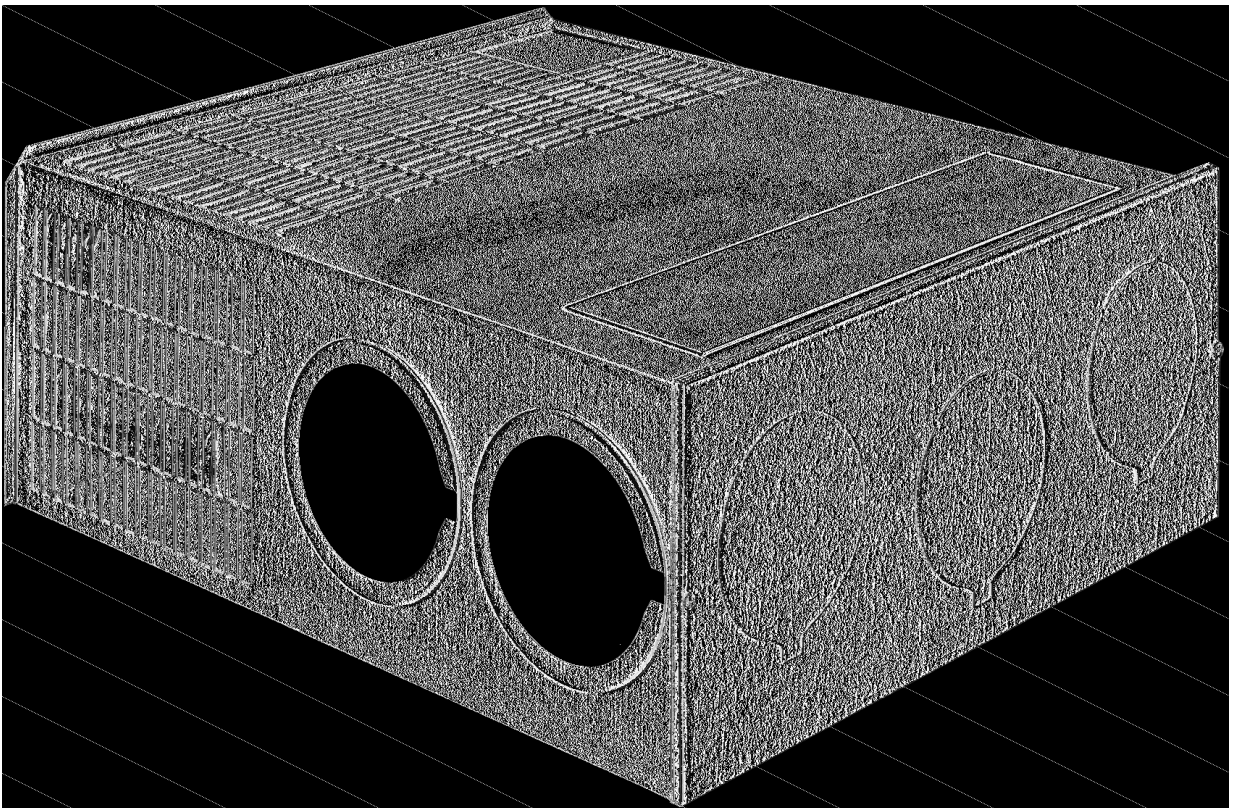


# **SUBURBAN RV FURNACE**

## **SERVICE & TRAINING MANUAL**



 **Suburban**

# TABLE OF CONTENTS

	<b>PAGE</b>
Furnace Introduction / Model & Serial Number Information .....	3
General Service Information / Cautions & Safety Information .....	4
Furnace Specification Sheet.....	5
Furnace Removal .....	6
Installation Information .....	8
Vent Assembly Installation.....	9
Return Air & Ducting Information .....	19
Return Air & Ducting Requirements.....	20
Electrical Supply Information .....	23
Furnaces Specifications .....	24
Sequence of Operation (12 VDC 520820 Fan Control Module Board) .....	26
Sequence of Operation (24 VAC 520947 Fan Control Module Board).....	27
Sequence of Operation (SHD-2542 Furnace) .....	28
Sequence of Operation (Time Delay Relay Equipped Furnaces).....	29
Troubleshooting Flow Chart (Furnaces Equipped with Time Delay Relay) .....	30
Troubleshooting Flow Chart (Furnaces Equipped with Fan Control Module Board) .....	31
Service Hints, Diagnosis sheet for (24 VAC Time Delay Relay Equipped Furnaces).....	32
Furnace Wiring Diagrams.....	34
SF, SH and SHD-2542 Electrode Gap Specifications & Positioning .....	37
NT and Park Model Electrode Gap Specifications .....	38
Maintenance.....	39

# FURNACE INTRODUCTION

Suburban furnaces installed in recreational vehicles are classified as Direct Vent Sealed Combustion Furnaces. A forced draft furnace utilizes a sealed combustion chamber which is vented to the outside atmosphere. The intake air for combustion is also taken from outdoors and is completely isolated from the room air. A motor is used to drive an impeller wheel to draw intake air into the chamber to support combustion and force the exhaust gases through the furnace chamber to the outside atmosphere. A second impeller wheel (driven by the same motor yet totally isolated from the combustion air) is used to circulate room air across the furnace chamber where it is heated. The blower then forces the hot air into the living area either through a duct system or through a front grille on the furnace cabinet on direct discharge models.

Suburban furnaces operate on 12-volt DC power which is supplied either by a 12-volt battery or a converter system. A recreational vehicle furnace that is specifically designed for "park model" trailers operates on 120 volts AC. These are designed and tested under the same standards as the 12-volt models.

Suburban forced draft combustion furnaces used in recreational vehicles are designed for use with Propane gas. Although a few recreational vehicle furnaces are approved for use with natural gas, one should never attempt to convert such a unit to natural gas unless the conversion is approved by the manufacturer of the furnace.

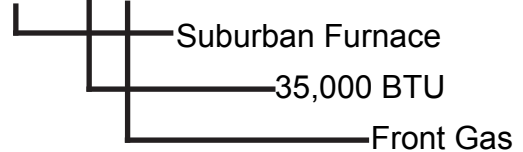
NOTE: Our Service technicians are available to assist you in making repairs or parts replacements from 8:00 AM to 5:00 PM Eastern Standard Time, Monday through Friday (except holidays), by calling 423-775-2131 EXT 7102. Email address: [SMCSales@suburbanmfg.com](mailto:SMCSales@suburbanmfg.com)

## MODEL & SERIAL NUMBER INFORMATION

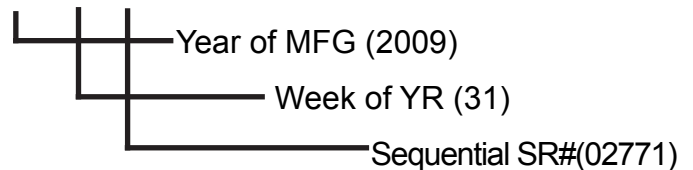
Model and Serial Numbers for Suburban Furnaces are located on a Data Plate attached to the furnace assembly. Below is an example:

<b>MODEL NO. / NUMÉRO DE MODÈLE</b>	
<b>SF-35F</b>	
<b>SERIAL NO./ NUMÉRO DE SÉRIE</b>	
<b>093102771</b>	
STOCK NO.	<b>2332</b>
INPUT BTU/HR.	<b>35,000 @</b>
DEBIT CALORIFIQUE	<b>10.0" W.C.</b>
OUTPUT BTU/HR. CLARIFIQUE	<b>27,300</b>
MANIFOLD PRESSURE PRESSION TUBULURE	<b>10.0" W.C.</b>
ORIFICE SIZE DIMENSION DE L'INJECTEUR	<b>#51</b>
TYPE OF GAS ESPECE DE GAZ	<b>LP</b>

### MODEL BREAKDOWN SF-35F



### SERIAL # BREAKDOWN 093102771



# GENERAL SERVICE INFORMATION

## GAS SUPPLY PRESSURE REQUIREMENTS

### LINE PRESSURE:

- Minimum 11" WC\*, Maximum 14" WC  
*\*WC - water column*

## VOLTAGE REQUIREMENTS

### VOLTAGE DC:

- 12 volt D.C.  
Minimum 10.5 volts D.C., Maximum 13.5 volts D.C.

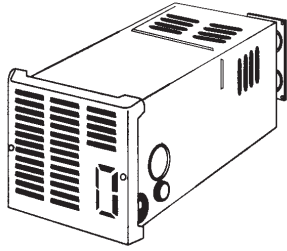
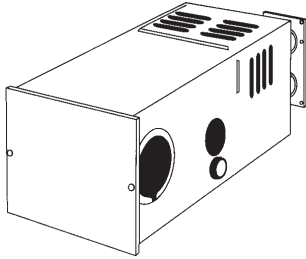
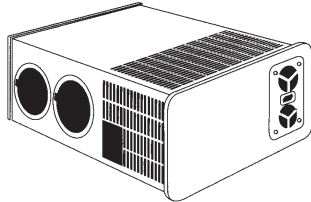
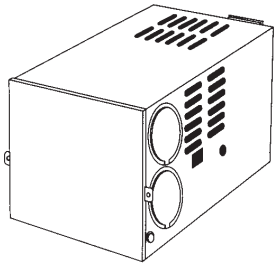
## SERVICE TOOLS REQUIRED

Manometer gauge/ U-Tube  
Volt ohm meter capable of testing above 15 amps  
Module board tester #641511  
Gas leak detector OR approved leak check liquid  
Assorted wrenches  
Assorted hand tools  
Safety glasses

## CAUTIONS & SAFETY INFORMATION

1. Never use a battery charger to power or test an electronic ignition furnace as they sometimes provide more than 14.5 DC Volts that could damage the module board.
2. Never operate the furnace with the electrode wire disconnected nor with the electrode assembly removed from the 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 on remote sense units.
5. Install the furnace so electrical components and connections are protected from water.
6. Wire the furnace direct to the battery when possible.
7. Use two wrenches on gas fittings when tightening gas connections.
8. Verify voltage of furnace, do not use 120 volt AC with 12 volt DC.
9. Do not modify the furnace in any way.
10. Do not vent the furnace to an outside enclosed porch area or where the vent is covered or obstructed.
11. Always meet or exceed minimum duct requirements. Also meet the minimum return air requirements.
12. Furnace must be installed and vented correctly. Refer to the Installation Manual for the specific model furnace.
13. Do not install aftermarket components.

# SUBURBAN RV FURNACES

SPEC SHEET		BTU/h INPUT	Height	Width	Depth	Ignition	Shipping Weight	
	<b>12 VDC DIRECT DISCHARGE</b>							
	NT-16SE	16,000	9 3/8"	9 3/8"	21-27 3/4"	Electronic	27	
	NT-20SE	19,000	9 3/8"	9 3/8"	21-27 3/4"	Electronic	27	
	<b>12 VDC DUCTED FURNACES</b>							
	NT-16S	16,000	9 3/8"	9 3/8"	22 3/4-29 1/2"	Electronic	27	
	NT-20S	19,000	9 3/8"	9 3/8"	23 3/8-30 1/8"	Electronic	27	
	NT-30SP	30,000	12 1/2"	12"	23"	Electronic	40	
	NT-34SP	34,000	12 1/2"	12"	23"	Electronic	40	
	NT-40	40,000	12 1/2"	12"	23"	Electronic	42	
		SF-20/20F	20,000	7 1/2"	17"	20"	Electronic	35
SF-25/25F		25,000	7 1/2"	17"	20"	Electronic	35	
SF-30/30F		30,000	7 1/2"	17"	20"	Electronic	35	
SF-35/35F		35,000	7 1/2"	17"	20"	Electronic	35	
SF-42/42F		40,000	7 1/2"	17"	20"	Electronic	35	
SH-35/35F		35,000	9 1/4"	17"	20"	Electronic	40	
SH-42/42F		40,000	9 1/4"	17"	20"	Electronic	42	
SF-20Q/20FQ		20,000	7 1/2"	17"	20"	Electronic	35	
SF-25Q/25FQ		25,000	7 1/2"	17"	20"	Electronic	35	
SF-30Q/30FQ		30,000	7 1/2"	17"	20"	Electronic	35	
SF-35Q/35FQ		35,000	7 1/2"	17"	20"	Electronic	35	
SF-42Q/42FQ		40,000	7 1/2"	17"	20"	Electronic	35	
SH-35Q/35FQ		35,000	9 1/4"	17"	20"	Electronic	40	
SH-42Q/42FQ		40,000	9 1/4"	17"	20"	Electronic	42	
<b>Accessories</b>		<b>Description</b>						
6258ACW		DOOR, Optional Access, Colonial White, Standard SF & SFQ Models						
6258APW		DOOR, Optional Access, Polar White, Standard SF & SFQ Models						
6267ACW		DOOR, Optional Access, Colonial White, Standard SH & SHQ Models						
	SFV-20	20,000	7 1/2"	17"	20"	Electronic	35	
	SFV-25	25,000	7 1/2"	17"	20"	Electronic	35	
	SFV-30	30,000	7 1/2"	17"	20"	Electronic	35	
	SFV-35	35,000	7 1/2"	17"	20"	Electronic	35	
	SFV-42	40,000	7 1/2"	17"	20"	Electronic	35	
	SHD-2542	25/40,000	9 1/4"	17"	20"	Electronic	44	
	<b>120 VAC PARK MODEL FURNACES</b>							
	P-40	40,000	12 1/2"	12"	23"	Electronic	46	
	<b>Accessories</b>		<b>Description</b>					
	050733	Duct Cover						
050715	Duct Collar 4"							
051240	Duct Collar 2"							
280552	Rain Shield							
062164	Bottom Duct Gasket, NT-24/30/34SP, NT-40, P40							
070853	Bottom Duct Gasket, SF Models EXCEPT SF-42/42F							
520009	Bottom Duct Kit W/Gasket, NT-24/30/34SP, NT-40, P40							
520576	Bottom Duct Kit W/Gasket, SF Models EXCEPT SF-42/42F, SH-35/35F							
520753	Bottom Duct Kit W/Gasket and Door, SF-42/42F							
520864	Bottom Duct Kit W/Gasket, SH-42/42F, SHD-2542							
								

# FURNACE REMOVAL

To replace parts or service the **SUBURBAN** family of **RV** furnaces, it is necessary to follow these steps:

## **DD-17DSI**

1. Turn off gas and power, then disconnect gas and power supply at the furnace. Label wires as necessary.
2. Remove the vent cap assembly by removing applicable screws.
3. Remove the cabinet front two (2) screws.
4. Remove the applicable screws securing the furnace to the coach floor.
5. Remove duct from side of furnace, if equipped.
6. Remove the furnace from the cabinet area to gain access to combustion chamber and applicable parts.
7. Some parts can be accessed without removal of the complete furnace.
8. To re-install, reverse this procedure.
9. Rewire applicable wires and perform a leak test on all fittings. Perform a drop pressure test.

## **NT-12/16/20S**

1. Turn off gas and power, then disconnect gas and power supply at the furnace. Label wires as necessary.
2. Remove the vent cap assembly by removing applicable screws.
3. Remove the cabinet front two (2) screws.
4. Remove the (1) one tie down screw securing the chamber to the cabinet.
5. Remove the furnace from the cabinet by pulling chamber outward completely to gain access to all controls and applicable parts.
6. To re-install, reverse this procedure.
7. Rewire applicable wires and perform a leak test on all fittings. Perform a drop pressure test.

## **NT-12/16/20SE**

1. Turn off gas and power, then disconnect gas and power supply at the furnace. Label wires as necessary.
2. Remove the vent cap assembly by removing applicable screws.
3. Remove the cabinet front two (2) screws.
4. Remove the (2) two tie down screws securing the chamber to the cabinet.
5. Remove the furnace from the cabinet by pulling chamber outward completely to gain access to all controls and applicable parts.
6. To re-install, reverse this procedure.
7. Rewire applicable wires and perform a leak test on all fittings. Perform a drop pressure test.

## **NT-24/30/34SP and NT-40**

1. Turn off gas and power, then disconnect gas and power supply at the furnace. Label wires as necessary.
2. Remove the vent cap assembly by removing applicable screws and one (1) flue retaining screw. Not applicable to NT-40.
3. Remove the cabinet front two (2) screws.
4. Remove the (2) two tie down screws securing the chamber to the cabinet.
5. Remove the furnace from the cabinet by pulling chamber outward completely to gain access to all controls and applicable parts.
6. To re-install, reverse this procedure.
7. Rewire applicable wires and perform a leak test on all fittings. Perform a drop pressure test.

# FURNACE REMOVAL

## **SF-20/25/30/35/42, SF-20Q/25Q/30Q/35Q/42Q, SFV-20/25/30/35/42, SH-35/42 and SHD-2542**

1. Remove the vent cap assembly from the outside access door by removing applicable screws, also the four (4) screws retaining the door to the frame. Remove the door to gain access to the furnace.
2. Turn off gas and power, then disconnect gas and power supply at the furnace. Label wires as necessary.
3. Remove the (1) one tie down screw securing the chamber to the cabinet.
4. Remove the furnace from the cabinet by pulling chamber outward completely to gain access to all controls and applicable parts.
5. To re-install, reverse this procedure.
6. Rewire applicable wires and perform a leak test on all fittings. Perform a drop pressure test.

## **SF-20/25/30/35/42F, SF-20FQ/25FQ/30FQ/35FQ/42FQ, SFV-20/25/30/35/42F and SH-35/42F**

1. Turn off gas and power, then disconnect gas and power supply at the furnace. Label wires as necessary.
2. Remove the vent cap assembly by removing applicable screws.
3. Remove the cabinet front two (2) screws.
4. Remove the (1) one tie down screw securing the chamber to the cabinet.
5. Remove the furnace from the cabinet by pulling chamber outward completely to gain access to all controls and applicable parts.
6. To re-install, reverse this procedure.
7. Rewire applicable wires and perform a leak test on all fittings. Perform a drop pressure test.

**NOTE: ON SFV MODELS, REMOVE EXTRA SCREWS FOR CHAMBER REMOVAL.**

## **P-30S and P-40**

1. Turn off gas and power, then disconnect gas and power supply at the furnace. Label wires as necessary.
2. Remove the vent cap assembly by removing applicable screws and one (1) flue retaining screw. (Not applicable to P40.)
3. Remove the cabinet front two (2) screws.
4. Remove the (2) two tie down screw securing the chamber to the cabinet.
5. Remove the furnace from the cabinet by pulling chamber outward completely to gain access to all controls and applicable parts.
6. To re-install, reverse this procedure.
7. Rewire applicable wires and perform a leak test on all fittings. Perform a drop pressure test.

# INSTALLATION INFORMATION

There are several important aspects of the installation which will pertain to all Suburban forced draft furnaces, regardless of the model or the method in which they are installed. They are:

1. Selecting a Location
2. Venting
3. Return Air
4. Ducting
5. Electrical Supply

Refer to the furnace installation manual for all installation requirements.

