



SUPPLEMENTARY SOLID FUEL FURNACE MODELS 311 & 411

DAKA Corporation . Rte 3 Box 65F . Pine City MN 55063 . 612/629-6737

INSTALLATION AND OPERATION INSTRUCTION MANUAL

Note: This model has been tested and listed in accordance with Underwriters Laboratories standard UL 391 for Solid Fuel Central and Supplementary Furnaces by Warnock Hersey International, Inc.

PRINCIPLE OF OPERATION:

As a supplementary furnace, this model is connected in parallel to a conventional primary furnace system, utilizing present ductwork to distribute wood-heated air throughout the home with the assistance of the primary furnace blower. As long as the heat produced by the supplementary furnace keeps the living area temperature above the setting on the primary furnace wall thermostat, the primary furnace should burn little gas, oil or use any electricity beyond that required to run the primary distribution blower. Should the wood fire fail to provide sufficient heat, however, the primary furnace will begin operating as usual. See Figure 1 for illustration of typical installation.

CAUTIONARY NOTES:

1. This furnace is designed for use only in conventional upflow systems, and must deliver heated air to a supply (warm air) plenum, never to ductwork. The warm air supply from this furnace must never be connected to the cold-air return inlet of a central primary furnace, as a possibility exists of components of the central furnace overheating and causing the central furnace to operate other than as intended. Do not use as freestanding stove.
2. Installation of this unit must be performed by a qualified installer familiar with solid-fuel systems.
3. This furnace must be connected to minimum 6" listed low-heat appliance type chimney, or a code-complying tile lined masonry chimney. Connection to a chimney flue serving another appliance is prohibited. Install according to manufacturer's instructions.
4. A barometric regulator/damper must be used in the chimney connector (smoke pipe leading to chimney flue) and must be set to maintain no more than .04" water column updraft. (DAKA barometric regulator #283 with adjustable settings available at extra cost.)
5. Installation of this furnace in mobile homes is prohibited.
6. This furnace must be installed with the following clearances to combustible surfaces:

To side wall:	18"	To front wall	48"
To back wall	28"	Flue pipe to side wall	27"
		Flue pipe to back wall	18"

See Figure 2 for ductwork clearances required, and Figure 3 for a diagram of furnace clearances.

For more information, including instructions for installations requiring reduced clearances, please write for publication NFPA 211 from:

NATIONAL FIRE PROTECTION ASSOCIATION, INC.
PUBLICATION SALES DEPARTMENT
BATTERYMARCH PARK
QUINCY, MA. 02269

7. Check local building and mechanical codes prior to installation to insure conformance with all requirements; review home insurance policy for coverage.
8. Minimum 6" chimney connector must be of minimum 24-ga. pipe with each section joined with three sheet metal screws, with all fissures sealed with furnace cement. Do not use galvanized pipe as the coating could melt and cause toxic fumes..
9. These furnaces have been designed to operate with a maximum warm air duct pressure of 0.20" water column and a maximum warm air duct temperature of 200°F. When used in a supplementary "add-on" mode, check the nameplate on the primary furnace to determine compatibility.
10. When any supplementary furnace is connected in parallel to an existing primary central furnace, a back-draft damper must be installed in the plenum of the primary furnace below the warm air inlet from the supplementary furnace to prevent the primary furnace from operating in an unintended manner; see Fig. 1 for an illustration of the position of this damper.
11. Installation on a non-combustible floor surface, such as concrete or 3/8" asbestos millboard, is required. Non-combustible surface must extend at least 16" in front and 8" to side of unit, under the chimney connector and at least 2" to each side of connector.

DANGER - RISK OF FIRE OR EXPLOSION - DO NOT BURN GARBAGE, GASOLINE, DRAIN OIL OR OTHER FLAMMABLE LIQUIDS.

WARNING - RISK OF FIRE - DO NOT OPERATE WITH FLUE DRAFT EXCEEDING .04" WATER COLUMN. DO NOT OPERATE WITH FUEL LOADING OR ASH REMOVAL DOORS OPEN. DO NOT STORE FUEL OR OTHER COMBUSTIBLE MATERIAL WITHIN MARKED INSTALLATION CLEARANCES. INSPECT AND CLEAN FLUES AND CHIMNEY REGULARLY.

CAUTION - HOT SURFACES - KEEP CHILDREN AWAY. DO NOT TOUCH DURING OPERATION. MAXIMUM DRAFT MARKED ON NAMEPLATE.

