

FEATURES

- Dual inputs, bridge and IEPE
- Programmable for $\frac{1}{4}$, $\frac{1}{2}$ and full bridges
- Voltage & shunt calibration
- Records fast events, up to 2 MS/s
- Simultaneous sampling
- One pre-trigger and two post-trigger sample rates
- Up to 4 million sample storage per channel, non-volatile
- Sixteen-channel, rack mounted enclosures
- Multi-enclosure synchronization
- Automatic, hands-off operation
- Ethernet interface
- Ready-to-run Windows software



TRANSDUCER SIGNAL CONDITIONING & TRANSIENT RECORDING

The 5800 is the standard in ruggedized transducer transient recording for severe environments. It is used worldwide for explosive effects testing where it can be placed close to the transducer to preserve high frequency events. Now the same capability is available in a rack-mounted, laboratory system, the 5810.

The 5810 is a 16-channel system enclosure for 5800 series recording modules. It is a 10.5-inch high rack-mounting enclosure that holds 16 channels in two 8-channel groups each group with its own Ethernet address. Each group has independently programmable sample rates and control inputs.

Ethernet gives systems of multiple recorders a clean and simple interface using commercially available hubs and switches for programming and data debriefing. Control and clock distribution are done by a PCM encoded bus carried on Category 5 or optic cable. Once programmed, only the clock/control bus is required for synchronized data recording.

Data acquired by the 5800 recorder modules is digitized and recorded in non-volatile, solid-state memory. It records calibration, pre-trigger and post-trigger data. In a typical test scenario recording of pre-trigger data is initiated by a TTL input, program instruction, or automatic sequencer. A TTL input or on-board discriminator triggers post trigger data recording.

The quantities and sample rates of pre and post-trigger data storage are programmable, enabling configuration according to the characteristics of the data being acquired. Sample rate can be changed during acquisition without interrupting data flow to capture high-speed events, yet have sufficient memory space to record long-term effects. Up to three sample rates can be programmed that change at trigger and programmed times after trigger. Multiple records can be programmed and recorded, each using the same pre and post-trigger sampling profile. Data is debriefed and transferred to permanent storage by the Ethernet interface.

Individual channel modules that plug into the 16-channel recorder condition, amplify, filter, digitize and store the transducer signals. Simultaneous sampling provides excellent time correlation between channels and synchronization to external events. Channel modules are available with 14, 16 or 24-bit resolution and sample rates up to 2 Million samples per second.

Each channel has two inputs: one for bridges, voltage, RTDs, potentiometers and thermocouples; the other AC coupled with current excitation for transducers with built-in electronics. Signal conditioning includes programmable excitation and completion for $\frac{1}{4}$, $\frac{1}{2}$ and full bridge transducers, automatic balance, voltage and shunt calibration, programmable gain and programmable low-pass filter. Characteristics of individual channel modules are given in the corresponding data sheets.

A high-level instruction set is provided for user programming or PI580, a turnkey Windows application, may be used to operate a single or multiple enclosures. Operating parameters are stored locally in non-volatile memory and automatically loaded when the system is powered up or reset.

PI580 software is a ready-to-use application with graphical user interface. The operator programs a test on or off line using drop-down hardware specific menus or downloads an Access compatible test database file. Tests files may be saved for reuse or as the starting point for a new test. PI580 exports recorded data to several binary and ASCII data formats compatible with popular data analysis applications.

PROGRAMMING

Channel and system parameters are programmed by high-level instructions written to the Ethernet interface or by PI580 Windows application software. Operating parameters are stored in non-volatile memory and automatically loaded when the system is powered up or reset. Data recorders may be programmed in place or configured and programmed prior to fielding.

Programmable channel parameters are input or bridge configuration, excitation, calibration modes and levels, gain, and filter frequency. Sample rates, number of pre and post-trigger samples, trigger level and delay, power mode and autostart sequence are programmed by groups of eight channels. Operating parameters may be read back to verify system programming and configuration.

INSTALLATION

The Model 5810 enclosures are line powered, 10.5 inches high and mount in 19-inch EIA 310 cabinets. Each enclosure holds two eight-channel groups of recording modules or a total of 16 channels. The enclosure contains power supplies and interface, programming and sample rate control cards for each group of channels.

Input, output interface and power connectors are on the rear of the enclosures. Input connectors are 9-pin, D type and BNC for IEPE transducers. Optional analog output connectors are BNC. Recording modules install from the front and are locked in place by the combined card-lock ejector.

