Fieldpaq 2+1 channel dynamic signal analyzer

New Standard for Advanced Sound & Vibration Test in the Field

Benstone Instruments, Inc.
Advancing Signal Science

State of the Art Technology

Powered by the MS Windows CE ™ operating system, fieldpaq offers a very intuitive and user-friendly operation. Fieldpaq supports a compact flash card storage system and USB interface for storage of large data files and simple transfer via USB port. With a high resolution 65,536 color TFT display, you can clearly view your data on the fieldpaq. Driven by the most powerful DSP chip (TI 67x series), fieldpaq can perform most advanced analysis at extremely high real-time rates.

Modularized Application Software

You may choose to purchase optional software modules for your fieldpaq. The following application programs are available from Benstone Instruments:
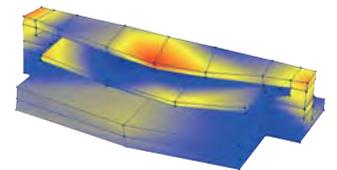
FFT Spectrum Analysis

Fieldpaq's powerful FFT program allows you to conduct cross-channel analysis such as FRF, coherence, and cross power spectrum that are required for modal testing, ODS testing or sound intensity measurements. This program also supports waterfall measurements, showing continuous spectrum maps over a period of time, or over a rotational speed range.
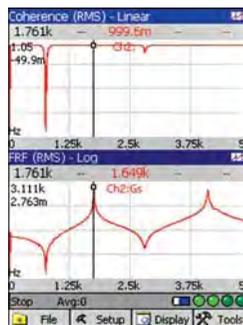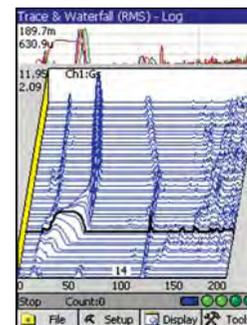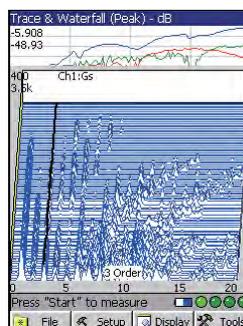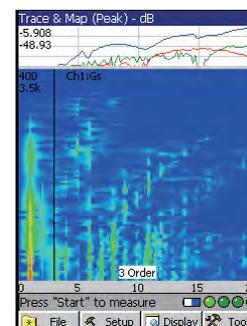
FRF and Coherence   Waterfall and trace plot   Structural modal shape

Computed Order Tracking

The computed order tracking program calculates the amplitude and phase of specified orders during a start-up or coast-down process. Fieldpaq's order tracking algorithm performs real-time digital re-sampling for ensuring accuracy of data. The order spectrum data can be displayed on a waterfall plot or intensity map. One may cut a slice or a trace of data from the waterfall plot and then examine the individual traces.

BORN FOR IN-FIELD TESTING

Fieldpaq supports dual channel real-time measurements, and for some software modules, it can perform 3-channel simultaneous measurements. Weighing only 1.2 kg (2.6 lb), it can be held and operated with one hand. The fieldpaq has an IP65 rated package and rubber armor designed for harsh environments. Expect up to 12 hours continuous operation in the field between recharging with a built-in state of the art high capacity lithium-ion battery.

Order tracking: waterfall and trace plot

Order tracking: intensity map and traces

Order tracking: polar plot of a trace

signal analyzer

## ibration Test in the Field

Rotor Balancing

The fieldpaq can balance any single plane, dual plane or overhung rotor in the field without moving the rotor onto a balancing machine. The balancing program of fieldpaq is simple, yet versatile. You may find the following utilities in the rotor balancing program:
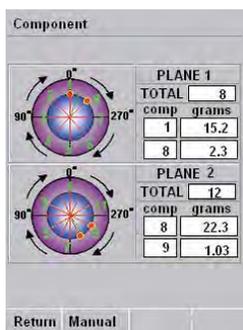
- component calculation
- built-in ISO 1940 standard
- 3 plane balancing (couple + static)
- review balancing history
- 3 equal-weight balancing
- drill depth calculation
- unequal radii calculation
- review vibration history
- printout of a report to a thermal printer
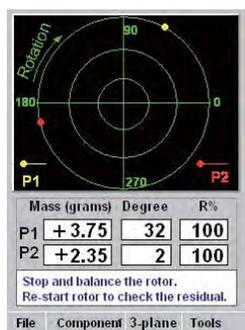

Balancing data and polar plot
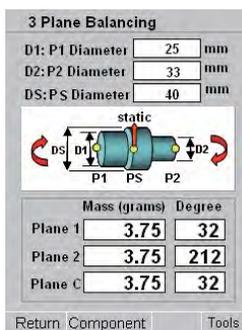
3 plane balancing

