CRYSTAL INSTRUMENTS

CoCo-80X DYNAMIC SIGNAL ANALYZER

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CoCo-80X Handheld System

www.crystalinstruments.com/coco80x-dynamic-signal-analyzer





CoCo-80X Highlighted Features

The handheld system performs complex processing in real-time. Battery provides 8 hours of uninterrupted use.

Equipped with 8 software-enabled input channels. A unit initially purchased as a 2 channel CoCo-80X can be remotely upgraded to 4, 6, or 8 channels via purchased upgrade.

Equipped with a bright 7.0-inch color LCD display with multi-point touch functionality.

The ISO 11898-1&2 CAN bus digital input allows simultaneous measurement of CAN data and vibration data.

802.11 b/g/n (optional) Wi-Fi connectivity for easy connectivity with the Engineering Data management (EDM) software.

Acquire GPS along with vibration data. GPS Standard: NMEA-0183

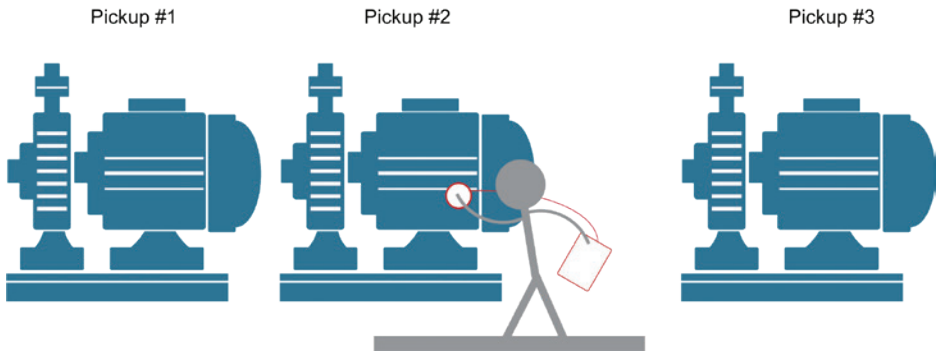
Dynamic Signal Analyzer & Vibration Data Collector

The CoCo-80X is a new generation of handheld data recorder, dynamic signal analyzer and vibration data collector from Crystal Instruments. Building on the success of the original CoCo-80, the new CoCo-80X boasts improved speed, a bigger screen, and more connection options. A significantly more powerful processor frees DSP resources for faster, more reliable, and more complex processing in real-time.

The CoCo-80X hardware platform supports two different software working modes: Dynamic Signal Analyzer (DSA) and Route & Onsite. Each working mode has its own user interface and navigation structure. DSA mode is designed for structure analysis and mechanical testing. It is useful for electrical measurement, acoustic analysis, and a wide range of other applications. Route & Onsite mode is dedicated to route based machine condition monitoring, vibration data collection, and trending.

The CoCo-80X supports multiple languages that can be switched dynamically. It comes with English, Chinese, Japanese, French, and Spanish.

Vibration Data Collector - Route & Onsite



Route Based Condition Monitoring
Measurement Channels: 1 or 3 channels (tri-axis) with tachometer enabled or disabled Route Collection control: Easy navigation from the UI level to routes. View or hold live signals, review measured record, previous measurement entry, next measurement entry, previous point, next point, point and route management.

Demodulated Spectrum
Available in both route collection and onsite mode Demodulation Bandwidth: 24 bandwidth options ranging from 125 Hz – 1.44 kHz, to 32 kHz – 46.08 kHz.

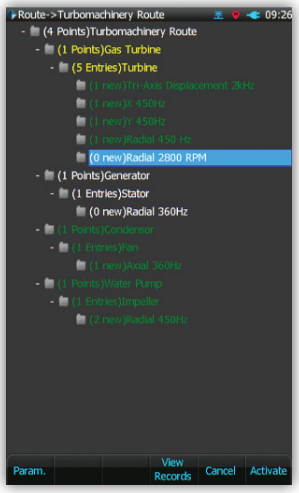
Coast-Down/Run-Up
The following measurements can be made in the Order Tracking option: Raw time streams, real-time order tracks and order spectra, narrow band RPM spectra and fixed band RPM spectra, overall RPM spectrum, and order tracks with phase relative to tachometer signals.

Rotor Balancing
Enables users to correct the imbalance without dismantling the machine. It is possible to balance rotors of any size with either 1 or 2 place balancing. Using the multiple channel option, parallel measurements on 2 sensors are possible, resulting in a faster, safer, and more accurate procedure. The user interface allows stopping and starting balancing as needed and to repeat any single operation without running the whole procedure.

The CoCo-80X operates in either Dynamic Signal Analysis (DSA) or Route & Onsite mode. Each working mode has its own user interface and navigation structure. Route & Onsite mode is dedicated to machine vibration data collection, analysis, and trending. It provides both route based data collection and onsite measurement functions.

