# TECHNICAL SERVICE GUIDE

## 1998 ADAPTIVE DEFROST

An Intelligent Refrigerator
Defrost System

EDC
Board
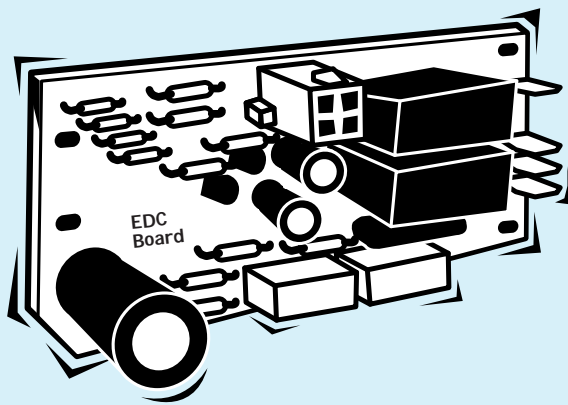
## Adaptive Defrost Models:

**CSG28D**
**MSG28D**
**TPG24P**
**TFG28P**
**TFG28Z**
**TFG30P**
**TFZ20P**
**TFZ22P**

**220-240V / 50HZ
MODELS**

## IMPORTANT SAFETY NOTICE

The information in this service guide is intended for use by individuals possessing adequate backgrounds of electrical, electronic and mechanical experience. Any attempt to repair a major appliance may result in personal injury and property damage. The manufacturer or seller cannot be responsible for the interpretation of this information, nor can it assume any liability in connection with it's use.

## CAUTION

To avoid personal injury while servicing this unit, disconnect power before servicing. If grounding wires, screws, straps, clips, nuts, or washers used to complete a path to ground are removed for service, they must be returned to their original position and properly fastened.

# Table of Contents

## ADAPTIVE DEFROST

We'll start this service guide out by giving you a simplistic overview of the Adaptive Defrost system, and then later in this guide we'll help you understand the detailed operations of each portion of the Adaptive system.

Adaptive defrost can best be described as a defrost system which adapts to the refrigerator's surrounding environment and household usage. Unlike conventional defrost systems which use electromechanical timers with a fixed defrost cycle time (10 hr., 12 hr, etc.), the adaptive defrost system utilizes an intelligent, electronic defrost control to decide when defrost is necessary. In order to make this decision the control monitors important refrigerator operations:

1. Length of time the Refrigerator doors were open since the last defrost.
2. Length of time the compressor has run since the last defrost.
3. Amount of time the defrost heaters were on in the last defrost.

Just prior to defrost heater operation, the refrigerator will enter a **Pre-Chill** mode. During Pre-Chill the electronic defrost control bypasses the thermostat and forces the compressor to run constantly for approximately 1 to 2½ hours (depending on model), in preparation for defrost heater operation.

During **Defrost** the electronic defrost control monitors defrost heater operation (heater ON time). Once defrost heater operation is terminated, or times out (45 mins.), the electronic defrost control will decide whether to initiate an immediate cool cycle or allow for some **Dwell** time before initiating the next cooling cycle - more on this subject to follow later in this service guide (Dwell time = the elapsed time from heater termination until normal cooling operation is resumed).

In summary, the Electronic Defrost Control (EDC), controls the amount of time between defrosts. This allows for efficiency by extending the time between defrosts. In other words, instead of a fixed defrost time (10 hr., 12 hr., 14 hr., etc.) the adaptive defrost system only defrosts when needed.

Now that you understand the basics of adaptive defrost, let's move onto the details.
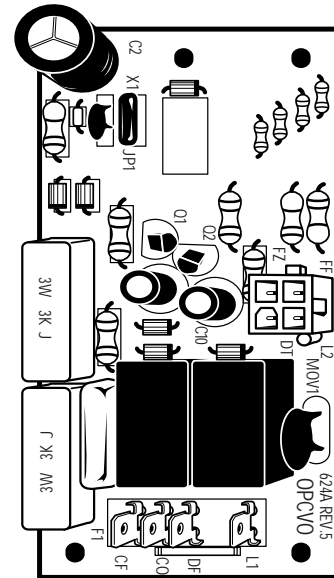


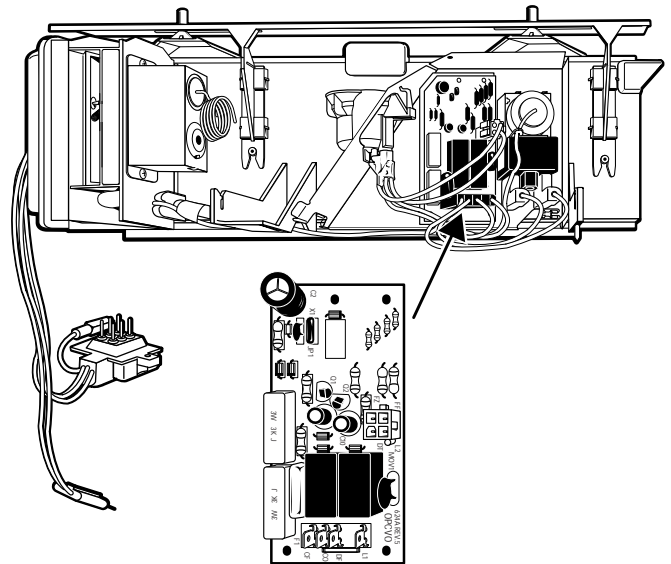**Electronic Defrost Control (EDC).**

## ADAPTIVE DEFROST OPERATION
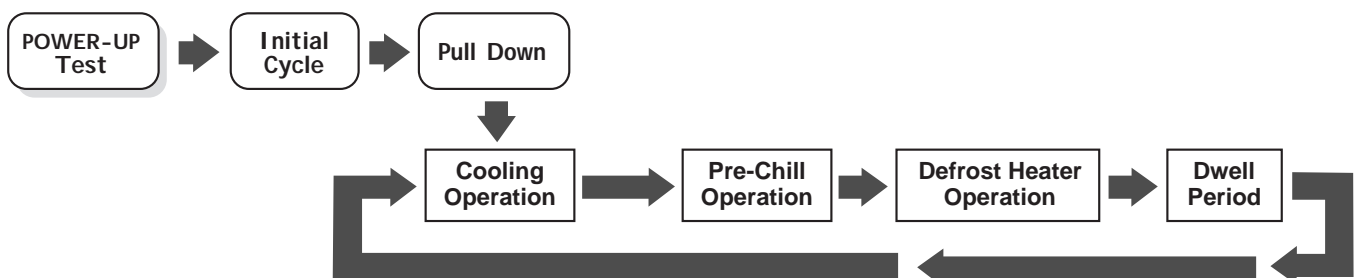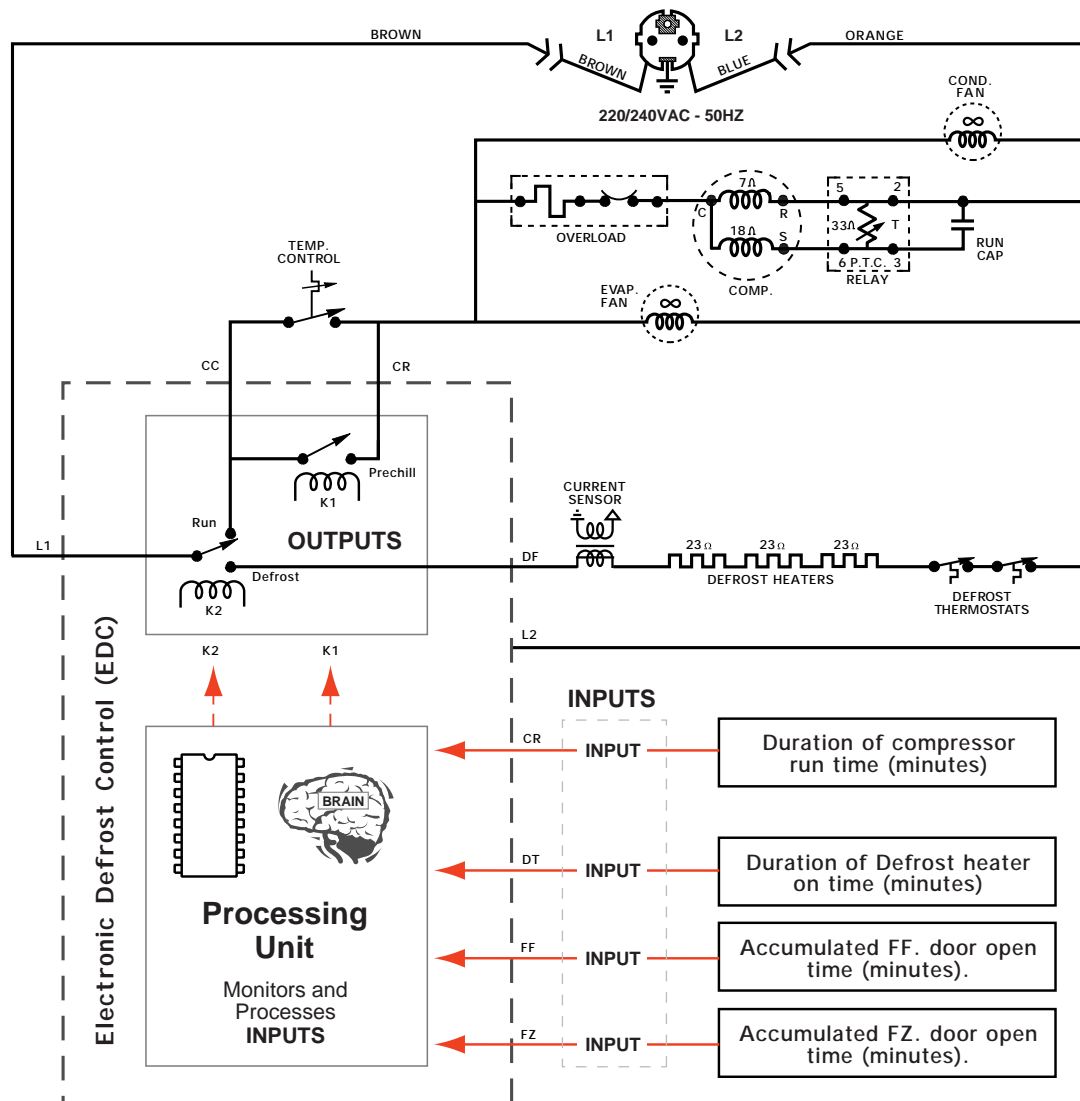
# ELECTRONIC DEFROST CONTROL

