energized

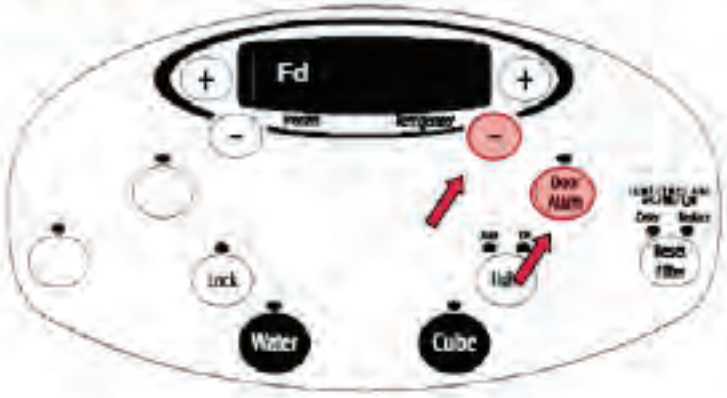


Example; Maytag Iceland Circuitry; Compressor Energized



Example; Maytag Iceland Circuitry; Defrost Circuit Energized

Forced Defrost- Used to run Defrost heaters through complete cycle

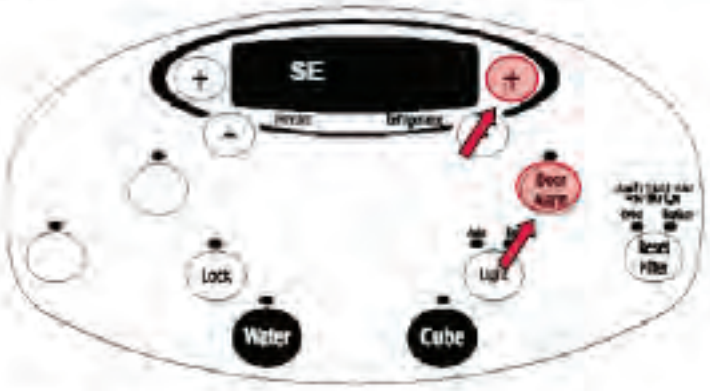


- To Force Unit into Defrost, Press and hold the Door Alarm (first) and Temperature Down Keypads
- Release the Door Alarm Keypad and wait 3 seconds
- FD appears in Freezer display

Forced Defrost- Used to run Defrost heaters through complete cycle

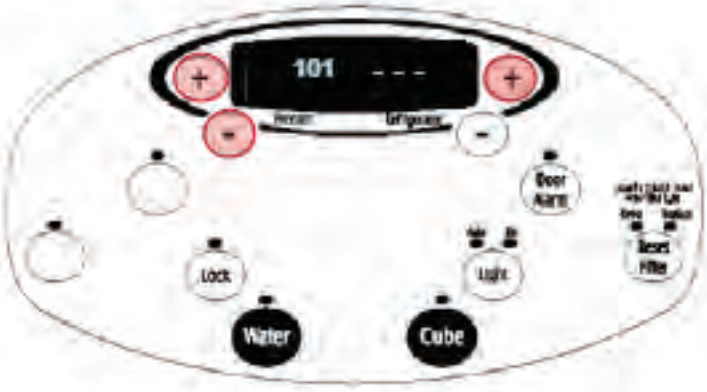
- Press Refrigerator Down Keypad again.
- Press Refrigerator Down Keypad again and FD and SH will flash to indicate that unit is in defrost.

Service Mode- Used to Toggle Components On and Off



- Press and hold Door Alarm (first) and Refrigerator UP Keypads
- Release the Door Alarm Keypad and wait for 3 seconds
- SE will appear

Service Mode



- Press Refrigerator UP Keypad again
- Display will show 101 in left display and dashes in right display
- Press Freezer Up and Down keypads to toggle through Service Test numbers

Service Tests

Service Test – 101 Defrost Heater & Defrost Circuit

- Press the Refrigerator Up keypad and Refrigerator Down keypad to energize or de-energize the defrost circuit.
- The display will read OFF when de-energized OP when energized with open defrost thermostat and CL when energized with closed defrost thermostat.

Service Tests

Service Test – 202 Default Defrost Operation

Press the Refrigerator Up Keypad or Refrigerator Down Keypad to change Defrost Operation from normal adaptive defrost (Off position) to minimum time between defrosts (On position).

2001 K MODEL COUNTER DEPTH SIDE-BY-SIDE REFRIGERATOR WITH VARIABLE CAPACITY COMPRESSOR

MODELS:

KSBP25FKSS00
KSBS25FKBL00
KSBS25FKBT00
KSBS25FKWH00
KSCS25FKSS00
KSFS25FKBL00
KSFS25FKBT00
KSFS25FKWH00

ADAPTIVE DEFROST

The adaptive defrost control allows the unit to enter a defrost mode only when it is needed.

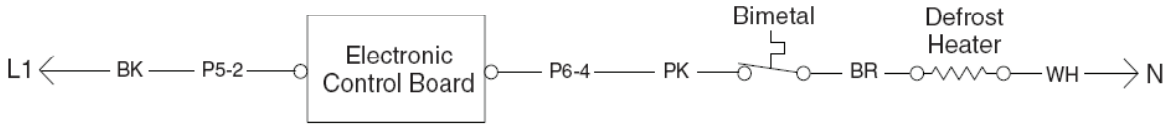
When powered up for the first time, the control initiates a defrost cycle after 8 hours of compressor run time. By monitoring the duration of defrost heating time and compressor run time, the control will continuously adapt the time between defrosts to optimize efficiency. Time between defrost periods will vary between 8 and 100+ hours. Defrost will occur immediately when the compressor has run at 4000 rpm or greater for 1hour, and 8 hours have elapsed since the last defrost.

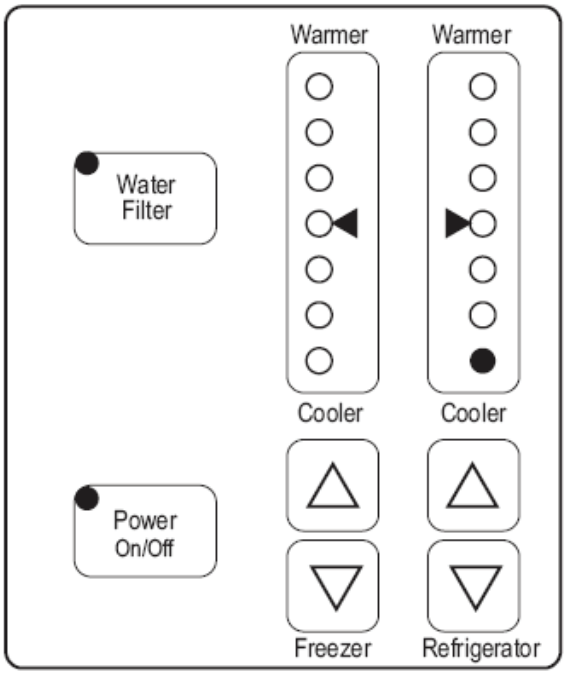
PULSED DEFROST

For the first 7 minutes of defrost, the heater is on continuously. It will then cycle off for 1 minute, and back on for 2 minutes. The heater will continue to cycle at this ratio until the bimetal opens, or until 33 minutes has elapsed. At this point, heat is discontinued, and a 4-minute “drip time” begins. This allows the water to drain before the unit returns to a cooling mode. Maximum defrost time, (pulsed heat on/off time + drip time) is 37 minutes. When entering a defrost cycle, if the bimetal is open, the time to defrost is reset to 8 hours, and the control will time through the entire 37 minute defrost period. During diagnostics this will allow a technician time to look for heater operation, and if necessary, bypass the bimetal.

THE DEFROST CYCLE

The Defrost Heater





DIAGNOSTICS MODE

The Diagnostics Mode is used to:

- Check the refrigerator & freezer thermistors.
- Operate the evaporator fan motor at 3000 rpm.
- Operate the condenser fan motor and compressor.
- Check the defrost bimetal and heater.

To enter the Diagnostics Mode, the control must be turned on, and be in a normal cooling mode.

Both the Power On/Off and the Water Filter Reset keys must be functional. The refrigerator LEDs will show the step number, with the bottom LED being #1. The results of the checks are shown on the water filter status indicator. Green indicates good and red indicates bad. After 20 minutes, the control will default from the Diagnostics Mode to a normal cooling mode.

To enter the diagnostics mode:

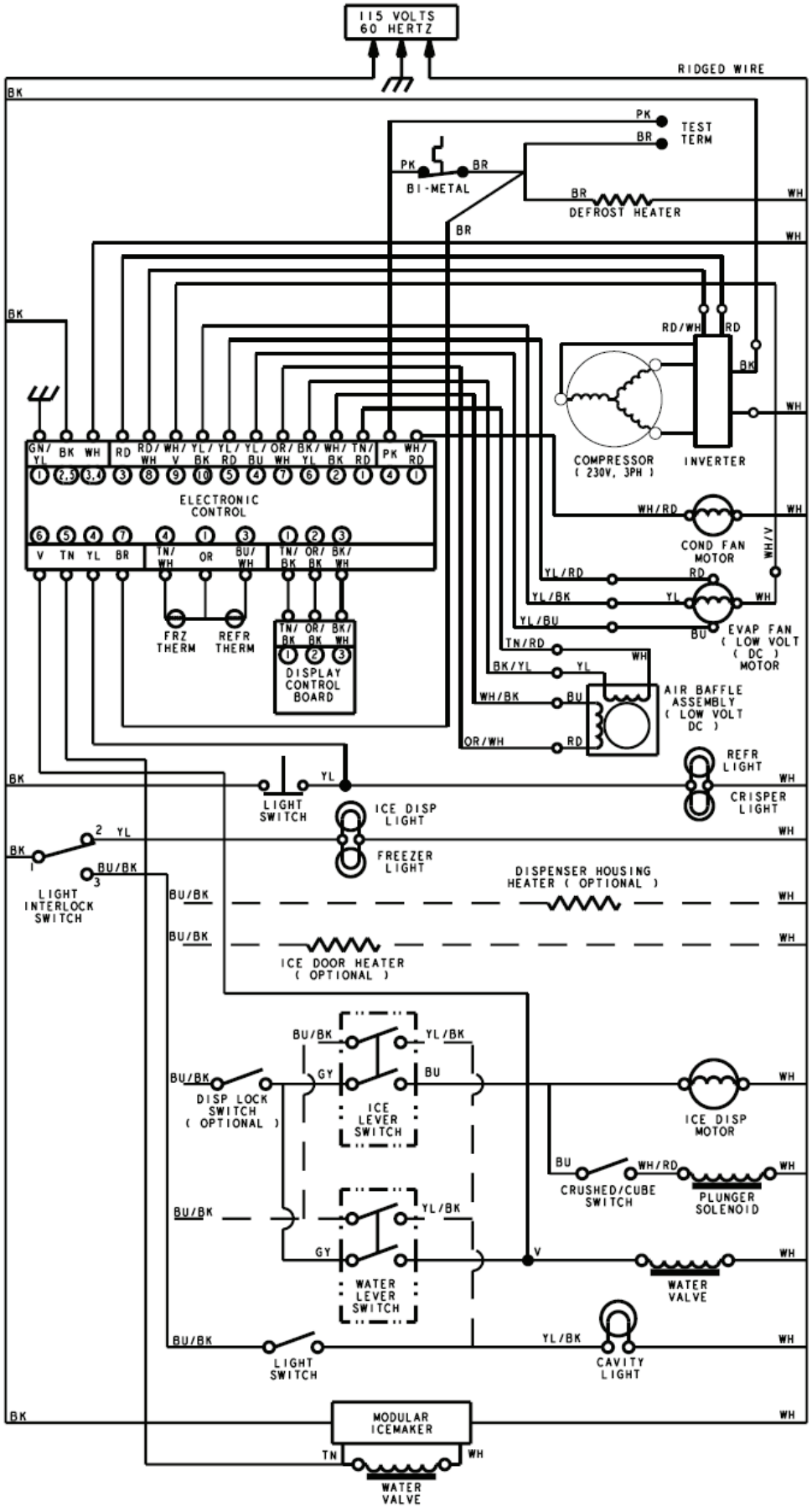
- Press and hold the Water Filter Reset keypad, and then immediately press and hold the Power keypad. Continue to press both keypads for 3 seconds, or until you hear a beep.

To advance the diagnostics sequence:

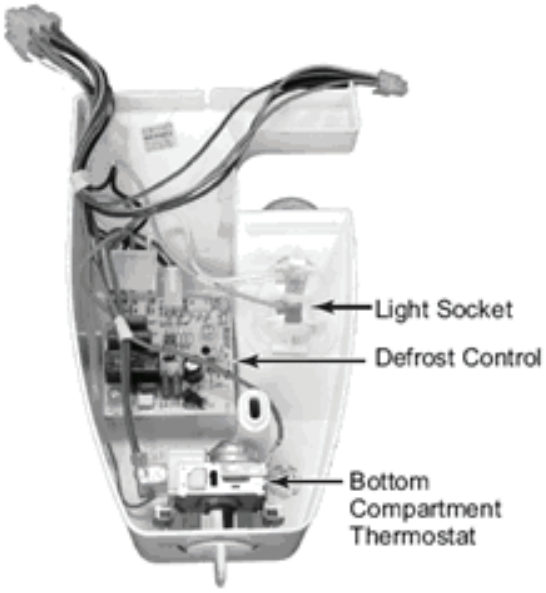
- To advance to the next step in the sequence, press and hold the Water Filter Reset key for 2 seconds, or until you hear a beep. The Diagnostics Chart on the following page shows the step number and the component being tested in each step.

Step	Component Tested	Result*	Comment
01	Freezer Thermistor.	Green	Thermistor is within normal range.
		Red	Thermistor is open or less than –20°F.
		Red	Thermistor is shorted or greater than 115°F.
02	Refrigerator Thermistor.	Green	Thermistor is within normal range.
		Red	Thermistor is open or less than 10°F.
		Red	Thermistor is shorted or greater than 115°F.
03	Evaporator Fan Motor.	Green	Evaporator Fan Motor is On at correct speed.
		Red	Evaporator Fan Motor is On at incorrect speed.
04	Condenser Fan Motor.	Green	Condenser Fan Motor is On.
05	Compressor.	Green	Compressor is On at 4500 rpm.
		Red	Compressor is Off waiting for minimum (7 minute) Off delay.
06	Air Door.	Green	Air Door fully opens.**
07	Bimetal/Defrost Heater.	Green	Defrost Heater is energized, bimetal closed.
		Red	Bimetal open. †

Press the “Water Filter Reset” to exit diagnostics.


115 VOLTS
60 HERTZ
RIDGED WIRE
BK
PK
TEST
TERM
BR
PK
BR
BI-METAL
BR
DEFROST HEATER
WH
BR
WH
BK
RD/WH
RD
BK
WH
COMPRESSOR
(230V, 3PH)
INVERTER
GN/ YL
BK
WH
RD
RD/ WH
WH/ V
YL/ BK
YL/ RD
YL/ BU
OR/ WH
BK/ YL
WH/ BK
TN/ RD
PK
WH/ RD
ELECTRONIC
CONTROL
V
TN
YL
BR
TN/ WH
OR
BU/ WH
TN/ BK
OR/ BK
BK/ WH
FRZ
THERM
REFR
THERM
DISPLAY
CONTROL
BOARD
WH/RD
WH
COND FAN
MOTOR
WH/V
YL/RD
RD
YL/BK
YL
WH
YL/BU
BU
EVAP FAN
(LOW VOLT
(DC)
MOTOR
TN/RD
BK/YL
YL
WH
WH/BK
BU
AIR BAFFLE
ASSEMBLY
(LOW VOLT
DC)
OR/WH
RD
REFR
LIGHT
WH
CRISPER
LIGHT
BK
YL
LIGHT
SWITCH
ICE DISP
LIGHT
FREEZER
LIGHT
WH
BK
2
YL
1
3
BU/BK
LIGHT
INTERLOCK
SWITCH
BU/BK
DISPENSER HOUSING
HEATER (OPTIONAL)
WH
BU/BK
ICE DOOR HEATER
(OPTIONAL)
WH
BU/BK
YL/BK
GY
BU
BU/BK
DISP LOCK
SWITCH
(OPTIONAL)
ICE
LEVER
SWITCH
ICE DISP
MOTOR
WH
BU
WH/RD
WH
CRUSHED/CUBE
SWITCH
PLUNGER
SOLENOID
BU/BK
YL/BK
GY
V
WH
WATER
LEVER
SWITCH
WATER
VALVE
BU/BK
YL/BK
WH
LIGHT
SWITCH
CAVITY
LIGHT
BK
MODULAR
ICEMAKER
WH
TN
WH
WATER
VALVE

Model GAFZ21XXMK00



DIAGNOSTICS

ADAPTIVE DEFROST CONTROL (ADC) TEST MODE

The refrigerator/freezer defrost system can be checked by manually initiating a defrost cycle. The following shows two methods for initiating the Adaptive Defrost Control (ADC) Test Mode.

Test Method #1

1. Turn the thermostat off for 15 seconds.
2. Turn the thermostat on for 5 seconds.
3. Turn the thermostat off for 15 seconds.
4 Turn the thermostat on for 5 seconds.
5. Turn the thermostat off for 15 seconds.
6. Turn the thermostat on for 5 seconds.
7. Turn the thermostat off.

The ADC should turn the defrost heater On within 3 to 8 seconds (with the bimetal closed). NOTE: The test mode will terminate when the bimetal opens.

If the refrigerator/freezer is already in defrost, the test mode can be terminated by unplugging the refrigerator/freezer from the wall outlet, waiting 30 seconds, and plugging it back in. The refrigerator/ freezer should immediately go into the “cooling” mode if the thermostat is closed.

If this first test procedure fails to make the ADC initiate a defrost cycle, use the second test method to make the ADC begin the test mode.

Test Method #2

1. Disconnect the refrigerator/freezer from the wall outlet for at least 30 seconds.
2. Turn the bottom compartment thermostat Off.
3. Reconnect power to the refrigerator/freezer.

The ADC should turn the defrost heater On within 3 to 8 seconds (with the bimetal closed).

