



HATS01-HATS09

High Altitude Two-Stage Conversion Kit Installation Instructions



WARNING

This conversion kit shall be installed by a qualified agency in accordance with the manufacturer's instructions and all applicable codes and requirements of the authority having jurisdiction. If the information in these instructions is not followed exactly, a fire, explosion or production of carbon monoxide may result causing property damage, personal injury or loss of life. The qualified service agency performing this work assumes responsibility for the proper conversion of this appliance with this kit.

Kit Includes:

- Installation Instructions
- Pressure Switch Assembly
- Natural Gas Orifices
- Wire Ties

IMPORTANT NOTE: These kits are approved for use on Amana® brand furnace models listed on the following page only. These models are part of the family of 40 inch tall, 80 percent, noncondensing furnaces.

THE INSTALLATION AND SERVICING OF THIS EQUIPMENT SHOULD BE PERFORMED ONLY BY QUALIFIED, EXPERIENCED TECHNICIANS.

THIS KIT IS INTENDED FOR USE IN CANADA UP TO 4500 FEET ONLY. THE AMANA® 80% FURNACES ARE CGA CERTIFIED TO 4500 FEET ONLY.



RECOGNIZE THIS SYMBOL AS A SAFETY PRECAUTION.

ATTENTION INSTALLING PERSONNEL

As a professional installer you have an obligation to know the product better than the customer. This includes all safety precautions and related items.

Prior to actual installation, thoroughly familiarize yourself with this Instruction Manual. Pay special attention to all safety warnings. Often during installation or repair it is possible to place yourself in a position which is more hazardous than when the unit is in operation.

Remember, it is **your** responsibility to install the product safely and to know it well enough to be able to instruct a customer in its safe use.

Safety is a matter of common sense...a matter of thinking before acting. Most dealers have a list of specific good safety practices...follow them.

The precautions listed in this Installation Manual are intended as supplemental to existing practices. However, if there is a direct conflict between existing practices and the content of this manual, the precautions listed here take precedence.

*NOTE: Please contact your distributor or our website for the applicable product data book referred to in this manual.

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I. Description

These kits are required when installing Amana® Air Command® 80 SSE II furnaces above their maximum rated altitude (Table 1). Above rated altitude, a derating of the appliance must be followed since the CFM moved by the induced draft and blower fans remain almost constant while the pounds of oxygen in that air is reduced as the altitude increases. If this procedure is not followed and the fuel input is not reduced, combustion can be inefficient, incomplete or can possibly result in premature failure of the heat exchanger due to an excessive temperature rise.

Model Number	Rated Altitude Without Change
GUIS, GUIV, GCIS	Up to 3000 Feet

Table 1

The orifices in the high altitude kits have been selected as a result of testing with the American Gas Association. They will provide appropriate derating at the altitudes listed in Table 2. The selection is based on non-derated gas (about 1000 BTU/Ft³ for natural gas, and 2500 BTU/Ft³ for propane gas). If your gas supply has been derated for the altitude, contact your gas supplier for orifice sizing.

GUIS, GUIV, GCIS High Altitude Charts

	For 3,001 feet to 7,000 feet					For 7,001 to 8,500 feet			
	HATS01	HATS02	HATS03	HATS04	HATS05	HATS06	HATS07	HATS08	HATS09
GUI(S,V)070	X					X			
GUI(S,V)090		X				X			
GUI(S,V)115			X				X		
GUI(S,V)140				X				X	
GCIS070					X				X
GCIS090					X				X
Low Pressure Switch "WC	-0.37	-0.37	-0.37	-0.32	-0.27	-0.32	-0.32	-0.27	-0.23
High Pressure Switch "WC	-0.66	-0.6	-0.55	-0.55	-0.46	-0.55	-0.46	-0.46	-0.37
Natural Gas Orifices (DMS)	#44	#44	#44	#44	#44	#45	#45	#45	#45

NOTE: High Altitude Natural Gas Orifices are included in all HATS kits. For propane gas, refer to Table 4.

