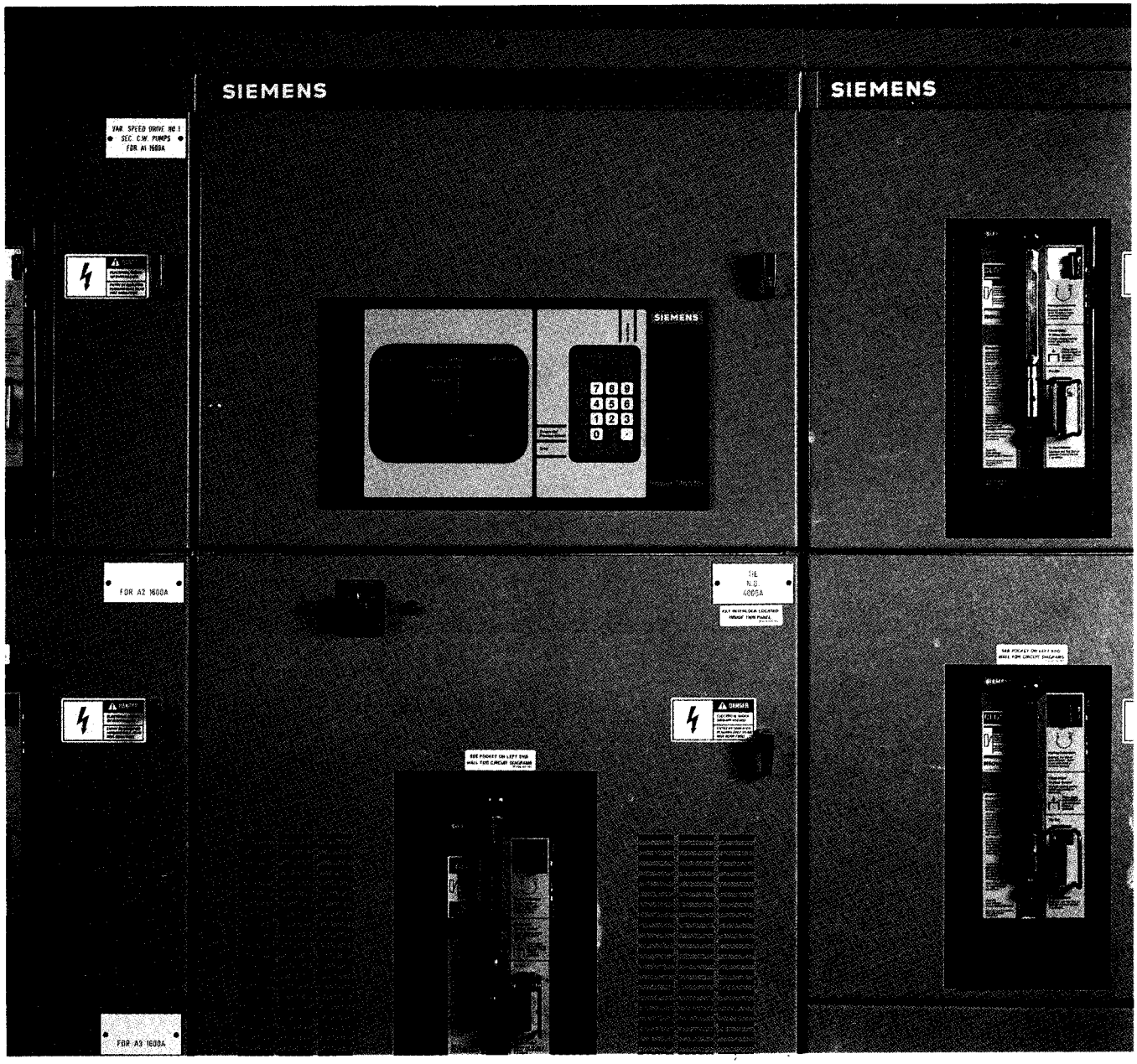
SIEMENS

Powerful Data For Power Management

Power Monitor™ Display and Monitoring Unit



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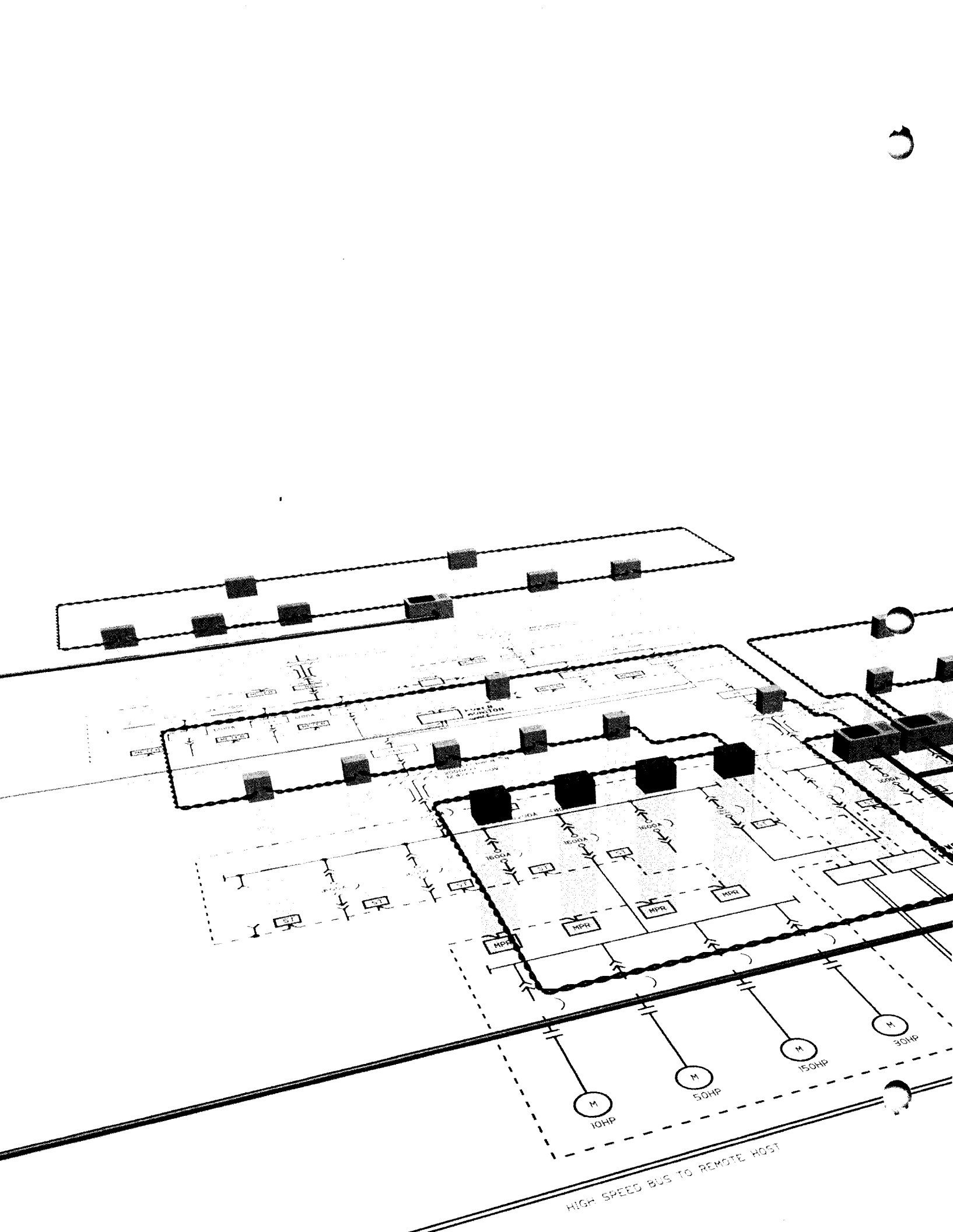
MPR
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10HP
50HP
150HP
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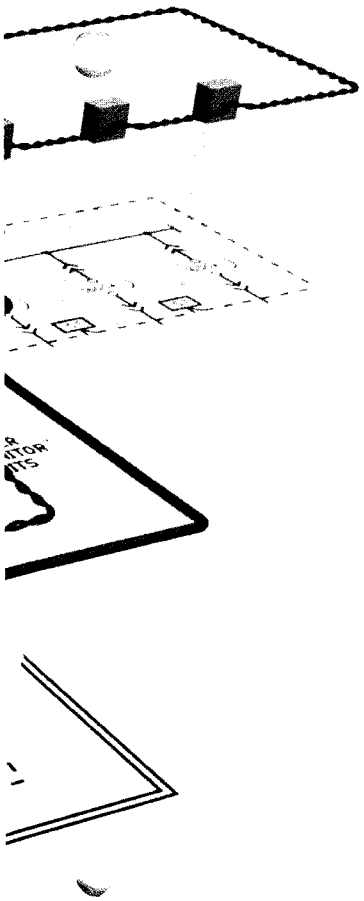
HIGH SPEED BUS TO REMOTE HOST

Powerful Data For Power Management

Power Monitor™ Display And Monitoring Unit

The Power Monitor™ display and monitoring unit by Siemens delivers power data you need. Whether you're responsible for facility design, daily operations, or utility cost control and allocation, the Power Monitor system puts the power data you need at your fingertips.

