RELAYCOM™

COMMUNICATION PACKAGE

Instruction Manual

Rev. 4.0
Manual P/N: 1601-0042-BA
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Note: In order to receive software updates and information on new product enhancements, please be sure to register your Relaycom software by filling out the blue registration card that came with this package and mailing it to one of the following addresses:
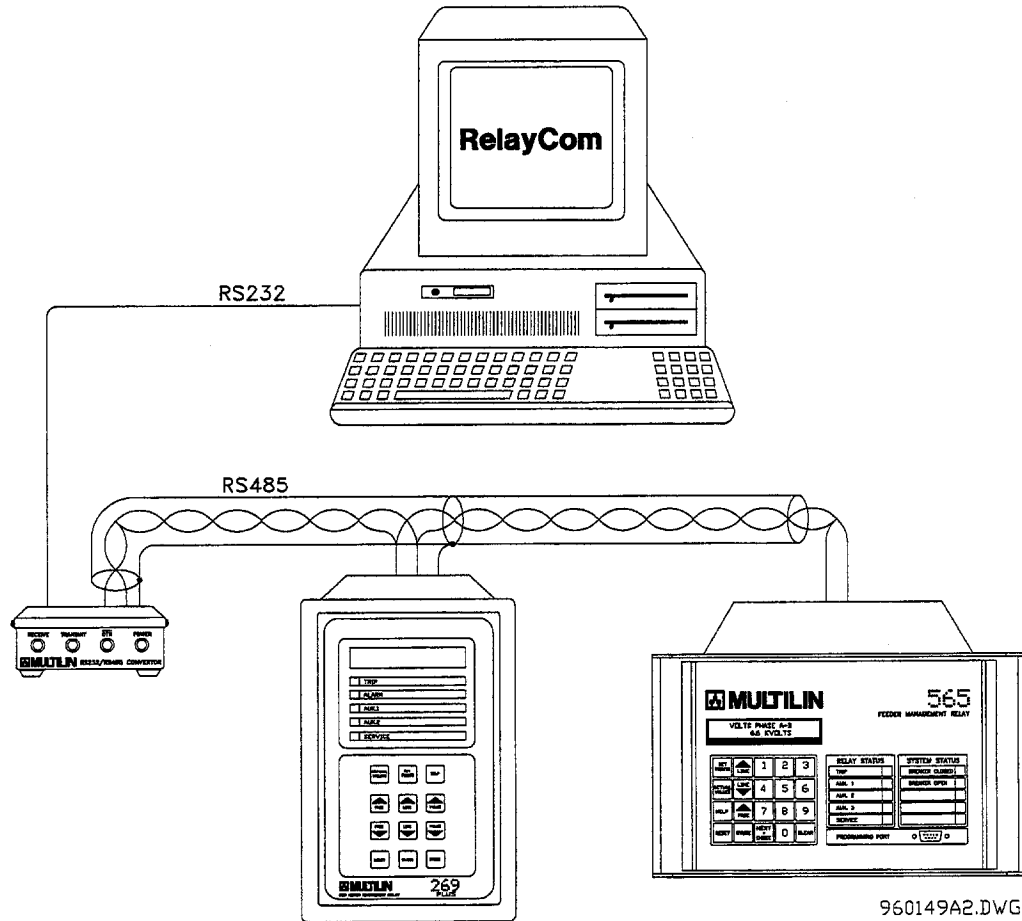
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1 INTRODUCTION

Figure 1-1 RelayCom System Overview

1.1 NEW FEATURES FOR VERSION 4.0

There are some enhancements to RelayCom from version 3.1 to 4.0. They are listed as follows:

- Support for 269 Plus revision C6.0.
- Support for 565/575 Local Event Recorder.
- Fully year 2000 compliant.
- Fully compatible with version 3.1 setpoint files.

1.2 RELAYCOM OVERVIEW

The RelayCom software package is a powerful but low cost tool that enhances and centralizes the many features of GE Multilin devices. It features real-time data acquisition, status monitoring, and remote programming of the devices. It is sure to be a valuable addition to running your plant or substation more smoothly.

RelayCom is a friendly environment which standardizes access to data from all GE Multilin products. Self-explanatory pull down menus and mouse support make selection of various operations quick and easy. The entire system is very simple and intuitive so that you can concentrate on the problem at hand.

The details for each device in your system are stored permanently in a configuration file created by you using straightforward setup screens. Once configured, accessing data or performing any operation on a device is done by simply

selecting the name you gave to the device. Devices are grouped into sites of your choosing which allows RelayCom to more closely represent the actual system. Many operations are performed on all the devices in a site.

All data and operations that are available using the front display and keypad of each GE Multilin device are available using RelayCom. This includes the viewing of all actual values in real time; viewing and editing of all setpoints; and the issuing of commands (eg. reset after a trip).

RelayCom also has many features that add value to GE Multilin relays. Some of these are: Setpoint access security which prevents unauthorized modification of device parameters; an event recorder that continuously monitors each device in a site and stores significant events with a time/date stamp; data logging and trending analysis that allows you to analyze trends of your devices on a graphical screen; a status screen that shows a brief one line description of all devices in a site and a setpoint programming utility that allows all setpoints to be stored in a disk file which can be modified and read from or written to devices.

RelayCom is suitable for use on all IBM 286/386/486/PS2 compatible personal computers. It comes complete with all the necessary hardware to connect up to 32 devices on a single serial communication port and additional hardware is available to expand the system to as many devices as required. Figure 1-1 illustrates a basic RelayCom system with a 269 Plus relay and a 565 relay connected.

1.3 PRODUCTS SUPPORTED

Currently, RelayCom provides complete support for revisions of the following GE Multilin products:

PRODUCT	FIRMWARE REVISIONS
169 Plus	E4, E5, E6, E7, E7.2
269 Plus	B2, B3.0 - C6.0
565	E1.0 - E2.7
575	E1.0 - E2.7
SR735	D1.3 - D1.5
SR737	D1.3 - D1.5
MTM Plus	D1.2 - E1.8
301	D1.1 - D1.2

1.4 SYSTEM REQUIREMENTS

The following are the minimum system requirements to run RelayCom version 4.0:

- 80286 PC and above
- MS-DOS 5.0 and above
- VGA color monitor
- 2 Mb RAM (550 Kb conventional memory)
- 30 Mb hard disk space
- 2 serial ports
- Microsoft compatible mouse

For the best possible results, the following equipment is recommended:

- 80486 PC and above
- 200 Mb hard disk (for storing more data for Trending Analysis)
- Parallel printer
- Two Hayes compatible modems (if modem utility is used)

1.5 A NOTE TO MOTORCOMM USERS

The MotorComm communications package proved to be a very successful product. Though it is still a useful software package, no further enhancements will be made to it. Instead, RelayCom is taking over where MotorComm left off and will provide all the features of MotorComm plus a considerable number of new ones. Some of the new features are:

- Support for all GE Multilin products that support RS485 communications; this now includes the 169 Plus, 269 Plus, 565, 575, SR735, SR737 and MTM Plus relays.

- A better user interface which takes advantage of pull down menus and a mouse.

- Utilization of additional communications ports COM3 and COM4 to allow the connection of more relays.

- Ability to save the configuration of a complete system so that parameters such as relay address, remote site phone number, etc. need only be entered one time. Once the system is configured, you need only select menu items to perform all operations.

Note: Motorcomm users may upgrade to RelayCom at a special price. Contact your GE Multilin sales representative for details.

1.6 ORDERING INFORMATION

The standard package comes complete with everything needed

(except a network of relays) to begin utilizing the multitude of features in RelayCom.

RELAYCOM

- Relaycom software on 3½" (720k) diskette (5¼" available on request)
- GE Multilin RS232/RS485 converter module (works with standard RS232 ports)
- 120 VAC power supply adapter for converter
- 9 pin serial cable and 25 pin serial cable
- Instruction manual

The following options are available to expand Relaycom to use more than one serial communication port:

RS232/RS485 CONVERTER

- RS232/RS485 converter module with power supply adapter and cables (same as included with standard RelayCom)
- Must have an available RS232 serial port in system.

RS485 CARD - PC

- RS485 serial port plug-in card.
- For use with IBM 286/386/486 compatible systems only.
- Must have an available slot in computer.

2 INSTALLATION

2.1 RELAYCOM SOFTWARE

The entire RelayCom software package is contained on a single floppy disk. You should have a 3½" (720k) and a 5¼" (360k) diskette; the software on each is identical and both are included for convenience.

To install RelayCom:

1. Insert the appropriate diskette into drive A and enter:

   A:INSTALL

2. Follow instructions given by the installation program.

2.2 RS232/RS485 CONVERTER

The RS232/RS485 Converter module should be mounted or positioned close to the serial communication port on your computer. It should be set up such that the four LEDs on the front of the unit are visible. Three different mounting arrangements are possible. Mounting angles for permanent attachment to a surface, dual sided adhesive material for attachment to the side of a computer or desk, and rubber feet for free standing mounting are provided. These can be used as shown in the figure. Physical dimensions are also shown in Figures 2-1 and 2-2.

The 9 pin male connector end of the interface cable must be plugged into the 9 pin female connector labeled "RS232" on the Converter. The other end of the interface cable will be a female connector with either 25 or 9 connections (both cables are included in the package). This end should be plugged into the serial port of your computer. Some computers have 9 pin serial ports and some have 25 pin serial ports. Use the cable appropriate to your computer serial port.

The RS232/RS485 Converter power pack should be plugged into a standard 120 VAC power outlet. The output end should be plugged into the jack labeled "POWER" on the Converter.

2.3 RS485 PLUG-IN CARD

If you are using more than one communications channel you might have the optional RS485 card. This card must be configured and installed in one of the expansion slots of your computer.

There are two hardware configuration parameters that must be set on the card: the "base address", and the "interrupt request level" (IRQ). The card contains a block of seven switches to configure the base address and a two-pin jumper to configure the interrupt request level. These are shown in the photograph.
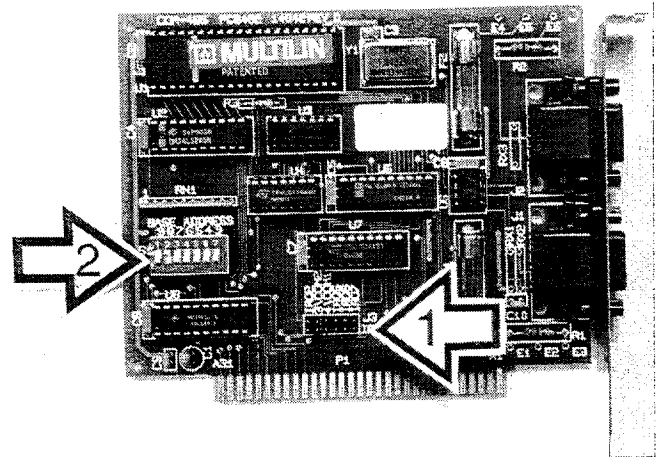
AT (286/386) compatible computers can have up to four serial communication ports installed. XT compatible computers can have up to two serial ports installed. The serial ports are commonly called COM1, COM2, COM3, and COM4. Each port must have a different base address as selected by the switches on the card. Only one port can be at each address. If your computer already has a COM1 serial port, you must not set the address switches of the Relaycom RS485 card to the COM1 address. Usually the RS485 card will be set to COM2. Additional cards will then be set to COM3 and COM4. Once you have decided which serial port number the RS485 card will be, you must set the address switches and IRQ jumper as described in the table on page 2-3.

The RS485 card is now configured and can be installed into the computer. To do this, first remove the computer chassis cover. This will be different for each of the many different types of computer available; see the instruction manual for your computer to determine how to remove the chassis cover.

Next locate a free expansion slot. These are usually on the left side of the computer at the back. Each expansion slot consists of a connector on the main circuit board of the computer into which the RS485 card can be inserted. Now remove the rear window slot cover and screw. Insert the RS485 card into the slot and screw it down using the screw from the slot cover.

The RS485 card has two female 9 pin connectors; these connectors are joined together on the card. The card contains
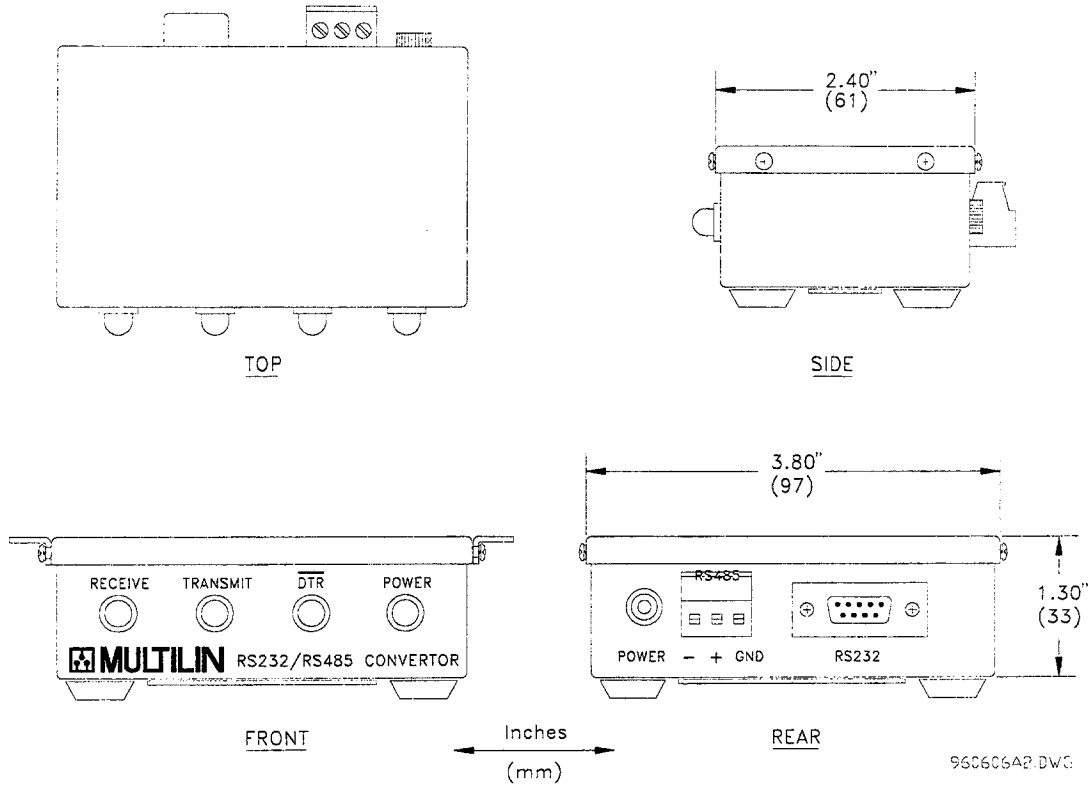
Figure 2-1 RS232/485 Converter Dimensions
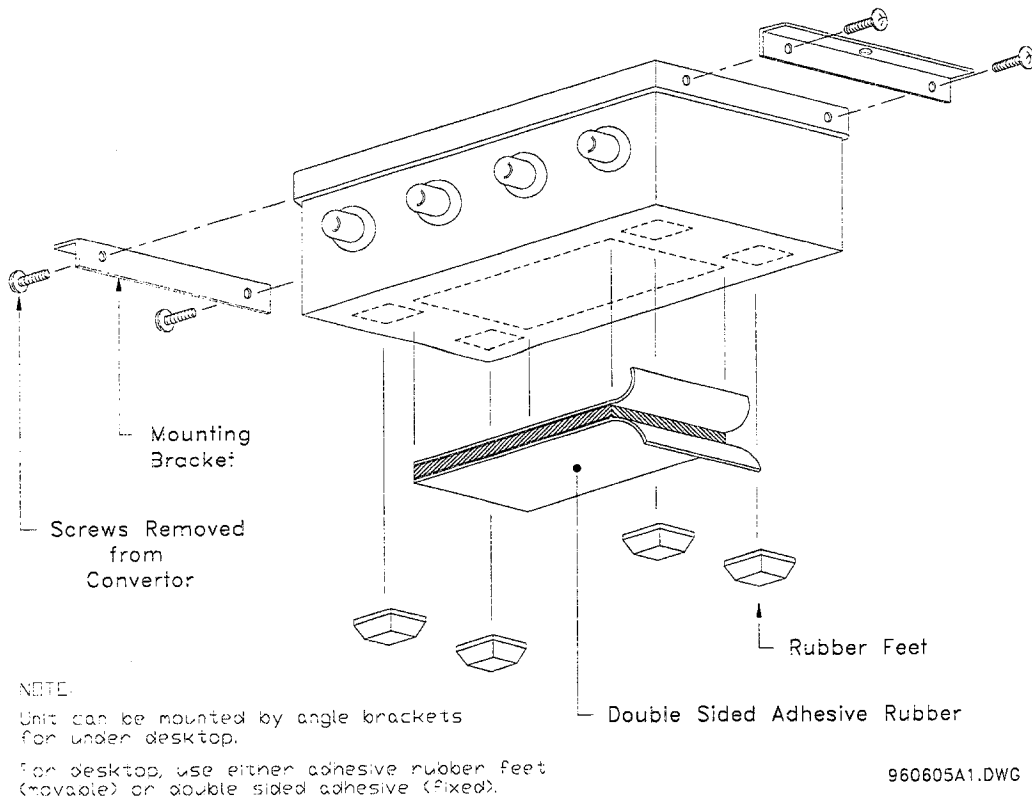
Figure 2-2 RS232/485 Converter Mounting

