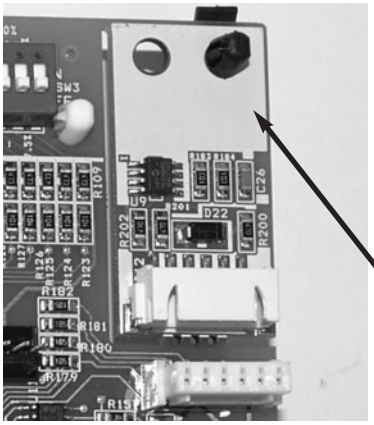
INSTALLATION INSTRUCTIONS

FOR RGPE UPFLOW, HORIZONTAL, RGLE DOWNFLOW 2 STAGE, 80+ GAS FURNACES





This Memory Card must be removed (broken away) from the furnace control when the control is replaced. The card must be inserted into the connector at J15 of the replacement control. Failure to retain this memory card with the furnace when replacing the furnace control could result in no operation when the furnace control is replaced.



COMMUNICATING THERMOSTATS INSTALLATION

SEE PAGE 84



⚠ WARNING

DO NOT EXCHANGE MEMORY CARDS BETWEEN 2 OR MORE DIFFERENT FURNACES. DOING SO COULD RESULT IN UNEXPECTED OPERATION – INCLUDING INADEQUATE AIRFLOW DURING HEATING (AND OTHER MODES) OR A LOSS OF HEAT.

⚠ RECOGNIZE THIS SYMBOL AS AN INDICATION OF IMPORTANT SAFETY INFORMATION!

⚠ WARNING

IF THE INFORMATION IN THESE INSTRUCTIONS IS NOT FOLLOWED EXACTLY, A FIRE OR EXPLOSION MAY RESULT, CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

⚠ WARNING

THESE INSTRUCTIONS ARE INTENDED AS AN AID TO QUALIFIED SERVICE PERSONNEL FOR PROPER INSTALLATION, ADJUSTMENT AND OPERATION OF THIS UNIT. READ THESE INSTRUCTIONS THOROUGHLY BEFORE ATTEMPTING INSTALLATION OR OPERATION. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN IMPROPER INSTALLATION, ADJUSTMENT, SERVICE OR MAINTENANCE, POSSIBLY RESULTING IN FIRE, ELECTRICAL SHOCK, CARBON MONOXIDE POISONING, EXPLOSION, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

⚠ WARNING

PROPOSITION 65 WARNING: THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER, BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

⚠ WARNING

— Do not store or use gasoline or other flammable vapors and liquids, or other combustible materials in the vicinity of this or any other appliance.
— 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.
  • Do not return to your home until authorized by the gas supplier or fire department.
— DO NOT RELY ON SMELL ALONE TO DETECT LEAKS. DUE TO VARIOUS FACTORS, YOU MAY NOT BE ABLE TO SMELL FUEL GASES.
  • U.L. recognized fuel gas and CO detectors are recommended in all applications, and their installation should be in accordance with the manufacturer's recommendations and/or local laws, rules regulations, or customs.
— Improper installation, adjustment, alteration, service or maintenance can cause injury, property damage or death. Refer to this manual. Installation and service must be performed by a qualified installer, service agency or the gas supplier. In the commonwealth of Massachusetts, installation must be performed by a licensed plumber or gas fitter for appropriate fuel.

DO NOT DESTROY THIS MANUAL. PLEASE READ CAREFULLY AND KEEP IN A SAFE PLACE FOR FUTURE REFERENCE BY A SERVICEMAN.

DESIGN CERTIFIED

CERTIFIED

Accredited by the RvA

ABS Quality Evaluations, Inc. Management System Certification

ANAB ACCREDITED

ISO 9001:2008

Certificate Number: 30164

92-24161-77-02
SUPERSEDES 92-24161-77-01

IMPORTANT: All Manufacturer products meet current Federal OSHA Guidelines for safety. California Proposition 65 warnings are required for certain products, which are not covered by the OSHA standards.

California's Proposition 65 requires warnings for products sold in California that contain, or produce, any of over 600 listed chemicals known to the State of California to cause cancer or birth defects such as fiberglass insulation, lead in brass, and combustion products from natural gas.

All “new equipment” shipped for sale in California will have labels stating that the product contains and/or produces Proposition 65 chemicals. Although we have not changed our processes, having the same label on all our products facilitates manufacturing and shipping. We cannot always know “when, or if” products will be sold in the California market.

You may receive inquiries from customers about chemicals found in, or produced by, some of our heating and air-conditioning equipment, or found in natural gas used with some of our products. Listed below are those chemicals and substances commonly associated with similar equipment in our industry and other manufacturers.

- Glass Wool (Fiberglass) Insulation
- Carbon Monoxide (CO)
- Formaldehyde
- Benzene

More details are available at the Websites for OSHA (Occupational Safety and Health Administration), at www.osha.gov and the State of California's OEHHA (Office of Environmental Health Hazard Assessment), at www.oehha.org. Consumer education is important since the chemicals and substances on the list are found in our daily lives. Most consumers are aware that products present safety and health risks, when improperly used, handled and maintained.

Installation Instructions are updated on a regular basis. This is done as product changes occur or if new information becomes available. In this publication, an arrow ➤ denotes changes from the previous edition or additional new material.

IMPORTANT: To insure proper installation and operation of this product, completely read all instructions prior to attempting to assemble, install, operate, maintain or repair this product. Upon unpacking of the furnace, inspect all parts for damage prior to installation and start-up.

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SAFETY INFORMATION

IMPORTANT!

THE COMMONWEALTH OF MASSACHUSETTS REQUIRES COMPLIANCE WITH REGULATION 248 CMR 4.00 AND 5.00 FOR INSTALLATION OF THROUGH-THE-WALL VENTED GAS APPLIANCES AS FOLLOWS:

(a) For all side wall horizontally vented gas fueled equipment installed in every dwelling, building or structure used in whole or in part for residential purposes, including those owned or operated by the Commonwealth and where the side wall exhaust vent termination is less than seven (7) feet above finished grade in the area of the venting, including but not limited to decks and porches, the following requirements shall be satisfied:

1. INSTALLATION OF CARBON MONOXIDE DETECTORS. At the time of installation of the side wall horizontal vented gas fueled equipment, the installing plumber or gasfitter shall observe that a hard wired carbon monoxide detector with an alarm and battery back-up is installed on the floor level where the gas equipment is to be installed. In addition, the installing plumber or gasfitter shall observe that a battery operated or hard wired carbon monoxide detector with an alarm is installed on each additional level of the dwelling, building or structure served by the side wall horizontal vented gas fueled equipment. It shall be the responsibility of the property owner to secure the services of qualified licensed professionals for the installation of hard wired carbon monoxide detectors.

a. In the event that the side wall horizontally vented gas fueled equipment is installed in a crawl space or an attic, the hard wired carbon monoxide detector with alarm and battery back-up may be installed on the next adjacent floor level.

b. In the event that the requirements of this subdivision can not be met at the time of completion of installation, the owner shall have a period of thirty (30) days to comply with the above requirements; provided, however, that during said thirty (30) day period, a battery operated carbon monoxide detector with an alarm shall be installed.

2. APPROVED CARBON MONOXIDE DETECTORS. Each carbon monoxide detector as required in accordance with the above provisions shall comply with NFPA 720 and be ANSI/UL 2034 listed and IAS certified.

3. SIGNAGE. A metal or plastic identification plate shall be permanently mounted to the exterior of the building at a minimum height of eight (8) feet above grade directly in line with the exhaust vent terminal for the horizontally vented gas fueled heating appliance or equipment. The sign shall read, in print size no less than one-half (1/2) inch in size, **"GAS VENT DIRECTLY BELOW. KEEP CLEAR OF ALL OBSTRUCTIONS".**

4. INSPECTION. The state or local gas inspector of the side wall horizontally vented gas fueled equipment shall not approve the installation unless, upon inspection, the inspector observes carbon monoxide detectors and signage installed in accordance with the provisions of 248 CMR 5.08(2)(a) 1 through 4.

(b) EXEMPTIONS: The following equipment is exempt from 248 CMR 5.08(2)(a)1 through 4:

1. The equipment listed in Chapter 10 entitled "Equipment Not Required To Be Vented" in the most current edition of NFPA 54 as adopted by the Board; and

2. Product Approved side wall horizontally vented gas fueled equipment installed in a room or structure separate from the dwelling, building or structure used in whole or in part for residential purposes.

(c) MANUFACTURER REQUIREMENTS – GAS EQUIPMENT VENTING SYSTEM PROVIDED. When the manufacturer of Product Approved side wall horizontally vented gas equipment provides a venting system design or venting system components with the equipment, the instructions provided by the manufacturer for installation of the equipment and the venting system shall include:

1. Detailed instructions for the installation of the venting system design or the venting system components; and

2. A complete parts list for the venting system design or venting system.

(d) MANUFACTURER REQUIREMENTS – GAS EQUIPMENT VENTING SYSTEM NOT PROVIDED. When the manufacturer of a Product Approved side wall horizontally vented gas fueled equipment does not provide the parts for venting the flue gases, but identifies "special venting systems", the following requirements shall be satisfied by the manufacturer:

1. The referenced "special venting system" instructions shall be included with the appliance or equipment installation instructions; and

2. The "special venting systems" shall be Product Approved by the Board, and the instructions for that system shall include a parts list and detailed installation instructions.

(e) A copy of all installation instructions for all Product Approved side wall horizontally vented gas fueled equipment, all venting instructions, all parts lists for venting instructions, and/or all venting design instructions shall remain with the appliance or equipment at the completion of the installation.

⚠ WARNING

INSTALL THIS FURNACE ONLY IN A LOCATION AND POSITION AS SPECIFIED IN THE LOCATION REQUIREMENTS AND CONSIDERATIONS SECTION OF THESE INSTRUCTIONS. PROVIDE ADEQUATE COMBUSTION AND VENTILATION AIR TO THE FURNACE SPACE AS SPECIFIED IN THE VENTING SECTION OF THESE INSTRUCTIONS.

⚠ WARNING

PROVIDE ADEQUATE COMBUSTION AND VENTILATION AIR TO THE FURNACE SPACE AS SPECIFIED IN THE COMBUSTION AND VENTILATION AIR SECTION OF THESE INSTRUCTIONS.

⚠ WARNING

COMBUSTION PRODUCTS MUST BE DISCHARGED OUTDOORS. CONNECT THIS FURNACE TO AN APPROVED VENT SYSTEM ONLY, AS SPECIFIED IN VENT PIPE INSTALLATION SECTION OF THESE INSTRUCTIONS.

⚠ WARNING

NEVER TEST FOR GAS LEAKS WITH AN OPEN FLAME. USE A COMMERCIALLY AVAILABLE SOAP SOLUTION MADE SPECIFICALLY FOR THE DETECTION OF LEAKS TO CHECK ALL CONNECTIONS, AS SPECIFIED IN GAS SUPPLY AND PIPING SECTION OF THESE TION INSTRUCTIONS.

⚠ WARNING

THIS FURNACE IS NOT APPROVED OR RECOMMENDED FOR INSTALLATION ON ITS BACK, WITH ACCESS DOORS FACING UPWARDS, OR WITH SUPPLY AIR DISCHARGING TO THE RIGHT-HAND SIDE WHEN FACING THE FRONT OF THE FURNACE. SEE FIGURES 6 AND 7 FOR PROPER INSTALLATION OF HORIZONTAL MODELS.

⚠ WARNING

DO NOT INSTALL THIS FURNACE IN A MOBILE HOME!! THIS FURNACE IS NOT APPROVED FOR INSTALLATION IN A MOBILE HOME. DOING SO COULD CAUSE FIRE, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

⚠ WARNING

USE ONLY WITH TYPE OF GAS APPROVED FOR THIS FURNACE. REFER TO THE FURNACE RATING PLATE.

⚠ WARNING

WHEN THIS FURNACE IS INSTALLED IN A RESIDENTIAL GARAGE, IT MUST BE INSTALLED SO THE BURNERS AND IGNITION SOURCE ARE LOCATED NO LESS THAN 18 INCHES ABOVE THE FLOOR. THIS IS TO REDUCE THE RISK OF IGNITING FLAMMABLE VAPORS WHICH MAY BE PRESENT IN A GARAGE. ALSO, THE FURNACE MUST BE LOCATED OR PROTECTED TO AVOID PHYSICAL DAMAGE BY VEHICLES. FAILURE TO FOLLOW THESE WARNINGS CAN CAUSE A FIRE OR EXPLOSION, RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

⚠ WARNING

USE OF THIS FURNACE IS ALLOWED DURING CONSTRUCTION IF THE FOLLOWING TEMPORARY INSTALLATION REQUIREMENTS ARE MET. INSTALLATION MUST COMPLY WITH ALL INSTALLATION INSTRUCTIONS INCLUDING:

- **PROPER VENT INSTALLATION;**
- **FURNACE OPERATING UNDER THERMOSTATIC CONTROL;**
- **RETURN AIR DUCT SEALED TO THE FURNACE;**
- **AIR FILTERS IN PLACE;**
- **SET FURNACE INPUT RATE AND TEMPERATURE RISE PER RATING PLATE MARKING;**
- **MEANS FOR PROVIDING OUTDOOR AIR REQUIRED FOR COMBUSTION;**
- **RETURN AIR TEMPERATURE MAINTAINED BETWEEN 55°F (13°C) AND 80°F (27°C); AND;**
- **CLEAN FURNACE, DUCT WORK AND COMPONENTS UPON SUBSTANTIAL COMPLETION OF THE CONSTRUCTION PROCESS, AND VERIFY FURNACE OPERATING CONDITIONS INCLUDING IGNITION, INPUT RATE, TEMPERATURE RISE AND VENTING, ACCORDING TO THE INSTRUCTIONS.**

⚠ WARNING

DO NOT JUMPER OR OTHERWISE BYPASS OVERTEMPERATURE OR ANY OTHER LIMITS OR SWITCHES ON THE FURNACE. IF ONE OF THESE LIMITS OR SWITCHES SHOULD TRIP OR OPEN, THE USER IS TO BE INSTRUCTED TO CALL A QUALIFIED INSTALLER, SERVICE AGENCY OR THE GAS SUPPLIER. FOR MANUALLY RESETABLE SWITCHES, THE USER IS FURTHER INSTRUCTED TO NEVER RESET THE SWITCH, BUT TO CALL A QUALIFIED TECHNICIAN. MANUAL RESET SWITCHES MAY REQUIRE FURTHER CORRECTIVE ACTIONS. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN CARBON MONOXIDE POISONING, SERIOUS INJURY OR DEATH. IF THE UNIT IS INSTALLED IN A CLOSET, THE DOOR MUST BE CLOSED WHEN MAKING THIS CHECK. INSTALLERS AND TECHNICIANS ARE INSTRUCTED TO REPLACE ANY LIMIT OR SAFETY SWITCH/DEVICE ONLY WITH IDENTICAL REPLACEMENT PARTS.

⚠ WARNING

DUCT LEAKS CAN CREATE AN UNBALANCED SYSTEM AND DRAW POLLUTANTS SUCH AS DIRT, DUST, FUMES AND ODORS INTO THE HOME CAUSING PROPERTY DAMAGE. FUMES AND ODORS FROM TOXIC, VOLATILE OR FLAMMABLE CHEMICALS, AS WELL AS AUTOMOBILE EXHAUST AND CARBON MONOXIDE (CO), CAN BE DRAWN INTO THE LIVING SPACE THROUGH LEAKING DUCTS AND UNBALANCED DUCT SYSTEMS CAUSING PERSONAL INJURY OR DEATH (SEE FIGURE 5).

- **IF AIR-MOVING EQUIPMENT OR DUCTWORK IS LOCATED IN GARAGES OR OFF-GARAGE STORAGE AREAS - ALL JOINTS, SEAMS, AND OPENINGS IN THE EQUIPMENT AND DUCT MUST BE SEALED TO LIMIT THE MIGRATION OF TOXIC FUMES AND ODORS INCLUDING CARBON MONOXIDE FROM MIGRATING INTO THE LIVING SPACE.**
- **IF AIR-MOVING EQUIPMENT OR DUCTWORK IS LOCATED IN SPACES CONTAINING FUEL BURNING APPLIANCES SUCH AS WATER HEATERS OR BOILERS - ALL JOINTS, SEAMS, AND OPENINGS IN THE EQUIPMENT AND DUCT MUST ALSO BE SEALED TO PREVENT DEPRESSURIZATION OF THE SPACE AND POSSIBLE MIGRATION OF COMBUSTION BYPRODUCTS INCLUDING CARBON MONOXIDE INTO THE LIVING SPACE.**

⚠ WARNING

ALWAYS INSTALL FURNACE TO OPERATE WITHIN THE FURNACE'S INTENDED TEMPERATURE-RISE RANGE WITH A DUCT SYSTEM WHICH HAS AN EXTERNAL STATIC PRESSURE WITHIN THE ALLOWABLE RANGE, AS SPECIFIED IN DUCTING SECTION OF THESE INSTRUCTIONS. SEE ALSO FURNACE RATING PLATE.

⚠ WARNING

WHEN A FURNACE IS INSTALLED SO THAT SUPPLY DUCTS CARRY AIR CIRCULATED BY THE FURNACE TO AREAS OUTSIDE THE SPACE CONTAINING THE FURNACE, THE RETURN AIR SHALL ALSO BE HANDLED BY DUCT(S) SEALED TO THE FURNACE CASING AND TERMINATING OUTSIDE THE SPACE CONTAINING THE FURNACE.

NOTICE

IMPROPER INSTALLATION, OR INSTALLATION NOT MADE IN ACCORDANCE WITH THE CSA INTERNATIONAL (CSA) CERTIFICATION OR THESE INSTRUCTIONS, CAN RESULT IN UNSATISFACTORY OPERATION AND/OR DANGEROUS CONDI-TIONS AND ARE NOT COVERED BY THE UNIT WARRANTY.

NOTICE

IN COMPLIANCE WITH RECOGNIZED CODES, IT IS RECOMMENDED THAT AN AUXILIARY DRAIN PAN BE INSTALLED UNDER ALL EVAPORATOR COILS OR UNITS CONTAINING EVAPORATOR COILS THAT ARE LOCATED IN ANY AREA OF A STRUCTURE WHERE DAMAGE TO THE BUILDING OR BUILDING CONTENTS MAY OCCUR AS A RESULT OF AN OVERFLOW OF THE COIL DRAIN PAN OR A STOPPAGE IN THE PRIMARY CONDENSATE DRAIN PIPING. SEE ACCESSORIES SECTION OF THESE INSTRUCTIONS FOR AUXILIARY HORIZONTAL OVERFLOW PAN INFORMATION (MODEL RXBM).

⚠ WARNING

DO NOT EXCHANGE MEMORY CARDS BETWEEN 2 OR MORE DIFFERENT FURNACES. DOING SO COULD RESULT IN UNEXPECTED OPERATION – INCLUDING INADEQUATE AIRFLOW DURING HEATING (AND OTHER MODES OR A LOSS OF HEAT).

Before beginning any troubleshooting procedure, complete the following installation checklist. A furnace malfunction is sometimes caused by an improper installation. By completing this checklist, the problem may be found and corrected. Make copies of the checklist and complete one for every Low Profile Furnace service call for your records.

INSTALLATION CHECKLIST

(Refer to this manual for specifics.)

GAS SUPPLY

_____ Adequate pipe size

_____ No gas leaks

_____ Proper supply and manifold gas pressure (check with an accurate U-tube manometer with the furnace and all other gas appliances operating.)

ELECTRICAL

_____ Correct thermostat and subbase_____ Thermostat model _____ Subbase model

_____ Correct thermostat mode and setting

_____ Correct line supply voltage

_____ Correct power supply polarity is required with electronic ignition

_____ Correct furnace ground to electrical panel

_____ DC microamp (∝A) flame signal (hot surface ignition units)

_____ Correct control voltage

_____ Measure and set heat anticipator amperage

_____ Air conditioning low voltage wires connected to terminals “Y” “C” - **not with wire nuts**

VENTING

_____ Correct vent pipe diameter and length (according to CSA tables)_____ Vent connection size

_____ Correct venting material (according to CSA tables)

_____ Correct lining for masonry chimneys

_____ Adequate clearance from combustibles

_____ Proper negative pressure reading in the vent

_____ Vent pipe secured to induced draft blower housing

COMBUSTION AIR

_____ Proper source of combustion air

_____ Correct combustion air opening size

_____ Optional attic combustion air pull

_____ Non-attic combustion air pull

FURNACE INSTALLATION

_____ Adequate clearance from combustibles

_____ Adequate clearance for service

_____ Proper air temperature rise (See furnace rating plate)

_____ External static pressure _____ inches w.c.

_____ Correct filter(s)

_____ Correct cooling coil or accessories (if equipped)

_____ Adequate supply and return air ducting _____ Return Air Duct Size _____ Supply Air Duct Size

_____ Air ducts sealed to prevent leakage

GENERAL INFORMATION

The RGPE/RGLE series furnaces are design certified by CSA for use with natural and propane gases as follows:

As a Category I furnace, it may be vented vertically with type B-1 vent pipe and also may be common vented as described in these instructions.

This furnace should be installed in accordance with the American National Standard Z223.1 - latest edition booklet entitled "National Fuel Gas Code" (NFPA 54) (in Canada, CSA B149.1 and .2 Installation Codes for gas burning appliances), and the requirements or codes of the local utility or other authority having jurisdiction including local plumbing or waste water codes.

The National Appliance Energy Conservation Act (NAECA) of 1987 states that any gas furnace manufactured after January 1, 1992, must have a minimum Annual Fuel Utilization Efficiency (AFUE) of 78%. The higher the AFUE percentage the more usable heat energy the consumer gets for every dollar of fuel purchased. This is similar to the EPA's minimum gas mileage requirement for automobiles. It gives the consumer a relatively easy way to make direct efficiency comparisons between different furnace brands and styles.

A high AFUE value, which translates into a low operating cost, is not the only concern that consumers have. They also want a furnace with a reasonable installed cost. They want a furnace that provides them with comfort – their main concern. And they expect a furnace with exceptional reliability and longevity.

Gas furnace manufacturers are always striving to provide consumers with the best furnace value. The Low Profile Furnace addresses all those consumer needs. It gives exceptional efficiency with a low installation cost. It delivers the comfort the customer wants along with the reliability they expect.

The key to all these customer benefits is the furnace's heat exchanger. The materials used to construct the furnace in general and the heat exchanger in particular make it a rugged, long lasting unit. The unique heat exchanger design provides the customer with a furnace only 34 inches high. This gives the consumer a unit easily installed in almost every location that accepts all customary accessories.

With the introduction of higher efficiency furnaces, special attention must be paid to the venting system. Only listed venting systems may be used as stated in the installation instructions and the *National Fuel Gas Code, ANSI Z223.1 (NFPA 54), or the Canadian CAN/CGA B149.1 and B149.2 Installation Codes for Gas Burning Appliances.* Since furnace technology and venting requirements are changing, awareness of local, state, and federal codes and industry changes is imperative.

NOTE: Always perform a proper heat loss calculation before specifying the furnace size. This ensures that the furnace is sized to adequately, economically, heat the building and provide the correct airflow for your application.

IMPORTANT: PROPER APPLICATION, INSTALLATION AND MAINTENANCE OF THIS FURNACE IS A MUST IF CONSUMERS ARE TO RECEIVE THE FULL BENEFITS FOR WHICH THEY HAVE PAID.

Additional helpful publications available from the "National Fire Protection Association" are: NFPA-90A – Installation of Air Conditioning and Ventilating Systems 1985 or latest edition. NFPA-90B – Warm Air Heating and Air Conditioning Systems 1984.

These publications are available from:

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

CSA-INTERNATIONAL
178 Rexdale Blvd.
Etobicoke (Toronto), Ontario
Canada M9W, 1R3

IMPORTANT INFORMATION ABOUT EFFICIENCY AND INDOOR AIR QUALITY

Central cooling and heating equipment is only as efficient as the duct system that carries the cooled or heated air. To maintain efficiency, comfort and good indoor air quality, it is important to have the proper balance between the air being supplied to each room and the air returning to the cooling and heating equipment.

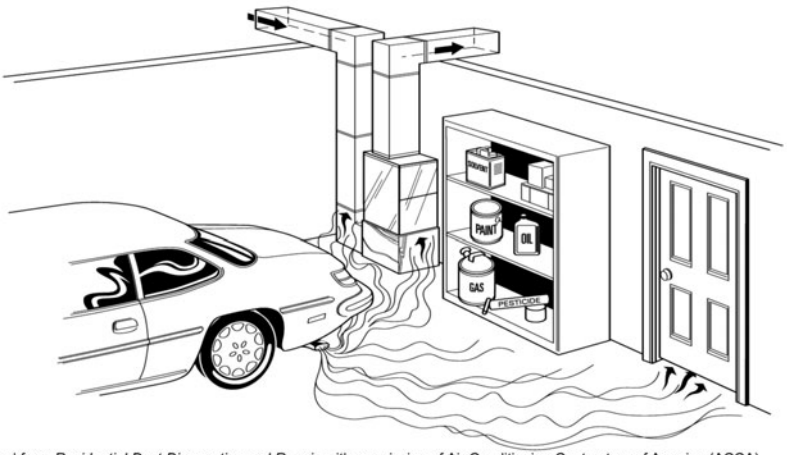
Proper balance and sealing of the duct system improves the efficiency of the heating and air conditioning system and improves the indoor air quality of the home by reducing the amount of airborne pollutants that enter homes from spaces where the ductwork and / or equipment is located. The manufacturer and the U.S. Environmental Protection Agency's Energy Star Program recommend that central duct systems be checked by a qualified contractor for proper balance and sealing.

⚠ WARNING

DUCT LEAKS CAN CREATE AN UNBALANCED SYSTEM AND DRAW POLLUTANTS SUCH AS DIRT, DUST, FUMES AND ODORS INTO THE HOME CAUSING PROPERTY DAMAGE. FUMES AND ODORS FROM TOXIC, VOLATILE OR FLAMMABLE CHEMICALS, AS WELL AS AUTOMOBILE EXHAUST AND CARBON MONOXIDE (CO), CAN BE DRAWN INTO THE LIVING SPACE THROUGH LEAKING DUCTS AND UNBALANCED DUCT SYSTEMS CAUSING PERSONAL INJURY OR DEATH (SEE FIGURE 1).

- **IF AIR-MOVING EQUIPMENT OR DUCTWORK IS LOCATED IN GARAGES OR OFF-GARAGE STORAGE AREAS - ALL JOINTS, SEAMS, AND OPENINGS IN THE EQUIPMENT AND DUCT MUST BE SEALED TO LIMIT THE MIGRATION OF TOXIC FUMES AND ODORS INCLUDING CARBON MONOXIDE FROM MIGRATING INTO THE LIVING SPACE.**
- **IF AIR-MOVING EQUIPMENT OR DUCTWORK IS LOCATED IN SPACES CONTAINING FUEL BURNING APPLIANCES SUCH**

FIGURE 1
MIGRATION OF DANGEROUS SUBSTANCES, FUMES, AND ODORS INTO LIVING SPACES



Adapted from *Residential Duct Diagnostics and Repair,* with permission of Air Conditioning Contractors of America (ACCA).

AS WATER HEATERS OR BOILERS - ALL JOINTS, SEAMS, AND OPENINGS IN THE EQUIPMENT AND DUCT MUST ALSO BE SEALED TO PREVENT DEPRESSURIZATION OF THE SPACE AND POSSIBLE MIGRATION OF COMBUSTION BYPRODUCTS INCLUDING CARBON MONOXIDE INTO THE LIVING SPACE.

NOTICE

IMPROPER INSTALLATION, OR INSTALLATION NOT MADE IN ACCORDANCE WITH THE CSA INTERNATIONAL (CSA) CERTIFICATION OR THESE INSTRUCTIONS, CAN RESULT IN UNSATISFACTORY OPERATION AND/OR DANGEROUS CONDI-TIONS AND ARE NOT COVERED BY THE UNIT WARRANTY.

NOTICE

IN COMPLIANCE WITH RECOGNIZED CODES, IT IS RECOMMENDED THAT AN AUXILIARY DRAIN PAN BE INSTALLED UNDER ALL EVAPORATOR COILS OR UNITS CONTAINING EVAPORATOR COILS OR GAS FURNACES USED WITH EVAPORATOR COILS THAT ARE LOCATED IN ANY AREA OF A STRUCTURE WHERE DAMAGE TO THE BUILDING OR BUILDING CONTENTS MAY OCCUR AS A RESULT OF AN OVERFLOW OF THE COIL DRAIN PAN OR A STOPPAGE IN THE PRIMARY CONDENSATE DRAIN PIPING.

RECEIVING

Immediately upon receipt, all cartons and contents should be inspected for transit damage. Units with damaged cartons should be opened immediately. If damage is found, it should be noted on the delivery papers, and a damage claim filed with the last carrier.

- After unit has been delivered to job site, remove carton taking care not to damage unit.
- Check the unit rating plate for unit size, electric heat, coil, voltage, phase, etc. to be sure equipment matches what is required for the job specification.
- Read the entire instructions before starting the installation.
- Some building codes require extra cabinet insulation and gasketing when unit is installed in attic applications.
- If installed in an unconditioned space, apply caulking around the power wires, control wires, refrigerant tubing and condensate line where they enter the cabinet. Seal the power wires on the inside where they exit conduit opening. Caulking is required to prevent air leakage into and condensate from forming inside the unit, control box, and on electrical controls.
- Install the unit in such a way as to allow necessary access to the coil/filter rack and blower/control compartment.
- Install the unit in a level position to ensure proper condensate drainage. Make sure unit is level in both directions within 1/8".
- Install the unit in accordance with any local code which may apply and the national codes. Latest editions are available from: "National Fire Protection Association, Inc., Batterymarch Park, Quincy, MA 02269." These publications are:
- ANSI/NFPA No. 70-(Latest Edition) National Electrical Code.
- NFPA90A Installation of Air Conditioning and Ventilating Systems.
- NFPA90B Installation of warm air heating and air conditioning systems.
- The equipment has been evaluated in accordance with the Code of Federal Regulations, Chapter XX, Part 3280.

LOCATION REQUIREMENTS AND CONSIDERATIONS

GENERAL INFORMATION

1. **NOTE:** This furnace is shipped with heat exchanger support brackets installed under the back of the heat exchanger. These may be removed before installation, but it is not required.

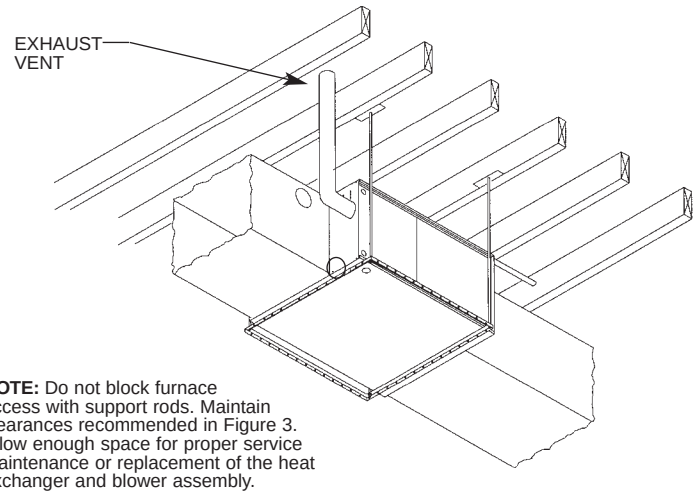
LOCATION

⚠ 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, PERSONAL INJURY OR DEATH.

2. IMPORTANT: *This furnace is not approved or recommended for installation on its back, with access doors facing upwards.*
3. This furnace is suitable for installation in buildings constructed on-site. This heating unit should be centralized with respect to the heat distribution system as much as practicable.
4. **NOTE:** These furnaces are approved for installation in attics, as well as alcoves, utility rooms, closets and crawlspaces.
5. **IMPORTANT**: *Support this unit when installed. For attic or crawl space installation, horizontal furnaces may be installed on combustible wood flooring or by using support brackets. See Figure 2.*
6. **IMPORTANT**: *If installing in a utility room, be sure the door is wide enough to:*
   a. allow the largest part of the furnace to pass; or
   b. allow any other appliance (such as a water heater) to pass.

FIGURE 2
HORIZONTAL FURNACE INSTALLED W/SUPPORT BRACKETS



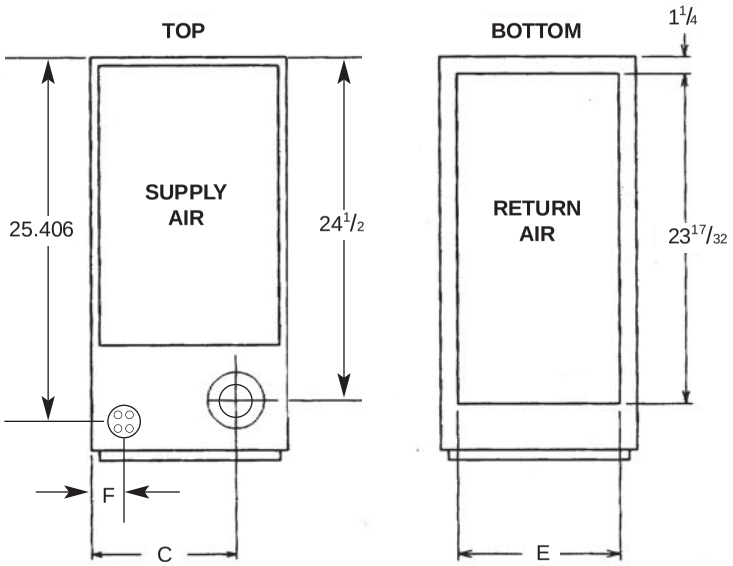
NOTE: Do not block furnace access with support rods. Maintain clearances recommended in Figure 3. Allow enough space for proper service maintenance or replacement of the heat exchanger and blower assembly.

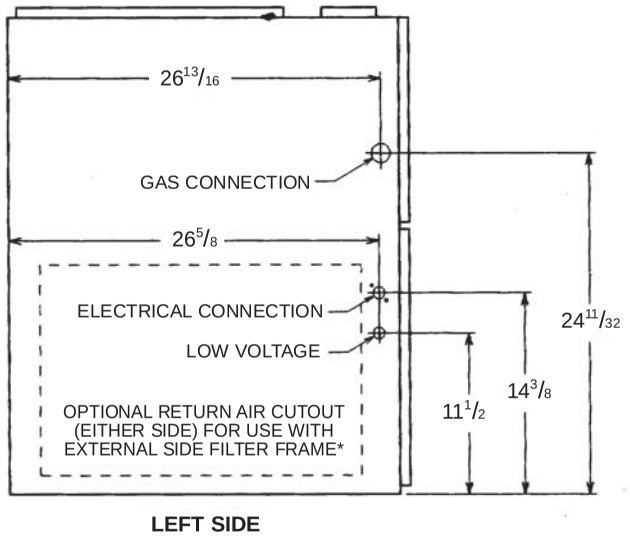
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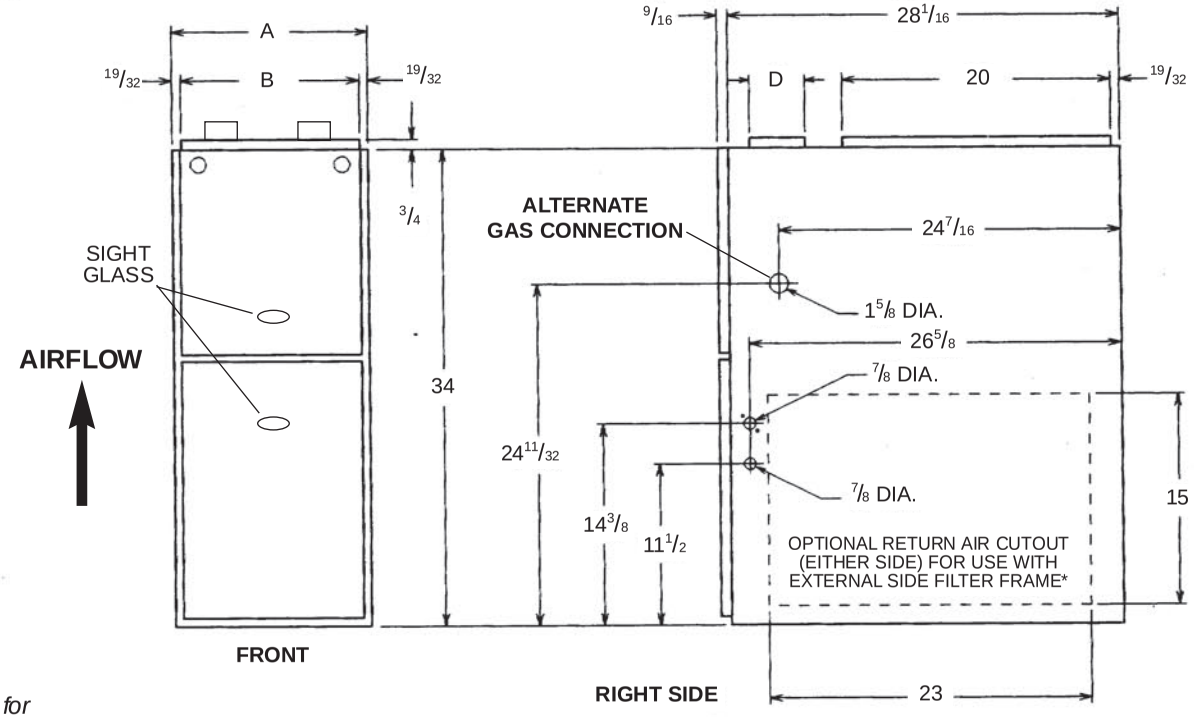
CLEARANCE TO COMBUSTIBLE MATERIAL (INCHES) UPFLOW/HORIZONTAL MODELS

Model RGPE	A	B	C	D	E	F	Left Side	REDUCED CLEARANCE (IN.) Right Side	Back	Top	Front	Vent	Ship. Wgts.
05	17 1/2	16 11/32	12 3/8	①	15	2 1/2	0	3②	0	1	3	6③	105 lbs.
07(A)	17 1/2	16 11/32	12 3/8	①	15	2 1/2	0	3②	0	1	3	6③	115 lbs.
07(B),10	21	19 27/32	14 1/8	①	18 1/2	2 1/2	0	0	0	1	3	6③	120 lbs.
12	24 1/2	23 11/32	15 7/8	①	22	2 1/2	0	0	0	1	3	6③	140 lbs.

① May require 3" to 4" or 3" or 5" adapter.
② May be 0" with type B vent.
③ May be 1" with type B vent.







IMPORTANT: *This furnace is not approved or recommended for installation on its back, with access doors facing upwards.*

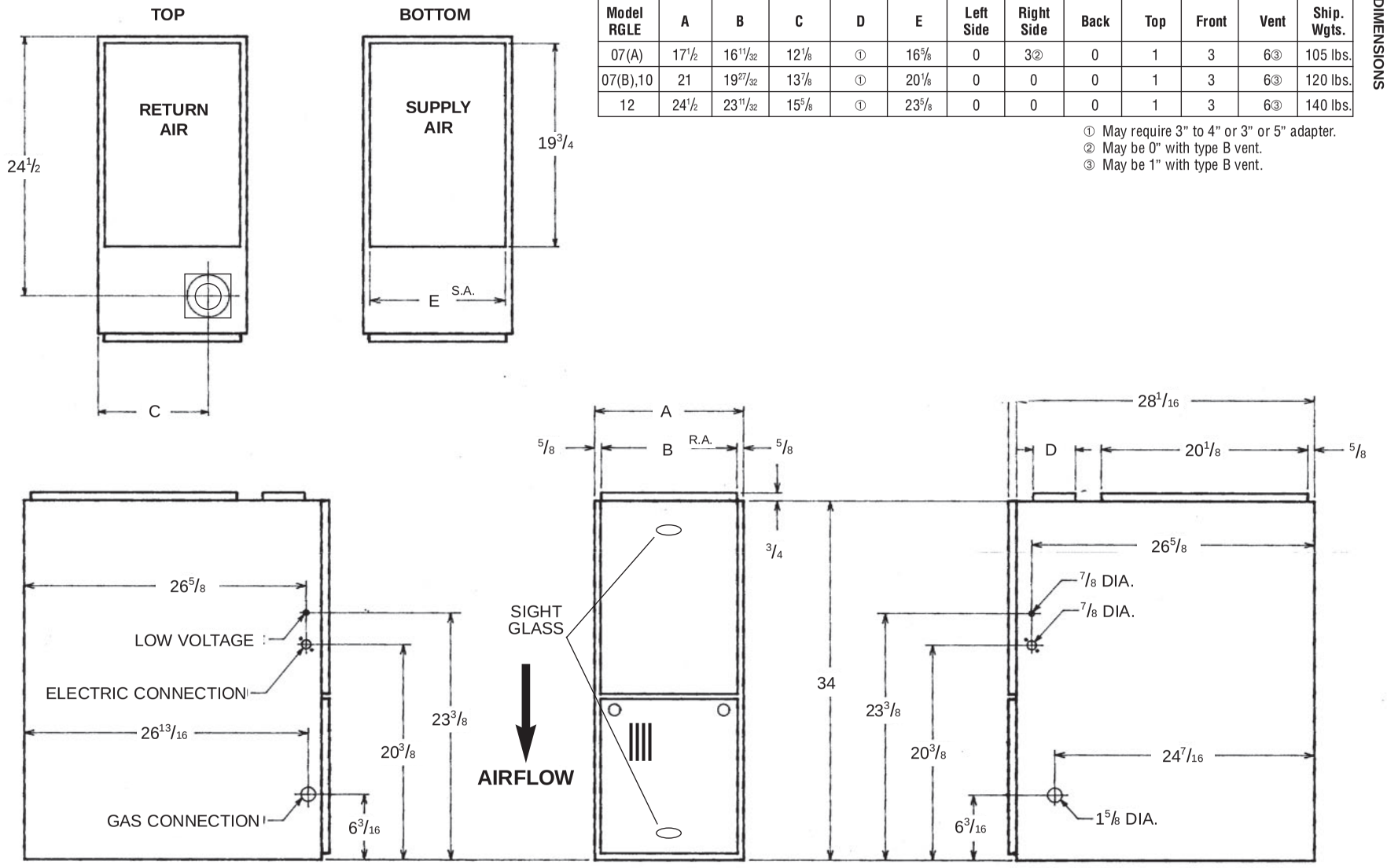
*Both sides for 1800 CFM or above.

FIGURE 3
UPFLOW/HORIZONTAL DIMENSIONS

CLEARANCE TO COMBUSTIBLE MATERIAL (INCHES) DOWNFLOW MODELS

Model RGLE	A	B	C	D	E	Left Side	REDUCED CLEARANCE (IN.) Right Side	Back	Top	Front	Vent	Ship. Wgts.
07(A)	17 1/2	16 11/32	12 1/8	①	16 5/8	0	3②	0	1	3	6③	105 lbs.
07(B),10	21	19 27/32	13 7/8	①	20 1/8	0	0	0	1	3	6③	120 lbs.
12	24 1/2	23 11/32	15 5/8	①	23 5/8	0	0	0	1	3	6③	140 lbs.

① May require 3" to 4" or 3" or 5" adapter.
② May be 0" with type B vent.
③ May be 1" with type B vent.



NOTE: IN DOWNFLOW CONFIGURATION, OPTIONAL AIR CUTOUT IS NOT PERMITTED.
COMBUSTIBLE FLOOR BASE REQUIRED IF FURNACE IS NOT INSTALLED ON COIL BOX.

FIGURE 4
DOWNFLOW DIMENSIONS

CLEARANCE – ACCESSIBILITY

The design of forced air furnaces with input ratings as listed in the tables on the following pages are certified by CSA for the clearances to combustible materials shown in inches.

See name/rating plate and clearance label for specific model number and clearance information.

Service clearance of at least 24 inches is recommended in front of all furnaces.

ACCESSIBILITY CLEARANCES, WHERE GREATER, MUST TAKE PRECEDENCE OVER FIRE PROTECTION CLEARANCES.

⚠ WARNING

UPFLOW AND HORIZONTAL FURNACES MUST NOT BE INSTALLED DIRECTLY ON CARPETING, TILE OR OTHER COMBUSTIBLE MATERIAL OTHER THAN WOOD FLOORING. INSTALLATION ON A COMBUSTIBLE MATERIAL CAN RESULT IN FIRE CAUSING PROPERTY DAMAGE, SEVERE PERSONAL INJURY OR DEATH.

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

DOWNFLOW UNIT DESIGN IS CERTIFIED FOR INSTALLATION ON NON-COMBUSTIBLE FLOOR. A SPECIAL COMBUSTIBLE FLOOR SUB-BASE, FIGURE 5, IS REQUIRED WHEN INSTALLING ON A COMBUSTIBLE FLOOR. FAILURE TO INSTALL THE SUB-BASE MAY RESULT IN FIRE, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH. THIS SPECIAL BASE IS OFFERED AS AN ACCESSORY FROM THE FACTORY. SEE THE CLEARANCE LABEL LOCATED INSIDE THE FURNACE FOR THE APPROPRIATE MODEL NUMBER.

THE SPECIAL BASE IS NOT REQUIRED WHEN THE FURNACE IS INSTALLED ON TOP OF AN AIR CONDITIONING PLENUM.

SITE SELECTION

1. Select a site in the building near the center of the proposed, or existing, duct system.
2. Give consideration to the vent system piping when selecting the furnace location. Be sure the venting system can travel from the furnace to the termination with minimal length and elbows.
3. Locate the furnace near the existing gas piping. Or, if running a new gas line, locate the furnace to minimize the length and elbows in the gas piping.
4. Locate the furnace to maintain proper clearance to combustibles as shown in Figures 3 and 4.

⚠ CAUTION

WHEN COILS ARE INSTALLED ABOVE A FINISHED CEILING OR LIVING AREA, IT IS RECOMMENDED THAT AN AUXILIARY SHEET METAL CONDENSATE DRAIN PAN BE FABRICATED AND INSTALLED UNDER ENTIRE UNIT. FAILURE TO DO SO CAN RESULT IN PROPERTY DAMAGE. RUN CONDENSATE TO A LOCATION WHERE IT IS NOTICEABLE.

⚠ WARNING

COMBUSTIBLE MATERIAL MUST NOT BE PLACED ON OR AGAINST THE FURNACE JACKET OR WITHIN THE SPECIFIED CLEARANCES OF THE VENT PIPE. THE AREA AROUND THE FURNACE MUST BE KEPT CLEAR AND FREE OF ALL COMBUSTIBLE MATERIALS INCLUDING GASOLINE AND OTHER FLAMMABLE VAPORS AND LIQUIDS. PLACEMENT OF COMBUSTIBLE MATERIALS ON, AGAINST OR AROUND THE FURNACE JACKET CAN CAUSE AN EXPLOSION OR FIRE RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH. THE FURNACE OWNER SHOULD BE CAUTIONED THAT THE FURNACE AREA MUST NOT BE USED AS A BROOM CLOSET OR FOR ANY OTHER STORAGE PURPOSES.

DUCTING

Proper air flow is required for the correct operation of this furnace. Too little air flow can cause erratic operation and can damage the heat exchanger. The duct system must carry the correct amount of air for heating and cooling. Position the unit to minimize long runs or runs with many turns and elbows.

Size and install the ducts according to acceptable industry standards and methods. The total static pressure drop (including evaporator coil, if used) of the entire system should not exceed 0.8" w.c. Be sure to have adequate space for unit filter. **NOTE:** Airflow external static pressure measurements do not include filter or coil.

IMPORTANT: *Some high efficiency filters have a greater than normal resistance to air flow. This can adversely affect furnace operation. BE SURE TO CHECK AIR FLOW if using any filter other than the factory-provided filter.*

NOTE: DO NOT take return air from bathrooms, kitchens, furnace rooms, garages, utility or laundry rooms, or cold areas.

IMPORTANT: *Return air temperature must be **above 55°F** during the heating season.*

⚠ WARNING

NEVER ALLOW 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. 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 A 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.

⚠ WARNING

BLOWER AND BURNERS MUST NEVER BE OPERATED WITHOUT THE 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.

UPFLOW UNITS

1. Set furnace in place and connect the return duct or return air cabinet to unit. Make the connection air-tight to prevent entraining combustion gases from any adjacent fuel-burning appliances. Unit return air may be connected on the sides or bottom of the return air compartment.
   a. Openings in the side must be cut out the full width of the knockouts on the unit. If using side return air, **THE BOTTOM base plate must be installed**.

      NOTE: Where the maximum airflow is 1800 CFM or more, both sides or the bottom must be used for return air.
   b. If using bottom return air, place furnace over return air plenum and seal furnace bottom to return air plenum.

