



Installation, Start-Up and Service Instructions

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SAFETY CONSIDERATIONS

Installation and servicing of air-conditioning equipment can be hazardous due to system pressure and electrical components. Only trained and qualified service personnel should install, repair, or service air-conditioning equipment.

Untrained personnel can perform basic maintenance functions of cleaning coils and filters and replacing filters. All other operations should be performed by trained service personnel. When working on air-conditioning equipment, observe precautions in the literature, tags and labels attached to the unit, and other safety precautions that may apply.

Follow all safety codes, including ANSI (American National Standards Institute) Z223.1. Wear safety glasses and work gloves. Use quenching cloth for unbrazing operations. Have fire extinguisher available for all brazing operations.

⚠ WARNING

Before performing service or maintenance operations on unit, turn off main power switch to unit. Electrical shock could cause personal injury.

FOR YOUR SAFETY WHAT TO DO IF YOU SMELL GAS

Do not try to light any appliance. Do not touch any electrical switch; do not use any phone in your building. Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions. If you cannot reach your gas supplier, call the fire department.

FOR YOUR SAFETY

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of the 48MA unit or any other gas-fired appliance.

⚠ WARNING

Improper installation, adjustment, alteration, service, or maintenance can cause injury or property damage. Refer to this manual. For assistance or additional information, consult a qualified installer, service agency, or the gas supplier.

⚠ CAUTION

Disconnect gas piping from 48MA unit when leak testing at pressures greater than 0.5 psig. Pressures greater than 0.5 psig will cause gas valve damage resulting in a hazardous condition. If gas valve is subjected to pressure greater than 0.5 psig, it must be replaced. When pressure testing field-supplied gas piping at pressures of 0.5 psig or less, the unit connected to such piping must be isolated by manually closing the gas valve.

INSTALLATION

General — Install unit on rooftop, outdoor site only. Install unit, electrical wiring, gas supply line (48MA) and condensate drain lines in accordance with all applicable codes.

Unit Clearances — See Fig. 1 and 2 for service and airflow clearances. For 48MA gas-fired units, provide not less than 36-in. clearance to combustibles from top and all sides. Keep burner end free from any obstruction.

Locate exit terminals of mechanical draft system (48MA flue outlet) as follows:

- Not less than 12 in. from any opening through which combustion products could enter the building.
- Not less than 2 ft from any adjacent building.
- Not less than 7 ft above grade when unit is adjacent to public walkways.

Roof Curb — Assemble and install per instructions shipped with this accessory. Information required to field fabricate a roof curb and other curb data are shown in Fig. 3-5.

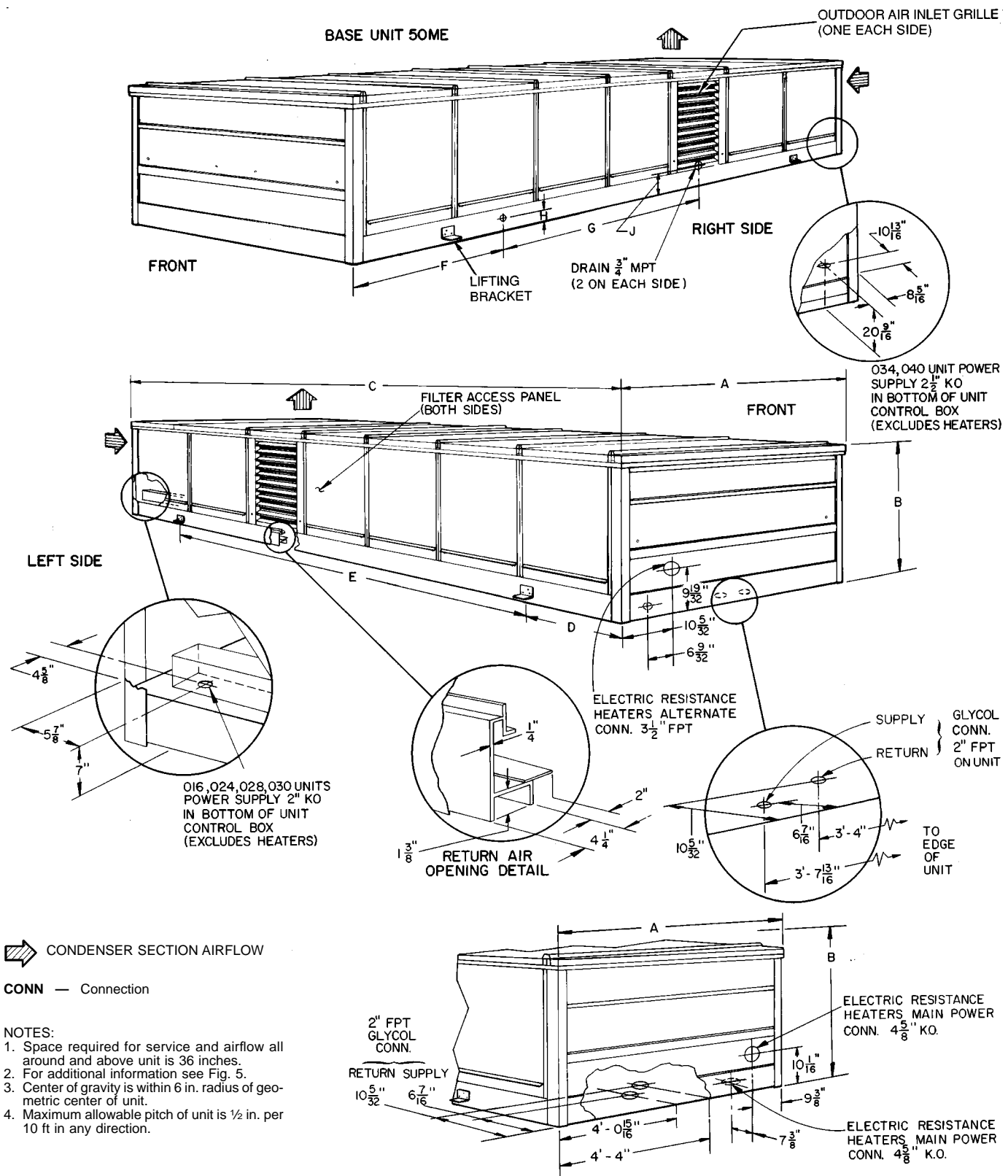
Install field-supplied insulation, cant strips, roofing and counter flashing as required. Seal all curb joints with mastic or other suitable roof cement to keep out moisture. Be sure that run-off pan at compressor end of curb is completely flashed and sealed.

Seal strip (Fig. 3) is shipped with accessory roof curb. Install as described in the roof curb installation instructions. The seal strip compresses under unit weight so that an airtight seal and vibration isolation are provided between unit base and curb.

Roof Openings — Except for the compressor and condenser section, roof area under the unit need not be filled in as the curb-mounted unit encloses this space. Leaving this roof section open provides ample clearance for ductwork, piping, and power and control wiring.

If the roof area inside curb is to be filled in so that roof deck and bottom of base unit can be used as a return-air plenum, any spaces under the curb flanges caused by corrugated roofing or roof irregularities must be sealed to prevent water seepage. If spaces are not sealed, the negative pressure of return air may draw water under the unit and into the building structure.

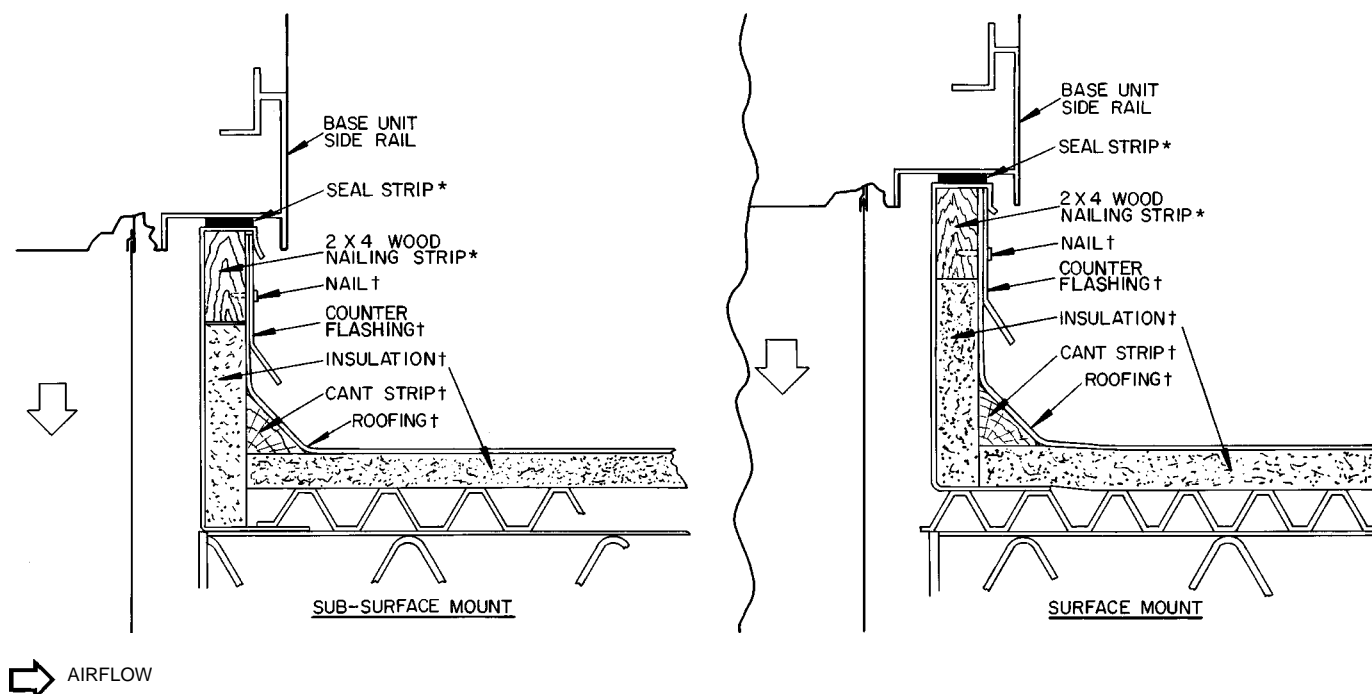
If openings are cut in a finished roof, provide at least 6-in. space on each of the longer sides of the supply and return air openings. Due to interference from the roof curb structure, this additional clearance may not be possible on the short sides.



UNIT 50ME	DIMENSIONS (ft.-in.)								
	A	B	C	D	E	F	G	H	J
016-030	7- $2\frac{3}{4}$	3-0 $\frac{9}{16}$	17-11 $\frac{5}{16}$	2-2 $\frac{15}{16}$	13-5 $\frac{1}{2}$	3-7 $\frac{1}{16}$	7-3 $\frac{3}{16}$	0-3 $\frac{3}{8}$	0-3 $\frac{3}{8}$
034,040	7-11	3-9 $\frac{15}{16}$ *	21-9 $\frac{1}{16}$	4-2 $\frac{5}{8}$	13-5 $\frac{1}{2}$	4-4	8-6 $\frac{3}{4}$	0-2 $\frac{15}{16}$	0-7 $\frac{1}{4}$

*Overall height; includes $1\frac{3}{4}$ -in. for fan guards.

Fig. 2 — Base Unit Physical Data and Dimensions; 50ME Units



*Factory supplied (with accessory roof curb).
 †Field supplied (when using accessory roof curb).

NOTE: Dimensions are in inches.

Fig. 3 — Roof Curb Detail

Rigging Unit — Inspect unit for shipping damage, and file any damage claim immediately with transportation company.

Lift unit with cables and spreader bars, using lifting brackets provided (Fig. 1 and 2). Lift one unit at a time, keep unit upright, and do not drop. Unit weights are given in Table 1. Unit center of gravity is within 6 in. of unit's geometric center. Eyebolts may be removed after unit is in final position.

IMPORTANT: Do not drill or punch holes in unit frame or panels; damage to internal components or wiring may result.

Unit Positioning — When lowering unit onto roof curb, do not exceed the out-of-symmetry tolerances given in Fig. 4 and 5. Be sure unit is level or is pitched within specified tolerances. Units have drains on both sides and may be pitched to either side.

Removing Shipping Shields (Fig. 6)

1. Remove shield over flue outlet grille (48MA only).
2. Remove shields (sheet metal covers) located in the outdoor-air inlet screen tracks behind the louvers. If the screens are removed for this procedure, be sure to replace them before replacing the louvered assembly.

Field-Fabricated Ductwork — Supply- and return-air openings are shown in Fig. 4 and 5. To simplify supply-air connection, a zone duct plenum may be field fabricated as shown in Fig. 7. It is recommended that this plenum be installed prior to unit positioning.

It is recommended that the unit be supported on blocks temporarily while the duct plenum is installed, rather than installing the plenum while the unit is suspended. The duct plenum may be installed once the unit is located in its final position, but it is much easier to install the plenum prior to unit final placement.

Zone supply-air duct openings on the base unit have tab slot connections similar to those shown in Fig. 7 except that the end partitions are hemmed. Hem is positioned so that the 1-in. flange at entering end of field-fabricated plenum will force-fit between hem and adjacent unit frame.

Standard flexible duct connections between duct plenum and duct system may be used. Follow applicable codes.

Insulate any supply-air ducts passing through unconditioned spaces and cover with a vapor barrier. Separate ducts with insulation if they run parallel for more than 5 ft. This will prevent heat transfer between zones.

Install a manual balancing damper in each zone duct to provide the required zone airflow.

The return-air duct connection consists of 4 sheet metal flanges as shown in Fig. 1, 2, 4, and 5.

Table 1 — Physical Data

UNIT 48MA/50ME	016	024	028	030	034	040
Zone Modules (Quantity)	8	8	10	10	12	12
Nominal Cooling Capacity (tons)	15	20	25	28	30	37
OPERATING WEIGHT (lb)						
Base Unit 48MA	3395	3815	4075	4080	5340	5710
Base Unit 50ME (with electric heat)	2995	3415	3675	3680	4900	5270
Roof Curb	506	506	506	506	630	630
REFRIGERANT CHARGE — R-22 (lb)	28	32	43	43	57	66.1
COMPRESSOR	Reciprocating Hermetic, 1725 Rpm					
No. 1 Type	06DE537	06DE824	06DE537	06DE537	06DE537	06EE250
Cylinders...Unloaders	6...2	6...2	6...2	6...2	6...2	4...1
No. 2 Type	—	06DA824	06DA824	06DA537	06DA537	06EA250
Cylinders (have no unloaders)	—	6	6	6	6	4
System Oil Charge (pints)	11	18	18	18	18	31
Unloader Settings (psig)	Compressor No. 1 Only					
Unloader No. 2	71.0 ± 1.5					—
Unloader No. 1	57.5 ± 2.5					—
	75.0 ± 1.5					75.5 ± 1.5
	62.5 ± 2.5					58.0 ± 2.5
Capacity Steps (%)	100,67,33	100,83,67 50,33,17	100,80,60 40,20	100,80,60 40,20	100,83,67 50,33,17	100,75, 50,25
CONDENSER FANS	Propeller, Direct Drive					
Motor Hp...Rpm...Frame (NEMA)	1...1075...56 (Single phase)					
No. 1	1...1140...56 (3 phase)					
No. 2	—					
No. 3	1...1140...56 (3 phase)					
Nominal Cfm	16,500	15,000	15,000	15,000	24,000	23,000
EVAPORATOR FANS*	Centrifugal, Belt Drive					
Number...Size (in.)	2...15 x 15	2...15 x 15	2...15 x 15	2...15 x 15	3...15 x 9	3...15 x 9
Cfm (Nominal)	6000	8000	10,000	10,000	12,000	12,000
Motor Hp...Rpm	5...1725	7½...1725	10...1725	10...1725	15...1725	15...1725
Std Alt	—	—	—	—	20...1725	20...1725
Fan Pulley	—	—	—	—	—	—
Outside Diameter (in.)	10.6	10.6	8.0	8.0	8.0	8.0
Bore (in.)	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞
Fan Belt Number...Size	1...3V630	1...3V630	2...3V560	2...3V560	2...3V630	2...3V630
Std Alt	—	—	—	—	3...3V670	3...3V670
Motor Pulley	Factory Installed					
Outside Diameter (in.)	5.3	6.0	5.0	5.0	5.0	5.0
Bore (in.)	—	—	—	—	6.0	6.0
Resulting Fan Rpm	1⅞	1⅞	1⅞	1⅞	1⅞	1⅞
Std Alt	880	995	1095	1095	1095	1095
Shaft Center Line Distance (in.)	—	—	—	—	1320	1320
Maximum Fan Rpm	18 ± 2.5	18 ± 2.5	18 ± 2.5	18 ± 2.5	21 ± 2.5	21 ± 2.5
CONDENSER COOLING COIL	Thermostatic Expansion Valve, Hot Gas Bypass					
Face Area (sq ft)	6.8	6.8	6.8	6.8	10.2	10.2
Corrugated Fins/in. ...Rows	13...2	13...2	13...2	13...2	13...2	13...3
EVAPORATOR COILS (zone)	Solenoid Valve and Capillary Tube for each					
Number...Face Area (sq ft/ea)	8...2.12	8...2.12	10...2.12	10...2.12	12...2.01	12...2.01
Corrugated Fins/in. ...Rows	13...3	13...3	13...3	13...3	12...3	15...3
HEATING SECTION (48MA)	One Heat Assembly in Each Zone Module					
Rise Range	25 F to 55 F at 0.75 in. wg ESP					
Input (1000 Btuh)	432	432	540	540	648	648
Total Each Module	54	54	54	54	54	54
Bonnet Cap.† (1000 Btuh)	324	324	405	405	486	486
Each Module	40.5	40.5	40.5	40.5	40.5	40.5
Burner Spud Qty...Size	2...38	2...38	2...38	2...38	2...38	2...38
OPTIONAL HEATING SECTION (50ME Electric)	Nichrome, Open-Wire Resistance Element in Each Zone Module					
Electric Heaters	—					
Qty...Elements (each)**	8...2 or 3	8...2 or 3	10...2 or 3	10...2 or 3	12...2 or 3	12...2 or 3
OPTIONAL HEATING SECTION (50ME Glycol Coil)	One Heating Coil in Each Zone Module					
Maximum Allowable Inlet Temperature (F)	200					
Maximum Allowable Flow, Each Coil (Gpm)	6					
Solution Mixture	20% Glycol					
Maximum Allowable Working Pressure (Psig)	30					
Total Internal Volume (Gal)	2.61	2.61	3.15	3.15	3.76	3.76
PRESSURE SWITCHES	—					
Low-Pressure (Psig)	29 ± 5					
Cutout	39 ± 5					
High-Pressure (Psig)	400 ± 5					
Cut-in	300 ± 5					
Indoor Airflow Switch (AFS1)	—					
Factory Setting (cfm)	6000					
Adjustment Range (cfm)	4000-6000					
INDOOR AIR FILTERS	—					
Standard Qty...Size (in.)	12...20 x 25 x 2					
High Efficiency (optional)	12...20 x 25 x 2 (36.5% Efficient)					
Qty...Size (in.)	—					
OUTDOOR AIR FILTERS	—					
Qty...Size (in.)	2...20 x 25 x 1					
	2...32 x 35 x 1					

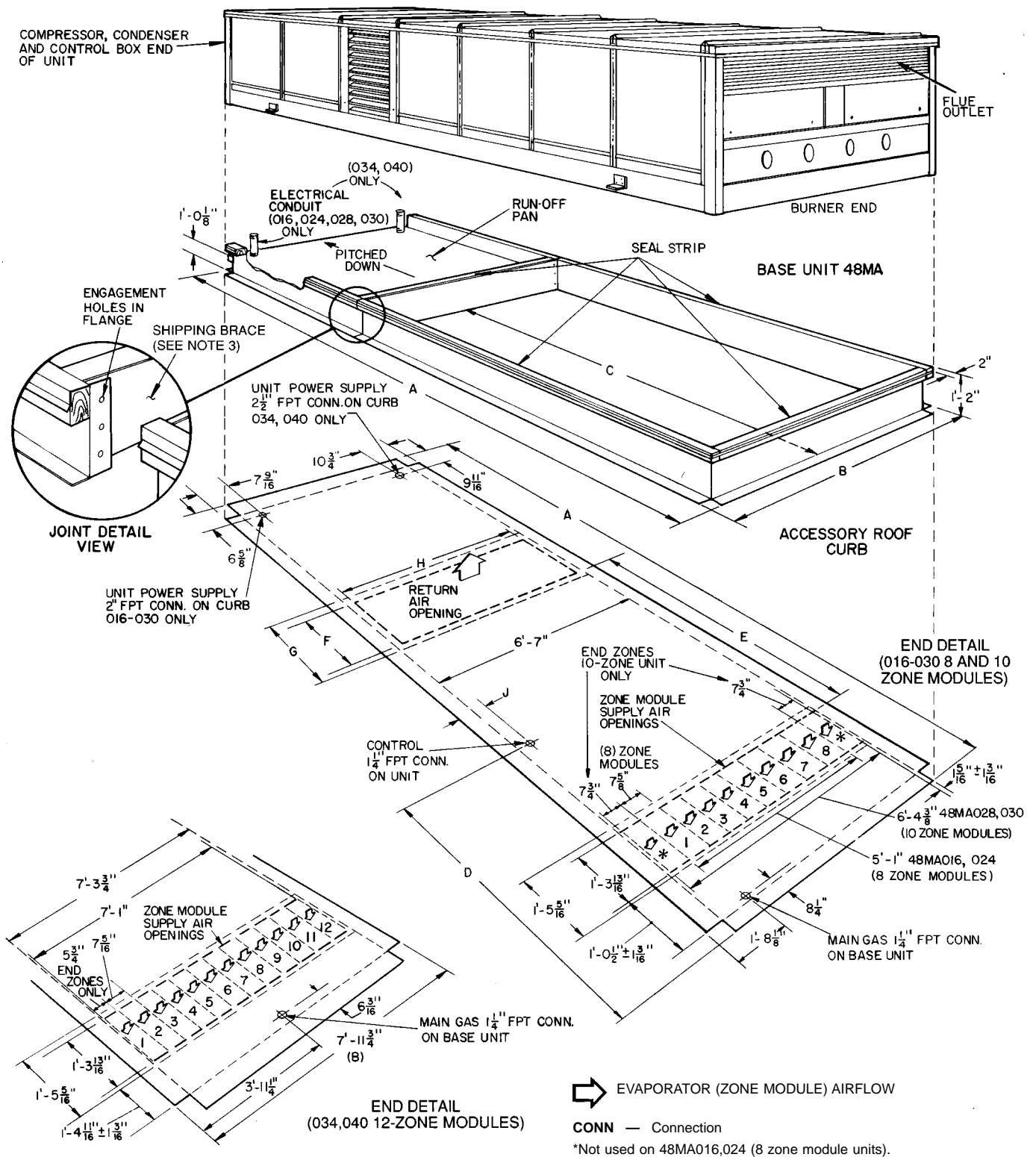
LEGEND

ESP — External Static Pressure
NEMA — National Electrical Manufacturers Association

*Standard unit shipped with standard motor, pulley, and belt(s); alternate unit shipped with alternate motor, pulley, and belt(s).

