

DYNA-TRAIL

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

For Model Numbers

NT-22A, NT-22C, NT-22CD,

NT-32A, NT-32C, NT-32CD

- 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

Post Office Box 399

DAYTON, TENNESSEE 37321

Form No. DTM-20, 22, 32 4-76

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Read This Entire Book

Each item included in your Dyna-Trail furnace unit is of high quality. Properly installed, your furnace will give years of satisfactory, dependable service and economical operation. To simplify any problems of installation, we urge that you read carefully these step-by-step instructions.

Foreword

The design of this unit has been certified by The American Gas Association and The Canadian Gas Association. In order for this furnace to operate according to your expectation and in conformity with generally accepted safety regulations, installation and service instructions outlined in this book **MUST BE FOLLOWED**. Failure to comply with installation and operation instructions will void the responsibility of the manufacturer.

KEEP THIS BOOK in a safe place, because it is an important collection of facts and figures compiled to assure you a satisfactory heating installation that will add to your living pleasure. This book is intended to be a permanent part of your furnace installation and should be preserved in a convenient location for ready reference.



DAYTON, TENNESSEE



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 direct vent system furnace, design certified by the American Gas Association and the Canadian 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-22A	Ducted discharge, 12 volts d.c. only, 22,000 B.t.u./hr. input. Bottom plenum.
NT-22C	Ducted discharge (bottom or side), 12 volts d.c. only, 22,000 B.t.u./hr. input.
NT-22CD	Same as NT-22C except can operate on either 12 volts d.c. or 115 volts a.c.
NT-32A	Ducted discharge 12 volts d.c. only, 30,000 B.t.u. input. Bottom plenum.
NT-32C	Ducted discharge (bottom or side), 12 volts d.c. only, 30,000 B.t.u. per hour input.

NT-32CD Same as NT-32C except can be operated 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 direct vent 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-22 (all models) and NT-32 (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 cap, 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 methods are recommendations only. If the installer wishes to use the adaptor back or furnace back on a noncombustible sidewall, this can be done.

1. INSTALLATION USING SUBURBAN FURNACE CABINET BACK. Recommended for sidewall construction of fiberglass, aluminum, etc., where a cutout through the side of the vehicle is desired.

- a. Locate furnace near lengthwise center of vehicle.
- b. Cut opening through inner and outer skin to dimensions given below which apply to each model furnace.

***Note:** Steps "c" through "g" apply to NT-22 and NT-32.

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

Model	Size and Location of Opening in Inner Skin	Size and Location in Outer Skin
NT-22A NT-32A	16" wide x 16 $\frac{1}{4}$ " high with its bottom edge 3-7/8" above mounting surface.	Same as inner skin
NT-22C, NT-22CD NT-32C, NT-32CD	16" wide x 16 $\frac{1}{4}$ " high with its bottom edge flush with mounting surface.	Same as inner skin

