



# American LED-gible®

Reducing Downtime Across the Nation!

## The 2800 Alpha-Numeric Marquee Series with EtherNetIP® Option

Owners Manual

for units with AB-2476-020 Processor Boards and PP-2111-189E Firmware



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## 1.0 Getting Started

Thank you for your purchase of an AMERICAN LED-gible® product. We take pride in the equipment we build, and we appreciate your support. We will do everything we can to keep you happy with your purchase for many years to come. Please review this manual carefully, and if you have any questions, call, e-mail, or fax us and we will be glad to help you. American LED-gible technical support can be reached at:

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## 1.1 Product Description

The 2800 series of Alpha-Numeric Marquees have been updated several times since the initial design in 1988. This owners manual covers the 5<sup>th</sup> generation units with the EtherNet/IP option, which were released to production in June of 2005 and use AB-2476-020 processor boards with PP-2111-189E or higher firmware.

The 2800 series of marquees display text using an X/Y grid of light emitting diodes or LEDs. Each LED has a diameter of 0.2", and the LEDs are spaced 0.3" center to center. The display circuit board is 80 LEDs wide by 16 tall LEDs tall. One, two, or three display circuit boards may be stacked horizontally, increasing the amount of text that can be displayed without scrolling. In some enclosure styles, display circuit boards can be installed in both the front and back of the cabinet forming double sided units.

The 5<sup>th</sup> generation 2800 provides two mono-spaced fonts, a 4" font, and a 2" font. The 4" font uses an 8x14 grid to form each character, allowing the 2800 to display one line of 4" text. The 2" font uses an 6x7 grid to form each character, allowing the 2800 to display two lines of 2" text, one above the other. The 2800 series also supports mixing 4" and 2" text on the display at the same time.

<b>LED Display Width</b>	<b>4" Font</b>	<b>2" Font</b>
One Display Board Wide	1 Line, 10 Characters Wide	2 Lines, 13 Characters Wide
Two Display Boards Wide	1 Line, 20 Characters Wide	2 Lines, 26 Characters Wide
Three Display Boards Wide	1 Line, 30 Characters Wide	2 Lines, 40 Characters Wide

2800 series marquees with EtherNet/IP option are available in a rugged dust tight painted steel enclosure appropriate for most industrial environments, and a heavy duty water tight stainless steel enclosure appropriate for steel foundry or food processing environments.



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## 2800 with EtherNet/IP Option



EL-2800-9xx marquees with the EtherNet/IP option implement DF1CRC serial protocol and include a factory installed Allen-Bradley 1761-NET-ENI communication module to connect the marquee to your Ethernet/IP network. This manual provides detailed directions on how to implement a typical alarm annunciation application using the 2800 and a Compact Logix L32E PLC or alternately a SLC5/05 PLC. To obtain a copy of the PLC project files described in this manual, contact American-LED-gible Inc and request disk PD-2116-097. We can send you a compact disk ground delivery, or we can e-mail you a zip image of the disk for free.

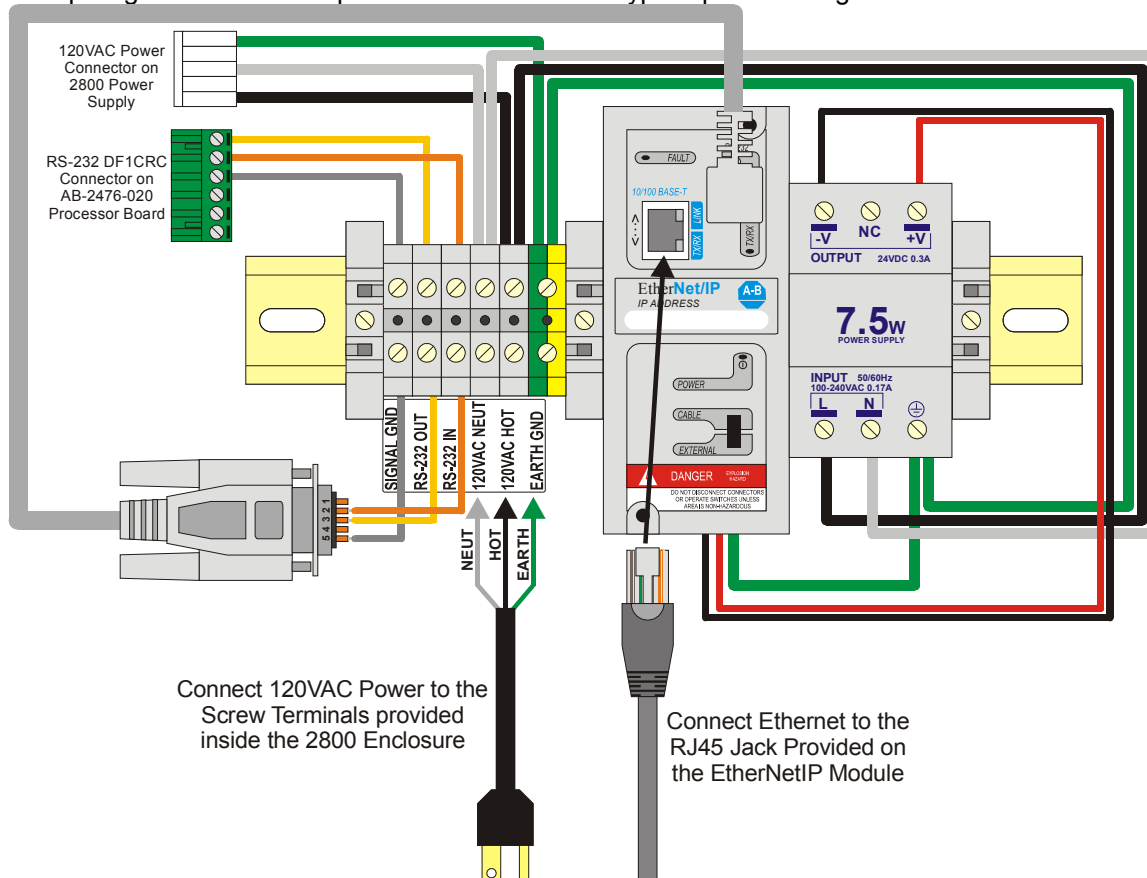
## 1.2 Unpacking the Marquee

Every marquee is carefully tested, both mechanically and electrically, before shipment. Inspect the unit for damage, which may have occurred in transit. If there is evidence of damage, file a claim with the shipper and notify American LED-gible.® Save the shipping materials for inspection.

If there are no signs of shipping damage, carefully remove the marquee from the shipping carton or skid. The marquee is designed to be hung from the ceiling or mounted to a wall. Be sure to locate the marquee where it is readily visible. The next few sections of the manual will cover power and communications wiring. You may wish to review these manual sections before permanently mounting the equipment.

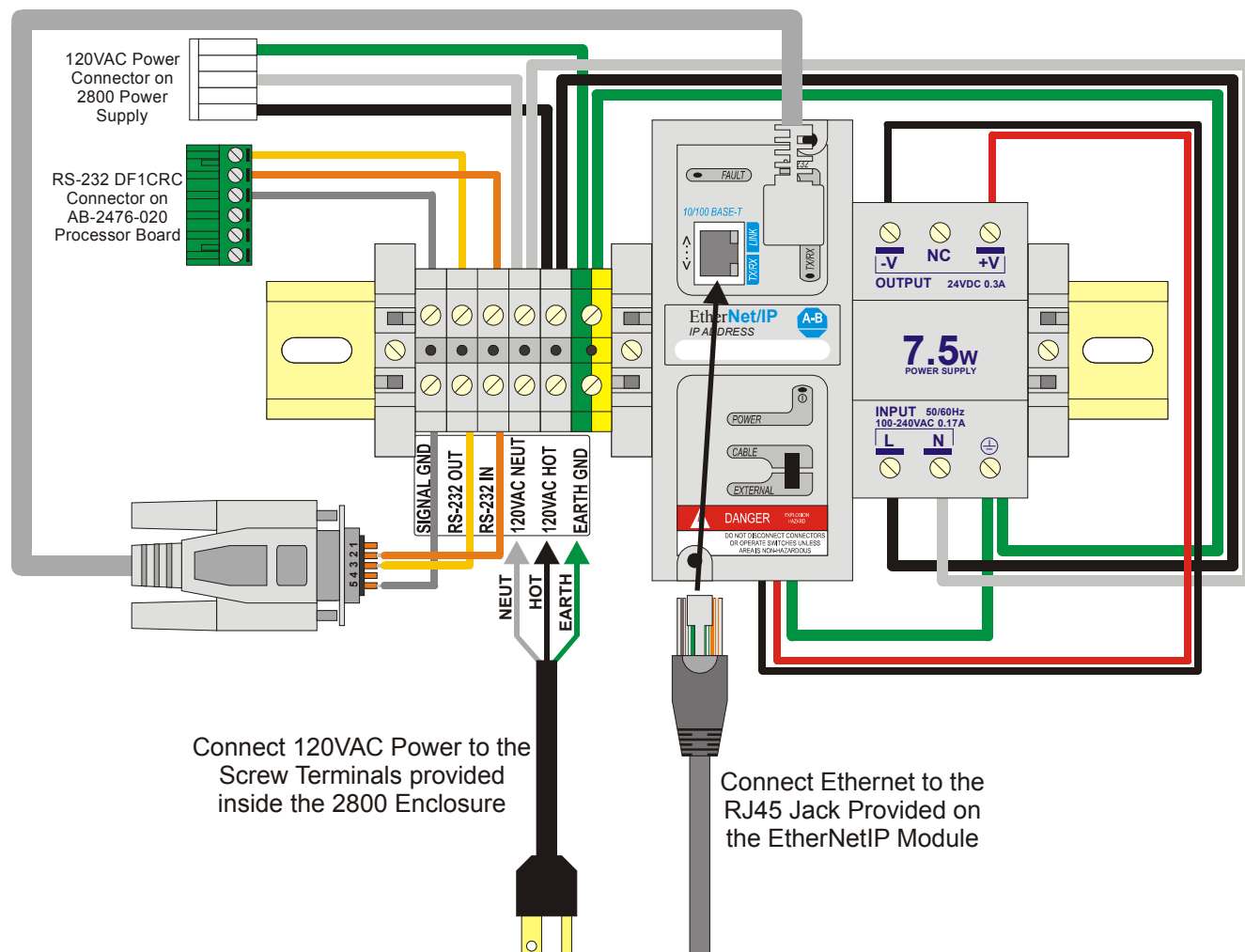
## 1.3 120VAC Power Wiring

After mounting the marquee, 120VAC power wiring will have to be installed. Inspect your unit for 120VAC power connections. Some units, such as the black anodized aluminum versions come with a 120VAC line cord attached. Other units such as the industrial steel versions provide 120VAC screw terminals on a DIN rail barrier inside the enclosure requiring the customer to punch a conduit hole. Typical power wiring is shown below.



### 1.4 Ethernet Wiring

Inspect your unit and locate the Allen-Bradley 1761-NET-ENI communications adapter. Connect your plant Ethernet network to the RJ45 jack on the ENI communications module. Typical Ethernet wiring is shown below.





