

# *GSE 60 Series*

Ethernet Interface Module



## **INSTALLATION AND OPERATING INSTRUCTIONS**

Issue AD

Part Number: 39-10-40305

Updated 2/12/2009





# ETHERNET INTERFACE MODULE

*This Module was intended for use across an Intranet. Use of this module on an Internet could allow unauthorized use of your indicator.*

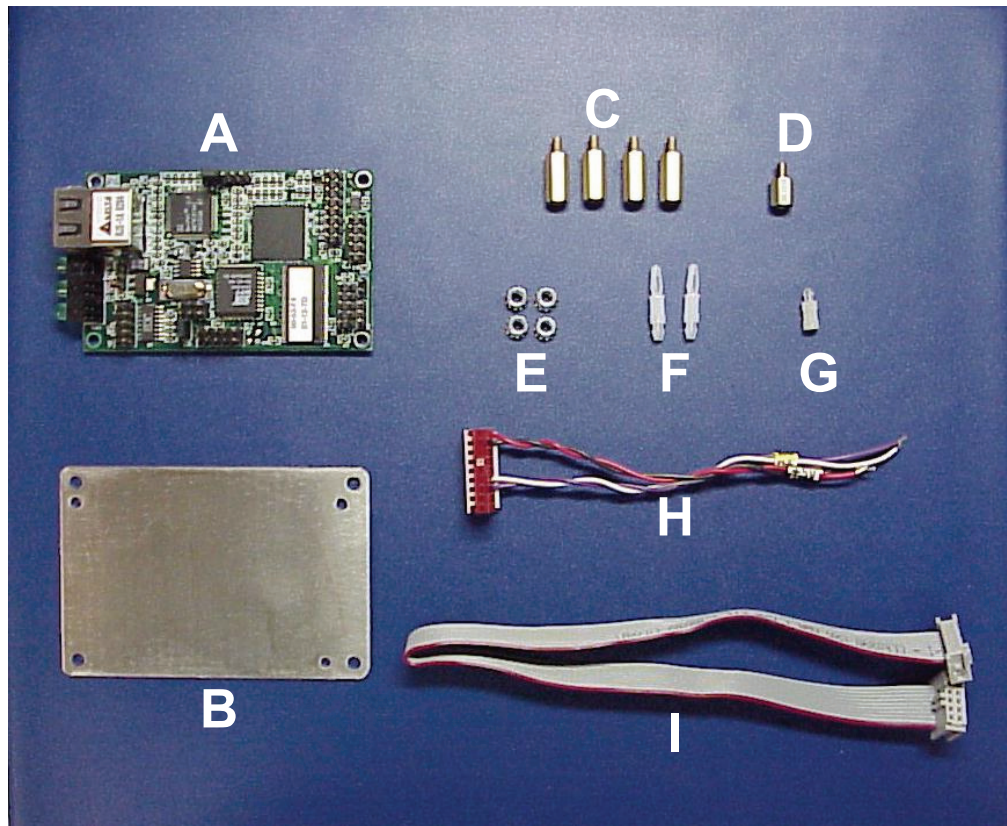
## INSTALLATION

There are two Ethernet Kits - One kit for the 460+, 560+, and 660+ product lines and a second kit for the 672 and 675 products.

**ETHERNET MODULE KIT (part number 24660B-415C0) - FOR MODELS: 460+, 560+, AND 660+**

Make sure your kit contains the following parts (also refer to the picture below).

QUANTITY	DESCRIPTION	REFERENCE	PART NUMBER
1	Ethernet interface module	A	41-42-8410R1
1	Option mounting plate	B	44-25-39626
4	14mm metal standoff	C	17-20-3013
1	5/16" metal standoff	D	17-20-3001
4	5.5mm lock nut	E	38-21-1640
2	Double ended snap in nylon spacer	F	17-20-0800
1	5/16" Nylon spacer	G	17-20-0805
1	Interface cable (+5V,ground, RS232)	H	299290-40081
1	10 pin keypad cable (refer to step 0 on page 9)	I	22-30-25530
1	Instruction manual		39-10-40305



Ethernet Module Kit

**INSTALLING THE ETHERNET INTERFACE MODULE**

1. Open the indicator by removing the back panel screws. Remove the VF display (on the Model 460 only).
2. Locate the option-mounting studs as shown in **Figure 1** and **Figure 2** below.

**NOTE:** When installing this module in the 560 and 660 Series indicators, use the second option position as shown in **Figure 2**.



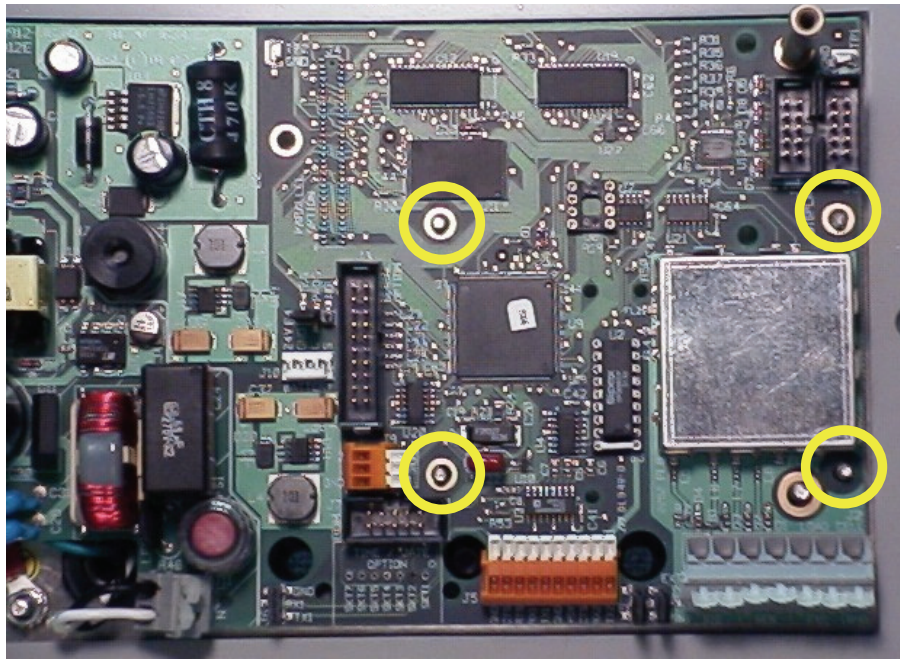


Figure 1: Locating the Option-Mounting Studs, Model 460/465

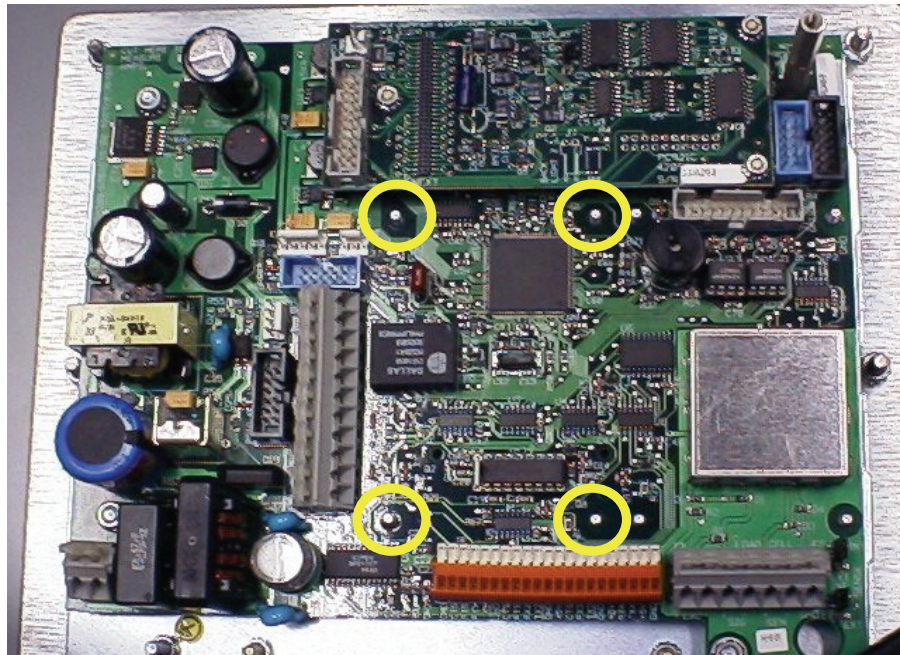


Figure 2: Locating Option-Mounting Studs, 560 and 660 Series

3. Install the four 14mm standoffs (C) over the option-mounting studs as shown in *Figure 3* and *Figure 4*.



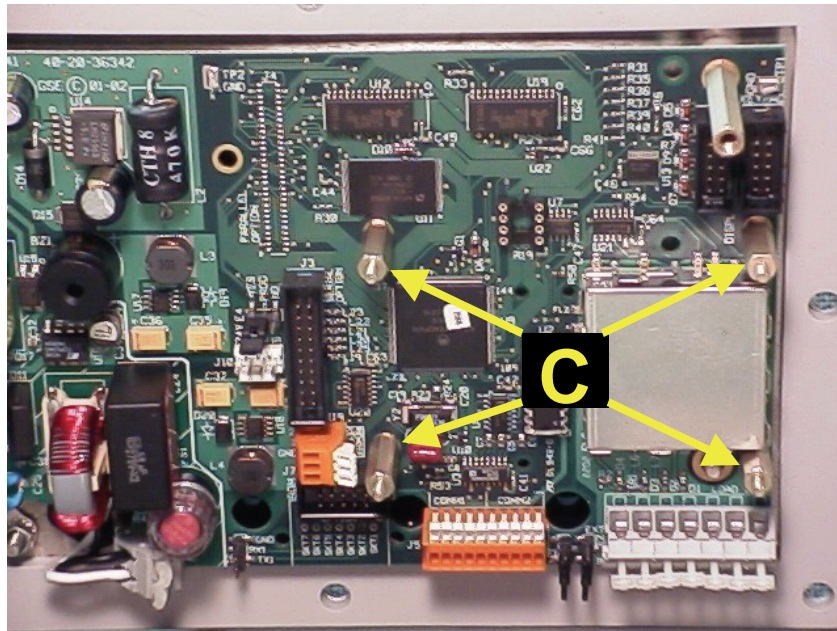


Figure 3: Installing the 14mm Standoffs (C), Model 460/465

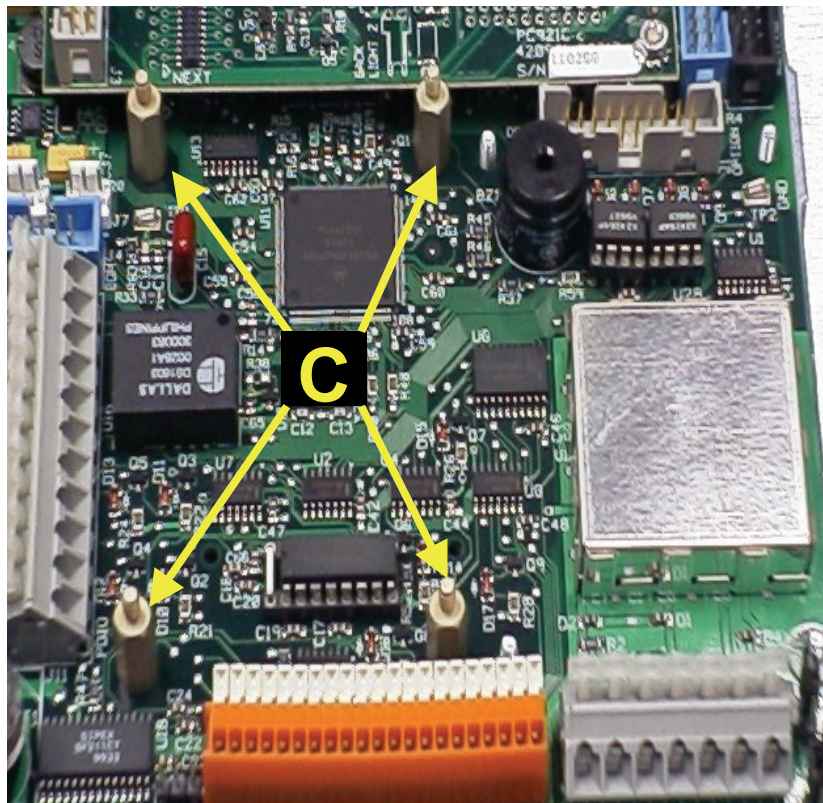


Figure 4: Installing the 14mm Standoffs (C), 560 and 660 Series

4. Place the option-mounting bracket (B) over the 14mm standoffs (C) and fasten with three 5.5mm nuts (E) as shown in *Figure 5* and *Figure 6*.
5. Install the two double-ended spacers (F) into the holes located below the two 5.5mm nuts (E) as shown in *Figure 5* and *Figure 6*.



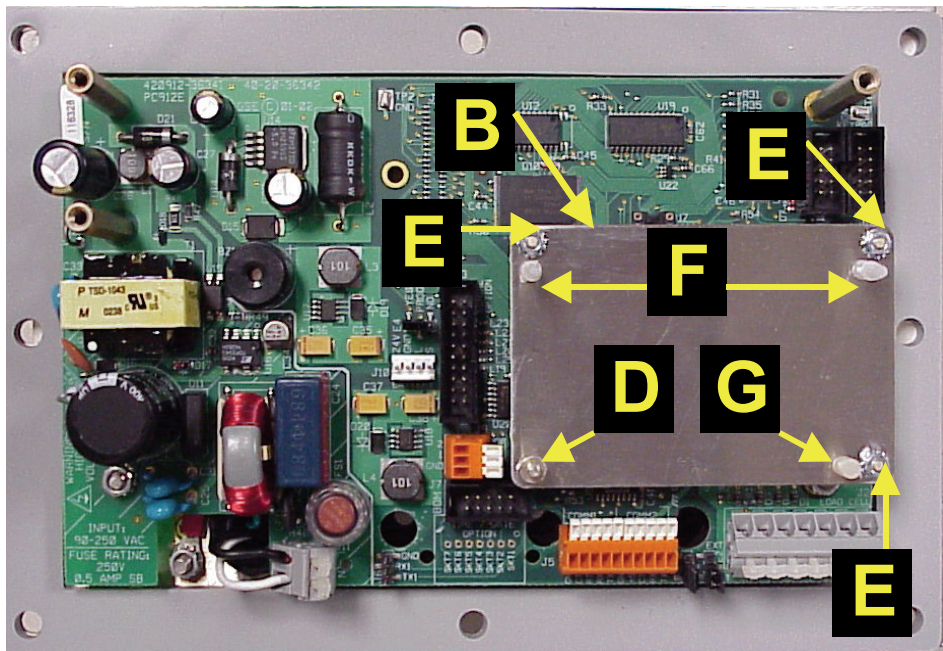


Figure 5: Installing the Option-Mounting Bracket (B), Model 460/465

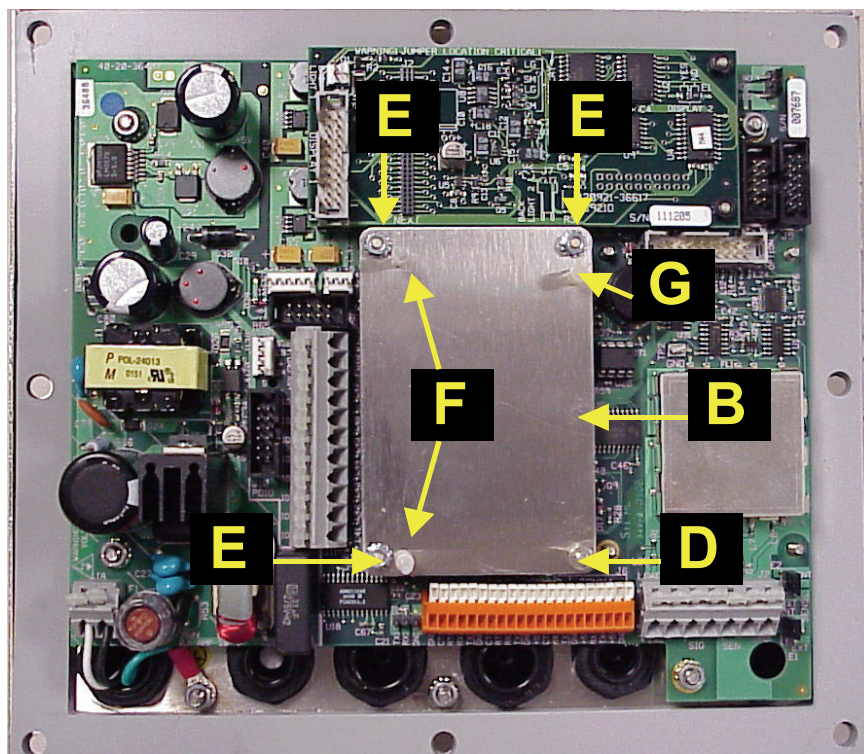


Figure 6: Installing the Option-Mounting Bracket (B), 560 and 660 Series

6. Install the single ended nylon spacer (G) into the last empty hole as shown in *Figure 5* and *Figure 6*.
7. Screw the 5/16" metal standoff (D) onto the remaining 14mm standoff (C). The standoff (D) should be on the bottom side of the module bracket as shown in *Figure 5* and *Figure 6*.