CONTROL

Sample timing and data recording is controlled by a PCM encoded bus that is distributed to each enclosure from a system command module. The command module has TTL inputs for system controls including Arm, Start, Trigger, Calibration, Balance, Autostart and Power Control. The encoding of control signals for distribution to enclosures makes the system immune to noise on the control bus that could cause false triggering and loss of data. The control bus distributes the clock that synchronizes data recorded across multiple enclosures.



Model 5882 Command Module

The 5881 and 5882 Command Modules employ Category 5 cable for enclosures within 50 meters of the Command Module. Each can drive up to sixteen groups or eight enclosures. The 5883 Command Module employs optic cable for distances up to 1 km. In the case of the 5883 two command modules are required, one to encode the TTL control signals on the optic interface and the other to receive the optic interface and generate the PCM control bus for distribution to enclosure. The 5883 automatically configures as the source or receiver by detecting the presence of the optic signal.

CALIBRATION

A portion of the data storage memory may be used for calibration data acquired before and after test data. Multi-point calibrations are recorded by specifying the calibration mode, stimulus and number of samples for each point.

Calibration modes include voltage substitution using a programmable internal reference and shunt resistors. Additional calibration modes measure and record excitation voltage, excitation current, zero with input shorted and gage zero with excitation off.

DATA RECORDING

Test data recording begins with a TTL Start input to the command encoder or a program instruction. Data is continuously recorded in successive memory locations at the programmed pre-trigger sample rate. The oldest data is overwritten when the number of samples taken exceeds the total programmed for the record.

When Trigger is received from the Command Module or internal discriminator the data recorder acquires the programmed number of post-trigger samples at the post-trigger sample rates. When all post-trigger samples are recorded, recording stops, memory is write protected and the recorder is reset for the next record. Data memory is backed-up for 40 hours by an internal capacitor bank.

The Autostart facility provides a means to automatically initiate recording of calibration and test data using a single TTL input to the Command Module. It runs a preprogrammed file that can contain up to 64 instructions. For example, it can load operating parameters, autobalance channels, select and record pre and post test calibration data, clear write protect and start the system for the acquisition of test data.

DEBRIEFING

Program instructions transfer data from channel memories to computer storage media. Data transfer rate is 450K bytes per second for a single recorder and multiple recorders are interlaced for faster debriefing. Debriefing is non-destructive. Data is not erased from the channel memory until the recorder is Armed for recording new data.

An Ethernet instruction retrieves data that provides elapsed start to trigger time. By synchronizing the start time for all recorders, data may be time correlated for recorders that triggered at different times and to other test events and data.

SPECIFICATIONS (Model 5810 enclosure)

Channel Modules

Capacity16 channels, programmable in two 8-channel groups.
 TypeAny 5800 series channel module. All channel modules must be of the same type. See the Channel Module data sheets for particulars and specifications.

Acquisition

Sampling.....One pre-trigger and two post-trigger sample rates per record.
 Rates2 MS/s to 20 S/s depending on specific channel module type.
 Resolution24-bits, 16-bits or 14-bits depending on specific channel module type.
 Correlation.....±1nS sample to sample, ±50nS channel to channel.

Data Storage

TypeCMOS, will retain data for 40 hours without external power.
 Size1M words (2M and 4M optional).
 Records.....Programmable pre and post-trigger data in 4096 word blocks. Multiple records without debriefing.
 Write ProtectEnabled on power up and after recording data. Must be cleared before recorded data can be overwritten.
 Backup Power ..Low-leakage capacitor bank. Automatically charged when external power applied.

Trigger

Sources.....External (from CM's TTL input), discriminator or Ethernet program command.
 Delay.....0 to 60 seconds with 1 microsecond resolution.
 DiscriminatorProgrammable full scale with 0.4% resolution. First channel triggers all channels in recorder group.

Control Inputs (Command Module)

Arm.....Sets full power level, prepares for acquiring data.
 StartBegins the acquisition of pre-trigger data.
 Trigger.....Begins the acquisition of post-trigger data.
 CalPerform a sequence of calibration steps and recording.
 Balance.....Performs balance of bridge type gages.
 AutostartExecutes the user programmed autostart sequence file.
 PowerProvides remote power control using the Category 5 control bus.
 Clock In/OutSynchronize external equipment to or from the 5800 system clock.

Connectors

Bridge9-Pin Type D. Mating connector is supplied.
 AuxiliaryBNC.
 Analog OutBNC (Optional).

