

INTERTECHNOLOGY INC.

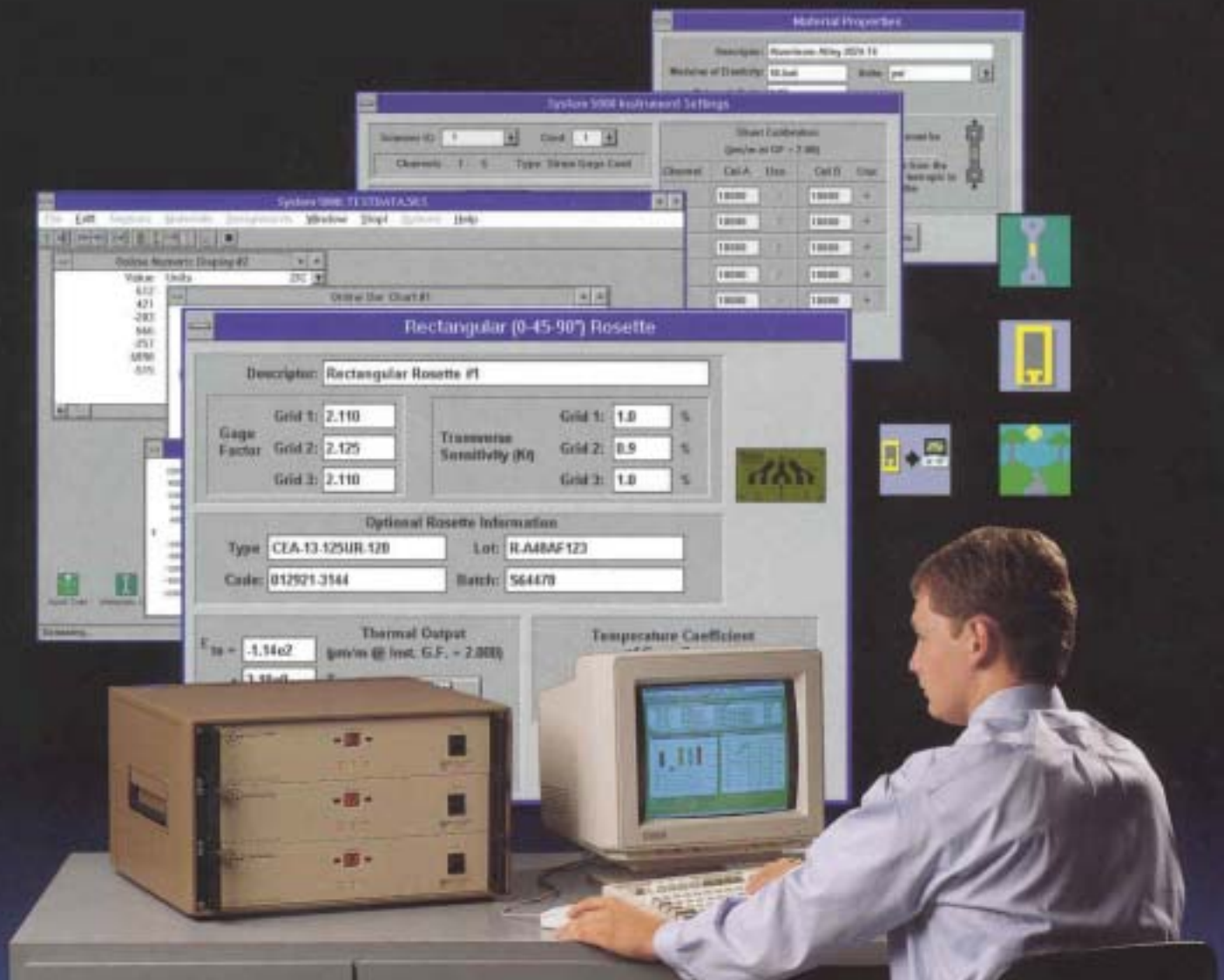
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System 5000

The Stress Analysis Data System



Your Total Solution for Stress Analysis,
Structural and Materials Testing



System 5000

The Measurements Group revolutionized strain measurement in 1981 with the introduction of System 4000 - a complete hardware/software approach to data acquisition, reduction and presentation for strain gauges and related sensors for stress analysis testing. Since that time, more than fifty-thousand channels have been used around the world in university laboratories, major research facilities and virtually every industry. System 5000 takes this concept into the next generation of data acquisition by using new developments in hardware and software to add features not previously possible.



