Model 8120-400A

Strain Gage Sensor Signal Conditioner

Installation and Operating Manual

**For assistance with the operation of this product,
contact PCB Piezotronics, Inc.**

Toll-free: 800-828-8840
24-hour SensorLine: 716-684-0001
Fax: 716-684-0987
E-mail: info@pcb.com
Web: www.pcb.com

Repair and Maintenance

PCB guarantees Total Customer Satisfaction through its "Lifetime Warranty Plus" on all Platinum Stock Products sold by PCB and through its limited warranties on all other PCB Stock, Standard and Special products. Due to the sophisticated nature of our sensors and associated instrumentation, **field servicing and repair is not recommended and, if attempted, will void the factory warranty**.

Beyond routine calibration and battery replacements where applicable, our products require no user maintenance. Clean electrical connectors, housings, and mounting surfaces with solutions and techniques that will not harm the material of construction. Observe caution when using liquids near devices that are not hermetically sealed. Such devices should only be wiped with a dampened cloth—never saturated or submerged.

In the event that equipment becomes damaged or ceases to operate, our Application Engineers are here to support your troubleshooting efforts 24 hours a day, 7 days a week. Call or email with model and serial number as well as a brief description of the problem.

Calibration

Routine calibration of sensors and associated instrumentation is necessary to maintain measurement accuracy. We recommend calibrating on an annual basis, after exposure to any extreme environmental influence, or prior to any critical test.

PCB Piezotronics is an ISO-9001 certified company whose calibration services are accredited by A2LA to ISO/IEC 17025, with full traceability to SI through N.I.S.T. In addition to our standard calibration services, we also offer specialized tests, including: sensitivity at elevated or cryogenic temperatures, phase response, extended high or low frequency response, extended range, leak testing, hydrostatic pressure testing, and others. For more information, contact your local PCB Piezotronics distributor, sales representative, or factory customer service representative.

Returning Equipment

If factory repair is required, our representatives will provide you with a Return Material Authorization (RMA) number, which we use to reference any information you have already provided and expedite the repair process. This number should be clearly marked on the outside of all returned package(s) and on any packing list(s) accompanying the shipment.

Contact Information

PCB Piezotronics, Inc.
3425 Walden Ave.
Depew, NY14043 USA
Toll-free: (800) 828-8840
24-hour SensorLine: (716) 684-0001
General inquiries: info@pcb.com
Repair inquiries: rma@pcb.com

For a complete list of distributors, global offices and sales representatives, visit our website, www.pcb.com.

Safety Considerations

This product is intended for use by qualified personnel who recognize shock hazards and are familiar with the precautions required to avoid injury. While our equipment is designed with user safety in mind, the protection provided by the equipment may be impaired if equipment is used in a manner not specified by this manual.

Discontinue use and contact our 24-Hour Sensorline if:

- Assistance is needed to safely operate equipment
- Damage is visible or suspected
- Equipment fails or malfunctions

For complete equipment ratings, refer to the enclosed specification sheet for your product.

Definition of Terms and Symbols

The following symbols may be used in this manual:

DANGER
Indicates an immediate hazardous situation, which, if not avoided, may result in death or serious injury.

CAUTION
Refers to hazards that could damage the instrument.

NOTE
Indicates tips, recommendations and important information. The notes simplify processes and contain additional information on particular operating steps.

The following symbols may be found on the equipment described in this manual:

This symbol on the unit indicates that high voltage may be present. Use standard safety precautions to avoid personal contact with this voltage.

This symbol on the unit indicates that the user should refer to the operating instructions located in the manual.

This symbol indicates safety, earth ground.

PCB工业监视和测量设备 - 中国RoHS2公布表

PCB Industrial Monitoring and Measuring Equipment - China RoHS 2 Disclosure Table

部件名称	有害物质					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
住房	O	O	O	O	O	O
PCB板	X	O	O	O	O	O
电气连接器	O	O	O	O	O	O
压电晶体	X	O	O	O	O	O
环氧	O	O	O	O	O	O
铁氟龙	O	O	O	O	O	O
电子	O	O	O	O	O	O
厚膜基板	O	O	X	O	O	O
电线	O	O	O	O	O	O
电缆	X	O	O	O	O	O
塑料	O	O	O	O	O	O
焊接	X	O	O	O	O	O
铜合金/黄铜	X	O	O	O	O	O

本表格依据 SJ/T 11364 的规定编制。

O： 表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。

X： 表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。

铅是欧洲RoHS指令2011/65/ EU附件三和附件四目前由于允许的豁免。

CHINA RoHS COMPLIANCE

Component Name	Hazardous Substances					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Chromium VI Compounds (Cr(VI))	Polybrominated Biphenyls (PBB)	Polybrominated Diphenyl Ethers (PBDE)
Housing	O	O	O	O	O	O
PCB Board	X	O	O	O	O	O
Electrical Connectors	O	O	O	O	O	O
Piezoelectric Crystals	X	O	O	O	O	O
Epoxy	O	O	O	O	O	O
Teflon	O	O	O	O	O	O
Electronics	O	O	O	O	O	O
Thick Film Substrate	O	O	X	O	O	O
Wires	O	O	O	O	O	O
Cables	X	O	O	O	O	O
Plastic	O	O	O	O	O	O
Solder	X	O	O	O	O	O
Copper Alloy/Brass	X	O	O	O	O	O

This table is prepared in accordance with the provisions of SJ/T 11364.

