



Carrier Corporation • Syracuse, N.Y. 13221

## The Weathermaster Plus (Split-System Heat Pump with Domestic Water Heater)

(Outdoor Coil Section; Indoor Compressor Section with Domestic Water Heater;  
Indoor Fan Coil Section with Accessory Electric Heaters; Accessory Optimizer System)

### INDEX

This data applies to any Weathermaster Plus system using a Model 38SQ outdoor coil section

FIG. NO	CIRCUIT CONNECTIONS			LABEL DIAG DRAWING NO.
	UNIT*			
	Indoor Compr Section 38QW	Outdoor Coil Section 38SQ	V-PH (60 Hz)	
1	Line Power			
2	Control Circuit			
3	—	940,960	230-1	38SQ500064
4	027 034	940 940		38QW500024
5	040 046	960 960		38QW500034
<b>SYSTEM WIRING 38QW/40FQ — 30 kW</b>				
6	Single-Phase; No Outdoor Thermostat			
7	Single-Phase; One Outdoor Thermostat			
8	Single-Phase; Two Outdoor Thermostats; Supplemental Heat Relay			
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11	Typical Wiring Schematic; 38HQ Accessory Optimizer System			

\*Indoor fan coil sections per Carrier-approved 38QW System table in Installation, Start-Up and Service Instructions and Product Data Digest

### GENERAL NOTES

1. Factory wiring is in accordance with National Electrical Code (NEC).
2. Field wiring must comply with NEC and all applicable local codes.
3. Disconnects for incoming field power on indoor and outdoor sections must be within sight from the unit and readily accessible, in compliance with NEC, Section 440-14.
4. Equipment ground connection is provided in the control box in compliance with NEC.
5. Control wires: connect Y to Y, C to C, W2 to W2, etc., in pattern shown.
6. Refer to Fig. 2 for staging jumpers.

### SEQUENCE OF OPERATION

**Fan Switch at AUTO. Position; Thermostat at ON Position** (Crankcase heater is on as soon as the field power supply is on.)

#### THERMOSTAT CALLS FOR COOLING

1. First-stage cooling thermostat (Co) closes and reversing valve solenoid (RVS) is energized. The RVS actuates reversing valve and switches system to cooling.
2. Second-stage cooling thermostat (C1) closes. If low-pressure switch (LPS) is closed, compressor contactor (C) is energized and compressor starts. At the same time, outdoor fan motor (OFM) starts and defrost timer (DT) is energized, although it is not functional in the cooling mode; indoor fan relay (IFR) is energized and indoor fan motor (IFM) starts.

When the second stage of cooling is satisfied, C1 opens. The compressor stops; indoor and outdoor fans stop; DT is de-energized. When the controlled temperature drops approximately 1 F below the cooling set point, Co opens. RVS is de-energized and reversing valve switches to heating (normal position). The unit is shut down except for compressor crankcase heater, which remains on as long as field power supply is on.

#### THERMOSTAT CALLS FOR HEATING (The reversing valve is de-energized, in heating position.)

1. First-stage heating thermostat (H1) closes. Compressor contactor (C) is energized and compressor starts; outdoor fan motor (OFM) starts; defrost timer (DT) is energized. Indoor fan relay (IFR) is energized and indoor fan motor (IFM) starts.
2. Second-stage heating thermostat (H2) closes and activates the first accessory heater element sequencer through indoor thermostat terminal W2. The first-stage electric heater element is energized immediately and the other heater elements are energized at regular intervals through the sequencers.

Separate outdoor thermostats may be used to energize the second sequencer and bring on additional heater elements if more incremental heat control is desired.

When the second stage of heating is satisfied, H2 opens and the electric heater(s) shuts off. When the first stage of heating is satisfied, H1 opens and the unit shuts down, except for compressor crankcase heater, which remains on as long as field power supply is on.

DEFROST CYCLE occurs when unit is in the heating mode. At 90-minute intervals during heating operation, normally open contacts of defrost timer (DT) close for 10 seconds. If defrost thermostat (DFT) is closed (closes at  $27 \pm 4$  F), defrost thermostat relay (DFTR) is energized to close a set of contacts which energize defrost relays (DFR-1 and DFR-2). One set of normally closed DFR-1 contacts open and 3 sets of normally open contacts close. Also, one set of normally open DFR-2 contacts close. As a result, the following actions occur simultaneously:

1. The outdoor fan motor stops.
2. Another electric circuit bypasses low-pressure switch (LPS) to prevent heat pump from stopping due to a momentary drop in refrigerant pressure. The reversing valve solenoid (RVS) is energized to switch the system to the cooling mode, allowing hot gas to go into outdoor coil for defrosting.
3. An accessory electric heater is activated. The DT's normally closed contacts open approximately 1-1/2 minutes later.

The defrost thermostat (DFT) opens when outdoor coil temperature reaches  $80 \pm 6$  F, de-energizing defrost thermostat relay (DFTR) and defrost relays (DFR-1 and DFR-2), terminating the defrost cycle. The RVS is de-energized and reversing valve switches the system back to the heating mode.

If the defrost cycle is not terminated by the DFT, the DT limits the defrost cycle to 10 minutes. At the termination of 10-minute cycle, normally open defrost timer contacts open and normally closed defrost timer contacts close.

SUPPLEMENTAL HEAT RELAY (when used) is energized by a manually operated switch (EM HT) in the indoor thermostat. When relay is energized, outdoor thermostat and compressor circuit are electrically bypassed to provide full, sequence-controlled electric heater operation.

SYSTEM MALFUNCTION WARNING INDICATOR (Warning Logic — WL) senses compressor operation through a line power current loop. When thermostat calls for compressor operation, 24-v control power is sent through terminal Y to terminals 1 and 2 on WL. If the current loop on WL does not sense line current flow to compressor, the compressor is not operating, and WL contacts 2-X close, energizing thermostat supplemental heat light.

