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Ranger

Power & Data Logging Instrumentation



ThermoWestronics



HA-5000 Harmonic Analyzers

The Ranger HA 5000 Harmonic Analyzer permits simultaneous recording of power quality parameters with the same instrument in all weather conditions. Users can view real-time data, captured wave forms, and trend data on site. Powerful Pronto for Windows software is included to analyze recorded data.

The HA 5000 was designed with state-of-the-art surface-mount components to provide users with a highly-accurate and reliable product that will service their needs for years. New features and compliance to new standards are field-upgradeable. Simple, quick upgrades and minimal maintenance reduce the cost of ownership.

Digital signal processing establishes error-free conversion of analog inputs. A 32-bit floating point device performs real-time calculations of all power quality and quantity variables.

Flash PROM provides the ability to add features, options, regulation upgrades and other enhancements on-site. You simply place the

Features

8 analog inputs (4 V and 4 A) via discrete voltage and current input ports

Current inputs are programmable to probe compatibility (1A, 1 VAC or 150 mV AC outputs)

24 math channels for real-time power and harmonic recording

Simultaneous recording of trend and harmonic data (measures true power out to the 50th harmonic)

Rugged, waterproof case for outdoor use; will withstand vehicular transport over rough terrain

Backlit graphic display shows wave forms in real time in scope mode including:

- Harmonic spectrum bar graphs
- Harmonic direction
- Harmonic content
- Single-cycle wave forms

Direct, in-field review of recordings on the unit

upgrade disk into your computer, connect the computer to the Harmonic Analyzer's RS232 port and run the program to upgrade your unit at the press of a key.

The HA 5000 utilizes advanced electronic engineering design, such as a Field Programmable Gate Array (FPGA) and an

Trend graphs record harmonics and power vs. time

Single-cycle trigger-captured wave forms with pre-and post-trigger cycles

Graphic display of real-time phasor diagrams

Captures and displays up to 600 events

Dynamic probe calibration over full harmonic range allows users to calibrate probes in the field. No special CTs or factory calibration required.

Compliance with IEEE-519, IEC-555-2, IEC-1004-7 and EN-61000-3-2 includes accuracy of dot product method of calculating power and power quality

Displays wave shape faults, sags, swells, RMS trends, THD trends, NMMH trends, on 3.5" x 4" LCD display

Trend power monitoring of kW, kWh, kvar, harmonic direction, power factor and more

4 pre-programmable default setups to get started/4 custom setups to meet specific needs



Application Specific Integrated Circuit (ASIC). The design facilitates higher-speed processing, superb frequency tracking, accurate measurements and calculations, and results in a more reliable instrument.

Dual latches with locking facility protect the instrument from harsh environments and provide security in unattended applications

Hard copies of the display can be printed to an optional printer by pressing one key

Auxiliary port for transfer of data to transportable datapacks, connection of optional printer, or to provide alarm outputs

Accessory port facilitates transferring data to computer, calibrating probes, recharging, and upgrading the HA 5000 with new features and functions

Programming keys facilitate on-site setup

Hookup diagram on inside of cover for quick, error-free installation for Y, Delta and Z Coil

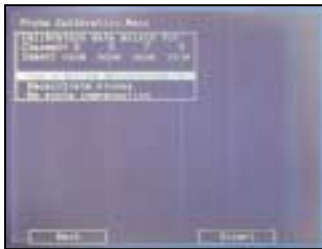
Includes probe compensation coil to improve accuracy of your current transformer

HA-5000 Screen Options

The HA 5000 Harmonic Analyzer offers several screen options to fit your application requirements. In addition to the screens illustrated below, you can choose Harmonic Text Summary and

Harmonic Direction screens. With Harmonic Text Summary, you can display all 50 harmonics for the wave form selected, its percentage rating relative to the fundamental, the phase angle, and the RMS value.

The Harmonic Direction bar graph screen graphically displays whether the harmonics are coming from the source or the load. This feature substantially reduces the time needed to diagnose problems at the job site.



Probe Calibration

The Probe Calibration screen features a quick, simplified menu selection to allow the user to choose from existing probe calibration, to create a new probe calibration, or to use no calibration at all. The entire process takes only seconds to accomplish.



