

INSTALLATION INSTRUCTIONS FOR UPFLOW — DOWNFLOW GAS FURNACES

WARNING:

Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage. Refer to this manual. For assistance or additional information consult a qualified installer, service agency or the gas supplier.

DO NOT DESTROY. PLEASE READ

FOR YOUR SAFETY

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

CAREFULLY AND KEEP IN A SAFE PLACE FOR FUTURE REFERENCE

FOR YOUR SAFETY

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance.
- Do not touch any electrical switch; do not use any phone in your building.
- *Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

CAUTION: TO ENSURE PROPER INSTALLATION AND OPERATION OF THIS PRODUCT, COMPLETELY READ ALL INSTRUCTIONS PRIOR TO ATTEMPTING TO ASSEMBLE, INSTALL, OPERATE, MAINTAIN OR REPAIR THE PRODUCT.

INSTALLATION

This furnace should be installed in accordance with the American National Standard 2223.1 1988 Booklet entitled "National Fuel Gas Code" (NFPA 54), and the requirements or codes of the local utility or other authority having jurisdiction.

Additional helpful publications available from the "National Fire Protection Association" are: NFPA 90A - Installation of Air Conditioning and Ventilating Systems 1981 or latest edition. NFPA 90B - Warm Air Heating and Air Conditioning Systems 1987, or latest edition.

These publications are available from:

National Fire Protection Association, Inc.
Batterymarch Park
Quincy, MA 02269

LOCATION

WARNING: THIS FURNACE IS NOT APPROVED FOR INSTALLATION IN A MOBILE HOME. DO NOT INSTALL THIS FURNACE IN A MOBILE HOME. INSTALLATION IN A MOBILE HOME COULD CAUSE FIRE, PROPERTY DAMAGE AND PERSONAL INJURY.

This furnace is suitable for installation in buildings constructed on-site. This heating unit should be located near the chimney and should be centralized with respect to the heat distribution system as much as practicable. When installed in a utility room, the door of the room should be wide enough to allow the largest part of the furnace to enter, or to permit the replacement of another appliance, such as a water heater.

CLEARANCE - ACCESSIBILITY

Forced air furnaces with input rating listed in tables below are design certified by A.G.A. Laboratories for the clearances to combustible materials shown in inches.

See rating plate and clearance label on the furnace for specific information on model numbers and minimum clearances to combustible material.

It is recommended that at least 24" clearance be allowed in front of all furnaces for proper servicing.

ACCESSIBILITY CLEARANCES WHERE GREATER MUST TAKE PRECEDENCE OVER FIRE PROTECTION CLEARANCES. The draft hood must be installed so as to be in the same atmospheric zone as the combustion air inlet to the furnace.

UPFLOW — Certified for use on combustible floor.

CAUTION: Upflow furnace must not be installed directly on carpeting, tile or other combustible material other than wood flooring.

WARNING: A SOLID METAL BASE PLATE (SEE TABLE OR FURNACE CLEARANCE LABEL FOR PART NUMBER) MUST BE IN PLACE WHEN THE FURNACE IS INSTALLED WITH SIDE OR REAR AIR RETURN DUCTS. FAILURE TO INSTALL A BASE PLATE COULD CAUSE PRODUCTS OF COMBUSTION TO BE CIRCULATED INTO THE LIVING SPACE AND CREATE POTENTIALLY HAZARDOUS CONDITIONS, INCLUDING CARBON MONOXIDE POISONING. REFER TO SECTION ON "CIRCULATING AIR SUPPLY" (PAGE 4) FOR RETURN AIR DUCTWORK INSTRUCTIONS.

FURNACE WIDTH	BASE PLATE NO	BASE PLATE SIZE
10%	AE-61229-01	9 $\frac{1}{4}$ x 24 $\frac{1}{16}$
14	AE-61229-02	12 $\frac{3}{4}$ x 24 $\frac{1}{16}$
17 $\frac{1}{2}$	AE-61229-03	16 $\frac{3}{4}$ x 24 $\frac{1}{16}$
21	AE-61229-04	19 $\frac{3}{4}$ x 24 $\frac{1}{16}$
24%	AE-61229-05	23 $\frac{3}{4}$ x 24 $\frac{1}{16}$
28	AE-61229-06	26 $\frac{3}{4}$ x 24 $\frac{1}{16}$

UPFLOW-

CLEARANCE TO COMBUSTIBLE MATERIAL (INCHES)

Furnace Width	10 $\frac{1}{2}$	14	17 $\frac{1}{2}$	21	24 $\frac{1}{2}$	28				
Input	45M	63M	75M	75M	100M	100M	125M	125M	150M	175M
Top	1	1	1	1	1	1	1	1	1	1
Front	6 ①	6 ①	6 ①	6 ①	6 ①	6 ①	6 ①	6 ①	6 ①	6 ①
Vent	6 ②	6 ②	6 ②	6 ②	6 ②	6 ②	6 ②	6 ②	6 ②	6 ②
Back	0	0	0	0	1	1	1	1	1	1
Sides	3 ②	1	1	1	1	1	1	1	1	1

① 6" front clearance also required for ventilation.

② May be 1" with B-1 Vent

DOWNFLOW WARNING: Unit design is certified for installation on non-combustible floor. A special factory supplied combustible floor sub-base is required when installing on a combustible floor. Failure to install the sub-base may result in fire, property damage and personal injury.

DOWNFLOW-

CLEARANCE TO COMBUSTIBLE MATERIAL (INCHES)

Furnace Width	14	17 $\frac{1}{2}$	21	24 $\frac{1}{2}$	28					
Input	45M	60M	75M	75M	100M	100M	125M	125M	150M	175M
Top	1	1	1	1	1	1	1	1	1	1
Front	6 ①	6 ①	6 ①	6 ①	6 ①	6 ①	6 ①	6 ①	6 ①	6 ①
Vent	6 ②	6	6	6	6	6	6	6	6	6
Back	0	0	0	0	0	0	0	0	0	0
Sides	3 ②	1	1	1	1	1	1	1	1	1

① 6" front clearance also required for ventilation.

② May be 1" with B-1 Vent

A gas-fired furnace for installation in a residential garage must be installed so that the burner(s) and the ignition source are located not less than 18" above the floor and the furnace is located or protected to avoid physical damage by vehicles.

