WOODWARD

Product Manual 26099
(Revision C)
Original Instructions

Servlink and EGCP-2 HMI

EGCP-2
RS-422 Serial Port Communications

Installation and Operation Manual

General Precautions

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment.

Practice all plant and safety instructions and precautions.

Failure to follow instructions can cause personal injury and/or property damage.

Revisions

This publication may have been revised or updated since this copy was produced. To verify that you have the latest revision, check manual *26311* , *Revision Status & Distribution Restrictions of Woodward Technical Publications*, on the *publications page* of the Woodward website:

www.woodward.com/publications

The latest version of most publications is available on the *publications page*. If your publication is not there, please contact your customer service representative to get the latest copy.

Proper Use

Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (i) constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage, and (ii) invalidate product certifications or listings.

Translated Publications

If the cover of this publication states "Translation of the Original Instructions" please note:

The original source of this publication may have been updated since this translation was made. Be sure to check manual *26311* , *Revision Status & Distribution Restrictions of Woodward Technical Publications*, to verify whether this translation is up to date. Out-of-date translations are marked with ⚠. Always compare with the original for technical specifications and for proper and safe installation and operation procedures.

Chapter 6 has been completely updated in this revision.

Contents

WARNINGS AND NOTICES II

ELECTROSTATIC DISCHARGE AWARENESS III

CHAPTER 1. GENERAL INFORMATION 1
Overview 1
Servlink Overview 2
Specifications 2

CHAPTER 2. SERVLINK SOFTWARE INSTALLATION 3

CHAPTER 3. HARDWARE CONNECTIONS 6

CHAPTER 4. MONITORING SERVLINK SOFTWARE OPERATION 7
Operating EGCP-2 Monitoring Software 14

CHAPTER 5. SERVLINK SOFTWARE ON-LINE HELP 28

CHAPTER 6. MODBUS RTU COMMUNICATIONS FOR THE EGCP-2 PANEL ... 31

Illustrations and Tables

Table 6-1. Examples of Modbus Control Mode Switching Logic 32
Table 6-2. Modbus Addresses for the RTU Protocol 35
Table 6-3. Common Modbus Error Numbers 38
Table 6-4. Typical Modbus Communications Settings 38

Warnings and Notices

Important Definitions

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

- **DANGER**—Indicates a hazardous situation which, if not avoided, will result in death or serious injury.
- **WARNING**—Indicates a hazardous situation which, if not avoided, could result in death or serious injury.
- **CAUTION**—Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.
- **NOTICE**—Indicates a hazard that could result in property damage only (including damage to the control).
- **IMPORTANT**—Designates an operating tip or maintenance suggestion.

⚠WARNING

Overspeed / Overtemperature / Overpressure

The engine, turbine, or other type of prime mover should be equipped with an overspeed shutdown device to protect against runaway or damage to the prime mover with possible personal injury, loss of life, or property damage.

The overspeed shutdown device must be totally independent of the prime mover control system. An overtemperature or overpressure shutdown device may also be needed for safety, as appropriate.

⚠WARNING

Personal Protective Equipment

The products described in this publication may present risks that could lead to personal injury, loss of life, or property damage. Always wear the appropriate personal protective equipment (PPE) for the job at hand. Equipment that should be considered includes but is not limited to:

- **Eye Protection**
- **Hearing Protection**
- **Hard Hat**
- **Gloves**
- **Safety Boots**
- **Respirator**

Always read the proper Material Safety Data Sheet (MSDS) for any working fluid(s) and comply with recommended safety equipment.

⚠WARNING

Start-up

Be prepared to make an emergency shutdown when starting the engine, turbine, or other type of prime mover, to protect against runaway or overspeed with possible personal injury, loss of life, or property damage.

⚠WARNING

Automotive Applications

On- and off-highway Mobile Applications: Unless Woodward's control functions as the supervisory control, customer should install a system totally independent of the prime mover control system that monitors for supervisory control of engine (and takes appropriate action if supervisory control is lost) to protect against loss of engine control with possible personal injury, loss of life, or property damage.

NOTICE

Battery Charging Device

To prevent damage to a control system that uses an alternator or battery-charging device, make sure the charging device is turned off before disconnecting the battery from the system.

Electrostatic Discharge Awareness

NOTICE

Electrostatic Precautions

Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts:

- **Discharge body static before handling the control (with power to the control turned off, contact a grounded surface and maintain contact while handling the control).**
- **Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards.**
- **Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices.**

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual *82715*, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules*.

Follow these precautions when working with or near the control.

1. Avoid the build-up of static electricity on your body by not wearing clothing made of synthetic materials. Wear cotton or cotton-blend materials as much as possible because these do not store static electric charges as much as synthetics.
2. Do not remove the printed circuit board (PCB) from the control cabinet unless absolutely necessary. If you must remove the PCB from the control cabinet, follow these precautions:
   - Do not touch any part of the PCB except the edges.
   - Do not touch the electrical conductors, the connectors, or the components with conductive devices or with your hands.
   - When replacing a PCB, keep the new PCB in the plastic antistatic protective bag it comes in until you are ready to install it. Immediately after removing the old PCB from the control cabinet, place it in the antistatic protective bag.

Chapter 1.
General Information

Overview

The EGCP-2 panel RS-422 port protocol may be selected for either Servlink communications protocol, which uses the Woodward PC Tools interface exclusively, or for Modbus® * RTU protocol, which uses an open protocol used by many third party software manufacturers.

*—Modbus is a registered trademark of Schneider Automation Inc.

To select which protocol will be used, enter the Sequencing and Serial Comms configuration menu of the EGCP-2 panel using the proper software password, and scroll to the menu item labeled: 422 Protocol. The selections under this menu item are:

1. Servlink
2. Modbus
3. Upload Setpoints

IMPORTANT

Whenever the 422 Protocol setpoint is changed, the EGCP-2 must be powered down, then powered up again, to reset to the new protocol.

If Servlink is chosen for the protocol selection, the EGCP-2 panel will communicate in the Servlink protocol, which is used only when using the Woodward EGCP2 HMI software P/N 8928-364 (see the EGCP-2 panel installation information in Chapter 2 of this manual).

If Modbus is chosen, the EGCP-2 panel will communicate in MODBUS RTU protocol, and make its information available according to the address list as shown in Table 6-1. Also, the Modbus Address, Modbus Time-out, and Modbus Reset menu items become functional when the 422 Protocol is set to Modbus.

IMPORTANT

If Upload Setpoints is chosen, the EGCP-2 panel will switch to a communications mode where it is waiting to see characters on the 422 serial port that set it to transfer the contents of the setpoint file to the PC. This task is run on the PC using the download.com DOS program, and is limited to authorized service representatives only.

Servlink Overview

Woodward's Servlink and EGCP-2 HMI monitoring software package are located on a single Compact Disc which ships with every unit. These two powerful software tools are used together to establish communications with, and serve as an monitoring and configuration interface for, the EGCP-2 platform.

When installed on a computer, the Servlink and EGCP-2 HMI files will reside in the same directory, typically on the hard drive of the computer they are installed on. Icons associated with the executable files for both the Servlink and EGCP-2 HMI software will be automatically generated upon installation.

These icons are used to run the programs. Using the computer's RS-232 serial port, the Servlink software establishes a direct serial communication protocol between the computer and the EGCP-2. The Servlink software may also be configured to operate via a modem for remote communications to the EGCP-2 control(s).

The Servlink software must always be started before the EGCP-2 software can be run. The EGCP-2 software then uses the information transmitted by this communication path to allow users to monitor or control various aspects of the EGCP-2 control from the computer.

The EGCP-2 software duplicates the front panel of the EGCP-2 hardware platform. All the monitoring information which can be obtained from the hardware can also be accessed by the EGCP-2 software in a format which is identical to that of the hardware. This makes the software very familiar to those accustomed to the EGCP-2 control keypad functions and LCD readout displays.

Specifications

Communications:
RS-422 protocol
9600 Baud (fixed maximum)
No Parity
1 Stop Bit

Minimum Computer Requirements:
Windows 95

Modem Requirements:
Transmitting Modem:
9600 Baud Capability (minimum)
8 Data Bits
No Parity
1 Stop Bit

Receiving Modem:
9600 Baud Capability (minimum)
DTR :OFF
Echo Offline Commands: OFF
Auto Answer: ON
Smart Mode (if applicable): ON
Handshaking: OFF

Chapter 2.
Servlink Software Installation

The EGCP-2 Monitoring Software is located on a single Compact Disc. This disc contain self installing software required for installation of the Servlink and EGCP-2 Monitoring Software onto a computer hard drive operating within a 32 bit environment such as Windows 95 or Windows NT 4.0.

To install the software on your computer's hard drive, turn on your computer and wait until the Windows desktop is displayed. Insert the Compact Disc (CD) into the CD drive of the computer which the installation will take place.

If you are unfamiliar with Windows 95, Windows NT 4.0, or mouse operation, you should consult the manufacturer's instructions before proceeding.

Go to the task bar located at the bottom of the desktop screen, and click once on the Windows Start button. Then click on the Run option.

A dialog box will pop up, and will display a prompt window asking for the program you wish to run. If you know the drive letter allocated to your CD drive type this drive letter, followed by a colon, and then a back slash followed by the word "setup". For example, if CD the drive designation for your computer is D, the following would be typed into the dialog box:

D:\SETUP

If you are unsure of which drive on your computer is designated as the Compact Disc drive, you can double-click on the Windows desktop icon labeled "My Computer", which will display the various drive and network connections for your computer. Look for the icon showing the Compact Disk drive followed by the drive letter designation. This letter is the letter which must be used when in the Run window dialog box prior to the setup instruction.

Once you have typed the proper command in the dialog box for setup, press the Enter (or Return) key on your computer. Windows will automatically begin reading the CD drive for setup instructions from the EGCP-2 HMI CD setup file located there.

The Servlink and EGCP-2 software installation will initially prompt the user if it may automatically create a directory on the hard drive of the computer, and label this directory "Woodward". Press the OK button and this directory will be made. All the Servlink and EGCP-2 software will be placed under this directory on the computer's hard drive.

IMPORTANT

Items on the Windows toolbar and desktop may appear differently than is shown in this manual, depending on active programs in windows at the time of installation or operation.

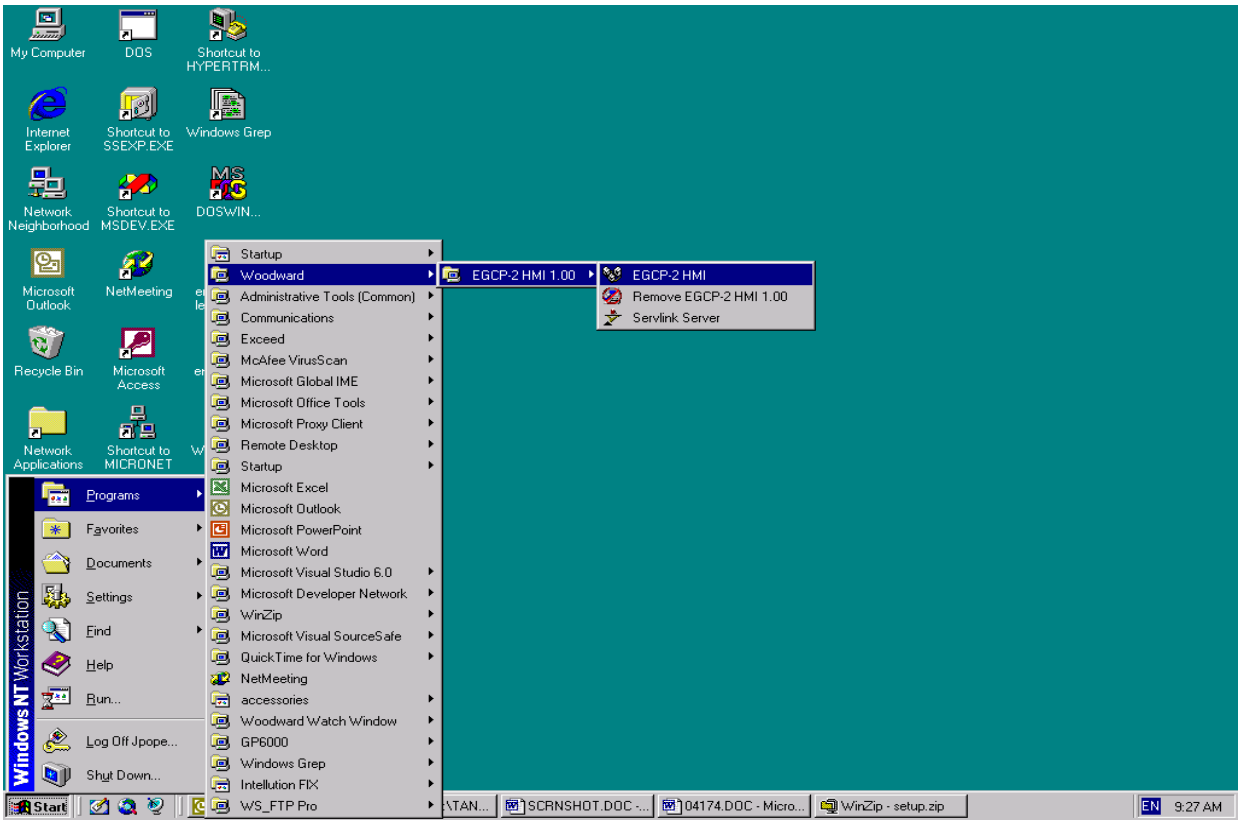
The intent of this manual is to accurately depict the windows which are directly associated with the installation and operation of the EGCP-2 monitoring software.

As the installation continues, the screen will momentarily show the Servlink and EGCP-2 icons which are created during the setup process. These icons are automatically inserted into the program menu of Windows 95 under the EGCP-2 label.

The installation process has made a new set of programs under the EGCP-2 HMI 1.00 program file. Click once on the desktop tool bar Start button, and select the Programs option. Among the various programs on the computer hard drive should now be one group called Woodward, then “EGCP-2 HMI 1.00”. Select this group, and the UPCI Servlink Server, EGCP-2 HMI, and Uninstall EGCP-2 HMI 1.00 executable file icons will appear. These are the files which were installed from the Compact Disc to the computer hard drive.

The UPCI Servlink Server and the EGCP-2 HMI are both used in communicating with and monitoring the EGCP-2 control system. The Remove EGCP-2 HMI 1.00 icon will remove all files associated with the installation of this software from the computer hard drive if it is selected. The Remove program prompts the user prior to uninstalling the software to confirm this action, which greatly reduces accidental removal of the installed software.

