

*Furnace
Heater*



SUBURBAN

DYNA-TRAIL

INSTALLATION, OPERATING, AND SERVICE INSTRUCTIONS SUBURBAN DYNA-TRAIL FURNACES

For Model Numbers

NT-20A, NT-20AD, NT-22A, NT-22AD, NT-22CS, NT-22CDS,
NT-30A, NT-30AD, NT-30CS, NT-30CDS

- This book contains complete instructions for installation and operation of your furnace. Keep with unit at all times.
- Should you require further information, contact your dealer or nearest Dyna-Trail Service Center.

SUBURBAN MANUFACTURING COMPANY

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INSTALLATION, OPERATING, AND SERVICE INSTRUCTIONS SUBURBAN DYNA-TRAIL FURNACES

INTRODUCTION

The furnace in your recreational vehicle is a Suburban Dyna-Trail furnace. It is a sealed combustion system furnace approved by the American Gas Association for safety and performance for installation in recreational vehicles. Your furnace is one of the following models of the Suburban Dyna-Trail furnaces.

NT-20A	Direct discharge, 12 volts d.c. only, 20,000 B.t.u./hr. input.
NT-20AD	Same as NT-20A except can operate on 12 volts d.c. or 115 volts a.c.
NT-22A	Ducted discharge, 12 volts d.c. only, 22,000 B.t.u./hr. input. Bottom plenum.
NT-22AD	Same as NT-22A except can operate on either 12 volts d.c. or 115 volts a.c.
NT-30A	Same as NT-22A
NT-30AD	Same as NT-22AD
NT-30CS	Same as NT-22CS

NT-30CDS	Same as NT-22CDS
NT-22CS	Ducted discharge (bottom or side), 12 volts d.c. only, 22,000 B.t.u./hr. input.
NT-22CDS	Same as NT-22CS except can operate on either 12 volts d.c. or 115 volts a.c.

Basically the combustion chamber is the same in all models as well as the blower, burner, and control assembly. The most significant differences in the models are the electrical systems of the d.c. only models versus the combination a.c./d.c. models, and the method of air discharge. Due to these two differences, the method of installation will vary from model to model, but the operation and general maintenance instructions are common to all models.

This furnace utilizes a sealed combustion system with a patented dual blower, one of which circulates room air while the other furnishes outside air for combustion. The combustion air blower then forces the flue products to the outside for maximum safety and heating efficiency.

NOTE: Combustion air must not be drawn from the living area!

INSTALLATION INSTRUCTIONS

Dyna-Trail NT-20 (all models), NT-22 (All models) and NT-30 (all models)

One of three methods of installing the Dyna-Trail furnace should be determined depending on the serviceability required and the material used in the sidewall construction of the recreational vehicle. If the material is fiberglass or other combustible material, one method utilizing the Dyna-Trail furnace cabinet back is recommended. If the material is non-combustible, such as aluminum, steel, etc., and the cabinet back is not desired, an alternative method, using only the vent pipe, is recommended. If the sidewall construction material is combustible, such as: fiberglass, etc., a third method is available which requires usage of a special adaptor back. These are recommendations only. If the installer wishes to use the adaptor back or furnace back on a noncombustible material, this can be done.

INSTALLATION USING SUBURBAN FURNACE CABINET BACK. Recommended for sidewall construction of fiberglass, aluminum, etc., where a cutout through the side of the vehicle is required for removal of the furnace from outside the vehicle.

Locate furnace near lengthwise center of vehicle.

Cut opening through inner and outer skin to dimensions given below which apply to each model furnace:

Model	Size and Location of Opening in Inner Skin	Size and Location in Outer Skin
NT-20A, NT-20AD	14½" wide x 15" high with its bottom edge even with mounting surface.	Same as inner skin
NT-22A, NT-22AD NT-30A, NT-30AD	15¾" wide x 15¾" high with its bottom edge 3⅜" above mounting surface.	Same as inner skin
NT-22CS, NT-22CDS NT-30CS, NT-30CDS	15¾" wide x 15¾" high with its bottom edge 2" above mounting surface.	Same as inner skin

*Note: Steps "c" through "g" apply to NT-22 and NT-30 only.

c. Put furnace in place with cabinet rear projecting through vehicle. Do not fasten in place.

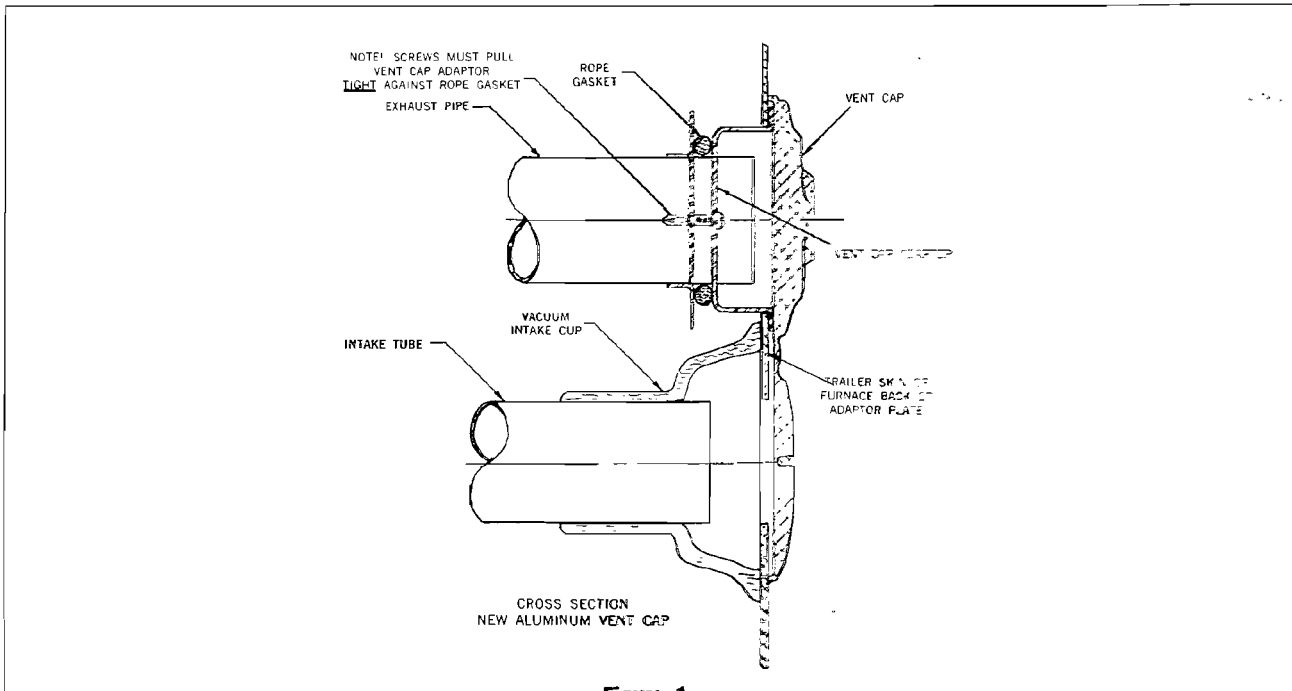
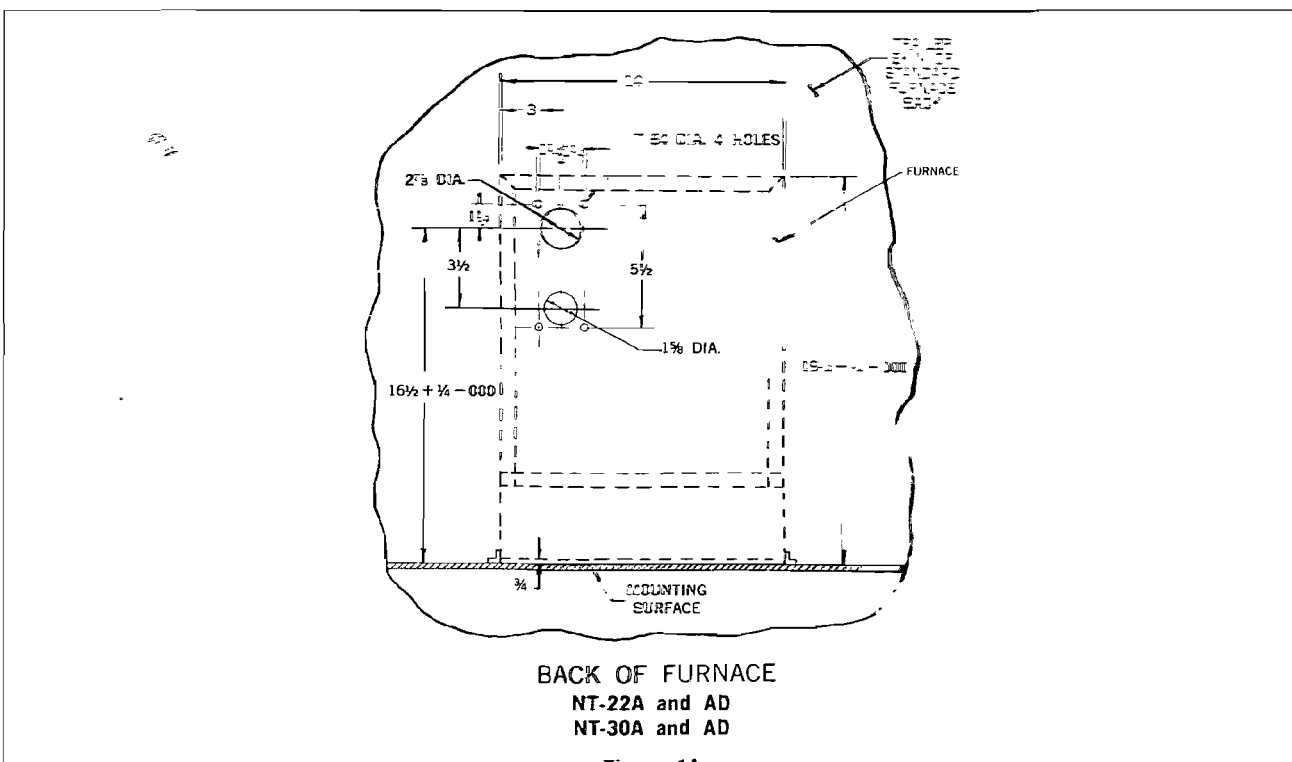


Figure 1



BACK OF FURNACE
NT-22A and AD
NT-30A and AD

Figure 1A

- d. Apply caulking compound between backplate and vehicle's exterior skin.
- e. Push furnace inward until backplate is tight against vehicle wall, then using outer row of holes on backplate, screw backplate securely to vehicle.
- f. Attach furnace to floor with screws through furnace legs.