Phasor Diagram

The Phasor Diagram screen displays real-time phasor diagrams, which instantly show the relationship of all the input channels in terms of direction and magnitude. These are useful in detecting input connection errors or miswirings at the job site.



Wave Form

The Wave Form screen shows captured data, which includes the triggered cycle and the pre- and post-triggered cycles of stored wave forms. It also shows wave forms in real time during recording. Moving the crosshair with the left and right cursor keys allows the user to see the values at any point on the wave form. Pressing the bar graph key will display a harmonic spectrum of the cycle selected.



Harmonic Spectrum

The Harmonic Spectrum bar graph screen graphically depicts the amount of harmonic energy present in each of the captured wave forms or on a real-time basis for the channel selected. Pressing both arrow keys will display harmonic direction, while pressing the left or right arrow key allows you to select a specific harmonic and display its energy phase relationship.

Specifications

Channels

8 analog and 24 math

Inputs

Voltage: (3) 0-600 VAC & (1) 0-180 VAC
Current: (4) 0-1 AAC (Model HA-5058)
or (4) 0-1 VAC/0-150 mVAC
(Model HA-5059)

Voltage Impulse

25 kV peak measured

Accuracy

± 0.25%, 1-25, 0.5%, 26-50th of
full scale

Noise Rejection

50/60 Hz programmable

Input Impedance

2 megaohms (HA 5059 current input)
1 ohm (HA 5058 current input)

Memory

1 MB

Sample Rate

256 samples/cycle

Recording Modes

Adaptive (Patented), Point Store,
Enhanced Point Store, Alarm Point
Store, and Cycle Store

Recording Length

Selectable from 1 second to 999 days

Power

From channel 1 input when above 90
VAC (with battery backup when
below 90 VAC)

Batteries

5000 mAh NiCad D Cells 3.8 VDC
typical

RS232 Interface

Serial port capable of 300 - 38.4k Baud

Operating Temperature

-10° to 60° C (ambient)

Dimensions

5.6" H x 8.9" W x 13.4" D
(14.22 x 22.61 x 34.04 cm)

Weight

19 lbs., 4 oz. (8.7 kg)

PM6000

Power Quality Monitor

The Power Master 6000

is the most user-friendly, comprehensive, compact, cost-effective unit to be introduced to the power monitoring field. It offers virtually everything needed to monitor and record power for surveys and audits. There are 3 voltage input channels capable of measuring 0 to 600 VAC and 3 current input channels for use with current probes. The PM6000 is designed for use with existing current probes with 1 amp or 1 volt outputs. Eleven pre-stored configurations are set for 3 phase, 2 phase, and single phase hook-ups with several math channels pre-configured for power and harmonic measurements. Users can also configure their own set-up and math calculation requirements and save them to non-volatile memory. Up to 32 power quality parameters can be recorded at one time.



Features

Graphical touchscreen interface provides straightforward, user-friendly operation
Resident on-line HELP guides users through configuration and hook-up
Records and displays up to 32 channels of voltage, current, power, power factor, VARs, phase angle, frequency, THD, odds, evens, triplens, individual harmonics and much more
Pre-stored configurations for easy set-up
NEMA 4X enclosure for use in outdoor applications

Real-time displays allow users to zero in on exact point conditions and view phasor diagrams, harmonic bargraphs, and directional harmonics in both text and graphical format
Built-in Connection Wizard ensures correct hook-up, provides suggestions upon detecting errors and determines if clamp-on transformer is properly oriented
Data storage includes internal flash memory and ATA flash memory card
Records harmonic magnitude and direction over time down to single cycle resolution for accurate analysis

Can be powered independently by AC measurement circuits or optional line cord for voltages below 90 volts.
Battery backup provides a 10 minute ride-through in case of loss of AC voltage
RS422, RS485 and RS232 with MODBUS ASCII protocol or modem communications
True RMS to the 50th harmonic
Fused voltage leads and internally fused voltage inputs protects the PM6000
Panel-mount configuration available

Specifications

Inputs

Voltage: (3) 0-600 VAC in-line shrouded 4mm banana plugs and fused crocodile clips
Current: (3) 0-1 VAC or (3) 0-1 AAC 4mm banana plugs, depending on model

