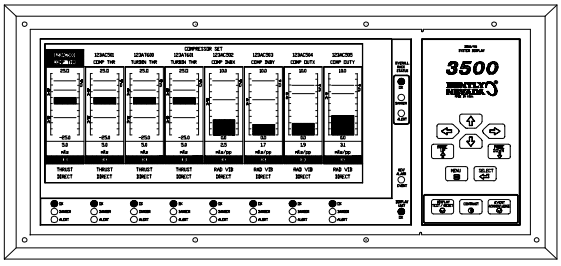
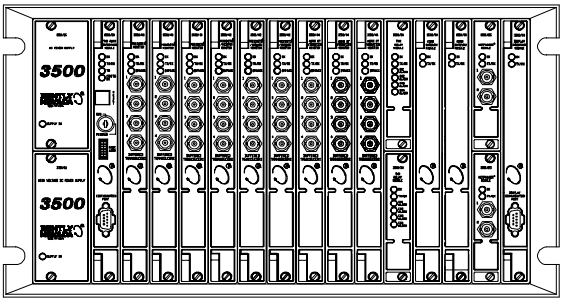
Part number 137412-01
Revision E, April 2002

3500/93 SYSTEM DISPLAY

OPERATION AND MAINTENANCE MANUAL





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Additional Information

Note

This manual does not contain all the information required to operate and maintain the Display Interface Module and Display Unit. Refer to the following manuals for other required information.

3500 Monitoring System Rack Installation and Maintenance Manual (129766-01)

- general description of a standard system
- general description of a Triple Modular redundant (TMR) system
- instructions for installing and removing the module from a 3500 rack
- drawings for all cables used in the 3500 Monitoring System

3500 Monitoring System Rack Configuration and Utilities Guide (129777-01)

- guidelines for using the 3500 Rack Configuration software for setting the operating parameters of the module
- guidelines for using the 3500 test utilities to verify that the input and output terminals on the module are operating properly

3500 Monitoring System Computer Hardware and Software Manual (128158-01)

- instructions for connecting the rack to 3500 host computer
- procedures for verifying communication
- procedures for installing software
- guidelines for using Data Acquisition / DDE Server and Operator Display Software
- procedures and diagrams for setting up network and remote communications

Contents

1. Receiving and Handling Instructions

1.1 Receiving Inspection

Visually inspect the module for obvious shipping damage. If shipping damage is apparent, file a claim with the carrier and submit a copy to Bently Nevada Corporation.

1.2 Handling and Storing Considerations

Circuit boards contain devices that are susceptible to damage when exposed to electrostatic charges. Damage caused by obvious mishandling of the board will void the warranty. To avoid damage, observe the following precautions in the order given.

- Do not discharge static electricity onto the circuit board. Avoid tools or procedures that would subject the circuit board to static damage. Some possible causes include ungrounded soldering irons, nonconductive plastics, and similar materials.
- Personnel must be grounded with a suitable grounding strap (such as 3M Velostat No. 2060) before handling or maintaining a printed circuit board.
- Transport and store circuit boards in electrically conductive bags or foil.
- Use extra caution during dry weather. Relative humidity less than 30% tends to multiply the accumulation of static charges on any surface.
- When performed properly, this module may be installed into or removed from the rack while power is applied to the rack. Refer to the Rack Installation and Maintenance Manual (part number 129766-01) for the proper procedure.

1.3 Disposal Statement

Customers and third parties that are in control of product at the end of its life or at the end of its use are solely responsible for proper disposal of product. No person, firm, corporation, association or agency that is in control of product shall dispose of it in a manner that is in violation of United States state laws, United States federal laws, or any applicable international law. Bently Nevada Corporation is not responsible for disposal of product at the end of its life or at the end of its use.

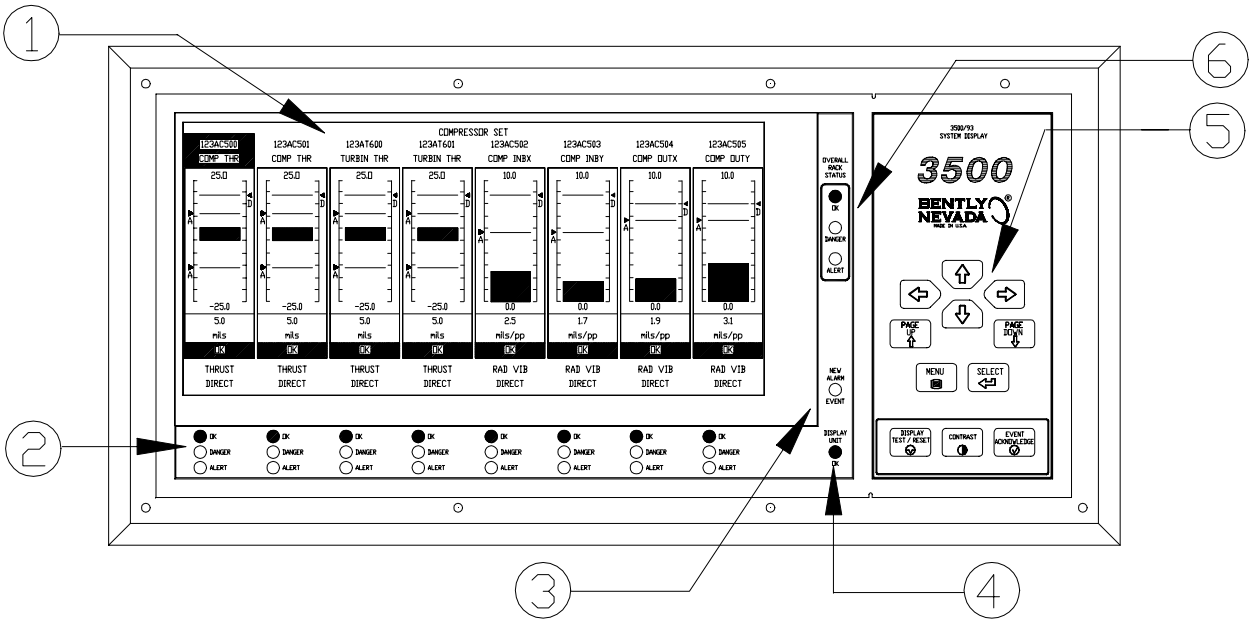
2. General Information

The 3500 System Display lets you collect data from all active channels in a 3500 rack and display them on an LCD that can be mounted in a convenient location. A 3500 Monitoring System can have up to two 3500 System Displays.

The 3500 System Display consists of three major components: The Display Unit, the Display Interface Module, and the Display Interface I/O Module.

2.1 Display Unit

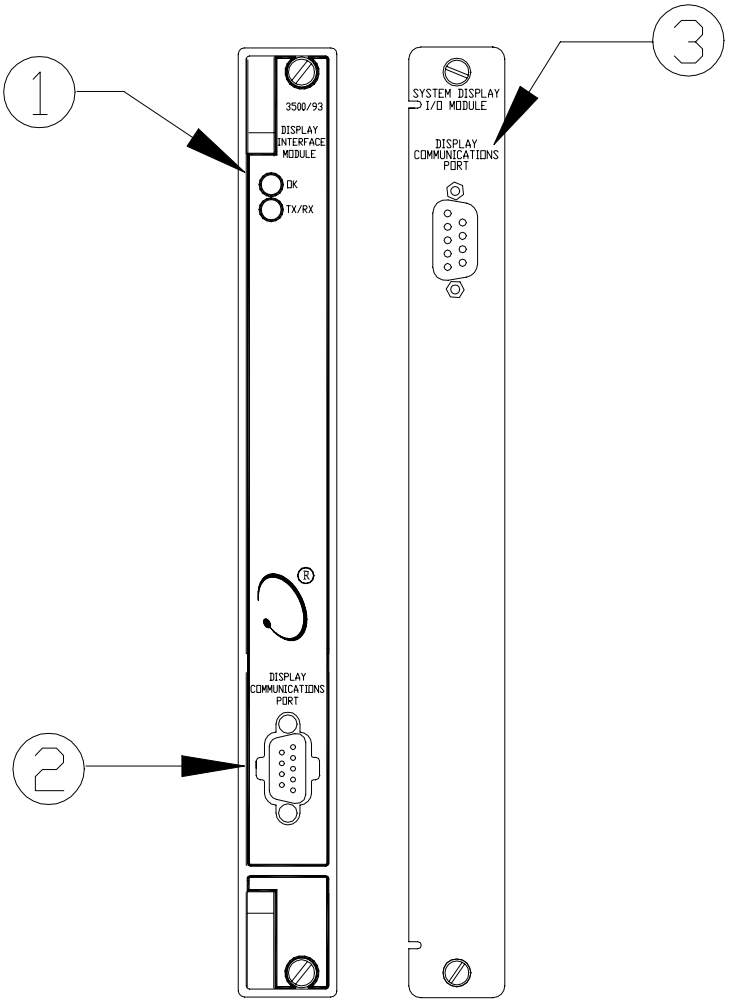
Two versions of the Display Unit can be ordered. The first version includes a reflective LCD module with out a backlight. The second version of the Display Unit includes a transflective LCD module with a backlight. The Display Unit can be mounted over the front panel of a 3500 rack or mounted in a convenient location away from the rack. Section 3 shows how to mount the unit. The Display Unit is equipped with status LEDs, and a membrane-switch keypad. Section 6 explains how to operate the Display Unit.



1) **LCD** Displays machine parameter information (See section 6.3)
2) **Channel Status LEDs** (See section 2.4.1)
3) **New Alarm Event LED** (See section 2.4.1)
4) **Display Unit Status LED** (See section 2.4.1)
5) **Keypad Control Panel** for user interface (See section 6)
6) **Rack Status LEDs** (See section (2.4.1)

2.2 Display Interface Module and I/O Module

The Display Interface Module and the Display Interface I/O Module are full-height 3500 modules that fit into a 3500 rack and support one Display Unit. The Display Interface Module and the I/O module can be installed in any slot except when a system face mount option is used. The Display Interface Module gathers and provides the machine parameter information and the configurations to the Display Unit upon request. It also provides the power to the non back-lighted Display Unit that is installed within 100 feet of the Display Interface Module. Sections 5.2 and 5.3 show how to connect the Display Unit to a Display Interface I/O module.



1) **LEDs** Indicate the operating status of the module. (See section 2.4.2)
2) **Display Communication Port** Retrieves machinery data from this rack only, using RS422 interface.
3) **Display Interface I/O Module** Optional module for extended cable support.(See sections 5.2 and 5.3)

2.3 Triple Modular Redundant (TMR) Description

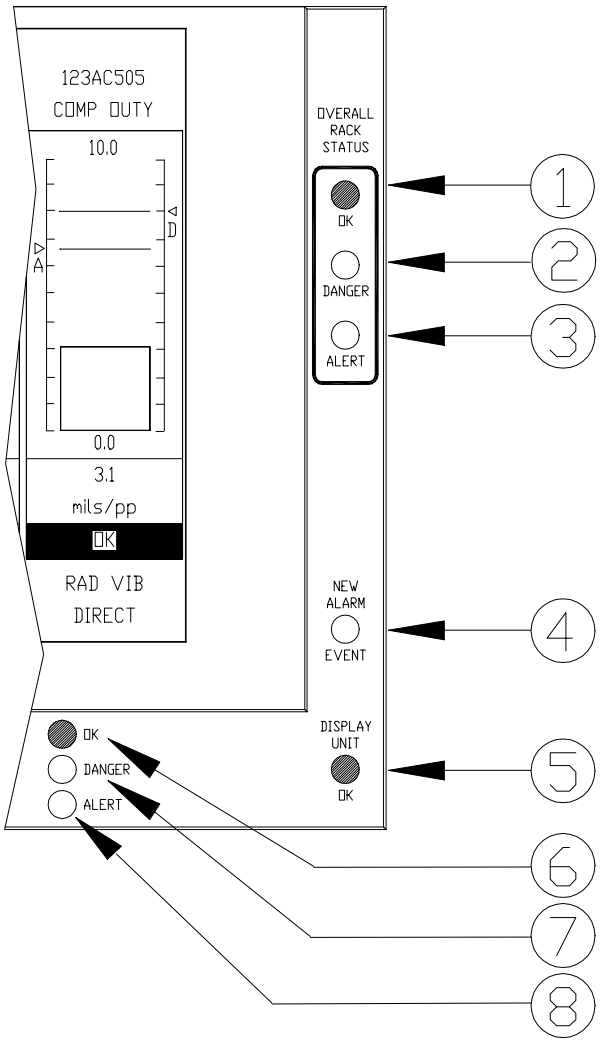
The Display Interface Module is considered a “consumer” of data because it receives data from other modules, formats it, and sends it on to the Display Unit. Since the Display Interface Module does not produce data or provide data to other modules in the 3500 rack, a redundant Display Interface Module is not required. However, for applications that require redundant System Displays or require continuous display of more than 8 proportional values in bargraph format

(or 16 proportional values in text format), two Display Interface Modules can be installed in the same rack to support two Display Units.

2.4 LED Description

The LEDs on the front panel of the Display Unit and the Display Interface Module indicate the operating status of the module as shown in the following figures. Refer to Section 8.2 for all of the available LED conditions.

2.4.1 Display Unit LEDs



1) **OK Overall Rack Status LED**
Indicates that all the modules in the rack are OK.

2) **Danger Overall Rack Status LED**
Indicates that at least one of the active channels in the rack is in Danger alarm status.

3) **Alert Overall Rack Status LED**
Indicates that at least one of the active channels in the rack is in Alert alarm status.

4) **New Alarm Event LED**
Indicates that a new alarm event has occurred since the last alarm event acknowledgment.

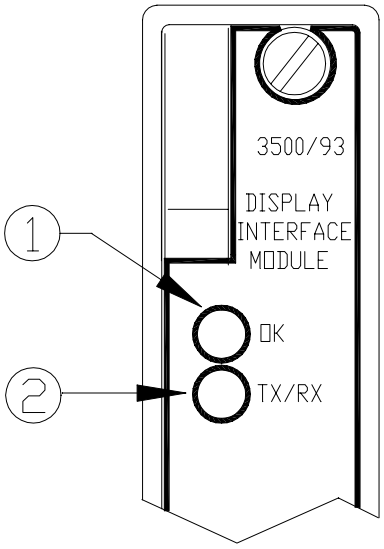
5) **Display Unit OK LED**
Indicates that the Display Unit is operating correctly.

