

215



## DIGITAL PANEL VOLTMETER

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.

## 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.

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## 1.0 GENERAL INFORMATION

### 1.1 UNPACKING AND INSPECTION

Your Model 215 was systematically inspected and tested, then carefully packed before shipment. Unpack the instrument and inspect for obvious shipping damage. Notify the freight carrier immediately upon discovery of any damage.

### 1.2 SPECIFICATIONS

External Reference

0.05 to 0.11V on 0.2V range

For Ratio (optional)

0.5 to 1.1V on other ranges

|                    | 215-2  | 215-3  | 215-4 | 215-5 |    |
|--------------------|--------|--------|-------|-------|----|
| Full Scale Voltage | 0.2    | 2.0    | 20.0  | 200.0 | V  |
| Resolution         | 0.1    | 1.0    | 10.0  | 100.0 | mV |
| Maximum Input      | 130    | 130    | 150   | 330   | Vp |
| Impedance          | 10,000 | 10,000 | 1.0   | 1.0   | M  |
| Bias Current       | 50     | 50     | 5.0   | 0.5   | pA |
| NMR @ 50/60 Hz     | 56     | 56     | 42    | 36    | dB |
| CMR (DC to 60 Hz)  | 80     | 80     | 80    | 80    | dB |

CMR (DC to 60 Hz)

$$\text{CMV} = \frac{V_{HI} + V_{LO}}{2}$$

-1V to +2V

### 1.3 ACCURACY

Maximum Error @ 25°C

±.05%R ±1 Count

Reading Tempco

±0.008% R°C

Zero Drift

±2μV/°C

Warmup to Rated Accuracy

5 sec. to within 1 count

### 1.4 CONVERSION CHARACTERISTICS

Technique

Dual Slope, Average Value

Signal Integration Period

100 ms

Reading Rate

2.5 sec.

Full Scale Step Response

1.2 sec.

## 1.5 ENVIRONMENTAL

|                       |                         |
|-----------------------|-------------------------|
| Operating Temperature | 0°C to +55°C            |
| Storage Temperature   | -40°C to +85°C          |
| Humidity              | 0 to 95% RH @ 0 to 40°C |

## 1.6 DISPLAY

|                |                                                                     |
|----------------|---------------------------------------------------------------------|
| Type           | 14.2mm 7-segment LED                                                |
| Symbols        | ±1.8.8.8                                                            |
| Decimal Points | Connector wired or solder switched to any of above three positions. |
| Overload       | 3 LSDs blank                                                        |
| Test           | Lights -1888 when +5V is applied.                                   |
| HOLD           | Holds the last reading when grounded.<br>(TTL/CMOS compatible)      |

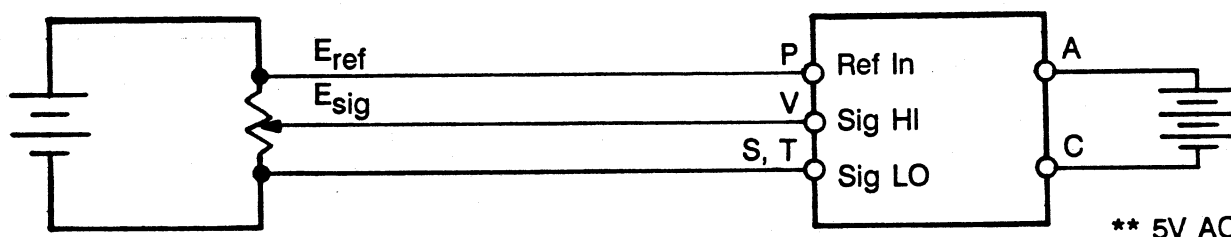
## POWER

|               |              |
|---------------|--------------|
| Input Voltage | 5VDC ±5%     |
| Consumption   | 1.2W Maximum |

## 2.0 OPERATING INSTRUCTIONS

### Ratio Operation

The Model 215 may be used to measure the ratio of an input signal to an external reference voltage.



