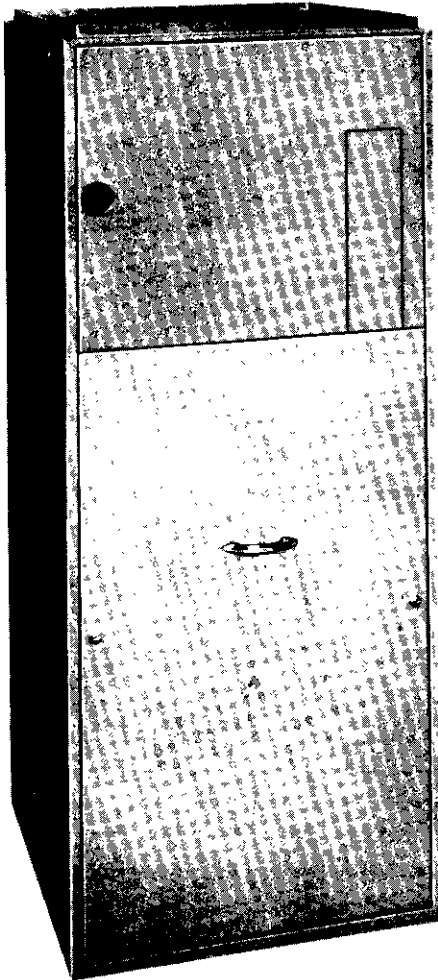


INSTALLATION INSTRUCTIONS

ELECTRIC FURNACE



MODELS

EFC5
EFC10
EFC10-B
EFC15
EFC20
EFC25
EFC30

TOTAL ELECTRIC FEATURES

BUILT-IN COOLING COIL COMPARTMENT — Slide-in type for easier conversion to summer cooling. Accommodates 1½, 2, 2½, and 3 ton cooling coils.

CONTROLS — On demand from wall thermostat, noiseless actuation by sequencing relays starts one heating element at a time, with a 30-second delay between each. Sequential starting of heating elements eliminates power drains and surges. Easily two staged.

LIMIT SWITCH — Thermal snap disc in each heating element shuts off power automatically if system air temperature becomes excessive.

40VA TRANSFORMER — Provides power supply for heating and optional cooling controls.

BLOWER RELAY — Provides automatic blower speed change-over to meet heating and cooling air delivery requirements.

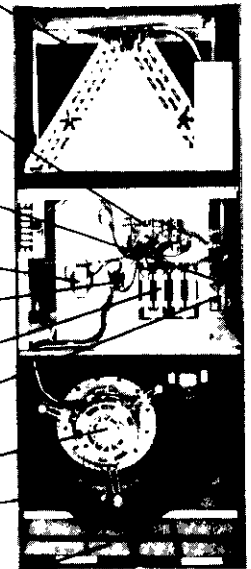
BRANCH CIRCUIT FUSING — Factory installed in models rated over 48 amps.

HEATING ELEMENTS — Nickel-chrome wire with individual fusible links for long life. Entire assembly slides out for easy maintenance.

MOTOR — Multi-speed for both heating and cooling.

BLOWER — Heated air is quietly circulated by large volume centrifugal blower that is matched to the electrical heating system for efficiency. Slides out for easy maintenance.

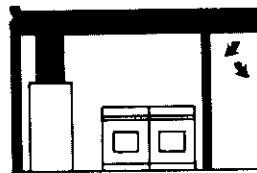
FILTERS — Twin permanent type slide out from front for easy cleaning on all models except Models EFC5 and EFC10.



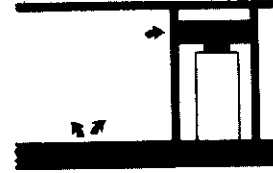
TYPICAL INSTALLATIONS



ATTIC



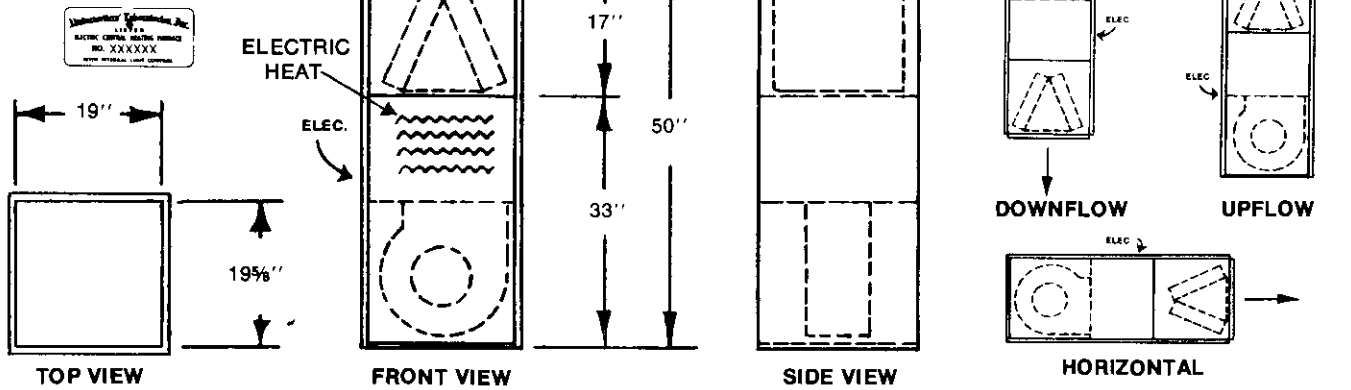
UTILITY ROOM



CLOSET

DIMENSIONS for architects and installation requirements

Furnace casing is U.L. listed for zero clearance to combustible material. In addition to the standard central heating tests, these furnaces have been tested for mobile home installation.



ELECTRIC FURNACE SPECIFICATIONS

MODEL	EFC5	EFC10 (+)	EFC15	EFC20	EFC25	EFC30
BTU Output	17,065	34,130	51,190	68,260	85,320	102,380
Kilowatts	5KW	10KW	15KW	20KW	25KW	30KW
Volts	240V	240V	240V	240V	240V	240V
Phase	1	1	1	1	1	1
Internal Fuses (2 ea.)	None	None	60A/30A	60A/60A	60A/60A/30A	60A/60A/60A
Power Circuits Req'd.	One	One	One	Two	Two	Two
Total Unit Amps @ 240V	23.4	44.2	66.1	86.9	107.7	128.5
Max. Fuse or Breaker Required	30A*	60A*	90A	60A/60A	60A/80A	60A/110A
Min. Ckt. Ampacity	29	55	83	57/52	57/78	57/104
Filters (2 Req'd)	10''x20''x1''	10''x20''x1''	10''x20''x1'' P	10''x20''x1'' P	10''x20''x1'' P	10''x20''x1'' P
Motor HP	1/6	1/6	1/3	1/3	1/3	1/3
Motor AMP	2.6A	2.6A	3.7A	3.7A	3.7A	3.7A
Shipping Wt. Lbs.	115	120	130	132	134	135

