ARTHUR W. KLEE
President

AIRXCEL
Suburban Division

July 31, 2014

Ms. Jennifer Timian
Chief, Recall Management Division
Office of Defects Investigation Enforcement
National Highway Traffic Safety Administration
1200 New Jersey Avenue, SE
Washington, DC 20590

Subject: EQ 14-009 and Safety Recall 14V-021

Dear Ms. Timian:

This letter is in response to your letter dated July 18, 2014, which was received on July 22, 2014. This response is made by Suburban Manufacturing Company, a Division of Airxcel, Inc., (hereafter referred to in this letter as Suburban).

As a preliminary matter, your letter advises as to certain responsibilities Suburban has under the NHTSA regulations. We are aware of those requirements and a review of your records will confirm that we have previously self-reported defects related information. You will also find that we have conducted a number of recall campaigns and have demonstrated a strong desire to cooperate with NHTSA. (I'm sure this can also be confirmed with Kelly Schuler.) The reason Suburban has not filed a Part 573 Defect Report in this situation involving Trails West is because we have found no reason to believe the incidents in question are the result of any defect in the Suburban SF-30FQ furnace.

The fires and damaged furnaces in question have involved Trails West bumper pull angled front snow mobile trailers. Although our installation instructions say "Do not install the furnace with the vent facing the forward end of the coach", Trails West ignored this and installed the furnace in the very front of the trailer, with the vent located on an angled, but still forward facing wall.

The Suburban SF-30FQ furnace, like all other Suburban RV furnaces is intended to be used in stationary applications. Suburban installation instructions and owner's manuals for all RV furnaces, including the SF-30FQ, include the following warning: "WARNING! Do not operate furnace while vehicle is in motion or being towed."

Trails West ignored this warning and instead specifically instructed its owners to use the furnaces in transit. Examples of these instructions given by Trails West are available at

https://www.youtube.com/watch?v=Ug5K8tNFKb0&feature=youtu.be&t=11m26s

and at

https://www.youtube.com/watch?v=YCXWzjBmUSU&feature=youtu.be

676 Broadway Street ■ Dayton, TN 37321 ■ 423-775-2131

(The specific segment in the first video encouraging use of the furnace in transit is between 11:30 and 11:55. The specific segment in the second video encouraging use of the furnace in transit is between 1:20 and 1:28)

We are certain there are numerous other instances of Trails West giving the same advice to its dealers and end users, as we found numerous internet references to customers having been told by Trails West and its dealers to use the furnaces while in transit.

The problems created by Trails West, first in its design of the subject trailers and second by its related sales and marketing decisions, become more obvious with a better understanding of the design and function of the Suburban SF-30FQ.

The design standard (ANSI Z21.47a-2012 CSA 2.3a-2012 Central Furnaces) for Recreation Vehicle furnaces requires all furnaces to be of a direct vent design, that is, all air for combustion must come from outside the living area and all combustion exhaust be vented to the outside. Suburban's SF-30FQ furnace utilizes an external vent assembly with an intake tube and an exhaust tube. The intake tube provides a path for outside air to be pulled into the furnace combustion chamber by the combustion air wheel which is driven by the furnace motor. The furnace motor is a dual shaft motor which powers both the combustion air wheel and the supply air wheel which distributes the warm air the furnace generates. Since this air is being drawn into the tube by the combustion air wheel the air in the intake tube has a negative pressure. This outside air pulled by the combustion air wheel is delivered to the burner assembly and mixed with LP gas for combustion. The heated combustion by products travel through the combustion chamber and are expelled through the exhaust tube. The pressure in the combustion chamber and exhaust tube has a positive pressure. This is shown in Figure 1. Standards compliance requires careful control of the airflow through the combustion process to accomplish reliable furnace operation combined with minimal production of Carbon Monoxide.

In the typical recreation vehicle furnace installation, the furnace is installed near the lengthwise center of trailer and the external vent assembly (intake and exhaust tubes) is positioned <u>perpendicular</u> to the intended direction of travel of the RV. When the furnace is operated with the trailer in a stationary

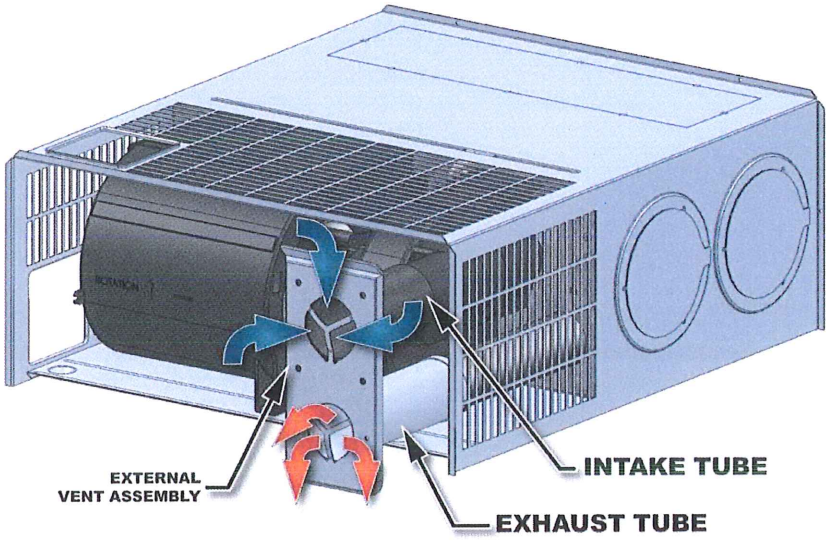
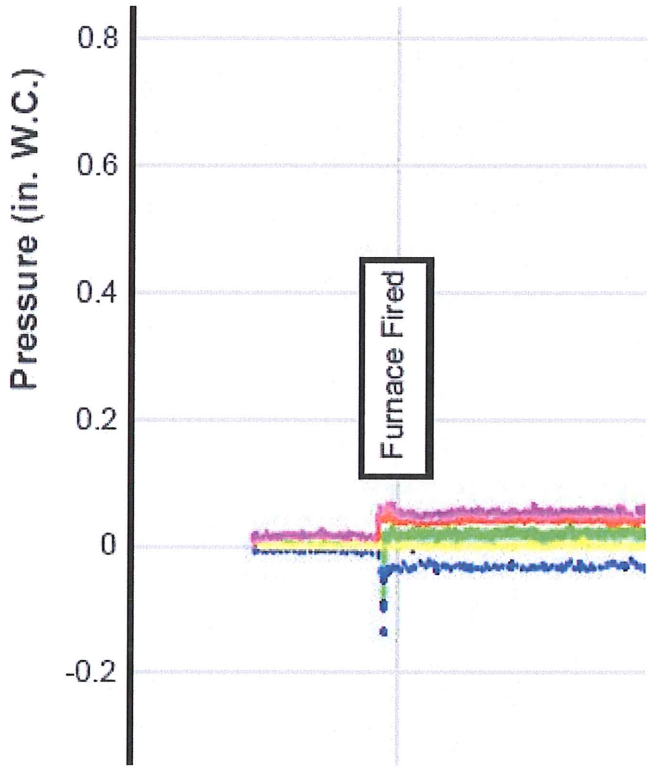


Figure 1

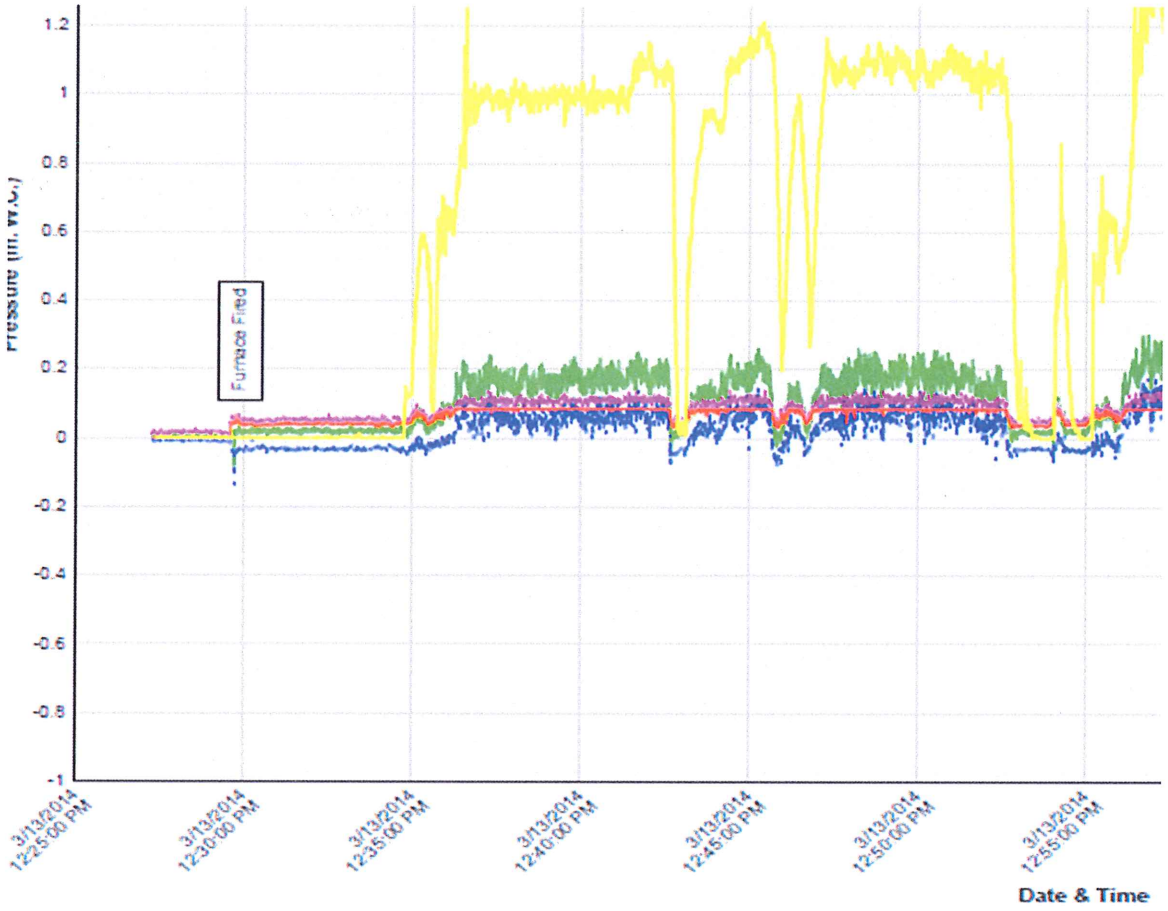
position (i.e. not in motion) the intake tube has a negative pressure and the exhaust tube has a positive pressure.

As part of Suburban's evaluation of the Trails West situation, third party testing was performed by Advanced Engineering Investigations, Denver Colorado, which recorded intake and exhaust tube internal pressures of a SF-30FQ furnace to evaluate a number of different operating parameters. The extracted chart below shows the furnace in normal operation, with the intake air pressure slightly negative, (shown below on the blue line) and the exhaust air pressure slightly positive, (shown below on the green line). The red line represents the difference in the intake tube pressure and the exhaust tube pressure. The yellow line represents vehicle speed (in this example, stationary). The block with "Furnace Fired" indicates the startup of the furnace. The full graph containing the data below is included and titled 12070 Test 14.