- g. Secure one-piece vent cap to the outside of the backplate according to Figure 1. Please insure that the vent cap adaptor is installed on the exterior of the furnace backplate!

*Note: Steps "h" through "r" apply to models NT-20A and NT-20AD only.

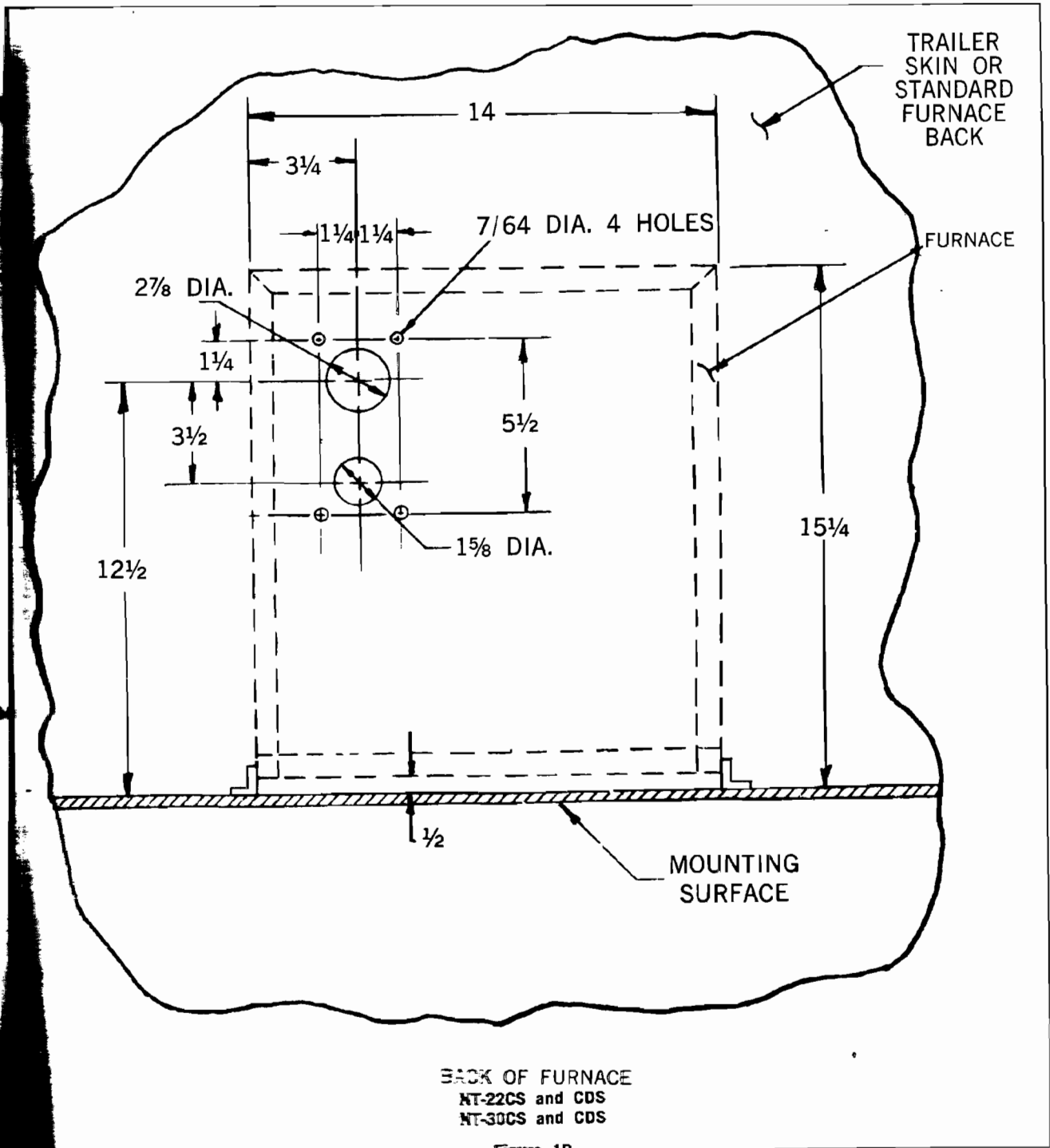


Figure 1B

From outside the vehicle, put furnace in place with mounting flange tight against the outer skin of the vehicle.

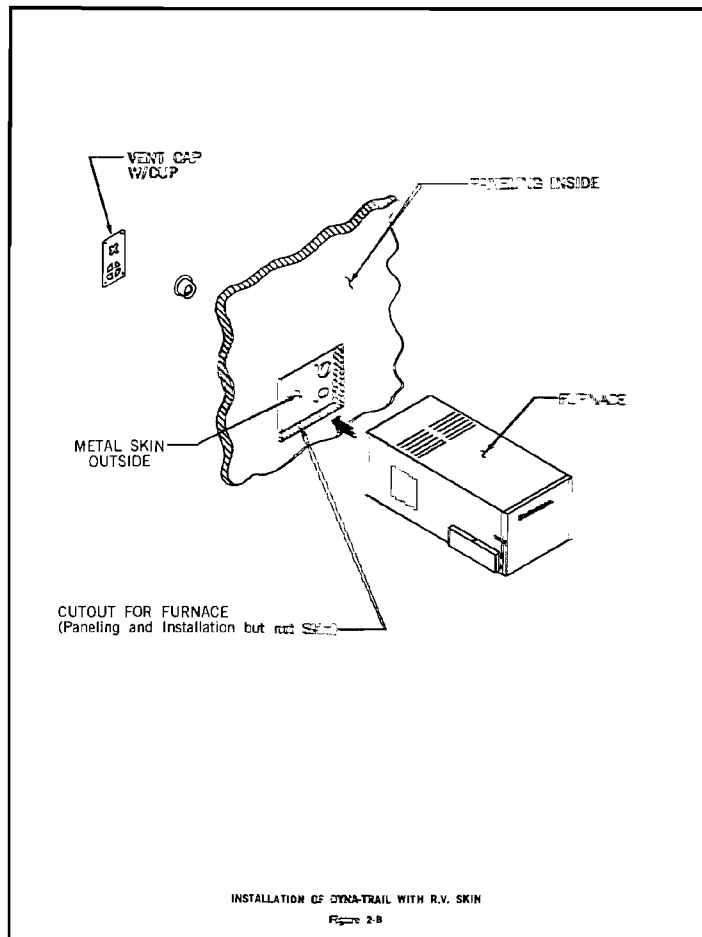
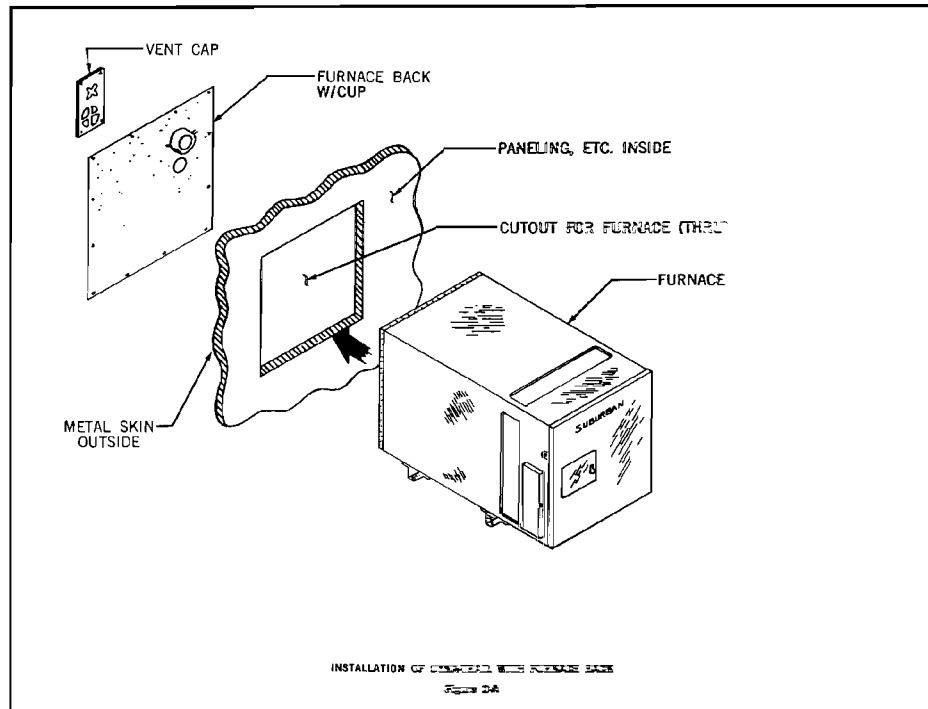
Using the mounting flange as a template, place the necessary holes in the vehicle's outer skin to secure the furnace.

