

MCOR CRATE

OPERATIONS MANUAL

Model 2513



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Introduction

This manual describes the Bi Ra System's Model 2513 – MCOR System Crate (A multi-channel corrector magnet driver system). The MCOR System provides precision bi-polar output currents with minimal zero-cross over distortion.

This manual is intended to describe the principle features, operations and specifications.

MCOR Crate Physical Description

The MCOR Model 2513 is a 19" rack mounted 6U x 220 mm crate. The crate has 17 slots; slot 00 for the EMCOR (Ethernet MCOR) Controller Module, and slot 0 thru 15 for the removable power modules (MCOR 1 thru MCOR 30). Slots 0 through 15 are identical.

The 00 slot employs two 96-pin VME connectors, and the 16 power slots have single 48-pin connectors on the backplane to achieve a modular architecture.

The MCOR power modules slide into standard card rails and two locking extractor handles hold each module in place (MCOR 30 modules use two slots each, while all other MCOR model types use one slot each). The power modules are accessed by twisting three ¼ turn captive fasteners and lowering a single hinged clear lexan front cover. The crate's front cover provides safety during operation and a positive air flow for cooling.



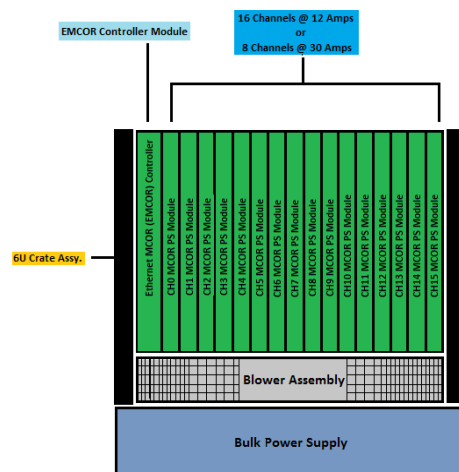
BiRa Systems Model 2513 crate assembly with Model 4922 blower assembly

MCOR Crate Functional Description

The MCOR Crate's Controller Module (EMCOR) controls up to 16 MCOR power modules (any combination of model type) using either an Ethernet, or USB interface connection. The connections are made using EMCOR front panel connections.

The Crate's backplane (4 layer) provides all of the power and signal connectivity between the power modules, the controller module and the outside world. A single unipolar bulk power supply provides the main DC power to the crate through the 180A Powerpole connector (DC Power Input) on the rear panel. This connector is attached internally to a pair of PCB mount busbars that distribute the bulk DC power across the backplane. The +5, +15 and -15 utility voltages are distributed via standard copper traces to the individual modules through the backplane. A standard 48-pin, type "E" DIN connector provides the signal and power connections from the backplane to each power module. The Controller module connects to the backplane using a VME format for connector arrangement, positioning, and module width. 16 pairs of Powerpole connectors on the back of the crate connect the MCOR outputs to their respective loads/magnets.

MCOR Crate System Diagram



An **MCOR Crate System** consists of:

MCOR Crate (Model 2513) with 1 EMCOR Controller Module and up to 16 MCOR Power Modules.

Blower Assembly (Model 4922 or 4922H).

Bulk Power Supply (Various Manufacturers and Models).

See the [MCOR 12](#) and [MCOR 30](#) datasheets for more information regarding Bulk Supply operating range voltages.

MCOR Crate Enclosure Specifications

Dimensions: 19" rack mount, 10.50" height, 21.50" depth.

Cooling: Recommend Bi Ra Model 4922 Blower (330 CFM)

Weight: 25 lb. (11.3kg)

