CE

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202A MAIN ASSEMBLY WITH SIGNAL CONDITIONERS -E EXCITATION SUPPLY -S STRAIN/MICROVOLT

10751ML-02 F

⚠ This device is marked with the international hazard symbol. It is important to read the Setup Guide before installing or commissioning this device as it contains important information relating to safety and EMC.

It is the policy of NEWPORT to comply with all worldwide safety and EMC/EMI regulations that apply. NEWPORT is constantly pursuing certification of its products to the European New Approach Directives. NEWPORT will add the CE mark to every appropriate device upon certification.

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1.0 GENERAL INFORMATION

The 202A-E and 202A-S are low-cost, 3 1/2 digit panel meters designed for a wide range of applications that require accurate dc measurement with zero and span adjustments. The 202A-S also provides a bridge balance. These adjustments are easily accessed behind the lens.

1.1 MODEL *202A-E*

The 202A-E consists of a main assembly and a plug-in excitation supply board (EB1).

Model 202A-E offers an electrically-floating supply for powering transmitters, active transducers, and bridges. In many cases, this built-in supply can eliminate the need for a more expensive external supply. The output voltage is adjustable from 10 to 24 V dc. Maximum output current is 50 mA at any voltage setting. (See Section 9.1)

1.2 MODEL *202A-S*

The 202A-S consists of a main assembly and a combination plug-in strain-gauge/excitation supply board (SB1).

In addition to most 202A-E features (with the exception that excitation maximum output current decreases from 30 mA at 10 V dc to 20 mA at 24 V dc), model 202A-S offers a high-impedance, precision preamplifier with programmable gains of 1, 3, 10, 30, and 100. Gains provide resolutions of 1000, 300, 100, 30, and 10 μV/count, respectively. Typical offset drift is only 0.3 μV/°C. The preamplifier is ideal for metal-foil, strain-gauge applications that require μV resolution.

2.0 SPECIFICATIONS

2.1 ANALOG INPUT

Model *202A-E*

Range	4-20 mA	1-5 V	0-10 V
Input resistance	13	1 M	1 M
Bias current	50 pA	10 pA	5 pA
Maximum input	55 mA	250 V	250 V
Ratiometric reference	0.05 - 0.2 V dc or 0.5 - 2 V dc		

Model *202A-S*

Range	
Most-sensitive scaling	±19.99 mV, 10 uV resolution
Least-sensitive scaling	±2.5 V, 1 mV resolution (limited by CMV)
Input resistance	1 G min without bridge balance
Bias current	1 nA typ, 5.5 nA max
Maximum voltage	50 V
Configuration	Differential, ratiometric, bipolar
Coarse preamplifier gains	1, 3, 10, 30, 100
Bridge-balance range	±1.5 mV with 350 bridge
Zero-adjustment range	-1000 to +1000 counts
Span-adjustment range	0 to 2000 counts

2.2 ACCURACY AT 25°C

Models *202A-E* and *202A-S*

Warmup to rated accuracy	10 minutes
Full-scale step response	1.0 second
Maximum error	±0.05% of reading ±1 count
Span tempco, ratiometric	±0.01% of reading/°C
Span tempco, non-ratiometric	±0.03% of reading/°C

Model *202A-E*

Zero tempco	±0.01 of offset/°C

Model *202A-S*

Balance tempco	±0.3 μV/°C typ, ±1.0 μV/°C max
Zero tempco	±0.01% of zero/°C

2.3 NOISE REJECTION

Models *202A-E* and *202A-S*

CMR, SIG GND to SIG HI	120 dB at gain 100, DC to 60 Hz
CMR, SIG GND to PWR GND	120 dB, DC to 60 Hz
CMV, SIG GND to PWR GND	1500 Vp test; 354 Vp per IEC spacing

Model *202A-E*

NMR, SIG HI to SIG LO	56 dB, 50/60 Hz

Model *202A-S*

CMV, SIG GND to SIG HI or LO	+2.5 V dc
NMR, SIG HI to SIG LO	70 dB, 50/60 Hz

2.4 EXCITATION SUPPLY

Model *202A-S*

Output voltage	Adjustable from 10 to 24 V dc
Output current, max	30 mA at 10 V dc, decreasing to 20 mA at 24 V dc
Load regulation	±0.5%
Line regulation	±0.01%/V of AC power
Tempco	±0.02%/°C
Ripple at 50/60 Hz	±0.01%

