Relay Control Panel

User Manual

Version 2.7 Rev 0

Preface

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Using This Guide

This user manual describes the installation and operation of the ERL Relay Control Panel (RCP) user interface software.

The manual uses a number of conventions to denote special information:

Example	**Describes**
Start>Settings>Control Panel	Choose the Control Panel submenu in the Settings submenu on the Start menu.
Right-click	Click the right mouse button.
Recordings	Menu items and tabs are shown in italics.
service	User input or keystrokes are shown in bold.
Text boxes similar to this one	Relates important notes and information.
..	Indicates more screens.
▶	Indicates further drop-down menu, click to display list.
⚠	Indicates a warning.

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Version Compatibility

Relay Control Panel Compatibility	
Relay	**Version**
Compatible with L-PRO 4000 Offliner	v2.0 - v2.6
Compatible with L-PRO 4000 Firmware	v2.0 - v2.5
Compatible with S-PRO 4000 Offliner	v1.0 - v2.1
Compatible with S-PRO 4000 Firmware	v1.0
Compatible with S-PRO 4001 Firmware	v1.0 - v2.0
Compatible with B-PRO 4000 Offliner	v2.0 - v2.2
Compatible with B-PRO 4000 Firmware	v2.0
Compatible with T-PRO 4000 Offliner	v1.0 - v1.3
Compatible with T-PRO 4000 Firmware	v1.0 - v1.2
Compatible with F-PRO 4000 Offliner	v1.0
Compatible with F-PRO 4000 Firmware	v1.0
Compatible with F-PRO 2000 Offliner	v1.0
Compatible with F-PRO 213 Firmware	v1.0
Compatible with F-PRO 235 Firmware	v1.0

Please contact ERLPhase Customer Service for complete Revision History.

PC System Requirements and Software Installation

Hardware

The minimum hardware requirements are:

- 1 GHz processor
- 2 GB RAM
- 20 GB available hard disk space
- USB port
- Serial communication port

Operating System

The following software must be installed and functional prior to installing the applications:

- Microsoft Windows XP Professional Service Pack 3 or
- Microsoft Windows 7 Professional Service Pack 1

Software Installation

The CD-ROM contains software and the User Manual for the Relay Control Panel.

Software is installed directly from the CD-ROM to a Windows PC. The CD-ROM contains the following:

- The Relay Control Panel
- The relay firmware, and firmware and installation instructions.
- User Manual: Relay Control Panel User Manual in PDF format
- ERL 61850 IED Configurator
- USB Driver

To Install Software on the Computer

Insert the CD-ROM in the drive. The CD-ROM should open automatically. If the CD-ROM does not open automatically, go to Windows Explorer and find the CD-ROM (usually on D drive). Open the CD.exe file to launch the CD-ROM.

To install the software on the computer, click the desired item on the screen. The installation program launches automatically. Installation may take a few minutes to start.

To view the Reay User Manual you must have Adobe Acrobat on the computer. If you need a copy, download a copy by clicking on Download Adobe Acrobat.

Anti-virus/Anti-spyware Software

If an anti-virus/anti-spyware software on your local system identifies any of the ERLPhase applications as a “potential threat”, it will be necessary to configure your anti-virus/anti-software to classify it as “safe” for its proper operation. Please consult the appropriate anti-virus/anti-spyware software documentation to determine the relevant procedure.

1 Overview

Relay Control Panel (RCP)

The RCP is the Windows graphical user interface software tool provided with all 4000 series and higher (new generation) ERL relays to communicate, retrieve and manage records, event logs, manage settings (identification, protection, SCADA etc.,), display real time metering values, view, analyze, and export records in COMTRADE format.

> The RCP is intended for stand - alone, interactive use with all ERL new generation relays. It does not provide automated record or settings collection, a database support or any automated data analysis.

Access Permission

There are four levels of access to relay information using the RCP. The default access level which allows the user to work in offline mode and is restricted to minimum offline information, such as locally stored recordings and settings.

Similarly, additional levels of password controlled unit access control are available for communications and interface with a compatible ERL protection relay. The ‘view’, the ‘change’ and the ‘service’ levels of access allow for secured data communication and information transfer through an active Ethernet or USB connection, and more advanced system configuration control aspects, as defined by role specific access control. Please refer to “Password Protection” on page 7-10 for more details on how to set the password control and the availability of functionality to interact with the relay using the RCP.

Getting Started

The RCP software must be installed on the local Personal Computer (PC) along with other necessary drivers in order to successfully communicate with the relay. Please refer “Relay Control Panel Installation” on page 2-1 for detailed instructions on the RCP installation procedures. Please also refer the official website in the contact information for the latest available versions of the RCP software.

2 Relay Control Panel Installation

Installation of the Relay Control Panel software may require changes to the Windows system configuration for proper operation. Please review the instructions in this chapter to ensure proper setup.

The relay CD-ROM contains the following:

- Relay Control Panel Windows software
- Firmware update with installation instructions
- User Manual in PDF format
- Relay Offliner Settings program
- Relay logic diagram in PDF format

2.1 Installing Relay Control Panel

The user must be logged on to the target computer as a user with local administrator privileges to install Relay Control Panel. Once installed, the user may be logged in as a Limited User, as administrator privileges are not generally required for operation of the program.

Overview

Instructions for installing Relay Control Panel and configuring Windows for its use are covered in the following sections. Separate instructions for each version of Windows Operating System are provided for the steps below. Use the one that is appropriate for the computer.

The procedure has the following parts:

1. Install Relay Control Panel.
2. Install Offliner Settings program
3. Install the Null Modem driver.
4. Create Windows Dial-Up Network definitions for modem and direct serial connections.

When these steps are complete, go to “First Time Start-Up” on page 2-5 for details on launching Relay Control Panel.

2.2 Installation on Windows XP or Windows 7

The user will need to have installed previously the ERLPhase's USB driver from the CD that was shipped with the relay (IED). See relay User Manual for instructions.

Step 1: Install RCP Software from CD-ROM

1. Install RCP Software from CD-ROM.
2. The CD-ROM should start automatically. If it doesn't, go to Windows Explorer and run the ERLPhase.exe file at the root of the CD-ROM directory.
3. To install Relay Control Panel software on the computer, select the *Relay Control Panel vx.x Rev x* (x refers to the version number). The installation program starts automatically, but may take a few minutes to begin.
4. During installation a prompt appears asking whether the relay is 50 Hz or 60 Hz units. For proper operation it is important to select the correct one. If the user needs to change this in the future, re-install Relay Control Panel.
5. When the installation is complete, a Relay Control Panel icon is placed on the desktop. Use the icon to launch Relay Control Panel.

   If the user prefers, he can start Control Panel through Windows Start menu (*Start>Programs>ERLPhase/Relay Control Panel*).

Step 2: Installing Null Modem Driver Software

A virtual software modem called a Null Modem must be set up for direct serial cable communication between this computer and a relay. A Null Modem driver is provided with the relay installation CD-ROM.

This section provides step by step instructions on how to install the Null Modem driver. If you are going to communicate with a 4000 series product please ensure that you connect your computer to the front USB port of a powered up 4000 series unit prior to following these steps.

1. Start Windows Control Panel by going to *Start>Control Panel*.
2. Double-click the *Phone and Modem Options* icon.
3. Select the *Modems* tab. Select *Add* to open the Add Hardware Wizard.
4. Select *Don't detect my modem; I will select it from a list,* then select the *Next* button

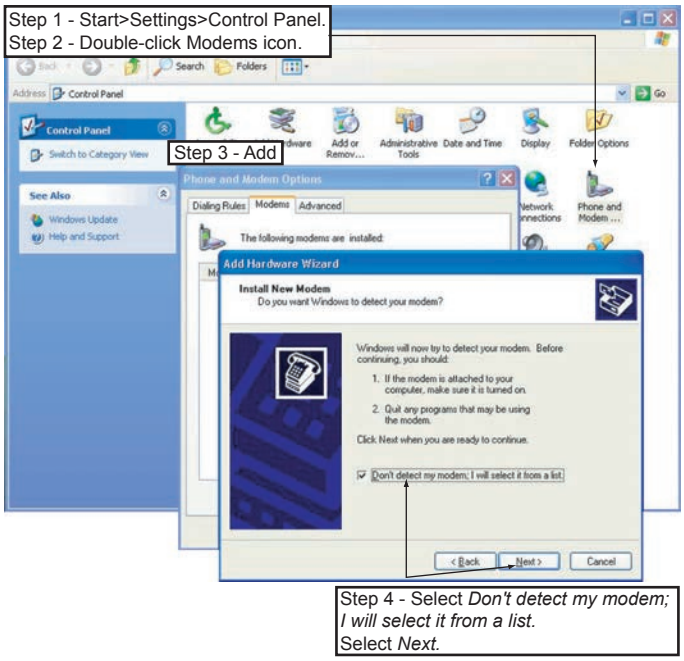

Figure 2.1: Null Modem Driver Installation

5. Select the *Have Disk* button, select *Browse*. To find the file go to *C:\Program Files\ERLPhase\Relay Control Panel\Null_Mdm.Inf.* Note that directory *Program Files(x86)* is used for Windows 7 64-bit operating systems instead of *Program Files*. Select *OK*. This is the default location for Relay Control Panel. If the user selected a different location to install Relay Control Panel, he will find the Null Modem driver (Null_Mdm.Inf) in that directory.

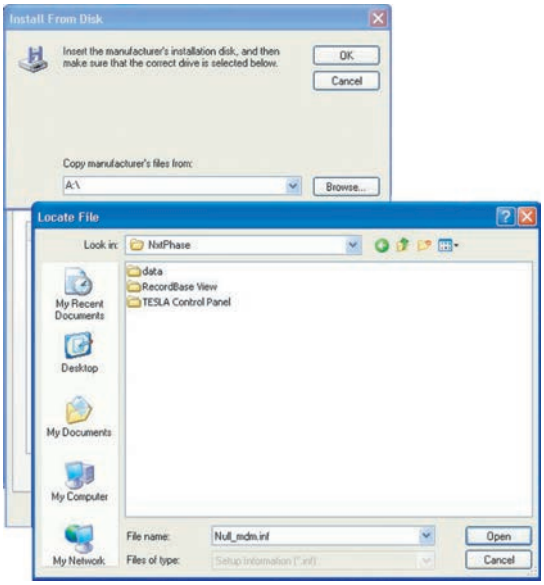

Figure 2.2: Browse for Null_Mdm.Inf

6. Select the *Generic Null Modem* driver and select *Next*. If the user is given more than one option, select the one that has the most recent date associated with it.
7. Select the serial port you wish to use. This is the serial port to be used for a direct cable connection to a relay. Typically COM1 or COM2 are available on a PC for this purpose. Select *Next*.

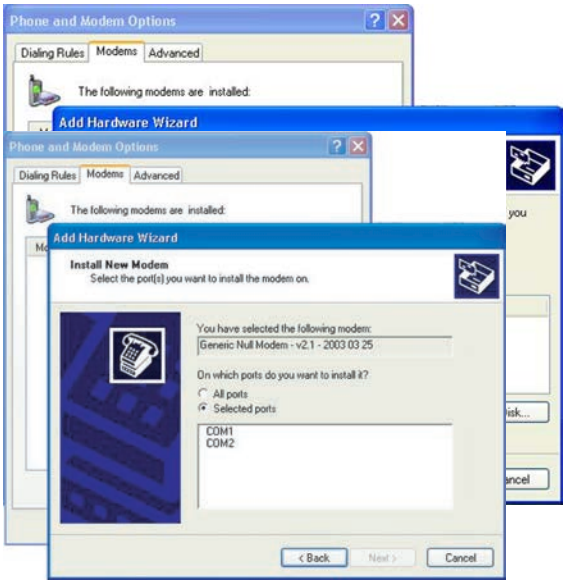

Figure 2.3: Select Serial Port

In Windows XP,the user may get a message stating that the Null Modem "has not passed Windows Logo testing" and asking "Do you want to continue the installation?" Select *Continue Anyway* to continue.

