



**SERVICE MANUAL
FOR
6537 & 6538 SERIES TWO TON
HIGH EFFICIENCY
PACKAGED HEAT PUMPS**

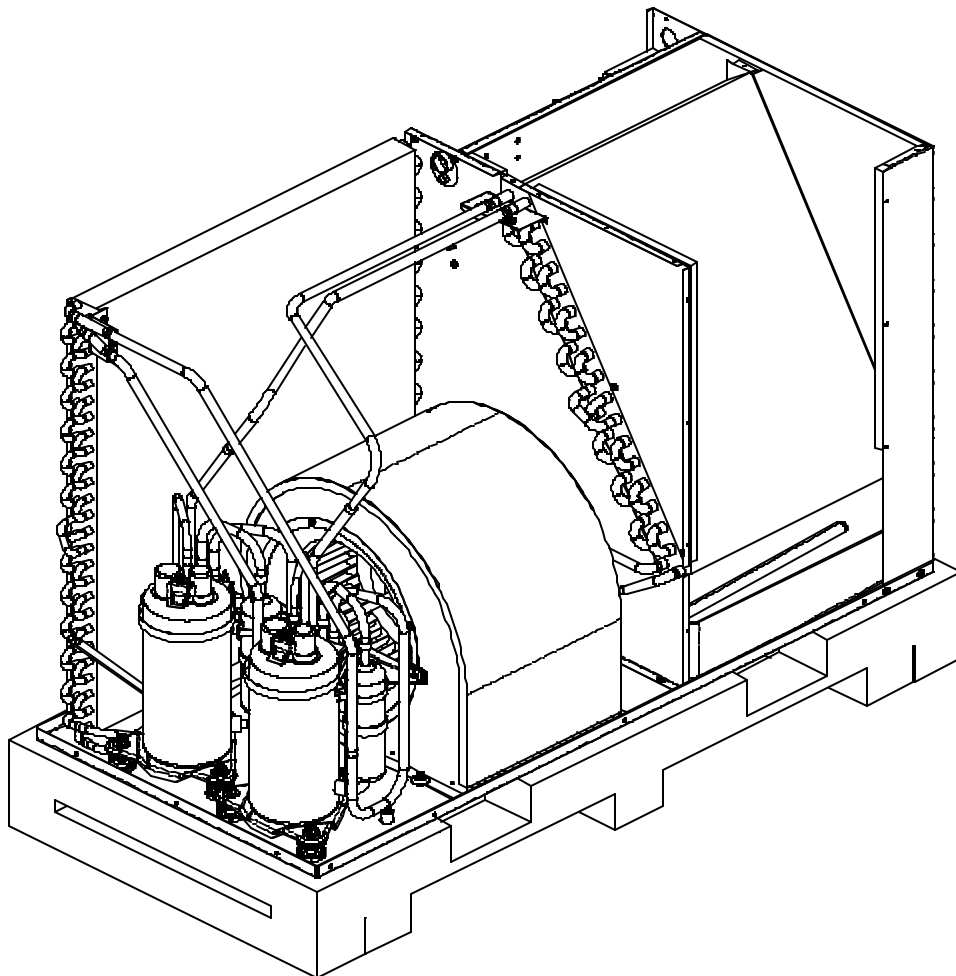


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1. WARNINGS

IMPORTANT NOTICE

These instructions are for the use of qualified individuals specially trained and experienced in installation of this type equipment and related system components.

Installation and service personnel are required by some states to be licensed. PERSONS NOT QUALIFIED SHALL NOT INSTALL NOR SERVICE THIS EQUIPMENT.

SHOCK HAZARD

TO PREVENT THE POSSIBILITY OF SEVERE PERSONAL INJURY, DEATH OF EQUIPMENT DAMAGE DUE TO ELECTRICAL SHOCK, ALWAYS BE SURE THE POWER SUPPLY TO THE APPLIANCE IS DISCONNECTED BEFORE DOING ANY WORK ON THE APPLIANCE. THIS CAN NORMALLY BE ACCOMPLISHED BY SWITCHING THE BREAKER FOR THE AIR CONDITIONER TO “OFF”, DISCONNECTING ALL EXTERNAL ELECTRICAL CONNECTIONS AND CORDS, SWITCHING ON BOARD

ELECTRICAL GENERATORS AND INVERTERS TO “OFF” AND REMOVING THE CABLE FROM EACH POSITIVE TERMINAL ON ALL STORAGE AND STARTING BATTERIES.

CAREFULLY FOLLOW ALL INSTRUCTIONS AND WARNINGS IN THIS BOOKLET TO AVOID DAMAGE TO THE EQUIPMENT, PERSONAL INJURY OR FIRE.

WARNING

Improper installation may damage equipment, can create a hazard and will void the warranty.

The use of components not tested in combination with these units will void the warranty, may make the equipment in violation of state codes, may create a hazard and may ruin the equipment.

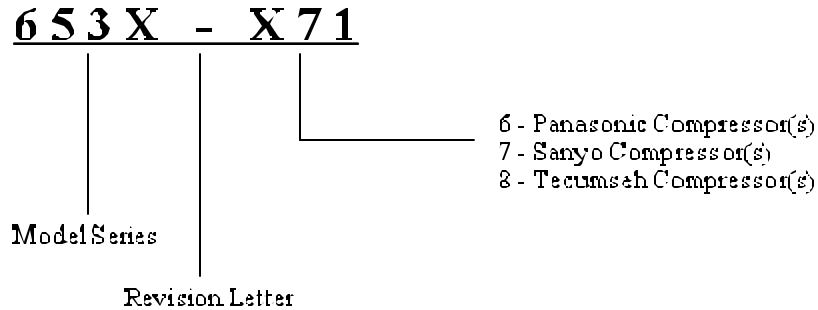
2. ACCESSIBILITY OF APPLIANCE

The accessibility of this appliance will vary from one installation to another. It shall be left to the service

technicians judgement, the best method of attaining access to perform service.

3. UNIT DIMENSIONS AND SPECIFICATIONS

PACKAGE AIR CONDITIONER MODEL NUMBER BREAKDOWN FOLLOWS:



4. UNIT SPECIFICATIONS AND IDENTIFICATION

653X-X71			
MODEL NUMBER FOR OUTDOOR USE		SERIAL NUMBER	
USE THERMOSTAT 6535B335 ELECTRICAL RATINGS: 115 VAC, 60 HZ, 1 PHASE			
CIRCUIT #1		CIRCUIT #2	
8.7	RLA	8.7	RLA
58	LRA	58	LRA
8.9	BCSC	8.9	BCSC
COMPRESSOR 1450-222 MOTOR THERMALLY PROTECTED			
3.4	FLA	I.D. BLOWER MOTOR DATA HORSEPOWER 1/3	FLA N/A
2.8	FLA	O.D. BLOWER MOTOR DATA HORSEPOWER 1/3	FLA 3.7
17.3	AMP	MINIMUM CIRCUIT CAPACITY	AMP 14.9
20	AMP	MAXIMUM OVERCURRENT PROTECTIVE DEVICE	AMP 20
25.75	OZ.	R-22 CHARGE WEIGHT	OZ. 25.75
MINIMUM EXTERNAL STATIC PRESSURE .4 IN H ₂ O			
#12	0' - 25'	MIN. SUPPLY CONDUCTOR GAUGE (COPPER)	0' - 25' #12
#10	25' - 40'	UTILISER DES FILS D'ALIMENTATION EN CURVE	25' - 40' #10
#8	40' - 63'		40' - 63' #8

