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GAS FURNACE
KITS AND ACCESSORIES

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GENTEQ (REGAL BELOIT) ECM 3.0 NOISE SUPPRESSION GROMMET KIT

INSTALLATION INSTRUCTION FOR INSTALLING A MOTOR MOUNTING BRACKET GROMMET KIT (98W03) ON FURNACES EQUIPPED WITH 3/4 AND 1HP GENTEQ 3.0 BLOWER MOTORS

Shipping and Packing List

4 - Inner tube grommets

4 - Outer washer grommets

4 - Aluminum sleeves

⚠ WARNING

Improper installation, adjustment, alteration, service or maintenance can cause personal injury, loss of life, or damage to property.

Installation and service must be performed by a licensed professional installer (or equivalent) or a service agency.

⚠ CAUTION

Physical contact with metal edges and corners while applying excessive force or rapid motion can result in personal injury. Be aware of, and use caution when working near, these areas during installation or while servicing this equipment.

⚠WARNING

Electric Shock Hazard.

Can cause injury or death.

Foil-faced insulation has conductive characteristics similar to metal. Be sure there are no electrical connections within ½" of any foil-faced insulation. If the foil-faced insulation comes in contact with electrical voltage, the foil could provide a path for current to pass through to the outer metal cabinet. While the current produced may not be enough to trip existing electrical safety devices (e.g. fuses or circuit breakers), the current can be enough to cause an electric shock hazard that could cause personal injury or death.

Application

This kit is to be used on indoor blower assemblies with either ¾ or 1 hp Regal Beloit 3.0 ECM motors used on 4 and 5 ton furnaces. It is intended to suppress motor related pure tone noise generated generally in the 300 to 650 Hz range. Pure tones found at higher frequencies are best suppressed through system modifications.

Installation

1 - Set thermostat to lowest setting, shut off gas supply, and disconnect electrical power to unit. Wait five minutes before continuing service procedures to avoid electrical shock. This will allow internal capacitors time to fully discharge.

2 - Remove blower access panel.

3 - Unplug the 5-pin power cable and 4-pin signal cable from the control module. See Figure 1 for location.

4 - Disconnect two wires at power choke on blower housing.

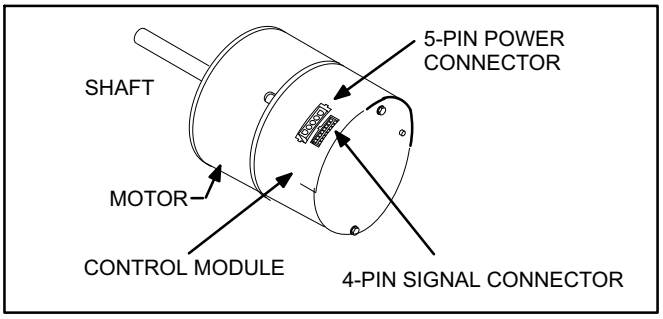

Figure 1

5 - Loosen two screws attaching control box to bottom of blower deck and rotate box so that blower can be removed from the furnace.

6 - Remove the two screws attaching the blower assembly to the bottom of the blower deck. Note which holes in the blower slide rails the screws are removed from.

7 - Carefully slide the blower assembly out of the furnace.

8 - Loosen the screw on the blower wheel hub locking the wheel on to the motor shaft.

9 - Position the blower assembly on its side with the motor side up.

10 - Remove the 4 screws holding the blower mounting arms to the side scroll of the blower housing.

11 - Pull motor / mounting bracket assembly from blower housing. **DO NOT LOOSEN THE BOLT HOLDING THE BELLY BAND AND THE MOUNTING ARMS TO THE MOTOR**. The belly band location on the motor will not change.

12 - Remove the metal inserts from each of the 4 grommets found on the end of the mounting arms. This will make it easier to remove the grommets.

13 - Remove the grommets from each of the four mounting arms. The removed sleeves and grommets can be discarded.