8. Select *Finish* and close the Phone and Modem Options and Control Panel dialog boxes.

2.3 First Time Start-Up

Starting Relay Control Panel

To start Relay Control Panel, double-click the *Relay Control Panel* icon placed on the desktop by the installation process or select *Start>All Programs>ERL-Phase>Relay Control Panel.*

Data Location

Relay Control Panel uses a data location on the computer to store records and settings from the relays. By default it is *My Documents\ERLPhase\Relay Control Panel or Documents\ERLPhase\Relay Control Panel.*

> When you change the data location, previously configured IEDs will not be affected. Only newly created IEDs will use the new data location. To edit the data location of existing IEDs use the Main Menu Edit button.

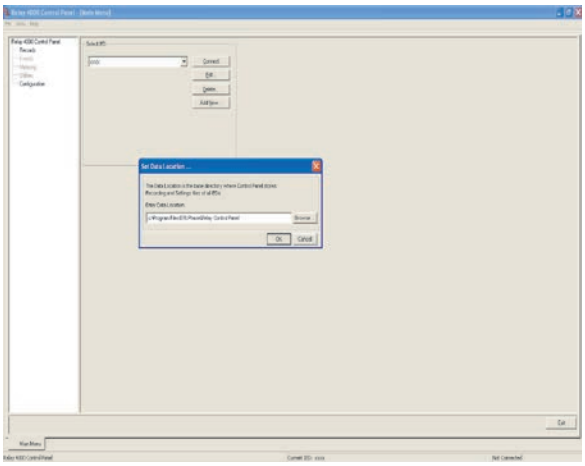

Figure 2.4: Data Location

3. Communicating with ERLPhase Relays

3.1 Communicating with the Relay (IED)

Connect to the relay to access its interface and Supervisory Control and Data Acquisition (SCADA) services through:

- Front USB 2.0 interface (user interface)
- 1 front and 2 rear Ethernet network links (user interface and SCADA)
- Direct serial link (user interface and SCADA)
- External or internal modem link (user interface only)

3.2 Setup Type of Communications for IED

Using the *Edit* button on the Relay Control Panel – Main Menu screen you are able to setup the type of communications used to communicate to the IED (relay).

For types of communications use in Relay Control Panel see for details see Figure 3.1: Screen to setup Communication with IED on page 1-2.

- Network Link, use for communicating with the relay (IED) via Relay Control Panel using Ethernet or LAN communications.
- Modem Link, use for communicating with the relay (IED) via Relay Control Panel using an internal modem or external modem with a phone (land line). You can select what modem you want to use by the Modem drop down menu and selecting the correct Modem that you want to use for land line for remote communications
- Direct Serial Link, use for communicating with the relay (IED) front USB port via Relay Control Panel using the computer's USB port (ERLPhase 4000 Series Device (COM number).

The user will need to have installed previously the ERLPhase's USB driver from the CD that was shipped with the relay (IED).

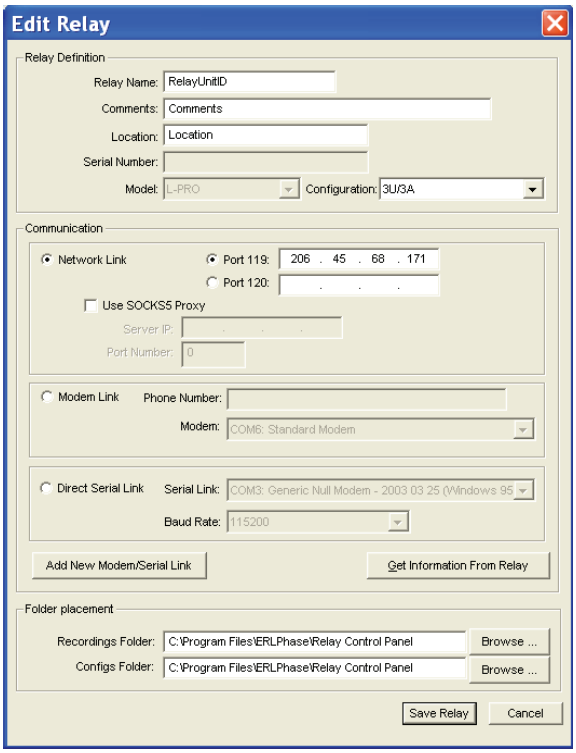

Figure 3.1: Screen to setup Communication with IED

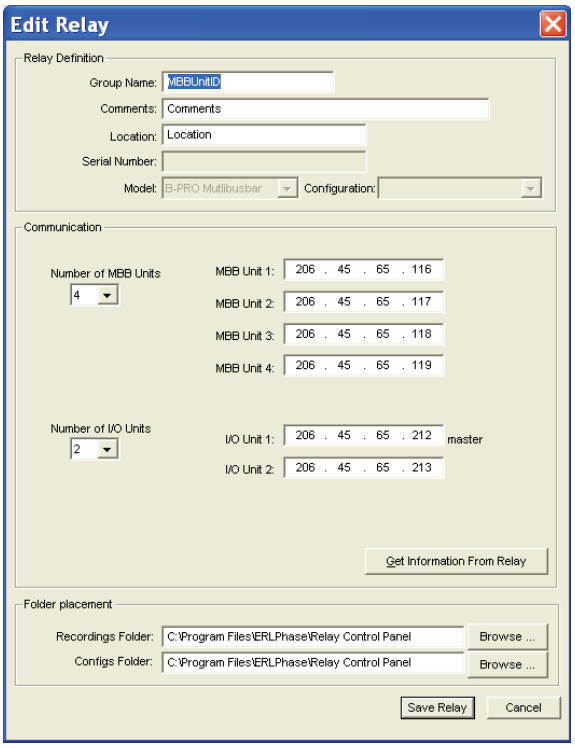

Figure 3.2: Screen to setup Communication with Multibusbar System

Network Link

Modify the Default Gateway and Network Mask if necessary. These settings are internal to the IED and may require configuration modification to the IED to ensure proper operation. The instructions below reference required changes to an ERL relay configuration for successful network communications.

- The Default Gateway may need to be changed if the relay and the control panel (or RecordBase) are on different but connected networks. The default setting is No Default Gateway.
- The Network Mask may need to be changed if the relay and control panel are on different subnets. The default setting is 255.255.255.0.
- To modify the Default Gateway or Network Mask use the Maintenance Menu command 1- Modify IP address.
- If unsure of these setting contact the network administrator.

Relay Control Panel Setup

1. Ensure that the computer running Relay Control Panel has access to the Ethernet network to which the relay has been connected.
2. Start Relay Control Panel.
3. Choose the target relay from the Select IED list in Relay Control Panel's Main Menu. If there is not already an entry for this relay, create one using the *Add New* button.
4. Select *Network Link*, select *Port 119* or *120* making sure that the correct IP address for the IED in the Port's IP address field. If required, select *Uses SOCKS5 Proxy* and has the Server IP address and Port Number. Please contact your network administrator for the SOCKS5 Proxy IP address and Port Number. You can now *Connect* via Relay Control Panel's Main Menu.

You must have view or change access level permission to establish connection to the relay.

Modem Link

External Modem

1. Connect a PC-compatible external serial modem to Port 123 on the rear of the relay.
2. Configure the relay's Port 123 to work with the modem.

   Port 123 settings are accessed through the relay's standard user interface.

   a. Establish a USB connection between the computer and Port 123 on the relay, run Relay Control Panel software, login with change access level and initiate a connection to the unit.

   b. When successfully connected, select *Utilities* in the Main Menu list, and go to the *Communication* tab to access the Port 123's settings.

   c. Set the Baud Rate. This will be the rate at which the relay will communicate with the external modem. It does not control the rate at which the modems communicate with each other. Unlike a direct serial link, there is no need for this baud rate to match that of the remote computer. A rate faster than the modem's top speed is recommended to take full advantage of the modem's compression capabilities.

   d. Select *External Modem*

e. The Modem Initialization String lets you set any special command codes required by the modem. The factory default for this field is M0 for external modems. These default values are all that are required for most modems.

f. *Save* the changes, close the Utilities tab and disconnect.

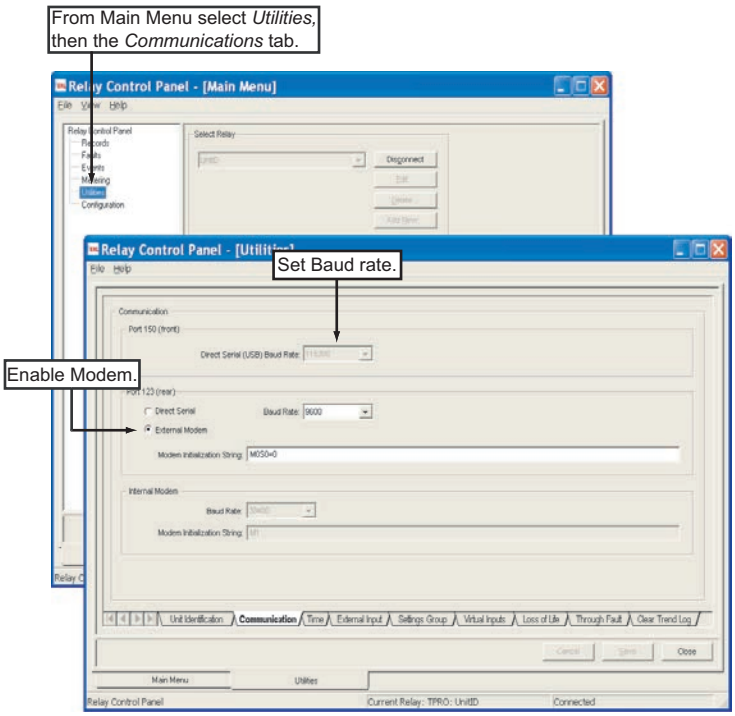

Figure 3.3: Communications Setup Utility

Internal Modem

Access the relay's user interface through a telephone link between the relay and the computer using an optional internal modem (Port 118 if installed). Internal modem configuration is done the same way as for external modem. Modem initialization string is M0 for internal modem If an internal modem was installed at the factory, it will already be appropriately configured.

Relay Control Panel Setup

1. Select *Modem Link*. Next select the Modem that is to be use to communicate with the remote IED (relay). The modem is selected by the drop down *Modem* menu. If the modem that is required is not in the drop down menu, then select the button *Add New Modem/Serial Link* and add a modem to Relay Control Panel *Edit Relay* menu.
2. Once the correct Modem is selected then add the phone number (in some cases additional dialing codes) of the remote IED (relay). You can now *Connect* via Relay Control Panel's Main Menu.