6) **Channel OK LED**
Indicates that the channel(s) displayed above the LED are OK.

7) **Channel Danger LED**
Indicates that the channel(s) displayed above the LED is in Danger alarm status.

8) **Channel Alert LED**
Indicates that the channel(s) displayed above the LED is in Alert alarm status

2.4.2 Display Interface Module LEDs



1) **OK LED**
   Indicates that the Display Interface Module is operating correctly.
2) **TX/RX LED**
   Flashes at the rate that messages are received from other 3500 modules.

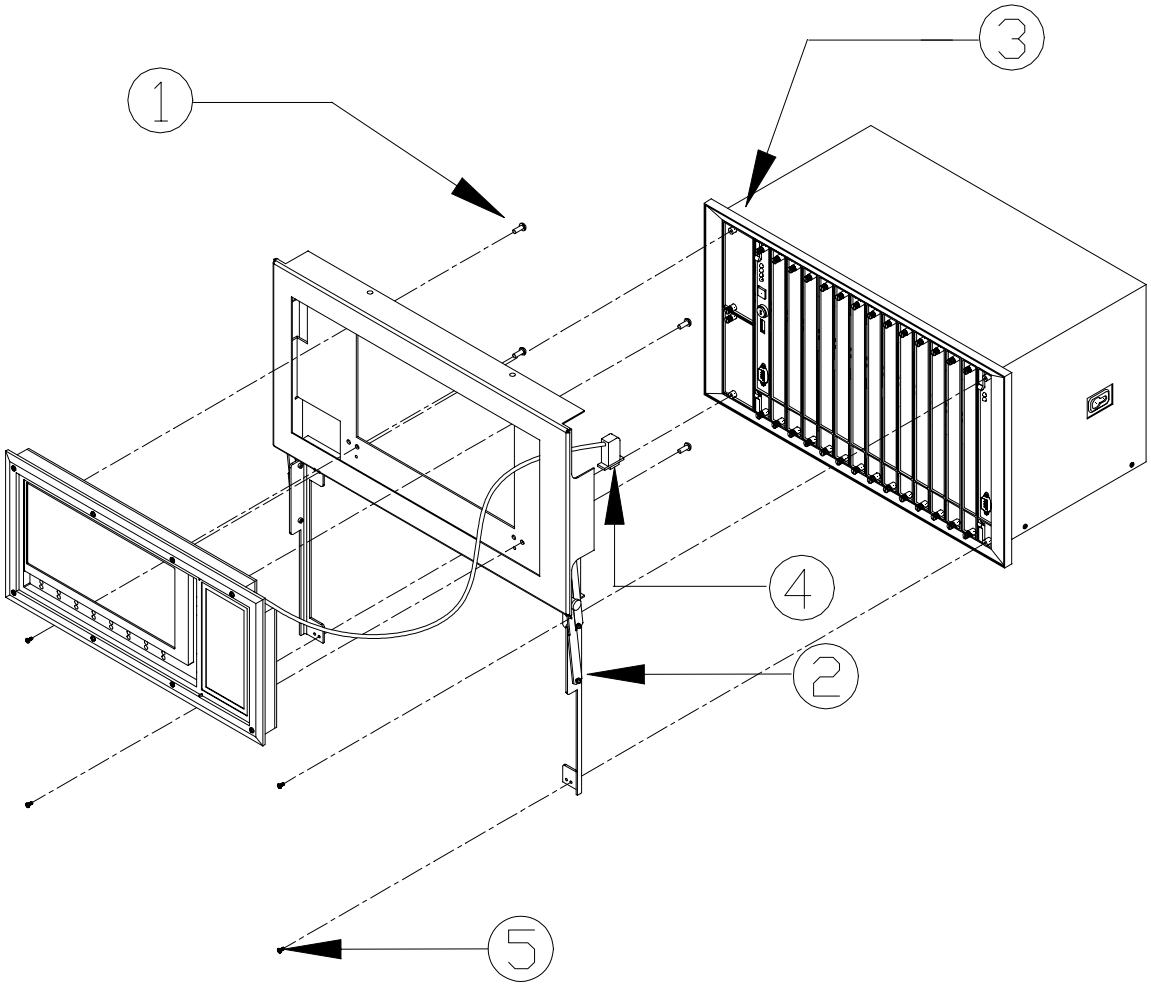
3. Installing the Display Unit

The Display Unit can be mounted in one of four basic mounting configurations. The four mounting configurations are System Face Mount, Rack Mount, Panel Mount and Independent Mount. The following sections describe how to mount the Display Unit for each of these mounting options in a typical installation.

3.1 Hardware Considerations

The slots in the rack are numbered from 0 to 15, counting from left to right. The power supplies go into slot 0 and the Rack Interface module goes into slot 1. Slots 2 through 15 are called “monitoring positions”. The 3500/93 module can be installed into any of the monitoring positions, with the exception of the system face mount used for the Display Unit. In this case the 3500/93 must be installed in slot 15. The 3500/93 System Face Mount option is not compatible with the 3500/05 Mini-rack. Also, if the 3500/20 Rack Interface Module and Data Manager I/O are to be used to interface to DDIX, TDIX or TDXnet, refer to the manual on the 3500/20 for slot restrictions this may place on your configuration.

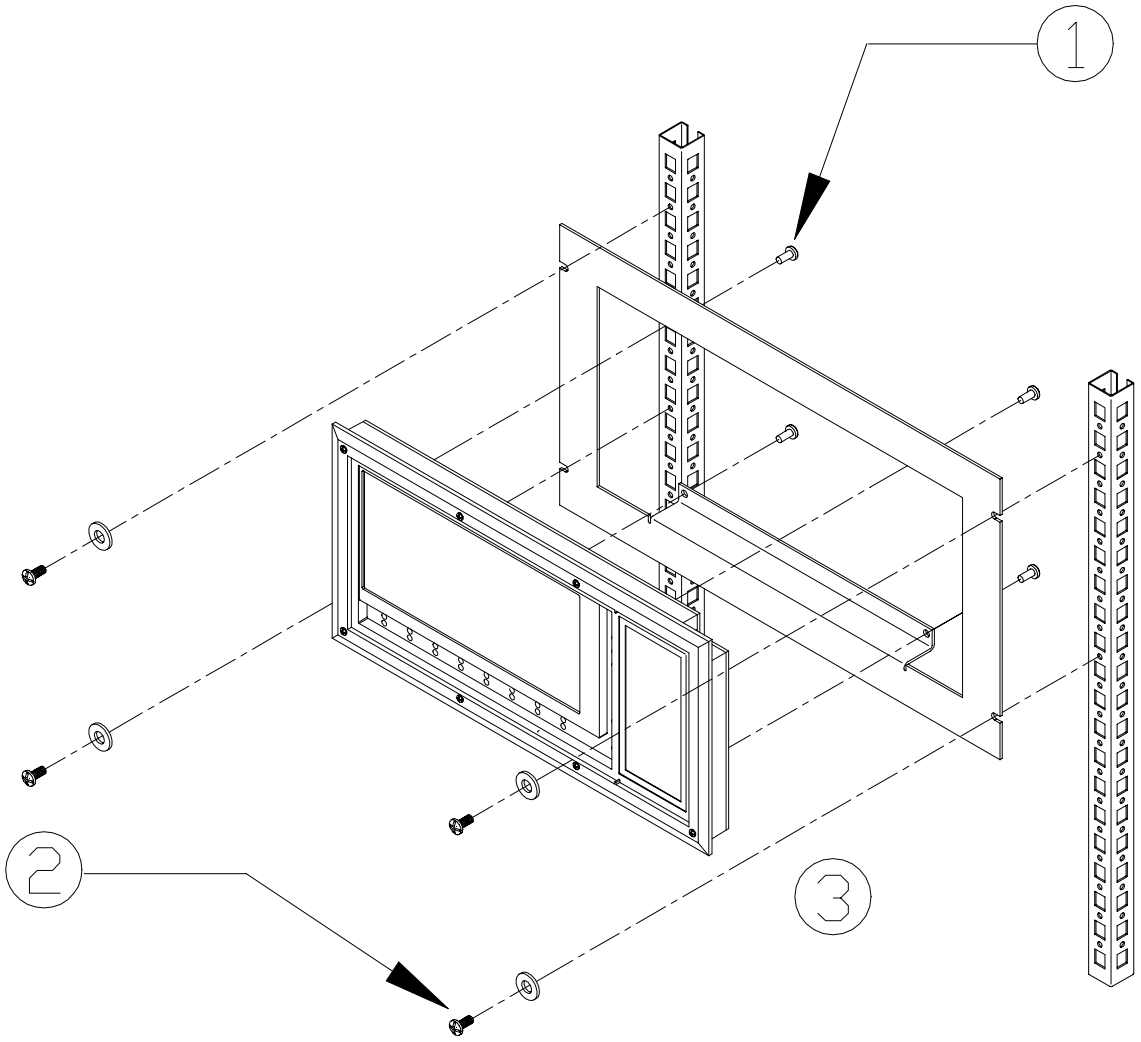
3.2 System Face Mount



1) Install the Display Unit to the system mount assembly using 10-32x.37 Phillips pan head screws (4 places). The 3500/93 System Face Mount option is not compatible with the 3500/05 A02 Mini-rack.
2) Open the frames of the system mount assembly as shown (2 places).
3) Remove captive screws (4 places).
4) Plug in D-Sub cable to the Display Interface Module. The Display Interface Module must be installed in slot 15.
5) Mount the frames to the rack using 4-40x.62 Phillips pan head screws (4 places).

Mounting Hardware		
Description	Bently Nevada Part Number	Quantity
System Mount Assembly	137224-01	1
10-32x0.37 Phillips pan head screw	04344178	4
4-40x0.62 Phillips pan head screw	04309007	4

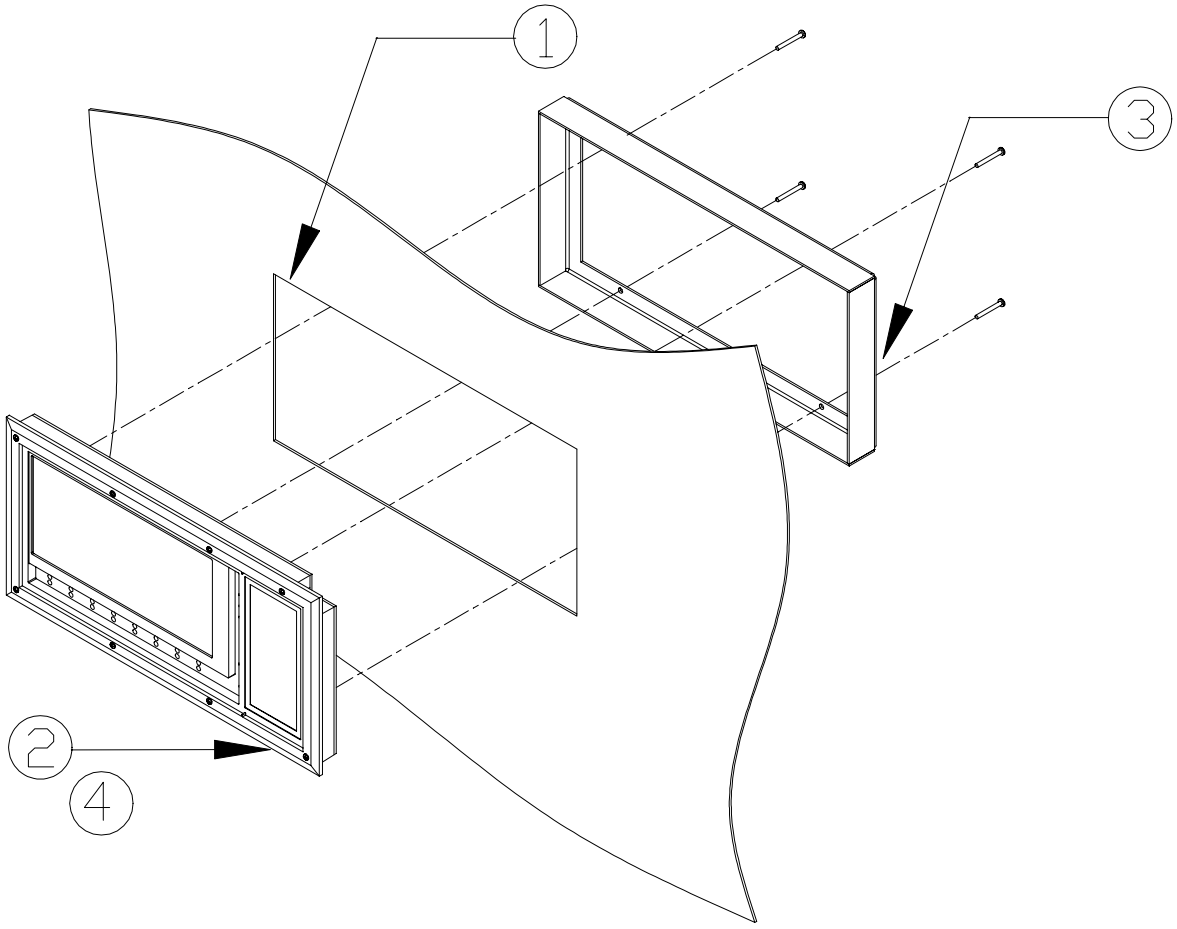
3.3 Rack Mount



1) Install the Display Unit to the Rack Mount Adapter using 10-32x.37 Phillips pan head screws (4 places).
2) Install the Rack Mount Adapter to the rail using proper screws and washers (user supplied).
3) Connect the cables.