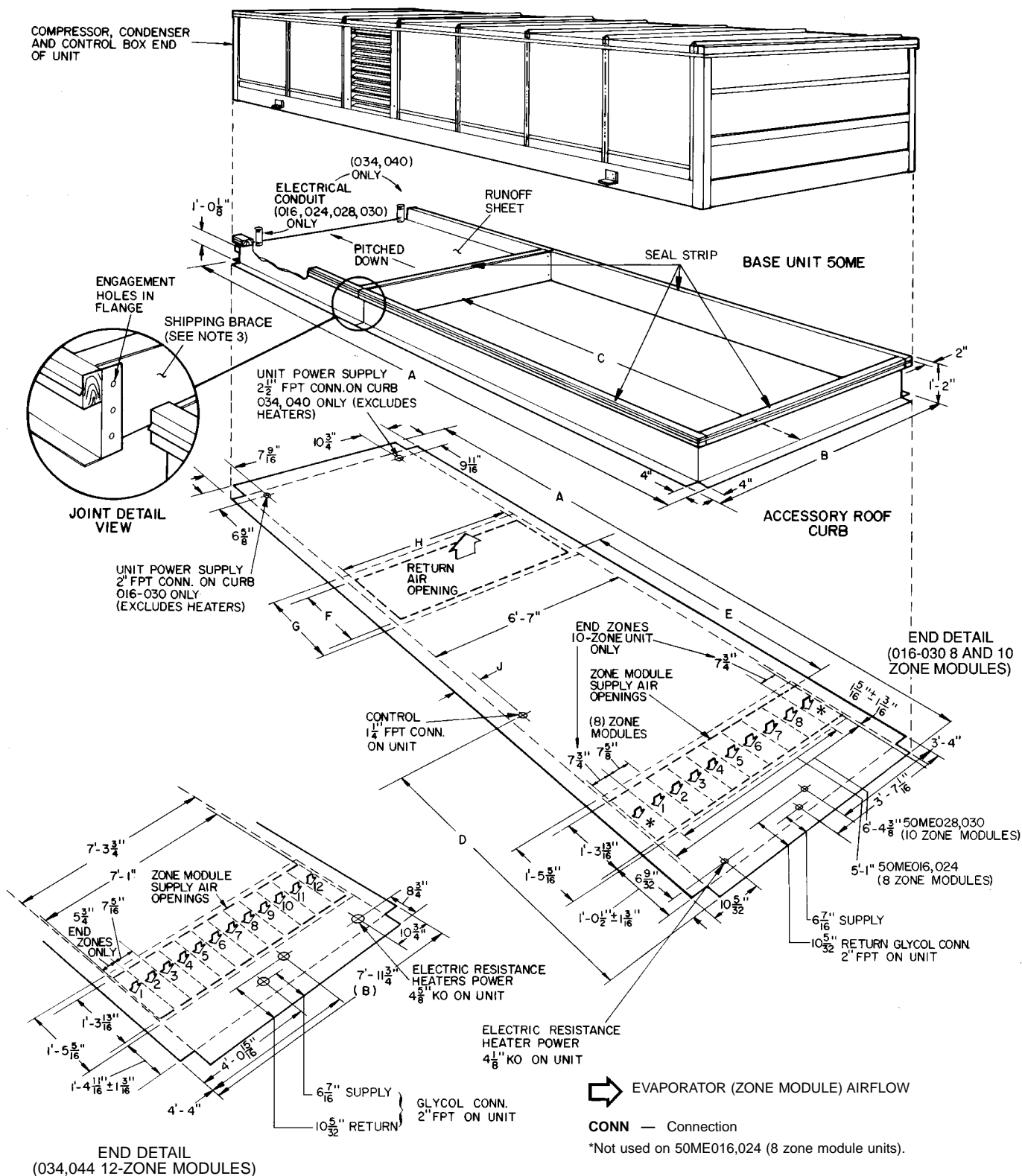
†The heating efficiency rating is a product thermal efficiency rating determined under continuous operating conditions independent of any installed system.

**See Field Power Supply Wiring section on page 10 and Table 4 for details.



UNIT 48MA	DIMENSIONS (ft-in.)								
	A	B	C	D	E	F	G	H	J
016-030	18-2 ¹ / ₈	7- 3	11-9	5-6 ¹ / ₄	7-2 ⁷ / ₈	1-10 ⁹ / ₁₆	2-2 ⁹ / ₁₆	6-0 ³ / ₈	0- 7 ¹ / ₂
034,040	21-9 ⁷ / ₈	7-11 ³ / ₄	14-1 ³ / ₄	6-7 ⁷ / ₁₆	8-4 ³ / ₁₆	2- 9 ¹ / ₈	3-1	6-8 ¹ / ₂	0-10 ⁹ / ₁₆

Fig. 4 — Roof Curb Physical Data and Dimensions; 48MA Units



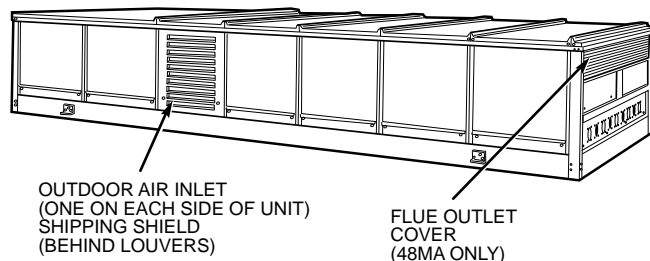
UNIT 50ME	DIMENSIONS (ft-in.)								
	A	B	C	D	E	F	G	H	J
016-030	18-2 1/8	7- 3	11-9	5-6 1/4	7-2 7/8	1-10 9/16	2-2 9/16	6-0 3/8	0- 7 1/2
034,040	21-9 7/8	7-11 3/4	14-1 3/4	6-7 7/16	8-4 3/16	2- 9 1/8	3-1	6-8 1/2	0-10 5/16

Fig. 5 — Roof Curb Physical Data and Dimensions; 50ME Units

Condensate Drains — Pipe nipples covered with foam rubber insulation are shipped in unit return air filter section (6 nipples in units 48MA, 4 nipples in units 50ME). Install a nipple in *each* drain connection on both sides of unit. See Fig. 1 and 2 for drain locations. Be sure foam rubber seals space between nipple and base rail opening to prevent rain leaks.

Connect a drain line to drain connection under outdoor air inlet grilles on *both* sides of unit. These drains need not be trapped.

Install a trapped drain line on remaining connections on lowest side of unit depending on unit pitch. If unit is level, a trapped drain may be installed at each connection if desired. Cap or plug unused connections on high side of unit to prevent airflow between unit interior and outdoors.

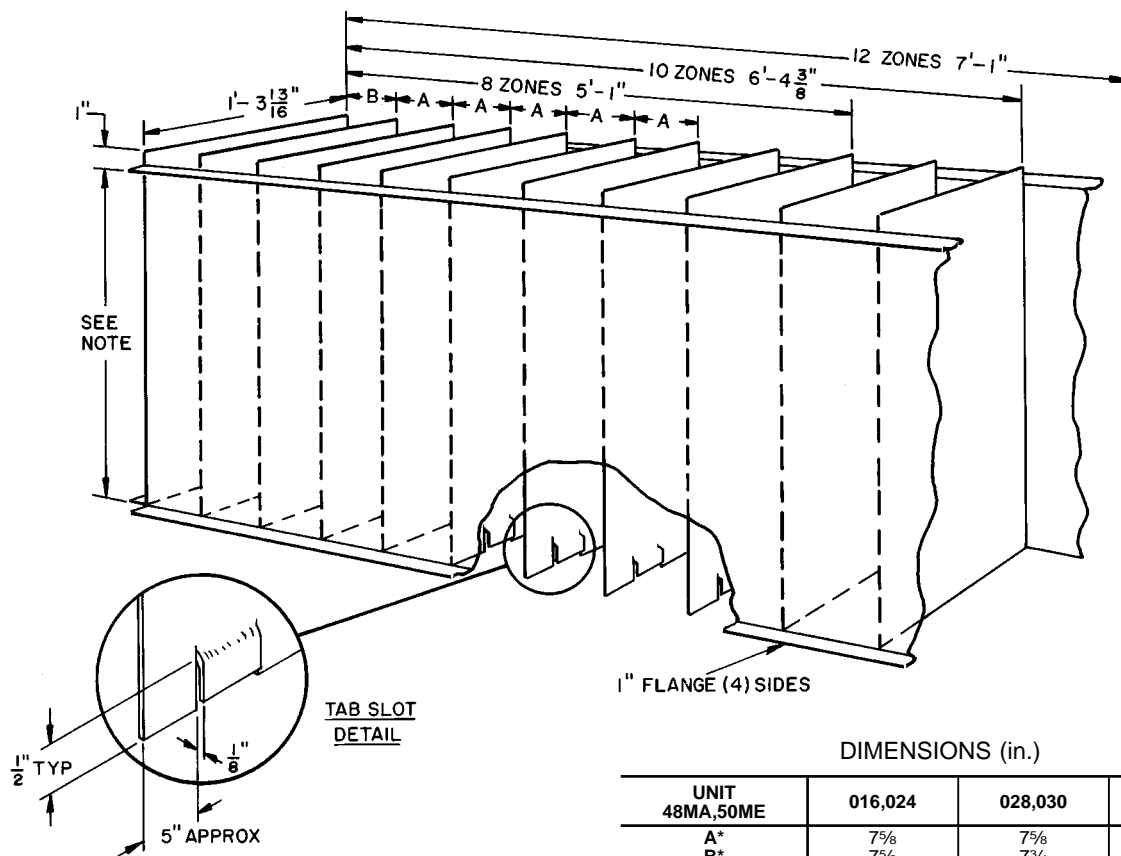


**Fig. 6 — Shipping Shield Locations
(016-030 Units Shown)**

Do not interconnect drains. Make each trap a minimum of 4 in. deep. Insulate trap against freeze-up or use flexible material.

Gas Piping (48MA) — Unit is equipped for use with type of gas shown on nameplate. Refer to latest edition of ANSI Z223.1. Unit main gas connection and alternate gas connection locations are shown in Fig. 1, 4, and 8. Do not use gas supply pipe smaller than unit gas connection. Maximum allowable natural gas supply pressure is 10.0 in. wg; minimum allowable natural gas supply pressure for full rate input is 5.0 in. wg.

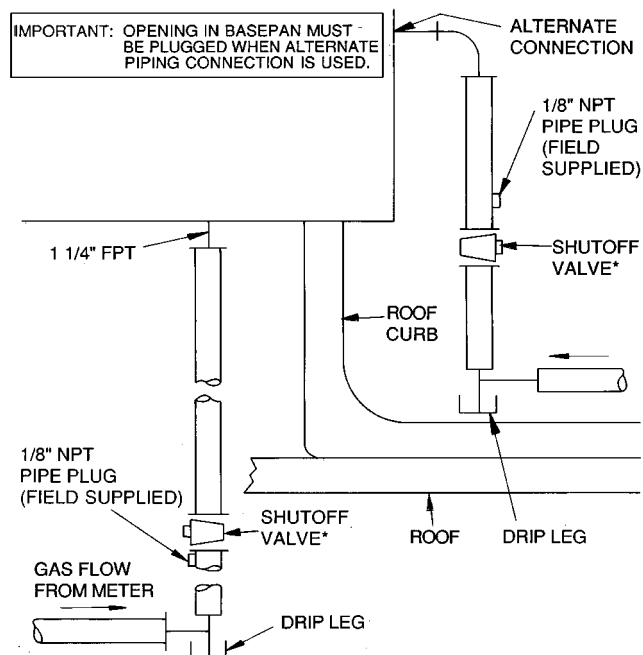
Pitch pipe 1/4 in. per 15 ft. Pitch all horizontal pipe runs upward to risers and from risers upward to meter. Install a dirt and moisture pocket (drip leg) at each section of vertical pipe run. Use only ground joint unions to ensure leakfree joints. Use only pipe joint compounds that are resistant to the action of liquefied petroleum gases.



NOTE: Dimension to suit job requirements. Twelve inches will bring duct plenum to bottom of roof curb.

*Typical; both ends.

Fig. 7 — Field-Fabricated Zone Duct Plenum Detail



*Shutoff valve not used except where required by code.



Fig. 8 — Suggested Gas Piping (48MA)

Unit has factory-installed gas shutoff valves. Install gas shutoff valve external to unit if required by code (Fig. 8). After piping is complete, pressurize gas line and check for leaks with soap and water solution.

Do not use an open flame when checking for gas leaks.

Optional Glycol Connections (50ME) — Each zone module has its own glycol heating coil and 115-v solenoid valve. Heating coils are connected in parallel to common supply and return manifolds. Supply manifolds are equipped with bleed cocks. Supply and return connections are shown in Fig. 2 and 5. *Unit does not have internal pressure relief for part-load operation. Maximum allowable system working pressure is 30 psig.* Unit ratings are based on 20% glycol solutions. Install solution supply apparatus in accordance with application requirements, and mix glycol solution percentage in accordance with glycol manufacturer's recommendations. Freeze-up protection is not factory installed.

Field Power Supply Wiring — When installed, unit must be electrically grounded in accordance with local codes or, in the absence of local codes, with the National Electrical Code (NEC).

Unit has a circuit breaker for each compressor, each fan motor, and for each 50ME electric resistance heater assembly (if unit is so equipped). If required by local code, provide an additional disconnect switch in accordance with code being followed.

All units have a main power supply terminal board in the power and condensing control box. The electric resistance heater power supply terminal board(s) (if unit is so equipped) on 50ME units is located in the heater control box at front of unit. See Fig. 2, 5, and 9.

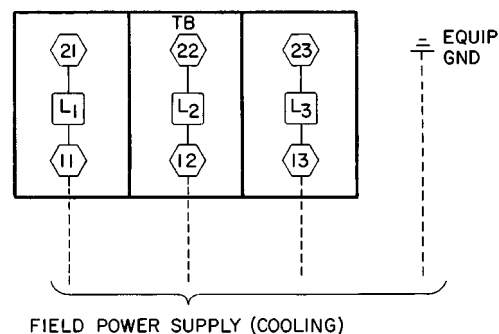
All terminal boards are suitable for use with copper or aluminum wire.

Connect electrical conduit (a threaded pipe nipple) shipped with unit to threaded fitting in roof curb and bottom of main power and condensing section control box. Route main power wires through conduit to terminal board in box as shown on unit label wiring diagram and in Fig. 9.

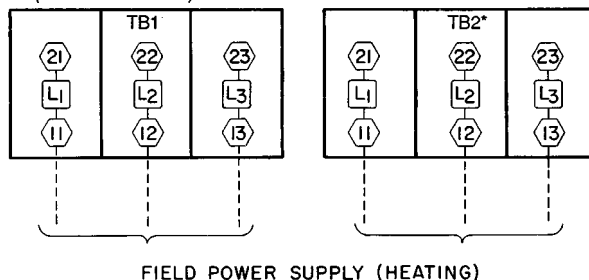
When installing 48MA, 50ME040 units with optional 20-hp motor, the electrical conduit interconnecting the curb and control box power wire openings will not accommodate aluminum wire of the size that may be required. If aluminum wire cannot be accommodated, an external transition box and short lengths of no. 300 kcmil, 75 C copper wire from the transition box to the unit main power connection are recommended.

Voltage to compressor terminals during compressor operation must be within voltage range indicated on unit nameplate. Phases must be balanced within 2%.

TERMINAL BOARD IN LOWER LEFT-HAND CORNER OF POWER AND CONDENSING CONTROL BOX ON 48MA AND 50ME



TERMINAL BOARD(S) IN HEATER CONTROL BOX, 50ME ONLY (IF SO EQUIPPED)



LEGEND

EQUIP — Equipment
GND — Ground
TB — Terminal Board

*208/230 v units only.

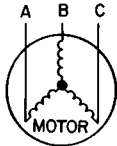
Fig. 9 — Field Power Supply Details

Use the following formula to determine the percent voltage imbalance.

% Voltage Imbalance:

$$= 100 \times \frac{\text{max voltage deviation from average voltage}}{\text{average voltage}}$$

EXAMPLE: Supply voltage is 460-3-60.



$$\begin{aligned} AB &= 452 \text{ v} \\ BC &= 464 \text{ v} \\ AC &= 455 \text{ v} \end{aligned}$$

$$\begin{aligned} \text{Average Voltage} &= \frac{452 + 464 + 455}{3} \\ &= \frac{1371}{3} \\ &= 457 \end{aligned}$$

Determine maximum deviation from average voltage.

$$(AB) 457 - 452 = 5 \text{ v}$$

$$(BC) 464 - 457 = 7 \text{ v}$$

$$(AC) 457 - 455 = 2 \text{ v}$$

Maximum deviation is 7 v.

Determine percent voltage imbalance:

$$\begin{aligned} \% \text{ Voltage Imbalance} &= 100 \times \frac{7}{457} \\ &= 1.53\% \end{aligned}$$

This amount of phase imbalance is satisfactory as it is below the maximum allowable 2%.

IMPORTANT: If the supply voltage phase imbalance is more than 2%, contact your local electric utility company immediately.

Unit failure as a result of operation on improper line voltage or excessive phase imbalance constitutes abuse and may cause damage to electrical components. See Tables 2-5 for unit, electric heater, and 50ME electrical application electrical data.

Each 50ME electric heat unit is fitted with a heating lock-out circuit (if equipped with optional heat). If any zone module is operating on mechanical cooling (compressor is operating), the heating element in each zone module is locked out and cannot be energized.

On 50ME units, cooling power supply wires and electric heater power supply wires (if applicable) must be sized according to the cooling MCA (Minimum Circuit Amps) values and heating MCA values shown on unit nameplate and in Tables 3-5. These wires may be powered by a common power supply (i.e., a pull-box junction), if desired. The common power supply wires from the main power source to the junction must be sized according to the common MCA values shown in Table 5.

UNIT COMMON FEED MINIMUM CIRCUIT AMPS — The unit common feed MCA is calculated on the basis of either: the sum of the cooling MCA plus ½ heating MCA on units with 2 heating elements per zone module (or ⅔ heating MCA on units with 3 heating elements per zone module) or the sum of the evaporator fan motor full load amps, per NEC, plus the full heating MCA, whichever is larger. Field wiring must conform to NEC limitations for Type T wire.

Table 2 — Unit 48MA Electrical Data

UNIT 48MA	Voltage (3 Ph, 60 Hz)	VOLTAGE RANGE		COMP NO. 1		COMP NO. 2		OFM FLA			COMBUSTION FAN MOTOR	IFM		POWER SUPPLY			
		Min	Max	RLA	LRA	RLA	LRA	No. 1	No. 2	No. 3	FLA	Hp	FLA	MCA	MOCP		
016	208/230	187	254	63.6	266	—	—	6.2	6.6	—	1.8	5	16.2	109.6	125		
	460	414	508	28.6	120				3.0				6.6	49.8	60		
	575	518	632	22.8	96				2.4				5.6	39.8	45		
024	208/230	187	254	44.4	170	44.4	170	6.2	6.6	—	1.8	7.5	24.2	137.5	150		
	460	414	508	19.9	77	19.9	77		3.0				11.0	62.2	70		
	575	518	632	15.7	62	15.7	62		2.4				9.0	49.4	60		
028	208/230	187	254	63.6	266	44.4	170	6.2	6.6	—	1.8	10	30.8	168.1	200		
	460	414	508	28.6	120	19.9	77		3.0				13.0	76.1	90		
	575	518	632	22.8	96	15.7	62		2.4				10.5	60.4	70		
030	208/230	187	254	63.6	266	63.6	266	6.2	6.6	—	1.8	10	30.8	187.3	200		
	460	414	508	28.6	120	28.6	120		3.0				13.0	84.5	100		
	575	518	632	22.8	96	22.8	96		2.4				10.5	67.5	90		
034	208/230	187	254	63.6	266	63.6	266	6.2	6.6	6.6	1.8	15	46.2	210.8	225		
									20	61.0		224.6	250				
	460	414	508	28.6	120				28.6	120		3.0	3.0	15	21.0	94.5	100
												20	26.6	100.5	125		
	575	518	632	22.8	96				22.8	96		2.4	2.4	15	16.0	75.6	90
												20	21.3	80.6	100		
040	208/230	187	254	80.0	345	80.0	345	6.2	6.6	6.6	1.8	15	46.2	247.7	300		
									20	61.0		261.5	300				
	460	414	508	38.5	150				38.5	150		3.0	3.0	15	21.0	116.7	150
												20	27.0	122.7	150		
	575	518	632	31.4	120				31.4	120		2.4	2.4	15	16.0	95	125
												20	21.3	100	125		

LEGEND

COMP — Compressor
FLA — Full Load Amps
IFM — Indoor (Evaporator) Fan Motor
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps

MOCP — Maximum Overcurrent Protection
OFM — Outdoor (Condenser) Fan Motor
RLA — Rated Load Amps

NOTES:

1. Combustion air fan is a 115-1-60 motor on all units.
2. Condenser fan motor no. 1 is a 208/230-1-60 speed control motor on all units.

Table 3 — Unit 50ME Electrical Data

UNIT 50ME	VOLTAGE (3 Ph, 60 Hz)	VOLTAGE RANGE		COMP NO. 1		COMP NO. 2		OFM FLA			IFM		POWER SUPPLY		
		Min	Max	RLA	LRA	RLA	LRA	No. 1	No. 2	No. 3	Hp	FLA	MCA	MOCP	
016	208/230	187	254	63.6	266	—	—	6.2	6.6	—	5	16.2	109.6	125	
	460	414	508	28.6	120				3.0			6.6	49.5	60	
	575	518	632	22.8	96				2.4			5.6	39.6	45	
024	208/230	187	254	44.4	170	44.4	170	6.2	6.6	—	7.5	24.2	138.0	150	
	460	414	508	19.9	77	19.9	77		3.0			11.0	61.9	70	
	575	518	632	15.7	62	15.7	62		2.4			9.0	49.2	60	
028	208/230	187	254	63.6	266	44.4	170	6.2	6.6	—	10	30.8	168.9	200	
	460	414	508	28.6	120	19.9	77		3.0			13.0	75.8	90	
	575	518	632	22.8	96	15.7	62		2.4			10.5	60.2	70	
030	208/230	187	254	63.6	266	63.6	266	6.2	6.6	—	10	30.8	188.0	200	
	460	414	508	28.6	120	28.6	120		3.0			13.0	84.5	100	
	575	518	632	22.8	96	22.8	96		2.4			10.5	67.3	90	
034	208/230	187	254	63.6	266	63.6	266	6.2	6.6	6.6	15	46.0	210.8	225	
											20	61.0	224.6	250	
	460	414	508	28.6	120	28.6	120		3.0	3.0	15	19.8	94.5	100	
											20	26.6	100.5	125	
	575	518	632	22.8	96	22.8	96		2.4	2.4	15	16.0	75.6	90	
											20	21.3	80.6	100	
040	208/230	187	254	80.0	345	80.0	345	6.2	6.6	6.6	15	46.2	247.7	300	
											20	61.0	261.5	300	
	460	414	508	39.3	150	39.3	150		3.0	3.0	15	19.8	118.5	150	
											20	26.6	124.5	150	
	575	518	632	31.4	120	31.4	120		2.4	2.4	15	16.0	95	125	
											20	21.3	100	125	

LEGEND

COMP — Compressor
FLA — Full Load Amps
IFM — Indoor (Evaporator) Fan Motor
LRA — Locked Rotor Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection
OFM — Outdoor (Condenser) Fan Motor
RLA — Rated Load Amps

NOTE: Condenser fan motor no. 1 is a 208/230-1-60 speed control motor on all units.

