MICRO MEASUREMENTS
A VPG Brand

Signal Conditioning Amplifier System

FEATURES

- Accepts quarter, half, or full bridge; all bridge-completion gages built in, including 120/1000 and 350 Ω dummies
- Fully adjustable and regulated bridge excitation on each channel; up to 12 VDC by front-panel control
- Continuously variable amplifier gain up to 2100 by front-panel control
- Separate bridge power switch
- Output 10 VDC at 100 mA, short-circuit-proof and current limiting standard
- LED null indicators provided on each channel to indicate amplifier and bridge-balance condition
- High stability with temperature and time
- Frequency response up to 50 kHz

DESCRIPTION

The demands of today's measurement applications are more exacting than ever before. An instrumentation system must provide durability and versatility, reliability with ease of operation, and economy with no sacrifice of accuracy.

The 2100 System was engineered with all of these requirements in mind, and to provide a durable, multi-channel signal conditioner/amplifier system capable of performing equally well in a wide variety of test applications and environments, and the 2100 System has proven itself through applications ranging from measurements on the ocean floor to testing of rocket motors.

The 2100 System accepts low-level signals, and conditions and amplifies them into high-level outputs suitable for multiple-channel simultaneous dynamic recording. The 2100 System is compatible with all types of external data recorders requiring voltage-level inputs.

Strain gage, load/pressure transducer and nickel temperature sensor inputs can be handled by the 2100 System without any rewiring.

All operational controls are located on the front panel for maximum setup efficiency. Frequently used controls are finger-operated, while initial setup adjustments are made through the front panel with a screwdriver.

Continuously variable amplifier gain is achieved via a locking ten-turn concentric-dial counting knob, which permits resetting to a predetermined value for repeating routine tests.

ADDITIONAL DETAILS

A separate bridge power switch removes bridge excitation, enabling the operator to detect unwanted signals due to electrical interference and/or noise, thermocouple effects, and shifts of the instrument zero during a long-term test. This feature is an absolute must for dynamic testing, and for validating test results.

An adjustable bridge excitation control on each channel permits excitation to be set as specified by the strain gage or transducer manufacturer. It also allows for any special consideration which may be dictated by the test material; for example, the poor thermal conductivity normally associated with plastics.

In addition to adjustable bridge excitation, each channel has its own regulator circuit. This prevents interaction of adjacent channels during setup or operation.

Each channel has a continuously variable gain control. In combination with recommended excitation, the independent gain control can provide a large output signal so that small signals can be resolved without overpowering the strain gage or transducer.

An LED display for each channel gives positive indication of amplifier and resistive balance. This capability accelerates setup and verifies tension/compression loading.

Easily read reference marks on the setup meter indicate acceptable line voltage and proper operation of internal power supplies.

A switch contained in the Model 2110B Power Supply allows adjustment when the line voltage is too high or too low.

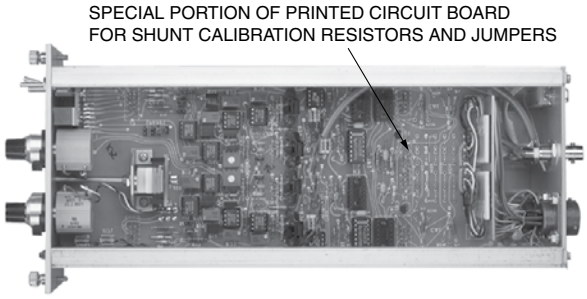
The 2100 System provides true quarter bridge, three-leadwire capability, including internal dummies and sufficient plug connections for remote shunt calibration.

A convenient network in the Model 2120B Strain Gage Conditioner/Amplifier allows the operator to change the factory-supplied shunt values, as well as shunt any arm of the bridge, as required.

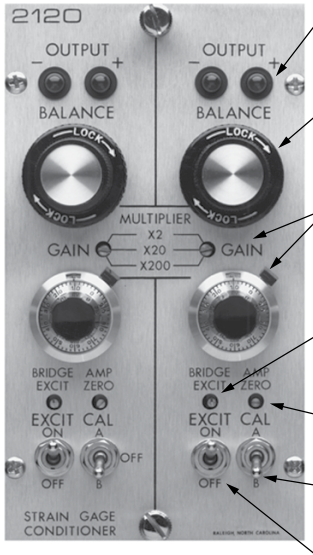
Signal Conditioning Amplifier System

MODEL 2120B
STRAIN GAGE CONDITIONER AMPLIFIER

A two-channel plug-in amplifier module that includes bridge completion, bridge balance, amplifier balance, bridge excitation regulator, and shunt calibration.



Front Panel



LED DISPLAY
Setup/Indicator for amplifier balance, bridge balance, tension/compression

BRIDGE BALANCE
Resistively balances the bridge; standard locking knob; digital locking knob ("K" option)

GAIN RANGE AND VERNIER
Varies amplifier gain between 1–2100

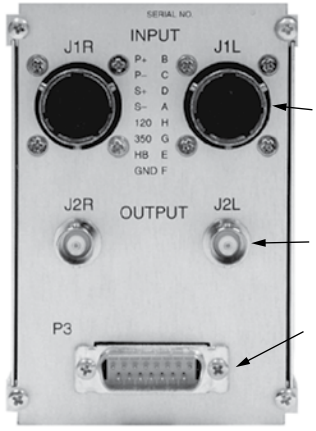
BRIDGE EXCITATION
Varies bridge excitation between 0.5–12 VDC

AMPLIFIER BALANCE
Adjusts amplifier offset

SHUNT CALIBRATION
(2 points)

BRIDGE EXCITATION (on/off)
Removes bridge excitation

Rear Panel



STRAIN GAGE/ TRANSDUCER INPUT
Quarter, half, and full bridge

OUTPUT
±10 VDC, ±100 mA

POWER RECEPTACLE

SPECIFICATIONS

All specifications are nominal or typical at +73°F (+23°C) unless noted.