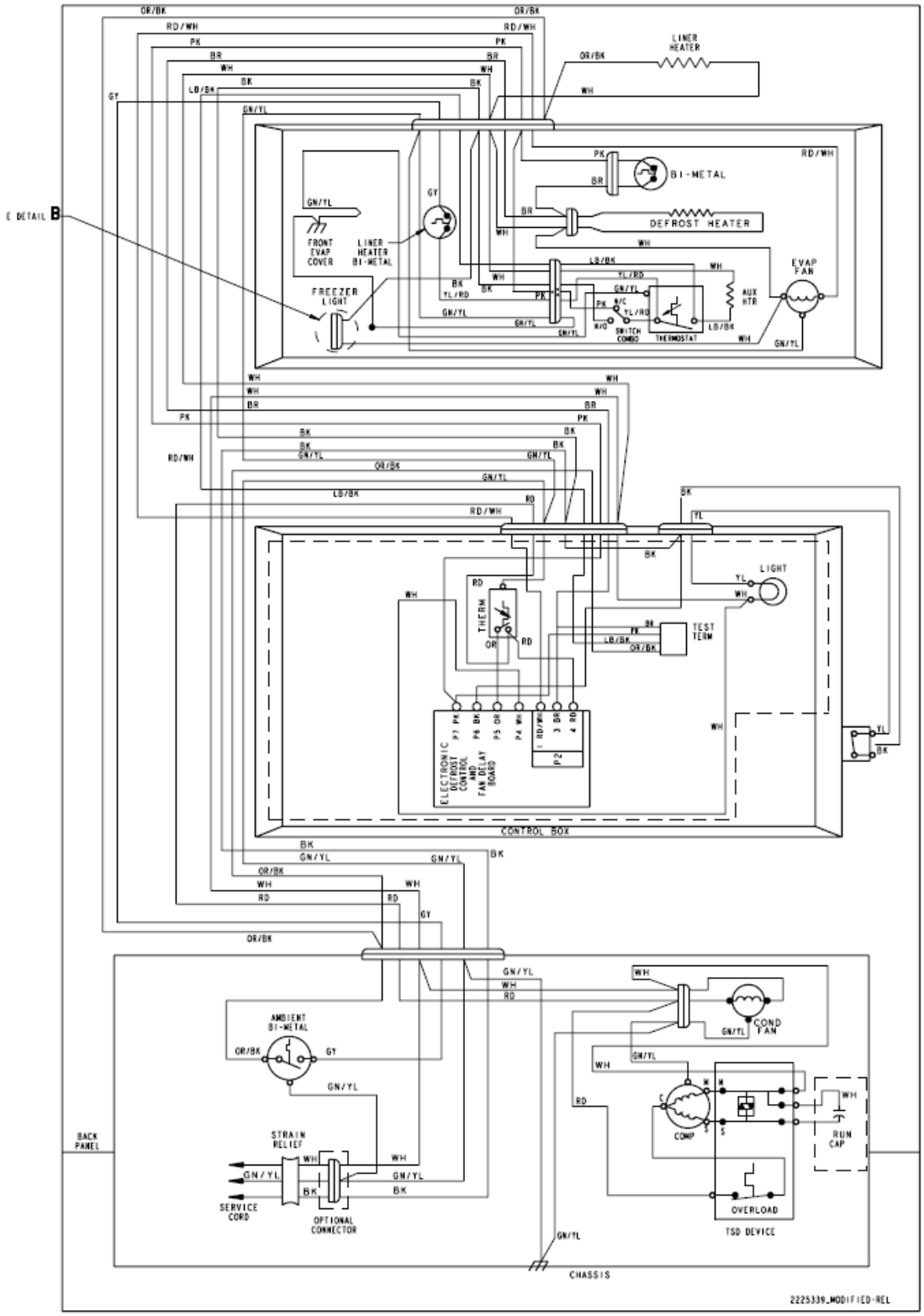
If the unit fails to go into the defrost mode during this test, the problem may not be with the ADC. A defective bimetal may be the cause of the failure. The ADC will only go into a test mode if the bimetal is closed. If the ADC senses an open bimetal, it will return to the cooling mode within 3 to 8 seconds.

HELPFUL HINT: Upon entering the test mode, the relay mounted on the ADC board should turn off the compressor, and turn on the defrost heater. Listen for the relay to click.

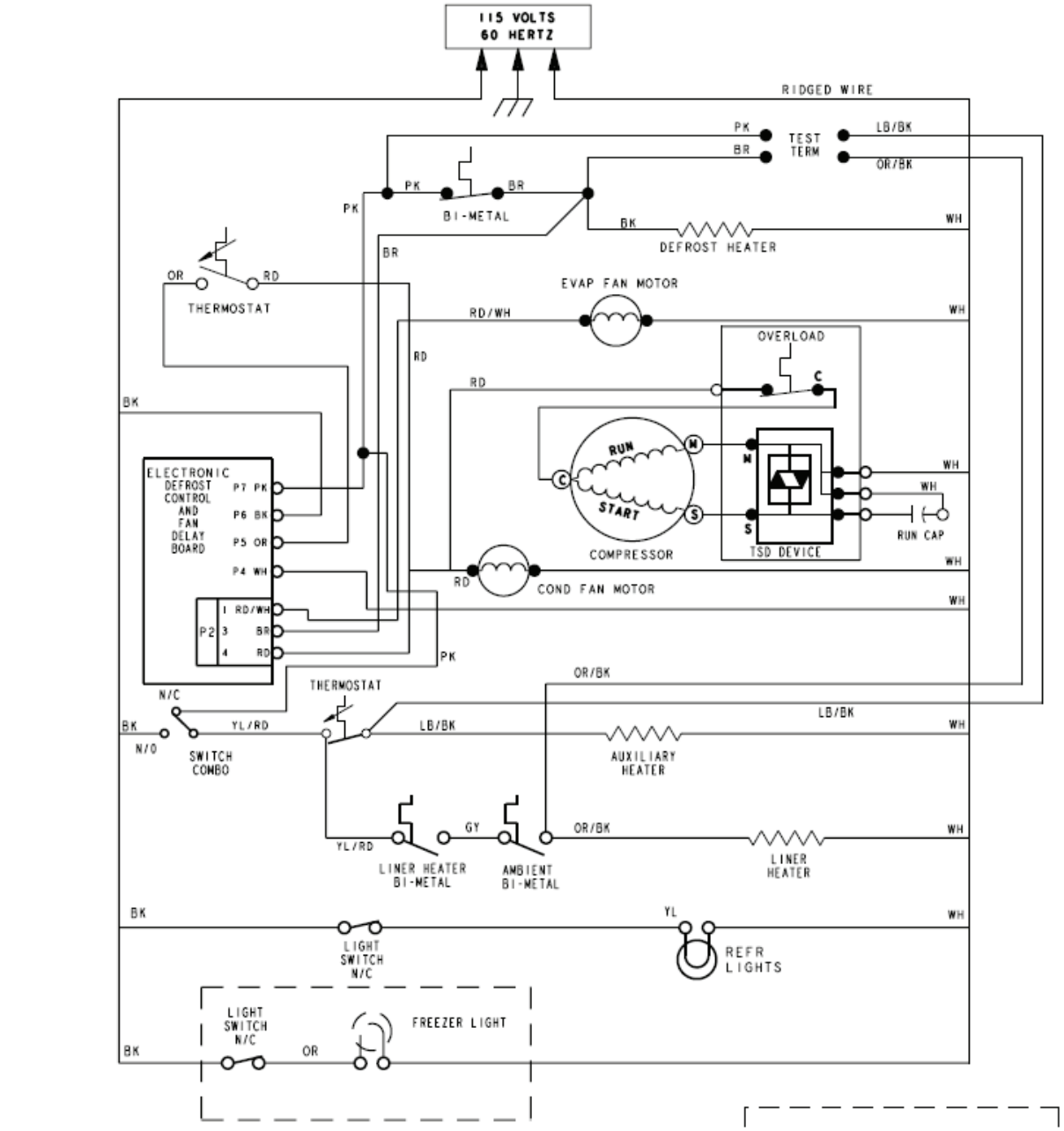
- If the relay clicks once when entering the test mode, check the defrost heater for 31 to 42 Ω.
- If the relay clicks twice, check for an open bimetal (allow up to 30 seconds between clicks).

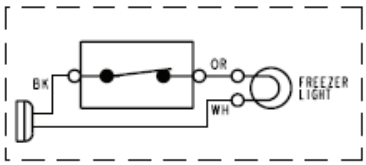
WIRING DIAGRAMS & STRIP CIRCUITS

WIRING DIAGRAM 1



WIRING DIAGRAM 2





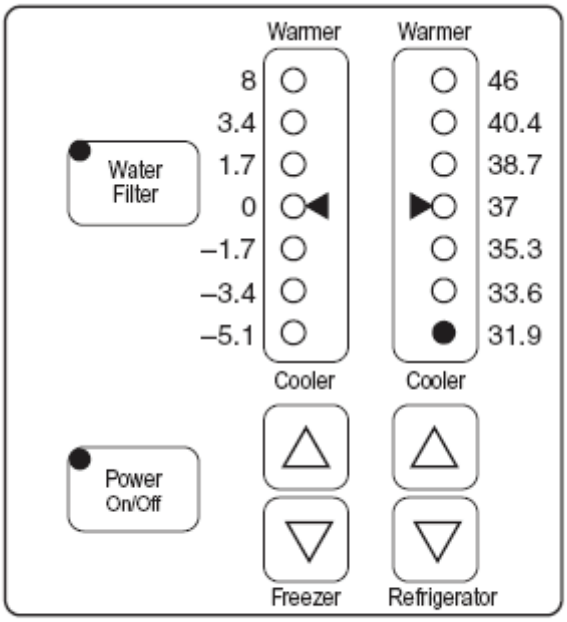
SYMBOL CODE

- (●) : CONNECTOR - SCREW ON
- (○) : CONNECTOR - CLOSED END
- ○ : DISCONNECT TERMINAL
- ● : PERMANENT CONNECTION
- : PLUG CONNECTOR
- : GROUND (CHASSIS)

WIRE COLOR CODE

VI	= VIOLET
BU	= BLUE
BK	= BLACK
RD	= RED
WH	= WHITE
YL	= YELLOW
OR	= ORANGE
BR	= BROWN
GY	= GRAY
PK	= PINK
PU	= PURPLE
TN	= TAN
OR/BK	= ORANGE/BLACK TRACER
YL/RD	= YELLOW/RED TRACER
BU/BK	= BLUE/BLACK TRACER
WH/BU	= WHITE/BLUE TRACER
BK/YL	= BLACK/YELLOW TRACER
WH/RD	= WHITE/RED TRACER
GN/YL	= GREEN/YELLOW TRACER
BK/WH	= BLACK/WHITE TRACER
YL/BK	= YELLOW/BLACK TRACER
BK/RD	= BLACK/RED TRACER
RD/WH	= RED/WHITE TRACER
LB/BK	= LIGHT BLUE/BLACK TRACER

2001 K MODEL
COUNTER DEPTH
SIDE-BY-SIDE REFRIGERATOR
WITH VARIABLE CAPACITY
COMPRESSOR
MODELS:
GC5SHGXKB00
GC5SHGXKQ00
GC5SHGXKS00
GC5SHGXKT00
GC5THGXKB00
GC5THGXKQ00
GC5THGXKT0



THE ELECTRONIC CONTROL PANEL

EVAPORATOR FAN & AIR DOOR DELAY

After defrost, an evaporator fan delay prevents unnecessary movement of warm, moist air through the refrigerator, by chilling the evaporator prior to starting the fan. Immediately after defrost drip time, the compressor starts at 4500 rpm, but the evaporator fan is delayed for 8 minutes. The air door remains closed for 8 minutes following defrost.

ADAPTIVE DEFROST

The adaptive defrost control allows the unit to enter a defrost mode only when it is needed. When powered up for the first time, the control initiates a defrost cycle after 8 hours of compressor run time. By monitoring the duration of defrost heating time and compressor run time, the control will continuously adapt the time between defrosts to optimize efficiency. Time between defrost periods will vary between 8 and 100+ hours. Defrost will occur immediately when the compressor has run at 4000 rpm or greater for 1 hour, and 8 hours have elapsed since the last defrost.

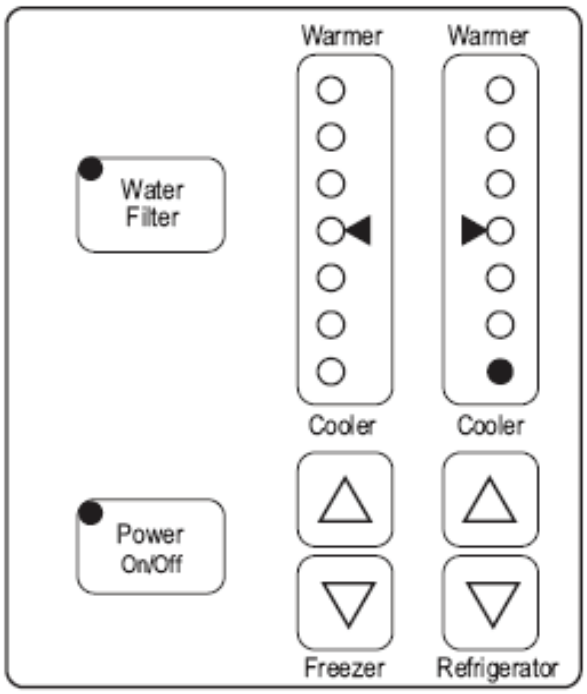
PULSED DEFROST

For the first 7 minutes of defrost, the heater is on continuously. It will then cycle off for 1 minute, and back on for 2 minutes. The heater will continue to cycle at this ratio until the bimetal opens, or until 33 minutes has elapsed. At this point, heat is discontinued, and a 4-minute “drip time” begins. This allows the water to drain before the unit returns to a cooling mode. Maximum defrost time, (pulsed heat on/off time + drip time) is 37 minutes. When entering a defrost cycle, if the bimetal is open, the time to defrost is reset to 8 hours, and the control will time through the entire 37 minute defrost period. During diagnostics this will allow a technician time to look for heater operation, and if necessary, bypass the bimetal.

POWER INTERRUPTION

After a power interruption, the following events will occur:

- The unit returns to the same operating mode and settings in use prior to the power interruption. If the unit was off, it remains off.
- Initially, the compressor, evaporator fan, and condenser fan motors will be off.
- The air door will close, and then adjust to the proper opening. The evaporator fan starts when the air door opens.
- The adaptive defrost control resets the compressor run time counter to 0, and if the freezer is above 20°F, the time to defrost is set to 8 hours.
- If the freezer temperature is below 12°F, the compressor starts after a delay of 7 minutes. If the freezer temperature is above 12°F, the compressor starts immediately.



PRE-DIAGNOSTICS CHECKS

- Confirm the refrigerator and freezer temperatures before beginning other checks.
- See if the compressor, evaporator, and condenser fans are running.
- Check the position of the air door.

DIAGNOSTICS MODE

The Diagnostics Mode is used to:

- Check the refrigerator & freezer thermistors.
- Operate the evaporator fan motor at 3000 rpm.
- Operate the condenser fan motor and compressor.
- Check the defrost bimetal and heater.

To enter the Diagnostics Mode, the control must be turned on, and be in a normal cooling mode. Both the Power On/Off and the Water Filter Reset keys must be functional. The refrigerator LEDs will show the step number, with the bottom LED being #1. The results of the checks are shown on the water filter status indicator. Green indicates good and red indicates bad. After 20 minutes, the control will default from the Diagnostics Mode to a normal cooling mode.

To enter the diagnostics mode:

- Press and hold the Water Filter Reset keypad, and then immediately press and hold the Power keypad. Continue to press both keypads for 3 seconds, or until you hear a beep.

To advance the diagnostics sequence:

- To advance to the next step in the sequence, press and hold the Water Filter Reset key for 2 seconds, or until you hear a beep. The Diagnostics Chart on the following page shows the step number and the component being tested in each step.

DIAGNOSTICS CHART

Step	Component Tested	Result*	Comment
01	Freezer Thermistor.	Green	Thermistor is within normal range.
		Red	Thermistor is open or less than –20° F.
		Red	Thermistor is shorted or greater than 115° F.
02	Refrigerator Thermistor.	Green	Thermistor is within normal range.
		Red	Thermistor is open or less than 10° F.
		Red	Thermistor is shorted or greater than 115° F.
03	Evaporator Fan Motor.	Green	Evaporator Fan Motor is On at correct speed.
		Red	Evaporator Fan Motor is On at incorrect speed.
04	Condenser Fan Motor.	Green	Condenser Fan Motor is On.
05	Compressor.	Green	Compressor is On at 4500 rpm.
		Red	Compressor is Off waiting for minimum (7 minute) Off delay.
06	Air Door.	Green	Air Door fully opens.**
07	Bimetal/Defrost Heater.	Green	Defrost Heater is energized, bimetal closed.
		Red	Bimetal open. †

Press the "Water Filter Reset" to exit diagnostics.

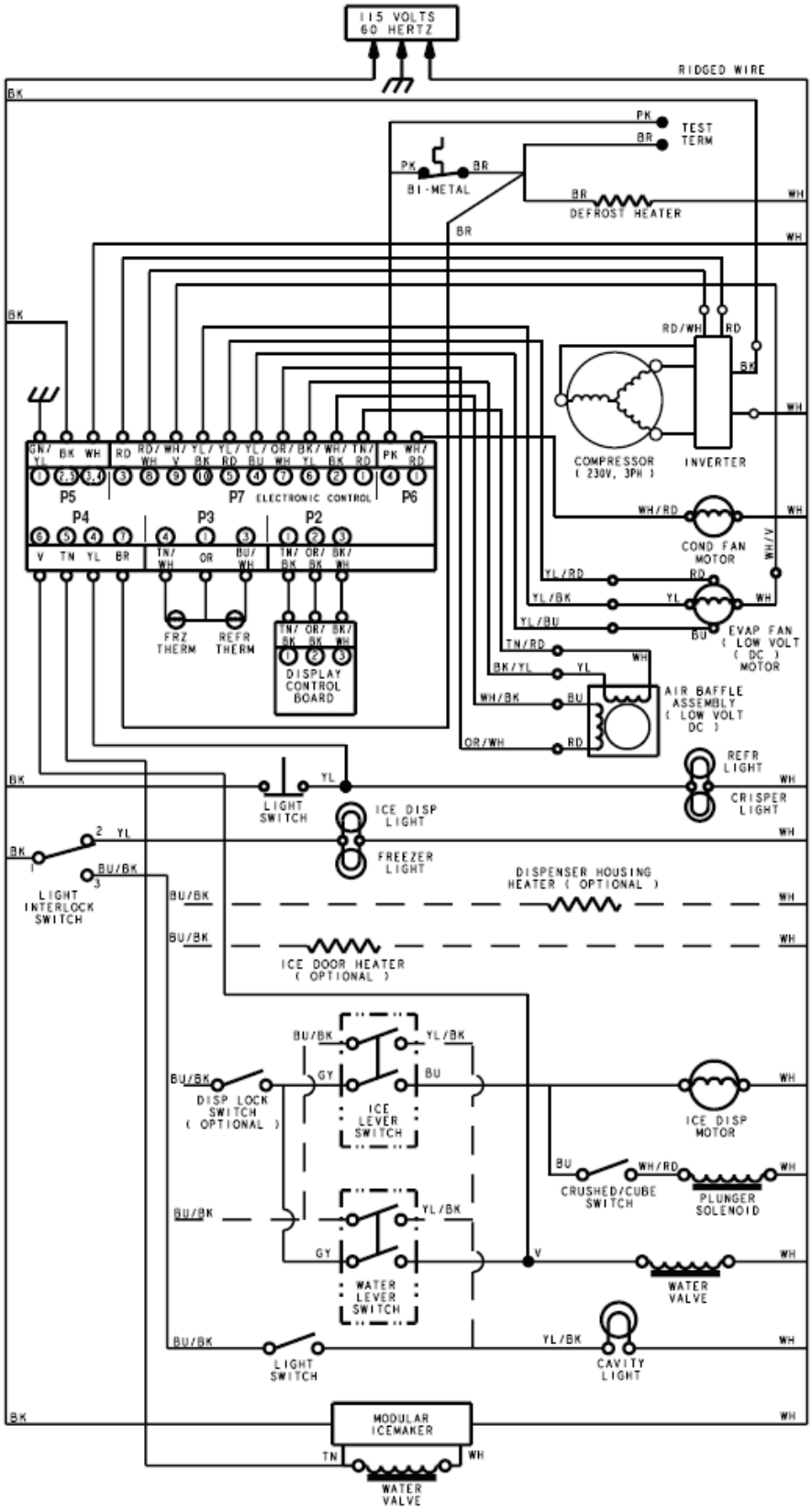
* Displayed on the Water Filter Indicator LED.

** The air door will close at step 01, and reset to the correct opening after exiting diagnostics.

† The bimetal may be bypassed with an insulated jumper.