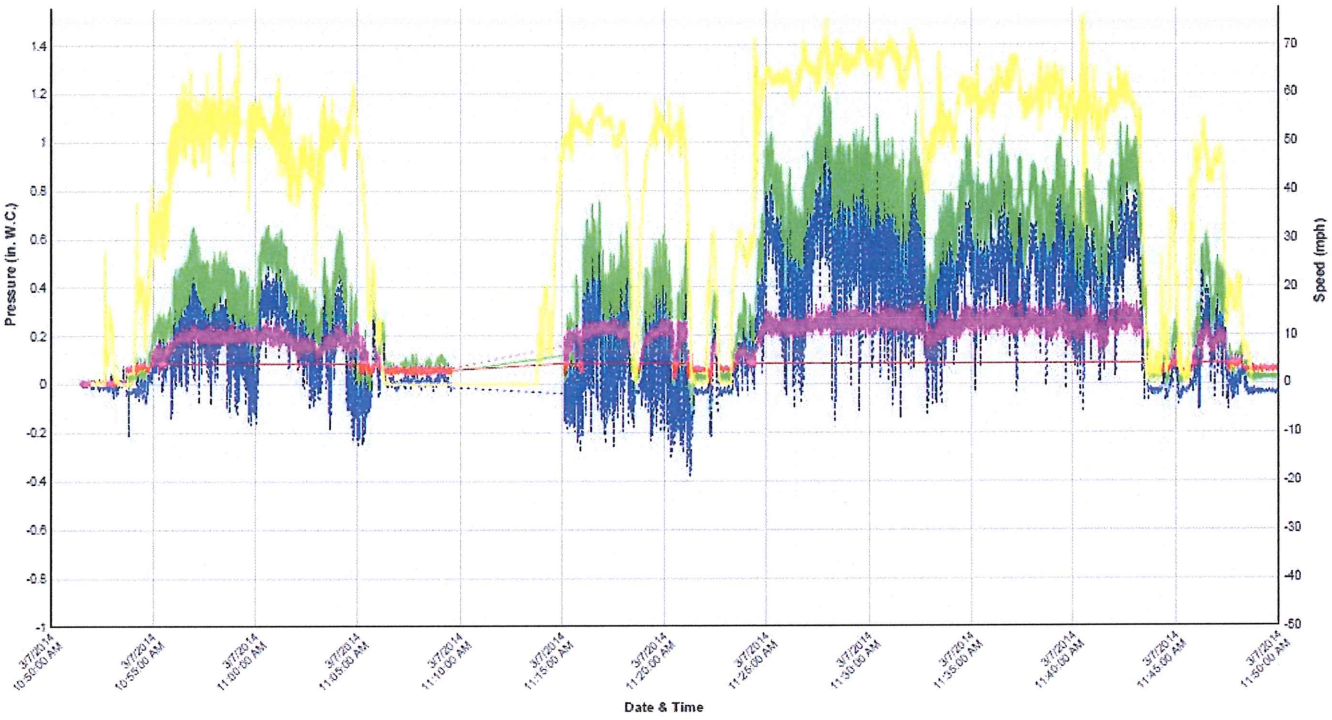
Even though Suburban warns against use of the furnace in transit, and some states prohibit the use of the LP gas system during transit, our third party testing also included recording intake and exhaust tube pressures with the furnace in motion. The graph below is extracted from a test that was conducted with the furnace installed near the lengthwise center of a recreation vehicle and the intake and exhaust tubes of the furnace vent are perpendicular to the direction of travel of the recreation vehicle in transit. The pressures in the exhaust and intake tubes stay relatively low, the exhaust tube pressure always remains greater than intake tube pressure and the pressure differential between the intake and exhaust tube remains relatively constant. The perpendicular orientation of the intake and exhaust tubes to the direction of travel of the RV does not create abnormal and excessive positive pressure within the intake and exhaust tubes and allows proper operation of the furnace. In the graph below the vehicle speed is

indicated by the yellow line, the exhaust pressure is indicated by the green line, the intake pressure is indicated by the blue line and the differential pressure is indicated by the red and purple lines. This third party test result shows when the furnace is installed correctly, even if used during transit, flame reversal and furnace damage does not occur. The full graph of data below is included and titled 12070 Test 14.



In the Trails West design of the RPM bumper pull trailer, the furnace is installed at the front, right hand side of the trailer in an angled, but forward facing nose cap. This contradicts the Suburban installation manual which states "Do not install the furnace with the vent facing toward the forward end of the coach". The Trails West installation results in the external vent assembly being oriented toward the direction of travel of the trailer. When the trailer is stationary the furnace operates as designed. However when the trailer is towed, the forward facing orientation of the furnace intake and exhaust tubes are exposed and vulnerable to increasing oncoming air pressure which disrupts normal furnace operation.

Third party testing shows that during those times when the furnace installed in the Trails West RPM bumper pull trailer is operated with the trailer in a stationary position (i.e. not in motion), pressures recorded inside the intake and exhaust tubes are similar to those shown above for a typical RV furnace installation. The full graph of data below is included and titled 12070 Test 11.

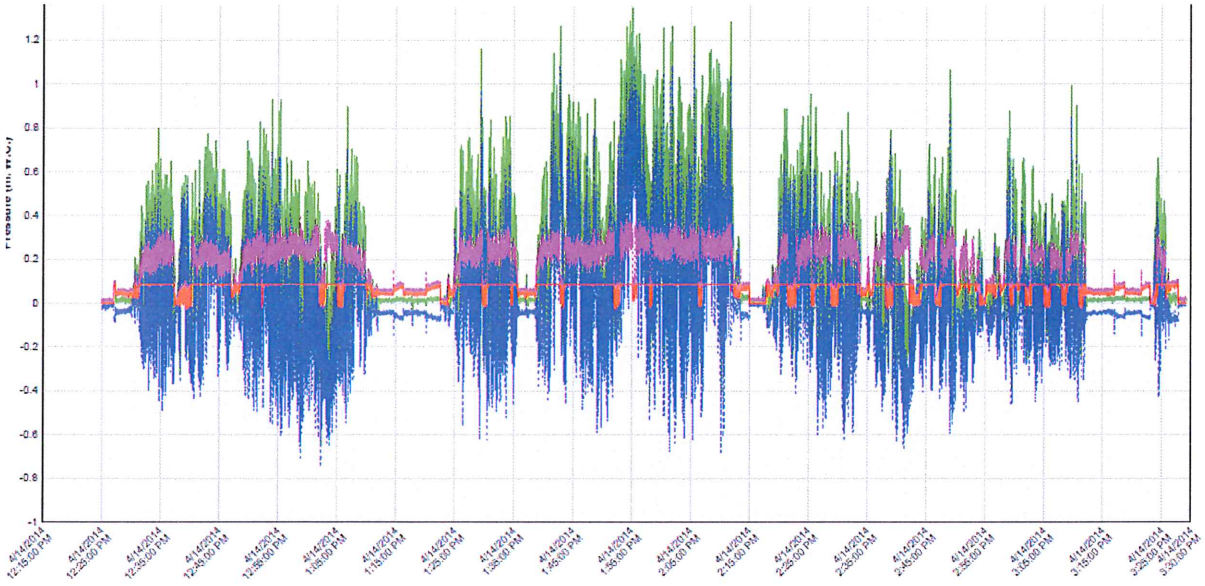


This same test also shows the recorded pressures within the forward facing intake and exhaust tubes of the furnace installed in the Trails West RPM trailer when the furnace is operated with the trailer being towed. The vehicle speed is indicated by the yellow line. The full graph of data above is included and titled 12070 Test 11.

When the Trails West RPM bumper pull trailer with the forward facing furnace vent assembly is towed and reaches highway speeds, the internal pressure in the intake tube and exhaust tube is significantly higher than when the furnace is correctly installed with the furnace vent assembly in a perpendicular position to the direction of travel of the trailer. This excessive amount of pressure created by towing the trailer creates a blockage on the furnace vent assembly and prevents the exhaust from correctly exiting the exhaust tube. Since the furnace exhaust is blocked, the flame on the burner loses its airflow and oxygen and reverses its normal direction and seeks oxygen within the combustion air housing. The migration of the flame outside the combustion chamber results in damage to components in the area of the combustion air housing, including the combustion air wheel.

This graph conclusively shows that the root cause of the issues with the Trails West trailers is the forward facing furnace vent assembly when combined with the use of the furnace during transit.

Early in its evaluation of the Trails West situation, Suburban recognized that the issue was caused by the Trails West selected furnace location coupled with use of the furnaces in transit. Because Suburban was very concerned with the situation Trails West had created with the original design of the trailer, and because it recognized that the way Trails West had installed the furnace would make it very difficult for Trails West to relocate the furnace to an appropriate location, Suburban looked for an alternative vent design that would allow the furnace to operate properly without relocating it to the sidewall of the trailer. To that end, Suburban designed a revised vent assembly which would still meet the requirements of the ANSI Z21.47a-2012/CSA 2.3a-2012 Standard while re-orienting the exterior portion of the vent assembly to make the outlet perpendicular with the direction of travel of the trailer in Trails West's unique application. Suburban subjected the revised vent assembly to third party testing and confirmed that it substantially reduced the risk associated with the original Trails West design and the use of the trailer in transit. The third party testing excerpted below, shows that with the Trails West trailer in transit while using the revised vent assembly, the pressure in the exhaust tube, shown in green, remains largely positive. The pressure in the intake tube, shown in blue, remains largely negative. The differential pressure is shown in purple and red. This provides adequate balance in the combustion air system to allow proper air flow through the combustion process, which in turn allows the burner flame to remain within the combustion chamber. This is in contrast to the earlier graph showing the testing of the Trails West trailer in transit with the original vent assembly installed. In that test, the pressure in both tubes is largely positive which prevents proper combustion air flow through the combustion chamber and causes flame to migrate outside the combustion chamber. The full graph of data below is included and titled 12070 Test 15.



On April 22, 2014 Suburban offered to provide the third party tested vent assembly to Trails West which, when installed, would eliminate the root cause of the Trails West fires and furnace damage and allow Trails West to perform the required Safety Recall 14V-021. Although this would remedy furnaces

which were undamaged, Suburban did have a concern that some portion of the furnaces which had been operated during transit with the original Trails West design could have internal damage, and it strongly recommended to Trails West that part of the Trails West Safety Recall should include either a complete inspection of the combustion system in furnaces that had been operated in transit, or alternatively, the replacement of those furnaces. Because of a concern that Safety Recall 14V-021 would be performed by persons who would be unqualified to dismantle, inspect, and then safely reassemble the furnaces, Suburban offered to provide Trails West with replacement furnaces which would allow the Recall to be performed by technicians who were not qualified to perform an internal inspection on the furnaces. (Although the current combustion air wheel is not the cause of these fires and furnace damage, CSA had also issued design approval for the combustion wheel demanded by Trails West and in an effort to get Trails West to move forward with the Recall, Suburban even offered to manufacture, specifically for this Recall, a special production run of SF-30FQ furnaces incorporating the alternative combustion air wheel.) Suburban's offers were rejected by Trails West and there have been no further discussions, although Suburban remains willing to provide this assistance to Trails West.

In summary, the Suburban SF-30FQ is sold to a number of US manufacturers of recreation vehicles, and is installed in many different configurations of RV's, including bumper pull trailers, fifth wheel trailers and various classes of motorized RV's. To the best of Suburban's knowledge, none of the Suburban SF-30FQ's installed by numerous other RV manufacturers across the US, and used by a much larger group of RV owners, have ever been involved in incidents similar to those reported by Trails West. To be certain of this conclusion, we have reviewed the claims history on combustion air components (combustion air wheels and housings) for this product line, as well as information received from OEM customers and a number of years of warranty history. The only things identified are some isolated warranty claims for replacement combustion air wheels. These warranty claims do not indicate furnace fires and the most likely reason for these replacements is noise and/or vibration.

If this was a design issue with the Suburban SF-30FQ furnace, Suburban would have received numerous claims or notices from other customers who on an annual basis use many times the total number of furnaces purchased by Trails West over this multiple year period. This has not occurred.

As confirmation that other Suburban customers follow the installation instructions, Suburban is unaware of <u>any other OEM customer</u> who has installed our furnaces in a forward facing wall on an RV. We didn't know Trails West was doing it until this issue arose earlier this year, and Trails West certainly didn't check with Suburban prior to ignoring the installation instructions and then compounding the error by telling its customers to ignore Suburban's warning not to use the furnace in transit. Suburban was, and is willing to assist Trails West in implementing its recall, but Trails West created this situation and Suburban is not prepared to assume design responsibility for their trailer to resolve it.

If there are any remaining questions about the furnace, or our testing procedures or test results, we are prepared to bring a SF-30FQ furnace and a complete file of the results of our third party testing to NHTSA's offices for further explanation and discussion.

