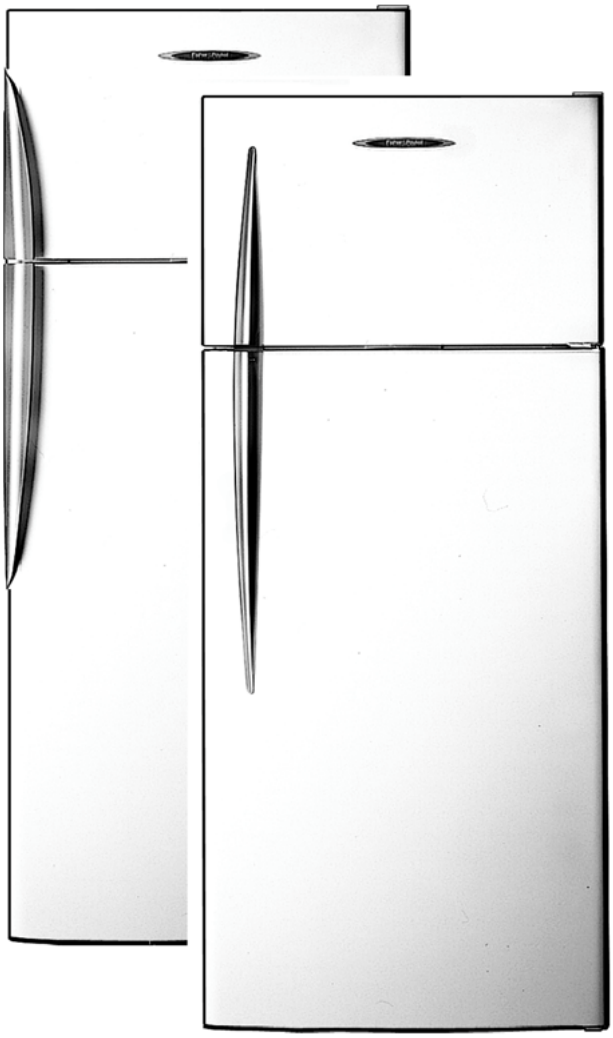
Fisher&Paykel
appliances

Service Manual

790 ACTIVE SMART REFRIGERATOR FREEZER



517800

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The specifications and servicing procedures outlined in this manual are subject to change without notice.

The latest version is indicated by the reprint date and replaces any earlier editions.

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C O N T E N T S

1 TERMINOLOGY

The following are terms used in this manual:

"B" MODELS
Dual temperature refrigerator/freezers in which the freezer compartment is below the refrigerator compartment.

"T" MODELS
Dual temperature refrigerator/freezers in which the freezer compartment is above the refrigerator compartment.

FC COMPARTMENT
Freezer compartment. The compartment in a dual temperature refrigerator used for keeping frozen food, where the temperature is maintained at approximately –16°C (3°F).

PC COMPARTMENT
Provision compartment. The compartment in a dual temperature refrigerator used for keeping fresh food, where the temperature is maintained at approximately 4°C (39°F).

CABINET WRAPPER
Pre-painted steel.

LINER
A one-piece vacuum formed ABS liner with a plug-in divider.

DIVIDER PARTITION
Injected moulding of HIPS, with two outer injected moulded housings, and an insulated ducted moulded polystyrene inner core.

FAN MOTORS
DC 12 volt brushless variable speed fan motors for air circulation in both the FC and PC compartments.

EVAPORATOR
Aluminium corrugated type mounted vertically on the back wall of the FC.

SUCTION & CAPILLARY LINE
Foamed into the back of the cabinet with all joints of the evaporator in the FC.

POWER/CONTROL MODULE
Contains the microprocessor that controls all functions of the refrigerator and gathers data from the sensors. This module also contains support circuitry to switch the various outputs.

DISPLAY MODULE
Using signals from the Power Module, this module generates the L.E.D. display. The lamp is also switched via this module.

REED SENSORS
A reed switch encapsulated within a plastic housing, mounted on the cross and base rails behind a plastic cover. A magnet housed just under the lower end cap of each door activates this sensor when the door is closed.

LOW AMBIENT HEATER
Two types are used. A PCB type is used in the air duct of "T" models. A blanket wire type is used in the divider of "B" models.

2 SPECIFICATIONS

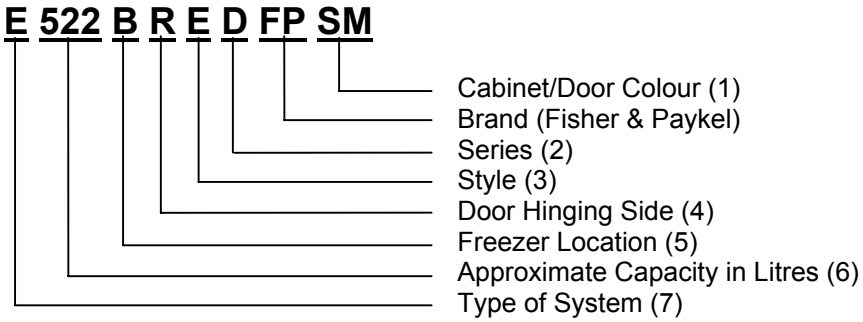
2.1 Cabinet Specifications

DIMENSIONS	E521T	E522B
Height	1695mm (67.8 inches)	1695mm (67.8 inches)
Depth	703mm (28.7 inches)	703mm (28.7 inches)
Width	790mm (31.1 inches)	790mm (31.1 inches)
CAPACITY GROSS VOLUME IN LITRES (AS 1430)		
Provision Compartment	400 litres (14.1 cu.ft.)	360 litres (12.7 cu.ft.)
Freezer Compartment	117 litres (4.13 cu.ft.)	160 litres (5.65 cu.ft.)
TOTAL	517 litres (18.25 cu.ft.)	520 litres (18.36 cu.ft.)
ELECTRONICS 110 volt		
Display Module	Part No. 881218	Part No. 881218
Power/Control Module	Part No. 884252	Part No. 884252
Module/Inverter	Part No. 884260	Part No. 884260
SUCTION LINE ASSEMBLY		
Part Number	875113	874810
DEFROST ELEMENT		
Part Number	881414	881414

COMPRESSOR SPECIFICATIONS		
Make	Embraco	Embraco
Model	VEG Y6H	VEG Y6H
Part Number	884259	884259
Volts	110	110
Hertz	53 - 150	53 - 150
Phase	3	3
Input Watts	55.7 - 205	55.7 - 205
Output Watts	97 - 468	97 - 468
Nominal BTU	330 - 1596	330 - 1596
Start Resistance (Ohms)	6.40	6.40
Run Resistance (Ohms)	6.40	6.40
Starting Device Type	Inverter	Inverter
Oil Charge (cm^3)	430	430
Refrigerant Type	R134a	R134a
Gas Charge	140 Grams of R134a	135 Grams of R134a

2.2 Model Number Identification

The following is an example of the model number identification for Fisher & Paykel Appliances:

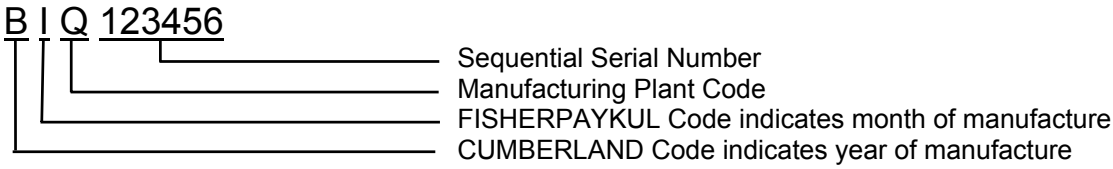


(1)	Colour of Cabinet/Door	WW = White Cabinet/White Doors SM = Silver Wrapper/Matt Stainless Steel Doors SX = Silver Wrapper/Brushed Stainless Steel Doors
(2)	Series	The series of the cabinet is located on the serial plate as Series A, B, etc.
(3)	Style	E = Elegence I = Inox M = Iridium
(4)	Door Hinging	L = Left Hand R = Right Hand
(5)	Freezer Location	B = Bottom T = Top
(6)	Litreage of Cabinet	Approximate total capacity.
(7)	Type of System	E = Electronic N = No Frost C = Cyclic

2.3 Serial Number Identification

The serial number consists of three letters and six digits and contains the following information:

Example:



Cumberland Code

Letter	C	U	M	B	E	R	L	A	N	D
Year	1	2	3	4	5	6	7	8	9	0

Fisherpaykul Code

Letter	F	I	S	H	E	R	P	A	Y	K	U	L
Month	1	2	3	4	5	6	7	8	9	10	11	12

Manufacturing Plant Code

A	Laundry – Australia
F	Refrigeration – New Zealand
M	Range & Dishwasher
N	Laundry – New Zealand
Q	Refrigeration - Australia

In the example above, the appliance was manufactured in the second month of the fourth year (2004) at the New Zealand Refrigeration plant.

3 SERVICING REQUIREMENTS

3.1 Interface Pen Mk 2

Used to retrieve and download data from the electronic control module when used in conjunction with the Fisher & Paykel Smart Tool diagnostic program on a laptop computer. The part number of the interface pen is 425930.

3.2 Health & Safety

3.2.1 Good Work Practices

1. Take care while removing all plastic components especially when cold.
2. Leave the product clean and tidy when service work is completed.
3. Extreme heat in cabinets will cause plastic deterioration or distortion and thermal fuses in the defrost heater to go open circuit (be careful with heat guns).

3.2.2 Environmental Health And Safety

When servicing products, consider safety and health issues and requirements which must be adhered to at all times. Specific safety issues are:

1. Electrical safety.
2. Electrostatic discharge.
3. Mixing of foam insulation.
4. Vapours while brazing.
5. Reclaiming of refrigerant.

3.2.3 Good Practice And Safety

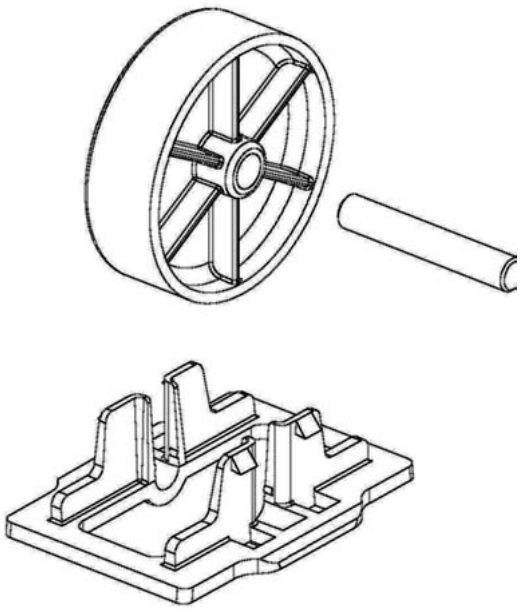
1. Take care when removing or servicing any electrical components to avoid electrical shock or short circuit conditions.
2. Take care when removing plastic components at low temperatures as breakages can occur with these components.
3. Extreme heating of plastic components can cause distortion of those parts being heated.
4. Avoid overheating temperature sensitive devices such as the element thermal fuses and cabinet sensors.
5. Avoid using solvents, citrus-based cleaners on all plastic parts. We advise only warm soapy water be used.

4 INSTALLATION INSTRUCTIONS

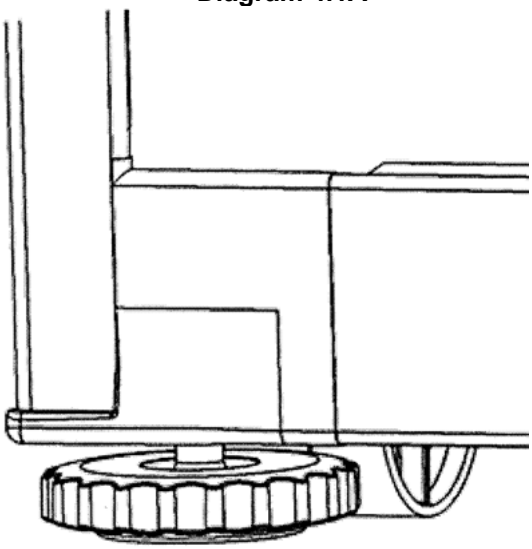
4.1 Levelling

The word 'level' is somewhat of a misnomer as a 'spirit level' need not be used to set the appliance level. It is preferable to have the appliance level in appearance where both doors will close with the aid of the door closing components. It is also important that the appliance sits solidly on the floor.

- Front and rear rollers are fitted ex factory.
- Cabinet levelling can be done by adjustment of the front roller levelling wheel fitted ex factory. See diagram 4.1B.
- Weight should be lifted off the cabinet for ease of adjustment.
- The product should be levelled with the majority of the weight on the hinge side front foot. The opposite side front foot should then be adjusted to stabilise the product.



REAR ROLLERS
Diagram 4.1A



FRONT ROLLER/LEVELLING WHEEL
Diagram 4.1B

4.2 Air Space Requirements

On all refrigerators and freezers it is important that an air gap is left around the product:

- 2 inches clearance at top
- 1 inch clearance each side

4.3 Temperature Adjustment

Refer **DISPLAY MODULE** in Section 6.1.3.

5 THEORY OF OPERATION

5.1 Internal Air Flow

The freezer fan draws air through the evaporator and into a duct in the rear wall of the freezer compartment. This air exits through the fan grill at the top of the freezer compartment. The air behind the freezer coil cover is also diverted through the divider partition to another fan which supplies the cold air into the provision compartment. The amount of air is controlled electronically by two sensors which in turn regulate the speed of both PC and FC fans to maintain selected temperatures in each compartment.

Air from the PC returns to the FC evaporator by way of the return air duct which is built into the divider partition. This air is drawn across the evaporator by the evaporator FC fan motor to be recirculated again throughout the PC / FC compartments.

"B" Model
Active Smart

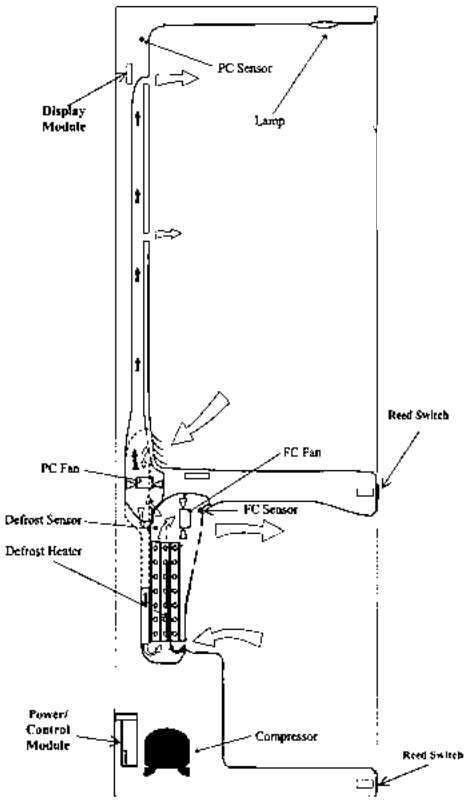


Diagram 5.1A

"T" Model
Active Smart

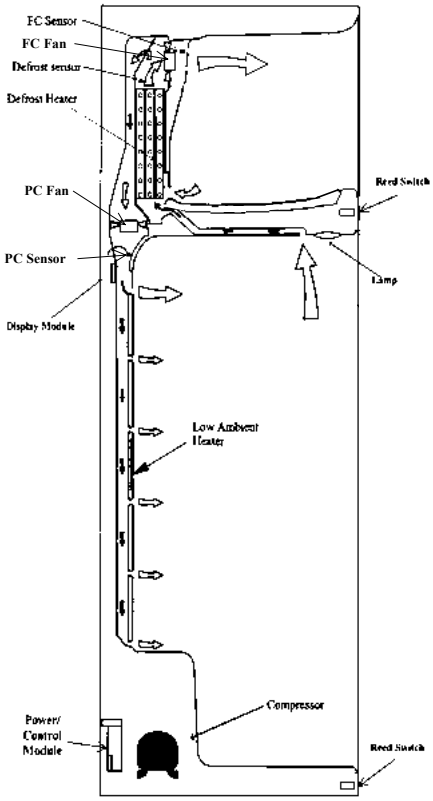


Diagram 5.1B

5.2 Defrost Cycle

A heating element is used to defrost the ice accumulated on the evaporator. The defrosts are adaptive to the usage and environment and are controlled by the power/control module. During a defrost, the temperature above the evaporator is sensed by the defrost sensor located on the evaporator chassis. This sensor must register +8°C (46°F) before terminating the defrost heater element. If the sensor does not register a temperature of +8°C (46°F) within 30 minutes of the commencement of the defrost cycle, the defrost will be terminated. If two successive defrost attempts fail to reach this temperature, a fault code is displayed (refer Section 6.2.1). Previous defrost history, the number of door openings, and the compressor run time are used to determine the interval between defrosting. The typical time interval for defrosts is between 12 and 24 hours. However, it can be as short as 5 hours or as long as 96 hours depending on the usage and environment.

NOTE: The defrost cycle will not **start** if the defrost sensor is above +8°C (46°F).

The **defrost** cycle follows a predefined sequence:

- There is a delay of 2 minutes before the element starts to heat (commonly known as **evaporator warm up time**).
- The defrost element will remain on until the defrost sensor has reached +8°C (46°F).
- The compressor will remain off for a further 4 minutes (commonly known as **drip time**).
- The compressor will restart, and a further 30 seconds later both fans will restart.

The following table outlines the defrost cycle of an Active Smart refrigerator.

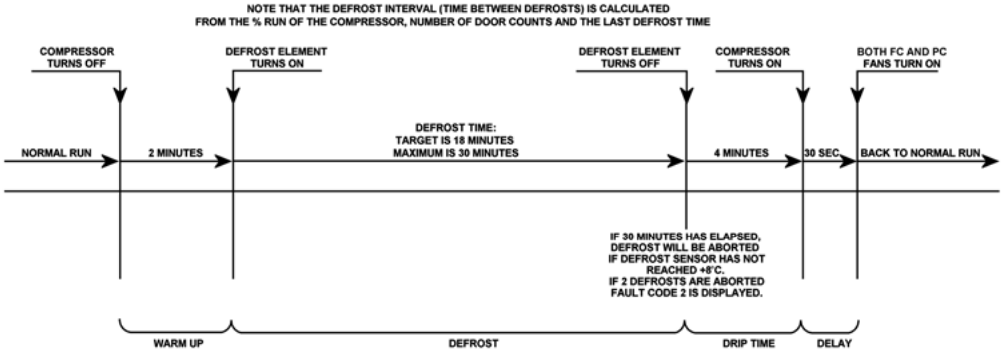


Diagram 5.2

5.3 The Refrigeration Circuit

The compressor discharges high pressure, high temperature gas into the back panel condenser circuit first, and then into the right hand side condenser in the cabinet by way of the base tube. This tube runs from the compressor compartment forward to the front bottom edge of the cabinet, returning down the left hand side to be connected to the left hand side condenser coil.