O: Indicates that said hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement of GB/T 26572.

X: Indicates that said hazardous substance contained in at least one of the homogeneous materials for this part is above the limit requirement of GB/T 26572.
Lead is present due to allowed exemption in Annex III or Annex IV of the European RoHS Directive 2011/65/EU.

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Reference Figures

MANUAL NUMBER: 18222
REVISION: B
ECO NUMBER: 37012

1.0 DESCRIPTION

Model 8120-400A Transducer Signal Conditioner/Amplifier is designed for use with resistance strain gage transducers that require an AC excitation-amplification source. It supplies a 3.28 kHz frequency, precision amplitude-regulated excitation, which is remotely sensed to the transducer. The instrument uses a phase-sensitive carrier amplifier-demodulator design so that both direction and magnitude of the applied force are determined. The 8120-400A contains all necessary balancing and calibration controls and condition/amplify the applied input to a standard ± 5 volt DC analog output level. Two analog outputs, both having low-pass cutoff frequencies, one of 2 Hz and the other of 400 Hz, are provided. The filtered outputs provide for averaging of signals containing noise or other unwanted dynamic components that are periodic in nature.

The 8120-400A is used in applications involving transformer coupling of the strain gage bridge (rotary transformer coupled torque sensors for example), and in applications that require a high sensitivity (amplification) with optimum "signal to noise" characteristics. Carrier amplifiers offer higher sensitivity than comparable DC-excited bridge amplifiers, and since they respond only to the modulated carrier frequency, they reject certain extraneous voltages that cause interference with DC-excited bridge instruments.

Note: If you have a PCB rotary transformer torque sensor, please refer to Section 3 of this manual, or to either the 4100 Series Rotary Transformer Torque Sensor Manual (PCB Manual #18227), or the 4200 Series Rotary Transformer Torque Sensor Manual (PCB Manual #18228), for calibration procedures.

Calibration of the instrument is made through conventional shunt technique, using an internally installed calibration resistor, or an external shunt calibration reference, such as our Model 8113A or 8113-105A Shunt Calibration References. Front panel calibration buttons provide for calibration in both the positive and negative directions. An internal symmetry control provides independent adjustment of the negative direction sensitivity for transducers that do not have symmetrical positive and negative slope characteristics. Positive direction calibration can be checked by means of REMOTE CAL terminals on the instrument I/O connector.

The 8120-400A Strain Gage Conditioner is also available in two additional forms. The 8120-410A is similar to the 8120-400A except it also contains a dedicated 4.5 digit LED display with a 3Hz update rate. The resolution of the digital display is 1:5000 (0.02% FS). The display also has a selectable decimal point, trick count multiplier, and a trailing inert zero. For more information on instruments with digital display, refer to PCB Manual #27259. The Model 8120-430A contains a Limit section (in addition to a Digital Indicator) that provides High/OK/Low indications and outputs. Refer to PCB Manual #19479 for more information. The Digital Indicator and Limit features are standard to all 8120 Series Instruments.

2.0 INSTALLATION AND CABLING

The following paragraphs provide the instructions for instrument installation and cabling.

Mounting

The 8120 Series Instruments can be operated as bench-top units or they can be rack or panel mounted. Clearance dimensions for a bench-mounted instrument are given in Figure 1 and cut-out dimensions for panel mounting are shown in Figure 2.