Direct Serial Link

Your PC must be appropriately configured for USB communication

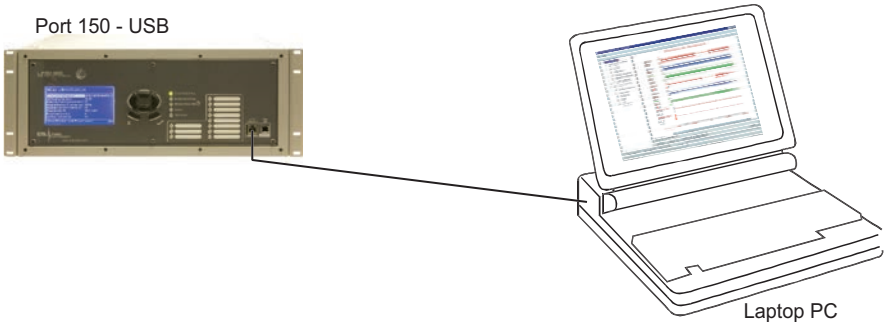

Figure 3.4: Direct Serial Link

Relay Control Panel Setup

1. Choose the target relay from the *Select IED* list in Relay Control Panel's Main Menu.
2. If there is not already an entry for this relay, create one using the *Add New* button.
3. The method of communication with the relay is specified as part of its IED definition. Use the *Edit* button to view or change this information. Ensure the *Direct Serial Link* option is selected.
4. Select *Direct Serial Link*. Next select the *COM port* that is to be used to communicate with the remote IED (relay). The COM port is selected by the drop down *Serial Link* menu. If the COM port that is required is not in the drop down menu, then select the button *Add New Modem/Serial Link* and add a new serial COM port to Relay Control Panel *Edit Relay* menu.
5. Once the correct Serial Link is selected then use the *Baud Rate* drop down menu and choose the correct baud to communicate to the remote IED (relay). The default Baud Rate is 115200. You can now *Connect* via Relay Control Panel's Main Menu.

   You must have view or change or service access level permission to establish connection to the relay.

4 Access Level Permissions

Access Permission

There are four levels of access to relay information using the Relay Control Panel. The default access level, which allows the user to work in offline mode, and the view, the change, and the service access levels, which require user connection to the IED. The Relay Control Panel does not support maintenance and update level access which is only accessible through a Hyper Terminal session. For additional details on these access modes, please refer to the product User Manual.

Default Level

The Default level of access allows the user to work offline of any device to perform offline configurations and view any locally stored recordings and settings information. No connection or password is required for this level of access. At this access level, the user will not have access to any information stored on any IED and will be unable to view live data or manipulate, configure and generally alter any IED using the Relay Control Panel application.

View Level

The View access level requires a valid password. With this permission the user is allowed to have read-only access to the information on the relay. The following table summarizes the available functionality.

Table 4.1: Available Menu - read only access

Records		**Events**	**Metering**	**Utilites**	**Configuration**	
On IED	**Local**				**Present Setting**	**Saved Setting**
Graph	Graph	Print	All metering functions depending on the relay type	Unit Identification	Get From IED	Edit
Get From IED	Save As	Copy		Communication	Refresh	Copy
Refresh	Export	Refresh		Time		Delete
	Delete			External Input		Rename
	Rename					Import
	Refresh					Save As
						Copy from IED
						Refresh

Change Level

The Change access level requires a valid password. With this permission the user is allowed to modify or change the information on the relay. This permission should be granted only to authorized and qualified personal. The following table summarizes the available functionality.

Table 4.2: Available Menu - modify access

Records		**Events**	**Metering**	**Utilities**	**Configuration**	
On IED	**Local**				**Present Setting**	**Saved Setting**
Graph	Graph	Print	All metering functions depending on the relay type	Unit Identification	Get From IED	Edit
Get From IED	Save As	Copy		Communication	Edit	Load from IED
Get and Delete from IED	Export	Erase		Time	Refresh	Copy
Delete	Delete	Refresh		External Input		Delete
Refresh	Rename			Virtual Input		Rename
Trigger Fault	Refresh					Import
Trigger Event						Save As
All other available trigger depending on relay type						Copy from other IED
						New
						Refresh

Service Level

The Service access level requires a valid password. With this permission the user is allowed to have full access to all the information on the relay. This is the highest level access and should be restricted to authorized and qualified personal. The 4000 series IEDs typically require Service Port access to permit Service level access. The following table summarizes the available functionality.

Table 4.3: Available Menu - full access to all functions

Records		**Events**	**Metering**	**Utilities**	**Configuration**	
On IED	**Local**				**Present Setting**	**Saved Setting**
Graph	Graph	Print	All metering functions depending on the relay type	Unit Identification	Get From IED	Edit
Get From IED	Save As	Copy		Communication	Edit	Load to IED
Get and Delete from IED	Export	Erase		Time	Refresh	Copy
Delete	Delete	Refresh		External Input		Delete
Refresh	Rename			Calibration		Rename
Trigger Fault	Refresh			Virtual Input		Import
Trigger Event				Trigger Output		Save As
All other available trigger depending on relay type				Password		Copy from other IED
						New
						Refresh

Maintenance Level

The maintenance level can be accessed through HyperTerminal Session.

Update Level

The update level can be accessed through HyperTerminal Session..

5 Working with Relay Control Panel

5.1 Relay Workspace

Relay Control Panel supports interaction with different ERL new generation relays one at a time. Each relay has its own workspace within the Relay Control Panel that stores its records, settings, and communication parameters files.

> A separate workspace should be created for each relay on your system to store its configuration files and records.

To work with a particular relay, select it from the *Select Relay* box on the *Main Menu* tab. If you are already connected to an IED you will not be able to select a different IED until you disconnect.

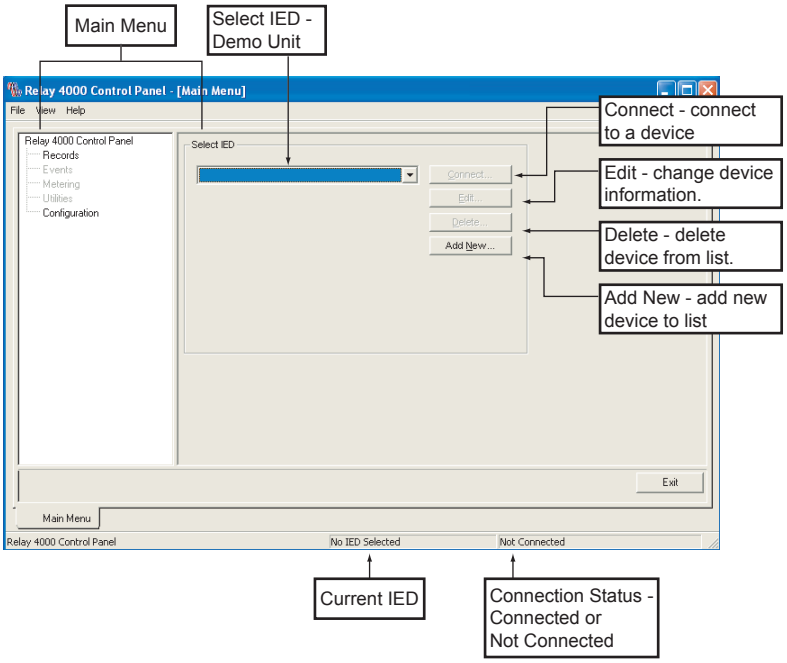

Figure 5.1: Selecting a Relay Workspace

Current IED

Selecting a relay sets Relay Control Panel's focus to that relay's workspace, known as the Current IED. The records and setting files belong to the selected relay.

If you initiate a connection using Relay Control Panel, it connects to the current IED using the communication parameters specified for this IED.

> The name of the Current IED is always displayed in the Status Bar at the bottom of the Relay Control Panel window (for details see "Selecting a Relay Workspace" on page 5-1.

Relay Control Panel assumes that the relay it is communicating with is the one identified as the Current IED. Forcing a connection with a different relay (i.e. moving the serial cable without telling Control Panel to disconnect), can cause the records and configuration files of that relay to be mixed with those of the Current IED.

Relay and System workspaces are added, modified or deleted from the Relay Control Panel Main Menu using controls in the *Select Relay* dialog box shown in Figure 5.1: Selecting a Relay Workspace on page 1. Connection access to previously defined IEDs or systems using the *Connect* button is also available from the Relay Control Panel Main Menu.

The *Edit* button displays the selected relay or system definition screen allowing changes to be made to the definition. Previously defined settings of the system definition are available for review and edit as required.

The *Add New* button is used to create a new relay or system definition beginning from a blank template, allowing the manual entry of all required information or direct extraction from an IED using the device IP address and the *Get Information From Relay* feature.

The *Delete* button removes the profile from your local system and deletes all associated local content.

5.2 B-PRO Multibusbar Workspace Definition

Relay Control Panel supports the control and information aspects of the ERL MutiBusBar Protection System, comprised of up to four independent B-PRO 4000 series relay units, and supporting the use of up to two ERL Digital I/O Expansion Modules for increased External Input capacity and System Synch clock generation. Similar to a single IED relay, the system has its own workspace within the Relay Control Panel that stores its records, settings, and communication parameters files.

System level configuration requires the definition of the individual IED IP addresses within the system, along with the appropriate IED quantity selection as indicated within the Edit relay screen. Each IED must be connected to an appropriate Ethernet network in order for RCP to properly operate, manage and monitor the system.

To work with a particular system of ERL relays and devices, select the system from the Select Relay box on the Main Menu tab. If you are already connected to an IED you will not be able to select a different IED until you disconnect.

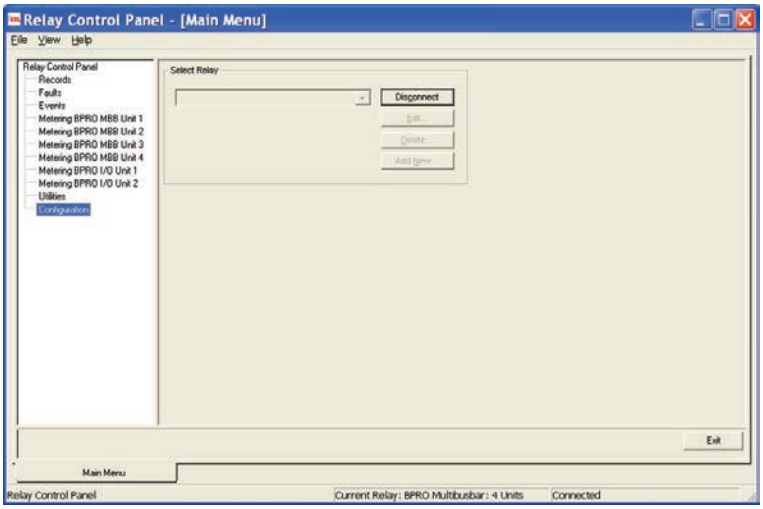

Figure 5.2: Selecting a Mutibusbar System Workspace

5.3 Adding/Editing a Relay Workspace Definition

Relay and System workspaces are added, modified or deleted from the Relay Control Panel Main Menu using controls in the *Select Relay* dialog box. The *Add New* and *Edit* buttons access a similar configuration screen allowing the user to review and edit a previous workspace definition, or alternately to create a new workspace beginning from a blank template. The appearance of the configuration screen will alter based on the selected device or system type to accommodate all the necessary information required for full workspace definition. Figure 5.3: Add New Relay on page 4 and Figure 5.4: Add New Multibusbar System on page 5 show the two primary screen configurations related to the *Add New* and *Edit* features.

