



Broadcast Electronics

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## **FM4C-5C / FMi301-402 3 phase CB1 Circuit Breaker Replacement Application Guide**

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## **FM 4C-5C / FMi301-402 3 phase CB1 Circuit Breaker Replacement Application Guide**

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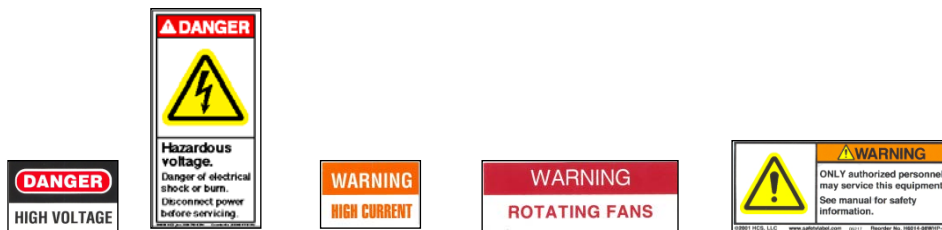
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## SAFETY PRECAUTIONS

**PLEASE READ AND OBSERVE ALL SAFETY PRECAUTIONS//**

**ALL PERSONS WHO WORK WITH OR ARE EXPOSED TO POWER TUBES, POWER TRANSISTORS, OR EQUIPMENT WHICH UTILIZES SUCH DEVICES MUST TAKE PRECAUTIONS TO PROTECT THEMSELVES AGAINST POSSIBLE SERIOUS BODILY INJURY. EXERCISE EXTREME CARE AROUND SUCH PRODUCTS. UNINFORMED OR CARELESS OPERATION OF THESE DEVICES CAN RESULT IN POOR PERFORMANCE, DAMAGE TO THE DEVICE OR PROPERTY, SERIOUS BODILY INJURY, AND POSSIBLY DEATH.**



### **DANGEROUS HAZARDS EXIST IN THE OPERATION OF POWER TUBES AND POWER TRANSISTORS -**

The operation of power tubes and power transistors involves one or more of the following hazards, any one of which, in the absence of safe operating practices and precautions, could result in serious harm to personnel.

- A. HIGH VOLTAGE** - Normal operating voltages can be deadly. Additional information follows.
- B. RF RADIATION** - Exposure to RF radiation may cause serious bodily injury possibly resulting in Blindness or death. Cardiac pacemakers may be affected. Additional information follows.
- C. HOT SURFACES** Surfaces of air-cooled radiators and other parts of tubes can reach temperatures of several hundred degrees centigrade and cause serious burns if touched. Additional information follows.
- D. RF BURNS** Circuit boards with RF power transistors contain high RF potentials. Do not operate an RF power module with the cover removed.

## **HIGH VOLTAGE –**

Many power circuits operate at voltages high enough to kill through electrocution. Personnel should always break the primary AC Power when accessing the inside of the transmitter.

## **RADIO FREQUENCY RADIATION**

Exposure of personnel to RF radiation should be minimized, personnel should not be permitted in the vicinity of open energized RF generating circuits, or RF transmission systems (waveguides, cables, connectors, etc.), or energized antennas. It is generally accepted that exposure to “high levels” of radiation can result in severe bodily injury including blindness. Cardiac pacemakers may be affected.

The effect of prolonged exposure to “low level” RF radiation continues to be a subject of investigation and controversy. It is generally agreed that prolonged exposure of personnel to RF radiation should be limited to an absolute minimum. It is also generally agreed that exposure should be reduced in working areas where personnel heat load is above normal. A 10 mW/cm<sup>2</sup> per one tenth hour average level has been adopted by several U.S. Government agencies including the Occupational Safety and Health Administration (OSHA) as the standard protection guide for employee work environments. An even stricter standard is recommended by the American National Standards Institute which recommends a 1.0 mW/cm<sup>2</sup> per one tenth hour average level exposure between 30 Hz and 300 MHz as the standard employee protection guide (ANSI C95.1-1982).

RF energy must be contained properly by shielding and transmission lines. All input and output RF connections, such as cables, flanges and gaskets must be RF leak proof. Never operate a power tube without a properly matched RF energy absorbing load attached. Never look into or expose any part of the body to an antenna or open RF generating tube or circuit or RF transmission system while energized. Monitor the tube and RF system for RF radiation leakage at regular intervals and after servicing.

## **HOT SURFACES –**

The power components in the transmitter are cooled by forced-air and natural convection. When handling any components of the transmitter after it has been in operation, caution must always be taken to ensure that the component is cool enough to handle without injury.



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# 1 FM4C-5C / FMi301-402 3 phase CB1 Replacement

## 1.1 Overview of the replacement of the circuit breaker.

The replacement of the front panel circuit breaker is a straight forward procedure. It does require the front cabinet panel to be removed to gain access to the circuit breaker.

## 2 Installation Preparation

### 2.1 Overview / Estimated Completion Time for Installation

The Circuit Breaker comes with hardware on the posts for the electrical connections. After access is gained, simply move the wires from the old breaker to the new one.

