SIGnal Workbench

Concurrent's family of SIGnal Workbench products provides flexible, programmable signal conditioning solutions for a wide range of automotive, aerospace and data acquisition applications. SIGnal Workbench is ideal for hardware-in-the-loop test stands and dynamic data processing and monitoring systems for engines and rotating machinery.

SIGnal Workbench is a complete solution that can provide everything needed for high-cycle testing: real-time computer system, data acquisition I/O cards, programmable signal conditioning, cabling and powerful GUI test software for data acquisition control, management, display and post-test analysis. Together with Concurrent's SIMulation Workbench modeling software, SIGnal Workbench offers a powerful solution for ECU and other subsystem testing that require fault insertion. SIGnal Workbench's programmable signal conditioning hardware is available separately with a control API for real-time applications that require analog input conditioning.

Fault Insertion Signal Conditioning For Automotive and Aerospace Testing

For automotive, aerospace and other test applications requiring fault insertion, Concurrent offers a standalone 4U rack-mountable fault insertion signal conditioning chassis that contains all necessary power supplies and cooling provisions. Each chassis contains twenty 3U 220mm slots that can hold fault insertion and signal conditioning (FISC) cards . When a large number of FISC cards are required, special configurations can be provided using multiple 3U chassis stacked in a cabinet.

Fault Insertion Signal Conditioning Chassis

Concurrent offers a wide range of FIS cards that are designed for various automotive and aerospace custom test systems. Each card has either four or eight FIS signal lines, depending on the conditioning requirements for each card type. FIS cards include front mounted test points providing a breakout function for each signal. Concurrent engineers are available to deliver customized, rack-mounted, test configurations to meet individual customer requirements.

Programmable Signal Conditioning for Data Acquisition

SIGnal Workbench features individually programmable signal conditioning modules that provide four channels of configurable transducer interface circuitry on a 3U euro-card. Mounted in a 4U chassis, each channel provides a programmable current/voltage output source and a fault-protected programmable gain amplifier. Selecting the voltage source mode allows the module to be configured as a strain conditioner. All of the functionality required to condition signals from sensors that use ¼, ½ or full bridge transducer configurations are supported in this mode.

SIGnal Workbench also offers 4U 4-channel thermocouple signal conditioning cards with type J and K miniature PCC

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connectors. Each connector has individually-monitored cold junction temperatures. Other thermocouple connector types are available upon request.

Programmable Signal Conditioning Chassis

Selecting the current source mode allows the module to support transducers that require constant current excitation, such as integrated electronics piezoelectric (IEPE) transducers for dynamic strain measurement. Channels can also be configured as instrumentation amplifiers to monitor general-purpose analog input signals. Conditioned signals are driven out of the module by low-impedance, high-speed operational amplifiers.

All channels are individually programmable with gain, excitation, bridge configuration and coupling mode set via GUI or API. All channels also support all signal conditioning functions, thus eliminating the need to utilize multiple card types. Channel configurations are fully flexible.

Outputs can be connected to the high-impedance input of Concurrent's analog input cards to provide a complete signal conditioning and A-to-D conversion solution. All output is routed through the rear panel of the 4U signal conditioning chassis which accommodates up to 16 signal conditioning modules.

Real-Time Data Acquisition Platforms

SIGnal Workbench solutions are available with Concurrent iHawk multiprocessing platforms running the RedHawk Linux real-time operating system. SIGnal Workbench platforms are custom-configured to meet the needs of your test application. Storage, memory size and processor performance can be selected in accordance with test run durations and channel count requirements. RedHawk provides the fully deterministic performance needed in high-performance, time-critical test applications.

SIGnal Workbench systems feature one or more 32-channel, 24-bit Sigma-Delta analog input boards supporting a rate of 216 Ksamples per second per channel. Other simultaneous sampling PCI and PCIe analog input cards are also available. The iHawk computer system, signal conditioning chassis and cabling can be optionally mounted in a 14U or 34U rackmount cabinet.