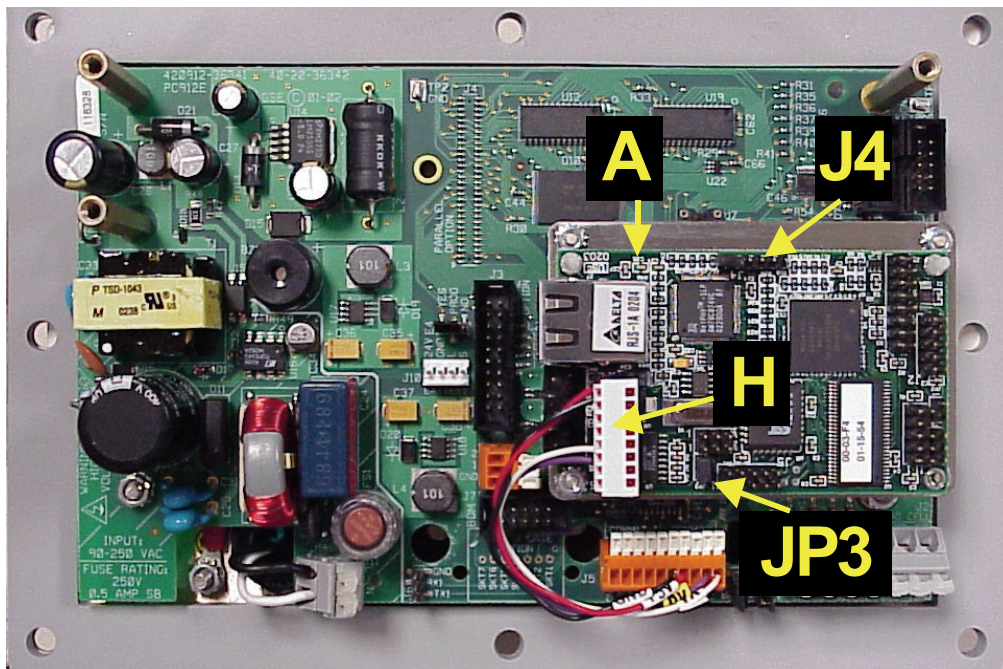


Figure 7: Installing Ethernet Module (A), Model 460/465

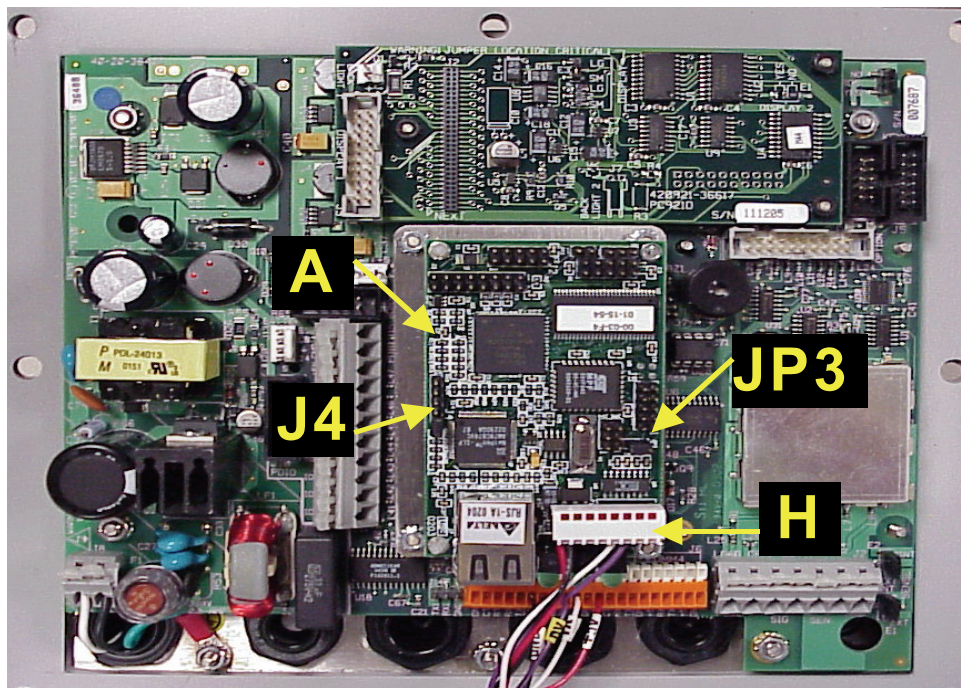


Figure 8: Installing Ethernet Module (A), 560 and 660 Series

8. Snap the Ethernet Module (A) onto the plastic spacers (F) and place a 5.5mm nut (E) on the 5/16" metal spacer (D) to secure the Ethernet module.
9. Make sure there is a shorting jumper on JP3 on the Ethernet module. Also there should be a shorting jumper on J4 as shown in *Figure 7* and *Figure 8*. The J4 jumper in conjunction with Lockout Settings as part of the product setup .



10. Install the power/RS232 cable (H) across the J8 (power) and J6 (RS232) of the Ethernet module. This cable will only fit on the J8 and J6 connectors one way. Refer to *Figure 7* and *Figure 8*.
11. If the module is being installed in the Model 460, replace the existing keypad cable with the keypad cable included with this kit (22-30-25530)
12. Connect the Ethernet module +5VDC (red wire pin 9) and Ground wire (black wire pin 8) to the indicator's +5V and Gnd of the desired comm port.
13. Connect the RX (Violet wire pin 3) and TX (White wire pin 4) wires to the desired comm port.

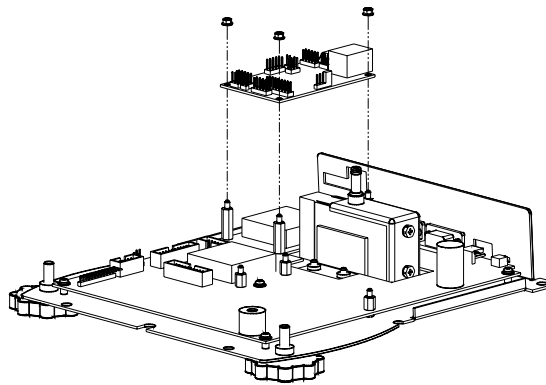
## ***ETHERNET MODULE KIT (part number 24675B-400C0) - FOR MODELS: 672 & 675***

The Ethernet Module will use communication port 3 as its connection.  
Make sure your kit contains the following parts (also refer to the picture below).

<b>Quantity</b>	<b>Part Number</b>	<b>Description</b>
1	41-42-8410R2	Ethernet Module
1	39-10-40305	Users Guide
3	17-40-2578	Snap on Nylon spacers
1	17-20-3025	Threaded Nylon Standoff
1	38-21-1643	Nylon Hex Nut
1	38-21-0101	Screw (M3-.5x6mm Pan head Phillips)
1	22-30-31157	2x5 interface cable
1	23-50-1002	Copper EMI clip

### *Model 672 Installation Instructions*

1. **DISCONNECT POWER! UNPLUG THE MODEL 672 TO INSURE DAMAGE WILL NOT OCCUR DURING OPTION INSTALLATION.**
2. Remove the six 8 mm screws (size) from the bottom plate. Separate the top enclosure from the bottom plate.
3. Cut out the Ethernet opening along the dotted line of the rear panel label.
4. Find the Ethernet option standoffs on the main board and remove the three nuts and set them aside.
5. Remove the Ethernet Module from the anti-static bag and place it on the three standoffs with the RJ45 Jack and LED's through the rear panel where the label was cut.




**Figure 8: Model 672 Ethernet Option Installation**

6. Install the three nuts that were set aside in step 4 using a 5.5 mm nut driver. Be sure to tighten the board snugly. Do not over tighten.
7. Install the 9" ribbon cable from J13 of the main board to J5 of the Ethernet Module.

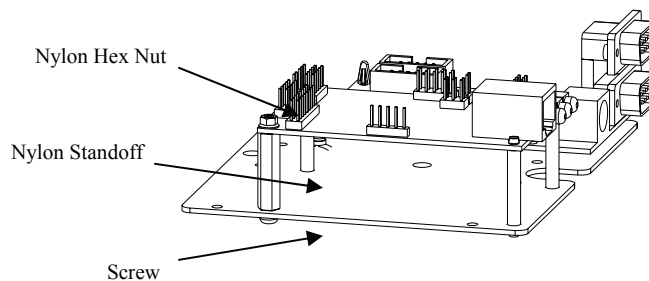
8. Reinstall the top enclosure to the bottom plate.
9. Discard any leftover hardware.
10. Mount the copper EMI clip to the back panel so that it will make good contact with the metal case of the RJ45 connector.

*Model 675 Installation Instructions*


1. **DISCONNECT POWER! UNPLUG THE MODEL 675 TO INSURE DAMAGE WILL NOT OCCUR DURING OPTION INSTALLATION.**
2. Remove the (6) 38-31-8710 M5 x 0.8 x 10 mm screws from the enclosure bottom plate and set it aside.

	Be sure to install the SBM modules first on the option-mounting plate.
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3. Locate the portion of the option-mounting bracket that is labeled ETH. Notice that there are (8) mounting holes.
4. Install (2) nylon spacers in the holes closest to the edge of the notched side of the option-mounting bracket.
5. Install the other (1) nylon spacer in the hole furthest from the back edge.
6. Place the nylon standoff under the left edge of the Ethernet board and fasten the standoff with the screw from underneath the option-mounting bracket.
7. Position the Ethernet Interface Module so that the LED's and RJ45 jack face the same edge as the notch. Install the Ethernet Interface Module on the (3) spacers and (1) standoff. Place the nylon hex nut on the screw post of the nylon standoff and tighten the hex nut. Refer to Figure 10 for illustration.



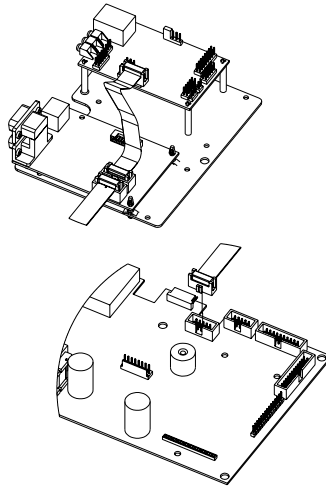
**Figure 9: Ethernet Option Installation**

	Be sure to install the SBM modules first on the option-mounting plate.
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8. Make sure to cut out the rear label to match the installed options. For the Ethernet Interface Module cut out the dotted line label Ethernet.
9. Install the option-mounting bracket in the Model 675 enclosure with the (2) 38-31-8710 self-tapping screws included with the option mounting bracket kit.

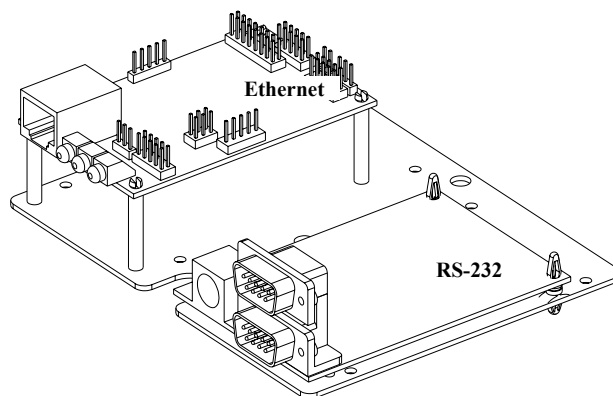


10. If the Ethernet Module and RS-232/PS2 option are both installed, connect the 9" ribbon cable from J5 of the Ethernet Module to J4 of the RS-232/PS2 Module. Then connect the 9" ribbon cable which came with the RS-232/PS2 Module from J2 of the RS-232/PS2 Module to J18 of the main board. Refer to Figure 16 for illustration.
11. If the Ethernet Module is the only communication option being installed, connect the 9" ribbon cable from J5 of the Ethernet Module to J18 of the main board.
12. Make sure to remove the jumper from JP3 if it is installed.
13. Mount the copper EMI clip to the back panel so that it will make good contact with the metal case of the RJ45 connector
14. Reinstall the enclosure bottom plate.



**Figure 10: Connecting the Ethernet Option to the Main Board**

	<p>Do not connect the Ethernet Module or RS-232 Module cables to the J4 BDM connector on the main board. This connection will cause damage to the main board making the Model 675 inoperable.</p>
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**Figure 11: Ethernet and RS-232 Options**

# Network Connections

The Ethernet module kit does **not** come with an RJ45 cable. Ethernet cables should be point-to-point and should **not** be spliced. If you want to connect the Ethernet module directly to your computer you must use a cross-wired (null) Ethernet cable or connect through a hub, router, or switch first. On 60 series units you must install your Ethernet cable through one of the indicator's strain relief's and crimp on an RJ45 connector (refer your computer support personnel or computer supply store). Plug the RJ45 connector into J7 of the Ethernet module.

Record the Mac Address for later use in configuring the IP address. This is the number located on the white label on U2 and is of the form ##-##-## ##-##-##

## SETUP

### *REFLASH YOUR INDICATOR*

The web server portion of the Ethernet option works best with the latest firmware (Code Level 332 November 25, 2002 or later). Those interested in checking status of the Ethernet of checking Tcp/Ip status directly from the Indicator's Parameter 95 will need Code Level 523, April 7, 2005 or later). When loading new firmware don't forget to save your indicator setup prior to updating.

### *SERIAL PORT*

The Indicator's serial port connected to the Ethernet option need to be 19,200 baud/ 8 data bits/ 1 stop bits and Xon flow control. Note that if you intend to send binary information, you will need to turn off Xon flow control, restrict the amount of data sent at a given time and provide a method to ensure all data is sent and received. If your 60 series indicator has an earlier version of firmware (before November 25, 2002) you must also set parameter P290 (Echo) to echo out the comm port that the Ethernet Option is connected to. For 300 series indicators with firmware dates of greater than 2005 you must turn on echo at P290 and set the style of echo at P296 to 60 series.

### *SETUP OF THE IP ADDRESS*

*You will need to download the latest version of GseIpsetup.exe from the GSE Web Site to complete this step: <http://www.gse-inc.com> (this file is located under distributor sign in/downloads/Ethernet)*

If you are part of an existing network consult with your system administrator. If your network does not use DHCP (Dynamic Host Configuration Protocol), then obtain the IP address, IP mask, Gateway Address, and DNS (Domain Name Server) from your system administrator. If you are part of an isolated network then we recommend choosing an address that is not accessible from the Internet:

- 10.0.0.0 to 10.255.255.255
- OR 172.16.0.0 to 172.31.255.255
- OR 192.168.0.0 to 192.168.255.255

The first number in the IP Address must be less than 224. Values of 0, 127, and 255 for the IP address should be avoided as they have special meanings. If you do not know what to use for the IP mask try 255.255.255.0. The GSE Ethernet card will refuse to set the IP Address to known invalid values, however it is recommended to be sure of your values before setting the IP Address as you can easily cause a network conflict by choosing an existing IP Address.

Now that you have your IP Address run GSE IP Setup. See *Figure 12*. You should see your Ethernet card with the MAC Address (##-##-## ##-##-##) you recorded as part of the installation process. If after pressing Search Again and you cannot find the Ethernet card, then check the following.

1. The Ethernet card has at least 2 green LEDs on. One LED only indicates that Ethernet card has power. Two indicate that the connection speed is 10 M Baud. Three indicate three M Baud. If this is not the case then you have a bad network cable or network problems.
2. Both the computer you are running GseIPSetup on and the Ethernet card are on the same side of a router.
3. Your computer has an IP address. (See Windows® Control Panel, Network Settings, TCP/IP properties).
4. Your firewall software/hardware is blocking Network access. Try turning off your firewall. If you have a software firewall this may have to be done at the Windows® Control Panel or at the System Tray depending on you Software vendor. If you have hardware firewall then you will need to know it's IP address and password. Please see your hardware vendor's literature.

