

DAKA 451C

DAKA Corporation .Industrial Park P.O. Box 90,Pine City, MN 55063

INSTALLATION AND OPERATION MANUAL

Price \$3.00

The DAKA Model 451C Supplementary Furnace was tested May 14-15, 1981, by PFS Corporation of Madison, Wisconsin, a nationally recognized independent testing agency, for compliance with following standards: UL 727 (June 1979), UL 737 (May 1978) and I.C.B.O. Research Committee Acceptance Criteria for Woodburning Supplementary Furnaces (March 1979). PFS Report No. 256.

PRINCIPLE OF OPERATION:

The DAKA 451C is a solid-fuel appliance designed for conventional upflow residential central forced-air heating applications.

As a supplemental furnace, the DAKA 451C is connected in parallel to a conventional upflow gas, oil or electric furnace, and utilizes the present ductwork to distribute wood-heated air throughout the home with the assistance of the blower on the primary furnace. As long as the heat produced by the DAKA 451C keeps the living area temperature above the setting of the primary furnace room thermostat, the primary furnace will not burn gas or oil, or use any electricity beyond that required to run the main blower. Should the wood fire fail to provide sufficient heat, however, the primary furnace will take over the heating requirements as usual. In this mode, the DAKA 451C is rated for use in well-insulated conventional homes up to 1500 sq. ft.

CAUTIONARY NOTES

1. The DAKA 451C is designed for use only in conventional upflow systems, and must deliver wood-heated air to the supply (warm air) plenum of such a system, never to ductwork or cold-air returns. As a woodburner produces heat as long as a fire is burning, the path of such heat must always be upwards through ductwork spaced sufficiently away from combustibles (See Figure 3). This unit is not designed for use as a room heater.
2. The DAKA 451C furnace should be connected to a minimum 6" listed low-heat appliance type ("all-fuel" or "Class A") type chimney serving only the DAKA furnace. Connection to a larger flue, or one serving another appliance such as a water heater or other furnace, is not only in opposition to most building codes, but also causes serious draft problems.
3. A barometric regulator/damper (such as those manufactured by Steinen of Carolina, 2308 Airport Rd., Kinston, NC 28501), must be used in the smoke pipe leading to the chimney, and must be set to maintain a .06" draft, as measured by a draft gauge (such as the one manufactured by Condar Co., Customer Service Dept., Box 6D, Hiram, OH. 44234).
4. A solid-disc cast-iron damper must be used in the smoke pipe, to permit shutting off the air supply to the chimney in the event of a chimney fire.

5. Installation in mobile homes is prohibited.
6. The DAKA 451C is designed for wood burning only; burning coal, trash, paper or any other combustible could cause overheating and create a fire hazard, as well as shortening the life expectancy of the combustion chamber and voiding the warranty.
7. To insure that your DAKA furnace is installed in accordance with fire safety and building code regulations, installation by a qualified heating contractor with solid-fuel system experience is required. You should also notify your insurance company concerning the installation of any woodburning appliance.
8. The DAKA furnace must be installed with the following clearances to combustible surfaces:

To side wall:	22"	Clearance in front:	48"
To back wall:	36"	Smoke pipe to side wall:	26"
Plenum to ceiling:	2"	Smoke pipe to back wall:	24"

For more information, including instructions on reduced clearance installations, write for publications 89M, 211 and HS-10 from:

National Fire Protection Association
 Publication Sales Department
 470 Atlantic Ave.
 Boston, MA 02210

9. We recommend that a smoke detector be installed on each floor of the residence, and that chemical fire extinguisher be in the vicinity of the woodburning furnace.

CAUTION!

HOLD FIREDOOR OPEN 1" FOR 5 SECONDS BEFORE FULLY OPENING. INSTALL AND USE ONLY IN ACCORDANCE WITH MANUFACTURER'S INSTALLATION AND OPERATING INSTRUCTIONS. INSPECT AND CLEAN CHIMNEY FREQUENTLY. UNDER CERTAIN CONDITIONS OF USE, CREOSOTE BUILDUP MAY OCCUR RAPIDLY. UNIT TO BE INSTALLED ON NON-COMBUSTIBLE FLOOR.