The route based data collection mode includes: overall readings, time waveform, spectrum and demodulated spectrum. Onsite measurement mode conducts following test in additional to the data collection functions: bump test, coast-down / run-up, and balancing.

Crystal Instruments' data collection system consists of the portable CoCo-80X data collector and the Engineering Data Management (EDM) software, designed specifically for use in industrial and manufacturing plants to acquire, analyze, and maintain data related to improving and optimizing the reliability and performance of rotating machinery.

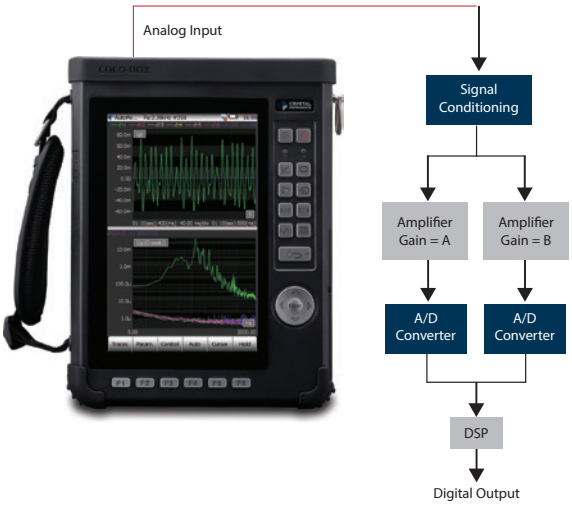


CoCo-80X Features

High Dynamic Range

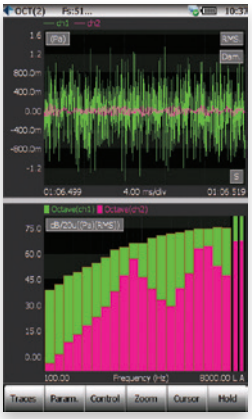
Crystal Instruments achieves its very high dynamic range for all its measurement instruments by using a unique patented technology that uses two A/D converters in each measurement channel.

With such high dynamic range of each input, the gain settings (voltage range settings) are very much eliminated.



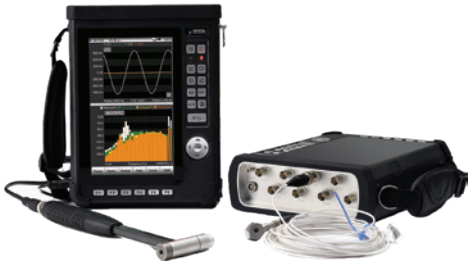
Performance

The new dual-core Da-Vinci Series processor allows for a very fast and reactive user interface, which works very well with the new touchscreen interface. This processor handles the user interface, project configuration, power management, network communication, and all peripherals. A high-speed floating point DSP manages the data input/output and real-time processing.



Portable Recording Solution

In addition to providing advanced real-time signal analysis, the CoCo-80X also serves as an excellent data recording device. The CoCo and Spider platforms support the unique ability to simultaneously perform both real-time processing and continuous data recording. To increase the reliability of data recording, a special check sum algorithm is always applied to the measurements.



Touchscreen with Intuitive Interface

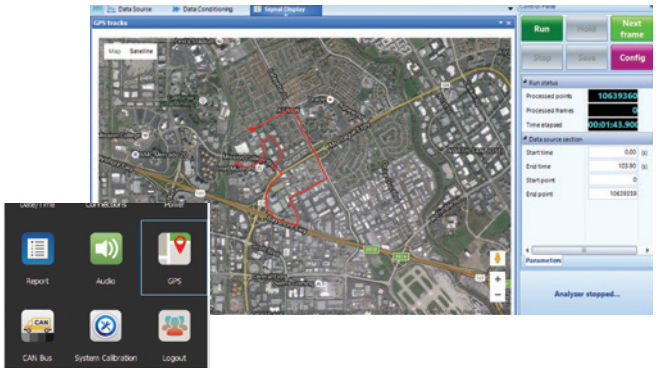
The color LCD display with multi-point touch functionality provides for a smooth user experience. The setup and configuration interface is easy to navigate, and allows for a simple and quick setup process.



GPS Feature*

Record all location data automatically during signal recording. Users are also able to view live location data through the easy-to-use GPS feature.

**Non Wi-Fi and Non GPS options are also available*



CAN bus

The (ISO 11898-1&2) CAN bus digital input allows simultaneous measurement of an automobile's speed, engine RPM and/or any of the hundreds of performance variables tracked by its Controlled Area Network (CAN).

