INSTRUCTION MANUAL

WITHSTANDING VOLTAGE TESTER

MODEL TOS 8630

Third Edition

WARNINGS against HIGH VOLTAGE
o *This tester generates high voltage.* o *Any incorrect handling may cause death.* o *Read Section 3 "WARNINGS" in this manual to prevent accident.* o *This manual should be placed within the reach of the operator so that he may read it whenever necessary.*

KIKUSUI ELECTRONICS CORPORATION
(KIKUSUI PART NO. Z1-210-920)

M-92071

— To supervisor in charge of operation —

(1) If the operator does not read the language used in this manual, translate the manual into appropriate language.

(2) Help the operator in understanding this manual before operation.

(3) Keep this manual near the tester for easy access of the operator.

— Receiving inspection —

Prior to the shipment from our factory, the tester has been subjected to electric- and mechanical-testing and guaranteed of satisfactory quality and performance. Nevertheless, you are kindly requested to make an acceptance inspection to see if the tester has any in-transit damage. Should there be any, please inform our local dealer of such a damage.

— For your own safety (How to avoid electrification) —

(1) While the tester is generating the output, do not touch the following areas, or else, you will be electrified, and run the risk of death by electric shock.

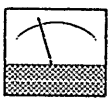
- *the output terminal*
- *the test lead-wire connected to the output terminal*
- *the Device Under Test (D.U.T.)*
- *any part of the tester, which is electrically connected to the output terminal.*

(2) Also, electric shock or accident may arise in the following cases:

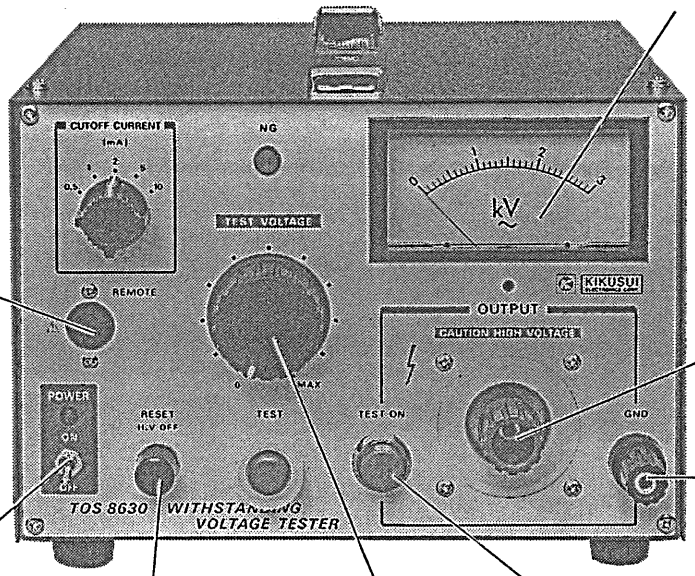
- *the tester being operated without grounding.*
- *if the gloves for electrical job are not used.*
- *approach to any part connected to the output terminal while the power of the tester is turned on.*

= ATTENTION =

Pay attention to the following instructions and those cautions given in the Section 3 "WARNINGS" as well.



Swinging of the indicator means "high voltage warning"



Read Instruction Manual Page 18 before remote operation.

High-voltage output terminal dangerous

Connect with the lead wire on GND side.

Turn on the POWER switch while the TEST VOLTAGE dial is at "0" position.

Be sure to push the RESET button before changing the test condition.

TEST VOLTAGE dial should be at "0" position except during the testing.

If the lamp comes on, it warns "high voltage"

The rear-side of the tester casing and the protective grounding terminal shall be connected to the earth, using the applicable tool.

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1. GENERAL

Model TOS8630 Withstanding Voltage Tester provides a test voltage of up to 3 kV AC with an output current of 10 mA.

The instrument has remote control function of test on/off and an NG judgement function and provides an NG output contact signal, thereby greatly contributing for labor economization in withstanding voltage test. The instrument employs a zero start switcing system to provide quality bumpless output waveforms even when at the instant the test voltage is turned on or off, thereby ensuring that no transiential voltage overshoots are applied to the device under test (D.U.T.). The instrument is compact and light, and is readily applicable for intermediate-point tests on manufacturing line or for tests of eletronic products.

Although many safety features are incorporated in the tester, a deadly accident may occur when the operator touches the D.U.T. or the probe.

Safety guards around D.U.T. should be considered for safe operation.
Also, other precaution, which deemed necessary for the tester and the devices, shall be maintained under positive control.

2. SPECIFICATIONS

Item		Specification	Remarks
Test voltage	Applied voltage	0 - 3 kV AC	
	Output	30 VA (3 kV, 10mA), when operated on 100 V AC line.	See Note 1.
	Waveform	AC line voltage waveform	
	Voltage regulation	15% or better (when change from maximum rated load to no load)	With line voltage 100 V
	Switching system	Zero start switching system	
Output Voltmeter	Scales	3 kV full scale	
	Class	JIS Class 2.5	
	Accuracy	±5% full scale	
	Response, graduation	Mean-value response, rms value graduation	
Judgement of test result (Shut down of output by leak current detection)	Judgement system	○ NG judgement when current larger than the set value is detcted. ○ When NG judgement is made, the output is cut out and an NG alarm is generated.	
	Reference value	0.5, 1, 2, 5, or 10 mA	
	setting Accuracy of	±5% of set value	See Note 2.
	judgement Detection system	Absolute value of leakage current is intergrated and compared with the set reference value.	
	Calibration	Calibrated for rms value of sine wave, using pure resistive load.	
	No-load output voltage needed for detection	400 V when set at 10 mA	See Note 3.

Item	Specification	Remarks
Dimensions of casing Maximum dimensions including extrusions	210 W x 140 H x 220 D mm (8.26 W x 5.51 H x 8.66 D in.) 215 W x 165 H x 270 D mm (8.46 W x 6.50 H x 10.6 D in.)	
Weight (net)	Approx. 4.8 kg	See Note 4.

Note 1: The period during which the Tester can be continuously operated with its maximum rated current is up to 30 minutes.

Note 2: When an actual test is done, errors are introduced also by the currents which flows through the stray capacitances of the output circuit and measuring leadwires. The overall judging accuracy of the test is the sum of the accuracy of judgement mentioned in the above specification table plus that which is corresponding to the errors caused by the stray currents. Approximate values of these currents are as shown in the following table.

Output Voltage	1 kV	2 kV	3 kV
Main unit only (without measuring leads)	4 μA	8 μA	12 μA
When 300-mm-long leads are used being suspended in air	6 μA	12 μA	18 μA
When the accessory lead-wires (HTL-1.5W) are used	20 μA	40 μA	60 μA

Note 3: Due to the internal resistance of the output circuit, to make NG judgement with the output terminals shorted, a certain level of no-load output voltage is needed. The value of such voltage is shown in the above table.

Note 4: Approx. 1kg increase when in line voltage modified.

Test Voltage Waveform:

When a capacitive load is connected to the AC output circuit, its voltage may become higher (depending on the capacitive component of the load) than the voltage which existed when no load is connected. Moreover, if the load is voltage-dependent (such as a ceramic capacitor), the waveform may be distorted. These effects, however, are utterly negligible when the output voltage is 3 kV and the capacitance is not greater than 0.05 μF.

Remote control:

The test/reset operation can be remote-controlled in the following cases:

- When the Remote Control Box (optional) is used.
- When the High Voltage Test Probe (optional) is used.
- When the instrument is controlled with a make-contact of a relay or a switch.
- When low-active control is made with logic elements. The input conditions of the Tester in this case are as follows:
  - HIGH level input voltage: 11 - 15 V
  - LOW level input voltage: 0 - 4 V
  - LOW level sweepout current: 7 mA or less

Note 5: The input terminals are pulled up to +15V supply voltage by a resistor. If the input terminals are made open, the state is identical with that a HIGH level input is applied.

NG Alarm Signals:

For the NG alarm signals, the Tester provides a lamp signal, a buzzer signal, and a make-contact signal. The ratings of the make-contact signal is 100 V AC, 1 A, or 30 V DC, 1 A.

