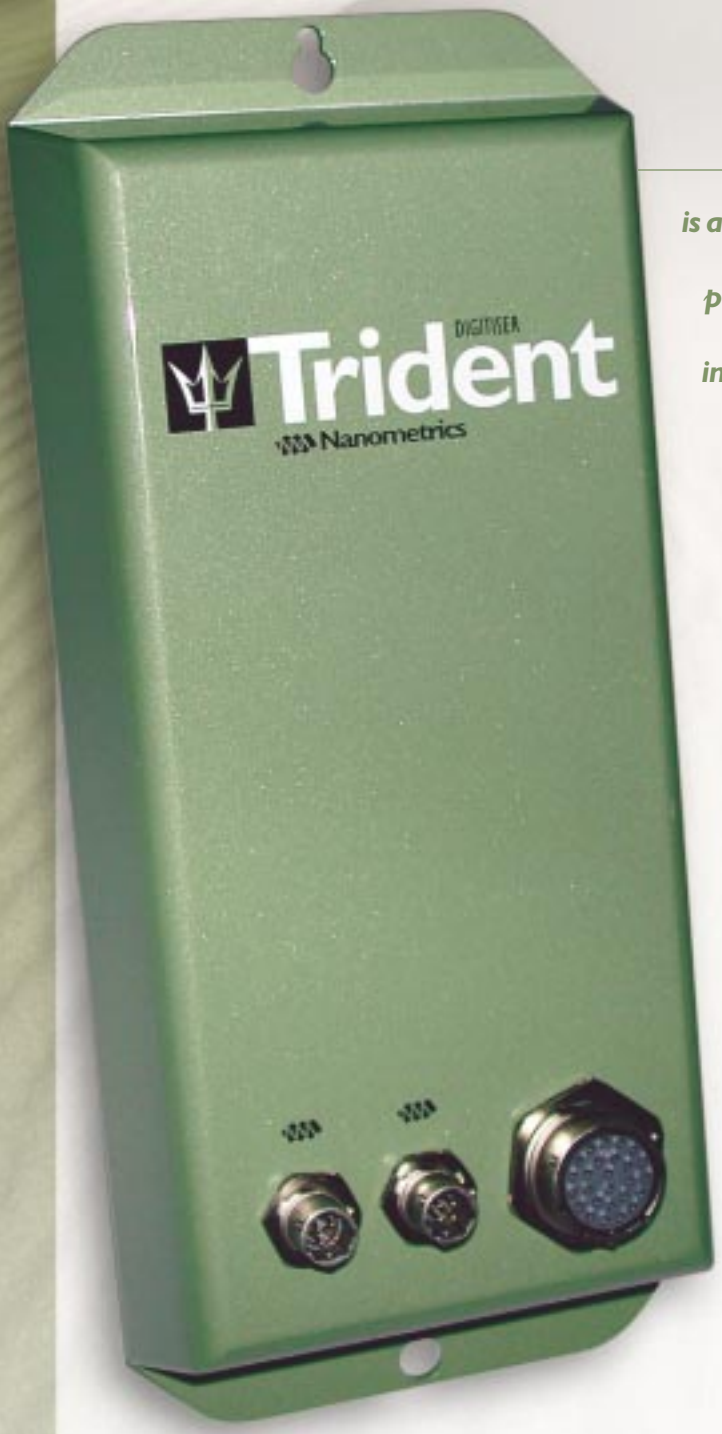
Trident DIGITISER



Trident

is a superior digitiser providing true 24-bit performance. This compact and robust instrument is equally suited to fixed and portable applications.

Benefits

- *Superior performance, true 24-bit resolution with 142 db dynamic range*
- *Versatile software programmable front-end gain to support a wide range of sensor types*
- *Remote mass centering and calibration functions, ideal for broadband applications*
- *More freedom in placing remote site components with new NMXbus technology*
- *Complete system response calibration using pseudo-random binary signals*
- *Scalable design that allows individual 3-channel units to be configured separately and daisy-chained for multi-channel system*