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

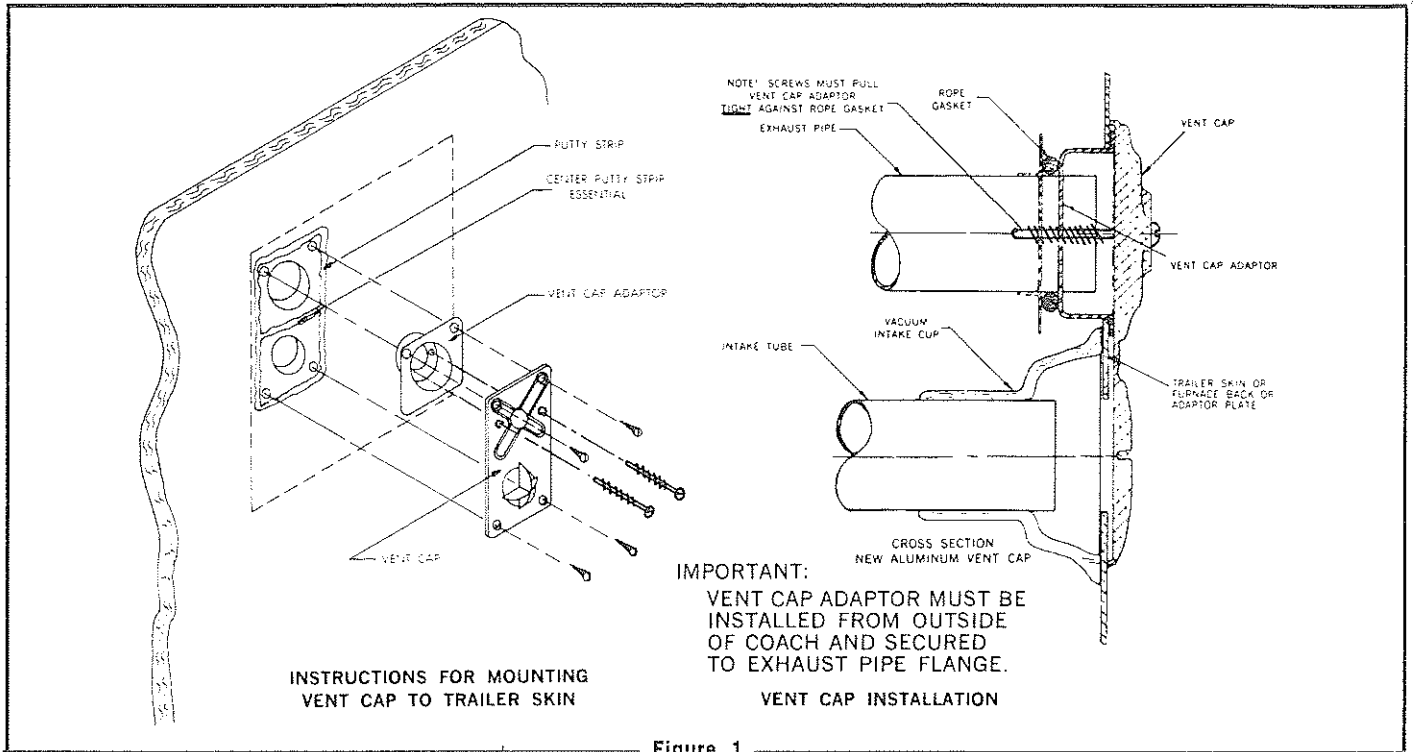


Figure 1

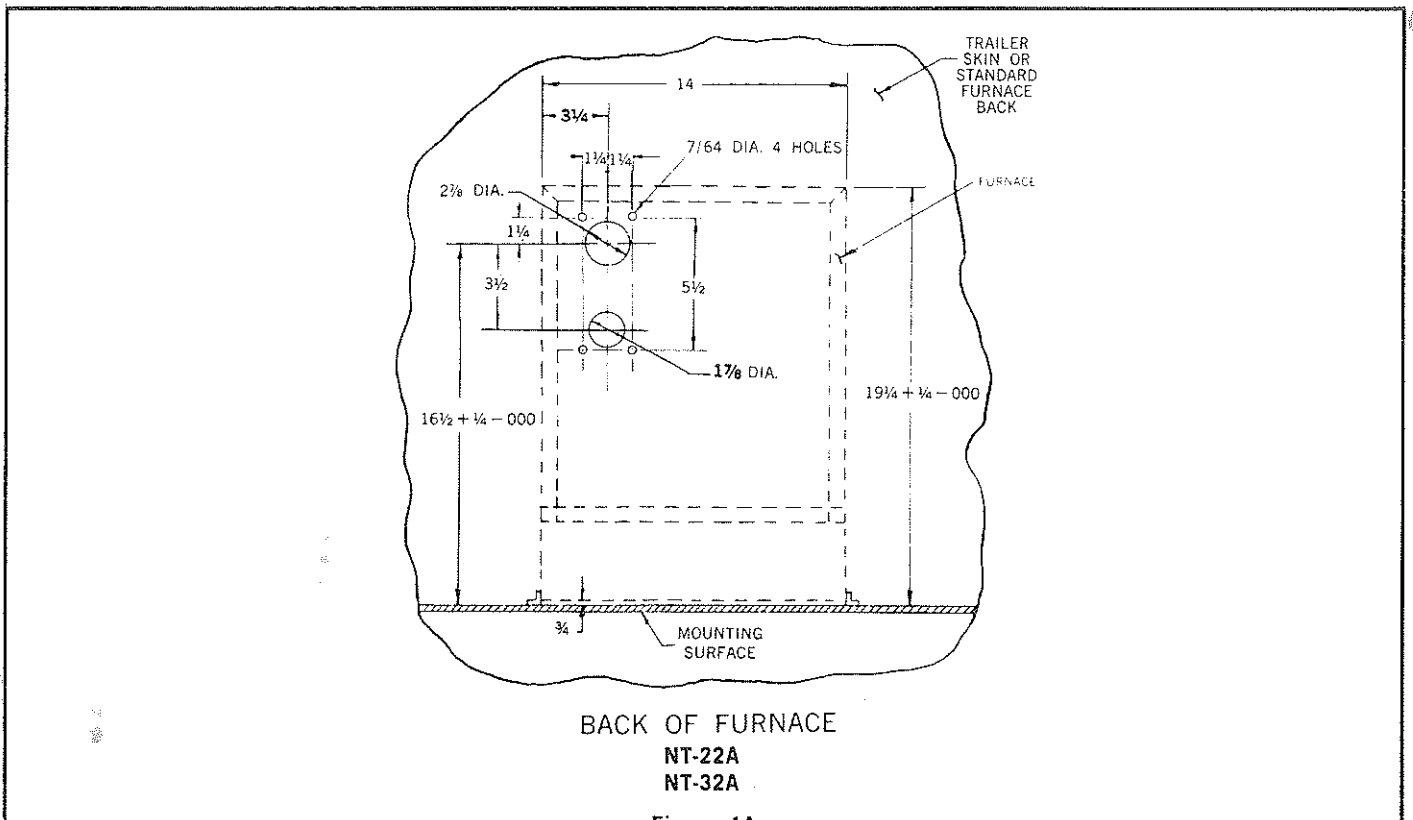
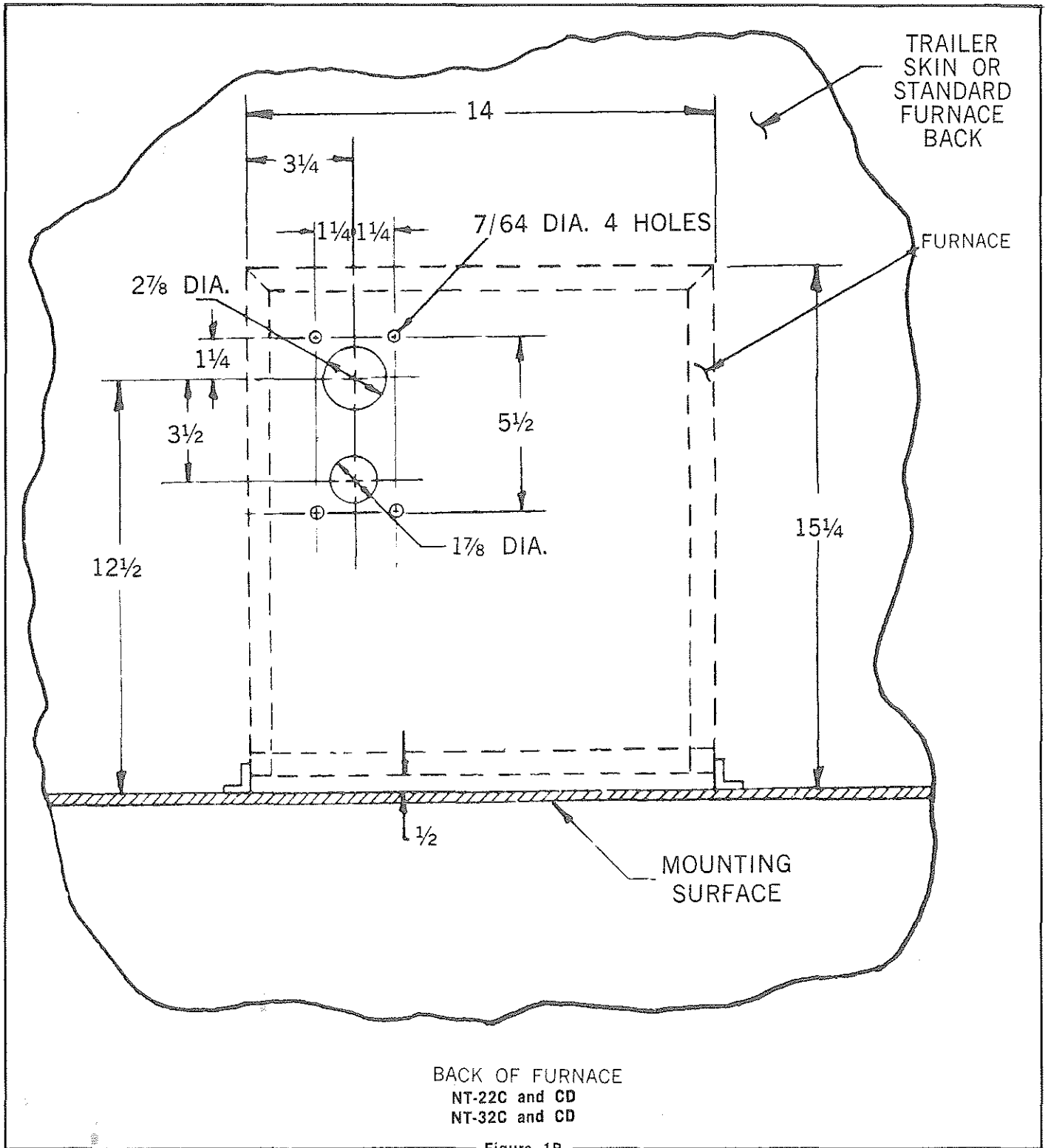


