3-D Data Acquisition Simplified and Streamlined

Breakthrough Usability for More Efficient Surveys, Higher Quality Data

Unlike other 3D seismic systems that rely on a user interface designed 10 years ago, the new Geometrics Geode DZ system supports today's best practices in seismic surveying. Instead of an assemblage of add-on patches and kluged together software routines, the new Geode DZ system offers an operating interface that is designed from the ground up to be intuitive and easy to learn and use. So intuitive and easy, in fact, that it can help you prevent expensive in-field mistakes and drastically reduce processing time and costs. With the new Geode DZ system, operators can better visualize and adjust layout geometry, keep the survey moving efficiently, and focus on data gathering, not software controls.

The DZ system's interface uses the familiar Windows paradigm, enabling even first-time users to find information, properties, tips, and tools and follow the logical progression of survey control from planning to quality control. No more wasted time trying to remember how the system works, operators can now understand when, where, and how adjustments should be made for best results.

Standard Ethernet Saves Time and Money
The Geode DZ communicates using standard Ethernet protocol, eliminating the need for expensive custom-designed controllers. Now virtually any computer can control your survey, and you'll save by using lower cost RAID drives, USB hard disks, printers, and other peripherals as well. Plus debugging Ethernet equipment and connections is far more understandable and familiar.

Flexible and Field-hardened System
The DZ uses Geode field-hardened technology, already deployed in over 400 systems worldwide and used for every imaginable application. With the ability to continuously record at high sample rates on any number of channels, the Geode DZ gathers high-quality data for 2-D and 3-D surveys, coal-bed methane studies, reservoir monitoring, steam floods, 3C/3D VSP, tectonic research, and marine surveys. Geode customers include academic institutions, engineering firms, and all major oil companies.
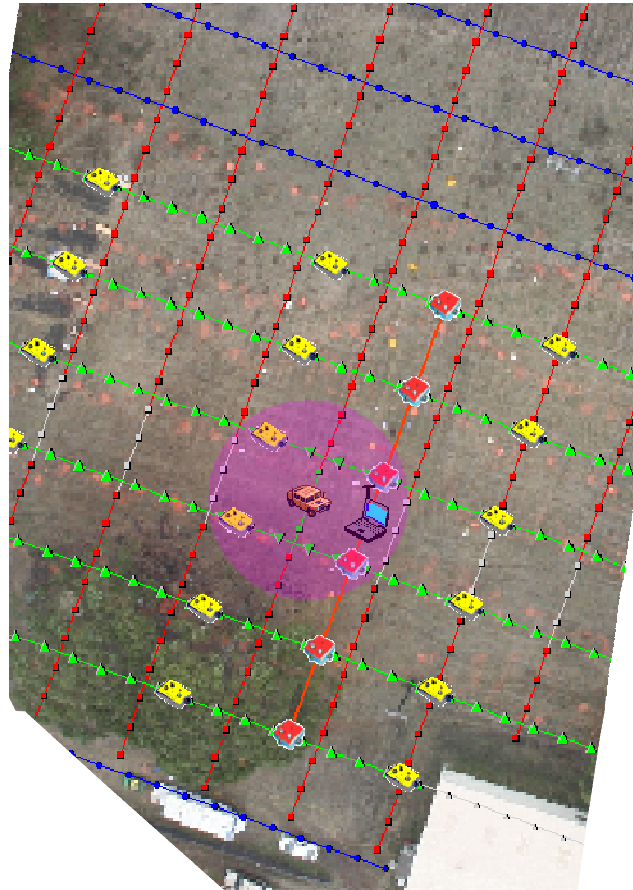
Solid, Trusted, and Ready
Approaching its 40th year as a manufacturer of rugged and easy-to-use instrumentation, Geometrics, with 30 service centers around the world, is equipped to continue supplying the support needed to keep you up and running.
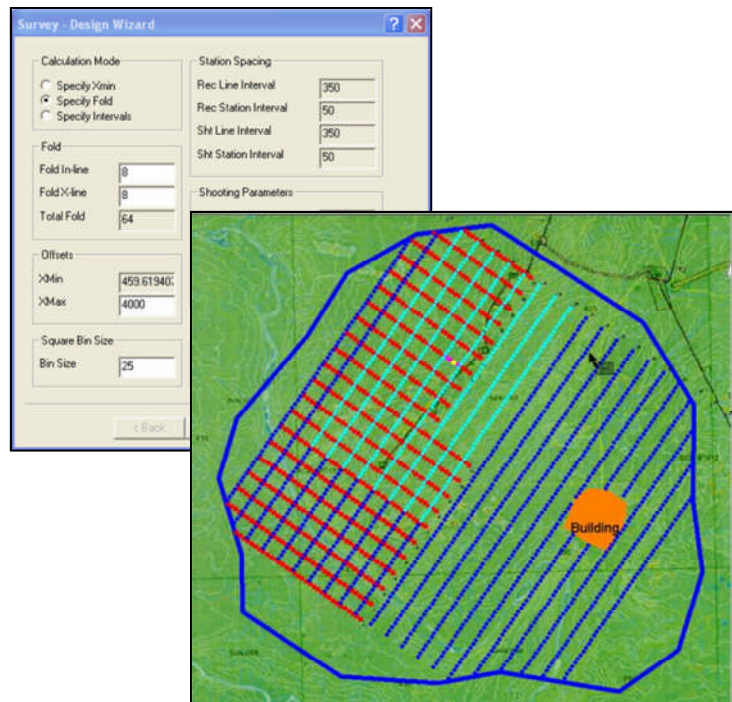
Keep Logistics Simple.