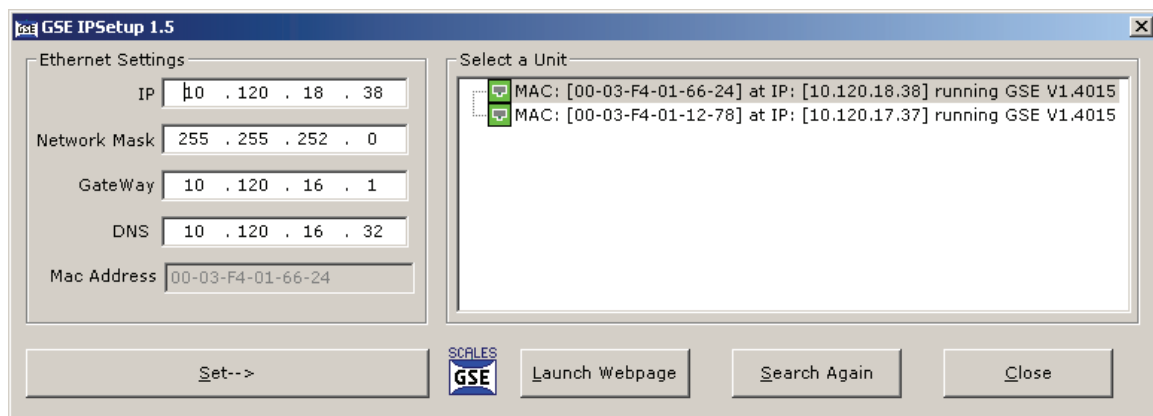


Figure 12: GSE IP Setup

*If IPSetup successfully finds your Ethernet option then choose one of the 3 choices below that best fits your situation.*

**A. If you are part of an existing network and have DHCP: (Ask your system Administrator)**

From a computer connected to the same network as the GSE Indicator (with a properly installed Ethernet Option), run the program GseIPSetup.exe. Note that GSE IP Setup uses a UDP broadcast protocol and will not operate through a router.

1. Select the device from the device list (It should have Mac ID that you recorded as part of the installation process). If no devices are found press the find button.
2. Record the IP address and IP mask for future reference.



3. If your response is MAC:[ #-#-#-#-#] ID:0.0.0.0 DHCP: 0.0.0.1 then GSE IP Setup was not able to communication with your DHCP server. Proceed to step B below to set the IP address.

### **B. If you do not have DHCP: (Ask your system administrator)**

From a computer connected to the same network as the GSE Indicator (with a properly installed Ethernet Option), run the program IPSetup.exe. Note GSE IP Setup uses a UDP broadcast protocol and will not operate through a router. When GSE IP Setup is executed, it will identify all GSE Indicator's (with Ethernet Option) connected to a LAN. If a device has not been initialized and its IP Address is 0.0.0.0, it can be identified by its 48-bit Ethernet address (Mac ID).

To configure a particular device:

1. Select the device from the device list (It should have Mac ID that you recorded as part of the installation process).
2. Enter the IP Address and IP Mask in their respective text boxes
3. Enter IP Gateway (IP address used to connect to other networks - leave blank if unknown).
4. If you have a Domain Name Server then enter it.
5. Select the "Set" button to program the new values in the selected device.

### **C. Using a crossover cable: (PC directly connected to Ethernet Option card)**

When using a crossover cable, you must make sure that you your computer itself has a network address and mask. This is normally found in the Windows® Control Panel, Network settings. Click on the properties of TCP/IP and make sure Specify an IP address is checked and the IP address and Mask are filled in. Then follow steps in method B above, remembering that the address you set for the Ethernet card must be on the same net. (If you are in doubt what this means, use an IP of 10.10.10.2 and Mask of 255.255.255.0 for your computer and IP of 10.10.10.3 and Mask of 255.255.255.0 for the Ethernet option).

## **ACCESSING THE GSE WEB SERVER**

### NOTES:

*If your are working on a corporate LAN that uses a proxy server for Internet web browsing, you will need to exclude the IP address of the Ethernet Option in your web browser's proxy servers settings/preferences. Otherwise, an attempt to connect to a web page on the LAN will fail because the proxy server will attempt to route the request outside the LAN. For most web browsers, this can be accomplished in the advanced settings for the proxy server configuration.*

*The Ethernet Option can conflict with any power up macro. This can be avoided by setting the power up macro activation delay (P5110) to 6 seconds.*

## STARTING THE WEB SERVER

From GSE IP Setup you can highlight your Ethernet card and then click on the Launch Webpage button. If the computer you are at does not have GSE IP Setup, then open your Web Browser and enter the IP address of the module in the Internet Address window (for example instead of typing www.website.com you type 10.120.18.38).

If you wish to be able to type a name instead of a number into your Web Browser:

1. If the IP address is an Internet address: Then one must register the name with an Internet Registrar.
2. If it is on a local Intranet: Register the name with the DNS server (this will require talking to the IT department)
3. If it is on a local Intranet and if you only need the name to be accessible from a few machines then on each machine you want to use the name on: Go to YourWindowsDrive:\WINDOWS\system32\drivers\etc and edit the file called hosts and add the line (use a text editor such as notepad)  
###.###.###.### DesiredName

After you successfully complete the above step your Web Browser should find the Ethernet module's home page. See *Figure 13*.

If you cannot get to the Ethernet Options Web Server, most problems are due to either a firewall stopping the process or you are using a cross over cable and have forgotten to set your computer's IP Address and mask so that the Ethernet Option and your computer are on the same network. For this case the IP Address first two numbers should be the same and the mask must be the same. Also avoid using 0,127 or 255 as they often have special meanings to networks.

### HOME PAGE

The Home Page (and on every GSE Web Server Page) has five buttons that allow access to five pages: **Home**, **Configure**, **Remote**, **FTP**, and **Email**. If the scale is setup for the correct baud rate and wired correctly you should see the Firmware Version of the Ethernet Card, Product Serial Number of the scale, Scale Application Version, and the Scale Application date. If there is a problem with the connection between the Scale and the Ethernet option the Product Number should show "No connection between Ethernet Option & Scale". In the case of Modbus TCP/IP setup this box will show "Using Modbus TCP/IP: Serial Connection Verified" or "Scale not setup for Modbus TCP/IP: See P65002".

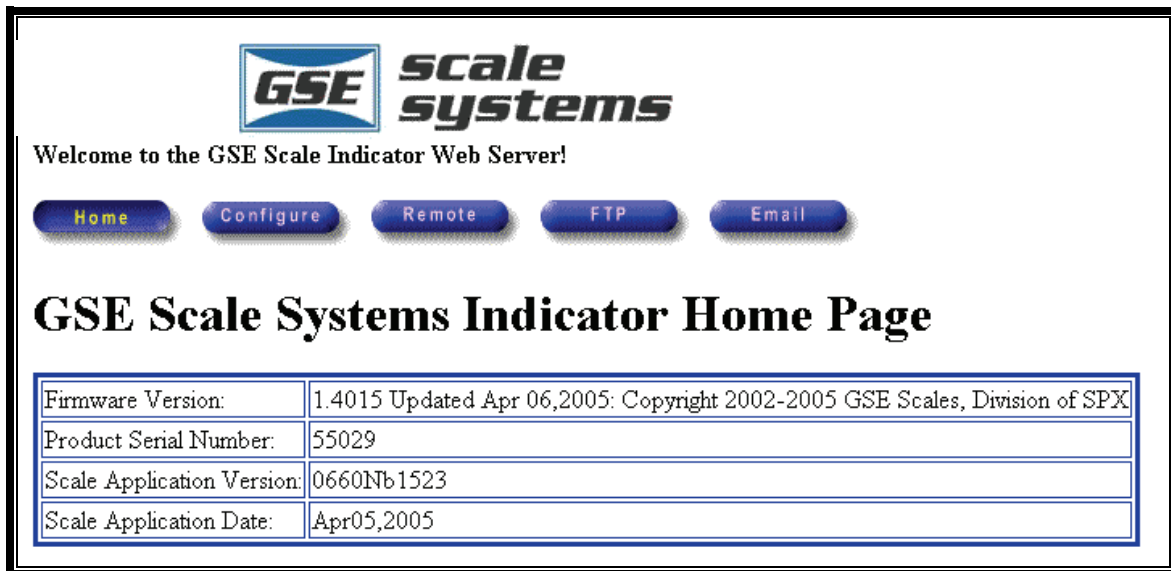


Figure 13 GSE Web Server Home Page

### CONFIGURE PAGE

To go to the Configure Web Page click the Configure button (See *Figure 14*). This is where you will find the real flexibility of the GSE Ethernet option. Before any settings are changed make sure the jumper is installed on connector J4 (See *Figure 7*) on the Ethernet Option. This jumper is used to restrict the features, which can be modified on the configure page and what protocols can be used.

If any items are grayed out or entirely missing from the Configure Page (assuming Firmware Version 1.4015 or later) then the jumper on connector J4 has been removed and/or items in the Jumper Lockout Section of the Configure Page activated. With the jumper installed simply uncheck all items in this page and press the Submit button.

When talking about the Internet the terms Server and Client are terms that you need to know. A Server is a device that listens for a connection. A Client is a device that establishes a connection.

If you plan to use the scale as a Server, i.e. you wish it to accept connections from other devices then set the *Server Listen Port*. Normally the port number is set to 23 for Telnet (terminal emulation protocol for TCP/IP). Any port other than 21, 80, 502 can be used but it is best to avoid the Well Known Port numbers 0 through 1023. For a list of port number see [www.iana.org/assignments/port-numbers](http://www.iana.org/assignments/port-numbers). Normally the Server Listen Address is left at zero, which allows any device to connect to the Ethernet card. However if for security reasons you want to reduce the possibility of others from accessing the GSE Ethernet adapter set the *Server Listen Address* to the IP address of the device (called the Client) you wish to allow to connect. The *Time to Wait Before Timeout Client* is the value in tens of seconds to allow a your external connection to sit idle before disconnecting. A value of The *Time To Make New Client Wait* is the time the connection must be idle before a new user is allowed to connect. To be useful this value must be less than the *Time to Wait Before Timeout Client* value. Otherwise a connection will be dropped before another is allowed.

If you want the Ethernet Option to be the Client (i.e. establish the connection) then you should set the *Client Connection Port* to valid port number. Normally the port number is set to 23 for Telnet. Any port other than 21, 80, or 502 can be used but it is best to avoid



the Well Known Port numbers 0 through 1023. Any port other than 21, 80, or 502 can be used but it is best to avoid the Well Known Port numbers 0 through 1023. For a list of port numbers see [www.iana.org/assignments/port-numbers](http://www.iana.org/assignments/port-numbers). To be a client the client needs to know the IP Address of the device you want the Ethernet Option to connect to. Enter this value in the Client Connection Address. If text is entered instead of an IP address the Ethernet card will use DNS to obtain the IP Address. In this case you should verify that you have a valid name and DNS Address set in the Ethernet card by starting a Windows® DOS box and typing "ping *device\_name*" (This can also be used to obtain the IP Address of a device). The *Disconnect If Inactive For Time* is the value in tens of seconds before the Client drops a connection. A 0 value means to never disconnect. This does not mean the Server (the device to which you are trying to connect) can't close its end! The *Time To Wait Before Reconnecting* is the time to wait after a connection is dropped before making an attempt to reestablish it. A value of zero means to never reconnect. This would mean the Indicator will only connect to a network when it is first powered up. The *Time To Wait Before Reconnecting* is in tens of seconds and can be used to cause a reconnect to a device at a periodic interval to update process information. The maximum value is 65,535, which allows updates to occur up to once a week.



Configure your Scale's TCP/IP:



## GSE Scale Systems Configuration Utility

Firmware Version: 1.4015 Updated Apr 06,2005: Copyright 2002-2005 GSE Scales, Division of SPX

### Network Settings

#### Server Settings (When listening for a connection)

Server Listen Port  (0 = don't allow outside connections, 23 = normal Telnet, 502 = Modbus TCP/IP server)  
Server Listen Address  (0 = allow any IP address)  
Time To Wait Before Timeout Client  x 10 Seconds (0 = Never Timeout)  
Time To Make New Client Wait  x 10 Seconds (Must be less than Time To Wait Before Timeout to have effect)  
(Allows another connection anytime the current connection has been idle for Time To Make New Client Wait)

#### Client Settings (When initiating a connection)

Client Connection Port  (0 = don't self connect, 23 = normal Telnet, 502 Modbus TCP/IP Slave Only)  
Client Connection Address  (0 = don't connect, Text -> use DNS)  
Disconnect If Inactive For Time  x 10 Seconds (0 = Never Disconnect)  
Time To Wait Before Reconnecting  x 10 Seconds (0 = Don't Reconnect)

#### Connect/Disconnect Text

Connection Text   
Connection Text Termination Character  (Can't Use Xon/Xoff with Software Flow Control)  
Disconnect Text   
Disconnect Text Termination Character  (Can't Use Xon/Xoff with Software Flow Control)

### Serial Port Settings

Data Baud Rate   
Data Flow Control

### Remote Page Settings

Remote Page Update Rate  x 0.1 seconds  
Restrict Browser to IP address  (0 = allow any IP address)

### Jumper Lockout

#### Prevent Changes to Following Checked Items:

(Note: Install Jumper, then make selections, then remove Jumper)

- Lock Network (Telnet) Settings
- Lock Serial Port Settings
- Lock Remote Page Settings
- Prevent Control from Remote Page
- Prevent Display from Remote Page
- Prevent Telnet
- Prevent Updates
- Turn Off Macro Echo (with -E%) After Startup (60 series only)
- Don't Send Serial Messages On CONNECT/DROPPED
- Send Ethernet Status to Parameter 95 (for 60 series only)
- Buffer Modbus TCP/IP Transactions (for 60 series only)
- Stop processing STX, ..., ETX during Telnet

Figure 14: GSE Web Server Configure Page (without lockouts activated)

There is another method for the scale to be a client by sending a special code sequence out the serial port to which the Ethernet card is connected. For more information on this method see the Appendix II - Telnet Client.

The Connect/Disconnect Text section is the text to send to the scale when connecting (either Server or Client) and dropping a connection. *Connection Text* and *Connection Text Termination Character* will be sent to scale when a connection is established. If you want to see the message on the scales 2x5 entry buffer remove the termination character, but be aware that all message will be appended to the entry buffer until you press clear it. Also remember that it is not possible to send the control codes for Xon or Xoff characters when using software flow control. *Disconnect Text* and *Disconnect Text Termination Character* function in an identical way except that they are only sent when a connection is dropped.

The Serial Port Settings setup the baud rate at flow control that the Ethernet Option uses to talk to the scale. Normally *Data Baud Rate* should be 19200 and *Data Flow Control* for Xon/Xoff. When the *Server Listen Port* is set to 502 the flow control will automatically changed to none for ModBus TCP/IP.

The Remote Page Settings control the remote page. *Remote Page Update Rate* is the rate in tenths of a second to update the Scale Display on the remote page. The lower the value the more network traffic you will generate, but the more responsive the remote page. The *Restrict Browser to IP address* is normally set to 0. If it is set to any other value then the GSE Web Server will only allow the keypad on the remote keypad to function from if it comes from that IP address. Any user that tries to use the remote page keypad will see the keypad change to:

\*\*\* Browser Keypad usage has been disabled \*\*\*

(See Ethernet Option User's Manual section on ACCESSING THE GSE WEB SERVER to enable this feature)

The Jumper Lockout are used to disable restrict or modify the behavior of the Ethernet Option. With the jumper off connector J4 (See *Figure 7*), the settings in this section cannot be changed. In addition locked restricted IP Address values will not be shown. To lock settings you must submit the changes before removing the jumper. To unlock the settings you must install the jumper first before you will be able to submit settings.

The *Lock Network (Telnet) Settings* prevents any changes to the Network Settings section of the Configure Page. The *Lock Serial Port Settings* prevents any changes to the Serial Settings section of the Configure Page. The *Lock Remote Page Settings* prevents any changes to the Remote Page Settings section of the Configure Page.

The *Prevent Control from Remote Page* will prevent anyone from using the Ethernet Option's Web Server's Remote Page to control the Indicator. The *Prevent Display from Remote Page* will prevent anyone from viewing the Indicators display's from the Ethernet Option's Web Server's Remote Page. In this case the user will see " Scale Viewing has been Disabled" instead of a copy of the Indicator's display. Note that this only applies to the display. Unless the *Prevent Control from Remote Page* box is also checked it will still be possible to control the Indicator.

