

# AMANA AIR COMMAND 90

<b>MODEL NUMBER:</b>	GUD
<b>BTU SIZES:</b>	45,000, 70,000, 90,000, 115,000 BTU'S

### ACCESSIBILITY CLEARANCE

Minimum - 36" at front is required for servicing or cleaning.

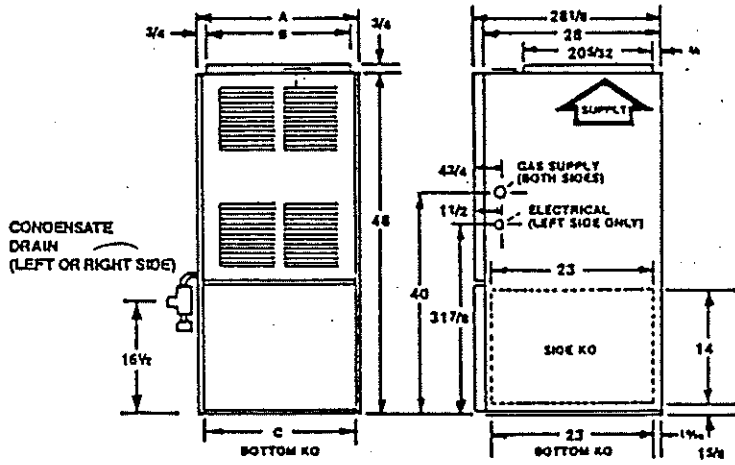
NOTE: In all cases accessibility clearance shall take precedence over clearances from the enclosure where accessibility clearances are greater.

### CLEARANCE FROM COMBUSTIBLE MATERIAL

- Front - 6"
- Left side - 1"
- Right side - 1"
- Rear - 0
- Top - 1"
- Flue 0
- Floor - C (combustible floor (wood only))

### COLD AIR RETURN AIR DUCTS

UPFLOW ONLY



Furnace models GUD045B30A, GUD070B30A, GUD070B40A, GUD090B35A are shipped with one filter. Furnace models GUD090B50A and GUD115B50A are shipped with two filters. If these furnaces are to be operated at high speed, then two return air connections must be made. These may be made on both sides of the furnace cabinet, or on one side and the bottom.

## GARAGE

When installed in a residential garage the furnace must be positioned so the burners and ignition source are located not less than 18 inches above the floor and protected from physical damage by vehicles.

## GENERAL

**CAUTION:** This unit should not be used as a construction heater.

The furnace must be set on a level floor to enable the condensate produced to drain properly.

Do not locate the furnace or its condensate drainage system in an area which will be subject to below freezing temperatures.

Do not install the furnace directly on carpeting, tile, or combustible material other than wood flooring. In addition, the furnace should be located as centrally as is practical.

### DIRECT VENT GAS FURNACE SPECIFICATIONS

Upflow Model	BTUH		Temp. Rise Range, °F	Number of Burners	E.L.A.	Blower D x W	Type	Blower Horsepower	Blower Speeds	Max. CFM @ .5 ESP	Filters			Approx. Ship Weight	
	Input	Output									Size	Type	Qty.		Weight
GU004S830A	(1) 45,000 (2) 45,000 (3) 40,500	(1) 43,000 (2) 43,400 (3) 39,100	25-55	2	15.1	10x8	PSC	%	3	1295	16x25x1	Semi-Permanent	1	145	158
GU0070830A	(1) 70,000 (2) 70,000 (3) 63,000	(1) 65,000 (2) 66,400 (3) 59,800	35-65	3	14.3	10x8	PSC	%	4	1270	16x25x1	Semi-Permanent	1	159	194
GU0070840A	(1) 70,000 (2) 70,000 (3) 63,000	(1) 65,000 (2) 66,400 (3) 59,800	35-65	3	17.3	10x10	PSC	%	4	1650	16x25x1	Semi-Permanent	1	168	194
GU0090835A	(1) 90,000 (2) 90,000 (3) 81,000	(1) 83,000 (2) 85,700 (3) 77,100	45-75	4	13.2	10x8	PSC	%	4	1400	16x25x1	Semi-Permanent	1	181	216
GU0090850A	(1) 90,000 (2) 90,000 (3) 81,000	(1) 84,000 (2) 85,700 (3) 77,100	35-65	4	17.4	10x10	PSC	%	4	2000	16x25x1	Semi-Permanent	2	190	216
GU011S850A	(1) 115,000 (2) 115,000 (3) 103,500	(1) 107,000 (2) 107,500 (3) 98,800	35-65	5	17.4	10x10	PSC	%	4	2000	16x25x1	Semi-Permanent	2	215	231

