ABB Power T&D Company Inc.
Power Automation & Protection Division
Coral Springs, FL
Allentown, PA

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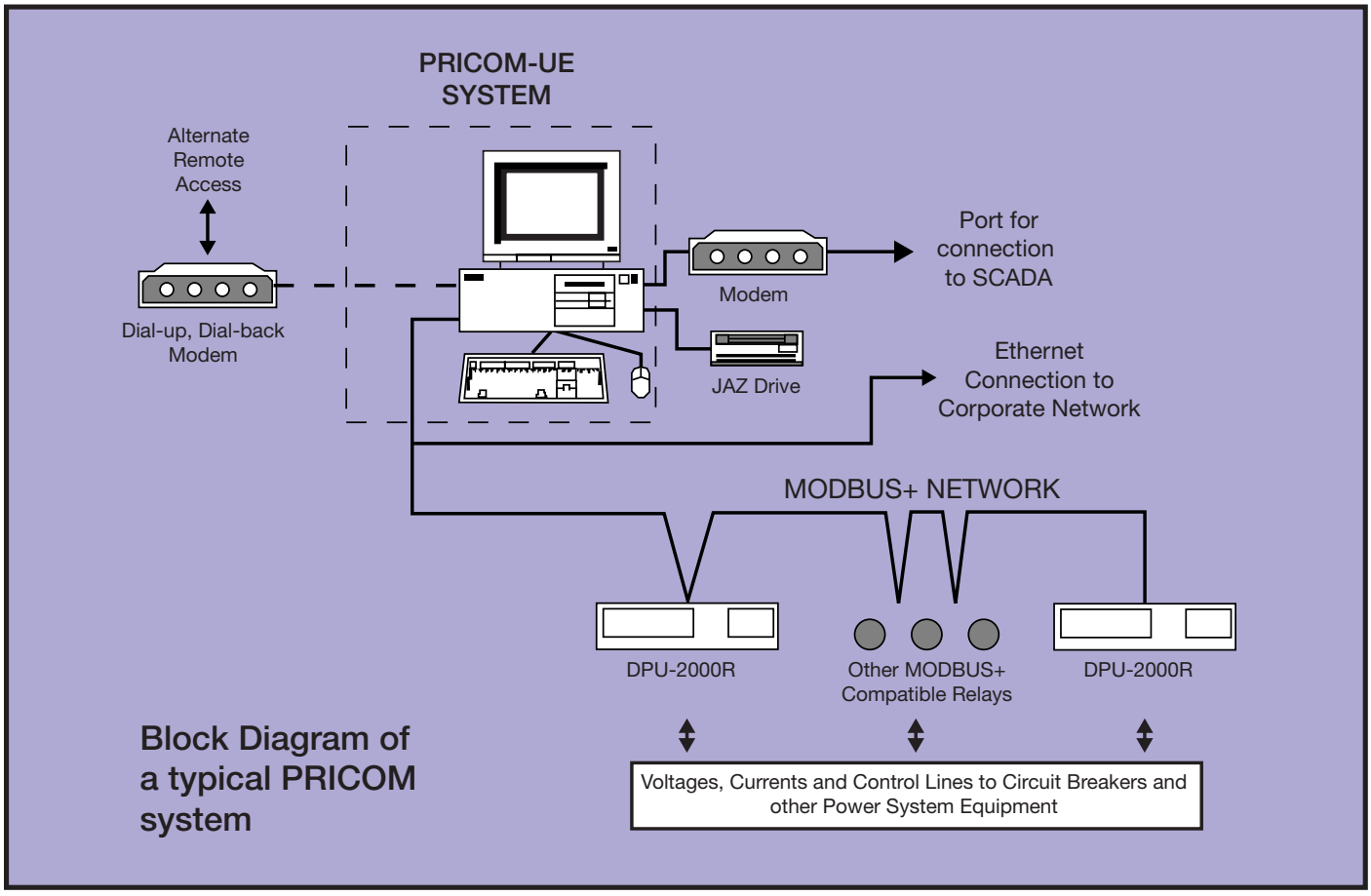
New Information

PRICOM
Power Communication and Control Systems



Block Diagram of a typical PRICOM system

The ultimate in Power Communications and Control capabilities is available through the PRICOM Series of automation systems. The power of RISC workstation technology is unleashed for customer substation automation system applications. This multi-user, multi-tasking environment enables users of different disciplines to simultaneously access the monitored portions of the power system and receive the data they need.