P — Permanent Filter * — Not Approved for Circuit Breaker

BLOWER AIRFLOW SPECIFICATIONS

MODEL	Blower Size (Inches)	Motor H.P.	Speed	Air Temp. Rise at Various E.S.P. In. H.O			Airflow in CFM at Various E.S.P. In. H.O			Max Tons
				0.20	0.30	0.50	0.20	0.30	0.50	
EFC5	9 x 8	1/6	High	16	17	20	1045	975	825	2
			Low	20	21	25	800	775	655	1 1/2
EFC10 (+)	9 x 8	1/6	High	32	34	40	1045	975	825	2
			Low	41	42	50	800	775	655	1 1/2
EFC15	10 x 7	1/3	High	34	35	38	1450	1405	1295	3
			Med	40	42	45	1210	1175	1090	2 1/2
EFC20	10 x 7	1/3	Low	54	55	57	905	890	845	2
			High	45	46	50	1450	1405	1295	3
EFC25	10 x 9	1/3	Med	53	55	59	1210	1175	1090	2 1/2
			Low	71	72	76	905	890	845	2
EFC30	10 x 9	1/3	High	45	47	51	1785	1740	1605	4*
			Med	58	58	61	1400	1380	1320	3
EFC30	10 x 9	1/3	Low	63	63	66	1270	1260	1210	3
			High	54	56	60	1785	1740	1605	4*
EFC30	10 x 9	1/3	Med	69	69	73	1400	1380	1320	3
			Low	76	76	80	1270	1260	1210	3

*Coil installs externally. (+) Model EFC10-B with 1/3 hp motor and 10x7 blower for 3-ton cooling.

Specifications are Subject to Change Without Notice.

APPLICATIONS

- APARTMENTS
- CHURCHES
- SMALL BUSINESSES
- MOBILE HOMES
- MODULAR STRUCTURES

INSTALLATION INSTRUCTIONS
ELECTRIC FURNACES

GENERAL

Units are shipped completely assembled and internally wired, requiring only duct connections, thermostat wiring and external 220-240V power supply. These furnaces have provision inside of unit for installation of a cooling coil (field or factory installed).

<u>FURNACE MODEL</u>	<u>COOLING COIL MODEL</u>
EFC5	2ACQ
EFC10	2ACQ
EFC10-B	3ACQ3
EFC15	3ACQ3
EFC20	3ACQ3
EFC25	3ACQ3
EFC30	3ACQ3

IN ADDITION TO THE STANDARD CENTRAL HEATING TESTS, THESE FURNACES HAVE ALSO BEEN TESTED FOR MOBILE HOME INSTALLATION. All units are provided with a 40VA transformer and 2-speed cooling relay as standard equipment. The Underwriters' Laboratories, Inc. label applies only to the furnace and not to any air conditioner which may be added, or part of the furnace.

INSTALLATION

Size of unit for a proposed installation should be based on heat loss calculation made according to methods of National Warm Air Heating and Air Conditioning Association. The air duct should be installed in accordance with the Standards of the National Fire Protection Association for the Installation of Air-Conditioning and Ventilating Systems of Other Than Residence Type, NFPA No. 90A and Residence Type Warm Air Heating and Air-Conditioning Systems, NFPA No. 90B. Where local regulations are at a variance with instructions, installer should adhere to local codes.

DUCTWORK

Design the ductwork according to methods given by the National Warm Air Heating and Air-Conditioning Association. When duct runs through unheated spaces, it should be insulated with a minimum of two inches of insulation. For heating and cooling installation or future cooling, use insulation with a vapor barrier outside the insulation. Flexible joints should be used to connect the ductwork to the furnace in order to keep noise transmission at a minimum.

UNPACKING

When received, carton should be checked for external signs of damage. If damage is found, request for inspection by carrier's agent should be made in writing immediately.

LOCATION AND CLEARANCES

At least 24 inch service access clearance from access panels should be provided. Furnace casing, plenum, and warm air duct are suitable for 0 inch clearance from combustible material.

Unit may be installed in utility room, closet, basement, attic, mobile home, or closed crawl space for UPFLOW, HORIZONTAL, or DOWNFLOW APPLICATION.

UPFLOW - No special mounting instructions are required, except when installed in a mobile home. See Form EFC41973-2.

HORIZONTAL INSTALLATION - When installed in horizontal position (and cooling coil is added later) the electric power entrance side must be located at the top.

Whenever the furnace is installed with a cooling coil, in the horizontal position, an auxiliary water pan is required. See Form EFC41973-1 and illustrations.

DOWNFLOW INSTALLATION - In downflow installations an EFC MOUNTING BASE is required. Set the EFC MOUNTING BASE in position, mark the floor and cut the hole. After the floor opening has been made, set the EFC BASE in place. Secure the base to the floor with wood screws through the holes provided. Set the furnace in place and secure it to the base with sheet metal screws through the holes provided.

The furnace must be secured at the top. Remove the upper access door and fasten either side of the furnace to a vertical wall partition with wood screws through the holes provided.

MOBILE HOME - See Mobile Home Installation Instructions, Form EFC41973-2.

FILTER

THIS UNIT MUST NOT BE OPERATED WITHOUT FILTER. Filter is at the intake end of the furnace and the filters are secured in place with an angle cross bar. To remove filters, disengage the angle bar and lift out the filters. Replacement filter should be of the same type that was originally supplied.

Foam or permanent filters can be cleaned by washing in warm soapy water and rinsing clean.

WIRING

All electrical wiring must comply with the National Electrical Code and all local ordinances.

Connect 24V thermostat wires to terminal strip mounted on inside of the unit.

Connect 220-240V power leads to terminal block or fuse panel located inside the unit. One field power circuit is required up thru the 15Kw models, and two field power circuits are required on 20Kw models and higher.

Equipment grounding terminals are supplied on the basis of one per each field power circuit.

Internal wiring of the furnace model is shown on the wiring diagram attached to the control panel cover.

The following chart is a guide to sizing field wiring conductors and is determined by Minimum Circuit Ampacity values from the specifications.

FIELD WIRING GUIDE*

Model	Power Wiring		Ground Wiring	
	Ckt. A	Ckt. B	Ckt. A	Ckt. B
EFC5	10	--	10	--
EFC10	6	--	10	--
EFC10-B	4	--	10	--
EFC15	2	--	8	--
EFC20	4	6	10	10
EFC25	4	3	10	8
EFC30	4	1	10	6

*Based on 60°C copper wire. Aluminum wiring materials may be used but must be sized based on Minimum Circuit Ampacity and determined from Table 310-18 of 1975 National Electrical Code.

FUSING

Models EFC15, EFC20, EFC25 and EFC30 are provided with fused sub-divided circuits.

24V TRANSFORMER

A 40VA transformer is built-in and supplies necessary capacity for operation of furnace controls as well as add-on air conditioning unit controls.

HEAT-COOL BLOWER RELAY

A heat-cool blower relay is built-in, providing for easy application of add-on air conditioning. No additional wiring is required other than the additional 24V wiring from the outdoor air conditioning unit.

