

MMU2-16LE *SmartMonitor*[®] Advanced Signal Monitor Overview



Eberle Design Inc.

© Copyright EDI 2013 050813



Managing Cabinet Malfunctions

The signal monitor has three basic important tasks to perform:

- *Detect* improper signals / voltages
- *Display* cabinet status and fault status
- *Diagnose* with accurate information



Detecting Cabinet Malfunctions

1) To **detect** cabinet fault conditions the monitor must be programmed correctly.

- Many monitors in the field have only a minimal set-up with much of the fault coverage left disabled.
- In most cases the main reason is a lack of understanding of the issues involved in developing the correct monitor configuration settings.
- Too much “monitor-speak” terminology!!!
 - › red fail, field check, leakage current, etc.



Display Cabinet Fault Status

2) Accurate cabinet fault status **display** provides the “clues”:

- Full Intersection Display
 - › Visually verify and spot faulty signal states
- RMS Voltage Reporting
 - › Signal voltage values help resolve fault types
- Historical Event Logs
 - › Time / Date, signal state interaction, accurate notes
- Signal Sequence Logs
 - › View signal timing or intermittent conditions leading to the fault



Diagnose for the Cause & Remedy

3) Diagnose the cause and find a remedy

- After the “clues” to the failure are assembled we must put them together in a clear fashion and interpret the results.
- Once again, understanding the details of monitor operation, the reasons voltage monitors react the way they do, and the related “monitor-speak” that results, often makes assembling the clues into a cause and remedy difficult.



Wouldn't it be great if you could...

- Use a built-in Setup Wizard to quickly and accurately configure the monitor to the exact requirements of the cabinet and intersection,
- Use a menu driven LCD interface to view vital cabinet data such as signal voltages, event logs, and configuration data,
- Use a built-in Diagnostic Wizard to automatically diagnose cabinet malfunctions and pinpoint faulty signals.

If your answer is YES,
the MMU2-16LE *SmartMonitor* is for you!



The MMU2-16LE *SmartMonitor*

- Nema TS2-2003 compliant
- LCD Menu Driven user interface
 - › Alpha Status display
 - › Full Intersection Channel display
 - › Context Help System
- Full Event Logging, ECom software
- True RMS voltage measurements
 - › LEDguard® increases the level of protection when monitoring LED signal heads.
- Built-in [Setup Wizard](#) and [Diagnostic Wizard](#)
- Type 12 with SDLC Mode for legacy TS-1 Cabinets
- Ethernet Port option
- NEMA Standard Flashing Yellow Arrow support



SmartMonitor Set-up

- Monitor Set-up -

A technician can use the [Set-up Wizard](#) to completely program the “enhanced” monitor functions by answering a series of *intersection questions*.

- ✓ Unused, Peds, 2-section turn (PP), Vehicle...
 - ✓ Field Check, Dual Indication, Red Fail, MYRCD are programmed
- The standard Nema Program Card is still used for Conflict, Min Flash, and MYCD programming.
 - Enhanced function programming is also stored in nonvolatile memory on the EDI Program Card. Replacing the card transfers the total MMU-16LE configuration database.
 - Configuration databases can be up or down loaded to disk files using ECom.



SmartMonitor Set-up (cont)

- Program Card -

- Permissive Matrix
 - › Insert a jumper for each channel pair that can run concurrently.
- Minimum Yellow Change Disable
 - › Insert a jumper for each channel that does not drive a true Yellow Clearance output (G ⇒ Y ⇒ R). For example, Peds.
- CVM & 24VDC Latch
 - › Insert a jumper to change non-latching operation to latching.
 - CVM Latch requires adequate minimum flash time
 - CVM Latch precludes TOD flash
 - 24VDC Latch can be problematic due to varying loading issues on the Cabinet Power Supply combined with short AC Main interrupts.



