SUPERSEDED BY 48MA-12SI 11/73

Combination Heating/Cooling Units

Multizone, Gas or Electric Heat

INSTALLATION

General — Unit is to be installed on a rooftop, outdoor site only. Install unit and provide electrical and control power wires, gas supply line (48MA) and condensate drain lines in accordance with all applicable codes.

Roof Curb — Assemble and install roof curb as described in instructions shipped with this accessory. Accessory roof curb and information required to field-fabricate a roof curb of 2-in. x 12-in. planks are shown in Fig. 1, 2 and 4. Install insulation, cant strips, roofing and flashing, as required. Seal all curb joint edges with mastic or other suitable roof cement to keep out moisture.

→ Seal strip is factory installed in side rails on units 48MA,50ME016,024, and 028 and shipped with accessory roof curb for units 48MA, 50ME034. Install seal strip as described in accessory roof curb installation instructions. The seal strip is designed to compress under unit weight. This provides an airtight seal and vibration isolation between unit base and curb. See Fig. 1.

Roof Openings — The roof area under the unit (except for the compressor/condenser section) need not be filled in as the curb-mounted unit will enclose this space. By leaving this section of roof open, ample clearance for installation of ductwork, power and control wiring and gas piping will be provided.

If roof area inside roof curb is to be filled in so that roof deck and bottom of base unit are to be used as a return air plenum, the spaces under the roof curb flanges caused by the corrugated roofing (or caused by irregularities in the roof) must be sealed to prevent water from seeping under the roof curb. If this is not done, negative pressure of return air may draw this water under unit where it could leak into building structure. Supply and return air duct openings are shown in Fig. 2 and 4.

If openings are to be cut into a finished roof, provide at least 6 in. of space on each of the longer sides of the supply and return air openings for additional installation clearance. This may not be done on the short sides of the air openings due to location of roof curb members.

Rigging Unit — Inspect unit for shipping damages. File damage claim with transportation agency. Lift unit with cables and spreader bars using lifting brackets provided (Fig. 3 and 5). Keep unit upright. Do not drop unit. Lift one unit at a time. Unit weight is shown in Table 1. Center of gravity is within a 6-in. radius of the geometric center of unit. Do not drill or punch holes in unit frame or panels. Damage to internal wiring or other components may result. Eyebolts may be removed after unit is in final position.

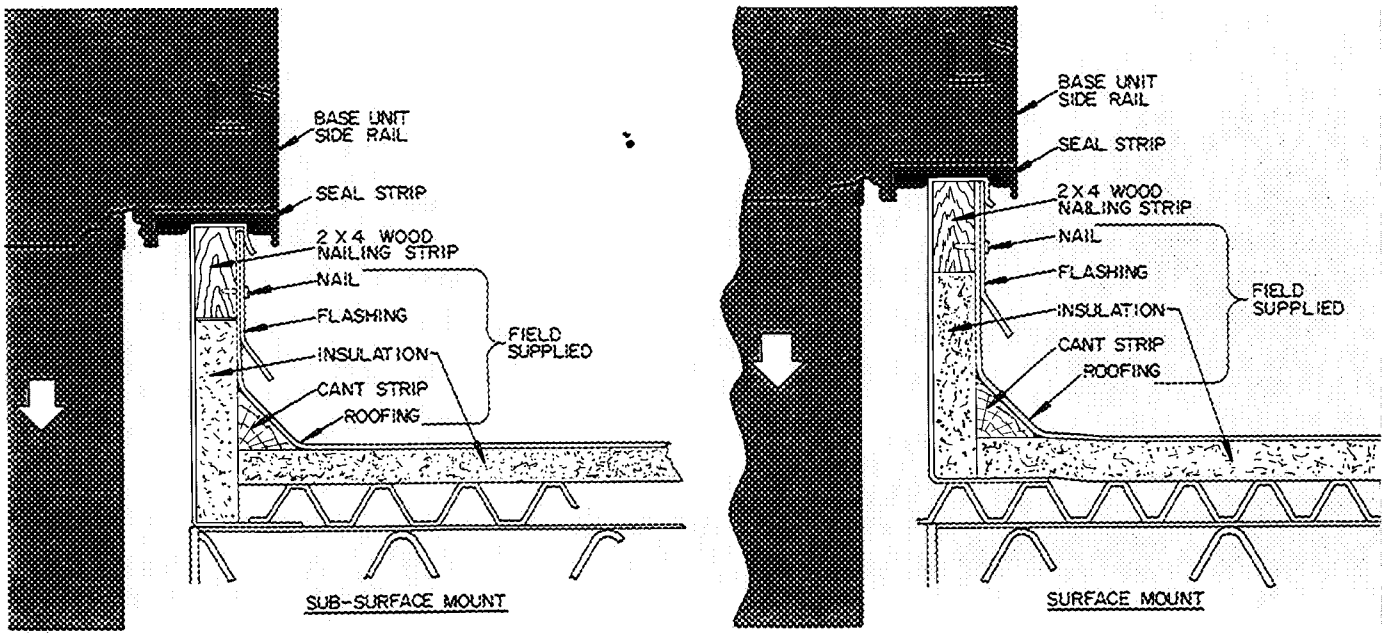
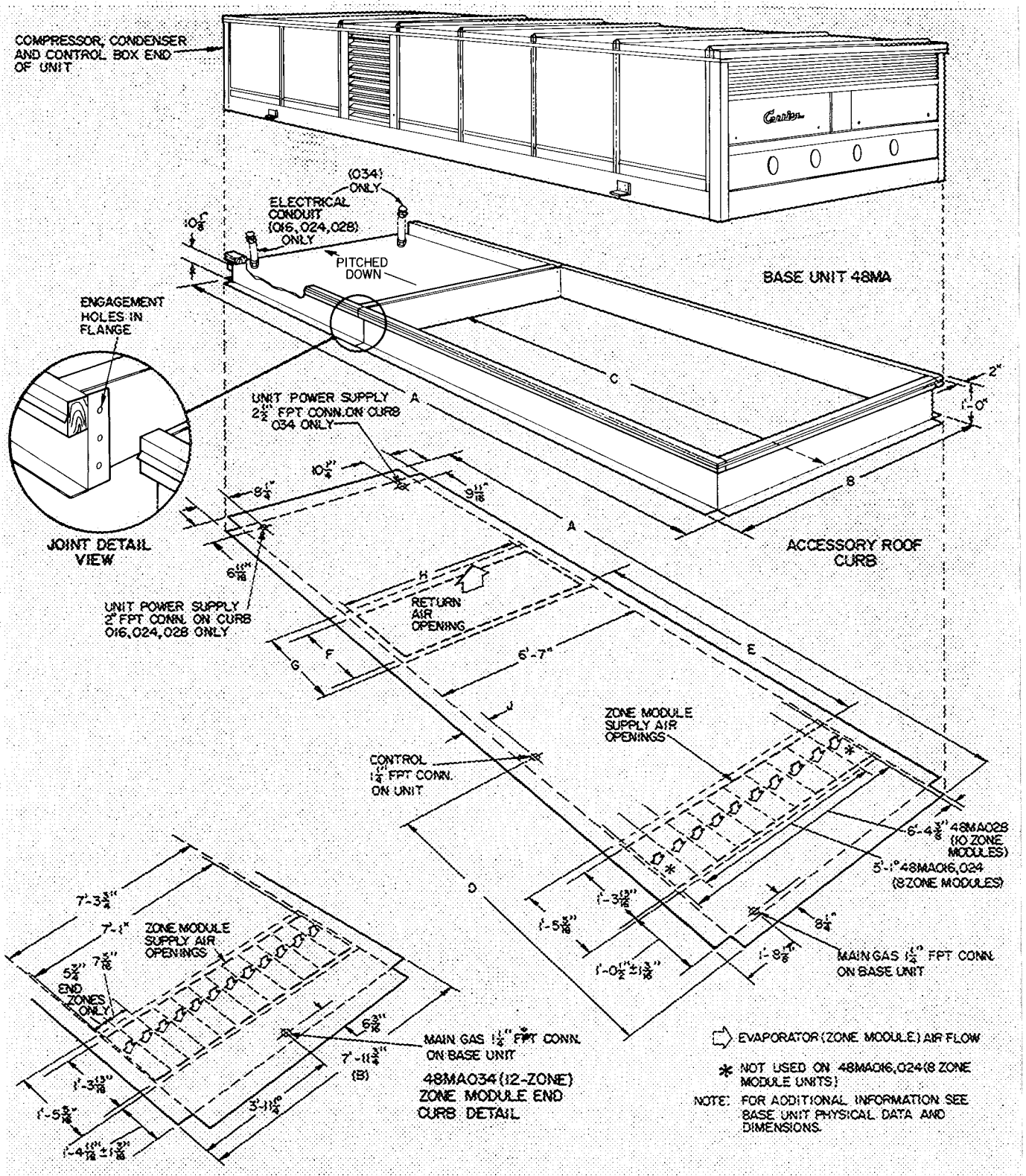


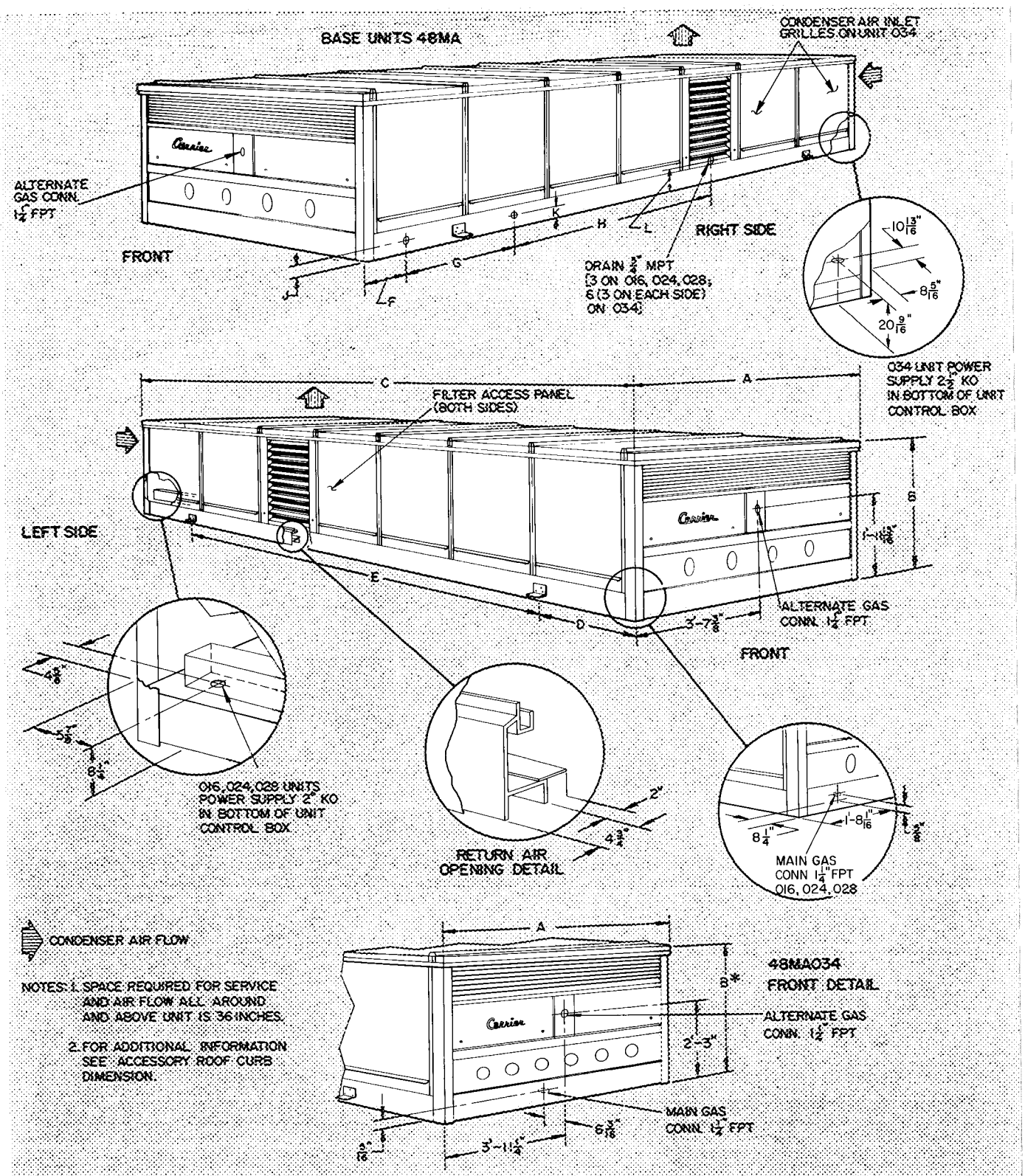
Fig. 1 — Roof Curb Detail



Certified dimension drawings available on request.

UNIT 48MA	DIMENSIONS (ft-in.)								
	A	B	C	D	E	F	G	H	J
016,024,028	18-0 5/16	7- 3	11-9	5-6 3/4	7-2 7/8	1-10 9/16	2-2 9/16	6-0 3/8	0- 7 1/2
034	21-7 15/16	7-11 3/4	14-1 3/4	6-7 1/16	8-4 3/16	2- 9 1/8	3-1	6-8 1/2	0-10 5/16

Fig. 2 — Roof Curb Physical Data and Dimensions; 48MA Units

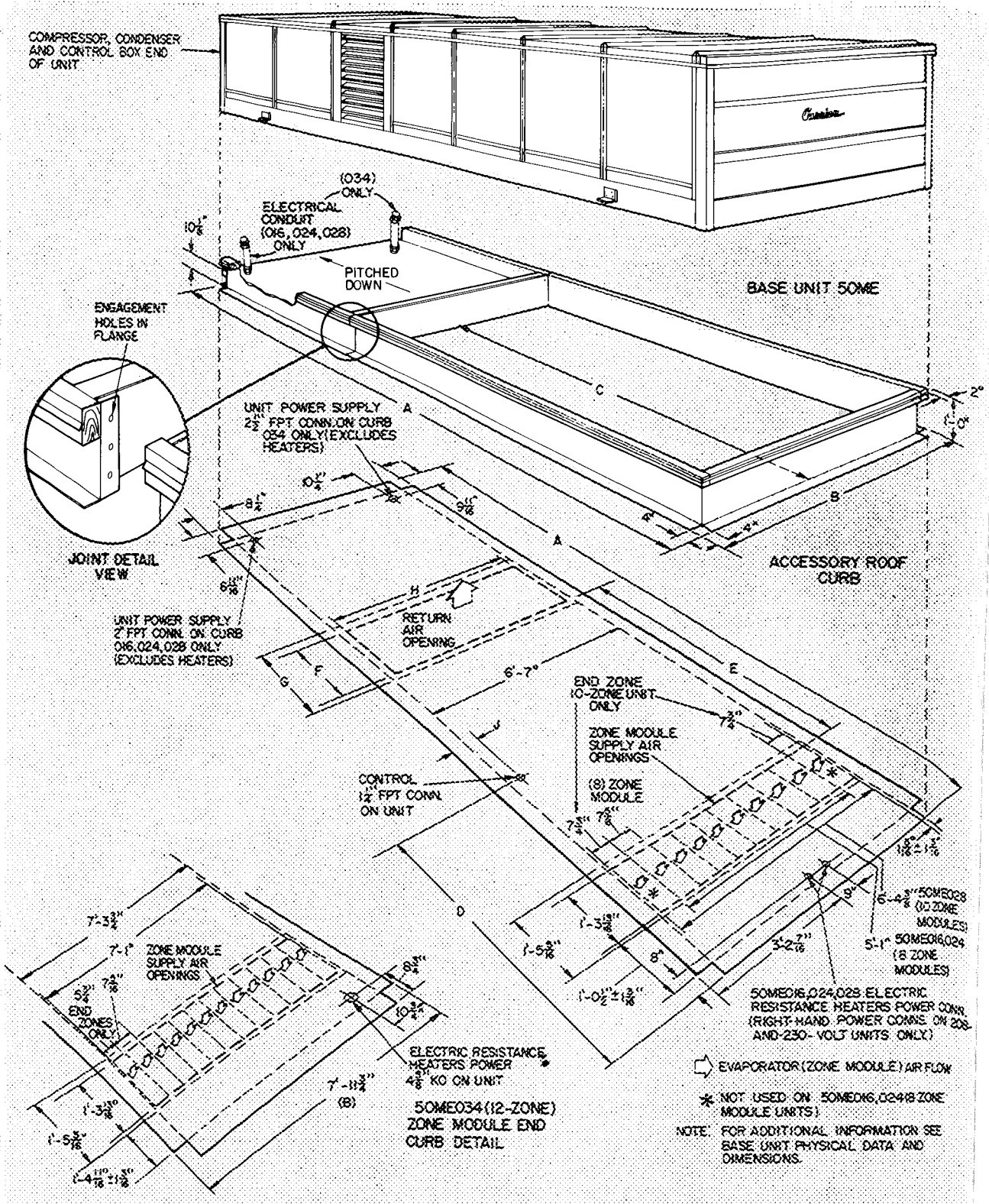


Certified dimension drawings available on request.

UNIT 48MA	DIMENSIONS (ft-in.)										
	A	B	C	D	E	F	G	H	J	K	L
016,024,028	7- 2¼	3-0⅝	17-1 3/16	2-2 15/16	13-5½	0- 9 1/16	2-10	7-3 3/16	0-3⅜	0-3⅜	0-3⅜
034	7-11	3-9 15/16*	21- 9 1/16	4-2⅛	13-5½	0-11 1/16	3- 4 3/16	8-6¾	0-3 1/32	0-2 15/16	0-7¼

*Overall height; includes 1 3/4-in. for fan guards (48MA034).

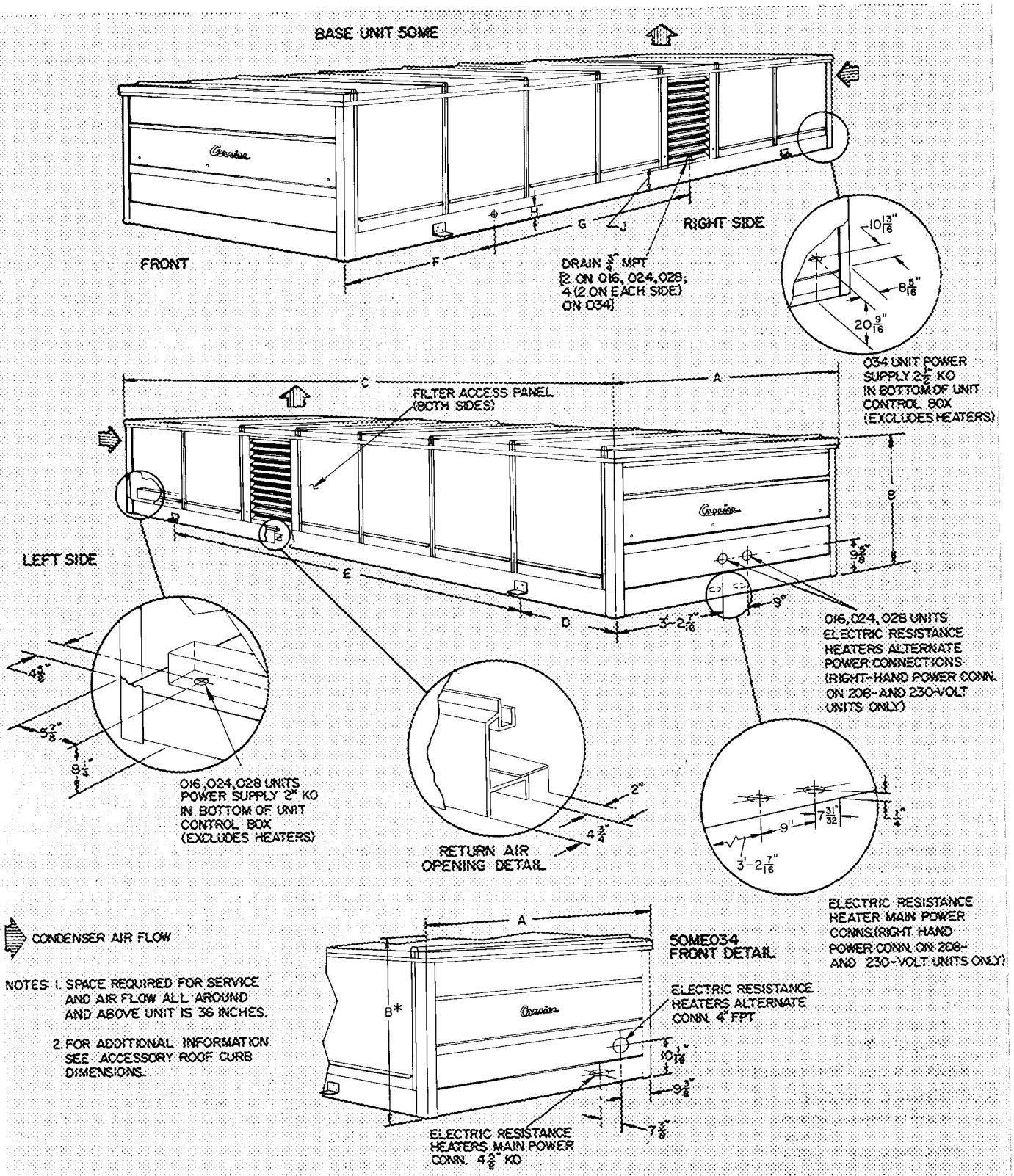
→ **Fig. 3 — Base Unit Physical Data and Dimensions; 48MA Units**



Certified dimension drawings available on request.

