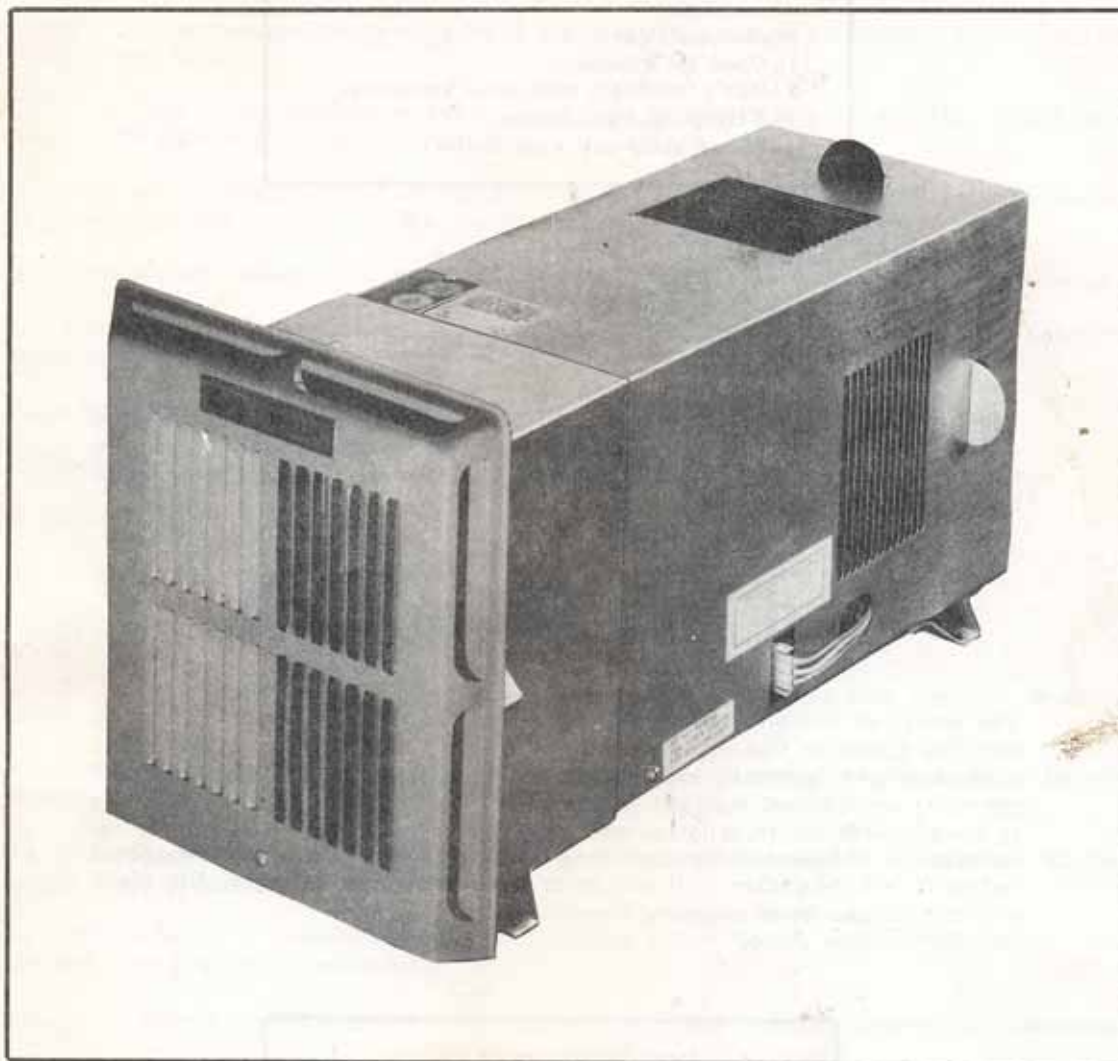


DYNATRIL

INSTALLATION, OPERATING, AND SERVICE INSTRUCTIONS



SUBURBAN DYNATRIL FURNACES

Models

NT-12MEC, NT-16MEC, NT-12MEF, NT-16MEF, NT-12MEP and NT-16MEP

This book contains instructions for installation and operation of your furnace. Keep with unit at all times.

Should you require further information, contact your dealer or nearest Suburban Service Center.



SUBURBAN

SUBURBAN MANUFACTURING COMPANY • BOX 399 • DAYTON, TENNESSEE 37321

FOR YOUR SAFETY

If you smell gas:

- 1-Open all windows.
- 2-Don't touch any electrical switches.
- 3-Extinguish open flames.
- 4-Immediately call your dealer.

Foreword

Your Dynatrail Furnace is a quality product. Properly installed, your furnace should give satisfactory, dependable service and economical operation. To simplify the proper installation, it requires that you read carefully these step-by-step instructions.

Read This Entire Book

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 in conformity with generally accepted safety regulations, the installation and operating instructions outlined in this book **MUST BE FOLLOWED**. Failure to comply with the installation and operation instructions will void any responsibility of Suburban Manufacturing Company. Your furnace was inspected before it left the factory. If any parts are found to be damaged, file claim with the transportation company immediately.

FOR YOUR SAFETY

Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

WARNING!

Read the following before installing furnace.

- 1—Do not attempt repairs yourself—all repairs should be made by a qualified service agency.
- 2—Do not install furnace unless the tube on the vent cap overlaps the exhaust tube on the furnace at least $\frac{1}{2}$ ".
- 3—Do not install vent cap upside down. The words SUBURBAN and DAYTON, TENN. must be installed right side up. (See figure 2)
- 4—Do not omit or substitute the special screw on exterior vent cap. This anchors the furnace to the vent cap and outer skin of the coach. (See figure 2)
- 5—Do not use any compound on threaded joints that is NOT resistant to Liquid Petroleum Gas.
- 6—Do not make any pipe connection without afterwards checking for leakage. (Use soap and water solution.)
- 7—Do not use open flame to check for leaks.
- 8—Do not attempt to alter the furnace for a positive ground system.
- 9—Do not install the furnace with floor coverings under the cabinet.
- 10—Do not connect the furnace direct to 110 Volts AC.
- 11—Do not use unauthorized gauge wire. 14 gauge wire is required.
- 12—Do not replace any wiring on the furnace with anything less than type 105 C or its equivalent.
- 13—Do not install furnace unless in compliance with local codes. (See par. C under General Notes.)
- 14—Do not install furnace unless clearances from combustible materials are adhered to. (See par. B under General Notes.)
- 15—Do not attempt to ignite a direct ignition furnace with a match, Butane torch, or flint type ignitors. (See Lighting Instructions.)
- 16—Do not operate the furnace with the electrode wire or the electrode assembly disconnected.
- 17—Do not operate the furnace through a battery charger. (Models NT-12MEF, 16MEF only.)
- 18—Do not use a screwdriver or metal object on any portion of the electrode assembly while furnace is in operation. (Models NT-12MEF, 16MEF only.)
- 19—Do not operate the furnace if the spark from the electrode is jumping to the flame sensor portion of the electrode assembly. (See fig. 5 for proper gapping of the electrode assembly. Models NT-12MEF, 16MEF only.)
- 20—Do not remove module board without first discharging board. (See Service Hints—Models NT-12MEF, 16MEF only.)
- 21—Do not attempt field repairs to the module board. (Models NT-12MEF, 16MEF only.)
- 22—Do not make design changes or modify the operation of the furnace in any way.
- 23—Do not convert the furnace to Natural Gas.
- 24—Do not install furnace where it cannot be easily removed for service.

INSTALLATION, OPERATING, and SERVICE INSTRUCTIONS

MODELS	BTU/Hr		Dimensions-Cabinet		Installation-Depth	
	Input	Output	Height	Width	Min.	Max.
NT-16MEC/MEF/MEP	16,000	12,000	9 13/16"	11"	23 5/16"	29"
NT/12MEC/MEF/MEP	12,000	9,000	9 13/16"	8 1/8"	23 5/16"	29"

INTRODUCTION

The furnace in your recreational vehicle is a Suburban Dynatrail 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 Dynatrail furnaces:

NT-16MEC, 12MEC—Pilot ignition
NT-16MEF, 12MEF—Electronic Spark ignition
NT-16MEP, 12MEP—Pilot with Piezo Ignitor
Suffix D—12 Volt DC or 115 Volt AC

WARNING: Above units for LP gas only.

Basically, the combustion chamber is the same in all models, as well as the blower, burner and control as-

sembly. The significant difference is the electrical system of the DC models versus the combination AC/DC models. Operation and maintenance 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.

WARNING: Combustion air must not be drawn from the living area.

WARNING: Preventive maintenance to the furnace is recommended at least once a year and should be done by a qualified service agency.

Installation Instructions

Due to the exclusive telescoping front feature, these furnaces will accommodate an installation depth of 23 5/16" to 29" from trailer skin to the exterior side of the room wall (See figure 1) with the following minimum clearances from furnace to combustible construction:

Floor — 5/8" Top — 1"
Sides — 1" Back — 0"

Please adhere to these clearances to provide adequate accessibility for servicing and proper operation.

These furnaces are designed to operate at the following gas inlet supply pressures:

Gas Min. Max.
LP 11" W.C.* 14" W.C.

* Water Column

Your Suburban furnace may be installed directly against the inner wall or the outer skin of the RV. If the installation is against the inner wall of the RV, a 1" clearance around the exhaust and air intake tubes must be maintained through the inner wall surface.

A—After selecting the location for installation of the furnace, check for wires, pipes, etc. which could interfere with the installation.

B—Frame the opening through inside cabinet as shown in figure 1.

C—After framing opening through cabinet front, locate center lines of exhaust and air inlet tubes on inner wall or outer skin as the case may be. Cut openings through side of coach, as described in the following, which refers to different side wall construction.

D—Install furnace into the 11 1/8" x 13 1/4" (NT-16) 11 1/8" x 10 3/8" (NT-12) opening and secure with screws as shown in figure 1. The furnace must be installed level, therefore, a small leveling block can be used under rear spacer brackets. Secure furnace to floor with brackets provided.

E—Install vent cap as described in figure 2.

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

The following are methods of installation depending on material used in side wall construction of RV.

1—Installation directly against noncombustible vehicle skin—(Aluminum, etc.)

No cabinet back required, no cutout in vehicle skin, except exhaust and air intake openings. Frame opening inside the trailer skin to dimensions given in chart of figure 3. Add 1/8" for clearance.

2—Installation in recreational vehicles where large Suburban back is not desired:

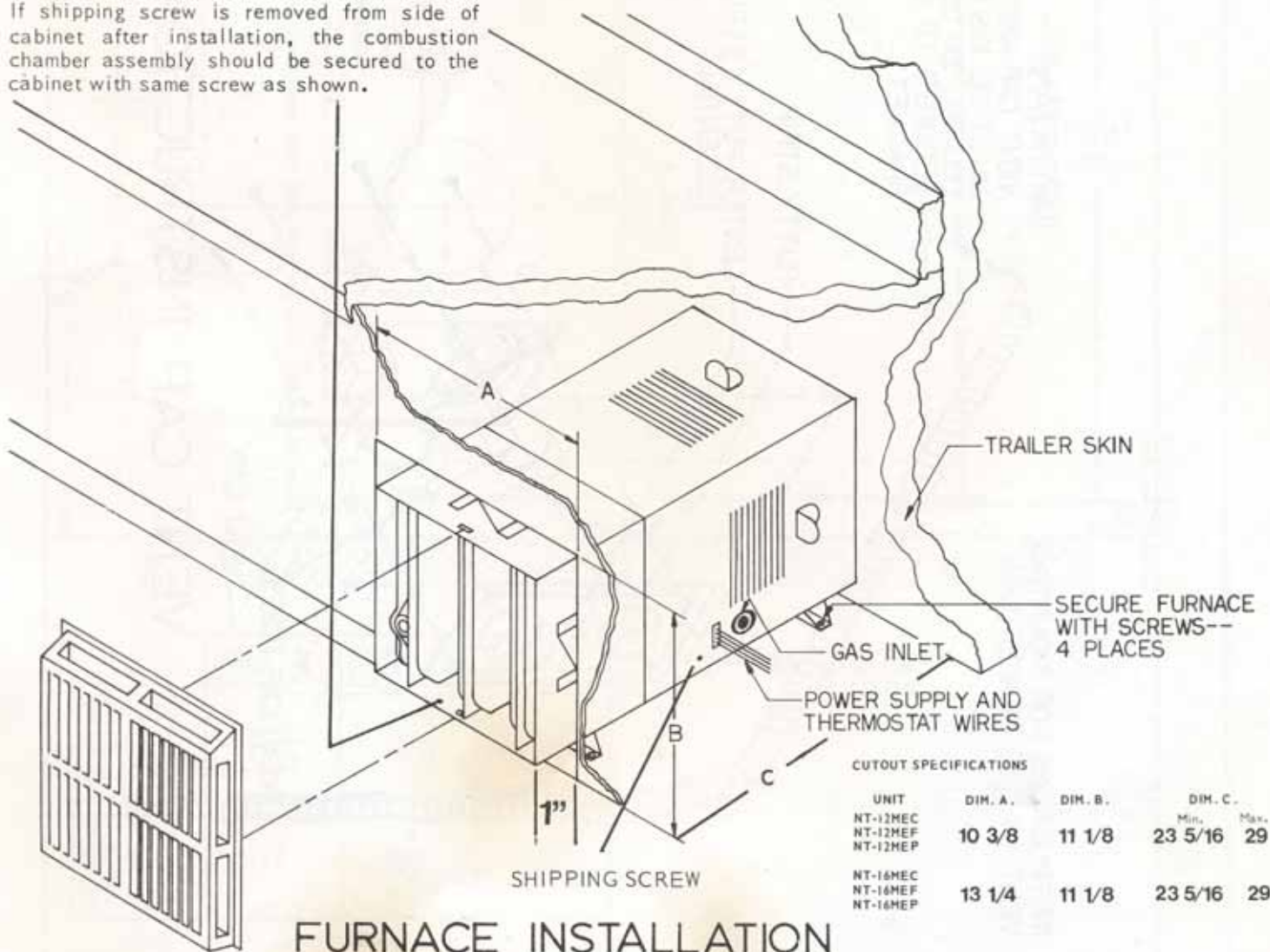
This installation requires a 4" x 8" cutout in the

vehicle skin, and utilizes a special adaptor back to cover the 4" x 8" opening.

