204B

DIGITAL PANEL METER
PROCESS MONITOR

Operator's Manual

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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.

The information contained in this document is believed to be correct but NEWPORT Electronics, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, patient connected applications.

This device is marked with the international caution 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.

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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.

1.0 DESCRIPTION

1.1 GENERAL

The Newport Model 204B Digital Panel Voltmeter is a low cost, reliable instrument for digital display of analog bipolar voltages. The display is 3999 counts on any of five ranges from 39.99 mV to 399.9 V. Included options are extended count ranges to 4999 or 5999 counts, and an extra zero to the right side of the display. Optical isolators are available to separate digital and analog ground by up to 350 V. An offset option is available for process transmitters.

The Model 204B DPVM is a line-powered meter with 14.2 mm high 7-segment LED readout. The housing is a break-resistant phenylene oxide case. No zero adjustment is required and full scale and offset adjustments are easily accessible with the front lens removed.

Accuracy at the low end of each range is not degraded by normal mode noise because the Model 204B performs true bipolar signal integration around zero. Many competitive meters rectify the signal before integration which erroneously adds the absolute value of the normal mode noise to the signal reading. The Model 204B average value circuit provides full normal mode and superior ac line transient noise rejection at signal levels from zero to full scale.

Ratio measurements are possible with the Model 204B without modifications or external logic. The configuration is 3-wire (common ground) and the reference must be within a specified voltage range.

Data output lines are parallel BCD, compatible with TTL and DTL. External control signals are also TTL and DTL compatible and increase the flexibility and ease of interfacing the Model 204B with other instruments.

1.2 SPECIFICATIONS

1.2.1 Input

Model	204B-1	204B-2	204B-3	204B-4 (6)	204B-5 (6)	Units
Range	0.04	0.4	4	40	400	V
Resolution	0.01	0.1	1	10	100	mV
Overdrive Protection	100	100	100	250	500 (1)	V
Input Resistance	1000	1000	1000 (2)	1.1	1	MΩ
Input Bias Current	1	1	1	0.1	0.01	nA
Reading Tempco(Typ)	±.0075%		±.005% (3)	±.01%		%R/°C
Zero Noise Digits (Typ)	.4	.2				P-P counts
Full Scale Noise Digits (Typ)	.8	.4	.2			P-P counts
Non-Linearity	<1.5	< 1				counts
External Reference Voltage	+0.01→ +0.08	+0.1 → +0.8	+1.00 → +3.50			V
Ratio Accuracy (4)	99.8±0.2					%R
Ratio Linearity (4)	2 (1 typ)					counts
Ext Ref Input Resistance (5)	47	471	4.72 k			Ω

(1) 600 V when ordered with ER1 or ER2 options.

(2) 1.1 M when ordered with ER1 or ER2 options.

(3) .01%R/°C when ordered with ER1 or ER2 options.

(4) 204B-1 must use HZ option to obtain stated accuracy.

(5) Solder blob 'M' closed; a higher resistance is available with the HZ option.

(6) This range exceeds CE specifications.

1.2.2 Accuracy @ 25°C

Total Error	±0.02%R ±1ct
Offset Tempco	±2 μV/°C
Warmup Time	1 hour

1.2.3 Offset

Range	±14 counts

1.2.4 Conversion Characteristics

Technique	Dual slope, average value
Signal integration Period	50 mSec (60 Hz); 40 mSec (50 Hz); trimmed within ±1% (type osc tempco ±.025%/^{o}C using 1% metal film trims)
Read Rate	3.6/sec @ full scale (50/60 Hz). 0-3.6/sec with external control
Polarity	Automatic

1.2.5 Input Characteristics

Type	Single ended (analog ground common to signal low)
Settling Time	2 readings (asynchronous input step)
NMR	40dB @ 50 Hz or 60 Hz
CMR	120dB @ 60 Hz
CMV	350 V signal low to digital ground with option OI installed.
Zero	Automatic
Ratio Measurement	3-wire

1.2.6 Calibration Controls

Full Scale Adjust (R41)	20 turn, accessible behind front lens; ±7.5%, 12^{o}/count @ full scale.
Input Offset (R42)	20 turn, accessible behind front lens; ±14 counts, 257^{o}/count.

1.2.7 Display

Type	14.2 mm (.56") 7-segment LED
Symbols	-3.8.8.8
Decimal Points	Three (to the right of the three MSD's).
Overload Indicator	Display flashes.
Color	Red filter.
Polarity Sign	Minus

1.2.8 Digital Signals

DIGITAL I/O DRIVE REQUIREMENTS

Description	Input	Output	Logical '0'	Logical '1'	Isink	Isource
Parallel BCD		X	0 V-.5 V	2.7 V-5.0 V	4.8 mA	.4 mA
+POLARITY		X	0 V-.4 V	2.4 V-5.0 V	1.6 mA	.4 mA
$\overline{\text{HOLD}}$	X		0 V-.6 V	2.0 V-5.0 V	.04 mA	1.2 mA
$\overline{\text{DATA READY}}$		X	0 V-.4 V	2.4 V-5.0 V	16.0 mA	.8 mA
$\overline{\text{BLANKING}}$	X		0 V-.4 V	Open (6)	—	1.6 mA

(6) Not compatible with TTL totem-pole outputs; TTL open-collector devices (or equivalent) must be used to drive the $\overline{\text{BLANKING}}$ input.

1.2.9 Power

Input Voltage	115 V ac ±10%
Frequency Range	47 to 63 Hz
Input Power	5W when display reads -3.888
Optional Input Voltages	C6 - 115 V ac ±10% 50 Hz
	C7 - 230 V ac ±10% 60 Hz
	C1 - 230 V ac ±10% 50 Hz
	C5 - 100 V ac ±10% 50 Hz
	C8 - 24 V ac ±10% 60 Hz
	C9 - 24 V ac ±10% 50 Hz
	C3 - 5 V dc ±5% (60 Hz rejection)
	C4 - 5 V dc ±5% (50 Hz rejection)
Output Voltage	+4.75 V ±.25 V @ 50 mA (mutually exclusive with all upper board options).

1.2.10 General

Operating Temperature	$0^{o}C$ to 50 ^{o}C
Storage Temperature	$-40^{o}C$ to $75^{o}C$
Humidity	Up to 95% non-condensing at $\leq 40^{o}C$
Weight	480g
Case Material	Black Polycarbonate

Case Size	
DIN	
Bezel (WxHxD)	96x48x6 mm (3.78x1.89x0.24 in)
Depth Behind Bezel W/Connector	135.4 mm (5.33 in)
Panel Cutout	92x45 mm (3.62x1.77 in)
NEMA (optional)	
Bezel	104x48x19 mm (4.09x1.88x0.75 in)
Depth Behind Bezel W/Connector	125 mm (4.91 in)
Panel Cutout	99.6x42.9 mm (3.92x1.69 in)

2.0 RECEIVING AND INSTALLATION

2.1 UNPACKING AND INSPECTION

Your Model 204B was fully inspected and tested, then carefully packed before shipment. Unpack the meter carefully and inspect it for obvious shipping damage.