Ambient conditions:

Temperature and humidity to meet specified performance:	5 to 35°C (41 to 95°F), 20 to 80% RH
Operatable temperature and humidity:	0 to 40°C (32 to 104°F), 20 to 80% RH

Power Requirements:

Line voltage :	100 V ±10%, 50/60 Hz AC (Can be factory-modified to nominal 110V, 115V, 120V, 200V, 220V, 230V and 240V.)
Power consumption:	10 VA or less when no load (in the reset state) (Note 6) Approx. 45 VA when with rated load
Insulation resistance:	30 MΩ or over, with 500 V DC
Withstanding voltage:	1000 V AC, 1 minute

Note 6: 25 VA or less when the instrument is modified to operate on an AC line voltage other than 100 V.

Accessories:

o High Voltage Test Leadwires, HTL-1.5W	1 set
o "HIGH VOLTAGE DANGER" label	1
o Instruction Manual	1
o 5P DIN Plug (assembly type)	1

3. WARNINGS

The tester supplies high voltage up to 3kV to the outside connection. Thus any incorrect handling of the tester may bring the risk of death to the operator. For safe operation of the tester, strictly observe the following instructions.

1. Electrification

   Be sure to wear a pair of rubber gloves for electrical job, before operating the tester, to prevent electric shock.

2. Grounding:

   The protective grounding terminal, on the rear of the tester casing, shall be positively grounded using the applicable tool.

   If not properly grounded, the casing of this tester is charged with high voltage when the power is short-circuited to the ground or conveyer or any devices connected to the ground or to the commercial power line (Note i). It is very risky that anyone who touches the casing under such a condition will be subject electric shock.

(Note i) Generally a commercial power line means a line leading to the AC cord socket of the tester, from which the rated power is supplied into the tester.

This manual also covers the power supply line from a private power generator.

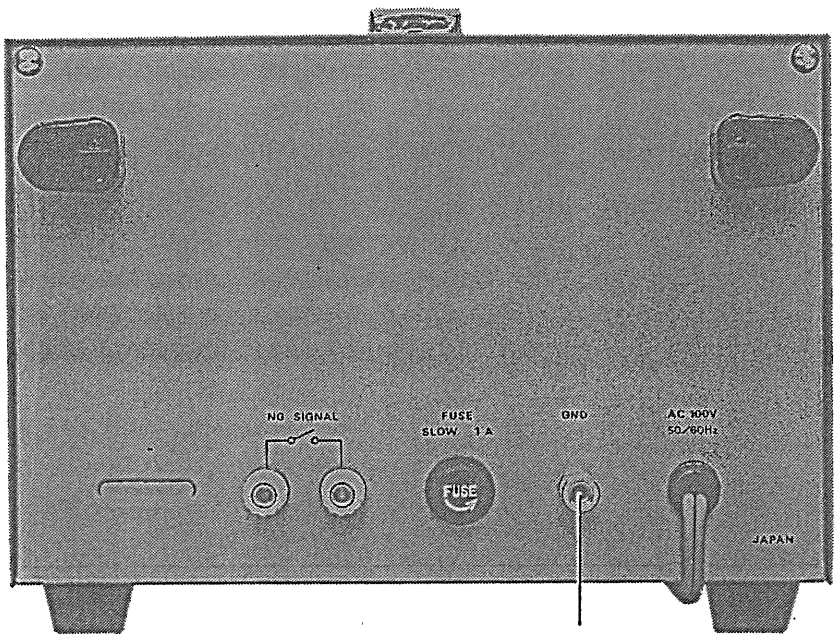


Figure 3.1 Rear of Casing, Model TOS8630 Protective grounding terminal

3. Connecting of test lead-wire on GND side:

Figure 3.2 shows the connection of the test lead-wire on GND side. Every time the tester is used, check if the lead wire is not damaged or disconnected.
The lead-wire connection to the D.U.T. shall be made from GND side. If the connection is incomplete, it is hazardous that the entire D.U.T. may be charged with high voltage.

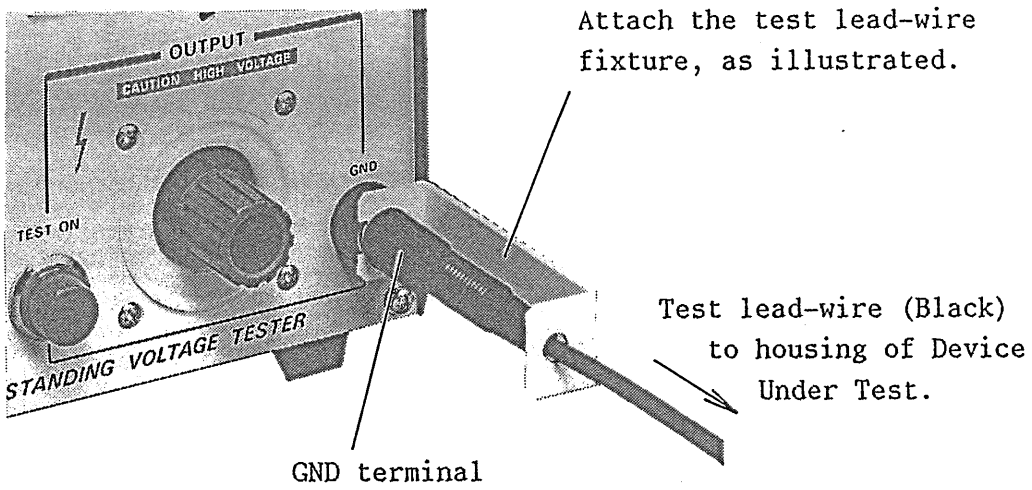


Figure 3.2

4. Connection of test lead-wire on high-voltage output side:

After connecting the read-wire on GND side, take the following procedure.

- Push the RESET button.
- Confirm if the indicator of the output voltmeter is at "0".
- Confirm if the TEST ON lamp has been off.
- Short the high-voltage output terminal with the GND test lead-wire once, and confirm that no high voltage is output.
- Connect the high-voltage test lead-wire with the high-voltage output terminal.
- Lastly, connect the GND test lead-wire and then the high-voltage output test lead-wire to the D.U.T.

5. Power source switch:

The power switch shall be turned on after confirming that the TEST VOLTAGE dial has been turned to the extreme left ("0" position).

6. Change of test condition:

Change-over of the switches on the panel shall be made after confirming that the RESET button has been pushed in and that the TEST VOLTAGE dial has been turned to the extreme left ("0" position).

7. Suspension of testing:

Except under testing, the TEST VOLTAGE dial shall be turned to the extreme left ("0" position).
Also, push the RESET button (H.V OFF) to ensure safety.
The Power switch shall be turned off if the tester is not used for some time or the operator is to leave from the tester.

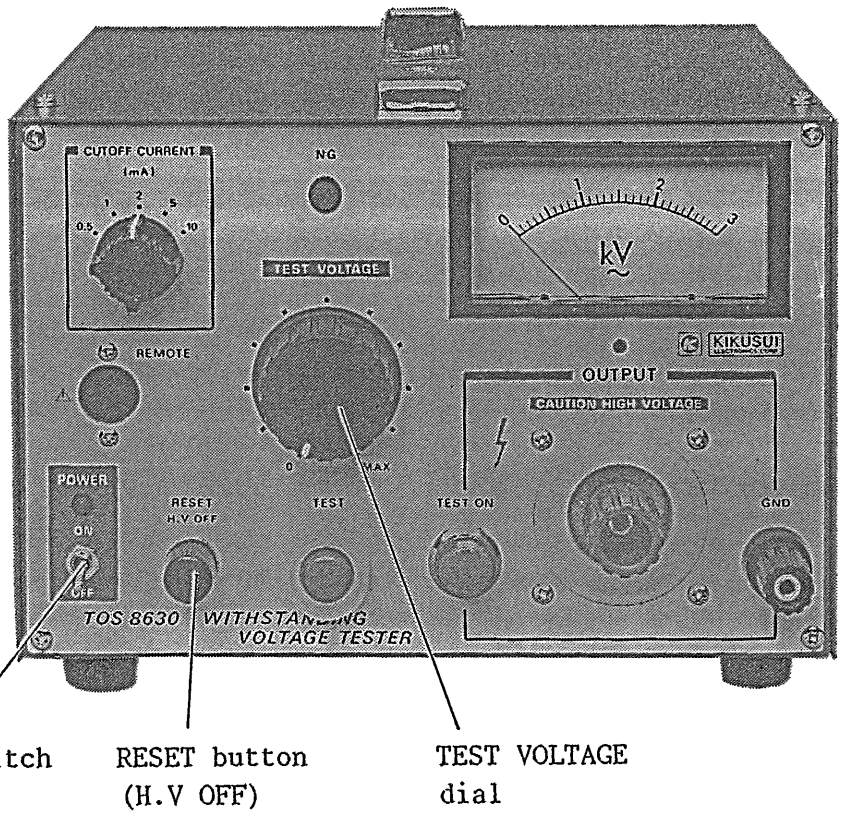
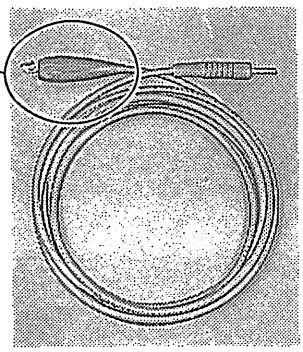


Figure 3.3

8. Critical areas of the tester under operation:

It is dangerous to touch such high voltage areas as the D.U.T., and the test lead-wide, probe and output terminal while the tester is under operation.