A loop from this condenser coil forms the cross rail mullion on dual temperature cabinets. The condenser then continues across the top front edge of the cabinet to form the right hand side condenser before entering the filter drier which is mounted vertically in the unit compartment.

Now the high pressure gas has been condensed, the liquid refrigerant flows through the capillary tube, entering the evaporator mounted in the freezer compartment. The liquid refrigerant then boils off due to the low suction pressure applied to within the evaporator from the compressor. The heat laden vapour is drawn back to the compressor by way of the suction line to start the cycle all over again.

The above information relates to the cabinet, not the drawing below.

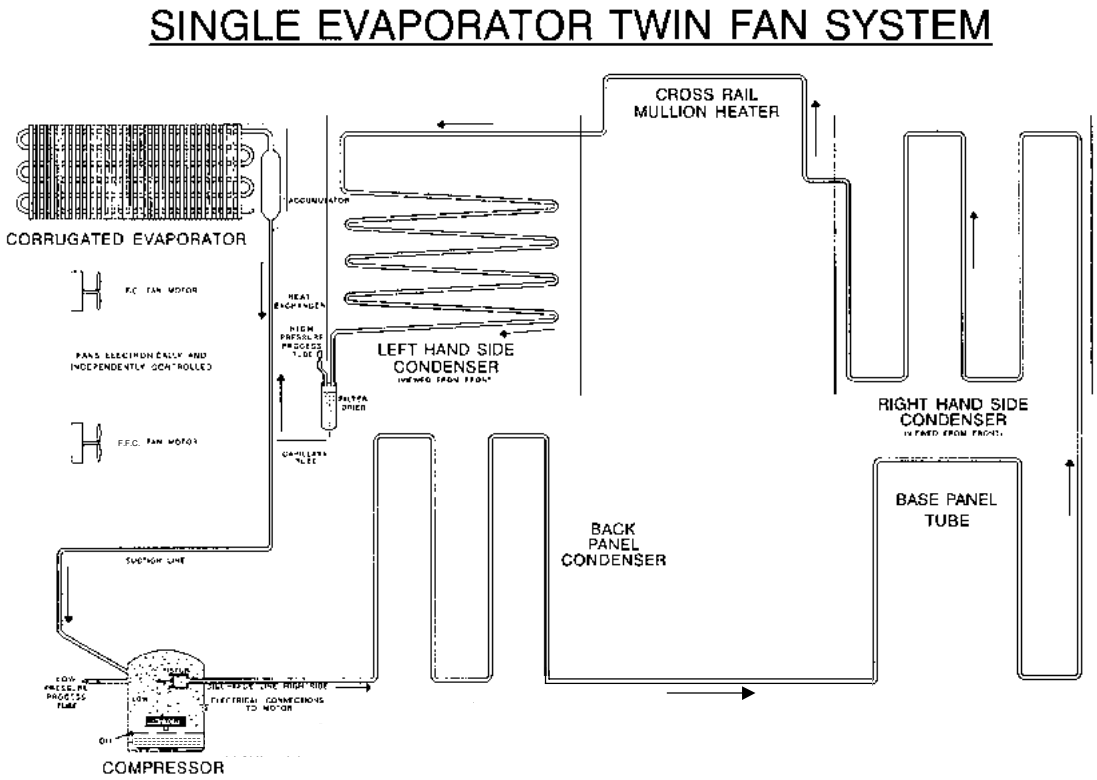


Diagram 5.3

5.4 Servicing Features

5.4.1 Condensate Disposal

During the defrost cycle, which is electronically timed and controlled, live frost is melted off the evaporator by means of heat from the defrost element. Condensate from the evaporator defrosting drops into a collection trough, which has an outlet hole in the centre of the liner. A tube then allows the condensate to flow into a water evaporation tray above the compressor.

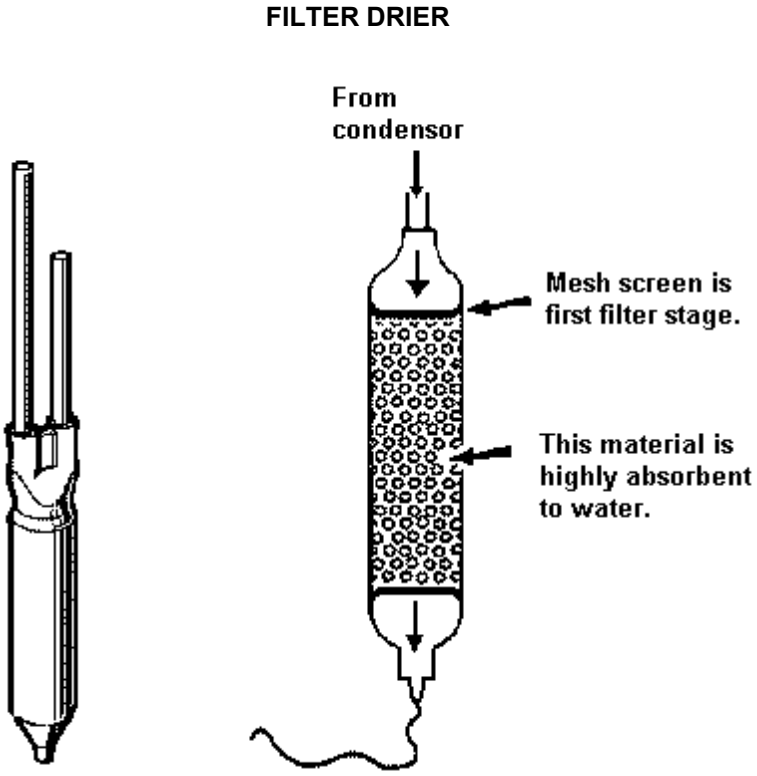


Diagram 5.4.1

The filter drier or molecular sieve, as the name suggests, is both a filter and a drier. Whenever a system is opened, it is essential that the filter drier is replaced. ALWAYS ensure that replacement filter driers are kept well sealed and airtight prior to being fitted to a system.

PLEASE NOTE: When filter driers are replaced on systems being serviced, **it is important that the filter drier is either cut from the system or the desiccant is removed before heat is applied to the old filter drier. Failure to do so will drive any moisture held in the desiccant back into the system.**

ALWAYS mount vertically or as near to vertical as possible and use the correct desiccant to suit the refrigerant being used.

XH7 or XH9 suits R134a.

5.4.2 Internal Condenser

The internal condenser is made in three sections (see circuit diagram below). One third of the condenser is attached to the back panel, and the other parts are attached to the inside of the right and left sides of the cabinet wrapper (as viewed from the back) all being foamed into place. It is very important, if pressure testing the high side circuit, to split the condenser into its 3 sections to locate which section is at fault. Always ease the back panel away from the cabinet slightly before pressure testing the internal pipework. This will prevent a pressure build-up within the cabinet should any leak be found internally in the foam insulation. Such a leak could pressurise and damage the cabinet liner.

The back panel condenser comes as part of the back panel and should always be replaced as a complete assembly if the back panel is ever removed.

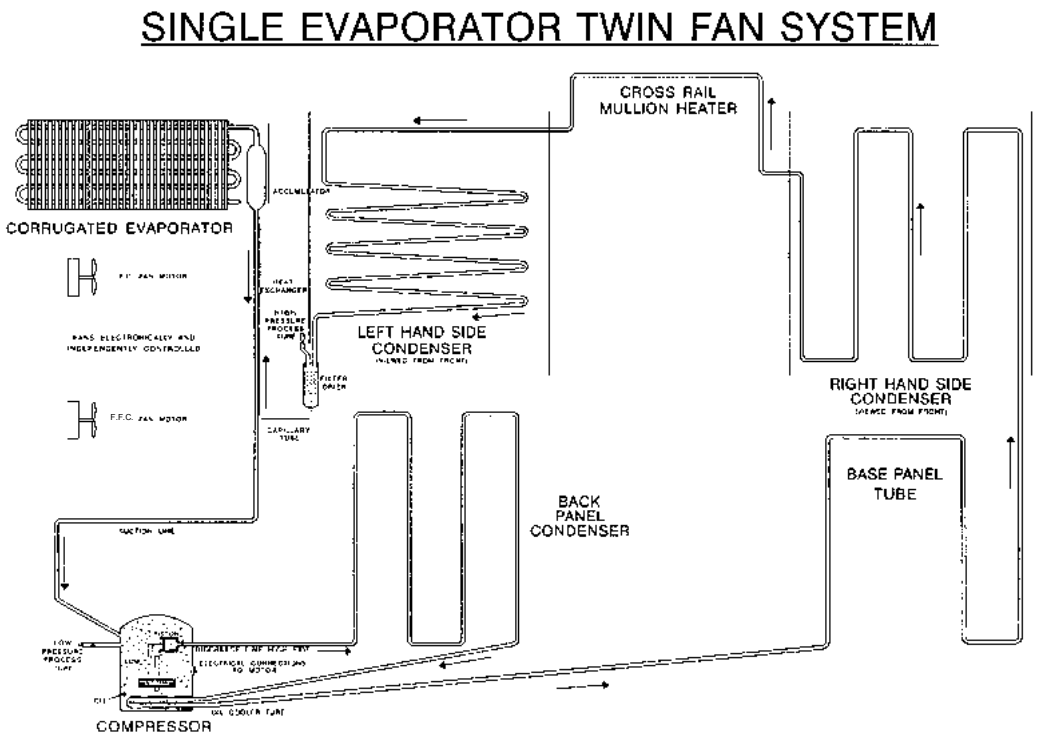
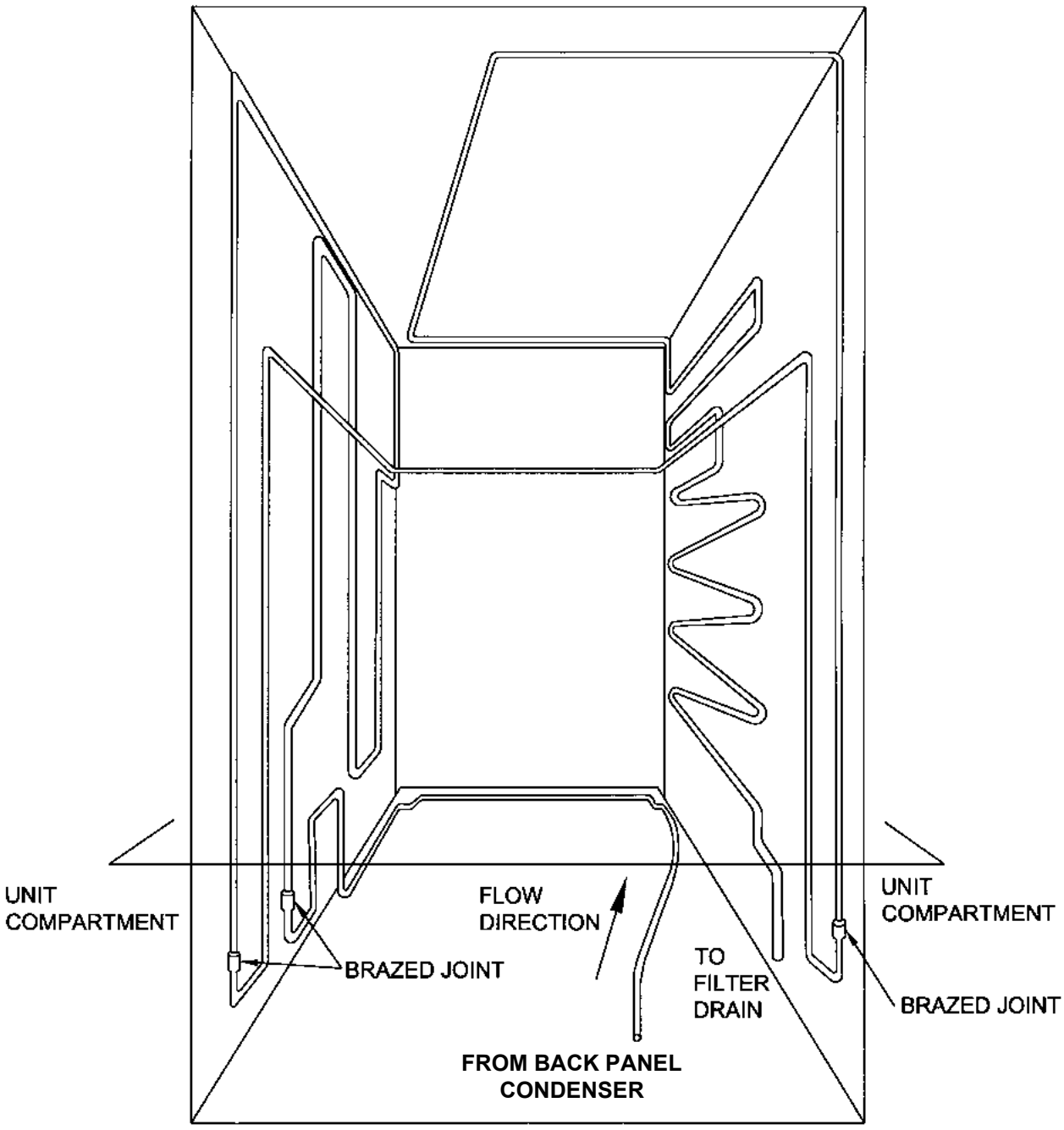


Diagram 5.4.2A

CONDENSER LAY OUT 680 / 790
"T" MODELS

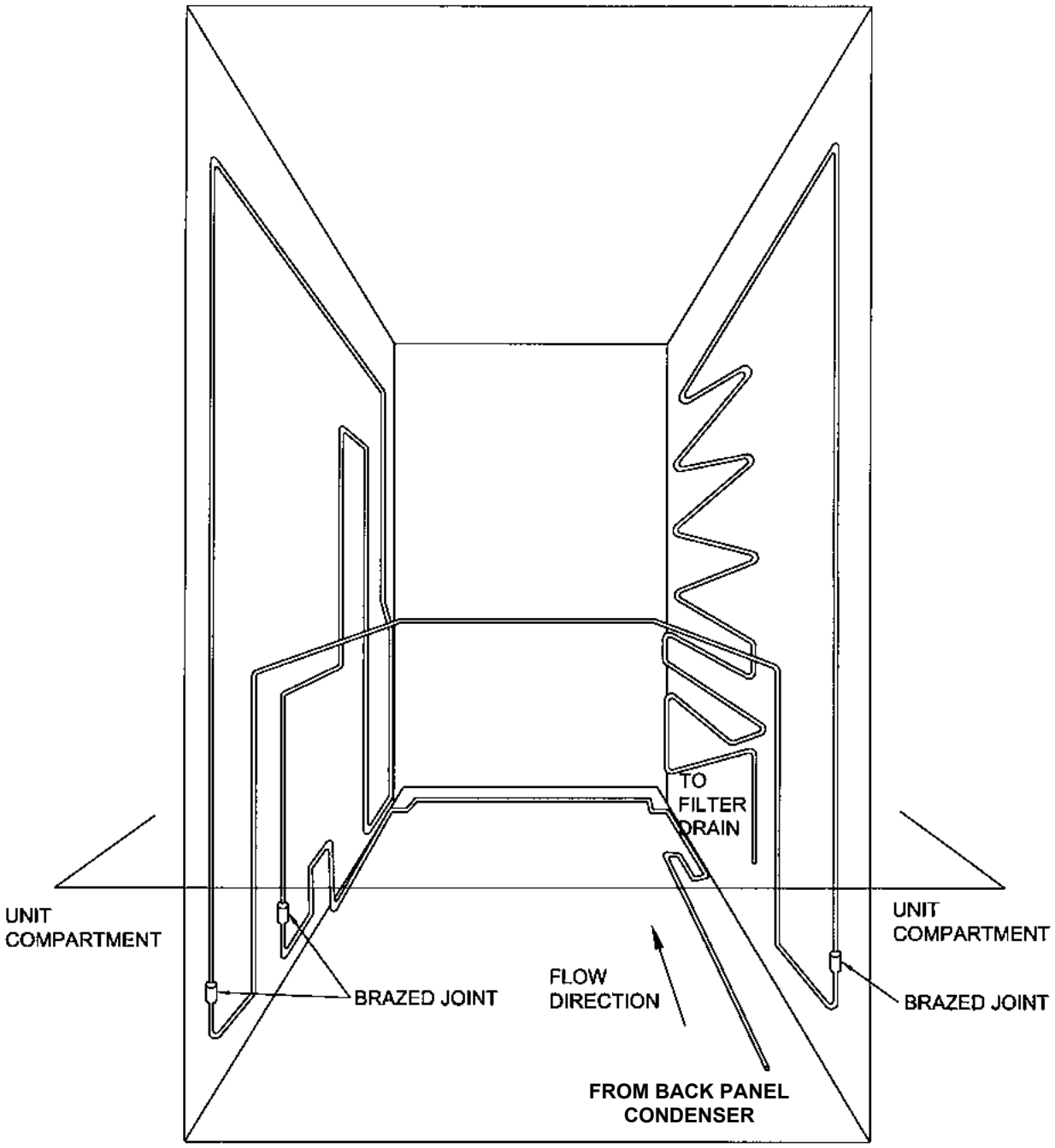
CONDENSER WITH TUBE CROSS RAIL



BACK PANEL CIRCUIT REMOVED FOR CLARITY
ALL BRAZED CONDENSER JOINTS ARE EXTERNAL IN UNIT COMPARTMENT
Diagram 5.4.2B

CONDENSER LAY OUT 680 / 790
"B" MODELS

CONDENSER WITH TUBE CROSS RAIL



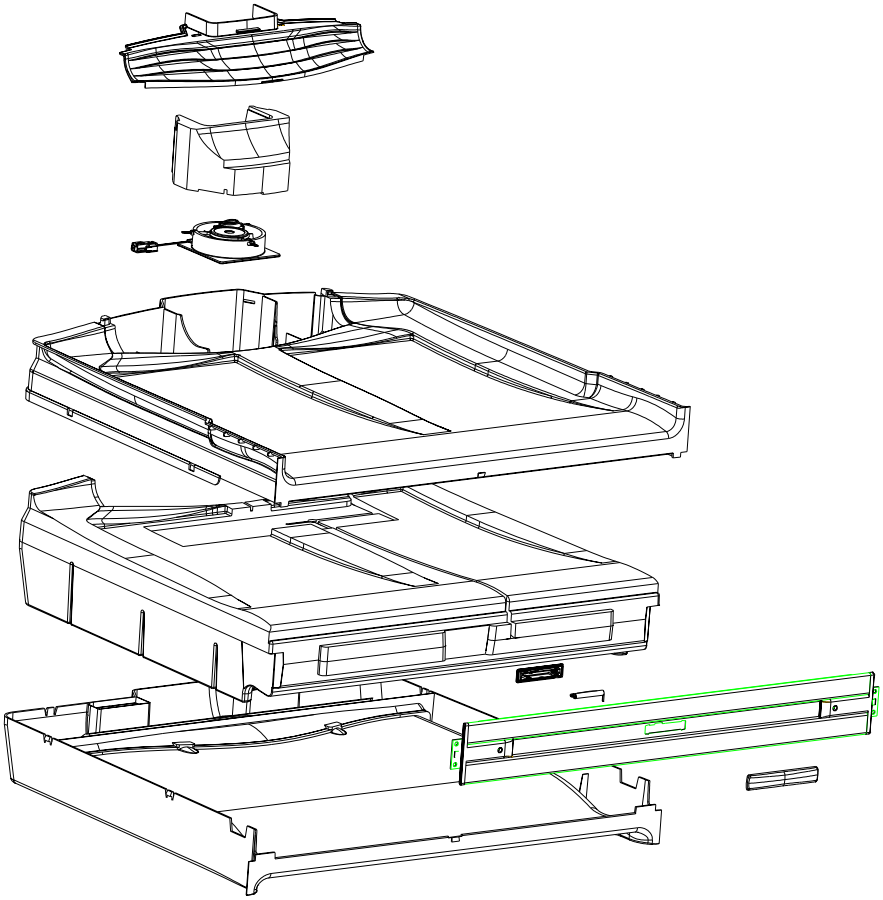
ALL BRAZED CONDENSER JOINTS ARE EXTERNAL IN UNIT COMPARTMENT
Diagram 5.4.2C