Table 2

Do not derate by adjusting the manifold pressures to lower pressure settings than what is specified on the furnace nameplate. With a lower density of air and a lower manifold pressure at the burner orifice, the orifice will not aspirate the proper amount of air into the burner. This can cause incomplete combustion of the gas, flashback, and/or possible yellow tipping.

In addition to using smaller orifices to reduce the fuel input, a different pressure switch must be used at altitudes above the rated altitudes shown in Table 1 because of the reduced air density. This is required regardless of the heat content of the fuel used.

II. Pressure Switch Installation

⚠ CAUTION

To avoid the risk of property damage, personal injury or fire, shut off gas supply first, then disconnect the electrical supply before proceeding with conversion.

1. Shut off gas and disconnect electrical supply.
2. Remove pressure switch assembly by removing two mounting screws, disconnecting rubber hose and disconnecting wiring. (See Figure 1 for typical location.)

⚠ CAUTION

To avoid the risk of property damage, personal injury or fire when disconnecting wires on the pressure switch, make certain to reconnect the wires in the same location.

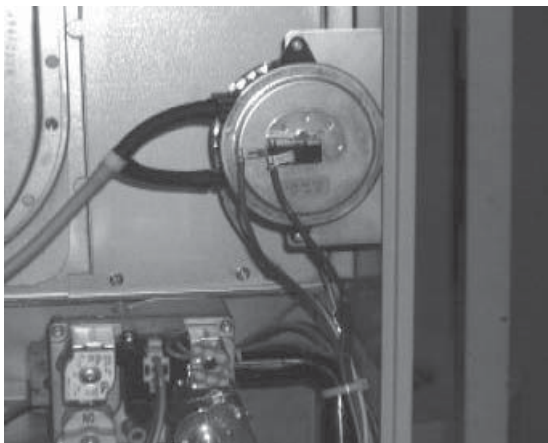


Figure 1
Pressure Switch Assembly

3. Install the pressure switch assembly provided in this kit. See Table 2 for the appropriate kit needed.
4. Reconnect the hose. Reconnect all wires. Verify wiring on the wiring diagram located inside the blower compartment access panel.
5. Proceed with orifice installation.

III. Orifice Installation

⚠ CAUTION

To avoid the risk of property damage, personal injury or fire, shut off gas supply first, then disconnect the electrical supply before proceeding with conversion.

1. Remove the gas manifold by removing the burner box front cover, cutting the wire ties, disconnecting the gas valve low voltage wires, and removing the four manifold mounting screws. See Figure 2.

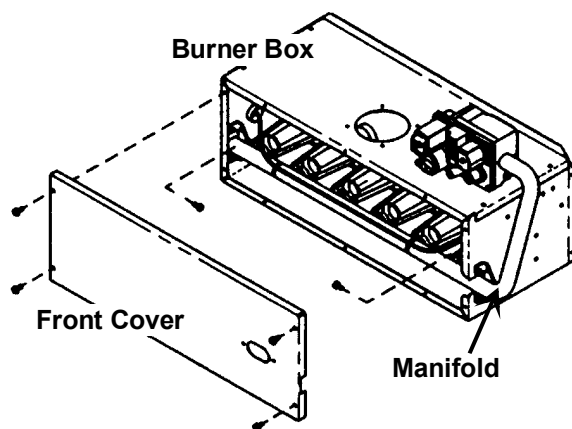
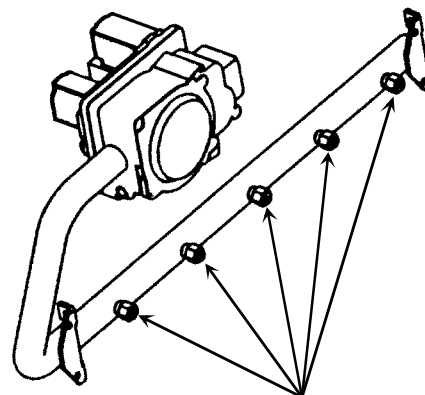


Figure 2
Gas Manifold Removal

2. Replace natural gas orifices (Figure 3A & 3B) with the correct orifice kit depending on propane or natural gas usage and the altitude at the installation site. Refer to Table 3 or 4 for the appropriate kit required.



