

# SANWA

## YX 360TRF MULTITESTER

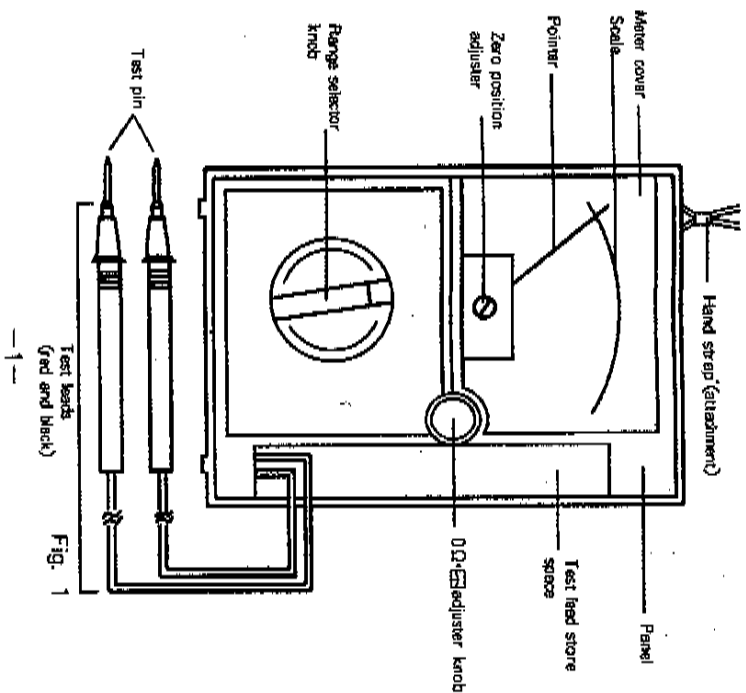
### INSTRUCTION MANUAL

SANWA ELECTRIC  
INSTRUMENT CO., LTD.  
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Chiyoda-ku, Tokyo, Japan

#### 1. INTRODUCTION

Thank you for purchasing a SANWA tester Model YX360TRF. You are kindly requested to thoroughly read this manual before use for safety. Especially, "SAFETY INFORMATION" and "MEASURING PROCEDURE" are important. Keep this manual together with the tester not to lose it.

#### 2. NAMES OF COMPONENTS



The following are precautions to prevent accidents such as electrical shocks.  
Be sure to read them before using the tester.

#### ■ Symbols

The following cautionary signs appear on the multimeter and in this manual.

⚠ Disobedience to instructions with this sign may lead to troubles of the tester and accidents such as electrical shock.

⚡ This sign caution that high voltage is applied to parts marked with it.

#### ■ Precautions for Safety Measurement

##### ⚠ WARNING

To ensure that the meter is used safely, follow all safety and operating instructions.

1. Never use meter on the electric circuit that exceed 3k VA.
2. Pay special attention when measuring the voltage of AC30 Vrms (42.4V peak) or DC60V or more to avoid injury.
3. Never apply an input signals exceeding the maximum rating input value.
4. Never use meter for measuring the line connected with equipment (i.e. motors) that generates induced or surge voltage since it may exceed the maximum allowable voltage.
5. Never use meter if the meter or test leads are damaged or broken.

6. Never use uncased meter.
7. Be sure to use a fuse of the specified rating or type. Never use a substitute of the fuse or never make a short circuit of the fuse.
8. Always keep your fingers behind the finger guards on the probe when making measurements.
9. Be sure to disconnect the test pins from the circuit when changing the function or range.
10. Before starting measurement, make sure that the function and range are properly set in accordance with the measurement.
11. Never use meter with wet hands or in a damp environment.
12. Never use test leads other than the specified test leads.
13. Never open tester case except when replacing batteries or fuses. Do not attempt any alteration of original specifications.
14. To ensure safety and maintain accuracy, calibrate and check the meter at least once a year.
15. Indoor use.

