

MCU1 OPERATORS MANUAL



**BRADSHAW
COMMUNICATION
SYSTEMS**

MODEL MCU1 MOTOR CONTROL UNIT OPERATION INSTRUCTION MANUAL

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INTRODUCTION

A. **MANUAL PURPOSE**

This manual contains operating instructions for the Bradshaw Communication Systems MCU1 Motor Control Unit. The instructions herein are provided for personnel responsible for monitoring and controlling an Earth Station Antenna using the MCU1. A nameplate label located inside the door of the MCU1 identifies the units' model number, part number, revision, and serial number. The serial number is used by Bradshaw Communication Systems (BCS) to identify the units' particular configuration of options.

This manual does not provide information pertaining to installation, troubleshooting, and/or maintenance of the MCU1. Information pertaining to these subjects is found only in the MCU1 Installation & Maintenance Manual, which, is intended only for qualified service personnel. The MCU1 contains no operator serviceable parts and all maintenance and/or repairs should be referred to qualified service personnel.

B. **MANUAL ORGANIZATION**

This manual is organized into the following two sections:

“Introduction” – This section provides manual purpose, manual organization, unit specifications, and customer support information.

“General Description” – This section provides safety precautions, typical system configuration, and a description of the operator controls and indicators found on the MCU1.

C. **UNIT SPECIFICATIONS**

Dimensions:	27" (67.3cm) high x 24" (61.0cm) wide x 9" (23.7cm) deep
Weight:	50 LBS (23 Kg)
Power Requirements:	3 Phase Power - Voltage & Current Dependent on Motor Sizes
Environmental:	-40° to 50°Celsius (-40° to 122° Fahrenheit) Operational 100% Relative Humidity
Enclosure:	Wall Mounted Weatherproof NEMA 4 Steel Enclosure
Enclosure Finish:	Severe Duty Paint
Enclosure Color:	White

D. **CUSTOMER SUPPORT**

Customer support, replacement parts, and repair are available 8AM – 5PM EST M-F by contacting Bradshaw Communication Systems at 770-844-9704 or by fax at 770-886-0205.

GENERAL DESCRIPTION

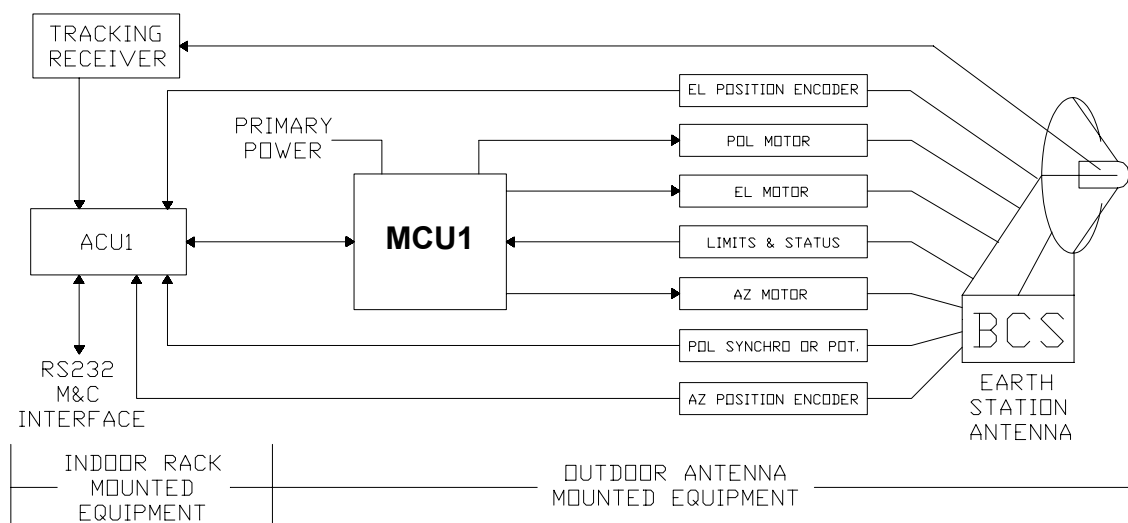
A. SAFETY PRECAUTIONS



Lethal voltages are present inside the MCU1. Emergency Stop switches and other interlocks will disable the system, but do not disconnect the MCU1 from primary power. Refer all troubleshooting and repair to qualified service personnel. The MCU1 contains no operator serviceable parts.