⚠ WARNING

A SOLID METAL BASE PLATE, (SEE TABLE 1) MUST BE IN PLACE WHEN THE FURNACE IS INSTALLED WITH SIDE 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 OR DEATH.

TABLE 1

FURNACE WIDTH	BASE PLATE NO.	BASE PLATE SIZE
$17\frac{1}{2}$"	RXGB-D17	$15\frac{1}{8}$" x $23\frac{9}{16}$"
21"	RXGB-D21	$18\frac{5}{8}$" x $23\frac{9}{16}$"
$24\frac{1}{2}$"	RXGB-D24	$25\frac{5}{8}$" x $23\frac{9}{16}$"

2. If summer air conditioning is desired, position the indoor coil on the supply air side of the furnace. Insure that no air can bypass this coil.
3. Connect the supply air plenum to the furnace plenum opening, or indoor coil.

NOTE: The RGLE has louvers to cool the inducer motor bearings.

DOWNFLOW UNITS

⚠ WARNING

THE DOWNFLOW FURNACE DESIGN IS CERTIFIED FOR INSTALLATION ON A NON-COMBUSTIBLE FLOOR. IF INSTALLED ON A COMBUSTIBLE FLOOR, USE THE SPECIAL BASE SPECIFIED ON THE FURNACE CLEARANCE LABEL. FAILURE TO INSTALL THE SPECIAL BASE MAY RESULT IN FIRE, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH. THIS SPECIAL BASE IS SHIPPED FROM THE FACTORY AS AN ACCESSORY.

1. Position the unit over the supply air plenum and connect.
   a. If installing on a combustible floor **and not using an evaporator coil box,** install the special combustible floor base. See Figure 5.
   b. If summer air conditioning is desired, position the indoor coil on the supply air side. Insure that no air can bypass this coil.
2. Connect the return air ducting to the return air opening at the top of the unit. Make the connection air tight to prevent entraining combustion gases from an adjacent fuel-burning appliance.

HORIZONTAL UNITS

1. Unit can be mounted left or right side airflow configuration.
2. Position the unit on adequate supports or by using support brackets (see Figure 2) and connect supply plenum and return.
3. If summer air conditioning is desired, position the indoor coil on the supply air side of the unit. Insure that no air can bypass this coil.
4. Secure the four angle brackets shipped with the unit to the return air opening. See Figure 6. Connect the return air ducting to the return air opening at the top of the unit. Make the connection air tight to prevent entraining combustion gases from an adjacent fuel-burning appliance.

NOTE: Do not block furnace access with support rods. Maintain clearances recommended in Figure 3. Allow enough space for proper service maintenance or replacement of the heat exchanger and blower assembly.

FIGURE 5
COMBUSTIBLE FLOOR BASE (RXGC-B17, -B21, -B24)

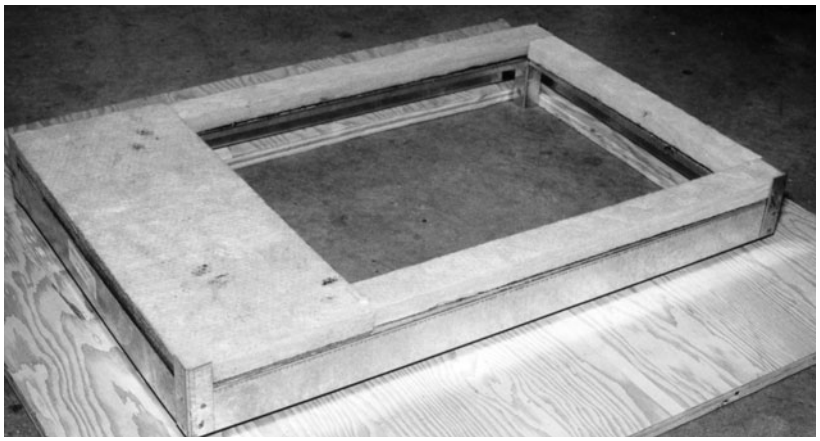
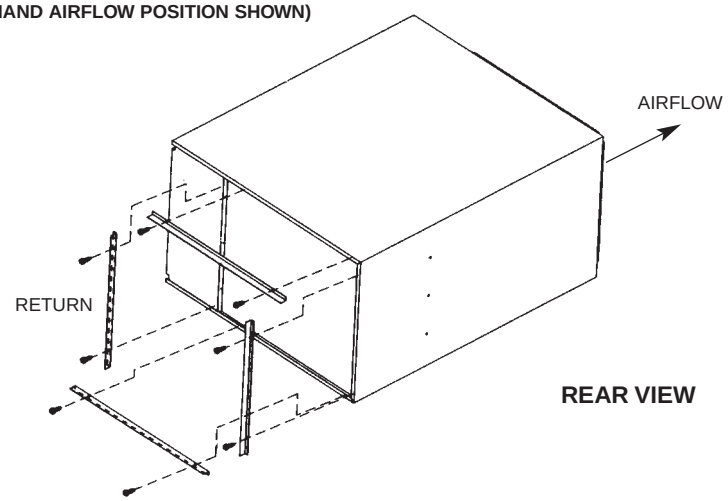


FIGURE 6
HORIZONTAL RETURN AIR DUCT
(LEFT-HAND AIRFLOW POSITION SHOWN)



FOUR ANGLE BRACKETS ARE SHIPPED WITH EACH UNIT THAT CAN BE USED TO SECURE THE RETURN AIR DUCT TO A HORIZONTAL UNIT.

COMBUSTION AND VENTILATION AIR

IMPORTANT: *This is not a direct vent furnace. Review venting instructions before installing.*

⚠ WARNING

THIS FURNACE AND ANY OTHER FUEL-BURNING APPLIANCE MUST BE PROVIDED WITH ENOUGH FRESH AIR FOR PROPER COMBUSTION AND VENTILATION OF THE FLUE GASES. MOST HOMES WILL REQUIRE THAT OUTSIDE AIR BE SUPPLIED INTO THE FURNACE AREA. FAILURE TO DO SO CAN CAUSE DEATH FROM CARBON MONOXIDE POISONING.

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 latest edition or CSA B149.1 and .2 or, applicable provisions for the local building codes, and not obstructed so as to prevent the flow of air to the furnace.

COMBUSTION AIR REQUIREMENTS

IMPORTANT: *Air for combustion and ventilation must not come from a corrosive atmosphere. Any failure due to corrosive elements in the atmosphere is excluded from warranty coverage.*

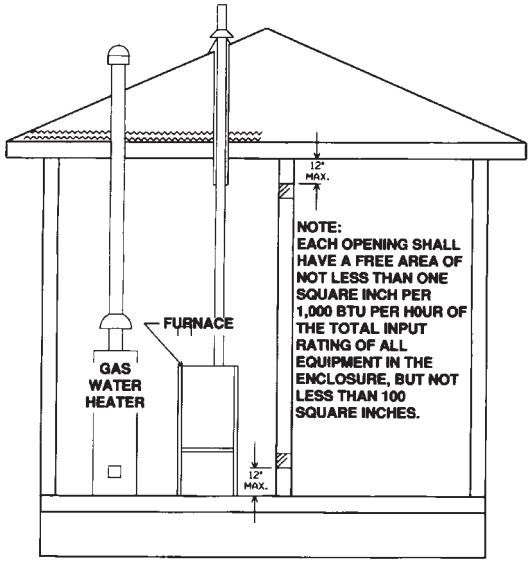
The following types of installation may require OUTDOOR AIR for combustion, due to chemical exposures:

- Commercial buildings
- Buildings with indoor pools
- Furnaces installed in laundry rooms
- Furnaces in hobby or craft rooms
- Furnaces installed near chemical storage areas.

Exposure to the following substances in the combustion air supply may also require OUTDOOR AIR for combustion:

- Permanent wave solutions
- Chlorinated waxes and cleaners
- Chlorine-based swimming pool chemicals
- Water softening chemicals
- De-icing salts or chemicals
- Carbon tetrachloride
- Halogen type refrigerants
- Cleaning solvents (such as perchloroethylene)
- Printing inks, paint removers, varnishes, etc.
- Hydrochloric acid
- Cements and glues
- Antistatic fabric softeners for clothes dryers
- Masonry acid washing materials

FIGURE 7
AIR FROM HEATED SPACE



Combustion air must be free of acid forming chemicals; such as sulphur, fluorine and chlorine. These elements are found in aerosol sprays, detergents, bleaches, cleaning solvents, air fresheners, paint and varnish removers, refrigerants and many other commercial and household products. Vapors from these products when burned in a gas flame form acid compounds. The acid compounds increase the dew point temperature of the flue products and are highly corrosive after they condense.

⚠ WARNING

ALL FURNACE INSTALLATIONS MUST COMPLY WITH THE NATIONAL FUEL GAS CODE AND LOCAL CODES TO PROVIDE ADEQUATE COMBUSTION AND VENTILATION AIR FOR THE FURNACE. FAILURE TO DO SO CAN CREATE HAZARDOUS CONDITIONS RESULTING IN PROPERTY DAMAGE, BODILY INJURY OR DEATH FROM SMOKE, FIRE OR CARBON MONOXIDE.

Combustion air requirements are determined by whether the furnace is in an open (unconfined) area or in a confined space such as a closet or small room. See Figures 7 and 8.

EXAMPLE 1.
FURNACE LOCATED IN AN UNCONFINED SPACE

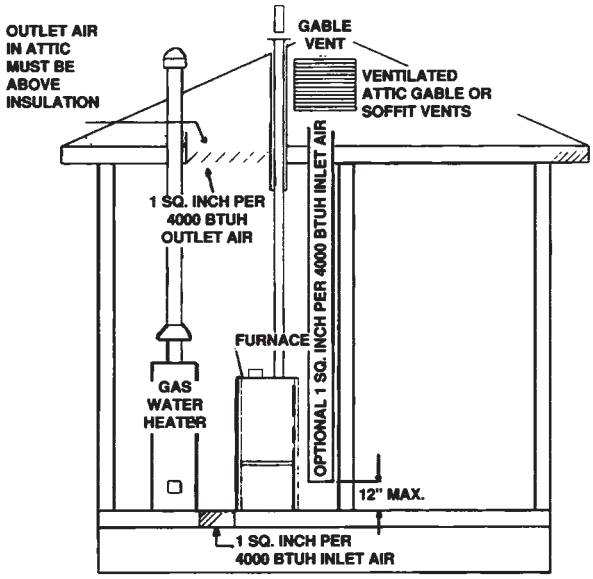
Using indoor air for combustion.

An unconfined space must have at least 50 cubic feet for each 1,000 BTUH of the total input for all appliances in the space. Here are a few examples of the room sizes required for different inputs. The sizes are based on 8 foot ceilings.

BTUH Input	Minimum Sq. Feet With 8' Ceiling	Typical Room Size With 8' Ceiling
50,000	312	14*x24* or 18*x18*
75,000	469	15*x31* or 20*x24*
100,000	625	20*x31* or 25*x25*
125,000	833	23*x34* or 26*x30*

If the open space containing the furnace is in a building with tight construction (contemporary construction), outside air may still be required for the furnace to operate and vent properly. Outside air openings should be sized the same as for a confined space.

FIGURE 8
AIR FROM ATTIC/CRAWL SPACE



EXAMPLE 2.
FURNACE LOCATED IN A CONFINED SPACE

A confined space (any space smaller than shown above as "unconfined") must have openings into the space which are located in accordance with the requirements set forth in the following subsections A and B. Size the openings by how they are connected to the heated area or to the outside, and by the input of all appliances in the space.

If confined space is within a building with tight construction, combustion air must be taken from outdoors or area freely communicating with the outdoors.

A. USING INDOOR AIR FOR COMBUSTION, ALL OF THE MODELS

IMPORTANT: *Air should not be taken from a heated space with a fireplace, exhaust fan or other device that may produce a negative pressure.*

If combustion air is taken from the heated area, the openings must each have at least 100 square inches of free area. Each opening must have at least one square inch of free area for each 1,000 Btuh of total input in the space. Here are some examples of typical openings required.

Btuh Input	Free Area Each Opening
100,000	100 Square Inches

AIR INTAKE PIPE CONNECTION (RGPE UPFLOW/HORIZONTAL ONLY)

A double-elbow may be installed to top inlet air opening, BUT IS NOT REQUIRED. This will help to prevent accidental blockage of the intake opening. Reference Figure 9 for proper elbow diameter.

NOTE: Inlet is specifically designed to prevent material from being pulled into furnace. If elbows are not used, the intake opening must be kept clean and free of debris.

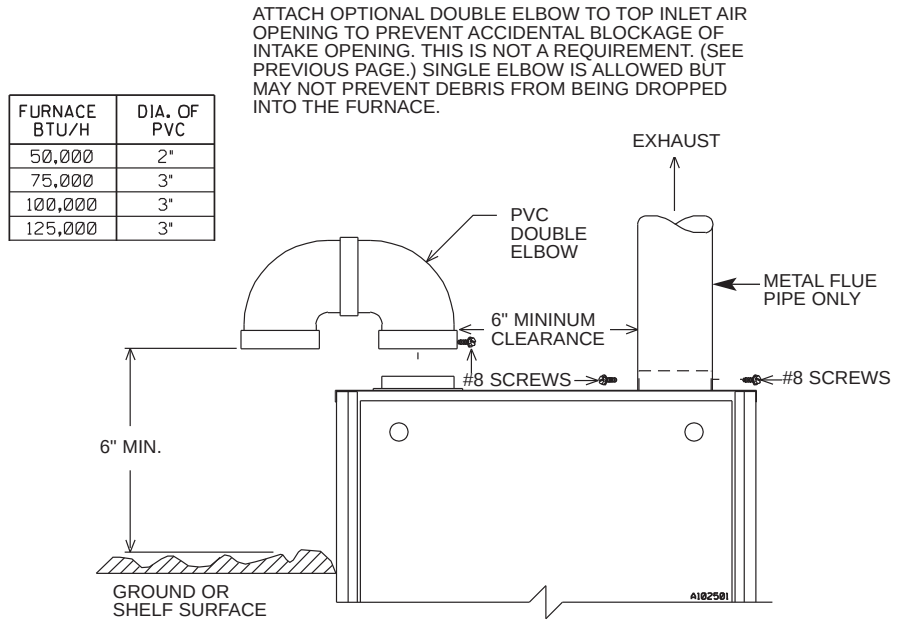
It is also acceptable to run the condensate drain (or refrigerant) line access over the air intake hole as long as a 1" minimum clearance is maintained.

B. USING OUTDOOR AIR FOR COMBUSTION, ALL OF THE MODELS

IMPORTANT: ***Never take combustion air from an attic space that is equipped with power ventilation.***

The confined space must communicate with the outdoors according to Methods 1 and 2. The minimum air opening dimension shall not be less than 3 inches. When using ducts, they shall be of the same cross-sectional area as the free area of the openings to which they connect.

FIGURE 9
COMBUSTION AIR FITTING – NON-ATTIC COMBUSTION AIR PULL, RGPE ONLY



NOTE: PREDRILL HOLES FOR SCREWS TO PREVENT CRACKING.

B: Method 1

Provide two permanent openings, one located within 12 inches of the top and one located within 12 inches of the bottom of the enclosure. Each opening shall communicate directly, or by ducts, with the outdoors or spaces (crawl or attic) that freely communicate with the outdoors.

a. Where directly communicating with the outdoors or where communicating to the outdoors through **VERTICAL DUCTS,** each opening shall have a minimum free area of **1 square inch for each 4000 BTUH** of total appliance input rating in the enclosure. Here are typical duct sizes:

VERTICAL OUTDOOR AIR OPENING DIMENSIONS

BTUH Input	Free Area Each Opening	Round Pipe Size
50,000	12.50 sq. inches	4”
75,000	18.75 sq. inches	5”
100,000	25.00 sq. inches	6”
125,000	31.25 sq. inches	7”

b. Where communicating with outdoors through **HORIZONTAL DUCTS,** each opening shall have a minimum free area of **1 square inch for each 2000 BTUH** of total input rating for all equipment in the enclosure. Here are typical duct sizes:

HORIZONTAL OUTDOOR AIR OPENING DIMENSIONS

BTUH Input	Free Area Each Opening	Round Pipe Size
50,000	25.00 sq. inches	6”
75,000	37.50 sq. inches	7”
100,000	50.00 sq. inches	8”
125,000	62.50 sq. inches	9”

B: Method 2

One permanent opening, located within 12 inches of the top of the enclosure, shall be permitted where the equipment has clearances of at least 1 inch from the sides and back and 6 inches from the front of the appliance. The opening shall directly communicate with the outdoors or communicate through a vertical or horizontal duct to the outdoors or spaces (crawl or attic) that freely communicate with the outdoors and have a minimum free area of:

a. One square inch for each 3000 BTUH of the total input rating of all equipment located in the enclosure, **AND**

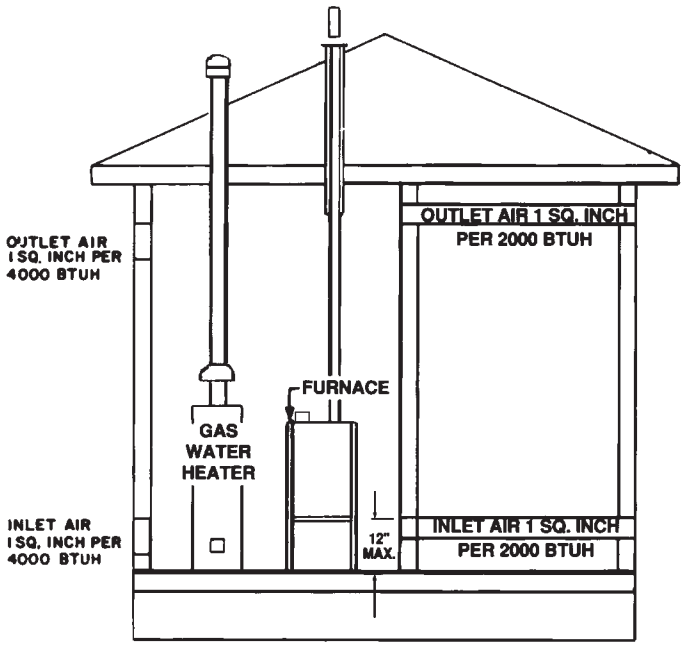
b. Not less than the sum of the areas of all vent connectors in the confined space.

IMPORTANT: *If the furnace is in a location with an exhaust fan, there must be sufficient ventilation to prevent the exhaust fan from creating a negative pressure in the room.*

Combustion air openings must **NOT BE RESTRICTED** in any manner.

CONSULT LOCAL CODES FOR SPECIAL REQUIREMENTS.

FIGURE 10
OUTSIDE AIR USING A HORIZONTAL INLET & OUTLET



B: Method 3, RGPE only

For the optimum in quiet operation, attic air may be brought directly to the furnace.

IMPORTANT: In applications using Method 3 for combustion air, the attic must be ventilated by gable or soffit vents. See Figure 8.

It is not required to provide any permanent openings as described in Method 1 or Method 2.

⚠ CAUTION

COMBUSTION AIR INTAKES CANNOT BE TERMINATED OUTSIDE. DOING SO CAN CAUSE IMPROPER

OPERATION OF THE FURNACE

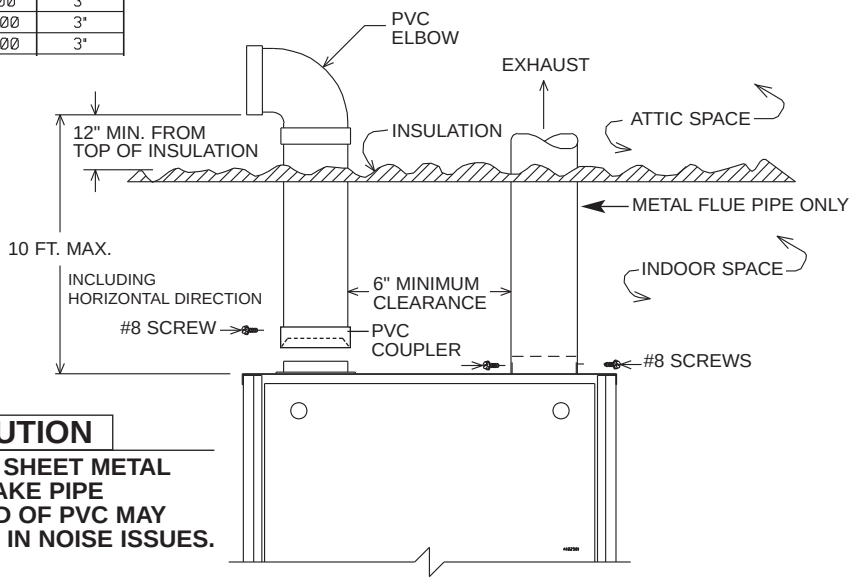
If attic combustion air is used, the inlet air opening at the furnace must be protected from accidental blockage. Install a 90° elbow pointing horizontally at the top of inlet air pipe. See Figure 11 (maximum of 2, 22½°, 45° or 90° elbows, allowed).

NOTE: Maximum length of pipe that may be used for combustion air is 10 feet with two elbows. Lengths of more than 10 feet can result in nuisance pressure switch trips.

FIGURE 11
COMBUSTION AIR FITTING – OPTIONAL ATTIC COMBUSTION AIR PULL, RGPE ONLY

FURNACE BTU/H	DIA. OF PVC
50,000	2"
75,000	3"
100,000	3"
125,000	3"

ATTACH A 90° ELBOW TO TOP INLET AIR OPENING TO PREVENT ACCIDENTAL BLOCKAGE OF INTAKE OPENING.



⚠ CAUTION

USE OF SHEET METAL AIR INTAKE PIPE INSTEAD OF PVC MAY RESULT IN NOISE ISSUES.

NOTE: PREDRILL HOLES FOR SCREWS TO PREVENT CRACKING.

VENTING

GENERAL INFORMATION

The furnace must be vented in accordance with these instructions, National Fuel Gas Code, ANSI Z223.1 and/or the Natural Gas Installation Code, CSA-B149.1 & .2 and requirements or codes of the local utility or other authority having jurisdiction.

⚠ WARNING

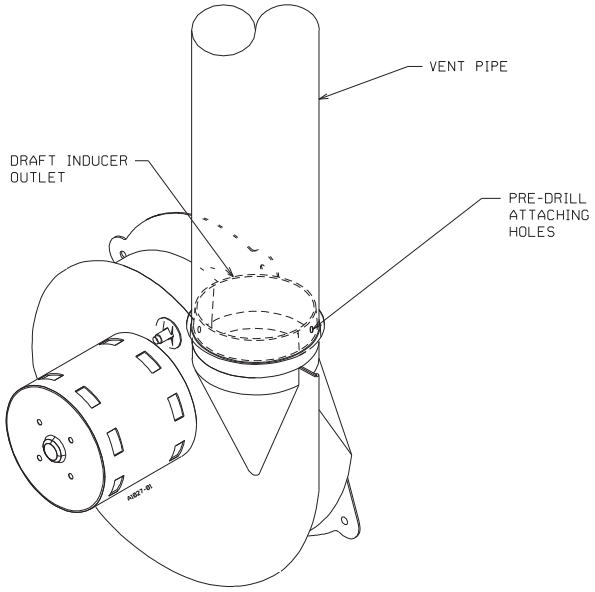
DEVICES ATTACHED TO THE FLUE OR VENT FOR THE PURPOSE OF REDUCING HEAT LOSS UP THE CHIMNEY HAVE NOT BEEN TESTED AND HAVE NOT BEEN INCLUDED IN THE DESIGN CERTIFICATION OF THIS FURNACE. WE, THE MANUFACTURER, CANNOT AND WILL NOT BE RESPONSIBLE FOR INJURY OR DAMAGE CAUSED BY THE USE OF SUCH UNTESTED AND/OR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

DRAFT INDUCER

⚠ WARNING

VENT PIPE ATTACHING HOLES MUST BE PREDRILLED IN THE DRAFT INDUCER COLLAR TO PREVENT DAMAGING THE INDUCER. DRILL 1/8" DIAMETER HOLES THROUGH THE VENT PIPE AND COLLAR AND USE #8 SCREWS TO ATTACH. SEE FIGURE 12. FAILURE TO FOLLOW THIS WARNING CAN CAUSE RECIRCULATION OF FLUE PRODUCTS CAUSING CARBON MONOXIDE POISONING RESULTING IN PERSONAL INJURY OR DEATH.

FIGURE 12
ATTACHING TO DRAFT INDUCER COLLAR



A0991-01

FURNACE CATEGORY INFORMATION

This furnace is shipped as a Category I type induced draft furnace. A Category I furnace operates with a nonpositive vent pressure and has a vent gas temperature at least 140°F above the dew point of the vent gases. A Category I type may be a draft hood equipped furnace or have a fan assisted combustion system (induced draft). The inducer is used to pull flue products through the combustion chamber and as they leave the furnace, most of the energy has been dissipated. The buoyant effect of the flue gases provides venting to the outdoors.

During the off cycle, the inducer is off and there is very little flow through the vent, cooling the vent. During the on cycle there is no dilution airflow, as with a draft hood type furnace. Although the vent heats up rapidly without dilution air, the flue products contain more water vapor, which results in a higher dew point temperature. It is most **important** that you follow the guidelines in these instructions to prevent the possible formation of condensation in the venting system.

As a Category I furnace it may be vented vertically with type B-1 vent pipe and also may be common vented, as described in these instructions.

IMPORTANT APPLICTION NOTES

When the furnace is used as a replacement, the existing vent system should be inspected to assure that there are no obstructions, blockage, or any signs of corrosion and is properly sized for use with this furnace.

NOTE: When the vent table permits more than one diameter of pipe for a connector or vent, the smallest permitted diameter must be used.

Vent pipe may be type "B-1," either rigid or suitable flexible construction that carries a u.l. listing.

Common venting is allowed with vertical B-1 vent systems, and lined masonry chimneys. Follow the National Fuel Gas Code, ANSI Z223.1 and/or the Natural Gas Installation Code, CSA-B149.1 & .2 for proper installation practices.

NOTE: Follow combustion air instructions as outlined in this manual.

Single wall vent connectors to "B-1 vent or masonry chimneys" may be used under the guidelines of the National Fuel Gas Code, ANSI Z223.1 and/or the Natural Gas Installation Code, CSA-B149.1 & .2.

The entire length of the vent connector shall be readily accessible for inspection, cleaning and replacement.

"B-1" VERTICAL VENTING

Type "B-1" vents must be installed in accordance with the terms of their listings and the vent manufacturer's instructions.

"B-1" vents must be supported and spaced in accordance with their listings and the manufacturer's instructions. All vents must be supported to maintain their minimum clearances from combustible material.

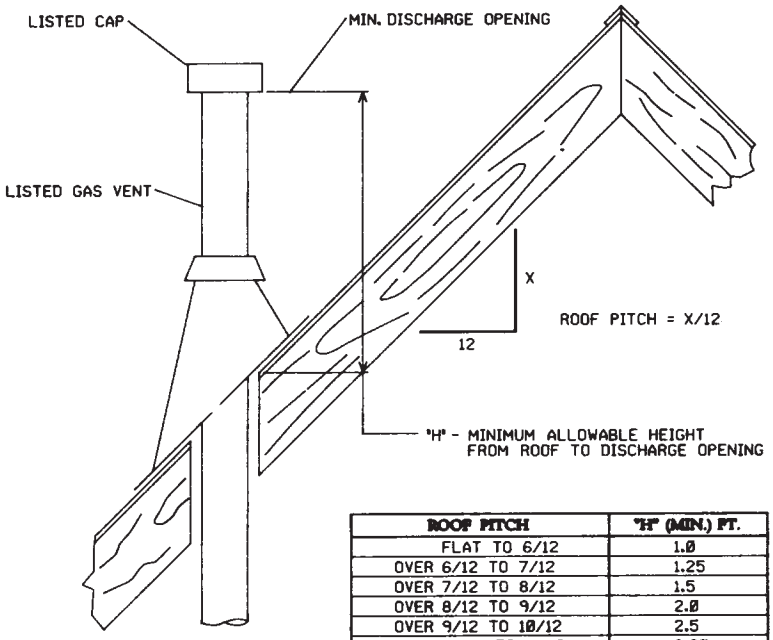
VERTICAL VENTING	
Input	Categorized Furnace Vent Size Required
50K	3"
75K	*4"
100K	*4"
125K	*5"

*NOTE: All furnaces have a 3" vent connection as shipped from the factory. A 3" to 4" or 3" to 5" vent transition is required on all but the 50,000 BTUH models when vertically vented or common vented with metal vent pipes. **THE VENT TRANSITION CONNECTION MUST BE MADE AT THE FURNACE VENT EXIT.** It must originate with an adapter if required, at the furnace flue collar and terminate either in a listed cap or roof assembly. When common venting, the vent connector size may differ from the above diameters depending on application. See ANSI Z21.47-1993/CSA-2.3-M93 or latest edition tables.

VERTICAL VENT SYSTEMS:

1. A gas vent shall terminate above the roof surface with a listed cap or listed roof assembly. Gas vents 12 inches in size or smaller with listed caps shall be permitted to be terminated in accordance with Figure 13, provided they are at least 8 feet from a vertical wall or similar obstruction. All other gas vents shall terminate not less than 2 feet above the highest point where they pass through the roof and at least 2 feet higher than any portion of a building within 10 feet.
2. A type B-1 gas vent shall terminate at least 5 feet in vertical height above the highest connected equipment draft hood or flue collar.
3. Must rise ¼" per foot away from the furnace on horizontal runs and be supported with straps or hangers so it has no sags or dips. Supports at 4 foot intervals and at all elbows are recommended.
4. The vent connector must be mechanically fastened to the outlet collar of the furnace with at least (2) sheet metal screws except vent connectors that are B-1 material. These shall be assembled in accordance with the manufacturer's instructions. See Figure 12.

FIGURE 13
TYPICAL VENTING WITH "B-1" VENT



ROOF PITCH	"H" (MIN.) FT.
FLAT TO 6/12	1.0
OVER 6/12 TO 7/12	1.25
OVER 7/12 TO 8/12	1.5
OVER 8/12 TO 9/12	2.0
OVER 9/12 TO 10/12	2.5
OVER 10/12 TO 11/12	3.25
OVER 11/12 TO 12/12	4.0
OVER 12/12 TO 14/12	5.0
OVER 14/12 TO 16/12	6.0
OVER 16/12 TO 18/12	7.0
OVER 18/12 TO 20/12	7.5
OVER 20/12 TO 21/12	8.0

5. Any angle greater than 45 degrees from the vertical is considered horizontal. The total horizontal distance of a vent plus the horizontal vent connector serving draft-hood equipped appliances shall not be greater than 75 percent of the vertical height of the vent.

NOTE: Refer to the National Fuel Gas Code, ANSI Z223.1 and/or the Natural Gas Installation Code, CSA-B149.1 & .2.

Single appliance venting of a fan assisted furnace into a tile-lined masonry chimney is prohibited. The chimney must be lined with either Type B vent or with a listed, single wall, metal lining system. Reference National Fuel Gas Code, ANSI Z223.1 and/or the Natural Gas Installation Code, CSA-B149.1 & .2. See Figure 14 for typical B-1 vent chase.

⚠ WARNING

DO NOT CONNECT THIS FURNACE TO A CHIMNEY USED TO VENT A SOLID FUEL APPLIANCE (WOOD OR COAL). VENTING WITH A SOLID FUEL APPLIANCE CAN LEAD TO IMPROPER FUNCTIONING OF THE UNIT, AND DUE TO SOOTING, THE POSSIBILITY OF FIRE RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

SPECIAL VENT SYSTEMS (SVS)

IMPORTANT: *It is THE FURNACE MANUFACTURER's position now that new installations of any HTPV pipe used in a category III vent application, including Selkirk's Selvent™ II HTPV product, should cease immediately.*

POWER VENT SYSTEMS

When vertical venting is not possible, the only acceptable method for horizontal venting is with the use of Tjernlund model GPAK-1TR or Field Controls models SWG-4R power venter. Type B vent pipe and fittings must be used. Common venting is not permitted

All application and installation instructions supplied with the power venter must be followed.

Please address all questions regarding power venter installation, agency listings and furnace model compatibility to:

Tjernlund Products, Inc.
(800) 255-4208 or (612) 426-2993

Field Controls L.L.C.
(800) 742-8368 or (919) 522-0214

RXGW-B01 CHIMNEY ADAPTER

IMPORTANT: *CHIMNEY ADAPTER IS CERTIFIED FOR USE ON UPFLOW (RGPE) ONLY.*

This appliance is CSA certified for use with RXGW-B01 Chimney Adapter. Refer to Kit Installation Instructions 92-101682-01.

EXISTING VENT SYSTEMS

IMPORTANT RETROFIT VENTING INSTRUCTIONS

If this furnace is a replacement installation, **ALWAYS INSPECT** the existing vent system to be sure there are no obstructions, blockages, or signs of corrosion.

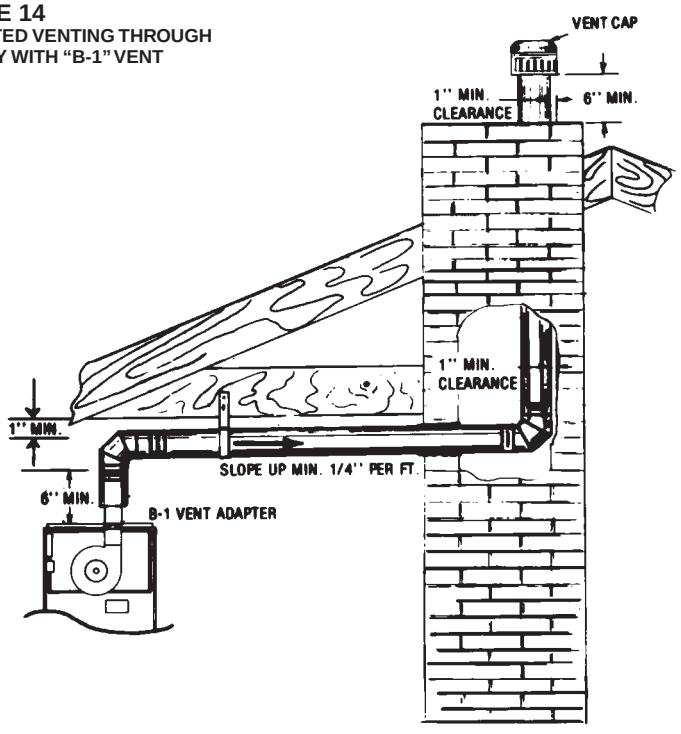
When the existing furnace is removed from a venting system serving other appliances, the venting is likely to be too large to properly vent the remaining attached appliances.

The following steps shall be followed with each appliance that remains connected to the common venting system, while the other appliances that remain connected to the common venting systems are not in operation.

NOTE: When the vent table permits more than one diameter of pipe for a connector or vent, the smallest permitted diameter must be used.

1. Seal any unused openings in the common venting system.
2. Visually inspect the venting system for proper size and horizontal pitch and determine that there is no blockage, restriction, leakage, corrosion or other deficiencies which could cause an unsafe condition.
3. Insofar as is practical, close all building doors, windows and all doors between the space where the appliances remaining connected to the common venting system are located. Turn on clothes dryers and any appliance not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.
4. Follow the lighting instructions. Place the appliance being inspected into operation. Adjust the thermostat so the appliance will operate continuously.
5. Test for spillage at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from a cigarette, cigar, or pipe.
6. After it has been determined that each appliance that remains connected to the common venting system properly vents (when tested as outlined above) return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous conditions of use.
7. If improper venting is observed during any of the above tests, the common venting system must be resized. Refer to National Fuel Gas Code, ANSI Z223.1 and/or the Natural Gas Installation Code, CSA-B149.1 & .2.

FIGURE 14
DEDICATED VENTING THROUGH CHIMNEY WITH "B-1" VENT



GAS SUPPLY AND PIPING

GAS SUPPLY

⚠ WARNING

THIS FURNACE IS EQUIPPED AT THE FACTORY FOR USE ON NATURAL GAS ONLY. CONVERSION TO LP GAS REQUIRES A SPECIAL KIT AVAILABLE FROM THE DISTRIBUTOR. FAILURE TO USE THE PROPER CONVERSION KIT CAN CAUSE FIRE, CARBON MONOXIDE POISONING, EXPLOSION, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

See the conversion kit index supplied with the furnace. This index identifies the proper LP Gas Conversion Kit required for each particular furnace.

IMPORTANT: *Any additions, changes or conversions required for the furnace to satisfactorily meet the application should be made by a qualified installer, service agency or the gas supplier, using factory-specified or approved parts. In the commonwealth of Massachusetts, installation must be performed by a licensed plumber or gas fitter for appropriate fuel.*

IMPORTANT: *Connect this furnace only to gas supplied by a commercial utility.*

IMPORTANT: *A U.L. recognized fuel gas and CO detector(s) are recommended in all applications, and their installation should be in accordance with the detector manufacturer's recommendations and/or local laws, rules, regulations or customs.*

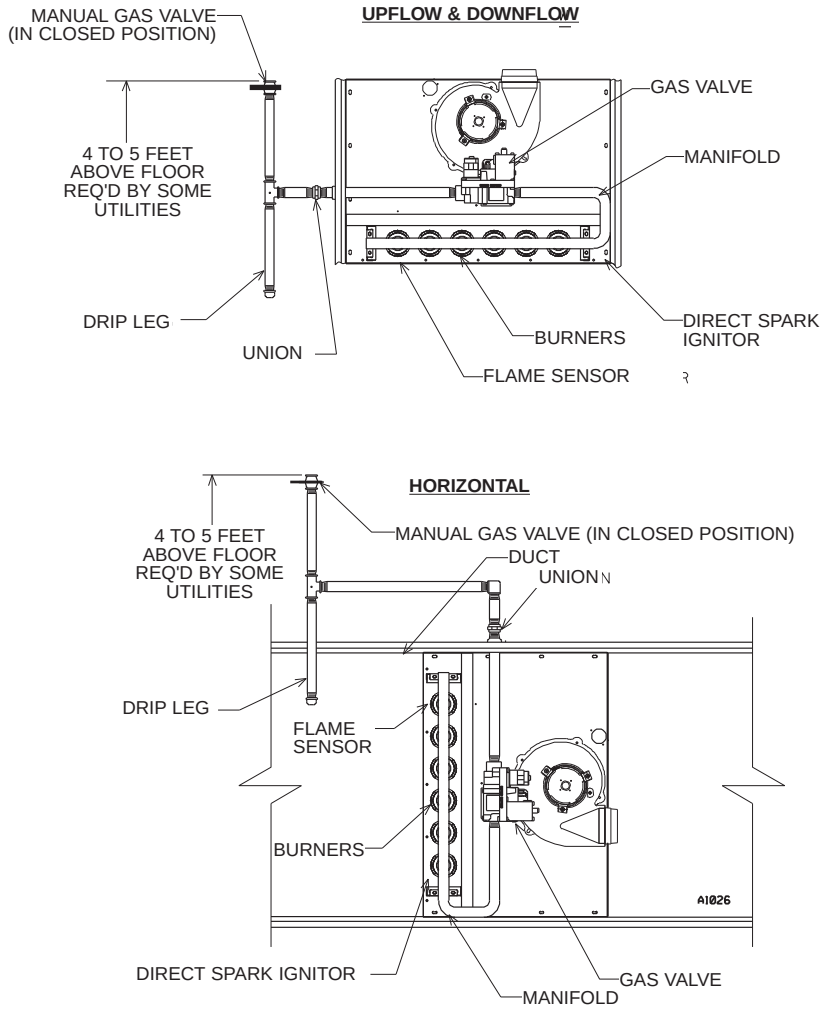
GAS PIPING (SEE FIGURE 15)

Install the gas piping according to all local codes, state codes and regulations of the utility company, whichever holds jurisdiction.

If possible, run a separate gas supply line directly from the meter to the furnace. Consult the local gas company for the location of the manual main shut-off valve. **The gas line and manual gas valve must be adequate in size to prevent undue pressure drop and never smaller than the pipe size to the combination gas valve on the furnace.** Refer to Table 2 for the recommended pipe size for natural gas and Table 3 for LP gas pipe sizes.

IMPORTANT: *It is permissible to run flexible gas connector inside the unit to a piece of black pipe. If local codes allow the use of a flexible gas appliance connector, always use a new listed connector. Do not use a connector which has previously serviced another gas appliance. Massachusetts law limits flexible gas connectors to a maximum of 36".*

FIGURE 15
GAS PIPING INSTALLATION



Install a ground joint union outside the cabinet to easily remove the control valve assembly. Install a manual shut-off valve in the gas line outside the cabinet. The valve should be readily accessible to turn the gas supply on or off. Install a drip leg in the gas supply line as close to the furnace as possible. Always use a pipe compound resistant to the action of liquefied petroleum gases on all threaded connections.

IMPORTANT: *When making gas pipe connections, use a back-up wrench to prevent any twisting of the control assembly and gas valve. Do not overtighten the connection.*

Any strains on the gas valve can change the position of the gas orifices in the burners. This can cause erratic furnace operation.

IMPORTANT: *ENSURE that the furnace gas control valve not be subjected to high gas line supply pressures.*

DISCONNECT the furnace and its individual shut-off valve from the gas supply piping during **any pressure testing that exceeds 1/2 PSIG (14" W.C.) (3.48 kPa).**

GAS PRESSURE

IMPORTANT: Natural gas supply pressure should operate between 5" to 10.5**"** w.c. LP gas supply pressure should be 11**"** to 13**"** w.c. **This pressure must be maintained with all other gas-fired appliances in operation.**

NOTE: Do not exceed a gas pressure of 13" w.c.

⚠ WARNING

ELEVATIONS ABOVE 2000 FT REQUIRE THAT THE FURNACE INPUT RATING BE ADJUSTED AND THAT THE SIZE OF THE BURNER ORIFICES BE RE-CALCULATED BASED ON ELEVATION AND GAS HEATING VALUE. THE BURNER ORIFICES MAY (OR MAY NOT) NEED TO BE CHANGED. SEE THE SECTION TITLED "HIGH ALTITUDE INSTALLATIONS" OF THIS BOOK FOR INSTRUCTIONS.

⚠ WARNING

NEVER PURGE A GAS LINE INTO THE COMBUSTION CHAMBER. NEVER USE MATCHES, FLAME OR ANY IGNITION SOURCE FOR CHECKING LEAKAGE. FAILURE TO FOLLOW THIS WARNING CAN CAUSE AN EXPLOSION OR FIRE RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

To check for gas leakage, use an approved chloride-free soap and water solution, or other approved method.

LP CONVERSION

NOTE: For installation, see specific LP kit installation instructions. Orifice must be ordered for the correct elevation.

NOTE: Order the correct LP conversion kit from the local distributor. Furnace conversion to LP gas must be performed by a qualified technician.

More information found in the high altitude and orifice section.

NOx MODELS

When converting furnaces equipped with NOx inserts to LP gas, remove the NOx insert assemblies. Steps for removal are listed below:

1. Turn off all electrical power and the gas supply to the furnace.
2. Remove the burner door from the furnace.
3. Remove the igniter assembly – **handle with care.**
4. Remove the two screws attaching the NOx insert retainer brackets to the center panel. Pull the retainer rod.
5. Put the two screws back into the holes in the center panel.
6. Re-install the igniter and burner assemblies.
7. Replace burner door.
8. Turn on electrical power and gas supply to the unit.

NOTE: Some NOx models may have one less NOx insert.

SETTING GAS PRESSURE

The maximum gas supply pressure to the furnace should be 10.5" w.c. natural gas, or 13" w.c. LP gas. The minimum supply gas pressure to the gas valve should be 5" w.c. natural gas or 11" w.c. LP gas. A properly calibrated manometer is required for accurate gas pressure measurements.

Supply Gas Pressure Measurement. A line pressure tap is on the inlet side of the gas valve.

1. With gas shut off to the furnace at the manual gas valve outside the unit, remove the input pressure tap plug.
2. Connect a U-Tube manometer to the pressure tap.
3. Turn on the gas supply and operate the furnace and all other gas-fired units on the same gas line as the furnace.
4. Adjust the line gas pressure to supply:
   A. 5" - 10.5" w.c. for natural gas.
   B. 11" - 13" w.c. for LP gas.
5. Shut off the gas at the manual gas valve and remove the U-Tube manometer.
6. Replace the pressure tap plug.
7. Turn gas on, and check for leaks.

NATURAL GAS:
If the supply gas line pressure is above the operating range, install an in-line gas regulator to the furnace. If supply gas line pressure is below the operating range, either remove any restrictions in the gas supply piping or enlarge the gas pipe. See Table 2.

LP GAS:
If the supply gas line pressure is above the operating range, have the LP supplier reduce the line pressure at the regulator. If supply gas line pressure is below operating range, have the LP supplier adjust the line pressure at the regulator. See Table 3.

NOTE: Depending on the amount of LP vapor and the outdoor ambient temperature, the LP storage tank may require supplemental heat to maintain proper pressure levels. Ensure LP storage tank does not drop below 15% capacity during heating season.

FIGURE 16
TYPICAL HOSE CONNECTION TO LINE PRESSURE TAP

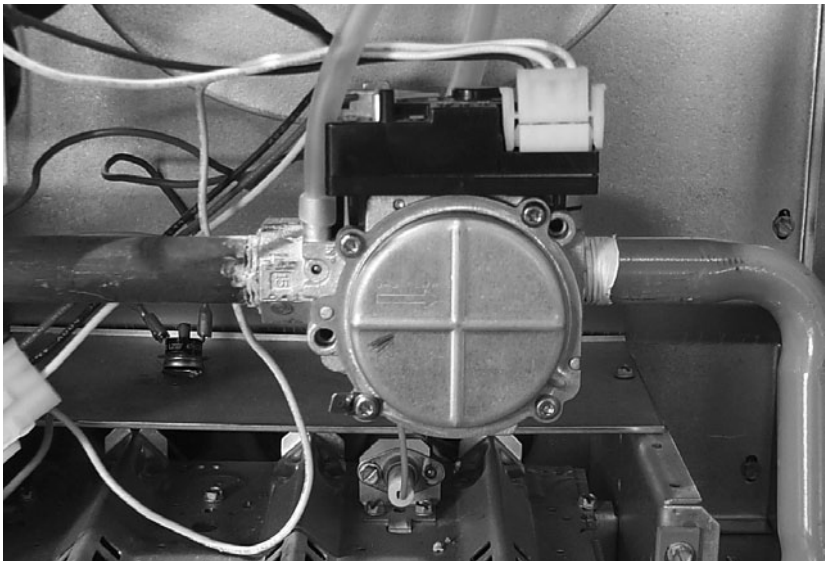


TABLE 2
NATURAL GAS PIPE CAPACITY TABLE (CU. FT./HR.)

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:

$$\text{Cu. Ft. Per Hr. Required} = \frac{\text{Gas Input of Furnace (BTU/HR)}}{\text{Heating Value of Gas (BTU/FT3)}}$$

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 LP gas supplier.

TABLE 3
LP GAS PIPE CAPACITY TABLE (CU. FT./HR.)

Maximum capacity of pipe in thousands of BTU per hour of undiluted liquefied petroleum gases (at 11 inches water column inlet pressure).
(Based on a Pressure Drop of 0.5 Inch Water Column)

Nominal Iron Pipe Size, Inches	Length of Pipe, Feet											
	10	20	30	40	50	60	70	80	90	100	125	150
1/2	275	189	152	129	114	103	96	89	83	78	69	63
3/4	567	393	315	267	237	217	196	182	173	162	146	132
1	1,071	732	590	504	448	409	378	346	322	307	275	252
1-1/4	2,205	1,496	1,212	1,039	913	834	771	724	677	630	567	511
1-1/2	3,307	2,299	1,858	1,559	1,417	1,275	1,181	1,086	1,023	976	866	787
2	6,221	4,331	3,465	2,992	2,646	2,394	2,205	2,047	1,921	1,811	1,606	1,496

Example (LP): Input BTU requirement of unit, 150,000
Equivalent length of pipe, 60 ft. = 3/4" IPS required.

ADJUSTING OR CHECKING FURNACE INPUT

NATURAL GAS:
The maximum gas supply pressure to the furnace should be 10.5” W.C. for natural gas. The minimum gas supply pressure for purposes of input adjustment to the furnace should be 5” W.C.

A properly calibrated manometer or gauge is required for accurate gas pressure readings.

1. When adjusting the furnace input, the high fire input should be checked. The high fire manifold pressure should be 3.5' W.C. Follow these steps to be sure the furnace is high fire mode:
   a. With a single stage thermostat, the furnace runs for 12 minutes on low fire before shifting to high fire. To be certain that it is on high fire, jump terminals “W” and “W2” on the control board in the blower compartment.
   b. With a two stage thermostat, set the thermostat to its highest setting to keep the furnace operating in the high fire mode.
2. To adust high fire manifold pressure, remove the adjustment cover screw on the outlet end of the gas valve and turn the adjustment screw clockwise to increase the pressure and counterclockwise to reduce the pressure. Replace the cover screw securely.
3. The low fire manifold pressure should be 1.7" W.C. As mentioned above, the furnace remains in the low fire mode for 12 minutes upon a heat call with a single stage thermostat. With a two stage thermostat, disconnect the thermostat lead to the “W2” terminal on the control board and the furnace will remain in the low fire mode. To adjust the pressure, remove the regulator cover, on top of the valve, and adjust as noted under Step 2, above. After the adjustment replace the screw cover securely.

