INSTRUCTION MANUAL

WITHSTANDING VOLTAGE TESTER

MODEL 866AZ

KIKUSUI ELECTRONICS CORPORATION

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1. GENERAL

Model 866AZ Withstanding Voltage Tester provides a test voltage of up to 5 kV with an output capacity of 500 VA. The instrument can be used for withstanding voltage test in compliance with JIS (Japanese Industrial Standards), the Electrical Appliance Control Ordinance issued by the Japanese governmental organization, UL, CSA, and other major Japanese and overseas electrical standards and ordinances.

The instrument has a GO-NOGO judgement function, a remote control function of test on/off, and can provide various output signals, thereby greatly contributing for labor economization in withstanding voltage test.

This instrument has been designed with special specification for voltage regulation and can provide the highest load regulation among the withstanding voltage testers manufactured by Kikusui.

The instrument, which deals with a high voltage, has been designed with full attention to the safety of the operator.

2. SPECIFICATIONS

Power requirements:	100 V ±10%, 50/60 Hz AC
Power consumption	
No load (reset state):	Approx. 3 VA
Full load (5 kV, 100 mA):	Approx. 600 VA
Insulation resistance:	30 MΩ or over (500 V DC)
Withstanding voltage:	1000 V AC, 1 minute
Dimensions:	300 W × 235 H × 290 D mm (11.81 W × 9.25 H × 11.42 D in.)
(Maximum dimensions):	305 W × 260 H × 340 D mm (12.01 W × 10.24 H × 13.39 D in.)
Weight:	Approx. 18 kg (40 lb.)
Accessories:	High voltage test leadwires (HTL-1.5W), approx. 1.5 m long (4.9 ft.) ..... 1 set Instruction manual ..... 1 copy
Test voltage	
Application voltage:	0 - 2.5 kV AC and 0 - 5 kV AC (two ranges)
Wattage rating:	500 VA (5 kV, 100 mA, up to 60 minutes of continuous operation, with 100 V line power)
Waveform:	AC line waveform
Voltage turn on:	Zero-turn-on switch provided
Voltage regulation	
5 kV range:	15% for load current change from 100 mA to no load at output voltage 5 kV
5 kV range:	2% for load current change from 10 mA to no load at output voltage 5 kV

2.5 kV range: 3% for load current change from 5 mA to no load at output voltage 1 kV

(The above values are when the line voltage is 100 V and the leak current detection value is set at 100 mA.)

Output voltmeter

Type of meter:	JIS Class 1
Scales:	2.5 kV range and 5 kV range, linear scales
Accuracy:	±3% of full scale
Indication:	Mean-value response, effective-value scale graduation
Calibration:	For each range, at instrument rear

Output cut off by leak current detection

Ranges:	0.5/1/2/5/10/100 mA (six ranges)
Setting accuracy:	±5%
Detection method:	Current is integrated, compared with the reference value, and calibrated in terms of rms value of sine wave.
Calibration:	For each range, at instrument rear

Note: For NG detection for output terminal shorting at 100 mA range, an output voltage of 300 V or over is required.

Current limiting: A current limiting resistor is connected in the high voltage transformer primary circuit and the resistor can be on/off-controlled from the instrument rear. The current limiting action is automatically released when the instrument is set for leak current detection at 100 mA.

Test method and test time

Test method:	Manual test or test with timer
Test time:	Timer setting 2 - 60 sec.

Test result judgement:

When a leak current larger than the set value is detected, the output is instantaneously cut out and an NG alarm signal is generated. If no NG judgement is done until the end of test with the timer, the GOOD signal is generated for about 50 msec.

There are three types of NG alarm signals and GOOD signal as follows:

- o Lamp
- o Buzzer (loudness adjustable)
- o Make contact signal (100 V AC, 1 A, or 30 V DC, 1 A)

Test on signals

The following signals are generated when test is being performed.

- o Lamp
- o Make contact signal (100 V AC, 1 A, or 30 V DC, 1 A)

Leak current measuring terminals

The current that flows in the tested object can be measured by connecting a milliammeter to these terminals.

Remote control

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

- o When the remote control box (optional) is used.
- o When the high voltage test probe (optional) is used.
- o When make-contact signal control is done with an external relay or other device.
- o When low active control is done with logic elements.

  The input conditions of this instrument are as follows:

High level input voltage:	11 - 15 V
Low level input voltage:	0 - 5 V
Low level sweep-out current:	1 mA

Note: Since the internal gate is pulled up with a resistor, a state equivalent to the high level input is obtained when the input terminals are made open.

Ambient temperature and humidity

Specification ranges: 5 to 35°C (41 to 95°F), 20 to 80% RH

Operable ranges: 0 to 40°C (32 to 104°F), 20 to 80% RH

Options:

- o Model 913A Remote Control Box

  Used being connected to a front panel connector, for remote control of test and reset operations.

- o Model 914A Remote Control Box

  The test is turned on only when test buttons are pressed with both hands. Used when extra high operation safety is required.

- o HTL-3W High Voltage Test Leadwire

  Test cable approx. 3 m (9.8 ft.) long

- o HTP-1.5A High Voltage Test Probe

  High voltage test probe designed for high operating safety and operability. Cable length approx. 1.5 m (4.9 ft.).

3. PRECAUTIONS BEFORE USE

3.1 Unpacking and Inspection

The instrument is shipped after being fully adjusted and inspected at the factory. Upon receiving the instrument, immediately unpack it and check for any sign of damage which might have been caused when in transportation. If any damage is found, immediately notify the bearer or, if malfunctioning is found, notify your Kikusui dealer.

