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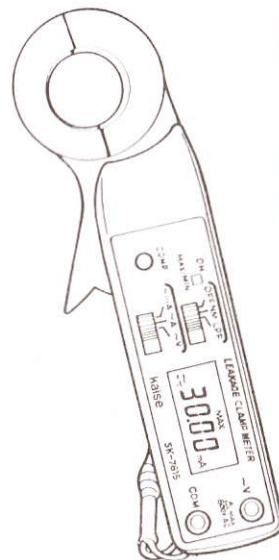
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CE


## INSTRUCTION MANUAL

Digital  
LEAKAGE CLAMP METER

MODEL SK-7810 ~30mA+~300mA+~60A  
MODEL SK-7815 ~mA + ~A + ~V


## KAISE CORPORATION


## FOR SAFETY MEASUREMENTS

Prior to use, to avoid an electrical shock hazard to the operator and/or damage to the instruments, read carefully the WARNINGS with the symbol  listed in [4. SAFETY PRECAUTIONS], [5. MEASUREMENT PROCEDURES] and [6. MAINTENANCE] of this instruction manual.

Important Symbol

: The symbol listed in IEC 1010 and ISO 3864 means "Caution (refer to instruction manual)".

 **WARNING:** The symbol in this manual advises the user of an electrical shock hazard that could result in serious injury or even death.

 **CAUTION:** The symbol in this manual advises the user of an electrical shock hazard that could cause injury or material damages.

### **WARNING**

High Power Line is very dangerous and/or lethal to measure. High Power Line sometimes includes High Surge Voltage that could possibly induce dangerous arcs of explosive short in the instrument and could result in serious injury to the operator. When measuring dangerous voltages of High Power Line or High Voltage Circuit, always place the instrument away from your body without holding it with your hands. Do not touch the Clamp Meter, its Test Leads, or any part of the circuit while it is on.

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# 1. INTRODUCTION

## 1-1. GENERAL

Models SK-7810 and SK-7815 are compact, rugged and easy-to-handle Digital Leakage Clamp Meters with 3200 count display.

Both models have many prominent features. One of them is the new Comparator that warns the limit of leakage current by buzzer.

The models are very reliable and useful instruments for technicians and engineers to test electrical appliances, equipments and facilities.

## 1-2. FEATURES

1. **Easy-to-read LCD:** 3200 count display with units and symbols.
2. **Comparator (setting 1mA to 20mA):** Buzzer sounds when an input is greater than the setting value.
3. **DH Key · MAX/MIN Key:** DH Key fixes display. MAX/MIN Key measures maximum and

minimum values.

4. **OUTPUT Terminals (SK-7810 only):** provides analog output for recorders.
5. **AC Voltage Measurements (SK-7815 only):** can measure up to 600V AC.
6. **Range Selection:** SK-7810 has manual-ranging. SK-7815 has autoranging.
7. **Low Pass Filter (LPF):** Higher frequency more than 150Hz is cut off.
8. **Auto Power Save:** This function saves battery consumption when switch-off is forgotten.
9. **Safety Design:** authorized with CE Marking as it passed EMCD and LVD of IEC-1010-1 Tests.

## 1-3. UNPACKING AND INSPECTION

Before unpacking, examine the shipping carton for any sign of damage. Unpack and inspect the instrument and accessories for any damage from mechanical shock, water leakage, or other causes. If any damage or missing item is found, consult the local dealer for replacement.

**Make certain that the following items are included in the box.**

1. Digital Leakage Clamp Meter
2. Two 1.5V R6P (AA) Batteries
3. Instruction Manual
4. Carrying Case
5. One pair of Test Leads 100-32(SK-7815 only) (complies with IEC spec.)

# 2. SPECIFICATIONS

## 2-1. GENERAL SPECIFICATIONS

### 1. DISPLAY:

- a. **Numerical Display** ; 3200 count LCD, 8.8mm high.
- b. **Units and Symbols** ; mA, A, V(SK-7815), ~, DH, MAX, MIN, COMP, AUTO(SK-7815), BAT, PH and Decimal Point.

2. **OPERATING PRINCIPLE** : Dual Slope Integration.

3. **RANGE SELECTION** : SK-7810 Manual-ranging.  
SK-7815 Autoranging.

4. **SAMPLING RATE** : 2 times/sec.