The Power Monitor panel collects, records and displays real-time and historical power data... lots of data–from average amps to kW demand, from breaker operating status to time-stamped tripping history, from out-of-limit alarm conditions to minimum and maximum measured values and their time of occurrence. Accurate data you need to evaluate the performance of your electrical distribution system. Data you must have to do your job better.



Consulting and design engineers–

No longer do you have to depend on bulk power consumption estimates when it's time to expand or rearrange a facility. The Power Monitor system provides the means to get information by substation, by assembly line, by your client's business units –just about any way you want it. The Power Monitor panel captures data that will give you a competitive edge in facility design.

Facility engineers and operations management–

The Power Monitor system gives you real-time operating information and provides a 24 hour-a-day "Early Warning System." It alerts you to changing conditions so you can avoid costly shutdowns. When an out-of-limit event occurs, the Power Monitor display immediately tells you what circuits are affected. Should a tripping event occur, it provides diagnostic information to help you get back on line quickly and safely.

Process Engineers–

The Power Monitor system provides the accurate and comprehensive information you need to evaluate total systems efficiencies and insure optimum performance. With the Power Monitor system you have the data necessary to balance your production systems and maximize productivity and profit.

Maintenance and field service engineers–

The guiding principle of the Power Monitor system is "keep it simple." Operation is easy... without massive manuals, complicated instruction codes or dismantling devices to make routine changes. The user-friendly software means minimum training, quick routine maintenance and greater safety.

Financial management–

The Power Monitor system gives you powerful data–to audit power bills, to allocate actual power costs to business units or profit centers or process or product types, to reduce utility costs and to better manage total power consumption and demand.

The Power Monitor system is a basic monitoring module for the facility-wide ACCESS™ electrical distribution communication system by Siemens. The data provided locally at the Power Monitor panel can be communicated remotely for power system management–either to an existing facility LAN or to a personal computer with custom display software provided by Siemens.

Specify Power Monitor™ display and monitoring unit. Powerful data for power management.

Proven Hardware For Powerful Performance

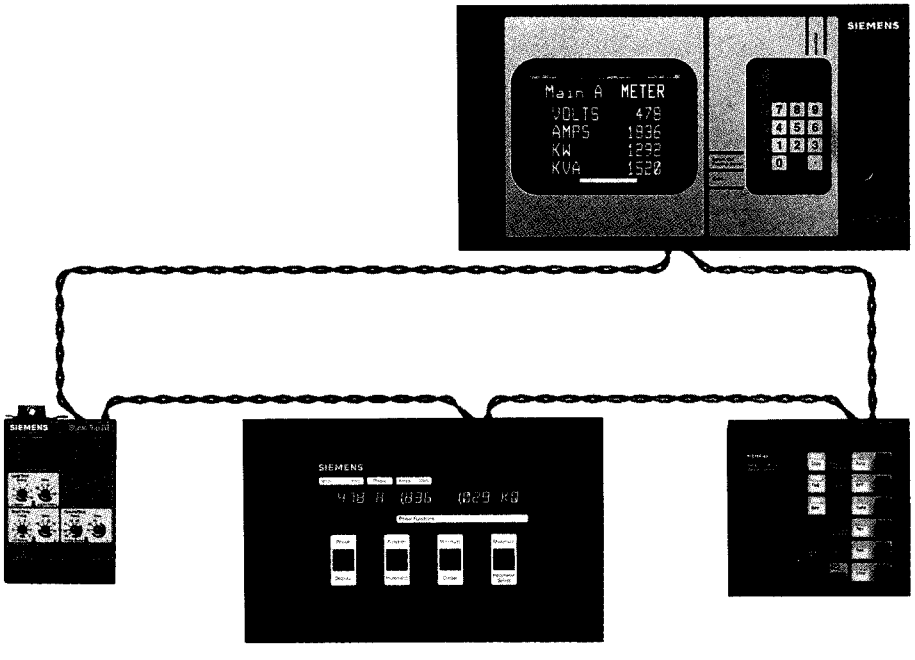
The Power Monitor panel features a built-in 9-inch high-visibility graphics display with impact resistant cover, sealed membrane keypad and a covered connector for using a full-function keyboard (with complete alphanumeric character set) when naming circuits, line-ups and discrete inputs. The front of the panel is sealed for use in NEMA 12 enclosures.

For years of trouble-free operation, the Power Monitor panel is based on a rugged industrial computer terminal, proven INTEL® 80286 based microcomputer hardware, and an isolated industry standard RS-485 communications network. Vital information on system configuration and recorded events is stored in non-volatile EEPROM where it is unaffected by temporary power loss or electromagnetic interference.

Good Communication Is Key

Each Power Monitor unit interrogates up to 32 slave devices – trip units, meters, motor protective relays, medium voltage relays or other devices. As each device responds with real-time data, the Power Monitor internal memory is updated. Communications occur via an industry standard EIA RS-485 serial bus and shielded, twisted-pair cable.

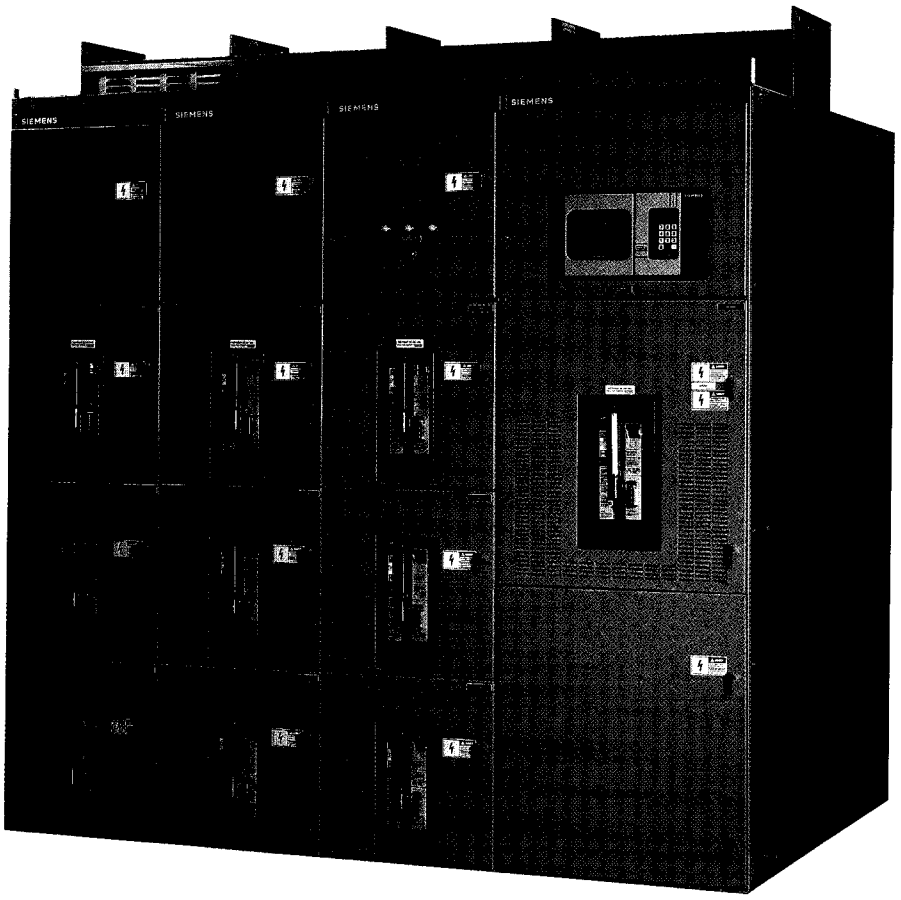
All communications are isolated from protective functions. In the unlikely event of lost communications, protective functions of relays or trip devices are not compromised.



The Power Monitor unit interrogates Static Trip IIIC trip units, 4700 power meters, Motor Master protective relays, and other Siemens devices with built-in communications capability.

Flexible Application Of Sophisticated Technology

The Power Monitor panel can be applied in low voltage or medium voltage switchgear, switchboards, motor control centers, separate control panels—any place in an electrical distribution system. Whether locally integrated into the equipment or mounted in a remote control panel, it can access information from one or more line-ups and report detailed device and system data.



Alarm Function

Perhaps the facility engineer's best friend is the Power Monitor Alarm function. For each metered value or status on each breaker, you decide whether and at what value an alarm should be given. When those conditions exist, the Power Monitor panel can enter this typical alarm sequence:

- An audible alarm sounds at the Power Monitor panel;
- The affected breaker is shown in flashing boldface on System Diagrams and Display Device Data menu screens;
- A description of the alarm condition and associated data are recorded in non-volatile memory in the Event Log along with date and time of occurrence.