Key Features

- Programmable Signal Conditioning
  o 4-channel selectable conditioning modules
  o GUI-programmable current and voltage sources
  o AC and DC coupling
  o 100 KHz bandwidth
  o Thermocouple conditioning options
  o Up to 16 conditioning modules per chassis

- Fault Insertion Signal Conditioning
  o A wide range of fault insertion cards
  o Custom designed for automotive and aerospace
  o 4 or 8 FISC lines per card
  o Front-mounted breakout for each signal

- Concurrent iHawk™ real-time multiprocessors
  o Intel® or AMD® CPUs
  o Configurable data storage
  o RedHawk Linux® real-time operating system
  o Signal conditioning control API
  o NightStar debugging and analysis tools

- Analog input
  o 32-channel, 24-bit Sigma-Delta cards
  o 64-channel, 16-bit cards
  o 216K simultaneous samples per second
  o PCIe and PCI

- APEX-DS data acquisition and test software
  o Analog input control
  o Data recording
  o Data display
  o Post-run analysis

- Rackmount cabinet packaging

Data Analysis and Monitoring Software

SIGnal Workbench solutions are available with APEX Turbine DS software. APEX-DS is a state-of-the-art, real-time, dynamic data acquisition and monitoring environment developed to meet the requirements of modern gas turbine R&D, engine production and engine overhaul test facilities. With APEX-DS, SIGnal Workbench is a complete turn-key solution for acquiring, storing and processing dynamic data signals.

The built-in real-time monitoring features of APEX-DS allow users to choose from any number of frequency domain and/or time domain engineering plots in real-time and plot vibration channels against performance parameters with no limit on number of plots and no performance impact. APEX-DS also offers remote monitoring. With this option, users have the ability to monitor test data on any number of real-time displays either at the test facility or a remote location.

Engine Test Stand

Specifications

Fault Insertion Signal Conditioning Cards

Type	Lines	Function
A	4	PWM Buffer/Filter Conditioning
B	4	LVDT/RVDT/Resolver Excitation w/RMS Converter
B2	0	RMS Converter to Analog No FI
B3	4	RVDT/LVDT/RSLVR Ex Gain x3
C1	8	Discrete Output
C2	8	Dual Potentiometer
C3	8	Cockpit Switch 10K Ohm
C4	8	ESO / GBEV Combo
C5	8	Fault Insertion Only
C6	8	RVDT/LVDT/Resolver FB
C7	8	Magnetic Chip Detect
D	4	Speed Signal w/Coupling/Bypass
E	0	RS-422 Switch with No FIS Lines
F	4	DEC To DEC Interlock
G	4	Cross Channel Data Link
H2	4	Ratiometric Pressure Sensor 1K Ohm
H3	4	Ratiometric RTD 100 Ohm
H4	4	Ratiometric 3-line RTD
H5	4	Ratiometric Pressure Sensor 1.5K Ohm
H6	4	Ratiometric Pressure Sensor 1.8K Ohm
H7	4	2/4-wire RTD Prog. Resistor 160 Ohm
H8	4	2/4-wire RTD Prog. Resistor 300 Ohm
J	4	3-line Perm Magnet ALT
K	0	Charge-Coupled Accel Simulator (single chan)
M	4	Isolated Type-S TC SIM
N	4	RTD / Pressure Bridge
O	2	Isolated Type-K TC SIM w/ CJC (single chan)
Q	4	RMS Current and Voltage Sense for PWM Solenoid / Torque Motor Loads
R	4	H-Bridge Average Current Sense for PWM Motor Loads

Programmable Signal Conditioning Cards

General Characteristics
- Gain range: 1 to 4096
- Frequency response: DC to 100KHz
- Gain accuracy: ± 0.05 %
- Linearity: ± 0.01 %
- Stability : 50 ppm / °C
- Input noise: 10 uV RMS
- Input protection: 125 V
- Input type: Di¢erential
- Output range: ± 10V max @ 15 mA
- Output impedance: 50 Ohms
- Short circuit protected: Yes