NOTE: Use a 3/32″ allen wrench for making the pressure adjustment.

LP GAS:
Furnaces for use on LP gas, the LP gas supply pressure must be set between 11.0” and 13.0” W.C. by means of the tank or branch supply regulators. The furnace manifold pressure should be set at 10” W.C. at the gas control valve. For elevations up to 7,000 feet, rating plate input ratings apply. For high altitudes (elevations 7,000 and over) and for any necessary major changes in the gas flow rate the orifice spud must be changed.

TO CHANGE ORIFICE SPUDS:

1. Shut off the manual main gas valve and remove the gas manifold.
2. Replace the orifice spuds.
3. Reassemble in reverse order.
4. Turn the gas supply back on and check for leaks.
5. Check for proper operation and set to proper manifold pressure.

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.

TO CHECK FURNACE INPUT:

1. Make certain that all other gas appliances are shut off, with the exception of pilot burners.
2. Start the furnace
3. Time the meter to measure the time required to burn one cubic foot of gas.
4. Use Table 4 to determine input rate.

TABLE 4

METER TIME IN MINUTES AND SECONDS FOR NORMAL INPUT RATING OF FURNACES EQUIPPED FOR NATURAL OR LP 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.
50,000	ONE	1	5	1	12	1	15	1	18	3	20
	TEN	10	50	12	00	12	30	13	12	30	00
75,000	ONE	0	44	0	48	0	50	0	53	2	0
	TEN	7	12	8	0	8	19	8	48	20	0
100,000	ONE	0	33	0	36	0	38	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	31	0	24	0	25	0	26	1	0
	TEN	3	36	4	0	4	10	4	20	10	0

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

ELECTRICAL WIRING

⚠ WARNING

TURN OFF ELECTRIC POWER AT FUSE BOX OR SERVICE PANEL BEFORE MAKING ANY ELECTRICAL CONNECTIONS. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN PERSONAL INJURY OR DEATH.

⚠ WARNING

THE CABINET MUST HAVE AN UNINTERRUPTED GROUND ACCORDING TO THE LATEST EDITION OF THE NATIONAL ELECTRICAL CODE, ANSI/ NFPA70-, OR IN CANADA, THE CANADIAN ELECTRICAL CODE, CSA-C22.1 OR LOCAL CODES THAT APPLY. A GROUND SCREW IS PROVIDED IN THE JUNCTION BOX. FAILURE TO PROPERLY CONNECT THE GROUND WIRE CAN CAUSE ELECTRICAL SHOCK RESULTING IN PERSONAL INJURY OR DEATH.

⚠ WARNING

THIS FURNACE IS EQUIPPED WITH A BLOWER DOOR SAFETY SWITCH. DO NOT DISABLE THIS SWITCH. FAILURE TO FOLLOW THIS WARNING CAN RESULT IN ELECTRICAL SHOCK, PERSONAL INJURY OR DEATH.

IMPORTANT: The furnace must be installed so that the electrical components are protected from water.

A grounding wire is provided to connect to the incoming grounding wire from line power. The furnace must be permanently grounded in accordance with all national and local codes.

Before proceeding with the electrical connections, be certain that the service panel voltage, frequency and phase corresponds to that specified on the furnace rating plate. Maximum over-current protection is 15 amperes.

Use a separate, fused branch electrical circuit containing a properly sized fuse or circuit breaker. Connect this circuit directly from the main switch box to an electrical disconnect that is readily accessible and located within arm's reach (2 ft.) of the furnace. Connect from the electrical disconnect to the junction box on the left side of the furnace, inside the blower compartment. See Figure 17. For the proper connection, refer to the appropriate wiring diagram located on the inside cover of the furnace control box and in these instructions.

NOTE: The electrical junction box may be moved to the right side if necessary. A knockout is provided. Seal the opposite hole with plug provided.

⚠ WARNING

L1 TERMINAL AND NEUTRAL TERMINAL POLARITY MUST BE OBSERVED WHEN MAKING FIELD CONNECTIONS TO THE FURNACE. FAILURE TO DO SO WILL EXPOSE LIVE WIRING IN THE BLOWER COMPARTMENT WHEN THE DOOR IS REMOVED. TOUCHING THESE LIVE CIRCUITS COULD RESULT IN PERMANENT INJURY OR DEATH FROM ELECTRICAL SHOCK.

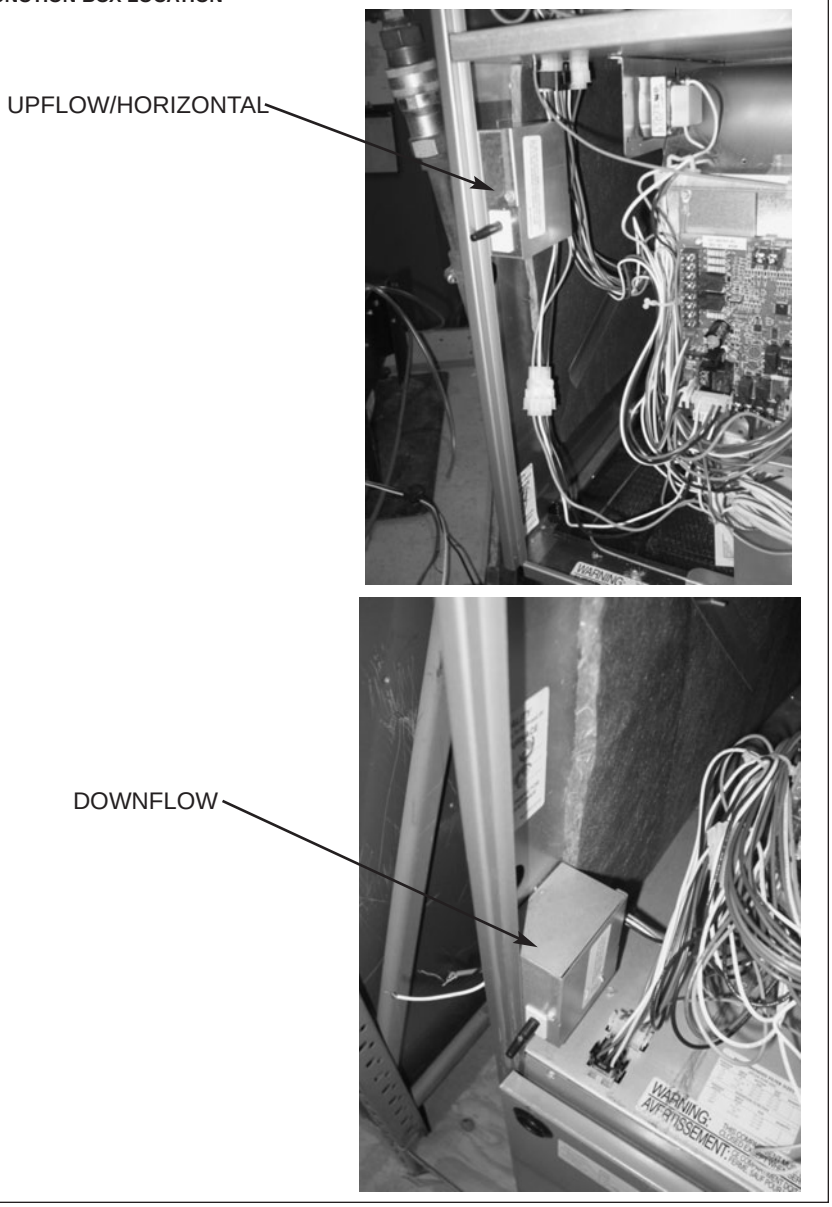
Make all electrical connections in accordance with the latest edition of the National Electrical Code ANSI/NFPA70 – or in Canada, the Canadian Electrical Code Part 1- CSA Standard C22.1 and local codes having jurisdiction.

These may be obtained from:

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

Canadian Standards Association
178 Rexdale Boulevard
Rexdale, Ontario, Canada M9W 1R3

FIGURE 17
JUNCTION BOX LOCATION



ELECTRICAL CHECKS

Line Power Check

The furnace must have a nominal 115 volt power supply for proper operation. If there is not a consistent power supply, contact a licensed electrician to correct the problem.

1. With the blower compartment door off, manually hold the push button door switch in.
2. Call for heat at the thermostat.
3. With the unit operating, use a voltmeter to measure the voltage from any 120 VAC terminal to any neutral connection.
4. The voltage should be a nominal 115 volts (acceptable 105-120VAC).

This test should be made with the unit in full operation.

Polarity Check

If line & neutral are reversed, a fault code (26) will be displayed at the furnace seven segment display (SSD) and at the communicating thermostat active fault display screen (communicating systems only).

Proper line voltage polarity, or phasing, is a must for this furnace to operate. Use a volt meter to make this check.

1. With the blower compartment door off, manually hold the push button door switch in.
2. Use a voltmeter to measure the voltage from any 120 VAC terminal to any bare metal ground on the furnace.
3. The voltage should be a nominal 115 volts (acceptable 105-120VAC).
4. Use a voltmeter to measure the voltage from any neutral terminal to the bare metal ground on the furnace.
5. The voltage should be less than 1.0 VAC.
6. If the voltage from any 120 VAC terminal to ground is less than 1.0 VAC volts and the voltage from a neutral to ground is a nominal 115 volts, the polarity is reversed.
7. To correct the problem, either reverse the hot and neutral wires to the furnace or have a licensed electrician check the building wiring.

Control Voltage Check

1. With the blower compartment door off, manually hold the push button door switch in.
2. Call for heat at the thermostat. (Does not include communicating thermostats.)
3. With the unit operating, use a voltmeter to measure the voltage from control voltage terminal “W” to terminal “C” on the furnace control board.
4. The voltage should be a nominal 24 volts (Acceptable 18-30 VAC).

This test should be made with the unit in full operation.

ACCESSORIES

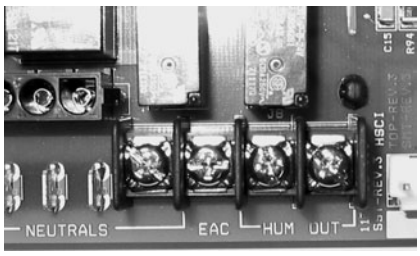
FIELD-INSTALLED OPTION ACCESSORIES

TWINNING: Most installations of (-)GPE/(-)GLE furnaces cannot be twinned. However, a few exceptions exist for installations with some commercial evaporator coils. Consult the installation instructions of the coil to see if the furnace(s) can be twinned. If so, a twinning kit will be required and the part number for the kit can be found in the installation instructions for the coil.

ELECTRONIC AIR CLEANER

Line voltage power is supplied from the screw terminal "EAC", see Figure 18, and a line voltage neutral screw terminal on the control board. This will power the electronic air cleaner whenever the blower is operating and delivering the recommended minimum CFM. The 50 and 75 KBTU models, which are capable of a maximum delivery of 1200 CFM, will operate the electronic air cleaner at 500 CFM and above. The 100 and 120 KBTU models, which are capable of a maximum delivery of 2000 CFM, will operate the electronic air cleaner at 800 CFM and above. These limits are set to prevent excessive production of ozone at the lower airflows of the furnace and are based on average requirements of commercially available electronic air cleaners.
Continuous fan speeds are selectable and some lower fan speeds may not deliver enough airflow to operate an electronic air cleaner. The IFC determines the minimum airflow necessary to operate an electronic air cleaner and will not turn on the electronic air cleaner unless the airflow is high enough for the EAC.

FIGURE 18
EAC AND HUMIDIFIER TERMINALS ON FURNACE CONTROL (IFC)



HUMIDIFICATION AND DEHUMIDIFICATION

HUMIDIFIER – The humidifier contacts (labeled "HUM OUT") are "dry" contacts on the I.F.C. This means that the terminals are connected directly to the contacts of a board-mounted relay. The coil of the relay is controlled by the microprocessor of the IFC. The coil is engaged roughly any time the heat speed blower is engaged and (1) 24VAC is present on the thermostat terminal of the IFC labeled "HUM STAT" or (2) a communicating thermostat with humidification and dehumidification capability is installed with call for humidification present.

An optional 24VAC humidistat can be installed as shown in Figures 19 thru 54 (II thru IV). With the optional humidistat, two separate conditions must be met before humidification can begin 1). There must be a call for heat and the blower must be engaged and 2.) The humidistat must determine that there is a need for humidification.

Note: Dipswitch SW2-1 (labeled "ODD") enables ("ON") or disables ("OFF") dehumidification operation. However, it has no affect on humidification operation. If this switch is set to the "ON" position and no humidistat is installed, the cooling

FIGURE 19
WIRING FOR OPTIONAL HUMIDIFICATION (AND DEHUMIDIFICATION WITH COMMUNICATING THERMOSTAT) WITH OPTIONAL HUMIDIFIER AND NO HUMIDISTAT (HUMIDIFICATION ACTIVE DURING ANY HEAT CALL) (FOR USE WITH COMMUNICATING AND NON-COMMUNICATING THERMOSTATS)

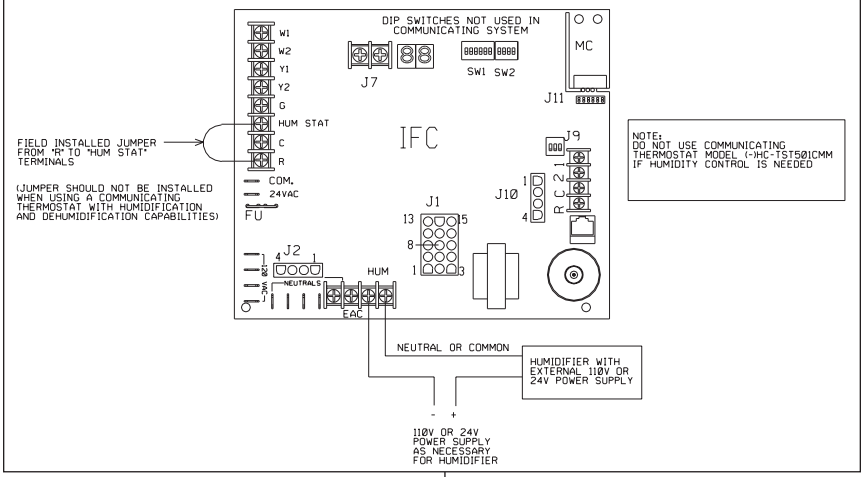


FIGURE 20
WIRING FOR OPTIONAL DEHUMIDIFICATION WITH HUMIDIFICATION (WITH OPTIONAL HUMIDISTAT AND HUMIDIFIER)
NOTE: CAN BE USED WITH COMMUNICATING OR NON-COMMUNICATING SYSTEMS

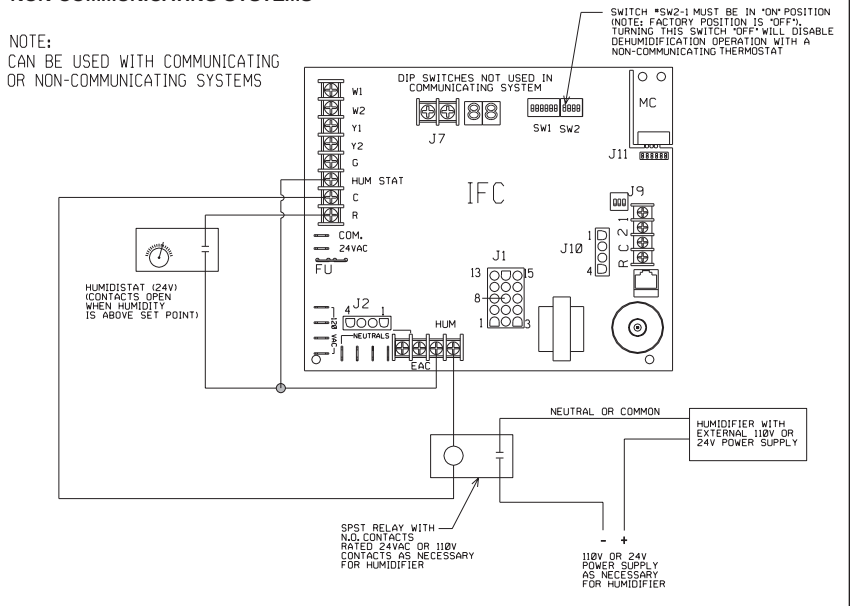


FIGURE 21
WIRING FOR OPTIONAL DEHUMIDIFICATION OPERATION AND HUMIDIFICATION WITH OPTIONAL HUMIDIFIER (HUMIDIFIER WITH INTERNAL POWER SUPPLY) (FOR USE WITH NON-COMMUNICATING THERMOSTATS)

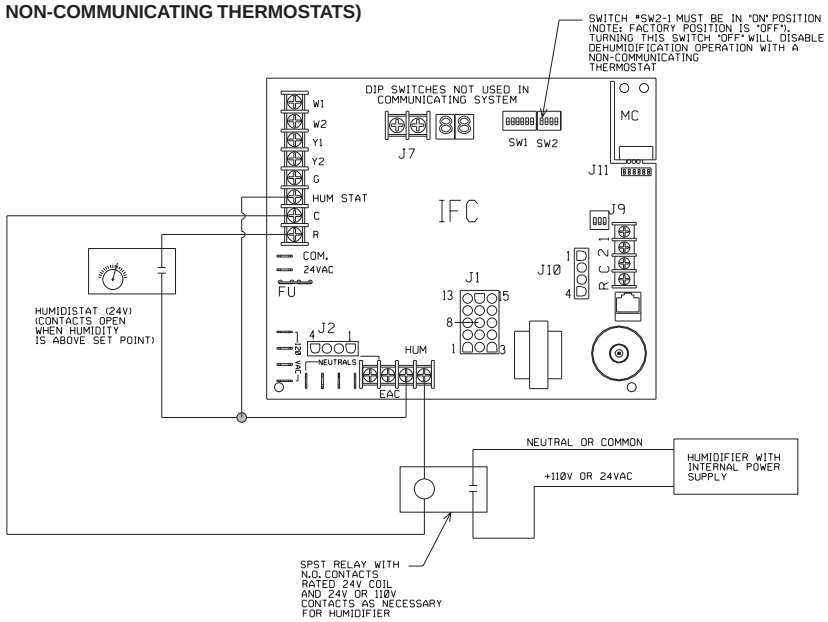
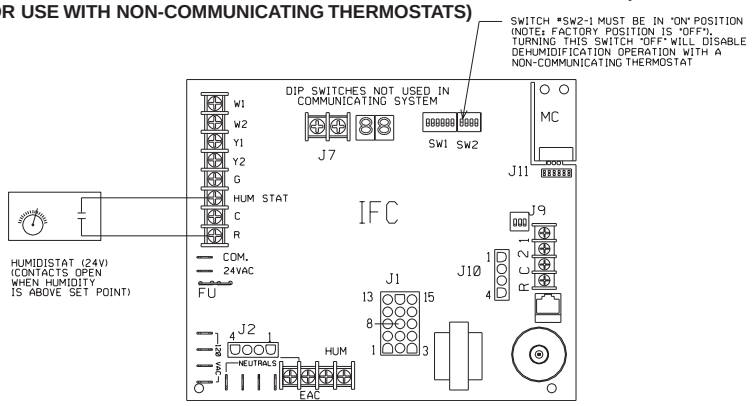


FIGURE 22
HUMIDISTAT USED TO CONTROL DEHUMIDIFICATION IN COOLING ONLY (NO HUMIDIFIER) (FOR USE WITH NON-COMMUNICATING THERMOSTATS)



airflow will be permanently reduced by approximately 15% giving less than optimal performance and possibly causing problems. It is not recommended to leave this switch in the "ON" position without a humidistat installed.

Control of dehumidification in cooling and/or humidification in heating can be done with a variety of methods depending on whether there is a communicating thermostat or a humidistat available and depending on the type of operation desired.

With systems configured with communicating thermostats and condensers, dehumidification is controlled by the condenser and is not affected by the position of dipswitch SW2-1 or the voltage (or lack of voltage) at the thermostat terminal labeled "HUM STAT".

To determine which wiring diagram and method to use, select from the following configurations:

A. HUMIDIFICATION CONTROL ONLY WITH NO DEHUMIDIFICATION (REQUIRES OPTIONAL HUMIDIFIER).

A1. WITH COMMUNICATING THERMOSTAT
Humidifier control is included with the (-)HC-TST412MDMS (modulating, non-communicating) and (-)HC-TST550CMMS (full-color communicating) model thermostats. However, it is not included with the (-)HC-TST501CMMS model communicating thermostat. The latter thermostat should not be used if humidification control is required. To wire the furnace for humidification control using the former thermostat, refer to the wiring diagram in Figure 19(I). Be sure <u>not</u> to install the jumper between "R" and "HUM STAT" on the furnace control. Installing this jumper will operate the humidifier any time there is a heat call. Without the jumper, the humidification call from the thermostat must be active and a heat call must be present with the blower running.

A2. WITH NON-COMMUNICATING THERMOSTAT

A2-1 CONTINOUS HUMIDIFIER OPERATION DURING HEATING. For continuous humidifier operation during heating, refer to Figure 19 (I) and make sure to install the jumper between the thermostat terminals labeled "R" and "HUM STAT". A separate humidistat is not required for this configuration and the humidifier will turn on whenever there is a call for heat and the blower is running.

A2-2 CONTROLED HUMIDIFIER OPERATION USING A HUMIDISTAT (REQUIRES OPTIONAL HUMIDISTAT). Controlled humidification can be accomplished using a humidistat as shown in Figures 20 (II) or 21 (III). These figures show installation of a humidifier with external and internal power supplies respectively. Dehumidification operation will be disabled if the dipswitch SW2-1 is in the "OFF" position. If this switch is in the "ON" position, dehumidification control will be active.

B. DEHUMIDIFICATION CONTROL WITH NO HUMIDIFICATION

B1. For communicating thermostats listed with this furnace, dehumidification is controlled automatically when selected at the thermostat and additional wiring is not necessary. The actual airflow demand (reduced for dehumidification) is requested of the furnace by the condenser.

B2. WITH NON-COMMUNICATING THERMOSTAT (REQUIRES OPTIONAL HUMIDISTAT). Control of dehumidification only (no humidification) can be accomplished by installing an optional humidistat as shown in Figure 22 (IV). The dipswitch SW2-1 must be set to the "ON" position. If this switch is not turned "ON", dehumidification operation will not take place. Further, if this switch is "ON" and no humidistat is installed, airflow in cooling will be permanently reduced by approximately 15%.

C. HUMIDIFICATION AND DEHUMIFICATION CONTROL (REQUIRES OPTIONAL HUMIDIFIER).

C1. WITH COMMUNICATING THERMOSTAT
Humidifier control is included with the (-)HC-TST412MDMS (modulating, non-communicating) and (-)HC-TST550CMMS (full-color communicating) model thermostats. However, it is not included with the (-)HC-TST501CMMS model communicating thermostat. Do not purchase the latter thermostat if humidification control is required. To wire the furnace for humidification and dehumidification control using the former thermostat, refer to the wiring diagram in Figure 19 (I). Be sure not to install the jumper between "R" and "HUM STAT" on the furnace control. Installing this jumper will operate the humidifier any time there is a heat call and dehumidification will never take place when in cooling. Without the jumper, a humidification call from the thermostat must be active and a heat call must be present with the blower running for the "HUM OUT" relay contacts to close.

C2. WITH NON-COMMUNICATING THERMOSTAT (REQUIRES OPTIONAL HUMIDISTAT.) For non-communicating thermostats, an optional humidistat must be installed. Controlled humidification and dehumidification can be accomplished using a humidistat as shown in Figures 20 (II) or 21 (III). These figures show installation of a humidifier with external and internal power supplies respectively. Dehumidification operation will be disabled if the dipswitch SW2-1 is in the "OFF" position. If this switch is in the "ON" position, dehumidification control will be active.

OTHER ACCESSORIES AVAILABLE

FOSSIL FUEL KIT (non-communicating systems only)
Use of a heat pump with the two stage furnace requires a heat pump thermostat used in conjunction with the fossil fuel kit. For proper operation use the following procedures:

a. With the RXPF-F01 kit, connect the thermostat "E" terminal, one side of the plenum switch, and the black wire from the fossil fuel kit to "W2" on the IFC.

b. For the RXPF-F02 kit, connect "W" on the fossil fuel kit interface wiring board to "W2" on the IFC.

Regardless of which fossil fuel kit is used, when activated, the two stage furnace follows the sequence of operation for a single stage thermostat.

➢ **IMPORTANT:** ALWAYS FOLLOW THE MANUFACTURER'S FOSSIL FUEL KIT INSTRUCTIONS.

TWINNING: Most installations of (-)GPE and (-)GLE furnaces cannot be twinned. However, a few exceptions exist for installations with some commercial evaporator coils. Consult the installation instructions of the coil to see if the furnace can be twinned. If so, a twinning kit will be required and the part number for the kit can be found in the installation instructions for the coil.

THERMOSTAT AND ACCESSORIES FOR THERMOSTAT
Programmable Communicating: (-)HC-TST501CMMS
Full-Color, Programmable Communicating: (-)HC-TST550CMMS
Remote Sensor: (For Thermostats Above Only) F1451378
Thermostat Wall Plate For Thermostat HC-TST501CMMS Above Only: F61-2600

RXGW-B01 CHIMNEY ADAPTER

IMPORTANT: Chimney adapter is certified for use on upflow only.

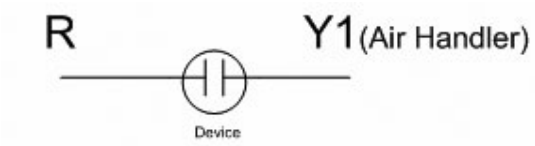
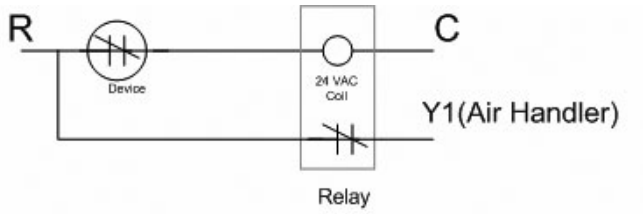
This appliance is CSA certified for use with RXGW-B01 chimney adapter. Refer to kit installation instructions 92-101682-01.

TYPICAL WIRING FOR SELECT ACCESSORIES FOR COMMUNICATING RESIDENTIAL SYSTEMS

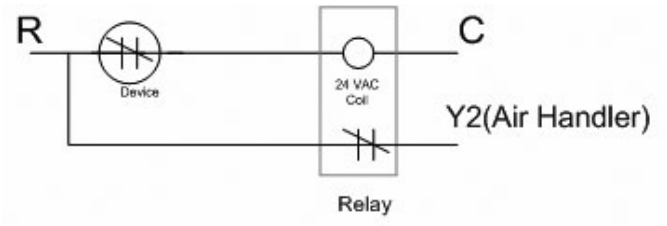
The Rheem Serial Communicating (CC2) system allows accessories to be connected to shut down the system in the event of a fault. Typical devices that can be connected are the drain overflow switch, smoke detector and freeze protection switch. There are two methods of connecting the switch to the system depending on the device configuration normally closed or normally open. The blower can run during a fault or the blower can shut off during a fault depending on how the system is connected. Please refer to local and/or state codes for installing these devices. The following operation applies only when BOTH the condenser and thermostat are serial communicating devices. If the condenser is non-communicating (traditional, legacy 24VAC controlled) this diagram is not valid.

OPERATION WITH SELECTED ACCESSORIES

<table>
<tr><th>METHOD</th><th>BLOWER ACTIVATION</th><th>CONTACTS</th><th>WIRING CONFIGURATION</th></tr>
<tr><td rowspan="2">A</td><td rowspan="2">BLOWER RUNS

(Y1)</td><td>NORMALLY OPEN</td><td>When 24 VAC is applied to Y1 at the furnace control in a communicating system a SYSTEM BUSY message appears on the thermostat. When the SYSTEM BUSY message appears the outdoor unit will shut down and the indoor unit will continue to run at first stage cooling airflow.

</td></tr>
<tr><td>NORMALLY CLOSED</td><td>If the device does not have normally open contacts an additional relay must be used for proper system operation.

</td></tr>
<tr><td rowspan="2">B</td><td rowspan="2">BLOWER DOES NOT RUN

(Y2)</td><td>NORMALLY OPEN</td><td>When the device is connected to Y2 and a fault occurs the blower will shut down. The Y2 input can still be used with normally open or normally closed contacts.

</td></tr>
<tr><td>NORMALLY CLOSED</td><td>If the device does not have normally open contacts an additional relay must be used for proper system operation.

</td></tr>
</table>

80+ HIGH ALTITUDE INSTRUCTIONS (TABLE 13)

⚠ CAUTION

INSTALLATION OF THIS FURNACE AT ALTITUDES ABOVE 2000 FT (610 m) SHALL BE IN ACCORDANCE WITH LOCAL CODES, OR IN THE ABSENCE OF LOCAL CODES, THE NATIONAL FUEL GAS CODE, ANSI Z223.1/NFPA 54 OR NATIONAL STANDARD OF CANADA, NATURAL GAS AND PROPANE INSTALLATION CODE, CAN B149.1.

Furnaces can be ordered from the factory already converted for high altitude elevations. The factory option for high altitude elevations would be ordered as a 278 option (example: a 75k BTU upflow furnace which is factory converted for high altitude elevations would have the model number (-)GPE-07EAMKR). These factory converted furnaces come with pressure switches for high-altitude elevations already attached. Also, different burner orifices are installed at the factory which are one drill size smaller (#43 DMS) than standard (-)GPE/(-)GLE gas furnaces (#42 DMS). The smaller orifice is installed to accommodate for average heating values expected in most high altitude areas and a required 4% per thousand feet reduction in input as specified by the *National Fuel Gas Code* (NFGC). Specific orifices should always be recalculated for all high altitude installations as outlined below. Orifices should be changed, if necessary, based on gas heating value and elevation.

34" 80 Plus furnaces installed above 2,000 ft. require the furnace to be derated 4% per thousand feet.

IMPORTANT: *Factory installed orifices are calculated and sized based on a sea level Natural Gas heating value of 1075 BTU per cubic ft.*

NOTE: Orifices are available through your local distributor.

Reference Tables 11, 12 and 13 for appropriate orifice sizing.

NOTE: Keep any parts removed during LP conversion procedure stored with the product literature for future use.

The following are examples of orifice sizing using the National Fuel Gas Code Appendix F:

Example: 900 BTU/ft³ Regional Natural Gas Heating Value

I/H = Q
25000 / 900 = 27.78 ft³

I = Sea Level input (per burner): 25000
H = Sea Level Heating Value: 900
Q = 27.78 ft³ Natural Gas per hour.

From Table F.1 of *National Fuel Gas Code Handbook, 2002* (3.5″ w.c. column).

Orifice required at Seal Level: #40

From Table F.4 of *National Fuel Gas Code Handbook, 2002*
Orifice required at 5000 ft. elevation (4% de-rate per thousand ft): #42

Orifice required at 8000 ft. elevation (4% de-rate per thousand ft.): #44

Example: 1050 BTU/ft3 Regional Natural Gas Heating Value

I / H = Q
25000 / 1050 = 23.81ft³

I = Sea Level input (per burner): 25000
H = Sea Level Heating Value: 1050
Q = 23.81 ft³ Natural Gas per hour.

From Table F.1 of *Natural Fuel Gas Code Handbook, 2002* (3.5″ w.c. column).

Orifice required at Sea Level: #43

From Table F.4 of *National Fuel Gas Code Handbook, 2002*

Orifice required at 5000 ft. elevation (4% de-rate per thousand ft.): #45

Orifice required at 8000 ft elevation (4% de-rate per thousand ft): #47

LP GAS (TABLE 11)

LP Gas is a manufactured gas that has consistent heating value across most regions.

The NFGC guidelines are used with the following exception:

The recommended LP Gas high altitude orifice selections differ slightly in that the NFGC LP orifice chart, as they are not accurate for Rheem products. The National Fuel Gas Code LP orifices are based on an 11" of water column pressure at the orifice, which differs from products that use 10" of water column at the orifice. This difference requires a deviation from the NFGC orifice size recommendations. The Sea Level input should still be reduced by 4% per thousand ft. and the orifice size must be selected based on the reduced input in Table 11.

TABLE 11
LP GAS

Altitude	Input (per burner) 25000	Orifice Size
0 to 2000 ft.	25000	#54
2000′-3000′	24000	#54
3000′-4000′	23000	#54
4000′-5000′	22000	#54
5000′-6000′	21000	#54
6000′-7000′	20000	#54
7000′-8000′	19000	#55
8000′-9000′	18000	#55
9000′-10000′	17000	#55

ORIFICE ORDERING INFORMATION

Orifice sizes are selected by adding the 2-digit drill size required in the orifice part number. Drill sizes available are 39 through 64; metric sizes available 1.10mm (-90) and 1.15mm (-91):

Orifice Part Number 62-22175-(drill size)

Example 1:
60 drill size orifice required
Part # 62-22175-60

Example 2:
1.15mm drill size orifice required
Part # 62-22175-91

TABLE 12
ALTERNATE METHOD FOR CANADIAN HIGH-ALTITUDE DERATE

NATURAL GAS

ALTITUDE	INPUT	OUTPUT	ORIFICE SIZE	MANIFOLD PRESSURE
0' - 2000'	50,000 75,000 100,000 125,000 150,000	40,000 60,000 80,000 100,000 120,000	#42	3.5" W.C.
2001' - 4500'	45,000 67,500 90,000 112,500 135,000	36,000 54,000 72,000 90,000 108,000	#42	2.9" W.C.

LP GAS

ALTITUDE	INPUT	OUTPUT	ORIFICE SIZE	MANIFOLD PRESSURE
0' - 2000'	50,000 75,000 100,000 125,000 150,000	40,000 60,000 80,000 100,000 120,000	#54	10" W.C.
2001' - 4500'	45,000 67,500 90,000 112,500 135,000	36,000 54,000 72,000 90,000 108,000	#54	8.1" W.C.

FIGURE 23
MANIFOLD PRESSURE-CHANGE LABEL

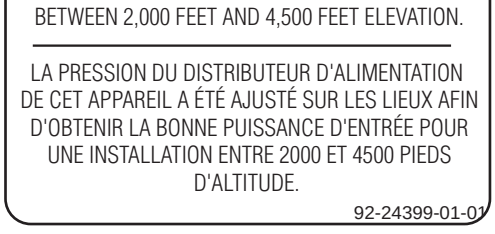


TABLE 13
SUPPLEMENTAL ORIFICE SIZE CHART

80 Plus Models with 25,000 Btu's per Burner

NATURAL GAS QUICK REFERENCE CHART FOR ORIFICE SELECTION, AT 3.5" W.C. AND APPROXIMATE FINAL FIRING RATES											
Sea Level Orifice Size	**Sea Level Cubic Foot at 3.5" W.C.**	**80 Plus Heat Value at 25,000**	**ELEVATION CHART (NFG recommended orifice based on 4% derate for each 1000 foot of elevation, based on the intersection of the orifice required at Sea Level and the elevation required below)**								
			0-999	**1000-1999**	**2000-2999**	**3000-3999**	**4000-4999**	**5000-5999**	**6000-6999**	**7000-7999**	**8000-8999**	**9000-9999**
37	30.63	816	37	37	38	39	39	40	41	42	42	43
38	29.25	855	38	38	39	40	41	41	42	42	43	43
39	28.2	887	39	39	40	41	41	42	42	43	43	44
40	27.03	925	40	40	41	42	42	42	43	43	44	44
41	25.98	962	41	41	42	42	42	43	43	44	44	45
42	24.95	1002	42	42	42	43	43	43	44	44	45	46
43	22.39	1117	43	43	44	44	44	45	45	46	47	47
44	21.01	1190	44	44	45	45	45	46	47	47	48	48
Final Firing Rate per Burner			25,000	24,000	23,000	22,000	21,000	20,000	19,000	18,000	17,000	16,000

All calculations are performed by using the first three columns of information only. Before beginning any calculations, determine the individual burner Btu size and heating value at Sea Level for the installation site. Each value shown in the Heat Value column is per burner at 3.5" W.C.

NOTE:
Heat Value at Sea Level, for the location of the installation, is available from the Natural Gas Supplier to that site. Orifices for all altitudes are based on Sea Level values.

Divide the individual burner capacity (25,000 for 80 plus) by the Heat Value for the site to determine the Cubic Foot value at Sea Level, or divide burner capacity by the Cubic Foot value for the Heat Value. Once you have either the Cubic Foot Value or the Heat Value you can estimate the Sea Level orifice for the site. To select the corresponding high altitude orifice, locate the site elevation on the chart above and the orifice required at Sea Level from your calculation in the first column. The correct high altitude orifice that must be installed in each individual burner is the intersection of these two points on the chart above.

ALTERNATE METHOD FOR CANADIAN HIGH-ALTITUDE DERATE

In Canada, unless an orifice change is specifically mandated by local codes, an alternate method of altitude deration through a reduction in manifold pressure is acceptable as described in Table 12. This information is based on a heating value of 1000 BTU per cubic feet of natural gas, and 2500 BTU per cubic feet of LP gas.

IMPORTANT: *Actual input rates must be measured onsite with manifold pressure adjustment to ensure that an actual 10% reduction in input rate is achieved.*

Once this field adjustment has been made, the label shown in Figure 23 must be affixed in a conspicuous location on the front of the furnace cabinet.

NOTE: This label is supplied in the information packet shipped with each furnace.

AIR FLOW

The importance of proper air flow over the heat exchanger cannot be over emphasized.

⚠ CAUTION

IT IS IMPORTANT THAT EACH DUCT SYSTEM BE SIZED AND INSTALLED FOR THE SPECIFIC APPLICATION BY PROPERLY APPLYING THE APPROPRIATE INDUSTRY ACCEPTED STANDARD. IF LESS THAN MINIMUM STANDARDS ARE APPLIED, THE EQUIPMENT USER COULD EXPECT TO EXPERIENCE HIGHER UTILITY BILLS, MAJOR COMPONENT FAILURE, VARYING DEGREES OF AIR NOISE OR OTHER UNSATISFACTORY ISSUES, OVER WHICH THE MANUFACTURER HAS NO CONTROL.

One of the most common causes of heat exchanger failure is overheating due to low air flow. An air flow table is located inside the blower door and on the following pages.

ZONING SYSTEMS

The manufacturer does not currently provide or support zoning. However, zoning systems can be installed with the system as long as the zoning equipment manufacturers specifications and installation instructions are met and followed.

The preferred zoning method is to use a “bypass” system which is properly installed for maximum efficiency. In these systems, excess air is routed back through the system to be used again – this is opposed to a “dump” system in which excess air is routed to a zone where it is expected that the extra heat or cooling would be least noticed.

If installed as a “bypass” system, the installation must have an optional freeze stat installed to prevent the coil from icing with excess bypass cooling. Also, if the zoning equipment manufacturer provides a limit switch (usually provided by

FIGURE 24
TEMPERATURE RISE MEASUREMENT

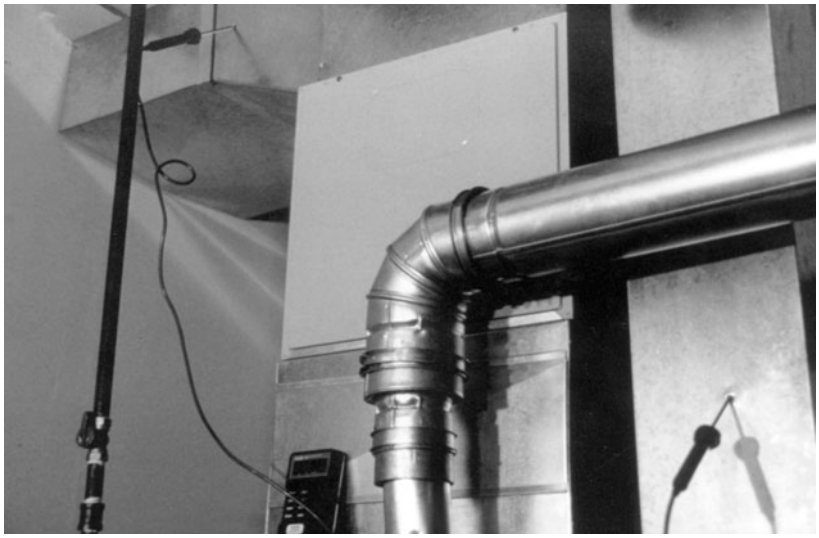


FIGURE 25
TYPICAL FURNACE NAME PLATE



AIR CONDITIONING DIVISION
FORT SMITH, ARKANSAS

CANADIAN ENERGY PERFORMANCE VERIFIED
RENDEMENT ENERGETIQUE VERIFIE

MODEL NO./NUMERO DE MODELE:
SERIAL NO./NUMERO DE SERIE: MFG. DATE

CATEGORY IV FORCED AIR FURNACE WHEN USING INDOOR AIR FOR COMBUSTION. CATEGORY IV TYPE FSP DIRECT VENT FORCED AIR FURNACE WHEN USING OUTDOOR AIR FOR COMBUSTION. FOR INDOOR INSTALLATION ONLY, IN A BUILDING CONSTRUCTED ON-SITE.
CATÉGORIE IV GÉNÉRATEUR D'AIR CHAUD À AIR FORCÉE LORSQUE DE L'AIR INTÉRIEUR EST EMPLOYÉ POUR LA COMBUSTION CATÉGORIE IV TYPE FSP ÉVACUATION DIRECTE GÉNÉRATEUR D'AIR CHAUD À AIR FORCÉE LORSQUE DE L'AIR EXTÉRIEUR EST EMPLOYÉ POUR LA COMBUSTION. POUR INSTALLATION À L'INTÉREIER SEULEMENT, DANS UN BATIMENT CONSTRUIT SUR LE SITE.

ELECTRIC 115 V. 60 HZ. 1 PH., MAXIMUM TOTAL INPUT 6.3 AMPS
ELECTRIQUE 115 V 60 HZ 1 PH, PUISSANCE D'ENTRÉE TOTALE MAXIMUM 6.3 A.
MAXIMUM OVERCURRENT PROTECTION 15 AMPERES. DISJONCTEUR À MAXIMA 15 A.

HOURLY INPUT RATING DEBIT CALORIFQUE MAXIMUM Btu/hr (Kw)	HOURLY INPUT RATING DEBIT CALORIFQUE MINIMUM Btu/hr (Kw)	FACTORY EQUIPPED FOR AGENCE A L'USINE POUR FOR GAS / GAZ
75000 (21 98)		NATURAL / NATUREL

**PLEASE REFER TO BOOKLET #92-101825-01 FOR INPUT CALCULATIONS
IN THE U S , AT ELEVATIONS ABOVE 2,000 FT. (610M), DERATE THE INPUT 4% PER 1,000 FT (305M) ABOVE SEA LEVEL
THIS APPLIANCE EQUIPPED FOR ALTITUDES / CET APPAREIL EST EQUIPÉ POUR ALTITUDES COMPRISES
ENTIRE 0-2,000' / (0-610) FT.(M)/PIEDS(M)

	NATURAL GAS/ GAZ NATUREL	LP GAS OR PROP./ GAZ DE PÉTROLE LIQUÉFIÉ OU PROP.
ORIFICE / INJECTEUR 50 DMS		
LIMIT SETTING/LIMITE COUPE-CIRCUIT 190° (88°) °F(°C)		
AUXILIARY LIMIT SETTING/ LIMITE COUPE-CIRCUIT AUXILIAIRE °F(°C)	IN. W C.(kPa)/ PO C.E. (kPa)	IN. W.C.(kPa)/ PO C.E (kPa)
MAXIMUM PERMISSIBLE GAS SUPPLY PRESSURE TO FURNACE	10 5 (2 61)	13 0 (3.23)
PRESSION MAXIMUM D'ALIMENTATION EN GAZ À CHAUDIÈRE	10 5 (2 61)	13.0 (3.23)
MINIMUM GAS SUPPLY PRESSURE FOR PURPOSES OF INPUT ADJUSTMENT	5.0 (1 24)	11.0 (2.73)
PRESSION MINIMUM D'ALIMENTATION EN GAZ POUR LE RÉGLAGE DE PUISSANCE D'ENTRÉE	5.0 (1.24)	11 0 (2.73)
MANIFOLD PRESSURE / PRESSION A LA TUBULURE	3.5 (0 87)	10 0 (2.49)

AIR TEMPERATURE RISE/
AUGMENTATIONDE LA TEMPÉATUREDE L'AIR 45° (25°)- 75° (42°) °F (C°)

MAXIMUM EXTERNAL STATIC PRESSURE PRESSION STATIQUE EXTÉRIEURE MAXIMAL INCHES W.C. (kPa)-PO C.E (kPa)		BLOWER/ SOUFFLEUR INCH (mm)/PO.(mm)	MOTOR FORCE HP (W)
.12	(.030)	11-7 (279-178)	1/2 (373)
.50	(.125)	11-7 (279-178)	1/2 (373)

ASSEMBLED IN THE USA 91-22176-09

the zoning manufacturer), this limit must be installed in the system to prevent the furnace from overheating.

TEMPERATURE RISE CHECK
To determine if the air flow is correct, make a temperature rise check.

1. Insert a thermometer in the supply air duct as close to the furnace as possible yet out of a direct line from the heat exchanger. See Figure 24.
2. Insert a thermometer in the return air duct as close to the furnace as possible.
3. Operate the furnace.
4. When the thermometer in the supply air duct stops rising (approximately five minutes), subtract the return air temperature from the supply air temperature. The difference is the temperature rise.
5. Compare the measured temperature rise to the approved temperature rise range listed on the furnace name plate. See product specification sheet and nameplate located on furnace.

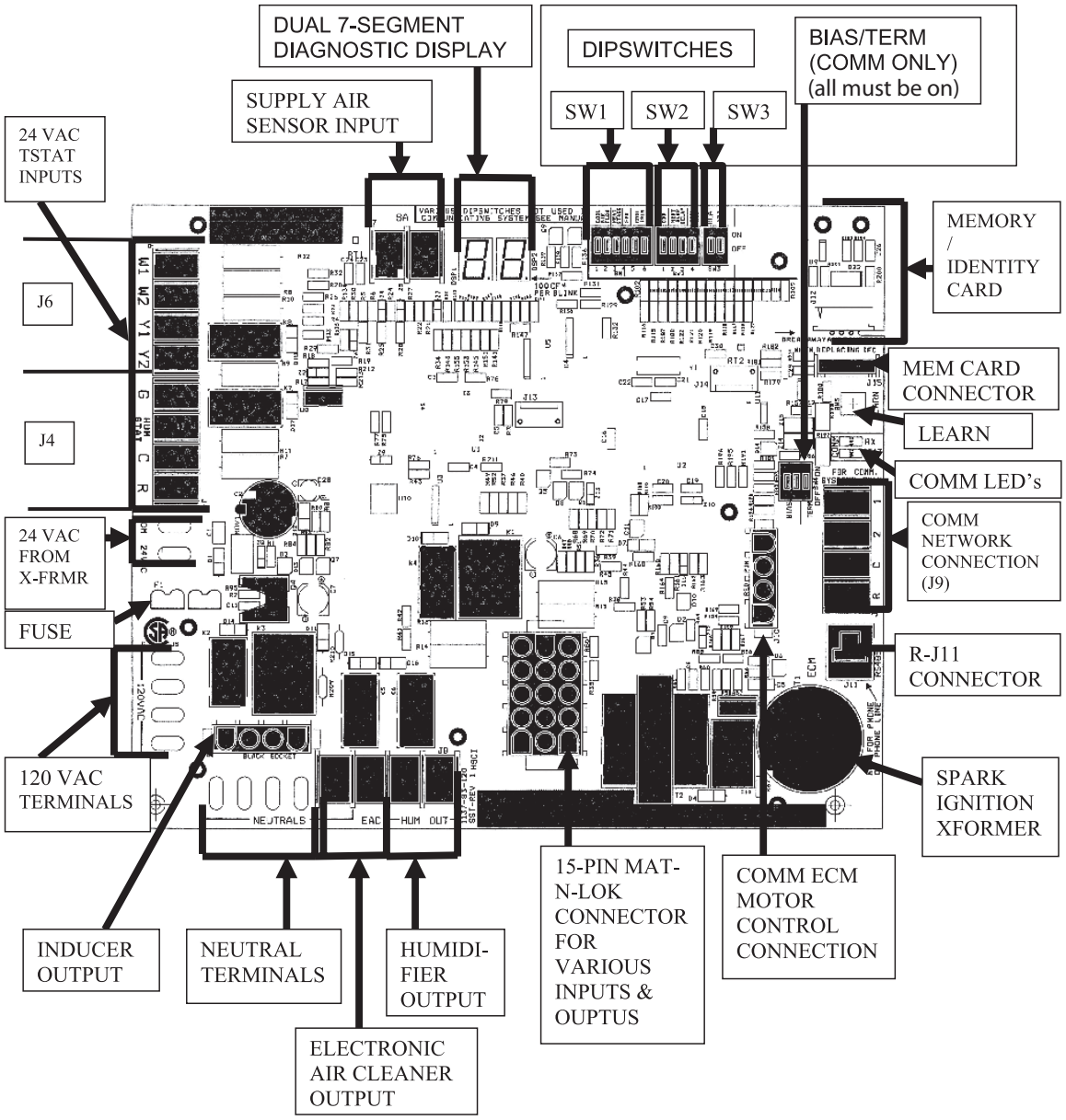
If the measured temperature rise is above the approved range, either the air flow is too low or the manifold pressure needs to be adjusted. More air must be moved by speeding up the blower, by removing restrictions in the duct system, or by adding more supply or return air duct. If the measured temperature rise is below the approved range, either the air flow is too much or the manifold pressure needs to be adjusted. Use lower speed tap on the multi-speed blower.