Find the center lines of the exhaust and intake holes. Draw a 4" wide x 8" high rectangle equal distance around the two centers as indicated by the dotted line in figure 3. From each center, the rectangle should measure 2 1/4" vertically and 2" horizontally. Cut the opening through the inner and outer skin of the vehicle.

NOTE:

If shipping screw is removed from side of cabinet after installation, the combustion chamber assembly should be secured to the cabinet with same screw as shown.

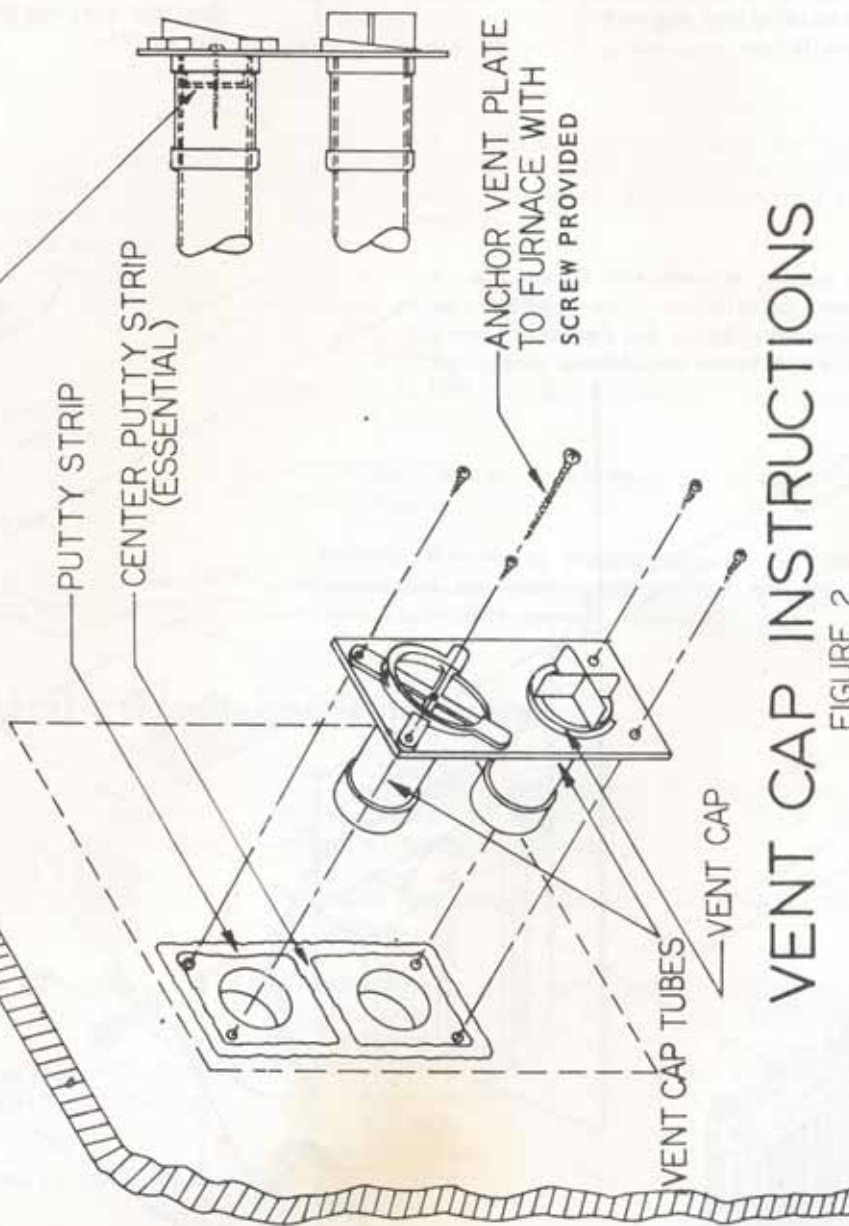


FURNACE INSTALLATION

FIGURE 1

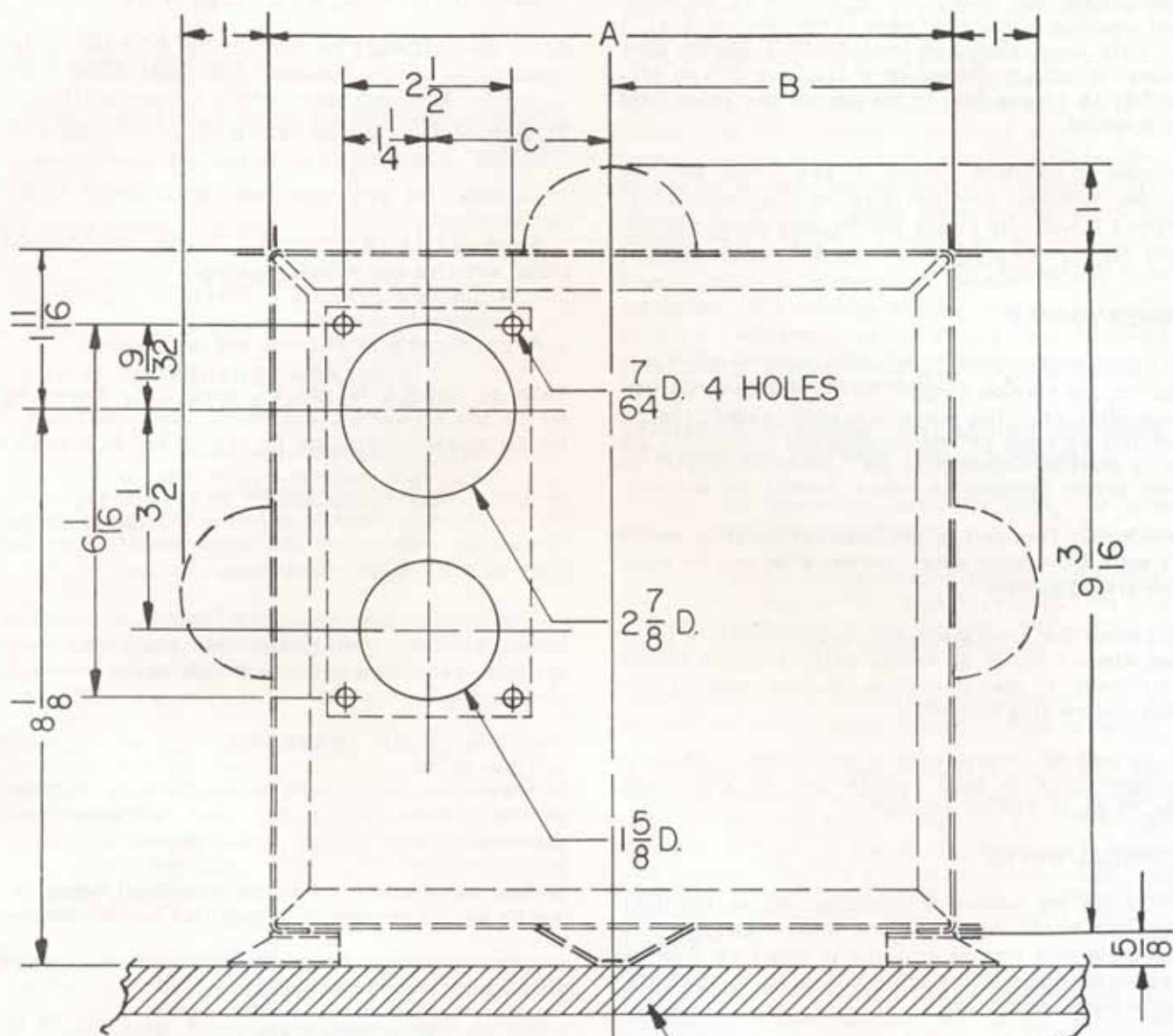
INSTRUCTIONS FOR MOUNTING
VENT CAP TO TRAILER SKIN

IMPORTANT:
VENT CAP AND TUBE ASSEMBLY
MUST BE INSTALLED FROM
OUTSIDE OF COACH AND
SECURED TO EXHAUST TUBE
BRACKET.



VENT CAP INSTRUCTIONS

FIGURE 2



UNIT	DIM. A	DIM. B	DIM. C
NT-12EF NT-12EC NT-12ECP	$8\frac{1}{8}$	$4\frac{1}{16}$	$2\frac{9}{32}$
NT-16EF NT-16EC NT-16ECP	11	$5\frac{1}{2}$	$3\frac{11}{16}$

MOUNTING
SURFACE

BACK VIEW OF FURNACE

FIGURE 3

GAS SUPPLY

Connect the gas supply to the furnace at the manifold provided on the right side of the furnace (Fig. 1). All male joints should be treated with a sealing compound resistant to the action of liquid petroleum gas. **NOTE:** An access door to the manual gas valve must be provided.

In order to maintain a check on gas supply pressure to the furnace, Suburban advises the installer to provide a 1/8" NPT plug tap for test gauge connection immediately upstream of the gas supply connection to the furnace.

POWER SUPPLY

1—Connect the 12 V DC power supply to the leads bearing the service plug on the right side of the furnace (fig. 1). The wires are color coded, red for positive (+) and yellow for negative (-). This polarity must be observed so the furnace motor will run with proper rotation to insure correct air delivery.

WARNING: This unit is designed for negative ground 12 volts DC system only. Do not alter unit for positive ground system.

2—Locate the room thermostat approximately 4 to 4½ feet above floor on an inside wall. Connect thermostat leads to the blue wires leaving power supply plug. (See wiring diagram.)

3—Be sure all voltage wire to the furnace is of heavy enough gauge to keep voltage drop to a minimum. No. 14 gauge wire is required.

GENERAL NOTES

A—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 lines before pilot will ignite or spark will ignite main burner.

B—After the furnace has been connected to the gas supply, all joints must be checked for leaks. **Do not use open flame to check for leaks. Use a soap and water solution.**

C—In the USA, the installation must conform with local building codes. In the absence of local building codes, refer to:

- 1—American National Standard for Recreational Vehicles A119.2-1975.
- 2—National Fuel Code, ANSI Z223.1-1974.

Also, the unit must be electrically grounded in accordance with the National Electrical Code ANSI C1-1975. The installation of the furnace shall be in accordance with any applicable local codes and regulations.

In Canada, the appliance must be installed in accordance with:

- 1—Standard CGA 10.1/Z240.4 — Gas equipped recreational vehicles and mobile housing.
- 2—CSA Standard Z240.6.2 — Electrical requirements for recreational vehicles.
- 3—Any applicable local codes and regulations.

Refer to figure 6 for the DC electrical circuits for NT-12 and NT-16MEC and MEP. Refer to figure 7 for the electrical circuits for NT-12 and NT-16MEF.

D—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.

E—The efficiency rating of this furnace is a product thermal efficiency rating determined under continuous operating conditions and was determined independent of any installed system.

WARNINGS

F—Preventive maintenance to the furnace is recommended at least once a year. (See Maintenance and Cleaning.)

G—The installation of the furnace and all necessary repairs should be made by a qualified service person.

H—Clothing or other flammable material should not be placed on or near the furnace.

I—Due to high temperatures, the furnace should be located out of traffic and away from furniture and draperies.

J—Children and adults should be alerted to the hazards of high surface temperatures and should stay away to avoid burns or clothing ignition.

K—Young children should be carefully supervised when they are in the same room as the furnace.

Operating Instructions

LIGHTING INSTRUCTIONS FOR MODELS NT-12MEF and NT-16MEF

1—To light the furnace, turn the manual valve to the OFF position and wait 5 minutes with blower running. (Set thermostat above actual temperature to operate blower.)

2—After 5 minutes, set the thermostat to the OFF position.

3—Open manual valve. (Correct operating characteristics depend on this valve being positioned fully open. Never attempt to operate with valve partially closed.)

- 4—Set thermostat on desired temperature.
- 5—Allow 30 seconds for main burner to light.
- 6—If burner does not light, set thermostat on OFF and repeat steps 1 through 5.
- 7—After 3 attempts with no ignition, go to shutdown and determine cause. **NOTE: Do not continue to cycle furnace through thermostat in an attempt to get ignition.**

TO SHUT DOWN

- 1—Turn manual valve to the OFF position.
- 2—Set thermostat on OFF.

LIGHTING INSTRUCTIONS FOR MODELS NT-12MEP, NT-16MEP, NT-12MEC, and NT-16MEC

- 1—To light the furnace, turn the manual valve to the OFF position and wait 5 minutes with blower running. (Set thermostat above actual temperature to operate blower.)
- 2—After 5 minutes, set the thermostat to the OFF position.
- 3—Open manual valve. (Correct operating characteristics depend on this valve being positioned fully open. Never attempt to operate with valve partially closed.)
- 4—Remove the lighter hole cover. (The furnace front is not exposed, so the lighter hole must be reached by removing the cabinet front.)
- 5—Insert a burning match through opening so that flame is near the pilot. For models NT-12MEP and NT-16MEP, the piezo ignitor may be used instead of a match.
- 6—Press reset button and hold. (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; however, you must be sure that a burning match is near the pilot during this time. For models NT-12MEP and NT-16MEP, you must continuously pump the ignitor while the reset button is depressed.) When the pilot is burning, continue to hold the reset button for approximately 30 seconds.
- 7—Release reset button—Be sure it releases fully.
- 8—Replace lighter hole cover.
- 9—Replace the furnace panels.
- 10—If the main burner and pilot goes out prematurely, turn the manual shutoff valve to the OFF position and wait 5 minutes with blower running.
- 11—Repeat steps 2 through 10.