To silence or acknowledge an alarm, press "C" to "Clear Alarm." When the value or status which triggered the alarm returns to within normal limits, the display characteristics will return to normal, and another message will be added to the event log with date and time of return to normal condition.

Early Warning System

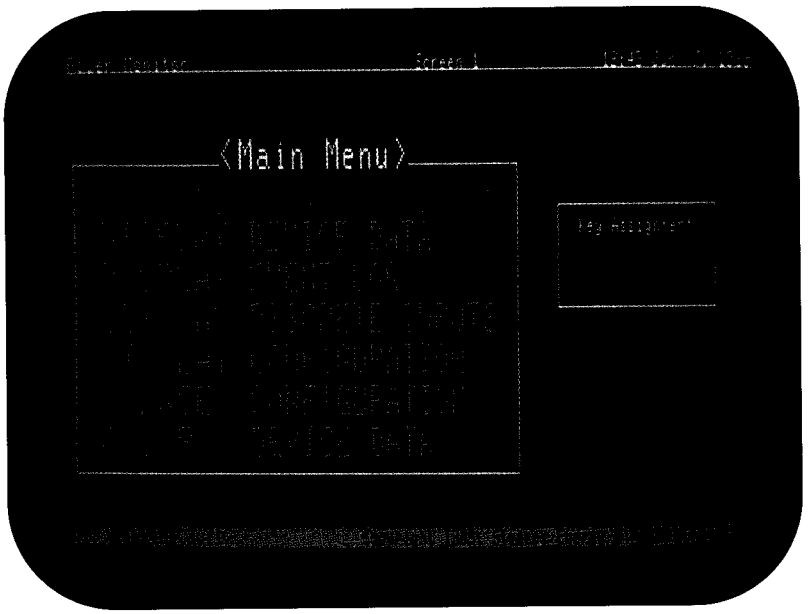
When alarm limits are defined at *less than pickup threshold,* the Power Monitor alarm serves as an "Early Warning System." Each near-limit warning provides plant engineers the opportunity to avoid a costly shutdown or other serious condition.

Finding The Way Around The Power Monitor™ System Is Easy

The Power Monitor™ display and monitoring unit is completely "menu-driven." Each screen gives you a list of options from which to choose and provides on-screen instructions in the "Key Assignment" box—no awkward help screens are required.

In the upper portion of each screen is a screen number. This number is a quick cross-reference to the operation manual documentation.

To proceed from the main menu (screen 1), determine the screen you want to see, position the cursor over the chosen menu item and press "Enter."



Display System Diagrams

The Power Monitor system has a unique feature that allows you to see one-line or single-line diagrams of your system. Typical System Diagrams will show main, tie and feeder circuits along with critical real-time data for up to 23 devices per diagram.

The "Display System Diagrams" selection calls up and displays your System Diagrams. The Power Monitor display automatically advances through up to 16 user-defined diagrams at regular intervals. Using the key assignments, you may "Pause" to suspend the automatic screen advance; "Page" to advance through each diagram; or "Return" to the Main Menu.

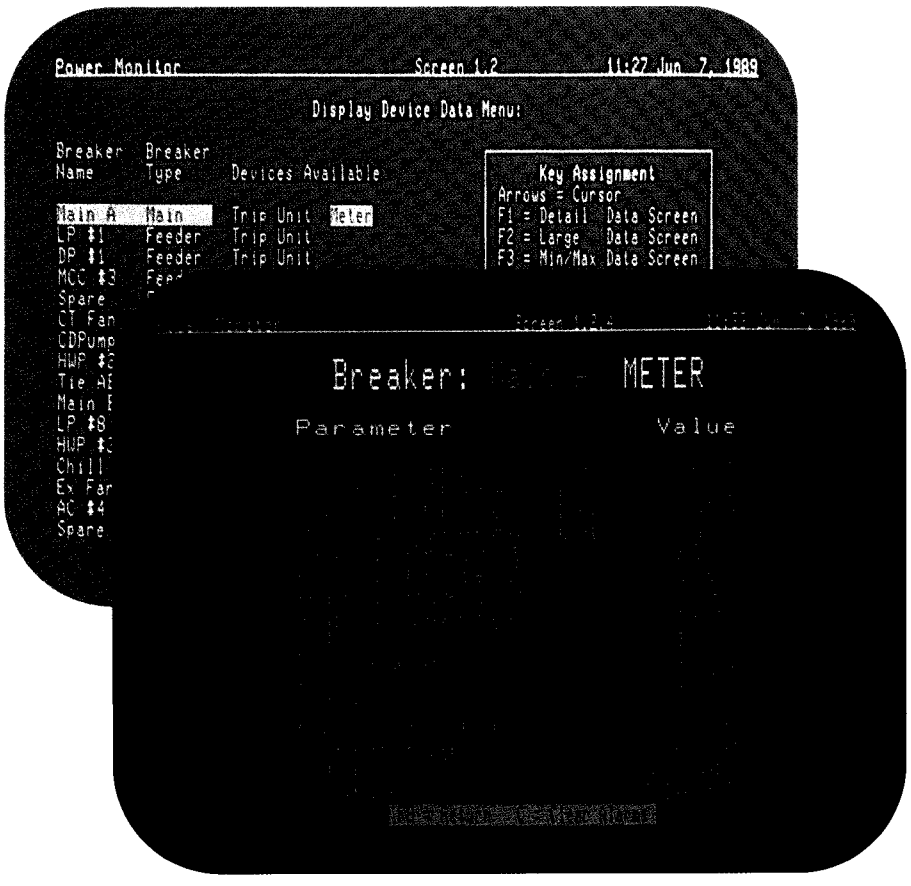
The System Diagram for "SUB 1A" (screen 1.1) reports all the vital, real-time data for the entire substation on one clear, concise display.

For the circuit breakers, "Main A" and "Main B," a summary of real-time data is displayed. For the feeders, real-time average amps are shown. "Open" means the breaker is open. "Spare" indicates a spare circuit breaker and cubicle. When an alarm condition occurs, the affected breaker's display is highlighted.

Display Device Data

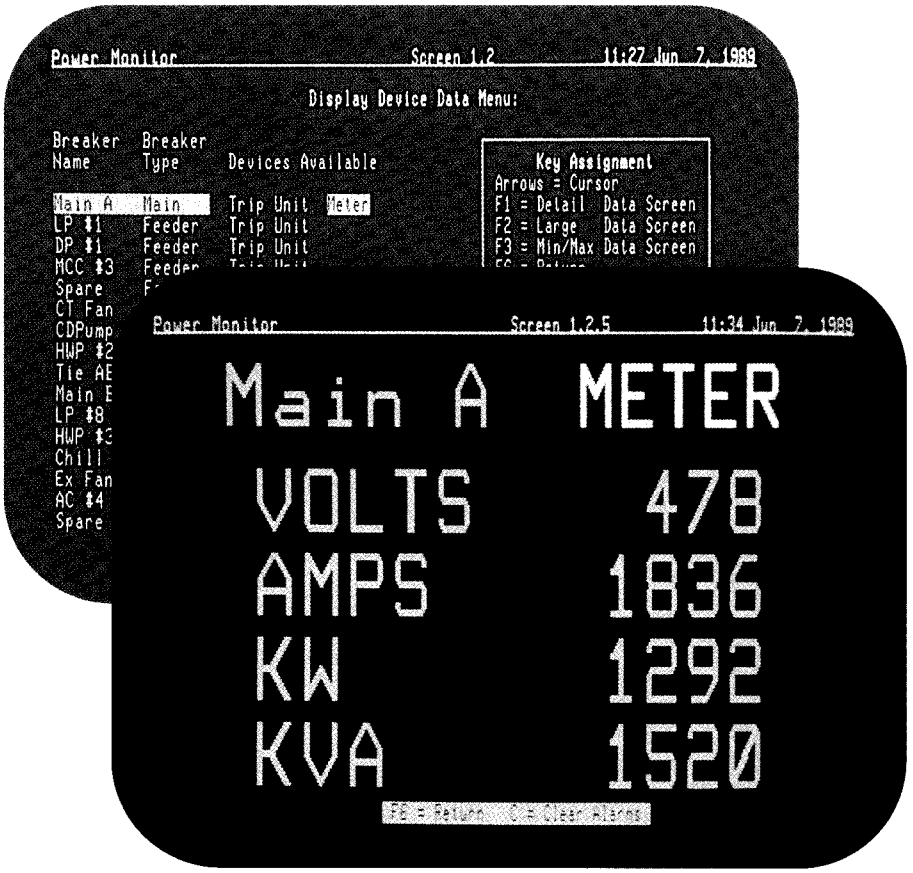
The "Device Data" screen (screen 1.2) lists each circuit, its name, its type, and the type of device(s) attached. For each circuit/device combination, there are three data screen options—"Detail Data," "Large [Character] Data," and "Minimum/Maximum [Value] Data."