IMPORTANT: *The measured temperature rise should be in the middle of the range. See product specification sheet and name plate located on furnace.*

IMPORTANT: *Some high-efficiency filters have a greater than normal resistance to airflow. This can adversely affect furnace operation. BE SURE TO CHECK AIRFLOW if using any filter other than factory-provided filter.*

INTEGRATED FURNACE CONTROL (I.F.C.)

FIGURE 26
TWO-STAGE CLIMATE-TALK COMMUNICATING FURNACE CONTROL (RHEEM # 62-102784-01)



24 VAC THERMOSTAT (TSTAT) INPUTS (J4 & J6)

24 VAC THERMOSTAT (TSTAT) INPUTS (J4 & J6)
These connections are used with any traditional 24VAC one-stage or two-stage thermostat. Fully communicating thermostats must be connected to the COMM NETWORK CONNECTION (see section titled ***COMMUNICATING SYSTEMS*** of this document for details).

W1, W2, Y1, Y2, G, C and R are the traditional thermostat inputs used in nearly all HVAC equipment. Installation of the thermostat to these connections is straight-forward and simple.

HUM STAT – This terminal is used to connect the output of a humidistat to the furnace control to control humidification and/or dehumidification. Optional equipment is required for these features. Please see the section titled *HUMIDIFICTION AND DEHUMIDIFICATION* of this document for more details.

SPECIAL CONFIGURATION – COMMUNICATING THERMOSTAT AND FURNACE WITH A NON-COMMUNICATING CONDENSER

Y1 and Y2 – These terminals may be used to connect directly to a non-communicating condenser when a communicating thermostat is installed to the furnace but a non-communicating condenser is installed in the system. While the optimum configuration is with a communicating condenser connected to the network, there may be installations where this is not desired. In these cases, the thermostat will be communicating with the furnace control and the furnace control will energize the condenser as necessary (the additional relays have been added to the furnace control to allow this operation).

The thermostat connections labeled "Y1" and "Y2" on the I.F.C. are normally ***inputs*** to the furnace control to turn on the blower when they are energized. However, in this configuration, these (normally) inputs become ***outputs*** to energize the condenser when a cooling call has been sent from the communicating thermostat.

When this configuration is desired, use the wiring diagram in Figure 27 to connect the thermostat and condenser to the furnace control. For single stage condensers, a jumper must be installed between Y1 & Y2 at the furnace control.

NOTE: A heat pump condenser cannot be installed with this configuration. There is no control for the reversing valve.

24 VAC FROM TRANSFORMER (XFORMER) CONNECTIONS

These inputs are used to connect 24VAC from the furnace transformer to the furnace control (I.F.C.).

FUSE (F1)

A three-amp automotive-style (ATC blade type) fuse is supplied on-board the furnace control. This fuse should provide protection from short-circuits on the control board and associated 24 VAC wiring.

115 VAC TERMINALS

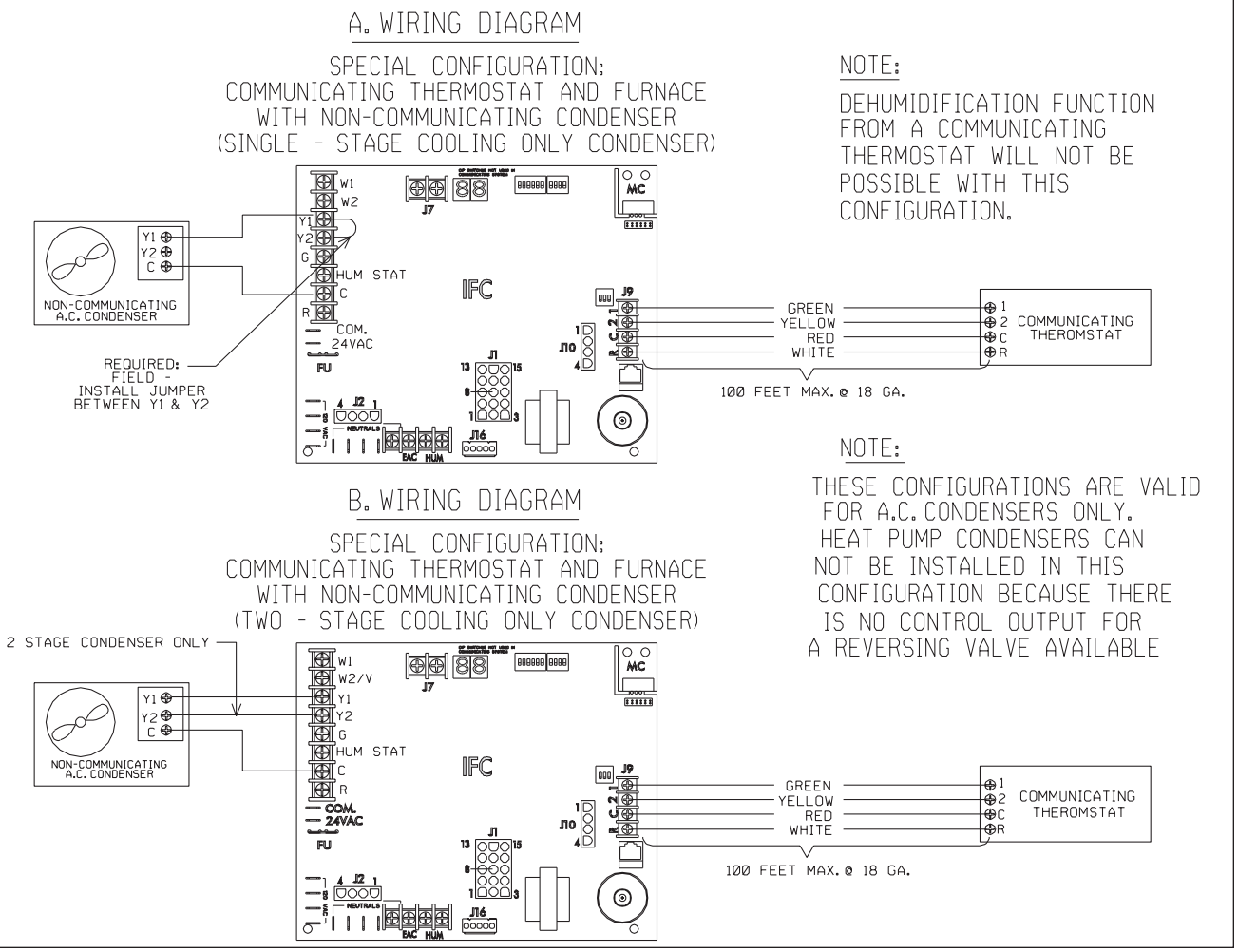
These terminals supply 115 VAC to the furnace control from the input at the junction box of the furnace. Additionally, spare terminals are provided for use with electronic air cleaners and other accessories as needed (Check the voltage rating of your equipment.)

INDUCED DRAFT MOTOR (INDUCER) OUTPUT (J2)

This four-pin Mate-n-Lok style connector is black in color and provides power to both the high and low speed inducer outputs. This connector on the IFC has female sockets so that it can not be confused with the four-pin connector used for motor control (which has male pins).

For troubleshooting purposes, follow the wiring diagram and troubleshooting flowchart supplied in this manual and on the inside of the furnace blower door. Additionally, the pin designations for the connector are specified below:

FIGURE 27
WIRING DIAGRAM – SPECIAL CONFIGURATION: COMMUNICATING THERMOSTAT AND FURNACE WITH NON-COMMUNICATING CONDENSER



Pin 1 to Inducer High Speed Output.

Pin 2 to Inducer Low Speed Output

Pin 3 is not used.

Pin 4 to Neutral.

NEUTRAL TERMINALS

These terminals connect 115VAC neutral to the furnace control from the input at the junction box of the furnace. Additionally, spare terminals are provided for use with electronic air cleaners, humidifiers and other accessories as needed (Check the voltage rating of your equipment.)

ELECTRONIC AIR CLEANER (E.A.C.) OUTPUT (J8)

This output is used to energize an electronic air cleaner. The output will provide 1.0 amp at 115 VAC. This output is energized any time the blower motor is above 40% of maximum airflow capacity. Airflow below this value is not considered to be enough for a typical electronic air cleaner to perform properly.

For 1/2HP motors – Electronic air cleaner is energized any time the blower is above 480 CFM (1200 CFM x 0.4)

For 1 HP motors - Electronic air cleaner is energized any time the blower is above 800 CFM (2000 CFM x 0.4)

HUMIDIFIER OUTPUT (J8)

These outputs (two) are connected to the contacts of a control-mounted relay. In this sense, they are what are called “dry” contacts. That is, they provide no voltage, they are only used to close a circuit. The contacts can be used to close either a 24VAC or 115VAC circuit either with a maximum of 1 amp current. Details about the humidifier outputs and wiring diagrams can be found in the section titled *HUMIDIFICATION AND DEHUMIDIFICATION* of this document.

15-PIN MATE-N-LOK CONNECTOR (J1) (see Fig 28)

The 15-pin Mate-n-Lok style connector provides connections for a variety of inputs and outputs to the furnace control. For modulating furnaces with a solenoid-controlled modulating gas valve (HG or HH Fuel Codes) the 15-pin connector provides power and control signals to the gas valve. Also, the flame sense, pressure switches sense and limits sense (Main Limit, MRLC and HALC) are connected to the I.F.C. through this connector. Reference the wiring diagram for the furnace printed in this document or on the inside of the furnace blower door for pin assignments for troubleshooting.

For troubleshooting purposes, follow the wiring diagram and troubleshooting flowchart supplied in this manual and on the inside of the furnace blower door. Additionally, the pin designations for the connector are specified below:

Pin 1 to Flame Sense rod.

Pin 2 to Overtemp Limit (MRLC) Sense

Pin 3 to Main Limit (LC) Sense

Pin 4 to 24 VAC to Limit Sense Circuits

Pin 5 24 VAC out to Auxiliary Limit (HALC- Heat Assisted Limit Control)

Pin 6 1st stage gas valve solenoid valve main solenoid 24VAC.

Pin 7 2nd stage gas valve solenoid

Pin 8 to Low Pressure Switch sense.

Pin 9 to High Pressure Switch sense.

Pin 10 to Low and High Pressure Switch 24VAC

Pin 11 to Aux Input sense

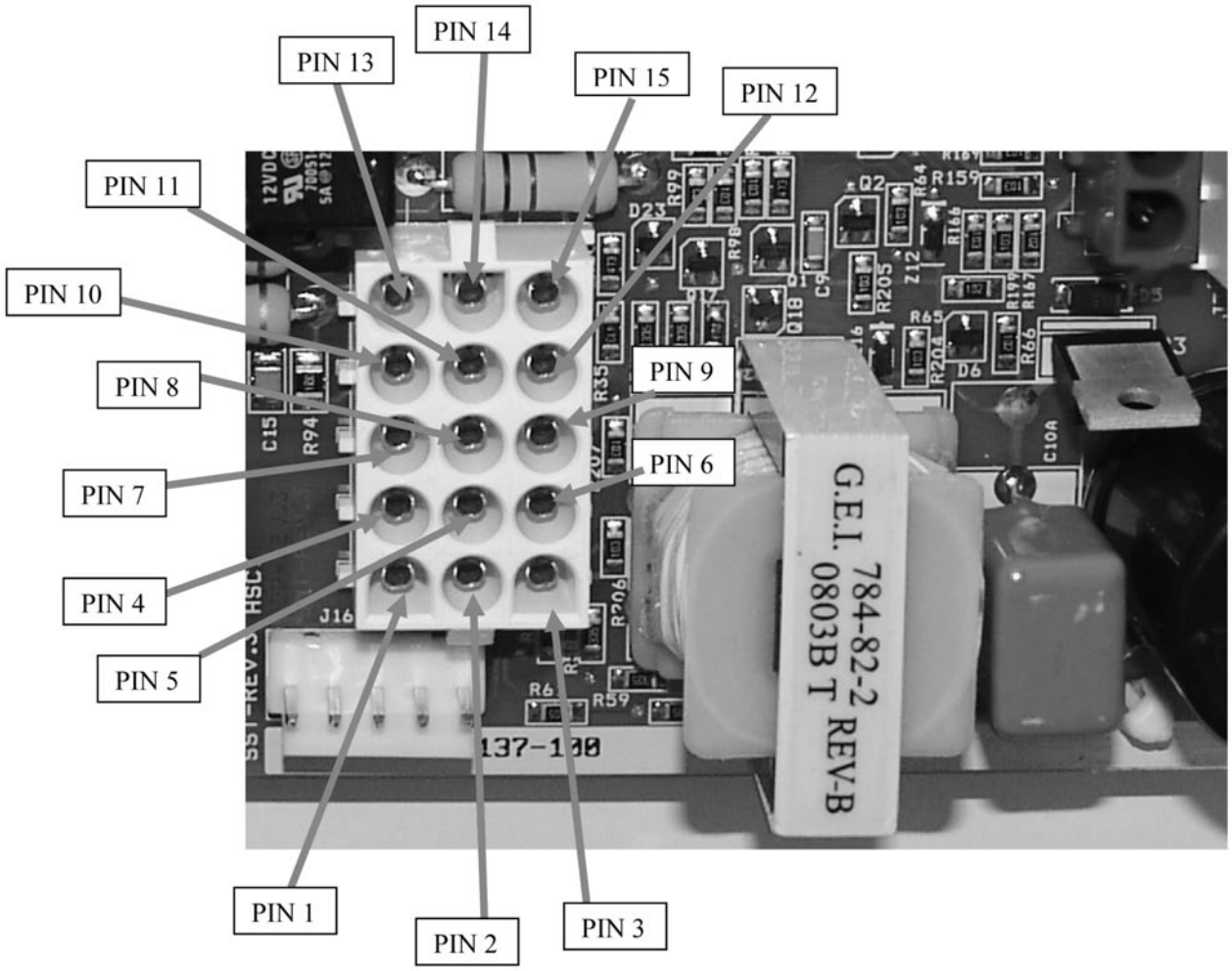
Pin 12 to Ground on furnace cabinet

Pin 13 not used on this control

Pin 14 not used on this control

Pin 15 gas valve 24VAC common

FIGURE 28
15-PIN CONNECTOR; J1 WITH PIN DESIGNATIONS



COMMUNICATING ECM MOTOR COMMUNICATIONS (CONTROL) CONNECTION (J10) (see Fig 28)

This connector sends and receives messages to and from the blower motor through a single peer-to-peer network. The blower motor does not communicate on the same communications buss as the furnace, condenser and thermostat. Further, a different communications protocol is used.

For troubleshooting purposes, follow the wiring diagram and troubleshooting flowchart supplied in this manual and on the inside of the furnace blower door. Additionally, the pin designations for the connector are specified below:

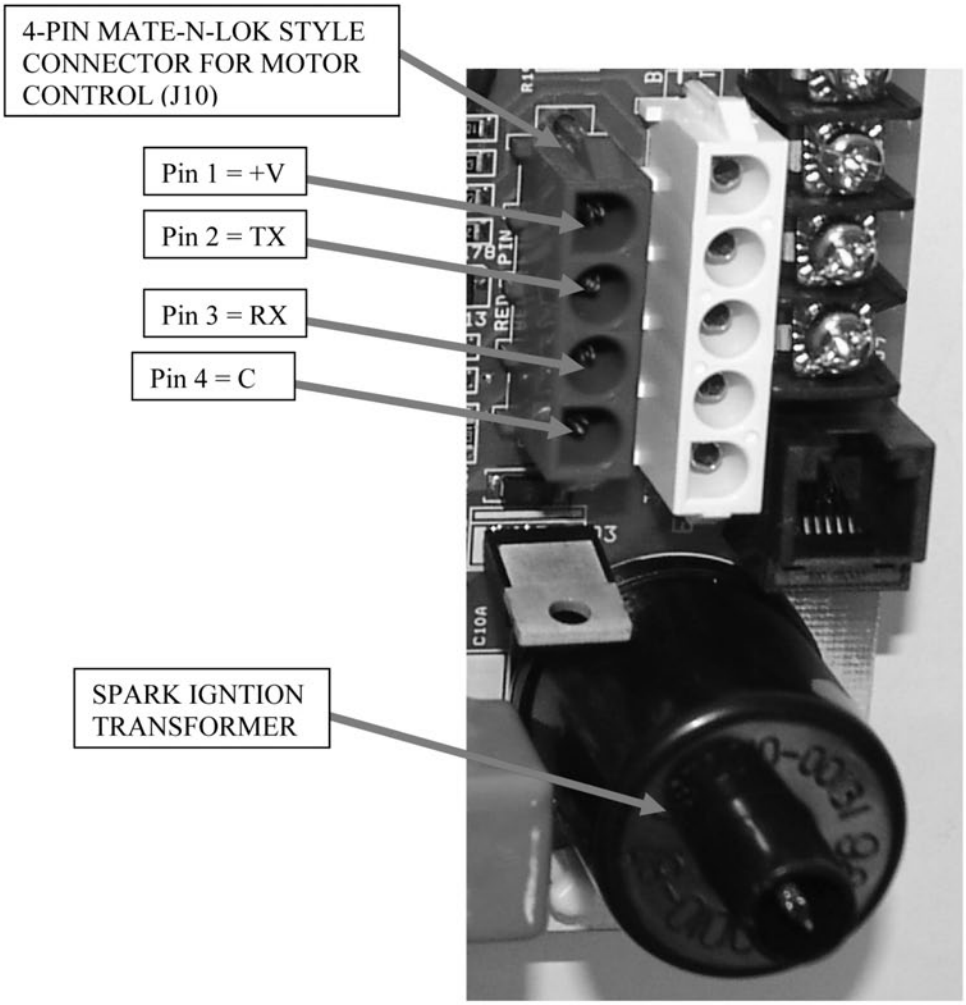
Pin 1 to communicating blower motor connector Pin 1 (+V)

Pin 2 to communicating blower motor connector Pin 2 (TX)

Pin 3 to communicating blower motor connector Pin 3 (RX)

Pin 4 to communicating blower motor connector Pin 4 (C)

FIGURE 29
FOUR-PIN MOTOR CONTROL CONNECTION; J10 WITH PIN ASSIGNMENTS.



SPARK IGNITION TRANSFORMER (XFORMER) (T1)

The spark ignition transformer resides on the furnace control (older generations of the modulating furnace have the spark transformer mounted to a separate ignition control). The transformer provides spark energy at approximately 60 hz frequency and a minimum of 12KV. The transformer can be seen in Figure 29.

R-J11 CONNECTOR (J-11)

⚠ WARNING

DO NOT CONNECT A TELEPHONE OR PHONE LINE TO THE CONNECTOR (JACK) AT POSITION J-11. DOING SO COULD CAUSE IRREPRABLE DAMAGE TO EITHER THE FURNACE CONTROL (I.F.C.) OR THE TELEPHONE (OR TELEPHONE LINE) OR BOTH.

This connector is used to program the furnace control at the factory. It can also be used to connect a field service diagnostic tool. Unfortunately, this tool was not available at the time of this publication but should be available in the future. Otherwise, this connection is not to be used in the field. It should never be connected to a telephone line or a telephone. Doing so could damage the furnace control or the telephone (or telephone lines) or both.

COMMUNICATIONS NETWORK CONNECTION

These connections are used when installing a communicating thermostat specified for use with this furnace. Further, normally, thermostat connections will not be made at the 24 V Thermostat Inputs when using a communicating thermostat. (Except under one special circumstance where a communicating thermostat and non-communicating condenser are used. See Figure 27 and the section of this document titled ***SPECIAL CONFIGURATION – COMMUNICATING THERMOSTAT AND FURNACE WITH A NON-COMMUNICATING CONDENSER.)***

The terminal labeled “1” on the furnace control connects directly to the terminal labeled “1” on the thermostat and “1” on the condenser. The remaining connections follow the same pattern.

Follow the wiring diagram in Figure 27 for connections of the communications network.

COMMUNICATIONS L.E.D.’s (Light Emitting Diodes)

Note: The “RX” and “STAT” L.E.D.’s will not operate unless a communicating thermostat is

installed. These L.E.D.'s will not energize if a traditional 24V thermostat only is used to control the furnace.

"RX" (Green) L.E.D. – This L.E.D. indicates that communications is being sensed to or from (i.e.: *something* on the network is trying to communicate) other components (e.g. a condenser) on the network. This L.E.D. will blink randomly any time a message is received by the furnace control. If no blinking is seen within five minutes, it can be assumed that there is not valid communications established. Check wiring to make sure that all points are connected properly.

Further, if this L.E.D. is on continuously, it is an indication that mis-wiring has occurred. Most probably, connections "1" and "2" are reversed. Double-check the wiring and make sure that the wire connected to pin "1" on the condenser is the same wire connected to pin "1" on the thermostat and the furnace control. The same follows for the wires to pins "2", "R" and "C".

"STAT" (STAT*US*) (Red) L.E.D. – This L.E.D. blinks twice slowly (¼ second ON, ¾ second OFF) upon power-up.

LEARN BUTTON

Pressing the learn button for two seconds will cause the green "RX" L.E.D. to blink rapidly (for a short period) to indicate an attempt at communications. If the L.E.D. does not blink, communications can not be established. The problem may be that the wires at the J9 connector "1" and "2" on the I.F.C. may be reversed. Check to make sure that wiring is from "1" on the IFC leads to "1" on the thermostat and condenser (if present) and the same follows for connections "2", "R" and "C".

MEMORY CARD CONNECTOR (J15)

This connector is used to insert a memory card.

MEMORY CARD

A memory card is defined as an electronic card that carries a copy of the furnace shared data.

RULES FOR WRITING, DISTRIBUTION AND ARBITRATION OF MULTIPLE COPIES OF FURNACE SHARED DATA FOR COMMUNICATING-CAPABLE FURNACES

Furnace shared data is defined as data specific to a given furnace that is critical for proper furnace operation. More specifically, it is data which defines the operation of the furnace and is unique to a given furnace platform and model. The most critical of these data are the coefficients that control the blower operation (i.e. define the blower speed-torque operation). Because of this, each furnace control is programmed with furnace shared data for that model furnace only. The furnace shared data from any given furnace can NOT be transferred to another furnace for any reason. Doing so can adversely affect operation of the furnace. Further, if no furnace shared data is present, the furnace will not operate in any mode and a fault will be displayed.

Valid Furnace Shared Data is defined as furnace shared data for the furnace series in question with the correct motor horsepower. However, it is impossible for the furnace control to determine if the furnace shared data is matched to the furnace input BTU's if the motor horsepower is correct. This means, for example, furnace shared data for a 120KBTU upflow furnace could be installed and recognized as valid furnace shared data in a 90KBTU downflow furnace. VALID FURNACE SHARED DATA simply means that there is no motor horsepower conflict and that the furnace shared data is for the series of furnace in question. VALID FURNACE SHARED DATA is data that will be used by the furnace control with no fault reported. VALID FURNACE SHARED DATA may not necessarily mean that the furnace shared data is correct for the furnace in question. The input BTU's could still be incorrect and this is why it is important to never exchange memory cards from one furnace to another.

Furnace shared data is programmed into the furnace control microprocessor and attached memory card at the factory. The attached memory card cannot be programmed in the field but furnace shared data inside the furnace IFC microprocessor may be written or rewritten in the field through the network depending on the circumstances.

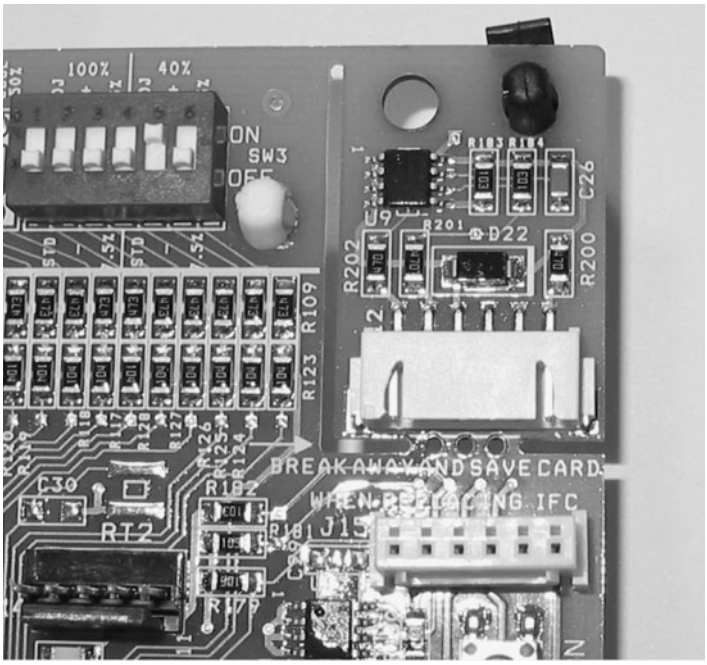
⚠ WARNING

DO NOT REPLACE THE FURNACE CONTROL OR MEMORY CARD OF THE FURNACE WITH A FURNACE CONTROL OR MEMORY CARD OF ANOTHER FURNACE OR ANOTHER COMPONENT (E.G.: A MEMORY CARD FROM A CONDENSER OR AIR HANDLER). THE WRONG FURNACE CONTROL OR MEMORY CARD MAY SPECIFY PARAMETERS WHICH WILL MAKE THE FURNACE RUN AT UNDESIRED CONDITIONS INCLUDING (BUT NOT NECESSARILY LIMITED TO) REDUCED AIRFLOW DURING HEATING CAUSING EXCESSIVE UNDESIRED OPERATION OF THE MAIN LIMIT CONTROL. FURTHER, THE MEMORY CARD IS SPECIFIC TO THE MODEL NUMBER AND BTU INPUT RATING FOR A SPECIFIC FURNACE AND THIS INFORMATION SHOULD NOT BE TRANSPORTED FROM ONE FURNACE (OR COMPONENT) TO ANOTHER.

The memory card is the default memory location to be used first when there is any conflict. If the memory card has been replaced with a card that has data for another furnace, the furnace will assume the identity of the "other" furnace. In all cases, the memory card has the final say about the data to use. It is only when the memory card is not present, is corrupt or specifies a motor larger or smaller than what is found in the furnace that the furnace control will use the data stored in the microprocessor (a mirror of the most recent memory card with blower size matching that found in the furnace). The hierarchy of data to be used in the event of a lost card or conflict is listed in order of importance below.

1. An ***ATTACHED*** memory card is physically connected to the furnace control and almost appears to be part of the furnace control itself. A photo is shown in Figure 30 and is how the furnace control with memory card is shipped from the factory.

FIGURE 30
AN ATTACHED MEMORY CARD

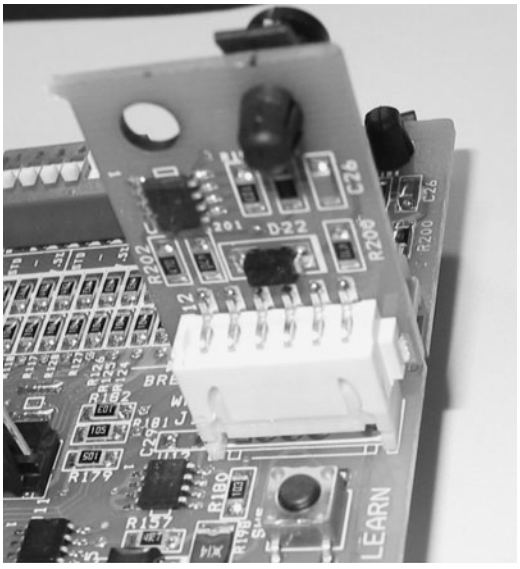


2. An ***INSERTED*** memory card is one that has been inserted into connector J15 of the furnace control and is shown in the photo in Figure 31 below. A memory card will not be inserted in this connector from the factory and the connector is designed only to be used to install a memory card to a replacement furnace control in the field.

   Replacement IFC's (furnace controls) from ProStock do NOT contain any furnace shared data and, as such, will not operate the furnace until furnace shared data is loaded in the field either via the original memory card or via redundant copies stored on various components in a communicating network (the latter applies only to installations configured as communicating systems and NOT to so-called legacy (24VAC) controlled systems).

   When the furnace control is replaced, the original memory card must be broken away from the original furnace control (IFC) and retained with the furnace. When the new IFC is installed, the original memory card will be inserted into connector J15 of the IFC to impart the critical furnace shared data to the replacement control. Note that in this circumstance there will be essentially two furnace shared data cards; one attached to the furnace control and one inserted into connector J15. However, the attached card has no furnace shared data as replacement controls ordered from ProStock will not contain any furnace shared data on the memory card or in the microprocessor and memory cards cannot be written (or rewritten) in the field.

FIGURE 31
AN *INSERTED* MEMORY CARD. NOTE THAT A BLANK CARD IS STILL SEEN ATTACHED TO THE FURNACE CONTROL BELOW. REPLACEMENT FURNACE CONTROLS FROM PROSTOCK WILL INCLUDE THIS ATTACHED CARD (BELOW) EXCEPT WITHOUT THE ELECTRONIC COMPONENTS WHICH ARE SHOWN HERE SURFACE-MOUNTED TO THE CARD.



1. If ***no memory card present***, –
   a. Furnace shared data from the "network" is used. Furnace network shared data is defined as a redundant copy (or copies) of the critical furnace shared data stored at various places and components on the communicating network.

      The "network" can be defined as follows:

      I. The "network" can be the furnace control itself if it was programmed at the factory and the memory card has been removed for some reason.

      II. The "network" can be a furnace control which has had a valid card previously (either attached or inserted) and removed for some reason.

      III. The "network" can be a furnace control attached to a communicating condenser and/or thermostat which has copies of the furnace shared data that can be retrieved by the furnace control.

      IV. A furnace control sent as a replacement part will have no furnace shared data either in the microprocessor or on the memory card. The replacement control does not include a valid memory card. The furnace shared data can be added by:

         1. Inserting a valid memory card (e.g. the original memory card sent with the original furnace con-

trol or a valid replacement memory card ordered from ProStock.

or

2. by attaching the furnace control to a communicating network (e.g. a condenser and thermostat) which was previously connected to (and operating with) a valid furnace control with valid furnace shared data.

   Regardless, the memory card of a replacement control cannot be programmed or reprogrammed in the field with furnace shared data and will always remain blank. In fact, this card does not even contain the electronic components necessary to turn it into a valid memory card.

V. Replacement memory cards with the appropriate furnace shared data for any given model can be ordered from Pro-Stock. In the event that the original memory card is lost, the original furnace control has been replaced and there is no furnace shared data on the network (or the furnace is not part of a communicating network (i.e.: is not connected to a communicating condenser and thermostat)), the replacement memory card must be ordered and installed into the connector at J15 to give the furnace valid furnace shared data. The furnace will not operate properly without the correct furnace shared data. When no furnace shared data is present (either at the memory card or on the network) a “d1” (NO SHARED DATA) fault code will be displayed at both the thermostat active fault screen and at the furnace control (I.F.C.) seven-segment displays. Also, the homeowner will be alerted via the communicating thermostat with either a CHECK SYSTEM or CHECK FURNACE error message displayed on the main screen.

   If the original memory card is lost, it should be replaced even if there is valid furnace shared data on the network. The valid furnace shared data on the network should only be considered as a backup to the memory card.

b. If valid furnace shared data is available from the network and no memory card is present, a “d4” (MEM CARD INVALID) fault is displayed at the communicating thermostat active fault screen and at the furnace seven-segment displays when in standby mode only (see fault code priority list). The homeowner is not alerted (level 1 fault).

c. If no furnace shared data is present on the network and a memory card is either not present or the shared data on the memory card is not valid, a “d1” (NO SHARED DATA) fault is displayed at both the communicating thermostat active fault screen and at the furnace seven-segment displays provided a higher priority fault code is not also present (in which case the higher priority fault is displayed) (see fault code priority list). The homeowner is alerted via the communicating thermostat (level 2 fault).

d. If furnace shared data from the memory card is not valid or is not present and shared data from network can be used, the appropriate fault (d4, d5, d6, d7 or d8 – see fault codes in this manual) is displayed at the communicating thermostat active fault screen and at the furnace seven-segment displays during standby mode only. The homeowner is not alerted (level 1 fault).

2. If ***one memory card present*** (attached to IFC ***or*** inserted in J15 of the IFC), furnace shared data from the memory card (if valid) will be used to write (or re-write) the network furnace shared data and furnace shared data from card will be used. If the data on that card is not valid,:

   a. If furnace shared data on the memory card

      I. is corrupt or invalid (“d4” – MEM CARD INVALID”),

      and/or

      II. is for another component or different furnace series (“d5” – CARD-HARD CNFLCT),

      and/or

      III. does not match the horsepower of the attached motor (“d6”- BLWR HP CNFLCT),

      and/or

      IV. does not support the motor manufacturer of the motor present (“d7” - BLWR MFG CNFLCT),

      and/or

      V. is from an older furnace and is missing critical newer furnace shared data (“d8” - OLD SHARED DATA),

      furnace shared data from the network (if valid) is used to control the furnace (see description of “network” under “If ***no memory card present***” (item 1 above)). Furnace shared data on the network will not be written or re-written from the memory card. If the furnace shared data on the network is valid, the appropriate fault for the memory card will be displayed at the active fault screen of the communicating thermostat and at the furnace seven-segment displays when in standby mode only (see fault code priority list). The homeowner will not be alerted (level 1 fault).

   b. If neither the furnace shared data on the memory card is valid nor the furnace shared data on the network is valid, the fault code status is elevated. The homeowner is alerted via the communicating thermostat (level 2 fault) and the fault code *d1* (NO VALID SHARED DATA) is displayed at the communicating thermostat active fault screen and at the furnace seven-segment displays provided a higher priority fault is not also present (in which case the higher priority fault is displayed) (see fault code priority list).

   c. If no furnace shared data is available on either the memory card or the network, the fault code “d1” (NO SHARED DATA) is displayed at the communicating thermostat active fault screen and at the furnace seven-segment displays provided a higher priority fault is not also present (in which case the higher priority fault is displayed) (see fault code priority list). The homeowner is alerted via the communicating thermostat (level 2 fault). Furnace shared data on the network will not be written or re-written from the memory card.

3. If ***two memory cards present*** – (attached to IFC ***and*** inserted in J15 of IFC), the memory card inserted into J15 "wins" and its furnace shared data is used and written to the network (if valid) unless:
   a. If no furnace shared data is present on the memory card inserted in J15, the furnace shared data from the attached memory card is used and the rules for ***one memory card present*** (outlined in 2 above) are used. A fault code is not displayed anywhere unless warranted for the attached memory card per the rules outlined for ***one memory card present***. Furnace shared data is not written to the network unless the furnace shared data on the attached memory card is valid.
   b. If furnace shared data on the memory card inserted in J15 is corrupt ("d4" – MEM CARD INVALID), the furnace shared data from the attached memory card is used and the rules for ***one memory card present*** (outlined in 2 above) are used. A fault code is not displayed anywhere unless warranted for the attached memory card per the rules outlined for ***one memory card present***. Furnace shared data is not written to the network unless the furnace shared data on the attached memory card is valid.
   c. If furnace shared data on the inserted memory card is a motor mismatch ("d6" - BLWR HP CNFLCT), the furnace shared data from the attached memory card is used and the rules for ***one memory card present*** (outlined in 2 above) are used. A fault code is not displayed anywhere unless warranted for the attached memory card per the rules outlined for ***one memory card present***. Furnace shared data is not written to the network unless the furnace shared data on the attached memory card is valid.
   d. If furnace shared data on the inserted memory card does not support the motor manufacturer of the motor present ("d7" - BLWR MFG CNFLCT), the furnace shared data from the attached memory card is used and the rules for ***one memory card present*** (outlined in 2 above) are used. A fault code is not displayed anywhere unless warranted for the attached memory card per the rules outlined for ***one memory card present***. Furnace shared data is not written to the network unless the furnace shared data on the attached memory card is valid.
   e. If furnace shared data on the inserted memory card is from an older furnace and is missing critical newer furnace shared data ("d8" – OLD SHARED DATA), the furnace shared data from the attached memory card is used and the rules for ***one memory card present*** (outlined in 2 above) are used. A fault code is not displayed anywhere unless warranted for the attached memory card per the rules outlined for ***one memory card present***. Furnace shared data is not written to the network unless the furnace shared data on the attached memory card is valid.
4. Furnace shared data is never written to any memory card (attached or inserted) in the field. There is no way to write to a memory card in the field. If a new memory card is needed, it must be ordered from Pro-Stock parts replacements.

REPLACING THE FURNACE CONTROL

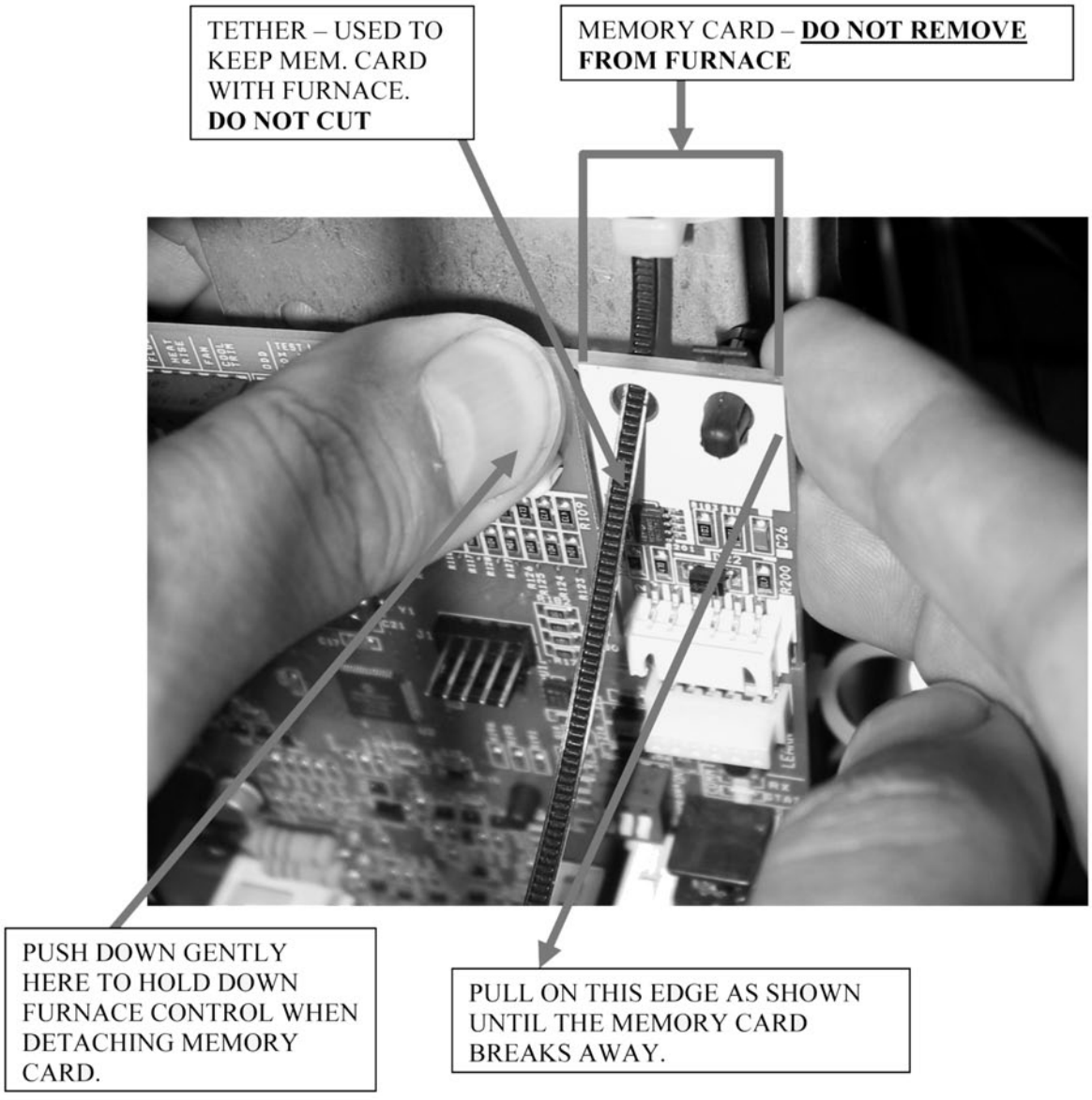
In the event that the furnace control must be replaced, the memory card must be broken away (detached) from the original furnace control and retained with the furnace. A plastic tether with a note wrapped around the tether is used to remind the technician not to remove the card from the furnace. The card can be broken away easily by putting pressure on the control board at dip-switch bank SW-3 with the left hand and pulling forward on the upper right-hand corner of the card with the furnace control still in place on the control board mounting plate (see Figure 32). The card will break free from the furnace control. Use this card to insert into the memory card connector labeled J15 of the replacement control board. Failure to save and connect the memory card properly to the replacement control may result in no operation or undesired operation of the furnace.

When replacing the furnace control, be sure to match the dipswitch settings of the original control on the replacement.

DO NOT CUT THE PLASTIC WIRE TIE USED AS A TETHER TO THE ATTACHED, BREAK-AWAY MEMORY CARD. DOING SO WILL DEFEAT THE PURPOSE OF RETAINING THE MEMORY CARD – WHICH COULD LEAD TO A LOSS OF CRITICAL DATA NECESSARY TO OPERATE THE FURNACE. THE CARD MUST STAY WITH THE FURNACE – EVEN WHEN THE FURNACE CONTROL (IFC) MUST BE REPLACED.

NEVER USE A CONTROL BOARD TAKEN FROM ANOTHER FURNACE AS A REPLACEMENT CONTROL FOR THIS FURNACE. FURNACE CONTROLS TAKEN FROM OTHER FURNACES MAY CONTAMINATE THE NETWORK WITH THE WRONG SHARED DATA WHICH CAN ONLY BE FIXED BY REPLACING THE MEMORY CARD WITH THE ORIGINAL MEMORY CARD FROM YOUR FURNACE OR A REPLACEMENT MEMORY CARD DESIGNED FOR YOUR FURNACE.

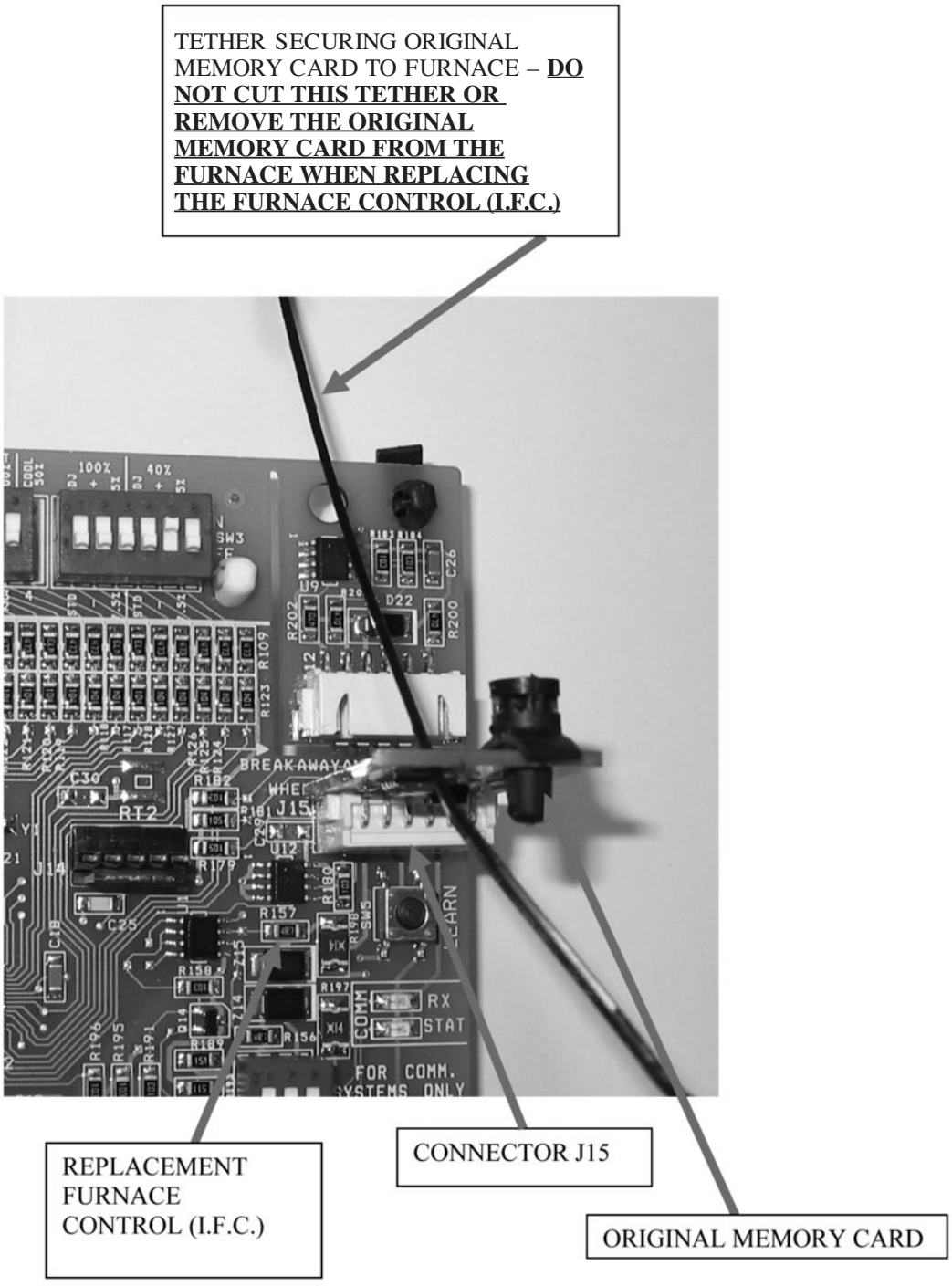
FIGURE 32
REMOVE THE MEMORY CARD WHEN REPLACING THE FURNACE CONTROL. THIS PHOTO SHOWS THE CORRECT WAY TO REMOVE THE MEMORY CARD. DO NOT CUT THE TETHER.



For communicatinig systems as a final confirmation of the correct shared data the model number should be verified by checking the furnace user menu under the sub menu titled “Unit Info.” Make sure that the model number displayed in the menu matches the model number on the rating label. (**NOTE:** Wild cards will be shown in parenthesis. Example: RGFLE/F)-06(E/N)MCKS.)

FIGURE 33

ON A REPLACEMENT FURNACE CONTROL THE ORIGINAL MEMORY CARD FROM THE ORIGINAL FURNACE CONTROL SHOULD BE INSERTED INTO CONNECTOR J11 OF THE REPLACEMENT CONTROL. DOING THIS WILL GIVE THE REPLACEMENT CONTROL ITS IDENTITY. NOTE THAT THERE WILL BE TWO MEMORY CARDS – THE ORIGINAL (INSERTED INTO J11) AND THE REPLACEMENT (STILL ATTACHED TO THE REPLACEMENT FURNACE CONTROL).



DIPSWITCHES

NOTE: The integrated furnace control does not recognize switch setting changes while energized.

SW1

SW1-1 AND SW1-2 – COOLING AIRFLOW SELECT – These dipswitches are used to select the appropriate cooling airflow based on the amount required. The switch settings do not affect cooling airflow when installed with a fully communicating condenser. In that case, the condenser supplies the information for cooling airflow which is preset at the factory and not adjustable.

For non-communicating systems or communicating systems with a non-communicating condenser (see section titled ***SPECIAL CONFIGURATION – COMMUNICATING THERMOSTAT AND FURNACE WITH A NON-COMMUNICATING CONDENSER*** of this document), the target cooling airflow will be determined by the adjustments of SW1-1 and SW1-2. Furnaces with ½ HP motors will have a maximum target airflow setting of 1200 CFM. Furnace with 1 HP motors will have a maximum target airflow setting of 2000 CFM. The airflow achieved may be less than the target if the static pressure across the furnace is over 0.6” wc. Consult the cooling equipment instructions and documents for target airflow and adjust accordingly.