Figure 1A



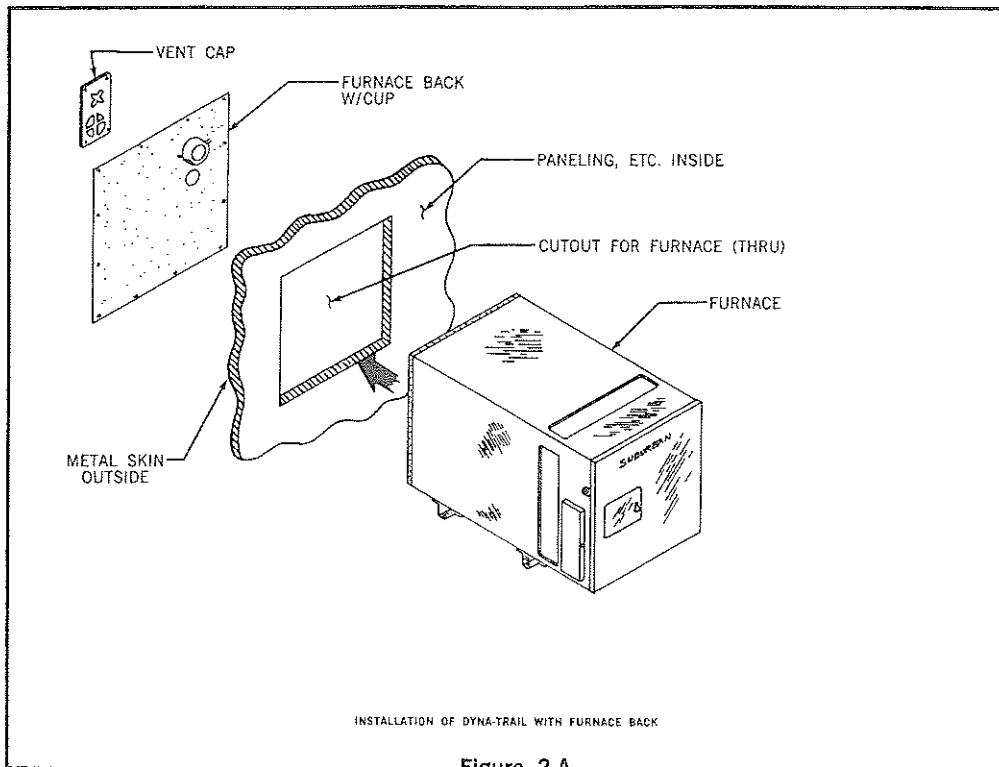


Figure 2-A

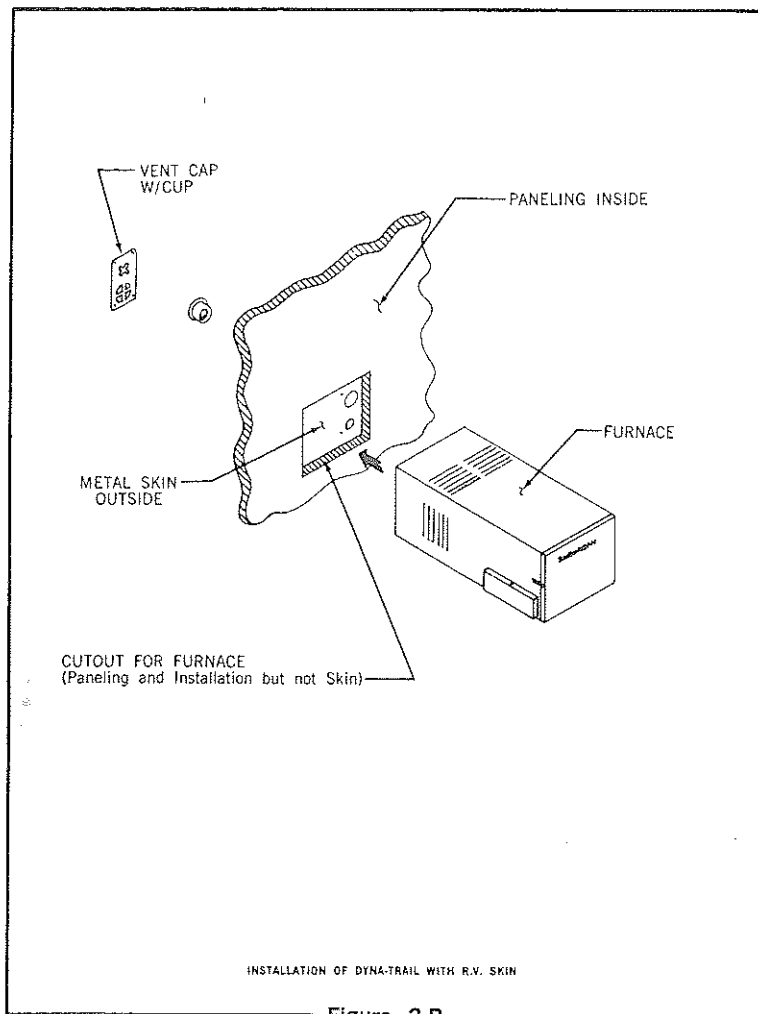
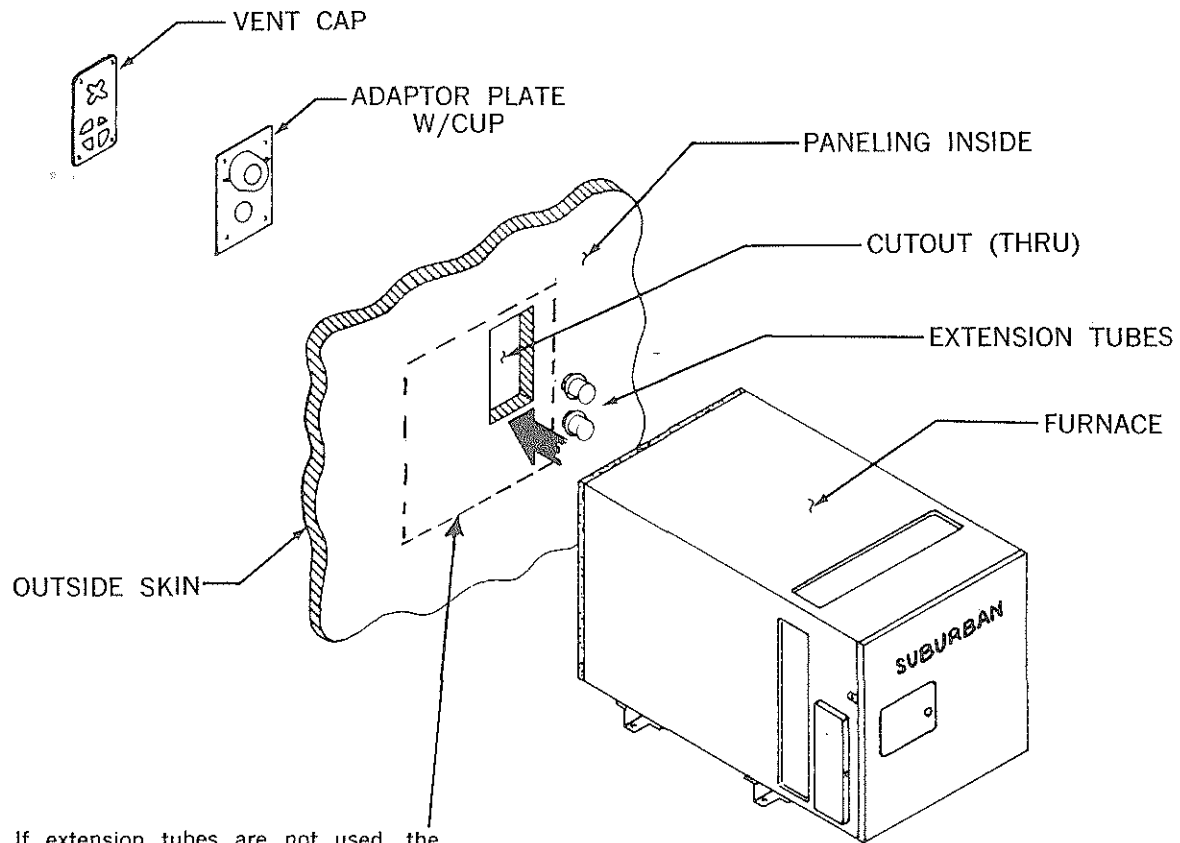


Figure 2-B



NOTE: If extension tubes are not used, the inner skin must be cut out as described in installation number (2) paragraph (B) as indicated by dotted lines.