2.2 INITIAL CHECKOUT PROCEDURE

> **CAUTION**
>
> Meters are internally connected for 24, 100, 115 or 230 V ac or 5 V dc power. Check label on meter for proper supply voltage.

2.2.1 Required Equipment

(1) Appropriate power source (5 watts) as indicated by the label.

(2) Calibrated voltage source.

2.2.2 Test Procedure

(1) Connect signal as follows:

SIGNAL IN to pin 17.

ANALOG GND IN to pin 16.

(2) Connect power as follows:

AC HI to pin A.

AC LO to pin 2.

AC GND to pin C.

(3) Verify that a key is between pins 3 and 4.

(4) Pins 1, 3, and B must be removed from connector.

(5) Apply power and check that the meter reads correctly for its specified range.

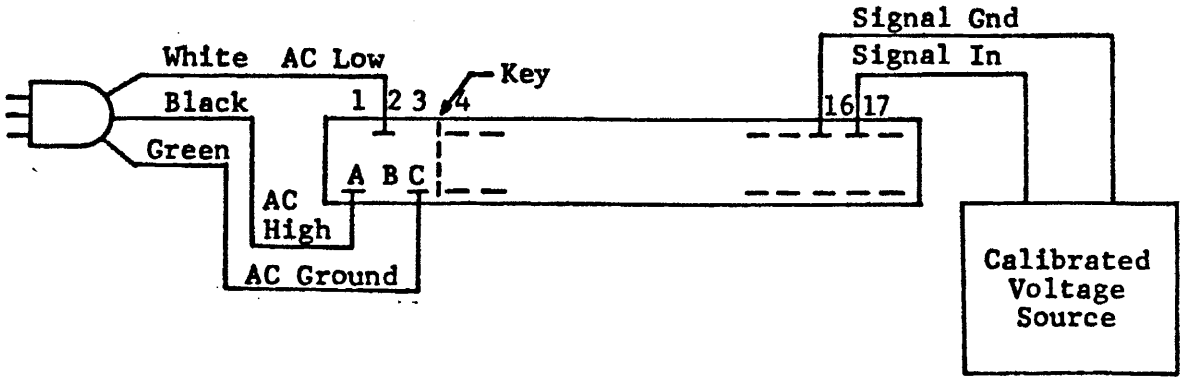


Figure 1

2.2.3 Optional Pin Assignments For C3, D4 and RMS Options

(1) Option C3 Power and Input Connections To TB1

TB1-1	No Connection
TB1-2	+5 V dc
TB1-3	5 V dc Return
TB1-4	No Connection
TB1-5	ANALOG GND IN
TB1-6	SIGNAL IN

(2) Option C3 Power Connections to J1 (Rear Connector)

J1-A	No Connection
J1-2	+5 V dc
J1-C	5 V dc Return

(3) Option D4 Power and Input Connections to TB1

TB1-1	AC HI
TB1-2	AC LO
TB1-3	AC GND
TB1-4	No Connection
TB1-5	ANALOG GND IN
TB1-6	SIGNAL IN

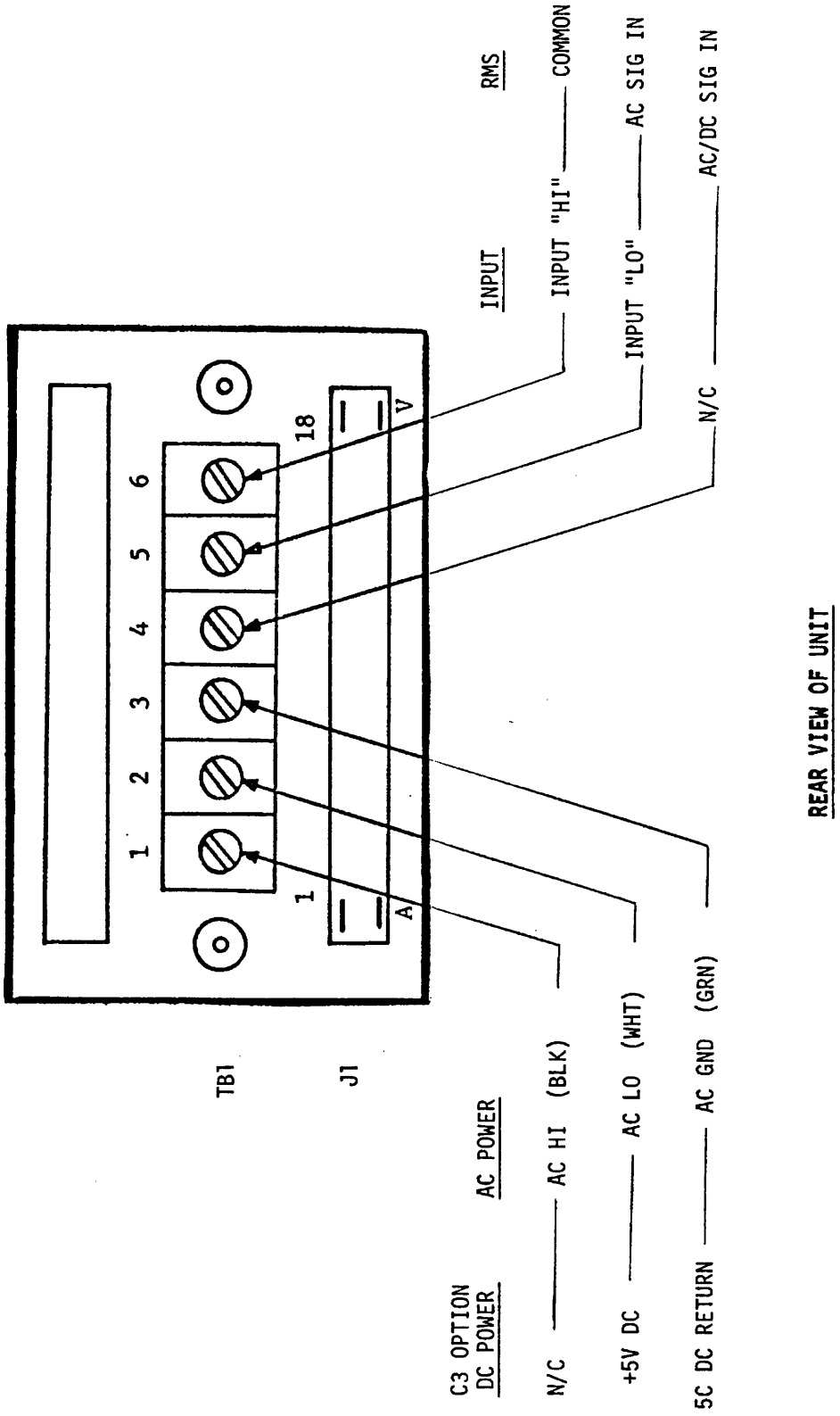
(4) Option RMS Input Connections to TB1

TB1-4	AC/DC SIGNAL IN
TB1-5	AC SIGNAL IN
TB1-6	ANALOG GND IN

2.3 MECHANICAL INSTALLATION

Drawing number 06896, Outline and Mounting Drawing, illustrates the mounting method for your panel meter. The unit is inserted from the front of the panel and held in place by two extrusions. The panel thickness may be between .75 mm (.030") and 6.35 mm (.25").