BURNER ADJUSTMENT

To adjust primary air to the main burner, it is necessary to remove the front of the furnace cabinet. The small sheet metal cover found just below and to the right of the observation hole cover must be removed. Behind the cover is a slotted screwhead. With a screwdriver, turn screwhead counterclockwise for less primary air and clockwise for more primary air. A symptom of too much primary air is the flame blowing off the burner 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 hard blue flame is the sign of correct adjustment.

WARNING: If a sooting problem cannot be corrected by the air adjustment on the main burner, discontinue use of the furnace until the problem can be corrected by a qualified service agency.

SEQUENCE OF NORMAL OPERATION FOR MODELS NT-12MEF and NT-16MEF (Direct Ignition)

- 1—When the thermostat calls for heat, the blower motor is energized immediately.
 - 2—As the blower motor reaches approximately 75% of the normal r.p.m. (within 3 to 5 seconds) the micro-switch, in response to the air flow, will engage, allowing current flow to the module board.
 - 3—After a 12–18 second delay, current will pass through the module board to the solenoid valve.
 - 4—The current to the valve opens it and allows gas to the main burner. The spark electrode then ignites the main burner. Once the flame has been established and the furnace is operating, occasional sparking may occur. This is common in some installations and is not significant. Sparking will neither damage the board nor interfere with the normal cycle of the furnace.
 - 5—After main burner ignition, (usually within 18–25 seconds) the flame detector will sense the presence of main burner flame and deenergize the lockout feature.
- If the main burner does not ignite or the flame detector does not deenergize the lockout feature within 7 seconds, the unit will go into lockout. At this time, it will be necessary to set the thermostat on OFF and repeat steps 1 through 5 of the lighting instructions.
- 6—After 3 attempts with no ignition, or main burner continues to go off within 7 seconds, shut down and determine cause. **Do not continue to cycle furnace through thermostat in an attempt to get ignition.**
 - 7—If within a period of approximately 2 minutes after the main burner is lit, the thermostat is turned off, 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 off, 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 and cool the heat exchanger. Be assured that this period of blower override is a part of the unit's normal operation.

SEQUENCE OF NORMAL OPERATION FOR MODELS NT-12MEC, NT-16MEC, NT-12MEP, and NT-16MEP

1—When the thermostat calls for heat, the blower motor is energized immediately.

2—As the blower motor reaches approximately 75% 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 gas 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 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 purpose of the fan switch is to control the sequence of the blower operation. Current is supplied to the motor through the thermostat relay. When the combustion chamber heats up, heating the bimetal disc of the fan switch to the operating temperature, the switch changes position to close 1 and 3. This completes a circuit through the motor from a direct source. Because of this, 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. After the chamber cools down, the fan switch changes back to its original position and shuts the blower off. If burner and blower shut off simultaneously after several minutes of operation, then the fan switch failed to completely change over. This may be 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. **WARNING: 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 flow 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, lint accumulation on the blower wheel, or a restriction in the hot air discharge duct.

2—The switch allows time for the blower to pull in a sufficient amount of air to support combustion before it engages.

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 AC to 12 volt DC.

A single-pole, double throw relay switches the unit from AC to DC/DC to AC automatically.

The convertor is to be installed with the furnace and wired to it according to the following diagram:

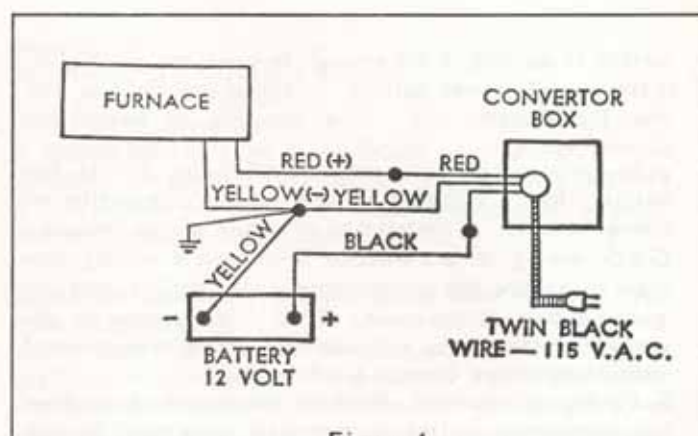


Figure 4

Maintenance and Cleaning

Your furnace should be inspected before use at least annually by a professional service agency.

A careful inspection of all gaskets should be made and if any gaskets show signs of leakage or deterioration, they should be replaced.

It is imperative that the control compartment, burner and circulating air passageways of the furnace be kept clean. More frequent cleaning may be required due to excessive lint from carpeting, bedding material, etc.

Periodic examination of the venting system should be made. **It is important that the flow of combustion and ventilation air not be obstructed.**

Circulating air openings in the louvers of the front grille area must not be blocked to permit adequate ventilation. Also, combustion air entering from the rear of the furnace must not be obstructed.

Periodic visual checks of the burner in operation should be made. If the primary air should need adjustment, follow the procedure outlined under Burner Adjustment.

Cleaning of the chamber and main burner will be re-

quired if the furnace has been allowed to operate with a high yellow flame. The yellow flame is due to incomplete combustion (lack of air) and will deposit a soot formation inside the chamber and on the main burner.

The furnace is equipped with an oiled, sealed motor and requires no oiling.

NOTE: To service the furnace, the combustion chamber assembly must be removed from the furnace cabinet. (See instructions for removing chamber.)

COMBUSTION CHAMBER REMOVAL—ALL MODELS

The combustion chamber must be removed from the front.

- 1—Disconnect power supply. (Right side of cabinet.)
- 2—Disconnect gas supply. (Right side of cabinet.)
- 3—Remove the vent cap screws on outside of coach to free exhaust pipe. (See figure 2.)
- 4—Remove front discharge grille.
- 5—Remove hold down screw (bottom front of combustion chamber assembly.)
- 6—The combustion chamber assembly can then be pulled out of cabinet.
- 7—To reinstall, reverse above procedure.

Service Hints, Diagnosis, and Corrective Measures

A. COMPLAINT—NO HEAT, ALL MODELS

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 models—Check to be sure pilot is lit. Always follow lighting instructions when lighting pilot. Also, read service hints on pilot outage problems.

4—Direct ignition units—See service hints covering ignition failures.

5—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 connections of the voltage lines are tight.

6—Malfunctioning microswitch—Be sure the micro-

switch is sailing in far enough to open the gas 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 battery, faulty motor, lint and dust accumulation on 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 DC 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 does not 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 5 to 7 seconds.

7—Gas valve—With test light, check gas valve terminals. If current is present, but valve is not opening (when microswitch engages), replace valve. (Chamber must be removed.)

8—Blower not operating—Check for burned-out motor.

9—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.)

10—Defective relay—Relay may be faulty if motor fails to start when thermostat calls for heat.

B. IGNITION FAILURES—MODELS NT-12, 16MEF

Cautions:

1—Never operate the furnace with the electrode wire disconnected nor with the electrode assembly removed from the furnace.

2—Never use a battery charger to check out an electronic ignition furnace.

3—Never use a screwdriver on any part of the electrode assembly while the furnace is in operation.

4—Be certain that the spark from the electrode never reaches the flame sensor portion of the electrode assembly.

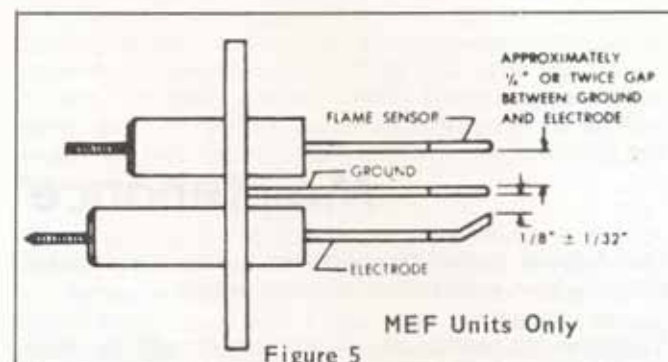
5—Be sure the electrode assembly screws are snug at all times, especially after the electrode has been removed and reinstalled.

6—Discharge Module Board Before Removing From Furnace. This is accomplished by placing a screwdriver on terminal coming out of the coil (where electrode wire connects) and grounding it to some portion of the furnace.

7—If the module board is found to be defective, it must be replaced—it is not field repairable. Any at-

tempt to repair the board may alter the board and cause it to operate in an unsatisfactory manner.

8—Insure that the gap between electrode and ground is always $1/8"$. The gap between the ground and the flame sensor should be twice the gap between electrode and ground to insure no sparking to sensor. Sparking to sensor will damage module board. (See figure 5).



ELECTRODE ASSEMBLY

The electronic ignition system is made up of three main parts. The module board, the electrode assembly and the electrode wire. The module board is the brain of the electronic ignition system and it has four functions:

1—When the blower reaches full r.p.m., a circuit is completed to the module board.

2—After a 12–18 second delay, a circuit is completed to the solenoid valve.

3—At the same instant, the electrode produces a spark as indicated by the small neon bulb on the module board as it flashes.

4—The module board also performs the lockout function in cases where the spark fails to light the burner. When lockout occurs, the spark stops and the voltage from the module board to the gas valve is discontinued and the valve closes. The unit will remain in lockout and the blower will continue to run until the thermostat is turned off.

It is important to determine the type problem being experienced and then the proper checkout procedure can be made. The following is a list of problems, how to identify in which area the problem is located, and how to correct it:

Electrode not sparking—With blower running and micro-switch engaged, check the following:

a—Check for proper input voltage required at spark module board after motor reaches full r.p.m. If no voltage, check back through circuit to determine cause.

b—Voltage is present but no spark present at electrode, after 12–18 second delay—check electrode wire connections.

c—Wire connections OK but electrode wire does not show continuity through it—replace electrode wire.

- d—Electrode wire does show continuity through it—check electrode gap, see figure 5.
- e—Electrode gap OK—Check electrode for possible cracks or carbon on tip of electrode.
- f—Electrode OK—Replace module board.

Electrode sparking but gas not coming through burner:

- a—Check to see if voltage is coming out of module board to gas valve after 12–18 second delay. If no voltage, and wires and wire connections are OK, replace module board.
- b—Voltage is coming out of module board to gas valve but gas valve does not open—replace gas valve.

Electrode sparking and gas valve opening but burner will not light:

- a—Check to see if gas is coming through burner (use a flow meter). If no gas is coming through burner, check for obstruction in gas line, in main burner orifice, or in main burner.
- b—Gas is coming through burner but spark will still not ignite burner—check gas pressure to be certain that it is 11 inches water column at furnace.
- c—Gas pressure OK—check for obstruction in main burner, check to be sure that air shutter is not completely closed, and be sure that electrode is positioned approximately 5/16 of an inch above and directly over one of the sawed slots on the main burner.
- d—Check all gaskets to be sure they are tight and forming a good seal.

Burner ignites but goes off and into lockout:

- a—Check to be certain that flame sensor is over one of the slots in the main burner and that the main burner flame is burning against the tip of the flame sensor—adjust by sliding burner in direction necessary.
- b—Burner still goes off and into lockout—check wire connection at flame sensor and at module board.
- c—Wire connections OK—check continuity through flame sensor wire.
- d—Continuity of flame sensor wire OK—check with micro amp meter in series with flame sensor and flame sensor wire to be certain that the flame sensor is generating at least seven micro amps within seven seconds after the burner is ignited. Replace electrode assembly if test is negative.
- e—Flame sensor OK but burner still goes off and into lockout—replace module board.

Repeated module board failures:

- a—Check to be sure that the electrode spark is not sparking against the flame sensor portion of the electrode assembly. (See figure 5 for correct gapping.)
- b—Check to be sure module board is not shorted to the mounting bracket.
- c—High voltage—14.5 volts DC, maximum.

Furnace pops when burner comes on:

This is due to delayed ignition and could be caused by:

- a—Improper gapping of electrode assembly (See fig. 3B for correct gapping.)
- b—Electrode assembly not properly positioned over

main burner.

c—Improper air supply to burner:

- 1—Check air adjustment
- 2—Check for dirty burner
- 3—Check for blockage in air intake or exhaust
- 4—Check all gaskets on chamber to assure a tight seal
- d—Excessive gas pressure—check pressure at furnace. 11" W.C. pressure is recommended.

Customer complains of unit going into lockout only once in a while:

a—We have found that lockout can occur if the gas pressure fluctuates at the time the thermostat calls for heat. Pressure fluctuations can be caused by a malfunctioning gas bottle regulator, an obstruction or a kink in the gas line and moisture in the gas bottle regulator or in the gas lines. For additional information, see paragraph B under Start Up or Ignition Phase.

C. COMPLAINT—PILOT OUTAGE—FOR MODELS NT-12MEC, NT-16MEC, NT-12MEP, and NT-16MEP

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 gas 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 gas valve. A simple check can be made in the field by a time-check. Remove the observation hole cover and extinguish the pilot flame after it 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 gas valve. Replace the thermocouple first and repeat the test for the valve. If the time lapse is still less than 30 seconds, replace the valve.

