

REMOTE DIGITIZER RD3

3 to 6 SIGNAL CHANNELS

DYNAMIC RANGE TO 136 dB

16 BIT RESOLUTION

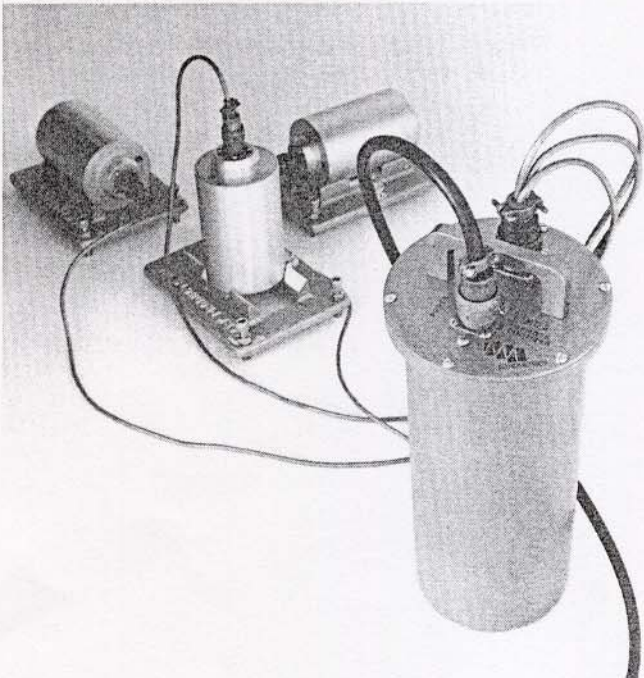
BROADBAND SENSOR SUPPORT

MINIMAL SAMPLE SKEW BETWEEN CHANNELS

PRECISE LINEAR PHASE FILTERS

EXTENSIVE REMOTE CALIBRATION

RUGGED WATERPROOF HOUSING



REMOTE DIGITIZER RD3

- 3 TO 6 SIGNAL CHANNELS
- DYNAMIC RANGE TO 136 dB
- 16 BIT RESOLUTION
- BROADBAND SENSOR SUPPORT
- MINIMAL SAMPLE SKEW BETWEEN CHANNELS
- PRECISE LINEAR PHASE FILTERS
- EXTENSIVE REMOTE CALIBRATION
- RUGGED WATERPROOF HOUSING
- POWERFUL ARITHMETIC PROCESSOR
- NON-VOLATILE CONFIGURATION MEMORY
- LOW POWER CMOS DESIGN
- RS-232C INTERFACE
- NO SPECIAL LINE INTERFACE REQUIRED
- TIMING PHASE-LOCK OPTION
- STATE OF HEALTH MONITORING OPTION

The RD3 Remote Digitizer is a high performance device for digitizing seismometer and accelerometer sensor outputs for transmission over a communications link. It is intended for applications where scientists wish to make as few compromises as possible on the quality of data acquired. The unit uses state-of-the-art components which permit levels of performance not previously possible in field instrumentation.

APPLICATION

The Remote Digitizer is used in digital seismograph or accelerograph networks where it functions as the interface between the sensor and the communications network.

Specific applications to which it is suited are:

- microseismic studies, in small aperture networks using sample rates to 480 s/s
- regional networks, using one, three or six components with radio, telephone line, or satellite telemetry
- seismic arrays where the sampling instant of separated sites must be synchronized to a master clock

FEATURES

3 TO 6 SIGNAL CHANNELS

The standard unit includes anti-alias filters for 3 channels with hardware multiplexing for 6. Optionally, a second set of 3 anti-alias filters can be installed.

DYNAMIC RANGE TO 136 dB 16 BIT RESOLUTION

A 16-bit ADC, precise gain-ranging and oversampling are all used to provide dynamic range which exceeds six orders of magnitude.

BROADBAND SENSOR SUPPORT

Digitizers can be configured for operation with broadband seismometers by providing analog response to DC in conjunction with a software 100 second high pass filter.

MINIMAL SAMPLE SKEW BETWEEN CHANNELS

There is minimal time skew between the different channels of a sample set. This eliminates the need for main-frame reprocessing before, for example, particle motion diagrams can be plotted.

PRECISE LINEAR PHASE FILTERS

Bessel analog filters combined with FIR software filters assure linear phase response with accurate channel-to-channel phase matching. The same process yields "square root n" enhancement of the initial hardware performance so that resolution in excess of 16 bits is possible.

EXTENSIVE REMOTE CALIBRATION

An accurate 8-bit DAC provides programmable sinusoidal, step and pseudo-random calibration signals to up to 3 sensors. Optionally a 16-bit DAC can be specified for additional range and resolution.