- Suitable for a broad range of surveys including 2-D, 3-D, 3-C, continuous recording, GPS synchronized monitoring, and deep surveys needing wide group spacing

- 8 kHz bandwidth and 24-bit resolution let's you work in the slowest and fastest rocks

- Fast deployment with system starts in under 30 seconds, any number of channels

- Easy troubleshooting with real-time look-ahead line and geophone tests; In-field instrument tests verify specifications for client approval

- Efficient data collection with fast cycle times and high production rates with in-box correlation and stacking

- Wide range of source options including vibrators, pseudo-random (Mini-Sosie), impact, and explosive

- Compatible with Geometrics Geode and StrataVisor NZ hardware that you already own

Integrated Planning Software Speeds Layout and Simulates Your Survey To Minimize Field Time.

- Simulates simple to complex layouts

- Offers wizard-driven, easy-to-use, and easy-to-remember interface

- Calculates and displays many parameters automatically: fold, spider, and offset

- Estimates array response

- Includes convenient Obstacle Manager

- Automatically generates SPS files

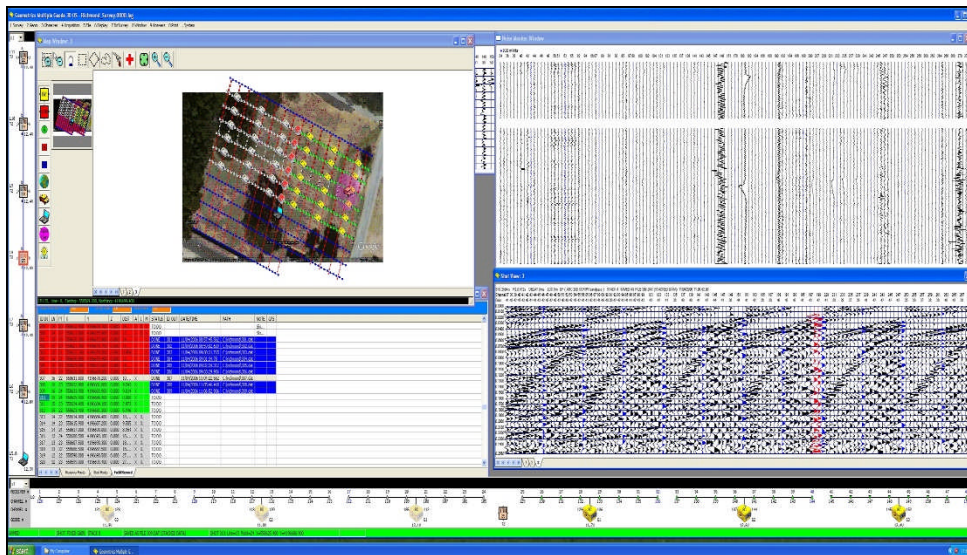- Uses same industry-standard software taught in SEG courses
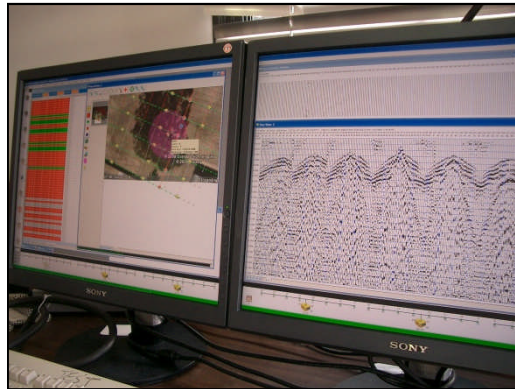
Rely On Simple, Flexible Hardware.

- Software configurable 2 to 8 channel A/D modules

- Continuous or trigger-based recording

- Separate trigger connection when radio reception is poor

- Omni-directional data transfer

- Hot-swap battery connections

- Either in-box stacking and correlation or full data transfer on high-speed Ethernet backbone

- Machine, survey, and real-world coordinates tied together in one step

- Orientation insensitive
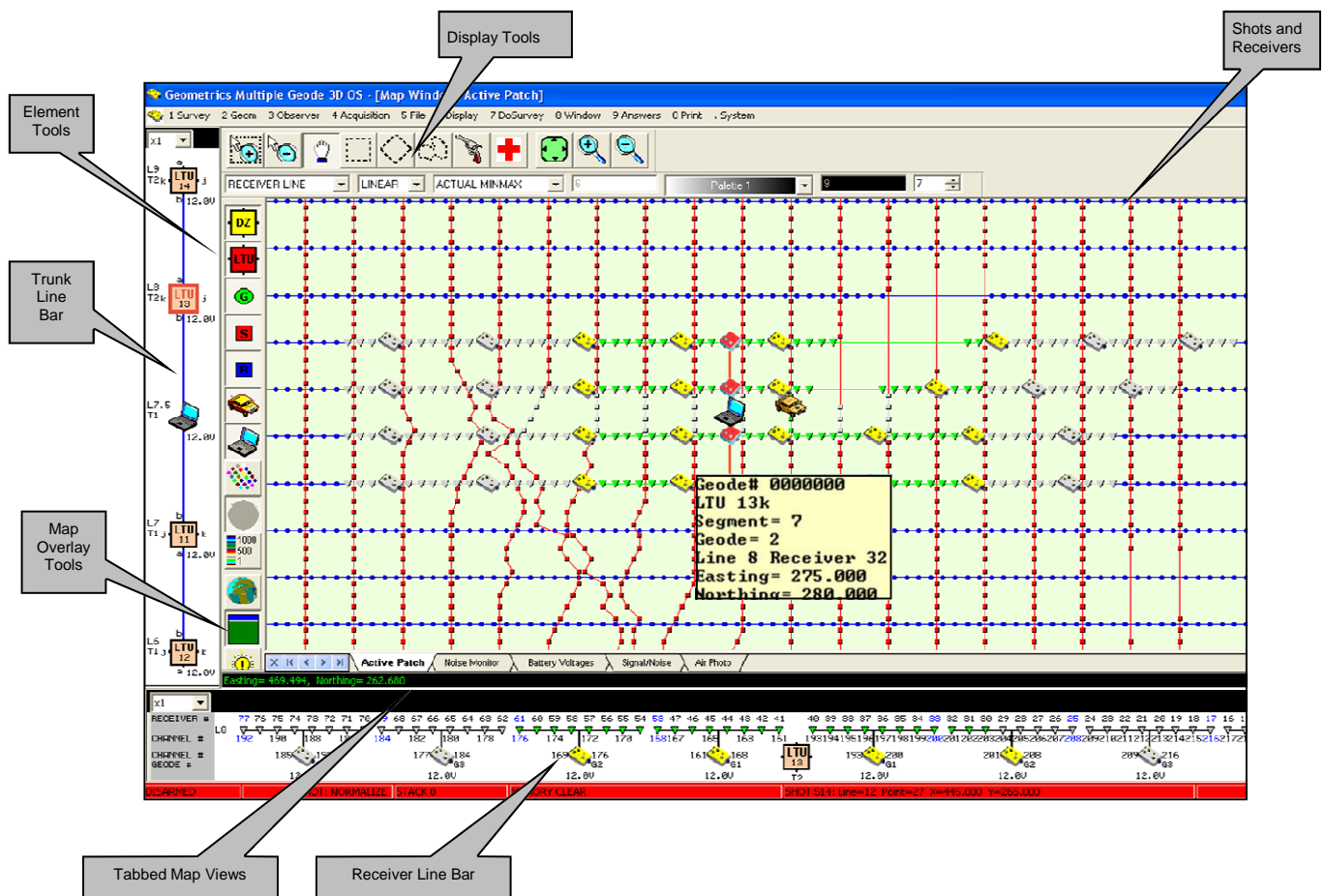
- 16 lines, 480 channels per line