WARNING: COMBUSTIBLE MATERIAL MUST NOT BE PLACED ON OR AGAINST THE DRAFT HOOD OR ON THE FURNACE JACKET WITHIN 6" OF THE DRAFT HOOD. THE AREA AROUND THE FURNACE MUST BE KEPT CLEAR AND FREE OF ALL COMBUSTIBLE MATERIALS INCLUDING GASOLINE AND OTHER FLAMMABLE VAPORS AND LIQUIDS. THE HOMEOWNER SHOULD BE CAUTIONED THAT THE FURNACE AREA MUST NOT BE USED AS A BROOM CLOSET OR FOR ANY OTHER STORAGE PURPOSES.

COMBUSTION AIR SUPPLY

This furnace is equipped with a limit switch to protect against overtemperature conditions in the control compartment caused by inadequate combustion air supply. The switch is located just above the burners on the furnace center panel and must be manually reset if tripped. DO

NOT jumper this switch. If this switch should trip, a qualified furnace installer or repair technician should be called to check and/or correct for adequate combustion air supply. If this unit is mounted in a closet, the door must be closed when making this check of the installation.

DO NOT reset the overtemperature switch without taking corrective action to assure that an adequate supply of combustion air is maintained under all conditions of operation.

Replace this switch only with the identical replacement part.

Adequate facilities for providing air for combustion and ventilation must be provided in accordance with section 5.3, Air for Combustion and Ventilation, of the National Fuel Gas Code, ANSI Z223.1-1984 and addendum Z223.1a-1987, or applicable provisions of the local building codes, and not obstructed so as to prevent the flow of air to the furnace. Where appliances are installed within a confined space and combustion air is taken from within the heated space, the air supply must be through two permanent openings of equal area, one located within 12 inches of the ceiling and one within 12 inches of the floor. Total free area of each opening must be equal to at least 1 square inch per 1,000 BTU/Hr. of total input rating of all appliances in the enclosure, and in no case less than 100 square inches. Where appliances are installed in a confined space within a building of unusually tight construction, air for combustion must be obtained from outdoors or from spaces or ducts freely communicating with the outdoors. Under these conditions, two openings of approximately equal area (one located near the top and one located near the bottom of the enclosure) must be provided each with a total free area of not less than one square inch per 4,000 BTU/Hr. of total input rating of all appliances in the enclosure. If horizontal ducts are used, each opening shall have a free area of not less than one square inch per 2,000 BTU/Hr. of total input rating of all appliances in the enclosure.

The minimum dimension of rectangular air ducts shall be not less than three inches.

If unit is installed where there is an exhaust fan, sufficient ventilation must be provided to prevent the exhaust fan from creating a negative pressure in the room.

Draffthood and combustion air openings must not be restricted in any manner.

Where appliances are installed in an unconfined space in buildings of conventional frame, brick or stone construction, infiltration normally is adequate to provide air for combustion, ventilation and draft hood dilution. If the unconfined space is within a building of unusually tight construction, a supply of combustion, ventilation and draft hood dilution air must be obtained from outdoors or spaces freely communicating with the outdoors. This must be through permanent openings having a total free area of not less than one square inch per 4,000 BTU per hour of total appliances input rating.

CONSULT LOCAL CODES FOR SPECIAL REQUIREMENTS.

Air openings in furnace casing front, return air grilles, and warm air registers must not be obstructed.

VENTING

Unit must be vented through a good chimney or an approved vent in accordance with Part 7, Venting of Equipment, of the National Fuel Gas Code, ANSI Z223.1-1984 and addendum Z223.1a-1987, or applicable provisions of the local building codes.

Vent connectors serving appliances vented by natural draft shall not be connected into any portion of mechanical draft systems operating under positive pressure.

WARNING: DO NOT CONNECT THIS FURNACE TO A CHIMNEY FLUE SERVING A SEPARATE APPLIANCE DESIGNED TO BURN SOLID FUEL (WOOD OR COAL).

Check chimney for soot, leaks, obstruction and proper height to prevent down draft. If it is necessary to construct a new chimney, local conditions such as necessary height, draft, and number of appliances served should be checked with gas company requirements and local building codes.

This furnace shall be connected to a factory built chimney or vent complying with a recognized standard, or a masonry or concrete chimney lined with a lining material acceptable to the authority having jurisdiction.

This furnace was designed for use with type "B-1" or single wall vent. Check clearance label on furnace for clearances for both types. Minimum clearances for various vent pipe materials must be as specified by Underwriters Laboratories. When a type "B-1" vent is employed, an adapter is required between the draft hood outlet and the "B-1" vent.

The vent pipe must be of the same size or larger than the flue outlet of the furnace. The vent pipe should run to the outside as directly as possible, keeping turns to a minimum. A single-wall metal vent pipe shall terminate at least 5 feet in vertical height above the highest connected equipment draffthood outlet or flue collar. The vent outlet must extend above the roof surface and through its flashing terminating in an approved cap. The vent pipe shall extend at least 3 feet above the highest point where it passes through a roof of a building and at least 2 feet higher than any portion of a building within a distance of 10 feet. An approved cap which does not obstruct the pipe outlet shall be attached to the end of single-wall metal pipe. (See Figure 1.)

Type B gas vents shall be installed and terminate above the roof surface with a listed cap or listed roof assembly in accordance with the terms of their respective listings and the manufacturers instructions. A Type B gas vent shall terminate at least 5 feet in vertical height above the highest connected equipment draffthood outlet or flue collar.

Horizontal runs should maintain a pitch of 1/4" per foot and should not exceed in length 75% of the vertical run. Vent pipe crossovers in the attic space must not extend at an angle of more than 60° from the vertical. Vent pipe must be rigidly supported by straps or hangers at least every 3 feet.

