ZonicBook/618E™

Portable Vibration Analysis & Monitoring System

Features

- **8 dynamic input channels, expandable up to 56 channels**
- **4 tachometer channels for rotational measurements**
- **High-speed Ethernet connection to the PC for continuous recording**
- **Five eZ-Series software packages address a wide variety of vibration monitoring and analysis applications**
- **TEDS support**

Vibration analysis and monitoring has never been easier than with the new ZonicBook/618E™ and eZ-Series™ analysis and monitoring software. The ZonicBook leverages 25+ years of experience providing vibration measurement solutions. This new Ethernet-based solution adds another dimension — the *lowest cost* full-featured 8 to 56 channel analyzer available. The ZonicBook hardware is the signal conditioning and acquisition engine, while the eZ-Series software in the PC defines the specific analysis and monitoring features of the system.
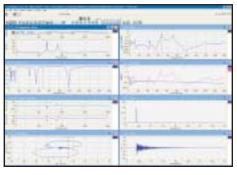
Software Overview

Five software packages are available for the ZonicBook, each tailored to a particular vibration measurement and analysis application. Choose the package that suits your application now, and upgrade to additional packages as your requirements evolve.

- **eZ-Analyst**™ provides real-time multi-channel vibration analysis, including overlay of previously acquired data while acquiring new data, strip charts of the throughput data files, cross channel analysis, and direct export to the most popular MODAL analysis packages, ME Scope and Star Modal.

- **eZ-TOMAS**™ provides on-line vibration recordings, limit checking, storage, and analysis of rotating machinery. Order track, Waterfall, Orbit, Polar, Bode, Spectrum, and Trend displays show machine startup or shutdown events, as well as diagnose long term changes in machine health.

The ZonicBook/618E with eZ-Series software and your PC makes a real-time, portable vibration analysis monitoring system

- **eZ-Balance**™ is used to balance rotating machinery with up to seven planes. A balance toolkit, including Split Weight calculations, supports the balance process. The balance vectors are displayed on a polar plot so the user has a visual indication of the improvement. Time and spectrum plots show detailed vibration measurement during the balance process.

- **eZ-Rotate**™ provides in-depth post acquisition analysis of measurements made by the ZonicBook on rotating machinery. Special emphasis is on order normalization and order tracking by re-sampling the time domain data acquired from eZ-Analyst. eZ-Rotate displays order tracked waterfall, Bode plots of Phase and Magnitude, order tracks of amplitude vs. RPM and color speed spectrum maps.

- **eZ-NDT**™ package is exclusively used in production applications to determine the quality of composite-metal products at production rates of 1 part per second.

eZ-Analyst software with the ZonicBook/618E and your PC makes a real-time, portable vibration and acoustic analysis system

Refer to the following pages for detailed information on each of the software packages. Demo software is also available from our website at **iotech.com/zonicbook**, or contact IOtech to schedule an on-site demonstration of the ZonicBook by one of our regional sales engineers at *your* facility.

Attention Current ZonicBook and *Medallion* Users

For a limited time, you can trade in your current ZonicBook or *Medallion* for a new ZonicBook/618E.
Contact the factory for special upgrade pricing.

PC Data Acquisition Hardware

Hardware Overview

The heart of the ZonicBook is a high-speed Ethernet engine powered by a PowerPC processor, enabling *all* acquired data to be transferred to the PC in real time at 2+ Mbytes per second. This means that *every* acquired data point can reside on your PC's hard drive, making recreation and post acquisition analysis of acquired data as precise as possible. Other analyzers simply store frequency-domain information, which makes play-back less precise than the original real-time measurement. Instead, ZonicBook transmits *all* time-domain measurements, which means there's no data loss when analyzing acquired waveforms. Since the data is already on your PCs hard drive, there's no time lost transferring data, as with other analyzers.

Another advantage of the ZonicBook architecture is there is virtually no limit to the length of time that continuous data can be acquired. Other systems do not offer continuous time-domain transfer to the PC, and as a result the waveform length is limited by the amount of built-in data storage. With the ZonicBook, the only limitation is the amount of hard disk memory that can be added to your PC, or that can be accessed by your PC on a network.

Finally, our architecture makes expansion beyond the 8 built-in channels less expensive than other suppliers. You can expand the ZonicBook in 8-channel increments up to 56 channels, and each additional 8 channels are approximately one third the cost of the first 8 channels. *All* channels in a ZonicBook system are measured synchronously, providing 1 degree phase matching between channels.