5.4.3 Cross Rail

The cross rail contains part of the condenser copper tubing (mullion heater) providing heat to the gasket area between the PC and FC compartments, preventing sweating of the gasket. Also mounted on the cross rail is the Reed Sensor, under the plastic cover in the centre.

5.4.4 Divider Partition

This is moulded in two outer pieces and has an inner polystyrene moulded duct assembly that is wax coated. This provides a barrier between the FC and PC compartments, also allowing return air from the PC to move back to the FC evaporator in 'T' models. In both models it houses the PC fan motor. The divider is fitted into the cabinet as an assembly and **cannot be replaced.**



"B" DIVIDER PARTITION

Diagram 5.4.4

6 ELECTRONICS SECTION

6.1 Overview Function Description

The electronic system consists of several parts:

Power/control module, display module, compressor, defrost heater, ambient heater, provision compartment fan, freezer compartment fan, light, temperature sensors and door sensors.

The purpose of the power/control module is to turn on the compressor, which cools the evaporator, then to use the fans to efficiently cool the compartments. Both fans turn on with the compressor. The freezer compartment (FC) fan is kept at a constant speed while the provision compartment (PC) fan is regulated to provide the balanced cooling for both compartments. The function of the microprocessor in the power/control module is to provide independence of both compartments to their set temperatures, although the environment of one compartment effects the other as they are linked by the ducts as can seen by the diagrams showing internal air flow of the cabinet (diagrams 5.1A and 5.1B).

6.1.1 Control & Peripheral Functions

The control system consists of the power/control module located in the unit compartment of the refrigerator, the slave display module located in the back of the refrigerator compartment and various sensors and actuators controlled by the power module. The function and brief description of each of these units is defined below.

6.1.2 Power/Control Module

This module is the electronic brain and control centre of the refrigerator. It contains a microprocessor, support circuitry and switching devices. The power/control module controls the Provision Compartment (PC) and Freezer Compartment (FC) temperatures by sensing the temperature and door state and operating the compressor and fans accordingly. This module also houses the alarm beeper.

The power/control module collects information on the refrigerator operation. Faults and diagnostic information is stored in its memory. They include the temperature setting, the history of FC and PC temperatures (approx 18 hours), defrost history (the last 12 defrosts) and fault history. This will help the service technician find and remedy the cause of failure. All this memory will be retained even when the fridge is disconnected from mains power supply.

The beeper is used to signal prolonged door opening and other fault conditions:

1. If the door is left open longer than 90 seconds, the alarm will sound. This will repeat every 30 seconds until the door is closed.
2. If the doors are left open longer than 5 minutes, the alarm will sound continuously and the PC light will turn off. The alarm will stop with the closing of the door.
3. All electronic faults, when detected, will sound the alarm and the L.E.D.'s on the display module will flash indicating the fault code. The pressing of any button will cancel the alarm but the fault code will remain until the cabinet has been serviced.

STAGE 4.2 POWER/CONTROL MODULE

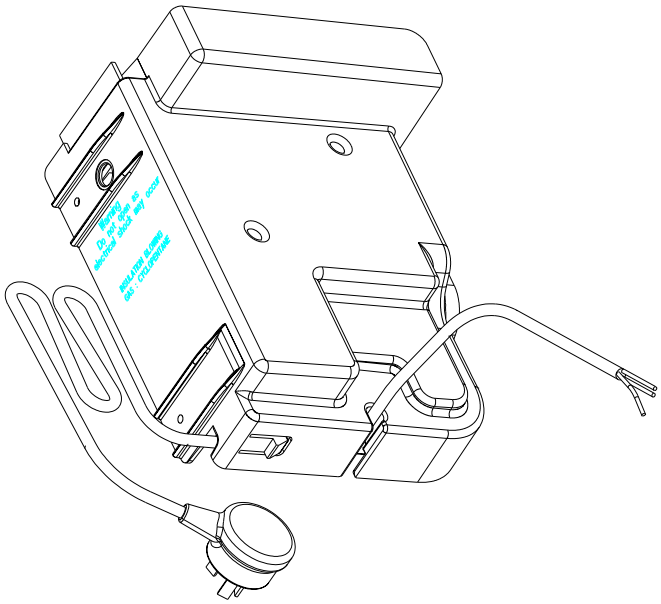


Diagram 6.1.2

6.1.3 Display Module

This module contains the user interface, and also the circuitry to drive the lamp. It is controlled via a 5-wire communications interface from the power/control module.

The user interface of push button switches and Light Emitting Diode (L.E.D.) display on the display module printed circuit board is used to input and display the required set temperatures for the refrigerator compartments.

The user interface is positioned at the rear of the provision compartment (PC). The interface automatically displays the current temperature setting for the PC compartment. This is shown as a series of L.E.D. lights on a thermometer symbol. To adjust the temperature of the PC, simply press the temperature up or down buttons to the appropriate setting.

Press the mode button on the left-hand side of the interface to select the FC compartment. The indicator light will flash for 8 seconds to show a new compartment has been selected. Press the up or down buttons to adjust the temperature as necessary.

Further presses of the mode button will toggle between the PC and FC compartments.

DISPLAY MODULE (Stage 4.2)

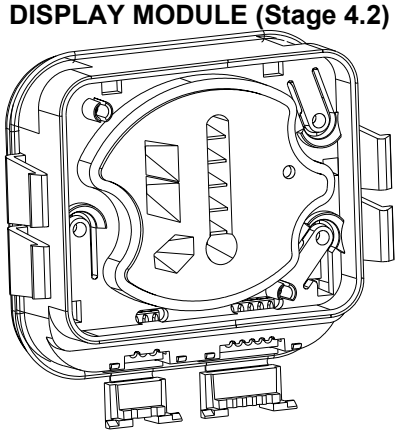


Diagram 6.1.3

6.1.4 Door Switches

“Reed” switches are used to detect the opening and closing of the doors. Two small magnets that are built into the PC and FC doors activate them. The reed switches are encapsulated within a plastic housing, which is clipped under the plastic covers on the base and cross rails.

6.1.5 Compressor

The compressor is turned on when cooling is required. It is switched by the power/control module sending a low voltage frequency signal to the inverter.

The refrigerator is fitted with a variable capacity compressor (VCC). This improves energy efficiency and maintains a more stable temperature in both the provision compartment and the freezer compartment. The compressor windings are wired in a 3 phase star formation with the resistance between any two pins being the same (6.4 ohms).

6.1.5.1 Variable Capacity Compressor Control Overview

The V4.2 power/control module on VCC product is identical to that on non-VCC product. The stage 4.2 power/control module senses if it is connected to a VCC compressor and uses the appropriate algorithm.

The compressor can operate at speeds between 1590 and 4500 rpm inclusive. On the Fisher & Paykel product we operate the compressor at a select number of different speeds between 1590 and 4500 rpm to reduce the variation in sound produced by the compressor. An electronic module/inverter connected between the power/control module and the compressor controls the speed. (Refer Photo 6.1.5.1) This it does by supplying a modulated DC 3 phase supply to the compressor. **Warning: Permanent damage will occur if the compressor is directly connected to the AC supply line.**

The power/control module monitors, amongst other things, the refrigerator compartment temperatures (via thermistors) and the defrost cycle, and from this information sends signals to the electronic module/inverter to determine compressor speeds.

Whenever the compressor starts, it is run at 2200 rpm for 2.5 seconds to establish lubrication, and is then run at 1590 rpm for a further 27 seconds before changing to any other higher speed as requested by the power/control module. This is to provide a softer start before the compressor potentially ramps up to some higher speed.

Whenever the fridge is plugged in/turned on, and/or after a defrost, in the first cooling cycle the control will run the compressor, after its initial start procedure, at its maximum speed, which is 4500 rpm. The compressor will stay at its maximum speed until both compartments have reached their cut-out temperature, at which point the compressor will switch off and the refrigerator goes into the warm-up cycle.

In the subsequent cooling cycles the algorithm will vary the compressor speed according to the amount of cooling required to achieve an average temperature in each compartment (as measured by the thermistors), equal to the compartment set temperatures with a 1 hour run-time.

In low ambients where the heat load and/or cabinet usage is low, the compressor will be likely to run at its minimum speed (1590rpm), and switch off more frequently than once every hour, similar to most non-VCC product.

When the compressor is running at slow speeds, the evaporator may not be fully flooded, but this is normal.

Photo 6.1.5.1

6.1.5.2 Built-in Electronic Protections (Within the Module/Inverter)

6.1.5.2.1 Compressor Start-up

In case any anomaly occurs during compressor starting, the control will wait 6 seconds before repeating the start-up. If the compressor doesn't start after 12 trials, the control will wait 8 minutes before repeating the start-up procedure (this condition may be when pressures are not equalised between suction and discharge sides in the refrigeration system, eg; after an interruption in the mains supply).

6.1.5.2.2 Overload Detection and Protection

The control can detect an overload condition by monitoring the current consumed by the compressor. If overload is detected the control reduces the current by reducing the speed of the compressor until the overload disappears, when the speed will return to the required value.
If the overload increases, the control will continue to decrease the current until the minimum speed of 1590 rpm may be reached, at which point the compressor may "stall", and the control will return to the start-up procedure.

6.1.5.2.3 Power Limitation (Temperature Protection)

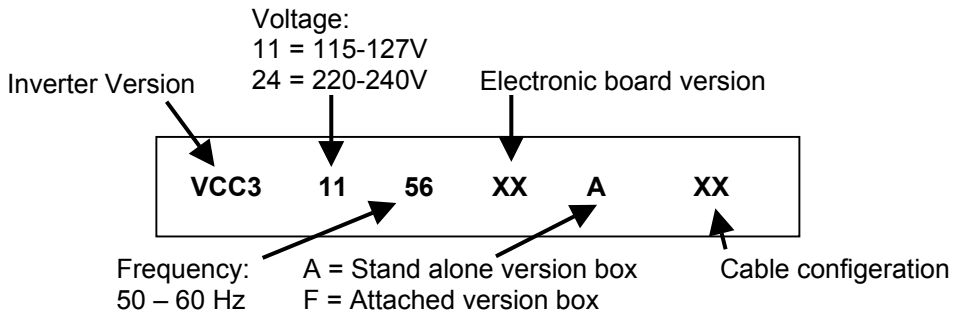
The control limits the power supplied to the compressor to 200 watts to keep all electrical components below a safe operating limit. The power is limited in the same way as the current in the overload protection.

6.1.5.2.4 Short Circuit Protection

In a case where a short circuit occurs, (eg; motor winding damage, connection faults etc), the same current limiting control is actuated to reduce further damage. In the case of a major failure, a fuse within the inverter will break the current supplied to the control. This fuse cannot be replaced in servicing.

6.1.5.3 VCC Module/Inverter Identification

The module/inverter has an identification label giving the following information:



6.1.5.4 Fault Finding

6.1.5.4.1 High Voltage Power Supply Circuit

Whenever power is supplied to the refrigerator, there should always be 110V mains voltage in the high voltage harness between the power/control module and the VCC module/inverter. This can be checked by removing the rear cover of the VCC module/inverter and testing with a multimeter. There should be 110V across the spade terminals above the edge connector at the top of the module (refer Photo 6.1.5.4). If this is not present, check the continuity of the harness from the power/control module. If there is continuity through the harness, replace the power/control module.

6.1.5.4.2 Signal Circuit

With a multimeter that can measure frequency, the signal circuit between the power/control module and the VCC module/inverter can be checked. Remove the rear cover of the VCC module/inverter and connect the multimeter across the two pins beside the signal harness edge connector. When the compressor is meant to be running, the frequency should be between 53Hz and 150Hz. At start up the frequency will be 75Hz for 2.5 seconds, then 53Hz for 27 seconds before changing to 150Hz. Multiplying the frequency of the signal circuit by 30 will give the compressor speed, so if the frequency is 53Hz the compressor speed will be 1590rpm, and if it is 150Hz the compressor speed will be 4500rpm.

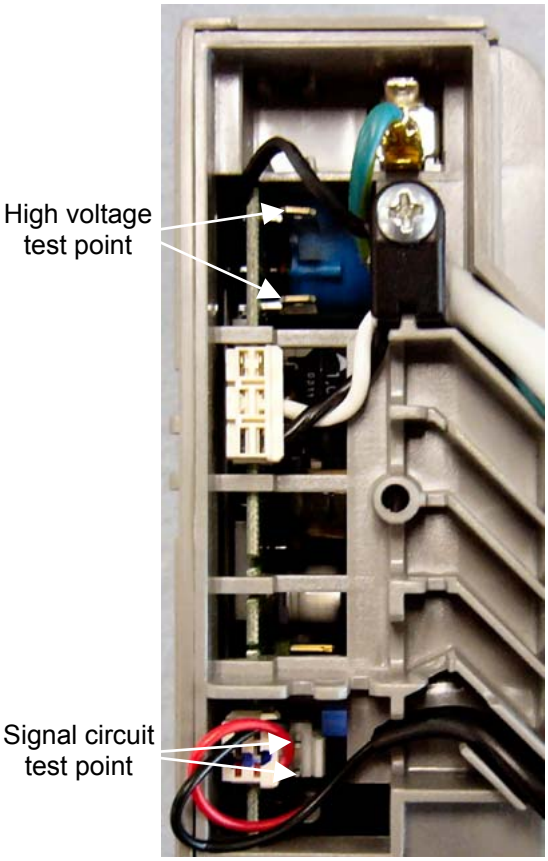


Photo 6.1.5.4

6.1.6 Defrost Heater

A heating element is used to defrost the ice accumulated on the evaporator. The defrosts are adaptive to the usage and environment and are controlled by the power/control module. During a defrost, the temperature above the evaporator is sensed by the defrost sensor located on the evaporator chassis. This sensor must register +8°C (46°F) before terminating the defrost heater element. Previous defrost history, the number of door openings, and the compressor percentage run time are used to determine the interval between defrosting. The typical time interval for defrosts is between 12 and 24 hours. However, it can be as short as 5 hours or as long as 96 hours depending on the usage and environment.

DEFROST ELEMENT

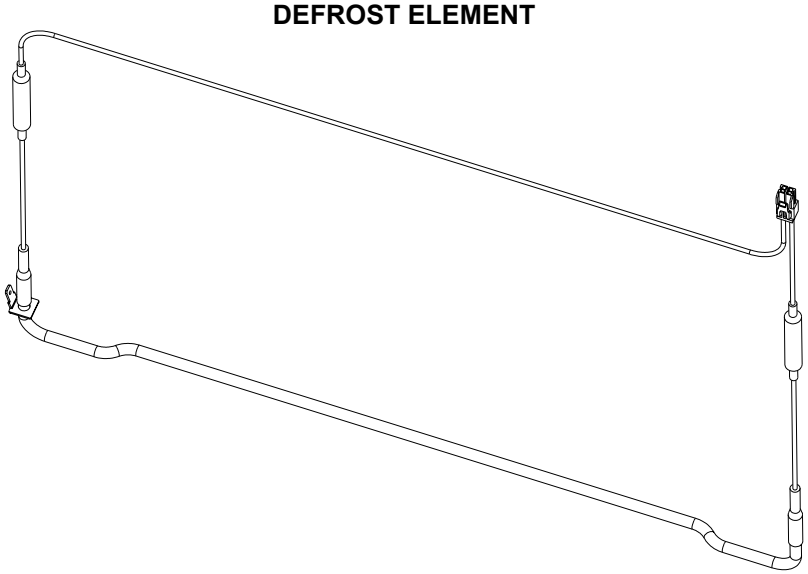


Diagram 6.1.6

6.1.7 Thermal Fuses

There are two thermal fuses mounted in the wiring harness of the defrost element, having a tripping temperature of 72^{0}C (161^{0}F). Once open circuit they can not be reset. Replacement is part of the element heater assembly.