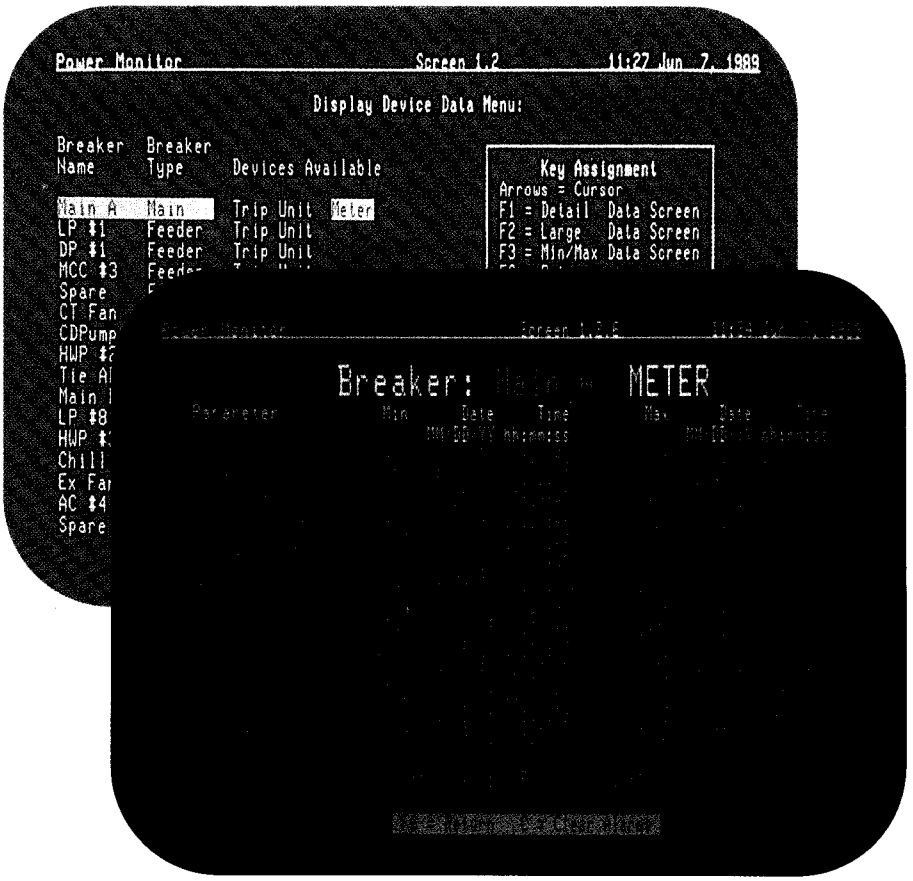
The "Detail Data Screen" (screen 1.2.4) for the meter associated with "Main A" reports: phase voltages and average voltage—either "line to line" or "line to neutral" (wye or delta), phase amps, average amps, kW, kW Demand, kVA, kVAR, power factor, frequency, kWHr and kVARHr.

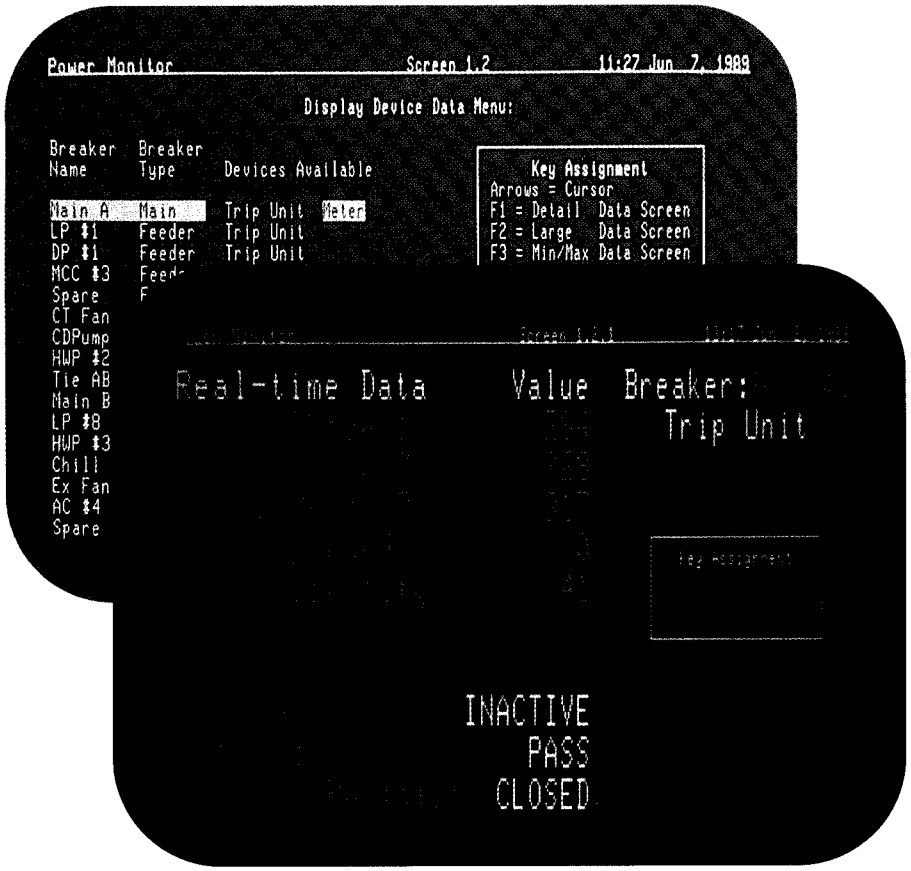


The "Large Data Screen" can be read at a distance and shows only critical data. The power meter associated with "Main A" (screen 1.2.5) reports: average volts, average amps, kW and kVA. Similar screens show trip unit or relay data.

The final "Device Data" option for "Main A" is the "Min/Max Data Screen" (screen 1.2.6). This screen reports minimum and maximum values that have occurred since they were last cleared by the user. Clearing min/max data usually coincides with the utility billing cycle. Each value carries its date and time of occurrence.

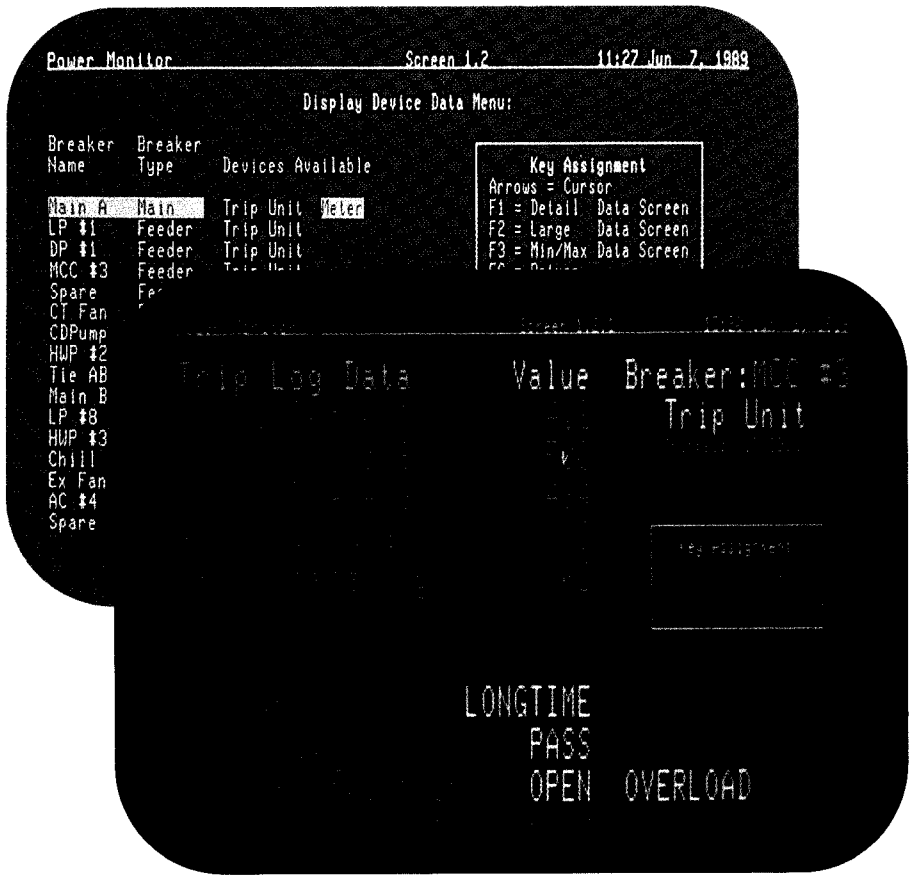






The "Detail Data Screen" (screen 1.2.1) for the "MCC#3" (Motor Control Center #3) circuit/trip unit reports: amps for each phase, ground amps and maximum phase amps as a percent of circuit breaker current sensor rating. It also reports which pickup is active, if any, the trip unit's self-test status and breaker position.

