

FM-220 COOLING FAN & MOTOR v1.0

ASSEMBLY & INSTALLATION INSTRUCTIONS

WARNING: Voltages inside the amplifier CAN & WILL KILL YOU! You MUST know how to work around HIGH VOLTAGE safely. If you do not, get assistance from someone who does. You MUST also be able to read your specific amplifier schematic and understand the design, theory and wiring of your amplifier to properly perform this upgrade.

FM-220 MOTOR PREPARATION

- () **Read, re-read and fully understand these instructions prior to beginning this upgrade.** Make sure to perform the steps in the order they are listed. Also, be sure to label wires as they are disconnected from various points inside the amplifier. This will help when the time comes to re-attach the wires that will be disconnected during installation of the kit.
- () Go through the Bill of Materials (BOM) and compare that list with the parts in the kit to make sure all parts are present. If you are missing any parts, please contact Harbach Electronics, LLC.
- () One at a time, remove black hex head screws holding the two stator halves together and replace each with one #8-32 x 2" screw. Be sure to reverse the orientation of the screw so that the threaded end of the screw sticks out the backside of the stator (opposite direction of the motor shaft).
- () On each end of the screws you just installed, place a #8 lock washer and a #8-32x1/4" aluminum spacer and tighten spacer on each side.
- () On top of each spacer, screw on one #8-32 nuts and tighten. The additional #8-32 nuts and fender washers will be used to attach the fan to the rear of the amp.

FM-220 COOLING FAN & MOTOR INSTALLATION

- () Unplug the amplifier power cord from the AC mains and let any high voltage stored in the electrolytic capacitors bleed down. Verify the HV has bled down as shown on the HV meter. Remove any input, output and control cables that may be connected to the back of the amplifier.
- () **Be sure that all high voltage has been properly bled to ground before removing any covers or putting your hands inside the amplifier. You CAN BE KILLED by the high voltages inside this equipment!**
- () Place the amplifier on a book, front panel up, and remove the bottom screws holding the feet and case in place. Lift the case up and remove it from the amplifier. Place the amplifier on the bench with the front panel facing you.
- () Remove the 15 sheet metal screws that hold the perforated cover in place and remove this along with the top rear plate cover.
- () Carefully remove the tubes and set them aside.

- () Using one of the larger foam pieces as a cushion, place the motor (shaft up) on the foam pad and press the mounting studs into the foam.
- () Take the fan blade (metal ring up) and press the blade down onto the shaft. Do not press too far. Have about ¼" of the shaft protruding through the fan blade hub.
- () Loosen the outer nut from each of the mounting studs of the old motor. Do not remove the nuts yet.
- () Turn the amplifier upside down. Locate the 2 wires coming from the old fan motor and cut them where they go through the chassis.
- () Turn the amplifier back right side up. Remove the nuts holding the old fan motor to the rear panel.
- () Lift the old motor and fan out of the chassis through the area vacated by the tubes.
- () Lower the new motor and fan into the area vacated by the old fan and motor.
- () Push the mounting studs through the existing mounting holes and secure with the provided flat washer and nut on each stud. **NOTE:** You may have to screw the flat washers on to the studs of the new motor due to tolerances in the washer center holes. Tighten both nuts.
- () Turn the amplifier upside down.
- () Pull the motor leads out of the bottom of the fan cutout in the chassis. Cut both wires so that about 2" extend outside the fan cutout with the leads dressed against the rear panel and pulled toward the circuit breakers.
- () Strip approximately ½" of insulation from the motor leads. In a like manner, strip ½" of insulation from the fan motor power leads that were previously cut.
- () Twist the fan motor leads to the fan power leads and secure with the provided blue wire nuts. Make sure that these connections are tight and are fully insulated.
- () Dress the connected wires along the rear of the chassis under the rear panel lip.
- () Turn the amplifier back right side up and replace the tubes.
- () Replace the perforated cover and top rear plate cover. Reinstall the 15 sheet metal screws holding these pieces in place. **DO NOT** over tighten these screws, as it is fairly easy to strip the screw threads in the aluminum underneath.
- () Reinstall the case and feet using a book to support the amplifier.

This completes the installation of the FM-220 replacement cooling fan and motor.

FM-220 BILL OF MATERIALS (BOM)				
Verification	Part Number	Quantity	Description	PCB Designation
[]	CON-101	2	Blue Wire Nut	N/A
[]	FAN-101	1	6" Fan Blade	N/A
[]	MOT-102	1	FM-220 Fan Motor	N/A
[]	NUT-104	4	#8-32 Nut	N/A
[]	SCR-102	2	#8-32 x 2" Machine Screw	N/A
[]	SPA-104	2	#8-32 x 1/4" Aluminum Hex Spacer	N/A
[]	WAS-102	2	#6 Flat Washer	N/A
[]	WAS-107	2	#8 Internal Tooth Lock Washer	N/A

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