Instruction Manual

p/n 300-047

DC Powered NOVA Model

Fully Differential 5 ½ Digit Digital Panel Meter

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Foreword

Your NOVA digital panel meter has been manufactured, tested and calibrated under rigid quality control standards. A complete calibration and failure report is maintained on each instrument. This instrument uses a unique state-of-the-art analog-to-digital converter. It has exceptional linearity characteristics and combined with an extremely stable reference supply, this instrument will maintain its accuracy for a minimum of 120 days.

Warranty

This Lincoln Instruments product is warranted to be free of defects in material and workmanship for a period of two years from the date of delivery. Lincoln Instruments will repair or replace without charge all defective equipment returned to it (transportation charges must be prepaid) during the warranty period. Repaired products will be returned to the point of origin. This warranty does not cover damages arising out of abuse or misuse of the product. No other warranty is expressed or implied. Lincoln Instruments is not liable for any consequential damages.

To assure quick turnaround of failed units, enclose a short note describing the failure symptom and the conditions under which the instrument failed. If this information is not enclosed with the unit when it is returned, Lincoln Instruments will send out a questionnaire to the responsible party and will not perform any repairs until this questionnaire is completed and returned.

Notice

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Section 1

Installation and Wiring Information

1.0 Installation

The meter may be mounted in a 1.682 (+0.030, -0.010) by 3.924 (+0.030, -0.010) inch panel cutout (see Figure 1). To mount, perform the following steps:

1. Remove the snap on red plastic bezel by inserting a screwdriver between the notch (located on the bottom of the bezel) and the bracket and snapping the bezel off.
2. Rotate the pawl screws several turns counter clockwise to retract the pawls. Make sure the pawls retract enough to overlap the thickness of the mounting panel. The pawls may be retracted to accommodate panel thicknesses up to 0.250 inches.
3. Insert the meter into the panel cutout.
4. Tighten the pawl screws.
5. Replace the bezel by snapping the bottom half on first.