DISPOSAL OF ASHES:

Ashes should be placed in a metal container with a tight fitting lid. The closed container of ashes should be placed on a non-combustible

floor or on the ground, well away from all combustible materials, pending final disposal. If the ashes are disposed of by burial in the soil or otherwise locally dispersed, they should be retained in the closed container until all cinders have thoroughly cooled.

CREOSOTE - FORMATION AND NEED FOR REMOVAL

When wood is burned slowly, it produces tar and other organic vapors, which combine with expelled moisture to form creosote. The creosote vapors condense in the relatively cool chimney flue of a slow-burning fire. As a result, creosote residue accumulates on the flue lining. When ignited this creosote makes an extremely hot fire.

INSTALLATION INSTRUCTIONS:

I. Unpacking

Remove all component parts from firebox for assembly; check piece count against parts list on last page of this manual.

Parts Shortage: Call or write factory immediately; provide model number and serial number of furnace, found on top mounted data plate, along with a description and quantity of missing parts.

Concealed Damage: If any components have been damaged in transit, advise the dealer from whom the furnace was purchased of the nature of the problem, so that a freight claim can be filed.

II. FURNACE ASSEMBLY

NOTE: Furnace is shipped with air jacket already fitted and installed. If it has worked loose during shipping or unpacking, do the following:

1. Remove air jacket top (Key No. 17 on parts list) by lifting up from front to back only, not side to side.
2. Ensure that bottom air jacket panel (18) is fully seated between lower bottom support angles.
3. Ensure that channels welded on air jacket sides (15 & 16) engage the lower support channels, and that the side panels are pressed tightly onto furnace around the front and back corners.
4. Reinstall the air jacket top form back to front, making sure that welded channels along inside edges of top fully engage the top edges of each of the air jacket sides.

- A. Attach firedoor (1) to door frame using hinge pin provided. Note that door features a double latch operation to limit initial swing of door to 1" on opening. Continue turning handle clockwise beyond 3 o'clock position to permit full opening of door. Close door with handle in same position, and rotate counterclockwise to lock.

- B. Insert thermal gasket (8) between ash door (7) and ash pan (9) front, and assemble using two 1/4" bolts and nuts provided.
- C. Remove cast-iron grate (10) from firebox. Install firebricks (12) along sides and back of firebox, starting at the front, by slipping brick under retaining angle iron and standing them upright on the grate support rails.

CAUTION! FIREBRICK MUST BE INSTALLED CORRECTLY OR HEAT DAMAGE MAY OCCUR!

- D. Reinstall cast-iron grate in firebox, reinforcing ribs down, resting on side rails. Insert 3" X 13½" X 1/4" steel grate spacer (11) at rear of grate in model 411 only.
- E. On furnace blower (20), remove screws holding air inlet collar in place. Using same screws, mount 6" starter collar (21) to face of blower air inlet collar.
- F. Install blower on back of furnace using four No. 12x½" screws provided.
- G. Remove cover from blower electrical junction box and uncoil twin pigtail wires. Remove one knockout plug from end of junction box.
- H. Install Smoke Flap (22) inside combustion chamber on hooks above firedoor, with bent edge to inside.

III. FURNACE CONTROL CENTER ASSEMBLY

NOTE: Furnace is designed for installation with supply connection on left side; should right side supply connection be preferred, it is possible to exchange side air jacket panels, but conduit and wiring provided will not be usable then, and will have to be replaced locally.

- A. On left side of furnace, mount Snap Disc Fan Control assembly (6) over inner two of four 13/64" holes prepunched toward top of furnace, using two No. 12-½" metal screws provided.
- B. Mount 4x4-inch Junction Box Extension Ring (4) over Snap Disc Fan Control, using two metal screws provided in prepunched holes; remove two knockout plugs from bottom of extension ring.
- C. Run the two blue electrical wires through the flexible conduit. Pass the 90° Conduit Connector and Straight Conduit Connector over each end of the wire set split end first, then screw each connector firmly into the end of the conduit.
- D. Snap the 90° connector end into the blower junction box, and the straight connector end into one knockout hole on the side mounted junction box ring.

IV. WIRING INSTRUCTIONS

WARNING: DISCONNECT ALL POWER BEFORE MAKING ELECTRICAL CONNECTIONS! FOR POWER SUPPLY CONNECTIONS, USE NO. 14 AWG OR LARGER WIRES ACCEPTABLE FOR AT LEAST 105°C. (Not provided). Check local codes for acceptable components.

