

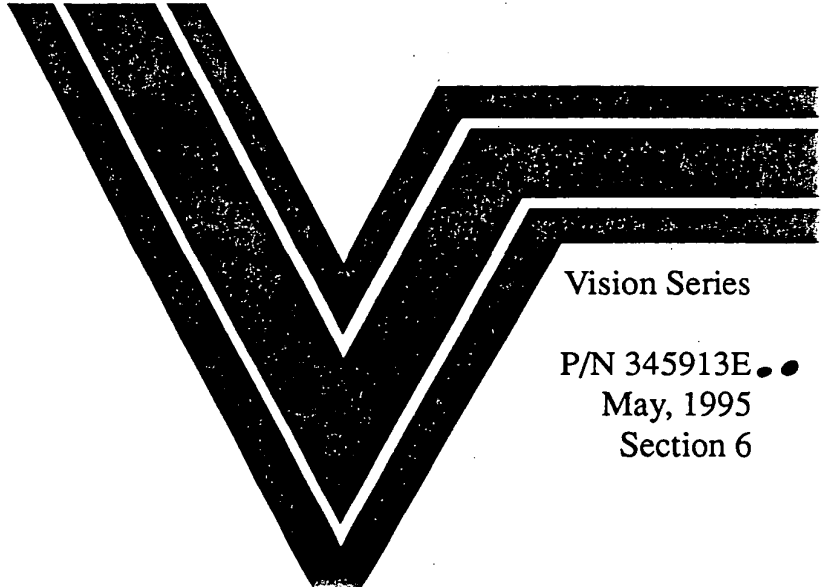


**HUSSMANN®**

**NRF, NRFV, NRC  
NRCV, NRD, NRDV,  
NRFL & NRFLV**

● Reach-in Frozen Food, Ice Cream  
Delicatessen, Dairy and Floral Merchandisers

● Installation &  
Operation Manual



Vision Series

P/N 345913E ●●

May, 1995

Section 6

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## WARRANTY

### REVISION CHANGES (“E”)

1. Parts List, Page iii.
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### IMPORTANT

KEEP IN STORE FOR FUTURE REFERENCE

*Quality that sets industry standards*

This merchandiser conforms to the  
Commercial Refrigeration Manufacturer's Association  
Health and Sanitation Standard

CRS-S1-86

**HUSSMANN**®

12999 St. Charles Rock Road • Bridgeton, MO 63044 USA • (314) 291-2000 • FAX (314) 298-4767

Reach-in

## REPLACEMENT PARTS LIST

Refer to door manufacturer's manual for replacement part numbers of mullion, door frame, perimeter anti-sweat heaters and vertical lighting.

Item	Part Number	Description	Used on
<b>Fans</b>			
1.	0138119	Fan Motor, Evaporator, 120V, 25W, CW EMS ESPL 25 EMV 16	Ice Cream
	0047000	Fan Motor, Evaporator, 120V, 9W, CW GE #5KSM51ECG3799	All Other
2.	0135659	Fan Blade, Evaporator, embossing toward motor Torrington #JU850-6, CW	Ice Cream
	0315470	Fan Blade, Evaporator, part number toward motor Thorsten #8CW34 (plastic)	All Other
<b>Electric Defrost Heaters</b>			
3.	0331741	Rear Finned Defrost Heater 208V, 8.5A, 24Ω	2 Door
	0331742	Rear Finned Defrost Heater 208V, 14.2A, 15Ω	3 Door
	0331743	Rear Finned Defrost Heater 208V, 17.6A, 12Ω	4 Door
	0331744	Rear Finned Defrost Heater 208V, 21.6A, 10Ω	5 Door
4.	0338328	Front Pan Heater-Rod, 208V, 0.5A, (2 required)	2 Door
	0338329	Front Pan Heater-Rod, 208V, 0.8A, (2 required)	3 Door
	0338330	Front Pan Heater-Rod, 208V, 1.1A, (2 required)	4 Door
	0338331	Front Pan Heater-Rod, 208V, 1.4A, (2 required)	5 Door
<b>Gas Defrost Pan Heaters</b>			
5.	0338314	Front Pan Heater 120V 1.1A, (2 required)	2 Door
	0338304	Rear Pan Heater 120V 1.5A, (2 required)	
	0338315	Front Pan Heater 120V 1.6A, (2 required)	3 Door
	0338305	Rear Pan Heater 120V 2.0A, (2 required)	
	0338316	Front Pan Heater 120V 2.2A, (2 required)	4 Door
	0338306	Rear Pan Heater 120V 2.6A, (2 required)	
	0338317	Front Pan Heater 120V 2.8A, (2 required)	5 Door
	0338307	Rear Pan Heater 120V 3.2A, (2 required)	

Item	Part Number	Description	Used on
<b>Defrost Relays and Thermostats</b>			
6.	0342599	Relay-SPST, 208V Coil	Electric
7.	0342598	Relay-SPDT, 120V Coil	Electric and Gas
8.	0338130	Thermostat-Relay Control, $\pm 5^{\circ}\text{F}$ Closes $35^{\circ}$ /Opens $20^{\circ}\text{F}$ (Pilot Duty only)	Electric and Gas
9.	0344662	Thermostat-Heater Limit, Closes $54^{\circ}$ , $\pm 3^{\circ}\text{F}$ /Opens $90^{\circ}$ , $\pm 6^{\circ}\text{F}$	Electric and Gas
10.	0331798	Defrost Termination Thermostat Closes $54^{\circ}$ , $\pm 3^{\circ}\text{F}$ /Opens $24^{\circ}$ , $\pm 6^{\circ}\text{F}$	Electric
	0144732	Adjustable Defrost Termination Thermostat	Gas
<b>Refrigeration Controls</b>			
11.	0125275	Fan Speed Control Lutron #FS5	Floral
12.	0113625	Refrigeration Thermostat Penn #A19AGD-21	All
<b>Horizontal Lighting</b>			
13.	0146742	Ballast 2 lamps, GE #8G1011W	All Med-Temp
	0137843	Ballast 2 lamps, Advance #RS2S110TP	3 Door Low-Temp
	0147091	Ballast 2 lamps, Advance #RC2S85TP	2,4,5 Door Low-Temp
14.	0254417	Fluorescent Lamp, F84T12 CW S	3 Door Med-Temp
	0119501	Fluorescent Lamp, F60T12 CW S	2,4 Door Med-Temp
	0254416	Fluorescent Lamp, -F72T12 CW S	5 Door Med-Temp
	0254418	Fluorescent Lamp, F84T12 CW HO	3 Door Low-Temp
	0119500	Fluorescent Lamp, F60T12 CW HO	2,4 Door Low-Temp
	0137847	Fluorescent Lamp, F72T12 CW HO	5 Door Low-Temp
<b>Vertical Lighting</b>			
15.	0371548	Electronic Ballast, 2 lamp Anthony	3 Door Med and Low
	0371549	Electronic Ballast, 1 Lamp Anthony	All
	0376886	Electronic Ballast, 1 or 2 Lamps Ardco	
16.	0371550	Fluorescent Lamp, F040W-T8 60 inch Anthony Replace with like fixture Ardco	All
<b>Optional 1500ma Lighting</b>			
17.	0106644	Electronic Ballast, 2 lamps	2,4 Door Med and Low
	0366987	Electronic Ballast, 2 lamps	3,5 Door Med and Low
18.	0344045	Fluorescent Lamp, F60T10JCW	2,4 Door Med and Low
	0344046	Flourescent Lamp. F72T10JCW	3,5 Door Med and Low

**MODEL DESCRIPTIONS**

This instruction covers the merchandisers listed below. Basic design features are listed to the right of each merchandiser. The case nomenclature includes the letters to the left plus the number of doors; NRFLV-4 for example. Nomenclature that does not contain the letter V also requires you to specify right- or left-hand door swing. For example, a NRFL-4R is a Floral Merchandiser with four doors; each hinged on the right.

NRF      Reach-in, Frozen Food  
          2, 3, 4, or 5 Doors

NRFV     Reach-in, Frozen Food  
          with vertical lighting  
          2, 3, 4, or 5 Doors

NRC      Reach-in, Ice Cream  
          2, 3, 4, or 5 Doors

NRCV     Reach-in, Ice Cream  
          with vertical lighting  
          2, 3, 4, or 5 Doors

NRD      Reach-in, Dairy and Delicatessen  
          2, 3, 4, or 5 Doors

NRDV     Reach-in, Dairy and Delicatessen  
          with vertical lighting  
          2, 3, 4, or 5 Doors

NRFL     Reach-in, Floral,  
          2, 3, 4, or 5 Doors

NRFLV    Reach-in, Floral,  
          with vertical lighting  
          2, 3, 4, or 5 Doors

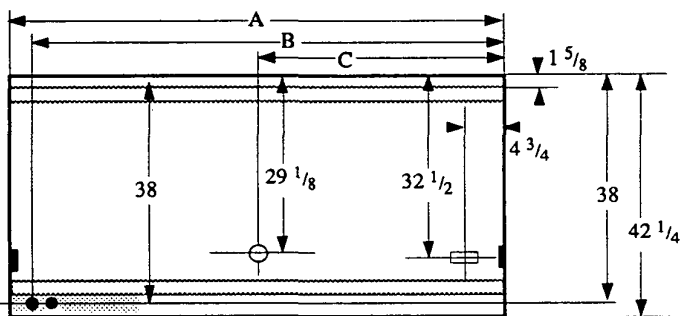
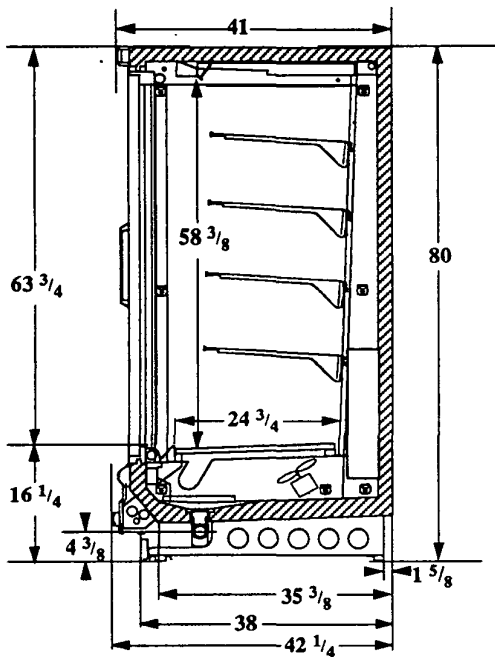
**APPLICATION**

These merchandisers are designed for displaying products in air conditioned stores where temperature and humidity are maintained at or below 75°F dry bulb temperature and 55% relative humidity.

