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AC Power Supply

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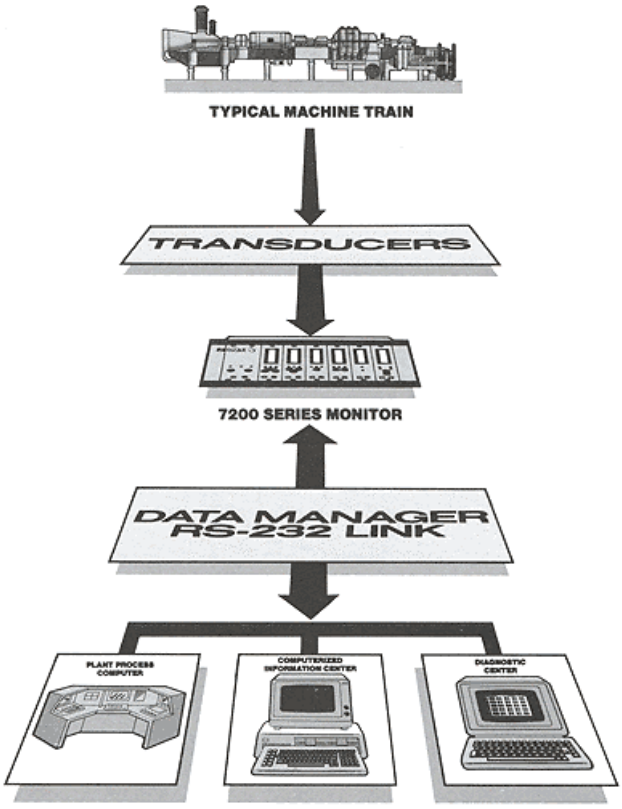
7200 SERIES

7200 Series Data Manager™



The first step toward computerizing your 7200 Series Monitoring System

Bently Nevada's 7200 Series Data Manager is the first step toward turning your 7200 Series Monitoring System into a computerized Rotating Machinery Information System. It interfaces the 7200 Series Monitoring System to any computer with an RS-232 interface, at an affordable cost.

Computerized monitoring systems process data faster and more accurately, and turn it into meaningful information, in easy-to-read formats. Advances in computer and monitoring technology make it possible to transform raw data on the mechanical condition of your machinery into valuable predictive maintenance information. Predictive maintenance information is available quickly, and can be charted and trended in easy-to-interpret formats. Machine operators and plant engineers receive timely and specific information needed to oversee the day-to-day operation of rotating machinery and to predict and identify potential machine problems.

The Data Manager makes it possible to collect, store, and display static, 1X amplitude, 1X phase, and shaft rpm data on a computer. Computer collection of machinery information eliminates both tedious hand logging and strip chart recorders, and ensures accurate, consistent records which are essential to good decision making.

Plant personnel have access to trending and historical information as well as the current status of machine parameters. They receive mechanical condition information that is vital to keeping machinery on-line and meeting production schedules.

Plant engineers get operating and diagnostic information for making maintenance decisions that minimize unscheduled plant downtime. They'll know when a machine is headed for trouble and when to schedule maintenance. And you'll see results in increased machine availability, reduced maintenance costs, and increased production output.

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Building a flexible system, for today and tomorrow's machinery information needs.

Recognizing that the type of information each person needs can vary from plant to plant depending on the type of plant and operational philosophies and procedures within the facility, Bently Nevada provides the basic "building blocks" for computerizing your 7200 Series Rotating Machinery Information System: 7200 Series Monitors, the Data Manager, computer software, and technical support. This enables plant engineers to design a system according to their unique applications and requirements, both today and in the future.

The Data Manager's modular design makes future expansion simple and inexpensive. As plant growth requires additional machinery information or an increased number of data points, existing monitoring and computer capabilities can be updated and expanded to meet your new requirements.