Table 4 — Electric Resistance Heater Data

UNIT 50ME	NOMINAL VOLTAGE (3 Ph, 60 Hz)	ELECTRIC HEAT kW (Unit Total)	HEATING ELEMENTS PER ZONE MODULE	FLA PER HEATING ELEMENT	MCA (Each Circuit)	MOCP (Each Circuit)
016,024	208/230	43/ 53	2	13.0/14.4	150/166	175/175
		57/ 70	2	17.3/19.2	200/221	225/225
		87/106	3	17.3/19.2	150/166	175/175
	460	53 70 106	2 2 3	7.2 9.6 9.6	83 111 166	90 125 175
	575	106	3	7.7	133	150
028,030	208/230	54/ 66	2	13.0/14.4	188/207	200/225
		72/ 88	2	17.3/19.2	250/276	275/300
		108/132	3	17.3/19.2	188/207	200/225
	460	66 88 132	2 2 3	7.2 9.6 9.6	103 138 207	110 150 225
	575	132	3	7.7	166	175
034,040	208/230	65/ 79	2	13.0/14.4	225/249	250/250
		87/106	2	17.3/19.2	150/165	175/175
		129/158	3	17.3/19.2	225/249	250/250
	460	79 106 158	2 2 3	7.2 9.6 9.6	124 166 249	125 175 250
	575	158	3	7.7	199	200

LEGEND

FLA — Full Load Amps
MCA — Minimum Circuit Amps
MOCP — Maximum Overcurrent Protection

NOTES:

1. Heaters are rated at 230 v, 460 v, and 575 v.
2. Terminal boards provided for heater power wire connections are suitable for use with copper or aluminum wire.

Table 5 — Unit 50ME Electrical Application Data

UNIT 50ME		NOMINAL VOLTAGE	kW (Unit Total)	MCA			
				Cooling	Heating Circuit		Unit Common Feed
Size	IFM Hp				1	2	
016	5	208/230	43/ 53 57/ 70 87/106	109.8/109.8	150.0/165.6 200.0/220.9 150.0/165.8	— — 150.0/165.8	184.8/192.6 216.7/237.6 316.7/348.3
		460	53 70 106	49.5	82.9 110.5 165.8	—	90.9 117.1 172.4
		575	106	39.6	132.5	—	138.1
024	7.5	208/230	43/ 53 57/ 70 87/106	138.0/138.0	150.0/160.6 200.0/220.9 150.0/165.8	— — 150.0/165.8	213.0/220.8 238.0/248.5 342.2/359.0
		460	53 70 106	61.9	82.9 110.5 165.8	—	103.4 121.5 176.8
		575	106	49.2	132.5	—	141.5
028	10	208/230	54/ 66 72/ 88 108/132	168.9	188.0/207.1 250.0/276.1 188.0/207.1	— — 188.0/207.1	262.9/272.5 293.9/307.0 419.6/445.0
		460	66 88 132	75.8	102.8 138.0 207.1	—	127.2 151.0 220.1
		575	132	60.2	165.6	—	176.1
030	10	208/230	54/ 66 72/ 88 108/132	188.0	188.0/207.1 250.0/276.1 188.0/207.1	— — 188.0/207.1	282.0/291.6 313.0/326.0 438.7/464.0
		460	66 88 132	84.5	102.8 138.0 207.1	—	135.9 153.5 222.6
		575	132	67.3	165.6	—	177.7
034	15	208/230	65/ 79 87/106 129/158	210.8	225.0/248.5 150.0/165.6 225.0/248.5	— 150.0/165.1 225.0/248.5	323.3/335.1 360.8/376.4 510.9/543.2
		460	79 106 158	94.5	124.3 165.1 248.5	—	156.7 185.4 268.3
		575	158	75.6	198.8	—	214.8
	20	208/230	65/ 79 87/106 129/158	224.6	225.0/248.5 150.0/165.1 225.0/248.5	— 150.0/165.1 225.0/248.5	337.1/348.9 374.6/391.2 524.6/558.0
		460	79 106 158	100.5	124.3 165.6 248.5	—	162.7 192.2 275.1
		575	158	80.6	198.8	—	220.1
040	15	208/230	65/ 79 87/106 129/158	247.7	225.0/248.5 150.0/165.1 225.0/248.5	— 150.0/165.1 225.0/248.5	360.2/372.0 397.7/412.8 547.7/579.0
		460	79 106 158	116.7	124.3 165.6 248.5	—	178.9 199.5 282.4
		575	158	95.0	198.8	—	227.5
	20	208/230	65/ 79 87/106 129/158	261.5	225.0/248.5 150.0/165.1 225.0/248.5	— 150.0/165.1 225.0/248.5	374.0/385.8 411.5/426.6 561.5/592.8
		460	79 106 158	122.7	124.3 165.6 248.5	—	148.9 205.5 288.4
		575	158	100.0	198.8	—	232.5

LEGEND

IFM — Indoor (Evaporator) Fan Motor
MCA — Minimum Circuit Amps

Field Control Wiring

ZONE THERMOSTATS — Install a Carrier approved accessory zone thermostat assembly in each zone according to installation instructions included in the accessory. Locate each thermostat assembly in the space where it will sense average zone temperature.

Route thermostat cable or equivalent single leads of no. 18 AWG (American Wire Gage) colored wire from thermostat subbase terminals through opening on base unit (Fig. 1, 2, 4, and 5) to low-voltage thermostat connections on zone control board (Fig. 10). Use no. 16 AWG wire for lengths exceeding 50 ft.

ZONE MODULE CONNECTIONS — Any module may be controlled independently or jointly with another module or modules. Modules are combined into nests that form individual Class II circuits (40 va) as follows:

Modules no. 1 and 2, 3 and 4, 5 and 6, 7 and 8, 9 and 10 (028-040 units), 11 and 12 (034,040 units).

The control signal can be transferred from one nest to another nest by using factory-supplied jumpers on

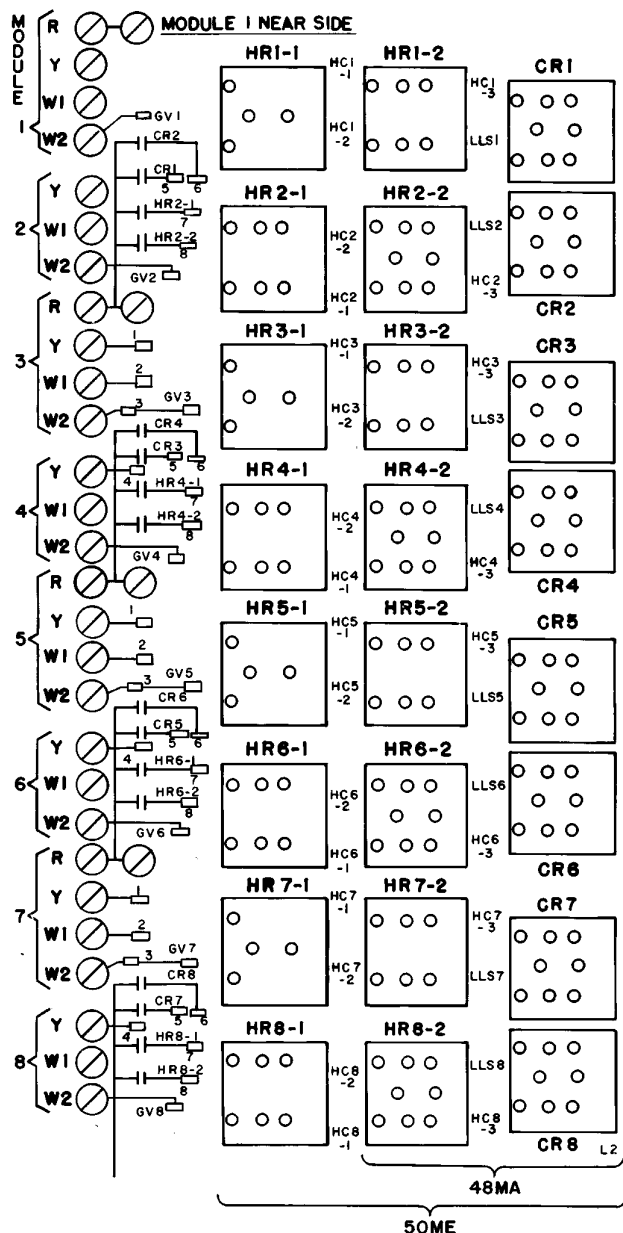
quick-connect type multiplexing terminals. This prevents overloading the nest control transformers. Factory-supplied jumpers with quick-connect terminals are shipped in the zone control and thermostat panel compartment.

Under no circumstances shall the transformer power from one Class II circuit be interconnected with any other circuit.

Thermostat heat anticipator settings are indicated for each permitted zone module connection arrangement illustrated in Fig. 11-28.

To Join Modules of the Same Nest Into the Same Zone (i.e., modules no. 1 and 2) — Install field-supplied jumpers on thermostat connections (screw terminals) Y to Y and W2 to W2 as shown in Fig. 11. Connect thermostat wires to terminal connections of first module in zone (for consistency). Two-stage cooling may be obtained in this example as shown in Fig. 12 (using a 2-stage thermostat).

To Join Modules Not of the Same Nest Into the Same Zone (i.e., modules no. 2 and 3) — Install the factory-supplied jumpers on quick-connect terminals 6 to 1, 7 to 2, and 8 to 3 as shown in Fig. 13. Note that module no. 1 is independently controlled by its own thermostat (in Fig. 13).



LEGEND

AFS	—	Airflow Switch
CR	—	Control Relay
ECR	—	Economizer Relay
ECT	—	Economizer Outdoor-Air Thermostat
GV	—	Gas Valve (not used on 50ME units)
HC	—	Heater Contactor
HR	—	Heater Relay
IFC	—	Indoor (Evaporator) Fan Contactor
LLS	—	Liquid Line Solenoid
MC	—	Master Cooling
MCR	—	Master Cooling Relay
MH	—	Master Heating
MHR	—	Master Heating Relay
MU	—	Master Unit
MUR	—	Master Unit Relay
NC	—	Normally Closed
NO	—	Normally Open
NS	—	Night Setback
SW	—	Switch
TRAN	—	Transformer
	□	Quick-Connect Type Terminals (for multiplexing)
	⊗	Screw-Type Terminals

NOTE: Twelve-zone unit shown. Eight-zone units have modules 1-8 only. Ten-zone units have modules 1-10 only.

Fig. 10 — Zone Control Board Component Location

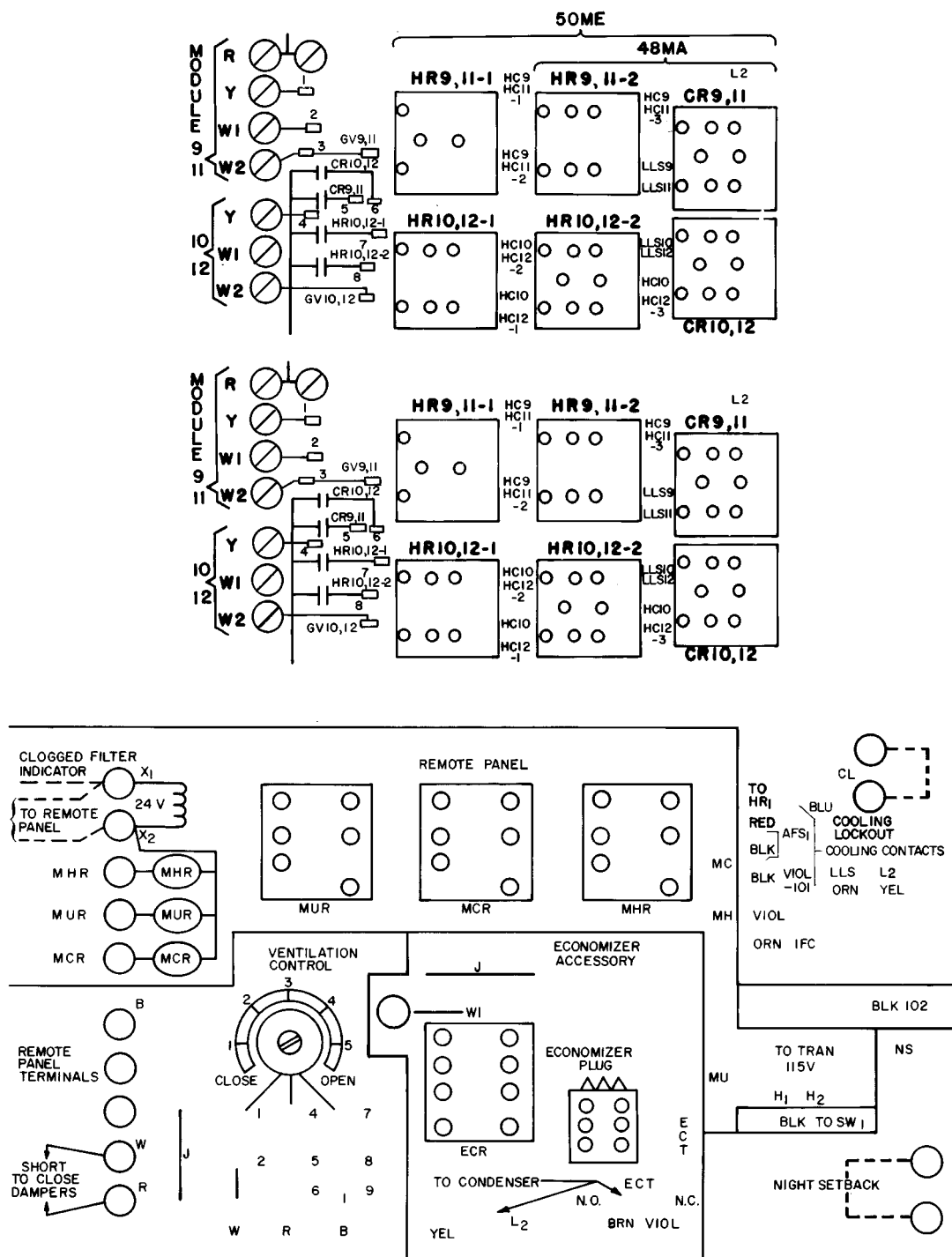


Fig. 10 — Zone Control Board Component Location (cont)

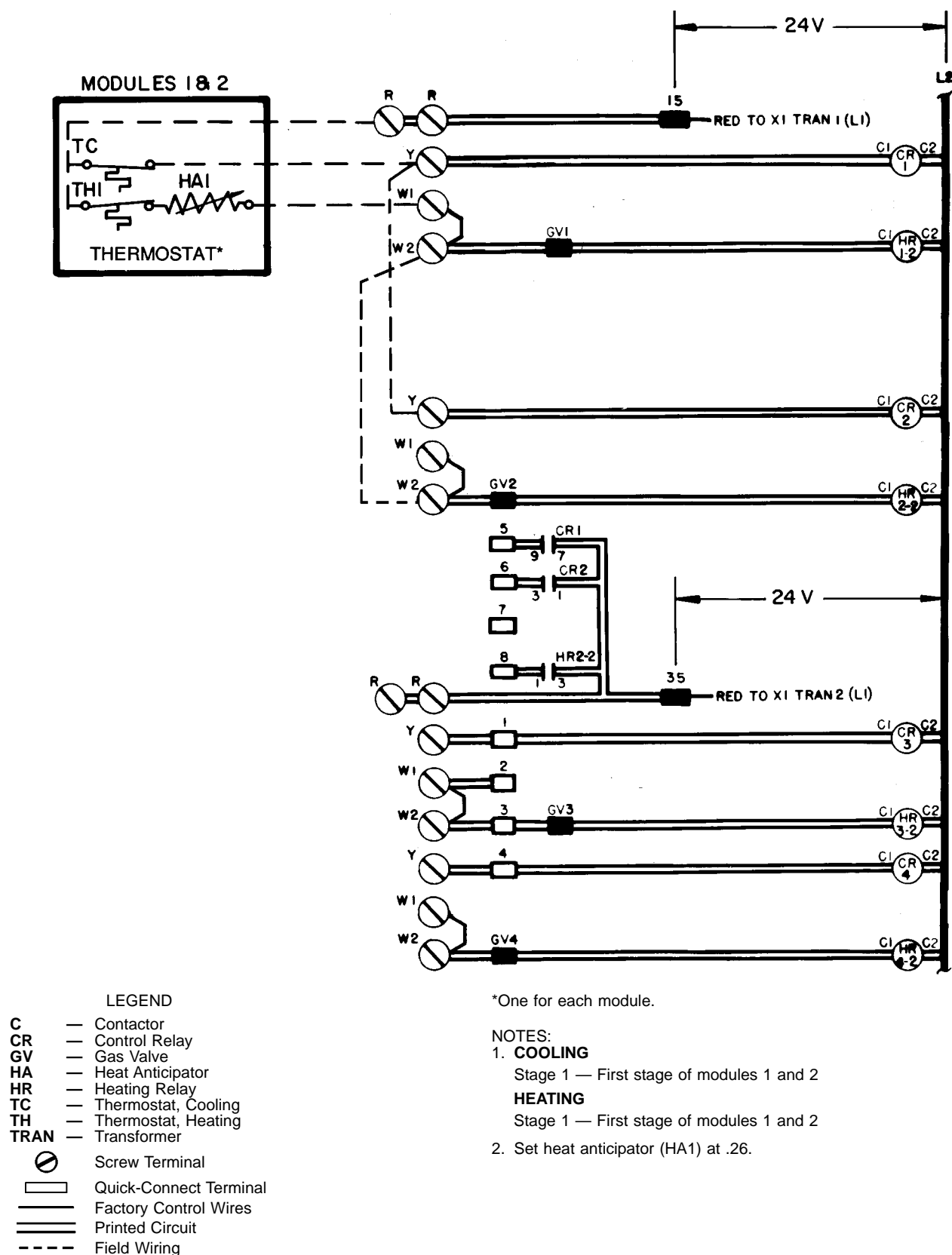
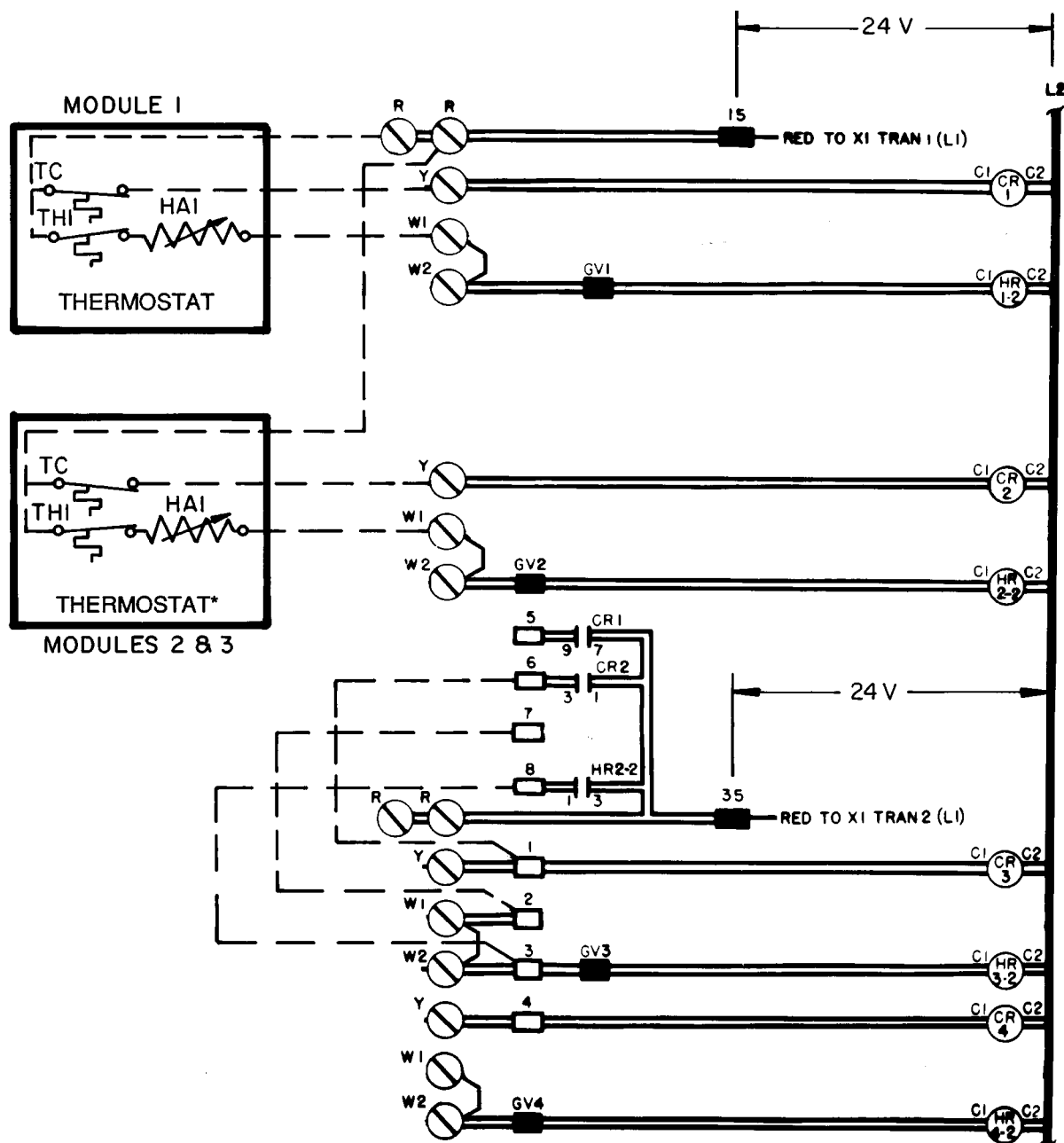


Fig. 11 — 48MA; One-Stage Heat, One-Stage Cool — 2 Nested Modules, Joint Zone Control



LEGEND	
C	— Contactor
CR	— Control Relay
GV	— Gas Valve
HA	— Heat Anticipator
HR	— Heating Relay
TC	— Thermostat, Cooling
TH	— Thermostat, Heating
TRAN	— Transformer
⊗	Screw Terminal
□	Quick-Connect Terminal
—	Factory Control Wires
—	Printed Circuit
---	Field Wiring

*One for each module.