**NOTE:** Plan view and cross section measurements are given in inches.

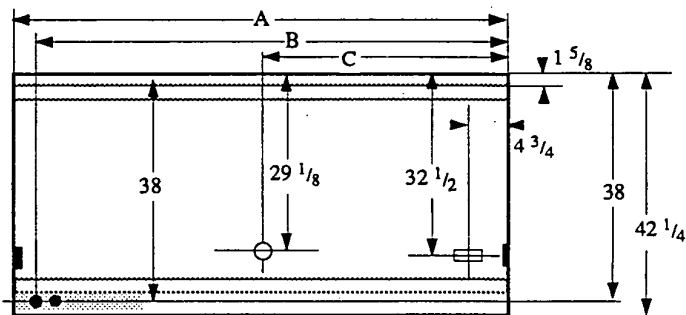
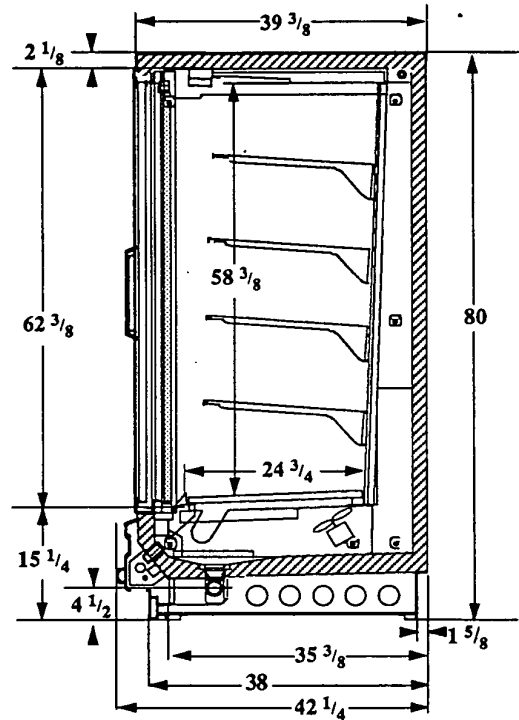
# 1-2 GENERAL INFORMATION

**NRF**   **NRC**   **NRD**   **NRFL**



	Dimension	A	B	C
▨ Electrical Service	2 Door	62	58 3/4	31
○ Waste Outlet	3 Door	92 1/2	89 1/4	46 1/2
□ Refrigeration Outlet	4 Door	122 7/8	119 5/8	61 1/2
■ Passageway Port	5 Door	153 5/8	150 3/8	76 7/8

**NRFV**   **NRCV**   **NRDV**   **NRFLV**



	Dimension	A	B	C
▨ Electrical Service	2 Door	62	58 3/4	31
○ Waste Outlet	3 Door	92 1/2	89 1/4	46 1/2
□ Refrigeration Outlet	4 Door	122 7/8	119 5/8	61 1/2
■ Passageway Port	5 Door	153 5/8	150 3/8	76 7/8

## SHIPPING DAMAGE

All equipment should be thoroughly examined for shipping damage before and during unloading.

This equipment has been carefully inspected at our factory and the carrier has assumed responsibility for safe arrival. If damaged, either apparent or concealed, claim must be made to the carrier.

### Apparent Loss Or Damage

If there is an obvious loss or damage, it must be noted on the freight bill or express receipt and signed by the carrier's agent; otherwise, carrier may refuse claim. The carrier will supply necessary forms.

### Concealed Loss Or Damage

When loss or damage is not apparent until after equipment is uncrated, a claim for concealed damage is made. Upon discovering damage, make request in writing to carrier for inspection within 15 days and retain all packing. The carrier will supply inspection report and required claim forms.

## EXTERIOR LOADING

Do NOT walk on top of merchandisers or damage to the merchandisers and serious personal injury could occur. THEY ARE NOT STRUCTURALLY DESIGNED TO SUPPORT EXCESSIVE EXTERNAL LOADING such as the weight of a person.

## LOCATION

Like other merchandisers, these are sensitive to air disturbances. Air currents passing around the merchandisers will seriously impair their operation. Do NOT allow air conditioning, electric fans, open doors or windows, etc. to create air currents around merchandisers.

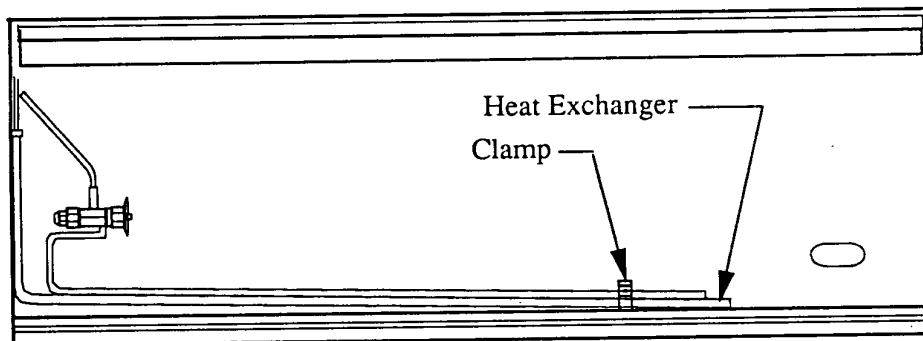
To prevent sweating on the exterior surfaces of merchandisers, there must be A MINIMUM CLEARANCE OF 4 INCHES between the merchandisers and other fixtures or walls.

## SHIPPING BRACES

Move the merchandiser as close as possible to its permanent location and then remove all packaging. Check for damage before discarding packaging. Remove all separately packed accessories such as kits and shelves.

**NOTE:** If the case was shipped with the end installed, two long bolts were used to hold the shipping brace to the end. If the shipping bolts are reinserted after removing the brace, they will extend into the product area. THEREFORE, BE SURE TO REPLACE THESE BOLTS WITH CAP SCREWS.

Locate the clamp on the right-hand end of the heat exchanger (see illustration), and remove it before piping the merchandiser. This clamp was installed to minimize shipping vibration.



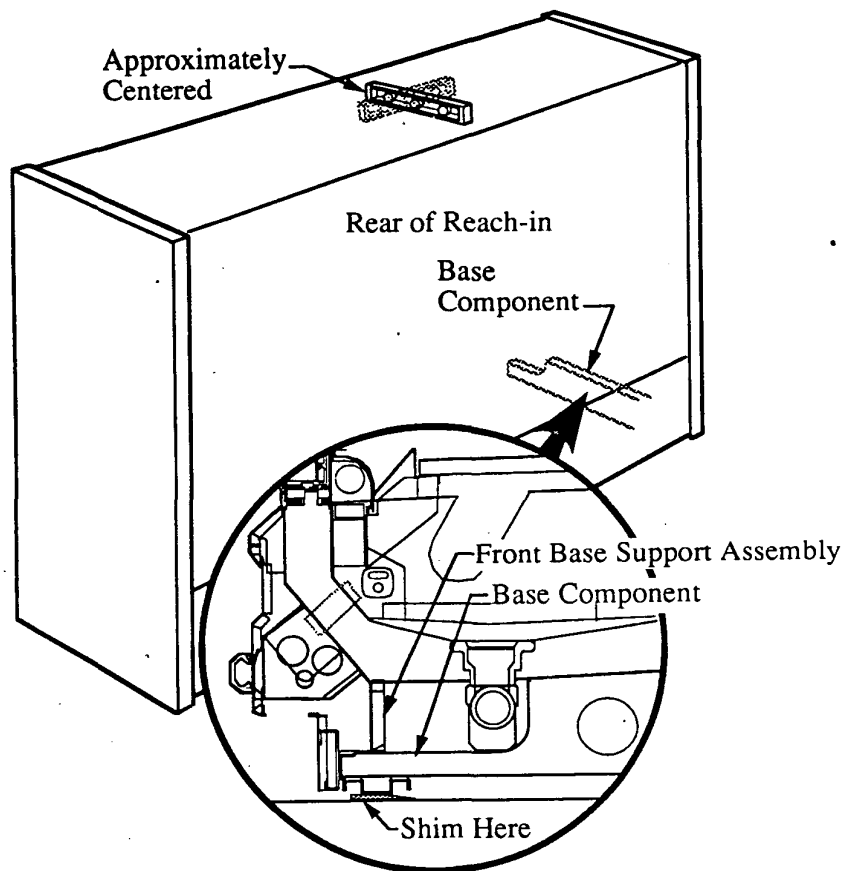
Top View of Merchandiser



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## 2-2 INSTALLATION



### LEVELING

Merchandisers must be installed level to ensure proper operation of the refrigeration system and to ensure proper drainage of defrost water. When leveling merchandisers, use a carpenter's level as shown. Leveling shims or wedges are provided with each merchandiser for use if needed.

**NOTE:** BEGIN LINEUP LEVELING FROM THE HIGHEST POINT OF THE STORE FLOOR.

### DOOR ADJUSTMENT

After leveling and joining the merchandisers, adjust and level doors according to manufacturer's instructions shipped with each product. The doors are not fine adjusted at the factory since they will go out of adjustment during shipment.

### JOINING

Sectional construction means that two or more merchandisers may be joined in line yielding one long continuous display requiring only one pair of ends. Joint kits and instructions are shipped with each merchandiser.

To join like fixtures, a joint assembly is required. To join unlike fixtures, or like fixtures operating at different temperatures, a 1 1/2 inch partition kit is required. To join same temperature fixtures on different defrost cycles, a plexiglass partition kit is required. ALL JOINTS MUST BE AIR-TIGHT TO PREVENT FORMATION OF ICE OR CONDENSATION.

## WASTE OUTLET AND WATER SEAL

The waste outlet is located at the center of each merchandiser allowing drip piping to be run under the fixture lengthwise, to the front or to the rear.

A water seal is supplied with each fixture. The connection between the case and the water seal has a 2 inch diameter. The connection for the drip piping is 1½ inches in diameter. The water seal must be installed to prevent air leakage and insect entrance into the fixture. See illustration.

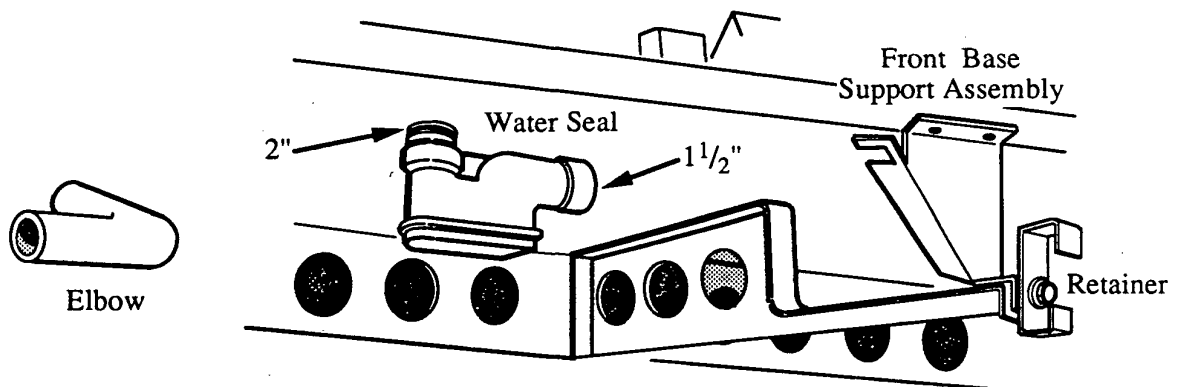
**NOTE:** PVC-DWV solvent cement is recommended. Follow the manufacturer's instructions.

## INSTALLING DRIP PIPING

Poorly or improperly installed drip pipes can seriously interfere with the merchandiser's operation and result in costly maintenance and product losses. Please follow the recommendations listed below when installing drip pipes to ensure proper installation.

1. Never use drip piping smaller than the nominal diameter of the pipe or water seal supplied with the merchandiser.

2. When connecting drip piping, the "water seal" must be used as part of the drip piping to prevent air leakage or insect entrance. Never use two water seals in series in any one drip pipe. **DOUBLE WATER SEALS IN SERIES WILL CAUSE AN AIR LOCK AND PREVENT DRAINING.**
3. Pitch the drip piping in the direction of flow. There should be a minimum pitch of 1/8 inch per foot.
4. Avoid long runs of drip piping. Long runs make it impossible to provide the pitch necessary for good drainage.
5. Provide a suitable air break between flood rim of the floor drain and outlet of drip pipe.
6. Prevent drip pipes from freezing:
  - A. Do NOT install drip pipes in contact with uninsulated suction lines. Suction lines should be insulated with a nonabsorbent insulation material.
  - B. Where drip pipes are located in dead air spaces, such as between merchandisers or between a merchandiser and a store wall, provide means to prevent freezing.



**NOTE:** Only one of the front support brackets may be removed at a time for field piping. If one is removed, it must be reinstalled exactly as it was originally to maintain the structural integrity of the case.