# Owners Manual

## 2800 with EtherNetIP Option

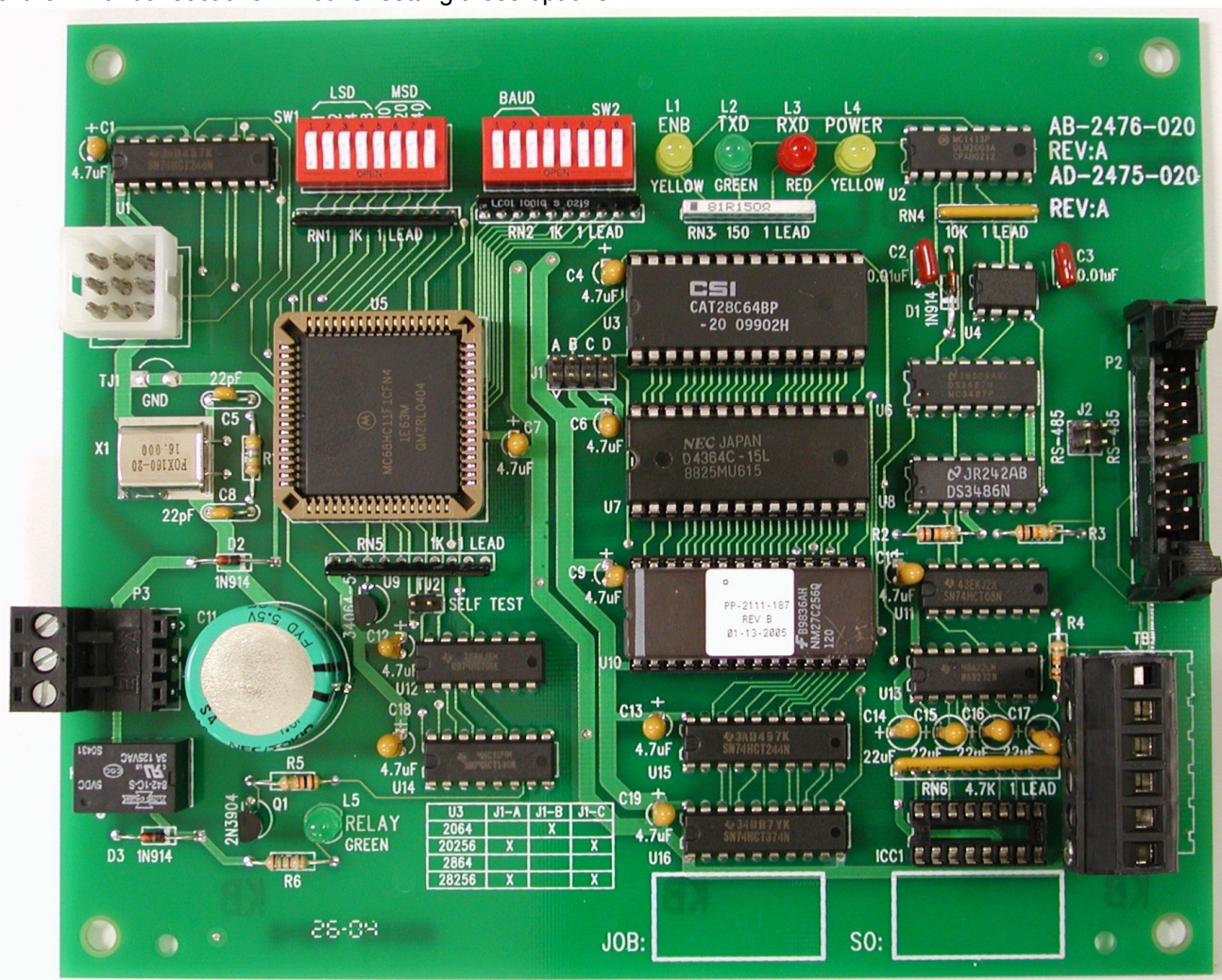


### 1.5 The AB-2476-020 Processor Board

After 120VAC power and EtherNetIP communications wiring has been installed, take a closer look at the AB-2476-020 5<sup>th</sup> generation 2800 processor board, pictured below. The first four 2800 generations used a 2Mhz MC6803 processor with firmware written in assembly language. The 5<sup>th</sup> generation 2800 uses a 4Mhz MC68HC11 processor chip with C language and multi-tasking support. This allows the 5<sup>th</sup> generation 2800 to do things that the previous generations could not, such as display static and scrolling 2" text at the same time. However it also renders the 5<sup>th</sup> generation processor board incompatible with all custom firmware written for previous generations of 2800 marquee. Do not install firmware chips removed from previous generations of 2800 into a 5<sup>th</sup> generation 2800.

Take special note of the five LED indicator lamps on the AB-2476-020 processor board. The indicator lamps can be quite helpful when trying to debug problems. The POWER indicator illuminates when the processor board has power. The RXD indicator flashes when characters are received via RS-232 or RS-485. The TXD indicator flashes when characters are transmitted via RS-232. The ENB indicator flashes when characters are transmitted via RS-485. The RELAY indicator illuminates when the mechanical relay output is activated.

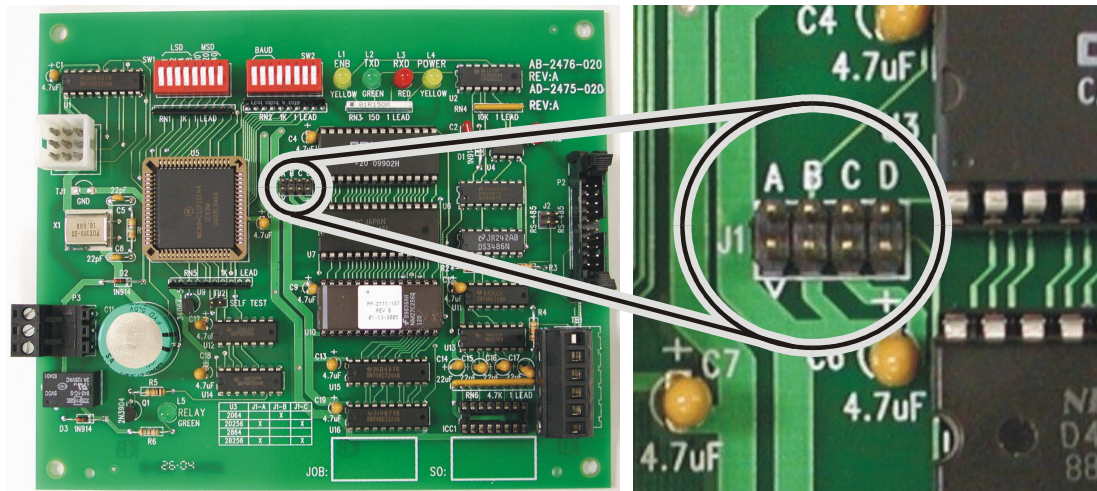
Also take note of the dip switch blocks and jumper headers which are used for configuring hardware options. The next few manual sections will cover setting these options.





### 1.6 Setting the U3 Message Memory Chip Type (J1)

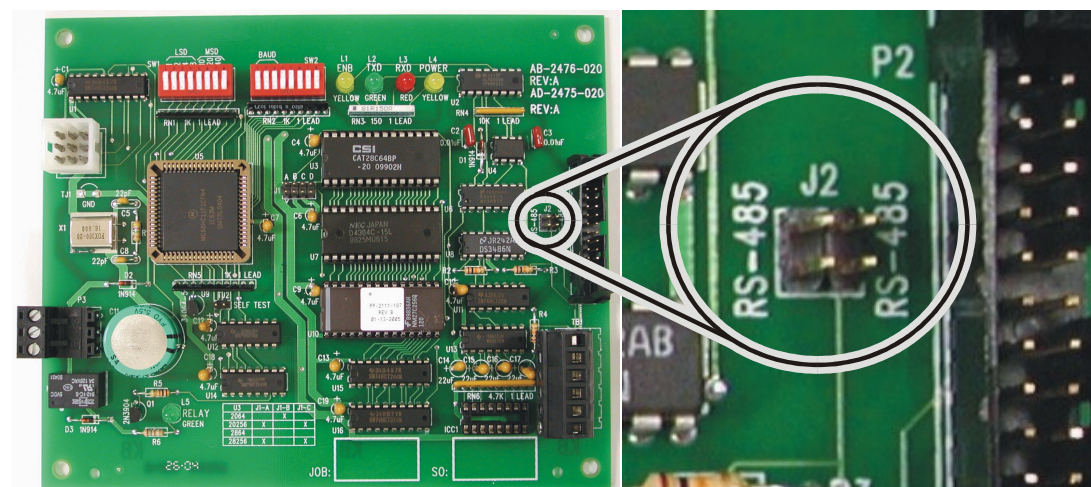
The J1 option jumpers are used to configure the processor board U3 message memory socket for different types of chips. In most cases, U3 will be populated with a 28C64 (64K x 8 EEPROM) chip, and all four J1 positions (A, B, C, and D) should be left open as shown in the picture. However if you have a special memory chip installed in your processor board, the factory will install J1 jumpers as required before shipment. Please do not change the J1 jumper settings without contacting American LED-gible technical support first.



### 1.7 Connecting the RS-485 Transmitter (J2)

The J2 option jumpers are used to connect the AB-2476-020 RS-485 transmitter to the serial communications connector. Installing the J2 jumpers allows the marquee to send data back to the PC/PLC over the same RS-485 wires that the PC/PLC uses to send data to the marquee(s).

The EL-2800 Marquee with EtherNetIP option always uses an RS-232 link between the processor board and the ENI module. The J2 jumpers must be removed, or the EtherNetIP option will not operate correctly.



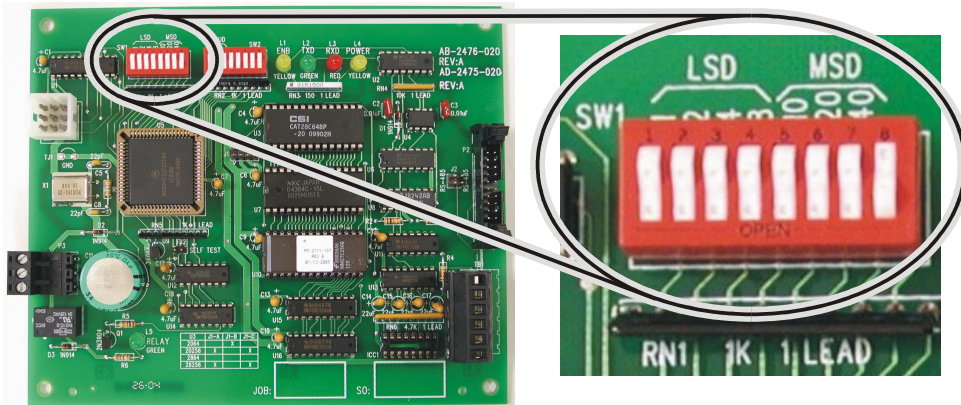
# Owners Manual

## 2800 with EtherNetIP Option



### 1.8 Setting the Address Character (SW1)

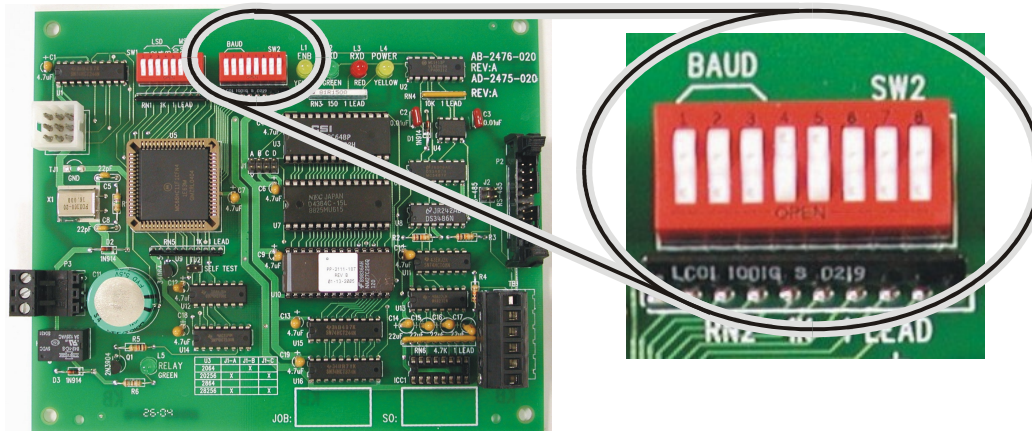
In the standard 2800 marquee, the SW1 dip-switch is used to configure an address character. However, when the EtherNetIP option is installed, the addressing functionality is provided by the IP Address of the 1761-NET-ENI module and the 2800 address setting is no longer needed, and as such has been disabled. Please set all SW1 switches to the OFF or OPEN position.