NOTES:

1. COOLING

Stage 1 — First stage of modules 1, 2, and 3

HEATING

Stage 1 — First stage of modules 1, 2, and 3

2. Set heat anticipators (HA1) at .13.

Fig. 13 — 48MA; One-Stage Heat, One-Stage Cool — One Independent Module, 2 Joint Modules Zone Control

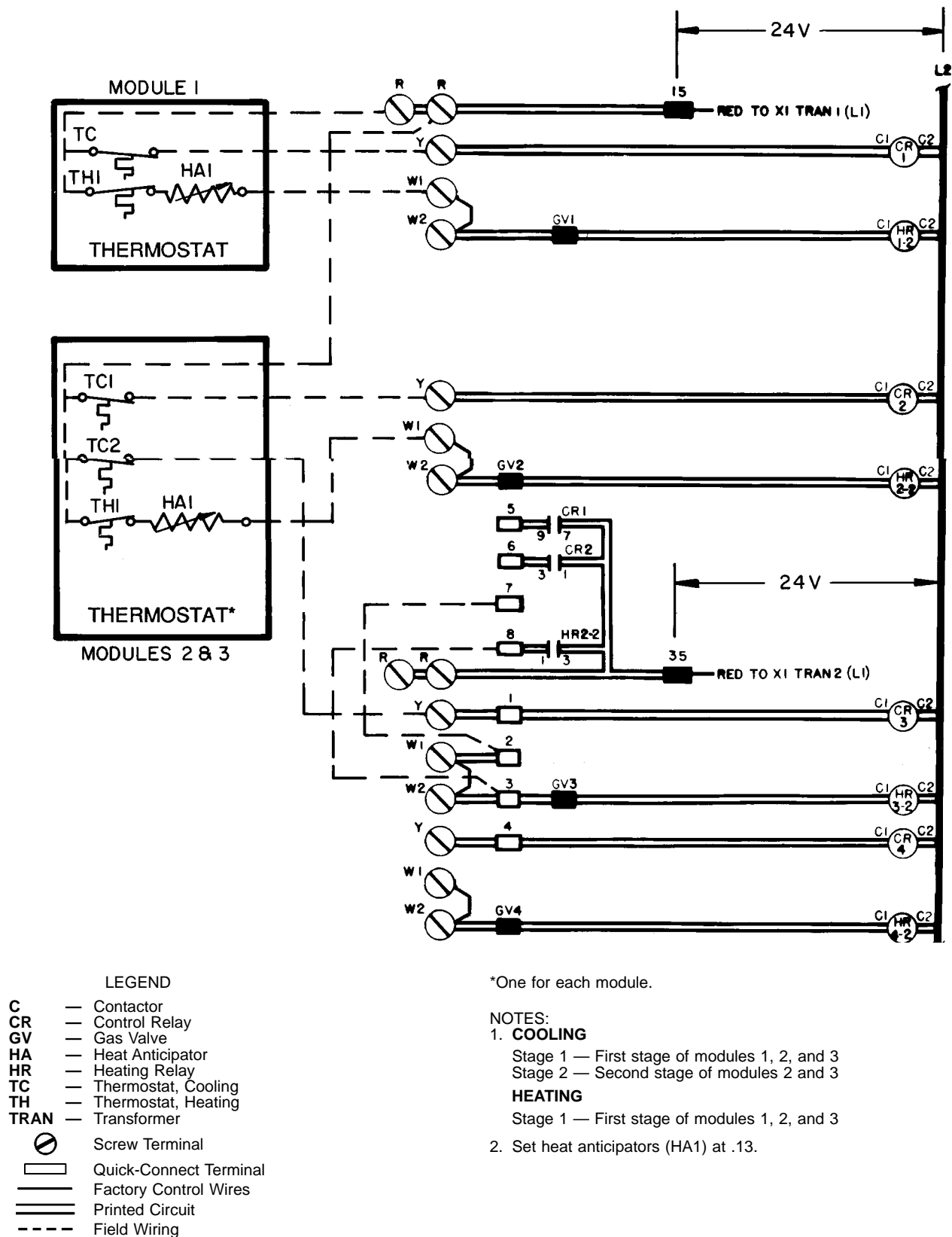
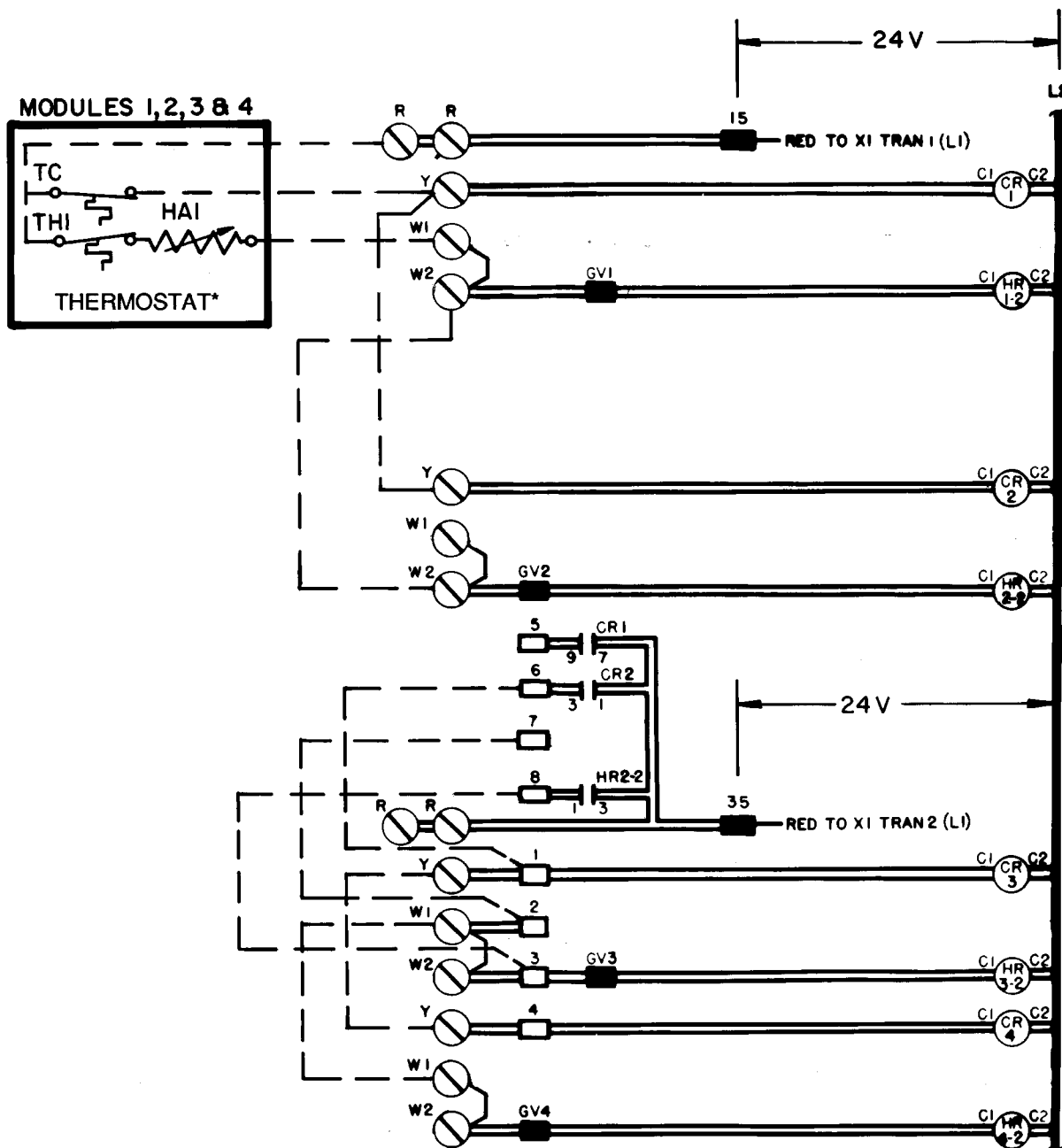


Fig. 14 — 48MA; One-Stage Heat, One-Stage Cool; One-Stage Heat, Two-Stage Cool Combination



LEGEND

C — Contactor
 CR — Control Relay
 GV — Gas Valve
 HA — Heat Anticipator
 HR — Heating Relay
 TC — Thermostat, Cooling
 TH — Thermostat, Heating
 TRAN — Transformer

⊗ — Screw Terminal
 □ — Quick-Connect Terminal
 — — — — — Factory Control Wires
 — — — — — Printed Circuit
 - - - - - Field Wiring

*One for each module.

NOTES:

1. COOLING

Stage 1 — First stage of modules 1, 2, 3, and 4

HEATING

Stage 1 — First stage of modules 1, 2, 3, and 4

2. Set heat anticipator (HA1) at .26.

Fig. 15 — 48MA; One-Stage Heat, One-Stage Cool — 4 Module Joint Zone Control

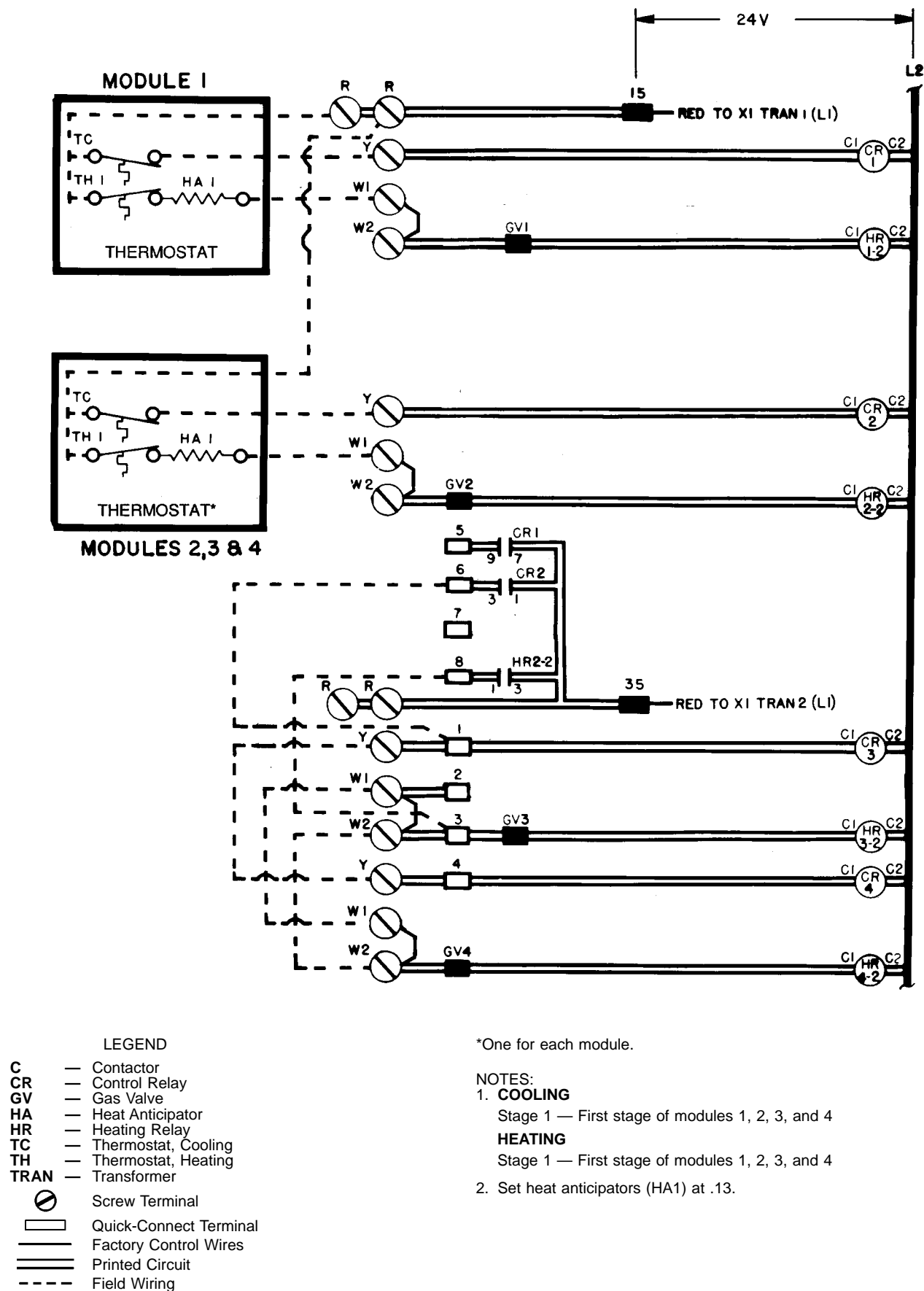


Fig. 16 — 48MA; One-Stage Heat, One-Stage Cool — One Independent Module, 3 Joint Modules Zone Control

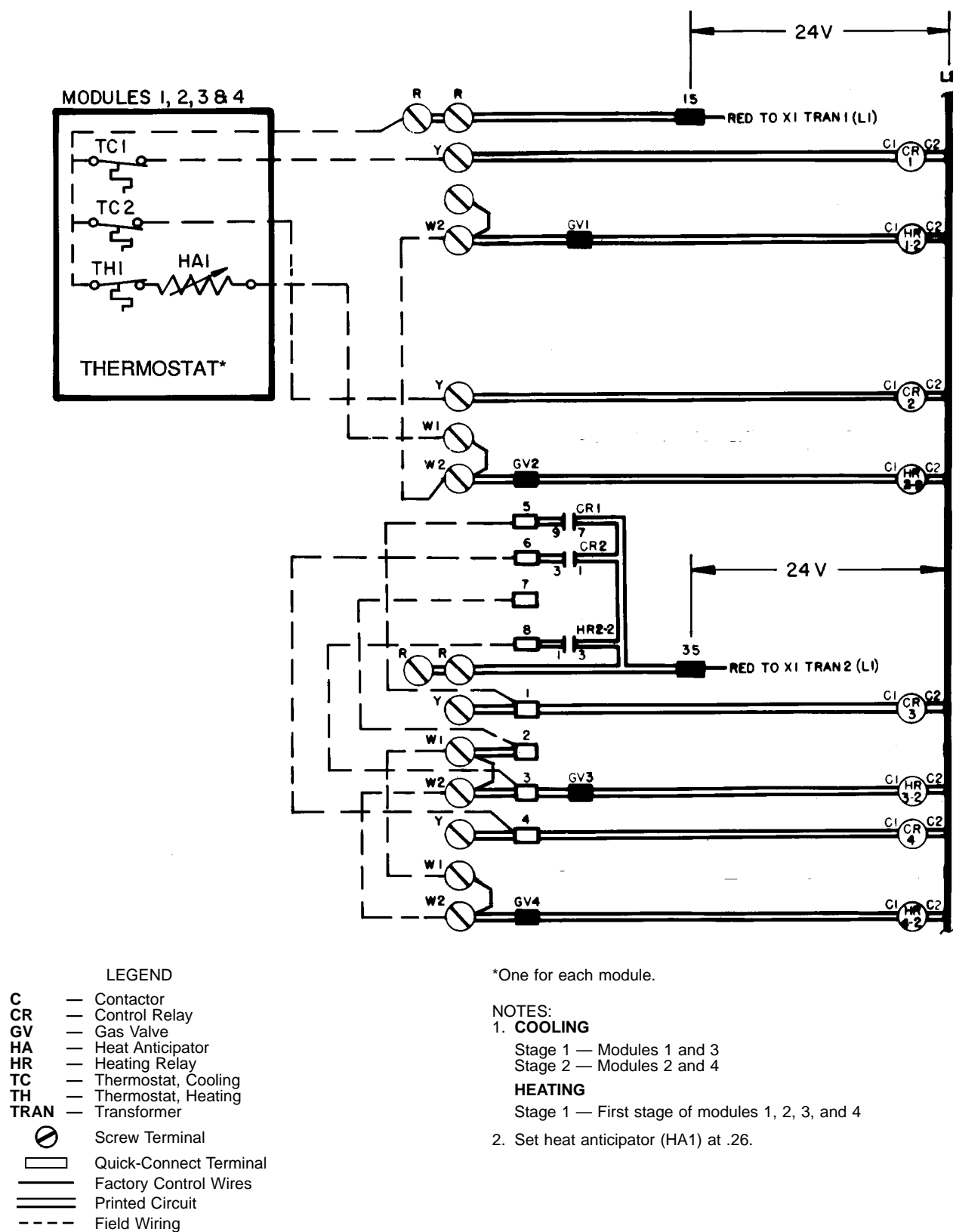


Fig. 17 — 48MA; One-Stage Heat, Two-Stage Cool — 4 Module Joint Zone Control

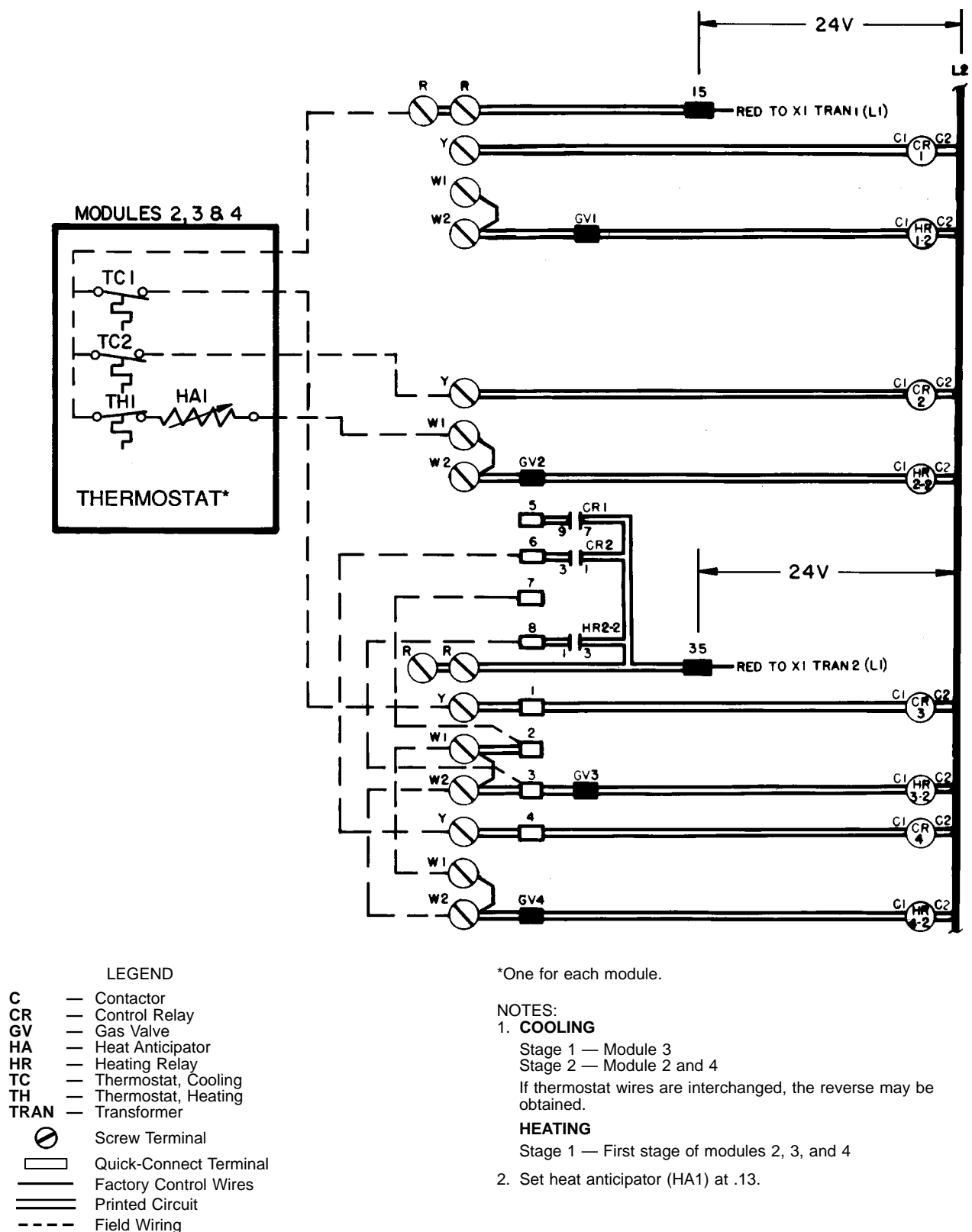
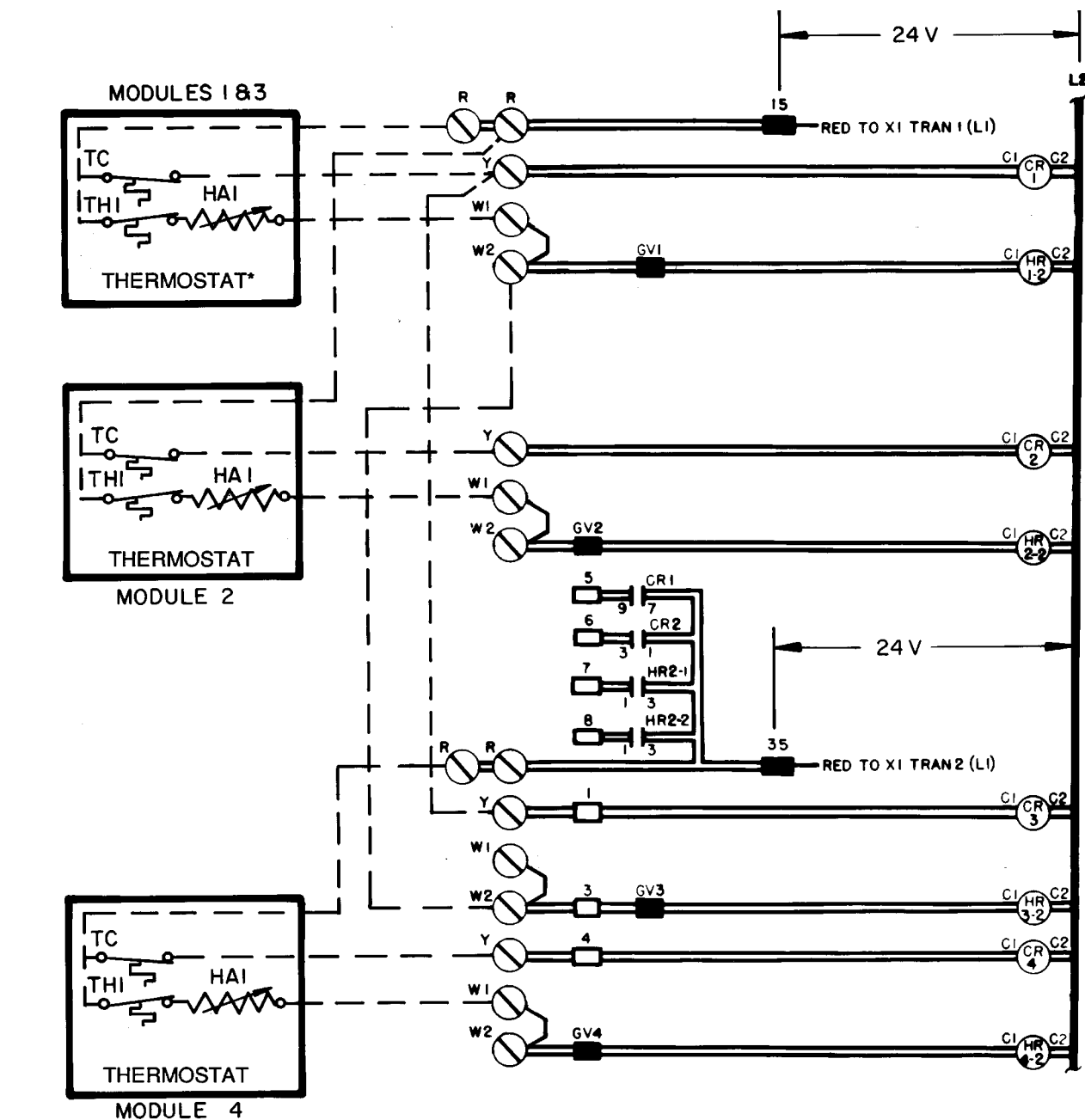


Fig. 18 — 48MA; One-Stage Heat, Two-Stage Cool — 3 Module Joint Zone Control



LEGEND

C	— Contactor
CR	— Control Relay
GV	— Gas Valve
HA	— Heat Anticipator
HR	— Heating Relay
TC	— Thermostat, Cooling
TH	— Thermostat, Heating
TRAN	— Transformer
⊗	Screw Terminal
□	Quick-Connect Terminal
—	Factory Control Wires
—	Printed Circuit
---	Field Wiring

*One for each module.

