Quality Refrigeration

INTELA-TRAUL®
MASTER SERVICE MANUAL

For All Full Size Undercounter, G-Series and R&A Series Refrigerator, Freezer, Dual-Temp and Hot Food Unit Controllers

Traulsen
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Form Number TR35705, revised 10/04

TABLE OF CONTENTS

I. GENERAL INFORMATION

I. a - HOW TO USE THIS MANUAL:

Traulsen provides this manual as an aid to the service technician in installation, operation, and maintenance of INTELA-TRAUL® Controllers. When used properly, this service manual can help the service technician maintain, troubleshoot and diagnose most of the problems and malfunctions that may occur with the Controllers.

This manual covers the four different types of Controllers (**Full Size Undercounter, G-Series, R&A Series Refrigerator & Freezer,** and **R&A Series Hot Food**). These vary slightly from one another, all exceptions are noted, and where appropriate separate sections are provided.

While we believe that most aspects of the controllers are covered in this manual, should you encounter a condition not addressed, or require a wiring diagram please contact:

Traulsen
4401 Blue Mound Road Fort Worth, TX 76106
Attn: Service Department
Phone: (800) 825-8220 or (817) 625-9671
Fax: (817) 740-6757

All service communication must include:

- Model Number & Serial Number Of Unit
- A detailed explanation of the problem

I. b - ABOUT INTELA-TRAUL:

The Traulsen INTELA-TRAUL and G-Series microprocessor controls are microprocessor based systems which replace several electromechanical components typically built into refrigeration products, such as: time clocks, thermometers, defrost limit switches and temperature controls, all combined into one solid state modular unit.

These microprocessor controls both monitor a cabinet air sensor and a coil sensor. The INTELA-TRAUL on the R & A Series also includes a discharge line sensor and a relative humidity sensor (H1 versions only). In conjuction with the programmed parameters of the control, and the information received, it cycles the refrigeration system ON and OFF at set temperatures, initiates and/or terminates defrost cycles, and initiates one of several alarm features if a problem is sensed (R & A Series only). R & A Series controls also allow the operator to cycle the door perimeter heaters ON/OFF as needed.

I. c - OPERATING THE CONTROLLER:

When operating the controller it is important to note that you only have approximately 20-30 seconds between button pushes. If you take longer than 30 seconds, the controller will revert back to displaying the cabinet temperature.If you enter the wrong security code, the controller will revert back to displaying the cabinet temperature. You can exit the parameters at any time by waiting 20-30 seconds for the control to return to normal operation.

II. BASIC SERVICE PROCEDURES

II. a - ADJUSTING THE TEMPERATURE:

The Display Will Read

Step 1: Press SET. Display will read "CUS." 

Step 2: Press SET. Display will read "000" with the left digit flashing. 

Step 3: Press SET. Display will read "000" with the center digit flashing. 

Step 4: Press ▼ until the center digit changes to an "A". 

Step 5: Press SET. Display will read "0A0" with the right digit flashing. 

Step 6: Press ▲ until the right digit changes to an "1". 

Step 7: Press SET. Display will read "SPH". 

Step 8: Press SET again.

Step 9: Press ▲ or ▼ to adjust temperature to desired setting.

(NOTE: SPH should be set at 38 to 40°F for refrigerators and 0°F for freezers)

Step 10: When display reads the desired temperature press SET. 

Step 11: Press ▼ until display reads "SPL". 

Step 12: Press SET.

Step 13: Press ▲ or ▼ to adjust temperature to desired setting.

(NOTE: SPL should be set at 34°F for refrigerators and -4°F for freezers)

Step 14: Press SET.

Step 15: Press ◄ to exit (R & A Series only). On G-Series models the controller will automatically revert back to normal temperature display operation after a delay of approximately 20-30 seconds.

II. BASIC SERVICE PROCEDURES

II. b - STARTING A MANUAL DEFROST CYCLE (R & A Series):

The Display Will Read

Step 1: Press SET. Display will read "CUS." — CUS

Step 2: Press SET. Display will read "000" with the left digit flashing. — 000

Step 3: Press SET. Display will read "000" with the center digit flashing. — 000

Step 4: Press ▼ until the center digit changes to an "A". — 0A0

Step 5: Press SET. Display will read "0A0" with the right digit flashing. — 0A0

Step 6: Press ▲ until the right digit changes to an "1". — 0A1

Step 7: Press SET. Display will read "SPH". — SPH

Step 8: Press ▼ until the control reads "Sd," Start Manual Defrost. — Sd

Step 9: Press SET. Display will read "n" (NO). — n

Step 10: Press ▲ or ▼. Display will read "4" (YES). — 4

Step 11: Press SET. Controller will display "SPH" for 30 seconds and — SPH

then "DEF" will appear.

NOTE: The controller will automatically revert back to normal operation after a delay of approximately 20-30 seconds.

NOTE:
Traulsen R & A Series refrigerator models also include an off-cycle defrost feature, which occurs once an hour. This is indicated by the control display, is time or temperature terminated, and generally is of 3 - 10 minutes in duration.

II. BASIC SERVICE PROCEDURES

II. c - STARTING A MANUAL DEFROST CYCLE (G-Series):

	The Display Will Read
Step 1: Press SET. Display will read "CUS."	CUS
Step 2: Press SET. Display will read "000" with the left digit flashing.	000
Step 3: Press SET. Display will read "000" with the center digit flashing.	000
Step 4: Press ▼ until the center digit changes to an "A".	0A0
Step 5: Press SET. Display will read "0A0" with the right digit flashing.	0A0
Step 6: Press ▲ until the right digit changes to an "1".	0A1
Step 7: Press SET. Display will read "SPH".	SPH
Step 8: Press ▼ until the control reads "Sd," Start Manual Defrost.	Sd
Step 9: Press SET. Display will read "n" (NO).	n
Step 10: Press ▲ or ▼. Display will read "4" (YES).	4
Step 11: Press SET. Display will then read "SPH," Start Manual Defrost.	SPH

Step 14: Press ▲ or ▼ to scroll to the next parameter, otherwise the controller will automatically revert back to normal operation after a delay of approximately 20-30 seconds.

NOTE:
Traulsen G-Series refrigerator models also include an off-cycle defrost feature, which occurs once an hour. This is indicated by the control display, is time terminated, and is generally of 3 - 10 minutes in duration.

The defrost cycle on Traulsen G-Series freezer models can be either time or temperature terminated.

III. TROUBLESHOOTING

III. a - CHECKING FOR DEFECTIVE SENSORS:

The Display Will Read

Step 1: Press SET. Display will read "CUS." 

Step 2: Press SET. Display will read "000" with the left digit flashing. 

Step 3: Press SET. Display will read "000" with the center digit flashing. 

Step 4: Press ▼ until the center digit changes to an "A". 

Step 5: Press SET. Display will read "0A0" with the right digit flashing. 

Step 6: Press ▲ until the right digit changes to an "1". 

Step 7: Press SET.

Step 8: Press ▲ until display reads "EL". Press SET. 

If the display now reads "-40," check for loose connection on the EVAPORATOR sensor. If the display has a very high reading such as "266," replace the evaporator sensor.

NOTE: Erroneous readings may be the result of a faulty sensing circuit (open or shorted) in the Controller.

Step 9: Press ▲ until the display reads "DL[1]". Press SET. 

In the event that the display now reads "-40," check for a loose connection on the DISCHARGE LINE sensor. If the display has a reading of "220" or higher, check for lack of adequate air-flow through the condenser, a bad condenser motor, or any other condition around the unit which could cause a high temperature, such as a steam table or a crossdraft. Otherwise, proceed with replacing the DISCHARGE LINE sensor.

NOTE: Erroneous readings may be the result of a faulty sensing circuit (open or shorted) in the Controller.

Step 10: Press ▲ until the display reads "AA[2]". Press SET. 

Display should read the approximate ambient air temperature behind the louver panel. If the display reads "111" check for a loose connection on the RH/AMBIENT AIR sensor. If the display reads "32.0" check the sensor for a short circuit.

NOTE: If display reads -40 or 266 the cabinet sensor is defective and requires replacement.

NOTE: Ambient Air Sensor not included on MIT version controllers.

NOTE: Erroneous readings may be the result of a faulty sensing circuit (open or shorted) in the Controller (on H1 control version only).

1= DL is not included on G-Series controllers.
2= AA is not available with MIT version controllers.