INSTALLATION OF FURNACE WITH ADAPTOR BACK

Figure 2-C

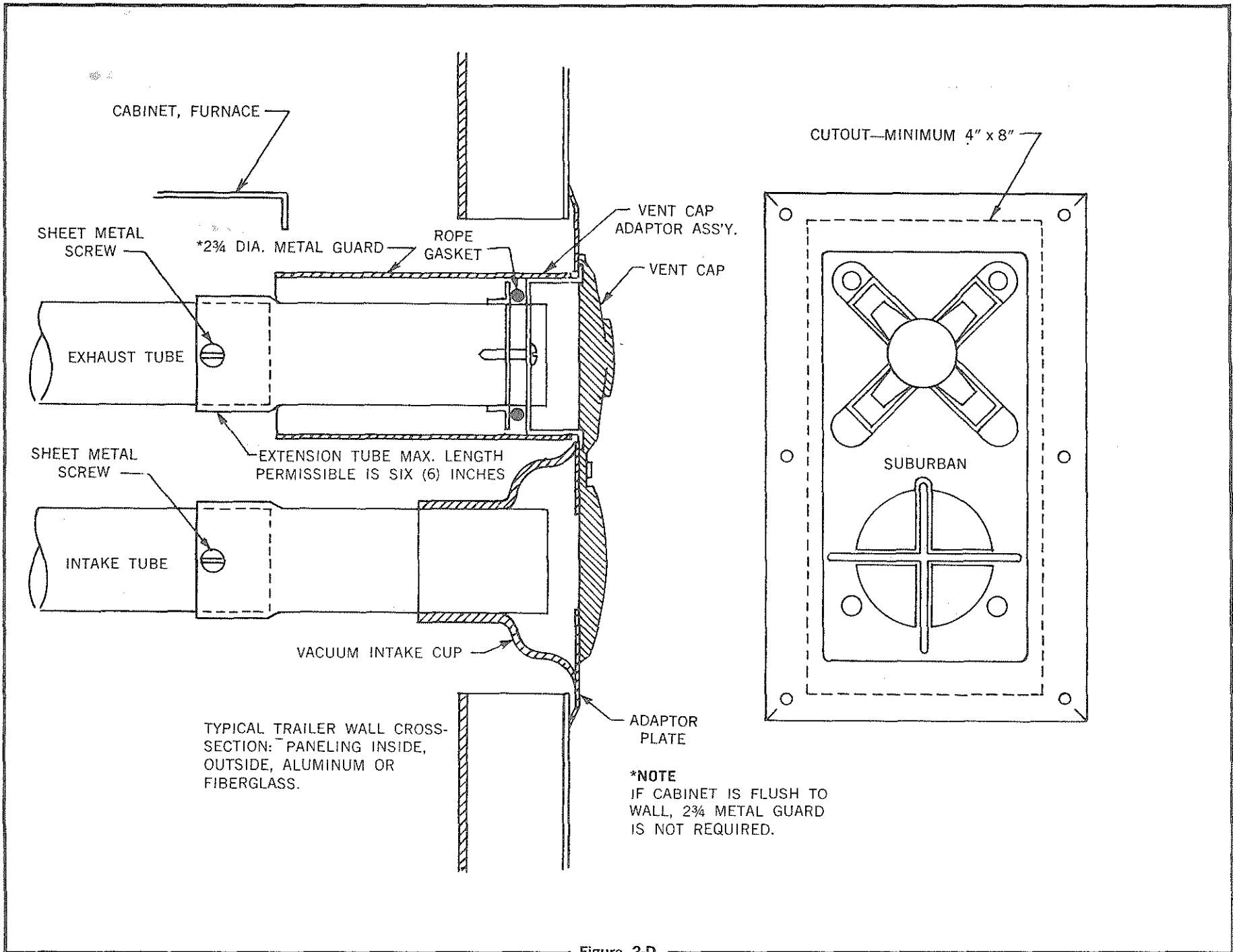


Figure 2-D

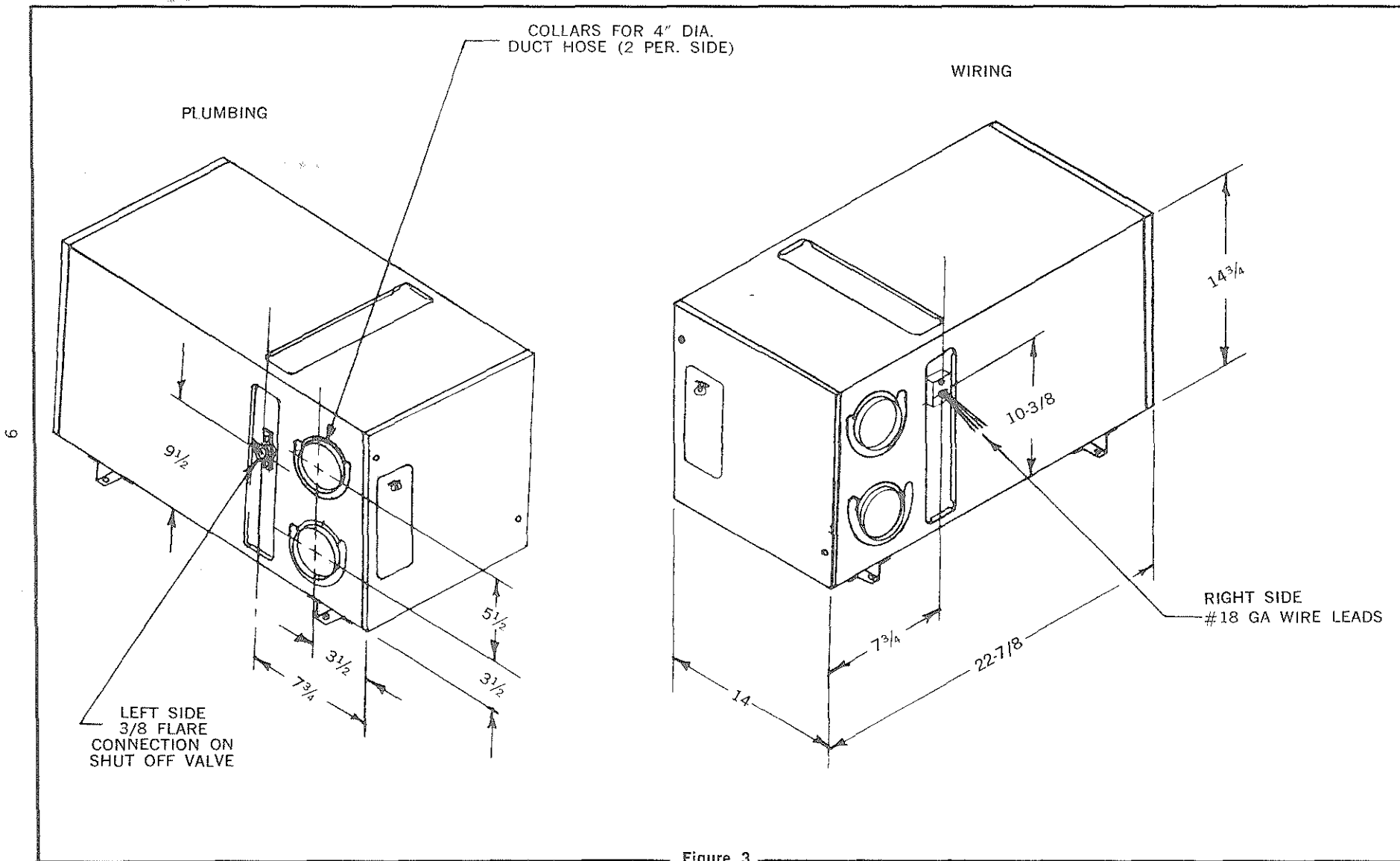


Figure 3

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.

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

Model	Size and Location of Opening
NT-22A	15 $\frac{3}{4}$ " wide x 15 $\frac{3}{4}$ " high with bottom edge 3-7/8" above mounting surface.
NT-22C, NT-22CD	15 $\frac{3}{4}$ " wide x 15 $\frac{3}{4}$ " high with bottom edge $\frac{1}{2}$ " above mounting surface.

NOTE: If extension tubes are used, only a 4" x 8" cutout is necessary in the inner skin. Refer to section (4) for correct installation of extension tubes.

- Refer to Figure 1-A or 1-B (depending on the model being installed) and pierce holes as shown in outer skin.
- Put furnace in place and press it hard against outer skin before securing furnace to outer skin. Then, bolt furnace to floor.
- 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.)
- 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.

- Locate furnace near lengthwise center of vehicle.
- If vehicle has inner and outer wall skins, proceed with item "c." If no inner skin, go to item "d."
- Cut an opening through inner skin to the dimensions given below which apply to each model furnace.
- Refer to Figure 1-A or 1-B (depending on the model being installed) and find centers of exhaust and intake holes. Draw a 4" wide x 8" high rectangle equal distances around the two centers as indicated by the dotted line in Figure 2-D. From each center the rectangle should measure 2 $\frac{1}{4}$ " vertically and 2" horizontally. Cut this out through inner and outer skin of vehicle.
- Put furnace in place and press it hard against inner skin of vehicle.
- Place special adaptor back in place on the vehicle's exterior and secure it with screws provided.
- 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!
- Attach furnace to floor with screws through furnace legs.
- See Figure 2-C for a simulated installation utilizing the special adaptor back.

NOTE: In all three (3) installation methods, please insure that approximately 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. INSTALLATION USING EXTENSION TUBES—Extension air intake and exhaust tubes can be used in any of the installations. Such tubes and their usage are limited to a maximum length of 12 inches.

Refer to Figure 2-D for a simulated installation utilizing the extension tubes.

5. GENERAL NOTES

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

- After one of the two preceding steps has been finished, the installation of the furnace may be completed by the following program.
- Connect the gas supply to the furnace at manifold provided on the left side of each furnace (see Figure 3). Be sure manual shutoff valve is outside of the furnace jacket.
- 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.

NOTE: This unit is designed for negative ground 12 volt DC system only. Do not attempt to alter the unit for a positive ground system.

- 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.
- Locate the room thermostat approximately 4 $\frac{1}{2}$ 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."
- 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.
- For side ducts it is required that a minimum of 36 square inches of duct area be provided and for the bottom duct area a minimum of 48 square inches. The purpose of the duct area is to prevent the unit from cycling on limit. Precaution must be used in this area where extra long duct work or irregular shaped duct work is used to prevent such a condition.
- 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.
- The cold air return for the furnace must be approximately 40 square inches free area.
- 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.
- 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-22A	1"	1"	1"	0"	0"	1"
NT-22C and CD	1"	1"	1"	0"	0"	1"
NT-32A	Same as NT-22A					
NT-32C and CD	Same as NT-22C and CD					

NOTE: Floor coverings should be removed from under furnace cabinet.

- L. The installation of this furnace must conform with local building codes. In the absence of local codes, the following American National Standards are applicable "Recreational vehicles A119.2-1975." The installation of the furnace shall be in accordance with any applicable local codes and regulations.
- M. 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.
- N. In Canada, the appliance must be installed in accordance with:
 - (1) Standard CGA B149.2—Installation code for propane gas burning appliances and equipment.

- (2) The Canadian electrical codes Part I-CSA standard C22.1.
- (3) Any applicable local codes and regulations.

- O. Refer to Figure 4 for the d.c. only electrical circuits. Refer to Figure 5 for the a.c./d.c. combination electrical circuits.
- P. 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.
- Q. This unit must be electrically grounded in accordance with the National Electrical Code ANSI C1-1975 when installed if an external electrical source is utilized.

OPERATING INSTRUCTIONS

1. To light the furnace, turn the manual valve to the "off" position and wait 5 minutes with blower running. Set the thermostat at its lowest setting.
2. Open manual valve. Correct operating characteristics depend on this valve being positioned fully open. Never attempt to operate with valve partially closed.
3. Remove the lighter hole cover. 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.
4. 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.
5. Replace the lighter hole cover.
6. Replace furnace panels.
7. 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.

