ADU-2220 & ADU
Auxiliary Display Unit

Operations Manual

THIS MANUAL CONTAINS TECHNICAL INFORMATION FOR THE
ADU-2220 and ADU AUXILIARY DISPLAY UNIT
FIRMWARE VERSION 012x

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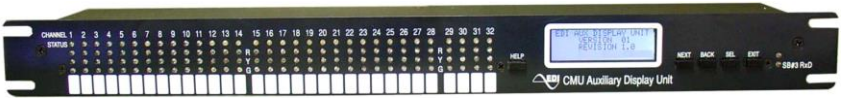
ADU-2220



ADU

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THE AUXILIARY DISPLAY UNIT SERIES IS DESIGNED AND MANUFACTURED IN THE USA BY EBERLE DESIGN INC.
PHOENIX, ARIZONA
EDI IS CERTIFIED TO ISO 9001:2015 QUALITY SYSTEMS STANDARDS.

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Section 1
General

1.1 OVERVIEW

The Eberle Design *Auxiliary Display Unit* (ADU) is a modular display that provides an enhanced user interface for the ATC Cabinet Monitor Unit system and the ITS Cabinet Monitor Unit system. The *Auxiliary Display Unit* is intended to mount into a 1U space of the 19 inch rack of the cabinet.

The ADU-2220 is intended for use with the CMUip-2212 Cabinet Monitor Unit of the ATC Cabinet system. The ADU is intended for use with the CMU(ip)-212 Cabinet Monitor Unit of the ITS Cabinet system. Both the ADU and ADU-2220 products are interchangeable and differ primarily in the source of power.

Product	Cabinet	Monitor	ADU Power Source
ADU-2220	ATC	CMUip-2212-xx	24-48 VDC
ADU	ITS v1	CMU(ip)-212	120 - 240 VAC

The *Auxiliary Display Unit* meets with or exceeds all specifications outlined in the ASHTO/ITE/NEMA ***Intelligent Transportation System (ITS) Standard Specification for Roadside Cabinets Version 01.02.17b*** document.

1.2 DISPLAYS

The *Auxiliary Display Unit* provides a Red, Yellow, and Green status LED indicator along with a Blue LED indicator for fault status, for each of the thirty two channels supported by the CMU. This LED Channel Status display provides a full view of the intersection status.

The *Auxiliary Display Unit* also provides a Liquid Crystal (LCD) based menu driven display that provides detailed status information from the CMU along with an interface to the EDI *SmartMonitor*® technology.

For further information on the Cabinet Monitor Unit (CMUip-2212 or CMU-212) functions or CMU Data Key parameters refer to the Eberle Design ***CMUip-2212 Cabinet Monitor Unit Operations Manual*** (pn 888-2212-001) or ***CMU(ip)-212 Cabinet Monitor Unit Operations Manual*** (pn 888-0212-001).

1.3 CONTEXT SENSITIVE HELP SYSTEM

The built-in Help system provides operational guidance as well as trouble shooting advice to both the novice and expert technician. The front panel HELP button presents the requested information on the main LCD depending on the display page and context currently selected.

1.4 *SMARTMONITOR* ® DIAGNOSTIC WIZARD

The built-in Diagnostic Wizard (see Section 4) is an integral part of the Help System that provides detailed diagnostic information regarding the fault being analyzed. The Wizard provides a concise view of the signal states involved in the fault, pinpoints faulty signal inputs, and provides guidance on how the technician should isolate the cause of the malfunction.

1.5 SERIAL BUS #3 TERMINATION

The ADU provides the cabinet termination resistors for the Serial Bus #3.

Section 2
Front Panel Description

2.1 DISPLAYS

2.1.1 CHANNEL STATUS DISPLAY

Thirty two Red, Yellow, and Green LED indicators are provided by the *Auxiliary Display Unit* to display the complete intersection status of the field signal inputs to the CMU monitor. If the monitor is operating normally without a fault condition present, the currently active RYG field input signal states will be displayed.

When the CMU monitor is in the fault mode, all channels that were involved in the fault will be indicated by the Blue LED indicators.

2.1.2 MAIN STATUS DISPLAY

The Main Status Display (LCD) of the *Auxiliary Display Unit* is used to display the current status of the CMU monitor and navigate the menu levels (see Section 3). When the CMU monitor is not in the fault mode, the Main Status display will show current monitor status. When the CMU monitor is in the fault mode, the Main Status display will show the latched CMU monitor status at the time of the fault.