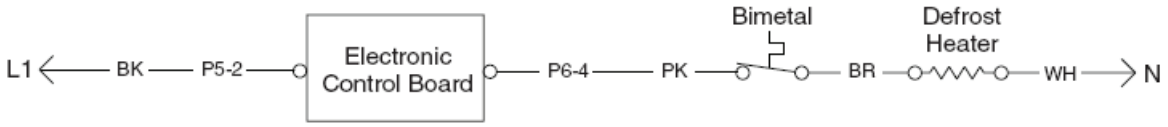
TROUBLESHOOTING CHART

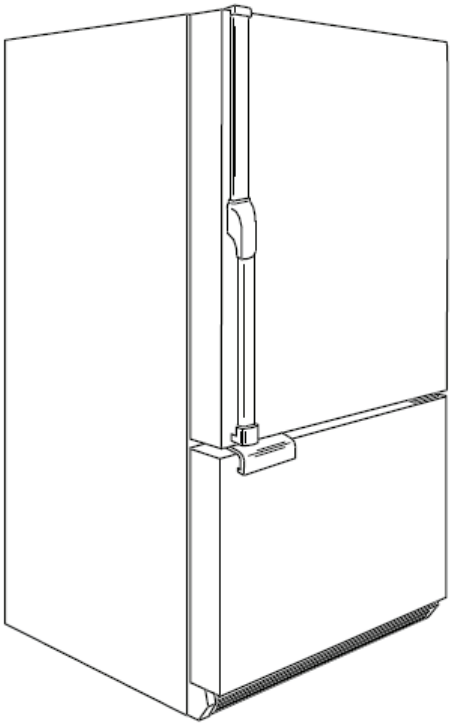
PROBLEM	POSSIBLE CAUSE	TEST PROCEDURE-ACTION
Condenser fan runs but the compressor will not start.	No DC control voltage from main PCB to the inverter board.	See "Component Testing" section for main PCB test procedure.
	Control voltage wires loose or reversed.	Check connections and repair as needed.
	Compressor.	See "Component Testing" section for compressor/inverter test procedure.
	Inverter board.	See "Component Testing" section for compressor/inverter test procedure.
Refrigerator compartment too warm.	Refrigerator control set too warm.	Set to a lower temperature.
	Refrigerator thermistor.	Check wires and connectors. Run diagnostics and if a defective thermistor is indicated, confirm with ohms test. See "Component Testing".
	Air door stuck closed or inoperative.	Look for ice or other blockage in air door. Run diagnostics test to operate air door.
	Evaporator fan motor not running.	Run diagnostics test to operate the evaporator fan motor. Check for a blocked fan blade and repair as necessary. Check for 5-17vdc from pin P7-9 to P7-10. If voltage is correct, replace the motor.
	Blocked air flow.	Check air door outlet and air returns for blockage.
	Warm freezer compartment.	See "Freezer compartment too warm."
Refrigerator compartment too cold.	Refrigerator control set too cold.	Set to a higher temperature.
	Refrigerator thermistor.	Check wires and connectors. Run diagnostics and if a defective thermistor is indicated, confirm with ohms test. See "Component Testing".
	Air door stuck open or inoperative.	Look for ice or other blockage in air door. Run diagnostics test to operate air door. Check for proper DC input voltage. If voltage is normal and door will still not operate, replace air door.
	Air door seal missing or damaged.	Repair or replace seal.
	Main PC board.	Run diagnostics test to operate air door.
Freezer compartment too warm.	Freezer control set too warm.	Set to a lower temperature.
	Freezer thermistor.	Check wires and connectors. Run diagnostics and if a defective thermistor is indicated, confirm with ohms test. See "Component Testing".
	Evaporator fan motor not running.	Run diagnostics test to operate the evaporator fan motor. Check for a blocked fan blade and repair as necessary. Check for 5-17vdc from pin P7-9 to P7-10. If voltage is correct, replace the motor.
	Condenser fan motor not running.	Check for a blocked fan blade and repair as necessary. See "Component Testing" section for condenser fan motor test procedure.
	Frost blocking evaporator.	Run diagnostics test to operate defrost system. Test defrost heater and bi-metal.
Freezer compartment too cold.	Freezer control set too cold.	Set to a higher temperature.
	Freezer thermistor.	Check wires and connectors. Run diagnostics and if a defective thermistor is indicated, confirm with ohms test. See "Component Testing".
	No evaporator fan motor feedback.	The fan motor will run at 3000 rpm.
Refrigerator runs too long.	Normal.	It is designed for this refrigerator to run almost constantly at the lowest possible compressor speed. Starting and stopping the compressor uses more power than continuous low rpm operation. Instruct customer.


115 VOLTS
60 HERTZ
RIDGED WIRE
TEST
TERM
BI-METAL
DEFROST HEATER
COMPRESSOR
(230V, 3PH)
INVERTER
COND FAN
MOTOR
EVAP FAN
(LOW VOLT
(DC)
MOTOR
AIR BAFFLE
ASSEMBLY
(LOW VOLT
DC)
REFR
LIGHT
CRISPER
LIGHT
ICE DISP
LIGHT
FREEZER
LIGHT
LIGHT
SWITCH
LIGHT
INTERLOCK
SWITCH
DISPENSER HOUSING
HEATER (OPTIONAL)
ICE DOOR HEATER
(OPTIONAL)
DISP LOCK
SWITCH
(OPTIONAL)
ICE
LEVER
SWITCH
ICE DISP
MOTOR
CRUSHED/CUBE
SWITCH
PLUNGER
SOLENOID
WATER
LEVER
SWITCH
WATER
VALVE
LIGHT
SWITCH
CAVITY
LIGHT
MODULAR
ICEMAKER
WATER
VALVE
P5
P7 ELECTRONIC CONTROL
P6
P4
P3
P2
FRZ
THERM
REFR
THERM
DISPLAY
CONTROL
BOARD

THE DEFROST CYCLE

The Defrost Heater





1997 "F" Model
22 cu. ft.
BOTTOM MOUNT
Refrigerator/Freezers

Defrost System

Automatic defrost every eight hours of compressor run time is accomplished by a radiant electric heater suspended beneath the evaporator. *(Fig. 4)*

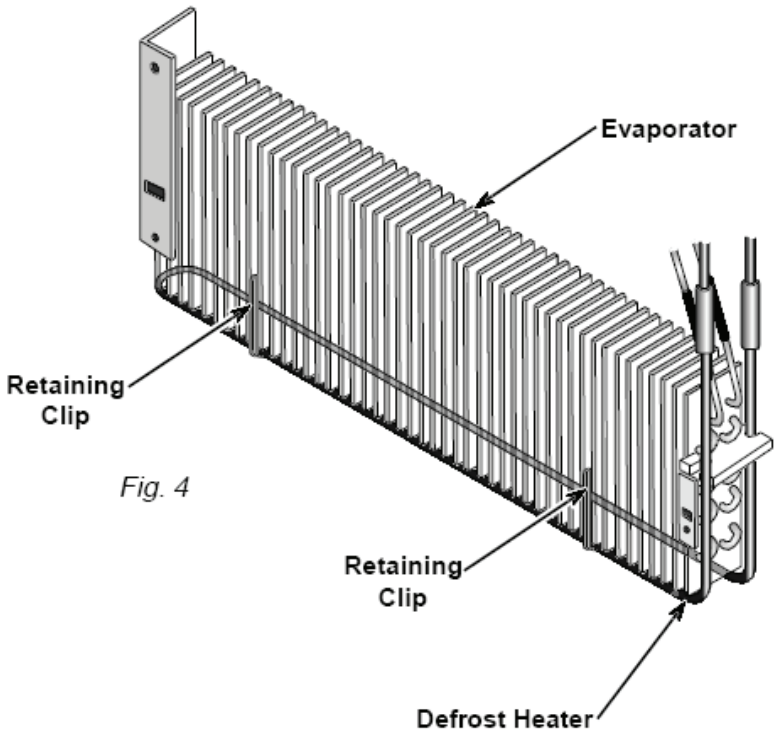


Fig. 4

The defrost timer is located in a box at the right side of the cabinet behind the toe grille. *(Fig. 5)* The defrost timer actuates the defrost heater through the bi-metal thermostat. *(Fig. 6)*

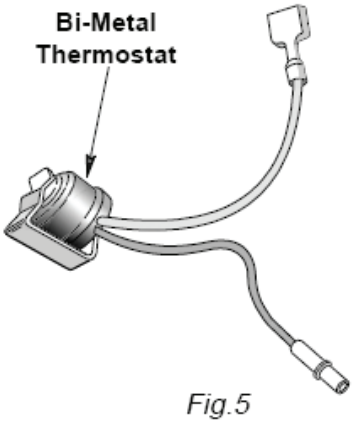


Fig.5

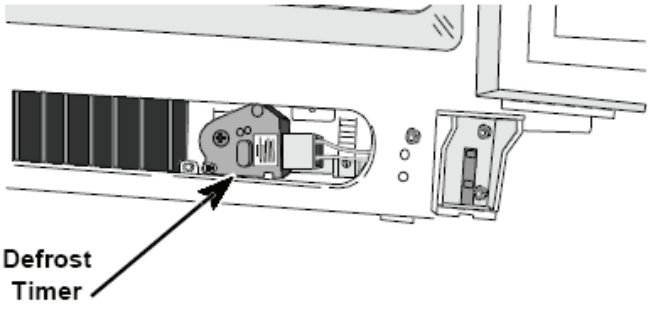
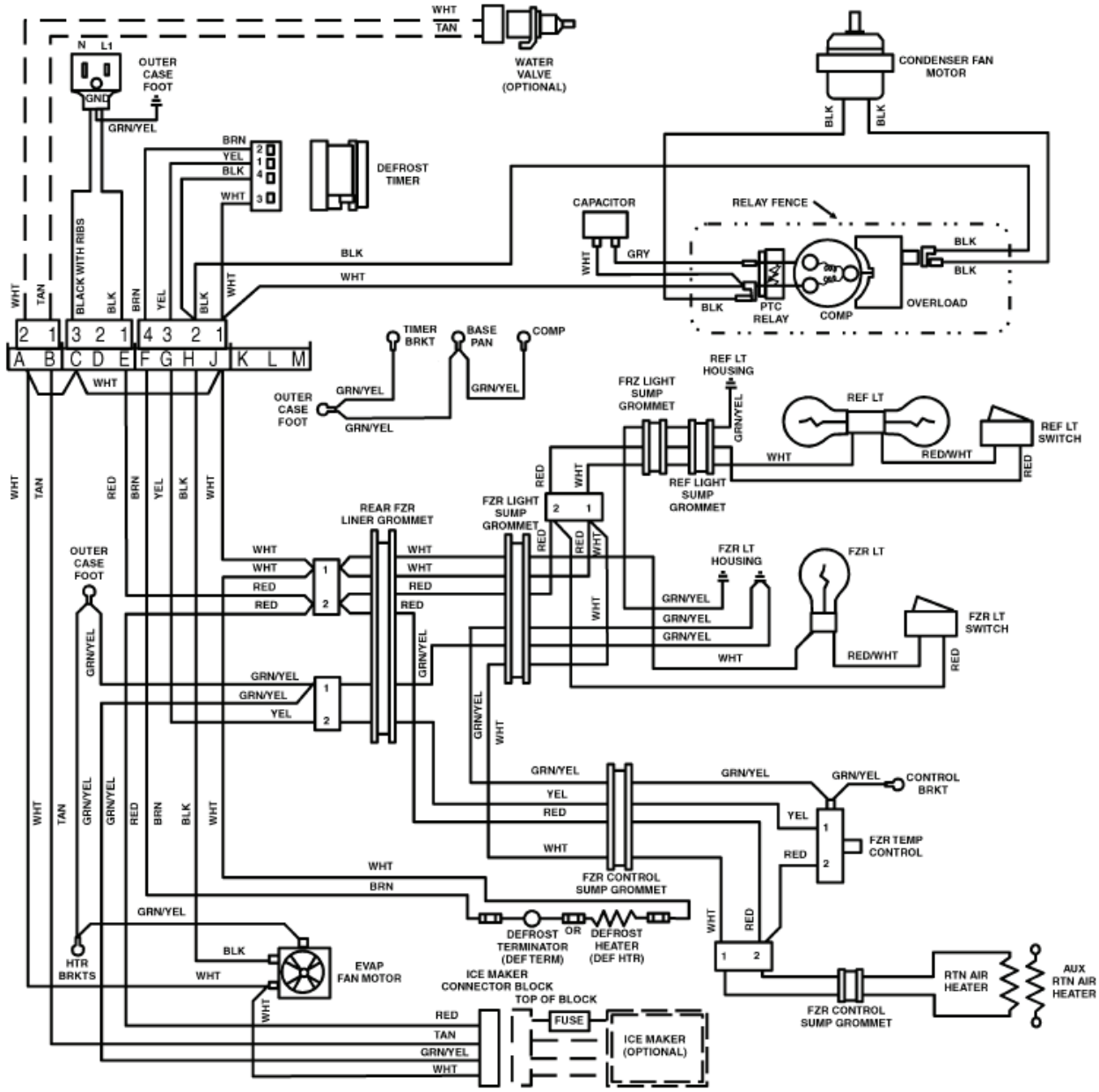


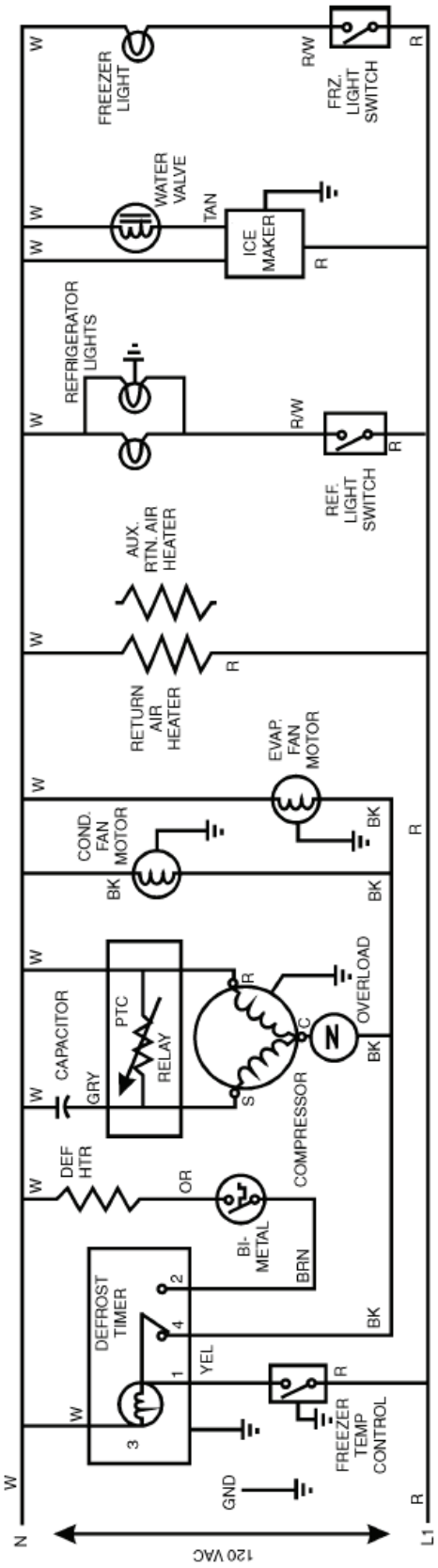
Fig.6

The bi-metal thermostat is attached to the outlet side of the evaporator coil tubing and opens at 48°F to terminate the defrost heating. After 33 minutes from the start of defrost cycle, the timer restores operation to the compressor circuit. The bi-metal thermostat contacts close at 13°F, enabling the defrost heater to operate during the next defrost cycle. The defrost heater is suspended on the right side and across the bottom of the evaporator. The defrost heater also provides warming to the defrost drain area to keep it clear during the defrost cycle.

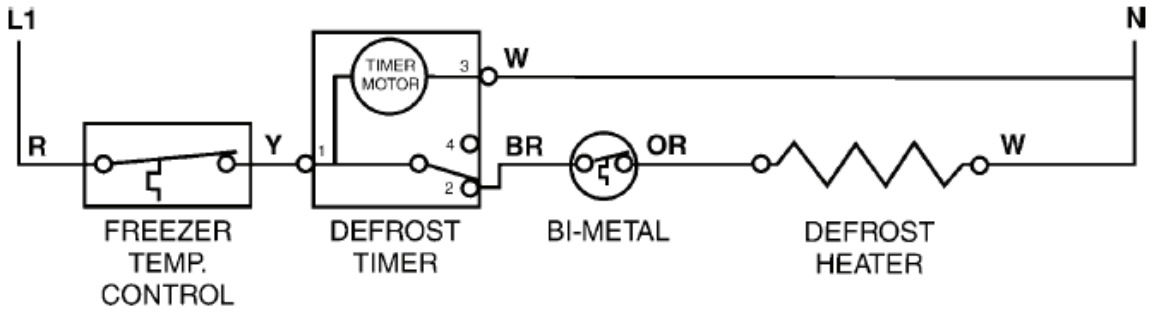
WIRING HARNESS SCHEMATIC



WIRING DIAGRAM



1. **Defrost Circuit** - Defrost Heater Energized



LEGACY AMANA, MAYTAG and JENN-AIR

Models:

E 01W E)	BBI20TL (P1199101W L)	BBI20TPE (P1199102W E)	BBI20TPL (P1199102W L)	BBI20TPSW (P1199103W W)	BBI20TPW (P1199102W W)
W 01W W)	BRF20TE (P1199201W E)	BRF20TE (P1199202W E)	BRF20TL (P1199201W L)	BRF20TL (P1199202W L)	BRF20TLW (P1199201W L)
'W 01W W)	BRF20TW (P1199202W W)	BXF19TL (P1311901W L)	BXF19TW (P1311901W W)		

Defrost occurs after predetermined length of compressor run hours. Compressor run time between defrost changes, or adapts, depending upon recent history of defrost lengths (time it takes for defrost terminator to open after defrost heater has been turned on).

- Defrost terminator opens at 55° F (13° C) and closes at 20° F (-7° C).
- Compressor run time between defrost (CRTD) will be one of three values under normal operation:

CRDT 1 (8 hours)
CRDT 2 (12 hours)
CRDT 3 (16 hours)

If defrost length is low (DT-LO defined as 19 minutes) indicating small frost load, CRTD for next defrost cycle is advanced to next level.

If defrost length is high (DT-HI defined as 21 minutes) indicating large frost load. CRTD for next defrost cycle is lowered to next level.

If defrost length is between 19 and 21 minutes CRTD for the next defrost cycle remains the same.

Initial value at power up CRTD is 4 hours.

- Vacation Mode CRTD equals 72 hours. Vacation Mode CRTD is interrupted with door openings. Defrost interval will revert back to interval before Vacation Mode. Three things must occur to reach Vacation Mode CRTD:

1) Defrost interval must be CRDT 3 (16 hours).
2) Both refrigerator and freezer doors must have remained closed since last defrost cycle.
3) Defrost thermostat must have opened in less the 19 minutes during last defrost cycle.

- Six minute dwell time occurs after defrost terminator opens before compressor and condenser fan motor will operate. If defrost thermostat does not open within 29 minutes from start of defrost cycle, adaptive defrost control will terminate defrost even though defrost thermostat had not opened.
- To force defrost cycle, with compressor running and one compartment door closed, press either door light switch 4 times within 8 seconds with at least ½ second between each cycle.

Input voltage reading and checks

L1 to L2 line voltage should be present when unit is powered.

K to L2 line voltage should be present with cold control contacts closed.

T to L2 line voltage should be present when cold control contacts are closed, defrost terminator is closed and adaptive defrost is in defrost mode.

R to L2 line voltage should be present when refrigerator door open (door light switch is closed).

F to L2 line voltage should be present with freezer door open (door light switch is closed).

Output voltage readings and checks

C to L2 line voltage should be present when in refrigeration mode with cold control contacts closed.

D to L2 line voltage present when in defrost mode with cold control contacts closed.

1997 Adaptive Defrost Control part # 12050501 used on bottom mounts. (substitute #120505060)

Models:

BBI20TE	BBI20TPS	BRF20TE	BRF20TW
BBI20TL	BBI20TPW	BRF20TE	BRF20TW
BBI20TPE	BBI20TW	BRF20TL	BXF19TL
BBI20TLP	BBITW	BRFTLW	BXF19TW

Defrost occurs after predetermined length of compressor run hours. Compressor run time between defrost changes, or adapts, depending upon recent history of defrost lengths (time it takes for defrost terminator to open after defrost heater has been turned on).

- Defrost terminator opens at 55° F (13° C) and closes at 20° F (-7° C).
- Compressor run time between defrost (CRTD) will be one of three values under normal operation:

CRDT 1 (8 hours)

CRDT 2 (12 hours)

CRDT 3 (16 hours)

If defrost length is low (DT-LO defined as 19 minutes) indicating small frost load, CRTD for next defrost cycle is advanced to next level.

If defrost length is high (DT-HI defined as 21 minutes) indicating large frost load. CRTD for next defrost cycle is lowered to next level.

If defrost length is between 19 and 21 minutes CRTD for the next defrost cycle remains the same.

Initial value at power up CRTD is 4 hours.