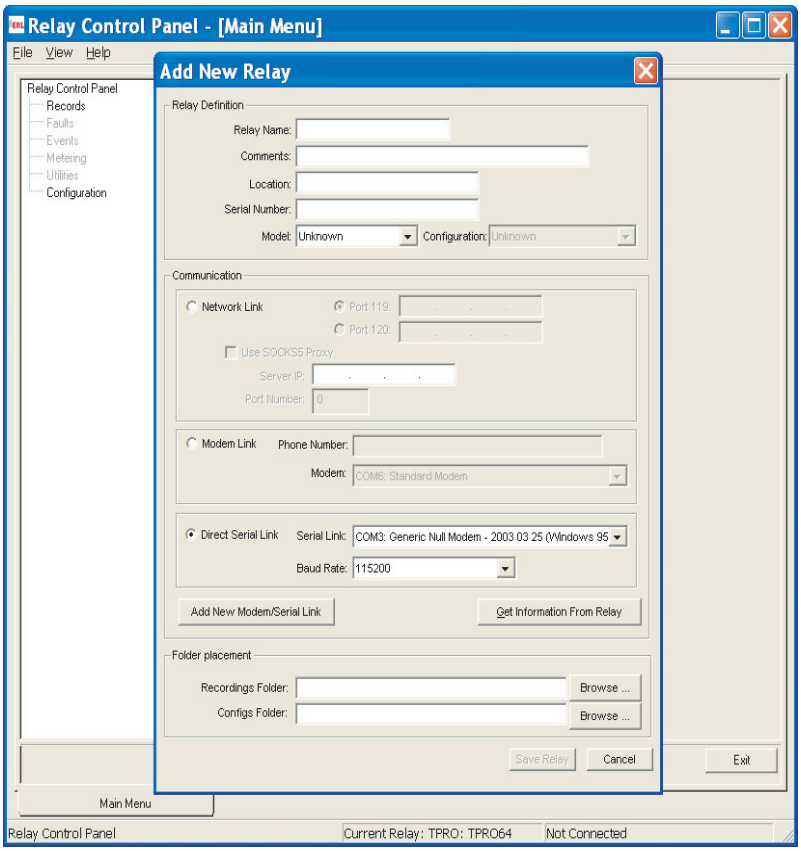

Figure 5.3: Add New Relay

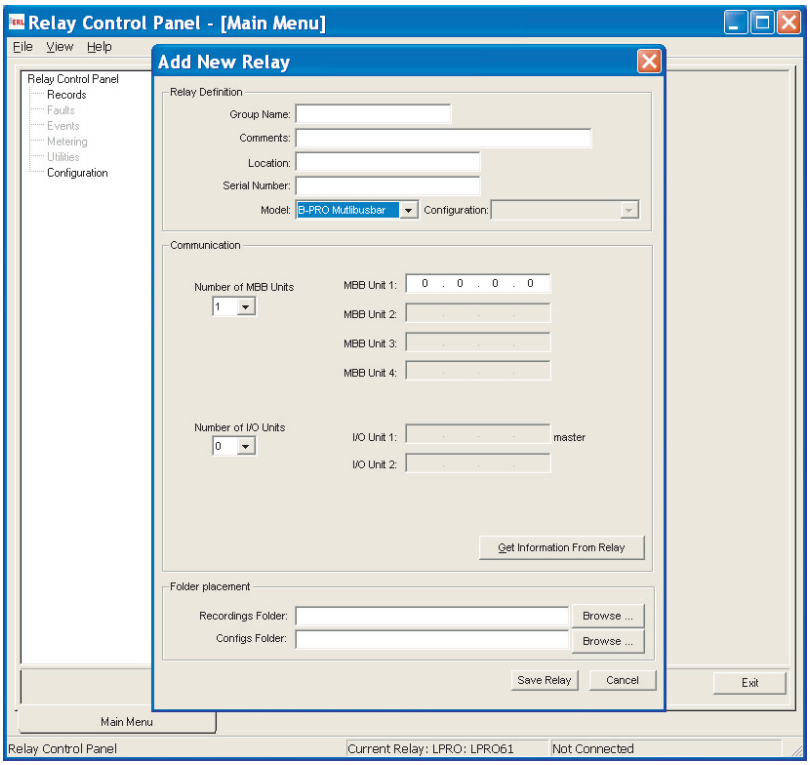

Figure 5.4: Add New Multibusbar System

Table 5.1: IED Workspace Settings	
IED Definition	
Relay Name	The Relay Name is the name you assign to this relay's workspace. It appears in the IED selection and the Current IED display at the bottom of the Relay Control Panel window. We recommend that you use the same name for this workspace as the Unit Name given to the relay (Unit Identification on page 7-2).
Group Name	Multibusbar related setting to uniquely identify the system workspace.
Comments	User-defined, for your reference only.
Location	User-defined, for your reference only.
Serial Number	Enter the IED Serial Number to match the serial number of the actual relay.
Get Information from IED	Connects to the relay and retrieves its configured name, location and serial number. The corresponding fields in the IED Definitions are overwritten.
Model	Relay type such as L-PRO, T-PRO, B-PRO, F-PRO etc.
Configuration	Additional detail related to the IED factory configuration and I/O configuration.

Table 5.1: IED Workspace Settings	
Communication	
Direct Serial Link	Connect to this relay through a serial cable.
Modem Link	Connect to this relay via a telephone link.
Network Link	Connect to this relay via a TCP/IP network. When connecting via TCP, the user can put an IP address into either port 119 or port 120 box. Get IED Information will use the selected IP and auto correct the information.
IP Address	IP addresses of the relay or system IED's. The relay's default factory IP addresses are 192.168.100.80 and 192.168.101.80. It is changed through the relay's Maintenance Menu.
Number of MBB Units	Number of discrete B-PRO Multibusbar relays included in the defined Multibusbar System: Min. 1 unit, Max. 4 units. IP addresses for each unit are required.
Number of I/O Units	Number of discrete ERL Digital I/O Modules included in the defined Multibusbar System: Min. 0 units, Max. 2 units. P addresses for each unit are required.
Placement Folder	The Default Folder directory applied to new IED definitions can be modified with the File>Data Locations command from the Main Menu.
Recordings Folder	The directory where the IED's retrieved records are stored.
Configs Folder	The directory where the IED's configuration files are saved.

Share configuration files and records with other Relay Control Panel users by using common folders.

5.4 Online and Offline Operation

Relay Control Panel can be used with or without a connection to the selected relay. Both offline and online modes work within the selected Current IED workspace.

Offline

In Offline mode, you can manage and display a relay's local (previously uploaded) records and create and edit configuration files without being connected to the unit.

Online

In Online mode you are connected to the relay and have access to both local and remote data and functions:

- Records (both local and on the relay)
- Event log
- Metering (real time readings of input and calculated channels)
- Channel and trigger configurations (the one presently active in the relay and any saved ones you may have created)
- Setup utilities and record configuration screens
- Record graphics display

Connection Status

The Status Bar at the bottom right side of the Relay Control Panel window shows if you are presently online or offline, and also shows View Only if in view only mode.

5.5 Navigating in Relay Control Panel

Relay Control Panel uses a split screen format. The left pane is used for navigation or selection. The right pane is the working area for each of the program's main sections. To bring up the Control Tabs, shown below, you must select the appropriate item on the Navigation Tree by double-clicking.

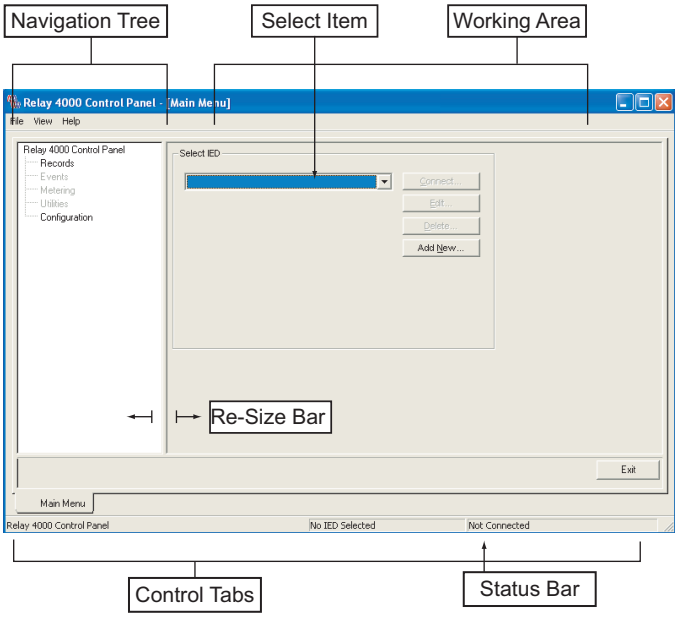

Figure 5.5: Relay Control Panel Display Sections Navigation Tree

The left pane provides a means of moving between Relay Control Panel functions or selecting items within a function (e.g. channels from a record). Relay Control Panel functions - Records, Fault, Events, Metering, Utilities and Configuration are activated by a double-click.

To optimize the screen space between the tree and the working area to create a larger working area some screens have a Hide Tree button to maxi

mize the working area.

Working Area

The Working Area on the right pane of the display represents the main working area of each section of the Relay Control Panel.

Control Tabs

The Control Tabs are a row of selection tabs near the bottom of the screen. Each time you start a function, a corresponding tab is created.

Select the control tabs to navigate from one screen to another or the Main Menu item. Use the Close button to close the screen.

Status Bar

The Status Bar at the bottom of the Relay Control Panel displays the name of the selected relay workspace and the status of the connections and view only mode.

6 Metering Display

The relay has a full set of real-time metering displays that provide present readings from the analog input channels and all other metering items such as protection, external input, ProLogic, group logic, virtual input and other items depending on relay type.

The Metering display is accessed through the Metering item in the Main Menu tab's function list.

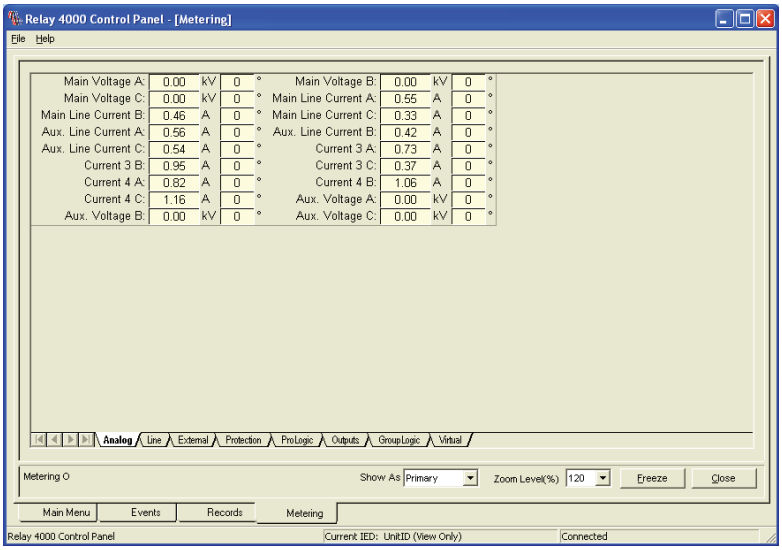

Figure 6.1: Metering Display

Standard Metering Screens

The metering display provides tabs at the bottom to select among multiple display screens depending on the relay type. Please refer the respective relay in “Control Tab Options” in Appendix A. for relay specific metering control tabs.

Primary/Secondary

Metered values can be shown as either system primary or secondary quantities.

Display Zoom

The magnification of metering screens can be adjusted using the Zoom Level (%) control. This allows the display to be enlarged for easy viewing while commissioning or testing.

Freeze

The freeze button provides a way to temporarily stop the update of the display. It can be used to ensure a synchronized set of readings for documentation purposes. The metering display can be exported to another program using Windows built-in Alt PrintScreen key and standard paste functions.