5. **OVERLOAD INDICATION** : -OL- symbol shows.(Except on 60A)

- 6. BATTERY WARNING** : BAT symbol shows when battery voltage is less than  $2.5V \pm 0.1V$ .
- 7. DISPLAY HOLD** : DH symbol shows and display is held.
- 8. MAX/MIN VALUE MEASUREMENTS**: Maximum and minimum readings are stored and displayed by MAX/MIN Key.
- 9. COMPARATOR (1mA to 20mA)** : works on 30mA and 300mA ranges of SK-7810, on  $\sim$ mA range of SK-7815. Buzzer sounds if input value exceeds the setting limit value.
- 10. FILTER SELECTION** : LPF (Low Pass Filter) cuts off higher frequency than approx. 150Hz.
- 11. OUTPUT TERMINAL (SK-7810 only)**: AC current is converted to DC mV by average rectification and delivered.
- |                          |                               |
|--------------------------|-------------------------------|
| <b>30mA range</b>        | ; 10mV/1mA Acc. $\pm 2\%$ Fs. |
| <b>300mA range</b>       | ; 1mV/1mA Acc. $\pm 2\%$ Fs.  |
| <b>60 A range</b>        | ; 1mV/1A Acc. $\pm 5\%$ Fs.   |
| <b>Output Resistance</b> | ; approx. 200 $\Omega$        |
- 12. TEMPERATURE COEFFICIENCY**: Under  $0^{\circ}\text{C}$  to  $18^{\circ}\text{C}$ , and  $28^{\circ}\text{C}$  to  $40^{\circ}\text{C}$  is  $\cdot \cdot \cdot =$  (Accuracy under  $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$ )  $\times 0.1/^{\circ}\text{C}$
- 13. INFLUENCE OF EXTERNAL MAGNETIC FIELD**: less than 2mA against 100A AC conductor close to the outside of Clamp Head.
- 14. MEASURING LINE VOLTAGE**: less than 600V AC.
- 15. DIELECTRIC STRENGTH**: 2kV AC for 1 minute (between the case and the metal of Clamp Head or OUTPUT/INPUT Terminals).
- 16. OPERATING TEMPERATURE & HUMIDITY**:  $0^{\circ}\text{C} \sim 40^{\circ}\text{C}$ , less than 80% RH in non-condensing.

- 17. STORAGE TEMPERATURE & HUMIDITY**:  $-20^{\circ}\text{C} \sim 60^{\circ}\text{C}$ , less than 70%RH in non-condensing.
- 18. SAFETY LEVEL** : IEC-1010-1 Overvoltage Category III, class II,  $\square$ . EMCD Test passed.
- 19. POWER SUPPLY** : Two 1.5V R6P(AA) batteries.
- 20. POWER CONSUMPTION**: approx. 5mW, (60mW for buzzer operation). 500 hour continuous operation.
- 21. AUTO POWER SAVE** : Power turns off automatically (enters in sleep condition of 0.05mW battery consumption) after about 30 minutes of Power-on or the other switch operation.
- POWER HOLD (PH)**; Turn on POWER Switch with DH Key being pressed. PH symbol shows on LCD and continuous measurements longer than 30 minutes are available.
- 22. OVERLOAD PROTECTION**: refer to Measuring Specifications.
- 23. CONDUCTOR DIAMETER**: Max. 30mm  $\phi$  .
- 24. DIMENSIONS&WEIGHT** : 212 $\times$ 42 $\times$ 30mm, 220g.
- 25. ACCESSORIES** : Two 1.5V R6P (AA) Batteries, 996 Carrying Case, One pair Test Leads (SK-7815 only), Instruction Manual.
- 26. OPTIONAL ACCESSORIES** : 880 Line Separator, 932 Output Cord for Recorder, 940 Alligator Clips.

## 2-2. MEASURING SPECIFICATIONS (23°C ±5°C, less than 80% RH in non-condensing)

### 1. SPECIFICATIONS OF MODEL SK-7810

AC CURRENT(～mA,～A)

Average Rectifying

Range	Accuracy 50/60Hz	Resolution	Maximum Value	Note
30.00mA	±1.0% ±5dgt	0.01mA	32mA	Filter in use: 1.0% ±3dgt added at 50/60Hz Frequency Characteristics: 1.0% ±3dgt added at 50Hz～400Hz Overload Protection: 100A(600V Line) for 1 minute
300.0mA		0.1mA	320mA	
60.0 A(0～50.0A) (50.1～60.0A)	±1.0% ±5dgt ±5.0% ±5dgt	0.1A	60A	

### 2. SPECIFICATIONS OF MODEL SK-7815

AC CURRENT(～mA)

Average Rectifying

Range	Accuracy 50/60Hz	Resolution	Maximum Value	Note
30.00mA	±1.0% ±5dgt	0.01mA	320mA	Filter in use: 1.0% ±3dgt added at 50/60Hz Frequency Characteristics: 1.0% ±3dgt added at 50Hz～400Hz Overload Protection: 100A(600V Line) for 1 minute
300.0mA		0.1mA		

AC CURRENT(～A)

