MAGNUM ENERGY
www.SensataPower.com

a product brand of: Sensata Technologies

1.0 Description

These instructions provide electrical safety and Electrostatic Discharge (ESD) prevention guidelines while servicing Magnum inverters made by Sensata Technologies.

Note: *This document is part of a series of Service Instructions to help qualified personnel replace components that have failed or have been damaged.*

Before performing any maintenance or service on Magnum inverters, read this entire document carefully and follow all instructions.

2.0 Electrical Safety Precautions

Follow these safety precautions to help protect yourself from potentially deadly electrical shock hazards, and also to protect the inverter from further damage.

These safety precautions are provided as a reminder, they are not intended to be a substitute for adequate training and experience in safety procedures when performing maintenance or service on electrical equipment.

2.1 Safety and Information Symbols

The following symbols appear in the service instructions to indicate dangerous and important safety information. They must be followed to reduce the risk of safety hazards.

Warning: This symbol indicates that failure to take a specified action could result in physical harm to the user.

Caution: This symbol indicates that failure to take a specified action could result in damage to the equipment.

Note: *This entry indicates information that emphasizes or supplements important points of the main text.*

2.2 Working Safely on Electrical Equipment

The following electrical safety guidelines must be followed when performing repair or maintenance on Magnum inverters:

- Before beginning any procedure that requires access to the inverter's interior, remove power by disconnecting all DC and AC power to the inverter.
- Do not work alone when potentially hazardous conditions exist.

Never assume that all power has been removed from the inverter; always check with a voltmeter.

Warning: Work done inside the inverter/charger must only be performed by qualified service personnel. Incorrect installation or servicing may result in a risk of electrical shock, fire, or other safety hazard.

2.3 Qualified Personnel

Qualified service personnel are trained and competent in the skills and actions necessary to avoid injury and possibly death to themselves and others due to obvious electric hazards involved with electrical equipment, and are familiar with standard practices for preventing accidents.

3.0 Preventing ESD Damage

Electrostatic Discharge (ESD) will cause damage to semiconductor components resulting in complete or intermittent equipment failures. It occurs when static electricity dissipates into electronic components that are improperly handled. Always follow these ESD prevention procedures while working on the inside of the inverter, or handling any circuit board:

- Wear a grounding wrist strap and attach it to a bare metal part of your inverter. If a grounding strap is not available, prevent any electrical difference between you and the electronic component you are working with. If you are removing a circuit board from its antistatic bag, always touch the bag first, then remove and hold the board by its edge (away from any metal edge connectors). If you are working inside the inverter, touch the case before you begin working and ensure your skin continuously touches any unpainted metal surface of the inverter case—by resting your arm or other hand on the case at all times.
- Avoid wearing any clothing that could build up a lot of static charge, such as wool or synthetic materials; or using any static-causing surfaces such as carpets, plastic, and packing foam.
- Keep the new circuit boards protected in their antistatic bags until you are ready to install them in the inverter. When the circuit boards are removed from the inverter, place them in the antistatic bags as soon as possible to help prevent further damage to them.
- Always hold the circuit boards by their edges or their metal mounting brackets. Avoid touching any electronic component on the board or any metal-edge connectors; try to minimize the time you physically hold the circuit boards.

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1.0 Description

These service instructions provide information on removing and replacing the top cover of a ME, RD, MS or MS-PAE Series inverter/charger. It also provides illustrations to help identify major components inside these inverter/chargers.

Note: *This document is part of a series of Service Instructions to help qualified personnel replace components that have failed or have been damaged.*

2.0 Installation Preparation

Before removing or replacing the top cover, read this entire document carefully and follow all instructions.

2.1 Safety Precautions

Follow all electrical safety precautions and the ESD prevention guidelines below, and in the *Electrical Safety Precautions and Electrostatic Discharge Prevention: Service Instructions: 64-1000*.

Warning: Hazardous voltages are present within the inverter when power is applied. Do not remove the inverter's top cover without first turning off and disconnecting all AC and DC power to the inverter. Always replace the top cover before reconnecting power.