- (1) For United States installations (Output ratings are preliminary.)  
 (2) For Canadian installation at 0-2000 ft. (Output ratings are preliminary.)  
 (3) For Canadian installation at 0-4500 ft. (Output ratings are preliminary.)  
 (4) Includes 5 amps drawn by ignitor during 21-second start up cycle.

This is a direct vent upflow type furnace for installation in a basement, closet or utility room.

**PIPING** - 1) Use ground joint unions. (Inside or outside of furnace). 2) Install a drip leg to trap dirt and moisture before it can enter the gas valve. The drip leg must be a minimum of three inches long. 3) Install a manual shut off valve. 4) Listed gas appliance connectors used in accordance with the terms of their listing that are completely in the same room as the equipment.

**CAUTION:** Wiring to the unit must be properly polarized and grounded.

Heat anticipator must be set at 0.7 amps.

Check temperature rise. **NOTE:** Air temperature rise is the temperature difference between supply and return air.

If the correct amount of temperature rise is not obtained, it may be necessary to change the blower speed. A higher blower speed will lower the temperature rise. A slower blower speed will increase the temperature rise.

Refer to the **WIRING DIAGRAM** on the furnace to connect the proper wires to the correct motor leads to the correct control terminals. All unused motor leads that are not connected to "park" terminals on the control must be taped.

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GENERAL

Check limit control operation after 15 minutes of operation by blocking the return air grille(s).

Never operate the furnace without a filter.

The blower compartment should be inspected and cleaned every two months as required. If the replacement of the filter(s) becomes necessary, it must be replaced with a filter of the same type and size.

Remember that dirty filters are the most common cause of inadequate heating or cooling performance.

Once each year oil your blower motor by adding 4 to 6 drops of SAE#20 motor oil to each motor bearing oil tube. NOTE: Do not over oil.

NOTE: Some blower motors may be permanently lubricated and do not require oiling. This type of motor does not have oil ports.

Vent blower motor may be oiled annually with 6 drops of Anderoil 465 oil. (3 drops in each oil tube)

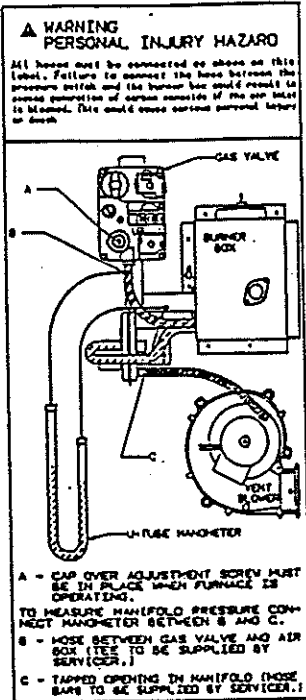
HIGH ALTITUDE INSTALLATIONS

Deration	When this furnace is installed at altitudes above 2,000 feet the furnace input must be derated 4% for each 1,000 feet above sea level because the density of the air is reduced.		
Orifice	Altitude	Orifice Size	Kit No.
	0-3500 ft.	#43	Factory installed
	3500-6000 ft	#44	HANG01
	6000-7500	#45	HANG02
	7500-8500	#46	HANG03
	8500-10,000	#47	HANG04
	10,000-15,000	#48	HANG05
Regulator Pressure	Adjustment of the manifold pressure to a lower pressure reading than what is specified on the furnace nameplate is not a proper derate procedure.  In no case should the final manifold pressure vary more than plus or minus 0.3 inches water column from the specified pressure. Any major changes in flow should be made by changing the size of the burner orifices. See Figure 16		
Pressure Switch	A different pressure switch is required at altitudes more than 4,000 feet above sea level. This is required regardless of the heat content of the fuel used.		