The *Prevent Telnet* prevents all forms of Telnet. With this setting enabled the Indicator cannot be a Server or Client (both power on and Indicator initiated). The *Prevent Updates* prevents GSE Auto Update from updating the firmware in the Ethernet Option board.

The *Turn Off Macro Echo (with -E%!) After Startup (60 series only)* is a feature for advanced users of 60 series products. The Ethernet Option board turns on scale echo using a macro command (E#%! where # is the serial port number) to find out what type of Indicator it is talking to and to make allow the remote page to function. Users of power up macros will need to add a delay to avoid conflicted with this activity at power up. When one checks this option, the Ethernet Option card will automatically turn off the echo by issuing an -E%! macro. However doing so will prevent the Ethernet Option's Web Server's Remote Page from displaying what is on the Indicator. The Indicator's Display on the Web Server's Remote Page will most likely show "P60202 I SN: #####". *Previous versions of the Ethernet Option Firmware (before 1.4016) required you to send an E%! macro as the first action after a TELNET connection was made to stop the echo from the Indicator. This version will automatically grab these echoes from the data stream and not pass it on to the TELNET connection, unless the "Stop processing STX,...,ETX during Telnet" feature discussed later in this section is enabled.*

The *Don't Send Serial Messages On CONNECT/DROPPED* feature is for users that don't want any message sent to the Indicator when a TELNET connection is made or dropped. Note that the default messages have a Carriage Return for the end character. The Indicator interprets this character as meaning the data in the entry buffer is just comments and should be discarded. Therefore if any entry is in progress when these messages come in the entry will be lost.

The *Send Ethernet Status to Parameter 95 (for 60 series only)* feature allows one to track the status of Ethernet Options connections at any 60 series instrument with firmware greater than 523. Checking this check box will provide the scale with information such as connection speed, FTP status, Telnet status, TCP/IP status, Pages served and the Number of Users accessing the Web Server's Remote Page controls. See the section *Parameter 95 - TCP/IP Status* for how to read this parameter. Advanced users should note that this feature works by sending the scale the following three macros %[95.OP=value%o%]LF, where LF is a line feed. The Indicator is told to save and restore any entry in process, but it is possible that a keystroke could be lost. The line feed is added for those users who wish to process the status with an input interpreter. Also note that the value received is in decimal and the result is displayed in hex at Parameter 95. Also note that you cannot use input interpreters if running ModBus TCP/IP.

The *Buffer ModBus TCP/IP Transactions (for 60 series only)* is a feature for users doing ModBus TCP/IP. The GSE ModBus TCP/IP is capable of buffering up to 16 ModBus TCP/IP commands. However, a lot of ModBus TCP/IP Masters cannot handle getting an echo for a command out of sequence (ie they can only send one Modbus TCP/IP command at a time). As a result this feature is off by default. Checking the check box will turn this feature on. Verify ModBus TCP/IP works with this feature off before enabling it.

The *Stop processing STX,...,ETX during Telnet* is an advance feature primarily for those users who wish to send binary information during a TELNET session. If this feature is enabled the Ethernet Option's Web Server's Remote Page will show "Telnet Session with STX,ETX not allowed in progress" in place of a copy of the Indicator's Display. To be able to send binary information Software flow control will have to be turned off at the Indicator and on Serial Settings of this Configure Web Page. With no flow control it is the user's responsibility to ensure they do not overrun the Indicator's serial port buffers (On a 60 series see Parameters 207, "Tx Buffer", and 208, "Rx Buffer").



## REMOTE PAGE

The **Remote** Web Page is where you can view and interact with the indicator. *If you want your browser to be able to display all the GSE special characters download GSE2000.ttf and GSE7000.ttf from the GSE website <http://www.gse-inc.com> (these files are located under distributor sign in/downloads/Ethernet) and then copy the files to your Windows\Fonts subdirectory.*

The **Remote** Page keypad usage and display may be enabled or disabled by the Jumper Lockout settings on the Remote Page. See Configure Page section for more details. *Figure 15* shows how the Remote Web Page for a 60 series product.

The screenshot displays the GSE Scale Systems Remote Web Page. At the top, the GSE logo is followed by the text "scale systems". Below this, a navigation bar contains buttons for "Home", "Configure", "Remote", "FTP", and "Email". A message states: "Setup your Scale from anywhere on your network. The remote display works best if you have GSE fonts loaded. [Distributor Sign In](#)".

The main interface is divided into several sections:

- Indicator Display:** Shows "2000A" in large green digits and "TCP/IP Stat" in smaller green text. Below the display, it says "Keypad in use by User #175640801".
- Keypad:** A grid of buttons including "ZERO", "SELECT", "ID", "F1", "F2", "←", "↑", "→", "UNITS", "TARE", "F3", "F4", "F5", "↓", "SCALE SELECT", "PRINT", "ENTER yes", "CLEAR no", "60 Series", and a numeric keypad (0-9). A red "SUBMIT" button is located at the bottom right of the keypad.
- Scale Transmit Windows:** Three vertically stacked windows on the right side:
  - Scale Transmit Window One [STX,1,Text,ETX]:** Contains the text "None" and a note: "Note: you must use your browser's refresh button to update this window".
  - Scale Transmit Window Two [STX,2,Text,ETX]:** Contains the text "None" and the same note.
  - Scale Transmit Window Three [All other output]:** Contains the text "None" and the same note. A "Clear Output Window" button is located at the bottom of this window.

Figure 15: 60 Series GSE Web Server Remote Page (looking at Indicators Parameter 95)

*Figure 16* shows how the Remote Page looks on a 300 series product. Note that unless the Ethernet to Serial Port connection is functioning the keypad will default to 600 series.

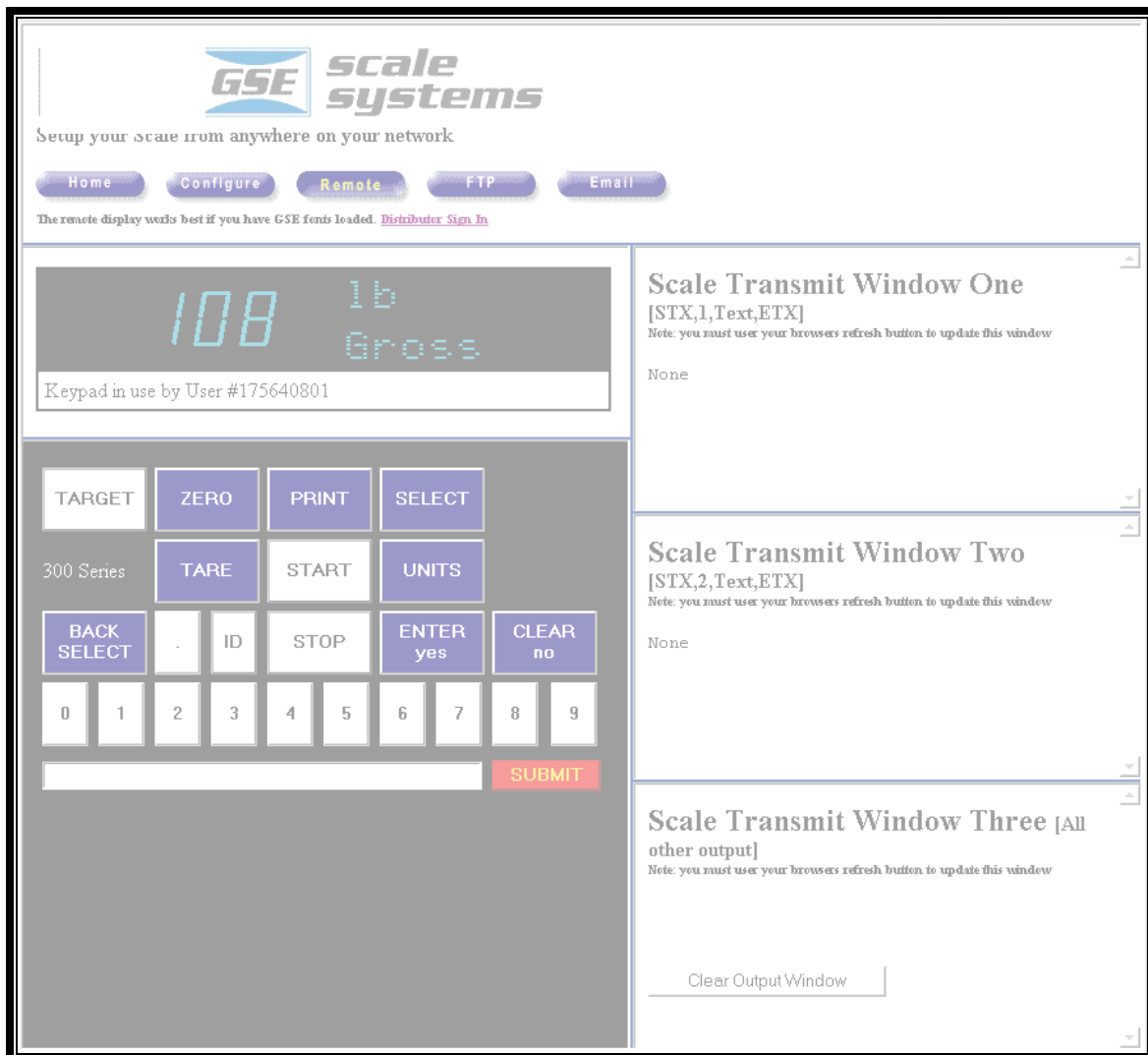


Figure 16: 300 Series GSE Web Server Remote Page (looking at Gross Weight)

#### USING THE KEYPAD

To use the keypad:

One can also use the Input Box next to the Submit key to enter the desired text to send to the indicator.

- Click on the appropriate buttons
- Use the entry box next to the Submit key
  - ✓ Press the Submit key to send this text to the indicator.
  - ✓ Press the Enter key instead of the Submit key if you wish to append the Enter key to the end of the Input Box.
  - ✓ Press the Select key to send an entered numeric value to the Select key.
- Arrow Keys work for any product but it is important to realize that pressing an arrow key where not appropriate will have side effects dependent on the product. Specifically the side effects are:

- ✓ The Up Arrow key will act the same as the F1 key on all products (460, 560, 660 series).
- ✓ The Down Arrow key will act the same as the Target Key on the 460 series products, the F2 Key on the 560 series products and the F4 Key on the 660 series products.
- ✓ The Left Arrow key will act the same as the Units key on the 460 & 560 series products and the F3 key on the 660 series products.
- ✓ The Right Arrow key will act the same as the Tare key on the 460 & 560 series products and the F5 key on the 660 series products.

#### DISPLAYING A CUSTOM TRANSMIT IN THE SCALE TRANSMIT ONE WINDOW

Create a custom transmit that starts with STX, '1' (ASCII character 1), and end it with ETX character {[STX(=02h)][1(=31h)]*YourText*[ETX(=03h)]}. This transmit window is limited to 256 characters. If more than 256 characters are received, the extra characters will spill into the Scale Transmit Three Window. Note that custom transmit data will not appear until you hit your browser's refresh button. Also note that each new transmit replaces the last.

#### DISPLAYING A CUSTOM TRANSMIT IN THE SCALE TRANSMIT TWO WINDOW

Create a custom transmit that starts with STX, '2' (ASCII character 2) and end it with ETX character {[STX(=02h)][2(=32h)]*YourText*[ETX(=03h)]}. This transmit window is limited to 256 characters. If more than 256 characters are received, the extra characters will spill into the Scale Transmit Two. Note that custom transmit data will not appear until you hit your browser's refresh button. Also note that each new transmit replaces the last.

#### DISPLAYING A CUSTOM TRANSMIT IN THE SCALE TRANSMIT THREE WINDOW

Any data (such as output from 64100, database downloads) from the scale appears in this window. This includes any transmits that do not meet the requirements for Scale Transmit Windows One & Two. It is limited to 80,000 characters. Note that download data will not appear until you hit your browser's refresh button. This window is cumulative. This means that if you have a custom transmit that is not of the form required for Scale Transmit Windows One & Two each transmit will be added to the previous. Pressing the Clear Output Window button can clear this window.

#### TURNING OFF THE CLICKING SOUND

The clicking sound caused by refreshing the scale's display on the Remote Page can be turned off by:

- ✓ Go to the Windows® Control Panel: (Start, Settings, Control Panel) and find the sounds (or multimedia) applet. Then locate the Sounds tab, then find the Windows Explorer group and set the sound for Start Navigation to None.

#### OTHER USERS

Once anyone on the network uses the keypad on the remote page you will see a number appear under the display box indicating that someone has accessed the scale within the last 2 minutes. A maximum of 5 users can be indicated. However remember that if more than one person tries to send information to the scale at the same time the information can be merged together with unpredictable results. An operator at the scale indicator itself will not show up as a user but you can observe the results of his actions. Finally if all multiple users are connected thru a proxy server then they will appear as one user. This can be remedied by following the procedure in Appendix I - Notes on Proxy Servers.

## FTP PAGE

See *Figure 17* for an illustration of the current FTP Web Page. See Appendix III for how to use the FTP Client.

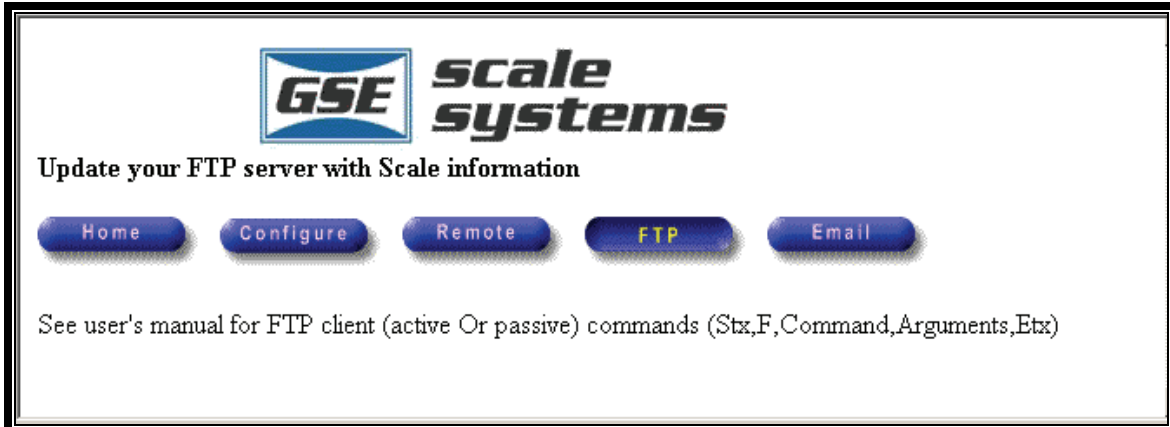


Figure 17: GSE Web Server FTP Page

## EMAIL PAGE

See *Figure 18* for an illustration of the current Email Web Page. This page contains a link for contacting GSE with any desired features you would like to see added to the Ethernet Option.



Figure 18: GSE Web Server Email Page

## Parameter 95 - TCP/IP Status (60 series products only)

This parameter is accessed from the Weigh Mode. Press 95 [SELECT] (60 series products only). The sending of P95 information must be enabled on the Configure Page of the Ethernet Option's Web Server. It allows viewing of network status information without opening the enclosure to see the Option Board Status LEDs or putting the scale into Setup. Information is only sent on change of state and never during a TELNET session. Pressing [CLR] – the display will change to 00000 and "none" for Stat". The Ethernet Option only updates this parameter when a change in status occurs and never during a TELNET or ModBus TCP/IP session.



TABLE 1. DEFINES THE MEANING OF EACH DIGIT DISPLAYED AT PARAMETER 95 "TCPLP STAT".