Warning: The capacitors inside the inverter store electric energy even after all AC and DC power is removed. After disconnecting all AC and DC power to the inverter, short the positive and negative DC terminals together to dissipate this energy.

Caution: Observe all ESD safety precautions when working with the control and FET boards, and within the inverter. Failure to follow ESD safety precautions could result in damage to internal components and the inverter.

Note: *If attempting to remove the cover while it is still installed, verify you have at least 6" of clearance above the top cover to pull the cover straight up.*

2.2 Required Tools and Equipment

You need the following equipment to remove and replace the top cover:

- T15 Torx head screwdriver – for #6-32 screw.
- T25 Torx head screwdriver (≥6" shaft) – for #10-32 screws.

3.0 Removing/Replacing the Top Cover

3.1 Removing the Top Cover

1. Locate and remove the six #10-32 screws (T25 head) (Figure 1, Item B) holding the cover to the inverter base and the #6-32 screw (T15 head) (Figure 1, Item A) on the front of the inverter.
2. After removing the seven Torx screws, remove the top cover by lifting it straight up out of the DC terminal plate (Figures 2 and 3, Item F).

   Note: *The DC terminal plate has slots on its side requiring the top cover to be lifted straight up. The top cover may seem tight as it is lifted out of these slots—this is normal.*

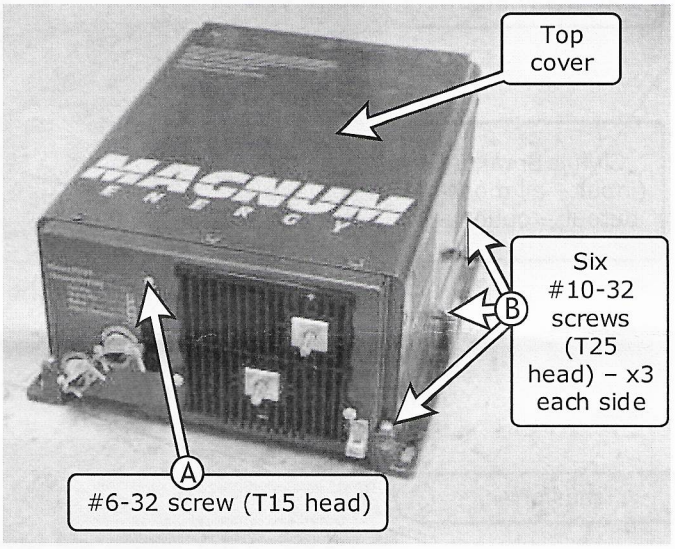

Figure 1, Top Cover Screws

3.2 Replacing the Top Cover

Note: *If the top cover has been removed to replace any component, ensure all connections are correctly made before replacing the top cover.*

1. Align the front of the top cover to slide in the slots on the DC terminal plate, and then push down slowly on the cover—ensuring the slots on both sides are lined up—until it sits flush on the inverter base.
2. After verifying the screw holes in the top cover align with the holes in the base and in the front of the inverter, screw in the six #10-32 screws (T25 head) holding the cover to the base, and then the #6-32 screw (T15 head) on the front.
3. The top cover is now replaced, review all the connections a final time and ensure they are correct.

4.0 Identifying Internal Components

Although Sensata Technologies manufactures multiple Magnum Energy inverter models, the location of the major internal components within the different models is identical. Use the illustrations below—for your particular inverter model—to identify the major components inside the inverter.