Phase angle readings displayed in meter groups are based on the reference voltage Phase Angle Reference Channel as referenced in the protection settings manual for respective relay type.

7 Relay Setup Utilities

The relay has global setup parameters that establish its identity and define its operation. Setup parameters define:

- Unit identification
- Communication port parameters
- Time display and settings
- External Input
- Virtual Inputs
- Analog input calibration
- Passwords
- Toggle Outputs
- Other relay specific control tabs

Please refer to “Control Tab Options” in Appendix A. for each relay specific control tabs.

The Relay Control Panel application is designed to interface with and configure a wide variety of IED’s. This section describes the control tabs for most IED’s. Not all control tabs are applicable to all units. Device specific information will be available in the User Manual provided with the IED, and accessible within the associated Offliner application.

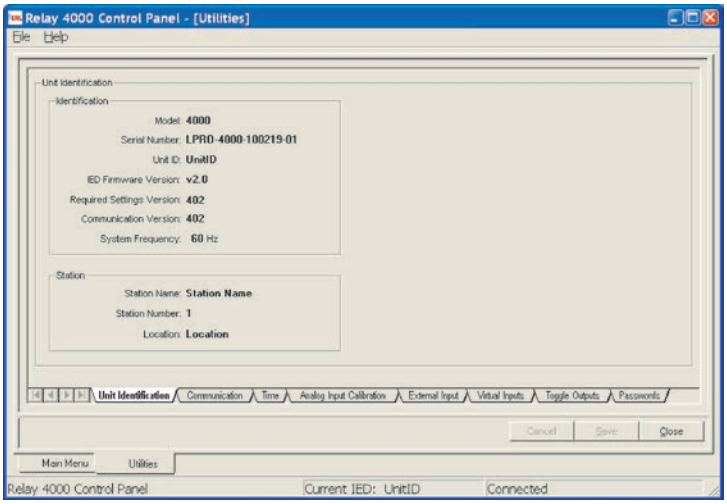

Figure 7.1: Relay Setup Utilities

The setup parameters are accessed through the Utilities tab on relay Control Panel. The user must be communicating with the IED for the Utilities tab to be available.

For details on connecting to the relay using Relay Control Panel software see “Communicating with the Relay (IED)” on page 3.-1.

7.1 Unit Identification

The Unit Identification tab identifies a particular relay and its records. Double-click *Utilities* to bring up the tabs; select *Unit Identification*.

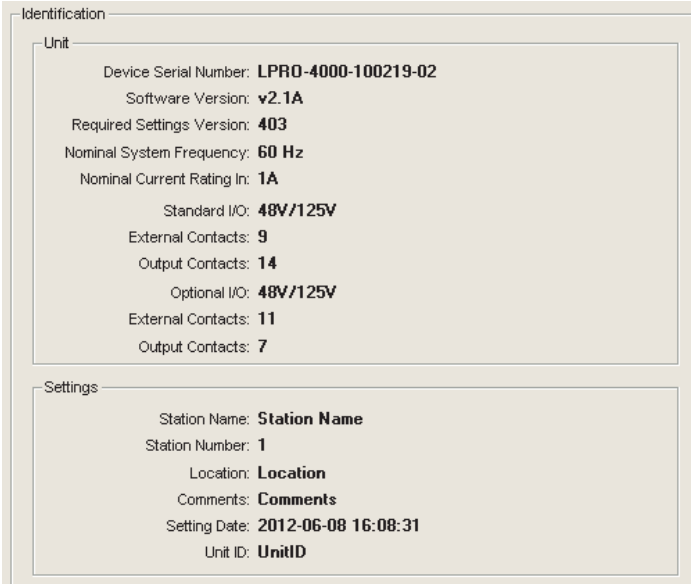

Figure 7.2: Unit Identification

Table 7.1: Unit Identification Settings	
Identification	
Device Serial Number	Read-only field, displays the serial number of the relay unit currently connected.
Unit ID	User-entered field that identifies the unit. It is part of the name given to records produced by the unit to identify their origin. By convention, this name should be the same as the "IED Name" assigned to the relay and relay’s workspace. The name must not contain the following: “,” “/” “\” “:” or any other character not valid for a Windows file name.

Table 7.1: Unit Identification Settings	
Software Version	Read-only field that displays the firmware version of the currently connected relay unit.
Required Settings Version	Describes the version of the settings file required by the connected relay. Control Panel is capable of creating older versions of settings files for use with relays whose firmware has not been updated (see “Managing Configuration Files” on page 8-1).
Communication Version	Read-only field that displays the version of the communications protocol used by the currently connected relay unit.
Nominal System Frequency	Read-only field that displays the assumed power system frequency of the relay, This is a factory setting.
Station	
Station Name	User-defined, for reference only.
Station Number	User-defined, for reference only.
Location	User-defined, for reference only.

7.2 Communication Port Settings

The Communication settings tab controls the modes and baud rates of the relay's communication ports. This feature may not be available or required for all IED's or systems.

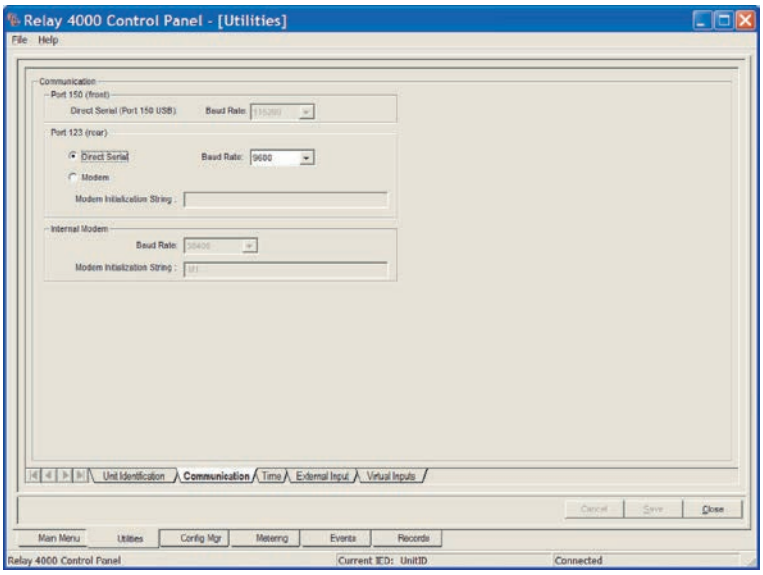

Figure 7.3: Relay Setup Utilities - Communication Ports

Table 7.2: Communication Settings	
Service Port	
The Service Port is Port 150 on the front of the relay. It can be used for connection with Relay Control Panel or a terminal program (to access the Maintenance Menu).	
Baud Rate	Sets the baud rate of the port. The default baud rate is 115,200 N81 baud. Note: The baud rate must match that of the port of the computer connected to this port. For best results, use the maximum baud rate that the communication link and equipment can sustain.

Table 7.2: Communication Settings	
Direct/Modem Port	
The Direct/Modem Port refers to either the relay's rear panel Port 123 or its (optional) Internal Modem port, depending on the Port Select setting.	
Port Select	Direct Serial: Port 123 is enabled for a direct serial connection with Relay Control Panel or a terminal program (to access the Maintenance Menu). External Modem: Port 123 can be used to connect to an external modem through a serial link. Internal Modem: Enables a modem connection through the relay's rear panel RJ-11 Internal Modem Port. Requires that the relay has the internal modem option installed. The internal modem can be disabled through the Maintenance Menu.
Baud Rate	Sets the baud rate of port 123. The default baud rate is 38,400 baud. For a direct serial connection on Port 123, the baud rate must match that of the port of the computer connected to this port. When configured for an internal or external modem, the baud rate specifies the rate at which the relay communicates with the modem. The actual communication rate between modems is less than or equal to this setting, depending on what the modems can negotiate over the phone line. For best results, use the maximum baud rate that the communication link and equipment can sustain.
Modem Initialization String	When using an internal or external modem, a modem initialization string can be entered containing modem control codes. The factory default for this field is "M0". Refer to the modem manual for details.
Datalink Timeout	Used only for DNP3 Level 2. This sets the timeout for the DataLink layer of the DNP protocol. Although configurable, the timeout should be disabled (set to 0 milliseconds) as per the DNP Users Group "Technical Bulletin 9804-002 DNP Confirmation and Retry Guidelines". The DataLink Timeout is automatically disabled when using either DNP3 Level 2 - TCP or UDP.
Master IP Address	For either DNP3 Level 2 - TCP or UDP, the Master IP Address must be set to the IP address of the master device that will be polling the relay. This prevents unauthorized master devices from communicating with the relay. Note: This setting does not control the IP address of the relay's Ethernet port. That is done through the relay's Maintenance Menu. Make sure the Master IP address is different from the relay's IP address.
Port	For either DNP3 Level 2 - TCP or UDP, the Port is the TCP or UDP port that the DNP service may be accessed at and is usually set to 20000.

7.3 Time Display and Settings

The Time Control tab displays the device's current time and provides controls to select and configure the source time signal for the IED, or manually configure the initial time parameters of the system.

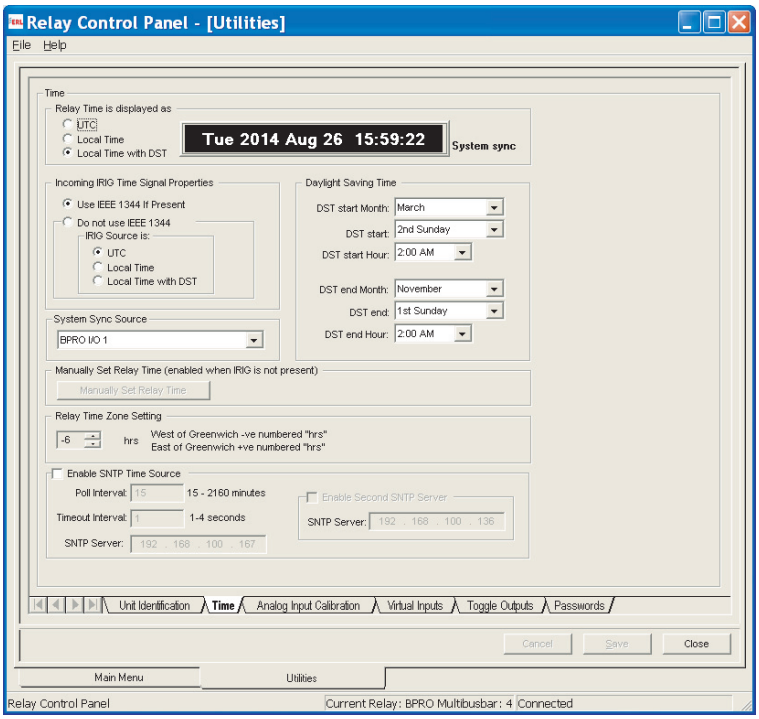

Figure 7.4: Relay Setup Utilities - Time Control

Time Sources

The 4000 Series ERL relays use time as a fundamental component of protection, fault logging, data logging and record generation requiring the presence of a source time signal or suitable alternate be available to the IED. The device supports the use of modulated or unmodulated IRIG-B time signals (external), primary/secondary SNTP network based time synchronization (external) and manually configurable system time based on a free-running, internal oscillator. The internal free-running oscillator is always present on the IED and, in the absence of any external time source, will become the default mode of time synchronization. Note that not all relays support SNTP.