2—Air leakage—Draft should not affect 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 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—Vent cap tube must overlap exhaust tube a minimum of $\frac{1}{2}$ " to assure a tight seal. (See diagram, figure 2.)
d—Lead-in wires to the blower motor should be sealed where they enter blower housing.

e—All other gasket points; e.g., blower assemblies, sponge rubber gaskets.

f—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.

3—Lack of sufficient air—Another reason for pilot outage during the off cycle is the lack of sufficient air to support pilot flame. 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 valve—If gas leaks by the 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.

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 which cannot be adjusted to a larger size.

8—Pilot adjustment—Pilot should be adjusted to where the pilot flame just envelopes the thermocouple tip.

Start Up or Ignition Phase

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

a—We have found that pilot outage will occur if the gas pressure fluctuates at the time the thermostat calls for heat. Pressure fluctuations can be caused by a malfunctioning gas bottle regulator, an obstruction or a kink in the gas line and moisture in the gas bottle regulator or in the gas lines.

b—It is difficult to check for these fluctuations that will not noticeably affect any other appliance in the coach. However, isolating the furnace from the coach

gas system will determine if the gas system is responsible. This isolation procedure can be done by connecting a separate upright bottle, regulator and gas line directly to the furnace, eliminating the coach gas system. If pilot outage still occurs, the furnace should be removed and thoroughly tested to determine the cause; however, if the furnace works properly on this separate system, then the coach gas system should be checked.

When moisture in the gas system is suspected as being the problem, especially where the horizontal type gas bottle is being used, the following steps should be taken to prepare the gas system against further moisture problems:

Corrective Measures—

1—Disconnect gas bottle and drain it completely dry of all gas and all moisture.

2—Disconnect and blow out all gas lines completely dry.

3—Install a new pressure regulator on the gas bottle.

4—Add the drying agent. $\frac{1}{2}$ pint of methanol alcohol per 100 pound bottle capacity is recommended.

Precautions—

5—Never fill gas bottle over 80%.

6—Do not use gas bottle completely dry to avoid using up the drying agent.

We have found the above procedures to be effective in over 95% of all pilot outage problems that we have encountered, especially where the horizontal gas bottle is used. All of these steps must be performed as described for the preparation of a contaminated gas system to be 100% effective.

Operating 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 fan switch failure. 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.

D. COMPLAINT—EXCESSIVE NOISE ALL MODELS

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 under Burner Adjustment.

E. COMPLAINT—ERRATIC BLOWER OPERATION— ALL MODELS

1—If blower motor is going off and on, check the following:

a—Thermostat points—if points are opening and closing, see Service Hints, line 2 below.

b—If thermostat points are remaining open or closed,

the internal overload switch in the motor is defective—replace motor.

2—If thermostat points are observed opening and closing rapidly when furnace first starts, check the following:

- a—Quick disconnect plug on side of furnace. Plug must be wired as shown on electrical diagrams.
- b—Miswiring at thermostat relay (see wiring diagram).
- c—Shorted gas valve—if furnace runs properly with wires at gas valve disconnected, replace gas valve.
- d—Short in wiring—check all connections including thermostat.

F. MAIN BURNER WILL NOT CYCLE OFF—ALL MODELS

- 1—Check thermostat—points should break cleanly.
- 2—Check gas valve—valve may be stuck open. If so,

replace—do not attempt to repair valve.

G. COMPLAINT—UNIT WILL NOT OPERATE—ALL MODELS

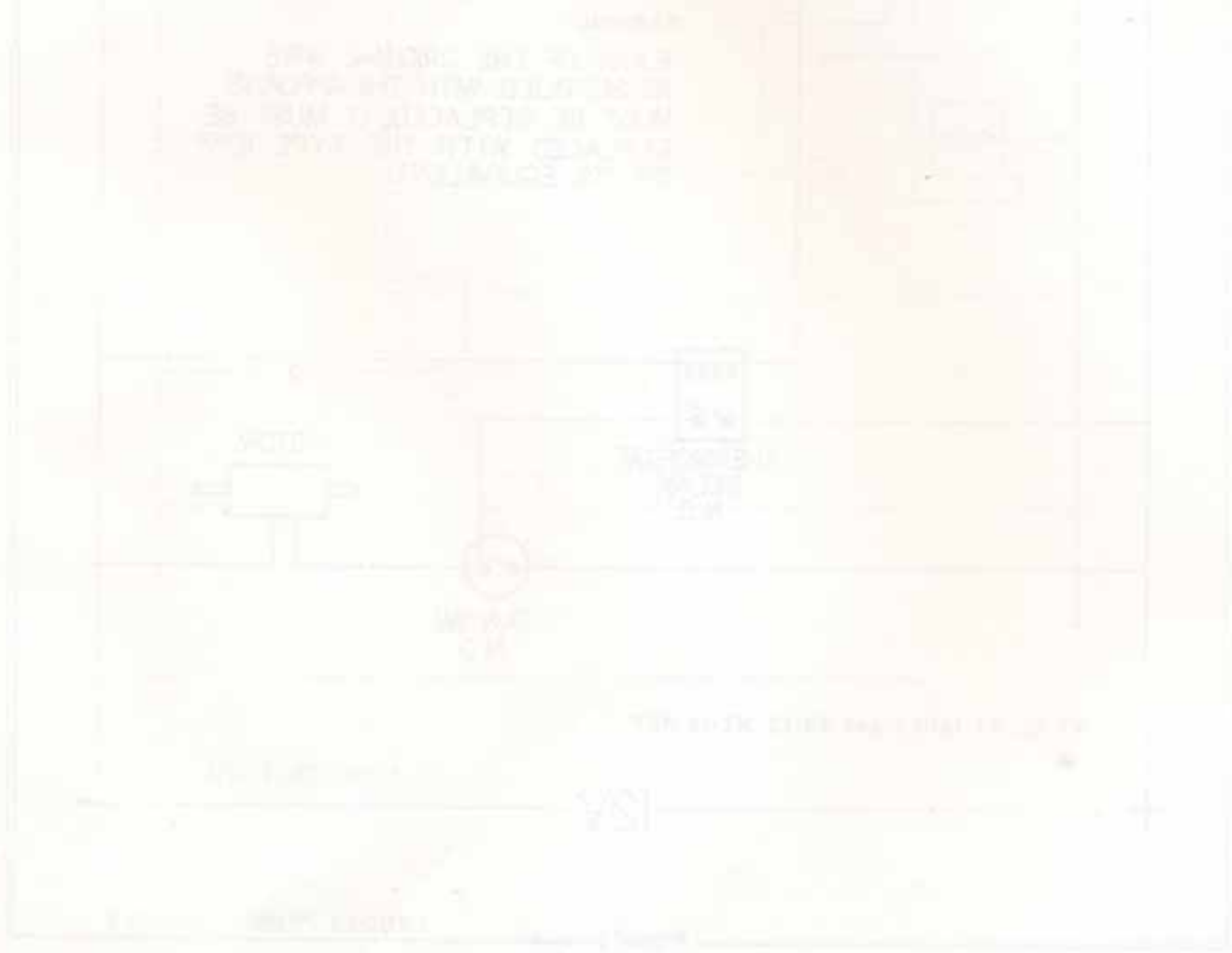
1—Check all wiring to assure proper connections or detect possible shorts.

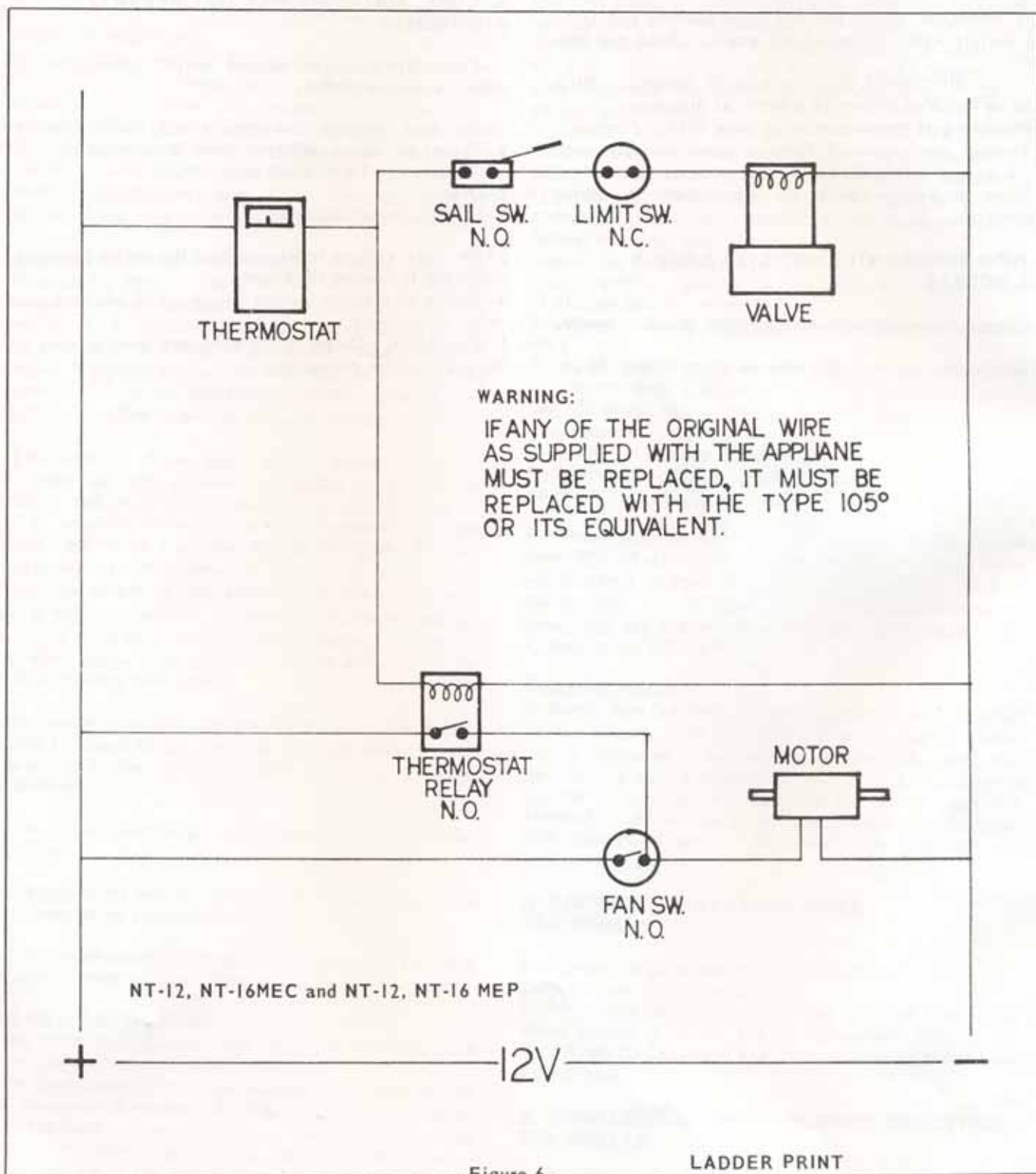
2—On dual voltage furnaces, check the following:

- a—Proper wiring connections to ac/dc convertor.
- b—Transformer for burnout or shorts.
- c—Diodes.
- d—AC/DC switching relay.

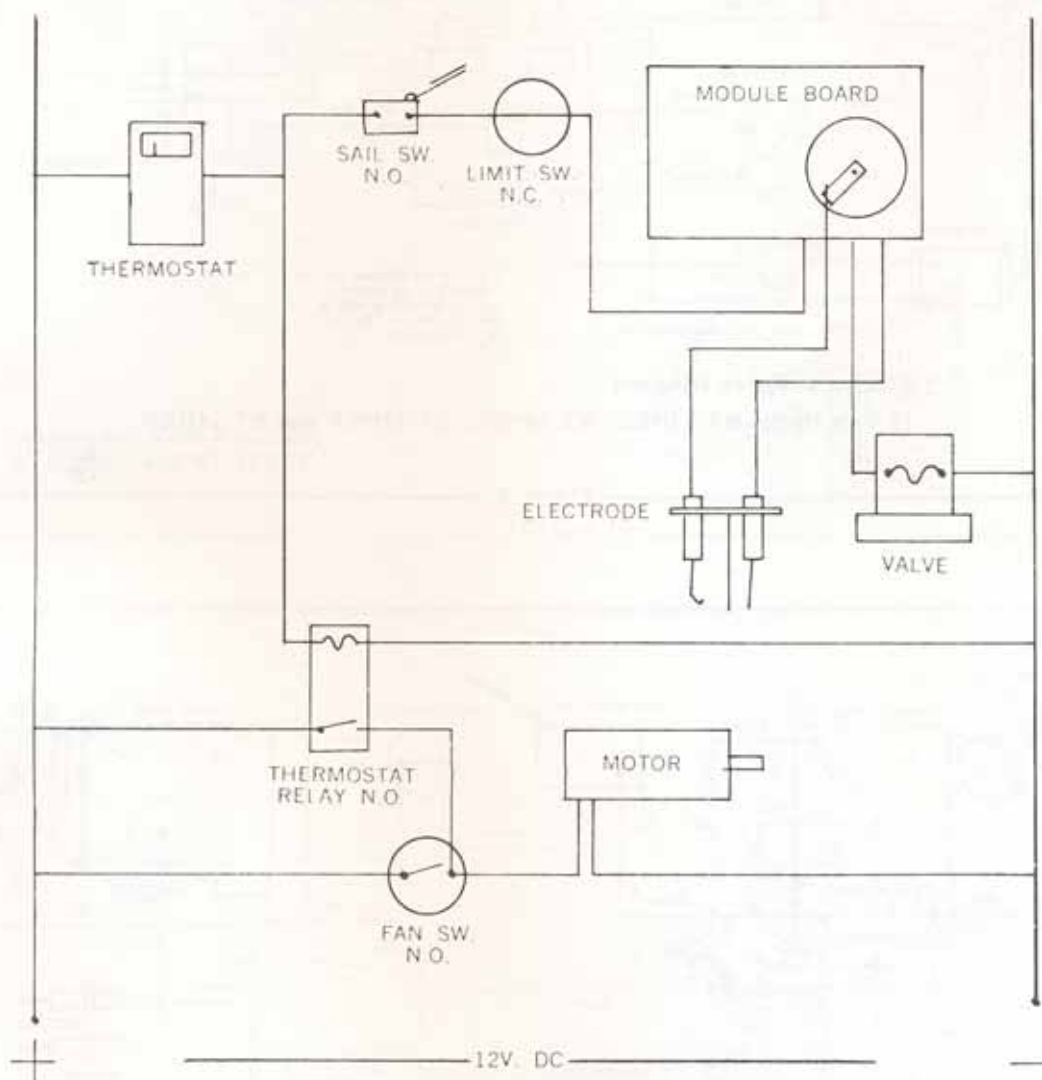
3—On dual voltage units, replace the entire convertor under the following conditions:

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





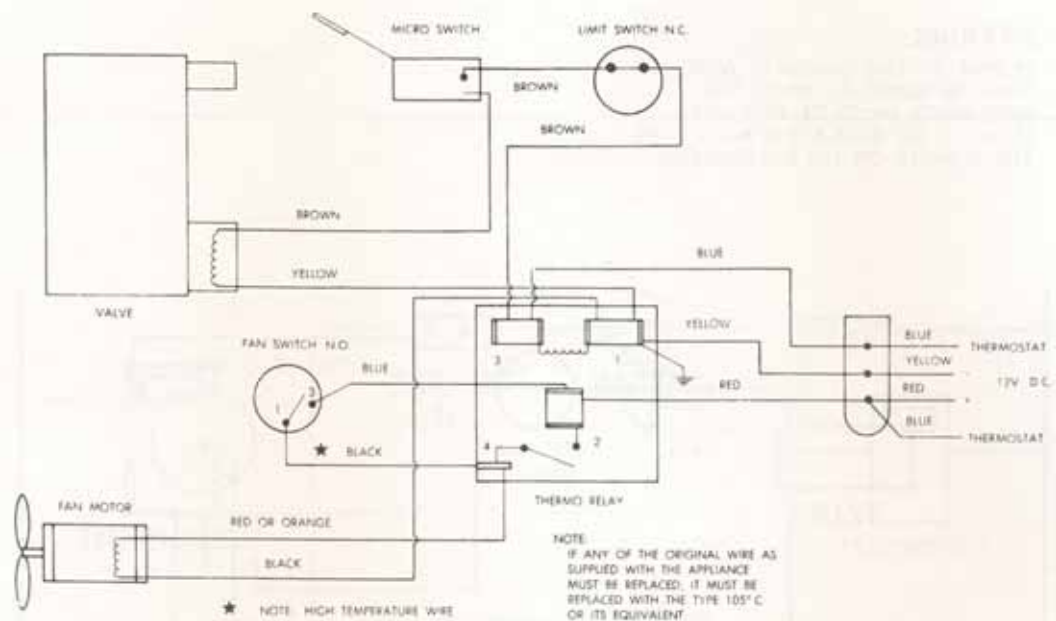
IF ANY OF THE ORIGINAL WIRE THAT IS SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, IT MUST BE REPLACED WITH TYPE 105 C WIRE OR ITS EQUIVALENT.



NT-12, NT-16MEF

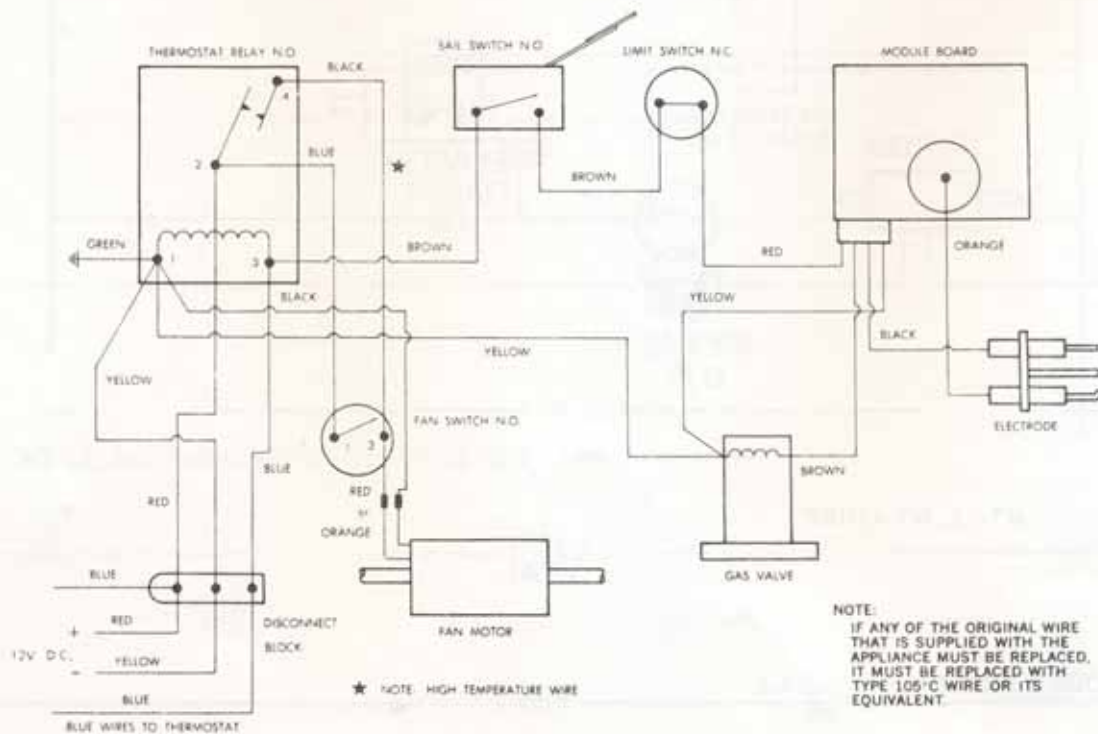
LADDER PRINT

Figure 7



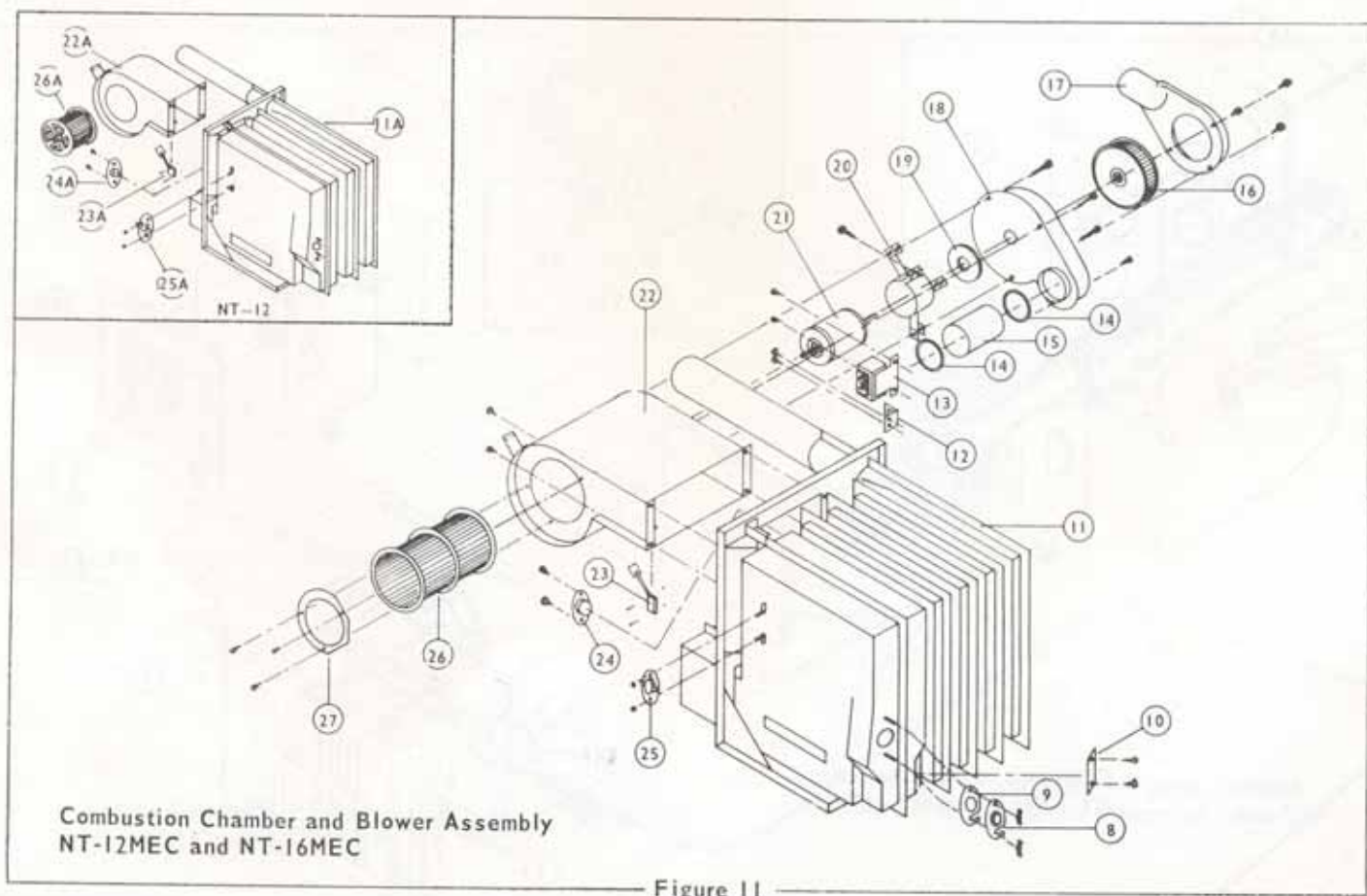
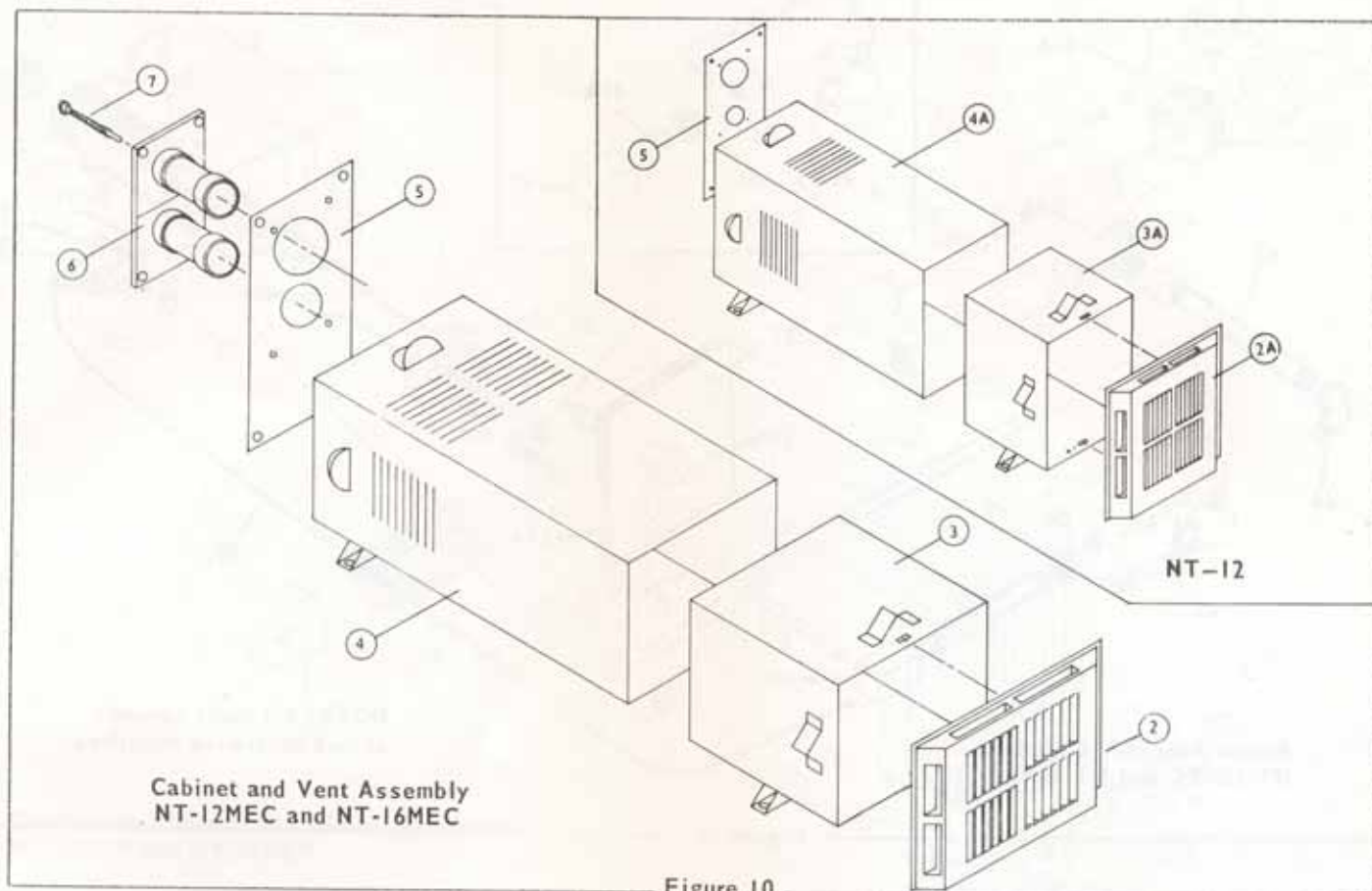
Electrical Wiring Diagram
12 Volt Units—NT-12MEC, NT-16MEC, NT-12MEP and NT-16MEP