Cooling airflow for non-communicating systems can be adjusted approximately +/- 10% by using the cool trim adjustment dipswitches; SW1-5 and SW1-6. See Figure 34.

Cooling airflow for non-communicating systems is also affected by the settings of dipswitch position SW2-6. This switch will determine the appropriate amount of airflow to be used for the low stage (1st stage) of cooling. See the tables in Figure 35. More information can be found in the section titled SW2 (SW2-6).

Consult the tables in Figures 34, 35 and 36 for target airflow settings and adjustments based on the positions of the dipswitches SW1-1, SW1-2, SW1-5, SW1-6 and SW2-6.

FIGURE 34
DIPSWITCH BANK SW1

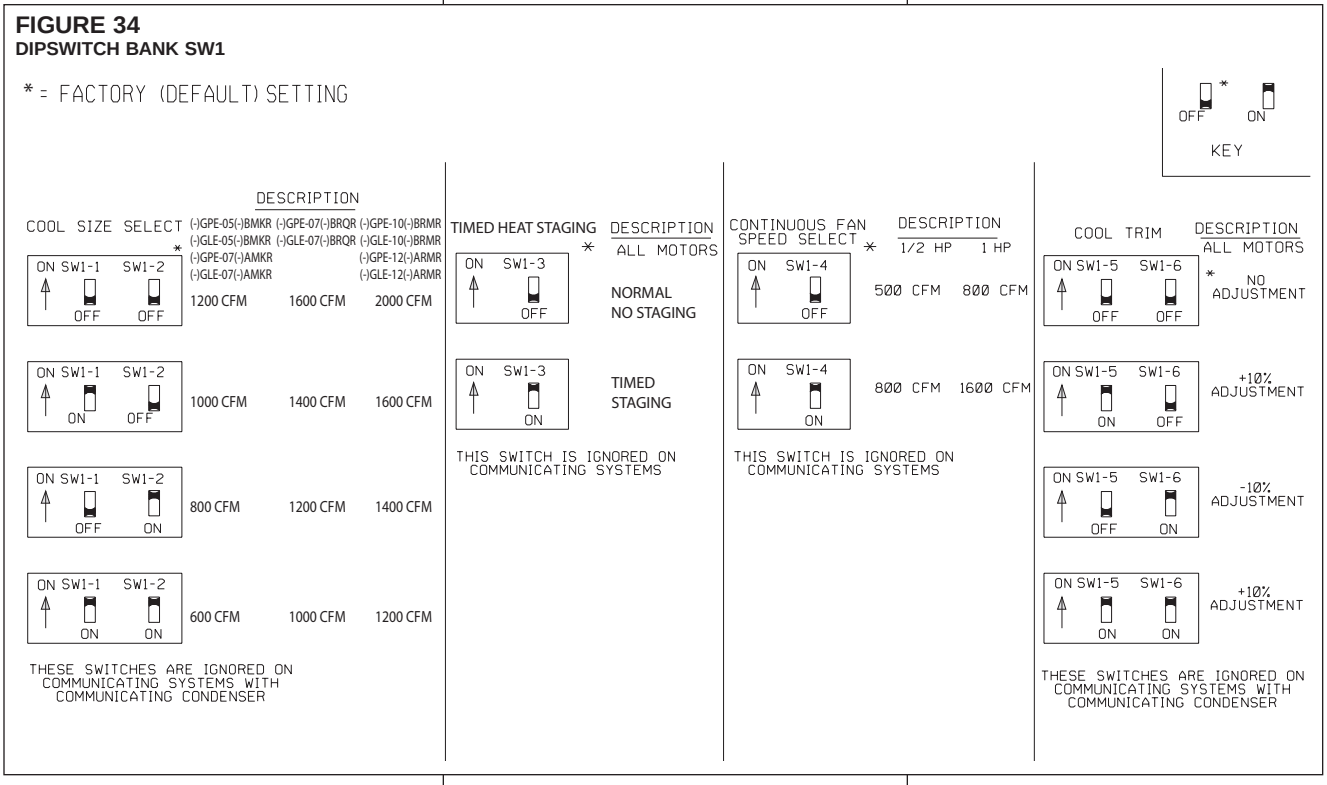


FIGURE 35
COOLING AIRFLOW SELECTIONS FOR NON-COMMUNICATING CONDENSERS

FURNACE COOLING AIRFLOW RATES, GPE-05, GPE-07(-)A, GLE-05 & GLE-07(-)A (1200 CFM Max) motor settings (applies only to systems configured with non-communicating condenser).

SW2, Pos. 4	SW1, Pos. 2	SW1, Pos. 1	Y2 Single stage	Y1 Low 2 stage	Y1+Y2 High 2 stage	Notes	
ON	OFF	OFF	1200 CFM	600 CFM	1200 CFM	3 Ton A/C	Low Airflow = approx. 50% of High-Stage Cooling (Could be used with condensers with two compressors.)
ON	OFF	ON	1000 CFM	500 CFM	1000 CFM	2.5 Ton	
ON	ON	OFF	800 CFM	400 CFM	800 CFM	2 Ton A/C	
ON	ON	ON	600 CFM	300 CFM	600 CFM		
OFF	OFF	OFF	1200 CFM	900 CFM	1200 CFM	3 Ton A/C	HIGH SEER (16+) Premium Cooling airflow (SW2, Position 4 is OFF)
OFF	OFF	ON	1000 CFM	750 CFM	1000 CFM	2.5 Ton	
OFF	ON	OFF	800 CFM	600 CFM	800 CFM	2 Ton A/C	
OFF	ON	ON	600 CFM	450 CFM	600 CFM		

FURNACE COOLING AIRFLOW RATES, GPE-07(-)B & GLE-07(-)B (1600 CFM MAX) motor settings (applies only to systems configured with non-communicating condenser)

SW2, Pos. 4	SW1, Pos. 2	SW1, Pos. 1	Y2 Single Stage	Y1 Low 2 Stage	Y1+Y2 High 2 Stage	Notes	
ON	OFF	OFF	1600 CFM	800 CFM	1600 CFM	4 Ton A/C	Low Airflow = approx. 50% of High-Stage (Could be used with condensers with two compressors).
ON	OFF	ON	1400 CFM	700 CFM	1400 CFM	3.5 Ton A/C	
ON	ON	OFF	1200 CFM	600 CFM	1200 CFM	3 Ton A/C	
ON	ON	ON	1000 CFM	500 CFM	1000 CFM	2.5 Ton A/C	
OFF	OFF	OFF	1600 CFM	1200 CFM	1600 CFM	4 Ton A/C	HIGH SEER (16+) Premium Cooling airflow (SW2, Position 4 is OFF)
OFF	OFF	ON	1400 CFM	1050 CFM	1400 CFM	3.5 Ton A/C	
OFF	ON	OFF	1200 CFM	900 CFM	1200 CFM	3 Ton A/C	
OFF	ON	ON	1000 CFM	750 CFM	1000 CFM	2.5 Ton A/C	

FURNACE COOLING AIRFLOW RATES, GPE-10, GPE-12, GLE-10 & GLE-12 (2000 CFM Max) motor settings (applies only to systems configured with non-communicating condenser).

SW2, Pos. 4	SW1, Pos. 2	SW1, Pos. 1	Y2 Single stage	Y1 Low 2 stage	Y1+Y2 High 2 stage	Notes	
ON	OFF	OFF	2000 CFM	1000 CFM	2000 CFM	5 Ton A/C	Low Airflow = approx. 50% of High-Stage (Could be used with condensers with two compressors.)
ON	OFF	ON	1600 CFM	800 CFM	1600 CFM	4 Ton A/C	
ON	ON	OFF	1400 CFM	700 CFM	1400 CFM	3.5 Ton	
ON	ON	ON	1200 CFM	600 CFM	1200 CFM	3 Ton	
OFF	OFF	OFF	2000 CFM	1400 CFM	1800 CFM	5 Ton A/C	HIGH SEER (16+) Premium Cooling airflow (SW2, Position 4 is OFF)
OFF	OFF	ON	1600 CFM	1200 CFM	1600 CFM	4 Ton A/C	
OFF	ON	OFF	1275 CFM	1050 CFM	1400 CFM	3.5 Ton	
OFF	ON	ON	1200 CFM	900 CFM	1200 CFM	3 Ton	

SW1-3 TIMED HEAT STAGING – This switch permits the user to select between no timed staging (i.e. a two stage thermostat is connected) or timed staging with a single-stage thermostat. With the selection "ON," the furnace will stage up to 100% heat after 12 minutes with a heat call on W1 only. This means that a 1-stage thermostat can be used to simulate 2-stage heating operation.

SW1-4 FAN SPEED SELECT – This dipswitch is used to select the continuous fan speed when the furnace is configured with a non-communicating thermostat.

"OFF"

½ HP MOTORS = Approx. 600 CFM

¾ HP MOTORS = Approx. 800 CFM

1 HP MOTORS = Approx. 1000 CFM

"ON"

½ HP MOTORS = Approx. 1200 CFM

¾ HP MOTORS = Approx. 1600 CFM

1 HP MOTORS = Approx. 2000 CFM

SW1-5 AND SW1-6 – COOLING AND HEAT-PUMP AIRFLOW ADJUSTMENT – These dipswitches are used to adjust the cooling and heat-pump airflow for non-communicating systems slightly based on the user's preference.

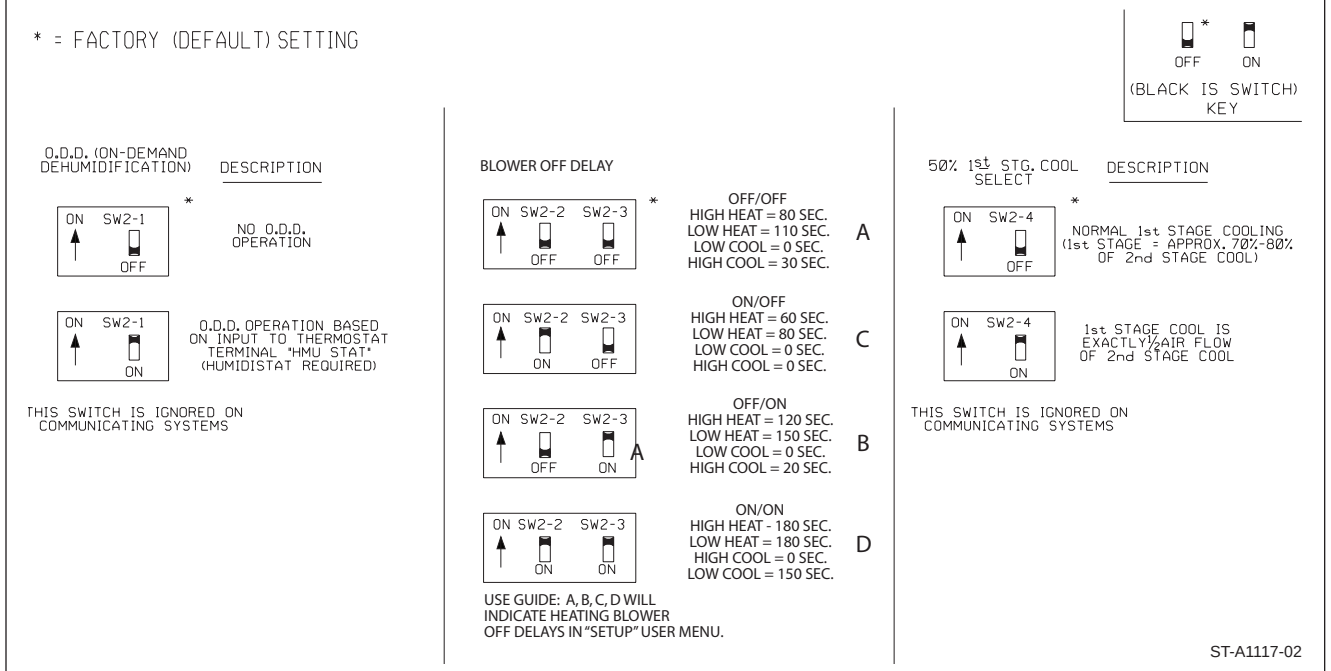
SW1-5 = "OFF", SW1-6 = "OFF" – No adjustment.

SW1-5 = "ON", SW1-6 = "OFF" – +10% adjustment.

SW1-5 = "OFF", SW1-6 = "ON" – -10% adjustment.

SW1-5 = "ON", SW1-6 = "ON" – No adjustment.

FIGURE 36
DIPSWITCH BANK SW2 TEST MODE SELECT



Switch (SW2-1)	Call	Voltage at "HUM"	Action
ON	COOL	24	Normal Cool (c or C)
ON	COOL	0	Dehum Cool (cd or Cd)
ON	Heat	24	Hum Contacts Closed.
ON	Heat	0	Hum Contacts Open.
OFF	COOL	24	Normal Cool (c or C)
OFF	COOL	0	Normal Cool (c or C)
OFF	Heat	24	Hum Contacts Closed.
OFF	Heat	0	Hum Contacts Open.

SW2

SW2-1 = ODD "ON" or "OFF" select. This switch will ignore the input from the 24 volt terminal labeled "HUM STAT" during cooling when in the "OFF" position. However, the "HUM STAT" input is always read in the heating mode to turn on and off the humidifier relay.

When in the "ON" position, the dehumidification feature will become active and it will be necessary to install a humidistat to the "HUM STAT" terminal as discussed and shown in wiring diagrams in the section of this manual titled "*HUMIDIFICATION AND DEHUMIDIFICATION*" of this document. Failure to install a humidistat to the "HUM STAT" terminal with dipswitch SW2-1 in the "ON" position will cause the cooling speed airflow to be reduced to the dehumidification speed..

SW2-2 and SW2-3 – BLOWER OFF DELAYS

Blower off delays in both heating and cooling are set with these two dipswitches. The selections are as follows (SW2-2/SW2-3):

OFF/OFF(default) =
high heat = 80,
low heat = 110 sec.,
Low Cool = 0 sec,
High Cool - 30 sec.

ON/OFF =
high heat = 60,
low heat = 80 sec.,
Low Cool = 0 sec.,
High Cool = 0 sec.

ON/ON =
highheat = 180,
low heat = 180 sec.,
Low Cool = 0 sec.,
High Cool = 50 sec.

FURNACE OPERATION USING NON-COMMUNICATING SINGLE-STAGE, AND TWO-STAGE THERMOSTATS (CONSULT THE SECTION OF THIS DOCUMENT TITLED NON-COMMUNICATING THERMOSTATS FOR WIRING DIAGRAMS)

The furnace is capable of operating with a single-stage or a two-stage thermostat as well as the modulating thermostat or fully communicating thermostat specified for use with the furnace. Fully communicating thermostat functions and operations are explained in detail in the sections of this manual titled ***COMMUNICATING SYSTEMS*** and ***THERMOSTATS*** (under the sub-section titled ***COMMUNICATING THERMOSTATS)***.

Based on the dipswitch settings of SW1-3, the furnace will operate with either single-stage or two-stage thermostats.

See the section of this document titled ***THERMOSTATS*** (under the sub-section titled ***NON-COMMUNICATING THERMOSTATS)*** for information on how to wire the thermostats for each of the configurations below.

In non-communicating systems, the heating cycle is always initiated by a 24 volt signal on W1. When the controller senses 24 volts on W1, the following sequence occurs:

TWO-STAGE FUNCTION SW1-3 = OFF:

After the blower on-delay period, the furnace will respond to the thermostat demand by adjusting the gas valve pressure and blower heating speeds to the "W" signal values. "W1" only = low gas valve pressure and blower heating speed. "W2" = high gas valve pressure and blower heating speed.

SINGLE-STAGE FUNCTION ("W" signal only) :

(Single-stage function only applies when switch SW1 is on and a single-stage thermostat is installed as shown in Figure 48.)

After the blower on-delay period, the furnace will respond to the thermostat demand by altering the gas valve pressure and blower speed as follows:

Phase 1: 0 to 7 minutes = Low of furnace capacity (gas valve output and blower speed)

Phase 2: After 7 minutes = 100% of furnace capacity (gas valve output and blower speed)

NOTE: If the call for heat ends during any phase, the furnace will terminate immediately at the firing rate of that phase.

SW2-4 - For most cooling operation, leave dip switch SW2-4 in the "OFF" position. This will enable the furnace operation with most two-stage, non-communicating cooling equipment. Actual SEER values will vary and depend on the equipment combination. Consult the specifications sheets and installation instructions of the cooling equipment purchased for a listing of the SEER ratings for a specific combination.

Placing SW2-4 in the "ON" position will establish the low (Y1) cooling airflow at ½ of the max cool (Y2) airflow. This setting will be useful with cooling systems where two compressors are used to control two cooling stages (one compressor for first stage and two compressors for second stage).

SW3-1 and SW3-2

HEATING AIRFLOW ADJUSTMENTS

The furnace is shipped from the factory with low and high fire heating airflows. These are set from the factory to let the furnace operate at the mid-point of the temperature rise range. The temperature may vary slightly due to furnace input and voltage variations.

The airflow can be slightly adjusted to the homeowner's taste. This is done with dipswitches SW3-1 and SW3-2 of the furnace control board. There is one adjustment below nominal (heat rise is less than nominal – air is warmer). Some models do not have all three adjustments. Figure 37 shows the approximate heat rise based on the adjustments of dipswitch SW3-1 and SW3-2.

⚠ WARNING

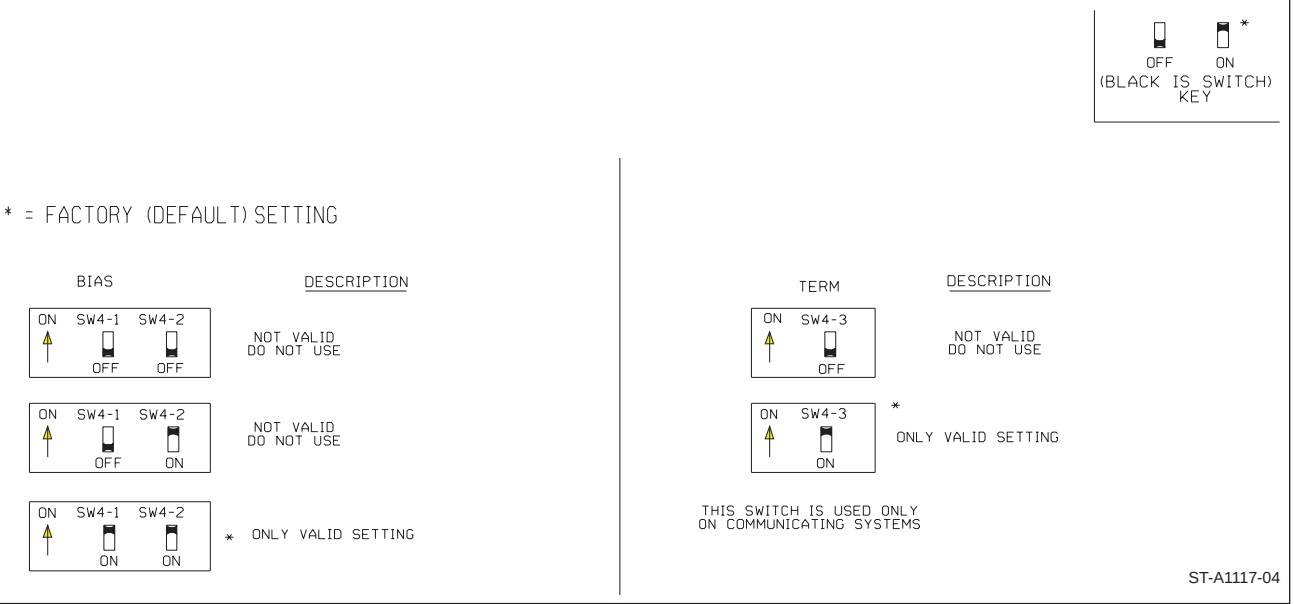
IT IS THE INSTALLER'S RESPONSIBILITY TO VERIFY THAT THE TEMPERATURE RISE DOES NOT EXCEED THE PUBLISHED RISE RANGE OF THE FURNACE. THE RISE RANGE MUST ALWAYS BE CHECKED AT BOTH LOW AND HIGH FIRE BEFORE LEAVING THE JOBSITE. IF THE TEMPERATURE IS OUTSIDE THE SPECIFIED RANGE, AN ADJUSTMENT TO THESE DIPSWITCHES MUST BE MADE TO CORRECT THE HEAT RISE.

FIGURE 37
HEAT RISE ADJUST – DIPSWITCHES SW3-1 AND SW3-2

	Model	Published Low Temp Rise Range	Low Fire: Low Adjustment B- SW3-1,2 = ON/OFF Approx. Temp Rise	Low Fire: Mid-Rise A- SW3-1,2 = OFF/OFF Approx. Temp Rise	Low Fire: 1st Hi Adjustment C- SW3-1,2 = OFF/ON Approx. Temp Rise	Low Fire: 2nd Hi Adjustment D- SW3-1,2 = ON/ON Approx. Temp Rise	Published High Temp Rise Range	High Fire: Low Adjustment B- SW3-1,2 = ON/OFF Approx. Temp Rise	High Fire: Mid-Rise A- SW3-1,2 = OFF/OFF Approx. Temp Rise	High Fire: 1st Hi Adjustment C- SW3-1,2 = OFF/ON Approx. Temp Rise	High Fire: 2nd Hi Adjustment D- SW3-1,2 = ON/ON Approx. Temp Rise
UPFLOW	(-)GPE-05(-)BMKR	20°-50°F	27°F	35°F	43°F	45°F	25°-55°F	32°F	40°F	48°F	55°F
UPFLOW	(-)GPE-07(-)AMKR	20°-50°F	27°F	35°F	43°F	50°F	30°-60°F	37°F	45°F	53°F	56°F
UPFLOW	(-)GPE-07(-)BRQR	20°-50°F	27°F	35°F	43°F	50°F	25°-55°F	32°F	40°F	48°F	55°F
UPFLOW	(-)GPE-10(-)BRMR	25°-55°F	32°F	40°F	48°F	55°F	30°-60°F	37°F	45°F	53°F	60°F
UPFLOW	(-)GPE-12(-)ARMR	30°-60°F	37°F	45°F	53°F	60°F	35°-65°F	42°F	50°F	58°F	65°F
DOWNFLW	(-)GLE-07(-)AMKR	20°-50°F	30°F	35°F	45°F	50°F	30°-60°F	37°F	45°F	53°F	60°F
DOWNFLW	(-)GLE-07(-)BRQR	20°-50°F	27°F	35°F	43°F	50°F	25°-55°F	32°F	40°F	48°F	55°F
DOWNFLW	(-)GLE-10(-)BRMR	25°-55°F	32°F	40°F	48°F	55°F	30°-60°F	37°F	45°F	53°F	60°F
DOWNFLW	(-)GLE-12(-)ARMR	30°-60°F	37°F	45°F	53°F	60°F	35°-65°F	42°F	50°F	58°F	58°F

SW4

FIGURE 38
DIPSWITCH BANK SW4 TERMINATION AND BIAS SELECTIONS



BIAS / TERMINATION

These dipswitches will not be used for first generation controls. They are designed to be used for future generations of ClimateTalk which may support multiple networks. **For current installations, all three of the dipswitches in bank SW4 must be in the "ON" position. If not, the system may not be able to communicate.**

DUAL SEVEN-SEGMENT DIAGNOSTIC DISPLAY

The dual seven-segment diagnostic display will either display the status of the system (e.g. "H" for Heat) or a diagnostic error code in the event of an active fault. Fault and status codes and their meanings can be determined from Table 16. For detailed information for each fault code refer to the TROUBLESHOOTING section of this manual. For communicating systems, the fault code and a description can be found in the thermostat "Active Fault" display area. (See the section of this document titled "ACTIVE FAULT DISPLAY" under COMMUNICATING SYSTEMS for more information).

The rightmost decimal on the display will blink one time for every 100 CFM of expected airflow whenever the blower is operating. If the value is actually less than 50 CFM above any increment of 100, the value will be rounded to the lesser 100 value and the lesser value will be displayed. For example, if the actual CFM is 1049, the decimal will blink ten times. If the actual CFM value is 1051, the decimal will blink eleven times. For better resolution, a service tool or communicating thermostat is required and the expected CFM can be determined within a resolution of 10 CFM. (See the section of this manual titled "USER MENUS" under "STATUS 1" or "STATUS 2" submenu "BLOWER CFM").

FAULT CODE BUFFER

Upon power reset, the last five fault codes from the furnace will be displayed on the seven-segment display. These will be displayed in chronological order from newest (displayed first) to oldest (displayed last).

For communicating systems, the fault code buffer can also be read at the communicating thermostat inside the furnace User Menus. The most recent six fault codes are stored. Also displayed is the number of days since each fault code was recorded.

NOTE: The following fault codes will not be stored back-to-back in the fault buffer. These will only be stored in the buffer if the previous fault stored was a different fault. 82, 11, 45, 46 & 57.

CLEARING DIAGNOSTIC FAULT CODES FROM THE BUFFER

To clear the fault codes in the fault buffer, the dipswitch at position SW3-2 can be used. Turn the switch off, on, off, on ***or*** on, off, on, off quickly within 30 seconds to reset the fault codes. When this is done, the right-most seven-segment display will energize the upper and lower horizontal segments for four seconds as confirmation that the fault codes have been cleared from the buffer. Be sure to return the switch to the original position after clearing the faults.

Faults can also be cleared at the furnace User menu under the *Fault Hist* selection. The seven-segment displays will again operate as described above.

Either procedure will clear the fault codes in the fault buffer displayed at the dual seven-segment displays on the I.F.C. And at the ***Fault History*** user menu on communicating thermostats.

TABLE 16
LIST OF FAULT CODES AND NORMAL OPERATION CODES

FAULT CODES / MESSAGES

MESSAGE TO TECHNICIAN at TSTAT (note: Fault Code Number and Fault Code Text are displayed in two separate regions of T-Stat display)			
FAULT CODE #	TEXT MESSAGE	MESSAGE TO HOMEOWNER	CODE NUMBER (displayed at furnace)
d1	NO SHARED DATA	"Call For Service" & "CHECK FURNACE"	d1
d4	MEM CARD INVALD	(None)	d4
d5	CARD-HRD CNFLCT	(None)	d5
d6	BLWR HP CNFLCT	"Call For Service" & "CHECK FURNACE"	d6
d7	BLWR MFG CNFLCT	"Call For Service" & "CHECK FURNACE"	d7
d8	OLD SHARED DATA	(None)	d8
d8	OLD SHARED DATA	"Call For Service" & "CHECK FURNACE"	d8
h	GAS HT ON-NO V	(None)	h (steady)
h	CALIBRATE -NO V	(None)	h (Flashing)
10	IGN 1 HR RTRY	"Call For Service" & "CHECK FURNACE"	10
11	FAILED IGNITION	(None)	11
12	LO FLAME SENSE	(None)	12
13	FLAME LOST	(None)	13
14	UNEXPCTED FLAME	"Call For Service" & "CHECK FURNACE"	14
22	MAIN LIMIT OPEN	"Call For Service" & "CHECK FURNACE"	22
23	HALC LIMIT OPEN	"Call For Service" & "CHECK FURNACE"	23
26	LINE_NTRL RVRSD	"Call For Service" & "CHECK FURNACE"	26
33	MRLC OPEN	"Call For Service" & "CHECK FURNACE"	33
44	LPC CLOSED	"Call For Service" & "CHECK FURNACE"	44
45	LPC OPEN	"Call For Service" & "CHECK FURNACE"	45
46	LPC OPEN	"Call For Service" & "CHECK FURNACE"	46
55	HPC CLOSED	"Call For Service" & "CHECK FURNACE"	55
57	HPC OPEN	"Call For Service" & "CHECK FURNACE"	57
60	BLWR FLT-RUN	(None)	60
61	BLWR FLT-NO RUN	"Call For Service" & "CHECK FURNACE"	61
66	BLOWER OVRSPEED	(None)	66
68	NO BLWR COMM	"Call For Service" & "CHECK FURNACE"	68
82	SA SENSOR FLT	(None)	82
93	CONTROL FLT	"Call For Service" & "CHECK FURNACE"	93

NORMAL OPERATION CODES / MESSAGES

CODE DISPLAYED AT FURNACE	DESCRIPTION (Neither a code or message is displayed at the thermostat. A code number only is displayed at the furnace control.)
0	Standby mode - no thermostat calls, no active faults.
c	Low-stage cooling
C	High-stage cooling
F	Continuous Fan Operation
HP	Heat-pump operation
H	High Heat
h	Low Heat

NOTE: To clear current fault codes in the furnace control buffer, turn dipswitch SW3-3 on, off, on, off, or off, on, off, on within 30 seconds. The right-most seven-segment display will energize the upper and lower horizontal members for four seconds as confirmation that the faults have been cleared. Be sure to return the dispswitch (SW3-3) to its original position after clearing the faults. The fault buffer can also be cleared at the user menu under "FAULT HIST" in the sub-menu titled "CLEAR FAULT HISTORY".

Either procedure will clear the fault codes in the buffer displayed at the dual seven-segment displays on the I.F.C. AND at the ***Fault History*** user menu on communicating thermostats.

NOTE: The following fault codes will not be stored back-to-back in the fault buffer. These will only be stored in the buffer if the previous fault stored was a different fault. 82, 11, 45, 46 & 57.

COMMUNICATING SYSTEMS

The modulating furnace is capable of communicating with a thermostat and condenser to improve cooling and heat-pump airflow, displaying active faults and active furnace information at the thermostat and improved diagnostics and troubleshooting.

WIRING A FURNACE FOR COMMUNICATIONS.

Maximum wire lengths and notes about wiring communicating systems are noted below.

MAXIMUM COMMUNICATING WIRE LENGTHS (1, 2, R & C)

Max Wire Length – Thermostat to Furnace = **100 FT** @ 18 AWG*

Max Wire Length – Furnace to Condenser = **125 FT** @ 18 AWG*

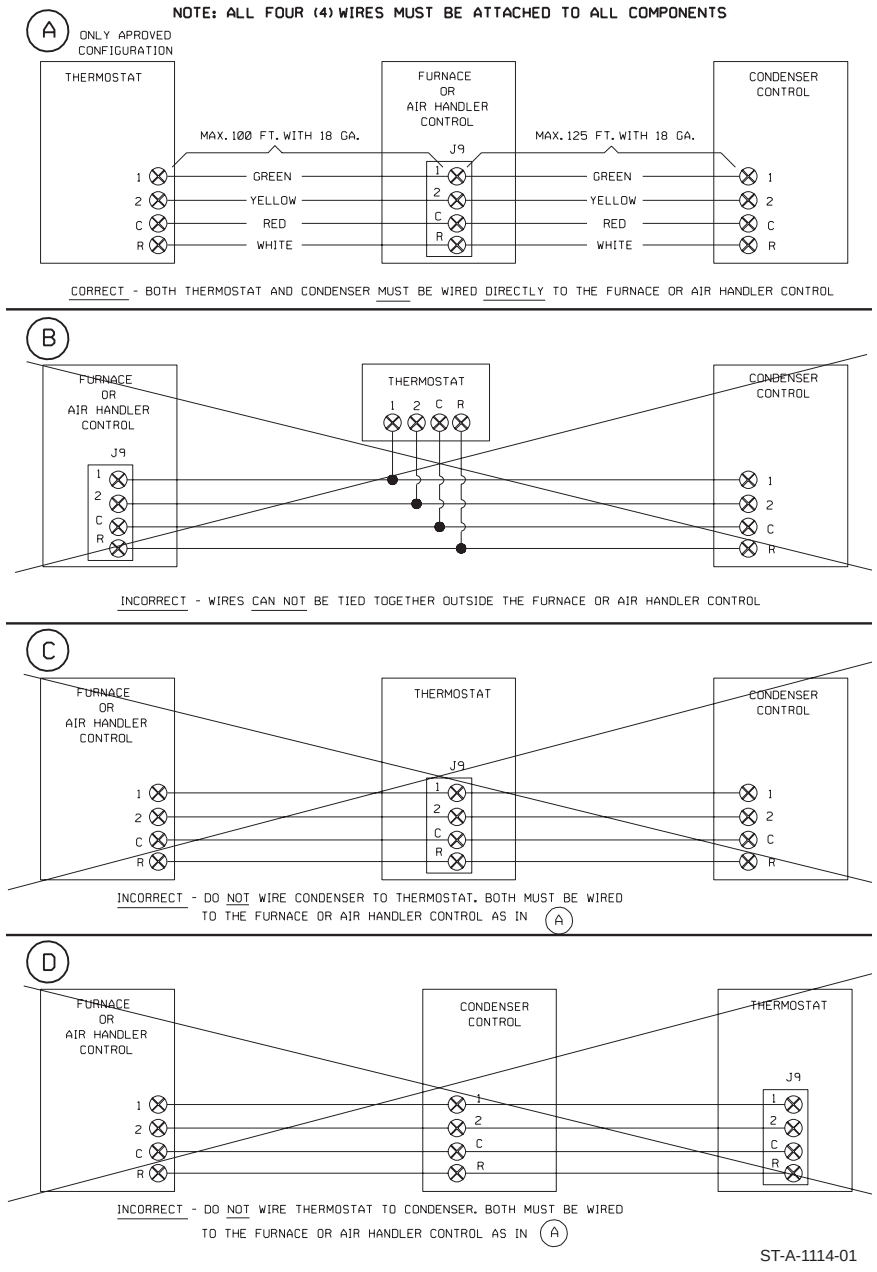
Notes:

1. When using twisted pairs, be sure the wires connected to pins labeled "1" (recommended wire color = green) and "2" (recommended wire color = yellow) are a twisted pair.
2. Wires may be solid or stranded..
3. *Wire gage smaller than 18 AWG is not approved or recommended for this application.
4. When using existing wire from a previous installation, be sure to trim the tip of the wire back past the insulation and strip a small amount of insulation from the wire to expose clean new copper for the communicating connections. Fresh copper must be exposed when making the communicating connections or communications may not be properly established.

Figure 39 is the wiring diagram for connecting the furnace to an approved ClimateTalk communicating thermostat and approved Rheem or Ruud communicating condenser.

The only approved configuration is to install dedicated wires directly from the furnace to the thermostat and a separate set of dedicated wires directly from the furnace to the condenser. Note: The only approved configuration requires that four dedicated wires (1, 2, R and C) be installed from the furnace to the condenser.

FIGURE 39
WIRING DIAGRAM – COMMUNICATING CONFIGURATION



STARTUP FOR SYSTEMS CONFIGURED WITH COMMUNICATIONS

⚠ WARNING

INSTALLATION OF LINE VOLTAGE AND GAS MUST BE PERFORMED ACCORDING TO INSTRUCTIONS WRITTEN IN THIS MANUAL. FAILURE TO DO SO COULD RESULT IN INJURY OR DEATH.

When the furnace is configured for communications, the components on the network (i.e. furnace, thermostat and condenser) must establish communications before engaging a heat (or other) thermostat demand. The procedure for establishing communications is automatic and is described below. Once communications is established, the start-up procedure will be the same as the general start-up instructions described in the section of this manual titled ***START-UP PROCEDURES***.

Once the communicating wiring is properly installed and the furnace is connected to line voltage, the system can be turned on. The thermostat will display the following text:

"SEARCHING"

is displayed several times for several seconds. Next, the text

"FURNACE FOUND"

and

"AIR CONDITIONER FOUND"

or

"HEAT PUMP FOUND"

(depending on which is installed in the system) will be displayed. The process can take several minutes (up to a maximum of 30) to complete. If these messages are not displayed within 30 minutes after energizing the system, communications can not be established. There are many reasons why communications may not be established – including improper settings of the "TERM" and "BIAS" switches (see BIAS / TERMINATION) and improper wiring (see ***WIRING A FURNACE FOR COMMUNICATIONS*** above).

The order in which these messages will be displayed will depend on which components are energized first. The order listed here assumes that the furnace and condenser are energized at the same time. If not, the order of display will be in the order that the components are turned on.

When the system has found all necessary components, the text area of the communicating thermostat will go blank. This is an indicator that the system is operating properly. Proceed by engaging a typical thermostat call to determine if operation is correct as described in the section of this book titled START UP PROCEDURES" to test heating, cooling and fan operation and to make necessary adjustments.

NOTE: When a communicating condenser is installed with the system, a capital "C" will be displayed at the furnace seven-segment display for both low & high cooling stages.

CONTINUOUS FAN OPERATION IN COMMUNICATING MODE

Continuous fan operation will always depend on the selection (Hi, Med, Low) made at the communicating thermostat for the continuous fan speed (see installation instructions for the thermostat). However, during the first few operations of continuous fan, the blower speed will be limited to a maximum of 600 CFM for ½ HP motors (75KBTU), 700 CFM for ¾ HP (75KBTU (wide) and 50 KBTU) and 1000 CFM for 1 HP motors (100KBTU). This will continue until the high cooling call information is provided from the condenser. Once the max cooling CFM value has been transmitted by the condenser (condenser must reach high stage – in heat pump or cooling), the continuous fan will then have a maximum CFM value equal to the max cooling airflow from the condenser. The Hi, Med and Low selections for continuous fan will be based on max CFM of the condenser with Hi continuous fan speed equal to the high speed CFM of the cooling/HP condenser.

NOTE: When default values are reset in the furnace "SETUP" user menu, the continuous fan CFM will be restored to factory default (Max = 600 CFM for ½ HP, 700 CFM for ¾ HP and 1200 CFM for 1 HP). These values will again be used to calculate continuous fan airflow until a cooling call has been established and a communicating condenser sends a fan demand to the furnace control.

ACTIVE FAULT CODES WITH COMMUNICATING SYSTEMS

Two levels of fault codes exist: (1) Non-critical and (2) Critical. In general a non-critical fault permits all (or nearly all) operations to proceed and a critical fault prevents all (or nearly all) operations from proceeding. Detailed explanations are given for each fault code and how to diagnose and troubleshoot problems by fault code displayed in the "TROUBLSHOOTING" section of this manual.

Active faults of either level will be displayed at the thermostat in the "ACTIVE FAULT" area of the thermostat. To enter the furnace "ACTIVE FAULT" area using a communicating thermostat, see the installation and operation instructions for that thermostat.

FURNACE USER MENUS

NOTICE: ALL TEMPERATURE VALUES DISPLAYED IN USER MENUS ARE DISPLAYED IN DEGREES FAHRENHEIT AT ALL TIMES. THIS IS TRUE EVEN IF THE THERMOSTAT IS SELECTED TO CELCIUS (C.). USER MENUS CAN NOT DISPLAY TEMPERATURES IN CELCIUS.

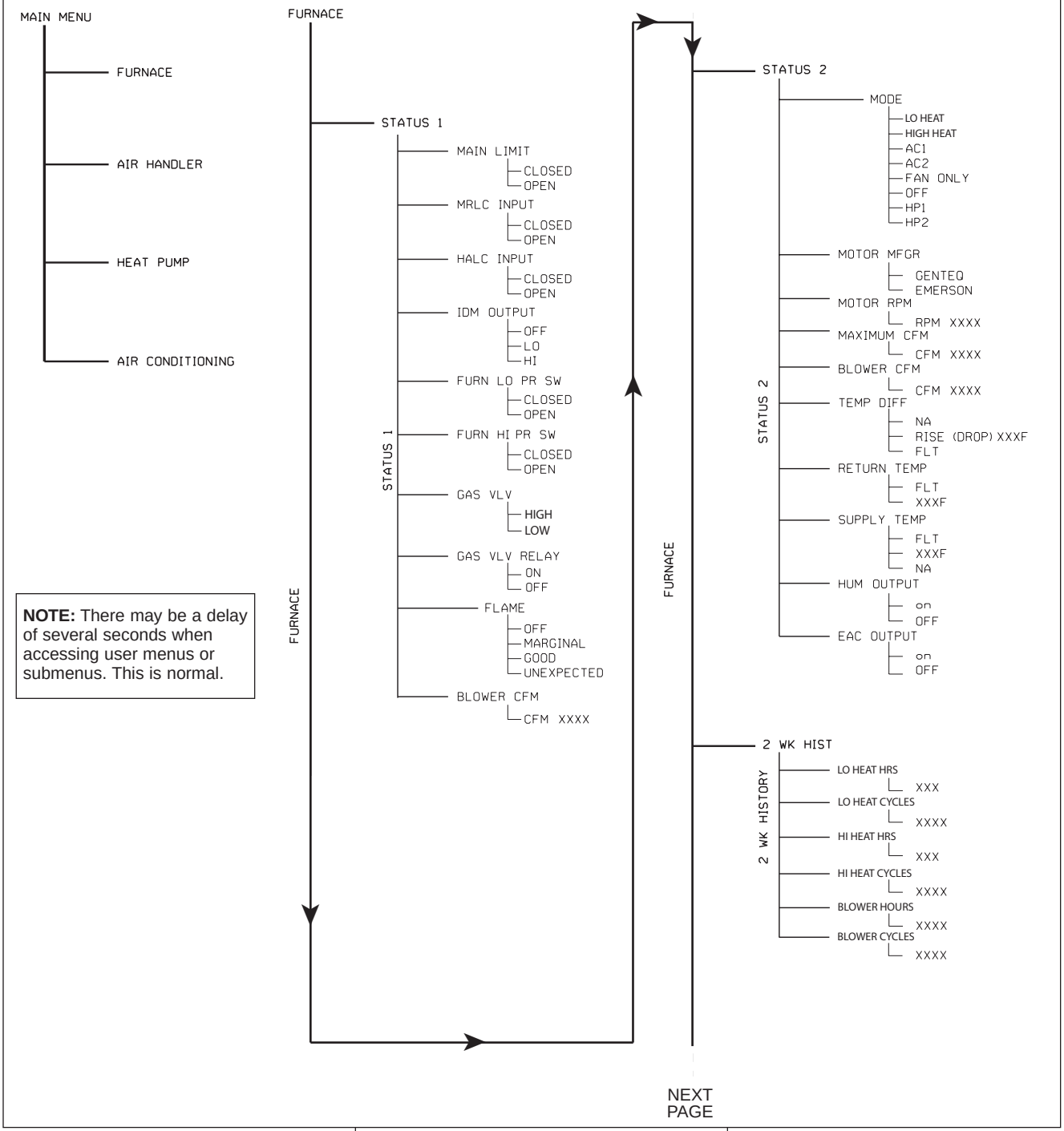
Systems configured for communications will have some advantages over traditional control (24VAC thermostats) systems. One advantage is that a variety of information that can be useful for configuring the furnace/system and diagnostic/troubleshooting information can be displayed at the thermostat.

The bulk of this information can be found inside the user menus. The procedure for entering (and exiting) the user menus will vary depending on the thermostat or service tool that is used. To enter, navigate or exit the furnace "USER MENU"s using a communicating thermostat, see the installation and operation instructions for that thermostat.

Navigating the user menus is straight-forward. The menu follows the logic tree shown in Figure 40 (a & b).

NOTE: There may be a delay of several seconds when accessing he user menus or sub-menus. This is normal.

FIGURE 40a
MENU TREE



NOTE: There may be a delay of several seconds when accessing user menus or submenus. This is normal.

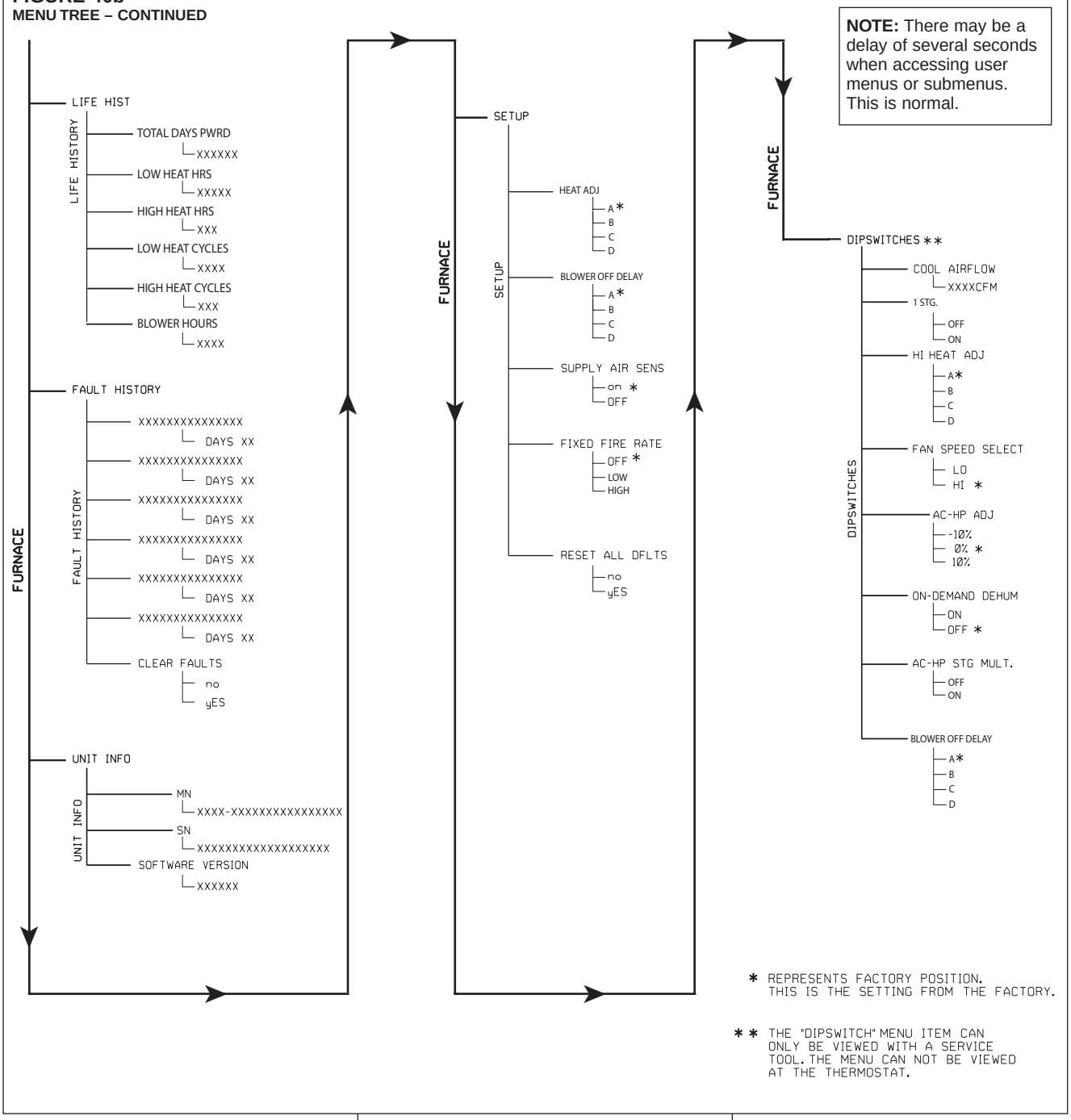
The thermostat menus give active information for various parameters and permit some installation options to be selected.

Note: Supply Air (SA) and Return Air (RA) temperature readings may not be accurate in standby mode. These should only be read and used when the blower is running in heat, cool or other modes.

"STATUS 1" menu – This menu gives information about the status of certain furnace components and features.

1. **MAIN LIMIT** – Indicates the state of the main limit – either opened or closed. The normal state is closed. An open limit can be an indicator of excessive static pressure in the ventilation duct.
2. **MRLC INPUT** – Indicates the state of the Manual Reset Limit Control (MRLC) – either opened or closed. The normal state is closed. These switches are sometimes referred to as "Roll-Out" controls or limits. When one or more of these limits has opened, a flame has rolled into the vestibule. This event should rarely (if ever) happen but can be an indicator that the exhaust flue is blocked.
3. **HALC INPUT** – Indicates the state of the Heat Assisted Limit Control (HALC) – either opened or closed. The normal state is closed. This limit switch is only present on downflow/horizontal models and can often be an indicator that the main blower has stopped turning unexpectedly when opened.