Channels
32

Accuracy
< 0.25% to 50th harmonic

Resolution
Programmable to 0.1 VAC and 0.1 AAC

Harmonic Measurement
True RMS to the 50th harmonic

Math

VAC, IAC, KW, KVAR, PF, phase angle, VA, frequency, THD, odds, triplens, real and imaginary impedance, Nth harmonic, Nth harmonic with direction, voltage imbalance, current imbalance, K-factor, temperature and more

Sample Rate
128 samples per cycle; single cycle true RMS response time; 16 bit simultaneously sampling all channels

Memory
4 MB RAM, 1 MB internal flash memory (ATA flash memory card optional)

Display
Backlit LCD graphic touchscreen display; 5.25" (133.4 mm) x 1.5" (38.1 mm)

Power

Requirements: 90-600 VAC off of phase A voltage measurement or separate line cord
Battery: 5 AF Ni-Cad battery pack

Communications

Serial Ports: RS232, RS422, or RS485 (up to 115.2 K baud); > 4 K isolation
Protocol: MODBUS ASCII

Operating Temperature
14° F (-10° C) to 140° F (60° C)

Certifications
CE



1250 Series Harmonic Power Logger

The 1250 Series Harmonic Power Logger

is a dedicated Ranger Data Logger, pre-programmed for measuring AC para-meters. Model 1258 is for use with current probes with 1 or 5 amp output, and Model 1259 is for use with current probes with 1 volt or 150 mV output. All units have 4 voltage input channels capable of measuring 0 to 600 VAC and 4 current input channels for use with current probes.

Simultaneous recording of power and harmonics such as watts, vars, THD, and triplens allows trouble-shooting in one session.

Harmonic Scan allows users to scan through all harmonics on any voltage or current input channel. Displays include harmonic number, distortion percentage, value in volts or amps, phase angle, and ranking. Parameters are recorded for playback and analysis on your computer.



Features

Records and displays voltage, current, power, vars, THD, TDD, odd, even, and triplen harmonics, power factor, phase angle and more

RS232 port and separate auxiliary port for other plug-in options

Easily set up for Wye or Delta systems (3- and 4- wire, single phase, and phase-to-phase)

Built-in phase rotation indication

Single-cycle RMS capture and true RMS recording to the 50th harmonic

Comprehensive data analysis software included (Pronto for Windows)

Power calculations use $V \cdot I$ method and comply with IEEE-519 and IEC-555 standards

Specifications (1250)

Inputs

Voltage: (3) 0-600 VAC (Ch 1, 2, & 3) & (1) 0-180 VAC (Ch 4)
Current: (4) 1A/5A AC (Model 1258) or (4) 1V/150 mV AC (Model 1259)

Math Channels

24

Accuracy

$\pm 0.25\%$ to the 25th harmonic
 $\pm 0.5\%$, 26th to the 50th harmonic

Memory

1 MB

Display

2 line, 16 character per line, LCD dot matrix

Sample Rate

256 samples per cycle

Math

Power Math: real power, reactive power, apparent power, power factor, phase angle ($0-360^\circ$ & $\pm 180^\circ$), % unbalance, frequency
Harmonic Math: THD (thd European), TDD, odd, even, selectable (2 - 50), triplen, K-factor

Meter Logger



The Ranger Meter Logger is a 5-channel data logging system built into an electric meter housing. It is ideal for responding to voltage complaints and power consumption problems. It installs onto the meter housing; all monitoring connections are made through the jaws of the metering system. Data is retrieved via the serial port on the outside of the housing. Scale factors, engineering units, date & time, recording length, recording mode, sample rate, math channel usage, and more can be configured via the serial port.