In the diagram, the position of the slider is to be determined. The long-term accuracy of the external reference voltage is not important, but it must remain stable during the measurement period.

For a ratio measurement, the Model 215 will provide the following reading:

$$\text{RATIO} = 1000 \times \frac{E_{sig}^*}{E_{ref}}$$

\*  $E_{sig}$  for the 20V and 200V ranges must be scaled by 1/10 and 1/100 respectively.

\*\* Change R21 1K resistor to 0 ohms if signal LO must be common to 5 volt power return.

## EXTERNAL REFERENCE VOLTAGES ARE:

$E_{sig}$  (FS Volt)  
2V, 20V, 200V  
  
200mV

$E_{ref}$  (Limits)  
 $+500\text{mV} < E_{ref} < +1.1\text{V}$   
  
 $+50\text{mV}^* < E_{ref} < +100\text{mV}$

\* Below 90mV, accuracy is degrade, depending on the VLSI noise.

### 2.1 INITIAL CHECKOUT PROCEDURE

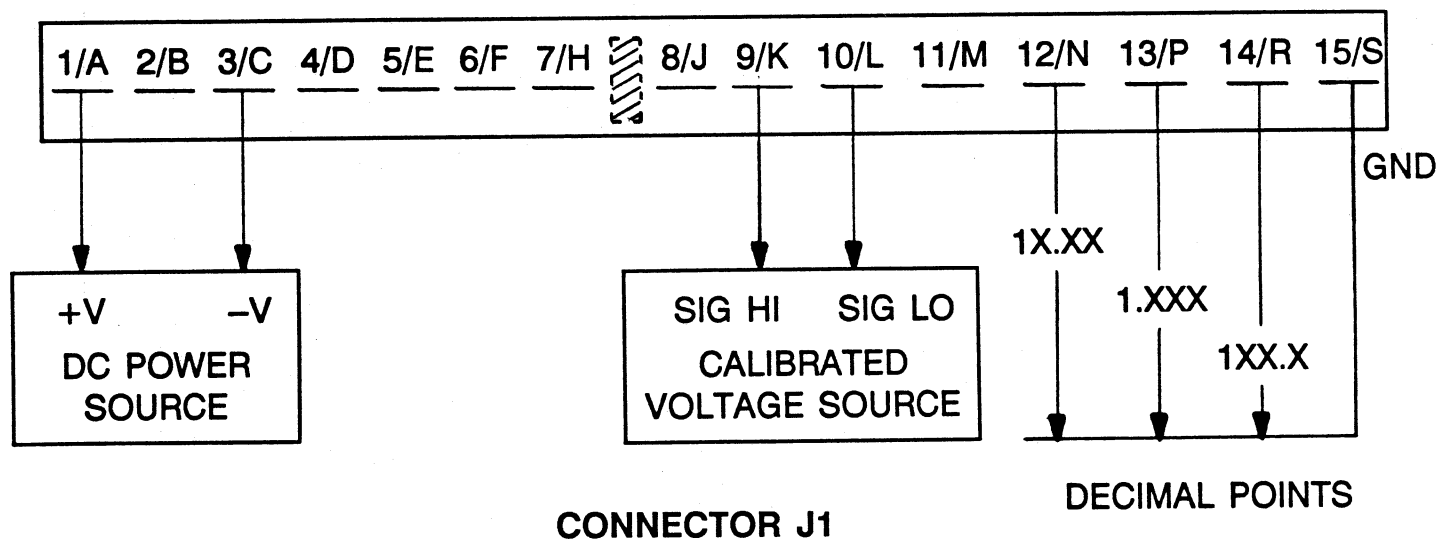
See Section 1.1 for unpacking and inspection procedure.

#### CAUTION

CHECK THAT THE DC POWER SOURCE IS SET TO +5.0V,  $\pm 5\%$  BEFORE CONNECTING TO THE METER.