Mounting Hardware		
Description	Bently Nevada Part Number	Quantity
Rack Mount Adapter	136978-01	1
10-32x0.37 Phillips pan head screw	04344178	4

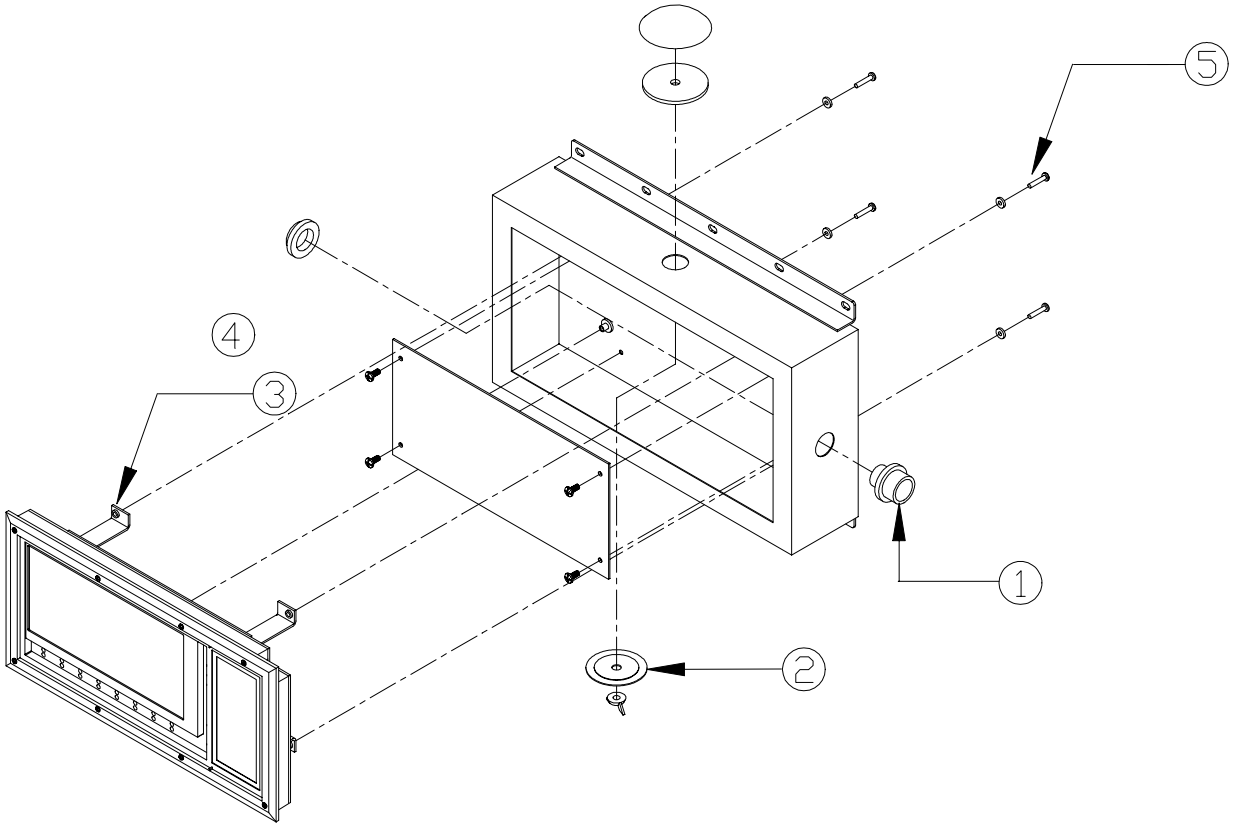
3.4 Panel Mount



1) Make panel mount cutout. Recommended cutout area (WxH) of 400±1.25 mm (15.75±0.05 in) x 190.5±1.25 mm (7.50±0.05 in)
2) Insert the Display Unit through the panel cutout.
3) Place the panel mount clamp as shown, and clamp down on the Display Unit using the 10-32x1.25 Phillips pan head screws (4 places). The panel mount clamp dimensions are: (WxH) 409.7±1.25 mm (16.13±0.05 in) x 200.15±1.25 mm (7.88±0.05 in)
4) Connect the cables.

Mounting Hardware		
Description	Bently Nevada Part Number	Quantity
3500 Display Unit Clamp	136977-01	1
10-32x1.25 Phillips pan head screw	04300148	4

3.5 Independent Mount



1) Install conduit fittings to the independent mount housing.
2) Install the seal kit.
3) Install the independent mount brackets to the Display Unit using 10-32x0.37 Phillips pan head screws (2 places).
4) Connect the cables.
5) Place the Display Unit on the housing, and use the seal washers, the flat washers and the 10-32x0.75 screws to clamp down the Display Unit to make a seal between the Display Unit and the Independent Mount Housing (4 places).

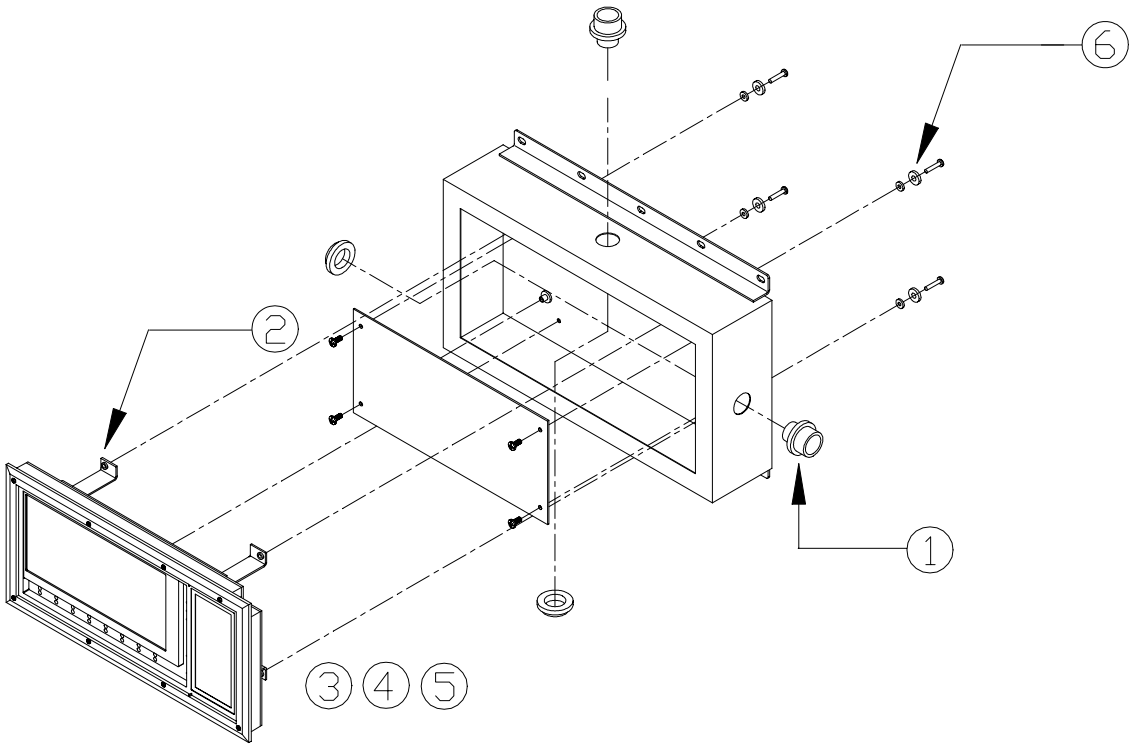
Mounting Hardware		
Description	Bently Nevada Part Number	Quantity
Stainless Steel Independent Mount Housing	137835-01	1
3500/93 Independent Mount Bracket	137836-01	2
10-32x0.37 Phillips Pan Head Screw	04344178	4
10-32x0.75 Phillips Pan Head Screw	04344186	4
Neoprene Seal Washer	03810112	4
No. 10 Flat Washer	04281412	4
Conduit Fitting 0.75 NPT	03813103	1
Seal Kit 0.75 Hole	03838117	1

3.6 Installing External Power Supply

Installation of the Display Unit farther than 100 ft. from the rack requires an external power supply to power the Display Unit. This section shows a typical installation of a Bently Nevada external power supply and a user supplied external power supply.

> **⚠ Warning**
>
> Contact with exposed live power wires can cause injury or death. De-energize all circuits before installation.

3.6.1 Installing a Bently Nevada External Power Supply



1) Install the conduit fittings to the independent mount housing (2 places). Route the Power and Signal cables in separate conduits.
2) Install the brackets to the Display Unit using 10-32x0.37 Phillips pan head screws (2 places).
3) Install the external power supply to the mounting plate.
4) Install the mounting plate to the housing using 10-32x0.37 screws.
5) Connect the power and signals using the Y-Adapter (reference section 5.3).
6) Place the Display Unit on the housing, and use the seal washers, the flat washers and the 10-32x0.75 screws to clamp down the Display Unit to make a seal between the Display Unit and the Independent Mount Housing.

Mounting Hardware		
Description	Bently Nevada Part Number	Quantity
Stainless Steel Independent Mount Housing	137835-01	1
3500/93 Independent Mount Bracket	137836-01	2
10-32x0.37 Phillips Pan Head Screw	04344178	8
10-32x0.75 Phillips Pan Head Screw	04344186	4
Neoprene Seal Washer	03810112	4
No. 10 Flat Washer	04281412	4
Conduit Fitting 0.75 NPT	03813103	2*
Power Supply (115 VAC or 230 VAC)	02200271 or 02200272	1
Mounting Plate	137833-01	1
4-40x0.18 Phillips Pan Head Screw	04330900	4
Y-Adapter	138227-01	1

* The independent mount hardware includes 1 conduit fitting. Order the additional fitting separately.

3.6.2 Wiring a User Supplied External Power Supply

Install the Display Unit on the Independent Mount Housing with user supplied power using the installation drawing in section 3.6.1. For item 3, install a terminal strip instead of the power supply (reference section 5.3).

Mounting Hardware		
Description	Bently Nevada Part Number	Quantity
Stainless Steel Independent Mount Housing	137835-01	1
3500/93 Independent Mount Bracket	137836-01	2
10-32x0.37 Phillips Pan Head Screw	04344178	8
10-32x0.75 Phillips Pan Head Screw	04344186	4
Neoprene Seal Washer	03810112	4
No. 10 Flat Washer	04281412	4
Conduit Fitting 0.75 NPT	03813103	2*
Terminal Strip	01660111	1
6-32x0.37 Phillips Pan Head Screw	04310447	2
Mounting Plate	137833-01	1
Y-Adapter	138227-01	1

* The independent mount hardware includes 1 conduit fitting. Order the additional fitting separately.

4. Configuration Information

The 3500 Display Interface Module supports two types of display units, the 3500 Display Unit or optional third party Modbus® displays. For information about configuring the interface module for an optional Modbus® Display, contact Bently Nevada Systems Integration Services through your local sales office. This section shows how to configure the Display Interface Module to operate with the 3500 Display Unit.

Configuration lets you control how the data from the monitor modules in a 3500 rack is displayed on the 3500 Display Unit. Before you configure the Display Interface Module, check that

- all other modules in the rack have been installed and configured.
- all active monitor channels in the rack have valid user channel names. Enter these names in the Channel Configuration screens for the individual modules (requires Rack Configuration Software version 2.31 or later).

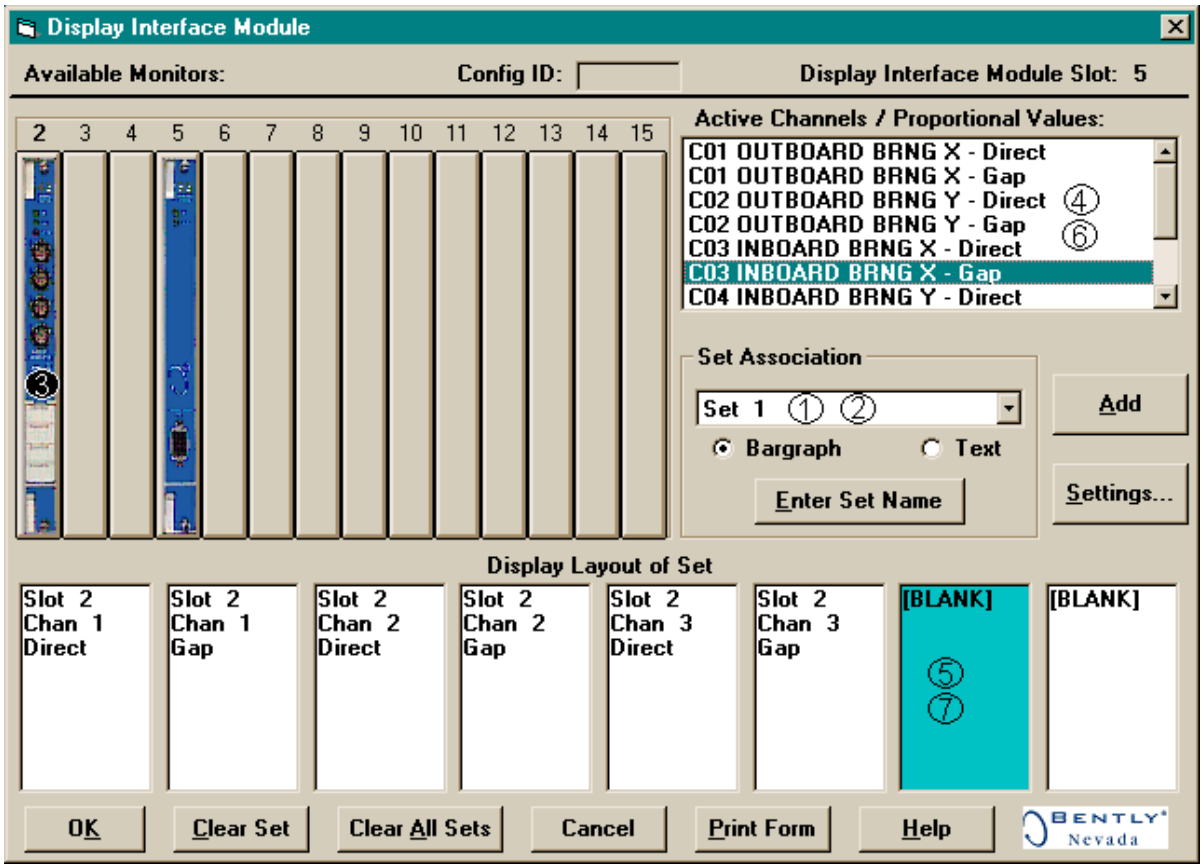
You configure the Display Interface Module by creating custom display sets, defining how the display unit presents information, and setting software switches. You can also check the status of the Display Interface Module and the Display Unit using the verification screen.