III. TROUBLESHOOTING

III. b - CHECKING FOR FAILED RELAYS:

Checking For A Failed Internal Controller Relay:

1. **Gain access to Controller compressor relay (see REMOVAL INSTRUCTIONS within this service manual for the specific type of controller your are servicing).**
2. **Locate the connector with the black/blue/purple wires and unplug it. Refer to the schematic on the side of the controller, or refer to the appropriate wiring diagram (to obtain this please contact the factory, referencing the serial numberof the unit involved).**
3. **Using a volt/ohm meter (VOM) with the power OFF, check the resistance across the black to blue wires of the Controller connector. If completed circuit is indicated (with no power to the Controller), the contacts are stuck closed and the Controller should be replaced (on MIT versions either the relay box or one of the other relays within the unit need to be replaced).**

Checking For A Failed External "Slave" Relay or Solid State Relay (SSR), p/n 337-60360-01 (MIT II Only):

1. **Gain access to the controller compressor relay (see REMOVAL INSTRUCTIONS within this service manual for the specific type of controller your are servicing).**
2. **Locate the external "slave" relay and unplug the harness connectors.**
3. **Using a volt/ohm meter (VOM), check the resistance from the "COM" terminal to the "NO" terminal. If a completed circuit is indicated, the contacts are stuck closed and the slave relay should be replaced.**
4. **For the SSR, remove the black and blue wires from terminals 3 & 4. Using a volt/ohm meter, and with the power OFF, measure the resistance across the terminals. A completed circuit indicates that the circuit is closed and that the relay should be replaced. A reading of 25 mΩ to 35 mΩ is considered normal for an open circuit in the SSR.**

Checking For A Failed Door/Light Relay (R & A Series models only):

1. **Gain access to Controller door relay (see REMOVAL INSTRUCTIONS within this service manual for the specific type of controller your are servicing).**
2. **Remove the wire from the door relay coil.**
3. **Using a volt/ohm meter (VOM), check across the relay contacts. If an open across the contacts is not indicated, replace the door relay.**

NOTE: Equipment manufactured with the MIT II controller version do not include a Door/Light relay).

4. **Physically check the switch for evidence of water. If switch has water in it, proceed with replacing the switch.**

III. TROUBLESHOOTING

III. c - CHECKING FOR OTHER FAILED COMPONENTS:

Checking For A Failed Door Switch:

1. **Remove the door(s) from the unit involved.**
2. **Locate the door switch, which is located behind the top door hinge(s).**
3. **Remove the switch from the cabinet.**
4. **Using a volt/ohm meter (VOM), check across the switch contacts. "COM" to "NO" should read open. If not, replace the switch.**
5. **Reinstall the switch and hinge onto the cabinet.**

NOTE: If the unit has more than one door, check ALL door switches in the same manner as described in steps 1 thru 5 above.

Checking For A Failed Controller Transformer (H1 & MIT I control versions only):

1. **Check incoming voltage. Voltage at the unit must be within the ranges shown in the table below.**

VOLTAGE		
MIN	**MAX**	**STANDARD**
104 VAC	**126 VAC**	**115/60/1**
187 VAC	**253 VAC**	**208-230/60/1**
10.2 Volts (MIT 12.4)	**13.8 Volts (MIT 14.7)**	**Transformer Output Voltage**

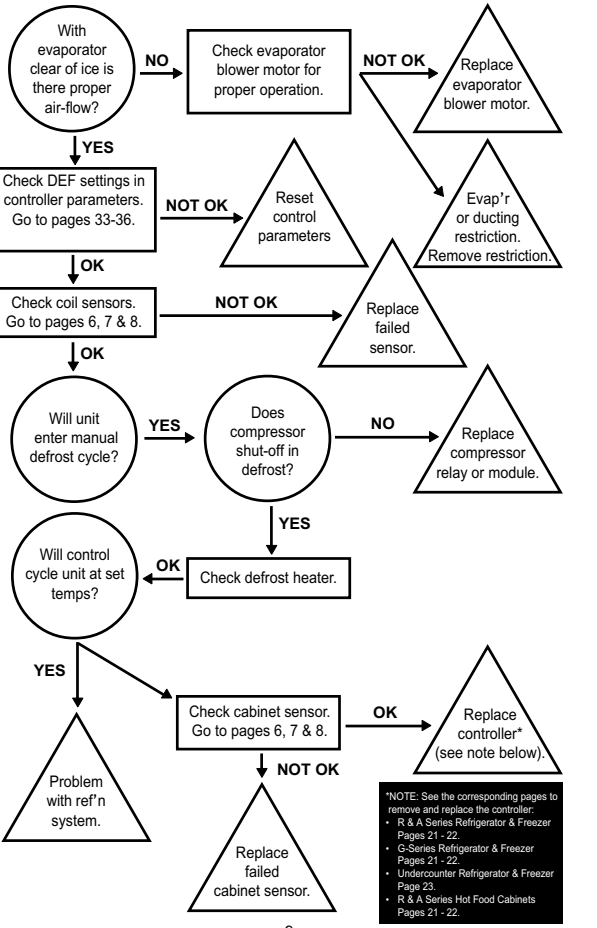
2. **If the controller display does not come back on, use a volt/ohm meter (VOM) and check the output voltage of the controller transformer.**
3. **If the output voltage from the transformer is not within the range shown in the table above, replace the transformer. If the transformer tests OK, replace the controller instead.**
4. **For equipment manufactured with the MIT II controller version the transformer is mounted inside the relay module. Check between 17 and 8 on 18 pin connector on relay module for 12V DC.**

Checking Cabinet, Coil or Discharge Line Sensors:

1. **Gain access to CABINET, COIL or DISCHARGE LINE sensor and disconnect it.**
2. **Place tip if sensor probe in a mixture of icewater for several minutes. Allow enough time for sensor probe to aclimate to the icewater.**
3. **At 32°F, probe resistance shoud be 32.7K Ohms, +/- 10%. If resistance is not within this range, repalce the sensor.**

III. TROUBLESHOOTING

III. d - CHECKING FOR ICED EVAPORATOR COIL:

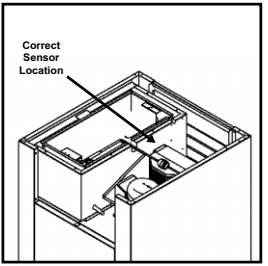


III. TROUBLESHOOTING

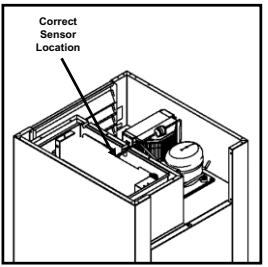
III. e - PROPER SENSOR PLACEMENT:

Coil Sensor:
The coil sensor should be inserted into the return air side of the evaporator coil. On freezer models only this sensor should be centered approximately 2" (two inches) from the top (horizontally through coil - centered in coil).

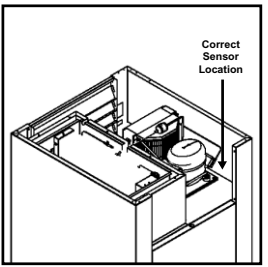
On refrigerator models this sensor should be mounted on top of the coil.



Cabinet Air Sensor:
The cabinet air sensor should be mounted inside the evaporator housing (hump) on the return air side of the evaporator coil.

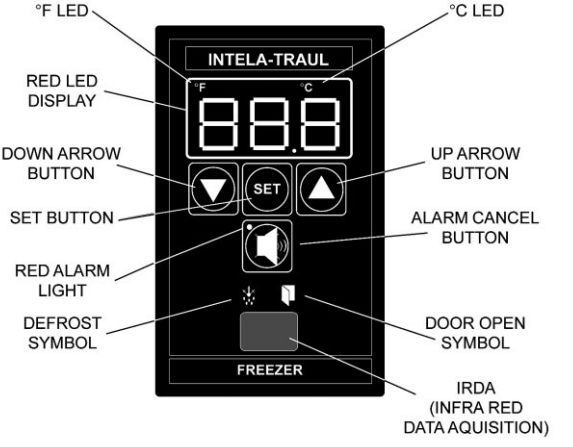


Discharge Sensor (R & A Series Only):
The discharge air sensor should be mounted on the hot gas side of the compressor. Placement should be as close to the compressor as possible and must be placed prior to the beginning of the hot gas loop. Please note that discharge sensors must be insulated.



IV. CONTROL ARCHITECTURE

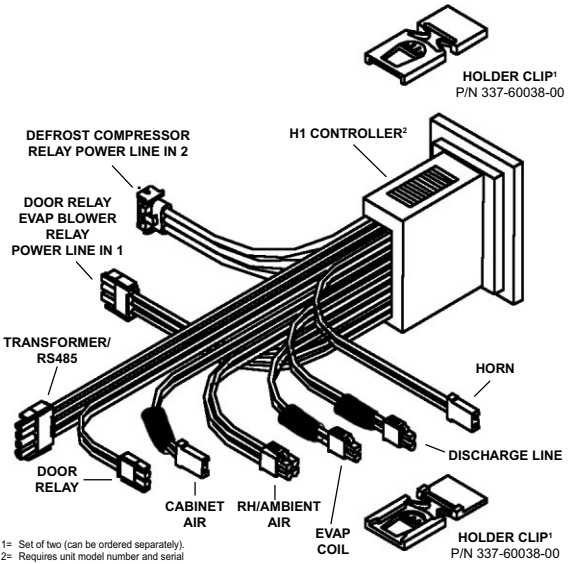
IV. a - R & A SERIES REFRIGERATOR & FREEZER VERTICAL CONTROLLER:



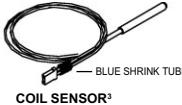
NOTES: IRDA not included on equipment manufactured with the MIT II control version.