SmartMonitor Set-up (cont)

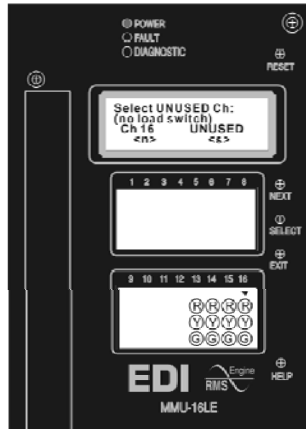
- Enhanced Functions -

- Field Check Enable
 - › Enable each color input if the signal reflects the Controller load switch command
- Dual Indication Enable
 - › R-G, R-Y, & G-Y for each channel
- Red Fail Enable
- Minimum Yellow + Red Clearance
 - › Disabled only for special conditions
- Unit options
 - › Program Card Memory
 - › LEDguard
 - › Flashing Yellow Arrow



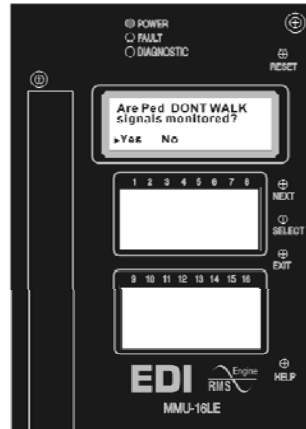
Set-up Wizard Example

First Wizard Screen
(Select Unused Channels)



NEXT →

Second Wizard Screen
(Select Don't Walk Monitoring)

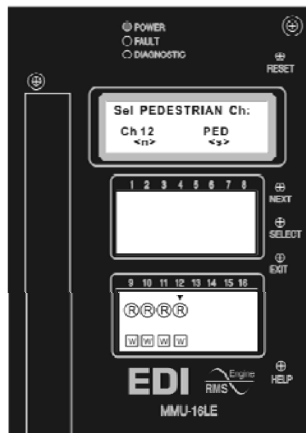


NEXT →



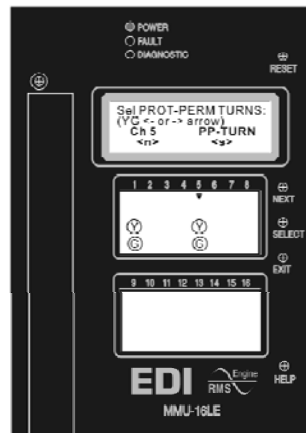
Set-up Wizard Example (cont)

Third Wizard Screen
(Select Pedestrian Channels)



NEXT →

Fourth Wizard Screen
(Select Prot-Perm Channels)



NEXT →



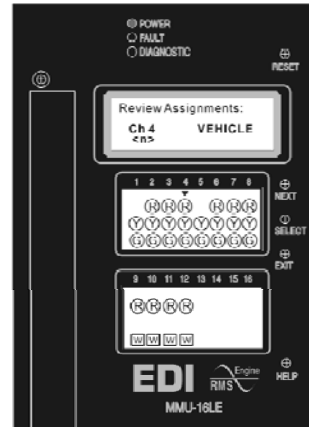
Set-up Wizard Example (cont)

- The final step of the Set-up Wizard is to review the selected channel assignments.
- The results will be used to *automatically* program:
 - › Field Check Enable
 - › Red Fail Enable
 - › Dual Indication Enable
 - › MYRC Disable



Page 13

Final Wizard Screen (Review Channel Assignments)



DONE
!



SmartMonitor Set-up Methods

- Program Card soldering
- *SmartMonitor* Front Panel Menu
 - › Set-up Wizard (recommended)
 - › Manual data entry
- ECcom Program
 - › Set-up Wizard (recommended)
 - › Manual data entry
 - › File upload

Page 14



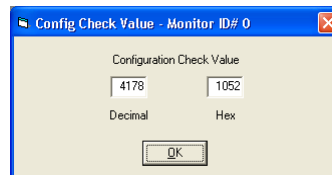
SmartMonitor Program Card Memory

- Enhanced function programming is also stored in nonvolatile memory on the EDI Program Card.
- Replacing the card transfers the *SmartMonitor* configuration database
- The PGM CARD MEMORY option should be enabled in Unit Options. If a card without memory is used, this option must be OFF.
- If the database on the Program Card is different than the *SmartMonitor*, the unit will remain in the fault mode.
 - › A front panel menu choice results:
Program Card Memory doesn't match MMU:
Copy FROM PgmCard?
Copy TO PgmCard?