5. UNIT DEPICTION FIGURES

6537

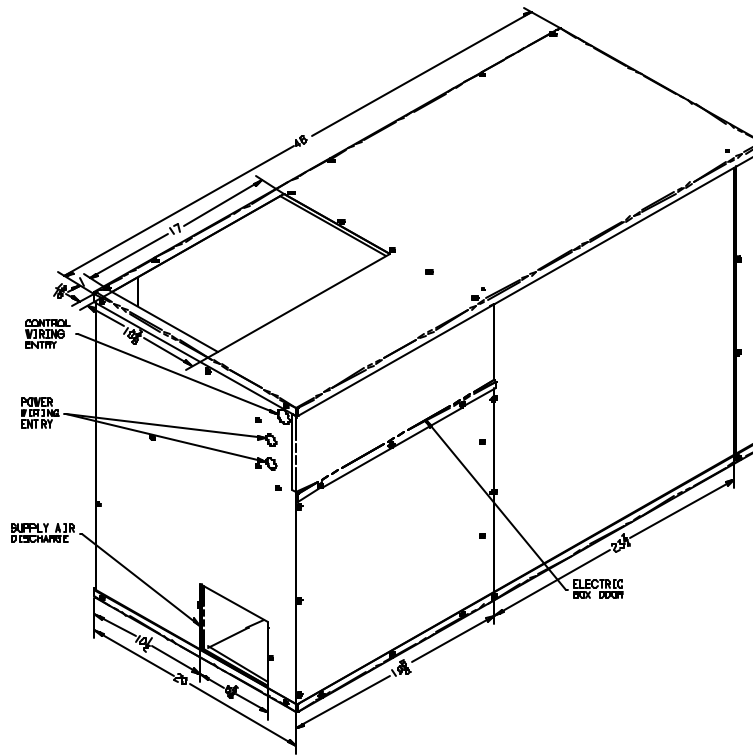


FIGURE 1

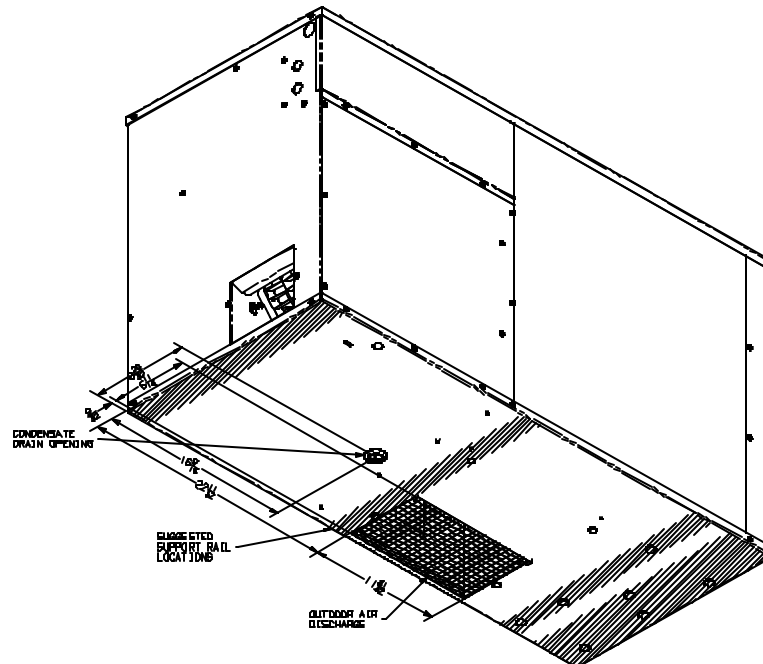
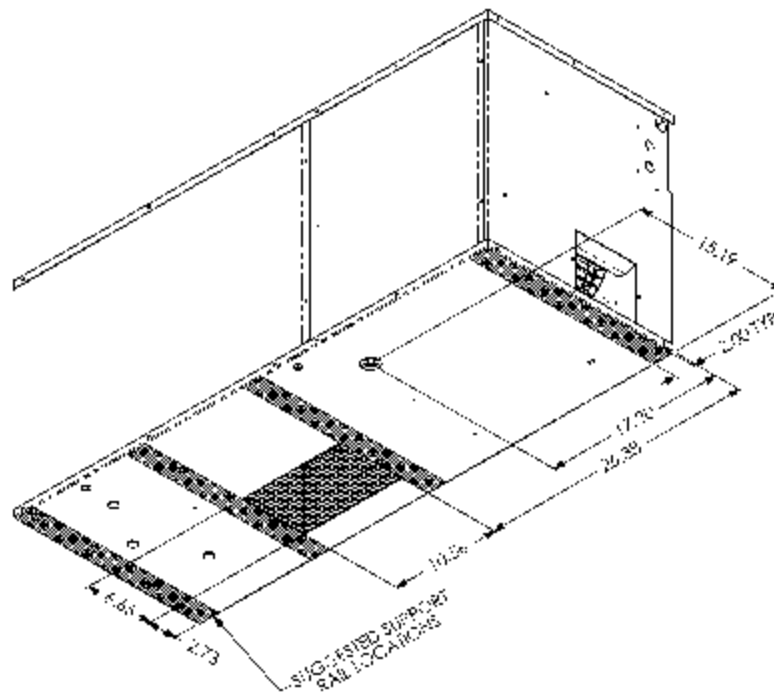
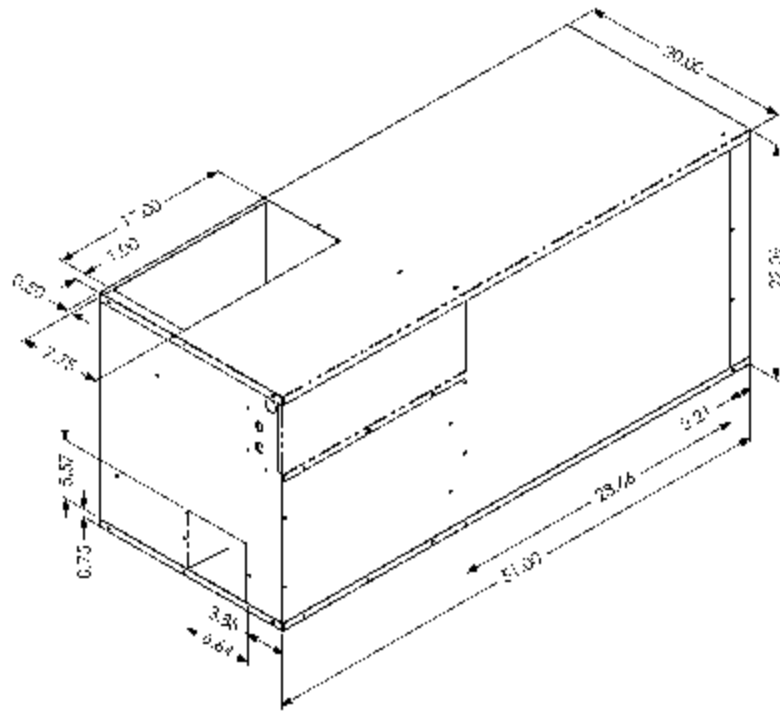


FIGURE 2

UNIT DEPICTION

6538



6. GENERAL INFORMATION

This packaged heat pump mounts below the floor of the vehicle. The innovative design makes it possible to maintain a smooth, free-flowing roof line for the vehicle. It also relocates all noise and condensate drainage off the roof to below the floor of the vehicle.

The heat pump contains a dual compressor system. It combines the capacity of two roof mounted units into one highly efficient and compact package.

Each compressor is connected to a separate refrigeration circuit. The system can be operated with a single compressor when the air conditioning requirement is low, or with two compressors when maximum performance is required.

This heat pump operates a two-stage system. The first compressor and refrigeration circuit is referred to as “1st Stage”. The second compressor and refrigeration circuit is referred to as “2nd Stage”. First and second stage will operate as indicated below.

1st stage (the first compressor and refrigeration circuit), will operate when:

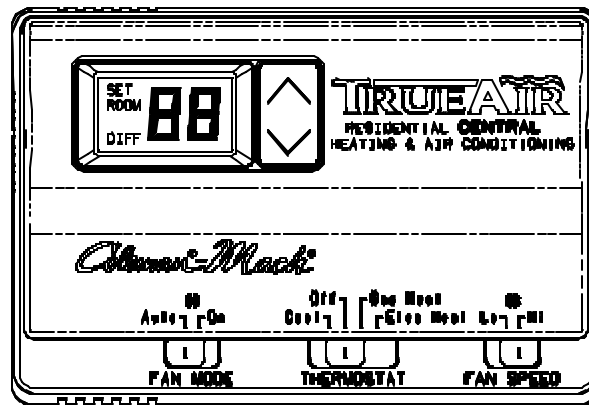
- 1) The thermostat is demanding cooling or electric heating,
- 2) The vehicle is being powered by either shore line or the on-board generator.

2nd stage (the second compressor and refrigeration circuit), will operate when:

- 1) The thermostat senses room temperature that is 2 degrees or higher than the setpoint temperature on the thermostat.

Switching and control of 1st and 2nd stage cooling is automatic. When the cooling demand does not require that both systems operate, stage two will shut down leaving stage one in operation. **Heat operation always energizes both stages**, however, only stage one operates if power is not available to circuit #2.

7. THERMOSTAT - 6535*3352 COLEMAN-MACH SERIES THERMOSTAT



6535*3352 THERMOSTAT OPERATION

The display indicates room temperature and the word ROOM is shown on the LCD until the temperature selector is pressed; at which time the display temporarily indicates the setpoint temperature and the word SET is shown on the LCD. Each time the UP arrow is pressed, the setpoint will decrease. Once the temperature selector button is no longer pressed for a few seconds, the room temperature will again be displayed, and the word ROOM will be displayed on the LCD.

In electric heat mode, if the heat pump is unable to satisfy the thermostat, DIFF will flash on the thermostat LCD when 2nd stage heating is required to satisfy the thermostat.

In gas heat mode, the gas furnace will provide the only source of heat and the heat pump is locked out.

NOTE

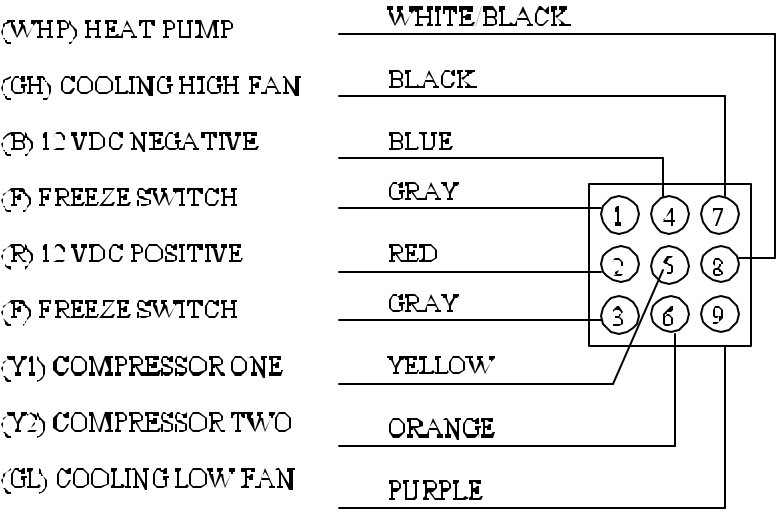
The temperature displays in degrees Fahrenheit as a factory set default (See Figure 2). To display in degrees Celsius, move the jumper marked “F” and “C” to bridge between middle pin and position “C”.

6535*3352 Heat Pump Thermostat Example To Bring On Gas Furnace As 2nd Stage Heat

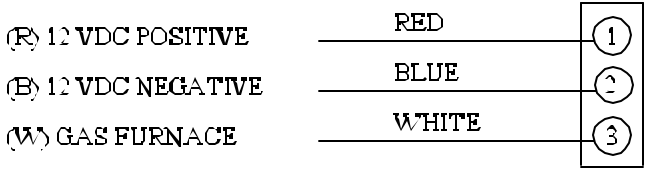
<u>Setpoint</u>	<u>Indoor Temp.</u>	<u>Operation</u>
70	70+	No functions occur
↓↓↓	69	Heat Pump turns on (Primary heat source)
	71	Heat Pump turns off (Thermostat satisfied)
	69	Heat Pump turns on
	65	Gas Furnace turns on (Heat Pump not able to satisfy Thermostat) (First strike for 2 nd stage heat counter)
	71	Heat Pump and Gas Furnace turn off (Thermostat satisfied)
	69	Heat Pump turns on
	65	Gas Furnace turns on (Heat Pump is again unable to satisfy Thermostat), (2 nd stage heat counter reaches 3 rd strike and Heat Pump is locked out for 2 hours), 2nd stage heat counter is reset if Heat Pump is running for more than 20 minutes and does not call for 2nd stage heat
	71	Gas Furnace turns off (Thermostat satisfied)
	69	Gas Furnace turns on (Becomes Primary heat source)
	71	Gas Furnace turns off (Thermostat satisfied)
	↓↓↓	After 2 hour lockout
	69	Heat Pump turns on (Resumes as Primary heat source)
	65	Gas Furnace turns on (Becomes Primary heat source) (Heat Pump is locked out for another 2 hours)
	71	Gas Furnace turns off (Thermostat satisfied)
	↓↓↓	After 2 hour lockout
	69	Heat Pump turns on (Resumes as Primary heat source)
	71	Heat Pump turns off (Thermostat satisfied) (2nd stage heat counter is reset any time Heat Pump satisfies thermostat setpoint and does not need Gas Furnace)

The word “DIFF” will flash on LCD when 2nd stage heat is operating.
 There is a 30 second delay between Stage 1 and Stage 2 Heat Pump operation.
 There is also a 3 minute anti-short cycle delay time of 3 minutes for cooling.

6535*3352 Thermostat Wiring



The thermostat operation switches the 12 VDC + to all output terminals



6535*335 2-Stage Heat Pump Thermostat Operation Table

	Mode Switch	Fan Mode Switch	Fan Speed Switch	Calling	Operation
1	Cool	Auto	Lo	No	No functions occur in this mode
2	Cool	Auto	Lo	Stage 1 1 Degree Above Set	ID fan low, compressor #1 and OD blower low cycle as needed
3	Cool	Auto	Lo	Stage 2 2 Degrees Above Set	ID fan low, compressors #1 and #2 and OD blower high cycle as needed
4	Cool	On	Lo	No	ID fan low continuous
5	Cool	On	Lo	Stage 1 1 Degree Above Set	ID fan low continuous, compressor #1 and OD blower low cycle as needed
6	Cool	On	Lo	Stage 2 2 Degrees Above Set	ID fan low continuous, compressors #1 and #2 and OD blower high cycle as needed
7	Cool	Auto	Hi	No	No functions occur in this mode
8	Cool	Auto	Hi	Stage 1 1 Degree Above Set	ID fan high, compressor #1 and OD blower low cycle as needed
9	Cool	Auto	Hi	Stage 2 2 Degrees Above Set	ID fan high, compressors #1 and #2 and OD blower high cycle as needed
10	Cool	On	Hi	No	ID fan high continuous
11	Cool	On	Hi	Stage 1 1 Degree Above Set	ID fan high continuous, compressor #1 and OD blower low cycle as needed
12	Cool	On	Hi	Stage 2 2 Degrees Above Set	ID fan high continuous, compressors #1 and #2 and OD blower high cycle as needed
13	Off	Auto	Lo or Hi	No	No functions occur in this mode
14	Off	On	Lo	No	ID fan low continuous
15	Off	On	Hi	No	ID fan high continuous
16	Gas Heat	Auto or On	Lo or Hi	No	No functions occur in this mode
17	Gas Heat	Auto or On	Lo or Hi	Stage 1	Heater will be energized to run
18	Gas Heat	Auto or On	Lo or Hi	Stage 2	There is no provision for 2 nd stage heat when operating in the gas heat mode
19	Elec Heat	Auto or On	Lo or Hi	No	No functions occur in this mode
20	Elec Heat	Auto or On	Lo or Hi	Stage 1	Heat pump will run ID fan high, both compressors, OD fan high and both reversing valves
21	Elec Heat	Auto or On	Lo or Hi	Stage 2 *See Note*	Heat pump will run ID fan high, both compressors, OD fan high and both reversing valves plus the heater will be energized to run

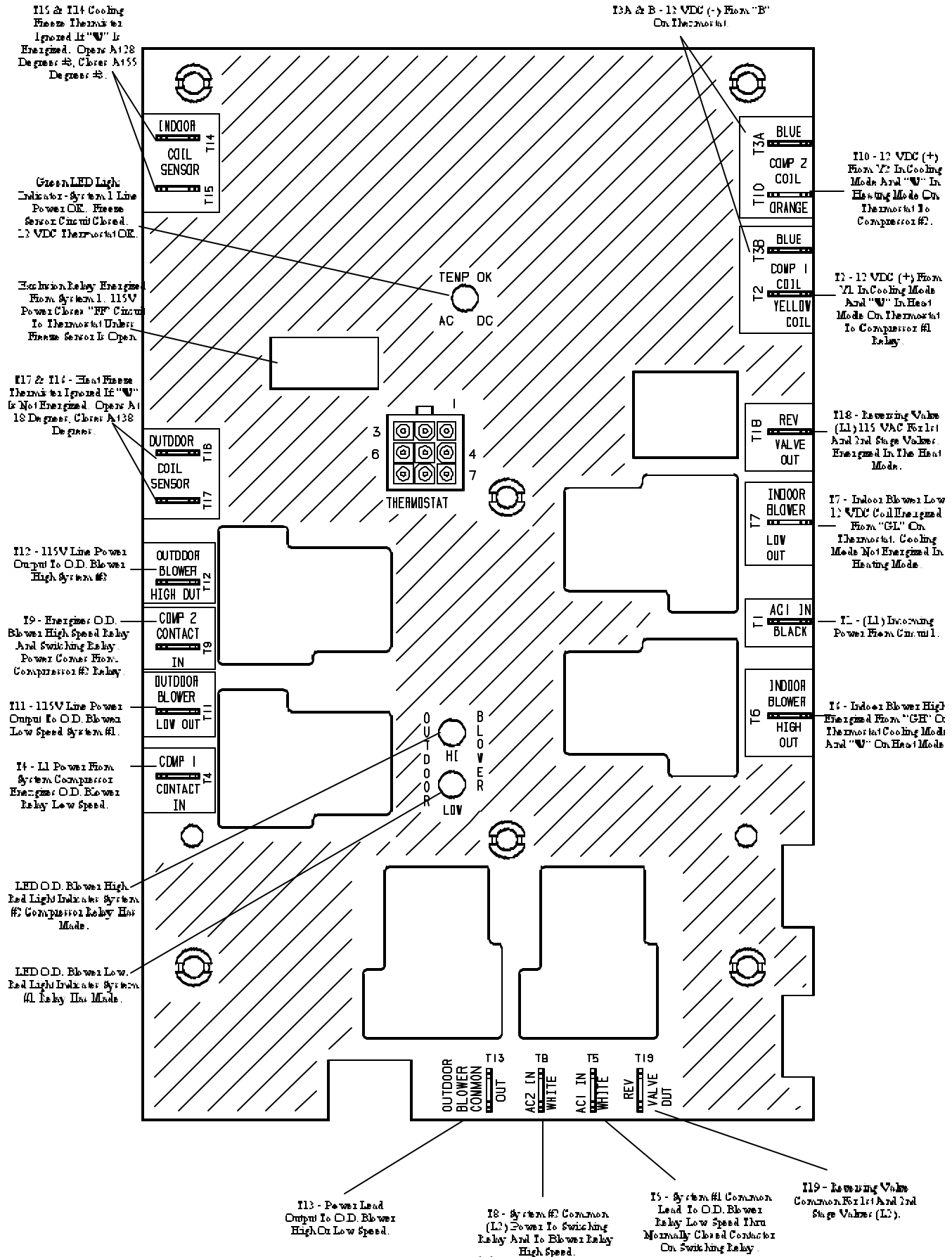
8. A TYPICAL COOLING CYCLE OF THE HEAT PUMP

- | | | | |
|----|---|-----|--|
| 1. | Begins with a call from the wall thermostat for High or Low Fan (customer choice). | 7. | Compressor #2 starts, the outdoor fan goes off (subject to available 115 volt power supply). |
| 2. | Indoor fan starts on the selected speed. | 8. | Outdoor fan starts again 2 seconds later (High Speed). |
| 3. | Within a few seconds, the thermostat will call for cooling. | 9. | Both systems operate to satisfy the thermostat. |
| 4. | Compressor #1 starts. | 10. | Both compressors shut off at setpoint temperature. |
| 5. | Outdoor fan starts 2 seconds later (Low Speed). | 11. | When the thermostat calls for cooling again, it will start by calling for stage 1 only. |
| 6. | 1 minute later the thermostat calls for second stage cool (subject to 2 degree temperature differential). | 12. | If the heat pump is unable to keep up with the load, stage 2 will start again when the indoor temperature is 2 degrees above the setpoint. |

9. A TYPICAL HEATING CYCLE OF THE HEAT PUMP (Electric Heat Mode)

- | | | | |
|----|--|-----|--|
| 1. | Begins with a call from the wall thermostat for Electric Heat. | 7. | Outdoor fan starts again 2 seconds later (High Speed). |
| 2. | Indoor fan starts on High Speed. | 8. | Both systems operate to satisfy the thermostat. |
| 3. | Both reversing valves switch to heat mode. | 9. | Both compressors shut off at setpoint temperature. |
| 4. | Compressor #1 starts. | 10. | If the Heat Pump is unable to maintain the coach temperature, the thermostat will automatically cycle the furnace on. The new True-Air Thermostats (Electric Heat Mode) will call for second stage (Furnace) heating operation anytime the temperature inside the coach is more than 5 degrees cooler than the customers chosen setpoint temperature. It is entirely possible the furnace and heat pump may both operate at the same time to satisfy the thermostat. |
| 5. | Outdoor fan starts 2 seconds later (Low Speed). | | |
| 6. | 30 seconds later the Heat Pump circuit board will energize the Compressor Relay #2, Compressor #2 starts, the outdoor fan goes off (subject to available 115 volt power supply). | | |

10. WIREBOX COMPONENT CHECKOUT **6537 & 6538 Model Printed Circuit Board**



11. SERVICE PROBLEMS AND POSSIBLE SOLUTIONS

COOLING MODE

<u>Problems</u>	<u>Possible Solutions</u>
1. Nothing Runs - Cooling Mode	No A/C Voltage, No 12 VDC, Thermostat, Wiring, P.C. Board, High Pressure Switch Open
2. IDFM* Runs, No Compressor, No ODFM*	Cooling Freeze Thermister - (Insufficient Indoor Air Flow), Thermostat, Wiring, Compressor, Contactor, P.C. Board
3. IDFM* Runs, ODFM* Runs, No Compressor	Insufficient Voltage To Unit, Run Capacitor, Start Device, Overload, Wiring, Compressor
4. IDFM* Runs, Compressor Runs, No ODFM*	Run Capacitor, Fan Motor, P.C. Board, Wiring, Fuse On Motor Black Wire
5. Compressor Runs, ODFM* Runs, No IDFM*	Thermostat, Run Capacitor, Wiring, Fan Motor, P.C. Board,
6. Compressor, ODFM*, IDFM* Runs, Insufficient Cooling	Air Flow Restriction, High Ambient Temperature, Undersized Refrigeration System, Very Little Or No Refrigerant Charge, Compressor
7. Compressor, ODFM*, IDFM* Runs, Unit Is Heating While In Cool Mode	Thermostat, Wiring, P.C. Board, Reversing Valve

HEATING MODE

<u>Problems</u>	<u>Possible Solutions</u>
1. Nothing Runs - Heat Mode	No A/C Voltage, No 12 VDC, Thermostat, Sub-base, Wiring, P.C. Board, High Pressure Switch Open
2. IDFM* Runs, No Compressor, No ODFM*	Heating Freeze Thermister, Low Outdoor Ambient Conditions, Wiring, Compressor, Contactor, P.C. Board
3. IDFM* Runs, ODFM* Runs, No Compressor	Insufficient Voltage To Unit, Run Capacitor, Start Device, Overload, Wiring, Compressor
4. IDFM* Runs, Compressor Runs, No ODFM*	Run Capacitor, Fan Motor, Wiring, P.C. Board, Fuse On Motor Black Wire
5. Compressor Runs, ODFM* Runs, No IDFM*	Run Capacitor, Fan Motor, Wiring, P.C. Board
6. Compressor Runs, ODFM* Runs, IDFM* Runs, Insufficient Heating	Air Flow Restriction, Low Ambient Temperature, Undersized Refrigeration System, Very Little Or No Refrigerant Charge, Compressors
7. Compressor, ODFM*, IDFM*, Unit Is Cooling While In Heat Mode	Wiring, P.C. Board, Reversing Valve

* IDFM - Indoor Fan Motor

* ODFM - Outdoor Fan Motor

12. ELECTRICAL DIAGNOSTIC FLOW CHARTS

6537 & 6538 SERIES

With the use of these flow charts, you will be able to quickly identify a non-working problem. Determine if the problem is high or low voltage and then solve the problem.

IMPORTANT NOTICE

When using a jumper wire to diagnose a low voltage problem, **Never Short Any Positive Terminal to Ground or the Terminal Marked "B"**. Serious thermostat or p.c. board damage may occur.

To use these flow charts, start at the **top left** corner. Check what is indicated in that box. If the answer to what is indicated is No, work horizontally until you find the problem. When the answer is Yes or OK, work the chart downward until you locate the problem. **Do Not Move Downward** on any chart until all preceding steps have been confirmed good. **Do Not** start in the middle of any chart without knowing everything previous (upward on the chart) is OK or you may replace the wrong part.

**! WARNING -
SHOCK HAZARD**

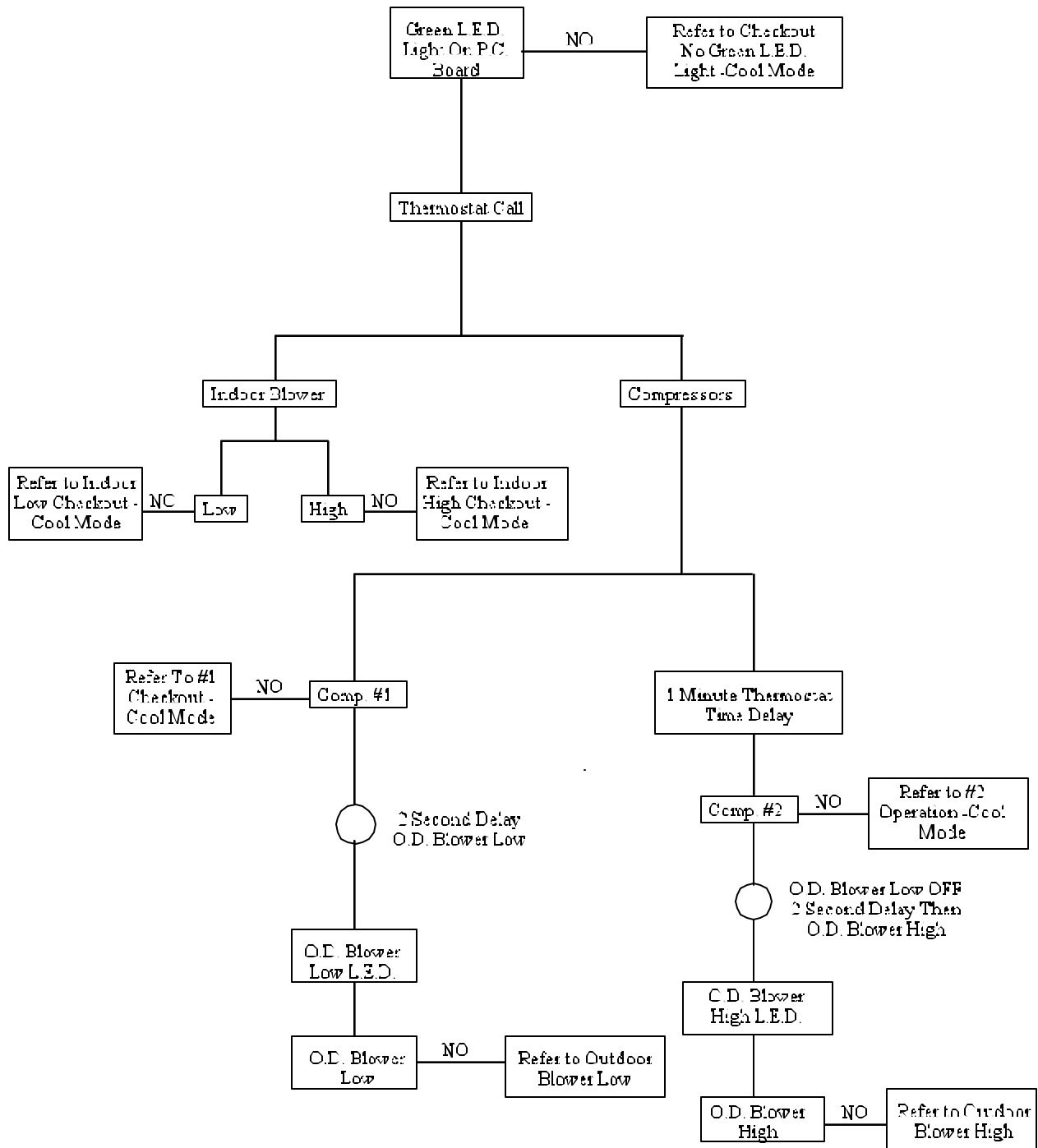
To prevent the possibility of severe personal injury, death or equipment damage due to electrical shock, always be sure the power supply to the appliance is disconnected before doing any work on the appliance. This can normally be accomplished by switching the breaker for the

air conditioner to off, disconnecting all external connections and cords, switching on board electrical generators and inverters to off and removing the cable from each positive terminal on all storage and starting batteries.

DANGER

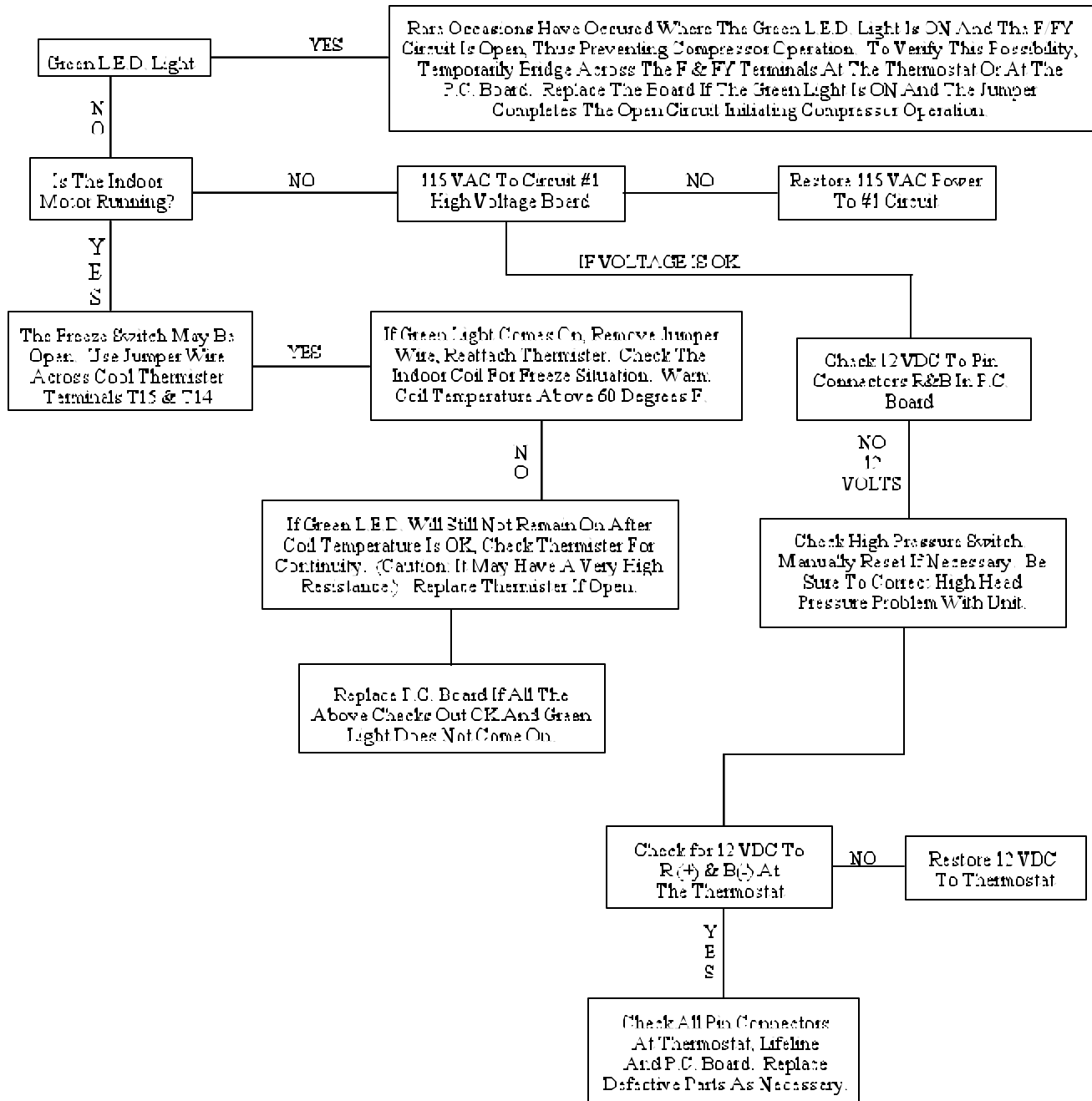
SOME DIAGNOSTIC TESTING MAY BE DONE ON ENERGIZED CIRCUITS. ELECTRICAL SHOCK CAN OCCUR IF NOT TESTED PROPERLY. TESTING TO BE DONE BY QUALIFIED TECHNICIANS ONLY.