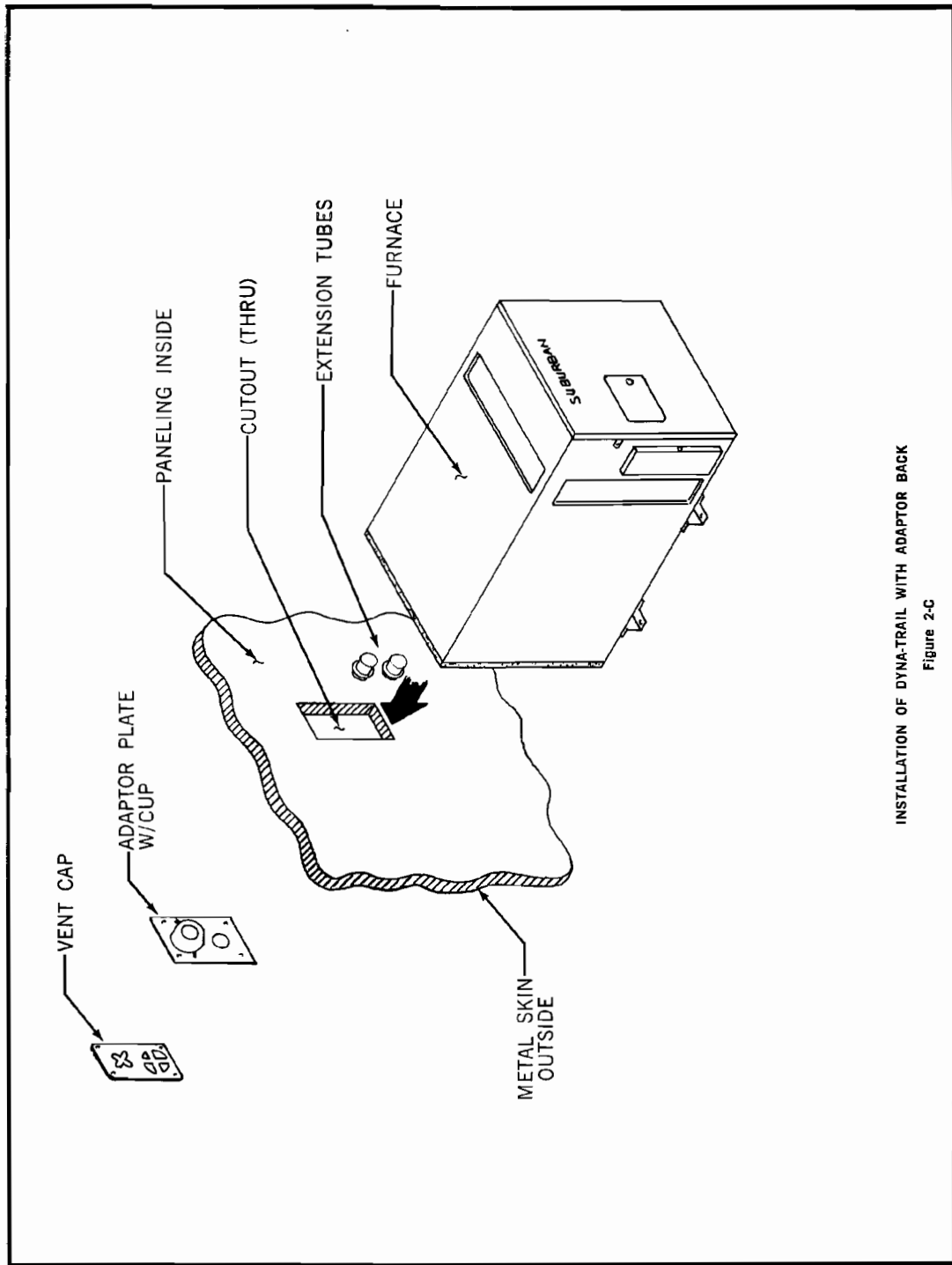
Apply caulking compound around edge of backplate

and fasten backplate to furnace with screws through holes pierced in step 1.

R. Secure one-piece vent cap to the outside of the backplate according to Figure 1. Please insure that the vent cap adaptor is installed on the exterior of the furnace backplate!

(Continued on Page 10)





INSTALLATION OF DYNA-TRAIL WITH ADAPTOR BACK
Figure 2-C

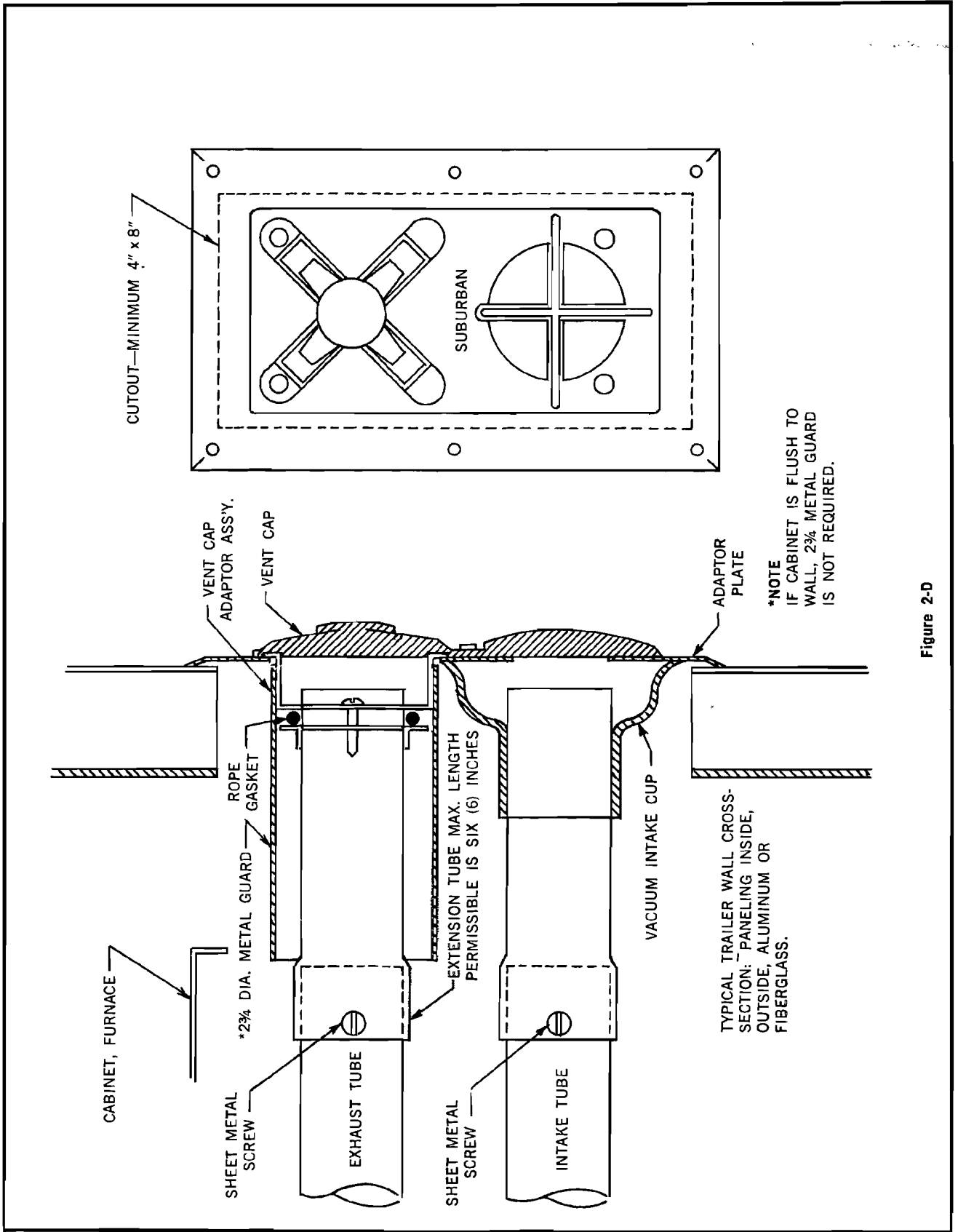
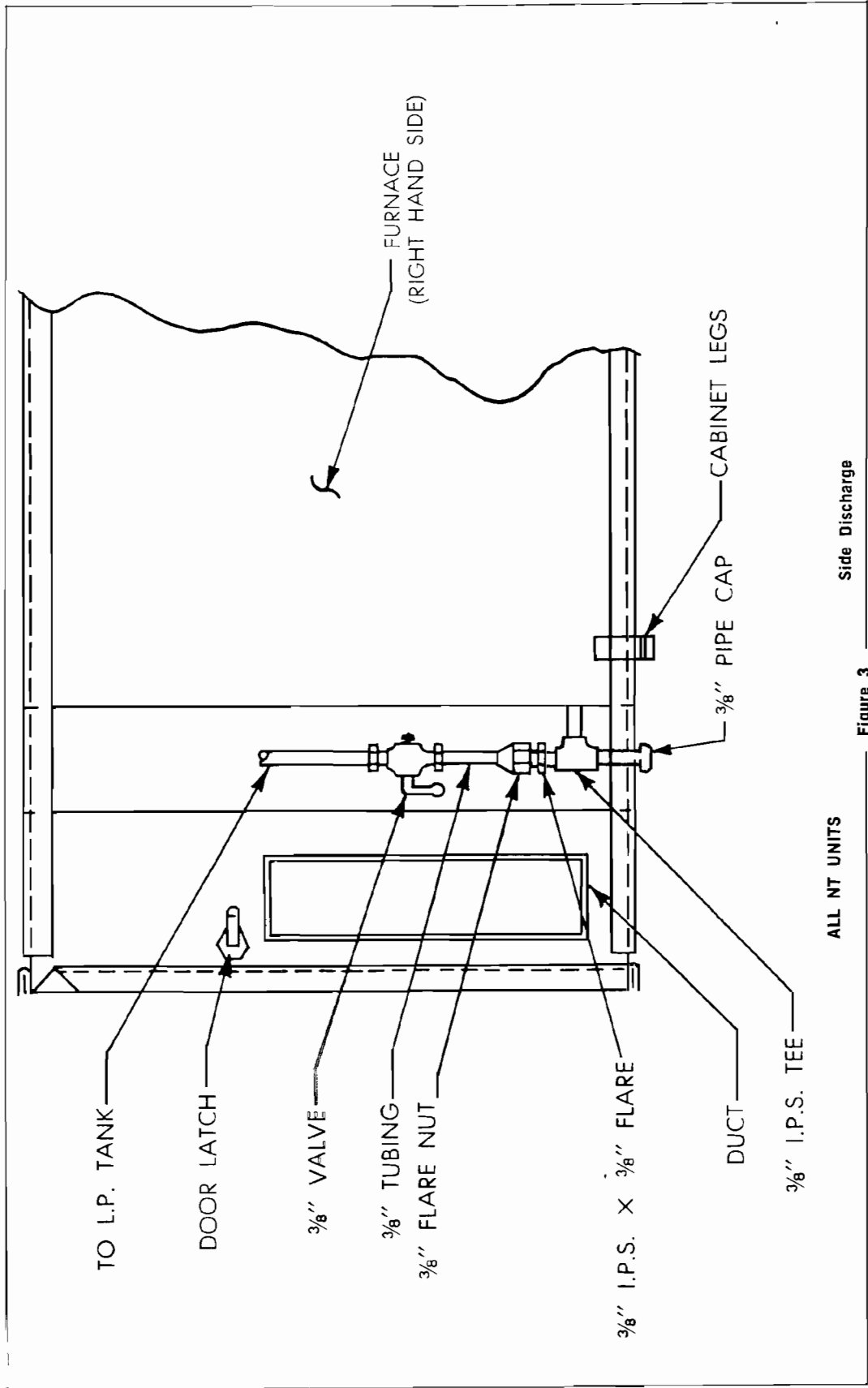


Figure 2-D



1. Please refer to Figure 2-A for simulated installation of this type.

2. INSTALLATION DIRECTLY AGAINST NONCOMBUSTIBLE VEHICLE SKIN (usually aluminum) no furnace cabinet back required—no cutout in vehicle's outer skin required except air-intake and exhaust openings.

- a. Try to locate furnace near lengthwise center of vehicle.
- b. If vehicle has inner and outer wall skins, proceed with item "c." If no inner skin, go to item "d."
- c. Cut an opening through inner skin to the dimensions given below which apply to each model furnace.