PARAMETER	SPECIFICATIONS
INPUT BRIDGE TYPE	• Quarter (120/1000 Ω and 350 Ω) • Half and full bridge (50–1000 Ω) Quarter-bridge dummy gages provided
BRIDGE EXCITATION	
Voltage:	0.5 to 12 VDC (adjustable for each channel) with 120 Ω full-bridge load.
Short-circuit current: Under ripple, noise, and 10%	<40 mA
line change:	±2 mV max
Load regulation:	±0.2% no-load to 120 Ω load (10% line change)
BRIDGE BALANCE	±2000 με (quarter, half, or 350 Ω full bridge). Range can be changed by internal jumper to ±4000 με or ±6000 με

Signal Conditioning Amplifier System

PARAMETER	SPECIFICATIONS	
SHUNT CALIBRATION	Two-position (center off) toggle switch Standard factory-installed resistors (±0.1%) simulate ±1000 με at GF=2	
AMPLIFIER GAIN	1 to 2100 continuously adjustable ±1%	
BANDPASS		
Normal:	DC to 5 kHz (min): -0.5 dB (-5%) DC to 15 kHz: -3 dB	
Extended (using internal jumper):	DC to 17 kHz: -0.5 dB DC to 50 kHz: -3 dB	
AMPLIFIER INPUT		
Temperature coefficient of zero:	±1 µV/°C RTI* ±210 µV/°C RTO** (-10°C to +60°C, after 30 minute warm-up) *Referred to input **Referred to output	
Noise RTI (350Ω source impedance):	• 1 µVp-p at 0.1 Hz to 10 Hz • 2 µVRMS at 0.1 Hz to 50 kHz	
Noise RTO:	• 50 µV p-p at 0.1 Hz to 10 Hz • 80 µV p-p at 0.1 Hz to 100 Hz • 100 µVRMS at 0.1Hz to 15 kHz • 200 µVRMS at 0.1Hz to 50 kHz	
Input Impedance:	>100 MΩ (balance limit resistor disconnected)	
Common-Mode Rejection (DC to 60 Hz):	Gain Multiplier	CMR (dB)
	x2	67
	X20	87
	x200	100
Source Current:	±10 nA typical; ±40 nA max.	
OUTPUT	±10 V (min) at ±100 mA	
Current limit:	140 mA	
SIZE	5.25 H x 2.94 W x 10.97 D in (133 x 75 x 279 mm)	
WEIGHT	2.2 lb (1.0 kg)	

Signal Conditioning Amplifier System

MODEL 2110B - POWER SUPPLY

A plug-in module capable of powering up to ten channels (five Model 2120B modules) at a maximum rated voltage or current. Provides initial bridge and amplifier voltages. All supplies are current-limited against amplifier malfunction.

BRIDGE-VOLTS METER
Used to set up/monitor bridge excitation, also line and power supply levels

CHANNEL SELECTOR
AC monitors ac line input. DC monitors the power supplies. Positions 1–10 select and display bridge excitation for each channel

PILOT LAMP
Indicates main power

POWER SWITCH
Main power on-off

EXTERNAL METER
Used with an external digital voltmeter to precisely adjust bridge excitation

SPECIFICATIONS

All specifications are nominal or typical at +73°F (+23°C) unless noted.

PARAMETER	SPECIFICATIONS
INPUT VOLTAGE	107, 115, 214, 230 VAC ±10% 50/60 Hz (selected internally)
Power:	40 W typical, 100 W max.
OUTPUTS VOLTAGES	• ±15 V at 1.2 A • +17.5 V at 1.1 A; All regulators current-limited against overload
METER	• 0 to 12 VDC (with switch) to read bridge excitation. • AC input and DC output go/no-go monitor
SIZE	5.25 H x 2.44 W x 12.34 D in (133 x 62 x 313 mm)
WEIGHT	6.7 lb (3.1 kg)

Signal Conditioning Amplifier System

MODEL 2150 - RACK ADAPTER

A prewired rack adapter which accepts one Model 2110B and up to five Model 2120B Strain Gage Conditioner Amplifiers. It has its own fuse and power cord and can be housed in any standard 19-in (483-mm) electronic equipment rack.

MODEL 2150 FRONT

MODEL 2150 REAR

PARAMETER	SPECIFICATIONS
POWER CABLE	2-ft (0.6-m) 3-wire line cord; 10-ft (3-m) extension available Receptacle to accept line cord from adjacent 2150 Rack Adapter
SIZE	5.25 H x 19 W x 14.17 D in (133 x 483 x 360 mm)
WEIGHT	6.6 lb (3.0 kg)

MODEL 2160B PORTABLE FOUR-CHANNEL ENCLOSURE

A prewired, fused enclosure which houses up to three (3) modules. A carrying handle ensures maximum portability. An additional snap-down bail support on the bottom can be used to elevate the 2160 for excellent work efficiency during bench-top operation. The Model 2160 would be substituted for the Model 2150 when two or four channels and maximum portability are required.

PARAMETER	SPECIFICATIONS
SIZE	5.55 H x 8.75 W x 13.80 D in (141 x 222 x 350 mm)
WEIGHT	5.2 lb (2.4 kg)

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