The Series 8000 linearization function board converts a nonlinear input signal into a linear signal for final processing by the output board. A nonlinear signal from either a thermocouple, RTD, or a customer-supplied sensor curve is processed and amplified to provide a linear output signal with a range of 0 through 1 volt dc which is passed to the output board.

For information regarding altering this board for other thermocouples or other nonlinear signals, contact your local Non-Linear Systems distributor.

SPECIFICATIONS

Thermocouple Accuracy	Temperature °C	Accuracy	Range Chip P/N
J	-18 to +750 °C	+/- 1 °C	2800-4551
K	-18 to +1370 °C	+/- 1 °C	2800-4552
T	-160 to +350 °C	+/- 1 °C	2800-4553

(For other thermocouples or input types, consult Non-Linear System)

Operating Temperature:	0 - 70 °C
Stability:	0.01% of span
Repeatability:	0.05% of span
Input:	0 - 1VDC (from input board)
Segments:	8
Response Time:	100ms

For general information regarding the Series 8000 specifications, refer to the *Series 8000 Operator's Manual.*

Setup Procedure

I. Disassemble the Series 8000 unit as described in the "Basic Assembly" section of the *Series 8000 Operator's Manual.*

II. Setup the Series 8000 input and output boards as described in the individual data sheets and *Series 8000 Operator's Manual.*

III. Install the linearization board.

IV. Calibrate the unit as described in the "Calibration" section of this data sheet.

V. Reassemble the unit as described in the "Basic Assembly" section of the *Series 8000 Operator's Manual.*

Calibration

The linearization board was configured by your distributor to your exact zero and span requirements. Should you wish to change the input requirements to the board, internal resistor values may need to be changed. Consult your local Non-Linear Systems distributor for further assistance.

Note: A voltmeter with a range of 0 through 1VDC and a resolution of 1mV is required for calibration.

1. Calibrate the input board for the minimum input level as determined by the desired range.

   With a voltmeter connected between TP1 and TP2 of the linearization board, input the minimum input level to the input board and adjust the input board zero potentiometer for 0.000VDC. Figure 2 shows the location of TP1 and TP2.

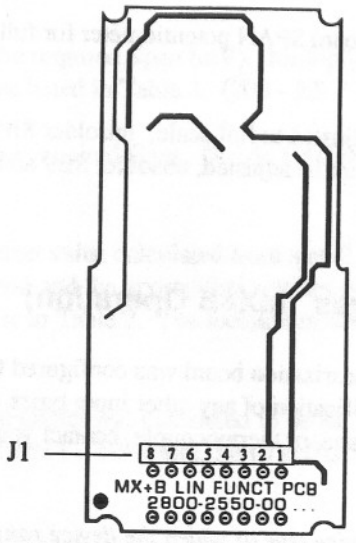


Figure 1. Connector J1 Pin-outs

2. With the input set to the minimum input level, measure the voltage between TP1 and pin 7 of connector J1, adjust the ZERO potentiometer on the linearization board for 0.000VDC. (Or, if the output board has a zero LED indicator, adjust the ZERO potentiometer until the LED is lit.) Figure 2 shows the test points and potentiometers on the linearization board.

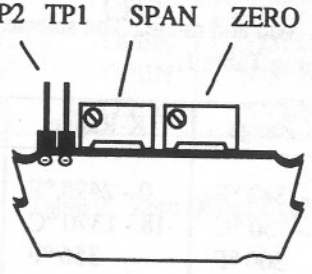


Figure 2. Location of the Test Points and Potentiometers

3. If available, adjust the output board zero potentiometer for the proper zero reading.

4. Set the input board to the maximum input level. Measure the voltage between TP1 and TP2 and adjust the input board SPAN potentiometer for 1.000VDC.

5. Adjust the linearization board SPAN potentiometer for full-scale out of the output board.

   If the output cannot be adjusted to full-scale, unsolder SB8 and repeat step 4. If the SPAN still cannot be adjusted, unsolder SB9 and repeat steps 4 and 5.

Selecting Other Ranges (MX+B Operation)

The operating range of the linearization board was configured to your exact input requirements. For modification of any other input types, such as frequency, strain gage, DC voltage, or thermocouple, contact your local distributor for assistance.

Note: To change the input device type or widen the device range, consult your local NLS® *distributor for assistance in obtaining the correct components for the range chips (P2 and P3).*

The following instructions provide the user with the ability to select a subset of gain and offset parameters within the range specification of the board. The example provided recalculates the parameters for a "J - thermocouple" with a temperature range of 50 to 200 °C and a range chip (NLS® P/N 2800-4551) with an initial setting of -18 to 750 °C.

1. Determine the required span and range. The selected span must exceed the minimum span listed in Table 1.

	J-Range	K-Range	T-Range
Range	0 -1382 °F -18 - 750 °C	0 - 2498 °F -18 - 1370 °C	-256 - 662 °F -160 - 350 °C
Minimum Span	300 °F 148 °C	356 °F 180 °C	316 °F 157 °C
mV/Degree	0.724/ °F 1.302/ °C	0.400/ °F 0.720/ °C	1.089/ °F 1.961/ °C
Range Chip P/N 2800-xxxx	4551	4552	4553

Table 1. Thermocouple Range Modules (P2, P3)

2. Calculate the required Offset (mV). Multiply the number of degrees you wish to offset from zero by the mV/Degree listed in Table 1. 68 * 1.302 = 88.53mV.