The "Detail Data Screen" displays the latest information from that device. If the circuit breaker has tripped (screen 1.2.1), the information shown is the trip log recorded in the trip unit's non-volatile memory which includes currents just before the trip, the type of trip, and the time of tripping to within one second. From the on-screen menu, you can "Clear Targets" on the trip unit and "Return" to the previous menu.



Display Event Log

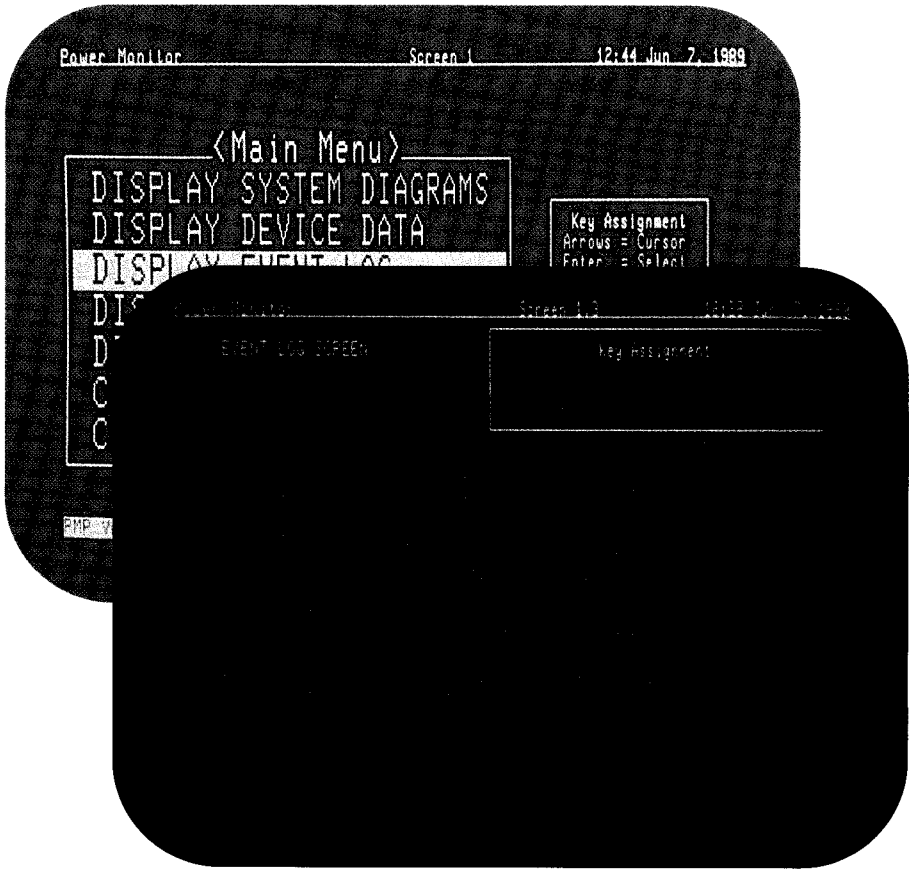
One of the strongest advantages is the Power Monitor Event Log. The Power Monitor computer compares actual, real-time values to the normal (user-defined) limits for each monitored device. When an out-of-limit condition or change of state occurs, the Power Monitor computer records that "Event" and pertinent conditions at the time of the event in the Event Log.

Select "Display Event Log" and the 64 most recent events, 16 per page, will be recalled (screen 1.3). Scroll through the events using the "Cursor" or "Page" keys. Each event shows the date and time of the event, the affected device and circuit conditions at the time of the event. Analysis of the Event Log will provide insight into preventing future interruptions and unwanted conditions.

Note: All tripping events are date-stamped at the time of occurrence at the device rather than at the time of polling as in other systems. The Power Monitor panel features an internal clock and software that periodically updates and synchronizes the clocks of system devices. This global update assures accurate system-wide time-of-event data.

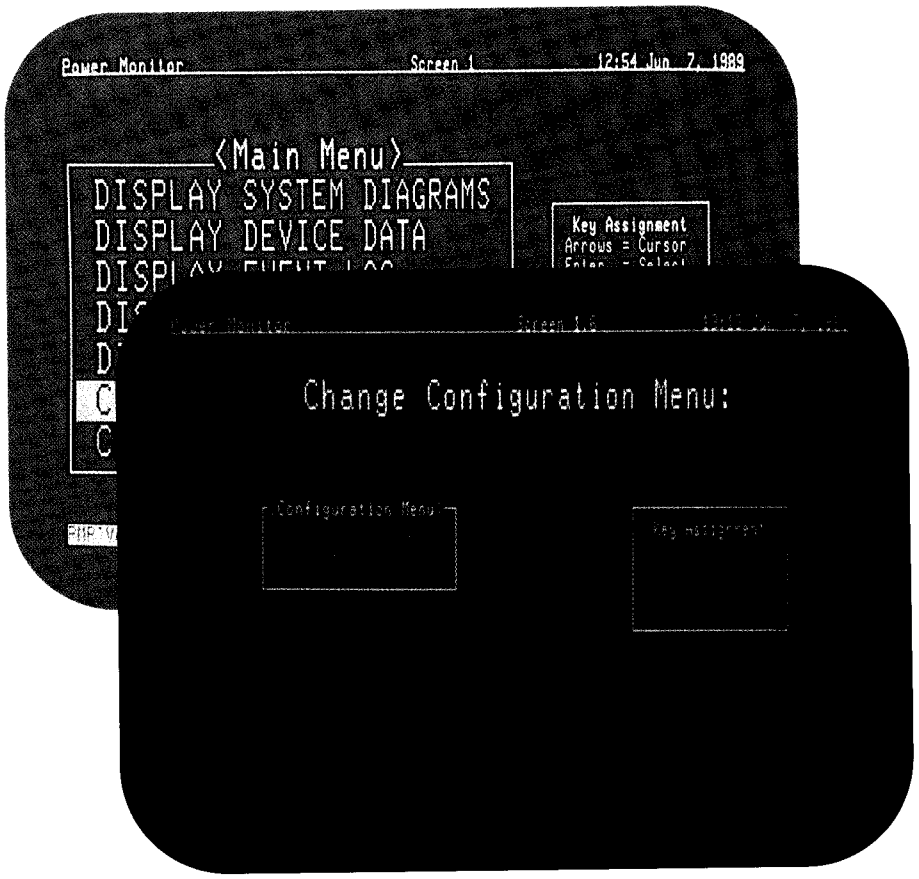
Reviewing the Event Log (screen 1.3) for June 2 reveals an overload trip on MCC#3. After bringing MCC#3 back on line, the maintenance engineer entered new Alarm limits for MCC#3 into Power Monitor. At the new settings, when current exceeds 350 amps, an "Early Warning" alarm will sound. At 12:11:17 on June 3, MCC#3 reached the new alarm threshold. Power Monitor sounded an alarm and logged the event. Because of the early warning, maintenance engineers were able to identify the cause of the overload and make adjustments thereby avoiding an unnecessary and expensive shutdown. The most recent event shows MCC#3 operating within normal limits and the highest phase currents that occurred during the event.

The "Erase Log" and "Erase Event" functions are password protected. If you have the password, highlight a specific event with the cursor and "Erase" it. "Home" will return the cursor to the most recent event.



Display Discrete Inputs

The Power Monitor system also reports the status of various discrete inputs (screen 1.4) using dry contacts from any external device . . . for instance, over- or under-temperature conditions, on/off status of transformer fans or pumps, open/closed



status of valves, or counters for specific events such as trips or circuit breaker operations. Pulsed outputs can also be read into the system and automatically scaled to provide a direct reading of the remote device such as from utility watt-hour meters.

Each discrete input is displayed along with its status which is continuously updated. Any discrete input in an alarm condition will be highlighted and flashing.

Configuring Displays

Configuration is simply a matter of describing for the Power Monitor computer the equipment–circuit/device combinations, relays, etc.–attached to the communications bus. Beyond that, you'll set up "Global Parameters" such as time-of-day and design your custom "System Diagrams." The Power Monitor computer does the rest.

All configuring is accomplished with the built-in keypad or with a full-function keyboard. The keyboard allows you to use the entire alphanumeric character set when naming circuit breakers, devices and screens.