- Vacation Mode CRTD equals 72 hours. Vacation Mode CRTD is interrupted with door openings. Defrost interval will revert back to interval before Vacation Mode. Three things must occur to reach Vacation Mode CRTD:

1) Defrost interval must be CRDT 3 (16 hours).
2) Both refrigerator and freezer doors must have remained closed since last defrost cycle.
3) Defrost thermostat must have opened in less the 19 minutes during last defrost cycle.

- Six minute dwell time occurs after defrost terminator opens before compressor and condenser fan motor will operate. If defrost thermostat does not open within 29 minutes from start of defrost cycle, adaptive defrost control will terminate defrost even though defrost thermostat had not opened.
- To force defrost cycle, with compressor running and one compartment door closed, press either door light switch 4 times within 8 seconds with at least ½ second between each cycle.

Input voltage reading and checks

L1 to L2 line voltage should be present when unit is powered.

K to L2 line voltage should be present with cold control contacts closed.

T to L2 line voltage should be present when cold control contacts are closed, defrost terminator is closed and adaptive defrost is in defrost mode.

R to L2 line voltage should be present when refrigerator door open (door light switch is closed).

F to L2 line voltage should be present with freezer door open (door light switch is closed).

Output voltage readings and checks

C to L2 line voltage should be present when in refrigeration mode with cold control contacts closed.

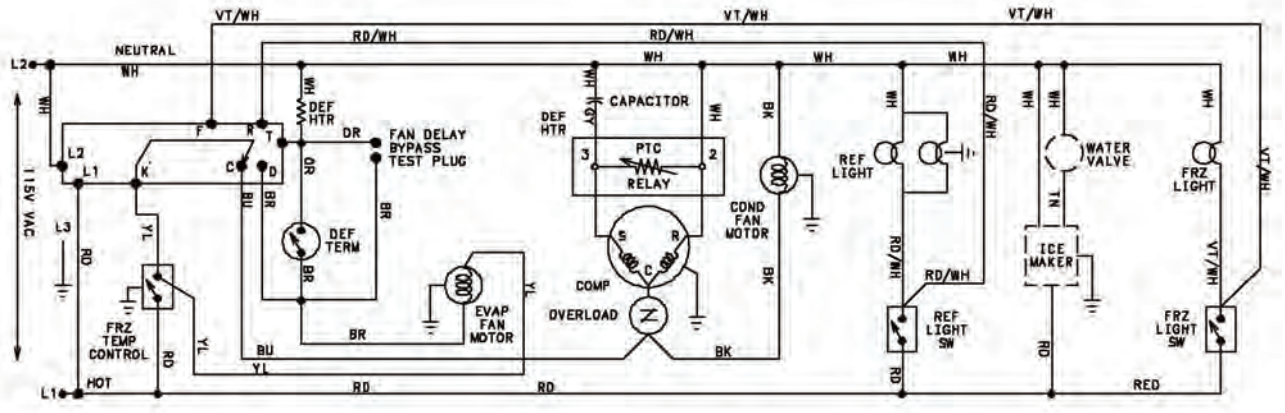
D to L2 line voltage present when in defrost mode with cold control contacts closed.

Wiring Schematic

DANGER
High Voltage

BBI20T	P1199101W
BRF20T	P1199201W
BBI20TP	P1199102W
BBI20TPS	P1199103W

WARNING
To avoid electrical shock which can cause severe personal injury or death, disconnect power to refrigerator before servicing. Wires removed during disassembly must be replaced on proper terminals to insure correct earthing and polarization. After servicing, reconnect power.



2000-2001 ADC Board 12106801 or 12106802 used on all “V”series SxS Refrigerators.

Models:

SBDE21VPE (P1317201WE)

SBDE21VPSE (P1317202WE)

Adaptive Defrost Operation

Defrost occurs after predetermined length of compressor run time. Compressor run time between defrosts changes, or adapts, depending upon recent history of defrost lengths (time it takes for defrost terminator to open after defrost heater has been turned on).

- Defrost terminator opens at 48º F (9º) and closes at 15ºF (-9ºC).
- Compressor run time between defrosts (CRDT) will be one of 3 values under normal operation: CRDT 1 (6 hours) or CRTD 2 (9 hours) or CRTD 3 (12 hours).

If defrost length is how (DT-LO defined as 24 Minutes) indicating small frost load, CRTD for next defrost cycle is advanced to next level.

If defrost length is high (DT-HI defined as 24 Minutes) indicating large frost load, CRTD for next defrost cycle is lowered to next level.

If defrost length is between 21 and 24 minutes, CRDT for next defrost cycle remains the same.

Initial value at power up is CRTD 0 is 3 hours.

- Vacation Mode CRTD equals 72 (12106801) or 96 (12106802) hours. Vacation Mode CRTD is interrupted with door openings. Defrost interval will revert back to interval before Vacation Mode. Three things must occur before unit will reach Vacation Mode CRTD.

1. Defrost Interval must be CRDT 3 (12 hours).
2. Both refrigerator and freezer doors must have remained closed since last defrost cycle.
3. Defrost thermostat must have opened in fewer than 21 minutes during last defrost cycle.

- After defrost terminator opens, six-minute dwell time occurs before compressor and condenser fan motor will operate. After defrost terminator opens, ten-minute dwell time occurs before evaporator fan motor will operate. Dwell time can be bypassed by disconnecting unit form power for at least 30 seconds.

- Select conventional defrost in Program Mode B.

Accessing Program Mode

Two programming modes are available. Mode A allows reading refrigerator and freezer thermistor temperatures. Mode B is used for all other programmable functions.

1. Open refrigerator door.
2. Press * pad.
3. Press Vacation pad.
4. Press the following sequence of pads within 6 seconds: Max Cool, Fast Freeze, Max Cool, Fast Freeze.
5. When access is granted, tome will sound three times and control will be in Program Mode A. Clean condenser indicator light will illuminate.
6. Toggle to Program Mode B by pressing * pad. Clean condenser indicator light is off.

Electronic Testing Mode

Forced Defrost Start

1. Press * pad to active control panel.
2. Simultaneously press and hold Max Cool and Display Off pad for 3 seconds.

Forced Compressor Start

1. Press * pad to activate control panel.

Simultaneously press and hold Fast Freeze pad and Display Off pad for 3 seconds

Defrost Mode Selection

Toggle Vacation pad to select adaptive or conventional defrost mode. Vacation indicator glows when adaptive defrost has been selected, if Vacation indicator is off, conventional defrost is se-

lected. Conventional defrost uses 8 hour CRTD value.

Forced Defrost

Defrost can be forced to start by pressing and holding the Alarm Off pad for 3 seconds. Program changes will be saved p0ermanently in EEPROM and program mode will exit to Run Mode.

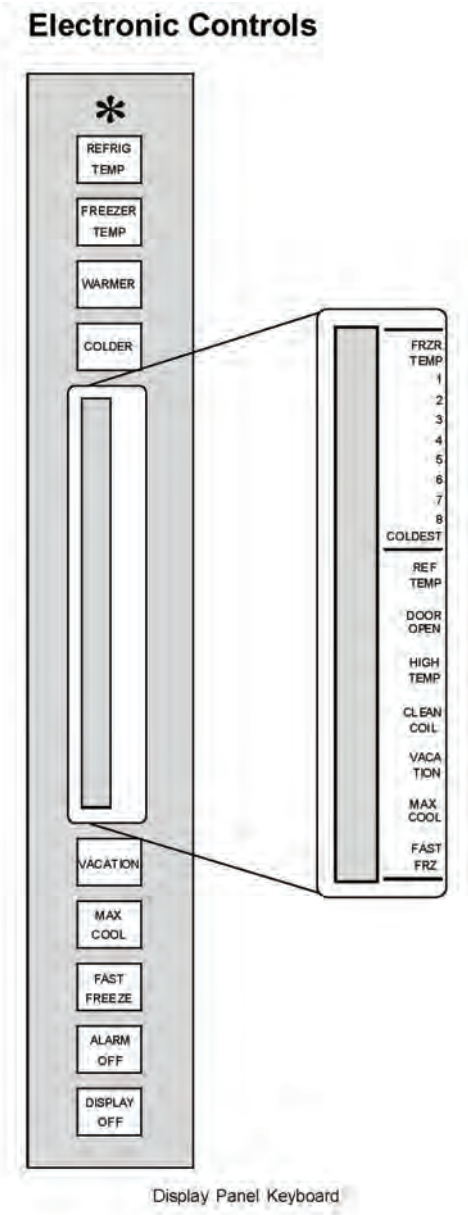
Forced Pull down (Compressor Start)

Compressor Start can be forced by pressing and holding Fast Freeze pad for 3 seconds. Program changes will be saved permanently in EEPROM. Compressor, evaporator fan, damper heater, and condenser fan will come on.

Exiting Program Mode

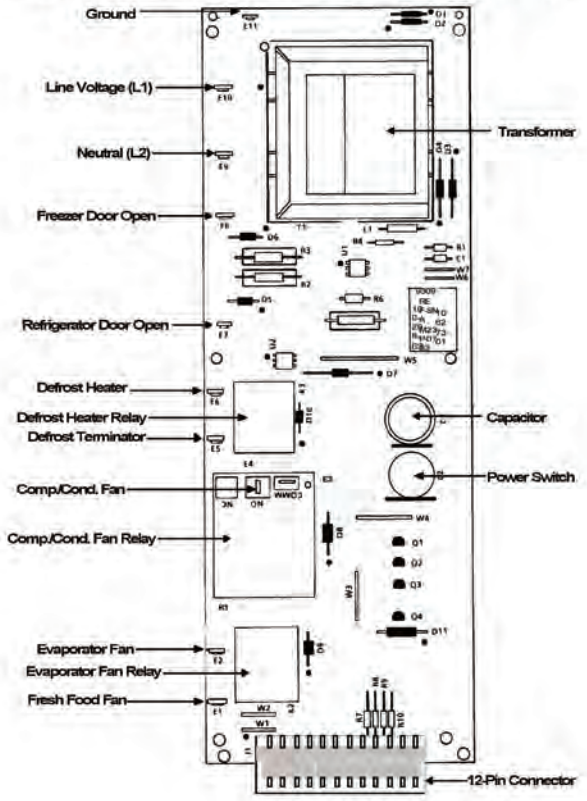
Press * pad for 3 seconds to exit Program Mode. Tone will sound three times. Changes made in Program Mode will be permanently saved in EEPROM.

Note: If no pad is pressed for 10 minutes, Program Mode will be automatically exited. No changes

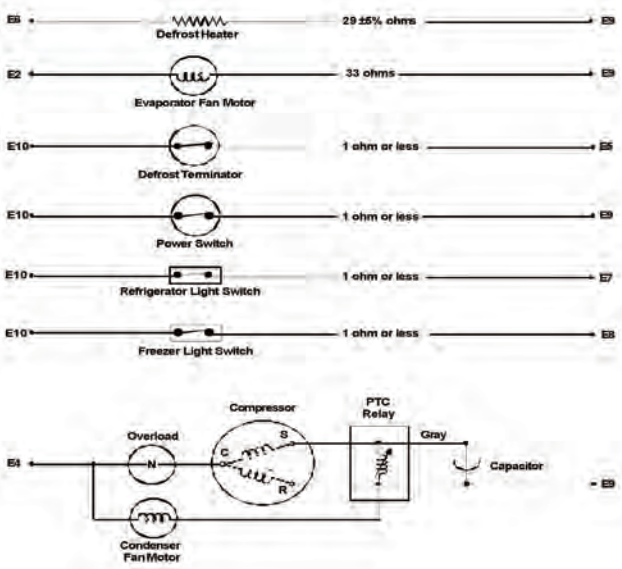


Display Panel Keyboard

High-Voltage Board Component Location



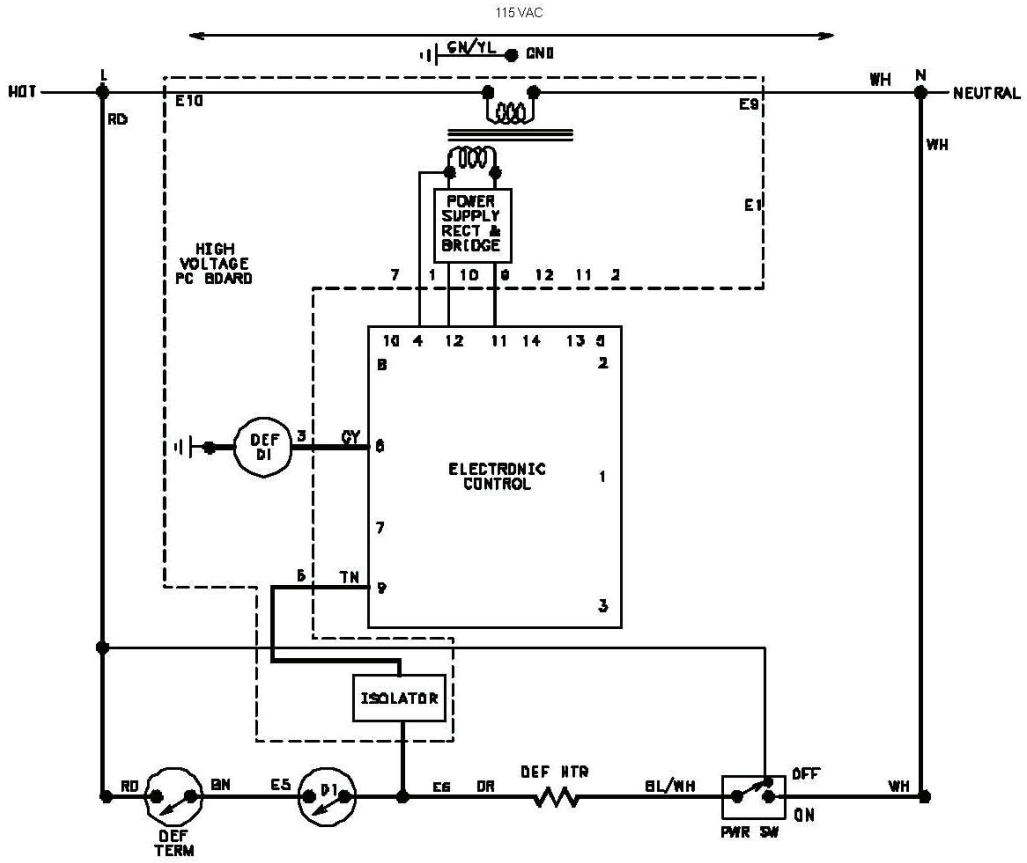
Resistance Checks made at High-Voltage Board



Refrigeration and Defrost Component Checks at High-Voltage Board

Voltage to Check	Measure Point-to-Point	Correct Readings
Low-voltage (LV board input)	W1 to D11	approximately –25 VDC
High-voltage (HV board input)	E10 to E9 (neutral) ground	approximately 120 VAC
Filament voltage (HV board output)	Pin 11 to Pin 12 (on HV board)	less than 5 VAC
Compressor/condenser fan motor	"ON" = E4 to E9 (neutral) ground "OFF" = E4 to E9 (neutral) ground	approximately 120 VAC 0 VAC
Compressor/condenser fan-motor relay*	"CLOSED" = R7 to ground "OPEN" = R7 to ground	approximately –11 VDC approximately –25 VDC
Evaporator fan-motor relay*	"CLOSED" = R8 to ground "OPEN" = R8 to ground	approximately –11 VDC approximately –25 VDC
Evaporator fan motor	"ON" = E2 to E9 (neutral) ground "OFF" = E2 to E9 (neutral) ground	approximately 120 VAC 0 VAC
Defrost heater	"ON" = E6 to E9 (neutral) ground "OFF" = E6 to E9 (neutral) ground	approximately 120 VAC 0 VAC
Defrost-heater relay*	"CLOSED" = R9 to ground "OPEN" = R9 to ground	approximately –11 VDC approximately –25 VDC
Defrost terminator	"CLOSED" = E5 to E9 (neutral) ground "OPEN" = E5 to E9 (neutral) ground	approximately 120 VAC 0 VAC
Fresh-food damper output voltage, HV board to damper-heater*	"ON" = E1 to ground "OFF" = E1 to ground	approximately –25 VDC -0 VDC
Fresh-food damper input-voltage signal to HV board from LV board	"ON" = R10 to ground "OFF" = R10 to ground	approximately –11 VDC approximately –25 VDC

*DC voltages are read from side of resistor closest to 12-pin connector.



NOTE: When the power switch is off, the isolator sees line voltage. This keeps the electronic controller from signaling the evaporator fan motor or the compressor relay coils and also keeps the damper heater off.

Adaptive Defrost

After a designated compressor run time, the refrigeration cycle is interrupted and the electronic control sends a low-voltage signal to defrost relay coil (def D1).

Powering the relay coil closes relay contact (D1), completing a high-voltage circuit to the defrost heater through the closed defrost terminator (closes at -9°C).

The isolator, which is part of high-voltage PC board, recognizes the presence of line voltage to at the defrost heater and sends a low-voltage signal to the electronic control. The electronic control counts the number of minutes the defrost terminator is closed (opens at 9°C).

The length of time the defrost terminator is closed determines if the next defrost cycle advances by 3 hours of compressor run, stays at the same interval, or delays by 3 hours of compressor run.

If the defrost terminator does not open before 29 minutes have passed, the defrost cycle is automatically terminated by electronic control and refrigeration cycles resume after a 6-minute dwell time.

2001 Adaptive Defrost Control 12566102 used on Side by Sides and to 12566101 on Bottom Mounts.

Models:

ARB2217CB	ARS9268BC	ARSE66MBW	BB20V1E
ARB2217CC	ARS9268BW	ARSE66ZBB	BB20V1PS
ARB2217CW	ARS9269BS	ARSE66ZBC	BB20V1S
ARS8265BB	ARSE664BB	ARSE66ZBS	BB20V1W
ARS8265BC	ARSE664BC	ARSE66ZBW	BRF20V1
ARS8265BS	ARSE664BS	ARSE67RBB	BRF20V1CPCR
ARS8265BW	ARSE664BW	ARSE67RBC	BRF20V1CPER
ARS8267BB	ARSE665BB	ARSE67RBS	BRF20V1CPSR
ARS8267BC	ARSE665BC	ARSE67RBW	BRF20V1CPWR
ARS8267BS	ARSE665BS	DRSE663BB	BRF20V1E
ARS8267BW	ARSE665BW	DRSE663BC	BRF20V1S
ARS9265BB	ARSE667BB	DRSE663BW	BRF20V1W
ARS9265BC	ARSE667BC	PSD265LGES	
ARS9265BW	ARSE667BC	PSD268LGEB	
ARS9266BS	ARSE667BW	PSD268LGES	
ARS9268BB	ARSE66MB	PSD268LGEW	

The ADC adapts the compressor run time between defrosts to achieve optimum defrost intervals by monitoring the cold control and length the defrost heater is on.

After initial power up, defrost intervals are 6 hr. (initial), 8 hr. (minimum), 96hr. (maximum). Defrost is delayed for 4 min. after the control cycles compressor off.

Optimum defrost is 15 minutes. Each additional minute the defrost thermostat remains closed, 1hr, is subtracted from the previous defrost interval. Each minute the thermostat opens prior to optimum defrost, it extends the defrost interval 1hr. ADC will terminate defrost at 30 minutes even if defrost thermostat has not opened and will reset the defrost interval to the 8 hr. minimum setting.

A 6 minute delay occurs after defrost thermostat opens before compressor is allowed to run. If defrost thermostat opens within 30 seconds of beginning of defrost, delay is by passed.

Four hours of continuous compressor run will initiate a defrost interval re-sets to 8 hours.

Power up: If defrost thermostat is open, compressor is powered momentarily. ADC checks to confirm defrost thermostat is open and immediately restores compressor circuit. This check may cause compressor overload to trip in high ambient conditions.

This is normal; compressor should start back up within 5 minutes.

If defrost thermostat is closed, defrost is powered.

To Force of Terminate defrost: Toggle freezer door light switch 5 times within 6 sec.

If cold control is open, a forced defrost will not occur until the cold control closes, then the ADC will immediately switch the function to defrost.