7200 Series Monitoring System

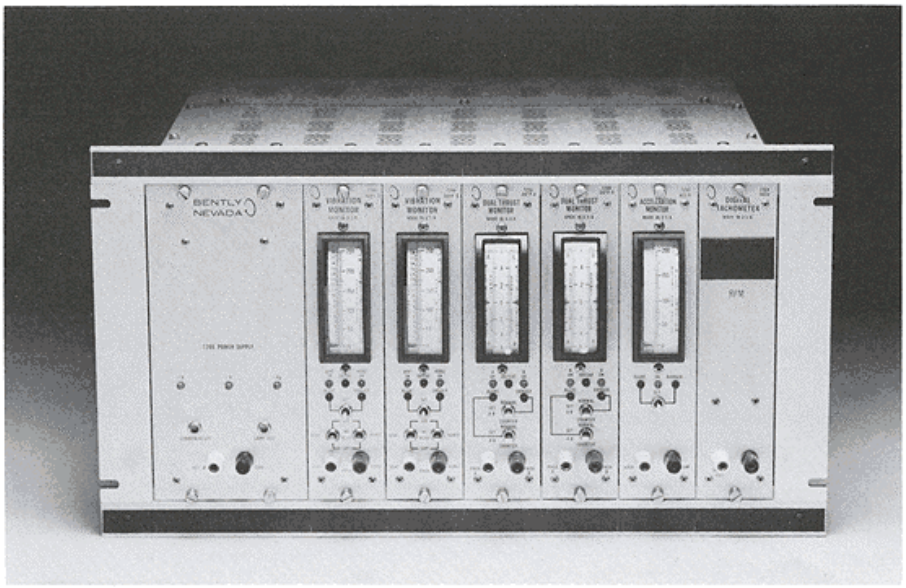
The 7200 Series Monitoring System offers the widest selection of monitoring modules available in the vibration instrumentation industry for steam and gas turbines, compressors, electric motors, pumps, gears, electric generators, and other critical machinery. Modules are available to monitor such behavioral parameters as relative shaft vibration, absolute shaft vibration, casing vibration, axial thrust position, differential expansion, shaft radial position, temperature, and speed (rpm).

A traditional analog system, the 7200 Series Monitoring System consists of an ac power supply and an instrument rack which holds up to twelve monitors and power supply.

The following 7200 Series monitors are available for use with the Data Manager. For retrofits, all monitors require modifications. Most modifications are simple, although in a few cases the modifications can be extensive. Consultation by Bently Nevada's Product Service is recommended to assure the compatibility of the 7200 Series Monitors with the Data Manager.

- ☐ 72100 RVXY-R Two-Plane Radial Vibration*
- ☐ 72200 Single-Plane Vibration
- ☐ 72300 Thrust Position
- ☐ 72328 Differential Expansion Complementary Input
- ☐ 72350 Dual Voting Thrust Position
- ☐ 72400 Eccentricity
- ☐ 72440 Eccentricity
- ☐ 72470 Dual Path
- ☐ 72500 RVDP-R Dual Probe*
- ☐ 72564 Dual Probe
- ☐ 72580 Dual Thermocouple Temperature
- ☐ 72600 Dual Resistive Temperature Detector
- ☐ 72645 Ramp Differential Expansion
- ☐ 72700, 72750 and 72790 Tachometers 1, 2, and 3
- ☐ 72710 Differential Expansion
- ☐ 72720 RVDP Dual Probe*
- ☐ 72800 Acceleration
- ☐ 72850 Two-Plane Radial Vibration
- ☐ 72937 Dual Valve Position Indicator
- ☐ 72938 Valve Position Indicator
- ☐ 72939 AC Case Expansion
- ☐ 72940 DC Case Expansion
- ☐ 72950 Zero Speed
- ☐ 72975 Eccentricity Peak-to-Peak