UNIT 50ME	DIMENSIONS (ft-in.)								
	A	B	C	D	E	F	G	H	J
016,024,028	18-0 1/16	7- 3	11-9	5-6 1/4	7-2 7/8	1-10 7/16	2-2 9/16	6-0 3/4	0- 7 1/2
034	21-7 15/16	7-11 3/4	14-1 3/4	6-7 5/16	8-4 3/16	2- 9 1/8	3-1	6-8 1/2	0-10 5/16

Fig. 4 — Roof Curb Physical Data and Dimensions; 50ME Units



NOTES: 1. SPACE REQUIRED FOR SERVICE AND AIR FLOW ALL AROUND AND ABOVE UNIT IS 36 INCHES.

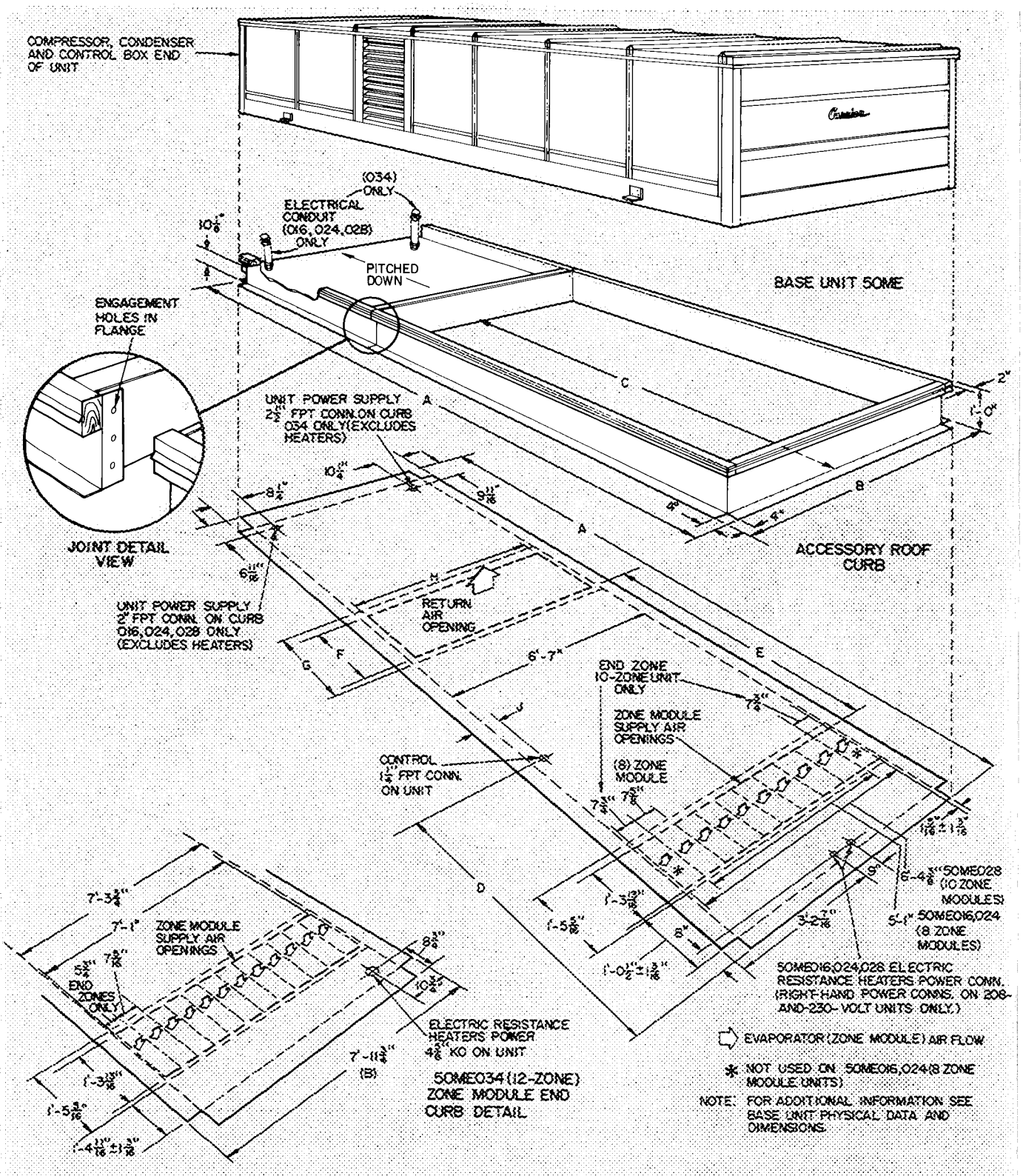
2. FOR ADDITIONAL INFORMATION SEE ACCESSORY ROOF CURB DIMENSIONS.

Certified dimension drawings available on request.

UNIT 50ME	DIMENSIONS (ft-in.)								
	A	B	C	D	E	F	G	H	J
016,024,028	7- 2 1/4	3-0 9/16	17-11 5/16	2-2 25/16	13-5 1/2	3-7 1/16	7-3 3/16	0-3 3/8	0-3 1/2
034	7-11	3-9 25/16*	21- 9 1/16	4-2 5/8	13-5 1/2	4-4	8-6 3/4	0-2 15/16	0-7 1/4

*Overall height; includes 1 3/4-in. for fan guards (50ME034).

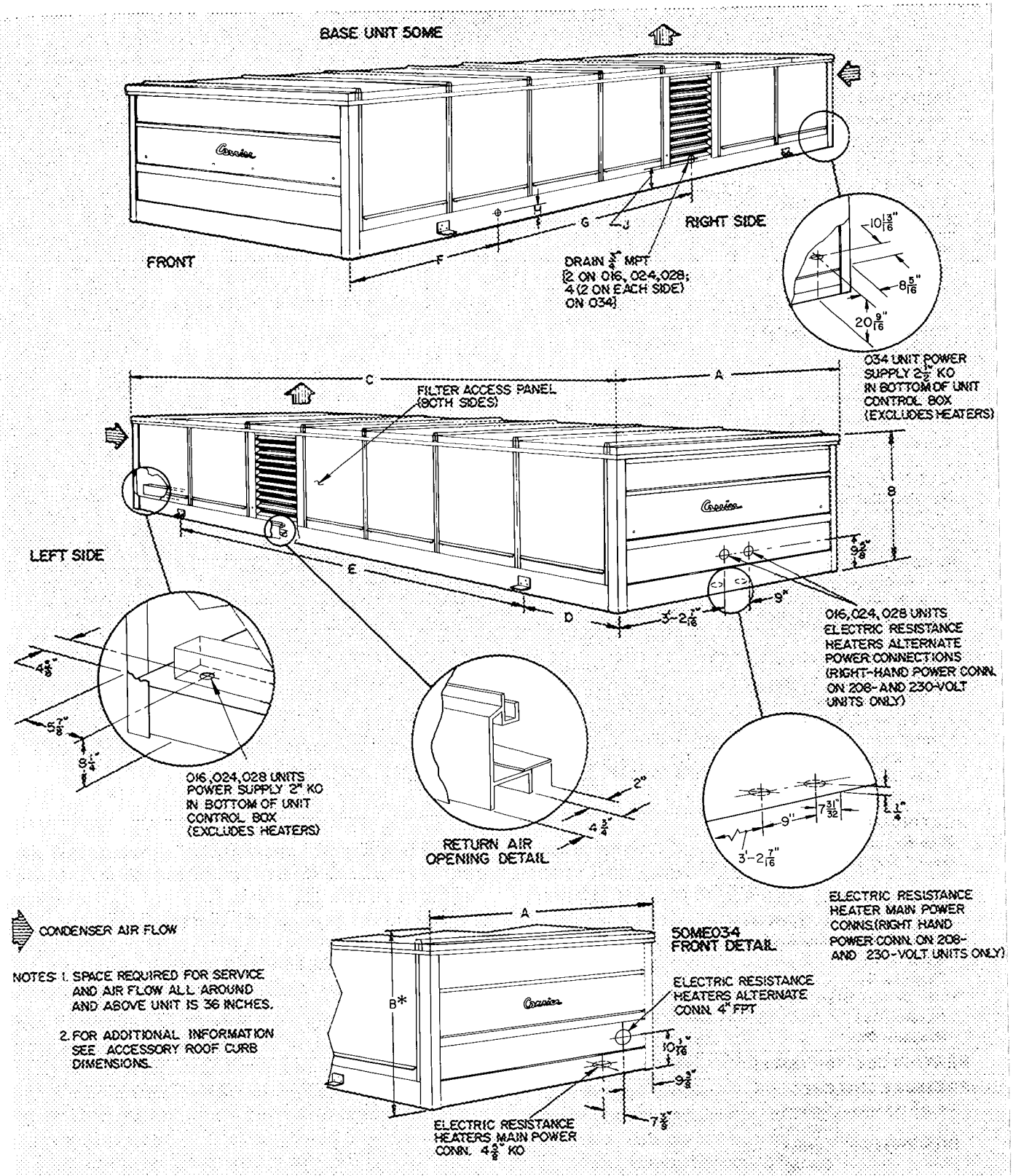
Fig. 5 — Base Unit Physical Data and Dimensions; 50ME Units



Certified dimension drawings available on request.

UNIT 50ME	DIMENSIONS (ft-in.)								
	A	B	C	D	E	F	G	H	J
016,024,028	18-0 5/16	7- 3	11-9	5-6 1/4	7-2 1/8	1-10 5/16	2-2 3/16	6-0 3/8	0- 7 1/2
034	21-7 13/16	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 3/16

Fig. 4 — Roof Curb Physical Data and Dimensions; 50ME Units



NOTES: 1. SPACE REQUIRED FOR SERVICE AND AIR FLOW ALL AROUND AND ABOVE UNIT IS 36 INCHES.

2. FOR ADDITIONAL INFORMATION SEE ACCESSORY ROOF CURB DIMENSIONS.

Certified dimension drawings available on request.

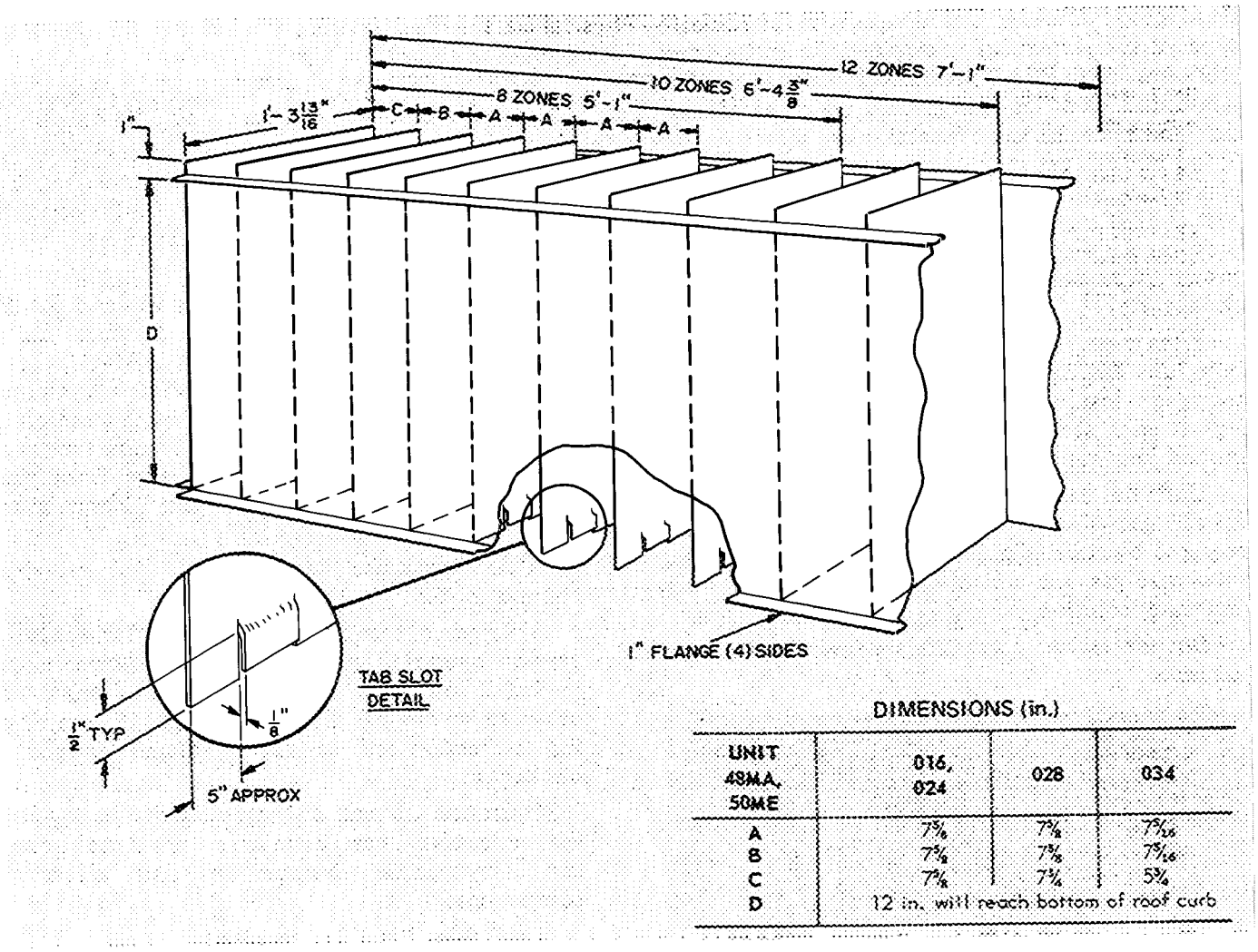
UNIT 50ME	DIMENSIONS (ft-in.)								
	A	B	C	D	E	F	G	H	J
016,024,028	7- 2¾	3-0$^{9}/_{16}$	17-11$^{5}/_{16}$	2-2$^{25}/_{16}$	13-5½	3-7$^{1}/_{16}$	7-3$^{5}/_{16}$	0-3⅜	0-3⅜
034	7-11	3-9$^{25}/_{16}$*	21- 9$^{1}/_{16}$	4-2⅝	13-5½	4-4	8-6¾	0-2$^{15}/_{16}$	0-7¼

*Overall height; includes 1 3/4-in. for fan guards (50ME034).

Fig. 5 — Base Unit Physical Data and Dimensions; 50ME Units

Table 1 — Physical Data

UNIT 48MA, 50ME	016	024	028	034
OPERATING WT (lb)				
Base Unit 48MA	3290	3710	3970	5340
Base Unit 50ME (with heaters)	2890	3310	3570	4900
Roof Curb	506	506	506	630
REFRIGERANT				
Operating Charge (lb)	22 / 28	22 / 32	22 / 43	22 / 57
COMPRESSOR	Recip Hermetic; 1725 Rpm			
No. 1	06D with two unloaders			
No. 2	–	06D		
Crankcase Oil (pts)				
Suniso 3GS or Capella BI	11	11 each compressor (22 system total)		
Unloader Settings (psig)	Compressor no. 1 only			
Left Bank	Load 71 0 ± 1 5 Unload 57 5 ± 2.5			
Right Bank	Load 76 0 ± 1 5 Unload 62.5 ± 2 5			
Capacity Steps (%)	100,67,33	100,83,67, 50,33,17	100,80,60, 40,20	100,83,67, 50,33,17
OUTDOOR AIR FANS	Propeller; Direct Drive			
Mtr Hp...Rpm...Frame no. 1	1. 1075. 56 (1-phase)			
no. 2	1 1140 .56 (3-phase)			
no. 3	–	–	–	1. 1140 56 (3-phase)
INDOOR AIR FANS	Centrifugal; Belt Drive			
No. ...Size (in.)	2 . 15x15	2...15x15	2 15x15	3 15x9
CFM (Nom)	6000	8000	10,000	12,000
Motor Hp...Rpm (std)	5 .1725	7.5. 1725	10. 1725	15 1725
Frame	184T	213T-215T	213T-215T	254T
Pulley Pitch Diam (in.)	5.5-6 5	5.8-7 0	4.9-5 9	7 0-8 4
Pulley Factory Setting (full turns open)	3	3	4	4
Fan Pulley Pitch Diam (in.)	11.0	11.0	8.0	11 0
Belt No. ...Size	1 ..B62	1 B62	2 .B55	2 .B68
Rpm Range	875-1030	920-1115	1060-1290	1110-1305
Rpm Change per Full Turn of Mtr Movable Pulley Flange	25	33	39	33
HEATING SECTION (48MA)				
Rise Range	25 F to 55 F at 0.75 in. wg ESP			
Input (1000 Btuh) Min-Max Total	240-480	240-480	300-600	360-720
Each Module	60	60	60	60
Bonnet Cap. (1000 Btuh) Total	360	360	450	540
Each Module	22.5/45 0	22.5/45 0	22 5/45 0	22 5/45 0
Burner Orifice Diam (in.)				
Natural Gas	.1065 (no. 36 drill)			
Propane Gas	0635 (no. 52 drill)			
Pilot Orifice Diam (in.)				
Natural Gas	0200			
Propane Gas	0120			
HEATING SECTION (50ME)	See Electrical Data			
PRESSURE SWITCHES				
Low-Pressure Cutout	29 ± 5 psig			
Cut-in	39 ± 5 psig			
High-Pressure Cutout	400 ± 5 psig			
Cut-in	300 ± 5 psig			
Indoor Air Flow Switch (AFS1)				
Factory Setting (cfm)	6000	6000	6000	9000
Adjustment Range (cfm)	4000-6000	4000-6000	4000-6000	6000-9000
INDOOR AIR FILTERS	Std Throwaway Type; 41 5 sq ft face area			
Std No. ...Size (in.)	12 . 20x25x2			
High Efficiency (optional)	12 20x25x2 (36 5% efficiency NBS atmosphere dust test)			
Roll Filter (optional)	65 ft of 2-in. media			



DIMENSIONS (in.)

UNIT 48MA, 50ME	016, 024	028	034
A	7 5/8	7 5/8	7 5/16
B	7 5/8	7 5/8	7 5/16
C	7 5/8	7 1/4	5 3/4
D	12 in. will reach bottom of roof curb		

Fig. 6 – Field-Fabricated Zone Duct Plenum Detail

Unit Positioning – When lowering unit on roof curb, do not exceed maximum "out of symmetry" tolerances shown in Fig. 2 and 4. Be sure that unit is level or pitched slightly to the right (when facing zone module end of unit) so that drains will function properly. Units 48MA,50ME034 have drains on both sides and may be pitched to either side.

Field-Fabricated Ductwork – Supply and return air openings are shown in Fig. 2 and 4. To simplify supply air connection, it may be desired to field fabricate and install a zone duct plenum as shown in Fig. 6. Duct plenum may be installed prior to unit positioning if desired. Zone supply air duct openings on base unit are fitted with a tab slot connection similar to the type shown on plenum detail except for end partitions which are hemmed. This hem is positioned so that the one-in. flange at the entering end of field-fabricated plenum will force-fit between it and adjacent unit frame member.