HOT WHILE IN OPERATION. DO NOT TOUCH, KEEP CHILDREN, CLOTHING AND FURNITURE AWAY. CONTACT MAY CAUSE SKIN BURNS. SEE NAMEPLATE AND INSTRUCTIONS.

KEEP ASH DOOR CLOSED DURING FIRING OF FURNACE TO AVOID DEVELOPING EXCESSIVE TEMPERATURES.

DANGER! EXPLOSIVE HAZARD

NEVER USE GASOLINE, GASOLINE-TYPE LANTERN FUEL, KEROSENE, CHARCOAL LIGHTER FLUID, OR SIMILAR LIQUIDS TO START OR FRESHEN UP A FIRE IN THIS FURNACE. KEEP ALL SUCH LIQUIDS WELL AWAY FROM THE FURNACE WHILE IT IS IN USE.

WARNING! FIRE HAZARD

DO NOT EXCEED RATED FLUE DRAFT. DO NOT STORE FLAMMABLE LIQUIDS IN FURNACE ROOM. DO NOT STORE WOOD CLOSER TO FURNACE THAN MARKED CLEARANCES. INSPECT FLUE PIPE AND CHIMNEY FREQUENTLY AND CLEAN OUT SOOT AND CREOSOTE DEPOSITS.

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.

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 NONCOMBUSTIBLE FLOOR OR ON THE GROUND, WELL AWAY FROM ALL COMBUSTIBLE MATERIALS, PENDING FINAL DISPOSAL. IF THE ASHES ARE DISPOSED OF BY BURIAL IN SOIL OR OTHERWISE LOCALLY DISPERSED, THEY SHOULD BE RETAINED IN THE CLOSED CONTAINER UNTIL ALL CINDERS HAVE THOROUGHLY COOLED.

INSTALLATION INSTRUCTIONS:

I. UNPACKING

Remove all component parts from firebox for assembly; check piece count against parts list on last page of this manual. (Note: Remove firebrick from carton while still within firebox; do not attempt to lift full carton.)

Parts Shortage: Call or write factory immediately; provide model number and serial number of furnace, found on front mounted data plate, along with a description and quantity of missing parts. Replacements will be shipped at once.

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

- A. Attach firedoor (Key No. 1 on parts list) to door frame using hinge pin (19) provided. Note that door features a double latch operation to limit initial swing of door to 1" on opening. Continue turning handle clockwise to 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 (6) between ash door (5) and ash pan (7) front, and assemble using two 1/4" bolts and nuts provided.
- C. Remove cast-iron grate (10) from firebox. Proceed to install eleven firebricks (11) 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.

- E. Install the 465-cfm blower (12) on back of furnace, using four #10 3/4" hex screws provided.

III. FURNACE CONTROL CENTER ASSEMBLY

- A. Remove air jacket top (13) by lifting up from front to back only, not side to side.
- B. On side of air jacket which will face away from primary furnace, remove 7/8" knockout.
- C. Spring and remove cover fan control (17). With pliers, remove whichever knockout at base of fan control will be closer to the back of the furnace when installed.
- D. Insert the probe of the fan control into the knockout hole on the side of the air jacket; holding the fan control tightly vertical against the side of the furnace, mark and drill two 9/64" holes at bottom center and bottom right mounting slots of fan control on air jacket side.
- E. Back control away from side of air jacket, and position two 1 1/2" spacer tubes between fan control and furnace over the screw holes; insert two No. 12 x 2" screws through spacers and tighten. This installation holds fan control 1 1/2" away from side of furnace for thermal protection.
- F. On inside of air jacket side, position fan control probe heat shield (16) 1/2" below probe; mark and drill two 11/64" holes, and mount shield to air jacket with two No. 10 x 1/2" metal screws. This shield protects the fan control probe from high radiant temperatures from the firebox to prevent early failure, so it is important that it be installed.
- G. Attach straight conduit connector to bottom of fan control in knockout. Attach end of flexible conduit by tightening two clamping screws on conduit connector; be sure that end of conduit does not intrude into fan control. Run two blue wires through conduit (tip: connect wire ends with a wire nut to facilitate travel through conduit).
- H. Attach 90° conduit connector to either blower junction box hole, pointing toward fan control side of furnace. Attach free end of flexible conduit to this conduit connector; conduit should not touch furnace itself at any point.