THERMOSTAT

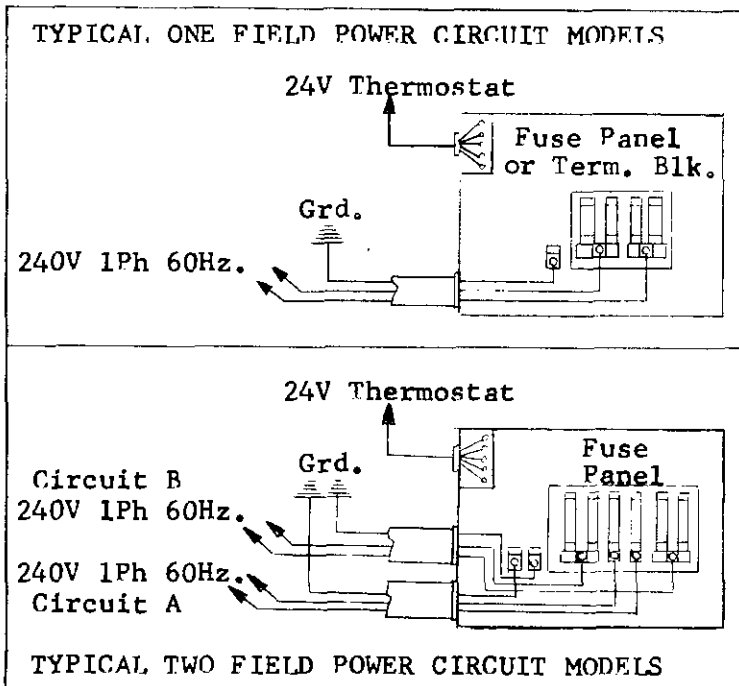
For heat only applications, a heat only thermostat with or without a manual fan switch can be used.

For heat-cool applications with add-on air conditioning, and the air conditioner is some other than produced by Bard Manufacturing Company and happens to include its own 24V transformer, "Use Thermostat With Isolating Contacts To Prevent Interconnection of Class 2 Outputs."

Bard air conditioners do not have a transformer in the outdoor section, therefore an isolating contact thermostat is not required. An isolating thermostat may be used, but terminals Rc-Rh must be jumpered together on the sub-base.

HEATER STAGING

All EFC furnaces are built at the factory for single stage thermostatic control. Models EFC5, EFC10, EFC10-B and EFC15 utilize a single sequencer and thus are always single stage. Models EFC20, EFC25 and EFC30 are wired for single stage control, but since they employ more than one sequencer module they can be field converted to two stage operation by disconnecting the BLUE wire from the 24V terminal W1, reconnecting to W2, and connecting a thermostat lead wire between W2 on the thermostat sub-base and W2 on the EFC 24V terminal board.



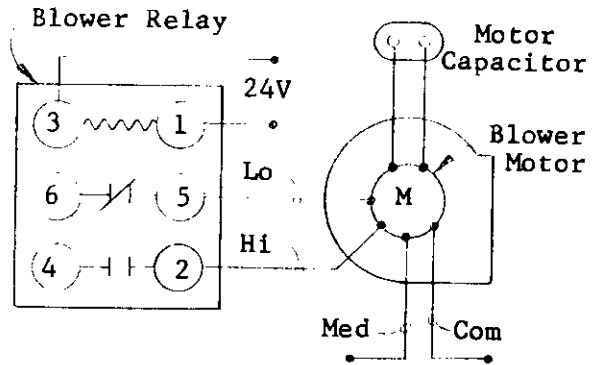
HEAT ANTICIPATOR SETTINGS

Models EFC5, EFC10, EFC10-B, EFC15 .15A
 Models EFC20, EFC25 (one stage) .30A
 Model EFC30 (one stage) .45A

For 2-stage operation:

	1st Stage (W1)	2nd Stage (W2)
Models EFC20, EFC25	.15A	.15A
Model EFC30	.15A	.30A

For proper temperature control the heat anticipator must be set to match the electric furnace controls as outlined above.



MULTI-SPEED BLOWER MOTOR

The EFC Series furnace is supplied with a multi-speed direct drive motor using either two or three "taps" to provide speed and airflow variation. Models EFC5 and EFC10 are two speed motors and do not have a motor capacitor. All other models use a three speed motor.

MOTOR SPEED IDENTIFICATION

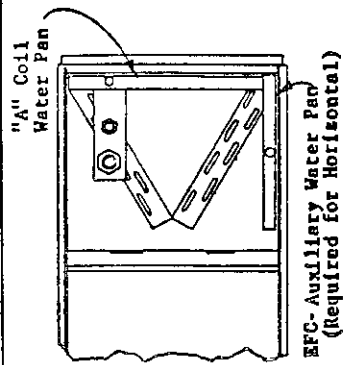
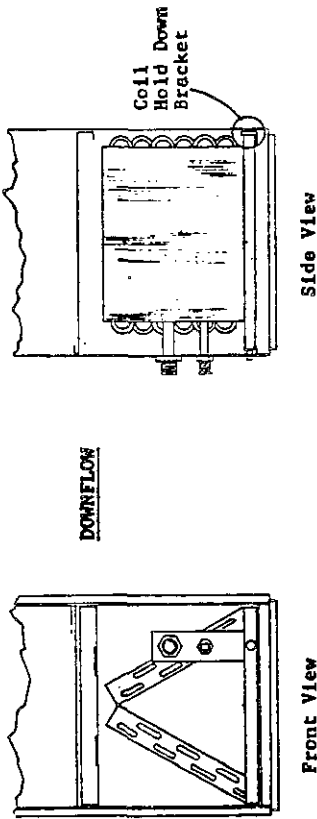
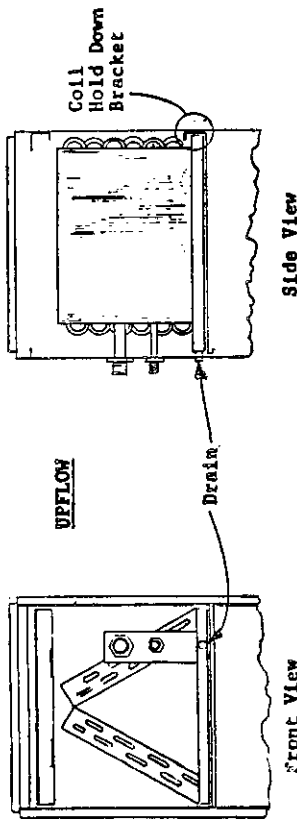
- Yellow - Common
- Brown - Capacitor
- Black - High
- Blue - Medium
- Red - Low

All furnaces are wired Low speed on heating and either Medium or High speed on cooling. The cooling speed is the same as Manual Fan Operation. The following chart is how the speed taps are connected at the factory.

