

## O12 SERIES UNITS

### I - INTRODUCTION

The O12 has been in production since 1976. It used the OL 1-80 series oil burner as indicated in Table 1. The unit is factory assembled with a two stage oil pump. Detailed operation, maintenance and service procedures for the OL1 oil burner are included in the "Oil Heat" section.

Units are shipped with standard nozzle sizes. Maximum nozzle sizes must be ordered if required. When installing a maximum size nozzle, a static disc size change is required. The correct size static disc for maximum nozzle is shipped with unit. Check "Nozzle Information" to verify static disc sizes. Only one size nozzle is available for O12-70.

Units are sent standard for a single line system, but the oil pump can be converted for two line operation. Simply install the by-pass plug provided in attached bag according to accompanying instructions. Never operate the pump with a single line when by-pass is installed. This will blow the oil bearing seal and damage pump.

Figure 1 shows a cutaway of an O12 unit.

TABLE 1

Unit Model No.	Burner Model Number
O12-70 Series	OL1-80-42
O12-105 Series	OL1-81-52
O12-140 Series	OL1-82-42
O12-168 Series	OL1-83-42

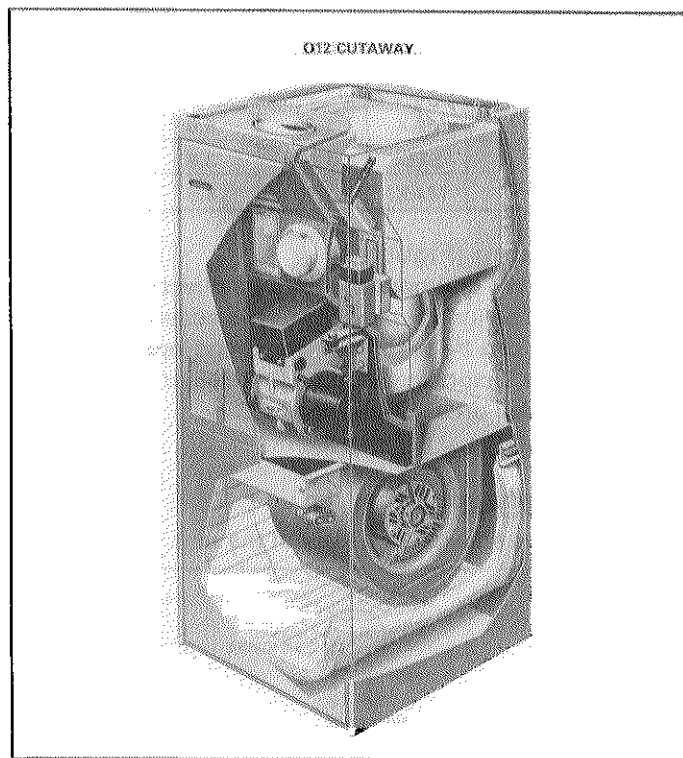


FIGURE 1

### II - UNIT INFORMATION

#### A - Specifications

Model Number	O12D2-70	O12Q3-105	O12Q4-140	O12Q5-168
Btuh input (maximum U.L. Listing)	70,000	105,000	140,000	168,000
Btuh input (nozzle furnished)	70,000	91,000	119,000	140,000
Btuh input (minimum)	70,000	91,000	119,000	140,000
Btuh output (maximum U.L. Listing)	56,000	84,000	112,000	134,000
Btuh output (nozzle furnished)	56,000	73,000	95,000	112,000
Btuh output (minimum)	56,000	73,000	95,000	112,000
Nozzle range (gph)	.50	.65 .75	.85 1.00	1.00 — 1.20
Nozzle furnished (gph)	.50	.65	.85	1.00
Vent size (inches oval)	5	6	7	7
Oil burner standard (2 stage)	OL1-80-42	OL1-81-52	OL1-82-42	OL1-83-42
Blower wheel nom. diam. x width (in.)	9 x 7	10 x 8	10 x 8	12 x 12
Blower motor horsepower	1/5	1/3	1/2	3/4
Tons of cooling that can be added	1 1/2 or 2	2-1/2 or 3	3, 3-1/2 or 4	3-1/2, 4 or 5
Free filter area (sq. ft.) and cut size (in.) (hammock)	---	(6.6) 40 x 28 x 1	(8.9) 54 x 28 x 1	(9.6) 58 x 28 x 1
Number and size of filters (in.) (frame)	(1) 16 x 25 x 1	---	---	---
Shipping weight (lbs.) 1 Package	181	211	220	283
Electrical characteristics	120 volts — 60 hertz — 1 phase			
Return Air Cabinet Model No. (Optional)	RA10 16-49 (Net weight 65 lbs.)		RA10 16-53 (Net weight 75 lbs.)	