Operating control failure, safety control open or mechanical malfunction may cause compressor not to operate. When malfunction is corrected or safety control resets, and compressor restarts, thermostat light de-energizes. The light can also be de-energized by the thermostat being normally satisfied or manually being turned off — then on.

DOMESTIC WATER HEATER OPERATING SEQUENCE — When the room thermostat calls for compressor operation, compressor contactor is energized. Both the compressor and water pump start. Compressor hot discharge gas flows through the heat exchanger inner tube, through the reversing valve and into the outdoor coil. Water is pumped from the domestic hot water tank through the heat exchanger outer tube, becomes heated by the compressor discharge gas, and returns to the hot water tank via the inner tube of the coaxial fitting.

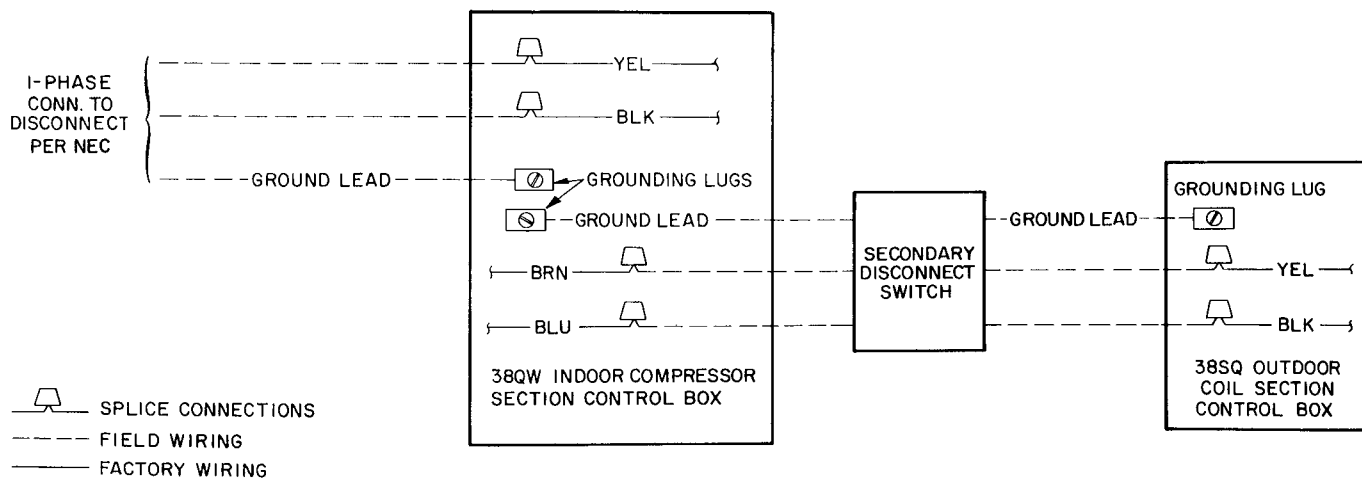
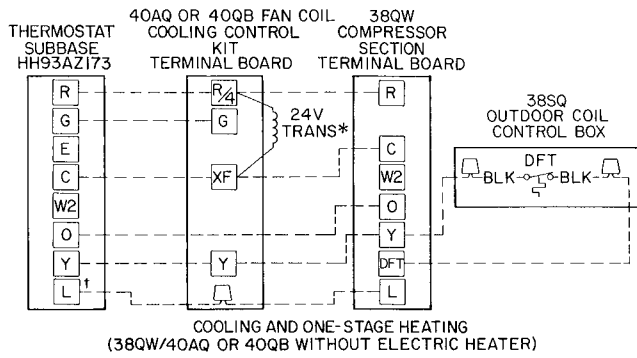
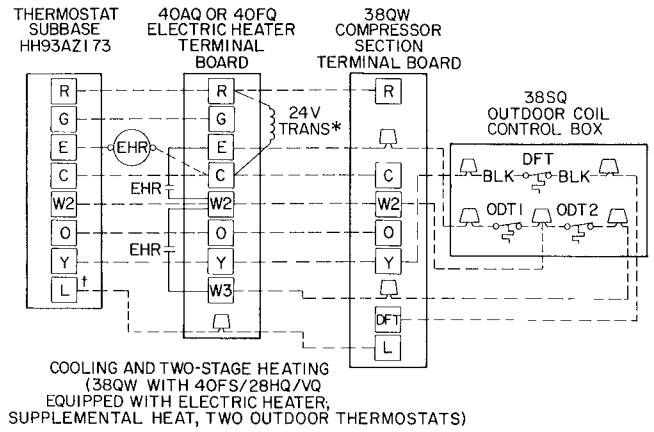