These fuses in both leads of the element protect the refrigerator from any over heating through failure of the element itself or a triac failure in the power/control module. Both sides are protected in case phase and neutral are reversed.

NOTE: Care should be taken if manually defrosting the evaporator (i.e.. using heat guns), to ensure that the thermal fuses are not over heated.

6.1.8 Low Ambient Heater

In low ambient temperatures a 12 Volt, 7 Watt low power heater is used to keep the temperature in the provision compartment above freezing. The ambient heater is controlled by the power/control module which runs the heater at 58% duty cycle to give 4.1 watts of heat. This is achieved by the use of pulse width modulation (PWM). The heater is situated in the air duct of the "T" models and in the divider partition on "B" models. The purpose of the element is to warm the area if the ambient becomes too low. The element is on when the cabinet cycles off. The low ambient heater operates during both the compressor on and off cycles when the percentage of compressor run time averaged over the previous four cycles drops below 65%. It switches off when the percentage run time increases to above 70%. The heater will always be switched off during the defrost cycle and whenever the PC door is open. There may be less than 4 cycles in the calculation if a defrost has occurred or there were long cycle times.

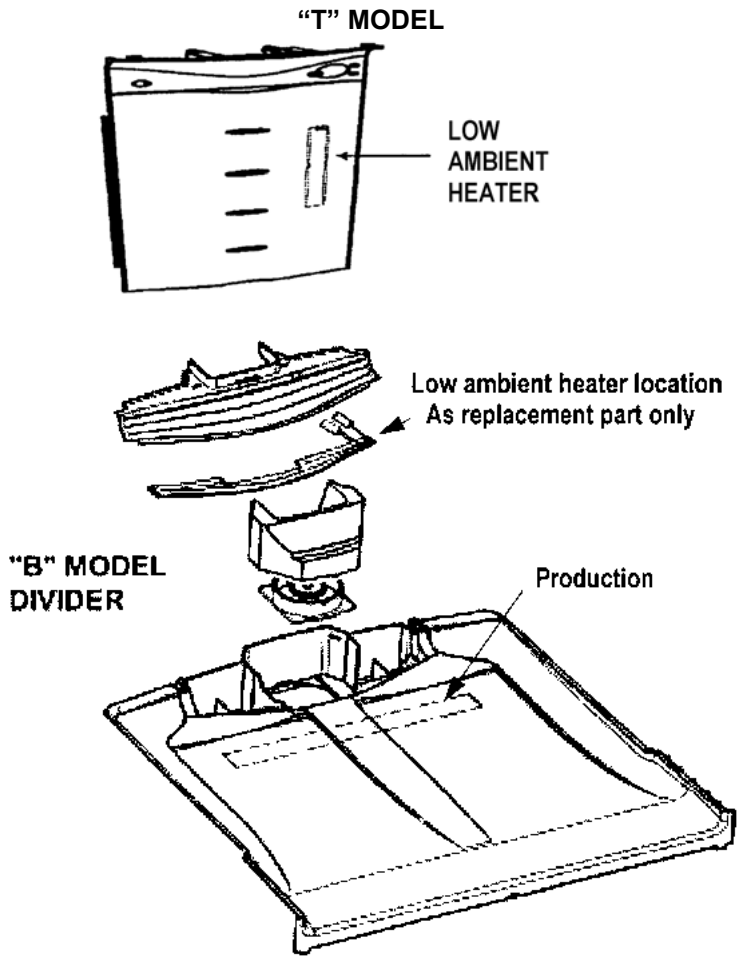


Diagram 6.1.8

6.1.9 PC / FC Fans

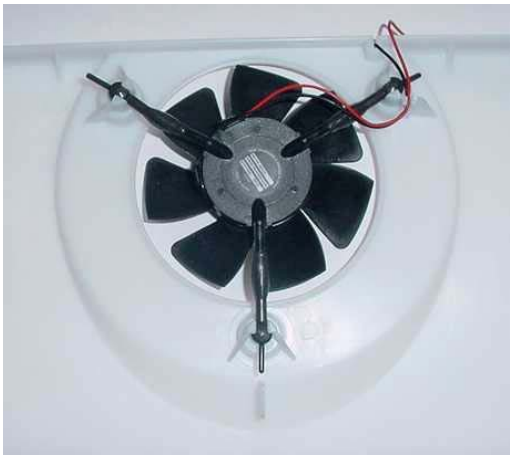
There are two 12 Volt DC electrically commutated motor (ECM) fans. They provide the required cooling power to both compartments. The motors are provided with from 18% to 100% voltage by using a pulse width modulating (PWM) technique. The power/control module controls the switching on and off of the compressor and the fans. The speed of the FC fan is set and the speed of the PC fan is regulated by altering the voltage supplied to it.

The FC fan will always runs at a constant speed.

The PC fan speed can be adjusted to meet the requirement of that compartment. Therefore the PC fan speed will be set at the average speed used from the previous cycles under normal door openings and loading conditions. During the off cycle of the compressor the PC fan will run at a very low speed to prevent air transfer in the ducts between the two compartments.

When the compressor is turned on, the fans will also be switched on, except immediately following a defrost cycle where there is a delay of 30 seconds after the compressor has started before the fans switch on.

FC FAN (Viewed from front)



PC FAN (Viewed from FC side)

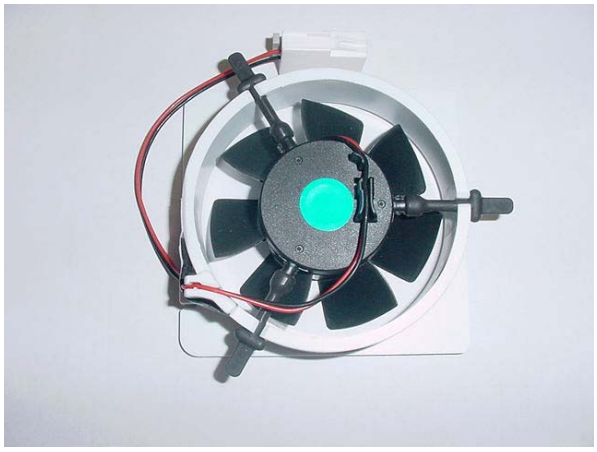


Diagram 6.1.9

6.1.10 Light

A 12 volt, 10 watt halogen lamp is used in the PC. To prevent overheating, the lamp is turned off after 5 minutes of the door being left open. The power/control module controls this.

LIGHT FITTING, LAMP AND COVER

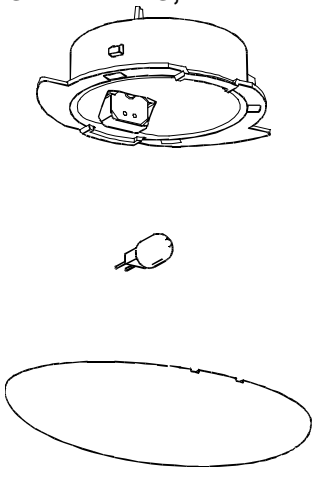


Diagram 6.1.10

NOTE: It is important that the lamp pins are tight in the lamp socket.

6.1.11 Thermistor Temperature Sensors

These sensors are used to monitor temperatures within the refrigerator. There are 3 of them:

1. Defrost sensor mounted on the evaporator chassis above the evaporator, used to measure the temperature when in defrost. (Colour Black)
2. FC sensor mounted on the FC fan cover, used to measure the temperature in the FC. (Colour White)
3. PC sensor mounted in the PC on the duct cover and used to sense the PC temperature. (Colour White)

Thermistor sensors are used for temperature measurement, therefore once the temperature of the refrigerator has reached its set temperature, the power/control module will turn the compressor off.

Their electrical resistance changes as the temperature changes. The table below lists some typical resistance values. The temperature can be read using Diagnostic Mode as described in the next section.

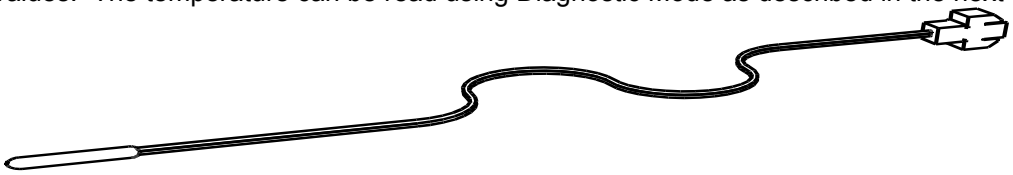


Diagram 6.1.11

THERMISTOR SENSOR RESISTANCE TABLE

TEMPERATURE (°C/°F)	RESISTANCE (K Ohms ±5%)
-30 / -22	25.17
-25 / -13	19.43
-20 / -4	15.13
-15 / 5	11.88
-10 / 14	9.392
-5 / 23	7.481
0 / 32	6.000
5 / 41	4.844
10 / 50	3.935
15 / 59	3.217
20 / 68	2.644
25 / 77	2.186
30 / 86	1.817
35 / 95	1.518
40 / 104	1.274
45 / 113	1.075
50 / 122	0.9106

6.2 Fault Finding Procedure

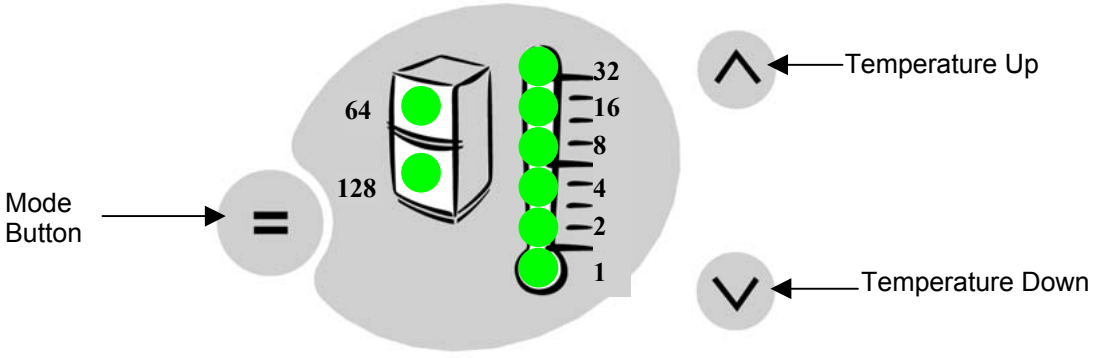
6.2.1 Fault Code Display Status

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.(s) When any control button is pressed, the audio alarm is turned off although the display will continue to be "flashed" instead of the normal "back-lit" display.

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.

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:



To determine the value of the displayed fault code, add up the values of the L.E.D.s that are flashing (ignore the flashing red L.E.D.). 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/control module failed its self-test.
Primary Action: Replace power/control module.

Display Code: 2
Reason: The previous 2 defrosts were aborted after 30 minutes.
Primary Action: Check defrost heater assembly in the FC. If faulty, replace.
Secondary Action: Check power module is supplying 230V to heater during defrost. If not, replace power module.

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: Re-terminate 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: Re-terminate 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

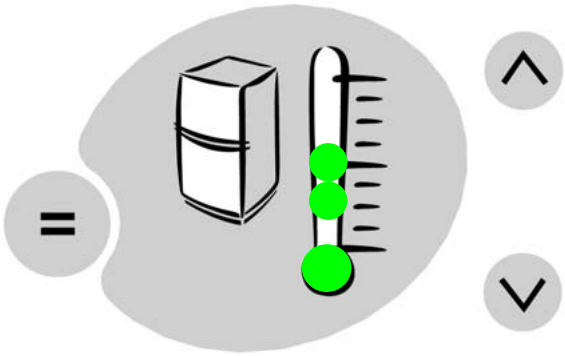
Reason: The PC fan is drawing more current than expected. Either the wiring is shorted or the fan is faulty.
Primary Action: Check PC fan wiring and connections at both fan and power module.
Secondary Action: Check fan. If faulty, replace.

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.



Example Fault Code: 8 + 4 + 1 = 13
13 = Low Ambient Heater Open Circuit

6.2.2 Diagnostic Mode

To enter the diagnostic mode, Press and hold the **MODE** button, then press the **TEMPERATURE UP** button.

The L.E.D.s indicate the PC sensor temperature. The current PC sensor temperature is displayed in a code form (refer Section 6.2.3 Sensor Temperature Conversion).

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.

Press the up button.

1 time = FC sensor temperature. The current FC sensor temperature is displayed in a code form (refer Section 6.2.3 Sensor Temperature Conversion).

2 times = Defrost sensor temperature. The current defrost sensor temperature is displayed in a code form (refer Section 6.2.3 Sensor Temperature Conversion).

3 times = Inputs/outputs status (refer Section 6.2.4 Input/Output Status).

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.

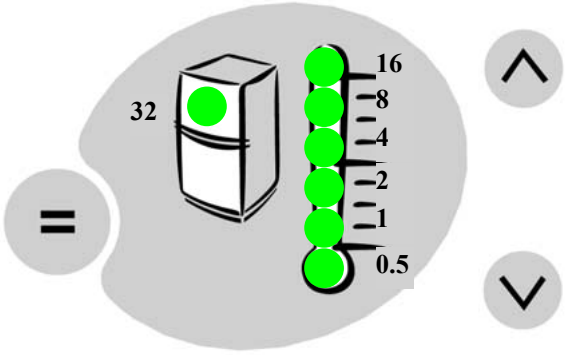
6.2.3 Sensor Temperature Conversion

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

1. Enter the diagnostic mode (refer Section 6.2.2 – Diagnostic Mode) and scroll to the appropriate sensor temperature.

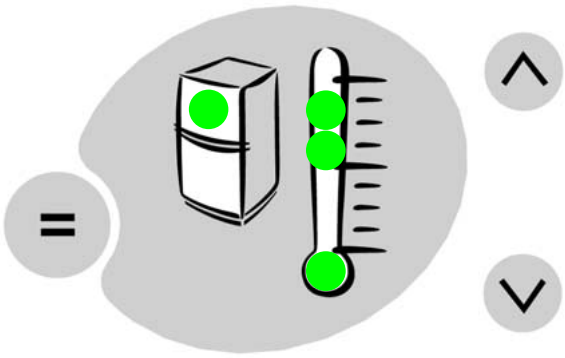
2. Add up the binary number indicated by the L.E.D. light pattern (refer figure below).

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



Example:

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



0.5 + 4 + 8 + 32 = 44.5
Subtract **40** from the result
44.5 - 40 = 4.5°C

Hence the temperature is **4.5°C**

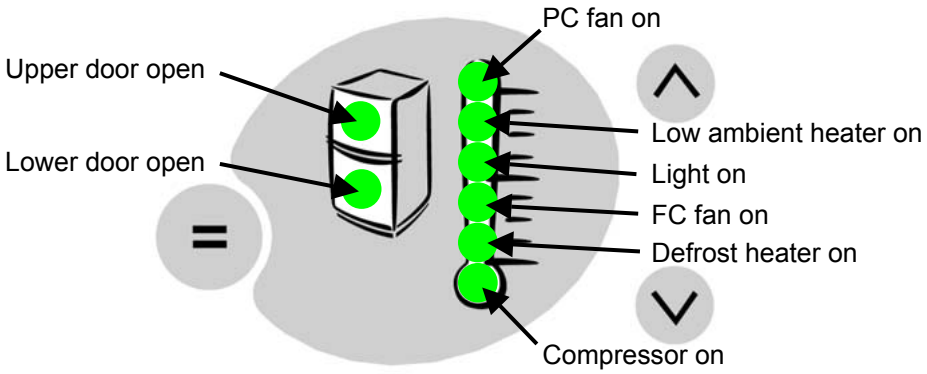
6.2.4 Input/Output Status

The Input/Output Status menu displays what devices (e.g. light, PC door, FC door, compressor, etc) are currently running or turned on.

To enter the menu, the steps are:

1a. Press and hold the **MODE** button (a short beep will sound).
1b. Whilst still holding the **MODE** button, briefly press the **TEMPERATURE UP** button (a short beep will sound); this enters diagnostic mode.
- Steps 1a and 1b need to be completed within 8 seconds.

2. Press the **TEMPERATURE UP** button 3 times.
- The respective L.E.D. turns on when a device is running, as shown below.



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

6.2.5 Data Download

To retrieve information from the control module, one of the following is required:

- A Light Pen (part number 425930) and a Cassiopeia Smart Tool.
- A Light Pen (part number 425930) and a laptop computer with the Fisher & Paykel Smart Tool diagnostic program loaded.

The steps to download data are:

1a. Press and hold the **MODE** button (a short beep will sound).
1b. Whilst still holding the **MODE** button, briefly press the **TEMPERATURE UP** button (a short beep will sound); this enters diagnostic mode.
- Steps 1a and 1b need to be completed within 8 seconds.

2. Press the **TEMPERATURE DOWN** button once; this enters data download mode.
- A red L.E.D. turns on and should be visible on the display.

3. Place the Light Pen over the top of the red L.E.D. until downloading is complete.

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

If additional help or information is required, please refer to the instructions provided with the Smart Tool, or ask your Technical Representative.

6.2.6 Manual Defrost

To manually force a defrost, the steps are:

1a. Press and hold the **MODE** button (a short beep will sound).
1b. Whilst still holding the **MODE** button, briefly press the **TEMPERATURE DOWN** button (a long beep will sound).
- Steps **1a** and **1b** need to be completed within 8 seconds.

2. To check if the fridge is in defrost mode, repeat step 1a & 1b.
- If a long beep sounds, then the defrost cycle has started.

3. To exit manual defrost mode, turn the refrigerator off at the power supply, and then while pressing the **MODE** button, switch the refrigerator on again at the power supply. If this is not done, the refrigerator will automatically exit from the manual defrost mode when the defrost is completed.

NOTE: The defrost cycle will not **start** if the defrost sensor is above +8°C (46°F).

The defrost cycle follows a predefined sequence:

- There is a delay of 2 minutes before the element starts to heat (commonly known as evaporator warm up time).
- The defrost element will remain on until the defrost sensor has reached +8°C (46°F), or until 30 minutes has elapsed if the defrost sensor does not reach +8°C (46°F).
- The compressor will remain off for a further 4 minutes (commonly known as drip time).
- The compressor will restart and a further 30 seconds later both fans will restart.