ORIFICES
Figure 3A
Replacing Gas Orifices



Figure 3B
Orifices

Note: Units Installed in Canada are certified to 4500 feet only.

Model Number	Kit Number	Altitude (Feet)	Orifice
GUIS GUIV GCIS	HATS01-05	3001 - 7000	#44
GUIS GUIV GCIS	HATS06-09	7001 - 8500	#45

Table 3
Natural Gas Orifice Kits*

*This table assumes non-derated natural gas (about 1000 BTU/Ft³). If your gas supply has been derated for the altitude, contact your gas supplier for orifice sizing.

Model Number	Kit Number	Altitude (Feet)	Orifice
GUIS GUIV GCIS	LPTK09	0 - 7000	#55
GUIS GUIV GCIS	HALP09	7001 - 8500	#56

Note: Units Installed in Canada are certified to 4500 feet only.

Table 4
Propane Gas Orifice Kits

3. Tighten orifices with a box-end wrench. Do not use a socket wrench, as it could damage the orifices. Do not overtighten. Do not cross thread.



CAUTION

To prevent premature heat exchanger failure, follow the instructions below to remove all metal inserts from the heat exchanger tubes during conversions to propane gas.

4. If converting to propane gas, remove metal screen inserts, where present, from the entrance of the heat exchanger tubes. See Figure 4 and follow the a,b,c directions.

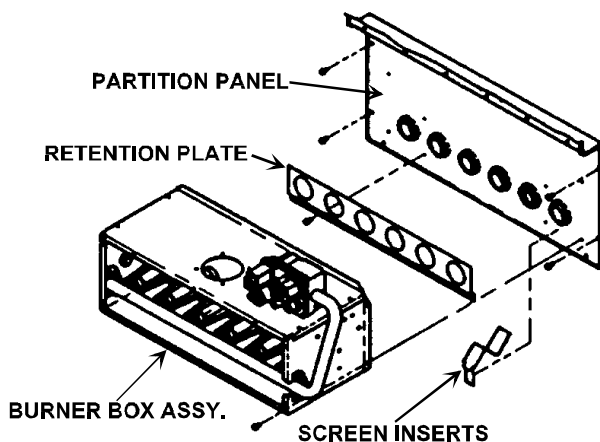


Figure 4
Removal of Metal Screen Inserts

- a. Remove entire burner box assembly, including burners, from the partition panel as one unit.
 - b. Hold assembly and remove the screen retention plate and tube inserts from each section of the heat exchanger.
 - c. Reinstall the retention plate and entire burner box assembly.
5. Reinstall the gas manifold and reconnect the gas valve low voltage wiring. Install new wire ties making sure that wires do not droop between orifices and burners.
 6. If converting to propane gas, see PROPANE GAS CONVERSION section for additional instructions. If remaining on natural gas, skip to OPERATIONAL CHECK.

IV. Propane Gas Conversion



WARNING

PERSONAL INJURY HAZARD

If your propane gas furnace is installed in a basement, an excavated area or a confined space, we strongly recommend that you contact your propane supplier about installing a warning device that would alert you to a gas leak.

Propane gas is heavier than air and any leaking gas can settle in any low areas or confined spaces.

Propane gas odorant may fade, making the gas undetectable except with a warning device.

An undetected gas leak would create a danger of explosion or fire. If you suspect the presence of gas, follow the instructions on the cover of the furnace installation manual. Failure to do so could result in **SERIOUS PERSONAL INJURY OR DEATH**.



WARNING

PERSONAL INJURY HAZARD

Iron oxide (rust) can reduce the level of odorant in propane gas. A gas detecting device is the only reliable method to detect a propane gas leak. Contact your propane supplier about installing a gas detecting warning device to alert you in the event that a gas leak should develop.

Failure to detect a propane gas leak could result in an **EXPLOSION** or **FIRE** which could cause **SERIOUS PERSONAL INJURY OR DEATH**.

IMPORTANT: Propane gas is heavier than air and does not vent upward as with natural gas fuels.



CAUTION

To prevent premature heat exchanger failure, follow the instructions below to remove all metal inserts from the heat exchanger tubes during propane gas conversions.