Note: *The illustrations below may not exactly match the inverter, and may include options not included on the inverter being serviced.*

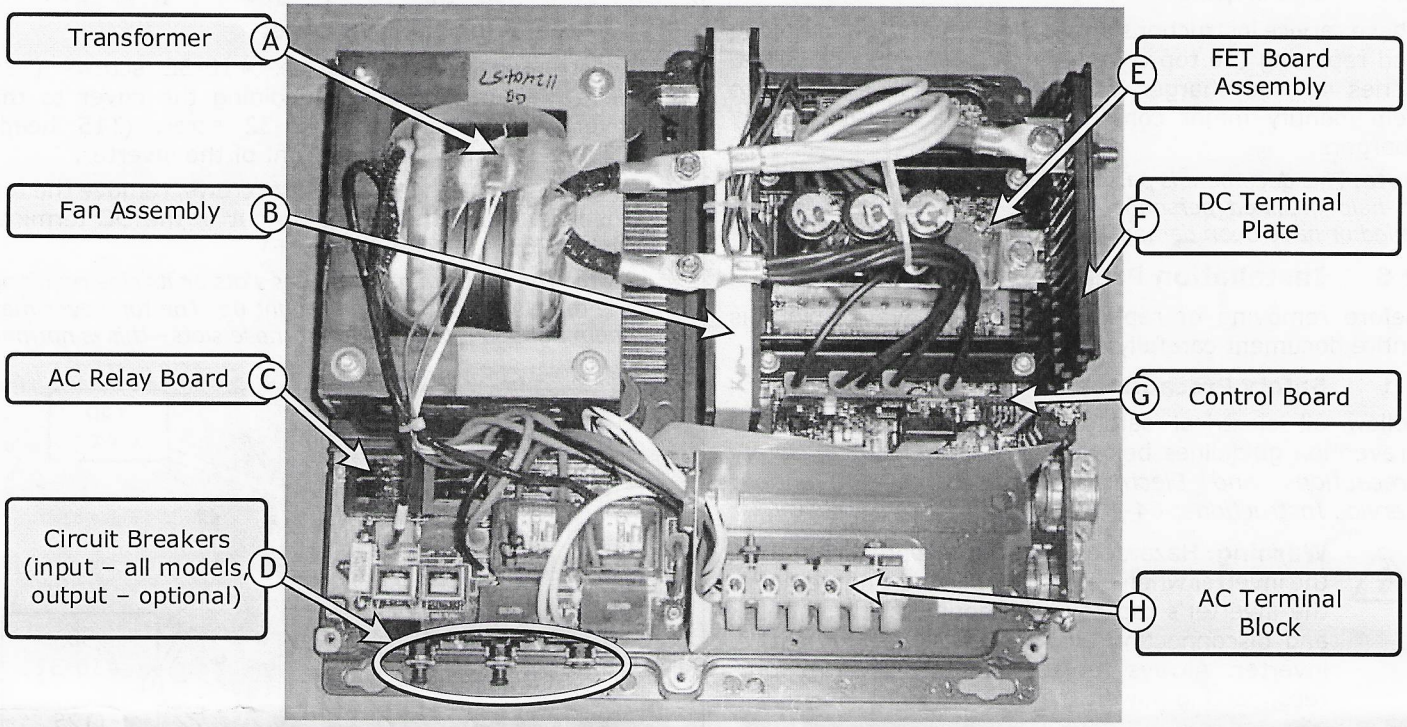

Figure 2, ME or RD Series Inverters – Internal Components

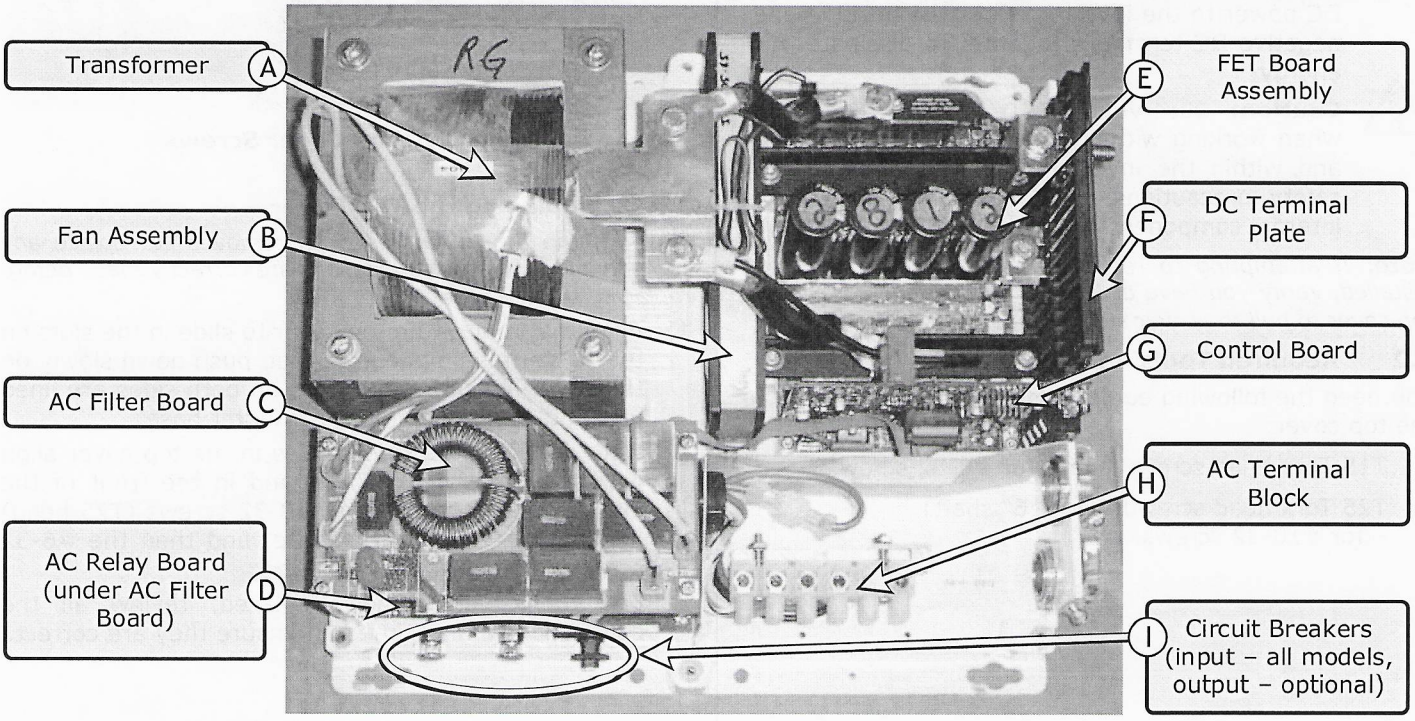

Figure 3, MS Series Inverter - Internal Components (similar to MS-PAE unit)

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1.0 Description

These service instructions provide information on removing and replacing the top cover of a MSH Series inverter/charger. It also provides illustrations to help identify major components inside these inverter/chargers.

Note: *This document is part of a series of Service Instructions to help qualified personnel replace components that have failed or have been damaged.*

2.0 Installation Preparation

Before removing or replacing the top cover, read this entire document carefully and follow all instructions.

2.1 Safety Precautions

Follow all electrical safety precautions and the ESD prevention guidelines below, and in the *Electrical Safety Precautions and Electrostatic Discharge Prevention: Service Instructions: 64-1000*.

Warning: Hazardous voltages are present within the inverter when power is applied. Do not remove the inverter's top cover without first turning off and disconnecting all AC and DC power to the inverter. Always replace the top cover before reconnecting power.

Warning: The capacitors inside the inverter store electric energy even after all AC and DC power is removed. After disconnecting all AC and DC power to the inverter, wait 5 minutes for the energy in the capacitors to dissipate before working on the unit.

Caution: Observe all ESD safety precautions when working with the control and FET boards, and within the inverter. Failure to follow ESD safety precautions could result in damage to internal components and the inverter.

Note: *If attempting to remove the cover while it is still installed, verify you have at least 6" of clearance above the top cover to pull the cover straight up.*

2.2 Required Tools and Equipment

You need the following equipment to remove and replace the top cover:

- T15 Torx head screwdriver – for #6-32 screw
- T25 Torx head screwdriver (≥6" shaft) – for #10-32 screws

3.0 Removing/Replacing the Top Cover

3.1 Removing the Top Cover

1. Locate and remove the six #10-32 screws (T25 head) (Figure 1, Item A) holding the cover to the inverter base and the #6-32 screw (T15 head) (Figure 1, Item B) on the front of the inverter.
2. After removing the seven Torx screws, remove the top cover by lifting it straight up out of the DC terminal plate (Figures 2 and 3, Item J).