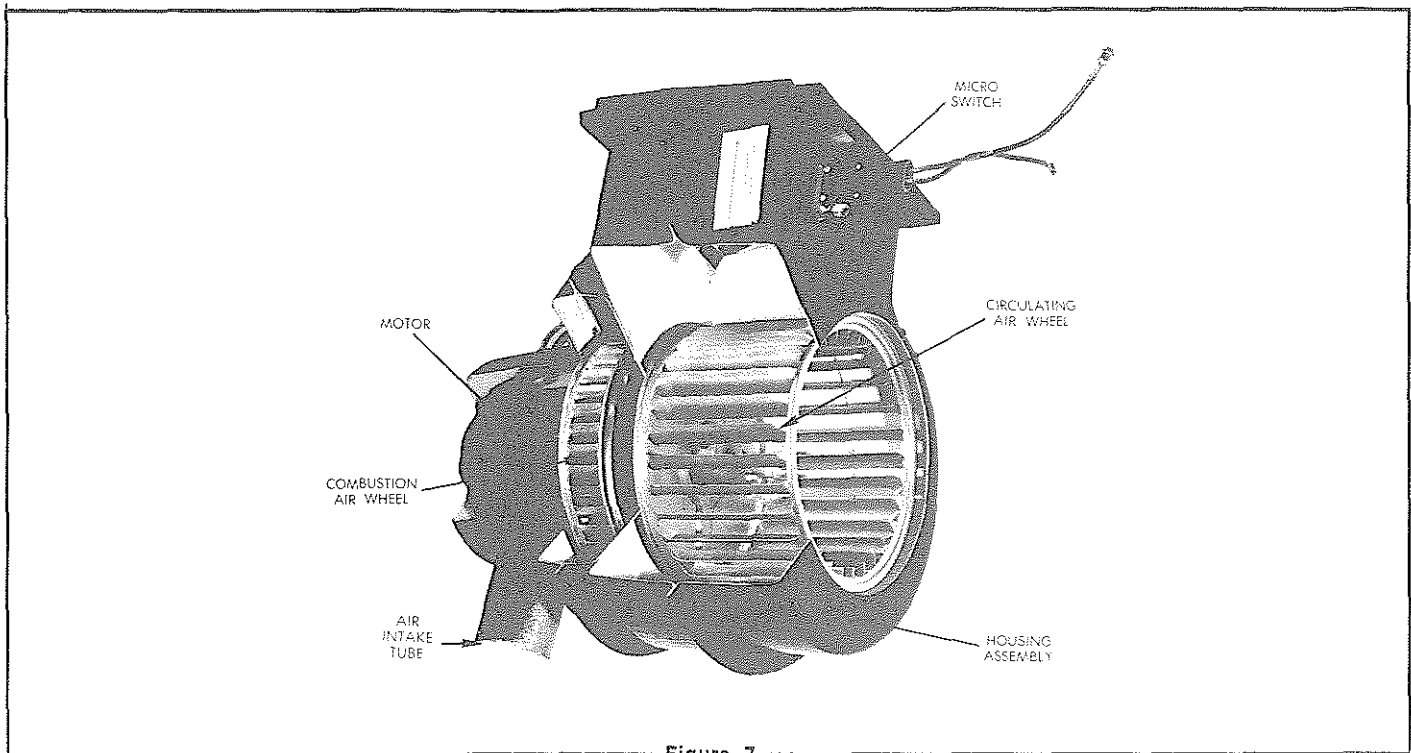


Figure 7

2. The switch allows time for the blower to pull in a sufficient 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 "IMPORT" 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-22 AND NT-32 DUCTED MODELS

The NT-22 and NT-32 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 wire and thermostat wires from junction box. Chamber can then be pulled completely out. NT-32 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. Gas valve—With test light check gas valve terminals in the terminal block. If current is present, but valve is not opening (when microswitch engages), replace gas valve. The chamber must be removed.
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 2 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 gas valve—If gas leaks by the gas 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. If pilot cannot be adjusted, replace pilot orifice and clean pilot burner.

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 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—The little primary air will cause burner to float on ignition and could pull pilot out.
3. Clogged gas line—When pilot is observed going out immediately when the blower starts, check for pinched gas line or partially clogged gas line. The obstruction may be an excess of pipe dope which has gathered in the manual shutoff valve or one of the pipe fittings.

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

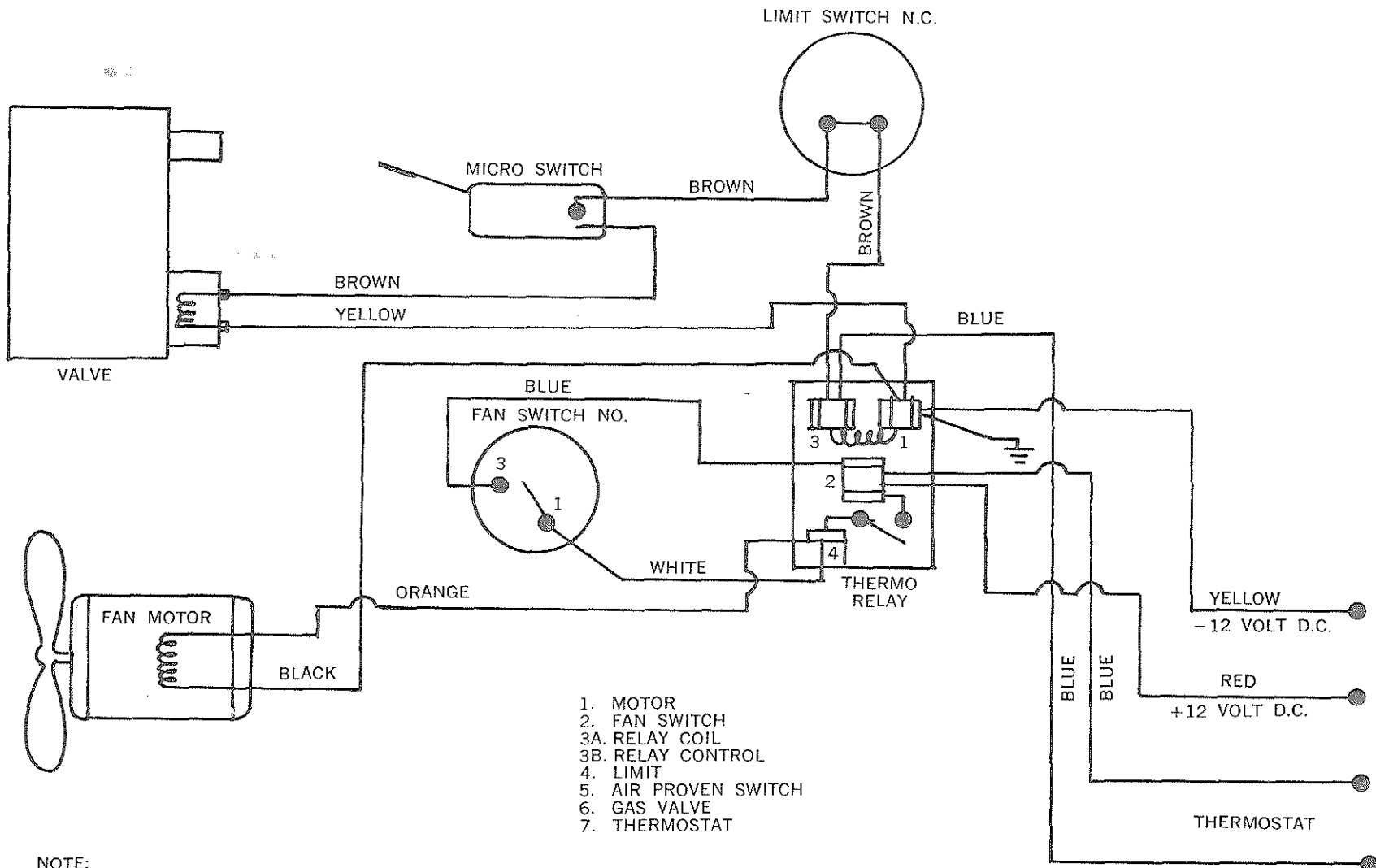
1. Automatic blower motor overload switch may be defective—Replace blower motor.
2. Blower assembly may be loose causing squirrel cage wheel to drag—Check assembly—secure if loose.

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 compartment.
- b. Excessive voltage or lighting has been placed on the input of the convertor.
3. If furnace thermostat is observed opening and closing rapidly when furnace starts, the gas valve may be shorted or a wire may be shorting out. Replace gas valve if symptom stops when gas valve is disconnected from circuit.



NOTE:

IF ANY OF THE ORIGINAL WIRE THAT IS SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, IT MUST BE REPLACED WITH TYPE 105° C WIRE OR ITS EQUIVALENT.

ELECTRICAL WIRING DIAGRAM
12 VOLT UNITS—NT-22, NT-32—A & C

LADDER PRINT

Figure 4

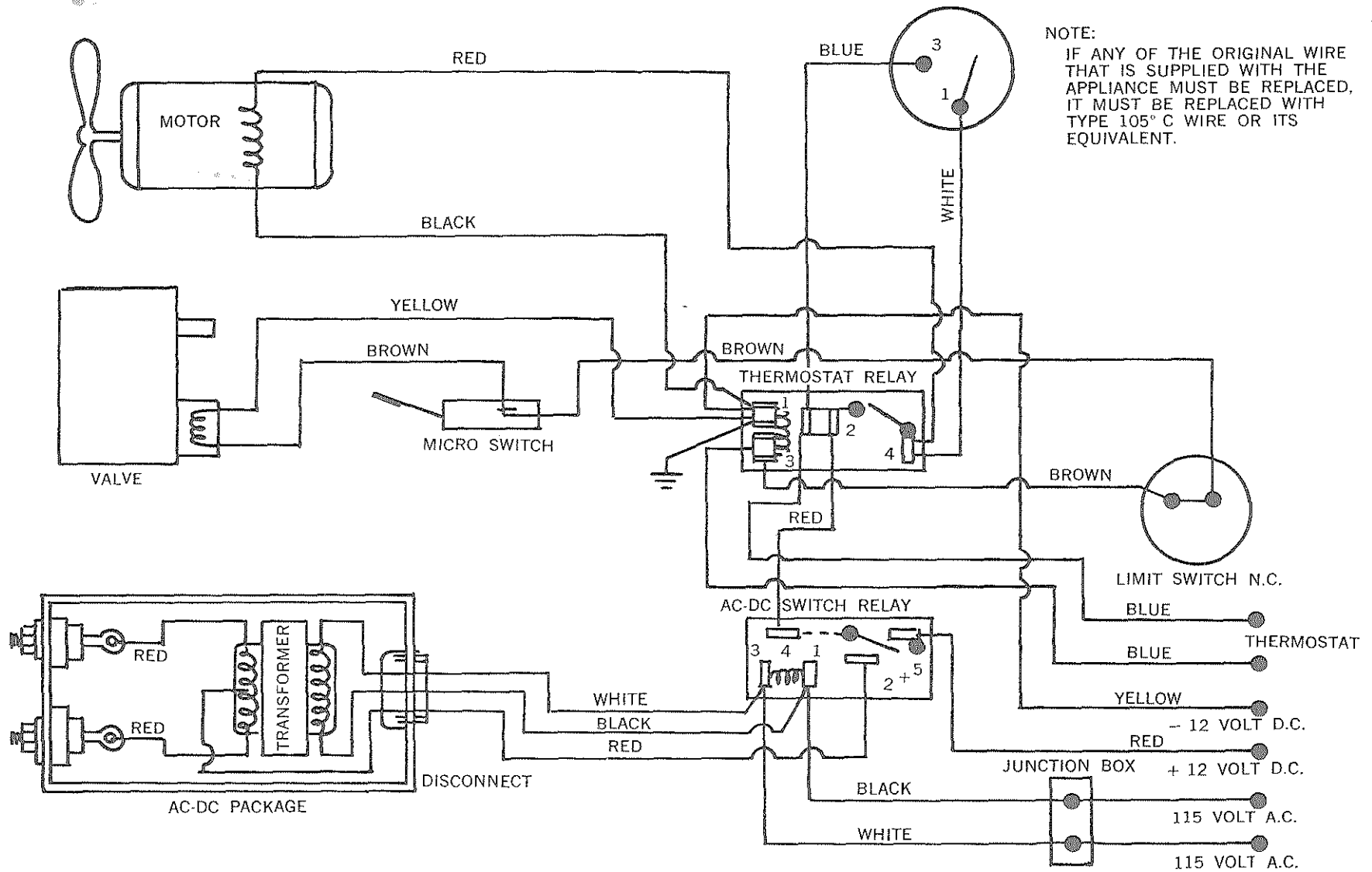


Figure 5

REPLACEMENT PARTS

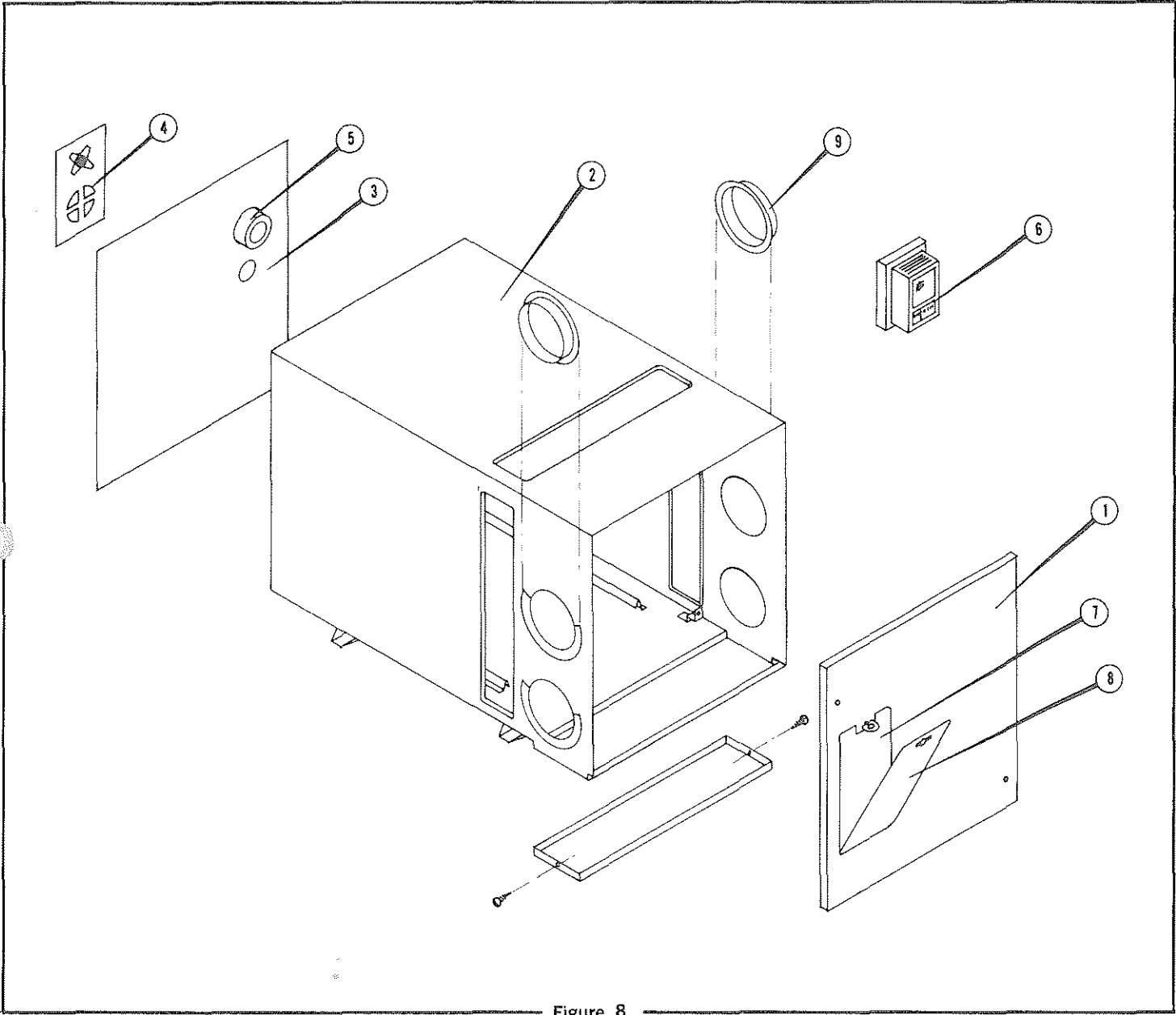


Figure 8

CABINET AND VENT ASSEMBLY—NT-22, NT-32

REPLACEMENT PARTS