Here is a typical screen from the Windows desktop with the Servlink and EGCP-2 software installed on the computer's hard drive:



Once the software is successfully installed on the computer, it will remain resident on the hard drive indefinitely, or until it is uninstalled.

Chapter 3.
Hardware Connections

Once the software is installed on the computer hard drive, the hardware connection between the computer and the EGCP-2 control must be made for correct communication between the two devices. This hardware connection is completed in one of two ways:

1. Direct cable connection between the computer and the EGCP-2 control(s) RS-422 network.
2. Remote connection via modem between the computer and the EGCP-2 control(s).

Direct Cable connection between the computer and EGCP-2 control(s) will be discussed first as it is the most straightforward of the two connection methods.

The laptop or desktop computer which will be used with the EGCP-2 RS-422 port will have a 9-pin serial port. This port is configured by the computer hardware to use a serial communications protocol called RS-232. The details of this protocol are not important to know for hardware connection to the EGCP-2 control(s), other than there is a need to convert the RS-232 protocol of the computer port to RS-422 protocol used by the EGCP control network. This conversion is accomplished by an external conversion module which takes the RS-232 serial port input from the computer, and changes it to a RS-422 protocol for the EGCP-2. These converters can be found in most computer or electronics stores, and are called RS-232 to RS-422 Converters. Consult the EGCP-2 Installation manual for wiring diagrams.

In a system with multiple (8 maximum) EGCP-2 controls, each control is interconnected to the others on the 422 network in a multidrop fashion.

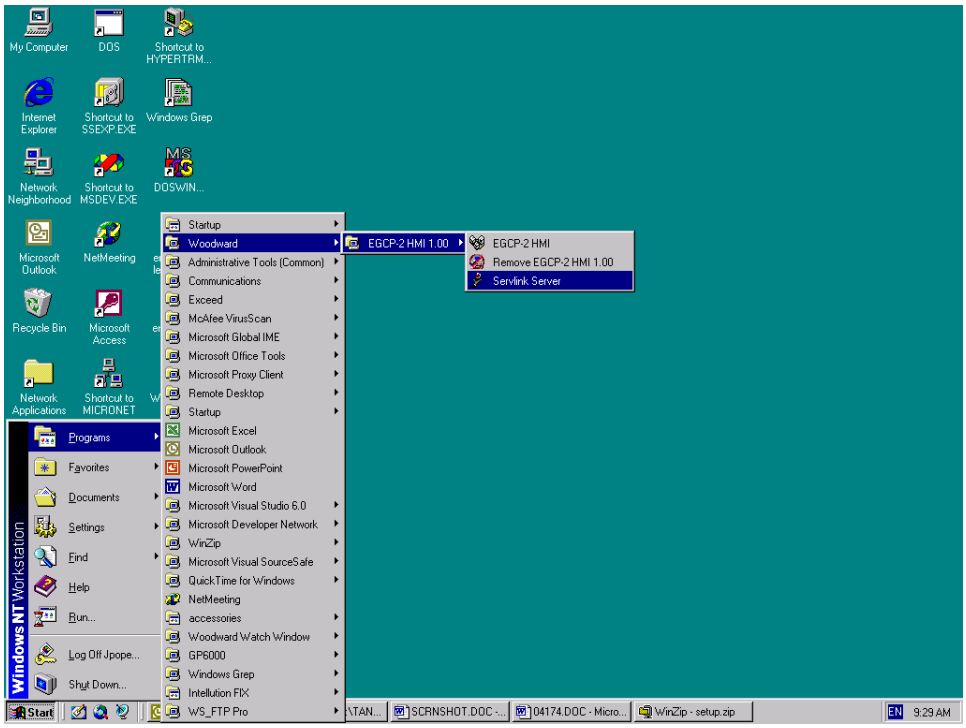
Modem connections are very similar, but now a modem is required both at the computer and at the EGCP-2 end of the network. The modem may be an internal or external type at the computer, and must be an external type at the EGCP-2 control. The conversion from RS-232 to RS-422 communications is made at the modem connection into the EGCP-2 control network.

For detailed wiring diagrams pertaining to the RS-422 network of the EGCP-2 controls, please consult the installation manual of the EGCP-2 control.

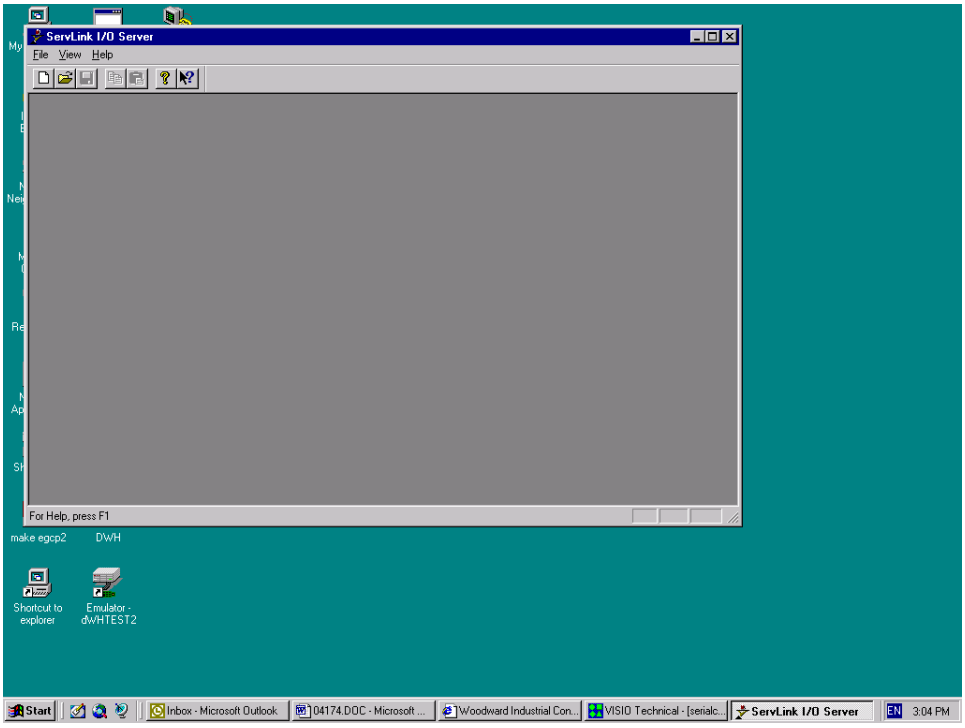
Chapter 4.
Monitoring Servlink Software Operation

Now that the software has been installed to the hard drive of the computer, and the desired hardware connections are in place between the computer and the EGCP-2 controls, the next step is to run the software and confirm operation of the entire communications network.

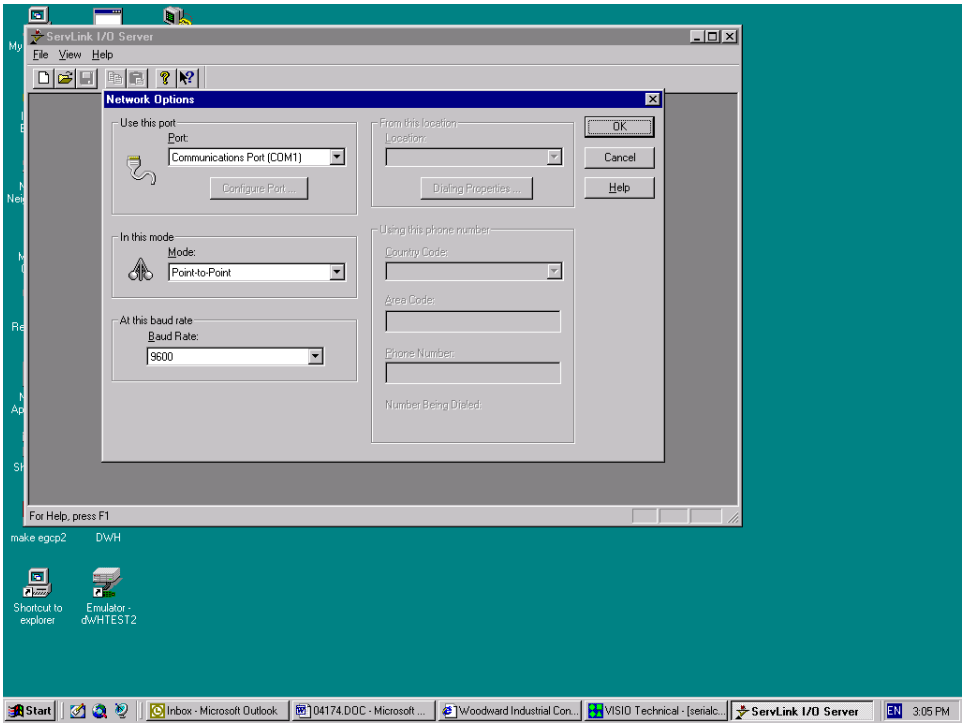
To run the EGCP-2 software, first click on the Start toolbar button in Windows desktop, then Programs, Woodward, EGCP-2 HMI 1.00, and then click on the Servlink server as shown here.



When you click once on the Icon, this screen will appear on the desktop. This is the Dialog Screen, where the type of communications you are using will be established prior to operation of the EGCP-2 monitoring software.



The first action to take inside the Servlink screen is to set up a new network definition file. Click once on **F**ile, and then on **N**ew as shown. The new network definition window will pop up on the computer screen.



This will open up the communications options screen. This screen allows the user to configure the Servlink connection via serial com port, or modem, as well as various communication protocol.

The screen shown above is the most important one in the Servlink software. The “Use This Port” box of this screen is used to select which communication port (COM) or modem will be used by your computer to communicate using RS-232 protocol to the EGCP-2 control. When you select a new file, the Servlink software automatically scans your computer’s operating system and lists any communications ports which are not being used by other applications, that may be used for serial communications.

You can use the scroll bar to the right of the Use Port dialog box to select the com port that will be connected for EGCP-2 communications.

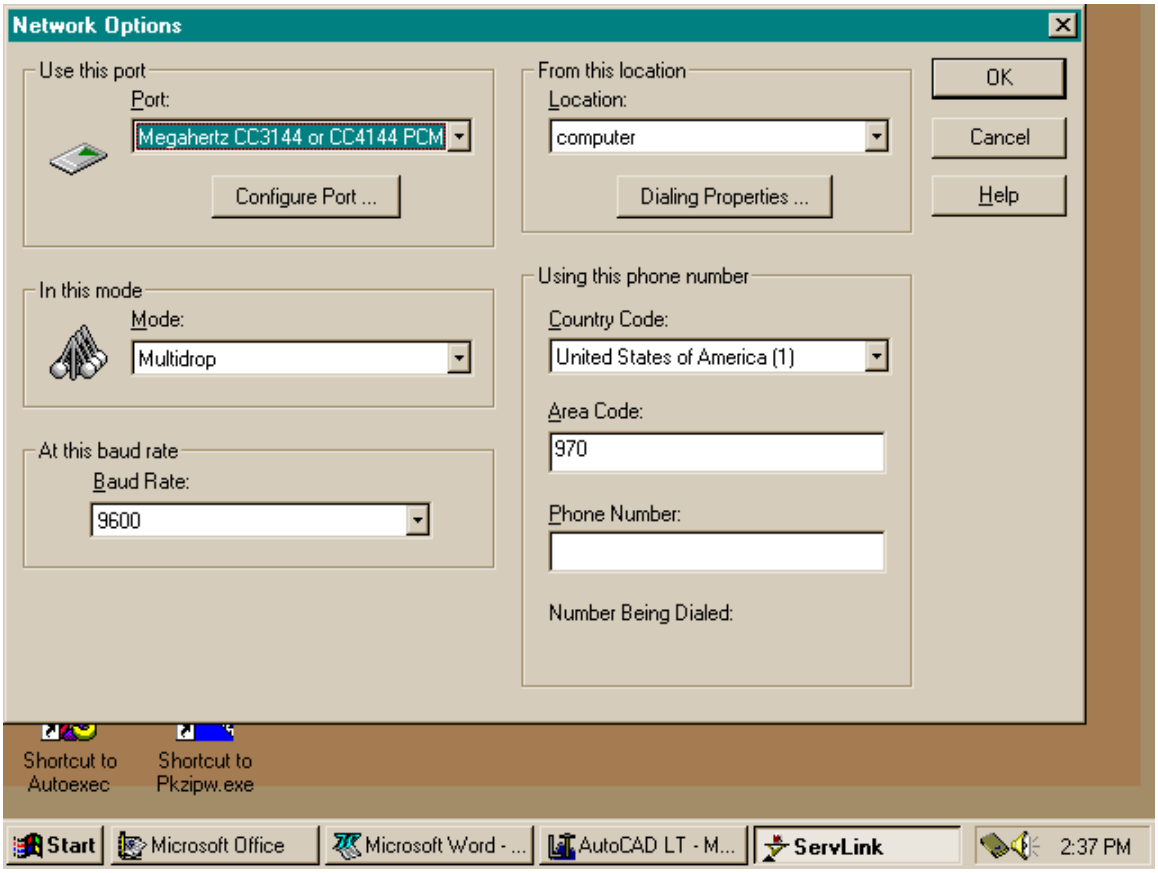
The next block down, “In this mode”, is used to select either multidrop or point-to-point communications over the serial port. Point-to-point communications assumes that the computer will be communicating with only one control at the other end of the network. Point-to-point communications should be used only when the communications between the computer and the EGCP-2 control are made in a direct fashion, (no secondary devices or other EGCP-2 controls can reside on the same network). There must be only the computer and one EGCP-2 control on the network for point-to-point communications.

The advantage of using the point-to-point communications mode option is speed. Since the communications are only between the PC and one EGCP-2 control, the Servlink software will scan for only one unit on the network. This takes less time than a multidrop communications mode, which scans for all eight units on the network, regardless of how many units are actually connected to it.

Use the multidrop communications option any time there are two or more EGCP-2 units that require monitoring from the computer on the same network.

The next box down is the “At this rate” box. Set this to 9600 Baud. The EGCP-2 is only capable of communicating at 9600 baud. Any other number put in this box will cause communication failure with the EGCP-2 control.