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

Zone supply air ducts passing thru unconditioned spaces must be insulated and covered with vapor barrier. Parallel duct runs of longer than 5 ft must be separated by insulation to prevent heat transfer between zone ducts.

Install a manual balancing damper in each zone duct to provide zone air flow.

Return air duct connection on 48MA,50ME 016,024,028 consists of 3 sheet metal flanges and a fourth flange being the bottom surface of base unit cross member (an extruded aluminum I-beam). Units 48MA,50ME034 have 4 sheet metal flanges.

→ **Condensate Drains** – Pipe nipples, covered with foam rubber insulation, are shipped in the return air filter compartment (48MA units shipped with 3; 50ME units shipped with 2). Install a nipple in each drain connection on right side of 48MA, 50ME016,024,028 or either side of units 48MA, 50ME034. Be sure that rubber sleeve on each nipple seals space between nipple and opening in unit outer skin to prevent rain or other outside water from entering unit.

Install a trap in each condensate drain line. Make each trap not less than 3-in. deep. Use a flexible material or insulate trap to prevent freeze-up.

Gas Piping (48MA) – Unit is equipped for use with type of gas shown on nameplate. Refer to latest edition of ANS Z21.30 entitled Installation of Gas Appliances and Gas Piping. Unit main gas connection and alternate gas connection are shown in Fig. 3. Do not use gas supply pipe smaller than unit gas connection. Maximum allowable natural gas pressure is 14.0 in. wg; minimum allowable natural gas pressure for full rate input is 5.0 in. wg. Propane gas pressure should be 11.0 in. wg at unit gas connection.

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 leaktight joints.

Unit has factory installed gas shutoff valves. Install gas shutoff valve, external to unit, if required by code (Fig. 7). 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.

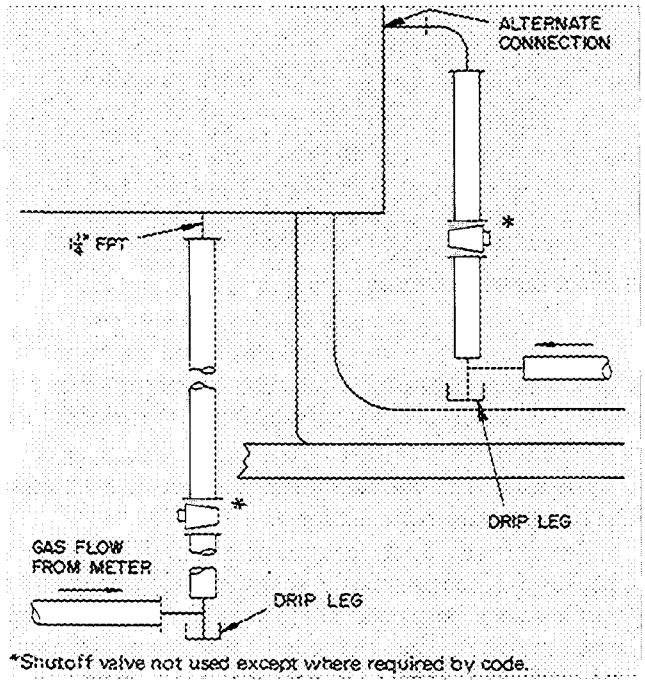


Fig. 7 – Suggested Gas Piping (48MA)

Field Power Supply Wiring – Unit has a circuit breaker for each compressor, fan motor and for 50ME electric resistance heater assemblies. 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) on 50ME units is located in the heater control box at front of unit. See Fig. 3, 5 and 8.

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

→ Connect the electrical conduit supplied with accessory roof curb (shipped with unit 034) to threaded fitting in roof curb and bottom of main power and condensing section control box as applicable. Route main power wires thru conduit to terminal board in box as shown on unit label wiring diagram and in Fig. 8.

When installing units 48MA028400 and 50ME 028400 (208-3-60) and in some instances units 48MA028500 and 50ME028500 (230-3-60) electrical conduit will not accommodate aluminum wire of the size that may be required. If aluminum wire is to be used, an external transition box and short lengths of no. 00 copper wire from the transition box to the unit terminal connection board is recommended.

Affix crankcase heater sticker to unit disconnect switch.

Voltage to compressor terminals during compressor operation must be within voltage range indicated on unit nameplate. Phases must be balanced within 2%. Contact local power company for correction of improper voltage or phase imbalance.

Operation of unit on improper line voltage or with excessive phase imbalance constitutes abuse and may cause damage to unit electrical components.

See Tables 2 and 3 as required.

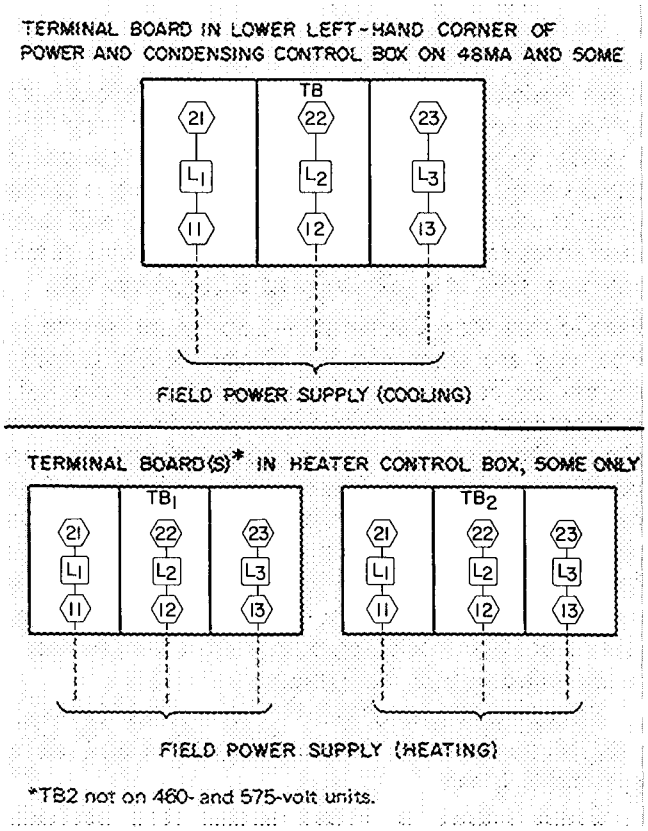


Fig. 8 – Field Power Supply Details

Table 2 — Electrical Data (3-Ph, 60-Hz)

UNIT 48MA, 50ME		VOLTAGE		MIN WIRE AMPS (NEC)			COMPR NO. 1			COMPR NO. 2			IFM	OFM1	OFM2 & 3*
					50ME								FLA		
Model	Series	Nom	Range Min-Max	48MA	Cooling	Heating	CB MTA	FLA	LRA	CB MTA	FLA	LRA			
016	400	208	187-239	109.6	109 0	400.0	44 5†	63 6	266	–	–	–	16 2	6 2	6 6
	500	230	207-264	99.5	98 9	332 0	40 0†	57 2	240	–	–	–	13 2	6.2	6.0
	600	460	414-529	49 8	49 5	166.0	40 0	28 6	120	–	–	–	6 6	6 2	3 0
	100	575	518-660	39.8	39 6	132 5	32.0	22 8	96	–	–	–	5 6	6.2	2 4
024	400	208	187-239	137.5	136 9	400 0	62.0	44 4	170	62 0	44 0	170	24 0	6.2	6 6
	500	230	207-264	124 8	124 2	332 0	56 0	40 0	153	56 0	40 0	153	22 0	6 2	6 0
	600	460	414-529	62 2	61 9	166.0	27 8	19 9	77	27 8	19 9	77	11 0	6 2	3.0
	100	575	518-660	49.4	49.2	132.5	22.0	15.7	62	22 0	15.7	62	9 0	6 2	2 4
028	400	208	187-239	168.1	167 5	500.0	89 0	63 6	266	62 0	44.4	170	29 0	6 2	6 6
	500	230	207-264	152 3	151.7	414 0	80.0	57 2	240	56.0	40 0	153	25 0	6.2	6 0
	600	460	414-528	76 1	75.8	207 0	40.0	28 6	120	27 8	19.9	77	12.5	6 2	3.0
	100	575	518-660	60 4	60.2	166.0	32.0	22 8	96	22.0	15 7	62	9 5	6 2	2 4
034	400	200	180-229	211 4	210 8	Variable	89 0	63 6	266	89.0	63.6	266	46 0	6 2	6.6
	500	230	207-264	189.5	188 9	See	80 0	57 2	240	80.0	57 2	240	42 0	6 2	6 0
	600	460	414-528	94.7	94 4	Table	40 0	28 6	120	40 0	28.6	120	21 0	6 2	3 0
	100	575	518-660	76 0	75 8	3	32 0	22 8	96	32.0	22.8	96	16 5	6.2	2 4

Values shown are for part-winding start.

CB — Circuit Breaker
FLA — Full Load Amps
IFM — Indoor Air Fan Motor
LRA — Locked Rotor Amps
MTA — Must Trip Amps
OFM — Outdoor Air Fan Motor

*OFM3 applies to 48MA,50ME034 only.

†Unit has two mechanically interlocked circuit breakers Values are for each.

NOTES

1. Outdoor Air Fan Motor no. 1 is 208/230-1-60 on all units.
2. Terminal boards provided for cooling power wire connections (and 50ME heating power wiring connections are suitable for use with copper or aluminum wire).

Table 3 — Electric Resistance Heater Data (60-Hz)

UNIT 50ME		V/PH	KW	HEATING ELEMENTS PER ZONE MODULE	FULL LOAD AMPS PER HEATING ELEMENT	CB MTA EACH ZONE MODULE	MAX FUSE AMPS EACH CIRCUIT	MIN WIRE AMPS EACH CIRCUIT	CONDUIT CONN. PROVIDED No. ...Size (in.)
Model	Series								
016, 024	400	208/3	115	3	23.1	52	200	200.0	2 2½ FPT
	500	230/3	106		19.2	45	175	165 8	2 2½ FPT
	600	460/3	106		9 6	45	175	165 8	1 2½ FPT
	100	575/3	106		7 7	37	150	132 5	1 .2½ FPT
028	400	208/3	144	3	23.1	52	250	249 5	2...3 FPT
	500	230/3	132		19.2	45	225	207.0	2 2½ FPT
	600	460/3	132		9 6	45	225	207 0	1 ..1½ FPT
	100	575/3	132		7.7	37	175	166 0	1...1½ FPT
034	400	200/3	79	2	16.5	52	300	286.4	1. 4⅝ KO
	500	230/3	79		14 4	52	250	249 6	
	600	460/3	79		7 2	45	125	124 8	
	400	200/3	106	2	22 0	52	200	190.4	1 4⅝ KO
	500	230/3	106		19 2	52	175	166 4	
	600	460/3	106		9 6	45	175	166.4	
	400	200/3	158	3	22.0	52	300	285 6	1 . 4⅝ KO
	500	230/3	158		19 2	52	250	249.6	
	600	460/3	158		9.6	45	250	249 6	
	100	575/3	158		7.7	45	200	199 2	

CB — Circuit Breaker (branch circuit protection)
MTA — Must Trip Amps

NOTE: Terminal boards provided for heater power wire connections are suitable for use with copper or aluminum wire.

→ On 50ME units, cooling power supply wires and heating power supply wires must be sized according to the Cooling Minimum Wire Amps values and Heating Minimum Wire Amps values shown on unit nameplate and in Tables 2 and 3. These wires may be powered by common power supply wires at a junction if desired. The common power supply wires from the main power source to the junction must be sized according to the Common Minimum Wire Amps values shown in Table 4.

UNITS 50ME016,024 AND 028 – In some installations, the common power supply wires from the main power source to the junction may be sized on values lower than those listed in Table 4. Consult Carrier Distributor.

UNIT 50ME034 – Unit is fitted with a heating lockout circuit. If any zone module is operating on mechanical cooling (compressor is operating) a heating element in each zone module is locked out and can not be energized. Common Minimum Wire Amps value varies with heating capacity as indicated in Table 4.

→ **Table 4 – Unit 50ME Electrical Application Data**

UNIT 50ME		VOLTS (Nom)	KW	MINIMUM WIRE AMPS			
				Cooling	Heating Circuit		Common
Model	Series				1	2	
016	400	208	115	109 0	200 0	200 0	509 0
	500	230	106	98 9	165 8	165.8	430 5
	600	460	106	49 5	165 8	–	215 3
	100	575	106	39.6	132.5	–	172.1
024	400	208	115	136 9	200 0	200 0	536 9
	500	230	106	124 2	165.8	165 8	455 8
	600	460	106	61 9	132.5	–	194 4
	100	575	106	49 2	132.5	–	180 7
028	400	208	144	167 5	249 5	249 5	666 5
	500	230	132	151 7	207 0	207 0	565 7
	600	460	132	75.8	207 0	–	282 8
	100	575	132	60.2	166.0	–	226.2
034	400	200	79	210 8	286 4	–	354 0
	500	230	79	188 9	249 6	–	313 7
	600	460	79	94.4	124 8	–	156 8
	400	200	106	210.8	190.4	190.4	428 8
	500	230	106	188 9	166 4	166 4	374 8
	600	460	106	94 4	166 4	–	187.4
	400	200	158	210 8	285 6	285 6	619 2
	500	230	158	188 9	249 6	249.6	541 2
	600	460	158	94 4	249 6	–	270 6
	100	575	158	75 8	199 2	–	216 2

Field Control Wiring

ZONE THERMOSTATS – Install a Carrier approved accessory zone thermostat assembly in each zone according to Installation Instructions included with 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 colored wire from thermostat subbase terminals thru opening on base unit (Fig. 2) to low-voltage thermostat connections on zone control board (Fig. 9 or 10). Use no. 16 AWG wire for lengths exceeding 50 feet.

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 on 48MA, 20 va on 50ME) as follows:

Modules no. 1 and 2, 3 and 4, 5 and 6, 7 and 8, 9 and 10, 11 and 12.

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

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, W1 to W1 and W2 to W2 as shown in Fig. 11. Connect thermostat wires to terminal connections of module no. 1. Two-stage cooling may be obtained in this instance as shown in Fig. 12. (Fig. 11 and 12 shows 48MA unit. 50ME unit is similar as shown in Fig. 20.)

To Join Modules Not of the Same Nest Into the Same Zone (i.e. modules no. 2 and 3) – On 48MA units, install the factory-supplied jumpers on quick-connect terminals 22 to 31, 23 to 33 and 24 to 34 as shown in Fig. 13. Connect thermostat wires to screw terminal connections of module no. 2. Two-stage cooling may be obtained in this instance as shown in Fig. 14. Note that in Fig. 13 and Fig. 12 module no. 1 is independently controlled by its own zone thermostat.

On 50ME units, install the factory-supplied jumpers on quick-connect terminals 6 to 1, 7 to 2, and 8 to 3 as shown in Fig. 20. Note that module no. 1 is independently controlled by its own thermostat. Note that Fig. 20 is electrically the same as Fig. 16.

Heat Anticipator Settings are indicated for each thermostat hookup illustrated.

On 50ME units each heating relay draws 0.13 amps. Where a thermostat must operate more than one heating relay, multiply number of relays by 0.13. Note that in Fig. 15, each heating thermostat operates two heating relays, therefore each thermostat heat anticipator setting will be 0.26 for 50ME units connected as in this example.

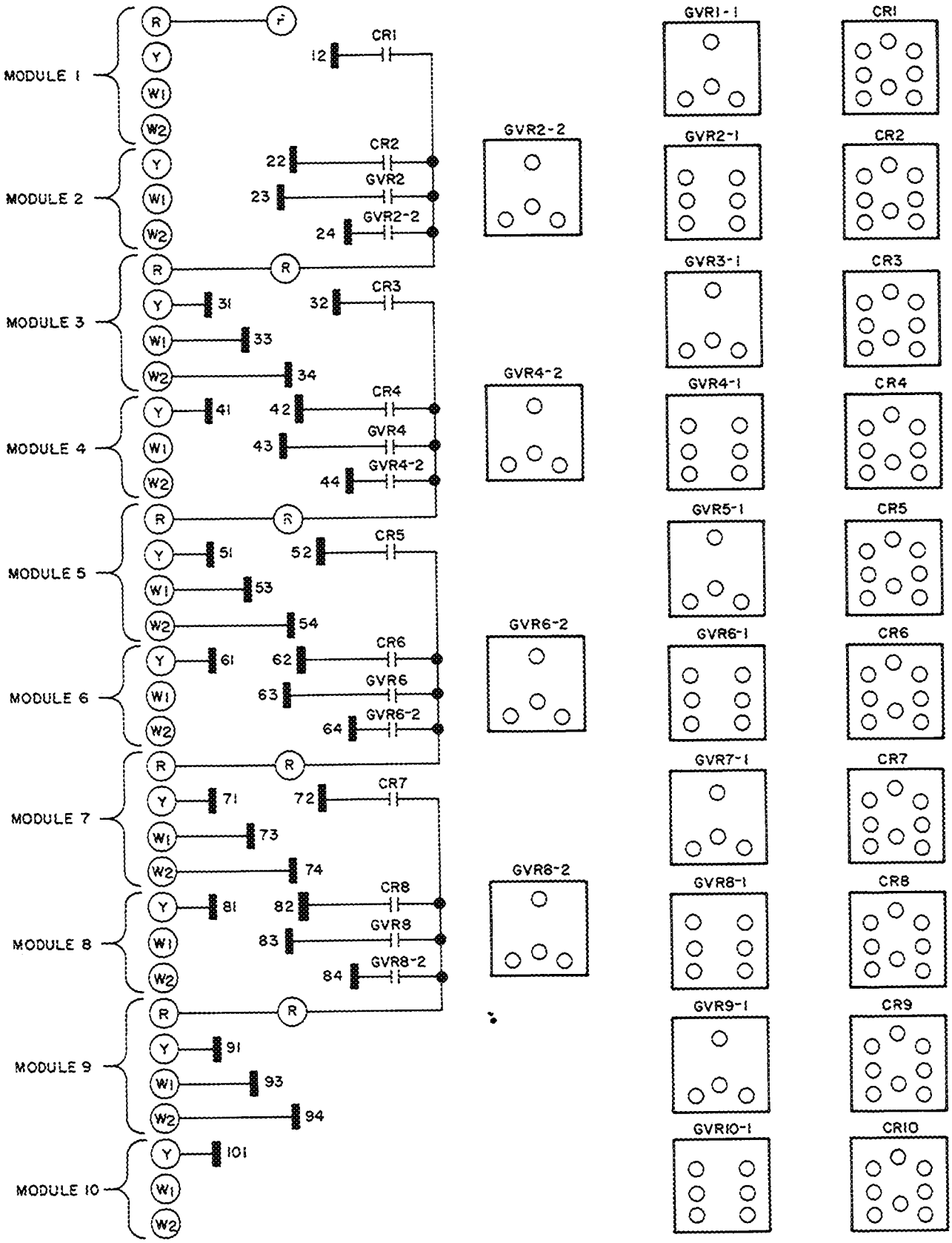
REMOTE CONTROL PANEL ACCESSORY – This central-station control can be set to override zone thermostat mode settings to lock out heating or cooling for the entire unit. The Day/Night switch and damper position knob provide in-space, central control of damper position. Panel also houses the "Filter" light to indicate reduced air flow and need for clean filters or need for new roll filter media. See Fig. 21. Install remote control panel in accordance with instructions shipped with this accessory.

Reheat Humidity 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. 22.

→ **Roll Filter** – Install accessory roll filter in accordance with instructions shipped with the accessory. If necessary, install filter media in optional roll filter as described in section entitled Service, Roll Filter. Also, adjust air pressure switch and filter media runout switch as described.

→ **Economizer** – Install accessory economizer as described in instructions shipped with accessory. Adjust optional economizer as described in Service, Economizer.

→ **Exhaust Damper** – Install accessory economizer as described in instructions shipped with accessory. Adjust optional economizer as described in Service, Exhaust Damper.