### 1.9 Setting the Baud Rate (SW2 Switches 1, 2, & 3)

The processor board serial port baud rate is set by switches 1 through 3 on the SW2 dip switch block, as shown in the table below. Later in this manual, we will be configuring the ENI module to operate at 19200bps, so make sure that switches 1, 2, and 3 on the SW2 dip-switch block are set to the OFF or OPEN position.

3	2	1	Baud
OFF	OFF	OFF	19200bps
OFF	OFF	ON	9600bps
OFF	ON	OFF	4800bps
OFF	ON	ON	2400bps
ON	OFF	OFF	1200bps
ON	OFF	ON	600bps
ON	ON	OFF	300bps
ON	ON	ON	150bps

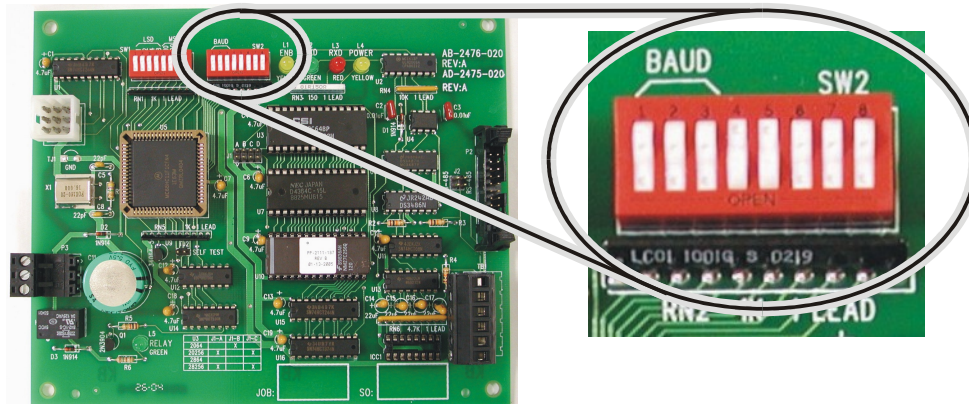




### 1.10 Enabling Message Scrolling (SW2 Switch 4)

When the PLC commands the 2800 marquee to display a message that is too long to fit on the LED display, the marquee can be configured to automatically scroll the text horizontally, or to truncate the message as required to make it fit on the display.

To disable message scrolling, set switch 4 on the SW2 dip switch block to the OFF or OPEN position. To enable message scrolling, set switch 4 on the SW2 dip switch block to the ON position.

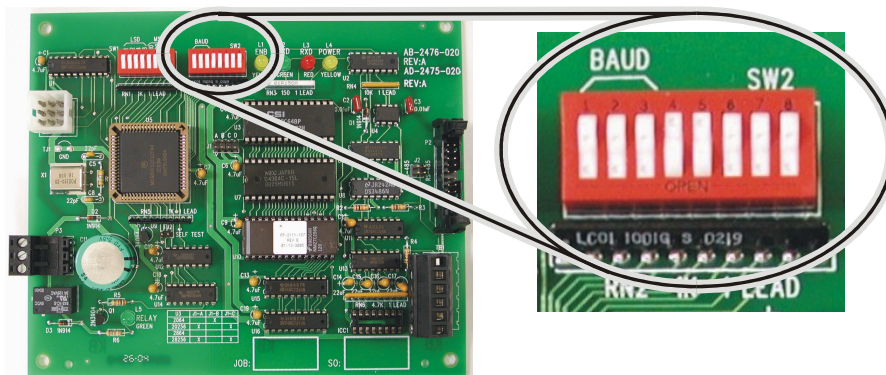


### 1.11 Setting the LED Display Width (SW2 Switches 5, 6 & 7)

2800 series marquees can be purchased with one, two, or three display boards of width. The AB-2476-020 processor board needs to know how many display boards are present so that it may properly position and scroll message text as required. The proper display width is configured at the factory before the 2800 marquee is shipped, but we cover how to set it here for the sake of documentation completeness.

The easiest way to determine the number of display boards in your marquee is to measure the width of the LED grid. Each LED display board is two feet wide so 1 Board = 2 Feet, 2 Board = 4 Feet, and 3 Board = 6 Feet of LED display width.

Switch 7	Switch 6	Switch 5	Display Boards Wide	4" Characters Wide
OFF	OFF	OFF	1	10
OFF	OFF	ON	2	20
OFF	ON	OFF	3	30



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## 2800 with EtherNet/IP Option

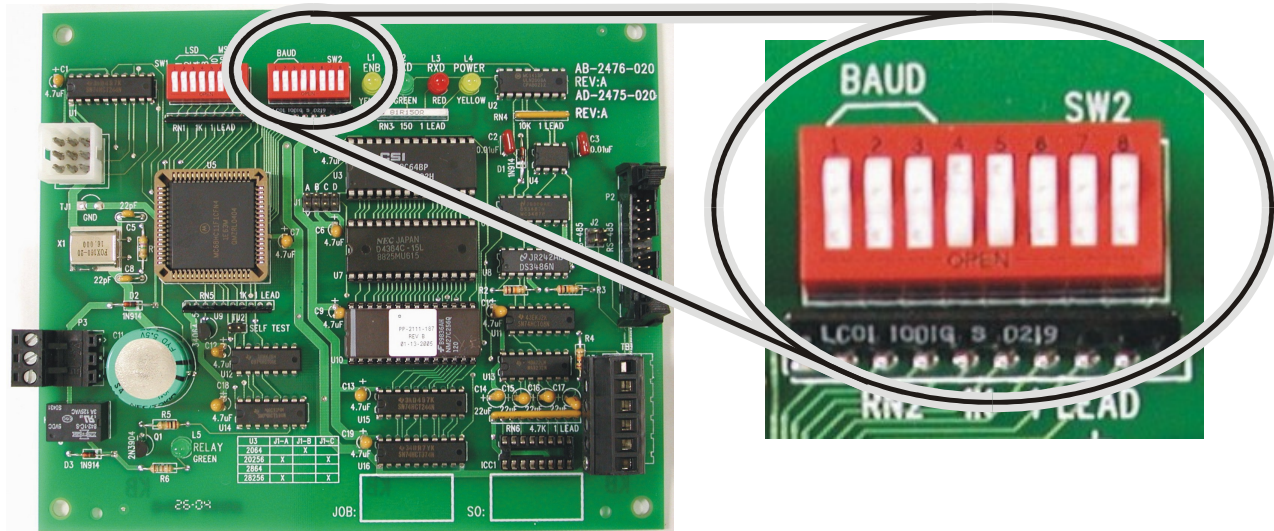


### 1.12 Suppressing DF1TIMEOUT Message (SW2 Switch 8)

By default, the 2800 Marquee with EtherNet/IP Option, expects to receive a message from the controlling PLC at least once every 15 seconds. If the Marquee does not receive a message from the PLC, the Marquee assumes that the PLC is offline, or the data communications link between the PLC and the Marquee has failed. When this failure conditions is detected, the 2800 will switch to displaying “DF1TIMEOUT”. This is to prevent old / stale information from remaining on the Marquee, which could be misleading.

However in some installations, it is desirable to suppress the DF1TIMEOUT feature. Starting with Rev E of the firmware, the DF1TIMEOUT feature can be disabled by setting switch 8 on the SW2 dip switch block to the ON position.

To enable the DF1TIMEOUT feature, make sure switch 8 on the SW2 dip switch block is left in the OFF or OPEN position. This is the factory default.



### 1.13 Power On Messages

Now that mounting and wiring is complete, it is time to apply power to the marquee. When power is applied to 2800 series marquees, they display basic configuration information before responding to control system commands. Please observe the power-on messages to verify that the configuration switches are set as intended.

The messages displayed by a 2800 marquee with EtherNetIP option when it powers up are:

1. Display Installed Firmware: **PP-2111-189E**

Verify that a PP-2111-189 series firmware is installed in the 2800, revision E or later. If your unit does not have PP-2111-189 series firmware installed, then this is probably not the correct manual for your unit. Contact American LED-gible technical support to receive a free copy of the correct manual.

2. Display Communications Mode: **DF1 CRC**

At the time this manual was written, the only communications mode available was DF1 CRC, however future versions of the 2800 may implement alternate communications mode options.

3. Display Serial Port Parameters: **19200,N,8,1**

Verify that the indicated baud rate matches the desired setting, typically 19200bps. The 2800 serial port only supports operation with no parity, eight data bits, one stop bit.

You do not have to remove power from the marquee when correcting dip-switch settings. The marquee will detect the switch setting change and automatically reboot itself if a reboot is required.

At this point, if the 2800 receives a message, it will display it. However since the ENI module has not been configured yet, it is highly unlikely to happen.

Most likely the 2800 will not receive a message for fifteen seconds, and then it will assume that the communications link to the controlling PLC is down, and display the error message "DF1 TIMEOUT". Do not be alarmed, this is expected behavior.

**NOTE: As of Rev E of the PP-2111-189 firmware, the DF1TIMEOUT feature can be disabled by turning SW2 switch 8 ON. See section 1.12 of this manual for more detailed directions.**



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## 2800 with EtherNetIP Option

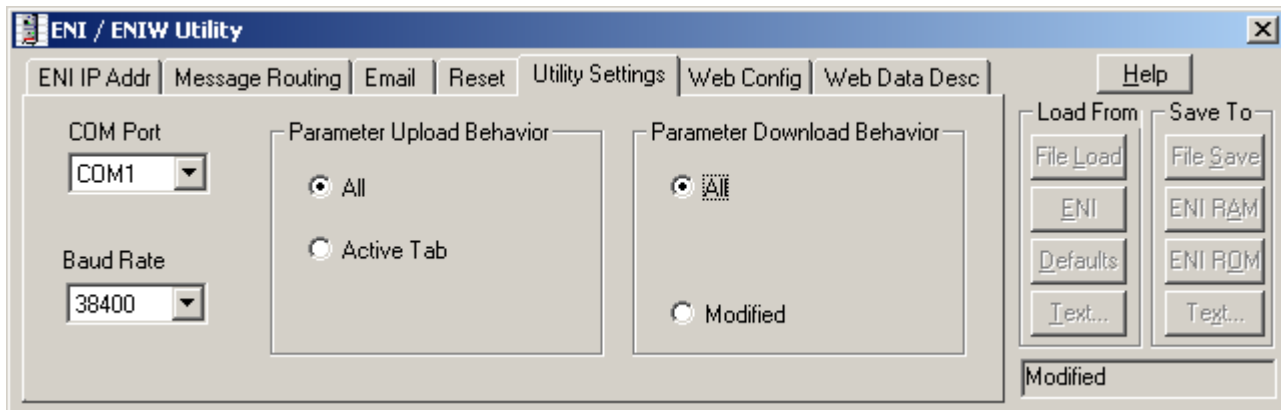


### 1.14 Configuring the 1761-NET-ENI module

Next we need to configure the 1761-NET-ENI module. The easiest way to do this is to download and install the ENI / ENIW Utility from Allen Bradley. Connect the serial port of the ENI module to your PC, and then run the ENI utility.

**NOTE:** You will probably need to consult with your network administrator to obtain an IP address allocation for the marquee. The ENI module can be configured to obtain its address on boot via BootP protocol, or a static IP address can be programmed directly into the module itself.

On the Utility Settings Tab, pick the COM Port you have connected to the ENI module, and be sure to set the upload and download behavior to ALL as shown below.