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## 2-4 INSTALLATION

### INSTALLING SPLASHGUARDS

The splashguard is shipped inside each merchandiser. AFTER merchandisers have been leveled and joined, and all drip piping, electrical and refrigeration work has been completed, install the splashguards. The leveling brackets have a maximum extension of one (1) inch for uneven floors.

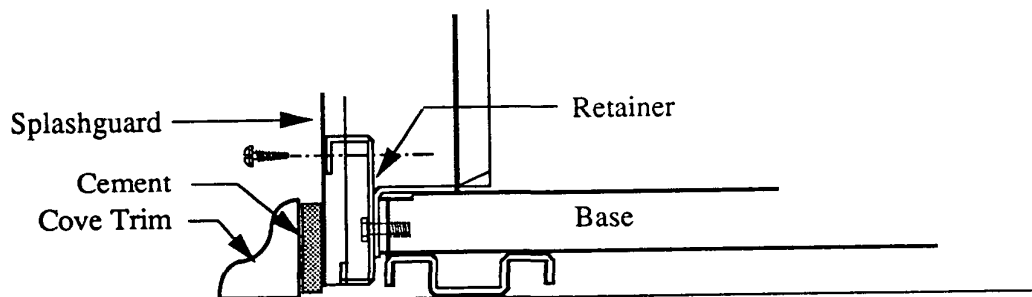
1. Loosely assemble the splashguard and the lower kick rail with #8 x 1/2 sheet metal screws.
2. Hook the lip on the top edge of the kick rail to the bottom lip on the bumper extrusion, and swing assembly into place.
3. With the splashguard positioned on the floor, tighten the sheet metal screws to hold the assembly in place.

### SEALING SPLASHGUARDS TO FLOOR

IF REQUIRED by local sanitation codes or if desired by the customer, the splashguards may be sealed to the floor using a vinyl cove base trim. The size of trim needed will depend on how much the floor is out of level.

To install the trim to the splashguard:

1. Remove all dirt, wax and grease from the area of the splashguard where adhesion will be necessary. This is to ensure a good and secure installation.
2. Apply a good contact cement to the trim and allow proper drying time according to the directions supplied with the cement.
3. Install the trim to the splashguard so that it is lying flush with the floor.



## REFRIGERANT

The correct type of refrigerant will be stamped on each merchandiser's serial plate which is located on the left-hand end of the interior top liner.

## REFRIGERANT PIPING

### Connection Sizes

Liquid Line	3/8 inches OD
Suction Line	7/8 inches OD

### Connection Location

The refrigerant line connections are at the right-hand end of the merchandiser (as viewed from the front) beneath the display pans.

After connections have been made, seal this outlet thoroughly. Seal both the inside and the outside. We recommend using an expanding polyurethane foam insulation.

### Multiplexing

Piping of merchandisers operating on the same refrigeration system may be run from merchandiser to merchandiser through the end frame saddles provided for this purpose. **DO NOT RUN REFRIGERANT LINES THROUGH MERCHANDISERS THAT ARE NOT ON THE SAME REFRIGERATION SYSTEM** as this may result in poor refrigeration control and compressor failure.

**NOTE:** If Gas defrost is used, the liquid line will need to be increased two sizes larger inside the merchandiser area. This is necessary to ensure even liquid drainage from all evaporators during defrost.

### Line Sizing

Refrigerant lines should be sized as shown on the refrigeration legend that is furnished for the store (not furnished by Hussmann). If a legend has not been furnished, refer to Branch Line Piping on page 3-2.

### Oil Traps

P-traps (oil traps) must be installed at the base of all suction line vertical risers.

### Pressure Drop

Pressure drop can rob the system of capacity. To keep the pressure drop to a minimum, keep the refrigerant line run as short as possible using a minimum number of elbows. Where elbows are required, **USE LONG RADIUS ELBOWS ONLY.**

## INSULATION

### With GAS Defrost

The suction and liquid lines should NOT contact each other and should be insulated separately for a minimum of 30 feet from the merchandiser.

### With OTHER Than Gas Defrost

The suction and liquid lines should be clamped or taped together and insulated for a minimum of 30 feet from the merchandiser.

### With EITHER of Above

Additional insulation for the balance of the liquid and suction lines is recommended wherever condensation drippage is objectionable or the lines are exposed to ambient conditions.

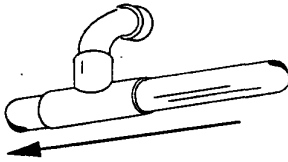
## 3-2 REFRIGERATION

**CAUTION:** THE FOLLOWING INFORMATION IS APPLICABLE ONLY FOR PIPING HUSSMANN MERCHANDISERS TO HUSSMANN REFRIGERATION EQUIPMENT.

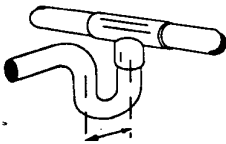
### BRANCH LINE PIPING

#### Suction Line – All Defrosts

- Pitch in direction of flow.
- May be reduced by one size at one third of case run load and again after the second third. Do NOT reduce below evaporator connection size.
- Suction returns from evaporators enter at the top of the branch line.



Suction Line Return



3" Loop

Liquid Line Take Off

#### Liquid Line – Offtime and Electric Defrost

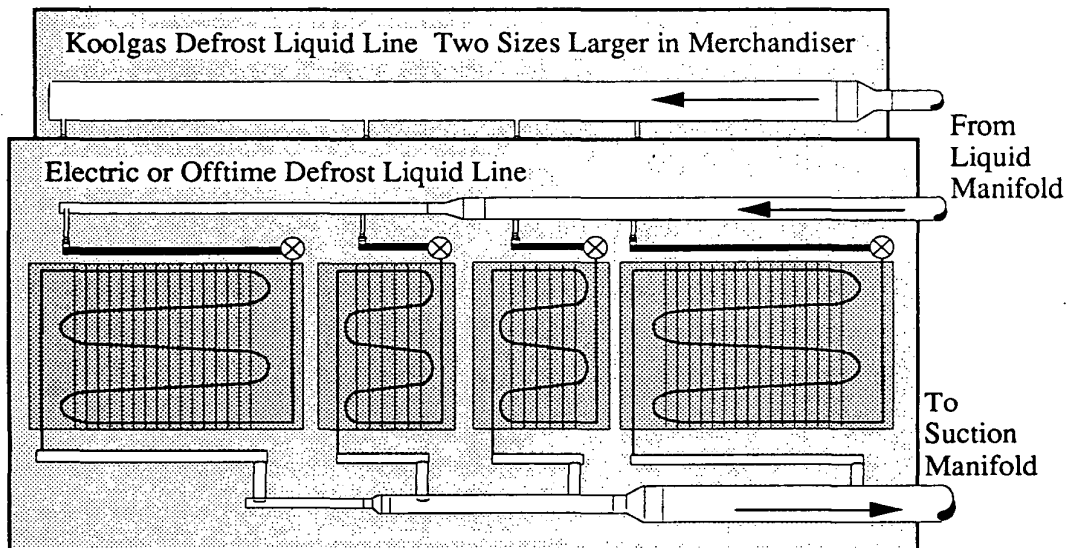
- May be reduced by one size after one half the case load run. Do not reduce below evaporator connection size.
- Take-offs to evaporators exit the bottom of the liquid line. Provide an expansion loop for each evaporator take-off. (Minimum 3 inch diameter.)

#### Liquid Line – Koolgas Defrost

- Maximum of 6 evaporators per Branch System.
- Increase the liquid line size inside the case by two sizes over the branch size.

Branch Size	In Case Size
$\frac{1}{2}$	$\frac{7}{8}$
$\frac{5}{8}$	$1 \frac{1}{8}$
$\frac{7}{8}$	$1 \frac{3}{8}$
$1 \frac{1}{8}$	$1 \frac{5}{8}$
$1 \frac{3}{8}$	$2 \frac{1}{8}$

- Take-offs to evaporators exit the bottom of the liquid line. Provide an expansion loop for each evaporator take-off. (Minimum 3 inch diameter.)



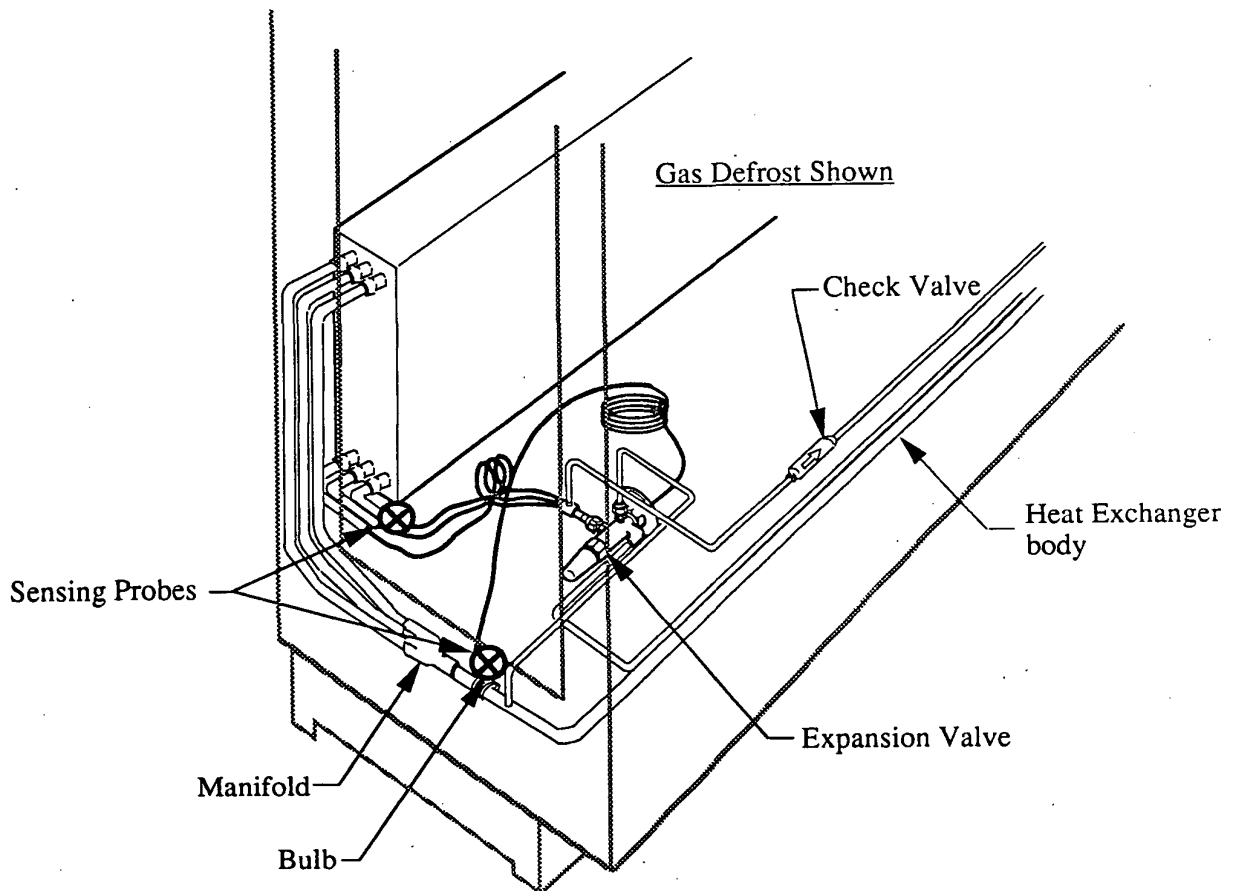
## EXPANSION VALVE ADJUSTMENT

Expansion valves must be adjusted to fully feed the evaporator. Before attempting to adjust valves, make sure the evaporator is either clear or only lightly covered with frost, and that the merchandiser is within 10°F of its expected operating temperature. Adjust valves as follows.