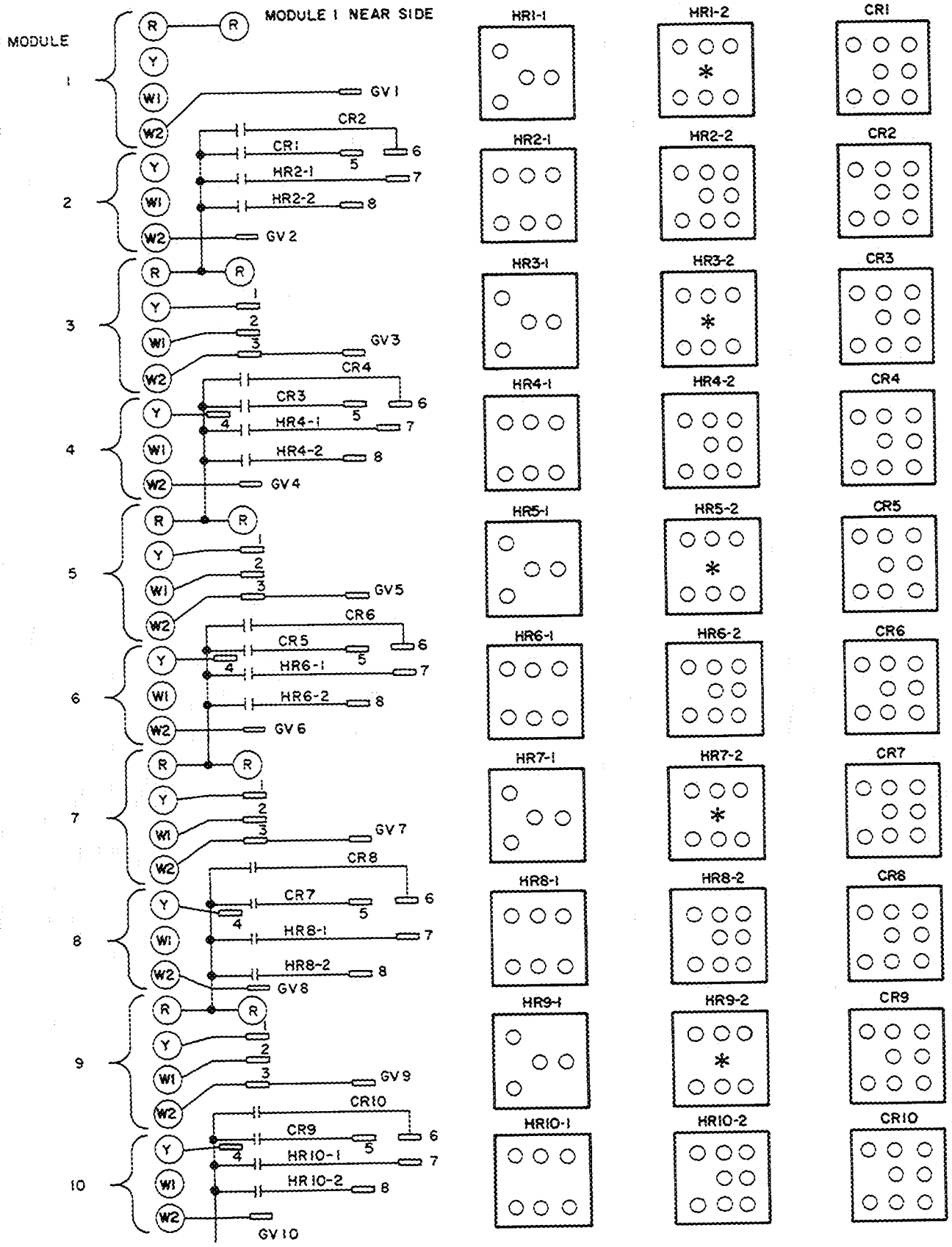
NOTE: Ten-zone unit shown. Eight-zone units do not have module no. 9 and 10.

LEGEND

CR — Control Relay
GVR — Gas Valve Relay
GVR_-2 — Multiplexing Relay

Multiplexing Terminal (quick-connect type)
Thermostat Connection Terminal (screw type)

Fig. 9 — Zone Control Board; Thermostat Connections; 48MA016,024 and 028



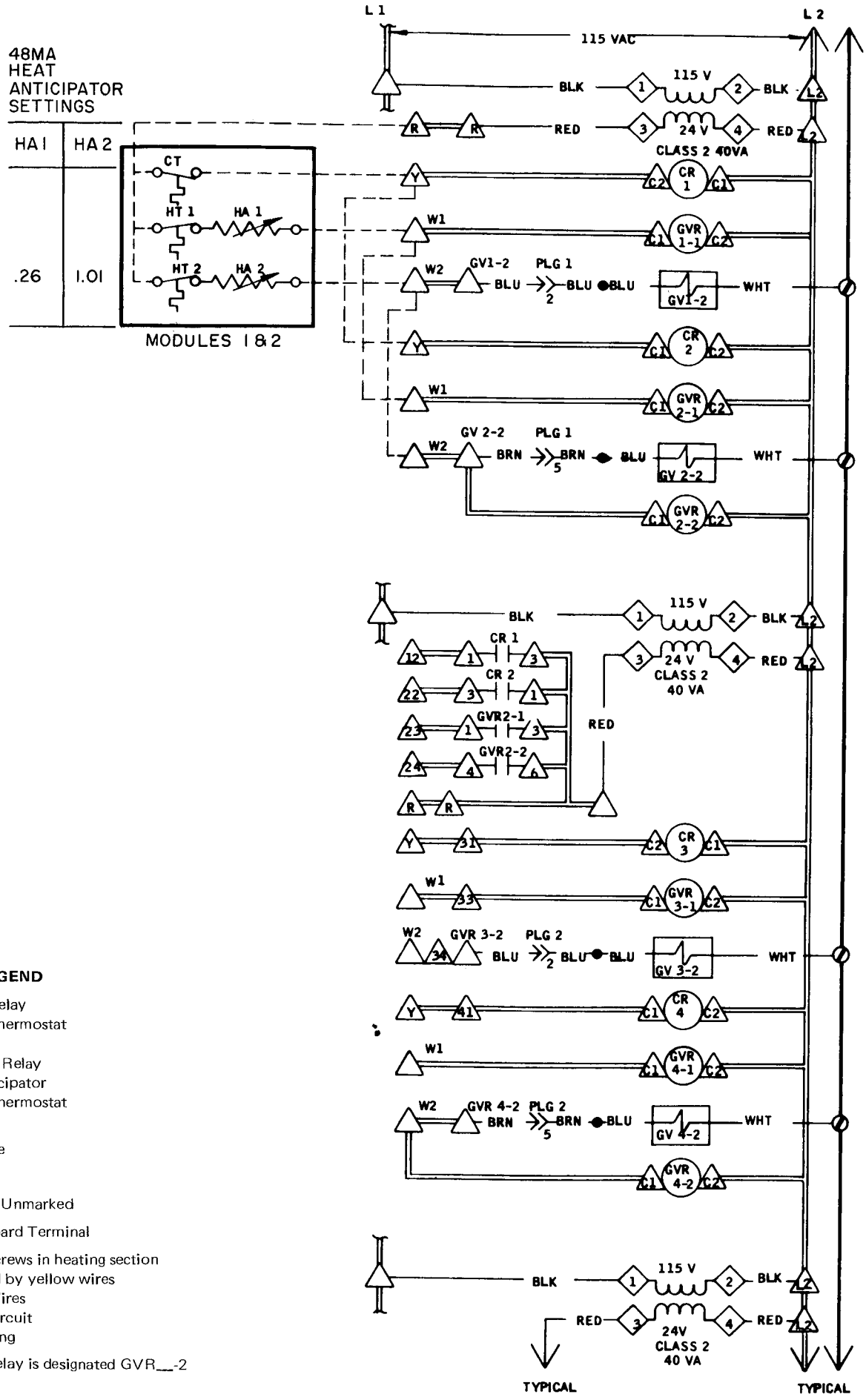
NOTE: Ten-zone unit shown. Eight-zone units do not have modules no 9 and 10.
*Receptacle not used on 48MA034.

LEGEND

CR — Control Relay
GV — Gas Valve (not used on 50ME units)
HR — Heater Relay

○ — Thermostat Connection Terminal (screw type)
▭ — Multiplexing Terminal (quick-connect type)

Fig. 10 — Zone Control Board; Thermostat Connections; 48MA034, 50ME016,024,028 and 034



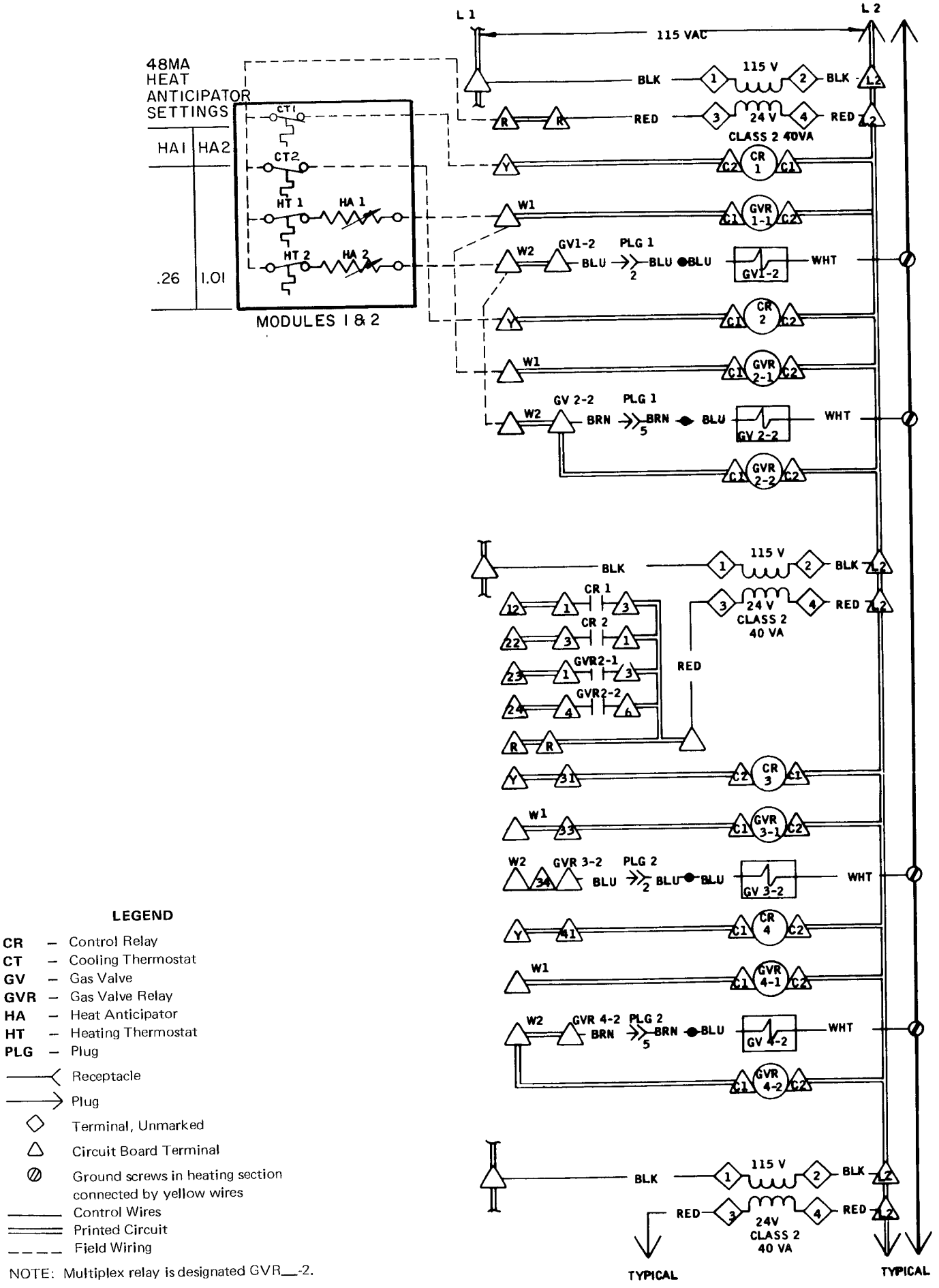
LEGEND

CR – Control Relay
CT – Cooling Thermostat
GV – Gas Valve
GVR – Gas Valve Relay
HA – Heat Anticipator
HT – Heating Thermostat
PLG – Plug

Receptacle
Plug
Terminal, Unmarked
Circuit Board Terminal
Ground screws in heating section connected by yellow wires
Control Wires
Printed Circuit
Field Wiring

NOTE: Multiplex relay is designated GVR__-2

Fig. 11 – Two-Stage Heat, One-Stage Cool, 48MA



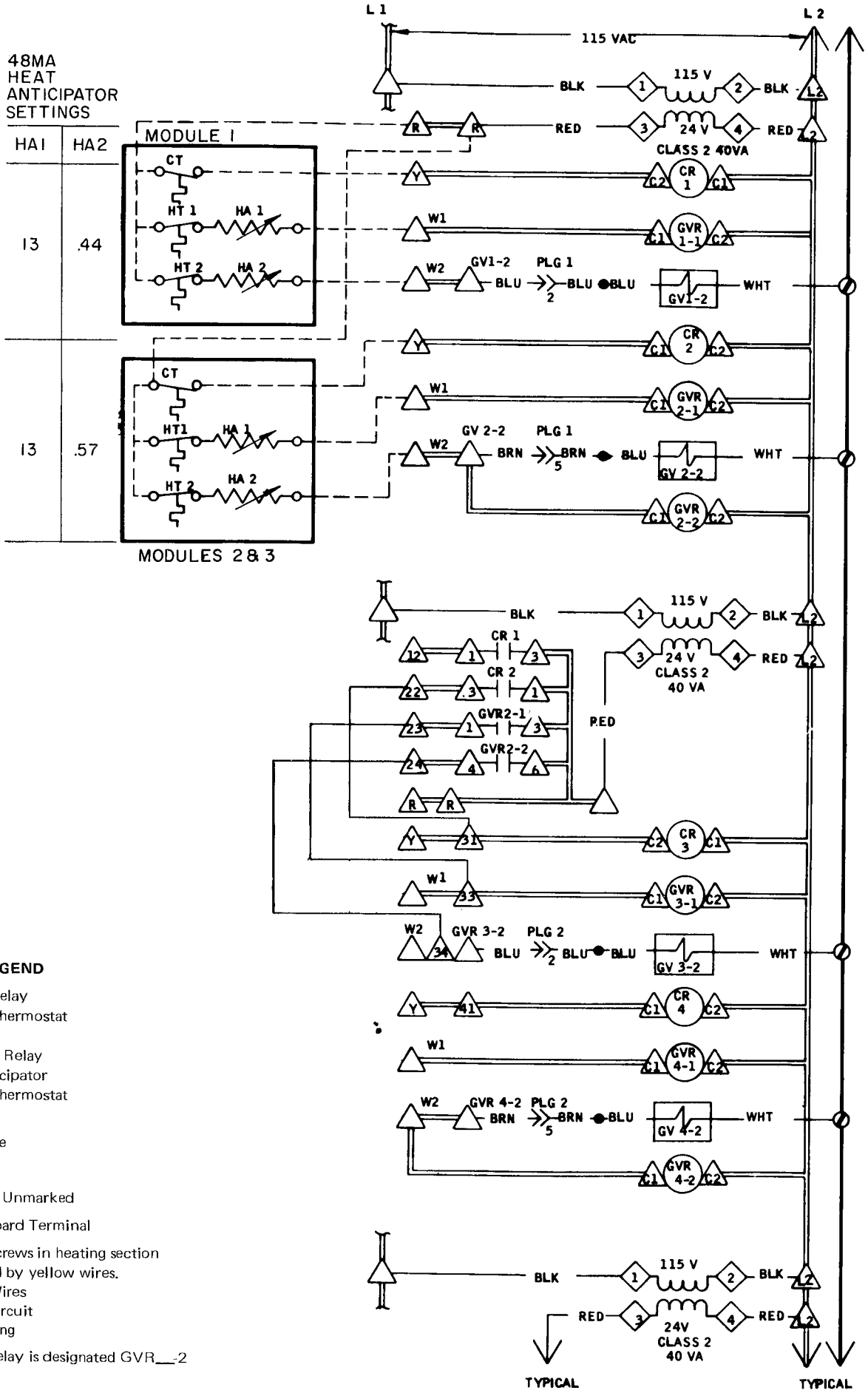
LEGEND

CR	– Control Relay
CT	– Cooling Thermostat
GV	– Gas Valve
GVR	– Gas Valve Relay
HA	– Heat Anticipator
HT	– Heating Thermostat
PLG	– Plug

Receptacle
Plug
Terminal, Unmarked
Circuit Board Terminal
Ground screws in heating section connected by yellow wires
Control Wires
Printed Circuit
Field Wiring

NOTE: Multiplex relay is designated GVR__-2.

Fig. 12 – Two-Stage Heat, Two-Stage Cool, 48MA

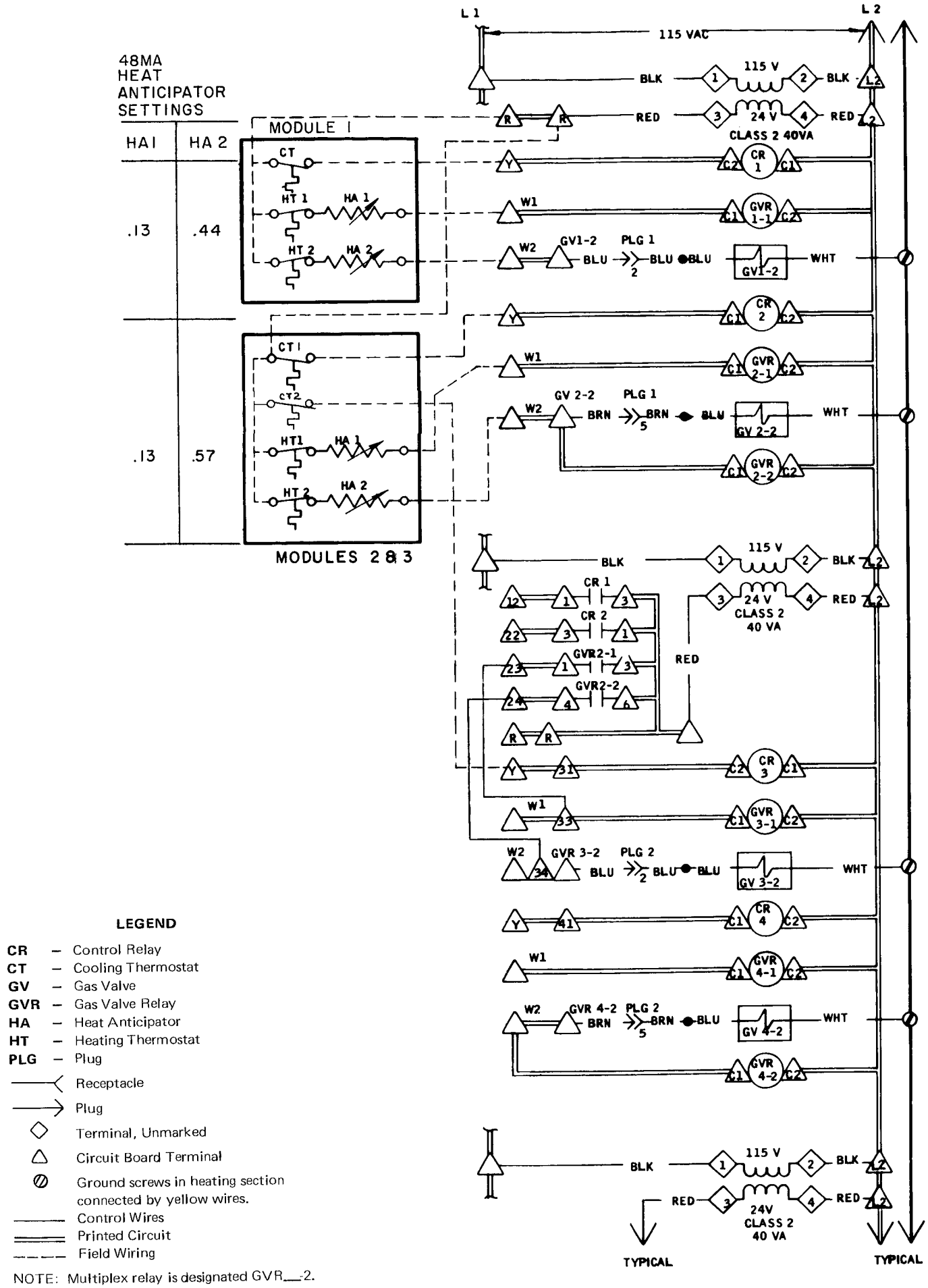


LEGEND

- **CR** — Control Relay
- **CT** — Cooling Thermostat
- **GV** — Gas Valve
- **GVR** — Gas Valve Relay
- **HA** — Heat Anticipator
- **HT** — Heating Thermostat
- **PLG** — Plug
- Receptacle
- Plug
- Terminal, Unmarked
- Circuit Board Terminal
- Ground screws in heating section connected by yellow wires.
- Control Wires
- Printed Circuit
- Field Wiring

NOTE: Multiplex relay is designated GVR__-2

Fig. 13 — Two-Stage Heat, One-Stage Cool, 48MA



LEGEND

CR	–	Control Relay
CT	–	Cooling Thermostat
GV	–	Gas Valve
GVR	–	Gas Valve Relay
HA	–	Heat Anticipator
HT	–	Heating Thermostat
PLG	–	Plug

Receptacle

Plug

Terminal, Unmarked

Circuit Board Terminal

Ground screws in heating section connected by yellow wires.

