Signal Conditioning Amplifier

FEATURES

- Accepts full, half, or quarter bridges; all bridge-completion gages built in, including 120/1000- and 350-ohm dummies
- Fully adjustable and regulated bridge excitation on each channel; up to 12Vdc by front-panel control
- Continuously variable amplifier gain up to 2100 by front-panel control
- Separate bridge-power switch
- Output 10Vdc at 100mA, 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 50kHz
- Direct channel-by-channel display of data, with optional peak hold/retention capability

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 the space shuttle.

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 strip charts, magnetic tape and X-Y recorders.

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

An important design objective achieved is miniaturization of the system while maintaining adequate spacing around the front-panel controls. 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.

A combination of integrated circuits and discrete components assures maximum performance and ease of service at the lowest possible price.

CONFIGURATION

A 2100 System consists of:

- One to five modules - Model 2120B Strain Gage Conditioner/Amplifier (two channels/module)
- One Model 2110B Power Supply
- One Model 2150 Rack Adapter

OR:

- One or two modules - Model 2120B Strain Gage Conditioner/Amplifier (two channels/module)
- One Model 2110B Power Supply
- One Model 2160B Portable Four-Channel Enclosure

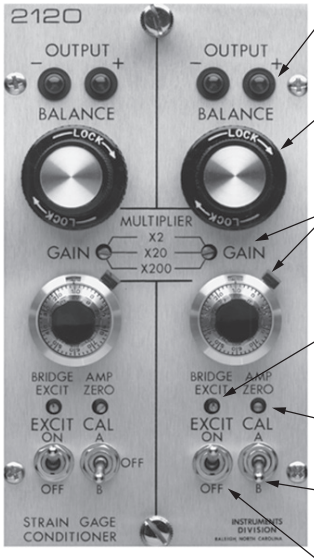
ADDITIONAL DETAILS

- 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.

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

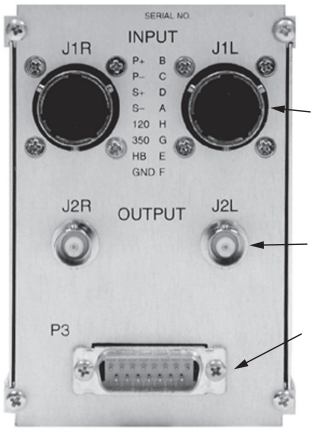
BRIDGE EXCITATION:
Varies bridge excitation between 0.5-12Vdc

AMPLIFIER BALANCE:
Adjusts amplifier offset

SHUNT CALIBRATION:
(2 points)

BRIDGE EXCITATION (on/off):
Removes bridge excitation

Rear Panel

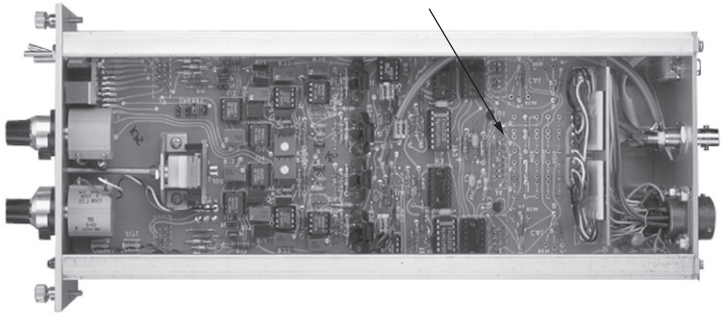


STRAIN GAGE/ TRANSDUCER INPUT:
Quarter, half, and full bridge

OUTPUT:
±10Vdc, ±100mA

POWER RECEPTACLE

SPECIAL PORTION OF PRINTED CIRCUIT BOARD FOR SHUNT CALIBRATION RESISTORS AND JUMPERS



Signal Conditioning Amplifier

MODEL 2120B STRAIN GAGE CONDITIONER AMPLIFIER

SPECIFICATIONS

All specifications in this bulletin are nominal or typical at +23°C unless noted. Performance may be degraded in the presence of high-level electromagnetic fields.