Bridge Completion
- Configuration: Full, Half, Quarter
- Auto balance: Yes, programmable
- Completion resistance: 120 Ohms or 350 Ohms
- Accuracy: 0.1%, 5 ppm/°C

Low Pass Filter
- Type: R - C
- Cut off frequency options: No filter (standard), 50 Hz, 500 Hz, 5 KHz

Current Excitation
- Type: Programmable constant current
- Range: 0 mAmps to 20 mAmps (16-bit resolution)
- Coupling to Amplifier: AC coupling for IEPE vibration sensors
- Compliance Voltage: 24 Volts DC

Voltage Excitation
- Type: Programmable constant voltage
- Range: 100 mV to 10 Volts
- Accuracy: 0.02 %
- Output current: 100 mAmps
- Stability: 10 ppm / °C
- Short circuit protection: Yes

Calibration Source
- Type 1: Differential Calibration Bus
  - o Analog Ground
  - o Programmable reference source on chassis controller card
    - 0 to 10 volt source (+/- 10V Build option)
    - 16-bit DAC
    - Divider network of 1-128 binary steps
  - o External voltage standard support
- Type 2: Local or remote shunt resistor
  - o Internal shunt resistors: 51 kOhm, 100 kOhm
  - o Accuracy: 0.1 %, 5 ppm / °C

Delta Sigma Analog Input PCIe Cards

Concurrent's CP-AD3224 is a 32-channel analog to digital 24-bit delta sigma converter card with a PCI Express interface. It is implemented using Cirrus Logic CS5368 delta-sigma converters. Each converter has an independently selectable clock source generated by a low jitter PLL. The interface is fully differential right up to the converter inputs for low noise and accurate measurements. Multi-board clocking and synchronization is supported. A RedHawk™ Linux® driver with extensive API including DMA and interrupt support is available for both 32-bit and 64-bit architectures.

Features

- 32-channel 24-bit Delta Sigma Analog to Digital Conversion
- Differential +/-10V or +/-5V Input
- Cirrus Logic CS5368 ADCs
- Industry Standard SCSI 68-pin Connector for Inputs
- RJ-12 (6-pin phone style) Connectors for Multi-board Synchronization
- PCI Express x1 Revision 1.0a
- Supports MSI Interrupts
- Independent Clocking for Four Channel Groups
- Low Jitter Phase Lock Loop (PLL) Clock Generators
- Supports Multi-board Clocking & Synchronization
- Directly Addressable Conversion Data Registers
- 64K Word Conversion Data FIFO with DMA
- Low Noise Analog Power Generation.
- Positive and Negative Calibration Voltage
- Gain and Offset Calibration Values Accessible
- Differential Input Impedance: >1Meg ohm (10V), >200K ohm (5V)
- Input Over-Voltage Protection: +/- 30V
- Sampling Rate (Fs) 2Khz to 216Khz
- NIST Traceable Calibration Standard

Specifications

- Packaging
  Full Height PCI Express 3.8" high, 9.5" long (10V), 8.0" long (5V)
- Power Requirements
  Less than 25 watts (3.3VDC @ 2 Amp, 12VDC @ 1.2 Amp)
- Environmental
  Operating: 10° to 40° C
  Storage: -40° to 65° C
- Relative Humidity: 10 to 80% non-condensing
- ROHS Compliant.

Ordering Information

- ☐ CP-AD3224-DS-10
  32-channel, 24-bit Delta Sigma +/-10 Volt A-to-D PCIe card
- ☐ CP-AD3224-DS
  32-channel, 24-bit, Delta Sigma +/- 5 Volt A-to-D PCIe card
- ☐ WC-AD3224-DS
  Driver for RedHawk Linux
- ☐ ICS-SWB-242 SIMulation Workbench™ I/O License
- ☐ CX-CBL-HSI-68-nn = 03, 06 or 10
  3/6/10-foot 68-pin Host Interface Cable
- ☐ CX-ALOG-SYNC-nn = 01, 10 or 30
  1/10/30-foot Analog I/O Sync Cable
- ☐ CX-CBL-AIO-BRKOUT
  Analog I/O Terminal Breakout Module

More Information

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