If cold control is closed and defrost terminator or heater circuit is open when defrost is forced, ADC shuts unit down momentarily and immediately restores power to refrigeration circuit.

If cold control is closed, a forced defrost is immediate without any delay (When the ADC cycles the unit into defrost on its own defrost it is delayed until 4 minutes after the compressor has been cycled off by the cold control.)

When ADC is in defrost, cold control is closed and refrigeration is forced, ADC bypasses 6 minute dwell time.

Input Voltage Readings and Checks

E2 to E4 ……..Line voltage should be present when the unit is powered.

E6 to E4 ……..Line voltage should be present when the cold control contacts are closed.

E5 to E4 ……..Line voltage should be present when the ADC is in defrost mode and the de frost terminator contacts are closed.

E7 to E4 ……..Line voltage should be present when the freezer door is open

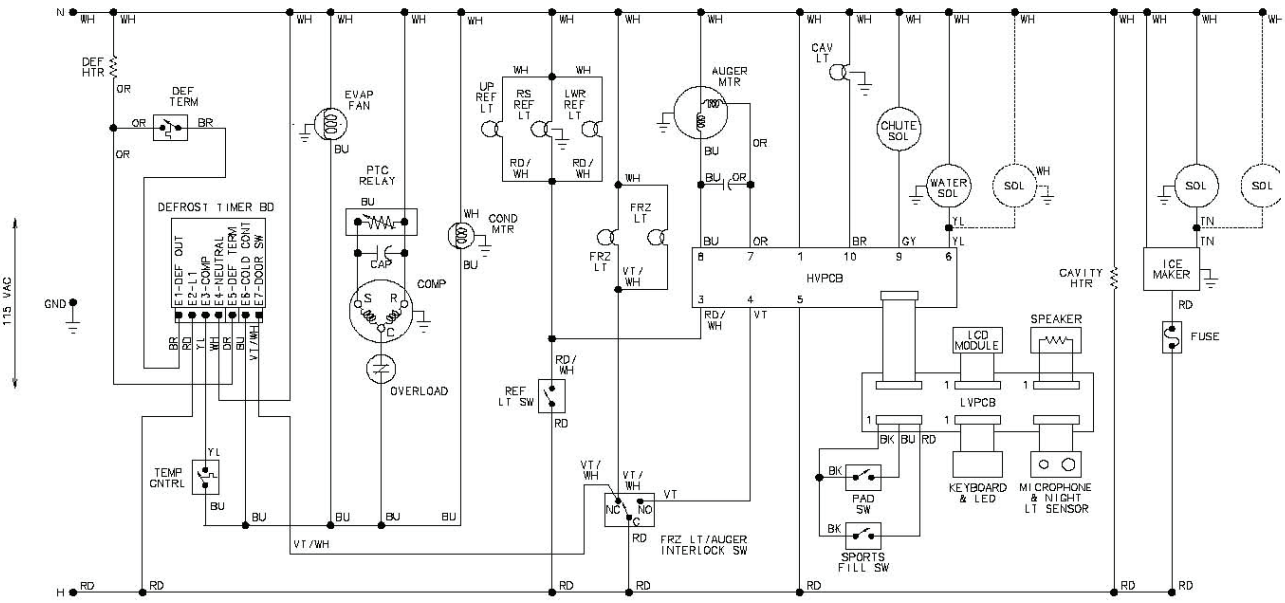
(freezer light switch closed)

Output Voltage Reading and Checks

E1 to E4 ……..Line voltage should be present when the ADC is in defrost mode.

E3 to E4 ……..Line voltage should be present when the ADC is not in the defrost mode or compressor dwell mode.

Schematic



2001 Top Mount Refrigerator manufactured for Amana by Frigidaire.

Models:

ARTE105B

ARTE805B

ARTE2107B

DRTE801B

Adaptive Defrost Control (ADC)

Electrical Requirements

Input Voltages: Voltage between L1 (Black) and Neutral (Light Blue) connector on the PC Board shall be 115VAC ± 10%, 60Hertz.

- Cold Control (Orange) supplies line voltage to the ADC relay center contact.
- Defrost termination (Blue) sensing is between the defrost heater and the bimetal thermostat. The heater is on the hot side of the line and the bimetal thermostat on the neutral.
- Door Switch (Yellow/Red) sensing is between the door switch and the light bulb. (Yel/Blk on the PC Board)

Output Voltage:

- Output voltage to the defrost heater (Brown) and compressor (Red) is equal to the input voltage from the cold control (Orange).

The PC Board will withstand the following electrical loads for temperatures as high as 110°F.

Initial Start and Power Interruptions

When power is applied to the power cord:

- If the defrost thermostat is closed, a refrigeration cycle will be initiated after 1 hour.
- If the defrost thermostat is open, a compressor cycle starts immediately.

Amps	Duration of Load	Reason for Load
15	3 seconds	Locked rotor
5	24 minutes	Defrost heater
3	indefinite	Compressor Running

ADC Characteristics

The ADC has a base defrost interval of 6 hour run time. All defrost interval timing starts with the compressor pulling down after or initial cabinet power.

When Time for a defrost:

- If the compressor has been running equal to or more than 1 hour, defrost immediately.
- If the compressor continues to run less than 1 hour, initiate the defrost immediately after that 1 hour.
- If compressor continues to run 1 hour after defrost, initiate defrost immediately after that 1 hour.

The adaptive defrost logic operates as follows.

Defrost Time	Change in Defrost Interval	Defrost Interval
Less than 12 minutes	+ 2 Hours	Maximum 12 Hours
Between 12 & 16 minutes	No Change	
More then 16 Minutes.	- 2 Hours	Minimum 6 Hours

The maximum defrost cycle must be terminated after 24 minutes. After each defrost heater termination, there must be a 6 minute delay before the compressor starts, but there is no time delay when the defrost heater has been on for 24 minutes.

Vacation Mode

When the defrost interval has reached 12 hours and the door has not been opened in the last 24 hours, the ADC places the refrigeration unit in vacation mode. Once in vacation mode, the defrost heater will be turned on after 72 hours. If the door has been opened and the heater on time is less than 16 minutes, then the defrost heater is turned on after 72 hours. Should the door not be opened but the heater runs for longer than 16 minutes, then the algorithm restarts in 6 hours, Once the refrigeration unit has been placed in vacation mode, if the door is opened and the compressor run time, since the last defrost, has been at least 5 hours, a defrost is initiated after 1 hour compressor run time since the initial door opening.

System Diagnostics

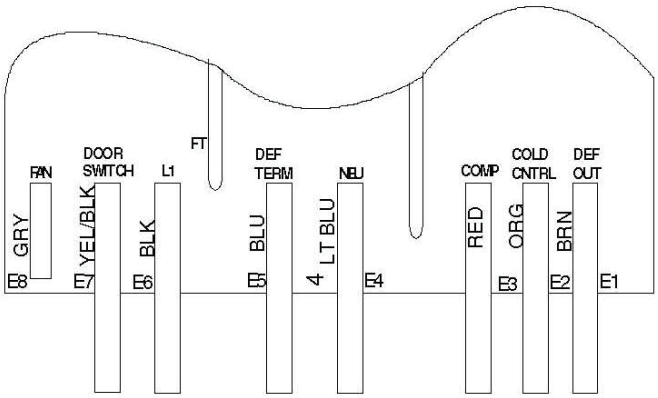
An electrical connection between the light switch and refrigerator light bulb is coupled to the ADC system board, providing a manual method of initiating defrost and back to compressor. To initiate a defrost; press the refrigerator light switch five times in a six second time period.

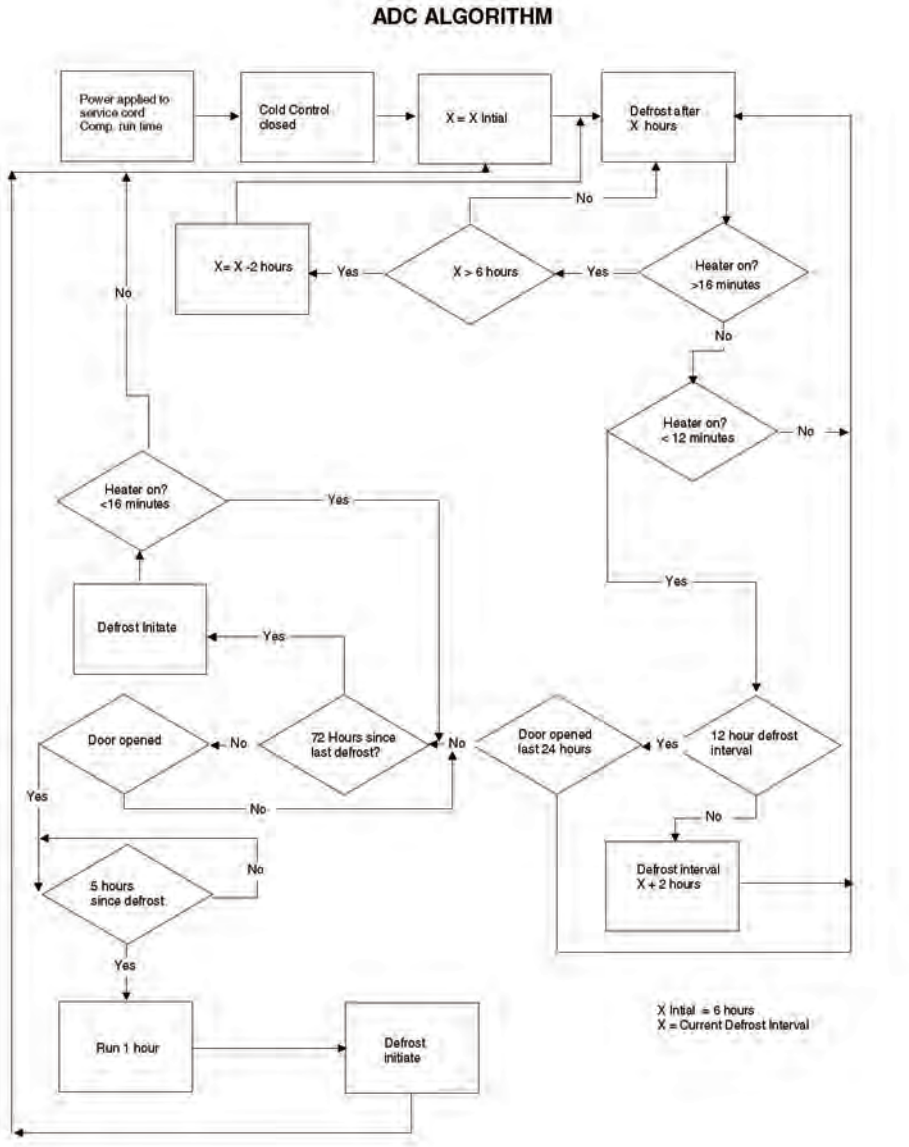
- If a defrost is initiated manually and the termination thermostat is closed, the heater will be actuated until the termination thermostat opens. A six-minute dwell time follows before the compressor is started and the 6 hour defrost interval is set.
- If a defrost is initiated manually and the termination thermostat is open, a six minute dwell time is initiated before the compressor is started and the 6 hour defrost interval is set.
- When terminating the defrost manually with the termination thermostat closed or open, the compressor is started and the 6 hour defrost interval is set.

An electrical connection between the defrost heater and defrost termination thermostat is coupled to the ADC for system data. This also gives the technician the ability to check electrical continuity individually of either the defrost heater of termination thermostat from the ADC mounting area.

The ADC printed circuit board has component identification and lead wire color (name) adjacent to each electrical tab. Four of the tab terminals mates with the present defrost timer connection and the remaining three individual leads have matching color screening on the circuit board around the tab.

Circuit Board Contacts





All Galesburg Refrigeration Produced Platform.

Models:

Includes all Galesburg refrigerator models manufactured prior to May of 2003 with ADC defrost cycle (does not include the Jenn-Air ®Luxury ™ Series refrigerators).

Adaptive Defrost Control

The adaptive defrost control assembly is a microprocessor controlled defrost timer. This new control allows defrost to occur only when needed, compared to mechanical timers which defrost at a preset interval whether it is necessary or not. The new control will continually adjust defrost intervals based on the amount of time the defrost heater is energized. This allows the defrost interval based on use, thus saving energy.

Checking the Adaptive Defrost Control

1. Disconnect the unit from the power source.
2. Open the fresh food and remove any items on the top shelf.
3. Remove the light shield and the temperature control housing
4. Connect the refrigerator to a wattmeter.
5. Make sure compressor is running (cold control closed).
6. Using an insulated number 22 jumper wire short between L1 and Test; this will put the refrigerator into a defrost for approximately 23 minutes.
7. The watt meter should read between 500 to 600 watts depending on the model.

NOTE: If the temperature control is open (unit not running and you jumper L1 and Test) the unit will cycle through the test mode in two seconds and there will be no watt draw.

Action

The issue is that some 12002104 ADC boards have been shipped in the 61005988 ADC board box. Do not reorder the board, the 12002104 board will function the same in place of the 61005988, but must use the forced defrost method for the 12002104 (shown in Figure 2)

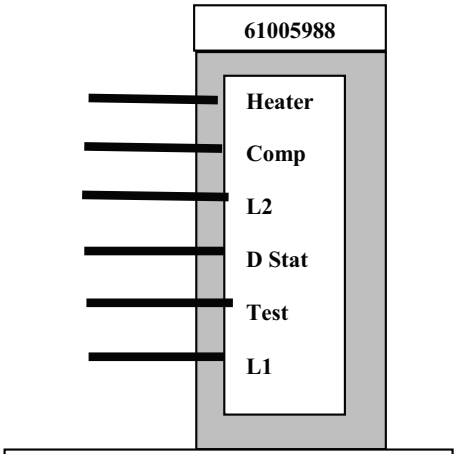


Figure 1
Galesburg Produced Platform produced before May 2003

Galesburg Produced Platform Produced Before May 2003 (Figure 1)

To initiate Forced Defrost Cycle:

Jump L1 to Test

To Terminate Forced Defrost Cycle disconnect power for five seconds.

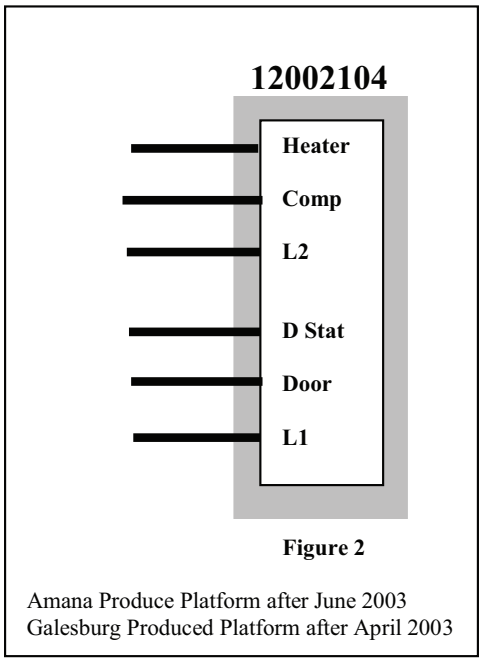


Figure 2

Amana Produce Platform after June 2003
Galesburg Produced Platform after April 2003

Amana Product Platform After June 2003
Galesburg Product Platform After April 2003 (Figure 2)

To initiate Forced Defrost Cycle:

Cycle cold control on and off three times in six seconds. The cold control needs to be left in the closed (call for cooling) position for the defrost system to energize on all platforms. It is not enough to cycle the cold control knob, the contacts must actually open and close (open doors for a period of time if necessary to force the control to call for cooling). In most cases, you can hear the contacts open and close if they are doing so.

To Terminate Forced Defrost Cycle:

Disconnect power for five seconds.

Amana 84” Bottom Mount Refrigerator

Models:

B136CAL1 (P1197503W) B136CAL1 (P1318403W)
B136CAL3 (P1197501W) B136CAL3 (P1318401W)
B136CAR1 (P1197504W) B136CAR1 (P1318404W)
B136CAR3 (P1197502W) B136CAR3 (P1318402W)

Adaptive Defrost Operation

Defrost occurs after predetermined length of compressor run hours. Compressor run time between defrosts changes, or adapts, depending upon recent history of defrost lengths (time it takes for defrost terminator to open after defrost heater has been turned on).

- Defrost terminator opens at 55ºF (13ºC) and closes at 20ºF (-7ºC).
- Compressor run time between defrosts (CRTD) will be one of 3 values under normal operation: CRTD 1 (8 hours) or CRTD 2 (12 hours) CRTD 3 (16 hours).

If defrost length is low (DT-LO defined as 21 minutes) indicating small frost load, CRTD for next defrost cycle is advanced to next level.

If defrost length is high (DT-HI defined as 24 minutes) indicating large frost load, CRTD for next defrost cycle is lowered to next level.

If defrost length is between 21 and 24 minutes, CRTD for next defrost cycle remains the same.

Initial value at power up CRTD 0 is 4 hours.

- Vacation Mode CRTD equals 96 hours. Vacation Mode CRTD is interrupted with door openings. Defrost Interval will revert back to interval before Vacation Mode. Three things must occur to reach Vacation Mode CRTD:

1. Defrost interval must be CRTD 3 (16 hours).
2. Both refrigerator and freezer doors must have remained closed since last defrost cycle.
3. Defrost thermostat must have opened in less than 21 minutes during last defrost cycle.

- Six minute dwell time occurs after defrost terminator opens before compressor and condenser fan motor will operate. Ten minute dwell time occurs after defrost terminator opens before evaporator fan motor will operate. Dwell time can be bypassed by disconnecting power to the unit for 30 seconds.
- Conventional defrost can be selected in Program Mode B

Accessing Program Mode

Two programming modes are available. Mode

A allows reading refrigerator and freezer thermistor temperatures. Mode B is used for all other programmable functions.

1. Open refrigerator door.
2. Press Display On pad.
3. Press * pad.
4. Press the following sequence of pads within 6 seconds: Max Ref, Max Frz. Max Ref, Max Frz.

5. When access is granted, tone will sound three times and control will be in Program Mode A. Unmarked indicator light will illuminate.
6. Toggle to Program Mode B by pressing Display On pad. Unmarked indicator light is off.

Mode B Functions

Automatic Keyboard Function

Activate and deactivate keyboard by toggling Display Off pad. If high temperature indicator glows, keyboard will disable after 10 minutes. If high temperature indicator is off, keyboard is always enabled. Do not leave keyboard in enabled mode after programming is complete.

Defrost Mode Selection

Toggle * pad to select adaptive or conventional defrost mode. Unmarked indicator glows when adaptive defrost has been selected. If unmarked indicator is off, conventional defrost is selected. Conventional defrost used 8 hour CRTD value.

Forced Defrost

Defrost can be forced to start by pressing and holding the Alarm Off pad for 3 seconds. Program changes will be saved permanently in EEPROM and program mode exit to Run Mode.