Figure 2

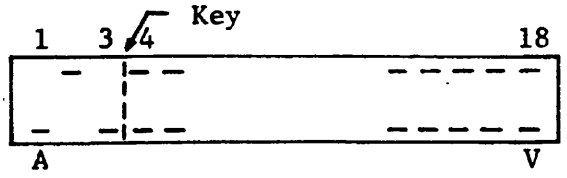

TB1
J1
1 2 3 4 5 6
1
18
A
V
C3 OPTION
DC POWER
AC POWER
N/C
AC HI (BLK)
+5V DC
AC LO (WHT)
5C DC RETURN
AC GND (GRN)
INPUT
RMS
INPUT "HI"
COMMON
INPUT "LO"
AC SIG IN
N/C
AC/DC SIG IN
REAR VIEW OF UNIT

3.0 OPERATING INSTRUCTIONS

3.1 PIN ASSIGNMENTS

PIN	NAME	PIN	NAME
1	No Connection	A	AC HI
2	AC LO	B	No Connection
3	No Connection	C	AC GND
4	X.XXX (DP1)	D	BCD 1
5	XX.XX (DP2)	E	BCD 2
6	XXX.X (DP3)	F	BCD 4
7	$\overline{\text{BLANKING}}$	H	BCD 8
8	BCD 80	J	BCD 100
9	BCD 40	K	BCD 200
10	BCD 20	L	BCD 400
11	BCD 10	M	BCD 800
12	BCD 1 k	N	+POLARITY
13	BCD 2 k	P	$\overline{\text{DATA READY}}$
14	BCD 4 k	R	$\overline{\text{HOLD}}$
15	+4.75 V dc Out	S	Spare
16	ANALOG GND IN	T	DIGITAL GND
17	SIGNAL IN	U	Spare
18	Spare	V	REFERENCE HI IN

Connector Type*	SAE	SCC18D/1-2
	ELCO	00-6007-036-450-012



*Pins 1, 3, and B must be removed.

Figure 3

Connector Pin Orientation as Viewed From the Rear of the Meter.

3.2 POWER

3.2.1 Input Voltage

The standard Model 204B operates from 115 V ±10%, 60 Hz. It consumes about 5.0 watts. A three wire connection should be used to connect power to the meter. Two conductors provide power and the third provides a ground for noise rejection.

Options C1 and C7 are 230 V ±10%. To change the meter in the field from 115 to 230 V operation, use the following procedure. See Figure 5.

(1) Remove power lines from meter and remove the meter from the case.

(2) Remove the two jumpers on the transformer W1 and W2.

(3) Add jumper W3 on the printed circuit board. The meter is now wired for 230 V.

To change the meter from 230 V to 115 V operation, reverse the above steps.

3.2.2 Input Frequency

The standard Model 204B is set at the factory for 60 Hz line operation. If a frequency change is required, the clock frequency must be changed.

The easiest method is to short the signal inputs and adjust R42 for a reading of ±0000. Change the value of R8 until the positive portion of $\overline{\text{DATA READY}}$ is 50 mS ±.5 mS for 60 Hz operation or 40 mS ±.4mS for 50 Hz operation.

Normal mode rejection is highly dependent on the clock frequency, and it is important that the above adjustments are set to ±1% to prevent degradation of normal mode rejection of the Model 204B. R8 should be a ±1% metal film resistor.

3.2.3 Output Voltage

The +4.75 V output is a regulated supply with the voltage range 4.75 V ±.25 V. A maximum current of 50 mA is available for external use which is mutually exclusive with all upper board options.

3.3 SIGNAL INPUT

3.3.1 Signal

For best results, shielded, twisted cable should be used for the input signal, with the shield terminated to ANALOG GND IN at the connector:

Analog ground and digital ground are internally connected and should not be connected externally.

If the meter has a noisy input signal, the input filter time constant may be lengthened for better noise rejection (at the expense of settling time). For the 400 mV and 4 V ranges, a 27 k ohm resistor in series with SIGNAL IN (pin 17) will provide 6 db more rejection but will increase settling time to approximately 1.25 sec. The sum of the series resistor and the source impedance should be no greater than 100 k ohms. Some zero offset due to bias current may be observed on the 40 mV range if an external input resistor is used.

3.3.2 Ground Precautions

It is essential that the ground connections to the Model 204B be proper for accurate readings. The input stage is single-ended and analog ground is internally connected to digital ground through a low internal resistance.

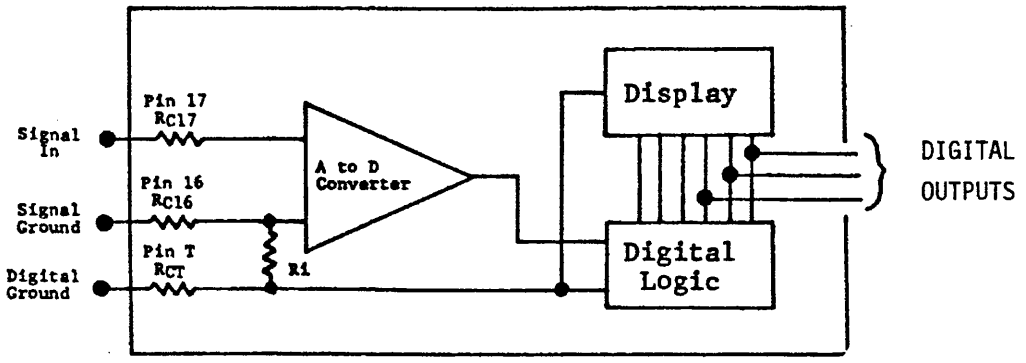


Figure 4

Model 204B Internal Grounds

The contact resistances resulting from the connection between the connector and the printed circuit board are shown as lumped resistors, R_{C17}, R_{C16} and R_{CT}. The internal resistance between the analog and digital grounds is shown as Ri.

CORRECT GROUNDING

The correct grounding method is to connect the low side of the signal to ANALOG GND IN and the common for the digital outputs to DIGITAL GND. This allows the digital current to flow only through R_{CT}, causing the no voltage drop across R_{C16} or Ri and the meter will read the signal correctly. There will exist a small voltage difference between pin 16 and pin T.

INCORRECT GROUNDING

An improper ground connection is to use a single ground pin for both analog and digital ground. When this is done, the return current for the digital outputs flows through either R_{C16} or R_{CT}. This causes a voltage drop in series with the input signal and the meter reading will be incorrect.

An improper system ground connection for the Model 204B is to tie the two ground connections together at the source. This creates a ground loop and the voltage drop across R_{CT} appears across R_{C16} and Ri simultaneously. This presents an erroneous reading as in the previous case with a single tie point at the connector.

3.4 OFFSET

The input offset components supplied with the standard instrument provides ±14 counts of adjustment.