See parts assembly on pages 12-13.

IV. CONTROL ARCHITECTURE



1= Set of two (can be ordered separately).
2= Requires unit model number and serial number to place order.



COIL SENSOR[3]
P/N 337-60071-02

DISCHARGE SENSOR[3]
P/N 337-60072-00

CABINET SENSOR[3]
P/N 337-60069-02

HORN[3]
P/N 337-60070-00

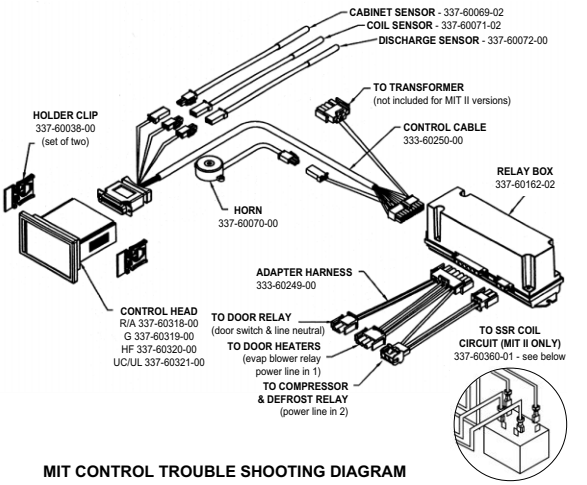
RH SENSOR[3]
P/N 337-60080-00
(control versions H only)

3= Component can be ordered separately.

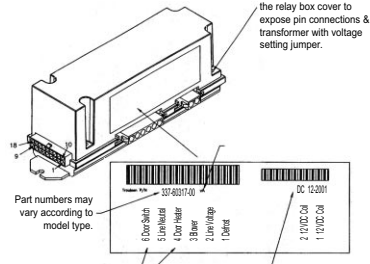
IV. CONTROL ARCHITECTURE

IV. b - R & A SERIES REFRIGERATOR & FREEZER VERTICAL CONTROLLER:

Parts assembly for H1 thru MIT control versions only



MIT CONTROL TROUBLE SHOOTING DIAGRAM



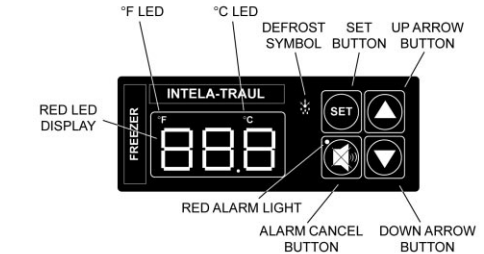
NOTE

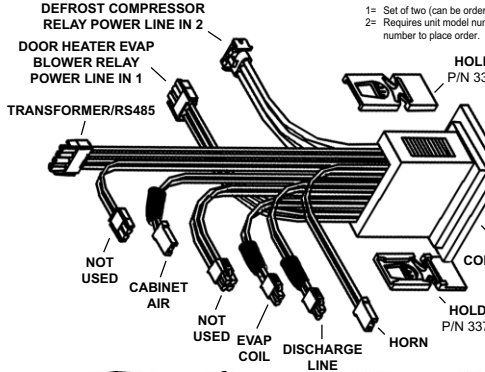
All pins in this connection should not read more than 20 VAC

Connector Pin No.	Color	Signal
1	Gray	Blower*
2	Orange	Door Heater*
3	Green	Alarm From Controller
4		
5		
6	Brown	
7	White/Purple	-RS485
8	Black	Ground
9	Yellow/Red	12 VAC
10	Blue	Compressor*
11	Purple	Defrost*
12	Yellow	Door Open Signal
13	Red	Power to Horn
14	Orange	
15	White	
16	Pink	+RS485
17	Red	12 VDC to Controller
18		

IV. CONTROL ARCHITECTURE

IV. c - <u>UC & UL (UNDERCOUNTER) HORIZONTAL CONTROLLER</u>:





1= Set of two (can be ordered separately).
2= Requires unit model number and serial number to place order.

COIL SENSOR³
P/N 337-60071-02

DISCHARGE SENSOR³
P/N 337-60072-00

CABINET SENSOR³
P/N 337-60069-02

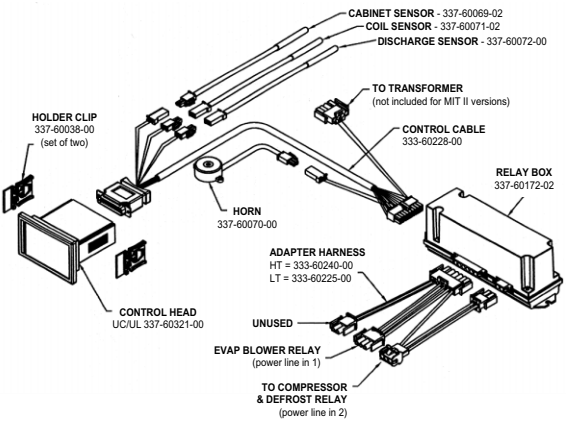
GREEN SHRINK TUBE

HORN³
P/N 337-60070-00

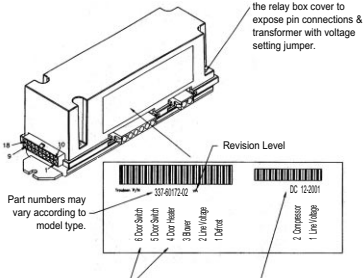
3= Component can be ordered separately.

IV. CONTROL ARCHITECTURE

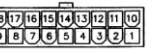
IV. c - UC & UL (UNDERCOUNTER) HORIZONTAL CONTROLLER:
Parts assembly for MIT control version only



MIT CONTROL TROUBLE SHOOTING DIAGRAM



NOTE
All pins in this connection should not read more than 20 VAC

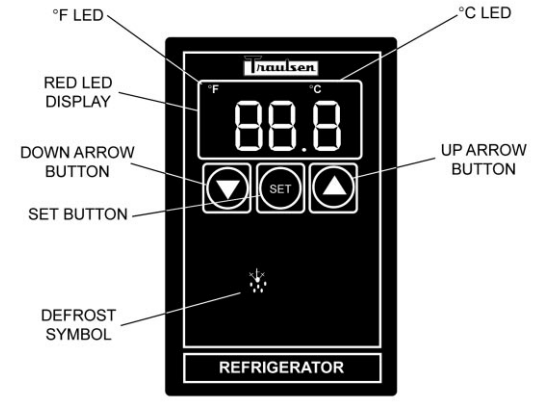


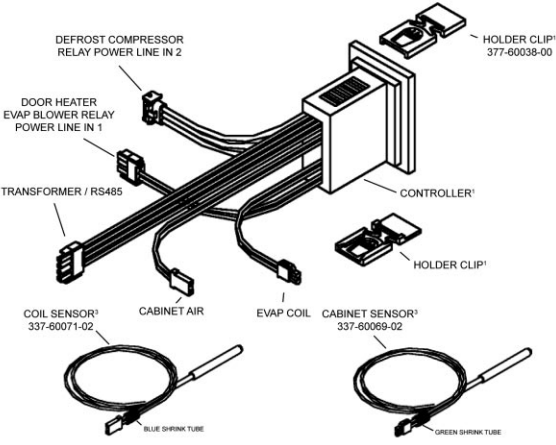
Connector Pin No.	Color	Signal
1	Gray	Blower*
2	Orange	Door Heater*
3	Green	Alarm From Controller
4	Black	Return From Horn
5		
6		
7	White/Purple	-RS485
8	Black	Ground
9	White	12 VAC
10	Blue	Compressor*
11	Purple	Defrost*
12	Yellow	Door Open Signal
13	Red	Power to Horn
14		
15		
16	Pink	+RS485
17	Red	12 VDC to Controller
18	Black	12 VAC

*Voltage should not be more than 5 DC when measured to ground (pin 8).