Figure 8



Electrical Wiring Diagram
NT-12MEF, NT-16MEF

Figure 9



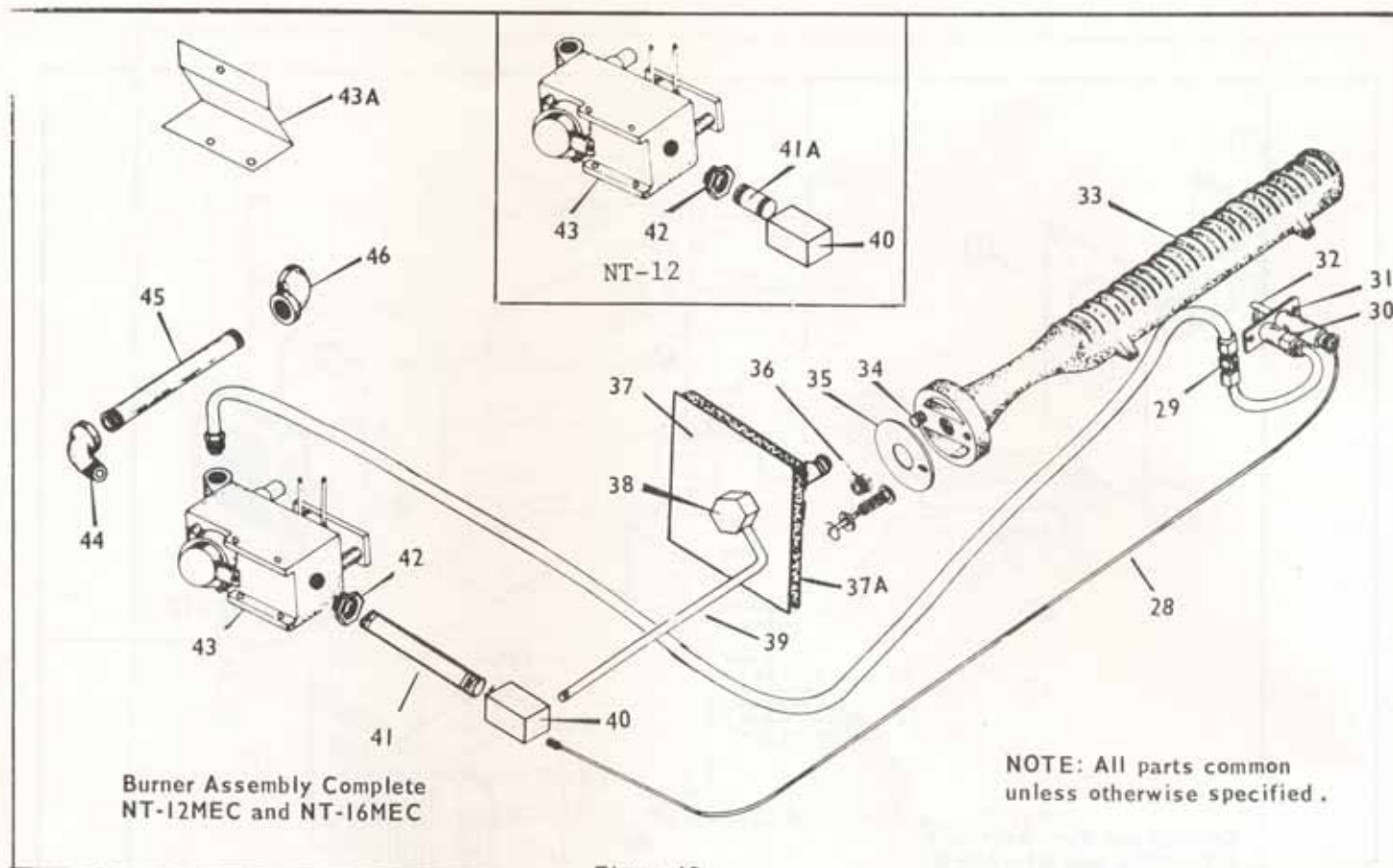


Figure 12

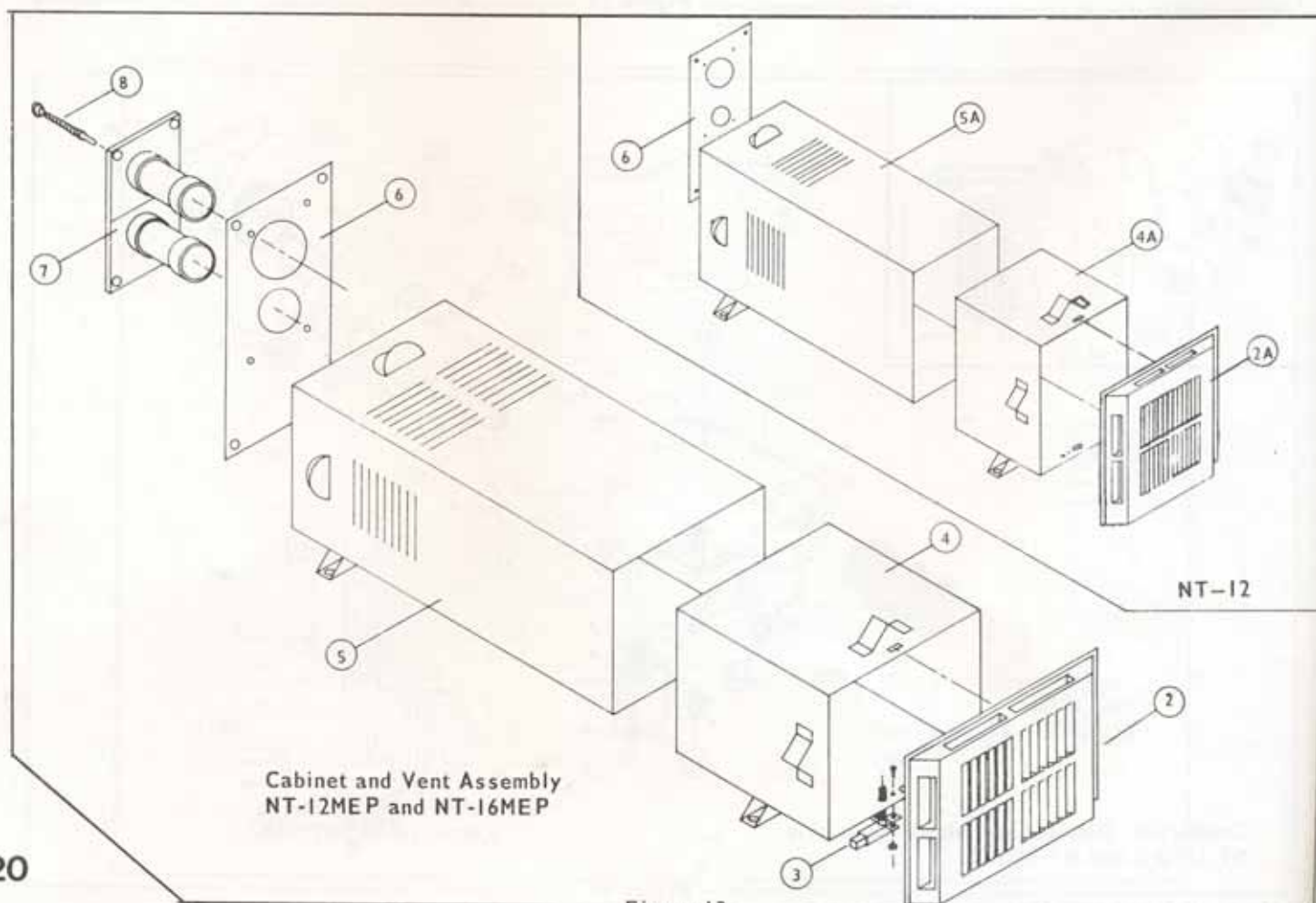
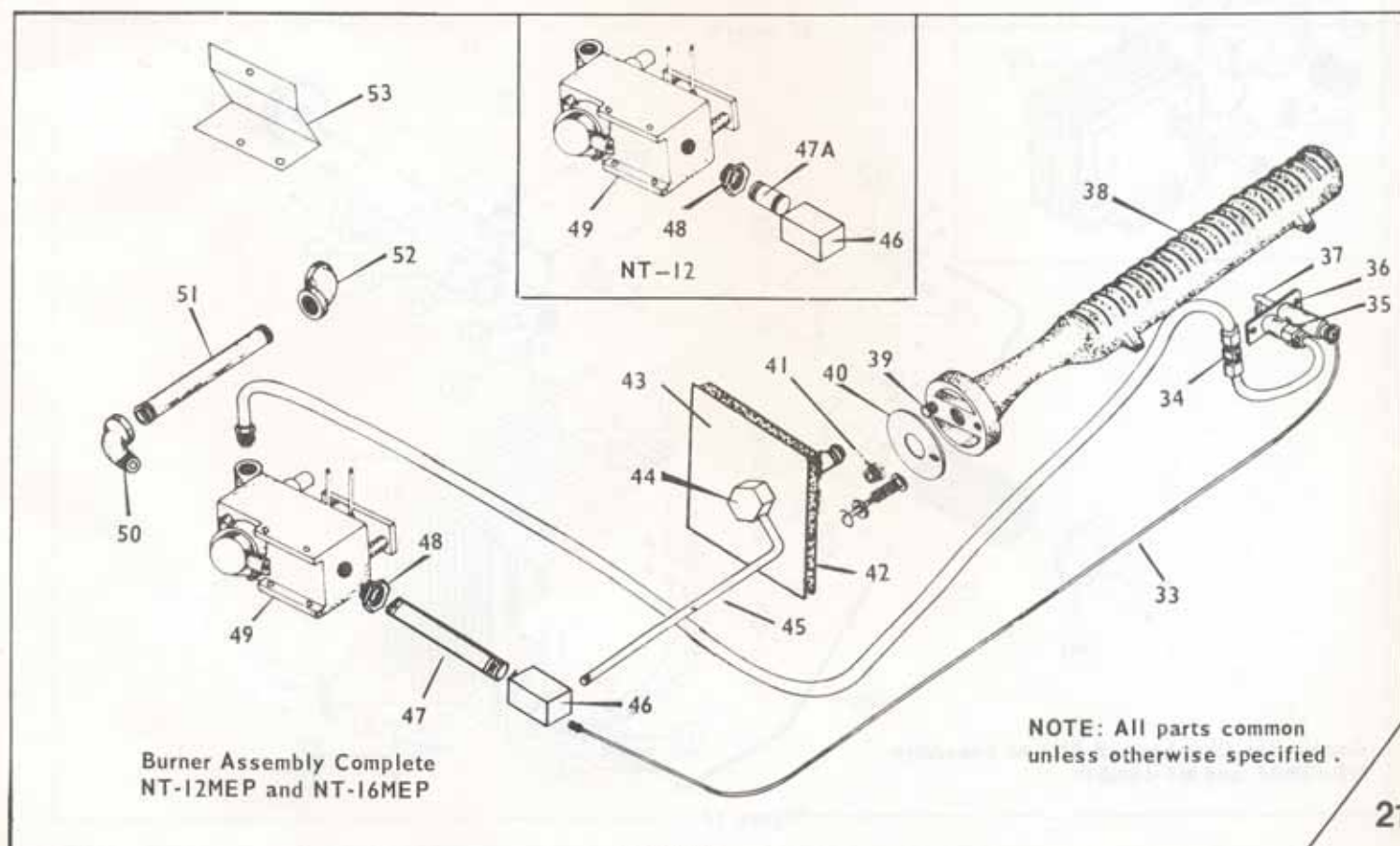
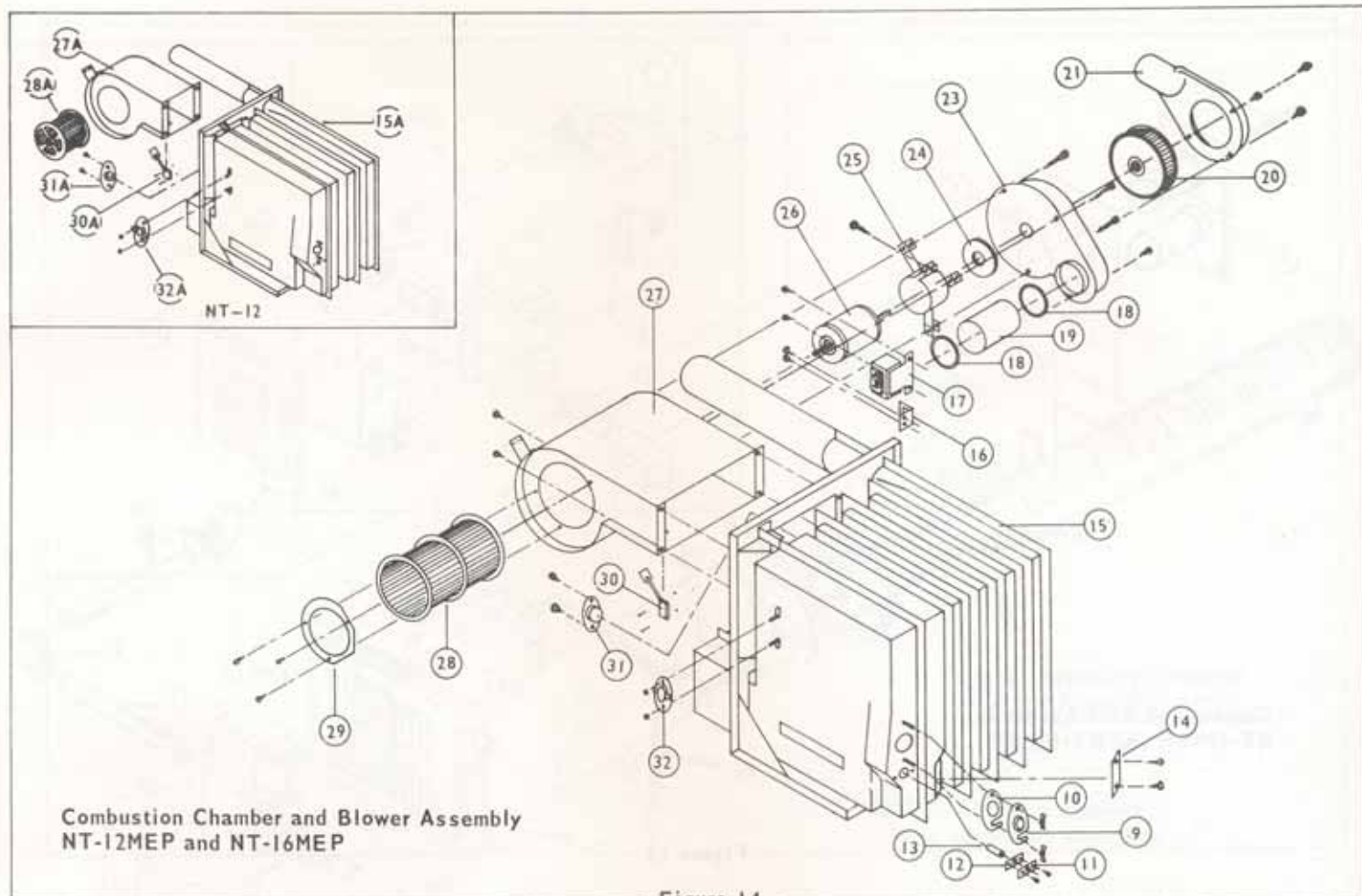