Scale Parameter 95 (95 Select from the weigh mode)				
Connection Speed				
0000 0	Tcplp	LEDs		
	Stat	1	2	3 (nearest connector)
0=No Connection		off	off	on
1= 10 M baud Connection		off	on	on
A = 100 M baud connection		on	on	on

Telnet Status		ModBus TCP/IP		FTP Status	
000 0 0	Tcplp	00 0 00	Tcplp	0 0 000	Tcplp
	Stat		Stat		Stat
0 = no Telnet connection		0=No Connection		0=No Connection	
1=Telnet Server		1=ModBus TCP/IP		1=Command Channel Open	
2=Telnet Client (Auto Connect)				2=Receiving Stream Data	
3=Telnet Client (Scale Initiated)				3=Sending Stream Data	

Http Status (within last two minutes)	
0 0000	Tcplp
	Stat
0= No pages served.	
1 = At least one page served	
2 = One User Accessing	
3 = Two Users Accessing	
4 = Three Users Accessing	
5 = Four Users Accessing	
6 = Five Users Accessing	

## GSE AUTO UPDATE

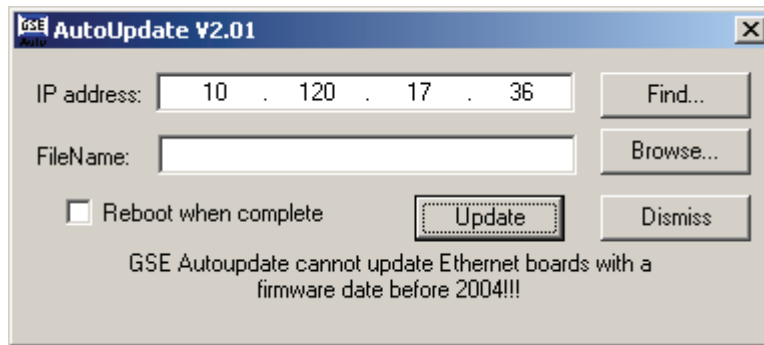
10/5/2005 9:28:00 AM

You will need to download the latest version of GseAutoUpdate.exe from the GSE Web Site to complete this step: <http://www.gse-inc.com> (this file is located under distributor sign in/downloads/Ethernet)

The GSE Auto Update utility will allow you to update your Ethernet Option using any PC with a network connection. It can find all GSE Ethernet Options on the same side of a router or bridge as the PC. It is possible to update any GSE Ethernet Option if you know it's IP address and your firewall/routers allow it. This utility will only work with cards with a firmware date of 2004 or later.

## Installation:

Go to the GSE Web Site and just copy the file onto your computer and double click to run.



## Operation:

Clicking the Find button will locate all GSE Ethernet option cards on the same side of the router as the PC running this software. Select the GSE Ethernet Option you are interested in updating if it is not already selected. If the Ethernet Option is located on the other side of a router you must know its IP address. Enter the File Name of the firmware update or use Browse to locate it. Check the "Reboot When Complete" checkbox to enable the update to start running as soon as the update is installed (Otherwise the update will not start running until you cycle power on your Indicator). Press the Update button to complete the process.

# TELNET

## DHCP NAME

Each card has a name GSE\_ETHERNET\_CARD\_XXXX where XXXX are the last 4 hex digits of the Ethernet MAC Address.

## TELNET SERVER/CLIENT SETTINGS

The Ethernet Option can act as both a Telnet Server and a Client at the same time. However, only one TELNET Connection can be present at a time. It is possible to have both an FTP client and TELNET session operating simultaneously. However, the user must take care that data from each session is not merged at the scale

The TELNET settings are discussed in the section on the Ethernet Option's Web Server's Configure Page. See the discussion in the Web Server's Configure Page for more details.

A TELNET session may also be initiated by the Indicator using macros and custom transmits. There are only two commands: one to signon and one to signoff. Both commands provide the Indicator status information by sending the Indicator the following macros:

```
%[80.###P=value%o%]LF
```

where ### is the variable specified in the TELNET Client command, *value* is the status and LF is a Line Feed character. The LF is provided in case a user might wish to use an input interpreter, but this is not expected to be the normal approach. Note that the response code is designed to save and restore any entry in progress. Also note that the user has the option of not receiving these macros at all and instead using the connect &

disconnect text as setup up on the Ethernet Option's Web Server's Configure Page (Connect/Disconnect Text section). For additional flexibility these responses as well may be turned off.

*Appendix II* provides the exact details of the TELNET CLIENT commands and responses

### USING TELNET

TELNET connections normally use port 23. Many networks will not allow the use of other port numbers for security reasons. GSE offers Communications Plus software that can open an close TELNET sessions and is designed to work with GSE Indicators.

**Note:** If you are writing your own Telnet software, the scale is set to echo any change in display via TELNET connection once it is established. You will not see this echo unless the *Stop processing STX,...,ETX during Telnet* is checked AND *Turn Off Macro Echo (with -E%!) After Startup (60 series only)* is not checked.

Description	Action	Comment
Get current display value	%X	If you turn off echo you will want to issue this command to find out what currently is on the scales display.
Turn off the echo	P290	Set to off
Will turn echo <b>on</b> after a connection is established	E#%!	The # is the comm port number of which the Ethernet Module is connected. NOTE: This command is issued automatically by the Ethernet Module every time the power is cycled and will only work with code level 332 November 25, 2002 or later.
Will turn echo <b>off</b> after a connection is established	-E#%!	The # is the comm port number of which the Ethernet Module is connected. NOTE: This command will only work with code level 332 November 25, 2002 or later.

Note: the baud rate should be 19200 and the flow control set for Software Xon.

## FTP CLIENT

The Ethernet Option is capable of being an FTP Client. It supports both active and passive modes. The Indicator needs to use macros and custom transmits to talk to an FTP Server..

It is recommend that one first tries connecting to the FTP Server of interest using Personal Computer. Windows® has a program called FTP (.exe) normally located in the \\Windows\system32 directory. Run this program and type ? or help for a list of commands. After connecting to the FTP Server of interest, issue a remtchelp command to see the command syntax of the server. These are the commands one must issue with macros and custom transmits from the Indicator to connect to the FTP Server. The Ethernet Options FTP Client commands are not hard coded and allow you to send the FTP Server any command.

The FTP Client commands can be divided into for categories:

- 1) Connecting.
  - a) Signon
  - b) Active mode
  - c) Passive mode
- 2) Commands with no data
- 3) Commands with data.
  - a) Command to start data transfer
  - b) Command to end data transfer
- 4) Disconnect
  - a) Signoff.

The Indicator must issue commands and verify they have completed before issuing the next. The Ethernet option provides this mechanism by sending data to the Indicator with the following macros:

```
%[80.###P=value%o%]LF
```

where *###* is the variable specified in the FTP Client command, *value* is the response from the FTP Server (possible codes are shown in the *Appendix III*, but the exact text can vary from one server to the next) and **LF** is a Line Feed character. The **LF** is provided for in case a user might wish to use an input interpreter, but this is not expected to be the normal approach. Also note that the response code is designed to save and restore any entry in progress.

*Appendix III* serves as a reference for the exact syntax of these commands and the expected responses.

## MODBUS TCP/IP

The Ethernet Option is capable of being a ModBus TCP/IP slave (Server). See *Appendix IV* for more information.

Note that ModBus TCP/IP is ModBus RTU with a header and no CRC (Cyclic Redundancy Check). A Master sends a ModBus RTU command with a header that consists of two bytes for a transaction identifier (normally this just act like a counter), three bytes of zero, and a byte for how many bytes follow. The master does not send a CRC. The slave responds with the same header prepended to the Normal ModBus RTU response without the CRC.

## TROUBLESHOOTING

If GSE IP Setup cannot locate the MAC address then check your Ethernet cables and connections. Verify that the green lights on the Ethernet Option are on:

- LED1 is the Ethernet Speed (on for 100M, off for 10M)
- LED2 indicates a link has been established
- LED3 indicates that the Ethernet Option has power.

If you still cannot see the MAC address of the Ethernet Card with GSE IP Setup:

- Your computer has an IP address. (See Windowsâ Control Panel, Network Settings, TCP/IP properties.



- Your firewall software/hardware is blocking Network access. Try turning off your firewall. If you have a software firewall this may have to be done at the Windows® Control Panel or at the System Tray depending on you Software vendor. If you have hardware firewall then you will need to know its IP address and password. Please see your hardware vendor's literature.

If you cannot see the Home Web Page from your browser by typing the IP address (#.#.#.#) at the address prompt then repeat the Setup IP address in Setup Section.

Once on the GSE Ethernet Option's Web Server's **Home** page check to see if the Product Serial Number box reads “No Connection Between Scale and Ethernet Module”:

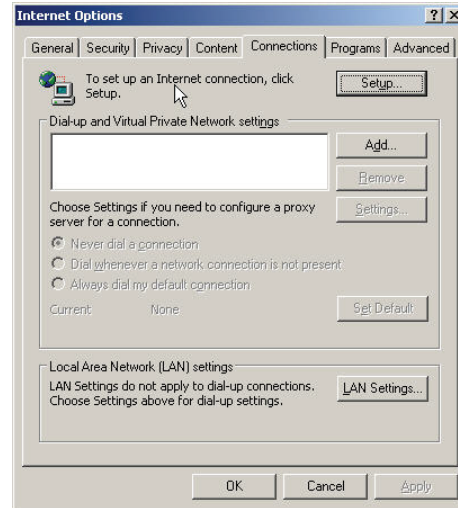
- Check the wiring between the Ethernet Module PCB and the scale
- Make sure you have the latest firmware in your Indicator (Code Level 332 November 25, 2002 or later). For earlier scale firmware P290 must be set to echo out the comm port that the Ethernet option is connected to. (300 series products must have P290 turned on and also have P296 set to 60 style echo).
- The baud rate of the Indicator's comm port and that on the **Configure** page match.
- Both the Indicator's comm port and the **Configure** page are set for Xon.
- If all the above configurations are correct, use a serial port on your computer and a terminal emulator program to monitor the serial port of the indicator to verify that the serial port of the scale is echoing out any changes in weight.

Finally check the GSE Ethernet Option's Web Server's **Remote** Page (assuming it has been allowed on the Configure Page) and verify that you can control the Indicator from the remote page.

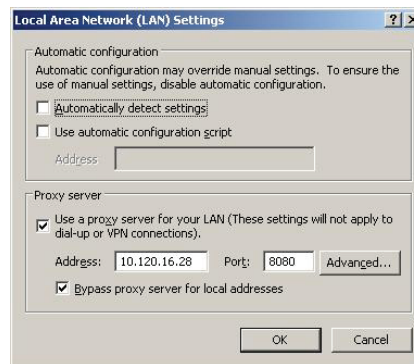
# Appendix I

## Notes on Proxy Servers:

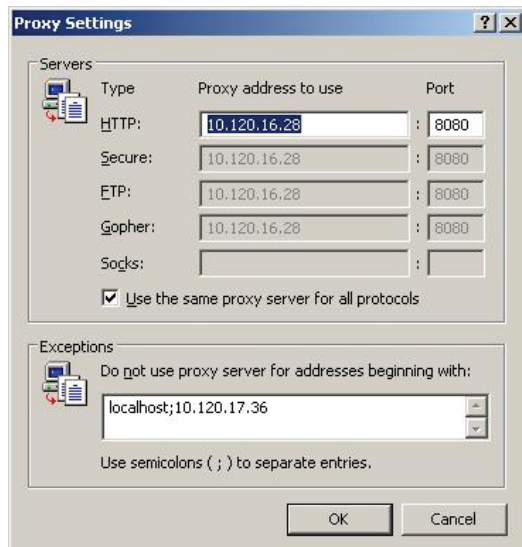
The web page server performance can be poor when connected to a proxy server. The following shows how to exclude the address of the Ethernet card from your proxy server without turning off the proxy server. On Microsoft's Internet Explorer Click the Tools Menu and select Internet Options. Then click the Connection tab. You should see the following menu show on the right.



If you click on the LAN Setting tab you get the following menu:



Then click the Advanced... button. In the box labeled Exceptions you can add your Ethernet address. ( In the example below we added the IP address of 10.120.17.36. Multiple entries are separated by a semicolon. Do not remove localhost if it exists)



# Appendix II

## TELNET Client on a GSE Ethernet Option

10/5/2005 9:28:00 AM

This document explains how to use TELNET on a GSE indicator with a GSE Ethernet Option installed.

### TELNET COMMAND FORMAT

TELNET command format is (commas between characters are for illustration only):

**STX,T,X,[arguments],ETX**

Where X is one of the following:

s Start TELNET Session  
Q Quit TELNET Session

[arguments] See individual commands for details

**NOTE:** The total allowable characters in a command is 256.

**NOTE:** Any use of a \ character must be replaced with \\

### TELNET COMMANDS

TELNET commands are case sensitive. They all begin with an **STX** character (use .002%e to enter this character into the scale) and end with an **ETX** character (use .003%e to enter this character into the scale). Arguments are separated with carriage returns (use .013%e to enter this character into the scale). See **Return Code Formats** section for details on available formats and locations to return any TELNET Server response code. The TimeOutValue is the maximum time in seconds to wait for an TELNET command to complete.

**STX,T,s,[Return Code Format] CR ,[Server IPaddress in X.X.X.X format],CR,[Port], CR,[TimeOutValue],ETX**

Connect to the TELNET server using the *Server IP address* in X.X.X.X format on *Port* with *Return Code Format* and wait a maximum of *TimeOutValue* in seconds. Until this command is issued and a valid session started no other TELNET commands will work (they are simply ignored). The *Server IP address* and *Port* override any settings made on the web server configuration page. *Server IP address* can be a text name if you have specified a DNS server (Domain Name Server) as part of in your IP Setup. The name in this case cannot start with a number. This command will not work if Telnet is turned off on the GSE Web Servers Configure Page or if you attempt to connect to ports 80, or 502.

**Note:** do not to use .###%e sequence to enter a portion of the IP address or it will get interpreted as a control code.

**STX,T,Q,[Return Code Format],ETX**

Close the current TELNET session using *Return Code Format*.

## Return Code Formats

There are three formats for the Server's response code: **S#**, **N#**, or **D**.

# Appendix II

**S#** means to put the TELNET Server's response code in variable 80.# as a string (number and up to the first 63 characters (scale variable limitation) of the human readable message from the TELNET server).

**N#** means to put the TELNET Server' response code number in variable 80.#.

**D** means don't bother with the response code.

**Caution:** specifying an incorrect # for a variable will cause a scale error

## Response Codes

### *Response codes 0 to 99*

Response codes  $\geq 0$  and  $< 99$  are information codes from the Ethernet option board.

**0** TELNET Command Okay

**1** Signed On TELNET Server

**2** Closed TELNET Server

### *Response codes $< 0$*

Response codes  $< 0$  are error codes from the Ethernet option board. PLEASE NOTE that to recover from these errors (-1 through -7) it may be necessary to quit the current TELNET session (STX,T,Q...) and restart it (STX,T,s). These errors could be caused by a previous connection before

**-1** TELNET connect attempt timed out

**-2** Read/Write Attempt with no connection

**-3** Error when closing TELNET connection

(Can also occur when trying to read/write to a closed connection)

**-4** No Such IP address/Port

**-5** Out of buffer space

**-6** TCP connection was reset

**-7** TCP connection was aborted

**-8** TELNET Command format incorrect

(i.e. STX,T,...,ETX contains an error such as an invalid argument )

(Invalid Telnet port, address, name or Telnet locked out can cause this)

**-9** Command had more than 256 characters

**-10** Data Transfer Receive Error

**-11** Data Transfer Send Error

**-12** Data Transfer Not Started

**-13** TELNET session already started

(you must close the current session (STX,T,Q...) before starting another OR session was not started by scale).

**-14** TELNET not allowed

(Telnet has been disabled. See Ethernet Option product configuration for details.)

**-15** Can't close TELNET not started by scale

(The current TELNET connection was started by a STX,T,s,...,ETX command)

**-16** Invalid Port

(Telnet is not allowed to use port 80 = http)

# Appendix III

## FTP Client on a GSE Ethernet Option

10/5/2005 9:28:00 AM

This document explains how to use FTP on a GSE indicator with a GSE Ethernet Option installed. Ethernet Options with firmware versions prior 1.3070 only supports FTP clients using active protocol. After this date both Active and Passive FTP is supported. The default is Active. You **must have the gateway IP address set** on your Ethernet Option or you will not be able to establish a connection to a FTP server.

### *FTP COMMAND FORMAT*

FTP command format is (commas between characters are for illustration only):

**STX,F,X,[arguments],ETX**

Where X is one of the following:

A	Ascii
a	Active mode (default)
b	binary
C	arbitrary FTP command
c	arbitrary FTP command with stream data
E	End of file transmission (Must do to terminate any data being sent to the server)
P	Port
p	Passive mode
S	Store File
s	Start FTP Session
R	Retrieve File
Q	Quit FTP Session

*[arguments]* See individual commands for details

**NOTE:** The total allowable characters in a command is 256.

**NOTE:** Any use of a \ character must be replaced with \\

### *FTP COMMANDS*

Ftp commands are case sensitive. They all begin with an **STX** character (use .002%e to enter this character into the scale) and end with an **ETX** character (use .003%e to enter this character into the scale). Arguments are separated with by carriage returns (use .013%e to enter this character into the scale). See **Return Code Formats** section for details on available formats and locations to return any FTP Server response code. The TimeOutValue is the maximum time in seconds to wait for an FTP command to complete.