The Electronic Defrost Control (**EDC**) board is located in the control console assembly next to the temperature control. By removing the control console you can gain access to the electronic defrost control board.

As you will note from the schematic diagram below, the EDC board has been broken down into 3 pieces in order to simplify and illustrate it's operation. The first piece consist of the **Inputs** from various refrigerator operations (door openings, compressor run time, defrost heater operation). The second piece is the **Processing Unit** where all of the decision making occurs (when to defrost, and how long to defrost). The third piece is what we will refer to as the **Outputs**, this is where all of the work is performed (Relays K1 & K2 open and close to initiate and terminate various operations (defrost, pre-chill, and cooling operation).



**ELECTRONIC DEFROST CONTROL
BOARD LOCATION**



**CAUTION:** Note that 230 volts is present at the EDC Board as long as the Refrigerator is plugged into its power source.

220/240VAC - 50HZ

OVERLOAD

COMP.

P.T.C. RELAY

RUN CAP

COND. FAN

EVAP. FAN

TEMP. CONTROL

**OUTPUTS**

Prechill K1

Run

Defrost K2

CURRENT SENSOR

DEFROST HEATERS

DEFROST THERMOSTATS

**Electronic Defrost Control (EDC)**

**Processing Unit**

Monitors and Processes **INPUTS**

BRAIN

**INPUTS**

| CR | **INPUT** | Duration of compressor run time (minutes) |
| DT | **INPUT** | Duration of Defrost heater on time (minutes) |
| FF | **INPUT** | Accumulated FF. door open time (minutes). |
| FZ | **INPUT** | Accumulated FZ. door open time (minutes). |

– 3 –

# COOLING OPERATION  (Normal Adaptive)

During cooling operation the Electronic Defrost Control (EDC) monitors door opening times (FF, FRZ & Refreshment center door), and compressor run times.  These times are accumulated until they add up to 60 hrs of **equivalent** compressor run time.  Once 60 hours (3600 minutes) of equivalent compressor run time is reached, the refrigerator will enter the Pre-Chill mode (pre-chill mode - described later on in this guide on page 8).
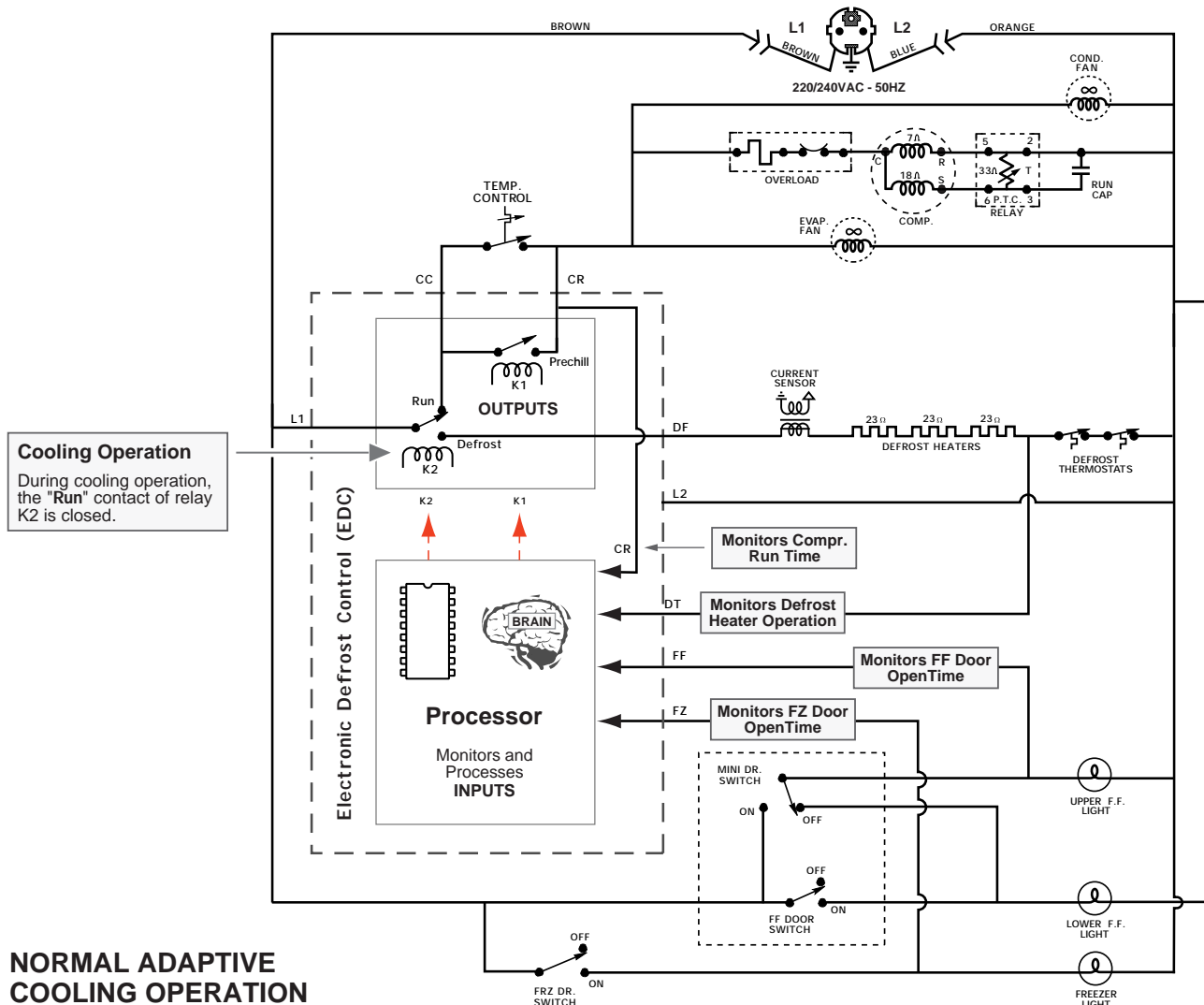
**Equivalent compressor run time** is calculated by multiplying the accumulated door opening times, since the last defrost cycle was completed, by 143 (1 minute of door open time is equivalent to 143 minutes of compressor run time).  Next add the accumulated compressor run time, since the last defrost.  The result will be the **equivalent** compressor run time.

As we stated earlier, the adaptive defrost system is able to **adapt** to its surrounding environment (ambient temperatures effect compressor run times) and household usage (accumulated door opening times).  The length of time between defrost cycles is decided by the electronic defrost control (EDC).  Heavy usage and hot ambient temperatures will require an early defrost, while low usage and a cool ambient will require longer periods between defrost cycles.

$$\left( \begin{array}{c} \text{Accumulated door} \\ \text{open time (mins.)} \end{array} \times 143 \right) + \begin{array}{c} \text{Accumulated compr.} \\ \text{run time (mins)} \end{array} = \begin{array}{c} \text{Equivalent compr.} \\ \text{run time (in mins)} \end{array}$$

**NOTE:** 1 minute of door open time is equivalent to 143 minutes of compressor run time.



**Cooling Operation**

During cooling operation, the "**Run**" contact of relay K2 is closed.

**NORMAL ADAPTIVE COOLING OPERATION**

– 4 –

# EQUIVALENT COMPRESSOR RUN TIME - EXERCISE

Using the example given below, calculate the equivalent compressor run time. Use the space to the right to perform your calculations:

## Example:

Since the last defrost occurred, refrigerator usage has been as follows:

1. Fresh food door has been opened 6 times. Each time the door was opened for 30 seconds.
2. Freezer door was opened once for 2 minutes, and Twice for 30 seconds.
3. Refreshment center door was opened 4 times. Each time the door was opened for 30 seconds.

Since the last defrost the compressor has run for an accumulated compressor run time of 25 hours (or 1500 minutes).

## How to solve:

Start by calculating the total time all of the doors were open (in minutes).

