

# Reducing the Effects of Electromagnetic Interference for the Genteq ECM Motor

Electromagnetic Interference (EMI) is any electrical energy that causes interference with the normal operation of an electronic device such as a radio receiver or television. EMI is produced by most electronic appliances as a result of either rapid changes in voltages or the generation of high frequency currents.

At the time ECM motors were introduced to production, they were designed to meet the FCC requirements (Part 15, Class B), for most applications. As a class B device, the ECM motor must meet the most restrictive emission limits under this FCC regulation. The ECM has internal filters that reduce the conductive energy to comply with FCC regulations.

## Recommendations for Proper Installation To Minimize EMI

To date, Genteq has millions of ECM units in the field. The very limited number of reported EMI issues is a demonstration of the suitability of the ECM motor in residential and light commercial applications. Although very effective, the ECM's filters cannot completely eliminate EMI emissions. And even EMI levels that are below the FCC limits could cause interference with weak television or radio signals. Proper installation of the ECM motor is crucial to limiting EMI.

To keep EMI to a minimum, follow these installation guidelines:

- 1) **Grounding** - Attach a direct grounding wire from the blower housing to the green grounding wire on the input voltage line via the connection harness. The motor enclosure is internally connected to the connector ground. The green wire of figure 1 shows a typical ground connection from motor to blower housing.

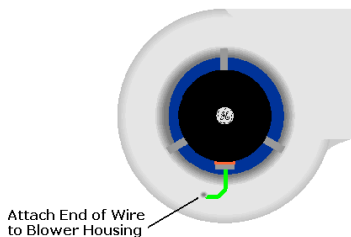


Figure 1

- 2) **Routing of Cables** - Use short wires for power connections. The opportunity for emissions increases in long wires.
- 3) **Thermostat Connections** - Shielded or twisted connections for signal cables are desirable. Use bundled wires for thermostat cables and/or keep them separated as far as practical from TV, radio, or intercom cables.

- 4) **Filtering on Control Signals** - Although this may not be needed, it has been shown that a small filter (capacitor or ferrite bead) connected from thermostat lines to ground will reduce EMI.
- 5) **Cabinet Grounding Considerations** - The metal enclosure of a furnace or air handler should be an effective part of EMI filtering. Sometimes however, the metal panels do not make a reliable interconnection due to poor assembly, installation damage, or corrosion. This allows an increase in the radiated EMI of the system. Reduce this by grounding the cabinet and by keeping good electrical contact between all cabinet panels.
- 6) **Separated Motor and Control** - In applications where the ECM control is separated from the motor, proper grounding of the shielded cable, control housing, and motor is required.
- 7) **Suggestions to Reduce TV Interference** - Field data shows that the product normally does not need additional EMI reduction, however if TV interference is present when the motor operates, two actions may be taken to increase the weak signal from the TV source.
  1. Check antenna, contacts, and cables. This can be done by a local representative.
  2. "Off the Shelf" gain amplifiers may be used. This type of amplifier is connected to your home TV's antenna. "Cable" television should not require such an amplifier. As the table below indicates, the suggested part number may be found at the following website

<http://www.radioshack.com/category.asp?catalog%5Fname=CTLG&category%5Fname=CTLG%5F002%5F004%5F004%5F000&Page=1>

HP	Voltage	Vendor	Part Number
All	120, 240, 277	Radio Shack	15-1109

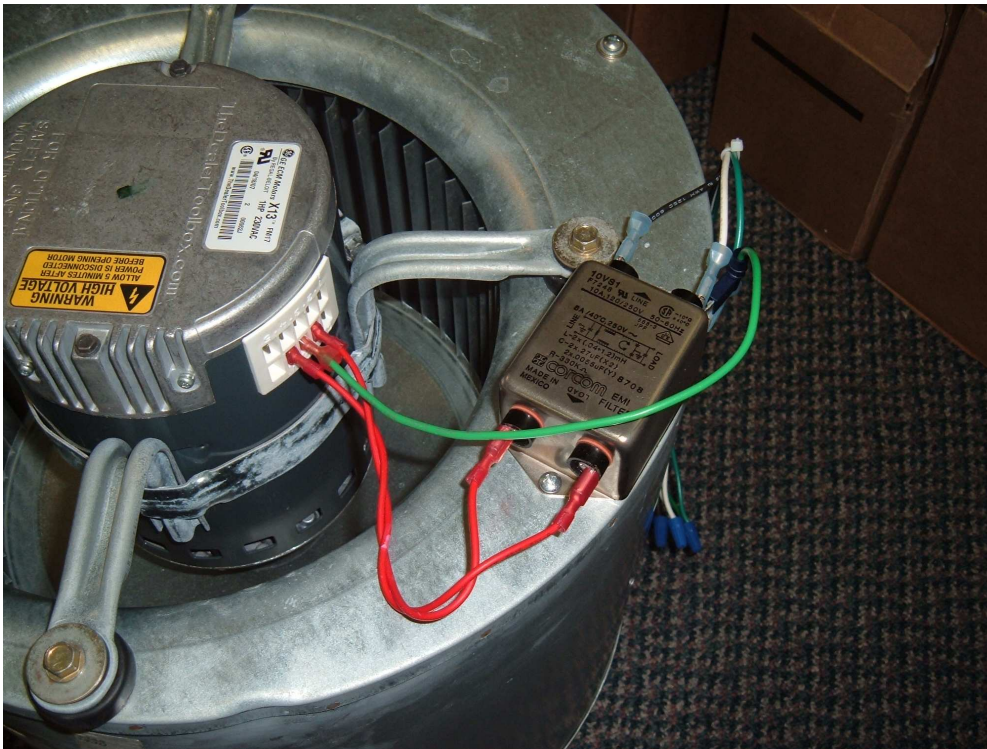
### Suggested Amplifier\*

- The distributor is for reference only.

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- 8) **Additional EMI Protection** – Field data shows that the product normally doesn't need additional EMI reduction, however, if additional filtering is desired, "off the shelf" EMI filters may be used. This type of filter is connected into the power lines to the motor (See figure below). For all cases, add twisting of the power lines from the motor to the filter, to minimize any stray radiation. Roughly one twist per inch will be sufficient.

Picture shows a typical X13 installation where there is room to mount the filter on the actual blower housing. Motors typically have a single piece connector, and this should be retained if possible. The filter is inserted in the line to the motor. The green ground wire from the motor connects to the filter ground and also grounds the blower. The red twisted power leads should be as short as possible, to avoid any RF radiation. Filters should be mounted using self tapping sheet metal screws.



## Suggested Filters\*\*

Rating	Hp	Voltage	Vendor	Part#	Distributor
Best	1*	120	Corcom	20EP6	digikey.com
Good	All (except 1 Hp 120VAC)	120, 240, 277	Preo	10EB11	digikey.com
Better	All (except 1 Hp 120VAC)	120, 240, 277	Corcom	10VS1	digikey.com
Best	All (except 1 Hp 120VAC)	120, 240, 277	Corcom	10EP1	digikey.com

\* A 20 amp rated EMI filter is required for a 1 Hp motor in a 120 VAC input voltage application.

\*\* The manufacturer and distributor are for reference only. All installations must comply with local codes and be done by a licensed professional.