Techni-talk

COMPLETE ELECTRONIC SERVICING INFORMATION

radio • tv • hi-fi

Vol. 18 No. 4 Winter, 1966

How to Build an SCR & Silicon Rectifier Tester

The vast number of silicon rectifiers used today in television receivers, plus the steadily increasing use of silicon controlled recifiers in home appliances makes it worthwhile to have a unit for testing these semiconductor devices.

A simple tester is described here which will test silicon diode rectifiers for "opens" and "shorts" and SCR's for "opens," "shorts," forward blocking ability and triggering. Indication is by a panel lamp which lights if the test is OK and remains off if the test is not passed. The tester itself contains an SCR which is triggered, and thus lights the lamp, by being so connected that the proper voltage is applied to the trigger circuit if the particular characteristic of the semiconductor being tested is satisfactory. Rearrangement of this circuit for the various tests is done with a five-position rotary switch. Since the tester is operated with internal batteries, it may be used anywhere.

The model of the tester shown in Figure 1 was constructed in a 3″ x 5″ x 7″ hammertone finished aluminum box. However, parts layout and lead lengths are not critical, and almost any enclosure could be used.

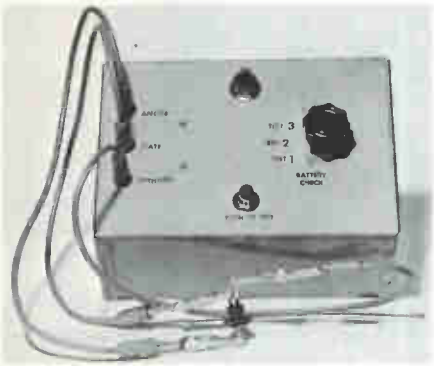


Fig. 1 Completed tester with GE-X3 connected for testing.

Use was made of the perforated insulating board and clips contained in ETR-4228 in mounting the capacitors, resistors and the internal SCR. Incidentally, the rubber feet supplied in ETR-4228 were also used on the bottom of the metal box. Figure 2 is an internal view of the tester and Figure 3 is the schematic diagram.

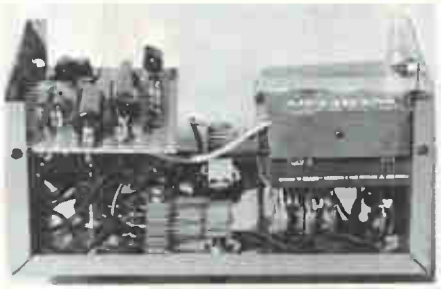


Fig. 2 Internal view showing location of parts.

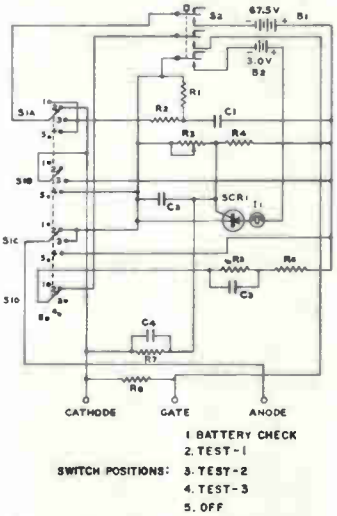


Fig. 3 Schematic diagram of tester.

In constructing the tester, the rotary switch (S1) was wired before being mounted on the box, with leads approximately 6″ long provided at the terminals used to connect to the parts to be mounted on the perforated board. The parts board was assembled and wired outside the box. It was then connected to the rotary switch, with the leads provided, and fastened in place in the box with two small angles. A small pieces of aluminum, bent to fit, was used to hold battery B1 in place. Battery B2 consists of two penlite cells mounted in a holder designed for the purpose. However, any 3-volt battery may be used.

When the tester has been completed, the only adjustment necessary is to set R2 for the desired leakage current level. To do this, connect a low-range milliammeter and a 500K pot in series between the ANODE and CATHODE jacks of the tester. Set the rotary switch in either the TEST 1 or TEST 2 position (Select the position which causes the milliammeter to read up-scale). Press the PUSH TO TEST button (S2) and adjust the 500K pot for the desired leakage current. (One milliampere is a satisfactory value). Now release this button, adjust R3 slightly, and again press the button, noting whether the OK panel lamp lights. Continue adjusting R3 and pressing the button after each adjustment until the point is reached where the bulb just lights. Now disconnect the 500K pot and the milliammeter — the tester is ready for use.