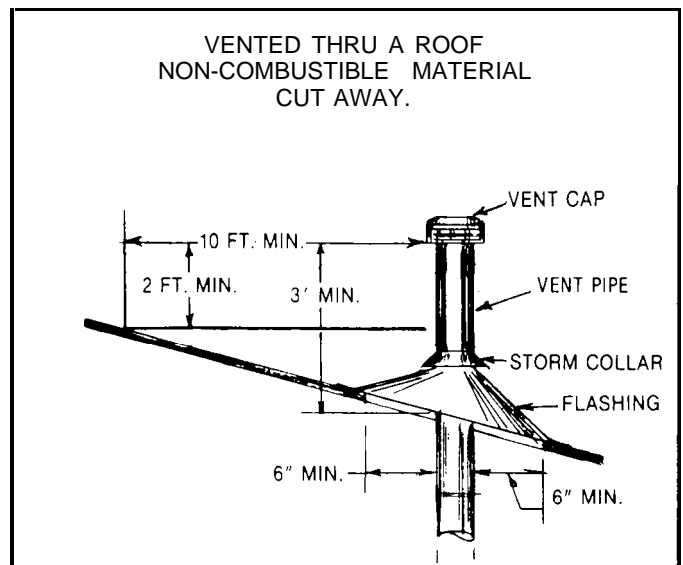


FIGURE 1

The vent connector must be fastened to the outlet collar of the furnace with at least 2 sheet metal screws.

Joints between sections of single wall piping must be fastened by sheet metal screws. "B-I" type material must be assembled in accordance with the manufacturer's instructions.

DEVICES ATTACHED TO THE FLUE OR VENT FOR THE PURPOSE OF REDUCING HEAT LOSS UP THE CHIMNEY HAVE NOT BEEN TESTED AND HAVE NOT BEEN INCLUDED IN THE DESIGN CERTIFICATION OF THIS FURNACE. **WE, THE MANUFACTURER, CANNOT AND WILL NOT BE RESPONSIBLE FOR INJURY OR DAMAGE CAUSED BY THE USE OF SUCH UNTESTED AND/OR UNCERTIFIED DEVICES, ACCESSORIES OR COMPONENTS.**

Where more than one appliance is vented into a common flue, the area of the common flue must be equal to the area of the largest flue or vent connector plus at least 50% of the areas of the additional flue or vent connectors.

The vent connector must be inserted into but not beyond the inside wall of the chimney flue. Do not reduce the size of flue outlet. Protect combustible ceiling or walls near vent pipe with fireproof insulation.

A vent connector must not pass through any ceiling, floor, fire wall or fire partition. A single wall metal pipe connector must not pass through any interior wall.

A vent connector made of single wall metal pipe must not pass through a combustible exterior wall unless guarded at the point of passage by a ventilated metal thimble not smaller than 4" larger in diameter than the vent connector. When there is a run of not less than 6 feet of vent connector in the open between the draft hood outlet and the thimble, the thimble may be 2" larger in diameter than the vent connector.

In lieu of thimble protection, all combustible material in the wall may be cut away from the vent connector a sufficient distance to provide the specified clearance from such vent connector to combustible material. Any material used to close up such opening shall be noncombustible.

Vent connector made of listed type "B" vent material may pass through walls or partitions constructed of combustible material if the connectors are installed with not less than the listed clearance to combustible material.

CONSULT LOCAL CODES FOR SPECIAL REQUIREMENTS

GAS SUPPLY AND PIPING

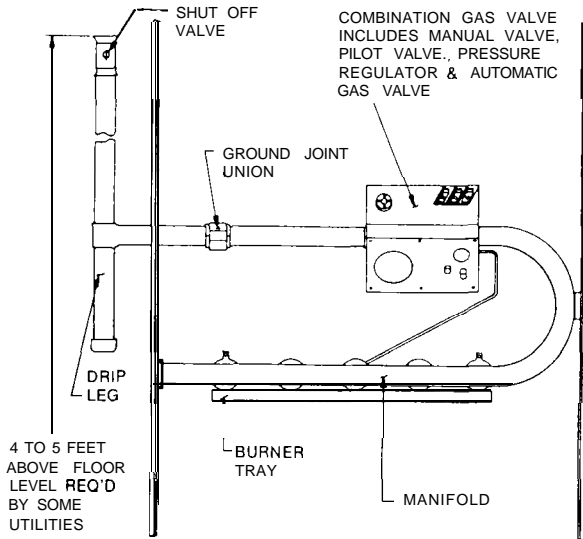
Any additions, changes or conversions required in order for the furnace to satisfactorily meet the application needs should be made by a qualified factory distributor or local service dealer, using factory specified or approved parts.

WARNING: THIS FURNACE WAS EQUIPPED AT THE FACTORY FOR USE ON NATURAL GAS ONLY. CONVERSION TO LP GAS REQUIRES A SPECIAL KIT SUPPLIED BY THE DISTRIBUTOR OR MANUFACTURER. MAILING ADDRESSES ARE LISTED ON THE FURNACE RATING PLATE, PARTS LIST AND WARRANTY. FAILURE TO USE THE PROPER CONVERSION KIT CAN CAUSE FIRE, CARBON MONOXIDE POISONING, EXPLOSION, PERSONAL INJURY OR PROPERTY DAMAGE.

CAUTION: Check rating plate to make certain unit is equipped to burn the type of gas supplied. Care should be taken after installation of this equipment that gas control valve not be subjected to high gas supply line pressure. The furnace and its individual shut off valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of 1/2 PSIG (3.48 KPA). The furnace must be isolated from the gas supply piping system by closing its individual manual shut off valve during any pressure testing of the gas supply piping system at test pressure equal to or less than 1/2 PSIG (3.48 KPA).

In making gas connections, avoid strains as they may cause noise and may damage controls.

To check for leaks in piping use a soap and water solution or other approved method. **DO NOT USE AN OPEN FLAME.**



NOTE: Plug cock, union and inlet pipe supplied by installer.

FIGURE 2

CONNECT GAS SERVICE from meter to control assembly. See Figure 2 for typical hook-up. A ground-joint union must be installed inside cabinet so the control assembly may be easily removed and a 1/8" NPT plug on the supply pipe to the valve for the purpose of making measurements of the inlet gas pressure. A manual shutoff valve or plugcock should be installed in the gas line outside of the furnace casing. Valve should be readily accessible for turning on or off. A drip leg should be installed in the gas supply line as close to the furnace as possible. A pipe compound **resistant to the action of liquefied petroleum gases must be used at all threaded pipe connections.**

GAS PIPE CAPACITY TABLE (CU. FT./HR.)

Capacity of gas pipe of different diameters and lengths in cu. ft. per hr. with pressure drop of 0.3 in. and specific gravity of 0.60 (natural gas).