4.1 Creating Custom Display Sets

The 3500 Display Unit displays data from monitor modules in the rack by using either a default display set or custom display sets. The default display set includes the primary values of all active channels from all modules in the rack. The default set begins with values from the left most module in the rack. The values in the set proceed in the order that modules are installed in the rack from left to right. You can display specific groups of proportional values that are of particular interest to you by using the 3500 Rack Configuration Software to create custom display sets.

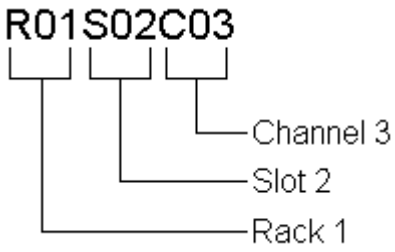
Custom display sets can contain 8 values for bargraph displays and 16 values for text displays. A set can include any combination of proportional values from any active channels in the rack. You can define up to a total of 52 custom display sets. The configuration software lets you assign names to each custom set. These names will appear in the main menu of the Display Unit. This menu lets you select which set of values are displayed on the 3500 Display Unit.

To create a custom display set, use the Display Interface Module dialog in the 3500 Configuration Software as follows:



1) Enter a name for the set here.
2) Select a set type - Text or Bargraph.
3) Click on a module.
4) The proportional values for all channels in the monitor will appear here.
5) Highlight a cell of the display set.
6) Highlight a value to be added to the display set.
7) Select the Add button. The highlighted proportional value will be added here.
8) Add other proportional values to the set as required by repeating steps 3 through 6.
9) Add other sets by repeating steps 1 through 7, or save the set(s) by selecting OK.

The Active Channel list box will display the user defined channel names. The user defined channel names are entered in the monitor channel option screens. If the channel names are not defined, the Active Channel list box will display the coded names with the following meaning:

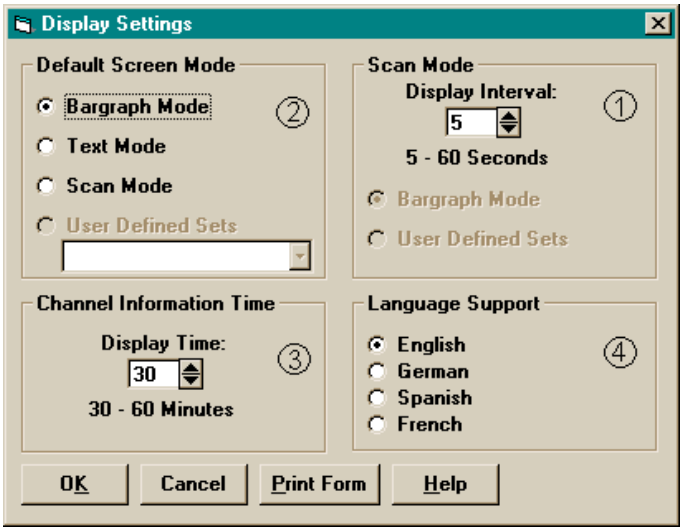


Note

The custom display sets that you define may become invalid if monitor channels in the rack are reconfigured. Whenever you reconfigure monitor channels, use the Display Interface Module dialog box to delete the reconfigured channels from your custom display sets and then add the channels to the sets again.

4.2 Defining Display Unit Settings

Display Unit settings let you choose the display mode that appears when the unit is turned on, the scan rate, and the amount of time before the unit returns from the channel information screen to the previous display. The Display Settings dialog box in the 3500 Rack Configuration Software looks like this:



1) Scan time setting and default scan mode setting box. Default scan time is set for 5 seconds.
2) Setting for the mode of operation after the power up or the Display Reset.
3) Time out setting for the Channel Information screen and Time on setting for the LCD back-light. The screen returns to the previous display and/or the back-light turns off. Default setting is 30 minutes.
4) Options for the Display Unit foreign language support. Default language setting is English.

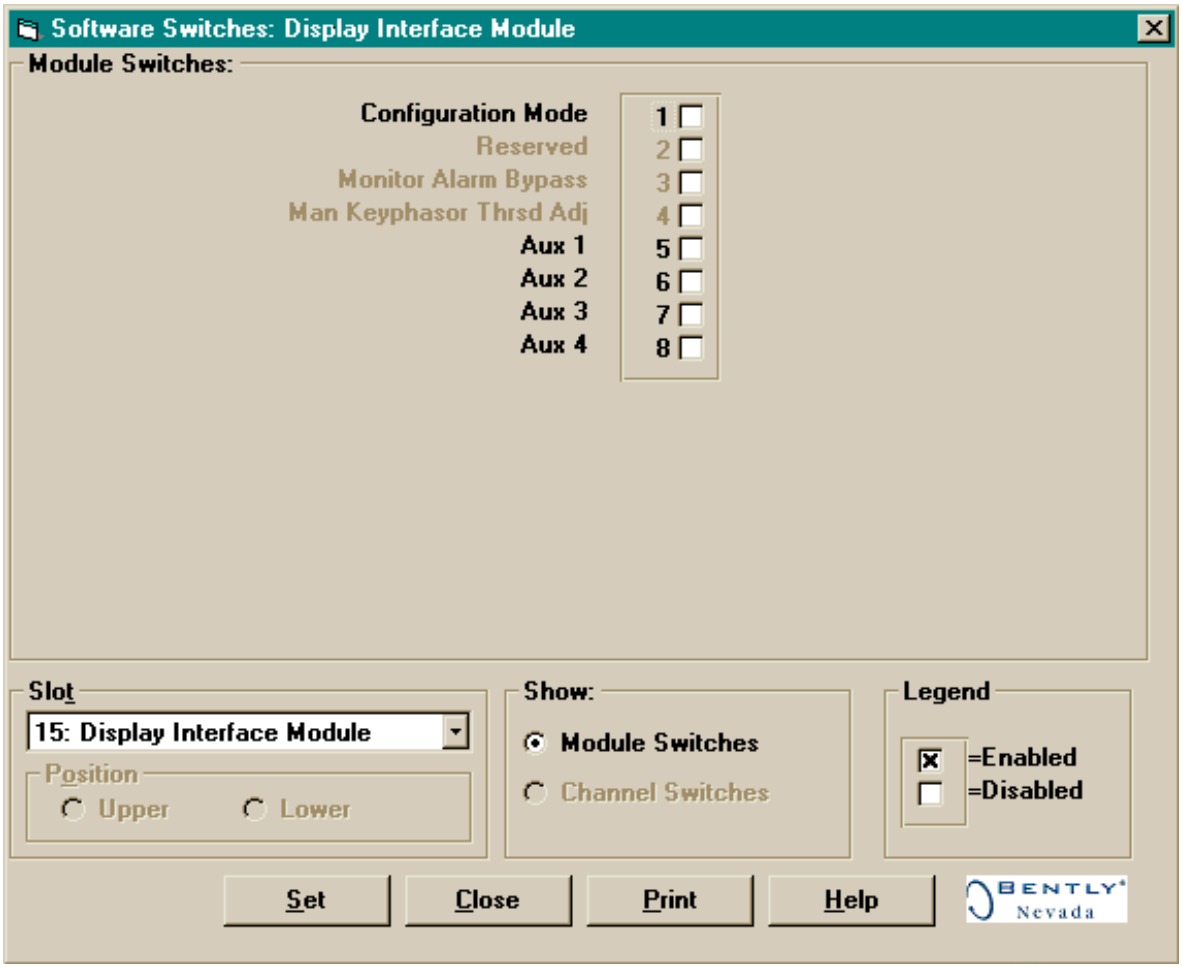
The help system that comes with the configuration software defines all of the fields in this dialog box.

4.3 Software Switch

The only software switch available on the Display Interface Module is the "Configuration Mode" module switch. This switch allows the Display Interface Module to be configured. When a configuration is downloaded from the Rack Configuration Software, the switch will automatically be enabled and disabled by the software. If the connection to the rack is lost during the configuration process, use this switch to remove the module from Configuration Mode.

No channel software switches are available for the Display Interface Module.

The switch can be accessed on the **Software Switches** screen under the **Utilities** option on the main screen of the 3500 Rack Configuration Software.



No change will take effect until the Set button is pressed.

The Configuration Mode module switch can be set through the Communication Gateway Module using 1 for the module switch number.

4.4 Module and Channel Statuses

The Display Interface Module returns both module and channel statuses through a verification screen in the 3500 Rack Configuration Software. This section describes the available statuses and where the statuses can be found.

Module Status (Display Interface Module Status)

OK

Indicates if the Display Interface Module is functioning correctly. A Not OK status is returned under any of the following conditions:

- ROM Failure
- RAM Failure
- Hardware Failure in the Module
- Node Voltage Failure
- Configuration Failure
- Slot ID Failure
- SCI Failure
- Neuron® Failure
- Some Cases of Firmware Failure

If the Display Interface Module OK status goes Not OK, the system OK Relay on the Rack Interface I/O Module will be driven Not OK.

Configuration Fault

Indicates if the Display Interface Module configuration is invalid.

Channel Status (Display Unit Status)

OK

Indicates if the Display Unit is functioning correctly. A Not OK status is returned to the Display Interface Module under any of following conditions:

- ROM failure
- RAM failure
- Configuration failure
- Communication failure
- Some cases of firmware failure

A Not OK channel status (Display Unit status) will not cause the module status to go Not OK when the Display Interface Module is in OK status.

The following table shows where the statuses can be found.

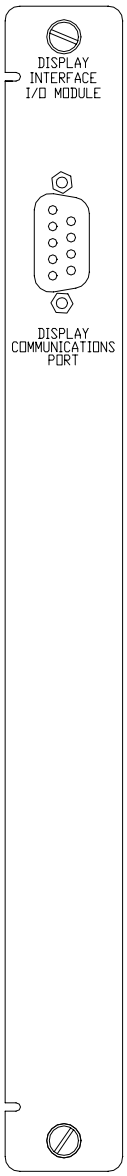
Statuses	Communication Gateway Module	Rack Configuration Software	Operator Display Software
Module OK	X	X	
Module Configuration Fault		X	
Channel OK	X	X	

5. I/O Module Description

The Display Interface I/O Module has an RS422 communication port that is the same as the port on the Display Interface Module. This I/O module lets you connect the communication cable from the Display Unit to the rear of the 3500 rack.

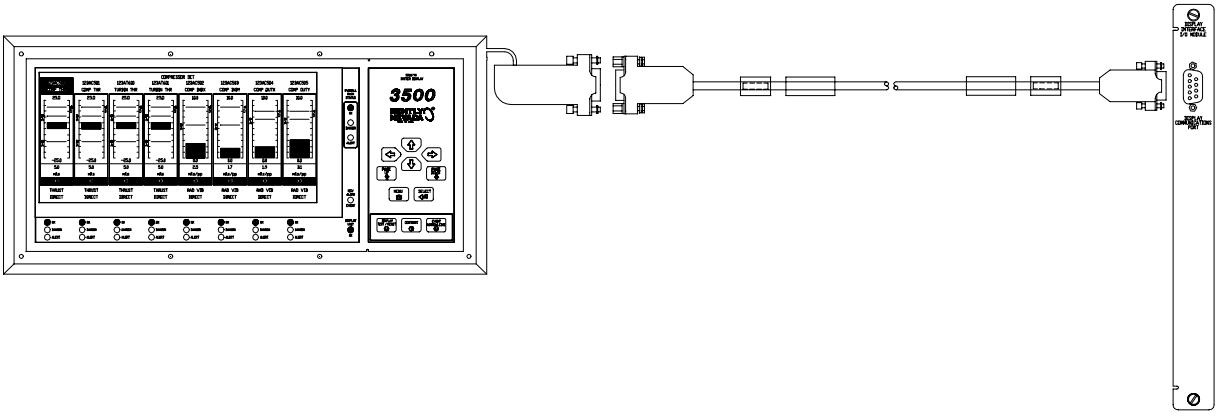
5.1 Display Interface I/O Module

The Display Interface I/O Module is an optional module that lets you connect the Display Unit to the rear of the 3500 rack.



5.2 Installing a Display Unit within 100 feet of the I/O Module

Installing a non back-lighted Display Unit 100 feet or less from the Display Interface I/O Module requires a cable that carries power to the Display Unit in addition to the RS422 signal lines. The back-lighted Display Unit always requires



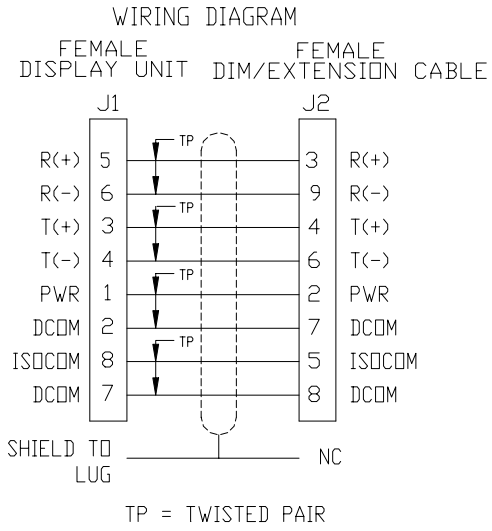
an external power supply, regardless of distance from the 3500 rack.