**STX,F,s,[Return Code Format] CR ,[Server IPaddress in X.X.X.X format],CR,[Username],CR,[Password], CR,[TimeOutValue],ETX**

Connect to the FTP server using the *Server IP address* in X.X.X.X format with *Username* and *Password*, *Return Code Format* and wait a maximum of *TimeOutValue* in seconds. Until this command is issued and a valid session started no other FTP commands will work (they are simply ignored.)

**Note:** any use of a / character must be replaced with //

# Appendix III

**Note:** do not to use .###%e sequence to enter a portion of the IP address or it will get interpreted as a control code.

## **STX,F,a,[Return Code Format],ETX**

Change to use active FTP protocol (default) using *Return Code Format*.

## **STX,F,c,[Return Code Format] CR,[Send Or Receive Data], CR, [Any Command (ASCII text without any CR characters)],CR,[TimeOutValue],ETX**

Send the command to the FTP server, use *Return Code Format*, and wait a maximum of *TimeOutValue* in seconds. *Any Command (ASCII text without any CR characters)* is the command in the server format (ie log onto your Ftp server from a windows PC using ftp.exe and issue a remtchelp command to see the syntax of the server (Note just typing help gets you the windows FTP client's syntax). Data is then sent or received depending on whether *Send Or Receive Data* is a **S** or **R** respectively. Data is then assumed to be received from or transmitted out the comm port that the Ethernet card is attached to. If data is sent to the server this command must be terminated with a **STX,F,E...** command. You cannot send any data stream containing a STX,# where # is 0, 1,2, F or CTL-A thru CTR-M. This makes binary mode file transfer to an FTP server impractical. There are no restrictions on data being received from the FTP server other than that the scale must be able to interpret the data. Also note that FTP servers in ASCII mode (default) expect lines of data to be terminated with both a Carriage Return and a Line Feed character.

Receiving data from the server should be but does not have to be terminated with a **STX,F,E...** command. If you don't you won't know the FTP server's final response and it would be possible that some error occurred and for you code to therefore become out of sync with the FTP server.

A valid response to this command (for both Send and Receive) is any response code of the form IXX and is normally 150. This code is known a mark command and means that the command is started but not finished (i.e. waiting for data transfer to complete).

**Note:** any use of a / character must be replaced with //

## **STX,F,p,[Return Code Format],ETX**

Change to use passive FTP protocol (NOTE: active is the default) using *Return Code Format*.

## **STX,F,C,[Return Code Format] CR,[Any Command (ASCII text without any CR characters)], CR, [TimeOutValue],ETX**

Send the command to the FTP server, use *Return Code Format*, and wait a maximum of *TimeOutValue* in seconds. *Any Command (ASCII text without any CR characters)* is the command in the server format (ie log onto your Ftp server from a windows PC using ftp.exe and issue a remtchelp command to see the syntax of the server (Note just typing help gets you the windows FTP client's syntax). This command is to be used when there is no associated data (file) with this command!

**Note:** any use of a / character must be replaced with //

## **STX,F,E,[Return Code Format],ETX**

End the file transfer and report any return codes according to *Return Code Format*. This command must be sent after any **STX,F,c...** commands when data is being sent. It should be done for file retrieval as well to verify the FTP server has sent all its data. In the case of file retrieval you will need to create a mechanism at the end of the file to let the scale know when to issue this command. A normal response to successful file transfer would be 226 but some servers will return a 250. One approach here is to take the result code and divide by 100 and see if it is a two.

## **STX,F,Q,[Return Code Format],ETX**

Close the current FTP session using *Return Code Format*.



# Appendix III

## Return Code Formats

There are three formats for the Server's response code: **S#**, **N#**, or **D**.

**S#** means to put the FTP Server's response code in variable 80.# as a string (number and up to the first 63 characters (scale variable limitation) of the human readable message from the FTP server).

**N#** means to put the FTP Server's response code number in variable 80.#.

**D** means don't bother with the response code.

**Caution:** specifying an incorrect # for a variable will cause a scale error

## Response Codes

### Response codes > 99

Response codes > 99 are from the FTP Server. The format is **XYZ** (where XYZ>99)

#### **X denotes:**

1. Positive preliminary reply. The action is being started but expect another reply before sending another command.
2. Positive completion reply. A new command can be sent.
3. Positive intermediate reply. The command has been accepted but another command must be sent.
4. Transient negative completion reply. The requested action did not take place, but the error condition is temporary so the command can be reissued later.
5. Permanent negative completion reply. The command was not accepted and should not be retried

#### **Y denotes:**

1. Syntax error.
2. Information.
3. Connections. Replies referring to the control or data connections.
4. Authentication and accounting. Replies for the login or accounting commands.
5. Unspecified.
6. Filesystem status.

#### **Z denotes:**

Digit used to further divide the messages (ie up to 10 of each type)

Typical Messages are:

(Note that the actual text will vary from system to system. RFC 959 allows codes 110, 120, 125, 150, 200, 202, 211, 212, 213, 214, 215, 220, 221, 225, 226, 227, 230, 250, 257, 331, 332, 350, 421, 425, 426, 450, 451, 452, 500, 501, 502, 503, 504, 530, 532, 550, 551, 552, and 553. However this does not mean that your server uses all these codes or that no other codes have or will be added. Also the Ethernet option may receive some codes and convert them into its error code (i.e. code <99).)

**110** Restart marker reply. In this case, the text is exact and not left to the particular implementation; it must read: MARK yyyy = mmmm Where yyyy is User-process data stream marker, and mmmm server's equivalent marker (note the spaces between markers and "=").

**120** Service ready in nnn minutes.

**125** Data connection already open; transfer starting.

**150** File status okay; about to open data connection. (This is also known as a mark command).

**200** Command OK

**202** Command not implemented, superfluous at this site.

**211** System status, or system help reply.

**212** Directory status.

**213** File status.

**214** Help message of some type.

**215** NAME system type. Where NAME is an official system name from the list in the Assigned Numbers document.

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- 220 Service ready for new user.
- 221 Service closing control connection. Logged out if appropriate.
- 225 Data connection open; no transfer in progress.
- 226 Transfer Complete
- 227 Entering Passive Mode (h1,h2,h3,h4,p1,p2).
- 230 User logged in, proceed.
- 250 Command .... Successful
- 257 "PATHNAME" created.
- 331 Username OK, password required.
- 332 Need account for login.
- 350 Requested file action pending further information.
- 421 Service not available, closing control connection. This may be a reply to any command if the service knows it must shut down.
- 425 Can't open data connection.
- 426 Connection closed; transfer aborted.
- 450 Requested file action not taken. File unavailable (e.g., file busy).
- 451 Error writing file.
- 452 Requested action not taken. Insufficient storage space in system.
- 500 Syntax error (unrecognized command)
- 501 Syntax error (invalid arguments)
- 502 Unimplemented MODE type
- 503 Bad sequence of commands.
- 504 Command not implemented for that parameter.
- 530 Not logged in.
- 532 Need account for storing files.
- 550 Requested action not taken. File unavailable (e.g., file not found, no access).
- 551 Requested action aborted: page type unknown.
- 552 Requested file action aborted. Exceeded storage allocation (for current directory or dataset).
- 553 Requested action not taken. File name not allowed.

## *Response codes 0 to 99*

Response codes  $\geq 0$  and  $< 99$  are information codes from the Ethernet option board.

- 0 FTP Command Okay
- 1 Signed On FTP Server
- 2 Signed Off FTP Server

## *Response codes $< 0$*

Response codes  $< 0$  are error codes from the Ethernet option board. Please note that to recover from these errors it may be necessary to quit the current FTP session (STX,F,Q...) and restart it (STX,F,s)

- 1 Time out
- 2 Password Error
- 3 Connection Failed
  - (On end file (STX,F,E... command) this happens if the data transfer to server has been started but the connection to the server was lost before this command was issued)
- 4 Command Failed
- 5 Bad session
  - (Can happen on quit (STX,F,Q... command) OR when the FTP command channel is lost when issuing End of file transmission (STX,F,E... command), arbitrary FTP command (STX,F,C... command), arbitrary FTP command with data stream (STX,F,c... command),
- 6 Network Error
  - (On end file (STX,F,E... command) this happens if the FTP data channel could not be closed)
- 7 Command had more than 256 characters
- 8 Ftp Command format incorrect
  - (i.e. STX,F,...ETX contains an error such as an invalid argument)
- 9 Ftp Buffer Full
- 10 Data Transfer Receive Error
- 11 Data Transfer Send Error

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**-12 Data Transfer Not Started**

(Can occur if the end of transmission command (STX,F,E...) is issued and a transfer is has not been started with the (STX,F,E... command) or has not been given time to start)

**-13 FTP session already started** (you must close the current session (STX,F,Q...) before starting another)

# Appendix IV

## Modbus TCP/IP on GSE Ethernet Option Rev 1.0

10/5/2005 9:28:00 AM

**Important Note:** Modbus TCP/IP is only possible on 60 series (except 672 and 675) Indicators with the Ethernet Card connected to Serial Port 1.

### Configure the GSE Ethernet Card

- 1) Use GSE IP Setup to configure the IP Address & Mask. If not using the Gateway Address do not leave it a zero but make it the same as the IP Address (ModBus TCP/IP requirement).
- 2) Go to GSE Ethernet Option's Web Server's Configure Page (enter the Ethernet Option's IP address in your web browser's go address box and click go).
- 3) In the section labeled **Network Settings**, subsection *Server Settings*:
  - a) Set the *Server Listen Port* to 502.
  - b) Set the *Server Listen Address* if you know the IP Address of the Master and want to prevent any other Master from connecting.
  - c) The *Time To Wait Before Timeout Client* is the amount of time to wait before reporting to ModBus that the Scale is not responding to a command.
  - d) The *Time To Make New Client Wait* value is not used for ModBus TCP/IP. However, any new device trying to connect is accepted immediately. See 3)b) above if you wish to limit the connection to a single IP Address.
- 4) Go to the section labeled *Serial Port Settings*:
  - a) Make sure the baud rate set to 19.2K baud
  - b) Make sure flow control set to none (using port 502 will automatically change flow control to none).
- 5) In the Jumper Lockout section:
  - a) Check the *Lock Network (Telnet) Settings* if you want to keep anyone from changing the ModBus TCP/IP Port setting.
  - b) Check the *Lock Serial Port Settings* if you want to keep anyone from changing the Serial Port settings.
  - c) Check the *Prevent Control from Remote Page* to prevent any possible control from the Remote Page.
  - d) It is not necessary to check *Prevent Display from Remote Page*, as "Modbus TCP/IP Session" will be shown in the Web Server's Remote Page Display area during once a connection has been made.
  - e) Check the *Prevent Telnet* to prevent a TELNET session from starting. (Note for advanced users: Any TELNET attempt will have to take into account that the Indicator will be in ModBus RTU mode, unless a macro started from a ModBus command is used to change it.
  - f) Check the *Prevent Updates* if you wish to prevent any updates to this Ethernet Option from the Network. Updating during a ModBus session will terminate it.
  - g) *Don't Send Serial Messages On CONNECT/DROPPED* has no effect on ModBus TCP/IP as the connect messages are not sent when this protocol is selected (by setting *Server Listen Port* to 502).
  - h) Check the *Send Ethernet Status to Parameter 95 (for 60 series only)* if you wish to have the Indicators Parameter 95 reflect TCP/IP status. (Note for advanced users: Parameter 95 is updated a ModBus command when the *Server Listen Port* is set to 502).

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- i) Check the *Buffer Modbus TCP/IP Transactions (for 60 series only)* option only if you have a buffering ModBus TCP/IP master. It is recommended to leave this feature off until one has verified that ModBus TCP/IP works without it first
- j) The check box *Stop processing STX,...,ETX during Telnet* has no effect when running ModBus TCP/IP. (The Indicator never echoes out a ModBus port)
- 6) Make sure you click the submit button on the Configure Page.
- 7) Remove the Ethernet Jumper on connector J4 if you wish to prevent any changes to these setting.

## Configure your GSE Indicator

1. The GSE Ethernet card must be connected to comm. 1.
2. The Scale should be set for ModBus RTU on comm 1 at 19.2K, 8 data bits, no parity, 1 stop bit, and no flow control. In addition a ModBus parameter map must be setup at P6001. The easiest way to do all this is to go into setup and press 65002 [Select]. Then press the [Units] key to select "Modbus TcpIp". Then press [Enter]. The standard ModBus register mapping (40001+) is at the end of this document. *Note for 660 series Indicators a second FRAM is required to use this feature unless one manual sets comm port one and the P6001 map (See 60 series Technical Reference Manual for details).*

## ModBus TCP/IP Server Notes

1. Only one connection to the Ethernet card from a Client can be made at once.
2. The maximum number of transactions that can be buffered is 16 (must come from same Client connection). (This must be enabled at the Web Server's Configure Page)
3. If a Client breaks and reestablishes a connection, the replies to previous unhandled transactions will be lost.
4. The Web Server Home Page will not show any details about the Indicator's Scale Application or Serial Number. The Web Server's Remote Page will not function. You can still configure and determine what firmware is in the Ethernet Option.
5. If the ModBus protocol or the length in the MBAP header is incorrect the entire data stream received will be discarded. (Transactions issued after the error occurred may also be discarded).
6. The ModBus TCP/IP server will temporarily stop listening to the Client when sending out error messages. Connections are dropped if Indicator stops responding to the Ethernet Option or if more than one transaction is sent when *Buffer Modbus TCP/IP Transactions (for 60 series only)* is not enabled. See 5)i) in the section Configure the GSE Ethernet Card.
7. Cycle time is ~35ms @ 10 words (read holding register) with Modbus RTU set for 19.2K. Increasing baud rate does not make a significant change in performance.
8. 115K baud does not function with Modbus RTU.

## Modbus TCP/IP Error Codes

In addition to the Indicator's normal Modbus RTU error codes (See 60 Series Technical Reference Manual), Modbus TCP adds or expands these error codes:

- 03 Illegal Data Value: Can be issued if the MBAP (Modbus Application) Header has an incorrect length field.
- 04 Slave Device Failure: Can happen when the scale is taken offline by operator viewing info parms or going into setup. This can also be issued if Modbus TCP buffers overflow OR if Scale's response is corrupted. (Should not happen).

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9. 06 Server is busy: Maximum Transaction Limit. This is sixteen when *Buffer Modbus TCP/IP Transactions (for 60 series only)* is enabled, and one with it disabled. (See 5)i) in the section Configure the GSE Ethernet Card).
- 11 Gateway Target Device Failed to Respond: Scale has failed to respond to command. This is most likely due to the scale being in setup mode.

## ModBus Master Comments

If you are using a PC and trying to talk to the Ethernet Option the Master must establish a connection to the scale. A ModBus TCP/IP command consists of:

1. Two bytes for the transaction identifier (normally this is just a counter)
2. Three bytes of zeroes (Protocol bytes and high byte of bytes to follow - you can't send more than 255 bytes so this is always zero)
3. Byte for how many bytes that follow.
4. Normal ModBus RTU command without the CRC.

The response from the slave will have items 1,2,3 above attached and the normal ModBus RTU command response without a CRC. Two economical tools that run on a PC and can act like a master are Modscan32® from [www.win-tech.com](http://www.win-tech.com), and Modpoll® from [www.modbustools.com](http://www.modbustools.com).

## Debugging

On the Home Web Page for the Ethernet Option you should see:

*"Using Modbus TCP/IP: Serial Connection Verified"*

in the product serial number box if the Scale is set up correctly for Modbus TCP/IP. Note that the latest firmware contains a setting to assist in setting this up at P65002. Contact GSE applications for the latest firmware if P65002 does not cycle to "Modbus TcpIP" when pressing the Units Key.

If the Home Web Page for the Ethernet Option shows:

*"Scale not setup for Modbus TCP/IP: See P65002"*

then either the Scale to Ethernet connections are incorrect (remember they must be connected to comm 1 for Modbus TCP/IP), the Ethernet card is not set for 19200 and server listen port of 502 (see Configure tab of Ethernet web page), or the Scale has not been setup up for ModBus TCP/IP at P65002.