FIGURE 40b
MENU TREE – CONTINUED



4. **IDM OUTPUT** – Indicates the state of the Induced Draft Motor (IDM) – OFF, HI or LO. The indication is the state at which the furnace control expects the motor to be. If the indication is HI or LO and the motor is not turning, a number of problems could be the cause – including a non-functioning blower relay on the furnace control or a non functioning inducer.
5. **FURN LO PR SW** – Indicates the state of the Low Pressure Control (LPC) (also known as low pressure switch) – either OPEN or CLOSED.
6. **FURN HI PR SW** – Indicates the state of the High Pressure Control (HPC) (also known as high pressure switch) – either OPEN or CLOSED.
7. **GAS VLV** – Indicates the firing rate of the gas valve. This value can be low or high depending on the thermostat demand.
8. **GAS VLV RELAY** – Indicates the state of the gas valve relay –either ON or OFF. ON indicates that the main gas valve solenoid is engaged. Any time the indication is ON, flame should be present.
9. **FLAME** – Indicates the presence of a flame. The possibilities are “OFF”, “MARGINAL”, “GOOD” and “UNEXPECTED”. A marginal flame can be an indicator that the flame sense rod needs to be cleaned. “UNEXPECTED” flame is a serious condition and must be dealt with immediately by a professional, licensed HVAC technician.
10. **BLOWER CFM** – Indicates the CFM that the furnace control

requests from the blower motor. This value may vary somewhat from the actual values, but it should be very close. The value can also be tracked through the blinking decimal point on the seven segment displays at the furnace control (although with not as much resolution).

"STATUS 2" menu – This menu also gives information about the status of certain furnace components and features.

1. **MODE** – Indicates the current state of operation of the furnace. The possibilities are listed below:
   a. **MOD HEAT –** Heat operation
   b. **AC –** Air conditioning operation.
   c. **FAN ONLY –** Continuous fan operation.
   d. **HP –** Heat-pump operation.
2. **MOTOR MFGR** – Indicates the manufacturer of the main air-circulating blower motor. At the time of this publication there are two possibilities; GenteQ (formerly GE) for Regal Beloit (formerly GE) and EMERSON.
3. **MOTOR RPM** – Indicates the RPM of the main circulating air blower.
4. **MAXIMUM CFM** – Indicates the maximum CFM that the main circulating air blower can deliver.
5. **BLOWER CFM** – Indicates the output of airflow in CFM of the main circulating air blower.
6. **TEMP DIFF*** – Indicates the difference between the outlet duct and inlet duct air temperatures. This menu item may not be accurate when the Air Circulating Blower (ACB) is not turning.

   When the outlet air (supply) temperature is greater than the inlet air (return) temperature, the thermostat will display the text "RISE" with the temperature value. Conversely, when the outlet air (supply) temperature is less than the inlet air (return) temperature, the thermostat will display the text "DROP" with the temperature value.

   This temperature is displayed in degrees F and can not be changed to Celsius units. A few other different conditions that apply to this menu item are:

   a. If the Supply Air Sensor (S.A.S.) is not turned on (see "SUPPLY AIR SENS" in "SETUP" menu below) and a sensor is not attached (or not sensed), NA will be displayed in the "TEMP DIFF" selection.
   b. If the S.A.S. is not turned on (see "SUPPLY AIR SENS" in "SETUP" menu below) and a sensor is attached, a valid temperature will be displayed in the "TEMP DIFF" selection.
   c. If the S.A.S. is turned on (see "SUPPLY AIR SENS" in "SETUP" menu below) and a sensor is attached, a valid temperature will be displayed in the "TEMP DIFF" selection.
   d. If the S.A.S. is turned on (see "SUPPLY AIR SENS" in "SETUP" menu below) and a sensor is not attached (or not sensed), the text "FLT" (for FauLT) is displayed in the "TEMP DIFF" selection

   *ALL TEMPERATURES WITHIN THE USER MENUS CAN BE DISPLAYED ONLY IN FAHRENHEIT VALUES

   Note: Supply Air (SA) and Return Air (RA) temperature readings may not be accurate in standby mode. These should only be read and used when the blower is running in heat, cool or other modes.
7. **RETURN TEMP*** – Indicates the temperature of the return air in the return air duct. This menu item may not be accurate when the Air Circulating Blower (ACB) is not turning. This value is sensed at the furnace control (IFC) and not at an external sensor attached to the control. If the temperature can not be sensed for some reason, the text "FLT" will be displayed. This temperature is displayed in degrees F and can not be changed to Celsius units

   *ALL TEMPERATURES CAN BE DISPLAYED ONLY IN FAHRENHEIT VALUES

   Note: Supply Air (SA) and Return Air (RA) temperature readings may not be accurate in standby mode. These should only be read and used when the blower is running in heat, cool or other modes.
8. **SUPPLY TEMP*** – Indicates the temperature of the supply air in the supply air duct. This menu item may not be accurate when the Air Circulating Blower (ACB) is not turning. This value is sensed at an external sensor attached to the control. This temperature is displayed in degrees F and can not be changed to Celsius units. A few different conditions that apply to this menu item are:

   a. If the Supply Air Sensor (S.A.S.) is not turned on (see "SUPPLY AIR SENS" in "SETUP" menu below) and a sensor is not attached (or not sensed), NA will be displayed in the "SUPPLY TEMP" selection.
   b. If the S.A.S. is not turned on (see "SUPPLY AIR SENS" in "SETUP" menu below) and a sensor is attached, a valid temperature will be displayed in the "SUPPLY TEMP" selection.
   c. If the S.A.S. is turned on (see "SUPPLY AIR SENS" in "SETUP" menu below) and a sensor is attached, a valid temperature will be displayed in the "SUPPLY TEMP" selection.
   d. If the S.A.S. is turned on (see "SUPPLY AIR SENS" in "SETUP" menu below) and a sensor is not attached (or not sensed), the text "FLT" (for FauLT) is displayed in the "SUPPLY TEMP" selection.

   *ALL TEMPERATURES CAN BE DISPLAYED ONLY IN FAHRENHEIT VALUES

   Note: Supply Air (SA) and Return Air (RA) temperature readings may not be accurate in standby mode. These should only be read and used when the blower is running in heat, cool or other modes.
9. **HUM OUTPUT** – Indicates when the humidifier output is turned on.

"2 WK HIST" menu – This menu gives information about the number of cycles and the amount of time spent in various modes of operation over the last 14 days.

NOTE: For both 2 WK & LIFE HIST, the value saved prior to power loss may not include information from the last hour of operation. This is because the information is only stored once every hour.

1. **LO HT HRS** – Indicates the number of hours of operation of low gas heat in the last 14 days.
2. **LO HT CYCLS** – Indicates the number of cycles of operation of low gas heat in the last 14 days.
3. **HI HT HRS** – Indicates the number of hours of operation of high gas heat in the last 14 days.
4. **HI HT CYCLS** – Indicates the number of cycles of operation of high gas heat in the last 14 days.
5. **BLOWER HRS** – Indicates the number of hours of continuous fan operation in the last 14 days.
6. **BLOWER CYCLS** – Indicates the number of cycles of operation (i.e.: the number of times it turned on and off) of the continuous fan operation in the last 14 days.

"**LIFE HIST**" menu – This menu gives information about the number of cycles and the amount of time spent in various modes of operation over the life of the furnace.

NOTE: For both 2 WK & LIFE HIST., the value saved prior to power loss may not include information from the last hour of operation. This is because the information is only stored once every hour.

1. TOTAL DAYS PWRD – Indicates the total number of days that the furnace has been powered. This number is not affected by any thermostat operation.
2. LO HT HRS – Indicates the number of hours of operation of low gas heat over the life of the furnace.
3. LO HT CYCLS – Indicates the number of cycles of operation of low gas heat over the life of the furnace.
4. HI HT HRS – Indicates the number of hours of operation of high gas heat over the life of the furnace.
5. HI HT CYCLS – Indicates the number of cycles of operation of high gas heat over the life of the furnace.
6. BLOWER HRS – Indicates the number of hours of continuous fan operation over the life of the furnace.
7. BLOWER CYCLS – Indicates the number of cycles of operation (i.e.: the number of times it turned on and off) of the continuous fan operation over the life of the furnace.

"**FAULT HISTORY**" menu – This menu gives information about the six most recent faults experienced by the furnace. The most recent fault is displayed upon entering the menu. Three seconds later the text "DAYS" is displayed followed by a number. The number indicates the number of days since that fault was experienced.

The faults can be viewed in order of occurrence. Pressing the down arrow key once will permit viewing of the next most recent fault. Pressing the key again will display the second most recent fault and so on.

If no fault present in the memory, the text "NO FAULT" and "DAYS 0" will be displayed. It is possible that there will be less than six faults stored (if less than six faults have occurred since installation or clearing of faults). In this case, the existing faults will be displayed in the order of occurrence and the remaining faults will be displayed as "NO FAULT" and "DAYS 0".

The final item in this menu is "CLEAR FAULTS". The options are "yES" and "no". This item permits the faults to be cleared so all six positions will display "NO FAULT" and "DAYS 0".

When faults are cleared, the right seven segment display on the furnace control will flash the upper and lower horizontal bars once.

Note that the "FAULT HISTORY" only accumulates days when power is applied to the furnace control board. For example, if a fault actually occurred ten days ago and the furnace was not powered for two of the ten days, the fault will be displayed with the text "DAYS 8" instead of "DAYS 10" is displayed to indicate the number of days since the fault occurred.

"**UNIT INFO**" menu – This menu gives information about the furnace.

1. MODEL NUMBER (MN)
2. SERIAL NUMBER (SN)
3. SOFTWARE VERS.

"**SETUP**" menu – This menu permits the field adjustment of certain parameters of the furnace. The selected values will be saved in memory even when power is lost and restored. The procedure for making changes in the furnace setup menu will vary depending on the thermostat or service tool that is used. To enter, navigate, make changes to or exit the furnace "SETUP" menu using a communicating thermostat, see the installation and operation instructions for that thermostat.

1. HEAT ADJ - This selection permits the adjustment of the heat airflow. Operation of this selection is exactly as with the dipswitches at SW3 at the furnace control. The heat rise can be changed by increasing or decreasing the airflow slightly. Adjustments are A, B, C & D as shown in Figures 37 & 40.

   The default factory setting for the low heat adjustment is "A".
2. BLOWER OFF DELAY - This selection permits the adjustment of the heating blower off delay in communicating mode. The selections are A, B, C and D. The actual timings for the blower off delay are described in Figure 36 as selections A-D of dipswitches SW2-2 and SW2-3.

   The default factory setting for the blower off delay is "A".
3. SUPPLY AIR SENS – This selection permits the disabling and enabling of the supply air sensor input. In many cases, it may not be possible to install this sensor. When this is the case, the selection can be changed to "OFF". Selecting "on" or "OFF" will affect how the "TEMP RISE" (TEMPerature RISE) and "SUPPLY TEMP" values are displayed in the "STATUS 2" menu. See the descriptions for these items in the "STATUS 2" menu descriptions above for more information.

   Note that turning this selection to "OFF" will prevent the "82" fault code (SA SENSOR FLT) from being displayed on power-up (or at any other time) and from logging in the fault buffer.

   The default factory setting for the supply air sensor input is "on".

   NOTE: FOR DUAL-FUEL OPERATION, THE SUPPLY AIR SENSOR MUST BE INSTALLED AND THE SELECTION FOR THIS SENSOR SET TO "ON" IN THE "SETUP" USER MENU UNDER THE SELECTION "SUPPLY AIR SENS" FOR DUAL-FUEL OPERATION. FAILURE TO INSTALL THE SENSOR AND TO TURN IT ON IN THE USER MENUS COULD CAUSE EXCESSIVE TRIPPING OF THE PRESSURE LIMIT CONTROLS ON THE AC SYSTEM.
4. FIXED FIRE RATE – This feature will temporarily fix the gas heating fire rate to the selection desired. The selected rate will be applied to the present heat call only. If there is no heat call already present when the selection is attempted, the system will not permit the firing rate to be fixed at the user menu. The firing rate and blower will be fixed at the selected rate for the duration of the existinig heat call or a maximum of two hours (whichever comes first). This feature should only be used for installation, diagnostic, adjustment and troubleshooting purposes by an experienced licensed technician. Selectable firing rates are low and high.
5. RESET ALL DFLTS – This selection restores all items in the "SETUP" menu to the factory default selections. If "yES" is selected, all settings in this menu will be lost.

   NOTE: When faults are cleared in the furnace "SETUP" user menu, the continuous fan CFM will also be restored to the factory default setting. (See Continuous Fan Operation in Communicating Mode.)

BELOW USER MENU IS USED FOR NON-COMMUNICATING SYSTEMS ONLY

"DIPSWITCH" menu – This menu permits viewing of the dipswitch selections. It is a way to read the

dipswitch selections without the need of translating the settings manually.

Note: The “DIPSWITCH” menus will not be displayed at the thermostat. They are invisible to the thermostat and can not be displayed. These menus can only be viewed with the field service tool. The reason is that dipswitch selections do not generally affect operation of the furnace when using the communicating mode of operation.

NOTE: The integrated furnace control does not recognize switch setting changes while energized. To change settings, remove power to the board by turning off the disconnect or switch to the furnace control or removing power at the breaker, make changes, then return power.

1. COOL AIRFLOW – Displays the value of the cooling airflow selected. See the section of this manual titled “DIPSWITCH” under “SW1” (SW1-1 and SW1-2) for details and selections.
2. TIMED STAGING FEATURE – OFF – 2 Stage Operation ON – Timed Staging W/1 Stage Thermostat
3. HEAT ADJ – Displays the value selected at SW3, positions 1 and 2. It is the adjustment of the high heat rate airflow. See the section of this manual titled “DIPSWITCH” under “SW3” for details and selections.
4. FAN SPD SELECT – Displays the fan speed selected. See the section of this manual titled “DIPSWITCH” under “SW1” (SW1-4) for details and selections.
5. AC-HP ADJ – Adjusts the cooling or heat-pump airflow slightly to change or adjust the temperature rise slightly. See the section of this manual titled “DIPSWITCH” under “SW1” (SW1-5 and SW1-6) for details and selections.
6. ON DEMAND DEHUM – Toggles the dehumidification feature on or off. See the section of this manual titled “DIPSWITCH” under “SW2” (SW2-1) for details and selections.
7. AC HP STG MULT – This allows for adjustment to the airflow for low-stage of cooling and heat-pump operation. See the section of this manual titled “DIPSWITCH” under “SW2” (SW2-4) for details and selections.

DUAL-FUEL OPERATION IN COMMUNICATING MODE

Systems configured for dual-fuel operation will include a communicating condenser with a reversing valve. Dual-fuel systems will display “*HP*” for Heat-Pump heat operation at the furnace control’s (I.F.C.) dual seven-segment displays. During defrost mode, “*dF*” will be displayed. All other codes apply.

The balance point can be adjusted at the thermostat for optimal operation. The balance point is the point below which gas heat will be used and above which heat-pump heat will be used.

For dual-fuel systems, to protect equipment, the supply air sensor must be installed. When the supply air sensor is properly installed and the system is in *defrost* mode, the gas heat will only operate when the outlet air is below 110°F. When the outlet air exceeds 110°F, the gas valve is turned off and the Air Circulating Blower (ACB) continues to run. When the supply air temperature reaches 95°F, the gas heat will again be turned on. This cycle will continue until the call for defrost has ended.

NOTE: FOR DUAL-FUEL OPERATION, THE SUPPLY AIR SENSOR MUST BE INSTALLED AND THE SELECTION FOR THIS SENSOR SET TO “ON” IN THE “SETUP” USER MENU UNDER THE SELECTION “SUPPLY AIR SENS” FOR DUAL-FUEL OPERATION. FAILURE TO INSTALL THE SENSOR AND TO TURN IT ON IN THE USER MENUS COULD CAUSE EXCESSIVE TRIPPING OF THE PRESSURE LIMIT CONTROLS ON THE AC SYSTEM.

START-UP PROCEDURES

IGNITOR PLACEMENT, ALIGNMENT & LOCATION

Ignition failure may be a result of improper ignitor alignment caused during a service call or other work done to the furnace in the field. When performing any work on the burner, heat exchanger, etc., the technician must check alignment of the spark ignitor. Misalignment of the ignitor could cause a failure to light or rough ignition. The correct ignitor alignment is shown in Figure 41.

TO START THE FURNACE

DIRECT SPARK IGNITION LIGHTING INSTRUCTIONS

This appliance is equipped with a direct-spark ignition device. This device lights the main burners each time the room thermostat calls for heat. See the lighting instructions on the furnace.

During initial start-up, it is not unusual for odor or smoke to come out of any room registers. To ensure proper ventilation, it is recommended to open windows and doors, before initial firing.

The furnace has a negative pressure switch that is a safety during a call for heat. The induced draft blower must pull a negative pressure on the heat exchanger to close the negative pressure switch. The induced draft blower must maintain at least the negative pressure switch set point for the furnace to operate. If the induced draft blower fails to close or maintain the closing of the negative pressure switch, a “no heat call” would result.

1. Remove the burner compartment control access door.
2. **IMPORTANT:** Be sure that the manual gas control has been in the “OFF” position for at least five minutes. Do not attempt to manually light the main burners.
3. Set the room thermostat to its lowest setting and turn off the furnace electrical power.
4. Turn the gas control knob to the “ON” position.
5. Replace the burner compartment control access door.

⚠ WARNING

FAILURE TO REPLACE THE BURNER DOOR CAN CAUSE PRODUCTS OF COMBUSTION TO BE RELEASED INTO THE CONDITIONED AREA RESULTING IN PERSONAL INJURY OR DEATH.

6. Turn on the manual gas stop.
7. Turn on the furnace electrical power.
8. Turn thermostat to “Heat” mode and set the room thermostat at least 10°F above room temperature to light the main burners.
9. After the burners are lit, set the room thermostat to a desired temperature.

FIGURE 41
OPTIMUM IGNITOR LOCATION



TO SHUT DOWN THE FURNACE

1. Set the room thermostat to its lowest setting and turn to “OFF” position.
2. Turn off the manual gas stop and turn off the electrical power to the furnace.
3. Remove the burner compartment control access door.
4. Shut off the gas to the main burners by turning the gas control knob to the “OFF” position.
5. Replace the burner compartment control access door.

⚠ WARNING

SHOULD OVERHEATING OCCUR OR THE GAS SUPPLY FAIL TO SHUT OFF, CLOSE THE MANUAL GAS VALVE FOR THE APPLIANCE BEFORE SHUTTING OFF THE ELECTRICAL SUPPLY. FAILURE TO DO SO CAN CAUSE AN EXPLOSION OR FIRE RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

SEQUENCE OF OPERATION

Heating Cycle Initiation

The heating cycle is always initiated by a 24 volt signal on W of the thermostat or, for communicating systems, a message is transmitted from the thermostat to the IFC. When the controller senses 24 volts on W or the communicated message for heat call, the following sequence occurs:

- High and low pressure switches are checked to insure contacts are open.
- Inducer is powered on high speed for a thirty (30) second prepurge.
- Pressure switches are monitored as the inducer creates the vacuum to close the contacts.

TABLE 17
NORMAL OPERATION CODES

NORMAL OPERATION CODES

Key

CODE	DISPLAYED TEXT CODE AT DUAL 7-SEGMENT DISPLAY OF IFC DESCRIPTION

NORMAL OPERATION CODES

0	**STANDBY MODE** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC**: *0* **DESCRIPTION:** This code is displayed anytime there is no fault code to display and no thermostat call present. The furnace is idle.
H or h (steady)	**GAS HEAT MODE** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC**: *H or h* (steady on - not blinking) **DESCRIPTION**: This code is displayed any time there is a call for gas heat. The lower-case "h" is displayed when the furnace is in low heat. Upper case H indicates high heat.
C	**COOLING MODE** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC**: *C* **DESCRIPTION:** This code indicates the furnade is in cooling mode (any stage).
HP	**HEAT PUMP HEAT MODE** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC**: *HP* or hP **DESCRIPTION:** This code indicates the furnade is in heat-pump heating mode (dual-fuel systems only) (any stage).
F	**FAN MODE** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC**: *F* **DESCRIPTION:** The furnace is in continous fan mode.
dF	**DEFROST MODE** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC**: *dF* **DESCRIPTION**: This code indicates that the heat-pump is in deFrost mode (dual-fuel systems only) and furnace is operating as supplemental heat at a fixed 65% of maximum gas heating capacity.
Cd	**DEHUMIDIFICATION MODE** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC**: *Cd* **DESCRIPTION**: This code indicates that cooling is active with dehumidification active at the same time. When dehumidification is active, the cooling airflow will be reduced in order to allow water to accumulate on the condenser thereby removing humidity from the conditioned environment.

- The controller sends a spark signal to spark across the electrodes.
- The main solenoid on the gas valve are energized (low fire) allowing gas to flow to the burners.
- When flame is proven, the ignition control is de-energized - 8 second maximum trial time.
- The gas valve maintains low rate through the warm-up period - 20 seconds (aka Blower Off Delay).

Heating Cycle Response

➤ **TWO-STAGE FUNCTION – NON-COMMUNICATING SYSTEMS ONLY:** (Two-stage function only applies when SW1-3 is in the "OFF" position and a two-stage thermostat is installed as shown in Figure 49.)

After the warm-up period, the furnace will respond to the thermostat demand by adjusting the gas valve and blower heating speeds to the "W" signal values. "W" only = low gas valve pressure and blower heating speed. "W2" = high gas valve pressure and blower heating speed if the call for heat ends, the furnace terminates at the present rate.

➤ **SINGLE-STAGE FUNCTION – NON-COMMUNICATING SYSTEMS ONLY:** (SW2-2 and SW2-3 must both be turned "off" for this operation.)

("W" signal only)
After the warm-up period, the furnace will respond to the thermostat demand by altering the gas valve pressure and blower speed as follows:

Phase 1: 0 to 7 minutes = Low fire furnace capacity (gas valve output and blower speed)

Phase 2: After 7 minutes = 100% of furnace capacity (gas valve output and blower speed)

NOTE: If the call for heat ends during any phase, the furnace will terminate immediately at the firing rate of that phase.

Heating Cycle Termination

("W" signal only, refer to dip switch set SW2 on IFC)

When the 24 volt signal is removed from W1 or, for communicatiing systems, a message is transmitted from the thermostat to the furnace to "end the heat call", the heating cycle will end and the furnace will shut down and return to the proper off cycle operation.

ADJUSTING OR CHECKING FURNACE INPUT

NATURAL GAS:
The maximum gas supply pressure to the furnace should be 10.5" W.C. for natural gas. The minimum gas supply pressure for purposes of input adjustment to the furnace should be 5" W.C.

A properly calibrated manometer or gauge is required for accurate gas pressure readings.

1. When adjusting the furnace input, the high fire input should be checked. The high fire manifold pressure should be 3.5' W.C. Follow these steps to be sure the furnace is high fire mode:
   a. With a single stage thermostat, the furnace runs for 12 minutes on low fire before shifting to high fire. To be certain that it is on high fire, jump terminals "W" and "W2" on the control board in the blower compartment.
   b. With a two stage thermostat, set the thermostat to its highest setting to keep the furnace operating in the high fire mode.
2. To adust high fire manifold pressure, remove the adjustment cover screw on the outlet end of the gas valve and turn the adjustment screw clockwise to increase the pressure and counterclockwise to reduce the pressure. Replace the cover screw securely.
3. The low fire manifold pressure should be 1.7" W.C. As mentioned above, the furnace remains in the low fire mode for 12 minutes upon a heat call with a single stage thermostat. With a two stage thermostat, disconnect the thermostat lead to the "W2" terminal on the control board and the furnace will remain in the low fire mode. To adjust the pressure, remove the regulator cover, on top of the valve, and adjust as noted under Step 2, above. After the adjustment replace the screw cover securely.

NOTE: Use a 3/32″ allen wrench for making the pressure adjustment.

LP GAS:
Furnaces for use on LP gas, the LP gas supply pressure must be set between 11.0" and 13.0" W.C. by means of the tank or branch supply regulators. The furnace manifold pressure should be set at 10" W.C. at the gas control valve. For elevations up to 7,000 feet, rating plate input ratings apply. For high altitudes (elevations 7,000 and over) and for any necessary major changes in the gas flow rate the orifice spud must be changed.

TO CHANGE ORIFICE SPUDS:

1. Shut off the manual main gas valve and remove the gas manifold.
2. Replace the orifice spuds.
3. Reassemble in reverse order.
4. Turn the gas supply back on and check for leaks.
5. Check for proper operation and set to proper manifold pressure.

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.

TO CHECK FURNACE INPUT:

1. Make certain that all other gas appliances are shut off, with the exception of pilot burners.
2. Start the furnace
3. Time the meter to measure the time required to burn one cubic foot of gas.
4. Use Table 4 to determine input rate.

TABLE 18

METER TIME IN MINUTES AND SECONDS FOR NORMAL INPUT RATING OF FURNACES EQUIPPED FOR NATURAL OR LP 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.
50,000	ONE	1	5	1	12	1	15	1	18	3	20
	TEN	10	50	12	00	12	30	13	12	30	00
75,000	ONE	0	44	0	48	0	50	0	53	2	0
	TEN	7	12	8	0	8	19	8	48	20	0
100,000	ONE	0	33	0	36	0	38	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	31	0	24	0	25	0	26	1	0
	TEN	3	36	4	0	4	10	4	20	10	0

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

MAINTENANCE

⚠ WARNING

DISCONNECT MAIN ELECTRICAL POWER TO THE UNIT BEFORE ATTEMPTING ANY MAINTENANCE. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN SEVERE PERSONAL INJURY OR DEATH.

FILTERS

Filter application and placement are critical to airflow, which may affect the heating and cooling system performance. Reduced airflow can shorten the life of the systems major components, such as motor, limits, elements, heat exchanger, evaporator coil or compressor. Consequently, we recommend that the return air duct system have only one filter location. The most common location will be inside the furnace or a filter base. For systems with a return air filter grill or multiple filter grills, can have a filter installed at each of the return air openings. DO NOT DOUBLE FILTER THE RETURN AIR DUCT SYSTEM. DO NOT FILTER THE SUPPLY AIR DUCT SYSTEM.

If high efficiency filters or electronic air cleaners are used in the system, it is important that the airflow is not reduced to maximize system performance and life. Always verify that the systems airflow is not impaired by the filtering system that has been installed, by performing a temperature rise and temperature drop test.

Keep the air filters clean at all times. Vacuum dirt from filter, wash with detergent and water, air dry thoroughly and reinstall.

See Table 19 and Figures 42 through 44 for proper filter sizes and locations.

1. 21”-100,000 BTUH unit requires removal of 3½” segment of filter and frame to get proper width for a side filter.
2. 24½”-125,000 BTUH units require removal of 7” segment of filter and frame to get proper width for a side filter.

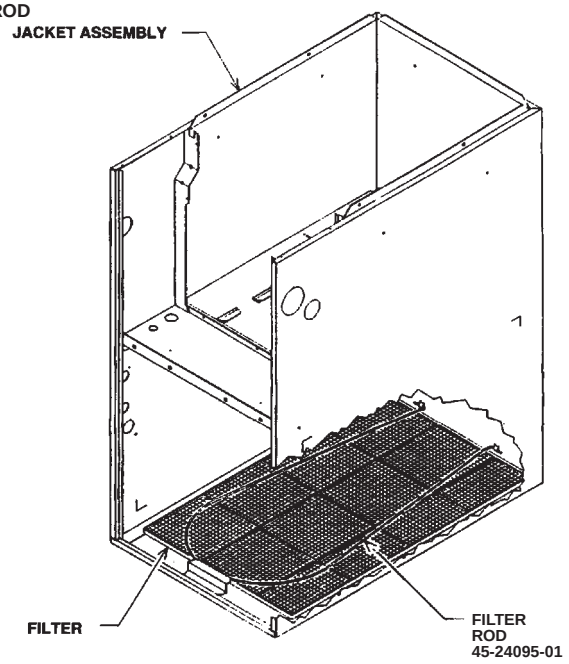
TABLE 19 FILTER SIZES

UPFLOW FILTER SIZES AS SHIPPED				
FURNACE WIDTH	INPUT BTUH	BOTTOM SIZE	SIDE SIZE	QUANTITY
17½"	50, 75	15¾" X 25"	15¾" X 25"	1
21"	75, 100	19¼" X 25"	15¾" X 25"	1
24½"	125	22¾" X 25"	15¾" X 25"	1

***NOTE:** Some filters must be ordered or resized to fit certain units and applications.

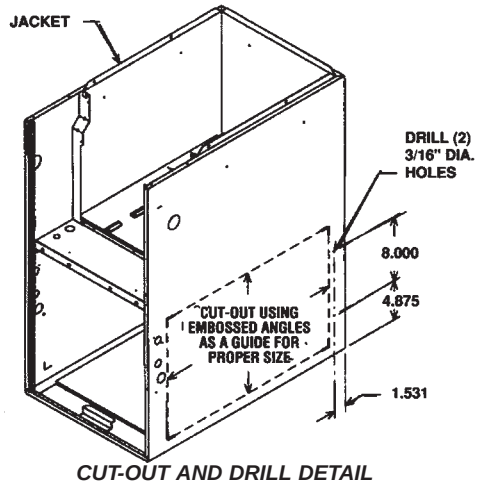
IMPORTANT: *Do not operate the system without filters. A portion of the dust entrained in the air may temporarily lodge in the air duct runs and at the supply registers. Any circulated dust particles will be heated and charred by contact with the furnace heat exchanger. This sooty residue will soil ceilings, walls, drapes, carpets, and other household articles. Soot damage may also result when certain types of candles are burned, or candlewicks are left untrimmed.*

FIGURE 42
FILTER RETAINING ROD

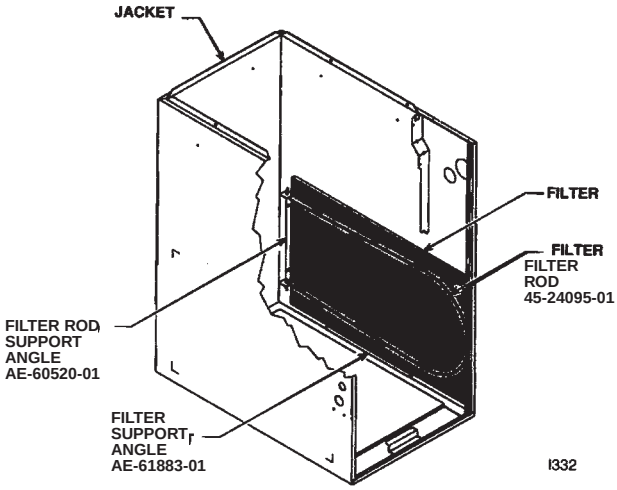


FILTER & ROD LOCATION

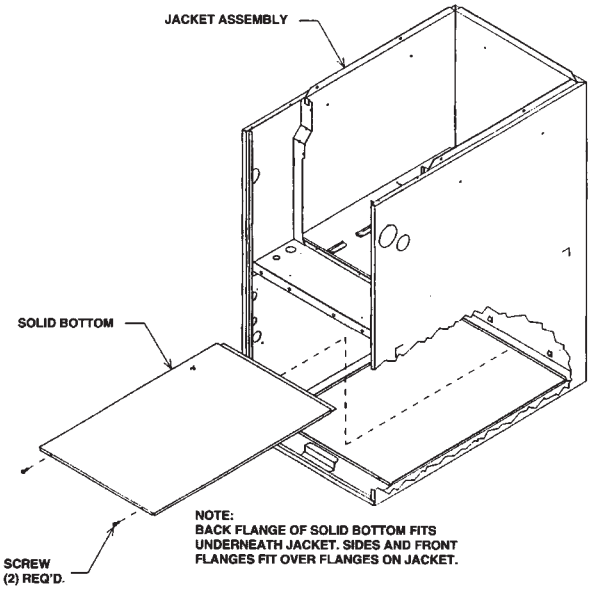
FIGURE 43
UPFLOW FILTER RETAINING ROD (SIDE RETURN)



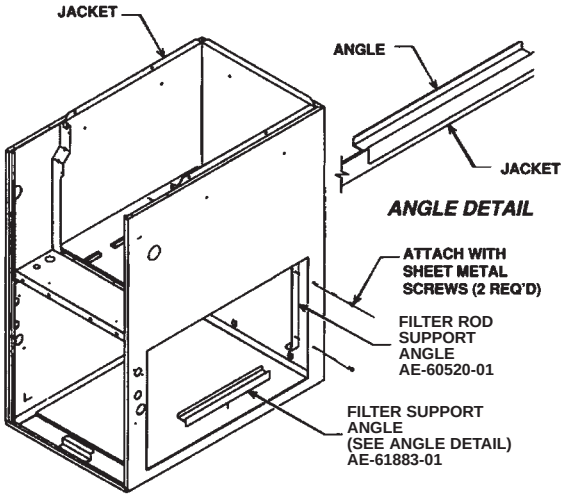
CUT-OUT AND DRILL DETAIL



FILTER AND ROD ASSEMBLY



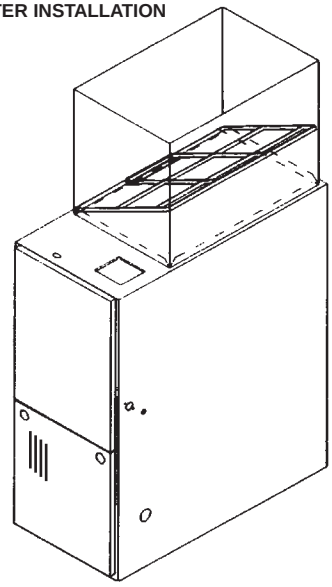
SOLID BOTTOM MAY BE ORDERED FROM THE FACTORY.

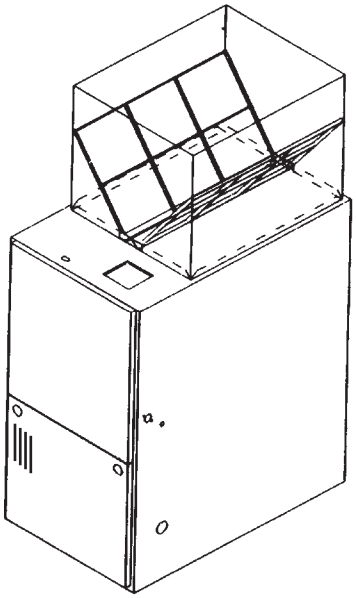


ROD & FILTER SUPPORT ANGLE ASSEMBLY

*BOTH SIDES FOR 1800 CFM OR ABOVE.

FIGURE 44
DOWNFLOW FILTER INSTALLATION





SYSTEM OPERATION INFORMATION

Advise The Customer To:

1. Advise customer of filter location. Keep the air filters clean. The heating system will operate better, more efficiently and more economically.
2. Arrange the 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 the system.
4. Avoid excessive use of kitchen & bathroom exhaust fans.
5. Do not permit the heat generated by television, lamps or radios to influence the thermostat operation.
6 Except for the mounting platform, keep all combustible articles three feet from the furnace and vent system.
7. **IMPORTANT**: *Replace all blower doors and compartment covers after servicing the furnace. Do not operate the unit without all panels and doors securely in place.*

⚠ WARNING

COMBUSTIBLE MATERIAL MUST NOT BE PLACED ON OR AGAINST THE FURNACE JACKET OR WITHIN THE SPECIFIED CLEARANCES OF THE VENT PIPE. THE AREA AROUND THE FURNACE MUST BE KEPT CLEAR AND FREE OF ALL COMBUSTIBLE MATERIALS INCLUDING GASOLINE AND OTHER FLAMMABLE VAPORS AND LIQUIDS. PLACEMENT OF COMBUSTIBLE MATERIALS ON, AGAINST OR AROUND THE FURNACE JACKET CAN CAUSE AN EXPLOSION OR FIRE RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH. THE FURNACE OWNER SHOULD BE CAUTIONED THAT THE FURNACE AREA MUST NOT BE USED AS A BROOM CLOSET OR FOR ANY OTHER STORAGE PURPOSES.

ANNUAL INSPECTION

The furnace should operate for many years without excessive scale build-up in the flue passageways, however, it is recommended that a qualified installer, service agency, or the gas supplier annually inspect the flue passageways, the vent system and the main burners for continued safe operation paying particular attention to deterioration from corrosion or other sources.

⚠ WARNING

HOLES IN THE VENT PIPE OR HEAT EXCHANGER CAN CAUSE TOXIC FUMES TO ENTER THE HOME RESULTING IN CARBON MONOXIDE POISONING OR DEATH. THE VENT PIPE OR HEAT EXCHANGER MUST BE REPLACED IF THEY LEAK.

- **IMPORTANT:** *It is recommended that at the beginning of the heating season and approximately midway in the heating season a visual inspection be made of the main burner flames for the desired flame appearance by a qualified installer, service agency, or the gas supplier.*
- **IMPORTANT:** *It is also recommended that at the beginning of the heating season, the flame sensor be cleaned with steel wool by a qualified installer, service agency, or the gas supplier.*
- **IMPORTANT:** *It is recommended that an annual inspection and cleaning of all furnace markings be made to assure legibility. Attach a replacement marking, which can be obtained through the distributor, if any are found to be illegible or missing.*

IMPORTANT: ***FOR Nox MODELS –*** *At the beginning of the heating season a visual inspection of the Nox device should be made to ensure they have not become obstructed by insects nests or anything else which may effect performance.*

LUBRICATION

The indoor blower motor and induced draft motor are prelubricated by the motor manufacturer and do not require further attention.

The motors must be cleaned periodically by a qualified installer, service agency, or the gas supplier to prevent the possibility of overheating due to an accumulation of dust and dirt on the windings or on the motor exterior. Air filters should be kept clean. Dirty filters can restrict airflow and results in motor overheating.

REPLACEMENT PARTS

Contact your local distributor for a complete parts list.

NOx MODELS

When converting furnaces equipped with NOx inserts to LP gas, remove the NOx insert assemblies.

TROUBLESHOOTING

Refer to Figure 45.

WIRING DIAGRAM

Figure 46 is a complete wiring diagram for the furnace.

FIGURE 45
TROUBLESHOOTING CHART

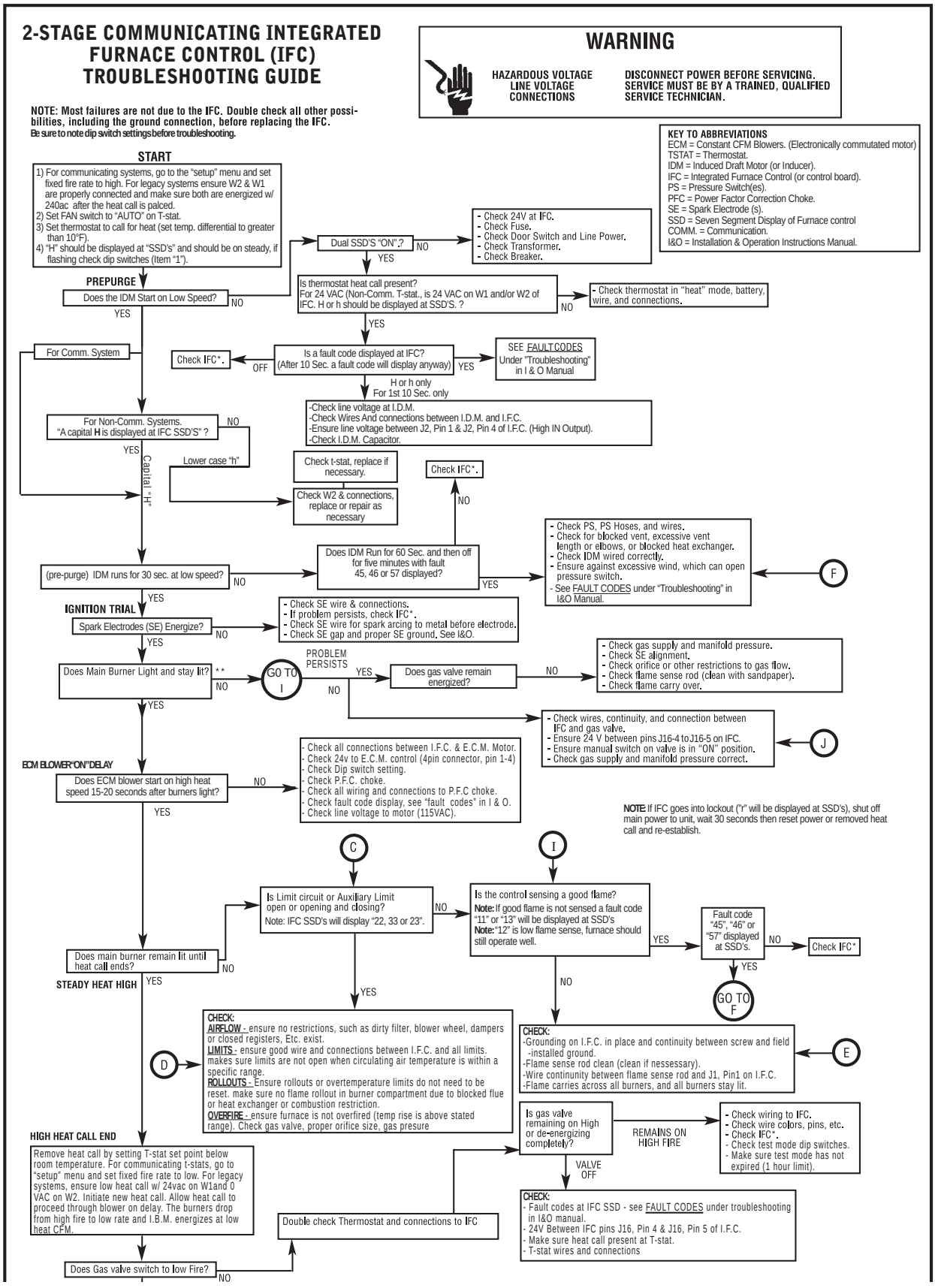


FIGURE 45
TROUBLESHOOTING CHART – CONTINUED

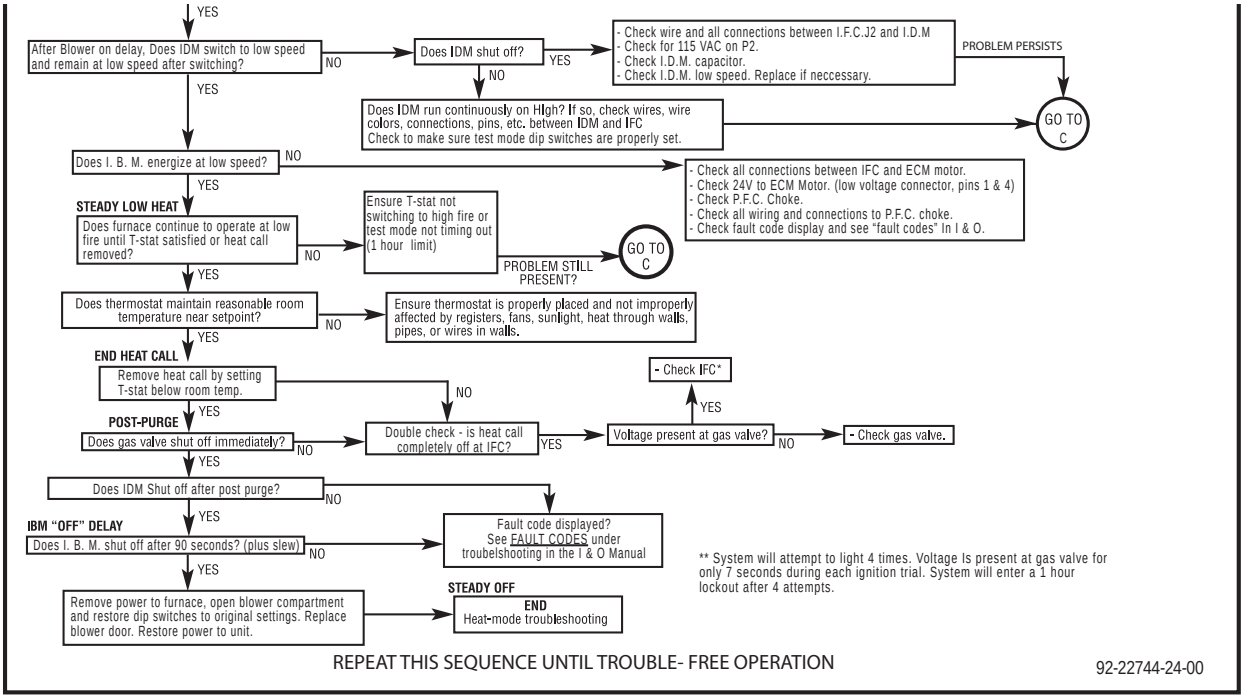


TABLE 20
FURNACE FAULT CODES EXPANDED W/DESCRIPTIONS AND SOLUTIONS

FAULT CODES

NOTE: The text in the "DISPLAYED TEXT" box shows combinations of upper-case and lower-case letters. Upper-case letters are used in the message displayed at the thermostat active fault screen. For example, the text **CARD-HARDware CoNFLiCT** indicates that the message displayed at the thermostat active fault screen will be **CARD-HARD CNFLCT**.
NOTE: The following fault codes will not be stored back-to-back in the fault buffer. These will only be stored in the buffer if the previous fault stored was a different fault. 82, 11, 45, 46 & 57.
NOTE: To clear current fault codes in the furnace control buffer, turn dipswitch SW3-2 on, off, on, off, or off, on, off, on within 30 seconds. The right-most seven-segment display will energize the upper and lower horizontal members for four seconds as confirmation that the faults have been cleared. Be sure to return the dispswitch (SW3-3) to its original position after clearing the faults. The fault buffer can also be cleared at the user menu under "FAULT HISTORY" in the sub-menu titled "CLEAR FAULT HISTORY".
Either procedure will clear the fault codes in the buffer displayed at the dual seven-segment displays on the I.F.C. AND at the ***Fault History*** user menu on communicating thermostats.
NOTE: The following fault codes will not be stored back-to-back in the fault buffer. These will only be stored in the buffer if the previous fault stored was a different fault. 82, 11, 45, 46 & 57.

Key

FAULT CODE	DISPLAYED TEXT CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT
	MESSAGES TO HOMEOWNER AT COMM. THERMOSTAT
	MESSAGE IN FAULT AREA OF COMM. THERMOSTAT
	STATUS
	DESCRIPTION
	EXPECTED OPERATION
	CAUSE
	SOLUTION

FAULT CODES

d1	**NO SHARED DATA** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT:** *d1* **MESSAGES TO HOMEOWNER AT COMM. THERMOSTAT:** *"CALL FOR SERVICE"* & *"CHECK FURNACE"*. **MESSAGE IN FAULT AREA OF COMM. THERMOSTAT:** "*NO SHARED DATA*" **STATUS:** This is a critical fault. The furnace will not operate in any mode. **DESCRIPTION:** This code is displayed anytime there is no shared data at the furnace or (for communicating systems only) on the network (e.g. at the condenser or thermostat). The shared data is electronically stored data that is used to define (among other things) blower operation. Without the shared data, the furnace can not function. Note that shared data may be available even if there is no card attached to the furnace control. A missing memory card will display fault code "d4" if shared data is available on the network. **EXPECTED OPERATION:** No operation (including thermostat) will be permitted without the shared data. The shared data defines the IBM (Indoor Blower Motor) speed-torque curve. Without this information, the IBM can not operate. Refer to the section of this manual titled "INTEGRATED FURNACE CONTROL" under the subsection titled "MEMORY CARD" for details on the hierarchy of use of multiple copies of shared data and distribution (among other details) of shared data. **CAUSE:** Typically, the memory card will be missing from the furnace. In most cases, the cause of this fault will be the loss or disconnection of the original memory card from the furnace control (or I.F.C.). When the furnace control (or I.F.C.) is replaced, the memory card must be broken away, saved and installed in the replacement control. This is explained in detail in the section of this book titled *REPLACING THE FURNACE CONTROL* . **SOLUTION:** Replace the missing memory card into the connector labeled J15 on the furnace control (I.F.C.). If the original card can not be found, a replacement card can be ordered from ProStock. Be sure to order the correct memory card for the furnace. Note: Furnace power must be cycled off and then on again after replacing the card or the shared data will not be read.
d3	**AIRFLOW MISMATCH** **CODE AT DUAL 7-SEG DISPLAY OF HP/AC & FAULT AREA OF COMM. THERMOSTAT:** *d3* **MESSAGES TO HOMEOWNER AT COMMUNICATING THERMOSTATS:** *"CALL FOR SERVICE"* & *"CHECK FURNACE".* **MESSAGE IN FAULT AREA OF COMMUNICATING THERMOSTATS:** *AIRFLOW MISMATCH* **STATUS:** This is a critical fault. The air conditioner (or heat pump) condenser will not operate in communicating mode. **DESCRIPTION:** This message will not be displayed at the furnace. It will be displayed at the condenser but it involves the furnace. It is an indicator that the maximum airflow that can be supplied by the furnace is not enough capacity for the condenser. **EXPECTED OPERATION:** No cooling or heat-pump heating operation can take place. However, all other modes of operation (including gas heat) should proceed as normal. Refer to the section of this manual titled "INTEGRATED FURNACE CONTROL" under the subsection titled "MEMORY CARD" for details on the hierarchy of use of multiple copies of shared data and distribution (among other details) of shared data. **CAUSE:** The condenser selected is too large for the airflow capacity of the furnace. **SOLUTION:** The condenser or furnace should be replaced with a condenser or furnace which will match the necessary airflow requirements of the condenser. Check specification sheets for both the furnace and the condenser to determine airflow capacity needed and supplied.