Model	Size and Location of Opening
NT-20A, NT-20AD	14½" wide x 15" high with bottom edge even with mounting surface.
NT-22A, NT-22AD NT-30A, NT-30AD	15¾" wide x 15¾" high with bottom edge 3⅞" above mounting surface.
NT-22CS, NT-22CDS NT-30CS, NT-30CDS	15¾" wide x 15¾" high with bottom edge ½" above mounting surface.

- d. Refer to Figure 1-A or 1-B (depending on the model being installed) and pierce holes as shown in outer skin.
- e. Put furnace in place and press it hard against outer skin before securing furnace to outer skin. Then, bolt furnace to floor.
- f. Secure one-piece vent cap to the outside of the outer skin with the four (4) screws provided. (See Figure 1 for correct installation of vent cap and vent cap adaptor).
- g. Please refer to Figure 2-B showing a simulated installation of this type.

3. INSTALLATION IN RECREATIONAL VEHICLE WITH FIBER-GLASS SKIN, ETC., where large Suburban furnace back is not desired. This installation requires a 4" x 8" cutout in the vehicle skin and utilizes a special adaptor back to cover the 4" x 8" cutout. These instructions also cover an installation where extension air intake and exhaust tubes are required. Such tubes and their usage are limited to a maximum length of 6 inches.

- a. Locate furnace near lengthwise center of vehicle.
- b. Cut opening through inner and outer skin of vehicle measuring 4" x 8".
- c. Put furnace in place and press it hard against inner skin of vehicle.
- d. Place special adaptor back in place on the vehicle's exterior and secure it with screws provided.
- e. Secure one piece vent cap to vehicle's exterior skin in accordance with Figure 1. Caution! Be sure the vent cap adaptor is installed on the exterior of the special adaptor back!
- f. Attach furnace to floor with screws through furnace legs.

*Note: The above instructions refer to a furnace utilizing air intake and exhaust extension tubes, Figure 2-D shows a simulated installation utilizing the extension tube. If extension tubes are not used and the furnace is to be installed against the outer skin of the vehicle, then refer to inner skin dimensions described in Installation 1 or 2 and cut the inner skin accordingly. This should be done after step "b" in this section (3). Then, the furnace should be pressed against outer skin of the

vehicle and the remaining steps of section 3 followed. This installation is recommended when the special adaptor back is used but air intake and exhaust tubes are not used.

- g. See Figure 2-C for a simulated installation utilizing the special adaptor back.

*Caution: In all three (3) installation methods, please insure that at least 40 square inches of free area have been allowed for cold air return!

Be sure the installation allows sufficient room for the furnace to be easily removed for service!

4. GENERAL NOTES

NOTE: Disregard step "D" for all d.c. only models.

- A. After one of the two preceding steps has been finished, the installation of the furnace may be completed by the following program.
- B. Connect the gas supply to the furnace at manifold provided on the right side of each furnace (see Figure 3). Be sure manual shutoff valve is outside the furnace jacket as shown.
- C. Connect the 12-volt d.c. power supply to the junction box located on the side of the furnace. The wires are color coded positive (+) and negative (-). This polarity must be observed so the furnace motor will run with the power direction of rotation to insure correct air delivery.
- D. Connect the 115-volt a.c. power supply to the black and white wires within the junction box on the side of the furnace. The furnace is equipped with an internal relay which automatically switches the furnace's power supply source from d.c. to a.c. when the a.c. power is connected to the trailer. The relay automatically switches back to d.c. when the a.c. power supply is disconnected from the trailer.
- E. Locate the room thermostat approximately 4½ feet above the floor on an inside bulkhead where it will not be affected by heat from any source except room air. Connect it at the junction box as mentioned in step "C."
- F. Be sure all voltage wiring to the furnace is of heavy enough gauge to keep voltage drop through it to a minimum. No. 14 gauge wire is recommended.
- G. On the ducted models, the ductwork connected to the furnace must be the same size as the connecting collars provided on the furnace for its entire length.
- H. To put the furnace in operation, follow the lighting instructions on it. On the initial starting, considerable time may be required to bleed air from the gas supply line before the pilot will ignite.
- I. The cold air return for the furnace must be at least 40 square inches free area.
- J. Usually the furnace will be installed under a counter. For easy access to it, the furnace enclosure should consist of a door or pair of doors through which the furnace can be serviced if the need arises.
- K. Clearance from combustible material adjacent to the unit must not be less than the dimensions given in the following table for your particular furnace.

Model	Right Side	Left Side	Top	Bottom	Back	Front
NT-20A and AD	0"	0"	0"	0"	0"	Exposed
NT-22A and AD	2"	1"	1"	0"	0"	1"
NT-22CS and CDS	2"	1"	1"	0"	0"	1"
NT-30A and AD	Same as NT-22A and AD					
NT-30CS and CDS	Same as NT-22CS and CDS					

- L. After the furnace has been connected to the gas supply, all joints must be checked for leaks. Turn on the gas and apply soapy water to all joints and watch to see if bubbles are formed.
- M. All installations of the furnace shall be in accordance with local codes.

- N. Refer to Figure 4 for the d.c. only electrical circuits. Refer to Figure 5 for the a.c./d.c. combination electrical circuits.
- O. After installation is completed and furnace is put into operation, it must be adjusted to obtain a normal temperature rise within the range specified on the plate adjacent to the rating plate.

OPERATING INSTRUCTIONS

1. To light the furnace, turn the manual valve to the "off" position and wait 5 minutes. Set the thermostat at its lowest setting. Open manual valve. Correct operating characteristics depend on this valve being positioned fully open. Never attempt to operate with valve partially closed.
2. Remove the lighter hole cover. On NT-20 models, the front louvered panel must first be opened to gain access to the lighter hole. On NT-22 models, the furnace front is not exposed, so the lighter hole must be reached by first removing or opening cabinet and, secondly, lift furnace access door. After lifting access door, then remove lighter hole cover.
3. Press reset button and hold. Insert a burning match through opening so that flame is near the pilot. On the initial lighting the pilot may not light immediately due to air in the gas line. If such is the case it may be necessary to hold the reset button in for a minute or more before the pilot lights. When the pilot is burning, continue to hold the reset button in for approximately 30 seconds or until the pilot continues to burn when the reset button is released.
4. Replace the lighter hole cover.
5. Replace furnace panels.
6. Set thermostat at desired position.

BURNER ADJUSTMENT

After the pilot is lit, the furnace is ready for adjustment and observation of the main burner and pilot flame.

To adjust primary air to the main burner, it is necessary to gain access the same way as with lighting the pilot. The small sheet metal cover found just below and to the right of the lighter opening must be removed. Behind the cover is a slotted screw head. With a screwdriver, turn screw head counterclockwise for less primary air and clockwise for more primary air. A symptom of too much primary air will be a howling or screeching noise when the burner is on (reduce air to correct). A symptom of too little primary air will be sooting on the exterior vent and a distinct yellow and floating flame (increase air to correct). A slight trace of orange should remain at the tip of the burner flame—this is a sign of correct adjustment.

SEQUENCE OF NORMAL OPERATION

1. When the thermostat calls for heat, the blower motor is energized immediately.
2. As the blower motor reaches approximately 75 percent of the normal r.p.m. (within 3 to 5 seconds) the microswitch, in response to the air flow, will engage allowing current flow to the solenoid valve or base valve.
3. The current to the valve opens it and allows gas to the main burner. The pilot light then ignites the main burner.
4. If within a period of approximately 2 minutes after the main burner is lit, the thermostat is turned back, both the

blower motor and solenoid valve are deenergized. However, if the furnace continues to run longer than 2 minutes, which it normally should, a slight snap can be heard from within the casing. The snap is caused by the fan switch as it changes its position. After this occurs, if the thermostat is satisfied or turned back, the solenoid valve will close, the flame on the main burner will go out, **but the blower will continue to run for a short period of time and will then shut off.** The purpose of this is to remove most of the remaining gases from the heat exchanger. Be assured that this period of blower override is a part of the unit's normal operation.

FAN SWITCH

The fan switch is to control the sequence of the blower operation. The fan switch is a two pole switch. When the bimetal disc of the fan switch is heated to the operating temperature, the switch changes positions to close 1 and 3. This completes a circuit through the motor from a direct source. The blower will continue to run as long as the chamber is hot even though the thermostat is satisfied and the main burner is off. When the chamber cools, the fan switch changes back to its original position and shuts the blower off. If burner and blower shut off simultaneously after about 2 minutes of operation, and the thermostat is still calling for heat, then the fan switch failed to completely change over. This is a symptom of a faulty switch—replace it.

LIMIT SWITCH

The purpose of the limit control is to turn off the gas to the main burner if for any reason the furnace becomes hotter than that which is safe. Improper operation of the furnace due to the limit control does not always indicate a defective control. If the circulating air is blocked or only partially so, the limit control will function and cause the main burner to cycle. Cycling on the limit is not always undesirable—if it happens only occasionally. This is a good indication of safe operation and will most likely happen on a warm day. If cycling happens too often or for an extended period, the circulating air system should be thoroughly cleaned.

If for any reason the limit control is found to be defective, there is no recommended method of repairing it. Because of its importance for safety reasons, it should be replaced with a new one. **CAUTION: NEVER SHUNT THE LIMIT CONTROL EVEN FOR ONLY TEMPORARY OPERATION.**

MICROSWITCH

The microswitch has two purposes:

1. It is an "air prover." It operates in response to the current of air generated by the blower. Hence, if for any reason the air from the blower is not sufficient, the switch will not operate. This may be caused by a slow motor due to low voltage, restricted return air, or lint accumulation on the blower wheel.
2. The switch allows time for the blower to pull in a sufficient