1. **IMPORTANT:** Remove the metal inserts from the entrance of all heat exchanger tubes, as shown in Fig. 4. This should be done as part of the "ORIFICE INSTALLATION" procedure.
2. Attach conversion data plate, with correct input rating adjacent to the unit rating plate.
3. Post "Conversion Date Certificate" adjacent to the furnace.

V. Operational Check

1. Start the furnace using the procedures in the section, "Operating Your Furnace" in the installation instructions. In addition, perform the following checks and adjustments.
2. The position of the ignitor, relative to the burner, is not affected by this conversion procedure but the ignitor should be visually inspected for any damage at this point.
3. Check For Leaks - Leak check the orifice threads by using a soap solution. Reinstall the burner box cover.

CHECK GAS INPUT AND PRESSURES

Gas supply and manifold pressures, with the burners operating, must be specified on the rating plate.

4. Checking Gas Pressure

Gas inlet pressure should be checked and adjusted in accordance to the type of fuel being consumed.

With Power and Gas Off:

Connect a water manometer or adequate gauge to the "inlet pressure tap" of the gas valve. (Figure 5)

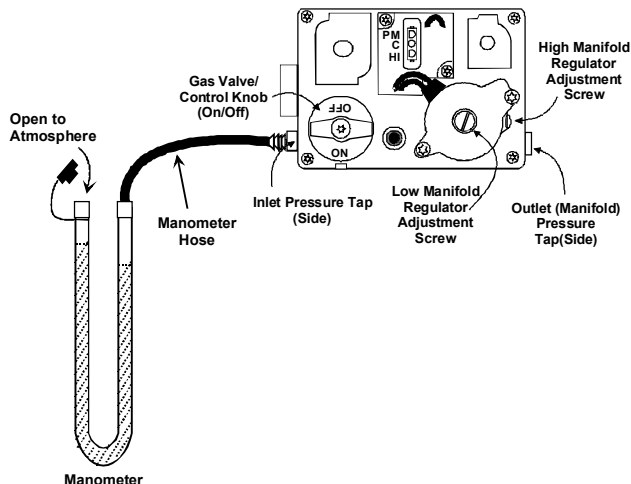


Figure 5
White-Rodgers Model 36E96 Connected to Manifold

As an alternative method, inlet gas pressure can also be measured by removing the cap from the drip leg and installing a predrilled cap with a hose fitting. (Figure 7)

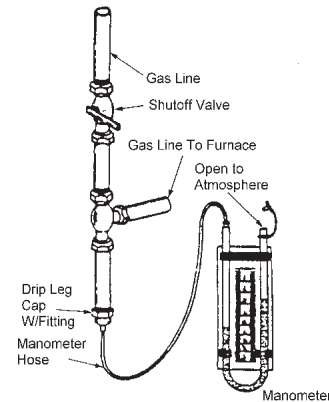


Figure 6
Measuring Inlet Gas Pressure (Alternate Method)

With Power and Gas On:

Put furnace into heating cycle and turn on all other gas consuming appliances.

Inlet Gas Pressure	
Natural	Min. 5.0" W.C., Max. 10.0" W.C.
Propane	Min. 11.0" W.C., Max. 13.0" W.C.

Inlet Gas Pressure Must Not Exceed the Maximum Value Shown in Table Above.

Figure 7
Inlet Gas Pressure

If operating pressures differ from above, make necessary pressure regulator adjustments, check piping size, etc., and/or consult with local utility.

5. Check the Manifold Pressure

A tapped opening is provided in the gas valve to facilitate measurement of the manifold pressure. See the "Outlet Pressure Tap" in Figure 5. A "U Tube" manometer having a scale range from 0 to 12 inches of water should be used for this measurement. The manifold pressure must be measured with the burners operating.

To adjust the pressure regulator, remove the adjustment screw on the gas valve (Figure 5). Using a 3/32" Allen wrench turn out (counterclockwise) to decrease pressure, turn in (clockwise) to increase pressure.