2.5 ANALOG-TO-DIGITAL CONVERSION

Models *202A-E* and *202A-S*

Technique	Dual-slope, average-value
Signal Integration Period	100 milliseconds
Read rate	2.5/seconds

2.6 DISPLAY

Models *202A-E* and *202A-S*

Type	7-segment, red LED
Digit height	14.2 mm (0.56 in)
Symbols	-1.8.8.8
Decimal points	Three positions programmable by jumpers behind lens or at connector, 10 mA sink
Overrange Indication	Three least-significant digits blank

2.7 POWER

Models *202A-E* and *202A-S*

AC voltages	115 or 230 V ac, ±15%
AC frequency range	49 to 440 Hz
DC voltages	9-32 V dc, isolated to 300 Vp 26-56 V dc, isolated to 300 Vp
Power consumption	4 watts
Output voltages	+4.7 V dc and -4.7 V dc ±5%, 10 mA max

2.8 ENVIRONMENTAL

Models *202A-E* and *202A-S*

Operating temperature	0 to 60°C
Storage temperature	-40 to +85°C
Relative humidity	95% to 40°C (non-condensing)

2.9 MECHANICAL

Models *202A-E* and *202A-S*

Bezel	96 x 48 x 8.0 mm (3.78 x 1.89 x 0.31 inches)
Depth behind bezel with connector	104,2 mm (4.10 inches)
Panel cutout	92 x 45 mm (3.62 x 1.77 inches)
Weight	425 g (15 oz)
Case material	94V-0 UL-rated polycarbonate
D1 connector	PCB edge connector with double row of 18 pins; 3.96 mm (0.156 inches) between pins
D4 connector	Barrier strip with #6 screw terminals for power and signal inputs (removes these inputs from D1)

3.0 MECHANICAL ASSEMBLY AND INSTALLATION

3.1 SAFETY CONSIDERATIONS

This device is marked with the international Caution symbol. It is important to read this manual before installing or commissioning this device as it contains important information relating to Safety and EMC (Electromagnetic Compatibility).

Unpacking & Inspection

Unpack the instrument and inspect for obvious shipping damage. Do not attempt to operate the unit if damage is found.

This instrument is a panel mount device protected in accordance with Class I of EN 61010 (115/230 AC power connections). Installation of this instrument should be done by Qualified personnel. In order to ensure safe operation, the following instructions should be followed.

This instrument has no power-on switch. An external switch or circuit-breaker shall be included in the building installation as a disconnecting device. It shall be marked to indicate this function, and it shall be in close proximity to the equipment within easy reach of the operator. The switch or circuit-breaker shall not interrupt the Protective Conductor (Earth wire), and it shall meet the relevant requirements of IEC 947–1 and IEC 947-3 (International Electrotechnical Commission). The switch shall not be incorporated in the mains supply cord.

Furthermore, to provide protection against excessive energy being drawn from the mains supply in case of a fault in the equipment, an overcurrent protection device shall be installed.

- The **Protective Conductor** must be connected for safety reasons. Check that the power cable has the proper Earth wire, and it is properly connected. It is not safe to operate this unit without the Protective Conductor Terminal connected.

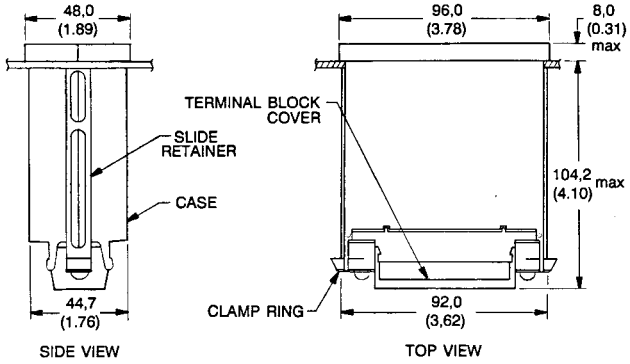
- Do not exceed voltage rating on the label located on the top of the instrument housing.
- Always disconnect power before changing signal and power connections.
- Do not use this instrument on a work bench without its case for safety reasons.
- Do not operate this instrument in flammable or explosive atmospheres.
- Do not expose this instrument to rain or moisture.