PRICOM Systems are designed to be a powerful yet easy to use. All vital functions are monitored continuously through the system's network connections. Quick and easy access is available to all voltage and power information breaker status, alarms and other vital operational details. All information can be accessed by all users on the network, except where limited access has been established by means of passwords. All workstations can view, acknowledge and control settings, events and/or alarms instantly and simultaneously as well as print hard copies of information and/or graphic displays. Access to data is via convenient, easy-to-select on-screen 3D push buttons. Just point and click for immediate response. The system's multi-tasking capabilities ensure that all alarms will be brought to your attention both on-screen and through audible alerts.

The system's Motif and X-Windows technology facilitate the display of desired information using graphic displays. PRICOM's SELECTAPLOT software allows you to select, display and compare up to five variables simultaneously using the same time scale.

ABB's expanded product line of PRICOM automation systems represents the next generation of its highly successful, field-proven PRICOM PLUS system. The new series opens up a wider range of applications - from the smallest substation to the largest - in the most cost-effective manner available. All systems in the product line use the identical field-proven software that was developed for the PRICOM PLUS system. Clear, logical high-resolution graphic displays are provided. Their use is virtually intuitive in viewing data and controlling equipment.

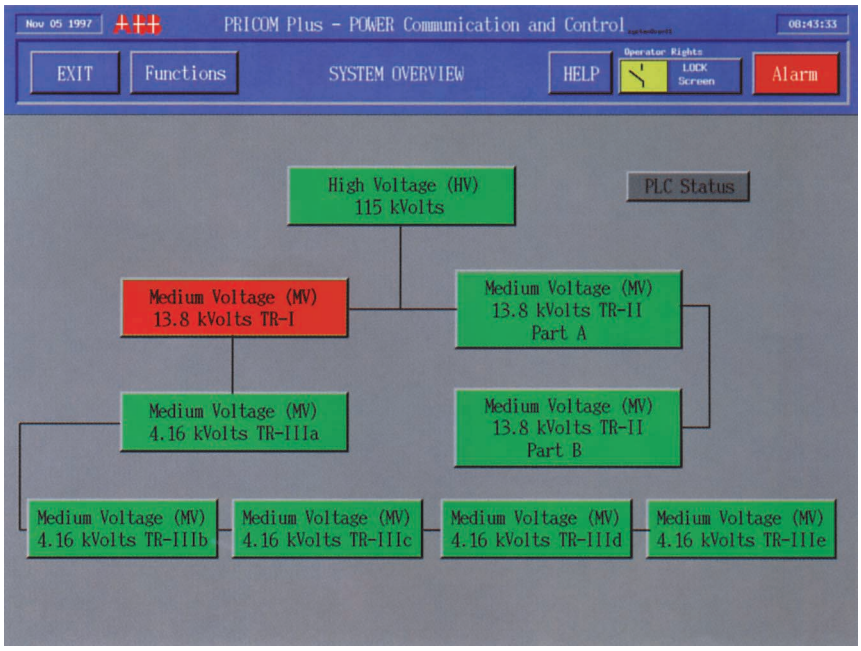
First is the PRICOM-UE (Utility Edition), the original PRICOM PLUS system. Based on open architecture principles and capable of meeting the most demanding utility applications, it is full featured, highly expandable and field proven. PRICOM-UE provides high-speed data gathering and control, comprehensive substation automation functions, access to and control of protective device settings, and interfaces to SCADA/EMS/DMS systems via either protocol emulation or through an external RTU. PRICOM-UE has been marketed since 1994 as PRICOM PLUS, and is in volume production.

The PRICOM-UE system is normally delivered on a workstation-class processor which can be sized to meet the most demanding performance requirements. Display call-up and update times are under one second; the system can process more than 200 alarms per second while performing all other functions.