3. Calculate the required Span (mV). Multiply the temperature span by the mV/Degree listed in Table 1. (200 - 50) * 1.302 = 195.3mV.

4. Calculate the required Gain. Divide 1000 by the Span (mV). 1000 / 195.3 = 5.120.

5. With the Offset value calculated from step 2, determine the Zero Offset Configuration and the appropriate settings of jumpers SB10 through SB13. Refer to Table 2. The location of the jumpers is shown in Figure 3.

   In step 2, the Offset was calculated to be 88.3mV, which is in the range of 0.000 and 100mV. Therefore, SB10 is CLOSED and SB11 through SB13 are OPEN.

Offset Voltage (mV) MIN.	MAX.	SB13	SB12	SB11	SB10
-50.00	50.00	OPEN	OPEN	OPEN	OPEN
0.000	100.0	OPEN	OPEN	OPEN	CLOSED
100.0	200.0	OPEN	OPEN	CLOSED	OPEN
200.0	300.0	OPEN	OPEN	CLOSED	CLOSED
300.0	400.0	OPEN	CLOSED	OPEN	OPEN
400.0	500.0	OPEN	CLOSED	OPEN	CLOSED
500.0	600.0	OPEN	CLOSED	CLOSED	OPEN
600.0	700.0	OPEN	CLOSED	CLOSED	CLOSED
700.0	800.0	CLOSED	OPEN	OPEN	OPEN

Table 2. Zero Offset Configuration

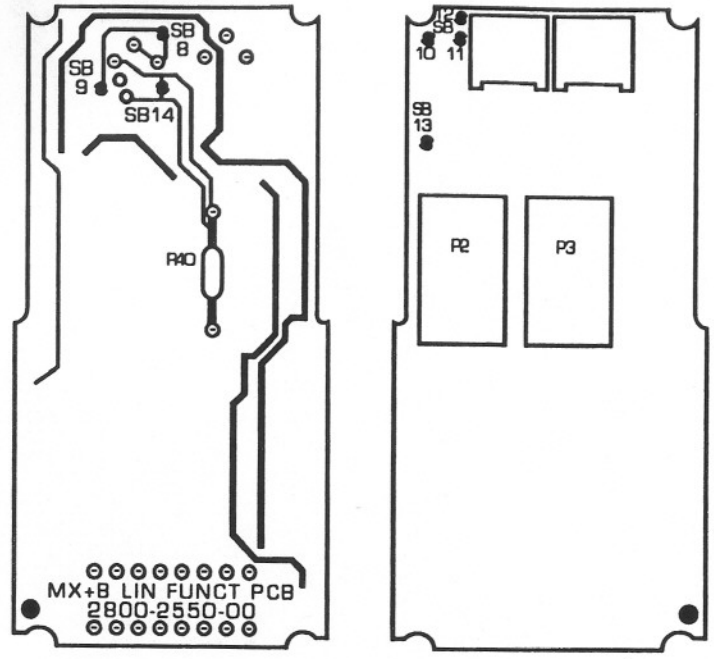
6. With the Gain value calculated from step 4, determine the Gain Setting Configuration and the appropriate settings of jumpers SB8, SB9, SB14, and resistor R40. Refer to Table 3. The location of these components is shown in Figure 3.

   In step 3, the Gain was calculated to be 5.120, which is in the range of 4.60 and 5.150. Therefore, R40 is 76.8k ohms and SB8 and SB14 are OPEN, SB9 is CLOSED.

Gain MIN.	Gain MAX.	R40 kΩ	SB14	SB9	SB8
1.000	1.500	NONE	CLOSED	CLOSED	CLOSED
1.280	1.830	3.4	OPEN	CLOSED	CLOSED
1.850	2.400	11.00	OPEN	CLOSED	CLOSED
2.400	2.950	22.10	OPEN	CLOSED	CLOSED
2.930	3.480	40.20	OPEN	CLOSED	CLOSED
3.450	4.000	76.80	OPEN	CLOSED	CLOSED
3.950	4.500	187.00	OPEN	CLOSED	CLOSED
4.550	5.100	NONE	OPEN	CLOSED	CLOSED
5.650	6.200	NONE	OPEN	CLOSED	OPEN
6.750	7.300	NONE	OPEN	OPEN	OPEN
2.050	2.600	NONE	CLOSED	CLOSED	OPEN
2.380	2.930	3.40	OPEN	CLOSED	OPEN
2.950	3.500	11.00	OPEN	CLOSED	OPEN
3.500	4.050	22.10	OPEN	CLOSED	OPEN
4.050	4.600	40.20	OPEN	CLOSED	OPEN
4.600	5.150	76.80	OPEN	CLOSED	OPEN
5.150	5.700	187.00	OPEN	CLOSED	OPEN
5.700	6.250	NONE	OPEN	CLOSED	OPEN
3.150	3.700	NONE	CLOSED	OPEN	OPEN
3.500	4.050	3.40	OPEN	OPEN	OPEN
4.050	4.600	11.00	OPEN	OPEN	OPEN
4.600	5.150	22.10	OPEN	OPEN	OPEN
5.150	5.700	40.20	OPEN	OPEN	OPEN
5.700	6.250	76.80	OPEN	OPEN	OPEN
6.250	6.800	187.00	OPEN	OPEN	OPEN
6.800	7.350	NONE	OPEN	OPEN	OPEN

Note, R40 must be type RN55C (1/4-watt ±1% tolerance).

Table 3. Gain Setting Configuration



(Component Side) (Pin Side)

Figure 3. Linearization Board Component layout