Forced Pull down (Compressor Start)

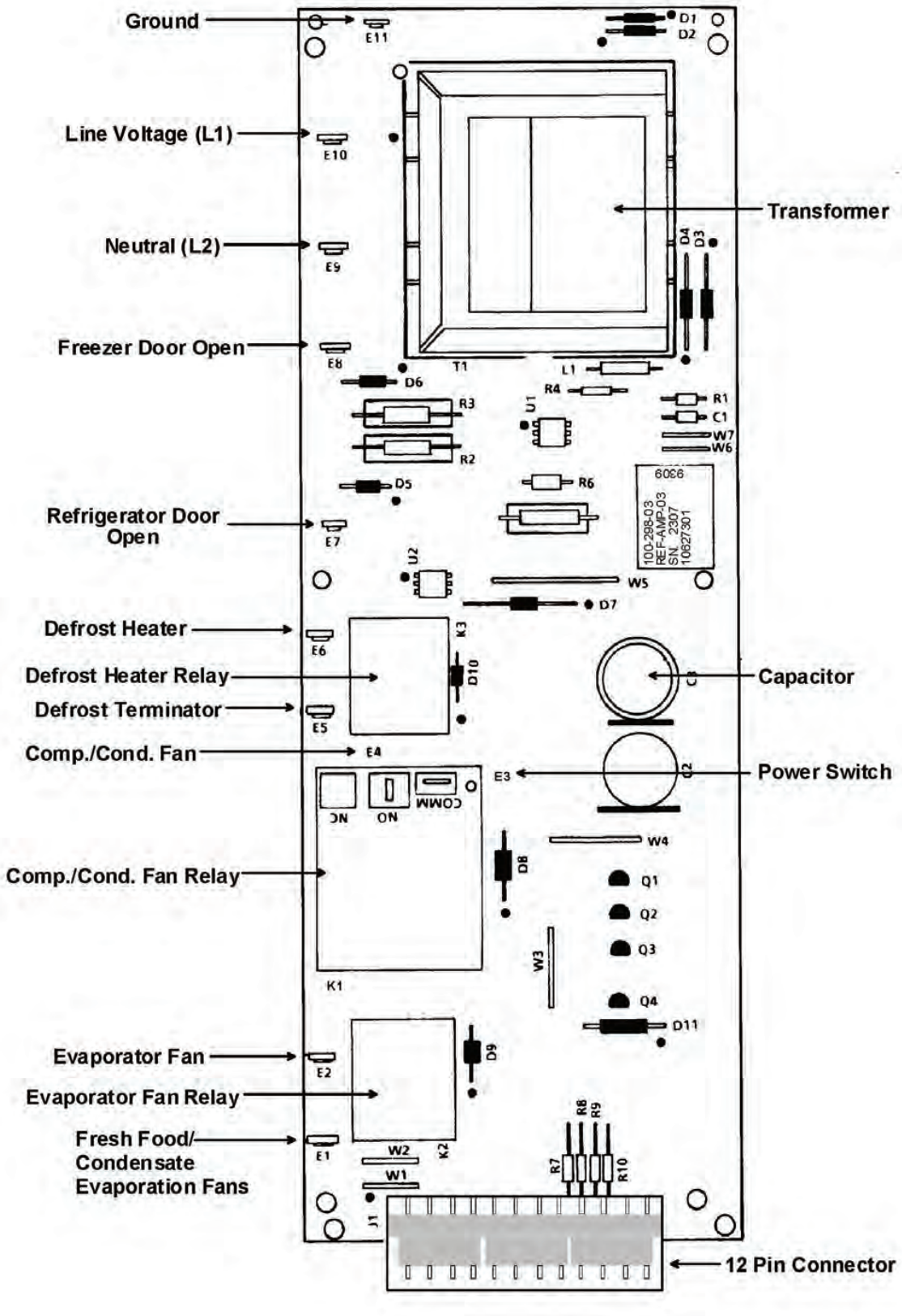
Compressor start can be forced by pressing and holding MAX FRZ pad for 3 seconds. Program changes will be saved permanently in EEPROM. Compressor, evaporator fan, damper heater, and condenser fan will come on.

Adaptive Defrost Circuitry

After proper compressor run time (either 8, 12, or 16 hours), refrigeration cycle is interrupted and a low voltage signal is sent from electronic control to defrost relay coil (D1 DEF). Powering of relay coil closes relay voltage signal is sent from electronic control to defrost relay coil (D1), completing the high voltage circuit to the defrost heater through the closed defrost terminator (closes at 20°F). The isolator, part of high voltage PC board, recognizes the presence of line voltage to the defrost heater, isolator sends a low voltage signal to electronic control which keeps count of the number of minutes defrost terminator remains closed (opens at 55°F). Length of time defrost terminator remains closed, determines whether next defrost cycle advances by 4 hours of compressor run, stays at same interval or backs up by 4 hours of compressor run. If defrost terminator does not open before 30 minutes, defrost cycle will automatically be terminated by electronic control and refrigeration cycle will resume after a 6 minute dwell time.

Important: When Showroom switch is off, isolator sees line voltage. In turn, isolator keeps electronic controller from signaling compressor, Condenser fan motor, evaporator fan motor relay coil and keeps fresh food fan motor off.

High Voltage Board and component voltage checks at board



Amana Built in 48” Side by Side Refrigerator

Models:

S148CA01 (P1305502W) S148CA03 (P1305501W)

S148DA01 (P1305602W) S148DA03 (P1305601W)

Adaptive Defrost Operation

Defrost occurs after predetermined length of compressor run hours. Compressor run time between defrosts changes, or adapts, depending upon recent history of defrost lengths (time it takes for defrost terminator to open after defrost heater has been turned on).

- Defrost terminator opens at 55ºF (13ºC) and closes at 20ºF (-7ºC).
- Compressor run time between defrosts (CRTD) will be one of 3 values under normal operation: CRTD 1 (8 hours) or CRTD 2 (12 hours) CRTD 3 (16 hours).

If defrost length is low (DT-LO defined as 21 minutes) indicating small frost load, CRTD for next defrost cycle is advanced to next level.

If defrost length is high (DT-HI defined as 24 minutes) indicating large frost load, CRTD for next defrost cycle is lowered to next level.

If defrost length is between 21 and 24 minutes, CRTD for next defrost cycle remains the same.

Initial value at power up CRTD 0 is 4 hours.

- Vacation Mode CRTD equals 96 hours. Vacation Mode CRTD is interrupted with door openings. Defrost Interval will revert back to interval before Vacation Mode. Three things must occur to reach Vacation Mode CRTD:

1. Defrost interval must be CRTD 3 (16 hours).
2. Both refrigerator and freezer doors must have remained closed since last defrost cycle.
3. Defrost thermostat must have opened in less than 21 minutes during last defrost cycle.

- Six minute dwell time occurs after defrost terminator opens before compressor and condenser fan motor will operate. Ten minute dwell time occurs after defrost terminator opens before evaporator fan motor will operate. Dwell time can be bypassed by disconnecting power to the unit for 30 seconds.
- Conventional defrost can be selected in Program Mode B

Accessing Program Mode

Two programming modes are available. Mode

A allows reading refrigerator and freezer thermistor temperatures. Mode B is used for all other programmable functions.

7. Open refrigerator door.
8. Press Display On pad.
9. Press * pad.
10. Press the following sequence of pads within 6 seconds: Max Ref, Max Frz. Max Ref, Max Frz.
11. When access is granted, tone will sound three times and control will be in Program Mode A. Unmarked indicator light will illuminate.
12. Toggle to Program Mode B by pressing Display On pad. Unmarked indicator light is off.

Mode B Functions

Automatic Keyboard Function

Activate and deactivate keyboard by toggling Display Off pad. If high temperature indicator glows, keyboard will disable after 10 minutes. If high temperature indicator is off, keyboard is always enabled. Do not leave keyboard in enabled mode after programming is complete.

Defrost Mode Selection

Toggle * pad to select adaptive or conventional defrost mode. Unmarked indicator glows when adaptive defrost has been selected. If unmarked indicator is off, conventional defrost is selected. Conventional defrost used 8 hour CRTD value.

Forced Defrost

Defrost can be forced to start by pressing and holding the Alarm Off pad for 3 seconds. Program changes will be saved permanently in EEPROM and program mode exit to Run Mode.

Forced Pull down (Compressor Start)

Compressor start can be forced by pressing and holding MAX FRZ pad for 3 seconds. Program changes will be saved permanently in EEPROM. Compressor, evaporator fan, damper heater, and condenser fan will come on.

Electronic Testing Mode

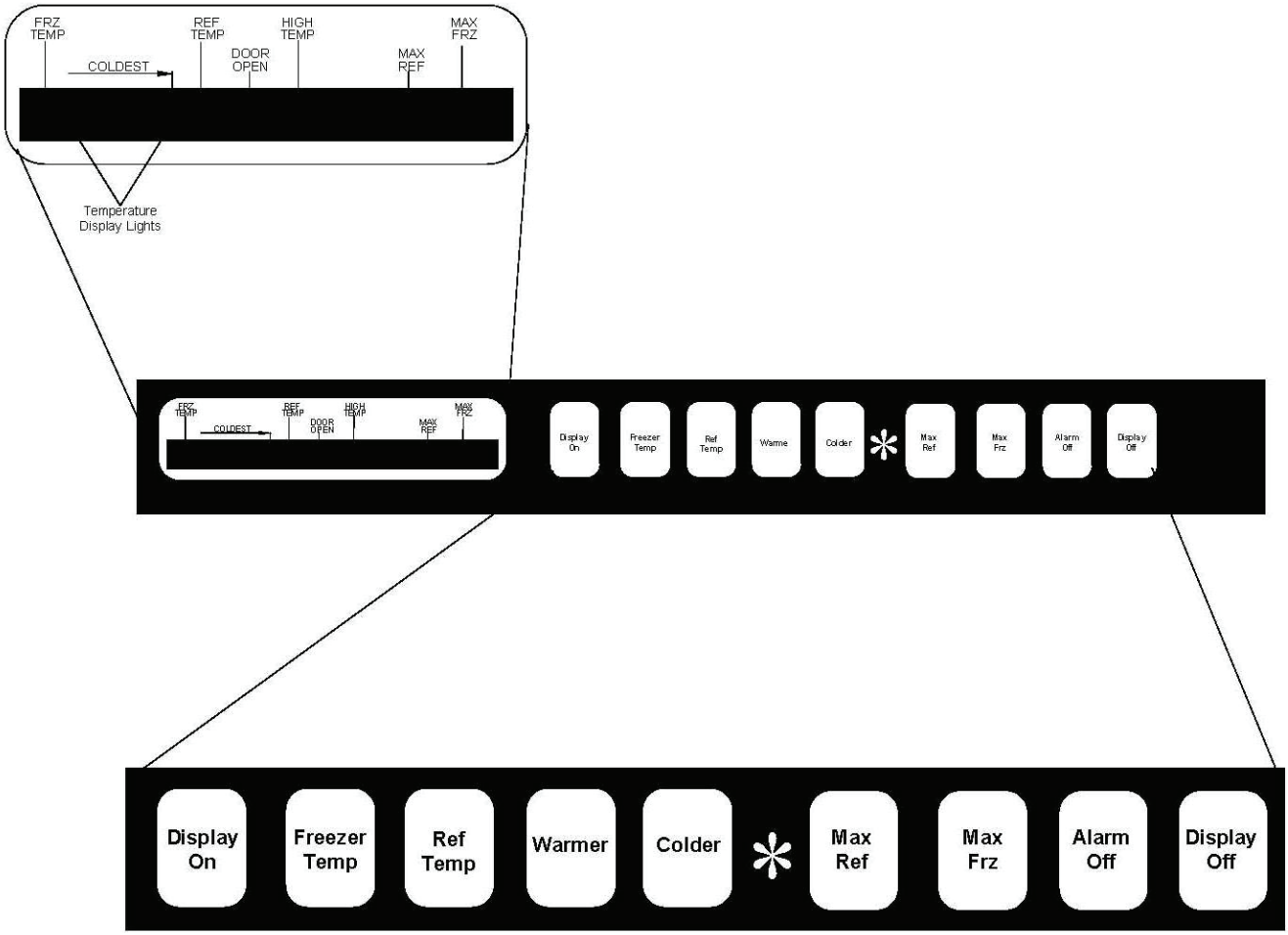
Forced Defrost Start

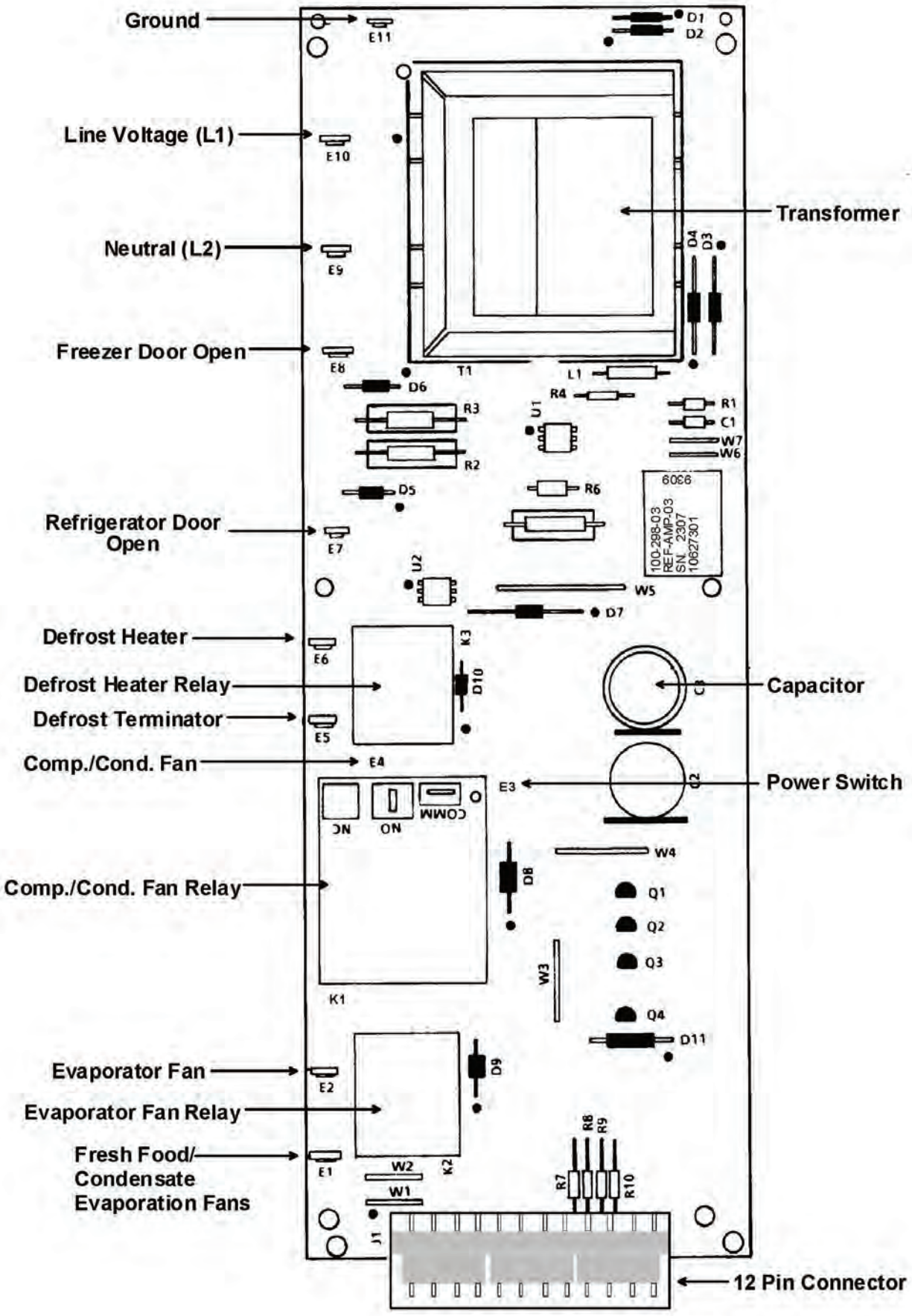
1. Press *Display On* pad to activate control panel.
2. Simultaneously press and hold *Max Ref* and *Display Off* pads for 3 seconds.

Forced Compressor Start

1. Press *Display On* pad to activate control panel.
2. Simultaneously press and hold *Max Frz* pad and *Display off* pads for 3 seconds.

Display Panel Keyboard




Ground
E11
D1
D2
Line Voltage (L1)
E10
Transformer
Neutral (L2)
E9
D4
D3
Freezer Door Open
E8
T1
L1
D6
R4
R3
U1
R1
C1
W7
W6
R2
D5
R6
Refrigerator Door Open
E7
U2
W5
D7
Defrost Heater
E6
K3
Defrost Heater Relay
D10
Capacitor
Defrost Terminator
E5
Comp./Cond. Fan
E4
E3
Power Switch
NC
ON
COMM
W4
Comp./Cond. Fan Relay
D8
Q1
Q2
Q3
W3
K1
Q4
D11
Evaporator Fan
E2
D9
Evaporator Fan Relay
R8
R9
Fresh Food/ Condensate Evaporation Fans
E1
W2
K2
R7
R10
W1
J1
12 Pin Connector

Refrigeration and Defrost Component Checks Made at High Voltage Board

Low voltage board input	W1 to D11	approximately	-25 VDC
High voltage board input	E10 to E9 (Neutral) or ground	approximately	120 VAC
Compressor/condenser fan motor	"ON" = E4 to E9 (Neutral) ground "OFF" = E4 to E9 (Neutral) or ground	approximately	120 VAC
Compressor/condenser fan motor relay	"CLOSED" = R7 to ground "OPEN" = R7 to ground	approximately approximately	-11 VDC -25 VDC
Evaporator fan motor relay	"CLOSED" = R8 to ground "OPEN" = R8 to ground	approximately	-11 VDC -25 VDC
Evaporator fan motor	"ON" = E2 to E9 (Neutral) or ground "OFF" = E2 to E9 (Neutral) or ground	approximately	120 VAC 0 VAC
Defrost heater	"ON" = E6 to E9 (Neutral) or ground "OFF" = E6 to E9 (Neutral) or ground	approximately	120 VAC 0 VAC
Defrost heater relay	"CLOSED" = R9 to ground "OPEN" = R9 to ground	approximately approximately	-11 VDC -25 VDC
Defrost terminator	"CLOSED" = E5 to E9 (Neutral) or ground "OPEN" = E5 to E9 (Neutral) or ground	approximately	120 VAC 0 VAC
Fresh food fan/condensate evaporation fan output voltage	"ON" = E1 to ground	approximately	-25 VDC
High voltage board to fresh food fan/ condensate evaporation fan	"OFF" = E1 to ground		0 VDC
Fresh food fan input voltage	"ON" = R10 to ground	approximately	-11 VDC
Signal to high voltage board from low voltage board	"OFF" = R10 to ground	approximately	-25 VDC

Filament voltage at pins 11 and 12 = less than 5 VAC

Amana “S” and “T” Series Electronic SxS Refrigerators.

Models:

SBDE20S4SW (P1190903WW) SBDE20S4SW (P1190906WW)
SRDE27S3E (P1190602WE) SRDE27S3W (P1190602WW)
SBDE20TPW (P1190904WW) SBDE20TPW (P1190905WW)
SBDE20TPE (P1190904WE) SBDE20TPE (P1190904WE)
SBIE20TPE (P1190707WE) SBIE20TPE (P1190704WE)
SBIE20TPSW (P1190704WW) SBIE20TPSW (P1190709WW)
SBIE20TPW (P1190707WW) SBIE20TPW (P1190911WW)
SRDE25TE (P1190911WE) SRDE25TPE (P1190314WE)
SRDE25TPSE (P1190314WE) SRDE25TW (P1190311WW)
SRDE27TPE (P1190603WE) SRDE27TPSE (P1190604WE)
SRDE27TPW (P1190603WW)

Adaptive Defrost Control 12106801

Defrost occurs after predetermined length of compressor run hours. Compressor run time between defrost changes, or adapts, depending upon recent history of defrost lengths (time it takes for defrost terminator to open after defrost heater has been turned on).

- Defrost terminator opens at 48ºF and closes at 25ºF
- Compressor run time between defrost (CRTD) will be one of three values under normal operation:

  CRTD 1 (8 hours)
  CRTD 2 (12 hours)
  CRTD 3 (16 hours)

  If defrost length is low (DT-LO defined as 19 minutes) indicating small frost load,
  CRDT for next defrost cycle is advanced to next level.
  If defrost length is high (DT-HI defined as 21 minutes) indicating large frost load,
  CRDT for next defrost cycle is lowered to the next level.
  If defrost length is between 19 and 21 minutes CRDT for the next defrost cycle
  remains the same.
  Initial value at power up CRTD 0 is 4 hours.
- Vacation Mode CRTD equals 72 hours. Vacation Mode CRTD is interrupted with door openings. Defrost interval will revert back to interval before Vacation Mode. Three things must occur to reach Vacation Mode CRTD:

1. Defrost interval must be CRTD 3 (16 hours).
2. Both refrigerator and freezer doors must remain closed since last defrost cycle.
3. Defrost thermostat must have opened in less than 19 minutes during last defrost cycle.

- Six minute dwell time occurs after defrost terminator opens before compressor and condenser fan motor will operate.

If defrost thermostat does not open within 29 minutes form start of defrost cycle, adaptive defrost control will terminate defrost even though defrost thermostat had not opened.