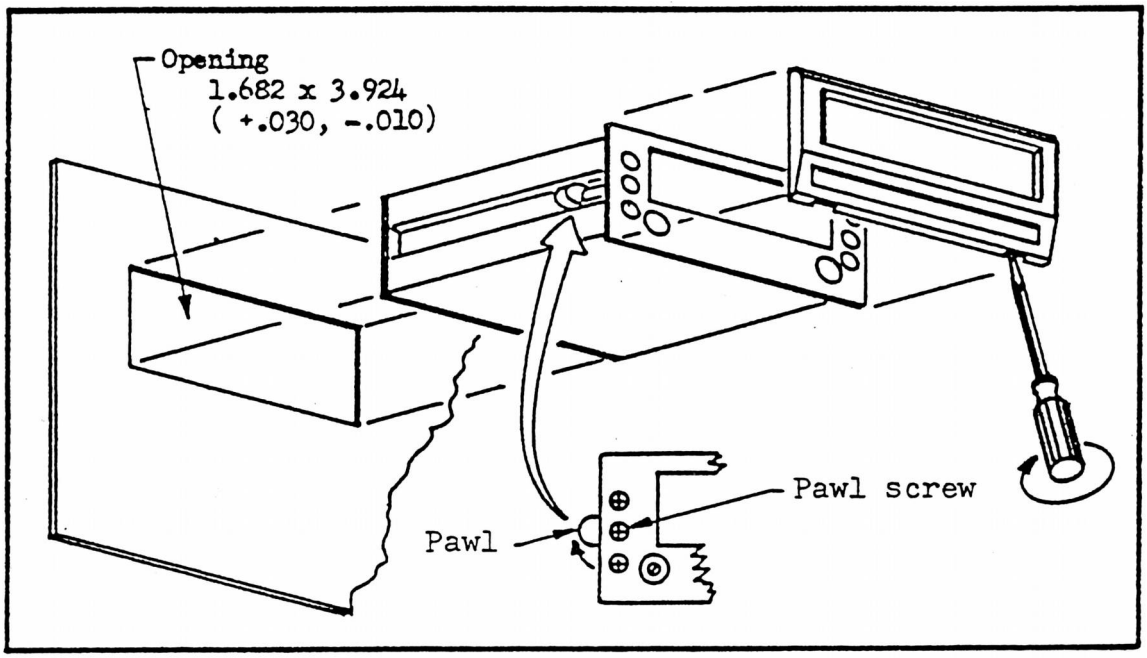


Figure 1 Installation and mounting diagram

1.1 Wiring Information

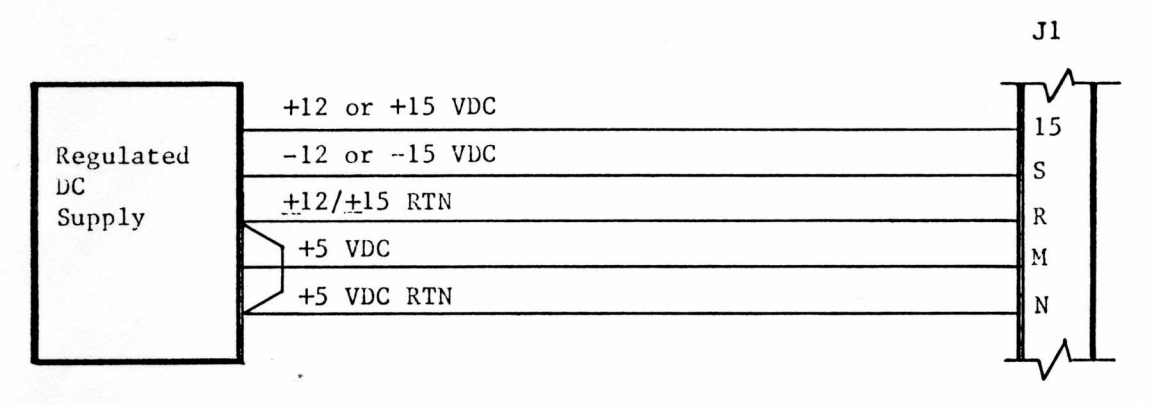
Reference Figure 3 for the locations and pin designations of J1 (Input Connector) and J2 (BCD Output Option Connector). All connections to the instrument are made through these two connectors.

The following connectors are recommended for use on J1 and J2.

J1	**J2**	
Cinch 251-15-30-160	Sullins ESC 13 DREH	(Solder Terminals)
Viking 2VK15D/1-2	Winchester 53-26-1	(Flat Cable)
Lincoln PN 212005	Lincoln PN 212038	(Solder Terminals)
	Lincoln PN 212039	(Flat Cable)

1.1.1 Input Power Wiring

Hookup power per Figure 2 below. For input power Option 3, use ±15 VDC @ 35 mA and +5 VDC @ 200mA. For input power Option 6, use ±12 VDC @ 35 mA and +5 VDC @ 200mA.



1.1.2 Input Signal Wiring

For ±1 .99999V input signal, apply positive lead to J1-2 and minus lead to J1-10. For ±13.0000V and ±130.000V (maximum safe input is 5OOV) Input signals, apply positive lead to J1-A and negative lead to J1-10. Maximum common mode voltage, between J1-2 or J1-10 and J1-K (digital ground) is 16VDC.

1.1.3 Decimal Point Wiring

Connect the appropriate jumper to light up the desired decimal point.

Decimal P t	Jumper	To
1.XXXXX	J1 - P	
1X.XXXX	J1 -14	
1XX.XXX	J1 -13	
1XXX.XX	J1 -12	J1 - 9
1XXXX.X	J1 -11	

Section 2

Other functions available on J1 input connector

2.0 Hold input (J1-8)

For normal operation the Hold input (J1-8) is left open. This allows the instrument to update its readings at the factory preset rate of 2.0 conversions per second. If a logical "0" level (TTL compatible) is applied to J1-8 asynchronously to the conversion signal, it will be ignored IF a conversion is already in progress. After the conversion is completed the instrument will update its BCD lines with the new information and hold this information until the Hold input is returned to an open circuit or to a logic "1" level (TTL compatible).

To make the instrument convert on command a positive going pulse with a 20 microsecond minimum pulse width must be applied to the Hold input. It takes approximately 500ms for the instrument to complete its conversion.