An IRIG-B time source will have the highest order of precedence and the highest available time accuracy. The ongoing presence of a valid IRIG-B time source is indicated by an LED on the front panel of the IED and is evident in data records.

An SNTP time source has a lower order of precedence from a valid IRIG-B source. SNTP operation (primary and secondary) requires network access and the selection and configuration of suitable SNTP network sources. The SNTP time may be configured for re-synchronization cycles ranging from 15 minutes to 36 hours, adjusting the IED system time to an accuracy within +/- 1 second. No visual indication is provided on the IED front panel regarding the status of

the SNTP synchronization however this information is available in data records.

The IED comes equipped with an internal free-running oscillator used to generate a 1 PPS time signal in the absence of any alternate available time source. Use of this oscillator as the primary IED time source requires manual time configuration, with the general accuracy subject to user input parameters, and is recommended primarily for stand-alone, unsynchronized applications. The internal oscillator carries a lifetime accuracy (including temperature effects and aging) of +/-25 ppm.

Displayed Time

Time is maintained in UTC format on the relay (i.e. without a time zone offset or daylight savings time applied). If the clock feeding the IRIG-B time signal to the relay is sending local time, the relay converts it to UTC internally.

The time displayed in the Time Control screen above is determined by the adjacent time display settings. The relay will automatically convert from its internal UTC time as required. The relay Time Zone Setting determines the offset between Local time and UTC. DST will automatically add 1 hour to the offset if appropriate.

System Sync Source

The 4000 series ERL relays support the application of a System Sync time source provided from another ERL IED which provides an IRIG style time output derived from the IED source clock. Time quality information within the output signal is modified to reflect the derived source.

Event and Record Timestamps

Event timestamps in the relay's Event Log are also controlled by the above time display settings. They will be displayed as UTC or local times as configured here.

Record timestamps shown in Control Panel's Records tab are handled a bit differently. Record times are converted from UTC using the Windows Time and Date settings of the PC running Control Panel. This enables records from multiple time zones to be normalized to a common time zone and format.

Table 7.3: Time Settings

IED Time is displayed as	
UTC	Sets the time display and the Event Log timestamps to Universal Coordinated Time (UTC). Note that UTC time is not affected by the relay Time Zone setting or Daylight Savings Time.
Local Time	Sets the time display and the Event Log timestamps to Local Time. Local time is converted to UTC using the relay Time Zone setting.
Local Time with DST	Same as Local Time, except Daylight Savings Time (DST) is factored into the time conversion. Daylight Savings Time is assumed to be in effect from 2 AM on the first Sunday in April until 2 AM on the last Sunday in October.

Table 7.3: Time Settings	
Present Time Display	When connected to a relay, the relay's present time is shown and continually updated. The specified time settings (e.g. Local Time) are applied to the displayed time.
Sync/No Sync Display	Indicates that the relay is synchronized to an IRIG-B time signal input.
Incoming IRIG Signal Properties	These settings determine how the relay responds to IEEE 1344 information in the IRIG-B time signal and manually define the format of the incoming time if IEEE 1344 data is not available.
Use IEEE 1344 If Present	If Use IEEE 1344 if Present is checked and the source clock generates IEEE 1344 data, the relay: • uses the time zone offset from the IEEE 1344 data embedded in the IRIG-B time signal • reads the IEEE 1344 data to determine the mode of the incoming IRIG signal (UTC, Local, Local with DST) Otherwise, the relay uses the manually entered time zone offset and clock source mode settings.
Do not use IEEE 1344	If Do Not Use IEEE 1344 is selected, the relay will ignore any IEEE 1344 data in the IRIG-B signal and use the manually entered time zone offset and clock source mode settings.
IRIG Source	Specifies the mode of the incoming clock signal. Ignored if IEEE 1344 data is present in the IRIG-B time signal and the Use IEEE 1344 If Present setting is enabled.
Manually Set IED Time	Allows the relay's clock to be manually set if an IRIG-B signal is not present. If an IRIG-B signal is present, but does not contain IEEE 1344 data, the year can be set manually.
Relay Time Zone Setting	Provides the offset from local time to UTC in hours. For example, Central Time has a +6 hour offset from UTC. This setting is ignored if IEEE 1344 data is present in the IRIG-B time signal and the Use IEEE 1344 If Present setting is enabled. This is expanded with the user being allowed to set DST start and end.

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7.4 Analog Input Calibration

The Calibration Utility provides a means of calibrating the relay's analog input channels. It is accessed through the Relay Control Panel's Utilities tab as Analog Input Calibration, but requires service access to the service port.

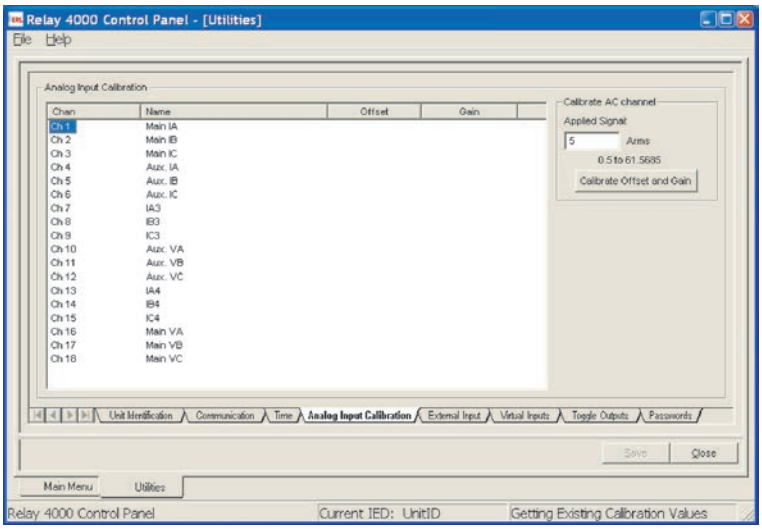

Figure 7.5: Analog Input Calibration

AC Channel Calibration Process

To calibrate a channel (*Main Menu>Utilities>Analog Input Calibration)*:

1. Select the channel or channels from the list. More than one channel of voltage or current can be chosen using the *Control/Shift + left-click*.

> It is possible to calibrate multiple channels simultaneously by using the mouse to select a set of channels from the list. Multiple channels can be selected using standard Windows selection methods.
>
> All channels in the selected set must have the same type of input.

2. Enter the voltage or current magnitude that is associated with the channel Applied Signal field. The signal magnitude level should be measured with a precision calibrated instrument.
3. Select the *Calibrate Offset* and *Gain* button. If a channel has not yet been configured, only *Calibrate Offset* will be displayed.
4. Under the *Offset* and *Gain* columns the line of the channel being calibrated *OK* or *No* will be displayed (see "Analog Input Calibration" on page 7-9).
5. Repeat for all other channels being used.
6. Use the *Save* button to load the new calibration to the relay.

Out of Range

An error message is displayed if the applied signal as seen by the relay differs from the value entered in the Applied Signal field by more than 10%. This helps to prevent erroneous calibration.

7.5 Password Protection

Access to various relay functions can be protected through the use of passwords, requires service access on service port. Passwords are now required and can contain a-z, A-Z, 0-9, -+=.

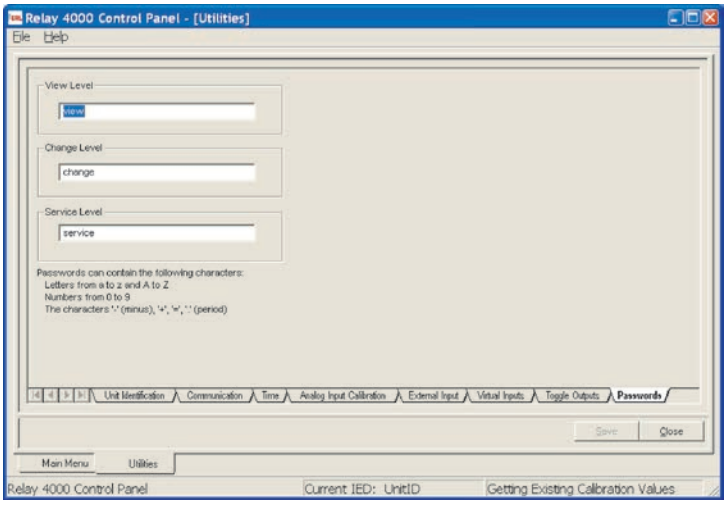

Figure 7.6: Password Protection

There are three user access levels: view, change and service. The factory default passwords for the three access levels are:

VIEW: view

CHANGE: change

SERVICE: service

Setting Passwords

Passwords can be viewed and set through the *Passwords* tab of Relay Control Panel's Utilities screen.

> The Password tab can only be accessed when connected via direct serial link through the relay's service port (Port 150). This provides protection from unauthorized remote access while ensuring that on-site staff can freely use the relay.

Testing the External Inputs

To test the external inputs, connect to the IED using the service access level and select *Metering>External*. This screen will display the status of the IED External Input contacts. Application of a suitable dc signal to an external input (polarity sensitive, input level based on configuration) will cause the input status to change from a Low to High status. External input status update within Relay Control Panel may require up to 0.5 seconds for changes to appear.

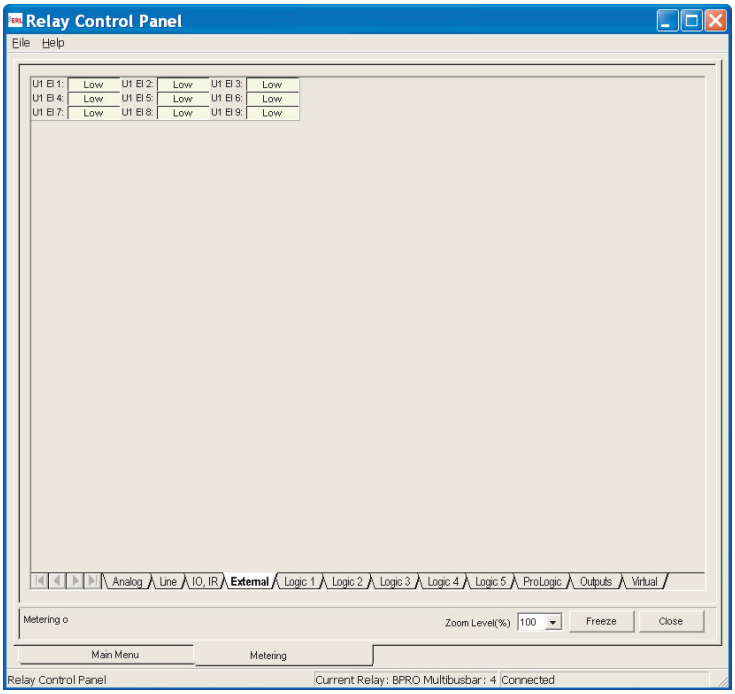

Figure 7.7: Testing External Inputs

Testing the Output Relay Contacts

To test the external inputs, connect to the IED using the service access level and navigate to select *Utilities>Toggle Outputs*. This feature will allow the user to enter a Test Mode allowing the individual output contacts to be manually toggled to verify operation. To enable this feature, select the check box to place the system into Test Mode. In multi-unit systems, IED selection may be required to identify the specific contact to be tested. Toggle the output contact (s) as desired using the *OPEN* or *CLOSED* buttons provided. Verify the correct operation through the use of an ohmmeter, contact connection or through the Relay Control Panel application by navigating to *Metering>External* and confirming the desired state change. Multiple contacts may be toggled while the system is in Test Mode. Upon exiting Test Mode, either by deselecting the checkbox or closing the *Utilities>Toggle Outputs* tab, the contact status will revert to their default status.