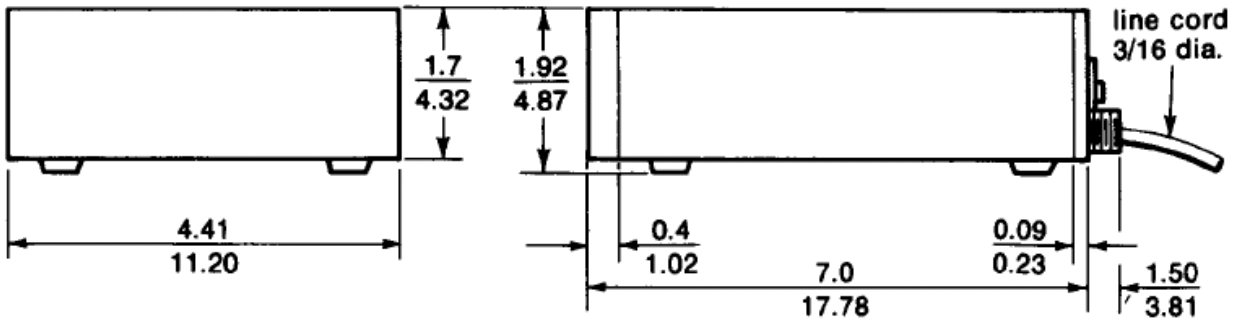

Figure 1 – Bench Mounting Clearance Dimensions

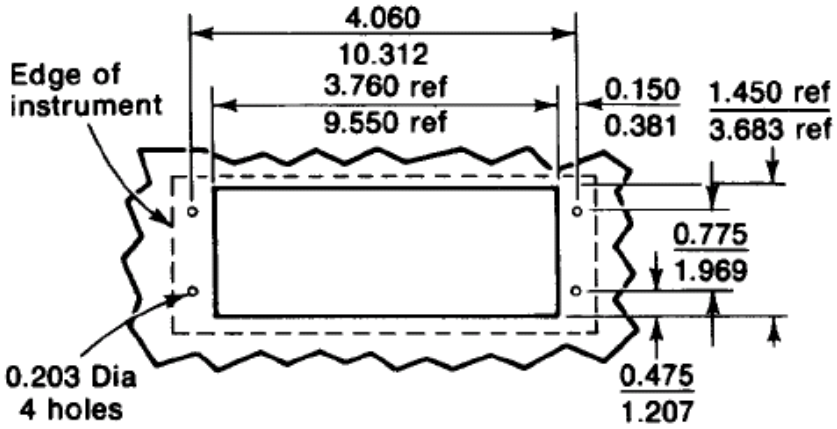

Figure 2 – Panel Mounting Cut-Out Dimensions

To panel mount an instrument, proceed as follows, referring to Figure 3.

Important: The unit is shipped with two spacer washers on the securing screws of the rear-panel I/O connector. When panel-mounting the unit, you *must* remove these washers so that the printed circuit board may move forward about 1/8" during Step (6).

1. Remove the front panel by removing the two #2-56 x 3/8” flat-head screws.

2. Remove the front bezel by removing the four #6-32 x 5/8” fillister-head screws.

3. Make the panel cut-out and drill the screw clearance holes indicated in Figure 2. The front bezel can be used as a template to define the rectangular cut-out and locate the clearance holes.

4. Hold the instrument enclosure behind the panel and re-attach the front bezel to the enclosure from the front of the panel with the four remaining screws.

5. Reinstall the front panel.

6. Tighten the two securing screws of the rear panel I/O connector to ensure that the connector is seated and that the conditioner printed-circuit board is pushed fully forward so that the front-panel screwdriver adjustments and buttons are accessible. These screws give approximately 1/8 inch adjustment; consequently, this is the maximum panel thickness that should be used.

Caution: Do not over tighten the connector securing screws or resultant damage may occur to the printed-circuit board.

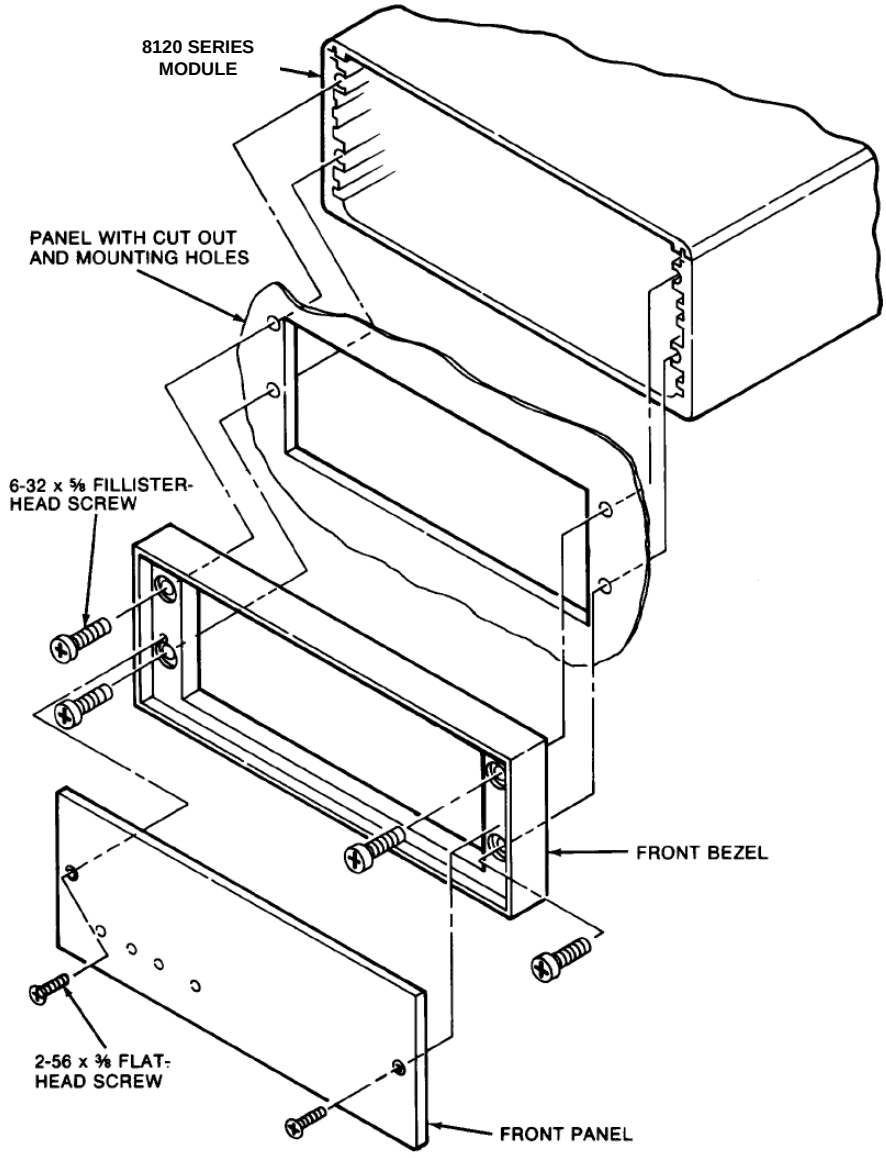

Figure 3 – Panel Mount Assembly

To rack mount an instrument, refer to Figure 4. Up to four 8120 Series Instruments can be mounted in a 19-inch rack using the 1.75-inch high Model 8171A Rack Adaptor.