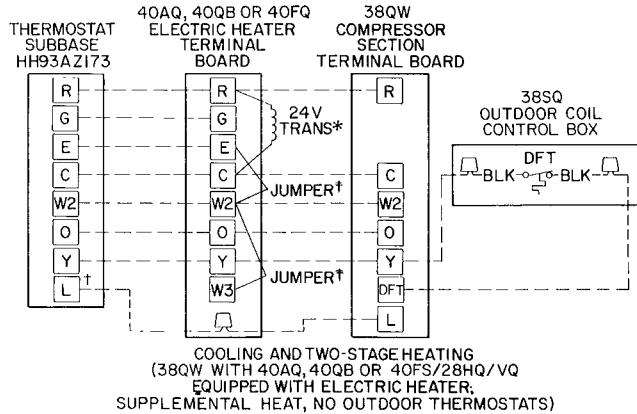
Fig. 1 — Line Power Connections



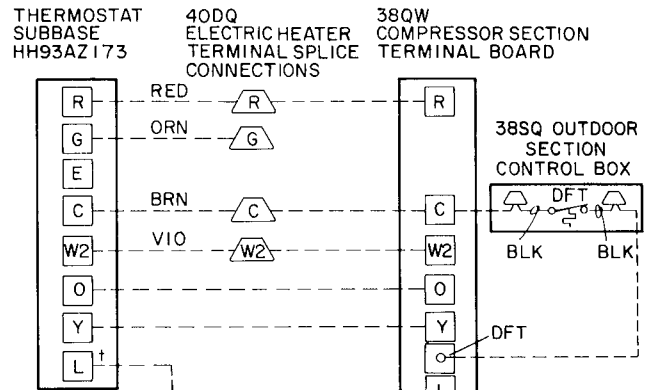
A



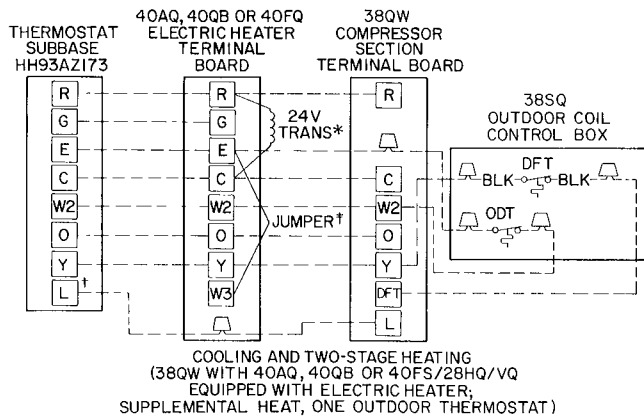
D



B



E

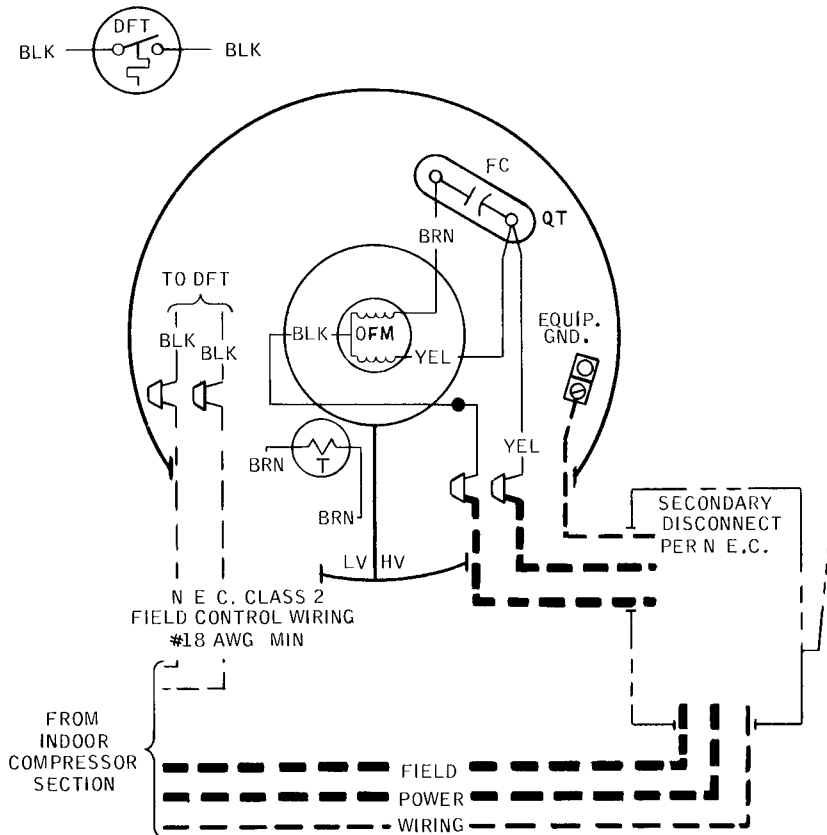


C

- DFT — Defrost Thermostat
- EHR — Supplemental Heat Relay
- ODT — Outdoor Thermostat
- Factory Wiring
- Field Wiring

\*Transformer (60 va) located in cooling control kit or electric heater  
 †Terminal L is identified as terminal X on some former thermostats (Required for system malfunction warning indicator on compressor section)  
 ‡Remove one or both factory-installed jumpers when installing outdoor thermostats (ODT) shown in connections C and D

Fig. 2 — Control Circuit Connections



**LEGEND**

- DFT** — Defrost Thermostat
- FC** — Fan Capacitor
- OFM** — Outdoor Fan Motor
- QT** — Quad Terminal
- T** — Thermistor

- Component Connection (Unmarked)
- Component Connection (Marked)
- Field Splice
- Field Control Wiring
- Field Ground Wiring
- Field Power Wiring

**NOTES:**

- 1 Thermistor shown is for use only with 38SQ indoor compressor section For 38QW application, thermistor must be removed and replaced with outdoor thermostat
- 2 Fan motor thermally protected
- 3 Use copper conductors only For 25-ft run or less, use min no 14 AWG For longer runs, use same ampacity conductor as supply to compressor section