## Appendix IV

### **Parameter 95 - TCP/IP Status (60 series products only)**

This parameter is accessed from the Weigh Mode. Press 95 [SELECT] (60 series products only). The sending of P95 information must be enabled on the Configure Page of the Ethernet Option's Web Sever. It allows viewing of network status information without opening the enclosure to see the Option Board Status LEDs or putting the scale into Setup. Information is only sent on change of state and never during a TELNET session. Pressing [CLR] – the display will change to 00000 and "none" for Stat"

# Appendix IV

TABLE 1. DEFINES THE MEANING OF EACH DIGIT DISPLAYED AT PARAMETER 95 "TCP/IP STAT".

Scale Parameter 95 (95 Select from the weigh mode)					
<b>Connection Speed</b>					
0000 0		Tcplp Stat	LEDs		
			1	2	3 (nearest connector)
0=No Connection			off	off	on
1= 10 M baud Connection			off	on	on
A = 100 M baud connection			on	on	on
<b>Telnet Status</b>		<b>ModBus TCP/IP</b>		<b>FTP Status</b>	
000 0 0		Tcplp Stat	00 0 00		Tcplp Stat
					0 0 000
0 = no Telnet connection			0=No Connection		0=No Connection
1=Telnet Server			1=ModBus TCP/IP		1=Command Channel Open
2=Telnet Client (Auto Connect)					2=Receiving Stream Data
3=Telnet Client (Scale Initiated)					3=Sending Stream Data
<b>Http Status</b> <i>(within last two minutes)</i>					
0 0000		Tcplp Stat			
0= No pages served.					
1 = At least one page served					
2 = One User Accessing					
3 = Two Users Accessing					
4 = Three Users Accessing					
5 = Four Users Accessing					
6 = Five Users Accessing					

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## Informational Parameters for ModBus TCP/IP

P60301	<b>ModBus Map Check.</b> If this display shows STD then all original register setups are in the scripted ModBus Tcp/IP configuration and the scale has the standard register setup.
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\*\*\* Do not change the length of the strings of Var# 25, 30 ,45 and 60 if you want to maintain the standard Modbus Tcp/IP map. Doing so will change the location of all data stored above the string.

### ModBus Parameter Map

If ModBus TCP/IP is setup by selecting P65002 and pressing the units key to get to the Modbs TcpIp option, and then press enter, the ModBus parameter map will be setup as below:

ModBus Map Parm	ModBus Registers	Scaled ?	Type	Scale Value	Parm Number
6001	40001	Y	INT16	Gross Scale 1	0.1
6002	40002	Y	INT16	Future Gross 1	25.1
6003	40003	Y	INT16	Rate Scale 1	23.1
6004	40004	N	High/Low Byte	Scaling/Stat Scale 1	96.1
6005	40005	Y	INT16	Gross Scale 2	0.2
6006	40006	Y	INT16	Future Gross 2	25.2
6007	40007	Y	INT16	Rate Scale 2	23.2
6008	40008	N	High/Low Byte	Scaling/Stat Scale 2	96.2
6009	40009	Y	INT16	Gross Scale 3	0.3
6010	40010	Y	INT16	Future Gross 3	25.3
6011	40011	Y	INT16	Rate Scale 3	23.3
6012	40012	N	High/Low Byte	Scaling/Stat Scale 3	96.3
6013	40013	Y	INT16	Gross Scale 4	1.4
6014	40014	Y	INT16	Future Gross 4	25.4
6015	40015	Y	INT16	Rate Scale 4	23.4
6016	40016	N	High/Low Byte	Scaling/Stat Scale 4	96.4
6017	40017	Y	INT16	Gross Scale 5	0.5
6018	40018	Y	INT16	Future Gross 5	25.5
6019	40019	Y	INT16	Rate Scale 5	23.5
6020	40020	N	High/Low Byte	Scaling/Stat Scale 5	96.5
6021	40021	Y	INT16	Gross Scale 6	1.6
6022	40022	Y	INT16	Future Gross 6	25.6
6023	40023	Y	INT16	Rate Scale 6	23.6
6024	40024	N	High/Low Byte	Scaling/Stat Scale 6	96.6
6025	40025	Y	INT16	Gross Scale 7	0.7
6026	40026	Y	INT16	Future Gross 7	25.7
6027	40027	Y	INT16	Rate Scale 7	23.7
6028	40028	N	High/Low Byte	Scaling/Stat Scale 7	96.7
6029	40029	Y	INT16	Gross Scale 8	1.8
6030	40030	Y	INT16	Future Gross 8	25.8
6031	40031	Y	INT16	Rate Scale 8	23.8

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6032	40032	N	High/Low Byte	Scaling/Stat Scale 8	96.8
6033	40033 / 40034	N	IEE FLOAT 32	Rounded Gross Sc 1	20.1
6034	40035 / 40036	N	IEE FLOAT 32	Rounded Gross Sc 2	20.2
6035	40037 / 40038	N	IEE FLOAT 32	Rounded Gross Sc 3	20.3
6036	40039 / 40040	N	IEE FLOAT 32	Rounded Gross Sc 4	20.4
6037	40041 / 40042	N	IEE FLOAT 32	Rounded Gross Sc 5	20.5
6038	40043 / 40044	N	IEE FLOAT 32	Rounded Gross Sc 6	20.6
6039	40045 / 40046	N	IEE FLOAT 32	Rounded Gross Sc 7	20.7
6040	40047 / 40048	N	IEE FLOAT 32	Rounded Gross Sc 8	20.8
<b>These Six are common to all enabled scales</b>					
6041	40049	N	IEE Float	APW	34 Common
	40050				
6042	40051	Y	INT32	Combined Gross of All Scales	40 Common
6043	40053	Y	INT32	Combined Net of All Scales	41 Common
6044	40055	Y	INT32	Combined Tare of All Scales	42 Common
6045	40057	N	INT32	Combined Count of All Scales	45 Common
<b>The following block is common to All Series</b>					
6046	40059	Y	INT16	Gross	0 Scale 1
6047	40060	Y	INT16	Net	1 Scale 1
6048	40061	Y	INT16	Tare	2 Scale 1
6049	40062	Y	INT16	Average Gross	15 Scale 1
6050	40063	Y	INT16	Average Net	16 Scale 1
6051	40064	Y	INT16	Peak Gross	18 Scale 1
6052	40065	Y	INT16	Peak Net	19 Scale 1
6053	40066	.01 Sec.	INT16	Free Fall	24 Scale 1
6054	40067	Y	INT16	Future Gross	25 Scale 1
6055	40068	Y	INT16	Future Net	26 Scale 1
6056	40069	N	INT16	Count (Qty)	30 Scale 1
6057	40070	Y	INT32	Gross Total	3 Scale 1
6058	40072	Y	INT32	Net Total	6 Scale 1
6059	40074	Y	INT32	# Accumulations	9 Scale 1
6060	40076	N	INT32	Count Total (Qty)	31 Scale 1
6061	40078	Y	INT16	Gross	0 Scale 2
6062	40079	Y	INT16	Net	1 Scale 2
6063	40080	Y	INT16	Tare	2 Scale 2
6064	40081	Y	INT16	Average Gross	15 Scale 2
6065	40082	Y	INT16	Average Net	16 Scale 2
6066	40083	Y	INT16	Peak Gross	18 Scale 2
6067	40084	Y	INT16	Peak Net	19 Scale 2
6068	40085	.01 Sec.	INT16	Free Fall	24 Scale 2

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6069	40086	Y	INT16	Future Gross	25 Scale 2	
6070	40087	Y	INT16	Future Net	26 Scale 2	
6071	40088	N	INT16	Count (Qty)	30 Scale 2	
6072	40089	Y	INT32	Gross Total	3 Scale 2	
6073	40091	Y	INT32	Net Total	6 Scale 2	
6074	40093	Y	INT32	# Accumulations	9 Scale 2	
6075	40095	N	INT32	Count Total (Qty)	31 Scale 2	
			<b>Setpoints set to act never deact above</b>			
6076	40097	Y	INT16	SP1 Target	Var 80.1	
6077	40098	Y	INT16	SP2 Target	Var 80.2	
6078	40099	Y	INT16	SP3 Target	Var 80.3	
6079	40100	Y	INT16	SP4 Target	Var 80.4	
6080	40101	Y	INT16	SP5 Target	Var 80.5	
6081	40102	Y	INT16	SP6 Target	Var 80.6	
6082	40103	Y	INT16	SP7 Target	Var 80.7	
6083	40104	Y	INT16	SP8 Target	Var 80.8	
6084	40105	Y	INT16	Var # 9	Var 80.9	
6085	40106	Y	INT16	Var # 10	Var 80.10	
6086	40107	Y	INT16	Var # 11	Var 80.11	
6087	40108	Y	INT32	Var # 12	Var 80.12	
6088	40110	Y	INT32	Var # 13	Var 80.13	
6089	40112	N	IEE Float	Var # 14	Var 80.14	
6090	40114	N	String 18 Char=9 Reg	Var # 15	Var 80.15	
6091	40123	N	16 Bits	SetPoint 1 - 16 Status		
***** END OF 460 SERIES *****						
<b>The following block is common to 560 and 660 Series</b>						
6092	40124	Y	INT16	Gross	0 Scale 3	
6093	40125	Y	INT16	Net	1 Scale 3	
6094	40126	Y	INT16	Tare	2 Scale 3	
6095	40127	Y	INT16	Average Gross	15 Scale 3	
6096	40128	Y	INT16	Average Net	16 Scale 3	
6097	40129	Y	INT16	Peak Gross	18 Scale 3	
6098	40130	Y	INT16	Peak Net	19 Scale 3	
6099	40131	.01 Sec.	INT16	Free Fall	24 Scale 3	
6100	40132	Y	INT16	Future Gross	25 Scale 3	
6101	40133	Y	INT16	Future Net	26 Scale 3	
6102	40134	N	INT16	Count (Qty)	30 Scale 3	
6103	40135	Y	INT32	Gross Total	3 Scale 3	
6104	40137	Y	INT32	Net Total	6 Scale 3	
6105	40139	Y	INT32	# Accumulations	9 Scale 3	
6106	40141	N	INT32	Count Total (Qty)	31 Scale 3	
6107	40143	Y	INT16	Gross	0 Scale 4	
6108	40144	Y	INT16	Net	1 Scale 4	
6109	40145	Y	INT16	Tare	2 Scale 4	
6110	40146	Y	INT16	Average Gross	15 Scale 4	
6111	40147	Y	INT16	Average Net	16 Scale 4	
6112	40148	Y	INT16	Peak Gross	18 Scale 4	
6113	40149	Y	INT16	Peak Net	19 Scale 4	
6114	40150	.01	INT16	Free Fall	24 Scale 4	

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		Sec.			
6115	40151	Y	INT16	Future Gross	25 Scale 4
6116	40152	Y	INT16	Future Net	26 Scale 4
6117	40153	N	INT16	Count (Qty)	30 Scale 4
6118	40154	Y	INT32	Gross Total	3 Scale 4
6119	40156	Y	INT32	Net Total	6 Scale 4
6120	40158	Y	INT32	# Accumulations	9 Scale 4
6121	40160	N	INT32	Count Total (Qty)	31 Scale 4
6122	40162	Y	INT16	SP Target 9	Var 80.16
6123	40163	Y	INT16	SP Target 10	Var 80.17
6124	40164	Y	INT16	SP Target 11	Var 80.18
6125	40165	Y	INT16	SP Target 12	Var 80.19
6126	40166	Y	INT16	SP Target 13	Var 80.20
6127	40167	Y	INT16	SP Target 14	Var 80.21
6128	40168	Y	INT16	SP Target 15	Var 80.22
6129	40169	Y	INT16	SP Target 16	Var 80.23
6130	40170	Y	INT16	Var # 24	Var 80.24
6131	40171	Y	INT16	Var # 25	Var 80.25
6132	40172	Y	INT16	Var # 26	Var 80.26
6133	40173	Y	INT32	Var # 27	Var 80.27
6134	40175	Y	INT32	Var # 28	Var 80.28
6135	40177	N	IEE Float	Var # 29	Var 80.29
6136	40179	N	String 18 Char=9 Reg	Var # 30	Var 80.30
6137	40188	Y	INT16	SP Target 17	Var 80.31
6138	40189	Y	INT16	SP Target 18	Var 80.32
6139	40190	Y	INT16	SP Target 19	Var 80.33
6140	40191	Y	INT16	SP Target 20	Var 80.34
6141	40192	Y	INT16	SP Target 21	Var 80.35
6142	40193	Y	INT16	SP Target 22	Var 80.36
6143	40194	Y	INT16	SP Target 23	Var 80.37
6144	40195	Y	INT16	SP Target 24	Var 80.38
6145	40196	Y	INT16	Var # 39	Var 80.39
6146	40197	Y	INT16	Var # 40	Var 80.40
6147	40198	Y	INT16	Var # 41	Var 80.41
6148	40199	Y	INT32	Var # 42	Var 80.42
6149	40201	Y	INT32	Var # 43	Var 80.43
6150	40203	N	IEE Float	Var # 44	Var 80.44
6151	40205	N	String 18 Char=9 Reg	Var # 45	Var 80.45
6152	40214	Y	INT16	SP Target 25	Var 80.46
6153	40215	Y	INT16	SP Target 26	Var 80.47
6154	40216	Y	INT16	SP Target 27	Var 80.48
6155	40217	Y	INT16	SP Target 28	Var 80.49
6156	40218	Y	INT16	SP Target 29	Var 80.50
6157	40219	Y	INT16	SP Target 30	Var 80.51
6158	40220	Y	INT16	SP Target 31	Var 80.52
6159	40221	Y	INT16	SP Target 32	Var 80.53
6160	40222	Y	INT16	Var # 54	Var 80.54
6161	40223	Y	INT16	Var # 55	Var 80.55
6162	40224	Y	INT16	Var # 56	Var 80.56
6163	40225	Y	INT32	Var # 57	Var 80.57
6164	40227	Y	INT32	Var # 58	Var 80.58



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6165	40229	N	IEE Float	Var # 59	Var 80.59
6166	40231	N	String 18 Char=9 Reg	Var # 60	Var 80.60
6167	40240	N	16 Bits	SetPoint 17 - 32 Status	
***** END OF 560 SERIES *****					
<b>The following block applies to the 660 Series</b>					
6168	40241	Y	INT16	Gross	0 Scale 5
6169	40242	Y	INT16	Net	1 Scale 5
6170	40243	Y	INT16	Tare	2 Scale 5
6171	40244	Y	INT16	Average Gross	15 Scale 5
6172	40245	Y	INT16	Average Net	16 Scale 5
6173	40246	Y	INT16	Peak Gross	17 Scale 5
6174	40247	Y	INT16	Peak Net	18 Scale 5
6175	40248	.01 Sec.	INT16	Free Fall	19 Scale 5
6176	40249	Y	INT16	Future Gross	20 Scale 5
6177	40250	Y	INT16	Future Net	21 Scale 5
6178	40251	N	INT16	Count (Qty)	22 Scale 5
6179	40252	Y	INT32	Gross Total	23 Scale 5
6180	40254	Y	INT32	Net Total	24 Scale 5
6181	40256	Y	INT32	# Accumulations	25 Scale 5
6182	40258	N	INT32	Count Total (Qty)	26 Scale 5
6185	40260	Y	INT16	Gross	0 Scale 6
6186	40261	Y	INT16	Net	1 Scale 6
6187	40262	Y	INT16	Tare	2 Scale 6
6188	40263	Y	INT16	Average Gross	15 Scale 6
6189	40264	Y	INT16	Average Net	16 Scale 6
6190	40265	Y	INT16	Peak Gross	17 Scale 6
6191	40266	Y	INT16	Peak Net	18 Scale 6
6192	40267	.01 Sec.	INT16	Free Fall	19 Scale 6
6193	40268	Y	INT16	Future Gross	20 Scale 6
6194	40269	Y	INT16	Future Net	21 Scale 6
6195	40270	N	INT16	Count (Qty)	22 Scale 6
6196	40271	Y	INT32	Gross Total	23 Scale 6
6197	40273	Y	INT32	Net Total	24 Scale 6
6198	40275	Y	INT32	# Accumulations	25 Scale 6
6199	40277	N	INT32	Count Total (Qty)	26 Scale 6
6198	40279	Y	INT16	Gross	0 Scale 7
6199	40280	Y	INT16	Net	1 Scale 7
6200	40281	Y	INT16	Tare	2 Scale 7
6201	40282	Y	INT16	Average Gross	15 Scale 7
6202	40283	Y	INT16	Average Net	16 Scale 7
6203	40284	Y	INT16	Peak Gross	17 Scale 7
6204	40285	Y	INT16	Peak Net	18 Scale 7
6205	40286	.01 Sec.	INT16	Free Fall	19 Scale 7
6206	40287	Y	INT16	Future Gross	20 Scale 7
6207	40288	Y	INT16	Future Net	21 Scale 7
6208	40289	N	INT16	Count (Qty)	22 Scale 7
6209	40290	Y	INT32	Gross Total	23 Scale 7