Natural Gas Adjustments

- a. Adjust the high stage regulator to required manifold pressure setting.
- b. Reinstall high stage cap screw.
- c. Recheck manifold pressure setting with cap on.
- d. Adjust low stage regulator to required manifold pressure setting.
- e. Reinstall low stage cap screw.
- f. Make sure furnace operates at the proper manifold pressure at both high and low stage outputs.
- g. For natural gas, the manifold pressure must be between 3.0 and 3.6 inches water column (3.5 nominal). The low stage manifold pressure must be between 1.6 and 2.2 inches water column (1.9 nominal).

Natural Gas Firing Rates														
Model	Stage	Low Stage Inputs and High Stage Inputs (BTU/hr) at Altitude												
		3,001 feet	3,500 feet	4,000 feet	4,500 feet	5,000 feet	5,500 feet	6,000 feet	6,500 feet	7,000 feet	7,001 feet	7,500 feet	8,000 feet	8,500 feet
GUI(S,V)070	Low	47,040	46,080	45,120	44,160	43,920	43,680	43,440	43,200	42,990	39,121	38,621	37,401	36,542
	High	64,170	62,790	61,410	60,030	59,616	59,202	58,788	58,374	57,940	52,725	51,567	50,408	49,249
GUI(S,V)090	Low	62,720	61,440	60,160	58,880	58,560	58,240	57,920	57,600	57,320	52,161	51,015	49,868	48,722
	High	85,560	83,720	81,880	80,040	79,488	78,936	78,384	77,832	77,253	70,301	68,755	67,210	65,665
GUI(S,V)115	Low	78,400	76,800	75,200	73,600	72,200	72,800	72,400	72,000	71,650	65,202	63,769	62,336	60,903
	High	106,950	104,650	102,350	100,050	99,360	98,670	97,980	97,290	96,567	87,876	85,944	84,013	82,082
GUI(S,V)140	Low	94,080	92,160	90,240	88,320	87,840	87,360	86,880	86,400	85,980	78,242	76,522	74,803	73,083
	High	128,340	125,580	122,820	120,060	119,232	118,404	117,576	116,748	115,880	105,451	103,133	100,816	98,498
GCIS070	Low	47,040	46,080	45,120	44,160	43,920	43,680	43,440	43,200	42,990	39,121	38,261	37,401	36,542
	High	64,170	62,790	61,410	60,030	59,616	59,202	58,788	58,374	57,940	52,725	51,567	50,408	49,249
GCIS090	Low	62,720	61,440	60,160	58,880	58,560	58,240	57,920	57,600	57,320	52,161	51,015	49,868	48,722
	High	85,560	83,720	81,880	80,040	79,488	78,936	78,384	77,832	77,253	70,300	68,755	67,210	65,665

Table 5

Propane Gas Adjustments

- Adjust the low stage regulator to increase low stage output so furnace will light and carryover.
- Adjust the high stage regulator to required manifold pressure setting.
- Reinstall high stage cap screw.
- Recheck manifold pressure setting with cap on.
- Adjust low stage regulator to required manifold pressure setting.
- Reinstall low stage cap screw.
- Make sure furnace operates at the proper manifold pressure at both high and low stage outputs.

For propane gas, the manifold pressure must be between 9.7 and 10.3 inches water column (10.0 nominal). The low stage manifold pressure must be between 5.7 and 6.3 inches water column (6.0 nominal).

6. Check Gas Input (Natural Gas Only)

To measure the gas input using the gas meter proceed as follows:

- Turn off gas supply to all other appliances except the furnace.
- With the furnace in low stage (1st stage) operation, time the smallest dial on the meter for one complete revolution. If this is a 2 cubic foot dial, divide the seconds by 2; if it is a 1 cubic foot dial, use the seconds as is. This gives the seconds per cubic foot of gas being delivered to the furnace.
- INPUT = GAS HTG VALUE x 3600 SECONDS PER CUBIC FOOT (3600 is a conversion factor- 3600 seconds = 1 hour.)

Example: Natural gas with a heating value of 1000 BTU per cubic foot and 34 seconds per cubic foot as determined by Step 2, then:

$$\begin{aligned}\text{Input} &= 1000 \times 3600 \div 34 \\ &= 106,000 \text{ BTU per Hour}\end{aligned}$$

NOTE: BTU content of the gas can be obtained from the gas supplier.