If the input offset adjustment range is not sufficient, it may be increased (to a maximum of ±10% of full scale) by increasing the value of R37. The following formula may be used to calculate the value of R37 in ohms:

$$R37 = \frac{(\pm\text{desired input offset digits}) \times (309{,}000) \times (\text{meter resolution in V})}{6.3 - (\pm\text{desired input offset digits}) \times (\text{meter resolution in V})}$$

If an external offset voltage is required, cut R39's service loop and connect the top of R39 to E14. The external voltage is applied to pin S and 16. The meter will now read:

$$\text{Offset digits} = \frac{(\text{external offset voltage in V}) \times R37}{(R37 + 309{,}000) \times (\text{meter resolution in V})}$$

3.5 RATIO

The REFERENCE HI IN allows an external voltage to be used as the reference source for conversion. In this mode, the meter reads the ratio of the signal voltage to the reference voltage rather than the average value of the input.

$$\text{Reading in Counts} = 2000 \times \frac{\text{Signal voltage}}{\text{Reference voltage}}$$

On the 40 V and 400 V ranges, the reference voltage must be scaled by 1/10 or 1/100 respectively. The reference input impedance for the 400 mV range is about 470 ohms. For the 4 V, 40 V and 400 V ranges the impedance is 4.7 k ohms. The reference voltage must be between the limits specified, and must be positive with respect to ANALOG GND IN. For high impedance ratio input open solder blob "M".

3.6 OPTICAL ISOLATION

The following procedure can be used to add the optical isolation option (OI):

3.6.1 Install three 100 ohm, ±5%, 1/4W, CF resistors (NEI P/N 8045101) at R25, R26, and R28.

3.6.2 Open solder switch "Y" on the component side of the board and solder switches "N", "V", "W", and "X" on the circuit side of the board.

3.6.3 Install 2 each NEI P/N 49789 Dual Optical Isolators. These Isolators provide 350 volts separation between digital and analog ground.

3.6.4 The value of R32 may need to be adjusted or solder blob "T" closed to optimize zero width.

3.7 DIGITAL SIGNALS

DIGITAL I/O DRIVE REQUIREMENTS

Description	Input	Output	Logical '0'	Logical '1'	Isink	Isource
Parallel BCD		X	0 V-.5 V	2.7 V-5.0 V	4.8 mA	.4 mA
+POLARITY		X	0 V-.4 V	2.4 V-5.0 V	1.6 mA	.4 mA
$\overline{\text{HOLD}}$	X		0 V-.6 V	2.0 V-5.0 V	.04 mA	1.2 mA
$\overline{\text{DATA READY}}$		X	0 V-.4 V	2.4 V-5.0 V	16.0 mA	.8 mA
$\overline{\text{BLANKING}}$	X		0 V-.4 V	Open (7)	----	1.6 mA

(7) Not compatible with TTL totem-pole outputs; TTL open-collector devices (or equivalent) must be used to drive the $\overline{\text{BLANKING}}$ input.

3.7.1 Parallel BCD Outputs

The data outputs are parallel BCD and are TTL and DTL compatible. The outputs are stable and valid while $\overline{\text{DATA READY}}$ (Pin P) is low.

3.7.2 $\overline{\text{DATA READY}}$ (Pin P)

$\overline{\text{DATA READY}}$ will go to a logical '0' at the end of a conversion cycle and to a logical '1' at the beginning of a conversion cycle.

3.7.3 $\overline{\text{HOLD}}$ (Pin R)

When a logical '0' is applied to the $\overline{\text{HOLD}}$ input, the meter will finish the conversion cycle it is on and will hold that reading. If it is applied before the beginning of a conversion, the meter will not start that conversion upon a logical '1' at the $\overline{\text{HOLD}}$ input, a new conversion will begin within 133 milliseconds.

3.7.4 +POLARITY (Pin N)

The +polarity output is a logical '1' when the meter indicates a positive reading.

3.7.5 BLANKING (Pin 7)

The digital display may be blanked by grounding the BLANKING input. The internal blanking signal occurs at displayed readings > ±3999 (> ±4999 for ER1 options; > ±5999 for ER2 options).

3.7.6 Decimal Points

Any of the three decimal points to the right of the three most significant digits can be lighted. The decimal points blank during overload.

Decimal Point	Ground P1 Pin	Solder Blob
X.XXX (DP1)	4	J
XX.XX (DP2)	5 (8)	L
XXX.X (DP3)	6 (9)	K

(8) Solder-blob 'B' closed.

(9) Solder-blob 'A' closed.

Decimal points are lit by grounding the appropriate pin (To P1-Pin T) or closing the appropriate solder blob. The grounding device must be capable of sinking 0.5 mA.

4.0 THEORY OF OPERATION

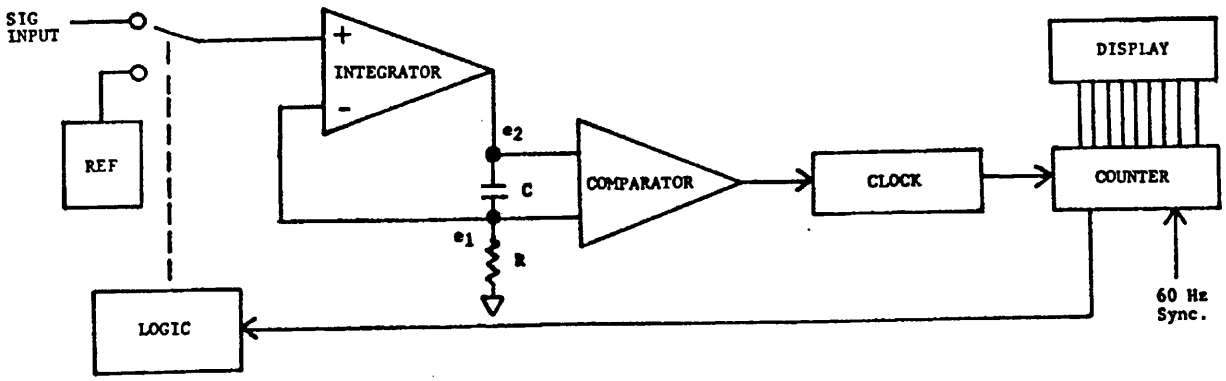


Figure 6

Block Diagram of Model 204B

The Model 204B panel voltmeter uses the dual slope method of conversion. Many state-of-the-art panel meters use dual slope conversion, but the Model 204B includes automatic zeroing before each reading and does so with a minimum of parts for increased reliability.

At the beginning of a conversion, the voltage across C is zero. The signal is then applied to the integrator and the voltage across C rises by the formula

$$V_{capacitor} = V_{in} \times \frac{time\ (sec)}{R\ C}$$

At the end of a fixed period of 2000 counts (T1), the counters are reset to 0000. The signal input is turned off and a stable reference voltage of the opposite polarity is now applied to the input. Since the reference voltage is constant, the slope, in volts/sec, during this second period (T2) is constant and independent of input signal levels. The time required to discharge the capacitor back to zero volts is then proprotional to the signal voltage.

After the clock is stopped by the capacitor voltage reaching zero, a third period (T3) allows the circuit to auto-zero the integrator and comparator for the next reading.