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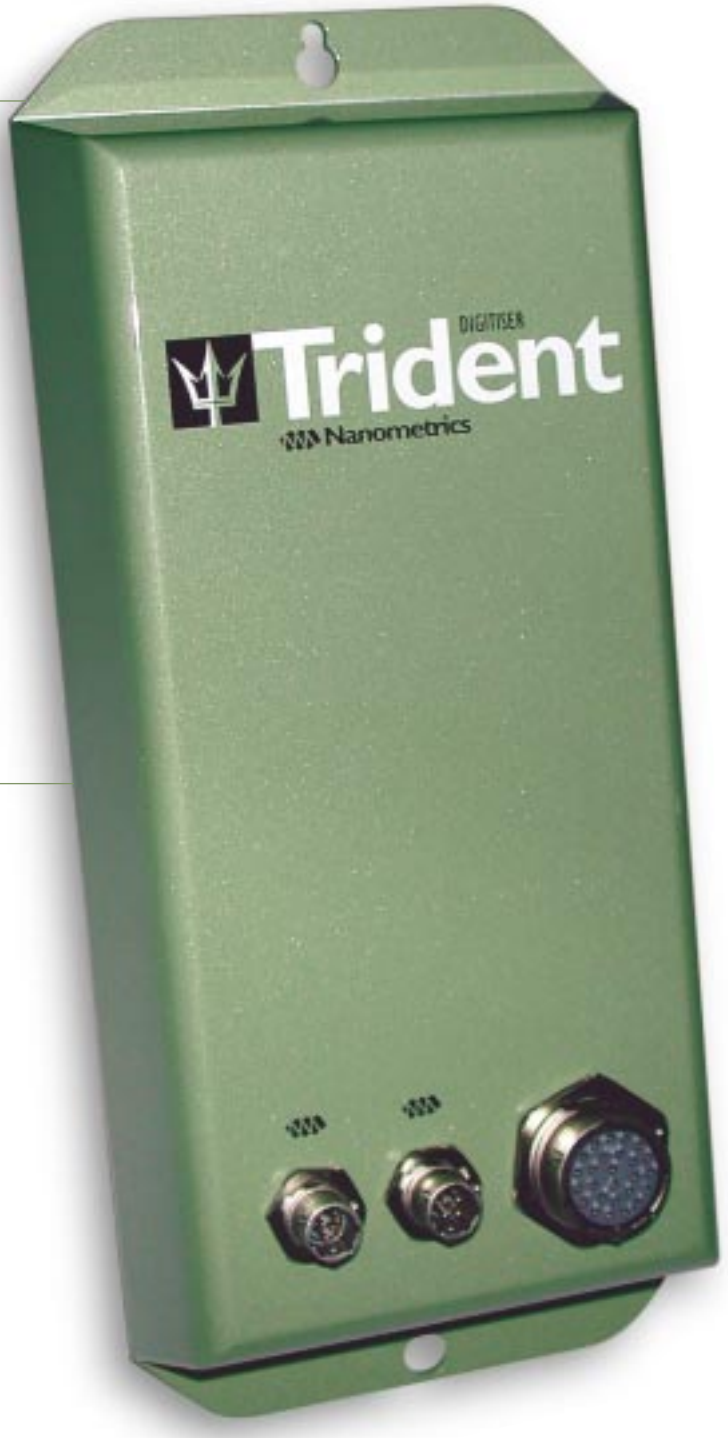
multi-channel system suitable for many applicat

Superior Data Quality

Nanometrics' new discrete sigma-delta design moves beyond the common chip set approach to provide true 24-bit performance with a typical dynamic range of 142 dB. In fact, maximum performance is achieved when the word length is configured to 26 bits.

Trident functions as a pure analogue-to-digital converter acquiring data from a single three-component seismometer. Unlike other digitisers, Trident is not packaged with the communications interface and timing system. Instead it is housed separately and placed in the seismometer vault. This results in improved long period performance and better data quality since Trident benefits from the same temperature-stable environment as the seismometer and a shorter seismometer cable can be used.



Versatile and User-Friendly Operation

Trident includes comprehensive seismometer control functions. It eliminates the use of external boxes, hand-held control units and complicated cabling. Software selectable sensitivity, mass centering, mass positioning, monitoring, and calibration can be handled remotely through the Trident from the central site. This reduces site visits, provides for easier deployment in portable applications, and allows the Trident to operate with a wide range of active and passive seismometers and transducers without modification.

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rmance. This compact and robust instrument is equally suited to fixed
ual Trident three-channel units can be daisy-chained together to form a
tions, a simple, yet effective concept.

Simple Cabling with the NMXbus

The NMXbus technology facilitates the best possible remote site installation without extensive pre-planning.

Remote seismic installations often involve the challenge of finding a secure, quiet and temperature-stable location for the seismometer and digitiser while positioning the GPS, VSAT or RF antenna in a more exposed area. These conflicting requirements are often handled by using long and costly seismometer, RF and GPS cables, or even by moving the seismometer to a less desirable location.

NMXbus eliminates the compromises. The simple twisted-pair NMXbus cable, is the only connection necessary between the Trident and the communications interface since it fully supports bi-directional data communications, timing, and power distribution.

Cabling is easier and less costly with NMXbus technology. Cables no longer need to be custom-measured and planned in detail for each remote site. Instead, RF and seismometer cables can be ordered in lengths that are standard for all sites. There is no need to predetermine the length of the NMXbus cable since it can easily be cut to length on-site. NMXbus cable runs up to about 150 m long and is relatively inexpensive. It is also compact, flexible, and portable.

Freedom of Design

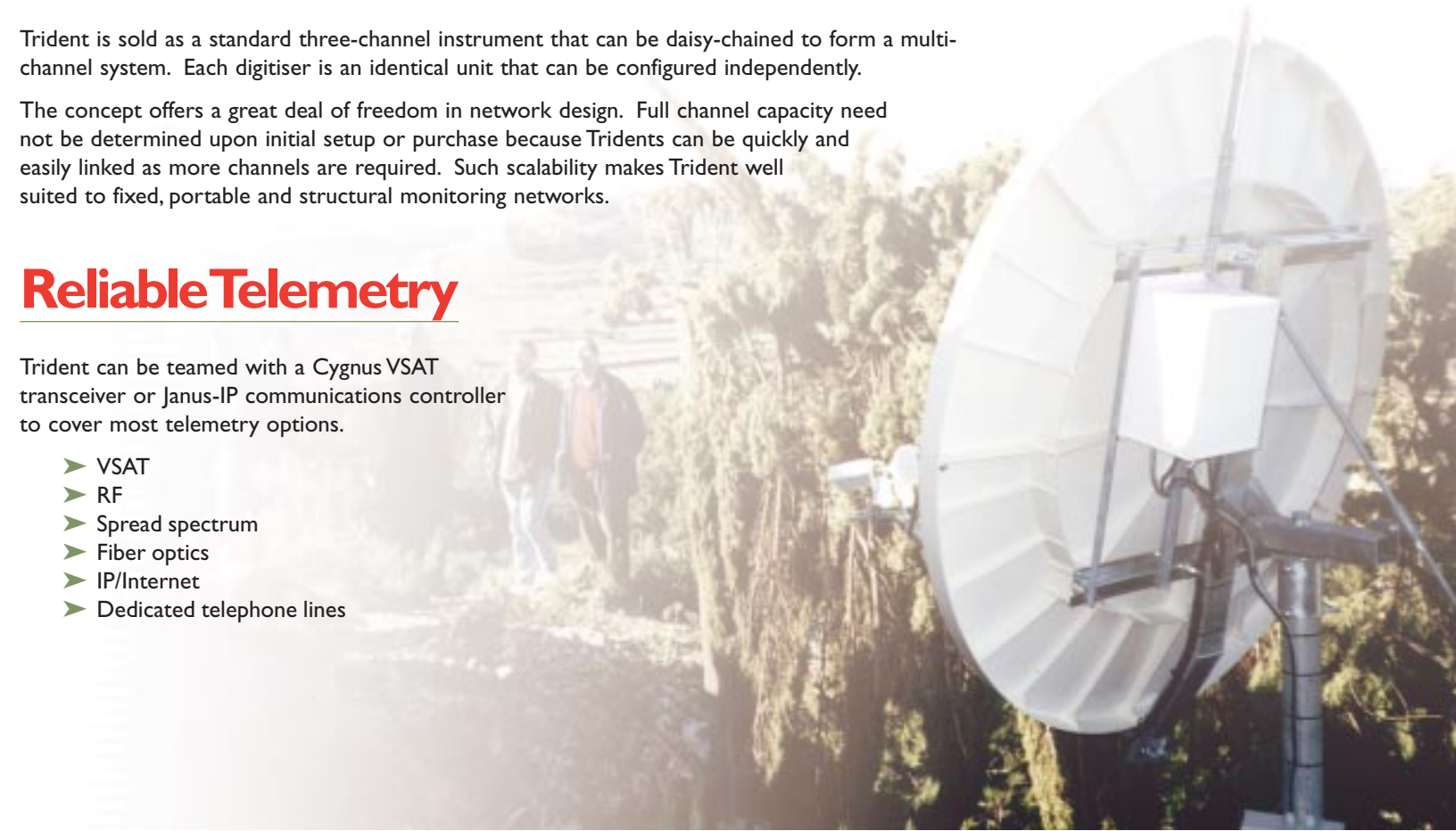
Trident is sold as a standard three-channel instrument that can be daisy-chained to form a multi-channel system. Each digitiser is an identical unit that can be configured independently.