Nominal Iron Pipe Size, Inches	Length of Pipe, Feet							
	10	20	30	40	50	60	70	80
1/2	132	92	73	63	56	50	46	43
3/4	278	190	152	130	115	105	96	90
1	520	350	285	245	215	195	180	170
1 1/4	1,050	730	590	500	440	400	370	350
1 1/2	1,600	1,100	890	760	670	610	560	530

After the length of pipe has been determined, select the pipe size which will provide the minimum cubic feet per hour required for the gas input rating of the furnace. By formula:

$$\text{Cu. Ft. Per Hr. Required} = \frac{\text{Gas Input of Furnace (BTU/HR)}}{\text{Heating Value of Gas (BTU/FT}^3\text{)}}$$

The gas input of the furnace is marked on the furnace rating plate. The heating value of the gas (BTU/FT³) may be determined by consulting the local natural gas utility or the L.P. gas supplier.

FIGURE 3

Gas piping should be installed in accordance with local codes and regulations of the utility company. Consult local gas company for location of manual main valve. The gas line should be of adequate size to prevent undue pressure drop and never smaller than the pipe size to the combination gas valve. It is recommended that the size of pipe selected be in accordance with Figure 3 for the length of pipe required and connected to the furnace as illustrated.

ELECTRICAL CONNECTIONS

The electrical supply requirements are listed on the furnace rating plate.

Use a separate fused branch electrical circuit containing a properly sized fuse or circuit breaker. Run this circuit directly from the main switch box to an electrical disconnect which must be readily accessible and located within sight of the furnace. Connect from the disconnect to the junction box on the left side of the furnace, inside the control compartment. The white test lead wire can be used or discarded. If discarded, connect the line voltage wire in its place. See appropriate wiring diagram.

WARNING: CABINET MUST BE PERMANENTLY GROUNDED. A GROUND SCREW IS PROVIDED IN THE JUNCTION BOX FOR THIS PURPOSE.

Installation of the electric supply line should be in accordance with the National Electrical Code ANSI/NFPA No. 70-1987 and local building codes.

This can be obtained from:

National Fire Protection Association
Batterymarch Park
Quincy, MA 02269

CIRCULATING AIR SUPPLY

The circulating air supply may be taken either: (1) from outside the building, (2) from return air ducts from several rooms, or (3) any combination of the two. When outside air is utilized, the system should be designed and adjusted such that the temperature of the supply air to the furnace will not be below 50°F during the heating season. When using a combination of outside air and return air, be sure the ducts are so designed and a diverting damper so installed that the volume of circulating air entering the furnace, cannot be reduced or restricted below that which would normally enter through the circulating air intake of the furnace.

Plenum chambers and air ducts must be installed in accordance with the Standard for the Installation of Air Conditioning and Ventilating Systems, NFPA No. 90A, or the Standard for the Installation of Warm Air Heating and Air Conditioning Systems, NFPA No. 90B.

When the furnace is installed so that the supply ducts carry air circulated by the furnace to areas outside the space containing the furnace, the return air shall be handled by a duct or ducts sealed to the furnace casing and terminated outside the space containing the furnace. **If there is no complete return air duct system, the return air connection must be sealed to the furnace casing and run full size to a location outside the utility room or space housing the furnace to prevent a negative pressure on the venting systems.**

When a cooling coil is used in connection with a furnace, it must be installed downstream of the furnace (outlet end of furnace) or in parallel with the furnace to avoid condensation in the heating element.

If installed in parallel with a cooling unit, the damper, or other means used to control the flow of air must be ade-

quate to prevent chilled air from entering the furnace, and if manually operated must be equipped with means to prevent operation of the other unit unless the damper is in the full heat or cool position.

CAUTION: One of the most common causes of trouble in forced air heating systems is insufficient return air to the furnace. The return air system should be approximately equal to or greater than the area of the warm air discharge. Consult local codes for special requirement. Blower speed should be adjusted to maintain the air rise range shown on the rating plate.

RETURN AIR

WARNING: NEVER ALLOW THE PRODUCTS OF COMBUSTION OR THE FLUE PRODUCTS TO ENTER THE RETURN AIR DUCTWORK, OR THE CIRCULATING AIR SUPPLY. ALL RETURN DUCTWORK MUST BE ADEQUATELY SEALED AND SECURED TO THE FURNACE WITH SHEET METAL SCREWS, AND JOINTS TAPED. ALL OTHER DUCT JOINTS MUST BE SECURED WITH APPROVED CONNECTIONS AND SEALED AIRTIGHT. WHEN A FURNACE IS MOUNTED ON A PLATFORM, WITH RETURN THROUGH THE BOTTOM, IT MUST BE SEALED AIRTIGHT BETWEEN THE FURNACE AND THE RETURN AIR PLENUM. THE RETURN AIR PLENUM MUST BE PERMANENTLY ENCLOSED. NEVER USE A DOOR AS PART OF THE RETURN AIR PLENUM. THE FLOOR OR PLATFORM MUST PROVIDE SOUND PHYSICAL SUPPORT OF THE FURNACE, WITHOUT SAGGING, CRACKS, GAPS, ETC. AROUND THE BASE AS TO PROVIDE A SEAL BETWEEN THE SUPPORT AND THE BASE.

FAILURE TO PREVENT PRODUCTS OF COMBUSTION FROM BEING CIRCULATED INTO THE LIVING SPACE CAN CREATE POTENTIALLY HAZARDOUS CONDITIONS, INCLUDING CARBON MONOXIDE POISONING THAT COULD RESULT IN PERSONAL INJURY OR DEATH.

DO NOT, UNDER ANY CIRCUMSTANCES, CONNECT RETURN OR SUPPLY DUCTWORK TO OR FROM ANY OTHER HEAT PRODUCING DEVICE SUCH AS A FIREPLACE INSERT, STOVE, ETC. DOING SO MAY RESULT IN FIRE, CARBON MONOXIDE POISONING, EXPLOSION, PERSONAL INJURY OR PROPERTY DAMAGE.

UPFLOW - UNITS

Install the cold air return to terminate through the floor under the furnace. A direct connection should be made to the bottom of the furnace. For installations where return air ducts cannot be run under the floor return air may be taken from the side or rear as required. A side or rear return air cabinet is available from the manufacturer.

When side air return is used, determine the size opening required, and scribe a line between the knockout squares, cut out opening along these lines.

Where maximum airflow is 1800 CFM or more, both sides or the bottom must be used for return air.