6.2.7 Show Room Mode

Go into diagnostic mode (press **MODE** and **TEMPERATURE UP** buttons together) then hold the **TEMPERATURE UP** button only for 3 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 L.E.D. display will go through an attention grabbing sequence unless buttons are pressed, at which time the display will respond as normal. 8 seconds after the last button press the display sequence will continue. The mode may be exited by switching off the appliance at the power supply.

6.2.8 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 interior lights and the alarm.

To enter this mode the customer is required to push and hold the compartment select **MODE** button on the display board for 10 seconds.

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

- The interior light will not turn on when the PC door is opened.
- There will be no set temperature lights (L.E.D.s) 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 compartment select **MODE** button for 10 seconds.

Note: When in the special option mode the Active Smart will operate as normal without the above being used. In normal operation, the set temperature L.E.D.s and interior light will be seen when the PC door is opened.

6.3 Door Gasket - (Integral)

The door gasket is able to be replaced as a separate part.

All replacement doors are supplied minus the door gasket. The door gasket is a replaceable part of the door. It is held in place against the door liner by means of a moulding which locks the gasket in place once pushed into it. There are no screws or retainers to remove or fit.

To Remove the Gasket
Pull on any section of the gasket to pull it away from the moulding.

To Replace the Gasket
Having removed the old gasket, lay the new gasket around the door gasket moulding. First fit all corners, then push the remaining gasket into place around the door.

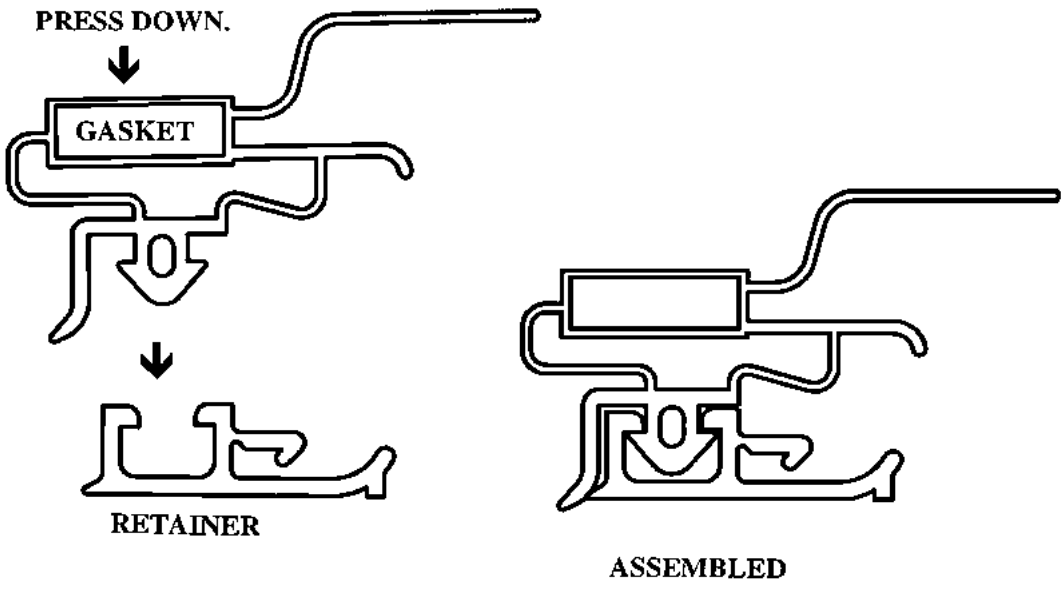


Diagram 6.3

7 REMOVING AND REFITTING OF COMPONENTS

7.1 Removal Of Power/Control Module

Located in the unit compartment on the right hand side and held in place by 2 self-tapping screws.

1. Unplug the refrigerator from the power supply.
2. Remove both mounting screws and earth screw (on the green / yellow earth wire) on the compressor mounting tray.
3. Pull the power/control module outwards to disengage the mounting lugs at the back of the module.
4. Remove all connectors along the top edge of the power/control module.
5. Remove the defrost connector (brown wires) and the VCC high voltage supply connector which is connected to the terminals marked “H Rail” on the side of the power/control module.
6. Refit in reverse order.

Note: It is important that the power/control module is clipped securely to the side of the unit compartment and the copper earth spring clip is not damaged as this maintains good earthing and provides a low inductance path to the chassis for RF voltage. Check that the flat pins at the back of the module are properly engaged with the lugs on the unit compartment when refitting.

Initialisation Of The Power/Control Module After Installation

The power/control module needs to know whether it is fitted into a “B” or “T” model upon installation because it performs different functions when either the PC or FC doors are opened. To do this, we need to “initialise” the power/control module.

To initialise the power/control module, the service technician must have the FC door closed and the PC door open, then press any of the buttons on the user interface in the PC. The power/control module then knows that the reed switch that is open circuit is controlled by the PC door, and the one that is closed circuit is controlled by the FC door.

If the power/control module is not initialised, as may be the situation for a new service module, the lights will not turn on and the fans will run with the door open. If the operator presses a button with both doors opened, the illegal *raspberry* audible feedback will sound, indicating that the module is unable to be initialised.

7.2 PC Sensor Replacement

1. Unplug the refrigerator from the power supply.
2. Remove all PC shelving.
3. Remove bottom PC air duct cover.
4. Remove polystyrene duct cover insulation.
5. Disconnect low ambient heater - “T” model only.
6. Remove 1 screw from top duct cover and unclip - “T” model only.
7. Remove PC sensor from its location.
8. Replacement of the new sensor is done by cutting the wiring back from the sensor end, and soldering in a new sensor, making sure both connecting wires are not shorting but are insulated with heat shrink sleeving.
9. Refit in reverse order.

7.3 FC Sensor Replacement

1. Unplug the refrigerator from the power supply.
2. Prise out the fan shroud using a flat blade screwdriver at the bottom of the grill cover.
3. Remove the FC fan motor plug connection.
4. Unclip the FC sensor and remove the evaporator coil cover.
5. Replacement of the new sensor is done by cutting the wiring back from the sensor end and soldering in a new sensor, making sure both connecting wires are not shorting but are insulated with heat shrink sleeving.
6. Refit in reverse order.

7.4 PC Fan Motor - “T” Model

1. Unplug the refrigerator from the power supply.
2. Remove all PC shelving.
3. Remove bottom PC air duct cover.
4. Remove polystyrene duct cover insulation.
5. Disconnect low ambient heater.
6. Remove 1 screw from top duct cover and unclip.
7. Unplug PC fan motor plug.
8. Withdraw downwards.
9. Refit in reverse order.

Note: When refitting the PC fan motor, the back of the fan motor faces downwards. Ensure there is a loop in the wiring harness between the fan motor and its housing.

7.5 PC Fan Motor - “B” Models

1. Unplug the refrigerator from the power supply.
2. Remove all PC shelving.
3. Remove the duct grill in the PC.
4. Remove the PC duct cover and polystyrene insulation.
5. Using 2 fingers, withdraw the fan motor upwards. It is mounted horizontally in the divider partition.
6. With the motor out, this will expose a small multi plug and socket connection to the fan motor and wiring harness. Unplug.
7. To refit back together, fit the wiring harness multi plug first into the pocket of the divider partition.
8. Using your 2 fingers, slip the motor back into the divider partition to fit horizontally. **Note:** The back of the fan motor faces upwards.
9. Refit duct covers and test.

The PC fan is supported by a rubber band type suspension. It is important that the fan sits central to the housing and that there is a loop in the fan motor wiring harness between the motor and the housing. This loop should be on a horizontal plane to the fan motor. This also applies to the FC suspended fan.

7.6 Cross / Base Rail Door Reed Switches

1. Unplug the refrigerator from the power supply.
2. Remove the door switch cover (located in the center of the cross and base rails).
3. Unclip the encapsulated reed switch from the housing.
4. Replacement of the new switch is done by cutting the wiring back from the switch end and soldering in a new switch, making sure both connecting wires are not shorting but are insulated with heat shrink sleeving. Take care not to leave too much excess wire as the reed switch must be able to be fitted back in to the housing.
5. Refit in reverse order.

7.7 Defrost Heating Element

1. Unplug the refrigerator from the power supply.
2. Remove the fan grill cover. This unclips with the aid of a small screwdriver.
3. Unplug the fan motor and unclip the evaporator sensor.
4. Remove the evaporator cover.
5. Lift the evaporator upwards to clear the bottom of the divider partition and pull the bottom edge of the evaporator forward.
6. Remove the cable ties from the thermal fuses.
7. Bend the first half of the evaporator clips and side deflectors away from the front bank of the evaporator on both sides.
8. Drop the element down and out of the evaporator bank.
9. Refit in reverse order.

7.8 Removal Of Display Module

1. Unplug the refrigerator from the power supply.
2. Remove all PC shelving.
3. Remove bottom PC air duct cover.
4. Remove polystyrene duct cover insulation.
5. Disconnect low ambient heater – “T” model only.
6. Remove 1 screw from top duct cover and unclip – “T” model only.
7. Compress clips on display module and release it from the top duct cover.
8. Unplug the 5 and 3 way edge connectors from the display module.
9. Refit in reverse order.

7.9 Thermal Fuse

This is part of the element assembly and is to be replaced as part of the defrost heater element assembly. Having a tripping temperature of 72^{o}C (162^{o}F), they are not resettable.

7.10 Replacement Of Interior Lamp

1. Unplug the refrigerator from the power supply.
2. Remove the lens cover with the aid of a small flat bladed screwdriver.
3. Remove the faulty lamp.
4. With the protective wrapper still covering the new lamp, fit it into the holder.
5. Cut the wrapper from the lamp. **Avoid handling of the new lamp as this will shorten the life of the new lamp.**
6. Refit the lens cover and test.

NB: Only a 12 volt 10 watt halogen lamp should be fitted. It is important that the lamp terminal is tight in the lamp socket.

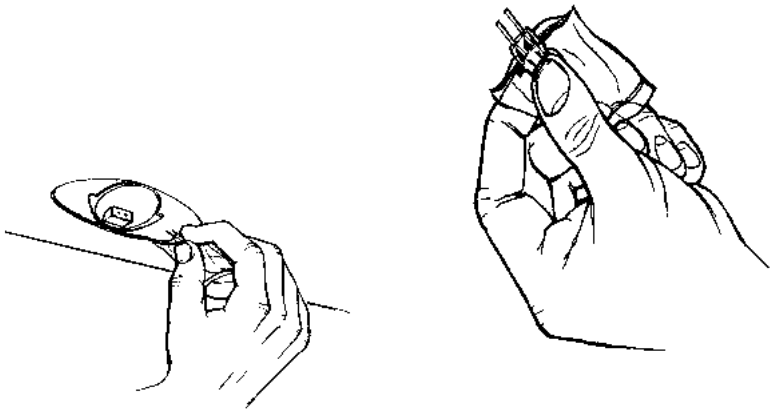


Diagram 7.10

7.11 Replacement Of Low Ambient Heater - “T” Model

1. Unplug the refrigerator from the power supply.
2. Remove all PC shelving.
3. Remove bottom PC air duct cover.
4. Remove polystyrene duct cover insulation.
5. Disconnect low ambient heater.
6. Refit in reverse order.

7.12 Replacement Of Low Ambient Heater - "B" Model

This element is mounted in the floor of the divider and is not replaceable. If it should be found to be open circuit, a replacement low ambient heater can be fitted to the return air grill.

7.13 Replacement Of Low Ambient Heater - "B" Model (In Return Air Grill)

This element is mounted in the return grill of the divider. It is of the blanket wire type on an aluminium tape stuck to the grill itself.

1. Unplug the refrigerator from the power supply.
2. Remove all the PC shelving and crisper bins.
3. Remove the PC duct cover.
4. Remove the PC air return grill and unplug the element from the harness.
5. Peel off the old element and replace with the new.
6. Refit in reverse order.

7.14 Evaporator Replacement

The evaporator is located in the FC compartment mounted on the back wall on its own carrier, with a grill covering a fan motor which is housed in the front cover.

Having determined that the evaporator needs replacing:

1. Unplug the refrigerator from the power supply.
2. Recover the refrigerant.
3. Remove the FC door.
4. Remove the evaporator coil cover.
5. Clean both suction and capillary pipes with emery cloth.
6. With the tube cutter, cut the suction pipe as close as possible to the induction brazed joint (cutting the suction capillary side of the joint).
7. With a file or knife cut the capillary where it enters the transition joint on the evaporator.
8. With the element wiring disconnected, the evaporator can be removed.
9. Take the replacement evaporator and fit it to the carrier, fitting the defrost element assembly and the 2 heat shrink sleeving onto the pipes.
10. Align the evaporator and joints ready to be soldered into position.
11. Lay the product on its back.
12. Place a protective covering over the back of the liner to protect it should solder drop onto it while the joint connections are being made.
13. Having fitted the suction and capillary lines together with a protective heat shrink sleeving placed on the pipe first away from the heated area, heat the "J" type soldering iron to temperature with the oxy-acetylene or LPG. This should be cleaned and tinned prior to the soldering operation.
14. Hook the iron over the joint area and allow the pipework to heat while applying the solder. Once the joint appears to have a full puddle of solder around the joint area, remove the iron and allow the joint to cool.
15. The same applies for the capillary, applying more heat to the transition joint as it is heavier in material than the capillary.
16. Pressure test both joints.
17. Fit heat shrink sleeving over the joint and heat, having placed damp rags around the area of the ABS liner as heating the heat shrink can cause the liner to be overheated. It is also important to keep the thermal fuse in the element circuit away from the heat gun, as heat from the heat gun can cause the thermal fuse to go open circuit.

Note: The solder used to solder these FC joints is a special solder containing 5% antimony and 95% tin and is supplied with the evaporator kit. Also, the solder contains a special flux as a resin core in itself. No other type of solder should ever be used.

7.15 Removal Of The FC Evaporator Cover

Fan cover Removal Tool (T models only)
The following illustration shows a tool that can be made in your workshop. This tool can be used to release and remove the freezer compartment fan cover in the Active Smart "T" model refrigerators. If preferred, the tool can be made from a screwdriver with a shaft length of approximately 200mm (7 to 8 inches) long and 4.5 mm (¼ inch) diameter.

B models are removed by grasping the bottom of the evaporator cover and pulling up and forward.

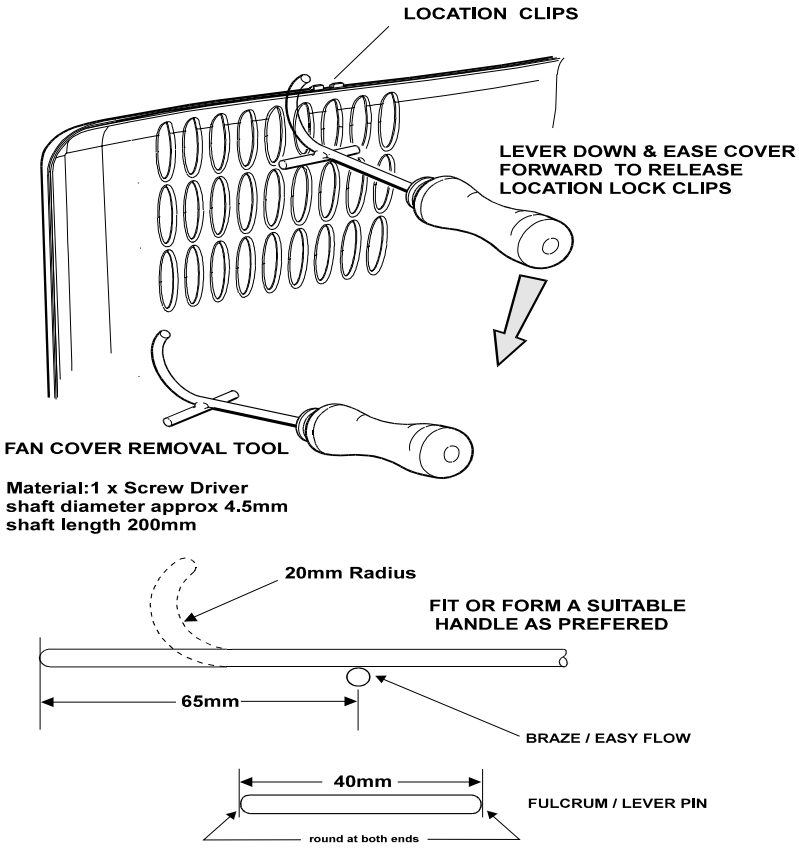


Diagram 7.15

7.16 Pressure Testing Of The Refrigeration System

The use of the in-line pressure gauge can speed up and eliminate the incorrect diagnosis of a leak within a refrigeration system. In some cases it has been found to be the service manifold that was being used that was leaking and not the system. There are very few parts on the in-line pressure gauge that can leak.

Rule one:
In pressure testing any cabinet, before disconnecting any joint please be 100% sure that it is not the joint that is at fault, otherwise a lot of time can be lost looking for a joint/leak that doesn't exist.

Rule two:

Only use dry nitrogen to pressure test a system, **NOT REFRIGERANT OR COMPRESSED AIR. NEVER OXYGEN**

Rule three:
Don't over pressurise the system. It could be dangerous.

How to use the In-line Pressure Gauge
Step 1:
Cut and connect the pipe circuit to be tested to the in-line pressure gauge and braze this joint.

Step 2:
At the other end of the pipe circuit being tested, crimp off the pipe with crimp off pliers and braze this end off to totally seal the circuit.

Step 3:
Connect a nitrogen bottle to the in-line pressure gauge by means of a hose with a Schrader valve-depressing key in the hose coupling.

Step 4:
Open the nitrogen bottle fully with the regulator backed off.

Step 5:
Increase the regulator pressure in the circuit being tested to **150 psi.**

Step 6:
Close nitrogen bottle valve, back off pressure regulator.

Step 7:
Disconnect the hose coupling to the Schrader valve fitting.

Step 8:
Seal the Schrader valve with its sealing cap.

Step 9:
Use a bit of masking tape to mark the face of the pressure gauge at the set pressure. Record date and time also.

Step 10:
Check all exposed brazed joints with soap bubbles including the joints on the in-line pressure gauge.

Step 11:
Allow pipe circuit under test to sit on drop off test. This could take a number of days for a result.

NOTE: In some cases a leak may not be found by pressurising the circuit whereas a vacuum pulled on the same circuit will find it. Keep this in mind as oil within the circuit can block a hole.

In some cases, if the brazed joint is warmed while under pressure, this can thin the oil and help to expose the leak. A heat gun or hair drier is useful.