14 - Slide the tube grommets provided in the kit into each mounting arm hole such that the inserted end of each grommet would be toward the shaft side of the motor.

15 - Slide the washer grommets provided in the kit on to the end of each tube grommet.

16 - Slide the aluminum sleeves provided into each grommet assembly such that the flat portion of each sleeve will rest against the scroll side of the blower. Figure 2 shows the noise suppression kit.

17 - Slide motor assembly back into the blower housing / wheel such that the flat on the motor shaft lines up with the screw retaining the wheel to the shaft. Position the mounting arms on the scroll side so the motor mounting arm screws will line up with the holes in the blower scroll side (only one orientation possible) Three of the screws attach to scroll side clinch nuts and one is screwed into an extruded hole in the scroll side. Care must to taken not to over torque the screw that is threaded into the extruded hole to prevent stripping the threads in the extrusion. It is recommended that the torque applied to that screw not exceed 40 in-lbs. The torque on the remaining screws is less critical. The recommended torque for these screws is 50 in-lbs. Alternate tightening of the screws until tight.

18 - Reposition the blower assembly for access to the screw attaching the wheel to the motor shaft. Center the wheel in the housing so that there are equal clearances between the wheel rims and the scroll side openings. When properly positioned, tighten the screw making sure it contacts the flat on the shaft. The recommended torque is 160 in- lbs.

19 - Spin the wheel by hand making sure it moves freely with adequate clearance from scroll sides.

20 - Slide the blower assembly back into furnace. Make sure the assembly is pushed all the way back. Reinstall the two screws attaching the blower to the blower deck. Make sure the same holes in the blower rails are used to ensure the blower is properly positioned.

21 - Position the control box eyelets on the screws located in the blower deck, and tighten the screws.

22 - Connect the two harnesses to the motor and the two wires to the choke.

23 - Install the blower access panel.

24 - Restore electrical power and verify blower is operating properly.

25 - Start furnace as directed in start-up instructions.

26 - Operate furnace and AC system over range of operation to ensure proper blower operation.

Noise Suppression Grommet Kit

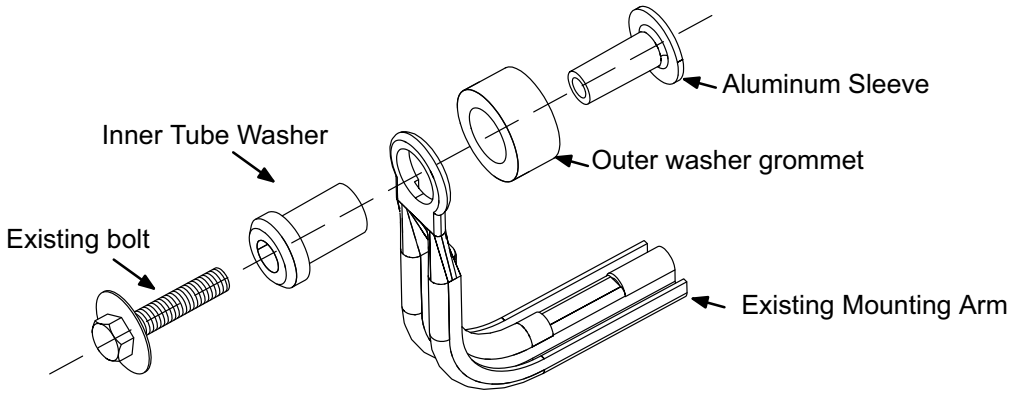

Figure 2

Guidelines For Suppressing Higher Frequency Indoor Blower Pure Tones

While the motor grommet kit will address motor related pure tones in the 300 to 650Hz range, the most effective way at this time, to address higher frequency noise (650 to 1100 Hz range) that may be generated by the motor or by blower wheel blade pass is to absorb the noise by making modifications to the return air plenum / ductwork. A large number of noise related complaints associated with the use of ECM motors are the result of short returns to the furnace, where there is little opportunity for the sound energy to be absorbed before reaching the living space. Two effective ways of absorbing the energy are through the use of baffles and through the addition of sound absorbing material to the inside of the plenum / ductwork.