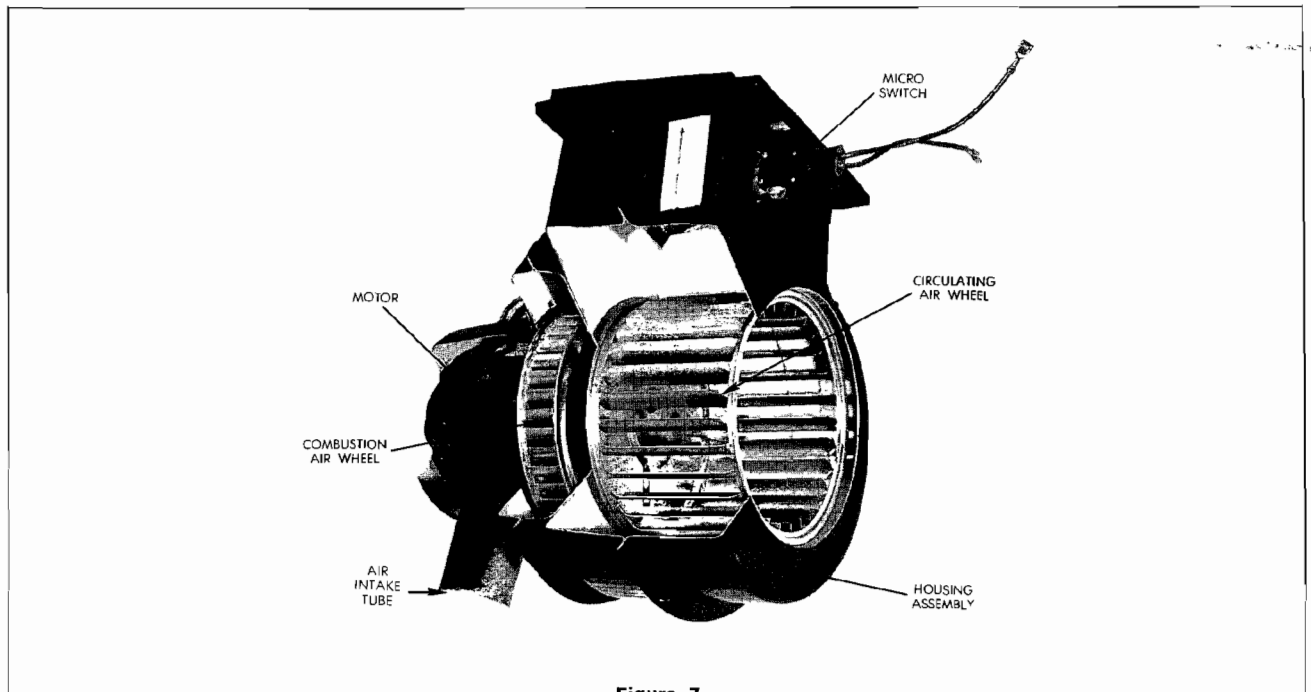


Figure 7

amount of air to support combustion before it engages. Once it engages, the solenoid valve opens, gas flows to burner, and ignition occurs.

BLOWER ASSEMBLY

Figure 7 shows a cutaway of the blower assembly. Although one motor drives all wheels, the blowers are separate. The combustion-air blower is sealed so as to allow no passage of air between it and the circulating room-air blower. The combustion-air blower draws air from the outside atmosphere, discharges it into the combustion chamber, and forces the combustion products out the exhaust tube. The circulating room-air blower pulls return air in and forces it across the heat chamber, discharging into the area to be heated.

AUTOMATIC SOLID STATE RECTIFIER SYSTEM ON DUAL VOLTAGE MODELS

Two diodes are mounted on a larger heat sink and combine with the transformer to create a full-wave rectifier which converts 115-volt a.c. to 12-volt d.c.

A single-pole, double-throw relay switches the unit from a.c. to d.c./d.c. to a.c. automatically.

The 115-volt wire (black and white) is factory wired to junction box.

NEW "IMPACT" IGNITION SYSTEM

This new spark ignitor has been added to facilitate lighting. It is a solid state device with no outside current required.

Depressing the "Ignition Button" operates a lever on the device which, in turn, creates a spark at the ignitor tip. Normally the unit will ignite with the first spark. In the event the unit doesn't readily light with the ignitor, it's possible the ignitor tip may need repositioning—aligning the ignitor tip with the pilot gas flow can be accomplished through the lighter hole.

On initial lighting, air in the gas line may require several pumps of the "Ignitor Button" for ignition.

The new ignitor does not prevent the lighting by match if desired.

MAINTENANCE AND CLEANING

The Suburban Dyna-Trail unit does not require any routine maintenance or cleaning.

If for any reason the main burner has been allowed to operate with a high yellow flame, a soot formation is sometimes deposited inside the combustion chamber. The carbon deposit may be of such quantity that cleaning will be necessary. To clean the combustion chamber, there is an access hole on the front of each radiation chamber. A vacuum cleaner is ideal to clean out any carbon deposit.

The Dyna-Trail is equipped with an oiled, sealed motor and requires no oiling.

COMBUSTION CHAMBER REMOVAL NT-20 NONDUCTED MODELS

The NT-20 combustion chamber must be removed from the rear.

1. Disconnect gas and power supply.
2. Remove cabinet back.
3. Disconnect gas manifold at brass union nut.
4. Remove hold-down screws (at the front and bottom of the combustion chamber).

5. Pull chamber outward (it slides on metal tracks) until terminal block can be reached. Remove line voltage wires and thermostat wires.
6. Chamber can now be removed completely. To reassemble, reverse steps.

NT-22 AND NT-30 DUCTED MODELS

The NT-22 and NT-30 combustion chamber must be removed from the front.

1. Disconnect gas and power supply.

2. Disconnect gas manifold from piping at union fitting.
3. Remove cabinet front.
4. Remove shipping screw securing chamber shield to cabinet.
5. Remove the four vent cap screws (outside) to free exhaust tube.
6. Pull chamber forward until junction box can be reached. Remove voltage wires and thermostat wires from junction box. Chamber can then be pulled completely out. NT-30 ducted models are same as NT-22.

SERVICE HINTS, DIAGNOSIS, AND CORRECTIVE MEASURES

A. COMPLAINT—NO HEAT

1. Thermostat off—Check to be sure thermostat is calling for heat. Wire to thermostat could be off terminal.
2. Gas supply—Be sure manual gas valve is in the open position (level parallel to gas line).
3. Pilot—Check to be sure pilot is lit (pilot outage discussed in "B" category).
4. Electrical connections and power—Battery must be charged. If battery is low, there will be sufficient power to run the blower, but not enough to run the blower at full speed. If blower doesn't run at its prescribed speed, the microswitch cannot be engaged and gas will not flow to the main burner. Be sure the connection of the voltage lines in the terminal block are tight.
5. Malfunctioning microswitch—Be sure the microswitch is sailing in far enough to open the solenoid valve. If the switch is not sailing in, clean any dust or dirt from the actuator pin. Other reasons for switch not sailing in are:
 - a. Insufficient blower speed (slow motor due to low charged battery, faulty motor, or lint and dust accumulation on the blower wheels, or restriction of return air to furnace). Check wiring in accordance with unit's wiring diagram to assure the proper polarity of the 12-volt d.c. power supply is observed. This polarity must be observed so the motor will run the proper direction of rotation to insure correct air delivery.
 - b. Faulty microswitch—Replace switch if valve doesn't open when switch is manually engaged. Switch should also be replaced if battery is fully charged and blower motor running at top speed fails to engage switch within 6 to 7 seconds.

NOTE: To service switch, combustion chamber must be pulled out (front or back depending on model and installation). If the chamber can be pulled out the rear, it needs to be only pulled out as far as needed to visually and manually check the switch.

6. Solenoid valve—With test light check solenoid valve terminals in the terminal block. If current is present, but valve is not opening (when microswitch engages), replace solenoid valve. The chamber must also be removed to check the above. To replace the solenoid valve it may be necessary to remove the chamber on NT-22 and NT-30 models depending on the type installation. On NT-20A models, access to the valve can be made from the outside (rear of unit) by removing the cabinet back. The valve may be replaced by:
 - a. Shutting off manual gas valve.

- b. Removing the four phillips head screws holding valve head to body and then remove valve head. Replace with new valve head.
7. Blower not operating—Check for burned-out motor. On dual voltage model furnaces, the a.c./d.c. switching relay could be faulty—check by shorting across terminals 3 and 4. If relay clicks, but motor fails to start, replace motor. If no click is evident, replace relay.
8. Short cycling (fan switch)—If burner and fan shut off simultaneously when the fan switch closes (2 or 3 minutes after burner comes on) it indicates a shorted fan switch. Replace switch (chamber must be removed).
9. Defective relay—Relay may be faulty if motor fails to start when thermostat calls for heat. This will be evidenced by a "click" when the thermostat is raised and motor fails to operate.

B. COMPLAINT—PILOT OUTAGE

Pilot outage can be due to several reasons. To isolate the source of a pilot outage complaint, it is very helpful to determine exactly when the pilot is going out. There are three phases of the unit operation:

1. Off phase.
2. Start up or ignition phase.
3. Operating phase.

If the time of outage can be linked to one of these phases, then possible sources can be isolated.

Off Phase

1. Weak thermocouple or safety pilot valve—Thermocouples are generally long lived, but failures can occur after a period of use. If the pilot is observed going out during the off cycle, it could be due to either a weak thermocouple or safety pilot valve. A simple check can be made in the field by a time check. Remove the lighter hole cap and extinguish the flame after the pilot has been lit for approximately 5 minutes. Use a watch to check the time that elapses between extinguishing the pilot and the snap of the safety valve. If this is less than 30 seconds, it indicates a weak thermocouple or safety pilot valve. Replace the thermocouple first and repeat the test for the safety pilot valve. If the time lapse is still less than 30 seconds, replace the safety pilot valve.
2. Air leakage—Draft should not affect the pilot. The unit has a sealed combustion chamber with an air intake and exhaust subject to the same atmospheric pressure. Therefore, the pressure within the chamber is equalized and air is steady.

Regardless of the wind or draft condition the pilot will not be blown out as long as the chamber is sealed properly. If, however, a leak is evident, it would disrupt the pressurized chamber, and a draft air movement would commence. As a result the pilot could possibly go out.

The following are points to check for air leakage. The unit should be pulled and all of these points should be carefully checked.

- a. Pilot burner gasket must be absolutely tight.
 - b. Air shutter adjustment cover gasket must be absolutely tight.
 - c. Vacuum cup on air intake tube should fit against cabinet back so that no room air can enter air intake.
 - d. Asbestos exhaust gasket should be fitted properly at the end of the exhaust tube to insure proper seal.
 - e. Lead-in wires to the blower motor should be sealed where they enter the blower housing.
 - f. All other gasket points; e.g., blower assemblies, sponge rubber gaskets.
 - g. It is possible that the felt gasket on the interior of the blower assembly may not be properly sealed. If not, air can flow from the sealed combustion compartment which is, in effect, air leakage. Checking this point will necessitate breaking down the blower assembly; therefore, it should be the last point to check. Nevertheless, this is an important hint as this could also be a contributing factor to pilot outage.
 - h. Restriction of exhaust tube—visually check rear exhaust tube opening for blocking of discharge of exhaust products.
 - i. Crossover tube between lower section of blower assembly and burner tunnel may be cracked, deteriorated, or off the blower assembly flange or burner tunnel. Replace if cracked or deteriorated.
3. Lack of sufficient air—Another reason for pilot outage during the off cycle is the lack of sufficient air to support proper pilot flame adjustment. It is important that the flame be the proper size. Unlike most heating equipment, too large a flame is a common cause of pilot outage. It should be just high enough to envelop the thermocouple. If the pilot flame is other than this or yellowish in color, replace the pilot orifice.
 4. Leaky solenoid valve—If gas leaks by the solenoid valve during the off burner periods, it burns, using the oxygen in the chamber and causing the pilot to go out because of lack of oxygen. Observe the main burner through the lighter hole to be sure that the burner cuts off completely on the off cycle. If a flame is present, no matter how small, it indicates that a small amount of gas is leaking through. If there is leakage, inspect the valve to be sure there is no dirt between the valve and valve seat. If there is no dirt to account for the trouble, replace the valve head.
 5. Malfunctioning microswitch—Make sure the microswitch is dropping all the way out and breaking the connection in the solenoid valve on the off cycle of the blower.
 6. Gas supply—Check gauge for proper gas supply and pressure.
 7. Clogged pilot orifice—Evident by small pilot flame.