**Location and Installation-** Locate the furnace near lengthwise center of the coach. 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 cabinet to combustible construction as listed in the installation manual for your specific furnace model. Secure furnace cabinet to the floor of the coach using the holes provided in the furnace cabinet.

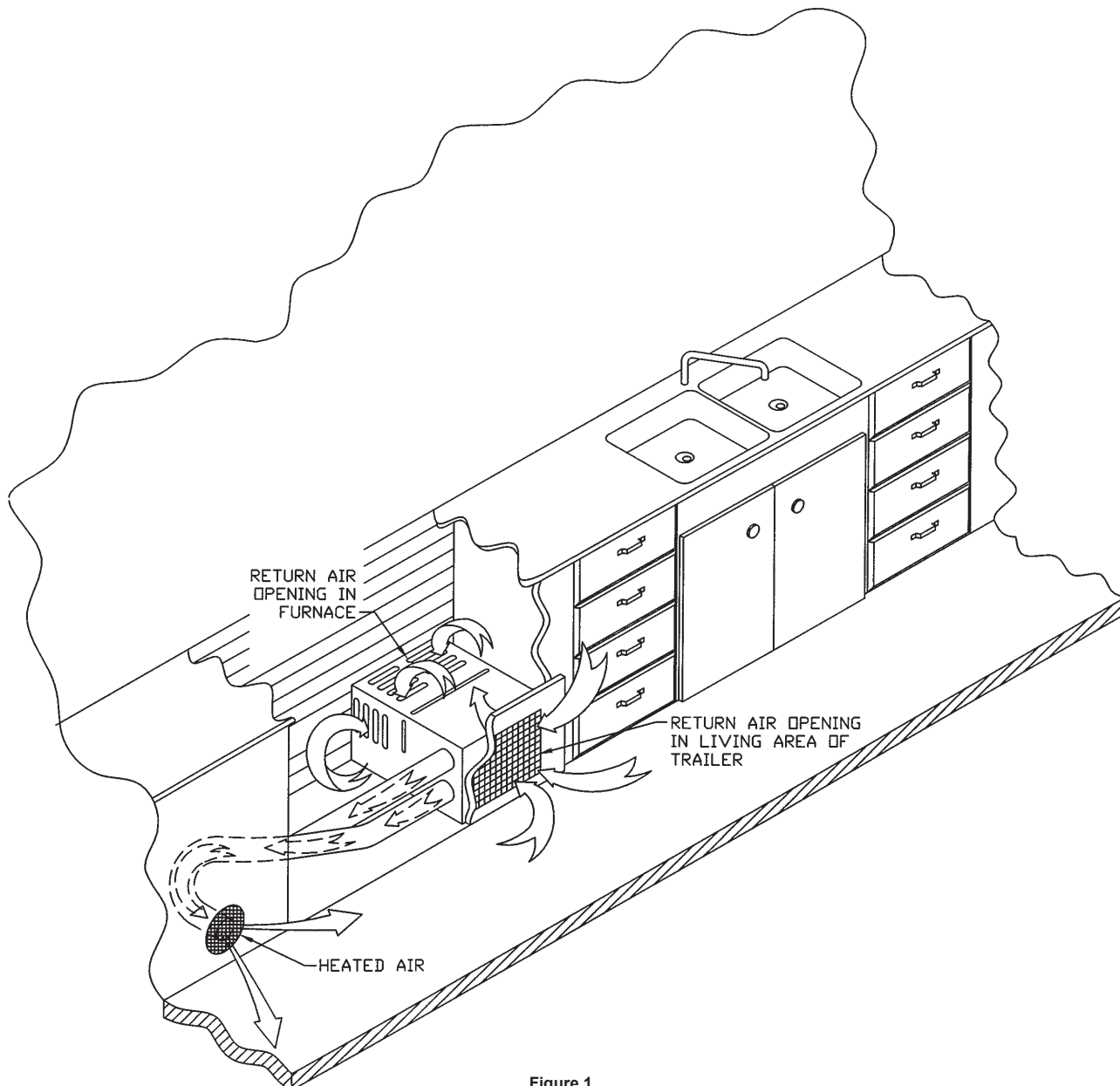


Figure 1



# VENT ASSEMBLY INSTALLATION

**VENTING-** By definition of a Direct Vent Sealed Combustion Furnace, it must be vented to the outside atmosphere and also draw combustion air from outdoors. Therefore, it is imperative that the vent be unobstructed and there must be a seal between the exhaust and intake (caulking) . Refer to the vent assembly installation in the manual. The vent must be straight. There can be no offsets or turns in the vent. All vent tubes which connect to the furnace exhaust and intake must overlap **a minimum of 1/2" on intake, and 1 1/4" on exhaust.** Check your furnace model number for vent installation procedures. Vents cannot be altered as supplied from the factory.