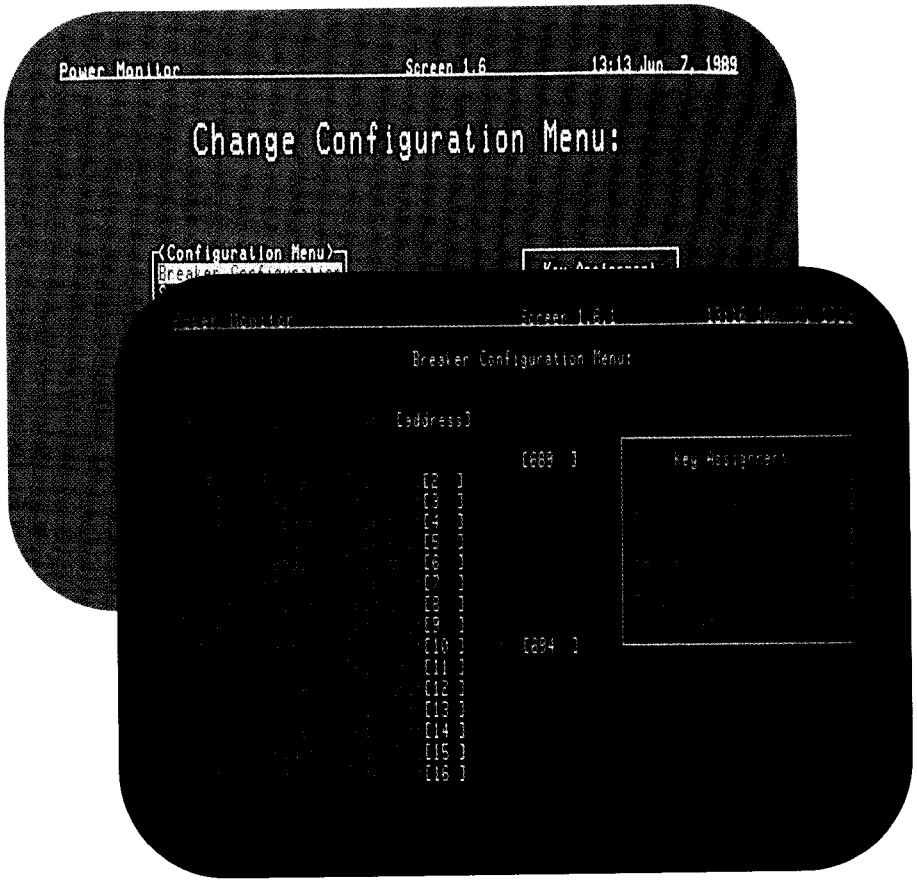
Access to the "Change Configuration" menu (screen 1.6) is password protected.

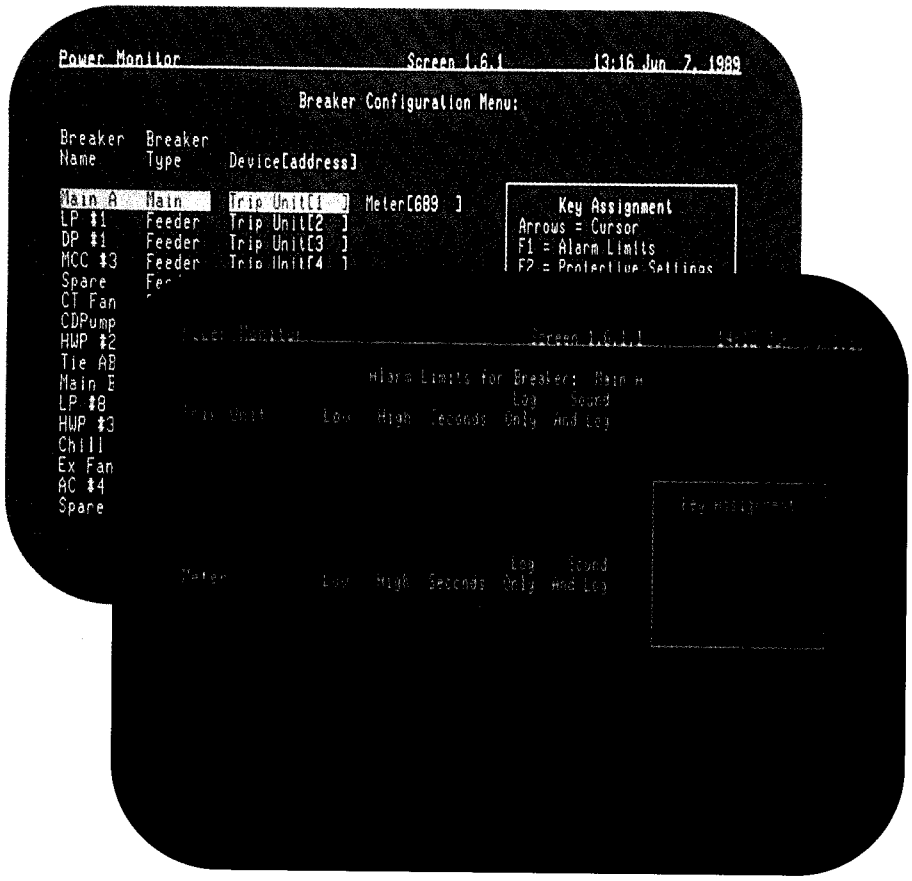
Breaker/Circuit Configuration

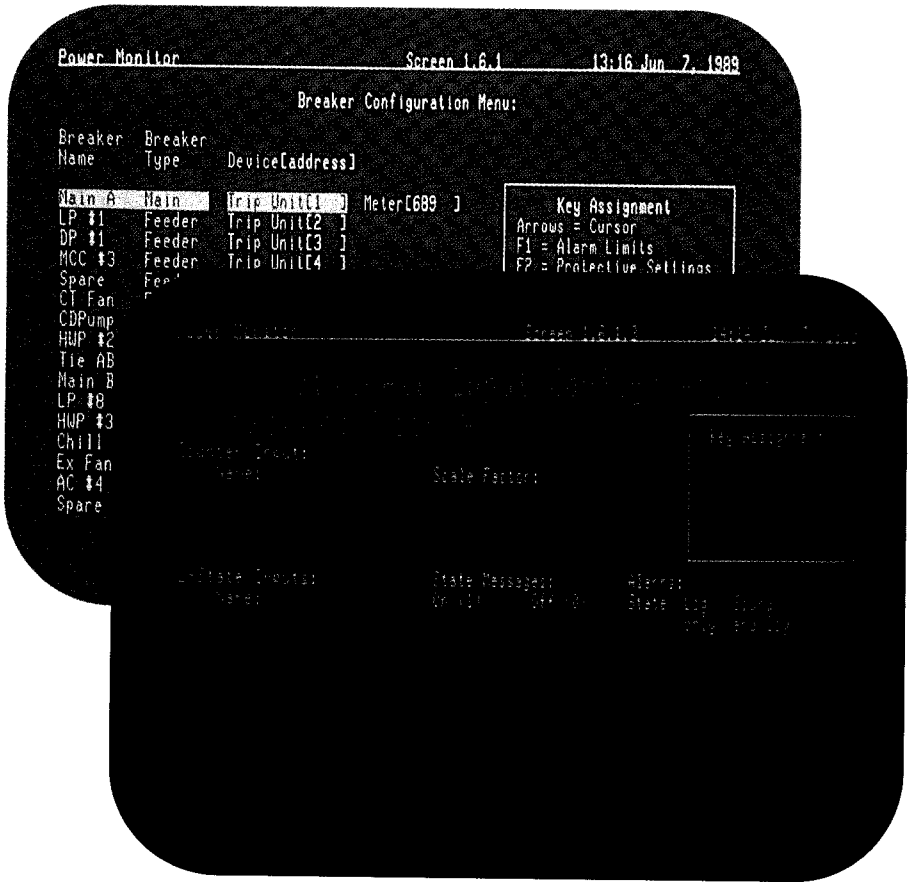
When you configure a circuit, you tell the Power Monitor unit the name of the circuit, its function, the address of the meter or trip unit on that circuit, and set the alarm limits.

Note: Each device–power meter, trip unit, protective relay, or other device–connected to the Power Monitor panel has a distinct internal address "stamped" in its non-volatile memory and recorded on the device's case.

The "Breaker Configuration" menu (screen 1.6.1) lists each circuit already configured. This screen is very much like the Display Device Data screen with the addition of the numerical address of each trip unit, meter, or relay. From this menu you can set alarm limits, change protective settings, add/update discrete inputs, add a new breaker/device, or configure/reconfigure a device.







Configure Alarm Limits

Various alarms have already been set on "Main A" (screen 1.6.1.1). For example, if the trip unit reports amps exceeding 95% breaker capacity for more than 2 seconds, the Power Monitor panel will sound an alarm and log the event.

Likewise, if the power meter reports line-to-line voltage below 475 or above 485 for more than 10 seconds, the Power Monitor panel will log the event but will not sound an alarm.