Sincerely,
AIRXCEL, Inc. – Suburban Division

Arthur W. Klee
President

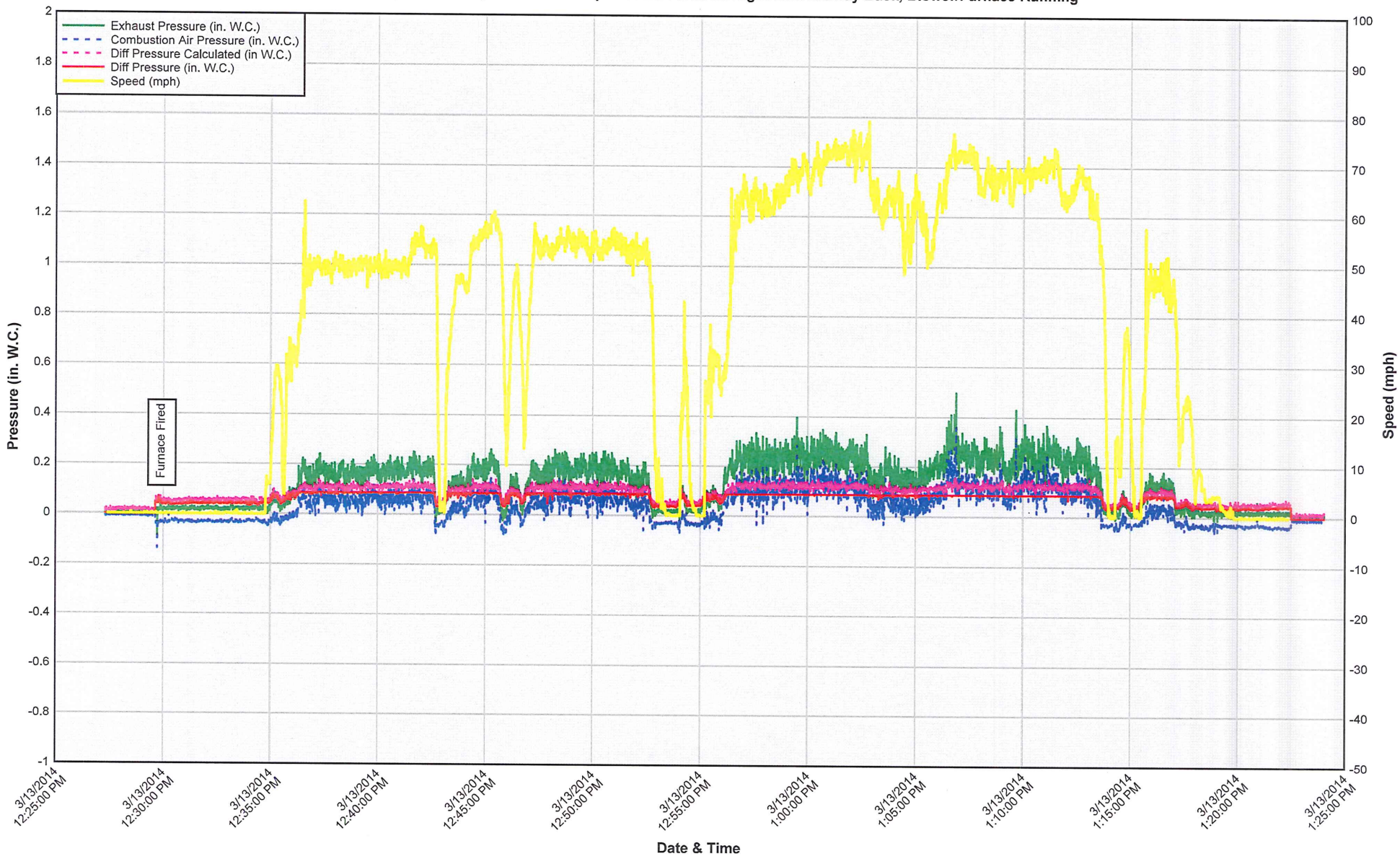
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Enclosures: 12070 Test 14
12070 Test 11
12070 Test 15
204770 Installation Manual (Trails West installation issues are highlighted)
204960 User's Manual (Highlighting added)

12070 Test 14

13 March 2014

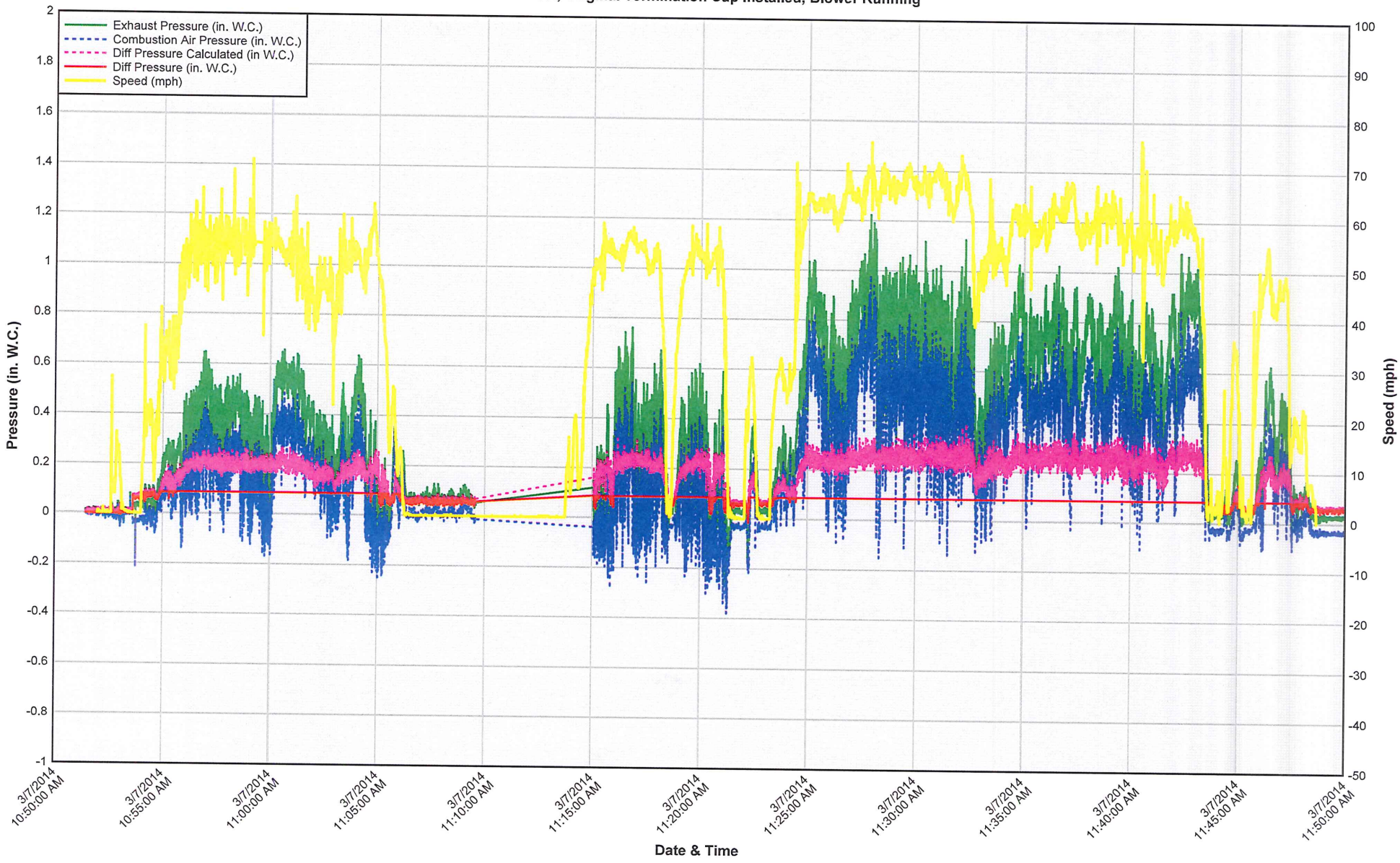
Road Test, New Trailer, Termination Cap Located Flush on Right Side Midway Back, Blower/Furnace Running



12070 Test 11

7 March 2014

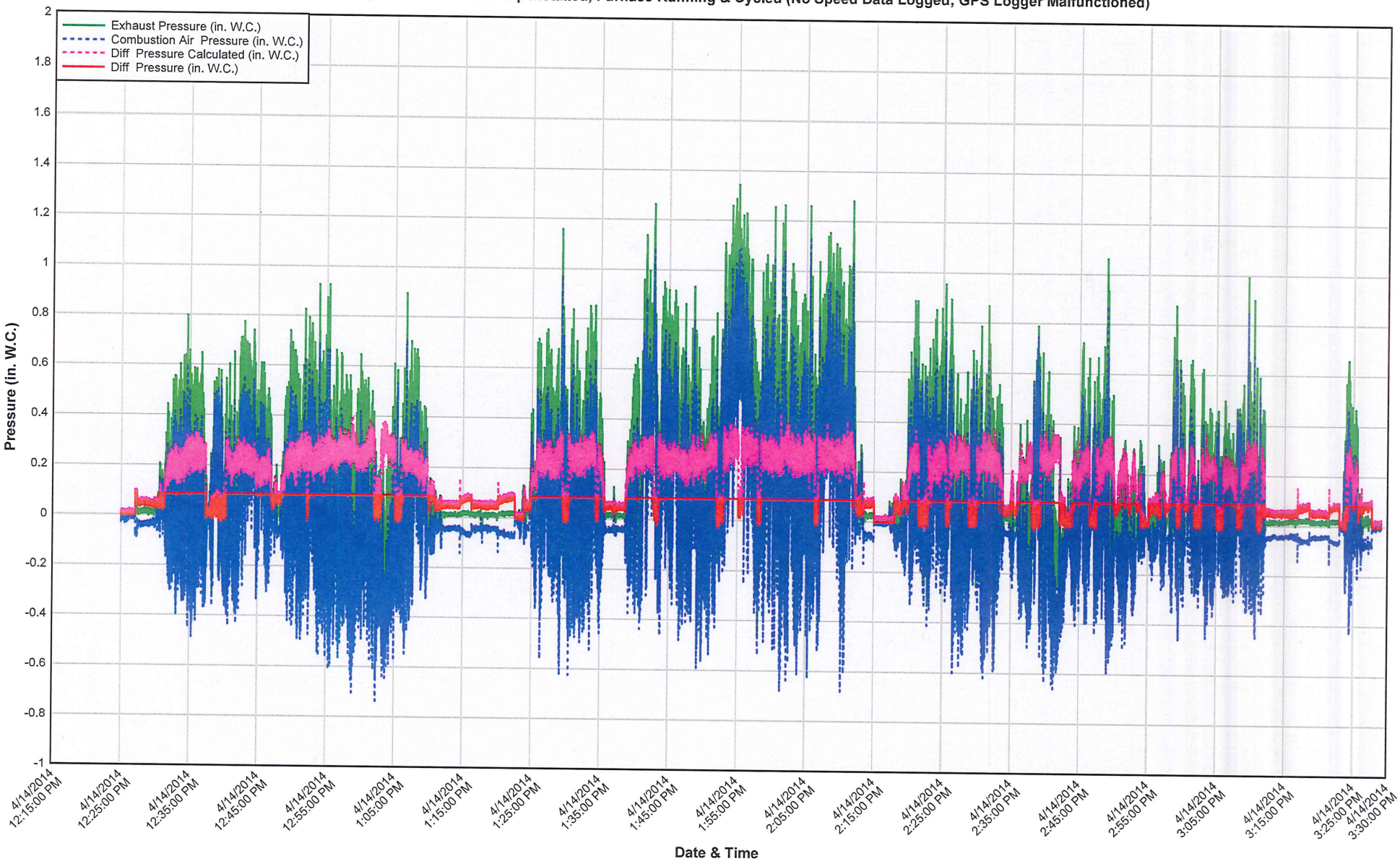
Road Test, Original Termination Cap Installed, Blower Running



12070 Test 15

14 April 2014

Road Test, New Termination Cap Installed, Furnace Running & Cycled (No Speed Data Logged; GPS Logger Malfunctioned)



Suburban

SUBURBAN MANUFACTURING COMPANY
676 Broadway Street
Dayton, Tennessee 37321
423-775-2131
www.RVComfort.com

SUBURBAN GAS FURNACES INSTALLATION INSTRUCTIONS FOR

SF-20FQ • SF-25FQ • SF-30FQ • SF-35FQ • SF-42FQ

The design of the furnace has been listed for installation in recreational vehicles only. In order for the furnace to operate in conformity with generally accepted safety regulations, the installation instructions must be followed. Failure to comply with the installation instructions will void the warranty on the furnace and any responsibility on the part of Suburban Manufacturing Company.

The furnace was inspected before it left the factory. If any parts are found to be damaged, do not install the furnace. Immediately contact the transportation company and file a claim.

FOR YOUR SAFETY
WHAT TO DO IF YOU SMELL GAS:

- Extinguish any open flame.
- Evacuate all persons from the vehicle.
- Shut off the gas supply at the gas container or source.
- Do not touch any electrical switch, or use any phone or radio in the vehicle.
- Do not start the vehicle's engine or electric generator.
- Contact the nearest gas supplier or qualified service technician for repairs.
- If you cannot reach a gas supplier or qualified service technician, contact the nearest fire department.
- Do not turn on the gas supply until the gas leak(s) has been repaired.

This book contains instructions covering the operation and maintenance of your furnace.

INSTALLER: LEAVE THIS MANUAL WITH THE APPLIANCE.

CONSUMER: RETAIN THIS MANUAL FOR FUTURE REFERENCE.

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

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! Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Refer to the installation instructions and/or owners manual provided with this appliance. Installation and service must be performed by a qualified installer, service agency or the gas supplier.

WARNING! Be sure the furnace and all ignition systems are "OFF" during any type of refueling and while vehicle is in motion or being towed.

INSTALLATION INSTRUCTIONS

WARNING! Installation of this appliance must be made in accordance with the written instructions provided in this manual. No agent, representative or employee of Suburban or other person has the authority to change, modify or waive any provision of the instructions contained in this manual.

These furnaces are designed and installed in such a manner as to be removable only from within living area of the recreational vehicle.

CAUTION: If possible, do not install the furnace to where the vent can be covered or obstructed when any door on the trailer is opened. If this is not possible, then the travel of the door must be restricted in order to provide a 6" minimum clearance between the furnace vent and any door whenever the door is opened.

NOTE: The exhaust temperature of this furnace could discolor or warp some materials. You should verify that the material used on the coach door, panel, or cover will not discolor or warp from the exhaust temperature whenever any door, panel, or cover is in the open position.

CAUTION: Due to the differences in vinyl siding, this appliance should not be installed on vinyl siding without first consulting with the manufacturer of the siding or cutting the siding away from the area around the appliance vent.