- Fresh food door      6 x 30 secs. = 3 mins.
- Freezer door          1 x 2 mins. = 2 mins.
- Freezer door          2 x 30 secs. = 1 mins.
- Refreshment door    4 x 30 secs. = 2 mins.

*Accumulated door opening time -* 8 mins.

Next multiply 8 minutes of total door opening times, by 143. *Remember that 1 minute of door open time is equivalent to 143 minutes of compressor run time.*

8 mins x 143 = 1144 mins.

Next add the 1144 minutes you calculated above to the 1500 minutes of accumulated compressor run time.

1144 mins. + 1500 mins. = 2644 mins.

> 2644 mins / 60  =  **44.07 hours**
> **Equivalent Compressor Run Time**

$$\left( \begin{array}{c} \text{Accumulated door} \\ \text{open time (mins.)} \end{array} \text{X } 143 \right) + \begin{array}{c} \text{Accumulated compr.} \\ \text{run time (mins)} \end{array} = \begin{array}{c} \text{Equivalent compr.} \\ \text{run time (in mins)} \end{array}$$

**NOTE:** 1 minute of door open time is equivalent to 143 minutes of compressor run time.
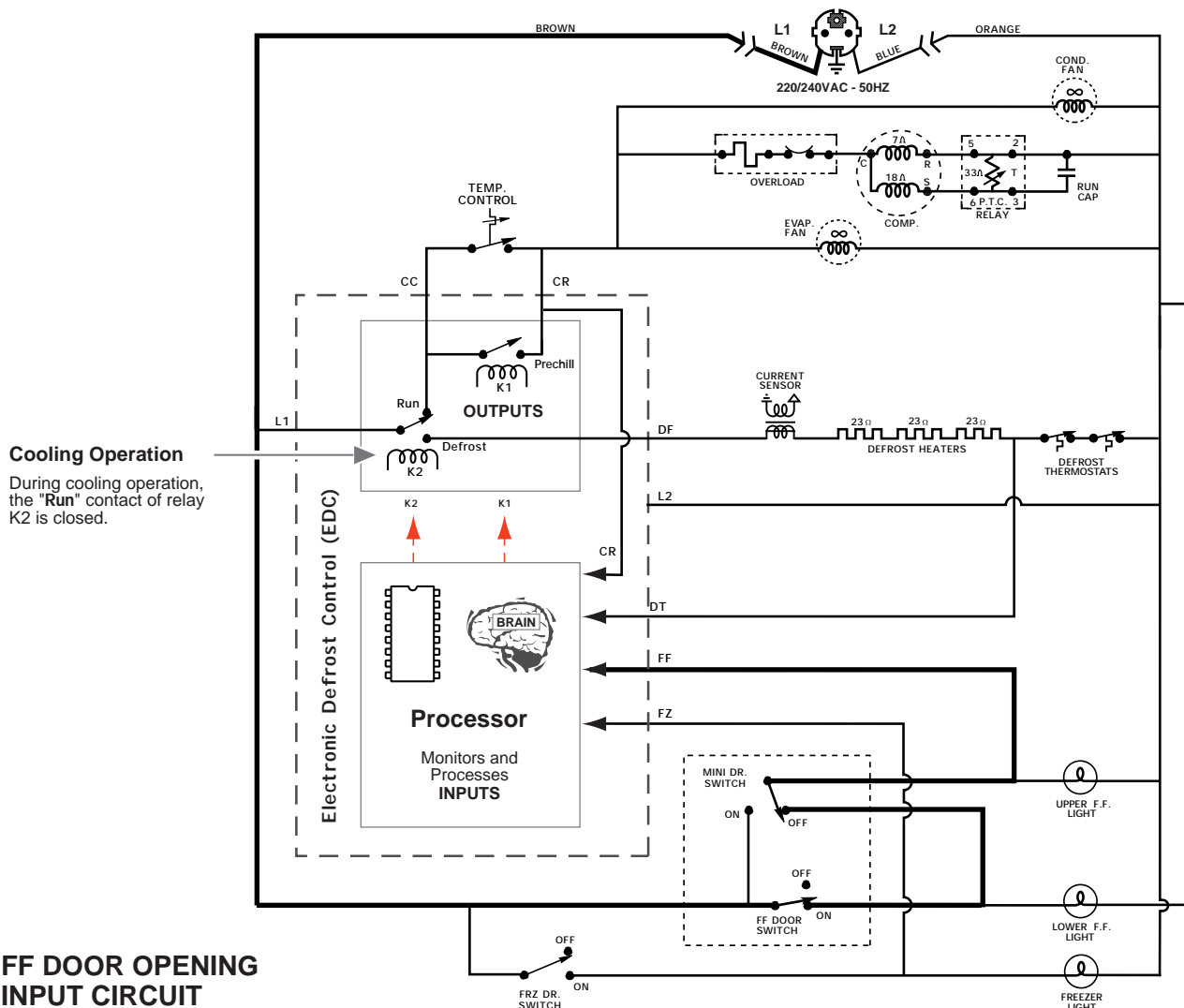
# COOLING OPERATION (Normal Adaptive Continued...)

As stated earlier, during cooling operation the Electronic Defrost Control (EDC) monitors door opening times (fresh food, freezer & refreshment center door), and compressor run times. The EDC monitors door opening times by looking for voltage (INPUT) present on the "FF" or "FZ" terminals of the EDC. When voltage is present at either, or both of these terminals, the EDC will begin counting until the voltage at these terminals is removed.

The schematic below shows the fresh food door in the open position. Notice that voltage is supplied to terminal "FF" on the EDC board as long as the door switch contact remains closed (door open). Also note that the lower fresh food light bulb is not part of the INPUT circuit to the EDC. In other words, the fresh food door light could be burned-out (open) and the EDC would still be able to monitor the voltage present at terminal "FF". The

same is also true for the freezer and mini door light circuits.

To summarize, the door switches provide INPUT to the EDC. These inputs are independent from the door lights. A failed light bulb (open), would have no bearing on adaptive defrost operation; however, a failed light switch (failed open, or failed closed) would affect adaptive defrost operation by either allowing constant input (defrost too early) to the EDC or not supplying input at all (defrost too late) to the EDC.



**Cooling Operation**

During cooling operation, the "**Run**" contact of relay K2 is closed.

**FF DOOR OPENING INPUT CIRCUIT**

## COOLING OPERATION (Normal Adaptive Continued...)

Let's assume for a moment that the compressor has run continuously for 25 minutes since the last defrost cycle occurred. Let's also assume that during this same period of time (25 minutes) the customer opened the FF door and forgot to close it shut. Based on what you have learned so far, let's calculate the equivalent compressor run time:

(25 mins. x 143) + 25 mins. = 3,600 mins. or 60 hrs.

**Equivalent compressor run time**

In this example you can see that during a 25 minute period of time (since the last defrost occurred) the cooling operation has already reached 60 hours of equivalent compressor run time. What you would expect to happen next is for the EDC to initiate the pre-chill mode. However, 25 minutes of compressor run time is hardly sufficient time to provide proper cooling. In addition, 25 minutes is much to short a time between the last defrost, and the next pre-chill cycle.

To avoid this situation, a minimum of 8 hours accumulated compressor run time must occur before the EDC will allow the refrigerator to enter the Pre-chill mode. As you can see from the flow chart below, once 8 hours of accumulated compres-

sor run time have occurred, the EDC then checks **equivalent compressor run time** (accumulated compressor run time + door opening times) to see if 60 hrs. has been reached. If it has, the EDC will terminate the adaptive cooling operation and initiate the Pre-Chill mode. If not, the EDC will continue to operate in the adaptive cooling mode until 60 hours of equivalent compressor run time have been reached.