Strain gauge technology is the world's most widely used precision stress/strain measurement technique. Over the years, through our Micro-Measurements Division, we have developed many of the tools necessary for accurate acquisition and understanding of strain gauge measurements. The primary factors affecting strain gauge and instrumentation performance are covered in the Tech Note portion of the Measurements Group's Strain Gauge Technology literature binder, recognized and used as the authoritative reference for strain gauge measurement by practitioners throughout the world. System 5000's extensive test software automatically applies these techniques and corrections to your test measurements, directly through Windows-based software.

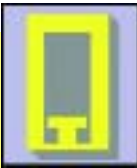
Fast... Accurate...Comprehensive...
Stress analysis test management has never been easier

Principal Features



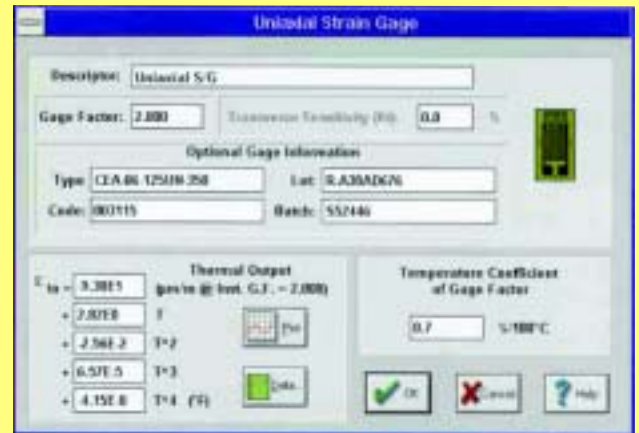
Hardware

- Inputs accepted from strain gauges, strain gauge based transducers, LVDT's, thermocouples and sensors with high-level outputs
- Stable, accurate, low-noise signal conditioning
- From 5 to 1,200 input channels - can be configured as needed at any time
- Scanning and recording intervals as short as 0.1 second for up to 1,200 inputs
- Built-in bridge completion for 120, 350 and 1,000 Ohm strain gauges
- Available with ISA (Windows 3.1 or 95) and/or PCMCIA (Windows 95) hardware interfaces



Software

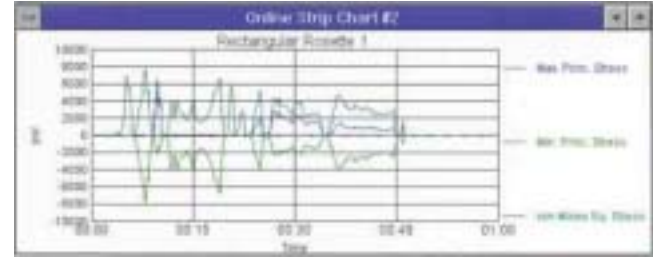
- Complete Windows-based software designed for the experimental stress analyst
- Autobalance
- Shunt calibration of all strain gauge inputs
- Data can be exported to an ASCII text file for user-specified data analysis and presentation
- Displays can be copied to the Windows clipboard
- Assignment of inputs is sensor-specific (strain gauges, thermocouples, etc.)
- Test set-up information can be saved and reused for subsequent testing
- Materials parameters can be specified for use in stress/strain relationships and Wheatstone bridge nonlinearity correction
- **Acquisition/Reduction/Presentation**
- Data reduction for delta, rectangular and tee rosettes, including the conversion of principal strains to principal stresses
- Calculation of equivalent stresses for common failure mode criteria
- Thermal output compensation
- Wheatstone bridge nonlinearity correction
- Transverse sensitivity correction
- Thermocouple linearization
- Automatic Audit Trail
- On-line monitoring of key channels and/or rosettes in fully reduced and corrected numeric or graphic formats
- Scaling for number of active bridge arms
- Data storage for later analysis or processing
- Correction for temperature coefficient or gauge factor
- Record on limits or user-defined time intervals
- Off-line presentation of all reduced data in numeric and graphic formats
- On-line Help system



 An exclusive StrainSmart feature

“Fast” Static Test Capability

System 5000's Model 5100 Scanners record test data within 1 millisecond from up to 1,200 channels at scan intervals as short as 0.1 seconds. This translates into more accurate test results and the ability to capture data under static loading conditions immediately before failure.



Model 5100 Scanner Front Panel

The Model 5100 Scanner is sized for standard 19-in (483-mm) instrumentation racks. Cabinets are available for various system configurations for bench-top or field use.