Attach two (2) sensing probes (either thermocouple or thermistor) to the evaporator. Position one under the clamp holding the expansion valve bulb; securely tape the other to the coil inlet line (see illustration).

Some "hunting" of the expansion valve is normal. The valve should be adjusted so that during the hunting **THE GREATEST DIFFERENCE BETWEEN THE TWO PROBES IS 3-5°F**. With this adjustment, during a portion of the hunting the temperature difference between the probes will be less than 3°F (at times as low as 0°F). Make adjustments of no more than 1/4 turn for Balanced Port TEV and 1/2 turn for "G" Body TEV at a time. Wait for at least 15 minutes before rechecking the probe temperature and making further adjustments.

**NOTE:** Gas Defrost has coil inlet at the bottom as shown. Electric Defrost has coil inlet at the top.



## 3-4. REFRIGERATION

### CONTROL SETTINGS — MEDIUM TEMPERATURE

#### Conventional Single Compressor

Measure Discharge Temperature  
at the center of the case  
at the discharge honeycomb.

Merchandiser temperature must be controlled by a thermostat with a 3–6°F differential. It will be wired to control the compressor motor contactor.

Standard Off Time is time terminated. Optional Gas defrost is temperature terminated. The defrost termination thermostats for all the merchandisers on one compressor are wired in series. On outdoor units the defrost timer will control a liquid line solenoid beginning a defrost pumpdown 4 minutes before defrost.

The defrost frequency and lengths listed may require adjustment for specific store conditions.

Factors include:

- Store temperature and humidity
- Low head pressure
- Long refrigerant line runs
- Seasonal changes
- Merchandiser temperature lower than recommended

When practical, defrost when store is closed.

Low pressure control settings are applicable to outdoor condensing units where ambient does not fall below 0°F.

Refrigeration Data			
	Dairy	Deli	Floral
Discharge Air °F	34	30	34
Evaporator °F	27	23	27
Fan Cycling CI/CO			
Gas Defrost ONLY °F	N/A	N/A	N/A
Defrost Data			
Frequency Hrs	24	24	24
Electric			
Temp Term °F	N/A	N/A	N/A
Failsafe Min	N/A	N/A	N/A
Gas			
Duration Min	12	12	12
Offtime			
Duration Min	60	60	60
When Thermostat Controls Temperature			
Low Pres Backup Control CI/CO (PSIG)			
R-22	43/33	39/29	39/29
R-502	52/42	48/38	48/38

### Parallel Compressor Rack

Measure Discharge Temperature  
at the center of the case  
at the discharge honeycomb.

Merchandiser temperature must be controlled by a CDA or EPR. The CDA sensor will be mounted in the same location as a thermostat sensing bulb. The CDA valve and control board will be mounted on the rack.

Standard Off Time and optional Gas defrost are time terminated. The defrost frequency and lengths listed may require adjustment for specific store conditions. Factors include:

- Store temperature and humidity
- Low head pressure
- Long refrigerant line runs
- Seasonal changes
- Merchandiser temperature lower than recommended

Stagger defrosts to maintain stable compressor loading and sufficient defrost gas. When practical, defrost when store is closed.

Refrigeration Data			
	Dairy	Deli	Floral
Discharge Air °F	34	30	34
Evaporator °F	27	23	27
Fan Cycling CI/CO			
Gas Defrost ONLY °F	N/A	N/A	N/A
Defrost Data			
Frequency Hrs	24	24	24
Electric			
Temp Term °F	N/A	N/A	N/A
Failsafe Min	N/A	N/A	N/A
Gas			
Duration Min	12	12	12
Offtime			
Duration Min	60	60	60



## 3-6 REFRIGERATION

### CONTROL SETTINGS — LOW TEMPERATURE

#### Conventional Single Compressor

Measure Discharge Temperature  
at the center of the case  
at the discharge honeycomb.

Merchandise temperature must be controlled by a thermostat with a 3–6°F differential. It will be wired to control the compressor motor contactor.

Standard Electric defrost is temperature terminated. The defrost termination thermostats for all the merchandisers on one compressor are wired in series. Failsafe must not control defrost cycle length, especially when less than 208V power supply is used for defrost heaters, or if frost build up is heavy from shopping demands.

On outdoor units the defrost timer will control a liquid line solenoid beginning a defrost pumpdown 4 minutes before defrost.

Optional Gas defrost is temperature terminated and has fan cycling thermostat. The defrost frequency and lengths listed may require adjustment for specific store conditions. Factors include:

- Store temperature and humidity
- Low head pressure
- Long refrigerant line runs
- Seasonal changes
- Merchandise temperature lower than recommended

When practical, defrost when store is closed.

Low pressure control settings are applicable to outdoor condensing units where ambient does not fall below 0°F.

Refrigeration Data		
	Frozen Food	Ice Cream
Discharge Air °F	-5	-12
Evaporator °F	-11	-19
Fan Cycling CI/CO		
Gas Defrost ONLY °F	20/35	20/35
Defrost Data		
Frequency Hrs	24	24
Electric		
Temp Term °F	54	54
Failsafe Min	40	40
Gas		
Duration Min	20	20
Offtime		
Duration Min	N/A	N/A
When Thermostat Controls Temperature		
Low Pres Backup Control CI/CO (PSIG)		
R-22	11/1	7/0
R-502	17/7	11/1

### Parallel Compressor Rack

Measure Discharge Temperature  
at the center of the case  
at the discharge honeycomb.

Merchandiser temperature must be controlled by a CDA or EPR. The CDA sensor will be mounted in the same location as a thermostat sensing bulb. The CDA valve and control board will be mounted on the rack.

Standard Electric defrost is temperature terminated. Failsafe must not control defrost cycle length, especially when less than 208V power supply is used for defrost heaters, or if frost build up is heavy from shopping demands.

Optional Gas defrost is time terminated and has fan cycling thermostat. The defrost frequency and lengths listed may require adjustment for specific store conditions. Factors include:

- Store temperature and humidity
- Low head pressure
- Long refrigerant line runs
- Seasonal changes
- Merchandiser temperature lower than recommended

Stagger defrosts to maintain stable compressor loading and sufficient defrost gas. When practical, defrost when store is closed.

Refrigeration Data		
	Frozen Food	Ice Cream
Discharge Air °F	-5	-12
Evaporator °F	-11	-19
Fan Cycling CI/CO		
Gas Defrost ONLY °F	20/35	20/35
Defrost Data		
Frequency Hrs	24	24
<b>Electric</b>		
Temp Term °F	54	54
Failsafe Min	40	40
<b>Gas</b>		
Duration Min	20	20
<b>Offtime</b>		
Duration Min	N/A	N/A

## 3-8 REFRIGERATION

### REFRIGERATION THERMOSTAT

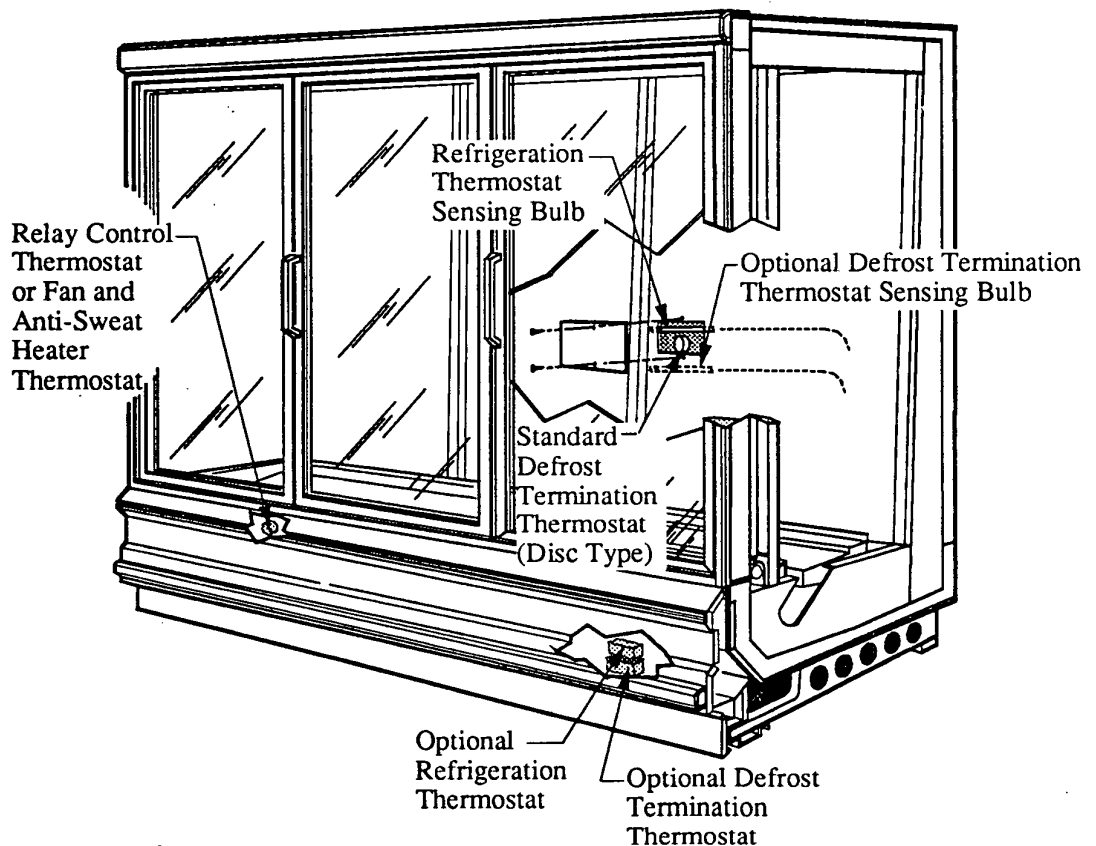
Factory installation of optional thermostat is shown below. The thermostat body is located in the electrical raceway at the right-hand end of the merchandiser. Its sensing bulb is fastened behind an access panel located on the inside back of the merchandiser.

### CDA SENSOR

Factory installed optional CDA sensor is located where the thermostat bulb would normally be located. Its leads will be routed through the electrical raceway and to the rack control panel. Leads are tagged in the raceway.

### DEFROST TERMINATION THERMOSTAT

On low-temperature merchandisers the defrost termination thermostat is located behind the access panel on the inside back. If an optional variable thermostat is used its components will parallel the refrigeration thermostat's.



## CONNECTIONS

All wiring must be in compliance with NEC and local codes. All electrical connections are to be made in the electrical raceway behind the kick rail at the right-hand end of the merchandiser (facing front). See Page 6-4 for instructions on removing upper kick rail.