2.1.3 SB#3 RXDATA INDICATOR

The SB#3 RxDATA LED indicator will be pulsed each time that a SDLC message is correctly received from the CMU monitor via Serial Bus #3. This indicator pulses rapidly during normal operation. If the *Auxiliary Display Unit* is not receiving data from the CMU monitor then the Main Status Display will show an error message “NO SB3 COMM from CMU” on line #4.

2.1.4 DISPLAY LED TEST

The monitor will illuminate all front panel LED and LCD indicators for 500ms when a Reset command is issued by the front panel RESET button or EXTERNAL RESET input of the CMU. This function provides a means to check the operation of all front panel indicators.

2.2 FRONT PANEL BUTTONS

Menu navigation is detailed in Section 3.

2.2.1 NEXT BUTTON

The NEXT navigation button is used to move to the next display window in a level of the menu (down), move the cursor, or increment the parameter (channel, input, log number, etc) of the current display function. Some display modes will indicate that the NEXT button affects a parameter by displaying a “<n>” symbol. Additional screens in a sequence are indicated by the “↓” symbol displayed in the lower right corner of the Main Status display.

2.2.2 BACK BUTTON

The BACK navigation button is used to move to the previous display window in a level of the menu (up), move the cursor backwards, or decrement the parameter (channel, input, log number, etc) of the current display function.

2.2.3 SELECT BUTTON

The SELECT navigation button is used once the cursor (▶) has been placed next to the desired parameter to enter or toggle the selection. Some display modes will indicate that the SELECT button affects a parameter by displaying a “<s>” symbol.

2.2.4 EXIT BUTTON

The EXIT navigation button is used to exit from a display mode and sets the new display mode one level back up the navigation tree. Continue to press the EXIT until the top level menu item is reached.

2.2.5 HELP BUTTON

The HELP button activates the context sensitive Help system. When the HELP button is pressed, the display will temporarily enter the Help system mode and display a screen that offers an explanation of the current menu item. Pressing the HELP button or the NEXT button will display additional screens in the sequence if available. Additional screens in a display sequence are indicated by the "↓" symbol displayed in the lower right corner of the Main Status display.

The EXIT button is pressed to exit the Help system mode. The display mode will then return to the last selected menu display level.

2.2.5.1 INVOKING THE DIAGNOSTIC WIZARD

The HELP button automatically activates the Diagnostic Wizard (see **Error! Reference source not found.**) when the display mode is currently at the top level menu AND the unit is in the fault state. When the HELP button is pressed, the display will enter the Diagnostic Wizard mode and display a sequence of screens that help diagnose the current fault. Pressing the HELP button or the NEXT button will display additional screens in the sequence if available. Additional screens in a display sequence are indicated by the "↓" symbol displayed in the lower right corner of the Main Status display.

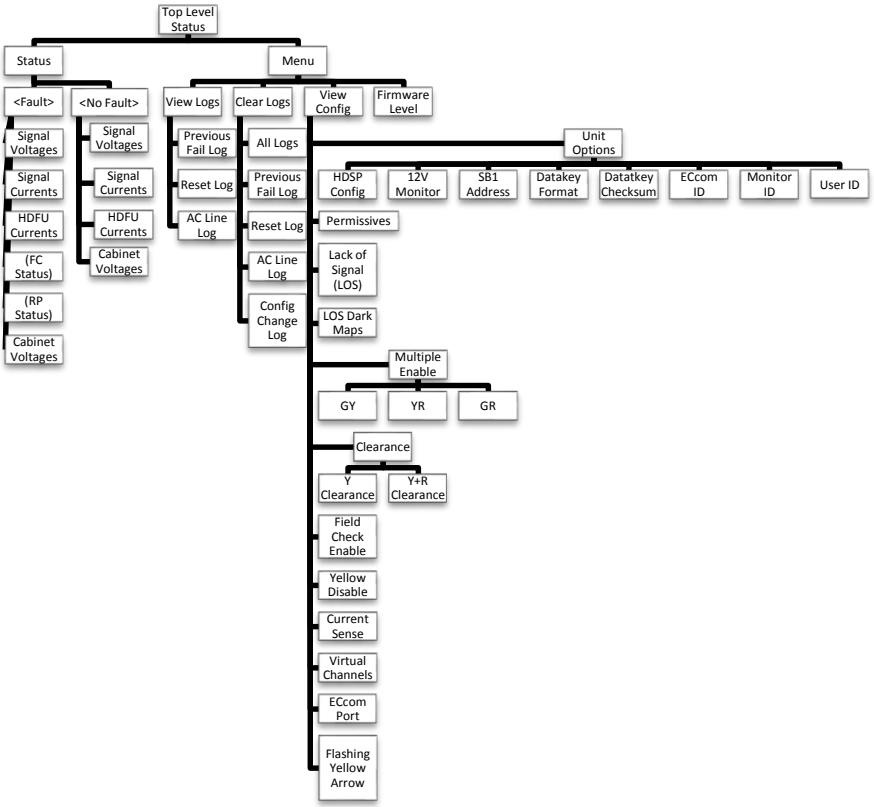
The HELP button also automatically activates the Diagnostic Wizard when the display mode is set to the Display Previous Failure (PF) log menu item (see 3.2.2.1).