CAUTION: In any installation in which the vent of this appliance can be covered due to the construction of the RV or some special feature of the RV such as slide out, pop-up etc. always insure that the appliance cannot be operated by setting the thermostat to the positive "OFF" position and shutting off all electrical and gas supply to the appliance. Never operate furnace with vent covered.

Part Number 204770
3-18-10

NOTE: These furnaces must be installed and vented as described in this manual so that the negative pressure created by the air circulating (return air) fan cannot affect the combustion air intake or venting of any other appliance. It is imperative that the products of combustion be properly vented to the atmosphere and that all combustion air supplied to burner be drawn from the outside atmosphere. (See Installing Vent Assembly.)

NOTE: Do not install the furnace with the vent facing toward the forward end of the coach.

IMPORTANT: If this furnace is to be connected to a common duct system also serving a cooling unit, a manual or automatic damper is required to prevent any cold conditioned air from circulating back into the furnace. Cold air passing over the furnace combustion chamber during the operation of the cooling unit can result in the formation of condensation inside the furnace combustion chamber. This condensation may promote corrosion and premature failure of the combustion chamber.

NOTE: These furnaces shall be installed so the electrical components are protected from water.

These furnaces are design certified for propane/LP gas only. Do not attempt to convert to natural gas.

Gas supply pressure for purposes of input adjustment:
Minimum - 11" W.C.* Maximum - 13" W.C. *
(W.C.* - Water Column).

In the U.S.A., the installation of the furnace must be in accordance with local codes and regulations. In the absence of local codes and regulations, refer to the latest edition of:

1. Standard for Recreational Vehicles NFPA 1192.

2. National Fuel Gas Code ANSI Z223.1/NFPA 54.

3. Furnace must be electrically grounded in accordance with the latest edition of the National Electrical Code NFPA 70.

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

1. Standard CSA Z240.0.2-08 Recreational Vehicles.

2. CSA Standard Z240.6.2-08 C22.2 NO.148-08 Electrical Requirements for Recreational Vehicles.

3. Standard Z240.4.2-08 Installation Requirements for Propane Appliances and Equipment in Recreational Vehicles.

4. CAN/CGA-B149 Installation Codes.

5. Any applicable local codes and regulations.

This unit is equipped with an electric igniter device that has an energy consumption of .1 amp @ 12 volts D.C.

RETURN AIR

There are two (2) methods described below for installing the furnace. Regardless of the method you choose, we require that a permanent opening be provided in the interior cabinetry of the coach directly in front of the furnace. The opening must allow for free, unobstructed removal of the furnace. This opening may be used as a means of providing circulating return air to the furnace. Other openings may be used as well. It is important that adequate return air be provided to assure normal heating and operation of the furnace. Failure to provide the minimum return air will cause erratic furnace cycling. Refer to the chart shown below for minimum return air requirements.

NOTE: Return air must be from within the living area of the coach.

NOTE: RV's that have a wall of separation to a cargo area (Toy Box) to transport internal combustion engine vehicles must not have return air openings from this area.

Model	Return Air Requirements Minimum Free (unobstructed) Area
SF-20FQ/25FQ/30FQ SF-35FQ	55 Sq. In.
SF-42FQ	142 Sq. In.* *may be reduced to 88 sq. in. min. if 5 ducts are used.

TABLE 1

INSTALLING THE FURNACE

NOTE: Before installing the furnace "X" dimension as illustrated in Figure 2 must be determined.

1. Locate the furnace near lengthwise center of the coach.

2. Choose a location for installation out of the way of wires, pipes, etc., which might interfere with the installation. Adhere to the minimum clearances from the cabinet to combustible construction as listed in Table 2. Refer to Figure **3** for illustration of furnace clearances.

NOTE: Side and top clearances may be "0" for through the wall installations up to a maximum of 3" wall thickness. (See Figure 1.)

3. When an appliance is installed directly on carpeting, tile or other combustible material, other than wood flooring, the appliance shall be installed on a metal or wood panel extending the full width and depth of the appliance. If preferred, the carpeting, tile or combustible materials, other than wood may be cut away the full length and depth of the appliance plus the appliance minimum clearances to combustibles. (See Table 2.)

4. Determine "x" dimension as shown in Figure 2. The tubes supplied with the furnace will accommodate an installation range for "x" from 1-1/2" - 3" If "x" dimension is less than 1-1/2" or greater than 3", then special vent tubes as charted in Figure 2 must be ordered.

WARNING! Do not alter, cut or otherwise modify the vent tubes as supplied by Suburban. Doing so could result in inadequate intake of combustion air or improper venting of furnace exhaust.

5. After determining "x" dimension, complete the furnace installation as follows:

A. IF INSTALLED DIRECTLY AGAINST OUTER SKIN OR "X" DIMENSION IS 0 - 1-1/2"

1. Vent Kit 520767 must be ordered. Do not cut or alter the vent tubes supplied with the furnace.

2. Cut an opening through the inner wall 17-3/4 x 8". This will allow the rear of the furnace to be installed against the outer skin of the coach. (See Figure 1.)

3. Cut two 2-1/4" diameter holes through the outer skin of the coach, as shown in Figure 1.

4. Put furnace in place, making sure that rear of furnace cabinet is as close to outer skin of coach as possible and still assure proper vent tube overlap. (See Installing Vent Assembly.) Secure furnace to cabinet. (See Figure 1.)

5. Secure furnace to the floor using two (2) hole provided in the furnace cabinet. (See Figure 1.)

6. Install vent assembly. (See instructions for installing vent.)

B. IF NOT INSTALLED AGAINST OUTER SKIN AND "X" DIMENSION GREATER THAN 1-1/2"

1. Determine "x" dimension as illustrated in Figure 2. Tube length for "x" dimension are charted. Special tubes, if needed, must be ordered.

2. Locate center lines for exhaust and intake tubes as shown Figure 1. Cut two 2-3/4" diameter holes through coach wall for exhaust and intake. (See Figure 2.)

3. Put furnace in place and secure furnace to cabinet.

4. Secure furnace to the floor using the two (2) holes provided in the furnace cabinet. (See Figure 1,)

5. Install vent assembly. (See instructions for Installing Vent.)

6. Reinstall cabinet front.

Model	Front	Left Side	Right Side	Top	Bottom	Back	Exhaust and Intake Tube
SF-20FQ	1"	0"	0"	0"	0"	0"	3/8"
SF-25FQ	1"	0"	0"	0"	0"	0"	3/8"
SF-30FQ	1"	0"	0"	0"	0"	0"	3/8"
SF-35FQ	1"	0"	0"	0"	0"	0"	3/8"
SF-42FQ	1"	2"	2"	1"	0"	0"	3/8"

-NOTE-
0" MEANS TO SPACER BUMPS

CLEARANCE FROM DUCTS TO COMBUSTIBLE MATERIAL - 1/4" (See Figure 3)

TABLE 2

INSTALLING VENT ASSEMBLY

The vent outlet must be installed so it is in the same atmospheric pressure zone as the combustion air intake. The exhaust and intake tubes must be installed from the outside, pass through the RV skin and slide onto the furnace exhaust and intake.

WARNING! Do not alter the vent assembly supplied with this furnace. Any modifications will result in improper installation which could cause unsafe furnace operation.

CAUTION! Combustion air must not be drawn from the living area. All air for combustion must be drawn from the outside atmosphere. All exhaust gases must be vented to the outside atmosphere - never inside the RV. Therefore, it is essential to insure that the vent cap and tube assemblies are properly installed.

1. Apply caulking to RV skin behind vent cap as shown in Figure 1. Apply caulking generously around perimeter of vent cap and across center as shown.

2. Insert intake tube through RV skin and slide it onto the furnace intake (See Figure 2.) Minimum tube overlap of 1/2" is required.

3. Insert vent cap exhaust tube through RV skin and slide it onto the furnace exhaust (See Figure 2.) Minimum tube overlap of 1 1/4" is required.

4. Attach vent cap assembly to outer skin of RV with the six (6) screws provided. Do not install vent assembly upside down. The word "Suburban" must be right side up.

CONNECTING GAS SUPPLY

Connect the gas supply to the furnace at the manifold, following the suggestions outlined below. It will be necessary to hold the flare fitting on the furnace manifold when connecting or loosening gas line.

NOTE: The compound used on threaded joints must be resistant to liquefied petroleum (LP) gas.

NOTE: The appliance must be disconnected from the gas supply piping system during any pressure testing of that system at test pressure in excess of 1/2 PSIG.

The appliance must be isolated from the gas supply piping during any pressure testing of the gas supply piping system at test pressure equal to or less than 1/2 PSIG.

1. Connect gas line to the 3/8" elbow at the front of the furnace. (See Figure 1.) Some standards may require the use of a manual shut off valve in the gas line external to the furnace cabinet.

2. In order to maintain a check of gas supplied pressure to the furnace, Suburban advises the installer to provide the 1/8" NPT plug tap for test gauge connection immediately upstream of the gas supply connection to the furnace and that it be readily accessible.

3. After the furnace has been connected to the gas supply, all joints must be checked for leaks.

WARNING! Never check for leaks with an open flame. Turn on the gas and apply soapy water to all joints to see if bubbles are formed.

CONNECTING ELECTRICAL SUPPLY

CAUTION: This furnace is designed for negative ground 12 volt D.C. system only. Do not attempt to alter the furnace for a positive ground system or connect the furnace directly to 115 volts A.C. Damage to furnace component parts will occur. Connect only to a protected circuit fused for not more than 20 amps.

Be sure all wiring to the furnace is of heavy enough gauge to keep the voltage drop through it to a minimum and to provide enough power for start-up surge. No. 12 gauge wire is recommended. If any of the original wire that is supplied with the appliance must be replaced, it must be replaced with type 105° C or its equivalent.

Power supply connections are to be on the right side of the furnace. The wires are color coded, red for positive (+) and yellow for negative (-). This polarity must be observed so the furnace motor will run the proper direction of rotation to insure correct air delivery. (See wiring diagram.)

If the furnace power supply is to be from a converter, we recommend that the converter system used to power the furnace be wired in parallel with the battery. This will serve two purposes:

1. Provide a constant voltage supply to the furnace.
2. Filter any A.C. spikes or volt surges.

CONNECTING DUCTS TO FURNACE

The following duct requirements must be followed in order to assure proper operation of the furnace:

A. The minimum open duct areas listed below must be maintained throughout entire duct system including through register:

MODEL	SIDE DUCTS			TOP DUCT	BOTTOM DUCT
	Min. Open Duct Area	Min No. Ducts Used	Duct Size	Min. Open Duct Area	Min. Open Duct Area
SF-20FQ	25 SQ. IN.	2	4"	56 SQ. IN.	56 SQ. IN.
SF-25FQ	36 SQ. IN.	3	4"	56 SQ. IN.	56 SQ. IN.
SF-30FQ	36 SQ. IN.	3	4"	56 SQ. IN.	56 SQ. IN.
SF-35FQ	48 SQ. IN.	4	4"	56 SQ. IN.	56 SQ. IN.
SF-42FQ	48 SQ. IN.	4	4"	56 SQ. IN.	*72 SQ. IN.

*SF-42FQ Bottom Duct requires use of Bottom Duct Kit, Part No. 520753.

NOTE: Ducts terminating in a dead air space (like holding tank compartments or cargo areas (Toy Boxes) with no means for return air recirculation should not be counted in the required duct area. Also ducts 2" in diameter or smaller should not be counted in the required duct area.

B. No outlet register is to be placed within 18" of the return air opening. Any register installed at 18" should never be adjusted to blow the outlet air toward the return air opening. If a register is installed on a wwall 90 degrees to the return air, it can be less than the 18".

C. Make the duct connections at the furnace cabinet tight. Loose connections will result in overheating of the component parts on the furnace and a reduction of the heated air flow through the duct system.

D. Avoid making any sharp turns in the duct system. Sharp turns will increase the static pressure in the plenum area and could cause the furnace to cycle.

E. Avoid making a lot of turns in the duct system. The straighter the duct system, the better the performance of the furnace.

F. Maintain a minimum of 1/4" clearance where ducts pass through any combustible construction, such as coach cabinetry. (See Figure 3.) **NOTE**: UL listed duct materials can be 0" clearance.

G. Do not install air boosters in the duct system. Such devices will cause the furnace to cycle on limit and to have erratic sail switch operation.

NOTE: After installation of the furnace and duct system is completed, adjustments must be made to obtain a temperature rise within the range specified on the Rating Plate.

INSTALLING THERMOSTAT

The thermostat used with this unit must have NO voltage output to return leg when there is not a call for heat or in the "OFF" setting.

Locate the room thermostat approximately 4-1/2 feet above the floor on an inside bulkhead where it is not affected by heat from any source except room air. Connect thermostat wiring to the blue wires on right side of furnace. (See wiring diagram.) If your furnace is equipped with a thermostat that has an adjustable anticipator, the anticipator should be set at .7 amps. If you desire longer heating cycles, adjust the anticipator to a higher setting. If you desire shorter heating cycles, adjust the anticipator to a lower setting. Adjustments to the anticipator setting should be made in .5 amp increments.

