

# TRANSISTOR/DIODE TESTER

## MODEL DT-100



### Lesson Manual

# ELENCO®

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## FEATURES

### **Diode Mode:**

1. Checks all types of diodes - germanium, silicon, power, light emitting (LEDs), and zener.
2. Indicates the cathode or anode leads of the diode.
3. Operates in circuit with resistors as low as 5k $\Omega$ .

### **Transistor Mode:**

1. Checks all types of transistors - germanium, silicon, power, RF, audio, switching, and FETs.
2. Identifies NPN and PNP types, PN or NP junctions.
3. High gain circuit, can test transistors in circuits with base or collector resistors as low as 100 $\Omega$ .
4. Measures relative beta of two transistors.

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# OPERATING INSTRUCTIONS

The DT-100 is a dynamic transistor and diode tester. It features in-circuit testing and polarity indicators for both transistors and diodes. To activate the DT-100, remove the four mounting screws from the bottom and install a fresh 9V battery.

## Diode Testing

1. Place the switch in the diode position.
2. Connect the diode to the red and black leads.
3. Push in the test switch. One diode LED should blink and identify whether the cathode or anode is connected to the diode (red) lead.
4. If both LED lamps blink, then the diode is shorted.
5. If neither LED lamps light, then the diode is open.

## Transistor Mode:

The DT-100 can measure transistors in or out of circuit. It will identify NPN or PNP by a simple adjustment.

### *Transistor Testing - Out of Circuit*

1. Place the switch in the transistor position.
2. Place the transistor in the socket or attach it to the C, B, and E leads.
3. Push in the test button. Adjust the base current control so that the OK LED lights up. This indicates a good transistor.
4. If the OK lamp doesn't light, adjust the base current control so that either the NPN or PNP LED lights up. This happens at the minimum or maximum position of the control setting. This will indicate transistor type. Place the switch to the NPN position if the NPN lamp lights up, or place the switch to the PNP position if the PNP lamp is lit.
5. If no lamps light up, then the transistor is open or we have not identified the base lead. Repeat assuming another lead at the base.

6. When the transistor is shown to be OK, the base current control gives an indication of transistor beta. The lower the setting relative to another transistor, the higher the beta. Lamps NPN and PNP measure base current. Higher base current results in a brighter LED. It also indicates if current is entering or leaving the base, thus, NPN or PNP respectively will light.

### *Transistor Testing - In Circuit*

The DT-100 will test transistors in circuit, provided the base biasing resistance is greater than  $100\Omega$ . Simply follow the previous procedure for testing out of circuit transistors. Do not apply power to the circuit of the transistor or diode under test. The DT-100 will supply the necessary power.

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## **CHECKING OUT YOUR TRANSISTOR/DIODE TESTER**

The following is a simple procedure for testing your DT-100.

### **Diode Operation:**

1. Place the switch in the diode position. Short the black and red leads together and push in the test button. The diode test LEDs should alternately go on at about a 1Hz rate.
2. Connect the red and black leads to any good diode. Only one LED should flash, identifying the red lead connection (anode or cathode). Reversing the leads should cause the other LED to flash.

### **Transistor Operation:**

1. Place the switch in the transistor position. Short the yellow (B) and black (E) leads together. Press the test button. Vary the base current control. The NPN lamp should light with the switch in the NPN position and the PNP lamp when the switch is in the PNP position.
2. Place a known good transistor in the test socket with the Emitter in E, Base in B and Collector in C pins. Be sure none of the leads are shorting. Vary the base current control. The OK LED should light up. Note that on the NPN transistor, the NPN lamp also will glow very slightly. This indicates the base current, and thus lower intensity. The base current control should be adjusted for the lowest setting with the OK lamp glowing.

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## THEORY OF OPERATION

Note the schematic diagram on page 6. The test transistor in this circuit is an NPN. Adjusting the variable resistor will cause the NPN LED to light up indicating that the base current is flowing. The output of the test transistor is fed to amplifiers Q2 and Q3. The output of Q2 is feedback in phase to the base of the test transistor causing the circuit to oscillate. Part of the oscillations are fed to a power rectifier, Q5, which switches on the OK LED indicator.