Before making such modifications to a system, the following considerations should be taken into account in order to develop a suitable approach.

1- System pressure drop

a- It is important to stay below the maximum allowable system pressure drop specified by Lennox. Adding baffles or sound absorbing materials will increase pressure drop. If the return represents a small portion of the total pressure drop of a system (meaning the return duct size is adequate or slightly oversized) with a relatively high total pressure drop, changes to the return may not have a significant effect on the total pressure drop. It is best to measure the static pressure at the return inlet of the furnace to see how much pressure drop you have to work with.

b- If it is determined that the pressure drop is too high, the return plenum / ductwork will need to be enlarged or modified in order to make the noise reduction modifications.

2- Indoor air quality / material suitability

a- If a sound absorbing material such as duct board or duct liner is added to the return, it should have an outer surface suitable for the velocity of the air in the duct to prevent the introduction of particles from the material into the air stream. In addition, it is best to locate the material in the duct such that the edges of the material are protected from air erosion. It is also desirable to have a surface that prevents the collection and growth of bio material on it.

b- If the absorbing material is downstream of an electronic air cleaner or is exposed to UV light, it should resist deterioration caused by ozone or UV.

c- The best solution from an IAQ standpoint is to use sheet metal baffles or to add elbows to the system to provide the same effect as baffles. This will eliminate the need for a and b above.

3- Use of Baffles (Figure 3)

a- The baffles, in effect, act as a muffler. The baffles also reflect the sound back into the furnace where it can be absorbed by the insulation in the cabinet. They also can enable interference canceling of the generated sound. Adding baffles and changing the direction of air will result in a higher the pressure drop.

b- An example of a baffled return is shown in figure 3. A starting point for size and positioning of baffles would be B= .6xA and C=A. The baffles can be positioned top to bottom or side to side. Access to the duct for baffle installation will probably be the determining factor. Because installations will vary over a broad range, it is suggested that (4) baffles be made for installation. Start by installing (2) baffles; then run at low, medium and high speeds and measure the static at the furnace return to determine how much the pressure drop has increased over the non-modified condition and note how much sound reduction has resulted. If available, a sound meter should be used to obtain an objective measure of sound attenuation. The number of baffles can then be varied and distances adjusted to determine impact on pressure drop and on the level of sound attenuation. Select the best sound attenuation - pressure drop configuration. The height of the baffle can also be varied to assess impact. Once you have done this on a few jobs, you should develop a good feel for what works best for many of your installations, and can probably make such modifications using a less detailed approach

4- Use of sound absorbing materials

a- In some cases the return plenum / ductwork will be too short to effectively use baffles. In such cases, sound absorbing materials should be considered. Duct board or duct liners are commonly used. It is recommended that 1” thick material be used if possible, in that it is effective in the 500 to 1000 Hz range. Thinner materials can also be used; they just will not be quite as effective in absorbing sound. Keep in mind section 2 “Indoor air quality / material suitability” at the beginning of this guideline. Table 1 shows published sound attenuation levels per lineal foot of duct at various frequencies for ducts with and without a 1” thick duct liner. The 1000 Hz frequency is the one of primary interest. As table 1 shows, the reduction is significant, so major noise reductions can be achieved with small amounts of insulation. If it is a short duct and straight without an elbow, much of the sound energy goes straight out and is not given an opportunity to bounce around and be absorbed. In such cases, It is best to try to use an elbow or a baffle to get effective sound attenuation. Many different va-

rieties of duct board and liners are sold, some of which are more readily available than others. An internet search of ”duct board for noise reduction in ducts” will yield a wealth of information on what is available on how to apply it. ASHRAE handbooks also offer information on a more technical level.