Simplify Your Recording Vehicle With PC-Based Controller.

- Communicates with acquisition system using standard Ethernet

- Supports low-cost peripherals

- Allows easy repair, with fast access to spares

- Uses familiar Windows operating system

Move Faster with Familiar, Easy-to-Remember Windows Paradigm

- Each map window shows survey area and system status at a glance
- Zoom and pan in multiple windows for views of different areas
- Tabs show real-time survey properties:
  - Real-time noise
  - Battery voltage
  - Active patch
  - Signal-to-noise
  - Topography
- Tool bars turn off unneeded icons
- Color-coded shots and receivers display availability
- Hover feature displays tool tips, element characteristics
- Side bars show trunk and receiver line properties
- Icons show clear indication of next shot, past shots, available shots
- Operator can audibly ping modules to alert crew
- Shot order revisions easily accomplished with drag-and-drop shot location

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Get Immediate Visual Access to Your SPS Files.

Sortable and searchable color-coded list windows show availability and status:

- Available receivers with instrumentation
- Phones in current patch
- QC status
- Shots acquired, yet to be taken
- Patch ready to move for the next shot

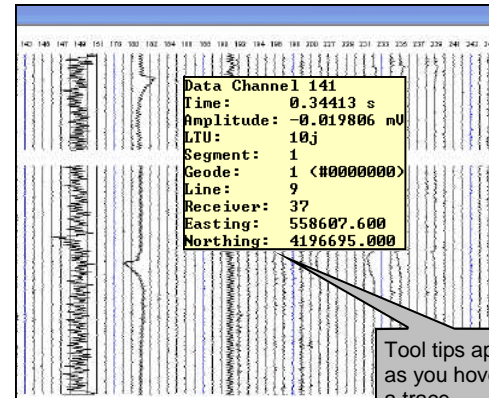Blue highlights means the shot has been completed

Green highlights means the shot can be acquired with the patch currently live

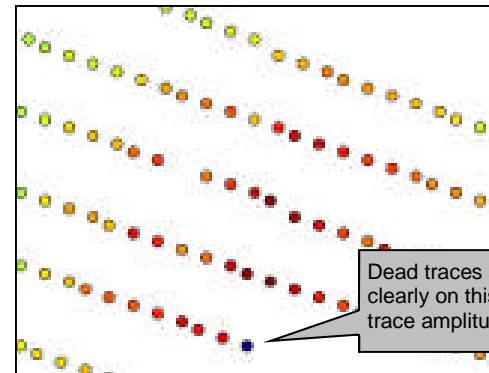Red highlights means the shot requires additional geophones to be deployed