PREVENTIVE MAINTENANCE

WARNING! If the user of this appliance fails to maintain it in the condition in which it was shipped from the factory or if the appliance is not used solely for its intended purpose or if appliance is not maintained in accordance with the instructions in this manual, then the risk of a fire and/ or the production of carbon monoxide exists which can cause personal injury, property damage or loss of life.

CAUTION: Label all wires before disconnecting for servicing. Proper polarity must be observed so the furnace motor will run with the proper direction of rotation to insure correct air delivery. (See wiring diagram).

CAUTION: Label all wires prior to disconnection when servicing controls. Wiring error can cause improper and dangerous furnace operation.

Always verify proper operation of furnace after servicing.

Your furnace should be inspected by a qualified service agency yearly before turning the furnace on. Particular attention should be given to the following items.

1. Inspect furnace installation and vent termination to be sure furnace is properly secured in place (see Installation Instructions), that vent terminates to the atmosphere, and that vent tubes overlap properly (see Installing Vent Assembly.)

2. Inspect chamber and venting to assure that these components are physically sound without holes or excessive corrosion and that the installation and/or re-installation is in accordance with Suburban's installation instructions. (Reference installation manual supplied with furnace.)

WARNING! It is imperative that the products of combustion be properly vented to atmosphere and that all combustion air supplied to burner be drawn from outside atmosphere.

3. Check the base on which furnace is mounted. Be sure it is physically sound, void of any sagging, deterioration, etc.

4. Inspect furnace, the venting, ducting and gas piping to furnace for obvious signs of deterioration. Correct any defects at once.

5. Inspect combustion chamber for restrictions in exhaust or intake. It is imperative that the flow of intake combustion air and the flow of exhaust gases being expelled to the outside atmosphere not be obstructed. Any soot or loose debris should be blown out using compressed air. (See Figure 6.)

6. Inspect all gaskets. If any gaskets show signs of leakage or deterioration, replace them. Safe operation of the furnace depends on all gaskets being tight.

7. Inspect return air inlet openings to the furnace. Remove any restrictions to assure adequate air flow.

You, as the owner/user, should inspect the furnace monthly during the heating season for presence of soot on vent. Operating the furnace under this condition could lead to serious property damage, personal injury or loss of life. If soot is observed on the vent, immediately shut the furnace down and contact a qualified service agency.

Listed below are several safety related items that you should follow during the heating season to assure continued safe operation of the furnace.

1. Inspect furnace venting. Venting must be free of obstructions, void of soot, and properly terminated to the atmosphere. (See Installing Vent Assembly.)

WARNING! Do not install screens over the vent for any reason. Screens will become restricted and cause unsafe furnace operation. Accessories are being marketed for RV products which we do not recommend. For your safety, only factory authorized parts are to be used on your furnace.

2. Periodically inspect the vent for obstructions or presence of soot. Soot is formed whenever combustion is incomplete. This is your visual warning that the furnace is operating in an unsafe manner. If soot is present, immediately shut furnace down and contact your dealer or a qualified service person.

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

4. The motor is permanently lubricated and requires no oiling.

5. Keep the furnace area clear of any combustible materials, gasoline or other flammable vapor and liquids.

6. Before operating furnace, check the location of the furnace vent to make sure it will not be blocked by the opening of any door on the trailer. If it can be blocked, do not operate the furnace with the door open.

7. Do not restrict the flow of combustion air or the warm air circulation to the furnace. To do so could cause personal injury and/or death.

8. Never operate the furnace if you smell gas. Do not assume that the smell of gas in your RV is normal. Any time you detect the odor of gas, it is to be considered life threatening and corrected immediately. Extinguish any open flames including cigarettes and evacuate all persons from the vehicle. Shut off gas supply at LP gas bottle. (See safety notice on front cover of this manual.)

9. Immediately shut furnace down and call a service agency if furnace cycles erratically or delays on ignition.

WARNING! Should overheating occur, or the gas supply fail to shut off, shut off the manual gas valve to the appliance before shutting off the electrical supply.

10. Never attempt to repair damaged parts. Always have them replaced by a qualified service agency.

11. Never attempt to repair the furnace yourself. Seek the help of a qualified service person.

12. Never restrict the ducting installed by your trailer manufacturer. To do so could cause improper furnace operation.

13. Do not install air boosters in the duct system. Such devices will cause the furnace to cycle and to have erratic sail switch operation.

14. Clothing or other flammable material should not be placed on or near the appliance.

15. Always follow the operating instructions. Do not deviate from the step-by-step procedures.

16. Do not use this appliance if any part has been submerged under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control that has been submerged under water.

17. When considering add-on rooms, porch or patio, attention must be given to the venting of your furnace. For your safety, do not terminate furnace vent inside add-on rooms, screen porch or onto patios. Doing so will result in products of combustion being vented into the room or occupied areas.

18. In any installation in which the vent of this appliance can be covered due to the construction of the RV or some special feature of the RV such as slide out, pop-up, etc. always insure that the appliance cannot be operated by setting the thermostat to the positive "OFF" position and shutting off all electrical and gas supply to the appliance. Never operate furnace with vent covered.

INSTALLATION AND REMOVAL OF UNIT

TO REMOVE

1. Disconnect power supply at furnace.
2. Remove vent cap assembly.
3. Disconnect gas connections.
4. Remove cabinet front (2 screws).
5. Remove tie-down screw from center of unit and remove furnace from cabinet.

TO INSTALL

1. Slide unit into cabinet. **NOTE**: Care must be taken in routing wiring to back of cabinet and outside of cabinet.
2. Reinstall tie-down screw, securing chamber assembly to cabinet.
3. Reinstall cabinet front.
4. Connect gas line.
5. Check gas connections for leaks using a soap and water solution. Correct any gas leaks immediately.
6. Reinstall vent cap assembly.
7. Reconnect power supply.

OPERATING INSTRUCTIONS

WARNING! Do not operate furnace while vehicle is in motion or being towed.

NOTE: During initial firing of this furnace, a burn-off of excess paint and oils remaining from manufacturing process may cause "smoking" for 5 - 10 minutes.

1. Stop! Read Users Information Manual supplied with furnace.

2. Turn the manual valve (if so equipped) or the valve at the outside LP tank to the "OFF" position. Do not force.

3. Set thermostat above room temperature to begin blower operation. A slight delay will occur before the blower comes on. Allow blower to run for 5 minutes for combustion chamber purge cycle. If blower does not come on or stops before ignition cycle, go to shut down and contact your dealer or a local recreational vehicle service agency.

4. After 5 minutes, move thermostat lever below room temperature. Blower will remain on. Wait approximately 2 minutes for blower to go off.

5. Open manual shut-off valve (if so equipped) or the valve at the outside LP tank. Correct operating characteristics depend on the valve being positioned fully open. Never attempt to operate with a valve partially closed. **NOTE**: This furnace is equipped with a valve shut-off switch, with switch in "OFF" position. Gas will not flow to burner nor will the furnace operate.

6. Set thermostat lever to desired setting. If set above room temperature, blower will come on.

7. Allow 30 seconds for main burner to light after blower comes on. This furnace is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.

8. If burner does not light, repeat Steps 1 through 8.

9. If after three (3) attempts with no ignition, go to shut down and contact your dealer or a local recreational vehicle service agency. Do not continue to cycle furnace through thermostat in an attempt to get ignition. NOTE: If furnace should lock out, the blower will go off in 5 minutes and remain off until unit is reset by reactivating thermostat.

TO SHUT DOWN

1. Set the thermostat to lowest setting, then move lever to "OFF" position.
2. Turn manual shut off valve (if so equipped) to the "OFF" position. Do not force.

ELECTRODE ADJUSTMENT

For consistent ignition of the burner, it is important that the electrode be positioned properly over the top of the burner. The electrode was set at the factory for proper ignition and should not need further adjustment; however, if you should experience inconsistent ignition, reposition electrode as follows:

Equipment needed:
- flashlight
- black felt-tip pen
- needle-nose pliers
- measuring tape

NOTE: Furnace must be removed. (See instructions for removing unit.)

1. Remove burner from combustion chamber by removing six (6) screws which attach the burner to the chamber and air baffles (plates).

2. Locate the lance in relation to the burner ports for electrode positioning by:

   a. Shine a flashlight into the burner venturi as illustrated. (Be sure flashlight lens is against the end of the burner.)

   b. Light will reflect off the lance in the venturi of the burner and shine through a portion of the two (2) rolls of burner ports in the top of the burner.

   c. Using a black felt-tip pen, mark a line along top of burner 3/16" in back of the lance and parallel with lance. Make an additional mark indicating the center line of the lance. (See illustration.) Both marks will be used later as reference marks; therefore, keep lines thin.

3. Reassemble the burner.

4. Adjust electrode so the electrode probe is positioned along the marked center line of the burner lance and the tip of the electrode terminates 3/16" from the back of the lance. (At the line marked in Step 2-c.) (See Figure 4.)

5. **IMPORTANT**: Be sure electrode probe maintains a 1/8" spark gap over the burner as illustrated.

6. Reinstall the furnace into the cabinet following the instructions in the manual.

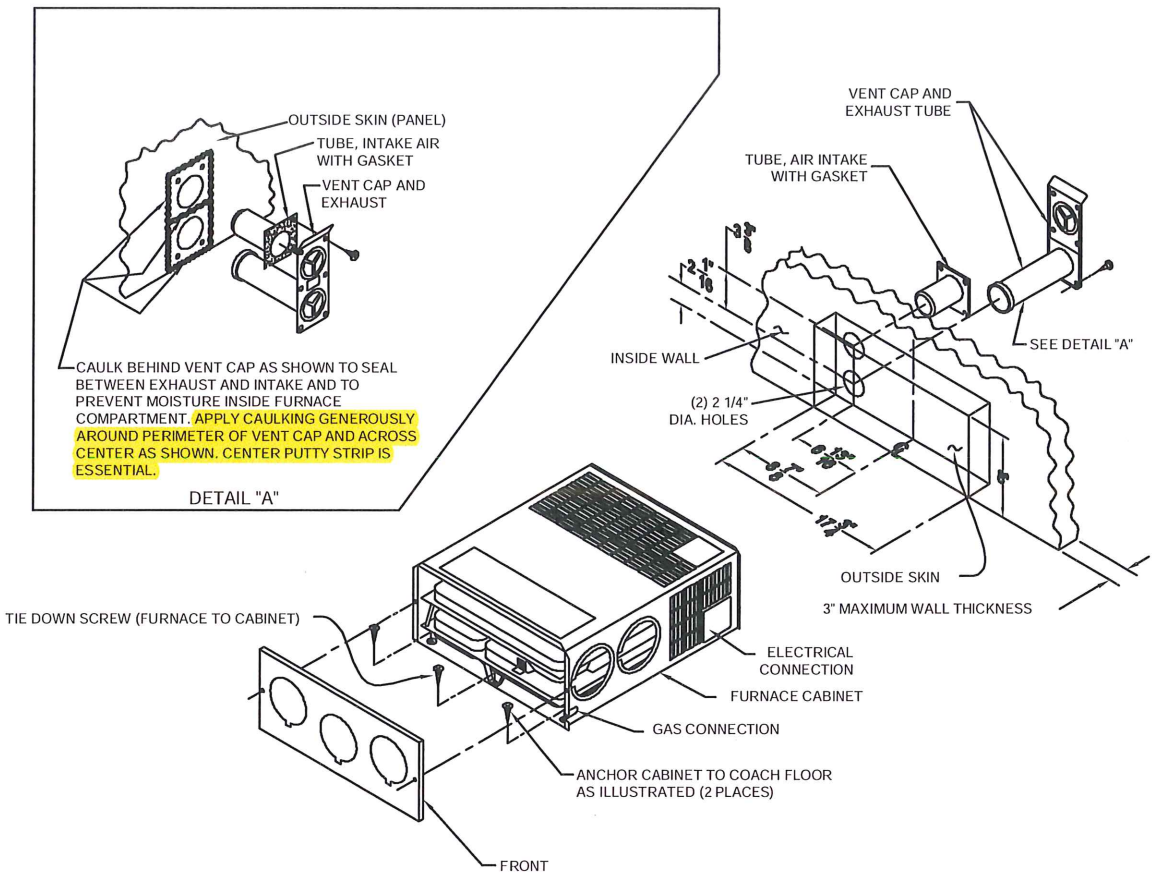
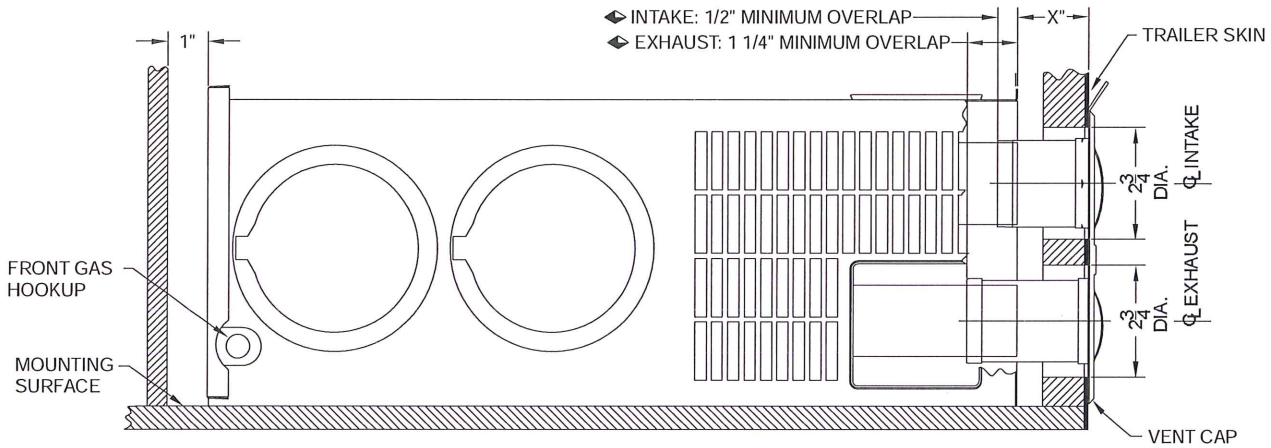


Figure 1

SF-20FQ, SF-25FQ, SF-30FQ, SF-35FQ, SF-42FQ, STANDARD VENT INSTALLATION



X" DIMENSION	EXTENSION TUBES KIT NO.
0" TO 1 1/2"	520767
1 1/2" TO 3"	★ USE VENT SUPPLIED WITH FURNACE
3" TO 4 1/2"	520768
4 1/2" TO 7 1/2"	520968
7 1/2" TO 9"	520551

◆ NEVER INSTALL THE EXHAUST TUBE WITH LESS THAN 1 1/4" OVERLAP, OR THE INTAKE TUBE WITH LESS THAN 1/2" OVERLAP.