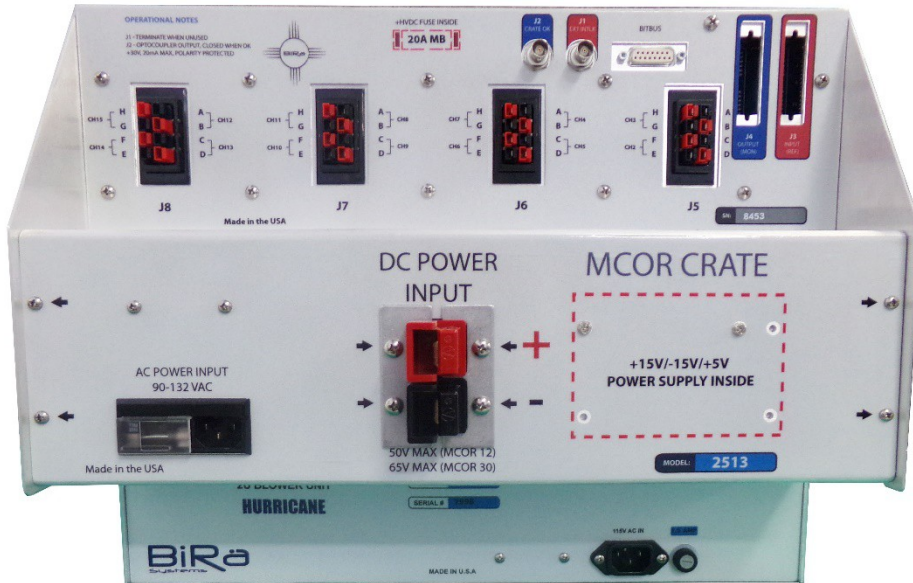


Photo of back of a 6U Model 2513 Crate mounted to a 2U blower assembly. Note that the **J3** and **J4** connectors are not required with the EMCOR as the controller module.

Installation Requirements

The following items are required to install a fully powered and cooled MCOR Crate (model 2513).

Power Requirements

Single phase 115 VAC is required for MCOR Crate and blower unit power. (Model 4922 is recommended). Bi Ra Systems technical staff will be pleased to assist on the selection of the single unipolar bulk power supply which provides main power to the crate.

Rack Space

A standard 19" rack with minimum of 14" of vertical space and 24" depth (Bulk Power Supplies tend to range from 20" to 24").

Unpacking Units

Carefully unpack units and check for any damage that might have occurred through shipment. MCOR Crate and blower should have a standard power cord each (115 VAC) with shipment. Guide rails in crate should be inspected after shipment to insure proper sitting.

EMCOR Module General Description

The Ethernet **MCOR** (EMCOR) Controller module was designed to be used in conjunction with an MCOR Crate and up to 16 MCOR Power Supply modules as the Controller assembly for all 16 MCOR modules. This controller module resides in slot 00 (left-most slot) of the crate and comes equipped with its own CPU module. Ethernet and USB interface connections are available and can be used to control the output levels of all MCOR modules, as well as monitor and feedback current, ripple, and fault status of all 16 channels simultaneously. Current and Ripple measurements to the EMCOR module are provided by each of the MCOR modules using independent readings (Monitor and Feedback readings) in the form of an analog voltage. The ADCs of the EMCOR module digitizes and stores the data making it easily accessible for monitoring purposes.

The EMCOR module has the ability to control all different MCOR model types in the same crate. Power for the EMCOR module is supplied by the crate. A single Bulk Power Supply supplies the power outputs for all MCOR modules residing in the crate.

See the [EMCOR User Manual](#) for more information.

The EMCOR Controller module replaces the C4 Interface Module, which is now considered obsolete.

MCOR Modules

MCOR (Magnet Corrector Power Modules) Description

MCOR modules come in eight different model types (see the table below for current output ratings). A single crate can accommodate 8 MCOR 30 modules (uses 2 slots per module), 16 MCOR 12 (and lower model) modules, or any combination thereof. All MCOR models provide bipolar outputs and are designed for smooth operation through zero amps with minimal "Crossover" problems. Two precision output current measurements ("feedback" and "monitor" measurements) provide independent confirmation of output current as monitored by the EMCOR Controller module. Fault sensing circuits on the MCOR modules monitor several different fault configurations and inhibit the output of a module in the event of a fault. A recently redesigned output amplifier (MCOR 12 and lower models) improves response, performance and reliability.

MCOR Model	Current Range
MCOR1	-1.02A to +1.02A
MCOR1.5	-1.538A to +1.538A
MCOR2	-2.05A to +2.05A
MCOR6	-6.15A to +6.15A
MCOR7.5	-7.69A to +7.69A
MCOR9	-9.23A to +9.23A
MCOR12	-12.307A to +12.307A
MCOR30	-30.769A to +30.769A

MCOR Crate Blower Assembly

An MCOR crate system is designed to be used with a rack mounted fan assembly in order to draw cooler air up through the bottom of the crate and prevent overheating of the MCOR and EMCOR modules. The air must be exhausted through the top of the crate, so there must be adequate space above the crate to accomplish proper air flow. Photos of a BiRa model 4922 fan (front and rear) assembly is shown below.