SERIAL PORT	ADDRESS SWITCHES	INTERRUPT REQUEST JUMPER
COM1	S1-3 - OFF S1-4 - OFF S1-5 - OFF S1-6 - OFF S1-7 - OFF S1-8 - OFF S1-9 - OFF	IRQ4/COM1
COM2	S1-3 - OFF S1-4 - OFF S1-5 - OFF S1-6 - OFF S1-7 - OFF S1-8 - ON S1-9 - OFF	IRQ3/COM2
COM3	S1-3 - OFF S1-4 - ON S1-5 - OFF S1-6 - OFF S1-7 - OFF S1-8 - OFF S1-9 - OFF	IRQ5
COM4	S1-3 - OFF S1-4 - ON S1-5 - OFF S1-6 - OFF S1-7 - OFF S1-8 - ON S1-9 - OFF	IRQ2

only one serial port. Either connector can be used for connection to GE Multilin relays.

2.4 CONNECTING GE MULTILIN RELAYS

RS485 requires a shielded twisted pair of wires to be connected between each GE Multilin product and either the RS232/RS485 converter or the RS485 plug-in card. Polarity is very important in RS485 connections. The "+" terminals of all devices must be connected together; likewise with the "-" terminals and the shield terminals. It is very important that the shield connection is grounded in one place only to prevent a difference in ground potential between relays. If a ground potential of greater than 10 Volts exists between relays, communication on the RS485 may become impossible. Up to 32 GE Multilin relays per serial port can be connected together in a daisy chain fashion as shown in the figure.

The RS232/485 converter has terminals labeled "RS485 +" and "RS485 -". The RS485 plug-in card has two female 9 pin connectors. Either connector can be used since they are internally connected in parallel. To connect to the RS485 card a male 9 pin connector must be used. Pin 4 is the "+" terminal, and pin 5 is the "-" terminal.

Depending on the length of the RS485 wires and the level of electrical noise, two terminating resistors may be required as
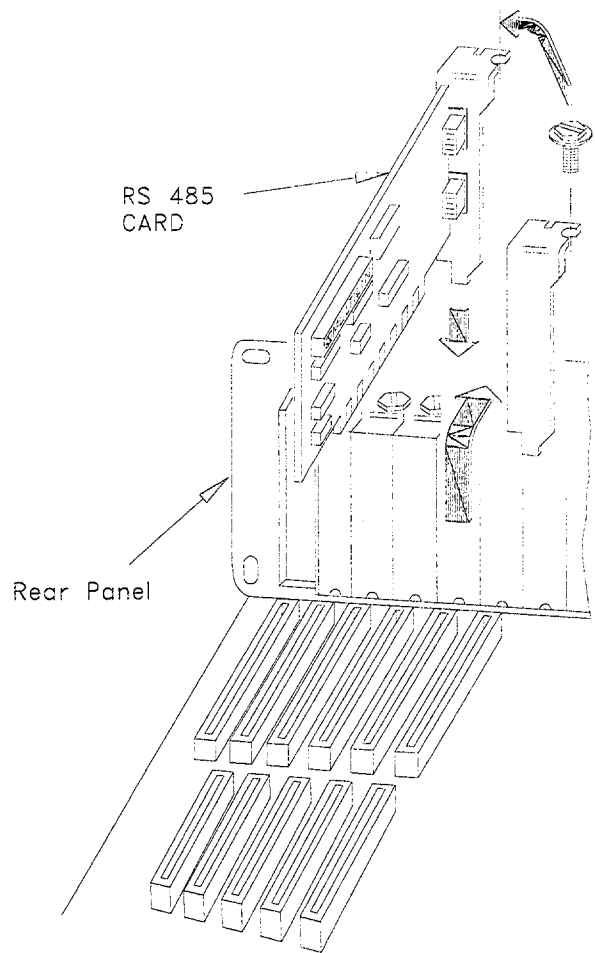
Figure 2-3 RS485 Card Installation

shown in Figure 2-4. These resistors prevent unwanted voltage signal reflection at each end of the communication link. These resistors should be approximately 120Ω, ¼W. They must be connected at each end of the communication link only, not on all of the devices on the link. In order to ensure reliable communications, shield should be grounded at the master device.

Terminal Connections for GE Multilin products:

PRODUCT	+	-	SHIELD
169 Plus	47	46	N/A
269 Plus	47	46	88
565	65	66	67
575	65	66	67
SR735	H9	H10	H8
SR737	H9	H10	H8
MTM Plus	15	16	17
301	41	42	43
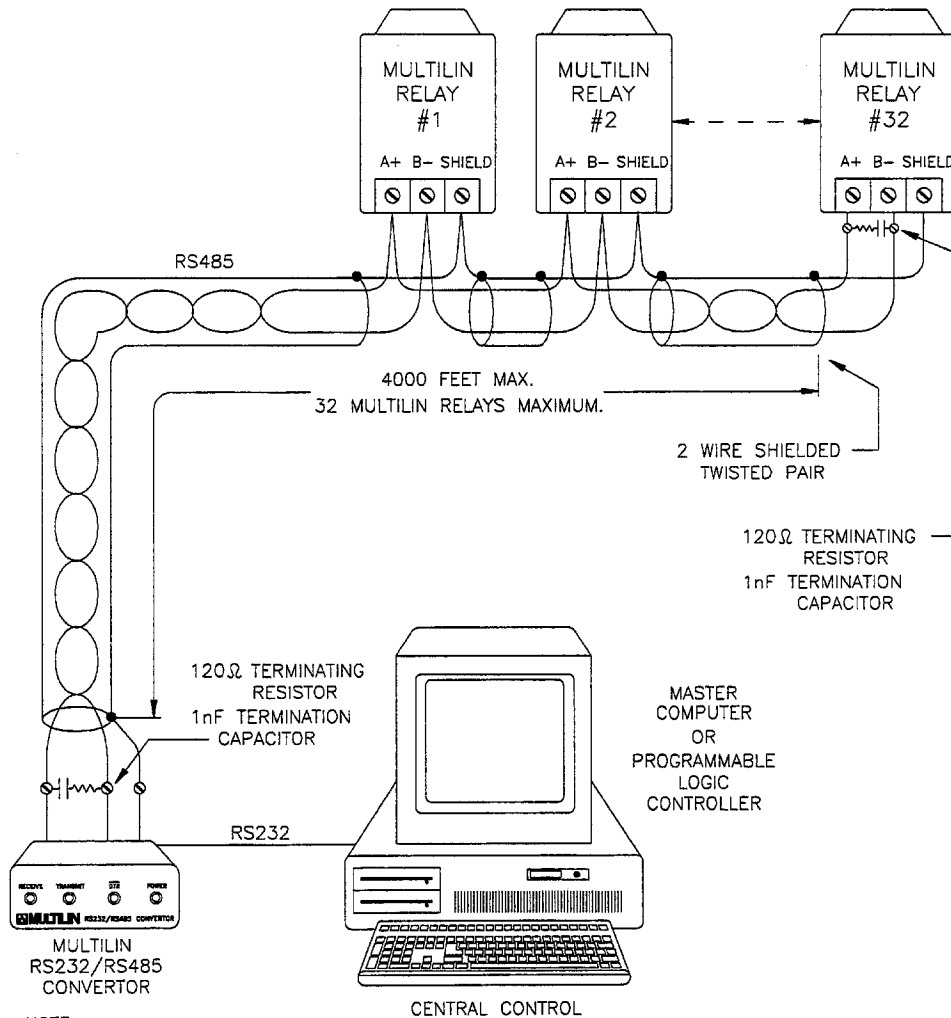
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Figure 2-4 Connection to GE Multilin Relays

2.5 MODEM SETUP

RelayCom provides monitoring/programming of remote unmanned sites over a telephone line. The ability to dial and operate a Hayes compatible modem is integral to the software. Full functionality of the RelayCom system is provided to remote sites in a way that is transparent to you.

To use the modem facility, a setup as in Figure 2-4 is required. One modem is connected directly to the computer. Another modem and a RS232/RS485 converter module is required at the remote site. This is all the hardware that is required for one remote site. Another modem and RS232/RS485 converter are required for each additional remote site. As many remote sites as desired can be set up to communicate with RelayCom.

The local modem is under direct control of the computer so RelayCom can set many of the desired parameters. However,

it will respond better if configured as follows (see your modem manual on how to set these parameters):

1. Normal DTR operation.
2. DCD only asserted during carrier link.

Additional configuration parameters for the local modem may be configured using RelayCom if needed (see section 3.4).

The remote modem operates completely independently so it must be configured prior to installation. Configure it as follows:

1. DTR always asserted.
2. Autoanswer mode.
3. No handshaking/no flow control.
4. No ARQ/no error control
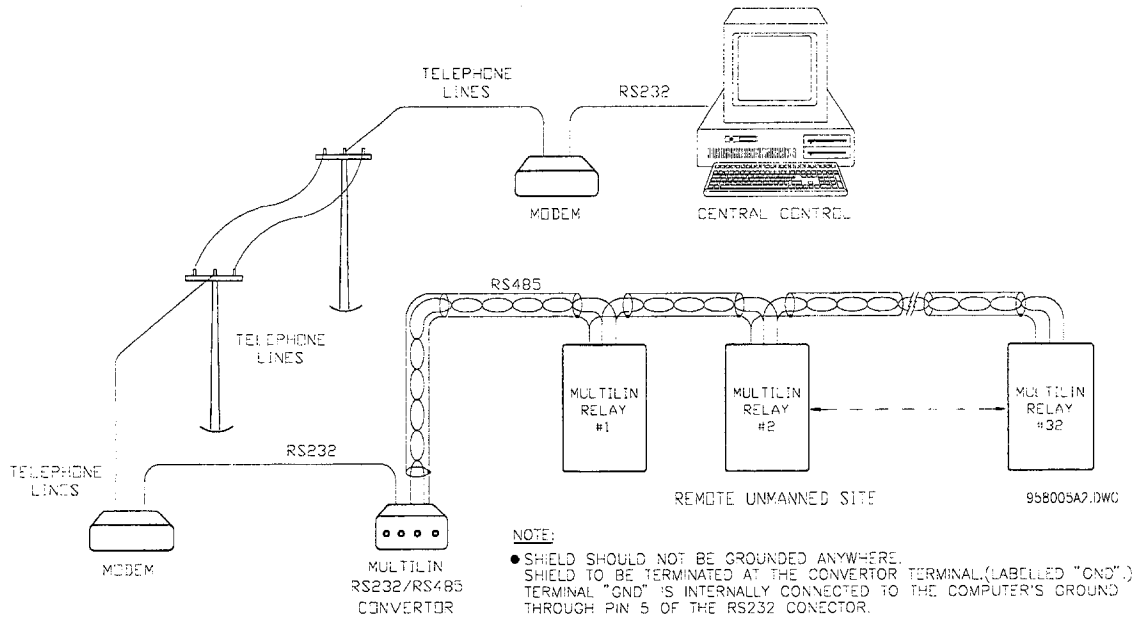
Figure 2-5 Remote Unmanned Site

The RS232/RS485 converter has eight dip switches inside the case. These must be set as follows:

DIP SWITCHES	FOR MODEM	DIRECT
SW1-1	ON	OFF
SW1-2	OFF	ON
SW1-3	ON	OFF
SW1-4	OFF	ON
SW2-1	OFF	ON
SW2-2	ON	OFF
SW2-3	OFF	ON
SW2-4	ON	OFF

Once the hardware is properly set up, it is very easy to utilize this feature. First, set up the appropriate port (see section 3.3) to indicate that a modem is attached to it. Then, simply configure a site to have a phone number (see section 3.1) and the same communications port as the modem. The site is automatically dialed up whenever interaction with relays at the site is required. A dialing box displays the status and results of the dialing process. All operations behave exactly as if the relay was directly connected to the computer.

3 CONFIGURING YOUR SYSTEM

Setup menu

```
┌─────────────┐
│ Sites       │
│ Relays      │
│ Ports       │
│ Modem       │
│ Printer     │
│ Colors      │
│ Security    │
└─────────────┘
```

One of the strengths of RelayCom is the ability to have the complete configuration of your system always loaded into the computer and ready for use. Before it is possible to take advantage of the features of RelayCom, you must set up this configuration; however, this only needs to be done once. The information is stored to a disk file named "RELAYCOM.CFG" which is automatically loaded every time you run RelayCom. RelayCom looks for this file in the same directory where "RELAYCOM.EXE" resides. Configuring RelayCom is a straightforward procedure and is explained in complete detail in the rest of this chapter.

3.1 CREATING SITES

Before you can tell RelayCom what relays you have installed you must create a site. A site is a collection of related relays.

This method of organization makes it easy to manage and visualize a large number of relays. RelayCom takes advantage of this idea to simplify the use of the multiple status and event recording features; these features are automatically performed for all relays in the site.

There are only a few restrictions for relays to be included in the same site; they must be on the same communications channel, have the same baud rate, and have the same phone number (only if it's a remote site). Except for the above restrictions, you may group relays together in any fashion that seems logical to you. You can even have the same relay included in several different sites (the reason for this will become apparent later). There can be up to one hundred sites and up to thirty-two relays per site.

When you choose "\ Setup \ Sites" the Site Configuration Screen like the one pictured will appear.