B. INTRODUCTION

The MCU1 is designed to allow automatic control via an Antenna Control Unit (ACU1) or local manual positioning of an earth station antenna. Operators may use the controls on the MCU1 to provide control at the antenna structure. The MCU1 is normally only a part of the complete antenna control system, however, the MCU1 has all controls necessary to allow positioning of the earth station antenna. This redundancy is extremely useful in the unlikely event of an Antenna Control Unit failure or if local positioning is required for antenna maintenance or other. A typical antenna control system configuration using the MCU1 is depicted in Figure 1. Note that the addition of the motors and limit switches are all that is required to allow local positioning of the earth station antenna.



TYPICAL SYSTEM CONFIGURATION
FIGURE 1

The ACU1 is the main system component and contains the control logic electronics to generate motor drive commands. The motor control commands are produced in response to inputs from the position encoders, limit and status switches, front panel controls, and R.F. signal receiving equipment. Control may also be accomplished via the RS-232 monitor & control port.

The angular position of each axis is reported by synchro based position encoders that are mounted on their corresponding axes of the earth station antenna. The signal from these position encoders is converted in the ACU1 to provide an angular display on the front panel display as well as being used for automatic positioning modes.

For automatic satellite tracking operation (Steptrack), a D.C. signal proportional to signal strength is connected to the ACU1. This signal is then used by the ACU1 to optimize the antenna position when in Steptrack mode.

The ACU1 is connected to the MCU1, which produces the high voltage required to start and stop the earth station antennas' motors. Each axis has a motor (or possibly two depending upon

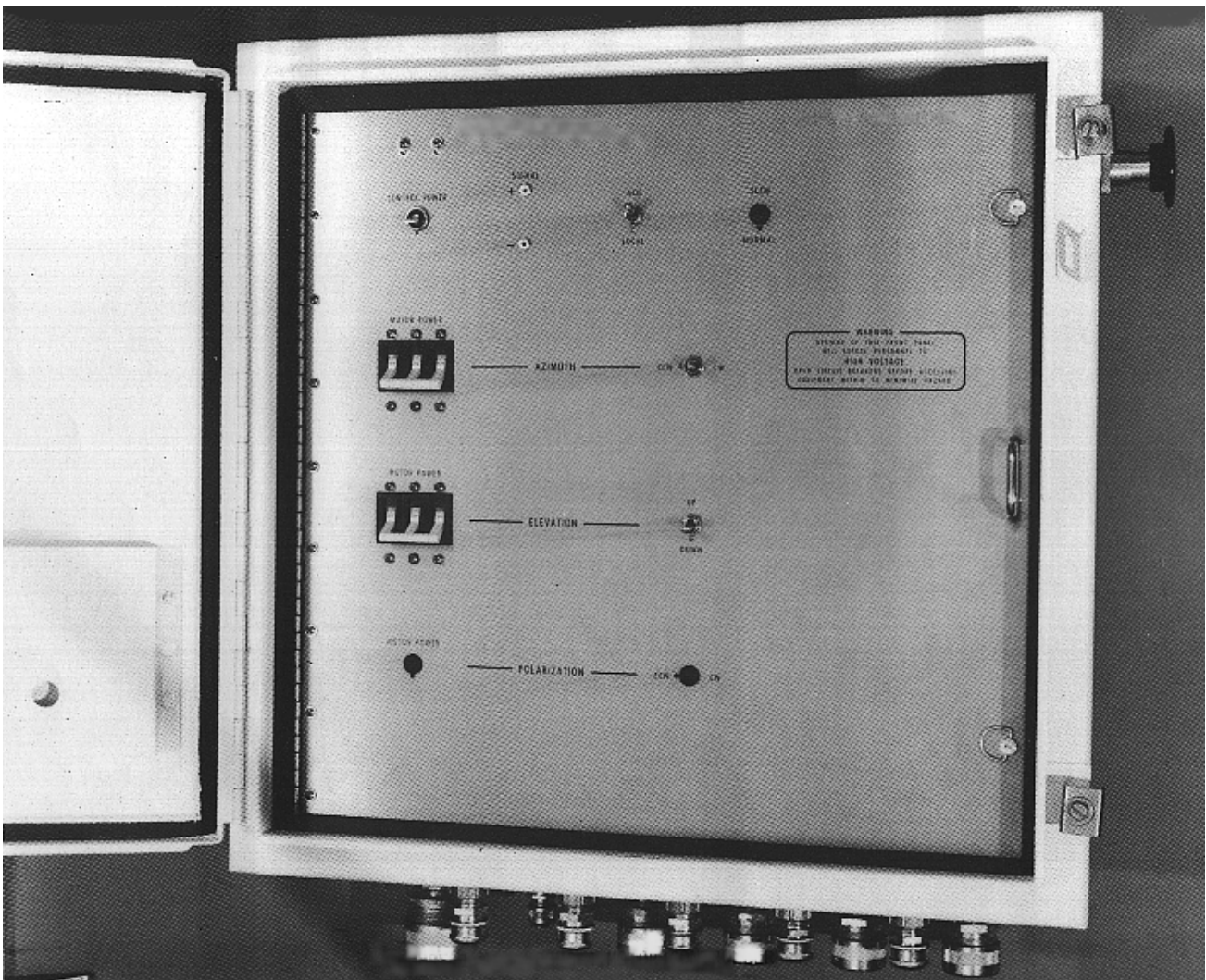
configuration) which allow electrical control of the mechanical movement of each antenna axis. In some system configurations two motors (or dual speed) motors are employed allowing two-speed control of each antenna axis. In these two-speed configurations the MCU1 is used in conjunction with a second, separate motor control unit to allow control of the additional motors (or secondary high-speed motor windings). The MCU1 allows for simultaneous control of all three axis motors if equipped with the polarization option as well.