**Fig. 3 — Wiring Schematic/Component Diagram 38SQ940300, 38SQ960300**

**LEGEND (Use with Fig 4 through 11)**

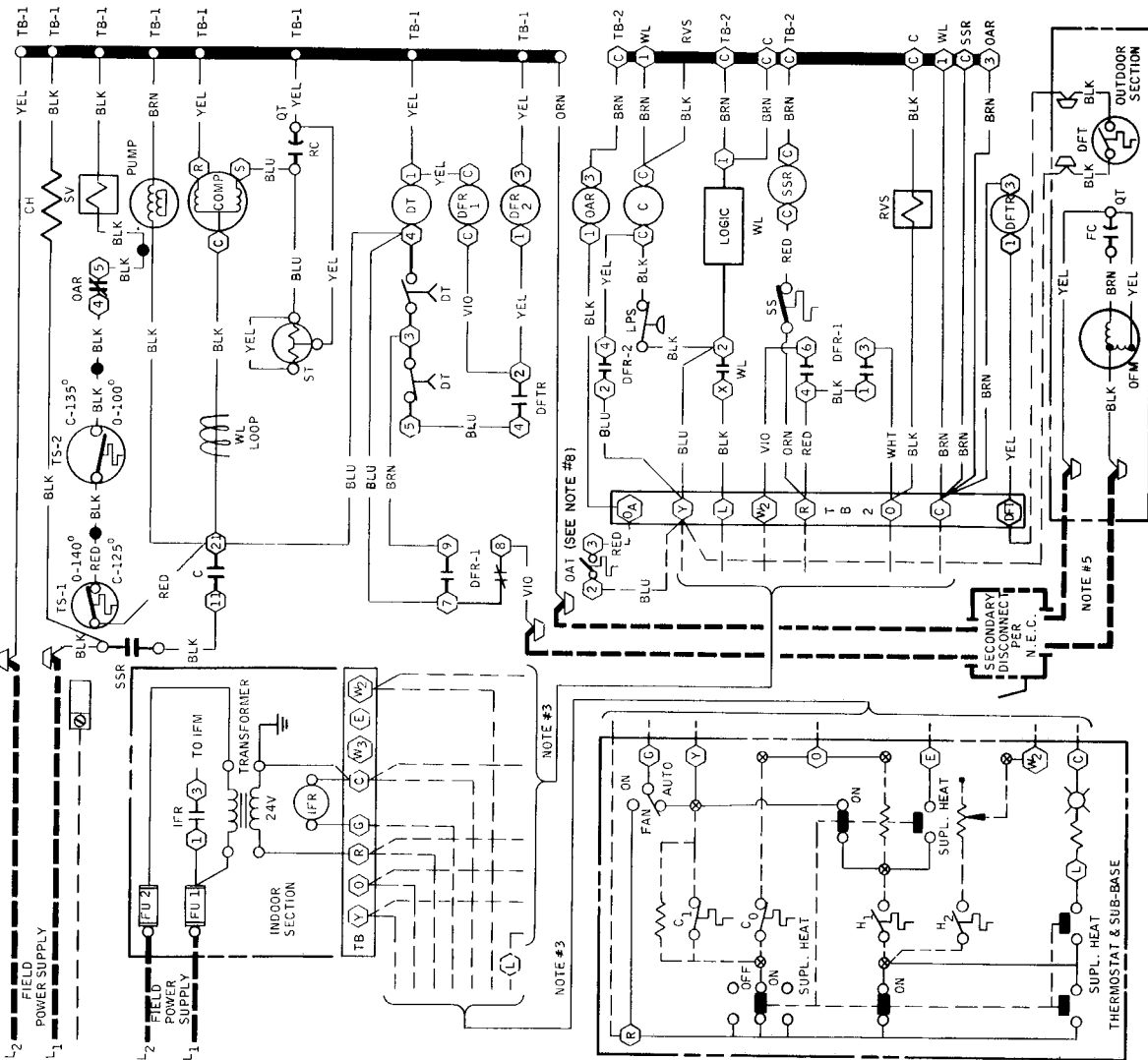
- C** — Contactor
- DFT** — Defrost Thermostat
- CH** — Crankcase Heater
- Comp** — Compressor
- DFR** — Defrost Relay
- DFTR** — Defrost Thermostat Relay
- DT** — Defrost Timer
- FC** — Fan Capacitor
- FL** — Fuse Link
- FM** — Fan Motor
- FR** — Fan Relay
- Fu** — Fuse
- Htr** — Heater
- IFM** — Indoor Fan Motor
- IFR** — Indoor Fan Relay
- LPS** — Low-Pressure Switch
- LS** — Limit Switch
- OAR** — Outside Air Relay
- OAT** — Outside Air Thermostat
- OFM** — Outdoor Fan Motor
- PI** — Plug
- QT** — Quad Terminal
- RC** — Run Capacitor
- RVS** — Reversing Solenoid
- SC** — Start Capacitor
- Seq** — Sequencer
- SR** — Start Relay
- SV** — Solenoid Valve
- T** — Thermistor
- TB** — Terminal Board
- Tran** — Transformer
- TS** — Temperature Switch
- WL** — Warning Logic
- SS** — Safety Switch
- SSR** — Safety Switch Relay

- Component Connection (Unmarked)
- Component Connection (Marked)
- Junction
- Junction (Thermostat to Subbase)
- Field Splice
- To indicate common potential only Not to represent wire
- Field Power Wiring
- Field Ground Wiring
- Field Control Wiring