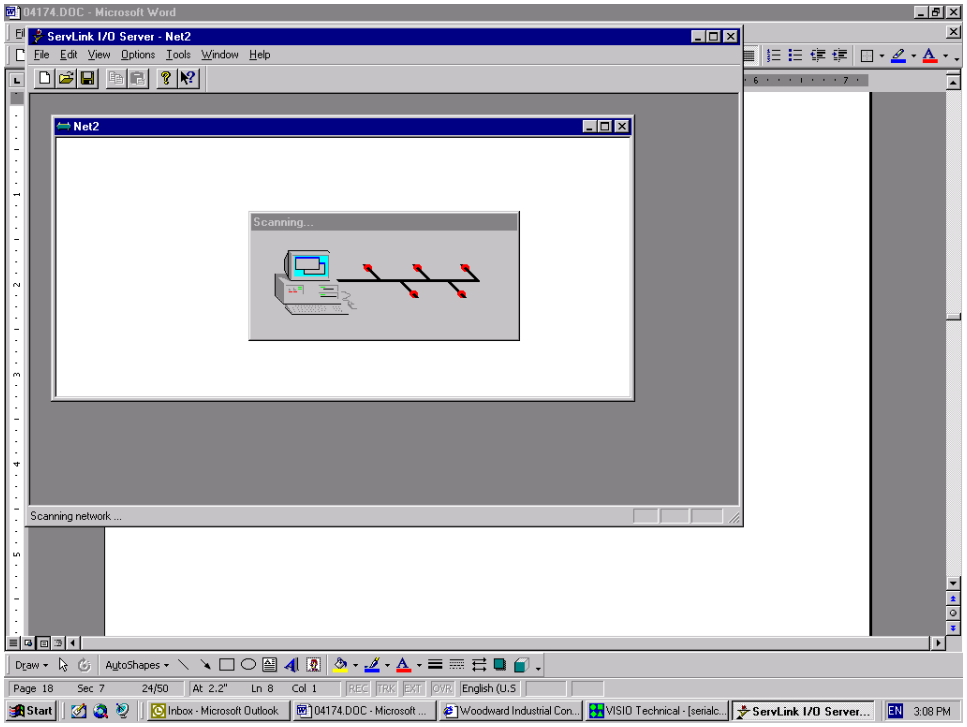
The boxes on the right hand side of the Servlink New File setup screen are normally turned “off” when the “Use This Port” box is configured for the COM ports of the computer. However, when the Modem option is selected in the “Use This Port” box, the boxes on the right hand side of the screen turn “on”, or become active, as shown below:



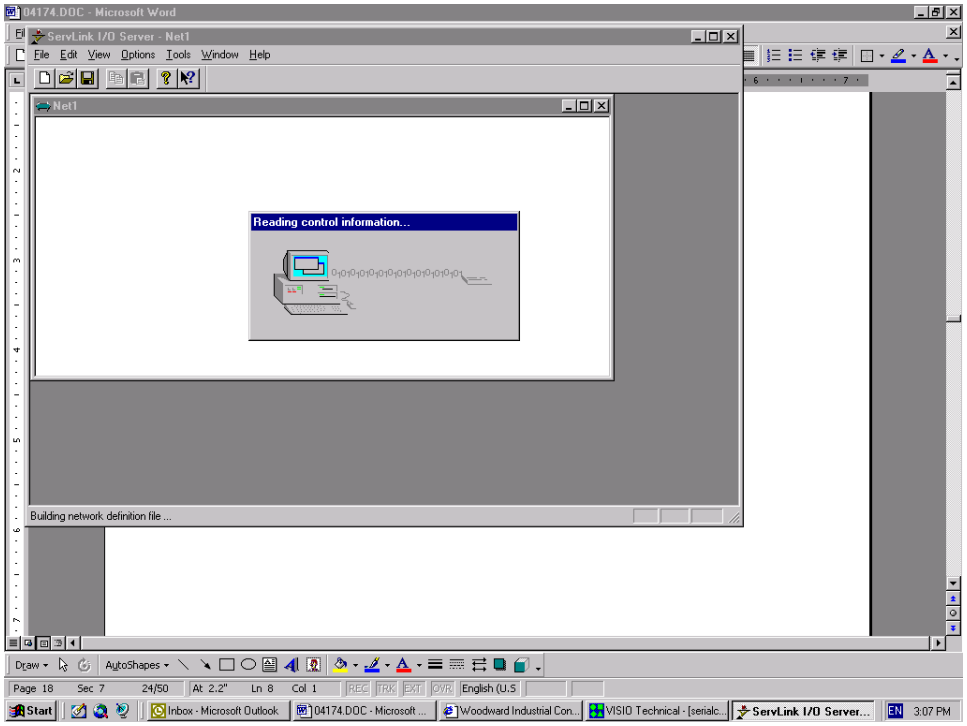
The box labeled “From this location” allows the user to set up various dialing properties for the modem, and store them under a user-defined name. These dialing properties include such functions as tone/pulse dialing, call waiting override, and adding any dialing prefixes to access external lines, etc.

The next box down on the right hand side of the screen is the “Using this phone number” box. Here information about the number of origin and the number to be dialed are entered by the user.

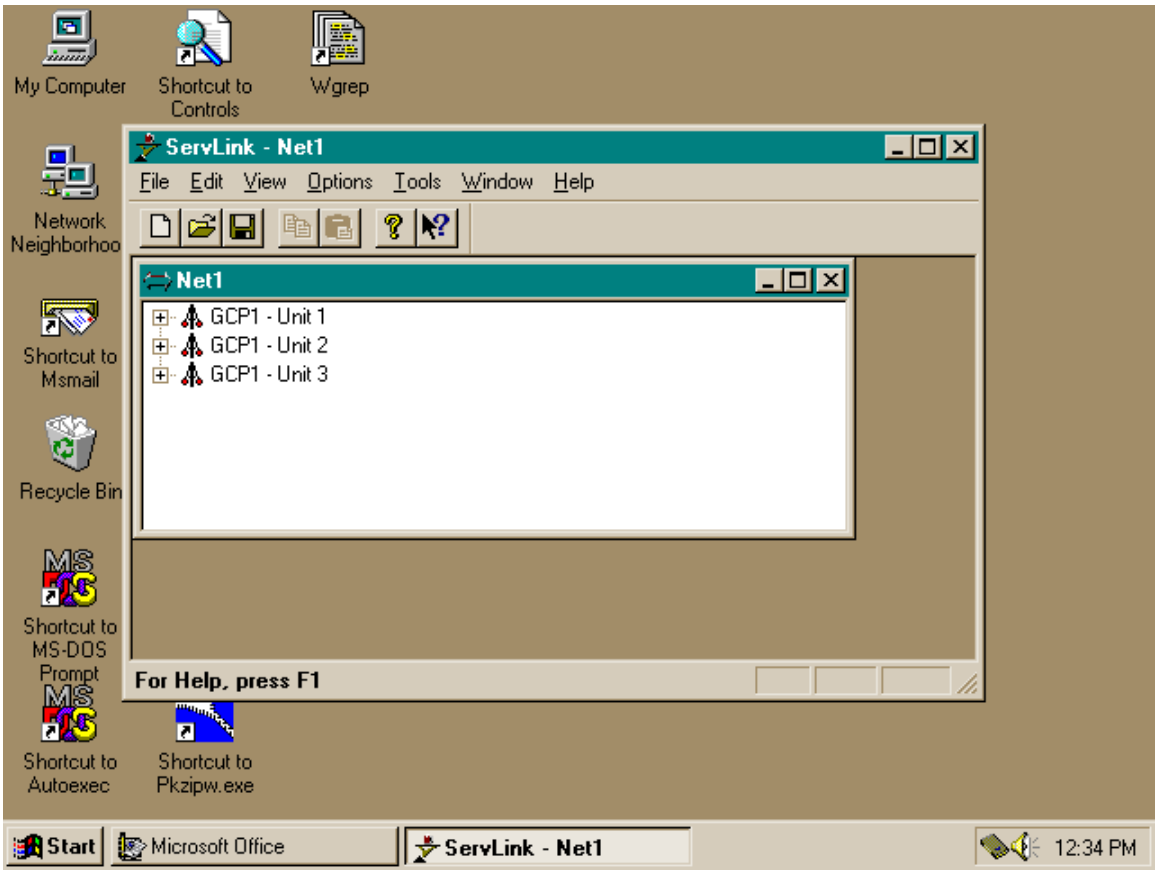
When all the various communications options are selected in the Servlink screen, press the OK button. Servlink will automatically dial the modem (if applicable) and scan the network for active controls. This may take several minutes, depending on network configuration. Here is what the screen of the computer looks like when it is scanning the network for active controls:



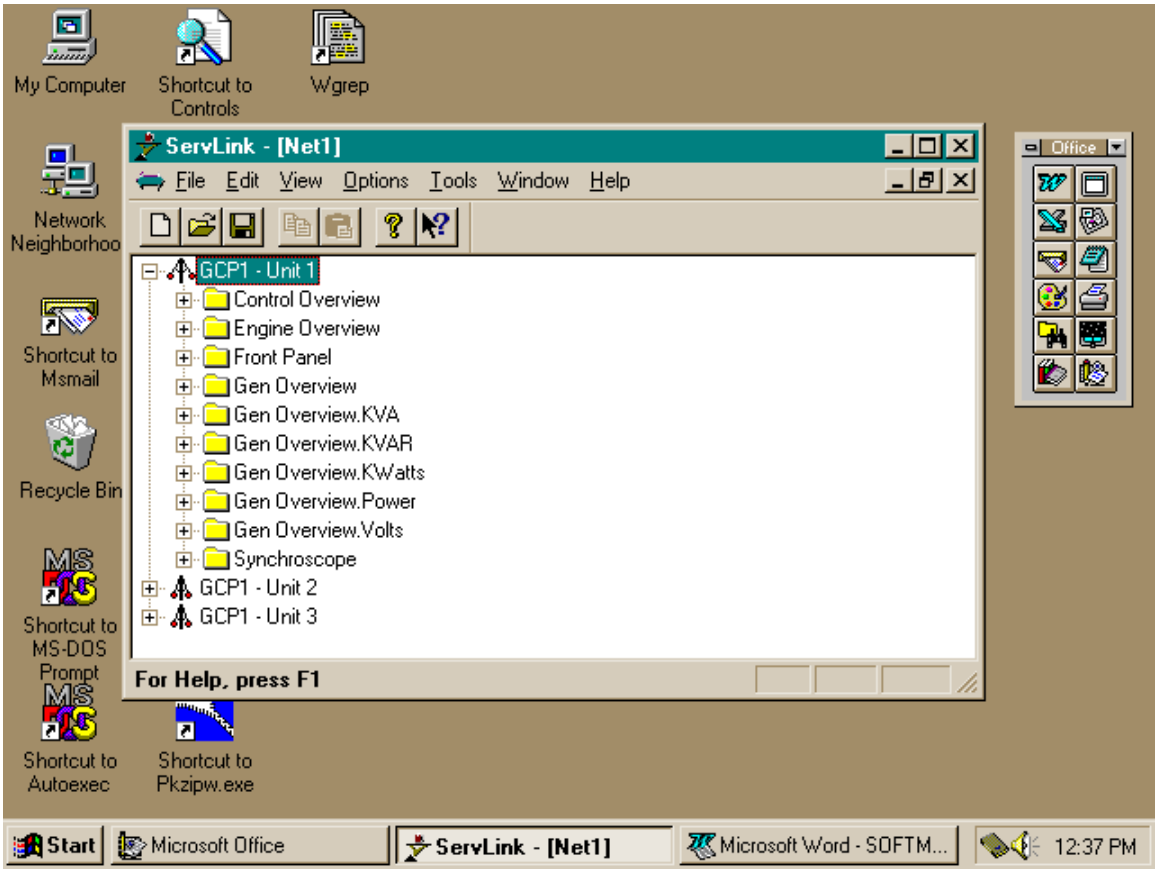
When communications are established with the EGCP-2 control network, the scanning screen will change to display that the UPCI Servlink software is reading the control information. That screen will look like this:



Once communications are established, and the data is read from the EGCP-2 control network, the UPCI Servlink software will show each control it is communicating on the network by that control's network address. Here is a typical Servlink network definition screen for a three-unit EGCP-2 network:



The Unit information is temporarily stored in a separate Servlink directory. To view the information in any unit directory, double click the mouse on the Unit symbol. The information for that Unit that is on the network will be displayed. This is what a typical EGCP-2 control network interface directory (as shown in Unit 1) contains. This information is used by the EGCP-2 Control Panel software.



If your network configuration is constant (neither the number of controls on the network nor the PC attached to the network will change), you may want to save the Network Definition File you have created for Servlink. To do this, click on the **F**ile button in the upper left hand window of Servlink. Select “Save **A**s”. A dialog window will pop up and ask you to name the new network definition file you have created. Typically, this file will be stored in the EGCP-2 directory on the hard drive of the computer Servlink is operating from. The file name given to the network definition file will have a “.net” extension. Once you have selected a file name, click on the OK button in the dialog box. This saves the network definition file you created.

Once you have created and saved the network definition file for Servlink, all you have to do in the future to run the definition file is open Servlink from the Programs Menu in Windows 95, and select **F**ile, and then **O**pen. When Open is selected, a list will appear containing the network definition file you created. Select the desired network definition file, and Servlink will automatically select the necessary communications options defined by the file and establish a communications link with the EGCP-2 control network.

Now that Servlink has established a reliable network connection, you may want to “minimize” the Servlink window by clicking on the Minimize button in the upper right hand of the Servlink Window. When you minimize an application, the software continues running, but the window is reduced to a button on the desktop toolbar. You can restore the application window to full size at any time by clicking on the reduced toolbar button for that software with the left mouse button.