High altitude kits can be purchased depending upon the altitude.

Altitude	4000-7000 ft.	7000-10,000 ft
Model:	Kit No.	Kit No.
GUD045BXXA	HAPS08	HAPS09
GUD070BXXA	HAPS09	HAPS11
GUD090BXXA	HAPS08	HAPS09
GUD115BXXA	HAPS11	HAPS12

Figure 16



MOBILE HOME

Do not install this unit in a mobile home, trailer, or recreational vehicle.

VENTING MATERIAL AND REQUIREMENTS

<p>Vent Pipe</p>	<p>Category IV Direct Vent Furnace is designed to be vented to the outside of the structure for the intake of combustion air. Two or three inch PVC Schedule 40 pipe meeting ASTM 1785, PVC primer and PVC solvent cement meeting ASTM D2576 specifications must be used. Only DWV type fittings meeting ASTM D2655 for socket dimensions and ASTM D3311 for exterior dimensions can be used. CSA approved ABS pipe, fittings, primer and/or solvent cement may also be used.</p>
<p>Vent Fittings</p>	<p>All 90 degree elbows must be either medium radius (1/4 bend DWV) or long radius (long sweep 1/4 bend DWV) types conforming to ASTM D3311. A medium radius (1/4 bend) elbow id 3 1/16 inch minimum from the plane of one opening to the centerline of the other opening for 2" pipe (4 9/16" for 3" pipe).</p>

Common venting of this furnace with another appliance (water heater, etc.) is not allowed.

All combustion air and exhaust piping must be installed in accordance with local codes and these instructions.

Test for spillage at the draft hood relief opening after 5 minutes of main burner operation.

This furnace must not be connected to any type B, BW, or L vent or vent connector and must not be vented into any portion of a factory built or masonry chimney, except when used as a pathway for PVC pipe as described below.

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## VENT MATERIAL AND REQUIREMENTS

This furnace is supplied with 2" and 3" air intake terminal screens. For both vertical and horizontal installations, insert the appropriately sized screen into the air intake terminal until it is firmly secured at the hub of the terminal elbow.

If the combustion air pipe is to be installed above a suspended ceiling or other area where dripping of condensation will be objectionable, insulation of the combustion air pipe may be required. Where required, use 1/2" thick closed cell foam insulation such as Armaflex or Isultube.

**LOCATION:** This furnace can be installed with either a vertical or horizontal direct vent. In either case, the exhaust vent and the combustion air intake pipe must be located on the same side of the structure and separated by no less than 16 inches and no more than 24 inches.

- 1) The vent termination must be at least 3 feet above any forced air inlet located within 10 feet.
- 2) The vent termination must be at least 12 inches away from any door, window, or gravity air inlet into any building.
- 3) The vent must terminate at least 1 foot above ground level or roof level. If heavy snow accumulation is expected, this distance will need to be increased.
- 4) The vent shall not terminate over public walkways or over an area where condensate or vapor could create a nuisance or hazard or could be detrimental to the operation of regulators, relief valves, or other equipment.

At the start of each heating season, inspect and, if necessary, clean the furnace flue passages.