TABLE 20

FURNACE FAULT CODES EXPANDED W/DESCRIPTIONS AND SOLUTIONS – CONTINUED

d4	**MEMory CARD INVALID** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT:** *d4* **MESSAGES TO HOMEOWNER AT COMMUNICATING THERMOSTATS:** *(none)* **MESSAGE IN FAULT AREA OF COMMUNICATING THERMOSTATS:** *"MEM CARD INVALID"* **STATUS:** This is a non-critical fault. The furnace should operate in any mode. **DESCRIPTION:** The memory card inserted into the slot at position J15 of the furnace control is corrupt and can not be used ***OR*** there is no memory card installed at all. However, a valid copy of shared data for the furnace can be retrieved from the network. **EXPECTED OPERATION:** Shared data from the memory card can not be used because it is invalid. During the first (up to) five minutes of operation after power reset, the furnace may not resond to thermostat calls and/or fan calls (from either the thermostat or the condeser) while the furnace is searching the network for valid shared data. Until valid shared data is found, no operation will take place. Once valid network shared data has been found, operation should proceed as normal with this fault (d4) only being displayed during the standby mode. If no valid network shared data is found, the d4 fault will be replaced by a d1 fault (see **d1**) and no operation will take place until the issue is repaired. **CAUSE:** This fault is displayed when there is no information on the memory card (blank) or the memory card has corrupted and can not be properly read. **SOLUTION:** Remove the memory card and replace with the ***original*** memory card from the furnace or the ***correct*** replacement memory card. **Never replace the memory card of a furnace with a memory card from another furnace or component (e.g. condenser or air handler). Doing so could result in improper operation of the blower which may cause damage to the heat exchanger. If the original memory card for the furnace control is available and working, it must be used.** A correct replacement memory card can be ordered from ProStock. Be sure to have the furnace model and serial number available when ordering.
d5	**CARD-HaRDware CoNFLiCT** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT:** *d5* **MESSAGES TO HOMEOWNER AT COMMUNICATING THERMOSTATS:** (none) **MESSAGE IN FAULT AREA OF COMMUNICATING THERMOSTATS:** *"CARD-HRD CNFLCT"* **STATUS:** This is a non-critical fault. The furnace should operate in any mode. **DESCRIPTION:** The memory card inserted into the slot at position J15 of the furnace control is not correct for the furnace application. **EXPECTED OPERATION:** Shared data from the memory card can not be used because it is invalid. During the first (up to) five minutes of operation after power reset, the furnace may not resond to thermostat calls and/or fan calls (from either the thermostat or the condeser) while the furnace is searching the network for valid shared data. Until valid shared data is found, no operation will take place. Once valid network shared data has been found, operation should proceed as normal with this fault (d5) only being displayed during the standby mode. If no valid network shared data is found, the d5 fault will be replaced by a d1 fault (see **d1**) and no operation will take place until the issue is repaired. **CAUSE:** There are a couple of reasons that this fault might be displayed: (1) The memory card inserted is from a different type of furnace (e.g.: from a two-stage furnace). (2) The memory card inserted is from an air handler or condenser or some other component. **SOLUTION:** Remove the memory card and replace with the ***original*** memory card from the furnace or the ***correct*** replacement memory card. **Never replace the memory card of a furnace with a memory card from another furnace or component (e.g. condenser or air handler). Doing so could result in improper operation of the blower which may cause damage to the heat exchanger. If the original memory card for the furnace control is available and working, it must be used.** A correct replacement memory card can be ordered from ProStock. Be sure to have the furnace model and serial number available when ordering.

TABLE 20

FURNACE FAULT CODES EXPANDED W/DESCRIPTIONS AND SOLUTIONS – CONTINUED

d6	**BLoWeR HorsePower CoNFLiCT** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT:** *d6* **MESSAGES TO HOMEOWNER AT COMMUNICATING THERMOSTATS:** (none) **MESSAGE IN FAULT AREA OF COMMUNICATING THERMOSTATS:** "*BLWR HP CNFLCT*" **STATUS:** This is a non-critical fault. The furnace should operate in any mode. **DESCRIPTION:** The horsepower reported by the motor does not match the horsepower stored in memory in the shared data of the memory card or furnace control. **EXPECTED OPERATION:** Shared data from the memory card can not be used because it is invalid. During the first (up to) five minutes of operation after power reset, the furnace may not resond to thermostat calls and/or fan calls (from either the thermostat or the condeser) while the furnace is searching the network for valid shared data. Until valid shared data is found, no operation will take place. Once valid network shared data has been found, operation should proceed as normal with this fault (d6) only being displayed during the standby mode. If no valid network shared data is found, the d6 fault will be replaced by a d1 fault (see **d1**) and no operation will take place until the issue is repaired. **CAUSE:** There are two possible causes for this fault: (1) The blower motor has recently been replaced and the wrong horspower motor was used. (2) The memory card or furnace control has recently been replaced and the wrong card or replacement control was used. **SOLUTION:** Determine the correct motor and/or shared data card for the furnace and replace the incorrect part with a new, correct part. **Never replace the memory card of a furnace with a memory card from another furnace or component (e.g. condenser or air handler). Doing so could result in improper operation of the blower which may cause damage to the heat exchanger.** If the ***original*** memory card for the furnace control is available and working, it must be used. A correct replacement memory card can be ordered from ProStock. Be sure to have the furnace model and serial number available when ordering.
d7	**BLoWeR ManuFactureR CoNFLiCT** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT:** *d7* **MESSAGES TO HOMEOWNER AT COMMUNICATING THERMOSTATS:** (none) **MESSAGE IN FAULT AREA OF COMMUNICATING THERMOSTATS:** "*BLWR MFR CNFLCT*" **STATUS:** This is a non-critical fault. The furnace should operate in any mode. **DESCRIPTION:** This fault code is displayed any time the blower motor attached is able to communicate with the furnace control but is not recognized by the furnace control. If the motor attached is from a new manufacturer which was not supported at the time of production of the furnace control or memory card, the furnace control will not recognize the newer motor. For example, the motors available to be used in production at the time of this writing were Regal Beloit (RB) (formerly GE) and Emerson. If a Panasonic motor were added in the future, the Panasonic motor would not be recognized by the production control board and memory card made today. The d7 fault code would be displayed. Refer to the section of this manual titled "INTEGRATED FURNACE CONTROL" under the subsection titled "MEMORY CARD" for details on the hierarchy of use of multiple copies of shared data and distribution (among other details) of shared data. **EXPECTED OPERATION:** Shared data from the memory card can not be used because it is invalid. During the first (up to) five minutes of operation after power reset, the furnace may not resond to thermostat calls and/or fan calls (from either the thermostat or the condeser) while the furnace is searching the network for valid shared data. Until valid shared data is found, no operation will take place. Once valid network shared data has been found, operation should proceed as normal with this fault (d7) only being displayed during the standby mode. If no valid network shared data is found, the d7 fault will be replaced by a d1 fault (see **d1**) and no operation will take place until the issue is repaired. **CAUSE:** A motor manufactured by a non-supported OEM at the time of production of the furnace control and/or memory card is used to replace the blower motor. **SOLUTION:** Either (1) replace the blower motor with a supported motor or (2) replace the memory card and/or furnace control with a newer updated version that supports the newer motor. **Never replace the memory card of a furnace with a memory card from another furnace or component (e.g. condenser or air handler). Doing so could result in improper operation of the blower which may cause damage to the heat exchanger.**

TABLE 20

FURNACE FAULT CODES EXPANDED W/DESCRIPTIONS AND SOLUTIONS – CONTINUED

d8	**OLD SHARED DATA** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT:** *d8* **MESSAGES TO HOMEOWNER AT COMMUNICATING THERMOSTATS:** (none). **MESSAGE IN FAULT AREA OF COMMUNICATING THERMOSTATS:** "*OLD SHARED DATA*" **STATUS:** This is a non-critical fault. The furnace should operate in any mode. **DESCRIPTION:** This message is intended for future applications where the shared data of a newer furnace has been replaced with shared data from an older furnace. If, in the future, a new parameter is added to the shared data, an older memory card in this hypothetical furnace will force this fault to be displayed. If the new shared data parameter is critical to furnace operation, the furnace will use shared data from the network if available. **EXPECTED OPERATION:** Shared data from the memory card can not be used because it is invalid. During the first (up to) five minutes of operation after power reset, the furnace may not resond to thermostat calls and/or fan calls (from either the thermostat or the condeser) while the furnace is searching the network for valid shared data. Until valid shared data is found, no operation will take place. Once valid network shared data has been found, operation should proceed as normal with this fault (d8) only being displayed during the standby mode. If no valid network shared data is found, the d8 fault will be replaced by a d1 fault (see **d1**) and no operation will take place until the issue is repaired. **CAUSE:** The incorrect memory card has been used with the furnace control. Specifically, an older memory card has been used with a newer furnace and some operation (perhaps critical) can not be performed by the furnace. **SOLUTION:** Replace the older memory card with a newer card. If the ***original*** memory card for the furnace is available, it must be used. **Never replace the memory card of a furnace with a memory card from another furnace or component (e.g. condenser or air handler). Doing so could result in improper operation of the blower which may cause damage to the heat exchanger. If the original memory card for the furnace control is available and working, it must be used.** A ***correct*** replacement memory card can be ordered from ProStock. Be sure to have the furnace model and serial number available when ordering
10	**IGNition 1 HouR ReTRY** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT:** *10* **MESSAGES TO HOMEOWNER AT COMMUNICATING THERMOSTATS:** "*CALL FOR SERVICE*" & "*CHECK FURNACE*". **MESSAGE IN FAULT AREA OF COMMUNICATING THERMOSTATS:** "*IGN 1 HR RTRY*" **STATUS:** This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g. cooling) should function. **DESCRIPTION:** This fault is displayed after four failed ignition attempts. After four attempts to ignite without success, the furnace control (or I.F.C.) goes into a lockout mode and will not attempt ignition again for one hour. **EXPECTED OPERATION:** After four failed ignition attempts (see fault code "*11*"), the furnace control (I.F.C.) will display "10" and will wait one hour before removing the "10" from the display and attempting the next ignition cycle provided the heat call is still present. If the first attempt at ignition after the one hour lockout is unsuccessful, the furnace control (I.F.C.) will attempt to light three more times before displaying "10" again and entering the second one-hour lockout. This cycle will repeat indefinately until gas heat is established or the heat call has ended. **CAUSE:** There can be several causes for multiple failed ignition attempts. The most common are: (1) The flame sense rod is unable to sense flame. It may need cleaning or may not be properly connected. (2) The igniter is not working properly. It may not be properly connected or the spark location may not be correct. (3) The furnace control may not be working properly and may need to be replaced. (4) The flame may not be properly spreading from the first burner to the last. **SOLUTION:** The solution will depend on the cause. Solutions to noted causes (1), (2), (3) and (4) above are: (1) Clean or replace the flame sense rod or check all connections and wire between the rod and the furnace control (or I.F.C.). (2) Replace or reposition the igniter or check all connections and wire between the igniter and the furnace control (or I.F.C.). (3) Replace the furnace control. (4) Check the manifold pressure during ignition. For natural gas it should be approx. 3.5" wc and for LP gas it should be 11" wc. If manifold pressure is good, watch the burner during ignition. If the first burner lights, but the second, third and so on do not light, the burner may need to be replaced.

TABLE 20

FURNACE FAULT CODES EXPANDED W/DESCRIPTIONS AND SOLUTIONS – CONTINUED

11	**FAILED IGNITION** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT:** *11* **MESSAGES TO HOMEOWNER AT COMMUNICATING THERMOSTATS:** (none) **MESSAGE IN FAULT AREA OF COMMUNICATING THERMOSTATS:** "*FAILED IGNITION*" **STATUS:** Up to three failed ignitions will not constitute a critical condition. Critical condition (with no heating operation) is only noted when the furnace has failed to ignite four or more times in a row. After four failed ignition attempts, the fault code will change from "*11*" to "10" and will react as described under the description for fault code "10". Fault code "*11*" will not trigger a message to be displayed to the homeonwer. It is only when the status is elevated to "10" that a message is displayed to the homeowner. **DESCRIPTION:** This fault is displayed at the furnace control after the first failed ignition attempt. It continues to be displayed until successful ignition or the furnace control has failed to ignite four consecutive times. After four attempts, the status of the fault is elevated to "10" and the furnace control (or I.F.C.) reacts as described under description for the fault code "10". Note: This fault will not be displayed to the homeowner on communicating systems unless it occurs at least three times within a single heat call. It will not be displayed to the homeowner after the first or even second failure. However, it will be displayed in the active fault screen of thermostat immediately after the first failure (and all subsequent failures) during a single heat call. Further, this fault (11) will only be logged into the fault buffer one time. It will not log more than once in the buffer. **EXPECTED OPERATION:** After the first failed ignition attempt, the fault ("*11*") is displayed and the inducer will complete a 20 second post-purge followed by a second ignition attempt. This cycle will be repeated until gas heat is established or until the fourth ignition attempt. After the fourth attempt, the furnace control (IFC) will proceed to one-hour lockout as described under the fault code "10". **CAUSE:** There can be several causes for a failed ignition attempt(s). The most common are: (1) The flame sense rod is unable to sense flame. It may need cleaning or may not be properly connected. (2) The gas valve may be turned off. (3) The igniter is not working properly. It may not be properly connected or the spark location may not be correct. (4) The furnace control may not be working properly and may need to be replaced. (5) The flame may not be properly spreading from the first burner to the last. **SOLUTION:** The solution will depend on the cause. Solutions to noted causes (1) through (5) above are: (1) Clean or replace the flame sense rod or check all connections and wire between the rod and the furnace control (or I.F.C.). Make sure furnace ground is properly connected. (2) Turn the valve on. (3) Replace or reposition the igniter or check all connections and wire between the igniter and the furnace control (or I.F.C.). (4) Replace the furnace control. (5) Check the manifold pressure during ignition. For natural gas it should be approx. 3.5" wc and for LP gas it should be 11" wc. If manifold pressure is good, watch the burner during ignition. If the first burner lights, but the second, third and so on do not light, the burner may need to be replaced.
12	**LOw FLAME SENSE** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT:** *12* **MESSAGES TO HOMEOWNER AT COMMUNICATING THERMOSTATS:** (none) **MESSAGE IN FAULT AREA OF COMMUNICATING THERMOSTATS:** "*LO FLAME SENSE*" **STATUS:** The status of this fault is non-critical and furnace operation will continue as normal in heating (and all other) mode(s). If flame sense is low, the furnace control (or I.F.C.) may soon no longer be able to properly sense the flame and status of the problem may be elevated to the level of fault code "*13*" or fault "*11*" (if flame can not be sensed at all). **DESCRIPTION:** The flame sense current from the flame sense rod at the furnace control (or I.F.C.) is weak or marginal at best. **EXPECTED OPERATION:** All operation (including gas heat) will proceed as normal with only the fault code ("*12*") displayed at the furnace control (I.F.C.) and "*LO FLAME SENSE*" displayed in the fault area of a communicating thermostat. **CAUSE:** (1) The most common cause for low flame sense during heat operation is that the flame sense rod may need cleaning or may not be properly connected or wiring between the rod and the furnace control may be shorted or opened. (2) Another cause for low flame may be an improperly mounted or poorly grounded flame sensor. **SOLUTION:** (1) Clean or replace the flame sense rod or check all connections and wire between the rod and the furnace control (or I.F.C.). (2) Reinstall or replace flame sensor and check wiring and connections. Also make sure the furnace is properly grounded.

TABLE 20

FURNACE FAULT CODES EXPANDED W/DESCRIPTIONS AND SOLUTIONS – CONTINUED

13	**FLAME LOST** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT**: *13* **MESSAGES TO HOMEOWNER AT COMMUNICATING THERMOSTATS**: (none) **MESSAGE IN FAULT AREA OF COMMUNICATING THERMOSTATS**: "*FLAME LOST*" **STATUS**: Flame loss is not a critical fault. Subsequent ignition attempts will follow and normal operation should resume. However, a lost flame can often be followed by failed ignition attempts then a one-hour lockout. Once the status has reached one-hour lockout, the fault condition is critical (although attempts at ignition will be made again after the 1 hour lockout) and furnace operation will proceed as described under "10" ("*IGN 1 HR RTRY*"). **DESCRIPTION**: After a successful ignition trial, the flame (which *was* properly sensed) is no longer sensed. This can happen any time after successful ignition while a valid heat call is present. **EXPECTED OPERATION**: When flame is lost, the fault code ("*13*") is immediately displayed at the IFC SSD's. The IBM (Indoor Blower Motor) is energized (if it was not already) at the correct speed (based on the demand from the thermostat) and completes a 90 second blower off delay. The IDM (Induced Draft Motor) remains energized at the most recent speed (based on the demand from the thermostat or as required for ignition cycle) for a 20 second post-purge. After both the post-purge and blower off delay are complete, the fault code ("*13*") is removed and a new attempt at ignition is made. Often, the new ignition attempt will fail and operation will proceed as though a failed ignition has occurred from that point (see fault code "*11*"). Note: This fault will not be displayed to the homeowner on communicating systems unless it occurs at least three times within a single heat call. It will not be displayed to the homeowner after the first or even second failure. However, it will be displayed in the active fault screen of thermostat immediately after the first failure (and all subsequent failures) during a single heat call. Further, this fault (13) will only be logged into the fault buffer one time. It will not log more than once in the buffer." **CAUSE**: (1) The most common cause for low flame sense during heat operation is that the flame sense rod may need cleaning or may not be properly connected or wiring between the rod and the furnace control may be shorted or opened. (2) Another cause for low flame may be an improperly mounted or poorly grounded flame sensor. (3) Flame pattern may be unstable. **SOLUTION**: (1) Clean or replace the flame sense rod or check all connections and wire between the rod and the furnace control (or I.F.C.). (2) Reinstall or replace flame sensor and check wiring and connections. Also make sure the furnace is properly grounded. (3) Check that all burner assembly components are properly installed. Check for good seals between the burner and blower compartments. Insure that the combustion door gasket is in place and the door is properly installed and sealed.
14	**UNEXPECTED FLAME** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT**: *14* **MESSAGES TO HOMEOWNER AT COMMUNICATING THERMOSTATS**: "*CALL FOR SERVICE*" & "*CHECK FURNACE*". **MESSAGE IN FAULT AREA OF COMMUNICATING THERMOSTATS**: *"UNEXPECTED FLAME"* **STATUS**: This is an extremely critical fault and should rarely (if ever) be seen in the field. The furnace will not operate with this fault present. **DESCRIPTION**: This fault indicates flame is present when it should not be. Flame is seen to be present when the gas valve is supposed to be off. **EXPECTED OPERATION**: When unexpected flame is sensed, the IBM (Indoor Blower Motor) is energized at maximum heat speed and IDM (Induced Draft Motor) is energized at high speed. Both will remain energized until the fault is cleared. Response to any thermostat call is not permitted until the fault is cleared. Note that the gas valve circuit should not have been energized when the unexpected flame was sensed. When the fault is cleared, the IDM will complete a 20 second post-purge and the IBM will complete a 90 second blower off-delay. **CAUSE**: (1) Field mis-wiring of 24VAC to the gas valve main solenoid. (2) Faulty gas valve stuck in the "OPEN" position. (3) Faulty furnace control (signal improperly sensed when it should not be sensed at all). **SOLUTION**: (1) Wire properly. (2) Replace gas valve. (3) Replace furnace control.

TABLE 20
FURNACE FAULT CODES EXPANDED W/DESCRIPTIONS AND SOLUTIONS – CONTINUED

22	**MAIN LIMIT OPEN** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT:** *22* **MESSAGES TO HOMEOWNER AT COMMUNICATING THERMOSTATS:** "*CALL FOR SERVICE*" & "*CHECK FURNACE*". **MESSAGE IN FAULT AREA OF COMMUNICATING THERMOSTATS:** "*MAIN LIMIT OPEN*" **STATUS:** This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g. cooling) should function. **DESCRIPTION:** The main limit has opened or is sensed to be opened. This normally means that the temperture inside the heat exchanger area has gone above a certain predetermined critical value and heating operation is not permitted until the limit cools to within normal parameters. **EXPECTED OPERATION:** When the main limit opens, the IBM (Indoor Blower Motor) will be energized at maximum heat speed. The gas valve circuit is de-energized (if it was energized) until the fault is cleared and the IDM (Induced Draft Motor) is energized at high speed and remains energized for 20 seconds after the fault is sensed. Response to thermostat cooling calls will take place as normal with IBM energizing at the higher of the two blower speeds (high heat or cool) when a call for cooling is also present. When the fault is cleared, the IBM will remain energized for the 90 second blower off-delay period. **CAUSE:** (1) No airflow (2) Insufficient airflow (3) Faulty limit control (4) Loose or faulty wiring. (5) Input too high **SOLUTION:** (1) Check for proper blower operation. Is the blower turning during heat (or any other) mode? If not, a blower motor fault should also be present. Check the wiring to the motor then check the motor. It may need replacing. (2) Check ductwork and filters. Determine the static pressure and make sure it is not above the published values for the furnace. Check the rate and outlet air temperature at high and low-fire heat (use the test mode dipswitches SW2-2 and SW2-3) and compare to the nameplate maximum values. Also, perform the calibration cycle again (if the SA sensor is installed) by cycling power to the furnace. (3) Replace the limit control. (4) Check wiring and connections. Replace and/or repair as necessary. (5) Insure properly sized burner orifices are installed. Check the manifold pressure at high fire and compare to the nameplate values. Adjust as needed.
23	**HALC (Heat Assisted Limit Control) LIMIT OPEN** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT:** *23* **MESSAGES TO HOMEOWNER AT COMMUNICATING THERMOSTATS:** "*CALL FOR SERVICE*" & "*CHECK FURNACE*". **MESSAGE IN FAULT AREA OF COMMUNICATING THERMOSTATS:** "*HALC LIMIT OPEN*" **STATUS:** This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g. cooling) should function. **DESCRIPTION:** The Heat Assisted Limit Control (H.A.L.C.) has opened or is sensed to be opened. This normally means that the temperture inside the blower area has gone above a certain predetermined value and heating operation is not permitted until the limit cools to within normal parameters. For modulating furnaces, this limit is only present in downflow models. However, there is a jumper wire between the pins on the IFC (Integrated Furnace Control) of upflow modulating models. If the "*23*" fault code is displayed on upflow models, it generally means that the connection between the two pins (pins *5* and *11* of connector *J1*) has been compromised. **EXPECTED OPERATION:** When the HALC (Heat Assisted Limit Control) circuit has been opened, the IBM (Indoor Blower Motor) is energized at maximum heating speed. The gas valve circuit is de-energized (if it was energized) and the IDM (Induced Draft Motor) is energized at high speed for 20 seconds after the fault is sensed. Response to thermostat cooling calls will take place as normal with IBM energizing at the higher of the two blower speeds (high heat or cool) when a call for cooling is also present. When the fault is cleared, the IBM will remain energized for the 90 second blower off-delay period. **CAUSE:** (1) On upflow 90+ (modulating) furnaces, the jumper is loose, broken or missing. (2) On downflow 90+ (modulating) furnaces, the H.A.L.C. may be faulty. Check continuity. (3) Loose or faulty wiring. (4) On downflow 90+ (modulating) furnaces, the blower operation may be compromised. **SOLUTION:** (1) Repair the jumper between pins 5 and 11 of connector J1 on the furnace control. (2) Replace the limit control. (3) Check wiring and connections. Replace and/or repair as necessary. (4) Check for proper blower operation. Is the blower turning during heat (or any other) mode? If not, a blower motor fault should also be present. Check the wiring to the motor then check the motor. It may need replacing

TABLE 20

FURNACE FAULT CODES EXPANDED W/DESCRIPTIONS AND SOLUTIONS – CONTINUED

26	**LINE NeuTRaL ReVerRSeD** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT:** *26* **MESSAGES TO HOMEOWNER AT COMMUNICATING THERMOSTATS:** "*CALL FOR SERVICE*" & "*CHECK FURNACE*". **MESSAGE IN FAULT AREA OF COMMUNICATING THERMOSTATS:** "*LINE_NTRL RVRSD*" **STATUS:** This is a critical fault. The furnace will not operate in gas heat or any other modes. **DESCRIPTION:** This fault code is an indication that line voltage and neutral are reversed to the furnace control. No operation is not allowed to proceed until the problem is corrected. **EXPECTED OPERATION:** No heating or cooling operation will take place. **CAUSE:** (1) Line and neutral to the furnace have been interchanged at the furnace. (2) Line voltage and neutral have been interchanged at the disconnect or at the breaker box. **SOLUTION:** (1) Check voltage with meter and reverse line and neutral if necessary. (2) Check voltage with meter and reverse line and neutral if necessary.
33	**MRLC (Manually Reset Limit Control) OPEN** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT:** *33* **MESSAGES TO HOMEOWNER AT COMMUNICATING THERMOSTATS:** "*CALL FOR SERVICE*" & "*CHECK FURNACE*". **MESSAGE IN FAULT AREA OF COMMUNICATING THERMOSTATS:** "*MRLC OPEN*" **STATUS:** This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g. cooling) should function. **DESCRIPTION:** The Manually Reset Limit Control (M.R.L.C.) is also known by the name "Rollout Limit". There can be several on any given furnace. When one or more of these limits open, they must be manually pushed back to open (hence the name; *Manually* Reset) to force the acknowledgement of a critical fault. This fault will occur when flames have rolled out of the normal area in the heat exchanger and into the burner compartment. This fault should rarely (if ever) be seen in the field and indicates a very serious problem that must be fixed before furnace operation can continue. **EXPECTED OPERATION:** When the MRLC (Manually Reset Limit Control) circuit has been opened, the IBM (Indoor Blower Motor) is energized at maximum heating speed. The gas valve circuit is de-energized (if it was energized) and the IDM (Induced Draft Motor) is energized at high speed. Response to thermostat cooling calls will take place as normal with IBM energizing at the higher of the two blower speeds (high heat or cool) when a call for cooling is also present. When the fault is cleared, the IDM will remain energized for a 20 second post-purge and the IBM will remain energized for the 90 second blower off-delay period. **CAUSE:** (1) Insufficient venting through either the inlet or exhaust. (2) Loose or faulty wiring. (3) Unstable flame pattern. **SOLUTION:** (1) Check that the pressure switch(es) have not been welded closed or bypassed. Check that the inducer is operating at the proper rpm. Insure that the venting does not exceed the maximum specified lengths. Check for obstructions in combustion venting. Check that all gaskets between the inducer and center panel / heat exchanger are properly installed and sealed. (2) Check wiring and connections. Replace and/or repair as necessary. (3) Check that all burner assembly components are properly installed. Check that all seals between the burner and blower compartments are tight. Insure that the door seals are in place and that the burner door is properly installed and does not leak. Check to make sure that the heat exchanger has not been damaged; i.e.: crushed tubes, breached collector box and etc.

TABLE 20

FURNACE FAULT CODES EXPANDED W/DESCRIPTIONS AND SOLUTIONS – CONTINUED

44	**LPC (Low Pressure Control (switch)) CLOSED** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT**: *44* **MESSAGES TO HOMEOWNER AT COMMUNICATING THERMOSTATS**: "*CALL FOR SERVICE*" & "*CHECK FURNACE*". **MESSAGE IN FAULT AREA OF COMMUNICATING THERMOSTATS**: "*LPC CLOSED*" **STATUS**: This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g. cooling) should function if present simultaneously with a heating call (e.g. defrost call in dual-fuel mode). **DESCRIPTION**: The low pressure control (or switch) should not be closed when the inducer is not running. If it is, this is a sign of a serious condition. The switch may be welded closed or purposely bypassed in the field. Before any heat cycle can begin, the pressure switch is tested to make sure that it is opened. The switch is ignored except in gas heating modes. **EXPECTED OPERATION**: There will be no other operation than displaying of the fault code and diagnostic messages to the homeowner and technician. The fault code is only present during a heat call *before* pre-purge begins. **CAUSE**: (1) Faulty switch. (2) Pressure switch physically bypassed in the field. (3) Loose or faulty wiring. (4) Abnormally high negative pressure present on vent system without inducer running. **SOLUTION**: (1) Replace low pressure control (switch). (2) Remove bypass and restore correct operation. Determine reason for bypass (e.g. vent length too long) and correct issue. Notify homeowner and proper authorities of illeagle tampering if necessary. (3) Check wiring and connections. Replace and/or repair as necessary. (4) Check for proper venting and terminations as defined in the furnace installation instructions.
45	**LPC (Low Pressure Control (switch)) OPEN** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT**: *45* **MESSAGES TO HOMEOWNER AT COMMUNICATING THERMOSTATS**: "*CALL FOR SERVICE*" & "*CHECK FURNACE*". **MESSAGE IN FAULT AREA OF COMMUNICATING THERMOSTATS**: "*LPC OPEN*" **STATUS**: This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g. cooling) should function if present simultaneously with a heating call (e.g. defrost call in dual-fuel mode). **DESCRIPTION**: This fault indicates that the low pressure switch is open ***when the inducer is energized at high speed.*** Since the modulating furnace only ignites at high fire, this condition should never be seen except after the blower on delay period of the ignition cycle and only after the furnace attempt to switch to a firing rate below 50%. The switch is ignored except in heating modes. **EXPECTED OPERATION**: This fault is displayed only after heat is established and switched to low fire with the IBM (Indoor Blower Motor) energized at low speed. When this fault is displayed the gas valve will be de-energized, the IBM will remain energized at the low heat speed and the IDM (Induced Draft Motor) will remain energized at the low speed. The IBM will complete a 90 second blower off-delay (at low speed) and the IDM will complete a 20 second post-purge (at low speed). After these delays, a new attempt at ignition will be made provided the call for heat is still present. **CAUSE**: (1) Blockage or improper termination in either the inlet or exhaust vents. (2) The flue vent length and/or number of elbows exceeds the maximum number specified. (3) Faulty or disconnected inducer. (4) Faulty control board (inducer relay). (5) High altitude kit not installed in areas of high elevation. (6) Loose or faulty wiring. (7) Disconnected, blocked, split or cut pressure switch hoses. (8) Wind gusts (sporadic). (9) Faulty pressure switch. **SOLUTION**: (1) Check the vent system for blockage and proper termination and repair as necessary. (2) Check the specification sheets and/or installation instructions. Remove excess venting. (3) Repair or replace inducer and/or inducer wiring and/or electrical connections. (4) Replace control board. (5) Check elevation of the installation and consult the specifications for the furnace to determine if a high altitude kit is needed. Install proper kit as necessary. (6) Check wiring and connections. Replace and/or repair as necessary. (7) Replace hoses as necessary. (8) Insure proper termination and determine if high altitude kit may be necessary (see item 4) (9) Replace the pressure switch.

TABLE 20

FURNACE FAULT CODES EXPANDED W/DESCRIPTIONS AND SOLUTIONS – CONTINUED

46	**LPC (Low Pressure Control (switch)) OPEN** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT:** *46* **MESSAGES TO HOMEOWNER AT COMMUNICATING THERMOSTATS:** "*CALL FOR SERVICE*" & "*CHECK FURNACE*". **MESSAGE IN FAULT AREA OF COMM. THERMOSTAT:** "*LPC OPEN*" **STATUS:** This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g. cooling) should function if present simultaneously with a heating call (e.g. defrost call in dual-fuel mode). **DESCRIPTION:** This fault indicates that the low pressure switch is open ***when the inducer is energized at low speed***. The switch must close after the inducer is energized and before the ignition sequence can begin. The switch is ignored except in heating modes. **EXPECTED OPERATION:** (1) DISPLAYED *BEFORE* HEAT IS ESTABLISHED: The IBM (Indoor Blower Motor) will not be energized. The fault code will not be displayed until the IDM (Induced Draft Motor) has been energized for a minimum of ten seconds. The IDM will remain energized at the high speed (high speed is default pre-purge speed) for a period of five minutes after the beginning of the pre-purge attempt. After five minutes, the IDM is de-energized and second attempt at pre-purge is made (as long as the heat call is still present). This cycle is repeated indefinately until either the pressure switch closes or the heat call is lost. (2) DISPLAYED *AFTER* HEAT IS ESTABLISHED - If this fault is displayed *after* heat is established, the gas valve will be de-energized, the IBM will be energized (if not already energized) at the correct heat speed (determined by the firing rate required by the thermostat) and the IDM will remain energized at high speed. The IBM will complete a 90 second blower off-delay and the IDM will complete a 20 second post-purge (at high speed). After these delays, a new attempt at ignition will be made provided the call for heat is still present. **CAUSE:** (1) Blockage or improper termination in either the inlet or exhaust vents. (2) The flue vent length and/or number of elbows exceeds the maximum number specified. (3) Faulty or disconnected inducer. (4) Faulty control board (inducer relay). (5) Loose or faulty wiring. (6) Disconnected, blocked, split or cut pressure switch hoses. (7) Wind gusts (sporadic). (8) Faulty pressure switch. **SOLUTION:** (1) Check the vent system for blockage and proper termination and repair as necessary. (2) Check the specification sheets and/or installation instructions. Remove excess venting. (3) Repair or replace inducer and/or inducer wiring and/or electrical connections. (4) Replace control board. (5) Check wiring and connections. Replace and/or repair as necessary. (6) Replace hoses as necessary. (7) Insure proper termination and determine if high altitude kit may be necessary (see item 4) (8) Replace the pressure switch.
55	**HPC (High Pressure Control (switch)) CLOSED** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT:** *55* **MESSAGES TO HOMEOWNER AT COMMUNICATING THERMOSTATS:** "*CALL FOR SERVICE*" & "*CHECK FURNACE*". **MESSAGE IN FAULT AREA OF COMMUNICATING THERMOSTATS:** "HPC CLOSED" **STATUS:** This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g. cooling) should function if present simultaneously with a heating call (e.g. defrost call in dual-fuel mode). **DESCRIPTION:** The high pressure control (or switch) should not be closed when the inducer is not running. If it is, this is a sign of a serious condition. The switch may be welded closed or purposely bypassed in the field. Before any heat cycle can begin, the pressure switch is tested to make sure that it is opened. The switch is ignored except in gas heating modes. **EXPECTED OPERATION:** There will be no other operation than displaying of the fault code and diagnostic messages to the homeowner and technician. The fault code is only present during a heat call before pre-purge begins. **CAUSE:** (1) Faulty switch. (2) Pressure switch physically bypassed in the field. (3) Loose or faulty wiring. (4) Abnormally high negative pressure present on vent system without inducer running. **SOLUTION:** (1) Replace high pressure control (switch). (2) Remove bypass and restore correct operation. Determine reason for bypass (e.g. vent length too long) and correct issue. Notify homeowner and proper authorities of illeagle tampering if necessary. (3) Check wiring and connections. Replace and/or repair as necessary. (4) Check for proper venting and terminations as defined in the furnace installation instructions.

TABLE 20

FURNACE FAULT CODES EXPANDED W/DESCRIPTIONS AND SOLUTIONS – CONTINUED

57	**HPC (High Pressure Control (switch)) OPEN** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT**: *57* **MESSAGES TO HOMEOWNER AT COMMUNICATING THERMOSTATS**: "*CALL FOR SERVICE*" & "*CHECK FURNACE*". **MESSAGE IN FAULT AREA OF COMMUNICATING THERMOSTATS**: "*HPC OPEN*" **STATUS**: This is a critical fault. The furnace will not operate in gas heat modes but all other modes (e.g. cooling) should function if present simultaneously with a heating call (e.g. defrost call in dual-fuel mode). If this fault is experienced during high heat operation (above 50% rate) and the low pressure switch remains engaged, the furnace will switch to low fire heat and continue to run (if possible) to try to satisfy the thermostat. **DESCRIPTION**: This fault indicates that the high pressure switch is open when the inducer is energized at high speed. This fault can be displayed any time during the heat call except during low heat call and only *after* the pre-purge and blower on delays are complete. **EXPECTED OPERATION**: (1) DISPLAYED BEFORE HEAT IS ESTABLISHED: The IBM (Indoor Blower Motor) will not be energized. The fault code will not be displayed until the IDM (Induced Draft Motor) has been energized for a minimum of ten seconds. The IDM will remain energized at the high speed (high speed is default pre-purge speed) for a period of five minutes after the beginning of the pre-purge attempt. After five minutes, the IDM is de-energized and second attempt at pre-purge is made (as long as the heat call is still present). This cycle is repeated indefinately until either the pressure switch closes or the heat call is lost. (2) DISPLAYED AFTER HEAT IS ESTABLISHED - If this fault is displayed after heat is established, the IDM will remain energized at high speed and the firing rate will drop to low (40%) provided the low pressure switch remains closed. The IBM will energize at, or switch to, the low-fire rate (also provided the low pressure switch remains closed). Low heat is provided until the heat call ends or the high pressure switch closes. If the high pressure switch closes, the heat rate and blower speed will be adjusted to the correct (higher) rate required by the thermostat and the IDM will remain energized at high speed. If the low pressure switch also will not remain closed, operation will be as described under fault code # 46 ("LPC OPEN") above. **CAUSE**: (1) Blockage or improper termination in either the inlet or exhaust vents. (2) The flue vent length and/or number of elbows exceeds the maximum number specified. (3) Faulty or disconnected inducer. (4) Faulty control board (inducer relay). (5) High altitude kit not installed in areas of high elevation. (6) Loose or faulty wiring. (7) Disconnected, blocked, split or cut pressure switch hoses. (8) Wind gusts (sporadic). (9) Faulty pressure switch. **SOLUTION**: (1) Check the vent system for blockage and proper termination and repair as necessary. (2) Check the specification sheets and/or installation instructions. Remove excess venting. (3) Repair or replace inducer and/or inducer wiring and/or electrical connections. (4) Replace control board. (5) Check elevation of the installation and consult the specifications for the furnace to determine if a high altitude kit is needed. Install proper kit as necessary. (6) Check wiring and connections. Replace and/or repair as necessary. (7) Replace hoses as necessary. (8) Insure proper termination and determine if high altitude kit may be necessary (see item 4) (9) Replace the pressure switch.
60	**BLoWeR FauLT - RUNning** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT**: *60* **MESSAGES TO HOMEOWNER AT COMMUNICATING THERMOSTATS** : (none) **MESSAGE IN FAULT AREA OF COMMUNICATING THERMOSTATS**: "*BLWR FLT RUN*" **STATUS**: This is a non-critical fault experienced by the furnace. All operations (including thermostat calls) should continue as normal with no perceivable difference in operation. **DESCRIPTION**: A blower fault which is non-critical allows the blower to continue to run but at less-than-optimal conditions. **EXPECTED OPERATION**: All (including thermostat) operation should continue as normal. Blower operation may be slightly compromised but will continue. **CAUSE**: (1) The blower has hit the maximum speed or torque limit specified by the manufacturer *or* is running at the temperature limit because the static pressure is too high. **SOLUTION**: (1) The static pressure is too high because the ductwork is improperly designed or is restricted for some other reason or the filter needs cleaning or replacing. Remove the obstruction or repair the duct so that static pressure does not exceed published values in the specification sheets or installation instructions.

TABLE 20

FURNACE FAULT CODES EXPANDED W/DESCRIPTIONS AND SOLUTIONS – CONTINUED

61	**BLoWeR FauLT – NOt RUNning** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT:** *61* **MESSAGES TO HOMEOWNER AT COMMUNICATING THERMOSTATS:** "*CALL FOR SERVICE*" & "*CHECK FURNACE*". **MESSAGE IN FAULT AREA OF COMMUNICATING THERMOSTATS:** "*BLWR FLT NO RUN*" **STATUS:** This is a critical fault. The furnace will not operate in any mode. **DESCRIPTION:** The blower has failed critically or there is a critical motor fault - such as thermal limit trip that prevents the blower motor from running. **EXPECTED OPERATION:** If the furnace was in heating operation when this fault occurred, blower operation will immediately stop and the furnace will shut down normally with post-purge at the correct speed. After the post purge (or immediately if no heat call was present), no other operation (including thermostat calls) will occur until this fault is cleared. **CAUSE:** (1) The motor has tripped on thermal limit because of a restriction or bearing failure. (2) The motor Power Factor Correction (P.F.C.) choke is faulty and needs replacing. (3) The furnace shared data is faulty or corrupted. (4) Wiring to the motor and/or P.F.C. has become compromised. (5) The motor has failed catastrophically. **SOLUTION:** (1) Remove obstruction or replace motor. (2) Replace the Power Factor Correction choke. (3) Replace the furnace memory card with the correct replacement part from ProStock. (4) Inspect and replace or repair wiring and/or connectors to the motor and/or P.F.C. as necessary. (5) Replace the motor.
66	**BLoWeR OVERSPEED** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT:** *66* **MESSAGES TO HOMEOWNER AT COMMUNICATING THERMOSTATS:** (none) **MESSAGE IN FAULT AREA OF COMMUNICATING THERMOSTATS:** "*BLWR OVERSPEED*" **STATUS:** This is a non-critical fault experienced by the furnace. All operations (including thermostat calls) should continue as normal with no perceivable difference in operation. **DESCRIPTION:** The blower motor is operating at the highest rpm or torque that specifications allow but the application requires more torque or speed in order to get the desired airflow under the current static pressure conditions. The motor will continue to operate because internal software will prevent operation above the permitted range. However, a fault is sent to the furnace control (or I.F.C.) from the motor. **Note:** This fault will not be displayed after the first hour of blower operation after power reset. Further, this fault will not be logged in the fault buffer or fault history after the first hour of operation and will only be logged into the fault buffer a maximum of one time. Thiscode (66) indication is intended as a tool to notify the installer of inadequate airflow due to excessive static pressure in the duct of the system. The code is not intended to be a fault code. It is merely an operating indicator. **EXPECTED OPERATION:** All (including thermostat) operation should continue as normal. Blower operation may be slightly compromised but will continue. **CAUSE:** (1) The blower has hit the maximum speed or torque limit specified by the manufacturer because the static pressure is too high. **SOLUTION:** (1) The static pressure is too high because the ductwork is improperly designed or is restricted for some other reason or the filter needs cleaning or replacing. Remove the obstruction or repair the duct so that static pressure does not exceed published values in the specification sheets or installation instructions for the furnace.

TABLE 20

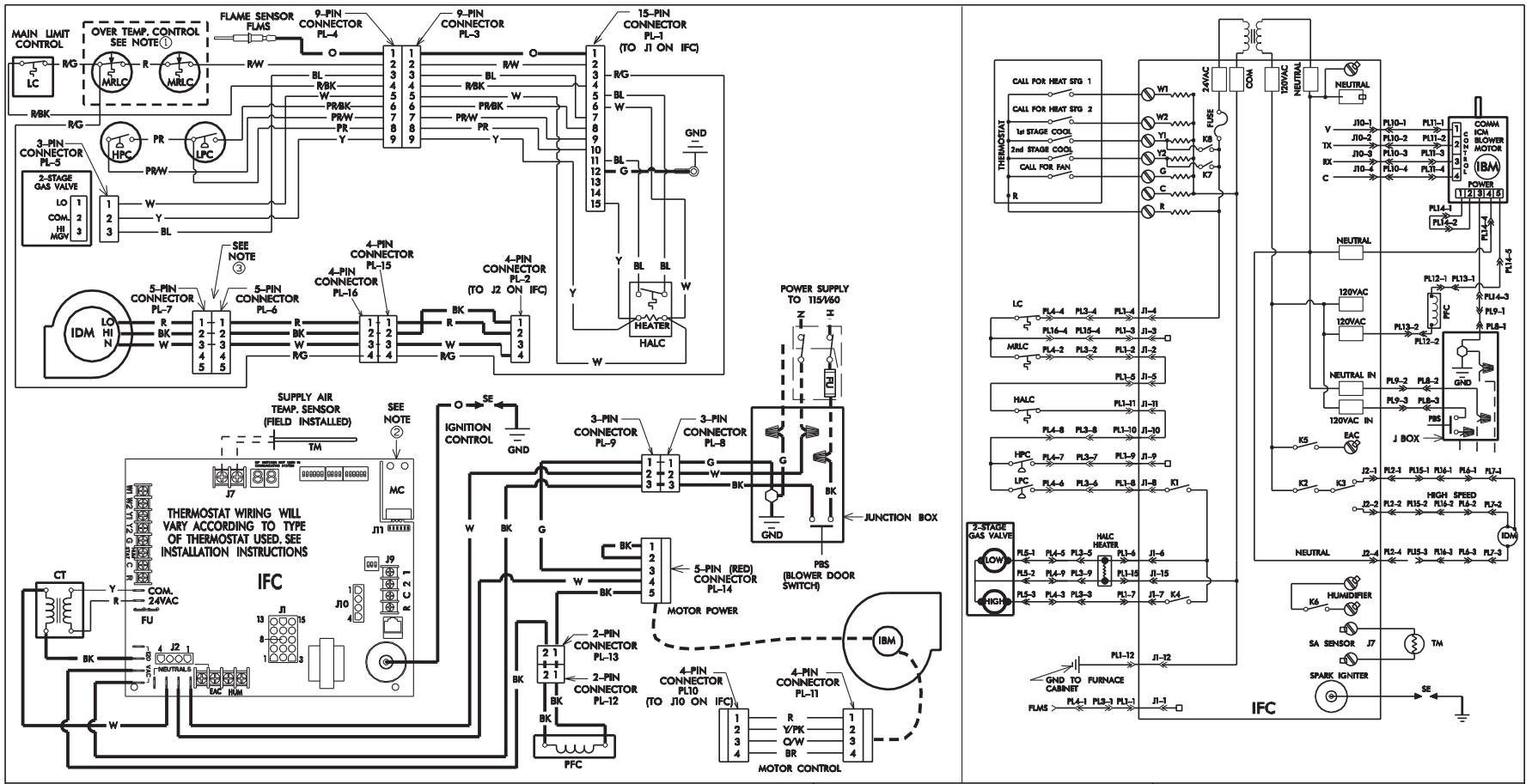
FURNACE FAULT CODES EXPANDED W/DESCRIPTIONS AND SOLUTIONS – CONTINUED

68	**NO BLoWeR COMMunications** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT:** *68* **MESSAGES TO HOMEOWNER AT COMMUNICATING THERMOSTATS:** "*CALL FOR SERVICE*" & "*CHECK FURNACE*". **MESSAGE IN FAULT AREA OF COMMUNICATING THERMOSTATS:** "*NO BLWR COMM*" **STATUS:** This is a critical fault. The furnace will not operate in any mode. **DESCRIPTION:** The furnace control (**I**.F.C.) can not communicate with the blower motor. **EXPECTED OPERATION:** If the furnace was in heating operation when this fault occurred, the gas valve will immediately close (flame will be lost), IBM (**I**ndoor Blower Motor) operation will immediately stop and the furnace will shut down normally (except without IBM operation) with IDM (**I**nduced Draft Motor) post-purge at the correct speed. After the post purge (or immediately if no heat call was present), no other operation (including thermostat calls) will occur until this fault is cleared. **CAUSE:** (1) The wires between the blower motor have been disconnected or there is a poor connection. (2) There is no line voltage to the motor. (3) The furnace shared data is faulty or corrupted. (4) The motor has failed catastrophically. **SOLUTION:** (1) Check wiring, connectors and terminals - repair or replace as necessary. (2) Check line voltage wiring, connectors and terminals to the Power Factor Correction choke and ECM motor. Repair and replace as necessary. (3) Replace the furnace memory card with the correct replacement part from ProStock. (4) Replace the motor.