12A. HEAT PUMP OPERATION SEQUENCE COOLING MODE



12A.1 NO COOLING - COOLING MODE

NO GREEN L.E.D. LIGHT F/FY CIRCUIT TO THE THERMOSTAT

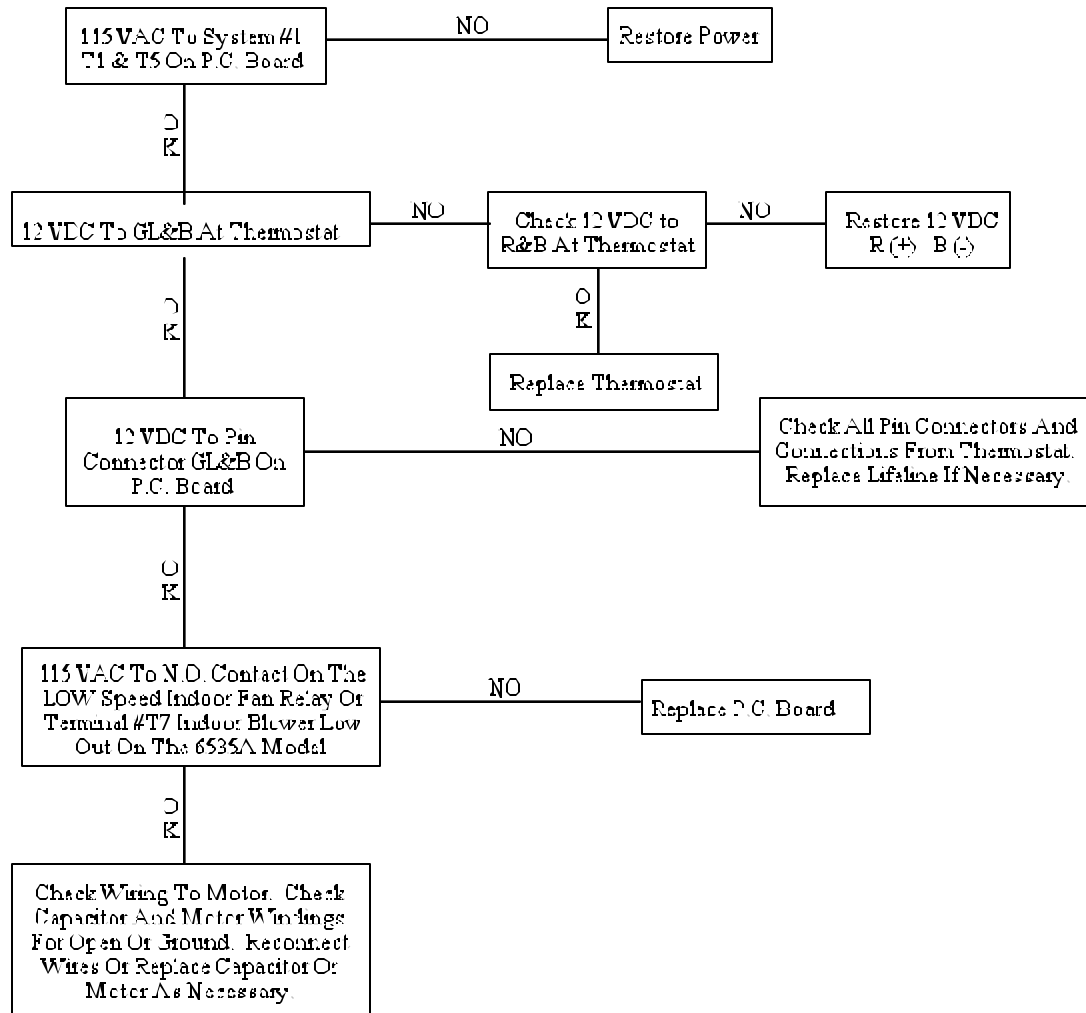


* Outdoor Thermistor Is Ignored In The Cooling Mode When "Y" Is Energized

12A.2 NO INDOOR BLOWER LOW SPEED COOLING MODE

Thermostat Set To Low Cool

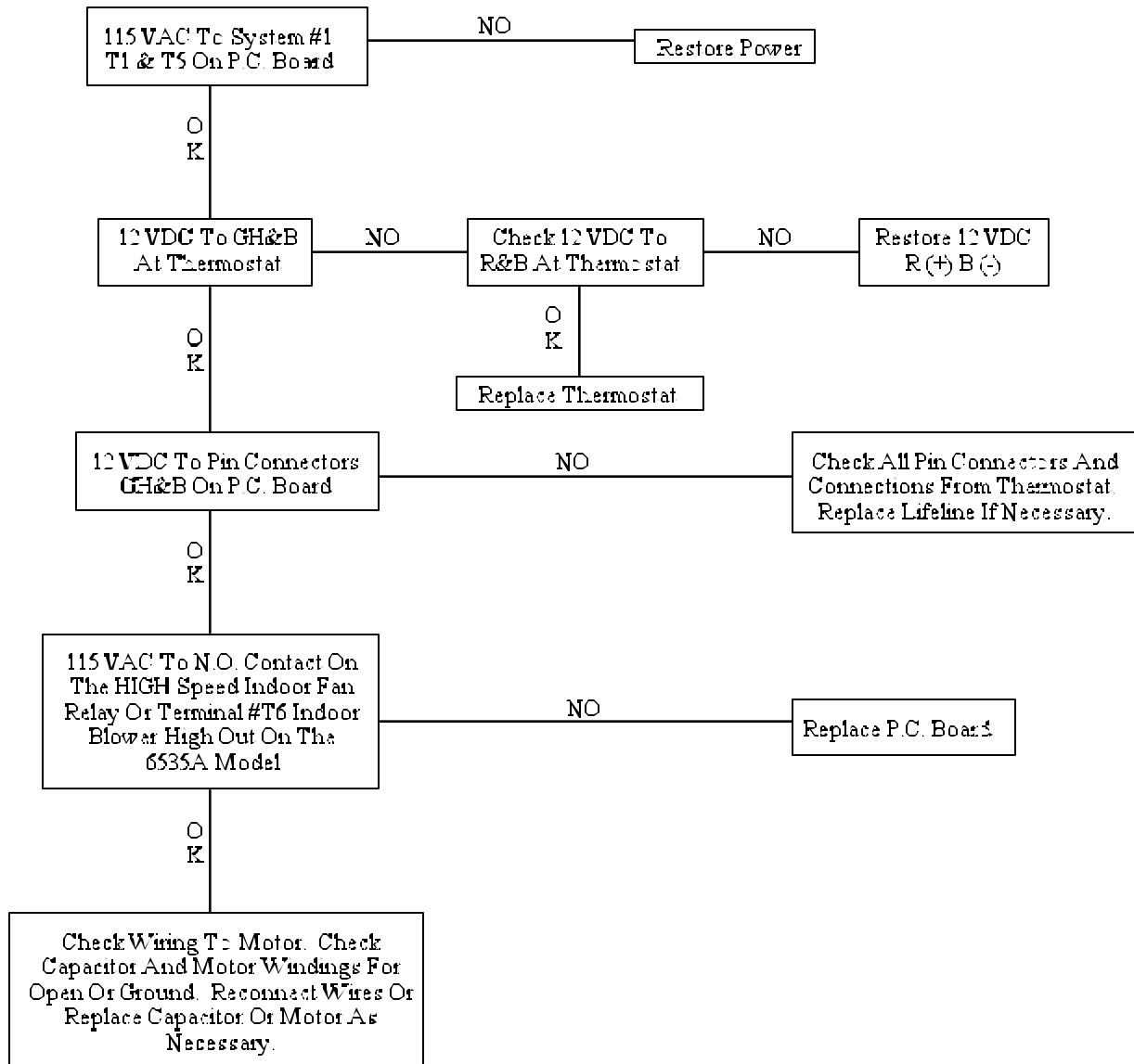
Note: All operating functions subject to thermostat time delays.



12A.3 NO INDOOR BLOWER HIGH SPEED COOLING MODE

Thermostat Set To High Cool

Note: All operating functions subject to thermostat time delays.

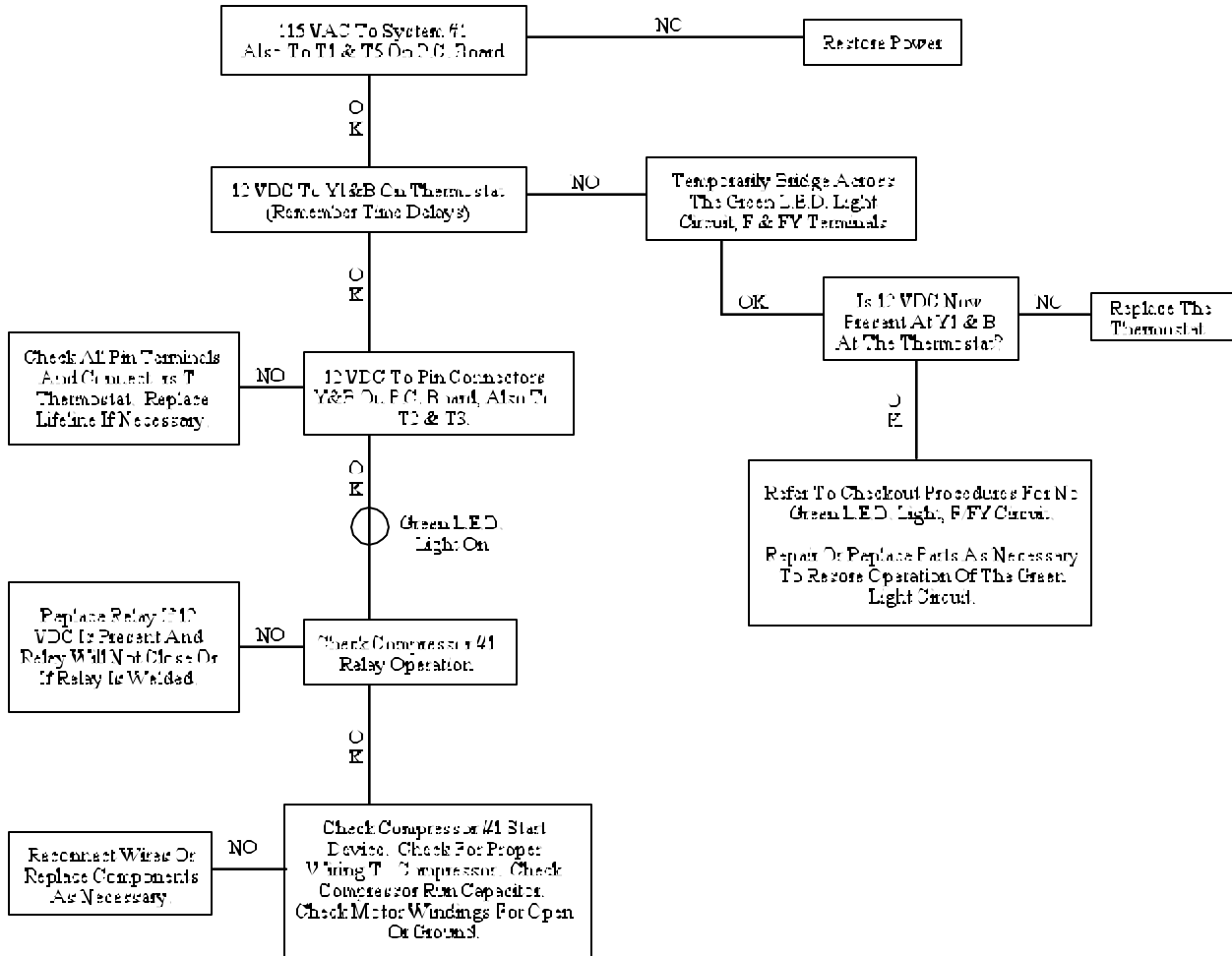


12A.4 COMPRESSOR #1 CHECKOUT

COOLING MODE

Thermostat Calling For Cooling

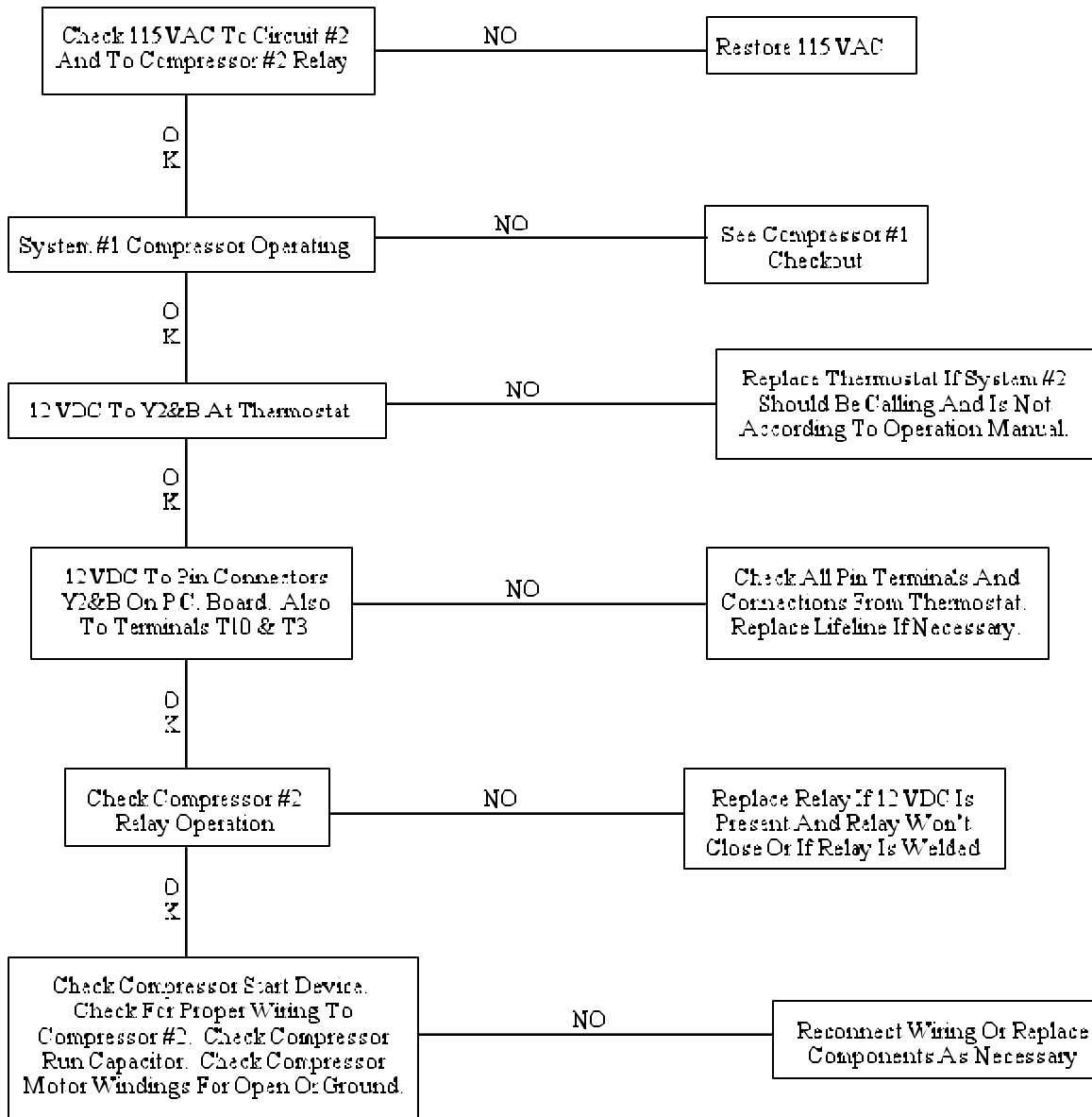
Note: All operating functions subject to thermostat time delays.