## VENT CLEARANCE FROM COMBUSTIBLE MATERIAL

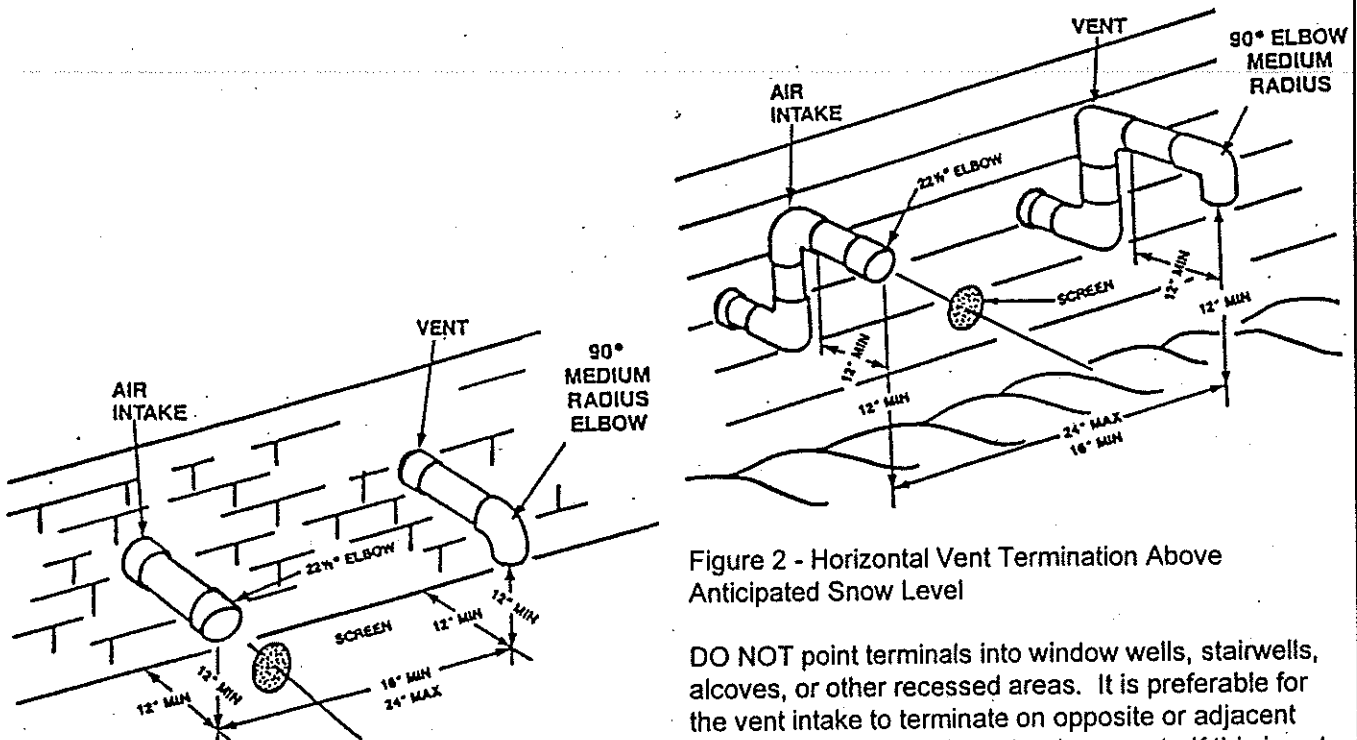


Figure 1 - Horizontal Vent Termination

Figure 2 - Horizontal Vent Termination Above Anticipated Snow Level

DO NOT point terminals into window wells, stairwells, alcoves, or other recessed areas. It is preferable for the vent intake to terminate on opposite or adjacent sides of the structure from the dryer vent. If this is not practical, maintain a 10 foot clearance

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## VENT CLEARANCE FROM COMBUSTIBLE MATERIAL

Maintain at least a three foot clearance from the air intake pipe to plumbing vent stacks.

The vent and air intake pipe may be run through an existing unused chimney. However, the pipes must be run all the way through the chimney, with the air pipe terminating at least 12" from the top of the chimney. The flue pipe must terminate at least 12" above the air intake.