IV. CONTROL ARCHITECTURE

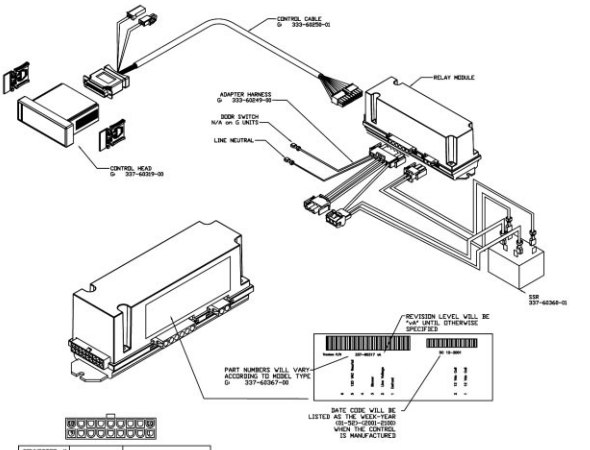
IV. d - G-SERIES REFRIGERATOR & FREEZER VERTICAL CONTROLLER:





IV. CONTROL ARCHITECTURE

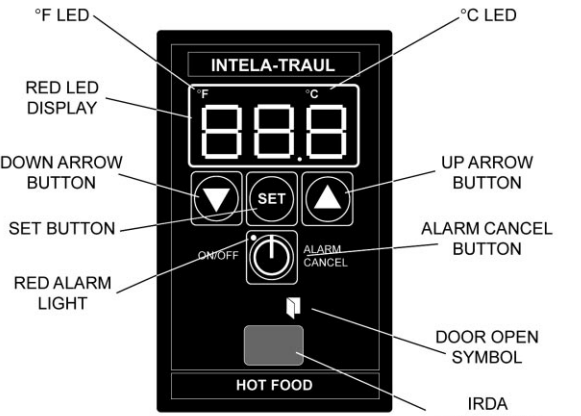
IV. d - <u>G-SERIES REFRIGERATOR & FREEZER VERTICAL CONTROLLER</u>:



CONNECTOR J1 PIN NUMBER	COLOR	SIGNAL
	GRAY	BLOWER
1		
2		
3		
4		
5		
6		
7	BLACK	GROUND
8	YELLOW/RED	POWER LINE FAILURE
9	BLUE	DOOR LINE
10	PURPLE	DEFROST
11		
12		
13		
14	ORANGE	5 VDC FROM CONTROLLER
15		
16		
17	RED	12 VDC TO CONTROLLER
18		

IV. CONTROL ARCHITECTURE

IV. e - R-SERIES HEATED CABINET VERTICAL CONTROLLER:



NOTES: IRDA not included on equipment manufactured with MIT II control version.

See parts assembly on pages 17-18.

HOT FOOD CABINET START-UP (pre-MIT version):
When power is first applied to the unit, you must set the temperature by pressing the "SET" and "UP ARROW" buttons at the same time using equal pressure with both thumbs, until the temperature appears on the display. Next, use the "UP" button to reach the desired temperature (maximum 180°), then press and release the "SET" button to lock it in.

After this is done you can turn the control ON and OFF by pressing and releasing the "ALARM CANCEL" button.

Be aware to watch for the display constantly reading "OFF". This is an indication of a possible faulty cabinet sensor. To remedy, replace the sensor and reset the operating temperature.

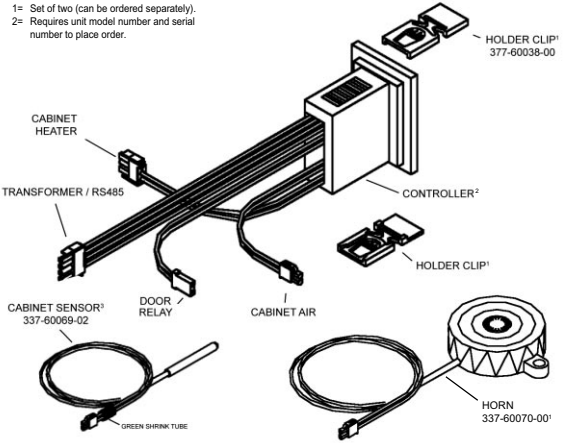
HOT FOOD CABINET START-UP (MIT version):
The MIT control offers an additional means of turning the cabinet heaters ON and OFF. After the operating temperature has been set, the operator can continuously turn the unit OFF and then back ON again to the same operating temperature by pressing the "ON/OFF" button on the face of the control.

Please note that this feature will not function if the control is in an alarm state with the alarm LED illuminated.

IV. CONTROL ARCHITECTURE

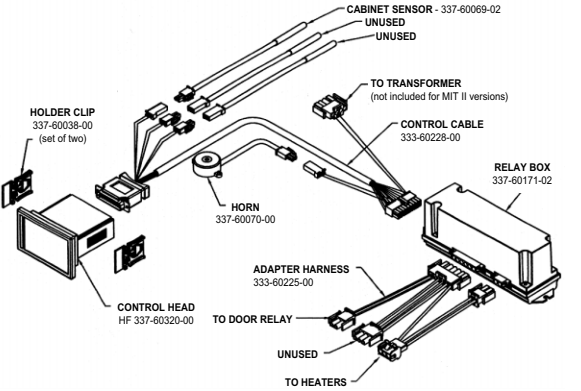
IV. e - <u>R-SERIES HEATED CABINET VERTICAL CONTROLLER</u>:
Parts assembly for H1 control versions only

1= Set of two (can be ordered separately).
2= Requires unit model number and serial number to place order.

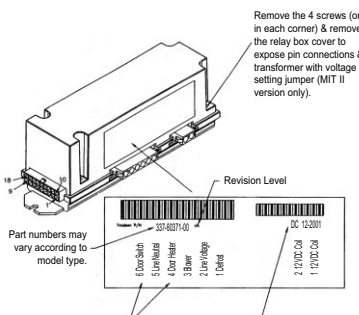


IV. CONTROL ARCHITECTURE

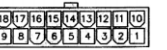
IV. e - R-SERIES HEATED CABINET VERTICAL CONTROLLER:
Parts assembly for MIT control versions only



MIT CONTROL TROUBLE SHOOTING DIAGRAM



NOTE
All pins in this connection should not read more than 20 VAC



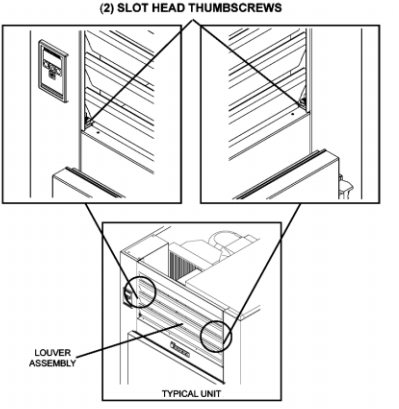
Connector Pin No.	Color	Signal
1	Gray	Blower*
2	Orange	Door Heater*
3	Green	Alarm From Controller
4	Black	Return To Horn
5		
6		
7	White/Purple	-RS485
8	Black	Ground
9	White	12 VAC
10	Blue	Compressor*
11	Purple	Defrost*
12	Yellow	Door Open Signal
13	Red	Power to Horn
14		
15		
16	Pink	+RS485
17	Red	12 VDC to Controller
18	Black	12VAC

*Voltage should not be more than 5 DC when measured to ground (pin 8).

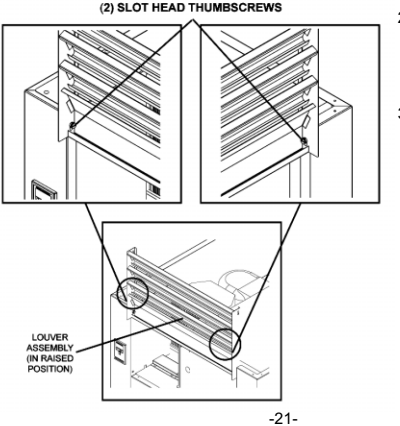
V. REMOVAL/INSTALLATION

V. a - ALL VERTICAL CONTROLLERS:

To remove INTELA-TRAUL® (p/n's 337-60090-00, 337-60091-00 and 337-60092-00) and G-Series (p/n's 337-60093-00, 337-60094-00 and 337-60095-00) Vertical Controller from the unit in which it is installed, proceed as follows (If unable to access the unit from the rear perform steps 1 through 3, otherwise, proceed to step 4):



1. At front of unit, remove two (2) slot head thumb screws from bottom corners of louver assembly. Set thumbscrews aside.



2. Swing louver assembly up and away from front of unit until it stops.

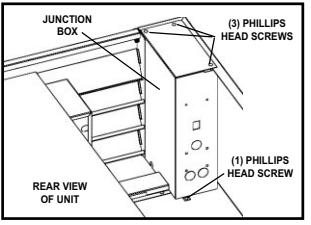
3. Remove two (2) Slot head thumb-screws from top of louver assembly. Set thumbscrews and louver assembly aside.

V. REMOVAL/INSTALLATION

WARNING: DISCONNECT ALL POWER BEFORE PROCEEDING

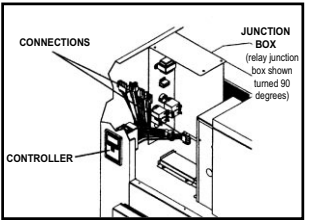
4. At the top of the junction box, remove three (3) Phillips head screws. Set screws aside.

5. Locate one (1) Phillips head screw at bottom of junction box, and remove. Set screw aside.



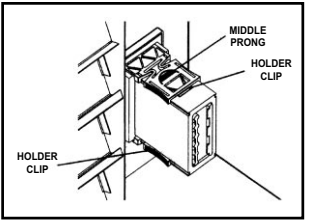
6. Carefully slide junction box away from front of unit until all wiring and connections to the controller are exposed.

7. Locate all nine (9) Controller connections (five for G-Series), then carefully disconnect each one.

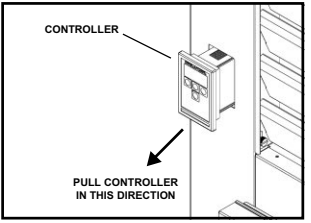


8. Firmly grasp and compress the rounded portion of the middle prong on each holder clip. Slowly slide each holder clip off the controller. Set clips aside.

NOTE:
Be sure ALL components have been disconnected from the Controller before performing the next step.



9. Slowly pull Controller through mounting hole and set aside.

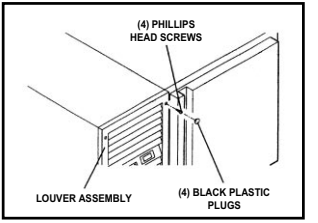


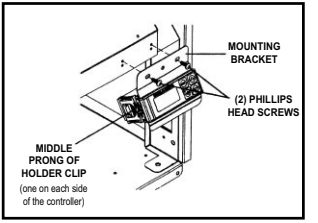
TO RE-INSTALL CONTROLLER, REVERSE THE PRECEEDING PROCEDURE.

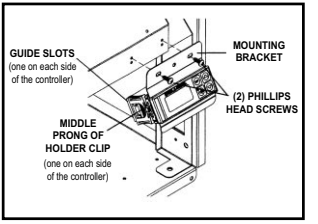
V. REMOVAL/INSTALLATION

V. a - ALL HORIZONTAL CONTROLLERS:
To remove INTELA-TRAUL® (p/n's 337-60096-00 and 337-60097-00) Horizontal Controller from the unit in which it is installed, proceed as follows:

WARNING: DISCONNECT ALL POWER BEFORE PROCEEDING







1. Check to make sure that the power cable is disconnected from the wall.
2. Remove the four (4) black plugs that are located in each corner of the power pack louver assembly. Set plugs aside.
3. Remove the four (4) Phillips head screws holding the louver assembly in place. Set screws and louver assembly aside.
4. Remove the two (2) Phillips head screws thathold the Controller and the bracket assembly to the condenser fan assembly. Set screws aside.
5. Locate all nine (9) Controller connections, then carefully disconnect each one.
6. Firmly grasp and compress the rounded portion of the middle prong on each holder clip. Slowly slide each holder clip off the Controller. Set clips aside.

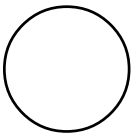
TO RE-INSTALL CONTROLLER, REVERSE THE PRECEEDING PROCEDURE.

VI. PROBLEM DIAGNOSIS

VI. a - HOW TO USE THE TROUBLESHOOTING TREES:

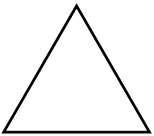
The troubleshooting trees on the following pages were developed as an aid to the service technician in determining the exact solution to a certain problem or malfunction. When used as designed, the troubleshooting trees can lead you from a general symptom to the most likely component to suspect as the cause of the problem.

The trees are made up of three different types of boxes:



QUESTION

CHECK



SOLUTION

QUESTION

Boxes ask a yes/no question and the answer will lead to either another question box, a check box, or a solution box.

CHECK

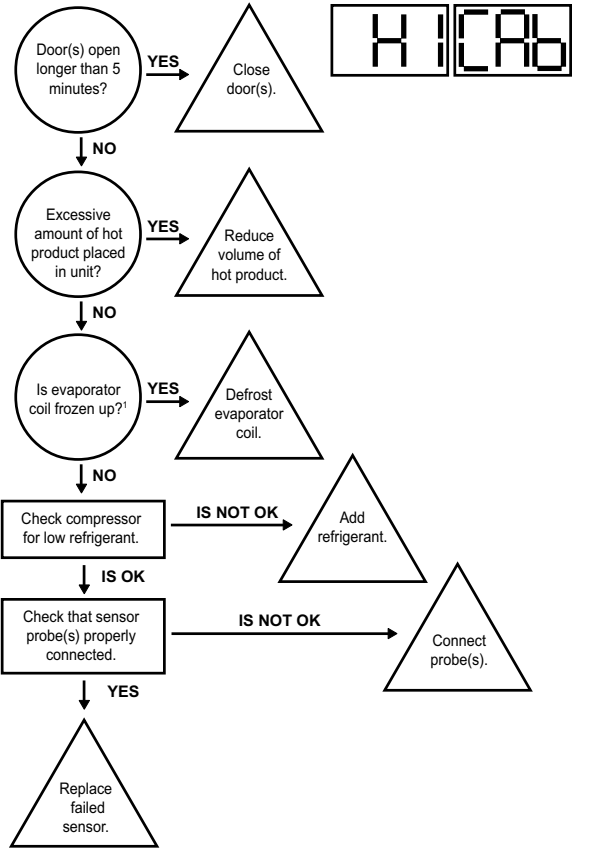
Boxes will suggest a point to check for proper operation, and will often refer you to a page in either the SERVICE INFORMATION or the REMOVAL/INSTALLATION sections of this manual. The result of the check may lead to another box, or a solution box.

SOLUTION

Boxes suggest the most likely component to cause the malfunction described in the heading of the tree. When reaching a solution box, do not immediately assume the component is defective. The final step is to use the SERVICE INFORMATION section of this manual to verify that the component is defective.

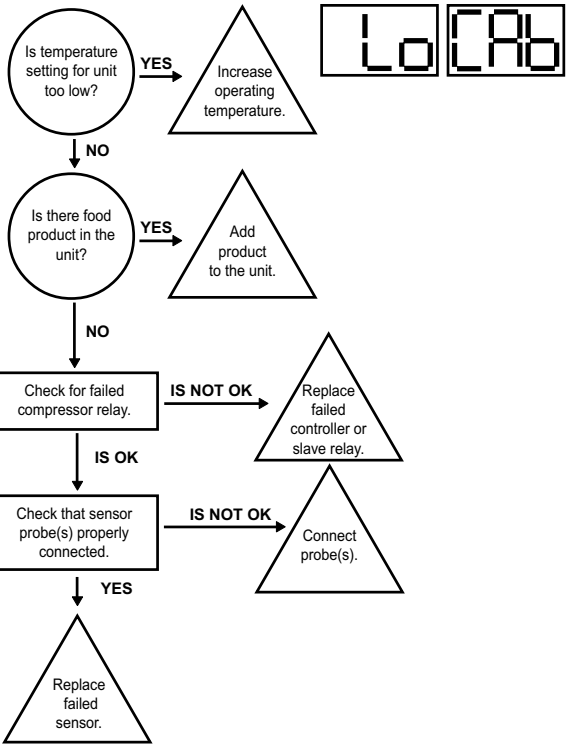
To use the troubleshooting trees, first find the page with the heading describing the type of problem occurring. Begin at the top of the page and follow the tree, step-by-step. When a check box is reached, refer to the suggested section to make the check suggested. Once a solution box is reached, refer to the suggested section to verify that the component in the solution box is indeed defective, and repair or replace per the direction in that section.

VI. b- HIGH TEMPERATURE ALARM



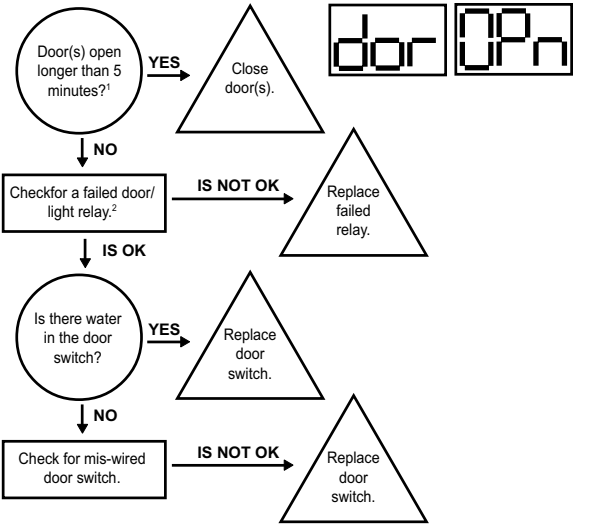
1= See procedure on page 9.

VI. c- LOW TEMPERATURE ALARM



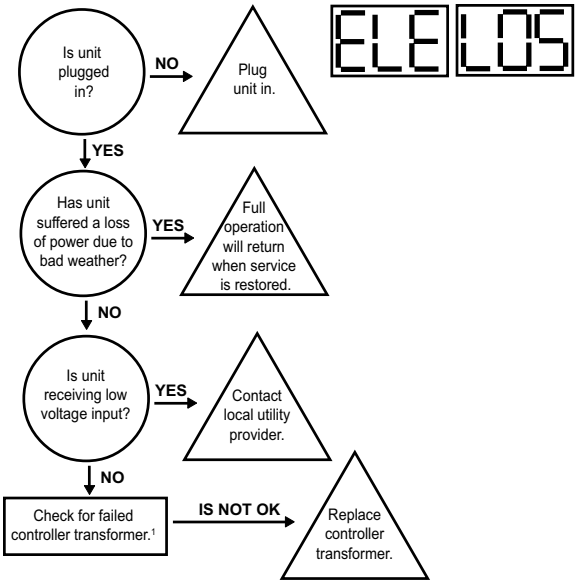
NOTE ON HOT FOOD UNITS ONLY
Hot food units are designed to hold hot food at set temperature. The cabinet is not designed to heat cold products.

VI. d- DOOR OPEN ALARM



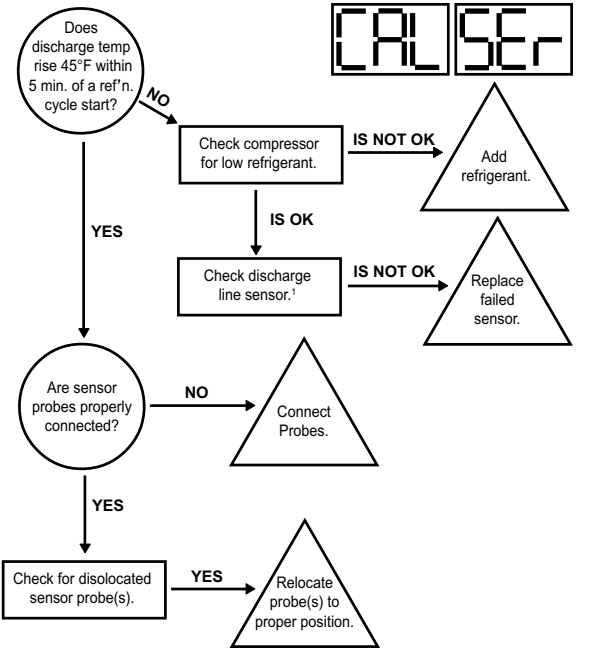
1= H1 and MIT 1 control versions only.
2= See procedure on page 7.

VI. e- POWER LOSS ALARM



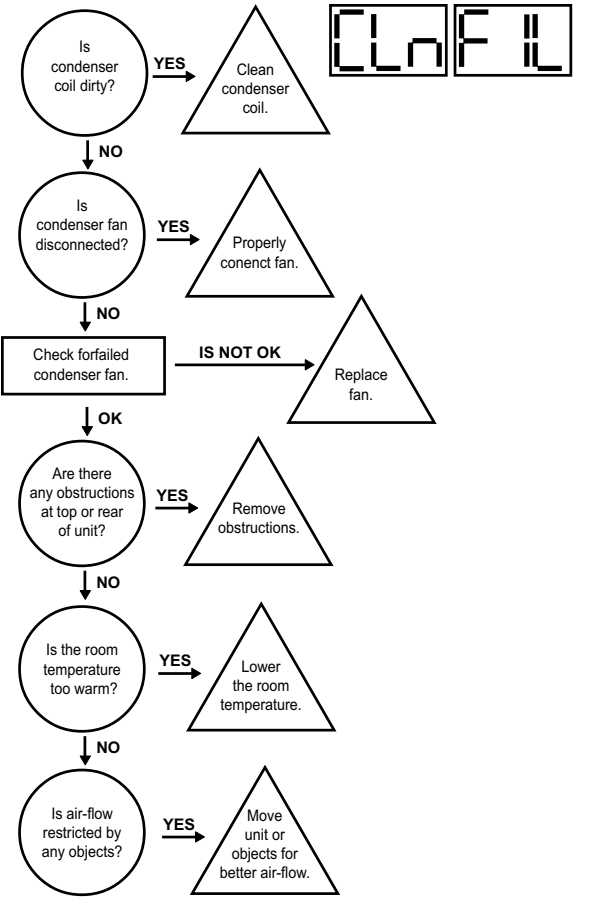
1= See procedure on page 8.

VI. f- SYSTEM LEAK ALARM



1= See procedure on page 8.

VI. g - CONDENSERCLEAN ALARM



VII. ACCESSING THE ENGINEERING LEVEL

VII. a - ACCESSING THE ENGINEERING LEVEL:
Not all control parameters can be adjusted at the customers level of access. To adjust these other parameters it is first necessary to gain access to the ENGINEERING LEVEL. Please follow the below procedure in order to enter this level.

	The Display Will Read
Step 1: Press SET . Display will read "CUS."	
Step 2: Press ▼ until "EnG" is displayed.	
Step 3: Press SET . Display will read "000" with the left digit flashing.	
Step 4: Press ▼ until the left digit changes to an "9".	
Step 5: Press SET . Display will read "900" with the center digit flashing.	
Step 6: Press ▼ until the center digit changes to an "9".	
Step 7: Press SET . Display will read "990" with the right digit flashing.	
Step 8: Press ▼ until the right digit changes to an "E".	
Step 9: The display will read (99E), press SET .	
Step 10: Press ◐ . The display will now read "FOC" - See Note.	

NOTE: R & A Series Only, for G-Series models press ▼ for the control to display "FOC."

VIII. CONTROL PARAMETERS

VIII. a - <u>PARAMETER DESCRIPTIONS</u>:

FOC 3-digit code which identifies the .hex file loaded at the factory.
ADR Device address for NAFEM networks.
BAU Communications rate when connected into a NAFEM network.
NAF Allow the control to communicate with a NAFEM network.
SPH High value of desired cabinet temperature range.
SPL Low value of desired cabinet temperature range.
SHL Lowest temperature of allowed range for setting of SPH.
SHH Highest temperature of allowed range for setting of SPH.
SLL Lowest temperature of allowed range for setting of SPL.
SLH Highest temperature of allowed range for setting of SPL.
RO Difference, in degrees, between displayed & measured temperature.
HI The highest temperature the cabinet air temperature is allowed to reach before triggering a High-Temp alarm.
LO The lowest temperature the cabinet air temperature is allowed to reach before triggering a Low-Temp alarm.
SCL Sets the temperature display scale (fahrenheit or celsius).
HAD Time, in minutes, that the controller delays triggering the High-Temp alarm at any start-up or at the end of a defrost cycle.
LAD Time, in minutes, that the controller delays triggering the Low-Temp alarm if cabinet air temperature equal or below SPL setting.
AC The amount of time, in minutes, that the compressor must be off between cycles.
DEF Defines the type of heat used to defrost the coil: Electric, Hot Gas, None or Off-Cycle.
IBD The amount of time, in hours, between the end of the drip time& start of the next defrost cycle.
DDC The maximum amount of time, in minutes, that the heat will be on during a defrost cycle.
CDE The temperature of the evaporator coil that indicates the end of a defrost heat cycle.
DDE The amount of time, in minutes, between the defrost heat being turned off and the compressor turning on.
BDD The delay time, in minutes, between the end of the drip time and and before the evaporator blower turns on.
BSD The temperature of the evaporator coil that triggers the evaporator blower to turn on after drip time ends.
ODD The maximum amount of time, in minutes, that the display will read the last temperature recorded before entering the defrost cycle.
SD Allows a techinician to start or stop a defrost cycle.
CFA Alows the customer to turn the clogged filter alram ON/OFF (R & A Series only).
CCR The minium amount of time, in minutes, that the compressor must be running before generating a clogged filter alarm.
CDL The discharge line temperature that will trigger a clogged filter alarm.
DOA Allows the customer to turn the door open alarm ON/OFF in units equipped with the appropriate hardware.
DAD The time, in minutes, that a door must be open before triggering a door open alarm.