12A.5 COMPRESSOR #2 CHECKOUT COOLING MODE

Thermostat Calling For Cooling

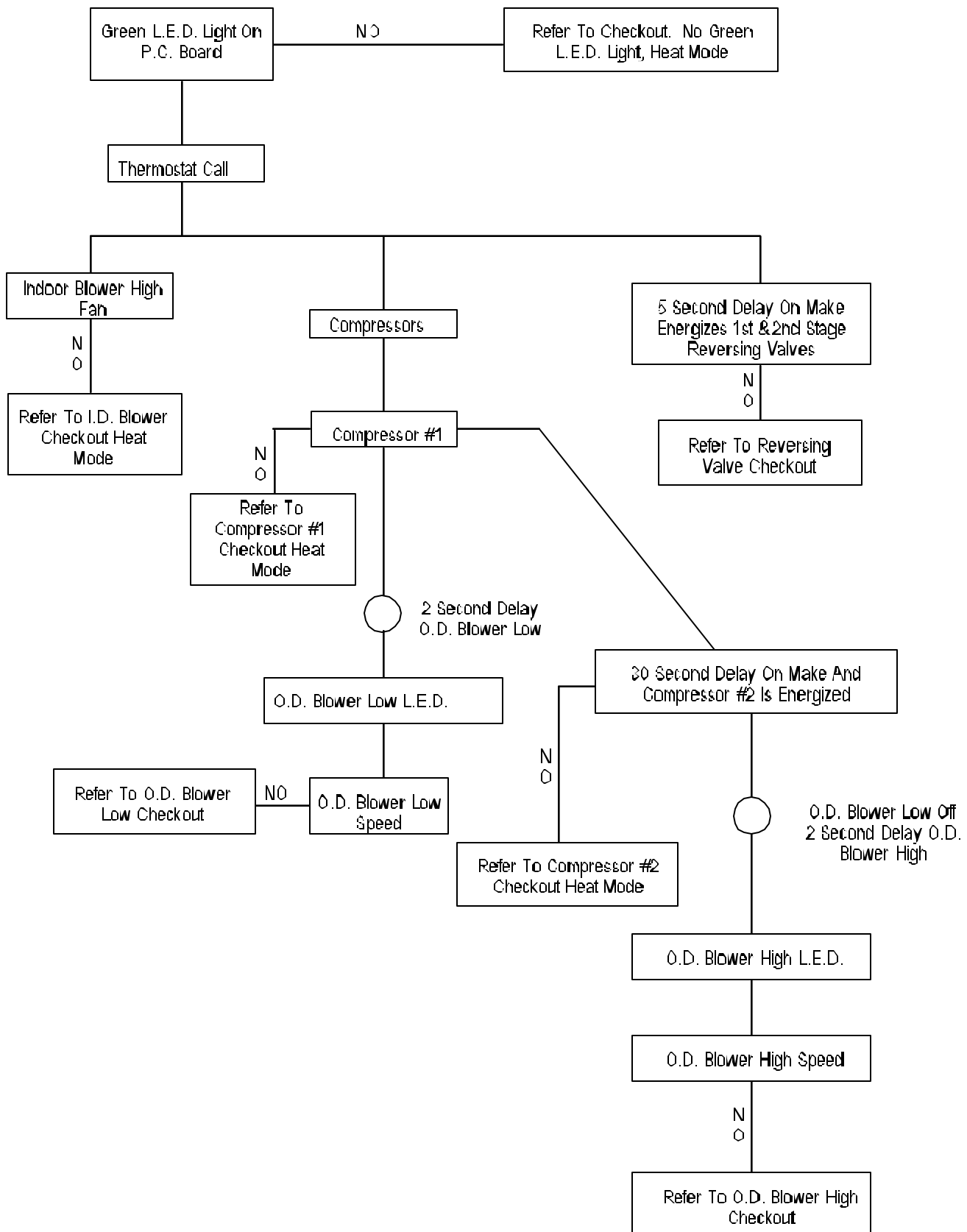
Note: All Operating Functions Subject To Thermostat Time Delays



Note:

Some coach manufacturers connect their energy management systems in series with the 12 VDC call for compressor #2. This is usually done between the output terminals on the p.c. board and the compressor #2 relay coil.

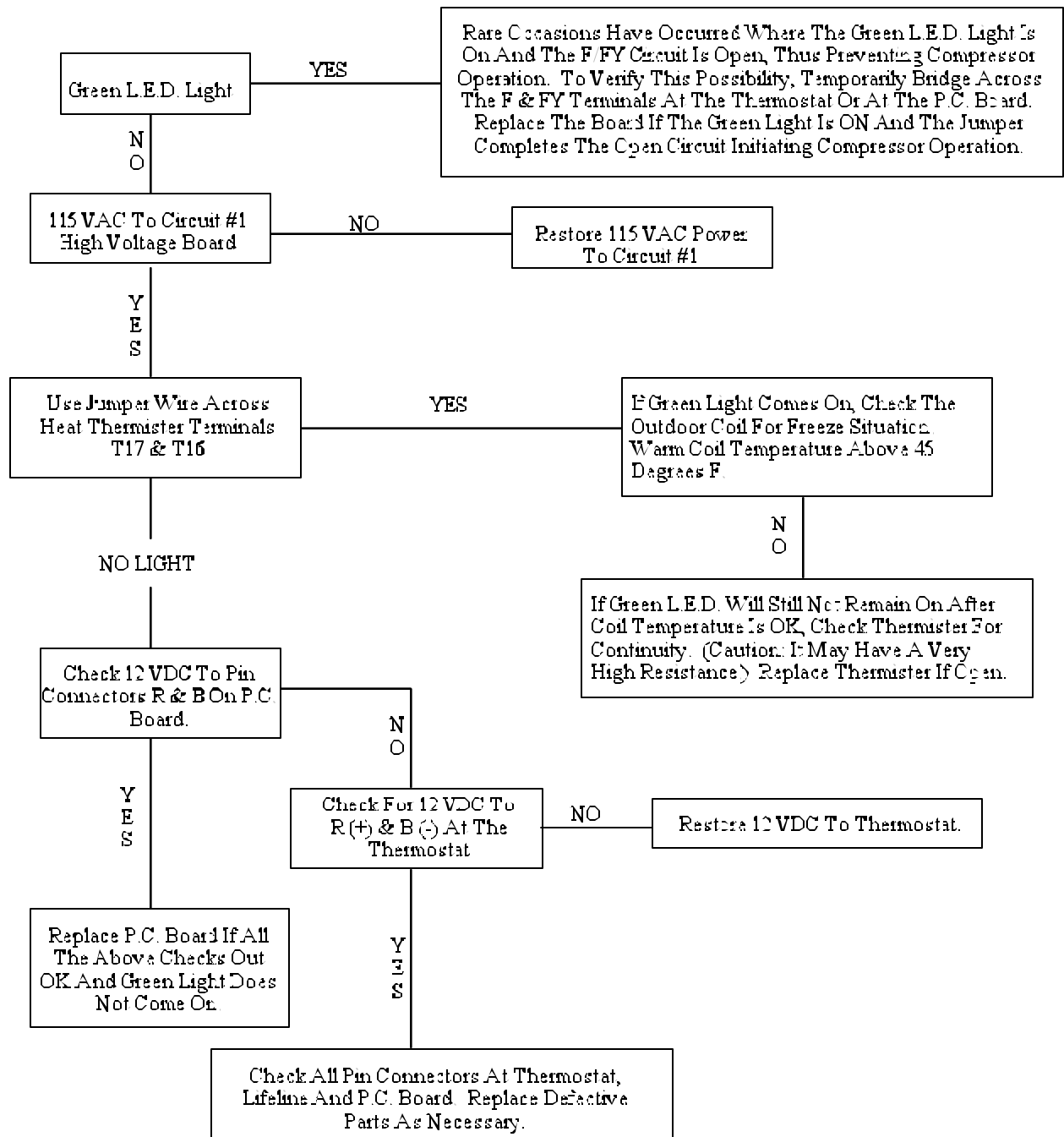
12B. HEAT PUMP OPERATION SEQUENCE HEATING MODE



12B.1 NO HEATING - ELECTRIC HEAT MODE

(Green L.E.D. Light Circuit)

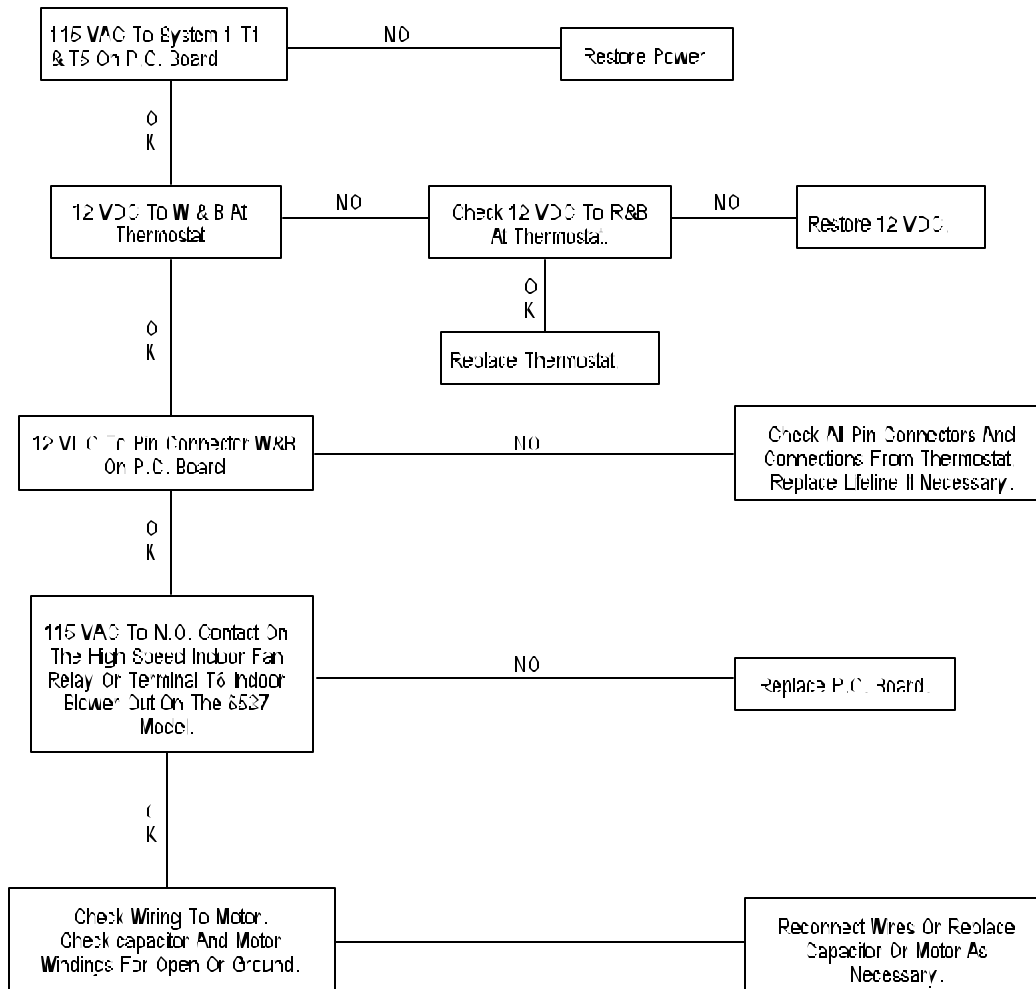
F/FY Circuit Open To The Thermostat



* Indoor Thermister Is Ignored When "W" Is Energized.