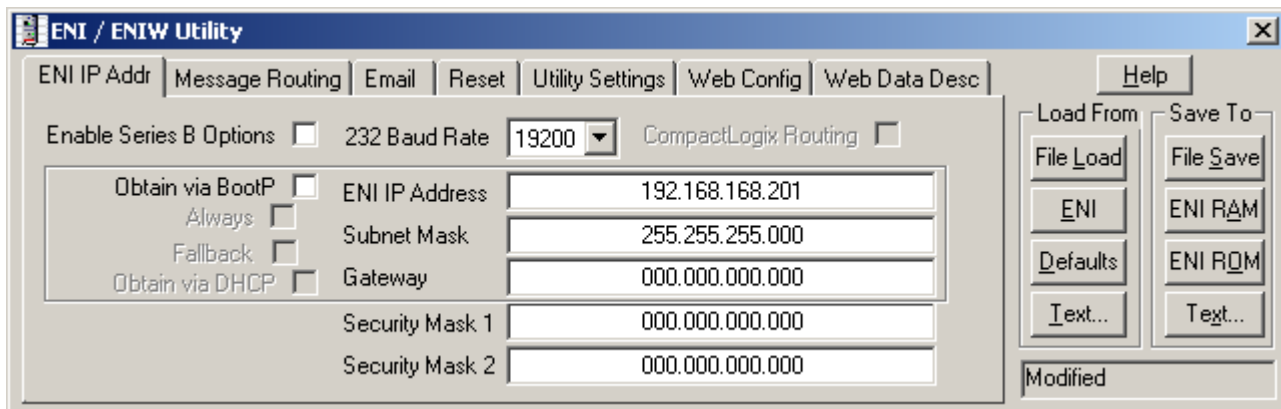


On the ENI IP Addr Tab, disable series B Options, set the baud rate to 19200.

If your administrator has setup a BootP server, then enable the BootP option and leave the IP Address, Subnet Mask, and Gateway options set to 000.000.000.000.

If your administrator has allocated a static IP address for the marquee, then disable the BootP option and enter the IP Address, Subnet Mask, and optionally Gateway numbers supplied by your administrator.

For the examples in this manual, we will be assigning the static IP address of **192.168.168.201** to the marquee as shown below.



Click **Save To ENI ROM** to save the new configuration into the ENI Module. Then reconnect the ENI module serial port to the 2800 marquee.

## 2.0 Operation

To control the text displayed on the 2800 marquee, construct the text you wish to display on the marquee in a string, and then send the string to the marquee by using a **MSG** instruction. The **MSG** instruction must be configured to generate a **PLC5 Typed Write** to the marquee with a destination memory address of **ST10:0**.

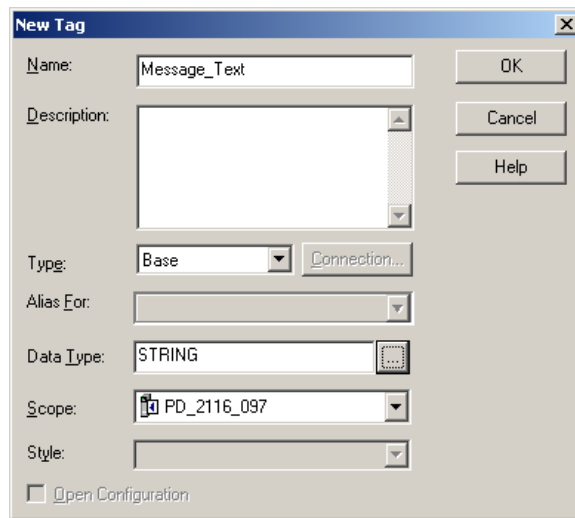
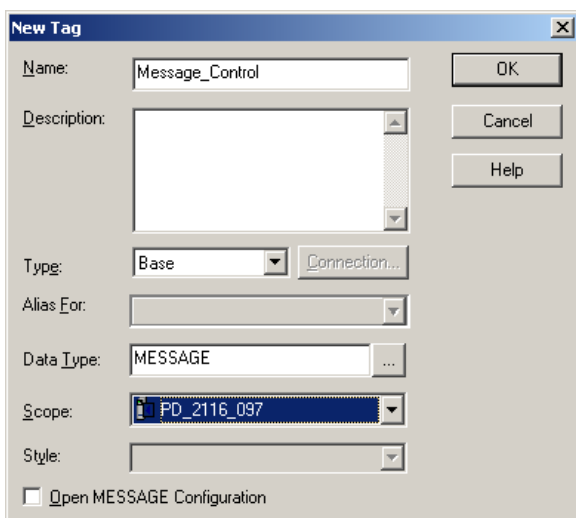
**NOTE:** You must program your PLC to send a message to the marquee at least once every fifteen seconds. If the marquee does not receive a message from the PLC for fifteen seconds, the marquee switches to displaying **DF1TIMEOUT** to signify the apparent loss of communications with the PLC. This prevents the marquee from displaying stale alarm data when the PLC is shutdown, or loss of communications occurs.

This chapter of the manual provides detailed directions on how to implement a typical alarm annunciation application using a 2800 marquee and a Compact Logix L32E PLC or alternately a SLC5/05 PLC. To obtain a copy of the PLC project files described in this manual, contact American-LED-gible Inc and request disk PD-2116-097. We can send you a compact disk ground delivery, or we can e-mail you a zip image of the disk for free.

In our examples, the PLC will use a string array/file to store all possible alarm messages, and a bit array/file in which each bit enables one of the alarm messages. The example ladder logic will scan the bit array/file to identify which alarms are active and should be displayed on the marquee. In the event no alarms are active, a default message will be sent to the marquee.

### 2.1 Compact Logix Example Memory Allocations

First we need to create two new controller tags. A message tag called **Message\_Control**, and a string tag called **Message\_Text**.



**Message\_Control** provides the memory required by the **MSG** instruction we will be using to send alarm text to the marquee.

**Message\_Text** is require because the **MSG** instruction can not send program level tags to the marquee. Our example logic will copy the text we wish to display on the marquee into **Message\_Text** before executing the **MSG** instruction to send **Message\_Text** to the marquee. One nice side effect of this is that the string stored in **Message\_Text** will track the message displayed on the marquee in real time, which may be useful in other parts of your application.

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## 2800 with EtherNetIP Option



Next, we need to allocate program tags to store the text of all possible alarms (**Alarm\_Text[]**), and a bit to activate the display of each alarm (**Alarm\_Queue[]**). For these tags, use an array size large enough to accommodate the maximum number of alarms you may need. Don't forget that the last alarm in the array will be a default message that is displayed if none of the other alarms are activated.

For our example, we will allocate memory for thirty one alarms plus one default message. Don't forget to enter the text of your alarm messages into the **Alarm\_Text[]** tag. Some silly example alarm messages are shown in the screen shots below.

The screenshot shows the 'Program Tags - MainProgram' window with a list of tags. The 'Alarm\_Text' tag is expanded, showing an array of 32 elements. Two 'New Tag' dialog boxes are open, showing the configuration for 'Alarm\_Text' and 'Alarm\_Queue'.

Name	Value	Force Mas	Style	Data Type
Alarm_Text	{...}	{...}		STRING[32]
Alarm_Text[0]	'EMERGENCY-STOP'	{...}		
Alarm_Text[1]	'OIL PRESURE LOW'	{...}		
Alarm_Text[2]	'FEED DOG JAM'	{...}		
Alarm_Text[3]	'MAIN BIN OUT OF PAPER'	{...}		
Alarm_Text[4]	'END OF BATCH REACHED EARLY'	{...}		
Alarm_Text[5]	'UNKNOWN ERROR DETECTED'	{...}		
Alarm_Text[6]	'ERROR - REDUNDANT ERROR'	{...}		
Alarm_Text[7]	'OVER TEMP MAIN CONSOLE'	{...}		
Alarm_Text[8]	'COMPUTER BOOT/POST ERROR'	{...}		
Alarm_Text[9]	'CRITICAL ERROR IN WINDOWS95'	{...}		
Alarm_Text[10]	'ERROR- LINUX NOT PRESENT'	{...}		
Alarm_Text[11]	'REBOOT UNIVERS (Y/N)?'	{...}		
Alarm_Text[12]	'ABORT RETRY FAIL (A/R/F)?'	{...}		
Alarm_Text[13]	'PRODUCT MARKETING FAILURE'	{...}		
Alarm_Text[14]	'PRODUCT ENGINEERING FAILURE'	{...}		
Alarm_Text[15]	'CONTRIVED ERROR ERROR'	{...}		
Alarm_Text[16]	'END OF TIME REACHED EARLY'	{...}		
Alarm_Text[17]	'ERROR - HEISENBUG FOUND!'	{...}		
Alarm_Text[18]	'FAILURE TO COMUNICATE!'	{...}		
Alarm_Text[19]	'FAILURE TO SPELL CORECTLY!'	{...}		
Alarm_Text[20]	'OUT OF ROM MEMORY ERROR'	{...}		
Alarm_Text[21]	'NO POWER OT MARQUEE, HU?'	{...}		
Alarm_Text[22]	'NOT POSSIBLE ERROR! HEY!'	{...}		
Alarm_Text[23]	'SILLY ERROR NOT FOUND'	{...}		
Alarm_Text[24]	'OUT OF ERROR MESSAGES ERROR'	{...}		
Alarm_Text[25]	'PAPER JAMMED IN CPU ERROR'	{...}		
Alarm_Text[26]	'WARNING: CPU IS ON FIRE!'	{...}		
Alarm_Text[27]	'FIRE DETECTED IN CASE'	{...}		
Alarm_Text[28]	'ENGINEER CANT SPELL ERROR'	{...}		
Alarm_Text[29]	'WARNING: ENGINEER NEEDS POP!'	{...}		
Alarm_Text[30]	'ERROR: ENGINEER HAS DIED'	{...}		
Alarm_Text[31]	'ALL IS WELL IN OUR PLANT!'	{...}		

**New Tag Dialog 1 (Alarm\_Text):**

- Name: Alarm\_Text
- Description: (empty)
- Type: Base
- Alias For: (empty)
- Data Type: STRING[32]
- Scope: MainProgram
- Style: (empty)
- Open Configuration: ☐

**New Tag Dialog 2 (Alarm\_Queue):**

- Name: Alarm\_Queue
- Description: (empty)
- Type: Base
- Alias For: (empty)
- Data Type: BOOL[32]
- Scope: MainProgram
- Style: Decimal
- Open Configuration: ☐



Next our example logic will need a timer that controls how long an alarm is displayed on the marquee before being replaced by the next alarm (**Alarm\_Timer**). We also need a double integer to keep track of which alarm is being checked / displayed (**Alarm\_Number**). And finally, we need a bit to back a one shot instruction that will prevent multiple triggering of some of our logic (**Alarm\_OneShot**).