*No longer available as a new monitor

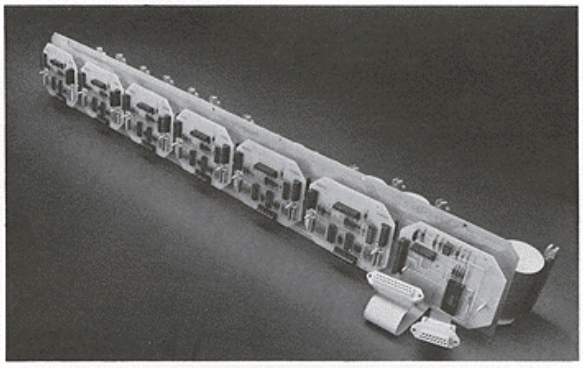


7200 Series Monitor

Data Manager: A cost-effective computer interface

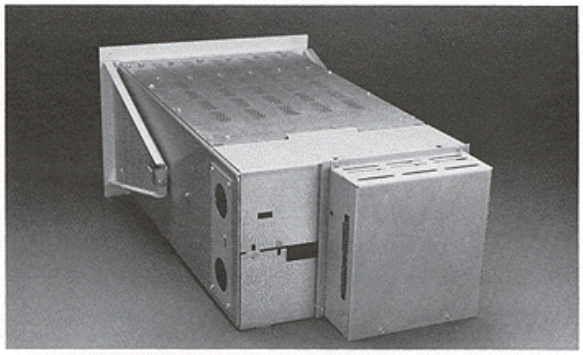
The Data Manager converts the analog monitor signals to a digital output for collection and display on a computer system. It is available for new installations or can be retrofitted to existing 7200 Series Monitoring Systems. The Data Manager consists of:

- ☐ Backplane electronics, which include multiplexing circuitry and buffered transducer outputs.



Backplane Electronics

- ☐ Communication Module, which includes an RS-232C compatible interface, analog-to-digital conversion, vector filter for 1X amplitude and phase data, tachometer, multiplexed transducer and Keyphasor outputs, and additional multiplexing and control circuitry.



Communication Module

The Backplane fits inside the 7200 Series rack and is connected by ribbon cable to the Communication Module. The Communication Module may be mounted on the back of the 7200 Series rack or at any other location within five feet of the rack.

Under direction from a host computer, the Data Manager selects and digitizes steady-state monitor signals representing meter reading (recorder outputs), Alert and Danger status, and transducer OK in a fraction of a second per monitor. 1X amplitude, 1X phase, probe gap, and shaft rpm information is gathered at a rate less than six seconds per transducer. This data is transmitted to a computer over the RS-232 link.

Connection from the Data Manager to the computer RS-232 port is low cost, requiring a single three-wire shielded cable. Additional Data Manager units may be connected in daisy chain fashion. Up to 16 Data Managers can be linked to a single RS-232 port. Special addressing techniques ensure that the computer communicates with only one Data Manager at a time.

Bently Nevada software packages communicate with up to four Data Managers. This design simplifies the system and reduces the time required for selecting and digitizing monitor signals. See Figures 1 and 2 for performance specifications.

Remote monitoring of machine condition is also possible, using a phone modem. Short haul modems can be used to transmit signals up to one mile away from the machine site.

The Data Manager also provides a pair of computer addressable dynamic data transducer outputs and their associated Keyphasor reference for use with diagnostic equipment, such as an oscilloscope, spectrum analyzer, Digital Vector Filter 2 (DVF 2), or ADRE (Automated Diagnostics for Rotating Equipment).

Data Manager operation is independent of the 7200 Series Monitoring System. Alert and Danger functions of the 7200 Series Monitoring System circuitry remain intact. A single failure in the Data Manager should not cause a malfunction in the 7200 Series Monitoring System.

The Data Manager can be operated in environments where 7200 Series Monitoring Systems are used. It is designed to meet CSA (Canadian Standards Association) and BASEEFA (British Approvals Service for Electrical Equipment in Flammable Atmospheres) standards of safety for use in hazardous areas.

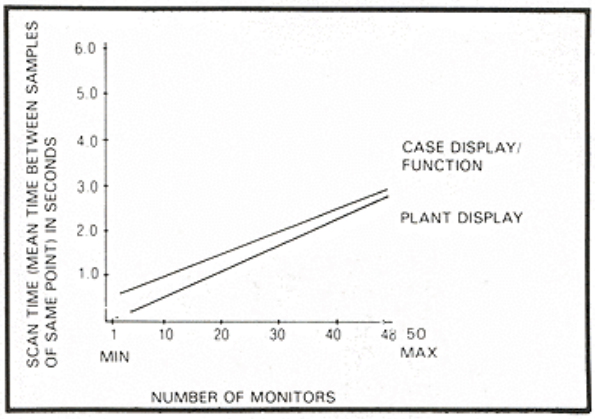


Figure 1

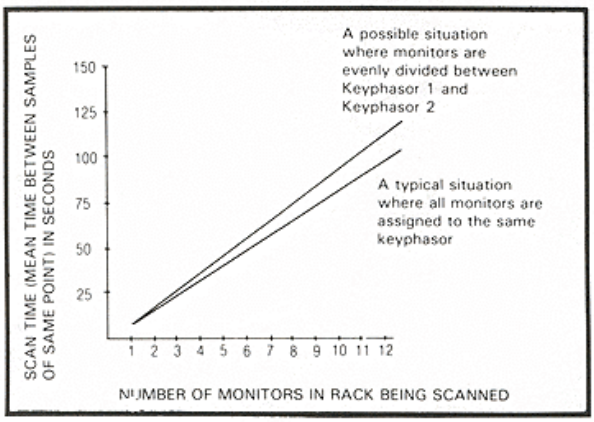


Figure 2

Software packages for displaying, charting, and trending machinery information.