- To force defrost cycle, with compressor running and one compartment door closed press either door light switch 4 times within 8 seconds with at least ½ second between each cycle.

Input voltage readings and checks

L1 to L2 line voltage should be present when unit is powered.

K to L2 line voltage should be present with cold control contacts closed.

T to L2 line voltage should be present when cold control contacts are closed and adaptive defrost is in defrost mode.

R to L2 line voltage should be present when refrigerator door open (door light switch is closed).

F to L2 line voltage should be present with freezer door open (door light Switch is closed).

Output voltage readings and checks

C to L2 line voltage should be present when in refrigeration mode with cold control contacts closed.

D to L2 line voltage present when in defrost mode with cold control contacts closed.

1997 Adaptive Defrost Control Part # 12050504 or #12050506 used on Side by Sides.

Models:

SBD20S4E	SBITPL	SRD22VPW	SSD25TL
SBD20S4L	SBI20TPSW	SRD25S3E	SSD25TW
SBD20S4W	SBI20TPW	SRD25SEL	SX22SE
SBD20TPE	SRD20S43	SRD25S3W	SX22SL
SBD20TPL	SRD20S4L	SRD25VPE	SX22SW
SBD20TPSW	SRD20S4W	SRD25VPL	SXD22S2E
SBD20TPW	SRD22S3E	SRD25VPSE	SXD22S2L
SBI20S2E	SRD22S3L	SRD25VPW	SXD22S2W
SBI2020S2E	SRD22S3W	SRD27S2E	SXD27TE
SBI20S2L	SRD22VPE	SRD27S2L	SXD27TL
SBI20S2W	SRD22VPL	SRD27S2W	SXD27TW
SBI20TPE	SRD22VPE	SSD25TE	

A defrost occurs after a pre-determined length of compressor run hours has been reached, similar to refrigerators equipped with an electromechanical defrost timer. However, the compressor run time between defrost cycles changes or adapts depending upon a recent history of defrost lengths (the time it takes for the defrost thermostat to open once the defrost heater has been turned on).

The compressor run time between defrosts will be one of the 4 values under normal operations, defined as 8, 12, 16, or 72 compressor run hour lengths. When the refrigerator is first installed or after a power interruption, the first defrost will occur 4 compressor run hours from the time power is applied. After the initial defrost, the length of the compressor run hours between defrosts (8, 12, 16, or 72) depends upon the length (time) of the last defrost.

To reach (Vacation Mode) 72 hours of accumulative compressor run time between defrost intervals, 3 things must happen.

1. The defrost interval must have advanced to 16 hours of accumulated compressor run time.
2. Both refrigerator and freezer door must have remained closed since the last defrost cycle.
3. The defrost thermostat must have opened in less than 19 minutes during the last defrost cycle.

Vacation Mode Defrost Interval Interruption

1. On all currant series controls, the vacation mode defrost interval is interrupted with a door opening. When a door is opened, the refrigerator will defrost 8 hours from the time the door is opened and will revert back to the 8 hour accumulated compressor run time.

2. If while in vacation mode defrost, the defrost thermostat remains closed for 21 minutes, or more, the next defrost will be 12 hours of accumulated compressor run time.

A 6 minute dwell time occurs after the defrost thermostat opens before the compressor and condenser fan motor will operate. If the defrost thermostat does not open within 29 minutes from the start of the defrost cycle, the adaptive defrost control will terminate the defrost even though the

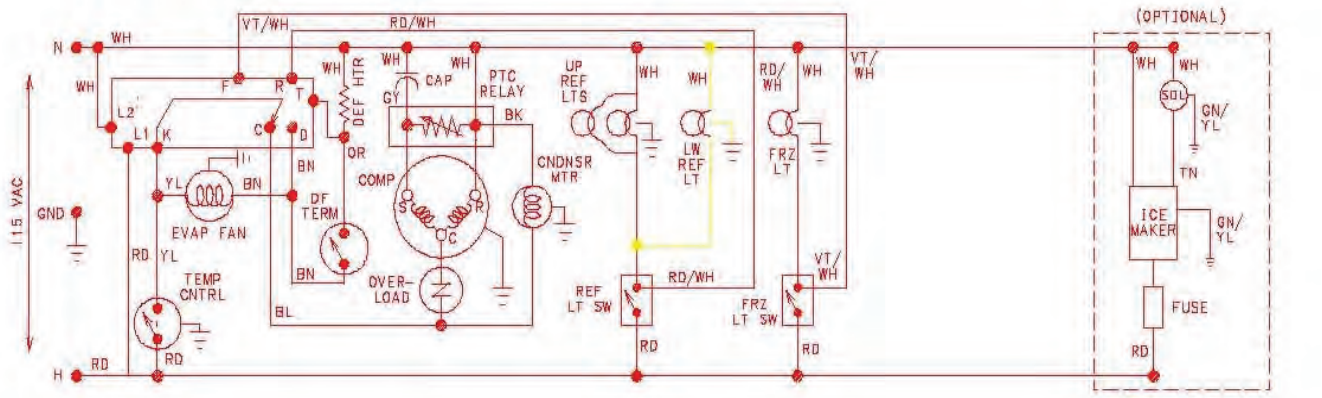
defrost thermostat has not opened.

Forced Defrost

To force a defrost cycle, open and close either the freezer or refrigerator door light switch 4 times in a 3 second period. Allow at least ½ second between each switch condition.

Important

1. The compressor must be operating when forcing defrost.
2. The evaporator fan motor is fan delayed through the defrost thermostat and will not function after a defrost cycle until the defrost thermostat closes.



Input Voltage Readings and Checks

L1 to L2- line voltage should be present whenever the refrigerator is powered.

K to L2- line voltage should be present with cold control contacts closed.

T to L2- line voltage should be present when cold control contacts are closed, defrost terminator is closed, and adaptive defrost control is in defrost mode.

R to L2- line voltage should be present with refrigerator door open (door light switch closed).

F to L2- line voltage should be present with freezer door open (door light switch closed).

Output Voltage Reading and Checks

C to L2- line voltage present when in refrigeration mode with cold control contacts closed.

D to L2- line voltage present when in defrost mode with cold control contacts closed.

JENN-AIR® LUXURY™ SERIES Refrigerators.

Models:

JS48SEDBFA	JS48WDWFA	JS42SEDBFA	JS42FSDBFA	EF42BDCBSS
JS48FSDBDA	JS48FBDBDA	JS42SEDBDA	JS42FBDBFA	EF42SBNDISCH
JS48SEFXDA	JS48FWDWDA	JS42SEFXFA	JS42FWDWFA	EF48BNDBSS
JS48CSDBFA	JS48FSFXFA	JS42SEFXDA	JS42FSDBDA	EF48SBDSBISC
JS48CSDWFA	JS48FBFXFA	JS42CSDBFA	JS42FBDBDA	IF42BCBOL
JS48CSDBDA	JS48FWFXFA	JS42CSDWFA	JS42FWDWDA	IF42SBNDBI
JS48CSDWDA	JS48FSFXDA	JS42CSDBDA	JS42FSFXFA	IF48BDCBOL
JS48CSFXFA	JS48FBFXDA	JS42CSDWDA	JS42FBFXFA	IF48SBDCBI
JS48CSFXDA	JS48FWFXDA	JS42CSFXFA	JS42FWFXFA	
JS48FSDBFA	JS48FBDBFA	JS42CSFXDA	JS42FSFXDA	

Defrost System

The Defrost system is both adaptive and preemptive.

The adaptive portion of the system adjusts the run time between defrost cycles to provide the optimum defrost duration.

Preemptive defrost will attempt to prevent defrost cycles from occurring during high-use periods.

The Main control board monitors door openings to track high usage periods. If the system identifies that a defrost cycle is likely to occur during a high use period, it will either begin defrost early or delay defrost until after the high use period.

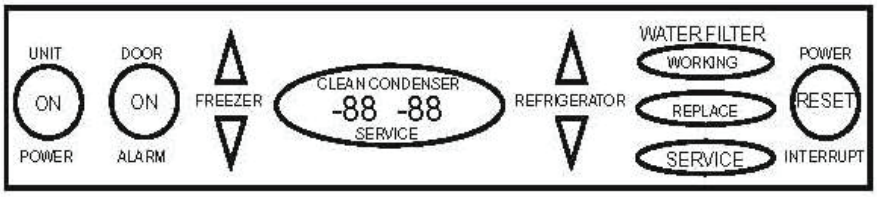
Before initiating a defrost cycle, the system will operate at maximum cooling capacity for 30 minutes. This will sub-cool the freezer section and result in a freezer temperature up to ten degrees below normal. This additional cooling will help to prevent the interior temperatures from rising much beyond the set point temperature during defrost.

There are three heaters wired in parallel for the defrost system. The glass defrost heaters are attached to the evaporator coil, the foil drip pan heater is under the drip tray and the tube heater is around the drain tube to prevent freeze-ups leading out of the evaporator section. Defrost termination is provided by the evaporator thermistor readings. There is a mechanical defrost thermostat wired is series with the heaters to act as a safety thermostat should the Main Control board fail to open the defrost circuit.

The defrost water is routed from the evaporator area to the machine compartment through the divider wall. The water flows into an evaporation tray with wicking pads to accelerate evaporation. These pads are located in the air path after the condenser and the compressor so that warmed air can aid in evaporation.

The defrost system can be energized through the Service Tests mode. Service Test 11 will energize the defrost heaters so long as the defrost terminator is closed. The defrost system will draw approximately 3 amps. While in Service Test 11 the display will show the evaporator temperature. A rising evaporator temperature will confirm that the defrost heater is energized without the need to access the evaporator. The defrost heaters are accessed in the same manner as the evaporator coil.

Troubleshooting Diagnostic Procedures



Power Supply Diagnostics

Check for Line voltage inputs and outputs per label on top of power supply.

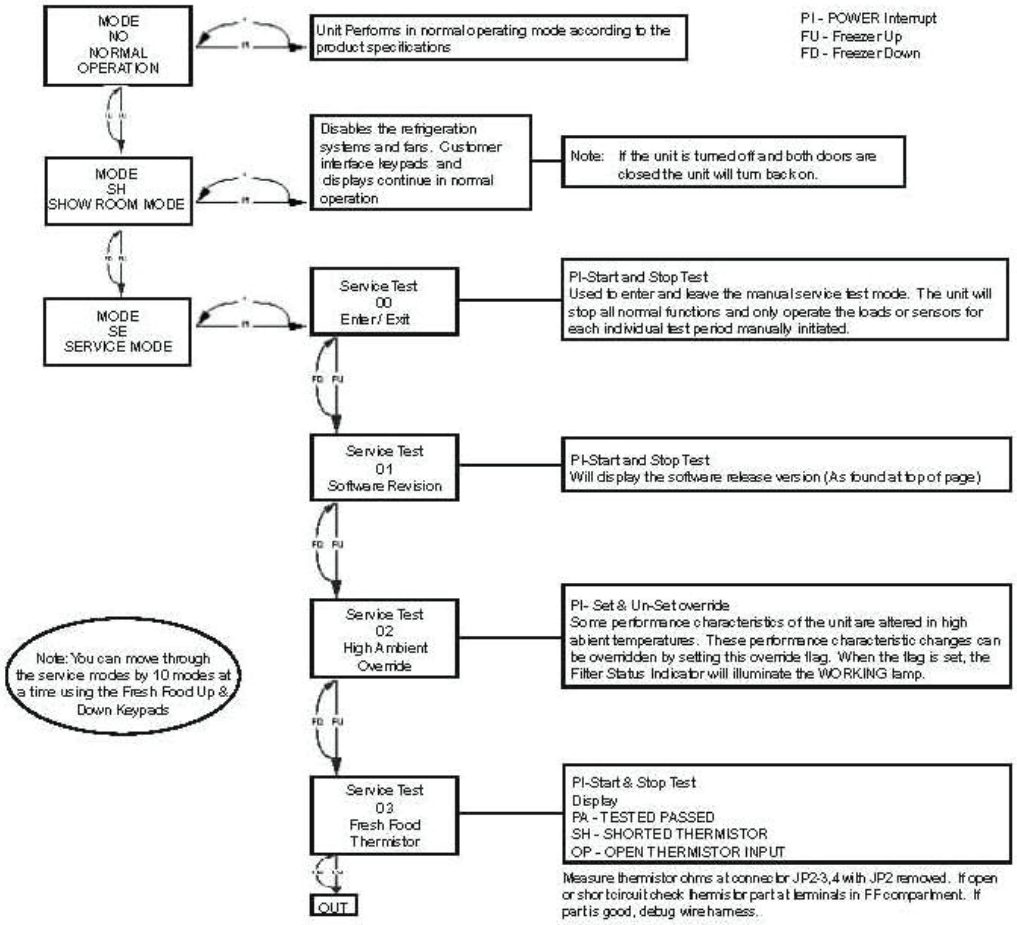
1. LINE INPUT
   With Main power switch ON check for line input on input terminal.
2. DC OUTPUT
   Check for +12VDC and +26 VDC output on output terminal.
   Check for +12VDC on Main Control Terminals JP11-3,2
   Check for +26VDC on Main Control Terminals JP11-3,1

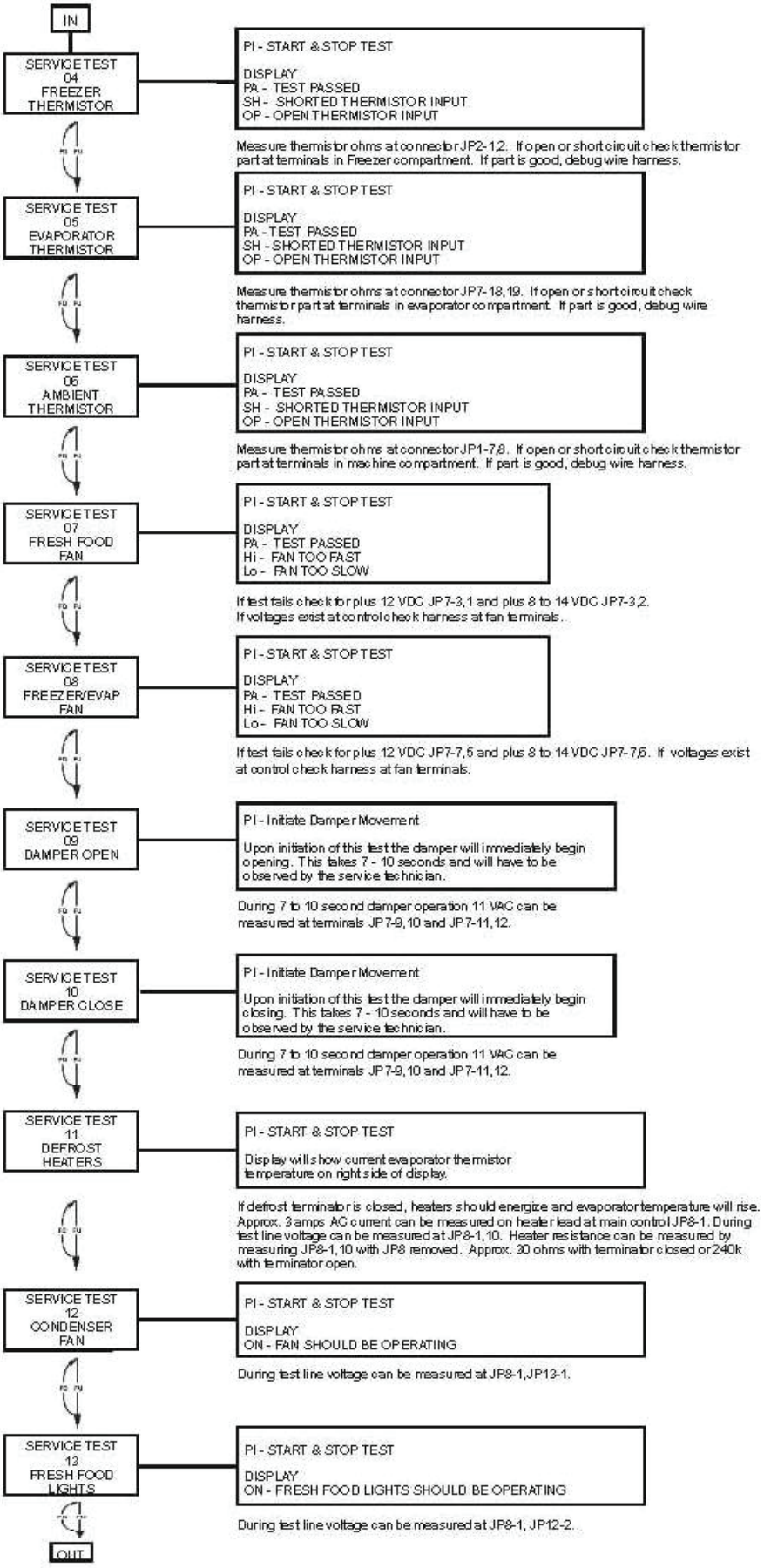
If voltage is "Pulsing" in a repetitious manner there is probably an overload condition on the output side of the power supply.

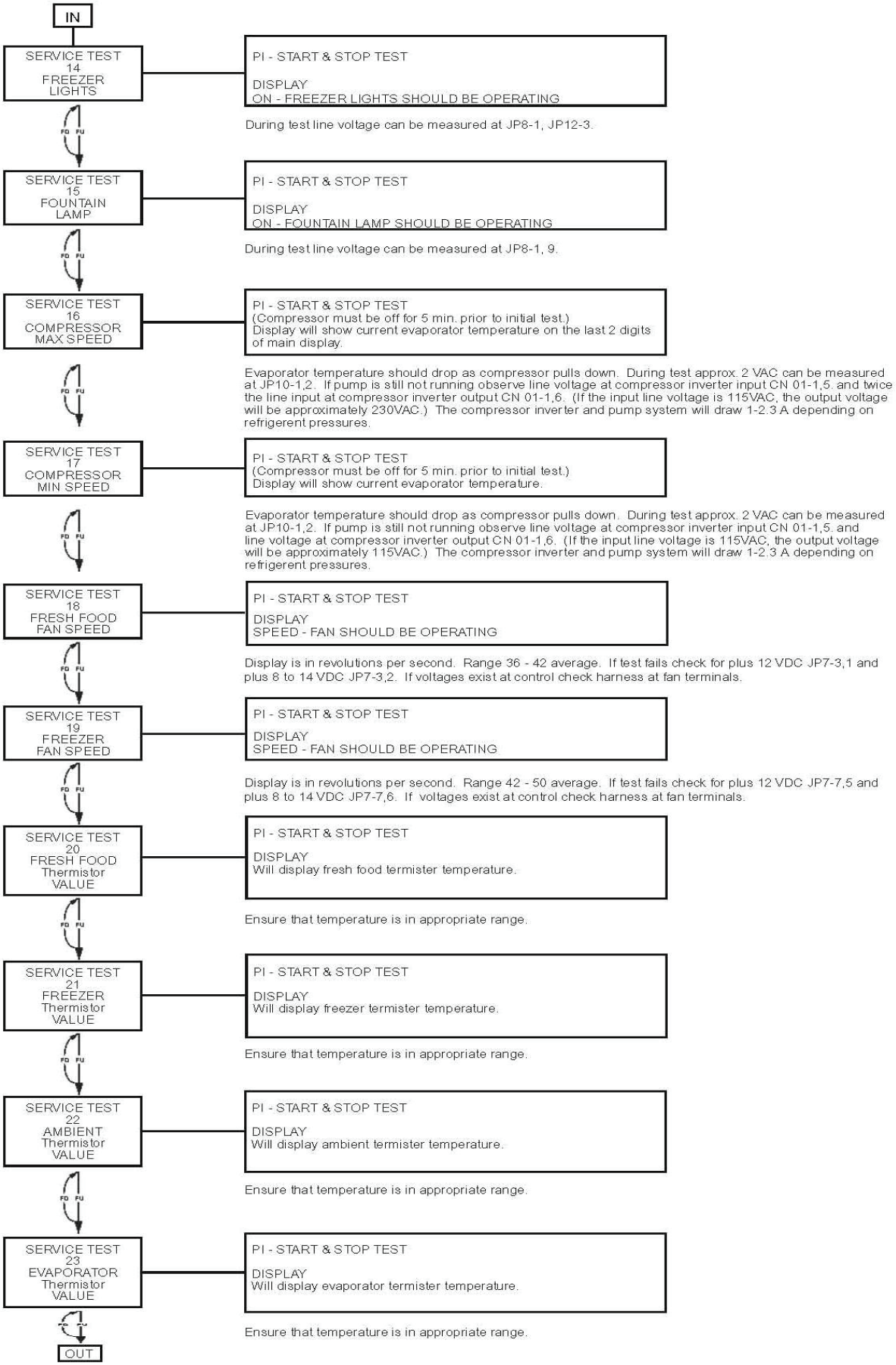
Remove JP7
If "Pulsing" persists test JP7 harness for short-circuits (JP-15, 17 & JP-15, 16)
If "Pulsing" stops remove JP11.
If "Pulsing" persists replace Power Supply.
If "Pulsing" stops replace main control.