You will see a listing of the parameters for all the sites currently configured. At the bottom of the screen is a listing of all the commands available to you. To change an existing site or to create a new one move the cursor to the appropriate site and press **ENTER** to revise it. A site configuration box will appear on the screen like the one pictured below.

Site Configuration Screen

```
┌──────────────────────────────────────────────────────────────────────────┐
│ ┌──────────────────────────────────────────────────────────────────────┐ │
│ │                        SITE CONFIGURATION                            │ │
│ │ Number Sites =  4                                                    │ │
│ │                                                                      │ │
│ │      NAME             PORT    BAUD    PHONE NUMBER      CONNECTED     │ │
│ │   01 Main Substation  COM2    2400    123-4567          No           │ │
│ │   02                                                                 │ │
│ │   03 Ore Refinery     COM1    2400                      No           │ │
│ │   04 Blast Furnace    COM1    2400                      No           │ │
│ │ ▶ 05 Rolling Mill     COM1    2400                      No         ◀ │ │
│ │   06                                                                 │ │
│ │   07                                                                 │ │
│ │   08                                                                 │ │
│ │   09                                                                 │ │
│ │   10                                                                 │ │
│ │ ┌──────────────────────────────────────────────────────────────────┐│ │
│ │ │  ↑/↓      Select Site          Enter      Revise Site             ││ │
│ │ │  Home       Top Page           E          Erase Site             ││ │
│ │ │  End        End Page           D            Dial Site            ││ │
│ │ │  Page Up   Scroll Up           H          Hangup Site            ││ │
│ │ │  Page Dn   Scroll Down         Esc               Quit            ││ │
│ │ └──────────────────────────────────────────────────────────────────┘│ │
│ └──────────────────────────────────────────────────────────────────────┘ │
│                                        | COM 1 2 3 4 | 14:58:32           │
└──────────────────────────────────────────────────────────────────────────┘
```

Relay Configuration Screen

```
┌──────────────────────────────────────────────────────────────────┐
│  ┌────────────────────────────────────────────────────────────┐  │
│  │                    RELAY CONFIGURATION                      │  │
│  │   Site: Ore Refinery           Number Relays =  6           │  │
│  │  ┌──────────────────────────────────────────────────────┐  │  │
│  │  │    NAME                TYPE        ADDRESS            │  │  │
│  │  │  01 Conveyor #1        169 PLUS      1                │  │  │
│  │  │  02 Conveyor #2        169 PLUS      2                │  │  │
│  │  │  03                                                  │  │  │
│  │ ►│  04 Fan #1             169 PLUS      3              ◄ │  │  │
│  │  │  05 Fan #2             169 PLUS      4                │  │  │
│  │  │  06 Fan #3             169 PLUS      5                │  │  │
│  │  │  07                                                  │  │  │
│  │  │  08                                                  │  │  │
│  │  │  09 Main Water Pump    269 PLUS      6                │  │  │
│  │  │  10                                                  │  │  │
│  │  ├──────────────────────────────────────────────────────┤  │  │
│  │  │   ↑/↓      Select Relay          Enter   Revise Relay│  │  │
│  │  │   Home       Top Page            E       Erase Relay │  │  │
│  │  │   End        End Page            Esc         Quit    │  │  │
│  │  │   Page Up    Scroll Up                               │  │  │
│  │  │   Page Dn    Scroll Down                             │  │  │
│  │  └──────────────────────────────────────────────────────┘  │  │
│  │                              | COM 1 2 3 4 |  14:59:21      │  │
│  └────────────────────────────────────────────────────────────┘  │
└──────────────────────────────────────────────────────────────────┘
```

Site Configuration Box

```
┌────────────────────────────────────┐
│  ┌──────────────────────────────┐  │
│  │ Name:      Rolling Mill       │  │
│  │ Port:      COM1               │  │
│  │ Baud Rate:  2400              │  │
│  │ Phone Number:                 │  │
│  └──────────────────────────────┘  │
└────────────────────────────────────┘
```

Each of the parameters for this site are listed in the box. You must enter a value for each; when the last value is entered you will be asked whether the new values should be saved to disk. However, if you don't save them, they will still be effect until you quit your current session with RelayCom. This allows you to temporarily change the values.

You begin by entering a name for the site; try to give it a meaningful name since this name will be used by RelayCom to help you identify the site. This is followed by the communication port; use the ←/→ keys to change the value. Then enter the baud rate; once again use the ←/→ keys for editing. Finally, a phone number may be entered (this is optional). Now that you have configured a site, you are ready to set up the relays for that site.

3.2 CONFIGURING RELAYS

Once you have configured a site, you must inform RelayCom of the relays that you actually have installed. Choose "\ Setup \ Relays" to begin this process. A box will appear that lists all the sites that you have set up in your system. Choose

the site you wish to modify and the "Relay Configuration Screen" will appear like the one pictured.

This screen is very similar in appearance to the Site Configuration Screen. It also works in a similar fashion. The relays contained in the site are listed on the screen as well as the commands available. There may be up to thirty-two relays contained in a site and you may order them in any way that you wish. Move the cursor to the appropriate relay and press **ENTER** to modify it. A relay configuration box will appear on the screen like the one pictured below.

Relay Configuration Box

```
┌────────────────────────────────────┐
│  ┌──────────────────────────────┐  │
│  │ Name:        Fan #1           │  │
│  │ Relay Type:  169 PLUS         │  │
│  │ Address:       3              │  │
│  └──────────────────────────────┘  │
└────────────────────────────────────┘
```

You begin by entering a name for the relay; once again, try to give it a meaningful name since this name will be used by RelayCom to help you identify the relay. This is followed by product type; use the ←/→ keys to change the value. Finally, the address of the relay must be entered; this value must be the same as the communication address programmed into relay (refer to sections 5.1 and 6.1 for details on how to program the relay address). You now have a relay completely set up and are almost ready to begin communicating with it.

Port Configuration Screen

```
╔══════════════════════════════════════════════════════════════╗
║ ┌────────────────────────────────────────────────────────────┐ ║
║ │                    PORT CONFIGURATION                      │ ║
║ ├────────────────────────────────────────────────────────────┤ ║
║ │  PORT               TYPE                                   │ ║
║ │                                                            │ ║
║ │  1 - COM1 ......                        MODEM              │ ║
║ │                                                            │ ║
║ │  2 - COM2 ......    MULTILIN RS485 CONVERTOR               │ ║
║ │                                                            │ ║
║ │  3 - COM3 ......       MULTILIN RS485 CARD                 │ ║
║ │                                                            │ ║
║ │  4 - COM4 ......       MULTILIN RS485 CARD                 │ ║
║ │                                                            │ ║
║ │                                                            │ ║
║ │                                                            │ ║
║ ├────────────────────────────────────────────────────────────┤ ║
║ │  Press number of port to change:                          │ ║
║ │                                                            │ ║
║ └────────────────────────────────────────────────────────────┘ ║
║                                      | COM 1 2 3 4 | 17:33:52   ║
╚══════════════════════════════════════════════════════════════╝
```

Note: It is imperative that each relay in the system is assigned a different communication address.

3.3 SETUP OF PORTS

3.3.1 Port communication hardware setup

Choose "\ Setup \ Ports" to configure the type of hardware installed for communications on each of the available ports. To change the setting for a particular port, press the number of the port in question (i.e. COM1=1, COM2=2, ...) to activate the editing field. The choices are as follows:

- GE MULTILIN RS485 CONVERTER—use with the GE Multilin RS232/RS485 converter box

- GE MULTILIN RS485 CARD — use with the interval RS485 plug-in card

- MODEM — use with modem

- FRONT 565/575 — use when connecting to the front programming port on the 565/575 relays

- FIBER OPTIC REPEATER — use with Fiber Optic repeater loops that require command echo control

For non-GE Multilin communications hardware products, the following port settings are available:

- DTR LOW TO TRANSMIT — RelayCom sets DTR to low when transmitting data from the PC. It sets DTR to

high when it is ready to receive data from the relays.

- DTR HIGH TO TRANSMIT — RelayCom sets DTR to high when transmitting data from the PC. It sets DTR to low when it is ready to receive data from the relays.

- RTS LOW TO TRANSMIT — RelayCom sets RTS to low when transmitting data from the PC. It sets RTS to high when it is ready to receive data from the relays.

- RTS HIGH TO TRANSMIT — RelayCom sets RTS to high when transmitting data from the PC. It sets RTS to low when it is ready to receive data from the relays.

For network communications, the following port settings are available:

- RS232 NETWORK MASTER—this port is connected to an external RS232 master device

- RS232 NETWORK SLAVE—this port is connected to an external RS232 slave device

Press Enter to accept the communication hardware setup. Press Enter again to accept the port IRQ number. You should NEVER change the default IRQ numbers unless your communication hardware does not provide the default IRQ numbers that RelayCom uses.

Modem Configuration Screen

```
┌─────────────────────────────────────────────────────────────────┐
│  ┌─────────────────────────────────────────────────────────────┐ │
│  │                   MODEM CONFIGURATION                       │ │
│  ├─────────────────────────────────────────────────────────────┤ │
│  │                                                             │ │
│  │  A - Modem Type ............  2400                          │ │
│  │                                                             │ │
│  │  B - Internal Card .........   NO                           │ │
│  │                                                             │ │
│  │  C - Touch Tone Dialing ....  YES                           │ │
│  │                                                             │ │
│  │  D - Connection Time .......   60                           │ │
│  │                                                             │ │
│  │  E - Initialization String . L1 &C1 &D2 E0 V1 Q0 M1        │ │
│  │                                                             │ │
│  │                                                             │ │
│  │                                                             │ │
│  │                                                             │ │
│  │                                                             │ │
│  │                                             | COM 1 2 3 4 | 17:41:45 │ │
│  └─────────────────────────────────────────────────────────────┘ │
└─────────────────────────────────────────────────────────────────┘
```

3.3.2 Network communications setup

RelayCom version 3.0 has been given the ability to communicate with external master devices using the Modbus protocol or the GE Multilin Proprietary protocol. An external masters could be a PLC, a SCADA systems ,or a PC. This feature enables a third party to access information (actual values, setpoints, commands) of the relays connected to RelayCom.

The external master simply send the same communication command to RelayCom as it would send to the relay. Then RelayCom will talk to the relay and return the response from the relay to the external master. In other words, RelayCom is "transparent" to the external master.

To set up RelayCom to communication with an external master device, simply choose the option RS232 NETWORK MASTER for the port communication hardware (see section 3.3.1 Port communication hardware setup). If the external master is a PC running another copy of RelayCom, select the option RS232 NETWORK SLAVE for the port communication hardware from the external master PC. The communications parameters are fixed at 9600 baud, no parity, 8 data bits, and 1 stop bit.

3.4 MODEM SETUP

Choose "\ Setup \ Modem" to configure various parameters relating to your modem — if installed. The following lists each parameter and its purpose.

A Type — This should be set to the type of modem you have. There are four choices: Smartmodem 300, Smartmodem 1200, Smartmodem 1200+, and Smartmodem 2400, Smartmodem V which represent the standard Hayes modem identification.

B Internal Card — If the modem you are using is a plug in card, select 'YES' for this options; otherwise select 'NO'. This parameter aids in the resetting of internal card modems.

C Touch Tone — Select 'YES' for this option if your phone line supports touch tone dialing; otherwise select 'NO'.

D Connection — This value determines the length of time the modem will wait for a connection to a remote site. If this time expires a new attempt is made at dialing the site.

E Initialization String — Smart Modem commands to initialize the modem. This field will be reset to defaults if it is cleared to a blank string.

3.5 PRINTER SETUP

1.   Choose "Setup/Printer" from the RelayCom main screen
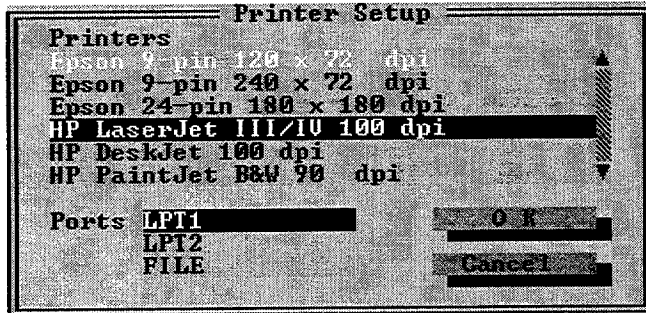
2.   Select the printer type

Click the printer type in the list to select, or click the ▲ / ▼ buttons on the scroll bar to scroll the list. Keyboard users can use the ↑/↓ arrow keys to choose the printer type then press Enter to select it.

Note that the printer type selection is mainly used to print out graphs. Printing out text reports such as setpoint files, actual value snapshots, or event logs does not require you to select the printer type to work. RelayCom can print text reports to any printer.

3.   Select the printer port

Click the printer port where your printer is connected to from the port list. If you select FILE as the port, RelayCom will print all data to files. It will ask you for the file names by the time data is printed. Enter "LPT1" or "LPT2" as the file name to override the print-to-file option.

4.   Click OK to confirm setup or Cancel to abort

3.6 SCREEN COLORS

If the default color selections made by RelayCom result in hard to read screens you can change them. There are several choices of color tables; choose the one which results in the best display.

Choose "\ Setup \ Colors \ Color" for EGA and VGA color monitors.

Choose "\ Setup \ Colors \ Monochrome" for monochrome monitors.

Choose "\ Setup \ Colors \ Black & White" for monochrome

monitors when the Monochrome choice does not look good.

3.7 SECURITY

RelayCom provides a security measure to prevent unauthorized changes to relay setpoints. Before a setpoint may be altered or a setpoint file downloaded, you must enter the correct password or access will be denied. Once setpoint access has been given, it remains in effect until explicitly disabled. A setpoint access indicator is displayed at the bottom left corner of each setpoint data page.

When entering a password the characters you type are displayed as 'X' to prevent anyone from seeing the password as it is entered. Upper and lower case letters are equivalent.

Choose "\ Setup \ Security \ Disable Access" to explicitly turn off setpoint access.

Choose "\ Setup \ Security \ Enable Access" to explicitly turn on setpoint access. You will be required to enter the correct password before access is given.

Choose "\ Setup \ Security \ Change Password" to modify the existing password. You will be required to enter the correct password before being allowed to continue. Then, you will be asked to enter a new password, and then to re-enter the password for verification. If all succeeds, the new password will be saved to disk. Don't use a password that is easily guessed; for example, your name would be a bad choice.