#### REQUIRED EQUIPMENT:

1. +5v,  $\pm 5$ , DC power source (2 Watts)
2. Calibrated voltage source.



CONNECTOR J1

DECIMAL POINTS

### 2.2 CALIBRATION INSTRUCTIONS

The Model 215 was calibrated at the factory or field-service center with a precision source. Frequent calibration is not necessary due to the stability and internal accuracy of the meter. The gain adjustment is accessible with the lens removed for customer calibration.

1. Check label on meter for proper DC power and input.
2. Connect DC power as indicated in the operating instructions.
3. Apply a positive signal input close to the full scale input of the model under test.
4. Adjust R14 so that the displayed reading agrees with the signal input.

3.0 DRAWINGS

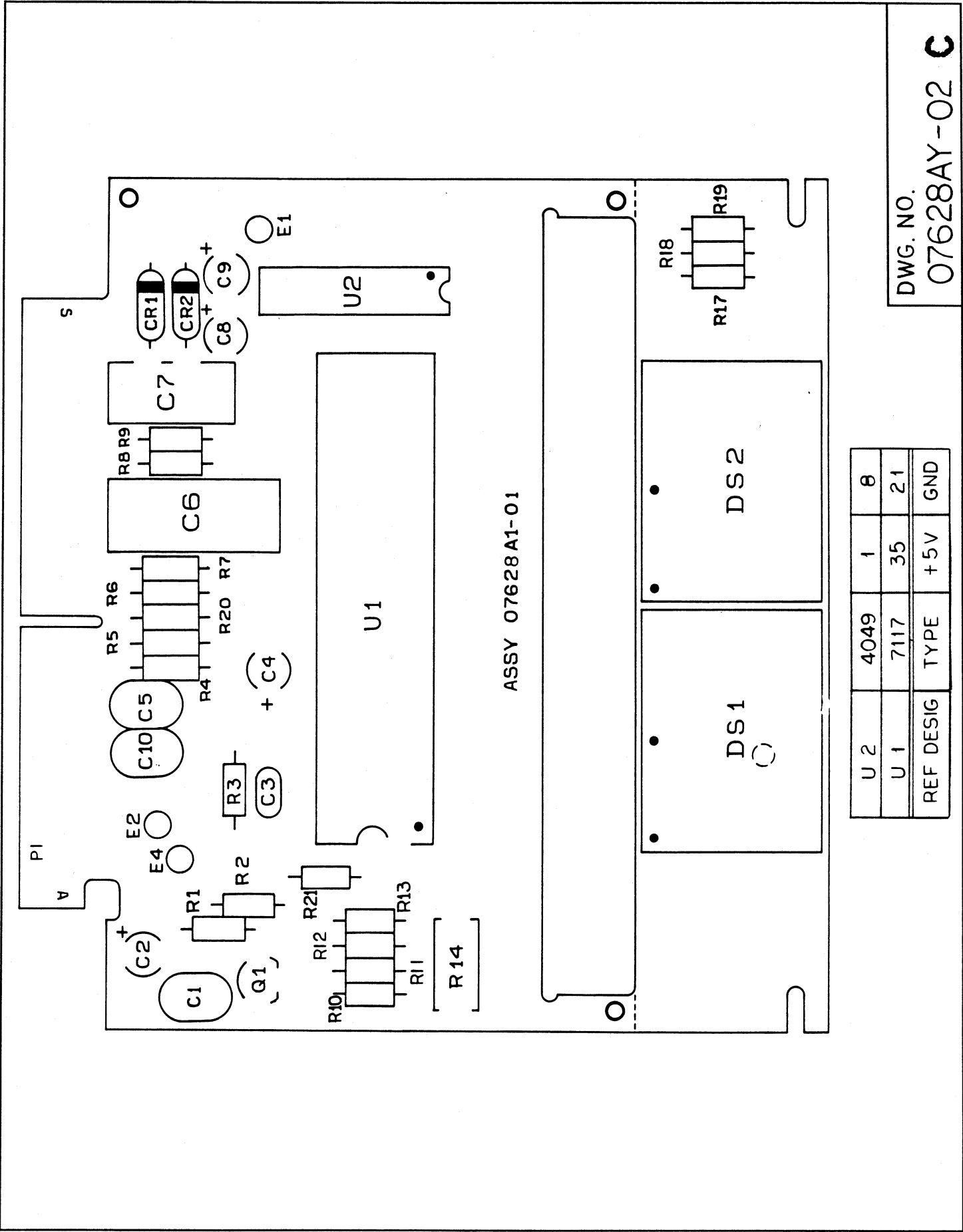


Figure 3-1 Assembly Diagram

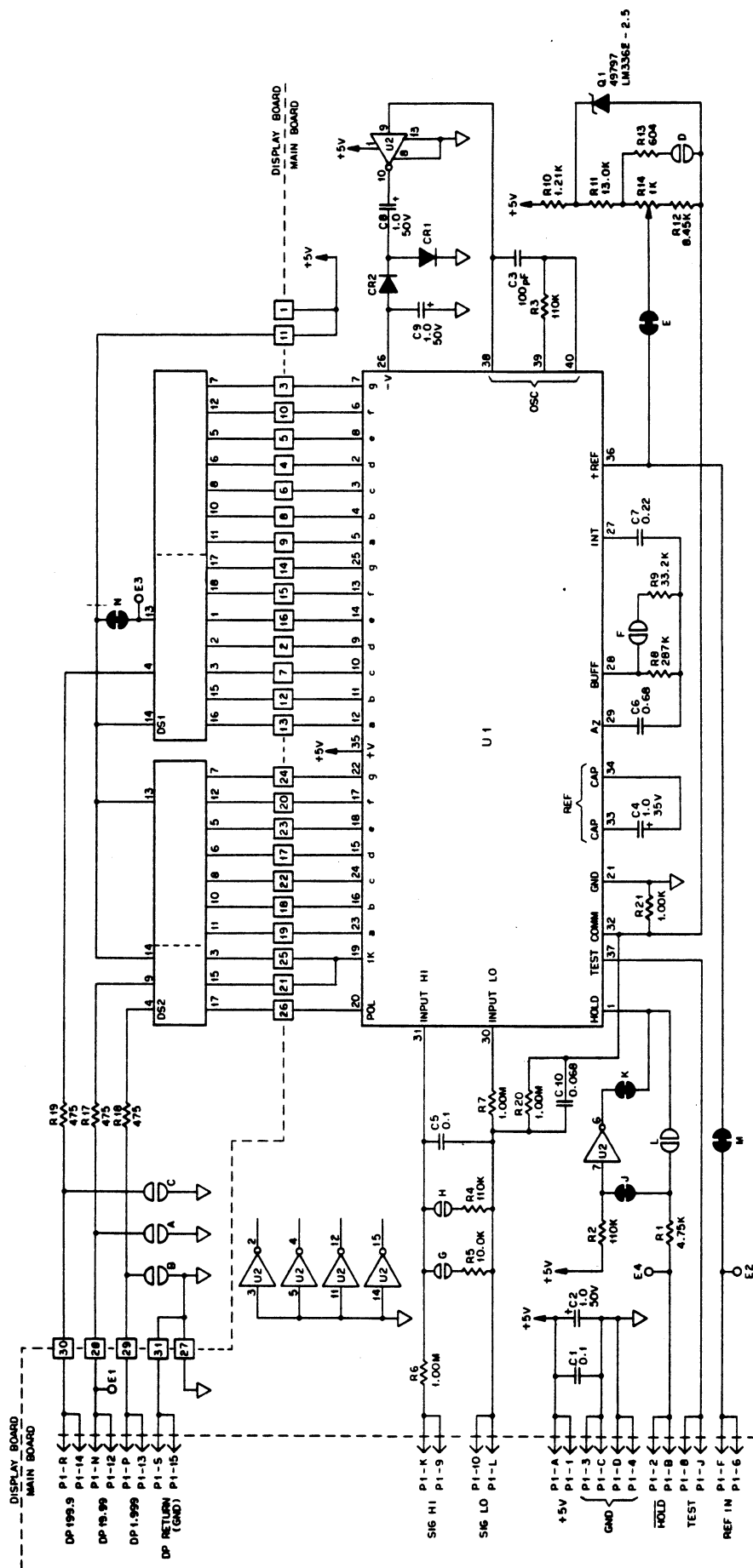


TABLE I

| DECIMAL PT. | A     | B      | C       |
|-------------|-------|--------|---------|