A low level on the $\overline{HOLD}$ input prevents the reset pulse from starting the counters. The relationship between T1 (signal integrate) and T2 (reference integrate) time can be expressed by the formula:

$$Eref\ T2 = Esig\ T1$$

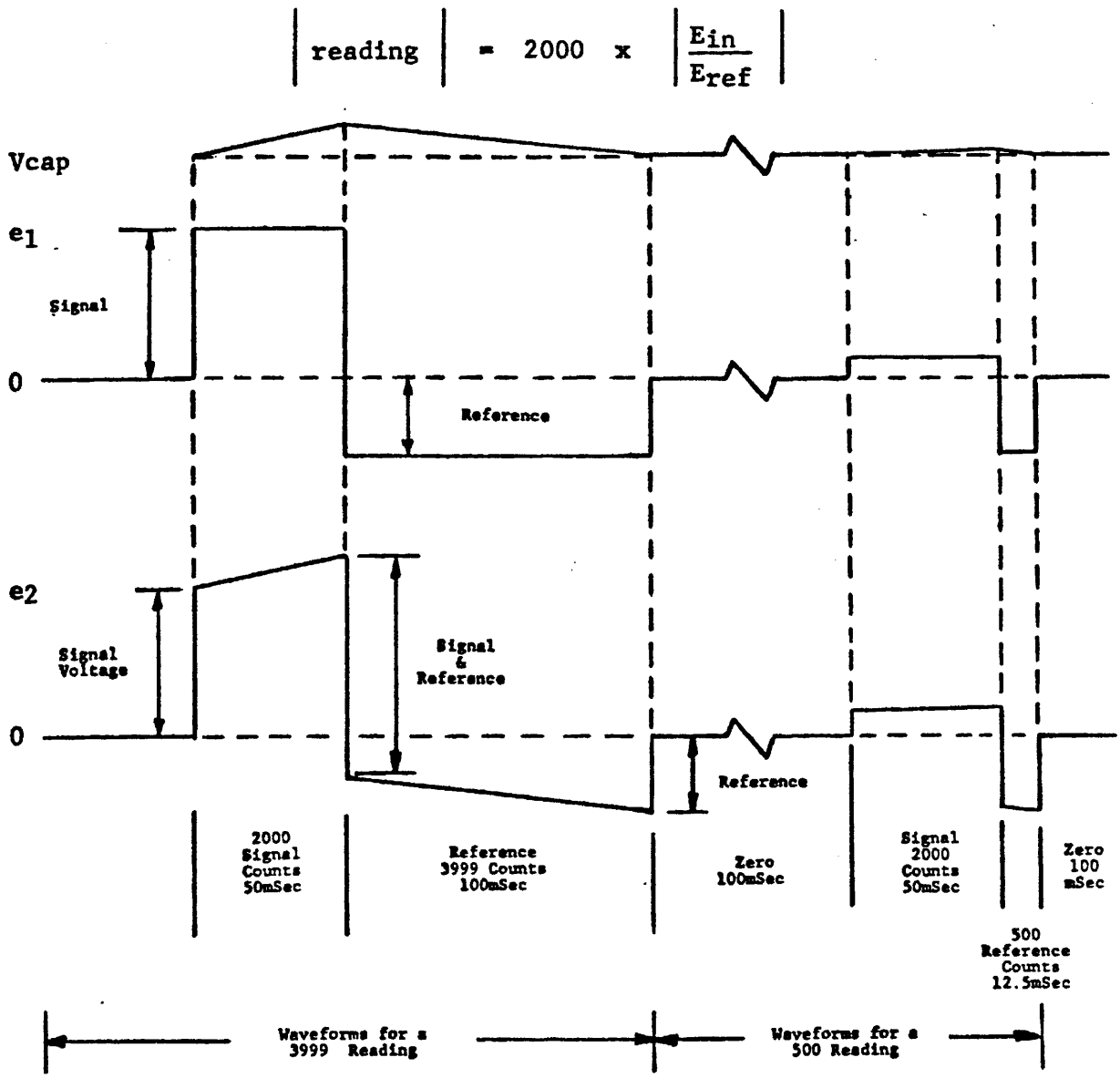


Figure 7

Voltage Wave Forms at e_1 and e_2

5.0 ADJUSTMENT AND CALIBRATION

The Model 204B was calibrated at the factory with a precision voltage source. Frequent calibration is not necessary due to the stability and internal accuracy of the meter. If recalibration is necessary, use the following procedure.

5.1 Plug the 204B to be tested into an appropriate test cable.

5.2 Turn on the power and adjust for 115 V ac.

5.3 With the voltage source set to 0 V, adjust R42 (input-offset; 100 k) until the polarity sign is bouncing between plus and minus polarity.

5.4 Apply an input signal equal to +3900.5 and slowly adjust R41 (full scale; 1 k ohm) until the display is bouncing between +3900 and +3901.

5.5 Using the voltage source, check linearity at 10, 100, 500, 1000, 2000, 3000 and 3999 counts. Verify that linearity is not worse than 1 count throughout this range in both polarities.

NOTE: This test requires the effects of zero offset, and full scale turnover to be taken into account.

5.6 Using the voltage source, observe the DPM readout.

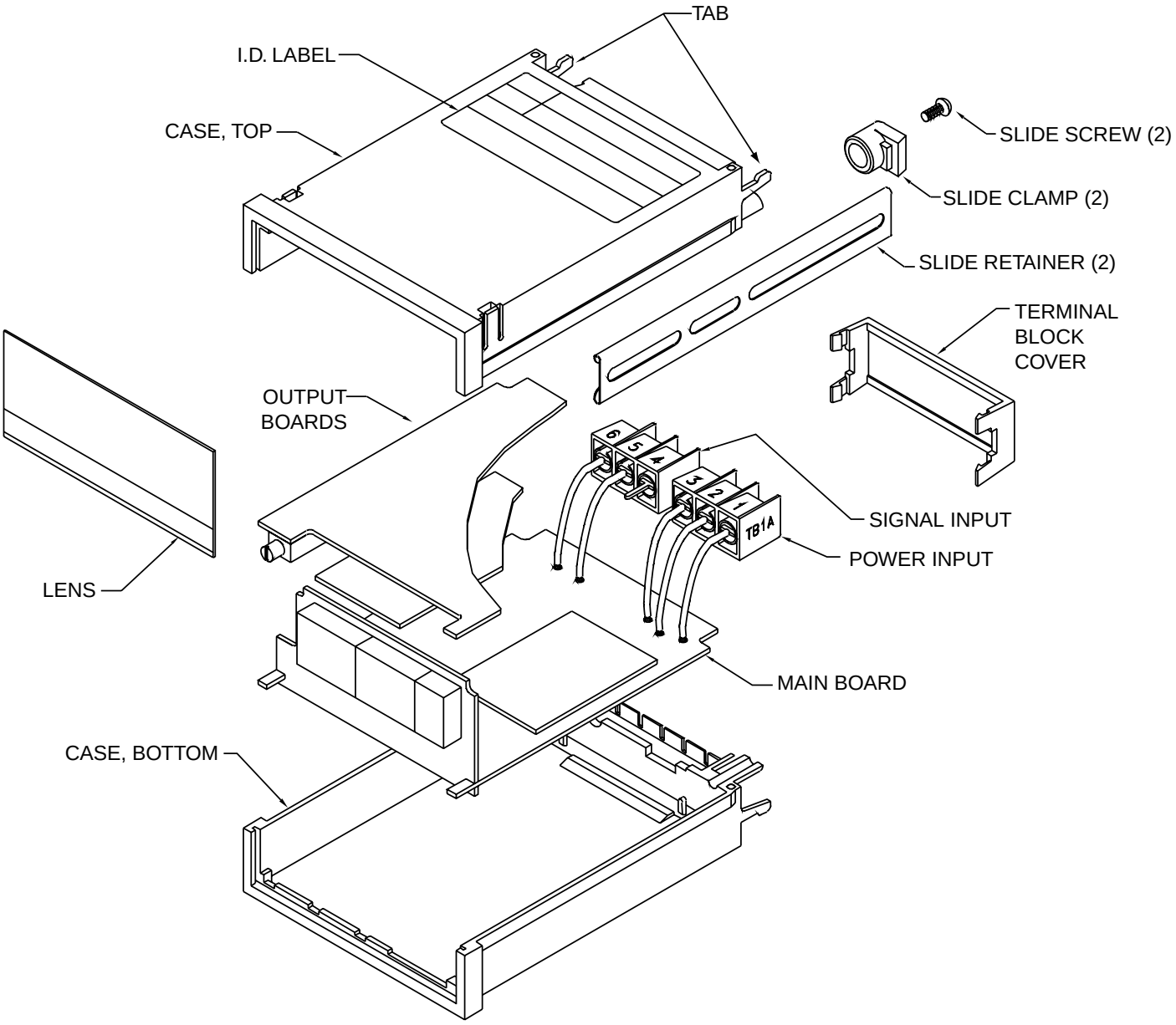
5.6.1 Check all numbers for proper decoding.