IV. FIELD AND UNIT WIRING CONNECTIONS (See Figure 3)

CAUTION! The DAKA furnace requires a separate protected 15-amp, 120V AC 60Hz single phase circuit with 75°C minimum wiring. All field wiring must be enclosed in approved conduit and comply with national, state and local electrical codes.

- A. Turn off all power to field wiring circuit.
- B. Attach an approved 3-wire field conduit from 120V service to unused blower junction box hole; conduit should not touch furnace itself at any point.
- C. Connect black (hot) wire from field conduit to one blue wire leading to fan control through unit conduit, using wire nut provided.
- D. At fan control, insert one blue wire end into lower left wiring hole (marked FAN LINE), using small screwdriver to spring clip to accept wire. Insert other blue wire into upper left wiring hole (marked FAN LOAD) in the same manner.
- E. In blower junction box, attach second blue wire to one black blower pigtail wire, using wire nut provided.
- F. Attach second black blower pigtail wire to white wire from field conduit, using wire nut provided.
- G. Attach green wire (ground) from field conduit to blower box by twisting wire around one cover plate mounting screw between plate and box.
- H. Check all connections for tightness and conformance with foregoing instructions, tuck all wires within blower junction box, and re-install cover plate, before re-energizing circuit.

V. CONNECTING DAKA FURNACE TO DUCTWORK

- A. With tin snips or saber saw, cut a 10" circular hole in the air jacket top panel of the DAKA furnace, and a second 10" circular hole in the side of the supply (warm air) plenum of the primary 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.

- B. 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.

- C. Using 10" starter collar (22) 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.
- D. Connect cold air return of primary furnace to DAKA furnace blowers by means of a 10" pipe joining the primary cold air return to a sheet metal box fully surrounding the twin blowers on the back of the furnace, leaving a minimum of 2" clearance around the blowers for proper air flow.

NOTE: Filter box No. 258 is available for this purpose through your dealer or direct from DAKA.

NOTE: After attaching warm and cold air supply and return pipes to primary furnace, check entire system to insure that static pressure remains unaffected.

VI. CONNECTING DAKA FURNACE TO CHIMNEY

- A. Mount and secure 6" 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" diameter minimum. Chimney should not be connected to any other appliance, for best draft.
 2. Smoke pipe from DAKA furnace to chimney connection should not be more than 75% of height of chimney above point of connection. Note that each 90° elbow in a smoke pipe is equivalent to six ft. of pipe; never use more than two 90° elbows in any smoke pipe run.

3. Smoke pipe should maintain a minimum 1/4" upslope per foot of length; all smoke pipe joints should be secured by a minimum of three No. 7 sheet metal screws to prevent separation.
 4. A solid-disc cast-iron damper should be installed in smoke pipe close to the chimney connection, to cut off oxygen supply in case of a chimney fire.
 5. A barometric regulator should be installed in smoke pipe at least 18" from furnace, to permit adjustment of chimney draft to a maximum of .06" water column draft.
 6. Smoke pipe should maintain a minimum 18" clearance to all combustibles.
 7. 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.
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VII. OPERATING INSTRUCTIONS FOR DAKA FURNACE

A. Fan Control

The fan control on the side of the DAKA furnace has a rotating thermostat disc. Holding the disc firmly in place, adjust the three tang for these three settings from left to right as follow: FAN OFF - 90°, FAN ON - 130°, LIMIT - 200°. These settings will cause the blower on the back of the DAKA furnace to turn on when the temperature within the air jacket rises to 130°F, and off when the temperature within falls to 90°F. The limit setting is inoperative on this model.

While this fan control is designed for fully automatic operation, you can turn twin furnace blowers on manually at any time by pushing white button on fan control in. Pulling button out will turn the twin blowers off, unless the heat-within the air jacket is above the "FAN ON" setting of the dial, in which case the blowers will continue to run until the temperature drops.

