



PM-351 3½-DIGIT DIGITAL PANEL METER

INTRODUCTION.

The PM-351 Digital Panel Meter is a three and one-half-digit, fixed-range instrument with automatic polarity. The meter is available in any one of five ranges: ±199 millivolts F.S., ±1.999 volts F.S., ±19.99 volts F.S., ±199.9 volts F.S. or ±1000 volts F.S.

Except for the ±199 millivolt range, modification from one range to another may be easily accomplished by the substitution, addition or deletion of one or two resistors. Calibration is readily accomplished by the adjustment of one potentiometer, accessible at the rear of the instrument. For operation, an external ±5 vdc (±5%) power supply is required. See figure 1 for a typical power supply circuit.

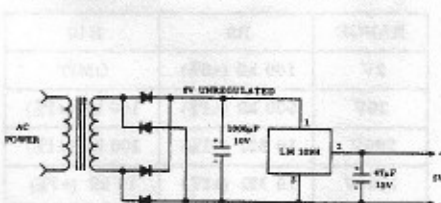


Figure 1. Typical Power Supply Schematic

SPECIFICATIONS.

Range: 0 to ±199 mVDC
or 0 to ±1.999 VDC
or 0 to ±19.99 VDC
or 0 to ±199.9 VDC
or 0 to ±1000 VDC

Accuracy: ±(0.05% Rdg. + 0.05% F.S.)

Update Rate: 3 readings/second nominal

Display: 0.3" high

Operating Temperature: 0° C to 50° C

Power: +5 vdc (±5%) @ 6 mA maximum

Size: 15/16" H x 2-1/2" W x 3-1/4" D
(23.8 mm H x 63.5 mm W x 82.6 mm D)

Weight: 4 oz (113 grams)

T/C: ±0.02% Rdg/°C on 200 mV & 2V ranges;
±0.025% Rdg/°C on other ranges

Input Z: 200 mV range, 100 MΩ; 2V range,
1000 MΩ; 20V range, 1 MΩ; 200V &
1000 V ranges, 10 MΩ

Common-Mode Rejection: 80 db minimum

Common Mode Compliance: ±100 mV between SIG LO & neg. terminal of B+ supply

Decimal Location: May be positioned by jumper on connector to any one of three locations; ±X, X, X, X

Input Current: 250 pA maximum (room temp.)

Input Voltage: ±50 vdc or 50 vrms maximum,
Protection: 200 mV or 2V ranges; ±150 vdc or 150 vrms maximum, 20V

INSTRUCTIONS

range; ±1000 vdc or 700 vrms maximum, 200V & 1000V ranges.

Overload Indication: Positive overload: +1, negative overload: -1 is displayed for inputs exceeding full scale.

OPERATING PRINCIPLES (See Figure 2.)

Analog-to-digital conversion is accomplished in a single monolithic integrated circuit. The output of the A/D converter drives an LCD display. Decimal point selection is accomplished by external jumpers.

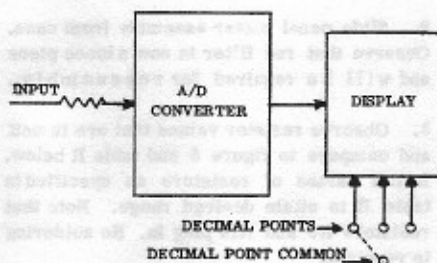
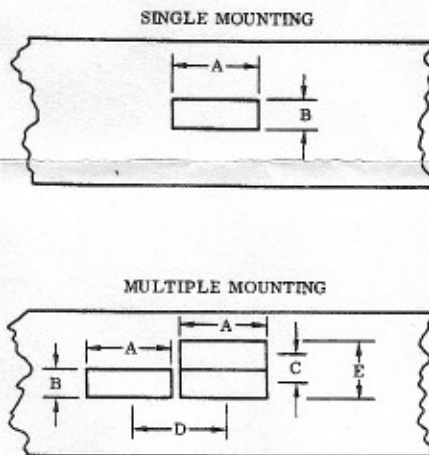


Figure 2. Simplified Block Diagram



PANEL THICKNESS: 1/16 IN. TO 1/4 IN.

	Panel Cover With Trim Plate	Center Line With Trim Plate	Center Line With Trim Plate	Center Line With Trim Plate
A	2-15/16			
B	21/32			
C		10/32	3-5/16 (MIN)	
D		3-1/4 (MIN)	2-1/2 (MIN)	
E				No. of holes x 21/32

Figure 3. Mounting Data



INSTALLATION.

1. Mount the PM-351 as follows:

- Cut hole in panel (figures 3 and 4).
- Slide trim plate over PM-351 housing, facing beveled edge of trim plate forward.
- Insert PM-351 through the cut-out in panel from front of panel.
- Fit mounting clips (2) into slots at sides of instrument. Foot of clip should face forward.
- Thread screws (2) into clips & tighten screws against rear surface of panel.

2. Install a keying tab in connector to mate with PM-351 between contacts 1 and 2. The connector should be NLS part number 39-195, or equivalent. (See table I for connector pin information.)