The setpoint access security feature is disabled when you first receive RelayCom. This means that you will not be required to enter a password when changing setpoints. To enable it, simply change the password to a value other than all blank characters. To disable it again, change the password back to all blank characters (just press **ENTER** when asked for the new password).
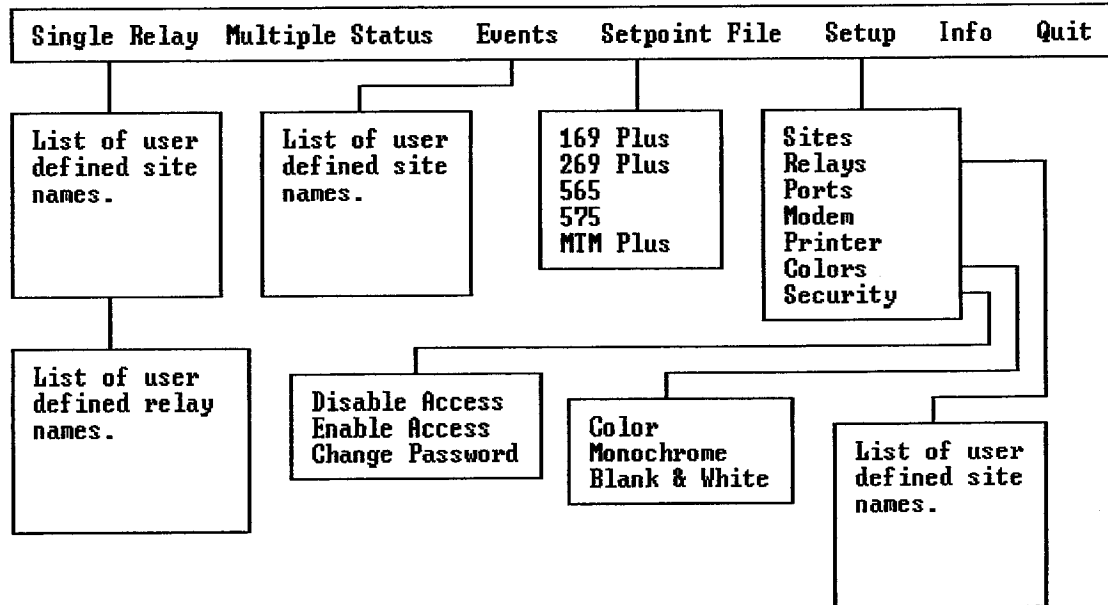
4 USING RELAYCOM

```
┌─────────────────────────────────────────────────────────────────────────┐
│ Single Relay  Multiple Status   Events   Setpoint File   Setup   Info   Quit │
└─────────────────────────────────────────────────────────────────────────┘
```

```
┌──────────────┐  ┌──────────────┐  ┌──────────┐  ┌──────────────┐
│ List of user │  │ List of user │  │ 169 Plus │  │ Sites        │
│ defined site │  │ defined site │  │ 269 Plus │  │ Relays       │
│ names.       │  │ names.       │  │ 565      │  │ Ports        │
│              │  │              │  │ 575      │  │ Modem        │
└──────────────┘  └──────────────┘  │ MTM Plus │  │ Printer      │
                                     └──────────┘  │ Colors       │
                                                   │ Security     │
                                                   └──────────────┘
```

```
┌──────────────┐  ┌──────────────────┐  ┌──────────────┐  ┌──────────────┐
│ List of user │  │ Disable Access   │  │ Color        │  │ List of user │
│ defined relay│  │ Enable Access    │  │ Monochrome   │  │ defined site │
│ names.       │  │ Change Password  │  │ Blank & White│  │ names.       │
│              │  └──────────────────┘  └──────────────┘  │              │
└──────────────┘                                          └──────────────┘
```

Figure 4-1 Main Menu System

4.1 GENERAL USAGE TIPS

Once RelayCom has been properly configured for your system, using the features is very easy. The interface to the various features is consistent throughout the program so learning a few basic concepts will help you navigate your way through all of RelayCom. The following describes the various ways you interact with RelayCom.

Menu System

The menu bar at the top of the screen is your primary access to all of the features in RelayCom. As you can see from the diagram of the main menu system, some menu items will perform actions directly whereas some lead to submenus.

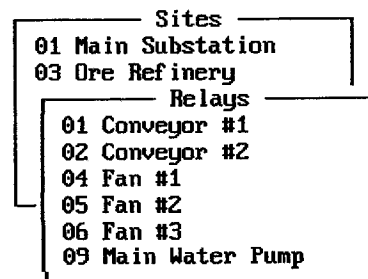There are three ways to choose an item from a menu:
1. Use the arrow keys to highlight the desired item and then press **ENTER**.
2. Press the highlighted letter of the desired item.
3. Click the mouse on the desired item.

Special Menus: Sites and Relays

There are two special purpose menus in the RelayCom system: the site menu and the relay menu. They are special because their contents are determined by you. The site menu lists the sites that you have configured in your system; likewise, the relay menu lists the relays that you have configured for a particular site. To choose an item from either of

these menus use the arrow keys to highlight the desired site/relay and press **ENTER** or click on the desired site/relay with the mouse. Most of the features in RelayCom utilize these menus when a choice of a site and/or a relay is required by you.

Example Relay Menu

```
┌──────── Sites ────────┐
│ 01 Main Substation    │
│ 03 Ore Refinery       │
│  ┌──────── Relays ────────┐
│  │ 01 Conveyor #1        │
│  │ 02 Conveyor #2        │
│  │ 04 Fan #1             │
└──│ 05 Fan #2             │
   │ 06 Fan #3             │
   │ 09 Main Water Pump    │
   └───────────────────────┘
```

Editing Values

Quite often in RelayCom you are required to make a change to a value. Configuring RelayCom or changing a setpoint value are examples of this. There are several different types of values and they are modified in slightly different ways. They all have one thing in common though: pressing **ENTER** signifies that you have finished editing the value. The following lists the various types of editable values and the way each is modified.

● TEXT — Some values are simply text (ie. any character entered from the keyboard). Entering file names and the

comment for a setpoint file are examples of text values. When you enter a character it is placed at the position of the cursor. Pressing **INSERT** switches you from insert mode to overstrike mode. The **DELETE** key and the **BACKSPACE** key erase characters that were entered. The **HOME** key takes you to the beginning of the text while the **END** key takes you to the end. The arrow keys move you both back and forth through the text.

- NUMERIC — Some values are numbers. The address for a relay is an example of this. Enter digits as required. The **DELETE** key erases digits that were entered.

- LIST — Some values have a limited range of values. The port value for site configuration is an example of this. Use the ←/→ keys to scan through the possible choices

4.2 SINGLE RELAY

Each GE Multilin product supported by RelayCom can be interrogated in detail. Each product has its own specific set of pull down menus and a unique status screen. However, you will find a consistency between the different products and a standard data template is used so as to make it intuitive when switching from one product to another. Actual values are displayed in real time, setpoints can be examined and modified, and commands can be issued.

When you choose "\ Single Relay", the usual site selector

menu will appear; choose the appropriate site. Then the device selector menu will appear; choose the desired device. At this point RelayCom will attempt to establish communications with the device. If successful the status screen for that product will appear and there will be a menu bar at the top of the screen. Using the menu system you can easily access any of the data pages contained within the device or send commands. Refer to the chapters regarding the individual products for more specific information. Below is a typical data screen.

4.3 MULTIPLE STATUS

The multiple status feature allows you to continuously monitor the state of all relays in a site on a single screen. When you choose "\ Multiple Status", the usual site selector menu will appear. Choose the appropriate site and a screen such as follows will appear.

Each relay is polled in succession to determine the state of the device which is then immediately displayed on the screen. Each product will display a different type of state but generally the following values are always present: breaker state (565/575 only), motor state (169/269 only), trip state, and alarms present. The cursor pointers indicate which relay is currently being polled. Polling will occur indefinitely until **ESC** is pressed which returns you to the main menu.

Single Relay Typical Data Screen

```
Status     Actual Values     Setpoints     Commands     File     Info     Return

  269+        \ Actual Values \ Metered Data
              Site:   Ore Refinery
              Relay: Conveyor #1              Rev: B3.6

    Commands          ▶ Phase A Current                            90 A ◀
                        Phase B Current                            90 A
  ↑/↓        Move       Phase C Current                            81 A
  Home  Top of Page     Average Current                            87 A
  End   End of Page
  Pg Up   Scroll Up     Ground Current                            0.6  A
  Pg Dn Scroll Down
  ←/→  Inc/Dec Value    Current Unbalance Ratio                     6 %
  0-9     Edit Value
  Tab   Toggle Menu     Motor Load                                 96 %
  Esc    Goto Menu      Thermal Capacity Used                       9 %
  F2        Print


  Access: Disabled

                                      | COM 1 2 3 4 | 16:43:02
```

Multiple Status Screen

```
                              MULTIPLE STATUS
  Site: Ore Refinery

   Conveyor #1          - MOTOR RUNNING
   Conveyor #2          - MOTOR RUNNING
   Fan #1               - MOTOR RUNNING
   Fan #2               - MOTOR RUNNING
   Fan #3               - MOTOR RUNNING
 ▶ Main Water Pump      - MOTOR OVERLOAD - GROUND FAULT ALARM              ◀




                                                 | COM 1 2 3 4 | 17:41:45
```

Event Recorder Screen

```
                              EVENT RECORDER
  Site: Ore Refinery

  Wed Jan 22, 1992  17:43:20
  Site: Ore Refinery            Relay: Main Water Pump
  COMMUNICATIONS ESTABLISHED
  MOTOR OVERLOAD
  GROUND FAULT ALARM

  Wed Jan 22, 1992  17:43:51
  Site: Ore Refinery            Relay: Main Water Pump
  MOTOR STOPPED
  RAPID TRIP
  Lockout Time = 12 min
  Pre-Trip Average Current = 244 A
  Pre-Trip Current Unbalance Ratio = 18 %
  Pre-Trip Ground Current = 4.3  A
  Pre-Trip Max Stator # = 5
  Pre-Trip Max Stator Temp = 78 oC

 ▶                                                                        ◀
                                                 | COM 1 2 3 4 | 17:44:05
```

4.4 EVENT RECORDER

The Event Recorder of RelayCom can be used to continuously monitor the status of your GE Multilin products. The Event Recorder will create a permanent record of the time and date for all significant events that occur on your system. Version 3.0 enables more than one event recorder running at the same time in a multitasking manner. This allows you to monitor events of all your GE Multilin devices at all sites.

1. Choose "**Monitor / Events**" from the main RelayCom menu. The usual site selector menu will appear; choose the appropriate site.

2. Choose "**Start**" from the Event Recorder menu to start event recording of this site. A dialog box will ask you to

enter a name for the file where event should be stored (Do not use the same file to store events from more than one site). Finally, another dialog box will ask you whether events should be output immediately to the printer. The event recorder is now running and it will still be running even though you quit from the Event Recorder screen.

Each device is polled in succession to determine its state which is then compared to its previous state. The types of events recognized varies depending on the device being polled but generally the following are always recognized: change in motor state (169, 269, 301), change in breaker state (565, 575), occurrence of a trip or an alarm.

3. Choose "Stop" from the Event Recorder menu to stop recording events of this site

4. Choose "Return" to return to the main RelayCom menu. Repeat step 1 if you want to set up the next site for event recording.

4.5 TRENDING ANALYSIS

4.5.1 Getting started with Trending Analysis

RelayCom supports trending analysis for the following GE Multilin devices: Motor Management relays 169 Plus, 269 Plus, 301, Feeder Management relays 565, 575, SR735, SR737, and Metering Module MTM Plus.

Before you can analyze trends of your devices, data has to be logged. RelayCom provides the following data logging features:

- Can log up to 20 analog or actual values per device
- A maximum of 10 devices can be polled at the same time
- Time between polls is fully configurable
- Easy-to-use dialog boxes to help you set up data logging

The following steps show you how to set up a new relay for data logging:

1. From the top of the RelayCom Main screen, choose "Monitor / Trends".

2. Choose "Setup / Change" from the Trending Analysis Menu.

   Select the site where the relay is located, then select the relay. A Setup dialog will pop up for you to select all parameters required to set up data logging. You do not need to select the site and the relay if the relay has been set up already.
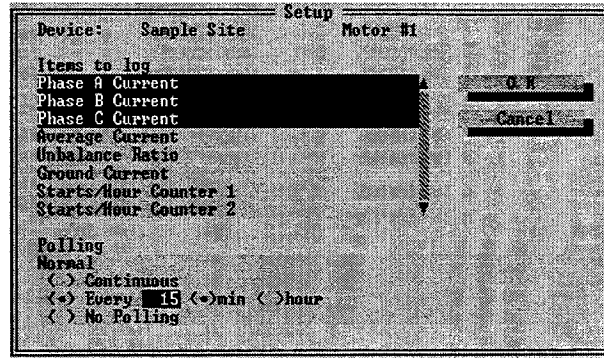
3. Click the items you would like to log with the mouse.

Items to be logged are displayed as white on a dark blue background. Items not to be logged are displayed as black on a light blue background. To unselect an item, simply click it again. The first three items in the list have been selected for you by default.

Keyboard users can navigate the current point-of-input by pressing the TAB key repeatedly. To select an item in the list, press the TAB key repeatedly until the item list is selected, which is indicated by an item in the list being displayed in yellow. The item list now has the point-of-input. Then press the ↑ / ↓ arrow keys to scroll through the list. Press Enter to toggle the items you want to log on/off.

4. Select time between polls.

The following options are available to set up how often RelayCom should poll the device and to log data:

- **Continuous** — this device is polled as quickly as possible. Depending on how many items to log as well as how many devices are set up for Continuous polling, the time between polls could range from 1/2 a second to 1 minute.

- **Every X min/hour** — this device is polled every X minutes or hours.

- **No polling** — disable polling and data logging of this device.

Click the corresponding radio button (•) to choose the polling option you want. The time interval has no effect if **Continuous** is selected. If you select **Every**, click the number field then enter the number, then click **min** or **hour** to select minutes or hours, respectively.

Keyboard users can press **TAB** repeatedly to choose

between the polling options. Press **Enter** to select the option you want. If you want to change the time interval, press **TAB** until the number input field is hilighted. Type in the number, then press **TAB** and **Enter** to select between **min** or **hour**.

Warning: Choosing **Continuous** polling may generated a huge amount of data on your hard disk. You should choose **Continuous** only for occasional troubleshooting purpose. You should not choose this option for normal daily data logging purpose.

The following table gives you an estimate on how much disk space will be used to log one full day (24 hours) of data:

# of devices	# of items to log per device	Polling	Disk space required (bytes)
1	20	Continuous	30 Meg
1	10	Continuous	20 Meg
1	10	Every 1 min	600 K
1	10	Every 15 min	40 K
10	10	Every 15 min	400 K

5. Click the **OK** button to confirm the setup or **Cancel** to abort.

    Keyboard users can press **TAB** repeatedly until the OK button is hilighted then press **Enter** to confirm the setup. The site and relay name of the device that you have just set up will be shown on the screen but data logging of that device has not been started yet. Refer to the next section, **Start/Stop Polling Devices**, on how to start up data logging.

6. Click an empty setup on the Trending Analysis screen to set up the second setup device.

    To set up a second device for data logging, simply click an empty setup (the one with no site and relay name) on the screen. Then repeat step 2 to set up data logging of that device.

    Keyboard users can press **TAB** to switch between the menu on the top of the screen and the device directory. Use the ↑ / ↓ arrow keys to select an empty setup (the one with no site and relay name). Press **TAB** again to switch back to the menu. Then repeat step 2 to set up data logging of that device.

4.5.2 Start / Stop polling devices

To start polling/logging a device, select the device on the Trending Analysis screen then select "Control / Start" from the menu. The polling status of the device and the total number of items it is logging will be shown on the screen to confirm that polling has been started. If there is any communications error with a device, the message "Com failure" will be shown on the screen.

To stop polling/logging a device, select the device on the Trending Analysis screen then select "Control / Start" from the menu. The polling status message "Stopped" will be shown on the screen.

To start polling/logging all the devices you have set up for trending, select "Control / Start All" from the menu. Polling of all the devices will be started one by one.

To stop polling/logging all the devices you have set up for trending, select "Control / Stop All" from the menu. Polling of all the devices will be stopped one by one.