Signal Conditioning

Every input to a ZonicBook system is software programmable for voltage range, AC/DC coupling, ICP® source, and is capable of reading sensor calibration information using Transducer Electronic Data Sheet (TEDS).

When ICP sensors are attached, AC coupling with 4 mA bias current is selected via software. AC coupling without bias is also possible for measuring any AC waveform from 25 mV to 5V full scale. DC coupling is also software selectable, with full scale ranges from 25 mV to 25 VDC coupling is particularly useful when attaching proximity sensors.

To insure that the sensor has not operated outside of its desired range, limits for each channel can be programmed to illuminate a front-panel LED for each channel if a limit is exceeded. LED status is latched when the limit is exceeded, allowing the operator to know whether an over-range condition has occurred at any time during an acquisition. Over-range status information is also available via eZ-Analyst software.

The ZonicBook also senses whether there is an open ICP sensor attached, and illuminates a front-panel LED indicating which channel is open. As with over-range, this information is also available via the eZ software packages.

Each analog input channel is provided as a conditioned analog output on the rear panel of the ZonicBook. The output signals are post-filtering and can be used to drive other recording devices.

Source Output

The ZonicBook includes one analog output channel, capable of generating continuous or swept sine, with programmable amplitude up to 5V and frequency up to 5 kHz. Each 8-channel WBK18 option also includes one analog output channel capable of generating the same range of sine wave outputs as the ZonicBook.

Measurement

The dynamic range of the ZonicBook on a single range and measuring a single channel is 70 dB. The ZonicBook offers a wider *effective* dynamic range than most other instruments because of the number of programmable ranges that are possible. Eight ranges, from 25 mV to 5V full scale can be software selectable on a per-channel basis.

All channels are sampled synchronously, resulting in better than 1 degree of phase matching between channels. The maximum per-channel bandwidth is a function of the number of channels enabled. For example, up to 4 channels can be enabled using the maximum bandwidth of 100 kHz, while 50 kHz is the maximum bandwidth when 8 channels are enabled, and 20 kHz is the maximum bandwidth in a 16 channel system. A programmable low-pass filter insures that unwanted frequencies are rejected before being sampled, with rejection of 75 dB minimum.

Power

The ZonicBook can be powered directly from a 10 to 30 VDC source, including a standard automotive battery, or can be powered from any 100 to 250 VAC source. For portable applications where no power is available, an optional battery pack which also serves as a UPS is available. With an 8-channel ZonicBook system, the DBK34A battery/UPS provides approximately two hours of operation.

The DBK34A rechargeable lead-acid battery/UPS (uninterruptible power supply) module

PC Connection

The ZonicBook has a 10/100BaseT Ethernet interface for connecting to the PC. It can be used in a point-to-point application, as in the case where it is attached to a notebook PC and used in the field. In this case the 2 Mbytes of buffer storage built into the ZonicBook is adequate to insure that continuous data transfers to the PC can occur without risk of data loss.

The ZonicBook is also capable of attaching to a network, presuming the network has enough available bandwidth. The network bandwidth required is a function of the number of signals being measured, and the bandwidth of the signals. The built-in 1 Msample of memory can be expanded up to 64 Msamples via an internal WBK30 memory option (factory installed).

If continuous, multi-channel measurements are required, it is recommended that a separate Ethernet connection between the ZonicBook and the PC be established to insure uninterrupted data transfer.

Tachometer Inputs

The ZonicBook has four separate inputs for measuring Tachometers. To accommodate a wide variety of tachs, each input is programmable for input range up to ±75V. Tach inputs have programmable AC/DC coupling, threshold level, and counter or period mode. Tach waveforms can be captured in realtime just like any other analog input, allowing real-time troubleshooting of tachometers. Tach inputs are used by eZ-Analyst and eZ-TOMAS software to determine relationships between frequency domain input channels and a known input frequency source

Digital I/O

Eight bits of digital I/O are provided via a front panel removable screw terminal. Each bit is programmable as input or output, with outputs capable of sinking 150 mA to drive relays directly.

Analog Channel Expansion

The WBK18 provides a full set of features for making dynamic signal measurements

The ZonicBook's 8 built-in channels can be expanded in 8-channel increments by attaching the WBK18 option, up to a total of 56 analog input channels. Each WBK18 adds 8 channels having the identical features as the ZonicBook's 8 built-in channels. Unlike other analyzers, expansion channels are nearly one third of the cost of

the main unit, and thus a large system can be assembled with increasingly lower cost per-channel. Each WBK18 adds approximately 1.5 inches (3.81 cm) in height to the system and 1.3 kg (2.9 lbs) in weight.