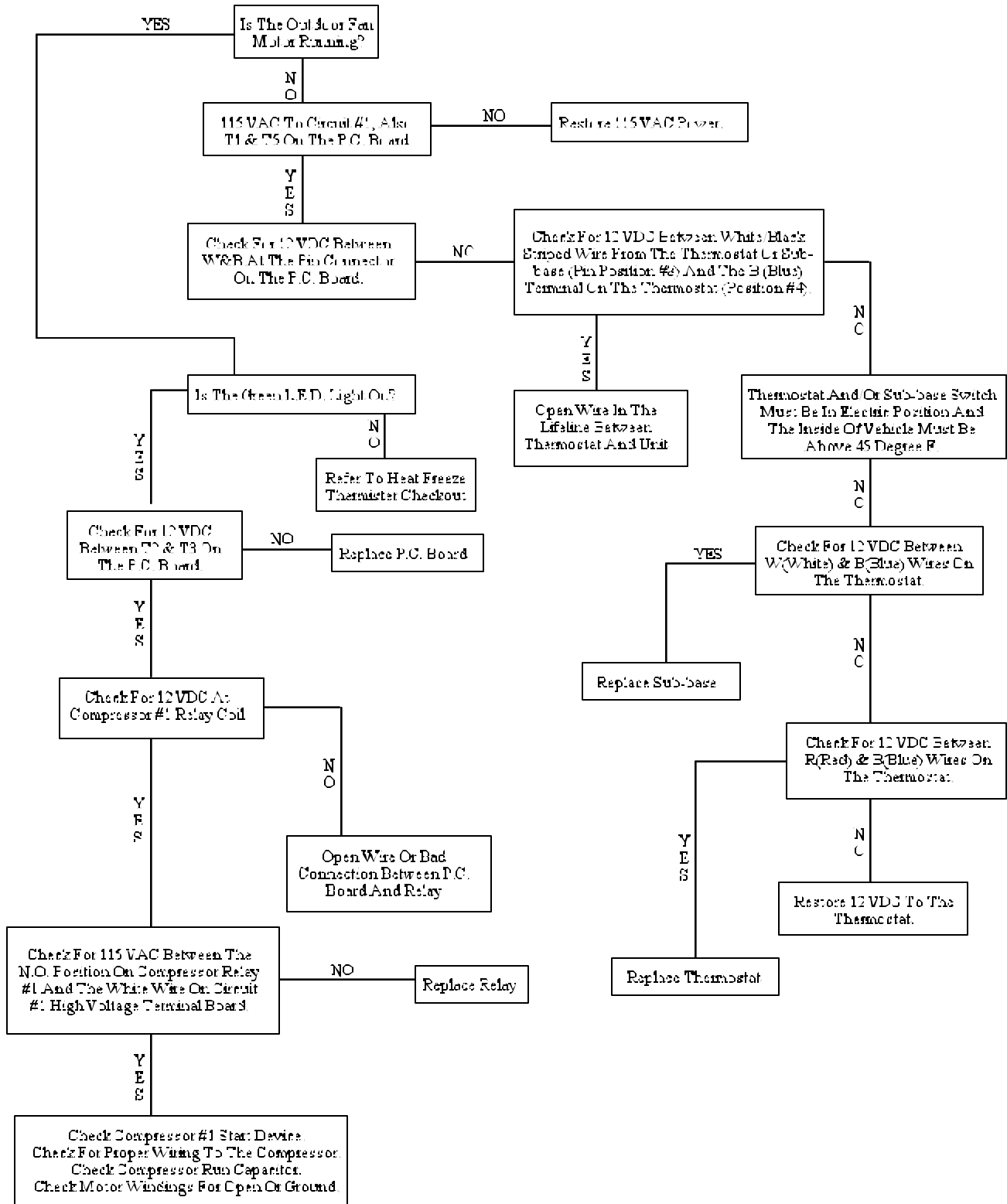
12B.2 NO INDOOR BLOWER ELECTRIC HEAT MODE

Note: Only High Fan Speed Is Energized In The Heating Mode.
All Operating Functions Subject To Thermostat Time Delays.



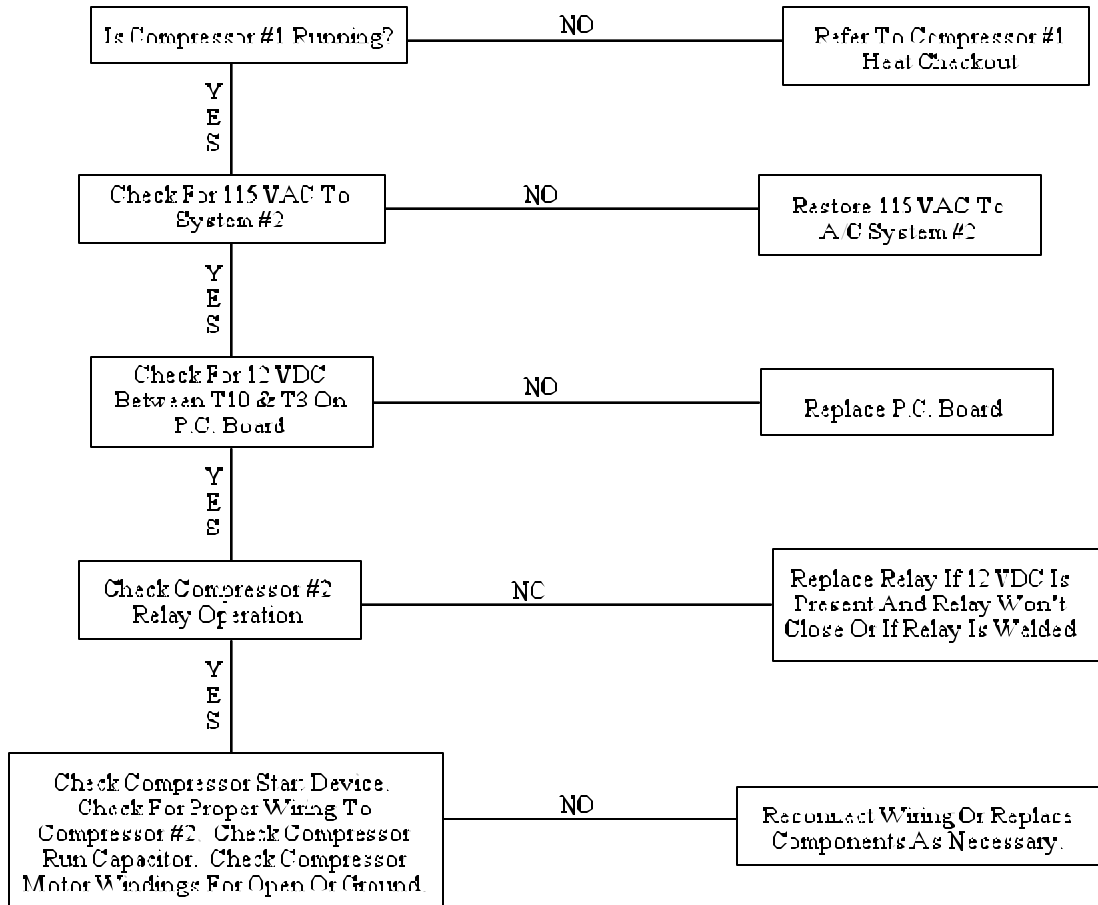
12B.3 COMPRESSOR #1 CHECKOUT ELECTRIC HEAT MODE

Note: All Operating Functions Subject To Thermostat And P.C. Board Time Delays.
Thermostat Or Sub-base Must Be In The Electric Mode.



12B.4 COMPRESSOR #2 CHECKOUT ELECTRIC HEAT MODE

Note: All Operating Functions Subject To Thermostat And P.C. Board Time Delays.
Thermostat Or Sub-base Must Be In The Electric Mode.



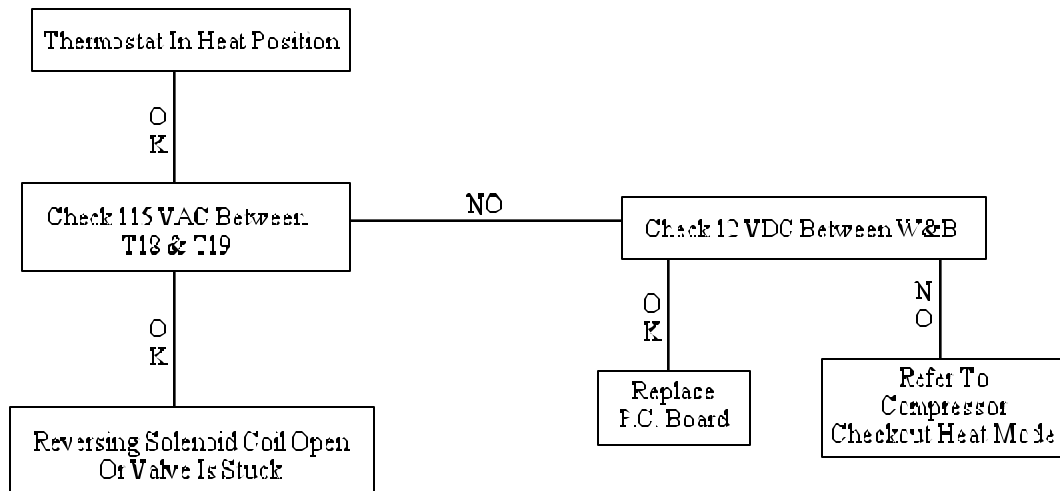
Note:

Some coach manufacturers connect their energy management systems in series with the 12 VDC call for compressor #2. This is usually done between the output terminals on the p.c. board and the compressor #2 relay coil.

12B.5 NO REVERSING VALVE OPERATION ELECTRIC HEAT MODE

Note: All Operating Functions Subject To Thermostat And P.C. Board Time Delays.
Thermostat And/Or Sub-base Must Be In The Electric Mode.

Note: If The Compressors Or Fan Motors Are Not Running, Refer To Proper Checkouts.