WARNING: A SOLID METAL BASE PLATE (SEE TABLE, PAGE 2, OR FURNACE CLEARANCE LABEL FOR PART NUMBER) MUST BE IN PLACE WHEN THE FURNACE IS INSTALLED WITH SIDE OR REAR AIR RETURN DUCTS. FAILURE TO INSTALL A BASE PLATE COULD CAUSE PRODUCTS OF COMBUSTION TO BE CIRCULATED INTO THE LIVING SPACE AND CREATE POTENTIALLY HAZARDOUS CONDITIONS, INCLUDING CARBON MONOXIDE POISONING.

DOWNFLOW UNITS

Install the cold air return to the top of the furnace. It is recommended that the return air plenum be lined with an acoustical duct liner such as Fiberglass, in order to reduce any possible transmission of air noise.

Filters must be installed in this furnace prior to operation.

WARNING: BLOWER AND BURNERS MUST NEVER BE OPERATED WITHOUT BLOWER DOOR IN PLACE. THIS IS TO PREVENT DRAWING GAS FUMES (WHICH COULD CONTAIN HAZARDOUS CARBON MONOXIDE) INTO THE HOME THAT COULD RESULT IN PERSONAL INJURY OR DEATH.

THERMOSTAT

Install room thermostat in accordance with instruction sheet in box with the thermostat. Run thermostat lead wires inside control compartment. Connect thermostat as shown on wiring diagram. Never install thermostat on an outside wall or where it will be influenced by drafts, concealed hot or cold water pipe or ducts, lighting fixtures, radiation from fireplace, rays of sun, lamps, television, radios or air streams from registers. Refer to instructions packed with thermostat for "heater" adjustment or selection.

HEAT ANTICIPATOR SETTINGS

For thermostat heat anticipator setting; (a) add the current draw of the various components in the system or (b) measure the current flow on either the R or W thermostat circuit and set the thermostat heat anticipator according to the current flow measured.

For additional information, refer to supplemental electric ignition instructions.

LIGHTING INSTRUCTIONS

Refer to instructions on furnace for specific controls used on that unit.

These instructions are for a standing pilot. If your unit is equipped with an automatic ignition device, do not attempt to light pilot using these instructions. Refer to separate instructions included with this package.

TO START FURNACE

- CAUTION:** Be sure that the manual gas control knob has been in the "off" position for at least five minutes.
- Set room thermostat to the lowest setting.
- Turn Manual Gas Control knob to the "Pilot" position.
- Depress and hold Manual Gas Control Knob while lighting pilot burner. Allow pilot to burn approximately one-half minute before releasing Manual Gas Control Knob. If pilot does not remain lighted, repeat operation allowing longer period before releasing Manual Gas Control Knob.
- Turn Manual Gas Control Knob to the "On" position.
- Replace control access door.
- Set room thermostat to a point above room temperature to light main burners. After main burner(s) are lighted, set room thermostat to desired temperature.

TO SHUT DOWN FURNACE

- Set thermostat to lowest setting
- Shut off gas to main burner(s) and pilot burner by turning the Manual Gas Control Knob clockwise to "Pilot" position. Depress knob partially to turn clockwise to "Off" position.

Should overheating occur or the gas supply fail to shut off, shut off the manual gas valve to the appliance before shutting off the electrical supply.

MAIN BURNER PRIMARY AIR ADJUSTMENT

After furnace has been in operation for approximately 5 minutes, close the air shutters until yellow tips appear on the flames. Now, open the air shutter until yellow tips just do disappear and the flames have soft blue cones. Repeat this procedure on all burners. Lock the air shutters by means of the lock screw.

TO RATE FURNACE

Manifold pressure should be set at 3.5" W.C. for natural gas. The inlet pressure to the gas valve must be between 5" and 7" W.C. Only small variations in the gas flow should be made by means of the pressure regulator adjustment. In no case should the final manifold pressure vary more than plus or minus 0.3" W.C. from the above specified pressure. To adjust pressure regulator, remove regulator cap and turn adjustment screw clockwise to increase pressure or counterclockwise to decrease pressure, then replace regulator cap securely. Any necessary major changes in the gas flow rate should be made by changing the size of the burner orifices. To change orifice spuds, shut off manual main gas valve and pilot valve and remove the manifold. For furnaces for use on L.P. gas, the L.P. gas supply pressure must be set between 11" and 14" W.C. by means of the tank or branch supply regulators. The furnace manifold pressure should be set at 10" W.C. at the combination gas control valve. For elevations up to 2,000 feet, rating plate input ratings apply. For elevations over 2,000 feet, reduce input 4% for each 1,000 feet above sea level.

Check of input is important to prevent over firing of the furnace beyond its design-rated input. NEVER SET INPUT ABOVE THAT SHOWN ON THE RATING PLATE. Use the following table or formula to determine input rate: Start furnace and measure time required to burn one cubic foot of gas. Time the meter with only the furnace in operation.

METER TIME IN MINUTES AND SECONDS FOR NORMAL INPUT RATING OF FURNACES EQUIPPED FOR NATURAL OR L.P. GAS

INPUT BTU/HR	METER SIZE CU. FT.	HEATING VALUE OF GAS BTU PER CU. FT.									
		900		1000		1040		1100		2500	
		MIN.	SEC.	MIN.	SEC.	MIN.	SEC.	MIN.	SEC.	MIN.	SEC.
45,000	ONE	1	12	1	20	1	23	1	28	3	20
	TEN	12	0	13	20	13	50	14	40	33	20
60,000	ONE			0	54	1	0	1	3	1	6
	TEN			9	0	10	0	10	24	11	0
75,000	ONE	0	12	0	48	0	50	0	53	2	0
	TEN	0	12	8	0	8	19	8	48	20	0
100,000	ONE	0	33	0	36	0	36	0	40	1	30
	TEN	5	24	6	0	6	15	6	36	15	0
125,000	ONE	0	26	0	29	0	30	0	32	1	12
	TEN	4	19	4	48	5	0	5	17	12	0
150,000	ONE	0	22	0	24	0	25	0	27	1	0
	TEN	3	36	4	0	4	10	4	24	10	0
175,000	ONE	0	19	0	21	0	22	0	23	0	52
	TEN	3	5	3	26	3	34	3	46	8	35

$$\text{Input BTU/HR} = \frac{\text{Heating Value of Gas (BTU/Ft}^3) \times 3600}{\text{Time in Seconds (for 1 cu. ft.) of Gas}}$$

Prior to checking furnace input, make certain that all other gas appliances are shut off, with the exception of pilot burners.