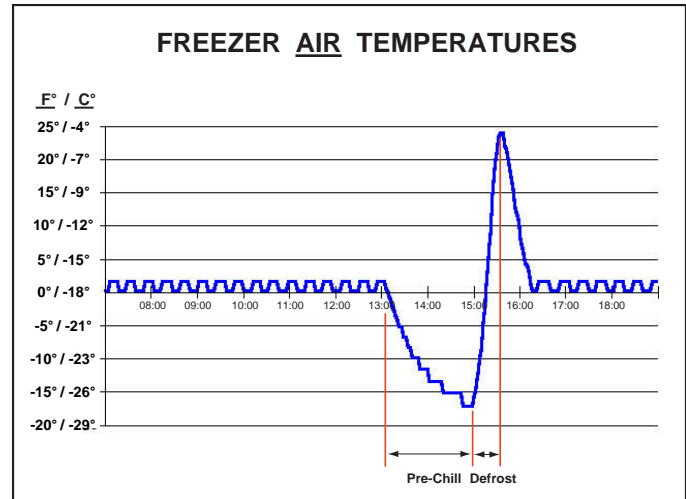**NORMAL ADAPTIVE COOLING OPERATION**
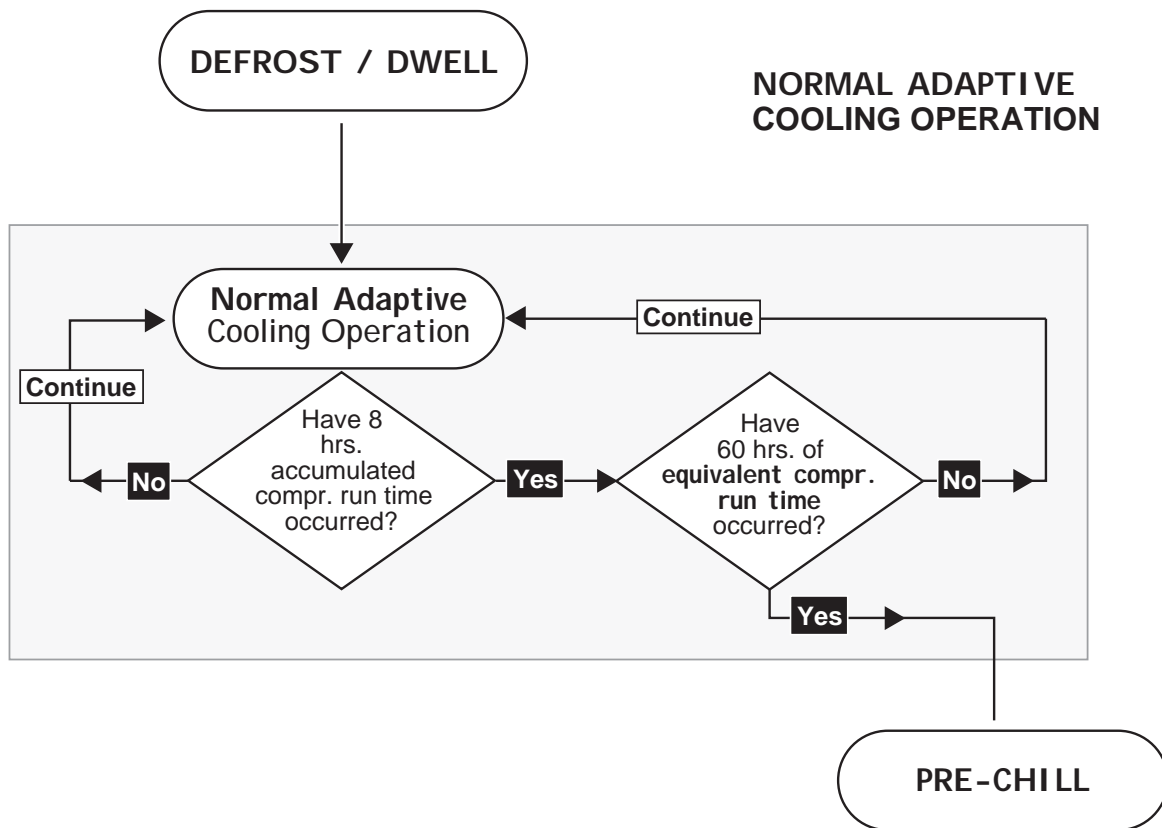
# PRE-CHILL

When the electronic defrost control (EDC) determines that a minimum of 8 hours of accumulated compressor run time have occurred, and 60 hours of equivalent compressor run time have been reached, the control will force the refrigerator into a continuous cool mode (**Pre-Chill**).  It is important to note that in order for the refrigerator to enter the pre-chill mode, the compressor must be running.  In other words, if the unit has met the above criteria (minimum of 8 hours accumulate compressor run time and 60 hours equivalent compressor run time) and the temperature control is satisfied (compressor not running), the unit will NOT enter the pre-chill mode until the temperature control calls for the compressor  to run.  The unit will then immediately enter the pre-chill mode.

During pre-chill the  compressor, evaporator fan and condenser fan will run during the entire cycle.  To accomplish this the electronic defrost control energizes relay K1 (pre-chill relay), which by-passes the temperature control (thermostat).

The pre-chill mode lowers the freezer temperature in preparation for defrost heater operation (approx. 15-20°F decrease in freezer temp.).  During defrost, defrost heater operation will cause freezer temperatures to rise slightly.   By lowering the freezer temperatures prior to defrost (pre-chill), the compressor "run-time" will be reduced, once the cooling mode is resumed.  In other words it will take less time for the freezer to reach it's operating temperature (thermostat set point).

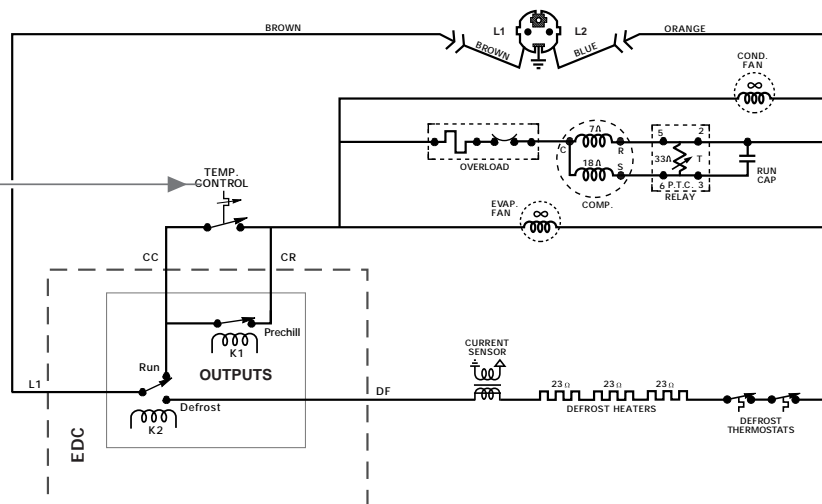| Cooling Operation | → | Pre-Chill Operation | → |
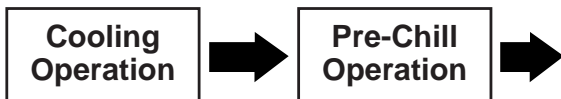
Pre-chill operation will last approximately 1 to 2½ hours, depending on the model.  Pre-chill time starts from the time the compressor last started.  For example, if the pre-chill mode was 2 hrs. long, and the compressor had been running for 15 minutes prior to 60 hrs. of equivalent compressor run time being reached, the electronic defrost control would subtract 15 minutes from the 2 hours (1hr. & 45 minutes).

### FREEZER AIR TEMPERATURES

| F° / C° |
|---|
| 25° / -4° |
| 20° / -7° |
| 15° / -9° |
| 10° / -12° |
| 5° / -15° |
| 0° / -18° |
| -5° / -21° |
| -10° / -23° |
| -15° / -26° |
| -20° / -29° |

08:00  09:00  10:00  11:00  12:00  13:00  14:00  15:00  16:00  17:00  18:00

Pre-Chill  Defrost

**Has no effect on temperature when relay K1 is energized**

**Note:** when K1 relay contacts are closed, the temperature control is by-passed and has no effect on refrigerator temperatures.   If the temperature control contacts open, the compressor will continue to run until the pre-chill mode ends.

# DEFROST OPERATION

After two hours of Pre-Chill have completed, the K1 relay is de-energized; shutting off the compressor, condenser fan and evaporator fan. Next the K2 relay is energized to complete the defrost heater circuit.

During defrost heater operation the Electronic Defrost Control (EDC) monitors heater ON time (total time defrost heaters are on). The EDC uses this information to determine how much frost has accumulated on the evaporator coils. Depending on the amount of frost, there are 3 possible defrost operations that can occur:

1. **Normal Defrost** operation - defrost heater operation is terminated by one of the termination thermostats, in less than 30 mins. of heater operation. Once defrost heater operation is terminated by one of the termination thermostats, there is a fixed 5 min. dwell time until normal cooling operation is resumed.

2. **Abnormal (A) Defrost** - defrost heater operation is terminated by one of the termination thermostats, between 30 to 44 mins. of defrost heater operation. Once defrost heater operation is terminated by one of the termination thermostats, there is a fixed 5 min. dwell time until normal cooling operation is resumed.

3. **Abnormal (B) Defrost** - defrost heaters remain on for the full 45 minutes of defrost operation and are NOT terminated by the termination thermostat(s). At the end of 45 minutes the electronic defrost control clock "times out", and begins the next cooling mode of operation (no dwell period).