## B - Nozzle Information

UNIT		NOZZLE SIZE		INPUT RATING		OUTPUT RATING		STATIC DISC O.D.		NOZZLE TYPE AND SPRAY ANGLE
		Gal./hr.	liter/h	Btuh	kW	Btuh	kW	in.	mm	
012-70 (60 HZ ONLY)	STD.	.50	1.9	70,000	20.5	56,000	16.4	3 <sup>11</sup> / <sub>16</sub>	94	Hago H-70°
012-105 (50 AND 60 HZ)	STD.	0.65	2.5	91,000	26.7	73,000	21.4	3 <sup>3</sup> / <sub>8</sub>	92	
	MAX.	0.75	2.8	105,000	30.8	84,000	24.6	3 <sup>1</sup> / <sub>4</sub>	83	Steinen H-70°
012-140 (50 AND 60 HZ)	STD.	0.85	3.2	119,000	34.9	95,000	27.8	3 <sup>3</sup> / <sub>8</sub>	92	
	MAX.	1.00	3.8	140,000	41.0	112,000	32.8	3 <sup>1</sup> / <sub>4</sub>	83	Monarch NS-70°
012-168 (60 HZ ONLY)	STD.	1.00	3.8	140,000	41.0	112,000	32.8	3 <sup>1</sup> / <sub>4</sub>	83	
	MAX.	1.20	4.5	168,000	49.2	134,000	39.3	NONE	NONE	
012-168 (50 HZ ONLY)	STD.	1.00	3.8	140,000	41.0	112,000	32.8	3 <sup>1</sup> / <sub>4</sub>	83	
	MAX.	1.20	4.5	168,000	49.2	134,000	39.3	3	76	

## C - Field Wiring (Figure 2)

The "R" and "W" thermostat leads wire directly to primary control. When an indoor blower relay is added, the indoor blower motor can be wired for two speed operation. The blower relay is factory installed on O12-105 units and must be field provided on all other models.

### 1 - Combination Fan/Limit Control

The limit de-energizes the control circuit at excessive temperatures. Do not alter limit setting.

Refer to Figure 4 for fan adjustment. O12-140 And O12-168 units also employ a fan start relay. The relay is energized on a heating demand and it then closes its contacts after a time delay to provide a sure fan start.

### 2 - Auxiliary Limit Control

All O12 units have an auxiliary limit control wired in series to the other limit. It must be manually reset.

## III - UNIT COMPONENTS

Figure 3 shows an exploded view of the unit.

