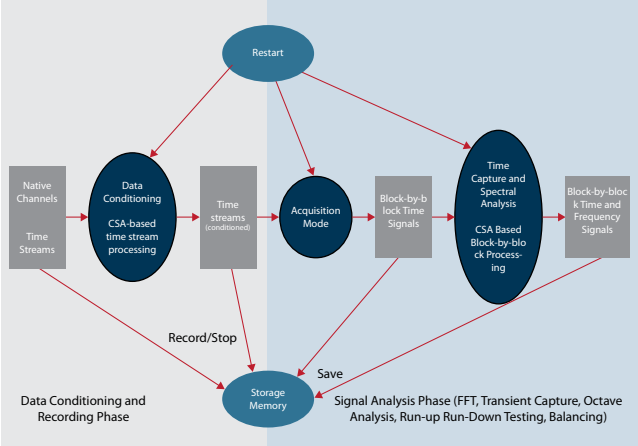
CRYSTAL INSTRUMENTS

DYNAMIC SIGNAL ANALYSIS & DATA ACQUISITION

WWW.CRYSTALINSTRUMENTS.COM



Crystal Instruments Spider Systems

Continuous Data Recording & Post Analysis

Introduction

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 Spider platform simultaneously performs 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 the 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 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.

Typical Data Storage on the Spider-NAS	
General Functions	• NTFS file system: Supports single large data file (2 TB max) • Data format: ASAM ODS data format • Data samples are in 32-bit single precision floating point • Data file access: EDM, FTP, removable disk • Configuration Tool: EDM software from Crystal Instruments
Storage Speed	• Up to 64 channels, each sampled at up to 102.4 kHz sampling rate retained with 32-bit floating point format (per IEEE 754-2008) • Aggregate speed is greater than 26 MB/second
Typical Storage Duration for a 250 GB Disk	• 4 channel at 1 kHz/ch sampling rate: 4660 hours • 8 channel at 5 kHz/ch sampling rate: 466 hours • 8 channel at 102.4 kHz/ch sampling rate: 23 hours • 64 channel at 102.4 kHz/ch sampling rate: 3 hours
Management	• Wake-on LAN, Keyboard Power-on, Timer Power-on • System power management, AC power failure recovery • Watch Dog Timer

The Spider-NAS features eight dedicated high-speed data buses and a removable 250 GB serial ATA (SATA) Solid State Disk (SSD).

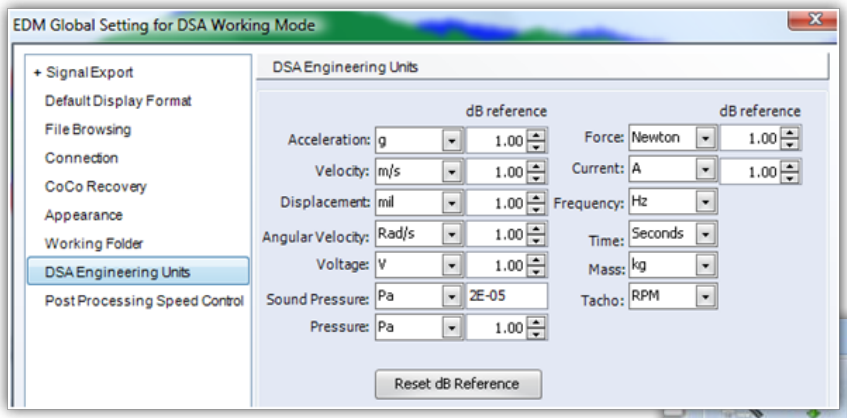
High Channel Count Solution Using Spider Front-ends

For high channel count applications, the data recording can be realized on Spider systems via either of two approaches: record the time-stream data into the flash memory on each of Spider front-end or, record the time-stream data into an external storage device, such as the Spider-NAS. (One Spider-NAS can service up to eight Spider-80X data acquisition front-ends simultaneously.) Either way, the data recording path does not involve the system's Ethernet connection. This provides robust recording while preserving network communication bandwidth.

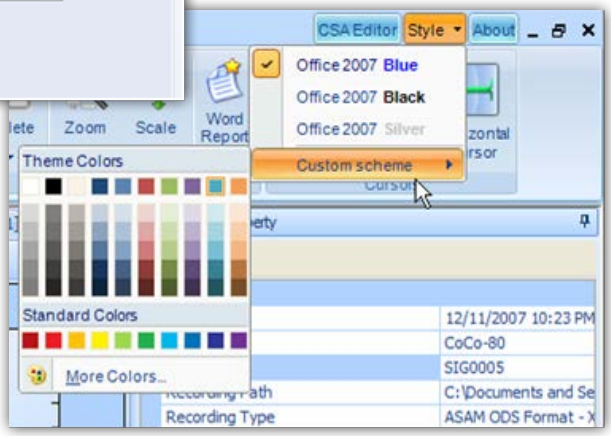
The Spider-NAS (Network Attached Storage) is a dedicated storage device that works with front-end modules from Crystal Instruments, including the Spider-80X, Spider-80SG, Spider-81, and Spider-DAQ. Eight dedicated high-speed data buses interface directly with each Spider front-end. Each Spider-NAS dedicated data port communicates at speeds up to 480 MB/second. The Spider-NAS can store simultaneous data from all (64 maximum) attached dynamic measurement channels at a sample rate as high as 102.4 kHz, or as low as a few samples per second. An Ethernet port is used to configure and control the Spider-NAS.

Remote Operation on Recorded Data

The recorded data can be remotely accessed and downloaded to an authorized PC anywhere in the world. This feature is particularly useful for remote machine monitoring or structure health monitoring. Multiple Spider front-ends can be installed throughout a processing factory or at a single machine location. The vibration signals and their extracted characteristic values can be recorded continuously.



Customizable Engineering Units: *Since the data model is built on ASAM-ODS, signal engineering units are carefully handled. The user displays the signals with user selectable quantity and units.*



Customizable Styles: *EDM is built completely upon the Microsoft.NET technology. The user interface has a modern look and is customizable per individual preferences.*

User Interface

EDM is a computer software tool that is used to manage one or more CoCo-80 devices connected to the PC. The physical connection is made through either USB or Ethernet. The EDM software intelligently searches through the connected hardware devices and browses into the remote device to look at its hardware property or software files. Data files are downloaded by drag-and-drop. The user is able to download multiple files and to view the files simultaneously.

EDM is also used as a terminal to configure the CoCo devices. Project files are uploaded with one mouse click.

Post Processing

EDM Post Processing includes a convenient tool to browse through raw data files and make selections for additional post processing. The selected time data is then analyzed using the CSA technique where the process is created using graphic functional elements designed for filtering, spectral analysis, and time-frequency analysis.

Data File Browsing and Selection

A unique algorithm is developed to help users quickly browse through any segment of raw data files even when the files include gigabytes of data.