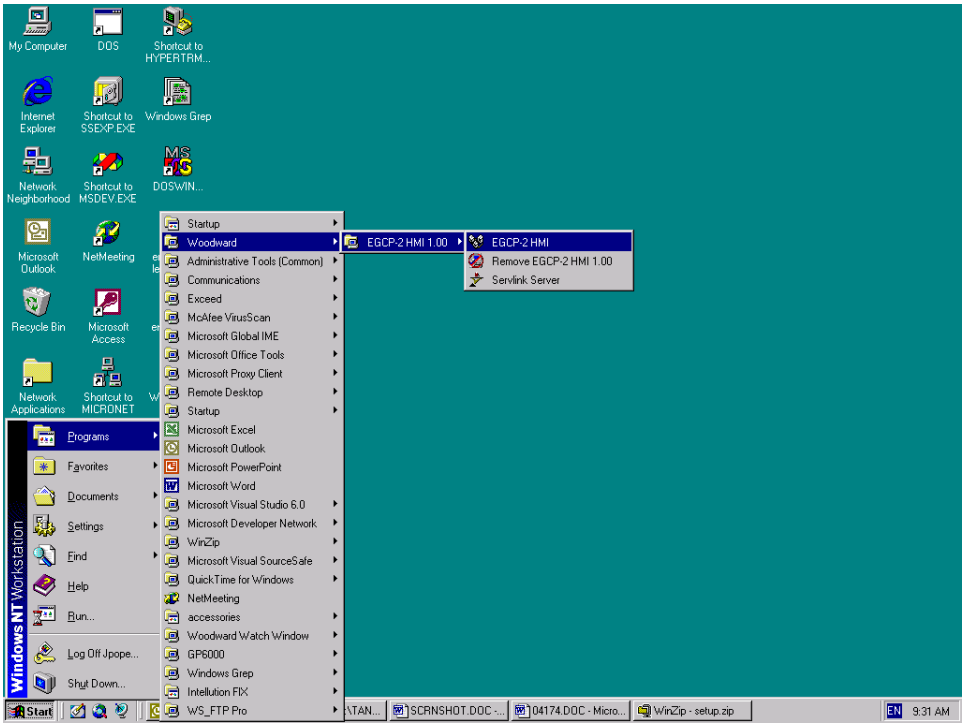
IMPORTANT

Terminating Servlink will result in loss of communications with the network. The Servlink Network Definition file will have to be executed again to re-establish this link.

Operating EGCP-2 Monitoring Software

Now that the communications link is established between the computer and the EGCP-2 controls, the EGCP-2 Monitoring Software Tool can be used to view the various parameters of each control on the RS-422 network.

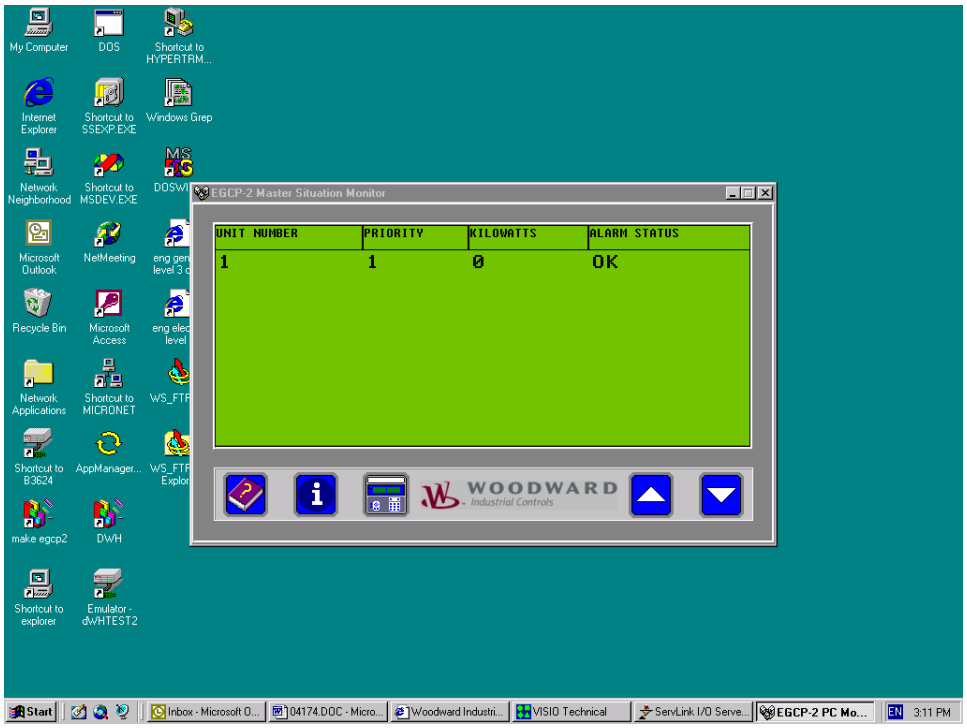
To open the EGCP-2 controls program, click once on the Start button in the Windows 95 desktop toolbar. Select Programs, Woodward, EGCP-2 HMI 1.00, and EGCP-2 HMI. Click once on the EGCP-2 HMI icon to execute the monitoring program, as shown below:



On clicking this icon, the EGCP-2 Monitoring Software will connected to the RS-422 network .

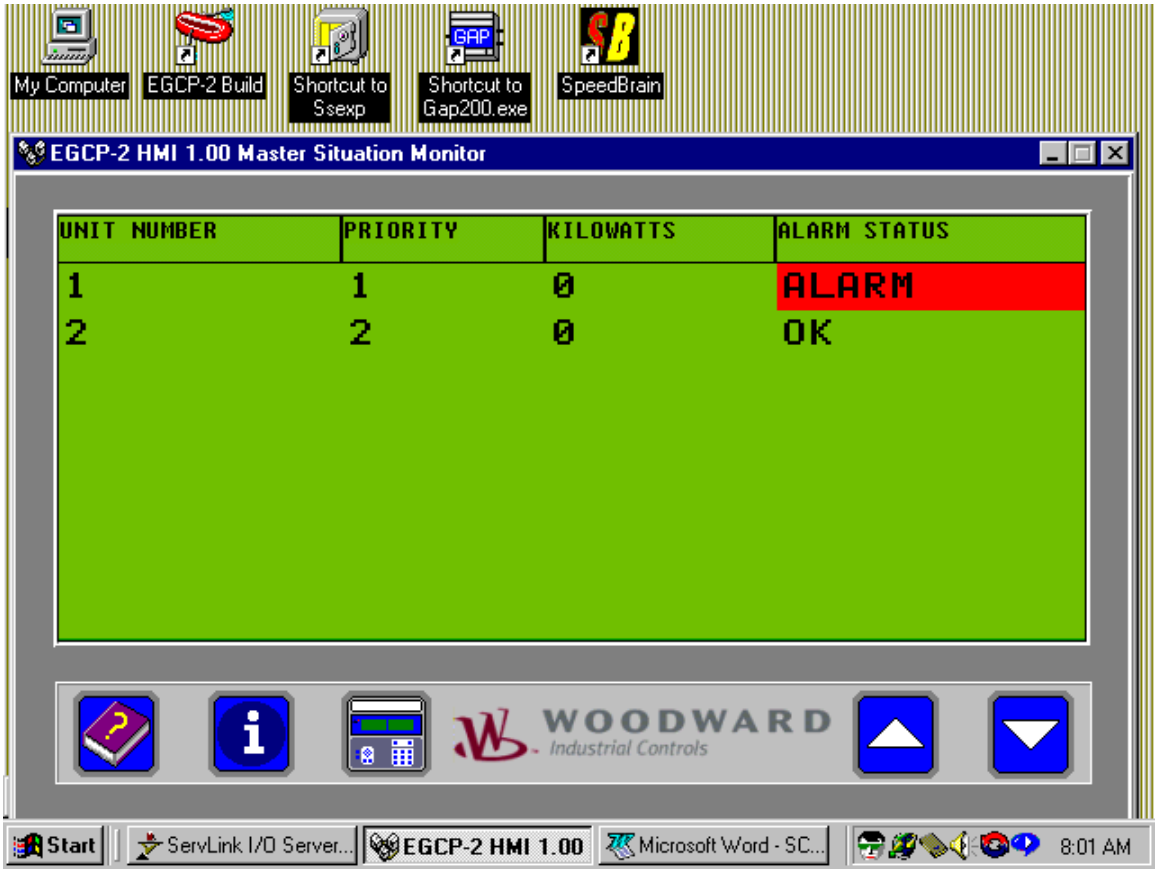
When the control information is linked to the EGCP-2 monitoring software, the LCD display on the hardware units will display an asterisk (*) cursor instead of the usual solid block cursor. This allows operators of the EGCP-2 to recognize the units are being accessed by remote control simply by glancing at the display screen of the hardware units.

When the control information is linked to the EGCP-2 monitoring software, the Master Situation Monitor screen will appear. This screen will show all EGCP-2 controls connected to the network, and their various status information, as shown here:

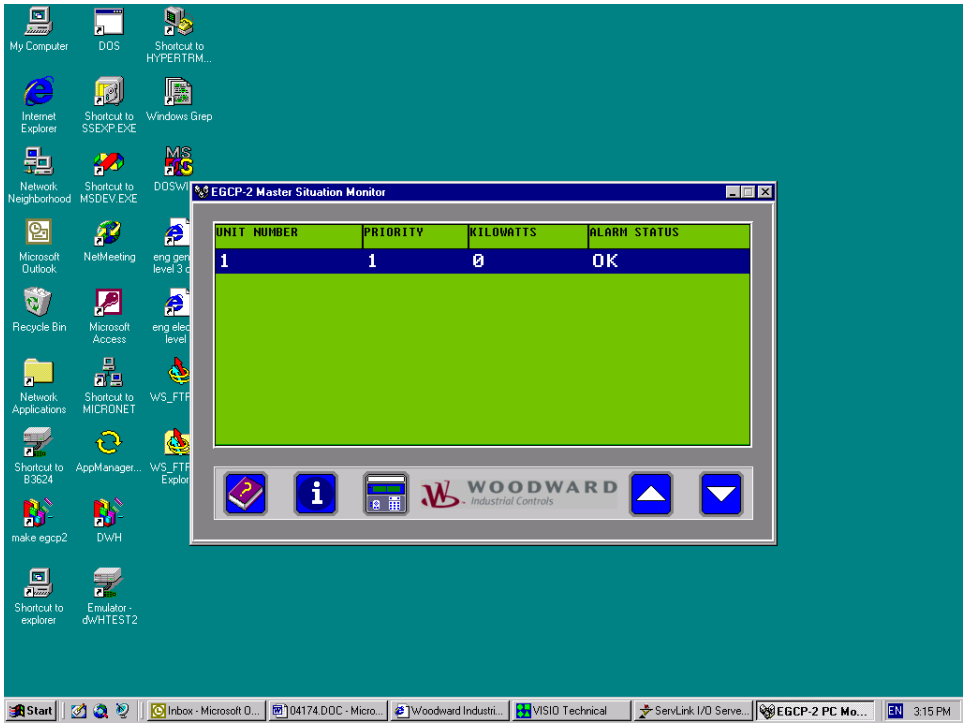


This Master Situation Monitor Screen is showing a single unit EGCP-2 network at 0 kW with no alarms.

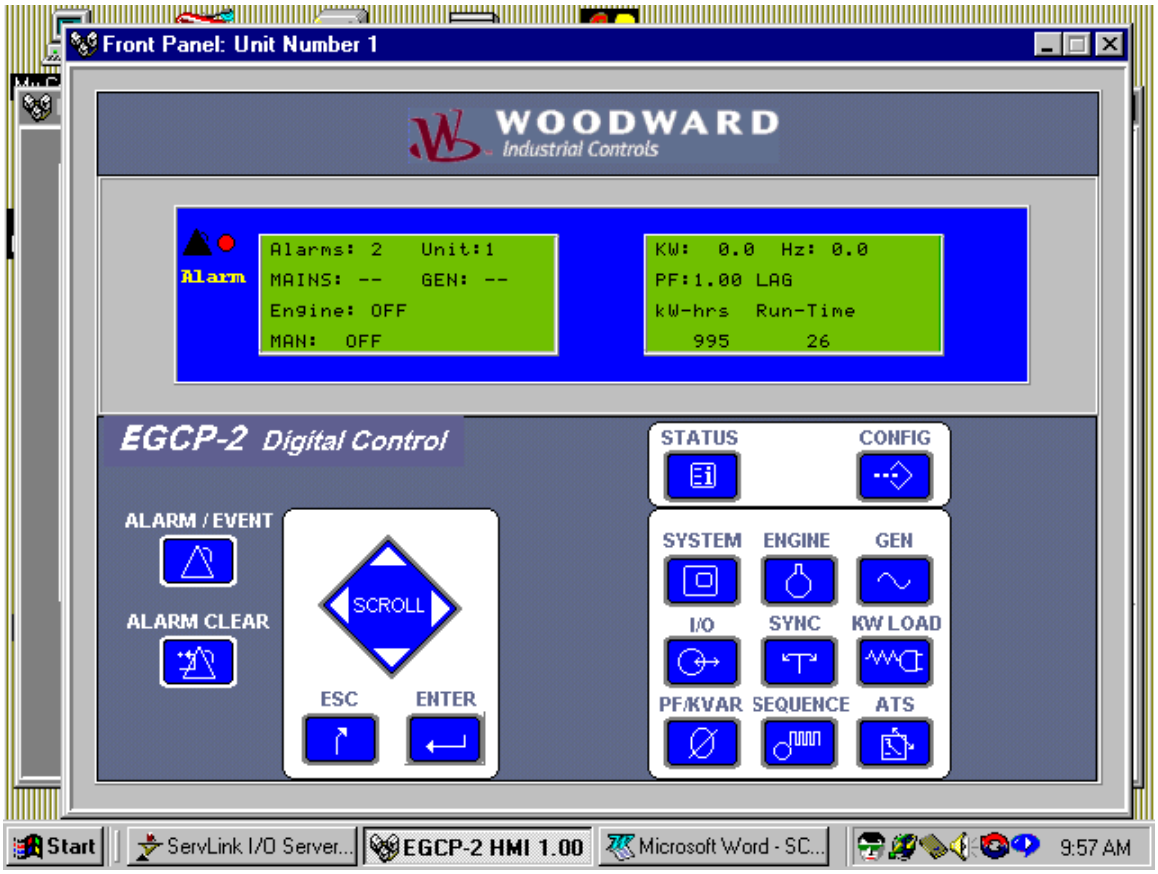
Here is another example of the Master Situation Monitor screen with two units at 0 kW with unit number one showing alarm indications. This implies that there are currently active alarms on the EGCP-2 control assigned network address one (1).



To view a specific unit's front panel display, highlight the unit you wish to observe using a single click of your mouse on that unit's display line in the Master Situation Monitor, as shown here.