Never touch this area!



NEVER touch the alligator of the test lead-wire and the vinyl-cover of the clip because they are NOT insulation proof.

Figure 3.4

— Warning after the output has been cut off —

9. Confirmation on completion of testing:

You may touch the D.U.T. and the high-voltage areas (test lead-wire, probe or output terminal) for correction of the wiring or any other purpose provided that the following confirmation has been made;
- the indication of output voltage is at "0", and
- the TEST ON lamp has been turned off.

10. Remote controll of tester:

In the case this tester is to be remote controlled, the application of high voltage to the tester will be controlled by an external signal.
Take the following safety precautions to prevent accident. Also, shall be maintained the safety precaution under positive control.

- NOT to permit unexpected output of high voltage from the tester (that is, to prevent this tester from being put in TEST ON condition).

- NOT to permit operator and any other come into contact with D.U.T. test lead-wire, probe, output terminal, etc. while the tester is generating high test voltage.

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11. Re-turn on of POWER switch:

Once the Power switch of the tester has been turned off, leave at least several seconds before it is turned on again. Do not repeat ON-OFF switching of the Power switch particularly when the tester is generating the output voltage. In such a case, the safety protection of the tester may not work properly, and the operater is endangered.
The power switch shall not be turned off while the tester is generating the output voltage except in the case of emergency.

12. Other precaution:

Do not short-circuit the tester output with the ground or a conveyer or any device connected to the ground, or with the comercial power-line around tester location. Such a short-circuit may cause high-voltage charging on the tester casing, which is very dangerous.
However, such a risky condition will not arise if only the casing has been ground, in which case the casing will not be electrically charged nor will cause the damage on the tester even when the GND terminal has been short-circuited with the high-voltage terminal.
The protective grounding terminal shall be positively grounded using applicable tool.

— In case of Emergency —

13. Emergency handling:

In the case of any accident such as an electric shock or burn-down of the D.U.T. resulting from the failure of the tester or D.U.T. take the following actions promptly;
- cut off the POWER switch, and
- pull out the plug of AC cord from the socket of the power source.

It does not make any difference whichever action of the above two is taken first, but be sure to take the two actions.

— Trouble-shooting —

14. In case of trouble:

In the following cases of trouble, it is very hazardous that the power of the tester may not be cut off while the tester continues to generate high voltage:

- TEST ON lamp keeps on lighting even when the RESET button has been pushed.
- TEST ON lamp is turned off but the indicator of the output voltmeter continues swinging.

The immediate action to take, in the above cases, is to pull out the plug of AC cord from the the socket of the power source, and suspend the operation of the tester.
Thereafter, entrust us with the trouble-shooting and repair of your defective tester.

If the tester shows any irregular performance, it is possible that a high voltage may be output irrespective of the operator's will.
Suspend the operation of the tester immediately.

15. Fade out of TEST ON lamp:

In the case the TEST ON lamp has been faded out, it may cause erroneous operation of the tester, which in turn give rise to dangerous electrification.
Please entrust us with the repair of such a defective tester.

◆◆ Attention for Trouble-Free Operation ◆◆

(1) The max. output voltage of this tester reaches higher than 3kV under no-load condition, and even higher voltage in proportion to the power-supply fluctuation. But be sure to operate the tester at a lower voltage than the specified 3kV.

(2) The heat dissipation capacity of the high-voltage transformer, embodied in the tester, is designed to be a half of the rated output, taking into consideration of the size, weight and cost.
Accordingly, if the test is to be conducted at the CUTOFF CURRENT of 10mA, leave a suspension time longer than the test duration.

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Incidentally, the max. allowable test duration is 30 minutes at ambient temperature of 40°C (104°F) or lower.

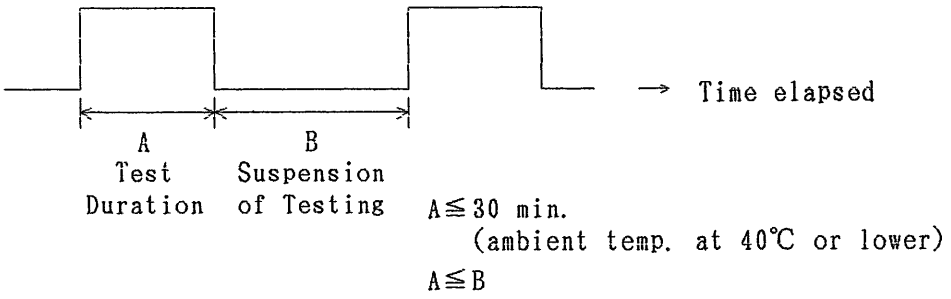


Figure 3.6

The above timing is not applicable if the tester is used at the CUTOFF CURRENT setting of 5mA or lower.

(3) This tester can be properly used with the input power supply of nominal input voltage ±10%, but its operation becomes incomplete outside of this range and leads to possible failures.
It is thus important to adjust the power supply within the range of nominal input voltage ±10% by any proper means.

(4) The operation and storage of the tester under exposure to the direct sunshine, high temperature and humidity or dusty environment should be avoided.

4. OPERATION INSTRUCTIONS

4.1 Description of Front Panel

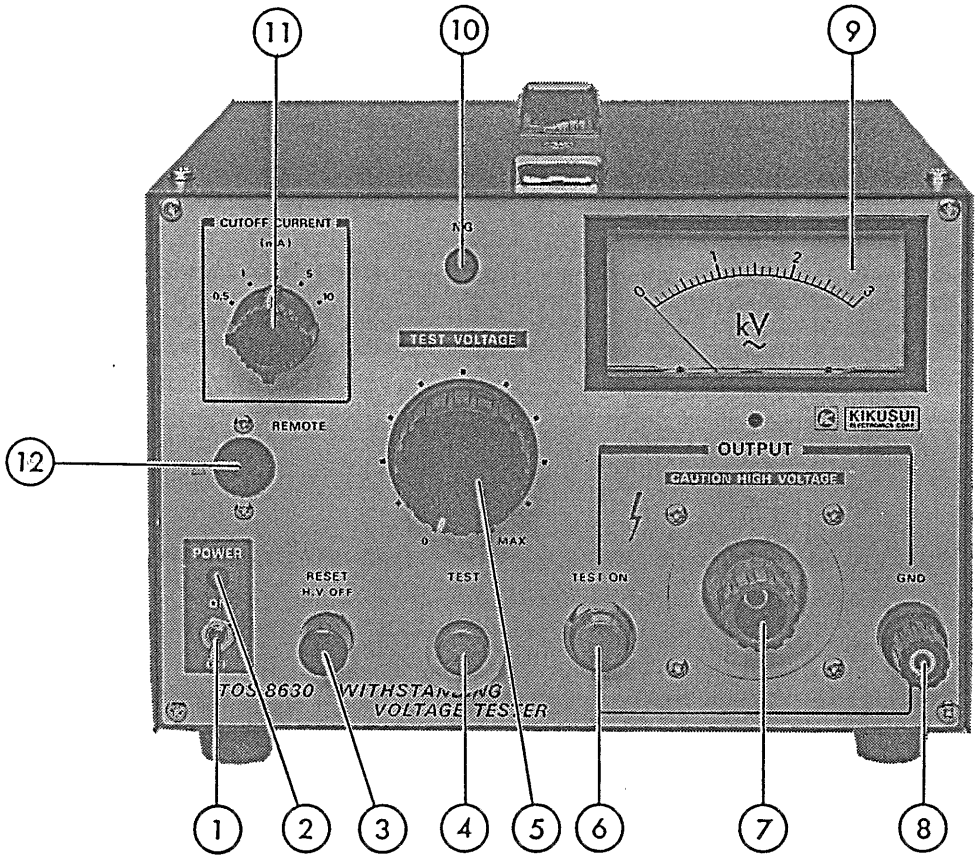


Figure 4.1

① POWER (ON/OFF) switch:

Main power switch of instrument. Before turning on this switch, be sure to read Section 3 "WARNINGS."