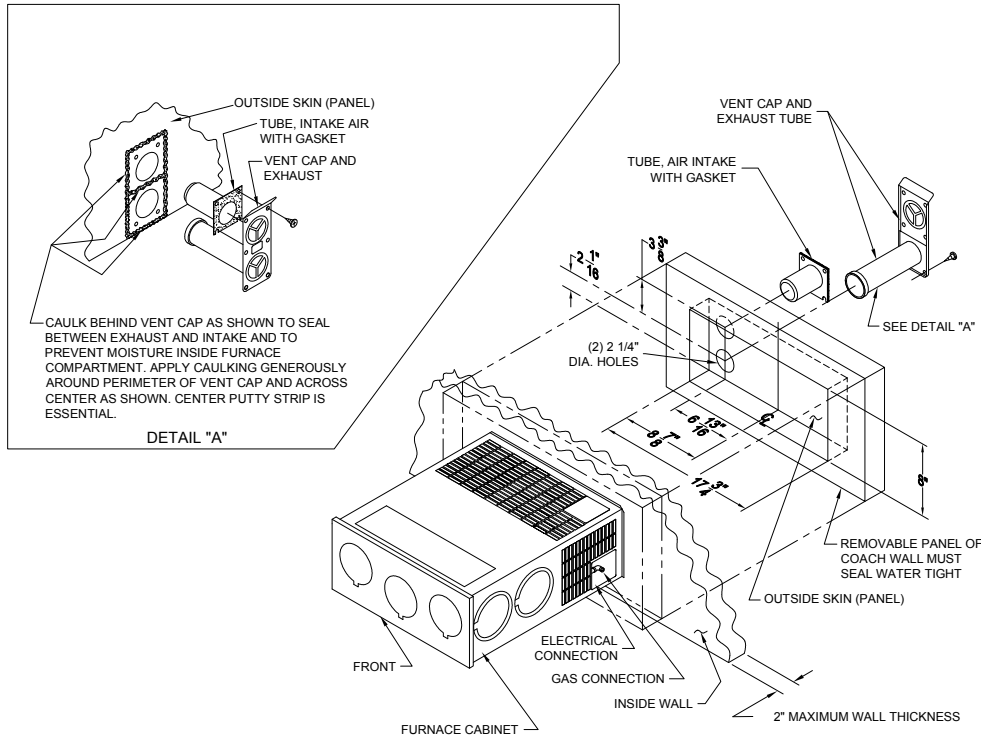


Figure 2 • SF & SFQ MODELS

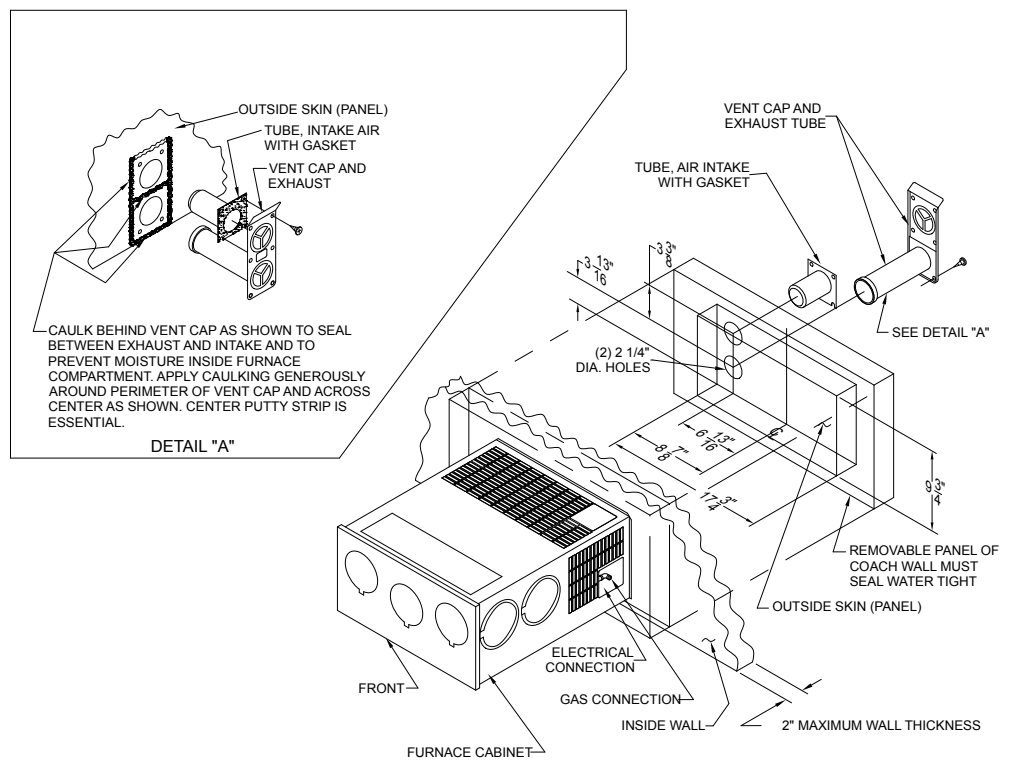


Figure 2A • SH MODELS

# VENT ASSEMBLY INSTALLATION

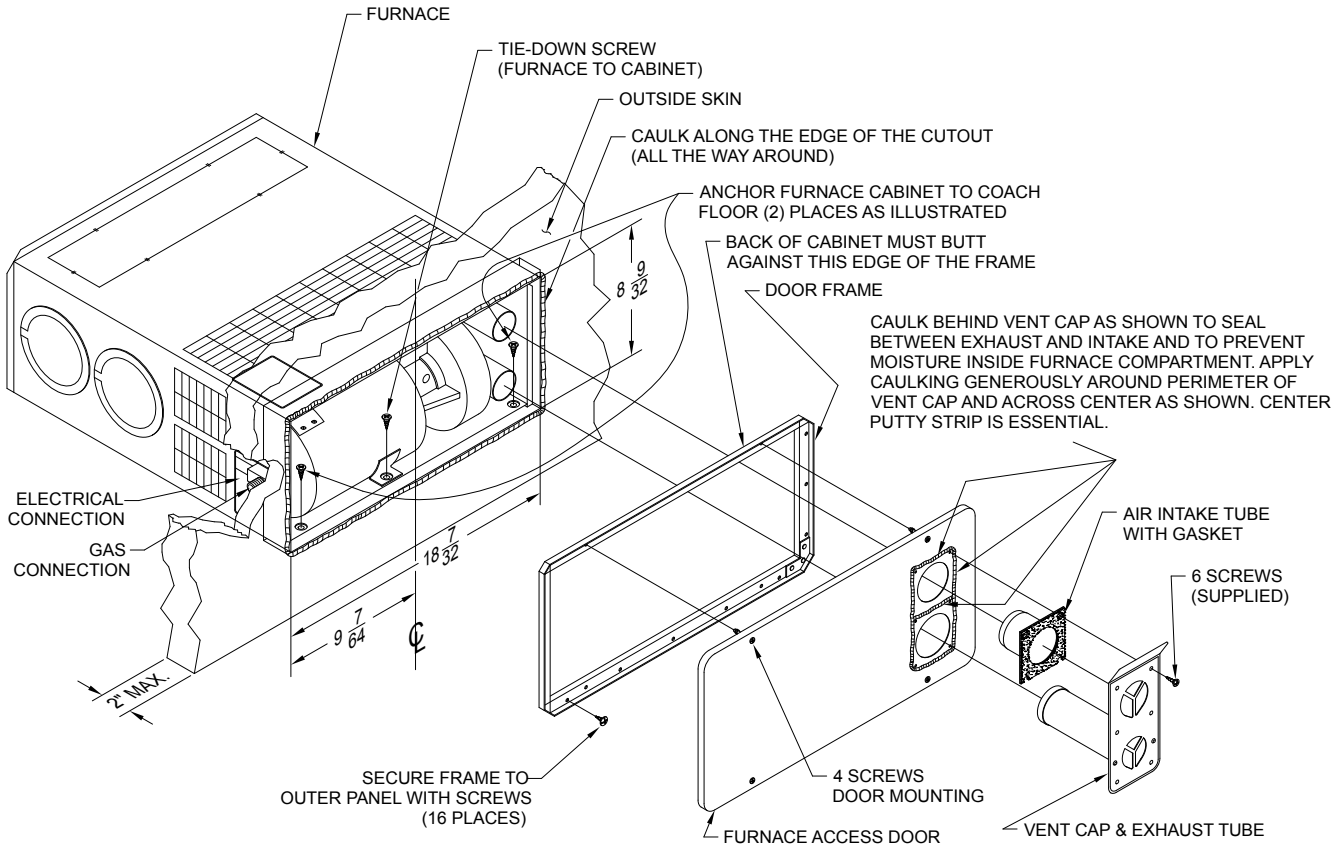


Figure 3 • SF & SFQ MODELS

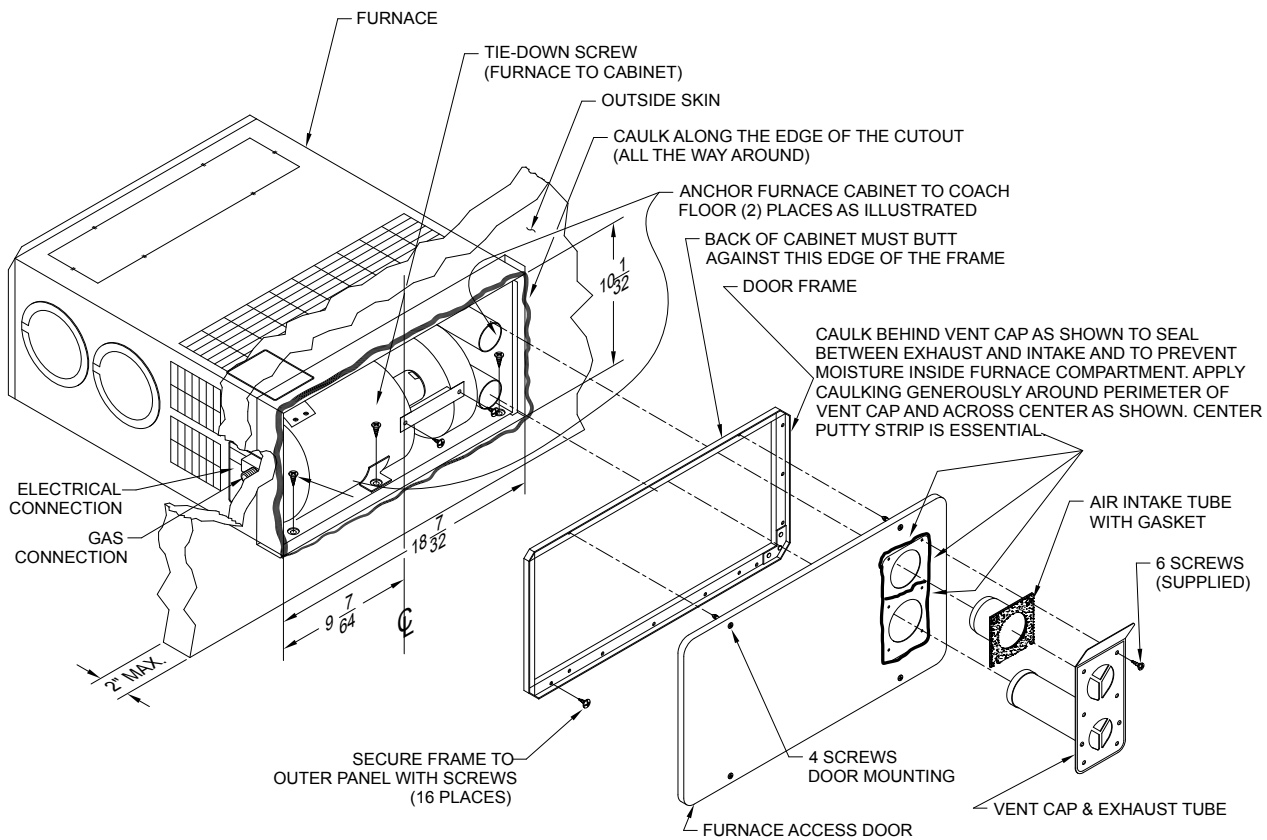


Figure 3A • SH & SHD-2542 MODELS

# VENT ASSEMBLY INSTALLATION

## SF-20F, SF-25F, SF-30F, SF-35F, SF-42F, STANDARD VENT INSTALLATION

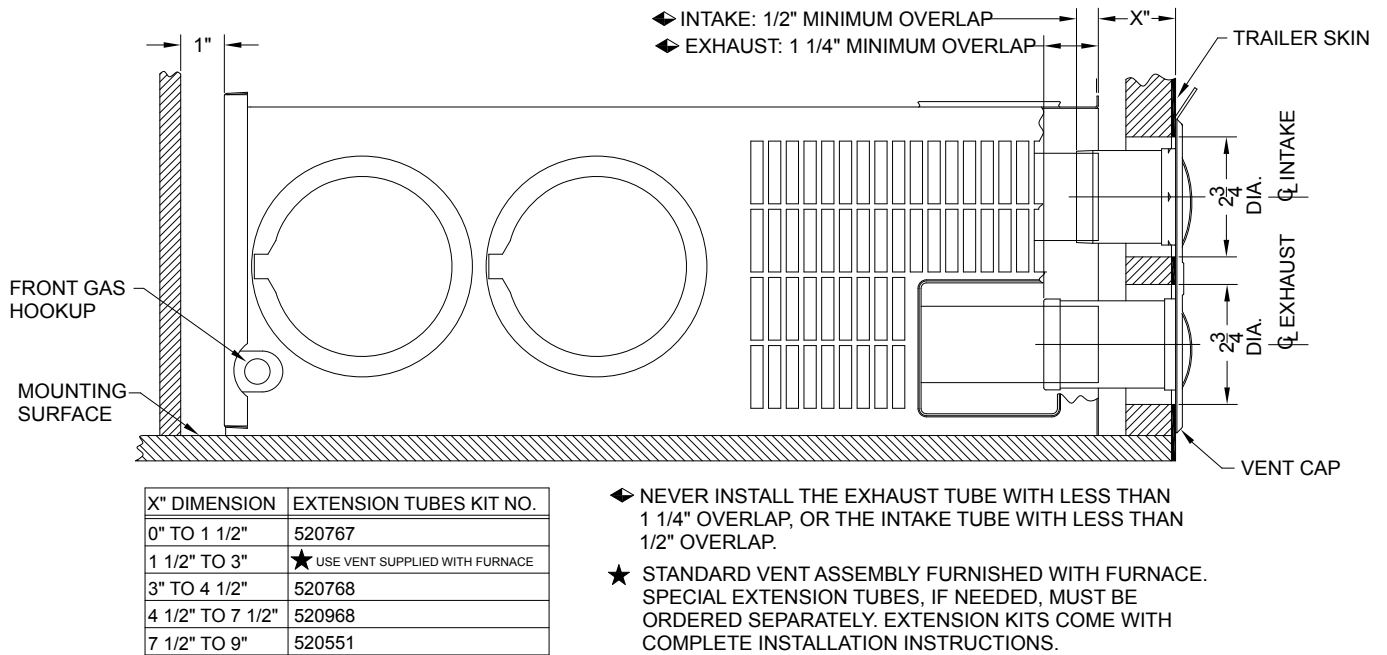


Figure 4 • SF & SFQ MODELS

## SH-35F, SH-42F STANDARD VENT INSTALLATION

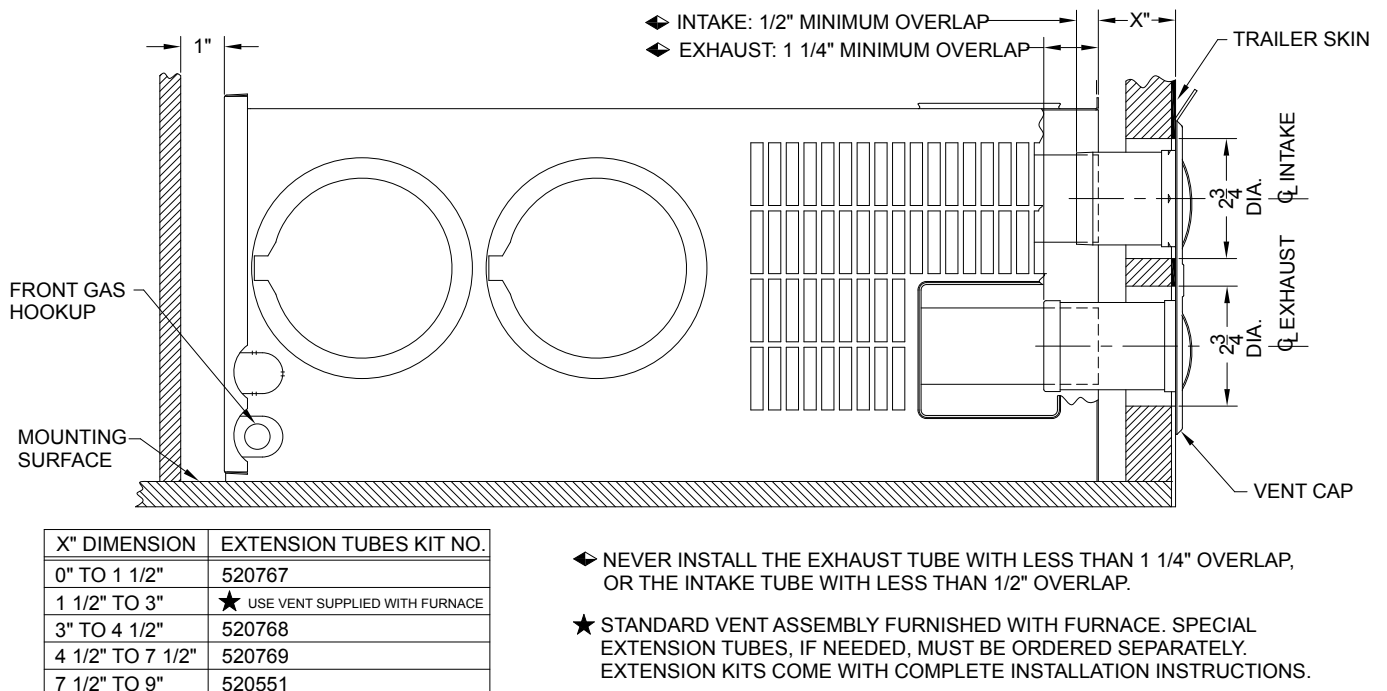


Figure 4A • SH Models

# VENT ASSEMBLY INSTALLATION (SFV MODELS)

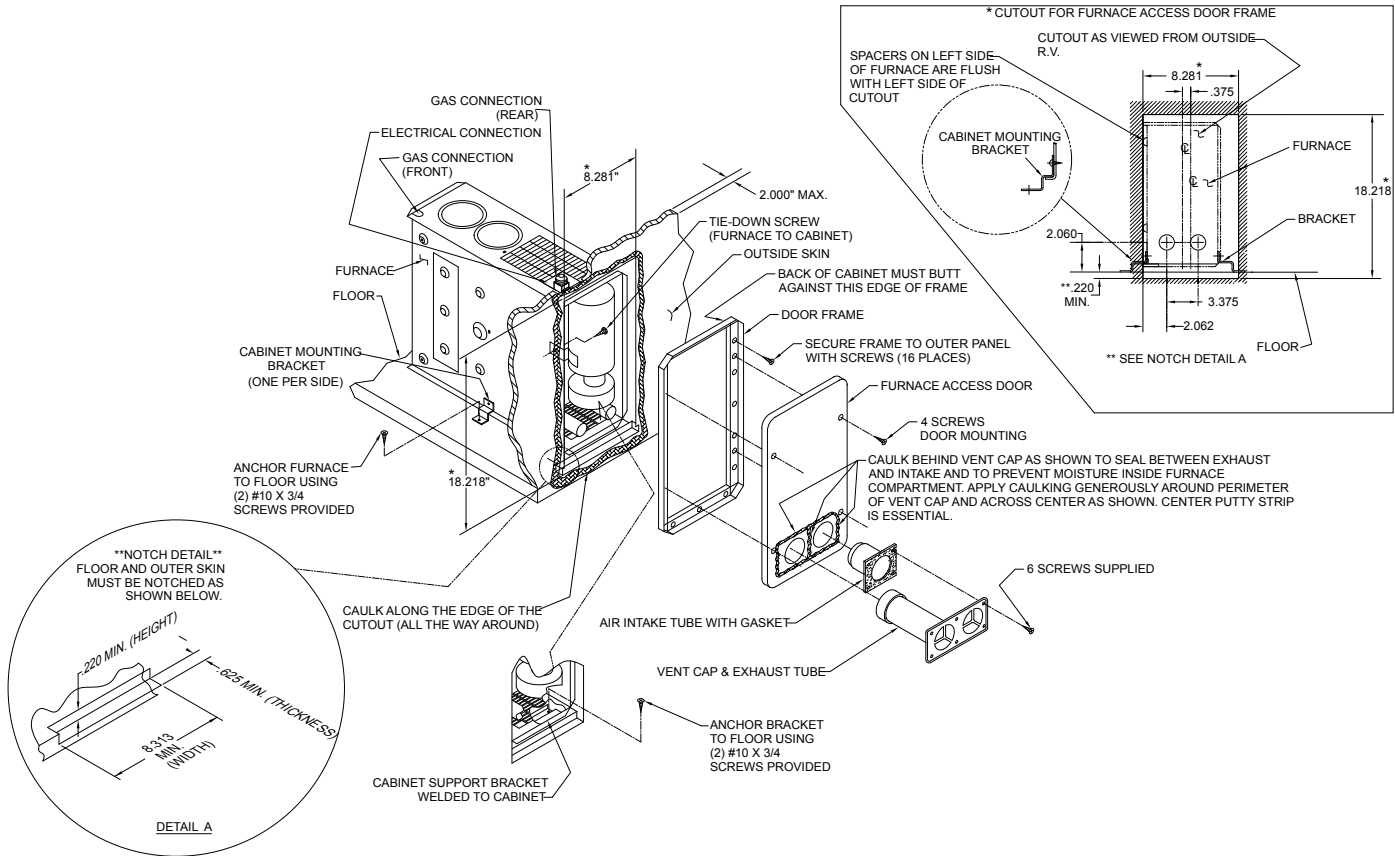
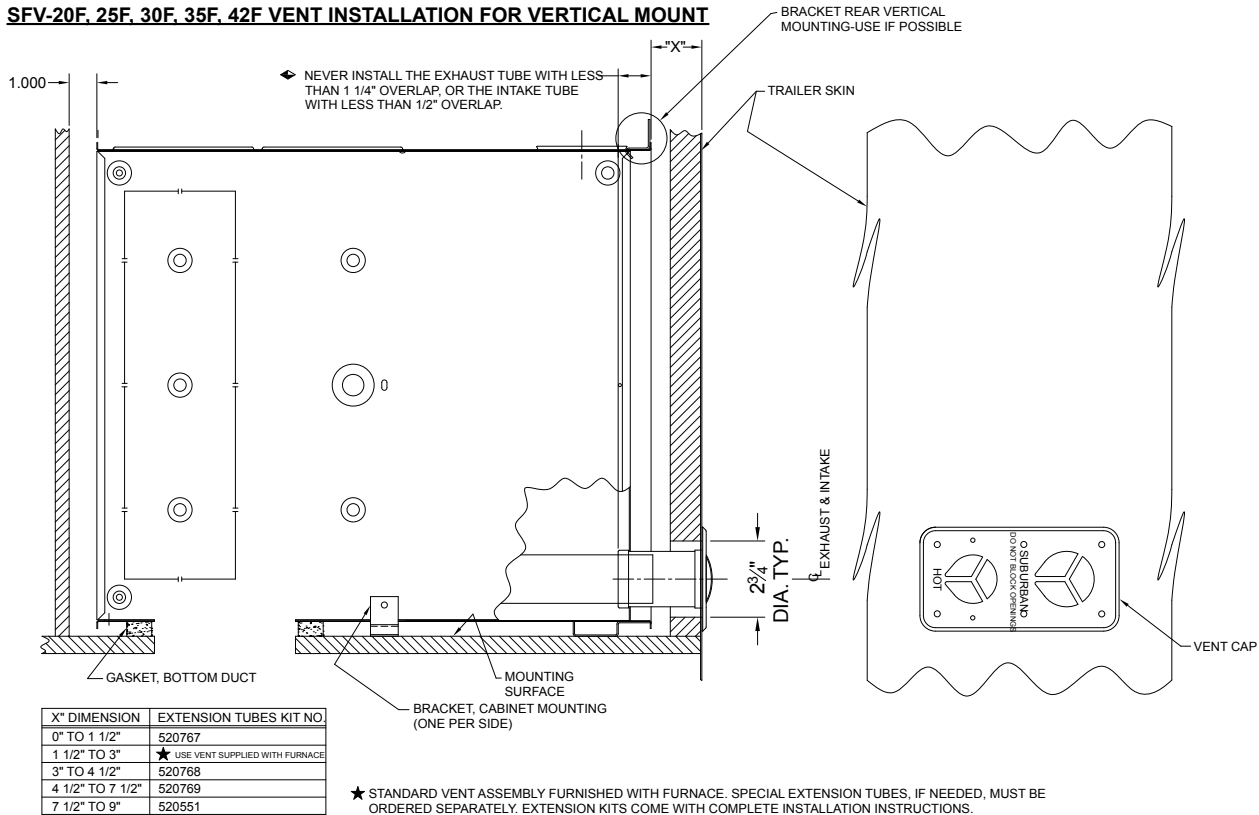


Figure 5

## SFV-20F, 25F, 30F, 35F, 42F VENT INSTALLATION FOR VERTICAL MOUNT



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"	520769
7 1/2" TO 9"	520551

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

Figure 5A

# VENT ASSEMBLY INSTALLATION (SFV MODELS)

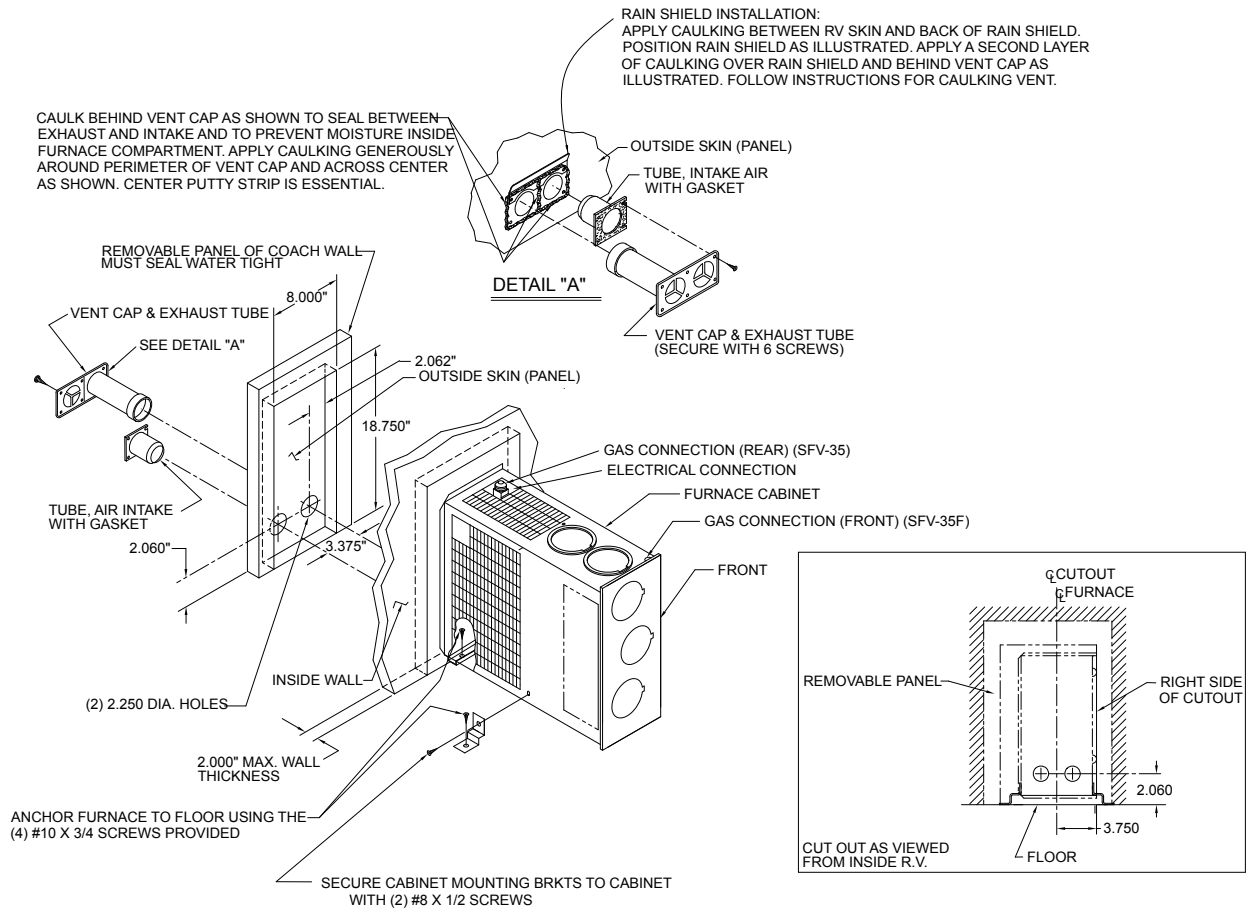


Figure 6

## SFV-20, 25, 30, 35, 42 VENT INSTALLATION FOR VERTICAL MOUNT

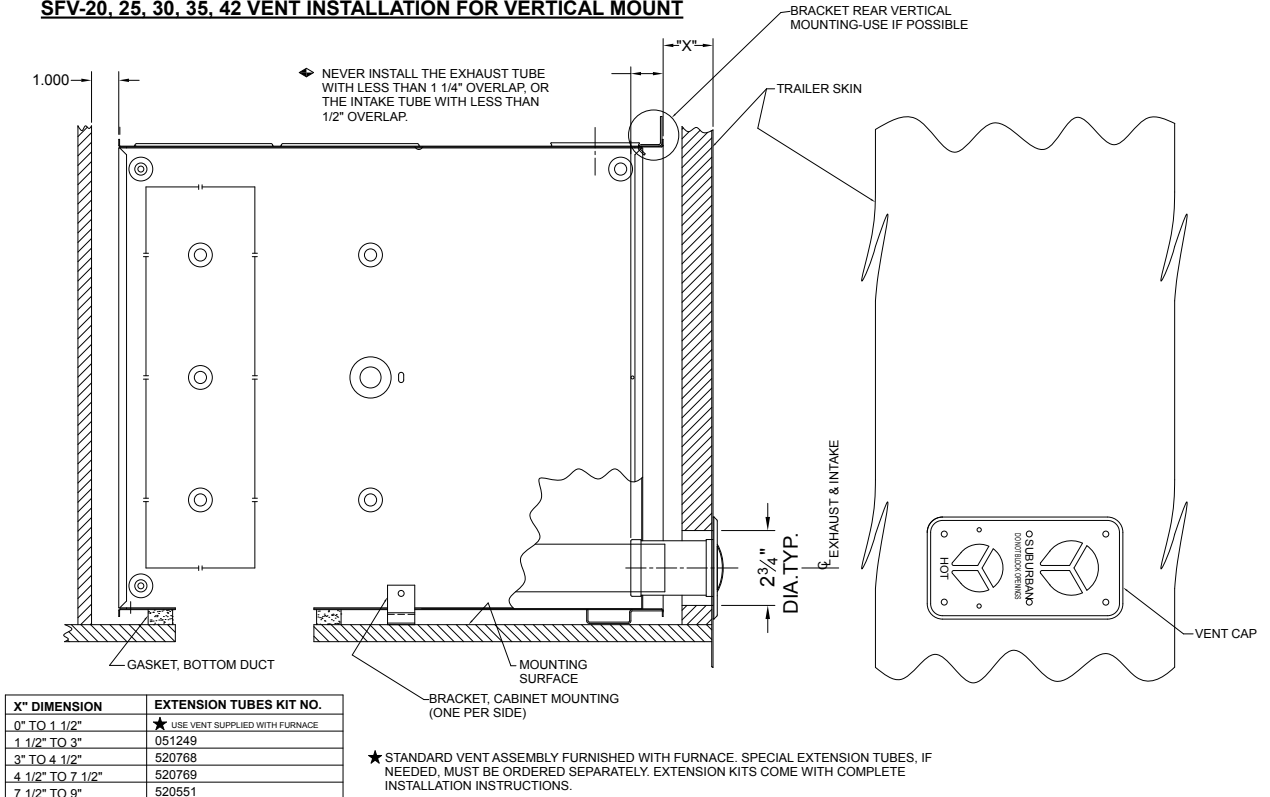
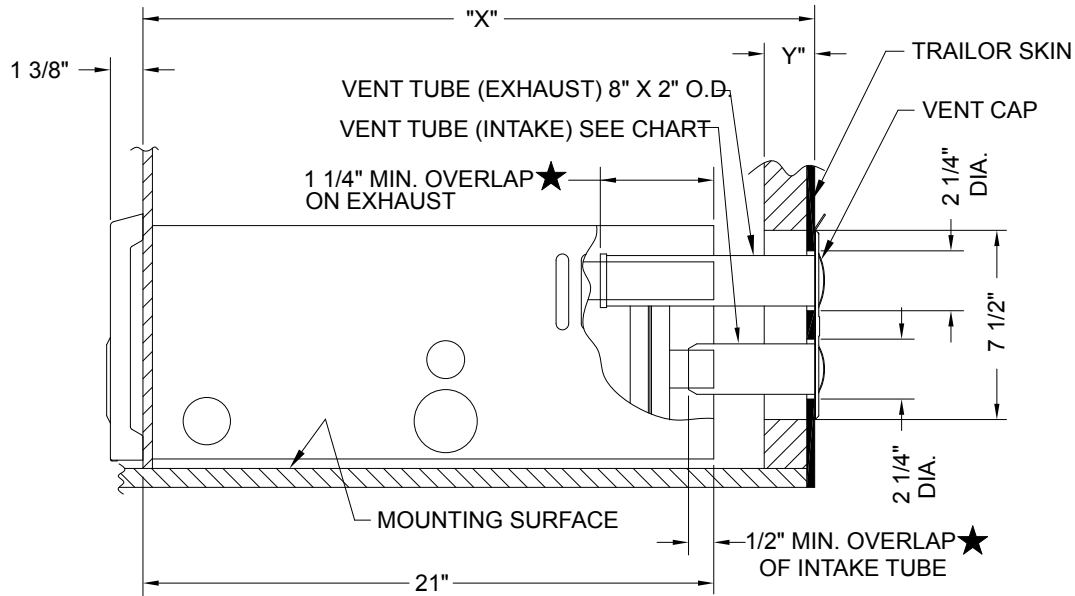