- A. Using an approved conduit and connector, bring a 3-wire 120V AC 15-amp minimum electrical service to the junction box on the side of the DAKA furnace.
- B. Wire unit in accordance with wiring schematic in Figure 5. Attach one of crimp terminals provided to black (hot) power supply wire, the other to one end of one blue wire to blower. Attach crimp terminals to each side of the Snap Disc Fan Control.
- C. Check all connections for tightness and electrical safety; coil all wires within junction boxes and install blower junction box cover, and 4" square J-box Cover Plate (5)

V. CONNECTING HOT AIR OUTLET ON DAKA FURNACE TO SUPPLY PLENUM ON MAIN FURNACE

CAUTION: SUPPLY PLENUM MUST BE METAL!

- 1. Using 10" Starter Collar (19) as pattern, mark and cut a 10" hole on side of furnace warm air plenum with bottom of hole at least 6" above top of DAKA furnace. IMPORTANT: Verify beforehand that sufficient clearance is available above air conditioner coils, etc. If sufficient clearance is not available, air conditioner coil may have to be moved to a second plenum with diversion baffles for summer use. See Figure 2 for necessary plenum and ductwork clearances.
- 2. Attach a 90° sheet metal elbow to one end of a straight 10" pipe of a length sufficient to project out over the DAKA furnace; insert this 90° elbow into supply plenum of primary furnace with outlet pointing upward. Slip plenum collar over straight end of 10" pipe and push up tight against supply plenum for a good air seal.

IMPORTANT: The 90° elbow within the supply plenum forms a venturi to extract air from DAKA furnace when primary furnace blower comes on. An absence of this elbow will cause back pressure down the warm air pipe to the DAKA furnace, adversely affecting heat distribution, and possibly damaging the DAKA furnace. If space prohibits installation of 90° elbow as recommended see Fig. r for alternates.
- 3. Using 10" starter collar (19) included, attach another straight 10" pipe to top of DAKA air jacket. Join it to pipe leading to primary furnace supply plenum with another 90° elbow. For best seal, apply duct tape to all pipe joints.

VI. CONNECTING AIR INLET ON DAKA FURNACE BLOWER TO COLD AIR RETURN ON MAIN FURNACE

NOTE: Not only is this connection required by building codes, but it also maintains level pressures throughout the home, eliminating many causes of poor draft and resulting furnace smoking.

- A. Using tin snips or sabre saw with metal cutting blade, cut a 6" circular hole in cold air return and mount second 6" starting

collar to return. (Not included)

- B. Run 6" diameter sheet metal pipe from collar on DAKA blower to collar on main furnace cold air return. Attach pipe to collar with at least three sheet metal screws per connection.

After attaching warm and cold air supply and return pipes to primary furnace, check entire system to insure that static pressure remains unaffected. Verify horizontal duct clearances per Fig. 2

VII. CONNECTING DAKA FURNACE TO CHIMNEY

Mount and secure 6" non-galvanized smoke pipe, 24-ga. or heavier to rear smoke outlet on DAKA furnace. Continue same gauge single-wall pipe to chimney connection, with following safety rules in mind:

1. DAKA furnace must be connected to a listed low-heat appliance type (Class "A" all-fuel) chimney of 6" minimum diameter. This flue must not serve any other appliance. Install chimney according to manufacturer's instructions.
2. A barometric regulator should be installed in smoke pipe at least 18" from furnace, to permit adjustment of chimney draft to a maximum of .04" water column draft. Barometric Regulator No. 283 with adjustable draft settings is available through DAKA dealers or direct from factory for this purpose.
3. Smoke pipe should maintain a minimum 18" clearance to all combustibles, and should never pass through walls or ceilings; use code acceptable means for passing through combustibles.
4. Heat reclaimers, fins or the like should not be used on smoke pipe, as they tend to cool flue gases and add to creosote formation on stoves and furnaces of advanced airtight design.
5. All joints of chimney connector pipe should be secured with a minimum of three No. 7 sheet metal screws, and further sealed with furnace cement to maintain good draft.
6. Smoke pipe should normally be installed with male ends leading from chimney to furnace; should runny creosote be formed in chimney connector, it will then return through pipe to furnace without dripping out of joints.
7. Maintain a minimum of 1/4" per foot of pipe rise to chimney connection; the steeper the rise, the more easily draft will be maintained, usually.
8. Avoid the use of 90° elbows in any chimney connector, as they adversely affect draft. If 90° elbows must be used, do not install more than two in any chimney connector.
9. Adequate combustion air must be provided in furnace area to prevent poor firing and smoking. Keep a window cracked open in furnace area, or install dryer type 4" vent to bring in fresh air.