MOTOR SPEED CONNECTIONS

Model	Heating	Cooling
EFC5	Low	High
EFC10	Low	High
EFC10-B	Low	High
EFC15	Low	High
EFC20	Low	High
EFC25	Low	Medium
EFC30	Low	Medium

ELECTRIC FURNACE EVAPORATOR COIL INSTALLATION



NOTE: "A" coil assembly in auxiliary water pan and slide into cabinet. When sliding into cabinet make sure that the pan is secured by the coil hold down brackets. This will prevent the "A" coil from dropping down.

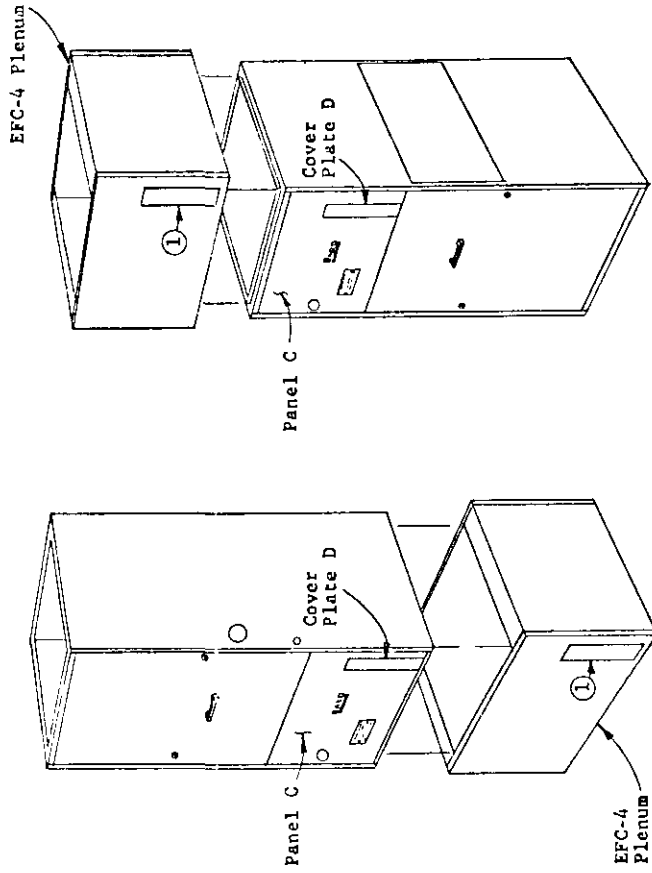
Bard Manufacturing Co. Bryan, Ohio 43506

EFC-4 PLENUM FOR 4ACQ1 EVAPORATOR COIL FOR USE WITH EFC SERIES ELECTRIC FURNACE ONLY.

Figure A - COUNTERFLOW application as shown with coil quick connects and drain connection at point (1). Panel C is reversible and should be as shown so serial plate can be easily read.

Figure B - UPFLOW application as shown with coil quick connects and drain connection at point (1). Panel C is shipped from the factory in this position and need not be changed.

General - Cover plate D which is secured to panel C should be left in place. This is only removed when evaporators 2ACQ or 3ACQ3 are installed directly in the EFC series furnace.



Form EFC10973

MOBILE HOME INSTALLATION INSTRUCTIONS

A furnace installed in a mobile home shall be permanently mounted.

UPFLOW INSTALLATION

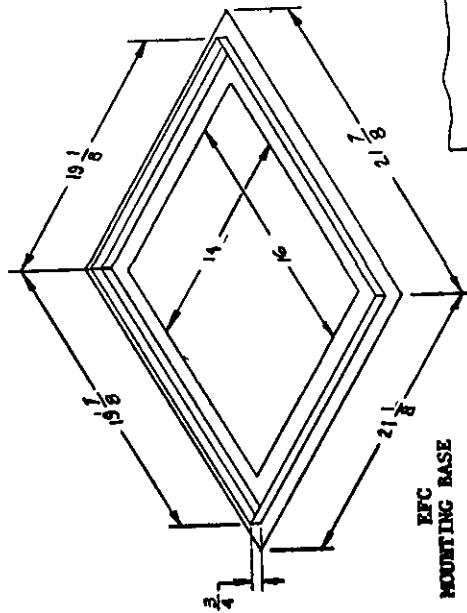
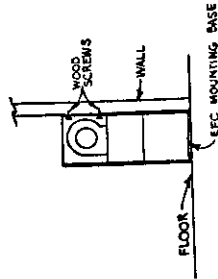
In upflow installations an EFC MOUNTING BASE is not required but the furnace must be secured to the floor. Remove the lower access door and fasten the bottom to the floor with wood screws.

The furnace must be secured at the top. Remove the upper access door and fasten either side of the furnace to a vertical wall partition with wood screws through the holes provided.

DOWNFLOW INSTALLATION

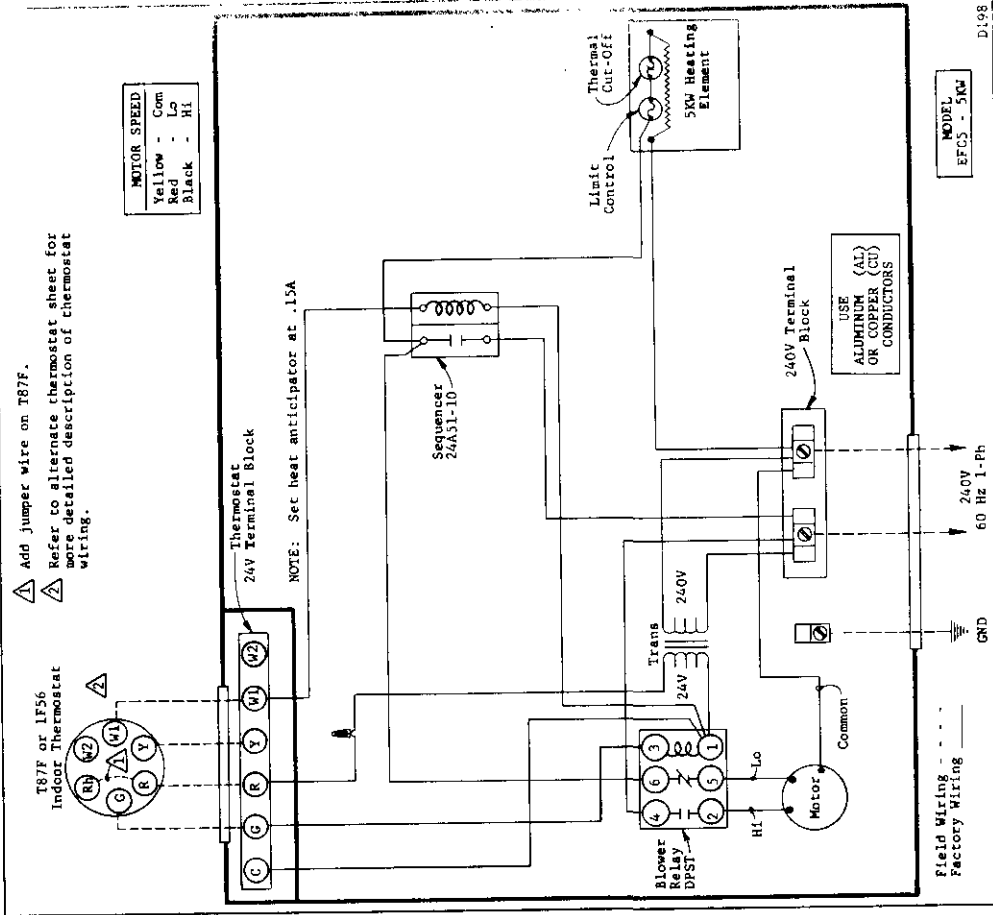
In downflow installations an EFC MOUNTING BASE is required. Set the EFC MOUNTING BASE in position, mark the floor and cut the hole. After the floor opening has been made, set the EFC BASE in place. Secure the base to the floor with wood screws through the holes provided. Set the furnace in place and secure it to the base with sheet metal screws through the holes provided.