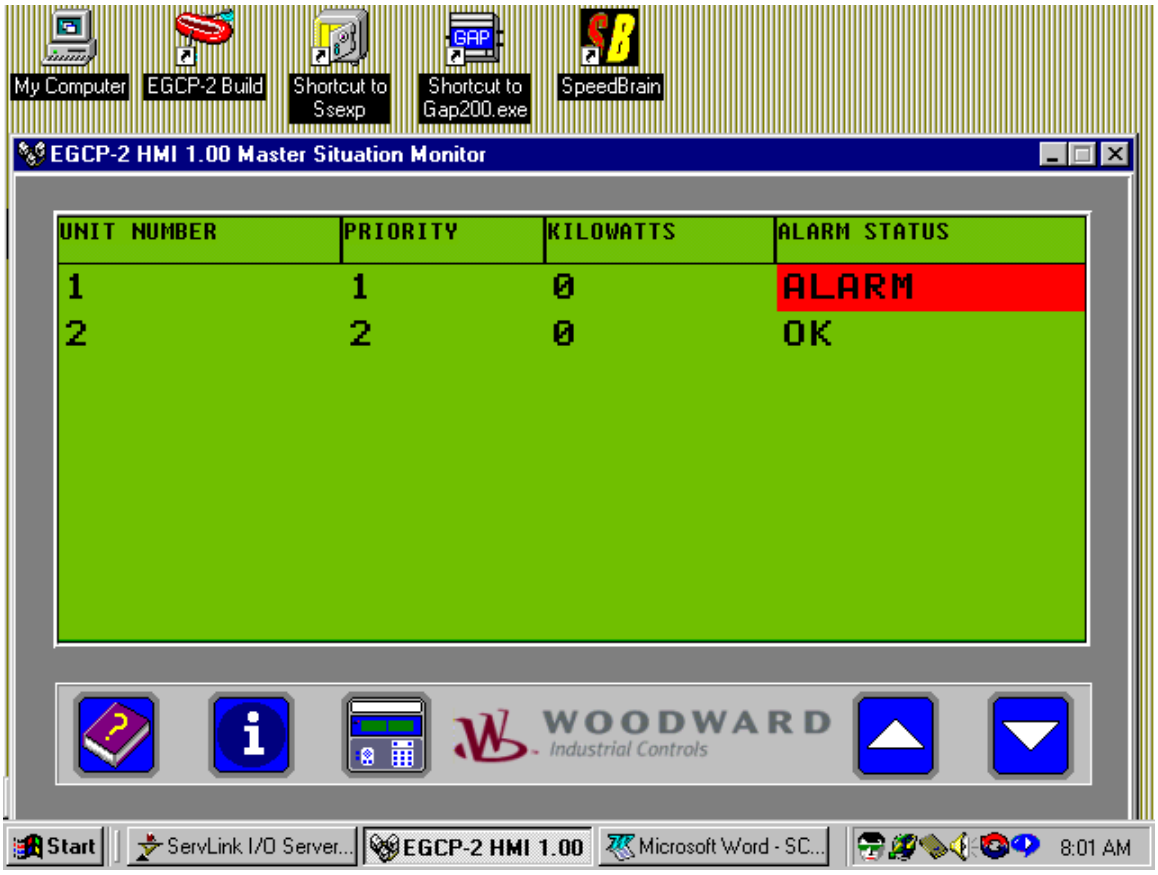
Once the line is highlighted, click the left mouse button on the front panel icon at the bottom left of the Master Situation Monitor screen. The Front Panel Display for that unit EGCP-2 (Unit 1 in this case) will pop up on the display of the computer as shown below:



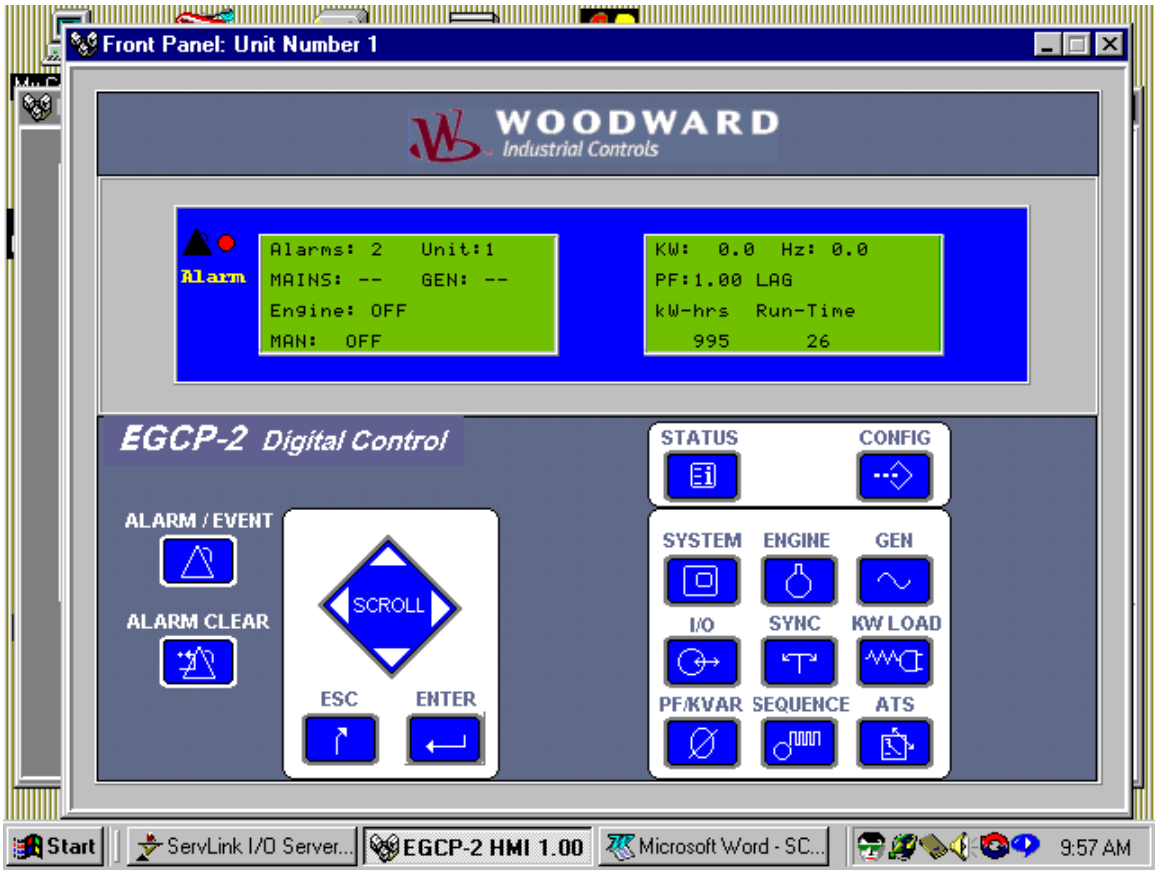
Multiple units can be viewed on the Windows desktop simultaneously. Each unit is “stacked” on top of the others. You can view any unit by clicking the left mouse key once on any part of that unit’s Front Panel display window, or if the front panel display has been minimized, by clicking on the minimized bar for that front panel on the desktop. Here is a screen shot showing a two unit system with both front panels on the desktop. Notice that the unit is identified on the upper left hand side of the front panel display bar.

The front panel display of the EGCP-2 monitoring software allows access to any monitoring information available on the actual unit. The buttons of the front panel operate in the same manner as the EGCP-2 as well. The front panel display operates in the same manner as most desktop windows, except that the size of the front panel display cannot be changed or maximized. The front panel display can be closed by clicking the X button in the upper right hand corner, or minimized to toolbar buttons using the under bar [_] button in the upper right hand corner. If a front panel display window is closed, it must be re-opened from the Master Situation Monitor.

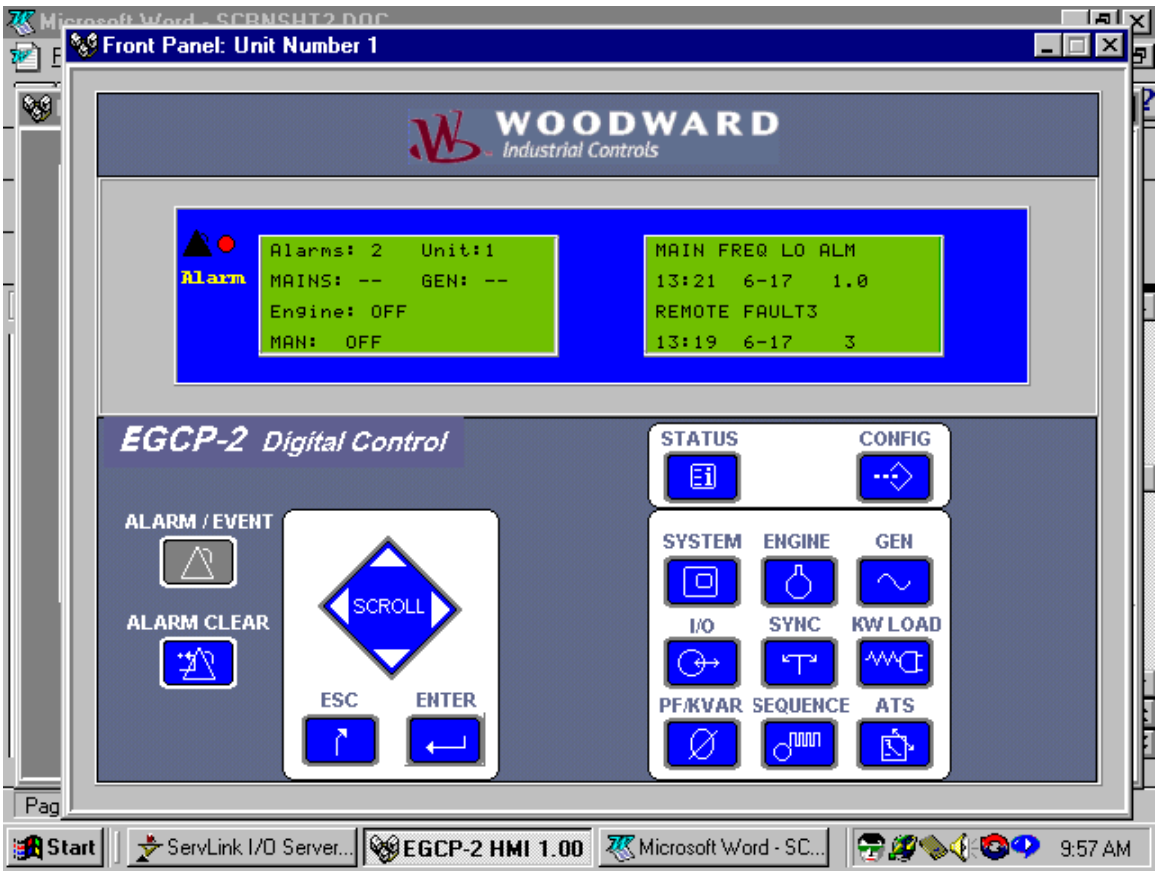
For example, to view an alarm condition on Unit 1, as seen from the Master Situation Monitor, below:



The Master Situation Monitor is showing an alarm condition on Unit #1. Highlighting Unit #1, and then clicking on the front panel display icon in the lower left corner of the Master Situation Monitor brings up the front panel display for Unit #1 .

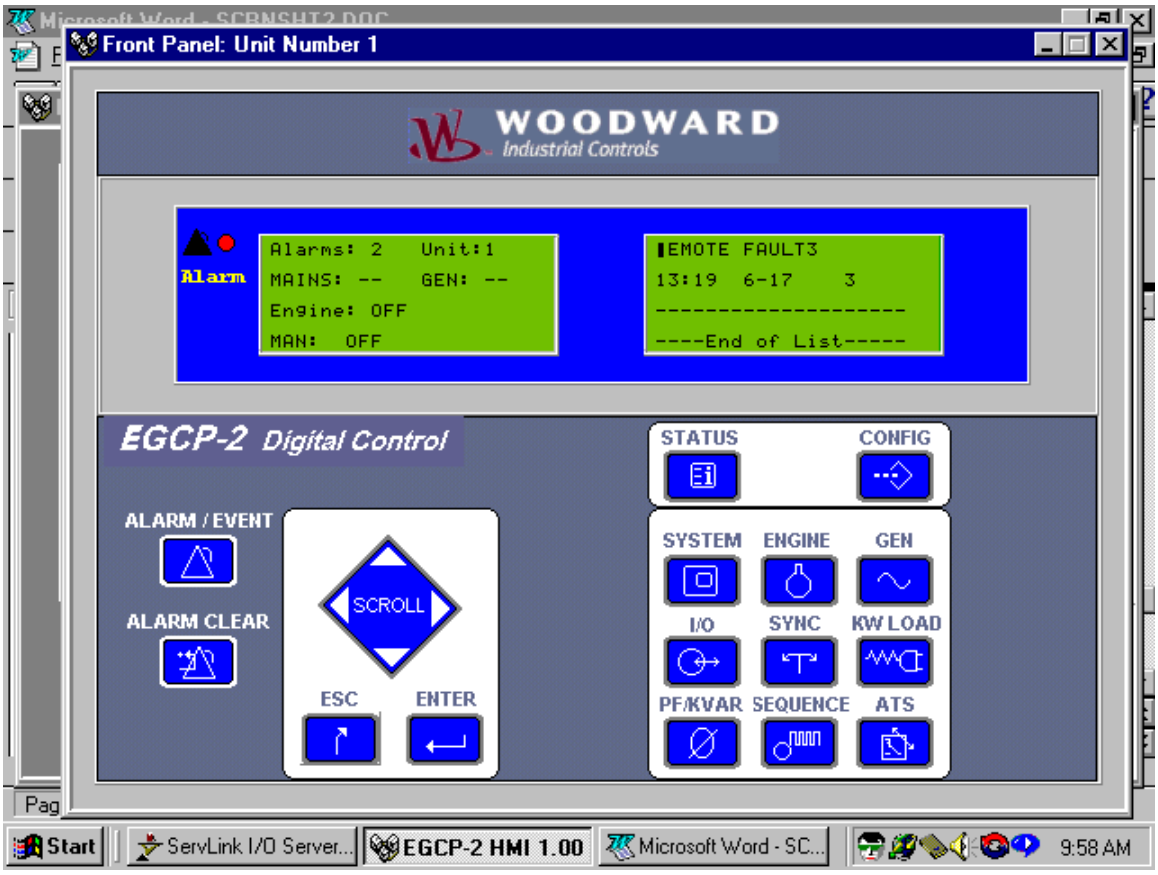


The front panel display for Unit 1 indicates two alarms in the System Status menu. Clicking the Alarm/Event button with the left mouse button will display the Alarm / Event Log of the control to the right hand LCD display as shown below:

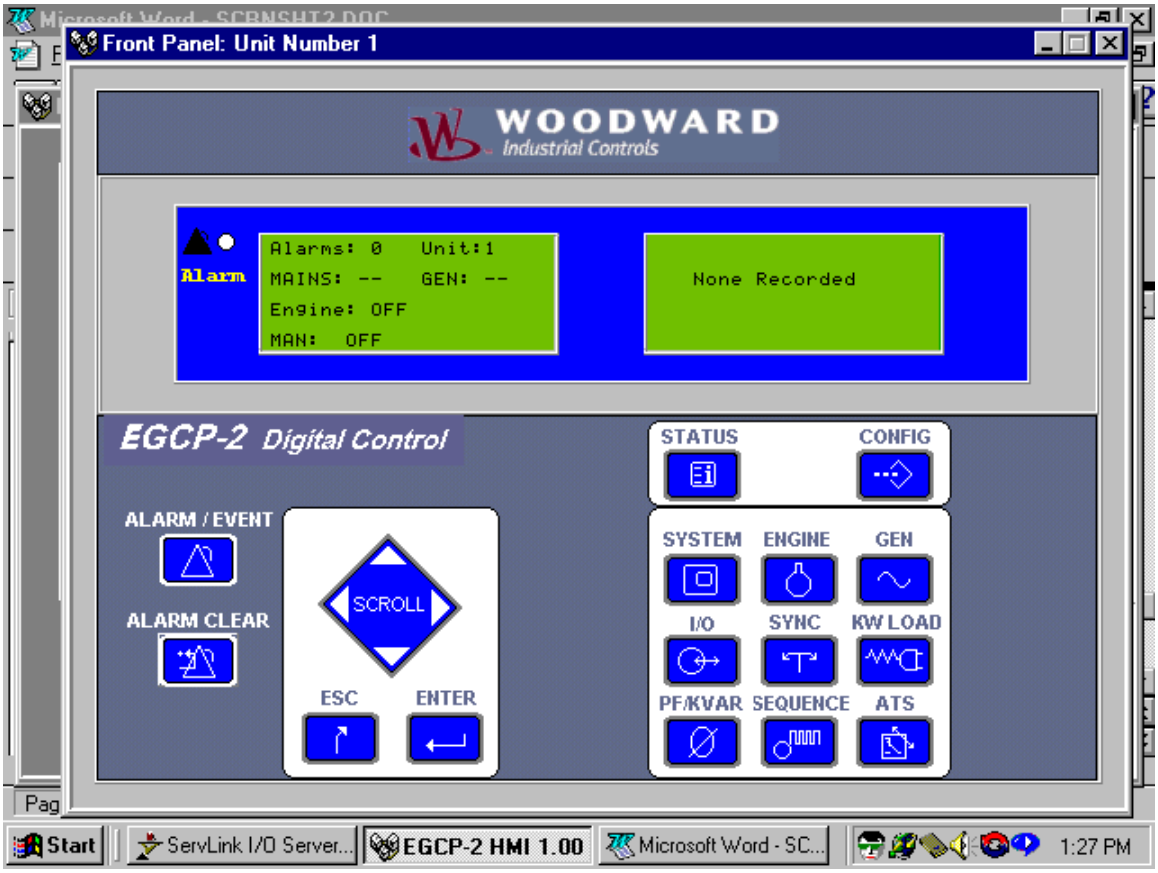


The alarm event list shows two alarms. The most recent is a Mains Frequency Low Alarm logged on June 17 at 13:21, and the other is a Remote Fault 3 discrete input driven alarm logged on the same date at 13:19 hours.

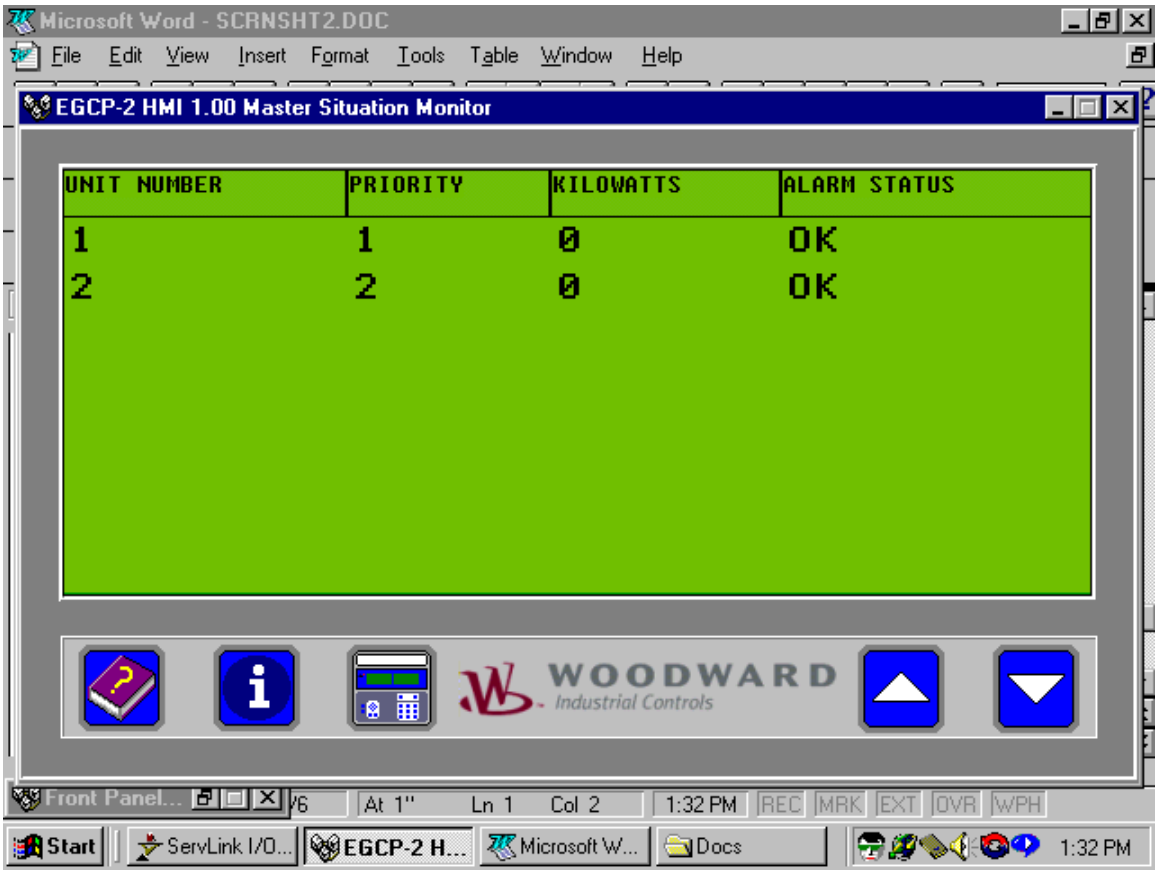
Pressing the Scroll Down key as shown below scrolls the alarm event list in the right hand display to show the end of the alarm event log list, as shown below.



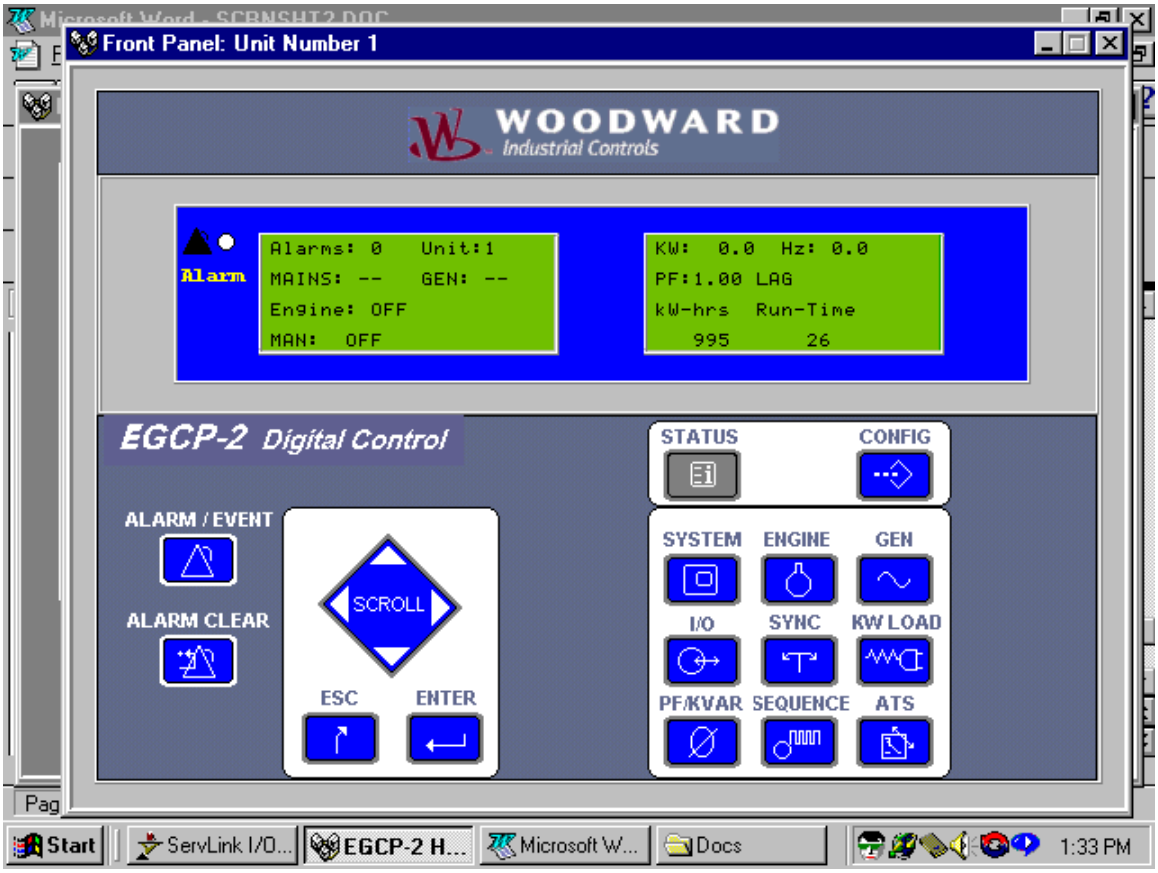
Pressing the Alarm Clear Button results in the logged alarm events being removed from the alarm event list. When all alarms have been cleared, the list displays “None Recorded” as shown.



The Master Situation Monitor display now reflects the cleared alarm state of unit number 1:

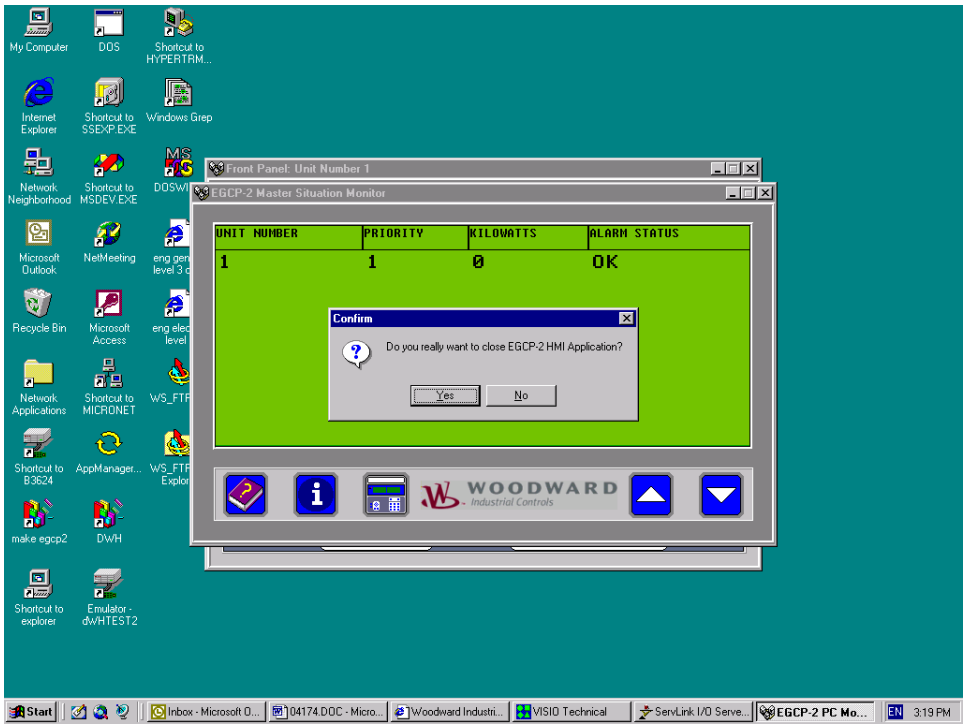


Pressing the Status button on the front panel display will revert the EGCP-2 display back to the status mode. Now both left and right displays show the status information for the item selected.



Using the Status, Configuration and Alarm/Event keys on the front Panel Display will provide access to any screen and function that is normally available to the users operating the unit directly from the front panel of the EGCP-2. For more information on how to navigate between the various menus and menu items in the EGCP-2, see the EGCP-2 Operators instruction manual.

To shut down the Master Situation Monitor, click once on the “X” button in the upper right hand corner of the Master Situation Monitor. This button A pop-up window will ask the operator to confirm the choice to shut down the EGCP-2 Monitoring Software as shown:



Selecting Yes will shut down the monitoring software. If No is selected, the Monitoring software will not shut down, and will continue to monitor the control network.

Once the Monitoring software is shut down, the Servlink software must also be terminated to shut down the external communication link over the RS-232 port of the computer.

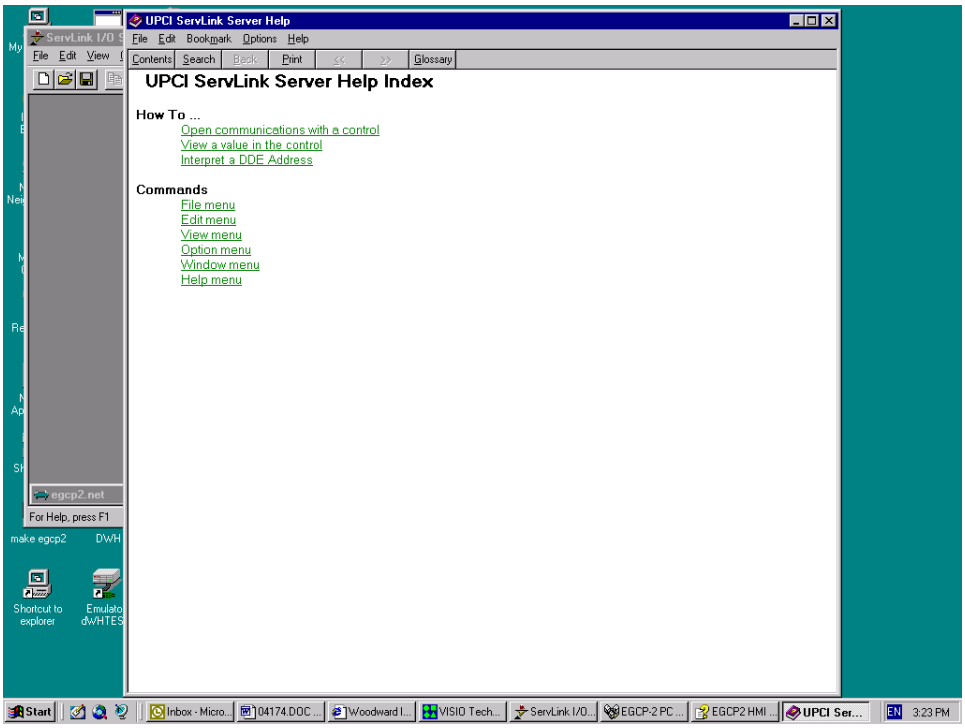
This can be done by selecting the File, and then Exit commands from the Servlink Window, or by pressing the X button in the upper right hand corner of the Servlink window. Servlink will prompt the operator if changes in the network (if any had occurred) need to be saved, and then terminate the connection.