## IDENTIFICATION OF WIRING

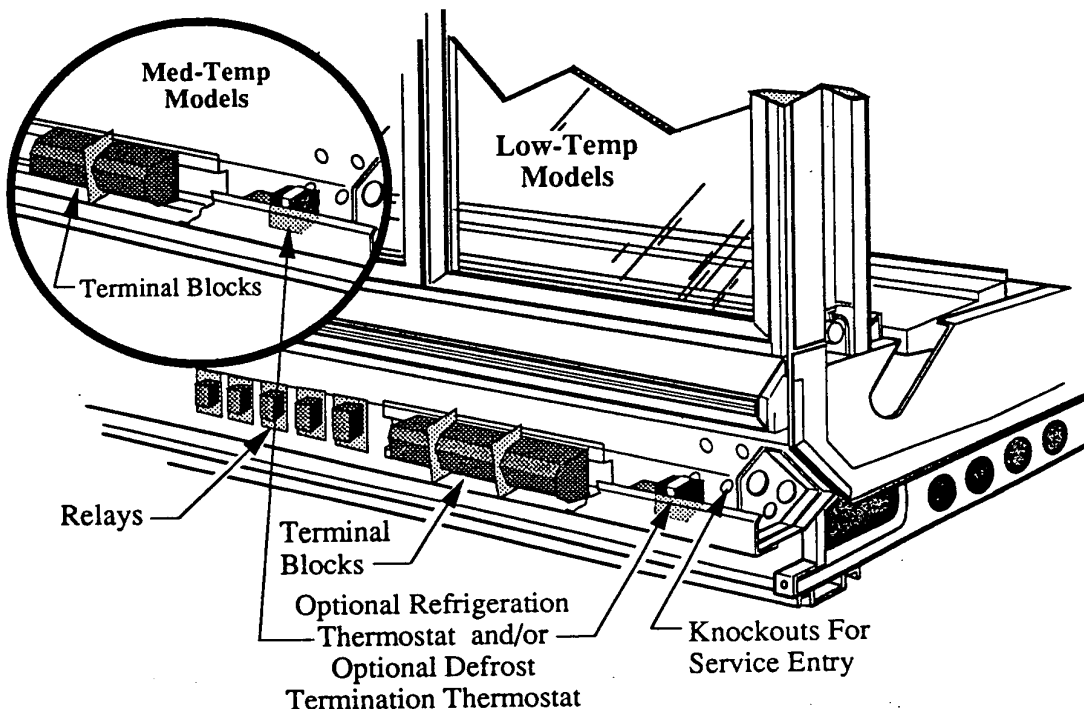
Leads for all electrical circuits are identified by colored plastic bands. These bands correspond to the "color code sticker" (shown below) located inside the merchandiser raceway.

### WIRING COLOR CODE

Leads for all electrical circuits are identified by a colored plastic band: neutral wire for each circuit has either White insulation or a White plastic sleeve in addition to the color band.

PINK .....REFRIG. THERMOSTAT LOW TEMP.	ORANGE OR
LIGHT BLUE ..REFRIG. THERMOSTAT NORM TEMP.	TAN .....LIGHTS
DARK BLUE ..DEFROST TERM. THERMOSTAT	MAROON...RECEPTACLES
PURPLE.....ANTI-SWEAT HEATERS	YELLOW....DEFROST HEATERS, 120V
BROWN .....FAN MOTORS	RED* .....DEFROST HEATERS, 208V
GREEN* .....GROUND	*EITHER COLORED SLEEVE OR COLORED INSULATION

**ELECTRICIAN NOTE: CASE MUST BE GROUNDED**



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## 4-2 ELECTRICAL

### FIELD WIRING

Field wiring must be sized for component amperes stamped on the serial plate. Actual ampere draw may be less than specified. Field wiring from the refrigeration control panel to the merchandisers is required for optional refrigeration thermostats, defrost termination thermostats or CDA sensors. When multiple merchandisers are on the same defrost circuit the defrost termination thermostats are wired in series. The component amperes listed below are taken from the Hussmann Merchandiser Data Book, **ALWAYS CHECK THE SERIAL PLATE.**

Off Time Defrost is standard for medium temperature merchandisers and is time terminated.

Electric Defrost is standard for low temperature merchandisers and requires temperature termination.

When two or more merchandisers with full length raceways are installed in line, remove the splashguards, end caps and raceway covers, and install the nipple and nuts (supplied) providing electrical passage from one merchandiser to the next. Partial length raceways require additional material (not supplied). In both applications, following NEC and local codes is the responsibility of the electrical contractor.

## Electrical Data

120V 1PH 60 Hz											208V 1PH 60Hz				
Model	Fan		Door Anti-sweat Heaters				Lights				Optional Gas Defrost Heaters	Standard Electric Defrost Heaters			
			Horizontal		Vertical		Horizontal			Vertical					
			Ardco	Anthony	Ardco	Anthony	Std	Opt	Opt	Ardco			Anthony		
Med Temp	(1)	(1,2)	(1,2)	(1,2)	(1,2)	(3)	(4)	(5)	(6)	(6)	(7)	(8)			
2-Door	1.40	1.1	—	1.14	1.93	1.4	2.2	2.9	1.89	2.02	—	—			
3-Door	2.10	1.5	2.8	1.59	2.78	1.4	2.2	2.9	2.34	2.60	—	—			
4-Door	2.80	2.0	3.7	2.08	3.65	2.7	4.1	5.8	3.06	3.32	—	—			
5-Door	3.50	2.4	4.6	2.55	4.44	2.7	4.1	5.8	3.51	3.90	—	—			
Low Temp															
	Frozen Food	Ice Cream			Frozen Food	Ice Cream	Frozen Food	Ice Cream							
2-Door	1.40	1.66	3.3	3.6	3.28	3.5	3.38	3.6	1.6	2.6	2.9	1.89	2.02	5.2	9.5
3-Door	2.10	2.49	4.7	5.3	4.66	5.0	4.99	5.3	2.2	3.5	2.9	2.34	2.60	7.2	14.7
4-Door	2.80	3.32	6.1	7.0	6.12	6.5	6.64	7.0	3.2	4.8	5.8	3.06	3.32	9.6	19.8
5-Door	3.50	4.15	7.6	8.9	7.53	8.2	8.19	8.9	3.3	5.0	5.8	3.51	3.90	12.0	24.4

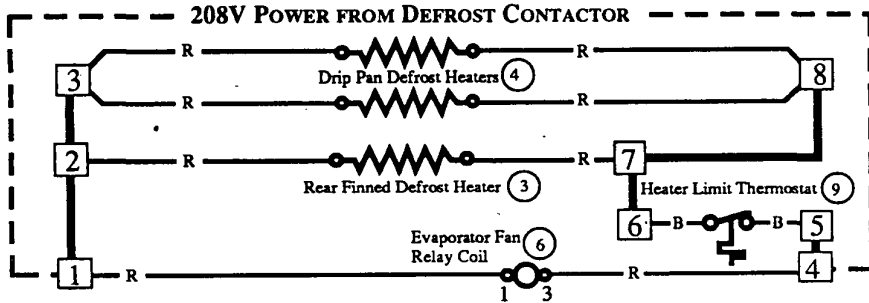
- (1) Fan and anti-sweat heaters should be wired in a separate circuit from the lights to avoid turning them off when the store lights are turned off.
- (2) Anthony Mach II or Ardco Scan-X Cycling Controls may be ordered for low-temp merchandisers. When ordered, these energy control systems will be factory installed and wired into the frame and door condensate heater circuit. For further information and servicing, refer to the instruction manual furnished with the control.

- (3) Standard Lighting—1 row canopy and 1 row interior ledge.
- (4) Lighting Option 1—2 row canopy and 1 row interior ledge.
- (5) Lighting Option 2—1 row 1500 ma Canopy and 1 row 1500 ma interior ledge.
- (6) Supplied by door manufacturer.
- (7) Used only with optional Gas defrost. Heaters are non-concurrent with fan and anti-sweat heaters.
- (8) Offtime is standard defrost on medium temperature and Electric is standard on low temperature.

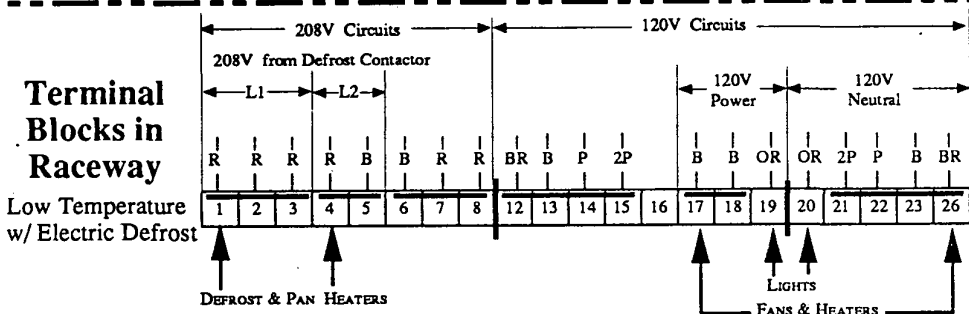
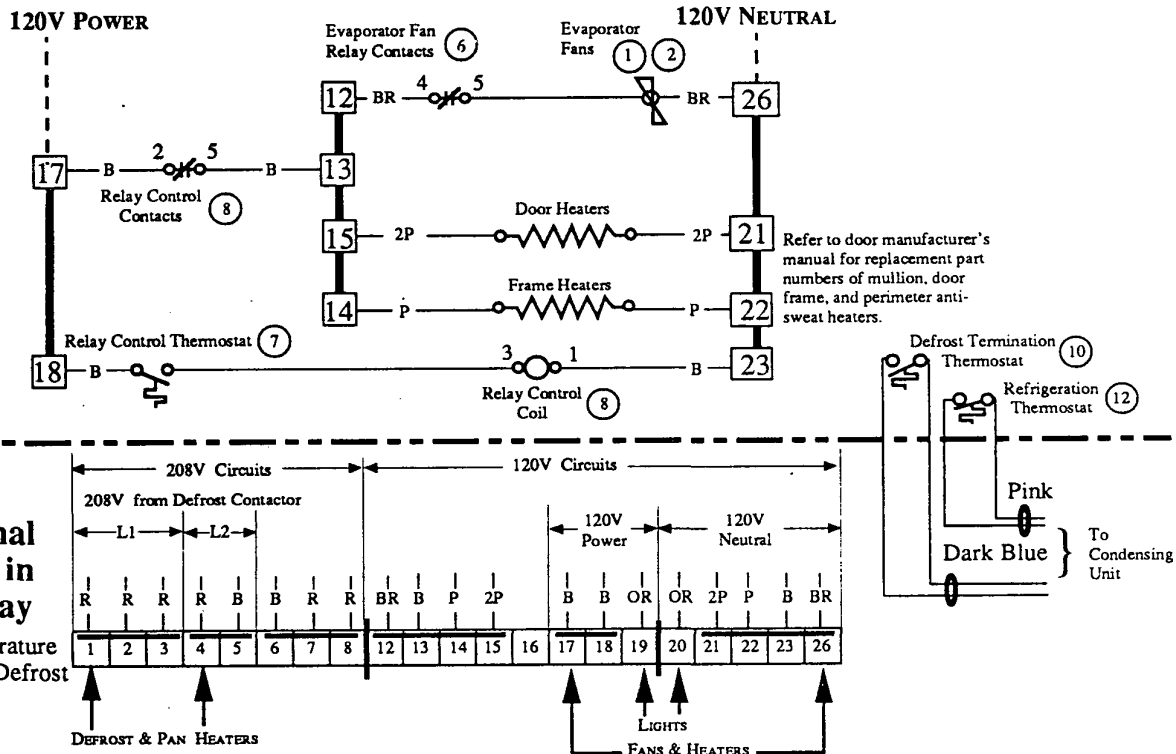
# 4-4 Fan and Heater Circuits – Electric Defrost (standard) Low Temperature

CIRCLED NUMBERS = PARTS LIST ITEM NUMBERS

R = Red P = Purple 2P = Purple (2 Bands) B = Black BR = Brown OR = Orange THESE ARE MARKER COLORS (WIRE MAY VARY.)



**CAUTION:** When multiplexing merchandisers equipped with defrost heaters, if branch circuit overcurrent protection is larger than the individual merchandiser's defrost circuit load, then additional supplemental overcurrent protection may be required per NEC Articles 210 and 240.