The ZonicBook expands to meet your testing needs

Vehicle Network Measurements

The DBK70 can easily be integrated with any of IOtech's data acquisition products

The ZonicBook is capable of making vehicle network measurements, including J1850 VPW, J1850 PWM, ISO-9141, CAN, J1939, and Keyword2000, via the DBK70 vehicle network option. The DBK70 can be configured to acquire network information from up to 4 different vehicle networks concurrently. Each pre-defined parameter acquired by the DBK70 is then converted to an analog voltage which is digitized by the ZonicBook via one input channel per parameter. The acquired network parameter is measured concurrent with other ZonicBook inputs, making it easy to correlate the network measurements to other signals measured by the ZonicBook.

Specifications

General

Environment
   Operating: 0˚ to 50˚C, 0˚ to 95% RH, non-condensing
   Storage: -20˚ to 70˚C
Power Consumption: 2.3A max @ 15 VDC
Input Power Range: 10 to 30 VDC, or 100 to 240 VAC
Vibration: MIL STD 810E, categories 1 and 10
PC Communication: 10/100BaseT Ethernet
Dimensions: 285 mm W x 220 mm D x 70 mm H (11" x 8.5" x 2.70")
Weight: 2.38 kg (5.25 lbs)
Warm-Up: 30 minutes to rated specifications
Throughput Rate: >2 Mbytes/s
Internal Data Storage: 1 Msample built-in, 64 Msample optional (factory installed)

Analog Specifications

Analog Inputs

Channels: 8 single-ended input channels, expandable up to 56 channels with six WBK18 modules
Input Connector: 1 BNC per channel
Input Impedance: 200k Ohm (single-ended)
Input Coupling: AC, DC (software programmable per channel)
High-Pass Filter: 0.1 Hz or 1 Hz (software programmable per channel)
Input Ranges: ±25V (DC coupled only), ±5V, ±2.5V, ±1V, ±500 mV, ±250 mV, ±100 mV, ±50 mV, ±25 mV (software programmable per channel)
Overrange Detection: Programmable from 1% to 100% of range
Overrange Indication: Front panel, one LED per channel, software status
Low-Pass Filter (software programmable per channel)
   Type: 8-pole Butterworth with simultaneous sample-and-hold (SSH)
   Cutoff Frequency (F_c): 10 Hz to 200 kHz in 1-2-5 progression
   Alias Rejection: 75 dB min
   Channel-to-Channel Phase Matching: 1˚ typ, 2˚ max
   Unit-to-Unit Phase Matching*: 1˚ typ, 2˚ max
   SS&H Latency: 100 ns max
Amplitude Accuracy:** ±0.5 dB ($F_{in} \le F_c/2$)

Accuracy at 0° to 50°C (32° to 122°F)			
	±% of Reading		
Range	Typical	Maximum	Offset
±25V	0.50	1.0	±15 mV
±5V	0.15	0.3	±3 mV
±2.5V	0.15	0.3	±2 mV
±1V	0.15	0.3	±1 mV
±500 mV	0.15	0.3	±1 mV
±250 mV	0.15	0.3	±1 mV
±100 mV	0.15	0.4	±1 mV
±50 mV	0.15	0.4	±1 mV
±25mV	0.20	0.4	±1 mV

* Conditions for Low-Pass Filter Phase-Matching
   8-pole LPF mode, 0.1 Hz or DC HPF mode
   1 Hz ≤ ($F_{in} \le F_c/2$)
   200 Hz ≤ F_c ≤ 20 kHz
** Condition for Amplitude Accuracy
   For F_{in} <20 kHz

PC Data Acquisition Hardware

Total Harmonic Distortion: -70dB typ
ICP Bias Source: 4 mA, 24V compliance (on/off software programmable per channel)
ICP Fault Detection Thresholds: <1V (short), >25V (open)
ICP Fault Indication: Front panel LED per channel, software status
Coupling: AC, AC with ICP or DC, programmable on a per-channel basis

Trigger Input (TTL Compatible)
Connector: BNC
Input Signal Range: 0 to 5V, TTL compatible
Input Characteristics: TTL compatible with 10K Ohm pull-up resistor
Input Protection: Zener clamped, 0.7V to +5V
Latency: 300 ns max