The 'New Tag' dialog box for 'Alarm\_Timer' shows the following configuration:

- Name: Alarm\_Timer
- Description: (empty text area)
- Type: Base
- Alias For: (empty)
- Data Type: TIMER
- Scope: MainProgram
- Style: (empty)
- ☐ Open Configuration

The 'New Tag' dialog box for 'Alarm\_Number' shows the following configuration:

- Name: Alarm\_Number
- Description: (empty text area)
- Type: Base
- Alias For: (empty)
- Data Type: DINT
- Scope: MainProgram
- Style: Decimal
- ☐ Open Configuration

The 'New Tag' dialog box for 'Alarm\_OneShot' shows the following configuration:

- Name: Alarm\_OneShot
- Description: (empty text area)
- Type: Base
- Alias For: (empty)
- Data Type: BOOL
- Scope: MainProgram
- Style: Decimal
- ☐ Open Configuration

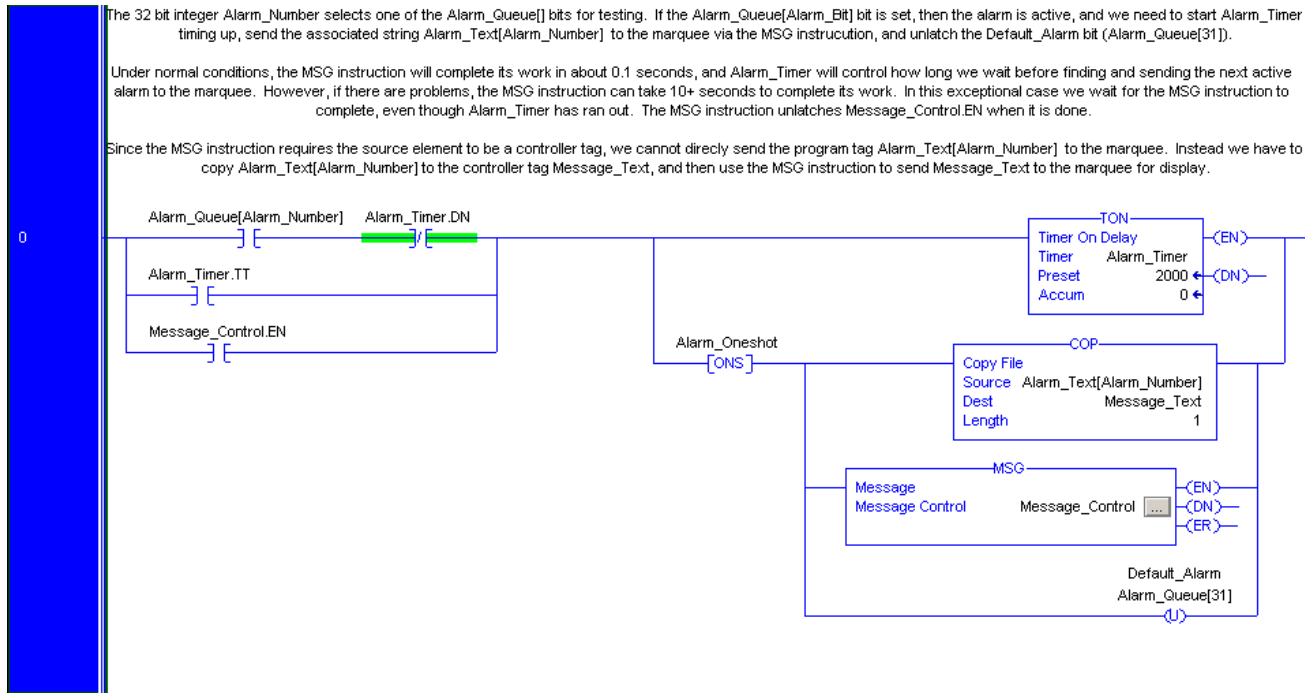
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## 2800 with EtherNetIP Option



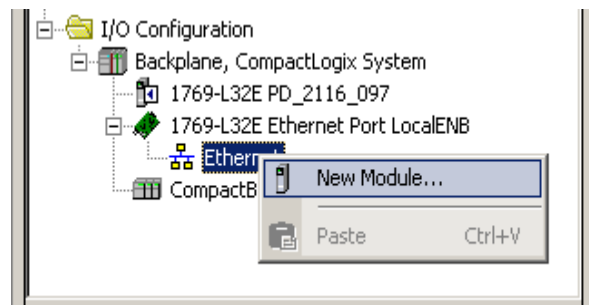
### 2.2 Compact Logix Example Ladder Logic

Rung 0 checks the **Alarm\_Queue[]** bit pointed to by **Alarm\_Number**. If the **Alarm\_Queue[Alarm\_Number]** bit is set, then rung 0 starts **Alarm\_Timer** timing up, copies the alarm text pointed to by **Alarm\_Number** (**Alarm\_Text[Alarm\_Number]**) to **Message\_Text**, triggers a **MSG** instruction that will send **Message\_Text** to the marquee, and unlatches the default alarm bit **Alarm\_Queue[31]**. The testing of **Alarm\_Timer.TT** and **Message\_Control.EN** hold this rung true until both the timer and the message instruction are done. The test of **Alarm\_Timer.DN** allows the rung to transition to false once the timer is done.

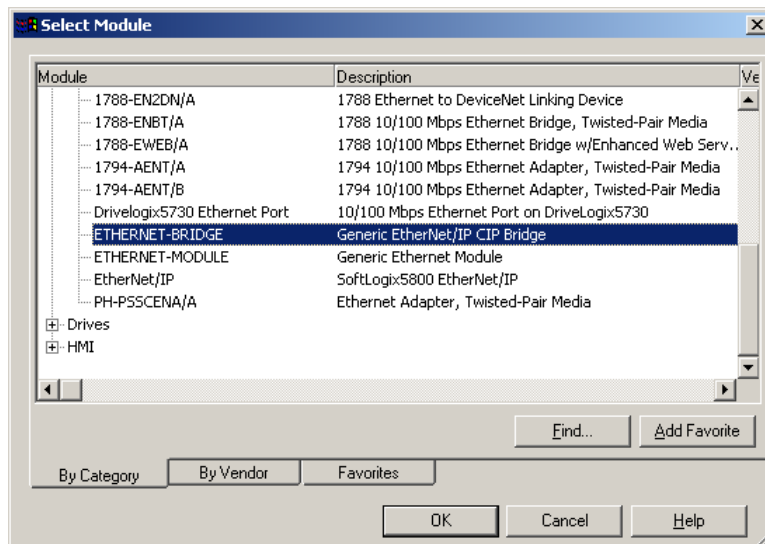


Next we need to configure the **MSG** instruction to send **Message\_Text** to the marquee in a PLC5 Typed Write message. To do this, the PLC will need to know the exact communications path from the PLC to the marquee.

The easy way to define the communications path to the marquee is to use the controller organizer in RSLogix5000. Expand the **I/O Configuration** folder for your project, and drill down to the Ethernet node as shown to the right. Right click **Ethernet**, and then select **New Module...** from the pop up menu.



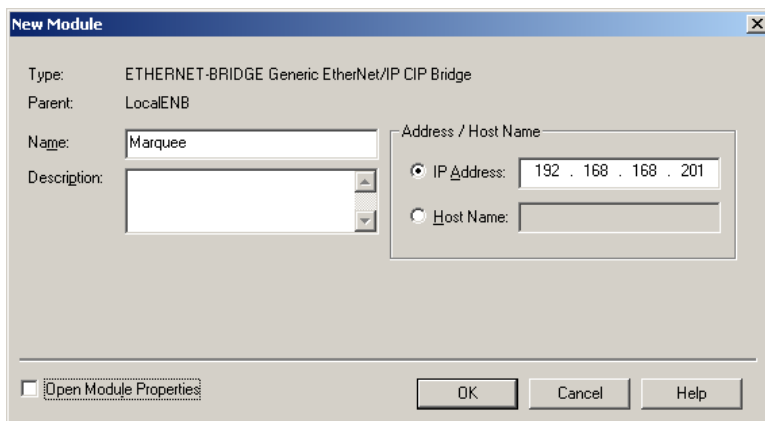
In the **Select Module** dialog, expand the **Communications** folder and select the **ETHERNET-BRIDGE** module as shown to the right. Click **OK**.



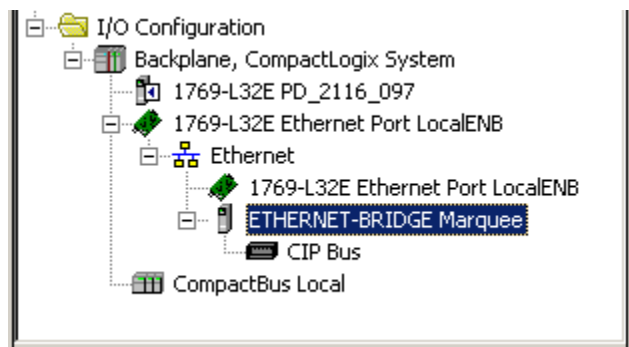
In the **New Module** dialog, type a symbolic name for this module, we will use **Marquee** for our example.

Enter the **IP Address** or **Host Name** of the 1761-NET-ENI module inside the marquee. For our example, the ENI module has a static IP Address of **192.168.168.201**.

Click **OK**.



Now RSLogix5000 knows the communications path from the PLC to the marquee. This will make configuring the **MSG** instruction much easier.





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## 2800 with EtherNetIP Option



Click the “...” button in the **MSG** instruction to bring up the **Message Configuration** dialog shown to the right.

On the **Configuration** tab, set the **Message Type** to **PLC5 Typed Write**. Set the **Source Element** to **Message\_Text**. Set the **Number Of Elements** to **1**. Set the **Destination Element** to **ST10:0**

The screenshot shows the 'Message Configuration - Message\_Control' dialog box with the 'Configuration' tab selected. The 'Message Type' is set to 'PLC5 Typed Write'. The 'Source Element' is 'Message\_Text' and the 'Destination Element' is 'ST10:0'. The 'Number Of Elements' is set to '1'. There are radio buttons for 'Enable', 'Enable Waiting', 'Start', and 'Done', all of which are currently unselected. The 'Done Length' is set to '0'. There are also fields for 'Error Code', 'Extended Error Code', 'Error Path', and 'Error Text', all of which are empty. The 'Timed Out' checkbox is unchecked. At the bottom, there are buttons for 'OK', 'Cancel', 'Apply', and 'Help'.

On the **Communications** tab, click the **Browse** button, and select the **ETHERNET-BRIDGE** module that you created. Make sure the **CIP Communications Method** is selected.

The screenshot shows the 'Message Path Browser' dialog box. The 'Path' field is set to 'Marquee'. The 'Marquee' section is expanded, showing a tree view of the system configuration. The tree view shows the following structure: 'I/O Configuration' -> 'Backplane, CompactLogix System' -> '1769-L32E PD\_2116\_097' -> '1769-L32E Ethernet Port LocalENB' -> 'Ethernet' -> '1769-L32E Ethernet Port LocalENB' -> 'ETHERNET-BRIDGE Marquee' (highlighted). The 'CIP Bus' and 'CompactBus Local' sections are also visible. At the bottom, there are buttons for 'OK', 'Cancel', and 'Help'.

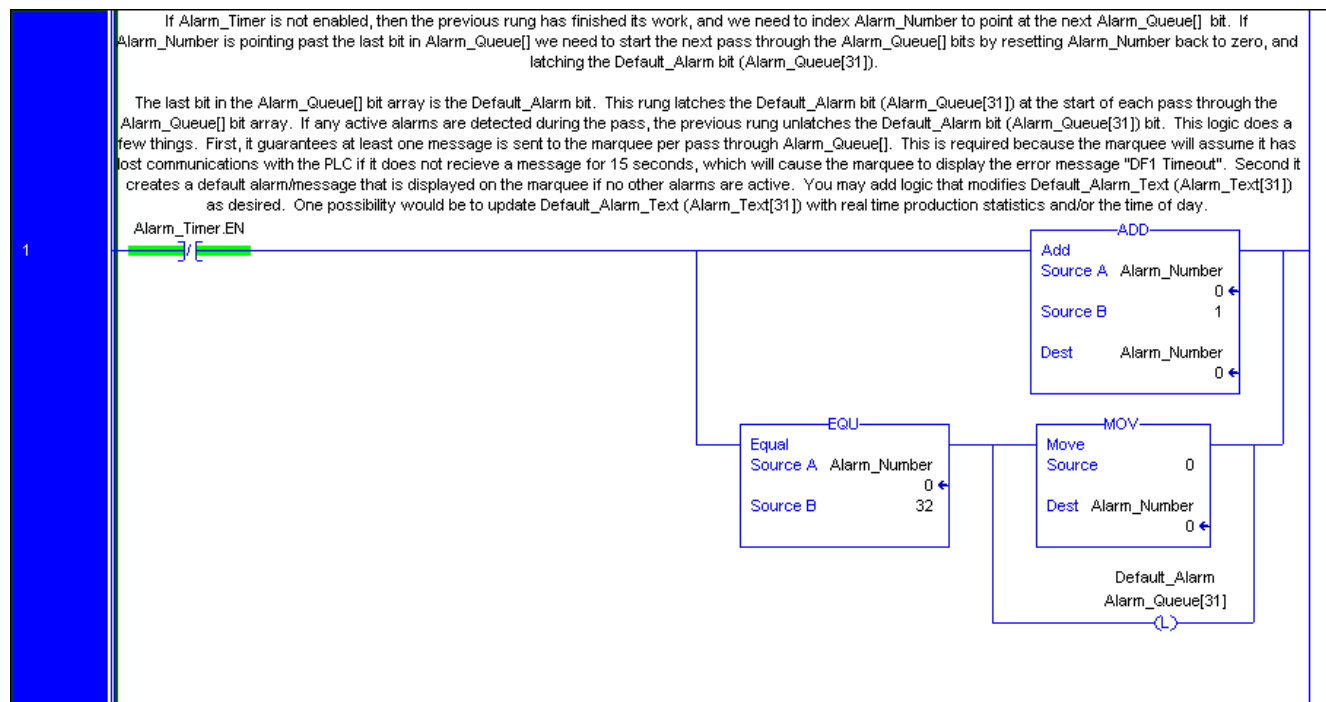
The screenshot shows the 'Message Configuration - Message\_Control' dialog box with the 'Communication' tab selected. The 'Path' field is set to 'Marquee'. The 'Communication Method' section has radio buttons for 'CIP', 'DH+', and 'CIP With Source ID'. The 'CIP' radio button is selected. The 'Channel' field is empty. The 'Destination Link' is set to '0'. The 'Source Link' is set to '0'. The 'Destination Node' is set to '0'. The 'Connected' checkbox is unchecked. The 'Cache Connections' checkbox is checked. There are radio buttons for 'Enable', 'Enable Waiting', 'Start', and 'Done', all of which are currently unselected. The 'Done Length' is set to '0'. There are also fields for 'Error Code', 'Extended Error Code', 'Error Path', and 'Error Text', all of which are empty. The 'Timed Out' checkbox is unchecked. At the bottom, there are buttons for 'OK', 'Cancel', 'Apply', and 'Help'.