   Note: *The DC terminal plate has slots on its side requiring the top cover to be lifted straight up. The top cover may seem tight as it is lifted out of these slots—this is normal.*

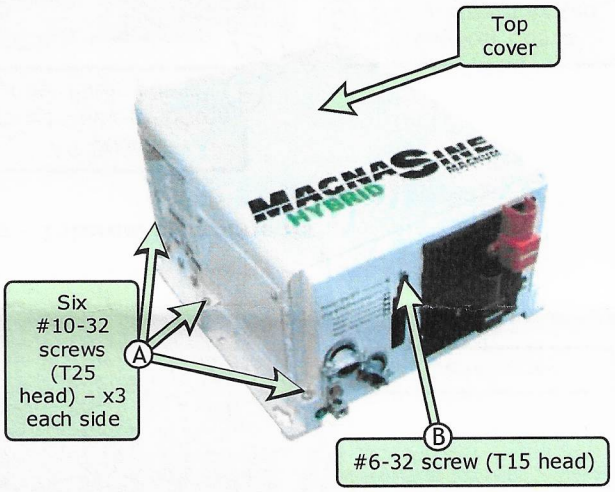

Figure 1, Top Cover Screws

3.2 Replacing the Top Cover

Note: *If the top cover has been removed to replace any component, ensure all connections are correctly made before replacing the top cover.*

1. Align the front of the top cover to slide in the slots on the DC terminal plate, and then push down slowly on the cover—ensuring the slots on both sides are lined up—until it sits flush on the inverter base.
2. After verifying the screw holes in the top cover align with the holes in the base and in the front of the inverter, screw in the six #10-32 screws (T25 head) holding the cover to the base, and then the #6-32 screw (T15 head) on the front.
3. The top cover is now replaced, review all the connections a final time and ensure they are correct.

4.0 Identifying Internal Components

Although Sensata Technologies manufactures two MSH Series inverter models, the location of the major internal components within the different models is identical. Use the illustrations below—for your particular inverter model—to identify the major components inside the inverter.

Note: *The illustrations below may not exactly match the inverter, and may include options not included on the inverter being serviced.*