EMC Considerations

- Whenever EMC is an issue, always use shielded cables.
- Never run signal and power wires in the same conduit.
- Use signal wire connections with twisted-pair cables.
- Install Ferrite Bead(s) on signal wires close to the instrument if EMC problems persist.

3.2 PANEL MOUNTING

NOTE: Dimensions are in millimeters ±0,25 mm and inches are in ( ) ±0.01 in.



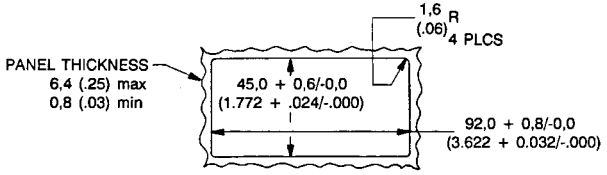


Figure 3-1 DIN Case Dimensions

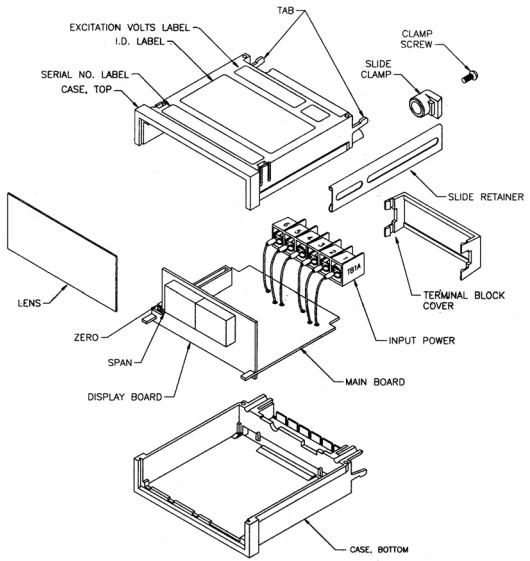


Figure 3-2 Exploded View

1. Remove main board edge connector J1, if installed.

2. Loosen the two clamp screws on rear of case until slide clamps can be rotated. Push the two slide retainers toward the rear of the case, and remove them.

3. Working from the front of the panel, insert the meter into the panel cutout.

4. Insert slide retainers back onto the case, and push them up tightly against the rear of the panel.

5. Rotate slide clamps back into original position and tighten clamp screws just enough to hold the case in place. NEVER OVERTIGHTEN CLAMP SCREWS.

6. Install any connectors that have been removed.

4.0 POWER AND SIGNAL INPUT CONNECTIONS

CAUTION: Incorrect power input can damage your panel meter.

4.1 INSTALLING OPTION C1 (230 V ac)

If this option is to be used, it must be installed prior to any power and signal connections. Option C1 is 230 V ac ±15%, 47-400 Hz operation. To change the meter in the field from 115 V ac operation, follow this procedure:

1. Refer to Figures 4-1 and 4-2. Remove power lines from the meter, then remove the meter from the case.

2. Remove jumpers W8 and W9 on the transformer.

3. Add jumper W4 on the printed circuit board. The meter is now wired for 230 V ac operation.

NOTE: To change the meter from 230 V ac to 115 V ac operation, reverse the above procedure.

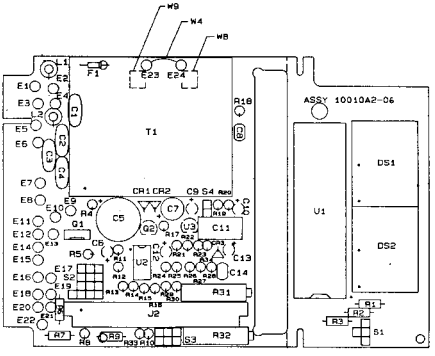


Figure 4-1 Changing Operating Voltage

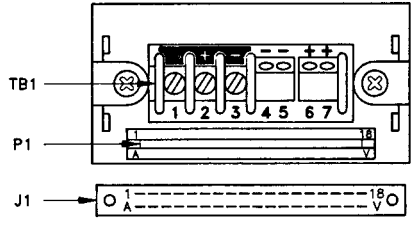


Figure 4-2 Rear View of Case with Connectors

4.2 POWER CONNECTIONS

TB1 Connection	~ AC Power Operation	Wire Color		⎓ DC Power Operation
		USA	Other	
1	AC LINE (L)	BLACK	BROWN	N/C
2	AC NEUTRAL (N)	WHITE	BLUE	+DC PWR
3	AC EARTH GROUND	GREEN	GREEN / YELLOW	-DC RETURN