This concludes a typical EGCP-2 monitoring session using the Servlink Software and EGCP-2 monitoring tool software.

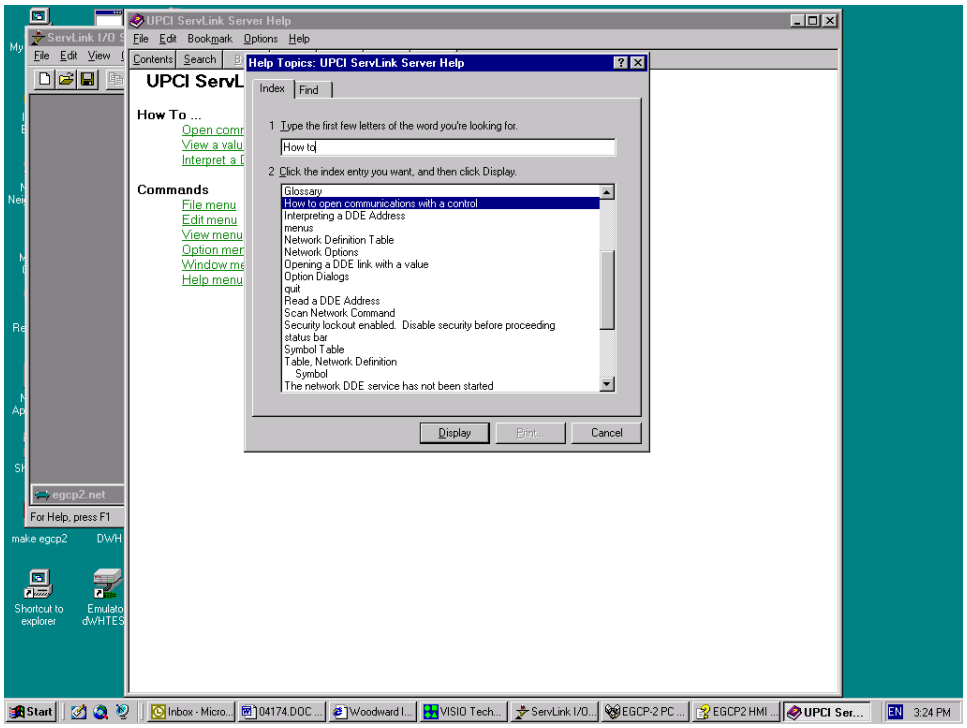
Chapter 5.
Servlink Software On-line Help

The Servlink and EGCP-2 software have extensive on-line help for operators using these powerful network tools. The on-line help is very similar to any on-line help found in Windows applications. There is a Help heading at the top of both the Servlink and EGCP-2 control windows which bring up specific help categories when clicked on using the left mouse button. Usually it is easiest to select the Index from the help categories for listing or searching for specific operating instructions.

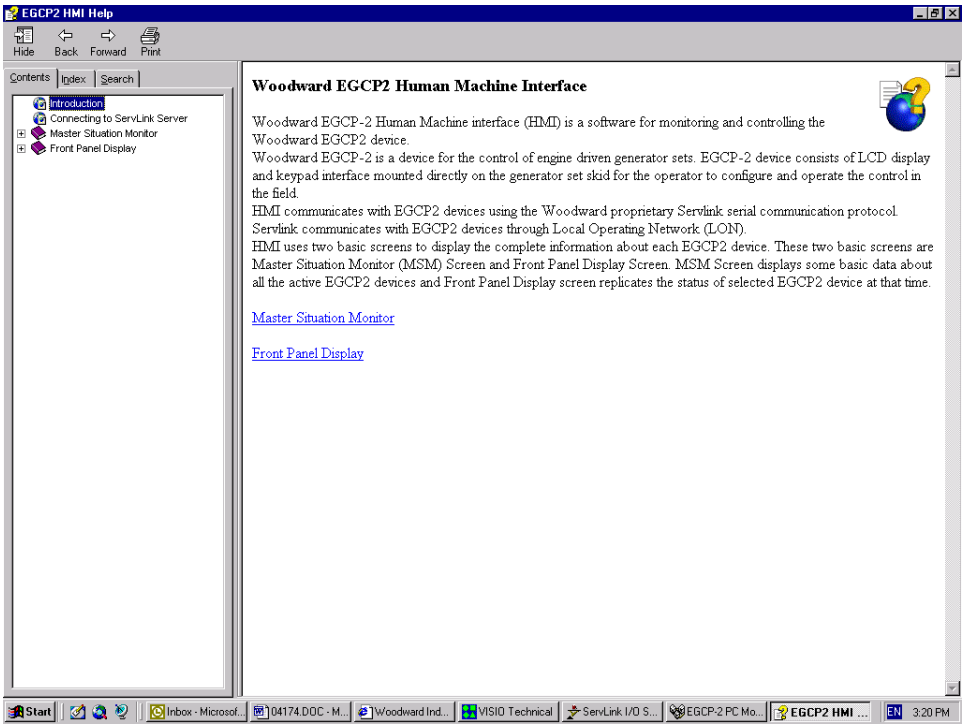
Here is the Help Index listing for Help files in the Servlink software:



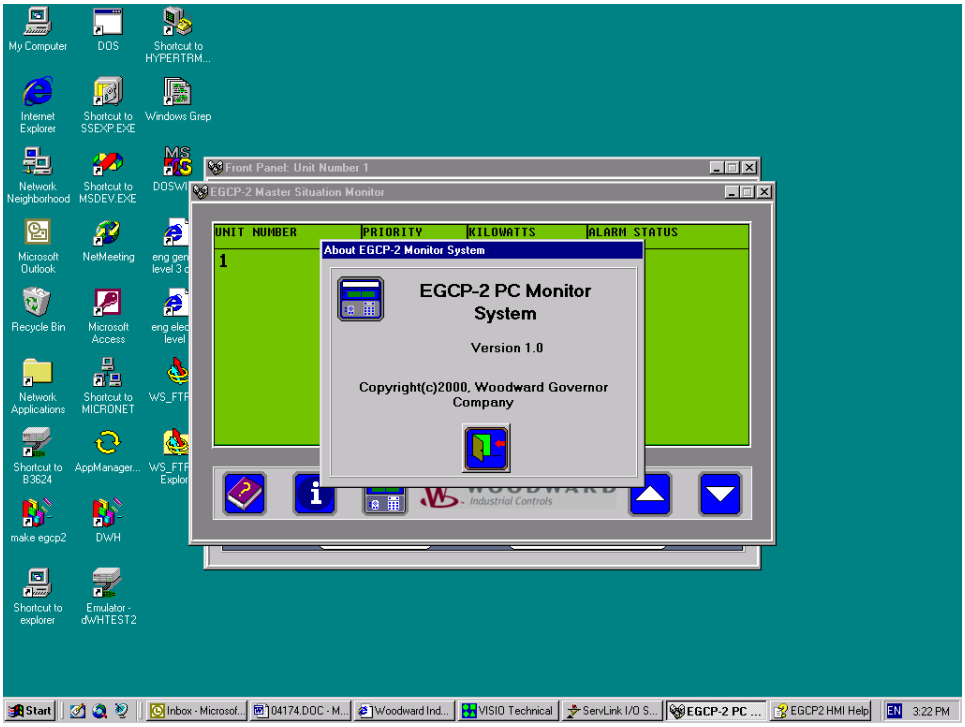
Clicking on any Index listing will take you to help information specific to that listing, or you may use the Search engine at the top of the help index to find a specific help subject. The illustration below shows a search window for the words " How to":



Similarly, the EGCP-2 Master Situation Monitor has on-line help facilities which can be accessed by clicking once on the “?” button of the Monitor window with the left mouse button. This will bring up the EGCP-2 Monitor help screen. This help screen operates identically to the Servlink help screen.



Pressing the “i” button on the Master Situation Monitor provides the name, revision number, and Copyright information for the EGCP-2 HMI software, as shown below.



Chapter 6.
Modbus RTU Communications for the EGCP-2 Panel

This Chapter is the Modbus® addresses for the following part numbers.

EGCP-2	Software
8406-115	5418-002 NEW, A, & B
8406-116	5418-002 NEW, A, & B

To view the software version in the EGCP-2:
1. Select the **Config** key on the front panel.
2. The right side of the display will say **Security Code**.
3. Select the **Enter** key on the front panel.
4. The software version will be displayed on the ***bottom of the right side of the display***.

The Modbus ID configuration menu item is adjustable from 1 to 247. This address identifies the Modbus Slave to the Modbus Master using this address. The Modbus address chosen for any particular EGCP-2 panel should be different from any other devices on the Modbus network.

IMPORTANT **The Network Address of the EGCP-2 panel is not linked to the Modbus ID in any way.**

Modbus Time-out is located in the Sequencing and Comms configuration menu. This item is the time, in seconds, which the EGCP-2 panel will wait before either receiving a valid message from the Modbus master, or indicating a Modbus failure. The EGCP-2 panel indicates a Modbus failure in the bottom two lines of the Modbus Timeout and Modbus Reset Sequencing and Comms configuration menu items. This display shows Link failure (failure to receive a valid message from the master) as true/false, and an error number, which is associated with the type of failure. For example, LF-XF 0 is the indication of a healthy Modbus connection with a Link Failure of False and a failure number of 0. The Link Failure is a latching-type indication, and requires the Modbus Reset menu item to be toggled from True to False in order to reset. See Table 6-3 for a list of common error numbers that may be seen in the Load Control Monitor Display.

The Modbus Reset is located in Sequencing and Comms configuration menu. It is used to reset any failures indicated on the Modbus serial communications, and also to restart the Modbus Time-out timer from zero seconds. The Modbus Reset should be left at FALSE, and turned to TRUE only to provide a reset action on the Modbus. Once the reset is accomplished, the Modbus Reset must be returned to False again.

The Modbus communications used by the EGCP-2 panel operate at 9600 baud, with 8 data bits, 1 stop bit, NO parity, and NO flow control. The protocol used is Modbus RTU (Master/Slave).

Reply Time-out, Delay, and Number of Retries for the Modbus Master must be configured to meet the requirements of the entire Modbus network and the devices communicating on that network. See Table 6-4 for more information on typical settings.

Addresses 00001–00016 Boolean Writes

The Boolean write variables can be used for remote control of the EGCP-2 over Modbus. Fourteen variables are available to mimic the fourteen discrete input switches. The Gen CB Aux input and Mains CB Aux input are not included in the Modbus addresses. They must be hard wired to the control.

If remote control is desired, the control must first be placed in the "Modbus Control Mode". The Auto, Test, and Run With Load inputs are used to determine whether the control is in the Modbus control or Hardware control mode. To activate the Modbus mode, all three of the addresses 00001, 00002, and 00003 must be set. It is not required that these Modbus inputs be different from the actual hardware inputs, but all three must be set before any remote control can take place. For example, if the Auto, Test, and Run With Load inputs were all open, the user could send a False command to addresses 00001, 00002, and 00003, and the control would switch from the Hardware control mode to Modbus control, but no action would take place. Table 6-1 shows some examples of how this switching takes place.

Table 6-1. Examples of Modbus Control Mode Switching Logic

Starting Mode	Auto Input 1	Test Input 2	Run WL Input 3	Auto 00001	Test 00002	Run WL 00003
Hardware	**Open**	**Open**	**Open**	**Set to False**	**Set to False**	**Set to False**
Result	**All three Modbus commands were sent so the Control mode changes from Hardware to Modbus. No action is taken because the control remains in the OFF mode.**					

Hardware	**Open**	**Open**	**Open**	**Set to False**	**Set to True**	**Set to False**
Result	**All three Modbus commands were sent so the Control mode changes from Hardware to Modbus. The Test input is set to True so the control will go into the TEST mode and the engine will start. If the Modbus commands were sent one at a time in the order of Auto, Test, Run WL, it would be after the Run WL input was sent that the engine would start, because it was the third one required, not after the Test input was set True.**					

Modbus	**Open**	**Open**	**Open**	**Set to True**	**False**	**False**
Result	**Modbus control has already been established. None of the discrete inputs change, so the unit is placed in the AUTO mode.**					

Modbus	**Open**	**Open to close**	**Open**	**True**	**False**	**False**
Result	**Modbus control was established in the AUTO mode, and the Test hardware input was closed. This will switch the control into the Hardware control mode. The unit would go in to the TEST mode and would start.**					

Modbus	**Open to close**	**Open**	**Open**	**True**	**False**	**False**
Result	**Modbus control has already been established. The Auto hardware input was closed. Since the hardware now matches the Modbus, no action is taken. The control remains in the Modbus mode until the switch configuration is made different from the Modbus inputs.**					

Once Modbus control has been established, the Modbus inputs can be viewed on the I/O Status screen. There is no indication that the control has seen three successful Modbus input messages.

The four momentary switch inputs to the EGCP-2 (Voltage Raise/Lower, Speed Raise/Lower) are internally (EGCP-2 software) timed to open after a one second ON time.

This means that if the EGCP-2 receives an ON command via Modbus for any of these four switches, the unit will turn the switch ON for one second, and then turn the input OFF. If the Modbus update for the ON command occurs again within the one-second period, the EGCP-2 will continue holding the switch ON until one second after the last active Modbus On update is received.

Addresses 10001–10071 Boolean Read
The Boolean Read variables are True/False inputs that show the positions of the hardware, the alarm status, and some system status readings.

Boolean Read 1 (10001) will be true whenever the control is switching between the Mains and Bus PT's via the PT disconnect relays.