**DWELL** = The elapsed time from heater termination until cooling operation is resumed.

| Normal Defrost < 30 mins. Defrost Heater Operation | → | 5 min. Dwell Period | → | Cooling Operation |

| Abnormal (A) Defrost 30-44 mins. Defrost Heater Operation | → | 5 min. Dwell Period | → | Cooling Operation |

Abnormal (B)

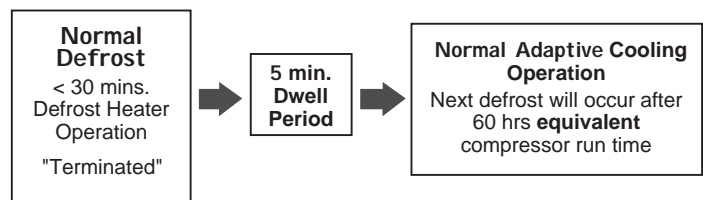| Abnormal (B) Defrost Full 45 mins. Defrost Heater Operation | → | NO Dwell Period | → | Cooling Operation |

**Defrost Heater Operation**

– 9 –
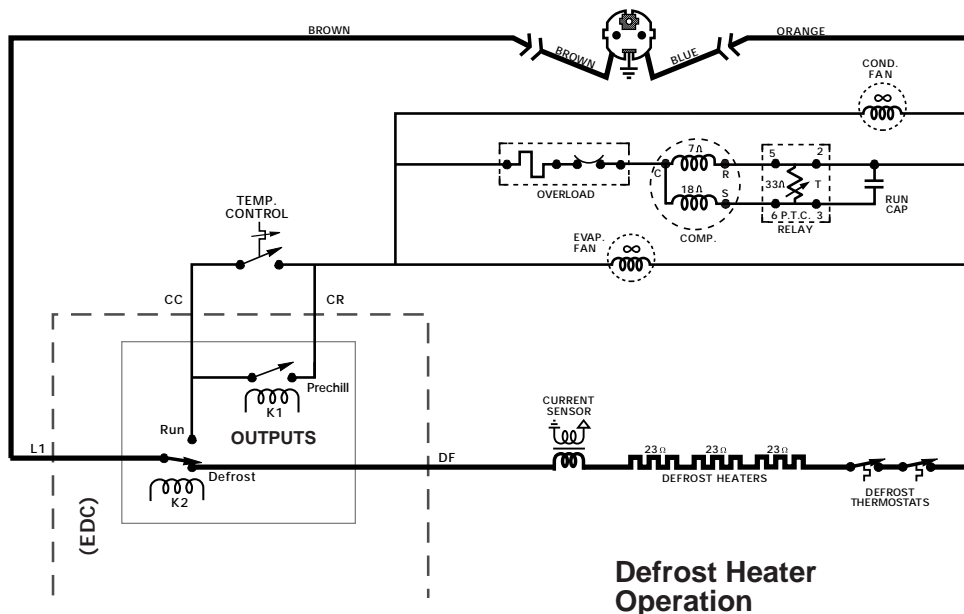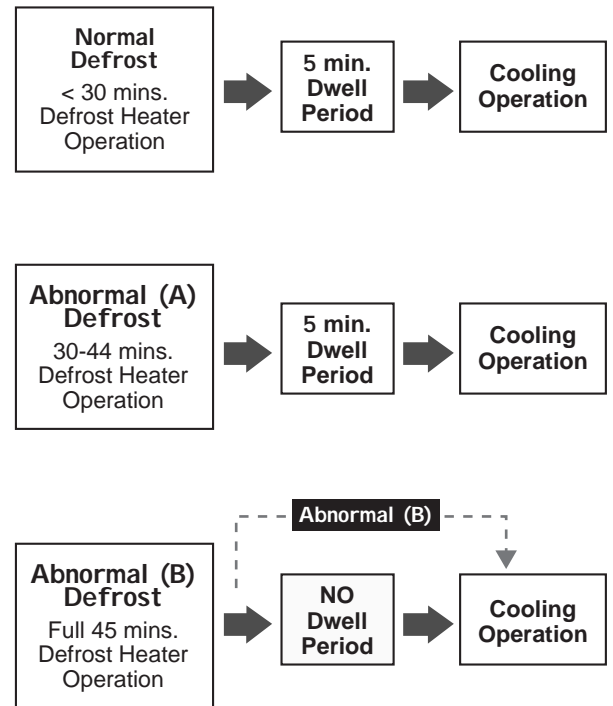
## DWELL PERIOD

After the defrost heaters have been terminated by one of the two defrost termination thermostats, K2 will remain energized (closed) for 5 additional minutes (Dwell Period). The Dwell Period is the elapsed time from heater termination until cooling operation begins. During Dwell, the compressor, condenser fan, and evaporator fan remain non-operational. The remaining melted frost from the evaporator will continue to drip and drain, so that prior to cooling operation, the evaporator will be totally clear of any moisture.

## COOLING OPERATION (Normal Adaptive)

At the end of a Normal Defrost the Electronic Defrost Control will return the refrigerator to a normal adaptive cooling operation and once again monitor accumulated door open time and actual accumulated compressor run time, until 60 hours of equivalent compressor run time is reached (**Normal Adaptive Cooling Operation** - next defrost will occur when needed). See pages 4-7 for additional information regarding Normal Adaptive Cooling Operation.
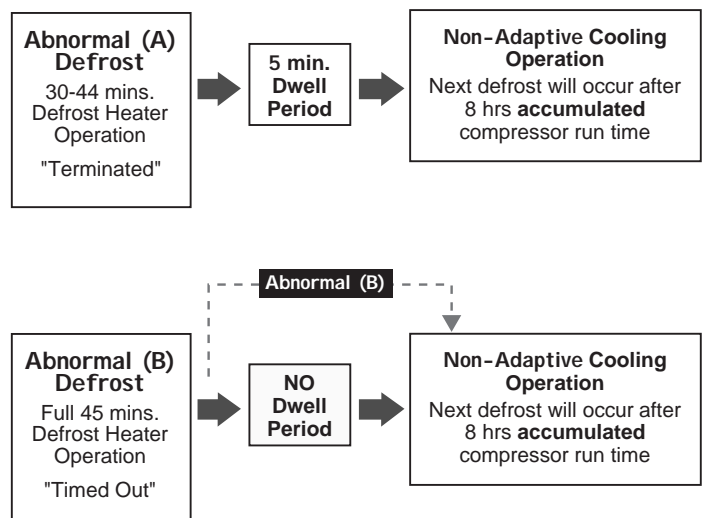
## COOLING OPERATION (Non-Adaptive)

At the end of an Abnormal (A) or Abnormal (B) Defrost, the Electronic Defrost Control will return the refrigerator to cooling operation; however, due to the abnormal amount of defrost heater ON time that occurred during the defrost cycle, the EDC will initiate the next defrost operation after a fixed 8 hours of accumulated compressor run time (**Non-Adaptive Cooling Operation** - the next defrost will occur after a fixed 8 hours of accumulated compressor run time).

During Non-Adaptive Cooling Operation only the compressor run time will be monitored, and the door open times will have no bearing on when the next defrost will occur. The refrigerator will operate just like a conventional defrost system with an electromechanical, fixed 8 hour timer, except for the addition of the pre-chill mode.

If the next defrost is a Normal Defrost (defrost heaters terminate in < 30 mins.) the EDC will allow the refrigerator to return to normal adaptive cooling operation (next defrost will occur after 60 hrs. equivalent compressor run time); however, if the next defrost is Abnormal (A or B), then the refrigerator will once again revert to a fixed 8 hour, accumulated compressor run time, defrost (non-adaptive cooling operation).

| **Normal Defrost** < 30 mins. Defrost Heater Operation "Terminated" | ➡ | **5 min. Dwell Period** | ➡ | **Normal Adaptive Cooling Operation** Next defrost will occur after 60 hrs **equivalent** compressor run time |

| **Abnormal (A) Defrost** 30-44 mins. Defrost Heater Operation "Terminated" | ➡ | **5 min. Dwell Period** | ➡ | **Non-Adaptive Cooling Operation** Next defrost will occur after 8 hrs **accumulated** compressor run time |

Abnormal (B)

| **Abnormal (B) Defrost** Full 45 mins. Defrost Heater Operation "Timed Out" | ➡ | **NO Dwell Period** | ➡ | **Non-Adaptive Cooling Operation** Next defrost will occur after 8 hrs **accumulated** compressor run time |