Configuration Check Value

- This parameter is calculated as a check value on the configuration database.



- The value be used as a quick check to verify the settings of the *SmartMonitor* have not been modified.
 - MENU → SET / VIEW CONFIG → CONFIG CHECK VALUE
- If the Check Value is different then the configuration is different.



Trouble Shooting a Fault

- **Diagnose** the cause and find a remedy. The Diagnostic Wizard is the first step.
- After the “clues” to the failure are assembled we must put them together in a clear fashion and interpret the results.
 - › Channels & Colors
 - › Signal RMS Voltages
 - › Time of Day
 - › Signal Sequences
 - › AC Service
- Monitor logs are only one side of the story. Correlating with CU Logs may also be helpful.
 - › Preemption event
 - › TOD event
 - › AC Service event
- Have confidence the remedy relates to the cause!

Page 17



SmartMonitor Diagnostic Wizard

- Diagnosing the Fault -

The Diagnostic Wizard automatically pinpoints faulty signals and offers relevant trouble shooting advice.

- › Identifies if the CU is the cause of the fault
 - › Pinpoints faulty signals caused by fault in the load bay or field
- First screen shows an explanation of the fault type and a concise view of only the channels involved in the fault.
 - Second screen pinpoints known faulty signals.
 - The last step offers the technician a list of probable causes to trouble shoot.

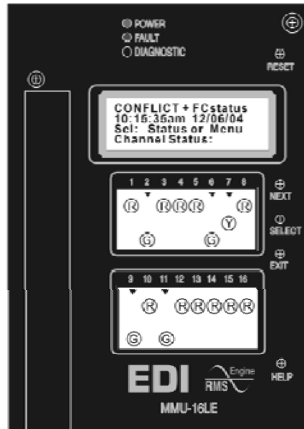
Just press the “Help” button!

Page 18



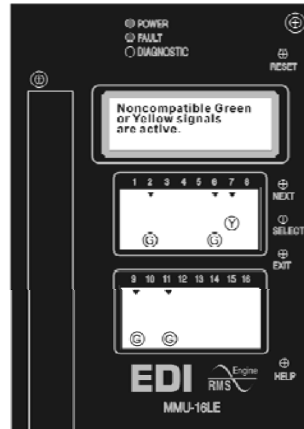
Diagnostic Wizard Example

Main Status Screen



HELP →

First Wizard Screen
(Concise Display)

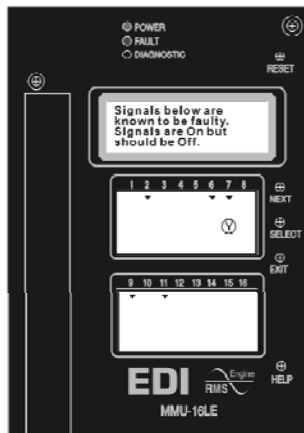


→ NEXT



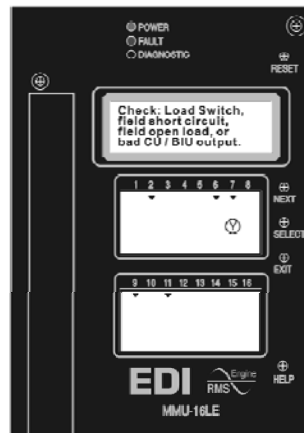
Diagnostic Wizard Example (cont)

Second Wizard Screen
(Pinpoint faulty signals)



→ NEXT

Third Wizard Screen
(Trouble shooting advice)



DONE !