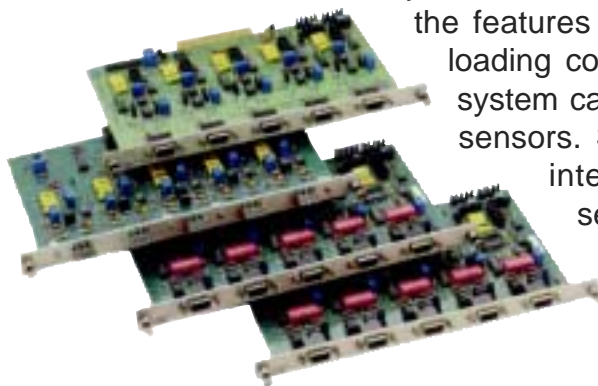
Model 5100 Scanner Rear Panel

Sensor connections are quickly made to the cards at the rear of each scanner in System 5000. Strain gauge cards include built-in bridge completion for quarter and half bridges and a constant voltage power supply for 0, 0.5, 1, 2, 5 and 10 Vdc bridge excitation.



Flexibility of Inputs

System 5000's instrumentation hardware is designed to incorporate all the features required for precision strain measurement under static loading conditions while maintaining flexibility and ease of use. A system can be configured with as few as 5 and as many as 1,200 sensors. Strain gauges, strain gauge based transducers can be intermixed in multiples of 5 by choosing the appropriate sensor card. Since each Model 5100 Scanner can function independently, your System 5000 components can be easily configured for each test requirement. A 100 channel system, for example, can be used as five independent 20-channel systems simply by purchasing additional software/interface hardware installations.



Sensor Cards

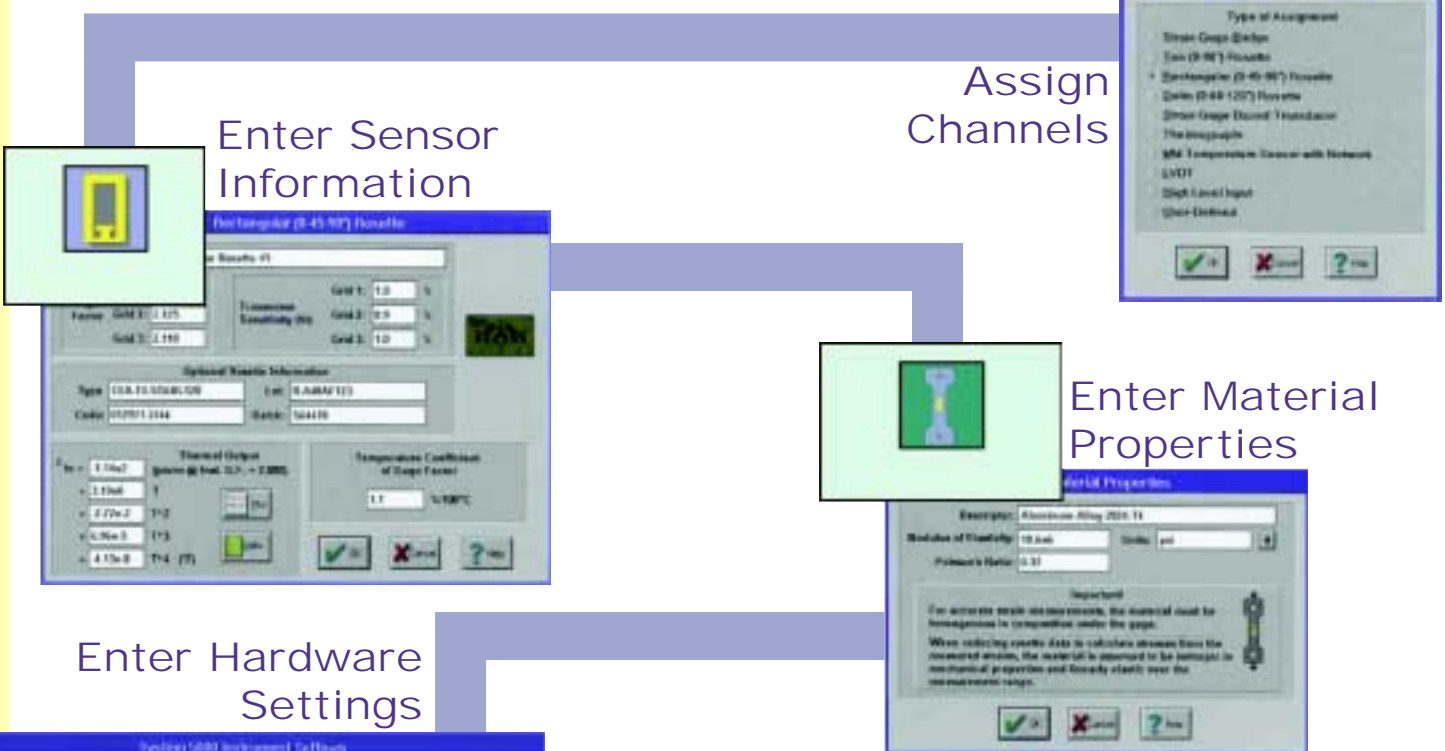
Multi-Channel Measurements... *Never Easier*