② Power pilot lamp

Indicates that the instrument power is on.

③ RESET button (HV OFF):

To stop the test or to cut off the HV output after test operation is over, press this button. This button is used also to reset the NG alarm state.

④ TEST button:

As you press this button when the instrument is in the reset state, the TEST ON lamp lights and the test voltage as set by the TEST VOLTAGE dial is delivered to the output terminal.

⑤ TEST VOLTAGE dial:

For setting the withstanding test voltage. The "0" position is for the minimum output and the voltage increases as this dial is turned clockwise. Be sure to keep this dial in the "0" position whenever no test is being done.

⑥ TEST ON lamp:

This red lamp indicates that the test voltage can be delivered to the OUTPUT terminal simply by turning ⑤ TEST VOLTAGE dial or the test voltage is being delivered.

⑦ OUTPUT terminal:

The hot line of the test voltage.

⑧ GND terminal:

The ground line of the test voltage. Electrically, this line is connected to the instrument chassis.

⑨ Voltmeter:

Indicates the output voltage (the voltage at the high voltage output terminal).

⑩ NG lamp:

Indicates that result judgement is no good.

⑪ CUTOFF CURRENT [mA]:

This knob is to set the leak current detection reference value to the 0.5, 1, 2, 5, or 10 mA. If a leak current larger than the set reference value flows in the D.U.T., the Tester makes the NG judgement, cuts off instantaneously its output, and generates the NG alarm signal.
The reference value should be set in conformity with the specification of the D.U.T. or other requirement.

⑫ REMOTE CONTROL connector:

When the instrument test/reset is remote controlled, the cable of the remote control box (Model 913A, 914A,) is connected to this connector. It also is used to connect other control signal. Be sure to read Section 4.3.3 "Remote Control" before operating the Tester in the remote control mode.

4.2 Description of Rear Panel

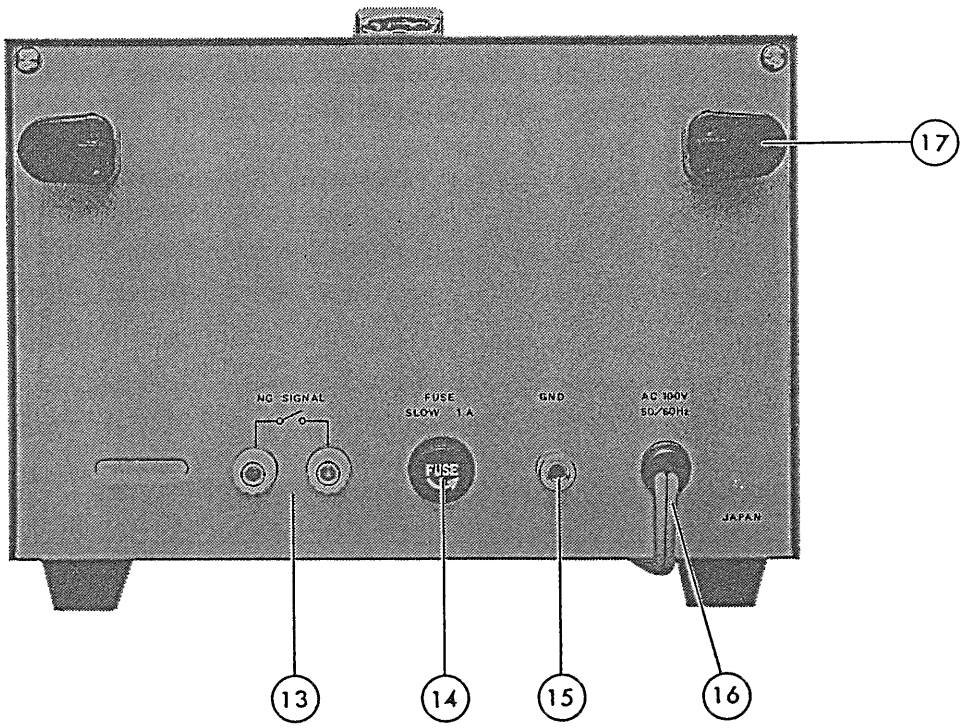


Figure 4.2

⑬ NG SIGNAL output terminal:

Provides a make-contact NG signal. The contact rating is 100V AC, 1A or 30V DC, 1A. Refer to Section 4.3.4 "Contact Signal Output."

⑭ Fuse:

Fuse of the AC power line.

Nominal Voltag	Fuse
100 V, 110 V 115 V, 120 V	1 A (S.B)
200 V, 220 V 230 V, 240 V	0.5 A (S.B)

⑮ Protective GND terminal:

To ground the instrument to an earth ground. Be sure to ground the instrument to the earth via this terminal.

⑯ AC XXXV 50/60 Hz:

The AC input power cord of the instrument.

⑰ Cord hook:

When the innstrument is not in use, the AC power cord may be taken up onto the hooks.

4.3 Operating Procedure

4.3.1 Procedure Before Test

(1) Before turning on the instrument power switch, check that the voltmeter is indicating the "0" scale position. If the meter is not indicating the "0" positions, adjust it to this position with its mechanical zero adjustment at its center. If the instrument power has been on, turn it off and then check the meter.

(2) After thoroughly reading and noting the items of Section 3 "WARNINGS," turn on the POWER switch and proceed as explained in this section.

4.3.2 Test Procedure

(1) Setting the leak current limit reference value:
With the CUTOFF CURRENT knob, set the leak current limit reference value as required by the D.U.T..

(2) Setting the test voltage:
Check that the TEST VOLTAGE dial is at the counterclockwise extreme position, and then press the TEST button. Gradually turn clockwise the TEST VOLTAGE dial to set the required test voltage. Press the RESET button to cut off the output.

(3) Connectiong the D.U.T.:
First of all, make sure that "the output voltmeter indication is 0" and "the TEST ON lamp is OFF." Next, connect the GND-side test leadwire to the GND terminal of the Tester and, with this leadwire, short the high voltage output terminal of the Tester to make sure that it is not charged to a high voltage. Next, connect the high-voltage-side leadwire to the high voltage output terminal of the Tester. Connect the GND-side leadwire to the D.U.T. and then connect the high-voltage-side leadwire to the D.U.T..

(4) Test procedure:

(a) Press the TEST button so that the test operation commences.

(b) When a leak current larger than the limit value set by the CUTOFF CURRENT knob has flowed, the NG judgment is done and the output is instantaneously cut off and the NG alarm signals with a lamp, buzzer and make-contact are generated. To reset the NG alarm signals, press the RESET button.

(c) When the required test time has elapsed and NG signal is not generated, the Tester makes a good judgement. Press the RESET button to cut off the output.

(d) When the test is over, press the RESET button to cut off the test voltage, turn the TEST VOLTAGE dial to the "0" position, and turn off the Power switch.

4.3.3 Remote Control

(1) The test/reset operation of this instrument can be remotecontrolled with the remote control box (option). As the plug of the remote control cable is connected to the REMOTE CONTROL connector on the instrument front panel, the internal circuit is automatically switched to the remote operation mode. In this case, the TEST button on the instrument front panel becomes idle, although the reset operation can be done either locally on the instrument front panel or remotely from the remote control box.

It also is possible to remote-control the instrument without using the remote control box but by using other control device. This method is explained below.

> Be extremely careful when using this method because the high voltage is on/off-controlled with an external signal. Pay attention so that the high test voltage is not generated inadvertently. Also, provide full measures to ensure that nobody is contacted with the high voltage areas (D.U.T. test lead-wire, probe or output terminal etc.) when the test voltage is being delivered.
> When these measures are unavailable, do not use the follwing remote control method.

① Because the instrument can operate by remote control, the pin No.2

and No.3 of connector must be externally connected.

② By controlling the TEST and RESET contacts shown in Figure 4.3, the test voltage can be on-off controlled in the same manner as done locally on the instrument front panel.