**NEVER VENT WITH AN EXISTING APPLIANCE OR A VENT USED BY A SOLID FUEL APPLIANCE.**

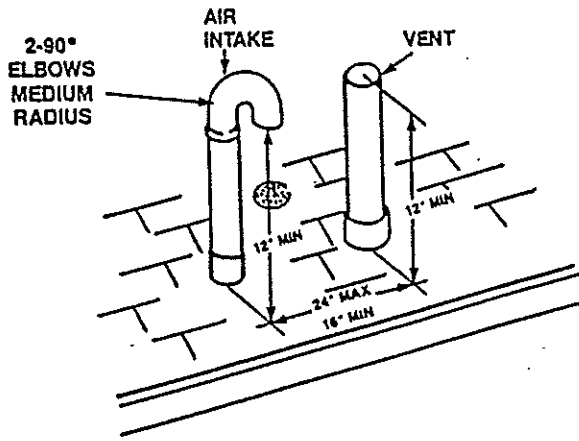


Figure 3 - Vertical Vent Termination

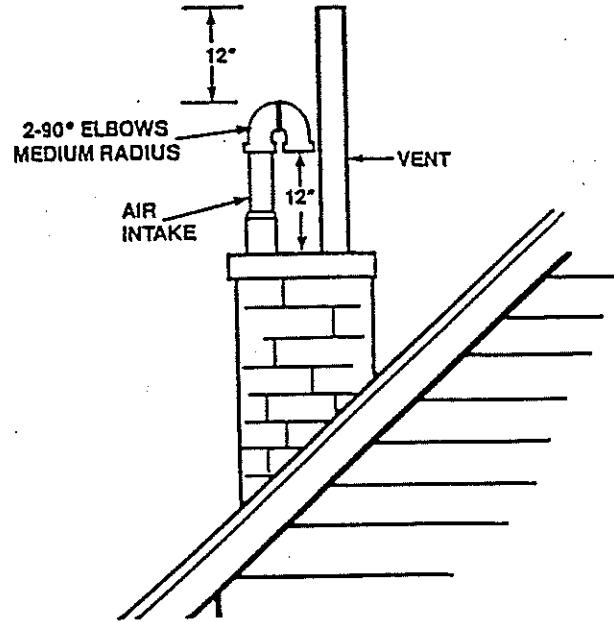


Figure 4 - Venting Through an Existing Chimney

## VENTING PROCEDURE

Do not terminate the combustion air intake where the air is often heavily contaminated with compounds containing chlorine or fluorine. (Swimming pools, clothes dryer vents, remote air conditioning or heat pump units, plumbing vent stacks, or exhaust fans).

Consult Tables 3 to 6 to select the proper diameter exhaust and combustion air piping. Two 45° elbows are equivalent to one 90° elbow. For horizontal piping, the elbow(s) used for vent and air pipe termination outside the structure as shown in Figure 1 are not counted when using Tables 3 thru 6. The additional two 90° elbows as shown in Figure 2 must be counted. If vertical piping is used, the two additional 90° elbows on the air intake as shown in Figure 3 and Figure 4 must be counted. **WHEN THE VENT SYSTEM REQUIRED IS BORDERLINE WITH NEXT SIZE COMBINATION CATEGORY, USE THE NEXT LARGER SIZE.**

No. of ELBOWS	VENT TYPE	FEET OF STRAIGHT PIPE EACH RUN						
		5-10	10-15	15-20	20-25	25-30	30-35	35-40
1	INLET	2	2	2	2	2	2	2
	EXHAUST	2	2	2	2	2	2	2
2	INLET	2	2	2	2	2	2	3
	EXHAUST	2	2	2	2	2	2	2
3	INLET	2	2	2	2	2	3	3
	EXHAUST	2	2	2	2	2	2	2
4	INLET	2	2	2	2	3	3	3
	EXHAUST	2	2	2	2	2	2	2
5	INLET	2	2	2	3	3	3	3
	EXHAUST	2	2	2	2	2	2	2
6	INLET	2	2	3	3	3	3	3
	EXHAUST	2	2	2	2	2	2	2