4.5.3 Removing devices from trending setup

You may want to remove a device from the trending setup so that you may log data for another device. If you remove a device from the trending setup, its data will NOT be lost right away. RelayCom only removes data older than the number of days specified in the Database Setup dialog (see section on **Changing Automatic Database Management Setup**). In other words, if you remove a device from the trending setup accidentally, you can set it up again and RelayCom will still be able to find its data.

Follow these steps to remove a device from the trending setup:
1. Select the device you want to remove from the Trending Analysis screen.
2. Choose "Setup / Remove" from the menu.
3. Press "Y" to confirm the removal, "N" to cancel.

4.5.4 Changing Automatic Database Management Setup

RelayCom stores all trending data in a database. The database is made up by a number of DBase IV compatible database files (.dbf). That means any DBase IV compatible software can retrieve the data from RelayCom's trending database.

Since data is stored to the hard disk as long as data logging is

taking place, a large amount of disk space can be used up. To avoid running out of disk space, RelayCom performs automatic clean-up at 10:00:00 PM every day. All trending data older than the number of days specified in the setup will be erased permanently. Data logging is suspended temporary when RelayCom is performing the clean-up.

The following steps show you how to change the database setup:
1. Choose "Setup / Database" from the Trending Analysis menu.

   A Database Setup dialog will pop up for you to select the parameters for automatic database management.
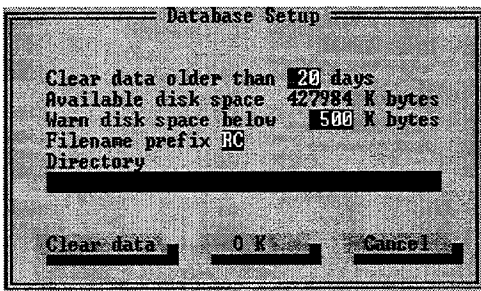
2. Click the input fields that you want to change.

   - **Clear data older than X days** — instructs RelayCom to erase data older than the number of days specified. For example, if you want to keep one month of data for analysis, you should enter the number 31 in this field.

   - **Warn disk space below X kbytes** — instructs RelayCom to give you a warning message when your hard disk has free space less than the number of kilobytes specified. If this message is popped up frequently, you can be sure that your hard disk is running out of space. Change the number of days specified in the field **Clear data older than X days** to a smaller number or select fewer items to log for your devices. If the message still pops up frequently, you may have to replace your hard disk with a larger capacity one. Please refer to the table in section 4.5.1 **Getting started with Trending Analysis** to estimate how much disk space is required for your application.

   - **Filename Prefix** — is the first two characters of the file names of the trending database files. RelayCom looks for this prefix when it is reading from or writing to the database files. In other words, if you change this prefix, all data that you logged previously with the old prefix will be ignored by RelayCom. **For normal usage of RelayCom, you should never change this field.**

   - **Directory** — instructs RelayCom to store database files in this disk directory. If this field is left blank, RelayCom will store database files in the current directory. **You should never change this field unless you want to store the database files to a network drive or to a directory other than the current directory.**

3. Click the **OK** button to confirm changes.
   or
   Click the **Clear** button to erase old data immediately
   or
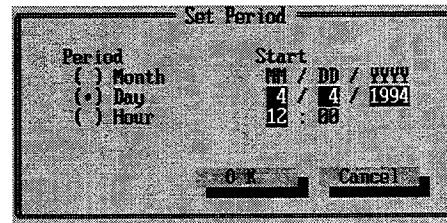   Click the **Cancel** button to abort changes.

4.5.5 Viewing graphs

1. Select "Graphs" from the Trending Analysis menu.

   A Graph dialog will pop up for you to select the parameters to view graphs, print graphs, or save data to spreadsheet files.
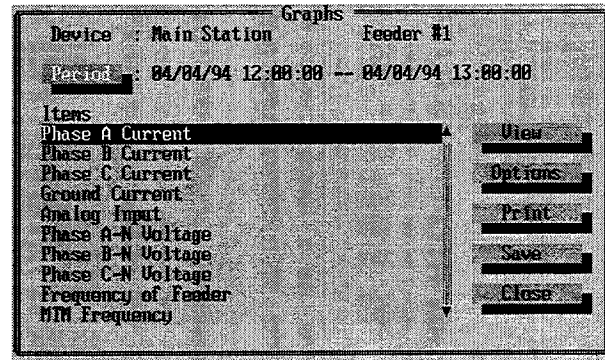
2. Click the **Period** button to select the time frame of the graph.

   If you want to view one day of data, simply click the **Day** radio button. Change the date by clicking the appropriate number. The time of the day will be ignored by RelayCom as it only applies to the **Hour** period. Click **OK** to confirm the period or **Cancel** to abort changes.

   Keyboard users can press **TAB** to choose between the periods then press **Enter** to select it. To change the date and time, press **TAB** to the number that you want to

SubStation A Motor 2 - Historic Trending Plot

A ——Phase A Current

Zoom In	Zoom Out	Close
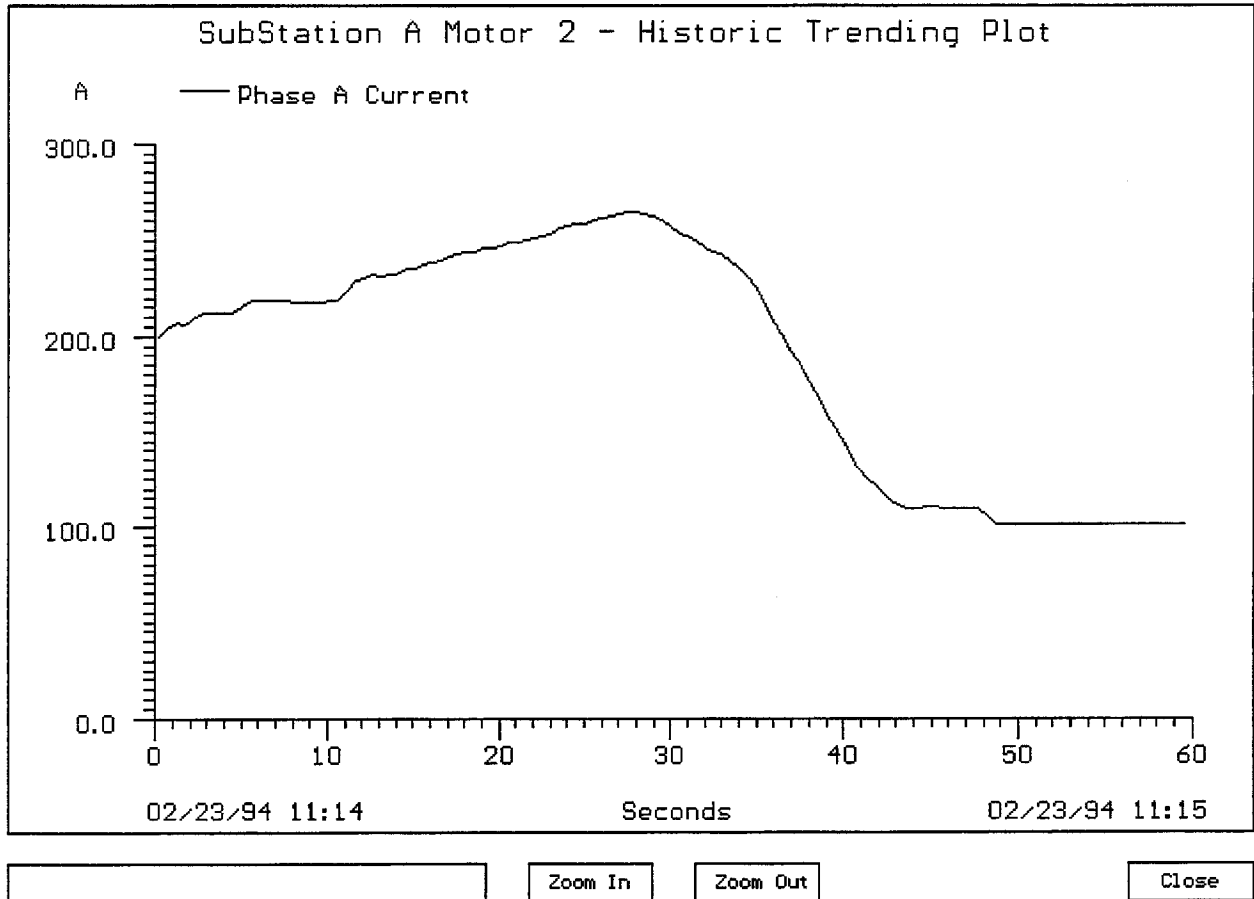
change then type in the correct number. To confirm changes, use the **TAB** key to select the **OK** button then press **Enter**. To cancel changes, select the **Cancel** button then press **Enter.**

3. Click the value you want to display on the graph from the item list.

   Only one item can be shown on the graph at a time.

4. Click the **View** button to view the graph.

5. Click anywhere on the graph to show the x and y values of the curve point.

   A vertical cursor line will be displayed on the screen. The y value of the curve point where the cursor is located will be shown right below the curve's name. The x value (time) of the curve point will be shown in the middle of the time axis.

   Keyboard input is not supported on the graph screen

6. Click "**Zoom In**" to expand the graph to examine graph details.

You have to click the place where you want to zoom in before clicking the "**Zoom In**" button.

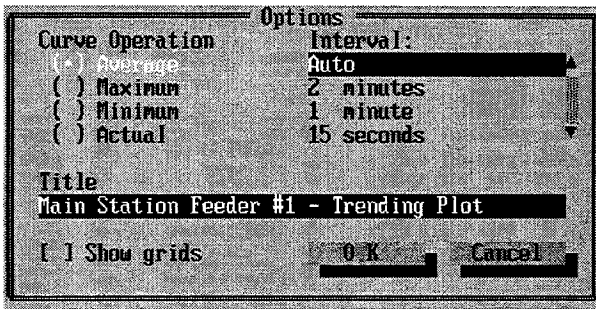7. Click "**Close**" to close the graph screen and return to the Graph dialog box.

   The graph data is saved even though the graph screen is closed. This makes it possible to print the same graph to the printer/plotter. Please refer to the section **Printing graphs** for details.

   Keyboard users can press Esc to close the graph screen.

4.5.6 Changing view graph options

1. Select "**Graphs**" from the Trending Analysis menu.

2. Click the **Options** button to change view graph options.

```
╔═══════════════ Options ═══════════════╗
║  Curve Operation      Interval:        ║
║   (•) Average         Auto           ▲ ║
║   ( ) Maximum         2 minutes      ▓ ║
║   ( ) Minimum         1 minute       ▓ ║
║   ( ) Actual          15 seconds     ▼ ║
║  Title                                 ║
║  Main Station Feeder #1 - Trending Plot║
║  [ ] Show grids        O K    Cancel   ║
╚════════════════════════════════════════╝
```
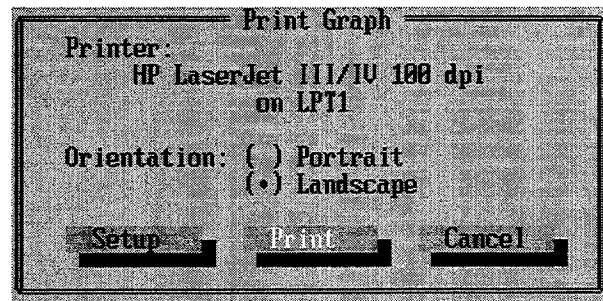
3. Make changes to the options, as necessary.

   • **Curve Operations** — instructs RelayCom on how to manipulate trending data before displaying the data on graphs or saving them to files.

      • **Average** — calculate the average point of all the points within the time interval specified in the Interval list. Therefore the curve is made up of a number of average points. By default, RelayCom uses this option to compress data if a large amount of data is to be displayed on the screen.

      • **Maximum** — take the maximum point only of all the points within the time interval specified in the Interval list. Therefore the curve is made up of a number of maximum points. You may choose this option if you want to see all the **peaks** of the curve.

      • **Minimum** — take the minimum point only of all the points within the time interval specified in the Interval list. Therefore the curve is made up of a number of minimum points. You may choose this option if you want to see all the **minimum** points of the curve.

      • **Actual** — no operation is performed, and all the data is used in displaying the curve. If there are too many points to show on the graph, RelayCom will use the option **Average** automatically. If you select this option when you transfer data to a spreadsheet file, the actual data (with the exact time and value when the data is logged) will be transferred to the file.

   • **Intervals** — a list specifying the time interval for curve operations. If **Auto** is selected, RelayCom will use the shortest interval to give you the maximum resolution of the graphs.

   • **Title** — displays this title on the top of the graph. RelayCom automatically makes up a default title which has the site name and the relay name.

   • **Show grids** — displays horizontal and vertical grid lines of the graph

4. Click **OK** to confirm changes or **Cancel** to abort.

5. Click **View** from the Graphs dialog to view the graph again.

4.5.7 Printing graphs

1. Click **Print** from the Graph dialog.

   If you are still looking at the graph screen, close the screen by clicking **Close**. The graph data will still be there even though the graph screen is closed.

```
╔═══════════════ Print Graph ═══════════════╗
║  Printer:                                  ║
║         HP LaserJet III/IU 100 dpi         ║
║                 on LPT1                     ║
║  Orientation:  ( ) Portrait                ║
║                (•) Landscape                ║
║    Setup          Print         Cancel      ║
╚═════════════════════════════════════════════╝
```

2. Click **Setup** to change printer setup, if needed.

   Please refer to section **3.5 PRINTER SETUP** for details.

3. Click **OK** to confirm printer setup or **Cancel** to abort changes.

4. Click **Print** from the Print Graph dialog or **Cancel** to abort printing.

   RelayCom will return to the Graph dialog after the printing is finished. Data logging will be suspended temporary during the print.

4.5.8 Transfering data to spreadsheet files

RelayCom can transfer graph data to Lotus compatible spreadsheet files. By default, RelayCom transfers the graph you have just viewed to the file. If you want to manipulate the data before the transfer, refer to the section **Changing view graph options**.

1. View the graph first to make sure the graph is the one you want to transfer.
2. Click **Close** to close the graph screen.
3. Click **Save** from the Graphs dialog.

4. Click OK to confirm the saving or **Cancel** to abort.
5. Enter the filename then press **Enter** or press **Esc** to abort the saving. You should use "CSV" as the filename extension of the file to identify this is a spreadsheet file.

4.6 SETPOINT FILES

The Setpoint File utility facilitates the programming of all GE Multilin devices supported by RelayCom. The complete configuration of a device is stored in a single disk file. Setpoint files can be created by directly reading the values from an existing device. Likewise, a setpoint file can be written to a device which will result in it being completely programmed. These setpoint files can be viewed and modified using a powerful editor. This editor also allows you to create a new file containing default setpoint values so that you may program a device independently of actually having it.

This feature can be used very effectively in several ways. Consultants or plant engineers can program a device setup and store it in a file for later downloading by OEM's or commissioning staff at installation time. A device setup can be saved to a file prior to a firmware update and then downloaded back to the device afterwards to restore the proper setup. Device setups can be stored as backups for future reference.

Setpoint files have a special format and must be viewed and edited only using the editor provided by RelayCom. The files contain error checking information so that a corrupted file cannot be downloaded to a device. Also, they contain information regarding the product type and revision; this prevents a file from being downloaded to the wrong device or to the wrong revision of a device.