8. Pilot adjustment—Pilot should be adjusted to where the pilot flame just envelops the thermocouple tip.
9. Incorrect installation of inner vent assembly—This must be installed on the exterior of the trailer or motor home.

Start-up or Ignition Phase

If the pilot is observed and is going out when the burner comes on, check for the following:

1. Malfunctioning microswitch—The microswitch allows gas to reach the main burner by closing the circuit through the gas valve, after the blower motor has started and reached approximately 75 percent of its maximum r.p.m. This takes about 3 to 5 seconds. If the microswitch opens the gas valve too soon, the main burner flame may float and pull the pilot flame out. This is caused by lack of oxygen in the combustion chamber. If microswitch is engaging too fast, replace switch.
2. Primary air—Too little primary air will cause burner to float on ignition and could pull pilot out.

Operation Phase

If burner and fan shut off simultaneously when the fan switch closes 2 to 3 minutes after the burner comes on, it indicates a shorted fan switch. Replace the switch. If this symptom occurs, it is also possible for the pilot to go out because the blower was not allowed to run and purge out the combustion products. The excessive amount of combustion products can smother the pilot.

C. COMPLAINT—EXCESSIVE NOISE

1. Blower out of balance—Replace blower.
2. Motor hum—Replace motor.
3. Air adjustment—A screeching or howling noise while burner is on is due to excessive primary air. To adjust for less air see instructions on page 11.

D. COMPLAINT—ERRATIC BLOWER OPERATION

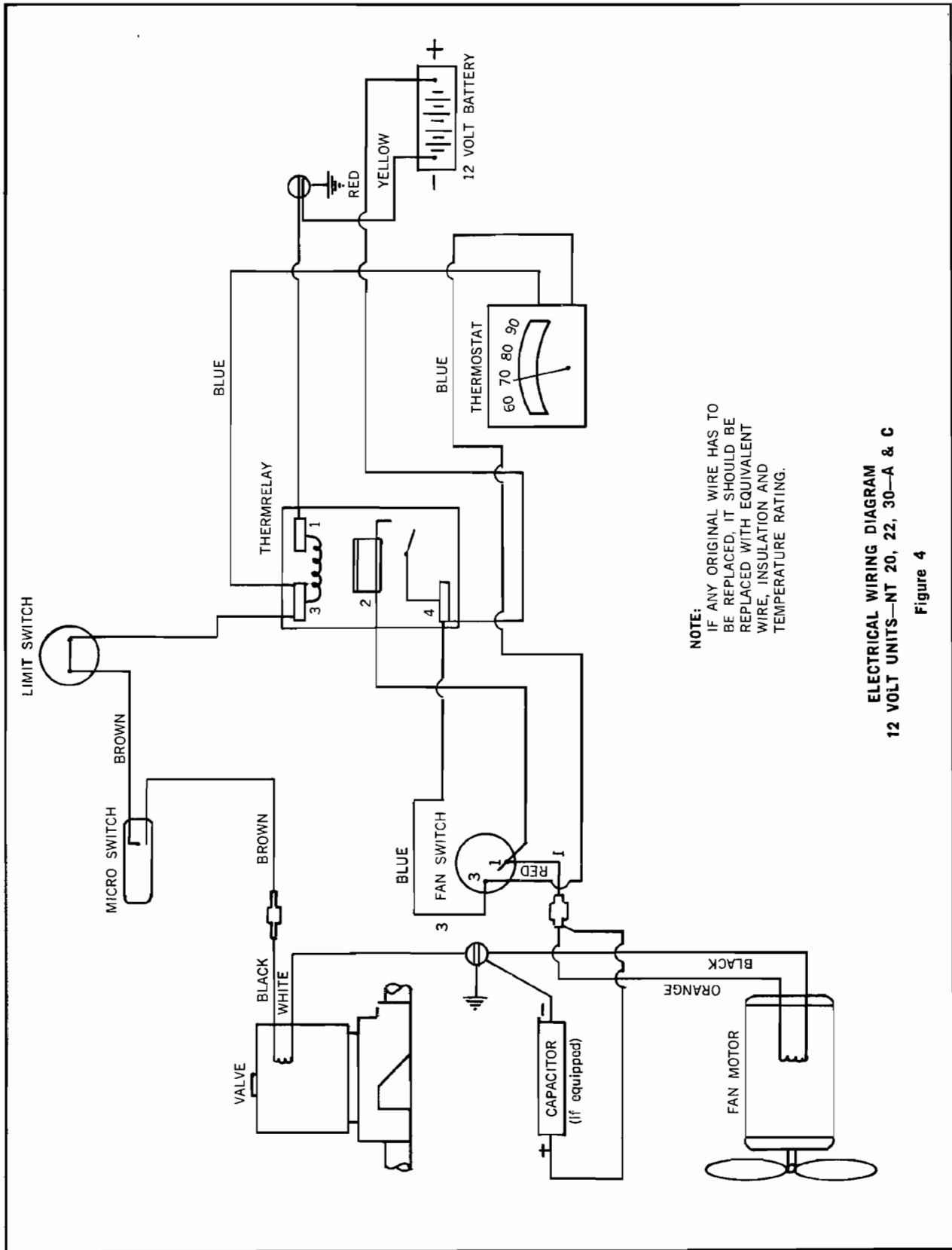
1. Automatic blower motor overload switch may be defective—Replace blower motor.
2. Blower assembly may be loose causing squirrel cage wheel to drag—Check assembly—secure if loose.

E. COMPLAINT—UNIT WILL NOT OPERATE

1. Check all wiring to assure proper connections or detect possible shorts.
2. On dual voltage furnaces check following:
 - a. Proper wiring connections to a.c./d.c. convertor.
 - b. Transformer for burnout or shorts.
 - c. Diodes.
 - d. A.c./d.c. switching relay.

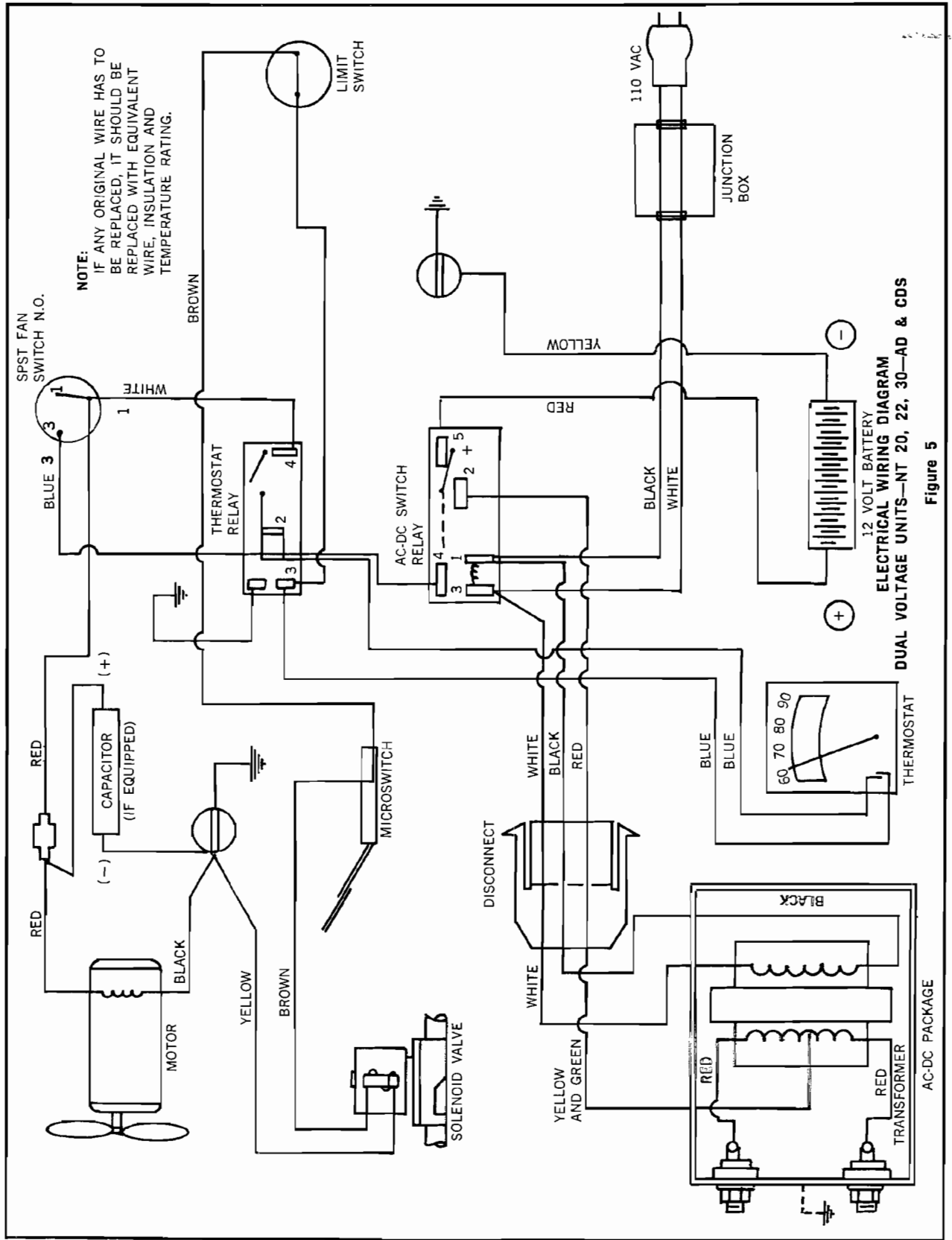
NOTE: On dual voltage units, replace the entire convertor under the following conditions:

- a. Source of problem cannot be traced to any one convertor component.
- b. Excessive voltage or lightning has been placed on the input of the convertor.