In addition to installing the furnace with an EFC MOUNTING BASE, the furnace must be secured at the top. Remove the upper access door and fasten either side of the furnace to a vertical wall partition with wood screws through the holes provided.



EFC MOUNTING BASE

Side View



△ Add jumper wire on T87F.

△ Refer to alternate thermostat sheet for more detailed description of thermostat wiring.

MOTOR SPEED	
Yellow	- Com
Red	- Lo
Black	- HI

Thermostat
24V Terminal Block

NOTE: Set heat anticipator at .15A

Sequencer
24A31-10

Trans
24V
240V

Blower
Relay
DPST

Motor
HI
LO
Common

240V Terminal
Block

USE
ALUMINUM (AL)
OR COPPER (CU)
CONDUCTORS

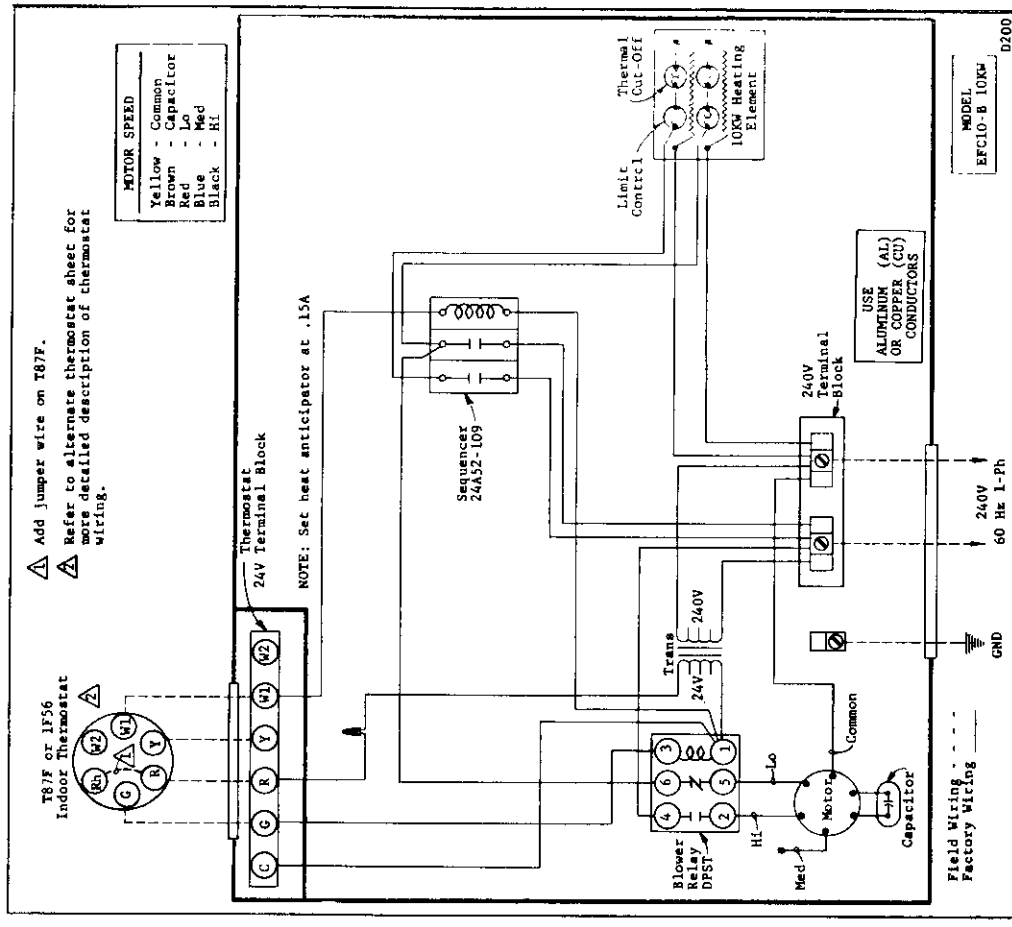
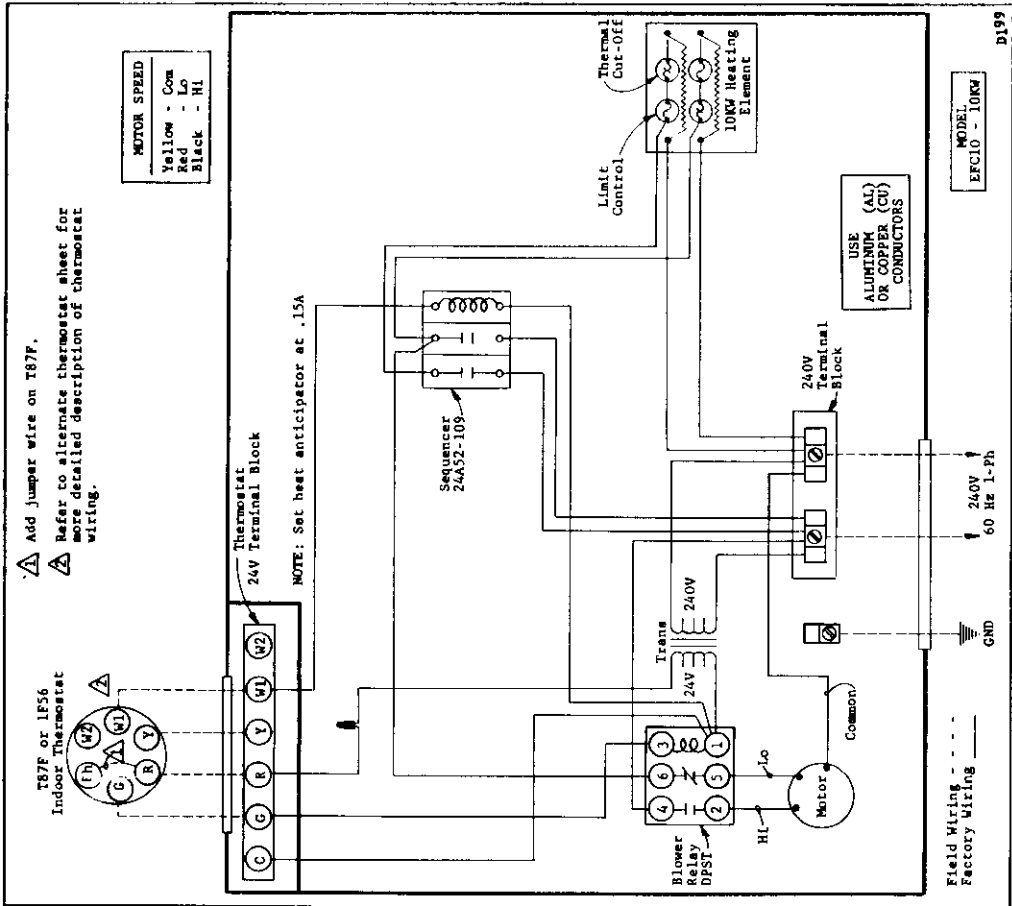
240V
60 Hz 1-Ph