7.17 Transporting Of Refrigerators

It is preferable to transport the refrigerator in an upright position.

It is recommended that:
If a cabinet is to be transported lying down, then the cabinet should be placed on the right-hand side when standing facing the front of the refrigerator. If looking at the back of the refrigerator when it is laid down in this manner, you will see the power cord entering the cabinet at the bottom and the discharge and suction pipes on the compressor uppermost. (Refer diagram).

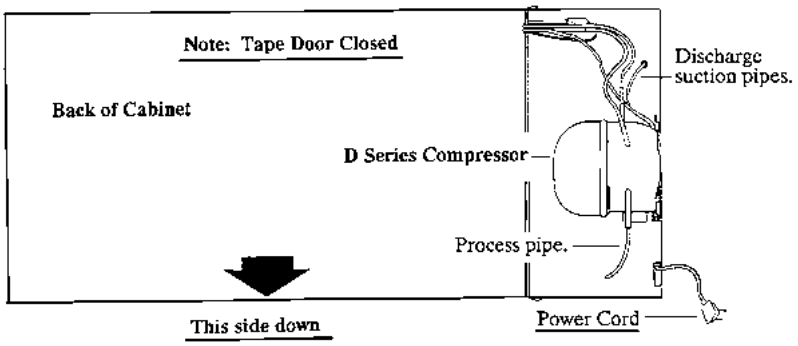


Diagram 7.17A

Note: We mark all our refrigerator and freezer cartons with a number of stars on one side of the carton. If the product is to be laid on its side for transporting at any time, the side of the carton with stars on should face upwards (see diagram). If transporting a cabinet that has been used, be sure to empty the water evaporator tray prior to laying the cabinet down as water from the water evaporator tray can enter the electronic power module which is attached to the side of the unit compartment.

Ideally, the product should be transported standing upright.

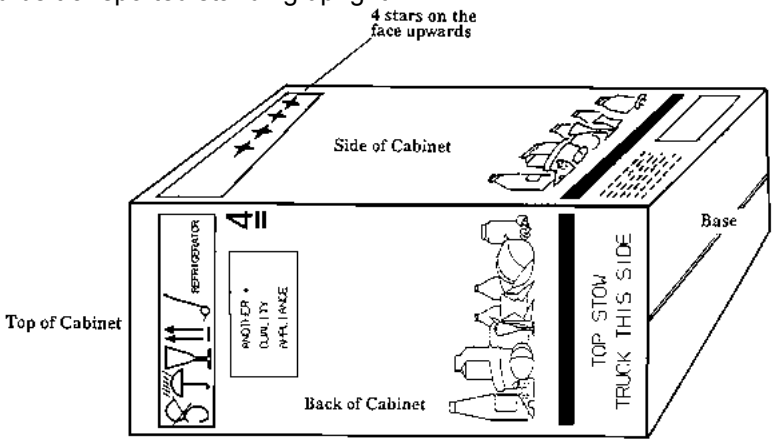
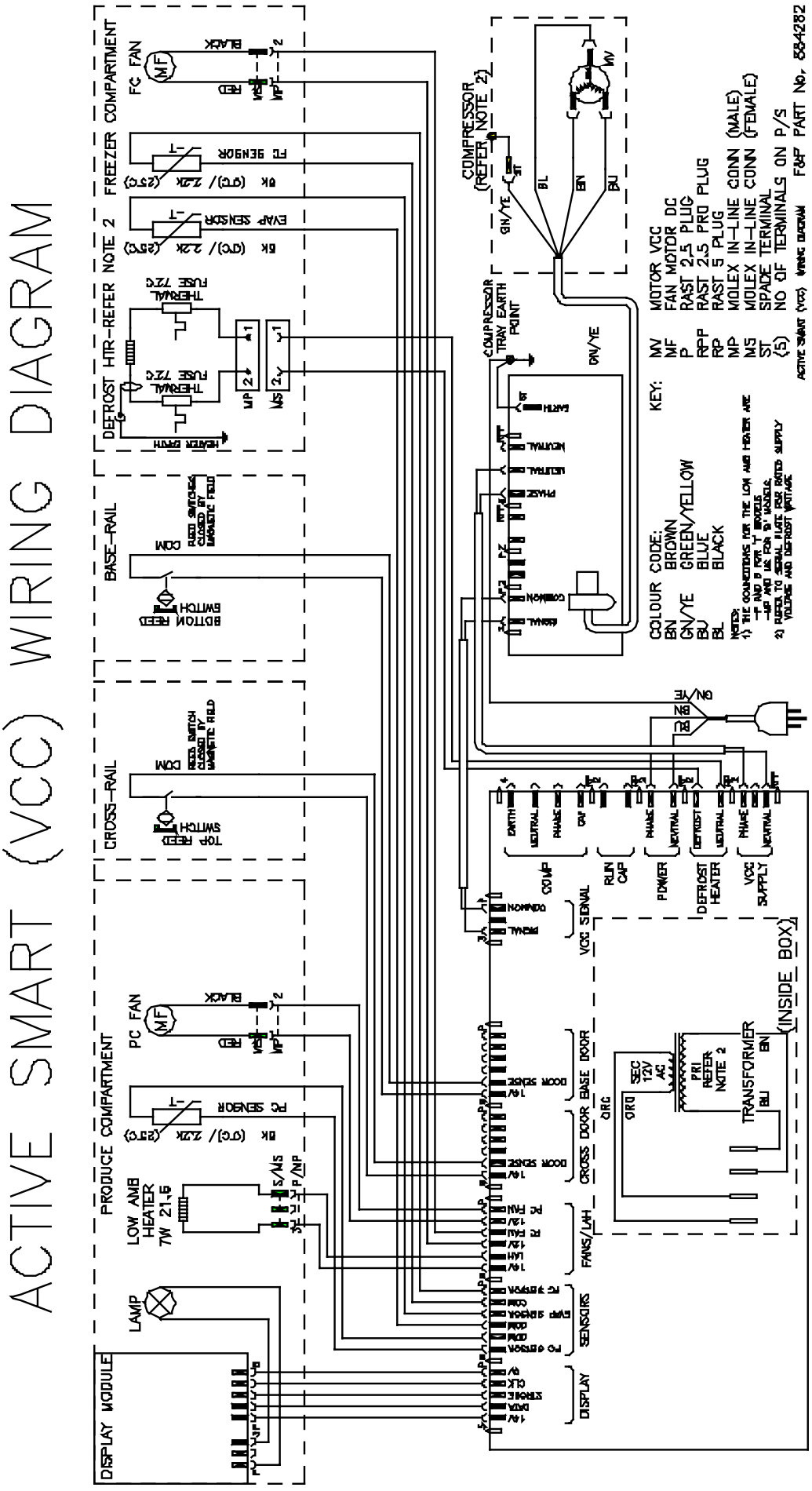


Diagram 7.17B

8 WIRING DIAGRAM



9 SERVICE REFERENCE

9.1 "B" Models

PC TOO COLD			
Cold Crispers	* Ambient heater open circuit (alarm will sound and fault code will be displayed)	-	Check continuity of element using multimeter.
Ice In Crispers	* 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	-	Ensure tip of sensor not against duct
Bottom of Compartment Cold – Top Warm	* PC fan not going (alarm will sound and fault code will be displayed)	-	Check for mechanical obstruction
		-	Check power to plug
		-	Check polarity
		-	Check for broken wires
		-	Replace fan
Total Compartment Too Cold	* FC fan not going (alarm will sound and fault code will be displayed)	-	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			
Top of Compartment Warm – Bottom Cold	* PC fan not going (alarm will sound and fault code will be displayed)	-	Check power to plug
		-	Check polarity
		-	Check for broken wires
		-	Check fan is not jammed with ice or anything else
		-	Replace fan
	* 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 iced up	-	Check defrost element, check continuity
		-	Check door seal / door left open
	* No refrigeration	-	Does cabinet run? If not 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 (alarm will sound and fault code will be displayed)	-	Is there a 12Volt supply, PC light working
		-	If yes check fan connection(s) at fan end, also at power module end of the harness
		-	If no check for power/control module failure.
	* Power/control module failure	-	Are lamp / interface L.E.D.'s working?
		-	If not check display module connection
		-	If OK is compressor running
		-	If not replace power module
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 fan (alarm will sound and fault code will be displayed)	-	Check PC cooling, fan running

FC TOO WARM Total Compartment Warm	* Iced up evaporator	- Check defrost element is working (alarm will sound and fault code will be displayed if faulty), 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.
	* 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.
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/control module voltage outputs. Check compressor and ancillaries. - Check reed switches are working OK by entering the Input/Output mode (refer to Section 6.2.4) and placing a magnet over the reed switch
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 display for any fault code - Check defrost element continuity - Put cabinet into manual defrost, wait for defrost relay to "click" on (2 ½ minutes after pressing buttons) - If no "click", check power/control module - If "click" heard, check the defrost heater 110v output at the power/control module
	* Sensors (alarm will sound and fault code will be displayed)	- Check console for fault codes 0-5 - Sensors above or below limit, refer thermistor service table in service manual
	* Door switch fault	- Check that no fault code is shown on the display - Check that PC/FC doors activate reed switches - Check also reed switches with magnet - Check wiring harness to power/control module
FAULT DISPLAYED, NO ALARM	* Display flashing fault code, but no alarm sounding	- Alarm has been switched off by user - Piezo alarm faulty, replace power/control module
LIGHT NOT FUNCTIONING		
	* Blown bulb	- Check power supply to socket 7Volts, if nil check plug at display module - Check continuity of bulb, if nil replace
	* Cabinet type	- Power / console module not initialised, close FC door and press compartment select button
	* Poor connection	- Spread halogen bulb legs - Check lamp holder, replace where possible - Check connector on display module
CONSOLE NO L.E.D. LIGHTS	* Power/control module no power	- Check harness and plugs on 5 way display module harness at both ends - Initiate cabinet
	* Power/control module not initialized	- Initialize power/control module, close FC door and push any button on display module - If raspberry noise still made, check door switches

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 IN COMPARTMENT	* Doors sealing	-	Check gaskets are sealing, adjust gaskets
		-	Check fans are operating
REFRIGERATION NOISE	* Popping, farting	-	Evacuate and recharge with ISCEON 49
	* Gurgling, whistling	-	Check alignment of capillary and apply sound dampening tape

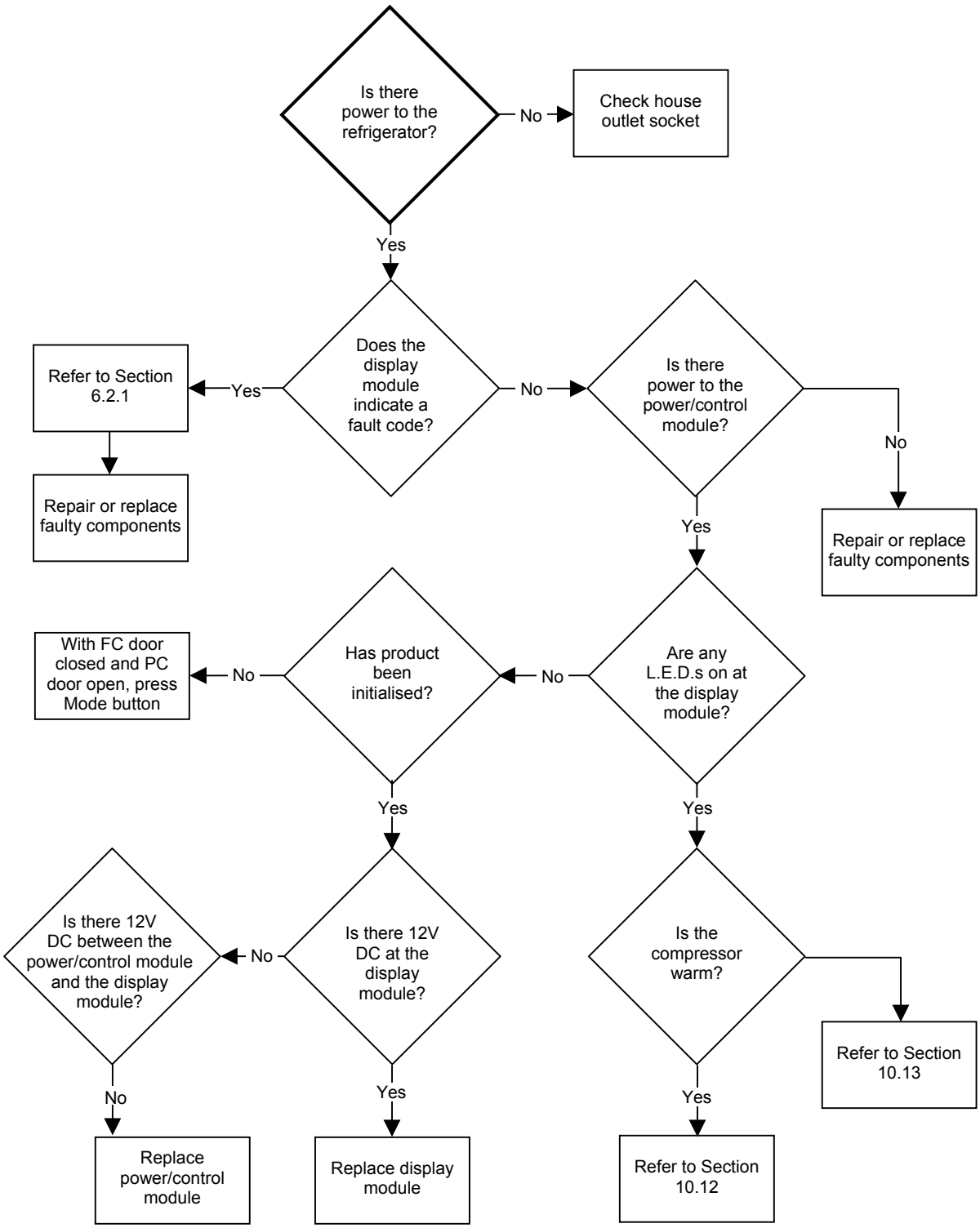
9.2 "T" Models

PC TOO COLD	* FC fan not going (alarm will sound and fault code will be displayed)	- 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	* Evaporator iced 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 (alarm will sound and fault code will be displayed)	- Is there a 12Volt supply, PC light working - If yes, check fan connection(s) at fan end, also at power/control module end of the harness - If no, check for power/control module failure
	* Power/control module failure	- Are lamp / interface L.E.D.'s working - If not check display module connection - If OK is compressor running ? - If not replace power/control module
	* PC delivery duct blocked	- De-ice area behind chassis -
FC 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 fanr	- Check PC cooling, fan running
FC 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
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/control module voltage outputs - Check compressor and ancillaries
FC COOLING - PC WARMING	* Iced up evaporator	- Check defrost circuit continuity - Doors sealing, adjust - Is PC fan is running? (alarm will sound and fault code will be displayed if faulty). If not, refer PC too warm

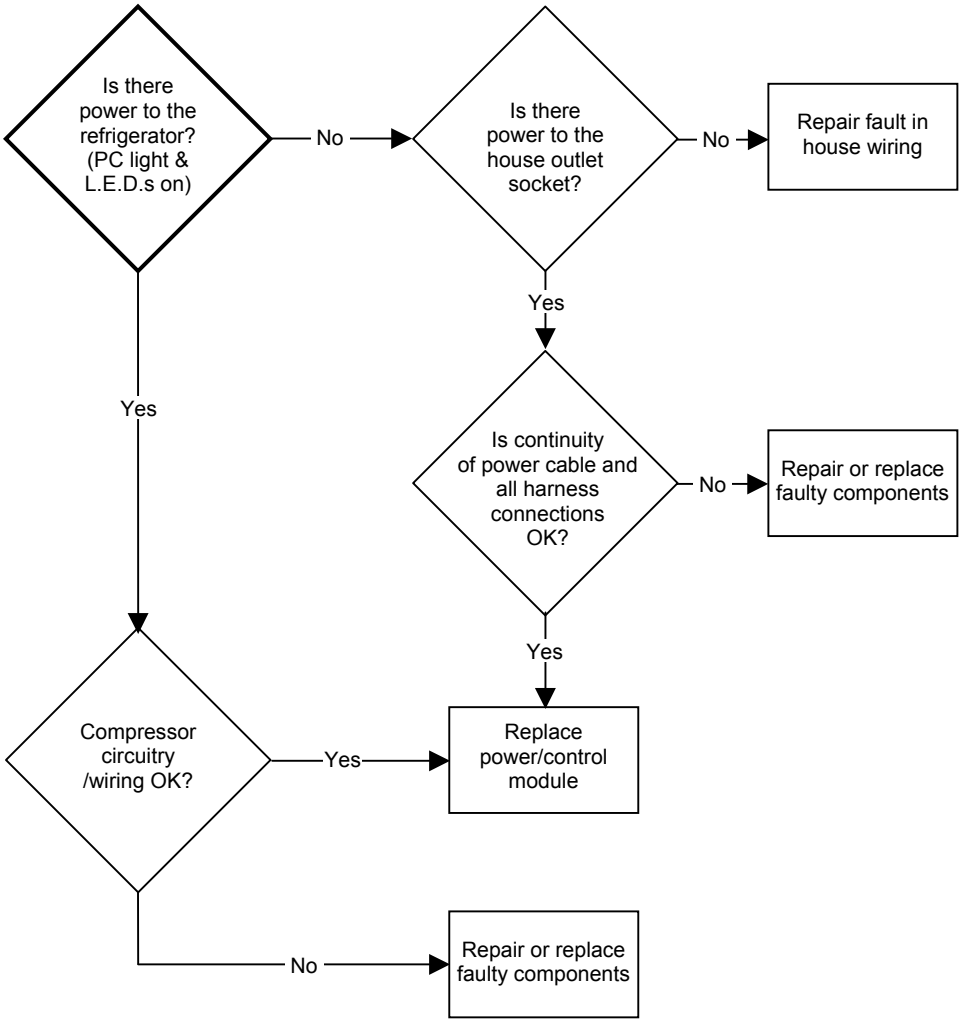
ALARM ON	* Defrost heater	-	Check display for any fault code - Check defrost element continuity - Put cabinet into manual defrost, wait for defrost relay to "click" on (2 ½ minutes after pressing buttons) - If no "click", check power/control module - If "click" heard, check the defrost heater 110v output at the power/control module
	* Sensors	-	Check display for fault codes 0-5 - Sensors above or below limit, refer thermistor service table in service manual
	* Door switch fault	-	Check that no fault code is shown on the display - Check that PC / FC doors activate reed switches - Check also reed switches with magnet - Check wiring harness to power/control module - Check wiring harness to console board
FAULT DISPLAYED, NO ALARM	* Display flashing fault code, 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 7Volts, if nil check plug at display module - Check continuity of bulb, nil replace
	* Cabinet type	-	Power/control module not initialised, close FC door and press compartment select button
	* Poor connection	-	Spread halogen bulb legs - Check lamp holder, replace where possible - Check connector on display module
CONSOLE - NO L.E.D. LIGHTS	* Power/control module no power	-	Check harness and plugs on 5 way display module harness at both ends - Initialize cabinet
RASPBERRY NOISE	* Power/control module not initialized	-	Initialise power/control module, close FC door and push any button on display module - If raspberry noise still made, check door switches
NOISY FAN PC	* Wires touching	-	Tuck wires away from fan blade
	* Faulty fan	-	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 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 IN COMPARTMENT	* Doors sealing	-	Check gaskets sealing, adjust gaskets - Check fans are operating
REFRIGERATION NOISE	* Popping, farting	-	Evacuate recharge with ISCEON 49, check alignment of capillary
	* Gurgling, whistling	-	Check alignment of capillary and apply sound dampening tape