This measured input must not be greater than the input indicated in the Product Data Book applicable to your model*.

- Repeat Steps a through c on high stage (2nd stage).
- Relight all other appliances turned off in Step 5a above. Be sure all pilot burners are operating.

Derating Example 1: GUI115CA50 at 4500 ft.

Sea level input = 80,000 BTU/Hr. (Low Stage)
115,000 BTU/Hr. (High Stage)

From Table 5 rates at 4500 ft. =

73,600 BTU/hr (Low Stage)
100,050 BTU/hr (High Stage)

Derating Example 2: GUIV090DX50 at 6500 ft.

Sea level input = 64,000 BTU/Hr. (Low Stage)
92,000 BTU/Hr. (High Stage)

From Table 5 rates at 6500 ft. =

57,600 BTU/hr (Low Stage)
77,832 BTU/hr (High Stage)

7. Check The Gas Input - Propane Gas

Verify the gas input rates by checking that the appropriate orifices have been installed and the manifold pressures have been set as stated in these instructions.

8. Check Burner Flames

Flames should be stable, soft and blue, (dust may cause orange tips but they must not be yellow), extending directly outward from the burners without curling, floating or lifting off.

9. Check the normal operating sequence of the ignition system to insure burners light properly.

10. Check Temperature Rise

Note: The relationship between external static pressure and temperature rise will be different than is shown in the Installation Instructions, while the relationship between CFM and temperature rise will be about the same. Temperature rise must still be within the limits on the nameplate.

*NOTE: Please contact your distributor or our website for the applicable product data book referred to in this manual.

Check the temperature rise through the unit by placing thermometers in supply and return air registers as close to the furnace as possible. Thermometers must not be able to “see” the furnace’s heat exchangers, or false readings could be obtained.

- All registers must be open, all duct dampers must be in their final (fully or partially open) position, and the unit operated for 15 minutes before taking readings.
- The temperature rise for each heating speed must be within the range specified on the rating plate or the Product Data Book applicable to your model*.

NOTE: Air temperature rise is the temperature difference between supply and return air.

With a properly designed system, the proper amount of temperature rise will normally be obtained when the unit is operated at rated input with the “as shipped” blower speed.

If the correct amount of temperature rise is not obtained, it may be necessary to change the blower speed. A faster blower speed will reduce the temperature rise. A slower blower speed will increase the temperature rise. If it is necessary to adjust the blower speed, consult the furnace installation manual for details.

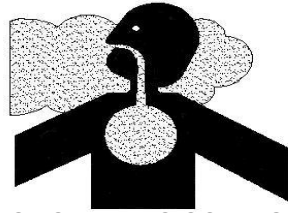
NOTE: Blower speed must be set to give the correct air temperature rise through the furnace as marked on the rating plate.

11. For propane gas conversions, attach conversion data plate, with correct input rating, adjacent to the unit rating plate and post “Conversion Date Certificate” adjacent to the furnace.

VI. Complete The Installation

See the furnace installation manual for all installation details which were not covered in this booklet.

**DANGER**
PELIGRO



CARBON MONOXIDE POISONING HAZARD

Special Warning for Installation of Furnace or Air Handling Units in Enclosed Areas such as Garages, Utility Rooms or Parking Areas

Carbon monoxide producing devices (such as an automobile, space heater, gas water heater, etc.) should not be operated in enclosed areas such as unventilated garages, utility rooms or parking areas because of the danger of carbon monoxide (CO) poisoning resulting from the exhaust emissions. If a furnace or air handler is installed in an enclosed area such as a garage, utility room or parking area and a carbon monoxide producing device is operated therein, there must be adequate, direct outside ventilation.

This ventilation is necessary to avoid the danger of CO poisoning which can occur if a carbon monoxide producing device continues to operate in the enclosed area. Carbon monoxide emissions can be (re)circulated throughout the structure if the furnace or air handler is operating in any mode.

CO can cause serious illness including permanent brain damage or death.

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