Figure 6A

# VENT ASSEMBLY INSTALLATION (NT SERIES)

## VENT TUBE INSTALLATION



PART NO.	INTAKE TUBE LENGTH ONLY	"X" DIMENSION
X050711	2" O.D. X 2 3/4" SPECIAL ★	21" TO 23 1/4"
X050712	2" O.D. X 5" *STANDARD	23 1/4" TO 25 1/2"
X050708	2' O.D. X 7 1/4" SPECIAL	25 1/2" TO 27 3/4"

★ NEVER INSTALL VENT TUBES WITH LESS THAN 1/2" OVERLAP ON INTAKE & 1 1/4" ON EXHAUST

★ STANDARD TUBE FURNISHED WITH FURNACE. THE SPECIAL TUBES, IF NEEDED, MUST BE ORDERED.

Figure 8  
NT 12/16/20SE

## INSTALLING VENT CAP

**IMPORTANT:** VENT CAP AND TUBE ASSY. MUST BE INSTALLED FROM OUTSIDE OF COACH.

HOLE DIA. IN OUTER SKIN MAY BE 2 1/4" IF OPENING CUT IN COMBUSTIBLE WALL IS CUT AS ILLUSTRATED IN FIGURES 3 OR 4. HOLE DIA. MUST BE 2 3/4" IF THE 4 X 7 1/2" OPENING AS SHOWN IN FIGURE 4 IS NOT CUT THROUGH COMBUSTIBLE WALL.

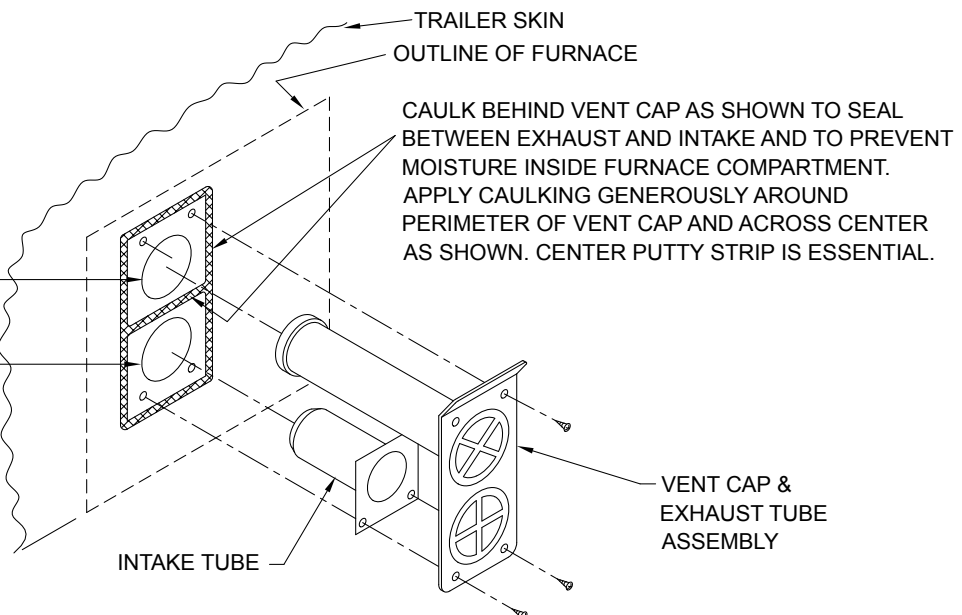
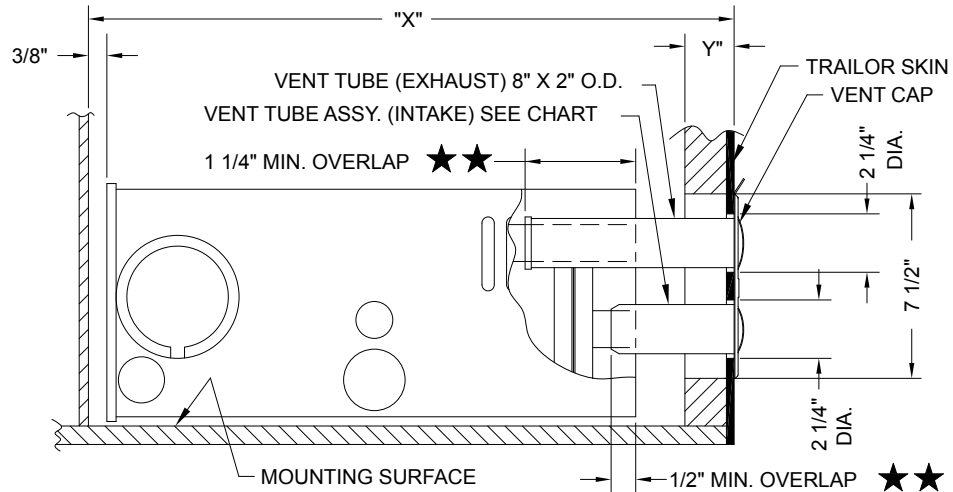


Figure 9  
NT 12/16/20S and SE

# VENT ASSEMBLY INSTALLATION (NT SERIES)

## VENT TUBE INSTALLATION NT-16S



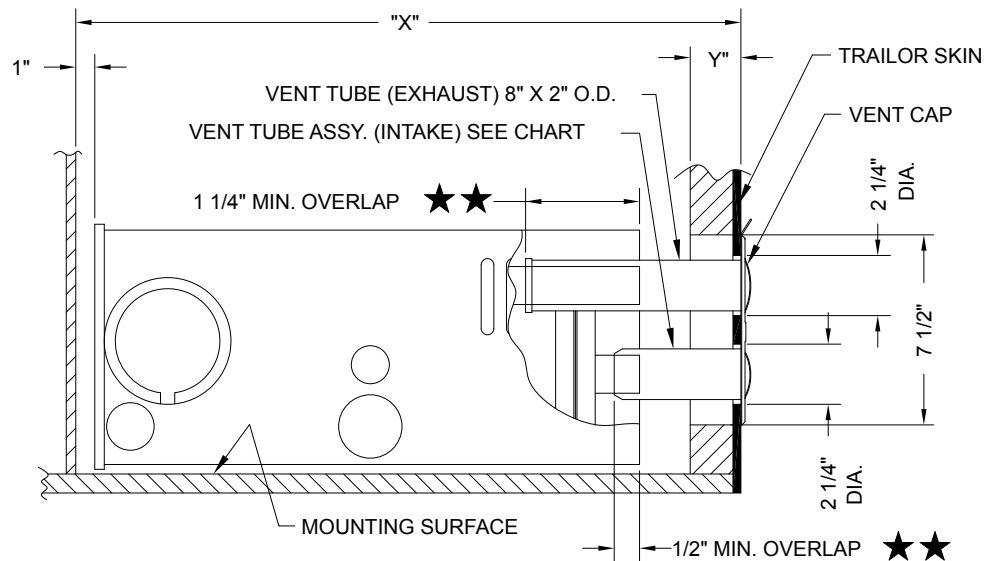
PART NO.	INTAKE TUBE LENGTH ONLY	"X" DIMENSION
X050906	2' O.D. X 3" STANDARD ★	22 3/4" TO 25"
X050712	2' O.D. X 5" SPECIAL	25" TO 27 1/4"
X050708	2' O.D. X 7 1/4" SPECIAL	27 1/4" TO 29 1/2"

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

★ STANDARD TUBE FURNISHED WITH FURNACE. THE SPECIAL TUBES, IF NEEDED, ARE TO BE ORDERED.

Figure 10  
NT 12/16S

## VENT TUBE INSTALLATION NT-20S



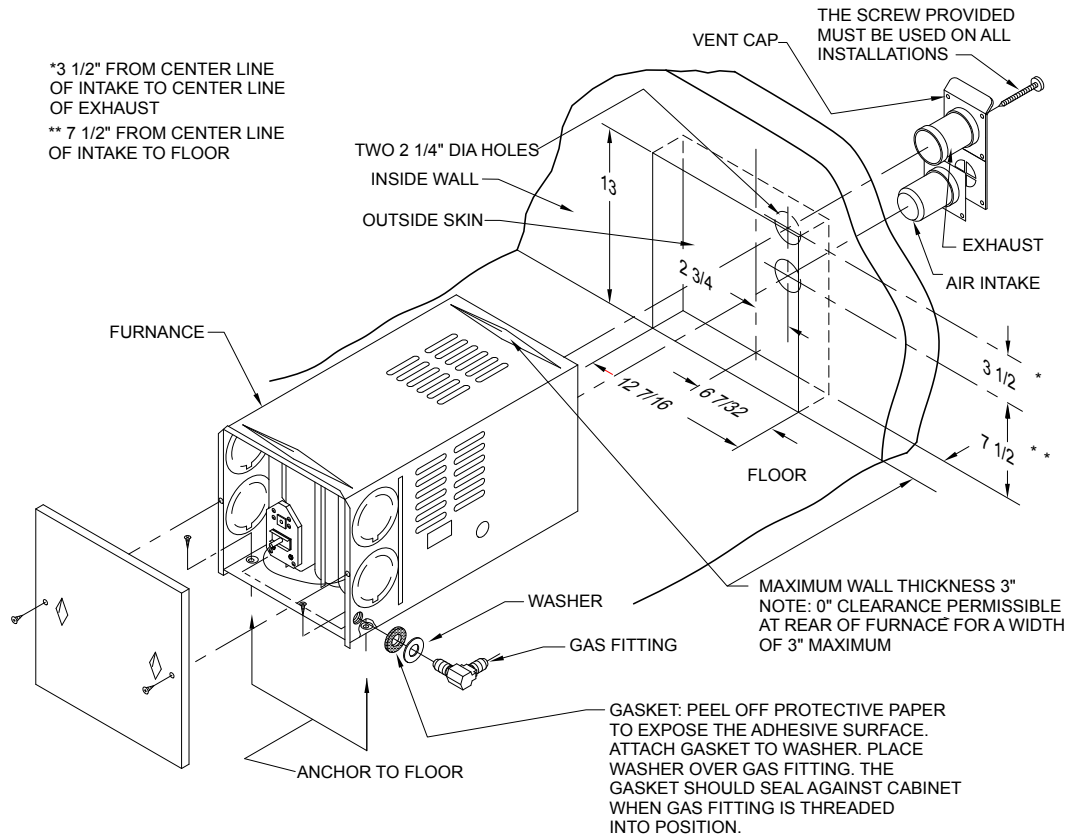
PART NO.	INTAKE TUBE LENGTH ONLY	"X" DIMENSION
X050906	2' O.D. X 3" STANDARD ★	23 3/8" TO 25 5/8"
X050712	2' O.D. X 5" SPECIAL	25 5/8" TO 27 7/8"
X050708	2' O.D. X 7 1/4" SPECIAL	27 7/8" TO 30 1/8"

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

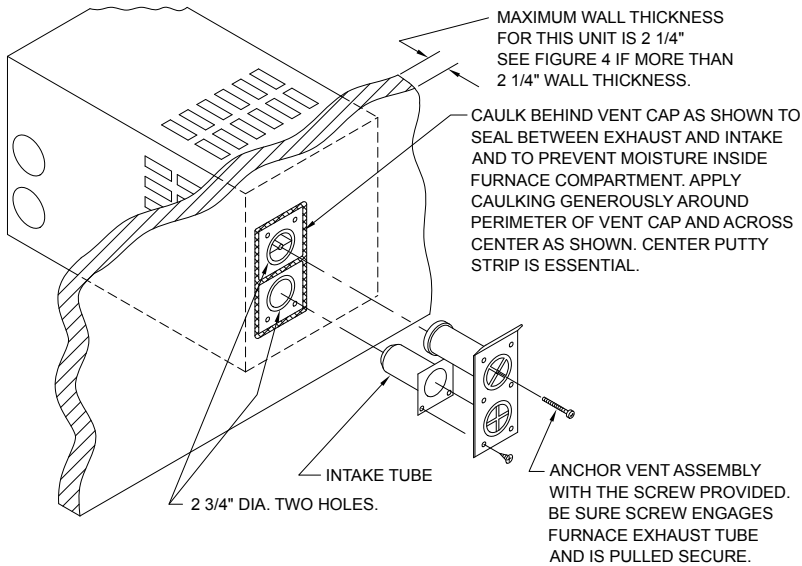
★ STANDARD TUBE FURNISHED WITH FURNACE. THE SPECIAL TUBES, IF NEEDED, ARE TO BE ORDERED.

Figure 11  
NT 20S

# VENT ASSEMBLY INSTALLATION (NT SERIES)



**Figure 12**  
NT 24/30/34SP • P30S



**Figure 13**  
NT 24/30/34SP • P30

EXTENSION TUBE KIT NUMBER	MIN./MAX. LENGTH (Extension Tube Range)
520498	2 1/4" to 3 1/8"
520499	3 1/8" to 4 7/8"
520500	4 7/8" to 7"
520501	7" to 9"

**Figure 14**  
NT 24/30/34SP • P30

EXTENSION TUBE KIT NUMBER	MIN./MAX. LENGTH (Extension Tube Range)
520593	2 1/4" to 3 1/8"
520594	3 1/8" to 4 7/8"
520595	4 7/8" to 7"
520596	7" to 9"