Average Rectifying

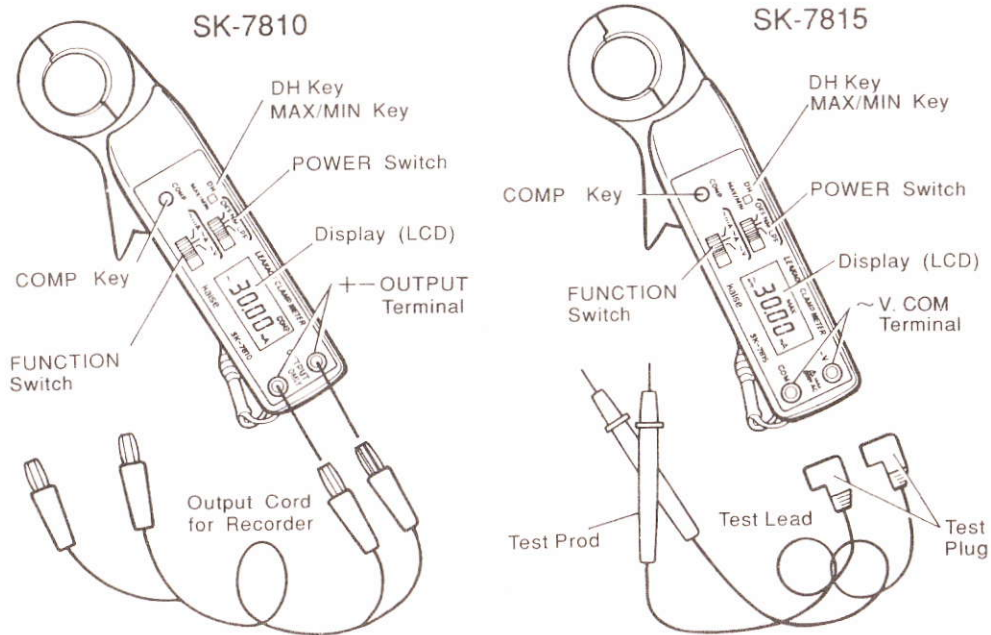
Range	Accuracy 50/60Hz	Resolution	Maximum Value	Note
30.00A	±1.5% ±5dgt	0.01A	60A	Filter in use: 1.0% ±3dgt added at 50/60Hz Frequency Characteristics: 1.0% ±3dgt added at 50Hz～400Hz Overload Protection: 100A(600V Line) for 1 minute
60.0A(0～30.0A) (30.1～50.0A)	±1.5% ±5dgt	0.1A		
	±2.0% ±5dgt			
(50.1～60.0A)	±5.0% ±5dgt			

AC VOLTAGE(～V)

Average Rectifying

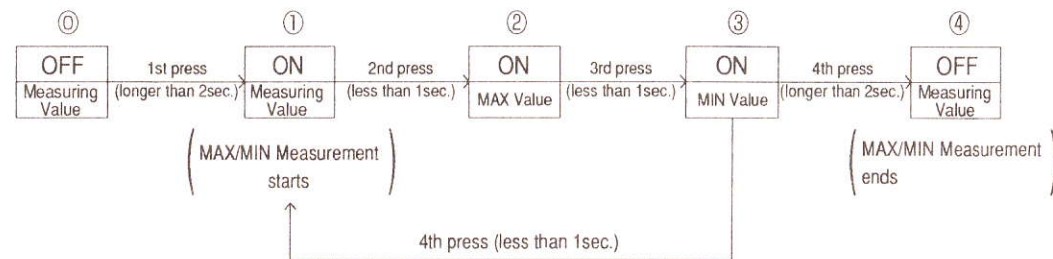
Range	Accuracy 50/60Hz	Resolution	Maximum Value	Note
300.0V	±2.0% ±5dgt	0.1V	600V	Filter in use: 1.0% ±3dgt added at 50/60Hz Frequency Characteristics: 1.0% ±3dgt added at 50Hz～400Hz Overload Protection: AC 900V for 1 minute
600V		1V		

## 3. NAME ILLUSTRATION



- 1. POWER Switch** : turns on or off power and selects NM(Normal Mode measurements) or LPF (Measurements through Low Pass Filter).
- 2. FUNCTION Switch** : selects AC 30mA, 300mA or 60A on SK-7810, and AC mA, A, V on SK-7815.
- 3. DH Key** : Press this Key once (for less than 1 second). DH sign shows on LCD and a displayed value is held.  
To cancel DH Key, press it once again.
- 4. MAX/MIN Key (common with DH Key)**: Press this Key once for more than 2seconds. MAX MIN symbol and a measurement value show on LCD. The LCD display changes with every press of this Key as follows. To cancel this Key, press this Key for more than 2 seconds at any step.