RUGGED WATERPROOF HOUSING

The electronic circuits are contained in a rugged, heavy duty cylinder with O-ring seals to ensure a completely waterproof housing.

POWERFUL ARITHMETIC PROCESSOR

The Digitizer uses a powerful control microprocessor so that digital signal processing techniques can be used to improve the system accuracy. The control processor can execute a multiply-add to a 32 bit accumulator in 5 microseconds.

NON-VOLATILE CONFIGURATION MEMORY

Parameters such as sample rate, baud rate, and site-dependent constants such as sensor sensitivity and site-id are entered into the non-volatile memory with a portable terminal prior to installation. Electrically-erasable ROMs are used to implement this memory so there is no danger of data loss even when power is interrupted.

TIMING SYNCHRONIZATION

The RD3 can be configured to synchronize the sample timing to an external master clock.

LOW POWER CMOS DESIGN

CMOS parts are used for all digital circuits. The analog circuit design minimizes power consumption without compromising signal quality or system noise performance.

RS-232C INTERFACE NO SPECIAL LINE INTERFACE REQUIRED

The use of the RS-232C standard enables the user to avoid the costs of a special line interface at the termination of the communications link. For example, the RD3 can be used for remote data acquisition directly into the serial port of a personal computer, or via a radio link. RS-422 is available as an optional alternative.

TIMING PHASE-LOCK OPTION

The internal sampling clock can be phase-locked to an external time source such as the minute marks from a Standard Time radio-clock or a reverse radio link.

STATE OF HEALTH MONITORING OPTION

An optional expansion board allows low speed analog and digital auxiliary data to be sampled.

SPECIFICATIONS

SIGNAL CONDITIONING

<i>Sensor channels</i>	• standard 3, optional 6
<i>Input configuration</i>	• differential
<i>Input sensitivity</i>	• typically 375 nanovolts/bit
<i>Anti-alias filter</i>	• low pass 5-pole linear phase
	• 50 dB rejection at folding frequency
<i>High-pass filter</i>	• one pole at 0.5 Hz
	• optionally DC coupled
<i>Preamplifier gain</i>	• typically 20 dB and adjusted to suit sensor (Gain-ranging provides a further 40 dB)
<i>Sensor calibration</i>	• 8-bit precision DAC with voltage or current output switched to one of 3 sensors

ENCODER

<i>Type</i>	• wide dynamic range gain-ranging encoder
<i>Dynamic range</i>	• to 136 dB
<i>ADC</i>	• 16 bits
<i>System noise</i>	• typically 1.5 bits rms (16-bit ADC, 25 Hz bandwidth)
<i>Gain algorithm</i>	• optimum gain determination for each sample
<i>Gain-range</i>	• 0 to 40 dB
<i>Gain accuracy</i>	• better than 0.1%
<i>Sample rate</i>	• 1 mS minimum, or as configured
<i>Multiplexer</i>	• software configurable for one through six channels
<i>Channel scan</i>	• rate typically 6400 Hz

OUTPUTS

RS-232C at baud rates from 300 to 38.4K baud, with one input and one output modem control line.

NON-VOLATILE MEMORY

User-defined set-up parameters are stored in non-volatile electrically erasable memory.

CONNECTORS

<i>Sensor input</i>	— 18 pin connector includes provision for sensor power.
<i>Input/Output</i>	— 10 pin connector for RS-232C, power, time-sync signals and modem controls. Mating connectors are supplied.

POWER REQUIREMENT

+ 11 to 15 Volts DC, 2-4 Watts according to options.

SOFTWARE

Controls digitization, channel selection, filtering, digital signal processing and data formatting for the RS-232C port which operates full duplex. Software can be customized to meet specific needs. For further information ask for software specifications.

PHYSICAL

<i>Size</i>	5" diameter by 11" long (136 × 280 mm)
<i>Construction</i>	Waterproof, heavy duty aluminum container with O-ring seals.

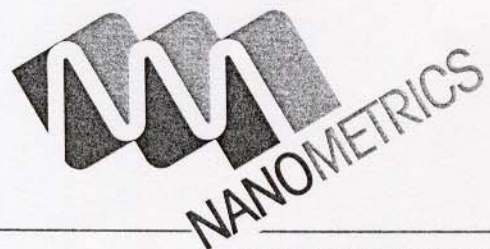
Operating Temperature: -25°C to +50°C.

OPTIONS *

1. Phase lock software for array systems
2. 3 additional signal channels (RD6)
3. RS-422 I/O
4. 16-bit calibrator
5. State of health monitoring

* Contact Nanometrics for details

NOTE: Please specify sensors and sample rate to be used with order so that factory can ship digitisers ready to use.



250 Herzberg Road, Kanata
 Ontario, Canada K2K 2A1
 Tel: 613-592-6776 Fax: 613-592-5929
 Feb/91