★ STANDARD VENT ASSEMBLY FURNISHED WITH FURNACE. SPECIAL EXTENSION TUBES, IF NEEDED, MUST BE ORDERED SEPARATELY. EXTENSION KITS COME WITH COMPLETE INSTALLATION INSTRUCTIONS.

Figure 2

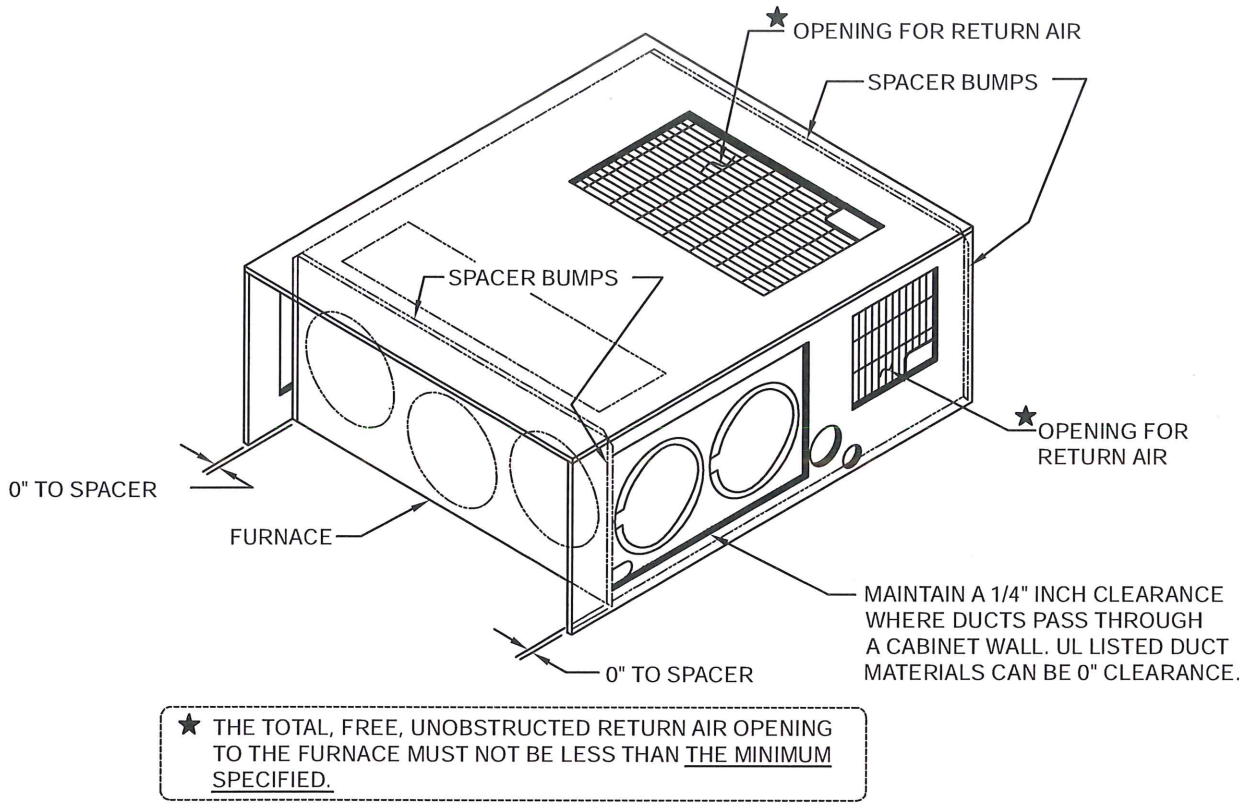


Figure 3

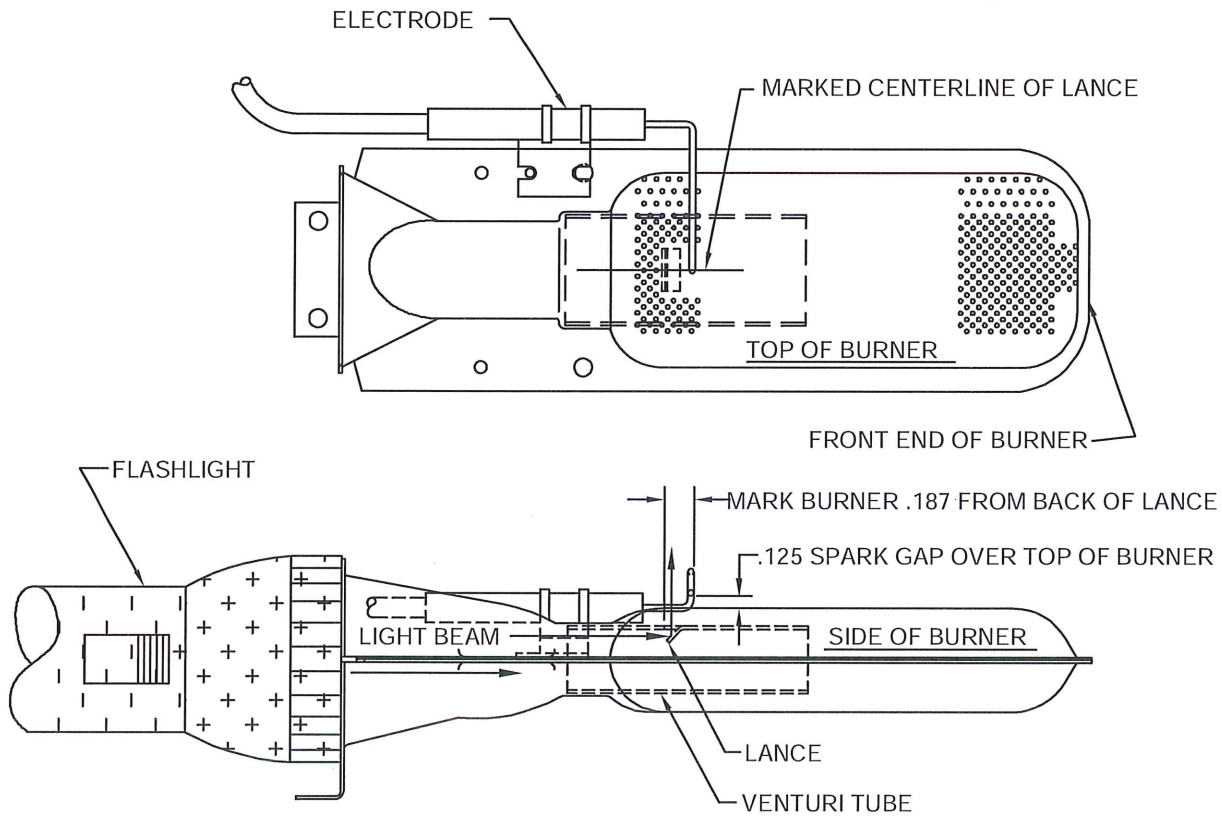
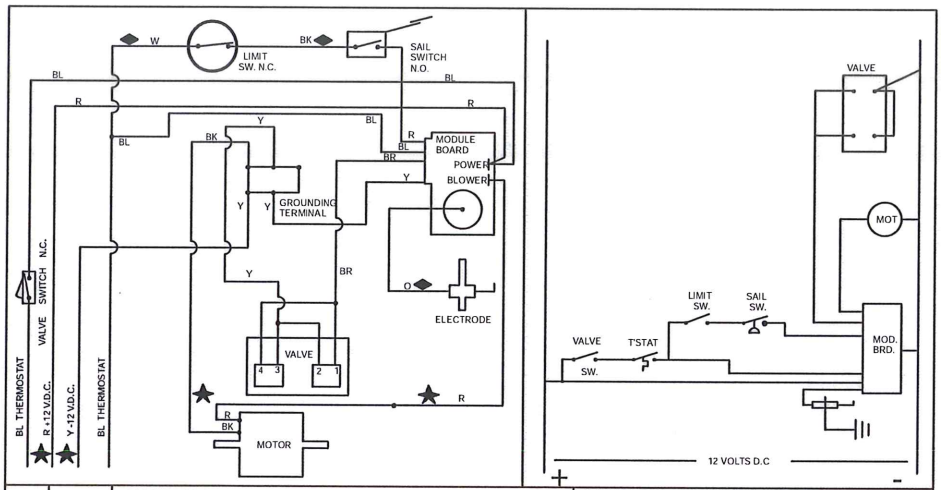


Figure 4



CODE	COLOR
O	ORANGE
BK	BLACK
BR	BROWN
BL	BLUE
R	RED
Y	YELLOW
G	GREEN

ALL WIRES ARE 18 AWG UNLESS OTHERWISE SPECIFIED
NOTE:IF ANY OF THE ORIGINAL WIRES AS SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, IT MUST BE REPLACED WITH WIRING MATERIAL HAVING A TEMPERATURE RATING OF AT LEAST 105° C.

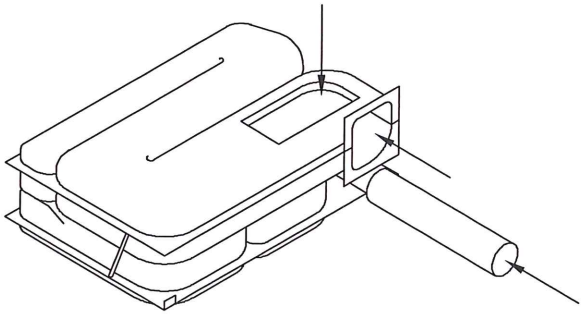
◆ 16/30 200°C RADIX (SIL-A-BLEND) 18 AWG WIRE

★ 14 AWG 105°C THERMOPLASTIC

CAUTION: DO NOT HI-POT (DIELECTRIC HIGH VOLTAGE TEST) THIS UNIT AFTER INSTALLATION. TO DO SO MAY CAUSE COMPONENT DAMAGE AND VOIDS WARRANTY OF FURNACE. UNIT 100% FIRE CHECKED.

340501

Figure 5



TO CLEAN THE CHAMBER, THE FURNACE MUST BE REMOVED F ROM THE CABINET AND THE MANIFOLD. BLOWER ASSEMBLY AND CONTROLS REMO VED LEAVING THE CHAMBER ONLY, AS SHOWN. USING COMPRESSED AIR, B LOW THROUGH THE CHAMBER, AS SHOWN BY ARROWS, TO REMOVE SOOT OR LOOS E DEBRIS.