| DP 1        | 1.999 | 19.99  | 199.9   |
| DP 2        | 19.99 | 199.9  | 1999.9  |
| DP 3        | 199.9 | 1999.9 | 19999.9 |

TABLE II

| MODEL | RANGE | D | F | G | H |
|-------|-------|---|---|---|---|
| 215-2 | 200mV | 1 | 1 | 1 | 1 |
| 215-3 | 2V    | 1 | 1 | 1 | 1 |
| 215-4 | 20V   | 1 | 1 | 1 | 1 |
| 215-5 | 200V  | 1 | 1 | 1 | 1 |

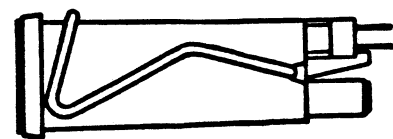
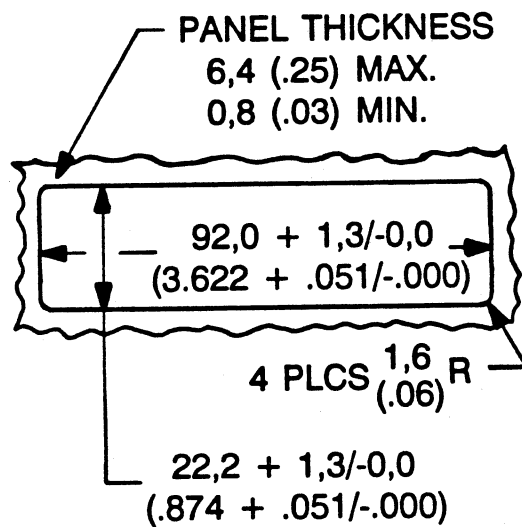
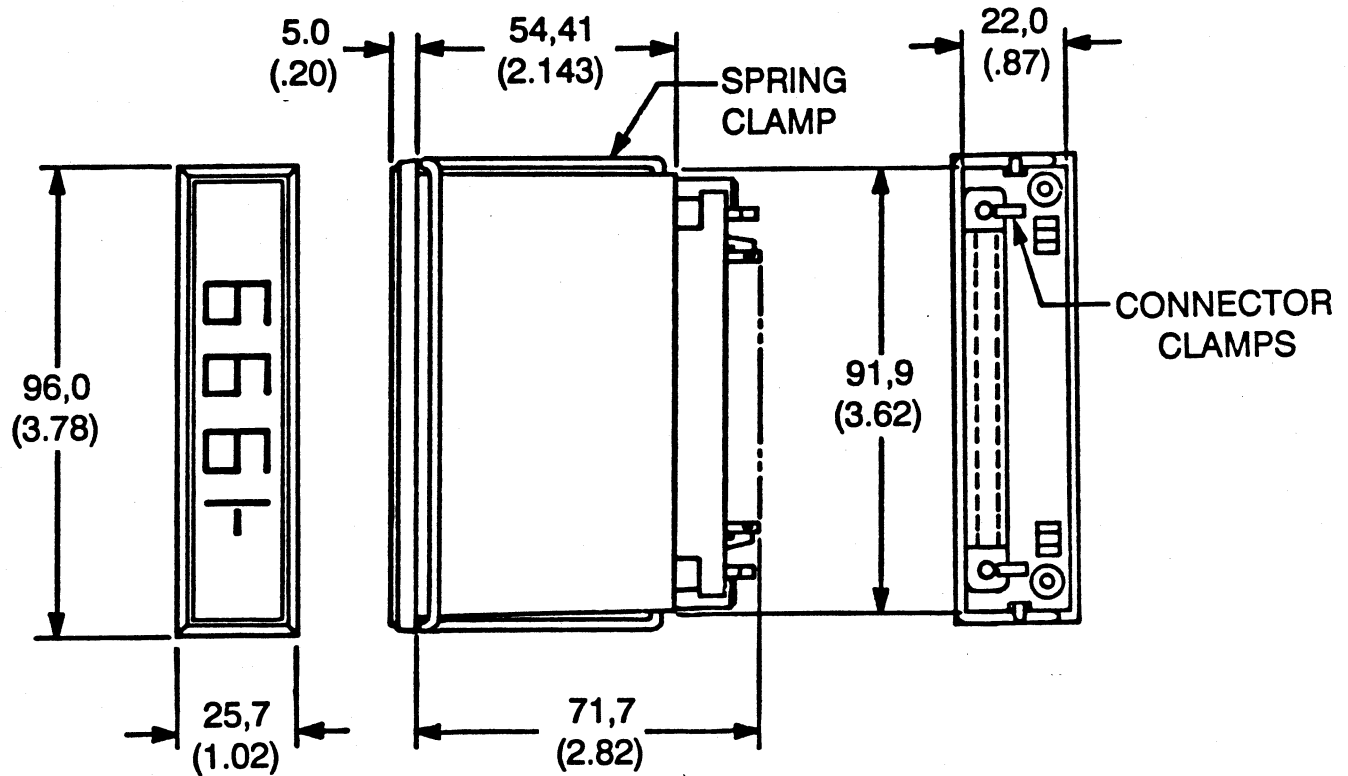
1- OPEN  
 2- CLOSE

Figure 3-2 Schematic Diagram

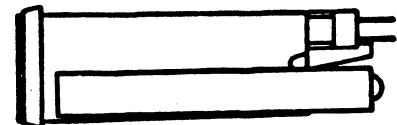
## 4.0 MECHANICAL

### 4.1 CASE AND PANEL CUTOUT DIMENSIONS

NOTE: Dimensions are in millimeters  $\pm 0,25\text{mm}$  and inches are in ( )  $\pm .01$  in.



SIDE VIEW  
SPRING CLAMP



SIDE VIEW  
U-CLAMP

## 4.2 CONNECTOR TYPES

SAE  
ELCO

SCA 15S/1-2  
00-6007-015-940-012

## 4.3 CONNECTOR PIN ASSIGNMENTS

|     |        |      |                 |
|-----|--------|------|-----------------|
| 1/A | +5VDC  | 9/K  | SIG HI IN       |
| 2/B | HOLD   | 10/L | SIG LO IN       |
| 3/C | GND    | 11/M | SPARE           |
| 4/D | GND    | 12/N | DP 1X.XX        |
| 5/E | SPARE  | 13/P | DP 1.XXX        |
| 6/F | REF IN | 14/R | DP 1XX.X        |
| 7/H | SPARE  | 15/S | DP RETURN (GND) |
| 8/J | TEST   |      |                 |

## 4.4 PHYSICAL

|                                       |                              |
|---------------------------------------|------------------------------|
| Weight                                | 145g (5 oz)                  |
| Case Material                         | 94V-O UL-rated polycarbonate |
| Bezel (W x H x T)                     | 96 x 25.7 x 5mm              |
| Depth behind bezel,<br>with connector | 72mm                         |
| Panel Cutout (W x H)                  | 92 x 22.2mm                  |







## 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.

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## 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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