NOTES:

1. COOLING

Stage 1 — First stage of modules 1, 2, 3, and 4

HEATING

Stage 1 — First stage of modules 1, 2, 3, and 4

2. Set heat anticipators (HA1) as follows:

MODULE(S)	SETTING
1, 3	.26
2	.13
4	.13

Fig. 19 — 48MA; One-Stage Heat, One-Stage Cool — 2 Independent Modules, 2 Joint Modules Zone Control

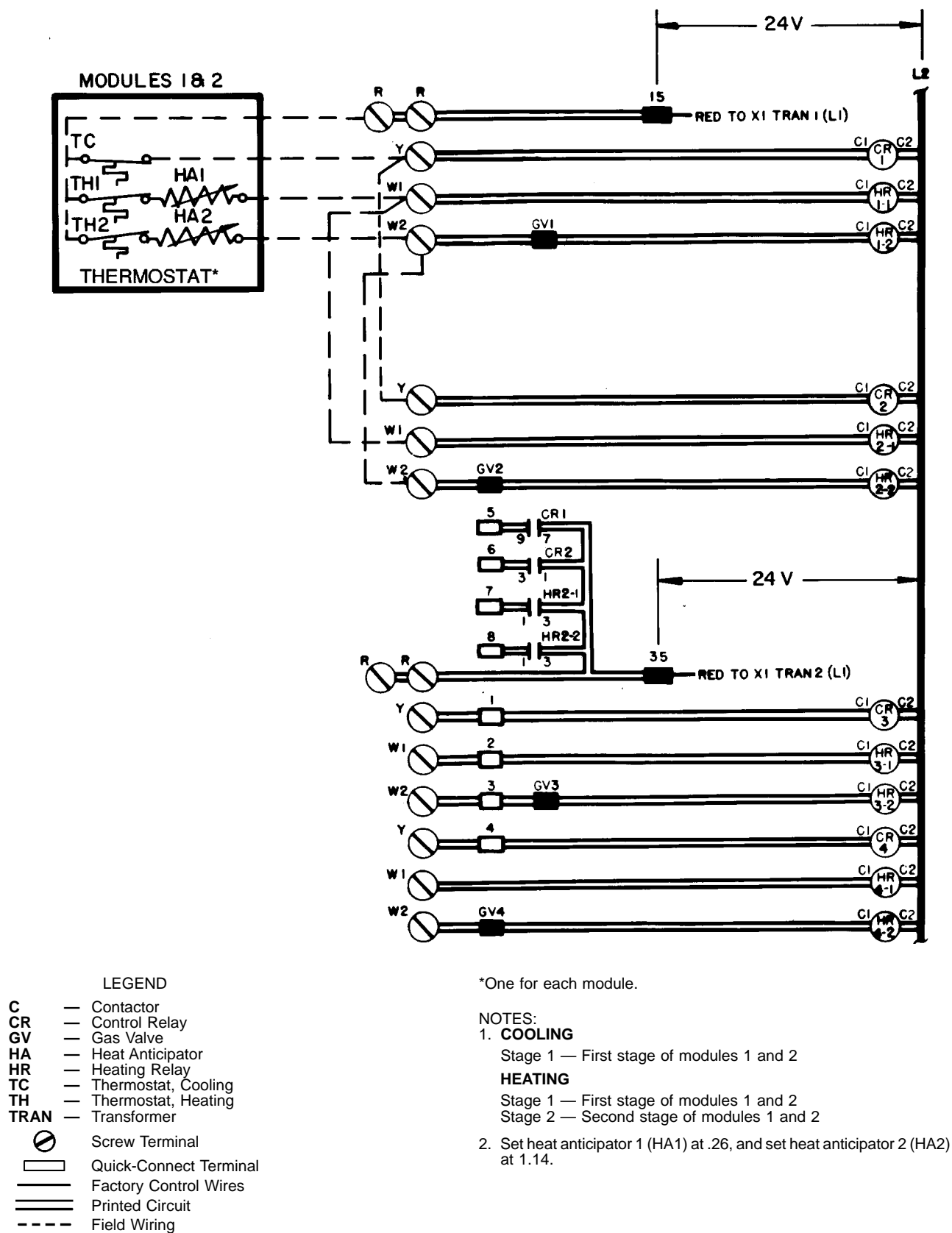


Fig. 20 — 50ME; Two-Stage Heat, One-Stage Cool — 2 Modules, Joint Zone Control

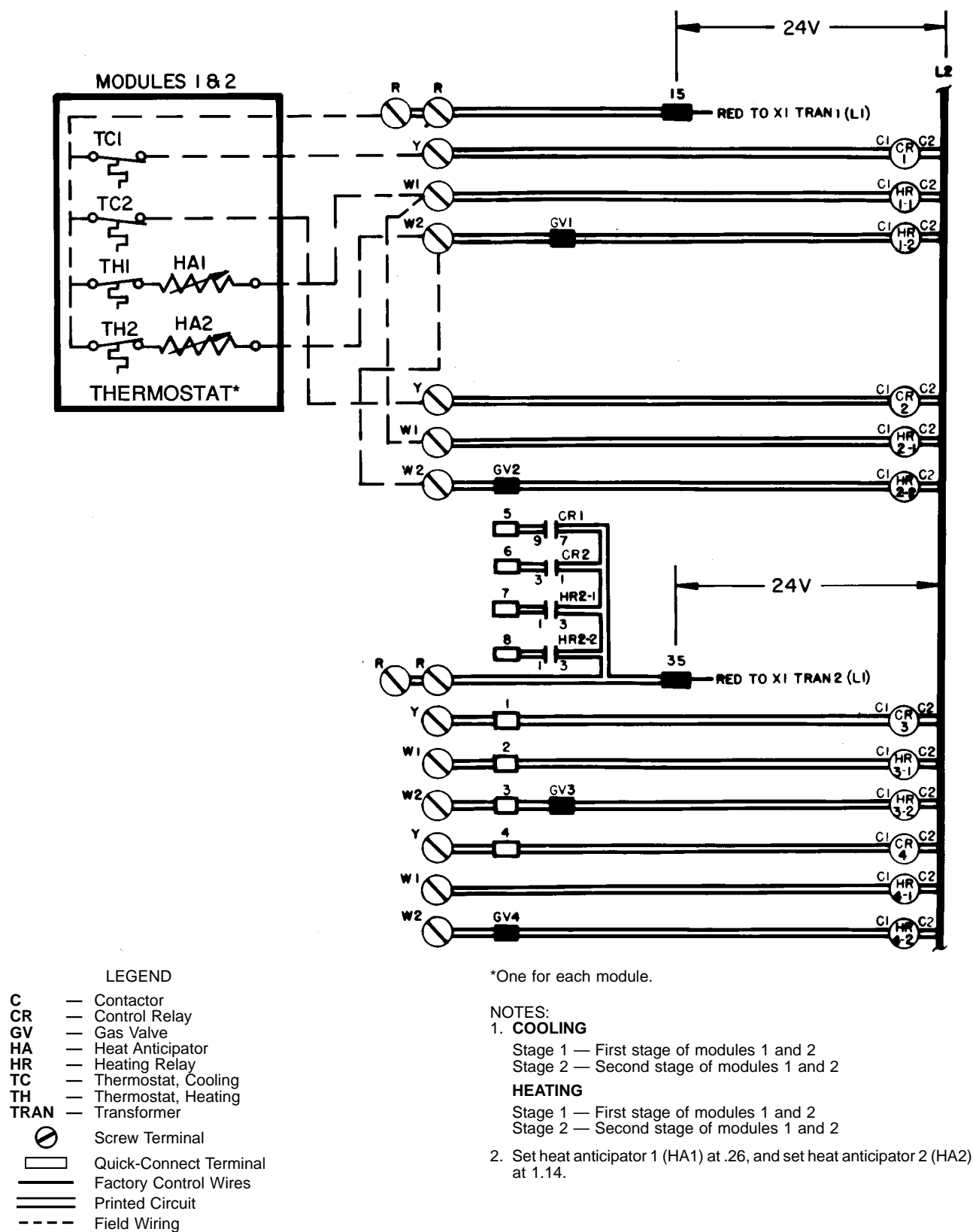


Fig. 21 — 50ME; Two-Stage Heat, Two-Stage Cool — 2 Modules, Joint Zone Control

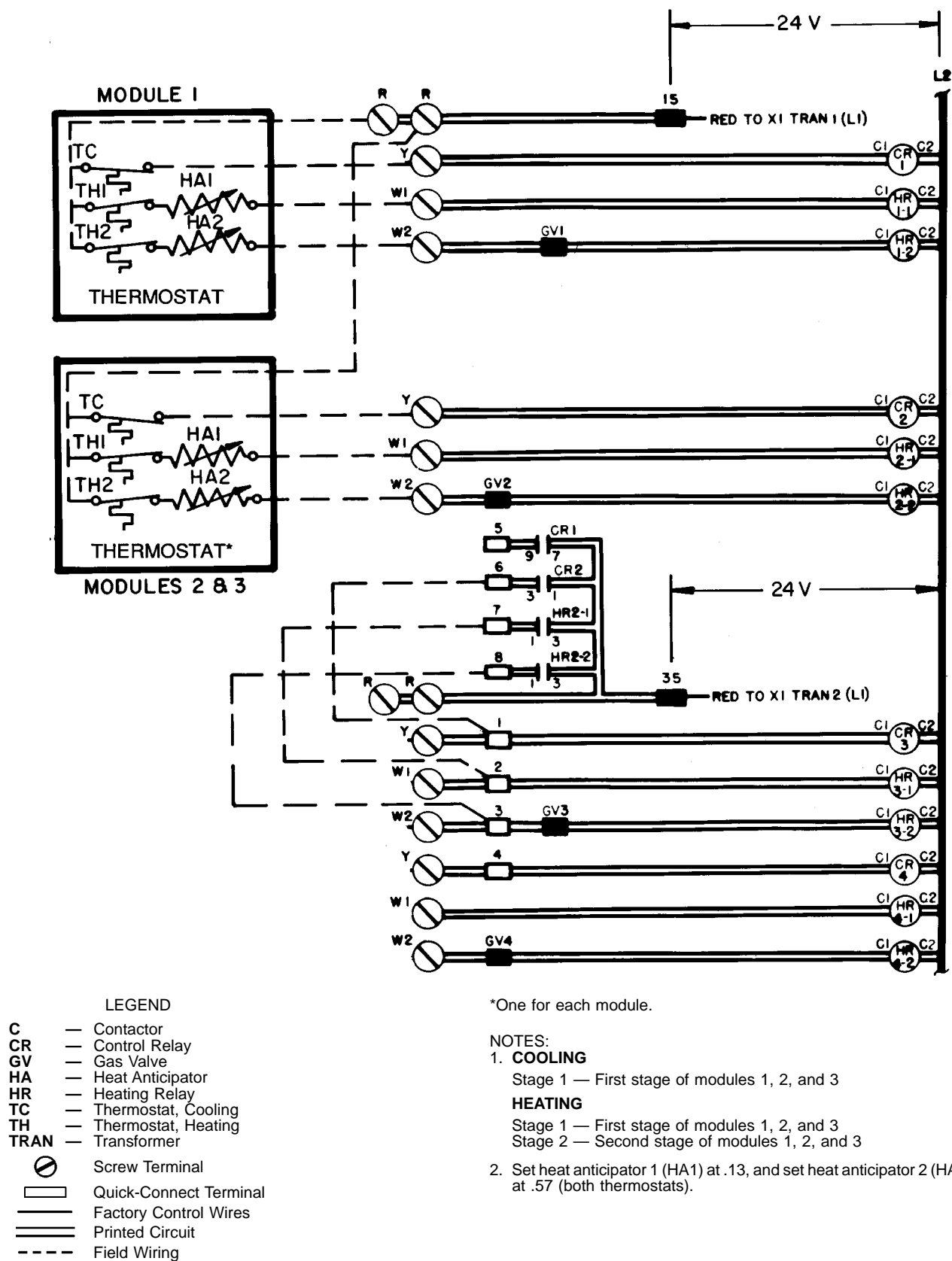


Fig. 22 — 50ME; Two-Stage Heat, One-Stage Cool — One Independent Module, 2 Joint Modules Zone Control

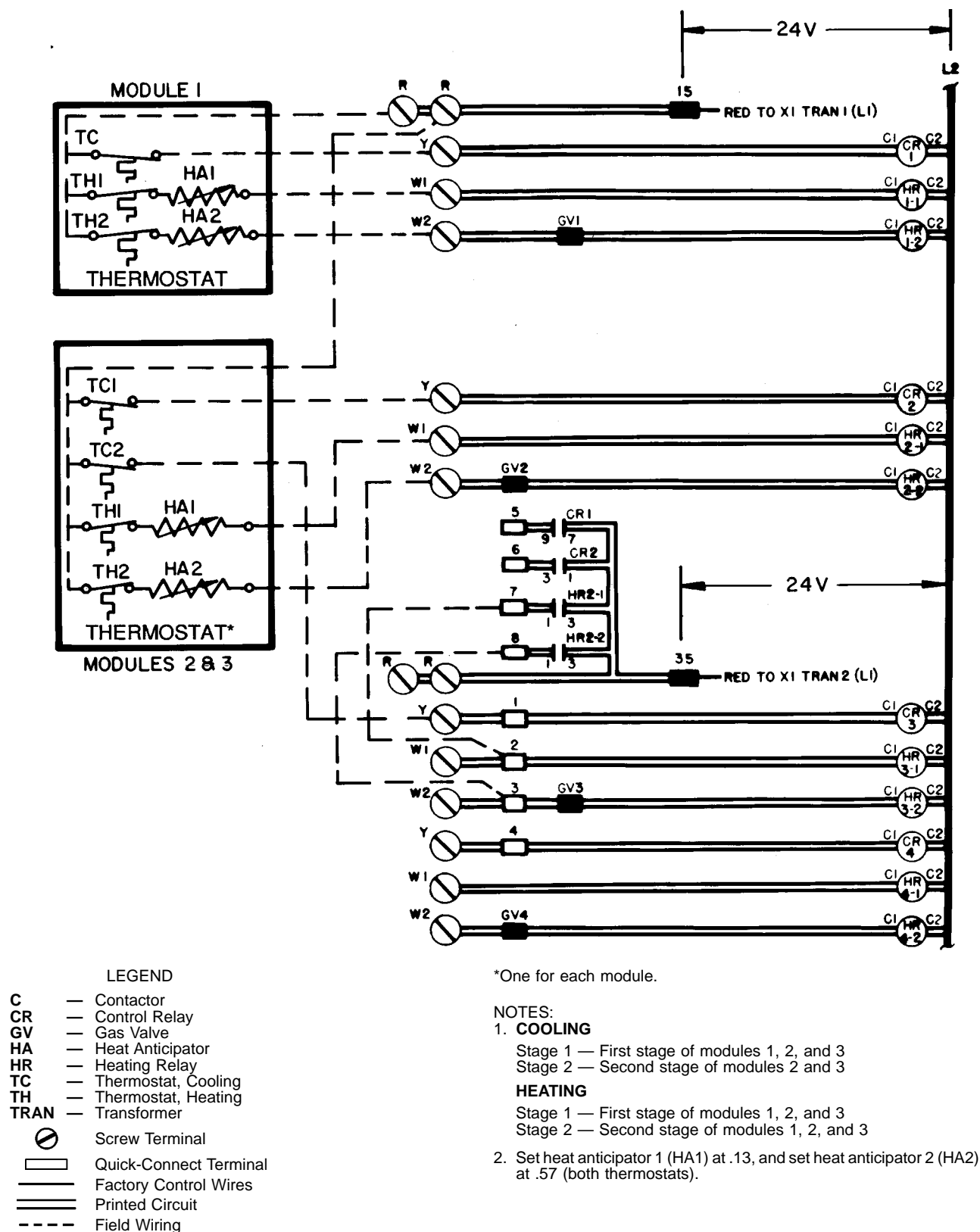


Fig. 23 — 50ME; Two-Stage Heat, One-Stage Cool; Two-Stage Heat, Two-Stage Cool Combination

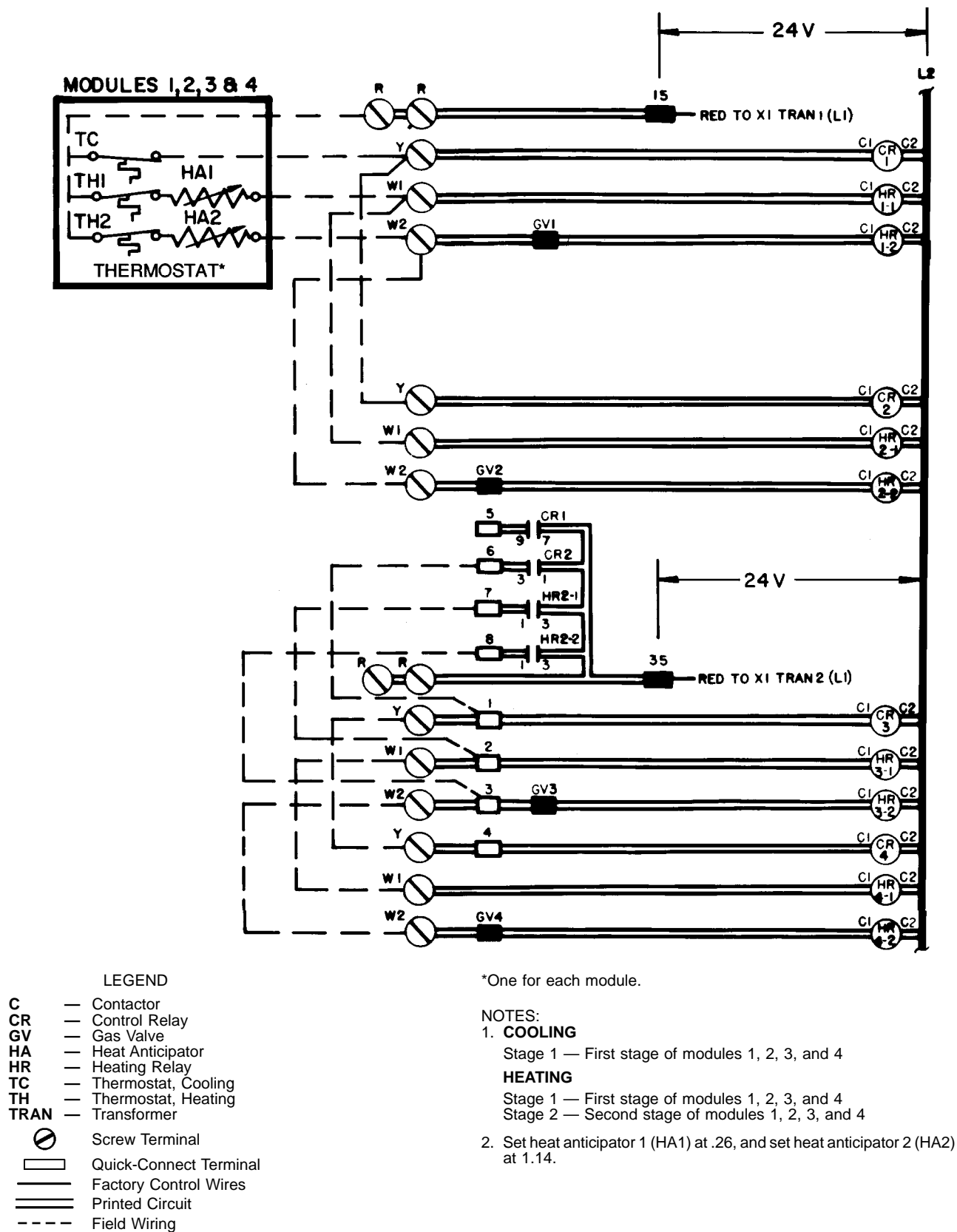


Fig. 24 — 50ME; Two-Stage Heat, One-Stage Cool — 4 Module Joint Control

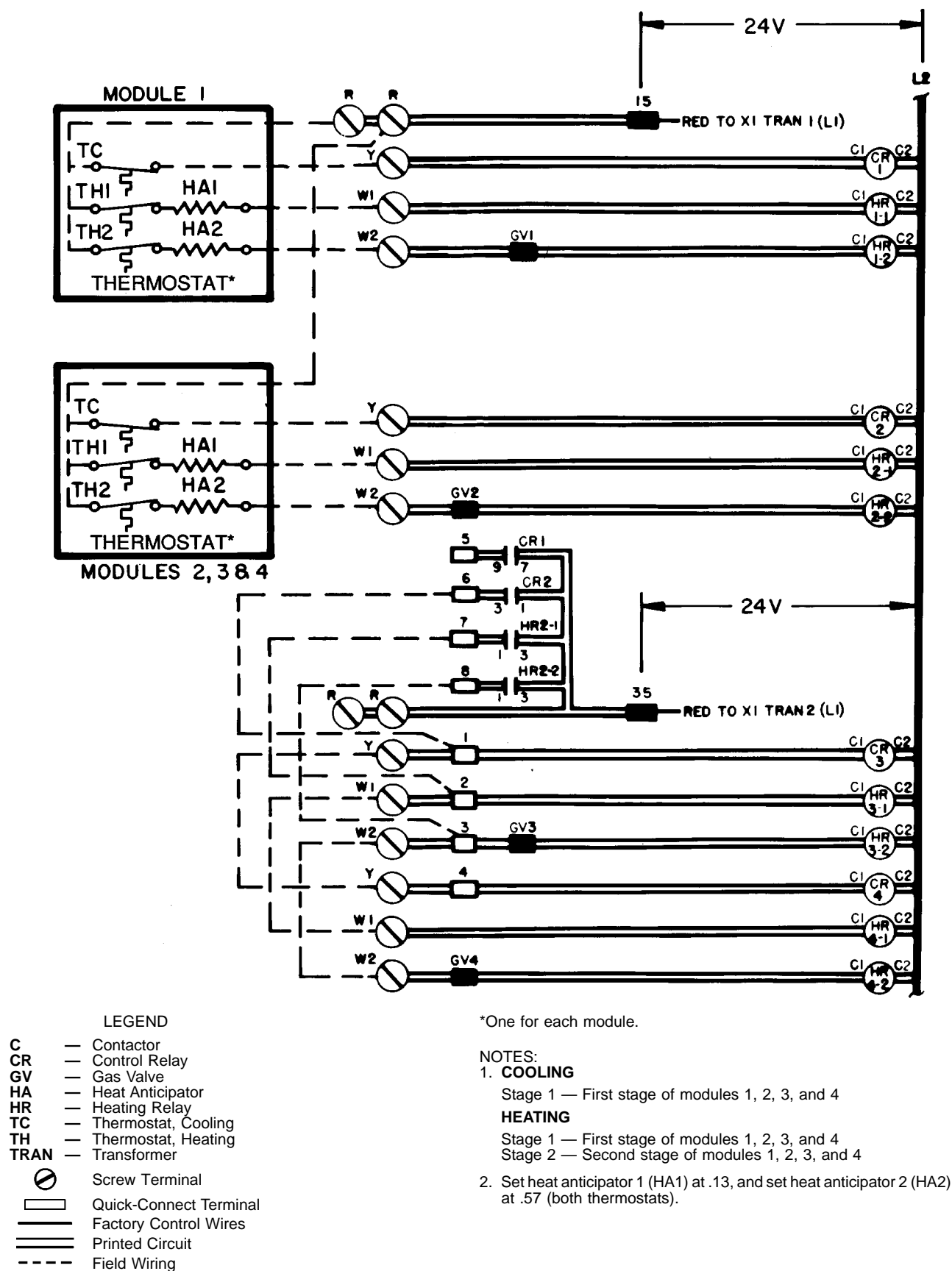


Fig. 25 — 50ME; Two-Stage Heat, One-Stage Cool — One Independent Module, 3 Joint Modules Zone Control