VIEW OF COMBUSTION CHAMBER
ASSEMBLY COMPLETE
NT-22, NT-32

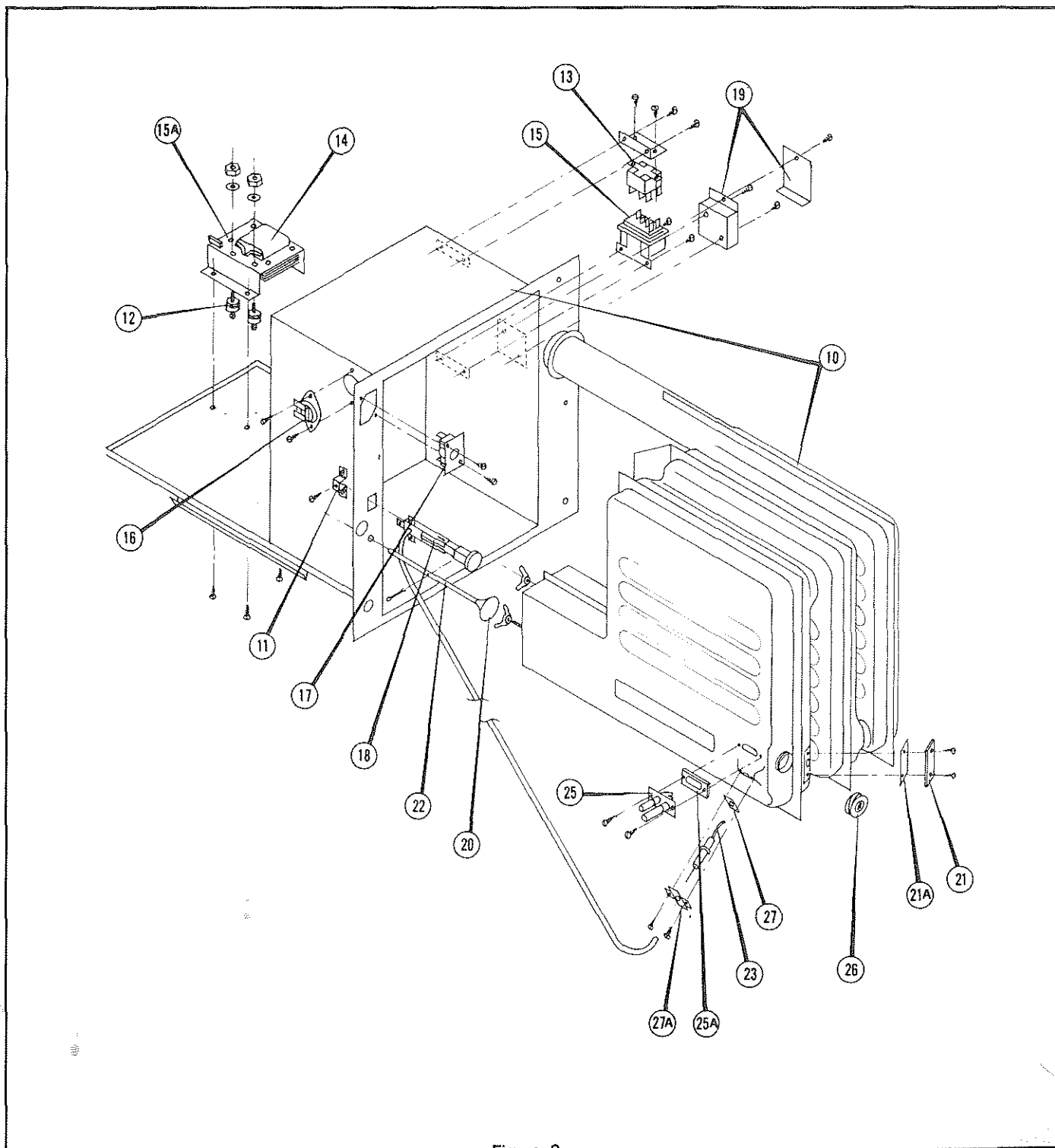


Figure 9

REPLACEMENT PARTS

VIEW OF BURNER ASSEMBLY
COMPLETE

NT-22, NT-32

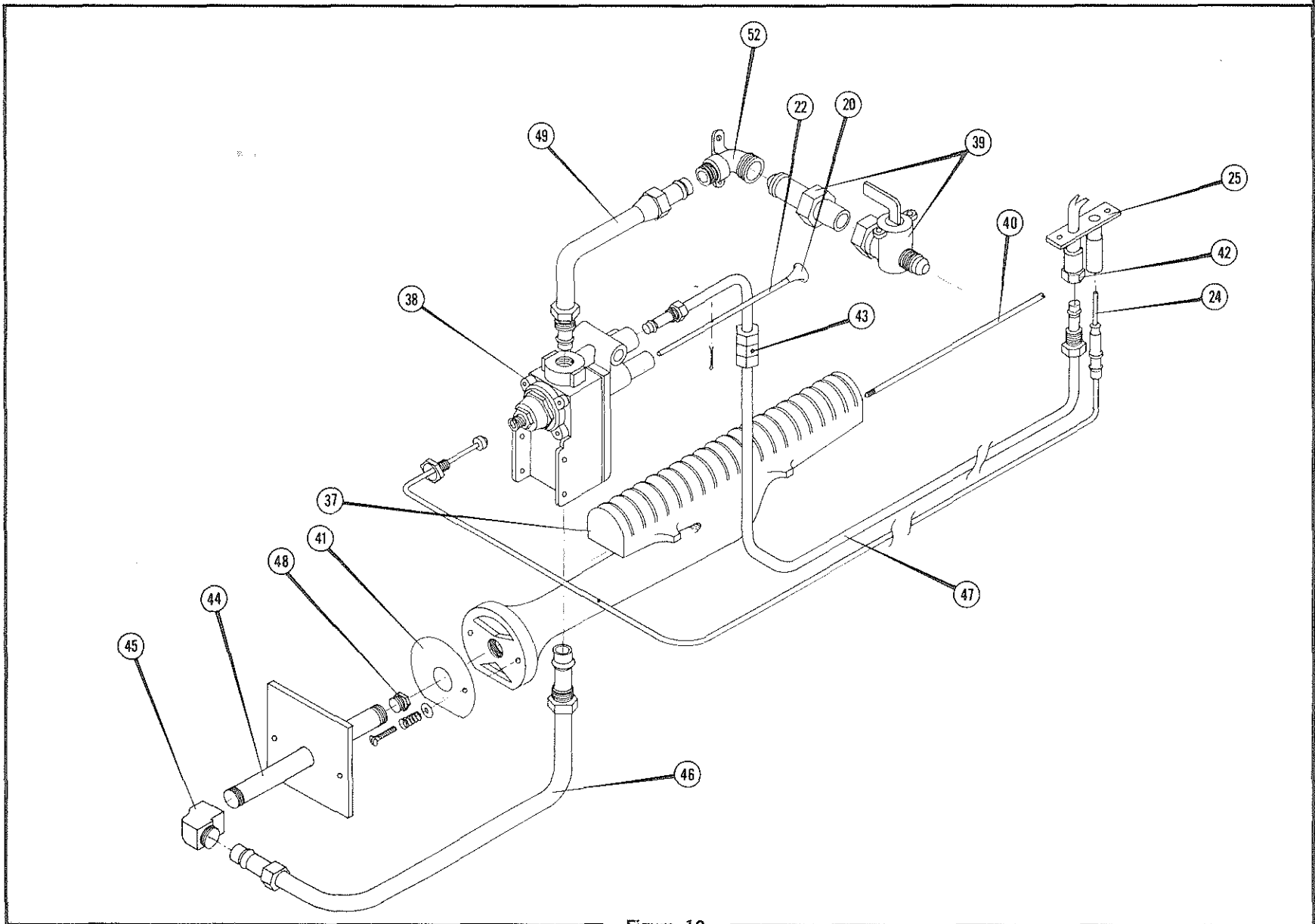
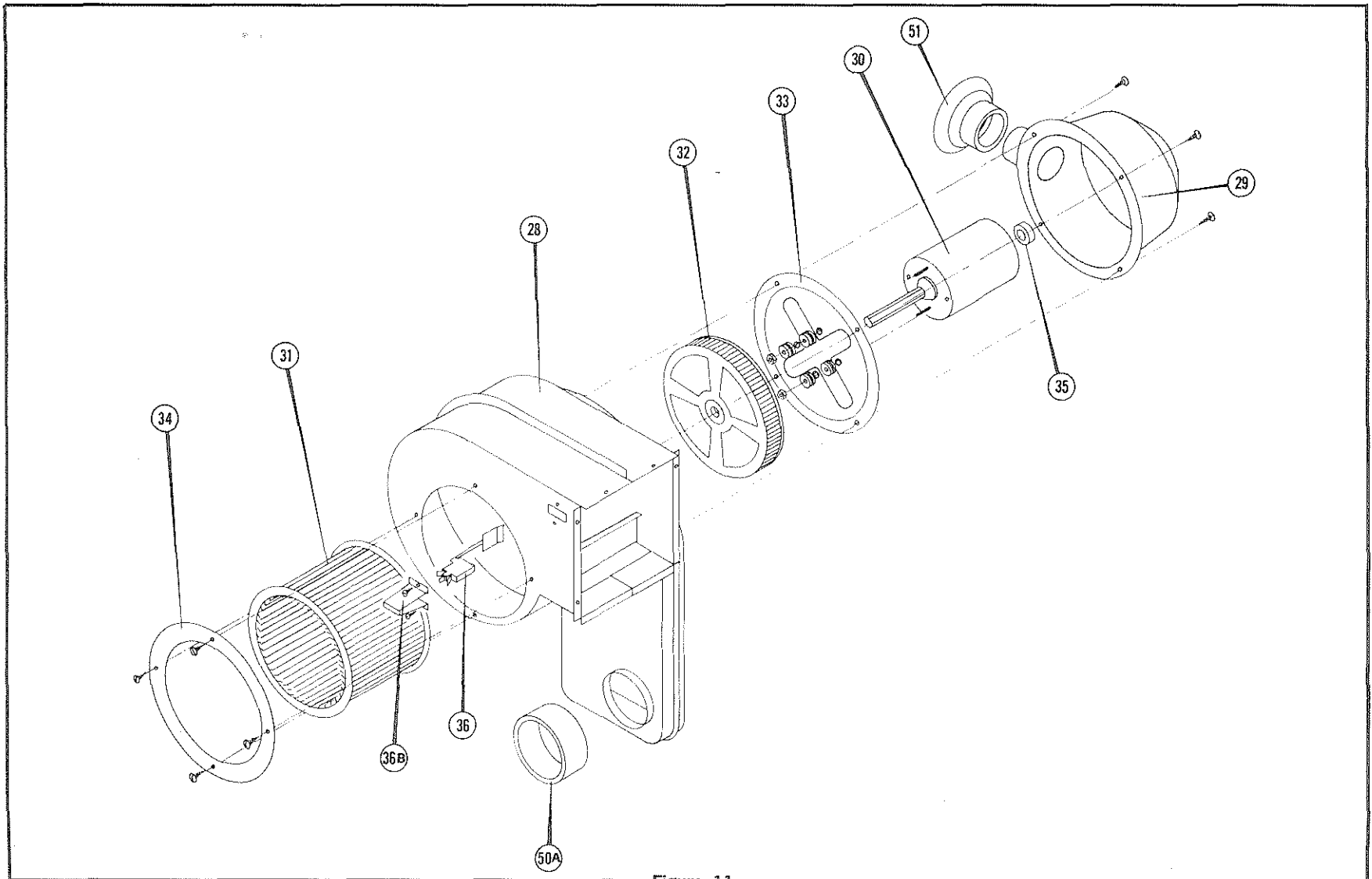