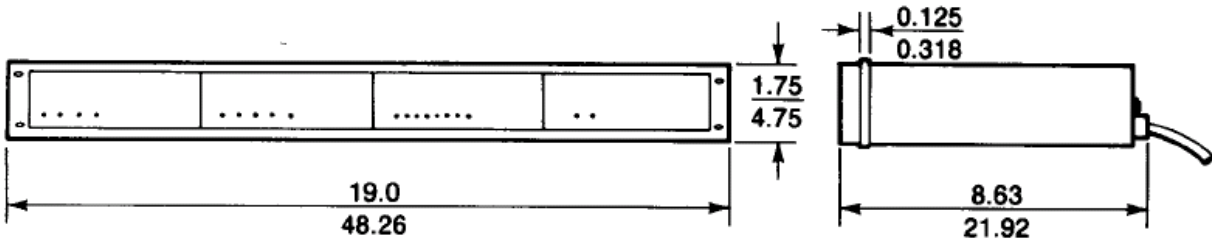

Figure 4 – Rack Mounting Dimensions

AC Power Connection

To protect operating personnel, the 8120 Series Instruments are equipped with a three-conductor power cord. When the cord is plugged into the appropriate receptacle, the instrument is grounded. The offset pin on the power cord is ground. To maintain the safety ground when operating the unit from a two-contact outlet, use a three-prong to two-prong adaptor and connect the green pigtail on the adaptor to ground.

To prepare the instrument for operation, connect the power cable to a 105-135 volt AC, 50-400 Hz power source. The instrument can use up to 5 watts of power.

Calibration Resistor

If a fixed resistor is shunted across one arm of a strain gage Wheatstone Bridge, it produces an unbalance equivalent to that of a particular value of mechanical input. If this Equivalent Input value is accurately known, it can be used as a reference point for shunt calibration of the system. Upon completion of installation of the transducer and its associated cabling, the user can:

1. Perform an overall dead weight calibration using a precisely known value of mechanical input. Shunt calibration data then can be collected by means of the installed calibration resistor for convenience in subsequent checking.

2. Replace the installed calibration resistor with one (or an equivalent resistance value) supplied by the transducer manufacturer to achieve a precisely known Equivalent Input allowing the instrument sensitivity to be adjusted correctly.

3. Determine the Equivalent Input value for the installed calibration resistor, knowing the transducer sensitivity, and adjust the instrument sensitivity accordingly.

4. A precision 59KΩ calibration resistor is installed in the 8120 at the factory. The installed resistor can usually be used even though the transducer calibration data mentions some other resistance value. In Section 3 of this manual, the techniques described above are demonstrated. If, however, the installed value of calibration resistor is not appropriate for the transducer and measurement range to be used, the 59KΩ resistor should be replaced at this time. The calibration resistor is mounted on solder terminals located at the front edge of the conditioner printed-circuit board in the instrument. It can be accessed by removing the front panel.

Note: PCB 4200 Series Rotary Transformer Torque Transducers are supplied with the appropriate calibration resistor integral to the transducer. When this type of transducer is used with the 8120-400A, it is not necessary to remove the 59KΩ resistor internal to the instrument. The calibration resistor can be appropriately connected to the 8120-400A calibration circuit via the transducer cabling. Refer to **Figure 5** and the following section.

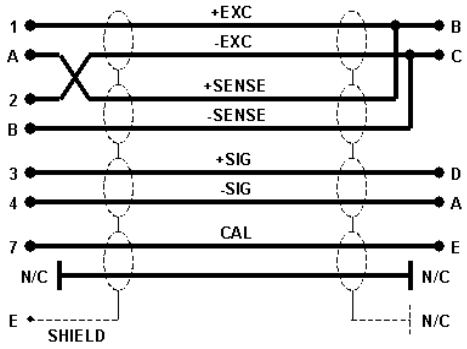

Figure 5 – PCB 4200 Series Cabling

Transducer Cabling

Cabling to the transducer is accomplished via the supplied instrument I/O connector (PCB Model 182-015A). The I/O connector pin numbers and functions are given in **Figure 6**.

Rear View

PIN		PIN	
1	+EXCITATION	A	+SENSE
2	-EXCITATION	B	-SENSE
3	+SIGNAL INPUT	C	CALIBRATION SENSE
4	- SIGNAL INPUT	D	OSC. DISABLE
5	SIGNAL COMMON	E	TRANSDUCER CABLE SHIELD
6	OSC. INPUT	F	OSC. OUTPUT
7	NC	H	ANALOG OUTPUT
8	REMOTE CALIBRATION	J	ANALOG OUTPUT
9	OUTPUT SHIELD	K	NC
10	OUTPUT SIGNAL COMMON	L	NC

Figure 6 – 182-015A Pin Out

Transducer cabling should take the form of a 4, 6, or 8-wire cable configuration. The 4-wire configuration, shown in Figure 7, should be used when overall deadweight calibration is the method used and the required cable length is less than 20 feet.