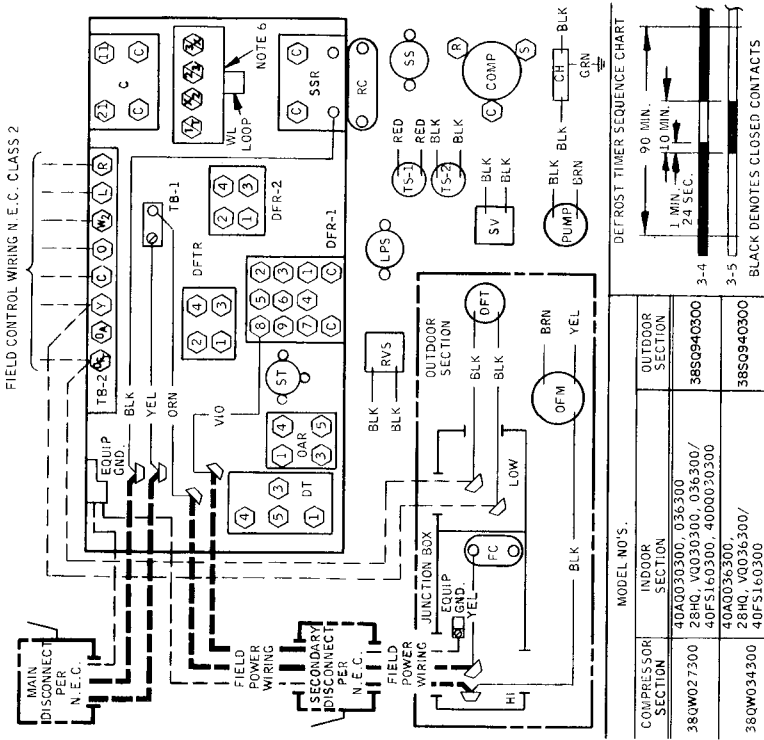
**NOTES**

- 1 Compressor and fan motors thermally protected
- 2 Use copper conductors only
- 3 If any of the original wire, as supplied, must be replaced, use the same or equivalent type wire
- 4 Two grounded lugs provided Limit to one grounding conductor per plug
- 5 Remote outdoor motor 230 v, 1.5 FLA max Use copper conductors only For 25-ft wire run or less, min wire size = 14 AWG For longer run, use same ampacity conductor as supply to compressor section
- 6 Upper/lower characters on marked connection () applies to Essex/P & B warning logics respectively
- 7 Must use thermostat HH07A1171 with subbase HH93AZ173
- 8 Must use thermostat HH22QA040
- 9 Use copper wire only; 90 C minimum between disconnect switch and unit
- 10 Transformer pigtails: Blue 208 v; red 230 v; insulate unused leads

**SCHEMATIC DIAGRAM**



**COMPONENT ARRANGEMENT**



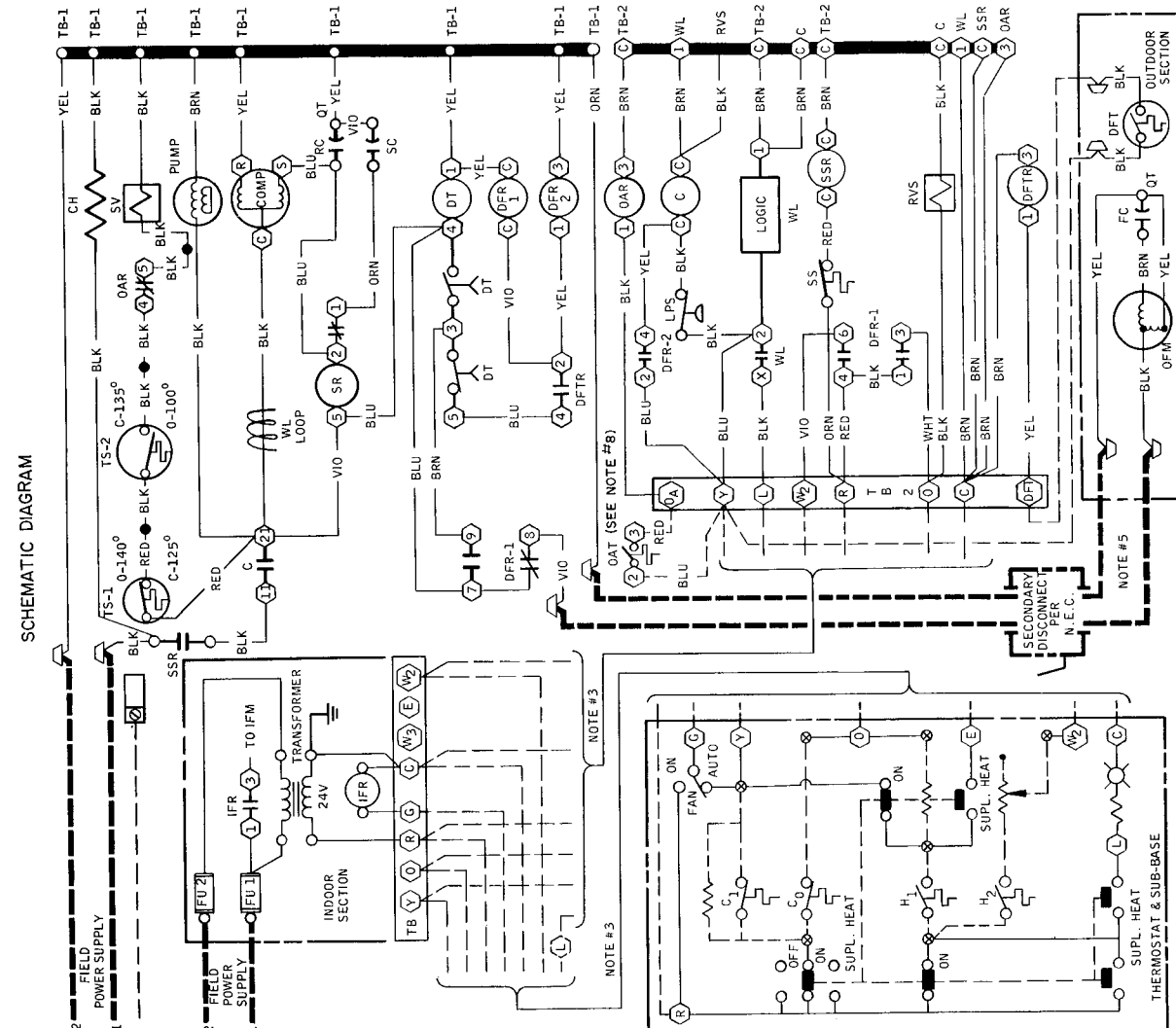
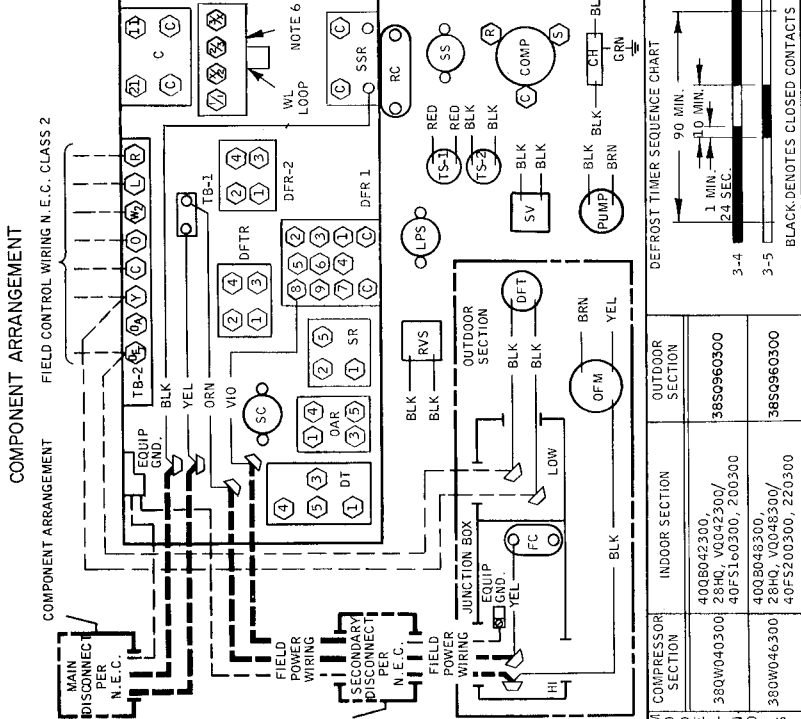
COMPRESSOR SECTION	INDOOR SECTION	OUTDOOR SECTION
40AQ030300; 036300	28HC; V0030300; 036300/	38S0940300
38QW027300	40FS160300; 4000030300	38S0940300
38QW034300	40AQ036300;	38S0940300
	28HC; V0036300/	
	40FS160300	