Choose "\ Setpoint File" to start the setpoint file utility. Choose the desired product type from the menu and a setpoint title screen such as the one on page 4-4 will appear.

Initially, no file will be loaded into the editor; this is indicated by the file name "NONAME" on the menu bar at the top

You will notice that the format of the screen is almost identical to that produced by the Single Relay feature. The only difference is the contents of the header box near the top of the screen.

SETPOINTS
Choose "\ Setpoints" to view the setpoint menu for the product chosen. This menu will be the same as that found in the "Single Relay" feature. Choose the desired page(s) and edit or view setpoints as usual.

FILE
Choose "\ File \ Open" to load an existing setpoint file into the editor. A File List Window will pop up for you to select a setpoint file. The File List Window displays file names in the current directory, the parent directory, and all sub-directories. You can enter the file name explicitly, or enter a file name with standard DOS wildcards (* and ?) to filter the names appearing in the window. You can use arrows to select a file name, and then press the **ENTER** key to open it. You may also double-click your left mouse button to open any file displayed in the window.

Choose "\ File \ New" to create a new file of setpoints for the selected product. It will contain all default values.

Choose "\ File \ Save" to store the currently loaded file to disk.

Choose "\ File \ Save as" to store the currently loaded file to another file. This essentially makes a copy of the original file. A File List Window, identical to the one in "\ File \ Open", will pop up to enter a new filename to be saved to the disk.

Choose "\ File \ Print" to create a printout of all the setpoints currently loaded into the editor.

Choose "\ File \ Comment to edit the comment associated with the current setpoint file. The comment can be used to help identify the setpoint file and provide any other useful information.

Choose "\ File \ Revision" to modify the revision information associated with the current setpoint file. In order to download a setpoint file to a device this revision must match

Setpoint File Menu System

File	Setpoint	Up/Download	Info	Return
Open New Save Save as Print Comment Revision	Setpoint menu which varies according to product chosen	Relay to File File to Relay	Information on this product	
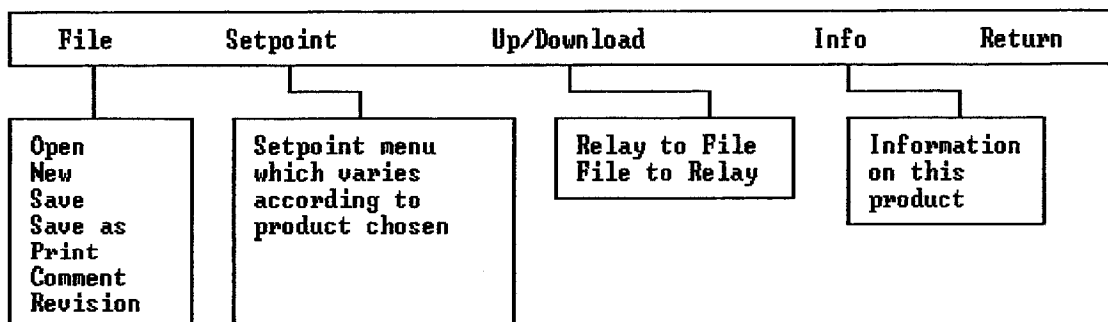
Typical Setpoint File Screen

```
 File              Setpoint            Up/Download    Info      Return

  ███  ███ ██  ▄█▄    \ Setpoints \ Phase Current
  █  █ █ █  █ █   █    Comment:  This is a comment for the file.
  ███  ███  █ █   █    File:     TESTFILE              Rev: B4.0

       Commands        ► Acceleration Time                      10.0 s ◄

   ↑/↓        Move       Starts per Hour                           3
   Home   Top of Page
   End    End of Page    Immediate Overload                       OFF
   Pg Up    Scroll Up
   Pg Dn  Scroll Down    Current Unbalance Alarm Level            10 %
   ←/→   Inc/Dec Value   Current Unbalance Alarm Delay             5 s
   0-9      Edit Value   Current Unbalance Trip Level             15 %
   Tab    Toggle Menu    Current Unbalance Trip Delay              5 s
   Esc     Goto Menu
   P2         Print      Undercurrent Level                       OFF
                         Undercurrent Delay                       10 s

                         Rapid Trip Level                      2.5 x FLC

  Access: Disabled  3 Range : 0.5 -> 125.0 (0.5  )
                                                  | COM 1 2 3 4 | 16:32:32
```

identically with the actual revision of the device.

UP/DOWNLOAD

Choose "\ Up\download \ Relay to File" to upload setpoints from the relay to a setpoint file. Then enter the correct communication port, relay address, baud rate, and telephone number (for modem communications only).

Choose "\ Up\download \ File to Relay" to download setpoints from a setpoint to the relay. Then enter the correct communication port number, relay address, baud rate, and telephone number (for modem communications only). Note that the revision number of the setpoint file must match the revision number of the relay. Otherwise, an "INCORRECT REVISION" error will occur before downloading. To change the revision number of the setpoint file, choose Revision in the File menu. Enter the desired revision number, then save the file.

INFO

Choose "\ Info" to display features of the relay.

4.7 MEMORY USAGE

RelayCom uses two types of (RAM) memory of your computer; the conventional memory (memory below 640K) and the XMS/EMS memory (memory above 1 Meg). RelayCom requires AT LEAST 400K of conventional memory to run. The remaining conventional memory is used to configure

relays. Therefore, the more conventional memory you have, the more relays you can configure. However, there is still an upper limit of how many relays you can configure since the conventional memory is limited and accessing memory above 640K is not an easy task in DOS. To determine how many relays you can configure, please refer to the following table:

Devices	Memory required for each device	Max # of devices that can be configured (assume 550K conventional memory)
169+ / 269+	1K	140
565 / 575	4K	40
SR735 / SR737	1K	140
MTM Plus	4K	40

For example, if your computer has 550K free conventional memory when you run RelayCom, the program itself takes 400K and you have around 150K for your relays. You can configure up to 140 units of 269 Plus, or 40 units of 565, or a combination of 50 units of SR735 and 25 units of MTM Plus.

To check how much free conventional memory your computer has, type "MEM" on the DOS prompt. The number on the right of the line "Largest executable program size" gives you how much free conventional memory your computer has.

If the message "Out of memory" is displayed while you are adding relays to your system, RelayCom has used up all the conventional memory for your relays. In this situation, you

can create more than one configuration files to store your relays, each having a smaller number of relays. Copy the configuration file you have just created to a new filename (say PLANT1.CFG). Then you can use a simple DOS batch file (like the following) to run RelayCom with the configuration you want:

```
REM  Batch file name RELAYCM.BAT
@echo off
if "%1"=="" goto run
copy %1 relaycom.cfg
:run
relaycom.exe
if "%1"=="" goto end
copy relaycom.cfg %1
:end
```

To run RelayCom with configuration file PLANT1.CFG, just type in the following at the DOS prompt:

RELAYCM PLANT1.CFG

Assuming you have the files RELAYCM.BAT, RELAYCOM.EXE, PLANT1.CFG in the same directory.

4.8 UNDER MICROSOFT WINDOWS 3.1

Although RelayCom is a DOS application, you can run RelayCom under the MS-DOS PROMPT session of Windows 3.1. The only difference of running RelayCom under DOS and Windows is performance. RelayCom runs faster in DOS than in Windows.

The followings are requirements to set up RelayCom to run under Windows in a PC and to maximize performance. For detailed setup procedures, please consult the MS-DOS and MS-WINDOWS user's guides.

- 486 PC or higher
- 8 Mb RAM (550 Kb conventional memory and 1 Mb expanded (EMS) memory)
- Run Windows in 386 Enhanced mode
- Do not run more than two copies of RelayCom at the same time.
- If you are running multiple copies of RelayCom, or with other communications program at the same time, you have to make sure **they do not use the same COM port to communicate**. Failure to do so may result in port conflict and this may give you a lot of communication errors and false readings.
- To keep RelayCom running in the background while you are doing other works in Windows, click the minimized MS-PROMPT icon in which RelayCom is running. A menu should appear on the top of the icon. Select **settings**

from the menu. Check the box **Background** for the task options. To improve the performance, increase the background and foreground priorities to 200. Note that this may slow down other applications while RelayCom is running. To boost the performance to maximum, check the box **Exclusive**. Note that this will stop other applications from running while RelayCom is running in the foreground.
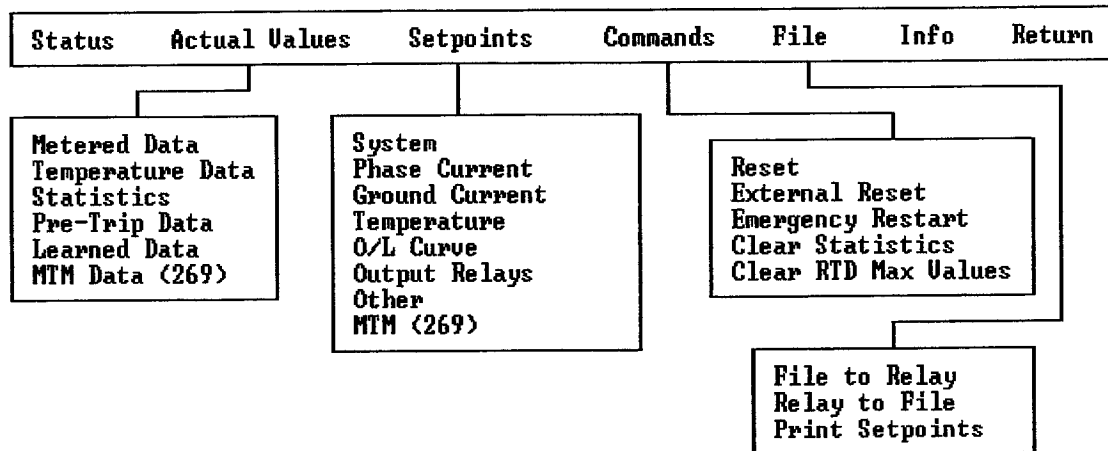
5 USING 169/269 PLUS MOTOR MANAGEMENT RELAYS

```
┌──────────────────────────────────────────────────────────────────────┐
│ Status   Actual Values   Setpoints   Commands   File   Info   Return   │
└──────────────────────────────────────────────────────────────────────┘

┌─────────────────┐   ┌─────────────────┐   ┌─────────────────────┐
│ Metered Data    │   │ System          │   │ Reset               │
│ Temperature Data│   │ Phase Current   │   │ External Reset      │
│ Statistics      │   │ Ground Current  │   │ Emergency Restart   │
│ Pre-Trip Data   │   │ Temperature     │   │ Clear Statistics    │
│ Learned Data    │   │ O/L Curve       │   │ Clear RTD Max Values│
│ MTM Data (269)  │   │ Output Relays   │   └─────────────────────┘
└─────────────────┘   │ Other           │
                      │ MTM (269)       │   ┌─────────────────────┐
                      └─────────────────┘   │ File to Relay       │
                                            │ Relay to File       │
                                            │ Print Setpoints     │
                                            └─────────────────────┘
```

Figure 5-1 169/269 Menu System

5.1 SETUP

NOTE: An access jumper must be placed across terminals 52 and 53 in order to store setpoints directly at the relay.

The communications address of your 169/269 Plus relay must be programmed so that it is the same as the one configured into RelayCom. To change the address follow these steps (Steps 3 to 5 are only applicable for a 169 Plus relay):

1. Press **SETPOINTS**
2. Press **PAGE DOWN** until the display reads: "PAGE 5: SETPOINT VALUES / SYSTEM CONFIGURATION".
3. Press **LINE DOWN** until the display reads: "SERIAL = MASTER ? XX / (No Indicates SLAVE)".
4. Press **VALUE DOWN** until the value "NO" is displayed.
5. Press **STORE**.
6. Press **LINE DOWN** until the display reads: "SLAVE ADDRESS = XXX".
7. Press **VALUE UP / VALUE DOWN** until the desired address is displayed.
8. Press **STORE** to save the new address.

The baud rate of your 169/269 Plus relay may also have to be changed. The 169 Plus default baud rate is 1200. The 269 Plus default baud rate is 2400. To change the baud rate follow these steps:

1. Press **SETPOINTS**
2. Press **PAGE DOWN** until the display reads: "PAGE 6: SETPOINT VALUES / GE MULTILIN SERVICE CODES".
3. Press **LINE DOWN** until the display reads: "SERVICE

USE ONLY / CODE = 0".
4. Press **VALUE UP / VALUE DOWN** until the value "23" is displayed.
5. Press **STORE**.
6. Press **LINE DOWN** until "BAUD RATE = XXX" is displayed.
7. Press **VALUE UP / VALUE DOWN** until the correct value from the table below is displayed.
8. Press **STORE** to save the new baud rate.

BAUD RATE	169/269 Plus VALUE
300	152
1200	230
2400	243

5.2 SETPOINTS

The 169/269 Plus setpoint messages in RelayCom are organized in pages similar to the relay itself. Figure 5-1 illustrates the choices available in the setpoint menu. The function of each setpoint is described in detail in the 169/269 Plus instruction manual.

5.3 ACTUAL VALUES

The 169/269 Plus actual values messages in RelayCom are also organized in pages similar to the relay. Figure 5-1 illustrates the choices available in the actual values menu.

5.4 COMMANDS

Figure 5-1 shows the commands that can be sent to your 169/ 269 Plus relay using RelayCom. Simply choose the desired command from the menu and it will be immediately executed. The following lists the exact meaning of each command:

- RESET — This command is exactly equivalent to pressing RESET on the relay keypad. A trip or alarm cannot be reset until the condition causing it (eg. high RTD temperature or lockout) is gone. All other latched (manual reset) trips and alarms can be reset using this command.

- EXTERNAL RESET — This command is exactly equivalent to using the External Reset feature of the 169/269 Plus relay. It is used to reset latched (manual reset) trips and alarms.

- EMERGENCY RESTART — This command is exactly equivalent to using the Emergency Restart feature of the 169/269 Plus relay. It is used to clear the thermal memory of the relay which also clears the lockout time; now that the lockout time is zero the relay can be reset.

- CLEAR STATISTICS — This command is exactly equivalent to using "START NEW COMMISSIONING?" in page 4 of Actual Values. It is used to clear all data relating to the start and trip counters.

- CLEAR RTD MAX VALUES — This command is exactly equivalent to using "CLEAR LAST ACCESS DATA?" in page 2 of Actual Values. It is used to clear all RTD maximum values.