If the earth station antenna being controlled by the ACU1 has a linearly polarized feed, the ACU1 polarization option is employed. This option allows the ACU1 to receive a signal from an additional position encoder (either a synchro transmitter or potentiometer depending upon configuration) and to control an additional motor. By adding the additional position encoder and motor the ACU1 can remotely control the rotation of the earth station antenna polarization feed horn.

The ACU1 is generally rack mounted and located in the control room area, while the position encoders, limit switches, MCU1, and motors are generally located on the earth station antenna structure. The R.F. tracking equipment is generally located in the control room area with the ACU1.

PHOTOGRAPH OF THE MCU1

The following is a typical photograph of the MCU1 and may be referred to for the operator controls discussion in Section C.



MCU1 (Cover Door Open)

C. **MOTOR CONTROLLER OPERATOR CONTROLS**

1. **Power Circuit Breaker**

The power circuit breaker turns the MCU1 internal power supply on and off as well as protecting it from over-current conditions. The circuit breaker features a toggle style operation. When the circuit breaker is toggled up, the MCU1 is ON. Conversely, when the circuit breaker is toggled down (or tripped), the MCU1 is OFF.

2. **Motor Power Circuit Breakers**

Each earth station antenna axis motor is protected by a circuit breaker capable of removing power to the motor in the event of an over-current condition. Each circuit breaker is clearly labeled to identify the associated axis of protection.

3. **ACU/LOCAL Switch**

The ACU/LOCAL Switch enables the operator to switch between automatic control provided by the Antenna Control Unit (ACU1) or manual control via axis jog switches contained on the MCU1. The switch features toggle style operation. When the switch is toggled in the up direction, control of the MCU1 is via the ACU1 (if connected). Conversely, when the switch is toggled in the down direction, control of the MCU1 is via the local jog switches located at the MCU1.

4. **Local Axis Jog Switches**

The Local Axis Jog Switches allow simultaneous or singular movement of each of the antenna's axes when The ACU/LOCAL Switch is in the LOCAL position. These switches feature a toggle style operation and are specifically designed to force the operator to stop at center prior to reversing directions. This helps reduce wear and tear at the motors/jackscrews as well as helps protect the internal circuits of the MCU1 from excessive over-loading caused by regenerated motor power.

5. **Slew/Normal Switch (Optional)**

The SLEW/NORMAL Switch enables the operator to switch between high-speed motors and normal track speed motors when the high-speed motor control option is implemented. The switch features toggle style operation. When the switch is toggled in the up direction, the high-speed (SLEW) motors are enabled (if implemented). Conversely, when the switch is toggled in the down direction, normal track speed motors are enabled.

6. **Signal Jacks**

Two test probe style jacks are available at the MCU1 to provide a D.C. signal proportional to signal strength output. These jacks only function if the antenna control system utilizes a tracking receiver and the system wiring has been wired to support this feature. The jacks are labeled "+" and "-" representing the positive and negative probe attachments respectively. The jacks are useful in the event manual satellite peaking is required at the MCU1.

7. **Emergency Stop Switch**

The Emergency Stop Switch is provided to allow the operator (or anyone realizing an emergency condition related to antenna movement) to stop all antenna axes movement despite the origin of control. The switch is a large red button located on the top right side of the MCU1. The switch features latching operation, with a push to activate, pull to reset style operation.