■ General Specification

Items	Specification
Drop shock proof	Tour-hand structure is adopted in the meter section. The meter section is designed to withstand shock.
Circuit protection	The circuit protected by fuse even when voltage of up to AC 230V is impressed on each range for 5 seconds.
Internal battery	R6 (IEC) or UM-3 1.5Vx2
Internal fuse	0.5A/250V 5.2mm (6x)X20mm
Standard calibration temp. and humidity range	23±2°C 45~75% RH
Operating temperature and humidity range	0~40°C 80% RH max. no condensation
Withstand voltage	3kV AC (1 min.) between input terminal and case
Dimensions and weight	158.5X129X41.5mm / approx. 320g
Accessories	One copy of instruction manual, Hand strap

■ APPLICATION AND EVALUATION

■ Application  
This instrument is portable multimeter designated for measurement of weak current circuits.

- Feature
- Panel face protection cover which serves also as a stand is employed.
  - Our technology has made it possible to measure high resistance (up to maximum 200MΩ) with low voltage.
  - Band meter of drop shock proof type with high sensitivity has been employed.
  - Over load protection circuit up to maximum 230V is provided.

■ Measurement Range and Accuracy

Function	Full scale value	Accuracy	Remarks
DCV ≡	0.1	±5% against full scale	Input impedance 20kΩ/V
	0.25/2.5/10/50	±3% against full scale	
DCV (NULL)	250/1000	±3% against full scale	Input impedance 5kΩ/V
	±5/±25	±5% against full scale	
ACV ~	10/50/250/750	±4% against full scale	Input impedance 5kΩ/V 30Hz~100kHz within ±3% f. s. (AC10V range)
	50μ	±3% against full scale	
DCA ≡	2.5m/25m/0.25	±3% against full scale	Voltage drop 0.1V Voltage drop 0.25V
	2k/20k/200k/2M (X1/X10/X100/X1K)	±3% against full scale	
Ω	200M (X100K)	±5% of arc	Center value 20Ω Max. value 2kΩ Release voltage 3V
	10μF	—	
C	±10dB~±22dB (for 10VAC) ~±62dB	—	*2
LI	0~150μA at X1 range 0~15mA at X10 range 0~150μA at X1K range 0~1.5μA at X100K range	—	Current across test pins
Use the external probe			
HV (DC high volt)	DC25kV	—	HV-10T probe
hrc	1000 at X1B range	—	HFE-6T probe

\*1 Not including the resistance of fuse.  
\*2 Pointer indication of the maximum move by charged current in the capacitor.

**⚠ WARNING**  
Confirm the range to use before measurement.

**■ Preparation for Measurement**

- 1 Adjustment of meter zero position :  
Turn the zero position adjuster so that the pointer may align right to the zero position.
- 2 Range selection :  
Select a range proper for the item to be measured set the range selector knob accordingly.

**NOTE**

When determining a measuring range, select such one for higher voltage than the value to be measured as well as where the pointer of a meter moves to a considerable extent. However, select the maximum range and measure in case the extent of value to be measured can not be predicted.

**■ Measuring DCV ---**

- 1 Set the range selector knob to an appropriate DCV range.
- 2 Apply the black test pin to the minus potential of measured circuit and the red test pin to the plus potential.
- 3 Read the move of the pointer by V and A scale.

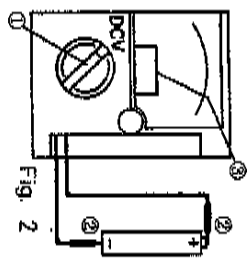


Fig. 2

**■ Measuring ±DCV (NULL)**

- 1 Set the range selector knob to an appropriate ±DCV (NULL) range.
- 2 Turn the 0Ω·⊞ adjuster so that the pointer may align exactly to 0 by ±DCV scale.
- 3 Apply the black test pin to the negative potential side of the circuit to measure and the red test pin to the positive potential side.
- 4 Read the move of the pointer by ±DCV scale.

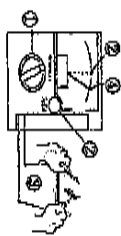


Fig. 3

**■ Measuring ACV~**

- 1 Turn the range selector knob to an appropriate ACV range.
- 2 Apply the test leads to measured circuit.
- 3 Read the move of the pointer by V and A scale.  
(Use AC 10V scale for 10V range only.)

• Since this instrument employs the mean value system for its AC voltage measurement circuit, AC waveform other than sine wave may cause error.  
• There occurs error under such frequencies other than specified in the specification.

**■ Measuring DCA ---**

**⚠ WARNING**  
Connect the meter in series with the load.

- 1 Turn the range selector knob to an appropriate DCA range.
- 2 Take out measured circuit and apply the black test pin to the minus potential of measured circuit and the red test pin to the plus potential.
- 3 Read the move of the pointer by V and A scale.

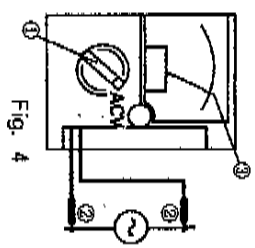


Fig. 4

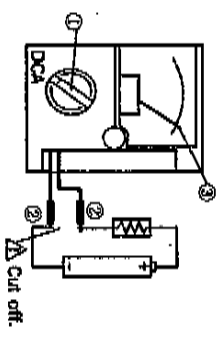


Fig. 5

ACV, DCV, DB, Ω, C, dB

■ Measuring Ω

⚠ Do not measure a resistance in a circuit where a voltage is present.

- 1 Turn the range selector knob to an appropriate Ω range.
- 2 Short the red and black test pins and turn the 0Ω adjuster so that the pointer may align exactly to 0Ω. (If the pointer fails to swing up to 0Ω even when the 0Ω adjuster is turned clockwise fully, replace the internal battery with a fresh one.)
- 3 Apply the test pin to measured resistance.
- 4 Read the move of the pointer by Ω scale.

Note: The polarity of + and - turns reverse to that of the test leads when measurement is done in Ω range.

Note: How to replace battery.

- 1 Loosen the screws fixing the rear case and remove it.
- 2 Take out R6 (UM-3) dry battery.
- 3 Put back the rear case where it was and fix it with the screws.

Note: Be sure to use the same rated fuse. In case a fuse other than the same rated one (see "4. SPECIFICATIONS") is used, error in indication occurs and/or circuit protection is made unable.

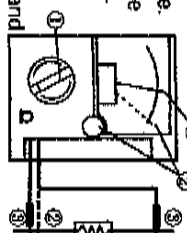


Fig. 6 BATTERY REPLACEMENT

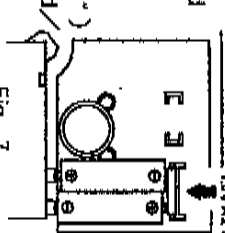


Fig. 7

■ Measuring Capacitor (C)

- 1 Set the range selector knob to C (μF).
- 2 Measure capacitance by applying the test pin to the capacitor to be measured after 0Ω adjustment made in the same manner as in the resistance measurement.
- 3 The pointer moves full scale, by the charge current to the capacitor. However, the pointer starts gradual returning from a certain point. Read the then indicated maximum value on C (μF) scale.

Note: Be sure to short circuit the both ends of the capacitor for discharge prior to the initial measurement or in such case to measure after the measurement was once made.

Note: Pay due attention to the polarity (+ and -) of the capacitor. (Connect + side of the capacitor to - side of the tester.)



Fig. 8

■ Measuring AF Output (dB)

dB (decibel) is measured in the same way as ACV measurement reading the dB scale instead.

For measurement on the 10V range, the dB scale (-10dB ~ +22dB) is read directly, but, when measured on the 50V range, 14dB is added. On the 250V range, 28dB is added to the reading on the scale, and on the 1000V range, 40dB added. Thus, the maximum dB readable is 22 + 40 = 62 (dB) measured on the 1000V range.

Note: Cut direct current with a capacitor of 0.1 μF or more when measuring such signal as having direct current.

MEASURING PROCEDURE

- **Measuring of I<sub>eco</sub> (Leak Current) for Transistor**
  - 1 Adjust 0Ω by setting the range selector knob to a proper range from X1~X1k.
  - 2 For NPN transistor, apply a black test pin to the collector and a red one to the emitter. For PNP transistor, the red one to the collector and the black one to the emitter.
  - 3 Determine the leak current by I<sub>eco</sub> scale indicated on the scale plate. (Unit in μA, mA)

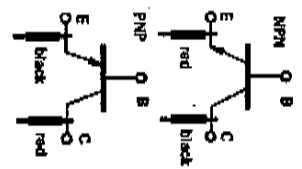


Fig. 9

- **Measuring of Diode (including LED)**
  - 1 Adjust 0Ω by setting the range selector knob to a proper range from X1 (150mA)~X100k (1.5μA).
  - 2 Apply the black test pin to anode side and the red one to cathode side when measuring I<sub>F</sub> (forward current). Apply the black test pin to cathode side and the red one to anode side when measuring I<sub>R</sub> (reverse current).
  - 3 Read the indicated value by L1 scale. (The pointer moves to a considerable extent for I<sub>F</sub>, and little extent for I<sub>R</sub>)
  - 4 Value indicated on L V scale during the measurement is the forward voltage of diode.

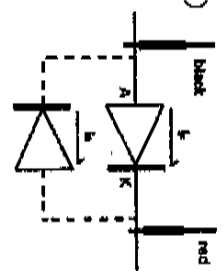


Fig. 10

7. USAGE OF OPTIONAL PROBES

- **Usage of High Voltage Probe (HV-10T)**  
Up to DC 25kV of CRT anode voltage can be measured by connecting optional HV-10T probe.

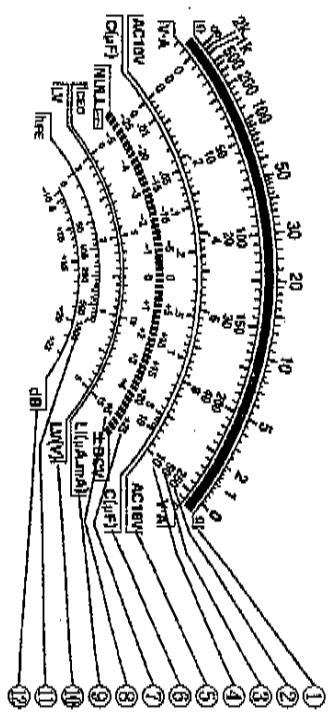
**⚠ WARNING**

- Keep the hand (finger) away from high voltage power supply. Electric shock may occur due to discharge.
- Measurement should be limited only to micro current circuits.

- 1 Turn the range selector knob and set it to **HV PROBE (DC 2.5V range)**.
- 2 Connect the jack of the black lead of the probe to the black test pin, and the jack of the red lead to the red test pin.
- 3 Apply the probe clip to the earth side and the measuring pin to measured point.
- 4 Read out measured value on 0~250 of V scale in kV unit after multiplying it by 0.1.

- **Usage of h<sub>FE</sub> PROBE (HFE-6T)**
  - 1 Set the range selector knob to X10 range (**h<sub>FE</sub> PROBE**).
  - 2 Short circuit both the red and black test pins to adjust 0Ω.
  - 3 Connect the black test pin to the probe jack when a transistor to be measured is NPN, and the red pin to the probe jack for PNP transistor.
  - 4 Connect the black clip of the probe to the transistor base and the red clip to the collector.
  - 5 Connect the remaining test lead to the emitter and measure h<sub>FE</sub>.
  - 6 Read the indicated value of the meter on h<sub>FE</sub> scale.

SCALE READING



MAINTENANCE

How to Replace the Fuse

- How to Replace the Fuse  
If an overload above lighting voltage (about 100V) is applied to DCA, and  $\Omega$  ranges, the fuse is blown to protect the circuit.
- ① Loosen the screws fixing the rear case and remove it.
- ② Pull out the fuse out of holder on the circuit board and replace it. (Fig-10)
- ③ Put back the rear case where it was and tighten the screws.
- ④ Check and see whether or not indications of respective ranges are normal (check other parts for any failures).

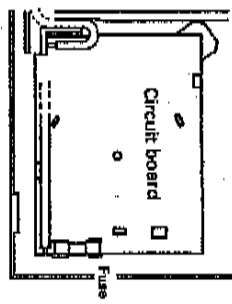


Fig. 11

Storage and Other Precautions

- ① Avoid giving the tester any excessive shock or vibration by loading it on the motorbike and the like.
- ② Keep off dust and moisture from the tester.
- ③ Do not leave the tester for a long time in places of a high temperature (higher than 55°C) a high humidity (higher than 80%), and dew condensation.
- ④ The meter cover is treated with antistatic coating. Do not wipe it hard or clean it with volatile solvent. Use a soft brush to remove dust.

Range	Multiplied	Range	Multiplied
$\Omega \times 100k$	$\times 100k$	DCV10	$\times 1$
$\times 1k$	$\times 1k$	DCV100	$\times 100$
$\times 100$	$\times 100$	ACV750	$\times 100$
$\times 10$	$\times 10$	ACV10	$\times 1$
$\times 1$	$\times 1$	C ( $\mu F$ )	$\times 1$
DCV250	$\times 1$	DCV $\pm 25$	$\times 1$
DCV25	$\times 1$	DCV $\pm 5$	$\times 1$
DCV0.25	$\times 0.01$	150mA at $\times 1$	$\times 10$
ACV250	$\times 1$	15mA at $\times 10$	$\times 1$
DCA0.25	$\times 0.001$	1.5mA at $\times 100$	$\times 0.1$
DCA25m	$\times 0.1$	150 $\mu A$ at $\times 1k$	$\times 10$
DCA2.5m	$\times 0.01$	1.5 $\mu A$ at $\times 100k$	$\times 0.1$
DCV50	$\times 1$	L.V.	$\times 1$
ACV50	$\times 1$	HFE	$\times 1$
DCA50 $\mu$	$\times 1$	ACV10	$\times 1$
DCV0.1	$\times 0.01$	ACV50	14dB added
		ACV250	28dB added
		ACV750	40dB added

10. OTHERS

• Use of Cover (example for the body cover)

- 1 When this tester is out of use :  
Attach the cover to the panel face for safekeeping.
- 2 When measuring :  
Attach it either to the rear case side or use it as a stand as illustrated.

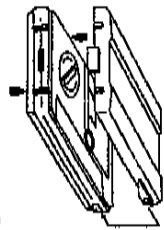
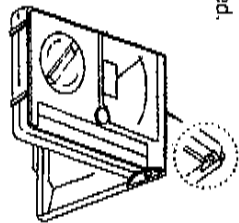


Fig. 12



• Store of Test Leads  
When placing the test leads in the storing space, roll it 3 times, then put in the test pin side first for store in the place (test lead store space) as illustrated.

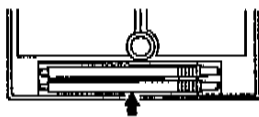


Fig. 13

• Attachment of Hand Strap

- 1 Loosen the screws fixing the rear case and remove it.
- 2 Hand strap is attached to connecting point.
- 3 Put back the rear case where it was and fix it with the screws.

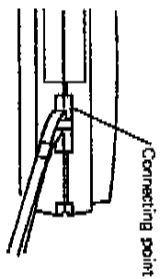


Fig. 14

11. OPTIONAL ACCESSORIES

- HV probe, HV-10T
- HFE probe, HFE-6T
- Test lead for repair, TL-61T

12. REPAIR

If the tester fails during use, check the following items before sending it for repair.

- Is the fuse not blown ?
- Is the battery not exhausted ?
- Are the test leads not disconnected ?

We repair defective product at cost. When mailing it to us for repair, do not use the same cardboard box in which it was delivered to you because it may receive damage in transit. Please send it in a box at least five times as large as the original box with enough cushioning material stuffed around it.

13. INFORMATION ON THE COMPANY

If you need information regarding purchase of repair parts and optional accessories or if you have any other sales related questions, please contact the dealer, selling agent, or maker.

The specifications described in this manual are subject to change without notice.

Patent pending