The design configuration is such that in-circuit transistors can be measured, provided that the base and collector resistors are greater than  $100\Omega$ .

When measuring PNP transistors, the power supplied to the test transistor is reversed via the NPN/PNP switch. Therefore, the PNP LED will light up.

Varying the base current control will reduce the base current. The lower the base current, the higher the gain of the transistor under test. Comparative tests of two transistors' gain (beta), can be made by observing the dial setting or the intensity of the base LED diode. The lower the setting with the PNP LED lit, the higher the beta of that transistor.

On diode operation, power is applied to IC1. This causes the circuit to oscillate at about a 1Hz rate. Placing a diode in series with the LED indicators will cause a current to flow, depending on the direction of the diode. Thus, the red test lead will identify the cathode or anode of the diode via the LED readout. Transistor Q4 reverses the current flow in this circuit.

All types of diodes may be tested: Silicon, germanium, LEDs or zeners over 6 volts. Zener diodes under 6V causes the second LED to glow at lower intensity, indicating that zener breakdown has occurred.

# DT-100 PARTS LIST

## Resistors 5% 1/4W

Qty.	Symbol	Value	Color Code	Part #	
<input type="checkbox"/>	1	R14	100Ω	brown-black-brown-gold	131000
<input type="checkbox"/>	2	R5, R6	220Ω	red-red-brown-gold	132200
<input type="checkbox"/>	2	R1, R10	330Ω	orange-orange-brown-gold	133300
<input type="checkbox"/>	1	R13	1kΩ	brown-black-red-gold	141000
<input type="checkbox"/>	1	R7	5.6kΩ	green-blue-red-gold	145600
<input type="checkbox"/>	1	R12	10kΩ	brown-black-orange-gold	151000
<input type="checkbox"/>	1	R8	18kΩ	brown-gray-orange-gold	151800
<input type="checkbox"/>	2	R2, R3	33kΩ	orange-orange-orange-gold	153300
<input type="checkbox"/>	1	R9	47kΩ	yellow-violet-orange-gold	154700
<input type="checkbox"/>	1	R11	100kΩ	brown-black-yellow-gold	161000
<input type="checkbox"/>	1	R4	330kΩ	orange-orange-yellow-gold	163300
<input type="checkbox"/>	1	R15	100kΩ	Variable Potentiometer	192611

## Capacitors

Qty.	Symbol	Value	Description	Part #	
<input type="checkbox"/>	1	C6	0.001μF (102)	Discap	231036
<input type="checkbox"/>	3	C2, C3, C5	0.01μF (103)	Discap	241031
<input type="checkbox"/>	2	C1, C4	10μF	Lytic	271045