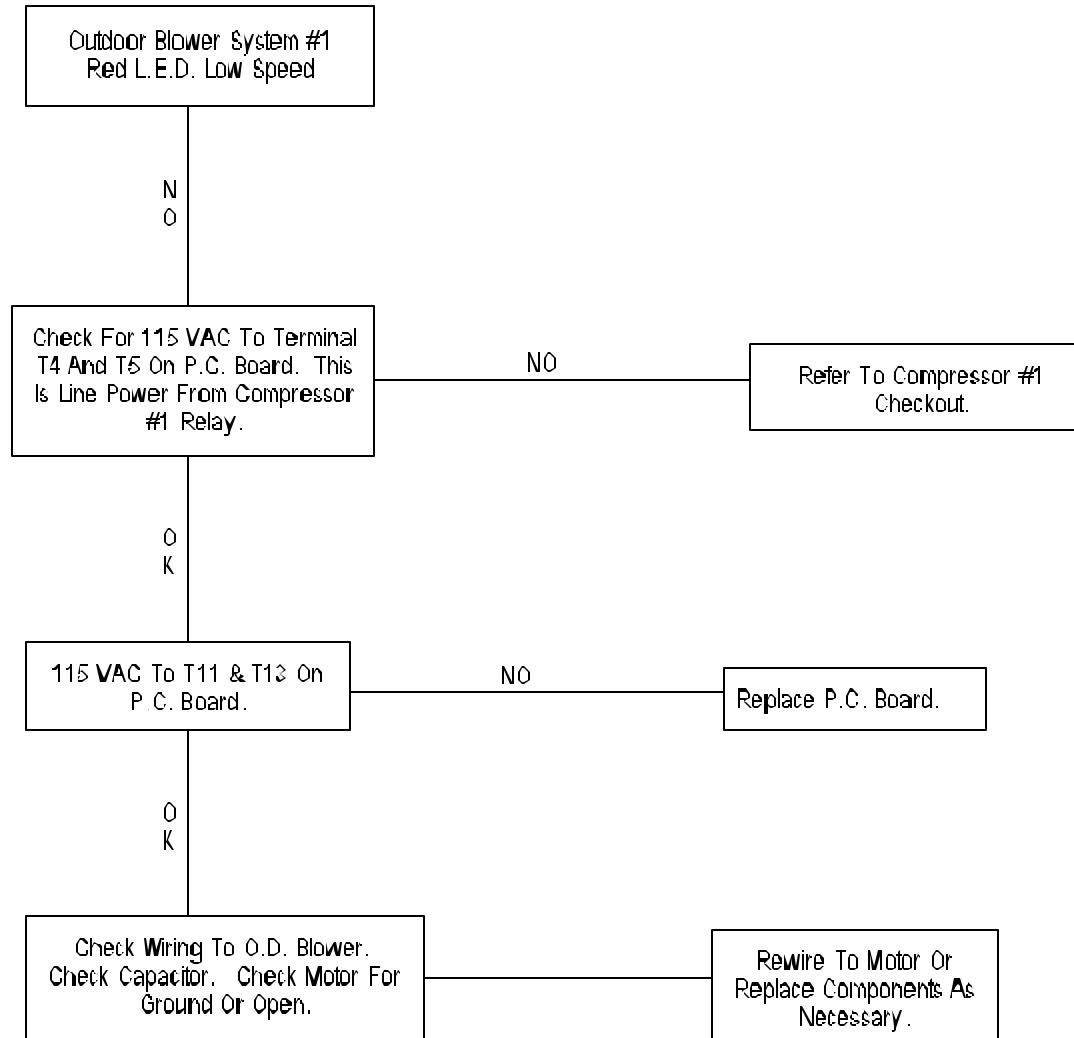


Note:

Reversing valve solenoid is energized in the electric heat mode. Once the reversing valve solenoid has energized, the p.c. board locks the valve into an energized position until the wall thermostat is placed in the cool position and actually has a demand for cooling.

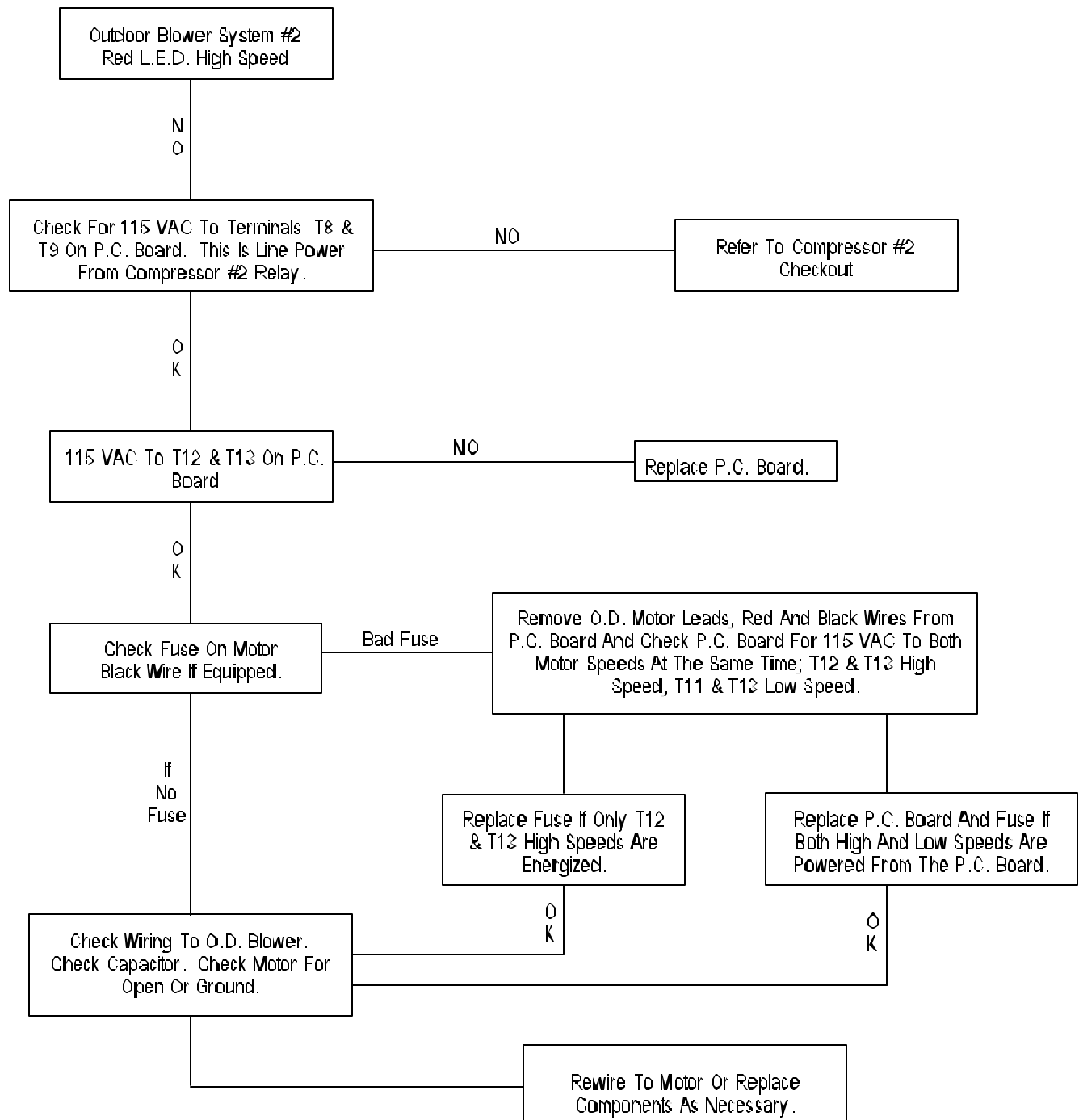
12C. OUTDOOR BLOWER MOTOR HEATING OR COOLING MODE

12C.1 No Outdoor Blower Low Speed

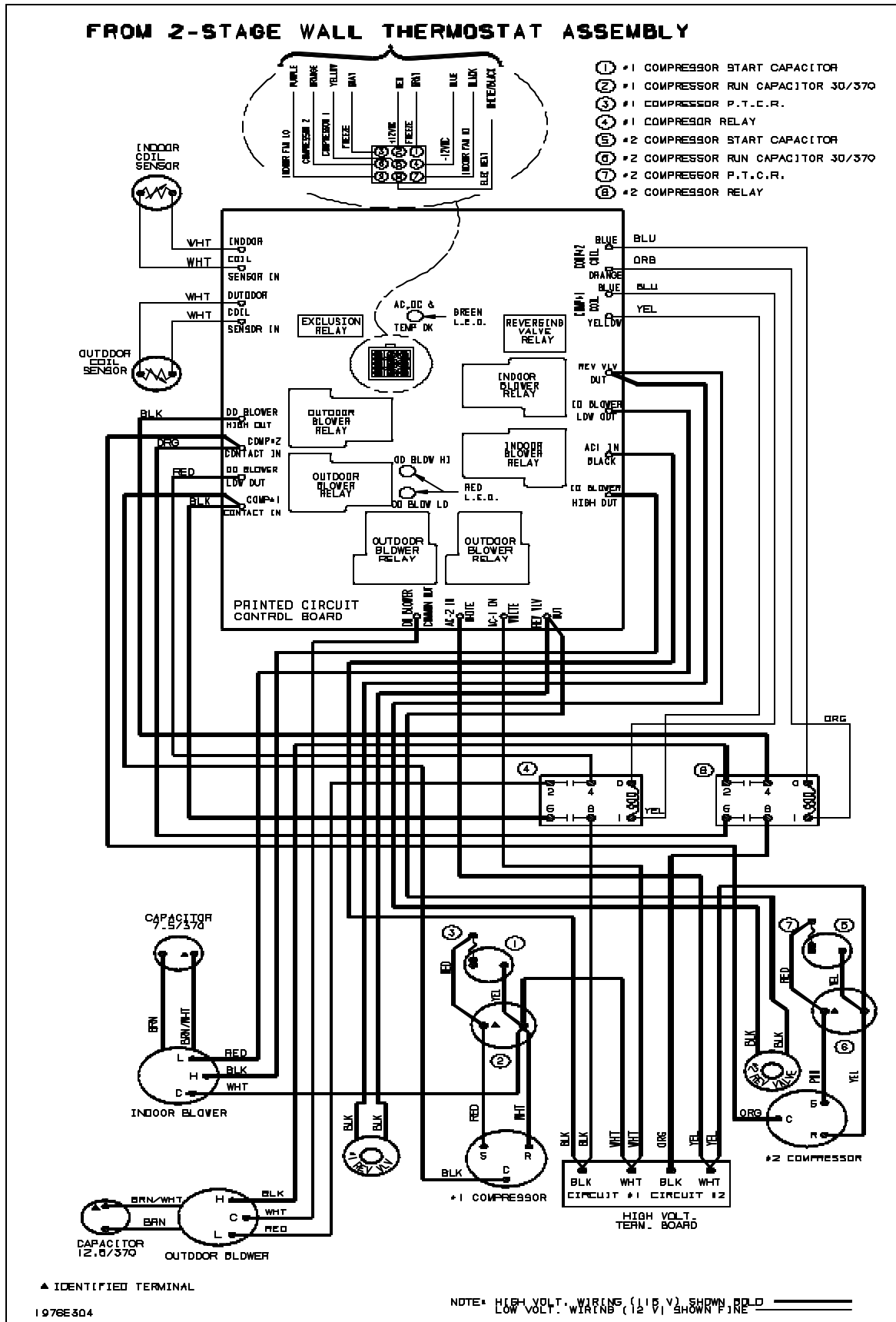


12C. OUTDOOR BLOWER MOTOR HEATING OR COOLING MODE

12C.2 No Outdoor Blower High Speed



13. WIRING DIAGRAM





RV Products
A Division of Airxcel, Inc.
P.O. Box 4020
Wichita, KS 67204



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Follow proper safety practices. If in doubt, consult a professional RV technician.