- CLEAR PRE-TRIP DATA — This command is exactly equivalent to using "CLEAR PRE-TRIP DATA?" in page 5 of Actual Values. It is used to clear all pre-trip data, cause of last event, and cause of last trip.
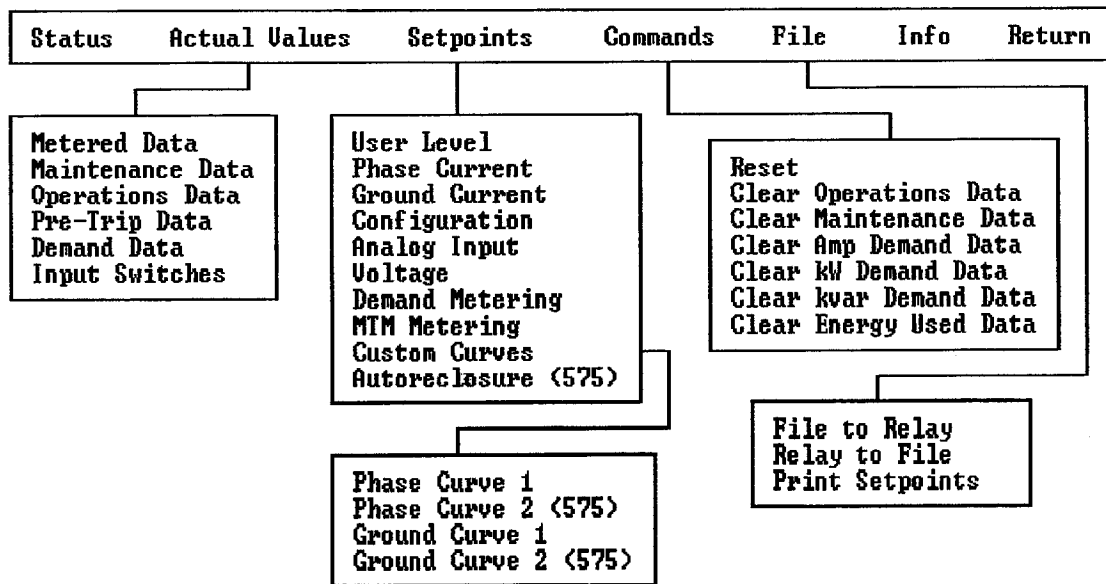
6 USING 565/575 FEEDER MANAGEMENT RELAYS


```
Status    Actual Values   Setpoints   Commands   File    Info    Return
```

```
Metered Data          User Level
Maintenance Data      Phase Current          Reset
Operations Data       Ground Current         Clear Operations Data
Pre-Trip Data         Configuration          Clear Maintenance Data
Demand Data           Analog Input           Clear Amp Demand Data
Input Switches        Voltage                Clear kW Demand Data
                      Demand Metering        Clear kvar Demand Data
                      MTM Metering           Clear Energy Used Data
                      Custom Curves
                      Autoreclosure (575)
                                             File to Relay
                                             Relay to File
                                             Print Setpoints
Phase Curve 1
Phase Curve 2 (575)
Ground Curve 1
Ground Curve 2 (575)
```

Figure 6-1 *565/575* Menu System

6.1 SETUP

NOTE: An access jumper must be placed across terminals 33 and 34 in order to store setpoints directly at the relay.

The communications address of your 565/575 relay must be programmed so that it is the same as the one configured into RelayCom. To change the address follow these steps:

1. Press **SETPOINTS**.
2. Press **PAGE** until the display reads: "SETPOINTS / COMMUNICATIONS".
3. Press **LINE DOWN** until "RELAY ADDRESS" is displayed.
4. Enter the desired address using the numeric keypad.
5. Press **STORE** to save the new address.

The baud rate of your 565/575 relay may also have to be changed. The default value is 2400. To change the baud rate follow these steps:

1. Press **SETPOINTS**.
2. Press **PAGE** until "SETPOINTS / COMMUNICA-TIONS" is displayed.
3. Press **LINE DOWN** until "BAUDRATE" is displayed.
4. Press **NEXT CHOICE** until the required value is displayed.
5. Press **STORE** to save the new baud rate.

6.2 SETPOINTS

The 565/575 setpoint messages in RelayCom are organized in pages similar to the relay itself. Figure 6-1 illustrates the choices available in the setpoint menu. The function of each setpoint is described in detail in the 565/575 instruction manual.

6.3 ACTUAL VALUES

The 565/575 actual values messages in RelayCom are also organized in pages similar to the relay. Figure 6-1 illustrates the choices available in the actual values menu.

6.4 COMMANDS

Figure 6-1 shows the commands that can be sent to your 565/575 relay using RelayCom. Simply choose the desired command from the menu and it will be immediately executed. You will be required to enter the security access code for all commands except for RESET. The following lists the exact meaning of each command:

• RESET — This command is exactly equivalent to pressing RESET on the relay keypad. A trip or alarm cannot be reset until the condition causing it is gone.

- REMOTE OPEN BREAKER — Sends a Serial Trip command to the unit to open the breaker remotely.

- REMOTE CLOSE BREAKER — Sends a Serial Close command to the unit to close the breaker remotely.

- CLEAR MAINTENANCE DATA — Clears the number of breaker trips and the accumulated kA^2 data.

- CLEAR OPERATIONS DATA — Clears the individual trip counters.

- CLEAR AMP DEMAND DATA— Clears the current demand data.

- CLEAR KW DEMAND DATA — Clears the real power demand data.

- CLEAR KVAR DEMAND DATA — Clears the reactive power demand data.

- CLEAR ENERGY USED DATA—Clears the energy used data.
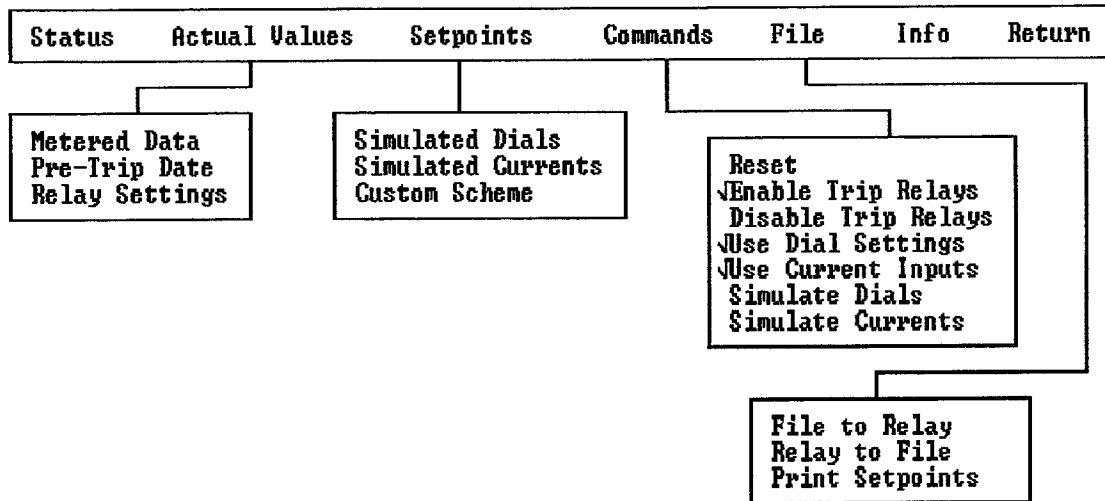
7 USING SR735/737 FEEDER PROTECTION RELAYS

```
Status    Actual Values    Setpoints    Commands    File    Info    Return
```

```
Metered Data        Simulated Dials
Pre-Trip Date       Simulated Currents
Relay Settings      Custom Scheme
```

```
Reset
√Enable Trip Relays
 Disable Trip Relays
√Use Dial Settings
√Use Current Inputs
 Simulate Dials
 Simulate Currents
```

```
File to Relay
Relay to File
Print Setpoints
```

Figure 7-1 SR735/737 Menu System

7.1 SETUP

The baud rate and communication address of your SR735/SR737 unit must be set so that they are the same as the ones configured into RelayCom. To change the baud rate of your unit, set DIP switches 1 and 2 according to the label on the front panel. To change the communication address, set switches 3 to 7 so that the combination of numbers add up to the required slave address. For example, to set baud rate to 9600, set 1 off and 2 on. To set slave address to 10, set 4 on, 6 on, 3 off, 5 off, 7 off. Disable test mode for normal operation (Test switch 8 off).

7.2 ACTUAL VALUES

"\ Actual Values \ Metered Data": Actual phase A B C and ground current being measured by the relay are displayed. If the relay is in simulation mode, the displayed current will be the programmed simulation current.

"\ Actual Values \ Pre-Trip Data": After the relay trips, all currents and cause of trip are saved by the relay. This screen shows the information present at time of trip and the cause of trip. Normally this pre-trip information is used when the relay is connected in a communication network to diagnose the fault that caused the trip. When used with the RelayCom program it confirms how the relay will operate and appear under simulated fault conditions which is useful for training and product understanding.

"\ Actual Values \ Relay Settings": Actual dial and option switch settings on the relay are displayed on the screen. This is useful for verification prior to installation that intended settings have in fact been set correctly. Use the "\ File \ Relay To File" menu selection to save these displayed settings to a file for future reference.

7.3 SETPOINTS

"\ Setpoints \ Simulated Dials": When doing simulations, protection settings can be either the actual relay dials on the front panel or simulated settings from the computer. If simulated settings are to be used, enter them using this menu selection.

"\ Setpoints \ Simulated Currents": If a current injection set is available, actual currents can be injected into the relay via its rear terminals for testing. Fault simulations can also be simulated using only a computer by entering required currents with this menu.

"\ Setpoints \ Custom Scheme": Custom scheme setpoints can be selected on the screen. This allows the relay to be configured using one of three curve types, lockout and block instantaneous. Switch 8 on the side of the relay must be ON for the setpoints to be used.

7.4 COMMANDS

"\ Commands \ Reset": Clear the trip target indicators on the front of the relay if any are set by executing this command. It has the same effect as pressing the CLEAR key on the front of the relay.

"\ Commands \ Clear Trip Record": Clear the trip record stored in the pre-trip data page of the relay to none.

"\ Commands \ Enable Trip Relays": Whenever the relay trips during testing the output trip relays will activate. This is the normal default when TEST switch 8 is first turned on. Use this mode for activating a test set timer to verify actual operation of the relay.

"\ Commands \ Disable Trip Relays": If testing is to be done in a situation where the trip relay outputs would shut down equipment, the trip relays can be disabled to prevent shutdown of equipment. Select this mode of operation before injecting currents or issuing the "Simulate Currents" command. If the output relays are disabled, no protection is provided to the switchgear. Returning the TEST switch 8 to the off position after issuing this command re-enables all trip relays and full protection is restored.

"\ Commands \ Use Dial Settings: Select this item if the desired protection settings for the simulation are to be from the relay front panel dials. Relay front panel TEST switch 8 must be on for simulation mode to work.

"\ Commands \ Use Current Inputs": The relay will use actual currents from its rear terminal inputs for all readings. A current injection set would need to be connected to the relay during simulation to use this mode. Relay front panel TEST switch 8 must be on for simulation mode to work.

"\ Commands \ Simulate Dials": Protection settings can be generated from the computer instead of the actual dials on the front of the relay. Use this menu to use dial settings from the computer and see the effect that changes make during simulation. Enter the desired settings with the \Setpoints\Simulated Dials menu before executing this command. Relay front panel TEST switch 8 must be on for simulation mode to work.

"\ Commands \ Simulate Currents": Once desired current values for a fault simulation have been entered into the computer using the \Setpoints\Simulated Currents menu, make the relay see these currents by executing this menu selection. Protection timeout begins as soon as the relay receives the command over the serial communications link. After a trip, the relay will return to \Command\Use Current Inputs mode and the \Command\Simulate Currents command must be executed for each new trip simulation. Relay

front panel TEST switch 8 must be on for simulation mode to work.
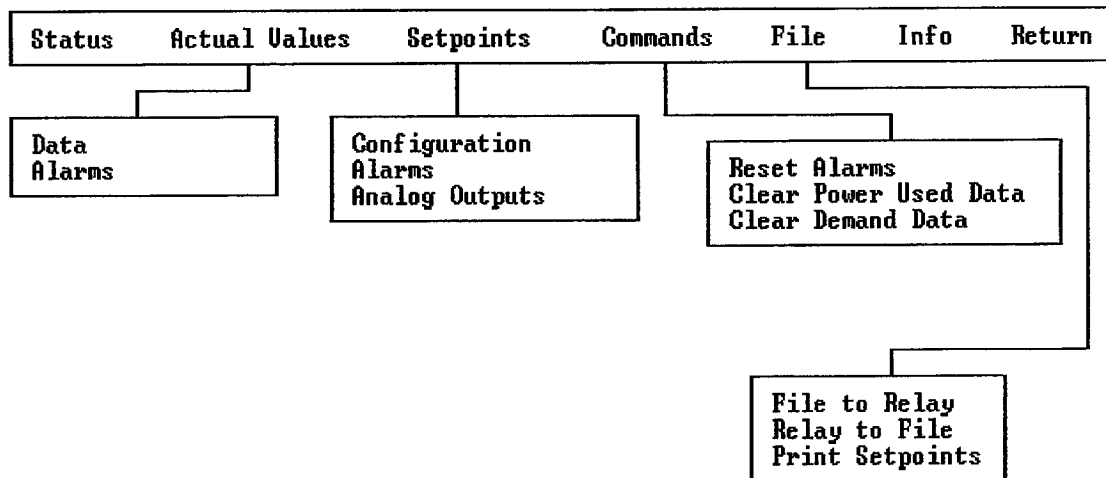
8 USING MTM PLUS METER TRANSDUCER MODULES

Figure 8-1 MTM Plus Menu System

8.1 SETUP

The communications address of your MTM Plus module must be programmed so that it is the same as the one configured into RelayCom. To change the address follow these steps:

1. Press **SETPOINTS**.
2. Press **PAGE** until the display reads: "SETPOINTS / COMMUNICATIONS".
3. Press **LINE DOWN** until "RELAY ADDRESS" is displayed.
4. Enter the desired address using the numeric keypad.
5. Press **STORE** to save the new address.

The baud rate of your MTM Plus module may also have to be changed. The default value is 2400. To change the baud rate follow these steps:

1. Press **SETPOINTS**.
2. Press **PAGE** until "SETPOINTS / COMMUNICA-TIONS" is displayed.
3. Press **LINE DOWN** until "BAUDRATE" is displayed.
4. Press **NEXT CHOICE** until the required value is displayed.
5. Press **STORE** to save the new baud rate.

8.2 SETPOINTS

The MTM Plus setpoint messages in RelayCom are organized in pages similar to the module itself. Figure 8-1 illustrates the choices available in the setpoint menu. The function of each

setpoint is described in detail in the MTM Plus instruction manual.

8.3 ACTUAL VALUES

The MTM Plus actual values messages in RelayCom are also organized in pages similar to the module. Figure 8-1 illustrates the choices available in the actual values menu.

8.4 COMMANDS

Figure 8-1 shows the commands that can be sent to your MTM Plus module using RelayCom. Simply choose the desired command from the menu and it will be immediately executed. You will be required to enter the security access code for all commands except for RESET ALARMS. The following lists the exact meaning of each command:

• RESET ALARMS — This command is exactly equivalent to pressing RESET on the relay keypad. A trip or alarm cannot be reset until the condition causing it is gone.

• CLEAR POWER USED DATA — Clears MWHRS and MVARHRS data.

• CLEAR DEMAND DATA — Clears demand values.