PILOT ADJUSTMENT

The pilot flame should be adjusted to provide a soft flame that surrounds the tip of the thermocouple or flame sensor. A pilot flame of approximately one inch in length is usually adequate for ignition and maintaining the operating circuit. Please refer to illustration located elsewhere in these instructions.

LIMIT CONTROL

High limit cut-off is set at factory and needs no further adjustment for normal operation.

Limit control is calibrated to prevent air temperature leaving the furnace from exceeding the maximum outlet temperature rating.

DOWNFLOW furnaces are equipped with an automatic reset auxiliary high temperature limit control.

FAN CONTROL

The fan control starts the blower circulating warm air when the bonnet temperature reaches a predetermined temperature setting and stops it when the bonnet temperature falls below the "OFF" setting. Set fan-off and fan-on temperature points as follows:

FAN CONTROL SETTINGS

	FAN - ON	FAN - OFF
Honeywell	120"	90"
Cemco	120"	90"

Fan-On setting is maximum allowable.

These settings are suggested for average installation and may be varied if necessary after heating system is in operation.

CONTROL CIRCUIT SAFETY CHECK

The safety features of the control system should be checked to assure proper operation of the furnace.

1. The pilot burner safety control does not permit gas to flow through the main gas burner unless there is a pilot flame present to ignite the gas. To check this function where combination gas manifold controls are used: Remove cap from over pilot valve adjusting screw located on top of the manifold gas control. With the main gas burner operating, use a small screwdriver and turn the adjustment screw clockwise until the pilot gas is turned off. (Note the number of turns required to do this.) Within 90 seconds of the extinguishing of the pilot flame, the main gas control should operate closing the main gas valve. Return the pilot adjustment screw to its original position and replace cap. Follow the lighting instructions in relighting the pilot.
2. The high limit control located on the vestibule control compartment prevents excessive outlet air temperature by shutting off the automatic main gas valve when the maximum outlet air temperature has been reached. To check the control operation, block the air flow through the unit temporarily. The limit switch should function to turn off the automatic gas valve within a few minutes. Remove blockage immediately after switch operates.

VENT SAFETY SHUT OFF SYSTEM

Furnaces manufactured after November 1, 1987, will be equipped with a limit switch to protect against over temperature conditions in the vent system caused by blockage of the vent. This switch is located on the lower left side of the draft diverter behind the upper front panel. On horizontal furnaces it is on the lower side of the draft diverter, adjacent to the furnace panel.

Do not reset this switch without taking corrective action to assure that the vent system is open without any restrictions.

If the switch trips (opens), call a qualified furnace installer or service technician to inspect the vent system.

MAINTENANCE

WARNING: DISCONNECT THE MAIN POWER TO THE UNIT BEFORE ATTEMPTING ANY MAINTENANCE.

1. Keep the air filters clean. There are several types of material used in air filter construction.
2. How to Clean Filters:
Glass Fiber (Throwaway) — This is a disposable type of filter. Inspect monthly and replace when necessary. A new home may require more frequent attention to the filters until dust from construction is removed.
Plastic Impregnated Fiber — Vacuum clean; wash with detergent and water. Air dry thoroughly and reinstall.

CAUTION: Do not operate your system for extended periods without filters. A portion of the dust entrained in the air may temporarily lodge in the air duct runs and at the supply registers. Any recirculated dust particles will be heated and charred by contact with the furnace heat exchanger. This residue will soil ceilings, walls, drapes, carpets, and other household articles.

MINIMUM FILTER SIZES

UPFLOW			
Width	Input	Filter Size	Type
10 1/2	45,000	10 x 25 x 1	Dis.
14	60,000	14 x 25 x 1	Dis.
14	75,000	14 x 25 x 1	Dis.
17 1/2	75,000	16 x 25 x 1	Perm.
17 1/2	100,000	16 x 25 x 1	Dis.
21	100,000	20 x 25 x 1	Perm.
21	125,000	20 x 25 x 1	Dis.
24%	125,000	24 x 25 x 1	Perm.
24%	150,000	24 x 25 x 1	Dis.
28	175,000	14 x 25 x 1 (2)	Dis.

DOWNFLOW			
Width	Input	Filter Size	Type
14	45,000	12 x 20 x 1 (2)	Dis.
14	60,000	12 x 20 x 1 (2)	Dis.
14	75,000	12 x 20 x 1 (2)	Dis.
17 1/2	75,000	12 x 20 x 1 (2)	Dis.
17 1/2	100,000	12 x 20 x 1 (2)	Dis.
21	100,000	16 x 20 x 1 (2)	Dis.
21	125,000	16 x 20 x 1 (2)	Dis.
24%	125,000	16 x 20 x 1 (2)	Dis.
24 1/2	150,000	16 x 20 x 1 (2)	Dis.
28	170,000	20 x 20 x 1 (2)	Dis.

LUBRICATION

The blower motor sleeve bearings are prelubricated by the motor manufacturer and may not require attention for an indefinite period of time. However, our recommendations are as follows:

1. Motors without oiling ports —
Prelubricated and sealed. No further lubrication should be required, but in case of bearing problems, the blower and the motor end bells can be disassembled and the bearings relubricated by a qualified service person.
2. Motors with oiling ports —
Add from 10 to 20 drops of Electric Motor Oil or an SE grade of non-detergent SAE-10 or 20 motor oil to each bearing every two years for somewhat continuous duty, or at least every five years for light duty. Take care not to over oil, because excessive lubrication can damage the motor.

In any event, clean motor periodically to prevent the possibility of overheating due to an accumulation of dust

and dirt on the windings or on the motor exterior. And, as suggested elsewhere in these instructions, the air filters should be kept clean because dirty filters can restrict airflow and the motor depends upon sufficient air flowing across and through it to keep from overheating.

SYSTEM OPERATION INFORMATION

1. Keep the air filters clean. Your heating system will operate better, more efficiently and more economically.
2. Arrange your furniture and drapes so that the supply air registers and the return air grilles are unobstructed.
3. Close doors and windows. This will reduce the heating load on your system.
4. Avoid excessive use of kitchen exhaust fans.
5. Do not permit the heat generated by television, lamps, or radios to influence the thermostat operation.
6. You may elect to extinguish the pilot burner during the summer months. Some authorities have calculated that doing so could result in a savings in excess of 3,000 cubic feet of gas.