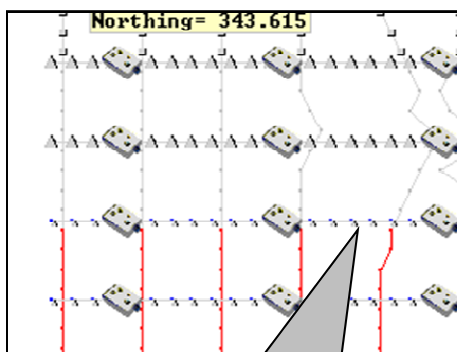# Control Quality at a Glance with Real-time Geometry and QC Tools.

- **Real time full-waveform noise monitor quickly identifies dynamic sources, moving vehicles, pumps, and aircraft**
- **Hover tooltip provides x, y, line and station**
- **Produce audible signal at any box from the controller to debug layout problems**
- **Signal crew location by pressing button on field box indicate location**
- **Real Time Geometry and QC Tools**
  - **Trace RMS**
  - **Noise**
  - **First Break Time**
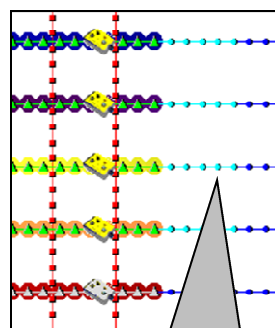- **Attributes displayed in color with A/D module and geophone locations so that problems can be quickly located**


```
Data Channel 141
Time:       0.34413 s
Amplitude: -0.019806 mV
LTU:       10j
Segment:   1
Geode:     1  (#0000000)
Line:      9
Receiver:  37
Easting:   558607.600
Northing:  4196695.000
```
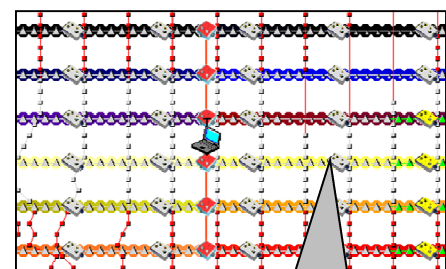
Tool tips appear as you hover over a trace

Dead traces show up clearly on this RMS trace amplitude plot

Northing= 343.615

Size differences on the map show which shots are completed and which geophones can be picked up

Color coding on the map view highlights receiver positions needed for next shot but yet installed

Geometric parameters like line number, distance from next shot, trace number can be color coded to look for errors and inconsistencies.

Find Relationships between All Variables Fast with Dynamically linked Windows
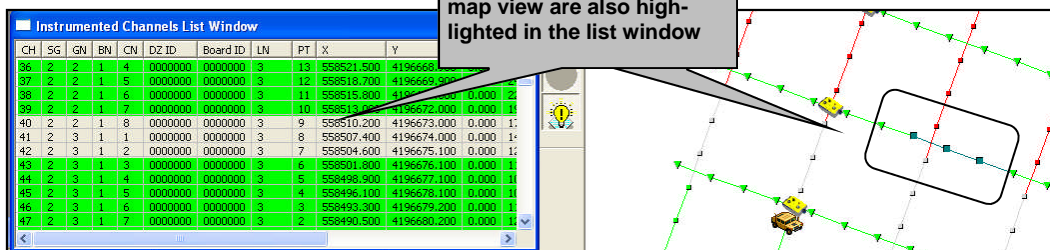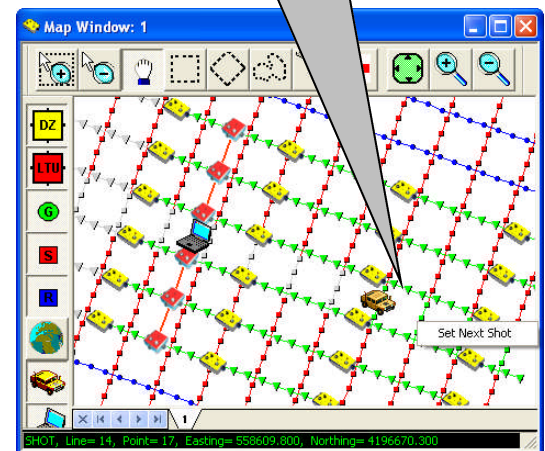
- Selected elements automatically high-lighted in multiple windows