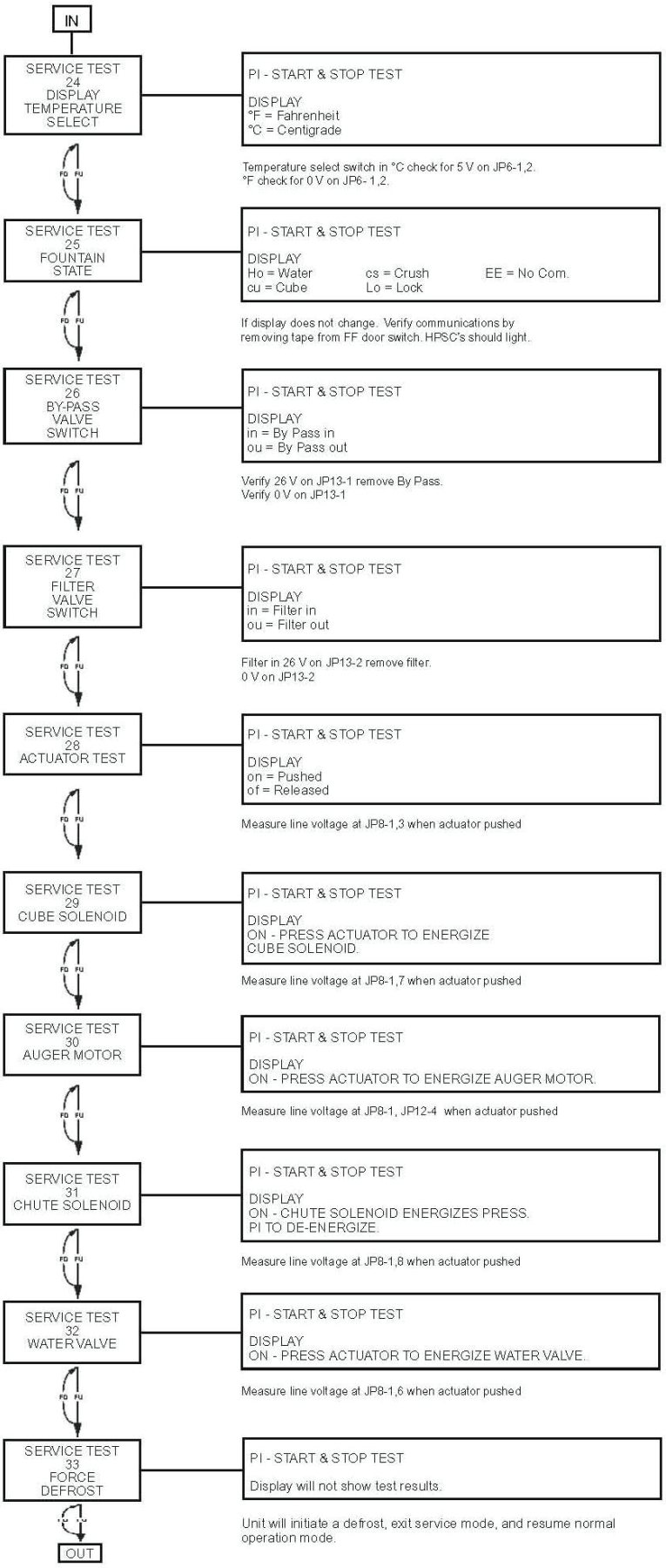
Diagnostic Control Mode

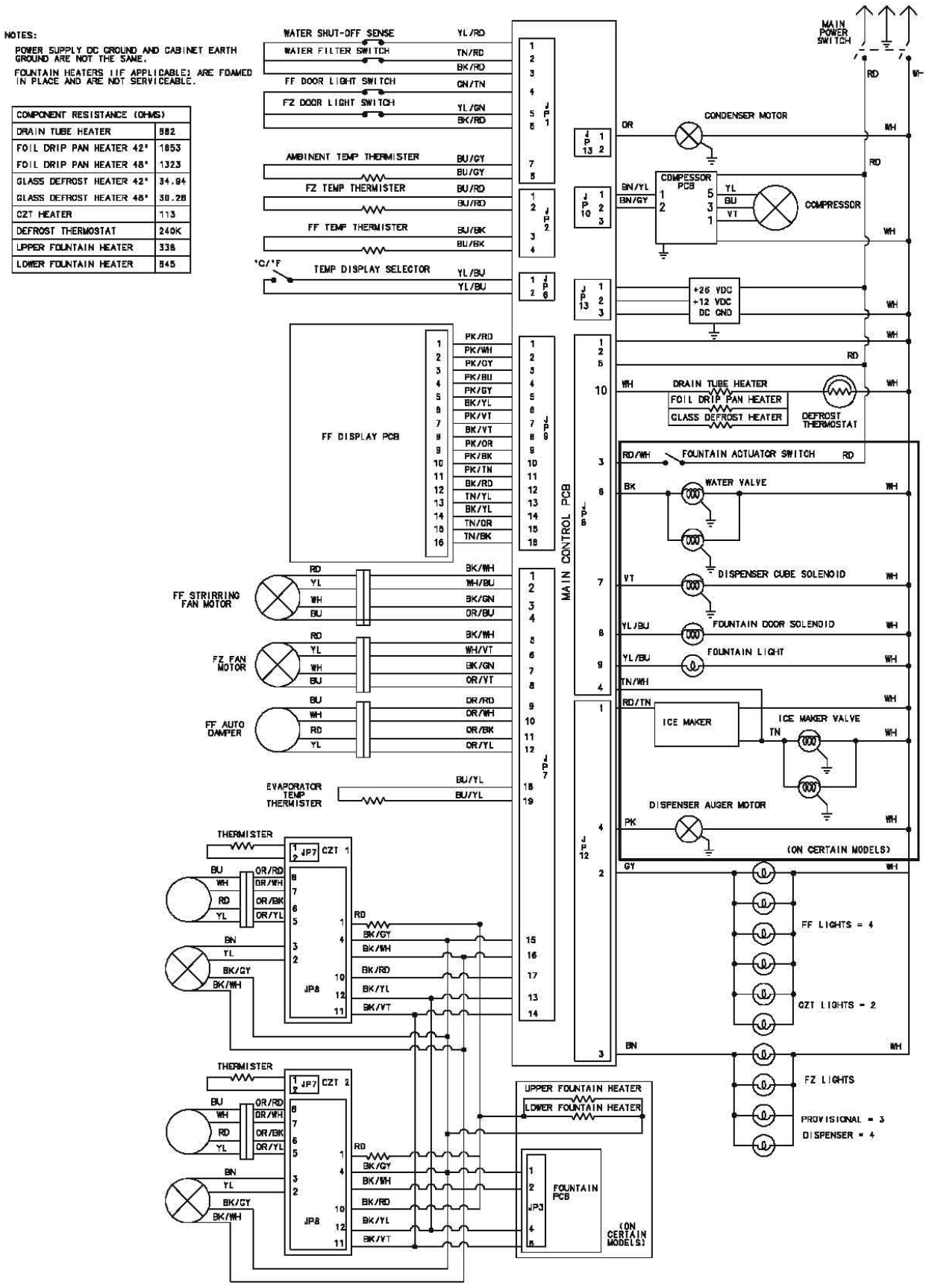
Unit always start in normal operation or showroom mode. To get into "mode selection" with fresh food door open and the fresh food door switch in the closed position, press "Power Interrupt" 3 times. Display will show "Current Mode". Use the FZ up & down selector to change mode selection.




IN
SERVICE TEST 04 FREEZER THERMISTOR
PI - START & STOP TEST
DISPLAY
PA - TEST PASSED
SH - SHORTED THERMISTOR INPUT
OP - OPEN THERMISTOR INPUT
Measure thermistor ohms at connector JP2-1,2. If open or short circuit check thermistor part at terminals in Freezer compartment. If part is good, debug wire harness.
SERVICE TEST 05 EVAPORATOR THERMISTOR
PI - START & STOP TEST
DISPLAY
PA - TEST PASSED
SH - SHORTED THERMISTOR INPUT
OP - OPEN THERMISTOR INPUT
Measure thermistor ohms at connector JP7-18,19. If open or short circuit check thermistor part at terminals in evaporator compartment. If part is good, debug wire harness.
SERVICE TEST 06 AMBIENT THERMISTOR
PI - START & STOP TEST
DISPLAY
PA - TEST PASSED
SH - SHORTED THERMISTOR INPUT
OP - OPEN THERMISTOR INPUT
Measure thermistor ohms at connector JP1-7,8. If open or short circuit check thermistor part at terminals in machine compartment. If part is good, debug wire harness.
SERVICE TEST 07 FRESH FOOD FAN
PI - START & STOP TEST
DISPLAY
PA - TEST PASSED
Hi - FAN TOO FAST
Lo - FAN TOO SLOW
If test fails check for plus 12 VDC JP7-3,1 and plus 8 to 14 VDC JP7-3,2. If voltages exist at control check harness at fan terminals.
SERVICE TEST 08 FREEZER/EVAP FAN
PI - START & STOP TEST
DISPLAY
PA - TEST PASSED
Hi - FAN TOO FAST
Lo - FAN TOO SLOW
If test fails check for plus 12 VDC JP7-7,5 and plus 8 to 14 VDC JP7-7,6. If voltages exist at control check harness at fan terminals.
SERVICE TEST 09 DAMPER OPEN
PI - Initiate Damper Movement
Upon initiation of this test the damper will immediately begin opening. This takes 7 - 10 seconds and will have to be observed by the service technician.
During 7 to 10 second damper operation 11 VAC can be measured at terminals JP7-9,10 and JP7-11,12.
SERVICE TEST 10 DAMPER CLOSE
PI - Initiate Damper Movement
Upon initiation of this test the damper will immediately begin closing. This takes 7 - 10 seconds and will have to be observed by the service technician.
During 7 to 10 second damper operation 11 VAC can be measured at terminals JP7-9,10 and JP7-11,12.
SERVICE TEST 11 DEFROST HEATERS
PI - START & STOP TEST
Display will show current evaporator thermistor temperature on right side of display.
If defrost terminator is closed, heaters should energize and evaporator temperature will rise. Approx. 3 amps AC current can be measured on heater lead at main control JP8-1. During test line voltage can be measured at JP8-1,10. Heater resistance can be measured by measuring JP8-1,10 with JP8 removed. Approx. 30 ohms with terminator closed or 240k with terminator open.
SERVICE TEST 12 CONDENSER FAN
PI - START & STOP TEST
DISPLAY
ON - FAN SHOULD BE OPERATING
During test line voltage can be measured at JP8-1, JP13-1.
SERVICE TEST 13 FRESH FOOD LIGHTS
PI - START & STOP TEST
DISPLAY
ON - FRESH FOOD LIGHTS SHOULD BE OPERATING
During test line voltage can be measured at JP8-1, JP12-2.
OUT


IN
SERVICE TEST 14 FREEZER LIGHTS
PI - START & STOP TEST
DISPLAY
ON - FREEZER LIGHTS SHOULD BE OPERATING
During test line voltage can be measured at JP8-1, JP12-3.
FD FU
SERVICE TEST 15 FOUNTAIN LAMP
PI - START & STOP TEST
DISPLAY
ON - FOUNTAIN LAMP SHOULD BE OPERATING
During test line voltage can be measured at JP8-1, 9.
FD FU
SERVICE TEST 16 COMPRESSOR MAX SPEED
PI - START & STOP TEST
(Compressor must be off for 5 min. prior to initial test.)
Display will show current evaporator temperature on the last 2 digits of main display.
Evaporator temperature should drop as compressor pulls down. During test approx. 2 VAC can be measured at JP10-1,2. If pump is still not running observe line voltage at compressor inverter input CN 01-1,5. and twice the line input at compressor inverter output CN 01-1,6. (If the input line voltage is 115VAC, the output voltage will be approximately 230VAC.) The compressor inverter and pump system will draw 1-2.3 A depending on refrigerent pressures.
FD FU
SERVICE TEST 17 COMPRESSOR MIN SPEED
PI - START & STOP TEST
(Compressor must be off for 5 min. prior to initial test.)
Display will show current evaporator temperature.
Evaporator temperature should drop as compressor pulls down. During test approx. 2 VAC can be measured at JP10-1,2. If pump is still not running observe line voltage at compressor inverter input CN 01-1,5. and line voltage at compressor inverter output CN 01-1,6. (If the input line voltage is 115VAC, the output voltage will be approximately 115VAC.) The compressor inverter and pump system will draw 1-2.3 A depending on refrigerent pressures.
FD FU
SERVICE TEST 18 FRESH FOOD FAN SPEED
PI - START & STOP TEST
DISPLAY
SPEED - FAN SHOULD BE OPERATING
Display is in revolutions per second. Range 36 - 42 average. If test fails check for plus 12 VDC JP7-3,1 and plus 8 to 14 VDC JP7-3,2. If voltages exist at control check harness at fan terminals.
FD FU
SERVICE TEST 19 FREEZER FAN SPEED
PI - START & STOP TEST
DISPLAY
SPEED - FAN SHOULD BE OPERATING
Display is in revolutions per second. Range 42 - 50 average. If test fails check for plus 12 VDC JP7-7,5 and plus 8 to 14 VDC JP7-7,6. If voltages exist at control check harness at fan terminals.
FD FU
SERVICE TEST 20 FRESH FOOD Thermistor VALUE
PI - START & STOP TEST
DISPLAY
Will display fresh food termister temperature.
Ensure that temperature is in appropriate range.
FD FU
SERVICE TEST 21 FREEZER Thermistor VALUE
PI - START & STOP TEST
DISPLAY
Will display freezer termister temperature.
Ensure that temperature is in appropriate range.
FD FU
SERVICE TEST 22 AMBIENT Thermistor VALUE
PI - START & STOP TEST
DISPLAY
Will display ambient termister temperature.
Ensure that temperature is in appropriate range.
FD FU
SERVICE TEST 23 EVAPORATOR Thermistor VALUE
PI - START & STOP TEST
DISPLAY
Will display evaporator termister temperature.
Ensure that temperature is in appropriate range.
FD FU
OUT


IN
SERVICE TEST 24 DISPLAY TEMPERATURE SELECT
PI - START & STOP TEST
DISPLAY
°F = Fahrenheit
°C = Centigrade
Temperature select switch in °C check for 5 V on JP6-1,2.
°F check for 0 V on JP6- 1,2.
FD FU
SERVICE TEST 25 FOUNTAIN STATE
PI - START & STOP TEST
DISPLAY
Ho = Water
cs = Crush
EE = No Com.
cu = Cube
Lo = Lock
If display does not change. Verify communications by removing tape from FF door switch. HPSC's should light.
FD FU
SERVICE TEST 26 BY-PASS VALVE SWITCH
PI - START & STOP TEST
DISPLAY
in = By Pass in
ou = By Pass out
Verify 26 V on JP13-1 remove By Pass.
Verify 0 V on JP13-1
FD FU
SERVICE TEST 27 FILTER VALVE SWITCH
PI - START & STOP TEST
DISPLAY
in = Filter in
ou = Filter out
Filter in 26 V on JP13-2 remove filter.
0 V on JP13-2
FD FU
SERVICE TEST 28 ACTUATOR TEST
PI - START & STOP TEST
DISPLAY
on = Pushed
of = Released
Measure line voltage at JP8-1,3 when actuator pushed
FD FU
SERVICE TEST 29 CUBE SOLENOID
PI - START & STOP TEST
DISPLAY
ON - PRESS ACTUATOR TO ENERGIZE CUBE SOLENOID.
Measure line voltage at JP8-1,7 when actuator pushed
FD FU
SERVICE TEST 30 AUGER MOTOR
PI - START & STOP TEST
DISPLAY
ON - PRESS ACTUATOR TO ENERGIZE AUGER MOTOR.
Measure line voltage at JP8-1, JP12-4 when actuator pushed
FD FU
SERVICE TEST 31 CHUTE SOLENOID
PI - START & STOP TEST
DISPLAY
ON - CHUTE SOLENOID ENERGIZES PRESS.
PI TO DE-ENERGIZE.
Measure line voltage at JP8-1,8 when actuator pushed
FD FU
SERVICE TEST 32 WATER VALVE
PI - START & STOP TEST
DISPLAY
ON - PRESS ACTUATOR TO ENERGIZE WATER VALVE.
Measure line voltage at JP8-1,6 when actuator pushed
FD FU
SERVICE TEST 33 FORCE DEFROST
PI - START & STOP TEST
Display will not show test results.
Unit will initiate a defrost, exit service mode, and resume normal operation mode.
FD FU
OUT


NOTES:
POWER SUPPLY DC GROUND AND CABINET EARTH GROUND ARE NOT THE SAME.
FOUNTAIN HEATERS (IF APPLICABLE) ARE FOAMED IN PLACE AND ARE NOT SERVICEABLE.
COMPONENT RESISTANCE (OHMS)
DRAIN TUBE HEATER 882
FOIL DRIP PAN HEATER 42" 1853
FOIL DRIP PAN HEATER 48" 1323
GLASS DEFROST HEATER 42" 34.94
GLASS DEFROST HEATER 48" 30.28
CZT HEATER 113
DEFROST THERMOSTAT 240K
UPPER FOUNTAIN HEATER 338
LOWER FOUNTAIN HEATER 845
WATER SHUT-OFF SENSE
WATER FILTER SWITCH
FF DOOR LIGHT SWITCH
FZ DOOR LIGHT SWITCH
AMBINENT TEMP THERMISTER
FZ TEMP THERMISTER
FF TEMP THERMISTER
°C/°F
TEMP DISPLAY SELECTOR
FF DISPLAY PCB
FF STIRRING FAN MOTOR
FZ FAN MOTOR
FF AUTO DAMPER
EVAPORATOR TEMP THERMISTER
MAIN CONTROL PCB
MAIN POWER SWITCH
CONDENSER MOTOR
COMPESSOR PCB
COMPRESSOR
+26 VDC
+12 VDC
DC GND
DRAIN TUBE HEATER
FOIL DRIP PAN HEATER
GLASS DEFROST HEATER
DEFROST THERMOSTAT
FOUNTAIN ACTUATOR SWITCH
WATER VALVE
DISPENSER CUBE SOLENOID
FOUNTAIN DOOR SOLENOID
FOUNTAIN LIGHT
ICE MAKER
ICE MAKER VALVE
DISPENSER AUGER MOTOR
(ON CERTAIN MODELS)
FF LIGHTS = 4
CZT LIGHTS = 2
FZ LIGHTS
PROVISIONAL = 3
DISPENSER = 4
THERMISTER
CZT 1
CZT 2
JP8
UPPER FOUNTAIN HEATER
LOWER FOUNTAIN HEATER
FOUNTAIN PCB
(ON CERTAIN MODELS)

— NOTES —

PRODUCT SPECIFICATIONS
AND
WARRANTY INFORMATION SOURCES

IN THE UNITED STATES:

FOR PRODUCT SPECIFICATIONS AND WARRANTY INFORMATION CALL:

FOR WHIRLPOOL PRODUCTS: 1-800-253-1301
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FOR ROPER PRODUCTS: 1-800-447-6737

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FOR LITERATURE ORDERS:

PHONE: 1-800-851-4605

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