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6210	40292	Y	INT32	Net Total	24 Scale 7
6211	40294	Y	INT32	# Accumulations	25 Scale 7
6212	40296	N	INT32	Count Total (Qty)	26 Scale 7
6213	40298	Y	INT16	Gross	0 Scale 8
6214	40299	Y	INT16	Net	1 Scale 8
6215	40300	Y	INT16	Tare	2 Scale 8
6216	40301	Y	INT16	Average Gross	15 Scale 8
6217	40302	Y	INT16	Average Net	16 Scale 8
6218	40303	Y	INT16	Peak Gross	17 Scale 8
6219	40304	Y	INT16	Peak Net	18 Scale 8
6220	40305	.01 Sec.	INT16	Free Fall	19 Scale 8
6221	40306	Y	INT16	Future Gross	20 Scale 8
6222	40307	Y	INT16	Future Net	21 Scale 8
6223	40308	N	INT16	Count (Qty)	22 Scale 8
6224	40309	Y	INT32	Gross Total	23 Scale 8
6225	40311	Y	INT32	Net Total	24 Scale 8
6226	40313	Y	INT32	# Accumulations	25 Scale 8
6227	40315	N	INT32	Count Total (Qty)	26 Scale 8
6228	40317	Y	INT16	SP Target 33	Var 80.61
6229	40318	Y	INT16	SP Target 34	Var 80.62
6230	40319	Y	INT16	SP Target 35	Var 80.63
6231	40320	Y	INT16	SP Target 36	Var 80.64
6232	40321	Y	INT16	SP Target 37	Var 80.65
6233	40322	Y	INT16	SP Target 38	Var 80.66
6234	40323	Y	INT16	SP Target 39	Var 80.67
6235	40324	Y	INT16	SP Target 40	Var 80.68
6236	40325	Y	INT16	Var # 69	Var 80.69
6237	40326	Y	INT16	Var # 70	Var 80.70
6238	40327	Y	INT16	Var # 71	Var 80.71
6239	40328	Y	INT16	Var # 72	Var 80.72
6240	40329	Y	INT32	Var # 73	Var 80.73
6241	40331	Y	INT32	Var # 74	Var 80.74
6242	40333	N	IEE Float	Var # 75	Var 80.75
6243	40335	Y	INT16	SP Target 41	Var 80.76
6244	40336	Y	INT16	SP Target 42	Var 80.77
6245	40337	Y	INT16	SP Target 43	Var 80.78
6246	40338	Y	INT16	SP Target 44	Var 80.79
6247	40339	Y	INT16	SP Target 45	Var 80.80
6248	40340	Y	INT16	SP Target 46	Var 80.81
6249	40341	Y	INT16	SP Target 47	Var 80.82
6250	40342	Y	INT16	SP Target 48	Var 80.83
6251	40343	Y	INT16	Var # 84	Var 80.84
6252	40344	Y	INT16	Var # 85	Var 80.85
6253	40345	Y	INT16	Var # 86	Var 80.86
6254	40346	Y	INT16	Var # 87	Var 80.87
6255	40347	Y	INT32	Var # 88	Var 80.88
6256	40349	Y	INT32	Var # 89	Var 80.89
6257	40351	N	IEE Float	Var # 90	Var 80.90
6258	40353	N	16 Bits	SetPoint 33 - 48 Status	
6259	40354	Y	INT16	SP Target 49	Var 80.91
6260	40355	Y	INT16	SP Target 50	Var 80.92

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6261	40356	Y	INT16	SP Target 51	Var 80.93
6262	40357	Y	INT16	SP Target 52	Var 80.94
6263	40358	Y	INT16	SP Target 53	Var 80.95
6264	40359	Y	INT16	SP Target 54	Var 80.96
6265	40360	Y	INT16	SP Target 55	Var 80.97
6266	40361	Y	INT16	SP Target 56	Var 80.98
6267	40362	Y	INT16	Var # 99	Var 80.99
6268	40363	Y	INT16	Var # 100	Var 80.100
6269	40364	Y	INT16	Var # 101	Var 80.101
6270	40365	Y	INT16	Var # 102	Var 80.102
6271	40366	Y	INT32	Var # 103	Var 80.103
6272	40368	Y	INT32	Var # 104	Var 80.104
6273	40370	N	IEE Float	Var # 105	Var 80.105
6274	40372	Y	INT16	SP Target 57	Var 80.106
6275	40373	Y	INT16	SP Target 58	Var 80.107
6276	40374	Y	INT16	SP Target 59	Var 80.108
6277	40375	Y	INT16	SP Target 60	Var 80.109
6278	40376	Y	INT16	SP Target 61	Var 80.110
6279	40377	Y	INT16	SP Target 62	Var 80.111
6280	40378	Y	INT16	SP Target 63	Var 80.112
6281	40379	Y	INT16	SP Target 64	Var 80.113
6282	40380	Y	INT16	Var # 114	Var 80.114
6283	40381	Y	INT16	Var # 115	Var 80.115
6284	40382	Y	INT16	Var # 116	Var 80.116
6285	40383	Y	INT16	Var # 117	Var 80.117
6286	40384	Y	INT32	Var # 118	Var 80.118
6287	40386	Y	INT32	Var # 119	Var 80.119
6288	40388	N	IEE Float	Var # 120	Var 80.120
6289	40390	N	16 Bits	SetPoint 49 - 64 Status	
6290	40391	Y	INT16	SP Target 65	Var 80.121
6291	40392	Y	INT16	SP Target 66	Var 80.122
6292	40393	Y	INT16	SP Target 67	Var 80.123
6293	40394	Y	INT16	SP Target 68	Var 80.124
6294	40395	Y	INT16	SP Target 69	Var 80.125
6295	40396	Y	INT16	SP Target 70	Var 80.126
6296	40397	Y	INT16	SP Target 71	Var 80.127
6297	40398	Y	INT16	SP Target 72	Var 80.128
6298	40399	Y	INT16	Var # 129	Var 80.129
6299	40400	Y	INT16	Var # 130	Var 80.130
6300	40401	Y	INT16	Var # 131	Var 80.131
6301	40402	Y	INT16	Var # 132	Var 80.132
6302	40403	Y	INT32	Var # 133	Var 80.133
6303	40405	Y	INT32	Var # 134	Var 80.134
6304	40407	N	IEE Float	Var # 135	Var 80.135
6305	40409	Y	INT16	SP Target 73	Var 80.136
6306	40410	Y	INT16	SP Target 74	Var 80.137
6307	40411	Y	INT16	SP Target 75	Var 80.138
6308	40412	Y	INT16	SP Target 76	Var 80.139
6309	40413	Y	INT16	SP Target 77	Var 80.140
6310	40414	Y	INT16	SP Target 78	Var 80.141
6311	40415	Y	INT16	SP Target 79	Var 80.142
6312	40416	Y	INT16	SP Target 80	Var 80.143
6313	40417	Y	INT16	Var # 144	Var 80.144

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6314	40418	Y	INT16	Var # 145	Var 80.145
6315	40419	Y	INT16	Var # 146	Var 80.146
6316	40420	Y	INT16	Var # 147	Var 80.147
6317	40421	Y	INT32	Var # 148	Var 80.148
6318	40423	Y	INT32	Var # 149	Var 80.149
6319	40425	N	IEE Float	Var # 150	Var 80.150
6320	40127	N	16 Bits	SetPoint 65 - 80 Status	
6321	40428	Y	INT16	SP Target 81	80.151
6322	40429	Y	INT16	SP Target 82	80.152
6323	40430	Y	INT16	SP Target 83	80.153
6324	40431	Y	INT16	SP Target 84	80.154
6325	40432	Y	INT16	SP Target 85	80.155
6326	40433	Y	INT16	SP Target 86	80.156
6327	40434	Y	INT16	SP Target 87	80.157
6328	40435	Y	INT16	SP Target 88	80.158
6329	40436	Y	INT16	Var # 151	80.159
6330	40437	Y	INT16	Var # 152	80.160
6331	40438	Y	INT16	Var # 153	80.161
6332	40439	Y	INT16	Var # 154	80.162
6333	40440	Y	INT32	Var # 155	80.163
6334	40442	Y	INT32	Var # 156	80.164
6335	40444	N	IEE Float	Var # 157	80.165
6336	40446	Y	INT16	SP Target 89	80.166
6337	40447	Y	INT16	SP Target 90	80.167
6338	40448	Y	INT16	SP Target 91	80.168
6339	40449	Y	INT16	SP Target 92	80.169
6340	40450	Y	INT16	SP Target 93	80.170
6341	40451	Y	INT16	SP Target 94	80.171
6342	40452	Y	INT16	SP Target 95	80.172
6343	40453	Y	INT16	SP Target 96	80.173
6344	40454	Y	INT16	Var # 174	80.174
6345	40455	Y	INT16	Var # 175	80.175
6346	40456	Y	INT16	Var # 176	80.176
6347	40457	Y	INT16	Var # 177	80.177
6348	40458	Y	INT32	Var # 178	80.178
6349	40460	Y	INT32	Var # 179	80.179
6350	40462	N	IEE Float	Var # 180	80.180
6351	40464	N	16 Bits	SetPoint 81 - 96 Status	
6352	40465	Y	INT16	SP Target 97	80.181
6353	40466	Y	INT16	SP Target 98	80.182
6354	40467	Y	INT16	SP Target 99	80.183
6355	40468	Y	INT16	SP Target 100	80.184
6356	40469	Y	INT16	SP Target 101	80.185
6357	40470	Y	INT16	SP Target 102	80.186
6358	40471	Y	INT16	SP Target 103	80.187
6359	40472	Y	INT16	SP Target 104	80.188
6360	40473	Y	INT16	Var # 189	80.189
6361	40474	Y	INT16	Var # 190	80.190
6362	40475	Y	INT16	Var # 191	80.191
6363	40476	Y	INT16	Var # 192	80.192
6364	40477	Y	INT32	Var # 193	80.193
6365	40479	Y	INT32	Var # 194	80.194
6366	40481	N	IEE Float	Var # 195	80.195

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6367	40483	Y	INT16	SP Target 105	80.196
6368	40484	Y	INT16	SP Target 106	80.197
6369	40485	Y	INT16	SP Target 107	80.198
6370	40486	Y	INT16	SP Target 108	80.199
6371	40487	Y	INT16	SP Target 109	80.200
6372	40488	Y	INT16	SP Target 110	80.201
6373	40489	Y	INT16	SP Target 111	80.202
6374	40490	Y	INT16	SP Target 112	80.203
6375	40491	Y	INT16	Var # 204	80.204
6376	40492	Y	INT16	Var # 205	80.205
6377	40493	Y	INT16	Var # 206	80.206
6378	40494	Y	INT16	Var # 207	80.207
6379	40495	Y	INT32	Var # 208	80.208
6380	40497	Y	INT32	Var # 209	80.209
6381	40499	N	IEE Float	Var # 210	80.210
6382	40501	N	16 Bits	SetPoint 97 - 112 Status	
6383	40502	Y	INT16	SP Target 113	80.211
6384	40503	Y	INT16	SP Target 114	80.212
6385	40504	Y	INT16	SP Target 115	80.213
6386	40505	Y	INT16	SP Target 116	80.214
6387	40506	Y	INT16	SP Target 117	80.215
6388	40507	Y	INT16	SP Target 118	80.216
6389	40508	Y	INT16	SP Target 119	80.217
6390	40509	Y	INT16	SP Target 120	80.218
6391	40510	Y	INT16	Var # 219	80.219
6392	40511	Y	INT16	Var # 220	80.220
6393	40512	Y	INT16	Var # 221	80.221
6394	40513	Y	INT16	Var # 222	80.222
6395	40514	Y	INT32	Var # 223	80.223
6396	40516	Y	INT32	Var # 224	80.224
6397	40518	N	IEE Float	Var # 225	80.225
6398	40520	Y	INT16	SP Target 121	80.226
6399	40521	Y	INT16	SP Target 122	80.227
6400	40522	Y	INT16	SP Target 123	80.228
6401	40523	Y	INT16	SP Target 124	80.229
6402	40524	Y	INT16	SP Target 125	80.230
6403	40525	Y	INT16	SP Target 126	80.231
6404	40526	Y	INT16	SP Target 127	80.232
6405	40527	Y	INT16	SP Target 128	80.233
6406	40528	Y	INT16	Var # 234	80.234
6407	40529	Y	INT16	Var # 235	80.235
6408	40530	Y	INT16	Var # 236	80.236
6409	40531	Y	INT16	Var # 237	80.237
6410	40532	Y	INT32	Var # 238	80.238
6411	40534	Y	INT32	Var # 239	80.239
6412	40536	N	IEE Float	Var # 240	80.240
6413	40538	N	16 Bits	SetPoint 113 - 128 Status	
6414	40539	Y	INT16	SP Target 129	80.241
6415	40540	Y	INT16	SP Target 130	80.242
6416	40541	Y	INT16	SP Target 131 PDIO	80.243
6417	40542	Y	INT16	SP Target 132 PDIO	80.244
6418	40543	Y	INT16	SP Target 133 PDIO	80.245

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6419	40544	Y	INT16	SP Target 134 PDIO	80.246
6420	40545	Y	INT16	SP Target 135 PDIO	80.247
6421	40546	Y	INT16	SP Target 136 PDIO	80.248
6422	40547	Y	INT16	SP Target 137 PDIO	80.249
6423	40548	Y	INT16	SP Target 138 PDIO	80.250
6424	40549	Y	INT16	Var # 236	80.251
6425	40550	Y	INT16	Var # 237	80.252
6426	40551	Y	INT32	Var # 238	80.253
6427	40553	Y	INT32	Var # 239	80.254
6428	40555	N	IEE Float	Var # 240	80.255
6429	40557	N	16 Bits	SetPoint 129 - 144 Status	

The following are Force Coil Functions beyond the Setpoint Coils and have the following special meanings				
	Inputs and outputs	Setpoints 1 . . . 256	ON / OFF / READ	You cannot force the state of an input
<b>Run Macro</b>	<b>Number to pass</b>	<b>Also Simulates Front Panel Keypress</b>	<b>ON / READ</b>	
1	301	[ F1 ]	<b>ON-</b> This will queue the macro on the stack. It will run when it reaches the top of the stack. Immediately if no other macros are running.(or queued ahead of it)	<b>READ Status-</b> Whenever the macro is called with this method, reading the instance will return "on" if the macro has not yet run or is running. It will return "off" if the macro has completed.
2	302	[ F2 ]		
3	303	[ F3 ]		
4	304	[ F4 ]		
5	305	[ F5 ]		
6	306	[Start]		
7	307	[Stop]		
8	308	[Setup]		
9 - 250	309-550	N/A	Add 300 to the macro number you wish to run or get status on (I.e. Pass 301 for macro 1).	



# Appendix IV

Scale Specific Commands	
Number to pass	
601	Zero Scale 1
602	Zero Scale 2
603	Zero Scale 3
604	Zero Scale 4
605	Zero Scale 5
606	Zero Scale 6
607	Zero Scale 7
608	Zero Scale 8
621	Tare Scale 1
622	Tare Scale 2
623	Tare Scale 3
624	Tare Scale 4
625	Tare Scale 5
626	Tare Scale 6
627	Tare Scale 7
628	Tare Scale 8
641	Accumulate Scale 1
642	Accumulate Scale 2
643	Accumulate Scale 3
644	Accumulate Scale 4
645	Accumulate Scale 5
646	Accumulate Scale 6
647	Accumulate Scale 7
648	Accumulate Scale 8

**All of these functions are affected by the Motion Inhibit Settings. When one of these functions is called, reading the instance will return true until the function completes. In addition to this, the motion inhibited status bit, in the scale status word, is set until all motion inhibited functions have completed. Zero scale is macro #601-608. Tare scale is macro #621-628. Accumulate scale is macro #641-648.**