VIII. OPERATING CONTROLS

A. Snap Disc Fan Control

The snap disc fan control (mounted in the J-box extension ring on the side of the DAKA furnace) is designed to turn on the 500-cfm lift blower on the DAKA furnace whenever the air temperature within the air jacket exceeds 110°F, and turn it off whenever the air jacket temperature falls below 90°F. This range is built into the snap disc thermostat and cannot be adjusted.

IMPORTANT: In a supplementary "add-on" installation, the blower on the DAKA furnace is not used as a circulation blower for heating the house, but as a lift blower to get the heat into the supply plenum of the primary furnace. If your primary furnace is not equipped with a fan control in the supply plenum to turn on the primary blower as heat is received from the DAKA furnace, one will have to be installed, wiring it in parallel with the primary blower fan control at the heat exchanger level. See Fig. 1 for necessary position of this fan control.

B. Automatic Damper Control

The automatic damper control below the fire door consists of a bi-metallic coil spring and draft door assembly. As the heat from the firebox reaches the spring, it automatically contracts and lowers the draft door to reduce the combustion air; as the fire dies down, the coil spring automatically expands and lifts the draft door, adding more combustion air and freshening the fire. To start the fire, we recommend the knob control be set on "HIGH"; for extended burning, a setting between "OFF" and "HIGH" will have to be found through experimentation for your particular installation. Opening the ash door slightly to aid in starting a fire is permissible, but never for more than a few minutes.

IMPORTANT: Normal operation will produce flue gas temperatures in 300° - 600°F range. If higher or lower operating temperatures are normally obtained, increase or decrease the barometric draft control setting and/or the automatic damper control setting to bring temperatures to within range. Too cool a flue gas temperature can result in heavy creosote formation, while too hot a temperature increases danger of chimney fire.

IX. EMERGENCY OPERATION INSTRUCTIONS

A. Operation During Power Failure

Continue firing the fire with smaller loads, more frequently tended. Set damper control knob to "EPF" (Electrical Power Failure) setting. To dissipate heat which builds up inside the air jacket during power failure operation, remove front panel (14) below ash door and remove the air filter (13). This allows air to circulate through the air jacket to prevent overheating. Use extreme care and vigilance during power failure to keep furnace from overheating, which could cause sever warpage or breakage. CAUTION! Do not expect the DAKA furnace to keep the house as warm during a power failure as when power is on.

DO NOT ATTEMPT TO INCREASE HEAT OUTPUT BY OPENING ASH DOOR OR FIREDOOR!

B. In Case of a Chimney Fire:

1. Call the fire department immediately.
2. Shut damper control to "OFF" setting.
3. Use chimney fire extinguishing flares if you have them. (Available at fireplace and woodstove shops)
4. After chimney fire, do not attempt to use chimney again until a professional inspection is made to determine safety.

X. MAINTENANCE OF YOUR DAKA FURNACE

A. Type of Fuel, Fueling Procedure

Fill with cordwood (and/or coal, if applicable) to the top of the firebrick. Before burning coal, you must have a coal burning grate, available from dealer or factory.

B. Flue Pipe and Chimney

These must be checked frequently during heating season, and deposits of soot and creosote over 1/8" thick removed using stiff-wire brushes designed for the job. Professional cleaning by a chimney sweep at least once a season is highly recommended.

C. Fire Chamber and Ash Pan

Check ash pan every few days and safely dispose of ashes. Keep ashes from building up on grate and interfering with combustion air flow from below. At end of heating season, clean out all residual ashes and soot from furnace. The moisture they contain could rust your furnace over the summer months, thereby shortening the life of the unit.

D. Furnace Filter

These furnaces are equipped with metal air filter (13), located behind front panel (14). They should be vacuumed and washed off periodically to insure best operation.

XI. TROUBLE SHOOTING

A. Problem: Smoke puffback when loading, poor burning, insufficient heat
Solutions:

1. Insufficient draft--debris or creosote could be blocking flue; inadequate chimney height or design could be causing downdrafts; check chimney connector for air leaks and seal with furnace cement; adjust barometric regulator to higher setting.
2. Insufficient make-up air--the house could be so well insulated that infiltration air is not getting in to replace air used in combustion; open a window slightly in furnace room or install a vent to the outside in furnace area.