- Problems displayed in windows best suited for identifying and addressing issues

- Test results summarized in onscreen charts allow quick scanning for anomalies

- Associations between variables saved to files for QA purposes

- Anomalous geophones can be high-lighted on the map to determine correlation between bad geophone groups

Setting the next shot can be done by right clicking in either the map or list windows

Geophones Highlighted in map view are also high-lighted in the list window
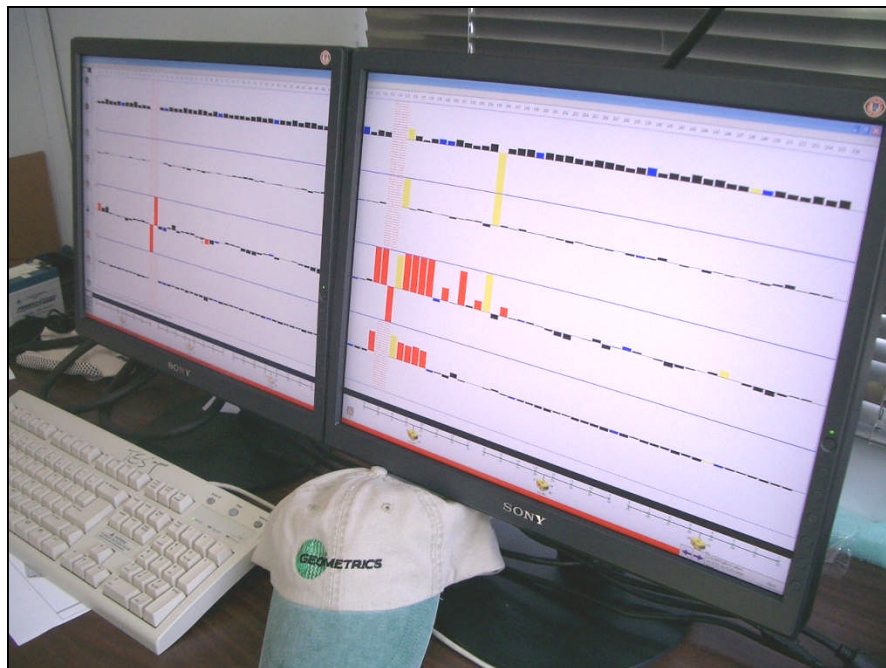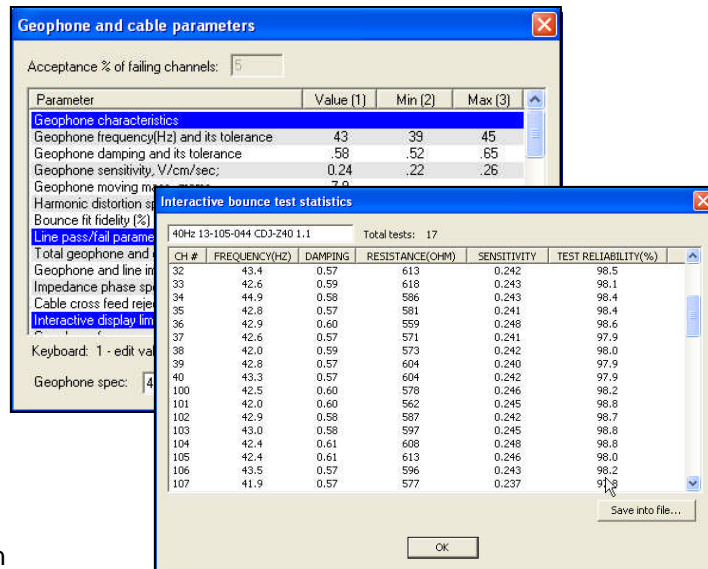
Verify Hardware with Industry-standard Tests .