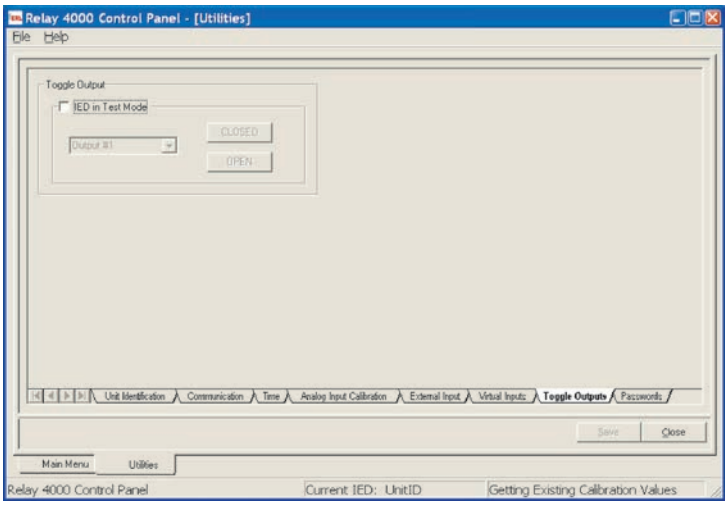

Figure 7.8: Testing Output Relay Contacts

8 Configuring the Relay

Where the Setup Utilities of the previous chapter specify the relay's global characteristics, it is the relay's Configuration File that defines its individual channels and recording triggers.

The configuration file identifies and adjusts the relay's input channels, derived (calculated) channels, record triggers, metering displays and trend logs. It also specifies how the relay handles record storage and excessive trigger conditions. Configuration files are created and managed by Relay Control Panel and loaded into the relay's non-volatile memory through the communications link.

8.1 Managing Configuration Files

Relay Control Panel's *Configuration Manager* creates and manages configuration files and handles transfer to and from the relay. To open the Configuration Manager screen, double-click the *Configuration* line in the left pane of the Main Menu screen.

The configurations shown in the Configuration Manager screen are specific to the selected Current IED. To work with configurations from another relay, the user must first select that unit as the Current IED (from the Main Menu).

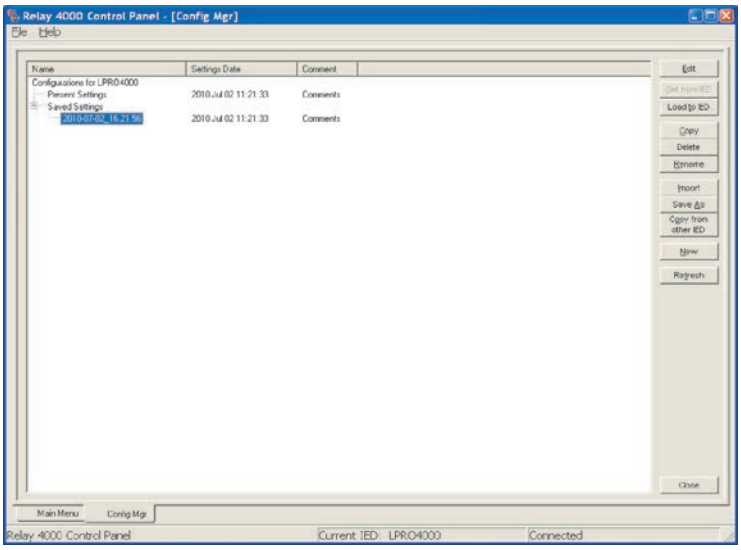

Figure 8.1: Configuration Manager

Editing a Relay's Present Configuration

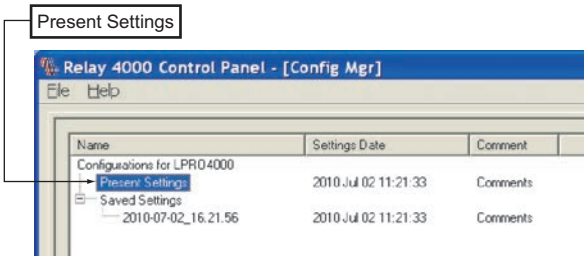

Figure 8.2: Present Configuration

The user can also transfer the relay's present configuration to a saved file in the Relay Control Panel using the *Get from Relay* button. When transferred, the configuration appears in the *Saved Settings* list.

Saved Configuration Files

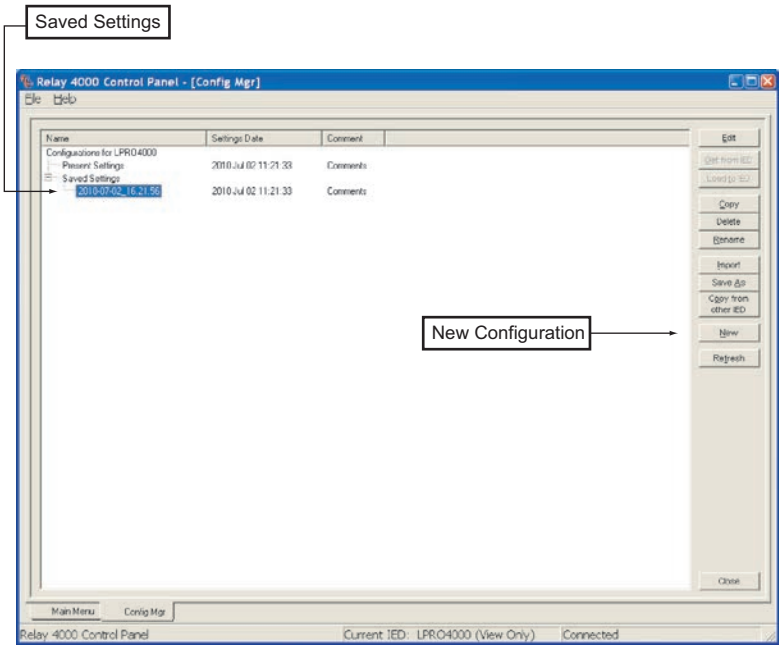

Figure 8.3: Saved Configurations

Saved configuration files are shown under the Saved Settings heading in the list. The Relay Control Panel can store many saved configuration files, limited only by hard disk and Windows operating system constraints.

Saved configuration files can be created, displayed and modified, copied, renamed, deleted or loaded into the relay. Click the desired configuration from the Saved Settings list, then select the appropriate action button on the right of the screen. Double-clicking on a configuration is equivalent to clicking the *Edit* button.

It is recommended that you maintain a copy of each relay's current configuration as a Saved Setting for a backup. It can be loaded into a replacement relay if the unit ever needs to be serviced.

Loading a Saved Configuration

A configuration file must be compatible with the firmware on the relay in order to be loaded. Compatibility is defined by the Settings Version, a number which identifies the version of configuration file a given version of firmware requires. When loading configuration to a multi-unit system, all units must be compatible.

Attempting to load an incompatible configuration file to an IED will result in an error message being generated and halt the configuration download.

The following specific error messages are displayed on attempting an upload:

- “Load Failed”: Relay not running
- “Load Failed”: Relay memory error
- “Load Failed”: Relay unable to load to DSP
- “Load Failed”: Invalid serial number
- “Load Failed”: Invalid version
- “Load Failed”: Invalid configuration file
- “Load Failed”: Bad frequency setting
- “Load Failed”: Bad CT format
- “Load Failed”: Invalid IO model
- “Load Failed”: Invalid network card configuration
- “Load Failed”: Unknown Reason # (where # is the error number to be provided to customer support)

To load a configuration file from the Saved Settings list into the Current IED, the user must be communicating with the relay. Initiate the load by selecting the desired configuration file and clicking the *Load to Relay* button. The relay will immediately load and run the new configuration. Complex configurations can take a few minutes to transfer and load, depending in part on communications rate. The relay will acknowledge the new settings back to Control Panel.

The relay will automatically go through a reset when loaded with a configuration that changes its sample rate. This will add an approximately two minutes to the load time.

Creating a New Configuration

Use the *New* button to create a new configuration file. New configuration files are compatible with the latest Setting Version by default. The Setting Version can be changed if desired to create new configuration files for older relays.

The fixed information in the Device Configuration screen is derived from the IED Definition "Adding/Editing a Relay Workspace Definition" on page 5-4.

Using Another Relay's Configuration as a Starting Point

Use the *Copy from Other Relay* button to create a configuration for the current relay based on an existing one from another IED. The configuration can be chosen from a list of the saved settings of the other IEDs defined in the Relay Control Panel.

Configuration Editor

The Configuration Editor provides the means to create, display and modify configurations for the relay. To start the editor from the Configuration Manager screen, either double-click on a configuration file or select it and click on the *Edit* button.

Depending on the type of the relay (L-PRO, T-PRO, B-PRO, F-PRO etc.) an Offliner Settings program will be launched which will present an independent Windows application program. Please refer to the descriptions of the respective relay type user manual for the detailed descriptions of the various functionality such as Identification, System Parameters, Line Parameters, Protection functions, ProLogics, Output Matrix, Setting Groups, Group Logics, SCADA Settings, and other functionality as applicable.

9 Record and Log Management

9.1 Records

The record management services are available from the *Records* tab, accessible from the Main Menu.

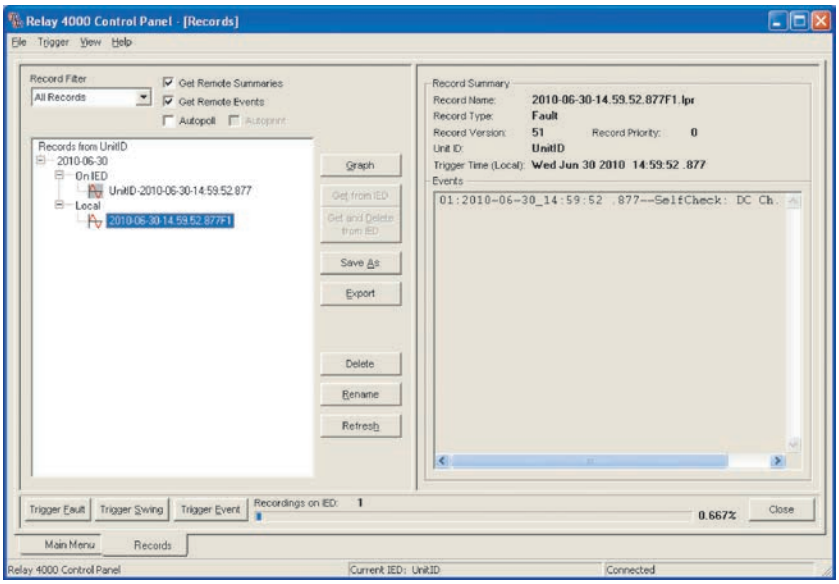

Figure 9.1: Record Listing

Record Lists

The left side of the *Records* tab shows lists of records for the current IED organized by date. Expanding a date entry shows On IED and Local headings. Records presently on the relay are shown under the On IED heading. Records that have been previously transferred to Relay Control Panel are shown under the Local heading. Records on the IED that have not been transferred to Control Panel are shown in bold-face. If working offline, only local records are shown.

Record Filter

The list of records displayed is controlled by the Record Filter control. The filter applies to both On IED and Local record lists. The time taken to access the directory can be controlled by selecting an appropriate number of records in the Record Filter.

Note that if additional recordings are created through the Trigger Fault, or any other buttons (depending on relay type), these new records do not displace the earliest fetch/displayed file records in the tree.