Next in line is the PRICOM-CE (Compact Edition) automation system. It uses the same field-proven software as PRICOM-UE, except scaling factors and data base sizes are changed. The same high resolution, user-friendly graphic displays are provided. Many applications allow use of a Pentium II class PC in place of a workstation as the system platform, making the system even more cost effective. PRICOM-CE was established for those applications (typically, an industrial or commercial substation) where access to and control of protective device settings is not required via the automation system or where an interface to a SCADA/EMS/DMS via a SCADA-type protocol is not applicable.

The newest member of the PRICOM Automation Systems product line is the PRICOM-SE (Special Edition). With special configuration of the same field-proven software used in all PRICOM systems, it is pre-engineered and pre-packaged to (virtually) be a shrink-wrap system for use in extremely small substations (i.e., one transformer and one to eight feeders). The PRICOM-SE system is designed to work with ABB's IEDs (protective relays), making it possible to equip these very small substations with data gathering and control capabilities in the most cost-effective manner.

The PRICOM-SE system is typically shipped as part of a package consisting of ABB IEDs, low power radios for communications, miscellaneous installation hardware and installation drawings. The platform is a Pentium II class PC with a 14-inch CRT, keyboard and mouse for the user interface.



Overview block diagrams provide a quick summary of system status and easy "point and click" access to more detailed information.

The detailed alarm summary provides date and time, alarm status and other relevant information. By clicking on an individual alarm line, the operator goes right to the page where that alarm appears.

PRICOM AUTOMATION SYSTEMS TECHNICAL DETAILS

1.0 Description of the PRICOM System

PRICOM is a Power Information, Communication and Control system that is primarily designed to automate electrical substation equipment in a true multi-tasking, multi-user, UNIX/LINUX environment. The system conforms to the X-Windows Graphical User interface specifications using Motif window management. It complies with all applicable IEEE and IEC specifications for automation systems. All required networking software is included, and applications software such as a word processor or spreadsheet can be incorporated into the system if necessary.

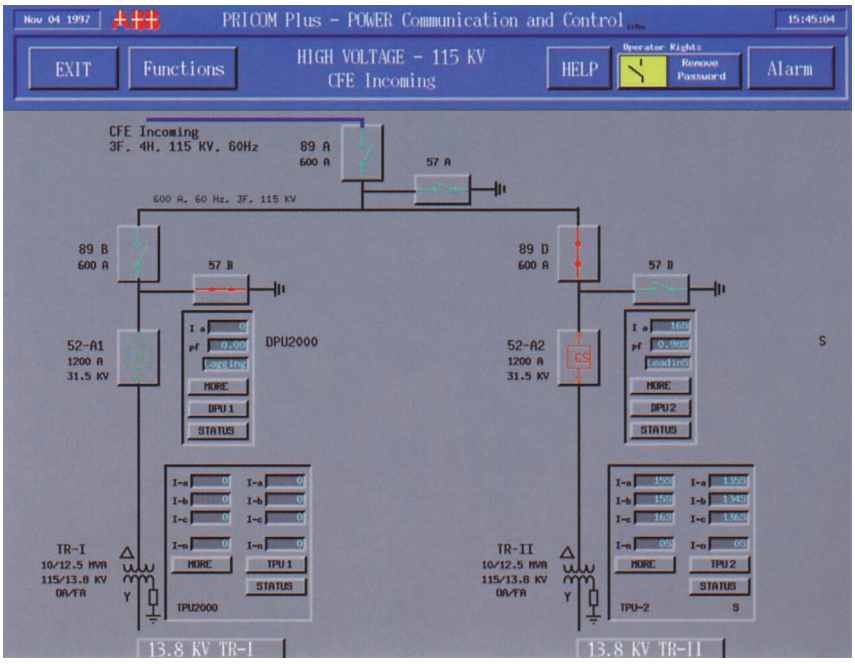
1.1 System Connections

PRICOM systems are delivered with a server that can be configured to communicate on multiple communications networks simultaneously, using a different communications protocol on each network. In addition to IEDs (Intelligent Electronic Devices, such as microprocessor-based relays, meters and other devices), the system is capable of communicating with Remote Terminal Units (RTUs), Programmable Logic Controllers (PLCs) and Supervisory Control and Data Acquisition (SCADA) systems.