The EXIT button is pressed to exit the Diagnostic Wizard mode. The display mode will then return to the last selected display level.

Section 3
Menu Operation

3.1 MAIN STATUS MENU MAP

The menu driven user interface follows the map shown below. At the top level, the NEXT button selects whether Current Status details or the main Menu selections are displayed. The NEXT button is used to scroll through the various selections that each menu level may provide. Pressing the SELECT button will invoke the function that the cursor (▶) points to. At any time the EXIT or BACK button may be pressed to back out of a menu selection.



3.2 TOP LEVEL MENU

The Top Level Status menu displays the current monitor status, consisting of the fault state, time and date, and the field signal states. This is the default display following a Reset. The Diagnostic Wizard (see Section 4) is automatically invoked when the HELP button is pressed at this level if the CMU monitor is currently in the fault state.

3.2.1 STATUS

Pressing the SELECT button from the top level provides further details regarding the current state including Field Check status (if applicable), Recurrent Pulse Status (if applicable), Field Voltages, Field Currents and Cabinet Voltages. This status may be current (no fault state) or the latched status at the time of the fault (fault state).

3.2.2 MENU

Pressing the NEXT button followed by the SELECT button from the top level provides the main Menu structure for selecting the following functions:

3.2.2.1 VIEW LOGS

This menu category provides a review of:

Previous Failure (PF) log
AC Line (AC) event log
Monitor Reset (MR) log

Events are stored with #1 being the newest event in the log. Pressing the NEXT button will display the events from newest to oldest (#1 … #n). Pressing the BACK button will display the events from oldest to newest (#n … #1).

The Diagnostic Wizard is automatically invoked when the HELP button is pressed while reviewing any of the Previous Failure (PF) logs.

3.2.2.2 VIEW CONFIGURATION

This menu category provides a means to review and/or set configuration parameters that are programmed into the Data Key. Note that to change a programming parameter, the Data Key must be reprogrammed. Refer to the Eberle Design ***MonitorKey® Data Key Programming Tool Operations Manual*** (pn 888-1212-001).

3.2.2.3 CLEAR LOGS

This menu category provides a means to clear the following logs:

Previous Failure (PF) log
AC Line (AC) event log
Monitor Reset (MR) log
Configuration (CF) log

The ALL selection will clear all four event logs.

3.2.2.4 VIEW FIRMWARE LEVEL

This menu item provides the CMU monitor firmware level.

The *Auxiliary Display Unit* firmware level can be obtained by operating the *Auxiliary Display Unit* without an SB#3 connection to the CMU monitor. When SB#3 communications is not operating, the *Auxiliary Display Unit* will default to a screen on the Main Status Display the shows the installed firmware level.

Section 4
Diagnostic Wizard

The built-in Diagnostic Wizard is an integral part of the Help System that provides detailed diagnostic information regarding the fault being analyzed. The Wizard provides a concise view of the signals involved in the fault, pinpoints faulty signal inputs, and provides guidance on isolating the cause of the malfunction.

Note that the full benefit of the Diagnostic Wizard will not be obtained unless the CMU has been programmed with the Field Check and Current Sense Enable parameters set. The EDI Setup Wizard of the *MonitorKey® Data Key Programming Tool* can be used to program the Field Check Enable function automatically. Refer to the Eberle Design ***MonitorKey® Data Key Programming Tool Operations Manual*** (pn 888-1212-001).

4.1 LAUNCHING THE DIAGNOSTIC WIZARD

The Diagnostic Wizard is automatically invoked when the CMU monitor is in the fault mode and the HELP button is pressed while the Main Status display is at the top level. It is also automatically invoked when the *Auxiliary Display Unit* is in the Previous Fail (PF) event log display mode and the HELP button is pressed.

4.2 DIAGNOSTIC WIZARD STEPS

Pressing the HELP button or the NEXT button will sequence the display through this series of steps. At any point the EXIT button will return the display back to the normal display mode.