Features

3 voltage inputs built into the meter blades
Works with 4- and 5-jaw meters (5th jaw is movable)
Measures L1 to neutral, L2 to neutral, and is configurable to measure L1 to L2 or neutral to ground
Configurable by computer or optional keypad
RS232 communications port
128 K internal memory
Pronto for Windows software

Specifications (Meter Logger)

Number of Channels

3 Voltage, 2 Current, 4 Math

Data Recording

Length: 10 seconds to 999 days
Method: Adaptive, point, enhanced point, and store on alarm

Characteristics

Operating Temperature: -10° to 60° C
Size: 6.75" diam. x 5" deep (17.15 x 12.7 cm)
Weight: 3.2 lbs (1.45 kg)
FCC: Class A, paragraph 15, Subpart J

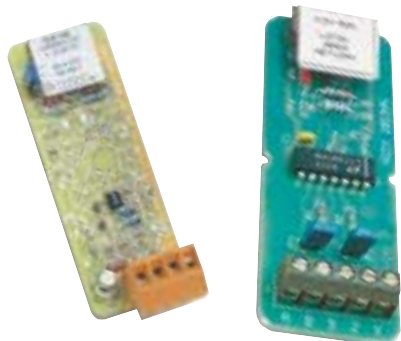


Ranger III Data Logger

The Ranger III Data Logger is an advanced recording, analyzing and reporting system. The Ranger III functions as a paperless recorder, storing data in memory at a rate and recording length you specify. Data transfer to your computer is via serial interface, modem, or portable data pack.

Basic system components include the micro-processor-based data logger, input signal conditioning modules, communications and configuration modules, and Pronto application software. The heart of the Ranger III is a patented storage technique and an ASIC which contains all main intelligence and signal processing. The durable, dustproof, housing holds all I/O modules, analog and digital inputs. The membrane key pad further eliminates access areas for contamination.

The Ranger III allows up to 8 inputs, which can be any combination of the single and dual plug-in modules listed at right. Input modules are available in isolated and non-isolated configurations. All modules automatically communicate their function to the Ranger III, eliminating unnecessary programming.



Input Modules

- DC Voltage/Current
4-20mA
- Dual Analog DC Voltage and Current
- AC Voltage and Current
- Dual Analog AC Voltage and Current
- Pulse Counting
- Temperature/Thermocouple
- Temperature/RTD
- Temperature/Thermistor
- Dual Analog Temperature
- RH
- Event

Features

- Analog and digital inputs
(combined total of 8)
- RAM storage (128 K or 1 MB)
- 4 built-in math channels
- More than 20 built-in basic math operations
(including rate-of-change, noise filtering, square root, peak and valley detection, log, anti-log, natural log, exponent, etc.)
- More than 40 enhanced power math selections available (via optional configuration module)
- 5 data storage modes (adaptive store, point store, enhanced point store*, store on alarm*, manual store*)
- 6 operational modes (setup, record, playback, display, review, print)
- Wide variety of plug-in modules (signal input, signal programming, communications, built-in serial interface, parallel printer interface, modem interface, alarm output, configuration)
- Pronto for Windows

*Available with CFG 712 or CFG 714

Specifications

Inputs

12 (8 analog/digital and 4 math)

Accuracy

± 0.05% of full scale

Noise Rejection

50/60 Hz (programmable)

Input Impedance

10¹² Ω each channel (w/o modules)

Digital Input Span

0 to 6 MHz

Digital Accuracy

± 0.01% of full scale

Configuration Memory

Flash EPROM re-programmable

User Interface

RS232 port (300 to 19200 baud)

Memory

128 K standard (1 MB optional)

Standard Recording Modes

Adaptive: Sample rate set at 500 ms, 1 sec., or 2 sec., depending on record length. Selectable recording period of 1 sec. to 999 days.

Point Store: Selectable sample rates of 250 ms to 12 hrs. Selectable record period of 1 sec. to 999 days.

Characteristics

Power: 3.62 VDC to 4.5 VDC
Operating Temperature: -10° to 60° C
(14° to 140° F)
Size: 1.87" H x 7.6" W x 11.6" D
(4.76 x 19.3 x 30.18 cm)
Weight: 2.5 lb. (1.13 kg)



Ranger IV Data Logger

The Ranger IV Data Logger is a general purpose data logger designed for plant maintenance, environmental, and process applications. It is used for troubleshooting motors, valves, pressure, flow, environmental conditions and other applications. Usage varies from short term (several hours) to permanent installations of single or multiple units.