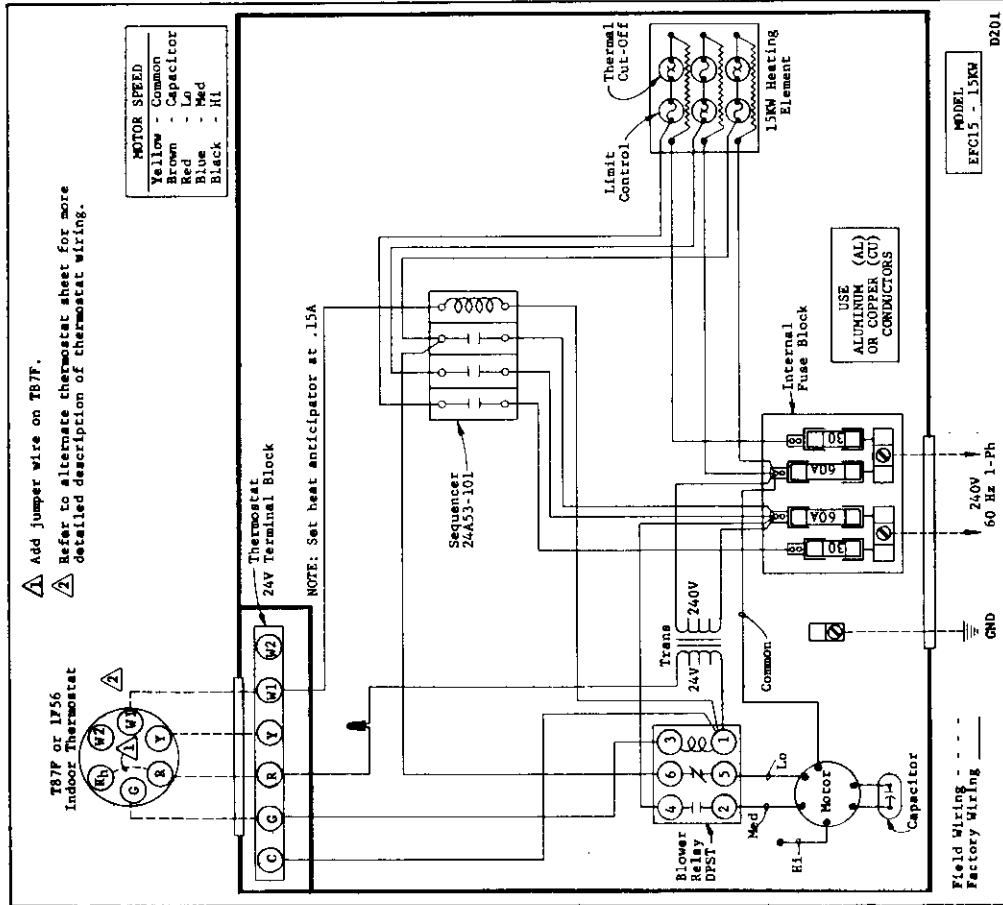
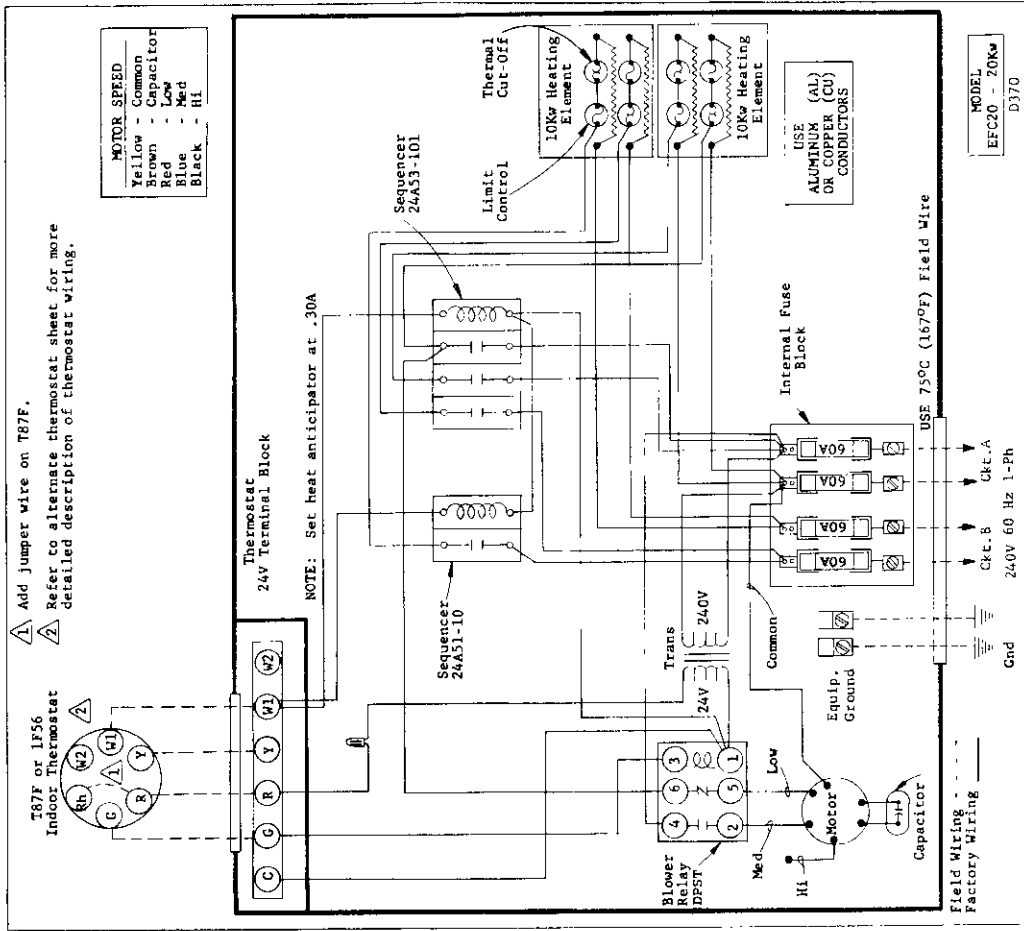
GRD