③ In the case of the setup shown in Figure 4.4, the test voltage is turned on when the switch is thrown to the NO Position, and instrument is forcefully reset when the switch is returned to the NC position.

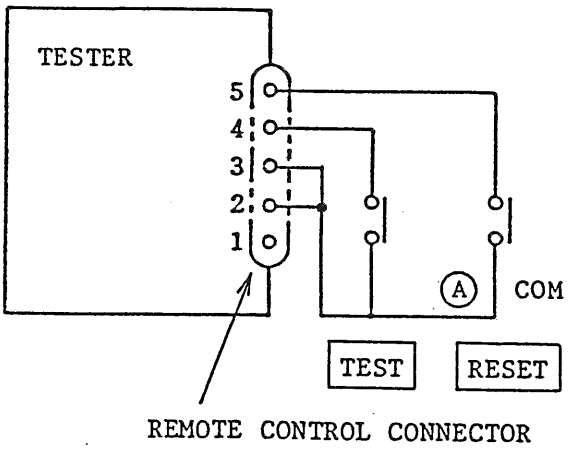


Figure 4.3

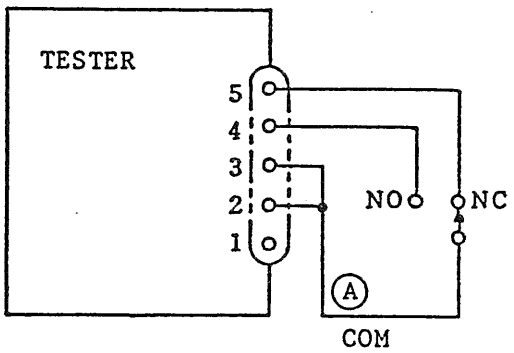


Figure 4.4

④ Logic elements (transistors, FET's, or photocouplers) may be used instead of the switches in Figure 4.3. The signal status for such operation is shown in Figure 4.5. The input conditions of this instrument for such operation are as follows:

- High level input voltage: 11 - 15 V
- Low level input voltage: 0 - 4 V
- Low level sweep out current: 7 mA or less
- Input signal duration needed: 20 msec minimum

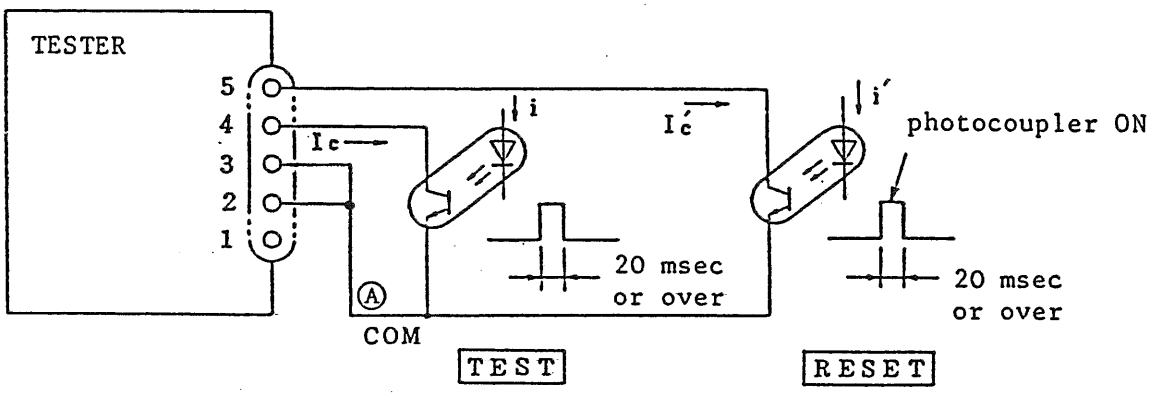


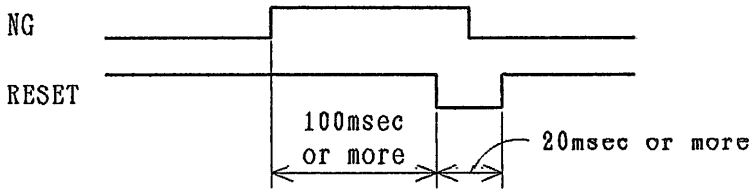
Figure 4.5

Notes: 1. Each of the gates is pulled up to ±15 V. If the input terminal is made open, it becomes equivalent with that a high level input is applied.

2. Pay attention for i and i' so that Ic and Ic' can be pulled by 7 mA or over.

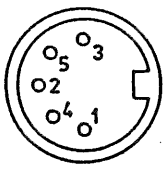
3. An impedance of 5 MΩ or over is needed between the common line (point Ⓐ in Figure 4.5) of the control circuit and the power line or the ground line.

4. The timing of the RESET signal for clearing the NG alarm is as follows.



⑤ As for the elements to be connected to the Tester, the use of photo-couplers as shown in Figure 4.5 or relays as shown in Figure 4.3 would be advantageous from the viewpoint of preventing erroneous system operations which could be caused by noise. Although the Testers are incorporated with the various provisions to guard it against erroneous operations caused by noise generated by itself or its related devices, it is most recommendable to take full attention to prevent noise when setting up the measuring system.

⑥ Note that the layout of pins of the REMOTE CONTROL connector is as per DIN Standard and is not in the due order of number progression as shown in Figure 4.6



Layout of connector pins as viewed from panel surface

Figure 4.6

4.3.4 Contact Signal Output

(1) This instrument provides an NG signal (a make-contact signal) for external use. This signal lasts until the next reset signal is applied.

(2) The contact signal is only with passive contacts and without any power source. Therefore, it cannot drive any load which has no own power.

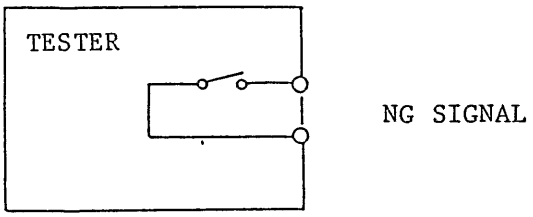


Figure 4.7

A contact which is closed when the signal is applied is called make contact, normally open contact, or form "a" contact. A contact which opens when the signal is applied is called break contact, normally closed contact, or form "b" contact.

The contacts of this instruments is of the make-contact type and its rating is 100 V AC, 1 A or 30 V DC, 1 A. The withstanding voltage between the circuit and the chassis is 500 V AC, 1 minute.

(3) Examples of uses of contact signals are shown in the following:

o To drive a DC buzzer with the NG signal

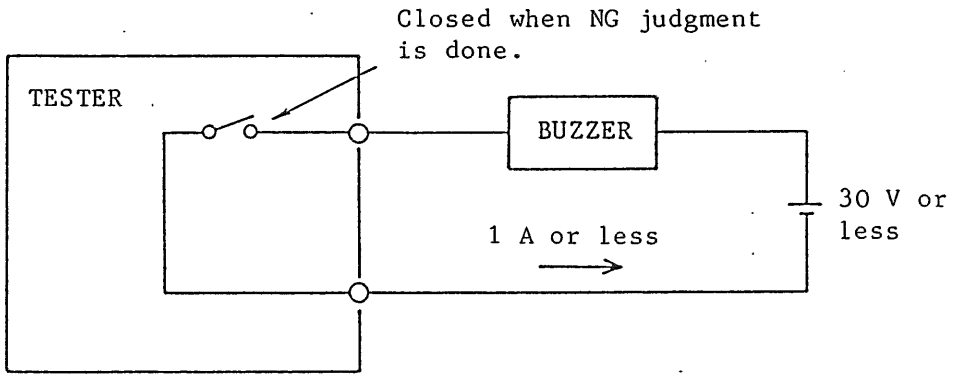


Figure 4.8

o To drive a lamp or buzzer with an AC power

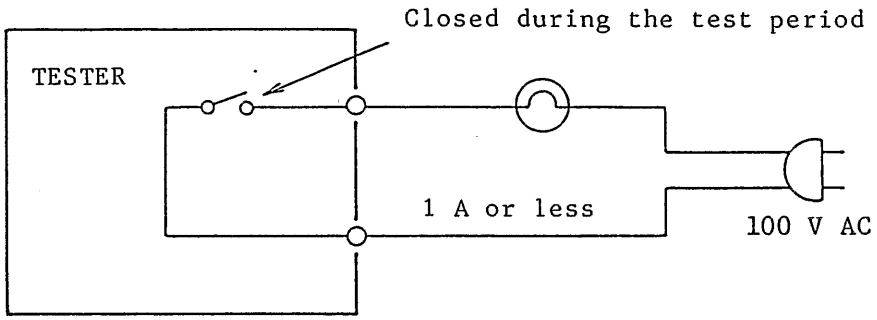


Figure 4.9

o To obtain an "L" level digital signal with the contact signal

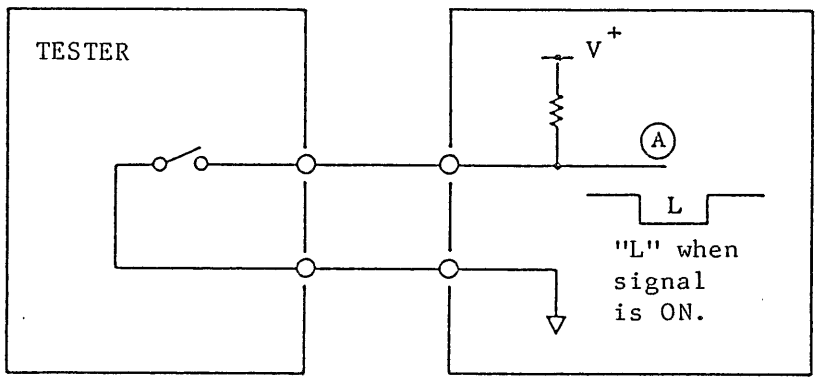


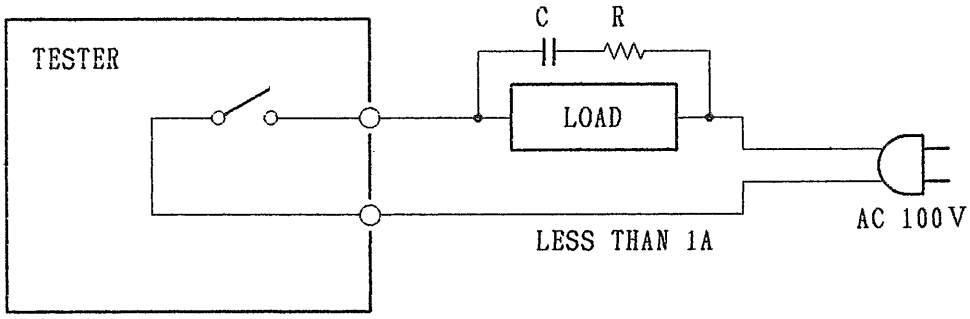
Figure 4.10

In the above illustration, an "L" level signal is obtained at point (A) when the contact output signal is on. However, since the signal obtained at point (A) involves chattering, an appropriate chattering suppression provision should be incorporated depending on the nature of the circuit to be driven by this signal. In some cases, a noise suppression provision may be necessary.

(4) Precaution on using the contact signal

Before using this contact signal, provide a contact protection meausre (to absorb surge) suitable to the using method. Failure can not only cause malfunction of the circuit being connected later but also break the contact of the tester.

The figure 4.11 and 4.12 are the examples of the contact protection method recommended.

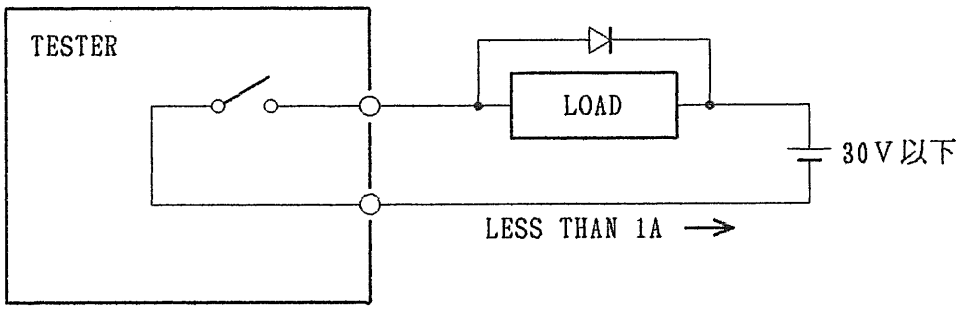


R : Approx. 100Ω 2W or over

C : Approx. 0.1μF AC 250V or higher

(The R and C are reference values only. Select proper values in accordance with the actual conditions.)

Figure 4.11



Diode

Reverse voltage 200V or higher

Foward current 1A or more

(The diode ratings are reference value only. Select proper values in accordance with the actual conditions.)

Figure 4.12

5. OPERATING PRINCIPLE

5.1 Block Digram

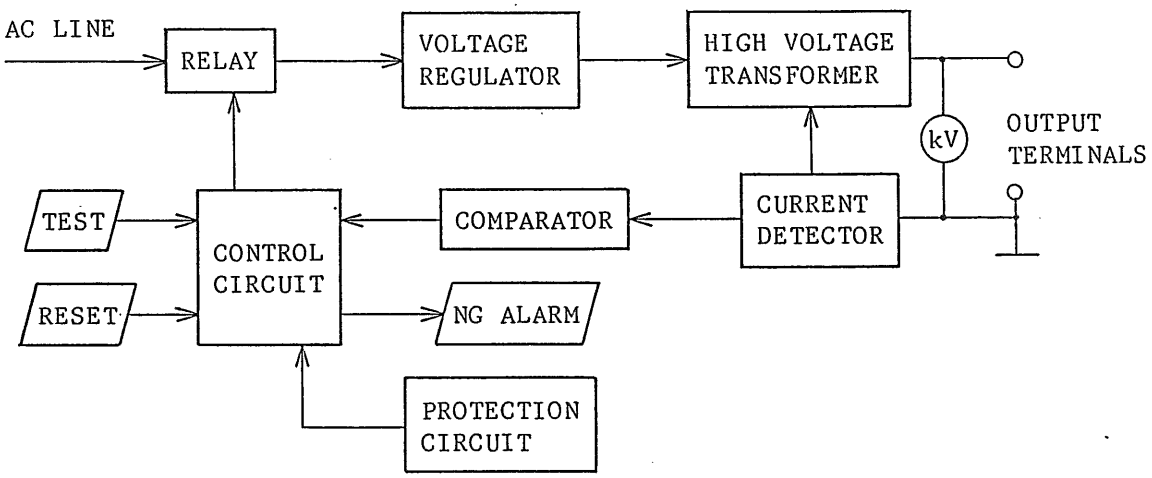


Figure 5.1

5.2 Descriptions of Individual Circuits and Components

① Relay:

On-off controls the power applied to the voltage regulator for withstanding voltage test. A solid-state zero-turn-on type relay circuit is employed to minimize transiential spike voltages caused when the Relay is turned on and off.

② Voltage regulator:

A slide transformer is used to control the output voltage.

③ High voltage transformer:

Boosts the voltage regulator output with a ratio of approximately 1:30 into a high output voltage of 0 to 3 kV. The rating is 3 kV, 10 mA.

④ Voltmeter:

Indicates the output voltage (the voltage of the output terminal).

⑤ Current detection circuit:

Consists of a full-wave-rectifier diode bridge circuit, current detecting resistors for respective ranges, and an integrating circuit.

⑥ Comparator:

Consists of a reference voltage generator and comparator circuit.
Make NG judgment.

⑦ Control circuit:

Controls overall operations of the instrument. Fabricated in high-reliability logic circuits with CMOS IC.

⑨ Protection circuit:

Various protectiye features are incorporated for the safety of test.
But be careful to operate.

5.3 Zero-turn-on Switch

If a regular mechanical contact type relay is used for on-off operation of the primary circuit of the high voltage transformer, transiential spike voltages may be produced, thereby applying an unjustifiedly high voltage to the D.U.T. and causing a possibility of rejecting an acceptable D.U.T or damaging it. The zero-turn-on switch, which employ a solid-state switching circuit, turns on and off the power line at approximately 0 volt level, thereby reducing transiential overshoots.

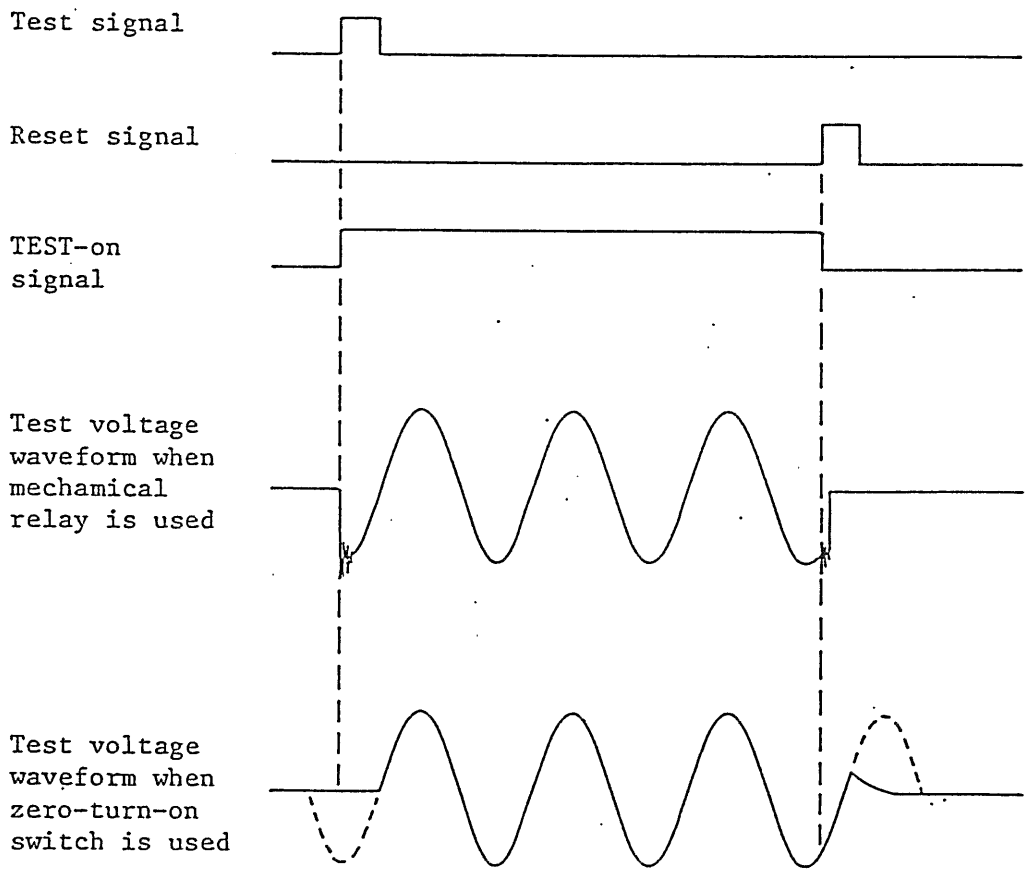


Figure 5.2

— *High-Voltage Test Probe and It's Usage Instruction* —

Two test probes, HTP-1.5A & HTP-3A, are available as optional.
A test probe shall be processed in the following sequence on completion of a testing;

1.) *turn off the switch of the probe, and then*

2.) *release the contact pin of the probe from the D.U.T. after comfirming the LED on probe has been OFF*

It is empharized that the probe shall NOT be processed in the reverse order (2.) & 1.)), or it will spoil the "zero" switching besides it is unsafe.

6. MAINTENANCE

6.1 Cautions

A hazardously high voltage of a level of 3 kV is generated within this instrument. Never attempt to repair the instrument for yourself. For such service, contact your Kikusui agent.

This section covers the calibration procedure of the instrument.
Be extremely careful not to touch the electrically charged parts.

6.2 Calibrations

This section explains the calibration procedures of the voltmeter and the CUTOFF CURRENT value.

(1) Meters and Resistors Required for Calibration

① Voltmeter Ⅰ: A voltmeter which is capable of measuring 5 kV AC (50/60 Hz) and DC, with an accuracy of approximately 1%. (Kikusui Model 149-10A, for example)

② Voltmeter Ⅱ: A voltmeter which is capable of measuring 2.5 V DC, with an accuracy of 0.1%.

③ Milliammeter: A Milliammeter which is capable of measuring 0.5, 1, 2, 5, and 10 mA AC (50/60 Hz) and DC, with an accuracy of approximately 1%.

④ Load resistors: Resistors as shown in Table 6.1, for calibration of CUTOFF CURRENT values. The resistors for the points calibration of which is omitted are not required.

Table 6.1

Cutoff current [mA]	Load resistor	
	Resistance [Ω]	Power consumption [W]
0.5	2M	0.5
1	1M	1
2	500k	2
5	200k	5
10	100k	10

Note 1: The working voltage ratings of the resistors must be 1 kV AC or over. The accuracies of resistances must be 5% or better.

Note 2: The resistances must have wattages with sufficient allowances for the above-mentioned power consumptions.

(2) Preparation and Notes Before Starting Calibration

① Before turning on the power switch, perform mechanical zero adjustment of the voltmeter.

② Turn on the power switch and allow a stabilization period of approximately 15 minutes.

③ The semi-fixed potentiometers are located on the PC board at the left-hand side in the casing. The layout of the potentiometers and test points are shown in Figure 6.2.

(3) Calibration of Voltmeter

① Set that the TEST VOLTAGE dial is at the counterclockwise extreme position ("0" position).

② Connect a standard voltmeter to the output terminal, set the Tester to the TEST ON state, and adjust the output voltage of the Tester so that the standard voltmeter indicates 3 kV.

③ Adjust RV102 (3 kV ADJ) so that the pointer of the voltmeter of the Tester is deflected to the center of the 3 kV scale position.

④ After the calibration is over, turn the TEST VOLTAGE dial to the counterclockwise extreme position ("0" position) and press the RESET button.

(4) Check of Voltmeter Indications

① Check the indication of the Tester voltmeter with the standard voltmeter. The measuring points are 1/2/3 kV indications.

Measuring points may be omitted, added, or changed depending on the purpose of calibration.

(5) Calibration of Cutoff Current (Leak Current Detection Sensitivity)

Measure the Voltage of TP101 with reference to TP100 (GND). For the TP (test point) number, see Figure 6.2.

(6) Check of Cutoff Current

① With the adjustment of Item (5) alone, the cutoff current should satisfy the accuracy of judgment to the specification. If it does not, the Tester is malfunctioning. No further adjustments than that of Item (5) can be made and the Tester needs repair service.

② Set the TEST VOLTAGE dial on the front panel to the counterclockwise extreme position ("0" position).

③ Connect a load resistor and a milliammeter which are corresponding to the set cutoff current, as shown in Figure 6.1. Select a resistance from Table 6.1 in conformity with the set current.

④ Set the Tester to the TEST ON state and gradually increase its output voltage until the Tester generates an NG signal at approximately 1 kV. Turn slightly the TEST VOLTAGE dial counterclockwise, set the Tester again to the TEST ON state, and increase the output voltage very slowly.

⑤ Read the current immediately before the NG signal is generated and the output is cutoff.

⑥ For each of the cutoff current values to be tested, repeat the procedure of Steps ③ - ⑤.