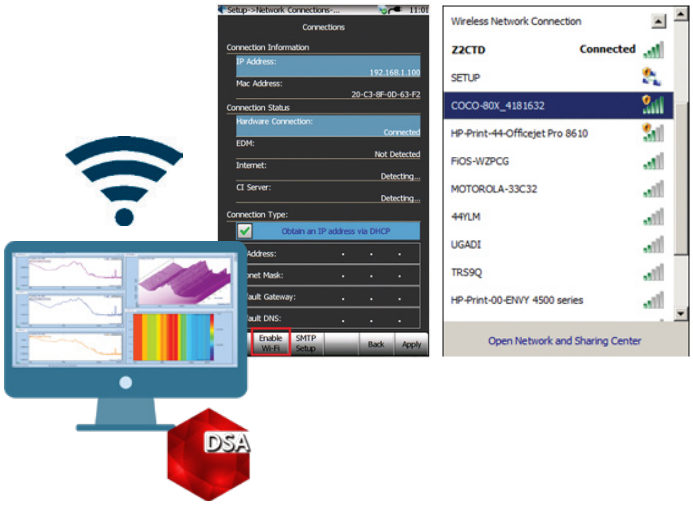
This diagram on the right illustrates how the CAN bus works with the CoCo-80X. Users need to configure the CAN bus profile on EDM, upload the profile to the CoCo-80X, and initiate the operation of CAN bus.



Wi-Fi Connection to PC*

CoCo-80X is wireless equipped. It can connect to the LAN or Internet via Wi-Fi to transfer the data or control signals.

**Non Wi-Fi and Non GPS options are also available*



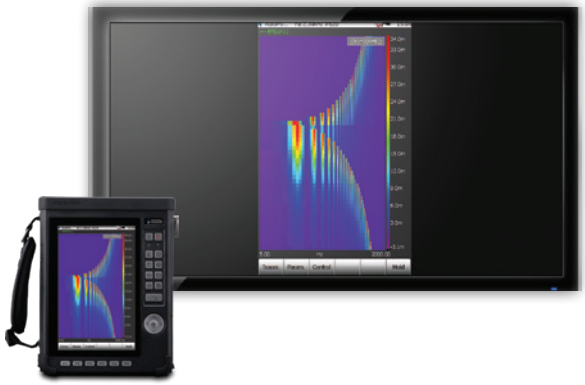
Convenient SD Card

Users can copy recorded signal files from the internal flash memory to an SD memory card or directly record the time stream data to an SD memory card.



High Resolution Display (HDMI)

Signals from the CoCo-80X are displayed on a high-resolution monitor or television with the simple connection of an HDMI cable. Set-up is easy and simple.



CoCo-80X Specifications



The CoCo-80X is equipped with 2, 4, or 8 software configurable input channels through BNC connectors. The removable SD card can record 8 channels of streaming signals simultaneously (up to 102.4 kHz) while computing real-time time and frequency based functions. An embedded signal source channel provides various signal output waveforms that are synchronized with the input sampling rate.

Inputs: 2, 4, 6, 8 channels

Up to 8 BNC connectors, built-in IEPE current source, single-ended or differential, AC, DC coupling, 150 dBFS dynamic range, dual 24-bit A/D converters, input range ±20 Volts

Output
1 LEMO connector, 100 dB dynamic range, 24-bit A/D converter

Tacho
1 LEMO connector: Tachometer Type 1 and 2 share one LEMO connector and can be selected by the software Interface

Ports
100 Base-T Ethernet, Wi-Fi, GPS, Mini-USB 2.0, SD Card, Audio input and output, CA
N-Bus

Maximum Sampling Rate
102.4 kHz simultaneously for all inputs

LCD
7" color TFT WVGA display 800x480 resolution with P-Cap touch screen, 1300 NITS

Dimensions
229 x 172 x 65.5 mm (L X W X H)

Weight
1.96 kg including battery

Power
- **Power Input:** DC power 15 V (±10%)/3A
- **Max Power Consumption**: 14 watts, 8 watts with LCD off
- **Battery Operations:** 6-8 hours

Typical Real-time Analysis Functions
Math (+,-,*, /), integration, differentiation, FFT, averaging, windowing, auto power spectra, cross spectra, FRF, coherence, real-time filters, RMS, octave, order tracking, swept sine, limiting, alarm/abort and more.

Vibration Data Collection Functions
RMS, true-RMS, overall-RMS, waveforms, spectrum, demodulated spectrum, trending and alarm, 2 plane balancing. Measure acceleration, velocity, displacement and tachometer.