To test a silicon rectifier, connect the cathode of the rectifier to the CATHODE jack and the anode to the ANODE jack. Set the rotary switch to TEST 1. Press the PUSH TO TEST button. Illumination of the OK lamp indicates a satisfactory forward voltage drop. Next turn the rotary switch to TEST 2 and press the PUSH TO TEST button. If the OK lamp lights, the rectifier has sufficiently low leakage.

To test an SCR, connect the anode, gate and cathode to the corresponding jacks on the tester. Set the rotary switch to TEST 1 and press the PUSH TO TEST button. If the OK lamp lights, the SCR has a satisfactorily low forward voltage drop. Now turn the rotary switch to TEST 2 and press the PUSH TO TEST button. If the OK lamp lights, the SCR has sufficiently low reverse leakage. Next turn the rotary switch to TEST 3 and press the PUSH TO TEST button. If the OK lamp lights, the SCR has sufficiently low forward leakage.

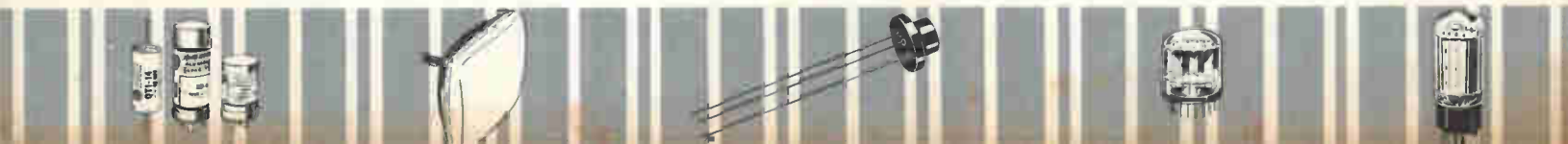
When the tests have been completed, turn the rotary switch to the OFF position.

The BATTERY CHECK position allows both batteries to be checked. In this position, pressing

TABLE OF TESTS

DEVICE	SWITCH POSITION	TEST
Rectifier	TEST 1	Forward voltage drop
Rectifier	TEST 2	Reverse leakage
SCR	TEST 1	Forward voltage drop
SCR	TEST 2	Reverse leakage
SCR	TEST 3	Forward leakage

Continued on page 8



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BENCH NOTES

SHORT DAMPER LIFE

This occurs in late Zeniths (16K26, 16K33), also many other sets using 6AY3 or 6BA3 dampers. Upon investigation, no trouble will be found with the circuit, but the damper won't last more than a year. The only remedy here is to use a heavier tube, such as the 6DW4B, designed for color sets, but directly interchangeable with the 6AY3 and 6BA3.

Dennis C. Smith
9201 Meyers Road
Detroit, Mich. 48228

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Rivette Radio & TV Service
120 Percy Street
Syracuse 4, N. Y.

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The socket on a nutdriver often gets "stripped." Try cutting the end of the socket off about three-sixteenths of an inch. This gives the socket a new grip.

Galen Eggers
Elk Creek, Nebraska 68348

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Vol. 18, No. 4

Winter, 1966

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Continued from page 1

HOW TO BUILD AN SCR AND SILICON RECTIFIER TESTER

the PUSH TO TEST button will light the OK lamp if both batteries are good. However, if the lamp does not light, a voltmeter or battery tester will be required to find which battery is bad.

PARTS LIST

B 1	67 ½-volt battery (Eveready No. 467 or equivalent)
B 2	3-volt battery (Two pen-lite cells in series or equivalent)
C 1 & 4	0.01 uf, 400-volt capacitor (G-E MPC-4S1)
C 2 & 3	0.1 uf, 200-volt capacitor (G-E MAL-2P1)
I 1	#49 panel lamp
R 1 & 2	4.7K, 1 watt resistor
R 3	100 ohm potentiometer
R 4	22K, 1 watt resistor
R 5 & 7	100K, 1 watt resistor
R 6	680 ohm, 1 watt resistor
R 8	1K, 1 watt resistor
S 1	Four-pole, five-position, non-shorting rotary switch (Centralab 1415 or equivalent)
S 2	Three-pole, push button switch (Switchcraft FF1009 or equivalent)
SCR 1	GE-X5
Enclosure	Bud CU-2108-A, 3" x 5" x 7" Minibox or equivalent
ETR-4288	Experimenter/Hobbyist Kit (see coupon on page 7)

Panel lamp socket, pointer knob, three banana jacks, test leads, and misc. screws and nuts.

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