Display Interface Extension Cable Part Numbers

Bently Nevada Cable Part Numbers (Assembled D-Sub Cables):

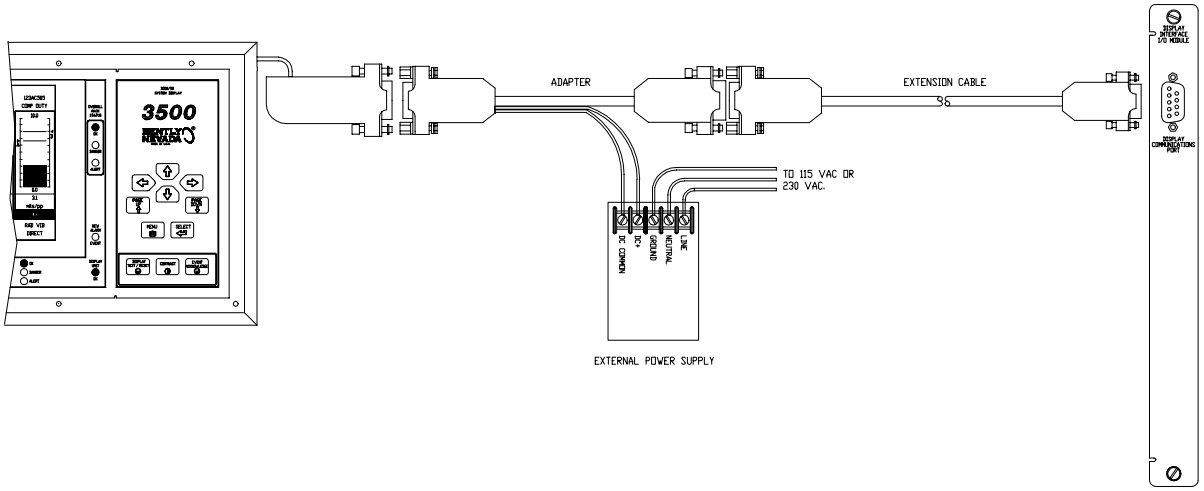
136634-0010-01	10 ft cable with PVC insulation
136634-0050-01	50 ft cable with PVC insulation
136634-0050-02	50 ft cable with Teflon® insulation
136634-0100-01	100 ft cable with PVC insulation
136634-0100-02	100 ft cable with Teflon® insulation

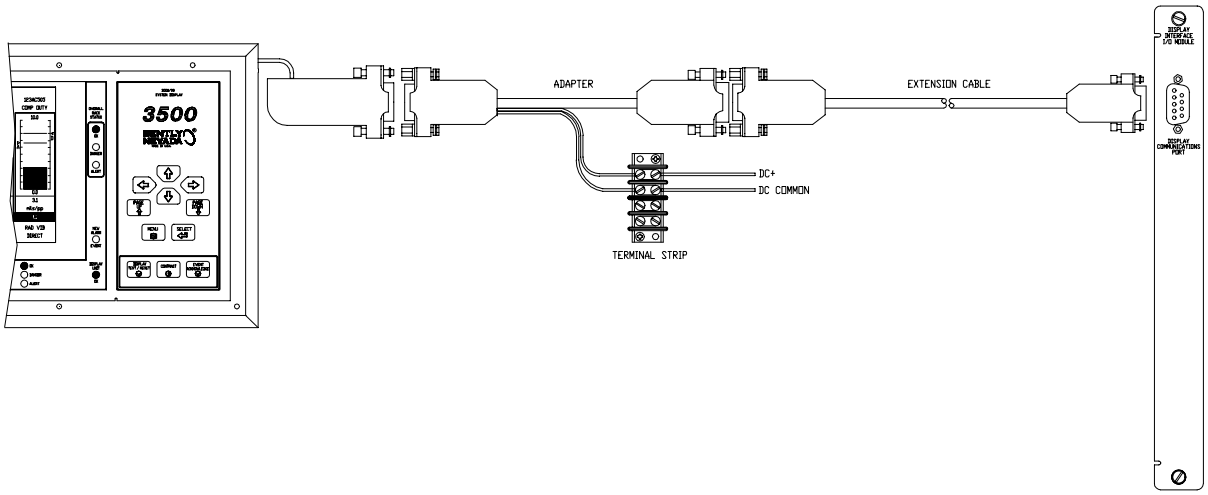
5.2.1 Cable Pin Outs



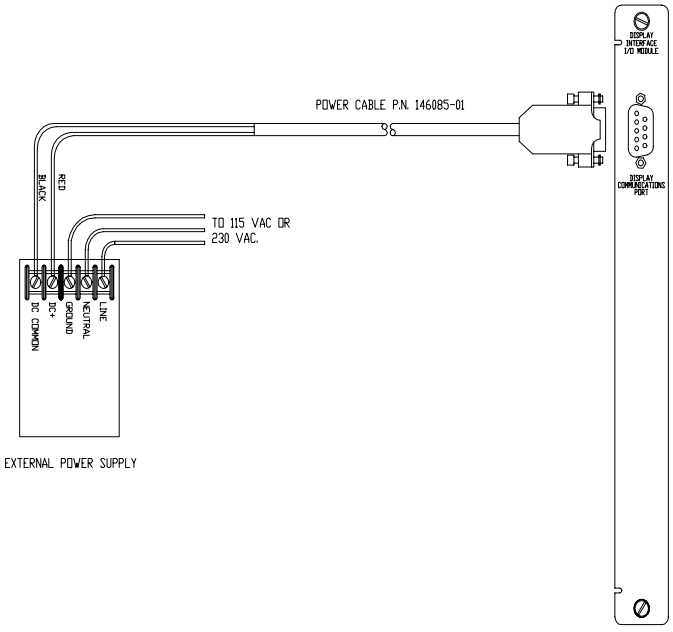
5.3 Installing a Display Unit farther than 100 feet from the I/O Module

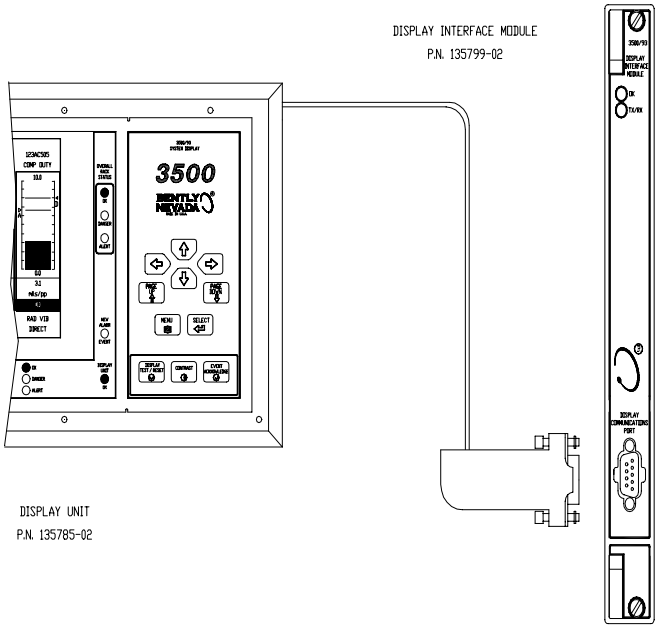
Installing the Display Unit farther than 100 feet from the Display Interface I/O Module or installing a back-lighted Display Unit requires an external power supply, adapter, and RS422 extension cable. The following figures show typical wiring for the external power supply.





Installing the back-lighted Display Unit in the System Mounting configuration (A05) requires an External Power Supply, a back-light Display Interface Module (p.n. 135799-02) and a Power Cable (p.n. 146085-01). The following figures show typical wiring for the external power supply.





The Display Unit can support input voltage range from +10 Vdc to +18 Vdc. The Display Unit can dissipate 5.6 watt of power, maximum. The back-lighted Display Unit requires +12 Vdc and can dissipate 12 Watts of power maximum.

5.3.1 500 Ft Extension Cable Part Numbers

500 FT Extension Cable

A B

Part number 130121-☐☐ - ☐☐

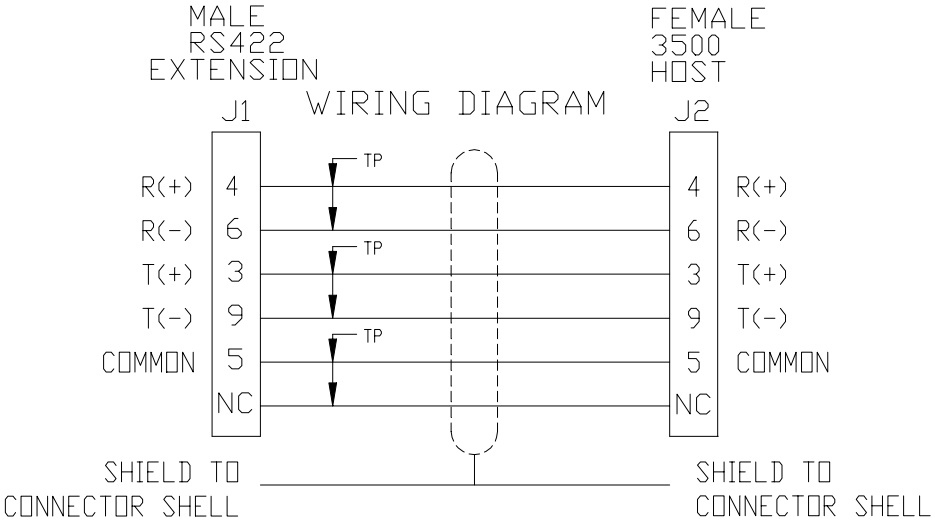
A ☐☐ Assembly Instructions

01 Not Assembled
02 Assembled

B ☐☐ Insulation Type

01 PVC insulation
02 Teflon® insulation

5.3.2 Cable Pin Outs



5.3.3 External Power Supply and Cables

Bently Nevada Part Numbers:

02200271	12 VDC External Power Supply 115 VAC
02200272	12 VDC External Power Supply 230 VAC
138227-01	The Adapter Cable
146085-01	System Mounting power cable (A05 option only)

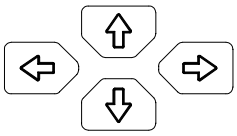
6. Operating the Display Unit

This section shows how to use the main menu and the buttons on the keypad to access options and control displays on the Display Unit. Before you can use the Display Unit, you need to

- install the Display Interface Module and optionally the Display Interface I/O Module. (Refer to the 3500 Rack Installation and Maintenance Manual, part number 129766-01.)
- install the Display Unit (see section 3)
- connect the Display Unit to the interface module (see section 5.2).
- configure the Display Interface Module to operate with the Display Unit (see section 4).

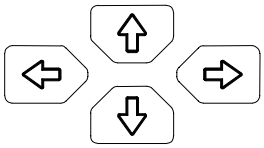
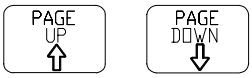
6.1 Options on the Main Menu

You can control the display mode or access utilities by selecting options on the main menu.

Press this key…	to…
	display the main menu.
	highlight options in the main menu.
	select a highlighted option.

6.2 Buttons on the Keypad

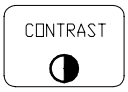
The buttons shown in the following table let you control how data is displayed on the LCD:

Display Mode	Keypad Button		
			
Bargraph, Scan* or Text Mode	Highlight a channel or manually scroll through the channels	Display the next page of information.	Display the Channel Information screen for the highlighted channel
User Defined Sets	Highlight a channel	Display the next user configured set	Display the Channel Information screen for the highlighted channel
Channel Information Screen	Display the Channel Information screen for the next channel		Return to Bargraph or Text Mode
Main Menu	Highlight an option on the menu		Select the option
Alarm and System Event List Screens		Display the next (or previous) 10 events in the list	Return to the Main Menu

= Keys are inactive for this display mode

* The scan rate and display format are set in the 3500 Rack Configuration software.

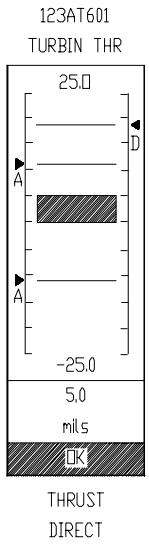
The utility function keys let you control the following items:

Press this key…	to…
	reset the Display Unit and put the unit into self test. (Upon reset, the Display Unit uploads the rack configuration from the Display Interface Module.)
	adjust the setting for the contrast of the LCD. After pressing the contrast key, press the Up Arrow or Down Arrow key to increase or decrease the LCD contrast. Press the select key when finished.
	turn the New Alarm Event LED off.

6.3 Ways to Display Data

The 3500 Display Unit lets you display data in 3 formats and lets you scan through data 2 ways - manually using the arrow keys and page keys or automatically using the scan mode.

6.3.1 Display Formats

Display Format	Description	Example
Bargraph	Displays up to 8 proportional values using graphical representation.	
Text	Displays up to 16 proportional values using text	
Channel Information	Displays all available information from one channel in a table	

6.3.2 Scanning through Data

The Display Unit can show data from only a limited number of channels at a time. Scanning lets you display the data from large sets of channels by scrolling through the data manually or automatically. Both methods scroll through data using one of two sequences - the default sequence or a sequence based on custom data sets.

The custom sequence consists of all of the channels that have been assigned to custom data sets using the 3500 Rack Configuration Software. The order of the sequence is the order of the data sets as listed in the main menu.

The Display Unit lets you scroll through either of these sequences of data manually or automatically. Manual scrolling moves through the scroll sequence one channel at a time by pressing the arrow keys or one screen at a time by pressing the page keys. When you reach the end of the sequence of channels, the scrolling starts over again at the beginning.

Automatic scrolling moves through the sequence of channels one display screen at a time. The time interval between scrolls and the type of display mode are set in the 3500 Rack Configuration Software. The type of display modes available for automatic scrolling are Bargraph Mode and User Defined Sets. Automatic scrolling displays data in a scroll sequence as follows:

If automatic scrolling uses this display format…	**the display unit shows data from the scroll sequence…**
Bargraph	8 channels at a time
Text	16 channels at a time

When the automatic scrolling reaches the end of the scroll sequence, it starts over again at the beginning.

7. Maintenance

This section describes how to verify that the Display Interface Module and the Display Unit are operating correctly. Before you use the verification utility, check that the cable between the Display Unit and the Display Interface Module is connected and that the Display Interface Module is configured correctly. These modules cannot be repaired in the field. Modules that are not operating correctly should be replaced with a spare.

When performed properly, this module may be installed into or removed from the rack while power is applied to the rack. Refer to the Rack Installation and Maintenance Manual (part number 129766-01) for the proper procedure.

7.1 Verifying Monitor Value

Verify the value displayed on the Display Unit by using the verification utility of 3500 Rack Configuration Software to compare the proportional value displayed on the Display Unit to the value displayed on the verification screen of a monitor.

7.2 Maintaining the Display Unit

No routine maintenance or adjustment is required for the Display Unit. Use standard household liquid glass cleaner (nonabrasive) to clean the viewing surface should dust or dirt build up on the display.

7.3 Performing Firmware/LCD Module Upgrades

Occasionally it may be necessary to replace the original firmware that is shipped with the 3500/93 Display Interface Module (DIM). The following instructions describe how to replace the existing DIM firmware, the existing Display Unit (DU) firmware and the DU LCD module. The DIM will need to be reconfigured using the 3500 Rack Configuration software after having its firmware upgraded.