5.6.2 Check for Dim/Dead/Bright segments.

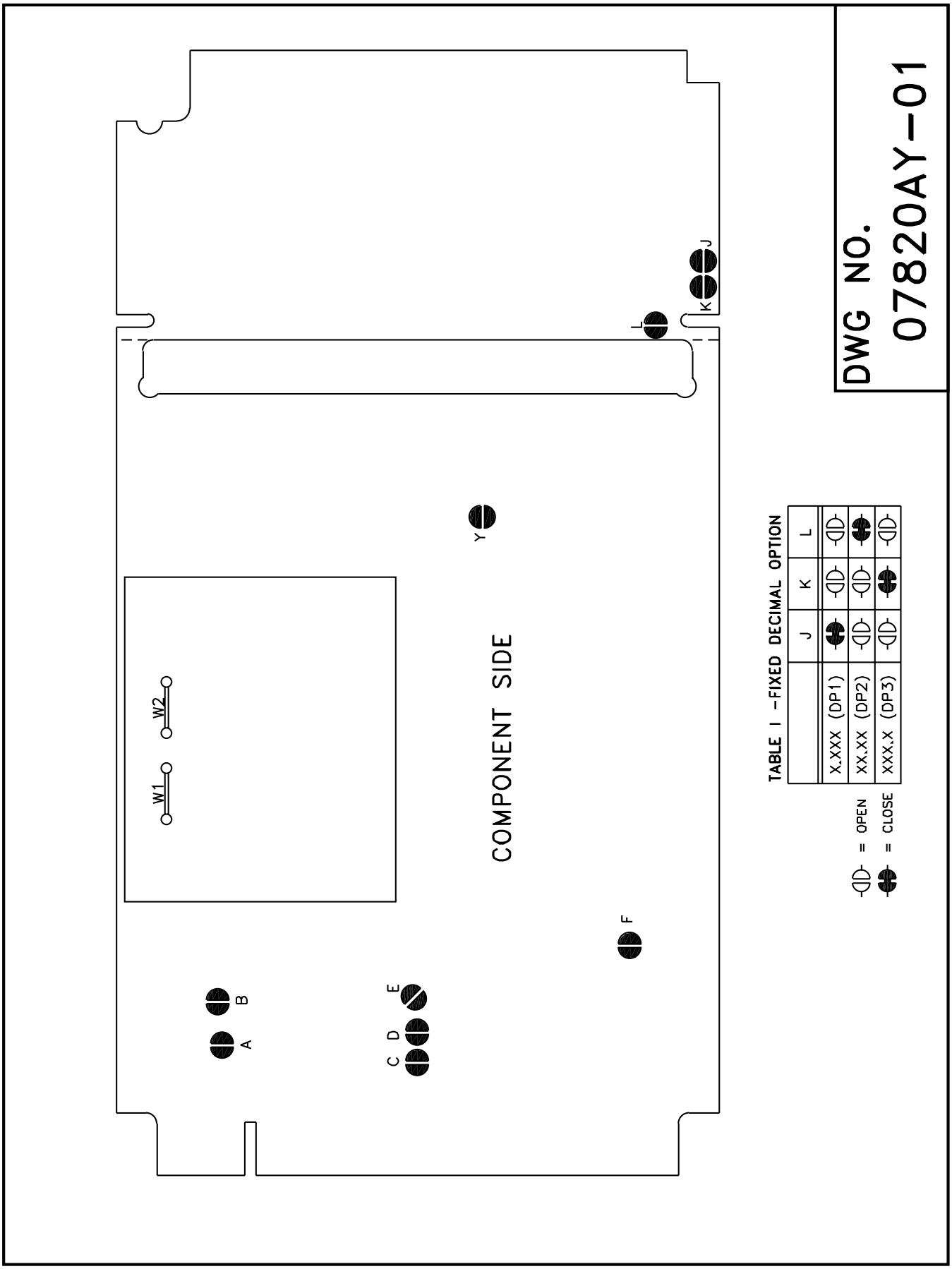
5.6.3 Check individual displays for the same relative intensity/ illumination.