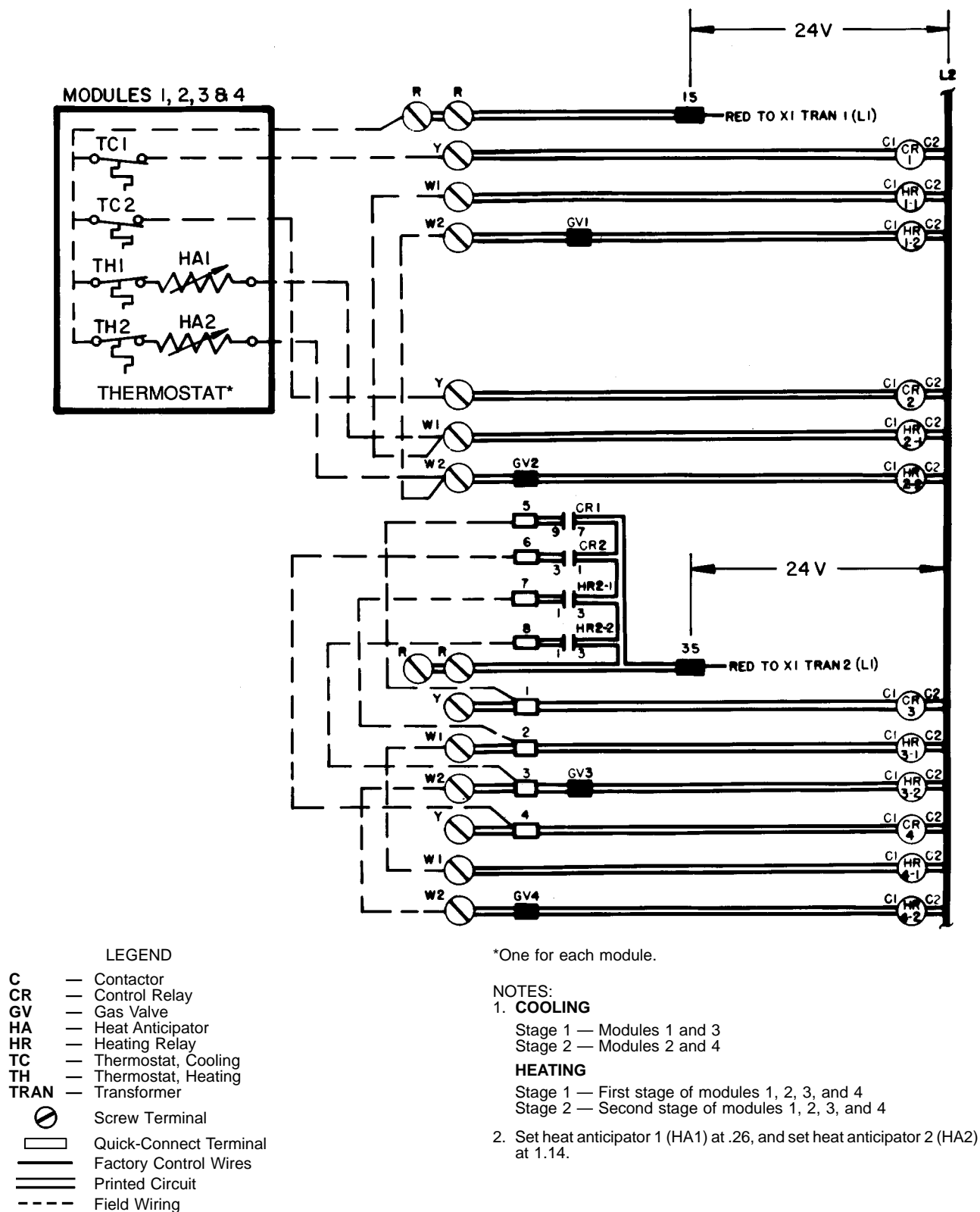


Fig. 26 — 50ME; Two-Stage Heat, Two-Stage Cool — 4 Module Joint Zone Control

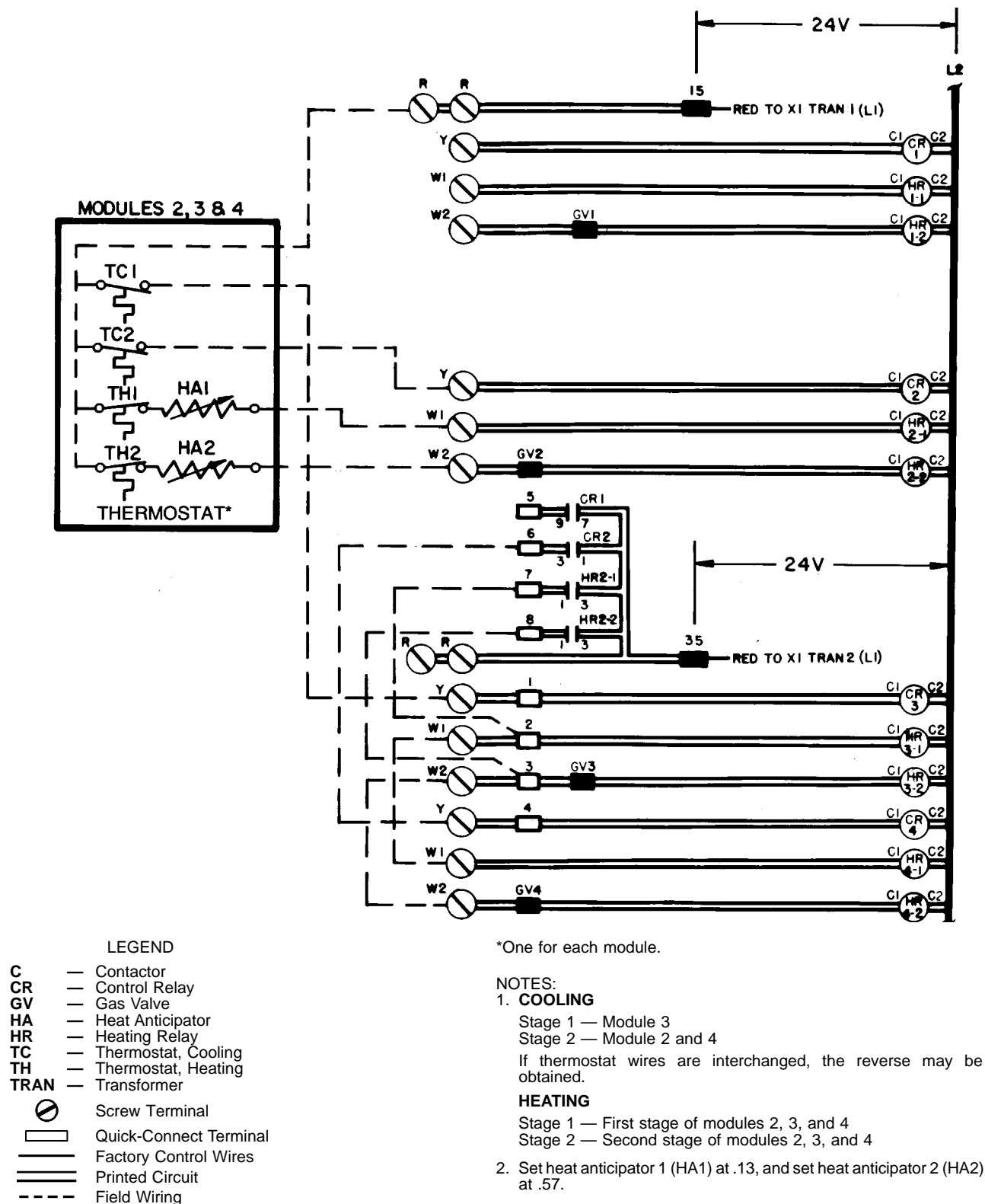


Fig. 27 — 50ME; Two-Stage Heat, Two-Stage Cool — 3 Module Joint Zone Control

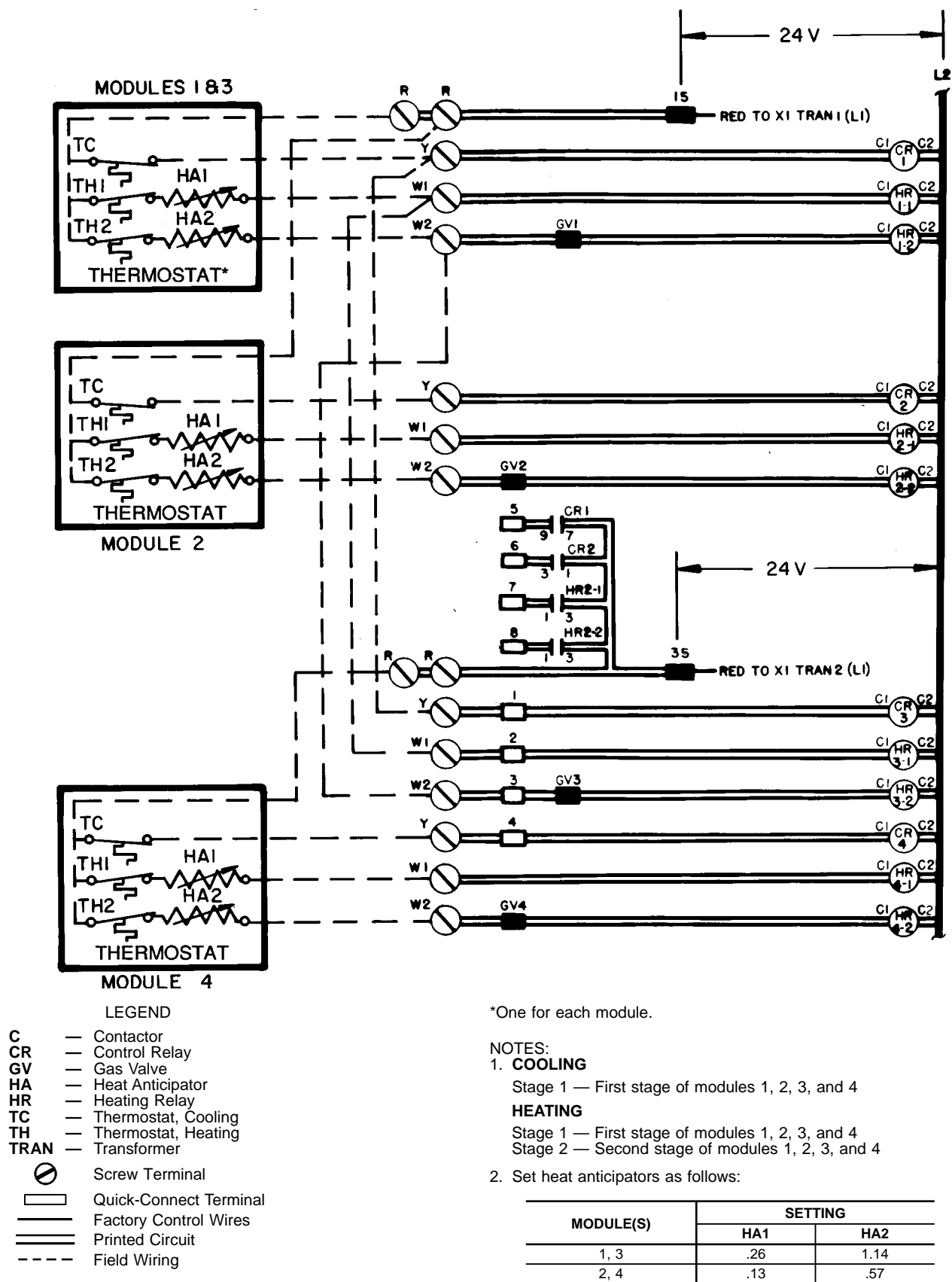


Fig. 28 — 50ME; Two-Stage Heat, One-Stage Cool — 2 Independent Modules, 2 Joint Modules Zone Control

ACCESSORY REMOTE CONTROL PANEL— This central-station control can be set to override zone thermostat mode settings to lock out heating or cooling for the entire unit. The DAY/NIGHT switch and damper position knob provide in-space, central control of damper position. Panel also houses the filter light to indicate reduced airflow and need for clean filters. See Fig. 29. Install remote control panel in accordance with instructions shipped with this accessory.

Reheat Humidity Control — Control is achieved in any module by wiring a humidistat in parallel with the cooling thermostat. If zone thermostat drops below setting of heating thermostat because the humidistat is closed (cooling coil is energized), the heating mode will be energized to reheat the air in order to maintain zone space temperature. A typical humidistat hookup is shown in Fig. 30.

Optional Economizer — Adjust optional economizer as described in Optional Economizer section on page 42.

Optional Exhaust Damper — Adjust optional exhaust damper as described in Optional Exhaust Damper section on page 42.

START-UP

After unit is installed, perform the following checks and procedures, and complete Start-Up Checklist on page CL-1.

Evaporator Fan — Fan belt and pulley are shipped attached to fan assembly. The factory-installed pulley provides fan speeds as shown in Table 1. Adjust fan belt(s) as described in Evaporator Fans and Motor section on page 41. Also see Zone Airflow Adjustment section on page 38.

Compressor Rail Shipping Bolts — Loosen shipping bolts beneath compressor rails so that rails float freely. *Do not loosen or remove bolts that attach compressors to rails.*

Refrigerant Valves — Open compressor discharge service valve. Check that the suction service, hot gas shutoff, and the liquid line shutoff valves are also open. See Fig. 31.

Zone Module Gas Valves (48MA) — Each zone module has its own combination gas valve and pressure regulator to which gas is supplied by one of the 2 main manual gas valves (Fig. 32).

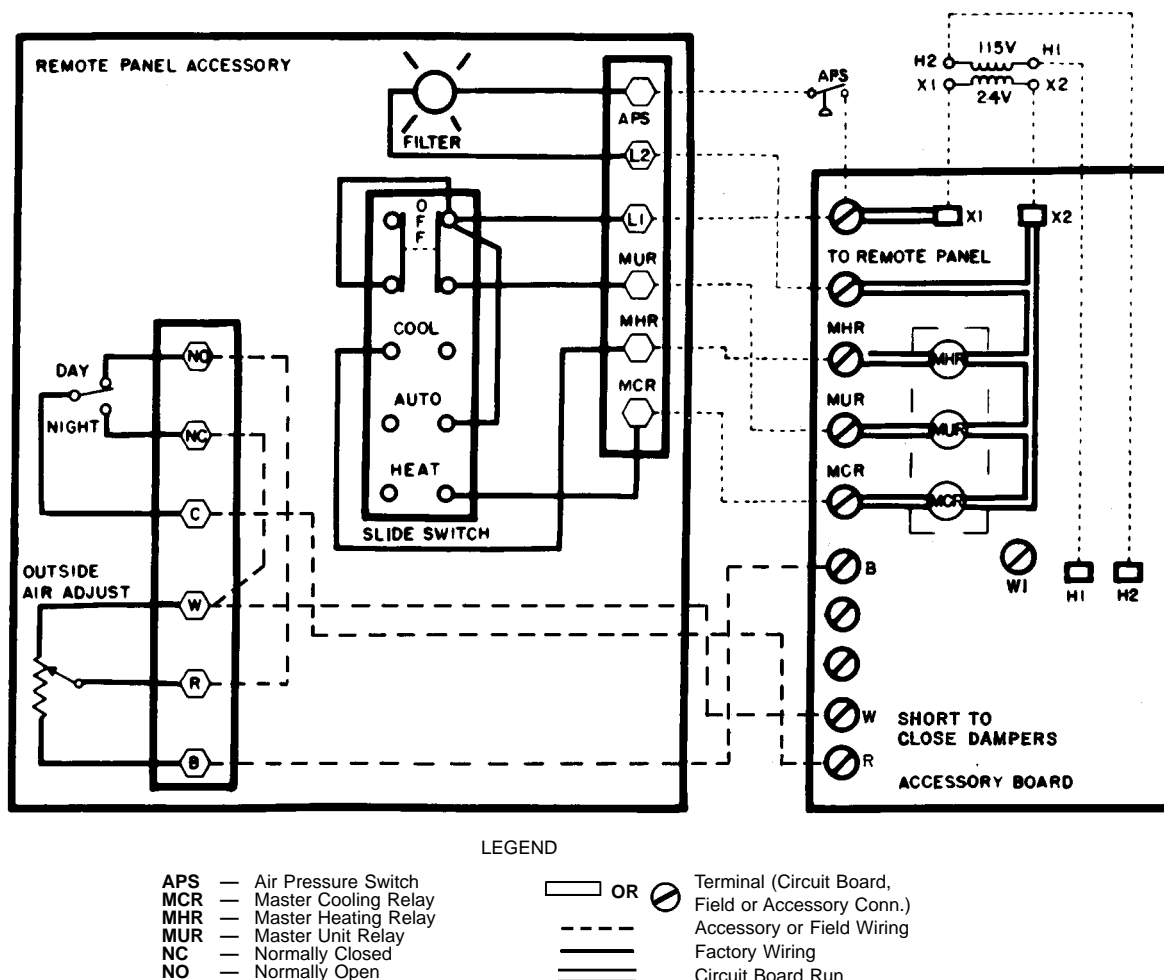


Fig. 29 — Remote Control Panel Accessory Connections

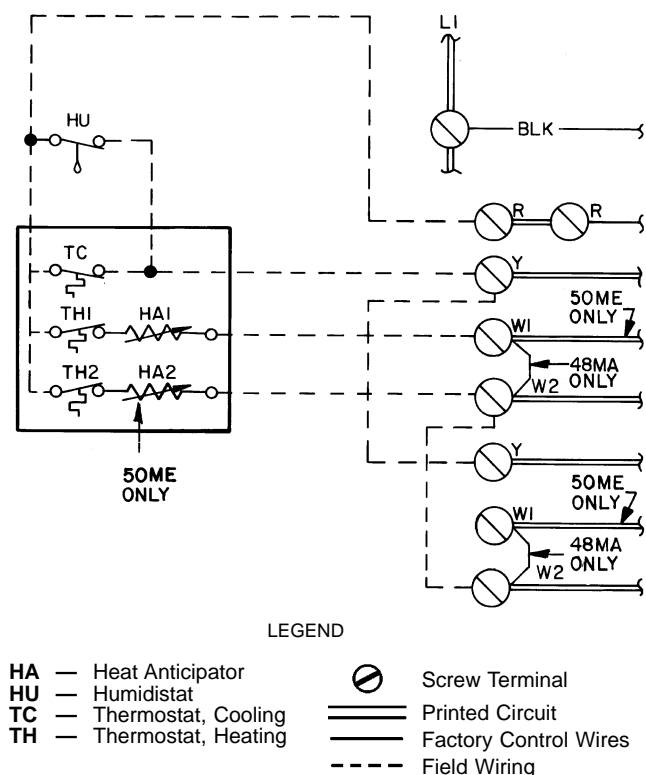


Fig. 30 — Humidistat Connections

The heating thermostat energizes a 115-v solenoid by means of a gas valve relay and the pilot lights. The main burner comes on after the pilot is proven.

The safety switches (airflow switches 1 and 2, pilot flame sensor, door switch, and limit switches) are in series with the gas valve.

Gas Heat Lighting Procedure (48MA)

1. Purge gas supply line of air. Make sure unit main manual and zone module gas valves have been off for 5 minutes before proceeding.
2. Set each zone thermostat to the lowest setting.
3. Turn zone module and main manual gas valves to ON position, and secure door of burner compartment.
4. Turn on unit main power supply. Set control circuit service switch in condensing control box at ON position. Evaporator fan will be energized.
5. Set zone thermostat to call for heat. Pilot will light. The main burner will come on after the pilot is proven.

NOTE: A time-delay relay will shut unit down in 180 seconds if main manual gas valve is not open.

TO SHUT OFF GAS HEAT — Set control circuit service switch at OFF position. Shut off unit power supply only if necessary. Remove heating controls compartment access door. Shut off main manual gas valves and pilot manual gas valves.

Intermittent Pilots (48MA) — Pilot flame should be approximately 1 to 1½ in. high.

ADJUSTMENT

1. Turn system switch to OFF position.
2. If intending to adjust every zone, disconnect main gas valve wires from terminal W on pilot switches in each zone.