Conditioned Analog Outputs
Each analog input signal is provided as a conditioned analog output on the rear panel
Channels: 8
Signal Connection: Female DB9
Amplitude: 0 to ±5V max
Output Impedance: 50 Ohm
Protection: 26V transient voltage suppressor

Source Output (Excitation Source)
Channels: 1
Signal Connection: BNC
Frequency Range: 1 Hz to 5 kHz
Frequency Resolution: 0.01 Hz
Amplitude Settings (p-p): 10V, 5V, 2V, 1V, 500 mV, 200 mV, 100 mV, 0 mV
Waveform Modes: Continuous sine, Sweep sine
Output Impedance: 50 Ohm
Accuracy: ±0.1 dB

Analog Triggering
Hysteresis Level: 1/600 of the comparator range
Maximum Trigger Latency
  Pre-Trigger: 300 ns + T; where T equals the pre-trigger scan period
  Post-Trigger: 300 ns
Trigger Jitter
  Pre-Trigger: 50 ns + T; where T equals the pre-trigger scan period
Post-Trigger: 50 ns

Sequencer
Operation: Programmable for channel, gain, and for unipolar/bipolar range in random order
Depth: 128 location
Maximum Repeat Rate: 1 MHz
Minimum Repeat Rate: 100 seconds per scan
Expansion Channel Sample Rate: Same as for direct channels

Tachometer Inputs
Channels: 4 differential
Connector: BNC
Input Impedance: 20 Ohm SE, 40K Ohm DE
Input Voltage Ranges: -50V to +50V specified, -75V to +75 maximum
Resolution (V/bit): 0.002307
DC Accuracy: 0.25% of reading + 200 mV offset
Noise: 5 mVrms (typical); 10 mVrms (maximum)
Common Mode Rejection: -70 dB typical (0 to 60 Hz); -40 dB guaranteed (0 to 60 Hz)
Coupling: AC or DC, programmable
Analog Sampling Bandwidth: DC to 1 MHz
Input Threshold: -12.5V to +12.5V referred to input, programmable in 100 mV steps
Threshold Accuracy: 2% of setting +125 mV offset
Input Hysteresis: 50 mV minimum, 100 mV maximum
Input Frequency: DC to 5 MHz
Sensitivity: 500 mVpp DC to 1 MHz; 5 Vpp 1 MHz to 5 MHz
Debounce Time: 500 ns after stable
Time Base Accuracy: 10 ppm (0˚ to 50˚C)

Digital I/O lines
Channels: 8, programmable as all inputs or all outputs
Power-Up Mode: Inputs pulled high
Connector: Removable screw-terminal block
Output Type: Open-drain DMOSFET
Output Pull-Up Resistor: 27K Ohm to +5V
Output Sink Current: 150 mA/output continuous, 500 mA output peak (<100 µs), 150 mA total continuous (per bank of 8 outputs)
Output Voltage Range: 0 to +5V, no external pullup required; 0 to +30V, with external pullup resistor
Output Resistance: 10 Ohms maximum
Input Characteristics: TTL-compatible; can be scanned along with any other channel

Ordering Information

Description	Part No.
8-channel vibration measurement system with one eZ-Series software package:	
Includes eZ-Analyst	ZonicBook/618EZA
Includes eZ-Balance	ZonicBook/618EZB
Includes eZ-TOMAS	ZonicBook/618EZT
Includes eZ-NDT	ZonicBook/618EZNDT
8-channel vibration measurement system with eZ-Analyst and eZ-TOMAS	ZonicBook/618EZAT
8-channel expansion option for the ZonicBook/618E	WBK18
Battery/DC UPS option	DBK34A
Vehicle network interface	DBK70
128 Mbyte memory option	WBK30

Accessories & Cables
Additional handle (one is included)	HA-111
Ethernet patch cable, 1.5 ft.	CA-242
Ethernet patch cable, 7 ft.	CA-242-7

CE Compliant Cables
1 male BNC to male BNC	CA-150-1
8 male BNC to male BNC	CA-150-8

Software
Real-time vibration analysis and recording software	eZ-Analyst
Post-acquisition vibration analysis software for rotating machinery	eZ-Rotate
Enhanced post-acquisition vibration analysis software	eZ-Rotate*Plus*
Machine vibration monitoring software	eZ-TOMAS
Machine balancing software	eZ-Balance
Quality inspection software	eZ-NDT

Related Products

Hardware

Software

PC Data Acquisition Hardware