For the engine and generator alarms, variables 34 through 62 (10034–10062), these will only go true after the delay time has been satisfied and will remain true until the alarm is cleared from the alarm log. If the corresponding alarm is set to the Disable level, it will not be seen in the Modbus variable.

Boolean Read 71 (10071), PF indication will be True to indicate a leading voltage and False to indicate a lagging voltage.

Addresses 30001–30073 Analog Read
The Analog Read variables are numeric representations showing the measured values of the control inputs, the alarm level type, and the mode of operation for certain functions of the control.

These values use a signed integer format that does not support decimal places. In order to view the decimal places on certain variables the value is multiplied by a scaling variable.

For analog reads 20 through 48 (30020–30048), the engine and generator alarm types, the alarm type is defined as follows:
0 = Disabled
1 = Warning
2 = Visual Alarm
3 = Audible Alarm
4 = Soft Shutdown
5 = Hard Shutdown

For analog reads 49 through 53 (30049–30053), the Loss Of Mains Alarms, the alarm type is defined as follows:
0 = Disabled
1 = Warning
2 = Loss of Mains
3 = Loss of Mains with Alarms

For the analog read 67, the Load Control Mode, the mode is defined as follows:
0 = Off
1 = Droop (Generator frequency will decrease as load is increased)
2 = Isochronous (On load, not in parallel with the Mains)
3 = Baseload (In parallel with the Mains, at a fixed kW setpoint)
4 = Process (In parallel with the Mains, controlling the process input)

For the analog read 68, the Synchronizer Mode, the mode is defined as follows:
0 = Off
1 = ATS (Auto Transfer State. Trying to open the Mains breaker
2 = Parallel (Trying to close Mains breaker)
3 = In Sync (Gen breaker or Mains breaker was synchronized successfully.)
4 = ATS Return (Trying to Open Gen breaker)
5 = Parallel Mains (Trying to Close Mains breaker)
6 = Gen Close Timer (Gen breaker close issued, waiting for feed back to show closed)
7 = Mains Close Timer (Mains breaker close issued, waiting for feed back to show closed)
8 = Gen Sync Timer (checking for successful synchronization of the generator)
9 = Mains Sync Timer (checking for successful synchronization of the Mains breaker)

For the analog read 71 (30071), the Address of the Master Unit, is only valid on controls that are in the Auto mode. Units not in Auto are not communicating with the master and cannot be relied upon.

For the analog read 72 (30072), the Engine state the state is defined as follows:
1 = Off
2 = Preglow
3 = Crank
4 = Run
5 = Cooldown (engine has ran above the Cooldown setpoint and will wait before stopping)
6 = Spindown (fuel solenoid is open but engine speed is still sensed as the engine coasts down)
7 = Restart (previous start attempt has failed, so trying again.)

For the analog read 73 (30073), the Synchroscope Phase Angle, will give a value between –180 and 180 degrees. Zero degrees would be in phase, negative measurements occur when in the right half of the synchroscope, and positive measurements occur when in the left half of the synchroscope. For example, if the synchroscope were showing a rotation in the clockwise direction for a generator that was slightly faster than the bus the sequence of angles would be 0, –30, –60, –90, –120, –150, 180, 150, 120, 90, 60, 30, 0…

Address 40001 Analogs Write
The Analog Write variable can be used to change the priority of the EGCP-2 over Modbus.

To change the priority the unit must be in the AUTO mode. When multiple units are in Auto the following rules apply to changing the priority.

When decreasing (incrementing value) a unit's priority, every active unit (in multiple unit configuration and auto mode) on the same network with a higher priority (lower value) than the unit, which is currently having its priority, changed, will increase (decrement value) priority when the priority change is committed.

And inverse to this:
When increasing (decrementing value) a unit's priority, every active unit (in multiple unit configuration and auto mode) on the same network with a lower priority (higher value) than the unit, which is currently having its priority, changed, will decrease (increment value) priority when the priority change is committed.

A delay occurs after a priority change of master units to allow proper record sorting for all units on the network.

Table 6-2. Modbus Addresses for the RTU Protocol

Address	Data Type/Scaling	Description
00001	BW	Change Input #1 (Auto)
00002	BW	Change Input #2 (Test)
00003	BW	Change Input #3 (Run With Load)
00004	BW	Change Input #4 (Voltage Raise)
00005	BW	Change Input #5 (Voltage Lower)
00006	BW	Change Input #6 (Speed Raise)
00007	BW	Change Input #7 (Speed Lower)
00008	BW	Change Input #10 (Process I/E)
00009	BW	Change Input #11 (Fault #1)
00010	BW	Change Input #12 (Fault #2)
00011	BW	Change Input #13 (Fault #3)
00012	BW	Change Input #14 (Fault #4)
00013	BW	Change Input #15 (Fault #5)
00014	BW	Change Input #16 (Fault #6)
00015	BW	Not Used
00016	BW	Commit All Alarms

Address	Data Type/Scaling	Description
10001	BR	Bus/Mains PT Switch in Transition
10002	BR	Mains Stable Indication
10003	BR	Bus Stable Indication
10004	BR	Alarm Status
10005	BR	Loss of Mains Status
10006	BR	Relay #1 (Mains Brk Close) Status
10007	BR	Relay #2 (Gen Brk Close) Status
10008	BR	Relay #3 (Engine Preglow) Status
10009	BR	Relay #4 (Fuel Solenoid) Status
10010	BR	Relay #5 (Engine Crank) Status
10011	BR	Relay #6 (Visual Alarm) Status
10012	BR	Relay #7 (Bus PT Connect) Status
10013	BR	Relay #8 (Mains PT Disconnect) Status
10014	BR	Relay #9 (Mains Brk Trip) Status
10015	BR	Relay #10(Gen Brk Trip) Status
10016	BR	Relay #11(Audible Alarm) Status
10017	BR	Relay #12 (Idle/Rated) Status
10018	BR	Input #1 Status (Auto)
10019	BR	Input #2 Status (Test)
10020	BR	Input #3 Status (Run with Load)

Address	Data Type/Scaling	Description
10021	BR	Input #4 Status (Voltage Raise)
10022	BR	Input #5 Status (Voltage Lower)
10023	BR	Input #6 Status (Speed Raise)
10024	BR	Input #7 Status (Speed Lower)
10025	BR	Input #8 Status (Gen CB Aux.)
10026	BR	Input #9 Status (Mains CB Aux.)
10027	BR	Input #10 Status (Process I/E)
10028	BR	Input #11 Status (Fault #1)
10029	BR	Input #12 Status (Fault #2)
10030	BR	Input #13 Status (Fault #3)
10031	BR	Input #14 Status (Fault #4)
10032	BR	Input #15 Status (Fault #5)
10033	BR	Input #16 Status (Fault #6)
10034	BR	SYNC_TIMEOUT Status
10035	BR	SYNC_RECLOSE Status
10036	BR	CRANK_FAIL Status
10037	BR	VOLTAGE_RANGE Status
10038	BR	OVERSPEED Status
10039	BR	OVERCURRENT Status
10040	BR	REVERSE_POWER Status
10041	BR	LOSS_OF_EXCITATION Status
10042	BR	SPEED_FREQ_MISMATCH Status
10043	BR	H2O_HIGH_LIMIT Status
10044	BR	H2O_LOW_LIMIT Status
10045	BR	OIL_PRESS_HIGH_LIMIT Status
10046	BR	OIL_PRESS_LOW_LIMIT Status
10047	BR	BATT_VOLT_LOW_LIMIT Status
10048	BR	BATT_VOLT_HIGH_LIMIT Status
10049	BR	GEN_VOLT_LOW_LIMIT Status
10050	BR	GEN_VOLT_HIGH_LIMIT Status
10051	BR	GEN_FREQ_HIGH_LIMIT Status
10052	BR	GEN_FREQ_LOW_LIMIT Status
10053	BR	LOAD_HIGH_LIMIT Status
10054	BR	LOAD_LOW_LIMIT Status
10055	BR	PROCESS_HIGH_LIMIT Status
10056	BR	PROCESS_LOW_LIMIT Status
10057	BR	REMOTE_FAULT1 Status
10058	BR	REMOTE_FAULT2 Status
10059	BR	REMOTE_FAULT3 Status
10060	BR	REMOTE_FAULT4 Status
10061	BR	REMOTE_FAULT5 Status
10062	BR	REMOTE_FAULT6 Status
10063	BR	Not Used
10064	BR	Not Used
10065	BR	Not Used
10066	BR	Not Used
10067	BR	Not Used
10068	BR	Not Used
10069	BR	Not Used
10070	BR	Not Used
10071	BR	PF Leading/Lagging Indicator

NOTE: ANALOG INPUTS ARE SIGNED INTEGER DATA.

Address	Data Type/Scaling	Description
30001	AR X10	Battery Voltage
30002	AR X10	Engine Oil Pressure
30003	AR	Engine Coolant Temperature
30004	AR	Engine Run Time
30005	AR	Engine KW/Hours
30006	AR	Engine RPM

Address	Data Type/Scaling	Description
30007	AR	Phase A Volts
30008	AR	Phase B Volts
30009	AR	Phase C Volts
30010	AR	Total KW
30011	AR	Total KVA
30012	AR X100	Generator Power Factor
30013	AR	Phase A kVAR
30014	AR	Phase B kVAR
30015	AR	Phase C kVAR
30016	AR	Total kVAR
30017	AR X10	Bus Output Frequency
30018	AR X10	Generator Output Frequency
30019	AR	Network Address
30020	AR	SYNC_TIMEOUT Alarm Type
30021	AR	SYNC_RECLOSE Alarm Type
30022	AR	CRANK_FAIL Alarm Type
30023	AR	VOLTAGE_RANGE Alarm Type
30024	AR	OVERSPEED Alarm Type
30025	AR	OVERCURRENT Alarm Type
30026	AR	REVERSE_POWER Alarm Type
30027	AR	LOSS_OF_EXCITATION Alarm Type
30028	AR	SPEED_FREQ_MISMATCH Alarm Type
30029	AR	H2O_HIGH_LIMIT Alarm Type
30030	AR	H2O_LOW_LIMIT Alarm Type
30031	AR	OIL_PRESS_HIGH_LIMIT Alarm Type
30032	AR	OIL_PRESS_LOW_LIMIT Alarm Type
30033	AR	BATT_VOLT_LOW_LIMIT Alarm Type
30034	AR	BATT_VOLT_HIGH_LIMIT Alarm Type
30035	AR	GEN_VOLT_LOW_LIMIT Alarm Type
30036	AR	GEN_VOLT_HIGH_LIMIT Alarm Type
30037	AR	GEN_FREQ_HIGH_LIMIT Alarm Type
30038	AR	GEN_FREQ_LOW_LIMIT Alarm Type
30039	AR	LOAD_HIGH_LIMIT Alarm Type
30040	AR	LOAD_LOW_LIMIT Alarm Type
30041	AR	PROCESS_HIGH_LIMIT Alarm Type
30042	AR	PROCESS_LOW_LIMIT Alarm Type
30043	AR	REMOTE_FAULT1 Alarm Type
30044	AR	REMOTE_FAULT2 Alarm Type
30045	AR	REMOTE_FAULT3 Alarm Type
30046	AR	REMOTE_FAULT4 Alarm Type
30047	AR	REMOTE_FAULT5 Alarm Type
30048	AR	REMOTE_FAULT6 Alarm Type
30049	AR	LOAD_SURGE Alarm Type
30050	AR	MAINS_VOLT_LOW_LIMIT Alarm Type
30051	AR	MAINS_VOLT_HIGH_LIMIT Alarm Type
30052	AR	MAINS_FREQ_HIGH_LIMIT Alarm Type
30053	AR	MAINS_FREQ_LOW_LIMIT Alarm Type
30054	AR	Generator Phase A/Neutral Volts
30055	AR	Generator Phase B/Neutral Volts
30056	AR	Generator Phase C/Neutral Volts
30057	AR	Mains/Bus Phase A/Neutral Volts
30058	AR	Phase A current
30059	AR	Phase B current
30060	AR	Phase C current
30061	AR	Phase A KVA
30062	AR	Phase B KVA
30063	AR	Phase C KVA
30064	AR	Voltage Bias Analog Output (0-100%)
30065	AR	Speed Bias Analog Output (0-100%)
30066	AR	Load Control Mode

Address	Data Type/Scaling	Description
30067	AR	Synchronizer Mode
30068	AR	Number of Unacknowledged Alarms
30069	AR	Unit Network Priority
30070	AR	Address of Master Unit.
30071	AR	Not Used
30072	AR	Engine State.
30073	AR	Synchroscope Phase Angle

Address	Data Type/Scaling	Description
40001	AW 1 to 8	Priority Change Address

Table 6-3. Common Modbus Error Numbers

CODE	Name	Meaning
00	NO ERROR	No Modbus communication faults detected.
01	Illegal Function	The function received is not an allowable action for the addressed slave.
02	Illegal Data Address	The address referenced in the data field is not an allowable address for the addressed slave.
03	Illegal Data Value	The amount of data requested from the slave was too large for the slave to return in a single response.
09	Checksum Error	There was an error in the message checksum. This can indicate link quality problems and/or noise on the line.
10	Garbled Message	The slave received data, however it is too short to be a valid Modbus message/command.
12	Buffer Overflow	Input buffer overflow. This indicates that the length of the received message from the master has exceeded the input buffer capacity of the EGCP-2. Reduce message sizes to correct.
20	Unsolicited Response	Unsolicited message received by the slave.

Table 6-4. Typical Modbus Communications Settings

Poll Time	Number of Retries	Retry Delay	Timeout
1.0 second	3	1.0 second*	10 seconds

1 second is the minimum recommended retry delay time. Setting the retry delay to less than one second may cause the control to fail to boot up properly upon a power cycle.

IMPORTANT

Communications settings will vary based on the Modbus system configuration. These settings are the recommended typical settings for a multiple unit EGCP-2 system connected to Modbus master.

We appreciate your comments about the content of our publications.

Send comments to: icinfo@woodward.com

Please reference publication 26099C.

PO Box 1519, Fort Collins CO 80522-1519, USA
1000 East Drake Road, Fort Collins CO 80525, USA
Phone +1 (970) 482-5811 • Fax +1 (970) 498-3058

Email and Website—www.woodward.com

**Woodward has company-owned plants, subsidiaries, and branches,
as well as authorized distributors and other authorized service and sales facilities throughout the world.**

Complete address / phone / fax / email information for all locations is available on our website.

2012/11/Colorado