The Ranger IV has a universal front end, with 4 ports that accept 4-channel plug-in input modules. All input selection is accomplished from the front panel. The unit can be configured with up to 16 universal input channels and 16 math channels. It features patented Adaptive Store Mode, which provides highly-accurate, high-resolution trend and anomaly data collection.

The Ranger IV is packaged in a rugged, dustproof, polycarbonate case and comes equipped with internal NiCad batteries (5000 mAh), 1 MB of memory, and our powerful Pronto for Windows data analysis and reporting software.

Features

16 universal input channels. Accepts AC and DC volts, AC and DC amps, 4-20 mA, T/C, RTD, thermistor, RH

16 user-programmable math channels

4 input ports per POD-4001A

Flash ROM

Pronto for Windows application software

Adaptive Store Mode

AC/DC powered

1 MB memory

Rugged packaging

Specifications

Inputs

4, 8, 12, or 16 analog channels

Accuracy

± 0.25% of full scale

Noise Rejection

50/60 Hz (programmable)

Input Impedance

10¹² Ω (typical)

Digital Input Span

0 to 800 KHz

Digital Accuracy

± 0.001% of full scale

User Interface

2-button menu system, plus RS232 serial port

Memory

1 MB

Recording Modes

Adaptive store, point store, point store on alarm, enhanced point store, and manual point store. Selectable recording period of 1 sec. to 999 days.

Characteristics

Power: 3.65 VDC to 4.5 VDC
Operating Temperature: -10° to 60° C
(14° to 140° F)
Size: 5.6" H x 8.9" W x 13.4" D
(14.22 x 22.61 x 34.04 cm)
Weight: 10 lbs. (4.52 kg)



Scout Data Logger

The Ranger Scout Data Logger

is a

compact, economical, paperless recorder with dedicated inputs. It incorporates many of the features and design parameters of the Ranger III & IV Data Loggers, including the powerful Pronto graphing and analysis software. Ranger's patented adaptive storage technique makes this little data logger far more accurate than much more expensive instruments. Storage modes include adaptive store, point store, enhanced point store, and store on alarm.

There are five models in the Scout line. Each model offers a choice of recording length, rate of data storage, scales and engineering units, playback method, and data display. Everything you need to record and analyze data is included: data logger with pre-configured inputs, serial interface cable, recharger, and Pronto analysis software.



Scout Models

DC/Voltage Data Logger
DC/Current Data Logger
AC Volts/Amps Data Logger
Thermocouple Data Logger
3-Channel AC Voltage Data Logger

Features

2 – 4 input channels and 4 math channels
128 K memory size
Alphanumeric display
Compatible with Pronto (Windows and DOS versions)
Built-in signal conditioners
Pre-configured inputs
Dedicated serial port
Terminal strip inputs
Expandable serial interface
Battery backup

Specifications

Inputs

Number: 2 to 4, depending on model
Type: AC and DC volts, AC amps, T/C, RTD, events

Accuracy

< 0.5%

Memory

128 K

Recording Modes

Adaptive, point store, point store on alarm, and enhanced point store

Sample Rate

Programmable down to 250 mS

Battery

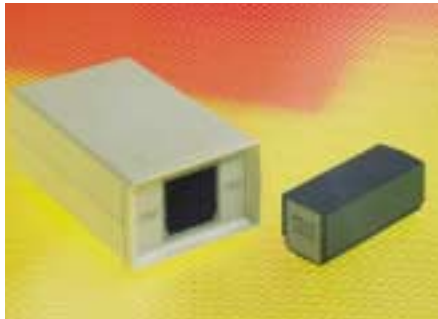
Type: 3 NiCad C cells
Recording time: 7 days minimum
Backup: Data and setup are backed up for a minimum of 30 days

Characteristics

Power: 4 VDC (at 84 mA)
Operating Temperature: -10° to 60° C
(14° to 140° F)
Size: 4.625" H x 7" W x 2.25" D
(11.75 x 17.78 x 5.72 cm)

Accessories

A wide variety of **Ranger accessories**



Data Packs

Data Packs are transportable memory devices designed to retrieve data from the internal memory of Ranger power and data loggers, which allows the units to stay on-site to continue to collect data. Data Packs have battery back-up so that they can be removed and transported to the computer site for playback (which requires a Data Pack Reader, as shown here.)

can further enhance the operation and versatility of Ranger power and data loggers. Data packs, readers, portable graphics printers, current probes and transformers, fast chargers, calibration coils, and a variety of configuration, communication, and special sampling modules are available. Voltage and current input cables are also available. All cables are color-coded to insure fast, error-free connections. In-line fusing on all voltage leads protects operators and equipment in the event of a short circuit.



