Model 82400SS

Master Shocker Supply

User's Manual

Lafayette Instrument®

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DESCRIPTION

The 82400ss was designed to provide a wide range of shock currents continuously variable from 0 to 5 mA. This shocker was designed to accommodate subject resistances from 0 to 100,000 ohms and are capable of delivering a full 5 milliamperes to a 100,000 ohm subject. Much higher subject resistances may be used of course; however, there may be some loss of the constant current feature and maximum shock current. The actual current received by the subject is always monitored by a special precision meter with two selectable ranges. The shock is initiated by a zero-cross-over low voltage circuit, which is completely isolated from the high voltage output for reliable performance in a solid-state programming package. The 82400ss is intended for use as a free standing unit.

SPECIFICATIONS

- **Current Range:** 0-5 mA
- **Maximum No Load Voltage:** 2500V AC
- **Internal Resistance**
  - **0-1 mA Output:** 2.3 Megohms
    2500V (2,300K Internal + 100K Load) = 1 mA
  - **0-5 mA Output:** 400 Kilohms
    2500V (400K Internal + 100K Load) = 5 mA
- **Regulation:** 3% w/50 Kilohm change in subject resistance (0-1 mA Output)
- **Meter Accuracy:** 3% of Full Scale (typical)

OPERATION

1. Working with any device that presents high voltages at its output terminals should always be approached with caution. On the 82400ss, the yellow binding posts can have as much as 2500V present when no load is connected across the shock output terminals. The front panel output current is limited to 1 mA while the back panel output can supply 5 mA. These currents can cause extreme discomfort and, under some circumstances, can be dangerous. Therefore, it is wise to verify that the shocker is turned OFF whenever connections are made to it.

Connection

1. Verify that the OFF/5 mA/1 mA Switch is in the OFF position.

2. Plug the Line Cord into a grounded 117V output.

3. Connect either the front panel (0-1 mA) or back panel (0-5 mA) shock output terminals to a scrambler input,

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grid harness input, or other shock administering device.

4. Connect a suitable initiation device such as remote pushbutton, COM-N.O. timer contacts, solid state driver (+ to red binding post, and to black binding post) or other switching device to these initiate binding posts.

5. Rotate the current level control fully counterclockwise

Calibration

1. Connect a 47K 2 watt resistor (supplied with unit) across the output terminals.

2. Rotate the meter range switch from OFF to either 5 mA or 1 mA depending on the shock level being administered.

NOTE: The meter range does not affect the shock output, it merely adjusts the meter circuit to properly read the shock current.

3. Turn the shock on by closing the circuit across the initiate binding posts.

4. Slowly rotate the current level control clockwise until the desired shock current is indicated on the meter.

5. Turn the shock OFF and turn the shocker OFF.

6. Remove the 47K resistor from the output.

7. Turn the power back on and set the meter range to the desired value.

The shocker is now ready for operation, and will deliver the shock current set above whenever the initiate binding posts are shorted via a switch closure or closed relay contacts. NOTE: Shock intervals of less than 2 seconds will not register the full shock value on the meter even though the full shock is being delivered. This is a consequence of the meter characteristic.

Although there is a wide range of individual differences between animals, the following shock levels have generally been found suitable for albino rats.

1 to 27 days	0.1 to 0.4 mA
23 to 59 days	0.3 to 0.6 mA
60 days and above	0.4 to 0.8 mA

The 5 mA shock level capable with these units will produce sever shock and is generally not used for simple conditioning. Please handle with extreme caution.

The above current values are RMS or Root Mean Square current. This is common practice; however, occasionally a study will give results in terms of average current, peak current, or peak to peak current. The following table may be used to convert any of these values to any other value by using the given multipliers.

GIVEN	DESIRED UNITS			
	RMS	AVERAGE	PEAK	PEAK TO PEAK
RMS	1.00	0.90	1.40	2.80
AVERAGE	1.10	1.00	1.60	3.10
PEAK	0.71	0.64	1.00	2.00
PEAK TO PEAK	0.35	0.32	0.50	1.00

For example to convert 4 mA PEAK TO PEAK to RMS, you would multiply 4 * 0.35 = 1.44 mA. That is to produce 4 mA Peak to Peak with any Lafayette Shocker the Subject Current level should be set at 1.44.

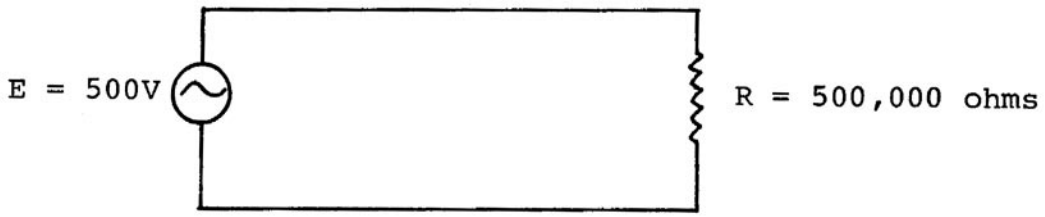
The Lafayette shocker, which you have purchased, is known as a Constant Current shocker. The theory behind its operation is as follows. For any given voltage source the current flow through a parallel resistor is given by the formula: I = E/R where:

I = Current (Amperes)

E = Voltage (Volts)

R = Resistance (Ohms)

For example, suppose we have the following circuit:



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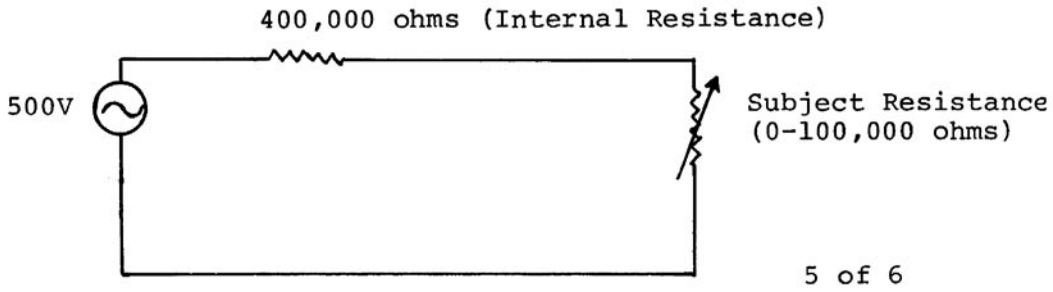
The current flow through the resistor would be given by I = E/R or I = 5,000/500,000 = 1/1,000 Ampere or 1 Milliampere (mA)

Suppose now that we wish to place an animal in place of the fixed resistor. We know that if the animal's feet are dry and it is undisturbed we have a subject resistance of 100,000 ohms; however, if the animal's feet become urine soaked and it is disturbed, the subject resistance drops to approximately 0 ohms.

We wish to produce a 1 mA shock and thus construct the following shocker based on the fact that the current is constant throughout a series circuit.



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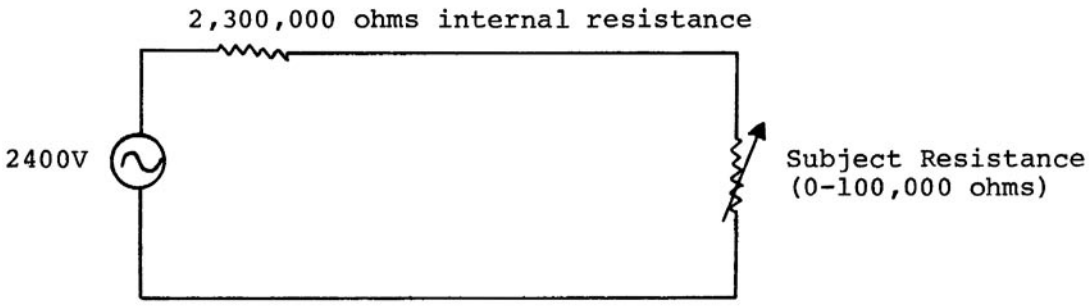
The current is equal to 500/500,000 (400,000 + 100,000) or 1 mA when the animal is unexcited; however, when the subject's resistance drops to 0 ohms, the current is equal to 500/400,000 or 1.2 mA.

The quality of a shocker is called regulation and is defined by:

$$\% \text{ Regulation} = \frac{1 \text{ initial} - 1 \text{ final}}{1 \text{ initial}} \quad X \quad 100$$

In this case the % Regulation is equal to [(1.0 – 1.2)/1.0] x 100 or 20%. This design would not be considered very satisfactory. Below is the equivalent circuit for the Lafayette Shockers number 82400SS.



When the subject's resistance equals 100,000 ohms the current flow is 1 mA. When the subject's resistance equals 0 ohms the current flow is 1.04 mA. In this case the % regulation is 4%, well within reasonable specifications. The higher internal resistor clearly gives better regulation; however, the transformer voltage must be boosted slightly to compensate for the higher resistance. 2500 volts has been found to be an optimum value and is thus incorporated in the Lafayette shockers.

Ordering Information:

All phone orders must be accompanied by a hard copy of your order. All must include the following information:
1) Complete billing and shipping addresses
2) Name and department of end user
3) Model number and description of desired item(s)
4) Quantity of each item desired
5) Purchase order number or method of payment
6) Telephone number

DOMESTIC TERMS
There is a $50 minimum order. Open accounts can be extended to most recognized educational institutions, hospitals and government agencies. Net amount due 30 days from the date of shipment. Enclose payment with the order; charge with VISA, MasterCard; or pay COD. We must have a hard copy of your order by mail or fax. Students, individuals and private companies may call for a credit application.

INTERNATIONAL PAYMENT INFORMATION
There is a $50 minimum order. Payment must be made in advance by: draft drawn on a major US bank; wire transfer to our account; charge with VISA, MasterCard; or confirmed irrevocable letter of credit. Proforma invoices will be provided upon request.

RETURNS
Equipment may not be returned without first receiving a Return Goods Authorization Number (RGA).

When returning equipment for service, please call Lafayette Instrument to receive a RGA number. Your RGA number will be good for 30 days. Address the shipment to: Lafayette Instrument Company, 3700 Sagamore Parkway North, Lafayette, IN 47904, U.S.A. Shipments cannot be received at the PO Box. The items should be packed well, insured for full value, and returned along with a cover letter explaining the malfunction. Please also state the name of the Lafayette Instrument representative authorizing the return. An estimate of repair will be given prior to completion ONLY if requested in your enclosed cover letter. We must have a hard copy of your purchase order by mail or fax, or repair work cannot commence.

WARRANTY
Lafayette Instrument guarantees its equipment against all defects in materials and workmanship to the ORIGINAL PURCHASER for a period of one (1) year from the date of shipment, unless otherwise stated. During this period, Lafayette Instrument will repair or replace, at its option, any equipment found to be defective in materials or workmanship. If a problem arises, please contact our office for prior authorization before returning the item. This warranty does not extend to damaged equipment resulting from alteration, misuse, negligence or abuse, normal wear or accident. In no event shall Lafayette Instrument be liable for incidental or consequential damages. There are no implied warranties or merchantability of fitness for a particular use, or of any other nature. Warranty period for repairs or used equipment purchased from Lafayette Instrument is 90 days.

DAMAGED GOODS
Damaged equipment should not be returned to Lafayette Instrument prior to thorough inspection.

When a shipment arrives damaged, note damage on delivery bill and have the driver sign it to acknowledge the damage. Contact the delivery service, and they will file an insurance claim. When damage is not detected at the time of delivery, contact the carrier and request an inspection within 10 days of the original delivery. Please call the Lafayette Instrument Customer Service Department for a return authorization for repair or replacement of the damaged merchandise.

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