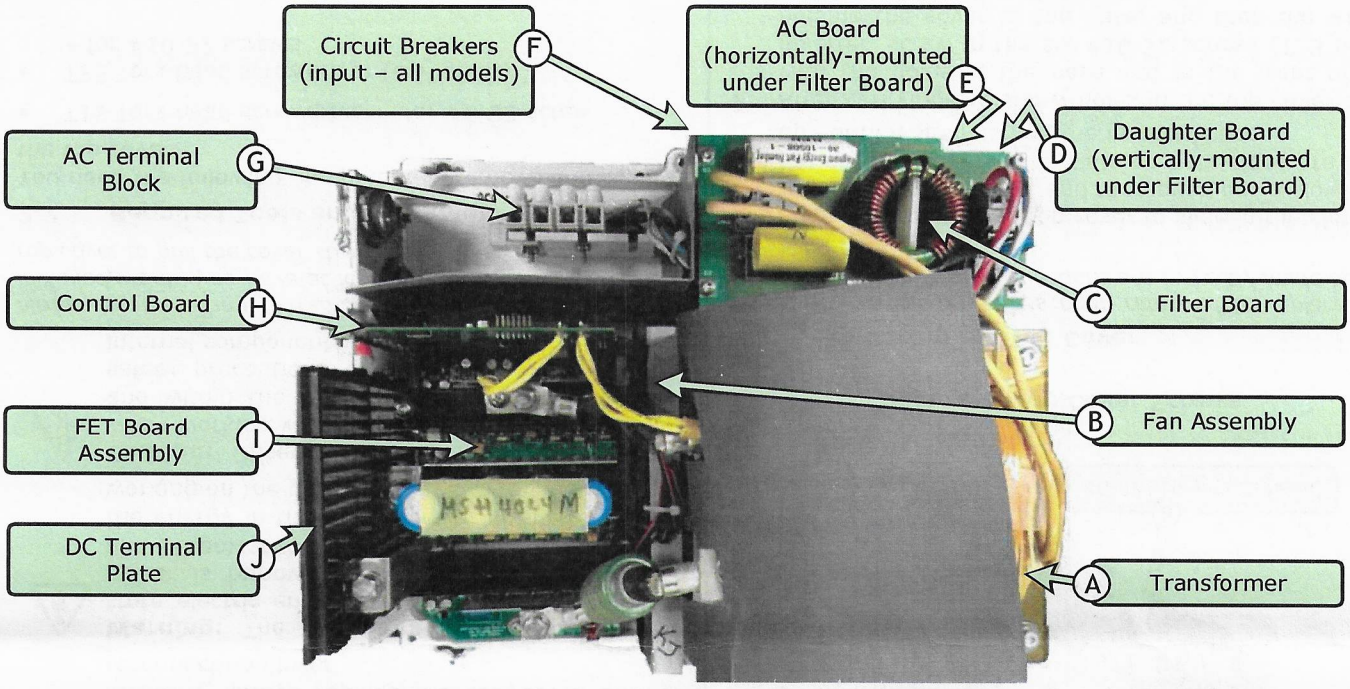

Figure 2, MSH-M Series Inverters – Internal Components

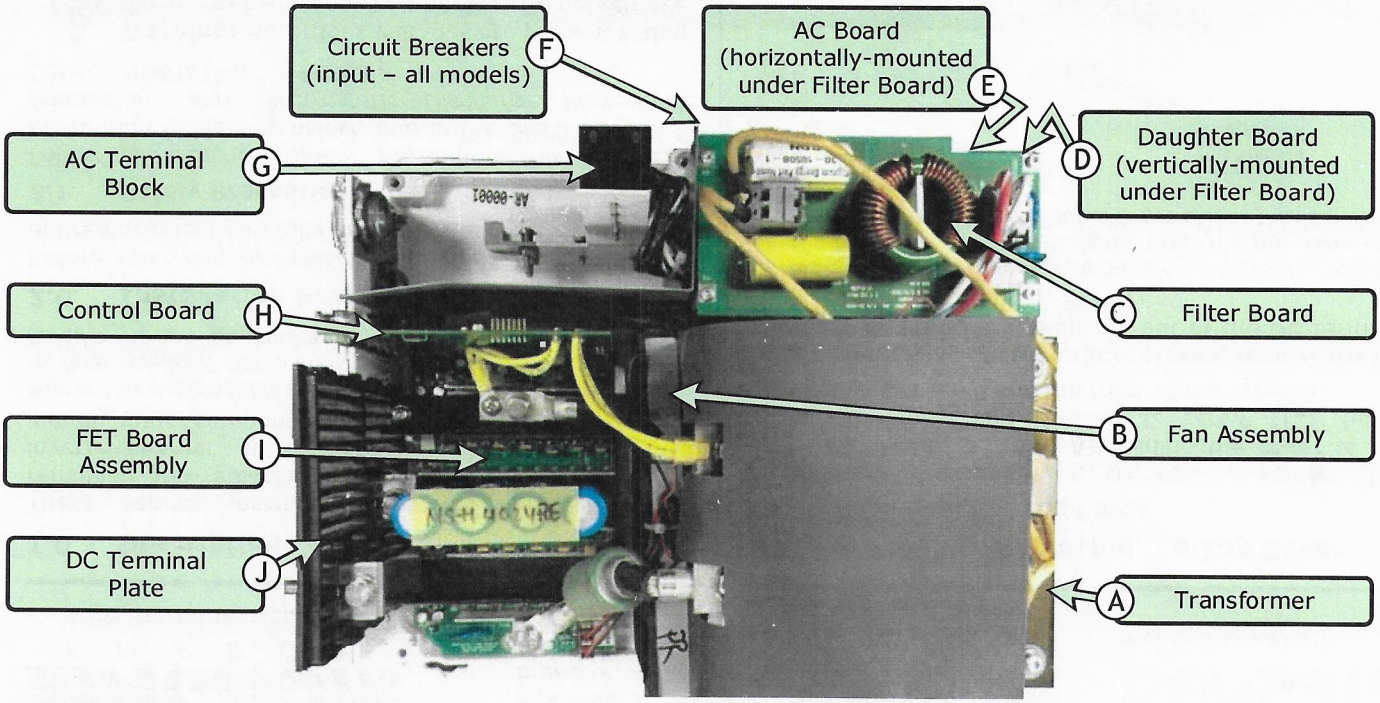

Figure 3, MSH-RE Series Inverter - Internal Components

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Description

These instructions provide the necessary information to safely replace the fan from a large Magnum inverter (i.e., ME, MS, RD, MS-PAE, or MSH Series). Review all instructions carefully before you proceed.

Safety Precautions

These precautions are provided as a reminder, they are not intended to be a substitute for the training and experience required to safely perform maintenance or service on any electrical equipment.

WARNING: Hazardous voltages are present within the inverter when power is applied. Do not remove the inverter's top cover without first turning off and disconnecting all AC and DC power to the inverter. Always replace the top cover before reconnecting power.

WARNING: The inverter may be receiving power from multiple sources (generator, utility, batteries, solar arrays, etc.,). To prevent accidental shock, ensure all power sources (AC and DC) are off and disconnected from the product (breakers opened, fuses removed, cables disconnected) prior to proceeding.

WARNING: The capacitors inside the inverter store electric energy even after all AC and DC power is removed. After disconnecting all AC and DC power to the inverter, wait 5 minutes for the energy to dissipate before working on the unit.

CAUTION: Observe all ESD safety precautions while working within the inverter. Failure to follow ESD safety precautions could result in damage to internal components causing the inverter to work incorrectly or not at all.