The Data Manager digital output interfaces with any computer system with an RS-232 interface, including process computers, the IBM Personal Computer, and the Hewlett-Packard 200 Series (9816, 9826, and 9836) computers. Information can be displayed, charted, and trended in the following formats:

- ☐ Graphical displays of machine trains with color annunciation of alarms.
- ☐ Color bar graph displays of meter readings.
- ☐ Trending of all monitored variables.
- ☐ End-of-shift reports.
- ☐ Numerical displays of current values.
- ☐ Hard copy generation of displayed and monitored values.

One of two software packages is included with the Data Manager. The software packages are the core of a data acquisition system and give you a foundation for expanding and modifying the software to your specific application. The software packages are offered in advanced Microsoft BASIC for the IBM Personal Computer or enhanced Pascal for the Hewlett-Packard 200 Series computers.

The software packages support a maximum of 96 channels in up to four 7200 Series racks when configured into a plant of up to eight machine trains, with up to four machine cases per train and up to eight channels per case.

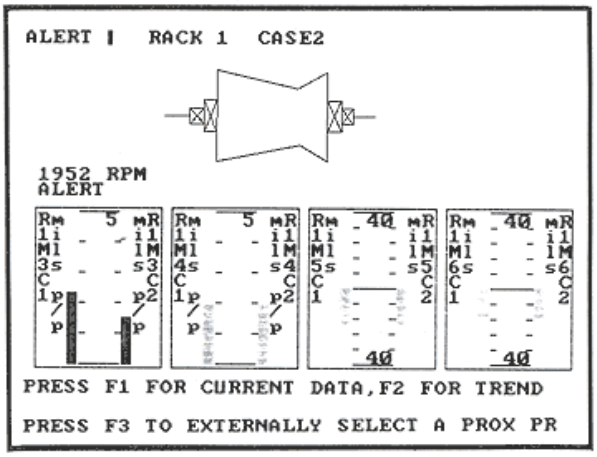
The software packages consist of the following groups of source files:

- ☐ Expandable software.
- ☐ Configuration program which enables the user to enter unique information, such as point names, scale factors, etc.
- ☐ Communications link program for determining communications link status.

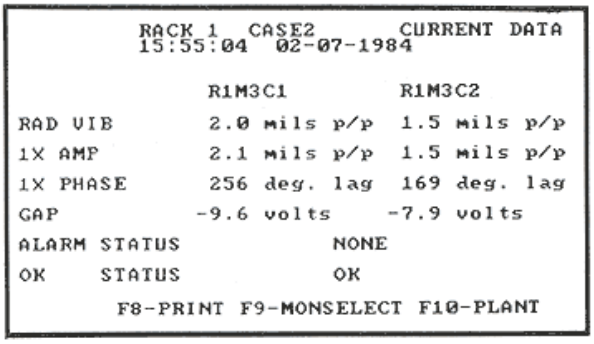
The software configuration can be generated by the user. Bently Nevada will also modify or custom design software programs upon request on a per-hour or contract basis. A software instruction package is also available for users to develop custom software programs. In addition, Bently Nevada offers an individual instruction seminar which is designed for customers who wish to modify Bently Nevada software or write their own custom programs.

Because of the settling times involved in the acquisition of 1X amplitude and 1X phase data, there is a significant difference between the scan time for this data and steady-state data. In the Bently Nevada software, data scanning is accomplished by interleaving samples of both data types. The data acquisition rate is shown in Figures 1 and 2 on page 3. The tables show the relationship between the display type/Keyphasor switching versus the data acquisition speed. Other variables may also affect the data acquisition rate to a lesser degree.