Figure 10

REPLACEMENT PARTS

VIEW OF BLOWER ASSEMBLY
COMPLETE
NT-22



20

Figure 11

REPLACEMENT PARTS

VIEW OF BLOWER ASSEMBLY
COMPLETE
NT-32

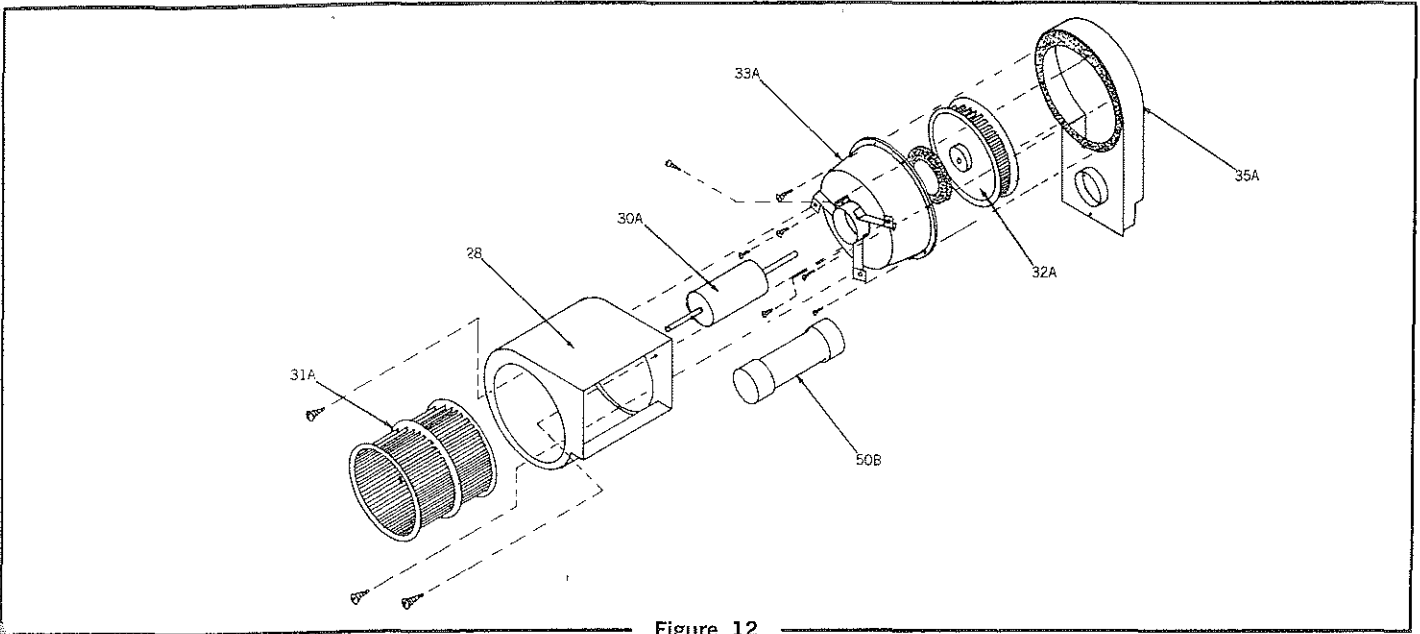


Figure 12

DYNA-TRAIL TRAVEL TRAILER FURNACE

PARTS LIST FOR MODELS

NT-22, NT-32

Effective February 1, 1975

Item No	Description	Part No.	Item No	Description	Part No.
1	Front, Main Cabinet, Assembly (NT-22C, CD and NT-32C, CD)	X100742	27A	Bracket, Electrode	061697
	Front, Main Cabinet, Assembly (NT-22A, NT-32A)	X100746	28	Housing, Blower (NT-22)	X390054
	Front, Main Cabinet, Assembly (NT-20A)			Housing, Blower (NT-32)	X390099
2	Cabinet, Outer Assembly (NT-22C, CD and NT-32C, CD)	X100733	29	Cover, Motor Air Intake (NT-22)	X390047
	Cabinet, Outer, Assembly (NT-22A, NT-32A)	X100548		Cover, Motor Air Intake (NT-32)	X390058
3	Back, Cabinet (NT-22, NT-32)	100585	30	Motor, Bosch 1450 RPM (NT-22)	230260
4	Cap, Vent (All Models)	260087	30A	Motor, Bosch 1500 RPM (NT-32)	230339
5	Adaptor, Vent Cap (All Models)	062123	31	Wheel, Blower, Large (NT-22)	350037
6	Thermostat, T819 (All Models)	160616	31A	Wheel, Blower, Large (NT-32)	350068
7	Latch, Door (Spring Type)	150033	32	Wheel, Blower, Small (NT-22)	350036
8	Door, Main Cabinet, Front (All Models)	030430	32A	Wheel, Blower, Small (NT-32)	350069
9	Collar, Duct—Round (All Models)	050296	33	Plate, Blower Divider (NT-22)	390045
10	Combustion Chamber (NT-22C, CD)	X110249	34	Ring, Inlet	390027
	Combustion Chamber (NT-32C, CD)	X110251	35	Bushing, Blower (Motor Cover)	070289
	Combustion Chamber (NT-22A)	X110248	36	Switch and Paddle Assembly (Micro) (NT-22)	X230006
	Combustion Chamber (NT-32A)	X110250	36A	Switch and Paddle Assembly (Micro) (NT-32)	X230340
11	Spacer, Bridge—14B (All Models)	120732	36B	Cover, Micro Switch	061659
12	Rectifier, Diode	230297	37	Burner, Main (NT-22)	010509
13	Relay, AC/DC Switching	230255		Burner, Main (NT-32)	010387
14	Transformer, BE 8912	230323	38	Valve, Basotrol G92TGD-1 (NT-22, NT-32)	160705
15	Relay, Thermostat RBM 150-7	230275	39	Valve, Manual Shut-off-506159022	160712
15A	Diode and Transformer Package	X230312	40	Rod, Air Shutter	140091
16	Switch, Fan Klixon	230348	41	Shutter, Burner Air	010366
17	Switch, Limit (NT-22, NT-32)	230389	42	Orifice, Pilot—.007	160659
18	Ignitor, Impact Assembly	X230326	43	Regulator, Pilot LB414	160556
19	Box, Junction	090157	44	Pipe, Manifold	X170409
20	Knob, Black, Pilot Reset	140093	45	Ell, Brass 90°	170392
21	Cover, Hole, Air Shutter Adjustment	260061	46	Tube, Gas Inlet	170419
21A	Gasket, Air Shutter Cover	070278	47	Tubing, Pilot	X170415
22	Rod, Lighter	140130	48	Orifice, Main Burner #55 (NT-22)	180188
23	Electrode, Spark	230349		Orifice, Main Burner #53 (NT-32)	180193
24	Thermocouple, 88D-30	160706	49	Tubing 90°	170411
25	Pilot Burner 2R572L	160535	50A	Crossover Tube (Rubber) (NT-22)	070206
25A	Gasket, Pilot Burner	070163	50B	Crossover Tube (Rubber) (NT-32)	070331
26	Cap, Lighter (Solid)	290099	51	Vacuum Cup	290079
	Cap, Lighter (MICA)	X290101	52	Fitting, Elbow	170408
27	Gasket, Electrode	070276			

RECREATIONAL VEHICLE LIMITED WARRANTY

PARTS

Suburban Manufacturing Company ("Suburban") warrants to the first purchaser the heating unit against defects in material and workmanship under normal use for a period of one year from date of first purchase of the recreational vehicle. The heat exchanger is warranted to the first purchaser against rustout and burnout for a period of 5 years from date of first purchase of the recreational vehicle. In-warranty parts will be replaced at no charge for the parts. Labor will be paid only as set forth in the "In-Warranty" Service Policy below.

EXCLUSIONS AND LIMITATIONS

This limited warranty is void if the heating unit is improperly installed, tampered with, or not operated in accordance with the Installation, Operating and Service Instructions book of Suburban, or within its proper voltage and fuel ratings as design certified by the American Gas Association. This warranty is in lieu of all other express warranties, is limited to replacement of defective parts and does not cover any damages resulting from failure of the heating unit. Any implied warranties are limited to one year from the date of first purchase of the recreational vehicle. Malfunctions caused by improper installation or operation, accident, misuse, abuse, neglect or other circumstances beyond Suburban's control such as fire, flood or other acts of God are not covered by this limited warranty.

"IN-WARRANTY SERVICE POLICY"

Suburban Manufacturing Company, with the cooperation of its authorized service centers, will endeavor to assure customer satisfaction. If there is a defect of material or workmanship in the heating unit within the limited warranty period, Suburban will pay a service allowance to the authorized service center under the terms of Suburban's contract with the service center. In-warranty repairs cover one year from date of original purchase; all other service expenses over one year will be made at the expense of the owner-user. The owner-user is responsible for transportation of the heating unit to and from the service center. A list of authorized service centers is enclosed with Suburban's Installation, Operating and Service Instructions book.

EXCLUSIONS AND LIMITATIONS

The exclusions and limitations contained in the limited warranty apply to this service policy. In addition, certain services are not included under in-warranty services. They are:

1. Initial checkout and subsequent checkouts which determine that the furnace is operating properly.
2. Cleaning.
3. Water or dirt in controls, fuel lines, and gas tanks.
4. Broken or shorted thermostat wires.
5. Restriction or alteration of warm air or return air circulation.
6. Thermostat adjustments.
7. Instructing owners in operation.
8. Adjusting primary air.
9. Pilot adjustment.
10. Electrode adjustments.
11. Clogged orifice.



DAYTON, TENNESSEE



SUBURBAN MANUFACTURING COMPANY

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