NOTE:
 IF ANY ORIGINAL WIRE HAS TO
 BE REPLACED, IT SHOULD BE
 REPLACED WITH EQUIVALENT
 WIRE, INSULATION AND
 TEMPERATURE RATING.

ELECTRICAL WIRING DIAGRAM
12 VOLT UNITS—NT 20, 22, 30—A & C
 Figure 4



ELECTRICAL WIRING DIAGRAM
DUAL VOLTAGE UNITS—NT 20, 22, 30—AD & CDS

Figure 5

REPLACEMENT PARTS

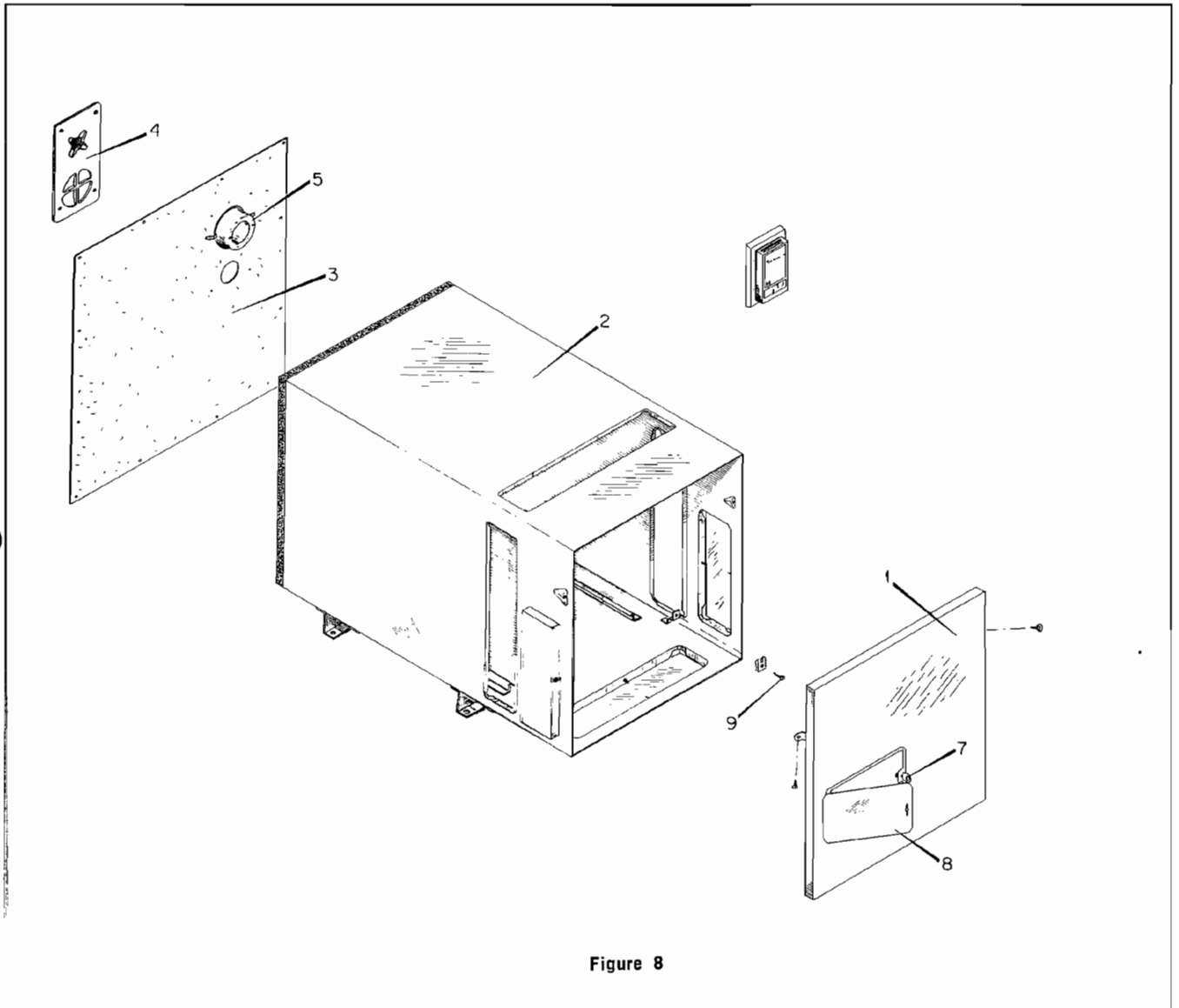


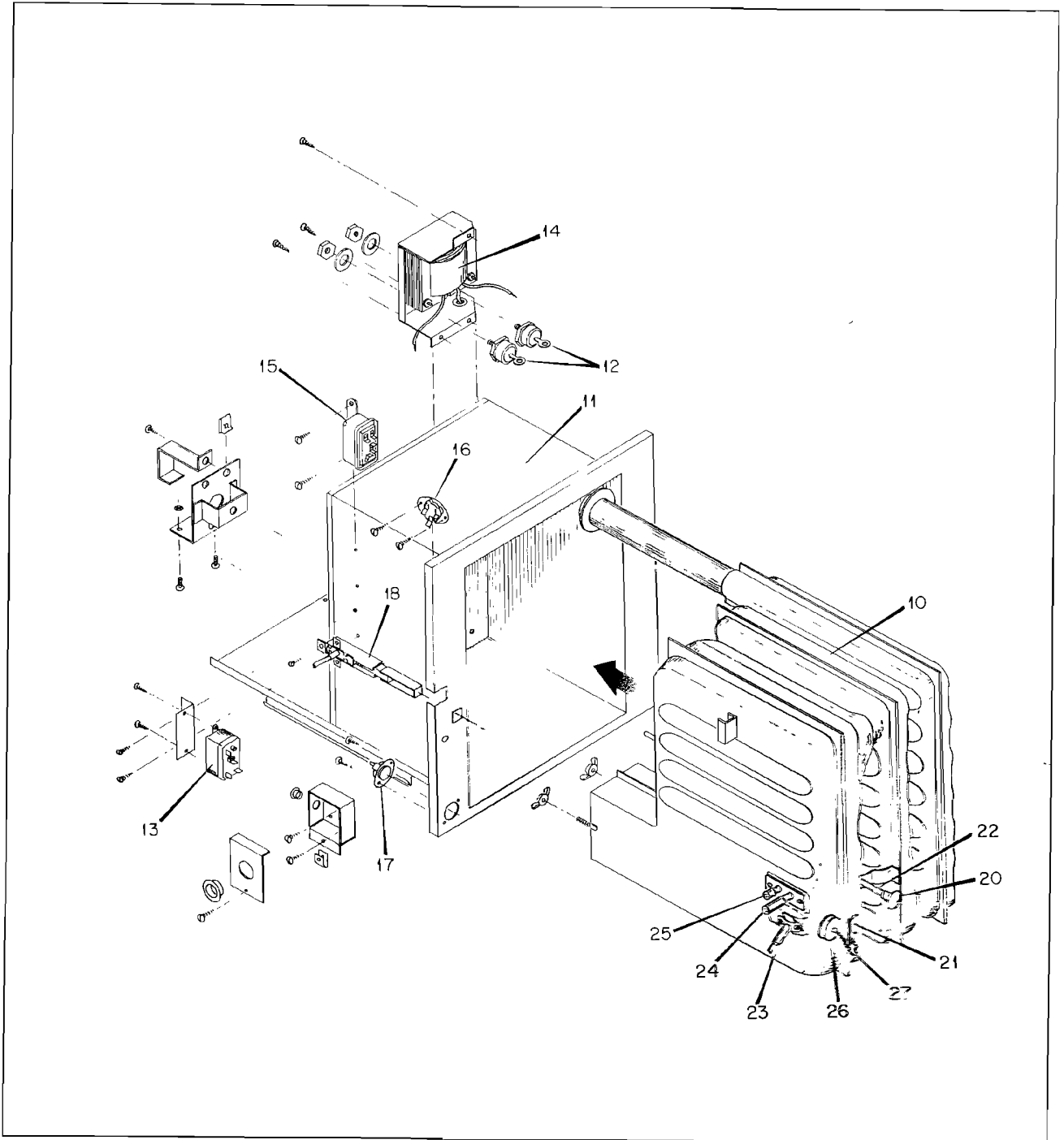
Figure 8

CABINET AND VENT ASSEMBLY—NT-22, NT-30

REPLACEMENT PARTS

Figure 9

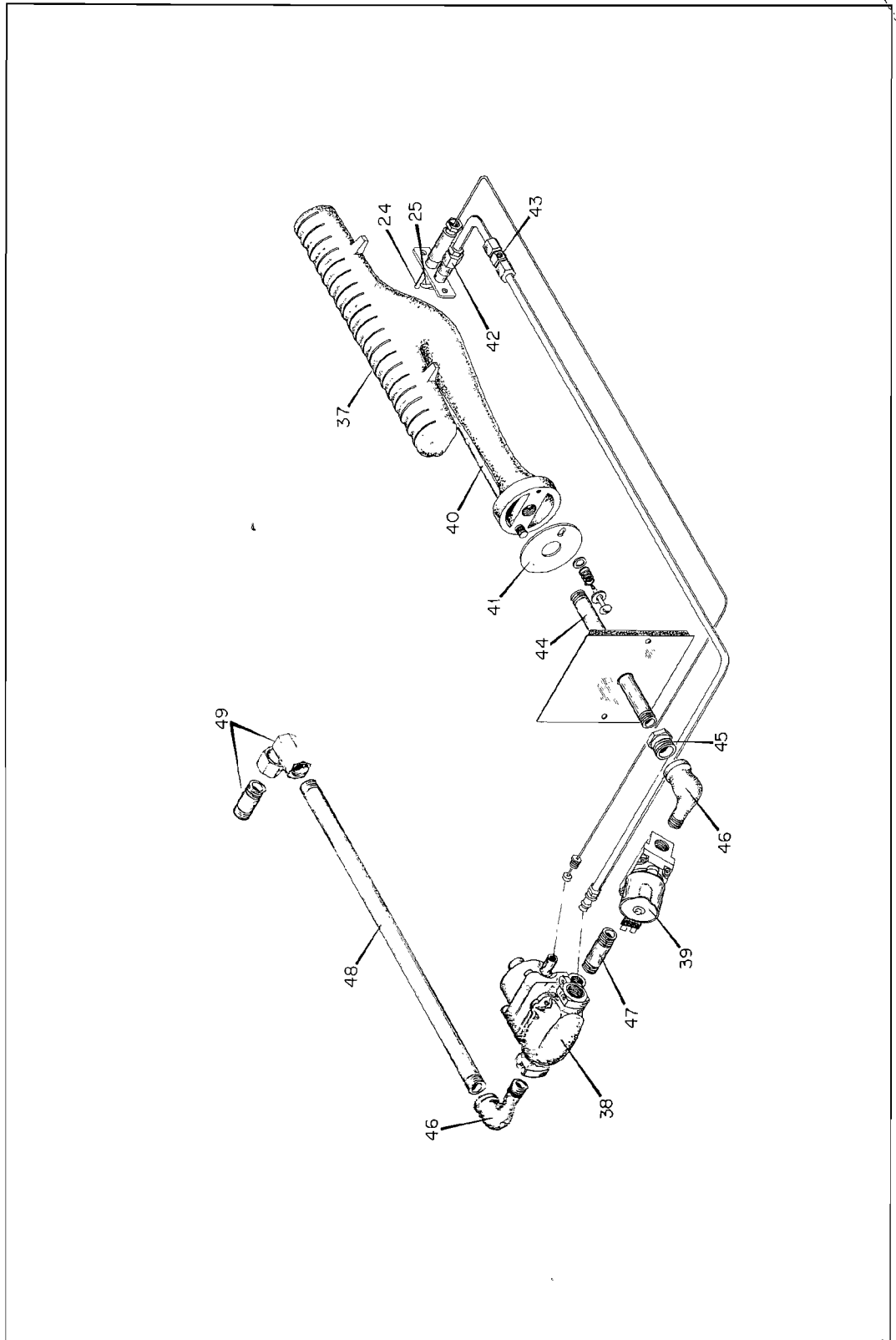
VIEW OF COMBUSTION CHAMBER
ASSEMBLY COMPLETE
NT-20, NT-22, NT-30



REPLACEMENT PARTS

Figure 10

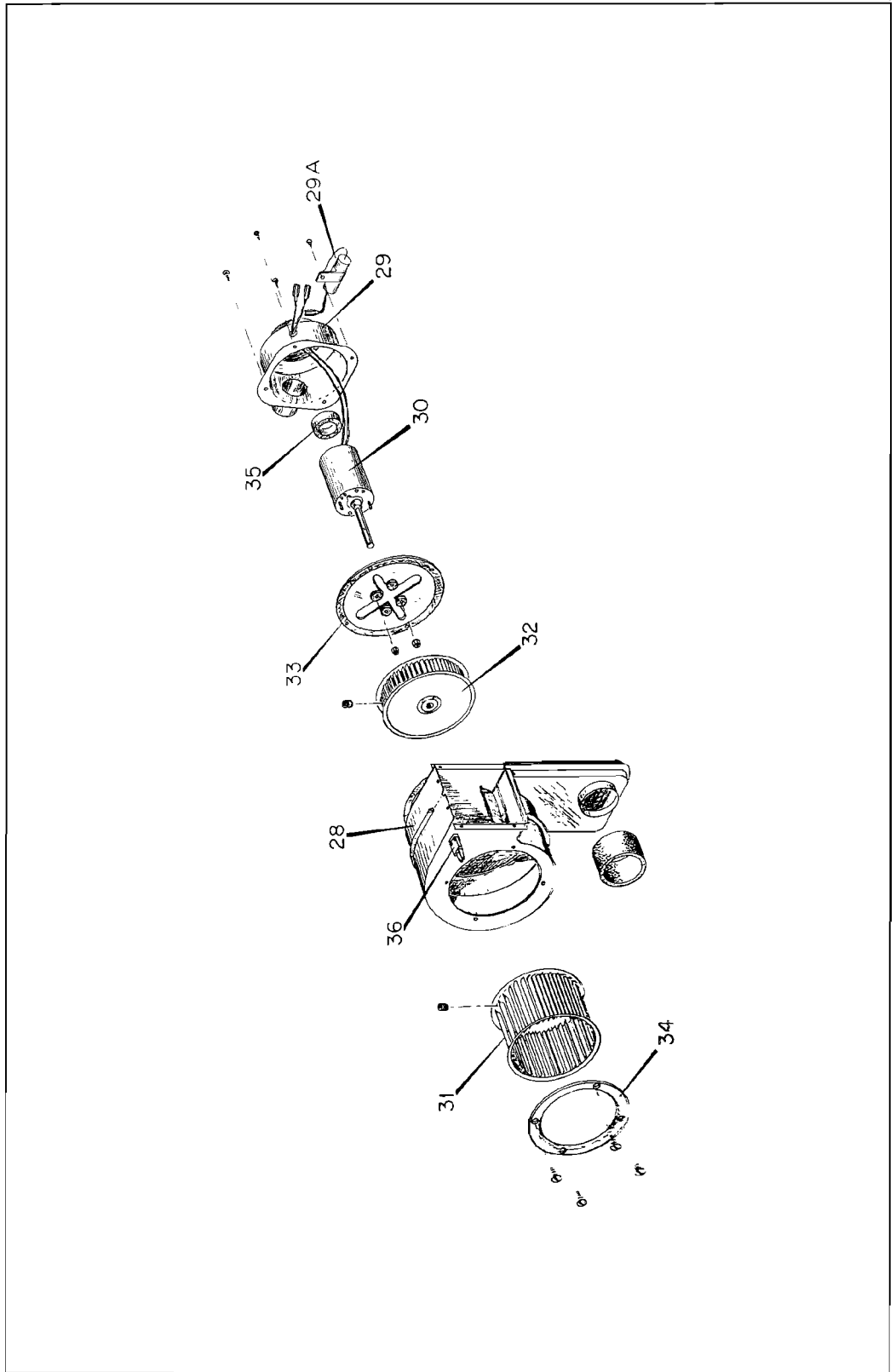
VIEW OF BURNER ASSEMBLY
COMPLETE
NT-20, NT-22, NT-30



REPLACEMENT PARTS

Figure 11

VIEW OF BLOWER ASSEMBLY
COMPLETE
NT-20, NT-22, NT-30



**DYNA-TRAIL TRAVEL TRAILER FURNACE
PARTS LIST FOR MODELS
NT-20, NT-22, NT-30**

Effective September 1, 1970

Item No.	Description	Part No.
1	Front, Main Cabinet, Assembly (NT-22, NT-30)	X100639
	Front, Main Cabinet, Assembly (NT-22A, NT-30A)	X100640
	Front, Main Cabinet, Assembly (NT-20A)	X100200
2	Cabinet, Outer, Assembly (NT-20A)	X100171
	Cabinet, Outer, Assembly (NT-22A, NT-30A)	X100548
	Cabinet, Outer, Assembly (NT-22CS, CDS and NT-30)	X100568
3	Back, Cabinet (NT-20)	100583
	Back, Cabinet (NT-22, NT-30)	100585
4	Cap, Vent (All Models)	260060
5	Adaptor, Vent Cap	061727
7	Latch, Door (Spring Type)	150033
8	Door, Main Cabinet, Front	030401
9	Combustion Chamber Hold Down Screw	
10	Combustion Chamber Assembly (NT-22, All Models)	X020183
	Combustion Chamber Assembly (NT-30, All Models)	X020184
	Combustion Chamber Assembly (NT-20, All Models)	X020185
11	Wrapper, Radiation Shield (NT-30A, AD)	X110181
	Wrapper, Radiation Shield (NT-22A, AD)	X110183
	Wrapper, Radiation Shield (NT-30C, CD)	X110184
	Wrapper, Radiation Shield (NT-22CS, CDS)	X110187
	Wrapper, Radiation Shield (NT-20A, AD)	X110188
12	Rectifier, Diode	230297
13	Relay, AC/DC Switching	230255
14	Transformer, BE 8912	230323
15	Relay, Thermostat RBM 150-7	230275
15A	AC/DC Package Complete	
16	Switch, Fan 11T-13 SPST	230329
17	Switch, Limit WA-11 165° (NT-20 Models)	230134