“Type 12 with SDLC” Option

● Benefits

- › Display interface remains 12 channel TS1 mode (RYGW)
- › EDI Field Check powers the Diagnostic Wizard
 - Identifies if the CU is at fault
 - Directly pinpoints faulty signals in load bay or field
- › MMU time clock is synchronized with the CU
- › Program Card is verified against the CU ring structure
- › Start-up Call function automatically puts CU in programmed start-up phases on exit from flash
- › CU provides redundant Conflict monitoring function
- › MMU fault status is available in the CU

● Requirements

- › CU to MMU Port 1 cable
- › Peds assigned to phases 2, 4, 6, and 8
- › No wiring changes to the cabinet are needed.

Page 21



Putting it all together

- From start to finish, [even a novice technician can](#):
 - › correctly program the MMU-16LE *SmartMonitor*,
 - › collect accurate data regarding a cabinet malfunction,
 - › then diagnose the problem quickly and effectively.
Without even knowing what “field check, leakage, ...” is!
- With the MMU-16LE *SmartMonitor*
 - › Correct setup means fault coverage is broadened.
 - › Safety levels go up and liability risks go down.
 - › Intersection down time is reduced.
 - › Call backs are reduced with more effective repairs.

Have confidence that the repair actually affected the original problem!

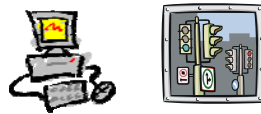


Page 22



ECcom

Signal Monitor Communications Software



Page 23



ECcom Communications Software

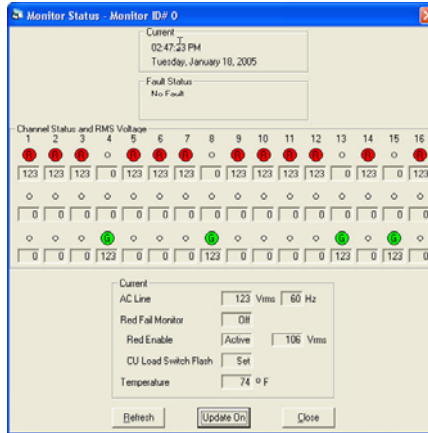
- ECcom software is used to communicate with an EDI signal monitor to retrieve and display valuable diagnostic information.
- Maintenance incident documentation is easy, complete, and accurate.
- Monitor reports can be seamlessly uploaded to the central system.

Page 24



Why guess when you can know...

- Real time status shows all signal states, field terminal voltages, and cabinet control voltages.
- Current fault type and fault status is displayed with time and date stamp.
- Channels involved in the fault are directly indicated.

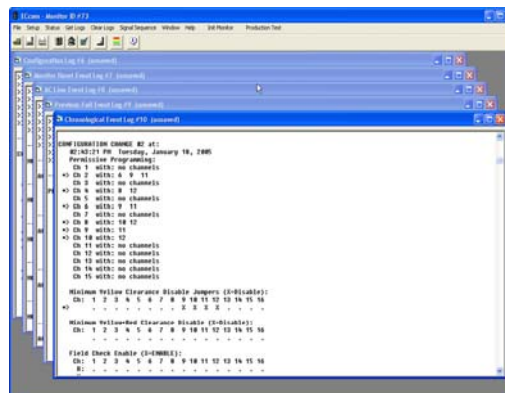


Page 25



Diagnose with Accurate Information

- Four Event Log Types
 - › Previous Failures (25)
 - › Monitor Reset Events (25)
 - › AC Line Events (40)
 - › Configuration Change Events (10)
- Chronological sort of event types by time and date

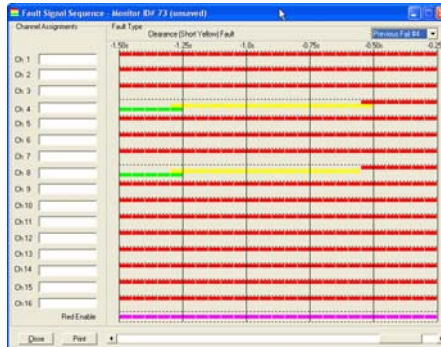


Page 26



Diagnose with Accurate Information

- Signal Sequence Display
 - › Graphically display signal states for 30 seconds prior to fault trigger.
 - › 50 millisecond resolution.
- The MMU2-16LE maintains Signal Sequence logs for the last five fault events.