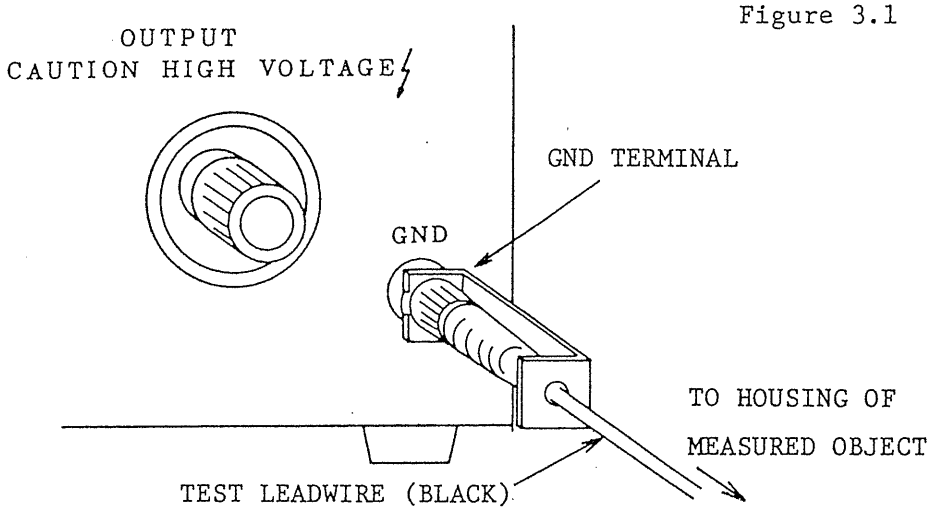
3.2 Precautions for Operation

This instrument has been designed with full attention to safety because this instrument handles a high voltage. Yet, as the instrument provides as high voltage as 5 kV to the external cir-circuit, serious hazards are unavoidable unless the instrument is handled correctly. Be sure to be extremely careful and observe the following when operating the instrument.

(1) Be sure to connect securely the GND terminal to a good grounding earth line. If grounding is imperfect, the instrument casing can be charged to the high voltage of the instrument when the output is shorted to the ground line or power line and hazards can be caused to the operator when he touches the instrument.

(2) The connection method of the test leadwire of the GND side is shown in Figure 3.1. Be sure to check for that this leadwire is not open, each time the instrument is used. Also be sure to connect at first the GND terminal to the ground line of the measured object. If it is not securely connected, the measured object becomes a floated state and a dangerously high voltage may be built up in the measured object.

Figure 3.1



(3) Be sure to wear gloves whenever operating this instrument, in order to guard against electric shock hazards.

(4) Before turning on the power switch, make it sure that the TEST VOLTAGE dial is in the counterclockwise extreme position ("0" position).

(5) Except when test is being done, keep the TEST VOLTAGE dial in the counterclockwise extreme position ("0" position). Also, press the RESET (HV OFF) button for the sake of safety. Be sure to turn off the power switch each time the instrument is not used even for a short period of time or when the operator leaves the instrument.

(6) Before changing the voltage RANGE switch, make it sure that the instrument is in the reset state and the TEST VOLTAGE dial is turned to the counterclockwise extreme position ("0" position).

(7) Never touch the tested object, leadwires or the output terminals when the instrument is in the TEST ON state and the test voltage is being delivered.

(8) Before touching the test leadwires or output terminal, be sure to check the following:

(a) The output voltmeter indication is zero.

(b) The TEST ON lamp is off.

Also short the high voltage OUTPUT terminal to the GND terminal with the test leadwire of the GND terminal side.

(9) Do not short the output to the ground line or AC power line, lest the instrument housing should be charged up to a hazardously high voltage. It is permissible, however, to short the high voltage OUTPUT terminal to the GND terminal when the instrument housing is grounded to an earth line.

(10) In case of an emergency, immediately turn off the POWER switch and disconnect the AC power cord from the AC line receptacle.

(11) If the TEST ON lamp does not go off even when the RESET button is pressed, it is possible that the output is delivered irrespective of TEST ON/OFF control. When such state is caused, immediately stop using the instrument and contact your Kikusui dealer for repair.

When the TEST ON lamp has failed and does not turn on, immediately replace it or contact your Kikusui dealer for repair.

(12) When the instrument is remote controlled, the high voltage output is turned on and off with an external signal. When operating the instrument in this mode, be extremely careful so that the high voltage output is not turned on inadvertently.

To make use of the instrument in good conditions for a long time, pay attention to the following:

(1) When in the no-load state, the maximum output voltage of the instrument becomes higher than 5 kV. An output voltage higher than 5 kV may be produced also when the AC line voltage has surged up. Operate the instrument with an output voltage not higher than 5 kV, whenever possible.

(2) This instrument operates normally with an AC power line voltage range of 100 V ±10%. If the AC line voltage is not within this range, the instrument operation becomes unstable and damage may be caused to the instrument. When the AC line voltage in your area is not within this range, step it up or down into this range using an appropriate device.

(3) Do not use or store the instrument in direct sunlight, in high temperature or humidity, or in dusty atmosphere.

This instrument employs a high voltage output transformer of 500 VA. Therefore, a large input power current (several tens amperes) may flow for several tens milliseconds before the NG signal is detected and the output current is cut off in case an overcurrent has flowed in the load being tested. Pay attention to the AC line capacity taking also into consideration the other instruments and devices connected to the same AC power line.