Through the software supplied with System 5000, the appropriate set-up information is entered - gauge factors, materials properties, transducer sensitivities, etc. Using these parameters, System 5000 automatically outputs the results of test data in engineering units. Set-up information and measurement data can also be permanently retained for off-line display or for export to databases, word processors and spreadsheets.

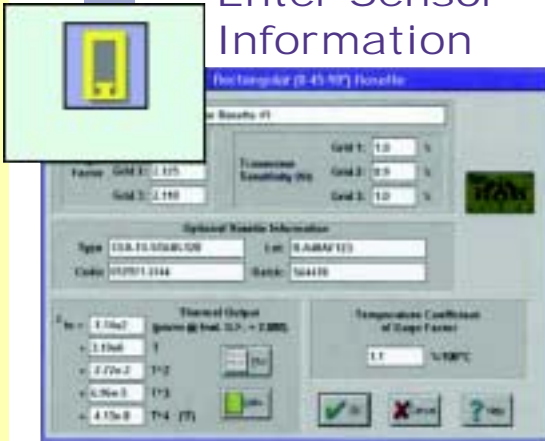
Accurate strain measurements require attention to the unique characteristics of the strain gauge and measurement system - thermal output, temperature coefficient of gauge factor and transverse sensitivity of strain gauges, as well as nonlinearity errors inherent in the Wheatstone bridge. System 5000 takes these into account automatically.



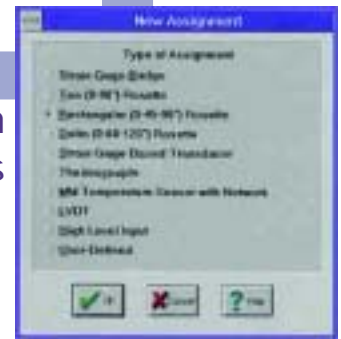
Connect Sensors



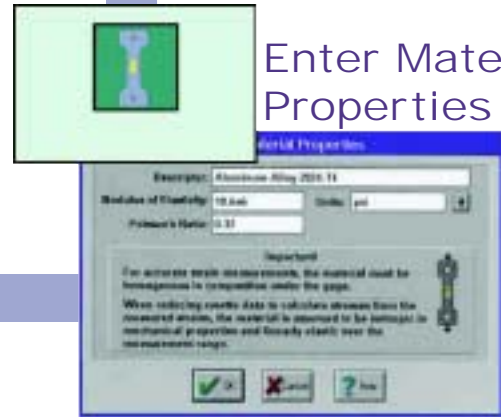
Enter Sensor Information



Assign Channels



Enter Material Properties



Enter Hardware Settings



Scan & Display Fully Corrected Test Data

Model 5100 Scanner

Inputs: Accepts up to 4 cards (5 channels per card and up to 20 channels per scanner). Maximum of 60 scanners (1,200 channels) can be accommodated.

A/D Converter: 16-bit (15-bit plus sign) successive approximation converter. Usable resolution is typically 15 bits. 40 microsecond conversion time per reading.

Scan Rate: 1 ms/scan. 10 complete scans/second typical usage. Concurrent scanning for all scanners.

Input channels in each scanner are scanned sequentially at a rate of 25,000 samples per second and stored in random access memory within a 1-ms window.

Dimensions: 3.5" H x 19" W x 16" D (89 x 483 x 381 mm).

Weight: 16 lb. (7.25 kg).

Power: 115/230 Vac selectable $\pm 10\%$.

Input Cards

Channels: 5 per card.

Input Characteristics:

Input impedance:

5110: $>22\text{ M}\Omega$

5120: $22\text{ M}\Omega$ each input

5130A: $22\text{ M}\Omega$ each input

5140: $10\text{ M}\Omega$ each input

Source current: 0.5 nA typical; 5 mA max.

Amplifier Characteristics:

Temperature stability: $1.2\mu\text{V}/^\circ\text{C}$ RTI, $100\mu\text{V}/^\circ\text{C}$ RTO; -10° to $+60^\circ\text{C}$ after 30-minute warm-up.