## POWER UP TEST

During initial power up, the EDC will perform a 60 second self monitoring test. During the first 60 seconds of operation, while the EDC is performing its self monitoring test, it is possible that there will be no compressor operation. With this in mind, **when you first apply power to the refrigerator, you should always wait 60 seconds prior to performing any diagnostic tests**. After 60 seconds, the refrigerator will perform normally, and begin the Initial cycle.
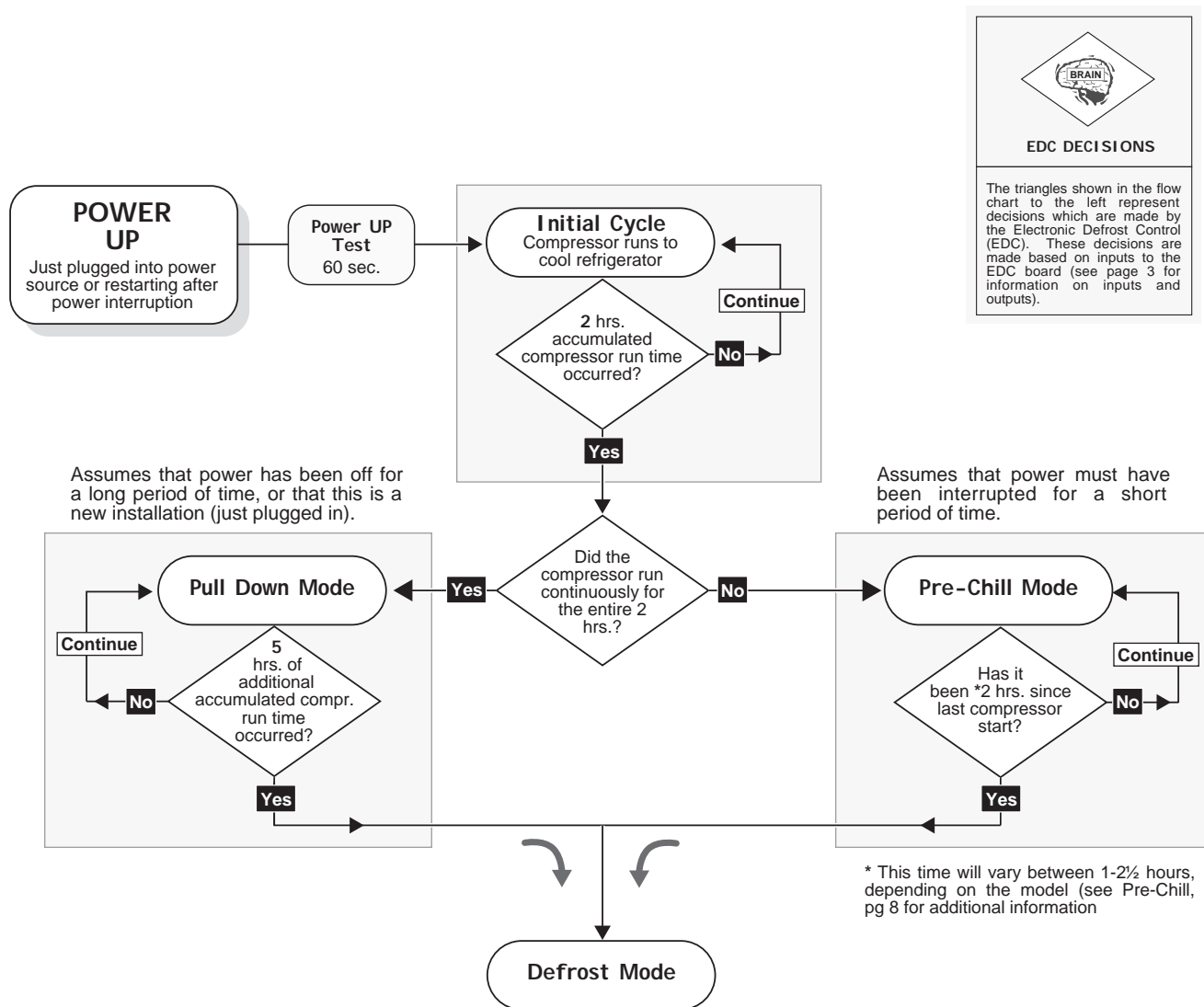
## INITIAL CYCLE

When the refrigerator is first connected to its power source and turned on, the EDC must determine whether this is a new installation, requiring a long cooling operation period, or a momentary power interruption. It makes this decision by monitoring the first two hours of compressor run time.

During this time, if the compressor **did not** cycle off on the temperature control, the EDC assumes that this must be a new installation (just plugged into power source), or a long power interruption. As a result, it will cause the refrigerator to enter a **Pull Down** mode (Pull Down mode will be described on next page). During the pull down mode the compressor will cycle on and off on the temperature control, until the compressor finally reaches 5 hours of additional accumulated compressor run time.

If on the other hand the compressor **did** cycle off during the first two hours of compressor run time, then the EDC assumes that the refrigerator must have experienced a temporary power outage and was able to recover within the 2 hour period.

**Note:** when power is interrupted to the refrigerator, the EDC will lose its memory after 1.4 seconds. If memory is lost, the EDC will always default to the Power-Up test in order to determine how to proceed.

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**BRAIN**

**EDC DECISIONS**

The triangles shown in the flow chart to the left represent decisions which are made by the Electronic Defrost Control (EDC). These decisions are made based on inputs to the EDC board (see page 3 for information on inputs and outputs).

**POWER UP**
Just plugged into power source or restarting after power interruption

**Power UP Test** 60 sec.

**Initial Cycle**
Compressor runs to cool refrigerator

2 hrs. accumulated compressor run time occurred? — **No** → **Continue**

**Yes**

Did the compressor run continuously for the entire 2 hrs.?

**Yes** → Pull Down Mode

Assumes that power has been off for a long period of time, or that this is a new installation (just plugged in).

**Pull Down Mode**
5 hrs. of additional accumulated compr. run time occurred? — **No** → **Continue**
**Yes**

**No** → Pre-Chill Mode

Assumes that power must have been interrupted for a short period of time.

**Pre-Chill Mode**
Has it been *2 hrs. since last compressor start? — **No** → **Continue**
**Yes**

* This time will vary between 1-2½ hours, depending on the model (see Pre-Chill, pg 8 for additional information
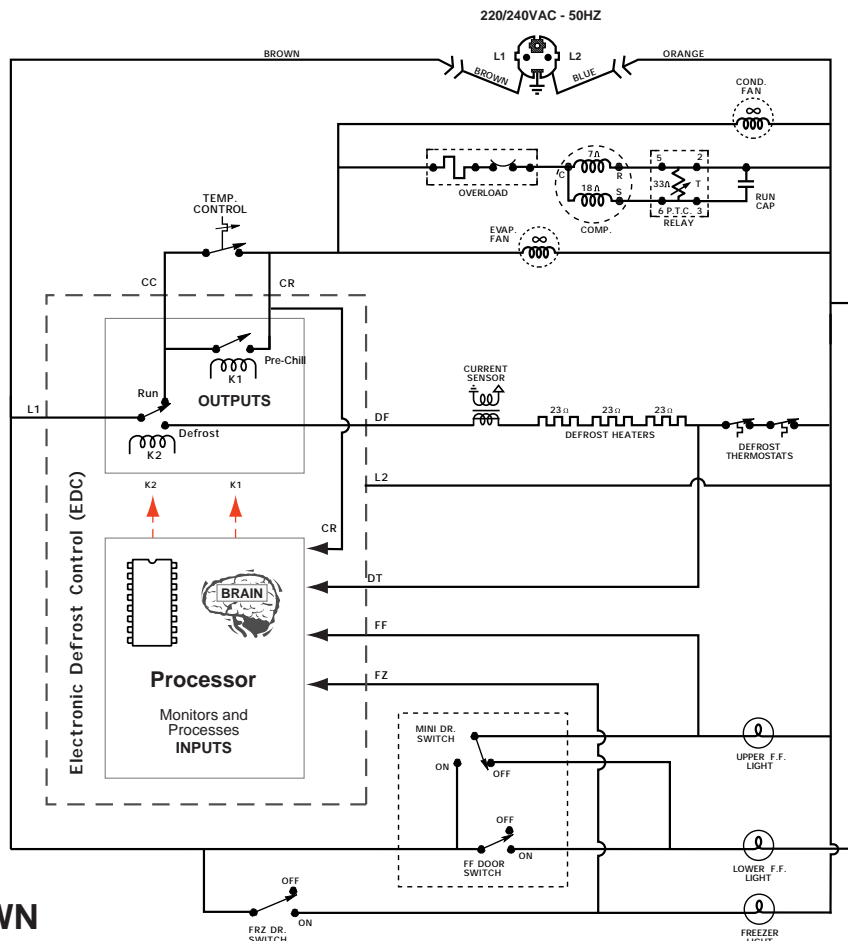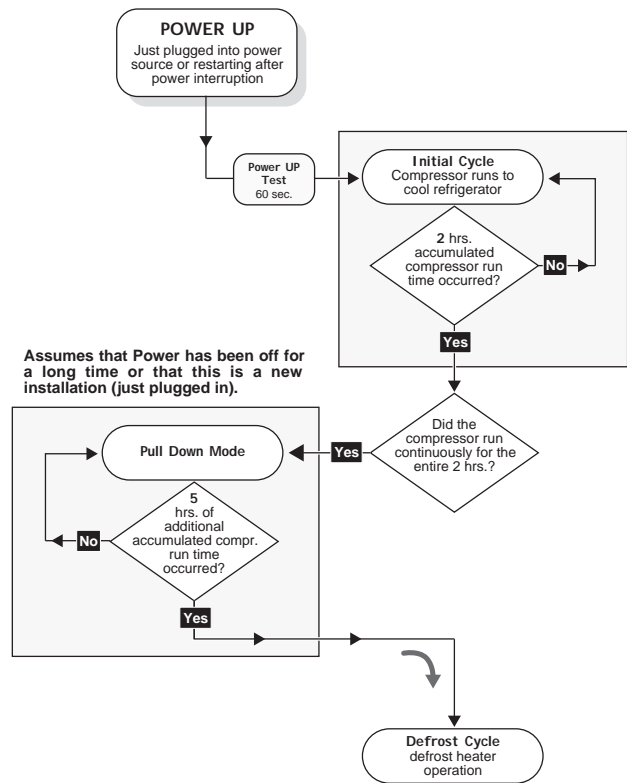
**Defrost Mode**

# PULL DOWN

During a long power outage, or during initial start-up (new installation - just plugged into power source) the compressor will run (cooling mode), attempting to satisfy the temperature control settings.

As we've previously discussed, the Electronic Defrost Control monitors compressor run time during the Power-Up test, in order to determine whether to allow the refrigerator to enter the Pre-Chill mode, or the Pull Down mode.

If the compressor has run **continuously** (not cycled off on temperature control) for two hours during the Power-Up test, the EDC will force the refrigerator into a **Pull Down** mode. In this mode of operation, the refrigerator will continue to cool until 5 additional hours of <u>accumulated</u> compressor run time have occurred.