TABLE 20

FURNACE FAULT CODES EXPANDED W/DESCRIPTIONS AND SOLUTIONS – CONTINUED

82	**SA (Supply Air) SENSOR FauLT** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT:** *82* (displayed only for the first five minutes after power up or not at all if "SA SESNSOR" is selected to "OFF" in the "SETUP" menu of the furnace in communicating systems only.) **MESSAGES TO HOMEOWNER AT COMMUNICATING THERMOSTATS:** (none) **MESSAGE IN FAULT AREA OF COMMUNICATING THERMOSTATS:** "*SA SENSOR FLT*" (displayed only for the first five minutes after power up or not at all if "SA SESNSOR" is selected to "OFF" in the "SETUP" menu of the furnace in communicating systems only.) **STATUS:** This is a non-critical fault and will only be displayed for the first five minutes after power-up of the furnace or not at all if "SA SENSOR" is selected to "OFF" in the "SETUP" menu of the furnace in communicating systems only. **DESCRIPTION:** The fault code indicates that the supply air sensor can not be detected by the furnace control (or I.F.C.) This may be a common problem in the field since the sensor comes unconnected and needs to be connected in the field. In many cases (particularly downflow applications) the sensor can not be installed at all because of the nature of the installation. For these reasons, the fault code has been designed to automatically stop displaying after five minutes and can even be selected to be ignored in the user menus at a communicating thermostat or field service tool. **EXPECTED OPERATION:** All (including thermostat) operation should continue as normal. Blower operation may be slightly compromised but will continue. Temperature rise may be slightly affected as an algorithm must be used to determine the optimal blower speed instead of the actual temperature rise for any given heat rate. **CAUSE:** (1) The sensor is not connected. (2) The connections or wiring between the furnace control and sensor or corrupted. (3) The sensor is faulty. Check the resistance at different temperatures if possible. If resistance is more than a few hundred ohms out of range, replace sensor. @60°F (16°C), resistance = Approx. 15,400Ω @70°F (23°C), resistance = Approx. 10,700Ω @110°F (43°C), resistance = Approx. 4600Ω @150°F (66°C), resistance = Approx. 2000Ω (4) The furnace control is faulty. **SOLUTION:** (1) Connect the sensor. (2) Check wiring, connections and terminals. Replace and repair as necessary. (3) Check the resistance of the sensor. Replace if bad. (4) Replace the furnace control.
93	**CONTROL FauLT** **CODE AT DUAL 7-SEGMENT DISPLAY OF IFC & FAULT AREA OF COMM. THERMOSTAT:** *93* **MESSAGES TO HOMEOWNER AT COMMUNICATING THERMOSTATS:** "*CALL FOR SERVICE*" & "*CHECK FURNACE*". **MESSAGE IN FAULT AREA OF COMMUNICATING THERMOSTATS:** "*CONTROL FLT*" **STATUS:** This is a critical fault. The furnace will not operate in any mode of operation. **DESCRIPTION:** This is a severe fault that should rarely (if ever) be discovered in the field. It is an indicator of an internal microprocessor fault on the furnace control (or I.F.C.) or voltage applied to the main gas valve solenoid when there should be none. **EXPECTED OPERATION:** If possible, if the furnace was in heating operation when this fault occurred, the gas valve will immediately close (flame will be lost), IBM (Indoor Blower Motor) operation will immediately stop and the furnace will shu down normally (except without IBM operation) with IDM (Induced Draft Motor) post-purge at the correct speed. After the post purge (or immediately if no heat call was present), no other operation (including thermostat calls) will occur until this fault is cleared. However, this fault may also indicate an internal microprocessor failure. This may mean that the heat call will not end as expected and that all outputs will be de-energized and gas valve closed immediately when the fault is sensed. **CAUSE:** (1) 24VAC or similar voltage applied to the main gas valve solenoid circuit unexpectedly. (2) Furnace control software test failure - failed furnace control (or I.F.C.). **SOLUTION:** (1) Check for miswiring in the furnace. (2) Replace the furnace control (or I.F.C.).



COMPONENT CODE

C	COMMON
CT	CONTROL TRANSFORMER
DISC	DISCONNECT SWITCH
FLMS	FLAME SENSOR
FU	FUSE
GND	GROUND
HALC	HEAT ASSISTED LIMIT CONTROL
HPC	HIGH PRESSURE CONTROL
IBM	INDOOR BLOWER MOTOR
IDM	INDUCED DRAFT MOTOR
IFC	INTEGRATED FURNACE CONTROL
LC	LIMIT CONTROL
LPC	LOW PRESSURE CONTROL
M	MAIN
MC	MEMORY CARD
MGV	MAIN GAS VALVE
MRLC	MAN. RESET LIMIT CONTROL
PBS	PUSH BUTTON SWITCH
PFC	POWER FACTOR CHOKE
PL	PLUG
RC	RUN CAPACITOR
SE	SPARK ELECTRODE
TM	THERMISTOR
⚠	WIRE NUT

NOTES:

① OVER TEMP/ROLLOUT MANUAL RESET LIMIT CONTROLS (MRLC) UP TO 2 MAXIMUM.

② BREAK AWAY MEMORY CARD AND KEEP WITH FURNACE WHEN REPLACING IFC.

③ 50K AND 75K BTUH MODELS HAVE 4-PIN CONNECTORS FOR THE INDUCED DRAFT MOTOR.

WIRING INFORMATION

LINE VOLTAGE
- -FACTORY STANDARD
- -FACTORY OPTION
- -FIELD INSTALLED

LOW VOLTAGE
- -FACTORY STANDARD
- -FACTORY OPTION
- -FIELD INSTALLED

REPLACEMENT WIRE
- -MUST BE THE SAME SIZE AND TYPE OF INSULATION AS ORIGINAL (105 C°MIN.)

WARNING
- -CABINET MUST BE PERMANENTLY GROUNDED AND CONFORM TO I.E.C., N.E.C., C.E.C. AND LOCAL CODES AS APPLICABLE.

WIRE COLOR CODE

BK	BLACK	GY	GRAY	R	RED
BR	BROWN	O	ORANGE	W	WHITE
BL	BLUE	PK	PINK	Y	YELLOW
G	GREEN	PR	PURPLE		

ELECTRICAL WIRING DIAGRAM

**UPFLOW /HORIZONTAL – DOWNFLOW
BLOWER INDUCED DRAFT
2-STAGE, COMMUNICATING
80PLUS GAS FIRED FORCED
AIR FURNACE
DIRECT SPARK IGNITION**

DR. BY	APP. BY	DATE	DWG. NO.	REV
MGR		9-8-08	90-24314-07	01

THERMOSTATS

NON-COMMUNICATING THERMOSTATS

THERMOSTAT WIRING

NOTE: Do not use 24 volt control wire smaller than No. 18 AWG.

Wire all non-communicating thermostats to the 24V connections on the integrated furnace control. See Figures 48 and 49.

NOTE: A larger wire gage may be be required for longer lengths of thermostat wire.

For proper installation of the Variable Output Thermostat, follow the "Thermostat Installation, Programming and Troubleshooting Manual" included as section II of this manual. For proper installation of a Single-Stage or Two-Stage Thermostat, see the Installation Instructions included with the thermostat.

SEQUENCE OF OPERATION

See the section of this book titled "Electrical Wiring - Thermostat" for a wiring diagram showing how to connect a thermostat.

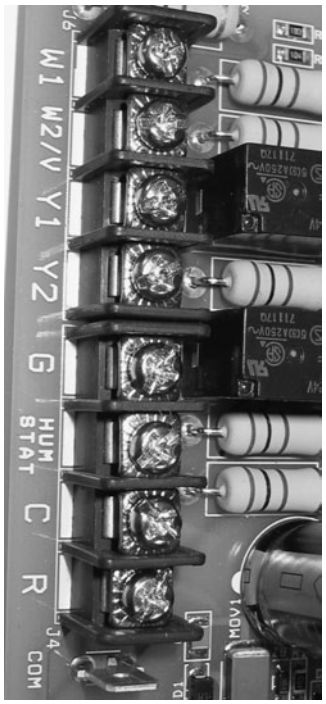
SINGLE-STAGE HEAT THERMOSTAT

NOTE: Single-stage heat operation is determined by the position of dipswitches SW1-3 options are: 7 minutes between 1st and 2nd stage, or OFF.

For single-stage operation, "W" from the thermostat must be connected to "W" on the furnace control.

a. Connect the "W" terminal on the thermostat to the "W" terminal on the control board.
b. When there is a call for heat, the "R" and "W" contacts close and the IFC runs a self check routine to verify that the pressure switch contacts are open. The limit switch contacts are constantly monitored.
c. The induced draft motor starts on high until the low pressure switch contacts close (a maximum of 60 seconds), and then changes to low speed. After a 30 second pre-purge, the spark ignitor energizes and the low fire gas valve opens, lighting the burners.
d. After the gas valve opens, the remote flame sensor must prove ignition for one second using the process of flame rectification. If the burners do not light, the system goes through another ignition sequence. It does this up to 4 times. (2 tries on low fire and 2 tries on high fire.)

FIGURE 47
24-VOLT TERMINALS



➢ e. The main blower starts on low heat speed 30 seconds after the flame is sensed. The furnace operates on low fire for 5 or 12 minutes and then, if the thermostat is not satisfied, shifts to high fire, causing the draft inducer to go to high speed, the gas valve to shift to 100% and the main blower goes to high heat speed.
f. When the thermostat cycle ends, the gas valve closes, and the burners go out.
g. The draft inducer will continue running for a 10 second (low speed) or 5 second (high speed) post purge.
➢ h. The main blower runs for 50-140 seconds on high heat speed or 80-170 seconds on low heat speed (this timing is field adjustable). See Figure 22 for switch settings.

Sequence if the system doesn't light or doesn't sense flame

a. If flame is not sensed within 8 seconds after the gas valve opens, the valve closes and the ignitor is de-energized. The induced draft motor will run for 60 seconds on low, and then begins another heat cycle.
b. The ignition process goes through one more try on low fire. If this fails, there are two attempts on high fire with a 30 second interpurge between trials. During high fire ignition attempts, the inducer steps to high speed, the high pressure switch closes (both pressure switches are now closed), and the gas valve steps to high fire.
c. If there is no ignition after the 2nd trial on high fire, the furnace goes into soft lockout for one hour.
d. The sequence repeats after a one hour delay and continues repeating until ignition is successful or the call for heat is terminated.
e. To reset the lockout, break power either at the thermostat or at the unit disconnect switch for 5 to 10 seconds. The furnace then goes through another set of trials for ignition (provided call for heat is still present).
f. If flame is established and maintained during the trial for ignition period and flame is lost, the gas valve is de-energized, the draft inducer continues to run, and control begins timing the inter-purge delay. The indoor blower motor will be energized and/or remain energized on low speed for low fire and heat speed for high fire for the selected delay off time.

When the inter-purge delay is over, the control initiates another ignition trial period. The control will recycle up to 5 flame losses (4 recycles) within a single call for heat before going into lockout.

TWO STAGE HEAT THERMOSTAT
Connect "W1" and "W2" terminals on the thermostat to "W" and "W2" terminals on the control board.

See the section of this book titled "Electrical Wiring - Thermostat" for a wiring diagram showing how to connect a thermostat.

Call for 1st stage heat

a. The "R" and "W" thermostat contacts close and the control module runs a self-check routine. After the control module verifies that both sets of pressure switch contacts are open, the induced draft motor starts on high until the low pressure switch contacts close (a maximum of 60 seconds), then changes to low speed.
b. After a 30 second pre-purge the spark igniter energizes and the low fire gas valve opens, lighting the burners.

c. After the burners light, the remote flame sensor must prove ignition. If the burners do not light, the system goes through another ignition sequence. It does this up to 4 times (2 attempts on low fire and 2 tries on high fire).
d. The main blower starts on low-heat speed 30 seconds after the flame is proven. The furnace continues to run on low fire until the call for heat is satisfied or the 2nd stage contacts close. If the 1st stage call for heat is satisfied the gas valve closes and the induced draft motor continues running for a 10 second post purge time. the main blower runs for its blower off delay (this timing is field adjustable). See Figure 36 for switch settings (SW2-3 & SW2-3).

Call for 2nd stage heat after 1st stage

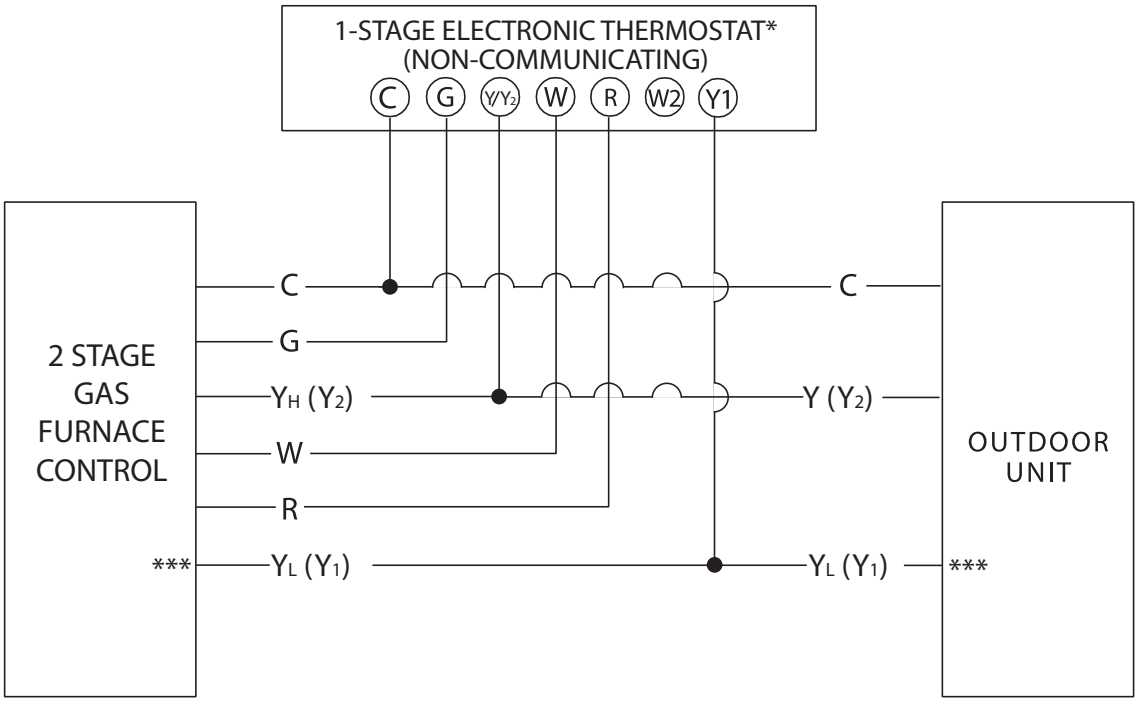
The “R” and “W2” thermostat contacts close, calling for 2 stage heat. The induced draft motor switches to high speed and the high pressure switch contacts close. The gas valve switches to high fire and the main blower switches to high heat speed.

2nd stage heat satisfied, 1st stage heat still required

The “R” and “W2” thermostat contacts open. The induced draft motor switches to low speed, the main blower motor switches to low heat speed and the gas valve changes to low fire. The furnace continues to run in this mode until the 1st stage heat call is satisfied. The system will shut down as noted in “d,” under 1st stage call for heat.

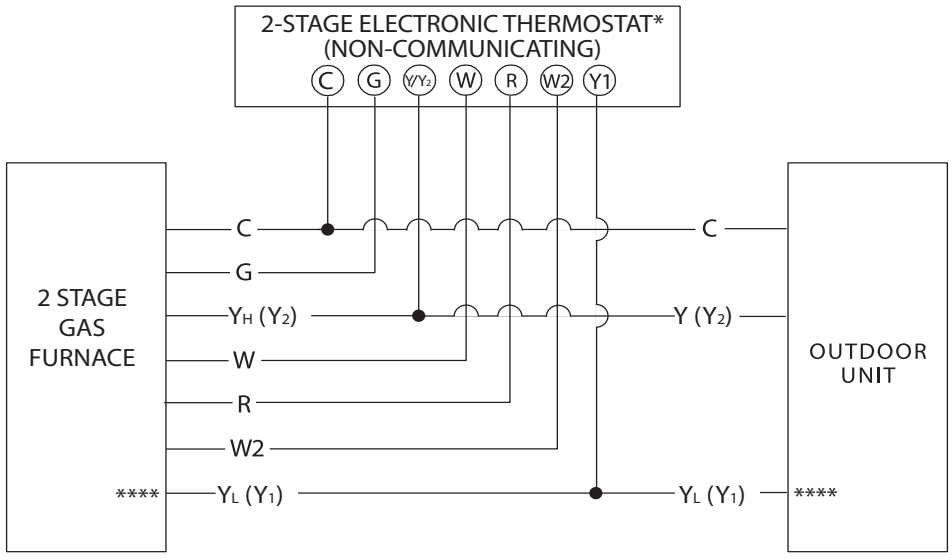
NOTE: Under extreme cold conditions, the 2-stage thermostat may call for the furnace to cycle between 1st and 2nd stage operation.

FIGURE 48
WIRING DIAGRAM FOR SINGLE-STAGE HEAT (NON-COMMUNICATING)



* NO MECHANICAL THERMOSTATS.
*** 2 STG. COOLING ONLY.

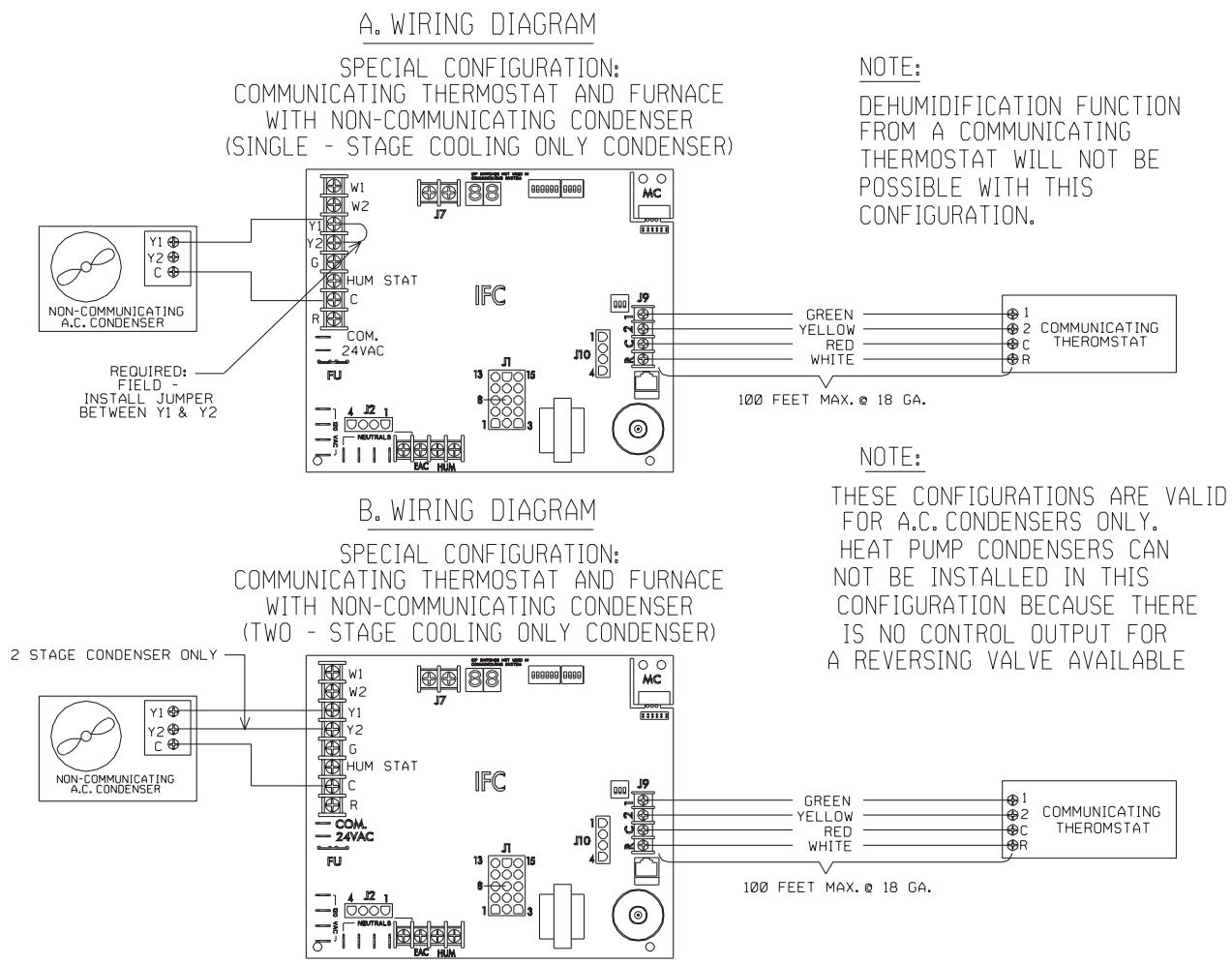
FIGURE 49
WIRING DIAGRAM FROM TWO-STAGE HEAT (NON-COMMUNICATING)



* NO MECHANICAL THERMOSTATS.
**** 2 STAGE COOLING ONLY.

FIGURE 50

WIRING DIAGRAM – SPECIAL CONFIGURATION: COMMUNICATING THERMOSTAT AND FURNACE WITH NON-COMMUNICATING CONDENSER



COMMUNICATING THERMOSTATS

COMMUNICATING THERMOSTATS

The furnace is capable of communicating with a thermostat and condenser to improve cooling and heat-pump airflow, displaying active faults and active furnace information at the thermostat and improved diagnostics and troubleshooting.

WIRING A FURNACE FOR COMMUNICATIONS

MAXIMUM COMMUNICATING WIRE LENGTHS (1, 2, R & C)

Max Wire Length – Thermostat to Furnace = **100 FT** @ 18 AWG*

Max Wire Length – Furnace to Condenser = **125 FT** @ 18 AWG*

Notes:

1. When using twisted pairs, be sure the wires connected to pins labeled “1” (recommended wire color = green) and “2” (recommended wire color = yellow) are a twisted pair.
2. Wires may be solid or stranded.
3. *Wire gage smaller than 18 AWG is not approved or recommended for this application.
4. When using existing wire from a previous installation, be sure to trim the tip of the wire back past the insulation and strip a small amount of insulation from the wire to expose clean new copper for the communicating connections. Fresh copper must be exposed when making the communicating connections or communications may not be properly established.

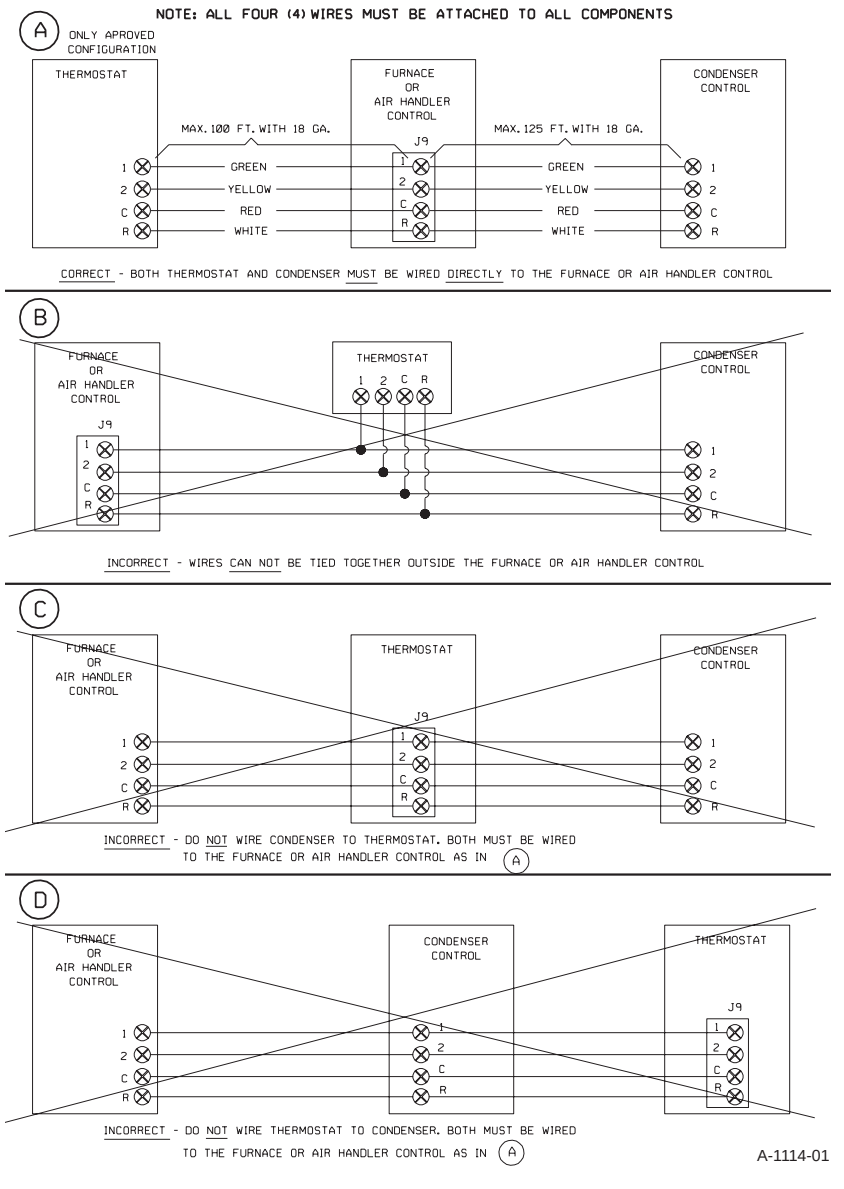
Figures 51 through 52 are wiring diagrams for connecting the furnace to an approved ClimateTalk communicating thermostat and approved Rheem or Ruud communicating condenser.

The only approved configuration for fully communicating systems is to install dedicated wires directly from the furnace to the thermostat and a separate set of dedicated wires directly from the furnace to the condenser. Note: The only approved configuration for systems with a communicating condenser requires that four dedicated wires (1, 2, R and C) be installed from the furnace to the condenser.

TWO NOTES ABOUT COMMUNICATING THERMOSTATS

1. When power to the thermostat has been reset and/or the batteries are replaced, the thermostat will respond quickly to changes in room temperature as indicated by the room temperature displayed at the thermostat. However, after a two-hour period, this will change and the thermostat will take as long as five minutes for every degree F to change the display. Therefore, for example a rapid change of five degrees in room temperature will not be correctly indicated at the thermostat for (up to) 25 minutes. This is done to buffer the thermostat against rapid and insignificant swings in temperature caused by briefly opening a door or window. This operation prevents excessive cycling of the thermostat and is a feature used in all modern thermostats.
2. For dual-fuel systems, once the thermostat has switched over to auxiliary heat (e.g. gas heat), subsequent heat calls may also immediately begin with auxiliary heat regardless of the dual-fuel changeover point and the actual outdoor temperature or the difference between room temperatures and setpoint. This is true as long as the subsequent heat call is within 12 minutes or less of end of the previous heat call. The actual time between heat calls that will cause this operation varies but should not exceed 12 minutes.

FIGURE 51
WIRING DIAGRAM – COMMUNICATING CONFIGURATION



SPECIAL CONFIGURATION – COMMUNICATING THERMOSTAT AND FURNACE WITH A NON-COMMUNICATING CONDENSER

Y1 and Y2 – These terminals may be used to connect directly to a non-communicating condenser when a communicating thermostat is installed to the furnace but a non-communicating condenser is installed in the system. While the optimum configuration is with a communicating condenser connected to the network, there may be installations where this is not desired. In these cases, the thermostat will be communicating with the furnace control and the furnace control will energize the condenser as necessary (the additional relays have been added to the furnace control to allow this operation).

The thermostat connections labeled "Y1" and "Y2" on the I.F.C. are normally ***inputs*** to the furnace control to turn on the blower when they are energized. However, in this configuration, these (normally) inputs become ***outputs*** to energize the condenser when a cooling call has been sent from the communicating thermostat.

When this configuration is desired, use the wiring diagram in Figure 52 to connect the thermostat and condenser to the furnace control.

For single stage condensers, a jumper must be installed between Y1 & Y2 at the furnace control.

NOTE: A heat pump condenser cannot be installed with this configuration. There is no control for the reversing valve.

STARTUP FOR SYSTEMS CONFIGURED WITH COMMUNICATIONS

⚠ WARNING

INSTALLATION OF LINE VOLTAGE AND GAS MUST BE PERFORMED ACCORDING TO INSTRUCTIONS WRITTEN IN THIS MANUAL. FAILURE TO DO SO COULD RESULT IN INJURY OR DEATH.

When the furnace is configured for communications, the components on the network (i.e. furnace, thermostat and condenser) must establish communications before engaging a heat (or other) thermostat demand. The procedure for establishing communications is automatic and is described below. Once communications is established, the start-up procedure will be the same as the general start-up instructions described in the section of this manual titled ***START-UP PROCEDURES***.

Once the communicating wiring is properly installed and the furnace is connected to line voltage, the system can be turned on. The thermostat will display the following text:

SEARCHING

is displayed several times for several seconds. Next, the text

FURNACE FOUND

and

AIR CONDITIONER FOUND

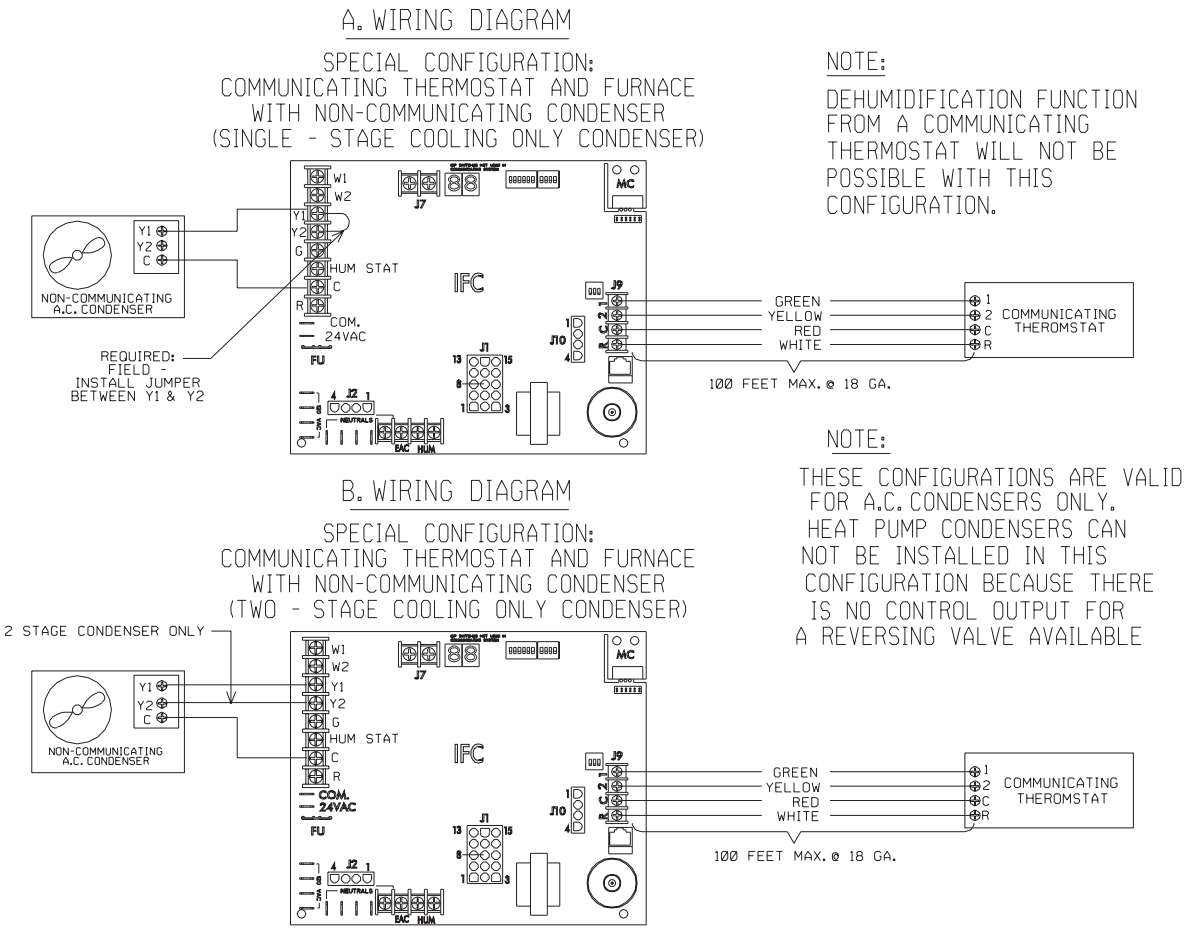
or

HEAT PUMP FOUND

(depending on which is installed in the system) will be displayed. The process can take several minutes (up to a maximum of 30) to complete. If these messages are not displayed within 30 minutes after energizing the system, communications can not be established. There are many reasons why communications may not be established – including improper settings of the "TERM" and "BIAS" switches (see BIAS / TERMINATION) and improper wiring (see ***WIRING A FURNACE FOR COMMUNICATIONS*** above).

FIGURE 52

WIRING DIAGRAM – SPECIAL CONFIGURATION: COMMUNICATING THERMOSTAT AND FURNACE WITH NON-COMMUNICATING CONDENSER



The order in which these messages will be displayed will depend on which components are energized first. The order listed here assumes that the furnace and condenser are energized at the same time. If not, the order of display will be in the order that the components are turned on.

When the system has found all necessary components, the text area of the communicating thermostat will go blank. This is an indicator that the system is operating properly. Proceed by engaging a typical thermostat call to determine if operation is correct as described in the section of this book titled START UP PROCEDURES" to test heating, cooling and fan operation and to make necessary adjustments.

ACTIVE FAULT CODES WITH COMMUNICATING SYSTEMS

Two levels of fault codes exist: (1) Non-critical and (2) Critical. In general a non-critical fault permits all (or nearly all) operations to proceed and a critical fault prevents all (or nearly all) operations from proceeding. Detailed explanations are given for each fault code and how to diagnose and troubleshoot problems by fault code displayed in the "TROUBLSHOOTING" section of this manual.

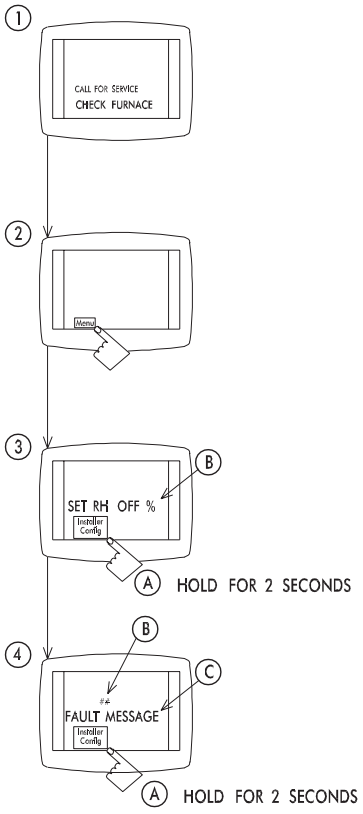
Active faults of either level will be displayed at the thermostat in the "ACTIVE FAULT" area of the thermostat. To enter the furnace "ACTIVE FAULT" area using a communicating thermostat, see the installation and operation instructions for that thermostat.

For detailed user menu text, navigation and descriptions, refer to the section of this manual titled ***COMMUNICATING SYSTEMS*** under the subsection titled ***USER MENUS***.

Below describes some basic methods for entering and viewing furnace fault messages and user menus for two different communicating thermostats available at the time of publication of this manual. Further setup and installation information on these thermostats can be found in their respective installation and operation instructions.

FIGURE 53

VIEWING DETAILED FAULT MESSAGES ON THE (-)HC-TST501CMMS COMMUNICATING THERMOSTAT



THERE ARE TWO TYPES OF FAULTS THAT CAN BE ACTIVE AT ANY GIVEN TIME

(1) CRITICAL FAULTS

(2) NON–CRITICAL FAULTS

CRITICAL FAULTS PREVENT THE FURNACE FROM OPERATING. WHEN THERE IS A CRITICAL FAULT A "CALL FOR SERVICE" ICON WIL BE DISPLAYED AND THE TEXT "CHECK FURNACE" WILL BE DISPLAYED IN THE TEXT AREA.

TO VIEW EITHER FAULT TYPE (CRITICAL OR NON–CRITICAL), FIRST PRESS THE "MENU" BUTTON.

PRESS (AND HOLD DOWN FOR 2 SECONDS) THE "INSTALLER CONFIG" BUTTON (A) . THE TEXT "SET RH OFF %" (OR SIMILAR) WILL BE DISPLAYED IN THE TEXT AREA (B) .

PRESS (AND HOLD DOWN FOR 2 SECONDS) THE "INSTALLER CONFIG" BUTTON (A) UNTIL A FAULT CODE NUMBER (B) AND MESSAGE (C) IS DISPLAYED.

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(-)HC-TST501CMMS PROGRAMMABLE COMMUNICATING THERMOSTAT

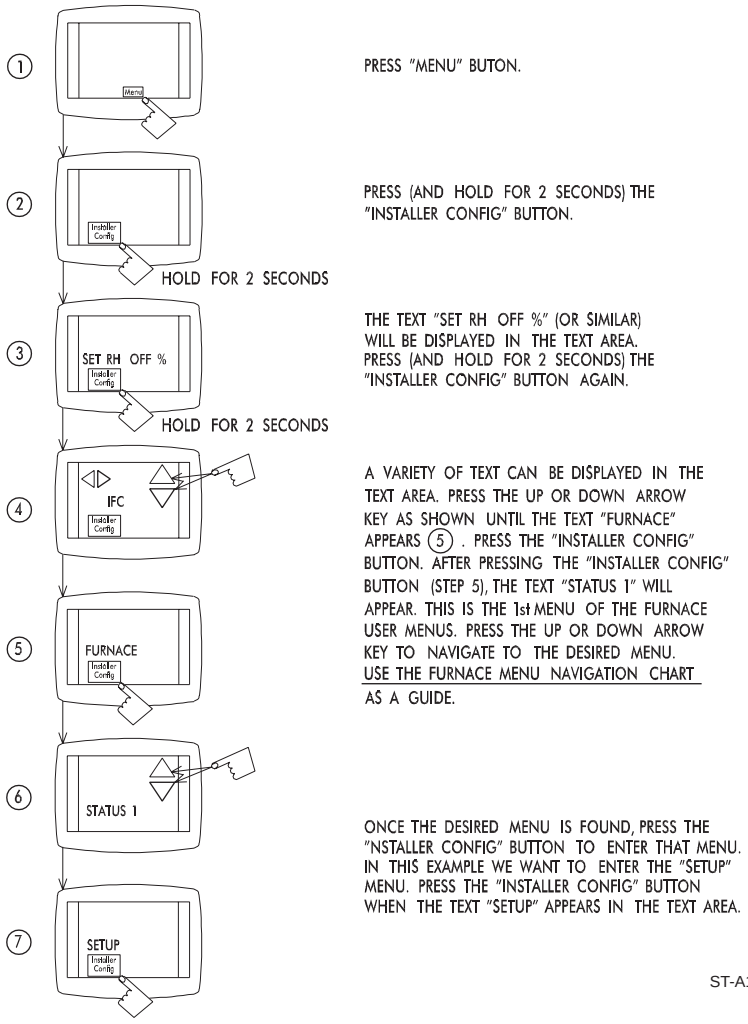
TIPS FOR NAVIGATING FURNACE USER MENUS USING THE (-)HC-TST501CMMS THERMOSTAT

NOTE: The (-)HC-TST501CMMS thermostat does not have built-in humidification control in heating mode (or any other mode). However, dehumidification is possible in cooling. If humidification control is required, a separate humidistat or a communicating thermostat with humidification capability (such as (-)HC-TST550CMMS) must be used. (See the section of this manual titled Accessories, Humidification and Dehumidification for wiring of a separate humidistat.)

Viewing the Active Faults: Figure 53 demonstrates how to view the furnace active faults with the (-)HC-TST501CMMS communicating thermostat.

Entering and Viewing the Furnace Main Menu and Sub Menus: Figure 54 demonstrates how to view and enter the furnace user menu and subsequent sub-menus with the (-)HCTST501CMMS communicating thermostat. To get into the submenus, use the up and down arrow keys of the thermostat to display the desired menu and press the "Installer Config" button on the thermostat to enter that menu.

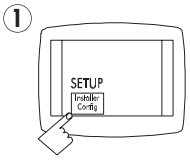
FIGURE 54



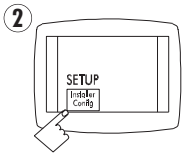
Making Setup Changes: Figure 55 demonstrates how to make changes to the SETUP sub-menu with the (-)HC-TST501CMMS communicating thermostat.

FIGURE 55

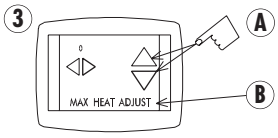
EXAMPLE – CHANGING ITEMS IN THE "SETUP" MENU OF THE (–)HC_TST50/CMMS COMMUNICATING THERMOSTAT



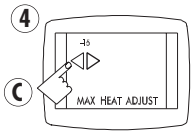
IN THIS EXAMPLE, WE WANT TO CHANGE THE "MAX HEAT ADJUST" TO –15%. FIRST, ENTER THE SETUP MENU AS DESCRIBED IN "ENTERING THE FURNACE MAIN MENU"



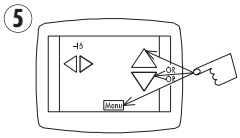
AFTER ENTERING THE "SETUP" MENU OF THE FURNACE (SEE STEP 7 IN FIGURE 54), THERE WILL BE SEVERAL VALUES THAT CAN BE CHANGED BY THE INSTALLER (BASED ON NEEDS OF THE INSTALLATION). THESE VALUES CAN BE CHANGED TO THE DESIRED SETTING BY PRESSING THE LEFT OR RIGHT ARROW KEYS UNTIL THE DESIRED VALUE IS DISPLAYED AND THEN PRESSING EITHER THE UP OR DOWN ARROW KEY OR THE "MENU" KEY. AN EXAMPLE FOLLOWS:



PRESS THE UP OR DOWN ARROW KEY Ⓐ UNTIL THE TEXT "MAX HEAT ADJUST" IS DISPLAYED Ⓑ.



THE TEXT "0" IS DISPLAYED IN THE UPPER LEFT-HAND CORNER OF THE THERMOSTAT. PRESS THE LEFT OR RIGHT ARROW KEY A UNTIL THE TEXT "–15" IS DISPLAYED IN THE CORNER Ⓒ.



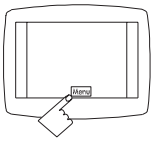
PRESS THE UP OR DOWN ARROW KEY OR THE "MENU" KEY TO SET THE VALUE. IF THE "MENU" KEY IS PRESSED, THE PREVIOUS MENU SCREEN WILL BE SHOWN – BUT, THE NEW VALUE (–15) WILL BE SET.

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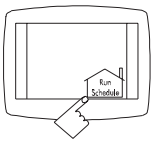
Escaping or Returning from Menus:
Figure 56 demonstrates how to escape from a menu back to the main screen or how to return to a previous menu level using the (-)HC-TST501CMMS communicating thermostat.

FIGURE 56

ESCAPING OR RETURNING FROM MENUS IN THE (–)HC–TST501CMMS COMMUNICATING THERMOSTAT



ONCE A MENU ITEM IS SELECTED, YOU CAN RETURN TO THE PREVIOUS LEVEL BY PRESSING THE "MENU" BUTTON. THIS BUTTON IS USEFUL WHENEVER IT IS NECESSARY TO GO BACK TO THE PREVIOUS MENU FROM ANY MENU.



TO RETURN TO THE MAIN SCREEN (TOP LEVEL WITH TEMPERATURE AND SETPOINT DISPLAYED) YOU CAN ALWAYS EITHER PUSH THE "RUN SCHEDULE" BUTTON (TEXT INSIDE HOUSE ICON) OR WAIT A FEW MINUTES AND THE THERMOSTAT WILL AUTOMATICALLY RETURN TO THE TOP SCREEN AFTER A TIMEOUT PERIOD.

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(-)HC-TST550CMMS FULL COLOR, PROGRAMMABLE COMMUNICATING THERMOSTAT

TIPS FOR NAVIGATING FURNACE USER MENUS USING THE (-)HC-TST550CMMS THERMOSTAT

VIEWING FURNACE FAULT MESSAGES WITH THE (-)HC-TST550CMMS THERMOSTAT

To enter a particular user menu on the (-)HC-TST550CMMS, full color communicating thermostat follow the directions below.

FIGURE 57
ENTER THE *ADVANCED INSTALLER MENU*



1. From the main screen, press the left and right arrow keys together at the same time for at least 3 seconds. The next screen below will appear. (Note that Call for Service appears at the bottom of the screen. This is an indicator that the fault messages should be viewed to determine the cause of the fault.)

FIGURE 58
SELECT *FAULT STATUS*



2. The ***ADVANCED INSTALLER MENU*** is displayed. Use the up and down arrow keys to highlight ***Fault Status***.
   Next, press the "***M***" key. The next screen below will appears

FIGURE 59
FAULT MESSAGE (IF ANY) *(MAIN LIMIT OPEN)* DISPLAYED.



3. The ***Fault Status*** screen will appear with a description of the current fault (if any). Use the section of this manual titled ***FURNACE FAULT CODES EXPANDED WITH DESCRIPTIONS AND SOLUTIONS*** for a full explanation of the fault and possible solution(s). To escape from this menu, press the ***Enter*** (to return to the furnace user menus) or ***Home*** button or just wait a few minutes and the main screen will appear again.

VIEWING FURNACE USER MENUS WITH THE (-)HC-TST550CMMS THERMOSTAT

To enter a particular user menu on the (-)HC-TST550CMMS, full color communicating thermostat follow the directions below.

Use the section of this manual titled ***Communicating Systems*** under the sub-section titled ***User Menus*** to navigate through the user menus.

FIGURE 60
ENTER THE *ADVANCED INSTALLER MENU.*



1. From the main screen, press the left and right arrow keys together at the same time for at least 3 seconds. The next screen below will appear.

FIGURE 61
NAVIGATING TO *COMMUNICATING DEVICES* AND SELECT.



2. The ***ADVANCED INSTALLER MENU*** is displayed. Use the up and down arrow keys to highlight ***Communicating Devices***. Next, press the "***M***' key. The next screen below will appear.

FIGURE 62
NAVIGATE TO *FURNACE* AND SELECT.



3. From the devices listed, use the up and down arrow keys to highlight the selection titled ***Furnace***. Next, Press the "***M***' Key. The next screen below will appear.

FIGURE 63
NAVIGATE TO DESIRED USER MENU AND SELECT.



4. The furnace menu options will appear. Use the up and down arrow keys to select the desired menu. Next, press "***M***' to enter the desired menu. Next, the next screen below will appear.

FIGURE 64
NAVIGATE THE USER MENUS USING UP AND DOWN ARROW KEYS.



5. Use the up and down arrow keys to view the menu items.
6. To escape from this menu, press the ***Enter*** (to return to the furnace user menus) or ***Home*** button or just wait a few minutes and the main screen will appear again.

CHANGING FURNACE SETUP ITEMS ON THE (-)HC-TST550CMMS THERMOSTAT

To change a particular furnace user setup item on the (-)HC-TST550CMMS, full color communicating thermostat follow the directions below.

Use the section of this manual titled ***Communicating Systems*** under the sub-section titled ***User Menus*** to navigate through the setup user menus.

FIGURE 65
ENTER THE *ADVANCED INSTALLER MENU.*



1. From the main screen, press the left and right arrow keys together at the same time for at least 3 seconds. The next screen below will appear.

FIGURE 66
IN THE *ADVANCED INSTALLER MENU* SELECT *COMMUNICATING DEVICES.*



2. The ***ADVANCED INSTALLER MENU*** is displayed. Use the up and down arrow keys to highlight Communicating Devices. Next, press the "***M***" key. The next screen below will appear.

FIGURE 67
SELECT *FURNACE* FROM THE LIST OF *COMMUNICATING DEVICES.*



3. From the devices listed, use the up and down arrow keys to highlight the selection titled ***Furnace***. Next, Press the "***M***" Key. The next screen below will appear.

FIGURE 68
SELECT *SETUP* FROM THE LIST OF *FURNACE* MENUS.



4. The furnace menu options will appear. Use the up and down arrow keys to navigate to the ***SETUP*** menu. Press "***M***" to enter the menu. Next, the next screen below will appear.

FIGURE 69
SELECT THE SETUP ITEM TO BE ADJUSTED *(MAX HEAT ADJ%).*



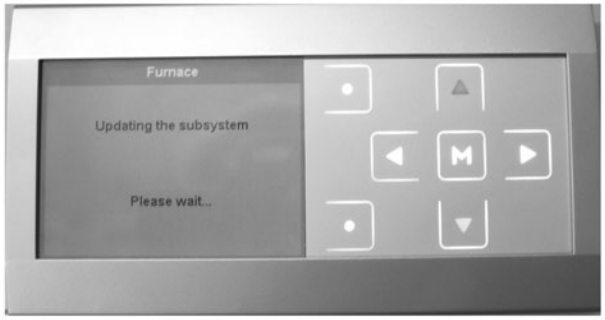
5. Use the up and down arrow keys to view and navigate to the desired setup menu item. Once the desired menu item is highlighted, press the "***M***" key to enter the sub menu. In this example, we will change the ***MAX HEAT Adj%*** (currently set to 0%)

FIGURE 70
SELECT THE DESIRED VALUE (7).



6. Use the up and down arrow keys to view and navigate to the desired setup selection. Once the desired menu item is highlighted, press the "***M***" key to change the selection. In this example, we will change the ***MAX HEAT Adj%*** (currently set to 0%) to +***7***%

FIGURE 71
UPDATING THE SUBSYSTEM.



7. This screen; ***Updating the Subsystem*** will be displayed briefly while the system updates the setting.

FIGURE 72
UPDATE SUCCESSFUL.



8. This screen; ***Update Successful*** will be displayed briefly upon successfully changing the setting.
9. To escape from this menu, press the ***Enter*** (to return to the furnace user menus) or ***Home*** button or just wait a few minutes and the main screen will appear again.