4. OPERATION INSTRUCTIONS

4.1 Description of Front Panel

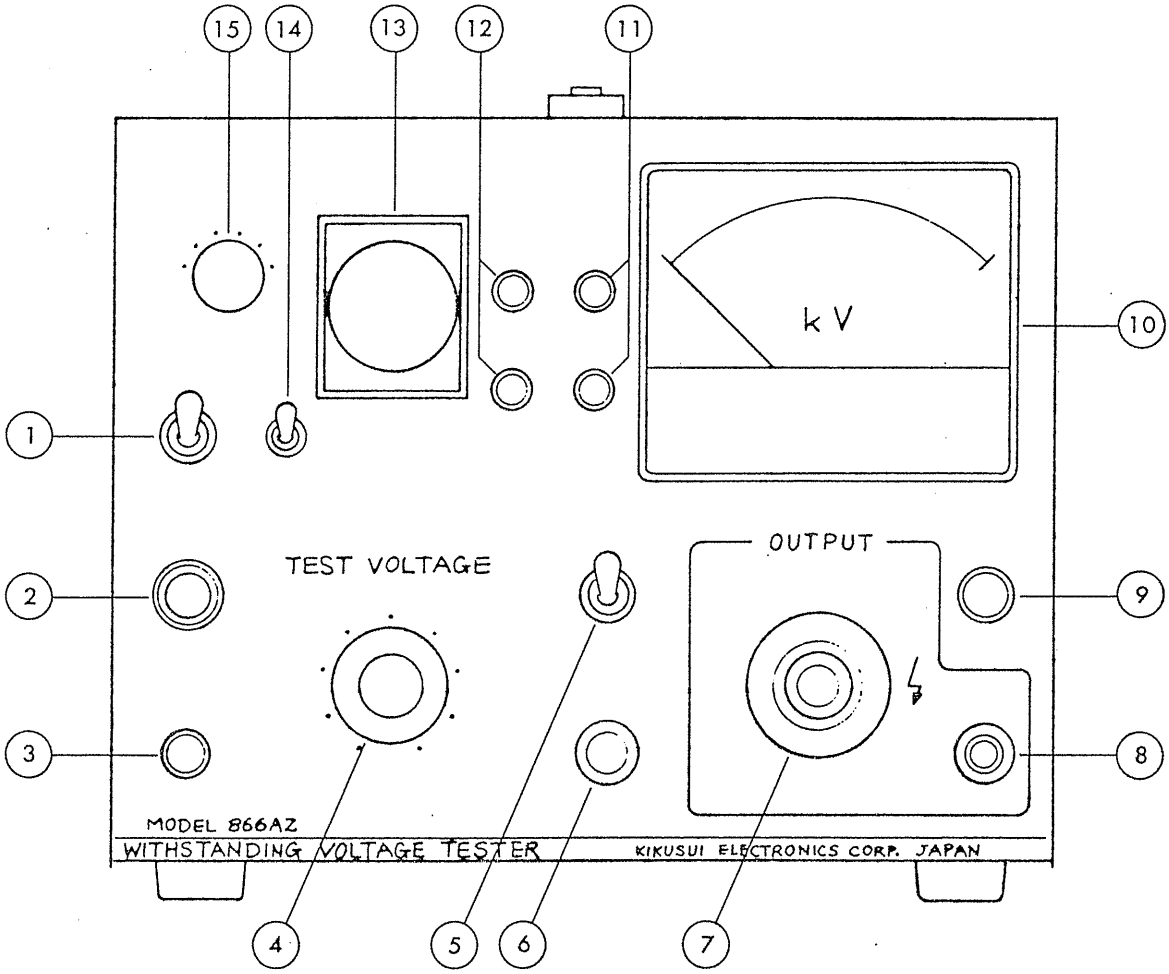


Figure 4.1

(1) POWER (ON/OFF) switch:

Main power switch of instrument. Before turning on this switch, be sure to read Section 3.2 "Precautions for Operation."

② TEST button:

As you press this button when the instrument is not in the NG alarm state, ⑥ TEST ON lamp lights and the test as set by ④ TEST VOLTAGE dial is delivered to ⑦ OUTPUT terminal.

③ RESET button (HV OFF):

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 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.

⑤ RANGE switch:

Selects a test voltage range (5 kV range or 2.5 kV range).

⑥ TEST ON lamp:

This red lamp indicates that the test voltage can be delivered to the OUTPUT terminal or the test voltage is being delivered.

⑦ OUTPUT terminal:

The high voltage 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 REMOTE CONTROL connector:

When the instrument is remote controlled, the cable of the remote control box is connected to this DIN-type connector.

⑩ Voltmeter:

Indicates the output voltage.

⑪ Test voltage range lamps (5 kV/2.5 kV):

Indicates the test voltage range being used (5 kV or 2.5 kV).

⑫ Test result lamps (GOOD/NG):

Indicate the test result. If the result of GO-NOGO judgement is GOOD, the GOOD lamp lights; if it is NOGO, the NG lamp lights. The NG lamp lights continuously; the GOOD lamp lights only for about 50 msec.

⑬ TIMER:

For test time setting, with the center knob.

⑭ TIMER/MANUAL switch:

Selects the test mode between TIMER and MANUAL. When set in the TIMER mode, the test voltage is applied for the period set by ⑬ Timer; when it is set in the MANUAL mode, the test voltage is applied continuously.

⑮ LEAK CURRENT dial:

Sets the reference value for leak current detection. The value can be set at 0.5, 1, 2, 5, 10 or 100 mA. If a leak current larger than the set value flows in the tested object, judgement is done to be NG and the output is instantaneously cut off. The dial should be set at a value corresponding to the requirement of the tested object.

