

# 202A MAIN ASSEMBLY AND -P PROCESS RECEIVER



Operator's Manual



 **NEWPORT** Electronics, Inc.  
<http://www.newportUS.com/manuals>



Additional products from  
**N<sup>®</sup>NEWPORT** Electronics, Inc.

Counters	Rate Meters
Frequency Meters	Timers
PID Controllers	Totalizers
Clock/Timers	Strain Gauge Meters
Printers	Voltmeters
Process Meters	Multimeters
On/Off Controllers	Soldering Iron Testers
Recorders	pH pens
Relative Humidity	pH Controllers
Transmitters	pH Electrodes
Thermocouples	RTDs
Thermistors	Thermowells
Wire	Flow Sensors

For Immediate Assistance  
In the U.S.A. and Canada: 1-800-NEWPORT<sup>®</sup>  
In Mexico: (95) 800-NEWPORT<sup>SM</sup>  
Or call your local NEWPORT Office.

**NEWPORTnet<sup>SM</sup> On-Line Service**  
<http://www.newportUS.com>

**Internet e-mail**  
[info@newportUS.com](mailto:info@newportUS.com)

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.

<b>TABLE OF CONTENTS</b>	<b>PAGE</b>
<b>1.0 GENERAL INFORMATION</b>	<b>1</b>
1.1 Model 202A-P: Process Receiver	1
1.2 Model 202A: Main Assembly	1
<b>2.0 SPECIFICATIONS</b>	<b>1</b>
2.1 Analog Input	1
2.2 Accuracy at 25°C	2
2.3 Noise Rejection	2
2.4 Analog-To-Digital Conversion	2
2.5 Display	2
2.6 Digital Controls	3
2.7 Power	3
2.8 Environmental	3
2.9 Mechanical	3
<b>3.0 MECHANICAL ASSEMBLY AND INSTALLATION</b>	<b>4</b>
3.1 Safety Considerations	4
3.2 Panel Mounting	5
<b>4.0 POWER AND SIGNAL INPUT CONNECTIONS</b>	<b>7</b>
4.1 Installing Option C1	7
4.2 Power Connections	9
4.3 Signal Input Connections	9
4.4 Main Board Connector Pin Assignments (J1)	10
<b>5.0 MAIN BOARD CONFIGURATION</b>	<b>11</b>
5.1 Decimal Point Selection	11
5.2 Input Range Selection	12
<b>6.0 CALIBRATION</b>	<b>13</b>
<b>7.0 DRAWINGS</b>	<b>14</b>

ILLUSTRATIONS	PAGE
<b>Figure 3-1</b> DIN Case Dimensions	<b>5</b>
<b>Figure 3-2</b> Exploded View	<b>6</b>
<b>Figure 4-1</b> Changing Operating Voltage	<b>8</b>
<b>Figure 4-2</b> Rear View of Case With Connectors	<b>8</b>
<b>Figure 5-1</b> Display Board Jumper Locations	<b>11</b>
<b>Figure 5-2</b> Main Board Jumper Locations	<b>12</b>
<b>Figure 7-1</b> Assembly Diagram	<b>14</b>
<b>Figure 7-2</b> Schematic Diagram	<b>15</b>

## 1.0 GENERAL INFORMATION

The hardware of the 202A can be configured by push-on jumpers as either a process meter with zero and span adjustments (202A-P), or as a main assembly which accepts plug-in signal conditioner boards (202A).

### 1.1 MODEL 202A-P: PROCESS RECEIVER

Model 202A-P is a low cost, 3 ½ digit process receiver with zero and span adjustments of 2,000 counts for transmitter signals such as 4-20 mA, 1-5 V, and 0-10 V. The meter can be scaled to display readings directly in engineering units. No plug-in signal conditioner board is required.

Model 202A-P can be used in ratiometric pot-follower applications to determine parameters such as liquid level or valve setting from the position of a potentiometer wiper. The required external reference voltage can be derived from the meter's 4.7 V dc supply.

### 1.2 MODEL 202A: MAIN ASSEMBLY

Model 202A is a 3 ½ digit main assembly that accepts plug-in signal conditioner boards. These include but may not be limited to the following:

EB1	Process input with excitation output
SB1	Strain input with excitation output
JB	Type J thermocouple input
KB	Type K thermocouple input
TB	Type T thermocouple input
MB	RTD (Pt 100), 1° resolution
RB	RTD (Pt 100), 0.1° resolution

## 2.0 SPECIFICATIONS

### 2.1 ANALOG INPUT

Range	4-20 mA	1-5 V	0-10 V
Resolution	8 µA	2 mV	5 mV
Input resistance	13 Ω	1 MΩ	1 MΩ
Bias current	50 pA	10 pA	5 pA
Maximum input	55 mA	100 V	100 V

Configuration	Differential, bipolar
Zero range	Multiturn pot provides $\pm 1000$ counts for the 4-20 mA and 1-5 V configuration; -1500 to +500 counts for the 0-10 V configuration
Span range	0 to 2000 counts with multiturn pot
NMR	56 dB at 50/60 Hz
Reference:	
Internal (std)	0.1 V dc with 3.9 k $\Omega$ source resistance
External (opt)	0.1V dc -50%/+100% with 10 M $\Omega$ input resistance

## 2.2 ACCURACY AT 25°C

Maximum error	$\pm 0.05\%$ of span $\pm 1$ count
Span tempco	$\pm 0.01\%$ of span/ $^{\circ}\text{C}$
Zero tempco	$\pm 0.1$ count/ $^{\circ}\text{C}$
Step response	1 s
Warmup to accuracy	1 min

## 2.3 NOISE REJECTION

CMR	120 dB from DC to 60 Hz
CMV	1500 Vp per HV test; 354 Vp per IEC spacing

## 2.4 ANALOG-TO-DIGITAL CONVERSION

Technique	Dual-slope, average-value
Input integration period	100 ms
Read rate	2.5/s

## 2.5 DISPLAY

Type	7-segment, red LED
Digit height	14.2 mm (0.56 in)
Symbols	-1.8.8.8
Decimal points	3 positions programmable by jumpers behind lens or at connector, 10 mA sink
Overrange indication	3 least-significant digits blank

## 2.6 DIGITAL CONTROLS (REFERENCED TO SIG GND)

Logical '0'	0 to +1.4 V
Logical '1'	+3.7 V to +5.0 V
Display HOLD	'1' = latched reading
Display TEST	'1' = -1888 reading

## 2.7 POWER

Standard AC input voltage	115 V ac, $\pm 15\%$
Optional AC input voltage	230 V ac, $\pm 15\%$
AC frequency range	47 to 400 Hz
Optional DC input voltage	9-32 V dc, isolated to 300 V dc 26-56 V dc, isolated to 300 V dc
Power consumption	4 W
Output voltages	+4.7 V dc $\pm 5\%$ at 10 mA max -4.7 V dc $\pm 5\%$ at 10 mA max

## 2.8 ENVIRONMENTAL

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

## 2.9 MECHANICAL

Bezel	96 x 48 x 5.1 mm (3.78 x 1.89 x 0.20 inches)
Depth behind bezel with connector	104 mm (4.09 inches)
Panel cutout	92 x 45 mm (3.62 x 1.77 inches)
Weight	425 g (15 ounces)
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 instrument is protected according to Class I (Protective Earth) of the IEC (International Electrotechnical Commission) 348 and the VDE 0411 regulations. To ensure safe operation, follow the guidelines below:

**VISUAL INSPECTION:** Do not attempt to operate the instrument if damage is found.

**POWER VOLTAGE:** This instrument is delivered with the AC power input connected for 240 V ac in Europe (C1 option) or 120 V ac in the USA (unless the instrument is provided with the DC power input option). Verify that the instrument is connected for the correct power voltage rating before using. If incorrect, make the required change as described in Section 4.

**POWER WIRING:** This instrument has no power switch; it will be in operation as soon as the power is connected.

Verify that the power cable has the proper ground (earth) wire and that this wire is properly connected to an adequate ground (earth) point. The meter must be grounded in accordance with the latest local safety regulations.

If AC, the power cable must contain a protective ground conductor which is not disconnected (open) either inside or outside the instrument. No extension cables without grounding wires shall be used.

**SIGNAL WIRING:** Do not make signal wiring connections or changes while power is on.

**RAIN OR MOISTURE:** Do not expose the instrument to condensing moisture.

**FUMES AND GASES:** Do not operate the instrument in the presence of flammable gases or fumes.

**EXERCISE CAUTION:** As with any electronic instrument, high voltages may be exposed when attempting to install, calibrate, or remove parts of the meter.



### 3.2 PANEL MOUNTING

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

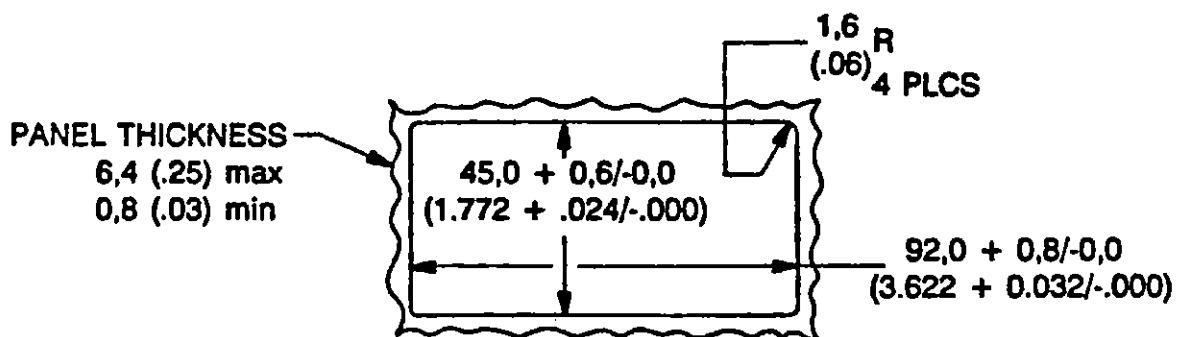
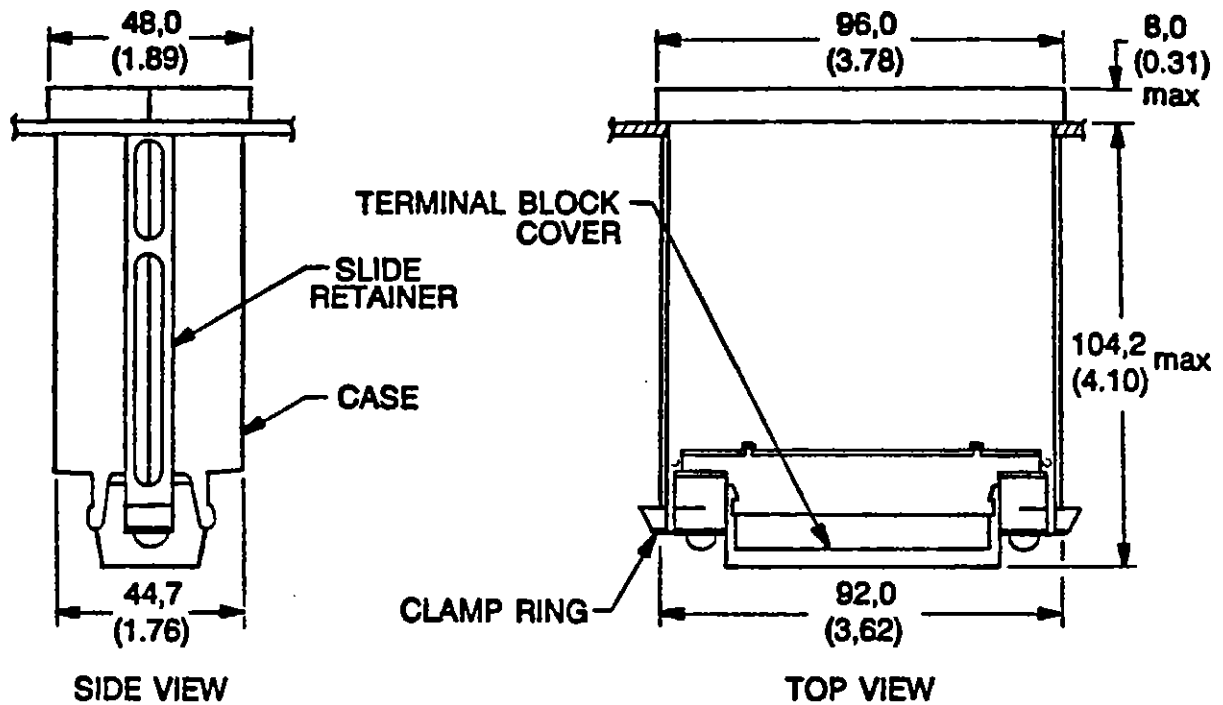
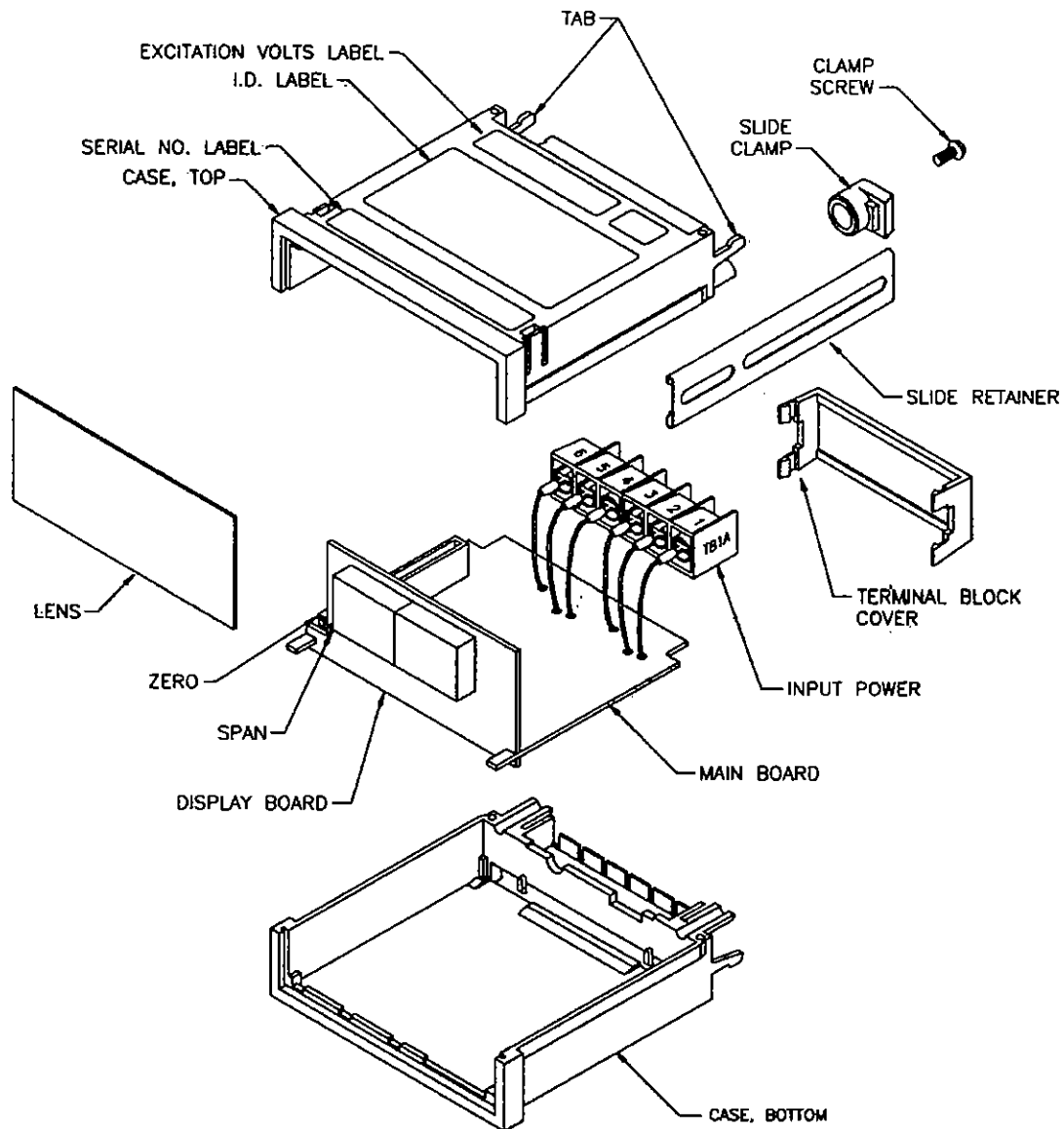


Figure 3-1 DIN Case Dimensions



**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 meter into 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  $\pm 15\%$ , 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.

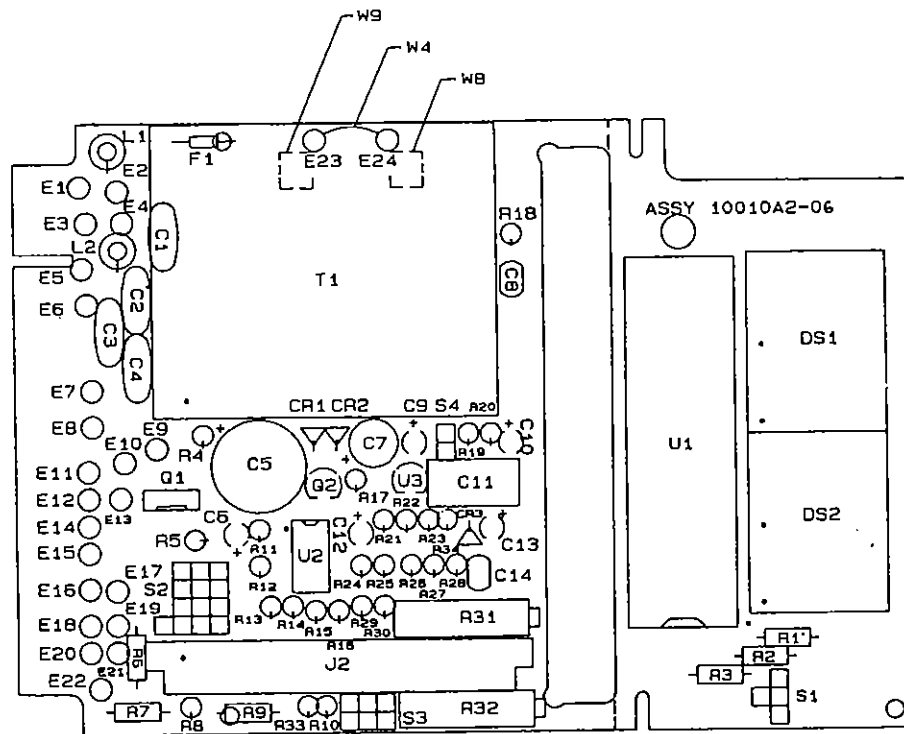


Figure 4-1 Changing Operating Voltage

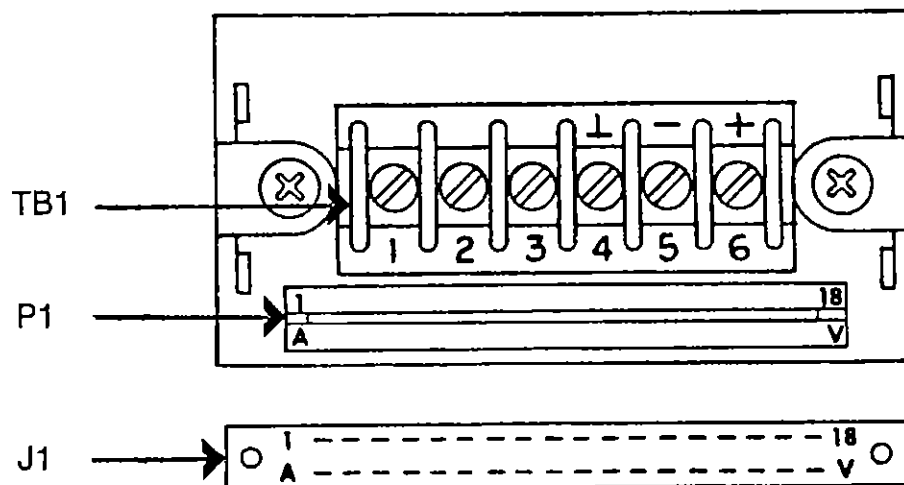


Figure 4-2 Rear View of Case with Connectors

## 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 INPUT CONNECTIONS

TB1 Connection	Signal
4	ANA GND
5	SIG LO
6	SIG HI

#### 4.4 MAIN BOARD CONNECTOR PIN ASSIGNMENTS (J1)

(Left to right, looking at rear of case)

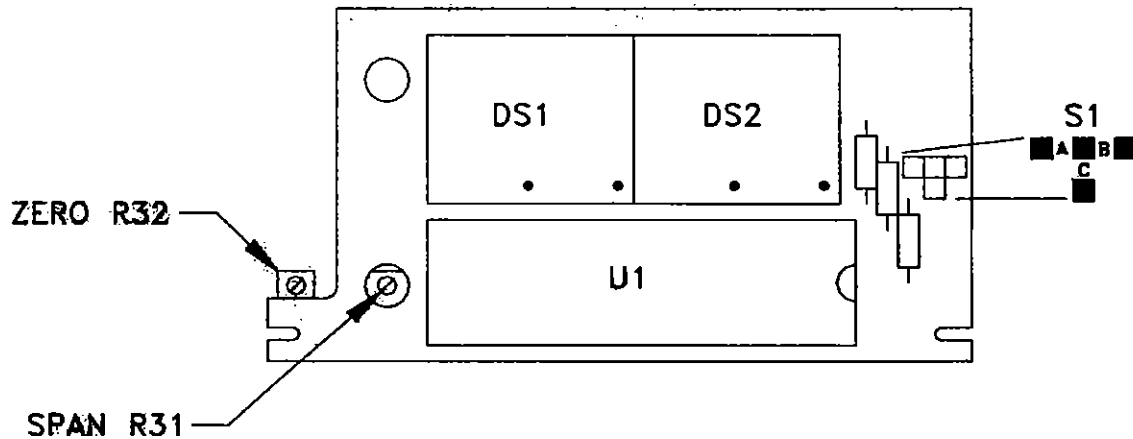
CONNECTION	FUNCTION	EXPLANATION
A	Spare	
1	No connection	
B	No connection	
2	Spare	
C	Spare	
3	No connection	
D	No connection	
4	No connection	
E	No connection	
5	No connection	
F	No connection	
6	DIGITAL GND	
H - 7	199.9 DP	
J - 8	19.99 DP	
K - 9	1.999 DP	
L - 10	LAMP TEST	Lights all display segments
M - 11	+4.7 V dc	Analog and digital power
N	-4.7 V dc	Analog and digital power
12	Spare	
P	+REF	Reference voltage
13	Spare	
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.

### 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 INPUT RANGE SELECTION

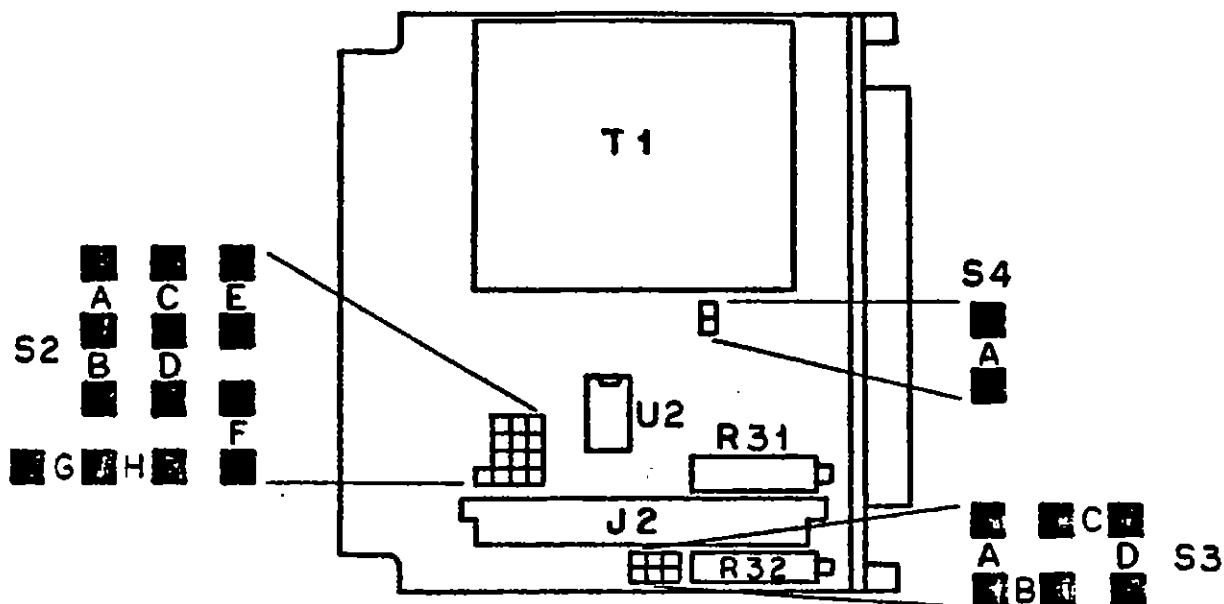


Figure 5-2 Main Board Jumper Locations

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

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

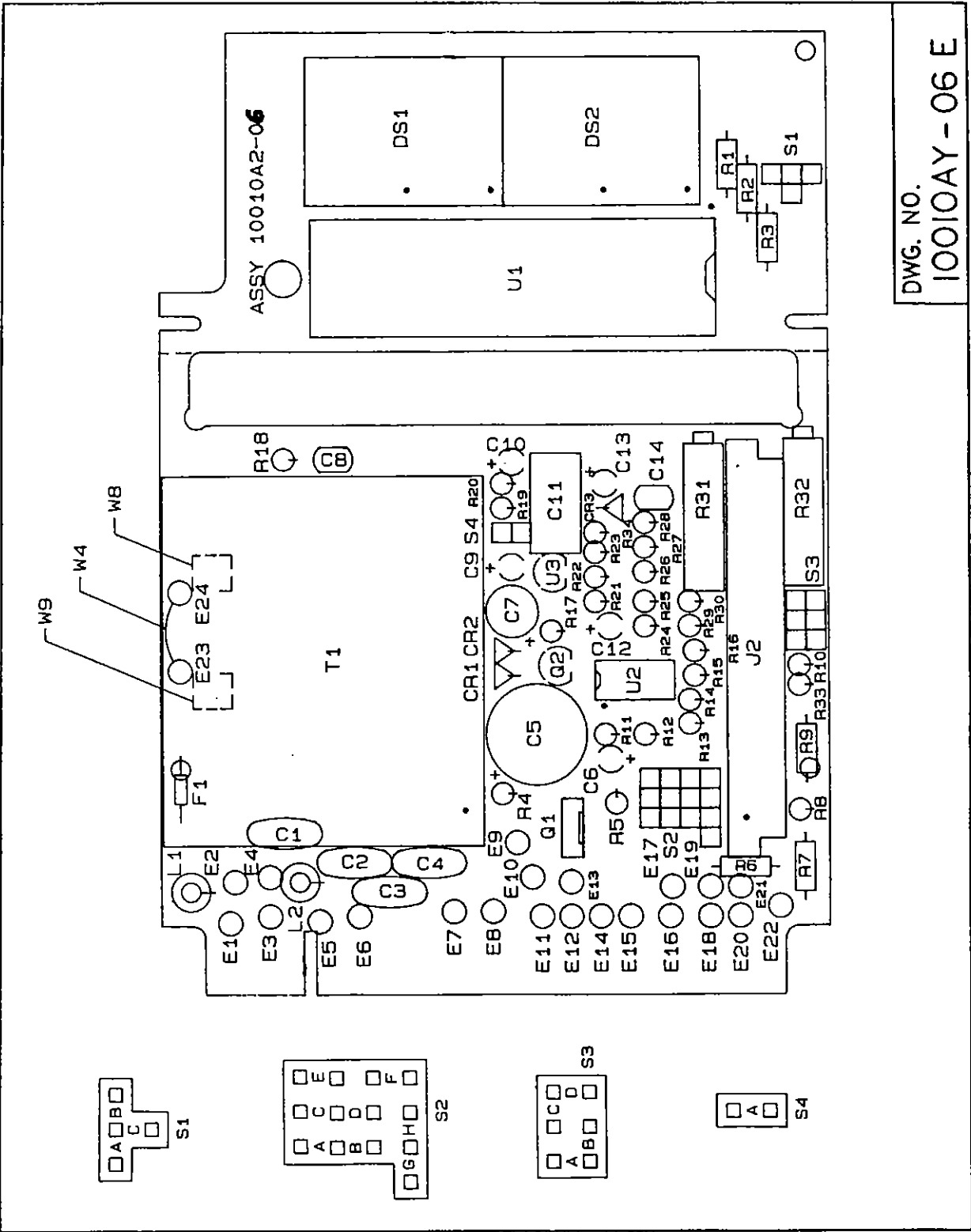


## **6.0 CALIBRATION**

The following calibration procedures apply to units that have been configured per Sections 4 and 5.

1. Refer to Figure 4-2. Apply the minimum input signal to TB1-5 (SIG LO) and TB1-6 (SIG HI).
2. Refer to Figure 3-2 for the location of the zero and span adjustments. Adjust R32 (Zero) to the desired low reading  $\pm 1$  count.
3. Adjust R31 (Span) to the desired high reading  $\pm 1$  count.
4. Repeat steps 2 and 3 until the meter is calibrated to within  $\pm 1$  count.

7.0 DRAWINGS



DWG. NO.  
10010AY-06 E

## 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.

NEWPORT is a registered trademark of NEWPORT ELECTRONICS, INC.

© Copyright 2005 NEWPORT ELECTRONICS, INC. All rights reserved. This document may not be copied, photocopied, reproduced, translated, or reduced to any electronic medium or machine-readable form, in whole or in part, without prior written consent of NEWPORT ELECTRONICS, INC.

For immediate technical or application assistance please call:

**1-800-6397678®**  
**1-800-NEWPORT**

---

Newport Electronics, Inc.  
2229 South Yale Street • Santa Ana, CA • 92704 • U.S.A.  
TEL: (714) 540-4914 • FAX: (203) 968-7311  
Toll Free: 1-800-639-7678 • [www.newportUS.com](http://www.newportUS.com) • e-mail: [info@newportUS.com](mailto:info@newportUS.com)  
ISO 9001 Certified

---

Newport Technologies, Inc.  
976 Bergar • Laval (Quebec) • H7L 5A1 • Canada  
TEL: (514) 335-3183 • FAX: (514) 856-6886  
Toll Free: 1-800-639-7678 • [www.newport.ca](http://www.newport.ca) • e-mail: [info@newport.ca](mailto:info@newport.ca)

---

Newport Electronics, Ltd.  
One Omega Drive • River Bend Technology Centre  
Northbank, Irlam • Manchester M44 5BD • United Kingdom  
Tel: +44 161 777 6611 • FAX: +44 161 777 6622  
Toll Free: 0800 488 488 • [www.newportuk.co.uk](http://www.newportuk.co.uk) • e-mail: [sales@newportuk.co.uk](mailto:sales@newportuk.co.uk)

---

Newport Electronics B.V.  
Postbus 8034 • 1180 LA Amstelveen • The Netherlands  
TEL: +31 20 3472121 • FAX: +31 20 6434643  
Toll Free: 0800 0993344 • [www.newport.nl](http://www.newport.nl) • e-mail: [info@newport.nl](mailto:info@newport.nl)

---

Newport Electronics spol s.r.o.  
Frystatska 184, 733 01 Karviná • Czech Republic  
TEL: +420 59 6311899 • FAX: +420 59 6311114  
Toll Free: 0800-1-66342 • [www.newport.cz](http://www.newport.cz) • e-mail: [info@newport.cz](mailto:info@newport.cz)

---

Newport Electronics GmbH  
Daimlerstrasse 26 • D-75392 Deckenpfronn • Germany  
TEL: 49 7056 9398-0 • FAX: 49 7056 9398-29  
Toll Free: 0800 / 6397678 • [www.newport.de](http://www.newport.de) • e-mail: [sales@newport.de](mailto:sales@newport.de)

---

Newport Electronique S.A.R.L.  
11, rue Jacques Cartier • 78280 Guyancourt • France  
TEL: +33 1 61 37 29 00 • FAX: +33 1 30 57 54 27  
Toll Free: 0800 466 342 • [www.newport.fr](http://www.newport.fr) • e-mail: [sales@newport.fr](mailto:sales@newport.fr)

---

Mexico and Latin America  
FAX: 001 (203) 359-7807  
En Español: 001 (203) 359-7803

<b>NEWPORTnet™ On-Line Service</b> <a href="http://www.newportUS.com">www.newportUS.com</a>	<b>Internet e-mail</b> <a href="mailto:info@newportUS.com">info@newportUS.com</a>
--	--

 **NEWPORT** Electronics, Inc.