Figure 13



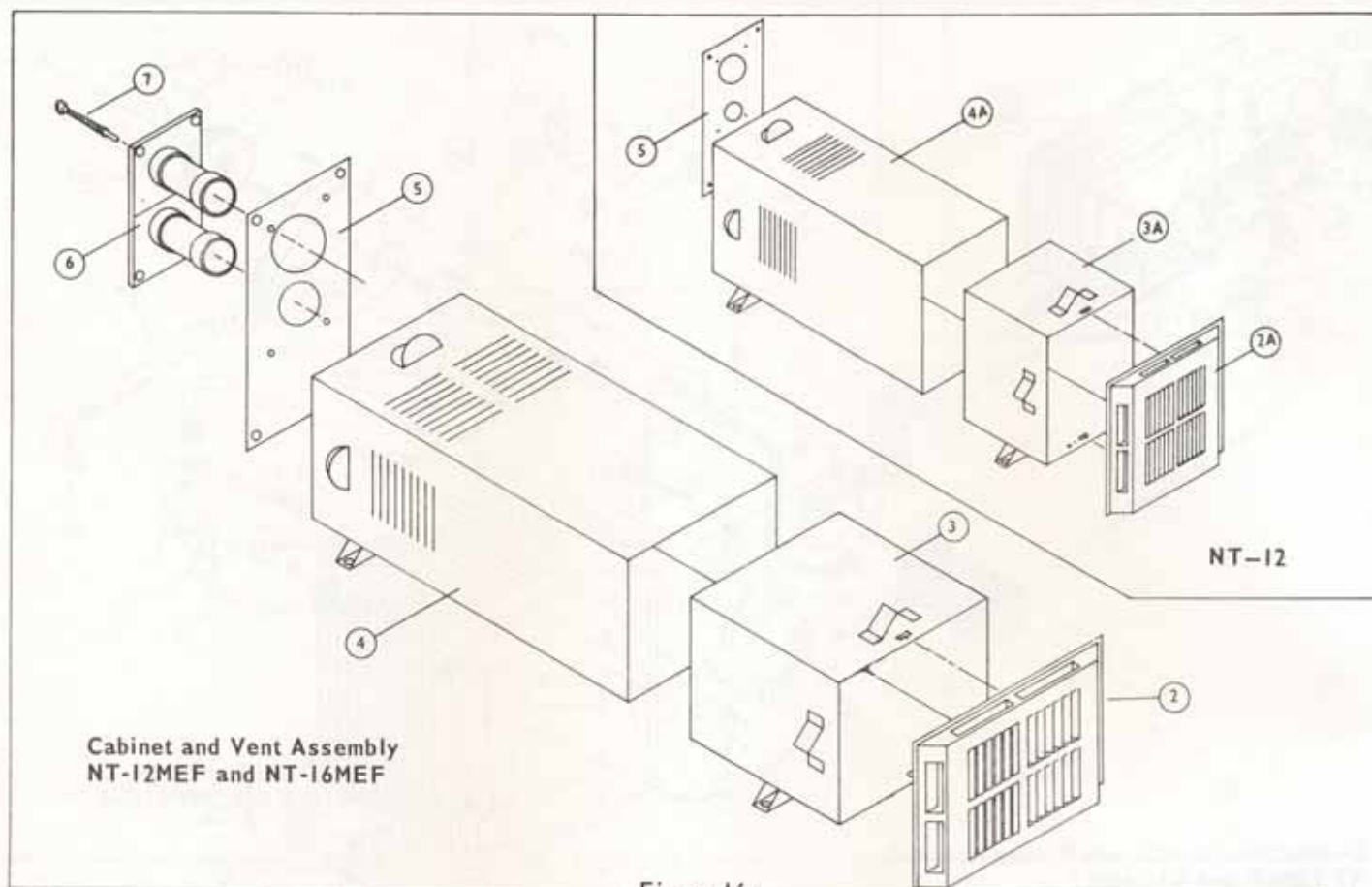


Figure 16

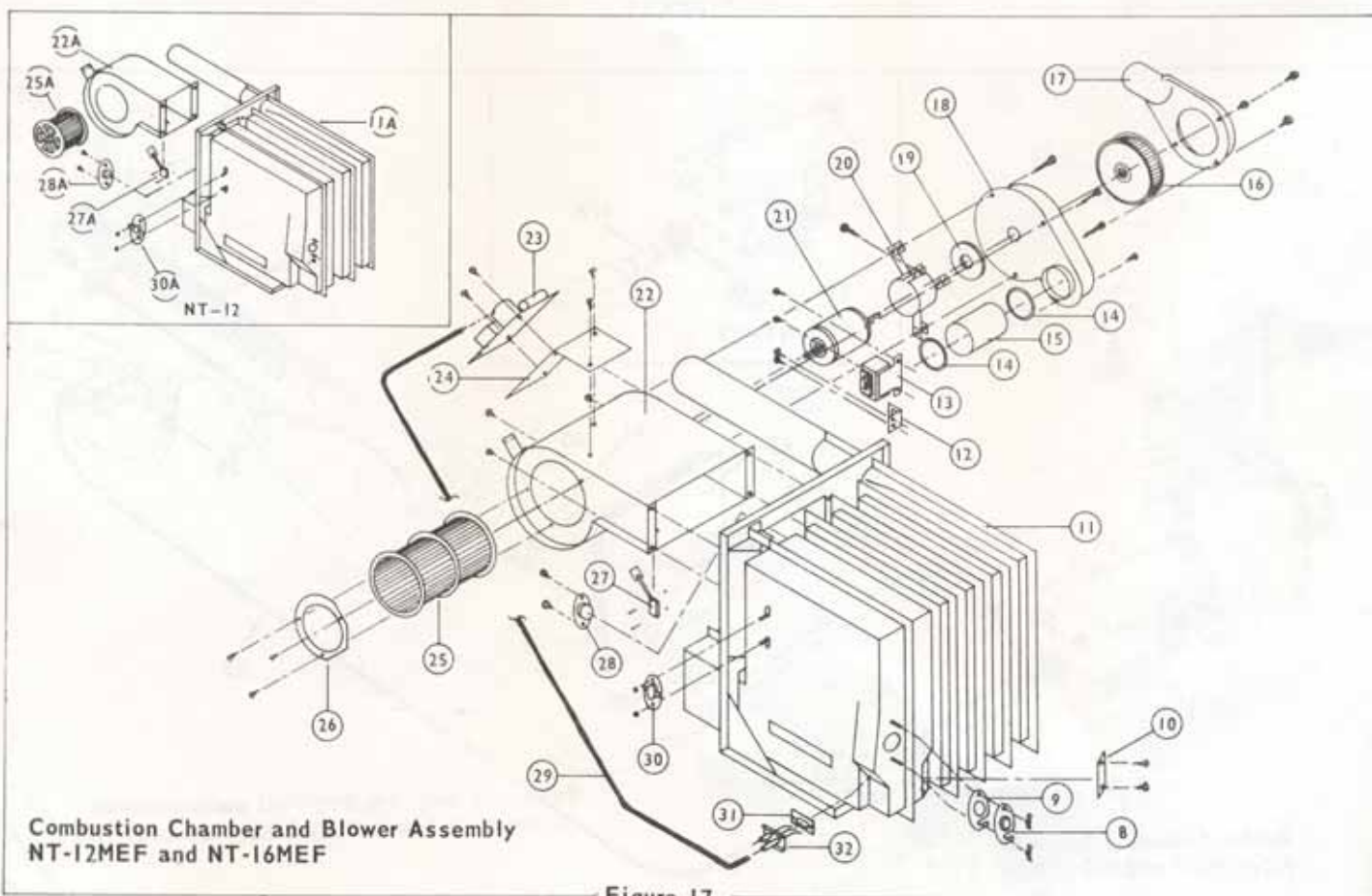


Figure 17

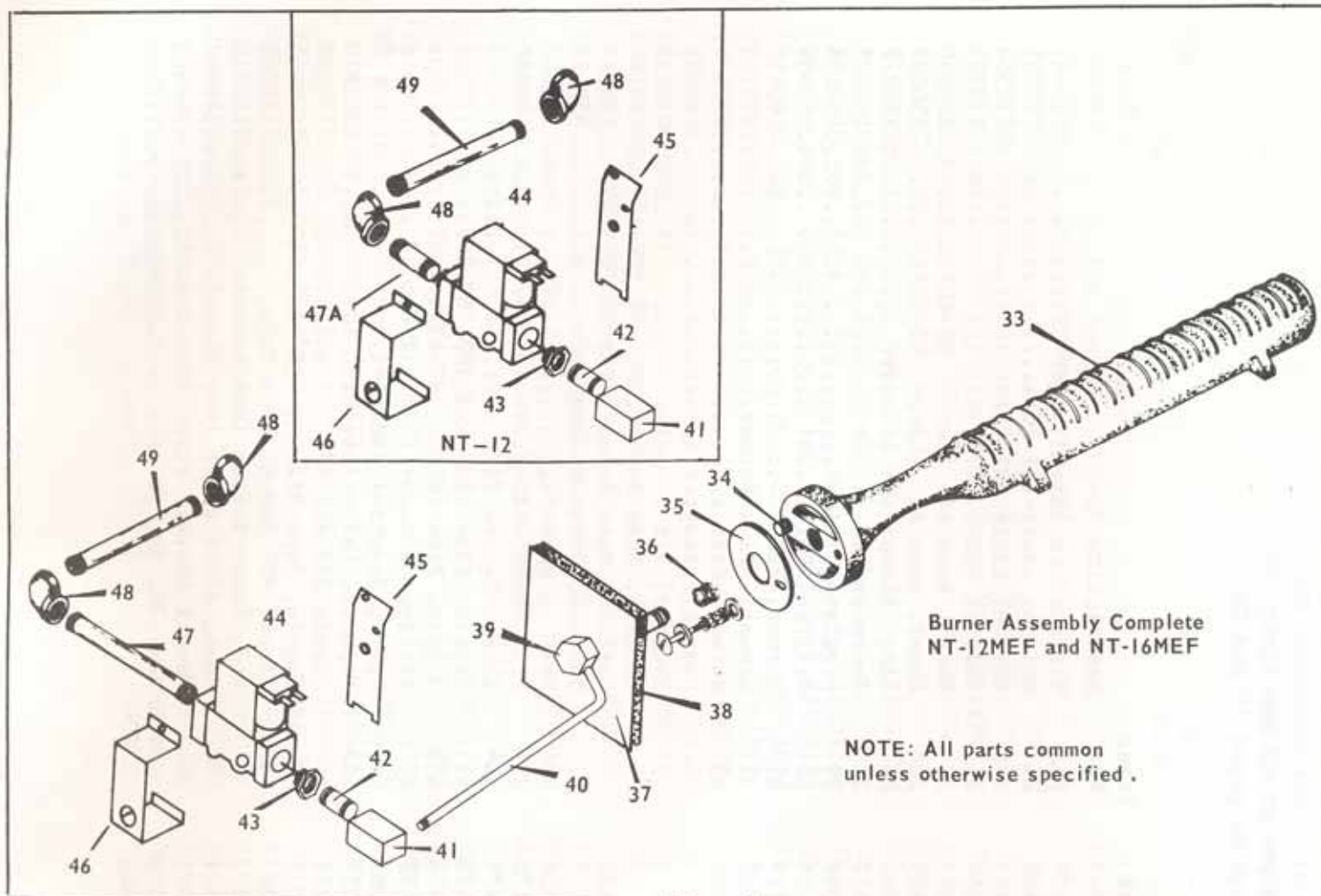


Figure 18

PARTS BREAKDOWN FOR NT-12 and 16MEC
Refer to drawings on pages 19 and 20

Item No.	Description	Part Number	Item No.	Description	Part Number
1	Thermostat (Not Shown).....	160616	23A	Microswitch Assembly (NT-12).....	X230447
2	Front Grille Assembly (NT-16).....	X030484	24	Switch, Limit (NT-16).....	230585
2A	Front Grille Assembly (NT-12).....	X030483	24A	Switch, Limit (NT-12).....	230584
3	Extension Front Discharge Ass'y (NT-16)X100869		25, 25A	Switch, Fan.....	230582
3A	Extension Front Discharge Ass'y (NT-12)X100867		26	Wheel, Room Air (Large, NT-16).....	350066
4	Cabinet Assembly (NT-16).....	X100865	26A	Wheel, Room Air (Large, NT-12).....	350067
4A	Cabinet Assembly (NT-12).....	X100864	27	Ring, Blower (NT-16 Only).....	390078
5	Template, Vent Cap.....	100852	28	Thermocouple.....	160527
6	Vent Cap and Tube Assembly.....	X260097	29	Regulator, Pilot.....	160556
7	Screw #8 x 1 3/4".....	120725	30	Orifice, Pilot .007.....	160659
8	Cover, Observation Hole.....	X290117	31	Burner, Pilot.....	160618
9	Gasket, Observation Hole Cover.....	070367	32	Gasket, Pilot Burner.....	070163
10	Cover, Air Shutter Adjustment Hole.....	260061	33	Burner, Cast Iron.....	010532
10A	Gasket, Air Shutter Adjustment Hole		34	Rod, Air Shutter Adjustment.....	140091
	Cover (Not Shown).....	070278	35	Shutter, Air.....	010533
11	Combustion Chamber and Radiation Shield Assembly (NT-16).....	X020820	36	Orifice, Main Burner, No. 62 (NT-12).....	180106
11A	Combustion Chamber and Radiation Shield Assembly (NT-12).....	X020818		Orifice, Main Burner, No. 57 (NT-16).....	180194
12	Bracket, Power Supply Plug.....	062171	37	Door, Combustion Chamber.....	030399
13	Relay, Thermostat.....	230423	38*	Orifice Holder.....	170543
14	Gasket, Crossover Tube.....	070412	39*	Pipe, Manifold.....	170550
15	Tube, Crossover (NT-16).....	050474	40*	Elbow, Square (1/8 NPT).....	170549
	Tube, Crossover (NT-12).....	050475	41	Nipple, Pipe (1/8 x 3 3/8, NT-16).....	170541
16	Wheel, Combustion Air (Small).....	350063	41A	Nipple, Pipe (Close, NT-12).....	170546
17	Scoop, Air Intake Assembly.....	X062239	42	Fitting, Reducer (3/8 x 1/8).....	170545
17A	Gasket, Air Scoop (Not Shown).....	070281	43	Valve, Basotrol G92SGD-1.....	160657
18	Housing, Combustion Air Blower Ass'y...X390075		43A	Support, Valve Assembly.....	X061870
19	Gasket, Shaft (Motor).....	070283	44	Nipple 3/8 x 1 1/2".....	170466
20	Mount, Motor.....	X061873	45	Nipple, Pipe 3/8 x 4 1/2.....	170353
21	Motor, Redmond.....	230571	46	Elbow, 90° 3/8 x 3/8 NPT.....	170082
22	Housing, Blower Assembly (NT-16).....	390071	47	Rod, Reset Button (Not Shown).....	140114
22A	Housing, Blower Assembly (NT-12).....	390079	48	Knob, Black Reset (Not Shown).....	140093
23	Microswitch Assembly (NT-16).....	X230448	49	Manual Shutoff Valve (Not Shown).....	160683
			* Item Nos. 38, 39, 40 make up Manifold Ass'y.X170551		

PARTS BREAKDOWN FOR NT-12 and 16MEP
Refer to drawings on pages 20 and 21

Item No.	Description	Part Number	Item No.	Description	Part Number
1	Thermostat (Not Shown).....	160616	27A	Housing, Blower Assembly (NT-12).....	390079
2	Front Grille Assembly (NT-16).....	X030484	28	Wheel, Large Blower (NT-16).....	350066
2A	Front Grille Assembly (NT-12).....	X030483	28A	Wheel, Large Blower (NT-12).....	350067
3	Piezo Ignitor.....	230573	29	Ring, Blower (NT-16 Only).....	390078
4	Extension, Front Discharge Assy (NT-16)X100869		30	Microswitch Assembly (NT-16).....	X230448
4A	Extension, Front Discharge Assy (NT-12)X100867		30A	Microswitch Assembly (NT-12).....	X230447
5	Cabinet Assembly (NT-16).....	X100865	31	Switch, Limit (NT-16).....	230585
5A	Cabinet Assembly (NT-12).....	X100864	31A	Switch, Limit (NT-12).....	230584
6	Template, Vent Cap.....	100852	32, 32A	Switch, Fan.....	230582
7	Vent Cap and Tube Assembly.....	X260097	33	Thermocouple.....	160527
8	Screw, #8 x 1 3/4.....	120725	34	Regulator, Pilot.....	160556
9	Cover, Observation Hole.....	X290117	35	Orifice, Pilot .007.....	160659
10	Gasket, Observation Hole Cover.....	070367	36	Burner, Pilot.....	160618
11	Retainer Ring, Electrode.....	061697	37	Gasket, Pilot Burner.....	070163
12	Gasket, Electrode.....	070276	38	Burner, Cast Iron.....	010532
13	Electrode.....	230522	39	Rod, Air Shutter Adjustment.....	140091
14	Cover, Air Shutter Adjustment Hole.....	260061	40	Shutter, Air.....	010533
14A	Gasket, Air Shutter Adjustment Hole		41	Orifice, Main Burner No. 62 (NT-12)....	180106
15	Cover (Not Shown).....	070278	42	Orifice, Main Burner No. 57 (NT-16)....	180194
15	Combustion Chamber and Radiation Shield		43	Gasket, Combustion Chamber Door.....	070304
15A	Assembly (NT-16).....	X020821	44	Door, Combustion Chamber.....	030399
16	Combustion Chamber and Radiation Shield		44*	Orifice Holder.....	170543
16	Assembly (NT-12).....	X020819	45*	Pipe, Manifold.....	170550
17	Bracket, Power Supply Plug.....	062171	46*	Elbow, Square (1/8 NPT).....	170549
18	Relay, Thermostat.....	230423	47	Nipple, Pipe 1/8 x 3/8 (NT-16).....	170541
19	Gasket, Crossover Tube.....	070412	47A	Nipple, Pipe Close (NT-12).....	170546
20	Tube, Crossover (NT-16).....	050474	48	Fitting, Reducer 3/8 x 1/8.....	170545
21	Tube, Crossover (NT-12).....	050475	49	Valve, Basotrol G92SGD-1.....	160657
22	Wheel, Combustion Air (Small).....	350063	50	Nipple 3/8 x 1 1/2".....	170466
23	Scoot, Air Intake Assembly.....	X062239	51	Nipple, Pipe 3/8 x 4 1/2.....	170353
24	Gasket, Air Scoop (Not Shown).....	070281	52	Elbow, 90° 3/8 x 3/8 NPT.....	170082
25	Housing, Combustion Air Blower Ass'y..	X390075	53	Support, Valve Assembly.....	061870
26	Gasket, Shaft (Motor).....	070283	54	Rod, Reset Button (Not Shown).....	140114
27	Mount, Motor Assembly.....	X061873	55	Knob, Black Reset (Not Shown).....	140093
	Motor, Redmond.....	230571	56	Manual Shutoff Valve (Not Shown).....	160683