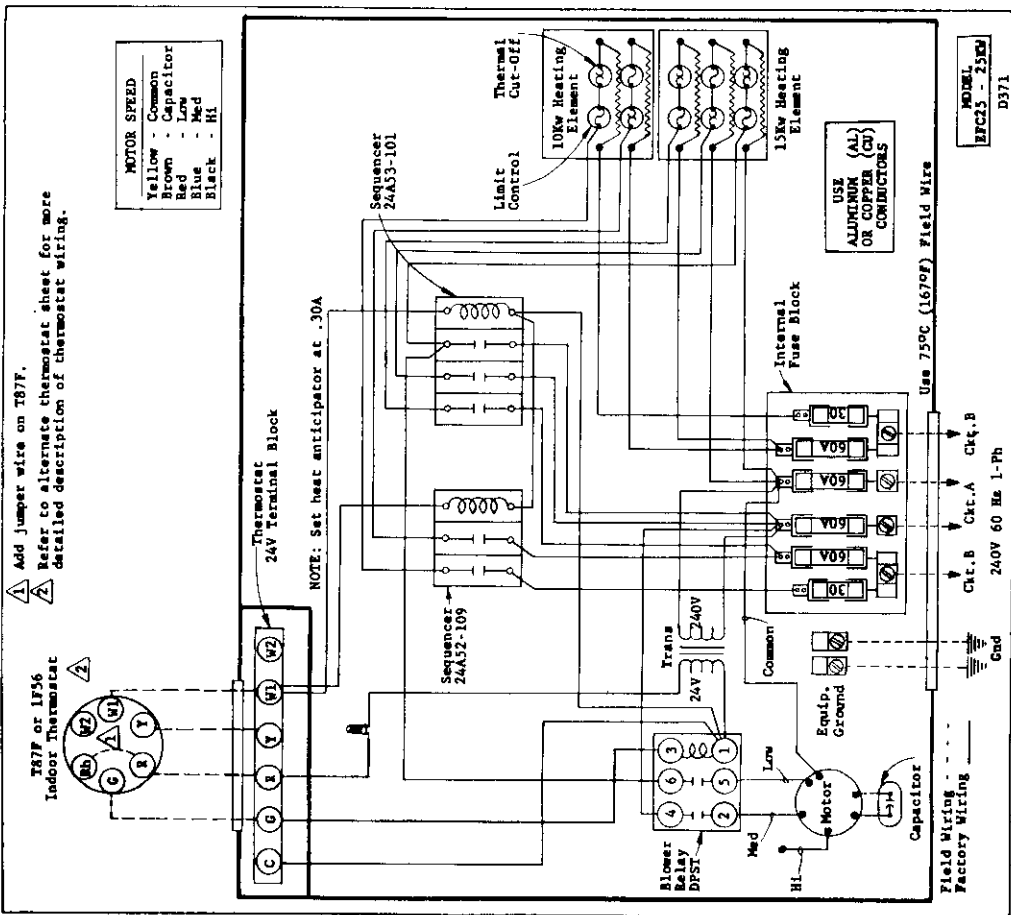
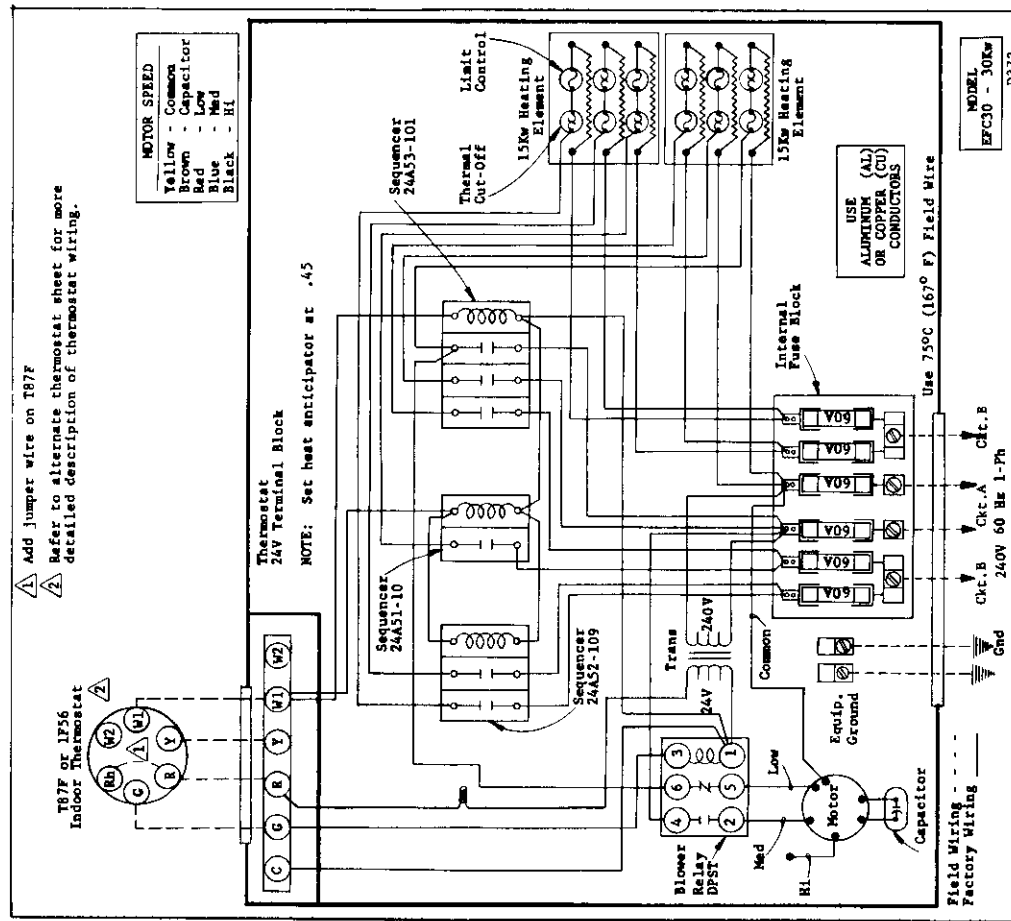
Field Wiring - - - -
Factory Wiring - - - -

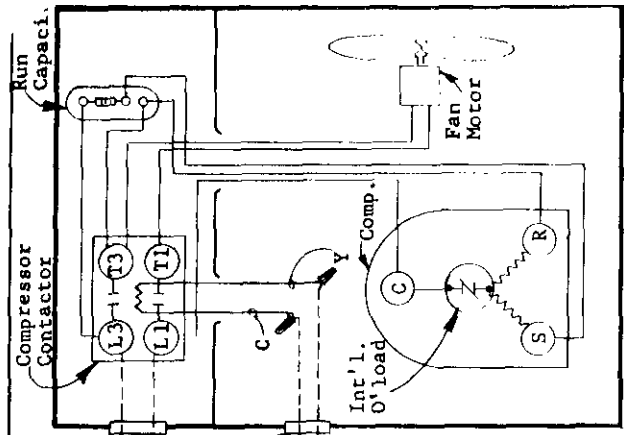
MODEL
EFC3 - 5KW

D198









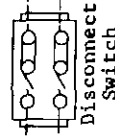
1 Add jumper wire on T87F.