4.3 SIGNAL CONNECTIONS

TB1 Connection	Signal Input and Output
4	-EXC
5	SIG LO
6	SIG HI
7	+EXC

4.4 MAIN BOARD CONNECTOR PIN ASSIGNMENTS (J1)

(Left to right, looking at rear of case)

CONNECTION	FUNCTION	EXPLANATION
A	Spare	
1	No connection	
B	No connection	
2	Spare	
C	Spare	
3	No connection	
D	No connection	
4	No connection	
E	No connection	
5	No connection	
F	No connection	
6	DIGITAL GND	
H - 7	199.9 DP	
J - 8	19.99 DP	
K - 9	1.999 DP	
L - 10	LAMP TEST	Lights all display segments
M - 11	+4.7 V dc	Analog and digital power
N	-4.7 V dc	Analog and digital power
12	-EXC	Excitation voltage out
P	+REF	Reference voltage
13	+EXC	Excitation voltage out
R - 14	HOLD	Hold last display reading
S	Spare	
15	No connection	
T	ANA GND	Analog and digital ground
16	Spare	
U	No connection	
17	Spare	
V	Spare	
18	ANA OUT	

" - " indicates common pin

5.0 MAIN BOARD CONFIGURATION

The following procedures are used to select the various configurations of the main board, for use as a 202A-E or 202A-S in conjunction with a plug-in signal conditioning card.

5.1 DECIMAL POINT SELECTION

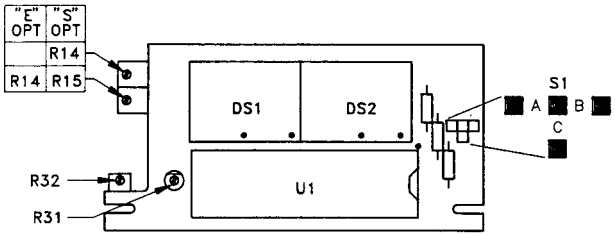


Figure 5-1 Display Board Jumper Locations

Remove all push-on jumpers not used in the desired configuration. Install appropriate jumpers as indicated in the chart below.

Decimal Point	S1	Alternate decimal point selection using main board connector J1.
1.999 DP	A	Connect K or 9 to 6
19.99 DP	C	Connect J or 8 to 6
199.9 DP	B	Connect H or 7 to 6
1999 DP	REMOVED	—

5.2 MODELS *202A-E* AND *202A-S*

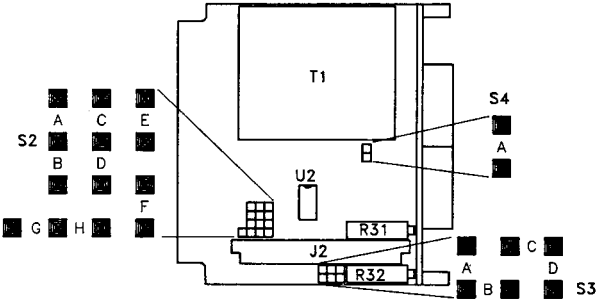


Figure 5-2 Main Board Jumper Locations

Remove all push-on jumpers not used in the desired configuration. Install appropriate jumpers as indicated in the chart below.

-E Selection	Input Ranges	S2	S3	S4
	4-20 mA	A,C,F,G,E	A,D	A
	1-5 V dc	A,C,E,F	B,D	A
	0-10 V dc	A,C,F,H,E	B,D	A
-S Selection	**Input Ranges**	**S2**	**S3**	
	ALL	A,C	D	

6.0 PLUG-IN CARD CONFIGURATION

6.1 Model *202A-E*

The -E card requires no configuration. Proceed to the calibration procedures.

6.2 Model *202A-S*

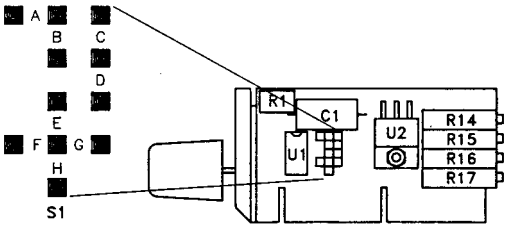


Figure 6-1 -S Card Jumper Locations

Remove all push-on jumpers not used in the desired configuration. Install appropriate jumpers as indicated in the chart below.