CoCo-90X Specifications

16 Channel Configuration of CoCo-90X

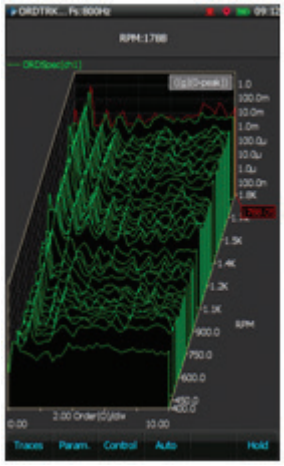


The CoCo-90X is equipped with 16 input channels employing LEMO connectors. It can accurately measure and record both dynamic and static signals. The mass flash memory can record 16 channels of streaming signals simultaneously (up to 51.2 kHz) while computing real-time and frequency-based functions. An embedded signal source channel provides various signal output waveforms that are synchronized with the input sampling rate. LEMO to BNC adapters are provided. .

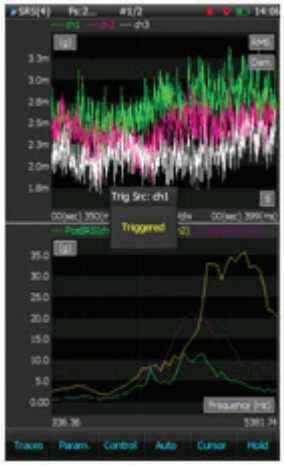
Inputs of CoCo-90X

16 LEMO connectors, built-in IEPE current source, single-ended, AC or DC coupling, 100 dB dynamic range, 24-bit A/D converters, input range +- 20 Volts.

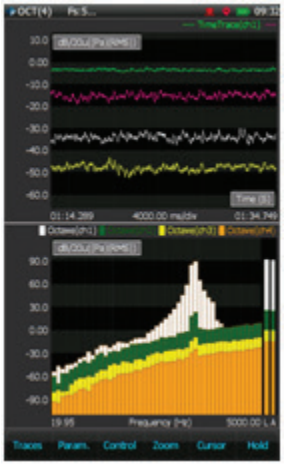
Dynamic Signal Analyzer - Software Applications



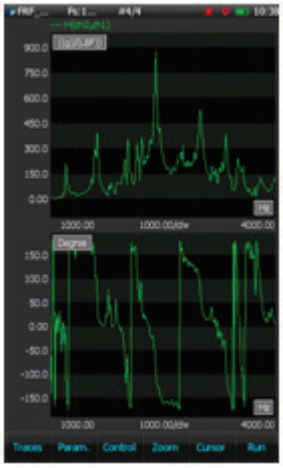
Order Tracking



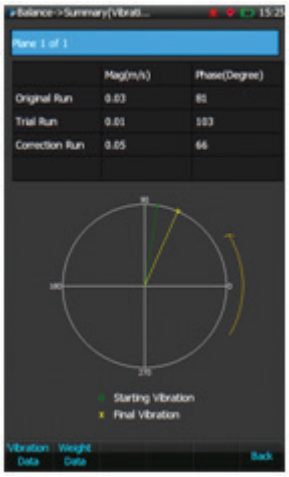
Shock Response Spectrum



Octave Analysis



Modal Data Acquisition



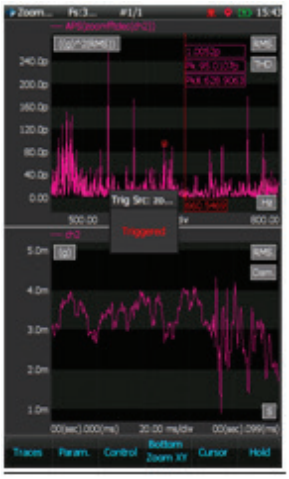
Rotor Balancing



Vibration Intensity



Sound Level Meter

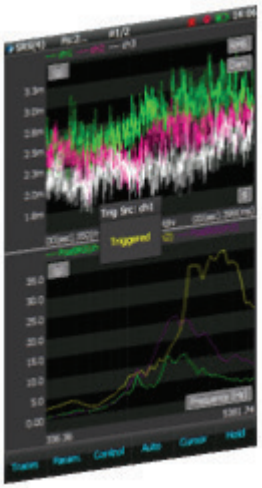


Zoom Analysis

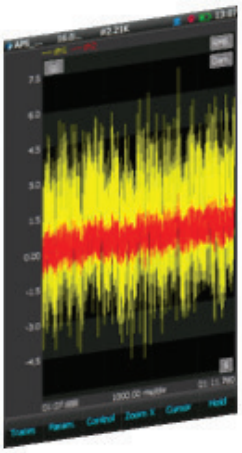
Route Vibration Data Collection*
In-Vehicle Data Acquisition
Modal Testing
Swept Sine Analysis
Limit Testing

Order Tracking
Transient Capture & SRS
Spectrum Analysis
Waterfalls & Spectrograms
Waveform Recording

Real-Time Octave Analysis
Machine Monitoring
Power System Stabilizer*
Sound Power
**Not available on CoCo-90X*







Software Features

Configurable Signal Display

- **Measurement Channels:** 1 or 3 channels (tri-axis) with tachometer enabled or disabled
- **Route Collection Control:** Easy navigation from the UI level to routes. View or hold live signals, review measured record, previous measurement entry, next measurement entry, previous point, next point, point and route management.

