http://www.benstone.com

impaq 4 channel dynamic signal analyzer

BENSTONE INSTRUMENTS, INC.
32905 Northland Court- St. Paul, MN 55045
Telephone: 651-257-6500
Fax: 651-357-4004
http://www.benstone.com
email:sales@benstone.com

S/E 108-2006.02 Tel:04-2322 7907

impaq 4 channel dynamic signal analyzer

New Standard for Advanced Sound & Vibration Measurement in the Field

Benstone Instruments, Inc.
Advancing Signal Science

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Born for in-Field Testing

Impaq is designed for those who need to perform advanced multi-channel sound and vibration measurements in the field. Unlike most PC-based analyzers that require a power cord and a gate leg table to setup a test, impaq integrates all the necessary subsystems into a compact, 1.15kg (2.54 lbs) metal housing. Each impaq is equipped with a long lasting Lithium-ion battery, which enables you to work continuously for at least 8 hours in the field. Simply put, impaq streamlines your infield testing.

Powered by the MS Windows CE™ …

Powered by the MS Windows CE™ operating system, impaq offers a very intuitive operation and user friendly navigation of menus. This powerful operating system supports Compact Flash memory storage and USB interface. The impaq utilizes both of these features to provide unlimited storage and simple connectivity to your computer. With a high resolution color TFT display, now you can easily view your data of different channels on the impaq.

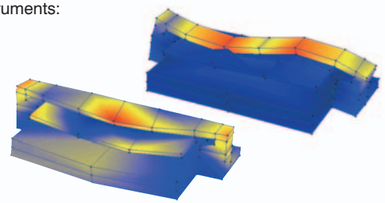
High Speed DSP Programming

Equipped with the fastest commercially available DSP chip in the world (TI 67x series), the impaq can perform most advanced analysis in real-time. One example is a real-time FFT analysis performed at 40 kHz with 12,800 lines of resolution.

MODULARIZED APPLICATION SOFTWARE

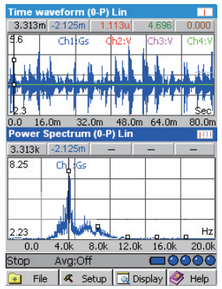
Because every person may have different needs for his own tests, we have made the application software completely modularized. It is very easy to install different application software to an impaq or download an updated version from our website. The following application programs are available from Benstone Instruments:

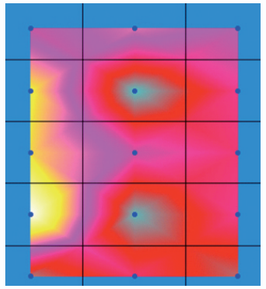
FFT Spectrum Analysis:



Impaq's powerful FFT program allows you to conduct cross-channel analysis such as FRF, coherence, and cross power spectrum that are required for modal test, ODS testing or sound intensity measurements. This program also supports complex spectrum measurements, which offer both the phase and amplitude information needed for advanced analysis.

- Modal testing
- Operational deflection shape measurement
- Sound intensity measurement
- System identification



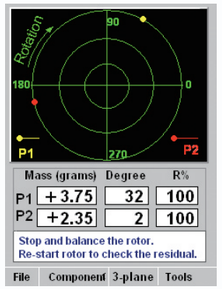


Sample data transfer from Impaq's power FFT program to 3rd party software to create animated modal shapes and sound intensity maps.

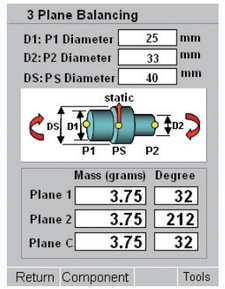
Rotor Balancing:

The impaq can balance any rotor in the field without moving the rotor onto a balancing machine. The balancing program of impaq is simple, yet versatile. You may find the following utilities in the rotor balancing program:

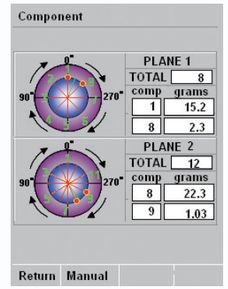
- Component calculation
- Drill depth calculation
- Allowable residual unbalance from ISO 1940 standard
- Unequal radii calculation
- 3 plane balancing (couple + static)
- Review of your vibration history
- Review of your balancing history
- Printout of a report to a thermal printer
- Balancing an overhung rotor
- 1 plane balancing
- 2 plane balancing



Rotor Balancing



3 Plane



Component Calculation

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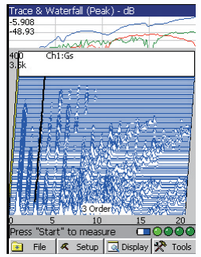
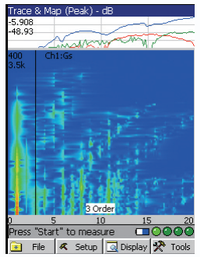
Computed Order Tracking

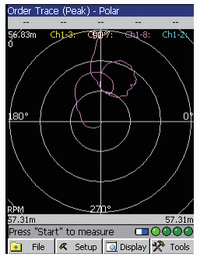
The computed order tracking program is used to analyze the sound or vibration signals of a varying speed machine. It calculates the amplitude and phase accurately of specified orders during a start-up or coast-down process. Thanks to the power of the high-speed DSP chip, impaq's order tracking algorithm performs digital re-sampling of the measured data 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.