Gain Ranges	S1
X1	G
X3	F
X10	E
X30	H
X100	--

7.0 CALIBRATION (202A)

Note: All main and plug-in card configuration jumpers must be installed prior to beginning the following calibration procedure.

7.1 Procedure for *202A-E* Process Meter with excitation

1. Refer to Figure 4-2. Apply the input signal to TB1-5 (SIG LO) and TB1-6 (SIG HI).
2. Monitor the excitation voltage available at TB1-4 (-) and TB1-7 (+) with an external meter. Remove lens and adjust the excitation pot (R14) for the required voltage.
3. Adjust the Zero (R32) and Span (R31) potentiometers twenty turns clockwise and then 10 turns counter clockwise to their mechanical midpoint positions.
4. With the minimum input applied, adjust Zero (R32) for the minimum required display.
5. With the maximum input applied, adjust the span pot (R31) to obtain the required maximum reading.
6. Recheck both zero and full scale following steps 2 thru 5 above.

7.2 Procedure for *202A-S* Microvoltmeter

1. Refer to Figure 4-2. Apply the input signal to TB1-5 (SIG LO) and TB1-6 (SIG HI).
2. Monitor the excitation voltage available at TB1-4 (-) and TB1-7 (+) with an external meter. Remove lens and adjust the excitation pot (R14) for the required voltage. This adjustment step is not necessary if the excitation output is not required.
3. Adjust the Zero (R32), Span (R31) and Bridge balance (R15) potentiometers twenty turns clockwise and then 10 turns counter clockwise to their mechanical midpoint positions.
4. With the input shorted or with the input set to its minimum level, adjust Zero (R32) for the displayed reading of 000.
5. Apply the maximum input signal and adjust the span pot (R31) to obtain the required maximum display.
6. Recheck both zero and full scale following steps 2 thru 6 above.

7.3 Procedure for 202A-S Strain Gauge (bridge input)

1. Remove the front lens. Adjust the Zero (R32), Span (R31) and Bridge balance (R15) potentiometers twenty turns clockwise and then 10 turns counter clockwise to their mechanical midpoint positions.
2. Apply power and monitor the excitation voltage available at TB1-4 (-) and TB1-7 (+) with an external meter. Adjust the excitation pot (R14) for the required bridge excitation voltage. Remove power from meter.
3. Refer to Figure 4-2. Connect the four input leads from the bridge to TB1-5 (SIG LO), TB1-6 (SIG HI), TB1-4 (-EXE) and TB1-7 (+EXE).
4. *Optional Bridge Balance adjustment.* Apply power and monitor the analog output voltage available at J1-18 (+) and J1-T (Ground) with an external digital meter. With no load applied to the load cell, adjust the Bridge Balance potentiometer (R15) for 0.0 millivolts. Remove the external meter before proceeding.
5. With no load applied to the load cell, adjust Zero (R32) for a displayed reading of 000.
6. Apply a reference load (near to full load rating) to the load cell, adjust the span pot (R31) to obtain the required reading for the load applied.
7. Recheck both zero and full scale following steps 3 through 5 above.

Note: Always remove power prior to removing or installing the signal conditioner board or when repositioning configuration jumpers.