	Housing, Blower Assembly (NT-16).....	390071		* Item Nos. 44, 45, 46 make up Manifold Ass'y.X170551	

PARTS BREAKDOWN FOR NT-12 and 16MEF
Refer to drawings on pages 22 and 23

26

Item No.	Description	Part Number	Item No.	Description	Part Number
1	Thermostat (Not Shown).....	160737	24	Bracket, Module Board Mounting.....	062130
2	Front Grille Assembly (NT-16).....	X030484	25	Wheel, Room Air (Large NT-16).....	350066
2A	Front Grille Assembly (NT-12).....	X030483	25A	Wheel, Room Air (Large NT-12).....	350067
3	Extension Front Discharge Ass'y (NT-16)X100869		26	Ring, Blower (NT-16 Only).....	390078
3A	Extension Front Discharge Ass'y (NT-12)X100867		27	Microswitch Assembly (NT-16).....	X230448
4	Cabinet Assembly (NT-16).....	X100865	27A	Microswitch Assembly (NT-12).....	X230447
4A	Cabinet Assembly (NT-12).....	X100864	28	Switch, Limit (NT-16).....	230585
5	Template, Vent Cap.....	100852	28A	Switch, Limit (NT-12).....	230584
6	Vent Cap and Tube Assembly.....	X260097	29	Wire, Electrode.....	230513
7	Screw #8 x 1 3/4.....	120725	30, 30A	Switch, Fan.....	230582
8	Cover, Observation Hole.....	X290117	31	Gasket, Electrode.....	070163
9	Gasket, Observation Hole Cover.....	070367	32	Electrode.....	230602
10	Cover, Air Shutter Adjustment Hole.....	260061	33	Burner, Cast Iron.....	010532
10A	Gasket, Air Shutter Adjustment Hole		34	Rod, Air Shutter Adjustment.....	140091
11	Cover (Not Shown).....	070278	35	Shutter, Air.....	010533
	Combustion Chamber and Radiation Shield		36	Orifice, Main Burner, No. 62 (NT-12).....	180106
11A	Assembly (NT-16).....	X020820		Orifice, Main Burner, No. 57 (NT-16).....	180194
	Combustion Chamber and Radiation Shield		37	Door, Combustion Chamber.....	030399
12	Assembly (NT-12).....	X020818	38	Gasket, Combustion Chamber Door.....	070304
13	Bracket, Power Supply Plug.....	062171	39*	Orifice Holder.....	170543
14	Relay, Thermostat.....	230423	40*	Pipe, Manifold.....	170550
15	Gasket, Crossover Tube.....	070412	41*	Elbow, Square 1/8 NPT.....	170549
	Tube, Crossover (NT-16).....	050474	42	Nipple, Pipe.....	170554
	Tube, Crossover (NT-12).....	050475	43	Fitting Reducer, 3/8 x 1/8.....	170545
16	Wheel, Combustion Air (Small).....	350063	44	Valve, Gas Harper-Wyman.....	160762
17	Scoop, Air Intake Assembly.....	X062239	45	Bracket, Valve Mounting.....	062229
17A	Gasket, Air Scoop (Not Shown).....	070281	46	Bracket, Valve Mounting Top.....	062232
18	Housing, Combustion Air Blower Ass'y.....	X390075	47	Nipple, Pipe 3/8 x 5 (NT-16).....	170555
19	Gasket, Motor Shaft.....	070283	47A	Nipple, Pipe 3/8 x 2 (NT-12).....	170373
20	Mount, Motor Assembly.....	X061873	48	Elbow, 90° 3/8 x 3/8 NPT.....	170082
21	Motor, Redmond.....	230571	49	Nipple, Pipe 3/8 x 4 1/2.....	170353
22	Housing, Blower Assembly (NT-16).....	390181	50	Manual Shutoff Valve (Not Shown).....	160683
22A	Housing, Blower Assembly (NT-12).....	390180		* Item Nos. 39, 40, 41 make up Manifold Ass'y.X170551	
23	Module Board.....	230483			

LIMITED WARRANTY

RECREATIONAL VEHICLE HEATING UNIT

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. Warranty parts will be replaced at no charge for the parts. Labor will be paid only as set forth in the Service Policy below.

SERVICE POLICY

Suburban Manufacturing Company, with the cooperation of its authorized service centers, will endeavor to assure customer satisfaction. If a defect of workmanship or material in the heating unit is repaired within one year from date of original purchase, Suburban will pay a service allowance to the authorized service center up to the maximum specified under the terms of Suburban's contract with the service center. To obtain repairs or replacements, the owner/user must provide for transportation of the heating unit to and from the service center and must inform the service center of the nature of the defect. A list of authorized service centers is enclosed with Suburban's Installation, Operating and Service Instructions book. The owner/user may obtain an updated list of authorized service centers from Suburban Manufacturing Company at any time. Any warranty labor charges paid by the owner/user will be reimbursed at Suburban's flat rate labor schedule in effect at time repairs were made. Any parts replaced under warranty and paid for by the owner/user must be returned to the factory for inspection. Reimbursement for parts will be made only at dealer price in effect at time parts were replaced. All repairs made after one year from date of original purchase will be at the expense of the owner/user.

EXCLUSIONS AND LIMITATIONS

A—There are no other express warranties except as set out above, and any implied warranties are limited in duration to one year from date of first purchase of the recreational vehicle. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

B—This limited warranty excludes consequential damages, incidental damages, or incidental expenses, including damage to property. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

C—This limited warranty does not cover damages caused by improper installation, mishandling, neglect, abuse, improper energy supply, other circumstances beyond Suburban's control such as fire, flood or other acts of God, or operation of the heating unit contrary to the provisions of the Installation, Operating and Service Instructions book of Suburban or contrary to proper voltage and fuel ratings as design certified by the American Gas Association.

D—Certain services are not included under the service policy. 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 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.
- 12—Disconnected wires.
- 13—Broken parts.

WARRANTY NOTICE

This warranty has been drafted to comply with new federal law applicable to products manufactured after July 4, 1975. It replaces any warranty included elsewhere in this package.

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



SUBURBAN

SUBURBAN MANUFACTURING COMPANY • BOX 399 • DAYTON, TENNESSEE 37321