Trigger Fault/ Trigger Swing/ Trigger Event

The relay can be manually triggered to generate different types of records. Trigger fault and Trigger event control tabs are available on all relays. The other control tabs of the Recording screen are specific to relays.

Please refer to the relay in “Control Tab Options” in Appendix A. for relay specific specific control tabs

Record timestamps are received from the relay are in UTC and are converted to local time using the Time Zone and Daylight Saving settings of the computer running Relay Control Panel.

Record Summary

The right side of the *Records* tab shows summary information on the selected record. The summary includes the list of events which occurred during the time-span of the record from the relay's event log.

Get Remote Summaries/ Fetch Remote Events

When both Get Remote Summaries and Remote Event options are checked, Control Panel accesses and displays the corresponding recording in- formation in the Record Summary and Events sections of the right-hand pane. The user may eliminate the delay involved in accessing this information by disabling the corresponding check-boxes.

Autopoll/ Autoprint

When Autopoll is checked, Relay Control Panel will periodically (default 60 seconds) poll the connected Relay for new record files and automatically transfer them to the local computer. Newest records will be transferred first, and only one new record will be transferred at each poll. Checking Autoprint will cause each transferred (via Autopoll) record file to be automatically printed on the default Windows printer using RecordGraph’s default template.

Note that the Autopoll and Autoprint states are not persistent; if Control Panel is disconnected from the relay, both Autopoll and Autoprint become unchecked.

Note also that RecordGraph is unavailable when Autoprint is enabled.

Graph

Records can be viewed with RecordGraph, ERLPhase’s interactive graphing software. To launch RecordGraph, select one or more local records and select the Graph button or double-click.

Get from IED

Selecting a relay file under On IED and then selecting the Get from IED button causes a record file on the IED to be transferred from the relay to your local computer. More than one file can be transferred at the time using Windows file selection function (Control/Shift + left-click). This action will not delete the record on the IED.

Get from IED and Delete

The Get From IED and Delete button erases the records on the relay after they have been transferred to Control Panel and verified.

When connected to a cooperative group, Get From IED automatically transfers the corresponding record from each group member and combines them into a single group record.

Save As

Selecting a local record and selecting the Save As button copies a record to a specified file. The.lpr (for L-PRO) file suffix should be retained and is relay dependent.

Export

Selecting a local record and selecting the Export button launches the Export Utility. Records can be exported in common formats such as COMTRADE for use in other software or playback.

Delete

The Delete button can be used to delete records on the IED or locally. More than one file can be deleted at a time using Windows file selection functions (Ctrl/Shift + left-click).

Rename

Select Rename to allow a local record file to be renamed. Records on the relay cannot be renamed.

Refresh

Selecting Refresh updates the Recordings screen. It checks the local directory and the remote IED (if connected) for new and stored files, updates Control Panel's records database and refreshes the screen.

Recordings Stored

Shows the number of records stored on the relay and percentage of recording space used.

File>Select Remote

This function is available through the On IED menu. If the user is online with the relay, this function selects all of the recording files displayed in the record list that have not yet been transferred to your local Recordings directory. The user may then perform whatever command is appropriate for the selection set, such as a Get from IED or a Get and Delete from IED Command.

9.2 Event Log

The event log services are available from the *Events* tab accessible from the Main Menu.

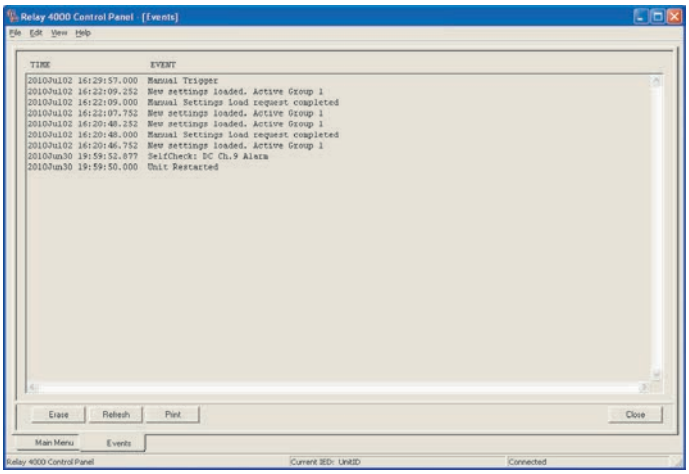

Figure 9.2: Event Log Display

The relay maintains a log of time-stamped events. Event messages can be produced by any of the relay's detectors if configured to do so.

Event messages can also be viewed in the Record Summary display

Circular Storage

The Event Log stores up to 250 events with automatic overwrite of the oldest event

Event Messages

The text of an event message is derived from the configuration of the detector that generates it.

The general format for event message is:

Date Time Element Name.Type.Description Detector State where:

- Element Name is the user-assigned name of the element associated with this channel
- ChannelType describes the member of the element or the type of channel which the detector is monitoring
- Description is user-assigned text available to further identify the detector
- Detector is the type of detector
- State indicates whether the detector is picking up or dropping out. In the case of external inputs this text is user-assigned to accommodate different external devices.

Example of an event message from an External Input detector

2010 Jul 12 20:44:33.672 Line #1.EI.BRKRI-a open

Example of an event message from a high analog level detector:

2010 Jul 12 20:44:33.650 Line #1.Va.High Mag active

Printing Event Log

The user may print or copy to clipboard all the events that are in the Event Log.

Choose from the menu bar to print event logs while connected to the IED.

Controls

The event display is a static snapshot of the contents of the event log.

The user can use the buttons at the bottom to access these functions. In addition, print commands are available under the File menu, a copy com- mand is available under the Edit menu, and a refresh command is available un- der the View menu.

Table 9.4: Event Commands

Refresh	Updates Event List by getting a new list from remote IED and updates the Event List screen.
Erase	Removes all events from remote IED in change and service only..
Print	(bottom button only) Prints all the events (up to 250 events) to a local printer.

9.3 Fault Log

The fault log services are available from the *Main Menu* tab, accessible from the Main Menu.

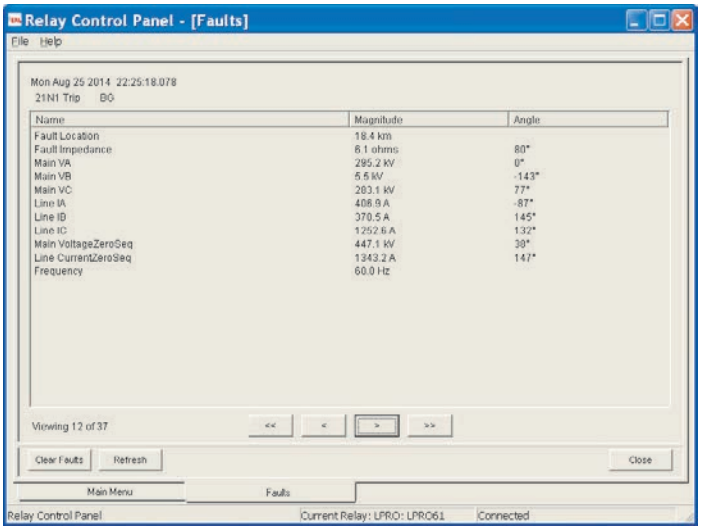

Figure 9.3: Fault Log Display

The relay maintains a log of time-stamped fault information. Fault messages will be triggered only for trip condition and will not log alarm conditions.

Circular Storage

The Fault Log stores up to 100 events with automatic overwrite of the oldest event. The quantity of available individual faults on the IED is indicated in the lower left hand side of the faults display.

Event Messages

The text of an event message is derived from the IED time and the nature of the protection fault encountered, which will always be specific to the nature and configuration of the IED. Fault Log data is uniquely identified by the time-stamp and the associated protection details (faulted phase, fault quantities, etc. as applicable).

Controls

The faults display is a static snapshot of the contents of the event log.

The user can use the buttons at the bottom to access these functions. In addition, print commands are available under the *File* menu, a copy command is available under the *Edit* menu, and a refresh command is available under the *View* menu.

Table 9.5: Fault Commands

Refresh	Update faults by getting a new list from remote IED and updates the Faults screen.

Table 9.5: Fault Commands	
Clear Faults	Removes all faults from remote IED in change and service only.
> , >>, <, <<	Scroll through available faults, single fault at a time using the single arrows, or scroll to start/end using double arrows.
Close	Exit Fault Log screen and close tab,

Caution: Selecting the *Clear Faults* button within Relay Control Panel will permanently removed and delete all Fault Logs from the IED.

10 Graphing Records

10.1 Getting Started

RecordGraph is a tool used to display and analyze records from ERLPhase relays. Use it to graphically view the data recorded during fault, swing and trend modes. RecordGraph is a separate program with Relay Control Panel.

Launch RecordGraph from RCP

Method 1: Records

1. Open Relay Control Panel by double-clicking on the icon on the desktop. If the application is not installed, install the application and then proceed.
2. Double-click on the *Records* item in the tree list or select *Records* and use the *Enter* key.
3. Using the *Records* tab, select a local record from the tree list.
4. Click the *Graph* button.

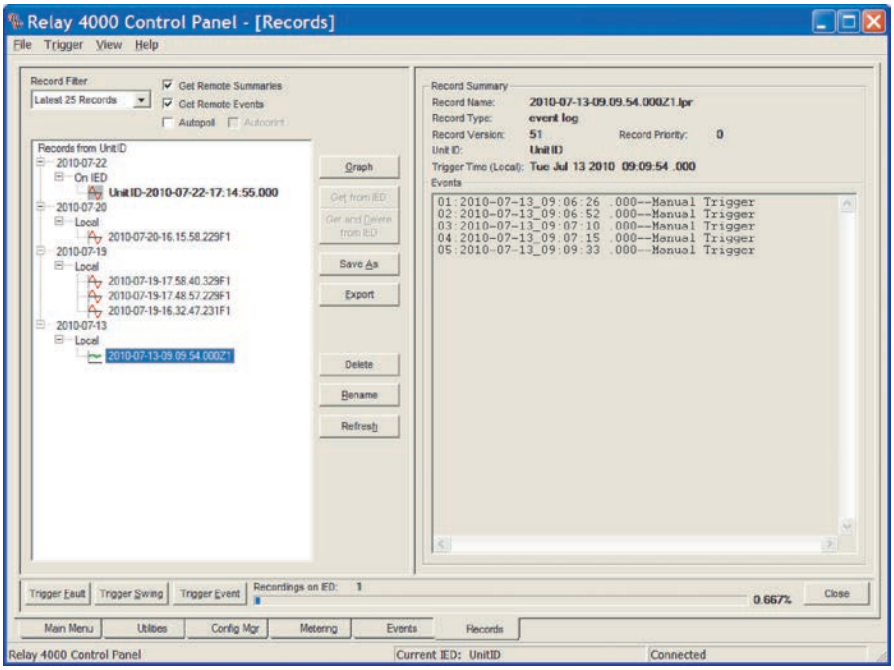

Figure 10.1: Launching RecordGraph from Relay Control Panel

When the Graph button is clicked from the Relay Control Panel, RecordGraph is launched with the selected record.

Method 2: Auto Print

If the Auto Print option is checked (enabled) in the Records list view, then RecordGraph will be automatically launched and prints the channels directly on to the Default printer. The layout and channel information is predefined in the <Default> or User-defined template.

> Enabling the Auto Print option can result in a significant quantity of printed pages depending on the level of system activity.
>
> See the RecordBase view manual for complete details of the various functionality within the RecordGraph tool.

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