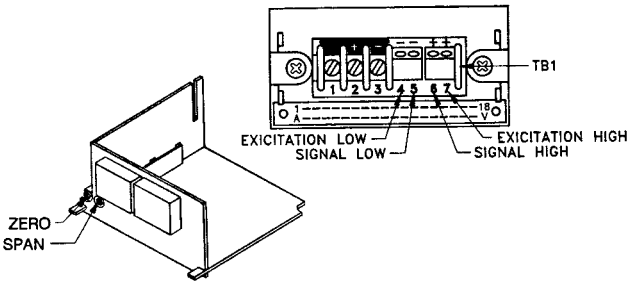


Figure 7-1 Calibration Points

8.0 DRAWINGS

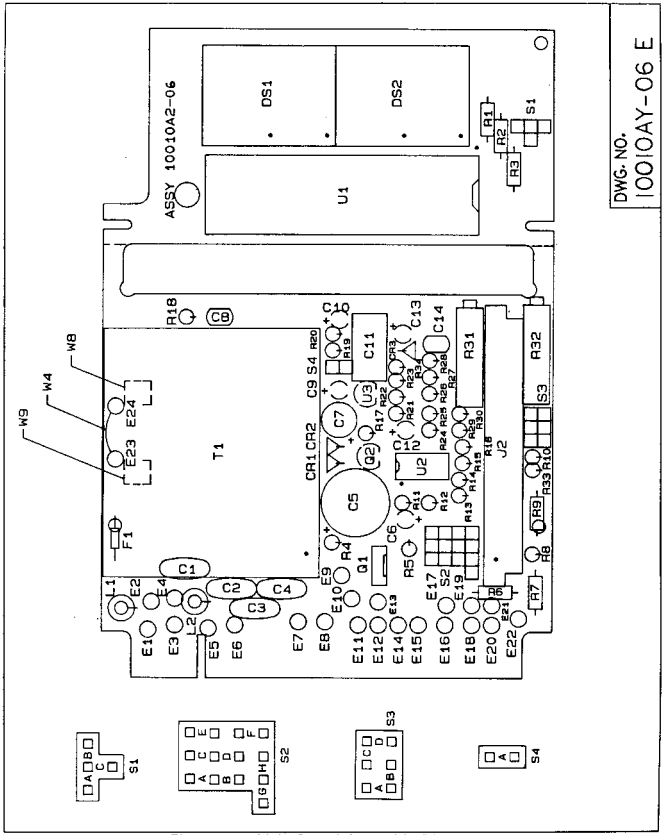


Figure 8-1 Main Board Assembly Diagram

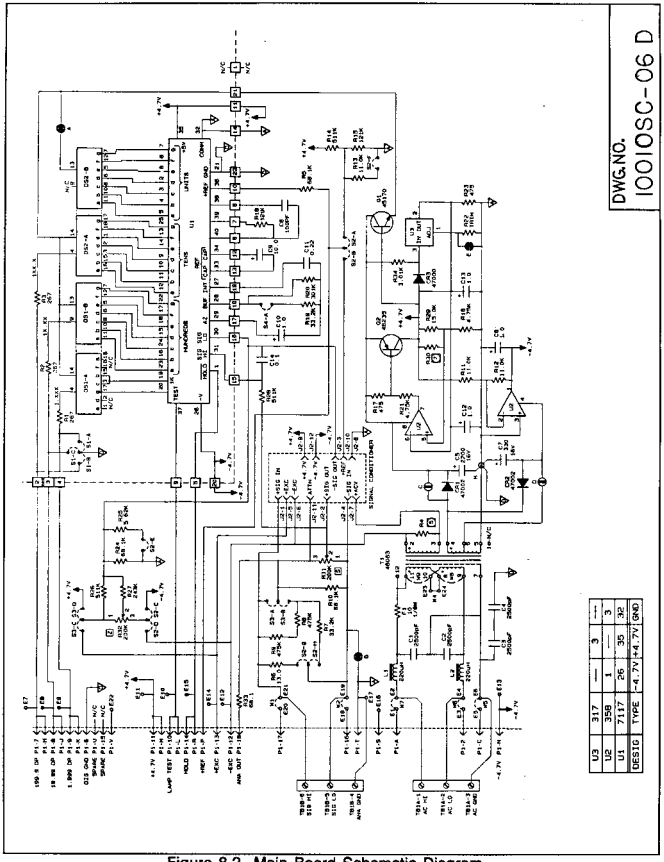


Figure 8-2 Main Board Schematic Diagram

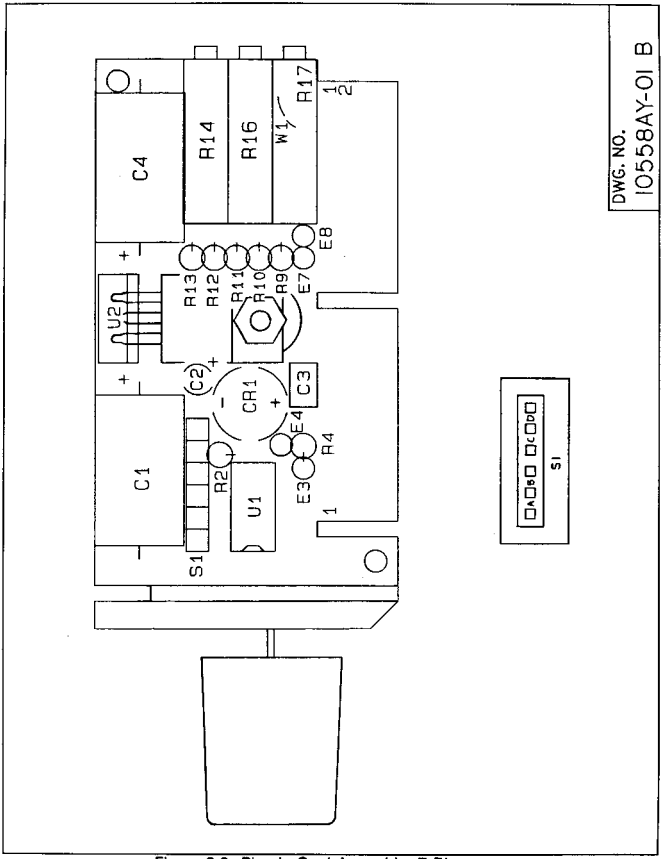


Figure 8-3 Plug-in Card Assembly -E Diagram