Section 3

Operating Instructions

3.0 Operating Instructions

After wiring connector J1 per the instructions given in Section 1.1, connect J1 to the appropriate edge card connector at the rear of the instrument. Install screws (2) to secure the connector to the rear plastic plate.

CAUTION: MAKE SURE THAT THE PIN NUMBERS AND LETTERS OF EDGE CARD CONNECTOR J1 CORRESPOND TO THAT EMBOSSED ON THE REAR PLASTIC PLATE.

Verify power connections are per figure 2.

Apply ±12/±15 VDC and +5 VDC. Typical current requirements should be approximately 35 MA for ±12/±15 VDC and 200 MA for +5 VDC.

Section 4

Calibration Procedure

4.0 Zero and Full Scale Calibration

To assure proper full scale calibration, a calibrator with an absolute accuracy of ±0.00l % of setting or better and linearity of ±0.0002% of setting should be used. Shown below is a list of recommended calibration equipment for calibrating the A,B and C range voltage models of the NOVA digital panel meter.

Description	Manufacturer
Trancell-1 Transportable Prime	Standard Reference Labs, Inc.
DC Voltage Standard	Fair Lawn, N.J. 07410
RV 722 DEKAVIDER Decade Voltage	Electro Scientific Ind.
Divider	Portland, Oregon 97229

For location of all adjustment potentiometers, see Figures 4a and 4b.

4.1 Zero Adjustment Procedure

The zero adjustment potentiometer is externally accessible (Reference Figure 4a).

4.1.1 Apply an input equivalent to +0.25 counts (+2.5 micro-volts for ±1.30000 volt input model)

4.1.2 Adjust the zero adjustment potentiometer (R6) for a reading of zero +½ count (zero +½ count occurs when the reading flickers between 00000 and 00001).

4.1.3 Apply an input equivalent to -0.25 counts.

4.1.4 Verify reading is zero -½ count (zero -½ count occurs when the reading flickers between 00000 and -00001).

4.1.5 Readjust R6 and repeat Steps 4.1.1 thru 4.1.4 as necessary to properly adjust zero.

4.2 Mid-range and Full Scale Adjustment Procedure

4.2.1 Verify zero is properly adjusted before proceeding.

4.2.2 Apply an input equivalent to a positive full scale reading of 130,000 (+1.30000 volts for ±1.30000 volt input model).

4.2.3 Adjust the positive full scale adjustment potentiometer (R49.) for a reading that flashes 130,000 counts.

4.2.4 Apply an input equivalent to a positive 14000 counts (+0.14000 volts for ±.1.30000 volt input model).

4.2.5 Verify readout is 14000 ± ½ count.

4.2.6 If readout is 14000 ± ½ count, proceed to Step 4.2.16.

4.2.7 If readout is not 14000 ± ½ count, disconnect all power to the panel meter and remove the instrument from its case. This is done by simply removing the four screws from the front of the unit (See Figure 4a).

4.2.8 Lay the unit down on a non-conductive surface and using extreme caution, reapply power to the instrument.

4.2.9 Apply input equivalent to a positive 14000 counts

4.2.10 Adjust midrange adjustment potentiometer (Rl5) for a reading of 14000.

4.2.11 Apply an input equivalent to a positive full scale reading of 130,000.

4.2.12 Adjust the positive full scale adjustment potentiometer (R49) for a reading that flashes 130,000.

4.2.13 Repeat Steps 4.2.9 thru 4.2.12, as necessary.

4.2.14 Disconnect all power to the panel meter, reinstall the instrument back in its case and reapply power.

4.2.15 Allow 5 minutes for the instrument to warm back up.

4.2.16 Verify the following readings (input voltages shown are for ±1.30000 volt input model).

Input (volts)	DPM Reading (counts)
.0.00000	00000
+1.30000	130,000
+0.14000	14000 ± ½

4.2.17 Readjust the zero adjustment potentiometer (R6) and the positive full scale adjustment potentiometer (R49) if necessary to obtain the above readings.