**Figure 15**  
NT 40 • P40



# VENT ASSEMBLY INSTALLATION (NT40 & P40)

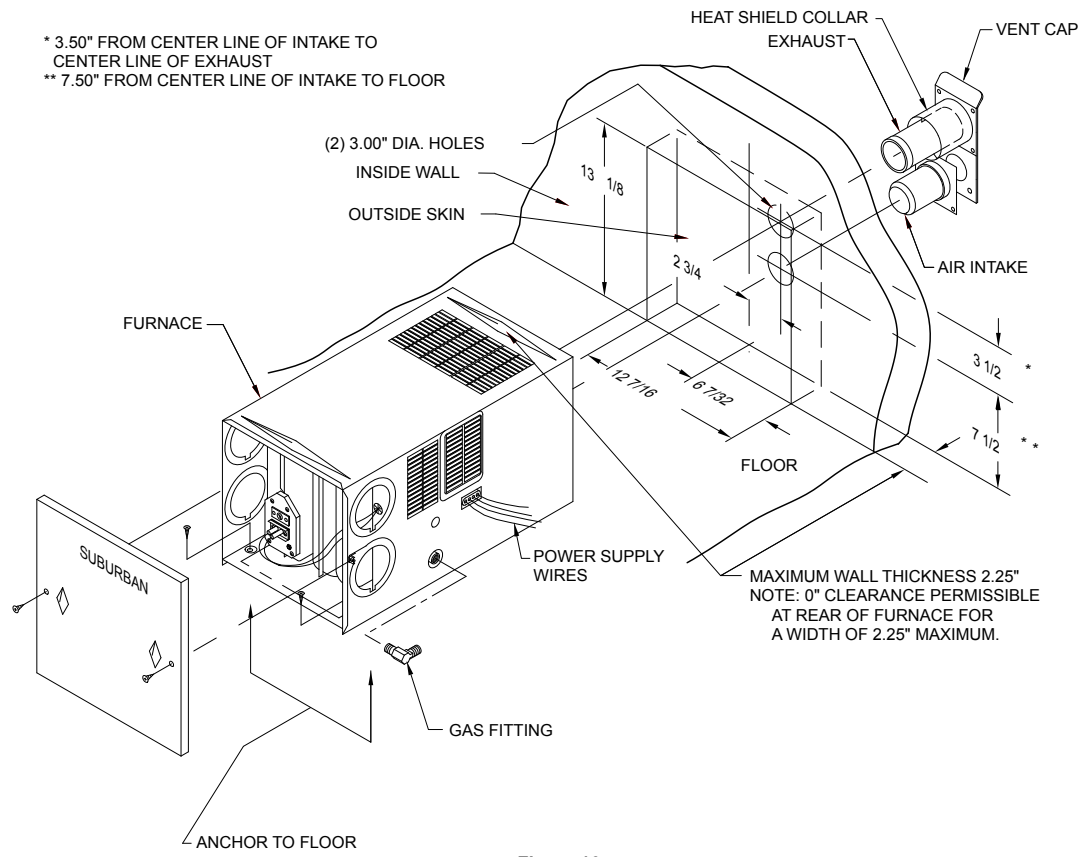


Figure 16  
NT40

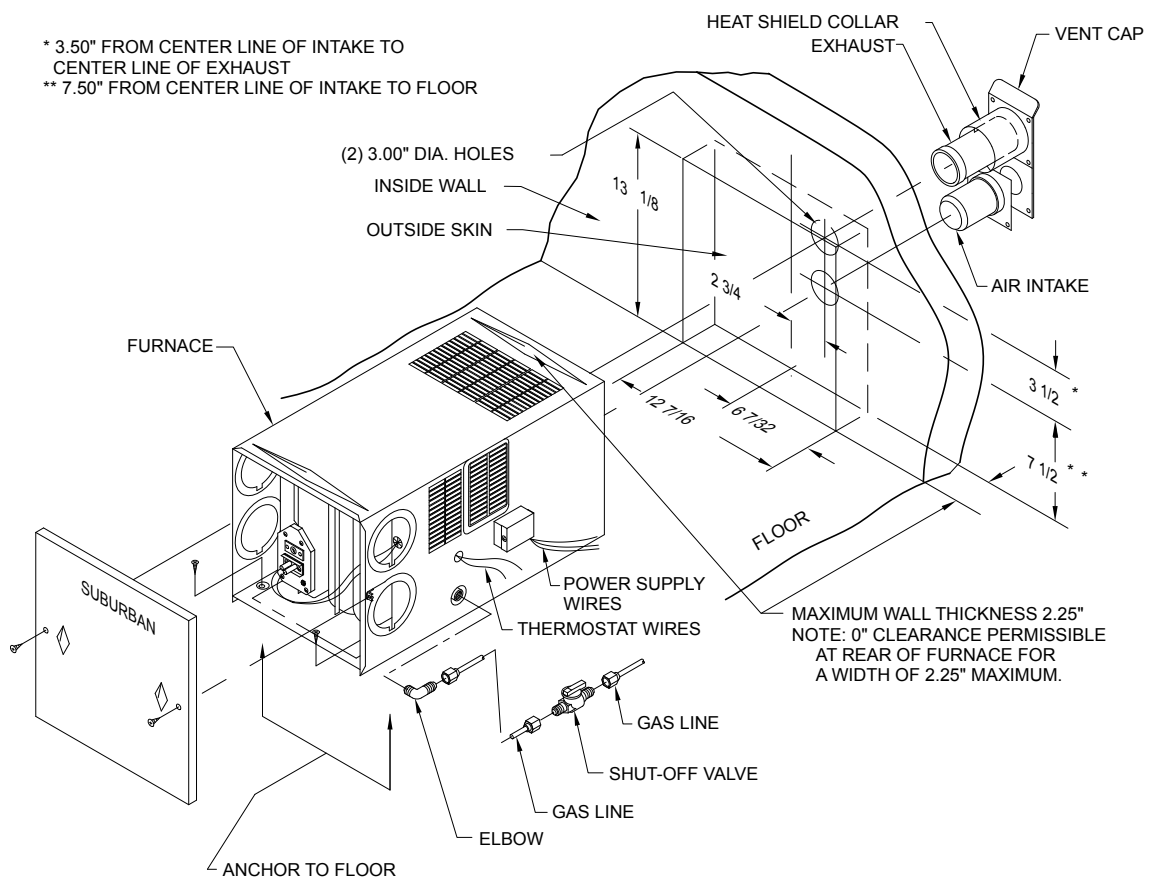


Figure 17  
P40

# VENT ASSEMBLY INSTALLATION (NT40 & P40)

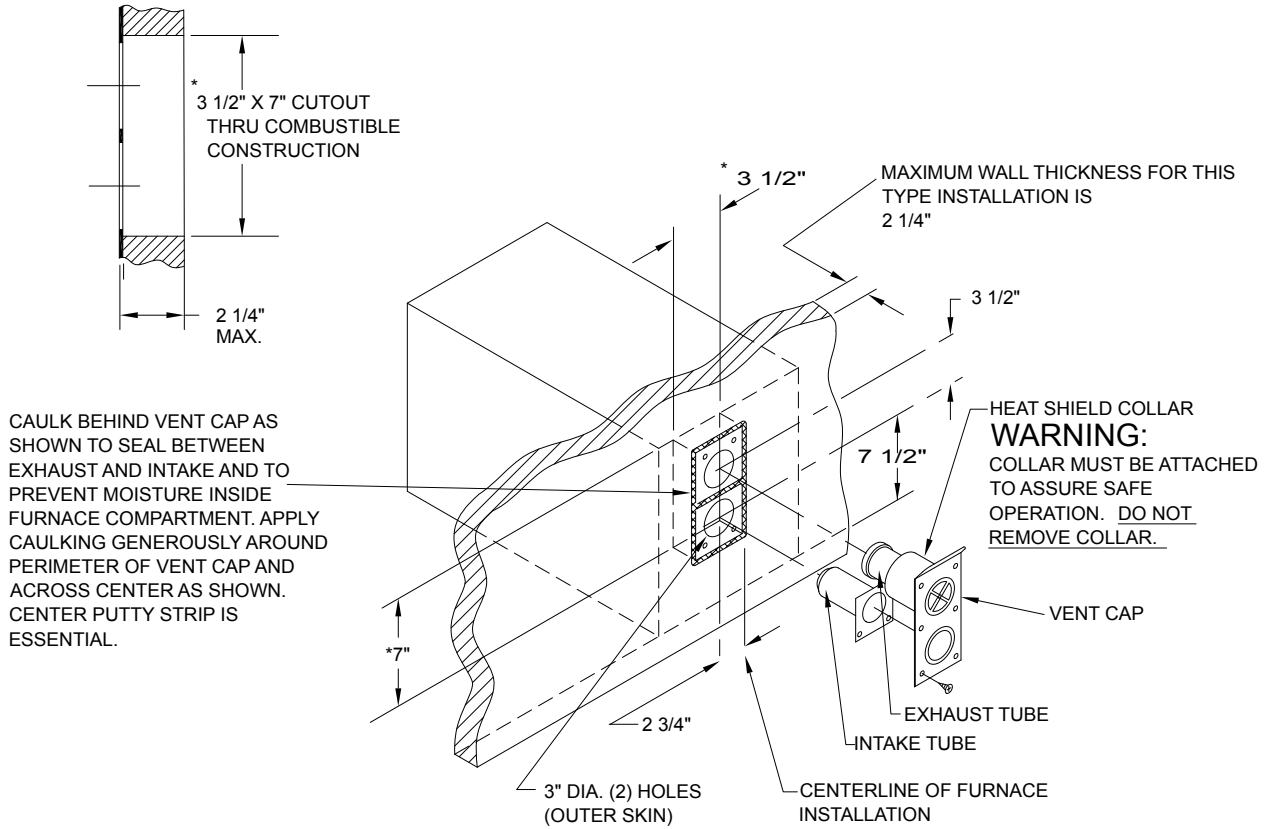
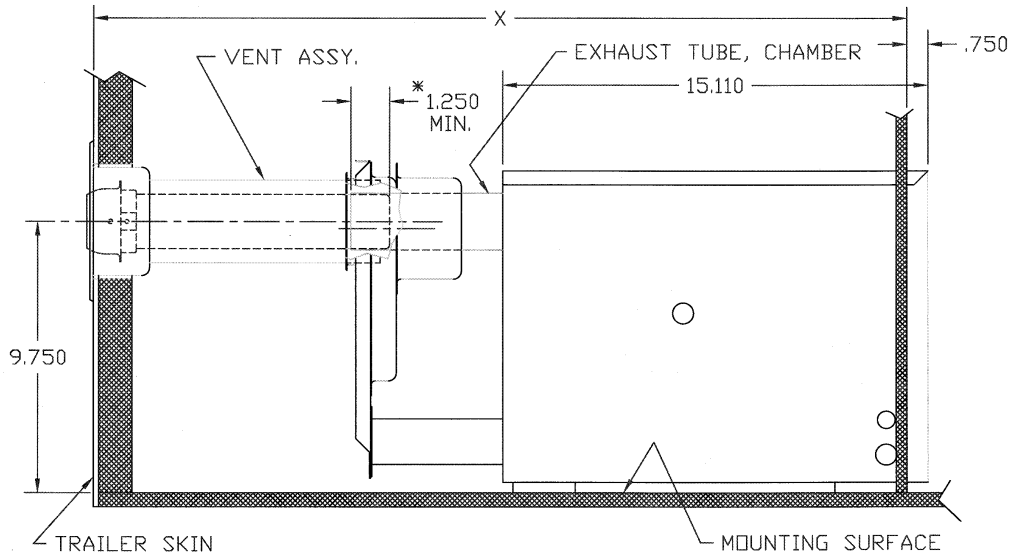


Figure 18  
NT40 • P40

# VENT ASSEMBLY INSTALLATION (DD SERIES)

Note: Vent cap must be installed on DD Furnace when bench testing.



PART NO.	VENT LENGTH	X DIMENSIONS
260197	5 7/8"	22" - 24 3/8"
260198	8 3/16"	24 3/8" - 26 5/8"
260199	10 1/2"	26 5/8" - 29"

\* NOTE:  
NEVER INSTALL VENT WITH LESS THAN 1,250" OVERLAP BETWEEN CHAMBER EXHAUST TUBE & VENT ASSY. EXHAUST TUBE.

Figure 19

# RETURN AIR

The cabinet that the furnace may be installed in will have louvers or openings for the return air back to the furnace. When the furnace is installed, it is imperative that the return air louvers on the furnace cabinet opening are not obstructed.

Usually, these furnaces are installed under a counter, sofa or bed in order to be out of the way. A grille or opening must be built into the cabinetry or into the base area of the sofa or bed. Return air from the living area of the trailer is drawn in through the grille and into the return air openings in the furnace cabinet. Figure 20 illustrates the return air circulation of the furnace. **Note: Refer to the installation manual for the minimum return air area for your specific furnace model.**

Insufficient return air will cause the furnace to overheat and cycle on limit. Another symptom of a return air problem is:

1. Furnace seems to run continuously in an effort to satisfy the thermostat.

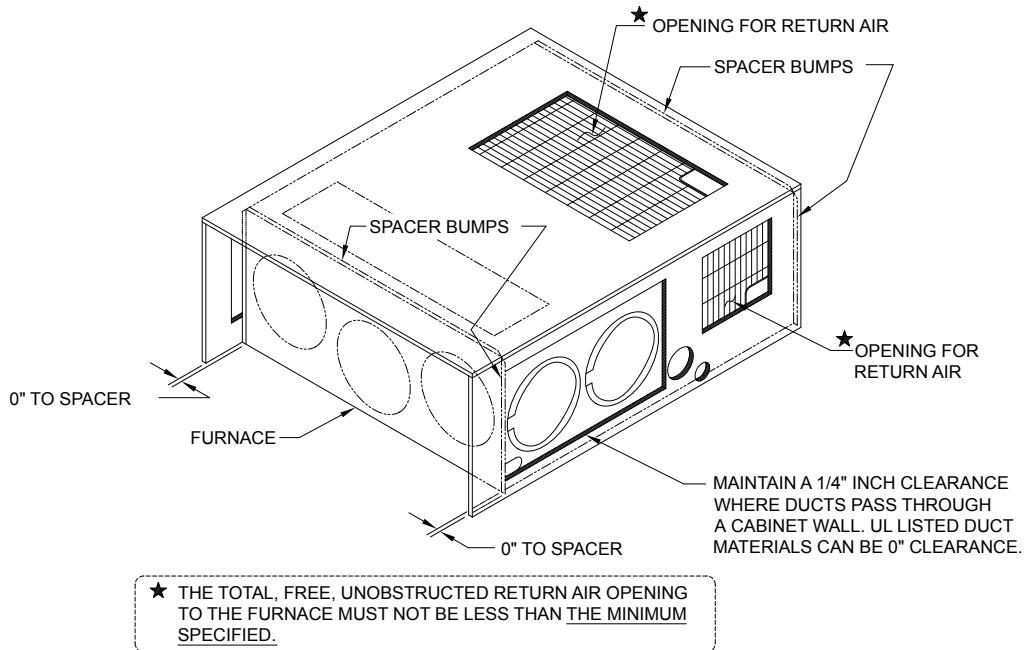


Figure 20  
SF 20F/25F/35F/42F

# DUCTING

Suburban furnaces require that a minimum duct area be maintained throughout entire duct system including through the register. It is very important to adhere to the minimum duct area in order to keep the furnace from cycling on high limit and to assure proper operation of the sail switch (sometimes referred to as a microswitch.) **NOTE: (Refer to the installation manual for the minimum ducted square inches area for each model.)**

**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.**

When installing a duct system, avoid making a lot of turns. The straighter the duct system, the less the resistance to air flow and the better the performance of the furnace.

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

The duct connections to the furnace cabinet should be tight to eliminate any heat loss which could result in overheating of the component parts on the furnace as well as a reduction in the heated air flow through the duct work.

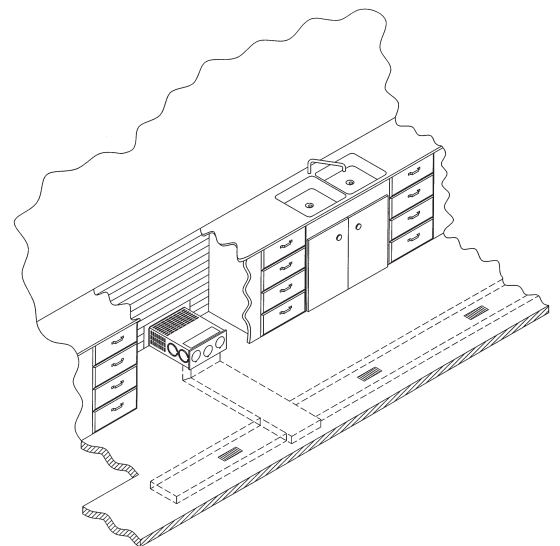


Figure 21

# RETURN AIR & DUCTING INSTALLATION REQUIREMENTS

MODELS	CLR FRONT	CLR TOP	CLR BTM	CLR BACK	CLR LEFT	CLR RIGHT	DUCTS REQ'D	BTM DUCT SQ INCH	TOP DUCT SQ INCH	L & R SIDE DUCT SQ INCH	RETURN AIR SQ INCH
DD-17DSI	SEE *1	0"	0"	0"	0"	0"	N/A	N/A	N/A	N/A	N/A
NT 12S	3/8"	1"	0"	0"	1"	1"	2 - 4"	N/A	N/A	25"	55"
NT 16S	3/8"	1"	0"	0"	1"	1"	2 - 4"	N/A	N/A	25"	55"
NT 20S	1"	1"	0"	0"	1"	1"	2 - 4"	N/A	N/A	25"	55"
NT 12SE	SEE *1	5/8"	0"	0"	5/8"	5/8"	N/A	N/A	N/A	N/A	N/A
NT 16SE	SEE *1	5/8"	0"	0"	5/8"	5/8"	N/A	N/A	N/A	N/A	N/A
NT 20SE	SEE *1	5/8"	0"	0"	5/8"	5/8"	N/A	N/A	N/A	N/A	N/A
NT 24SP	0"	0"	0"	0"	1"	1"	3 - 4"	48"	N/A	36"	55"
NT 30SP	0"	0"	0"	0"	1"	1"	3 - 4"	48"	N/A	36"	55"
NT 34SP	0"	0"	0"	0"	2"	2"	4 - 4"	48"	N/A	48"	55"
NT 40	1"	1"	0"	0"	2"	2"	4 - 4"	48"	N/A	48"	113"
P 30	0"	0"	0"	0"	1"	1"	4 - 4"	48"	N/A	48"	55"
P 40	1"	1"	0"	0"	2"	2"	4 - 4"	48"	N/A	48"	113"

\*1 - Special clearances for discharge grills. Refer to Installation and Instruction Manual.

\*2 - Return air should be 142" if 4 ducts are used. May be reduced to 88" if 5 ducts are used.

**NOTE:** 0" clearance is to spacer (flanges)

# RETURN AIR & DUCTING INSTALLATION REQUIREMENTS

MODELS	CLR FRONT	CLR TOP	CLR BTM	CLR BACK	CLR LEFT	CLR RIGHT	DUCTS REQ'D	BTM DUCT SQ INCH	TOP DUCT SQ INCH	L & R SIDE DUCT SQ INCH	RETURN AIR SQ INCH
SF 20/20F	1"	0"	0"	0"	0"	0"	2 - 4"	56"	56"	25"	55"
SF 20Q/20FQ	1"	0"	0"	0"	0"	0"	2 - 4"	56"	56"	25"	55"
SF 25/25F	1"	0"	0"	0"	0"	0"	3 - 4"	56"	56"	36"	55"
SF 25Q/25FQ	1"	0"	0"	0"	0"	0"	3 - 4"	56"	56"	36"	55"
SF 30/30F	1"	0"	0"	0"	0"	0"	3 - 4"	56"	56"	36"	55"
SF 30Q/30FQ	1"	0"	0"	0"	0"	0"	3 - 4"	56"	56"	36"	55"
SF35/35F	1"	0"	0"	0"	0"	0"	4 - 4"	56"	56"	48"	55"
SF35Q/35FQ	1"	0"	0"	0"	0"	0"	4 - 4"	56"	56"	48"	55"
SF 42/42F	1"	1"	0"	0"	2"	2"	4 - 4"	72" SEE *3	56"	48"	SEE *2
SF 42Q/42FQ	1"	1"	0"	0"	2"	2"	4 - 4"	72" SEE *3	56"	48"	SEE *2
SH 35	1"	0"	0"	0"	1"	1"	4 - 4"	56"	56"	48"	55"
SH 42	1"	1"	0"	0"	2"	2"	4 - 4"	72" SEE *3	56"	48"	SEE *2
SHD 2542	1"	1"	0"	0"	2"	2"	4 - 4"	72" SEE *3	56"	48"	SEE *2

\*1 - Special clearances for discharge grills. Refer to Installation and Instruction Manual.

\*2 - Return air should be 142" if 4 ducts are used. May be reduced to 88" if 5 ducts are used.

\*3 - Bottom duct required. SF42/42Q uses KIT# 520753, SH42 and SHD-2542 uses KIT# 520864.

**NOTE:** 0" clearance is to spacer (flanges)

# RETURN AIR & DUCTING INSTALLATION REQUIREMENTS

MODELS	CLR FRONT	CLR TOP	CLR BTM	CLR BACK	CLR LEFT	CLR RIGHT	DUCTS REQ'D	BTM DUCT SQ INCH	TOP DUCT SQ INCH	L & R SIDE DUCT SQ INCH	RETURN AIR SQ INCH
SFV 20/20F	1"	1"	0"	0"	1"	1"	SEE *4	52"	SEE *4	SEE *4	55"
SFV 25/25F	1"	1"	0"	0"	1"	1"	SEE *4	52"	SEE *4	SEE *4	55"
SFV 30/30F	1"	1"	0"	0"	1"	1"	SEE *4	52"	SEE *4	SEE *4	55"
SFV 35/35F	1"	1"	0"	0"	1"	1"	SEE *4	52"	SEE *4	SEE *4	55"
SFV 42/42F	1"	2"	0"	0"	1"	1"	SEE *4	52"	SEE *4	SEE *4	142"

\*1 - Special clearances for discharge grills. Refer to Installation and Instruction Manual.

\*2 - Return air should be 142" if 4 ducts are used. May be reduced to 88" if 5 ducts are used.