Waterfall Plot



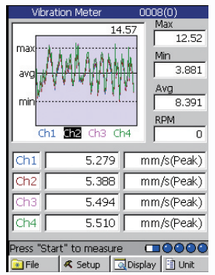
Intensity Plot



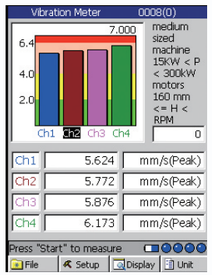
Polar Plot

Vibration Meter

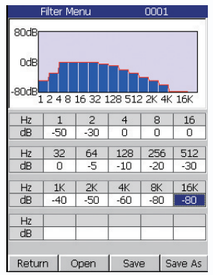
The overall vibration level is a basic parameter for determining a machine's operational condition. By simulating the operation of an analog meter, impaq's vibration meter program performs time domain integration, filtering and root mean square (RMS) calculations for accurate measurements of vibration levels. One to Four channels can be measured at the same time, displaying the results to a trend chart, bar chart, or you may record the data continuously to a file. Easily check vibration severity with the built-in ISO 10816-3 standard. The user may select different filter settings, or create a user defined filter for special measurements. This program also supports HAV (hand-arm vibration) measurement.



Trending



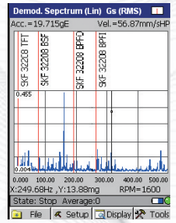
Bar Chart



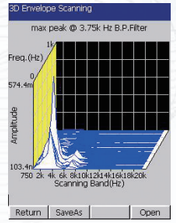
User Defined Filter

Bearing Analysis

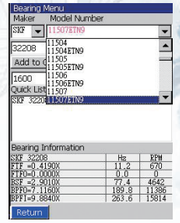
When the element of a bearing develops a defect, it will crate repeated spike signals and excite the natural frequencies of the structures. By taking advantage of demodulation technology, one may see the fault frequencies of a bearing on a demodulated spectrum at its early stage of damage. Impaq's bearing analysis program uses a **patented** "wavelet based Hilbert Transform algorithm", which shows very clear spectral pattern and low levels of side band in the demodulated spectrum. With a built-in database of bearings, one can easily identify the bearing frequencies on a demodulated spectrum. In this program, one may conduct a scanning process and show the results on a 3D plot, and then select the appropriate filter for best measurement quality results.



Bearing Frequencies



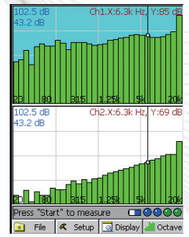
3D Scanning



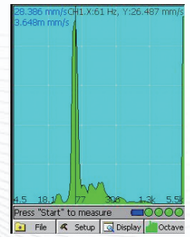
Bearing Database

Octave Analysis

The octave program utilizes real-time digital filtering technology to generate 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. For vibration measurement, the octave program can perform time domain integration and then transform the acceleration spectrum into a velocity or a displacement spectrum.



2 Channel 1/3 Octave

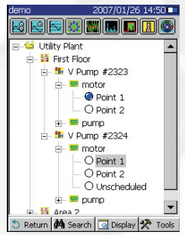


1/12th Octave plot

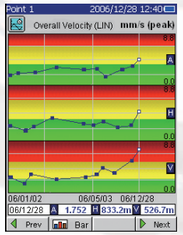
Route-Based Data Collector

The data collector program can collect a large quantity of vibration data according to a predefined route. This software supports tri-axial vibration measurement simultaneously (real-time), 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.

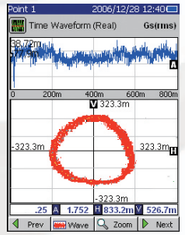
Power Specturm



Typical Route Setup



Overall Velocity Trending



Time Waveform and Orbit plot

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Specification

Hardware Feature	Technical Specifications
Operating system	Windows CE™
Number of input channels	4 analog channels and 1 aux channel
Connector of input channels	Analog: 7 pin Lemo, Aux: 6 pin Lemo
Channel coupling	AC, DC, IEPE, 200V microphone, 0V microphone
Aux channel	TTL in (external trigger, TTL out, RS-232C)
DSP processor	TI TMS320C67x
External memory	Compact flash card
Battery	L-ION 8.4V 5400 mAhr, rechargeable
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 deg C to + 60 deg C
Safety certifications	CE
Sealing	IP 65
Housing material	Aluminum alloy
Weight	2.4 lb (1120 grams)
Size	4.5 in x 8.9 in x 2.56 in. (115 mm × 227 mm × 65 mm)
Max input signal range	±20 Volt
Dynamic range	>90 dB
Frequency range	0 Hz to 40kHz

Feature for FFT Analysis	
FFT real time rate	40 kHz, single channel @12,800 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 pre-defined 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

Feature for Rotor Balancing	
Rotor type for balancing	Single plane, dual plane, overhung rotor
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, 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.

Specification

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 HP, 5Hz HP, 10Hz HP, MeF (ISO 10816)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	10kHz
Max. resolution	12,800 lines
Demodulation filters	500Hz-2kHz, 1kHz-2.5kHz, 2kHz-5kHz, 5kHz-10kHz, custom
Bearing database	Built-in commonly used bearings' fault frequencies
3D scanning	Scan the demodulation filter 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
Max. band with 4 channel on	Full octave: 32kHz, 1/3 octave: 10kHz, 1/12 octave: 5kHz
Max. band with 1 channel on	Full octave: 32kHz, 1/3 octave: 40kHz, 1/12 octave: 20kHz
Integration time (sec)	1/128, 1/64, 1/32, 1/16, 1/8, 1/4, 1/2, 1, 2, 4
Detection	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 (show 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