DEFROST TIMER SEQUENCE CHART

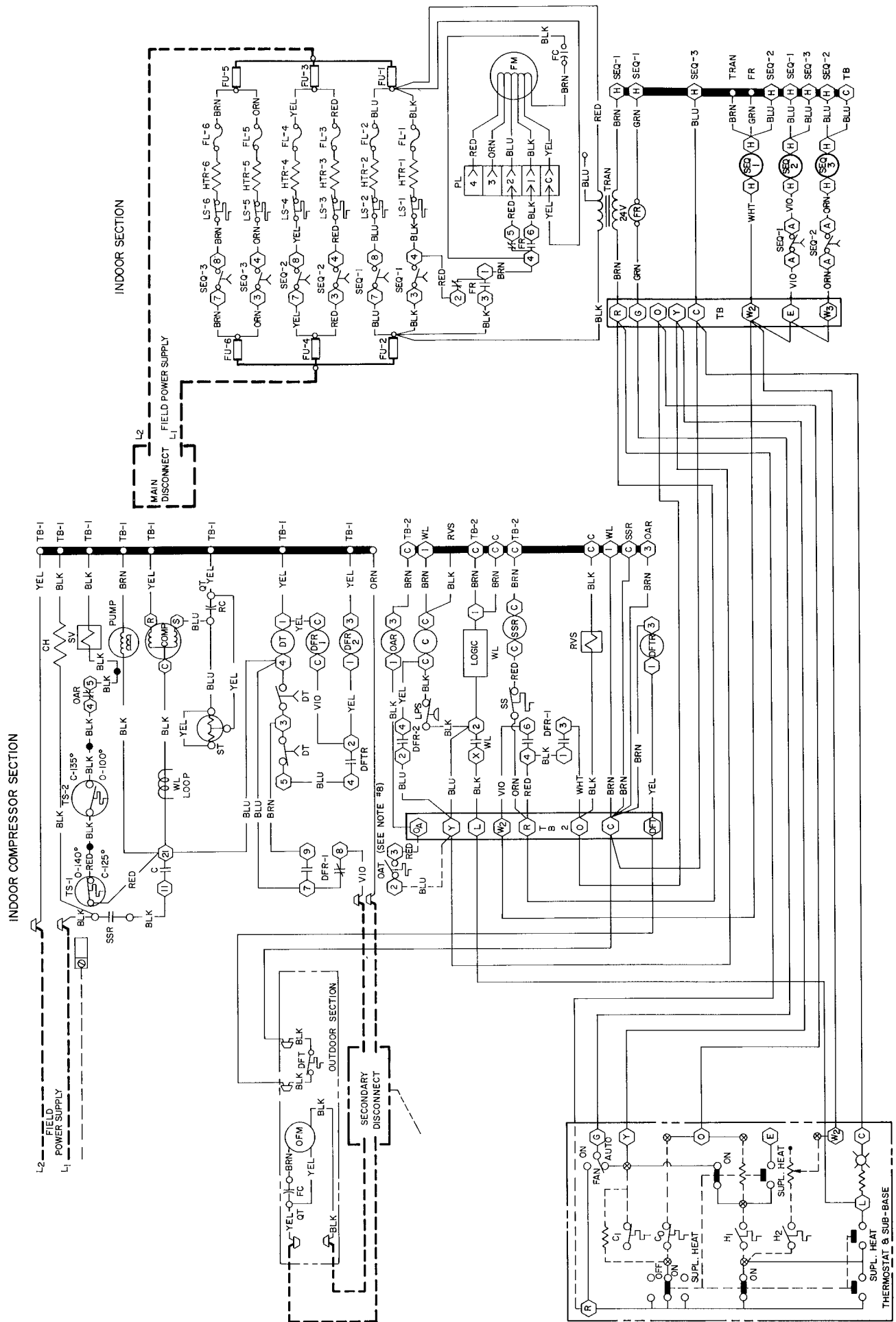
90 MIN. —  
1 MIN. —  
24 SEC. —

BLACK DENOTES CLOSED CONTACTS

**Fig. 4 — Label Diagram; 38QW027/38S0940; 38QW034/38S0940; 230-1-60**

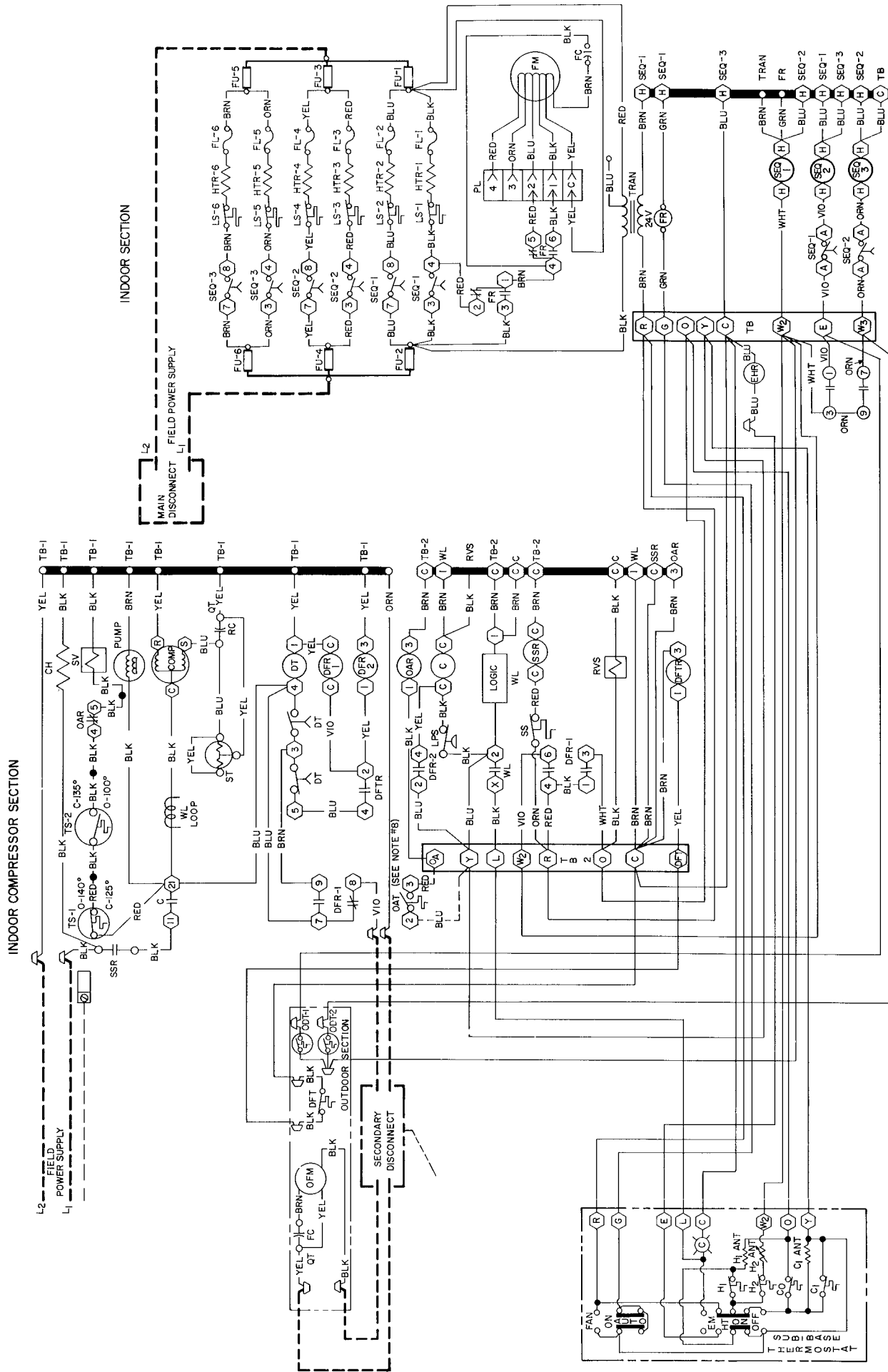