	Switch, Limit 195° (NT-22, All Models)	230228
	Switch, Limit 210° (NT-30 Models)	230229
18	Ignitor, Impact Assy.	X230326
20	Knob, Black, Pilot Reset	140093
21	Cover, Hole, Air Shutter Adjustment	260061
22	Rod, Control (Reset Button)	140095
23	Electrode, Spark	230277
24	Thermocouple, 88D-30	160527
25	Pilot, Burner 2R57-2L	160535
26	Cap, Lighter	290099
27	Chain, Lighter Cap	150038
28	Housing, Blower Assembly	X390054
28A	Assembly, Blower Complete (Specify Model Heater When Ordering)	

PARTS LIST (Continued)

Item No.	Description	Part No.
29	Cover, Motor Air Intake Assembly (NT-20 Models Only)	X390058
	Cover, Motor Air Intake Assembly (NT-22 and NT-30 Models)	X390047
29A	Capacitor, 750 MFD Electrolytic	230327
30	Motor, Bosch 1850 RPM (NT-30)	230259
	Motor, Bosch 1450 RPM (NT-22)	230260
	Motor, Redmond TW 2336Q	230186
31	Wheel, Blower, Large	350037
32	Wheel, Blower, Small	350036
33	Plate, Blower Divider, Redmond	390015
	Plate, Blower Divider, Bosch (NT-22 and NT-30 Models)	390045
34	Ring, Inlet	390027
35	Bushing, Blower (Motor Cover)	070289
36	Switch and Paddle Assembly (Micro)	X230006
37	Burner, Main (.052) NT-30	010387
	Burner, Main (.047) NT-22	010509
	Burner, Main (.045) NT-20	010523
37A	Burner, Main, Assembly Complete (Specify correct model heater when ordering)	
38	Pilot, Safety TS 11-K	160540
39	Valve, Alpha (Solenoid) 3812	160650
40	Rod, Air Shutter	140091
41	Shutter, Burner Air	010366
42	Orifice, Pilot—.007	160659
43	Regulator, Pilot LB 414	160556
44	Pipe, Manifold ¼"	170339
45	Bushing, ¼" × ⅜" Hex	170280
46	Ells, ⅜" × 90° St.	170012
47	Nipple, ⅜" × 1½"	170281
48	Pipe, Black Iron (NT-22-30) NT-22 and 30A-AD)	170265
	Pipe, Black Iron (NT-22 and 30 C and CD)	170341
49	Fitting, Tetrad	170292
50	Combustion Chamber Assembly Complete (NT-20 All Models) (Not Pictured)	None
51	Combustion Chamber Assembly Complete (NT-22 All Models) (Not Pictured)	None
52	Combustion Chamber Assembly Complete (NT-30 All Models) (Not Pictured)	None
53	Thermostat, T819 (Not Pictured)	160516
54	Pilot Assembly-Burner-Orifice-Tubing-Thermocouple	None
55	Pilot Tubing-Nuts and Ferrules	None
56	Shutoff Valve (Not Pictured)	160354
57	Vacuum Cup (Not Pictured)	290079