Figure 6.1

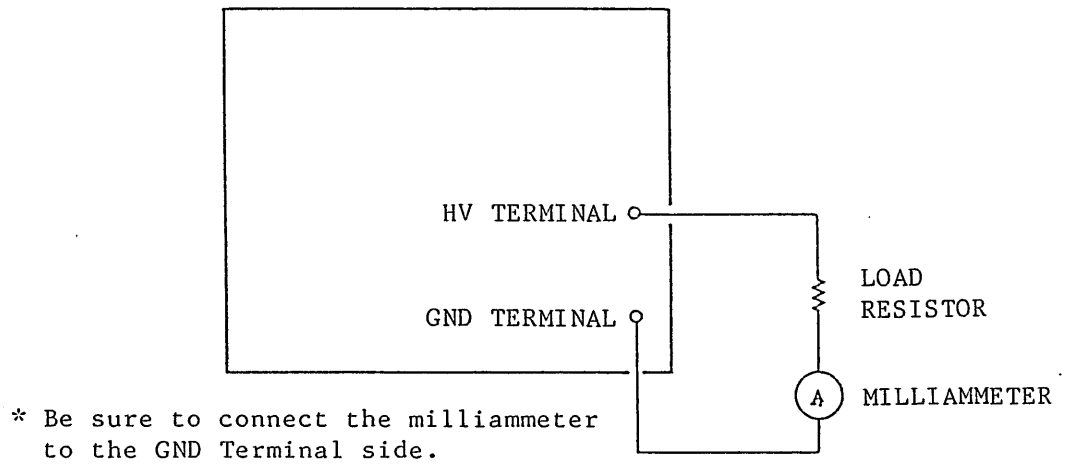
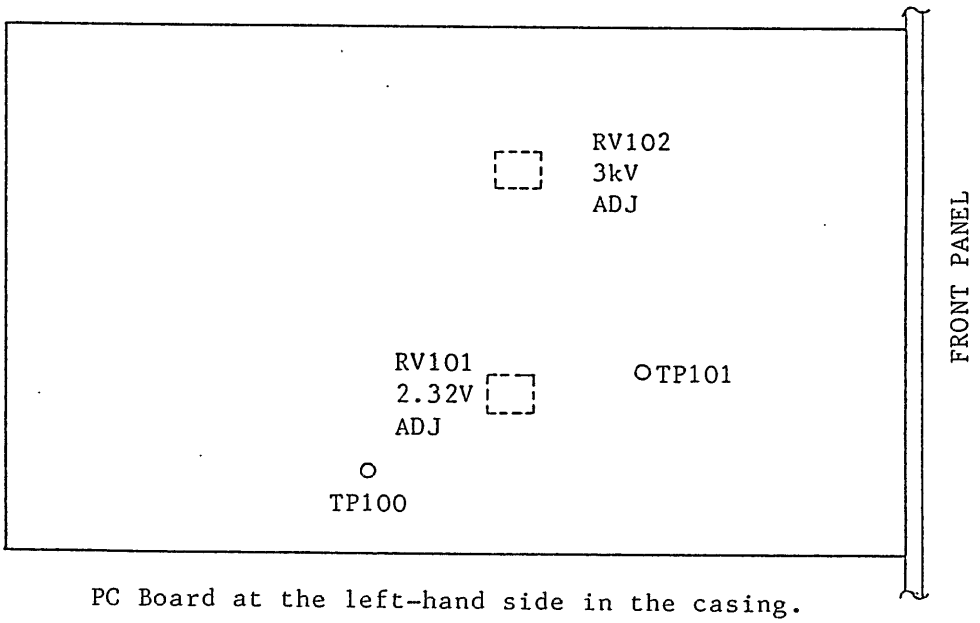


Figure 6.2



PC Board at the left-hand side in the casing.

7. OPTIONS

The following options are available for this instrument.

7.1 Model 913A Remote Control Box

For remote control of test and reset operations.

Specifications

Functions

OPERATE switch:

The TEST button is effective only when this switch is ON. By turning OFF this switch, the output voltage is forcefully reset.

TEST button:

The test voltage is delivered as this button is pressed when the OPERATE switch is ON and the instrument is in the reset state.

RESET button:

This button is used to cut off the test voltage or to reset the NG alarm.

Dimensions: 150 (W) × 70 (H) × 40 (D) mm
(5.9 (W) × 2.8 (H) × 1.6 (D) in.)

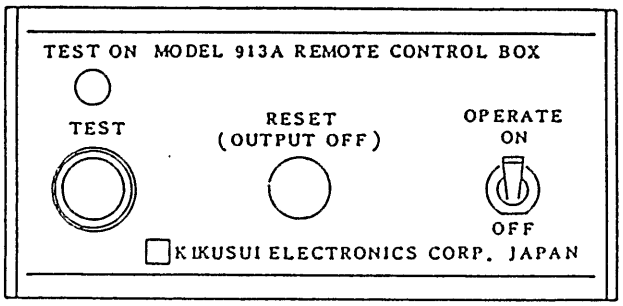


Figure 7.1

7.2 Model 914A Remote Control Box

With this control box, the test voltage is delivered only when the two test buttons are pressed simultaneously.

Specifications

Functions:

Has two TEST buttons and the output voltage is delivered only when the two buttons are pressed concurrently. Other functions are same as those of Model 913A.

Dimensions: 280 (W) × 70 (H) × 40 (D) mm
(11.0 (W) × 2.8 (H) × 1.6 (D) in.)

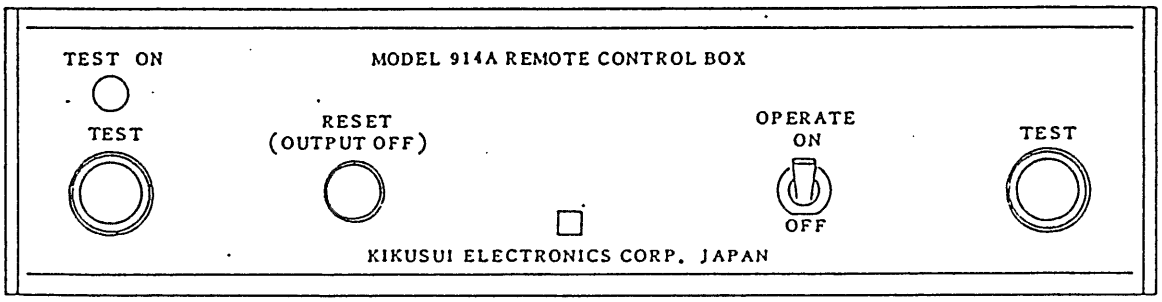


Figure 7.2

7.3 HTP-1.5A High Voltage Test Probe

The test switch can be pressed only after holding the grip, thereby preventing inadvertent turning on of the test voltage. When the test switch is released, the test voltage is reset forcefully.

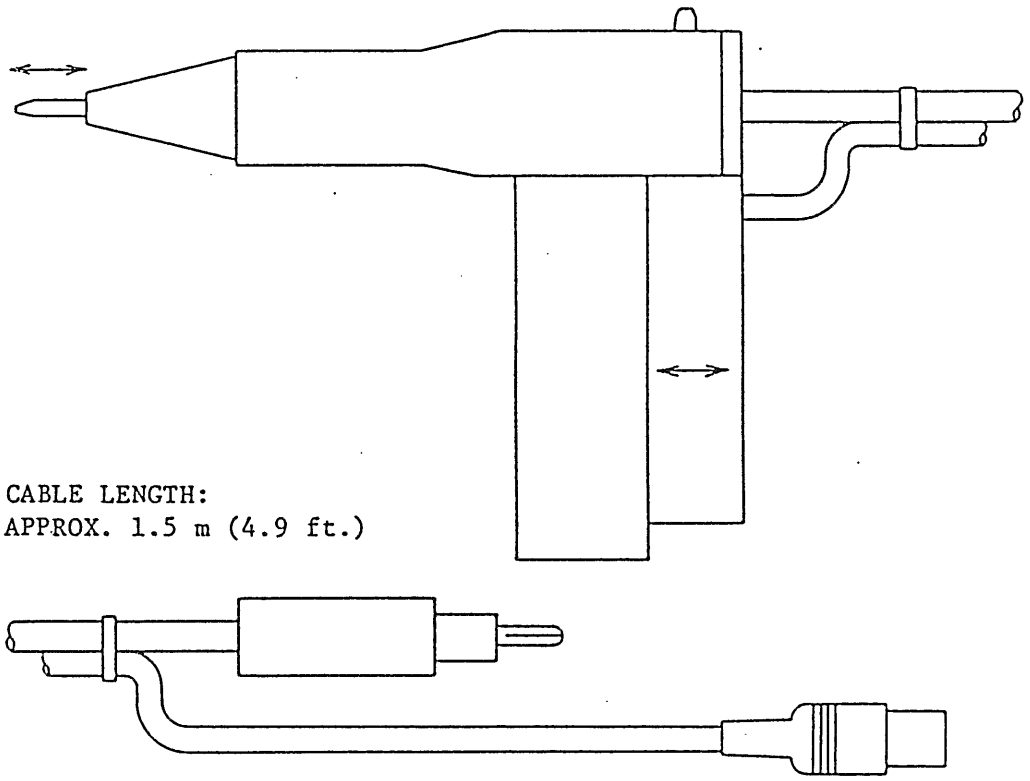


Figure 7.3

WARNING

(1) The maximum allowable working voltage of the probe is 5 kV. Never use it for measurement of voltages higher than 5 kV.

7.4 HTL-3W High Voltage Test Leadwire

The maximum allowable working voltage of the test leadwire is 5 kV. Never use it for measurement of voltages higher than 5 kV. The test leadwire is 3 meters (9.8 ft) long.

7.5 Model 9203 Buzzer Unit

This unit may be used when the sound generated by the buzzer housed in the Withstanding Voltage Tester is not sufficient. This unit can be driven by the NG alarm signal (contact signal) of the Tester.