4.2 Description of Rear Panel

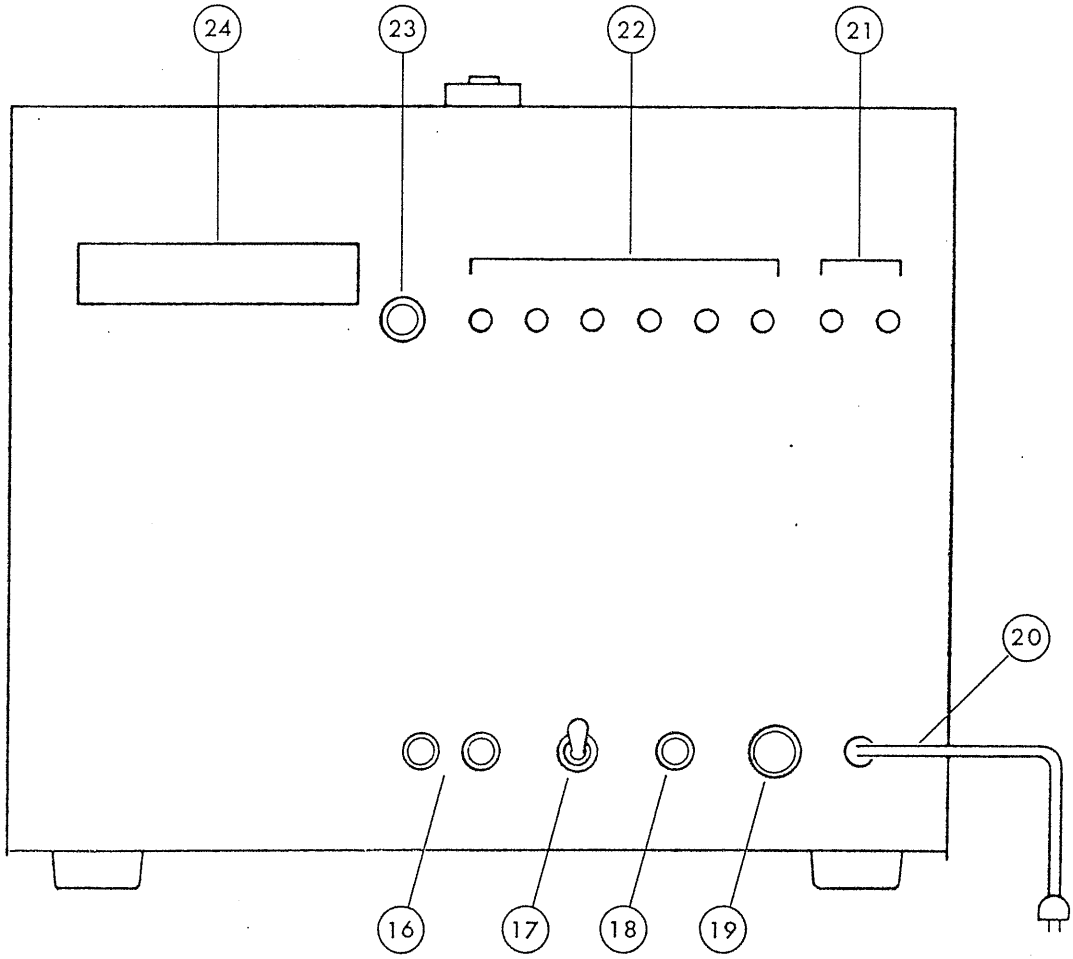


Figure 4.2

(16) CURRENT MONITOR terminals:

The leak current can be directly monitored by disconnecting the shorting bar from these terminals and connecting a milliammeter between them. The milliammeter should be capable of measuring the current set by (15) LEAK CURRENT dial. Be sure to connect the shorting bar when the current is not measured.

⑰ CURRENT LIMITING switch:

This switch selects either the current limiting function is to be brought into effect or not in case of shorting of the load when ⑮ LEAK CURRENT knob is set at one of the 0.5 - 10 mA ranges. Set this switch in the OFF state when a test with a good regulation is required; else, set this switch in the ON state.

⑱ GND terminal:

To ground the instrument to an earth ground.

⑲ Fuse:

Fuse of the AC power line (10 amperes).

⑳ AC power cord

㉑ VOLTMETER ADJ (2.5 kV/5 kV) potentiometers:

Semi-fixed potentiometers to calibrate voltmeter indication, for the 2.5 kV range and 5 kV range, respectively.

㉒ LEAK CURRENT ADJ (0.5 - 100 mA) potentiometers:

Semi-fixed potentiometers to calibrate the reference leak current detection values for ranges 0.5 - 100 mA with respective potentiometers.

㉓ BUZZER loudness control:

Controls the loudness of sound of the buzzer, which sounds continuously for an NG alarm or only for about 50 msec for a GOOD judgement signal.

㉔ Signal output terminal:

Provides various make-contact signals (each contact is made when its signal is generated and it is broken when its circuit is reset). The contact rating is 100 V AC, 1 A or 30 V DC, 1 A.

- o GOOD signal:

  A GOOD signal is generated if no NG signal is generated until the end of test. This terminal is for such GOOD signal. While the NG signal lasts long, the GOOD signal lasts only for about 50 msec. The GOOD signal is not generated when a test is done without using the timer.

- o NG signal:

  A contact signal as an NG alarm signal is delivered.

- o TEST ON signal:

  A signal is delivered to indicate that a test is being performed.

4.3 Operating Procedures

Test Procedure

Be sure to read thoroughly Subsection 3.2 "Precautions for Use" before starting operating the instrument. To operate the instrument for withstanding voltage test, proceed as follows.

(1) Turning on the instrument power:

Check that (4) TEST VOLTAGE dial is set at the counterclockwise extreme position ("0" position). Then, turn on (1) POWER switch.

(2) Selecting the test voltage range:

Select the required test voltage range (2.5 kV or 5 kV) with (5) RANGE switch. The corresponding indicator lamp will light.

(3) Setting the leak current limit reference value:

With ⑮ LEAK CURRENT dial, set the leak current limit reference value as required by the tested object.

(4) Connecting the tested object:

After making sure that the output voltmeter and the TEST ON lamp are in the below-mentioned states, short the high voltage OUTPUT terminal to the GND terminal with the test leadwire of the GND terminal. Next, connect the test leadwire of the GND terminal to the tested object. Then, connect the test leadwire of the high voltage side to the tested object.

- o The output voltmeter indication is "0".
- o ⑥ TEST ON lamp is off.

(5) MANUAL test:

(a) Set ⑭ TIMER/MANUAL switch to the MANUAL state. Press ② TEST button, and ⑥ TEST ON lamp will light indicating that the instrument is ready to supply the test voltage. Gradually turn ④ TEST VOLTAGE dial so that the output voltage applied to the tested object increases.

(b) After the test is over, press ③ RESET button, and the output voltage is turned off.

(c) When a leak current larger than the limit value set in Step (3) by ⑮ LEAK CURRENT dial has flowed in the tested object, 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 ③ RESET button.

(6) TIMER test:

(a) Before connecting the tested object, press (2) TEST button and set the test voltage with (4) TEST VOLTAGE dial. Press (3) RESET button to turn off the test voltage.

(b) Set (14) TIMER/MANUAL switch to the TIMER state. Set with (13) TIMER the test time as required by the tested object.

(c) Connect the tested object as explained in Step (4).

(d) Press (2) TEST button again, and the test operation will start. When the test time set by the timer has elapsed, the tested object is judged to be acceptable and GOOD signals (a lamp signal, a buzzer signal and a contact signal) are generated. These signals last only for about 50 milliseconds.

(e) When an NG signal is generated, the operations are the same with those of the case of (5) MANUAL test.

(7) Re-application of test voltage:

Note that the test voltage is delivered to the output terminals simply by pressing (2) TEST button when in either the MANUAL test mode or TIMER test mode except when in the NG alarm state.

(8) To generate the test voltage only during the period the TEST button is pressed:

Turn (13) TIMER dial to the counterclockwise extreme position ("0" position). When this setting is done, the test voltage is generated only during the period the TEST button is kept pressed. It is immediately turned off as the button is released. If the button is pressed again, the test voltage is generated again. The voltage setting method is the same as that of the case of (6) TIMER test.

Remote Control

This instrument can be remote-controlled with the remote control box (optional). As the plug of the remote control cable is connected to (9) REMOTE CONTROL connector on the instrument front panel, the internal circuit is automatically switched to the remote operation mode. In this case, although the TEST button on the instrument front panel becomes idle, the reset operation can be done either from the instrument front panel or from remote control box.

It also is possible to remote-control the instrument without using the remote control box. 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 the operator's body is not contacted with the output terminal or the test lead-wire when the test voltage is being delivered. When these measures are unavailable, do not use the following remote control method.

(1) 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 at the instrument front panel.

(2) 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

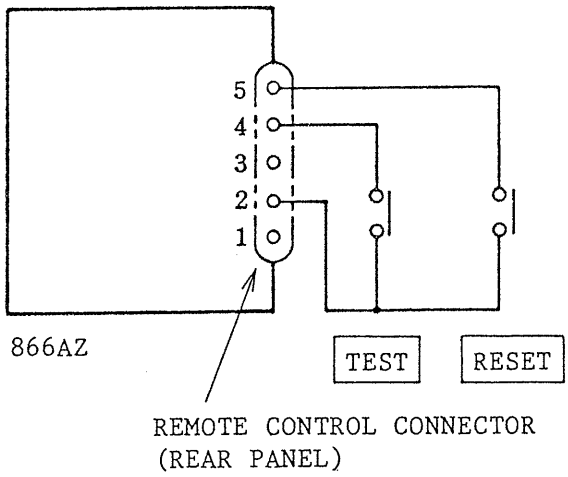
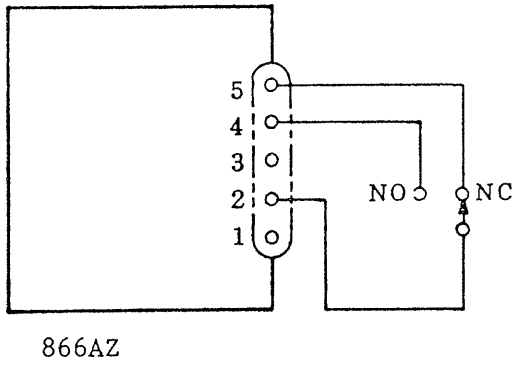


Figure 4.4

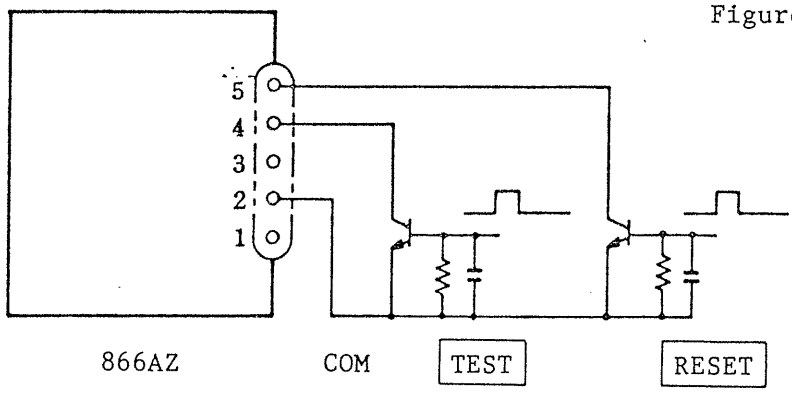


(3) Logical elements or transistors may be used instead of the switches in Figure 4.3. The signal status for such operation is shown in Figure 4.5. The input conditions of this instrument for such operation are as follows:

- o High level input voltage: 11 - 15 V
- o Low level input voltage: 0 - 5 V
- o Low level sweep out current: 1 mA

The internal gate is pulled up to +15 V with resistors. Pay attention to the withstanding voltage rating of the transistors used. An impedance of 5 MΩ or more is required between the earth ground line and the power line or common line of the circuit which controls this instrument.

Figure 4.5



(4) 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.

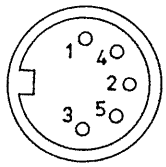


Figure 4.6

Layout of connector pins as viewed from panel side

Contact Signal Outputs

(1) This instrument provides three types of make-contact signals for external use as follows:

- o GOOD signal: This signal is generated when the GOOD judgment is done. The signal lasts for approximately 50 msec.
- o NG signal: This signal is generated when the NG judgment is done. This signal lasts until the next reset signal is applied.
- o TEST ON signal: This signal is generated and remains on for the entire period of test.

(2) The contact signals are only with passive contacts and without any power sources. Therefore, they cannot drive any loads which have no power.

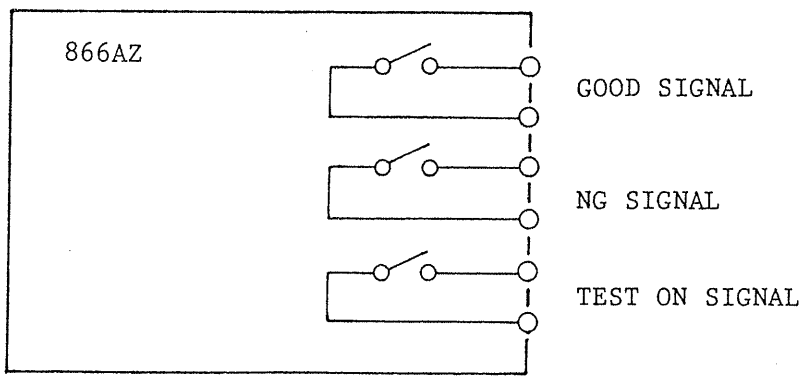


Figure 4.7

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 instrument are of the make-contact type and their rating is 100 V AC, 1 A or 30 V DC, 1 A.

(3) Examples of use of these contacts are illustrated in the following.

(a) To drive a DC buzzer with the NG signal:

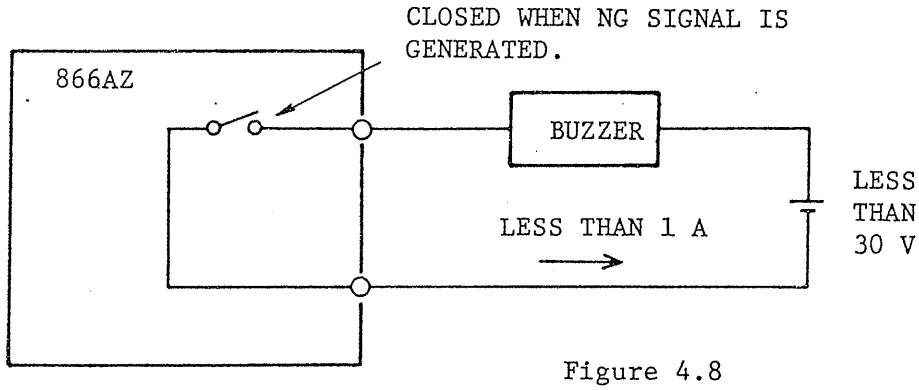


Figure 4.8

(b) To drive a lamp with the TEST ON signal:

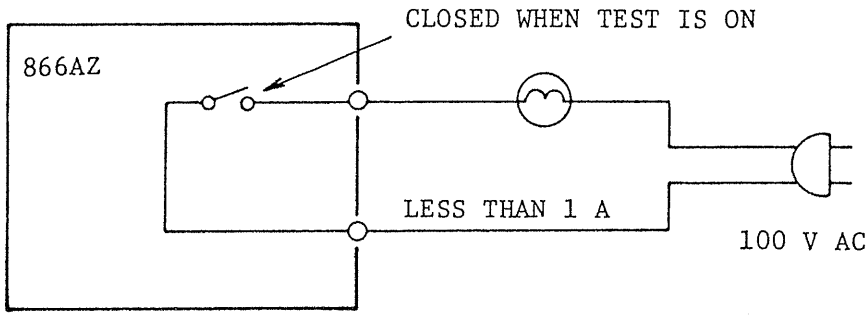


Figure 4.9

(c) To obtain an "L" level digital signal with the contact signal:

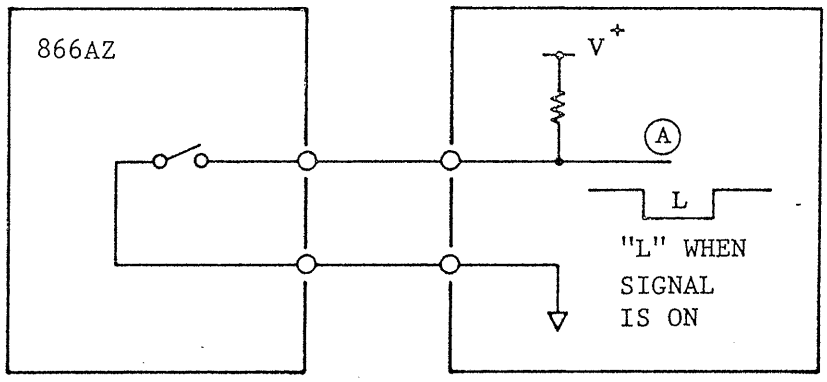


Figure 4.10

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 include 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 needed.

5. OPERATING PRINCIPLE

5.1 Block Diagram

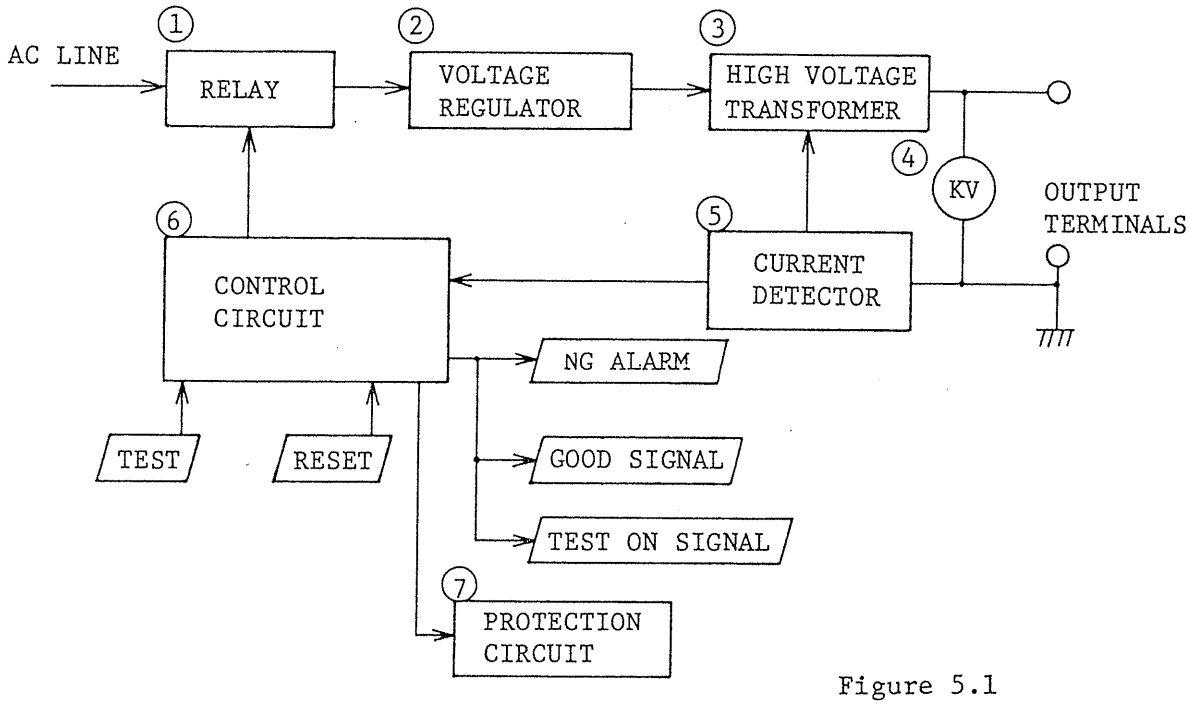


Figure 5.1

5.2 Descriptions of Individual Circuit and Components

① Relay:

ON/OFF-controls the AC line 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 power 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 1:25 or 1:50 into a high output voltage of 0 to 2.5 kV or 0 to 5 kV. The rating is 5 kV, 100 mA (500 VA) when the AC line voltage is 100 V.

④ Voltmeter:

Indicates the output voltage (test voltage) of this instrument.

⑤ Current detector:

Consists of a current detecting resistor, a reference voltage generator circuit, and a comparator.

⑥ Control circuit:

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

⑦ Protection circuit:

Various protective features are incorporated for the safety of test.

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 applving an unjustifiedly high voltage to the tested object and causing a possibility of rejecting an acceptable tested object 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.

However, if the tested object is connected under the state that the test voltage is being delivered, spikes are produced at the instant of contacting and the effect of the use of the zero-turn-on switch is lost. It also is dangerous. Be sure to turn on or off the test voltage using the TEST and RESET buttons after the tested object is securely connected.

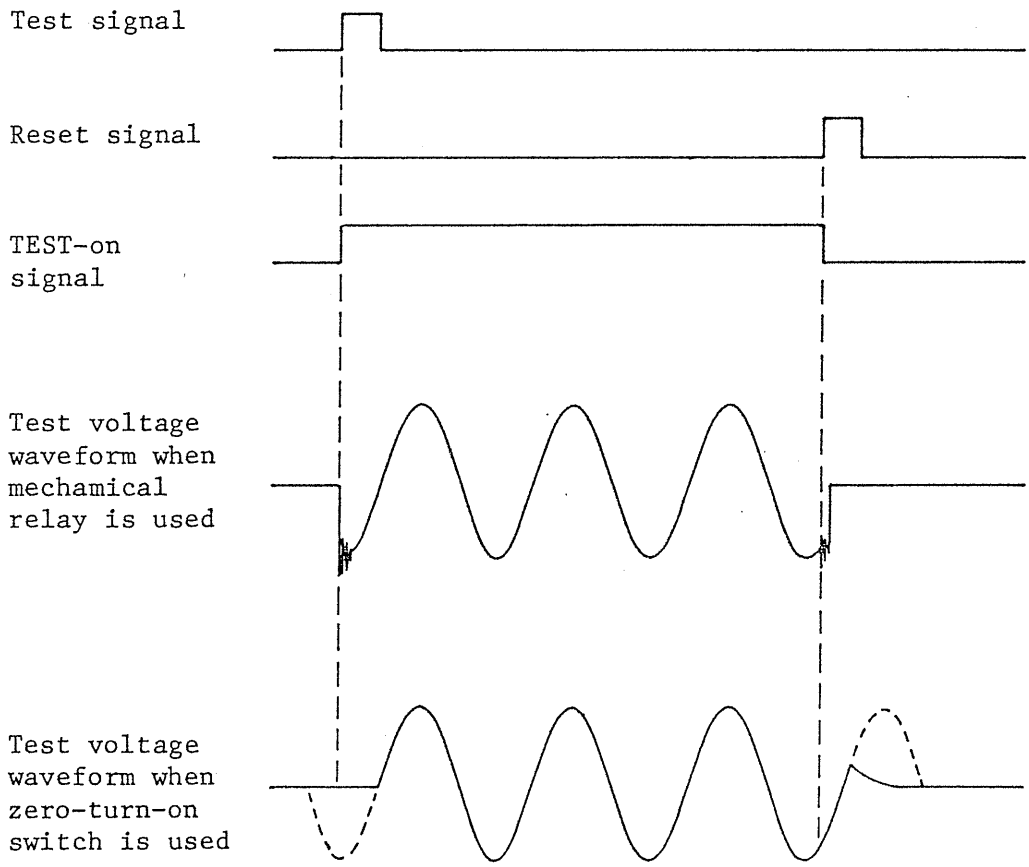


Figure 5.2

5.4 Regulation Provision of Instrument

In order to prevent hazards to the operator and damage to the tested object in such case as shorting of the load, excessive regulation of the instrument can be suppressed by connecting a 5-ohm resistor in the primary circuit of the high voltage transformer at the 0.5 - 10 mA leak current range of the instrument. The 5-ohm resistor is connected when the CURRENT LIMITING switch

on the rear panel is turned on. With this provision the instrument regulation is approximately 5% for 10 mA output to no-load change when the output voltage is 5 kV. At the 100 mA range, the current limiting function is not brought into effect even when the switch is turned on. When the switch is OFF, the resistor is shorted and the instrument exhibits high regulation.

6. MAINTENANCE

6.1 Maintenance

Hazardously high voltage of a level of 5 kV is generated within this instrument. Never attempt to calibrate, check of repair the instrument inside for yourself. For such service, contact your Kikusui dealer.

6.2 Calibration

(1) Meters and resistors required for calibration

(a) Voltmeter which can measure 2.5 kV AC with an accuracy of approximately 1%. (Kikusui 149-10A, for example)

(b) Ammeter which can measure 0.5/1/2/5/100 mA with an accuracy of approximately 1%.

(c) Load resistors: 5k/50k/100k/250k/500k/1MΩ resistors, voltage rating of 500 V AC

(2) Procedure before starting calibration

Before turning on the instrument power switch, make it sure that the voltmeter indicates the "0" scale position. If it has been shifted, adjust it to the "0" position. Then, turn on the instrument power by throwing (1) POWER switch to the top position.

(3) Voltmeter calibration

(a) Set (5) RANGE switch to the 2.5 kV position.

(b) Connect the voltmeter to the output terminals of the instrument, press (2) TEST button, and adjust (4) TEST VOLTAGE dial so that the voltmeter indicates 2.5 kV.

(c) Adjust (21) VOLTMETER ADJ (2.5 kV) semi-fixed potentiometer so that the voltmeter on the instrument front panel indicates 2.5 kV.

(d) Press ③ RESET button, turn ④ TEST VOLTAGE dial to the counterclockwise extreme position ("0" position), and throw ⑤ RANGE switch to the 5 kV position.

(e) Press ② TEST button and adjust ④ TEST VOLTAGE dial so that the externally connected voltmeter indicates 5 kV.

(f) Adjust ㉑ VOLTMETER ADJ (5 kV) semi-fixed potentiometer so that the voltmeter on the instrument front panel indicates 5 kV..

(g) Press ③ RESET button to cut off the test voltage.

(5) Leak current detection sensitivity calibration

(a) Remove the shorting bar from ⑯ CURRENT MONITOR terminals on the rear panel and connect in its place a milliammeter which can measure 0.5 mA. Connect a 1-MΩ resistor between output terminals.

(b) Set ⑤ RANGE switch to the 2.5 kV position and ⑮ LEAK CURRENT dial at 0.5 mA.

(c) Press ② TEST ON button. Observing the milliammeter, raise the output voltage to a point where the NG alarm signal is generated (voltage approximately 500 V and output current approximately 0.5 mA). Read the milliammeter indication in this state.

(d) Repeat the procedure of Step (c) once more or twice and adjust ㉒ LEAK CURRENT ADJ (0.5 mA) semi-fixed potentiometer so that the NG alarm signal is generated exactly at 0.5 mA.

(e) Calibrate the sensitivity for each of 1 - 100 mA ranges, in a similar manner as Steps (a) through (d) above. The full scale of the milliammeter and load resistance for each of the current ranges are as shown in the following table.

Range [mA]	Milliammeter full scale [mA]	Load resistor [Ω]
0.5	0.5	1 M
1	1	500 k
2	2	250 k
5	5	100 k
10	10	50 k
100	100	5 k

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
(5.90 (W) × 2.56 (H) × 1.58 (D) in.)

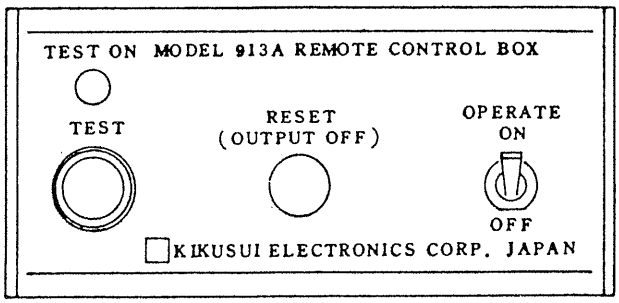


Figure 7.1

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 the same as those of Model 913A.

Dimensions: 280 (W) × 70 (H) × 40 (D) mm
(11.0 (W) × 2.6 (H) × 1.6 (D) in.)

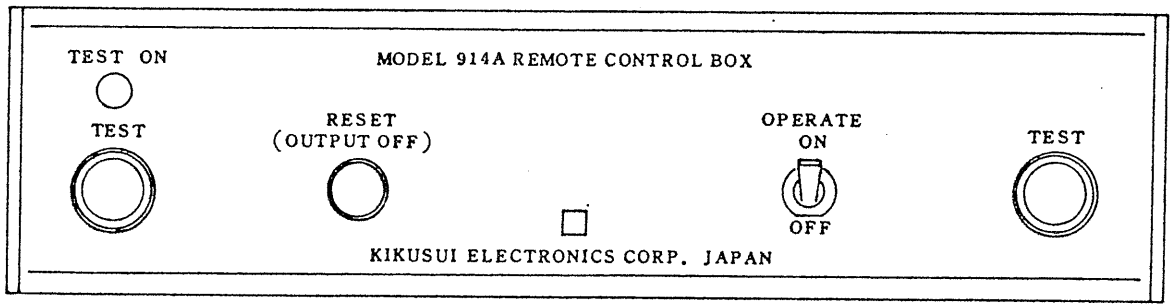


Figure 7.2

7.3 HTL-3W High Voltage Test Leadwire

A high voltage test leadwire approximately 3 m (4.9 ft.) long

7.4 HTP-1.5A High Voltage Test Probe

The HTP-1.5A is designed for high operation safety, yet maintaining good operability. 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.

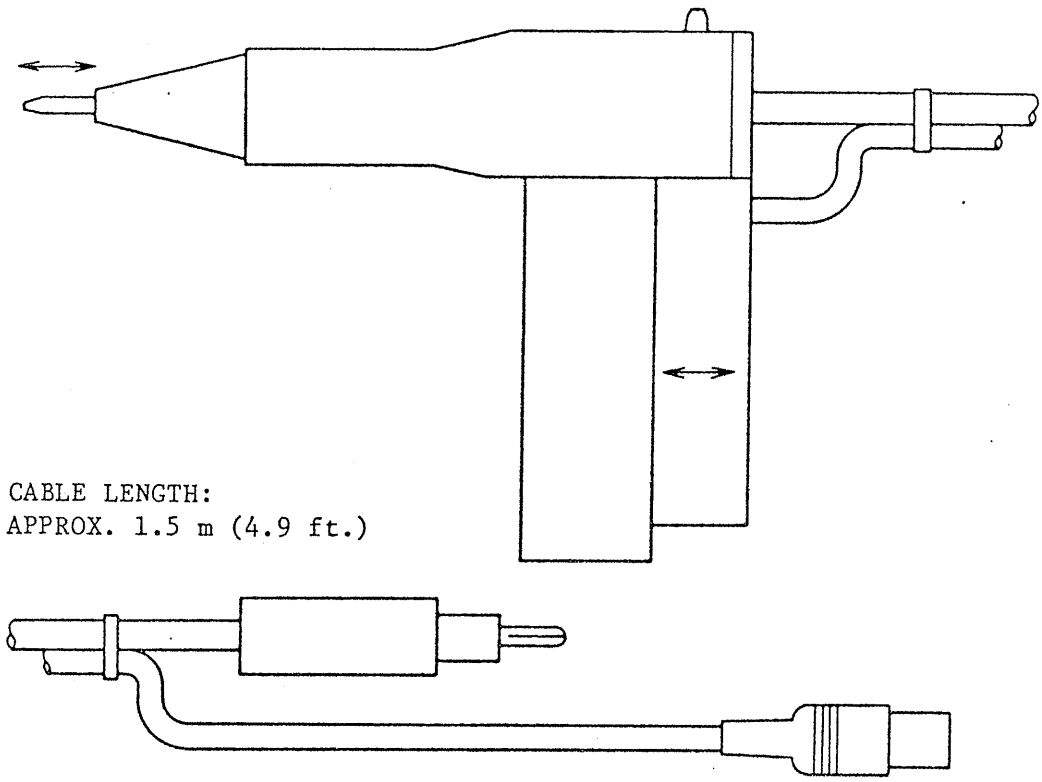


Figure 7.3