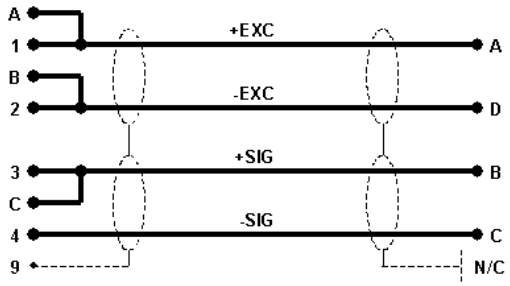

Figure 7 – 4 Conductor Cabling

The 6-wire configuration, shown in Figure 8, should be used when the instrument is to be calibrated by achieving a precisely known Equivalent Input value through the use of a shunt calibration resistor supplied by the transducer manufacturer and when the required cable length is less than 20 feet.

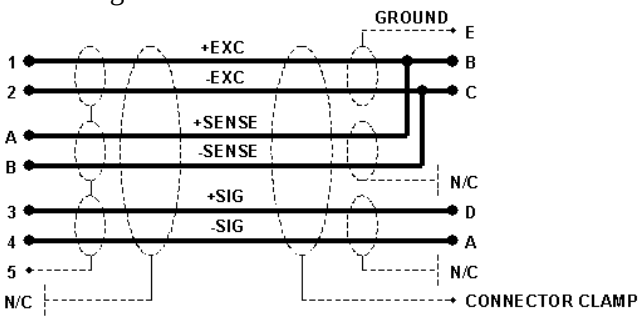

Figure 8 – PCB 4100 Series Cabling

The 8-wire configuration, shown in Figure 9, should be used with cable lengths longer than 20 feet since the excitation voltage is sensed and regulated at the transducer and optimum shunt calibration can be achieved.

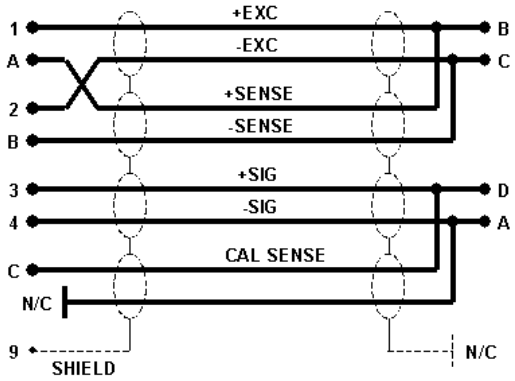

Figure 9 – 8 Conductor Cabling

Remote Calibration Check

The instrument can be placed in the calibration mode (positive realm only) by shorting pins 5 (Signal Common) and 8 (Remote Cal) of the rear-panel I/O connector. Figure 10 indicates three methods of remotely entering the calibration mode (external switch, transistor, or TTL source).

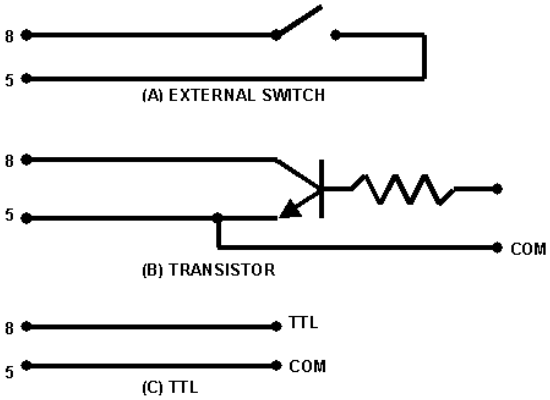

Figure 10 – Remote Calibration Methods

Master/Slave Connections

When more than one 8120-400A (or a combination of AC Carrier Conditioners) is being used in a measurement setup (instruments are continuously mounted or the transducer cabling is in a common conduit or raceway), beat frequencies may be produced from the 3-kHz oscillators used in the instruments to power the transducer(s) excitation. To prevent beat frequencies from occurring, one unit can be designated the Master, and the other units can be driven from the Master oscillator. The remaining units are designated as Slave instruments. To connect as Master/Slave units, refer to Figure 11.

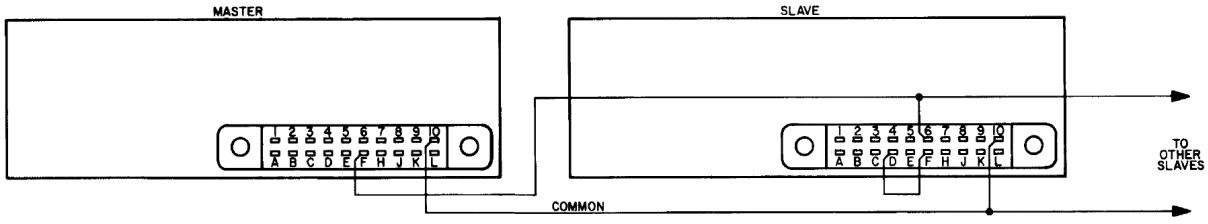

Figure 11 – Master/Slave Connections

Analog Outputs

Two analog outputs are simultaneously available at the instrument I/O connector, with each output having a different passband: DC to 2 Hz and DC to 400 Hz. The cutoff frequencies are achieved with active low-pass filters. When the DC to 2 Hz output is used, a trade off is made between noise elimination and increased time-to-answer, or slew time. Each output has a 60db rolloff a decade from the cutoff frequency.