B. Problem: Poor heat throughout house while burning wood

Solutions:

1. Poor quality wood--burn only wood which has been air dried for at least six months, preferably a year or more. Use hardwoods such as hickory, oak, maple, etc. for highest heat value per load.
2. Check to insure that all cold air return vents are open and not blocked with furniture, etc.
3. Make sure that all duct joints are airtight, and apply duct tape to seal.
4. Check flue gas temperature--normal operating range is 300°F - 600°F. Lower temperature would indicate insufficient draft or inadequate combustion air. To check flue gas temperature, we recommend that a smoke pipe surface thermometer be used. The Chingard thermometer is an excellent device for this purpose, available at many stores.
5. Insure that primary furnace blower is turning on to distribute heat effectively. Lower "FAN ON" setting on primary furnace fan control to start circulation earlier.

C. Problem: Paint Discoloration (whitish appearance)

Solution: Paint is rated for 900°F surfaces, and overheating of furnace will cause a whitish appearance on outside of combustion chamber surfaces; reduce chimney draft to control overheating.

NOTE: To cover discoloration, obtain a high-combustion flat black spray paint from hardware store or fireplace shop.

D. Problem: Auto Damper Control won't hold setting; shaft loose

Solution: Tighten only the shaft nut closest to the coil spring by turning counter clockwise, using a 7/16" open end or adjustable wrench.

E. Problem: Loose Knob on Auto Damper Control

Solution: With furnace in cool mode, turn shaft so that arm of coil spring is in 10 o'clock position. Turn loose knob to 12 noon position and tighten set screw with 5/64" allen wrench.

If problems persist, or help is needed in installation or operating of furnace, contact:

Customer Service Department
DAKA Corporation
Route 3 Box 65F
Pine City, Minnesota 55063
(612) 629-6737

Contact your dealer or DAKA for accessories available for these models:
#213 - Soft Coal Shaker Grate Kit (For all non-anthracite coal)
#283 - Barometric Draft Regulator/Damper