4.2.1 CONCISE DISPLAY STEP

The first step of the Diagnostic Wizard provides a simple definition of the fault type detected. It also filters the Channel Status display to a concise view of only the channels actually involved in the fault.

Press the HELP or NEXT button to proceed to the next Diagnostic Wizard step.

4.2.2 FAULTY SIGNAL IDENTIFICATION STEP

The next step(s) pinpoint known faulty signals. This function relies on the proper programming of the Field Check Enable parameters in the CMU Data Key. This step is the heart of the Diagnostic Wizard. It identifies first whether the fault condition was caused by the Controller Unit or by a malfunction of the load bay or field wiring and loads. If the malfunction was caused by a malfunction of the load bay or field wiring and loads, the “faulty” inputs of each channel are directly identified along with the proper state.

> If Field Check is not enabled for a signal that is part of the concise display fault status then the Diagnostic Wizard will identify the input(s) as “not Field Checked”.
>
> The full benefit of the Diagnostic Wizard will not be obtained unless the CMU has been fully programmed with the Field Check Enable and Current Sense Enable parameters correctly set.

Press the HELP or NEXT button to proceed to the next Diagnostic Wizard step.

4.2.3 TROUBLE SHOOTING TIPS STEP

The last step offers the technician several suggestions to investigate for the cause of the malfunction.

Section 5
Trouble Shooting

5.1 TROUBLE CHECK POINTS

5.1.1 POWER

When power is applied the *Auxiliary Display Unit* LCD display will always show a message. If no message is displayed check that the power cable is plugged in and the source of power is active. No internal fuses are used in the ADU-2220. The ADU uses a fuse on the AC input.

5.1.2 SERIAL BUS #3

When communications is established between the CMU monitor and *Auxiliary Display Unit*, then the "SB#3 RxD" indicator on the *Auxiliary Display Unit* front panel will regularly flash. If the *Auxiliary Display Unit* is not communicating with the CMU monitor, then the *Auxiliary Display Unit* LCD display will show an error message stating "NO SB3 COMM from CMU" on line #4.

1) The SB#3 cable must be connected between the *Auxiliary Display Unit* and the SB#3 RJ-45 connector in the last Output Assembly of the cabinet. This cable is a standard Cat-5 network cable.
2) There is no setup programming required in the CMU monitor to enable the *Auxiliary Display Unit*. If the

5.2 ADU ERROR MESSAGES

5.2.1 COMMUNICATION ERROR

If the *Auxiliary Display Unit* is not communicating with the CMU monitor, then the *Auxiliary Display Unit* LCD display will show an error message stating "NO SB3 COMM from CMU" on line #4.

5.3 TECHNICAL SUPPORT

Additional technical support may be obtained by contacting Eberle Design Inc.

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Section 6
SPECIFICATIONS

6.1 SB #3 COMMUNICATION PORT

This port provides the EIA-485 data path to the CMU Cabinet Monitor Unit (CMU) using Serial Bus #3. The signals are Neutral Ground referenced, which is the same Ground point as the CMU. A standard CAT-5 network cable with RJ-45 connector is used. The cable connects from this port to an unoccupied SB#3 RJ-45 port of the Output Assembly.

Pin	Function
1	Reserved
2	Reserved
3	Ground (Neutral / 48VDC Ground)
4	RxDATA +
5	RxDATA -
6	Ground (Neutral / 48VDC Ground)
7	TxDATA +
8	TxDATA -

6.2 MECHANICAL

Height.....(1U) 1.7 inches
Width ..... 19.0 inches
Depth ..... 1.5 inches

6.3 ENVIRONMENTAL

Storage Temperature Range ..... -45 to +85 ^{o}C
Operating Temperature Range..... -34 to +74 ^{o}C
Humidity Range (non-condensing).....0 to 95% Relative

6.4 ELECTRICAL

6.4.1 ADU-2220

DC Operating Voltage Minimum ..... 22 Vdc
DC Operating Voltage Maximum ..... 60 Vdc
DC Operating Power Maximum ..... 5 watts

6.4.2 ADU

AC Operating Voltage Minimum ..... 89 Vac
AC Operating Voltage Maximum ..... 270 Vac
AC Operating Frequency ..... 45 to 65 Hz
AC Operating Power Maximum ..... 5 watts

6.5 ADU-2220 CONNECTOR

The 48VDC power is supplied with a Phoenix Contact 3-pin header 1776511, with a mating harness plug part number 1777992. Pin #1 is the rightmost pin when viewed from the connector end (back side of the ADU).

Pin	Function
1	+48VDC
2	48VDC Ground
3	Earth Ground