Touch-Enabled Customizable Menus

The intuitive user interface is specifically designed for easy operation while still providing a wide variety of analysis functions. Various display options are accessible via the touch screen, including axis scaling and the input channel display.

Trigger Function

The CoCo-80X provides many common tools for data acquisition, including a trigger function. A dedicated trigger setup interface allows for faster configuration. Users can choose from several trigger modes and trigger conditions.

Languages

The CoCo-80X supports multiple languages that can be switched dynamically. It supports English, Chinese, Japanese, French, Czech, and Spanish.

Signal Generator

The CoCo-80X provides an output channel from which you can generate a variety of signal types. Waveforms can be configured via several parameters settings such as range, frequency, and amplitude.

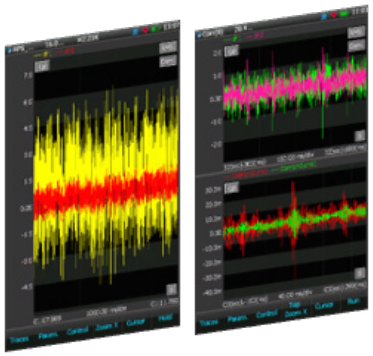
Automated Test & Limiting Check

The CoCo-80X can autonomously conduct complex multi-step tests through automated testing schedules. The CoCo-80X can also perform certain functions when a predefined limit is exceeded. Customized limit profiles can be created in EDM and uploaded to the CoCo-80X.

Configurable Signal Display

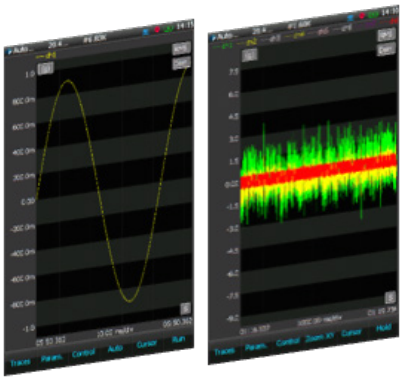
Display Multiple Traces

Signals can be displayed in many configurations to suit users' preferences. For measurements that involve multiple signal types, it may be useful to display them on separate graphs.



Display Multiple Signals (On One Trace)

The CoCo-80X can display all input channels on one graph, simultaneously. This provides great flexibility in the display configuration, and is certainly beneficial for high-channel count measurements.



Many Simultaneous Signal Windows

Users can create multiple customized displays, which can be switched between during testing. Each window can be configured for different signal types to view signal.



Touch-Enabled Customizable Menus

Interactive Signal Display

The signal display headers are interactive. Simply tap the screen to open the configuration menu. You can select which channels will be displayed and which colors will be used. The signal type can also be changed here. Signals can be viewed in a numeric display or as a standard signal display. These options can be changed effortlessly at any point during testing—all with just a single input.



Figure 1: Customizable Display

Axis Scaling

The signal display axes are also interactive – these can be adjusted by tapping on the X- or Y-axis. The Y-axis can also be set to auto-scale. Users can easily configure each signal display individually, and with minimal effort.



Figure 2: Configure Axis Scaling

Zoom and Scroll Gestures

The CoCo-80X touchscreen display supports zoom and scroll gestures. Users can use these gestures to control the zoom level of any display type. The zoom/scroll gestures are designed for many signal types, including 2D and 3D (waterfall) signal displays



Figure 3: Example of Zoom Gestures

Trigger Function

Trigger Setup

A special display view is dedicated to the trigger setup. Trigger levels and pre-trigger values can be entered as a numerical value or adjusted via the touchscreen. Users can also choose from the various trigger modes and trigger conditions.

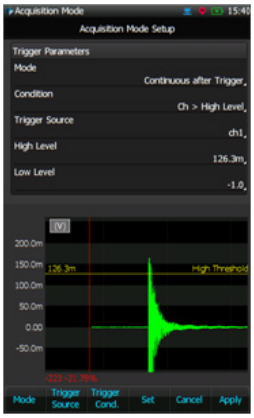


Figure 4: Acquisition Mode Setup

Trigger Conditions

The CoCo-80X supports several trigger modes—these include Free Run, Continuous after trigger, single shot, Manual-arm, and Auto-arm.