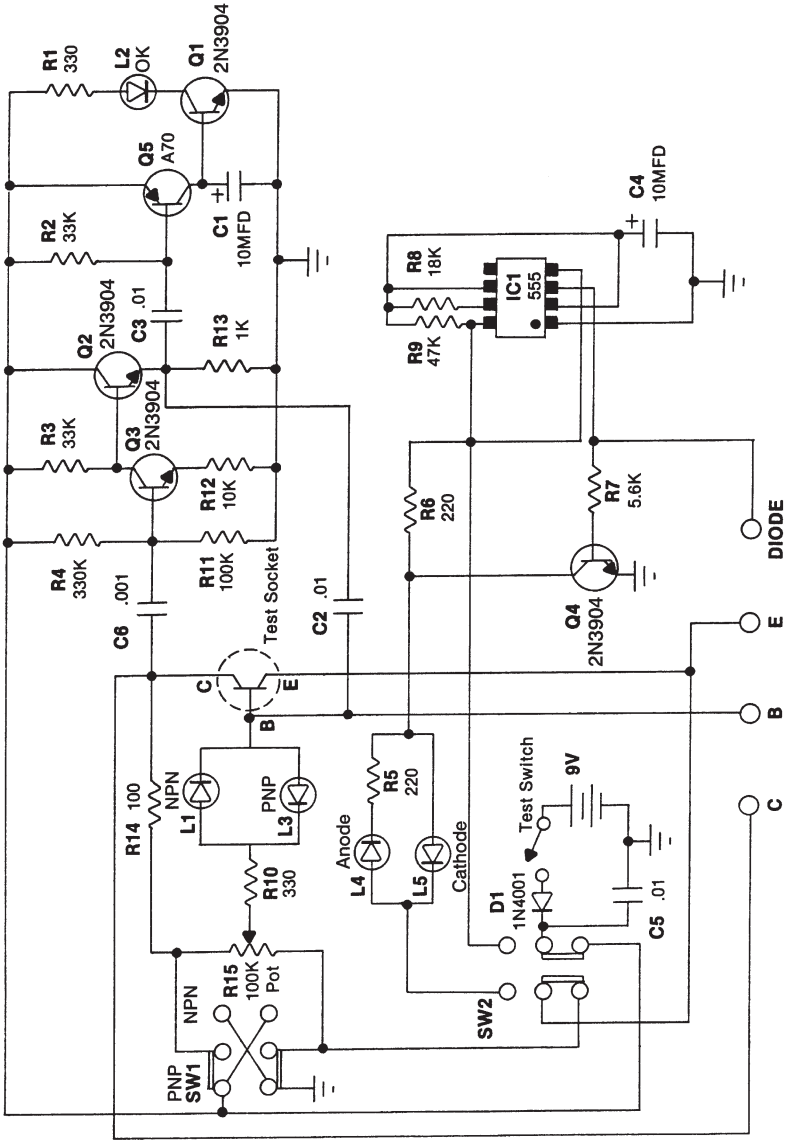
## Semiconductors

Qty.	Symbol	Value	Description	Part #	
<input type="checkbox"/>	1	D1	1N4001	Diode	314001
<input type="checkbox"/>	1	Q5	MPS A70	Transistor	320070
<input type="checkbox"/>	4	Q1 - Q4	2N3904	Transistor	323904
<input type="checkbox"/>	1	IC1	555	Integrated Circuit	330555
<input type="checkbox"/>	5	L1 - L5		Light Emitting Diode	350002

## Miscellaneous

Qty.	Description	Part #	Qty.	Description	Part #		
<input type="checkbox"/>	1	PC board	511100	<input type="checkbox"/>	4	Rubber feet	662015
<input type="checkbox"/>	1	Switch push button	540001	<input type="checkbox"/>	1	Socket 8-Pin IC	664008
<input type="checkbox"/>	2	Switch DPDT	541111	<input type="checkbox"/>	1	Transistor socket	664500
<input type="checkbox"/>	1	Battery snap	590098	<input type="checkbox"/>	1	Clip black	680001
<input type="checkbox"/>	1	Knob	622009	<input type="checkbox"/>	1	Clip red	680002
<input type="checkbox"/>	1	Case top	623061	<input type="checkbox"/>	1	Clip green	680003
<input type="checkbox"/>	1	Case bottom	623062	<input type="checkbox"/>	1	Clip yellow	680004
<input type="checkbox"/>	5	Spacer LED	624111	<input type="checkbox"/>	1	Label top	724100
<input type="checkbox"/>	4	Screw M3 x 5mm	640300	<input type="checkbox"/>	1	Wire black 20 ga.	813110
<input type="checkbox"/>	4	Screw 2.8 x 8mm	641102	<input type="checkbox"/>	1	Wire red 20 ga.	813210
<input type="checkbox"/>	1	Nut pot 7mm	644101	<input type="checkbox"/>	1	Wire yellow 20 ga.	813410
<input type="checkbox"/>	1	Flat washer	645101	<input type="checkbox"/>	1	Wire green 20 ga.	813510
<input type="checkbox"/>	1	Lockwasher 5/16" int.	646101	<input type="checkbox"/>	1	Wire blue solid 22 ga.	814620

# SCHEMATIC DIAGRAM



SCHEMATIC DIAGRAM - DT-100  
REV-B

Test Leads

## **TWO YEAR WARRANTY**

All ELENCO® models are guaranteed for two full years on all parts and service. For the first 3 months, your transistor/diode tester is covered at absolutely no charge. For the remaining 21 months, a nominal service charge is required to cover shipping and handling.

**When returning merchandise for repair, please include proof of purchase, a brief letter of explanation of problem, and sufficient packing material. Before returning any merchandise please call our service department at (847) 541-3800 to obtain a return authorization number (RMA).**

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