Current Probes and Current Transformers

Ranger power and data loggers are compatible with all industry standard current probes and transformers. Ranger offers several models of the most popular ranges and sizes. Flexible current probes are also available.



Portable Graphics Printers

Portable graphics printers add the ability to print an alphanumeric listing of data while simultaneously recording the data to the memory of the data logger. Date, time, value, minimum, maximum, and average can be printed. Its ability to print the graphs created in Pronto software make this battery-operated graphics printer an ideal partner for your laptop computer.



Meter Socket Adaptor

For applications in which a Ranger power logger must be connected to a watt-hour meter, the Meter Socket Adaptor provides a quick, safe connection. Six models are available, covering single- and three-phase operations, voltage only, or voltage and current applications. For use with Ranger 1250 and 1230 Series.



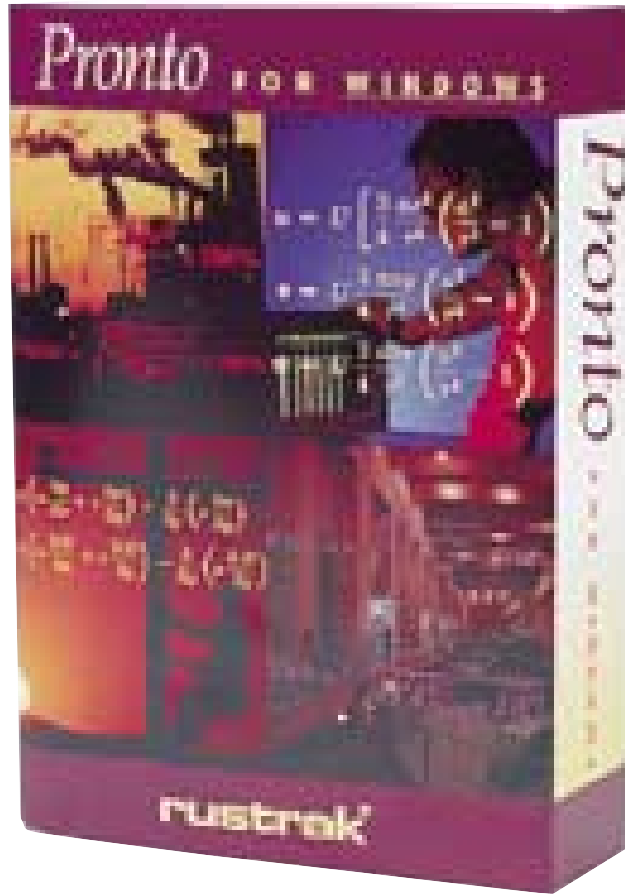
Pronto for Windows

Application Software

Pronto for Windows is a full-featured, Windows-based program designed to extract data from the Ranger family of data and power loggers and present it graphically for analysis. Through the use of straight-forward icons and keyboard commands, you can graph and analyze data and create hard copy reports. Pronto for Windows is the only program you will need to communicate, analyze, report, and manage data as well as configure the data logger itself.

Selection of icons from the toolbar makes all commonly used instructions such as zooming, statistical analysis, annotation, playback, and printing as easy as pointing and clicking the mouse. File management is greatly improved through the use of projects, which define how the data will be stored, grouped, and how it will appear on screen and in reports. Easy-to-follow dialog boxes provide step-by-step choices for all data management tasks.

A multi-functional communication set allows interface to data loggers by serial port, RS485 local area network, or modem—all in the same program. A comprehensive, context-sensitive help system provides detailed instruction anywhere in the program. Interface to other application software, such as spreadsheets or word processors is quick and easy using the Windows clipboard or Object Linking and Embedding (OLE).