5.6.4 Check minus polarity sign.

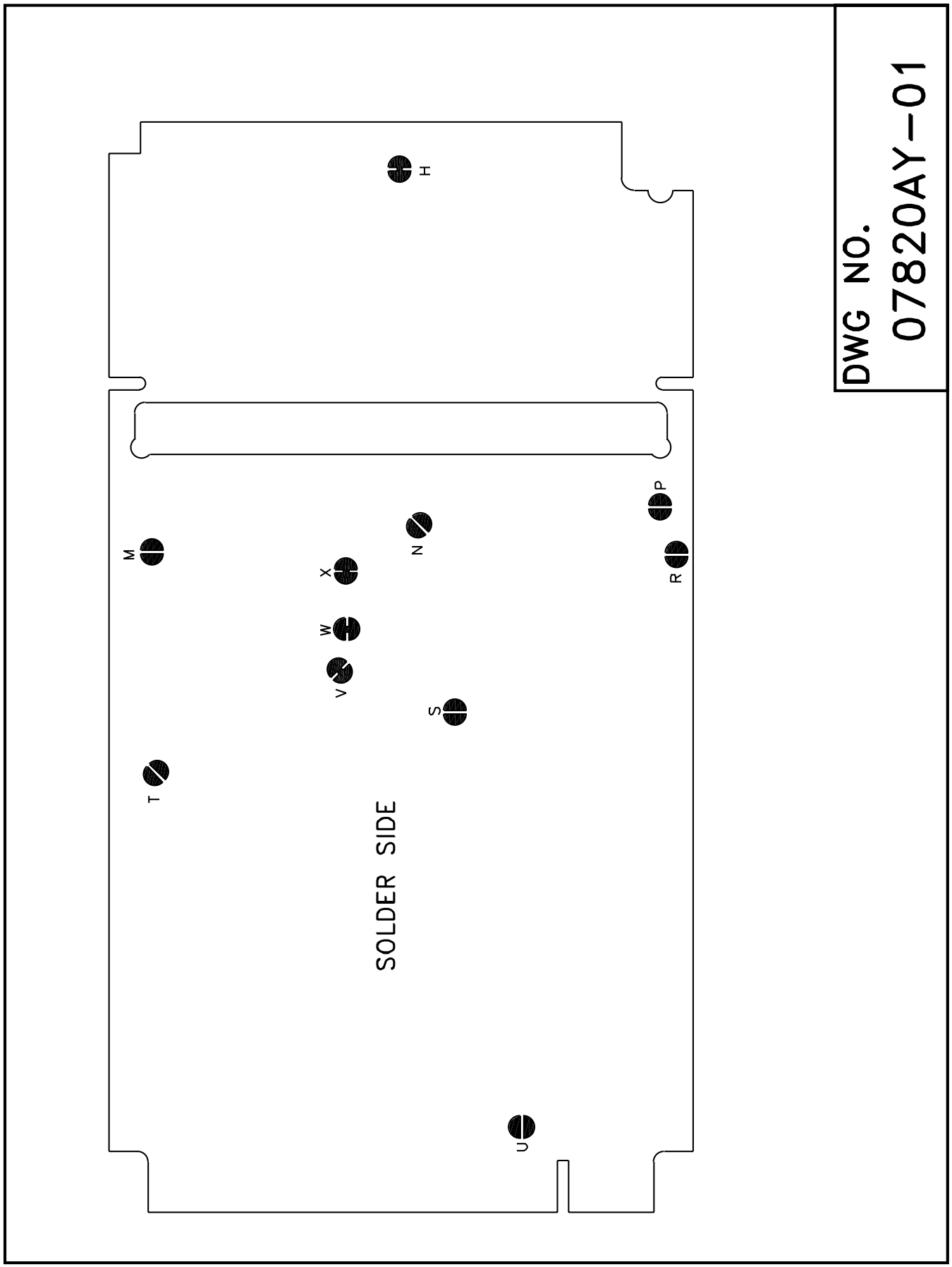
6.0 DRAWINGS



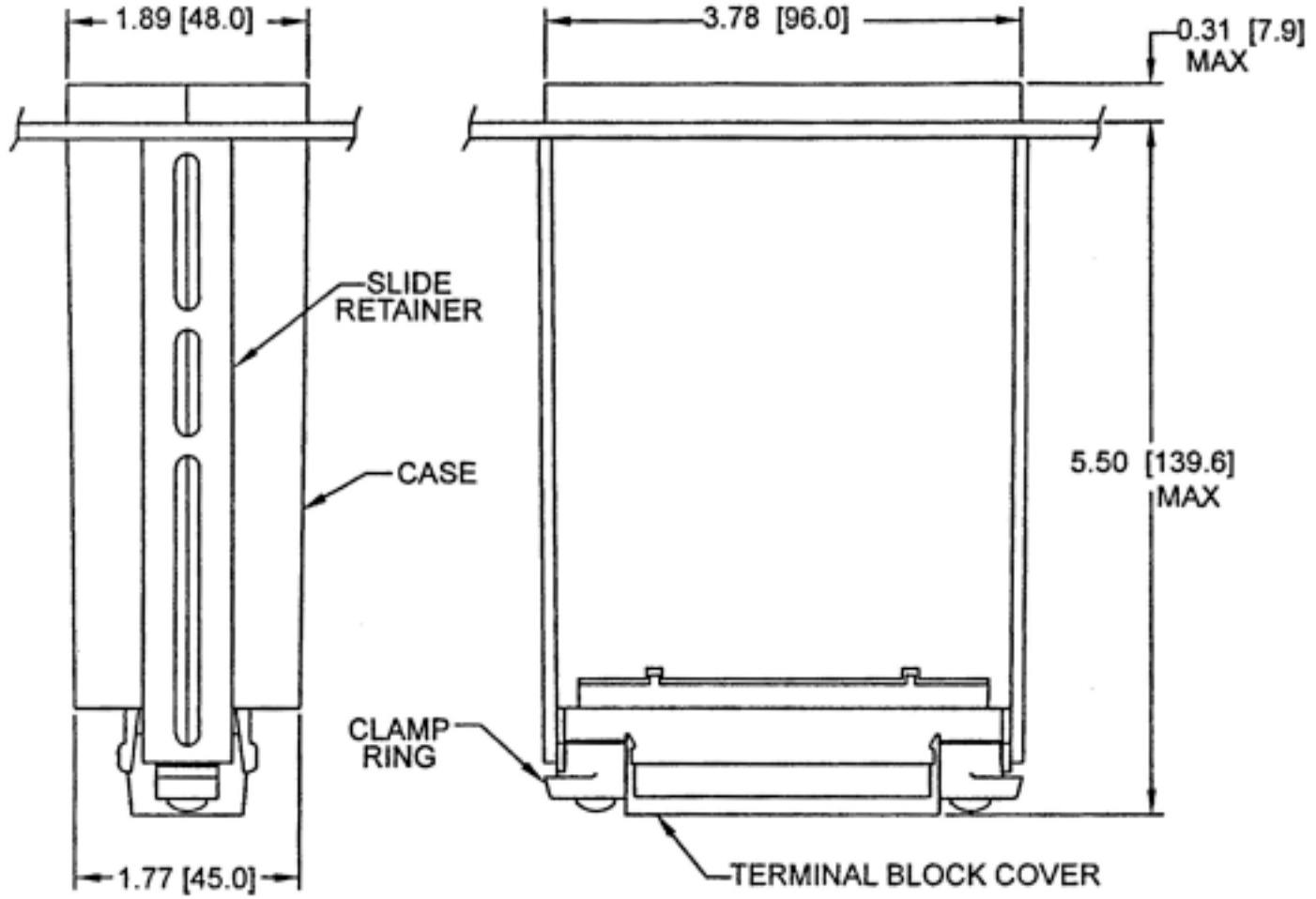
EXPLODED VIEW - 204B, DIN 1A CASE



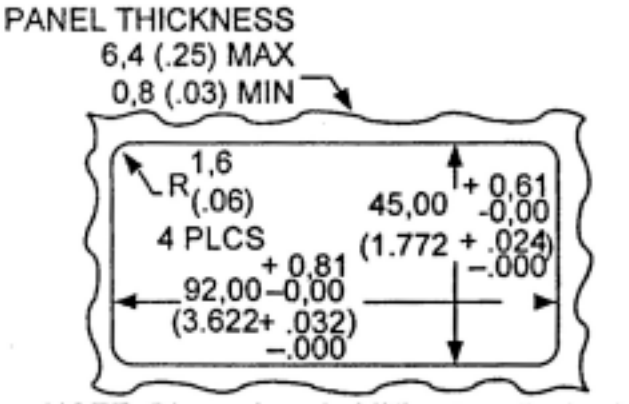
PCBA DWG, 204B, 3 3/4 DIGITAL PROCESS METER - SOLDERSWITCHES