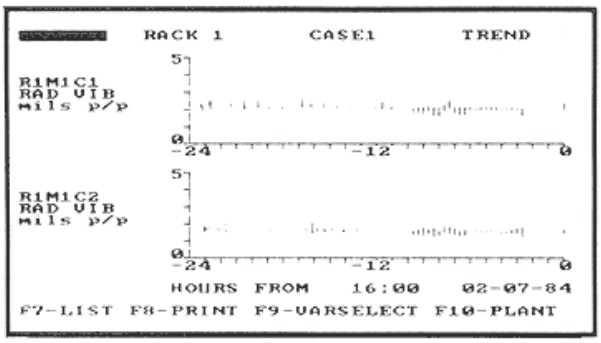
The figures indicate the responses for Bently Nevada package software only. Customer-written or Bently Nevada customized software may have different response times.



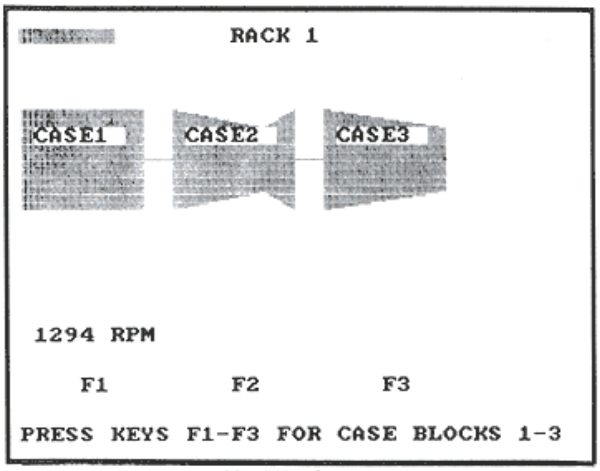
Enhanced Graphics



Overall Values



Trend



Machine Case

Specifications

Inputs

Power Requirements — Accepts 50/60 Hz AC power. Two options are available: 110 Vac rated from 95 to 125 Vac or 220 Vac rated from 190 to 250 Vac.

Nominal power consumption: 8 watts.

Static Signals — DC Proportional: 0 to -10 Vdc. Alert, Danger and OK: 0 to -30 Vdc.

Dynamic Signals — Derived from 24 transducer signals maximum, 2 channels per monitor.

Operating Range — -0.3 to -18.8 Volts.

Keyphasors — Two inputs provided; 1% duty cycle, minimum.

Operating Range — ±24 Volts.

Outputs

Buffered Dynamic Signals

Frequency — DC to 80 KHz (-3 dB), typical.

Accuracy — ±2% of full scale, ±0.02 percent/degree Centigrade deviation from 25°C.

Output Impedance — 100 ohms, typical.

Keyphasor Trigger — 4V to 1V, typical. 5.25V to 0V, maximum.

Keyphasor Power — -18V ±5 percent. Maximum current is limited to 30 mA.

Communication Port Data (8-Bit Digitized Value)

Meter Reading (Recorder Outputs) — DC proportional from selected monitors.

Accuracy — ±2.1 percent of full scale, ±0.022 percent/degree Centigrade deviation from 25°C.

Settling Time — Less than 250 microseconds to within 1 percent of final value, typical.

Alert, Danger, and OK Status Signals

SIGNAL	PARAMETER	VALID RANGE OF BINARY DATA	VOLTAGE RANGE FROM BACKPLANE
OK Status	Not OK OK	140 to 255 0 to 3	-3.3 to -8 Vdc 0 to -72 mV
Alert Alarm Status	Alarm No Alarm	123 to 255 0 to 51	-2.9 to -8 Vdc 0 to -1.2 Vdc
Danger Alarm Status	Alarm No Alarm	123 to 255 0 to 51	-2.9 to -8 Vdc 0 to -1.2 Vdc

Gap Signal

Accuracy — ±0.52V, ±0.044V/degree Centigrade deviation from 25°C.

Settling Time — Less than 2.5 seconds to within 1 percent of final value, typical.

In-Phase and Quadrature Data

Accuracy — ±3.9 percent of full scale, ±0.035 percent/degree Centigrade deviation from 25°C. (Data is processed from selected buffered transducer.)

Settling Time — Less than 6 seconds to within 1 percent of final value, typical.

RPM Data

Accuracy — ±2.7 percent of full scale, ±0.022 percent/degree Centigrade deviation from 25°C. Full scale depends on switch setting on VFM/Tach circuit board.