Figure 5: Acquisition Modes 'Free-Run', 'Auto-Trigger', and 'Manual Trigger'

Signal Source

The CoCo-80X provides an output channel from which you can generate a variety of signal types. The signal source can be configured from the parameters menu, and includes many signal options. Each waveform offers several parameters settings such as range, frequency, and amplitude.

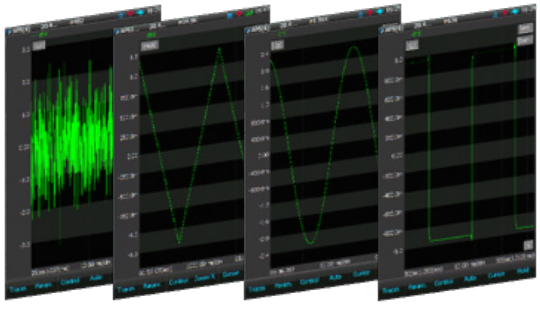


Figure 6: Signal options include Sine, Triangle, Square, White Noise, Pink Noise, DC, Chirp, and Swept Sine

Languages

The CoCo-80X supports multiple languages that can be switched dynamically. It supports English, Chinese, Japanese, French, Czech, and Spanish.



Figure 7: User interface with Japanese, Spanish, and French languages (respectively)

Automated Test and Limiting Check

Automated Test Schedules

Automate your tests by configuring a test schedule. By incorporating triggers into a repeatable test schedule, the CoCo-80X can autonomously conduct complex multi-step tests.

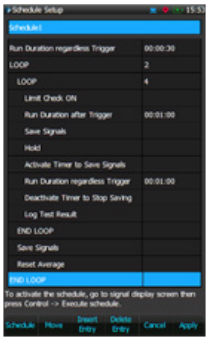


Figure 8: Sample Test Schedule

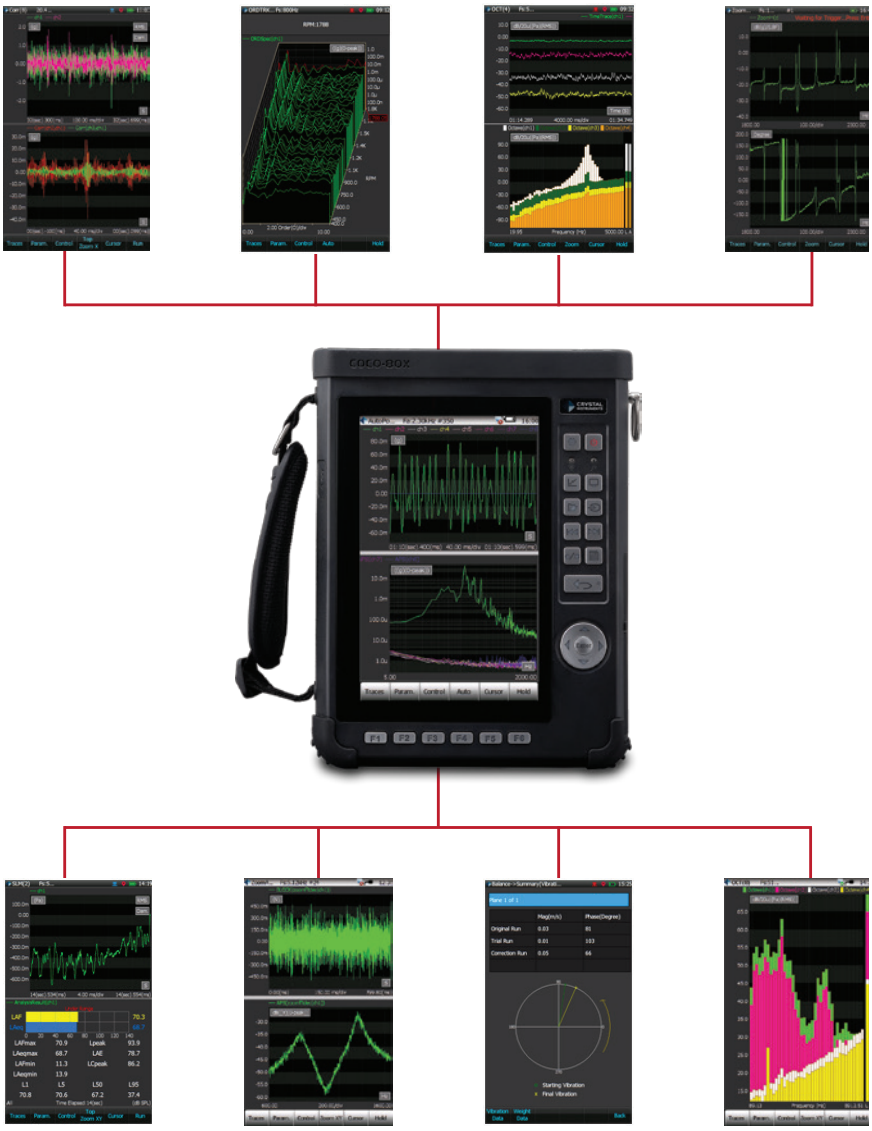
Limit Alarm

Users can create a limit alarm, which will automatically perform certain functions when the predefined limit is exceeded. Customized limit profiles can be created in EDM and uploaded to the CoCo-80X. The alarm limit can perform the following actions when triggered: Log Event, Beep Sound, Save Signals, Send Message to EDM, and Enable Input.