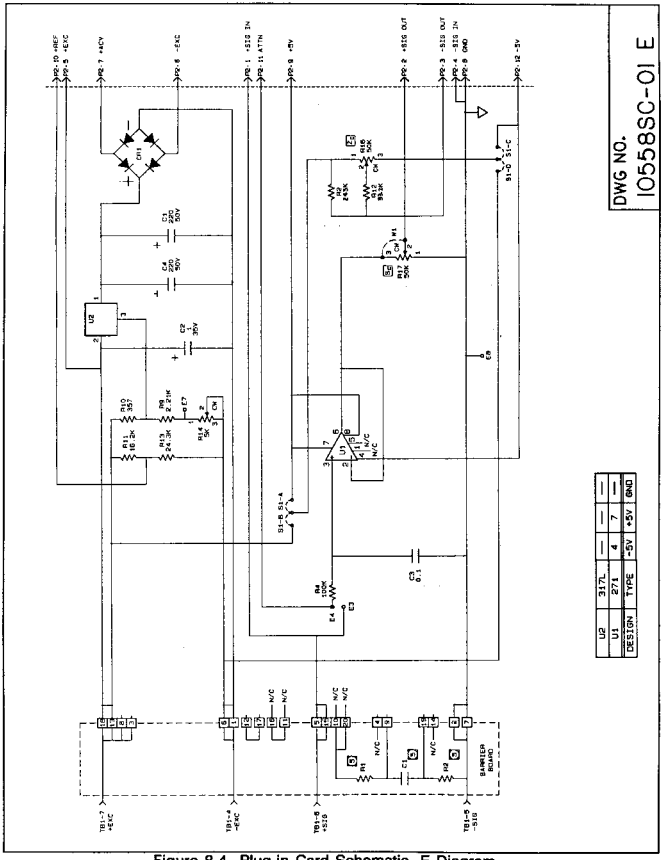


Figure 8-4 Plug-in Card Schematic -E Diagram

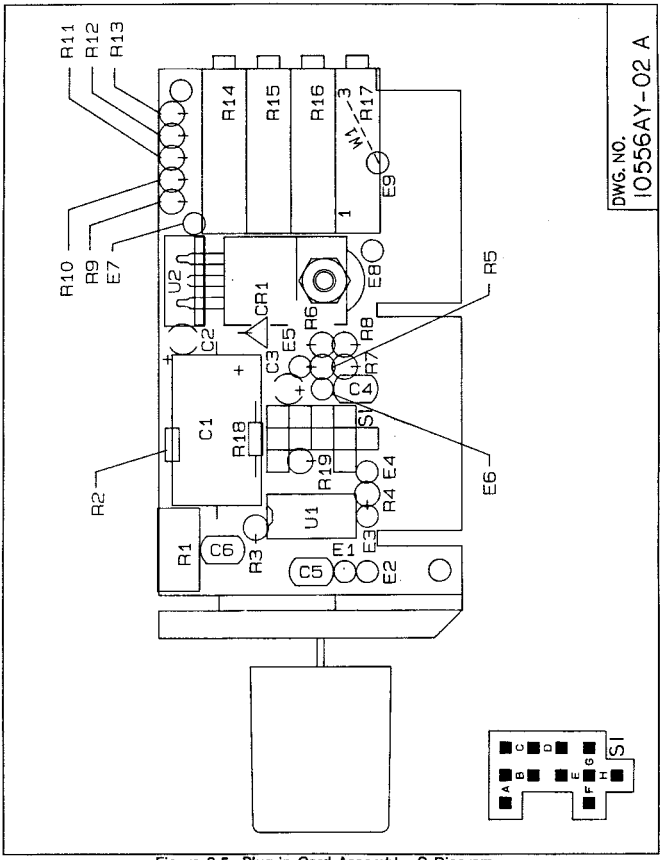


Figure 8-5 Plug-in Card Assembly -S Diagram

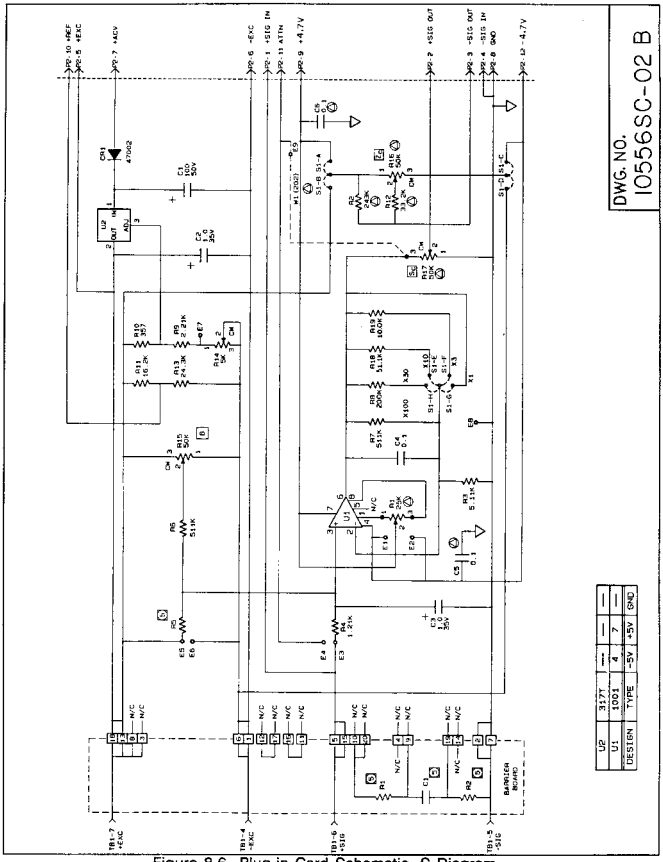


Figure 8-6 Plug-in Card Schematic -S Diagram

9.0 APPLICATION NOTES

9.1 Excitation Supply/Current Transmitter Interface