5- Alternate approaches

a- If the pressure drop of the return is high, you can consider selectively locating sound absorbing materials. Rather than lining the entire plenum or duct area, you can just line surfaces most likely to receive the direct impact of the sound pressure waves, such as the back surface of a turning elbow. Selective application may be sufficient to address the homeowners concerns.

b- A combination of baffles and sound absorbing materials also can be used. One good place to add sound absorbing materials would be on the side of the baffles facing the furnace inlet.

c- If sufficient space is available a flex duct can be used to divert and return flow through a longer run which will absorb much of the sound energy.

Because of the wide variation in returns, there is no one solution that will give you the desired results. However using the above guidelines should enable you to work toward a solution that will substantially reduce duct related pure tone noise.

Table 1

Duct Configuration	Octave Band Frequency (Hz)				
	125	250	500	1000	2000
Unlined sheet metal duct	0.1*	0.1	0.1	0.1	0.1
Sheet metal duct with 1” liner	0.3	0.7	1.9	5.3	4.8

*dB per lineal foot

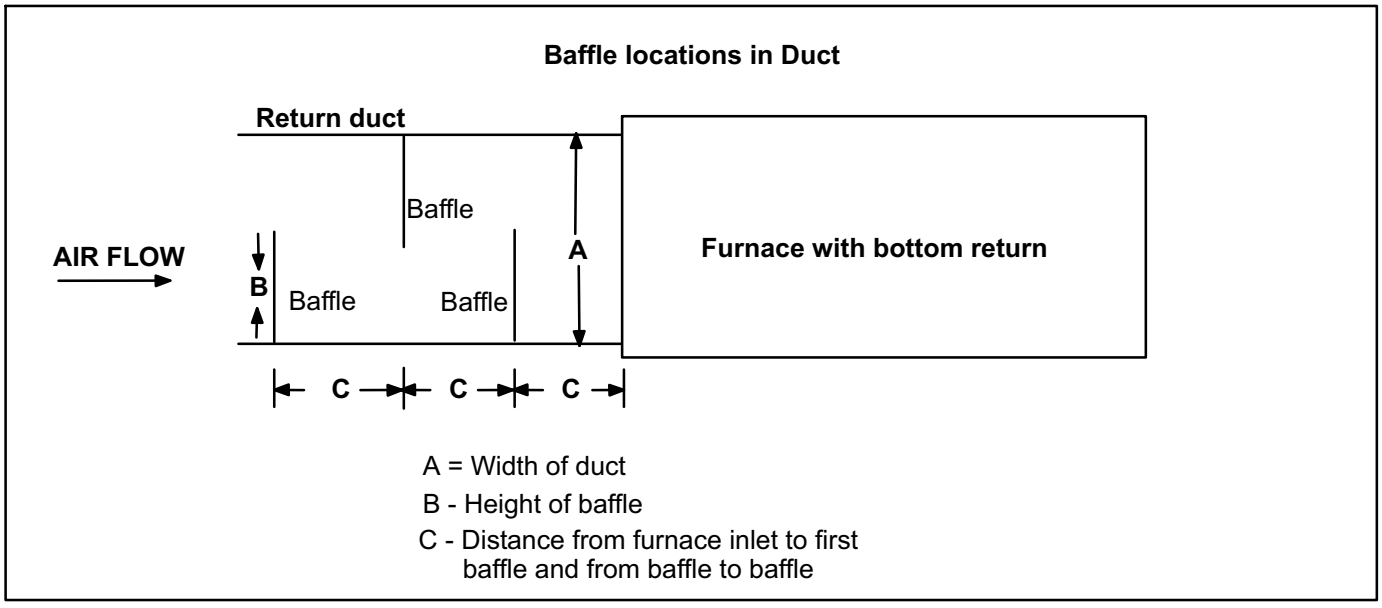

Figure 3