There are no settings that need changed on the **Tag** tab.

Click **OK** to finish configuring the **MSG** instruction.

The screenshot shows the 'Message Configuration - Message\_Control' dialog box with the 'Tag' tab selected. The 'Name' field is set to 'Message\_Control'. The 'Description' field is empty. The 'Type' is set to 'Base'. The 'Data Type' is set to 'MESSAGE'. The 'Scope' is set to 'PD\_2116\_097'. There are radio buttons for 'Enable', 'Enable Waiting', 'Start', and 'Done', all of which are currently unselected. The 'Done Length' is set to '0'. There are also fields for 'Error Code', 'Extended Error Code', 'Error Path', and 'Error Text', all of which are empty. The 'Timed Out' checkbox is unchecked. At the bottom, there are buttons for 'OK', 'Cancel', 'Apply', and 'Help'.

Rung 1 checks to see if rung 0 is active by checking the enable bit for the timer in Rung 0 (**Alarm\_Timer.EN**). If rung 0 is not busy, then it is time to add one to **Alarm\_Number** so that it points at the next **Alarm\_Queue[]** bit. If after indexing **Alarm\_Number**, it points past the end of the **Alarm\_Queue[]**, it is wrapped back to zero, and the default alarm bit (**Alarm\_Queue[31]**) is latched. Latching the default alarm bit guarantees at least one alarm is displayed for each pass through the **Alarm\_Queue[]** bits.



The rest of your ladder logic simply needs to turn on bits in the **Alarm\_Queue[]** bit array to activate displaying alarm messages on the marquee as your application requires. Optionally, you can also add logic to modify the **Alarm\_Text[]** strings in real time as required by your application.

Also, be sure to read section 3 of this manual. It provides instructions on how to embed formatting control codes in your alarm text. Alarm text can flash, and it is also possible to mix 4" and 2" text on the display at the same time.

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### 2.3 SLC5/05 Example Memory Allocations

First we need to create a new integer file large enough to store the control block for the **MSG** instruction plus an additional two words. The SLC5/05 **MSG** instruction needs 51 words for its control block. In our example **N9:0** through **N9:50** are used for the MSG Control block. **N9:51** is used to keep track of the current alarm number. **N9:52/0** is used to back a one shot rising instruction.

The Data File Properties dialog box for File 9 shows the following configuration:

- File: 9
- Type: N
- Name: ALRM\_CTRL
- Desc: (empty)
- Elements: 53
- Last: N9:52
- Attributes: ☐ Debug, ☐ Skip When Deleting Unused Memory
- Scope: ☒ Global, ☐ Local (To File: LAD 2 -)
- Protection: ☐ Constant, ☐ Static, ☒ None, ☐ Memory Module

Next we will need a new string file large enough to store the text of all possible alarms plus one default alarm message, plus one extra element for temporary storage, used to work around a limitation of the MSG instruction.

The SLC5/05 **MSG** instruction does not support indirect addressing in the source data table address field. To work around this limitation, we will use a **COP** instruction to copy the active alarm text to the extra string element, and then configure the message instruction to send the extra string element the marquee.

For our example the string file will need to hold thirty three elements, thirty one to store the alarms (**ST10:0** through **ST10:30**), one to store the default alarm (**ST10:31**), and one to work around the indirect addressing limitation (**ST10:32**).

The Data File Properties dialog box for File 10 shows the following configuration:

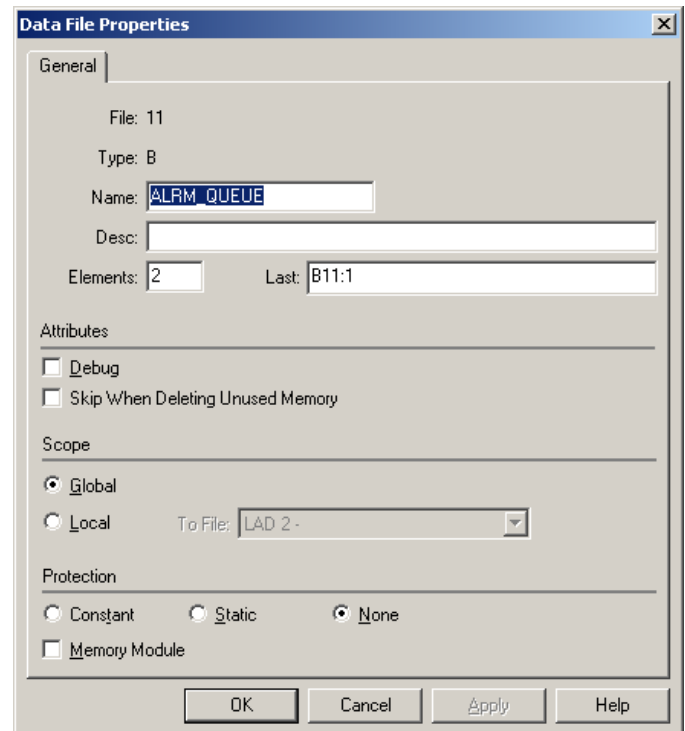
- File: 10
- Type: ST
- Name: ALRM\_TEXT
- Desc: (empty)
- Elements: 33
- Last: ST10:32
- Attributes: ☐ Debug, ☐ Skip When Deleting Unused Memory
- Scope: ☒ Global, ☐ Local (To File: LAD 2 -)
- Protection: ☐ Constant, ☐ Static, ☒ None, ☐ Memory Module



Finally we will need a bit file to specify which of the alarms are currently active. We will need one bit for each alarm message plus one bit for the default alarm message.

For our example, we need thirty two bits. Bit **B11:0/0** will activate alarm message **ST10:0**, **B11:0/1** will activate **ST10:1**, **B11:0/15** activates **ST10:15**, and **B11:0/30** activates **ST10:30**.

Note: It is allowable to specify bit addresses with bit offsets greater than 15. **B11:0/16** is equivalent to **B11:1/0**.



**Data File Properties**

General

File: 11

Type: B

Name: ALRM\_QUEUE

Desc:

Elements: 2 Last: B11:1

Attributes

☐ Debug

☐ Skip When Deleting Unused Memory

Scope

☒ Global

☐ Local To File: LAD 2 -

Protection

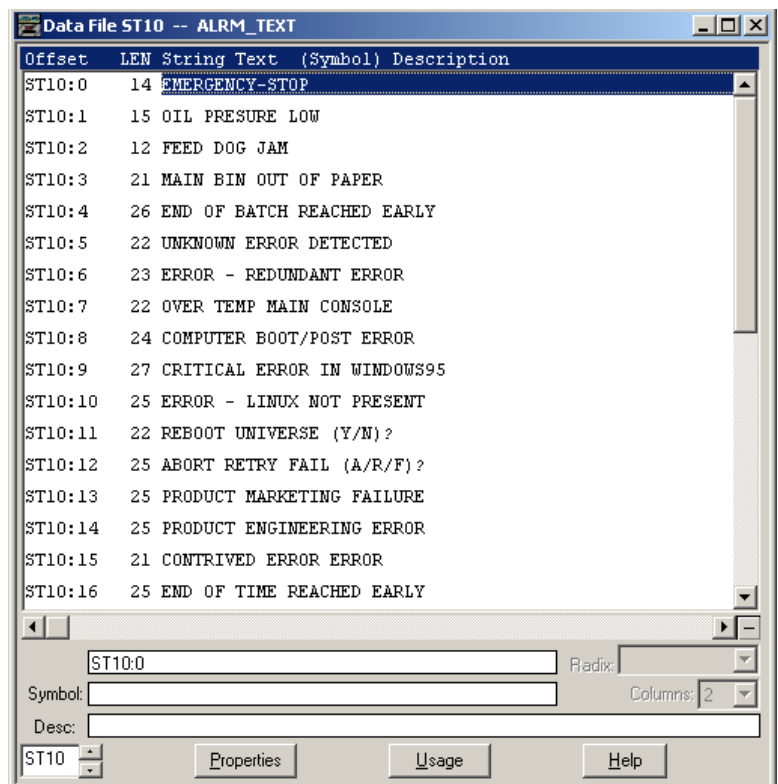
☐ Constant ☐ Static ☒ None

☐ Memory Module

OK Cancel Apply Help

Open the Alarm Text string file **ST10**, and enter the text of your alarm messages. Keep in mind that the last alarm (**ST10:31** in our example) will be the default alarm. The ladder logic will automatically activate the default alarm if none of the other alarms are active. The default alarm is typically set to something like "Welcome to the paint shop!" or "All is well!".

For our example **ST10:0** through **ST10:30** store the text to display on the marquee when the associated alarm bit is set. **ST10:31** stores the default alarm message, which is displayed on the marquee when none of the other alarm messages are active. The text of the currently displayed alarm is copied into **ST10:32** before being sent to the marquee via the **MSG** instruction.