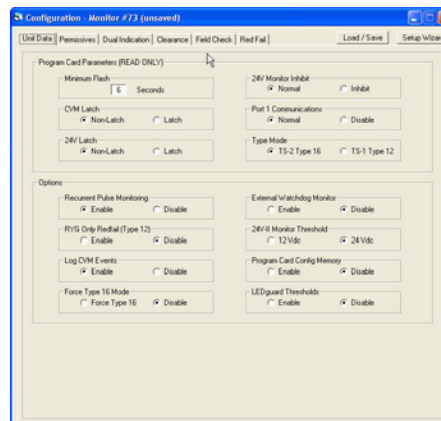


Page 27



EDI ECcom Misc Functions

- View Monitor Configuration
- Set Clock and Monitor ID
- View Configuration Check Value
- View firmware revision info
- *SmartMonitor*
 - › Transfer configuration database to / from disk file
 - › Set-up Wizard



Page 28



SmartMonitor Ethernet Configuration

- The default network settings from the factory are:
 - › IP Address 192.168.1.100
 - › Subnet Mask 255.255.255.0
- To change the *SmartMonitor* network settings
 - › ECom Search Function
 - › Using ECom DOES NOT require that the network settings of the PC match the network settings of the *SmartMonitor* (UDP)

Page 29



ECcom Ethernet Configuration

- SETUP / COMM PORT / SETTINGS menu item,
- Click on the SEARCH button. The Search function will find all EDI monitors on the local subnet.

The screenshot shows a dialog box titled "ECom Port Search" with a table and several controls. The table has four columns: IP, MAC Address, Monitor ID#, and Monitor Name. The first row contains the values 192.168.1.100, 00:40:90:27:30:25, and empty cells for the other two columns. Below the table is a "Refresh" button. To the left of the "Selected IP Address" field is a "Filters" section with "Filter Port Name" checked and "Retrieve ID and Name" unchecked. The "Selected IP Address" field contains "192.168.1.100". To the right is a "Sort by" section with radio buttons for "IP Address" (selected), "MAC Address", "Monitor ID", and "Monitor Name", and a "Sort Ascend" button. At the bottom are "Cancel" and "Ok" buttons.

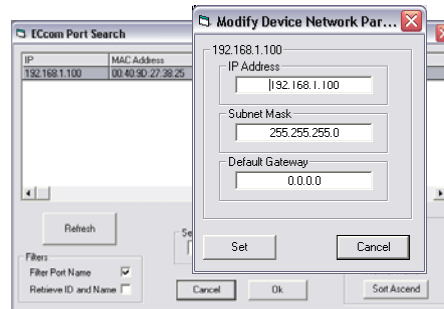
IP	MAC Address	Monitor ID#	Monitor Name
192.168.1.100	00:40:90:27:30:25		

Page 30



ECcom Ethernet Configuration

- Right Click on the monitor entry that needs to be configured
- Select CONFIGURE SETTINGS
- Set the new network parameters

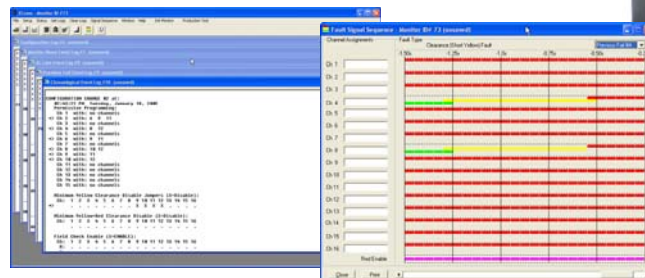


Page 31



MMU2-16LE SmartMonitor®

Whether you are a NOVICE or EXPERT Signal Technician, the MMU2-16LE SmartMonitor and ECcom make a great combination.



Page 32



Thank You...

Setting the Standard
for
Quality and Reliability

Eberle Design Inc.
www.EDIttraffic.com

SmartMonitor and LEDguard are trademarks of Eberle Design Inc.

Page 33