Figure 9: Sample Limit Test

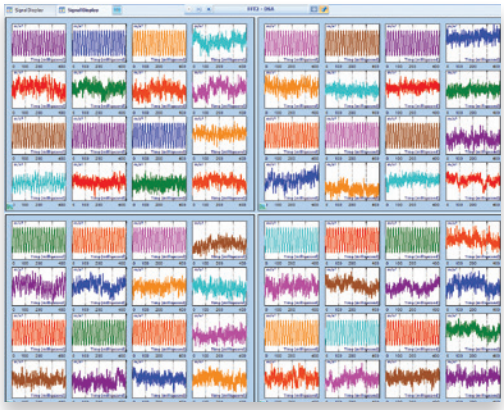
Configurable Signal Analysis for Dynamic Signal Analyzer

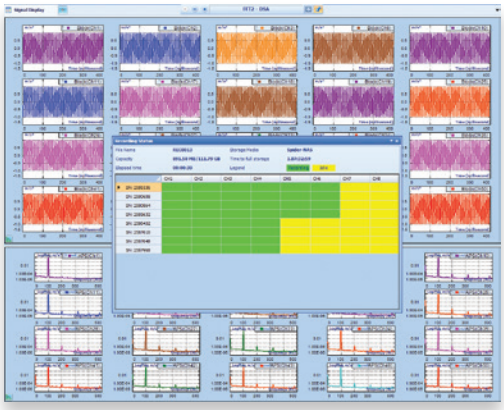


Configurable Signal Analysis (CSA) is a new concept introduced and adopted by Crystal Instruments in its newest generation of dynamic signal analyzer systems, including the CoCo-80X. It allows the user to dynamically configure the DSP (Digital Signal Processing) functions so that the data processing flow can be customized from application to application. The result is a portable, customizable handheld signal analyzer which includes specialized, powerful functions while maintaining a very clean and simple user interface for day to day operation. CSA is a unique feature that is currently available only in Crystal Instruments products.

Unlike the traditional approach, CSA is user customizable. With CSA, the user can flexibly apply various math operations to live data streams without changing the installed program. The processing algorithm is a combination of user customizable math functions. Most of these algorithms are fairly simple, such as add, subtract, multiply and divide operations. Some others are very sophisticated, such as calculating the Frequency Response Functions (FRFs), between all the channels. The user can choose and apply the analysis functions of their choice, or combine them to meet their particular needs.

Continuous Data Recording & Post Analysis







Spider and CoCo Hardware Platforms

In a time-critical test, it is highly desirable to record the raw time data continuously, so that the data can be analyzed later when more time is available for a complete review. Integral raw data recording eliminates the need for a separate recording device so necessary just a few years ago.