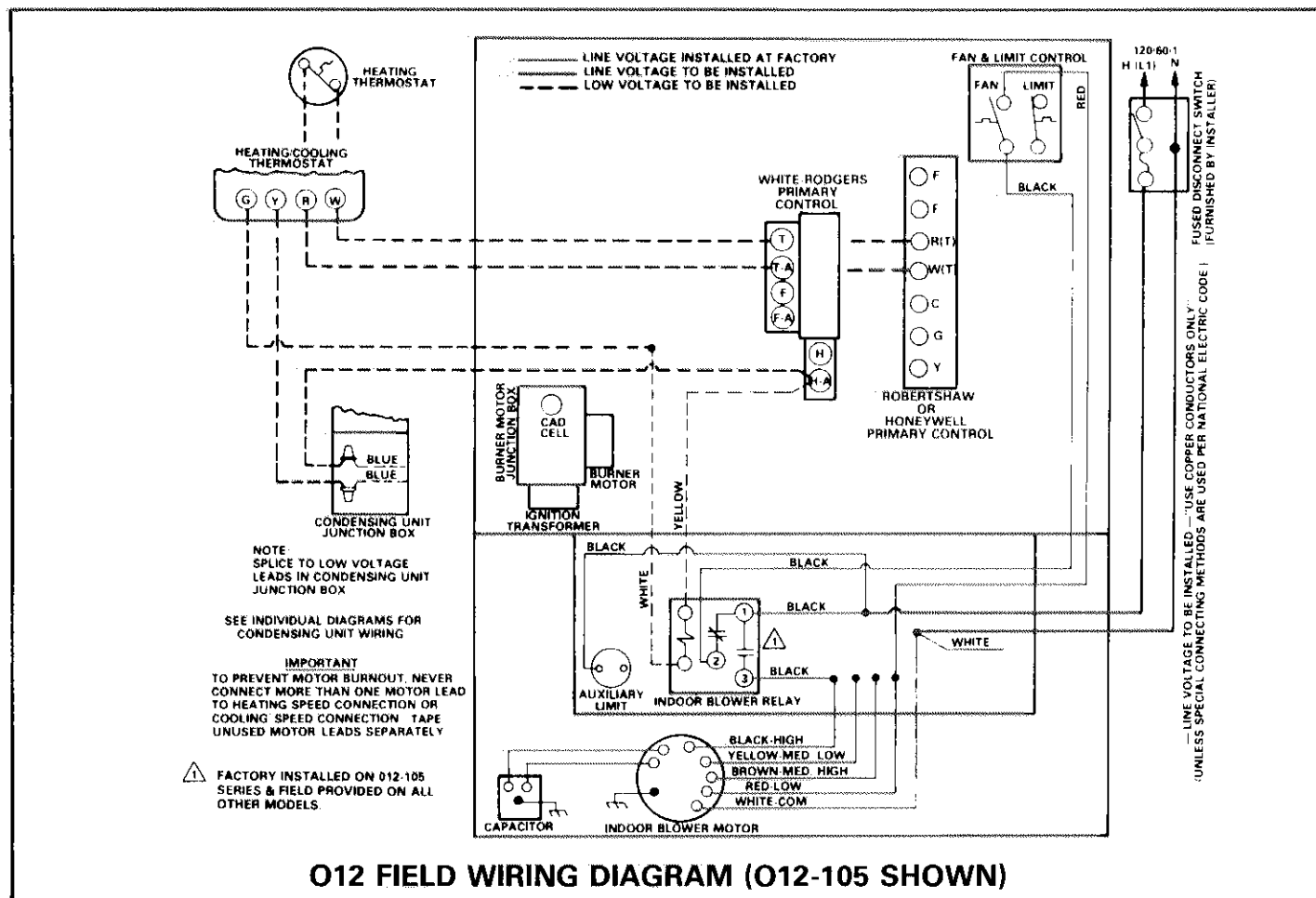


FIGURE 2

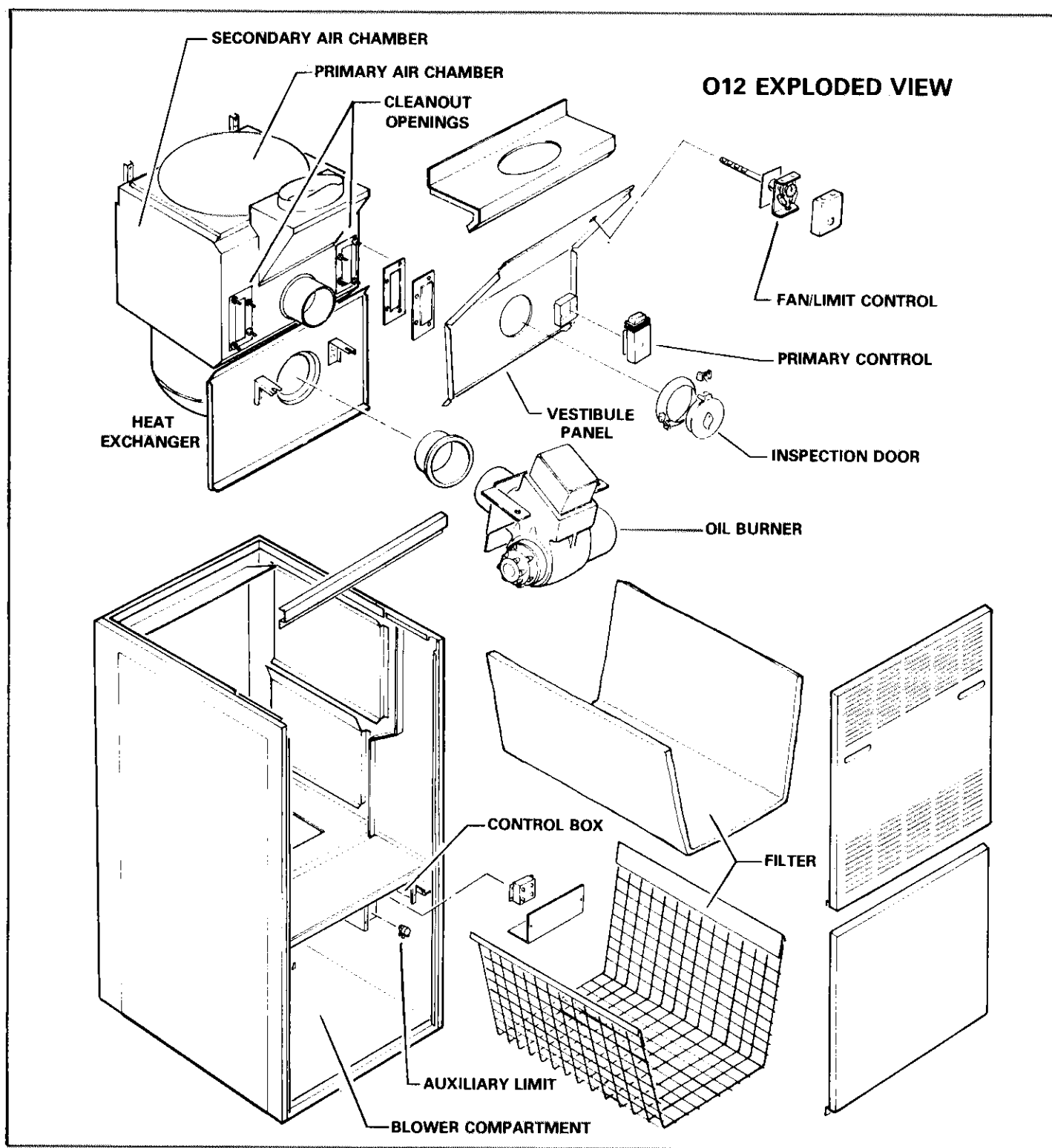


FIGURE 3

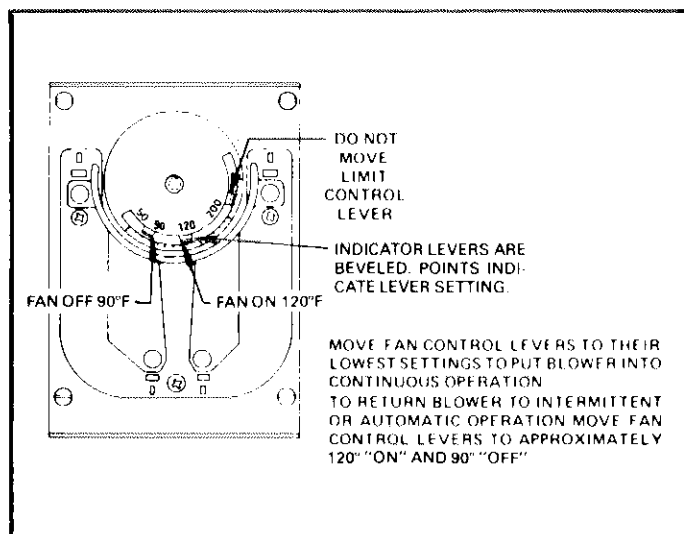
### 3 - Primary Control

Both White-Rodgers (style 668-453) and Robertshaw (style SJ4041) primary controls are used in O12 production. They provide complete shutdown of unit in case of flame failure. Primary control mounts on wiring junction box in furnace vestibule on O12-105/-140 & -168 and in blower compartment on O12-70. A 40 VA transformer is

an integral part of the primary control. If the control locks out, the reset button must be "pushed in" before the unit can try for a restart. See Figure 5.