FIG. 1 - TYPICAL INSTALLATION AS SUPPLEMENTARY "ADD-ON" FURNACE

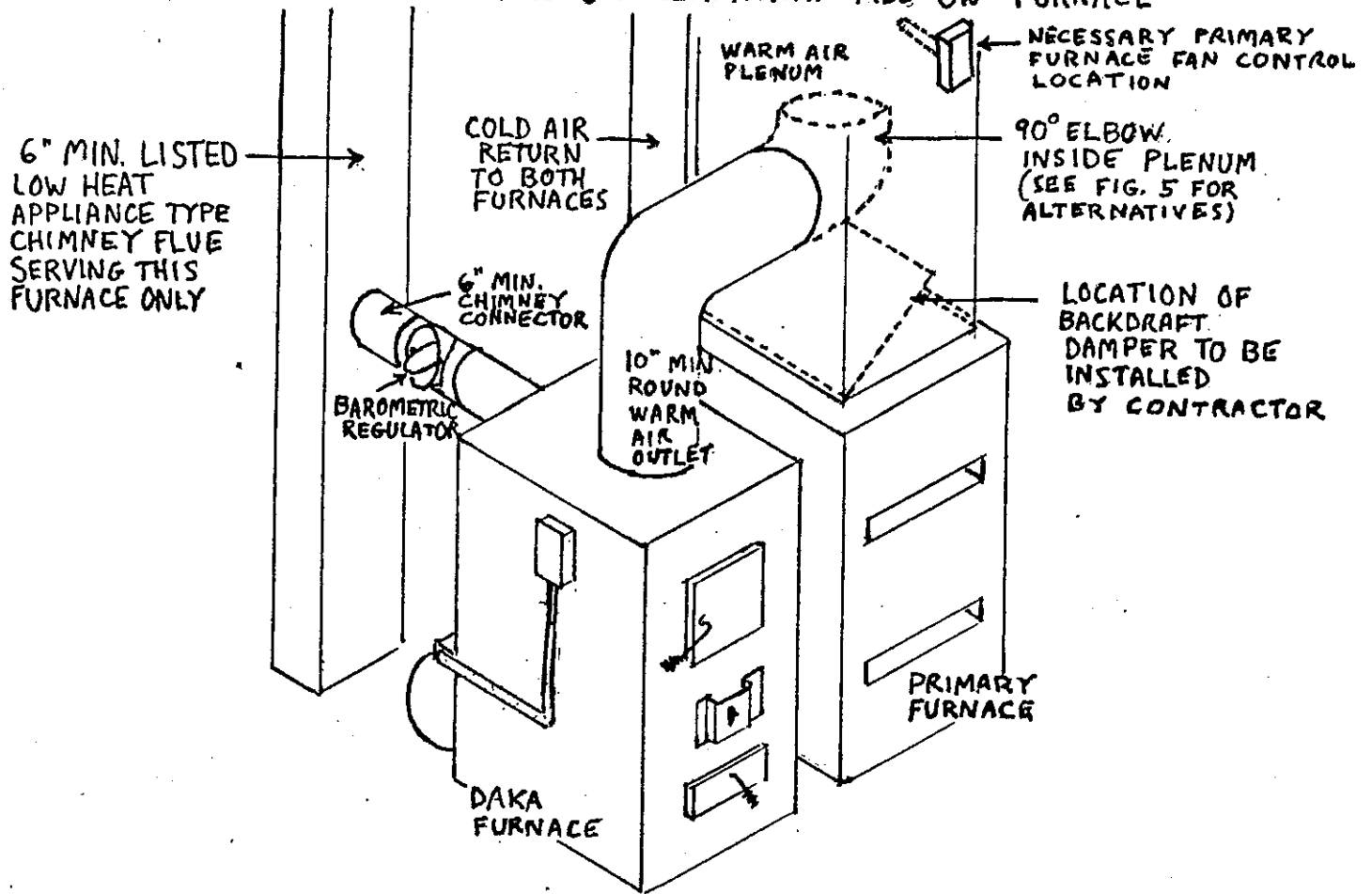


FIG. 2 - CLEARANCES FROM HORIZONTAL WARM AIR DUCTS

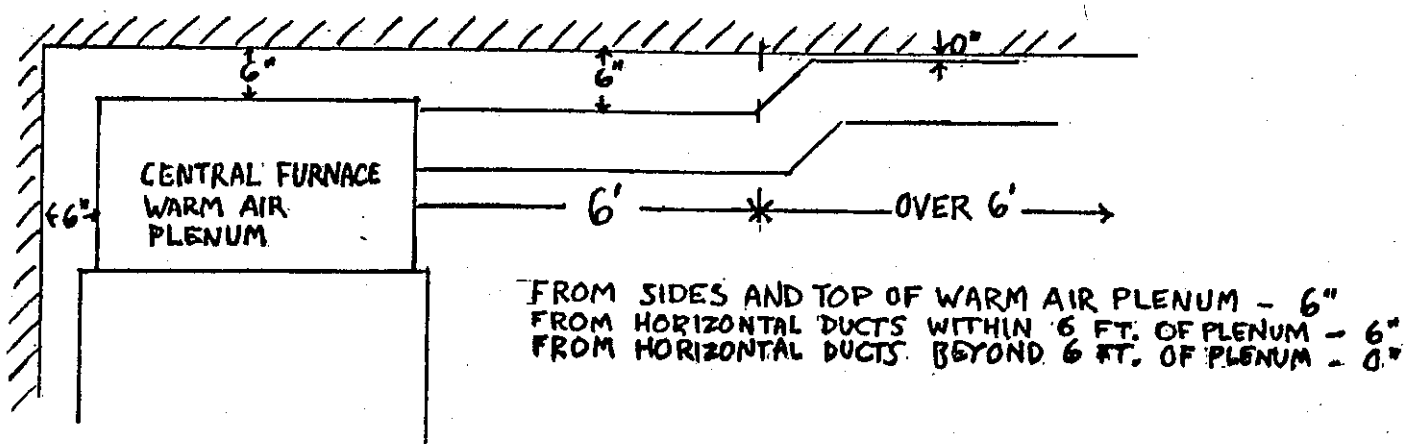


FIG. 3
FURNACE CLEARANCES