Figure 6

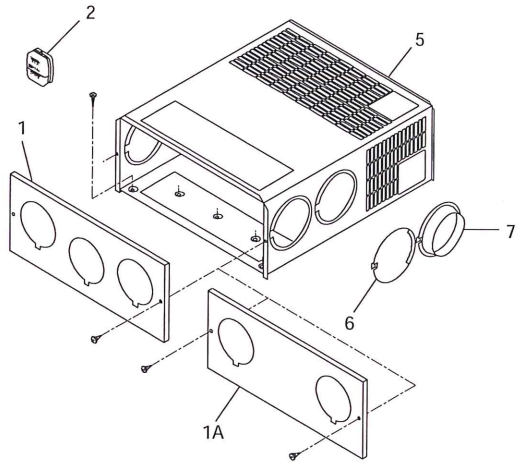


Figure 7

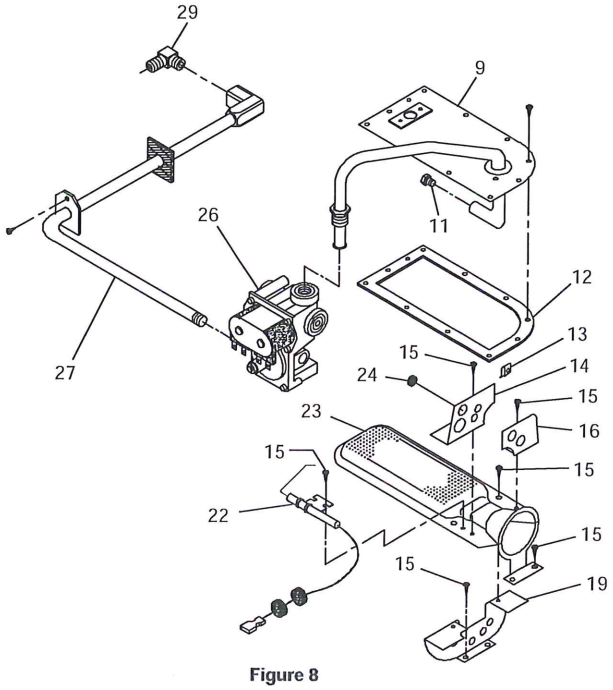


Figure 8

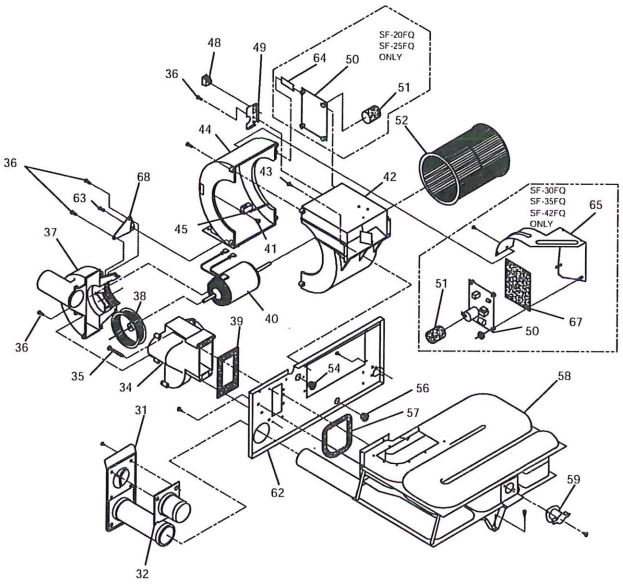


Figure 9

REPLACEMENT PARTS LIST

Only factory authorized parts are to be used. Do not attempt to repair defective parts.

When ordering repair parts from your dealer, a Suburban Service Center, or distributor, always give the following information:

1. Part Number (Not Item No.)
2. Part Description
3. Model and Serial Number of furnace
4. Number of Parts Required

ITEM NO.	DESCRIPTION	PART NUMBER
1	Cabinet Front Assembly (SF-35FQ, 42FQ)	101242
1A	Cabinet Front Assembly (SF-20FQ,25FQ,30FQ)	102316
2	Thermostat	161154
5	Cabinet Assembly (SF-20FQ, 25FQ, 30FQ only)	102327
	Cabinet Assembly (SF-35FQ only)	102358
	Cabinet Assembly (SF-42FQ only)	102359
6	Cover, Duct	050733
7	Collar, Duct	050715
9	Manifold Assembly Complete	171743
11	Orifice, Main Burner (SF-20FQ)	180305
	Orifice, Main Burner (SF-25FQ)	180306
	Orifice, Main Burner (SF-30FQ)	180307
	Orifice, Main Burner (SF-35FQ)	180308
	Orifice, Main Burner (SF-42FQ)	180309
12	Gasket, Burner Access Cover	071263
13	Tinnerman	121704
14	Plate, Secondary Air (Top-Back Half) (SF-20FQ, 25FQ, 30FQ, SF-42FQ)	063198
	Plate, Secondary Air (Top-Back Half) (SF-35FQ)	063199
15	Screw #8-18 x 1/2 Stainless	121651
16	Plate, Secondary Air (Top-Front Half) (SF-20FQ, 25FQ, 30FQ, SF-42FQ)	062933
	Plate, Secondary Air (Top-Front Half) (SF-35FQ)	062936
19	Plate, Secondary Air (Bottom) (SF-20FQ, 25FQ, 30FQ, SF-42FQ)	062935
	Plate, Secondary Air (Bottom) (SF-35FQ)	062938
22	Electrode	232286
23	Burner Assembly Complete (SF-20FQ)	010767
	Burner Assembly Complete (SF-25FQ)	010762
	Burner Assembly Complete (SF-30FQ, SF-35FQ)	010865
	Burner Assembly Complete (SF-42FQ)	010799
24	Grommet	070963
26	Valve	161122
27	Pipe Assembly, Gas Inlet	171576
29	Gas Fitting 90° Elbow	170374
31	Vent Cap and Exhaust Tube Assembly	260553
32	Tube Assembly Intake (Vent)	051249
34	Combustion Air Housing Assembly (Front Half)	390852

ITEM NO.	DESCRIPTION	PART NUMBER
35	Screw #8-18 x 2 1/4 (4 Required)	121929
36	Screw #6-19 x 1/2 (8 Required)	121928
37	Combustion Air Housing (Rear Half) (SF-20FQ)	390849
	Combustion Air Housing (Rear Half) (SF-25FQ, 30FQ, SF-35F, 42FQ)	390848
38	Wheel, Combustion Air (SF-20FQ)	350189
	Wheel, Combustion Air (SF-25FQ, 30FQ, SF-35FQ)	350184
	Wheel, Combustion Air (SF-42FQ)	350183
39	Gasket, Firewall (Combustion Air)	071084
40	Motor Assembly with Gasket (SF-20FQ, 25FQ, 30FQ)	233004
	Motor Assembly with Gasket (SF-35FQ)	233042
	Motor Assembly with Gasket (SF-42FQ)	233043
41	Screw # 4-20 X 5/8 (2 Required)	121945
42	Blower Assembly (Room Air) Front Half	391039
	Blower Assembly (Room Air) Front Half (SF-42FQ)	391052
43	Screw #8-18 X 1/2 (4 Required)	121857
44	Blower Housing (Room Air) Rear Half	391035
45	Switch, Sail	232261
48	Switch ON/OFF	232351
49	Bracket, ON/OFF Switch	063446
50	Module Board	520820
51	Insulator Cap, Module Board Coil	070973
52	Blower Wheel	350206
54	Bushing, Universal	070362
56	Bushing, Strain Relief	071206
57	Gasket, Firewall (Chamber Side)	071262
58	Chamber Assy. Final (SF-20FQ, 25FQ, 30FQ, SF-35FQ)	021225BK
	Chamber Assy. Final (SF-42FQ)	021226
59	Switch, Limit (SF-20FQ)	232503
	Switch, Limit (SF-25FQ, 30FQ, SF-35FQ)	232504
	Switch, Limit (SF-42FQ)	232505
62	Firewall	110792
63	Screw #6-19 x 3/4 (4 Required)	122001
64	Stop Module Board (SF-20FQ, 25FQ)	063610
65	Panel Assembly Module Board (SF-30FQ, 35FQ,42FQ)	102078
67	Insulator Module Board (SF-30FQ, 35FQ,42FQ)	070807
67	Bracket Housing (Room and Combustion Air)	063616

TWO YEAR LIMITED WARRANTY
SUBURBAN RECREATIONAL VEHICLE FURNACE

TWO YEAR LIMITED WARRANTY

This Suburban product is warranted to the original purchaser to be free from defects in material and workmanship under normal use and maintenance for a period of two years from date of purchase whether or not actual use begins on that date. It is the responsibility of the consumer/owner to establish the warranty period. Suburban does not use warranty registration cards for its standard warranty. You are required to furnish proof of purchase date through a Bill of Sale or other payment records.

Suburban will replace any parts that are found defective within the first two years and will pay a warranty service allowance directly to the recommended Suburban Service Center at rates mutually agreed upon between Suburban and its recommended service centers. Replacement parts will be shipped FOB the shipping point within the Continental United States, Alaska and Canada to the recommended service center performing such repairs. All freight, shipping and delivery cost shall be the responsibility of the owner. The exchanged part or unit will be warranted for only the unexpired portion of the original warranty. Before having warranty repairs made, confirm that the service agency is a recommended service center for Suburban. DO NOT PAY **THE SERVICE AGENCY FOR WARRANTY REPAIRS; SUCH PAYMENTS WILL NOT BE REIMBURSED.**

For warranty service, the owner/user should contact the nearest recommended Suburban Service Center, advising them of the model and serial numbers (located on the furnace) and the nature of the defect. Transportation of the RV to and from the Service Center and/or travel expenses of the Service Center to your location is the responsibility of the owner/user. A current listing of recommended service centers may be obtained from Suburban's website, www.rvcomfort.com. If you cannot locate a recommended service center locally, the service agency chosen to perform warranty repairs must contact our Service Department at 423-775-2131 for authorization before making repairs. Unauthorized repairs made will not be paid by Suburban.

THREE YEAR LIMITED WARRANTY ON HEAT EXCHANGER

The furnace heat exchanger is further warranted to be free from defects in material and workmanship during the third through fifth year after the date of original purchase. A replacement heat exchanger will be provided under the same conditions as stated in the two year warranty EXCEPT no labor reimbursement will be provided.

LIMITATION OF WARRANTIES

ALL IMPLIED WARRANTIES (INCLUDING IMPLIED WARRANTIES OF MERCHANTABILITY) ARE HEREBY LIMITED IN DURATION TO THE PERIOD FOR WHICH EACH LIMITED WARRANTY IS GIVEN. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS SO THE ABOVE LIMITATIONS MAY NOT APPLY TO YOU. THE EXPRESSED WARRANTIES MADE IN THIS WARRANTY ARE EXCLUSIVE AND MAY NOT BE ALTERED, ENLARGED, OR CHANGED BY ANY DISTRIBUTOR, DEALER OR OTHER PERSON WHOMSOEVER.

SUBURBAN WILL NOT BE RESPONSIBLE FOR:

1. Normal maintenance as outlined in the installation, operating and service instructions owner's manual including cleaning of component parts; such as, orifices and burners.
2. Initial checkouts and subsequent checkouts which indicate the furnace is operating properly, or diagnosis without repair.
3. Damage or repairs required as a consequence of faulty or incorrect installation or application not in conformance with Suburban instructions.
4. Failure to start and/or operate due to loose or disconnected wires; water or dirt in controls, fuel lines and gas tanks; restriction or alteration of return air circulation; low voltage.
5. Routine adjustments that may be required to the thermostat, electrode and burner.
6. Costs incurred in gaining access to the furnace.
7. Parts or accessories not supplied by Suburban.
8. Freight charges incurred from parts replacements.
9. Damage or repairs needed as a consequence of any misapplication, abuse, unreasonable use, unauthorized alteration, improper service, improper operation or failure to provide reasonable and necessary maintenance.
10. Suburban products whose serial number has been altered, defaced or removed.
11. Suburban products installed or warranty claims originating outside the Continental U.S.A., Alaska, Hawaii and Canada.
12. Damage as a result of floods, winds, lightning, accidents, corrosive atmosphere or other conditions beyond the control of Suburban.
13. ANY SPECIAL, INDIRECT OR CONSEQUENTIAL PROPERTY, ECONOMIC OR COMMERCIAL DAMAGE OF ANY NATURE WHATSOEVER. Some states do not allow the exclusion of incidental or consequential damages, so the above limitation may not apply to you.

NO REPRESENTATIVE, DEALER, RECOMMENDED SERVICE CENTER OR OTHER PERSON IS AUTHORIZED TO ASSUME FOR SUBURBAN MANUFACTURING COMPANY ANY ADDITIONAL, DIFFERENT OR OTHER LIABILITY IN CONNECTION WITH THE SALE OF THIS SUBURBAN PRODUCT.

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

IF YOU HAVE A PRODUCT PROBLEM

FIRST:
If your RV has its original furnace and is still under the RV manufacturer's warranty, follow the steps suggested by your dealer or manufacturer of the RV.

SECOND:
Contact a conveniently located recommended Suburban Service Center. Describe to them the nature of your problem, make an appointment, if necessary, and provide for delivery of your RV to the selected service center.