### 4 - Oil Burner

O12 uses the OL1-80 series oil burner. The burner motor has thermal cutout protection. In the event motor locks out, push reset button after motor has had sufficient time



**FIGURE 4**

to cool. See Figure 5. Refer to section 11.2A for additional information.

#### 5 - Heat Exchanger And Combustion Chamber

Heat exchanger construction consists of a primary and secondary heating surface. The oil is ignited in the primary chamber and the combustion gases pass through a rear opening into the secondary chamber before being vented.

Two cleanout openings are provided in the front of secondary chamber. Remove vestibule panel for access. Primary heating surface cleanout access is through the inspection tube. The inspection tube is also used for flame inspection.

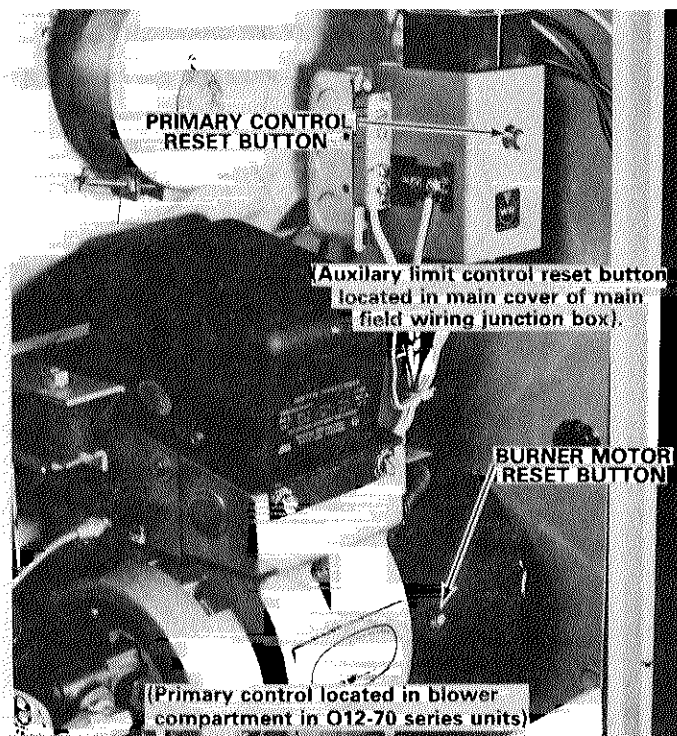
The fiber combustion chamber provides a high temperature zone for clean, quiet and efficient combustion. Chemical soot removers should not be used for cleaning. When installing, cleaning or servicing furnace, do not scrape or mutilate combustion chamber lining. Replacement combustion chamber kits are available. See Table 2.

#### 6 - Filter

O12-105/-140 & -168 units are equipped with a hammock type wrap around filter. O12-70 units use a one inch thick frame type filter.

**TABLE 2**

Unit Model No.	Combustion Chamber Replacement Kit
O12-70 Series	LB-35902BA
O12-105 Series	
O12-140 Series	LB-35902BB
O12-168 Series	



**FIGURE 5**

## IV - TEMPERATURE RISE

To measure temperature rise, place plenum thermometers in warm air and return air plenums. Locate thermometer in warm air plenum where thermometer will not "see" heat exchanger, thus picking up radiant heat. Turn up thermostat as high as possible to start unit. After plenum thermometers have reached their highest and steadiest readings, subtract the readings. This difference should be approximately 80°F. If this temperature is low, decrease blower speed; if temperature is high, increase blower speed. Table 3 shows the speed selection charts for the various units.