Turn the main gas valve to the "Off" position. This will prevent any further flow of gas to the pilot burner. Reread the lighting instructions prior to establishing a pilot flame at the beginning of the next heating season.

7. Exclusive of the mounting platform, keep all combustible articles three feet from the furnace draft diverter and vent stack.

CAUTION: Replace all blower doors and compartment covers after servicing the furnace. Do not operate the unit without all panels and doors securely in place.

8. If you desire to operate your system with constant air circulation, please ask advice from your servicing contractor.

HEAT EXCHANGER AND BURNER ASSEMBLY

The furnace should operate for many years without excessive scale buildup in the flue passageways; however it is recommended that the home owner inspect the flue passageways, the vent system and the main and pilot burners for continued safe operation paying particular attention to deterioration from corrosion or other sources. The flue passageways and vent system should be inspected and cleaned (if required) by a qualified serviceman after the second year of service and annually thereafter using this procedure.

1. Turn off all power to the furnace and set the thermostat lever to the lowest temperature.
2. Shut off the gas supply to the furnace either at the meter or at a manual valve in the supply piping.
3. Remove the control door from the furnace.
4. Turn the gas control knob to the "Off" position.
5. Mark the individual wires to the gas control for identifying purposes when they are to be reconnected.
6. Remove wires from the gas controls if the system contains electric ignition; disconnect the ignition wire to the ignitor from its supply end at the control box mounted on the furnace.
7. Loosen the 2 screws securing the burner cover and lift the burner cover off.
8. Using wrenches, separate the ground-joint unit in the supply piping at the furnace.

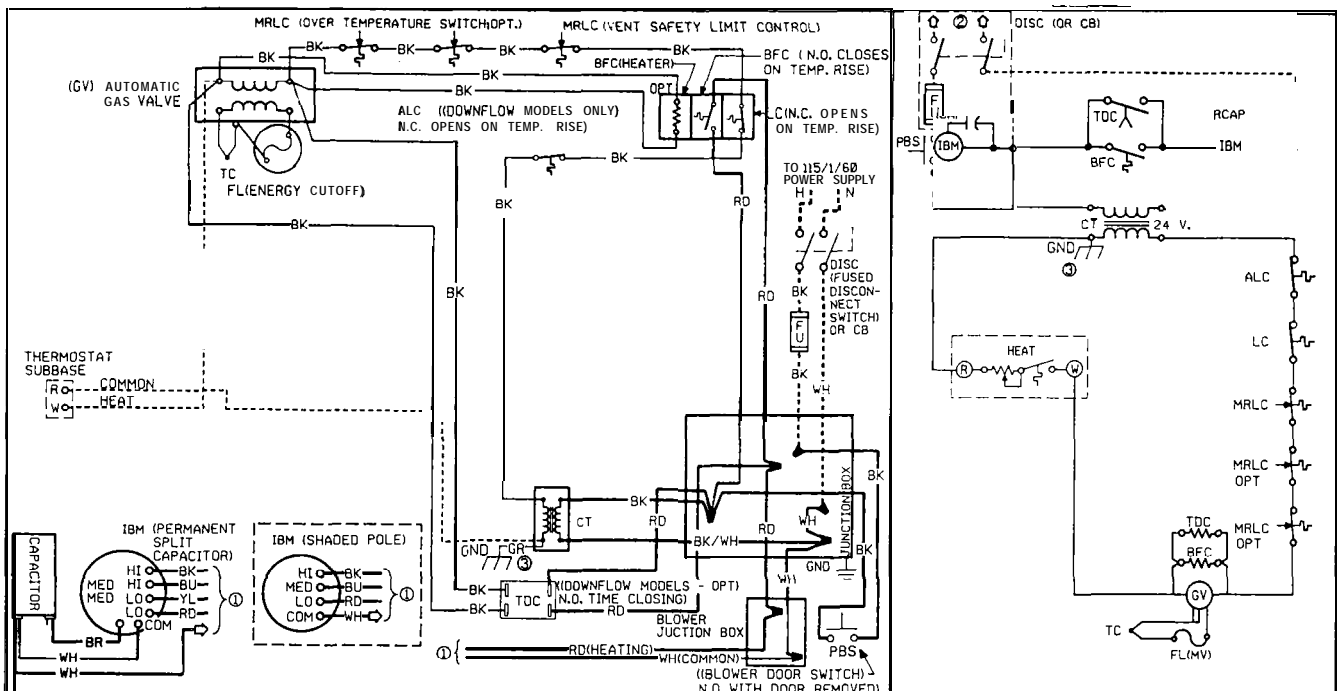
9. Remove piping between the control valve and the ground-joint union.
10. Remove the burner assembly from the furnace.
11. Disconnect the vent pipe from the draft diverter collar.
12. Remove the 4 screws holding the top front casing panel in place and bend the 2 tabs out that are holding the bottom edge into the casing side panels and lift the top casing panel away from the furnace.
13. Remove the 4 sheet metal screws that secure the draft diverter to the center panel and remove the diverter from the furnace.
14. Each furnace section has a flue baffle secured in each cell section outlet collar. Remove the 2 screws in each collar, and slide out the flue baffle.
15. The furnace sections can now be cleaned by the use of a wire brush with a flexible handle. Slide the brush through each section. Sweeping back and forth through each section will loosen any scale allowing it to fall to the bottom of the sections. The debris can now be brushed out of the bottom sections or cleaned with the nozzle of a vacuum cleaner.
16. Inspect the heat exchanger cells for excessive rusting and/or holes. Replace cells as necessary to ensure proper operation of the furnace.

WARNING: HOLES IN THE VENT PIPE CAN CAUSE TOXIC FUMES TO ENTER THE HOME, WHICH MAY CAUSE INJURY OR DEATH. THE VENT PIPE MUST BE REPLACED IF IT LEAKS.