The following block diagrams show the proper hookup for interfacing an electrically-floating excitation supply with either a 2-wire or a 4-wire current transmitter (4-20 mA loop-powered).

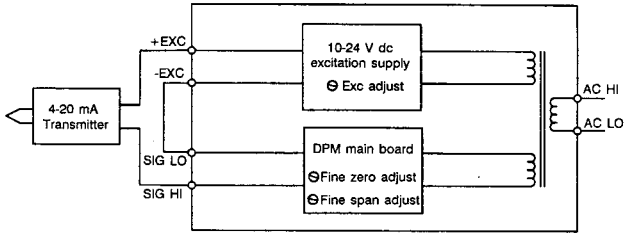


Figure 9-1 Two-wire Connection

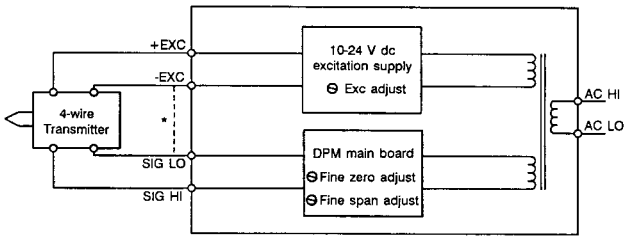


Figure 9-2 Four-wire Connection

* For 3-wire hookup, connect -EXC to SIG LO.

NOTES: