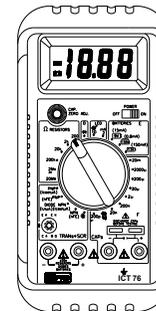




INSTRUCTION MANUAL
ICT76 COMPONENT-TESTER

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ICT 76
COMPONENT TESTER
INSTRUCTION MANUAL



1. Introduction

1.1 Unpacking and checking

When you unpack your new component tester, these are the items you should have:

1. ICT76 component tester.
2. Set of test leads (one black and one red).
3. Operating manual.
4. Protective holster.

1.2 Front face of tester

Fig.1 and the numbered list below identify the items fitted at the front of the tester. Before you use the tester make sure you are thoroughly familiar with the settings and the input terminals.

1. Digital display — The 3½ segment 1999-count digital LCD display has automatic annunciators for polarity, decimal point, over range and low battery voltage.
2. Zero adjuster for capacitance — This allows the display to be zeroed when measuring capacitance (zeroing range approx. $\pm 20\text{pF}$).
3. On/off switch — Use this switch to switch the tester "ON" and "OFF".

4. Rotary function and range switch — This switch is used to set the desired function and range.
5. Capacitance sockets — The terminals of capacitors can be inserted in these sockets to allow their capacitance to be measured directly.
6. Capacitance input terminal (+) — Positive input for capacitance measurements. Takes banana plug.
7. Capacitance input terminal (-) — Negative input for capacitance measurements. Takes banana plug.
8. Ω , E, D, LED input terminal (+) — Positive output for testing resistors, diodes and LEDs and positive input for battery testing. Takes banana plug.
9. Ω , E, D, LED input terminal (-) — Negative output for testing resistors, diodes and LEDs and negative input for battery testing. Takes banana plug.
10. Transistor and SCR socket for transistors and silicon-controlled rectifiers - and for measuring transistor h_{FE} and I_{CE0} and for testing SCRs.

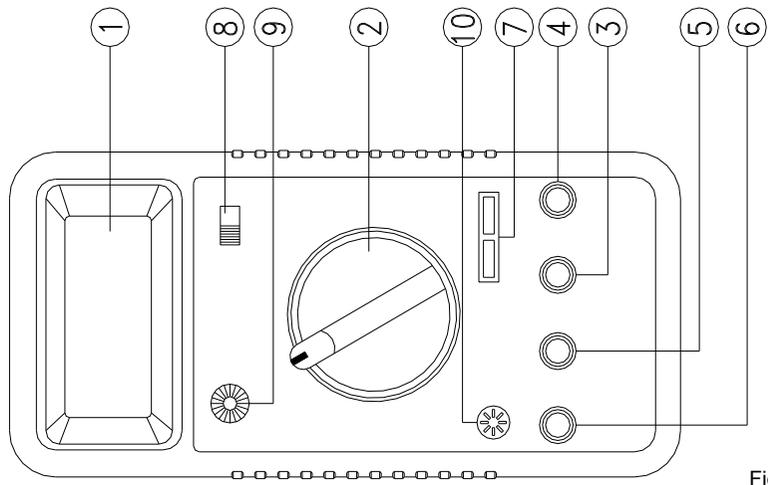


Figure 1

2. Technical specification

2.1 General specification

Display : 3 1/2 digit 1999 count LCD display.

Polarity indication : Automatic, positive implied negative indicated.

Over range : "1" or "-1"

Low battery voltage indication : "E3" shown if the voltage from the battery drops below the operating voltage.

Display update rate : Nominal rate of two per second.

Operating temperature : 0 to +50°C, 0 to 80% RH.

Storage temperature : -20 to +60°C, 0 to 80% RH (battery not fitted).

Temperature coefficient : 0.15 x specified accuracy/°C, <18°C or >28°C.

Supply required : Standard 9V alkaline battery, NEDA 1604, JIS 006P, IEC 6F22, PP3.

Battery life (alkaline) : Typically 200 hours.

Dimensions (L x B x H) : 84 x 31 x 175mm (tester only).

Weight (inc. battery) : 330g.

Accessories : Test leads, battery and operating manual.

2.2 Electrical specification

Accuracy is given as \pm (measurement error + display error) and applies at $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$ and less than 75% RH.

Measurement error (%) is given as a percentage of the current measurement.

Display error (D) is given in units equal to the smallest increment able to be shown on the display.

The error for a given unit of measurement (e.g. pF) is given in the unit of measurement itself.

2.2.1 Capacitance

Range	Resolution	Accuracy	Measuring frequency
200pF	0.1pF	$\pm(0.5\% + 1D + 0.5pF)$	820Hz
2nF	1pF	$\pm(0.5\% + 1D)$	
20nF	10pF		
200nF	100pF		
2 μ F	1nF		
20 μ F	10nF		
200 μ F	100nF	82Hz	
2000 μ F	1 μ F	$\pm(1\% + 1D)$	8.2Hz
20mF	10 μ F	$\pm(1.5\% + 1D)$	

Testing voltage : 3.2V peak (max.). The (+) socket is always positive relative to the (-) socket.

Input protection : The tester is protected against capacitor discharge (above 50V) by a 0.25A, 250V quick-acting fuse.

Zeroing for capacitance : restricted to approx. $\pm 20\text{pF}$

2.2.2 Resistance

Range	Resolution	Accuracy	Max. off-load voltage	Overload protection
200 Ω	0.1 Ω	$\pm(0.75\% + 4\text{D})$	3.2V	500 Vd.c./a.c. (max)
2k Ω	1 Ω	$\pm(0.5\% + 1\text{D})$	0.5V	
20k Ω	10 Ω			
200k Ω	100 Ω			
2M Ω	1k Ω	$\pm(0.75\% + 1\text{D})$		
20M Ω	10k Ω	$\pm(2\% + 1\text{D})$		

2.2.3 Diode testing

Range	Resolution	Accuracy	Max. Measuring current	Max.off-load voltage
→	1mV	$\pm(1.5\% + 5D)$	1.5mA	3.2V

Overload protection: 500V \approx (max.)

2.2.4 LED testing

Testing voltage : 3.2V (max.)

Measuring current : 2mA or 10mA (two ranges)

LED's tested by light-up, with forward voltage displayed.

2.2.5 Measurement of transistor hFE and leakage current

hFE values from 0 to 1000 for PNP or NPN transistors

hFE base current : approx. 100 μ A

hFE collector voltage : approx. 3V

ICEO : 10nA to 20 μ A.

2.2.6 Testing of silicon-controlled rectifiers

"Good/bad" test

Test limit: The holding current (I_h) of the SCR under test must be less than 0.31mA (for $V_{TM} = 1V$), and the gate current (I_g) must be less than 0.39mA (for $V_{GT} = 0.7V$)

2.2.7 Battery testing

Battery type Load

9V approx. 15mA

1.5V (AA, C or D) approx. 150mA

1.55V button cells approx. 0.8mA

Approximate battery voltage displayed.

3. Using the tester

3.1 Measuring capacitance

- ⚠ WARNING :**
1. Never apply voltage to the test terminals; this could damage or destroy the tester.
 2. Fully discharge capacitors before testing them.
 3. With polarised capacitors, make sure they are connected with the correct polarity.
 4. Do not test capacitors in-circuit.

Procedure:

1. Switch on tester (move on/off switch to "ON" position). The appearance of numbers on the LCD display indicates the tester is on.
2. Set to the 200pF range. Adjust the zero adjuster so that the lowest digit on the display is as close as possible to changing from "1" to "0" and the "-" sign does not appear. If you need to use test leads, plug them in before you zero the tester. Zeroing the tester with the leads connected allows the capacitance of the leads to be nulled. Do not short the leads together.
3. You should zero the meter whenever you are going to make measurements in order that the last digit will be as close as possible to "0". We would remind you that the highest resolution available is on the 200pF range.

4. If the capacitance of the capacitor you are going to measure is specified, set the appropriate range. If it is not, start with the 200pF range. If an over range is indicated, go to the next range up. Continue doing so until the over range annunciator disappears and a measurement is shown. This will ensure that you are using the range offering the maximum possible resolution.
5. With low-value wire-ended capacitors and/or capacitors for PCB mounting, set the meter to "0" and insert the capacitor terminals straight into the measuring sockets. Where it is not possible to use the measuring sockets with the capacitors you wish to measure, plug the test leads into the (+) and (-) capacitance input terminals and apply the leads to the capacitor terminals.
6. An over range is indicated by a "1" as the highest digit and no other digits shown.
7. The capacitance value can be read straight off the display because the meter automatically inserts the decimal point and the range it has selected can be read off at the same time.

Note:

1. An open-circuited capacitor will show "0" on all the ranges (expect for a few pF on the 200pF range).
2. When using the 200pF range, you are advised always to use the short test leads if the measuring socket cannot be used in the particular case. Long test leads introduce quite large amounts of additional capacitance. If the capacitance of the leads is more than 20pF, it will not be possible for you to null it with the zero adjuster. What is more, even after the capacitance of the leads has been nulled, it is possible that subsequent movements of the leads will destroy the effect of the nulling.
3. If the capacitance of the test leads is above the maximum that the zero adjuster can correct for, what you can do is to make a note of the capacitance of the leads and subtract it from the final measurement.
4. When you wish to measure a number of capacitors some of which require the test leads and some of which do not, you can leave the leads connected to the tester while making all of the measurements. This means that the tester does not have to be zeroed twice (once with the leads and once without).
5. To extend the life of the battery, it is advisable for the on/off switch to be switched to "OFF" once measurements have been completed.
6. During measurements, the tester applies a very low voltage to capacitors. With the majority of capacitors there is no risk of their voltage limits being exceeded. Nor are the capacitors charged to dangerous voltages when they are disconnected from the tester.

7. Capacitors (and particularly electrolytic capacitors) are often subject to wide tolerances. Hence the values measured are often up to 100% more than the nominal values but they are seldom drastically below them.
8. The tester uses an a.c. voltage method of measurement which is less subject to errors than the d.c. ramp voltage method when the capacitors being measured have high leakage currents, which electrolytic capacitors often do.

3.2 Measuring resistance

1. Switch on tester (move on/off switch to "ON" position).
2. Turn rotary switch to the desired range.
3. Plug the black test lead into the Ω "—" input terminal and the red lead into the Ω "+" input terminal.
4. Apply the probes to the points between which the resistance is to be measured and read off the value shown.

3.3 Measuring transistor hFE

1. Switch on tester (move on/off switch to "ON" position).
2. Turn rotary switch to the desired hFE range (PNP or NPN).
3. Connect the transistor straight into the transistor socket. The holes of the socket are marked E, B and C for emitter, base and collector.
4. Read the hFE (d.c. gain) value straight off the display.

⊕

3.4 Testing transistor leakage current (ICEO)

1. Switch on tester (move on/off switch to "ON" position).
2. Turn rotary switch to the desired ICEO range (PNP or NPN).
3. Connect the transistor straight into the transistor socket. The holes of the socket are marked E, B and C for emitter, base and collector.
4. Read the leakage current (ICEO) of the transistor straight off the display. The unit of measurement is μA .

3.5 Testing of SCRs/ thyristors (good/bad)

1. Switch on tester (move on/off switch to "ON" position).
2. Turn rotary switch to the position ⊕
3. Insert the SCR straight into the transistor socket. The holes of the socket are marked A and G for anode and gate and K for cathode.
4. If the SCR is good, the display should show "000".
5. Turn the rotary switch briefly to NPN hFE and back to the ⊕ range. If the SCR is good, the display should now show "1" (overrange).

4. Changing the battery

The tester is powered by a single 9V battery. To change the battery, refer to Fig.2 and follow the instructions given below.

1. Remove the test leads from the component being tested, switch the tester off (move on/off switch to "OFF") and unplug the test leads from the input terminals.
2. Lay the tester front-face-down on a work surface and unscrew the three screws in the bottom half of the case.
3. Lever up the end of the bottom half of the case closest to the LCD display until it releases from the top half with a slight click.
4. Take the battery out of the top half of the case and carefully unplug the connector from it.
5. Press the connector onto the new battery until it clicks home and insert the battery into the top half of the case. Make sure that the connecting wire will not be caught between the two halves of the case.
6. Fit the bottom half of the case back onto the top half. As you do so make sure that the O-rings on the case screws are correctly seated and that the two hooked lugs are engaged in the top half. Screw the three screws back in.

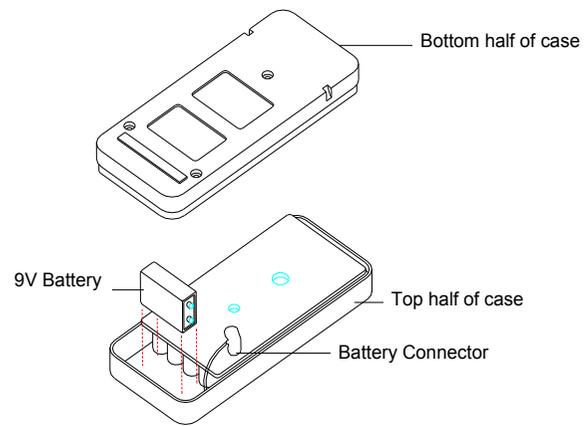
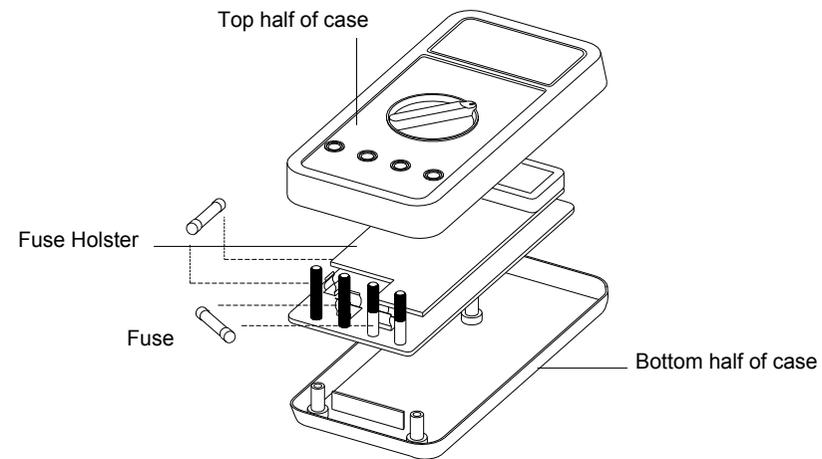


Figure 2

5. Changing the fuse

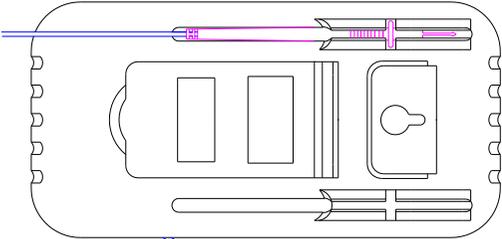
To change or check the fuse, refer to Fig.3 and follow the instructions given below.

1. Carry out steps 1 to 3 of the instructions for changing the battery.
2. Lift the printed circuit board out of the top half of the case. Do not unscrew any of the screws in the printed circuit board.
3. Carefully remove the fuse from the fuse holder by first levering one end out of one clip and then pulling the fuse out of the other clip.
4. Fit a new fuse of the same size with the same ratings. Make sure that the fuse is centered longitudinally in the fuse holder.
5. Make sure that the bar of the rotary switch in the top half of the case and the rotary switch on the printed circuit board are both in the "OFF" position.
6. Fit the printed circuit board back into its original position, making sure that O-rings on the case screws are correctly seated and that the connecting wire of the battery will not be caught between the top and bottom halves of the case. Fit the two halves of the case back together ensuring that the notches in the top half of the case are engaged. Screw the three screws back in.

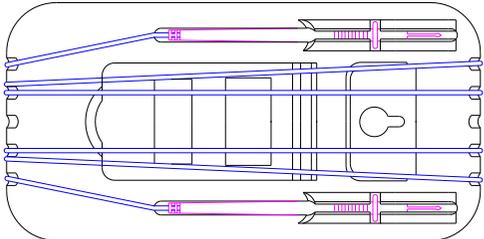


Fuse 0.25A, 5 x 20mm, fast blow, 250V, HBC 1.0KA

HOW TO USE THE PROBE HOLDER

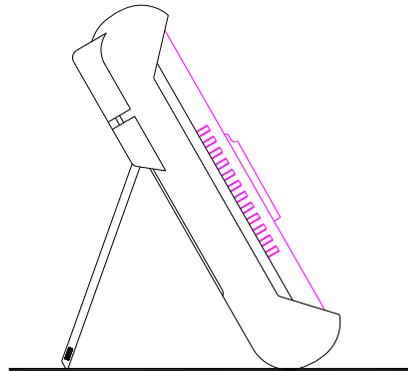


Clip one probe on the holster for one handed meter operation.

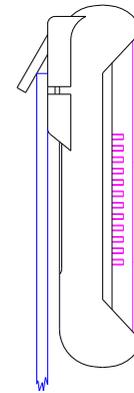


Wrap the leads around the holster to store the test probes.

HOW TO USE THE TILT STAND AND HOLSTER

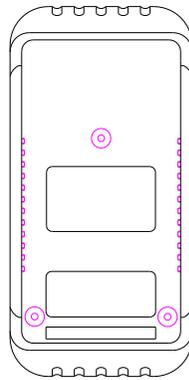


Swing the stand out for easier meter reading.

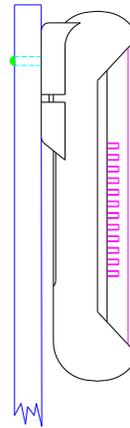


Swing the upper holder out and hook it over a door.

HOW TO USE THE TILT STAND AND HOLSTER



Meter in holster face down



Hang on a nail at the workbench

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