VIII. CONTROL PARAMETERS

VIII. a - PARAMETER DESCRIPTIONS (continued):

APD The amount of time, in seconds, that a visual alarm text will be displayed.
ATD Alarm temperature delay.
AAS Allows the customer to set the type of audible alarm style, either Blast, OFF or Continuous.
CL Allows the customer to set the time of day.
DAY Allows the customer to set the date.
DS Sets daylight savings time On or OFF.
DL1 Selects the time to start a defrost lockout.
DL2 Selects the time to start a defrost lockout.
DL3 Selects the time to start a defrost lockout.
DL4 Selects the time to start a defrost lockout.
DCF Allows the customer to set the percentage of time that the door perimeter heaters will operate, to control surface condensation.
CON The amount of time the compressor will run in the event of a cabinet air sensor failure.
COF The amount of time, in minutes, that the compressor will be OFF in the event of a cabinet air sensor failure.
EL Displays the evaporator temperature at the time (press set or the up arrow button to display this feature).
DL Displays the discharge line temperature at the time (press set or the up arrow button to display this feature).
CB When activated (by pressing the set or up arrow buttons), will display the cabinet air temperature at the time the button is pressed.
PLn When activated will display the approximate line voltage.
RCO Will energize the compressor relay for 10 seconds when activated.
RdF Will energize the heater relay for 10 seconds when activated.
RFA Will energize the blower relay for 10 seconds when activated.
RDH Will energize the door heater relay for 10 seconds when activated.
Pro Parameter used only when reflashing the program memory.
CEP When activated, will return all of the parameters to the initial factory settings.
REF Displays the revision level of the software loaded into memory.

VIII. CONTROL PARAMETERS

VIII. b - PARAMETER ACCCESS & UNITS OF MEASUREMENT:

H1, MIT I & MIT II CONTROL VERSIONS ONLY

Control Parameter	Description	Access	Unit of Measure
ADR*	Device Address	ENG	
BAU*	Comm. Baud Rate in K	ENG	KBaud
NAF*	NAFEM Communications Enable	ENG	On/Off
SPH	Temperature Set-Point High	CUS	Degree
SPL	Temperature Set-Point Low	CUS	Degree
SHL	Set-Point High/Low	ENG	Degree
SHH	Set-Point High/High	ENG	Degree
SLL	Set-Point Low/Low	ENG	Degree
SLH	Set-Point Low/High	ENG	Degree
RO	Room Offset	CUS	Degree
HI	Upper Temperature Limit	ENG	Degree
LO	Lower Temperature Limit	ENG	Degree
SCL	Temperature Scale	CUS	F or C
HAD	High-Temperature Alarm Delay	ENG	Minute
LAD	Low-Temperature Alarm Delay	ENG	Minute
AC	Anticylcing	ENG	Minute
DEF	Defrost Type	ENG	Electric/Gas/Off
IBD	Intervals Between Defrosts	ENG	Hours
DDC	Maximum Defrost Duration	ENG	Minute
CDE	Coil Temperature At End of Defrost Cycle	ENG	Degree
DDE	Drip Time At End of Defrost Cycle	ENG	Minute
BDD	Blower Delay At Drip Time	ENG	Minute
BSD	BSD After Defrost End	ENG	Degree
ODD	Display Hold After Defrost	ENG	Minute
SD	Start/Stop Defrost	CUS	Start/Stop
CFA	Clogged Filter Alarm	n/a	On/Off
CCR	Clogged Filter Compressor Run Time	n/a	Minute
CDL	Clogged Filter Alarm Temperature	n/a	Degree
DOA	Door Open Alarm	ENG	On/Off
DAD	Door Display Alarm Delay	ENG	Minute
APD	Alarm Pause Delay	ENG	Second
ATD	Alarm Temperature Delay	ENG	Second
AAS	Audible Alarm Style	CUS	On/Off
CL	Set The Clock Time	CUS	H/N/S
DAY	Set The Clock Date	CUS	Y/N/D
DS	Daylight Savings	CUS	On/Off
DL1	Defrost Lockout 1	CUS	Time/Off
DL2	Defrost Lockout 2	CUS	Time/Off
DL3	Defrost Lockout 3	CUS	Time/Off
DL4	Defrost Lockout 4	CUS	Time/Off
DCF	Dewpoint Correction Factor	CUS	%
CON	Compressor Default On Time	ENG	Minute
COF	Compressor Off Time	ENG	Minute
EL	Evaporator Coil Temperature	CUS	Degree
DL	Discharge Line Temperature	CUS	Degree
CB	Cabinet Air Temperature	CUS	Degree
PLn*	Display Line Voltage	ENG	Volts
RCO*	Cycle Compressor Relay	ENG	On/Off
RdF*	Cycle Defrost Relay	ENG	On/Off
RFA*	Cycle Blower/Fan Relay	ENG	On/Off
RDH*	Cycle Door Heater Relay	ENG	On/Off
PRO*	Go To Bootloader For Programming	ENG	
CEP*	Clear EEPROM & Load Defaults	ENG	
REF*	Software Version/Revision/Step	n/a	

*MIT II control version only.

VIII. CONTROL PARAMETERS

VIII. c - G-SERIES PARAMETER SETTINGS (MIT II Control Version):

Control	Freezer Models				Refrigerator Models		
Parameter	GF1	GF2	GF3	GF4	GR1	GR2	GR3
ADR*	2	2	2	2	2	2	2
BAU*	9.6	9.6	9.6	9.6	9.6	9.6	9.6
NAF*	ON	ON	ON	ON	ON	ON	ON
SPH	-5.2	0.1	0.1	32	38.1	39.2	39.2
SPL	-10	-4	-4	26.1	34	37	37
SHL	-8	-3.1	-3.1	30.2	36	39.2	39.2
SHH	-5.2	0.1	0.1	34	40	40	40
SLL	-13	-6.2	-6.2	26.1	32	34	34
SLH	-10	-4	-4	28	34	37	37
RO	0	0	0	0	0	0	0
HI	0.1	5	5	35.2	41	41	41
LO	-18.4	-10	-10	20	30.2	30.2	30.2
SCL	F	F	F	F	F	F	F
HAD	n/a	n/a	n/a	n/a	n/a	n/a	n/a
LAD	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AC	3	3	3	3	3	3	3
DEF	ELE	ELE	ELE	ELE	OFF	ELE	OFF
IBD	4.0	4.0	4.0	4.0	1.0	2.0	1.0
DDC	20	20	20	20	10	20	10
CDE	75	75	75	75	45.1	70	45.1
DDE	2	2	2	2	2	2	2
BDD	1	1	1	1	0	0	0
BSD	32	32	32	32	32	32	32
ODD	10	10	10	10	10	10	10
SD	Starts a new defrost cycle at any time or stops a current defrost cycle.						
CFA	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CCR	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CDL	n/a	n/a	n/a	n/a	n/a	n/a	n/a
DOA	n/a	n/a	n/a	n/a	n/a	n/a	n/a
DAD	n/a	n/a	n/a	n/a	n/a	n/a	n/a
APD	n/a	n/a	n/a	n/a	n/a	n/a	n/a
ATD	n/a	n/a	n/a	n/a	n/a	n/a	n/a
AAS	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CL	Set the hours and minutes in military time.						
DAY	Set the year, month, day of the month and day of the week.						
DS	ON	ON	ON	ON	ON	ON	ON
DL1	OFF	OFF	OFF	OFF	OFF	OFF	OFF
DL2	OFF	11:30am	OFF	OFF	OFF	OFF	OFF
DL3	OFF	5:30pm	OFF	OFF	OFF	OFF	OFF
DL4	OFF	OFF	OFF	OFF	OFF	OFF	OFF
DCF	n/a	n/a	n/a	n/a	n/a	n/a	n/a
CON	19	19	19	19	11	11	11
COF	7	7	7	7	10	10	10
EL	Will display evaporator coil temp in real time every time an arrow is pressed.						
DL	Will display discharge line temp in real time every time an arrow is pressed.						
CB	Will display cabinet air temp in real time every time an arrow is pressed.						
PLn*	Will display power line voltage in real time every time an arrow is pressed.						
RCO*	Turns ON/OFF the compressor relay for 10-seconds or until an arrow is pressed.						
RdF*	Turns ON/OFF the defrost relay for 10-seconds or until an arrow is pressed.						
RFA*	Turns ON/OFF the blower relay for 10-seconds or until an arrow is pressed.						
RDH*	Turns ON/OFF the door heater triac for 10-seconds or until an arrow is pressed.						
PRO*	Set the controller in receiving mode for programming.						
CEP*	Clear all controller memories and reloads the factory default parameters.						
REF*	Firmware revision in the format X9.9 (X=version, 9=major revision, 9=minor revision).						

*MIT II control version only.