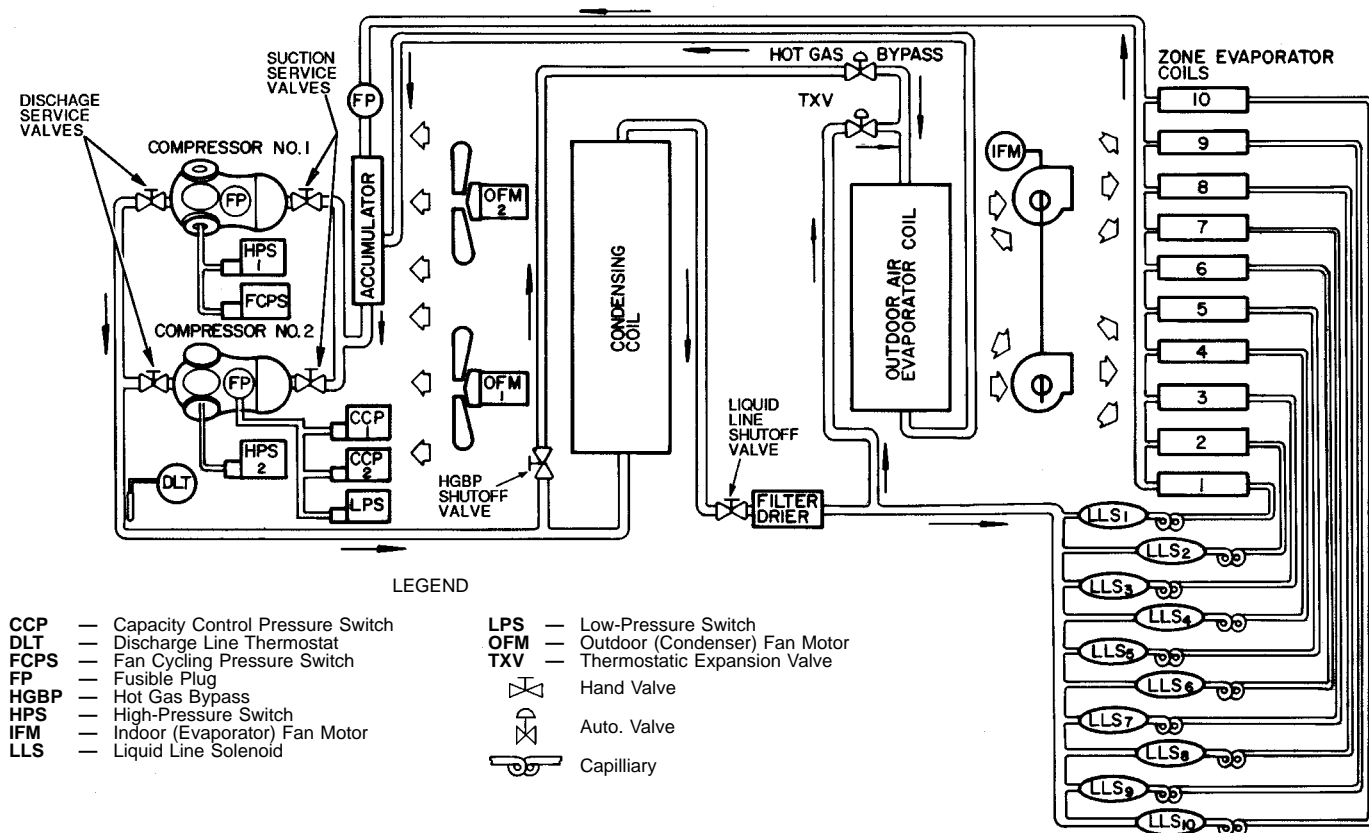
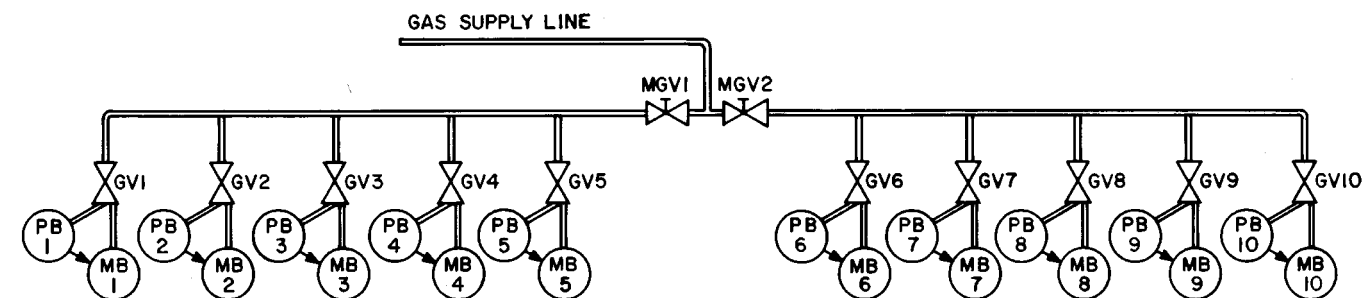


Fig. 31 — Refrigerant Piping Schematic (10-Zone Unit Shown — 8- and 12-Zone Units Similar)



LEGEND

GV — Gas Valve (Zone Module)
 MB — Main Burner
 MGV — Main Manual Gas Valve
 PB — Pilot Burner

NOTE: Unit is equipped with a forced-draft blower and the following safety devices: forced-draft airflow switch, flame roll-out protection switch, combustion chamber access door switch, heating limit switches, and spark-ignited automatic pilots. All of these switches are located in the heating section and must be in safe condition before the main burners can ignite.

Fig. 32 — Gas Piping Schematic (10-Zone 48MA Unit Shown — 8- and 12-Zone Units Similar)

3. Turn system switch to ON position. Set each zone thermostat at setting to call for heat. Pilot will ignite.

NOTE: A time-delay relay will shut unit down in 180 seconds if main manual gas valve is not open.

4. Remove burner access panel.
5. Remove screw-cap cover on zone gas valve to expose pilot adjusting screw. With a small screwdriver, turn adjusting screw until flame is correct height. Replace screw-cap cover on gas valve.
6. Turn system switch to OFF position.
7. Reconnect main gas valve wires to W1 on pilot switches.
8. Set system switch at ON position, and set zone thermostats as desired.

9. Replace burner access panel.

PRESSURE ADJUSTMENT (NATURAL GAS)

1. Turn control circuit service switch to OFF position, and set thermostat at lowest setting.
2. Remove the 2 heating control access panels and the burner access panel.
3. Remove plug from zone manifold pressure tap. Connect suitable gage. Route gage line through pilot switch grommet so that burner access panel may be closed.
4. Close burner access panel.
5. Turn control circuit service switch to ON position. Set zone thermostat to call for heat. After pilot is proven, burner will operate.

NOTE: A time-delay relay will shut unit down in 180 seconds if main manual gas valve is not open.

6. Remove screw cap from zone module gas valve pressure regulator to expose pressure adjustment screw.
7. Turn pressure adjustment screw with a small screwdriver until 3.5 in. wg is achieved.
8. Replace screw cap.
9. Turn control circuit service switch to OFF position and set zone thermostat at lowest position.

10. Remove burner access panel. Disconnect gage line connection on zone manifold. Replace plug in manifold pressure tap.

11. Repeat steps 3-10 for each heating module.

12. Replace all unit panels. Turn control circuit service switch to ON position, and set zone thermostat as desired.

Main Burner Adjustment (48MA) — Flame should appear clear blue (almost transparent) in color with a well-defined inner cone. If there is insufficient primary air, flame will be yellow tipped. If there is too much primary air, flame will be well defined but have a tendency to lift or dance off ports. Allow unit to operate for at least 15 minutes before making final primary air adjustment.

ORIFICE ALIGNMENT — The most likely cause of burner flame flashback is misalignment of the burner orifice. Be sure that orifice points straight down the burner.

PRIMARY AIR ADJUSTMENT — Observe flame characteristics through view ports in main burner access panel. Turn off main manual gas valves in burner control compartment. Then remove main burner access panel.

If Flame Is Yellow (Insufficient Primary Air) — Turn spoiler screw counterclockwise about 4 turns for each ¼ in. of change in spoiler length. See Fig. 33 for spoiler screw location.

If Flame Lifted Off Ports (Too Much Primary Air) — Turn spoiler screw clockwise about 4 turns for each ¼ in. of change in spoiler length. See Fig. 33 for spoiler screw location.

Replace main burner access panel and turn on main manual gas valves. Observe flame characteristics. Repeat these procedures as required until correct flame characteristics are achieved.

Outdoor-Air Thermostat Adjustment (50ME with Electric Heat) — The outdoor-air thermostat (OAT) is located in upper right-hand area of zone control board (Fig. 34 and 35), is factory set at 40 F, and is adjustable between -10 F and 55 F.

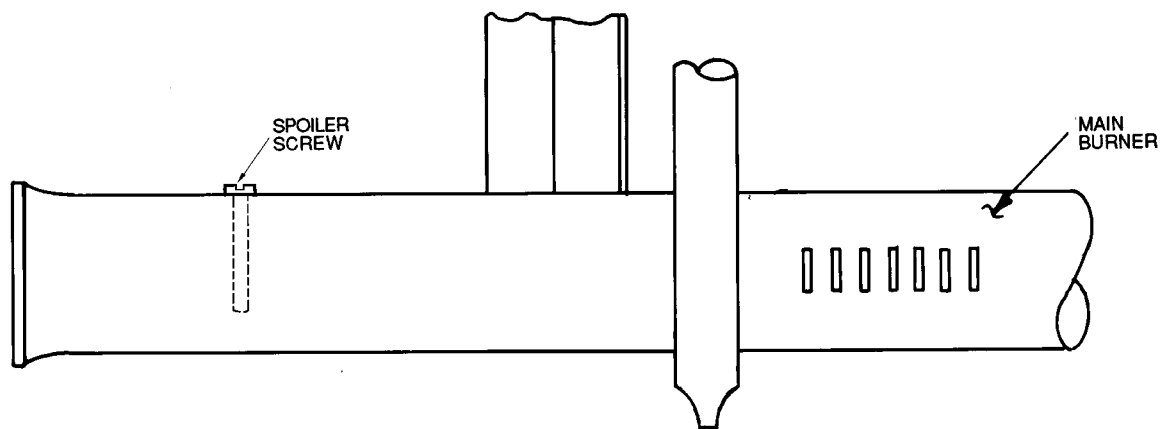
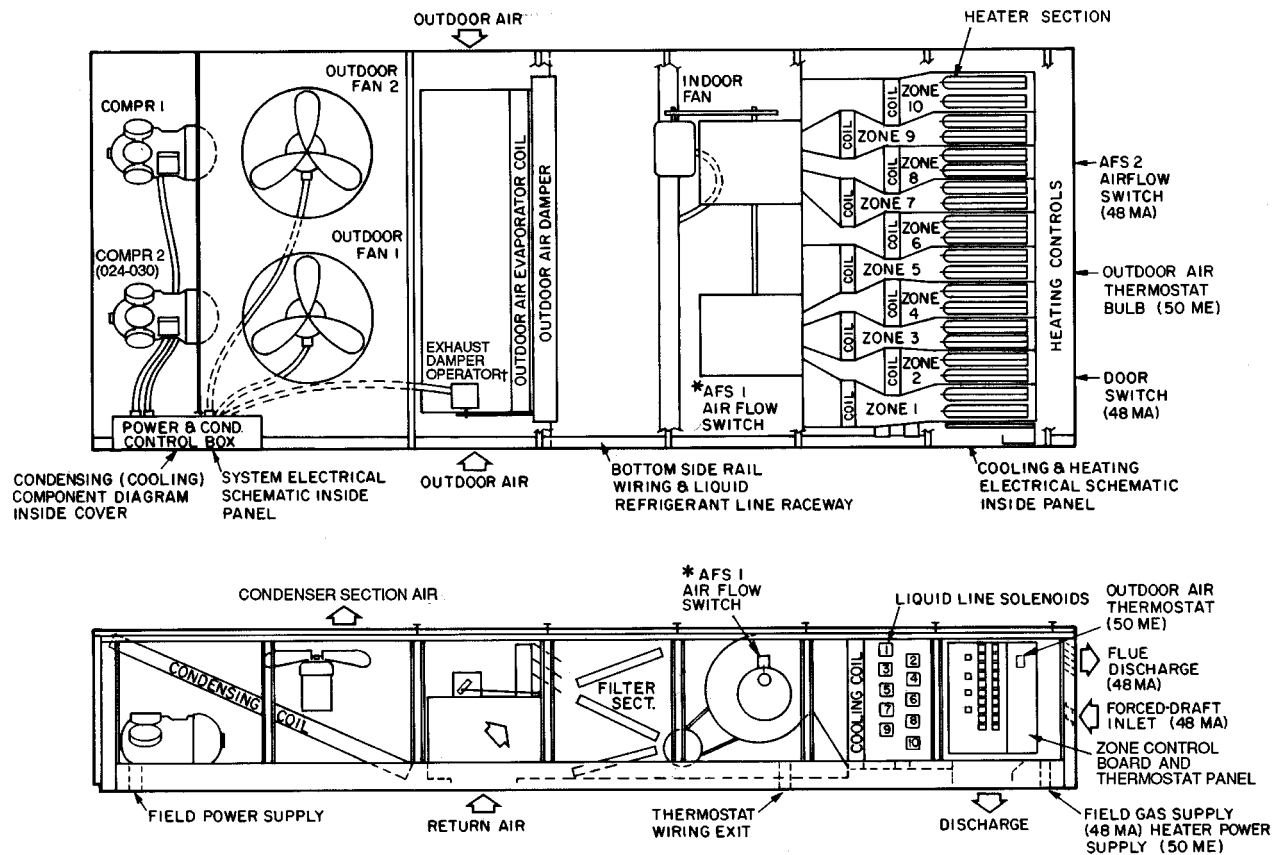


Fig. 33 — Spoiler Screw Location



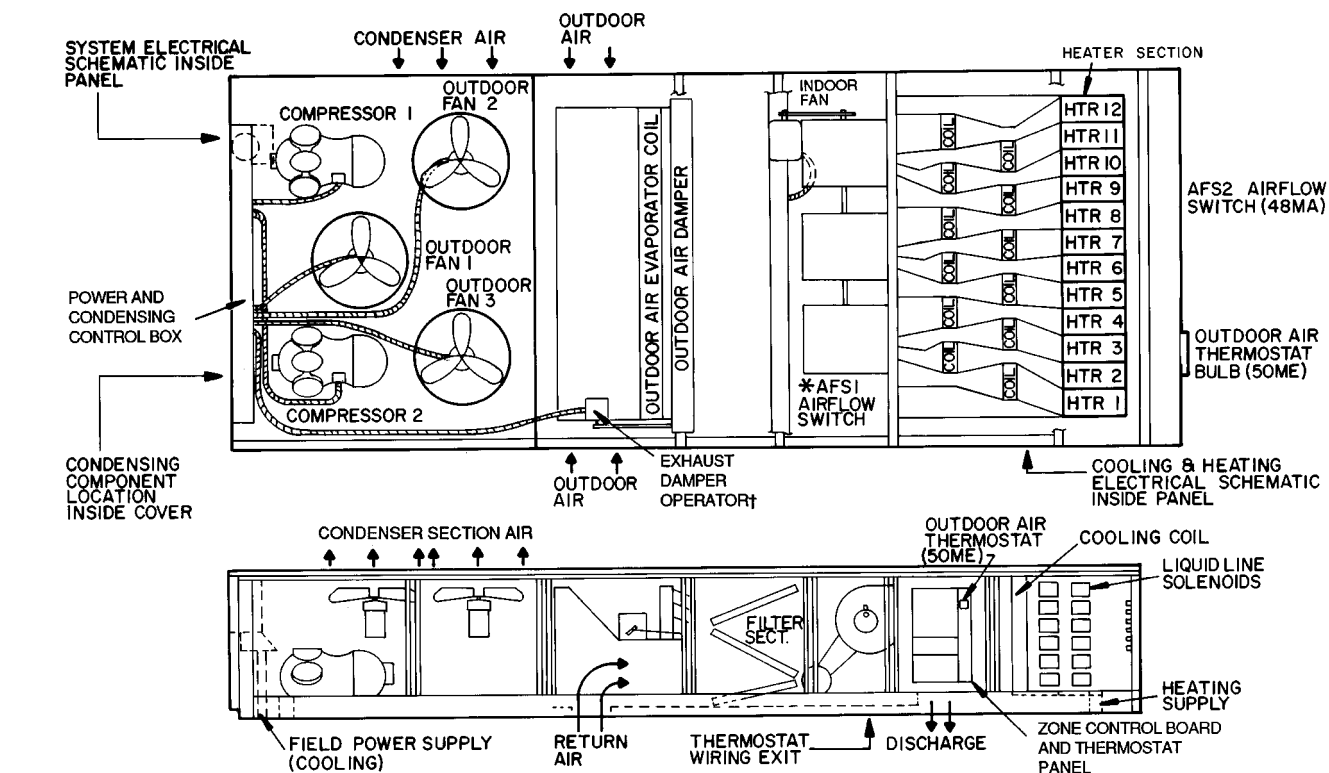
LEGEND

COMPR — Compressor
COND — Condensing

*AFS1 deenergizes control circuit if loss of indoor air occurs.

†Factory-supplied option.

Fig. 34 — Major Component Identification (Typical 10-Zone Unit Shown; 8-Zone Units Similar)



HTR — Heater

*AFS1 deenergizes control circuit if loss of outdoor air occurs.

†Factory-supplied option.

Fig. 35 — Major Component Identification (Typical 12-Zone Unit Shown).

When OAT is open, final stage heating element in all zone modules is inactive. When OAT is closed, final stage heating element in a zone module may be energized whenever second-stage thermostat for that zone module calls for heat as follows:

UNITS WITH 2-ELEMENT HEATERS

First-Stage Heat — One element energized

Second-Stage Heat

OAT Open — One element energized

OAT Closed — Two elements energized

UNITS WITH 3-ELEMENT HEATERS

First-Stage Heat — One element energized

Second-Stage Heat

OAT Open — Two elements energized

OAT Closed — Three elements energized

Optional Glycol Heating Coils — Start up glycol solution supply system in accordance with equipment manufacturer's instructions. Solution supply temperature must not exceed 200 F. Maximum solution flow through each zone module heating coil is 6 gpm.

Zone Airflow Adjustment — Adjust each zone duct balancing damper to provide required airflow to each zone. Increasing or decreasing airflow to one zone may cause a change in the airflow to other zones. After initial damper settings have been made, repeat the adjustment procedure, as required, to be sure final desired airflows are achieved. Do not go below 600 cfm or above 1200 cfm per zone module.

Be sure that temperature rise is within range shown on unit instruction plate and Table 1 (48MA only).

Sequence of Operation — When unit power is on and no zone thermostat is calling for cooling or heating, the evaporator fan and crankcase heater(s) are on. The outdoor-air dampers are at the pre-set position.

COOLING — On a call for cooling from a zone thermostat, compressor no. 1, with unloader(s), starts; the liquid line solenoid for that zone evaporator coil opens; and condenser-fan motor no. 1 starts. Compressor will load or unload in response to suction pressure as required. As additional cooling is required (i.e., more zones call for cooling), compressor no. 2 (no unloaders) will be energized (024-040 units only). If required, compressor no. 1 will unload when compressor no. 2 (024-040 units only) is energized. As cooling requirements decrease, capacity control pressurestats prevent compressor no. 1 from shutting down while compressor no. 2 (024-040 units only) is in operation. Compressor no. 1 will fully load up after compressor no. 2 (024-040 units only) shuts down as required to match heat load.

If heat load is not sufficient to maintain operation of compressor no. 1 in an unloaded condition, hot gas bypass valve will meter hot gas to outdoor air evaporator coil to supply additional load. On 48MA and 50ME040, hot gas is introduced into evaporator whenever required to eliminate unloader short-cycle operation.

The Motormaster® head pressure control device will vary speed of condenser-fan motor no. 1 to regulate airflow across condenser coil. As required, condenser-fan motor no. 2 (no. 2 and 3 on 3-fan units) will cycle on and off in response to head pressure via a cycling pressurestat. See Head Pressure Control section on page 40.

HEATING (48MA) — On call for heating from a zone, the forced draft blower will start and the pilot will light. The zone burner will ignite after the pilot has been proven. (Approximately 60 seconds.)

NOTE: A time-delay relay will shut unit down in 180 seconds if the unit main gas valve is not open.

HEATING (50ME WITH ELECTRIC HEAT) — On a call for heating from a zone, the first-stage heating relay, contactor, and heating element are energized. Upon additional calls for heating from that zone, stage 2 is energized in a similar manner. However, second element on 2-element heater assemblies and second and third heating elements on 3-element heater assemblies are energized as described in Outdoor Air Thermostat Adjustment section on page 36.

Heating Lockout (50ME with Electric Heat) — If any zone module is operating on mechanical cooling (Compressor[s] is operating), one heating element in each zone module is locked out and zone module cannot be energized. Operation of lockout circuit is independent of outdoor-air thermostat operation.

HEATING (50ME WITH GLYCOL HEATING COILS) — On a call for heating from a zone, the heating relay and heating coil solenoid valve for that zone are energized. If 2 or more unit zone modules are joined to serve a common zone, stage 2 of heating thermostat operates remaining heating relays and solenoid valves depending on connection arrangement.

OUTDOOR-AIR DAMPER — This control regulates the amount of outdoor air that passes through the outdoor air evaporator coil and enters the return air-stream (Fig. 34 and 35). A knob in the zone control and thermostat panel activates the damper control motor (damper operator). Damper may be fully closed, fully open, or set at any intermediate position by setting the knob as desired. In the fully open position, the damper will permit 25% outdoor air and 75% return air into the unit.

SERVICE

Cabinet Panels and Grilles

SIDE PANELS — To remove a panel, remove lower screw on T-fastener. Loosen T-fastener pivot screw. Swing aside T-fastener. Pull bottom of panel out and down.

TOP PANELS — Remove end caps from each end of rain covers. Remove panel screws and lift off panels as required. Save end caps and screws for reinstallation.

HEATER ACCESS PANELS — See Side Panels section above.

Cleaning — Inspect unit interior at the beginning of each heating and cooling season and during each season as operating conditions require. Remove unit side panels and top panels to expose unit interior as required.

EVAPORATOR COILS (ZONE COOLING COILS) AND GLYCOL HEATING COILS — Clean with a stiff brush, vacuum cleaner, or compressed air.

CONDENSER AND OUTDOOR-AIR COOLING COILS — Clean with a stiff brush or vacuum cleaner. If cleaning with compressed air or low-pressure water or steam, guard against damaging compressor, wiring, and nearby controls.

CONDENSATE DRAINS — Check and clean annually at start of cooling season.

INDOOR-AIR FILTERS — Clean or replace filters at start of each heating and cooling season and as often as necessary during each season, depending on operating conditions. Refer to Table 1 for type and size of filters used. Filter section is shown in Fig. 34 and 35. Indoor-air filter tracks will accept 2 layers of one-in. thick filters.

OUTDOOR-AIR INLET SCREENS — Clean with steam or hot water and mild detergent.

GAS HEATING SECTION — Inspect burners and heat exchangers before each heating season. Remove exhaust grilles to inspect heat exchangers. Clean with wire brush if there is any accumulation of debris. The main burners should also be cleaned if there is any accumulation of debris. Fire each zone to be assured of proper operation. Correct pilot height is 1 to 1½ inches.

COMBUSTION AIR FAN — Inspect blower wheel for dirt, and remove and clean if necessary.

Airflow Switches

INDOOR AIRFLOW SWITCH (AFS1) — This switch is located in evaporator fan inlet venturi. This switch will shut down unit if airflow through zone modules is insufficient.

COMBUSTION AIRFLOW SWITCH (AFS2) — This switch (48MA only) is located in combustion air plenum. This switch will shut down unit heating mode if combustion air is insufficient. See Forced-Draft Blower (48MA) section on page 42 for details on combustion air shutter adjustment.

Service Switch — A control circuit service switch is located in the power and condensing control box (Fig. 34 and 35). Shut down unit (compressors, fans, and control circuits) at this switch.

Do not use compressor circuit breakers to start and stop compressors except in emergency.

Time Guard® Control Circuit — Each compressor circuit has a 5-minute delay before restarting compressor after shutdown for any reason. On starting, Time Guard device timer causes a delay of 15 seconds after thermostat closes before compressor starts. On compressor shutdown, timer recycles for 4 minutes, 45 seconds. During this time, compressor cannot restart.

On 2-compressor units, no. 2 compressor will not start for at least 2½ minutes after no. 1 compressor starts. See Capacity Control Pressure Switches section below.