TO COMBUSTIBLES

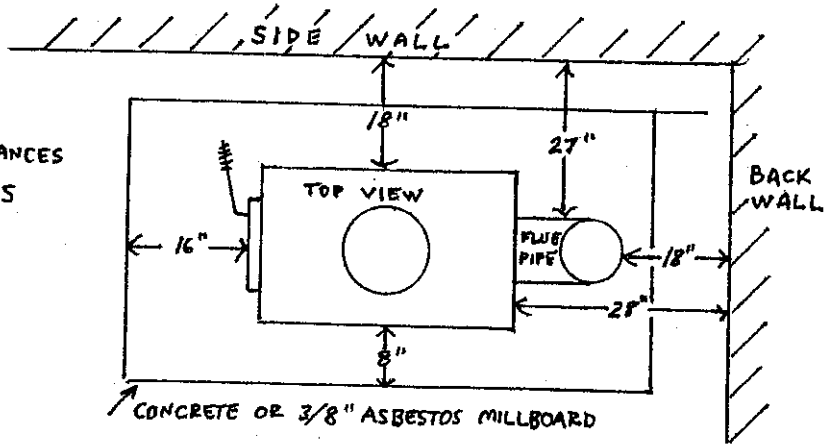


FIG. 4 ALTERNATIVE PLENUM PIPE INSERT DESIGNS

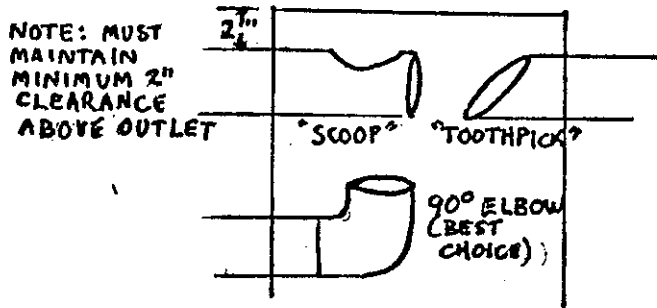
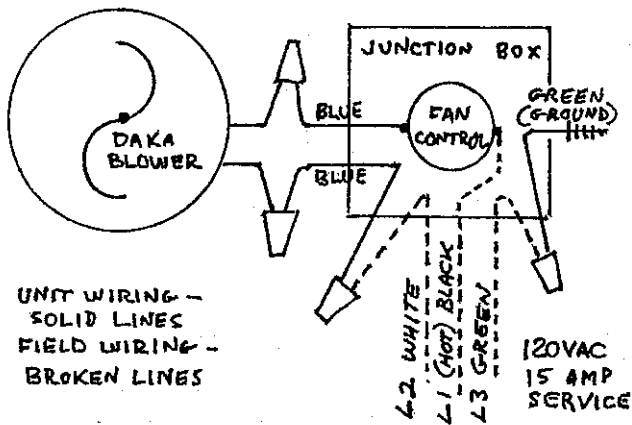
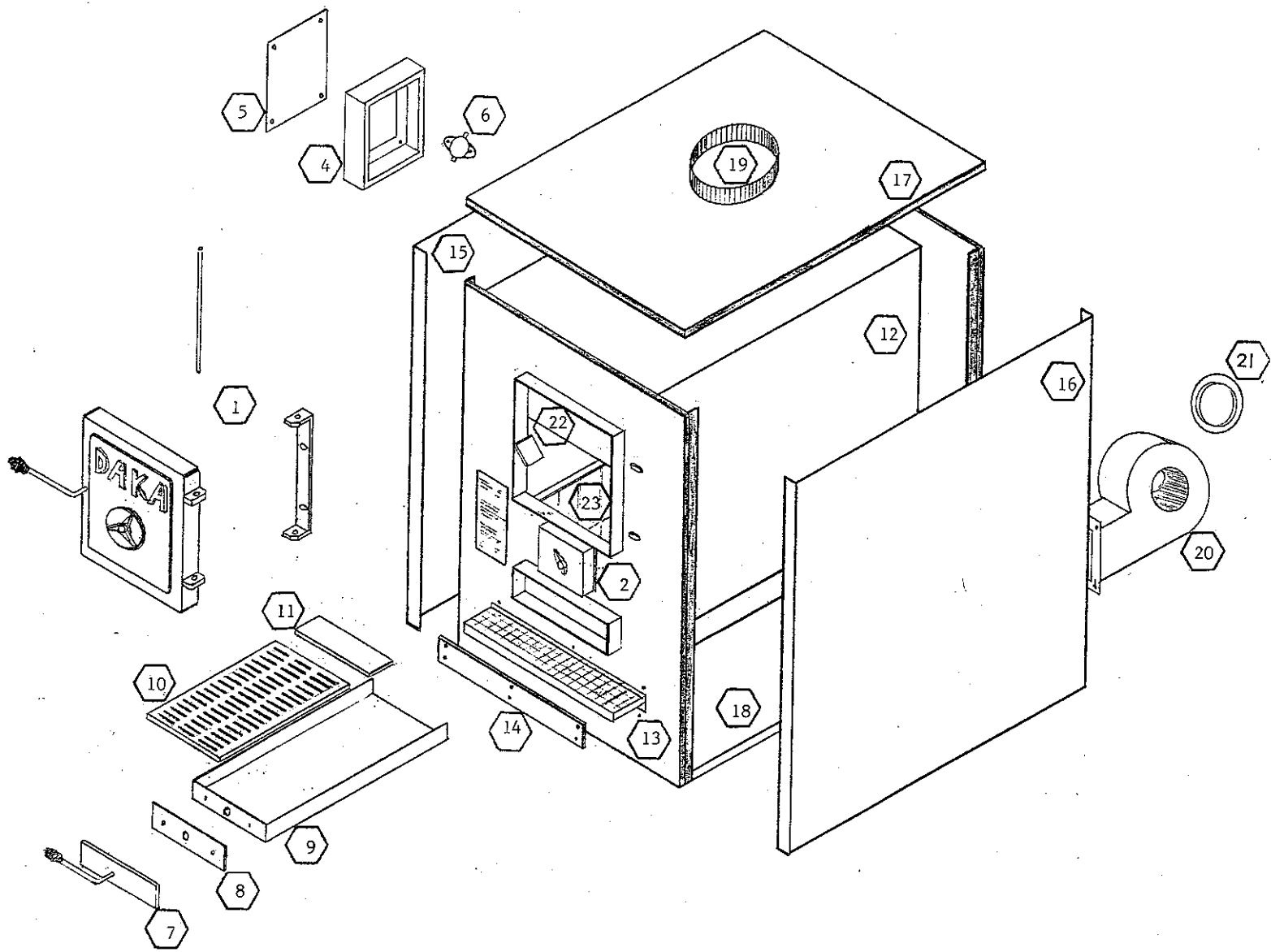