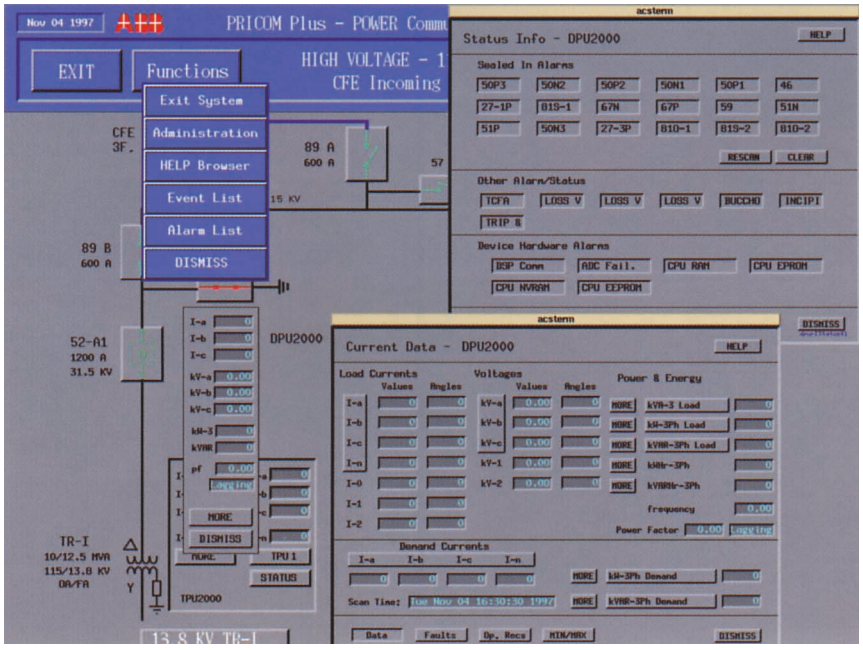
PRICOM systems can be configured with Ethernet and RS-232/RS-485 serial ports as needed. Multiple users on the various ports can access the system simultaneously. Users can make remote connection to the systems using X-Windows technology to access data and displays that are resident on the local server. The system can accept and respond to SQL queries from other DCS platforms over the Ethernet connection using TCP/IP. Additional platforms connected to the Ethernet can also log into the Host Server.

1.2 System Databases

Field devices report by exception to the real-time database. The system can be configured so that each parameter in the real-time database can be individually configured to also be written to a historian database for long-term retention. The historian database can be periodically downloaded to longer-term storage devices (magnetic tape or optical disk) as necessary. Any parameter in the real-time or historian database can be plotted and displayed in multiple simultaneous plots. The plots can be expanded or compressed and the time axis may be shifted. A value marker can be positioned by the pointing device anywhere on the plot curve to display the actual numerical value of the data at that point.



The initial data screen provides relevant information and buttons for selecting additional information or performing control commands.



Each "point and click" operation opens additional windows which 'drill down' deeper and deeper into the data base for information.

The real-time database is configured via templates which can work with all common data input and output representations, such as integer, floating point, status, analog, pulse counter, and strings. Templates are also used to define group specifications, trend displays, historical specifications, 1/0 blocks, communications channels, timed tasks, groups of users, and individual users. The database can be generated outside the system and then loaded onto the PRICOM system in ASCII format. It can also be unloaded in ASCII format, modified by any word processor program capable of working with ASCII, and then reloaded.