Circuit breaker replacement will take about 35 minutes to complete.

### 2.2 Items / Tools required for the Upgrade Process

- ☐ No. 2 Phillips Screwdriver
- ☐ Wire cutters
- ☐ 7/16" nut driver
- ☐ Circuit Breaker



**WARNING: ENSURE ALL PRIMARY POWER IS DISCONNECTED BEFORE PROCEEDING.**

### 2.3 Removal of the circuit breaker

Ensure primary power has been removed from transmitter prior to performing this procedure. Remove the six Philips head screws from the front of the circuit breaker.

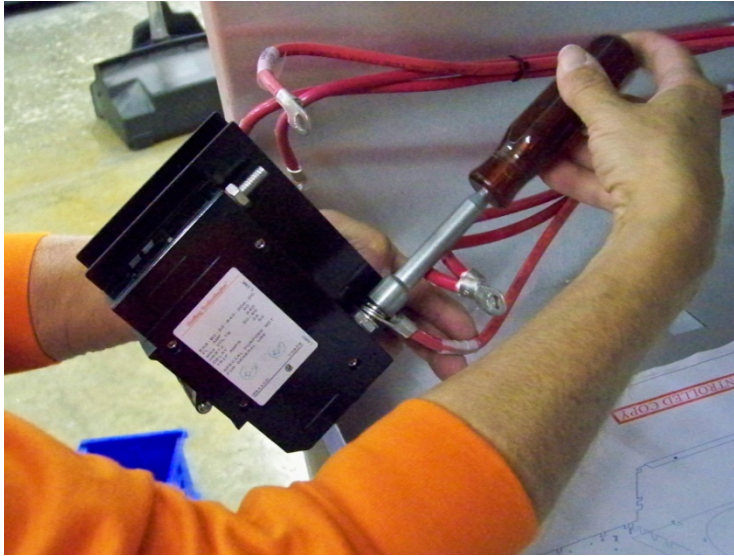




The PA modules do not have to be removed to perform this procedure. Remove the front cabinet panel by removing the 25 Philips head screws. Set screws aside for reinstallation later.



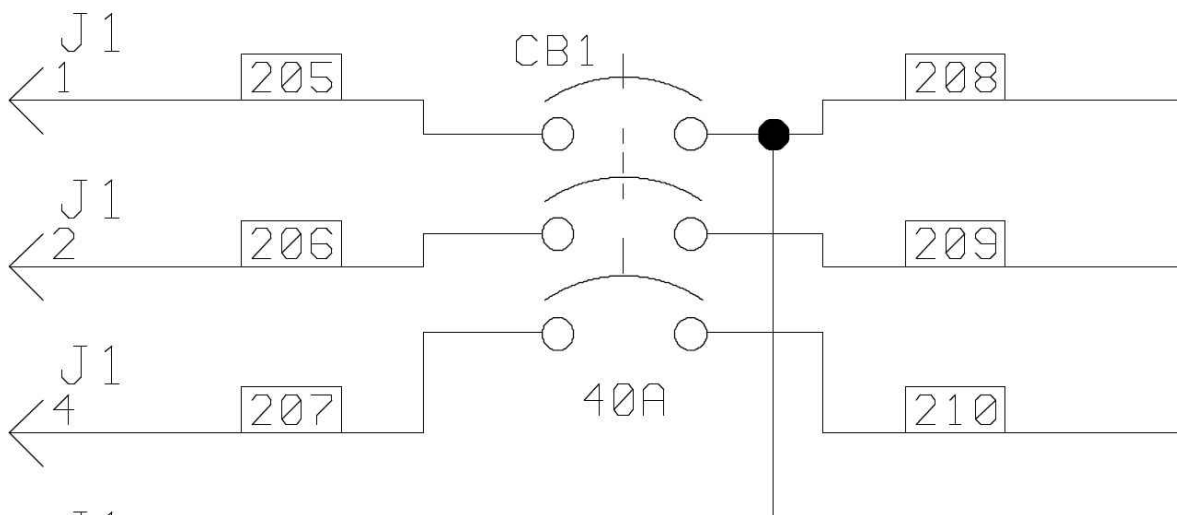
Remove the wires from the back of the circuit breaker using a 7/16" nut driver.

