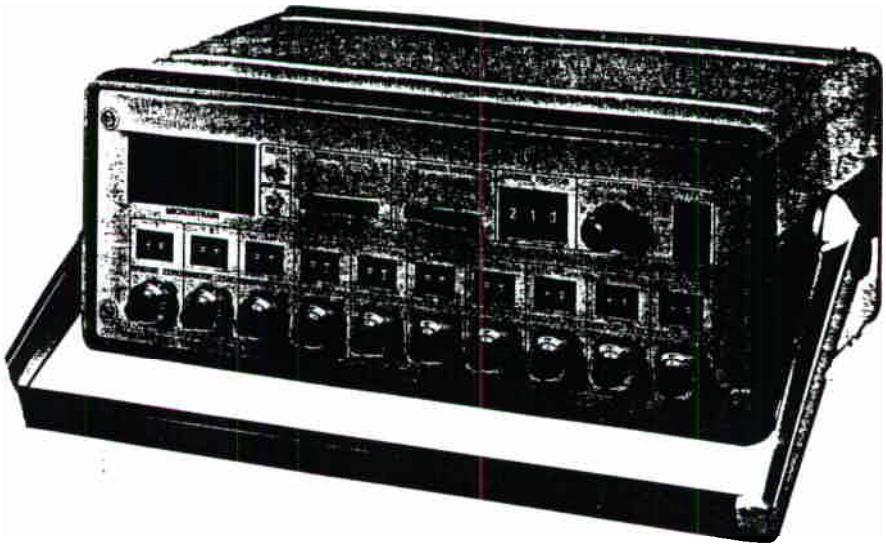
CE

User's Guide



DMD-22

10- CHANNEL STRAIN METER

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OMEGA ENGINEERING, INC.

DMD-22

TABLE OF CONTENTS

SECTION 1 GENERAL DESCRIPTION

10 Channel Digital Strain Indicator, which operates on either 115VAC or 230VAC, is a ten input meter which may be used for ¼, ½, or full bridge inputs. Readings are given directly in microstrain on the 4½ digit display. The front panel gauge factor dial covers the range of gauge factors likely to be encountered in use, but gauge factors outside this range may be easily accommodated by setting the gauge factor to 2.00 and calculating the strain (see Section 4). A Precision Two State Zero Adjustment is provided, ensuring ease of zero setting together with ease of re-setting for subsequent tests. An analogue output is provided on the rear panel for connection to a recorder. Refer to Figure 3.2 in Section 3.2.

The bridge circuits are energised from an internal source supplying 2V, 5V or 10VDC. Bridge Voltage and Bridge Mode are selected by push button operation on the front panel. An Amplifier Zero Control is situated on the front penal together with an Amp Zero/Read Switch.

Inside the type 8692 are two 12 volt, 1.2AH Lead-Acid Ni-Cad batteries, which allow the user to have a portable unit. It is advisable to turn off the 8692 while recharging the batteries (charging time is 6 hours) Once the batteries are fully charged, they last up to 40 hours before they need to be recharged.

The handle on this instrument doubles as a multi purpose bench stand. Press both buttons on the sides of the handle to change the angle of the stand.

Figure 1-1

SECTION 2 UNPACKING

Remove the packing list and verify that all equipment has been received.

Upon receipt of shipment, inspect the container and equipment for any signs of damage. Take particular note of any evidence of rough handling in transit. Report any damage immediately to the shipping agent/Courier.

Note: The carrier will not honour any claims unless all shipping material is saved for their examination. After removing and examining contents, save packing material and carton in the event of a query.

Make sure the following items are in the shipping box:

QTY	DESCRIPTION
1	Digital Strain Indicator with integral battery pack and charger.
1	Power Cord
1	Operators Manual

SECTION 3 PARTS

3.1 Front of the Strain Meter

Figure 3.1 shows the front of the instrument. Following the figure is a description of each part of the strain indicator.

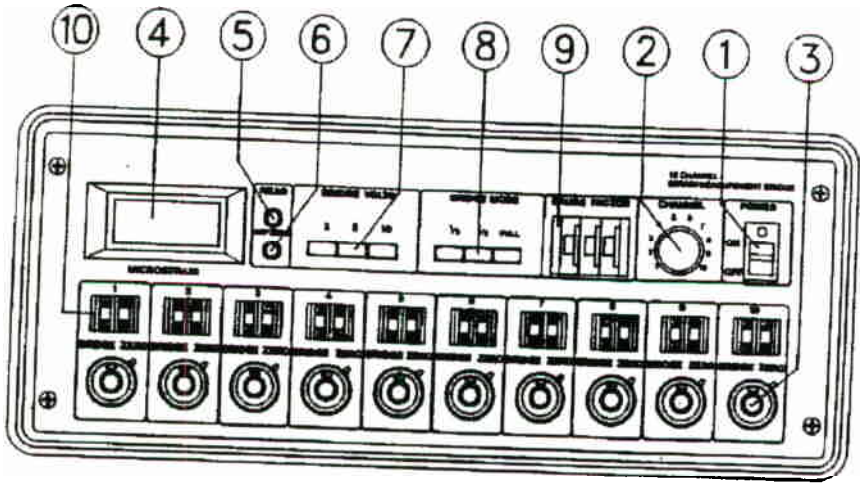


Fig. 3.1. Front

KEY	DESCRIPTION
1.	Main Power Switch. A small LED light indicates that power is on.
2.	Channel Selector Knob (position 1 through 10)
3.	Bridge zero fine adjustment knob
4.	LCD display (4½ digits)
5.	Amp zero switch. Switchable to either Amp Zero or Read
6.	Amp zero control screw.
7.	Bridge mode push buttons setting to either 2, 5 or 10 volts
8.	Bridge mode push buttons setting to either ¼, ½ or full configuration.
9.	Gauge Factor Number; value set by user (from 1.00 to 2.99 in 0.01 steps).
10.	Bridge balance number; one for each of 10 channels. Bridge balance number can be set from -9 up to +9.

3.2 REAR OF INSTRUMENT

Figure 3.2 shows the rear part of the strain indicator. Following the figure is a description of each

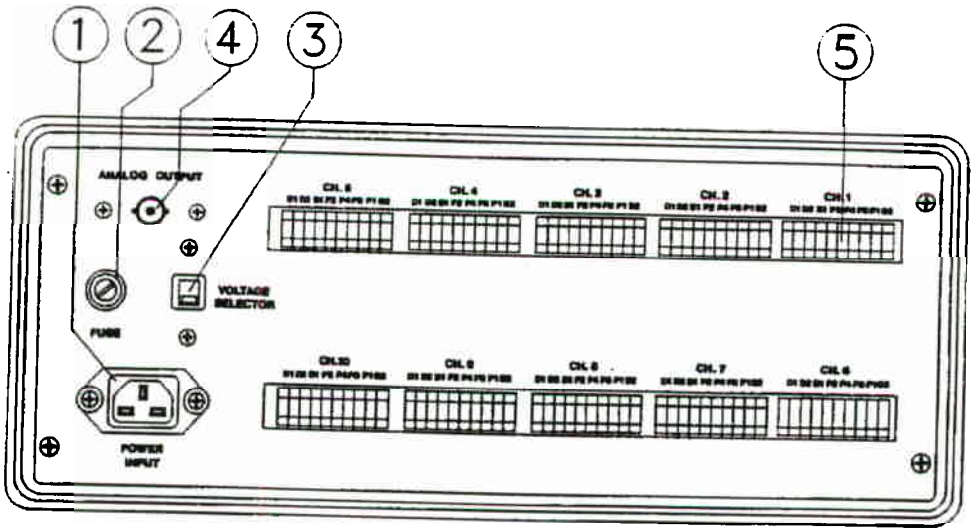


Fig. 3.2. Rear

KEY	DESCRIPTION
1.	Power Cord Socket
2.	Fuse (500mA anti surge type)
3.	Voltage Selector Switch (115V/230V)
4.	Analogue output connector (BNC Connection)
5.	Interface Connector capable of hooking up 10 Strain Gauges (one circuit per channel).

SECTION 4. WIRING

1. Make sure the voltage Selector Switch (fig. 3.2, #3) is set to the appropriate voltage for your country.

2. Connect the strain gauges to be measured to the terminals at the rear of the instrument as shown in figures 4.1 through 4.5 and as described below.

4.1 FULL BRIDGE CONFIGURATION

Positive supply to P1

Negative supply to P2

Negative signal to S1

Positive signal to S2

No connections to P3 and P4

Minimum gauge resistance is 120 ohms.

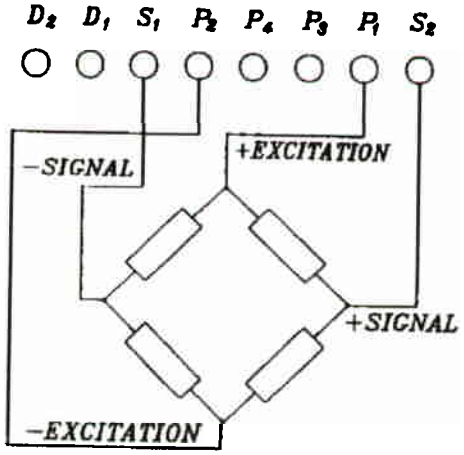


FIGURE 4-1
FULL BRIDGE OR mV/V TRANSDUCER

4.2 HALF BRIDGE CONFIGURATION

Positive supply to P1

Negative supply to P2

Strain Gauge junction to S1

Jumper P1 to P3 and P2 to P4

Minimum gauge resistance is 80 ohms

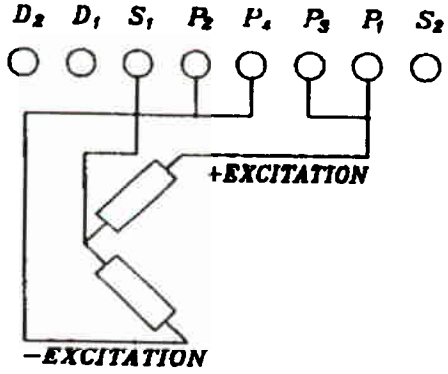


FIGURE 4-2
HALF BRIDGE

4.3 QUARTER BRIDGE CONFIGURATION

(Single gauge, three wire connection)

Strain gauge terminal 1 to P1

Strain gauge terminal 2 to S1

Strain gauge terminal 2 to D1 or D2

Jumper P1 to P3

Jumper P2 to P4

Use D1 for 120 ohm gauges or

D2 for 350 ohm gauges

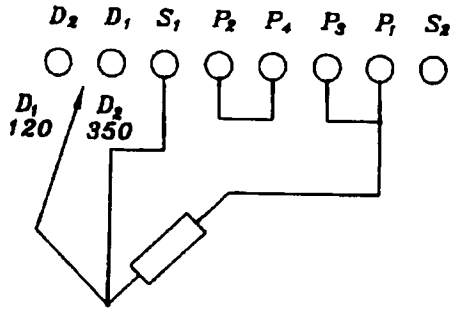


FIGURE 4-3
THREE WIRE QUARTER BRIDGE

4.4 OTHER CONFIGURATIONS

For two wire quarter bridge configuration using 120 or 350 ohm gauges, connect the active gauge between P1 and S1. Jumper P1 to P3, P2 to P4 and D1 to S1 for 120 ohm gauges or D2 to S1 fro 350 ohm gauges. Select ¼ bridge mode for direct reading in microstrain. Refer to figure 4.4.

For other resistance values, use the half bridge arrangement with an external resistor (R1). In this case, connect the active gauge between terminals P1 and S1 and the external resistor between S1 and P2. Jumper P1 to P3 and P2 to P4 on the rear panel. Select ¼ bridge mode for direct reading in microstrain. Refer to figure 4.5

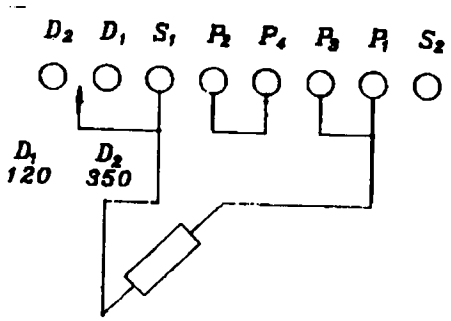


Fig. 4.4. Two-wire quarter bridge

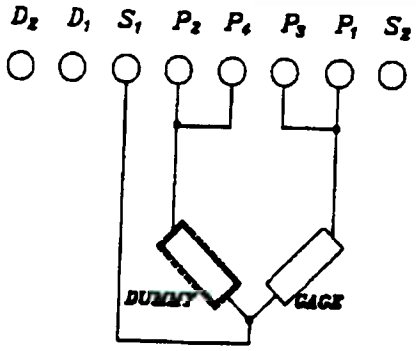


Fig. 4.5. Quarter bridge other than 120 ohms or 350 ohms

4.5 INTERNAL CIRCUIT

P1 = + Excitation

P2 = - Excitation

S1 = - Signal

S2 = + Signal

P3 = ½ bridge completion resistor

P4 = ½ bridge completion resistor

D1 = 120 ohm, ¼ bridge completion resistor

D2 = 350 ohm, ¼ bridge completion resistor

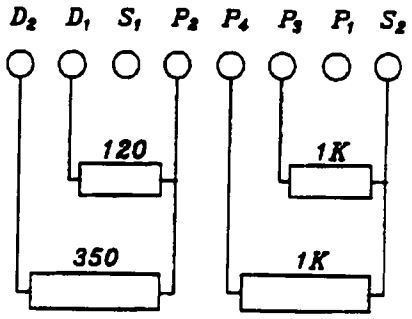


Fig. 4.6. Internal Circuit

SECTION 5 OPERATION

5.1 INTRODUCTION TO OPERATION

1. An output of approximately 2 volts full scale is available at the rear BNC socket of the instrument, suitable for the connection of an oscilloscope or other high impedance recording of display device. The available dynamic response of this output extends beyond 20 KHz. This output may also be used to supply a Recorder provided the recorder is fitted with a suitable amplifier containing a gain control enabling the signal to be set to a specific value of strain for a given trace width.

2. For optimum accuracy, the indicator should be left on for approximately ten minutes before final adjustment of zero is made. If tests are being conducted over a period of time, without being able to restore the original zero conditions of the specimen or structure, then the reading on the zero dials should be noted, so that the indicator may be set to the same zero condition when re connecting. Record reading here._____

3. The gauge factor control should be set to the value appropriate to the gauges in use. If gauges are used whose gauge factor is outside the provided range, then set the dial to 2.00 and correct the strain readings by simple arithmetic proportion.

4. Hook up a load cell or pressure transducer to display in engineering units of your choice.

   Set the gauge factor on the Type 8692 per the following formula:

$$GF = \frac{(mV/V)\ \ 1000}{D \times B}$$

   GF = Gauge factor setting on the instrument.

   mV/V = Rated output of the Transducer/Sensitivity.
   If the sensor does not state the rated output in the mV/V format, divide the full scale mV output by the excitation voltage to get the mV/V output.

   D = Desired display at full scale output. Note the display does not have a decimal point.

   B = Bridge selection
   Full Bridge = 1
   Half Bridge = ½
   Quarter Bridge = ¼

5. Select the channel desired using the channel selector knob (fig. 3.1 #2). Make sure the strain gauge is connected at the rear of the instrument, to the corresponding panel.
Set front panel switch fig. 3.1 #5 to Amp Zero then set and adjust adjacent zero screw (fig. 3.1 #6) until you see 0000 on the digital display, then set switch to the "Read" position and adjust for zero on the display by using the appropriate Coarse Zero control (fig. 3.1 #10) and the Bridge Zero Knob (fig. 3.1 #3) on the front panel. When you have zeroed the instrument, lock the control in place using the black out knob. If further readings are to be taken at a later date, record the setting of the Bridge Balance Number and the Bridge Zero Dial.
Record value here:_____ (Bridge Balance Number)
_____ (Bridge Zero)

6. For dynamic measurements, the signal available at the BNC socket on the rear panel (fig. 3.2 #4) may be connected to an amplifier or a recorder. The output at this socket is ± 2 volts which is equivalent to ±20,000 microstrain. The frequency response is DC to 20 KHz.

7. To use the Type 8692 to monitor Strain Gauge Transducers, whose calibration is known in terms of millivolts per volt.

a. Set volts to 10 volts

b. Set bridge mode to ¼ bridge

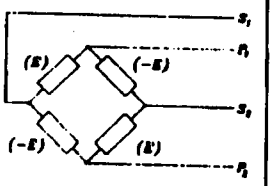
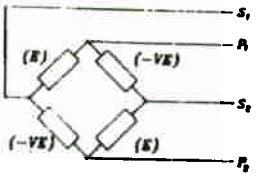
c. Set the gage factor dial (fig. 3.1 #5) and adjust ZERO screw (fig. 3.1 #6).

e. Set front panel switch to READ (fig. 3.1 #5) and adjust zero control until zero is shown on the Digital Volt Meter.

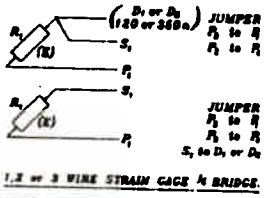
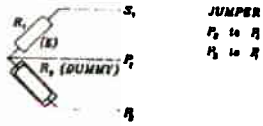
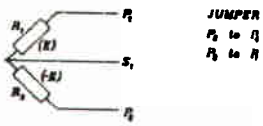
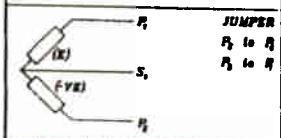
f. Apply load to Transducer and note reading on the display (fig. 3.1 #4) 2,000 microstrain on the display indicates a signal of 1.0 millivolt per volt.

g. Note that once the amplifier zero screw has been adjusted in step 5, it will only need occasional re adjusting.

h. The following diagrams give details of Bridge mode and gauge factor setting.

	BRIDGE MODE SELECTION ON INSTRUMENT	STRAIN GAGE SETTING (SGF) ON INSTRUMENT
 4 ACTIVE GAGES, 4 MONITORING EQUAL STRAINS + 2 TENSION +2 IN COMPRESSION. FULL BRIDGE CONFIGURATION	FULL	$GF_1 = GF_2$
 4 ACTIVE GAGES, 2 MONITORING AXIAL STRAIN + 2 MONITORING PIOSSION STRAIN EFFECTS. FULL BRIDGE CONFIGURATION	FULL	$GF_1 = \frac{GF_2(1+V)}{2}$

Bridge Mode & Gague Factor Setting

	GAGE FACTOR SETTING (GFF) ON INSTRUMENT
 1, 2 or 3 WIRE STRAIN GAGE ¼ BRIDGE.	¼	$GF_1 = GF_2$
 1 ACTIVE GAGE AND 1 DUMMY GAGE ½ BRIDGE CONFIGURATION	¼	$GF_1 = GF_2$
 2 ACTIVE GAGES, EACH GAGE IS MEASURING EQUAL BUT OPPOSITE STRAINS (BENDING STRAIN)	½	$GF_1 = GF_2$
 2 ACTIVE GAGES, ONE GAGE MONITORS THE EFFECTS OF POISSONS RATIO, THE OTHER MONITORS THE AXIAL STRAIN. ½ BRIDGE CONFIGURATION	½	$GF_1 = \frac{GF_2(1+V)}{2}$

5.2 PROCEDURE TO USE

1. Connect strain gauges in accordance with section 4.

2. Select the correct bridge mode (fig. 3.1 #8) on the front panel.

3. Select the bridge excitation voltage (fig. 3.1 #7) required on the front panel.

4. Set the bridge zero (fig. 3.1 #2 &3). Refer to step 5 in section 5.1.

5. Set the gauge factor dial to the gauge factor for the gauges in use, apply strain and note reading on the LCD (fig. 3.1, #4) on the front panel. Note that the range of the instrument is ±19999 microstrain and therefore no range switch is required.

SECTION 6 RECHARGEABLE BATTERIES REPLACEMENT

To replace batteries:

1. Turn off the type 8692, and unplug.

2. Unscrew the 4 screws from the top cover and remove top cover.

3. Unplug the 4 leads to the batteries.

4. Unscrew the 4 screws holding the battery clamp and remove clamp.

5. Remove old batteries and replace with fresh 12V, 1.2AH lead acid rechargeable batteries.

6. Follow steps 1 through 4 in reverse order.

SECTION 7. SPECIFICATIONS

Channels	:	10
Range	:	± 19999 Microstrain
Linearity	:	0.02% full scale
Gauge resistance	:	¼ bridge: 120 or 350 ohms ½ bridge: at least 80 ohms Full bridge: at least 120 ohms
gauge factor range	:	1.00 to 2.99 in 0.01 steps
Bridge voltage	:	2VDC, 5VDC or 10VDC
Bridge modes	:	¼, ½ or full bridge
Bridge zero	:	Coarse adjustment is in 9 overlapping steps up to 10,000 microstrains, ± 2% resistance imbalance is covered. Fine adjustment is by a locking 10 turn front panel control with a range of 1 to 700 microstrain.
Zero drift	:	Less than 0.5 microstrain/°C
Gain drift	:	Less than 0.005%/°C
Input impedance	:	1000 megohm
Gauge connections	:	Screw terminals are at the rear and provide for ¼, ½ or full bridge connections.
Analogue output	:	± 2VDC. Equivalent to ± 20000 microstrain
Frequency response	:	DC to 20k Hz
Power	:	115/230VAC, 50/60Hz. Slide switch at rear. Battery: two (2) 12V, 1.2AH Lead-Acid rechargeable batteries built in. Full charge of 40 hours approximately.
Weight	:	15.4 pounds (7 Kg)
Dimensions (less handle)	:	14.5" L x 6.00" H x 11.8" D (370 x 150 x 300mm) refer to fig. 7.1

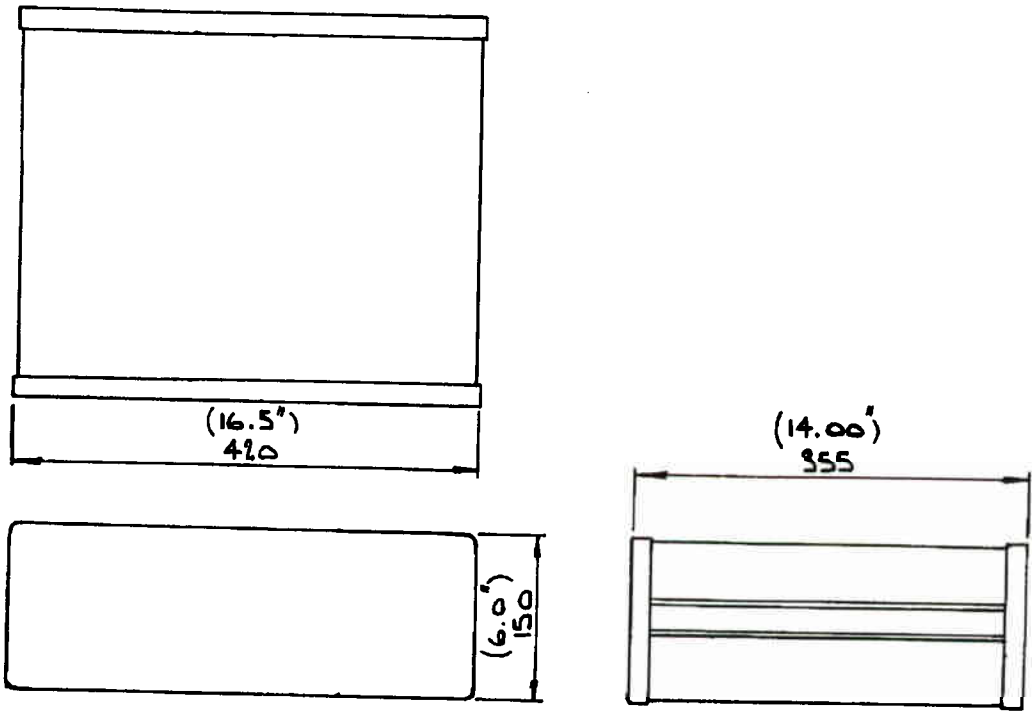


Fig. 7.1 Dimensions

MADE IN USA

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA'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 having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

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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 OMEGA:

1. Purchase Order 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 OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

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

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