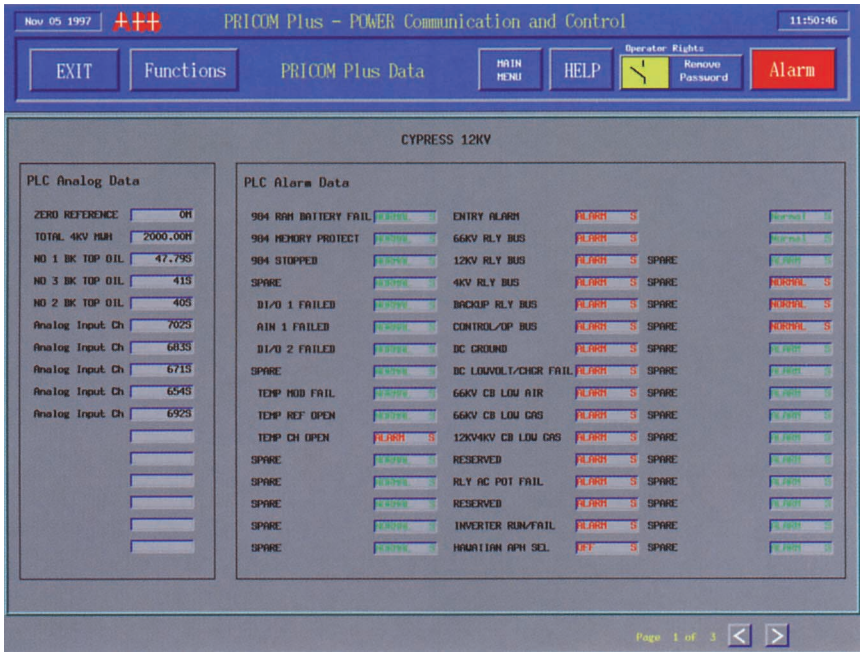
Real-time parameters can be time-stamped with a time resolution of up to 1 millisecond. The actual accuracy depends on the device that generates the data. PRICOM can process high-speed data acquisition, such as waveform capture, as well as upload data from remote terminals with time stamps.

1.3 System Operations

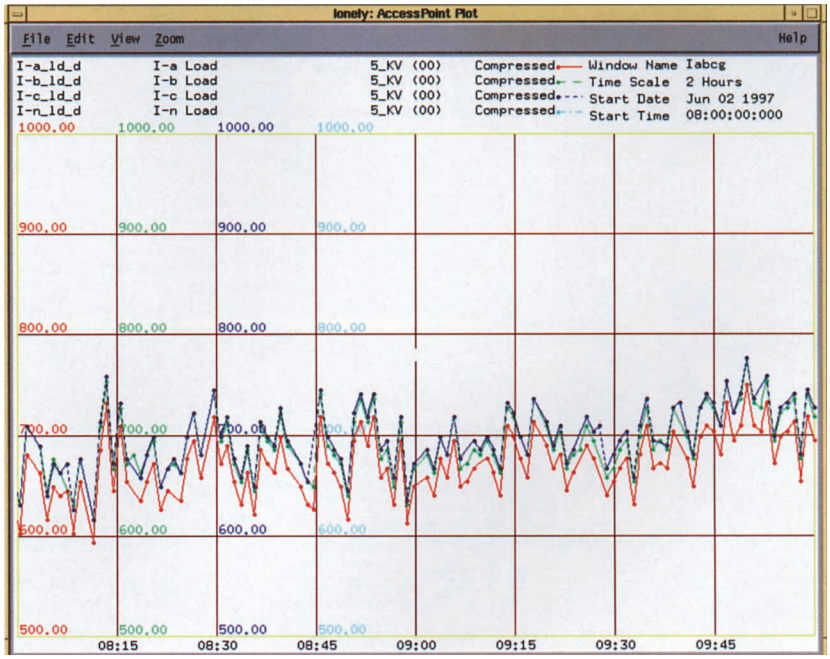
The operation of the PRICOM system is intuitive to the user. All operations are conducted via the pointing device (mouse), and the screen displays lead the user to the information that is desired. In virtually every application, the only required use of the keyboard is to enter an individual password.

The multi-tasking capability of the system allows continuous scanning of the power system parameters regardless of what other operations are being conducted by the simultaneous users of the system. The server updates the real-time database on an exception basis, and detects, records, and tracks alarm conditions as they occur. The alarms are tracked in an alarm queue containing all alarms in the system. In addition, a message database file keeps a chronological record of all alarm-related events each day. This database can be viewed or printed as needed. Alarms can be acknowledged individually or all at one time. Four priorities of alarms can be defined. The PRICOM system also tracks all events via a message database. Events include such activities as setting changes, supervisory control activities, alarm acknowledgments, user-defined parameter set points, security violation attempts, user login and logout, and use of system configuration utilities. All such events can be configured to be retained in the message database on an individual basis.