17. Check the ports on the gas burners to make certain that they are clean. Brushing or jarring may loosen any accumulation. Standing the burner assembly on end will allow any scale to fall out of the entrance end of the burners.
18. Reinstall the flue baffles into each section.
19. Reinstall the draft diverter and top front casing panel.
20. Reconnect the vent pipe to the draft diverter collar.
21. Replace the burner assembly and secure in position.
22. Reinstall the gas supply piping between the gas control and the ground joint union.
23. Reconnect all wiring that was previously disconnected.
24. Turn on the gas supply.
25. Turn on the electric power.
26. Follow the lighting procedure listed on the lighting instruction label on the furnace. Due to the removal of the controls and piping during the cleaning operation, the system will contain air and therefore may have to be cycled a couple of times before the pilot gas will ignite.
27. After the pilot is in operation and the control knob is turned to the "On" position, install the control door.
28. Reset the thermostat lever to the desired temperature.

REPLACEMENT PARTS

Replacement parts for service are listed in the PARTS LIST included with these instructions.

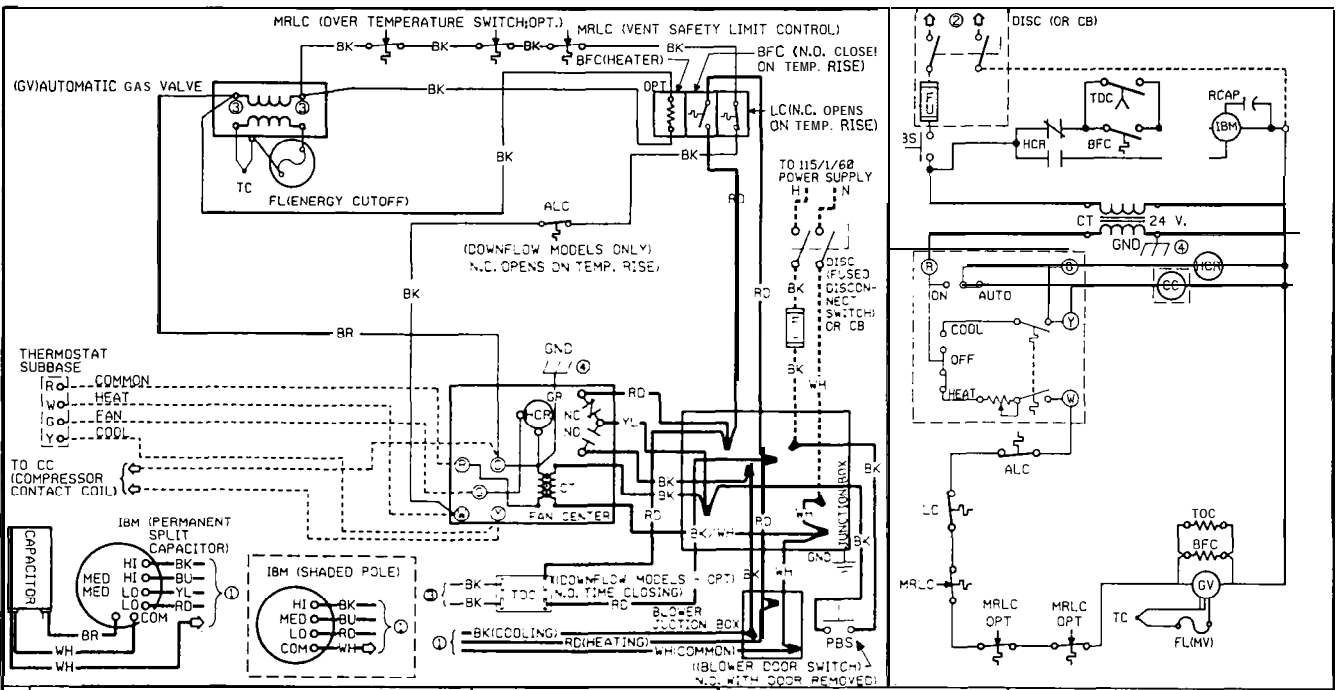


COMPONENT CODE		NOTES:	WIRING INFORMATION	WIRE COLOR CODE															
ALC	AUXILIARY LIMIT CONTROL				MRLC	MANUAL RESET LIMIT CONTROL	OPT	OPTIONAL COMPONENT	PBS	PUSH BUTTON SWITCH	RCAP	RUN CAPACITOR	TC	THERMOCOUPLE	TDC	TIME DELAY CONTROL	WIRE NUT		
BFC	BLOWER/FAN CONTROL	CB	CIRCUIT BREAKER	CT	CONTROL TRANSFORMER	DISC	DISCONNECT SWITCH	FL	FUSE LINK	FU	FUSE	GND	GROUND	GV	GAS VALVE	IBM	INDOOR BLOWER MOTOR	LC	LIMIT CONTROL

LINE VOLTAGE	LOW VOLTAGE	REPLACEMENT WIRE	WARNING
-FACTORY STANDARD	-FACTORY STANDARD	-MUST BE THE SAME SIZE AND TYPE OF	-CABINET MUST BE PERMANENTLY GROUNDING AND CONFORM TO N.E.C. (I.E.C.-CANADA) AND LOCAL CODES.
-FIELD INSTALLED	-FACTORY OPTION	-INSULATION AS ORIGINAL (85°C MDL)	
-FIELD INSTALLED	-FIELD INSTALLED		

WIRE COLOR CODE	WIRE COLOR CODE
BK...BLACK	PU...PURPLE
BR...BROWN	RD...RED
BU...BLUE	WH...WHITE
GR...GREEN	YL...YELLOW
OR...ORANGE	

WIRING DIAGRAM			
UPFLOW/DOWNFLOW GAS FIRED FORCED AIR FURNACE SINGLE STAGE HEAT			
DR. BY	APP. BY	DATE	DWG. NO.
D.T.	JHW	2-28-87	90-21283-07
REV			02



COMPONENT CODE		NOTES:	WIRING INFORMATION	WIRE COLOR CODE															
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LINE VOLTAGE	LOW VOLTAGE	REPLACEMENT WIRE	WARNING
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-FIELD INSTALLED	-FACTORY OPTION	-INSULATION AS ORIGINAL (85°C MDL)	
-FIELD INSTALLED	-FIELD INSTALLED		

WIRING DIAGRAM			
UPFLOW/DOWNFLOW GAS FIRED FORCED AIR FURNACE SINGLE STAGE HEAT, SINGLE STAGE COOL			
DR. BY	APP. BY	DATE	DWG. NO.
D.T.	JHW	2-28-87	90-21283-08
REV			02