At the end of pull down mode, the EDC will terminate cooling operation and begin defrost heater operation (with no pre-chill mode).



**POWER UP**
Just plugged into power source or restarting after power interruption

Power UP Test 60 sec.

**Initial Cycle**
Compressor runs to cool refrigerator

2 hrs. accumulated compressor run time occurred? — No

Yes

**Assumes that Power has been off for a long time or that this is a new installation (just plugged in).**

Did the compressor run continuously for the entire 2 hrs.?

**Pull Down Mode** ← Yes

5 hrs. of additional accumulated compr. run time occurred? — No

Yes

**Defrost Cycle**
defrost heater operation



**220/240VAC - 50HZ**

# PULL DOWN

## DIAGNOSTIC TIPS

### Initiating a Defrost Cycle

When it is necessary to initiate a defrost cycle, open the FF door. Press and release the FF door switch 3 times within 5 seconds. After doing so you will hear a relay click (K2 energized), on the Electronic Defrost Control. Forcing a defrost in this manor initiates an immediate defrost cycle with no Pre-Chill mode. Once the defrost cycle is initiated the refrigerator will continue through the defrost cycle, following the same process as described earlier on page 9 (Defrost Operation)

**Important note:** if the unit is already in defrost or dwell when you attempt to initiate a defrost cycle, pressing the switch 3 times within 5 seconds will terminate the defrost or dwell cycle (see next paragraph). Also, if your fingers slips off of the switch while performing this task, or you loose count, close the refrigerator door. Wait 10 seconds, and then reopen the door and perform the task once again.
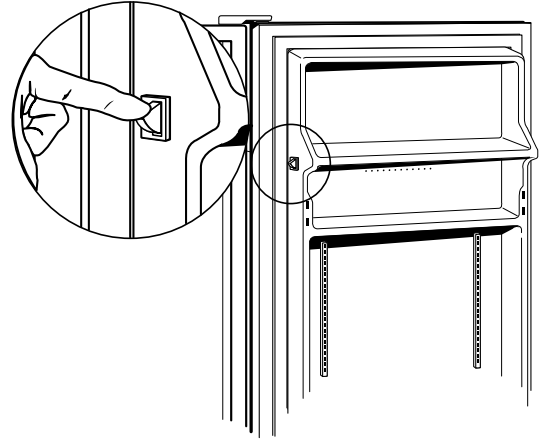
### Terminating a Defrost or Dwell Cycle

To terminate (end) a defrost or dwell cycle, press the FF door switch 3 times within 5 seconds. After doing so you will hear a relay click (K2 deenergized) on the Electronic Defrost Control. Terminating a defrost or dwell cycle in this manor will cause the refrigerator to enter the **Initial Cycle** mode (pg. 11).

**Important note:** when forcing a defrost cycle, wait at least 60 seconds prior to terminating the defrost cycle.

### Forcing a Pre-Chill Mode

Should it ever become necessary to force a pre-chill mode, press the FF door switch 6 times within 5 seconds. After doing so you will hear a relay click (K1 energized) on the Electronic Defrost Control. Forcing a pre-chill mode in this manor initiates an immediate pre-chill mode. However, don't forget from page 8, that the unit will NOT begin pre-chill operation until the thermostat calls for the compressor to run. In other words, if you force a pre-chill mode while the temperature control is satisfied, the until will not begin pre-chill operation until the thermostat calls for cooling (compressor starts).

Once the pre-chill mode is initiated the refrigerator will continue through the pre-chill mode (1-2½ hours continuous compressor run), following the same process as described earlier on page 8 (Pre-Chill)
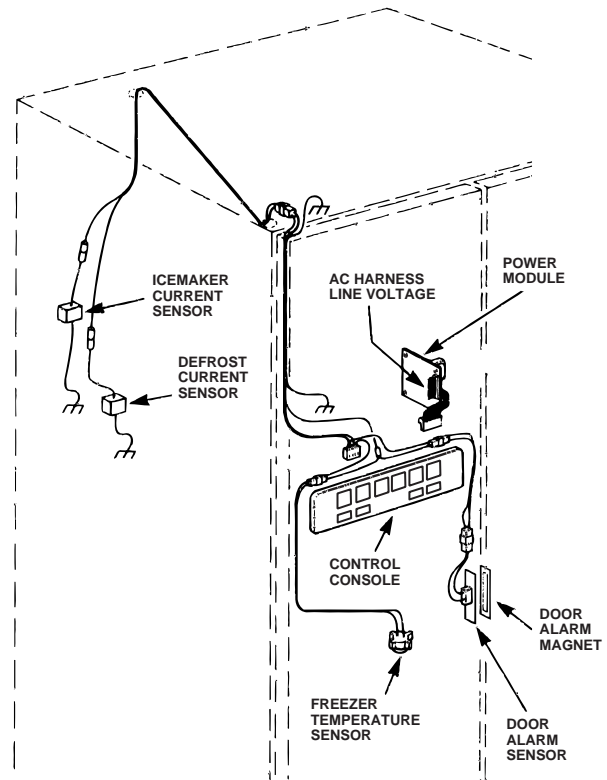
### Terminating a Pre-Chill Mode

It is NOT possible to terminate the Pre-chill mode; however, once you have entered the pre-chill mode you can force a defrost, and then terminate the defrost following the instructions above. Doing so will cause the refrigerator to enter the **Initial Cycle** mode (pg. 11).



| | | |
|---|---|---|
| DEPRESSED (IN) | RELEASED (OUT) | = 1 |

## EDC INTERFACE WITH ELECTRONIC MONITOR ON FREEZER DOOR.

The EDC has no **direct** interface with the electronic monitor on the freezer door; however, the electronic monitor is constantly monitoring for defrost heater current in order to determine how much time has lapsed since the last defrost. The electronic monitor expects to see defrost heater current every 76.8 hours (50HZ models). If no defrost heater current is sensed within this time period, the electronic monitor will assume that no defrost has occurred and will display "**DE**" in the electronic monitor display. The "**DE**" fault code indicates that no defrost heater current has been sensed within a 76.8 hour time period.
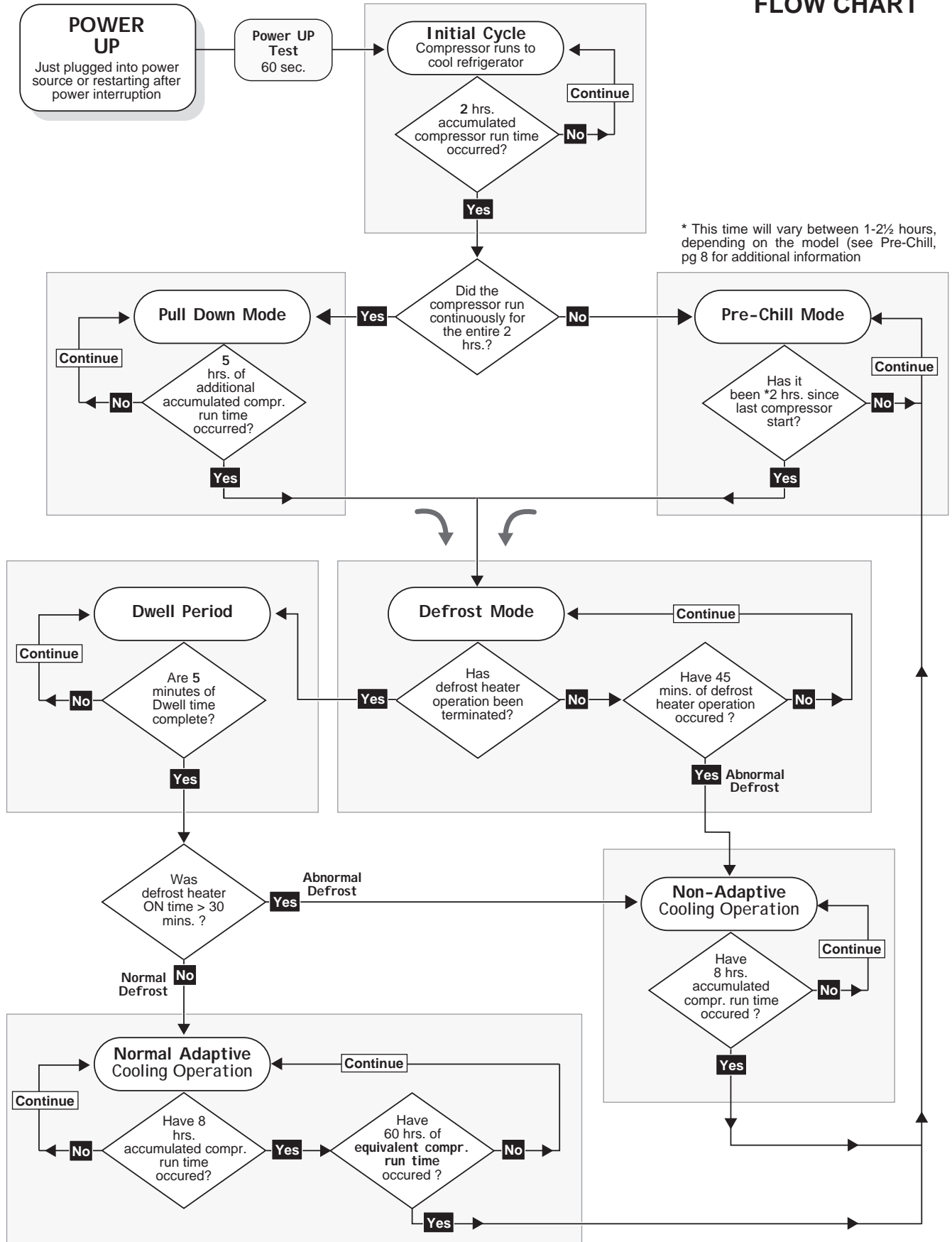
With adaptive defrost, periods between defrost can exceed the time limit above. To prevent a false **DE**" reading on the electronic monitor, the EDC will momentarily (2 seconds) energize the defrost heaters after 74 hours (50HZ models) of time has lapsed since the last defrost. If the compressor is running at the time 74 hours has been reached, the EDC will NOT allow the defrost heaters to operate. However, once the compressor has cycled off on the temperature control, the EDC will momentarily energize relay K2 (2 seconds) on the EDC board, which in turn will allow the defrost heaters to operate.

Momentarily energizing the defrost heaters, allows the monitor to test the defrost heater and wiring without a defrost actually occurring. Afterwards, the electronic monitor will reset, and will once again begin counting down the 76.8 hours.
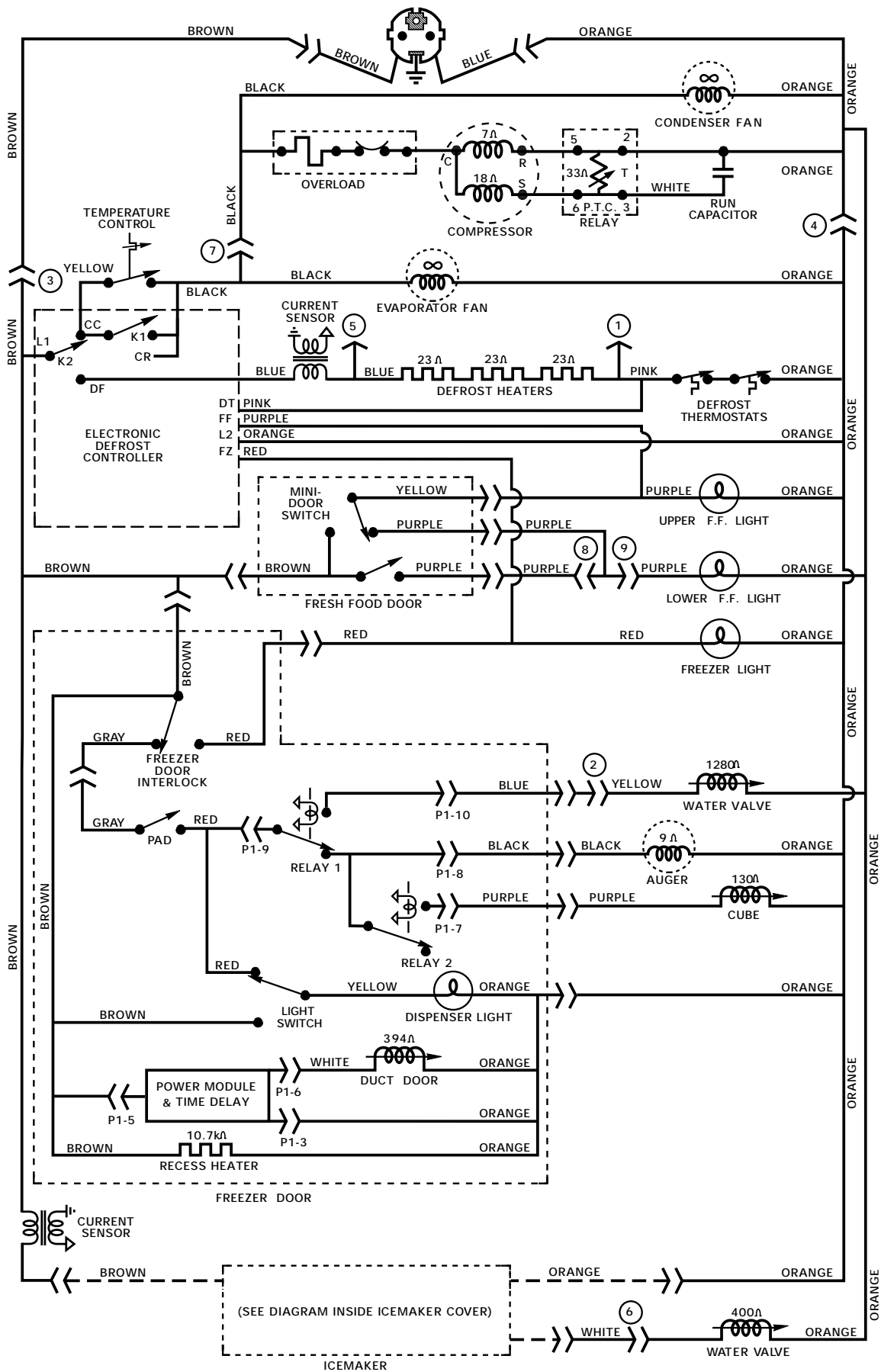
**ELECTRONIC MONITOR SYSTEM**

# ADAPTIVE DEFROST CONTROL FLOW CHART

**POWER UP**
Just plugged into power source or restarting after power interruption

Power UP Test 60 sec.

**Initial Cycle**
Compressor runs to cool refrigerator

Continue

**2** hrs. accumulated compressor run time occurred? — **No**

**Yes**

* This time will vary between 1-2½ hours, depending on the model (see Pre-Chill, pg 8 for additional information

Did the compressor run continuously for the entire 2 hrs.?

**Yes** — **Pull Down Mode**

**No** — **Pre-Chill Mode**

Continue

**5** hrs. of additional accumulated compr. run time occurred? — **No**

**Yes**

Continue

Has it been *2 hrs. since last compressor start? — **No**

**Yes**

**Dwell Period**

Continue

Are **5** minutes of Dwell time complete? — **No**

**Yes**

**Defrost Mode**

Continue

Has defrost heater operation been terminated? — **Yes**

**No** — Have 45 mins. of defrost heater operation occured ? — **No**

**Yes** **Abnormal Defrost**

Was defrost heater ON time > 30 mins. ? — **Yes** **Abnormal Defrost**

**Normal Defrost** **No**

**Non-Adaptive Cooling Operation**

Continue

Have 8 hrs. accumulated compr. run time occured ? — **No**

**Yes**

**Normal Adaptive Cooling Operation**

Continue

Have 8 hrs. accumulated compr. run time occured? — **No**

**Yes** — Have 60 hrs. of **equivalent compr. run time** occured ? — **No**

Continue

**Yes**

# SXS-G 28/30 Electronic Models



203C5158P005

# KNOWLEDGE EXERCISE

1.  The physical component which controls adaptive defrost operation is referred to as?
    a. defrost timer      b. defrost terminator      c. EDC      d. heater

2.  The electronic defrost control is located where?
    a. condenser area      b. freezer area      c. back side of unit      d. control console

3.  Which terminal on the EDC board provides compressor run time input to the EDC?
    a. terminal "CR"      b. terminal "CC"      c. terminal "DF"      d. terminal "L1"

4.  If the fresh food light opens (burns out), what will the affect be on adaptive defrost operation be?
    a. no affect                   b. It will revert to a fixed 8 hour conventional defrost
    b. the unit will not defrost      c. It will cause and abnormal defrost to occur

5.  During "**normal adaptive**" cooling operation, the unit will enter the pre-chill mode after 60 hours of equivalent compressor run time have occurred, but not until?
    a. 143 minutes of accumulated door open time have occurred
    b. one of the refrigerator doors are open
    c. 8 hours of accumulated compressor run time have occurred
    d. none of the above

6.  What color are the two wires which supply AC voltage to the EDC board?
    a. brown and pink           b. orange and brown
    c. red and black            d. red and yellow

7.  During which defrost operation will there be no dwell period?
    a. normal defrost      b. abnormal (A) defrost      c. abnormal (B) defrost      d. Both b & c

8.  What is the dwell period time when a normal defrost operation occurs?
    a. 5 minutes      b. there is no dwell period during a normal defrost
    c. 10 minutes      d. there is no correct answer

9.  When the refrigerator is first plugged into its power source, what occurs?
    a. The unit will immediately enter the "pre-chill" mode
    b. The unit will immediately begin "normal adaptive" cooling operation
    c. The unit will perform a 60 second "power-up test"
    d. The unit will enter a "pull down" mode

10. On adaptive defrost models, what must one do to "force" a defrost cycle?
    a. depress the fresh food light switch 5 times within 3 seconds
    b. advance the defrost timer manually
    c. there is no way to force a defrost
    d. depress the fresh food light switch 3 times within 5 seconds

> The answers to the above questions are as follows:  3 of the answers are "**A**'s", 1 of them is a "**B**", 4 of them are "**C**'s" and the remaining 2 are "**D**'s".  You figure out the rest.  For those who just have to know if you answered them correctly, you can call our Technical Resource Center (Techline) and they'll give you the answers.