PRICOM can send commands to IEDs connected to the communications networks. The commands take precedence over the scan process and are immediately sent to the device. Of course, the user attempting to send



Custom analog and status summary screens are quickly and easily built to meet specific requirements.



Real time and historical data plots can be selected and displayed at any time. Real time plots are updated automatically at periodic intervals.

commands must be so authorized by the security level of his login. Typical commands are a multi-step process:

(1) select the command; (2) verify the unit identification (usually a password); (3) command the operation; and (4) verify the operation.

Each IED that is implemented in the PRICOM system may be accessed by a menu screen that is specific to that device. Most features and capabilities of the device are accessible from the menu screen in the PRICOM-UE system. In the PRICOM-CE and PRICOM-SE systems, most features and capabilities of an IED are supported with the exception of access to, and the ability to edit, protective device settings.

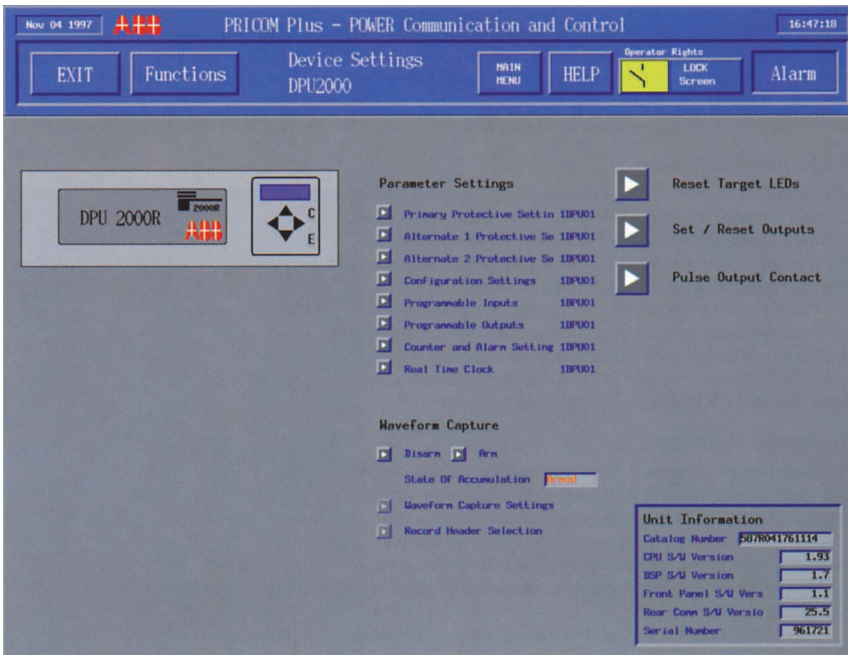
An optional audio help system can be implemented to assist the user. This system can be configured by the user to include specific and customized help information. In addition, the user can easily implement customized help displays to cover specific requirements.

1.4 System Utilities

The PRICOM systems include configuration utilities to allow the user to re-configure or modify the system displays and database to account for changes in the monitored and controlled equipment. Separate utilities are provided to export any selected data to another computer for further analysis, or to run applications such as a word processor or spreadsheet while continuing to operate the PRICOM application.

1.5 System Security

PRICOM systems provide up to 1000 levels of security. The operating system enforces data integrity and security access through password control and security levels. Password protection restricts access to system features, functions, and database points. Security levels range from the most privileged (level 0) to the least (level 999). Each security level is associated with a specific, definable set of user privileges. Default settings installed in the systems are: I-Viewer (Level 900, read only, no operations); 2 - Operator (Level 800, breaker and switch operation with metered data, acknowledgment of alarms and events, no protective device settings changes); 3 - Protection (Level 500, protective device settings only, no breaker or system operations); 4 - Administrator (Level 100, all configuration changes, all operations, user accounts, etc.); and 5- SuperUser (Level 0, all configuration and operations, without restrictions). These and other levels are fully configurable.