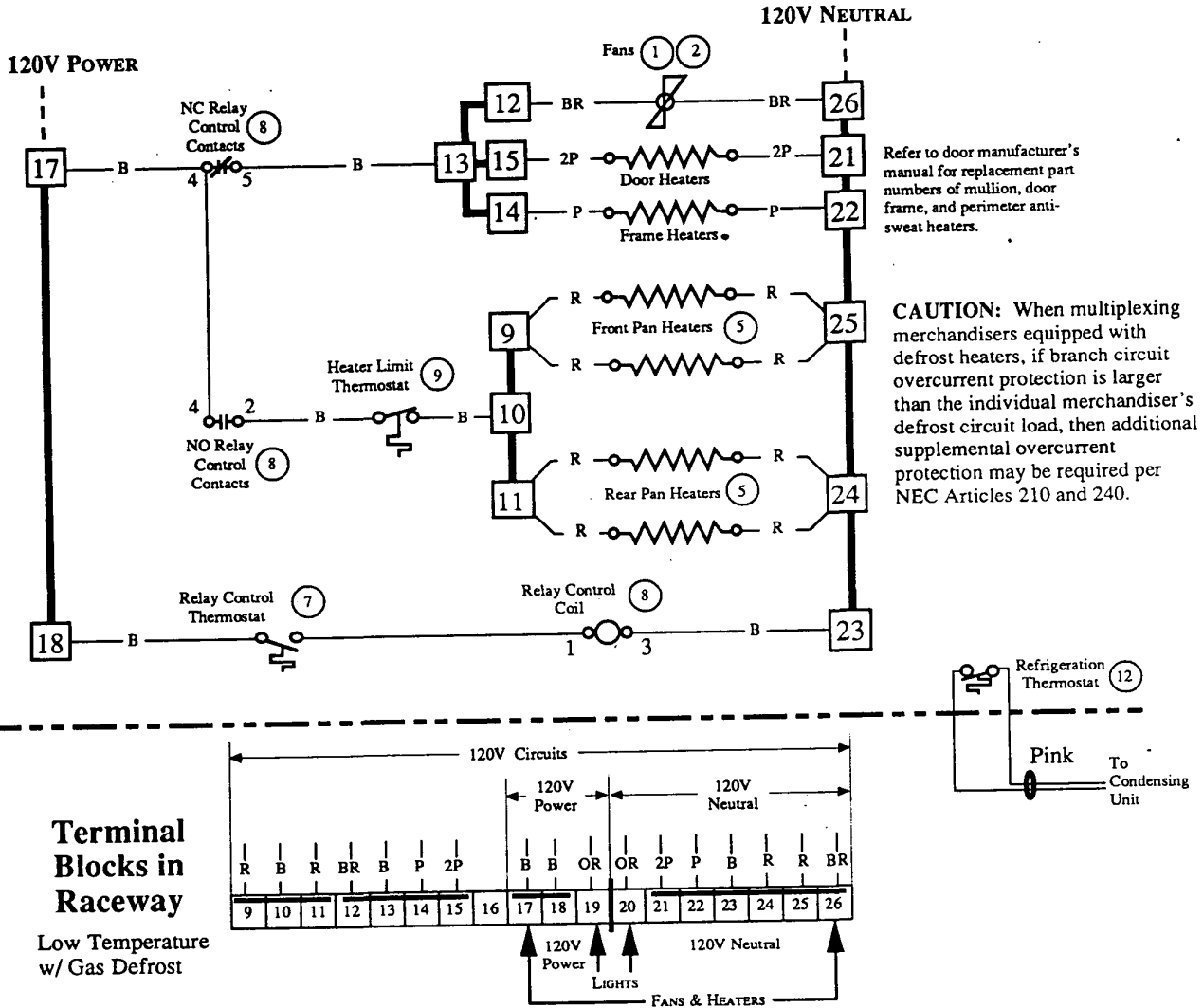
## Electric Defrost Sequence — Low Temperature

1. Power from the defrost contactor energizes Defrost Heaters and 208V Evaporator Fan Relay Coil. Relay Contacts open the Fan circuit.
2. If the Pan Heaters exceed 90°F the Heater Limit Thermostat will open.
3. Temperature rise of the evaporator closes the Relay Control Thermostat at about 35°F, energizing 120V Relay Control Coil. This relay's contacts open the Frame and Door Heater Circuits and also opens power supply to Fan Relay Contacts.
4. When Defrost Termination Thermostat ends defrost period, the defrost contactor opens the Defrost Heater and Evaporator Fan Relay Coil circuits.
5. Temperature fall of the evaporator opens the Relay Control Thermostat at about 20°F, De-energizing 120V Relay Control Coil. Relay Control Contacts close the Frame and Door Heater Circuits, and the Evaporator Fan Circuit.

# Fan and Heater Circuits – Gas Defrost (optional) Low Temperature

CIRCLED NUMBERS = PARTS LIST ITEM NUMBERS

R = Red P = Purple 2P = Purple (2 Bands) B = Black BR = Brown OR = Orange THESE ARE MARKER COLORS (WIRE MAY VARY.)



Refer to door manufacturer's manual for replacement part numbers of mullion, door frame, and perimeter anti-sweat heaters.

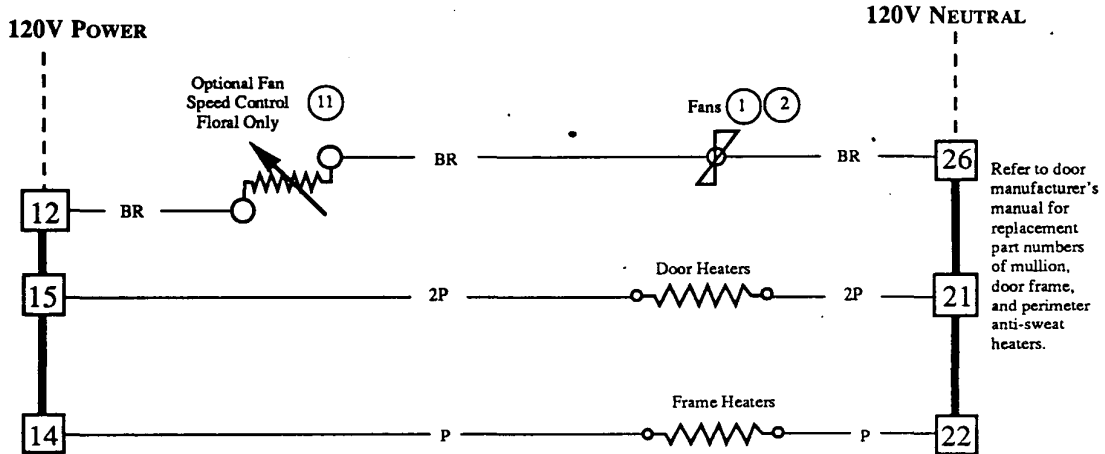
**CAUTION:** When multiplexing merchandisers equipped with defrost heaters, if branch circuit overcurrent protection is larger than the individual merchandiser's defrost circuit load, then additional supplemental overcurrent protection may be required per NEC Articles 210 and 240.

## Gas Defrost Sequence — Low Temperature

1. Defrost vapor enters the evaporator causing a rise in temperature. At about 35°F the Relay Control Thermostat closes the Relay Control Coil circuit. The Coil opens Contacts 4-5 and closes 4-2. Contacts 4-5 open the Fan, Door Heater, and Frame Heater Circuits. Contacts 4-2 energize the Front and Rear Pan Heater Circuits.
2. If the Pan Heaters exceed 90°F the Heater Limit Thermostat will open.
3. When defrost timer ends the defrost period, the evaporator temperature will start to fall. At about 20°F, the Relay Control Thermostat will open, DE-energizing the Relay Control Coil. Contacts 4-2 will open the Pan Heater circuits, and contacts 4-5 will close the condensate heaters and fan circuits.

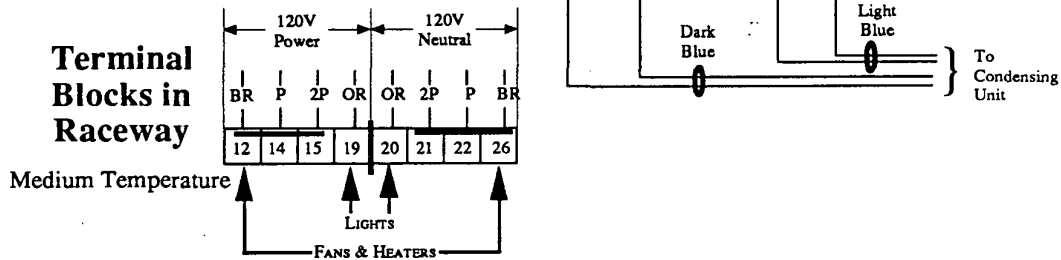


# Fan and Heater Circuits Offtime Defrost (standard) & Gas Defrost (optional) Medium Temperature



Defrost Termination Thermostat (10)  
Required for Gas Defrost Only

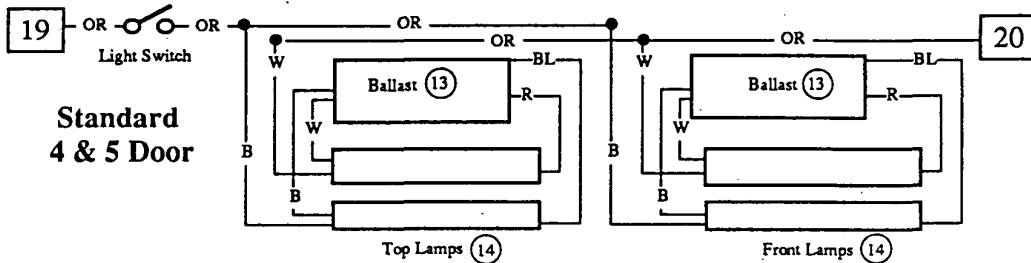
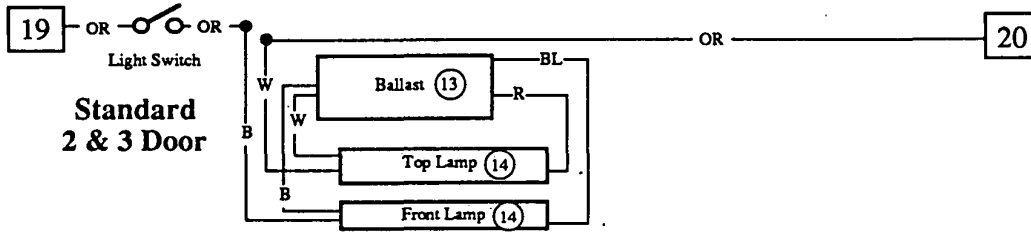
Refrigeration Thermostat (12)



CIRCLED NUMBERS = PARTS LIST ITEM NUMBERS  
 P = Purple 2P = Purple (2 Bands) BR = Brown OR = Orange  
 THESE ARE MARKER COLORS (WIRE MAY VARY.)

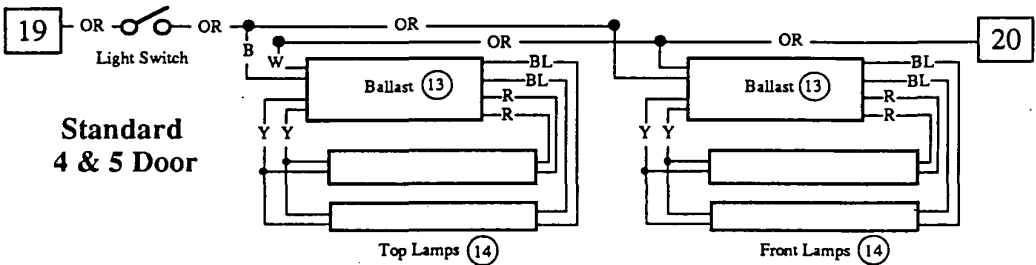
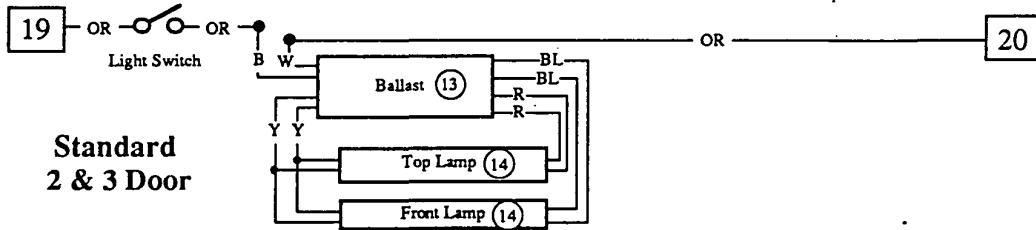
## Med-Temp Horizontal Light Circuits

NOTE: Vertical Light, ballast (15) and lamps (16), are part of the door (refer to door manufacturer's manual).  
These lights are connected in the raceway to the same terminals used for horizontal lights.