10 FLOW DIAGRAMS

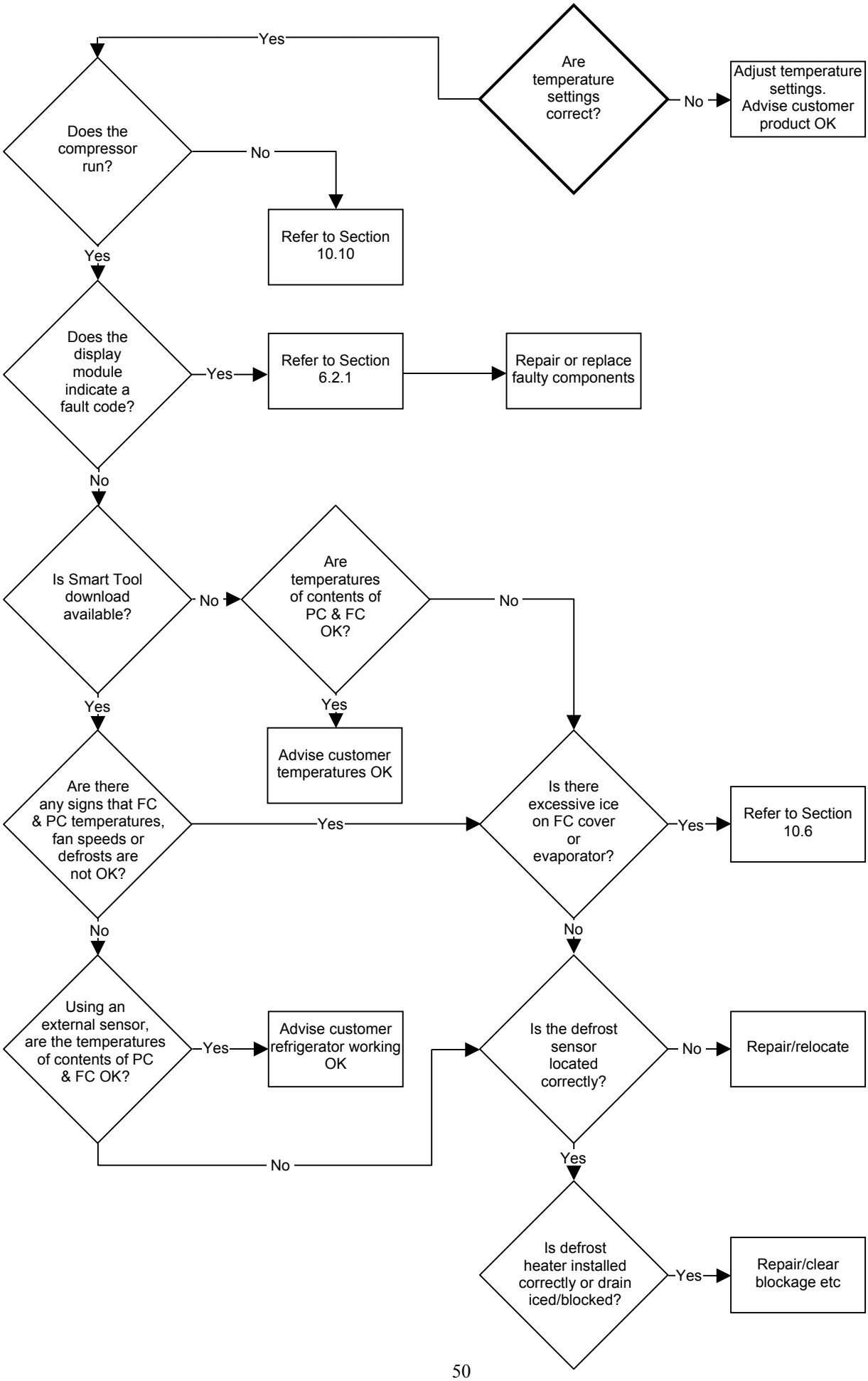
10.1 Refrigerator Not Operating



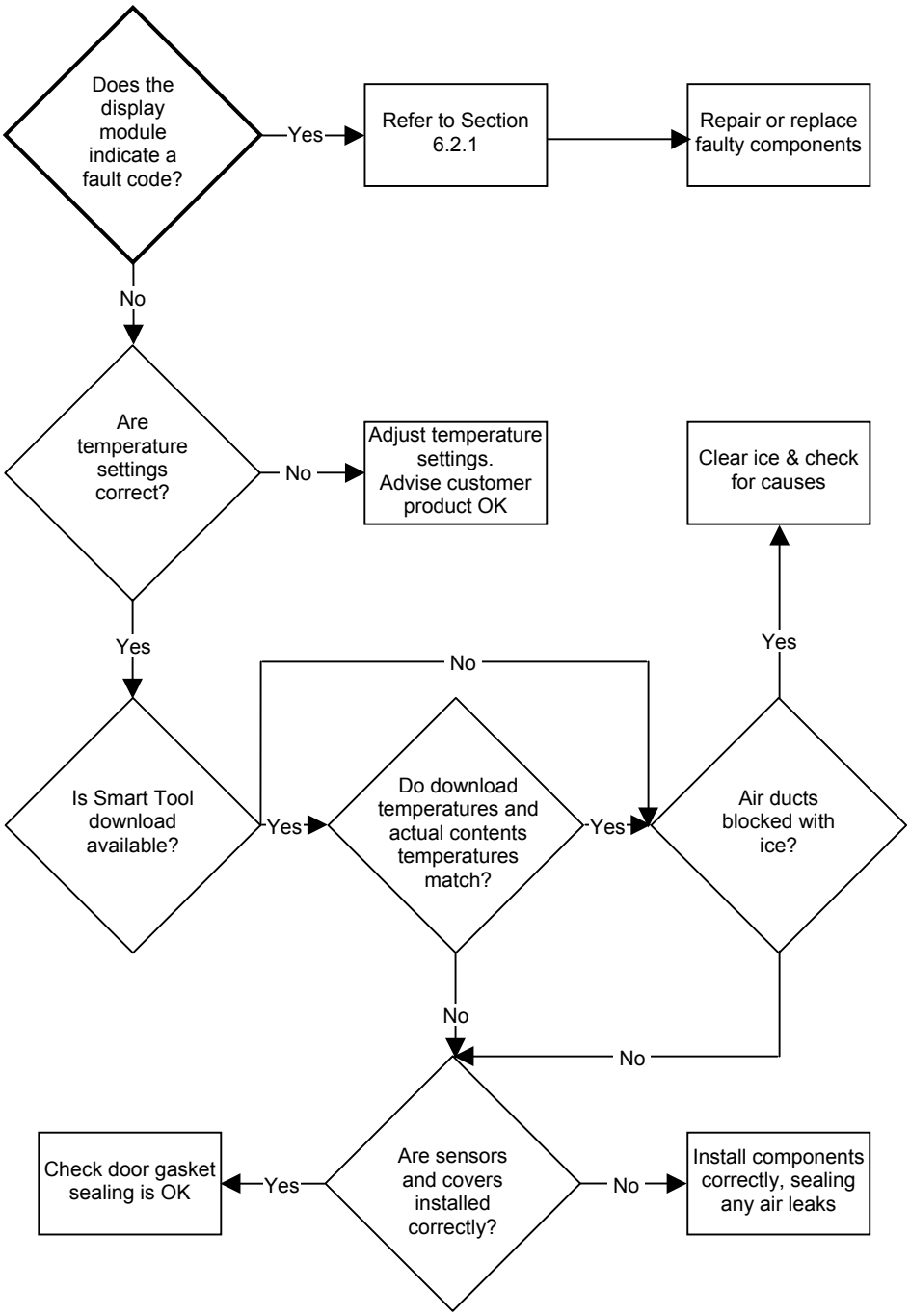
10.2 No Power To Power/Control Module And/Or Display Module