The following items will be required to perform the upgrades:

Large Flathead Screwdriver

Medium Phillips Screwdriver

¼ inch socket or nutdriver

Grounding Wrist Strap*

Small Flathead Screwdriver

Upgrade Firmware ICs*

Upgrade LCD module*

*Refer to Section 9 (Ordering Information) for part numbers. Users may use their own grounding wrist strap or IC removal tool.

7.3.1 Display Interface Module Firmware Installation Procedure

The following steps will need to be followed to complete the Display Interface Module firmware upgrade:

Ensure that the Module's configuration is saved using the 3500 Rack Configuration software.

Refer to Section 1.2 (Handling and Storing Considerations) before handling the monitor or the upgrade firmware IC.

Remove the monitor from the 3500 rack.

Remove the Top Shield from the monitor.

Remove the original firmware IC from the monitor PWA.

Install the upgrade firmware IC into the socket on the monitor PWA.

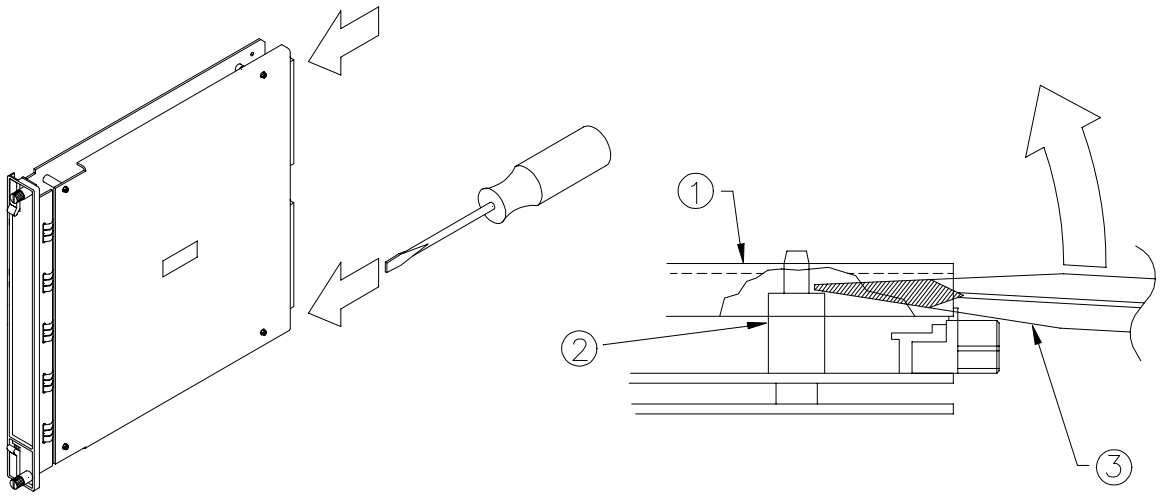
Replace the monitor Top Shield.

Replace the monitor into the 3500 system.

Reconfigure the monitor using the 3500 Rack Configuration software.

Detailed instructions for some of the steps listed above are provided on the following pages. Please review completely before proceeding.

7.3.1.1 Top Shield Removal



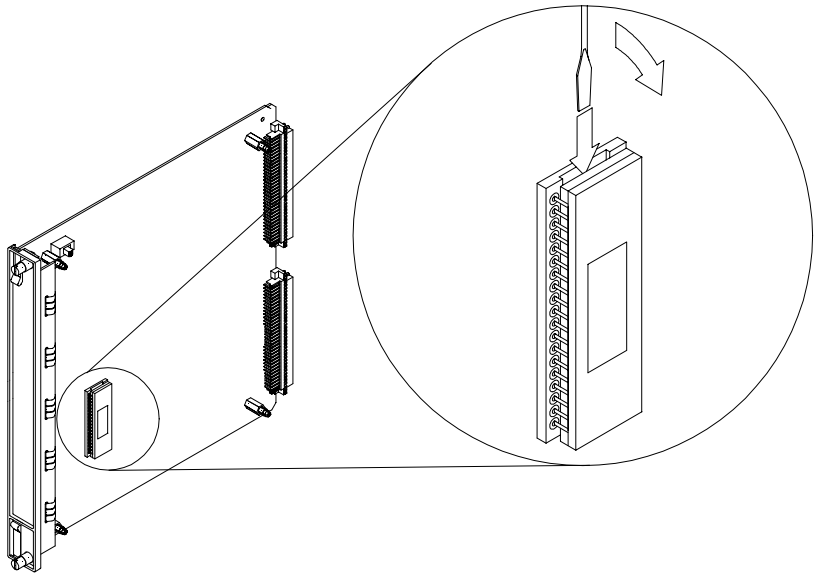
1) Top Shield.
2) Standoff.
3) Screwdriver.

Step 1. Place the large flathead screwdriver under the top shield and on the ridge of the rear standoffs and lift upward on the screwdriver to pop the cover loose from the rear standoffs.

Step 2. Move the top shield up and down to work it loose from the two front standoffs.

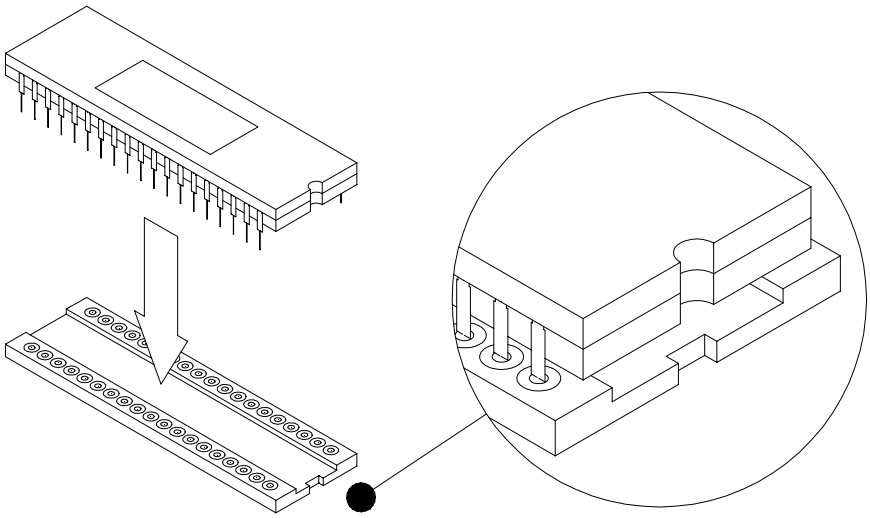
7.3.1.2 Original Firmware IC Removal

Step 1. Insert the small flathead screwdriver under the lip of either end of the firmware IC. The diagram shows the approximate location of the chip to be removed, but not necessarily its orientation.



Step 2. Slightly lift the one end of the chip by gently prying with the screwdriver. Move to the other end of the chip and repeat. Continue this process until the chip comes loose from the socket.

7.3.1.3 Upgrade Firmware IC Installation



7.3.1.4 Install the upgrade firmware IC into the PWA.

Step 1. Install the new firmware chip into the socket on the PWA. Be sure that the notched end of the IC is matched to the notched end of the socket. Ensure that the IC is firmly seated in the socket.

7.3.1.5 Top Shield Replacement

Replace the top shield. Be sure that the notch on the top shield is positioned at the top left corner of the module as shown in the diagram under “Top Shield Removal”. Align the holes in the top shield with the standoffs and press down around each standoff until they snap in place.

7.3.2 Display Unit Firmware/LCD Module Installation Procedure

The following steps will need to be followed to complete the Display Unit (DU) firmware upgrade and/or LCD Module replacement:

Ensure that the Module’s configuration is saved using the 3500 Rack Configuration software.

Refer to Section 1.2 (Handling and Storing Considerations) before handling the monitor or the upgrade firmware IC.

Invoke test mode and record the Display Unit version number. Refer to section 7.3.2.8 for test mode.

Remove the DU from its mounting.

Remove the case from the DU PWA.

Remove the original EPROMs and/or LCD module from the DU PWA.

Install the upgrade EPROMs and/or LCD module into the DU PWA.

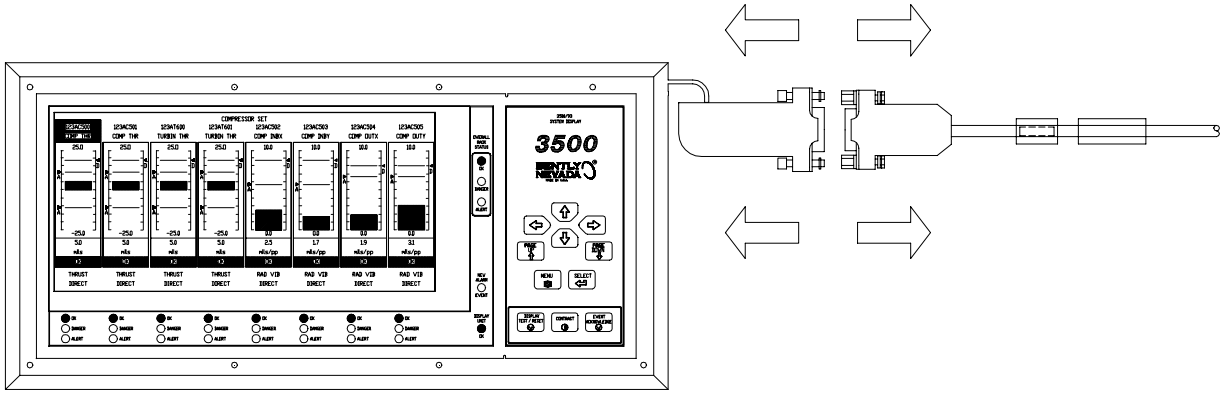
Replace the DU case.

Replace the DU back into its mounting.

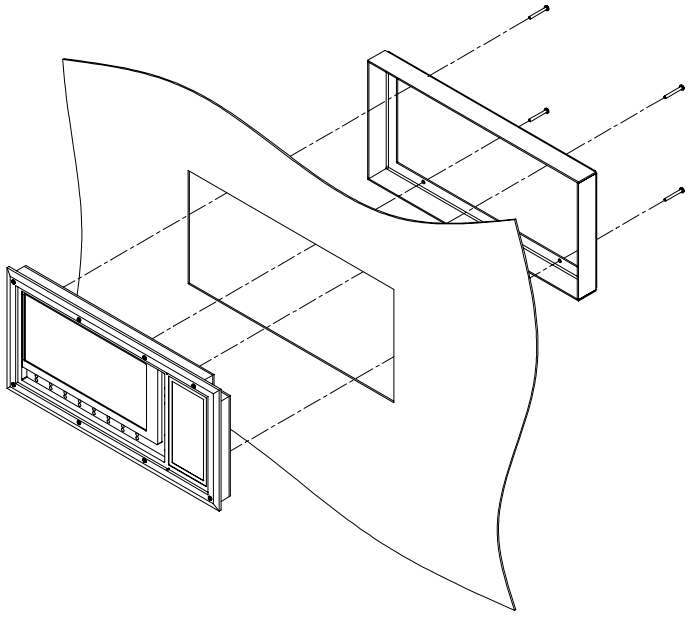
Run Test Mode and verify correct keypad operation.

Detailed instructions for some of the steps listed above are provided on the following pages. Please review completely before proceeding.

7.3.2.1 Remove the Display Unit from its mounting.

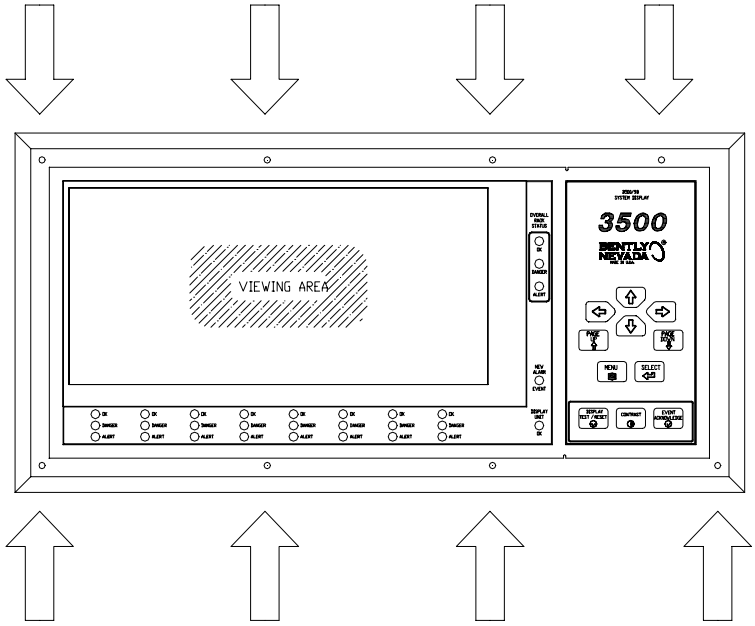


Step 1. Disconnect the DU pigtail connector from its mating connector.

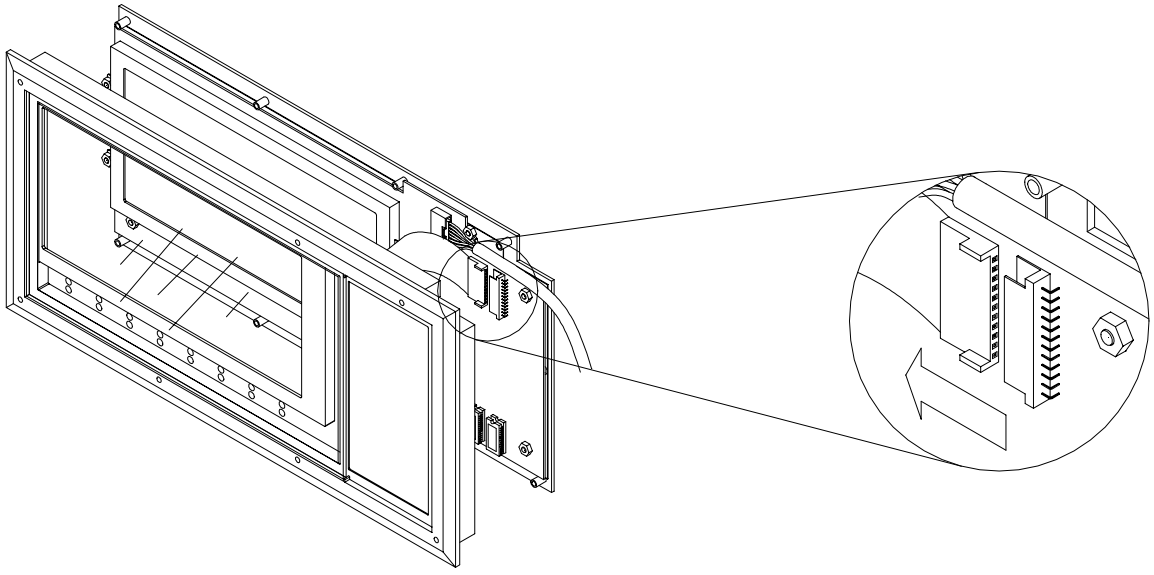


Step 2. Remove the four 10-32 Phillips head screws from the DU backplate and withdraw the DU from the mounting.