**Data File ST10 -- ALRM\_TEXT**

Offset	LEN	String Text (Symbol)	Description
ST10:0	14	EMERGENCY-STOP	
ST10:1	15	OIL PRESURE LOW	
ST10:2	12	FEED DOG JAM	
ST10:3	21	MAIN BIN OUT OF PAPER	
ST10:4	26	END OF BATCH REACHED EARLY	
ST10:5	22	UNKNOWN ERROR DETECTED	
ST10:6	23	ERROR - REDUNDANT ERROR	
ST10:7	22	OVER TEMP MAIN CONSOLE	
ST10:8	24	COMPUTER BOOT/POST ERROR	
ST10:9	27	CRITICAL ERROR IN WINDOWS95	
ST10:10	25	ERROR - LINUX NOT PRESENT	
ST10:11	22	REBOOT UNIVERSE (Y/N)?	
ST10:12	25	ABORT RETRY FAIL (A/R/F)?	
ST10:13	25	PRODUCT MARKETING FAILURE	
ST10:14	25	PRODUCT ENGINEERING ERROR	
ST10:15	21	CONTRIVED ERROR ERROR	
ST10:16	25	END OF TIME REACHED EARLY	

ST10:0 Radix:

Symbol: Columns: 2

Desc:

ST10 Properties Usage Help

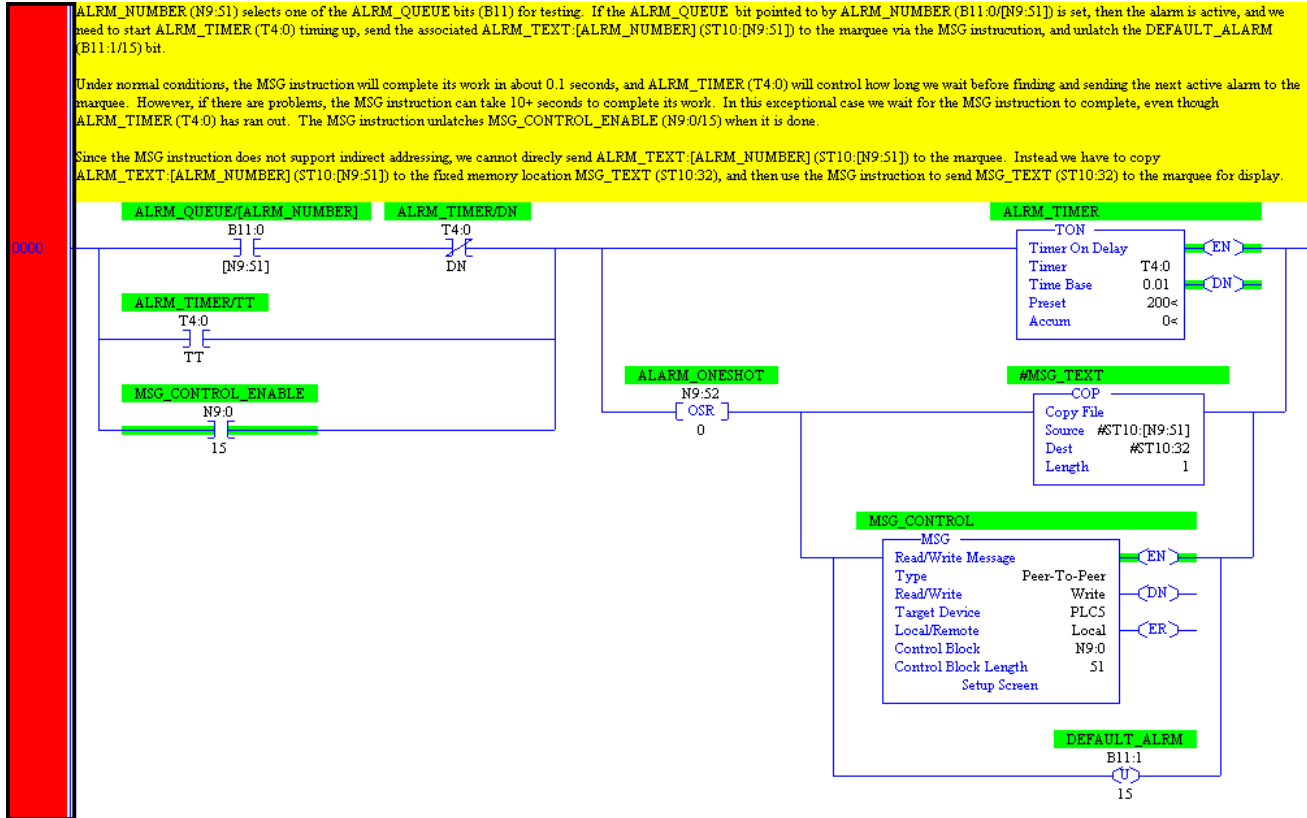
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## 2800 with EtherNetIP Option



### 2.4 SLC5/05 Example Ladder Logic

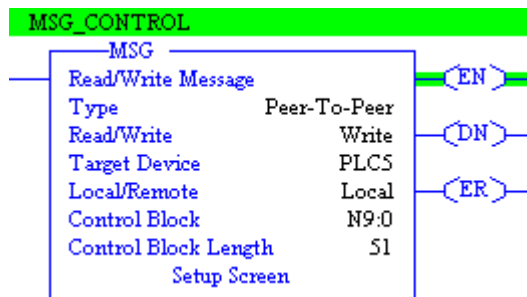
Rung 000 checks the alarm queue (**B11**) bit pointed to by alarm number (**N9:51**). If the bit is set, then rung 000 starts the alarm timer (**T4:0**) timing up, copies the alarm text pointed to by alarm number (**N9:51**) to the extra string element (**ST10:32**), triggers a **MSG** instruction that send the extra string element (**ST10:32**) to the marquee, and unlatches the default alarm bit (**B11:1/15**). The testing of the alarm timer timing bit (**T4:0/TT**) and the message instruction enable bit (**N9:0/15**) hold this rung true until both the timer and the message instruction are done. The test of the alarm timer done bit (**T4:0/DN**) allows the rung to transition to false once the timer is done.



Next we need to configure the **MSG** instruction to send **ST10:32** to the marquee in a PLC5 Typed Write message.

We need to configure the **MSG** instruction in such a way that a **PLC5 Typed Write** to **ST10:0** will be sent to the marquee. For our example, configure the **MSG** instruction as follows:

Set the Type field to **Peer-To-Peer**  
Set the Target Device field to **PLC5**  
Set the Local/Remote field to **Local**  
Set the Control Block to **N9:0**



Then double click **Setup Screen** to bring up the **MSG** Instruction configuration dialog box shown to the right.

Set This Controller Data Table Address to **ST10:32**. Set the size in elements to **1**, and Channel to **1** which is the EthernetIP port.

Set Target Device Data Table Address to **ST10:0**. The marquee will ignore writes to any data table address other than **ST10:0**. Set MultiHop to **Yes**. The ENI module will not forward the packet to the marquee unless MultiHop is set to Yes

The image shows the 'MSG - N9:0 : (51 Elements)' configuration dialog box. The 'General' tab is selected. The 'This Controller' section has 'Communication Command' set to 'PLC5 Write', 'Data Table Address' set to 'ST10:32', 'Size in Elements' set to '1', and 'Channel' set to '1'. The 'Target Device' section has 'Message Timeout' set to '23', 'Data Table Address' set to 'ST10:0', and 'Local / Remote' set to 'Local'. The 'MultiHop' checkbox is checked. The 'Control Bits' section has 'Ignore if timed out (TO)' set to '0', 'To be retried (NR)' set to '0', 'Awaiting Execution (EW)' set to '0', 'Continuous Run (CO)' set to '0', 'Error (ER)' set to '0', 'Message done (DN)' set to '0', 'Message Transmitting (ST)' set to '1', 'Message Enabled (EN)' set to '1', and 'Waiting for Queue Space' set to '0'. The 'Error' section has 'Error Code(Hex)' set to '0'. The 'Error Description' section shows 'No errors'.

On the MultiHop Tab, enter a single hop, from the SLC5/05 to the ENI IP address (192.168.168.201 in our example). Even though it is only one hop, the ENI module will not deliver the message to the marquee unless MultiHop is enabled.

The image shows the 'MSG - N9:0 : (51 Elements)' configuration dialog box with the 'MultiHop' tab selected. The 'Ins = Add Hop' button is visible. The table below shows the configuration for a single hop:

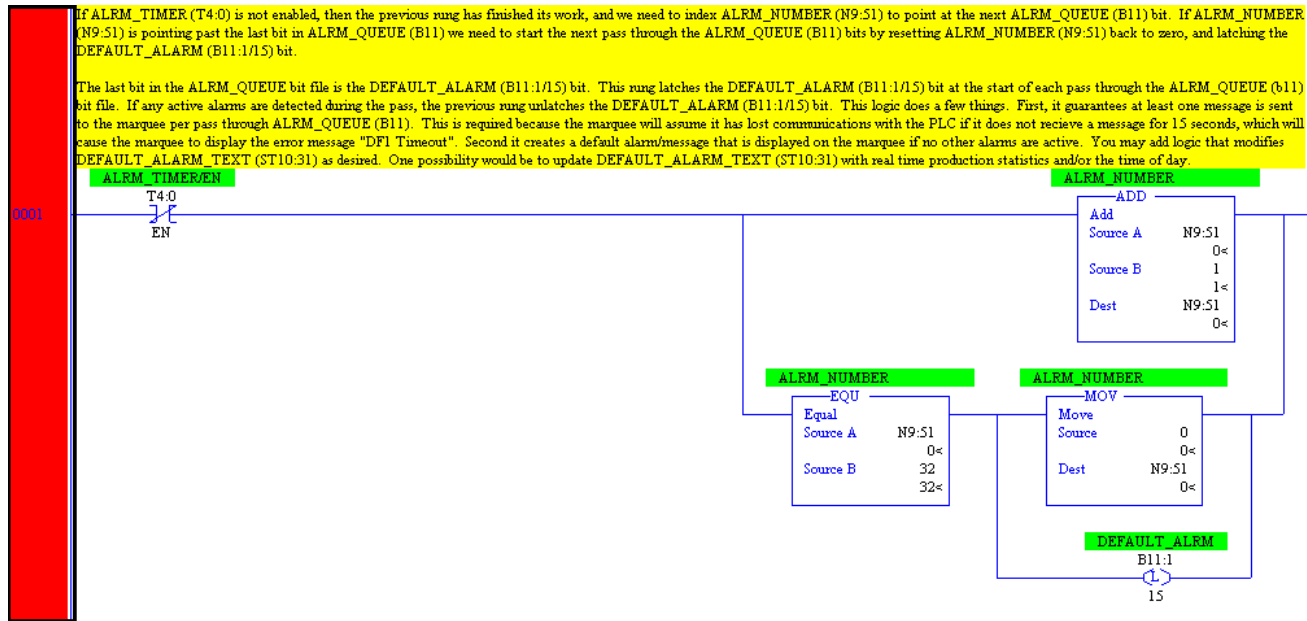
From Device	From Port	To Address Type	To Address
This SLC500	1	EtherNet IP Device (str.)	192.168.168.201

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Rung 001 checks to see if rung 000 is active by checking the enable bit for the timer in Rung 000 (**T4:0/EN**). If rung 000 is not busy, then it is time to add one to alarm number (**N9:51**) so that it points at the next alarm queue (**B11**) bit. If after indexing alarm number (**N9:51**), it points past the end of the alarm queue (**B11**), it is wrapped back to zero, and the default alarm bit (**B11:1/15**) is latched. Latching the default alarm bit guarantees at least one alarm is displayed for each pass through the alarm queue (**B11**) bits.



The rest of your ladder logic simply needs to turn on bits in the alarm queue (**B11**) file to activate displaying alarm messages on the marquee as your application requires. Optionally, you can also add logic to modify the alarm text (**ST10**) strings in real time as required by your application.

Also, be sure to read section 3 of this manual. It provides instructions on how to embed formatting control codes in your alarm text. Alarm text can flash, and it is also possible to mix 4" and 2" text on the display at the same time.



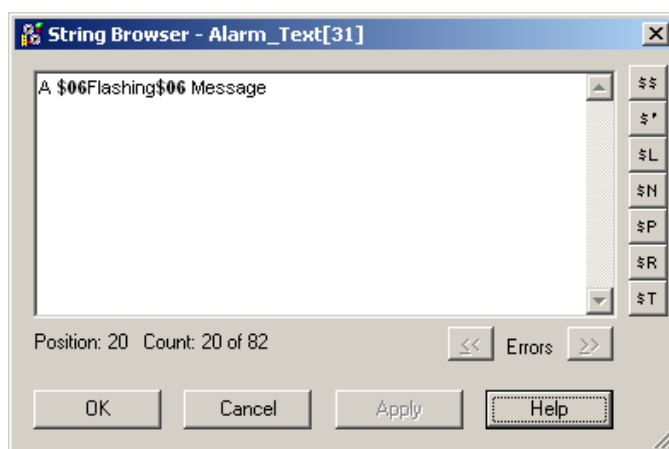
### 3.0 Alarm Text Enhancements

Text enhancements are character sequences that are embedded in an alarm text that modify the formatting of the text on the LED display.

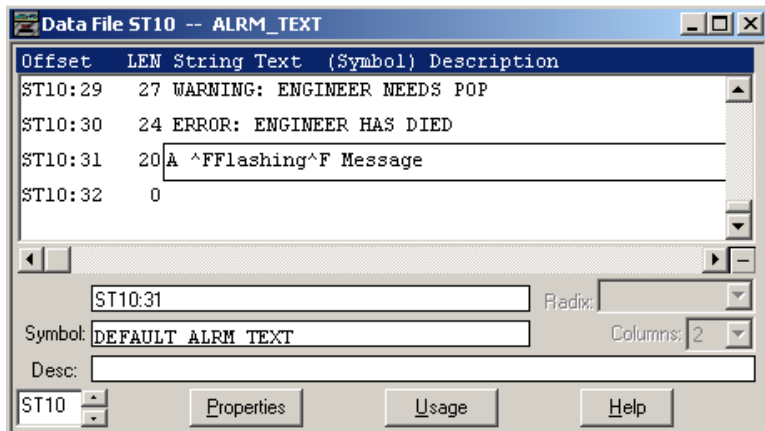
#### 3.1 Flash Toggle

To make a word or phrase in an alarm flash, surround the word or phrase with **Control-F** characters. It is important to always use **Control-F** characters in pairs. One to turn flashing on, and one to turn flashing back off.

In RSLogix5000, **Control-F** characters are entered into the alarm string using the special character sequence **\$06**. So to make the marquee display the message “A Flashing Message” in which the word “Flashing” flashes, enter the alarm text as shown below.



In RSLogix500, **Control-F** characters are entered into the alarm string using the special character sequence **^F**. So to make the marquee display the message “A Flashing Message” in which the word “Flashing” flashes, enter the alarm text as shown below.



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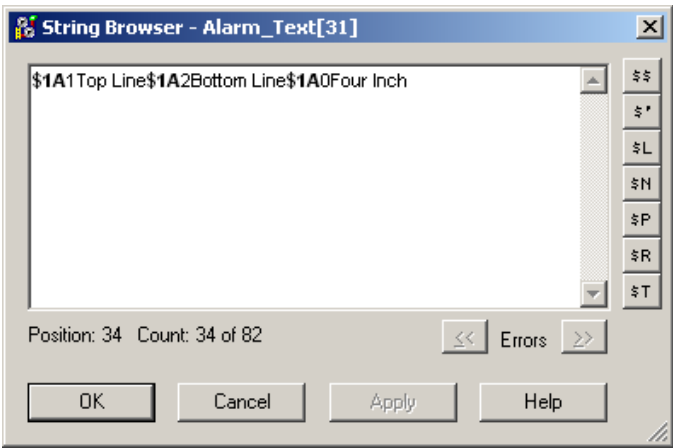
### 3.2 Line Control

The 2800 marquee has a 4" font, and a 2" font, and can display one line of 4" text, or two lines of 2" text. It is even possible to mix 4" and 2" text on the display at the same time.

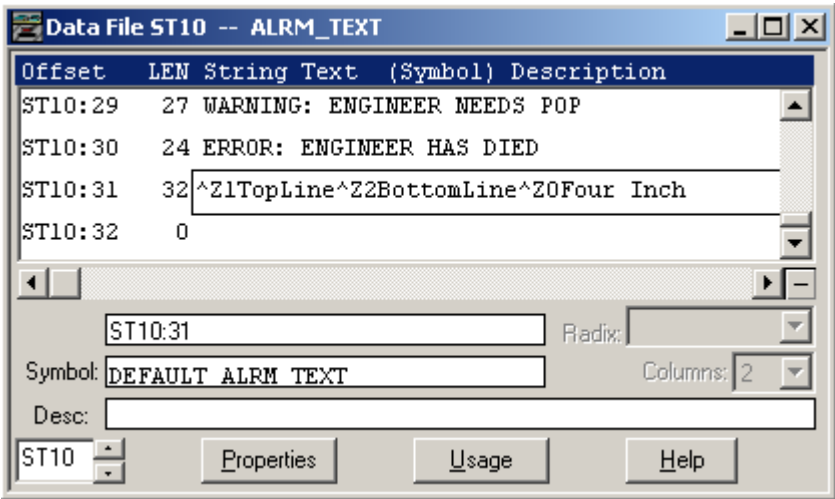
The 2800 defaults to displaying 4" Text, but it can also be manually selected by embedding the two character sequence **Control-Z 0**.

The top 2" text line is selected by embedding the two character sequence **Control-Z 1**, and the bottom 2" text line is selected by embedding the two character sequence **Control-Z 2**.

In RSLogix5000, **Control-Z** characters are entered into the alarm string using the special character sequence **\$1A**. So to make the marquee display the message "Top Line" in the top 2" line, "Bottom Line" on the bottom 2" line, and "Four Inch" in four inch text, enter the alarm text as shown below.



In RSLogix500, **Control-Z** characters are entered into the alarm string using the special character sequence **^Z**. So to make the marquee display the message "Top Line" in the top 2" line, "Bottom Line" on the bottom 2" line, and "Four Inch" in four inch text, enter the alarm text as shown below.



## 4.0 Troubleshooting

Before contacting ALI for technical support, please review the manual sections covering installation and operation.

There are several status indicator lamps on the 2800 processor board that are quite helpful when trying to debug problems. The POWER indicator illuminates when the processor board has power. The RXD indicator flashes when characters are received via RS-232 or RS-485. The TXD indicator flashes when characters are transmitted via RS-232. The ENB indicator flashes when characters are transmitted via RS-485. The RELAY indicator illuminates when the mechanical relay output is activated.

### 4.1 Getting Technical Support by Phone or Fax

If you need technical assistance, contact us by phone or fax and please have the following information available:

- 1) Customer Name, Address, Phone Number, Fax Number
- 2) Unit Model Number
- 3) Unit Serial Number
- 4) Description of the problem.

The serial number and model number of the system control box can be located on the right hand side of the box. It is imprinted on a SILVER ID TAG.

American LED-gible Inc.  
(614) 851-1100  
September 2003  
Model # EL-2800-902  
Serial # SO-6316-001

American LED-gible technical support may be reached at:

**American LED-gible® Inc.**  
**Technical Support**  
(614) 851-1100 Phone  
(614) 851-1121 Fax  
[support@ledgible.com](mailto:support@ledgible.com) e-mail  
[engineering@ledgible.com](mailto:engineering@ledgible.com) e-mail

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### 5.0 Limited Warranty

We warrant to you that your AMERICAN LED-gible BRAND MARQUEE, when purchased by you, will be free from defects in material and workmanship, under normal use, for one year from date of delivery. If your LED-GIBLE BRAND MARQUEE should prove to be defective within the warranty period, we will repair it (or, if we think necessary, replace it) without charge to you.

To obtain service, please call our Customer Service Department at 1-614-851-1100 or write to:

AMERICAN LED-gible Inc.  
1776 LONE EAGLE STREET  
COLUMBUS, OHIO 43228

We will furnish you with shipping instructions. This warranty covers merchandise returned to American LED-gible (shipped prepaid) for repair, not in plant repairs. Should you need an in plant repair at your facility, American LED-gible will schedule a trip. Rates are per diem, plus travel expenses.

ALI shall have the right of final determination as to the existence and cause of the defect. This warranty expressly excludes any defects or damages caused by accessories, replacement parts, or repair service, other than those which have been authorized by ALI. This warranty does not cover any damage caused by accident, misuse, shipment, or other than ordinary use.

This warranty excludes all incidental or consequential damages. Some states do not allow the exclusion of, or limitation of, incidental or consequential damages, so the foregoing exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights, which vary from state to state. This warranty is in lieu of any other warranty, express, written, implied, or statutory, and no agreement extending or modifying it will be binding upon ALI, unless in writing and signed by duly authorized officer.

If your AMERICAN LED-gible MARQUEE is outside the warranty period, please call our Customer Service Department as above. After you return the unit to American LED-gible, we will estimate the repair charges, and contact you so a purchase order can be issued. Again, should you require in-house repair of your marquees, ALI rates are per diem, plus travel expenses. Please make sure to call, so a trip can be scheduled if this option is preferred.

#### **LIMITATION OF LIABILITY:**

If this product is not in good working order as warranted above, your sole remedy shall be repair or replacement as provided above. In no event will ALI be liable for special, indirect, or consequential damages, or any damages whatsoever resulting from loss of use, data, or profits arising out of, or in connection with this contract or the use or performance of ALI products, whether in an action of contract or tort, including negligence. ALI's liability for damage to property shall be limited to the cost of the product sold to the buyer.



## 6.0 ASCII Chart

ASCII CHARACTER	Hexadecimal Code	Decimal Code
CTRL-A	01h	1
CTRL-B	02h	2
CTRL-C	03h	3
CTRL-D	04h	4
CTRL-E	05h	5
CTRL-F	06h	6
CTRL-G	07h	7
CTRL-H	08h	8
CTRL-I	09h	9
CTRL-J	0Ah	10
CTRL-K	0Bh	11
CTRL-L	0Ch	12
CTRL-M	0Dh	13
CTRL-N	0Eh	14
CTRL-O	0Fh	15
CTRL-P	10h	16
CTRL-Q	11h	17
CTRL-R	12h	18
CTRL-S	13h	19
CTRL-T	14h	20
CTRL-U	15h	21
CTRL-V	16h	22
CTRL-W	17h	23
CTRL-X	18h	24
CTRL-Y	19h	25
CTRL-Z	1Ah	26
CTRL-[	1Bh	27
CTRL-\	1Ch	28
CTRL-]	1Dh	29
CTRL-^	1Eh	30
CTRL-_ SPACE	1Fh 20h	31 32

ASCII CHARACTER	Hexadecimal Code	Decimal Code
!	21h	33
"	22h	34
#	23h	35
\$	24h	36
%	25h	37
&	26h	38
'	27h	39
(	28h	40
)	29h	41
*	2Ah	42
+	2Bh	43
,	2Ch	44
-	2Dh	45
.	2Eh	46
/	2Fh	47
0	30h	48
1	31h	49
2	32h	50
3	33h	51
4	34h	52
5	35h	53
6	36h	54
7	37h	55
8	38h	56
9	39h	57
:	3Ah	58
;	3Bh	59
<	3Ch	60
=	3Dh	61
>	3Eh	62
?	3Fh	63
@	40h	64

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ASCII CHARACTER	Hexadecimal Code	Decimal Code
A	41h	65
B	42h	66
C	43h	67
D	44h	68
E	45h	69
F	46h	70
G	47h	71
H	48h	72
I	49h	73
J	4Ah	74
K	4Bh	75
L	4Ch	76
M	4Dh	77
N	4Eh	78
O	4Fh	79
P	50h	80
Q	51h	81
R	52h	82
S	53h	83
T	54h	84
U	55h	85
V	56h	86
W	57h	87
X	58h	88
Y	59h	89
Z	5Ah	90
[	5Bh	91
\	5Ch	92
]	5Dh	93
^	5Eh	94
_	5Fh	95
`	60h	96

ASCII CHARACTER	Hexadecimal Code	Decimal Code
a	61h	97
b	62h	98
c	63h	99
d	64h	100
e	65h	101
f	66h	102
g	67h	103
h	68h	104
i	69h	105
j	6Ah	106
k	6Bh	107
l	6Ch	108
m	6Dh	109
n	6Eh	110
o	6Fh	111
p	70h	112
q	71h	113
r	72h	114
s	73h	115
t	74h	116
u	75h	117
v	76h	118
w	77h	119
x	78h	120
y	79h	121
z	7Ah	122
{	7Bh	123
	7Ch	124
}	7Dh	125
~	7Eh	126
DELETE	7Fh	127