**Fig. 5 — Label Diagram; 38QW040/38SQ960;  
38QW046/38SQ960; 230-1-60**

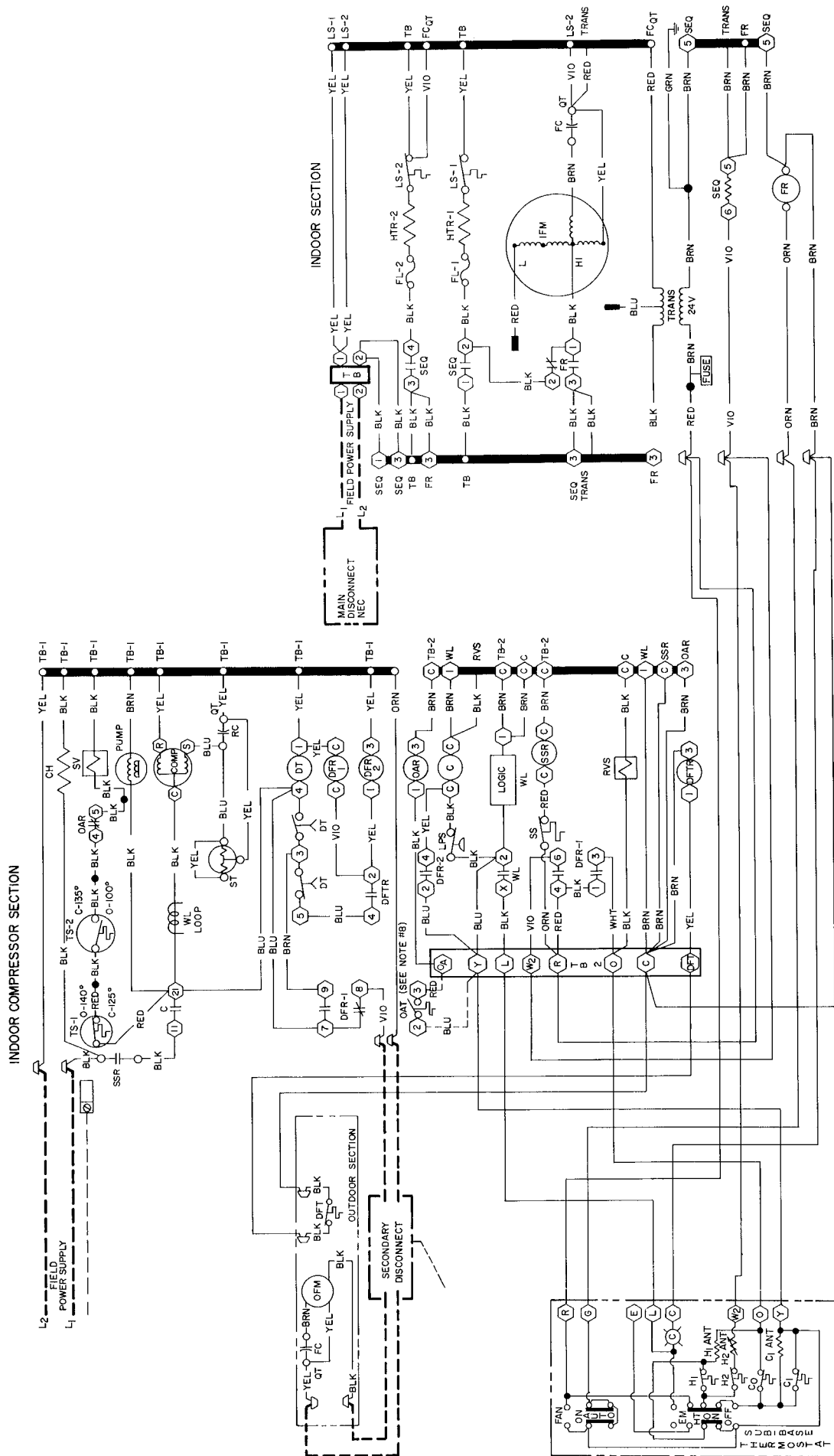


SINGLE PHASE; NO OUTDOOR THERMOSTAT  
 Fig. 6 — System Wiring Schematic; 380W/40FO — 30 kW





SINGLE PHASE; TWO OUTDOOR THERMOSTATS, SUPPLEMENTAL HEAT RELAY  
 Fig. 8 — System Wiring Schematic; 38QW/40FQ — 30 kW