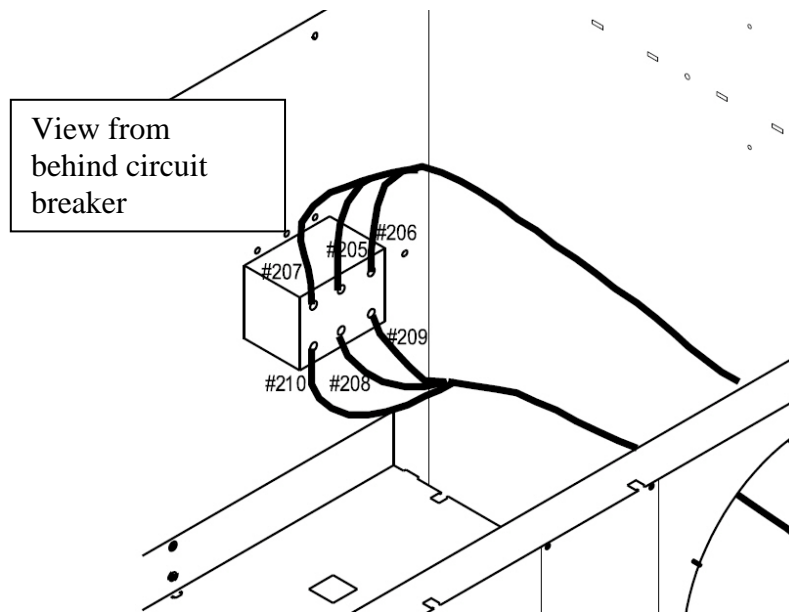
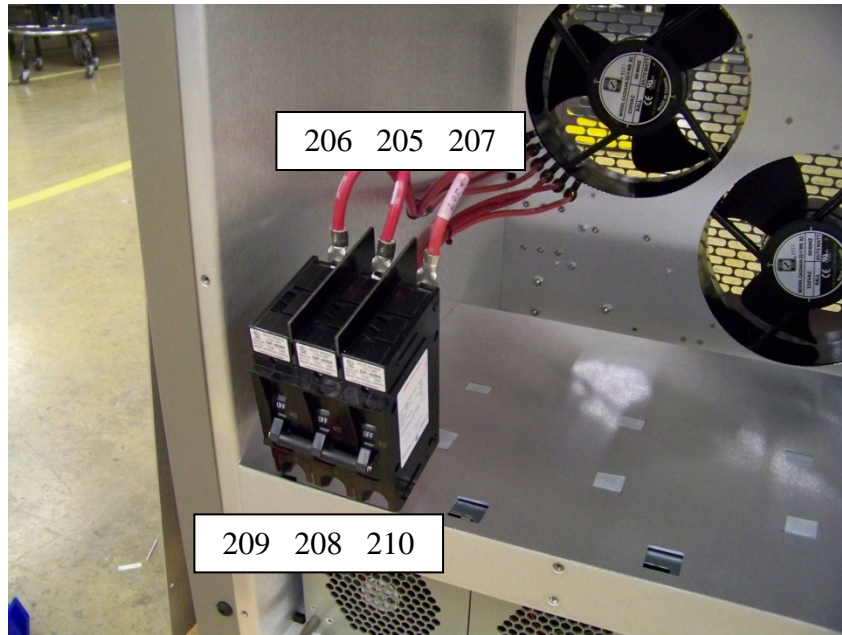


## 2.4 Installation of the circuit breaker

Reverse the process used to remove the circuit breaker. Install the wires according to the drawings. Hardware is included on the studs of the circuit breaker. Use a split lock washer as an extra precaution. Stack the hardware as follows:

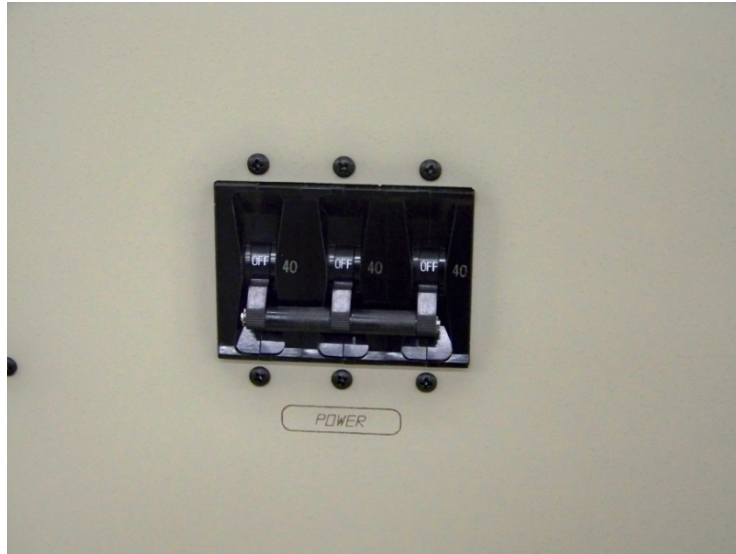
- Flat washer
- Wire lug
- Flat washer
- Split lock washer
- Nut





Hold the panel up to the front of the transmitter being careful not to scratch the painted surface. Start two screws at the top of the panel to hold the weight of the panel. Do not tighten these screws; leave loose enough to allow access behind the panel at the bottom to position the breaker. Reaching around behind the panel hold the circuit breaker to the back of the panel, install the six Philips screws holding the breaker to the panel.





Install the remaining 25 screws to put the front panel on the front of the chassis. Do not tighten the screws until all screws are started. Secure the panel by tightening the screws.



### 3 RF Technical Services Contact Information

RF Technical Services -

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