Table 3 - 45,000 BTUH FURNACE

No. of ELBOWS	VENT TYPE	FEET OF STRAIGHT PIPE EACH RUN						
		5-10	10-15	15-20	20-25	25-30	30-35	35-40
1	INLET	2	2	2	2	2	2	2
	EXHAUST	2	2	2	2	2	2	2
2	INLET	2	2	2	2	2	2	3
	EXHAUST	2	2	2	2	2	2	2
3	INLET	2	2	2	2	2	3	3
	EXHAUST	2	2	2	2	2	2	2
4	INLET	2	2	2	2	3	3	3
	EXHAUST	2	2	2	2	2	2	2
5	INLET	2	2	2	3	3	3	3
	EXHAUST	2	2	2	2	2	2	2
6	INLET	2	2	3	3	3	3	3
	EXHAUST	2	2	2	2	2	2	2

Table 4 for 70,000 BTUH FURNACE

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**VENTING PROCEDURE**

NOTE: Vent pipe diameters apply for installation from sea level to 2000 ft. For installations above 2000 ft. reduce the maximum pipe length as follows: 2000-5000 ft. above sea level-reduce max length allowable by 5 ft. 5001-7000 ft. above sea level-reduce max. length allowable by 10 ft.

No. of ELBOWS	VENT TYPE	FEET OF STRAIGHT PIPE EACH RUN						
		5-10	10-15	15-20	20-25	25-30	30-35	35-40
1	INLET	2	2	3	3	3	3	3
	EXHAUST	2	2	2	2	2	2	2
2	INLET	2	3	3	3	3	3	3
	EXHAUST	2	2	2	2	2	2	2
3	INLET	3	3	3	3	3	3	3
	EXHAUST	2	2	2	2	2	2	3
4	INLET	3	3	3	3	3	3	3
	EXHAUST	2	2	2	2	2	3	3
5	INLET	3	3	3	3	3	3	3
	EXHAUST	2	2	2	2	3	3	3
6	INLET	3	3	3	3	3	3	3
	EXHAUST	2	2	2	3	3	3	3

Table 5 - 90,000 BTU FURNACE

Table 6 - 115,000 BTUH FURNACE

HORIZONTAL ONLY - To prevent the pipe from moving, and possibly damaging the connections, locate the fittings on the inside wall and a coupling on the outside as shown in Figure 5.

In a basement installation, the vent pipe may be run between the joist spaces. If the pipes must go below the joists, then the pipes must run up into the last joist space to go through the header. Two 45° elbows should be used rather than 90's. The horizontal run must not have any sag that can hold condensate and should pitch up at least 1/4" per foot so that condensate will run back to the unit to drain. Support the horizontal run at least every three feet.