\*3 - Bottom duct required. SF42/42Q uses KIT# 520753, SH42 and SHD-2542 uses KIT# 520864.

\*4 - For Vertical mount furnace, review the table below for ducting requirements. The duct requirements must be followed in order to assure proper operation of the furnace. The minimum open duct areas listed below must be maintained through the entire duct system, including through register.

**NOTE:** 0" clearance is to spacer (flanges)

22

MODELS	TOP AND FRONT DUCTS (4" Round)	BOTTOM	LEFT DUCT	RIGHT DUCT
	Minimum Duct Area	Minimum Duct Area	Minimum Duct Area	
SFV 20/20F	*Optional	Required 52 SQ. IN.	*Optional	*Optional
SFV 25/25F	*Optional	Required 52 SQ. IN.	*Optional	*Optional
SFV 30/30F	*Optional	Required 52 SQ. IN.	*Optional	*Optional
SFV 35/35F	48 SQ. IN. (Bottom Front Duct Not to be Used)	52 SQ. IN.	56 SQ. IN.	DO NOT USE
SFV 42/42F	48 SQ. IN. (Top Front Duct Not to be Used)	52 SQ. IN.	56 SQ. IN.	72 SQ. IN.

\*Use of these ducts are in addition to the required use of the bottom duct

# ELECTRICAL SUPPLY INFORMATION

## 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 120 volts A.C. Damage to furnace component parts will occur.**

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.

# FURNACE SPECIFICATIONS

12 VDC MODELS								
MODEL	DESCRIPTION	INPUT BTU/hr	GAS TYPE	VOLTAGE	MOTOR DIAMETER	AMP DRAW	STATIC PRESSURE	C.F.M. MAX.
DD-17DSI	Direct Discharge	17,000	PROPANE	12 VDC	3"	2.9	N/A	145
NT 12S	Ducted	12,000	PROPANE	12 VDC	3"	2.8	.1" WC	122
NT 16S	Ducted	16,000	PROPANE	12 VDC	3"	2.8	.1" WC	165
NT 20S	Ducted	19,000	PROPANE	12 VDC	3"	2.8	.1" WC	165
NT 12SE	Direct Discharge	12,000	PROPANE	12 VDC	3"	2.8	N/A	140
NT 16SE	Direct Discharge	16,000	PROPANE	12 VDC	3"	2.8	N/A	140
NT 20SE	Direct Discharge	19,000	PROPANE	12 VDC	3"	2.8	N/A	150
NT 24SP	Ducted	24,000	PROPANE	12 VDC	2.5"	3.5	.2" WC	265
NT 30SP	Ducted	30,000	PROPANE	12 VDC	2.5"	5.5	.2" WC	345
NT 34SP	Ducted	34,000	PROPANE	12 VDC	2.5"	7.5	.1" WC	373
NT 40	Ducted	40,000	PROPANE	12 VDC	2.5"	9.5	.155"/.20B	441
PARK MODELS								
P 30S	Ducted	30,000	PROPANE	120 VAC	3"	2.5	.15" WC	345
P 40**	Ducted	40,000	PROPANE	120 VAC	3"	2.0	.15" WC	441

**NOTE:**

\*\* P 40 Park Model Furnace and valve is convertible to Natural Gas. Instructions on converting unit to Natural Gas are on Sticker on side of cabinet.



# FURNACE SPECIFICATIONS

<b>12 VDC MODELS</b>								
<b>MODEL</b>	<b>DESCRIPTION</b>	<b>INPUT BTU/hr</b>	<b>GAS TYPE</b>	<b>VOLTAGE</b>	<b>MOTOR DIAMETER</b>	<b>AMP DRAW</b>	<b>STATIC PRESSURE</b>	<b>C.F.M. MAX.</b>
SF 20/20F	Ducted	20,000	PROPANE	12 VDC	3"	6.5=2.5 IN. MOTOR 8.5=3 IN	.2" WC	300
SF 20Q/20FQ	Ducted	20,000	PROPANE	12 VDC	3"	7.0=3 IN. MOTOR	.2" WC	300
SF 25/25F	Ducted	25,000	PROPANE	12 VDC	3"	6.5=2.5 IN. MOTOR 8.5=3 IN	.2" WC	300
SF 25Q/25FQ	Ducted	25,000	PROPANE	12 VDC	3"	7.0=3 IN. MOTOR	.2" WC	300
SF 30/30F	Ducted	30,000	PROPANE	12 VDC	3"	6.5=2.5 IN. MOTOR 8.5=3 IN	.2" WC	300
SF 30Q/30FQ	Ducted	30,000	PROPANE	12 VDC	3"	7.0=3 IN. MOTOR	.2" WC	300
SF35/35F	Ducted	35,000	PROPANE	12 VDC	3"	8.5=2.5 IN. MOTOR 9.4=3 IN	.2" WC	375
SF35Q/35FQ	Ducted	35,000	PROPANE	12 VDC	3"	8.4=3 IN. MOTOR	.2" WC	375
SF 42/42F	Ducted	40,000	PROPANE	12 VDC	3"	11.5	.25" WC	430
SF 42Q/42FQ	Ducted	40,000	PROPANE	12 VDC	3"	9.5	.25" WC	430
SFV 20/20F	Ducted	20,000	PROPANE	12 VDC	3"	8.5	.2" WC	300
SFV 25/25F	Ducted	25,000	PROPANE	12 VDC	3"	8.5	.2" WC	300
SFV 30/30F	Ducted	30,000	PROPANE	12 VDC	3"	8.5	.2" WC	300
SFV 35/35F	Ducted	35,000	PROPANE	12 VDC	3"	9.4	.2" WC	375
SFV 42/42F	Ducted	40,000	PROPANE	12 VDC	3"	11.5	.25" WC	430
SH 35/35F	Ducted	35,000	PROPANE	12 VDC	3"	8.2	.2" WC	375???
SH 42/42F	Ducted	40,000	PROPANE	12 VDC	3"	10.6	.25" WC	430
SHD 2542	Ducted	25,000 40,000	PROPANE	12 VDC	3"	8.8 (LOW) 12 (HIGH)	.25" WC	430

# SEQUENCE OF OPERATION FOR FAN CONTROL MODULE BOARD PART NUMBER 520820

TIME LINE	DESCRIPTION
<b>Start Time</b>	<p>The wall thermostat controls the operation of the furnace by reacting to room temperature. This allows current to flow through the ON/OFF switch to the module board.</p>
<b>Thermostat Calls for Heat</b>	<p>The module board constantly checks for a minimum 9.5 volts. If there is not 9.5 volts, the module board will go into a stand by mode until adequate power is supplied. It will then resume normal operation.</p> <p>Upon a call from the thermostat, the module board thermostat circuit will go active. The sail switch circuit is verified as being open. The blower output is energized. Blower motor starts.</p>
<b>15 Seconds Purge Cycle</b>	<p>The module board will then verify that the sail switch circuit is closed and motor is up to speed. If this circuit remains open for 30 seconds after the blower motor starts, the module board will go into lockout mode and shut down the blower motor.</p> <p>The module board checks that the gas valve relay contacts (which are located on the module board) are open before the ignition sequence starts.</p> <p>The board has a pre-purge timing circuit of approximately 15 seconds. This allows the combustion chamber to purge.</p>
<b>7 Seconds Ignition Cycle and Flame Sense</b>	<p>The module board will energize the gas valve and enable the high voltage spark output to the electrode for seven (7) seconds of ignition time.</p> <p>The module board will then check for flame sense to verify successful lighting of the main burner flame. Sparking of the igniter will then be terminated and the gas valve and blower outputs will remain energized.</p> <p>If ignition is successful the module board will monitor the flame sense, sail switch and limit switch circuits, and the thermostat inputs during the heating period.</p> <p>The flame is sensed through the spark wire and electrode. Therefore, it is essential that the electrode is properly positioned in the burner flame.</p>
<b>2nd and 3rd Ignition Cycles if Required</b>	<p><b><u>3 Try Ignition Board</u></b></p> <p>If the flame is <u>not</u> sensed after seven (7) seconds, a second 15 second purge cycle will begin followed by a second Trial-For-Ignition sequence. After three (3) Trial-For-Ignition attempts with no ignition of the main burner, the module board will de-energize the gas valve immediately and blower will run for 3 minutes and then shutdown in lockout mode.</p>
<b>Heating Cycle</b>	<p>If during the heating cycle, the limit switch circuit opens and remains open for 5 minutes, the module board will go into lock out and shut down the blower motor. If this occurs, the thermostat will need to be reset for the furnace to operate.</p>
<b>90 Second Shut Down</b>	<p>When the thermostat has reached its set point and the demand for heat ends, the gas valve will be de-energized and the flame will go out. The post purge period of 90 seconds begins. When it times out, the blower motor output is removed, and the blower stops.</p>

# SEQUENCE OF OPERATION

## FOR 24 VAC FAN CONTROL MODULE BOARD

### PART NUMBER 520947

TIME LINE	DESCRIPTION
Start Time	<p>The wall thermostat controls the operation of the furnace by reacting to room temperature. This allows current to flow through the ON/OFF switch to the module board.</p>
Thermostat Calls for Heat	<p>The module board constantly checks for a minimum 18 volts for normal operation.</p> <p>Upon a call from the thermostat, the module board thermostat circuit will go active. The sail switch circuit is verified as being open. The blower output is energized. Blower motor starts.</p>
15 Seconds Purge Cycle	<p>The module board will then verify that the sail switch circuit is closed and motor is up to speed. If this circuit remains open, blower motor will run continuously until sail switch closes</p> <p>The module board checks that the gas valve relay contacts (which are located on the module board) are open before the ignition sequence starts.</p> <p>The board has a pre-purge timing circuit of approximately 15 seconds. This allows the combustion chamber to purge.</p>
7 Seconds Ignition Cycle and Flame Sense	<p>The module board will energize the gas valve and enable the high voltage spark output to the electrode for 7 seconds of ignition time.</p> <p>The module board will then check for flame sense to verify successful lighting of the main burner flame. Sparking of the igniter will then be terminated and the gas valve and blower outputs will remain energized.</p> <p>If ignition is successful the module board will monitor the flame sense, sail switch and limit switch circuits, and the thermostat inputs during the heating period.</p> <p>The flame is sensed through the spark wire and electrode. Therefore, it is essential that the electrode is properly positioned in the burner flame.</p>
2nd and 3rd Ignition Cycles if Required	<p><b><u>3 Try Ignition Board</u></b></p> <p>If the flame is <u>not</u> sensed after seven (7) seconds, a second 15 second purge cycle will begin followed by a second Trial-For-Ignition sequence. After three (3) Trial-For-Ignition attempts with no ignition of the main burner, the module board will de-energize the gas valve immediately and blower will run for 3 minutes and then shutdown in lockout mode.</p>
Heating Cycle	<p>If during the heating cycle, the limit switch circuit opens and remains open, the gas valve will close and the blower motor will continue to run.</p>
90 Second Shut Down	<p>When the thermostat has reached its set point and the demand for heat ends, the gas valve will be de-energized and the flame will go out. The post purge period of 90 seconds begins. When it times out, the blower motor output is removed, and the blower stops.</p>

# SEQUENCE OF OPERATION FOR SHD-2542

TIME LINE	DESCRIPTION
<p><b>Start Time</b></p> <p><b>Thermostat Calls for Heat</b></p>	<p>The wall thermostat controls the operation of the dual stage furnace by reacting to room temperature. This allows current to flow through the ON/OFF switch to the Blower Speed Control Board then to the Module Board.</p> <p>The module board constantly checks for a minimum 9.5 volts. If there is not 9.5 volts, the module board will go into a stand by mode until adequate power is supplied. It will then resume normal operation.</p> <p>Upon a call from the thermostat, the First Stage will be activated (NOTE: Could be Second Stage if W1 &amp; W2 powered). The module board thermostat circuit will go active and the sail switch circuit is verified as being open. The blower output is energized. Blower motor starts.</p>
<p><b>15 Seconds Purge Cycle</b></p>	<p>The module board will then verify that the sail switch circuit is closed and motor is up to speed. If this circuit remains open for 30 seconds after the blower motor starts, the module board will go into lockout mode and shut down the blower motor.</p> <p>The module board checks that the gas valve relay contacts (which are located on the module board) are open before the ignition sequence starts.</p> <p>The board has a pre-purge timing circuit of approximately 15 seconds. This allows the combustion chamber to purge.</p>
<p><b>7 Seconds Ignition Cycle and Flame Sense</b></p>	<p>The module board will energize the gas valve and enable the high voltage spark output to the electrode for 7 seconds of ignition time.</p> <p>The module board will then check for flame sense to verify successful lighting of the main burner flame. Sparking of the igniter will then be terminated and the gas valve and blower outputs will remain energized.</p> <p>If ignition is successful the module board will monitor the flame sense, sail switch and the limit switch circuits, and the thermostat inputs during the heating period.</p> <p>The flame is sensed through the spark wire and electrode. Therefore, it is essential that the electrode is properly positioned in the burner flame.</p>
<p><b>2nd and 3rd Ignition Cycles if Required</b></p>	<p><b><u>3 Try Ignition Board</u></b></p> <p>If the flame is <u>not</u> sensed after seven (7) seconds, or if the unit fails to ignite, a second fifteen (15) second purge cycle will begin followed by a second Trial-For-Ignition sequence. After three (3) Trial-For-Ignition attempts with no ignition of the main burner, the module board will de-energize the gas valve immediately and blower will run for three (3) minutes and then shutdown in lockout mode.</p>
<p><b>2nd Stage Heating Cycle</b></p>	<p>If during the thermostat cycle, the demand for heat drops below the second stage thermostat setting (3 to 5 degrees variance depending on thermostat manufacturer), the blower speed control board will be energized. The blower speed control board will energize the additional gas valve solenoid and increase motor speed to the high position. Furnace will remain in the second stage operation until thermostat is satisfied.</p>
<p><b>90 Second Shut Down</b></p>	<p>When the thermostat has reached its set point and the demand for heat ends, the gas valve will be de-energized and the flame will go out. The post purge period of 90 seconds begins. When it times out, the blower motor output is removed, and the blower stops.</p>

# SEQUENCE OF OPERATION FOR FURNACES EQUIPPED WITH TIME DELAY

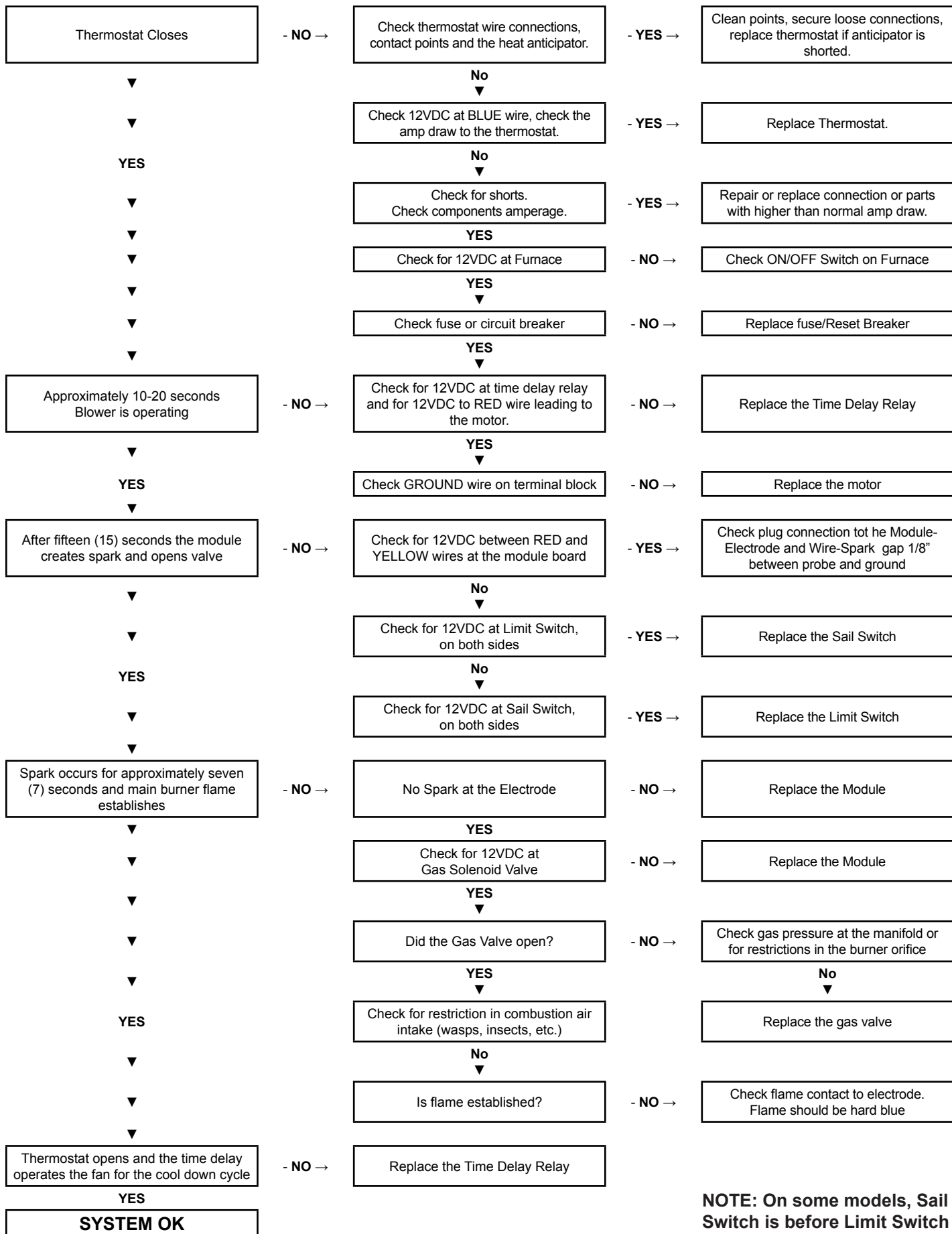
TIME LINE	DESCRIPTION
<b>Start Time</b>	The wall thermostat controls the operation of the furnace by reacting to room temperature upon a call from the thermostat, this allows current to flow through the ON/OFF switch then to the relay.
<b>Thermostat Calls for Heat</b>	<p>The relay receives the power and allows power to pass through to the switch within the relay. This is done by a heater coil within the relay which actuates a bi-metal disc closing the relay circuit.</p> <p>The module board thermostat circuit will go active. The sail switch circuit is verified as being open. The blower output is energized. Blower motor starts.</p>
<b>15 Second Purge Cycle</b>	<p>The limit switch protects the furnace from over heating conditions. The contacts in the limit switch open at a given temperature setting, shutting off power to the ignition system which controls the gas valve.</p> <p>As the room air wheel comes up to speed, air flow closes the sail switch completing the circuit. The sail switch is placed into the system as a safety to prove there is adequate air for combustion.</p>
<b>7 Seconds Ignition Cycle and Flame Sense</b>	<p>The next operation is controlled by the Direct Spark Ignition (DSI) system as power is applied to the DSI Board. The system will do the following:</p> <ol style="list-style-type: none"> <li>1. The board has a timing circuit which allows the blower to purge the chamber of any products of combustion or gas.</li> <li>2. The board will then apply power to the gas valve. At the same time it produces a high voltage power supply to the electrode producing spark at the burner.</li> <li>3. The board will also confirm the presence of a flame. If the flame is not sensed after seven (7) seconds, the module will try two (2) more times and then go into lock out mode. The flame is sensed through the spark at the burner.</li> </ol>
<b>2 &amp; 3 Ignition Cycles If Needed</b>	If the flame is <u>not</u> sensed after seven (7) seconds, a second 15 second purge cycle will begin followed by a second Trial-For-Ignition sequence. After three (3) Trial-For-Ignition attempts with no ignition of the main burner, the module board will de-energize the gas valve immediately and blower motor will continue to operate.
<b>Heating Cycle</b>	If during the heating cycle, the limit switch circuit opens and remains open, the gas valve will close and the blower motor will continue to run.
<b>90 Second Shut Down</b>	When the thermostat has reached its set point and the demand for heat ends, the gas valve will be de-energized and the flame will go out. The post purge period of 90 seconds begins. When it times out, the blower motor output is removed, and the blower stops.