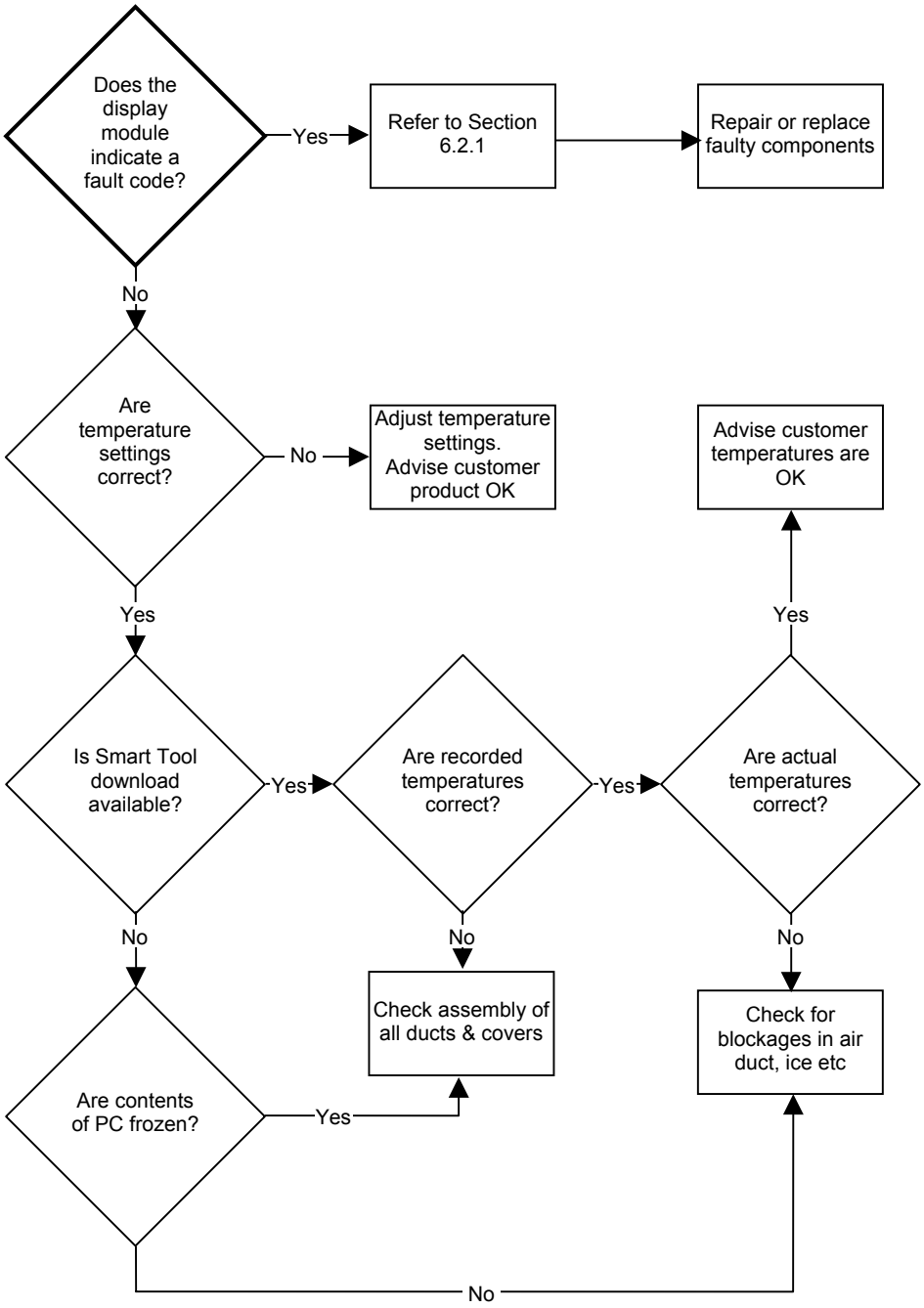
10.3 PC/FC Warm



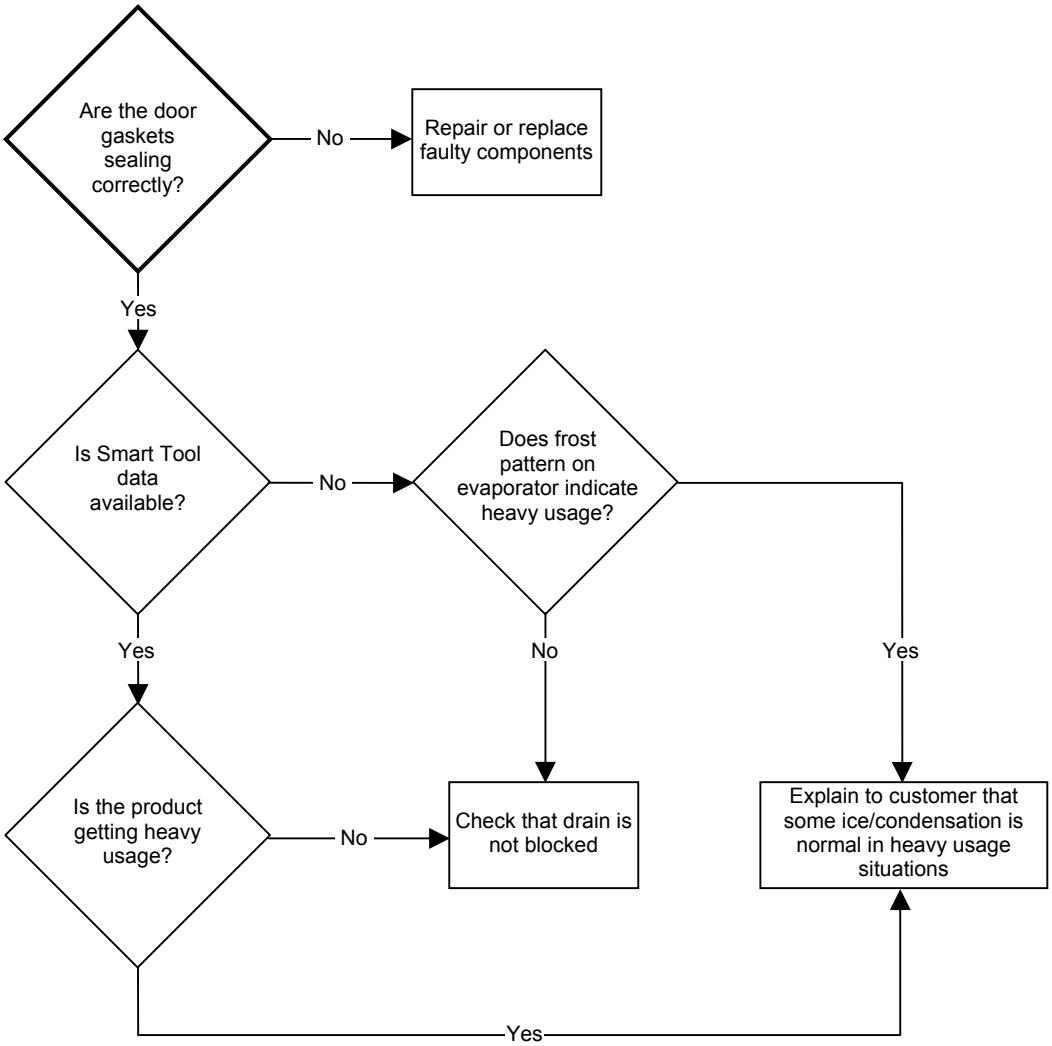
10.4 FC Too Cold – PC Too Warm



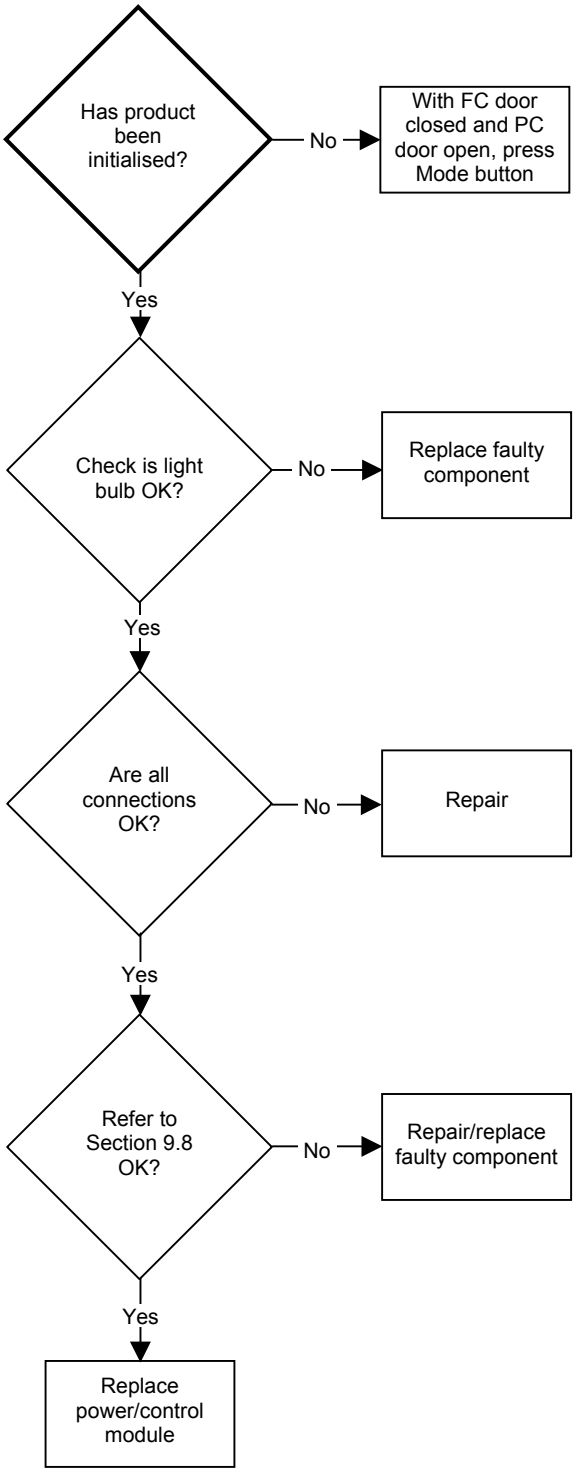
10.5 PC Too Cold



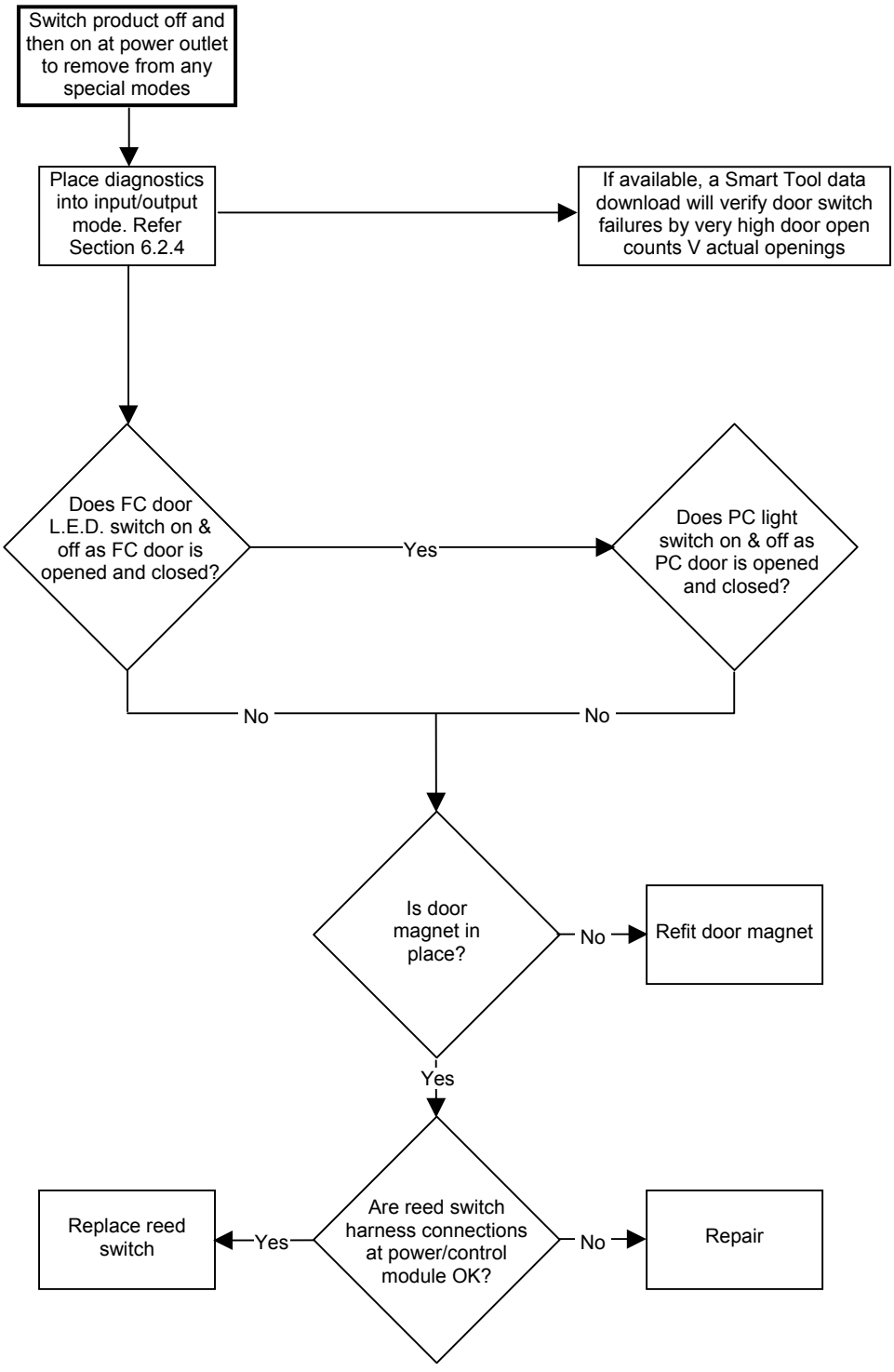
10.6 Ice/Condensation Forming



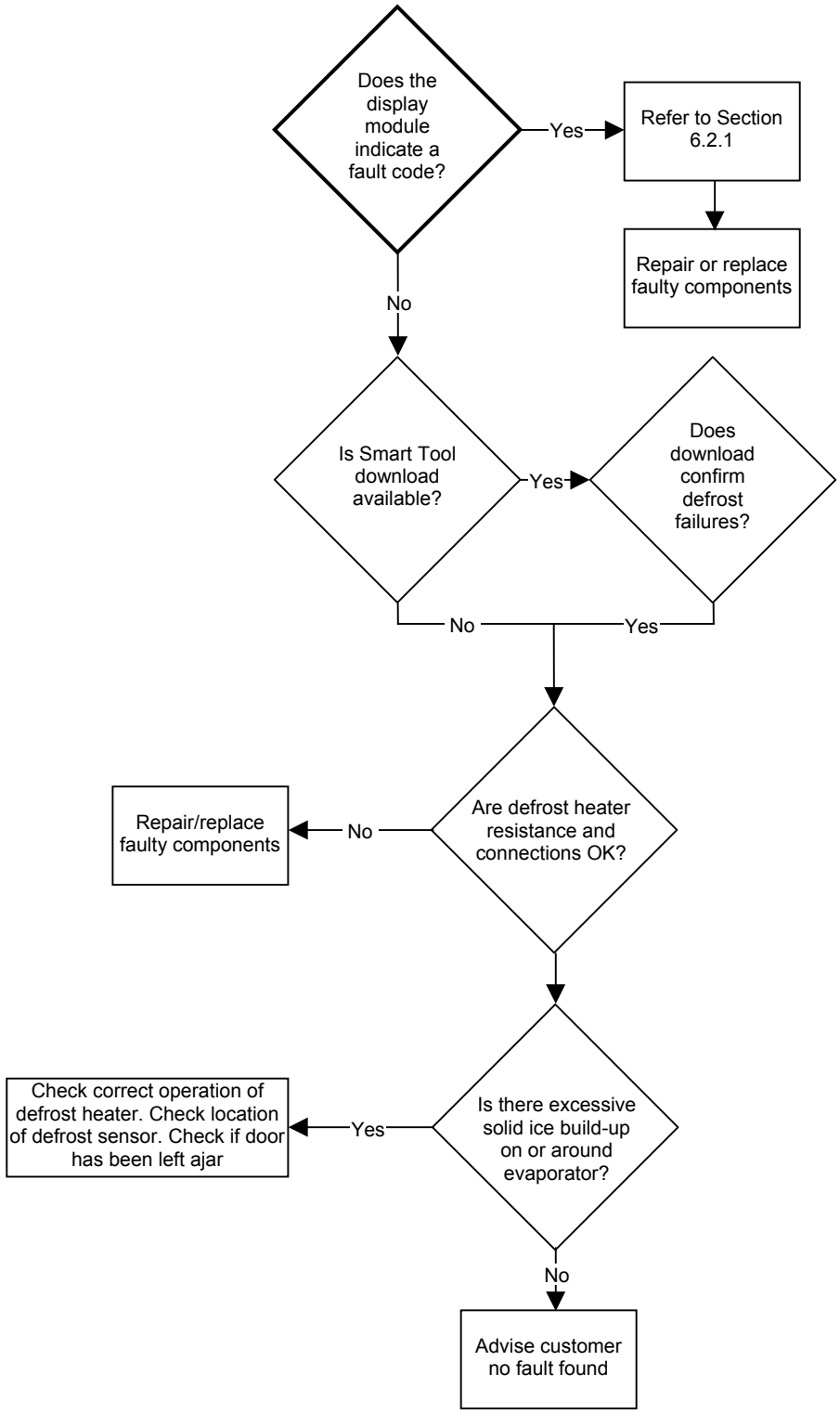
10.7 No Light


Has product been initialised?
No
With FC door closed and PC door open, press Mode button
Yes
Check is light bulb OK?
No
Replace faulty component
Yes
Are all connections OK?
No
Repair
Yes
Refer to Section 9.8 OK?
No
Repair/replace faulty component
Yes
Replace power/control module

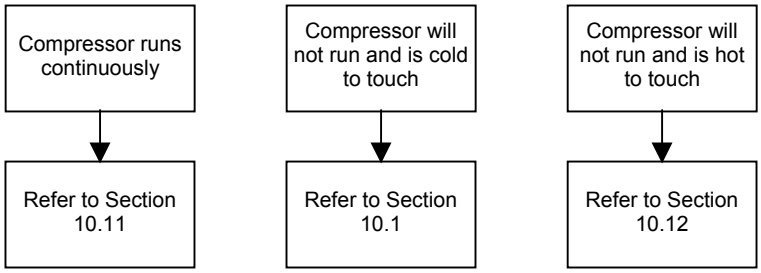
10.8 Door Switch Not Operating



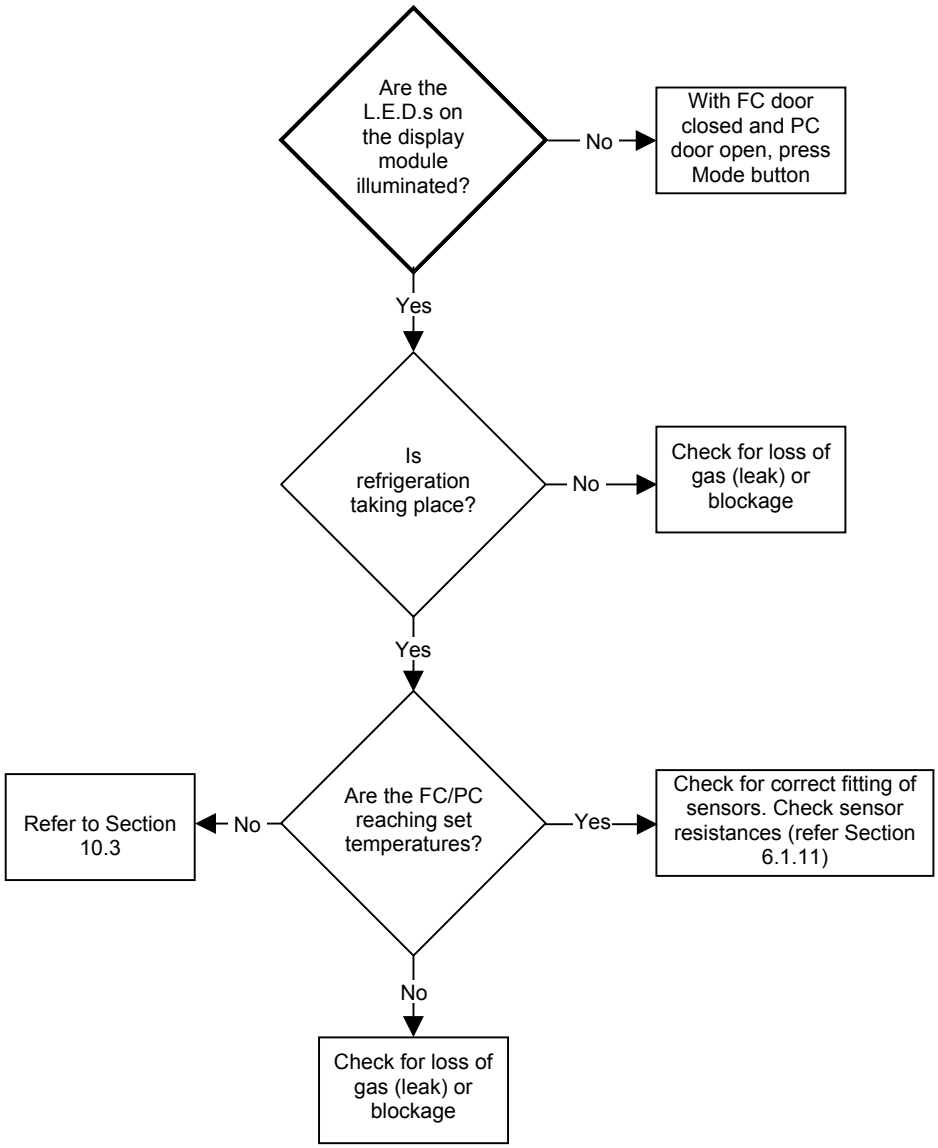
10.9 Defrost Heater Faults



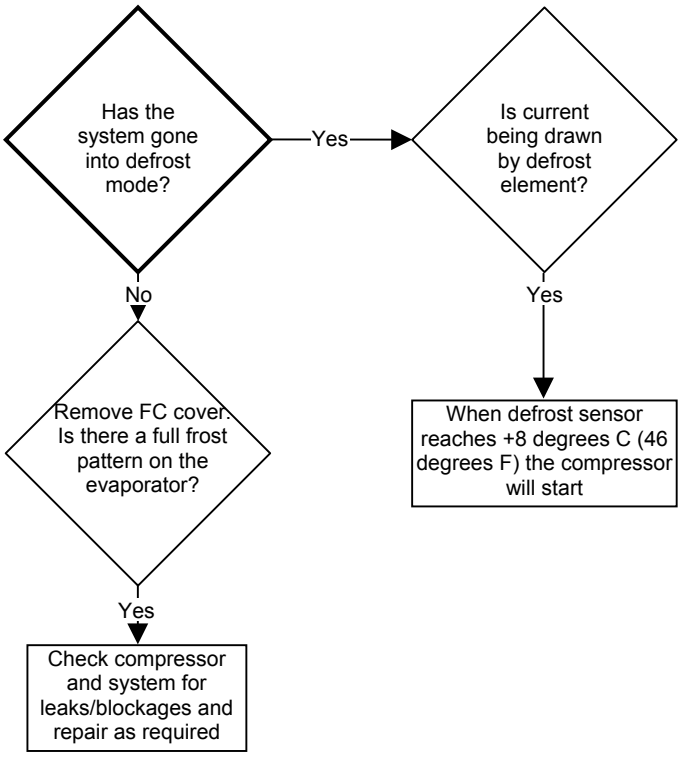
10.10 Compressor Faults



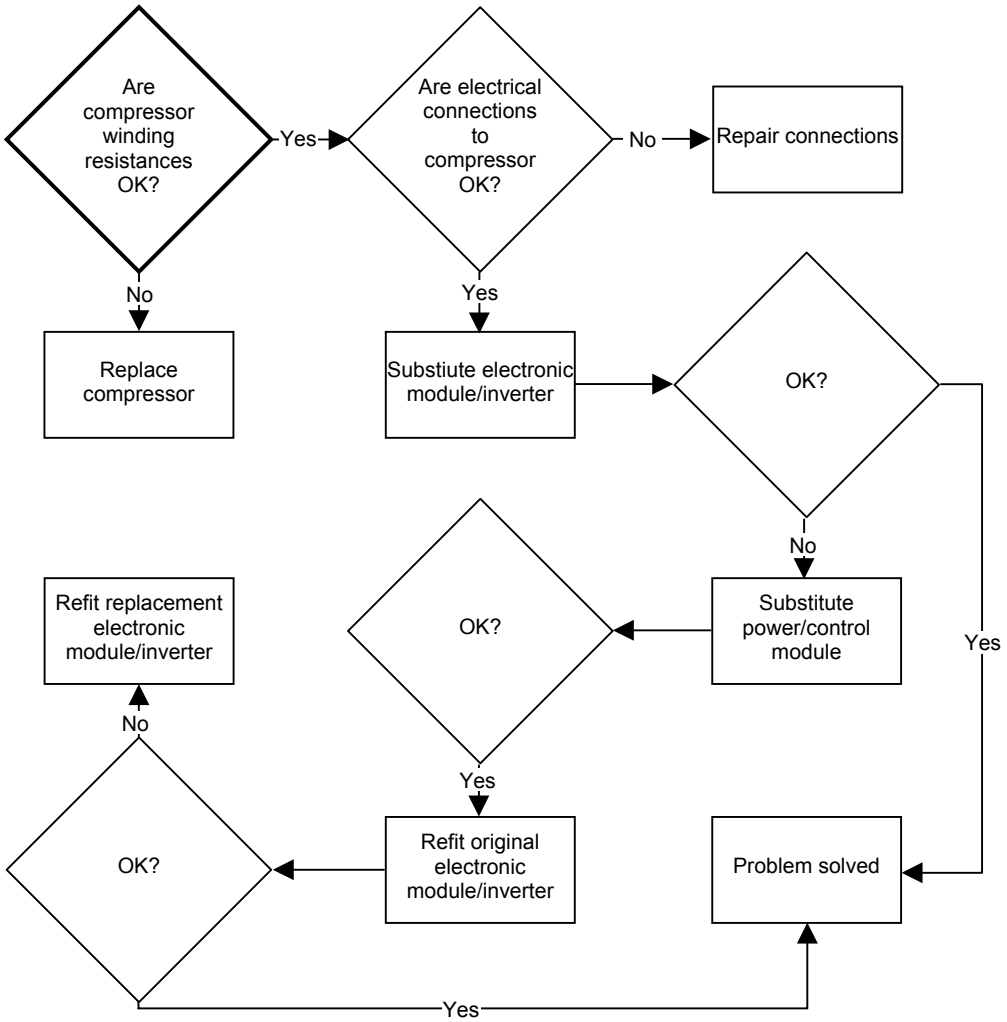
10.11 Compressor Runs Continuously



10.12 Compressor Will Not Run And Is Hot To Touch



10.13 Compressor Electrical Tests



10.14 Refrigeration System Faults