PCBA DWG, 204B, 3 3/4 DIGITAL PROCESS METER - SOLDERSWITCHES

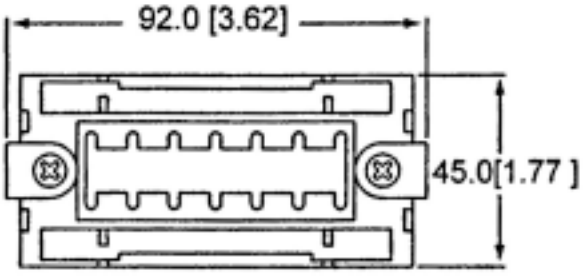


Notes: Dimensions are in inches ±0.01"
with millimeters in [ ] ±0.25 mm.



NOTE: Dimensions in Millimeters (Inches)

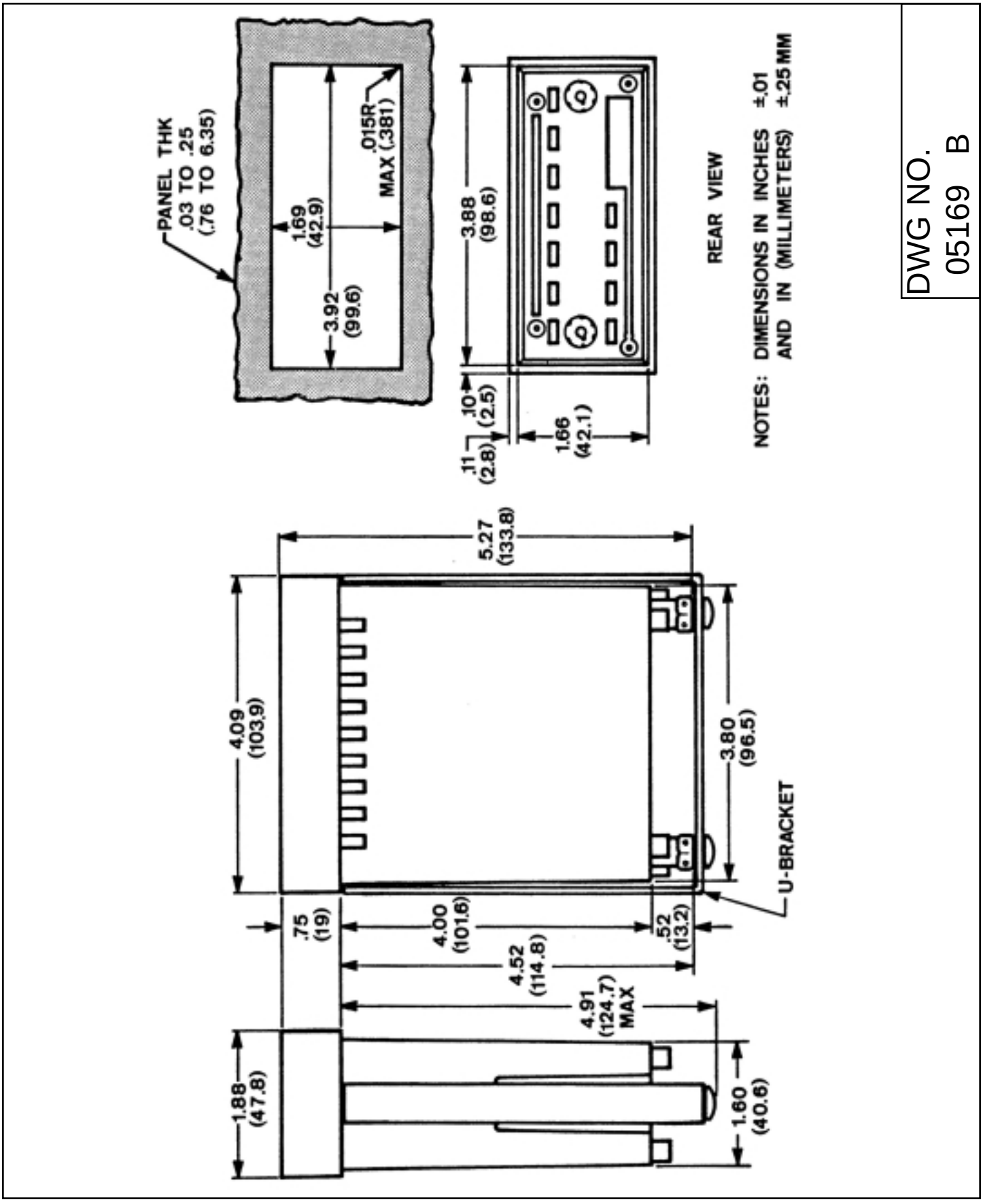
PANEL CUTOUT



REAR VIEW

(TERMINAL BLOCK COVER AND
BEZEL NOT SHOWN FOR CLARITY)
SLIDE CLAMPS ROTATED AND SLIDE RETAINERS
REMOVED AS SHOWN FOR INSTALLATION.

OUTLINE AND MOUNTING FOR DIN 1A CASE



OUTLINE AND MOUNTING FOR OPTIONAL NEMA CASE

Warranty/Disclaimer

NEWPORT ELECTRONICS, INC. warrants this unit to be free of defects in materials and workmanship for a period of one (1) year from date of purchase. In addition to NEWPORT's standard warranty period, NEWPORT ELECTRONICS will extend the warranty period for one (1) additional year if the warranty card enclosed with each instrument is returned to NEWPORT.

If the unit should malfunction, it must be returned to the factory for evaluation. NEWPORT's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by NEWPORT, if the unit is found to be defective it will be repaired or replaced at no charge. NEWPORT's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of NEWPORT's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

NEWPORT is pleased to offer suggestions on the use of its various products. However, NEWPORT neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by NEWPORT, either verbal or written. NEWPORT warrants only that the parts manufactured by it will be as specified and free of defects. NEWPORT MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive and the total liability of NEWPORT with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall NEWPORT be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by NEWPORT is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, NEWPORT assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and additionally, purchaser will indemnify NEWPORT and hold NEWPORT harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

Return Requests/Inquiries

Direct all warranty and repair requests/inquiries to the NEWPORT Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO NEWPORT, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM NEWPORT'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting NEWPORT:

1. P.O. number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult NEWPORT for current repair charges. Have the following information available BEFORE contacting NEWPORT:

1. P.O. number to cover the COST of the repair,
2. Model and serial number of product, and
3. Repair instructions and/or specific problems relative to the product.

NEWPORT's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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For immediate technical or application assistance please call:

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