## Low-Temp Horizontal Light Circuits

NOTE: Vertical Light, ballast (15) and lamps (16), are part of the door (refer to door manufacturer's manual).  
These lights are connected in the raceway to the same terminals used for horizontal lights.



CIRCLED NUMBERS = PARTS LIST ITEM NUMBERS

P = Purple 2P = Purple (2 Bands) BR = Brown OR = Orange B = Black W = White Y = Yellow R = Red BL = Blue

ALTERNATE COLOR FOR ORANGE WIRES = TAN

THESE ARE MARKER COLORS (WIRE MAY VARY.)

**CARE AND CLEANING**

Long life and satisfactory performance of any equipment is dependent upon the care it receives. To ensure long life, proper sanitation and minimum maintenance costs, these merchandisers should be thoroughly cleaned, all debris removed and the interiors washed down, weekly.

**CAUTION: SHUT FANS OFF DURING CLEANING PROCESS.****Exterior Surfaces**

The exterior surfaces must be cleaned with a mild detergent and warm water to protect and maintain their attractive finish. **NEVER USE ABRASIVE CLEANSERS OR SCOURING PADS.**

**Interior Surfaces**

The interior surfaces may be cleaned with most domestic detergents, ammonia based cleaners and sanitizing solutions with no harm to the surface.

**Do NOT Use:**

- Mineral oil based solutions, as these will dissolve the butyl sealants used in constructing the merchandisers.
- Abrasive cleansers and scouring pads, as these will mar the finish.

**Do:**

- Remove the product and all loose debris to avoid clogging the waste outlet.
- Thoroughly clean all surfaces with soap and hot water. **DO NOT USE STEAM OR HIGH WATER PRESSURE HOSES TO WASH THE INTERIOR. THESE WILL DESTROY THE MERCHANDISERS' SEALING CAUSING LEAKS AND POOR PERFORMANCE.**
- Rinse with hot water, but do **NOT** flood. **NEVER INTRODUCE WATER FASTER THAN THE WASTE OUTLET CAN REMOVE IT.**
- Allow merchandisers to dry before resuming operation.
- When cleaning lighted shelves, wipe down with a damp sponge or cloth so that water does not enter the light channel. **DO NOT USE A HOSE OR SUBMERGE SHELVES IN WATER.**

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## 5-2 USER INFORMATION

### SHELF ALIGNMENT

Taped to one of the shelves of each merchandiser is a small plastic bag containing shelf alignment strips. These strips are designed to enhance the appearance of the shelves by aligning the front edge of each shelf with that of an adjacent shelf. See illustration.

When installing the shelves on the merchandisers:

1. Insert one of the alignment strips into the slot behind the front edge of each shelf.
2. After all shelves are installed, slide the strip across the shelf joint wherever two shelves are adjacent. This will lock them together.

**NOTE:** Some PTM styles are pop riveted to the shelf. In these instances, the alignment strips must be cut in half before inserting them into the shelf.

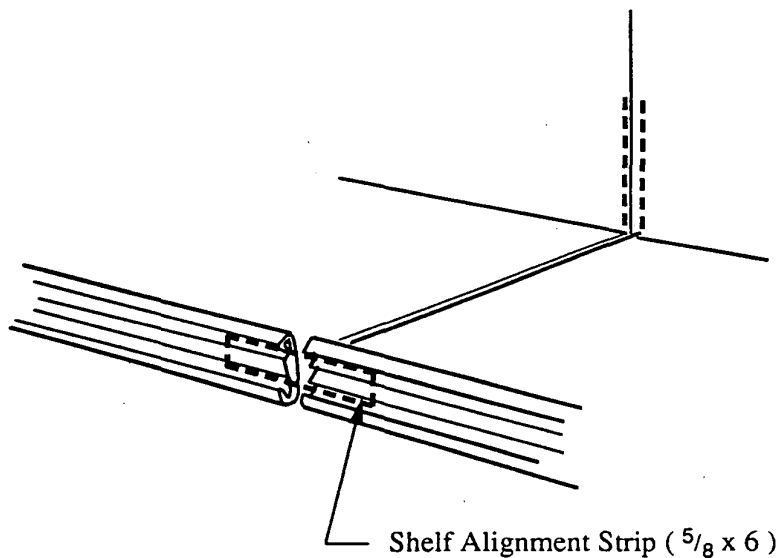
### STOCKING

Product should NOT be placed in merchandisers until all refrigeration controls have been adjusted and merchandisers are at proper operating temperature.

All shelves and the lower deck are intended to display product. Shelf height is adjustable in one inch increments. Spacing of 12 inches is recommended for most applications. Maximum load per shelf is 200 pounds. Merchandisers may be ordered with optional "L" shaped wire shelves.

Proper rotation of product during stocking is necessary to prevent product loss. Always bring the oldest product to the front, and set the newest to the back.

Do not prop doors open while stocking. And keep the doors closed as much as possible to prevent coil frosting and high merchandiser temperature.



**WARNING**

Always disconnect the electrical power at the main disconnect when servicing or replacing any electrical component. This includes, but is not limited to, such items as fans, heaters, thermostats and lights.

**REPLACING FAN BLADES**

Replace fan blades with the raised, embossed side of the blade TOWARD the motor.

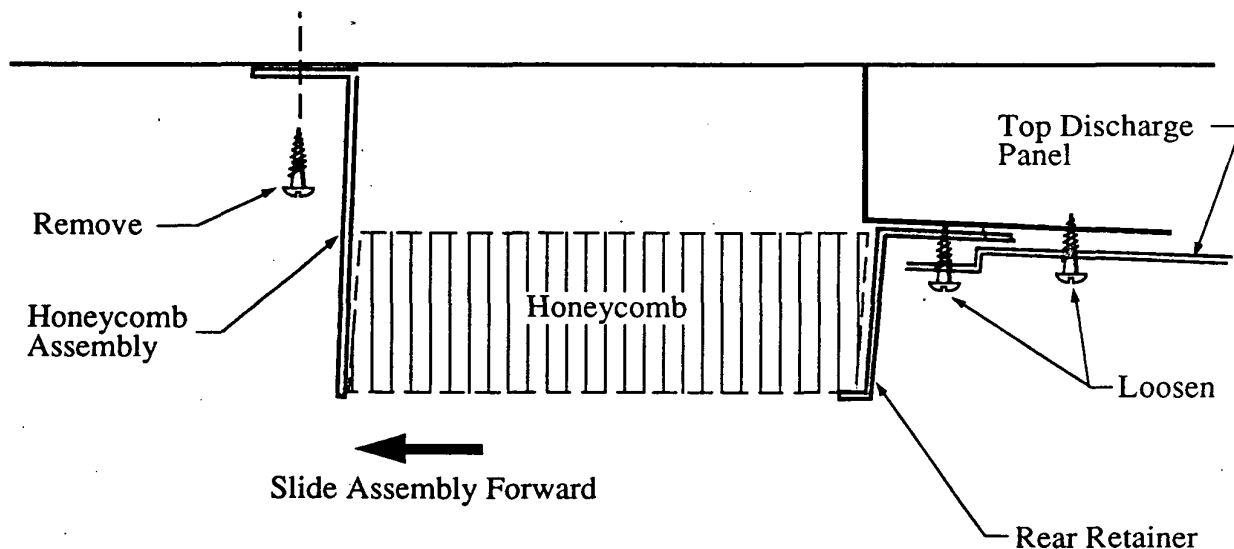
**DOORS AND FRAMES**

See manufacturer's service manual for servicing information. One manual is shipped with each merchandiser.

**CLEANING HONEYCOMB ASSEMBLIES**

Honeycombs should be cleaned every six months. Dirty honeycombs will cause merchandisers to perform poorly. The honeycombs may be cleaned with a vacuum cleaner. Soap and water may be used if all water is removed from the honeycomb cells before reassembling. Be careful not to damage the honeycombs.

1. Loosen sheet metal screws in top discharge panel as shown below.
2. Remove the sheet metal screws located in the front metal retainer which holds the honeycomb assembly in place.
3. Slide the honeycomb assembly forward to remove it.
4. Clean and dry the honeycomb.
5. After cleaning reassemble in reverse order of removal.



## 6-2 SERVICE

### ELECTRIC DEFROST HEATERS (Low Temperature Only)

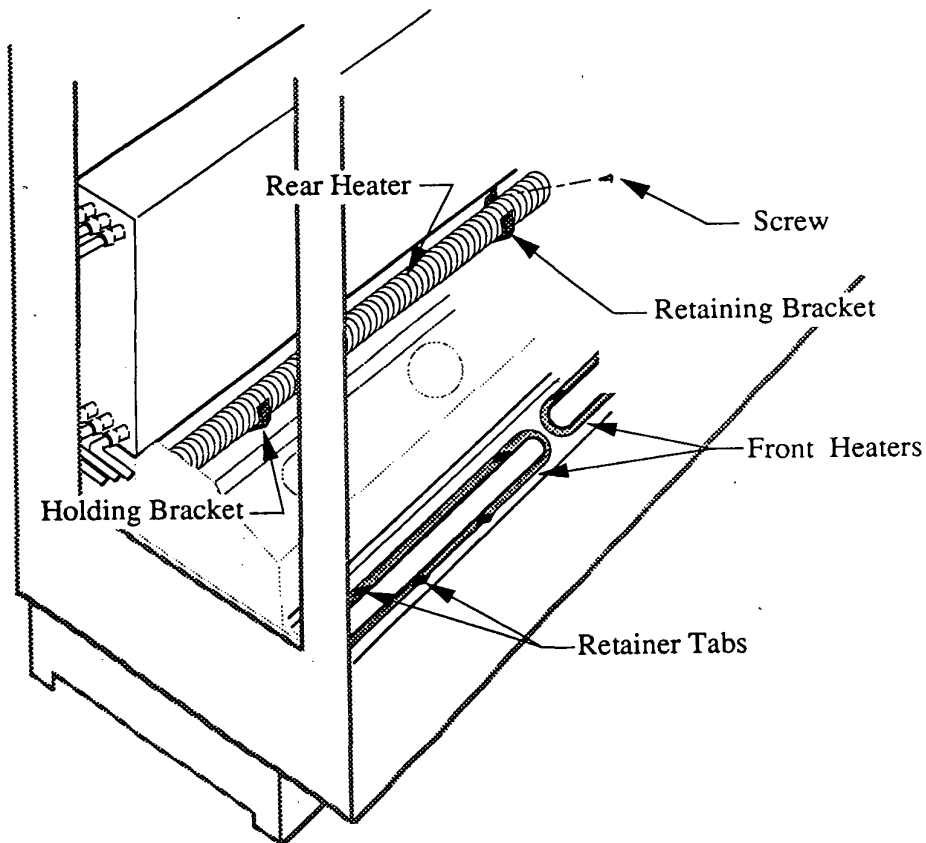
The front defrost heaters are located as shown below. These heaters are installed on slave plates. Electric defrost requires a finned rear heater which is located behind the fan plenum in retaining brackets below the evaporator.