2 For 2-stage heat operation, disconnect the BLUE wire that is factory connected to 24V terminal W1 and reconnect to terminal W2. Connect a thermostat lead wire between W2 terminal at thermostat and W2 terminal at 24V terminal strip in EFC.

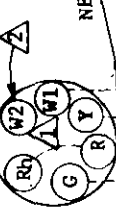
Refer to Installation Instruction sections on Heater Staging and Heat Anticipator Settings for further information.

TYPICAL ELECTRIC FURNACE WITH AIR CONDITIONING

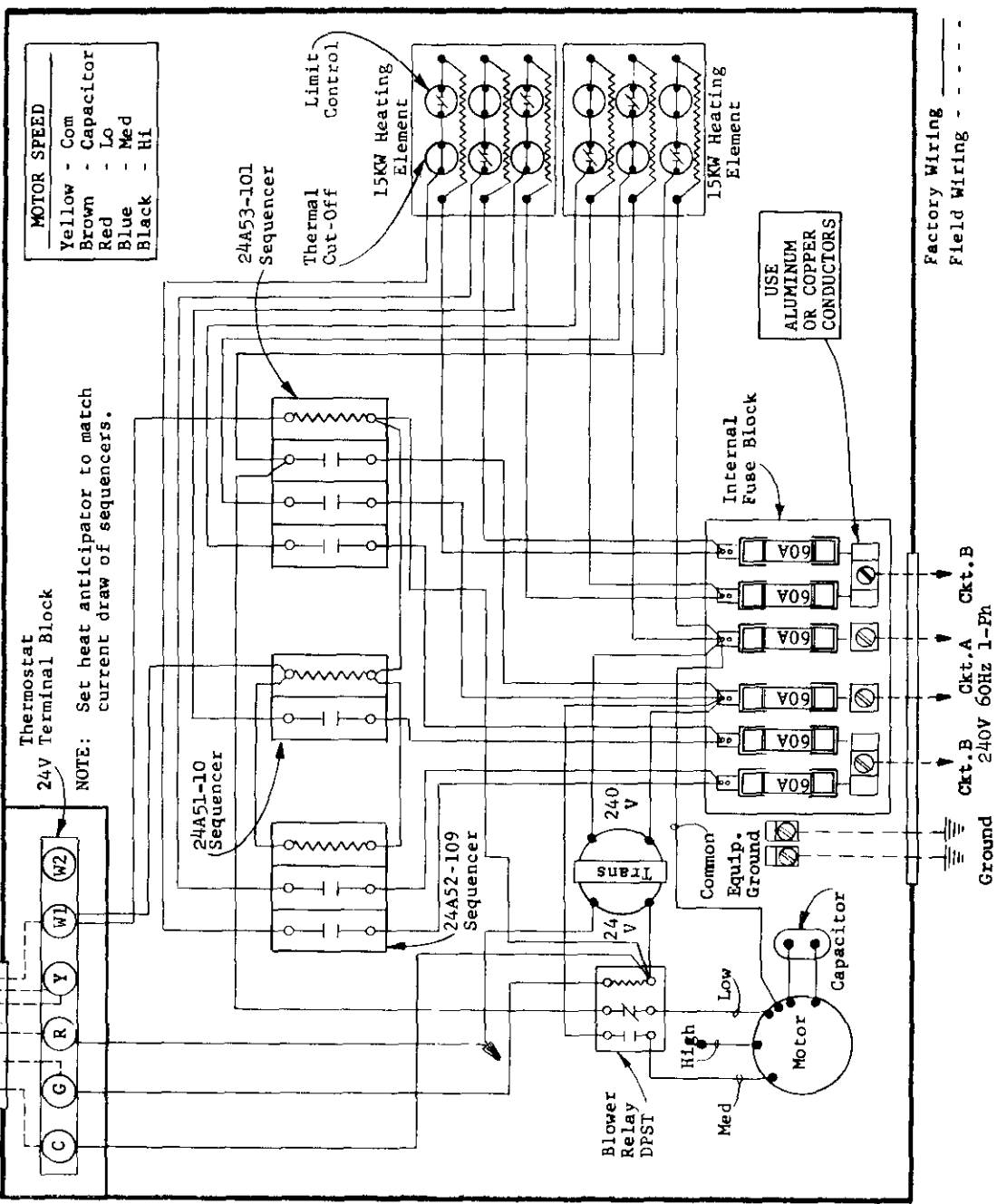
230V 60 Hz 1-Phase



T87F or 1F56 Indoor Thermostat



NEC Class 2 24 V



MOTOR SPEED	
Yellow	- Com
Brown	- Capacitor
Red	- Lo
Blue	- Med
Black	- Hi

NOTE: Set heat anticipator to match current draw of sequencers.

USE ALUMINUM OR COPPER CONDUCTORS

Factory Wiring
Field Wiring

ALPHABETICAL PARTS LIST
ELECTRIC FURNACE

4/1/76

PART NO.	DESCRIPTION	EFC10	EFC10-B	EFC15	EFC20	EFC25	EFC30
5152-026	Blower Housing	x					
5152-035	Blower Housing		x	x	x		
5152-034	Blower Housing					x	x
5152-005	Blower Wheel	x					
5152-010	Blower Wheel		x	x	x		
5152-014	Blower Wheel					x	x
1171-005	Cabinet Latch (2 req'd)	x	x	x	x	x	x
8552-001	Capacitor 370V		x	x	x		
8552-002	Capacitor 370V					x	x
1171-002	Door Pull	x	x	x	x	x	x
7004-001	Filter (2 req'd)	x					
7003-001	Filter (2 req'd)		x	x	x	x	x
8614-007	Fuse			(2)	(4)	(4)	(6)
8614-006	Fuse (2 req'd)			x		x	
8614-017	Fuse Block			x			
8614-013	Fuse Block				x		
8614-014	Fuse Block					x	
8614-019	Fuse Block						x
8604-014	Heat Strip 10Kw	x	x		(2)	x	
8604-015	Heat Strip 15Kw			x		x	(2)
8402-015	Limit Switch	(2)	(2)	(3)	(4)	(5)	(6)
8102-003	Motor	x					
8105-012	Motor		x	x	x		
8105-010	Motor					x	x
8200-003	Motor Mount	x	x	x	x	x	x
5451-011	Motor Mounting Parts	x	x	x	x	x	x
8201-014	Relay - Blower	x	x	x	x	x	x
8401-017	Sequencer				x		x
8401-018	Sequencer	x	x			x	x
8401-019	Sequencer			x	x	x	x
8607-005	Terminal Board 24V	x	x	x	x	x	x
8607-001	Terminal Block 230V	x	x				
8402-018	Thermal Cut-off	(2)	(2)	(3)	(4)	(5)	(6)
8407-007	Transformer	x	x	x	x	x	x

Minimum Net Billing - \$5.00. Supersedes all previous lists.
Subject to change without notice. F.O.B. Bryan, Ohio