The filter characteristics are given by the following equations:

$$A_{out} @ f_0 = 0.7\ A_{in}$$
$$A_{out} @ 10f_0 = 0.001\ A_{in}$$
$$T = 1.4/f_0$$

where A_{out} = output amplitude
A_{in} = input amplitude
f_0 = selected cutoff frequency
T = time-to-answer in seconds (output of filter within 0.1% of final value after step function is applied).

3.0 CALIBRATION

This section contains the instructions for calibrating the 8120-400A. Included is a functional description of the instrument front-panel (see Figure 12). To perform calibration, proceed as follows.

1. Turn power ON by placing the rear-panel slide switch in the ON position. The front-panel indicator should light to indicate the application of AC power. Allow 5 minutes of warm-up for stabilization of transducer characteristics.

2. Make sure the transducer is unloaded and is free from locked in torque or load by releasing one end. Zero the output reading with the Fine and Coarse R balance controls.

3. Press the NULL button and adjust the C BALANCE control to obtain the minimum (least positive, most negative) output reading. In some instances, an integral digital indicator will be used to display the conditioner output (Model 8120-410A or 8120-430A). When only the conditioner is supplied (8120-400A), an external indicator must be used to monitor the conditioner output. Release the NULL button. This step need only be performed one time for any transducer/cable combination.

Dead Weight Calibration

1. Load the transducer in the positive direction with a convenient dead weight value that is greater than one half of full scale. The following step is only for Rotary Transformer Transducers. If not using a Rotary Transformer Transducers, skip to step 2.
   1a. Remove the 8120's front panel (one small flat-head screw near each edge) to access the SYMMETRY and PHASE adjustments. Adjust the PHASE control (the one to the extreme right), until a maximum output value is obtained. Once set for your transducer, this PHASE adjustment step need not be repeated unless a great change in cable length or capacitance is required.

2. Adjust the Coarse and Fine SPAN controls until the output value equals the dead weight value. Remove the dead weight, and then press the +CAL button, noting the indicator reading obtained. In future calibrations, you need only press the +CAL button and adjust the SPAN controls until you obtain the previously recorded dead weight reading.

3. If the transducer is to be also used in the negative direction, load the transducer in the negative direction with the same dead weight value as used in step (1) and confirm that the dead weight reading obtained is the same as that of step (1). If not, see steps (4).

4. An internal SYMMETRY adjustment is provided to compensate for transducers that do not have symmetrical sensitivity characteristics. This adjustment is factory set assuming symmetrical characteristics. If

step (3) indicates that a field adjustment is necessary, proceed as follows:

- ✓ Remove the front panel by removing the two #2-56 flat head screws to obtain access to the SYMMETRY adjustment.

- ✓ With the transducer loaded as in step (3), adjust the SYMMETRY control (just to the right of the –CAL button) to obtain a dead weight reading equal to that obtained in step (3).

Shunt Resistor Calibration
If dead weight calibration is not practical and the transducer manufacturer has supplied a calibration resistor (or resistor value), install the recommended calibration resistor in place of the installed 59KΩ resistor as discussed in Section 2. If you purchased a complete system from PCB Piezotronics, this step may not be necessary. Please consult our factory.

1. Complete steps (2) and (3). Now press the +CAL button and adjust the PHASE control until a maximum output reading is obtained. Once set for your transducer, this PHASE adjustment step need not be repeated unless a great change in cable length or capacitance occurs.

2. Next adjust the SPAN controls until the instrument output is equal to the Equivalent Input value simulated by the installed resistor. Now release the +CAL button.

3. If a negative Equivalent Input value is also provided (as in the case of PCS's calibration sheet), press the –CAL pushbutton and confirm that the negative value can also be obtained with the same setting of the Coarse and Fine controls. If not, adjust the Symmetry control to obtain the negative Equivalent Input value.

4.0 CALIBRATION OF PCB ROTARY TRANSFORMER TORQUE SENSORS

Shunt calibration of the Model 4100 Torque Sensor Series is done utilizing the PCB Model 8113-105A or 8113A Calibration Reference Box.

Preparation
Do not follow the procedure, in Section 2 for replacement of the shunt calibration resistor since a calibration resistor is included with each PCB Rotary Transformer Torque Sensor. It should already be installed in the Calibration Reference Box Model 8113-105A or 8113A.

Calibration with 8113-105A Calibration Reference Box
A Model 8113-105A Calibration Reference Box is shipped with each PCB 4100 Series rotary torque sensor and contains a precision shunt calibration resistor for performing calibration of the 8120-400A/410A instrument. The box mounts directly on the edge connector at the rear panel. It is activated with a DC powered internal relay. A 5 VDC excitation must be provided in series with a remote ON-OFF switch in order to activate the relay to the ON position. The internal resistor of the 8120-400A/410A is bypassed when using a Model 8113-105A reference box.

Calibration Procedure
Both the transducer cable and 8113-105A reference box should always be connected to the 8120-400A/410A instrument.