B. Automatic Draft Control

The automatic draft control consists of a bimetallic 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. (NOTE: If draft control shaft will not hold a setting, tighten only the shaft nut closest to the coil spring by turning counterclockwise with a 7/16" open-end or adjustable wrench).

VIII. EMERGENCY OPERATION INSTRUCTIONS

A. Operation During a Power Failure

1. Remove furnace filter(s) to prevent fire hazard.
2. Set automatic draft control to "EPF" (Electrical Power Failure) setting.
3. Continue firing the fire with smaller loads, more frequently tended.
4. Use extreme care and vigilance during power failure to keep furnace from overheating, which could cause severe 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 or fire door.

B. What to do in case of a chimney fire:

1. Call the fire department immediately.
 2. Close the solid disc damper in the smoke pipe to cut off oxygen to the chimney. Use chimney fire extinguishing flares if you have them. (Available at fireplace and woodstove shops).
 3. After chimney fire, do not attempt to use chimney again until a professional inspection is made to determine safety.
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IX. MAINTENANCE OF YOUR DAKA FURNACE

A. Flue pipe and chimney

1. 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.

B. DAKA Furnace Blowers

Lubricate motor bearings after each six months of use; lubrication points are at each end of the motor housing on the side of the motor. Use SAE 20 oil for lubrication. Vacuum away dust and dirt on motor air inlets, and also on blower impellers at least once each season.

CAUTION! Turn off all power to unit before cleaning or lubricating.

C. Fire chamber and ash pan

1. 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.
 2. 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.
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X. 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.
 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.
 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, or write:

Condor Company
Customer Service Dept.
Box 6D
Hiram, OH 44234

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.

FIG. 1 TYPICAL PARALLEL INSTALLATION AS SUPPLEMENTARY FURNACE:

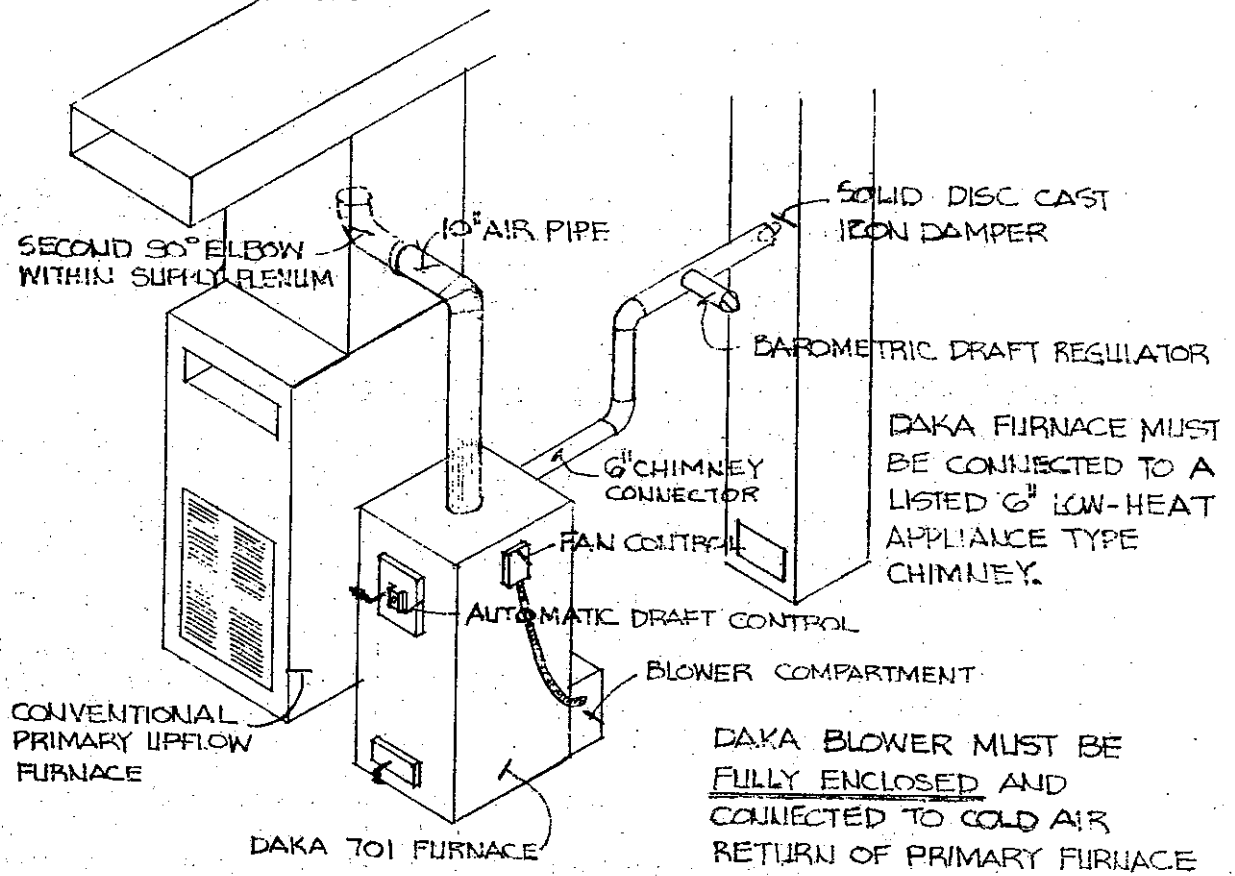


FIG. 2 DUCT CLEARANCE FOR HORIZONTAL WARM AIR DUCTS

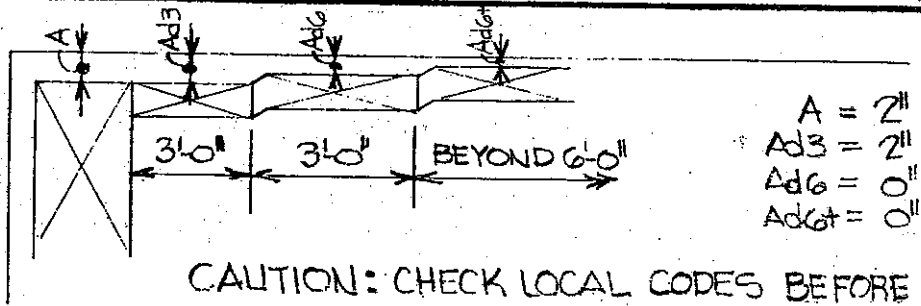
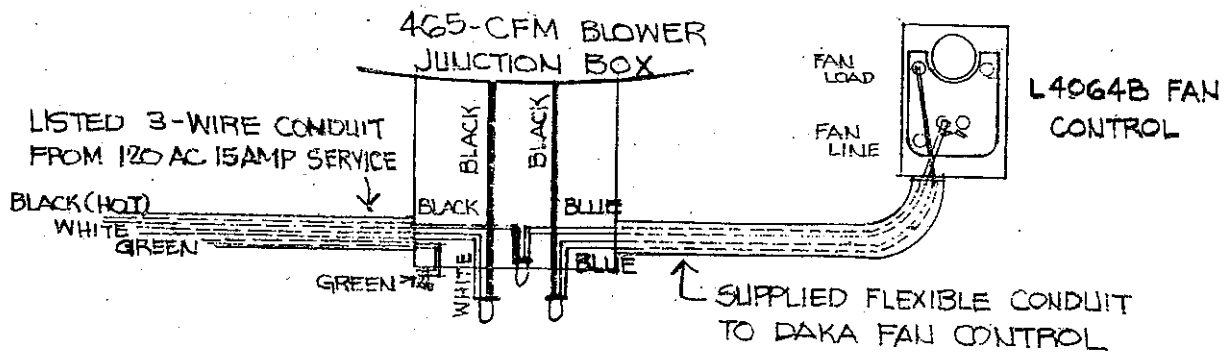
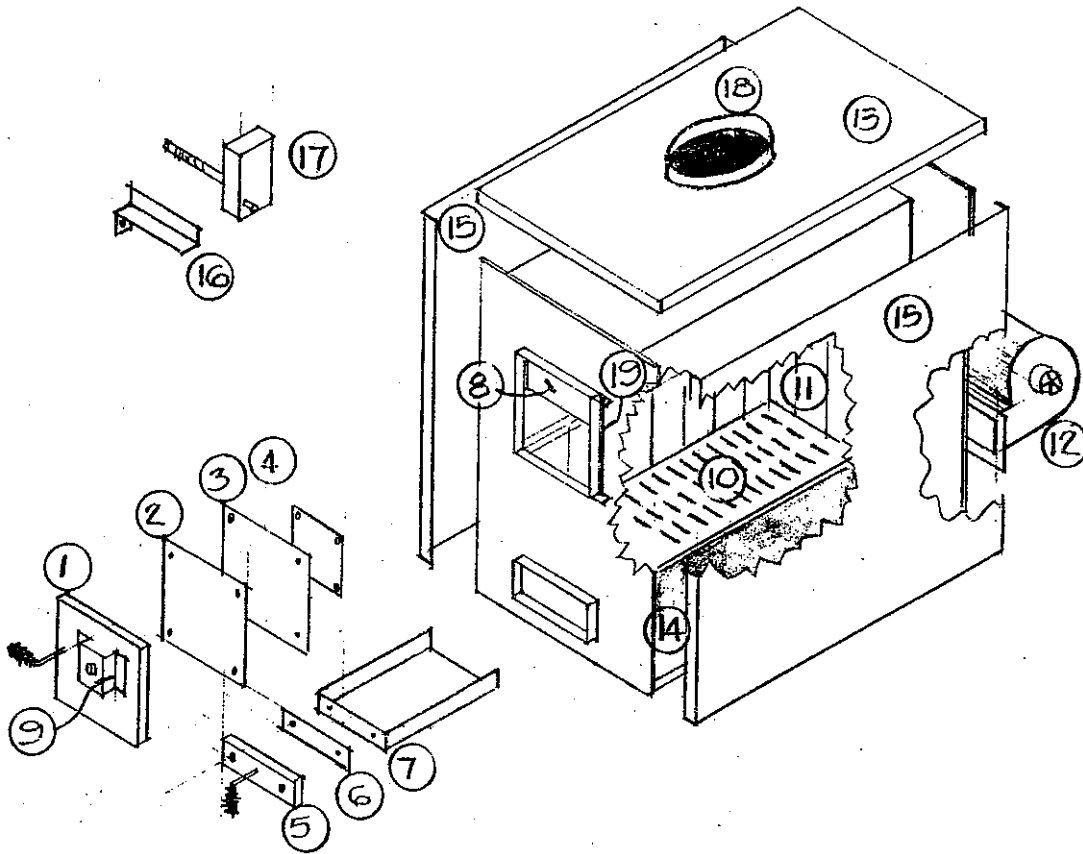