7.3.2.2 Remove the case from the DU PWA.



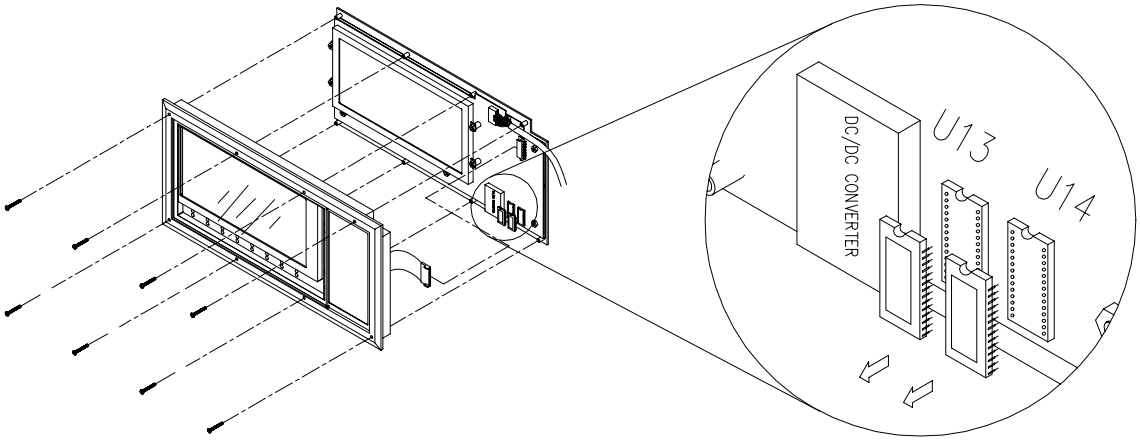
Step 1. Place the DU front side up on a flat, static safe surface and remove the eight 6-32 X 1-1/4 Phillips head screws from the front of the DU.



Step 2. If you are replacing the LCD module only, and not upgrading the firmware then skip section 7.3.2.3 and 7.3.2.4 and proceed to section 7.3.2.5.

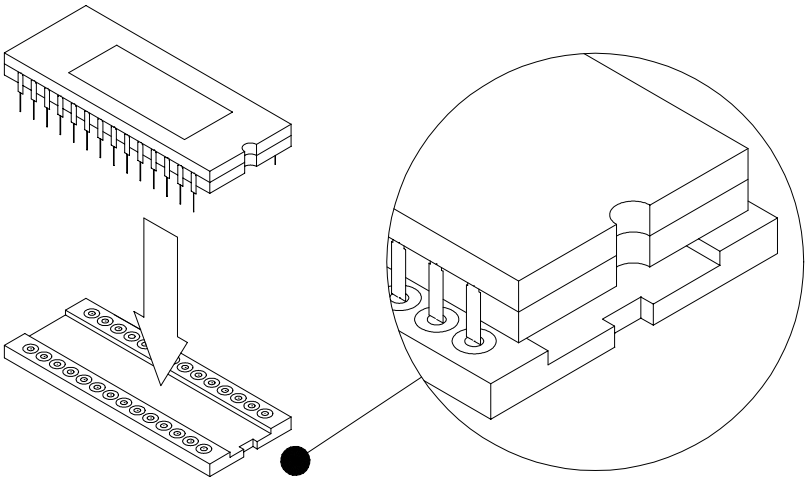
Carefully lift up the right (keypad side) of the display approximately 4 inches. Note that the keypad is connected to the main PWA by a flexible “pigtail” flat flex wire harness. Using your right index finger and thumb push the pigtail connector to the left completely out of the mating receptacle (J2). The display cover can now be completely separated from the back plate.

7.3.2.3 Remove the original EPROMs from the DU PWA.



Step 1. Locate the EPROMs in the area shown on the DU PWA. Insert the small flathead screwdriver under the lip of either end of the chip. Slightly lift the one end of the chip by gently prying with the screwdriver. Move to the other end of the chip and repeat. Continue this process until the chip comes loose from the socket. Repeat for the remaining original EPROM.

7.3.2.4 Install the upgrade EPROMs into the sockets on the DU PWA.

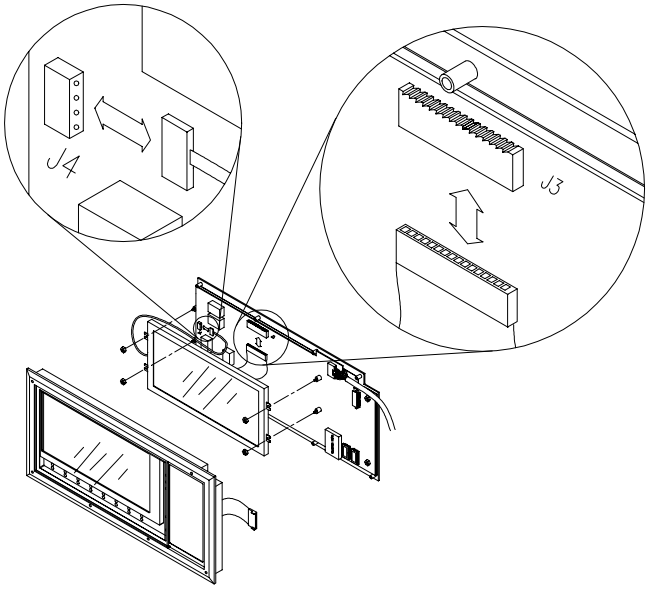


Step 1. Install the U13 upgrade. For Display Unit versions 001.xxx, Place part number 137353-01 into the U13 socket on the PWA. For Display Unit versions 002.xxx, Place part number 145703-01 into the U13 socket on the PWA. Be sure that the notched end of the IC is matched to the notched end of the socket. Ensure that the IC is firmly seated in the socket.

Step 2. Install the U14 upgrade. For Display Unit versions 001.xxx, Place part number 137354-01 into the U14 socket on the PWA. For Display Unit versions 002.xxx, Place part number 145703-01 into the U13 socket on the PWA. Be sure that the notched end of the IC is matched to the notched end of the socket. Ensure that the IC is firmly seated in the socket.

If you are not replacing the LCD module then skip section 7.3.2.5 and proceed to section 7.3.2.6.

7.3.2.5 Display Unit LCD Module Replacement



Step1. Remove the LCD module. Use a nutdriver to remove the four 6-32 x ¼ hex nuts from the LCD mounting studs. Carefully lift up the LCD module, about an inch or two, so that you can see the flex connector pigtail. Note how the pigtail(s) is/are routed. Withdraw the pigtail connector from receptacle J3. If the LCD module has a backlight then you will need to lift up the module further to expose the backlight pigtail connector at receptacle J4. Remove the backlight pigtail from J4. The LCD module is now free from the assembly and can be removed.

Step 2. Install the upgrade LCD module. To install the new LCD module you will need to reverse the procedure in Step 1. Route the LCD pigtail and the backlight pigtail so that they do not get pinched between the LCD and components on the main PWA.

7.3.2.6 Replace the Display Unit case.

Step 1. Replace the Display Unit case. Insert the keypad pigtail connector into the receptacle J2. Align the screw holes in the cover with the PWA standoffs. Check and adjust the display pigtail cable so that it is positioned in the cover notch and does not get pinched when the cover is pressed down flush with the back plate. Check and if necessary, adjust the LCD module backlight pigtail cable to make sure it positioned as to not get pinched between the cover and backplate.

Step 2. Replace the eight 6-32 x 1 ¼ Phillips head screws to secure the cover to the back plate.

.

7.3.2.7 Replace the DU back into its mounting.

Step 1. Replace the Display Unit back into its mounting by installing the four 10-32 Phillips head screws. Install the Display Unit pigtail back into its original socket.

7.3.2.8 Run Test Mode and verify correct keypad operation.

Step 1. After the Display Unit has been powered up and configured, put the Display Unit into Test Mode by performing the Test Mode key sequence. Press and hold the “event acknowledge” key and simultaneously press and then release the “select” key. Release the “event acknowledge” key and notice that the Display Unit is now in Test Mode. Test the keypad by pressing any single key, the corresponding key symbol on the LCD display will turn black. Subsequent key presses will toggle the LCD key symbol between black and white. Back-lighted LCD modules will toggle the back-light on and off when the Contrast key is pressed multiple times. Verify that all keypad keys are functional. Repeat the Test Mode key sequence to exit Test Mode. Discard the old EPROMs after you have verified proper Display Unit functionality.

The Display Unit version number is displayed in the upper left hand corner of the LCD module in test mode.

8. Troubleshooting

This section describes how to troubleshoot a problem with the Display Interface Module or the Display Unit by using the information provided by the self-test, the LEDs, System Event List, and the Alarm Event List.

8.1 Self-test

To perform the Display Interface Module self-test:

1. Connect a computer running the Rack Configuration Software to the 3500 rack (if needed).
2. Select **Utilities** from the main screen of the Rack Configuration Software.
3. Select **System Events/Module Self-test** from the Utilities menu.
4. Press the **Module Self-test** button on the System Events screen.

> **Note**
> Data will not be displayed while self-test is being performed.

5. Select the slot that contains the Display Interface Module and press the **OK** button. The module will perform a full self-test and the System Events screen will be displayed. The list will not contain the results of the self-test.
6. Wait 30 seconds for the module to run a full self-test.
7. Press the **Latest Events** button. The System Events screen will be updated to include the results of the self-test.

Verify if the module passed the self-test. If the module failed the self-test, refer to Section 8.3.

To perform the Display Unit self-test:

1. Push the Display Reset/Test button located on the front panel of Display Unit.
2. Wait 30 seconds for the module to run a full self-test.

> **Note**
> Data will not be displayed while self-test is being performed.

3. Select **System Event List** from the utilities menu screen of the Display Unit.

Verify if the Display Unit passed the self-test. If the Display Unit failed the self-test, refer to Section 8.3.

8.2 LED Conditions

The following table shows how to use the LEDs to diagnose and correct problems.

Display Interface Module:

OK	TX/RX	Scenario	Action
1 Hz	1 Hz	Display Interface Module is not configured or in Configuration Mode.	Reconfigure the module or exit Configuration.
5 Hz		Display Interface Module error	Check the System Event List for severity.
ON	Flashing	Display Interface Module is operating correctly.	No action required.
OFF		Display Interface Module is not operating correctly.	Check the System Event List.
	Not flashing	Display Interface Module is not communicating correctly or there are no monitors in the rack.	Check the System Event List.

= behavior of the LED is not related to the condition.

Display Unit:

Display Unit OK	Scenario	Action
5 Hz	Display Unit error	Check the System Event List for severity.
ON	Display Unit is operating correctly.	No action required.
OFF	Display Unit is not operating correctly.	Check the System Event List.

New Alarm Event LED	Overall Rack Status LEDs			Conditions
	OK	Danger	Alert	
ON				New alarm event has been detected since the last alarm event acknowledgment. The LED can be turned off by pressing the "Alarm Event Acknowledgment" button.
OFF*				No new alarm event.
	ON			All modules in the rack are OK.
	OFF*			At least one module in the rack is not OK.
		ON		At least one of the active channels in the rack is in Danger alarm status.
		OFF*		None of the channels is in Danger alarm status.
			ON	At least one of the active channels in the rack is in Alert alarm status.
			OFF*	None of the channels is in Alert alarm status.

= behavior of the LED is not related to the condition.

* = Off can also indicate that the Display Unit has lost communications with the Display Interface Module, the Display Interface Module has lost SCI communications with the Rack Interface Module, or the Display Interface Module has lost Neuron® Communications.

Channel Status LEDs (8 Sets)			Conditions
OK	Danger	Alert	
ON			Channel(s) above the LED is OK.
OFF*			Channel(s) above the LED is Not OK.
	ON		The channel(s) above the LED is in Danger alarm status.
	OFF*		The channel(s) above the LED is not in Danger alarm status.
		ON	The channel(s) above the LED is in Alert alarm status.
		OFF*	The channel(s) above the LED is in Alert alarm status.

= behavior of the LED is not related to the condition.

* = Off can also indicate that the Display Unit has lost communications with the Display Interface Module, the Display Interface Module has lost SCI communications with the Rack Interface Module, or the Display Interface Module has lost Neuron® Communications.

8.3 System Event List Messages

This section describes the System Event List Messages that are entered by the Display Interface Module and Display Unit.

Example of a System Event List Message:

Sequence Number	Event Information	Event Number	Class	Event Date DDMMYY	Event Time	Event Specific	Slot
0000000123	Device Not Communicating	32	1	02/01/90	12:24:31:99		5L

Sequence Number: The number of the event in the System Event List (for example 123).

Event Information: The name of the event (for example Device Not Communicating).

Event Number: Identifies a specific event.

Class: The severity of the event. The following classes are available:

Class Value	Classification
0	Severe/Fatal Event
1	Potential Problem Event
2	Typical logged Event
3	Reserved

Event Date: The date the event occurred.

Event Time: The time the event occurred.

Event Specific: Provides additional information for the events that use this field.

Slot: Indicates the module that the event is associated with. If a half-height module is installed in the upper slot or a full-height module is installed, the field will be 0 to 15. If a half-height module is installed in the lower slot then the field will be 0L to 15L. For example, a module installed in the lower position of slot 5 would be 5L.

The event associated with the Display Unit will have 200 added to the slot occupied by Display Interface Module. Example: Display Interface Module installed in slot 15. Display Unit will be represented by slot 215.

The following System Event List Messages may be placed in the list by the Display Interface Module and the Display Unit, and the messages are listed in numerical order. If you are unable to solve any problems, contact your nearest Bently Nevada Corporation office.