Settling Time — Less than 6 seconds to within 1 percent of final value.

Resolution

MAXIMUM RPM	BIT RESOLUTION
6000	±23 RPM
12000	±47 RPM
24000	±94 RPM
48000	±188 RPM
96000	±376 RPM

Self-Test — Backplane: -3.0 Vdc ±5.3 percent (binary value of 128 ±7).

Communication Module: -2.5 Vdc ±2.8 percent (binary value of 103 to 109, 106 nominal).

Communications Port

RS-232 Connections

PIN NUMBER	TO COMPUTER J2	TO NEXT RACK J3
2	Transmit	Receive
3	Receive	Transmit
7	Signal Common	Signal Common
9*	+12 Vdc	+12 Vdc
10*	-12 Vdc	-12 Vdc

*Pins 9 and 10 as implemented are nonstandard to RS-232C link. They are provided to supply power to a short haul modem, if required.

Data Manager implements RS-232 Type Z link (special implementation).

Available Baud Rates — 50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2400, 4800, 9600.

Environmental

Temperature Range

Operating — 0°C to +65°C (+32°F to +149°F).

Storage — -40°C to 85°C (-104°F to +185°F).

Relative Humidity — To 95% noncondensing.

Environmental Conditions — Designated to meet the CSA Class 1, Division 2, and BASEEFA safety requirements for component approval.

Dimensions

Weight — Communication Module: 3 lbs., 13 ozs. (1.7 kg).

Height, Width — Refer to dimension drawing.

Mounting and Cabling

Communication Module Mounting — Standard (for mounting on back of rack): 1 foot with flat cable (supplied).

Remote: Up to 5 feet with flat ribbon cable; up to 10 feet with shielded cable.

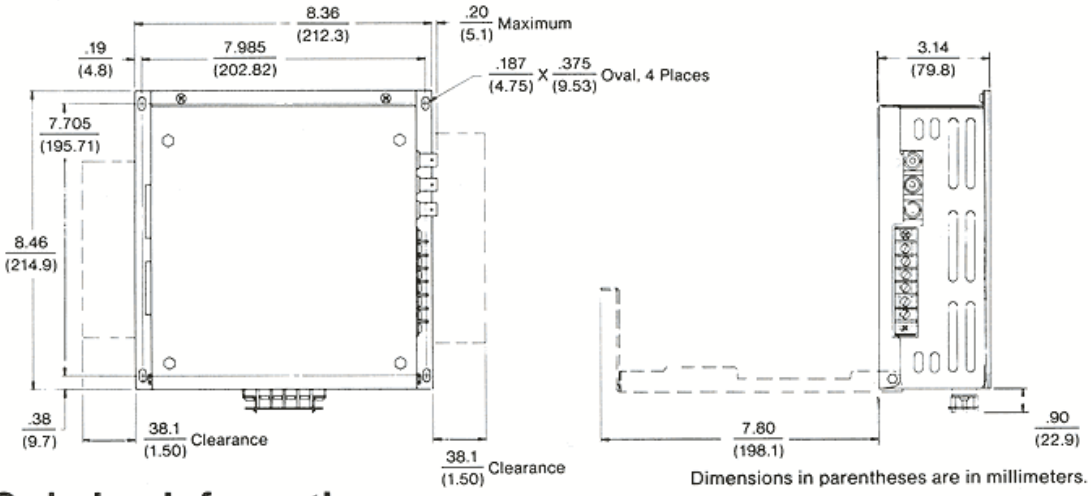
Communication Module Cabling — 3-wire shielded cable, 100 feet maximum.

Short haul modem for distances between 100 feet and 1 mile.

Recommended cable for short haul modem: Alpha 9819 or equivalent.

Proximitor and Trigger Outputs — RG58 coaxial cable or other properly shielded cable for distances up to 1000 feet.

Dimensions



Dimensions in parentheses are in millimeters.

Ordering Information

New Installations

When ordering the 7200 Series Data Manager for new installations, please order one Data Manager rack (replaces the standard 7200 rack), one Communication Module, and one software package.

Please complete your requirements below.

Rack

For new installations, two types of racks are available — a panel mount rack or a 19-inch EIA rack. The instrument rack size must be specified when ordering the panel mount rack.