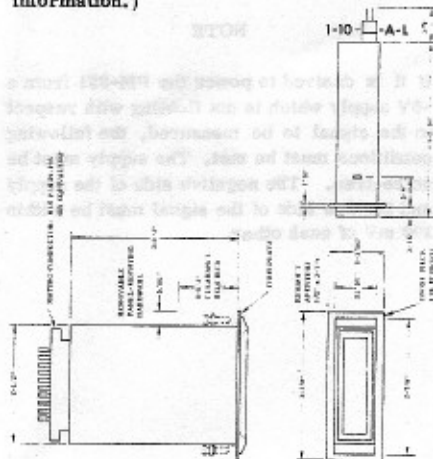


Figure 4. Outline Drawing

Table I. Connector Pin Information

Pin No.	Pin Letter	Pin Letter
(Top of Bd.)	(Bottom of Bd.)	(Bottom of Bd.)
1	Decimal Pt. Com.	A N/C
2	N/C	B 10 ⁰ Decimal
3	N/C	C 10 ¹ Decimal
4	N/C	D 10 ² Decimal
5	Signal Low	E N/C
6	N/C	F N/C
7	N/C	H Signal High
8	N/C	J N/C
9	+5V Power	K } Power Ground (negative side of +5V Supply)
10	N/C	

OPERATION.

- Power Supply.** Connect the negative side of your 5V supply to pins K and L of the connector and the positive side to pin 9.
- Signal.** Connect the signal to be measured to pin H of the connector. A shielded lead may be needed if the signal has a high source resistance. Connect the low side of the signal to be measured to pins 5 and K of the connector. It will usually be better to do this with two separate wires rather than a jumper across 5 and K at the connector. This will eliminate current flow through the signal low connection to pin 5.
- Decimal Indicator.** Jumper between pin 1 and pins B, C or D depending upon which decimal point is to be illuminated. See below. If a decimal is not desired, do not install a jumper.

Decimal Location + 1 . 0 . 0 . 0
 D C B

- Connector.** Plug connector onto P/C fingers at rear of PM-351. Orient connector so the keying tab mates with the slot in the P/C board.
- Readings.** Apply power and signal. Within 10 seconds the PM-351 will display the correct reading.

NOTE

If it is desired to power the PM-351 from a +5V supply which is not floating with respect to the signal to be measured, the following conditions must be met. The supply must be noise-free. The negative side of the supply and the low side of the signal must be within 100 mV of each other.

CALIBRATION.

- Ensure a 5-minute warm-up period.
- Verify the +5-volt power supply voltage. If necessary, adjust to +5V ($\pm 0.1V$).
- 200 Millivolt Meter.** With a precision DC power supply, apply +190 mVDC. Adjust potentiometer R4 at rear of meter until read-out displays +190.

NOTE

As in paragraph 3 above, for a 2-volt meter, apply +1.900 VDC; a 20-volt meter, apply +19.00 VDC; a 200-volt meter, apply +190.0 VDC; and a 1000-volt meter, apply 900 VDC.

RANGE MODIFICATION (Except 200 mV unit.)

- Insert a small screwdriver or pen knife between case and rear cover, midway on case above printed circuit connector, and pry gently outward. Remove rear cover.
- Slide panel meter assembly from case. Observe that red filter is now a loose piece and will be required for reassembly.
- Observe resistor values that are in unit and compare to figure 5 and table II below. Install values of resistors as specified in table II to attain desired range. Note that resistors R9 and R10 plug in. No soldering is required.
- If a decimal indicator is desired, refer to paragraph 4 under Operation.
- Reassemble unit by reversing steps 1 and 2.

- A range modification resistor set covering the four higher ranges of the PM-351 is available from your distributor, specify NLS part number 39-356.

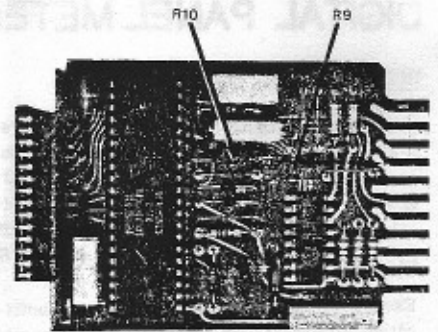


Figure 5. Component Location

Table II. Resistor Values in Range Modification Kit

RANGE	R9	R10
2V	100 k Ω ($\pm 5\%$)	OMIT
20V	909 k Ω ($\pm 1\%$)	100 k Ω ($\pm 1\%$)
200V	10 M Ω ($\pm 1\%$)	100 k Ω ($\pm 1\%$)
1000V	10 M Ω ($\pm 1\%$)	10 k Ω ($\pm 1\%$)

MAINTENANCE.

To facilitate maintenance, all three integrated circuits plug into the printed circuit board and can be easily removed without soldering. These include the LCD display, the ICL7016-CPL chip and the CD4049AE chip.

Prices and Specifications Subject to Change without Notice



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