Component calculation

3 Channel Route-Based Data Collector

The data collector program supports simultaneous triaxial measurement, saving many work hours in the field. Demodulation spectrum analysis is a standard feature for identifying bearing faults at earlier stages of bearing failure. Temperature and other process parameter measurements are also supported in the data collector program.
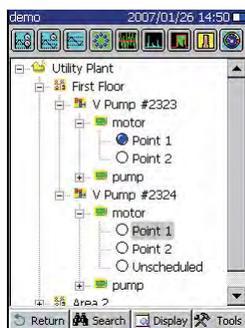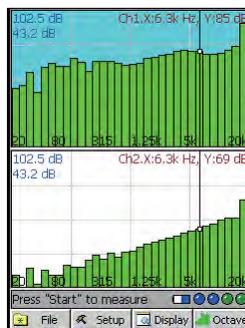

Hierarchy data of a route
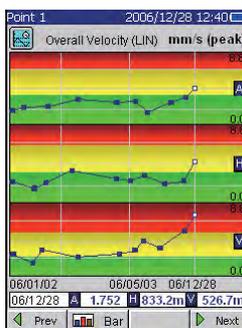
Triaxial measurements on trend charts
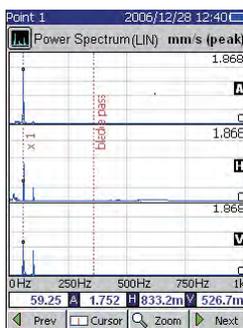
Triaxial spectrum plots

3 Channel Vibration Meter

Fieldpaq's vibration meter program performs accurate measurements of overall vibration levels with uniaxial accelerometers connected to Ch. 1 and Ch. 2, or connect a triaxial accelerometer to channel 1 for overall vibration levels measured real-time (x,y,z). Display the results to a trend chart, bar chart, or record the data continuously to a file. This program also supports HAV (hand-arm vibration) measurement.
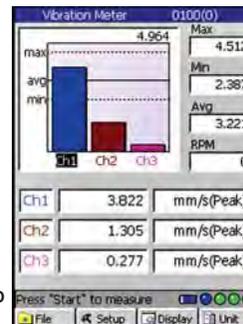
3 channel vibration meter

Bearing Analysis

Fieldpaq's bearing analysis program uses a patented "wavelet based Hilbert Transform algorithm," which shows a very clear spectral pattern and low levels of side band in the demodulated spectrum. With a built-in database of over one million bearings, one can easily identify the bearing frequencies on a demodulated spectrum.
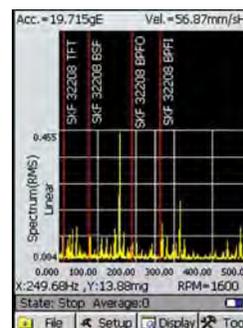
Demodulated spectrum and bearing frequencies

Raw Data Recording

Directly record raw time data to the built-in compact flash card. For example, a 1 gigabyte file will contain approximately 2.9 hours of continuous data with two channels recording at 5 kHz bandwidth.The fieldpaq is Windows CE ™ that supports current compact flash card technology, meaning that as compact flash cards increase in size, you will be able to install and use the higher data density compact flash cards for your raw data recording needs. The recorded data can be viewed directly on the fieldpaq or transferred to your PC and viewed with other software.
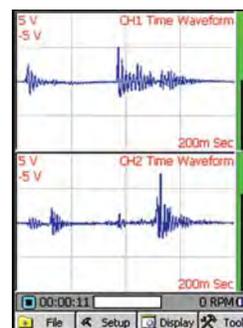
Live display of raw data recording

Octave: 1/3 octave plot

Octave Analysis

The octave program utilizes real-time digital filtering to generate full octave, 1/3 octave or 1/12 octave spectrums. Conforming to the IEC 61260 & IEC 61672 standards, the octave program is best suited for acoustic or vibration measurement in the field.

Specification

Hardware Feature	Technical Specifications
Operating system	Windows CE™
Number of input channels	2 analog channels and 1 aux channel, channel 2 supports triaxial input
Connector of input channels	Analog: 4 pin Lemo, Aux: 6 pin Lemo
Channel coupling	AC, DC, IEPE
Aux channel	TTL in (external trigger), TTL out, RS-232C
DSP processor	TI TMS320C6713
External memory	Compact flash card
Battery	rechargeable L-ION 8.4V 5400 mAhr, up to 12 hours continuous operation
PC communication interface	USB 1.1, mini B type USB connector
LCD display	240 x 320 bright active matrix TFT; 65,536 colors
Operating temperature	-10 degree C to + 60 degree C
Safety certifications	CE mark
Dust and water proof	IP 65
Weight	2.6 lb (1.2 kgs)
Size	5.1 x 9.4 x 3.1in. (130 x 240 x 80mm)
Max input signal range	±20 Volt
Dynamic range	>90 dB
Frequency range	0 Hz to 40 kHZ