**NOTE:** On some models, Sail Switch is before limit switch.

# TROUBLE SHOOTING GUIDE

## SUBURBAN RV FURNACES with TIME DELAY

### 12 VDC HEATING SECTION

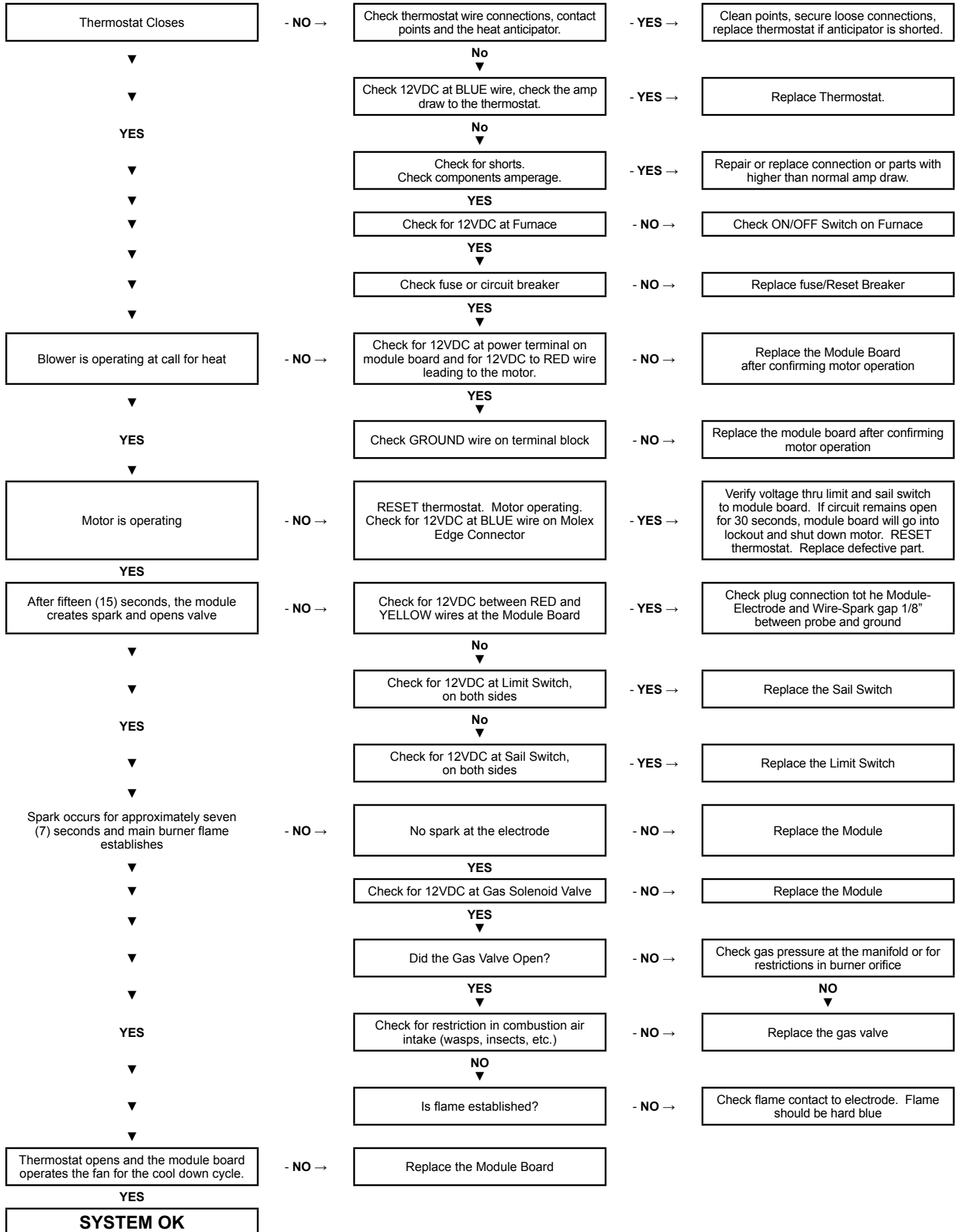


**NOTE: On some models, Sail Switch is before Limit Switch**

# TROUBLE SHOOTING GUIDE

## SUBURBAN RV FURNACES with FAN CONTROL MODULE BOARDS

### 12 VDC HEATING SECTION



# SERVICE HINTS, DIAGNOSIS, and CORRECTIVE MEASURES

## FOR THE IGNITION SYSTEMS OF SUBURBAN

### 24 VOLT ELECTRONIC IGNITION GAS FURNACES WITH TIME DELAY

#### CAUTIONS

1. Never operate the furnace with the electrode wire disconnected nor with the electrode assembly removed from the furnace.
2. Never use a screwdriver on any part of the electrode assembly while the furnace is in operation.
3. Be certain that the spark from the electrode never reaches the flame sensor portion of the electrode assembly.
4. Be sure the electrode assembly screws are snug at all times, especially after the electrode has been removed and reinstalled.
5. If the module board is found to be defective, it must be replaced - it is not field repairable. Any attempts to repair the board may alter the board and cause it to operate in an unsatisfactory manner.
6. Insure that the gap between electrode and ground is always 1/8". The gap between the flame sensor should be approximately twice the gap between electrode and ground to insure no sparking to sensor. Sparking to sensor will damage the module board.

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 several functions.

1. When the blower reaches approximately 75% of the normal R.P.M. and sufficient air flow is established, the sail switch engages and completes a 24 volt circuit through the limit switch to the module board.
2. After a 12 - 18 second delay, 24 volt current will pass through the module board to the solenoid valve. The current to the valve opens it and allows gas to the main burner; simultaneously, the module board sends high voltage through the electrode wire to the electrode assembly. The voltage seeks a ground between electrode and ground probe and a spark occurs. The spark then ignites the main burner.
3. The module board also performs the lockout function in cases where the spark fails to light the burner. When lockout occurs, the spark stops, 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. Turning the thermostat off disengages the lockout function of the module board. After the blower has stopped, the ignition sequence can be started again. The module will try three times for ignition before lockout.

It is important to determine the type problem being experienced, 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.

1. Electrode not sparking - with blower running and micro switch engaged, check the following:
  - a. Check for proper voltage at module board after the blower motor reaches full R.P.M. If no voltage, check continuity through micro switch and limit switch. Also check wiring and wire connections.
  - b. Voltage is present but no spark 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 to be sure it is 1/8" maximum between electrode and ground. NOTE: Gap between sensor and ground must be twice electrode gap.
  - e. Electrode gap OK - check electrode assembly for possible cracks or carbon on tip of electrode.
  - f. Electrode OK - replace module board.
2. Electrode sparking, but gas not coming through burner:
  - a. Check to see if voltage is coming out of module board to gas valve after the 12 - 18 second delay. Check the wires in the molex connector to be sure they are intact and making contact with the module board. Check wire from the module board to valve for continuity. Wire and connections check OK - replace module board.
  - b. Voltage is coming out of module board to gas valve, but gas valve does not open - replace gas valve.
3. Electrode sparking and gas valve opening, but burner will not light:
  - a. Check to see if gas is coming through to the burner. This can be accomplished by using a flow meter in the gas supply line. If no gas is coming through the 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.  
Line Pressure - Min. 11" W.C.\*, Max. 14" W.C.

To properly check pressure, first determine the line pressure, cycle furnace and check pressure drop on demand. The drop in pressure should not be more than 1/2" W.C. A drop of more than 1/2" W.C. would indicate a faulty regulator, a restriction in the gas line, or a pinched gas line. Excessive pressure drop could also be due to moisture contamination.





# WIRING DIAGRAMS

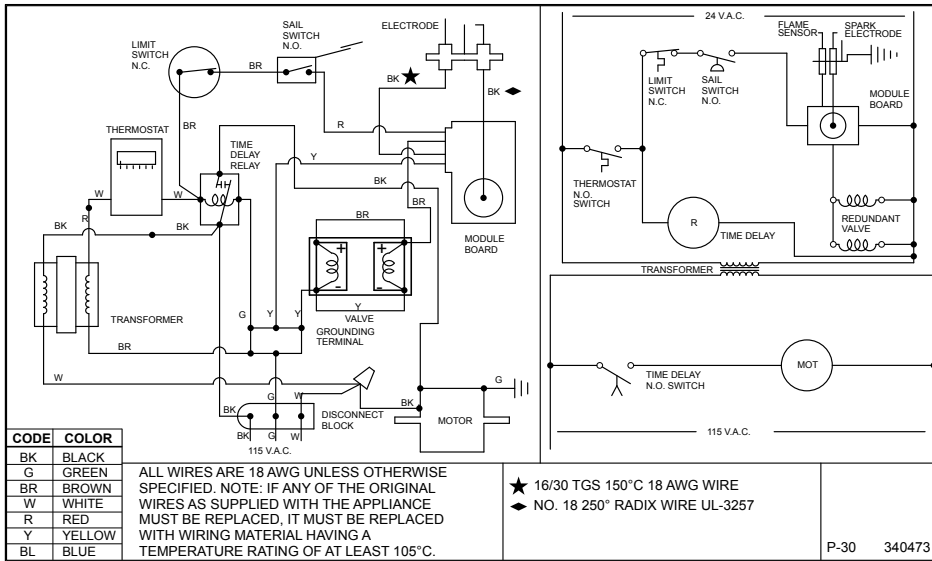


Figure 21 • P-30S with Time Delay

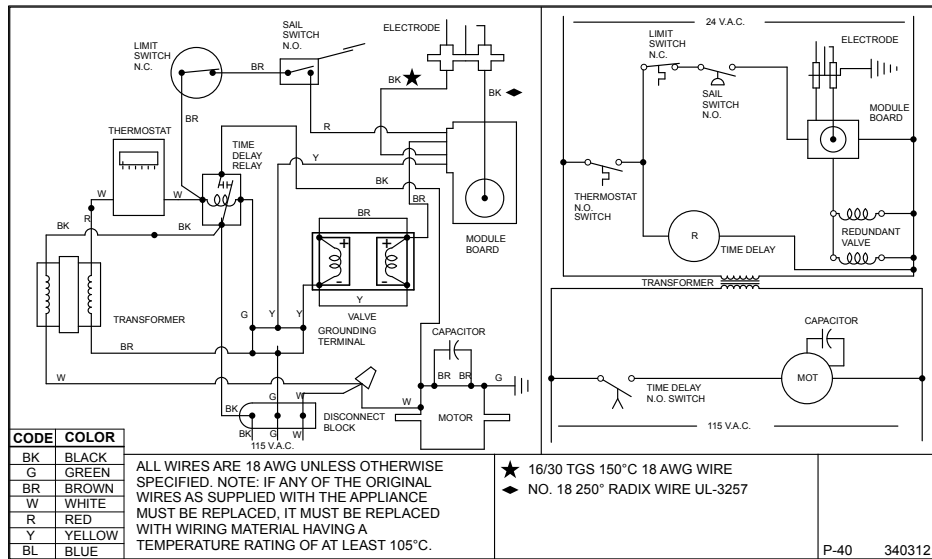


Figure 22 • P-40 with Time Delay

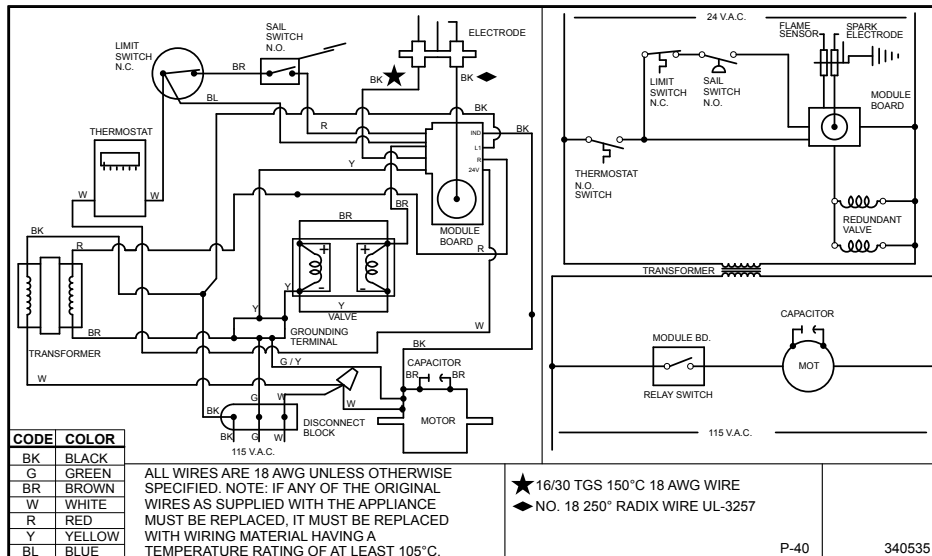
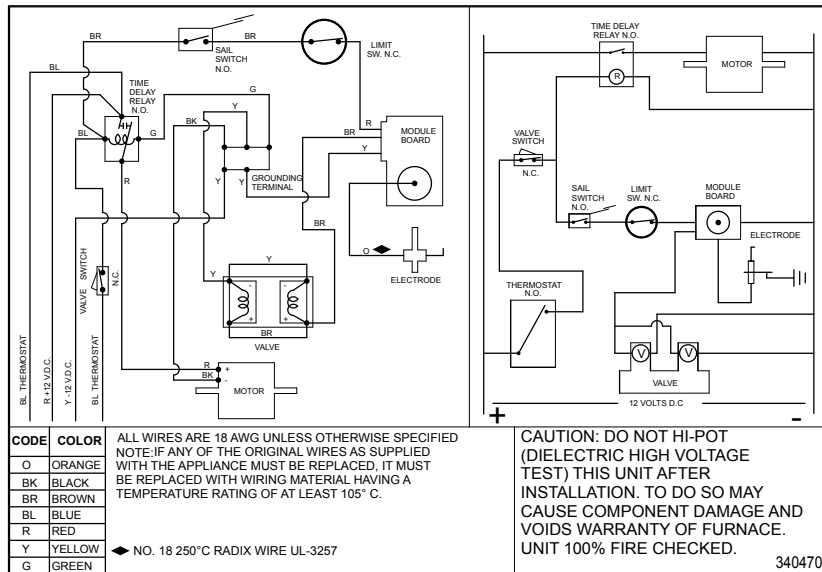
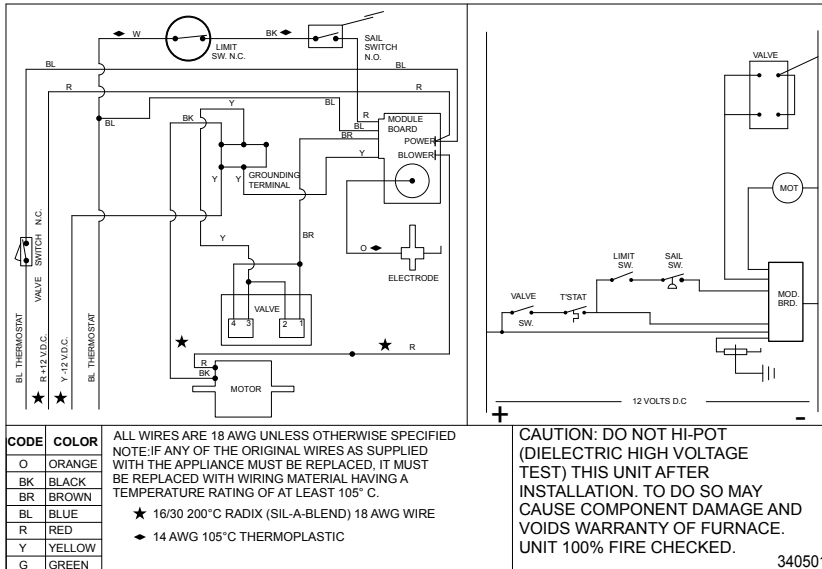