9 USING THE 301 MOTOR MANAGER

```
┌─────────────────────────────────────────────────────────────────────────┐
│ Status   Actual Values   Setpoints   Commands   File   Info   Return      │
└─────────────────────────────────────────────────────────────────────────┘
        │                      │              │
   ┌────┴──────┐        ┌──────┴──────┐   ┌───┴─────────────────────┐
   │ Data      │        │ Motor Data  │   │ Reset                   │
   │ Status    │        │ Configuration│  │ Lockout Reset           │
   │ Inputs    │        │ Advanced Data│  │ Enable Local Control    │
   │ Statistics│        └─────────────┘   │ Disable Local Control   │
   └───────────┘                          │ Stop                    │
                                          │ Start A                 │
                                          │ Start B                 │
                                          │ Clear Statistics        │
                                          └─────────────────────────┘
```
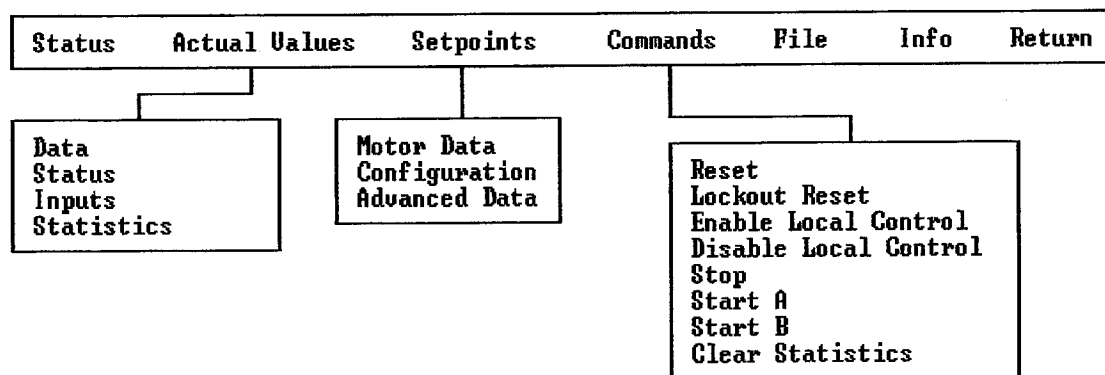
Figure 9-1 301 Menu System

9.1 SETUP

The communications address and baud rate of your 301 Motor Manager must be programmed so that it is the same as the ones configured into RelayCom. To change the communication setpoints of the relay follow these steps:

1. Press **SETPOINTS**
2. Press **LINE DOWN** once, the message "COMMUNICATION ADDRESS" is displayed
3. Enter the desired address using the numeric keypad
4. Press **STORE** to save the new address
5. Press **LINE DOWN** once, the message "COMMUNICATION AT xxxx BAUD" is displayed
6. Press **NEXT CHOICE** until the required value is displayed
7. Press **STORE** to save the new baud rate

9.2 SETPOINTS

The Motor Manager setpoint messages in RelayCom are organized in pages similar to the relay itself. Figure 9-1 illustrates the choices available in the setpoint menu. The function of each setpoint is described in detail in the 301 Motor Manager Instruction Manual.

9.3 ACTUAL VALUES

The Motor Manager actual values messages in RelayCom are also organized in pages similar to the relay. Figure 9-1 illustrates the choices available in the actual values menu. The meaning of each actual value is described in detail in the 301 Motor Manager Instruction Manual.

9.4 COMMANDS

Figure 9-1 shows the commands that can be sent to your Motor Manager using RelayCom. Simply choose the desired command from the menu and it will be immediately executed. You will be required to enter the security access code for all commands except for RESET. The following lists the meaning of each command:

- RESET—This command is exactly equivalent to pressing the RESET on the relay keypad. It provides reset after a trip for the following conditions:

  - Single phasing
  - Thermistor (now cool)
  - Over current (no thermal lock-out existing)
  - Under current
  - Acceleration time
  - Serial link failure

- LOCKOUT RESET — This command is exactly equivalent to the lockout reset input. It provides reset after a trip for the following conditions:

  - Ground fault
  - Stalled rotor
  - Overload

  When the Motor Manager has tripped due to an over current, using the lockout command causes the Thermal Capacity to be 0%.

- START A — This command is exactly equivalent to the Start A input. Start A input is used for all types of contactors, that is: direct-on-line, reversing, speed 1 or start.

- START B — This command is exactly equivalent to the Start B input. Start B input is used for a reversing and a speed 2 contactor.

- STOP — This command is exactly equivalent to the Stop input. It de-energized the contactor output relay presently selected.

- CLEAR STATISTICS — This command is exactly equivalent to enabling the setpoint "CLEAR STATISTICS" on page 2 of Setpoints.

- ENABLE LOCAL START — If Status Input 1 is closed, this command enables local start commands. Thus the Motor Manager will respond to local Start A and Start B inputs. If Status Input 1 is open, this command will have NO effect.

- DISABLE LOCAL START — If Status Input 1 is closed, this command disable local start commands. Thus the Motor Manager will not respond to local Start A or Start B inputs. If Status Input 1 is open, this command will have NO effect.

10 AN EXAMPLE SYSTEM

The following section will demonstrate the setup and use of RelayCom with the help of an example system. The system has the following components:
1. 269 Plus relay connected to a fan motor.
2. 269 Plus relay connected to a pump motor.
3. IBM PC compatible computer.
4. RS232/RS485 Converter Module with power pack.
5. RelayCom software disk.

10.1 INSTALLING THE SYSTEM

The first step is to connect the relays using shielded twisted pair wire. Polarity is very important in RS485 connections; the "+" terminals of the RS485 converter module and of both relays must be connected together; likewise, the "-" terminals of the RS485 converter module and of both relays must also be connected together. The shield wire should be connected to both relays and grounded in one place. The terminal connections for the 269 relays are as follows: "+" = #47, "-" = #46, shield = #88. Finally, an RS232 cable should be connected between the RS485 module and serial port COM1 of your computer. Both relays and the RS485 module should of course be powered on. Those are all the hardware connections that are required to establish a communications link between RelayCom and the two relays.

The second step is to program the slave addresses of each relay. To change the address for the fan motor relay follow these steps:

1. Press **SETPOINTS**
2. Press **PAGE DOWN** until the display reads: "PAGE 5: SETPOINT VALUES / SYSTEM CONFIGURATION".
3. Press **LINE DOWN** until the display reads: "SLAVE ADDRESS = 1".
4. Press **VALUE UP / VALUE DOWN** until the desired address is displayed.
5. Press STORE to save the new address.

Follow the exact same steps for the pump motor relay except set the slave address to have the value of two.

Now you are ready to install the RelayCom software.
1. Insert the distribution diskette into drive A and type "A:INSTALL". Follow the instructions given by the install program.

You have now completed the installation process for the example system. The next step is to tell RelayCom what devices are in the system and how to find them. This is explained in the next section.

10.2 CONFIGURING THE SYSTEM

The install program automatically loads RelayCom so you should now see the word "RelayCom" displayed in large block letters. First you must configure a site which will contain the two relays you will be communicating with:
1. Choose "\ Setup \ Sites".
2. Locate the cursor indicators (use arrow keys) over site number one and press **ENTER** to change the parameters for the site.
3. Enter the name "EXAMPLE SITE" and press **ENTER**.
4. Use the ←/→ keys to select "COM1" as the communications port and then press **ENTER**.
5. Use the ←/→ keys to select "2400" as the baud rate and then press **ENTER**.
6. Do not enter a value for the phone number. Press **ENTER** again.
7. You will be asked whether the new settings should be saved to disk. Press **Y** to confirm.

Now you will configure the two relays:
1. Choose "\ Setup \ Relays".
2. Locate the cursor indicators (use arrow keys) over relay number one and press **ENTER** to change the parameters for the relay.
3. Enter the name "FAN MOTOR" and press **ENTER**.
4. Use the ←/→ keys to select "269 PLUS" as the device type and press **ENTER**.
5. Enter the number 1 for the address of the relay and press **ENTER**.
6. You will be asked whether the new settings should be saved to disk. Press **Y** to confirm.
7. Locate the cursor indicators (use arrow keys) over relay number two and press **ENTER** to change the parameters for the relay.
8. Enter the name "PUMP MOTOR" and press **ENTER**.
9. Use the ←/→ keys to select "269 PLUS" as the device type and press **ENTER**.
10. Enter the number 2 for the address of the relay and press **ENTER**.
11. You will be asked whether the new settings should be saved to disk. Press **Y** to confirm.

The last step in configuring RelayCom for the example system is to make sure the communication port is set up for the correct hardware:
1. Choose "\ Setup \ Ports".
2. Press 1 to change the setting for COM1.
3. Use the ←/→ keys to select "RS232/RS485 CONVERTER" as the port type. Press **ENTER** followed by **ESC.**

4. You will be asked whether the new settings should be
    saved to disk. Press **Y** to confirm.
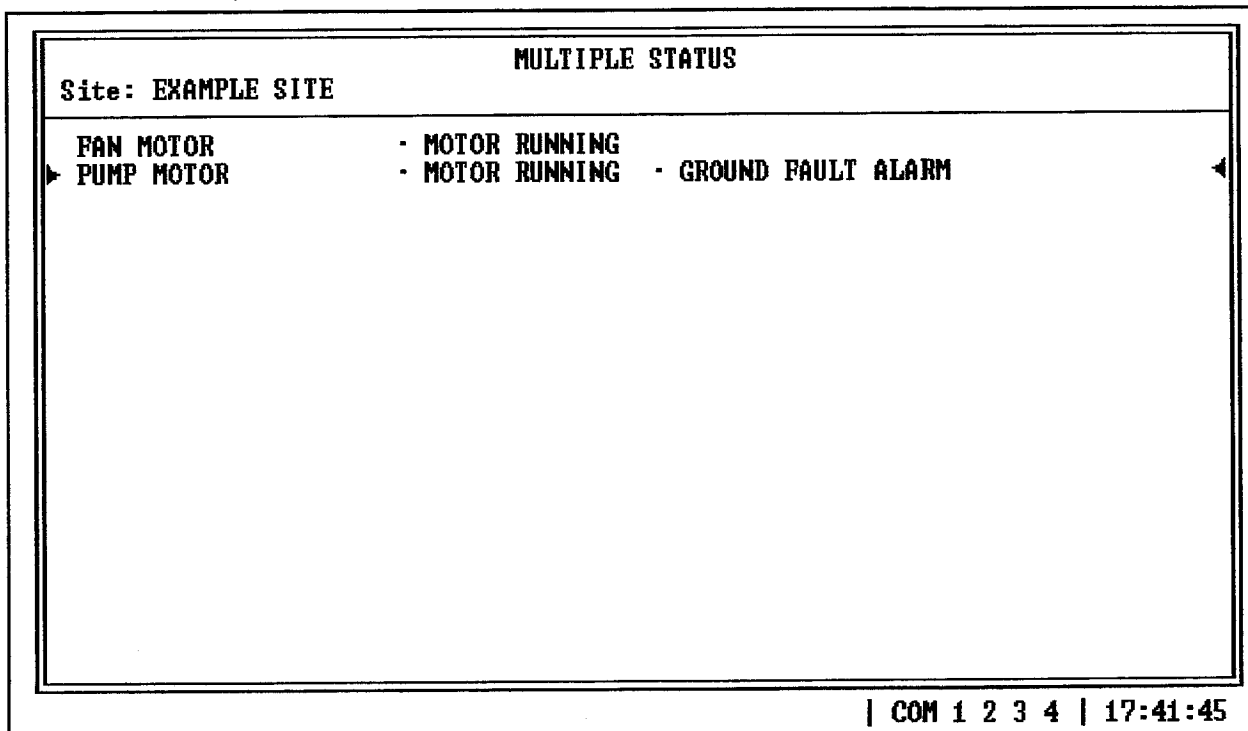

10.3 VIEWING STATUS OF THE SYSTEM

Your system should now be installed and configured and is
ready for action. Begin by viewing the multiple status screen.
This feature is a good test to ensure that the relays are all
connected and responding properly.

1. Choose "\ Multiple Status \ EXAMPLE SITE".

The display should be similar to the figure below. Both the
Fan Motor relay and the Pump Motor relay are being
continuously polled for status information which is then
displayed on the screen. The cursor arrows indicate which
relay is currently being polled. If either relay displays the
status message "NOT RESPONDING" then there is a prob-
lem with communications between that device and RelayCom.
Make sure that you have set everything according to the
instructions and if there is still a problem consult appendix A
for troubleshooting hints.

That is all there is to installing, configuring, and using
RelayCom. Of course, there are more options to set up and
features to use than have been described here. To use any of
these other features refer to the appropriate chapter.

Multiple Status Screen for Example Site

```
╔══════════════════════════════════════════════════════════════════════════════╗
║  ┌────────────────────────────────────────────────────────────────────────┐  ║
║  │                            MULTIPLE STATUS                              │  ║
║  │  Site: EXAMPLE SITE                                                     │  ║
║  │  ────────────────────────────────────────────────────────────────────  │  ║
║  │   FAN MOTOR            · MOTOR RUNNING                                  │  ║
║  │ ► PUMP MOTOR           · MOTOR RUNNING   · GROUND FAULT ALARM         ◄│  ║
║  │                                                                        │  ║
║  │                                                                        │  ║
║  │                                                                        │  ║
║  │                                                                        │  ║
║  │                                                                        │  ║
║  │                                                                        │  ║
║  │                                                                        │  ║
║  │                                                                        │  ║
║  │                                                                        │  ║
║  │                                                                        │  ║
║  └────────────────────────────────────────────────────────────────────────┘  ║
║                                                  | COM 1 2 3 4 | 17:41:45     ║
╚══════════════════════════════════════════════════════════════════════════════╝
```

APPENDIX A

TROUBLESHOOTING THE COMMUNICATIONS LINK

The RS232/RS485 converter is a very useful aid in troubleshooting the communications link. It has four LED's: RECEIVE, TRANSMIT, DTR, and POWER. When attempting to communicate with a device the LED's will light up in the following sequence:

1. POWER LED always on indicating converter is powered on.
2. DTR LED turns on indicating computer is ready to transmit.
3. TRANSMIT LED turns on as data is transmitted from the computer.
4. DTR and TRANSMIT LED's both turn off indicating computer has completed transmission.
5. RECEIVE LED turns on as data is received from slave device.
6. RECEIVE LED turns off indicating slave device has completed response.

When the communications link is working properly this sequence will probably be very hard to follow because it happens so quickly. However, if any of the LED's do not turn on, there is a problem. Possible reasons for any of the LED's not turning on are listed below.

POWER: This LED should always be on whenever the power supply adapter is connected to the converter and is plugged into a standard 120 VAC outlet. If this is not the case, the power supply adapter or the converter itself is faulty and should be returned for repair.

DTR (Data Terminal Ready): This LED indicates that the computer is ready to transmit data. If it does not turn on as described above the problem lies somewhere between the computer and the converter. Ensure that the converter is connected properly to the RS232 serial port of the computer. Also be sure that RelayCom is configured for the correct port.

TRANSMIT: This LED indicates that the computer is transmitting data. If it does not turn on as described above the problem lies somewhere between the computer and the converter. Ensure that the converter is connected properly to the RS232 serial port of the computer. Also be sure that RelayCom is configured for the correct port.

RECEIVE: This LED indicates that a slave device is transmitting data in response to a request from the computer. If the DTR and TRANSMIT LED's are working properly but the RECEIVE LED does not then the problem lies somewhere

between the converter module and the device(s). This is the most common problem and there could be several reasons for it. Ensure that the polarity of the RS485 wires is not reversed anywhere. Also, check that the shield connection is grounded in one place. Finally, make sure that the device address is the same as that configured in RelayCom and that it is not duplicated by any other device on the same data channel.

The following are possible reasons for not being able to establish communications between a relay and RelayCom. You should review the chapters on installation and configuration as well.

- Relay address incorrect.
- Relay baud rate incorrect.
- Relay not powered on.
- Relay in master mode (169 Plus only).
- Incompatible revision or modification of relay.
- Two (or more) relays have the same communication address.
- Polarity of RS485 channel reversed.
- Shield connection not properly grounded.
- Terminating resistors not installed.

LIST OF FIGURES