Features

- Download data by modem from multiple computers
- Download data while running other applications
- Multiple downloads from the same site can be appended to the same file
- Addressable RS485 communication locally or remotely by modem
- Configure data loggers locally or remotely
- Create projects for storing data (Projects can contain multiple sessions and data can be pulled from multiple data loggers)
- Create views to display and print data in any form
- Comprehensive, context-sensitive, on-line help system
- Flexible zooming capabilities
- Icons facilitate access to frequently-used functions
- Insert text and objects anywhere on the view
- Cut and paste data to and from the clipboard
- Create exceedence reports with a single keystroke



With Pronto for Windows, analyzing and graphing data is a simple "point & click" operation.

Pronto for Windows

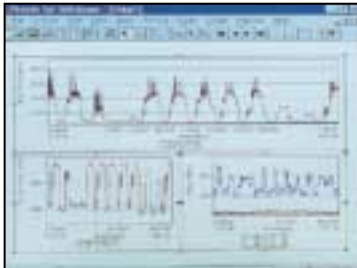
Screens and Functions

Pronto for Windows

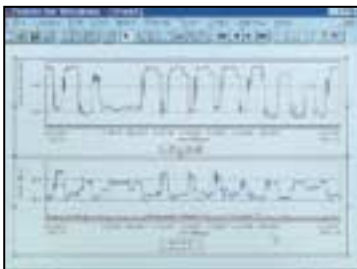
software provides an extensive set of screens and functions that allows the user to plot, annotate, analyze, and print reports from the information collected by Ranger data and power loggers. This program has been designed so that

all functions can be implemented quickly with the minimal number of keystrokes in a logical, straightforward fashion. For example, Pronto's exceptional zooming capabilities let you define how you want to zoom in or out on the data on-screen.

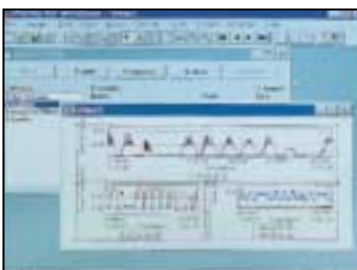
You can zoom to exception filter parameters, page left or right and snap to zoom box limits by drag and click mouse action.



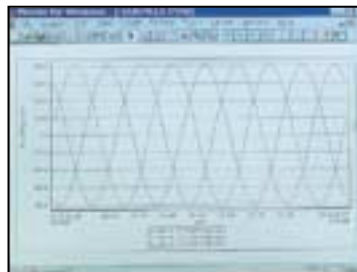
Graph Assistant provides a comprehensive set of tools for creating user-defined views.



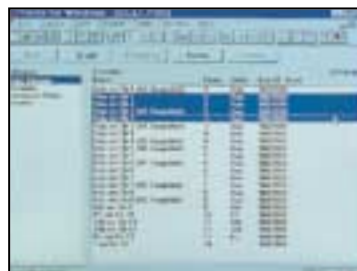
With Pronto's trending capabilities, you can plot trends or data vs. time.



Create views to display and print your data in any form you choose.



Individual cycle waveforms—from multiple channels—can be displayed.



Create projects for storing data. Projects can contain multiple sessions and data can be pulled from multiple data loggers.

Pronto for Windows Functions

- File Management Tools
- Templates for Viewing Data
- Unlimited Traces on Screen
- Titles, Subtitles & Legends for Text & Data
- Text Annotation
- Arrow Pointer for Text
- Cut & Paste Options
- Font Selection of Size & Type
- Color Selection for Text & Graphs
- User Information Screen
- Modem Communications
- Local Data Logger Network Support
- Remote Data Logger Network Support
- Notebook
- Access to Word Processors
- 38.4 K Baud Rate (up to 115.2K Baud for PM6000 only)
- Zooming Tools
 - Frame
 - Pan
 - Exception Zooming
 - Limits (value or %)
- Playback Tools
 - Manual
 - Auto
 - Scheduled
 - Multiple
- Reporting Tools
 - Exceedence Reports
 - Customer Statistics
 - Tabular Listings
 - Custom Reports
- Network-Addressable Data Logger Access
- Windows-Controlled Printer Support
- Built-In Address Book
- Context-Sensitive, On-Line Help System
- Macros for Frequently-Used Functions