- **Geophone Line Tests**
  - Resistance
  - Natural Frequency
  - Similarity
  - Impedance
  - Damping
  - Noise
  - Distortion
  - Cross talk
- **Instrument Tests**
  - Noise
  - Gain Similarity
  - Bandwidth
  - Cross-Talk
  - Phase Similarity
  - DC Offset
  - Distortion
  - Common Mode Rejection

Configurations:

- A/D Module: 2, 4, 6 or 8 channels per box, software selectable
- Line Tap Unit (LTU): interfaces to 1 or 2 DZ line segments and to trunk line
- System:
  - Up to 16 lines
  - Up to 2048 channels
  - 480 channels per line (240 channels per line segment)
  - Separate trunk line controls AUX and VIB channels
  - PC based controller with gigabit Ethernet
  - Ruggedized NZ controller for in-field look-ahead test

Electronics:

A/D Conversion: 24-bit

Dynamic Range: 115 dB at 2 ms, 24 dB.

Distortion: 0.0005% @ 2 ms, 1.75 to 208 Hz.

Bandwidth: 1.75 Hz to 8 kHz. Low frequency option available.

Common Mode Rejection: > 100dB at <= 100 Hz, 36 dB.

Cross Talk: -125 dB at 23.5 Hz, 24 dB, 2 ms.

Noise Floor: 0.20 mV, RFI at 2 ms, 36 dB, 1.75 to 208 Hz.

Stacking Trigger Accuracy: 1/32 of sample interval.

Maximum Input Signal: 2.8V PP, 0 dB, 177 mV PP, 24 dB.

Input Impedance: 20 kOhm, 0.02 mf.

Preamplifier Gains: 0, 12, 24 or 36 dB. Consult factory.

Anti-alias Filters: -3 dB at 83% of Nyquist down 90 dB.

Acquisition Filters:
    Low Cut: OUT, 10, 15, 25, 35, 50, 70, 100, 140, 200, 280, 400 Hz Notch: 50, 60, 150, 180 Hz and OUT
    High Cut: OUT, 250, 500 or 1000 Hz
    Display filters: Any user-defined corner frequency.
    Diversity stack and spiking filters for MiniSosie

Sample Interval: 0.02, 0.03125, 0.0625, 0.125, 0.25, 0.5, 1.0, 2.0, 4.0, 8.0, 16.0 ms.

Correlation: Built-in high-speed hardware correlator in each DZ module, before or after stack. Additional s/w correlation in controller for QC display when recording uncorrelated. .

Record Length: 65,536 samples per channel, may be limited by configuration.

Intelligent Event Self-Trigger: Available for micro-seismic, earthquake and vibration monitoring.

Continuous Recording: GPS synchronized for injection monitoring, micro-seismic or earthquake studies

Testing: see separate publication with more details on testing.
- **Instrument Tests**: Noise, DC offset, gain and phase similarity, distortion, bandwidth, timing accuracy, cross feed, CMRR.
- **Line and Geophone Tests:** natural frequency, damping, line resistance, distortion, geophone similarity, cross talk, impedance. Real-time full waveform waterfall-style noise monitor.

Power:

- DZ Module: 12V external battery, 0.5W/ch during acquisition, low power modes available when inactive.
- LTU Module: 12 V external, 3.0W.
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Both LTU and DZ have two power connectors for uninterrupted operation during battery replacement.

Environmental: LTU and DZ: - 40C to +75 C. Submersible.

Physical:
- DZ A/D Module: 16.5 x 24 x 8.25 cm, 2.3 kg.
- LTU Module:16.5 x 16.5 x 8.25, 1.8 kg.
- PC controller: contact factory.
- NZ Look-Ahead Ruggedized Field Controller: see data sheet

Software

Omni-Lite Layout by Gedco: Design, edit, verify, import, export, compare and plot land 3D-survey geometry. Create scripts using new powerful algorithms. Easy to use Wizard allows users to create simple and complex shooting schemes. Integration of DXF, TIFF and Shape files for multi-layered projects. Creates SPS files to be read directly by Geometrics Survey Control Software.

Survey Control Software: Controls initial layout, testing and collection of 2 and 3D seismic data. 'Smart' SPS file system matches instrument to survey coordinate system, alerting operator when hardware mismatches occur. Map window displays shot/unshot status. Non-sequential source-driven shooting supported with multiple vibes/shooters. Integrated QC tools for signal to noise, first break, and RMS amplitude analysis. Flexible displays allow in-field analysis of data frequency content and signal strength.

System:

Data Formats: SEG-2, SEG-D and SEG-Y.
Communication Protocol: 10/100/1000 bit Ethernet depending on module and system requirements
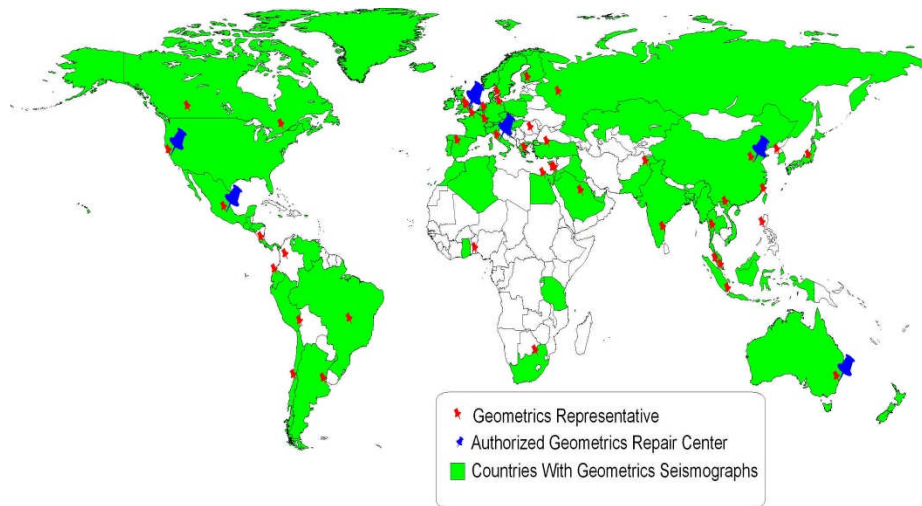**Wake-Up Time:** Approximately 30 s
Operating System: Windows XP.
Plotters: Drives any XP compatible printer/ plotter.
Warranty: Three year parts and labor on Geometrics-built components. Extended warranty available

Support:

Geometrics has service centers located in London, Beijing, Chennai (India), Sydney, Milan and our main facility in San Jose, California. For logistics support, Geometrics has over 30 representative offices around the world. Crew start-up and operation services are also available.

* Geometrics Representative
* Authorized Geometrics Repair Center
* Countries With Geometrics Seismographs

All Geode hardware components are backed by a 3 year warranty. Over 400 Geode systems are in active use. Our customers include:

- **Shell Exploration and Production**
- **Schlumberger**
- **Compagnie Générale de Géophysique (CGG)**
- **Bureau of Geophysical Prospecting (BGP)**
- **Stanford University**
- **University of California at Berkeley**
- **United States Geological Survey**
- **U.S. Army Corps of Engineers**
- **Geological Survey of Japan**
- **WesternGECO**
- **Kansas Geological Survey**
- **Geological Survey of Canada**
- **National Geophysical Research Institute, India**
- **University of Calgary**
- **University of Alberta**
- **University of Texas**
- **Anatolian Geophysics (Oz Yilmaz)**

For a full list of customers or to arrange a demonstration of the Geode, please contact us at one of our offices listed below.

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