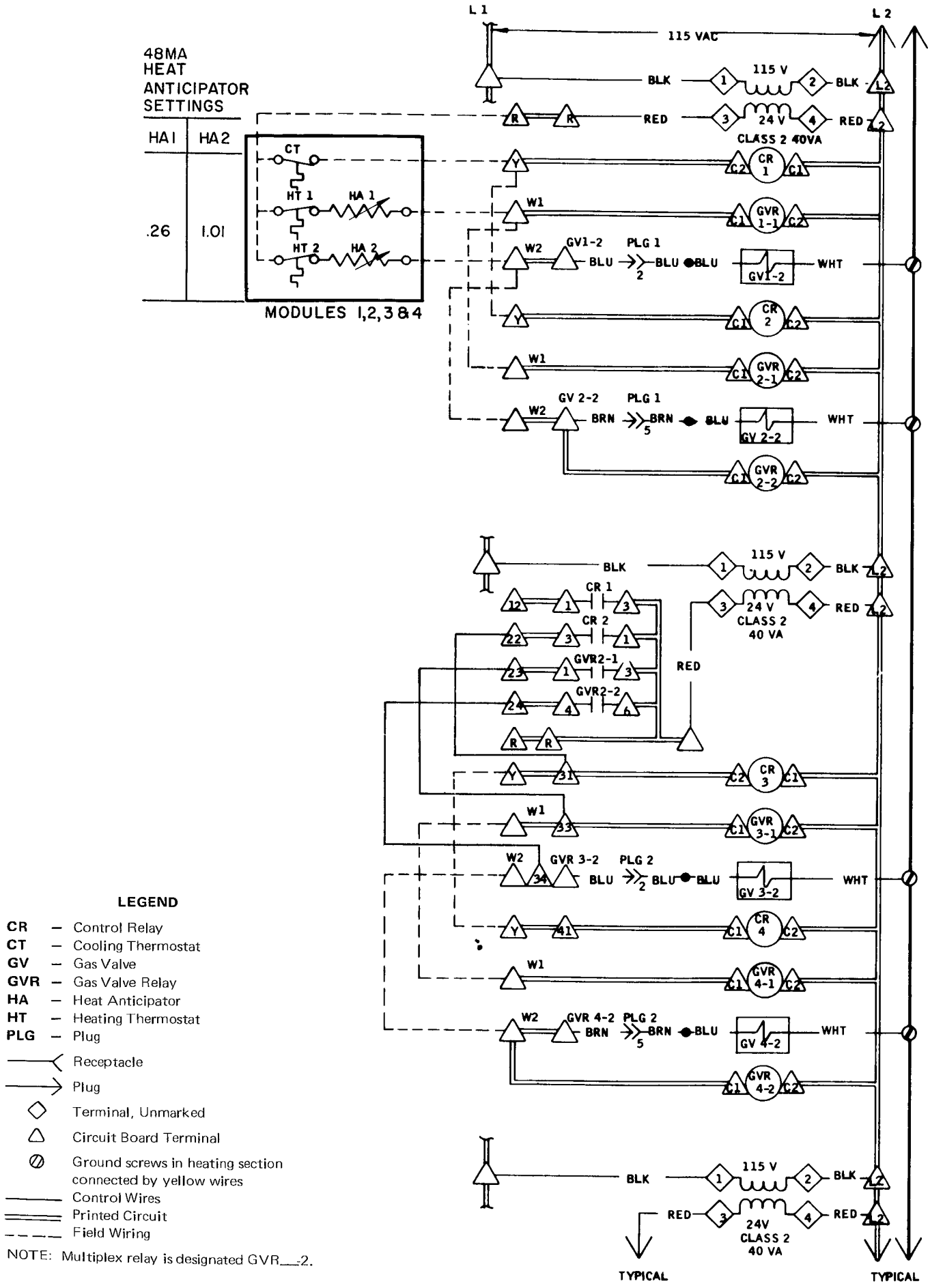
Control Wires

Printed Circuit

Field Wiring

NOTE: Multiplex relay is designated GVR__-2.

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



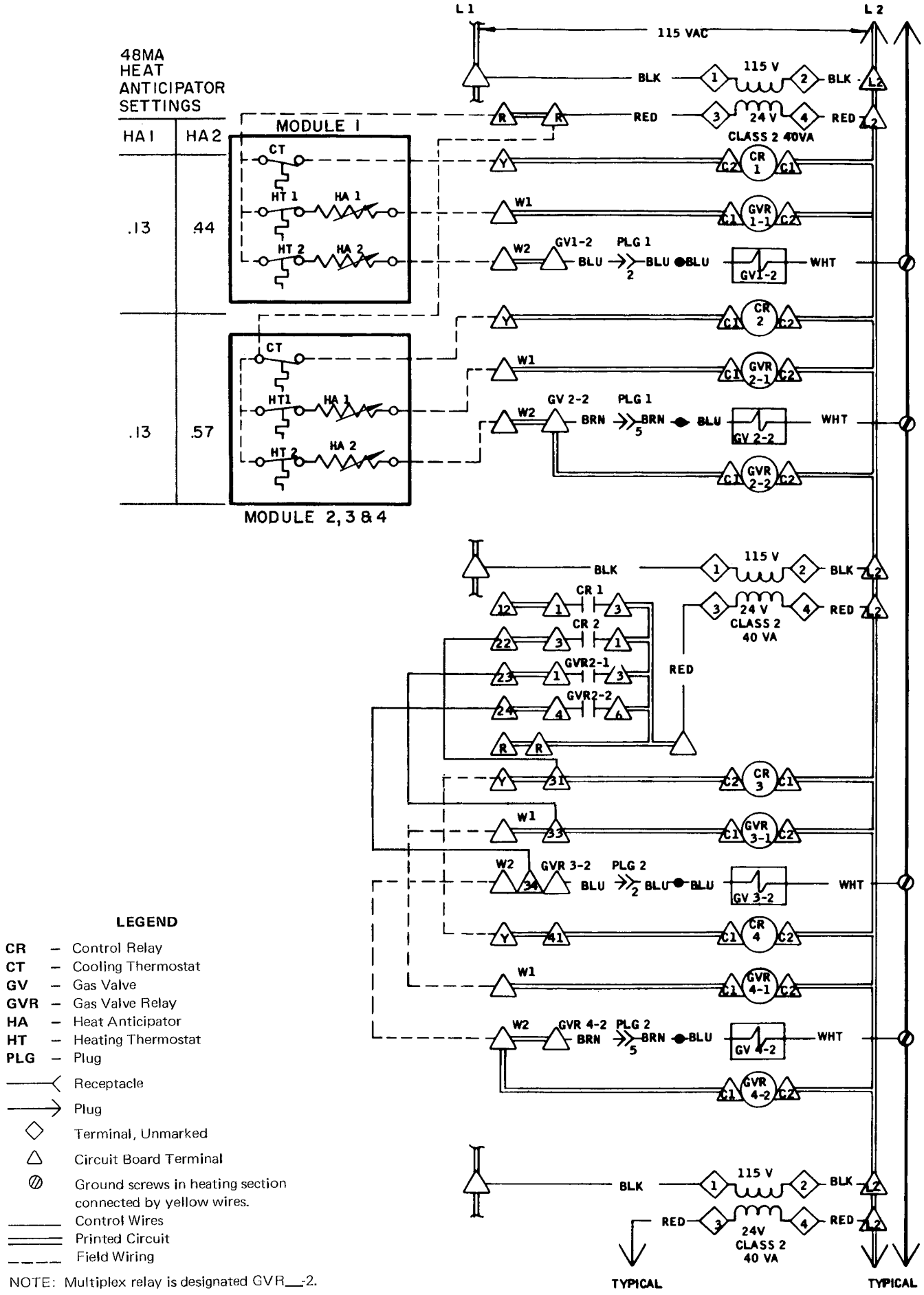
LEGEND

- **CR** – Control Relay
- **CT** – Cooling Thermostat
- **GV** – Gas Valve
- **GVR** – Gas Valve Relay
- **HA** – Heat Anticipator
- **HT** – Heating Thermostat
- **PLG** – Plug

Receptacle
Plug
Terminal, Unmarked
Circuit Board Terminal
Ground screws in heating section connected by yellow wires
Control Wires
Printed Circuit
Field Wiring

NOTE: Multiplex relay is designated GVR___2.

Fig. 15 – Two-Stage Heat, One-Stage Cool, 48MA



LEGEND

CR	–	Control Relay
CT	–	Cooling Thermostat
GV	–	Gas Valve
GVR	–	Gas Valve Relay
HA	–	Heat Anticipator
HT	–	Heating Thermostat
PLG	–	Plug

Receptacle

Plug

Terminal, Unmarked

Circuit Board Terminal

Ground screws in heating section connected by yellow wires.

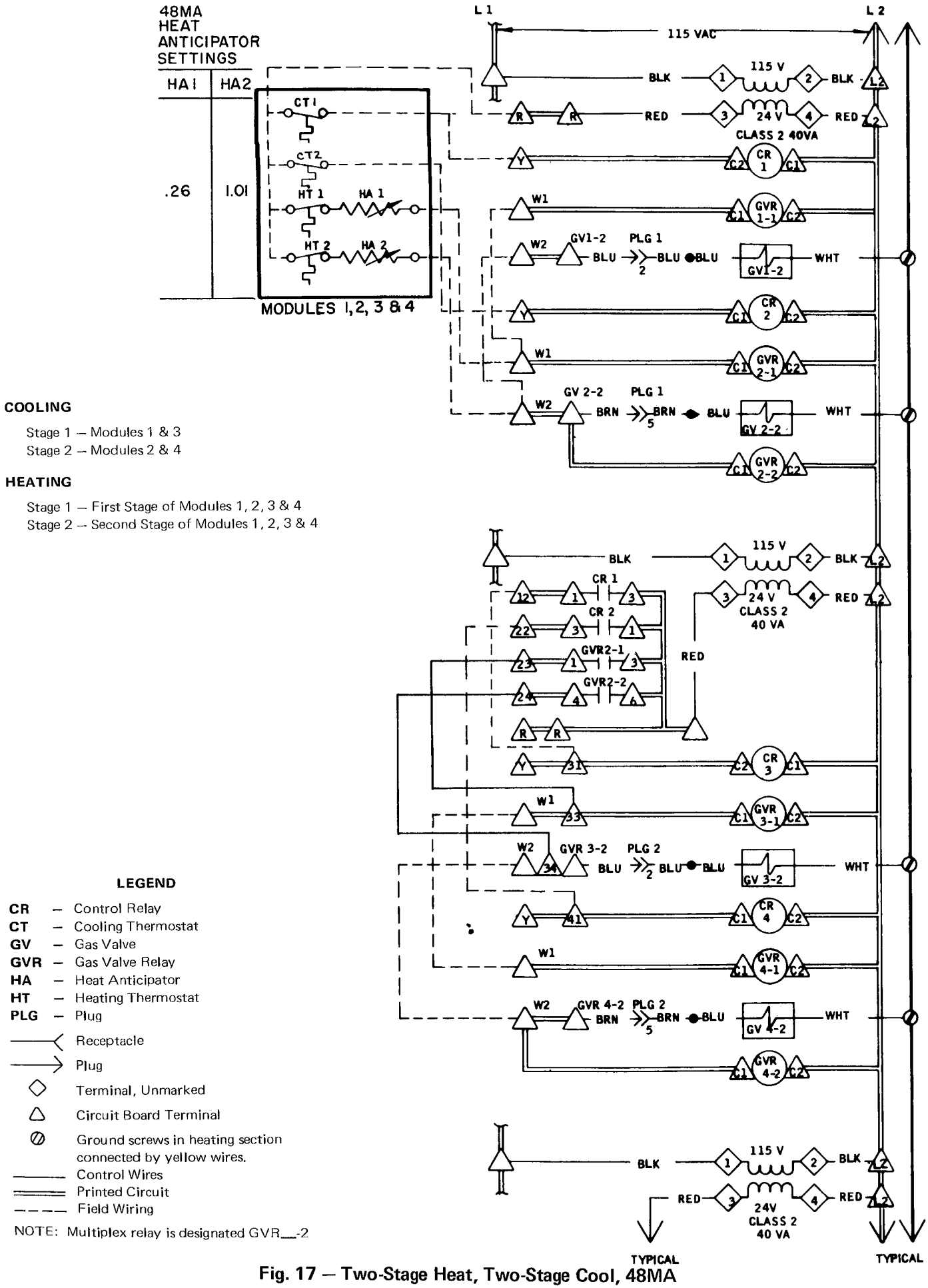
Control Wires

Printed Circuit

Field Wiring

NOTE: Multiplex relay is designated GVR__-2.

Fig. 16 – Two-Stage Heat, One-Stage Cool, 48MA



COOLING

Stage 1 — Modules 1 & 3
Stage 2 — Modules 2 & 4

HEATING

Stage 1 — First Stage of Modules 1, 2, 3 & 4
Stage 2 — Second Stage of Modules 1, 2, 3 & 4

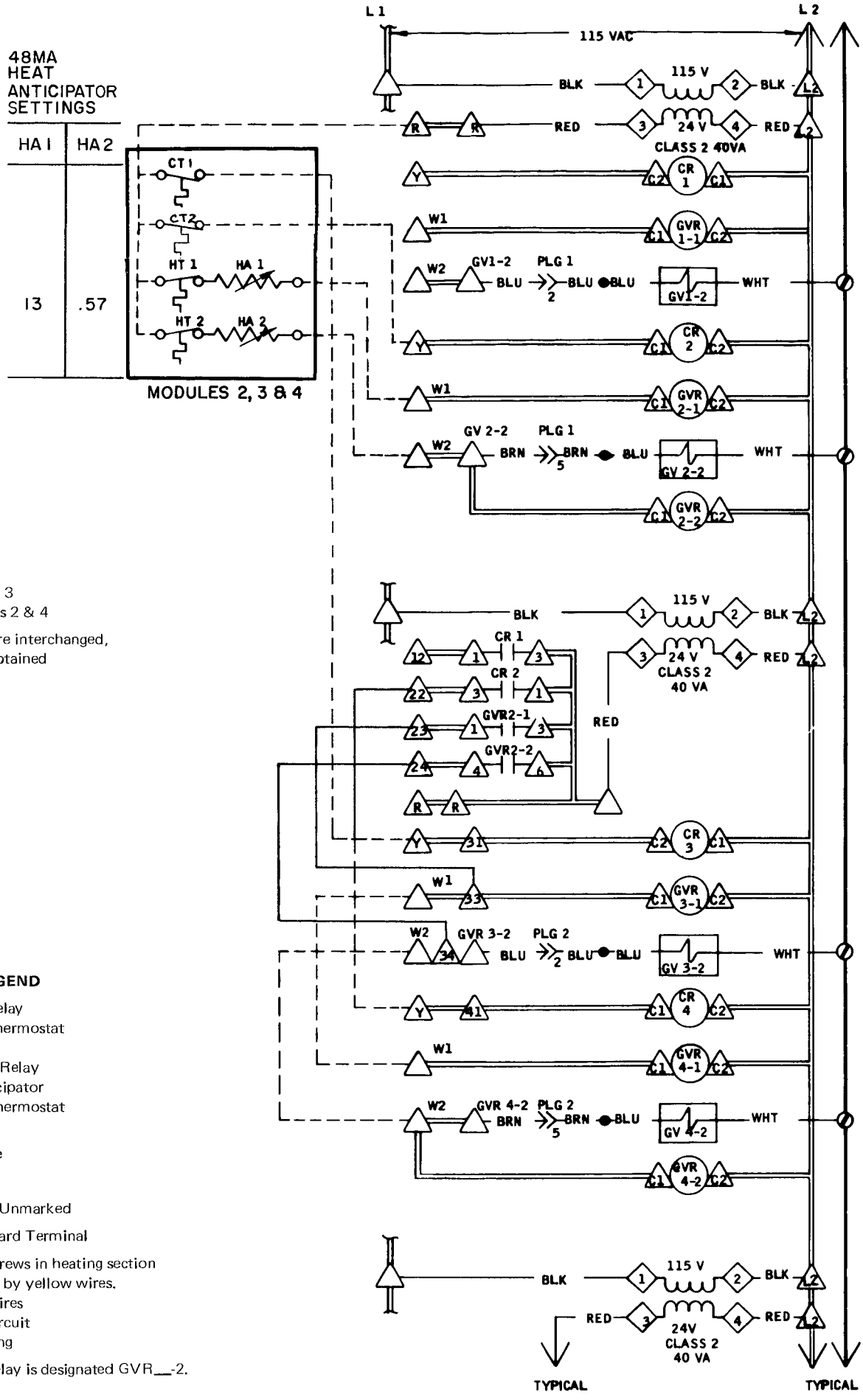
LEGEND

CR — Control Relay
CT — Cooling Thermostat
GV — Gas Valve
GVR — Gas Valve Relay
HA — Heat Anticipator
HT — Heating Thermostat
PLG — Plug

Receptacle
Plug
Terminal, Unmarked
Circuit Board Terminal
Ground screws in heating section connected by yellow wires.
Control Wires
Printed Circuit
Field Wiring

NOTE: Multiplex relay is designated GVR__-2

Fig. 17 — Two-Stage Heat, Two-Stage Cool, 48MA



NOTE:

COOLING

Stage 1 — Module 3
Stage 2 — Modules 2 & 4

If thermostat wires are interchanged, the reverse may be obtained

LEGEND

CR — Control Relay
CT — Cooling Thermostat
GV — Gas Valve
GVR — Gas Valve Relay
HA — Heat Anticipator
HT — Heating Thermostat
PLG — Plug

Receptacle
Plug
Terminal, Unmarked
Circuit Board Terminal
Ground screws in heating section connected by yellow wires.
Control Wires
Printed Circuit
Field Wiring

NOTE: Multiplex relay is designated GVR__-2.

Fig. 18 — Two-Stage Heat, Two-Stage Cool, 48MA

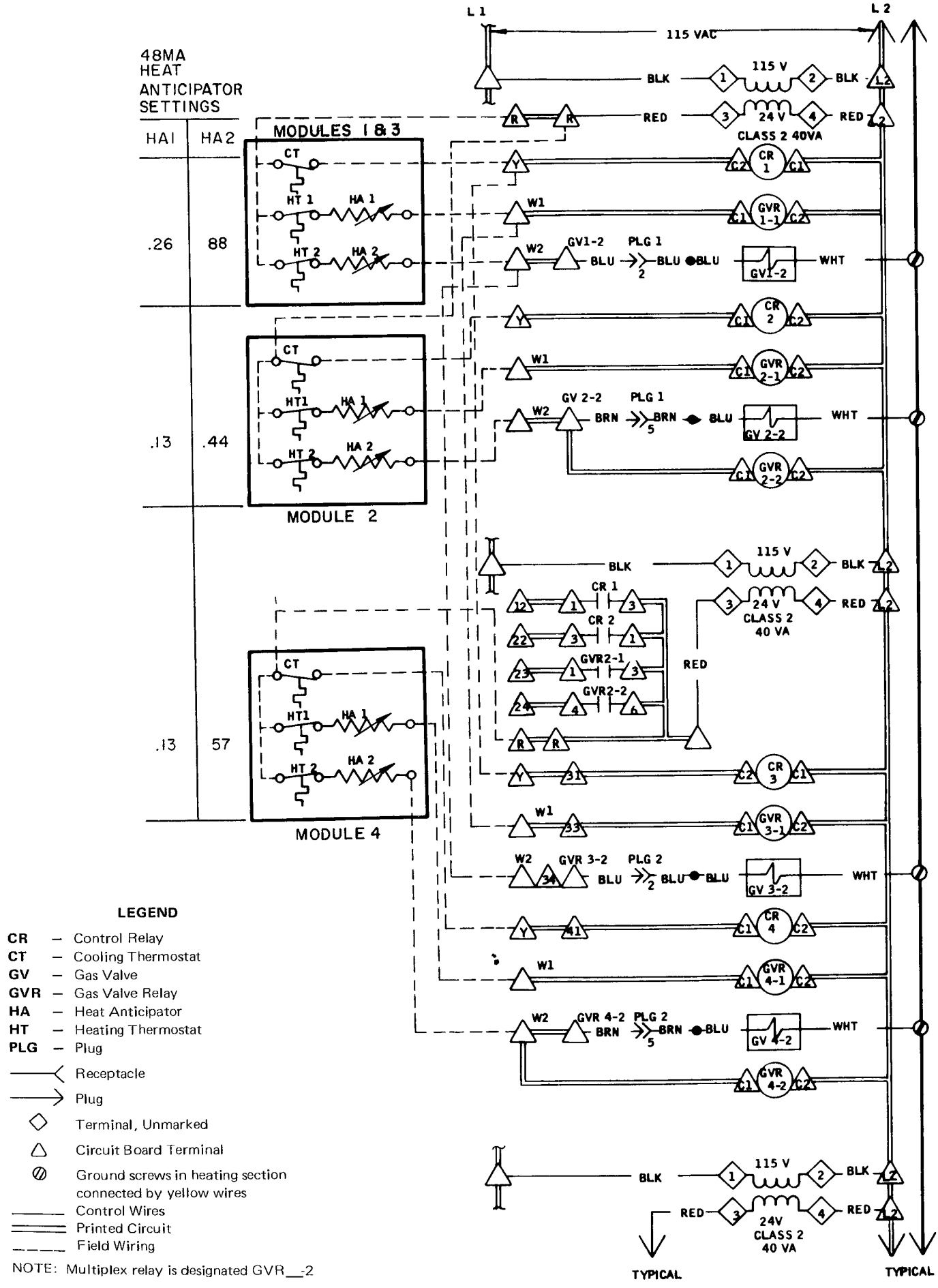


Fig. 19 — Two-Stage Heat, One-Stage Cool, 48MA

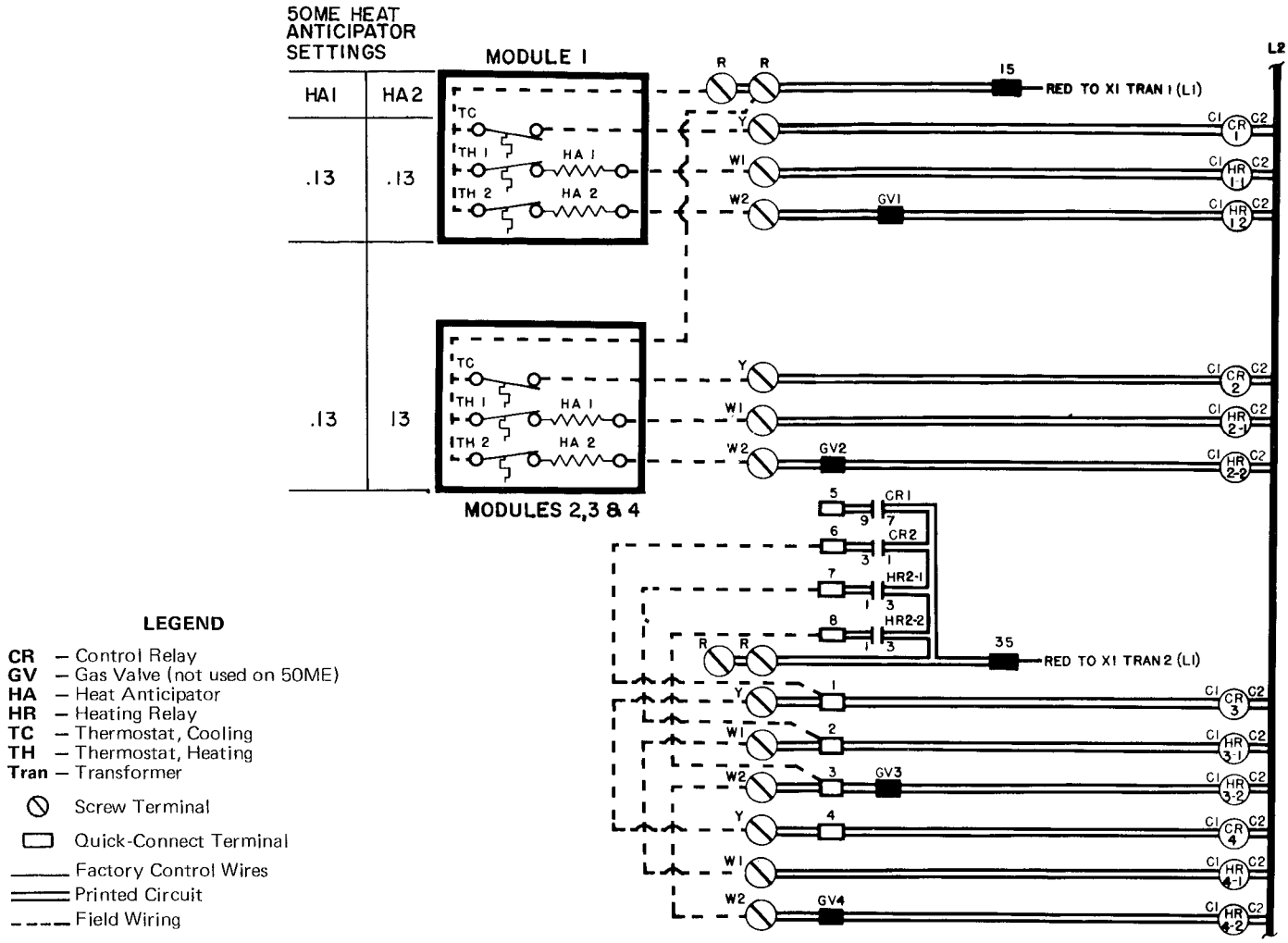


Fig. 20 – Typical Thermostat Connections; 50ME (Two-Stage Heat, One-Stage Cool Shown)

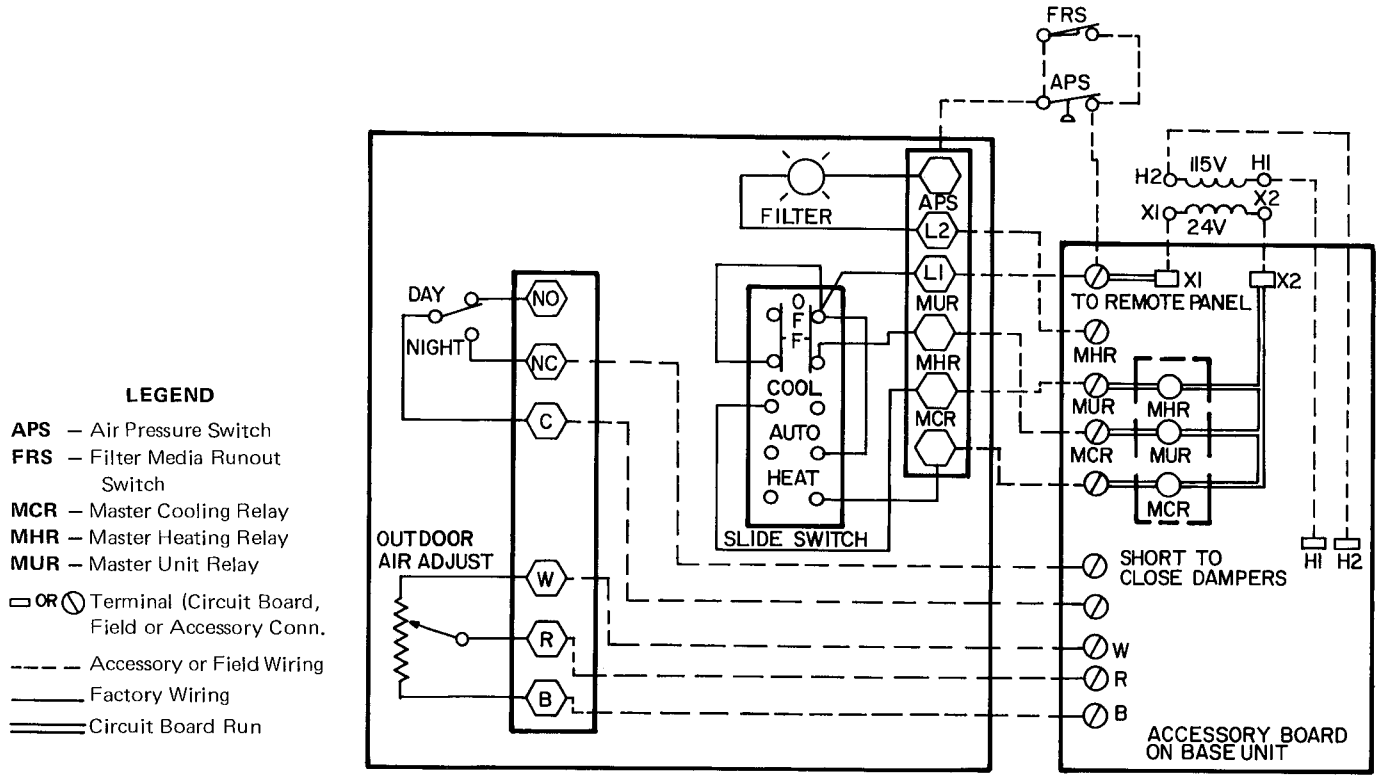
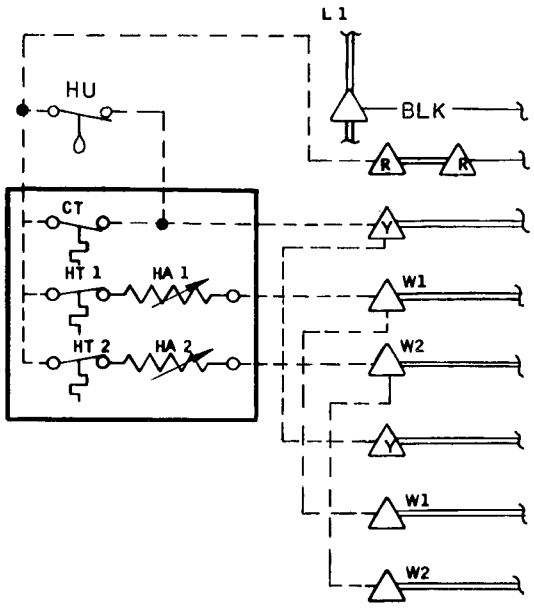


Fig. 21 – Remote Control Panel Accessory Connections



LEGEND

CT – Cooling Thermostat	△ Circuit Board Terminal
HA – Heat Anticipator	═══ Circuit Board Printed Circuit
HT – Heating Thermostat	——— Control Wiring
HU – Humidistat	– – – – Field Wiring

Fig. 22 – Humidistat Connections

START-UP

After unit is installed, perform the following checks and procedures.

Indoor Air Fan Belt – Belt is shipped taped to fan assembly. Install belt and adjust as described in Service, Indoor Air Fans and Motor.

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 suction and discharge service valves. Check that the hot gas shutoff valve and the liquid line shutoff valve is also open.

Furnace Lighting Procedure (48MA)

1. Purge gas supply line of air. Make sure unit main and pilot gas valves have been off for 5 minutes before proceeding.
2. Set all zone thermostats to the lowest settings.
3. Turn pilot and main manual gas valves "On" and secure door of burner compartment.
4. Turn on unit main power supply. Set control circuit service switch in condensing control box at "On." Indoor air fan and forced-draft blower (combustion air fan) will be energized.

   Pilots will then ignite. If any pilot goes out, it will automatically reignite.
5. When pilot flame is proved by pilot sensor (after about one minute), set each zone thermostat to call for heat one at a time to check operation of zone module gas valve operation (both stages of heat). Then set all thermostats as desired.

TO SHUT OFF FURNACE – Set control circuit service switch at "Off." 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.

Automatic Pilots (48MA) – With combination air fan and main blower off, pilot flame should be approximately 1 to 1 1/2-in. high.

ADJUSTMENT – Set unit service switch at "Off."

Remove screw-cap cover on pilot gas valve handle to expose pilot adjusting screw. With a small screwdriver, turn adjusting screw until flame is correct height.

Replace screw-cap cover on gas valve handle. Turn on unit and set zone thermostats as desired.

Be sure all unit panels are in place.

Zone Module Gas Valves (48MA) – Each zone module has its own combination gas valve/pressure regulator which is supplied by one of the two main gas valves (Fig. 26).

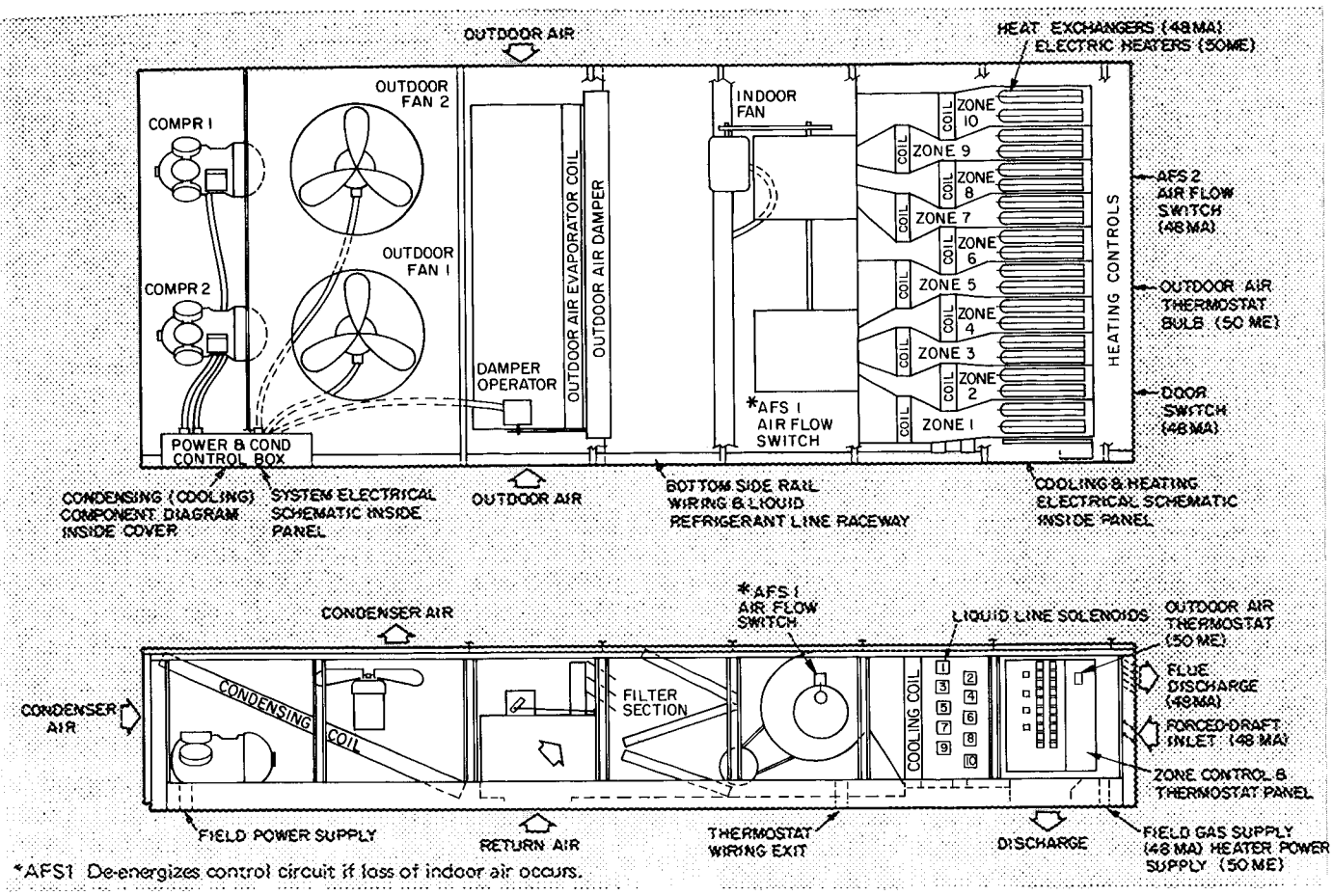
The first-stage heating thermostat energizes a 115-volt solenoid via a gas valve relay. At this time, second stage of gas valve is de-energized and permits only part (50%) of the gas to flow thru a bypass orifice and on to the burner.

The second-stage thermostat directly energizes the gas valve 24-volt second-stage solenoid and permits full rate (100%) gas flow to the burner.

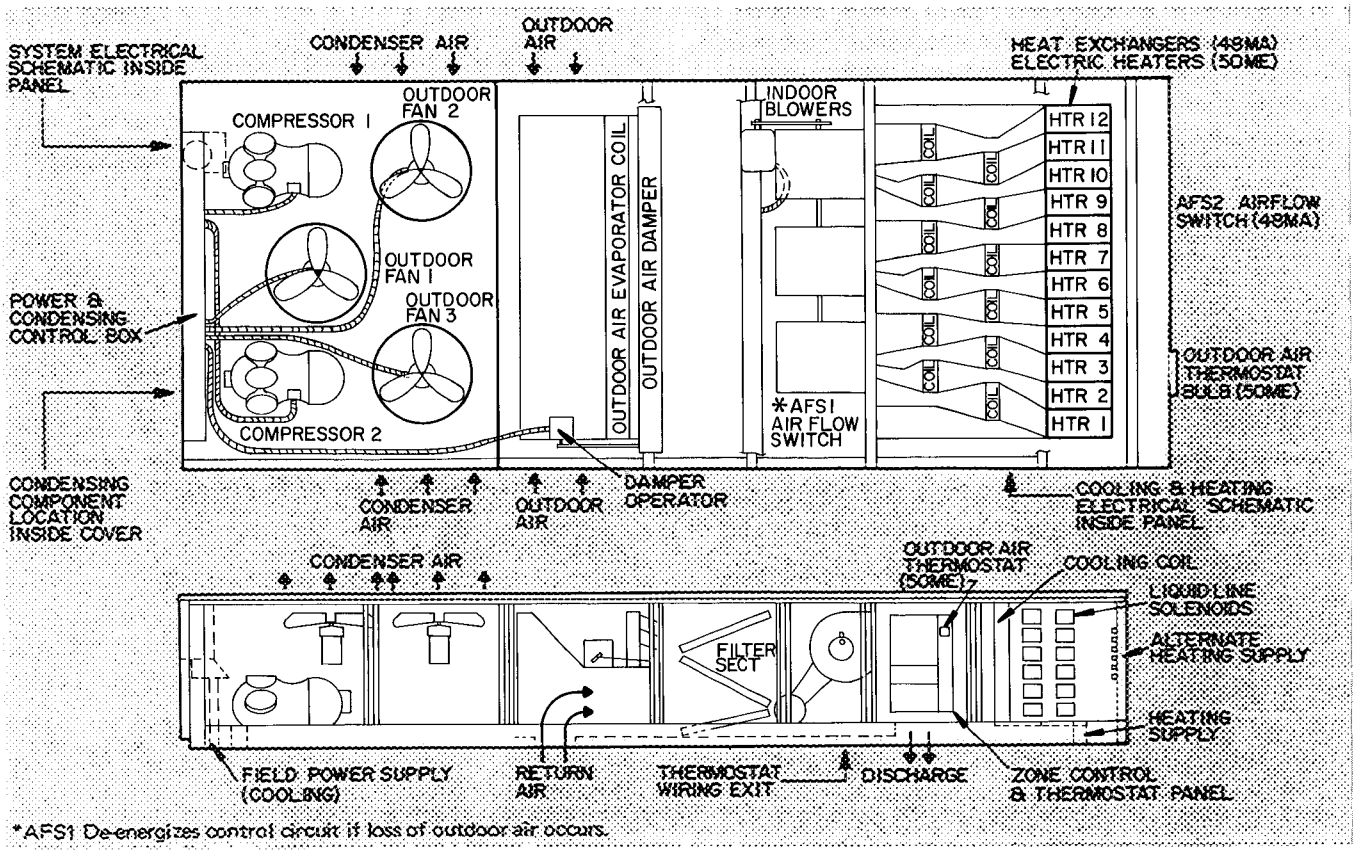
The safety switches (air flow switches 1 and 2, pilot flame sensor, door switch, and limit switches) are in series with the first-stage solenoid only. Energizing the second stage without energizing the first stage will not permit gas to flow to the burner.