1. With the relay OFF, zero the output reading with the Coarse and Fine R balance controls.

2. Turn the relay ON.

3. Zero the output again with the Coarse and Fine R balance controls.

4. Push the +CAL button and adjust the SPAN such that the reading matches the +CAL value on the transducer calibration sheet.

5. Release +CAL and check zero; adjust if necessary. Check +CAL and adjust if necessary. Repeat steps (4) and (5) until zero and span are correct.

6. Push the -CAL button and adjust the SYMMETRY pot located behind the front panel to the right of the –CAL button, until the reading matches the –CAL value on the transducer calibration sheet.

7. Turn the relay OFF.

8. Check and adjust zero per step (1). No further adjustment is required with the relay ON, even if the zero changed from step (1).

Calibration with 8113A Calibration Reference Box

The Model 8113A Calibration Reference Box may be used in some cases and contains a precision star bridge and two position rotary switch that allows the user to switch to either CAL mode or RUN mode.

Calibration Procedure

1. Switch the 8113A to the RUN position and zero the output reading with the Coarse and Fine R balance control.

2. Switch the 8113A to the CAL position.

3. Zero the output again with the Coarse and Fine R balance controls.

4. Push the +CAL button and adjust the SPAN such that the reading matches the +CAL value on the transducer calibration sheet.

5. Release +CAL and check zero; adjust if necessary. Check +CAL and adjust if necessary. Repeat steps (4) and (5) until zero and span are correct.

6. Push the -CAL button and adjust the SYMMETRY pot, located behind the front panel to the right of the –CAL button, until the reading matches the –CAL value on the transducer calibration sheet.

7. Switch the 8113A to the RUN position and check the instrument zero and adjust per step (1).

8. No further adjustment is required with the 8113A in the CAL position, even if the zero changed from step (1).

5.0 TROUBLESHOOTING

If the instrument is suspected of faulty operation, observe the following steps:

1. If the unit is totally inoperable (front panel power indicator does not light), check the primary power fuse (F1) located on the standup board that forms the power cord connection point. If the fuse is blown, replace it with a 0.50 ampere fuse of equivalent manufacture. Before reapplying power, visually inspect the power cord and the input power connections for anything that could have caused the overload.

2. The inability to balance correctly where the instrument output reads totally off-scale and the balance controls have no authority can very likely be the result of a damaged, or defective transducer or cable. This possibility can be confirmed, or eliminated, by substituting a transducer and or cable known to be in good condition or by simulating a balanced transducer. PCB supplies a simple Star Bridge consisting of four precision resistors mounted on a female circuit board edge connector that is supplied in the shipping box. Use the Star Bridge by plugging it into the back of the 8120 as if it were a transducer and interconnect cable and proceed with a calibration again. If the instrument works okay and a satisfactory calibration is achieved, then the transducer or cable is faulty. If a satisfactory calibration is not achieved, then the instrument is at fault.

3. Step (2) above is to be used only to verify instrument operation. Calibration instructions, found in Section 3 of this manual, must be completed before the Instrument and Transducer are used.

Note: The user can contact the factory for assistance. See the front page of this manual for phone and fax numbers for the factory.

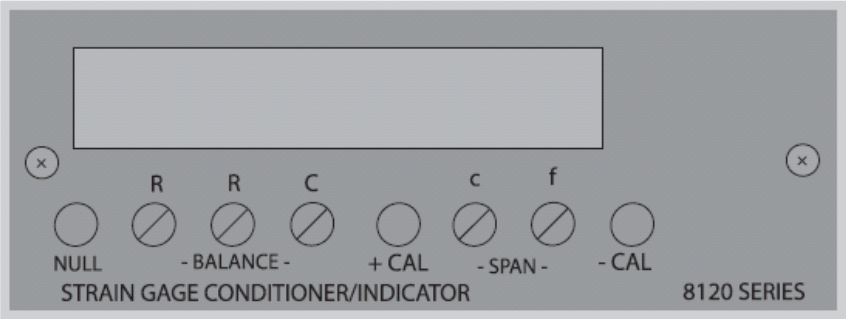

Figure 12 – Front Panel

R and C Balance Controls
These controls are used to set the output to zero when the transducer is unloaded.

NULL Pushbutton
This pushbutton is pressed when nulling the transducer bridge with the R and C Balance controls. It provides for non-synchronous demodulation of the carrier for balancing purposes. After a minimum reading is obtained on the display device by adjusting the C control, the push-button is released and the output is zeroed using the R controls.

SPAN Controls
The Coarse and Fine SPAN controls are used to set the output to the dead weight value when dead weight calibration is used. They can also be used to set the output to the Equivalent Input value when the CAL (+ or -) button is pressed.

CAL Pushbuttons
The +/–CAL pushbuttons provide for shunt calibration in the positive and negative directions, respectively. They are used in conjunction with the SPAN controls to calibrate the instrument. When both positive and negative direction calibration is required, the +CAL button is used in conjunction with the SPAN controls and the –CAL button is used with the internal SYMMETRY adjustment.

PHASE Control
The PHASE Control is used to give maximum output possible when a transducer and cable are connected to the instrument. The pot is accessed by removing the front panel. It is located to the extreme right.

SYMMETRY Control
The SYMMETRY Control is used to compensate for transducers that do not have symmetrical sensitivity characteristics in compression/tension for load cells, or CW/CCW rotation for torque sensors. The pot is accessed by removing the front panel. It is located to the right of the -CAL button.