FIG. 3 WIRING DIAGRAM



PARTS LIST FOR DAKA 451C FURNACE



Key	Description	Qty.	Key	Description	Qty.
1	Firedoor	1	-	Fan Control Spacer Tube-1 1/2"	2
2	Thermal Gasket-Firedoor	1	-	Door Heat Shield Spacer-3/4"	4
3	Gasket Plate	1	-	Door Hex Bolt - 1/2"x1"	7
4	Heat Shield	1	-	" " " - 1/2"x2"	4
5	Ash Door	1	-	" " Nut - 1/2"	11
6	Thermal Gasket - Ash Door	1	-	Hex Metal Screw-#12 - 2"	2
7	Ash Pan - 21"	1	-	" " " -#10 - 1/2"	6
8	Smoke Flap Plate	1	-	Flexible Conduit - 44"	1
9	Automatic Draft Control	1	-	Straight Conduit Connector	1
10	Cast Iron Grate - 18"	1	-	90° Conduit Connector	1
11	Firebrick	11	-	Wire - Blue - 56"	2
12	465-cfm Blower	1	-	Wire Nut - Small	3
13	Air Jacket Top Panel	1	-	Warranty Sheet	1
14	" " Bottom Panel	1			
15	" " Side Panel	2			
16	Fan Control Heat Shield	1			
17	Fan Control L 4064B	1			
18	10" Hot Air Starter Collar	1			
19	Door Hinge Pin	1			

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.

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, P.O. Box 90, Pine City MN 55063; telephone 612/629-6737.

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