Figure 23 • P-40 Fan Control Board

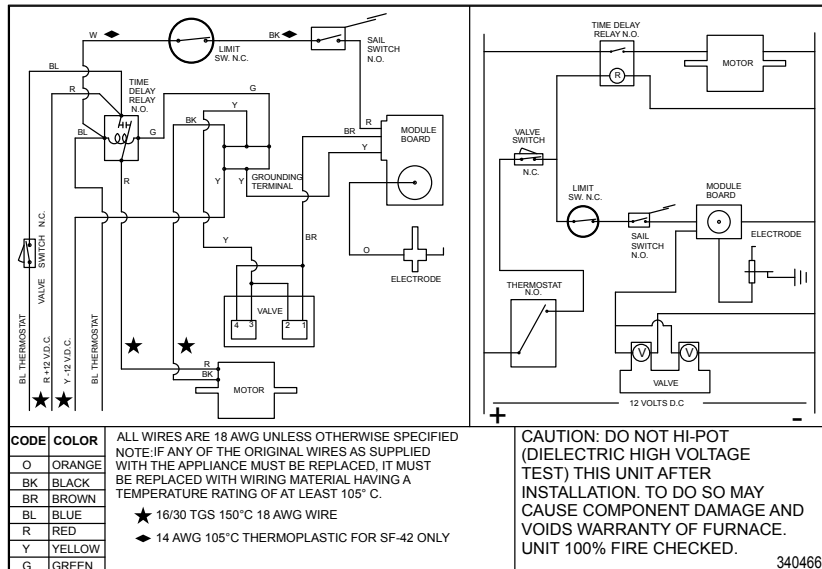
# WIRING DIAGRAMS



**Figure 24 • NT MODELS, Local Flame Sense with Time Delay**



**Figure 25 • SF 20F/25F/30F/35F/42F, Fan Control Board**



**Figure 26 • SF MODELS, Local Flame Sense with Time Delay**

# WIRING DIAGRAMS

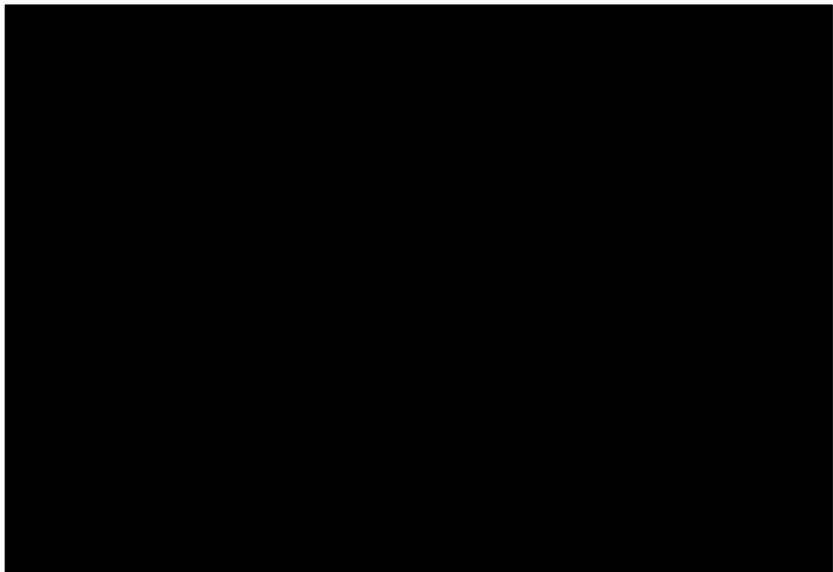


Figure 27 • NT 12S/16S/20S & SE MODELS, Fan Control Board

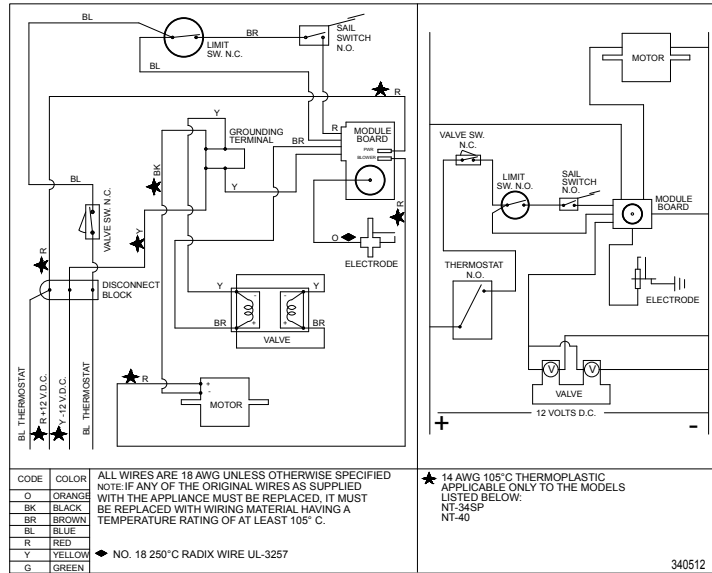


Figure 28 • NT 24SP/30SP/34SP & NT 40 MODELS, Fan Control Board

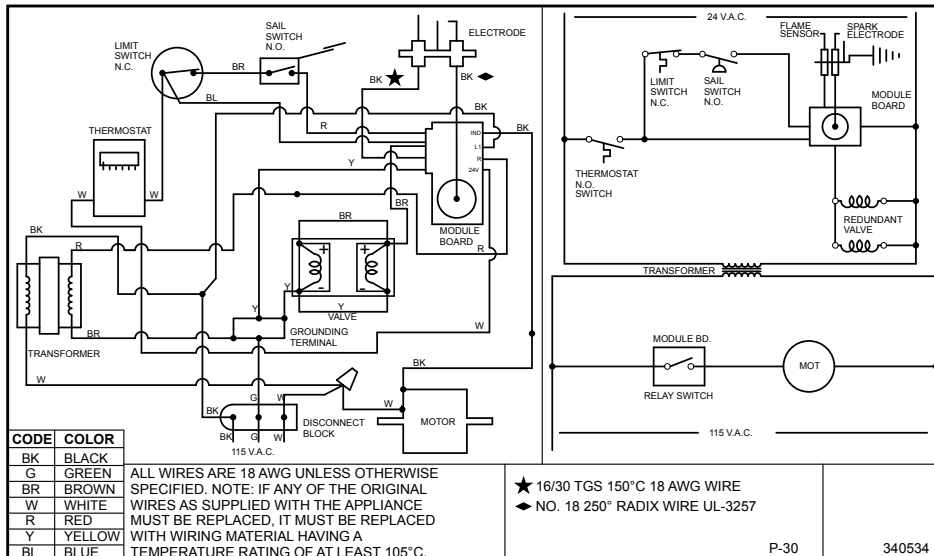


Figure 29 • P-30S, Fan Control Board

# SF, SH AND SHD-2542 ELECTRODE GAP SPECIFICATIONS AND POSITIONING

To assure consistent ignition of the burner, it is important for the electrode to be positioned properly over the top of the burner. When replacing the electrode, or should you be experiencing ignition type problems, the electrode should be positioned as outlined in the drawing.

1. Remove the furnace chamber assembly from the furnace cabinet following instructions listed in the installation manual.
2. Remove the burner access door. Manifold assembly will have to be removed at the valve. Remove the burner from the combustion chamber by removing six (6) screws which attach the burner to the chamber and air baffles (plates). Remove top air baffle and clip.
3. 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 the 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 position of the two (2) rows of burner ports in the top of the burner.
  - c. Using a black felt-tip pen, mark a line along top of burner  $3/16$ " from back of lance and parallel with lance. Make an additional mark indication center line of the lance. (See illustration). Both marks will be used later as reference marks; therefore, keep lines thin.
4. Reassemble the burner into the chamber. Be sure the air baffles (plates) are positioned as removed. Mount center clip in place.
5. 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 3C). (See illustration).
6. **IMPORTANT:** Be sure electrode probe maintains a  $1/8$ " spark gap over the burner as illustrated.
7. Reinstall burner access door and reconnect manifold. Manifold must be checked for leaks with unit operating, before installing in cabinet. Reinstall furnace into the cabinet following the instructions in the installation manual. Check all gas connections for leaks using proper leak test solution.

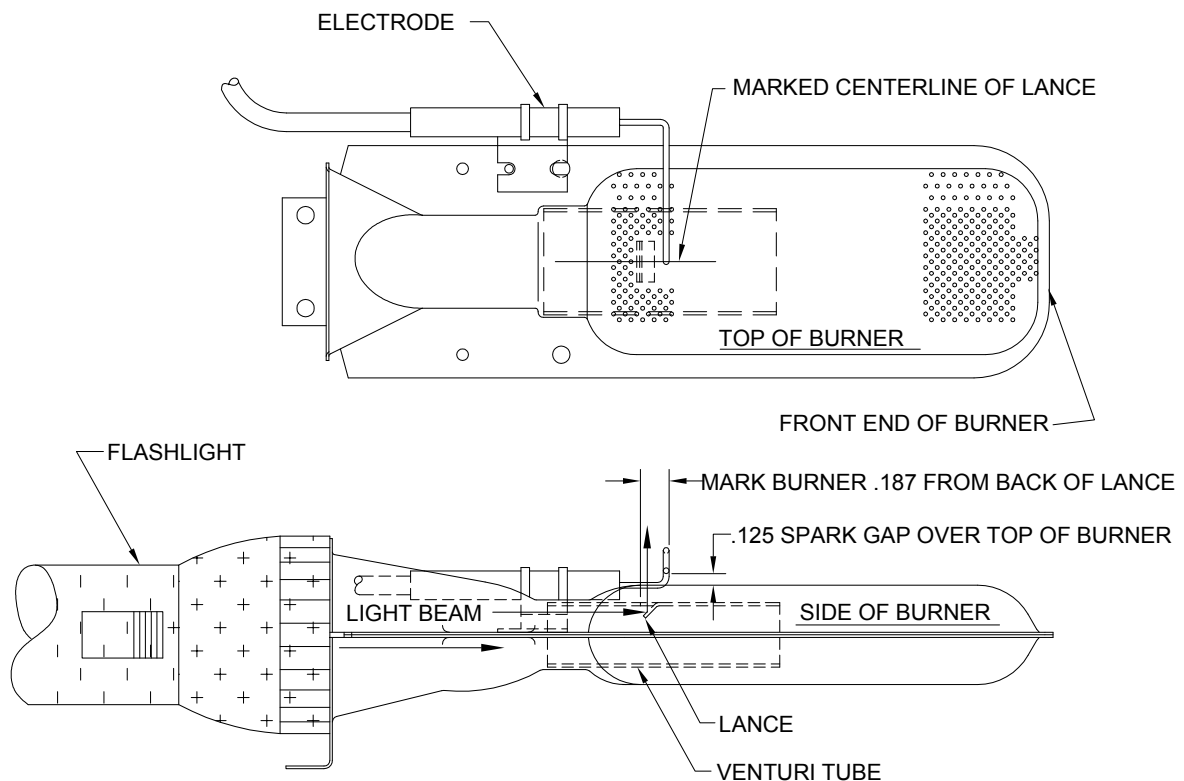
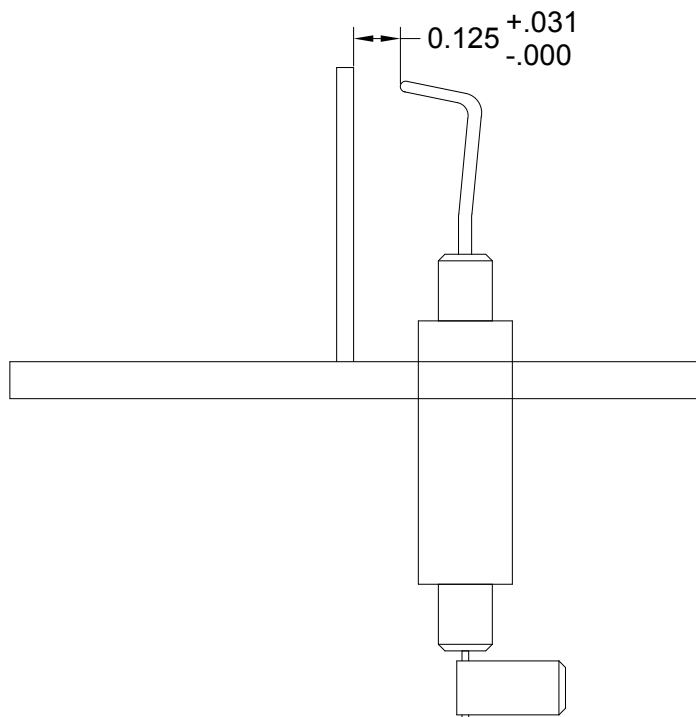


Figure 30

# NT ELECTRODE GAP SPECIFICATIONS AND POSITIONING

To assure consistent ignition of the burner, it is important for the electrode to be positioned properly over the top of the burner. When replacing the electrode, or should you be experiencing ignition type problems, the electrode should be positioned as outlined in the drawing.

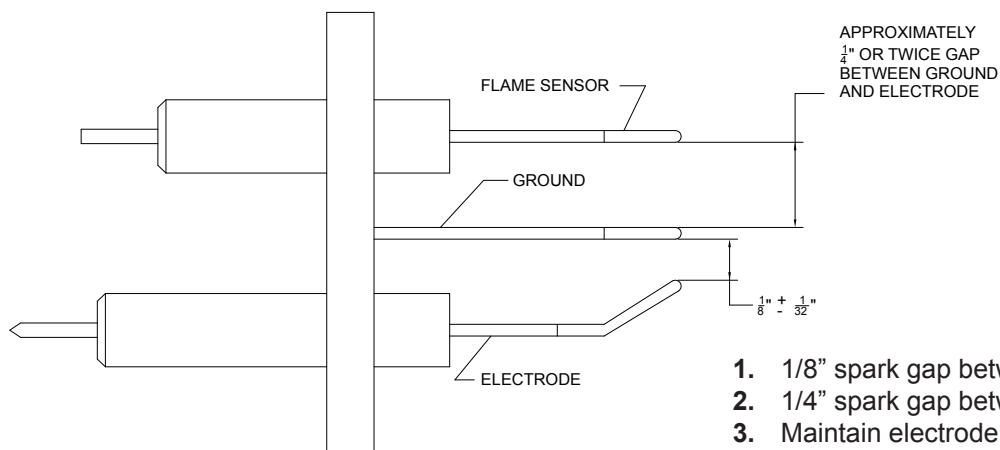


1. 1/8" spark gap between electrode and ground.
2. Maintain electrode position of 3/16" over burner ports.

Figure 31  
Local Flame Sense

# PARK MODEL ELECTRODE GAP SPECIFICATIONS AND POSITIONING

To assure consistent ignition of the burner, it is important for the electrode to be positioned properly over the top of the burner. When replacing the electrode, or should you be experiencing ignition type problems, the electrode should be positioned as outlined in the drawing.



1. 1/8" spark gap between electrode and ground.
2. 1/4" spark gap between ground and flame sensor.
3. Maintain electrode position of 3/16" over burner ports.

Figure 32  
Remote Flame Sense

# MAINTENANCE

Preventative maintenance is essential if an RV owner is to have reliable, safe operation of his furnace. Two important areas to watch closely in order to assure safe, reliable operation are the venting and the main burner.

An obstruction in the vent or main burner will reduce the combustion air which results in incomplete combustion. Whenever incomplete combustion occurs, the by-products are carbon monoxide (CO) and soot. If the furnace exhaust vent shows black soot forming, the furnace should not be operated until the problem is corrected. Two common causes are:

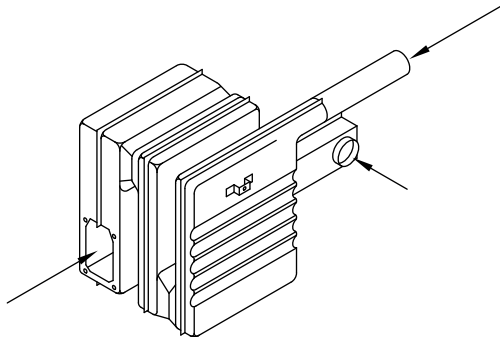
1. Restriction in the vent or furnace intake (screens, wasp nests, tape).
2. Dirty burner.

If operation of the furnace continues under these conditions, it could result in serious injury to the occupants of the RV or even death.

Cleaning of the main burner and an inspection of the venting system should be done at least once a year, preferably just before the beginning of the heating season. Some RV owners and service personnel have the false assumption that if a furnace has not been used, it will not require cleaning. **NOT SO!** A furnace which has not been used for some time could be more in need of cleaning than a furnace which has been used extensively.

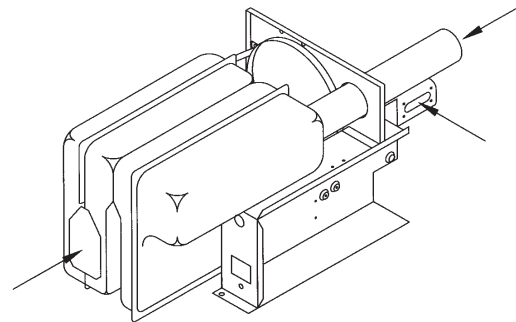
Dust and lint should be removed from the room air blower wheel and sail switch. A build up of dust and lint on the blower wheel can cause the motor to drag and not generate enough air flow to engage the sail switch. Dust accumulation on the sail switch will restrict the travel of the actuator arm and prevent operation of the valve circuit.

A yearly inspection should be made of all gaskets on the furnace. If any gaskets show signs of leakage or deterioration, they must be replaced.



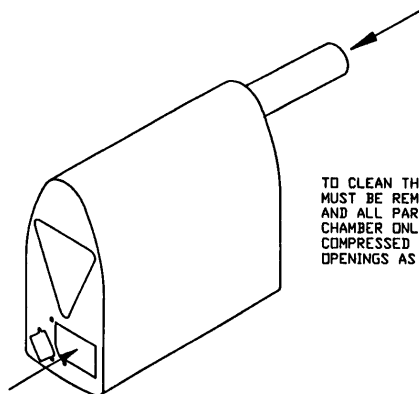
TO CLEAN THE CHAMBER, THE FURNACE MUST BE REMOVED FROM THE CABINET AND THE MANIFOLD, BLOWER ASSEMBLY AND CONTROLS REMOVED, LEAVING THE **CHAMBER ONLY** AS SHOWN ABOVE. USING COMPRESSED AIR, BLOW THROUGH THE CHAMBER, AS SHOWN BY ARROWS, TO REMOVE SOOT OR LOOSE DEBRIS.

Figure 33



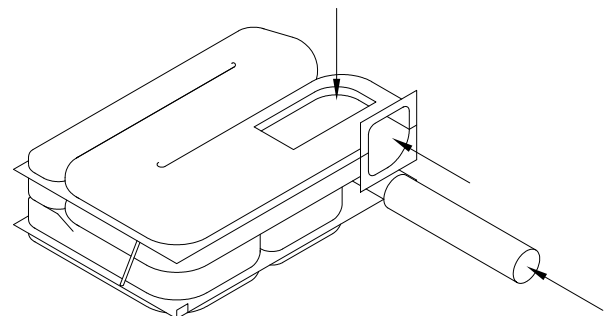
TO CLEAN THE CHAMBER, THE FURNACE MUST BE REMOVED FROM THE CABINET AND THE MANIFOLD BLOWER ASSEMBLY AND CONTROLS REMOVED LEAVING THE CHAMBER ONLY, AS SHOWN. USING COMPRESSED AIR BLOW THROUGH THE CHAMBER AS SHOWN BY ARROWS, TO REMOVE SOOT OR LOOSE DEBRIS.

Figure 35



TO CLEAN THE CHAMBER, THE FURNACE MUST BE REMOVED FROM THE CABINET AND ALL PARTS REMOVED LEAVING THE CHAMBER ONLY AS SHOWN. USING COMPRESSED AIR BLOW THROUGH OPENINGS AS SHOWN BY ARROWS.

Figure 34



TO CLEAN THE CHAMBER, THE FURNACE MUST BE REMOVED FROM THE CABINET AND THE MANIFOLD, BLOWER ASSEMBLY AND CONTROLS REMOVED LEAVING THE **CHAMBER ONLY**, AS SHOWN. USING COMPRESSED AIR, BLOW THROUGH THE CHAMBER, AS SHOWN BY ARROWS, TO REMOVE SOOT OR LOOSE DEBRIS.

Figure 36



676 Broadway Street  
Dayton, Tennessee 37321  
423-775-2131  
Fax 423-775-7015  
[www.RVComfort.com](http://www.RVComfort.com)

All information published in this manual is subject to change without notice.