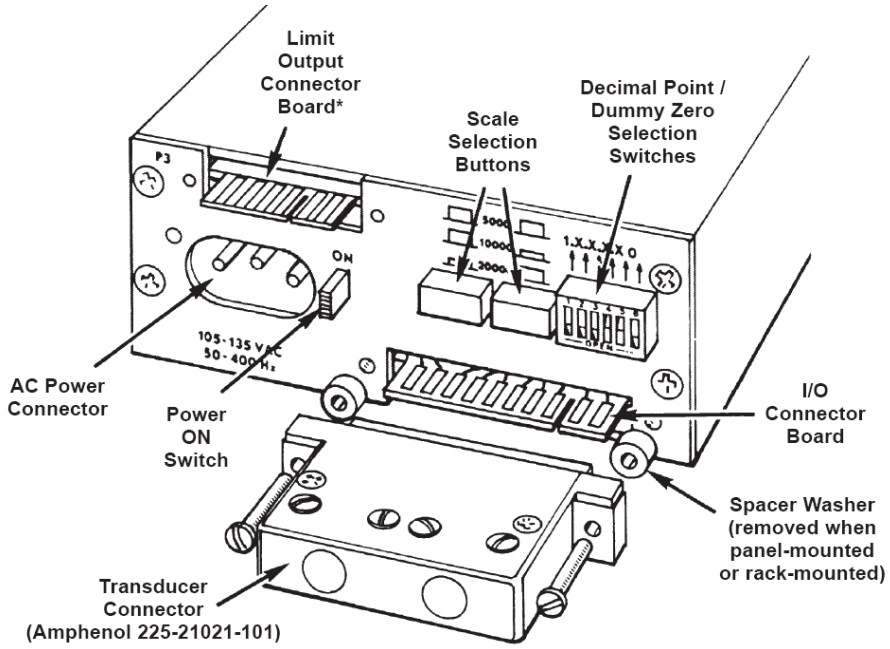

Figure 13 – Rear Panel

Decimal Point / Dummy Zero Switches
These switches, located in the upper right corner of the panel, place the decimal point in its proper place for the measurement range. Moving one of the switches places the decimal point at the selected position on the front panel display. Switching the rightmost switch "ON" causes an inert zero to be displayed.

Scale Selection Buttons
These pushbuttons control the range shown on the front panel display. For instance, if both pushbuttons are left fully extended rearwards, the full-scale display will read 5000. Pushing the left button in and leaving the right button extended out will cause the full scale display to be a maximum of 20000.

Input Power
The input power receptacle and the power ON/OFF switch are at the left side of the rear panel.

I/O Connector Board
The circuit board connector, marked P1, supplies the total interface to the transducer. See Section 2 for proper cable circuitry. Additional cable diagrams are shown in each PCB Transducer manual.

Model Number		Revision: A
8120-400A	**STRAIN GAGE SENSOR SIGNAL CONDITIONER**	ECN #: 24069

Bridge Resistance (4-arm)	ohm	90 to 1000	
Bridge Excitation	kHz	3.28 (regulated)	
	VAC (RMS)	2	[1]
Accuracy	%	+/-0.05	[4]
Balance Range	Mv/V	+/-1.5	[2]
Span Range	Mv/V	0.5 to 5	[2] [4]
Active Filter	Hz	2, 400	[3]
Analog Output (dc to 2 Hz)	volts	0 to +/-5	
Analog Output (dc to 400 Hz)	volts	0 to +/-5	
Output Ripple and Noise	% (RMS)	0.02 (2 Hz filter)	[4]
	% (RMS)	0.15 (400 Hz filter)	[4]
Shunt Calibration		Actuated via front panel	
Shunt Calibration Resistor		Accessible through rear panel	
ELECTRICAL			
Power Supply Requirement	VAC	105 to 135	
	Hz	50 to 400 at 5 watts max.	
ENVIRONMENTAL			
Operating Temperature Range	°F [°C]	0 to +130 [-18 to +54.4]	
PHYSICAL			
Connectors: Input/Output	type	20-pin card edge	
AC (power) Input	type	IEC 320	
Size (H x W x D):	in	1.7 x 4.41 x 8.5	
	[mm]	[43.2 x 112.0 x 215.9]	
Weight	lb [kg]	2 [0.9]	

All specifications are at room temperature unless otherwise specified.

OPTIONAL VERSIONS

Optional versions have identical specifications and accessories as listed for the standard model except where noted by the letter prefixes below. More than one option may be used.

- ❑ B- 12 VDC Battery-powered operation
- ❑ C- 4-20 mA Current output
- ❑ F- Nominal 230 VAC operation
- ❑ G- Galvanic isolated outputs

NOTES:
[1] Nominal
[2] 10-turn coarse and fine adjust
[3] Selectable
[4] Full Scale

SUPPLIED ACCESSORIES:
AC Line Cord (1)
Star Bridge Sensor Simulator (1)
Model 182-015A Mating Connector (1)

Drawn: BLS	Engineer: DMB	Sales: MFC	Approved: MK	Spec Number:
Date: 4.12.06	Date: 4/13/06	Date: 4/14/06	Date: 4-10-06	32388

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