Device-specific screens provide access to parameter settings, waveform capture setup and target information.

Selecting the Device Settings button provides the operator with this screen for reviewing and editing the protective settings in the PRICOM-UE system.

1.6 Performance

PRICOM systems performance is, of course, dependent upon the computer platform that is used. For the PRICOM-UE system on a workstation platform, screen callup and update times are under 1 second, and the system is capable of processing a simultaneous burst of over 200 alarms while performing all other functions. For the PRICOM-CE and -SE systems on a Pentium II platform, screen callup and update times are under 2 seconds and the system is capable of processing a simultaneous burst of over 100 alarms while performing all other functions. All PRICOM systems are based on the time-tested and highly stable UNIX/LINUX family of operating systems to insure freedom from operating system hangs and crashes.

1.7 Documentation and Training

An extensive set of manuals is provided with each PRICOM system. One document is specifically directed at the operator and the normal use of the system. The remaining documents provide detailed insight into the core modules and functioning of the overall system. The system is so intuitive to use that most operator training courses require less than two full days which provides for presentations, discussions and laboratory exercises.

ABB strongly recommends that at least one person from the user organization be trained in system administrative procedures. This training includes basics of the operating system, database configuration and modification, display configuration and modification and use of the various tools provided. Any custom documentation that may be appropriate, such as specific IED interfaces, is normally supplied as an appendix to the System Operations User Guide. This publication thoroughly describes all system functions and features that are available via the menu, overview, single-line and device function screens.

1.8.0 Hardware Configurations

Application of the PRICOM-UE system in a medium to large utility substation generally requires the performance capabilities of a Sun SPARC-equivalent or IBM RS/6000 workstation computer. RAM memory requirements usually start at the 64Mb level and increases with increasing numbers of IEDs. Bulk storage is typically a 2.0Gb hard disk, but this can also be augmented if needed. A 17-inch, high-resolution color monitor is supplied with the system unless a larger screen size is specified.

The PRICOM-CE and -SE systems are usually supplied on a Pentium II PC platform with 32Mb of RAM memory and 2.0Gb hard disk. A 15-inch, high-resolution color monitor is supplied standard with the PRICOM-CE system; a 14-inch, high-resolution color monitor is supplied standard with the -SE system. As above, other configurations and options are available.

1.8.1 Options

To insure uninterrupted operation, ABB recommends the use of a I-KVA UPS for powering the system. Either a tape drive or optical storage device such as a "Jaz" drive is recommended for program and data storage. ABB can provide quotations for many other options that are required to meet specific circumstances.

1.9 Future Growth

ABB is an active participant in the "LAN Initiative" which is intended to develop a standard local area network configuration and protocol for use within and between substations. The final result will be a high-speed communications system that is compatible with the UCA 2.0 (Utility Communications Architecture, Version 2.0) and is intended to be a US and International approved standard. All ABB's microprocessor-based products and the PRICOM Systems, will be upgradeable, at minimum cost, to the new standard when it is released.

2.0 Summary

ABB's PRICOM substation automation systems avoid the complexity in integrating and installing intermediate devices such as protocol converters, data concentrators and 110 modules. In most cases these functions are performed by the 1/0 software resident on the server host. Each addressable device is connected via a twisted pair cable or fiber optic network. The PRICOM systems provide for minimum cabling to connected devices, and allows high-speed communications busses to be established for automation functions. ABB has an extensive library of PLC code for implementation of sophisticated and complex functions for those applications that require them.

For more details, including assistance with your particular application, detailed specifications and pricing, contact the nearest sales office of ABB Power T&D Company or call 610-395-7333.

ABB Power T&D Company Inc.
Power Automation and Protection Division
4300 Coral Ridge Drive
Coral Springs, FL 33065
800 523-2620

ABB Power T&D Company Inc.
Power Automation and Protection Division
7036 Snowdrift Road, Suite 2
Allentown, PA 18106
800 634-6005