Required Tools and Equipment

The following is needed to remove/replace the inverter's fan:

- Replacement Fan – inspect for any physical damage
- One 6-32 X .375 Torx (TX15) Screw
- Torx T15 Screwdriver
- Diagonal Cutters
- One Small Cable Tie (~4")

Fan Installation Instruction Sheet

Step 1: Removing the Fans

Refer to Figure 1 when performing the tasks below.

A. To access the inverter's fans, refer to *Service Instructions: 64-1007-MSH Top Cover Removal* or *64-1001-Top Cover Removal*.

B. Remove and discard the outside screw securing the fan bracket. The screw on the inward facing tab near the side of the chassis can remain in place for the replacement fan installation. Refer to Figure 1.

Figure 1, Fan Bracket

C. Remove the connector with the fan wires from the power board.

D. Remove the fans from the bracket.

Step 2: Installing the Replacement Fans

A. Install the replacement fans, (P/N 44-0004) side by side under the bracket. Ensure that the label on the fan points toward the transformer. Refer to Figure 2.

Figure 2, Fan Orientation

B. Route the wires through the grooves in the fan casings. Ensure that the wires or not crushed or trapped between the bracket and fan body. Refer to Figure 3.

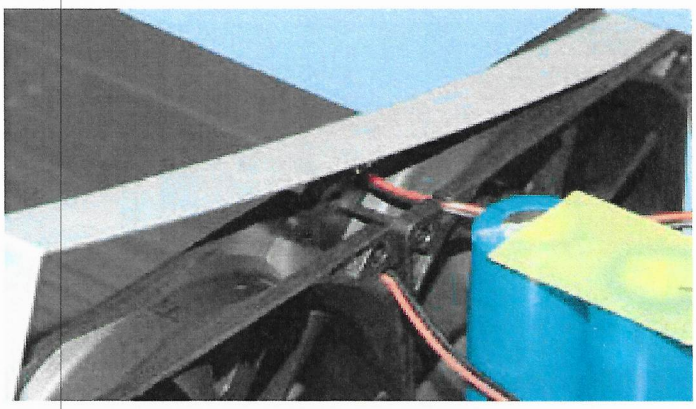

Figure 3, Route Wires Through Fan Casings

C. Secure the free end of the fan bracket with the provided screw.
D. Tighten the screw until the the bracket is secure to the chassis with no gap.
E. Reconnect the connector with the fan power wires to the FET board. Refer to Figure 4.