**TABLE 3**

### BLOWER SPEED SELECTION

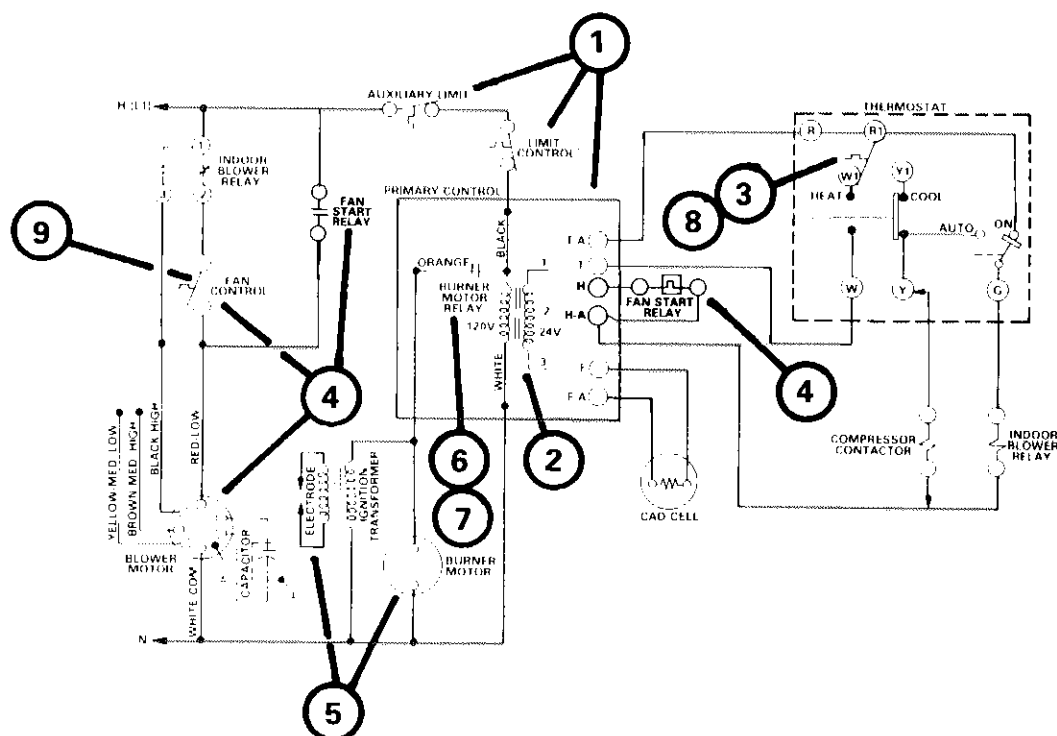
(APPROXIMATE) TO PREVENT MOTOR BURNOUT NEVER CONNECT MORE THAN ONE MOTOR LEAD TO ANY ONE CONNECTION. FAN UNUSED MOTOR LEADS SEPARATELY.

SPEED	BLOWER MOTOR LEAD		
	D2 OR Q4	Q3	Q5
LOW	RED	RED	RED
MEDIUM LOW	---	YELLOW	YELLOW
MEDIUM	YELLOW	---	BLUE
MEDIUM HI	---	BROWN	BROWN
HIGH	BLACK	BLACK	BLACK

## V - SCHEMATIC WIRING DIAGRAM OPERATING SEQUENCE

Figure 6 illustrates a typical O12Q4-140 with a White-Rodgers primary control.

## TYPICAL O12 SEQUENCE OF OPERATION



- 1 - Line potential feeds through the auxiliary limit and limit controls to power primary control.
- 2 - The primary control provides 24 volt control circuit.
- 3 - On a heating demand, the thermostat heating bulb makes.
- 4 - On O12-140 & -168 units the fan start relay is energized. In approximately 30 seconds the relay contacts make to energize the indoor blower motor on low speed. On O12-70 & -105 units, the fan control initiates blower motor operation.
- 5 - The primary control simultaneously energizes the burner motor and ignition transformer at the oil burner. The burner motor operates the oil pump and combustion

blower to feed air and oil vapor into the combustion chamber. The fuel mixture should ignite with the spark furnished by ignition transformer.

- 6 - If combustion does not take place within approximately 45 seconds, as detected by cad cell, the primary control locks itself out.
- 7 - Should a flame failure occur during the heating cycle, the primary control locks itself out in response to the cad cell.
- 8 - As the heating demand is satisfied, the thermostat heating bulb breaks. This de-energizes the oil burner circuits.
- 9 - The blower motor continues running until furnace temperature drops below fan control setpoint.

FIGURE 6