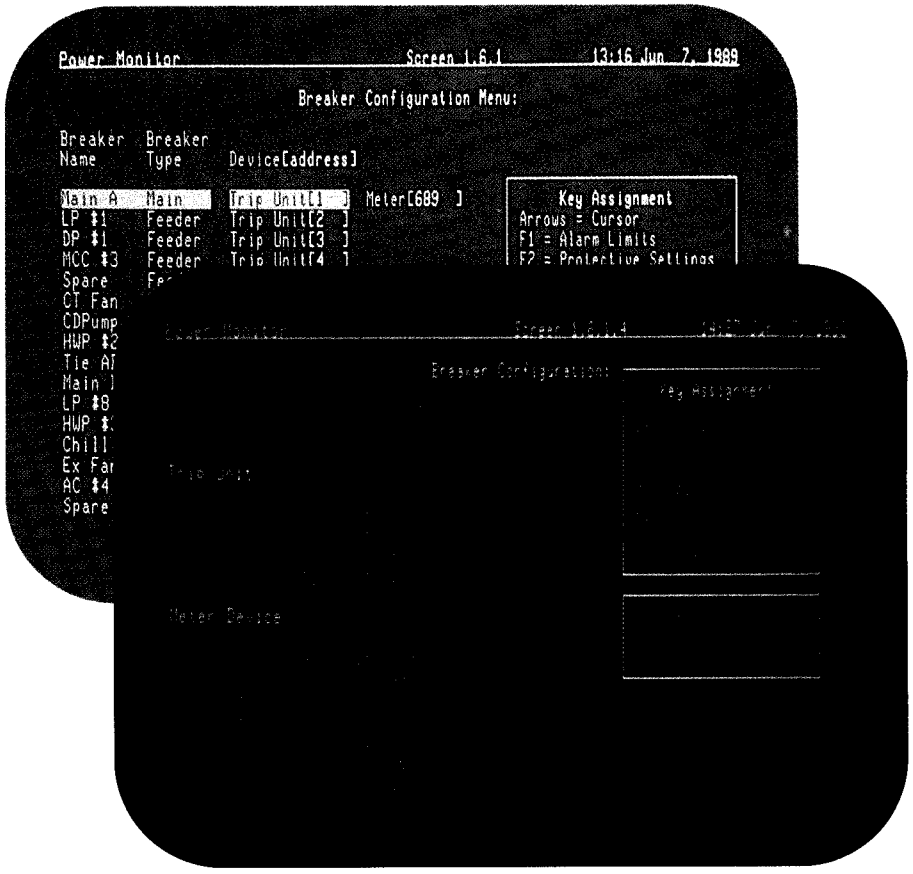
To enter new values, position the cursor in the desired field, press F5 to "Edit Field," key in the new value and press "Enter." Exiting this screen will "Save" the new limits.

For items with no limits, such as long time pickup, select whether Power Monitor should "Log Only" or "Sound and Log." Any change of status—from inactive to active or vice versa—will be logged according to your instructions.

The "Reject Edits" option, pressed before saving the changes, will restore the previous settings.

Configure Discrete Inputs

The same basic options and functions are available in the "Discrete Input Configuration" menu (screen 1.6.1.3). The 4700 power meter, for example, includes four discrete inputs that may be used for status inputs from cooling fans or other auxiliary switchgear equipment. Or you may elect to count breaker trips, watt-hour meter pulses or relay operations. Each is configured in the same manner as the alarms. Changes of state can be logged in the Event Log, logged and alarmed or merely displayed.



Configuring A Breaker/Device

First of all, remember that the Power Monitor computer doesn't really talk to a circuit or a circuit breaker, it talks to the microprocessor-based device—trip unit, protective relay, power meter, etc.—associated with that circuit. So, configuring a breaker consists of telling the Power Monitor computer the name of the circuit, its function, the address of the respective meter or relay and/or trip unit for that circuit, and details about various ratings and scales.

Providing all of the requested information in screen 1.6.1.4 will properly configure a breaker.

Circuit type—main, tie or feeder

Circuit name—any name you choose up to six characters long, use any ASCII character

Device fields may include:

Device Address/Serial Number—the internal address of the device

Amp Scale/Current Sensor Rating—The full scale rating of the current sensor

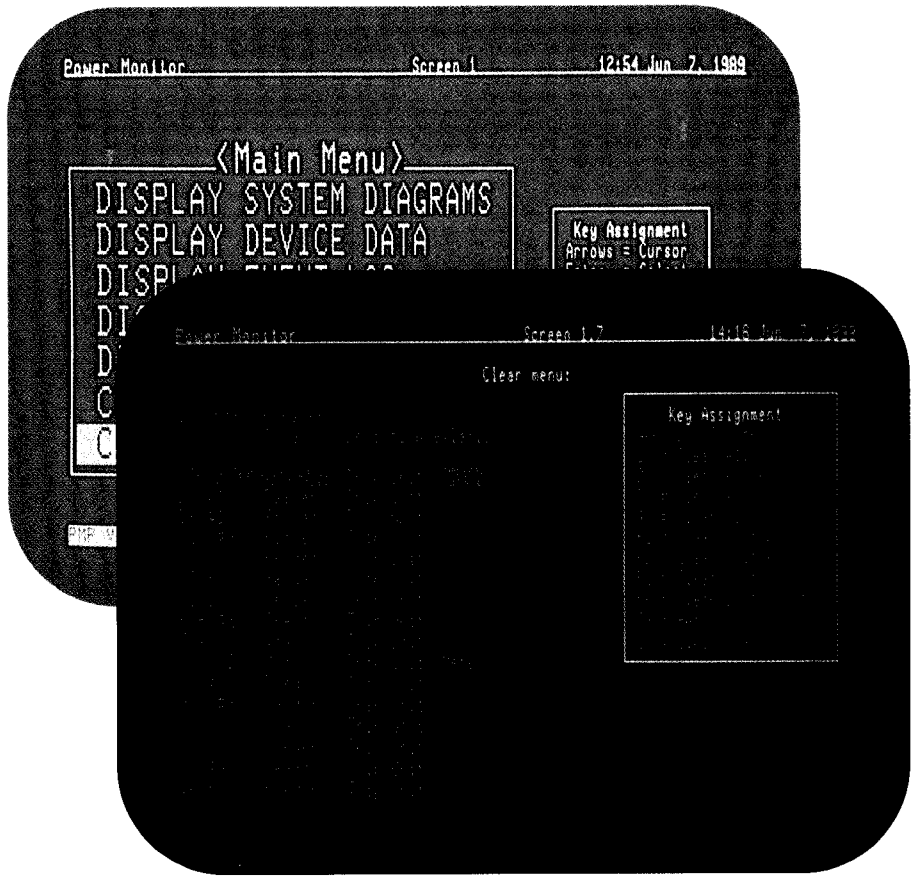
Volt Scale—120, 480, 15,000 for example

Volt Mode—select from four modes, Wye—L-L ; Wye—L-N; Delta—L-L; or Test

Demand Period—set to match the utility demand period

Polling Priority—sets polling frequency

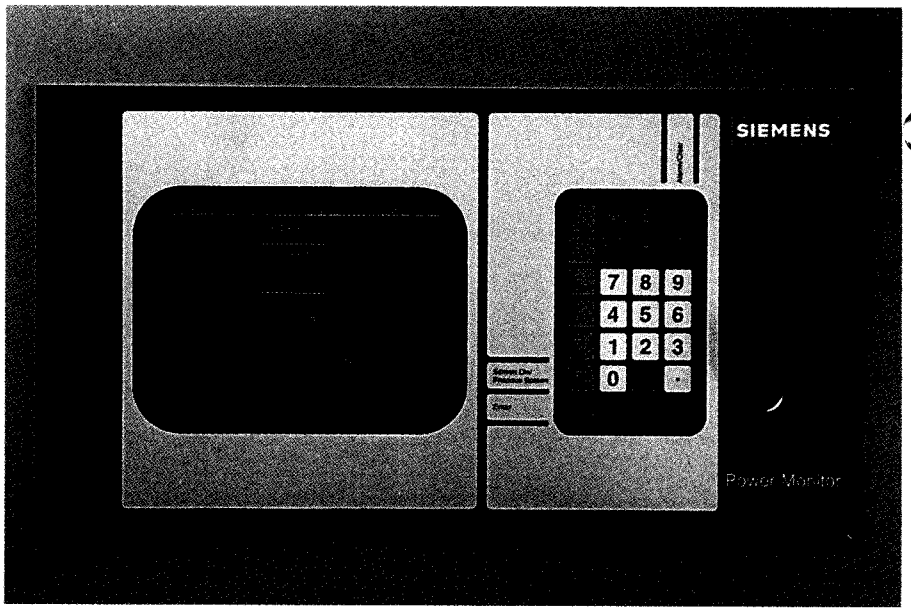
After entering the data, "Configure" each device. "Configure" stores the data in the non-volatile memory of the Power Monitor computer and the device. "Test" requests information from the selected device and compares it to the Power Monitor computer's stored information.