THIRD:
For the location of the nearest service center, refer to the listing provided or contact:

Suburban Manufacturing Company
Customer Service Department
676 Broadway Street
Dayton, Tennessee 37321
(423) 775-2131, Ext. 7101
www.rvcomfort.com

FOR FUTURE REFERENCE, YOU SHOULD RECORD THE FOLLOWING INFORMATION:	
MODEL NUMBER:	
SERIAL NUMBER:	
STOCK NUMBER:	
DATE OF PURCHASE:	

AIRXCEL® Suburban Division™

Suburban

AIRXCEL
Suburban Division

Suburban
676 Broadway Street
Dayton, Tennessee 37321
423-775-2131
www.RVComfort.com

SUBURBAN GAS FURNACES

USER'S INFORMATION MANUAL For Models

SF-20Q • SF-25Q • SF-30Q • SF-35Q • SF-42Q
SF-20FQ • SF-25FQ • SF-30FQ • SF-35FQ • SF-42FQ
SFV-20Q • SFV-25Q • SFV-30Q • SFV-35Q • SFV-42Q
SFV-20FQ • SFV-25FQ • SFV-30FQ • SFV-35FQ • SFV-42FQ
SH-35 • SH-42 • SH-35F • SH-42F • SHD-2542Q

This book contains instructions covering the operation and maintenance of your furnace. Keep with unit at all times. INSTALLER: LEAVE THIS MANUAL WITH THE APPLIANCE. **CONSUMER:** RETAIN THIS MANUAL FOR FUTURE REFERENCE. Should you require further information, contact your dealer or nearest Suburban Service Center.

WARNING Installation of this appliance must be made in accordance with the written instructions provided in this manual. No agent, representative or employee of Suburban or other person has the authority to change, modify or waive any provision of the instructions contained in this manual.

⚠WARNING
FIRE, EXPLOSION AND ASPHYXIATION HAZARD

Improper adjustment, alteration, service, maintenance or installation can cause serious injury or death.

Read and follow instructions and precautions in User's Information Manual provided with this furnace. Installation and service must be performed by a qualified service agency or the gas supplier.

WARNING! Be sure the furnace and all ignition systems are "OFF" during any type of refueling and while vehicle is in motion or being towed.

⚠WARNING
FIRE OR EXPLOSION HAZARD

Failure to follow safety warning exactly could result in serious injury, deathor property damage.

- — Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- — WHAT TO DO IF YOU SMELL GAS
- • Evacuate all persons from the vehicle.
- • Shut off the gas supply at the gas container or source.
- • Do not touch any electrical switch, or use any phone or radio in the vehicle.
- • Do not start the vehicle's engine or electric generator.
- • Contact the nearest gas supplier or qualified service technician for repairs.
- • If you cannot reach a gas supplier or qualified service technician, contact the nearest fire department.
- • Do not turn on the gas supply until the gas leak(s) has been repaired.
- — Installation and service must be performed by a qualified installer, service agency or the gas supplier.

MAINTENANCE AND CLEANING

WARNING! If the user of this appliance fails to maintain it in the condition in which it was shipped from the factory or if the appliance is not used solely for its intended purpose or if appliance is not maintained in accordance with the instructions in this manual, then the risk of a fire and/or the production of carbon monoxide exists which can cause personal injury, property damage or loss of life.

CAUTION: Label all wires before disconnecting for servicing. Proper polarity must be observed so the furnace motor will run with the proper direction of rotation to insure correct air delivery (See Wiring Diagram.)

CAUTION: Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous furnace operation.

Always verify proper operation of furnace after servicing.

You, as the owner/user, should inspect the furnace monthly during the heating season for presence of soot on vent. Operating the furnace under this condition could lead to serious property damage, personal injury or loss of life. If soot is observed on the vent, immediately shut furnace down and contact a qualified service agency.

Listed below are several safety related items that you should follow during the heating season to assure continued safe operation of the furnace.

1. Inspect furnace venting. Venting must be free of obstructions, void of soot and properly terminated to the atmosphere. (Refer to installation manual.)

WARNING! Do not install screens over the vent for any reason. Screens will become restricted and cause unsafe furnace operation. Accessories are being marketed for RV products which we do not recommend. For your safety, only factory authorized parts are to be used on your furnace.

2. Periodically inspect the vent for obstructions or presence of soot. Soot is formed whenever combustion is incomplete. This is your visual warning that the furnace is operating in an unsafe manner. If soot is present, immediately shut furnace down and contact your dealer or a qualified service person.
3. Periodically observe the main burner flame to assure it is burning with a hard blue flame with well defined burner ports (See Figure 2). If flame appears yellow or burner has a lazy flame, shut furnace down. It is possible that burner needs cleaning or replaced. If excessive rust and corrosion are present on burner surface, the burner must be thoroughly cleaned or replaced. The burner may be cleaned using a steel wire brush and blown clean using high compression air. Contact a qualified service person for assistance.

NOTE: To properly observe burner operation, the furnace must be removed. This should only be done by your dealer or a qualified service agency.

4. Keep furnace clean. More frequent cleaning may be required due to excessive lint from carpeting, bedding material, etc. It is imperative that control compartments, burners and circulating air passageways of the appliance be kept clean.
5. The motor is permanently lubricated and requires no oiling.
6. Keep the furnace area clear of any combustible materials, gasoline or other flammable vapor and liquids.
7. Before operating furnace, check the location of the furnace vent to make sure it will not be blocked by the opening of any door on the trailer. If it can be blocked, do not operate the furnace with the door open.
8. Do not restrict the flow of combustion air or the warm air circulation to the furnace. To do so could cause personal injury and/or death.
9. Never operate the furnace if you smell gas. Do not assume that the smell of gas in your RV is normal. Any time you detect the odor of gas, it is to be considered life threatening and corrected immediately. Extinguish any open flames including cigarettes and evacuate all persons from the vehicle. Shut off gas supply at LP gas bottle. (See safety notice on front cover of this manual.)
10. Immediately shut furnace down and call a service agency if furnace cycles erratically or delays on ignition.

WARNING! Should overheating occur, or the gas supply fail to shut off, shut off the manual gas valve to the appliance before shutting off the electrical supply.

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11. Never attempt to repair damaged parts. Always have them replaced by a qualified service agency.
12. Never attempt to repair the furnace yourself. Seek the help of a qualified service person.
13. Never restrict the ducting installed by your trailer manufacturer. To do so could cause improper furnace operation.
14. Avoid direct contact with the outlet registers or vents as they will become hot during the heating cycle.
15. Do not install air boosters in the duct system. Such devices will cause the furnace to cycle on limit and to have erratic sail switch operation.
16. Clothing or other flammable material should not be placed on or near the appliance.
17. Always follow the Operating Instructions. Do not deviate from the step-by-step procedures.
18. Do not use this appliance if any part has been submerged under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control that has been submerged under water.
19. When considering add-on rooms, porch or patio, attention must be given to the venting of your furnace. For your safety, do not terminate furnace vent inside add-on rooms, screen porch or onto patios. Doing so will result in products of combustion being vented into the room or occupied areas.
20. In any installation in which the vent of this appliance can be covered due to the construction of the RV or some special feature of the RV such as slide out, pop-up etc. always insure that the appliance cannot be operated by setting the thermostat to the positive "OFF" position and shutting off all electrical and gas supply to the appliance. Never operate furnace with vent covered.

Your furnace should be inspected by a qualified service agency yearly before turning the furnace on. Particular attention should be given to the following items:

1. Inspect furnace installation and vent termination to be sure furnace is properly secured in place, that vent terminates to the atmosphere and that vent tubes overlap properly. (See installation manual supplied with furnace.)
2. Inspect chamber and venting to assure that these components are physically sound, without holes or excessive corrosion and that the installation and/or reinstallation is in accordance with Suburban's Installation Instructions. (Reference installation manual supplied with furnace.)

WARNING! It is imperative that the products of combustion be properly vented to atmosphere and that all combustion air supplied to burner be drawn from outside atmosphere.

3. Check the base on which furnace is mounted. Be sure it is physically sound, void of any sagging, deterioration, etc.
4. Inspect furnace, the venting, ducting and the gas piping to furnace for obvious signs of deterioration. Correct any defects at once.
5. Inspect combustion chamber for restrictions in exhaust or intake. It is imperative that the flow of intake combustion air and the flow of exhaust gases being expelled to the outside atmosphere not be obstructed. Any soot or loose debris should be blown out using compressed air. (See Figure 3.)
6. Inspect all gaskets. If any gaskets show signs of leakage or deterioration, replace them. Safe operation of the furnace depends on all gaskets being tight.
7. Inspect return air inlet openings to the furnace. Remove any restrictions to assure adequate air flow.

OPERATING INSTRUCTIONS

WARNING! Do not operate furnace while vehicle is in motion or being towed.

NOTE: During initial firing of this furnace a burn-off of excess paint and oils remaining from manufacturing process may cause "smoking" for 5 - 10 minutes.

FOR YOUR SAFETY READ BEFORE OPERATING

WARNING! If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or loss of life.

A. This appliance does not have a pilot. It is equipped with an ignition device which automatically lights the burner. Do **not** light the burner by hand.

B. BEFORE OPERATING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

- Extinguish any open flame.
- Evacuate all persons from the vehicle.
- Shut off the gas supply at the gas container or source.
- Do not touch any electric switch or use any phone or radio in the vehicle.
- Do not start the vehicle's engine or electric generator.
- Contact the nearest gas supplier or qualified service technician for repairs.
- If you cannot reach a gas supplier or qualified service technician, contact the nearest fire department.
- Do not turn on the gas supply until the gas leak(s) has been repaired.

C. Use only your hand to push in or turn the gas control knob. Never use tools. If the knob will not push in or turn by hand, don't try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

D. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control which has been under water.

OPERATING INSTRUCTIONS

1. **STOP!** Read User's Information Manual supplied with furnace.
2. Turn the manual valve (if so equipped) or the valve at the outside LP tank to the "OFF" position. Do not force.
3. Set thermostat above room temperature to begin blower operation. A slight delay will occur before the blower comes on. Allow blower to run for 5 minutes for combustion chamber purge cycle. If blower does not come on or stops before ignition cycle, go to shut down and contact your dealer or a local recreational vehicle service agency.
4. After 5 minutes, move thermostat lever below room temperature. Blower will remain on. Wait approximately 2 minutes for blower to go off.
5. Open manual shut-off valve (if so equipped) or the valve at the outside LP tank. Correct operating characteristics depend on the valve being positioned fully open. Never attempt to operate with a valve partially closed.

NOTE: This furnace is equipped with a valve shut-off switch. With switch in "OFF" position, gas will not flow to burner nor will the furnace operate.

6. Set thermostat to desired setting. NOTE: Motor will not come on instantly. Allow approximately 30 seconds for motor operation gas flow and sparks.
7. Allow 30 seconds for main burner to light after blower comes on. This furnace is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
8. If burner does not light, repeat Steps 1 through 8.
9. If after three (3) attempts with no ignition, go to shut down and contact your dealer or a local recreational vehicle service agency. Do not continue to cycle furnace through thermostat in an attempt to get ignition. NOTE: If furnace should lock out, the blower will go off in 5 minutes and remain off until unit is reset by reactivating thermostat.

TO TURN OFF GAS TO APPLIANCE

1. Set the thermostat to lowest setting, then move lever to "OFF" position.
2. Turn off all electric power to the appliance if service is to be performed.
3. Turn manual valve (if so equipped) to the "OFF" position. Do not force.

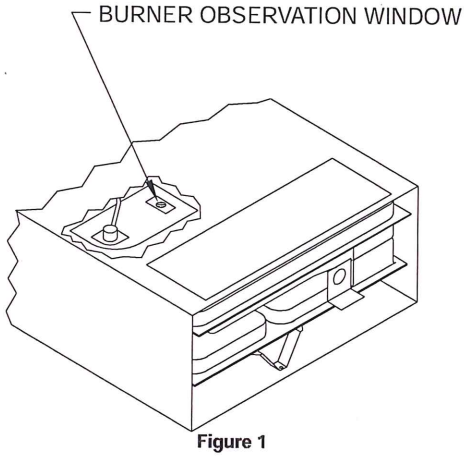


Figure 1

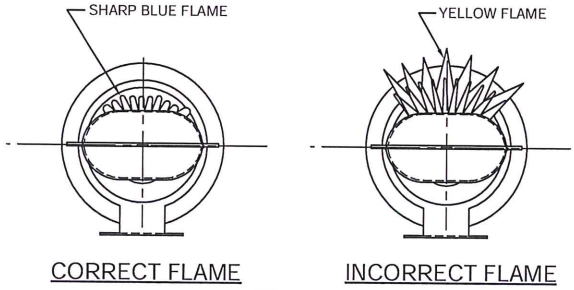
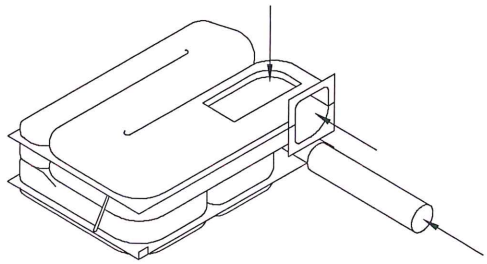


Figure 2



TO CLEAN THE CHAMBER, THE FURNACE MUST BE REMOVED F ROM THE CABINET AND THE MANIFOLD. BLOWER ASSEMBLY AND CONTROLS REMO VED LEAVING THE CHAMBER ONLY, AS SHOWN. USING COMPRESSED AIR, B LOW THROUGH THE CHAMBER, AS SHOWN BY ARROWS, TO REMOVE SOOT OR LOOS E DEBRIS.

Figure 3