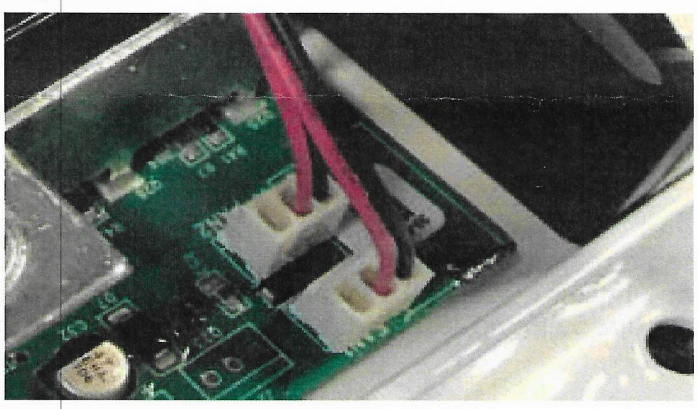

Figure 4, Connect Wires to FET Board

F. Loop up the fan wires into a bundle, allowing for a small amount of slack so that the cables are not overly tight against the top center of the fan bracket.

G. Secure the wires with a cable tie at the center of the fan bracket. Refer to Figure 5.

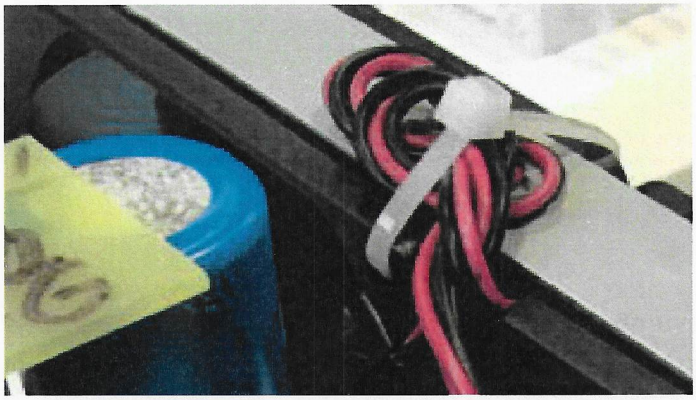

Figure 5, Bundle Fan Wires

H. Trim the excess cable tie.
I. Verify that the fan plugs are still connected after bundling wires.
J. If there are no other internal components to replace, reinstall the top cover as described in *Service Instructions: 64-1007-MSH Top Cover Removal* or *64-1001-Top Cover Removal*.

Service and Warranty Information

Sensata Technologies warrants this part to be free from defects in material and workmanship that result in product failure during normal usage, according to the following terms and conditions:

1. The limited warranty on this fan continues for the remaining portion of the original warranty period, or for 90 days from the date of the return shipment to the original purchaser—whichever is greater.
2. This limited warranty is voided if:
   - the product has been modified without authorization
   - the product has been damaged from abuse, neglect, accident, high voltage or corrosion
   - the product was not installed/operated according to instructions

How to Receive Warranty Service

If your product requires warranty service, contact Sensata at:

- Telephone: 425-353-8833, or
- Email: MagnumWarranty@Sensata.com

If returning your product directly to Sensata, you must:

1. Return the unit in the original, or an equivalent, shipping container.
2. Receive a Return Materials Authorization (RMA) number from Sensata prior to the return of the product for service.
3. Place RMA numbers clearly on the shipping container or the packing slip.

When sending your product for service, please ensure it is properly packaged. **Damage due to inadequate packaging is not covered under warranty.** We recommend sending the product by traceable and insured service.

BEFORE RETURNING ANY UNIT, A RETURN MATERIAL AUTHORIZATION (RMA) NUMBER IS REQUIRED