SIGnal Workbench

Signal Conditioning Solutions

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 rackmountable 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.

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

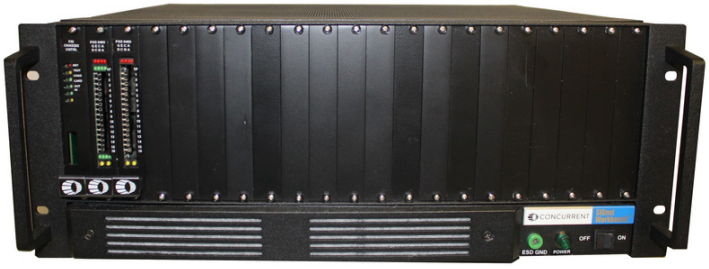
SIGnal Workbench features individually programmable signal conditioning modules that provide four channels of configurable transducer interface circuitry on a 3U euro-card. Mounted in a 4U chassis, each channel provides a programmable current voltage output source and a fault-protected programmable gain 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 1/4, 1/2 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 connectors. Each connector has individually-monitored cold junction temperatures. Other thermocouple connector types are available upon request.

tSelecting 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.



Fault Insertion Signal Conditioning Chasis

Programmable Signal Conditioning Chassis

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.

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

KEY FEATURES:

Programmable Signal Conditioning

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

Fault Insertion Signal Conditioning

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

Concurrent iHawk™ real-time multiprocessors

- Intel® Xeon Scalable Family CPUs
- Configurable data storage
- RedHawk Linux® real-time operating system
- Signal conditioning control API
- NightStar debugging and analysis tools

Analog Input

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

APEX-DS data acquisition and test software

- Analog input control
- Data recording
- Data display
- Post-run analysis

Rackmount cabinet Packaging

- 14U or 34U racks

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

TYPE	LINES	FUNCTION
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 channel)
M	4	Isolated Type-STC SIM
N	4	RTD / Pressure Bridge
O	2	Isolated Type-KTC SIM w/ CJC (single channel)
Q	4	RMS Current and Voltage Sense for PWM Solenoid / Torque Motor Leads
R	4	H-Bridge Average Current Sense for PWM Motor Loads
S	8	Automotive Actuator with Solid State Fault Insertion
T	8	Automotive Sensor with Solid State Fault Insertion

Programable 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: Differential
- Output range: ± 10V max @ 15 mA
- Output impedance: 50 Ohms
- Short circuit protected: Yes

Bridge Completion

- Configuration: Full, Half, Quarter
- Auto balance: 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
  - Analog Ground
  - 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
  - External voltage standard support
- Type 2: Local or remote shunt resistor
  - Internal shunt resistors: 51 kOhm, 100 kOhm
  - Accuracy: 0.1 %, 5 ppm / °C