SINGLE PHASE, NO OUTDOOR THERMOSTAT  
**Fig. 9 — System Wiring Schematic; 38QW/40DQ — 10 kW**

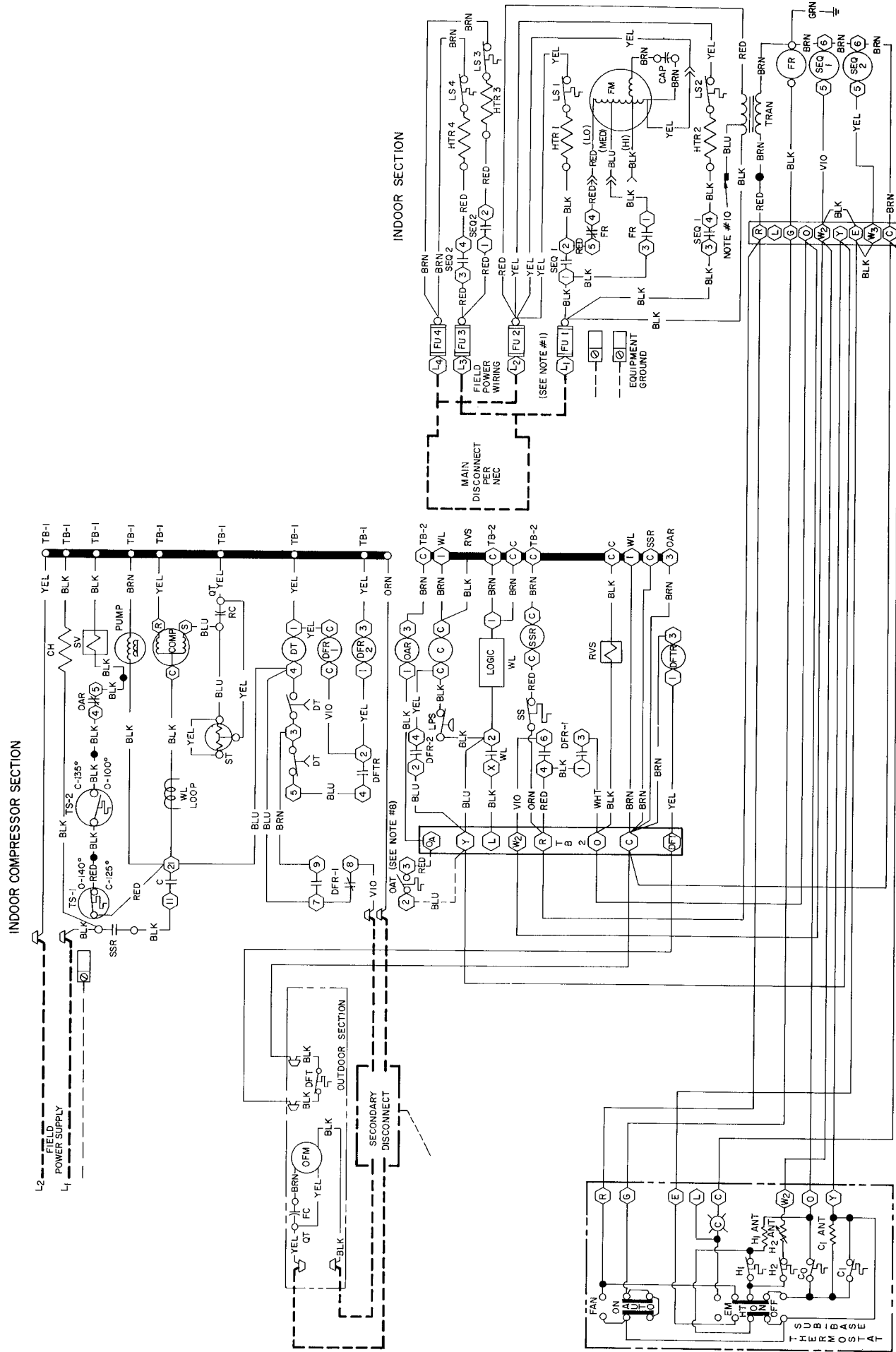


Fig. 10 — System Wiring Schematic; 38QW/40QB — 20 kW

NOTE: For one- and two-thermostat and Optimizer schematics, refer to Fig. 7, 8 and 11