4.2.18 Apply an input equivalent to a negative full scale reading of -130,000.

4.2.19 Adjust the negative full scale adjustment potentiometer (R41) for a reading that flashes -130,000.

4.2.20 Verify the following readings . (input voltages shown are for ±1.30000 volt input model).

Input (volts)	DPM Reading (counts)
±1.30000	±130,000
±1.00000	±100,000 ± 1
±0.75000	± 75,000 ± 1
±0.50000	± 50,000 ± 1
±0.10000	± 10,000 ± ½
±0.01000	± 01,000 ± ½
±0.00100	± 00100 ± ½
±0.00010	± 00010 ± ½
±0.00000	00000

Section 5

Options

5.0 Buffered, Latched Paralle1 BCD Output

The BCD signals are available on connector J2, identified on the rear plastic plate. Reference Figure 3 for the location and pin designation.

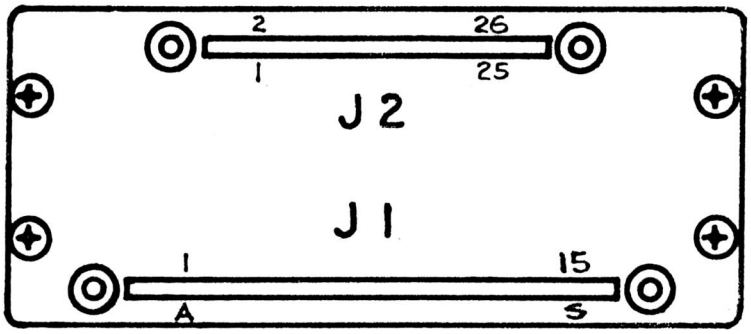
This option converts the multiplexed BCD output signals to a parallel configuration. This is accomplished by storing the multiplexed data in the CMOS Quad D Flip-Flops (CD40175). Since these signals are static and not derived from the outputs of decade counters, it is not susceptible to capacitive output loading. Each BCD output signal is buffered with a CMOS Hex Inverter (C04049A), is fully TTL compatible, positive true and capable of driving and sourcing 2 full TTL loads.

The 2×10^4, 4×10^4 BCD, 8×10^4 and 1×10^5 output signals are available on connector J1-L, J1-J, J1-K and J1-F respectively.

The polarity signal (J2-10), is also derived from CMOS Flip - Flops buffered with a CMOS Hex Inverter and is fully TTL compatible. It is a logical "1" for positive readings and logical "0" for negative readings.

$\overline{\text{PRINT}}$ (J2-F) is a logical "0" when the parallel BCD data, over-range and polarity signals are valid. A logical "I" indicates the data is being updated.

Over-range (J1-7) is a logical "0" when the DPM reading is less than 130,000 counts. It switches to a logical "1" whenever the reading is equal to or greater than 130,000 counts.



J1		J2	
A *	1 *	1 1 x10^0	2 2 x10^0
B *	2 ANALOG IN (+)	3 4 x10^0	4 8 x10^0
C *	3 *	5 1 x 10^1	6 2 x10^1
D *	4 *	7 4 x 10^1	8 8 x 10^1
E *	5 DISPLAY BLANK	9 1 x 10^2	10 2 x 10^2
F *	6 *	11 ~~4 x10^2~~	12 8 x 10^2
H DP GND	7 ~~*~~	13 STROBE	14 DIG GND
J *	8 HOLD	15 1 x 10^5	16 OVERRANGE
K *	9 DP GND	17 POLARITY	18 PRINT
L *	10 ANALOG IN (-)	191 x 10^4	20 2 x 10^4
M +5V	11 lXXXX.X	21 4 x 10^4	22 8 x 10^4
N +5V RTN	12 1XXX.XX	23 1 x 10^3	24 2 x 10^3
P 1.XXXXX	13 1XX.XXX	25 4 x10^3	26 8 x 10^3
R ±15V RTN	14 1X.XXXX		
S -15V	15 +15V		