Flash Memory Failure

Event Number: 11
Event Classification: Potential Problem
Action: Replace the Display Interface Module as soon as possible.

EEPROM Memory Failure

Event Number: 13
Event Classification: Potential Problem
Action: Replace the Display Unit as soon as possible.

Internal Network Failure

Event Number: 30
Event Classification: Severe / Fatal Event
Action: Replace the Display Interface Module immediately.

Device Not Communicating

Event Number: 32
Event Classification: Potential Problem
Action: Check to see if one of the following components is faulty:

- the Display Interface Module
- the rack backplane

Device Is Communicating

Event Number: 33
Event Classification: Potential Problem
Action: Check to see if one of the following components is faulty:

- the Display Interface Module
- the rack backplane

Display Unit Not Communicating

Event Number: 35
Event Classification: Potential Problem
Action: Check to see if one of the following components is faulty:

- the cable connection
- the Display Interface Module (use Comm Gateway Port Test Utility)
- the Display Unit

Display Unit Is Communicating

Event Number: 36
Event Classification: Typical Logged Event.
Action: No action required.

Fail Main Board +5V-A (Fail Main Board +5V - upper Power Supply)

Event Number: 100
Event Classification: Potential Problem
Action: Verify that noise from the power source is not causing the problem. If the problem is not caused by noise, check to see if one of the following components is faulty:

- the Display Interface Module
- the Power Supply installed in the upper slot

Pass Main Board +5V-A (Pass Main Board +5V - upper Power Supply)
Event Number: 101
Event Classification: Potential Problem
Action: Verify that noise from the power source is not causing the problem. If the problem is not caused by noise, check to see if one of the following components is faulty:
- the Display Interface Module
- the Power Supply installed in the upper slot

Fail Main Board +5V-B (Fail Main Board +5V - lower Power Supply)
Event Number: 102
Event Classification: Potential Problem
Action: Verify that noise from the power source is not causing the problem. If the problem is not caused by noise, check to see if one of the following components is faulty:
- the Display Interface Module
- the Power Supply installed in the lower slot

Pass Main Board +5V-B (Pass Main Board +5V - lower Power Supply)
Event Number: 103
Event Classification: Potential Problem
Action: Verify that noise from the power source is not causing the problem. If the problem is not caused by noise, check to see if one of the following components is faulty:
- the Display Interface Module
- the Power Supply installed in the lower slot

Fail Main Board +5V-AB (Fail Main Board +5V - upper and lower Power Supplies)
Event Number: 104
Event Classification: Severe/Fatal Event
Action: Verify that noise from the power source is not causing the problem. If the problem is not caused by noise, check to see if one of the following components is faulty:
- the Display Interface Module
- the Power Supply installed in the upper slot
- the Power Supply installed in the lower slot

Pass Main Board +5V-AB (Pass Main Board +5V - upper and lower Power Supplies)
Event Number: 105
Event Classification: Severe/Fatal Event
Action: Verify that noise from the power source is not causing the problem. If the problem is not caused by noise, check to see if one of the following components is faulty:
- the Display Interface Module
- the Power Supply installed in the upper slot
- the Power Supply installed in the lower slot

Fail Main Board +17V-A (Fail Main Board +17V - upper Power Supply)

Event Number: 152
Event Classification: Potential Problem
Action: Verify that noise from the power source is not causing the problem. If the problem is not caused by noise, check to see if one of the following components is faulty:
- the Display Interface Module
- the Power Supply installed in the upper slot

Pass Main Board +17V-A (Pass Main Board +17V - upper Power Supply)

Event Number: 153
Event Classification: Potential Problem
Action: Verify that noise from the power source is not causing the problem. If the problem is not caused by noise, check to see if one of the following components is faulty:
- the Display Interface Module
- the Power Supply installed in the upper slot

Fail Main Board +17V-B (Fail Main Board +17V - lower Power Supply)

Event Number: 154
Event Classification: Potential Problem
Action: Verify that noise from the power source is not causing the problem. If the problem is not caused by noise, check to see if one of the following components is faulty:
- the Display Interface Module
- the Power Supply installed in the lower slot

Pass Main Board +17V-B (Pass Main Board +17V - lower Power Supply)

Event Number: 155
Event Classification: Potential Problem
Action: Verify that noise from the power source is not causing the problem. If the problem is not caused by noise, check to see if one of the following components is faulty:
- the Display Interface Module
- the Power Supply installed in the lower slot

Fail Main Board +12V (Fail Main Board +12V - Second stage regulator)

Event Number: 156
Event Classification: Severe/Fatal Event
Action: Verify that noise from the power source is not causing the problem. If the problem is not caused by noise, check to see if the following component is faulty:
- the Display Interface Module

Pass Main Board +12V (Pass Main Board +12V - Second stage regulator)

Event Number: 157
Event Classification: Severe/Fatal Event
Action:

Verify that noise from the power source is not causing the problem. If the problem is not caused by noise, check to see if the following component is faulty:

- the Display Interface Module

Device Configured

Event Number: 300
Event Classification: Typical Logged Event
Action: No action required.

Configuration Failure

Event Number: 301
Event Classification: Severe/Fatal Event
Action: Download a new configuration to the module. If the problem still exists, replace the module immediately.

Configuration Failure

Event Number: 301
Event Classification: Potential Problem
Action: Download a new configuration to the module. If the problem still exists, replace the module as soon as possible.

Module Entered Cfg Mode (Module Entered Configuration Mode)

Event Number: 302
Event Classification: Typical Logged Event
Action: No action required.

Software Switches Reset

Event Number: 305
Event Classification: Potential Problem
Action: Download the software switches to the Display Interface Module. If the software switches are not correct, replace the Display Interface Module as soon as possible.

Module Reboot

Event Number: 320
Event Classification: Typical Logged Event
Action: No action required.

Module Removed from Rack

Event Number: 325
Event Classification: Typical Logged Event
Action: No action required.

Module Inserted in Rack

Event Number: 326
Event Classification: Typical Logged Event
Action: No action required.

Device Events Lost

Event Number: 355
Event Classification: Typical Logged Event
Action: No action required.
This may be due to the removal of the Rack Interface Module for an extended period of time.

Pass Module Self-test

Event Number: 410
Event Classification: Typical Logged Event
Action: No action required.

Fail Slot Id Test

Event Number: 461
Event Classification: Severe/Fatal Event
Action: Verify that the Display Interface Module is fully inserted in the rack. If the Display Interface Module is installed correctly, check to see if one of the following components is faulty:

- the Display Interface Module
- the rack backplane

Pass Slot Id Test

Event Number: 462
Event Classification: Severe/Fatal Event
Action: Verify that the Display Interface Module is fully inserted in the rack. If the Display Interface Module is installed correctly, check to see if one of the following components is faulty:

- the Display Interface Module
- the rack backplane

8.4 Alarm Event List Messages

The following Alarm Event List Messages are returned by the Display Interface Module and the Display Unit.

Alarm Event List Message	When the message will occur
Entered Not OK	module went Not OK
Left Not OK	module returned to the OK state

8.5 Display Unit Busy Flag Checking

Under some combinations of operation, configuration, and contrast setting the Display Unit may appear to contain “snow” in the background of the LCD display. If the snow cannot be eliminated by adjusting the contrast setting then it can be eliminated by placing the Display Unit into “flag checking” mode. This mode is toggled on and off by performing the following key sequence and key combination.

1. Press and hold the Event Acknowledge key
2. Press and release the Menu key
3. Release the Event Acknowledge key

Operation of the Display Unit in flag checking mode will reduce the display update rate from a nominal 1 second to a nominal 2 seconds. The Display Unit powers up and defaults with flag checking turned off.

9. Ordering Information

Part number 3500/93 - A □□ - B □□ - C □□ - D □□

A □□ Mounting Option

01	System Mount (Not compatible with 3500/05 A02 Mini-rack)
02	Rack Mount
03	Panel Mount
04	Independent Mount (Stainless Steel Housing)
05	Back-lighted System Mount (Not compatible with 3500/05 A02 Mini-rack)
06	Back-lighted Rack Mount
07	Back-lighted Panel Mount
08	Back-lighted Independent Mount (Stainless Steel Housing)

B □□ Mounting Distance / Cable Type

00	No Cable Required
01	10 Foot Cable (PVC)
02	50 Foot Cable (PVC)
03	50 Foot Cable (Teflon®)
04	100 Foot Cable (PVC)
05	100 Foot Cable (Teflon®)

C □□ External Power Supply

00	None
01	115 Vac
02	230 Vac

D □□ Agency Approval

00	None
01	CSA-NRTL/C

Note

The 3500 System Display requires 2.30 or later version of the Rack Configuration Software.

Spares / Accessories

3500/93 Display Unit	135785-01
3500/93 Back-lighted Display Unit	135785-02
3500/93 Display Interface Module	135799-01
3500/93 Display Interface Module (A05 thru A08 options)	135799-02
3500/93 Display Interface I/O Module	135813-01

3500/93 System Display Operation & Maintenance Manual	137412-01
10 Foot Cable (PVC)	136634-0010-01
50 Foot Cable (PVC)	136634-0050-01
50 Foot Cable (Teflon®)	136634-0050-02
100 Foot Cable (PVC)	136634-0100-01
100 Foot Cable (Teflon®)	136634-0100-02
500 Foot Extension Cable (PVC)	130121-02-01
500 Foot Extension Cable (Teflon®)	130121-02-02
External Power Supply 115 VAC	02200271
External Power Supply 230 VAC	02200272
Power Cable	146085-01
External Power Terminal Strip Mounting Kit	138228-01
Adapter	138227-01
Terminal Strip	01660111
Mounting Plate (for Term Strip & External Pwr Supply)	137833-01
6-32x0.37 Phillips Pan Head Screw for Term Strip (2 Req'd)	04310447
4-40x0.18 Phillips Pan Head Screw for Supply (4 Req'd)	04330900
10-32x0.37 Phillips Pan Head Screw for Plate (4 Req'd)	04344178
Grounding Wrist Strap (single use only)	04425545
Firmware IC (Display Unit U13)	*137353-01
Firmware IC (Display Unit U14)	*137354-01
Firmware IC (Display Unit U13)	*145703-01
Firmware IC (Display Unit U14)	*145702-01
Firmware IC (Display Interface Module U4)	136746-01
Reflective LCD module	00906250
Back-lighted LCD module	00900002

*Note – These parts must be ordered and installed as a set of two. 137353-01 and 137354-01 for version 1 Display Units and 145703-01 and 145703-02 for version 2 and later Display Units. The Display Unit version can be viewed by invoking the Test Mode Key Sequence (Reference section 7.3.2.8) and reading the version number from the upper left hand corner of the Display Unit LCD. Version 2 and later Display Units will either be part number 135785-01 rev C or later or part number 135785-02 rev NC or later.

10. Specifications

INPUTS

Power Consumption:	15.5 watt maximum (Display Interface Module & Display Unit) 5.6 watt maximum (Display Unit backlight off) 12.0 watt maximum (Display Unit backlight on) (Back-lighted Display Units are powered from external power and do not draw any power from the rack)
Data:	Collects data, such as current values and current alarm status, via a high speed internal network

OUTPUTS

Display Interface Module	
OK LED:	Indicates when the Display Interface Module is operating properly.
TX/RX LED:	Indicates when the Display Interface Module is communicating with other modules in the 3500 rack.
Display Unit:	
Unit OK LED	Indicates when the Display Unit is operating properly.
Rack OK LED	Indicates rack is in OK status
Rack Alert LED	Indicates rack is in Alert status
Rack Danger LED	Indicates rack is in Danger status
OK LED (8)	Indicates displayed channel(s) above the LED is in OK status
Alert LED (8)	Indicates displayed channel(s) above the LED is in Alert status
Danger LED (8)	Indicates displayed channel(s) above the LED is in Danger status
New Alarm LED	Indicates new alarm has been detected since the last acknowledgment.
640x200 Dots LCD	Displays data in graphical and text format
Communication between the Display Unit and the Display Interface Module	Hardware: RS422 Interface Protocol: Supports Bently Nevada proprietary protocol and Modbus® protocol based on AEG PI-MBUS-300 Rev. E Reference Manual

ENVIRONMENTAL LIMITS

Display Interface Module & I/O Module

Temperature:	-30° C to 65° C (-22° F to 149° F) operating -40° C to 85° C (-40° F to 185° F) storage
Humidity:	95% noncondensing

Display Unit

Temperature:	-20° C to 65° C (-4° F to 149° F) operating -30° C to 80° C (-22° F to 176° F) storage
Humidity:	95% noncondensing

CE MARK DIRECTIVES:

EMC Directives:

EN50081-2:

Radiated Emissions:	EN 55011, Class A
Conducted Emissions:	EN 55011, Class A

EN50082-2:

Electrostatic Discharge:	EN 61000-4-2, Criteria B
Radiated Susceptibility:	ENV 50140, Criteria A
Conducted Susceptibility:	ENV 50141, Criteria A
Electrical Fast Transient:	EN 61000-4-4, Criteria B
Surge Capability:	EN 61000-4-5, Criteria B
Magnetic Field:	EN 61000-4-8, Criteria A
Power Supply Dip:	EN 61000-4-11, Criteria B
Radio Telephone:	ENV 50204, Criteria B

Low Voltage Directives:

Safety Requirements:	EN 61010-01

APPROVALS

CSA-NRTL/C	Class I, Division 2, Groups A, B, C, D Temp Code T4, Tamb = 65° C

PHYSICAL

Display Interface Module:

Dimensions (Height x Width x Depth)	241.3 mm x 24.4 mm x 241.8 mm (9.50 in x 0.96 in x 9.52 in)
Weight:	0.82 kg (1.82 lb)

Display Interface I/O Module:

Dimensions (Height x Width x Depth)	241.3 mm x 24.4 mm x 99.1 mm (9.50 in x 0.96 in x 3.90 in)
Weight:	0.38 kg (0.84 lb)

Display Unit:

Dimensions (Height x Width x Depth)	203.2 mm x 412.8 mm x 31.2 mm (8.00 in x 16.25 in x 1.23 in)
Weight:	2.1 kg (4.6 lb)

RACK SPACE REQUIREMENTS

Main Board:	1 full-height front slot
I/O Modules:	1 full-height rear slot