PRESSURE ADJUSTMENT (NATURAL GAS)

1. Set control circuit service switch at "Off" and thermostat at lowest setting.
2. Remove the two heating control access panels and the burner access panel.
3. Connect suitable gage to zone manifold pressure tap. Route gage line thru pilot switch grommet so that burner access panel may be closed.
4. Close burner access panel.
5. Set control circuit service switch at "On." Set zone thermostat to call for full rate fire (first and second stage of gas valves open). Burner will now operate.
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.



→ **Fig. 23 – Major Component Identification (Ten-Zone Unit Shown, Eight-Zone Units Similar)**



→ **Fig. 24 – Major Component Identification (Twelve-Zone Unit)**

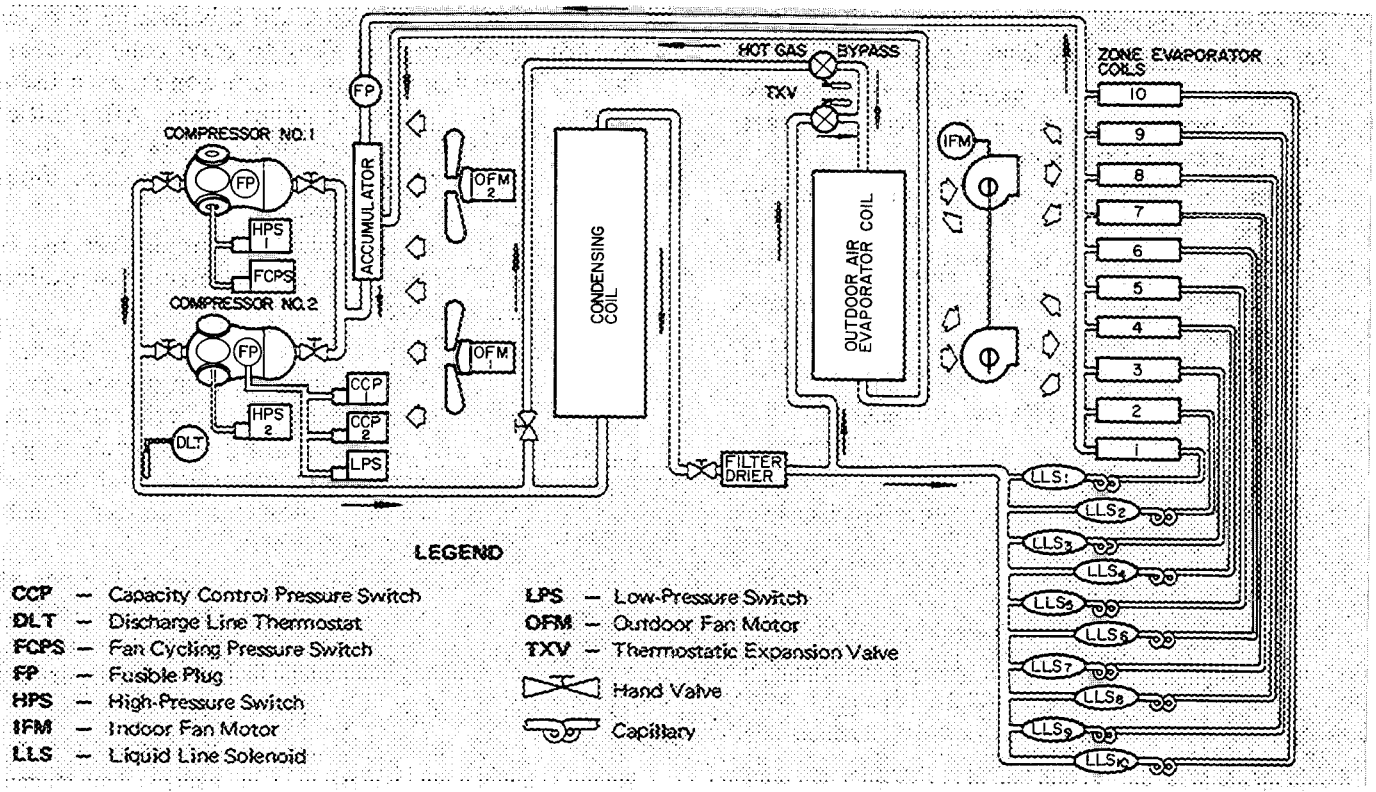
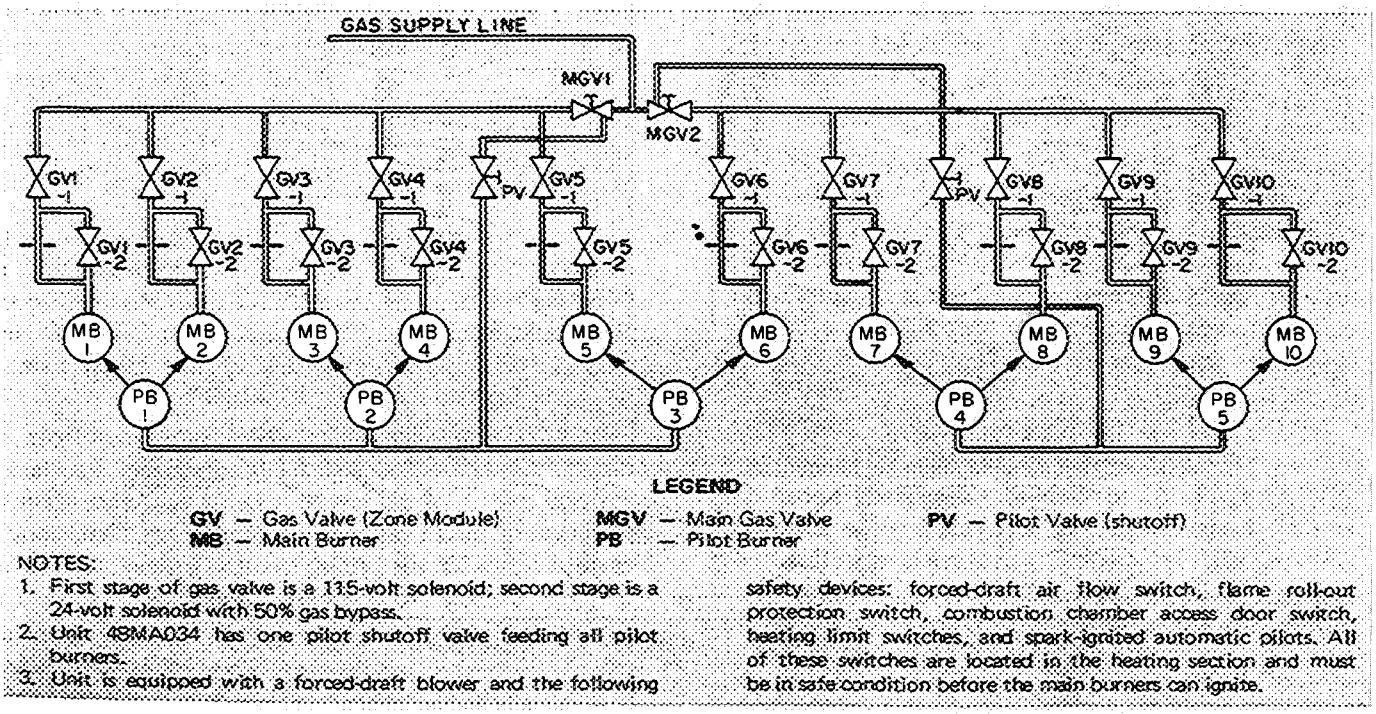


Fig. 25 — Refrigerant Piping Schematic (Ten-Zone Unit Shown, Eight- and Twelve-Zone Units Similar)



NOTES:
1. First stage of gas valve is a 115-volt solenoid; second stage is a 24-volt solenoid with 50% gas bypass.
2. Unit 48MA034 has one pilot shutoff valve feeding all pilot burners.
3. Unit is equipped with a forced-draft blower and the following safety devices: forced-draft air flow 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. 26 — Gas Piping Schematic (Ten-Zone 48MA Unit Shown)

9. Set control circuit service switch at "Off" 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 the above procedure for each heating module.
12. Replace all unit panels. Set control circuit service switch at "On" and set zone thermostat as desired.

PRESSURE ADJUSTMENT (PROPANE GAS) – Be sure that 11.0 in. wg pressure is available at unit gas connection.

Main Burners (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 thru view ports in main burner access panel. Turn off main gas valves in burner control compartment. Then remove main burner access panel.

If Flame Was Yellow (Insufficient Primary Air) – Turn spoiler screw counterclockwise about four turns for each 1/4 in. of change in spoiler length.

If Flame Lifted Off Ports (Too Much Primary Air) – Turn spoiler screw clockwise about four turns for each 1/4 in. of change in spoiler length.

Replace main burner access panel and turn on main gas valve. Observe flame characteristics. Repeat the above procedure as required until correct flame characteristics are achieved.

Outdoor Air Thermostat Adjustment (50ME) – The outdoor air thermostat (OAT.) is located in the upper right-hand area of the zone board compartment of unit as shown in Fig. 23 and 24. It is factory set at 40 F but is field adjustable between –5 F and 55 F as desired.

When OAT. is open, third heating element in *all* zone modules is inactive. When OAT. is closed, the third heating element in a zone module is activated whenever second-stage thermostat for *that zone* module calls for heat.

Zone Air Flow Adjustment – Adjust indoor air fan speed to provide required total unit air flow. Indoor air fan adjustment is described in Service, Indoor Air Fans and Motor.

Then, adjust each zone duct balancing damper to provide required air flow to each zone. Increasing or decreasing air flow to one zone may cause a change in the air flow to other zones. After initial damper settings have been made, repeat the adjustment procedure, as required, to be sure final desired air flows are achieved.

Adjust fans so that furnace temperature rise is within range shown on unit furnace instruction plate. Also see Table 1.

To Check Unit Operation At Start-Up – Review applicable information regarding compressor crankcase heaters, unit circuit breakers, thermostats, and remote control panel for all units. Also recheck gas controls instruction regarding pilot and burner adjustment, forced-draft blower air shutter adjustment as required for unit 48MA.

When unit power is on and no zone thermostat is calling for cooling or heating, the indoor air fan, forced-draft fan and crankcase heater(s) are on. The burner pilots are lit and the outdoor air dampers are at the pre-set position.

COOLING – On call for cooling from a zone thermostat, compressor no. 1, with 2 unloaders, starts; the liquid line solenoid for that zone evaporator coil opens and outdoor air 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. If required, compressor no. 1 will unload when compressor no. 2 is energized. As cooling requirements decrease, capacity control pressurestats prevent compressor no. 1 from shutting down while compressor no. 2 is in operation. Compressor no. 2 will shut down and compressor no. 1 will fully load up as required.

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.

The Motormaster® head pressure control will vary outdoor air fan motor no. 1 to regulate air flow across condenser coil. As required, outdoor air fan motor no. 2 will cycle on and off in response to head pressure via a cycling pressurestat. See Service, Head Pressure Control.

HEATING (48MA) – On call for heating from a zone, the first-stage gas valve is energized. The heat exchanger for that zone will be at half rate firing. Upon additional call for heating from that zone, stage two will be energized to permit full rate firing. See Zone Module Gas Valves.

HEATING (50ME) – On call for heating from a zone, the first-stage heating relay, contactor, and heating element are energized. Upon additional call for heating from that zone, stage two is energized in a similar manner. If the outdoor air temperature

is above the outdoor air thermostat setting (OAT. open) the second heating element only is energized by the second-stage heating thermostat. If the outdoor air temperature is below the outdoor air thermostat setting (OAT. closed) the second and third heating elements are energized by the second-stage heating thermostat for that zone. See Fig. 21 and Outdoor Air Thermostat Adjustment.

OUTDOOR AIR DAMPER – This control regulates the amount of outdoor air that passes thru the outdoor air evaporator coil and enters the return air stream (Fig. 21). A knob in the zone control and thermostat panel activates the damper control motor (damper operator). Damper may be closed, fully opened, or set at any intermediate position by setting the knob as desired. In the fully open position, the damper will permit a 25% outdoor air/75% return air mixture in the unit.

SERVICE

Cabinet Panels and Grilles

SIDE PANELS – To remove, undo quarter-turn fasteners on panel. Pull bottom of panel out and down.

Panel replacement is the reversal of this procedure.

TOP PANELS – Remove end caps from each end of plastic rain covers. Slide rain covers from top panel flange joint. Remove panel screws and lift off panels as required.

To replace panel without damage to gasket, lift matching edge of adjacent panel to resemble a "peak roof." Press down on peak. This will compress gasket and maintain flange alignment. Slide on rain cover, replace end caps and all panel screws.

CONDENSER AIR INLET GRILLES – To remove grille, first remove shipping screw at bottom of grille frame, then lift up, pull out and down. Replacement is the reversal of this procedure.

HEATER ACCESS PANELS – See Side Panels 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) – Clean with a stiff brush, vacuum cleaner or compressed air.

CONDENSER COIL – Clean with a stiff brush or vacuum cleaner. When cleaning with compressed air or low-pressure water or steam, guard against damaging compressor, wiring and nearby controls. Condenser fan motors are dripproof, but not waterproof.

OUTDOOR AIR COOLING COIL – Refer to condenser coil cleaning procedure.

CONDENSATE DRAIN – 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 filter used. Filter section is shown in Fig. 23 and 24. Return-air filter tracks will accept two layers of one-in. thick filters.

OUTDOOR AIR INLET SCREENS are cleanable. Clean with steam or hot water and mild detergent.

Air Flow Switches

INDOOR AIR FLOW SWITCH (AFS1) is located in indoor air fan inlet venturi (Fig. 23 and 24). This switch will shut down unit if air flow thru zone modules is insufficient. See Table 1 for settings.

COMBUSTION AIR FLOW SWITCH (AFS2) on 48MA is located in combustion air plenum (Fig. 23 and 24). This switch will shut down unit heating mode if combustion air is insufficient. See Forced-Draft Blower for discussion of combustion air shutter adjustment.

Service Switch – A control circuit service switch is located in the Power and Condensing Control Box (Fig. 23 and 24). Shutdown 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 Circuit for each compressor provides a 5-minute delay before restarting compressor after shutdown for any reason. On starting, Time-Guard 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 two compressor units, no. 2 compressor will not start for at least 2-1/2 minutes after no. 1 compressor starts. See Service, Capacity Control Pressure Switches.

Timer on units 48MA016 and 50ME016 provides part-winding start on 208- and 230-volt units.

Capacity Control Pressure Switches (on two-compressor units only) – These switches are connected to the suction side of the system near the accumulator. Approximately 2-1/2 minutes after compressor no. 1 starts, the timer makes the circuit to CCP1 and CCP2 to operate compressor no. 2 as follows:

1. CCP1 is open (opens at 77 psig; closes at 83 psig).
2. CCP2 is closed (opens at 53 psig; closes at 80 psig).
3. Holding relay no. 2 (HR2) is de-energized.

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.

Compressors have their own oil supply (11 pints each compressor crankcase). Compressor crankcases on two-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 condenser air inlet grilles to gain access to compressors. Sight glass should be about 1/3 to 2/3 full of oil.

Compressor data is shown in Tables 1 and 2 and on data plate attached to compressor body. Refer to 06D Compressor Service Manual for additional compressor service information.

TO ADD OR REMOVE OIL

1. Close liquid line shutoff valve and hot gas bypass valve.
2. Pump down compressor and close suction and discharge service valves. Vent remaining pressure in compressor to atmosphere.
3. Add oil thru oil filler plug.
4. To remove oil, remove crankcase oil drain plug.

Compressor Capacity Control Unloaders (Fig. 27) on compressor no. 1 are suction-pressure actuated to load or unload compressor at factory settings indicated in Table 1. If necessary, they may be field adjusted or reset as follows:

CONTROL SET POINT (cylinder load 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 psi.

PRESSURE DIFFERENTIAL (difference between cylinder load and unload points) is adjustable from 6 to 22 psi. To adjust, remove sealing cap to expose pressure differential adjustment screw. Turn adjustment screw counterclockwise to its backstop position. In this position pressure differential is 6 psi. Turn adjustment clockwise to desired pressure differential. Each full turn clockwise increases differential by 1.5 psi.

Crankcase Heater for each compressor keeps oil free of refrigerant while compressor is off. Crankcase heater is automatically de-energized when the compressor is in operation.

If unit power is shut off for longer than a few hours, make sure power is on and that crankcase heater 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."

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 follow Low Charge procedure below.

LOW CHARGE

1. Set control circuit service switch at "Off."
2. Disconnect indoor fan contactor.
3. Manually close air flow switch (AFS1) on indoor air fan housing (Fig. 23 and 24) 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 (use R terminal at module 7).
7. Reset control circuit service switch at "On."
8. Operate unit for about 5 minutes.
9. Add refrigerant vapor at no. 1 compressor suction service valve fitting at a rate of 1 lb per minute.

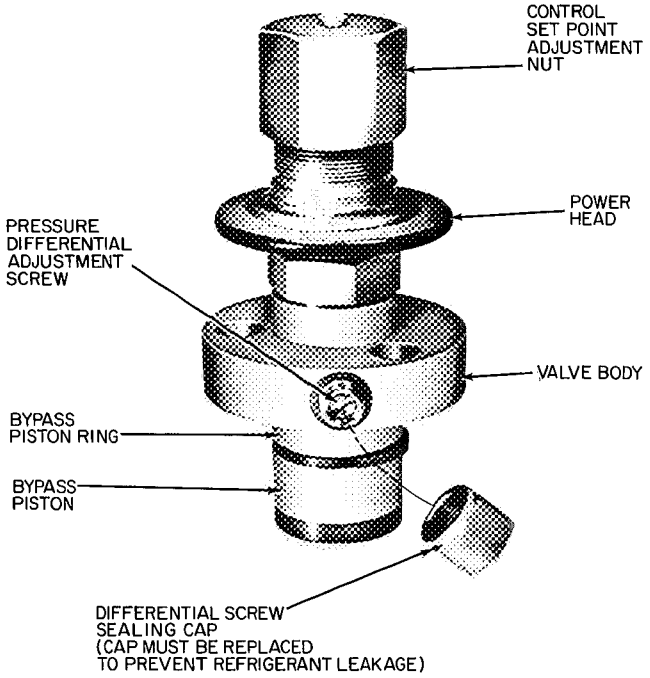
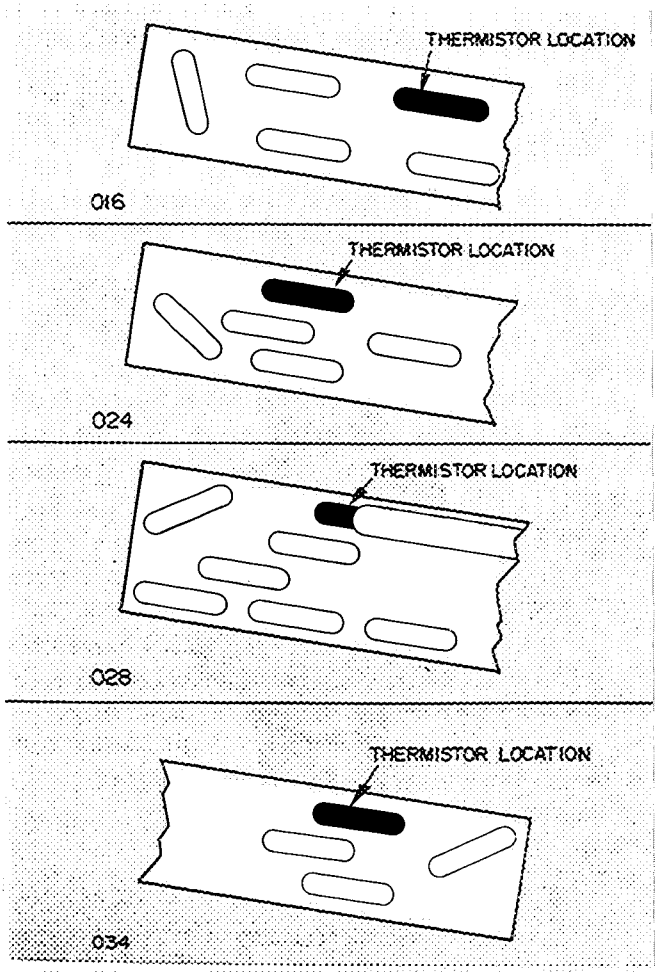


Fig. 27 – Compressor Capacity Control Unloader

10. Check liquid level in accumulator sight glass. Add refrigerant until sight glass is one-half 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 one-half full. If sight glass appears clear, but bubbles can be seen, refrigerant level is above top of glass. Refrigerant system is overcharged. Bleed refrigerant until sight glass is one-half full.
11. When correct refrigerant charge has been achieved, restore unit to normal operation (reversal of steps 1 thru 7).
12. Be sure air flow switch (AFS1) functions normally, control circuit service is reset at "On" and that all unit panels are in place before leaving unit.