INPUTS:

Quarter (120W/1000W and 350W), half and full bridge (50-1000W). Quarter-bridge dummy gages provided.

BRIDGE EXCITATION:

0.5 to 12Vdc (adjustable for each channel) with 120W full-bridge load.

Short-circuit current: <40mA.

Ripple, noise, and 10% line change: ±2mV max.

Load regulation: ±0.2% no-load to 120W load (10% line change)

BRIDGE BALANCE:

±2000με (quarter, half, or 350W full bridge), range can be changed by internal jumper to ±4000με or ±6000με

CALIBRATION:

Two-position (center off) toggle switch.

Standard factory-installed resistors (±0.1%) simulate ±1000me at GF=2.

AMP GAIN:

1 to 2100 continuously adjustable ±1%.

BANDPASS:

dc to 5kHz (min): -0.5dB (-5%)
dc to 15kHz: -3dB

Can be extended by internal jumper to:
dc to 17kHz: -0.5dB
dc to 50kHz: -3dB

AMP INPUT:

Temperature Coefficient of Zero:
±1 μV/°C RTI*, ±210μV/°C RTO**;
-10° to +60°C (after 30 minute warm-up).

Noise RTI: (350W source impedance)
1μV p-p at 0.1Hz to 10Hz;
2μV p-p at 0.1Hz to 100Hz;
2μVrms at 0.1Hz to 50kHz.

Noise RTO:
50μV p-p at 0.1Hz to 10Hz;
80μV p-p at 0.1Hz to 100Hz;
100μVrms at 0.1Hz to 15kHz;
200μVrms at 0.1Hz to 50kHz.

Input Impedance: >100MW (balance limit resistor disconnected).

Common-Mode Rejection: (dc to 60 Hz).

Gain Multiplier	CMR (dB)
X2	67
X20	87
X200	100

Source Current: ±10nA typical; ±40nA max.

OUPUT:

±10V (min) at ±100mA.
Current Limit: 140mA.

SIZE:

5.25 H x 2.94 W x 10.97 D in (133 x 75 x 279mm).

WEIGHT:

2.2lb (1.0kg)

* Referred to input
** Referred to output

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

OUPUTS:

±15V at 1.2A and +17.5V at 1.1A; all regulators current-limited against overload.

INPUT:

107, 115, 214, 230Vac ±10% 50/60Hz (selected internally).

Power: 40W typical, 100W max.

METER:

0 to 12Vdc (with switch) to read bridge excitation. Also ac input and dc output go/no-go monitor.

SIZE:

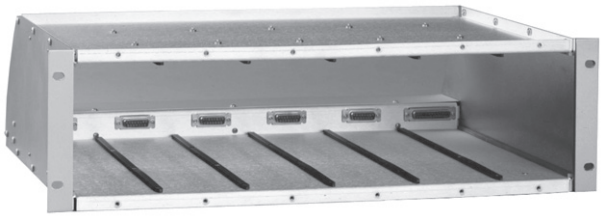
5.25 H x 2.44 W x 12.34 D in (133 x 62 x 313mm).

WEIGHT:

6.7lb (3.1kg).

MODEL 2150 RACK ADAPTER

Model 2150: A prewired rack adapter which accepts one Model 2110B or 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.



MODEL2150 FRONT

2150 SPECIFICATIONS:

POWER:

2-ft (0.6-m) 3-wire line cord; 10-ft (3-m) extension available.
Fuse: 1A size 3 AG (32 x 6.5 dia. mm).
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 360mm)

WEIGHT:

6.6 lb (3.0kg)

MODEL2150 REAR

MODEL 2160B PORTABLE FOUR-CHANNEL ENCLOSURE

Model 2160: 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.

2160B SPECIFICATIONS:

SIZE:

5.55 H x 8.75 W x 13.80 D in (141 x 222 x 350mm)

WEIGHT:

5.2lb (2.4kg)

Disclaimer

All product specifications and data are subject to change without notice.

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