FIG. 5 WIRING DIAGRAM





KEY NO.	DESCRIPTION	PART NO.	Quantity Per	
			Furnace Model	311
1	Firedoor W/Hinge Pine	59620005	1	1
2	Automatic Damper Assembly	17032100	1	1
3	Rope Gasket	57610204	1	1
4	Junction Box Ring - 4"x4"	62630601	1	1
5	Junction Box Cover Plate	62630602	1	1
6	Snap Disc Fan Control	58640004	1	1
7	Ash Door	19035100	1	1
8	Ash Door Gasket	57610202	1	1
9	Ash Pan - 21"	57590406	1	N/A
	Ash Pan - 25"	57590007	N/A	1
10	Grate - 21"	59650001	1	1
11	Grate Spacer - 3"x13½"	57660001	N/A	1
12	Furnace Shell - 26"	15030100	1	N/A
	Furnace Shell - 30"	15030200	N/A	1
13	Air Filter - 20"x25"	57660302	1	N/A
	Air Filter - 20"x29"	57660303	N/A	1
14	Front Panel	57590510	1	N/A
15	Air Jacket Left - 26"L	64590508	1	N/A
	Air Jacket Left - 30"L	64590608	N/A	1
16	Air Jacket Right - 26"R	64590508	1	N/A
	Air Jacket Right - 30"R	64590608	N/A	1
17	Air Jacket Top - 26"	64590509	1	N/A
	Air Jacket Top - 30"	64590609	N/A	1
18	Air Jacket Bottom - 26"	64590507	1	N/A
	Air Jacket Bottom - 30"	64590607	N/A	1
19	Starter Collar - 10"	56660026	1	1
20	Blower - 500 cfm	63610003	1	1
21	Starter Collar - 6"	56811158	1	1
22	Smoke Flap	57590512	1	1
23	Firebrick	57600001	13	15
-	Flexible Conduit	62630407	1	1
-	Conduit Connector 90°	62670202	1	1
-	Conduit Connector - Straight	62670201	1	1
-	Crimp Terminals	62670205	2	2
-	Wire Set - 2 Blue	60670006	1	1
-	Wire Nut	62630802	4	4
-	Sheet Metal Screw - No. 12-¼"	62670205	14	14
-	Sheet Metal Screw - No. 10-3/8	61660217	2	2

LIMITED WARRANTY

DAKA Corporation warrants the combustion chambers of its supplementary furnaces to be free of defects in material or workmanship for five years from date of sale; all other components, including electronics, gaskets and grates are covered in the same manner for a period of one year.

DAKA will repair or replace defective components, at our option, at no charge for parts and labor, and will pay freight charge for one-way shipment for warranty claims during first year. In second and subsequent years, only parts and labor will be provided at no charge. DAKA is not responsible for installation or dismantling costs.

Warranty void if unit is used in other than residential service connected to conventional basement-type upflow central heating system, if non-approved fuels are used in firing of units, or if unit is damaged due to accident, improper installation or negligence.

For service under this warranty, contact selling dealer or DAKA Corporation, Customer Service Dept., Industrial Park, Rt. 3 Box 65F, Pine City MN 55063; telephone 612/629-6737.

Implied warranties including that of merchantability are expressly limited in duration to the duration of this warranty. DAKA Corporation disclaims any responsibility for consequential damages. Some states do not allow limitations on how long an implied warranty lasts, or the exclusion or limitation of incidental or consequential damages, so this limitation and exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

This is our exclusive written warranty.