Capacity Control Pressure Switches (CCP) (2-Compressor Units Only)

— These switches are connected to the suction side of the system on compressor no. 2. Approximately 2½ minutes after compressor no. 2 starts, the timer makes the circuit to CCP1 and CCP2 to operate compressor no. 2 as follows:

1. CCP1 is open (opens at 63 psig; closes at 83 psig). This prevents cycling of compressor no. 2 at start-up.
2. CCP2 is closed (opens at 54 psig; closes at 78 psig).
3. Holding relay no. 2 (HR2) is deenergized.

When the suction pressure reaches 83 psig, CCP1 closes to energize HR2 and compressor no. 2. Compressor no. 2 will then be operated by CCP2.

Compressor Oil — Compressors have their own oil supply. Compressor crankcases on 2-compressor units are interconnected. Loss of oil due to a leak in the system should be the only reason for adding oil after unit has been in operation. A sight glass is provided in the crankcase interconnection line or on the compressor crankcase. Remove end panels to gain access to compressors. Sight glass on 06D compressor should be about ⅓ to ⅔ full of oil. Sight glass on 06E compressor should be about ⅛ to ½ full of oil.

Compressor data is shown in Table 1 and on dataplate attached to compressor body. Refer to 06D or 06E Compressor Service Manual for additional compressor service information.

TO ADD OR REMOVE OIL

1. Close liquid line and hot gas bypass shutoff valves. See Fig. 31.
2. Pump down compressor and close suction and discharge service valves. Recover remaining refrigerant in compressor.
3. Add oil through oil filler plug.
4. To remove oil, remove crankcase oil drain plug, and drain only as much oil as is required.

Compressor Capacity Control Unloader(s) (Fig. 36)

Unloader(s) on compressor no. 1 are suction-pressure actuated to load or unload compressor at factory settings indicated in Table 1. If necessary, unloader(s) may be field adjusted or reset as follows:

CONTROL SET POINT (Cylinder Load Point) — This unloader set point is adjustable from 0 to 85 psig. To adjust, turn control set point adjustment nut clockwise to its bottom stop. In this position, load point is 85 psig. Turn adjustment nut counterclockwise to desired load point. Each full turn counterclockwise decreases load point by 7.5 psig.

PRESSURE DIFFERENTIAL (Difference Between Cylinder Load and Unload Points) — This unloader set point is adjustable from 6 to 22 psig. To adjust, remove differential adjustment screw sealing cap to expose pressure differential adjustment screw. Turn adjustment screw counterclockwise to its backstop position. In this position pressure differential is 6 psig. Turn adjustment clockwise to desired pressure differential. Each full turn clockwise increases differential by 1.5 psig.

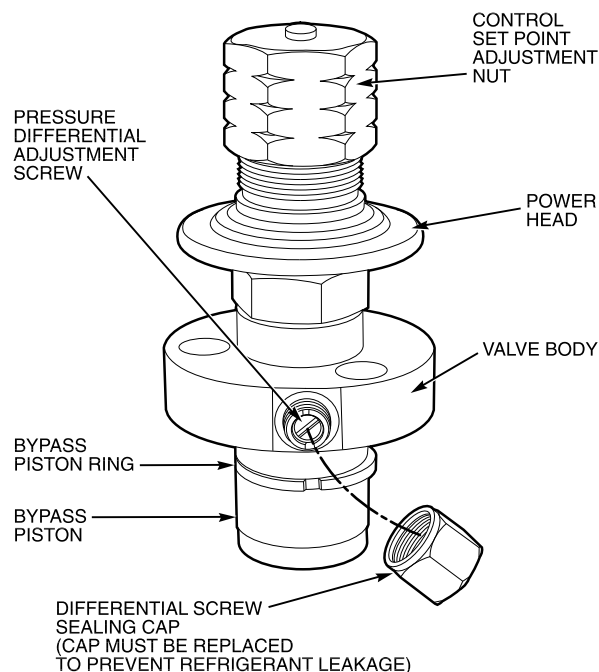


Fig. 36 — Compressor Capacity Control Unloader

Crankcase Heater(s) — One heater for each compressor keeps oil free of refrigerant while compressor is off. Crankcase heater(s) is automatically deenergized when the compressor(s) is in operation.

If unit power is shut off for longer than a few hours, make sure power is on and that crankcase heater(s) has been on for at least 24 hours prior to start-up. This will ensure that refrigerant has been driven out of compressor crankcase(s). To prevent start-up during this warm-up period, set control circuit service switch at OFF position.

Refrigerant Charge — Quantity and type of refrigerant is shown on unit nameplate and in Table 1. Add refrigerant as follows:

NO CHARGE — Evacuate refrigerant system and add refrigerant quantity specified or add 15 lb of refrigerant vapor to system and then refer to Low Charge section below.

LOW CHARGE

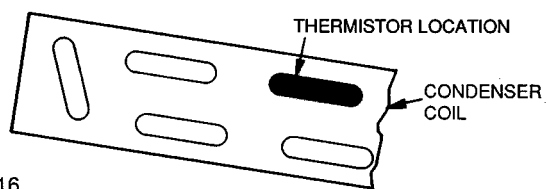
1. Set control circuit service switch at OFF position.
2. Disconnect evaporator-fan contactor.
3. Manually close airflow switch (AFS1) on evaporator fan housing (Fig. 34 and 35) with a piece of tape.
4. Remove MH jumper (or master heating relay, MHR, if remote control panel accessory is used) from zone control board to lock out heating.
5. Remove all cooling relays (CR) except CR8, from zone control board.
6. Add jumper on terminals R-Y on module 8.
7. Reset control circuit service switch to ON position.
8. Operate unit for about 5 minutes.
9. Add refrigerant vapor at no. 1 compressor suction service valve fitting at a rate of one lb per minute.
10. Check liquid level in accumulator sight glass. Use accumulator no. 1 on 040 units (adjacent to compressor no. 1). Add refrigerant until sight glass is $\frac{1}{2}$ full. If sight glass appears clear (no bubbles) but a film of refrigerant shows at bottom of sight glass, refrigerant level is below sight glass. Continue adding refrigerant until sight glass is $\frac{1}{2}$ full. If sight glass appears clear, but bubbles can be seen, refrigerant level is above top of glass. Refrigerant system is overcharged. Recover refrigerant until sight glass is $\frac{1}{2}$ full.
11. When correct refrigerant charge has been achieved, restore unit to normal operation (reverse Steps 2-7).
12. Be sure airflow switch (AFS1) functions normally and control circuit service is set at ON position.

Head Pressure Control

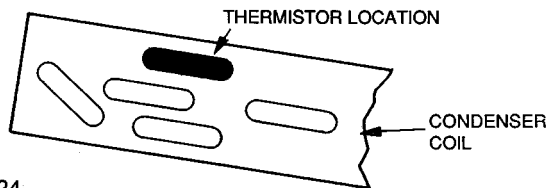
MOTORMASTER® HEAD PRESSURE CONTROL DEVICE — Outdoor (condenser) fan motor no. 1 (OFM1) is a 208/230-v motor operated by a Motormaster device thermistor (a thermally sensitive resistor) located on the condenser coil as shown in Fig. 37. The function of this control is to maintain proper saturated condensing temperature at low outdoor ambient temperatures. The control does this by modulating OFM1 speed in response to the saturated condensing temperature sensed by the thermistor. Control is factory set and cannot be adjusted or serviced. However, thermistor or control may be replaced if necessary.

FAN CYCLING PRESSURESTAT — Outdoor (condenser) fan motor no. 2 (OFM2), and no. 3 on 3-fan units (OFM3) is controlled by a nonadjustable pressurestat connected to compressor no. 1.

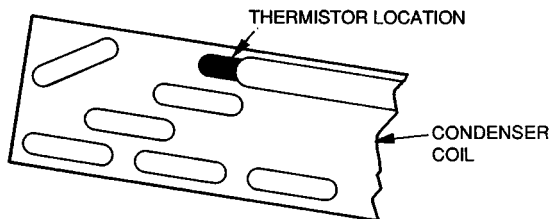
Fan(s) shuts off at 86 F saturated condensing temperature (160 psig), restarts at 118 F (approximately 255 psig).



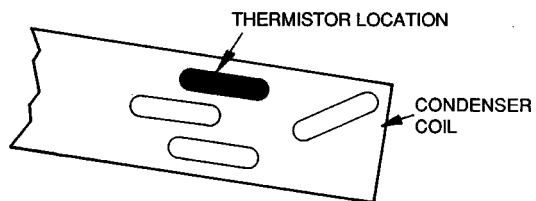
UNIT 016



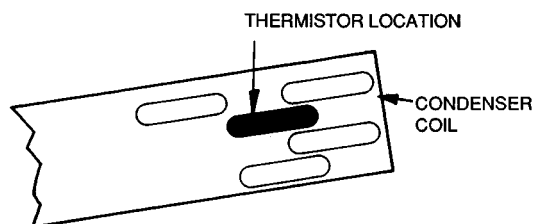
UNIT 024



UNITS 028, 030



UNIT 034



UNIT 040

Fig. 37 — Motormaster® Thermistor Locations on Condenser Coil

Condenser Fans

⚠ CAUTION

Shut off service switch to deenergize condenser-fan motors.

ADJUSTMENT — Remove fan guard from top of unit. Remove rubber hubcap from fan hub and loosen fan hub setscrews. Adjust fan height using a straight edge laid across fan deck venturi (Fig. 38). Tighten setscrews and replace rubber hubcap to prevent hub from rusting to motor shaft. Fill hub recess with Permagum (or similar adhesive) if rubber hubcap is missing.

FAN MOTOR REMOVAL — Disconnect motor electrical leads at motor control box. Loosen fan hub setscrews and remove fan. Loosen motor mounting band and lift out motor.

Reverse this procedure for reassembly.

LUBRICATION — Condenser-fan motors have factory-lubricated bearings. No relubrication is necessary for the first 3 to 5 years of continuous operation except in excessively dirty outdoor-air applications. After the first relubrication bearings must be opened, cleaned, and repacked annually with light- to medium-duty multi-purpose grease.

Evaporator Fans and Motor

⚠ CAUTION

Shut off service switch to deenergize evaporator-fan motor.

MOTOR REMOVAL — Disconnect motor power wires at conduit connection on unit junction box. Then remove motor and conduit assembly from unit.

FAN SHAFT BEARING REMOVAL

1. Remove fan motor and belts.
2. Loosen the locknut on each shaft bearing collar and remove the fan drive pulley.
3. Loosen the fan wheel locknuts and slide out fan shaft.
4. Remove the 2 bearings.

Reverse steps 1-4 to reassemble.

FAN SPEED ADJUSTMENT — Pulley listed in Table 1 is factory installed in the unit.

If the factory-supplied pulley is not suitable, provide a field-supplied pulley of the correct size as required. Refer to Table 1 for additional fan data.

IMPORTANT: Increasing fan speed increases load on motor. Do not exceed maximum fan motor full load amperage (Tables 2 and 3).

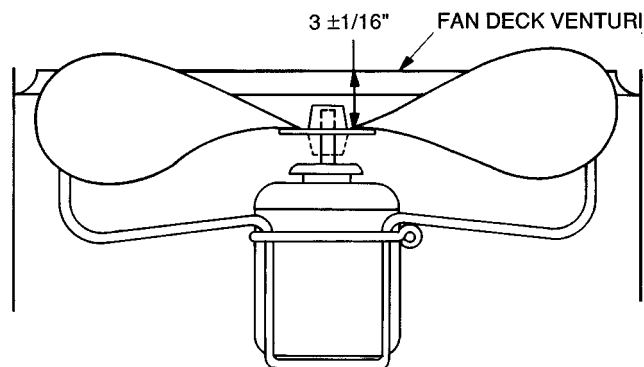


Fig. 38 — Condenser-Fan Adjustment

PULLEY REMOVAL

1. Shut off unit power.
2. Loosen fan motor mounting plate and remove belt.
3. Loosen pulley setscrew.
4. Slide pulley off shaft.

Reverse steps 1-4 to install new pulley.

PULLEY ALIGNMENT — Loosen fan pulley setscrews and slide fan pulley along fan shaft for parallel alignment. Make angular alignment by loosening motor from mounting plate.

BELT TENSION ADJUSTMENT — Loosen fan motor pivot bolts. Pull back motor mounting plate to proper belt tension (approximately $\frac{3}{4}$ -in. deflection with one finger) and tighten motor pivot bolts.

LUBRICATION — Evaporator-fan shaft and motor bearings require annual lubrication after 3 to 5 years of continuous operation as follows:

Fan Shaft Bearings — Automotive-type grease fittings are factory supplied. Apply a medium-duty, lithium-based grease to fittings while rotating shaft.

Fan Motor Bearings — Remove plugs and install automotive-type grease fittings. Use a suitable motor bearing grease per motor manufacturer's recommendations.

Forced-Draft Blower (48MA)

LUBRICATION — Add 2 or 3 drops of a good grade of no. 20 SAE (Society of Automotive Engineers) motor oil at each oil cup on the motor once a year.

AIR SHUTTER ADJUSTMENT — The air shutter is held in position on the blower inlet by a wing nut. Loosen wing nut and reposition shutter until correct pressure is achieved. Combustion chamber air pressure is to be measured through drain connection below heat exchangers. Correct pressures are 0.10 ± 0.01 in. wg for units 48MA016, 024, 034, and 040; 0.14 ± 0.01 for units 48MA028 and 030. Figure 39 shows correct shutter position. Note pivot hole location.

Zone Module Transformers — When replacing these transformers, be sure to connect wires on correct terminals to maintain correct polarity. See base unit label diagram on the unit for connections.

Optional Economizer — See Fig. 40.

THERMOSTAT SETTINGS — Set economizer outdoor air thermostat (ECT) at a temperature which will provide cooling with outdoor air only. This setting, when achieved, will lock out the compressor(s). A 45 F setting is suggested.

Set mixed-air thermostat (MAT) as desired to provide mixed air of the correct temperature. This setting cannot be lower than the ECT setting. A 58 F setting is suggested.

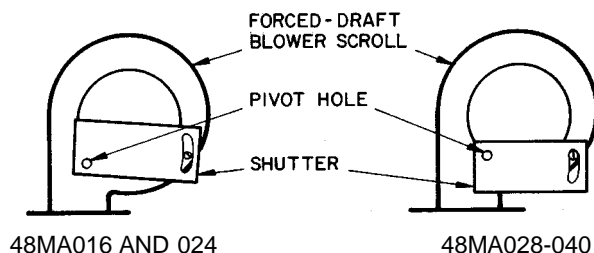


Fig. 39 — Forced-Draft Blower Shutter Position

DAMPER POSITION — When outdoor-air damper is fully open, the return-air damper will be fully closed and vice versa.

OPERATION

Heating or Compressor Cooling — Dampers will assume the ventilation position indicated by the ventilation control knob. If a remote control center is used, DAY/NIGHT switch must be at the DAY position.

If terminals in unit control box labeled SHORT TO CLOSE DAMPERS are shorted or if DAY/NIGHT switch is set at NIGHT position, outdoor-air damper will close.

Intermediate Season (Free Cooling Using Optional Economizer) — If outdoor-air temperature drops below economizer outdoor-air thermostat (ECT) setting, the compressor(s) will remain off. The dampers will modulate to maintain the mixed-air thermostat (MAT) setting. If the outdoor air temperature rises above the ECT setting, the unit will operate as described in Heating or Compressor Cooling section above.

Optional Exhaust Damper — See Fig. 34 and 35. When unit is on economizer cycle (free cooling) and an exhaust damper is part of the unit, the exhaust relay is energized. The fan motor controls the Motormaster® head pressure control and the fan cycling pressure switches are bypassed so that condenser fans operate at full speed as follows:

- Fan no. 1 and 2 on units 48MA/50ME016-030
- Fan no. 2 and 3 on units 48MA/50ME034, 040

When the return air damper is 25% closed, the exhaust damper begins to open. The condenser fans pull indoor return air through the open exhaust damper and discharge it to the outdoors.

Replacement Parts — A complete list of replacement parts may be obtained from any Carrier distributor upon request.

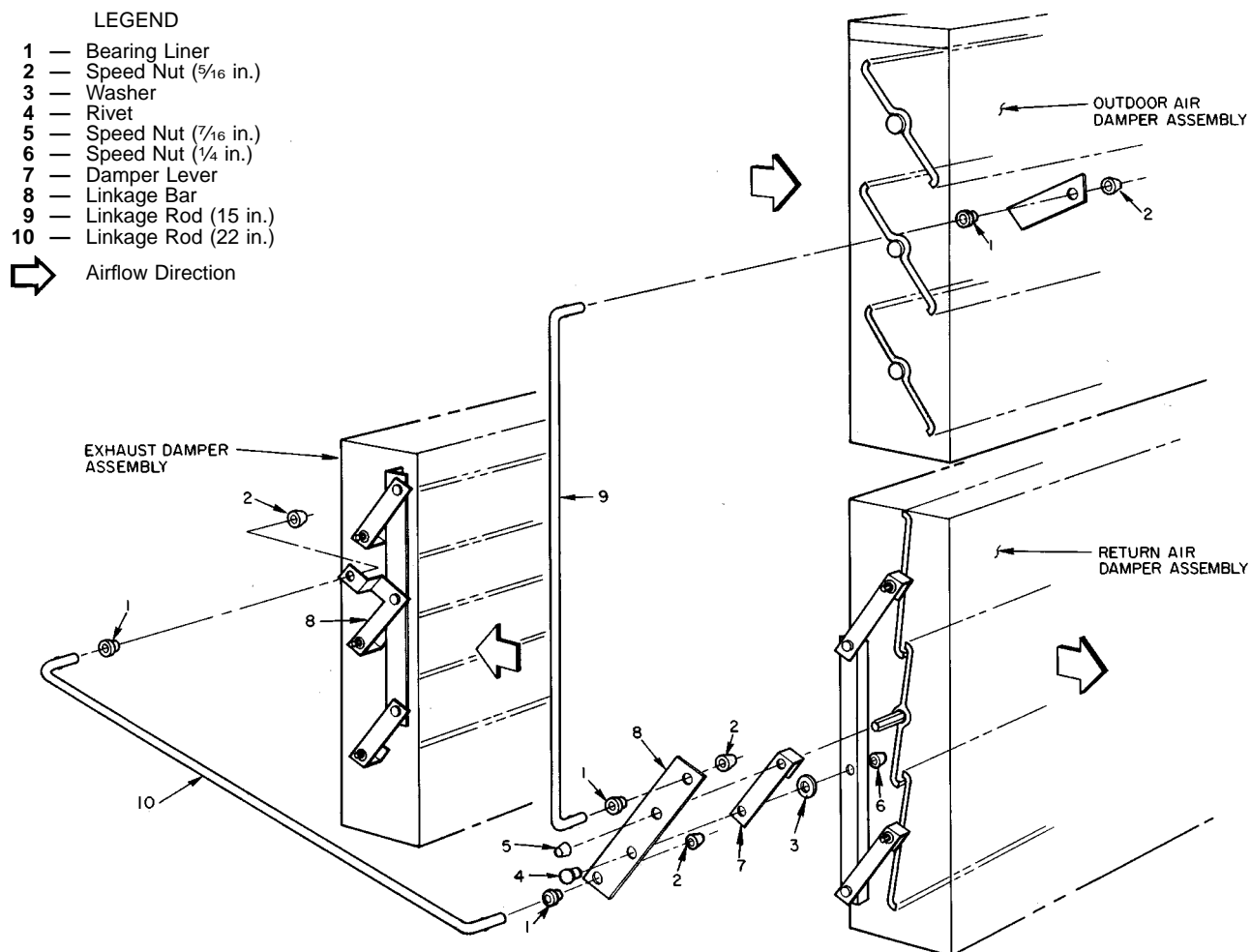


Fig. 40 — Economizer and Exhaust Damper Assemblies, Exploded View

PACKAGED SERVICE TRAINING

Our packaged service training programs provide an excellent way to increase your knowledge of the equipment discussed in this manual. Product programs cover:

- Unit Familiarization
- Maintenance
- Installation Overview
- Operating Sequence

A large selection of product, theory, and skills programs is available. All programs include a video cassette and/or slides and a companion booklet. Use these for self teaching or to conduct full training sessions.

For a free Service Training Material Catalog (STM), call 1-800-962-9212. Ordering instructions are included.

START-UP CHECKLIST

MODEL NO.: _____

SERIAL NO.: _____

DATE: _____

TECHNICIAN: _____

PRE-START-UP:

- ☐ VERIFY THAT ALL PACKING MATERIALS HAVE BEEN REMOVED FROM UNIT
- ☐ REMOVE ALL SHIPPING HOLDDOWN BOLTS AND BRACKETS PER INSTRUCTIONS
- ☐ VERIFY INSTALLATION OF ECONOMIZER HOOD
- ☐ VERIFY THAT CONDENSATE CONNECTION IS INSTALLED PER INSTRUCTIONS
- ☐ VERIFY THAT ALL ELECTRICAL CONNECTIONS AND TERMINALS ARE TIGHT
- ☐ CHECK GAS PIPING FOR LEAKS (48MA)
- ☐ CHECK THAT INDOOR-AIR FILTER IS CLEAN AND IN PLACE
- ☐ VERIFY THAT UNIT IS LEVEL
- ☐ CHECK FAN WHEEL AND PROPELLER FOR LOCATION IN HOUSING/ORIFICE, AND VERIFY SET SCREW IS TIGHT
- ☐ VERIFY THAT FAN SHEAVES ARE ALIGNED AND BELTS ARE PROPERLY TENSIONED

START-UP

ELECTRICAL

SUPPLY VOLTAGE L1-L2 _____ L2-L3 _____ L3-L1 _____

COMPRESSOR AMPS — COMPRESSOR NO. 1 L1 _____ L2 _____ L3 _____
— COMPRESSOR NO. 2 L1 _____ L2 _____ L3 _____

SUPPLY FAN AMPS _____ EXHAUST FAN AMPS _____

ELECTRIC HEAT AMPS (50ME, IF APPLICABLE) L1 _____ L2 _____ L3 _____

TEMPERATURES

OUTDOOR-AIR TEMPERATURE _____ F DB (Dry-Bulb)

RETURN-AIR TEMPERATURE _____ F DB _____ F WB (Wet-Bulb)

COOLING SUPPLY AIR _____ F

GAS HEAT SUPPLY AIR (48MA) _____ F

ELECTRIC HEAT SUPPLY AIR (50ME, IF APPLICABLE) _____ F

PRESSURES

GAS INLET PRESSURE (48MA) _____ IN. WG

GAS MANIFOLD PRESSURE (48MA) STAGE NO. 1 _____ IN. WG

STAGE NO. 2 _____ IN. WG

REFRIGERANT SUCTION CIRCUIT NO. 1 _____ PSIG CIRCUIT NO. 2 _____ PSIG

REFRIGERANT DISCHARGE CIRCUIT NO. 1 _____ PSIG CIRCUIT NO. 2 _____ PSIG

- ☐ VERIFY REFRIGERANT CHARGE

GENERAL

- ☐ ECONOMIZER MINIMUM VENT AND CHANGEOVER SETTINGS TO JOB REQUIREMENTS

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Book 1 | 1 PC 111 Catalog No. 564-840 Printed in U.S.A. Form 48MA/50ME-3SI Pg CL-1 4-96 Replaces: 48MA/50ME-1SI
Tab 1c | 1d

CUT ALONG DOTTED LINE