#### Remove Front Heaters

1. Disconnect Power.
2. Disconnect ground wire.
3. Bend retainer tabs open slightly and lift front heater from bracket.
4. RECONNECT GROUND WIRE to replacement heaters.

#### Remove Rear Defrost Heater

1. Disconnect Power.
2. Remove fan plenum.
3. Remove screw and retaining bracket from center of merchandiser and slip rear heater out of holding bracket.



## OPTIONAL GAS DEFROST HEATERS (Low Temperature Only )

The front defrost heaters are located as shown below. These heaters are installed on slave plates. Gas defrost rear heaters are very similar to the front heaters. The rear heaters are located behind the fan plenum and below the evaporator, they are held in place by the same retainer tabs used to secure the front heaters.

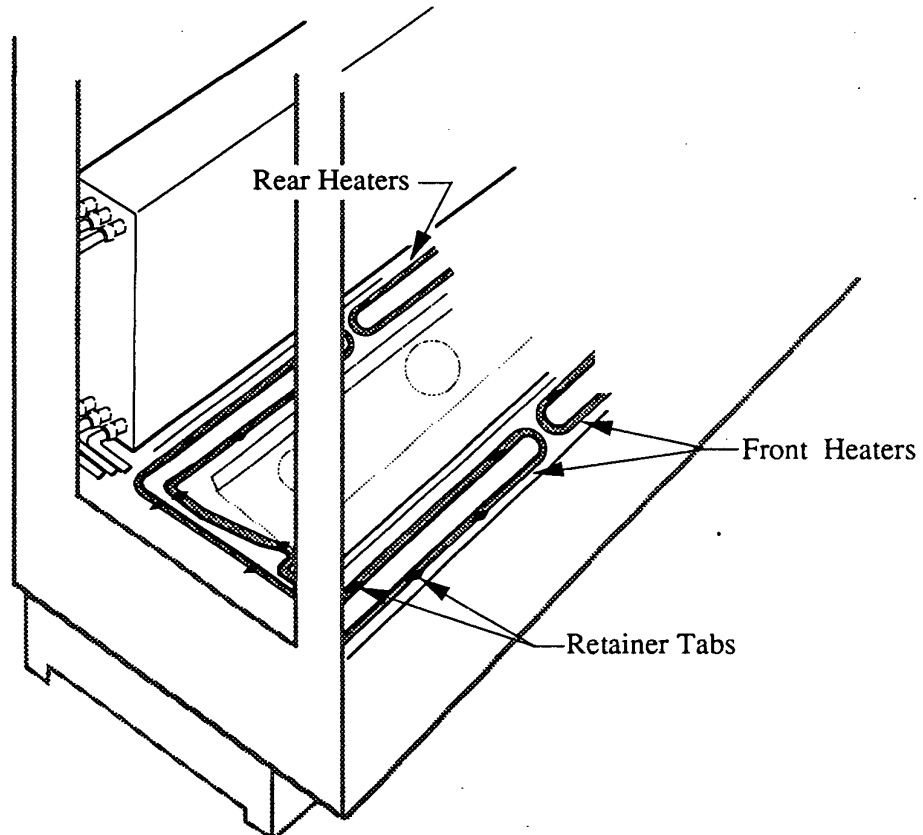
### Remove Front Heaters

1. Disconnect Power.
2. Disconnect ground wire.
3. Bend retainer tabs open slightly and lift front heater from bracket.
4. RECONNECT GROUND WIRE to replacement heaters.

### Remove Rear Defrost Heaters

1. Disconnect Power.
2. Remove fan plenum.
3. Bend retainer tabs open slightly and lift heater from bracket.

**NOTE:** When replacing rear heaters, you may have to remove the plenum end cap. If so, be sure to reseal the merchandiser exactly as it was originally sealed.



## 6-4 SERVICE

### REMOVING UPPER KICK RAIL

Remove the upper kick rail by pushing in and up to free it from the bumper area.

**NOTE:** If kick rail is difficult to remove, carefully slide a small slotted screw driver between the bumper and the kick rail.

1. Insert screw driver in the removal notch (located at each end) and lift the kick rail up.
2. Once the bottom is free, lower the upper kick rail out from behind the front panel.

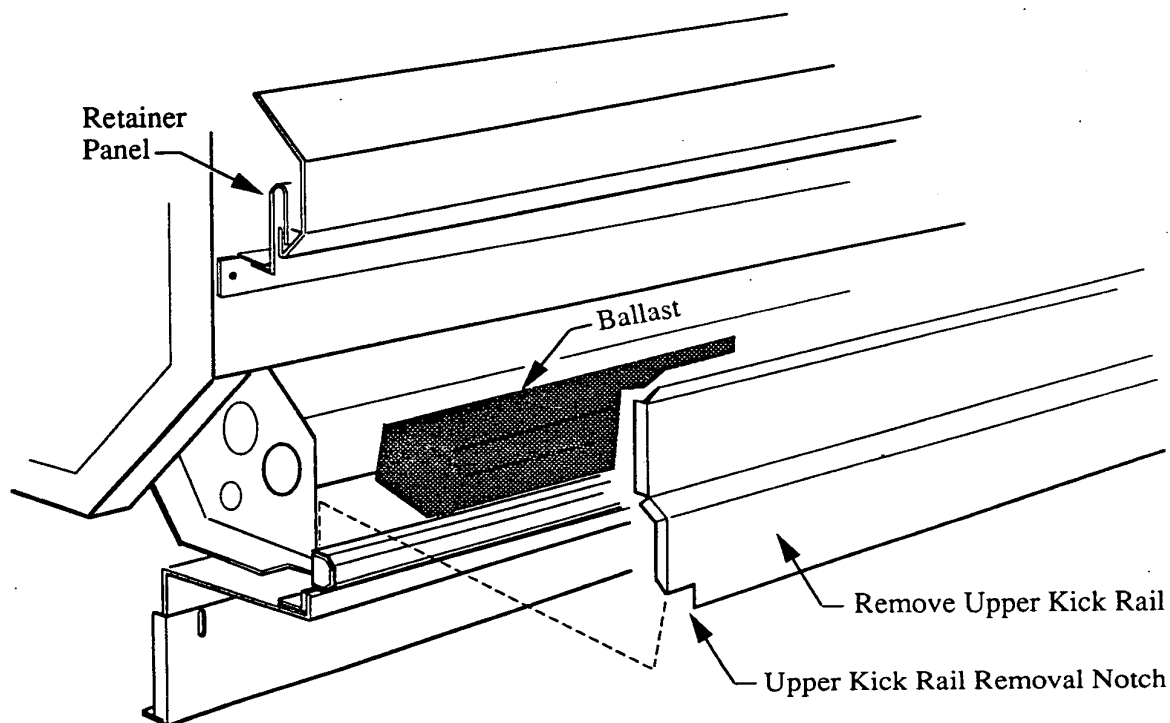
To install, slide the upper kick rail into retainer behind front panel. Position the lower edge of the kick rail behind the bumper and in front of the adjustable bracket.

### REPLACING LIGHT BALLAST

The lamp ballasts are located behind the upper kick rail at the left-hand end of the merchandiser.

**To gain access:**

1. Disconnect the electrical power to the light fixture.
2. Remove the upper kick rail.
3. Service or replace ballasts as required. Reassemble items as they were originally installed.





## SERVICING VERTICAL LIGHTING

Refer to door manufacturer's manual for servicing of ballasts and lamps.

## SERVICING HORIZONTAL LIGHTING

### Removing Ledge Lamp Shields

1. Press down on lamp shield to release it from the top retainer.
2. Lift shield out and away from light fixture flanges.

**NOTE:** When installing shield, be sure it covers the entire length of the light fixture.

### Lamp Ballasts

The lamp ballasts are located behind the lower bumper rail at the left-hand end of the merchandiser.

#### TO GAIN ACCESS:

1. Disconnect the electrical power to the light fixture.

2. Remove the lower bumper rail.
3. Service or replace ballasts as required. Reassemble items as they were originally installed.

### Replacing Fluorescent Lamps

Fluorescent lamps are furnished with moisture resistant lamp holders and shields. **WHENEVER A FLUORESCENT LAMP IS REPLACED, BE CERTAIN TO REINSTALL THE LAMP SHIELDS.**

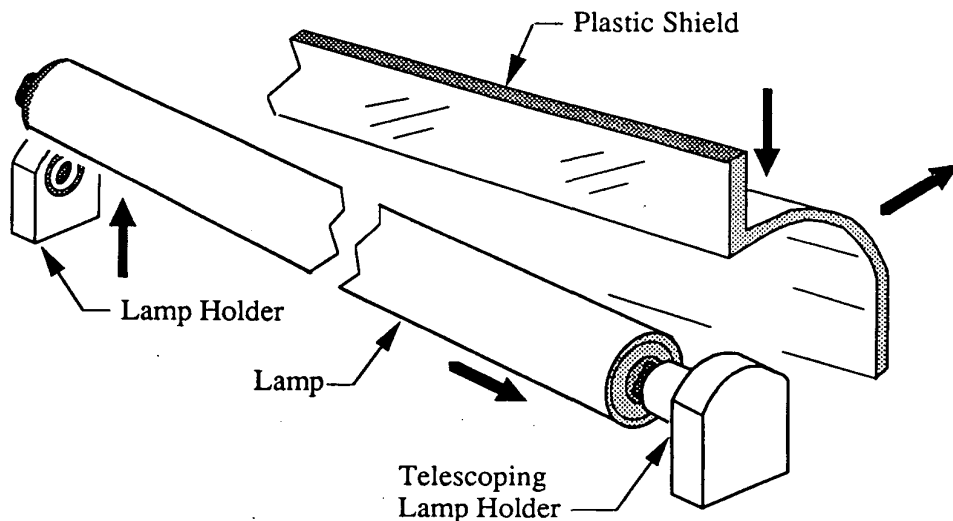
**NOTE:** Do NOT twist the lamp.

#### REMOVE LAMP

To remove a lamp, simply push the lamp toward telescoping lamp holder and raise the other end.

#### INSTALL LAMP

To install a lamp, first position it inside telescoping lamp holder, then lower and position the opposite end.



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## 6-6 SERVICE

### REPAIRING ALUMINUM COIL

The aluminum coils used in Hussmann merchandisers may be easily repaired in the field. Materials are available from local refrigeration wholesalers.

Hussmann recommends the following solders and technique:

#### Solders

Aladdin Welding Products Inc.  
P.O. Box 7188  
1300 Burton St.  
Grand Rapids, MI 49507  
Phone: 1-800-645-3413  
Fax: 1-800-645-3414

X-Ergon  
1570 E. Northgate  
P.O. Box 2102  
Irving, TX 75062  
Phone: 1-800-527-9916

#### Technique

1. Locate Leak.
2. **REMOVE ALL PRESSURE.**
3. Brush area **UNDER HEAT.**
4. Use **PRESTOLITE TORCH ONLY. NUMBER 6 TIP.**
5. Maintain separate set of stainless steel brushes and **USE ONLY ON ALUMINUM.**
6. Tin surface around area.
7. Brush tinned surface **UNDER HEAT**, thoroughly filling the open pores around leak.
8. Repair leak. Let Aluminum melt solder, **NOT** the torch.
9. Don't repair for looks. Go for thickness.
10. Perform a leak check.
11. Wash with water.
12. Cover with a good flexible sealant.

#### NOTE:

Hussmann Aluminum melts at .....1125°F  
Aladdin 3-in-1 rod at .....732°F  
X-Ergon Acid core at .....455°F  
Factory Solder at aluminum  
to copper transitions .....855°F