The concept offers a great deal of freedom in network design. Full channel capacity need not be determined upon initial setup or purchase because Tridents can be quickly and easily linked as more channels are required. Such scalability makes Trident well suited to fixed, portable and structural monitoring networks.

Reliable Telemetry

Trident can be teamed with a Cygnus VSAT transceiver or Janus-IP communications controller to cover most telemetry options.

- VSAT
- RF
- Spread spectrum
- Fiber optics
- IP/Internet
- Dedicated telephone lines



Technical Specifications

➤ Sensor Inputs

Channels	3 (6-channel configuration achieved by daisy-chaining two units)
Sampling	Simultaneous
Input voltage range	20Vpeak-to-peak differential (at gain=0.4)
Input impedance	43 kΩ
Nominal sensitivity	5 counts/μV (gain=1)
Gain selection	Software selectable 0.4, 1, 2, 4, 8 Selectable sensitivity common for all 3 channels
EMC	EN55022, EN55011 FCC Part 15

➤ Performance (100Hz output sample rate)

Shorted input noise (100 sps)	0.5 counts RMS (of 24 bits)
Dynamic range	142 dB typical (max. sine wave above shorted input level)

➤ Digitiser

Type	Proprietary high order sigma-delta
Digital filter	140 dB attenuation at output Nyquist frequency
Filter type	Linear phase (Consult factory for min. phase filter opt.)

➤ Data Output

Output channels	1, 2 or 3
Output sample rates	10, 20, 40, 50, 100, 200, 500 sps
Opt. DC removal filter	1 mHz to 1 Hz, first order

➤ Timing

The Trident requires absolute time and phase informed from a Cygnus VSAT transceiver or Janus-IP communications controller via the NMXbus connection.

Abs. time accuracy	<100 μs to UTC

➤ Sensor Calibration & Control

Sine wave and random binary sensor calibration. Mass centering on command.

➤ Trigger Detection

Number of triggers	0-3 independent trigger detectors
Trigger modes	STA/LTA, threshold
STA/LTA time constants	Programmable

Threshold triggers have hold-off between triggers.

➤ NMXbus

Prerequisite	NMXbus-compatible TimeServer or device containing a TimeServer, usually either a Cygnus satellite transceiver or Janus-IP communications controller
More channels	2 Trident digitisers can share the same NMXbus
Number of bus connectors	Two (to permit daisy-chaining)
Bus cable spec	Shielded twisted-pair
Termination	Automatic
Max. bus length	150 m (subject to sensor power requirements and source voltage)

➤ Power

Power supply voltage	9 - 36 V (over NMXbus)
Power consumption	1.8 W typical, 100 sps continuous acquisition

➤ Environmental

Operating temp.	-20°C to 55°C
Packaging	Machined aluminum case, submersible IP-67

➤ Instrument State-of-Health

Power supply voltage	DC voltage from NMXbus
Temperature	Internal temperature
3 external inputs	Input voltage, commonly used for mass position
3 max. signal	Max value of signal per channel per second
3 calibration active	Each bit indicates if calibration is active
3 controls active	Each bit indicates if control line toggled from default
3 signal clipped	Each bit indicates if input signal clipped
Time since last locked	No. of seconds free running without timeserver
Diagnostic SOH	A number of software diagnostic and statistical counts are also included as SOH messages

➤ Commands Supported

Calibrate	Initiates calibration sequence
Mass center	Initiates mass centering (STS-2 and CMG-3 series seismometers only)
Configuration	Get / change / save / copy current configuration
Software upload	Upload new DSP firmware
Test code	Allows the user to test new code downloaded via the NMXbus
Reboot	Reboots the digitiser

Partner Product Specifications

The Cygnus VSAT transceiver and Janus-IP communications controller provide communications and timing support for the Trident digitiser.

➤ Timing System

Type	UTC timed with digitally controlled VCXO clock disciplined by GPS time code receiver
Time accuracy	<10 μs with GPS locked
Internal oscillator	1ppm
GPS receiver	12 channel
Antenna	External active antenna, 26 dB gain
Antenna cable	3 m standard, 10 m optional

➤ Data ports

NMXbus ports	Two
User serial ports	Two
Serial port drivers	Buffered serial Command and control
Ethernet port	10-based-T
Storage capacity	12 MB

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