Programming

Data/Prog.Ethernet 100BaseT interface for each channel group. Multiple groups can use Ethernet hubs and switches.
 ControlCommand Module distributes PCM encoded clock and control signals. Each command module operates up to 16 recorder channel groups over a distance of up to 50 meters using Category 5 (Ethernet) cable. Two 5883 type Control Modules make a transmitter-receiver pair that operate up to 16 recorder channel groups over a distance of 1 km using fiber optic cable.
 PowerThe line-powered 5810 is operated in the High power mode.

Environmental

Temperature0 to +55°C operating, -40 to 71°C non-operating.
 Humidity95%, non-condensing.
 Altitude15,000 ft operating, 40,000 ft non-operating.
 Vibration0.27grms from 5 to 55 Hz, 10 minutes per axis.
 Shock30g, half sine, 11 mS.

General

Capacity16 channels in two 8-channel groups.
 Size19" wide, 12.25" (7U) high, 17" deep for mounting in 19", EIA-310C cabinets.
 Power115/230 VAC, ±10%, 200 watts.
 CoolingIntegral fan circulates air from the rear panel that exits through slots in the front panel.

ACQUISITION & RECORDING SOFTWARE

PI580 is a complete software operating environment for Windows. This ready to use, turnkey application has everything needed to program and operate the 5800 and export recorded data files.

Ready-to-Run

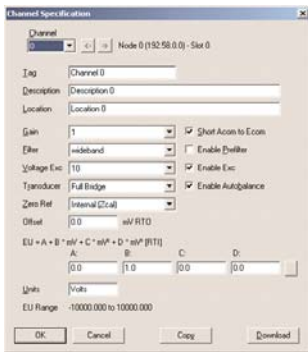
Unlike general purpose programming languages, PI580 is an application that is ready to use out of the box and specifically tailored for transducer data acquisition and recording. Versatile and easy to use, its operator interface employs menus and tool bars to program 5800 hardware and acquire and record calibration and test data.

Database Programming

Program channel and system operating parameters in a Microsoft Access or compatible database or spreadsheet. Then download the database file to program channel, group and system hardware.

Select and Name Channels

Select channels for a test from the system inventory. Assign each channel a "Tag" or name that will make measurement identification easy and enter the engineering units of measure.



PI580 Channel parameter programming screen

Menus Simplify Programming

The built-in programming menus are configured to the installed channel hardware. Menus feature drop-down selection of parameters such as excitation, gain and filter frequency for channel programming and sample rates for group profile programming.

Real Time Data Displays

Data displays are useful for monitoring channels before, during and after a test. Display types include: Tabular, strip chart, bar chart, picture (bitmap), X-Y Chart, and multi-channel plot. Data is displayed in A/D counts, millivolts and engineering units. A system status display shows the power and recording status of each eight-channel group.

Pre and Post Trigger

With PI580 you select the pre and post-trigger memory by entering the time period for each. Using the selected sample rates, PI580 calculates the pre-trigger and post-trigger memory sizes.

Trigger Level and Delay

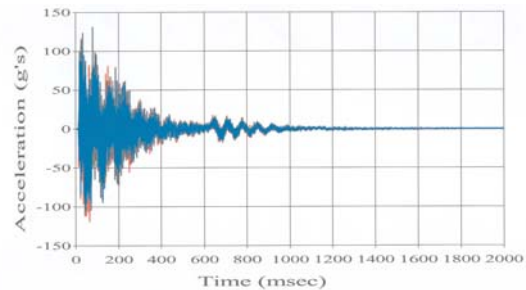
The trigger level is set for the first channel in each recording group using engineering units. Select internal or external trigger and set trigger time delay in microseconds.

Debrief Recorder

Debriefing of the data recorder can be done for a single channel or multiple channels. Operator may specify which records to debrief. PI580 exports recorded data in binary and ASCII formats compatible with display/analysis programs including Excel, DPLOT, DADISP and FAMOS.

Calibrate Recorded Data

PI580 supports all 5800 calibration modes with up to eight calibration steps per channel recording the calibration data to memory. It will automatically calculate the slope and offset for engineering units calibration.



Plot of exported data

ORDERING INFORMATION

Enclosures

5810Data Recorder, 16 channels in two groups of eight, 115/230 VAC, Ethernet interface for each group.

Enclosure Options

AO.....Analog output connectors, BNC

Command-Modules

- 5881Command Module, Cat.5, battery powered.
- 5882Command Module, Cat 5., 12 VDC.
- 5883Command Module, Optic, battery powered.

Command Module Options

5891Power Supply, 115 or 230 VAC for 5881 and 5883.

Software

PI580Operating Software for Windows 2000/XP.