Head Pressure Control

Motormaster® – Outdoor fan motor no. 1 (OFM1) is a 208-, 230-volt motor operated by a Motormaster thermistor (a thermally sensitive resistor) located on the condenser coil as shown in Fig. 28. The function of this control is to maintain proper saturated condensing temperature at low outdoor temperature. It does this by modulating the speed of OFM1 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.



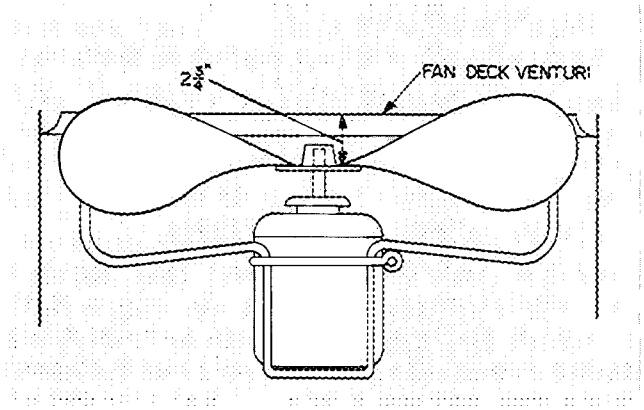
→ **Fig. 28 – Motormaster® Thermistor Locations on Condenser Coil**

→ FAN CYCLING PRESSURESTAT – Outdoor fan motor no. 2 (and no. 3 on 3 fan units) is controlled by a nonadjustable pressurestat connected to compressor no. 1 by a capillary tube.

Fan(s) shuts off at 80 F saturated condensing temperature (145 psig), restarts at 120 F (approximately 260 psig).

Outdoor Air Fans – Shut off service switch to de-energize outdoor air 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 venturi (Fig. 29). Tighten setscrews and replace rubber hubcap to prevent hub from rusting to motor shaft. Fill hub recess with permagum if rubber hubcap is missing.



→ **Fig. 29 – Outdoor Air Fan Adjustment**

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

Reassembly is the reversal of the above procedure.

LUBRICATION – Fan motors have factory-lubricated bearings. No relubrication is necessary for the first 3 to 5 years of continuous operation except during excessively dirty conditions. Annually thereafter, bearings must be opened, cleaned and repacked with light- to medium-duty multipurpose grease.

Indoor Air Fans and Motor – Shut off service switch to de-energize indoor air 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 – Remove fan motor and belts. Loosen the locknut on each shaft bearing collar and remove the fan drive pulley. Loosen the fan wheel locknuts and slide out fan shaft. Remove bearings (two).

Reassembly is the reversal of the above procedure.

FAN SPEED ADJUSTMENT (Fig. 30) – Loosen fan belt by loosening fan motor mounting plate bolts. Loosen movable pulley flange setscrews and remove flange key. Screw movable flange toward fixed flange to increase fan speed and away from fixed flange to decrease fan speed.

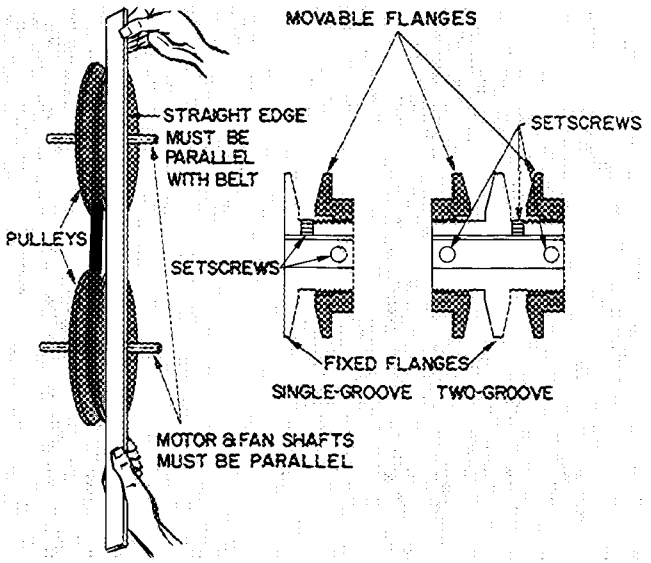


Fig. 30 – Indoor Air Fan Pulley Adjustment

Increasing fan speed increases load on motor. Do not exceed maximum fan motor full load amperage (Table 2).

Turn movable flange to nearest key slot of pulley hub and replace flange key. Readjust belt tension as described below, and tighten flange setscrews. Retighten motor mounting plate bolts.

PULLEY ALIGNMENT (Fig. 30) – 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 3/4-in. deflection with one finger) and tighten motor pivot bolts.

LUBRICATION – Fan shaft and motor bearings require annual lubrication after 3 to 5 years of continuous operation as follows:

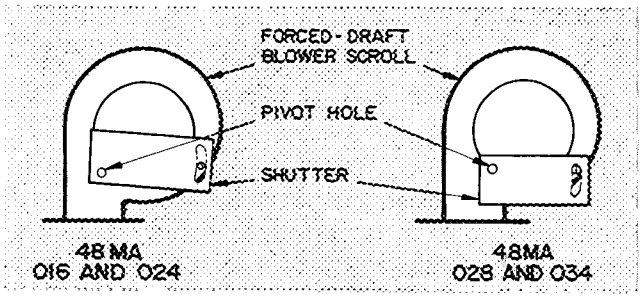
Fan Shaft Bearings – Automotive type grease fittings are factory supplied. Apply a medium-duty, lithium-base grease to fittings while rotating shaft.

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 *two or three drops* of a good grade of no. 20 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 thru drain connection below heat exchangers. Correct pressures are 0.10 ± 0.01 in. wg for units 48MA016,024 and 034; 0.15 ± 0.01 for unit 48MA028. Fig. 31 shows correct shutter position. Note pivot hole location.



→ **Fig. 31 – Forced-Draft Blower Shutter Position**

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

→ **Roll Filter (Optional)** – See Fig. 32.

INSTALLING FILTER MEDIA – If replacing dirty filter media, refer to section entitled Replacement of Dirty Filter Media. The following procedure is to be used for installation of filter media if filter media has already been removed from unit.

1. Remove filter media roll from shipping carton. Do not unroll paper leader at this time.
2. Install media roll on supply spool so that free end of paper leader can unwind in a clockwise direction. Cardboard tube inside media roll must be tight against supply spool flange.
3. Push back the pressure plate and install supply spool in supply spool holders.
4. Unroll paper leader. Feed paper leader around idler roller and across frame between flanges and against support rods. Pull leader around idler roller on take-up side of assembly and tape to cardboard tube on take-up spool.

5. Push toggle switch on frame to manual (Man.) position to manually operate drive motor. Check action of all moving parts. Be sure that paper leader is aligned so that it does not "ride up" on the take-up spool. Hold toggle in manual position until end of leader is wound past the take-up idler roller. The filter media will now be in the air stream.
6. Check that filter media travels freely between flanges and support rods and that fluff side faces upwind. Take-up spool should rotate so that scrim side of dirty media is on the outside.
7. Air pressure switch in control box is factory set at 0.5 in. wg. Check setting as described in Service, Air Pressure Switch Adjustment.
8. Set toggle switch at automatic (Auto.) *Roll filter assembly will not operate if this is not done.*
9. Replace fan section and filter section top and side panels.
10. Set control circuit service switch at "On" and replace power and condensing control box access panel.

REPLACEMENT OF DIRTY FILTER MEDIA – Rethreading of clean media roll is not necessary. When clean media is installed, simply tape the paper trailer of the dirty media roll to the leader of the clean media roll as follows:

1. Set control circuit service switch at "Off." *Do not shut off unit main power circuit breakers.*
2. Remove filter access panel on each side of unit. Top panel need not be removed.
3. Unwind remaining paper trailer from the now empty supply spool and disconnect from cardboard tube.
4. Remove empty supply spool from supply holders and remove cardboard tube from supply spool. Save this cardboard tube.
5. Install clean filter media roll on supply spool so that paper leader unwinds in a clockwise direction. (See Fig. 32.)
6. Reload supply spool in supply spool holders and connect paper trailer of dirty filter roll to paper leader of clean filter roll.
7. Press toggle switch into manual (Man.) position to take up remaining trailer so that clean filter leader is pulled thru roll filter assembly.
8. When clean filter leader has reached the take-up spool, release toggle switch.
9. Disconnect dirty filter trailer from clean filter leader. Release keeper on top holder of take-up spool and remove take-up spool from unit.
10. Remove dirty filter roll from take-up spool.
11. Install the cardboard tube that was removed from the supply spool in step 4 onto the take-up spool.
12. Install take-up spool in take-up holders. Be sure notches in flange end of take-up spool engage the key on the slave sprocket. Secure the keeper on the upper spool holder.
13. Attach paper leader of clean filter to cardboard tube with tape.
14. Depress toggle switch to manually draw clean filter media across unit. Release toggle switch when clean filter media reaches take-up roller.
15. Check operation of all moving parts.
16. Set toggle switch at "Auto." *Roll filter assembly will not operate if this is not done.*
17. Replace filter section access panels.
18. Set control circuit service switch at "On" and replace control box access panel.

CLEANING – Every six months check all moving parts for binding or abrasion. Remove any loose fibers around idler roll bearings and other moving parts.

LUBRICATION – All ball bearings are sealed for life and require no further lubrication.

Filter media advance motor is also factory lubricated for life.

AIR PRESSURE SWITCH ADJUSTMENT – Connect a draft gage with a range of 0 to 1 in. wg across the filter bank. To simulate clogged filter conditions, place a sheet of paper across the filter media until 0.50 in. wg is registered on the draft gage. Turn the adjusting screw on the air pressure switch until contacts just close and media advance motor starts.

Remove the sheet of paper. The motor will stop.

FILTER MEDIA RUNOUT SWITCH ADJUSTMENT

1. Remove cardboard tube from take-up spool and place on supply spool.
2. Install take-up spool in supply holders so that pressure plate rests against cardboard tube.
3. Turn adjusting screw on pressure plate until runout switch just activates. The runout light will come "On" when switch is activated.
4. Turn adjusting screw in another one-half turn and then tighten locknut.
5. Move pressure plate back and forth several times to make sure runout light comes "On" and that adjustment is correct.
6. Remove supply spool from supply holder. Remove cardboard tube from supply spool and replace on take-up spool.
7. Set take-up spool in lower take-up holder so that notches in flange end of spool shaft engage key on slave sprocket. Secure the keeper on the upper holder so that plain end of spool shaft is held in place.

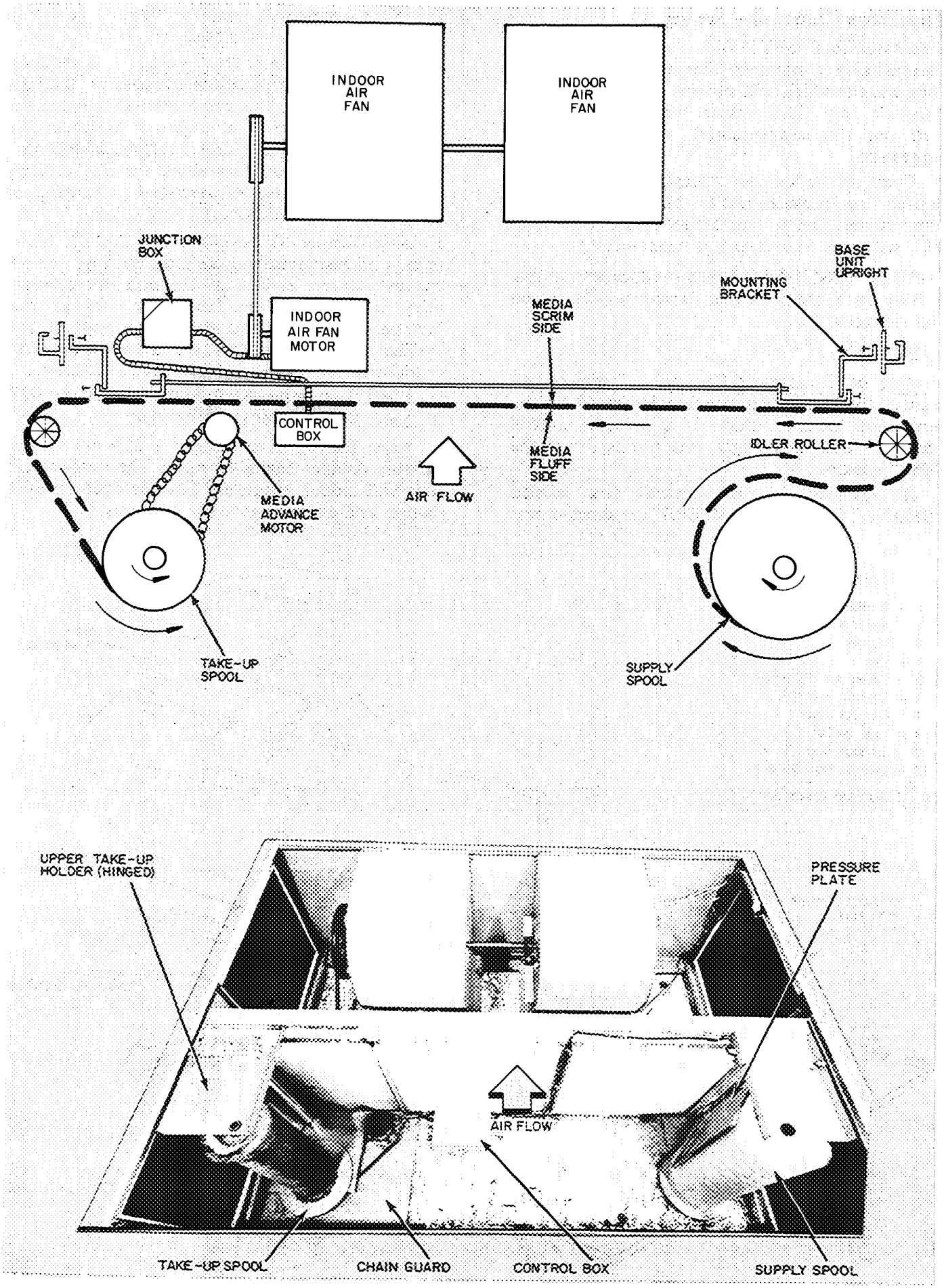


Fig. 32 — Roll Filter Assembly

→ **Economizer (Optional)** – See Fig. 33.

THERMOSTAT SETTINGS – Set outdoor air thermostat (economizer 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.

Then 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.

DAMPER POSITION – When outdoor air damper is fully open, the return air damper will be 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.

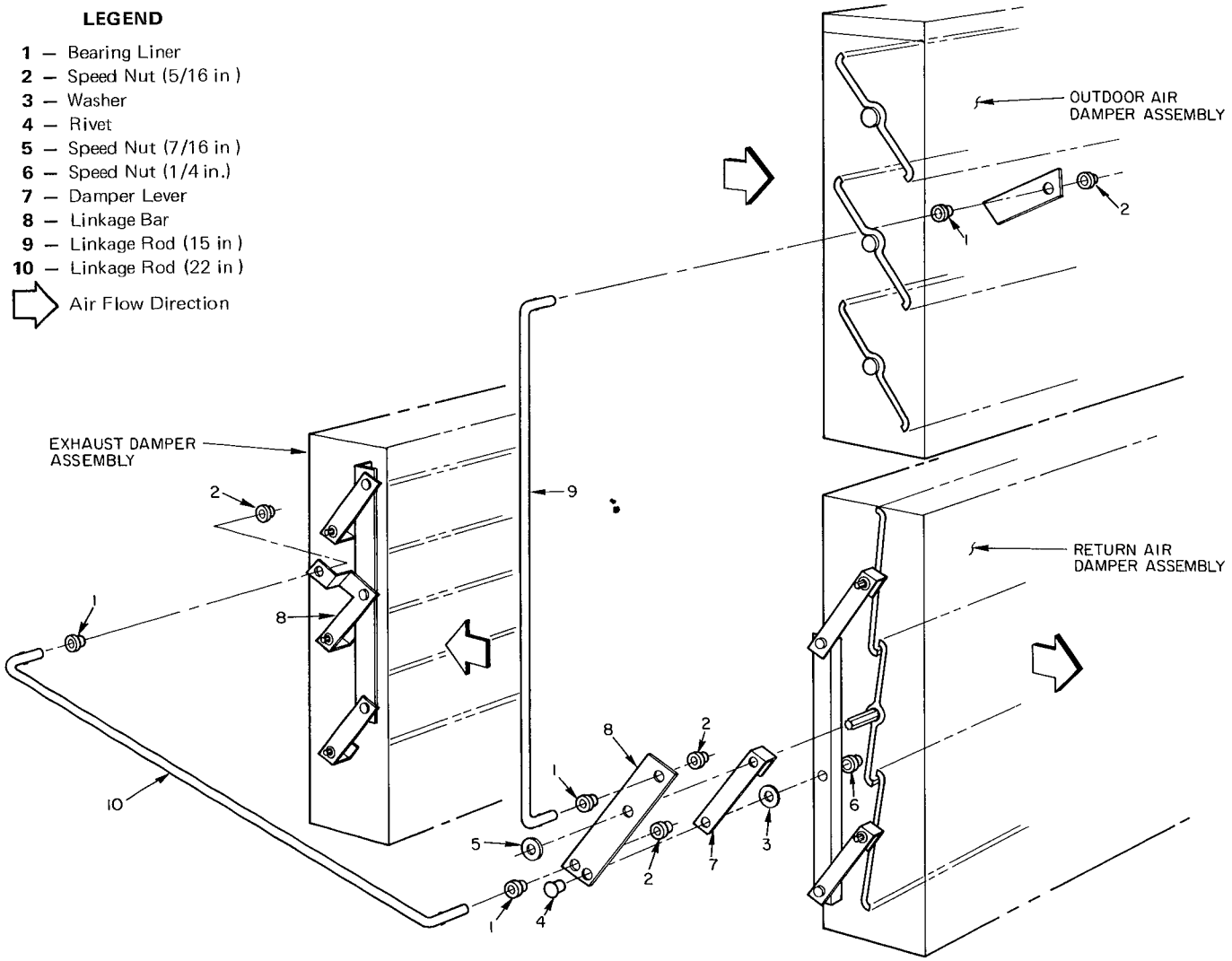
Intermediate Season (Free Cooling) – If outdoor air temperature drops below economizer thermostat (ECT) setting, the compressor(s) will remain off. The dampers will modulate to maintain the mixed air thermostat (MAT.) setting. If the outdoor air temperature rises above the ECT setting, the unit will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

Exhaust Damper (Optional) – See Fig. 33. 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 outdoor air fans operate at full speed as follows:

1 and 2 on units 48MA,50ME016,024 and 028

2 and 3 on units 48MA,50ME034

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



→ **Fig. 33 – Damper Assemblies, Exploded View**

For replacement items use Carrier Specified Parts

Manufacturer reserves the right to change any product specifications without notice.

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