Gain accuracy and stability: 0.1% at 23°C $+100\text{ ppm}/^\circ\text{C}$.

Common-mode rejection (dc to 5 Hz): 100 dB typical.

System noise:

5110: Normal mode operation $\pm 2\mu\epsilon$ typical (± 4 ADC counts).

5120: Normal mode operation $\pm 10\mu\epsilon$ typical (± 4 ADC counts).

5130A: Normal mode operation:

± 4 ADC counts typical (at 0-15 Vdc excitation);

± 10 ADC counts typical (at 20-30 Vdc excitation).

5140: Normal mode operation ± 4 ADC counts typical.

Filter Characteristics:

Type: 4-pole Butterworth.

Cutoff frequency (-3 dB): 5 Hz.

Individual Card Specifications

Model 5110 Strain Gauge Card

Inputs: Strain gauge: 120, 350, 1,000 Ω quarter bridges, 60 to 5,000 Ω half & full bridges. Jumper selectable completion resistors (0.02% $\pm 3\text{ ppm}/^\circ\text{C}$ typ). Strain gauge based transducers: 60 to 5,000 Ω impedance.

Measurement range (strain gauge):

Normal range mode: $\pm 16,383\mu\epsilon$.

High range mode: $\pm 163,830\mu\epsilon$.

Low range mode: $\pm 1,638\mu\epsilon$.

Resolution (strain gauge):

Normal range mode: $1\mu\epsilon$.

High range mode: $10\mu\epsilon$.

Low range mode: $0.1\mu\epsilon$.

Measurement range (strain gauge based transducer):

Normal range mode: $\pm 8\text{ mV}/\text{V}$.

High range mode: $\pm 80\text{ mV}/\text{V}$.

Low range mode: $\pm 0.8\text{ mV}/\text{V}$.

Resolution (strain gauge based transducer):

Normal range mode: $0.5\mu\text{V}/\text{V}$.

High range mode: $5.0\mu\text{V}/\text{V}$.

Low range mode: $0.05\mu\text{V}/\text{V}$.

System coarse balance range: 100% of measurement range.

Excitation: 0, 0.5, 1.0, 2.0, 5.0, 10.0 Vdc. Software programmable.

Calibration: Two shunt calibration points available on each channel. Switch-selectable. Software enable/disable.

Input connector: 9-pin D-sub style.

Excitation:

Accuracy: $\pm 5\text{ mV}$ typical.

Current: 250 mA maximum (50 mA per channel). Over current protected.

Load regulation: $<0.05\%$ of full scale for a load variation of 10% to 100% of full load.

Temperature stability: Better than $0.005\%/^\circ\text{C}$.

Model 5120 Thermocouple Card

Inputs: Thermocouple types J, K, T, E, R, S, B. Built-in electronic compensation. Software selectable. Open sensor detection.

Measurement range: $\pm 81.9\text{ mV}$.

Resolution: $2.5\mu\text{V}$.

Input connector: 3-pin screw terminal.

Model 5130A High-Level Input Card

Inputs: Differential input dc volts.

Measurement range: $\pm 1, \pm 2, \pm 5, \pm 10\text{ Vdc}$.

Resolution: $\pm 30.5, \pm 61, \pm 152.5, \pm 305\mu\text{V}$.

Excitation: 0, 0.5, 1.0, 2.0, 5.0, 10.0, 15.0, 20.0, 25.0, 30.0 Vdc

Input connector: 9-pin D-sub style.

Excitation:

Accuracy: $\pm 10\text{ mV}$ typical.

Current: 250 mA max. (50 mA per channel) at 1 to 15 Vdc;

200 mA max. (40 mA per channel) at 20 Vdc;

150 mA max. (30 mA per channel) at 25 to 30 Vdc.

Over current protected.

Load regulation: $<0.05\%$ of full scale for a load variation of 10% to 100% of full load.

Temperature stability: Better than $0.005\%/^\circ\text{C}$.

Model 5140 LVDT Card

Inputs: Full-bridge and half-bridge transducers.

Measurement range: 0.5, 2.5, 5 Vrms

Resolution: 15.25, 30.5, 76.2, 152.5 μV rms.

Excitation: 3.0 Vrms at 2,500 or 5,000 Hz sine wave.

Calibration: Excitation sample

Input connector: 9-pin D-sub style.

Excitation:

Accuracy: $\pm 5\text{ mVrms}$ typical.

Current: 250 mA max. (50 mA per channel), over current protected.

Load regulation: $<0.1\%$ of full scale for a load variation of 10% to 100% of full load.

Temperature stability: Better than $0.05\%/^\circ\text{C}$.