72323—□□ Data Manager Rack

□□	**Instrument Rack Size Option**
02	4-position
03	6-position
04	8-position
05	10-position
06	12-position
07	14-position
08	4-position weatherproof configuration
09	6-position weatherproof configuration
10	8-position weatherproof configuration
11	10-position weatherproof configuration
12	12-position weatherproof configuration
13	14-position weatherproof configuration
14	19-inch EIA rack

Communication Module

Order one Communication Module per rack, according to the required input voltage.

43018—□□ Communication Module

□□	**Voltage Requirement Option**
01	110V
02	220V

Software

Expandable software is available for the IBM Personal Computer in Microsoft BASIC or Hewlett-Packard 200 Series computer in HP Pascal. See Data Manager Software Data Sheet, L0561.

Retrofits

For retrofitting the Data Manager to an existing 7200 Series Monitoring System, the Backplane, Communications Module, and expandable software packages must be ordered. Please include a list of all monitors in your 7200 Series rack with your order.

For retrofits, all monitors require modification. Most modifications are simple, although in a few cases the modifications can be extensive. Consultation with Bently Nevada's Product Service is recommended to assure the compatibility of the 7200 Series Monitors with the Data Manager.

Please complete your requirements below.

Backplane Kit

Order one Backplane Kit per rack. Specify the BNC Catalog Number below according to the number of positions in the 7200 Series Rack. Please note that the power supply occupies the first two positions in the 7200 Series Rack.

47418-□□ Backplane

□□	**Rack Positions Option**
01	4-Position
02	6-Position
03	8-Position
04	10-Position
05	12-Position
06	14-Position

Communication Module

Order one Communication Module per rack, according to the required input voltage.

43018 – □□ Communication Module

□□ **Input Voltage Option**
01 110V
02 220V

44700-01 □□ Weatherproof Housing for Communication Module

Software

Expandable software is available for the IBM Personal Computer in Microsoft BASIC or Hewlett-Packard 200 Series computer in HP Pascal. Please contact your local sales representative for ordering information.

ACCESSORIES

Communication Cable Parts Kit

This kit is used to connect the Data Manager and your computer, or to link several Data Managers to the same computer. Two kits are offered. The kits include cables with connectors for on-site assembly and installation.

A B
43586 – □□□ – □□ General Purpose Communication Cable Parts Kit

A: Cable Length Option
B: Connector Option

□□□ **Cable Length Option**
1 to 100 feet. Order in 1-foot increments.
Example: 021 = 21 feet.

□□ **Connector Option**
02 Two 25-pin D connectors, one male and one female, used to link two Data Managers.
03 Two 25-pin D female connectors used to link Data Manager(s) to IBM Personal Computer and other computers.

44020 – □□□ Communication Cable Parts Kit for HP Series 200 computer and certain other computers.

Cable Length Option
1 to 100 feet. Order in 1-foot increments.
Example: 035 = 35 feet.

Short-Haul Modems

Short-haul modems are used for communication between the Data Manager and computer when they are between 100 feet and one mile apart. One unit is required for the Data Manager, and one unit is required for the computer. The two modems are interconnected by a communication cable.

44313-01 Data Manager Short-Haul Modem
02290900 Computer Short-Haul Modem

Communications Cable for Short-Haul Modem

43585 – □□□□ Short-Haul Modem Communication Cable

□□□□ **Cable Length Option**
From 100 feet to 1,000 feet.
Order in 1-foot increments.
Example: 0123 = 123 feet.

For lengths greater than 1,000 feet, please order multiple cables.

Coaxial Cable Assembly

This accessory provides 50-ohm cable with BNC connectors for connecting Data Manager analog outputs to oscilloscopes, spectrum analyzers, and other measurement devices.

43584 – □□□□ **Coaxial Cable Assembly**

□□□□ **Cable Length Option**
From 1 to 1,000 feet.
Order in 1-foot increments.
Example: 0208 = 208 feet.

Coaxial "T" Connector

This accessory is for connecting multiple Communication Module outputs.

00510700 Coaxial "T" Connector

Five-Foot Communication Module Cable Kit

This kit allows you to mount the Communication Module up to five feet from the rear of the monitor rack. It replaces standard one-foot cables.

43362-05 and **43363-05** Five-Foot Communication Module Cables. (Both numbers must be specified.)

When ordering spare monitors for Data Manager systems, please specify the modifications listed on the side of the board which is being replaced.

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L0534-02 (11/84)