Feature for FFT Analysis

FFT real time rate	40 kHZ, single channel @12800 lines
FFT resolution	100-12,800 lines
Windows	Hanning, flattop, rectangular, force, exponential
Analysis function	Spectrum, power spectrum, cross power spectrum, FRF, time waveform, orbit and coherence.
Engineering units	Automatic units transform with predefined table
Zoom FFT	Yes
Average	Linear, exponential, time, peak hold
Input signal range	± 10mV, ±20mV, ±50mV, ±100mV, ±200mV, ±500mV, ± 1V, ±2V, ±5V, ±10V, ±20 V, auto range, range up only.
Trigger	External, input channel triggering, pre/ post triggering.
Cursor	Single, harmonic, harmonic+ single, peak, mark cursor.
Waterfall mode	Display in waterfall plot or intensity map, armed by time or rpm step

Feature for Rotor Balancing

Rotor type for balancing	Single plane, dual plane, overhung rotor, 3 balancers
Balancing speed	60 rpm to 300,000 rpm
Order resolution	Low, normal, high, 0.03, 0.015, 0.008, and 0.004 orders
Average number	10, 20, 50 and 100 times
Balancing grade	Built-in ISO 1940 standard or user defined
Tools	3 plane balancing (static and couple), unequal radii, Component calculation, drill depth, vibration history, balancing history.

Feature for Computed Order Tracking

Measurement types	Order trace, order spectrum and waterfall display.
Rotation speed	6 rpm to 480,000 rpm
Order resolution	0.5, 0.25, 0.125 and 0.0624
Max. number of traces	User selectable 16 orders plus overall traces.
Max. order	800 order
Waterfall display	Adjustable waterfall plot and intensity plot.
Waterfall cursor	RPM cursor and Order cursor.
Y-Axis of order traces	Linear, log, dB, real, image, phase and polar plot.

Feature for Vibration Meter

Types of vibration	Acceleration, velocity and displacement
Types of detection	RMS, peak, peak to peak, true peak and quest factor
Filters	2Hz-1kHz, 5Hz-1kHz, 10Hz-1kHz, 2Hz high pass, 5Hz high pass, 10Hz high pass and user defined.
Display	trend chart (vibration vs. time or rpm) or bar chart
Severity	ISO 10816-3 or user defined

Feature for Bearing Analysis

Max frequency band	10 kHz
Max resolution	12,800 lines
Demodulation Filters	500Hz-2kHz, 1kHz-2.5kHz, 2kHz-5kHz, 5kHz-10kHz, custom
Bearing database	Built-in common used bearings' fault frequencies
3D scanning	Scan the demodulation filters from 1kHz to 10kHz and show the results in a 3D plot
Overall bearing vibration	Envelope acceleration and high pass velocity.

Feature for Octave Analysis

Octave spectrum	Full octave, 1/3 octave and 1/12 octave
Maximum band with 2 channel on	Full octave: 32k Hz, 1/3 octave: 20kHz, 1/12 octave: 10kHz
Maximum band with 1 channel on	Full octave: 32kHz, 1/3 octave: 40kHz, 1/12 octave: 20kHz
Integration time (second)	1/128, 1/64, 1/32, 1/16, 1/8, 1/4, 1/2, 1, 2, 4
Detection method	Fast, slow, impulse, linear
Trigger sources	Off, external, input channels, manual
Weighting	A, C or flat

Feature for Data Collector

Types of measurement	Overall acceleration, overall velocity, overall displacement, overall bearing vibration (envelope acceleration and high pass velocity), time waveform, power spectrum, demodulated spectrum, temperature, process parameters.
Vibration sensors	Support simultaneous 3 axis measurement or uni-axial
Overall display	Bar chart or trend chart (shown with latest 9 historical data)
Spectrum display	Show band alarm or fault frequencies.
Time waveform display	Show waveform and/or orbit
Search	Search train, machine or point
Tools	Add note, skip point, hide archive points, show all points, show archive points only, insert or delete unscheduled points

Feature for Data Recorder

Recorded data	Raw time data and TTL tacho signal
Monitor display	Waveform or spectrum (resolution 100, 200 or 400 lines)
Storage media	Compact flash card
Data review	Playback block by block, fast forward or rewind
Maximum file size	1 Gigabyte each
Maximum sampling rate	51.2 kHz for 1 channel, 25.6kHz for 2 channels