**MISCELLANEOUS INFORMATION/NOTES**

**NORMAL SEQUENCE:**

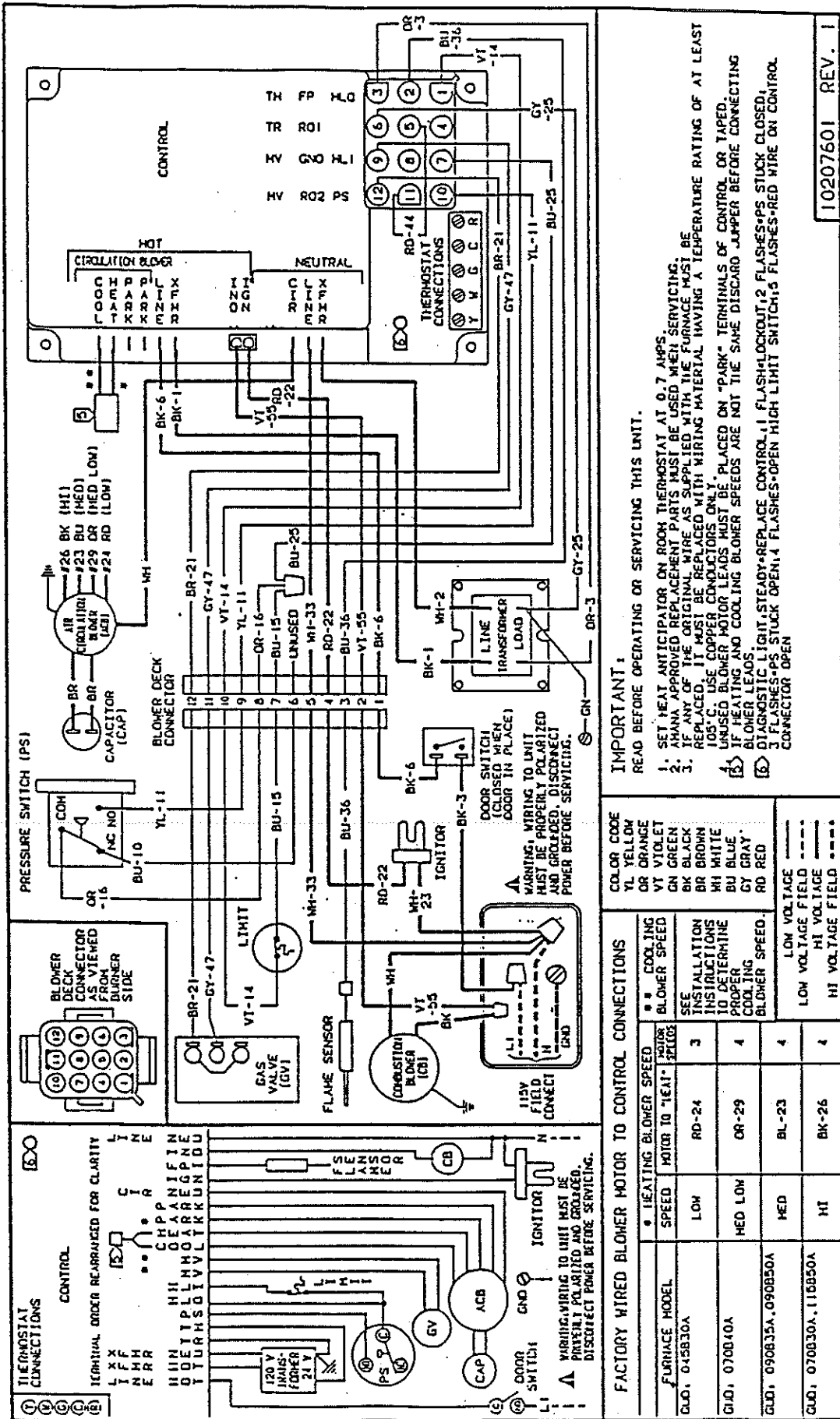
1. Thermostat calls for heat.
2. The vent blower is energized.
3. The ignitor is energized and allowed to preheat for 17 seconds.
4. The gas valve is energized delivering gas to the burners and starting combustion.
5. Seven seconds after the gas valve was energized, the controls started checking the signal from the flame sensor. Gas will only continue to flow if a signal is present.
6. The control waits 30 seconds and turns on the air circulation blower to the speed that was selected for heating operation.
7. The thermostat is satisfied and opens.
8. The control de-energizes the gas valve.
9. There is a 15 second delay while flue products are purged from the furnace heat exchanger and then the vent blower motor is de-energized.
10. There is another 75 second delay to allow heat in the heat exchanger to be transferred to the conditioned space and then the air circulation blower will stop.

**ABNORMAL OPERATION:**

1. Internal control failure with White-Rodgers control - If the control during one of its test cycles determine it has an internal fault, it stops and the diagnostic light will light continuously. The control should be replaced.
2. System lockout - 1 flash
3. Pressure switch stuck closed - 2 flashes
4. Pressure switch stuck open - 3 flashes
5. Open limit switch - 4 flashes
6. Missing jumper wire - 5 flashes
7. Flame sensed with no call for heat - continuous flashing



# XIII WIRING DIAGRAMS



10207601 REV. 1