Clear Device Data

Periodically, you will want to clear or reset data from the Power Monitor memory. This function is password protected. You may choose to clear data (screen 1.7) for a specific device or all devices. Make your selection and press the corresponding function key. This feature allows remote resetting of kWHr or kVARHr values on all devices simultaneously, such as at the end of month or other billing period.

The following guide may be used in conjunction with specifications for low and medium voltage switchgear, motor control, switchboards or other electrical equipment where the functions provided by the Power Monitor™ display and monitoring unit are desired. This description should be used in addition to specifications for related Siemens protective and metering devices having communications capability.



▲*The Power Monitor display reports critical substation data in clear and concise single-line diagram displays. In this typical low voltage application, mains are equipped with Static Trip IIIC trip units and 4700 power meters. Feeders, with trip units only. This configuration provides high-accuracy main metering with current, tripping and status information on all circuit breakers.*

Display and Monitoring Unit

A Power Monitor™ display and monitoring unit shall be installed in each lineup (or group of lineups) to provide local access to critical operating information. A local communications bus shall be used for information exchange between the Power Monitor display and monitoring unit and associated trip units, power meters and/or protective relays. The communications bus connection shall provide at least 500V galvanic isolation so that failure of the communications bus wiring will not compromise the individual protective device functions. The local communications bus shall be wired with a return loop to provide redundancy.

The Power Monitor display and monitoring unit faceplate shall contain a nine-inch graphics display and integral keypad. Key assignments shall be indicated on each display screen to facilitate operation. Each display screen shall be numbered for easy reference to the operation manual. A covered connector shall allow a PC-XT compatible keyboard to provide access to the full alphanumeric character set for naming and configuring devices.

A main menu shall provide access to all system data and configuration screens. User-configurable single-line diagrams shall provide a time-saving overview of critical real-time circuit information. Detail data screens shall display all real-time data associated with a selected device. In addition, protective device detail data screens shall indicate pickup, watchdog, trip targets and device position indication. Large character data screens shall display summary data from a selected device for viewing up to 20 feet away. Min/Max screens shall list resettable minimum and maximum values of all real-time data associated with a selected device and their respective dates and times of occurrence.

A discrete input table shall list discrete inputs and their respective status. Each discrete input shall have a user-configured designation of up to 20 alphanumeric characters with state designations of up to ten characters each for "on" and "off" states.

An event log shall list the 64 most recent events in reverse chronological order. All events shall list the cause, date and time of occurrence, and the associated device. Tripping events shall list all currents, the date and time of trip, cause of trip, and the associated protective device. The trip time shall be stamped at the device with accuracy to one second. The event log will be stored in non-volatile memory where it will be retained during a power loss. A security password shall be required to erase any event from memory.

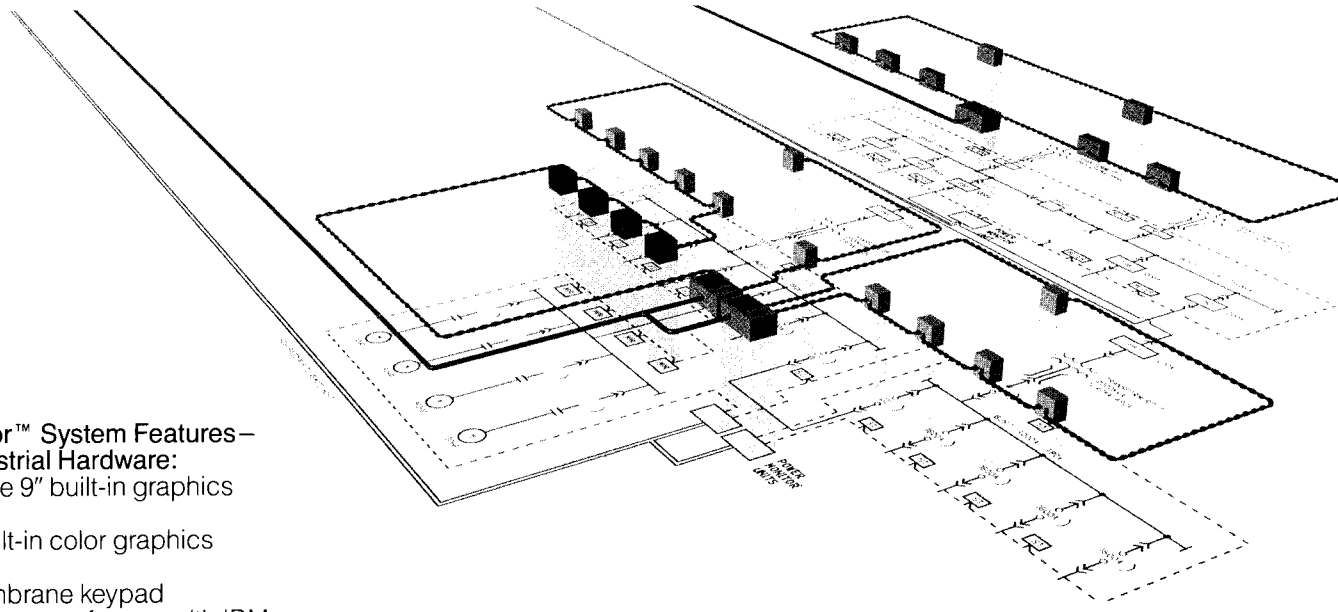
An alarm logic function shall allow all metered data to be checked against user-defined limits. A security password must be entered before limits can be reset. When the metered values exceed these limits for the designated time delay, or when discrete inputs go to an alarm state, the alarm logic function shall provide audible and visual alarms and add a description of the alarm condition to the non-volatile event log with date and time of occurrence.

Configuration data and protective settings shall be accessible only after entering a security password. Devices shall have assignable circuit designations of up to 6 alphanumeric characters for clear identification on all screens. A find-address function shall be provided to automatically configure a new device on the communications bus without removing rating plugs.

Each Power Monitor display and monitoring unit shall be preconfigured and tested for proper communications to all associated devices installed at the factory. An operation manual shall be provided with documentation of connected devices and their communication addresses.

[Optional] A remote communications port shall be provided. The output shall be (choose one):

- RS-232 for connection to customer furnished equipment. A protocol document shall be furnished to allow customer to access real-time data, min/max data and the event log;
- To a high-speed communication network for connection to a personal computer to be supplied with the equipment;
- A modem for communications using a dedicated line. A protocol document shall be furnished to allow customer to access real-time data, min/max data and the event log.



Power Monitor™ System Features–
Rugged Industrial Hardware:
- Monochrome 9" built-in graphics display
- Optional built-in color graphics display
- Sealed membrane keypad
- Covered connector for use with IBM XT keyboard
- Audible and visual alarms for user-defined conditions
- Optional RS-232, modem or high-speed network output for communications to a remote PC host or facility control system
- Monitors up to 32 devices
- Non-volatile memory (No batteries required to maintain critical configuration data)
- Requires 120V, 60 Hz or 50 Hz AC control power

Easy To Use Software:
- Full-sized graphic display
- Menu-driven convenience
- On-screen instructions in "Key Assignment" box
- Numbered screens cross-reference operation manual
- Uses complete alphanumeric character set
- Password protected for data security
- Self-test at power on
- Remotely configures most system devices–trip units, power meters, protective relays
- Password secured access to protective relaying settings
- Password secured configuration

Early Warning System:
- Audible and visual alarms
- Settable alarm limits– both value and delay
- Automatic event recording

Event Recording:
- Settable alarm limits–both value and delay
- Selectable logging– with/without alarm
- Logs date and time of event
- Logs type of trip
- Logs circuit conditions at time of trip

Metering:
- RMS phase to phase volts
- RMS phase to neutral volts
- RMS phase currents
- RMS ground current
- Amps Demand
- Peak % capacity amps
- kW
- kW Demand
- kW Hours
- kVA
- kVAR
- kVAR hours
- Power Factor
- Frequency

Status:
- Breaker position
- Motor status
- Trip unit or relay pickup conditions–Long Time, Short Time, Ground Fault, Phase Unbalance, etc.
- Trip unit or relay trip condition–Overload, Phase Unbalance, Loss of Motor Load, etc.
- Self-diagnostic "Watchdog" circuits
- Discrete inputs from any dry-contact
- Dual-state electronic counter with scale factor

Local Communications Bus:
- Connects up to 32 devices
- Industry standard EIA RS-485 serial bus
- Shielded twisted-pair cable
- Up to 4000 feet radial, daisy-chain or combined configuration
- Isolated from device protective functions

Remote Communications Bus:
- Optional high speed communications network to personal computer
- Optional modem communications over dedicated line
- Optional RS-232 output to other facility communications equipment.

Power Monitor Panel And Devices:
- Non-volatile memory
- UL recognized
- Surge protection meets ANSI C37.90

SIEMENS

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