FIGURE 3 - PIN OUTS FOR NOVA-A-61-2

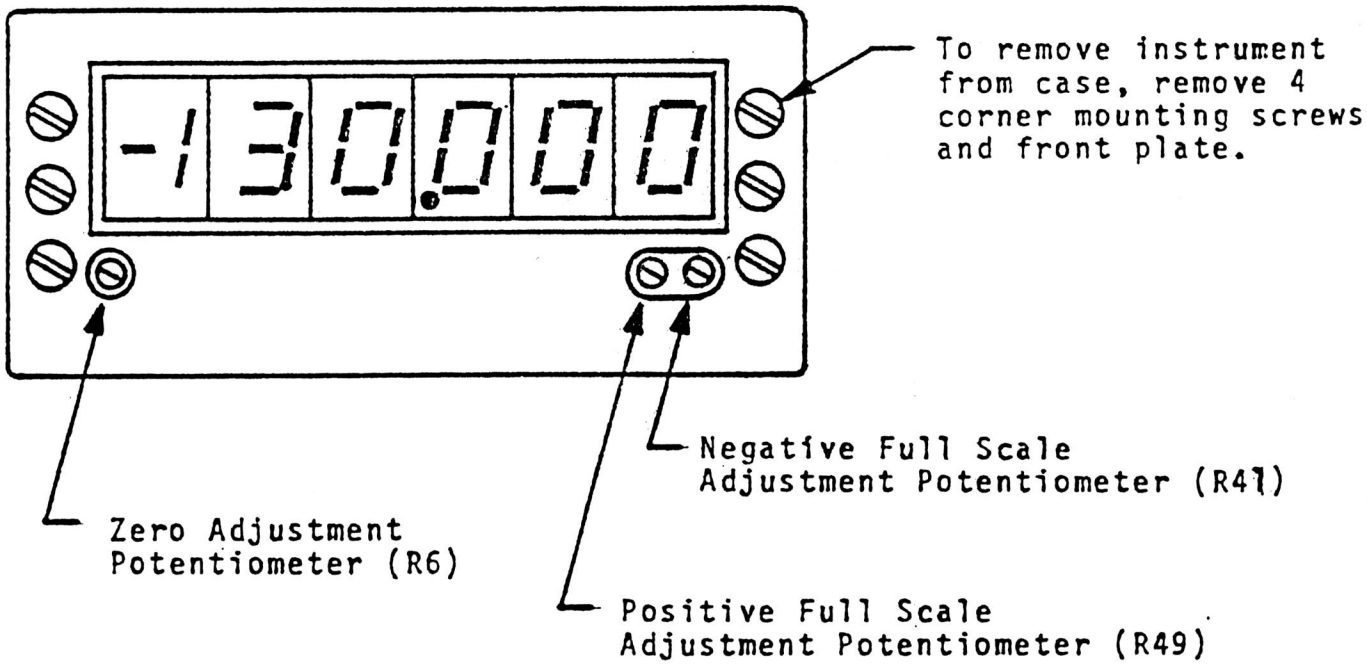


Figure 4a - External Adjustment Potentiometers

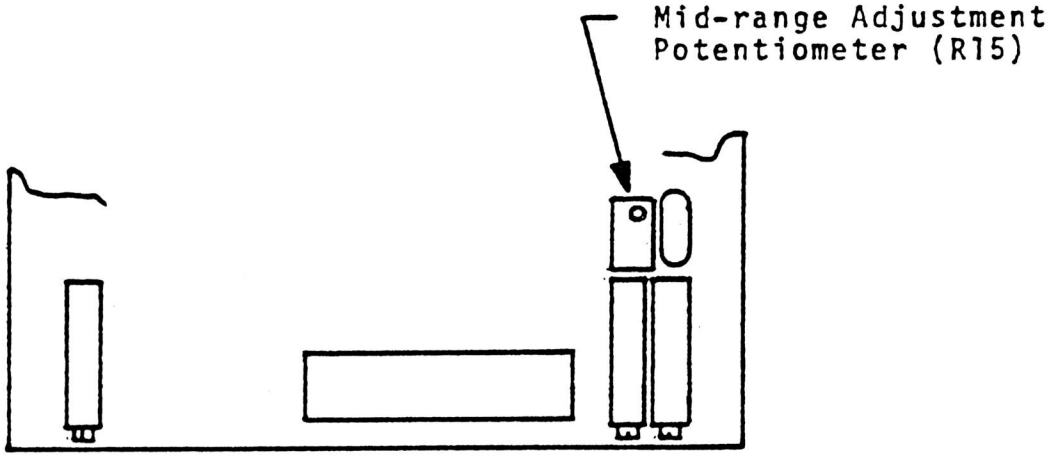


Figure 4b - Internal Adjustment Potentiometer