Fisher&Paykel appliances

Service Diagnostics

Active Smart™ Refrigerators

USA

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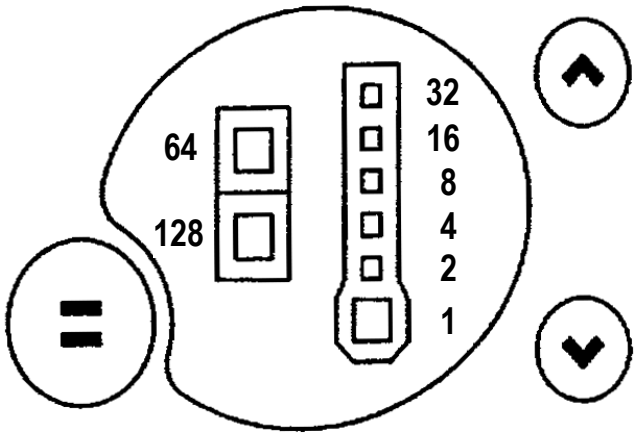
1.0 Fault Code Display Status - (Stage 4.2)

If a fault should develop in the temperature measurement system, defrost system, fans or low ambient heater, a fault code will be shown automatically on the display and the fault audio alarm will sound. At the same time, the bottom L.E.D. will flash red alternately with the fault L.E.D pattern. When any control button is pressed, the audio alarm is turned off, although the normal display is shown for 8 seconds before the fault code continues to flash.

To reset the audio alarm, disconnect the refrigerator from the power supply for a few seconds. If this is not done, the audio alarm will automatically reset after 72 hours.

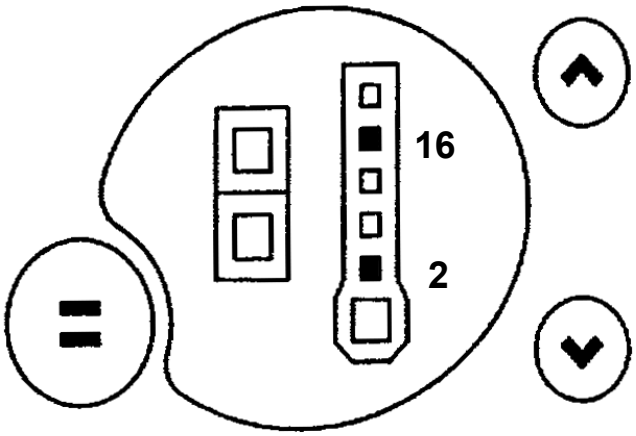
Fault codes will be in a binary code and the L.E.D.s that flash will have the following binary values:



Note: The refrigerator goes through a sequence of tests whenever it is turned on at the power supply or whenever the door is closed while it is on. It takes 20 seconds to complete the test sequence, and opening a door will interrupt it. If, for example, there is a fault with the fans/low ambient heater connector at the power module (it may be unplugged) and a door is opened as soon as the fault audio alarm sounds, the fault code shown will be code 13 (low ambient heater drawing less current than expected). This is because the low ambient heater is the first item tested and so the refrigerator will fault for this but carry on with more tests.

If the doors are left closed until the tests are completed, the fault code shown will be code 11 (the current measured for the ambient heater, PC fan and FC fan is lower than expected). It is therefore recommended that if the fault audio alarm sounds as soon as the refrigerator is turned on, or as soon as the doors are closed, the service technician should wait for 20 seconds before opening the door to check the fault code. This will allow the refrigerator to complete the sequence of tests and will ensure that the fault code displayed is the correct one.

Example fault code:



Values of the L.E.D.s displayed are 2 + 16 = 18. Fault code displayed is fault code 18.

The faults and their respective fault code that can be checked and serviced in the field are as follows:

Display Code: 1

Reason: On the last power up, the power module failed its self-test.
Primary Action: Replace power module.

Display Code: 2

Reason: The previous 2 defrosts were aborted after 30 minutes.
Primary Action: Check defrost heater assembly in the FC (refer Section 16.0 D1 Defrost Heater). If faulty, replace.

Display Code: 3

Reason: The resistance of all the temperature sensors is outside the normal range. (> 45K Ohms).
Primary Action: Check the 6 way RAST connector at the power module.
Secondary Action: Reterminate the 6 way RAST connector.
Tertiary Action: Replace the power module.

Display Code: 4

Reason: The resistance of all the temperature sensors is outside the normal range. (< 660 Ohms).
Primary Action: Check the 6 way RAST connector at the power module.
Secondary Action: Reterminate the 6 way RAST connector.
Tertiary Action: Replace the power module.

Display Code: 5

Reason: The resistance of the FC sensor is outside the normal range. (> 45K Ohms).
Primary Action: Check the sensor connection at the power module.
Secondary Action: Replace the sensor.

Display Code: 6

Reason: The resistance of the FC sensor is outside the normal range. (< 660 Ohms).
Primary Action: Check the sensor connection at the power module.
Secondary Action: Replace the sensor.

Display Code: 7

Reason: The resistance of the evaporator sensor is outside the normal range. (> 45K Ohms).
Primary Action: Check the sensor connection at the power module.
Secondary Action: Replace the sensor.

Display Code: 8

Reason: The resistance of the evaporator sensor is outside the normal range. (< 660 Ohms).
Primary Action: Check the sensor connection at the power module.
Secondary Action: Replace the sensor.

Display Code: 9

Reason: The resistance of the PC sensor is outside the normal range. (> 45K Ohms).
Primary Action: Check the sensor connection at the power module.
Secondary Action: Replace the sensor.

Display Code: 10

Reason: The resistance of the PC sensor is outside the normal range. (< 660 Ohms).
Primary Action: Check the sensor connection at the power module.
Secondary Action: Replace the sensor.

Display Code: 11

Reason: The current measured for the ambient heater, PC fan and FC fan is lower than expected.
Primary Action: Check the 6 way fan/LAH RAST connector at the power module.
Secondary Action: Reterminate the 6 way fan/LAH RAST connector.
Tertiary Action: Replace the power module.

Display Code: 12

Reason: The current measured for the ambient heater, PC fan and FC fan is higher than expected.
Primary Action: Check the 6 way fan/LAH RAST connector at the power module.
Secondary Action: Reterminate the 6 way fan/LAH RAST connector.
Tertiary Action: Replace the power module.

Display Code: 13

Reason: Low ambient heater is drawing less current than expected. Either the heater or wiring is open circuit or the heater is faulty.

Primary Action: Check wiring and connections at both heater and power module.

Secondary Action: Check ambient heater resistance. If not within limits, replace.

Display Code: 14

Reason: Low ambient heater is drawing more current than expected. Either there is a short in the heater or wiring, or the heater is faulty.

Primary Action: Check wiring and connections at both heater and power module.

Secondary Action: Check ambient heater resistance. If not within limits, replace.

Display Code: 15

Reason: The PC fan is drawing less current than expected. Either the wiring is open circuit or the fan is faulty.

Primary Action: Check PC fan wiring and connections at both fan and power module.

Secondary Action: Check fan. If faulty, replace.

Display Code: 16

Reason: The PC fan is drawing more current than expected. Either the wiring is shorted or the fan is faulty.

Primary Action: Check PC fan wiring and connections at both fan and power module.

Secondary Action: Check fan. If faulty, replace.

Display Code: 17

Reason: The FC fan is drawing less current than expected. Either the wiring is open circuit or the fan is faulty.

Primary Action: Check FC fan wiring and connections at both fan and power module.

Secondary Action: Check fan. If faulty, replace.

Display Code: 18

Reason:	The FC fan is drawing more current than expected. Either the wiring is shorted or the fan is faulty.
Primary Action:	Check FC fan wiring and connections at both fan and power module.
Secondary Action:	Check fan. If faulty, replace.

2.0 Thermistor Sensors Resistance Table

Temperature (°C)	Resistance (K Ohms ± 5%)
-30.0	25.17
-25.0	19.43
-20.0	15.13
-15.0	11.88
-10.0	9.392
-5.0	7.481
0.0	6.000
5.0	4.844
10.0	3.935
15.0	3.217
20.0	2.644
25.0	2.186
30.0	1.817
35.0	1.518
40.0	1.274
45.0	1.075
50.0	0.9106

3.0 Mode Status - Stage 4.2

To enter the diagnostic mode:

Press and hold the **MODE** button, then press the temperature **UP** button (this enters the diagnostic mode).

This enters the PC sensor temperature status (refer Section 5.0).

Press the up button.

1 time = FC sensor temperature (refer Section 6.0).

2 times = Defrost sensor temperature (refer Section 7.0).

3 times = Inputs / outputs status (refer Section 8.0).

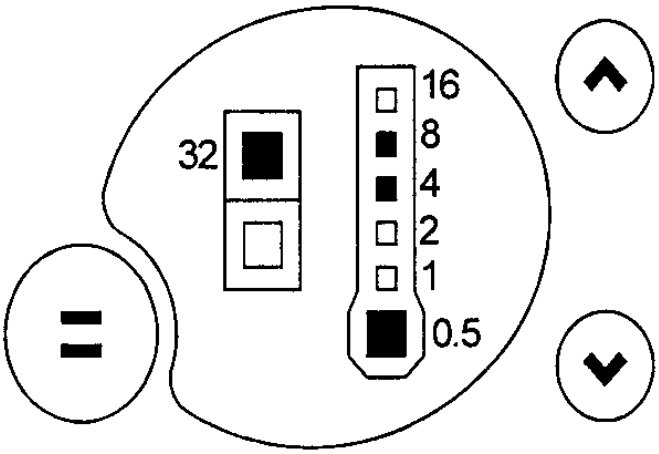
To enter the data down load mode:

Press and hold the **MODE** button while pressing the temperature **UP** button, (this enters the diagnostic mode), then press the temperature **DOWN** button (this enters the data down load mode).

To exit the diagnostic mode, press the **MODE** button. If not terminated manually, diagnostic mode will time out and go back to default display after 5 minutes.

Note: The door alarms do not operate when the appliance is in diagnostic mode.

4.0 Sensor Temperature Conversion



To obtain the temperature of either compartment sensor or defrost sensor:

1. Enter the diagnostic mode (refer Section 3.0 - Mode Status) and scroll to the appropriate sensor temperature.

2. Add up the binary number indicated by the **L.E.D.** light pattern (refer figure above).

3. Subtract **40** from the result to get the temperature.

Example:

Add up the number corresponding to each **L.E.D.** which is on:

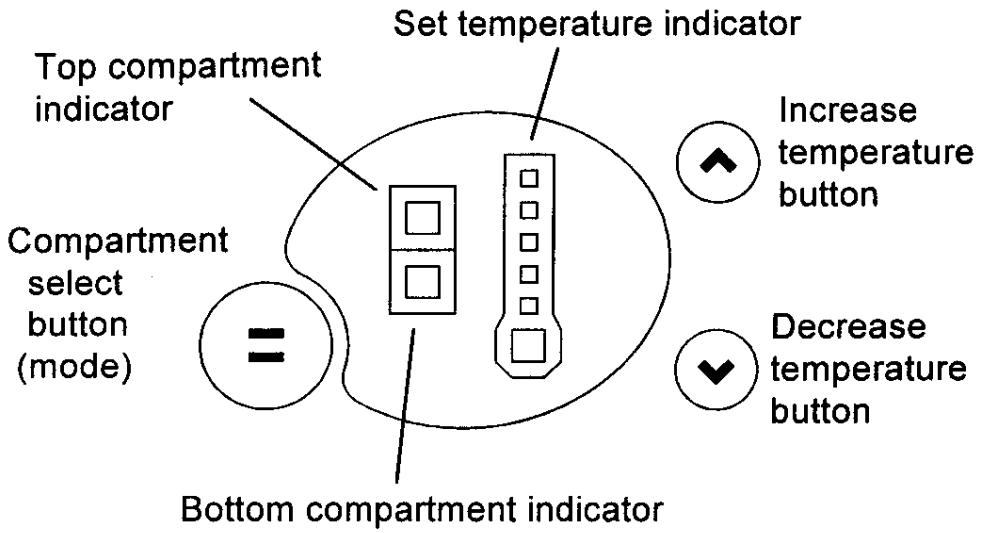
0.5 + 4 + 8 + 32 = 44.5

Subtract **40** from the result

44.5 - 40 = 4.5 ^{o}C

Hence the temperature is **4.5^{o}C**

5.0 PC Sensor Temperature



To read the PC sensor temperature:

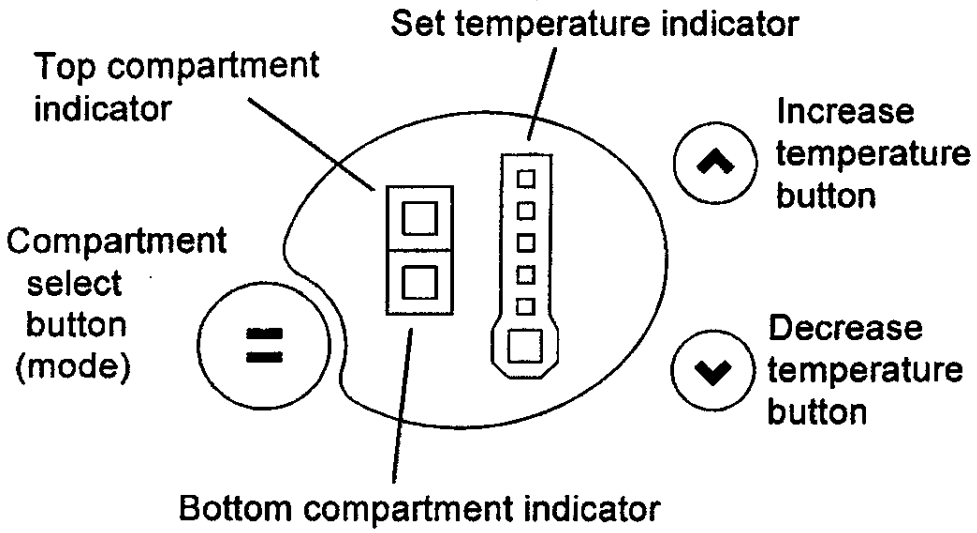
1. Press and hold the **MODE** button while pressing the temperature **UP** button (this enters the diagnostic mode).

2. The current PC sensor temperature is displayed in a code form (refer Section 4.0 Sensor Temperature Conversion).

3. Return to normal operation by pressing the **MODE** button.

CAUTION: In reading temperatures there is a need to enter the required mode when the door is first opened as all temperature readings are only sensor temperature / air temperatures and these will change rapidly with the increase in air temperature as soon as the door is opened.

6.0 FC Sensor Temperature



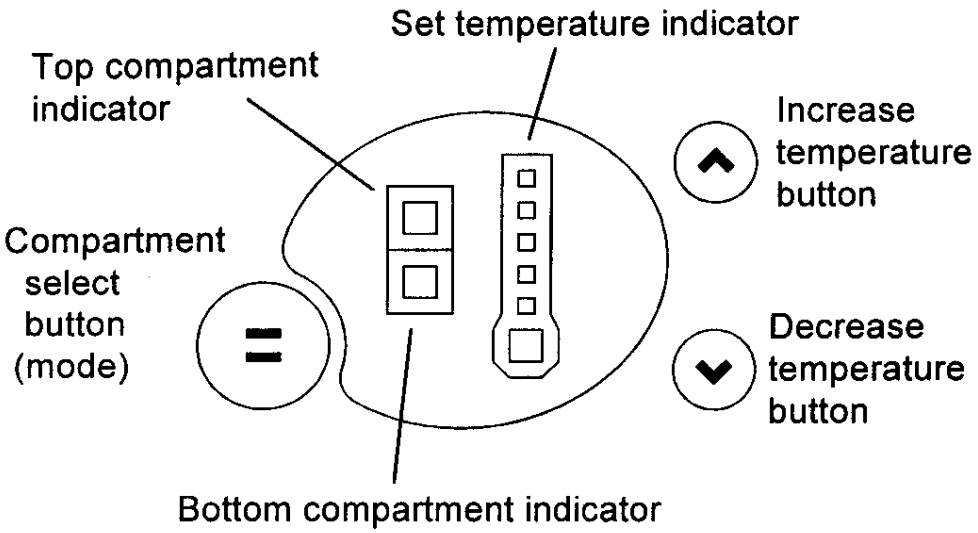
To read the FC sensor temperature:

1. Press and hold the **MODE** button while pressing the temperature **UP** button (this enters the diagnostic mode).

2. Press the temperature **UP** button once. The current FC sensor temperature is displayed in a code form (refer Section 4.0 Sensor Temperature Conversion).

3. Return to normal operation by pressing the **MODE** button.

7.0 Defrost Sensor Temperature



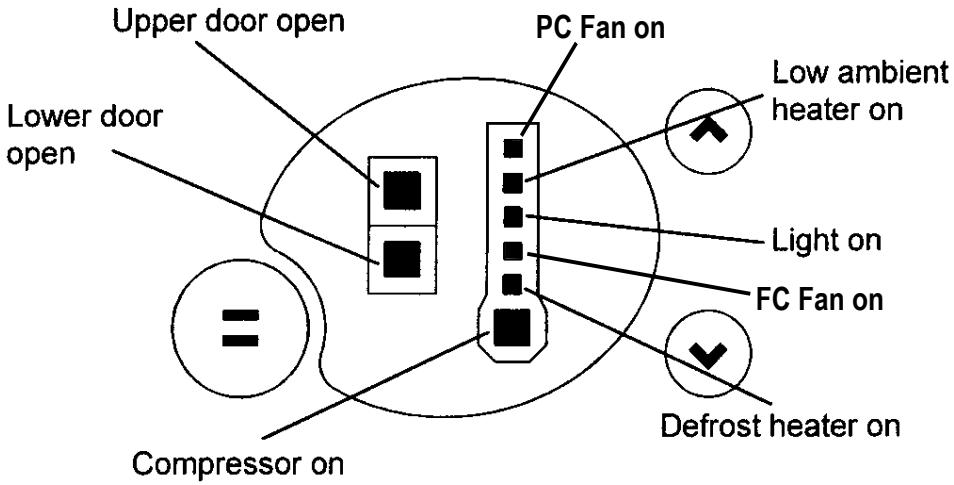
To read the defrost sensor temperature:

1. Press and hold the **MODE** button while pressing the temperature **UP** button (this enters the diagnostic mode).

2. Press the temperature **UP** button twice. The current defrost sensor temperature is displayed in a code form (refer Section 4.0 Sensor Temperature Conversion).

3. Return to normal operation by pressing the **MODE** button.

8.0 Input / Output Status



To enter the input / output status tests:

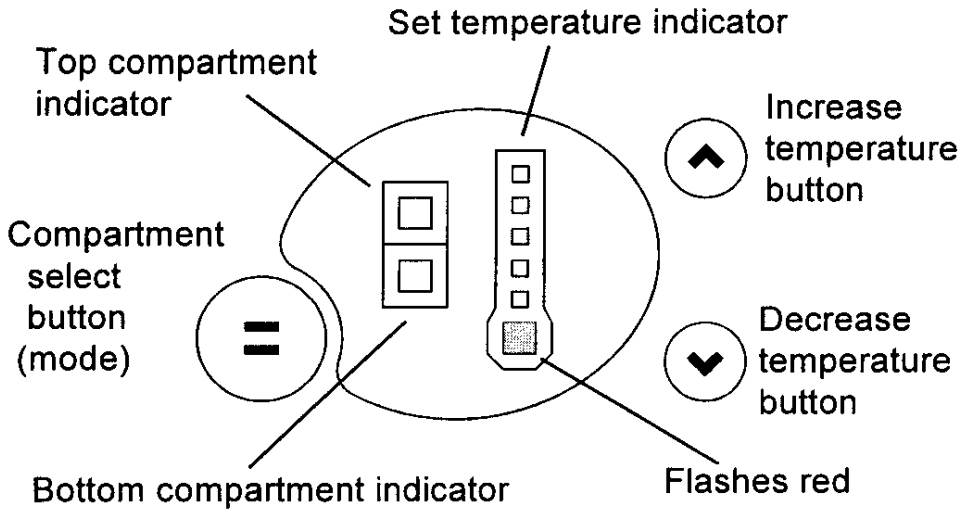
1. Press and hold the **MODE** button while pressing the temperature **UP** button (this enters the diagnostic mode).

2. Press the temperature **UP** button three times. The current input / output status is displayed (refer diagram above).

3. If a device is on or a door is open the respective **L.E.D.** lights up.

4. Return to normal operation by pressing the **MODE** button.

9.0 Download Data



To download data into your laptop:

1. Press and hold the **MODE** button while pressing the temperature **UP** button (this enters the diagnostic mode).

2. Press the temperature **DOWN** button once. A **RED L.E.D.** will show at the bottom of the temperature scale.

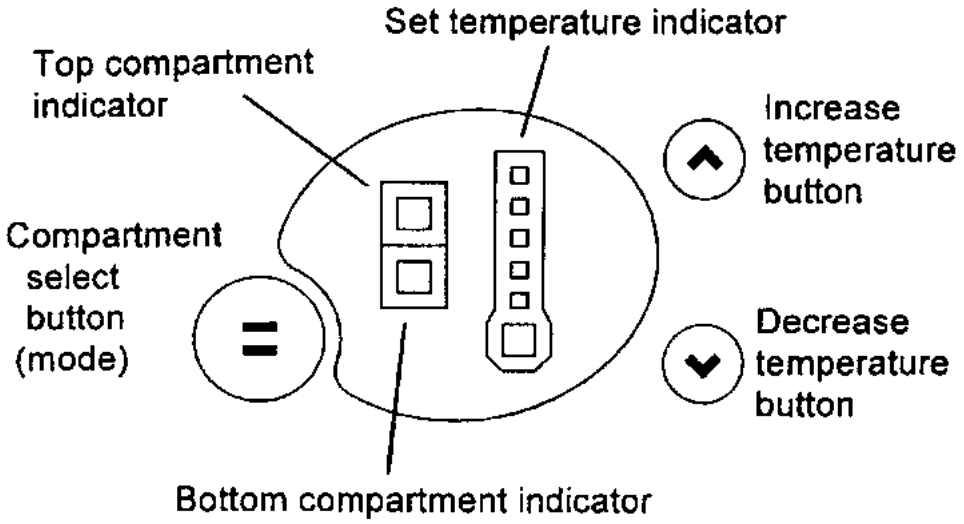
3. Place the **INTERFACE PEN** over the top of the **RED L.E.D.** until the downloading has been completed.

4. Return to normal operation by pressing the **MODE** button.

Notes on data downloading:

An interface MK2 downloading pen is needed, part number 425930B, and the FISHER & PAYKEL Smart Tool diagnostic programme loaded on to a laptop computer.

10.0 To Manually Force A Defrost



Press and hold the **MODE** button while pressing the temperature **DOWN** button. Note there will be a delay of 2 minutes before the element starts to heat after going into this mode.

Also, after the defrost is terminated, the compressor will stay off for 4 minutes before restarting and the fans will stay off a further 30 seconds after the compressor has started.

NOTE: A defrost will not occur if the defrost sensor is above +8^{o}C. The use of a phase plug and clip on amp meter in the power lead will indicate whether the defrost element is drawing current.

11.0 Show Room Mode

Enter the diagnostic mode (press **MODE** and temperature **UP** buttons together), then hold the temperature **UP** button only for three seconds. The Show Room Mode will be entered which turns off the normal system control leaving only the PC light operating with no door alarms. There will be a "long" beep and while the doors are opened the LED display will go through an attention grabbing sequence unless buttons are pressed, at which time the display will respond as normal. Eight seconds after the last button press the display sequence will continue. The mode may be exited by switching off the appliance at the mains.

12.0 Special Option Mode (Israel)

The Active Smart refrigerator is fitted with a special option mode. Should the customer wish to disconnect the operation of the door switch they can do so. To enter this mode the customer is required to push and hold the **MODE** button on the display board for ten seconds.

When the cabinet is in this special option mode the following will not operate:

- The interior lights will not turn on when the PC door is opened.
- There will be no set temperatures (LEDs) lights displayed on the display module.
- The door alarm will be disconnected and will not sound even if the doors were to be left open.

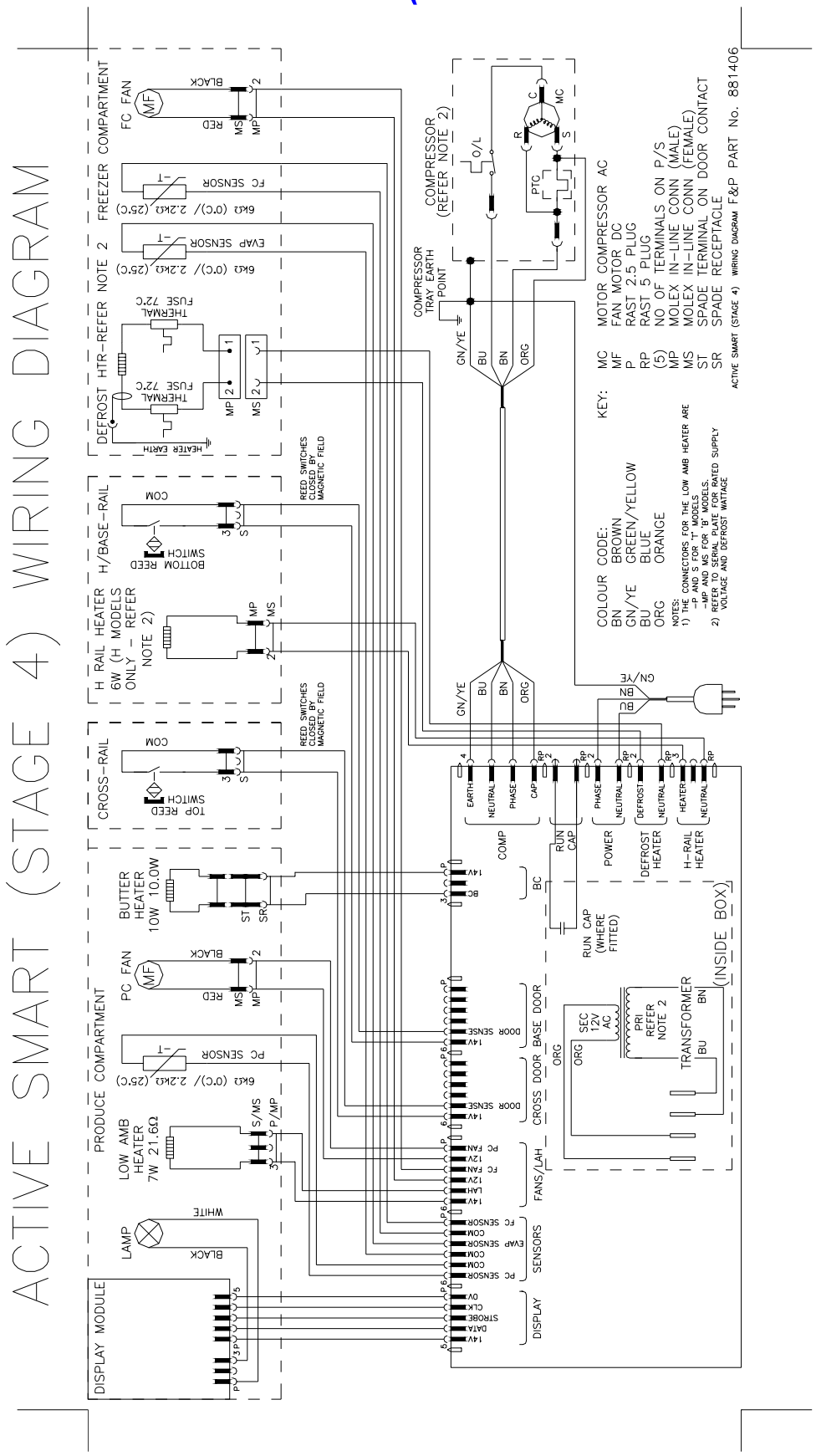
The customer may exit this mode at anytime by pushing and holding the **MODE** button for ten seconds.

If the mode is not exited manually by the customer, it will revert automatically after 80 hours.

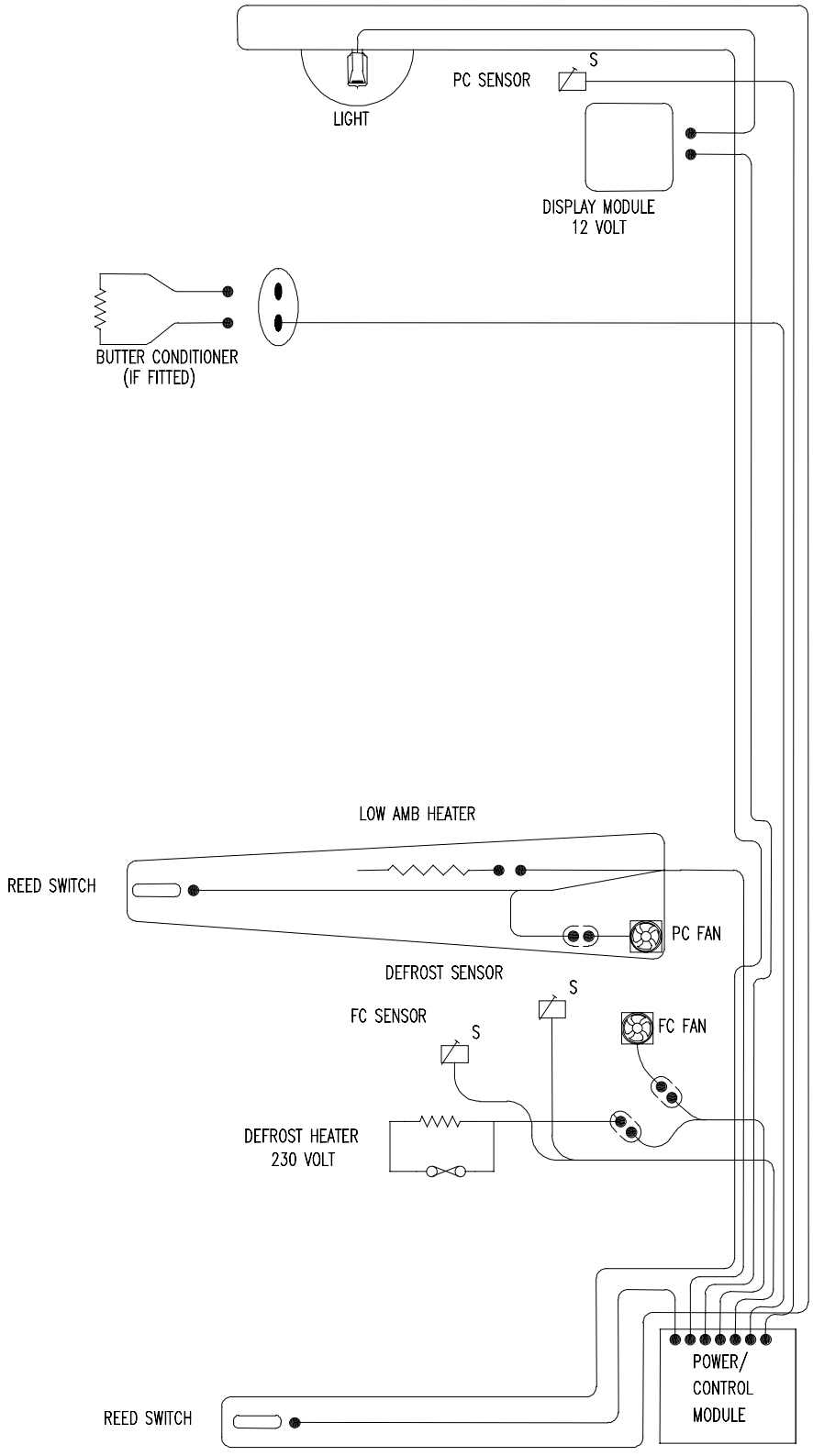
Note: When in the special option mode the Active Smart will operate as normal without the above being used.

13.0 Wiring Diagrams

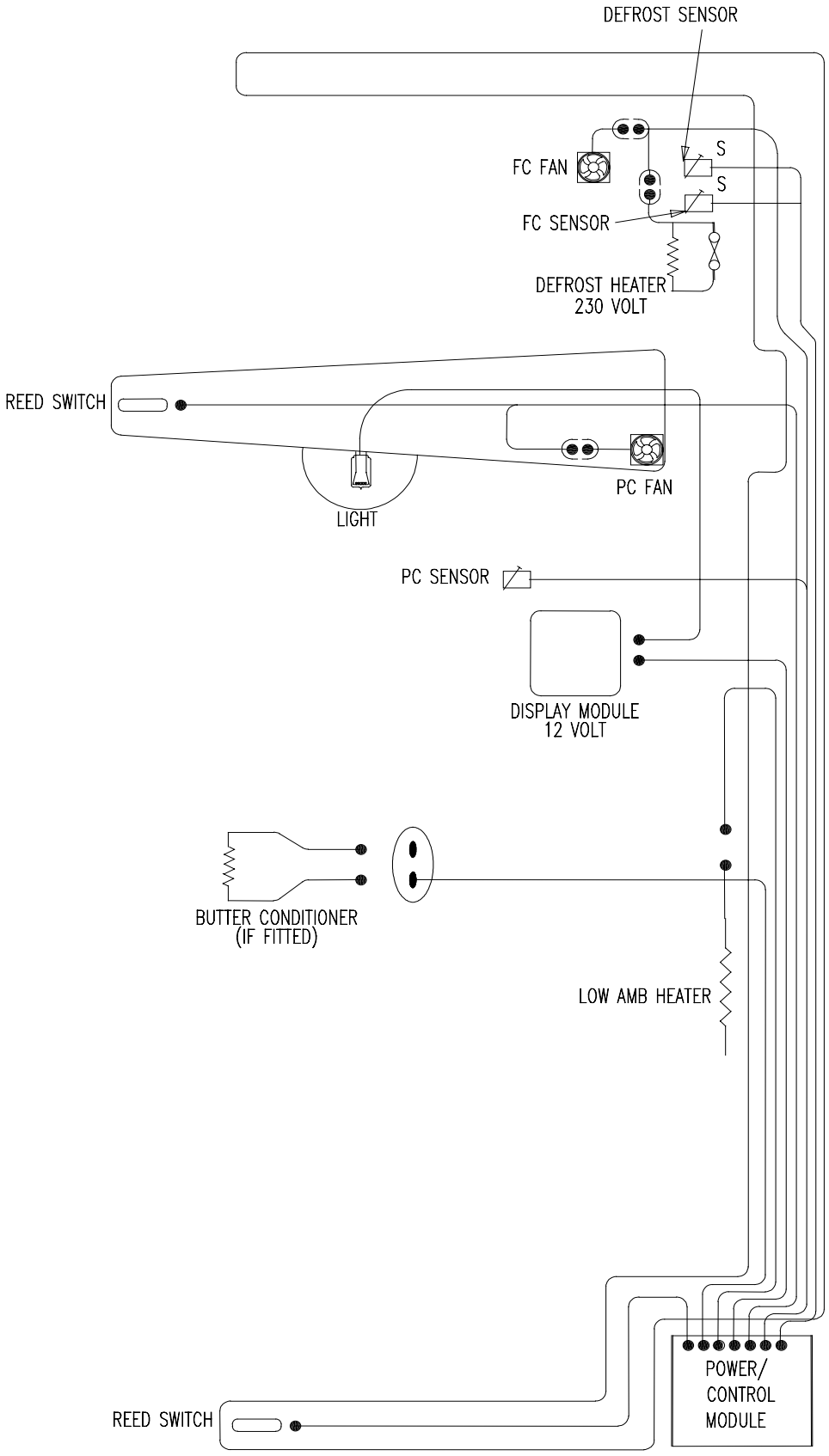
Stage 4 Power & Console Board (With Butter Conditioner)



“B” Model Wiring Route
Active Smart Stage 4



“T” Model Wiring Route
Active Smart Stage 4



14.0 Service Reference "B" Models

PC TOO COLD Cold Crispers Ice in crispers	* Ambient heater open circuit	- Check continuity of element using multimeter.
	* PC fan fitted upside down	- Fan hub to be facing PC
	* PC fan not going	- Check voltage to plug, check wiring polarity
	* Air leakage base duct cover	- Seal with foam tape on duct divider spigot
	* PC sensor location	- Remove insulation pad
Cold Compartment Warm Top	* PC fan not going	- Check for mechanical obstruction - Check power to plug - Check polarity - Replace fan - Check for broken wires.
Total Compartment Too Cold	* FC fan not going	- Check power to plug - Check for broken wires - Check polarity - Replace fan
	* Short of gas	- Check run percentage, if high, check evaporator - Check fully flooded evaporator, check for leak.
	* PC sensor inaccurate	- Check calibration of sensor ice point using interface binary or refer to thermistor resistance table in service manual.

PC TOO WARM Warm Compartment Cool Bottom	* PC fan not going	- Check power to plug - Check polarity - Check for broken wires - Replace fan - Check fan is not jammed with ice or anything else.
	* PC fan upside down	- Fan hub to be facing FC refit.
	* Return duct iced up	- De-ice duct area behind chassis - Check PC duct insulation for good seal in return duct. - Check doors are sealing.
Total Compartment Warm	* PC duct blocked	- Defrost evaporator chassis - Check for door seal
	* Evaporator ice up	- Check defrost element, check continuity - Check door seal / door left open
	* No refrigeration	- Does cabinet run? If no check power supplies. If yes, check refrigeration system. If running, check for live frost / fully flooded evaporator. If not check for leak.
	* Fans not working	- Is there a 12 volt supply, PC light working. - 12 volt supply to console board, check harness and plugs. - 12 volt AC secondary of transformer open circuit.

FC TOO COLD Total Compartment too cold	* FC sensor location	- Check set temperature Sensor clipped and located in correct position.
	* Faulty sensor	- Check calibration of sensor ice point using interface binary or refer to thermistor resistance table in service manual.
	* PC faulty sensor	- Check PC cooling, fan running
FC TOO WARM Bottom warm top frozen	* Iced up evaporator	- Check defrost element is working, replace if faulty. Check doors are sealing or have they been left open, adjust and advise customer. FC fan jammed, clear restriction, replace fan if necessary. Check defrost sensor position, reposition onto chassis if not already there.
TOTAL CABINET TOO WARM	* No refrigeration	- Does cabinet run? If no check power supplies. If yes check refrigeration system. If running, check for live frost / fully flooded evaporator. If not, check for leak.
		- Compressor is not running, check power module voltage outputs. Check compressor and ancillaries .
		- Check reed switches are working OK.
FC COOLING PC WARMING `	* Iced up evaporator	- Check defrost circuit continuity - Doors sealing, adjust - PC fan is running, if not refer PC too warm
	* Iced up return duct	- De ice duct area - check PC duct insulation for good seal in return duct - Check doors are sealing

ALARM ON	* Defrost heater	- Check console for any fault code - Check defrost element check continuity - Check power module 230v output
	* Sensors	- Check console for fault codes - Sensors above or below limit, refer thermistor service table in service manual
	* Alarm board fault	- Check that PC / FC doors activate reed switches - Check also reed switches with magnet - Check wiring harness to console board
	* DC fan fault PC & FC	- Check open circuit - Check console for fault - Check diagnostics for fault - Check short circuit
	* Ambient heater	- Check open circuit - Check console for fault - Check diagnostics for fault - Check short circuit
FAULT DISPLAYED, NO ALARM	* Console board but no alarm sounding	- Alarm has been switched off by user - Piezo alarm faulty on board, replace board
LIGHT NOT FUNCTIONING	* Blown bulb	- Check power supply to socket 7 volts, if nil check plug at board - Check continuity of bulb, if nil replace
	* Cabinet type	- Console board not initialised, close FC door and press any button
	* Poor connection	- Spread halogen bulb legs - Lamp holder, replace where possible - Connector on control module

CONSOLE NO LED LIGHTS	*	Power module no power	- Is there a 12 volt supply - 12 volt supply to console board (Stages 1 to 3), check harness and plugs - 12 volt AC secondary of transformer open circuit - Initialise cabinet.
RASPBERRY NOISE	*	Wrong console module	- Initialise console module, close FC door and push any button on console module
NOISY FAN PC	*	Ice around gasket	- Replace assembly with new fan kit
	*	Wires touching	- Tuck wires away from fan blade
	*	Faulty fan	- Fit replacement
	*	Wires pulled too tight	- Re route wires
NOISY FAN FC	*	Ice on cover	- Clear ice off cover and check doors are sealing
	*	Ice on grill	- Clear ice off grill and check doors are sealing
	*	Fan off mountings	- Refit
	*	Wires touching	- Tuck wires away from fan blade
	*	Capillary touching	- Shift capillary from fan area, make sure it is not touching any part of the cabinet
	*	Fan motor noisy	- Fit replacement
	*	Wires pulled tight	- Re route wiring
ICE BUILD UP COMPARTMENT	*	Doors sealing	- Check gaskets are sealing, adjust gaskets - Fit drain valve to drain tube
REFRIGERATION NOISE	*	Popping, farting	- Evacuate recharge with ISCEON 49
	*	Gurgling, whistling	- Check alignment of capillary and apply sound dampening tape

15.0 Service Reference "T" Models

PC TOO COLD Total Compartment Too Cold	* FC fan not going	- Check power to plug - Check polarity - Replace fan
	* Short of gas	- Check run percentage, if high check evaporator - Check fully flooded evaporator, check for leak
	* PC sensor inaccurate	- Check calibration of sensor ice point using interface binary or refer to thermistor resistance table in service manual
PC TOO WARM Total Compartment Warm	* Evaporator ice up	- Check defrost element, check continuity - Check door seal / door left open
	* No refrigeration	- Does cabinet run? If no, check power supplies. If yes, check refrigeration system - If running, check for live frost / fully flooded evaporator, if not check for leak
	* Fans not working	- Is there a 12 volt supply, PC light working - 12 volt supply to console board, check harness and plugs - 12 volt AC secondary of transformer open circuit - Check fan is not a Y97-16 stalling on fan speed 3
	* Power module failure	- Is compressor running, is there a 12 volt supply from power module to console board (Stages 1 to 3). If not, replace power module
	* PC delivery duct blocked	- De ice area behind chassis

FC TOO COLD Total Compartment Too Cold	* FC sensor location	- Check set temperature - Sensor clipped and located in correct position
	* Faulty sensor	- Check calibration of sensor ice point using interface binary or refer to thermistor resistance table in service manual
	* PC faulty sensor	- Check PC cooling, fan running
FC TOO WARM Total Compartment Warm	* No refrigeration	- Does cabinet run? If no check power supplies. If yes, check for live frost / fully flooded evaporator, if not check for leak
TOTAL CABINET TOO WARM	* No refrigeration	- Does cabinet run? If no check power supplies. If yes, check refrigeration system - If running, check for live frost / fully flooded evaporator - If not, check for leak - Compressor is not running, check controller voltage outputs - Check compressor and ancillaries
FC COOLING PC WARMING	* Iced up evaporator	- Check defrost circuit continuity - Doors sealing, adjust - PC fan is running, if not refer PC too warm

ALARM ON	* Defrost heater	- Check console for any fault code - Check defrost element, check continuity - Check power module 230 volt output
	* Sensors	- Check console for fault codes - Sensors above or below limit, refer thermistor service table in service manual
	* Alarm board fault	- Check that PC / FC doors activate reed switches - Check also reed switches with magnet - Check wiring harness to console board
	* DC fan fault PC & FC	- Check open circuit - Check console for fault - Check diagnostics for fault - Check short circuit
	* Ambient heater	- Check open circuit - Check console for fault - Check diagnostics for fault - Check short circuit
FAULT DISPLAYED NO ALARM	* Console board display but no alarm sounding	- Alarm has been switched off by user - Piezo alarm faulty on board, replace board
LIGHT NOT FUNCTIONING	* Blown bulb	- Check power supply to socket 7 volts, if nil check plug at board - Check continuity of bulb, if nil replace
	* Cabinet type	- Console board not initialised, close FC door and press any button.
	* Poor connection	- Spread halogen bulb legs - Lamp holder, replace where possible

CONSOLE NO LED LIGHTS	*	Power module no power	- Is there a 12 volt supply? - 12 volt supply to console board, check harness and plugs - 12 volt AC secondary of transformer open circuit
RASPBERRY NOISE	*	Wrong console module	- Initialise console module, close FC door and push any button on console module
NOISY FAN PC	*	Ice around gasket	- Replace assembly with new fan kit
	*	Wires touching	- Tuck wires away from fan blade
	*	Faulty fan replace assy with new fan kit	- Fit replacement
NOISY FAN FC	*	Ice on cover	- Clear ice off cover and check doors are sealing
	*	Ice on grill	- Clear ice off grill and check doors are sealing
	*	Fan off mountings	- Refit
	*	Wires touching	- Tuck wires away from fan blade
	*	Capillary touching	- Shift capillary from fan area and make sure it is not touching any part of the cabinet
	*	Fan motor noisy	- Fit replacement
	*	Wires too tight	- Re route wiring
ICE BUILD UP COMPARTMENT	*	Doors sealing	- Check gaskets sealing, adjust gaskets - Fit drain valve to drain tube
REFRIGERATION NOISE	*	Popping farting	- Evacuate recharge with ISCEON 49, check alignment of capillary
	*	Gurgling whistling	- Check alignment of capillary and apply sound dampening tape

16.0 Fault Finding Flow Chart - (Listing)

A) System Faults

A1 Nothing in cabinet operating
A2 Compressor
A3 Compressor running, but warm PC / FC
A4 Console Fault Code
A5 No power to Power and Console modules
A6 Refrigerant System

B) Temperature Faults

B1 FC too cold, PC too warm
B2 FC PC warm
B3 Ice / Condensation forming
B4 PC too cold

C Sensor Faults

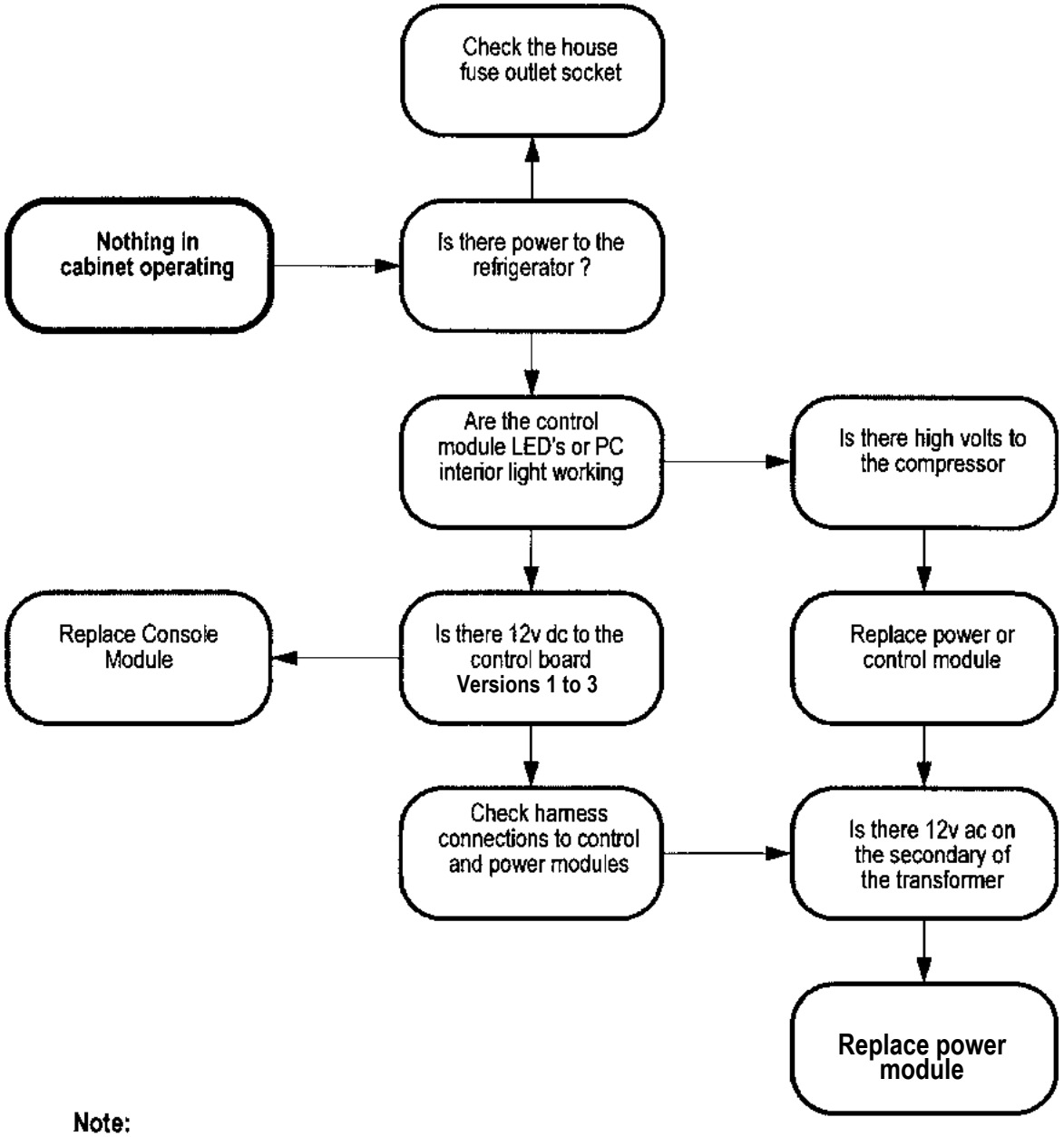
C1 FC stratification
C2 PC stratification
C3 Defrost sensor
C4 PC or FC sensor fault code

D Auxiliary Faults

D1 Defrost heater
D2 Door alarm operation
D3 Fans - PC / FC
D4 No Light
D5 Low ambient heater

A. System Faults

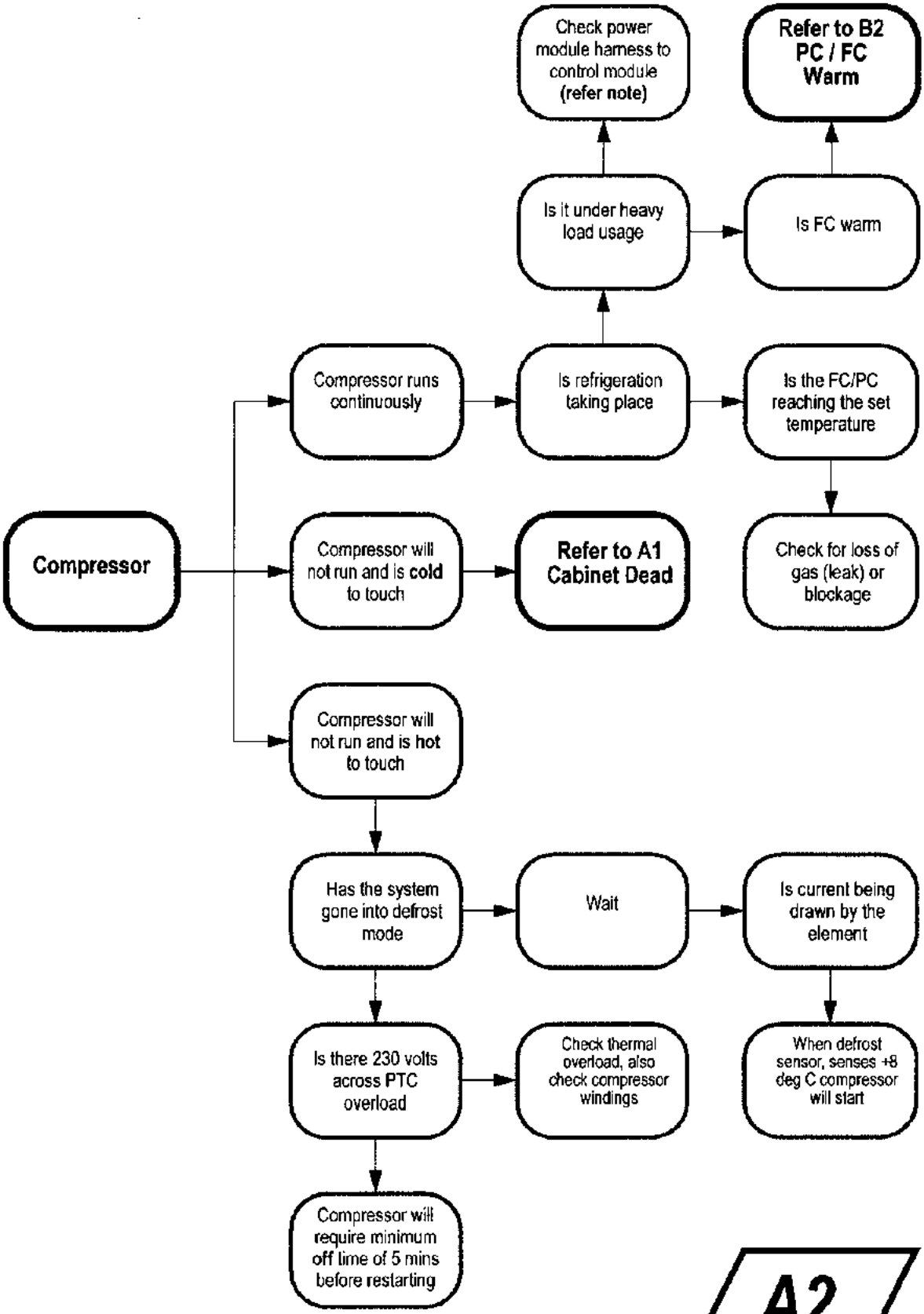
A1 Nothing In Cabinet Operating



Note:
Open circuit transformer - compressor will not run.

A1

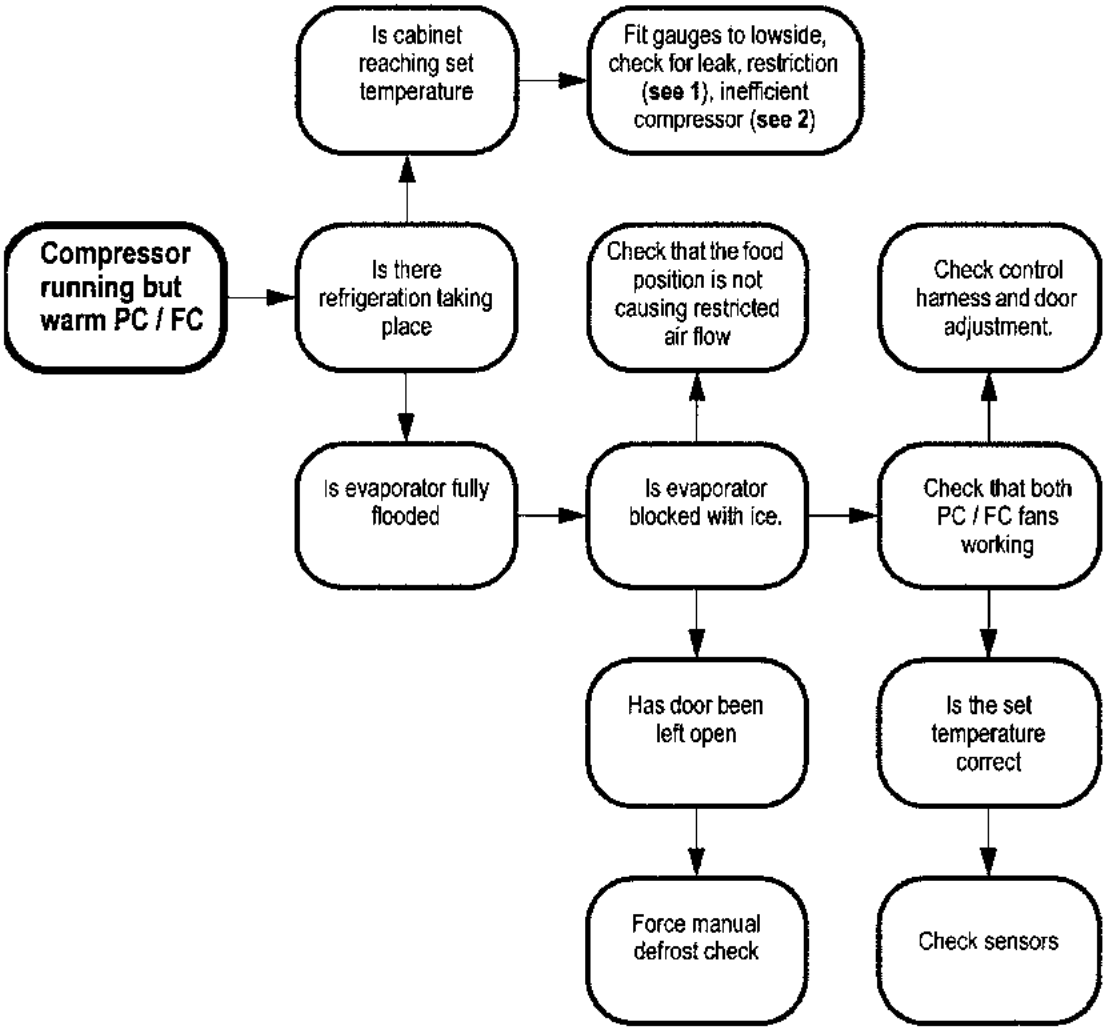
A2 Compressor



NOTE: If the power module is not connected to the console board, or there is no 12v dc supply to the console board, the compressor will run at 100%. If there is no 12v dc supply on the power board the compressor will not run.

A2

A3 Compressor Running, But Warm PC / FC



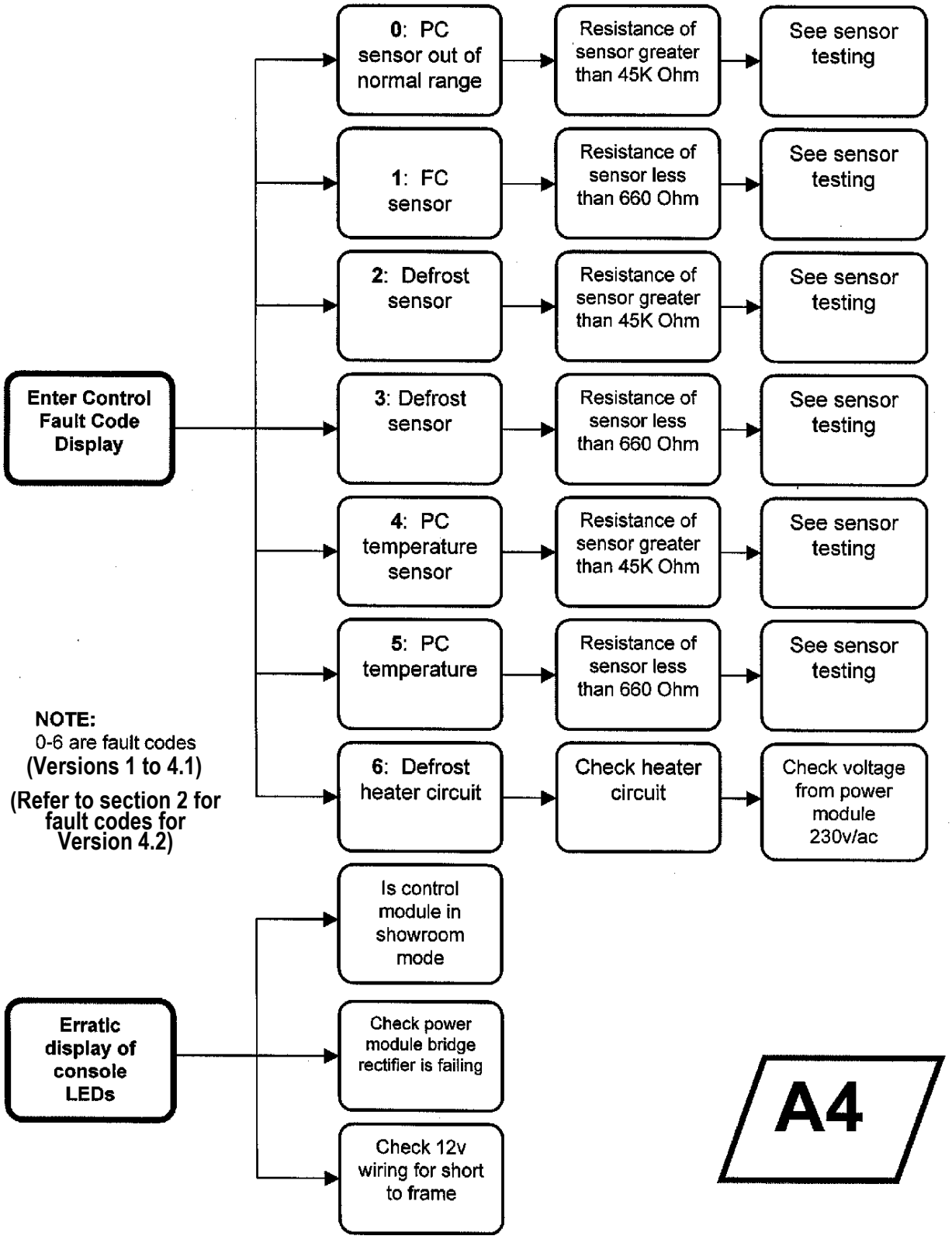
NOTES:

1. Incorrect transportation of cabinets can cause oil slugging. This can give the same symptoms as intermittent and / or permanent blockages, so too can moisture in the system. If these symptoms occur, purge with nitrogen at 827 kPa (120 psi) for 15 minutes or until system is clear. Change the filter and evacuate for at least 2 hours before charging.

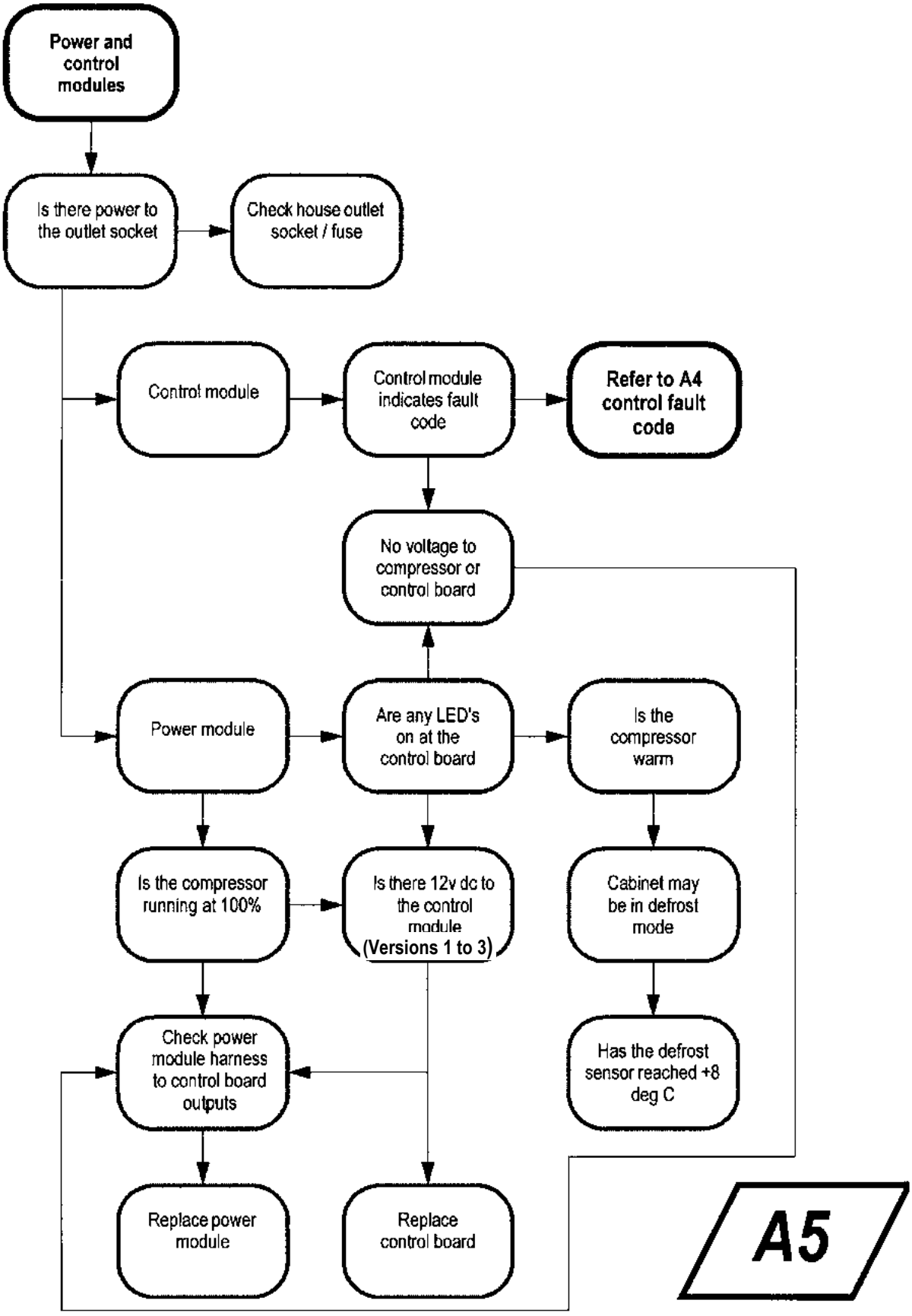
2) To check for an inefficient compressor, pinch off suction line with pinch of pliers. A good compressor should pull at least -30kPa (20 inches of vacuum).

A3

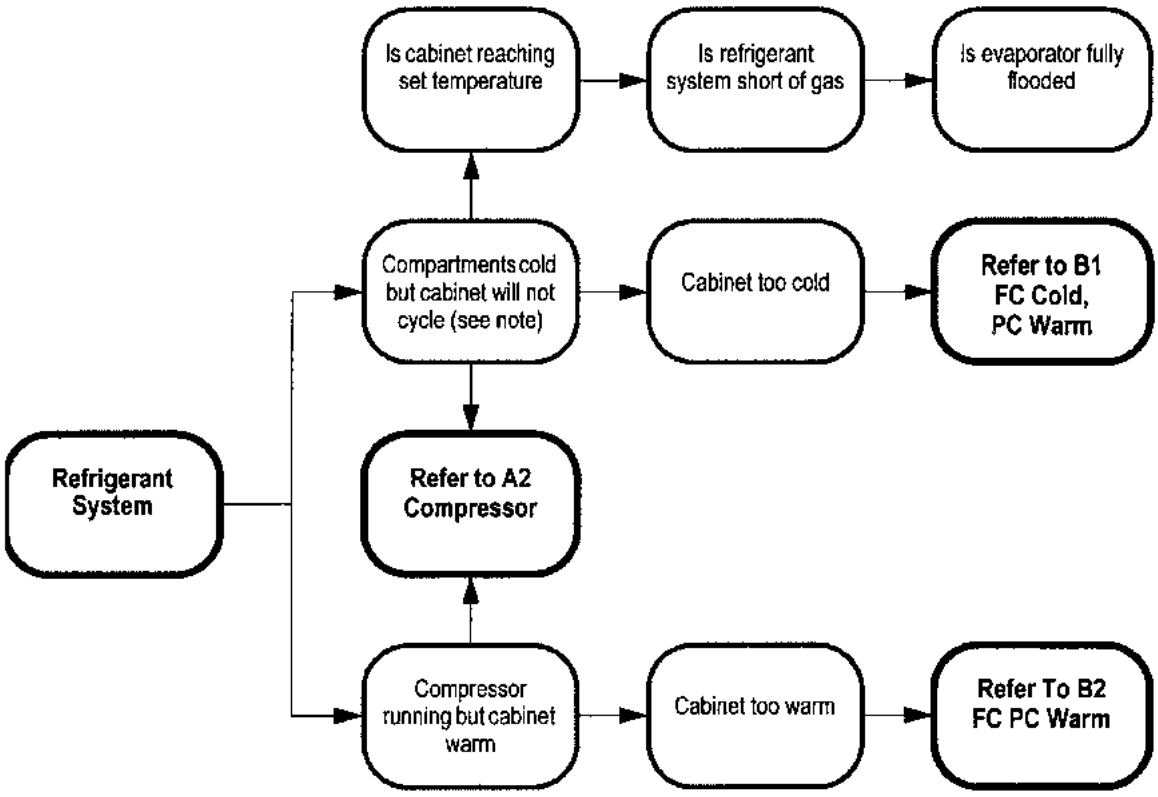
A4 Console Fault Code



A5 No Power To Power And Control Modules



A6 Refrigerant System

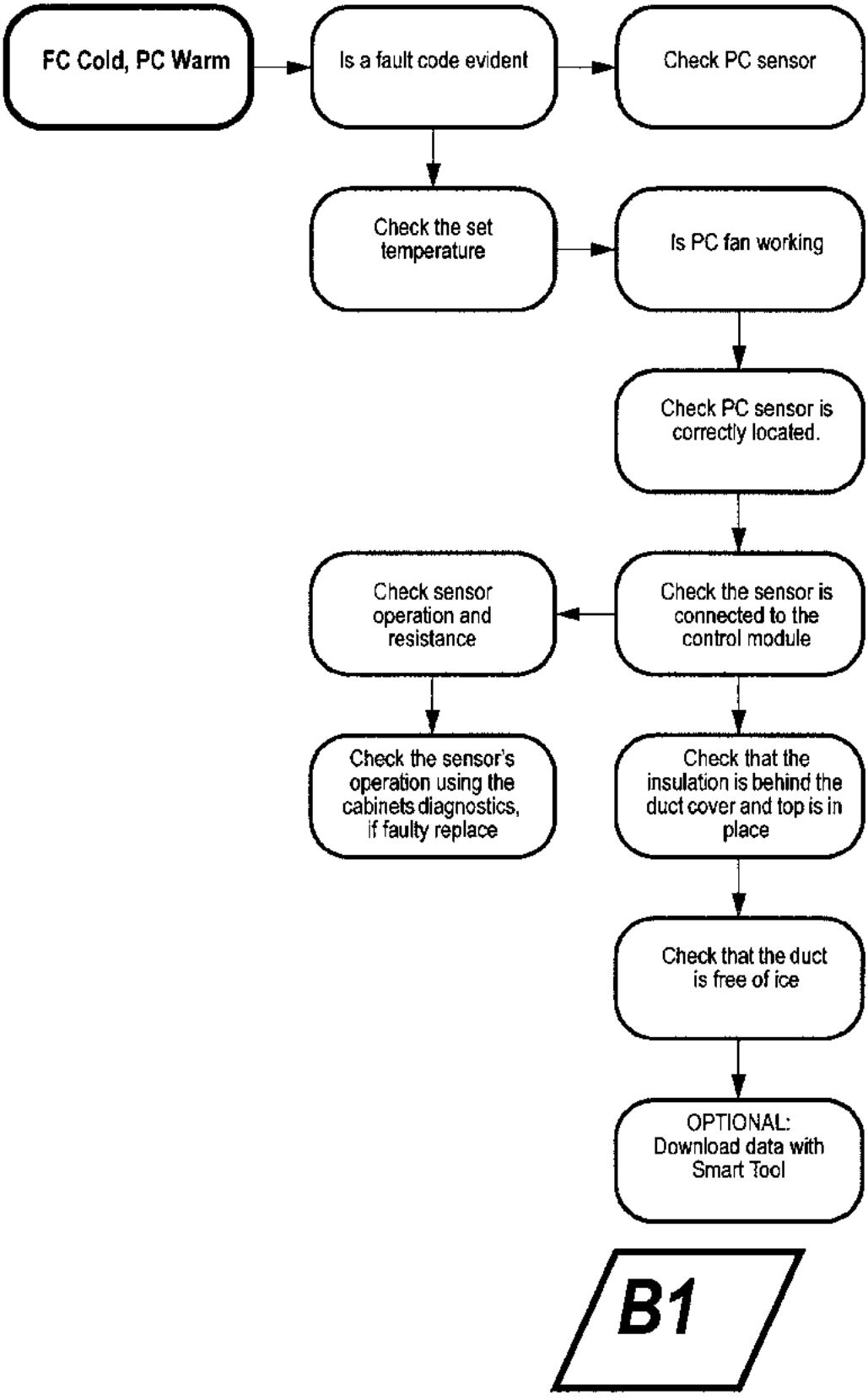


NOTE:
Live frost can only be checked for when the compressor has been running for at least 10 minutes with the door open. Even with a partially flooded evaporator frost may form over the whole evaporator. This may be due to conduction as the result of a long run time. Where the evaporator is not flooded this frost can be easily melted with vigorous rubbing by hand and it will not quickly reform. Where an evaporator is flooded, vigorous rubbing will not be able to easily melt the frost and it will also quickly reform.

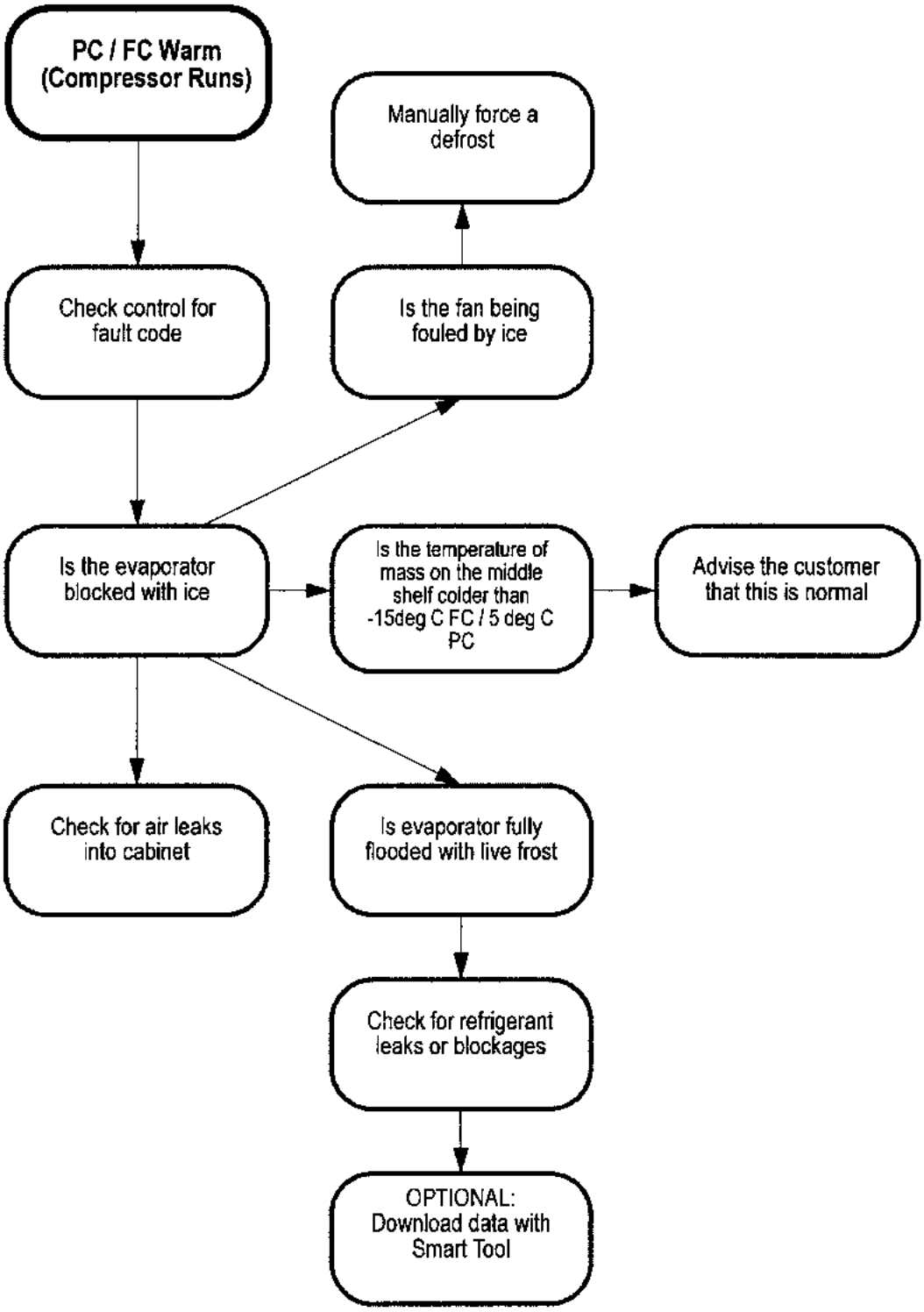
A6

B. Temperature Faults

B1 FC Too Cold, PC Too Warm

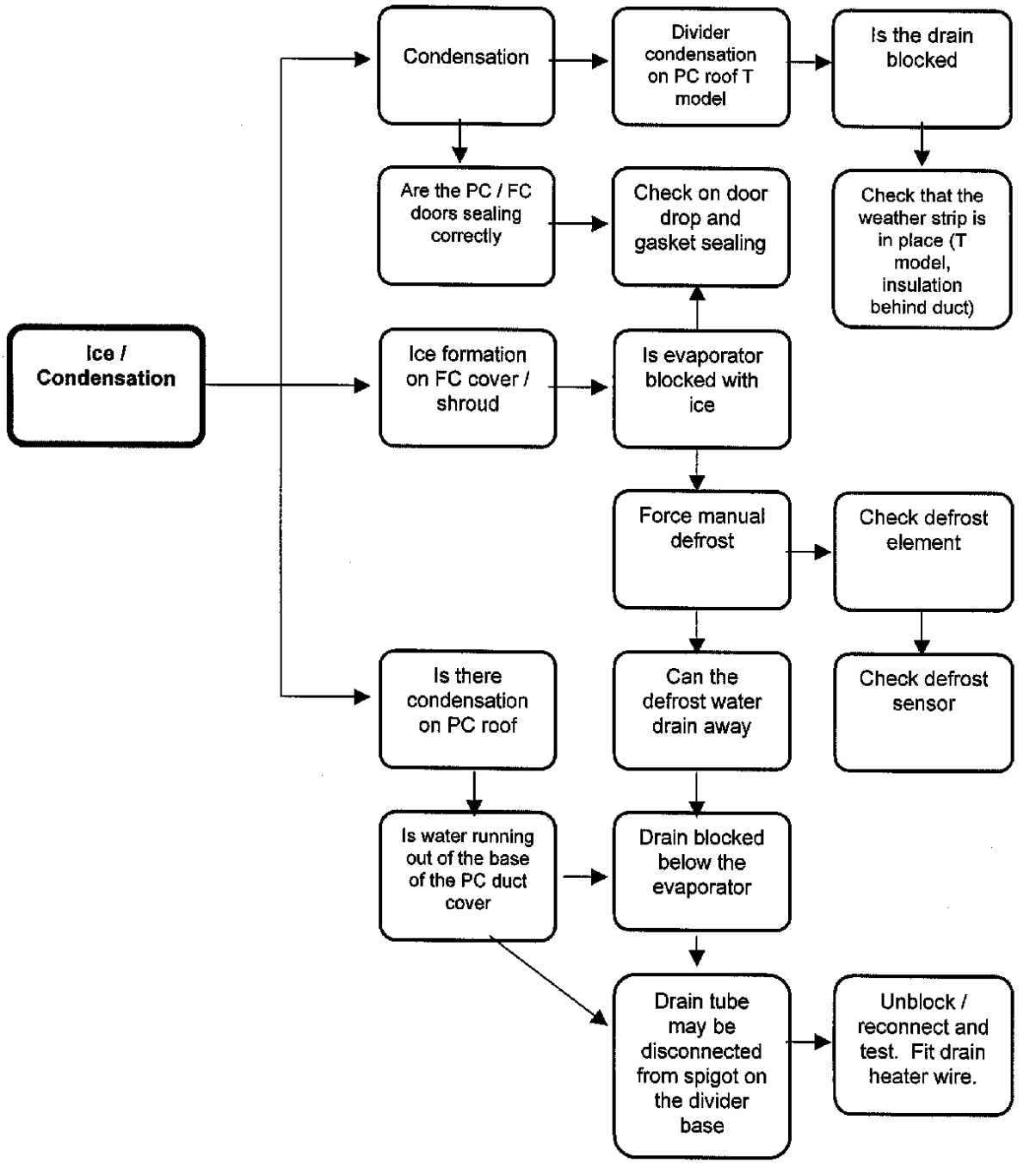


B2 FC / PC Warm



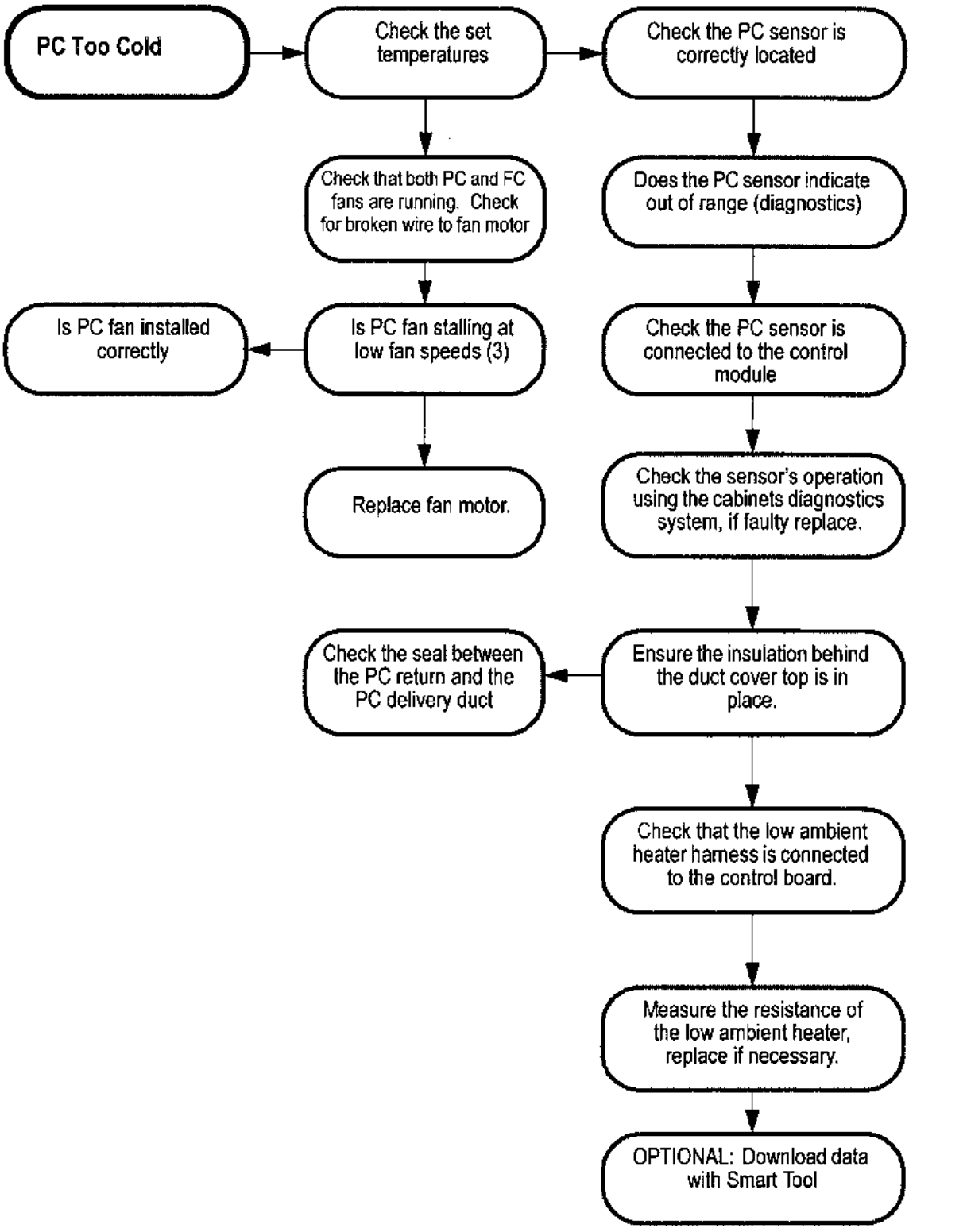
B2

B3 Ice / Condensation Forming



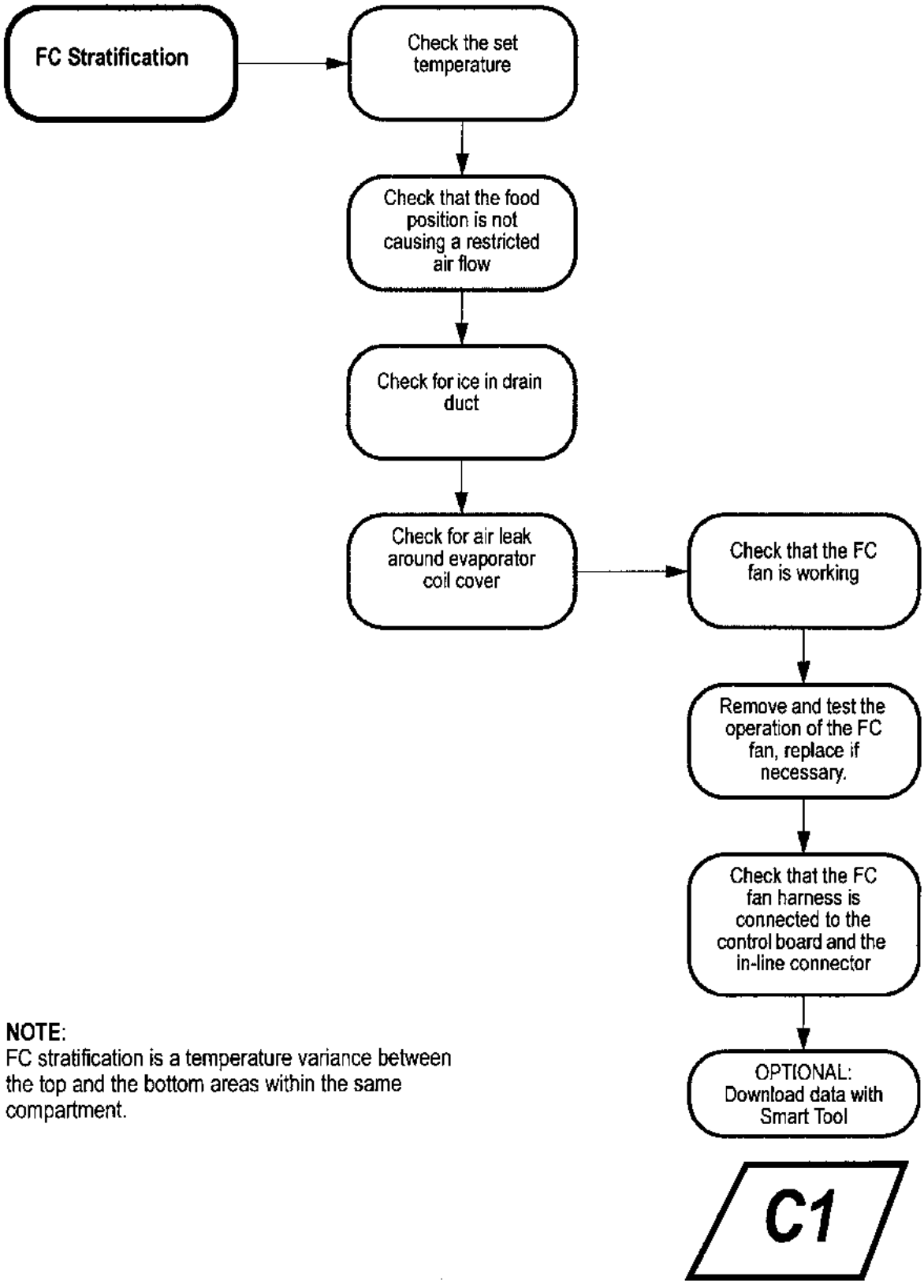
B3

B4 PC Too Cold



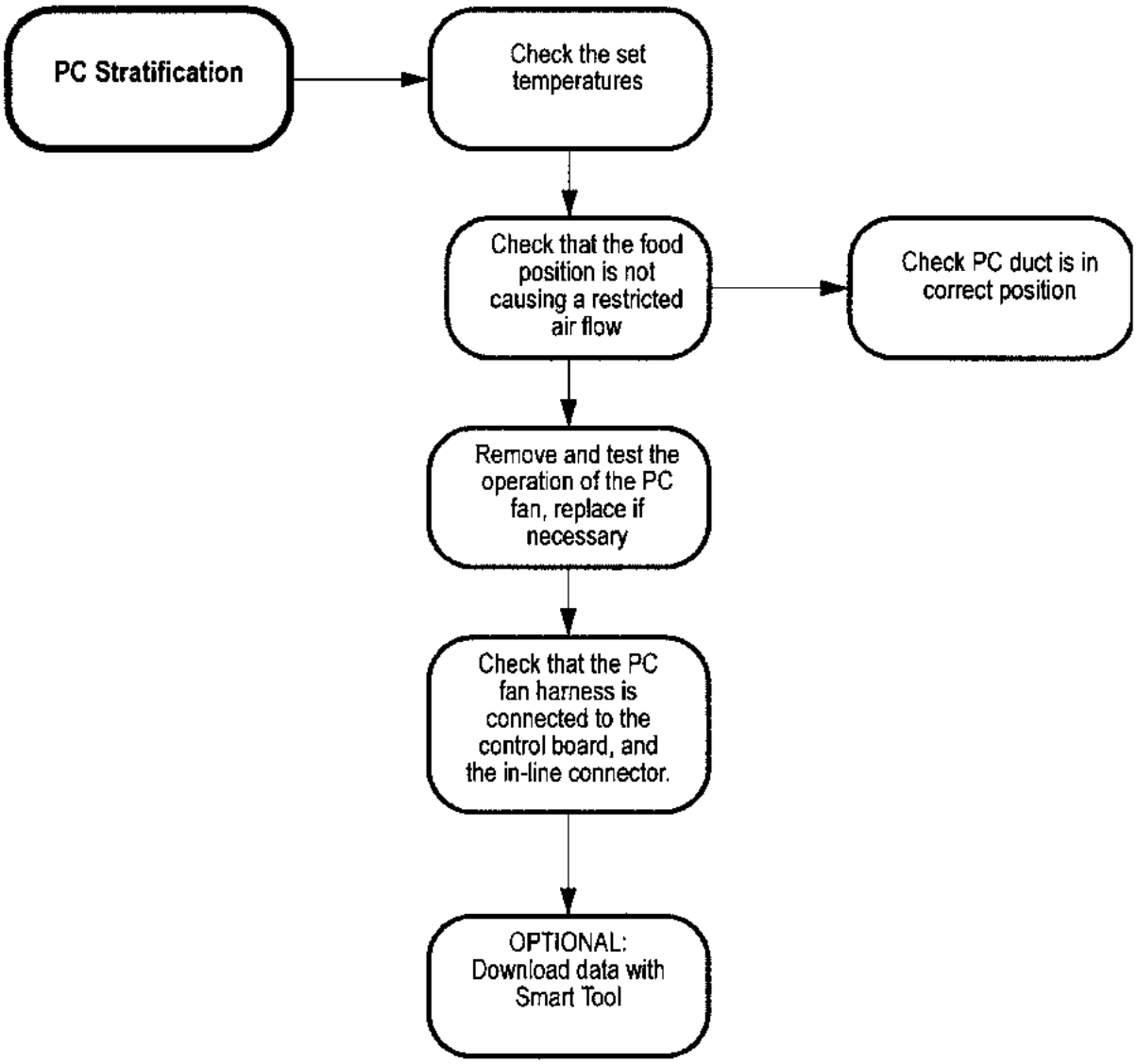
C. Sensor Faults

C1 FC Stratification



NOTE:
FC stratification is a temperature variance between the top and the bottom areas within the same compartment.

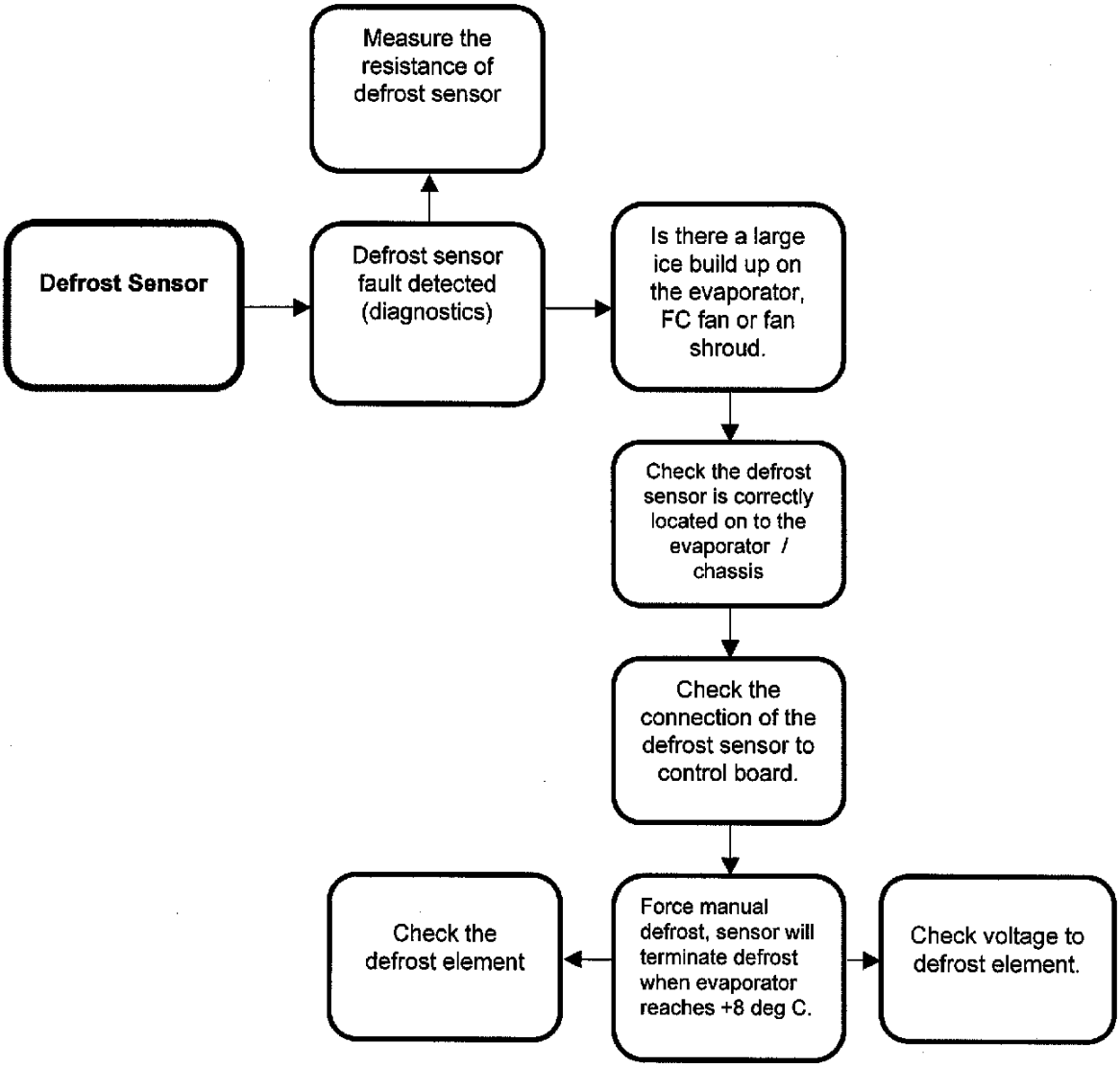
C2 PC Stratification



NOTE:
PC stratification is a temperature variance between the top and the bottom areas within the same compartment. Also refer to the Active Smart Refrigerator - Service Reference for B and T issues.

C2

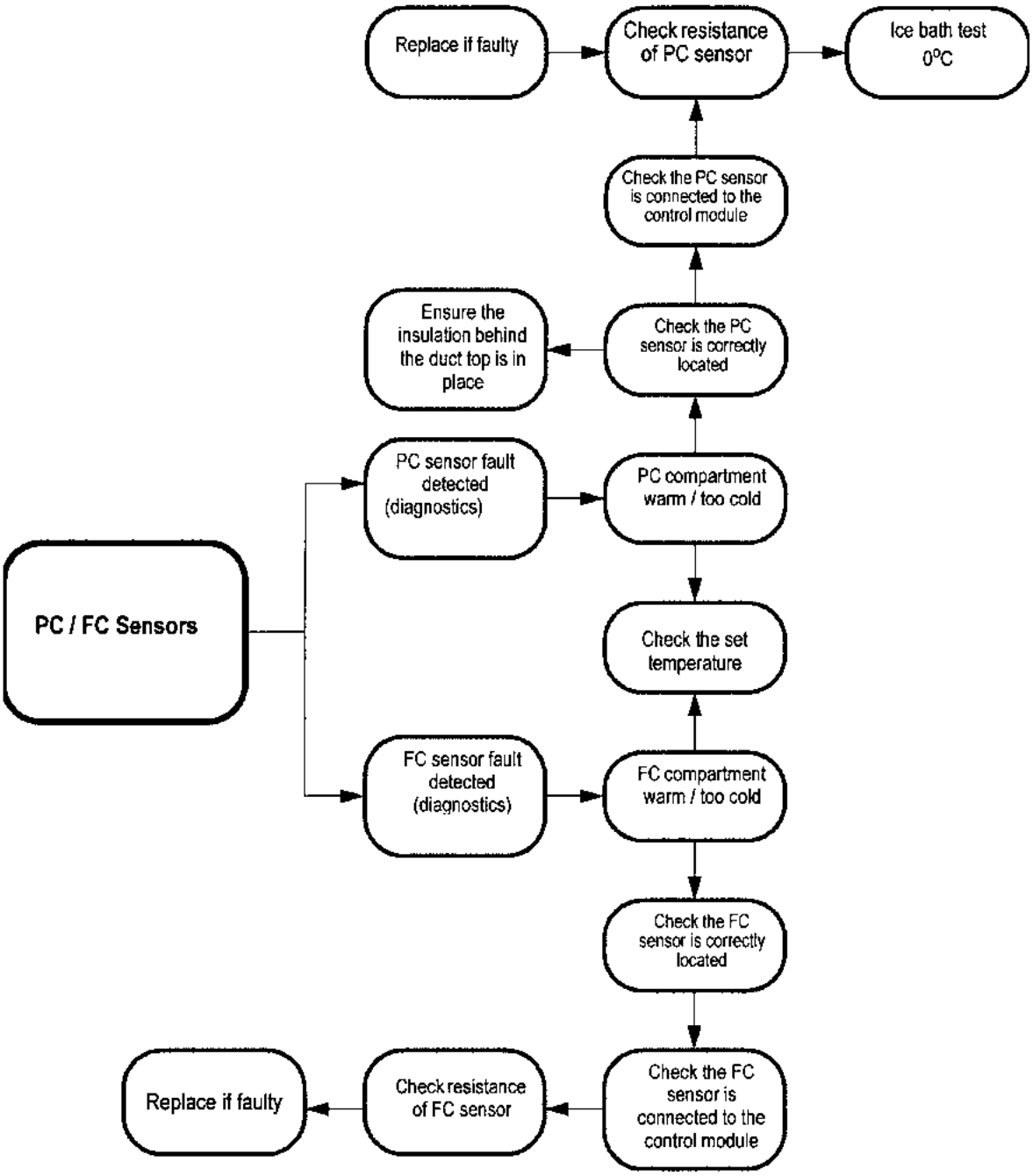
C3 Defrost Sensor



NOTE:
If the sensor is above +8 deg C, place the sensor into the evaporator coil. This will lower the sensor temperature. (The colour of the defrost sensor is black.)

C3

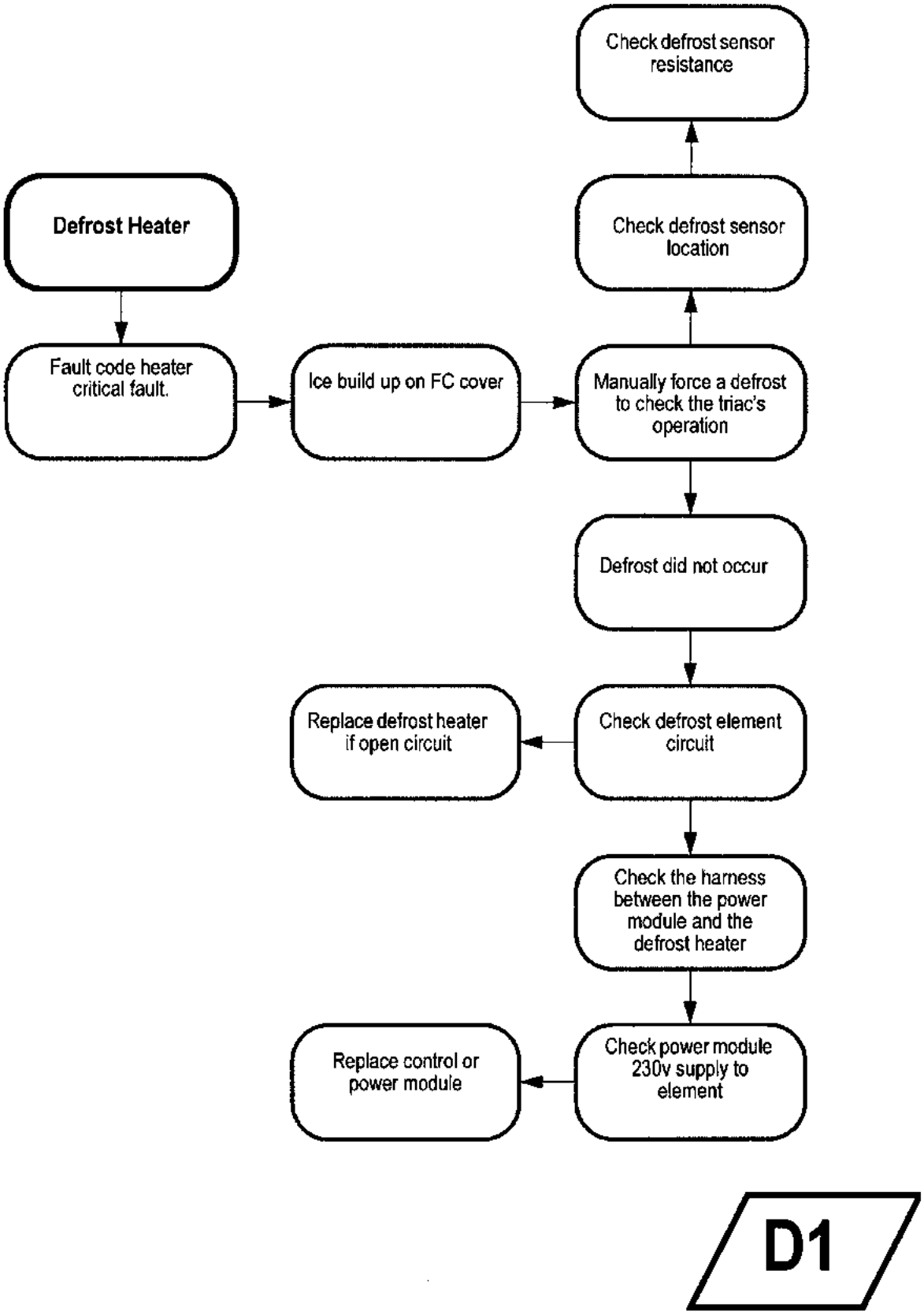
C4 PC Or FC Sensor Fault Code



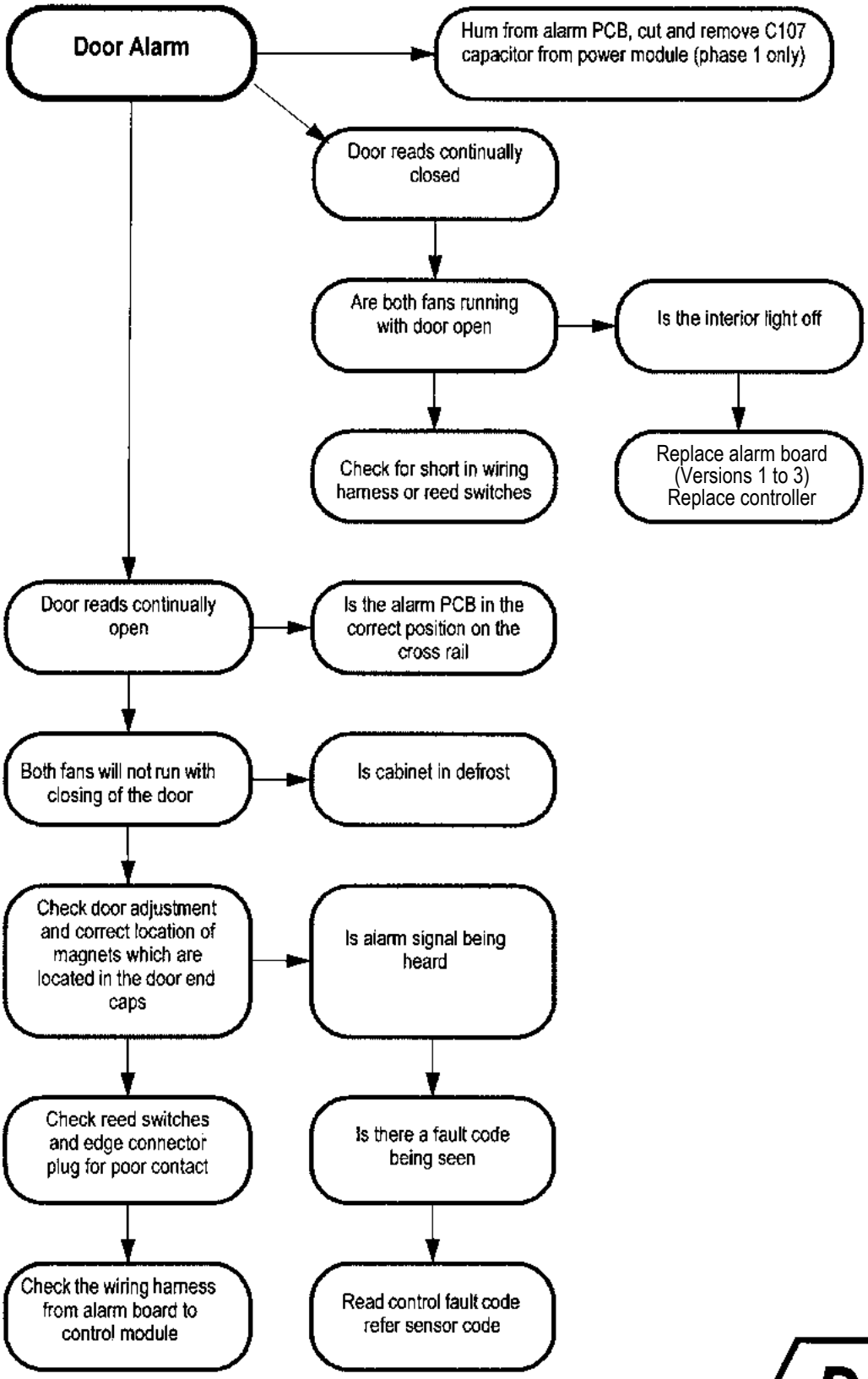
C4

D. Auxiliary Faults

D1 Defrost Heater

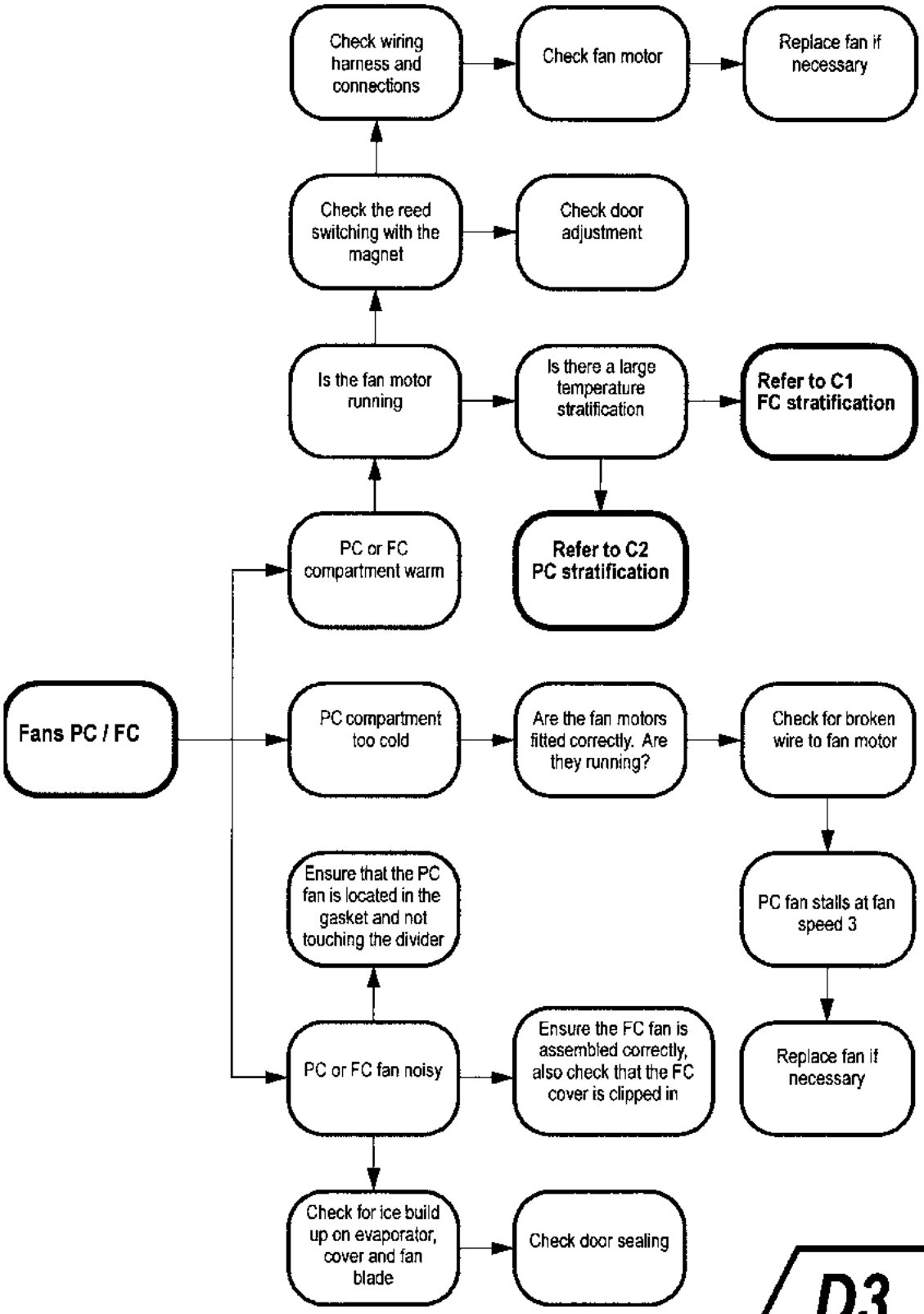


D2 Door Alarm Operation



D2

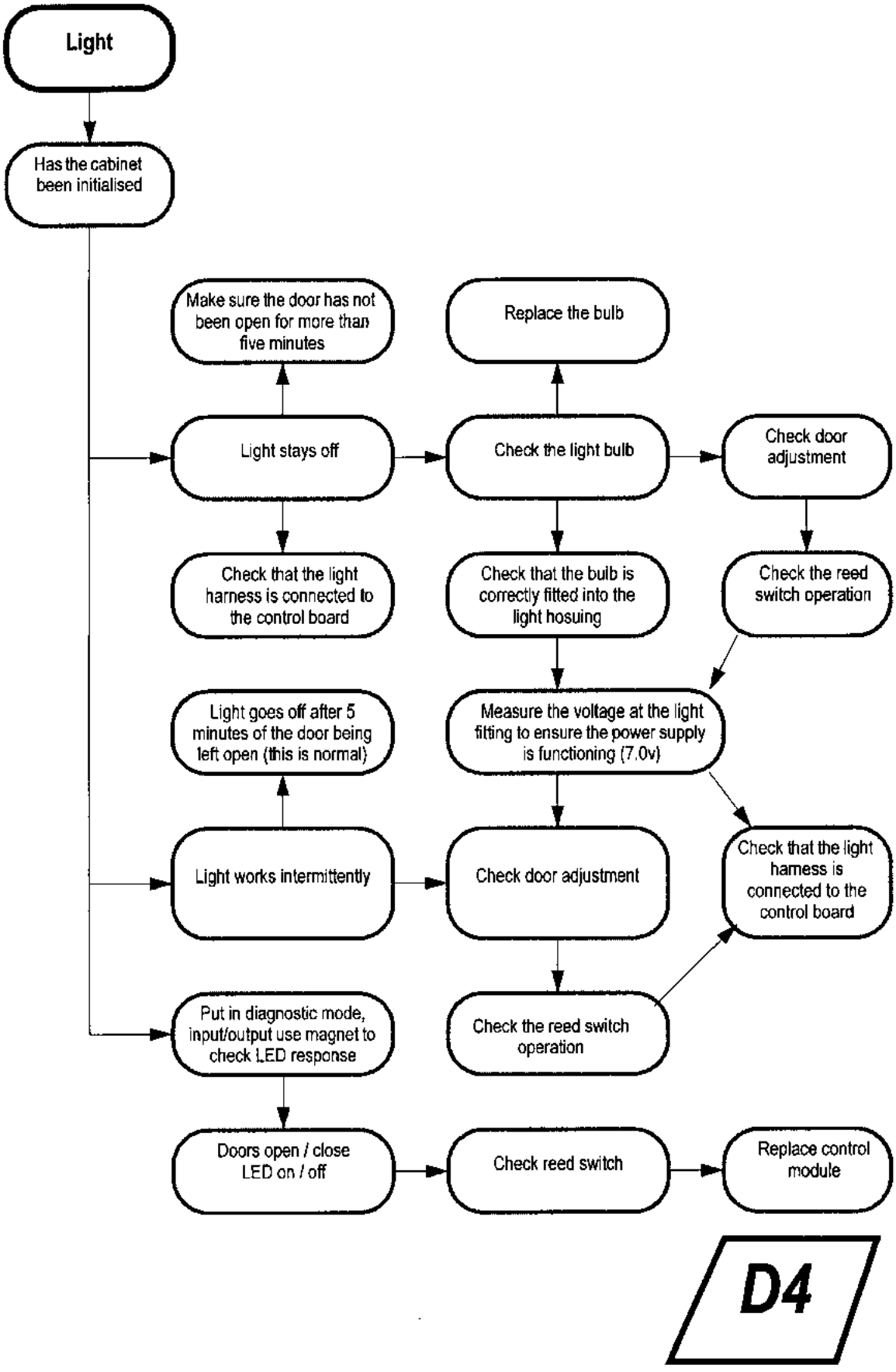
D3 Fans – PC / FC



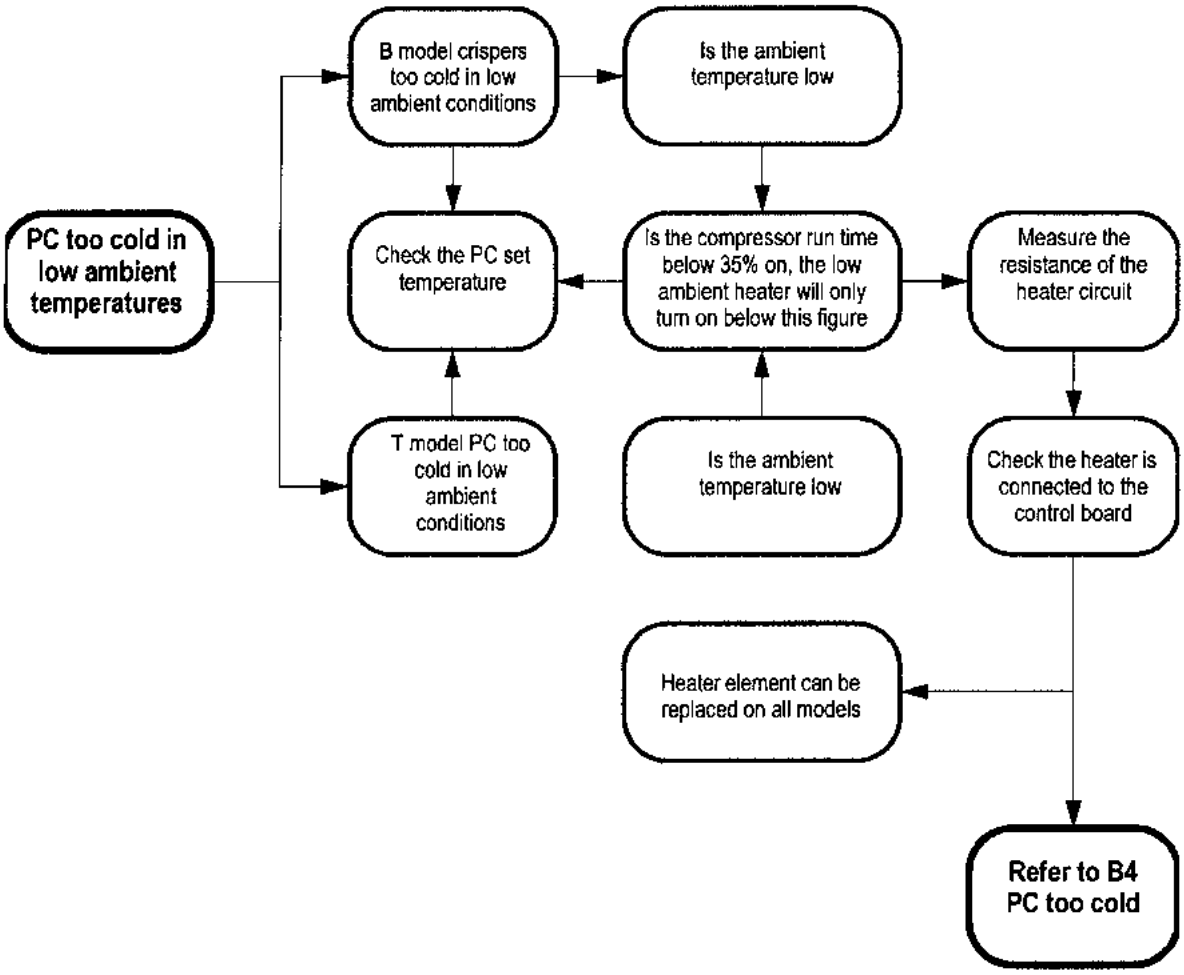
NOTE:
Read in conjunction with Active Smart Refrigerator - Service Reference.

D3

D4 No Light


Light
Has the cabinet been initialised
Make sure the door has not been open for more than five minutes
Replace the bulb
Light stays off
Check the light bulb
Check door adjustment
Check that the light harness is connected to the control board
Check that the bulb is correctly fitted into the light housing
Check the reed switch operation
Light goes off after 5 minutes of the door being left open (this is normal)
Measure the voltage at the light fitting to ensure the power supply is functioning (7.0v)
Light works intermittently
Check door adjustment
Check that the light harness is connected to the control board
Put in diagnostic mode, input/output use magnet to check LED response
Check the reed switch operation
Doors open / close LED on / off
Check reed switch
Replace control module
D4

D5 Low Ambient Heater



D5