VIII. CONTROL PARAMETERS

VIII. d - R-SERIES PARAMETER SETTINGS (MIT II Control Version):

Control	Refrigerator Models							
Parameter	RA1	RA2	RA3	RA4	RA5	RA6	RA7	RA8
ADR	2	2	2	2	2	2	2	2
BAU	9.6	9.6	9.6	9.6	9.6	9.6	9.6	9.6
NAF	ON	ON	ON	ON	ON	ON	ON	ON
SPH	39.2	39.2	39.2	39.2	38.1	38.1	39.2	39.2
SPL	37	37	37	37	34	34	37	37
SHL	39.2	39.2	39.2	39.2	36	36	39.2	39.2
SHH	40	40	40	40	40	40	40	40
SLL	34	34	34	34	32	32	34	34
SLH	37	37	37	37	34	34	37	37
RO	0	0	0	0	0	0	0	0
HI	41	41	41	41	41	41	41	41
LO	30.2	30.2	30.2	30.2	30.2	30.2	30.2	30.2
SCL	F	F	F	F	F	F	F	F
HAD	15	15	15	15	15	15	15	15
LAD	2	2	2	2	2	2	2	2
AC	3	3	3	3	3	3	3	3
DEF	OFF	OFF	OFF	OFF	OFF	OFF	ELE	ELE
IBD	1.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0
DDC	10	10	10	10	10	10	20	20
CDE	45.1	45.1	45.1	45.1	45.1	45.1	70	70
DDE	2	2	2	2	2	2	2	2
BDD	0	0	0	0	0	0	0	0
BSD	32	32	32	32	32	32	32	32
ODD	10	10	10	10	10	10	10	10
SD	Starts a new defrost cycle at any time or stops a current defrost cycle.							
CFA	OFF	ON	OFF	ON	ON	ON	OFF	ON
CCR	20	20	20	20	20	20	20	20
CDL	220.1	220.1	220.1	220.1	220.1	220.1	220.1	220.1
DOA	ON	ON	ON	ON	ON	ON	ON	ON
DAD	15	15	15	15	15	15	15	15
APD	2	2	2	2	2	2	2	2
ATD	10	10	10	10	10	10	10	10
AAS	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
CL	Set the hours and minutes in military time.							
DAY	Set the year, month, day of the month and day of the week.							
DS	ON	ON	ON	ON	ON	ON	ON	ON
DL1	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
DL2	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
DL3	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
DL4	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
DCF	100	100	100	100	100	100	100	100
CON	11	11	11	11	11	11	11	11
COF	10	10	10	10	10	10	10	10
EL	Will display evaporator coil temp in real time every time an arrow is pressed.							
DL	Will display discharge line temp in real time every time an arrow is pressed.							
CB	Will display cabinet air temp in real time every time an arrow is pressed.							
PLn*	Will display power line voltage in real time every time an arrow is pressed.							
RCO*	Turns ON/OFF the compressor relay for 10-seconds or until an arrow is pressed.							
RdF*	Turns ON/OFF the defrost relay for 10-seconds or until an arrow is pressed.							
RFA*	Turns ON/OFF the blower relay for 10-seconds or until an arrow is pressed.							
RDH*	Turns ON/OFF the door heater triac for 10-seconds or until an arrow is pressed.							
PRO*	Set the controller in receiving mode for programming.							
CEP*	Clear all controller memories and reloads the factory default parameters.							
REF*	Firmware revision in the format X9.9 (X=version, 9=major revision, 9=minor revision).							

*MIT II control version only.

VIII. CONTROL PARAMETERS

VIII. e - R-SERIES PARAMETER SETTINGS (MIT II Control Version):

Control Parameter	Freezer Models RF1	RF2	RF3	RF4	RF5
ADR	2	2	2	2	2
BAU	9.6	9.6	9.6	9.6	9.6
NAF	ON	ON	ON	ON	ON
SPH	-15.4	-10	0.1	0.1	-5.2
SPL	-20.2	-15.4	-4	-4	-10
SHL	-15.4	-13.6	-2.2	-2.2	-8
SHH	-10	-10	0.1	0.1	-5.2
SLL	-20.2	-20.2	-6.2	-6.2	-13
SLH	-17	-15.4	-4	-4	-10
RO	0	0	0	0	0
HI	5.2	5.2	5	5	0.1
LO	-25.6	-25.6	-10	-10	-17.8
SCL	F	F	F	F	F
HAD	15	15	15	15	15
LAD	2	2	2	2	2
AC	3	3	3	3	3
DEF	ELE	ELE	ELE	ELE	ELE
IBD	4.0	4.0	4.0	4.0	4.0
DDC	30	20	20	20	20
CDE	55	75	75	70	70
DDE	5	2	2	2	2
BDD	1	1	1	1	1
BSD	-10	32	32	32	32
ODD	10	10	10	10	10
SD	Starts a new defrost cycle at any time or stops a current defrost cycle.				
CFA	ON	OFF	OFF	ON	ON
CCR	20	20	20	20	20
CDL	220.1	220.1	220.1	220.1	220.1
DOA	ON	ON	ON	ON	ON
DAD	15	15	15	15	15
APD	2	2	2	2	2
ATD	10	10	10	10	10
AAS	OFF	OFF	OFF	OFF	OFF
CL	Set the hours and minutes in military time.				
DAY	Set the year, month, day of the month and day of the week.				
DS	ON	ON	ON	ON	ON
DL1	OFF	OFF	OFF	OFF	OFF
DL2	OFF	OFF	OFF	OFF	OFF
DL3	OFF	OFF	OFF	OFF	OFF
DL4	OFF	OFF	OFF	OFF	OFF
DCF	100	100	100	100	100
CON	19	19	19	19	19
COF	7	7	7	7	7
EL	Will display evaporator coil temp in real time every time an arrow is pressed.				
DL	Will display discharge line temp in real time every time an arrow is pressed.				
CB	Will display cabinet air temp in real time every time an arrow is pressed.				
PLn	Will display power line voltage in real time every time an arrow is pressed.				
RCO	Turns ON/OFF the compressor relay for 10-seconds or until an arrow is pressed.				
RdF	Turns ON/OFF the defrost relay for 10-seconds or until an arrow is pressed.				
RFA	Turns ON/OFF the blower relay for 10-seconds or until an arrow is pressed.				
RDH	Turns ON/OFF the door heater triac for 10-seconds or until an arrow is pressed.				
PRO	Set the controller in receiving mode for programming.				
CEP	Clear all controller memories and reloads the factory default parameters.				
REF	Firmware revision in the format X9.9 (X=version, 9=major revision, 9=minor revision).				

VIII. CONTROL PARAMETERS

VIII. f - UNDERCOUNTER PARAMETER SETTINGS (MIT II Control Version):

Control Parameter	UF1	UF2	UP1	UP2
ADR	2	2	2	2
BAU	9.6	9.6	9.6	9.6
NAF	ON	ON	ON	ON
SPH	0.1	38.1	38.1	38.1
SPL	-4	33.8	33.8	33.8
SHL	-0.31	36	36	36
SHH	0.1	40	40	40
SLL	-6.2	32	32	32
SLH	-4	34	34	34
RO	0	0	0	0
HI	5	41	41	41
LO	-10	30.2	30.2	30.2
SCL	F	F	F	F
HAD	15	15	15	15
LAD	2	2	2	2
AC	3	3	3	3
DEF	GAS	GAS	OFF	OFF
IBD	4.0	4.0	1.0	1.0
DDC	20	20	10	10
CDE	75	75	45.1	45.1
DDE	5	2	2	2
BDD	1	1	0	0
BSD	-10	32	32	32
ODD	10	10	10	10
SD	Starts a new defrost cycle at any time or stops a current defrost cycle.			
CFA	OFF	OFF	N/A	OFF
CCR	20	20	N/A	20
CDL	220.1	220.1	N/A	220.1
DOA	OFF	OFF	N/A	OFF
DAD	15	15	N/A	15
APD	2	2	2	2
ATD	10	10	N/A	10
AAS	OFF	OFF	N/A	OFF
CL	Set the hours and minutes in military time.			
DAY	Set the year, month, day of the month and day of the week.			
DS	ON	ON	ON	ON
DL1	OFF	OFF	OFF	OFF
DL2	OFF	OFF	OFF	OFF
DL3	OFF	OFF	OFF	OFF
DL4	OFF	OFF	OFF	OFF
DCF	100	100	100	100
CON	19	19	11	11
COF	7	7	10	10
EL	Will display evaporator coil temp in real time every time an arrow is pressed.			
DL	Will display discharge line temp in real time every time an arrow is pressed.			
CB	Will display cabinet air temp in real time every time an arrow is pressed.			
PLn	Will display power line voltage in real time every time an arrow is pressed.			
RCO	Turns ON/OFF the compressor relay for 10-seconds or until an arrow is pressed.			
RdF	Turns ON/OFF the defrost relay for 10-seconds or until an arrow is pressed.			
RFA	Turns ON/OFF the blower relay for 10-seconds or until an arrow is pressed.			
RDH	Turns ON/OFF the door heater triac for 10-seconds or until an arrow is pressed.			
PRO	Set the controller in receiving mode for programming.			
CEP	Clear all controller memories and reloads the factory default parameters.			
REF	Firmware revision in the format X9.9 (X=version, 9=major revision, 9=minor revision).			

HOURS OF OPERATION:
Monday thru Friday 7:30 am - 4:30 pm CST

Quality Refrigeration

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