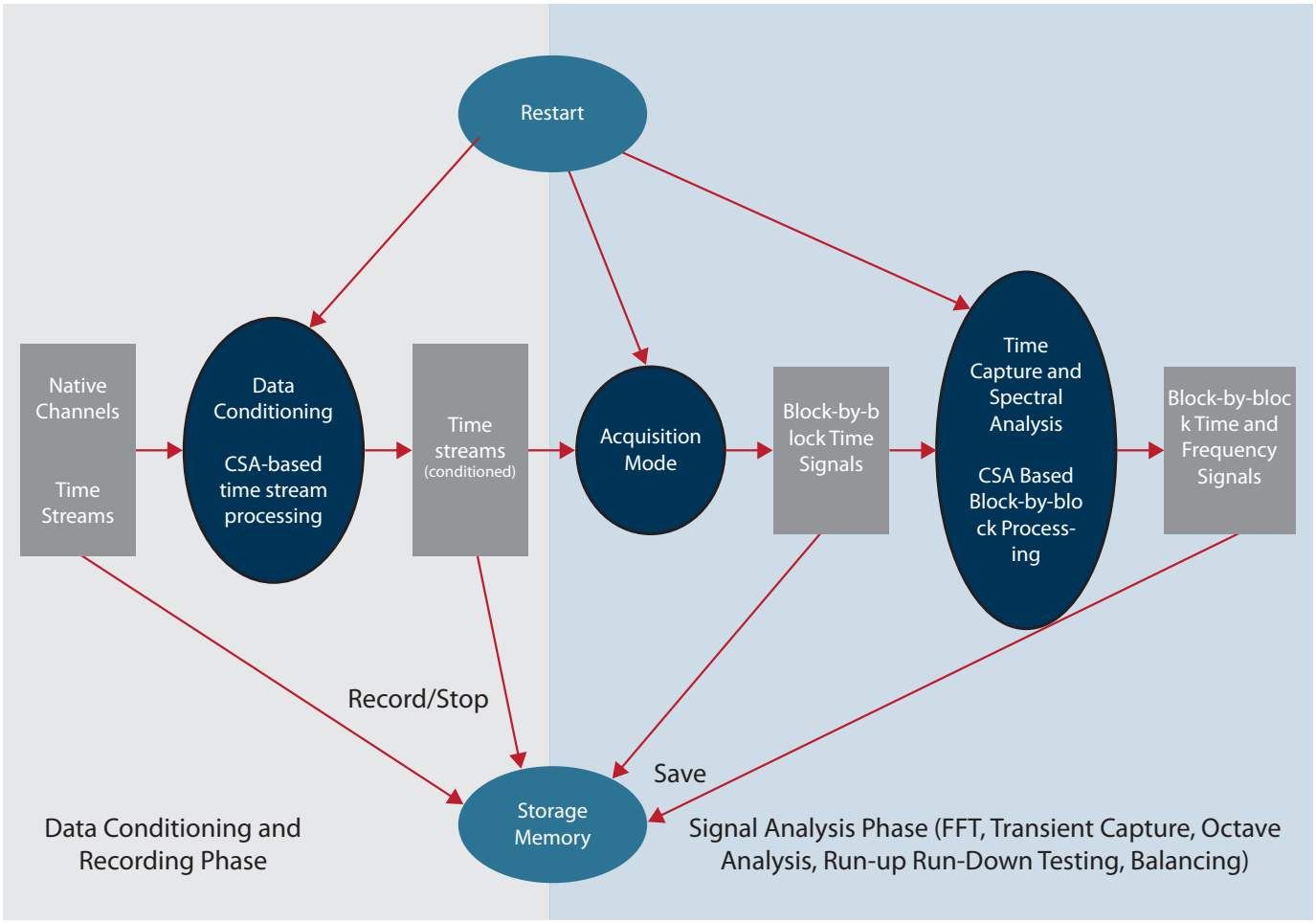
The CoCo and Spider platforms simultaneously perform both real-time processing and continuous data recording. In most of real-time applications, the raw data can be recorded at any desired sampling rate with full 32-bit floating point precision. To increase the reliability of data recording, a special check sum algorithm is always applied to the measurements.

For example in a typical FFT process, the raw data time streams (full bandwidth, sampled at the instrument's highest sample rate) and/or the continuous output of a bandwidth-reducing data conditioning process can be recorded at a lower sample rate on the system's storage media while the real-time filtering and spectral analysis is in progress. This same design philosophy is incorporated in both CoCo portable devices and Spider high channel count systems.

While being recorded, the measured values can be graphically displayed as y/t or y/x diagrams, as bar charts, as waterfalls, FFT, PSD, tachometer speed, or numerical statistics displays with a simple mouse-click. EDM software allows users to design an individual graphical visualization for each desired real-time measurement.

The recording system processes virtually every physical quantity, including: temperature, voltage, stress, strain, pressure, force, acceleration and frequency. Even high channel count applications using hundreds of channels can be configured within a very short time and are handled safely and efficiently.

The recording function is driven by user-defined events. On both CoCo and Spider front-ends the recording "action" can be initiated via various events, including: hard button press, user software command, defined trigger-condition event, digital input event, third party software command, defined alarm limit event, fixed timer, etc.





CoCo and Spider Portable Recording Solutions

Portable Recording Solution

The CoCo provides a portable solution for continuous data recording. Dedicated record and stop buttons are provided on the front panel enabling the user to initiate or terminate recording at any time. The storage media can be user selected as either the internal flash memory or the removable SD card. Using Configurable Signal Analysis (CSA) on the PC, the user can cause the CoCo to record not only selected raw time-streams, but also any filtered or processed time-streams such as RMS or peak values. The maximum data recording rate of the CoCo-80 is 102.4 kHz for 8 channels simultaneously. When less precision is required and longer duration is needed, a special compression function can be enabled to double the recording time. After the recording, there are two ways to make data easily available for post processing: Using EDM software to transfer the data into PC or, physically moving the CoCo SD card to the PC.

The recording function is driven by user-defined events. On both CoCo and Spider front-ends the recording "action" can be initiated via various events, including: hard button press, user software command, defined trigger-condition event, digital input event, third party software command, defined alarm limit event, fixed timer, etc.

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