Upper : MAX/MIN Key Operation
Lower : Display

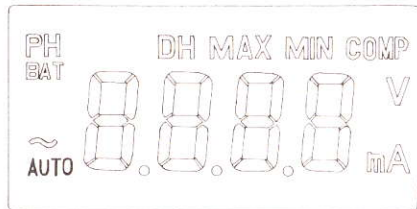


- 5. COMP Key** : Comparator function is available using this Key and DH Key.
  - Ranges to be used : 30mA and 300mA ranges on SK-7810, ~mA range on SK-7815.
  - Values to be set : Press COMP Key to set up a desired value of 1mA to 20mA.
  - Start of Measurement : Press DH Key after setting up the desired value.
  - Judge : Buzzer sounds if measuring input value exceeds the value being set.  
**NOTE** : If COMP Key is pressed during measurements, the set up value is displayed for one second.
  - Cancel : Press COMP Key for more than 2 seconds. COMP symbol turns off and this function is canceled.  
**NOTE** : COMP Key does not operate when MAX/MIN Key is on. Also, MAX/MIN function does not operate when COMP Key is on.
- 6. +-OUTPUT(SK-7810)**: OUTPUT Terminals for recorder. Any input is not allowed.
- 7. ~V COM(SK-7815)**: Input Terminals for AC Voltage measurements.
- 8. CLAMP HEAD** : Open CLAMP HEAD and clamp on a single conductor.
- 9. Test Leads(SK-7815 only)**: Always use Test Leads that complies with IEC specifications for safety.

Insert Black Test Plug of Test Leads into COM Terminal and Red Test Plug of Test Leads into ~V Terminal when measuring AC Voltage.

**⚠ WARNING** : In case of current measurements, remove Test Leads from Terminals for safety.

## 10. DISPLAY (LCD):



**PH** : POWER HOLD symbol. Turn on POWER Switch with DH Key being pressed. PH symbol shows and continuous measurements longer than 30 minutes becomes available.

**BAT** : Battery Warning

~ : Alternative Current (AC).

**AUTO** (SK-7815 only): Autoranging.

**DH** : Display Hold.

**MAX MIN** : Maximum and Minimum measurements are on.

**MAX** : Maximum value.

**MIN** : Minimum value.

**COMP** : Comparator Measurements.

**V** : Unit of Voltage.

**mA, A** : Units of Current.

## 4. SAFETY PRECAUTIONS

Correct Knowledge about electric measurements is necessary because electric measurements are sometimes very dangerous work. To eliminate possibility of injury to operator and damage to the instrument, the following precautions and measurement procedures must be taken. Misuse, abuse and carelessness cannot be prevented by any written word and is fully the operator's responsibility. Observing the following precautions, take safe measurements.

### 4-1. WARNINGS

**Warning 1. Checks of Test Leads and Body:** Before every measurement, do not fail to confirm that the body of this instrument and handle insulators of the attached test leads have no cracks nor any other damage on them. Make sure that the body and the handle insulators are free of dust, grease and moisture.

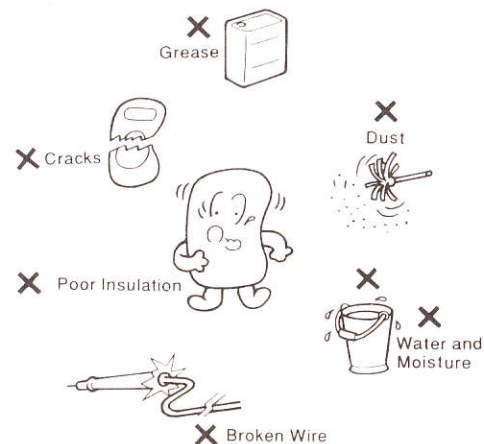


Fig.1

**⚠ Warning 2. High Voltage Limits (SK-7815):** Do not attempt to measure voltage greater than 600V rms. Use extreme care when measuring High Power Line even it is less than 600V rms.

**⚠ Warning 3. Care of High Voltage Measurements (SK-7815):** When measuring high voltage, always put the instrument away from your body without holding it with your hands. put Alligator Clip on the Black Test Prod of COM side and connect it to earth side of the circuit being measured and hold the Red Test Prod of ~V side with one hand and connect it to the other side of the circuit.

Also, take safety distance from the power source or the circuit to prevent any part of your body from touching high voltage. Refer to Fig.2.

**⚠ Warning 4. Correct Selection of FUNCTION Switch:** When making measurements, always confirm that FUNCTION Switch is set to correct position.

**⚠ Warning 5. Test Lead Disconnection and Removal of Clamp Head:** Prior to changing FUNCTION Switch to the other position during measurements, or opening Battery Case Lid for replacement of batteries, always disconnect Test Leads from the circuit being measured, and or remove Clamp Head from the circuit being measured.

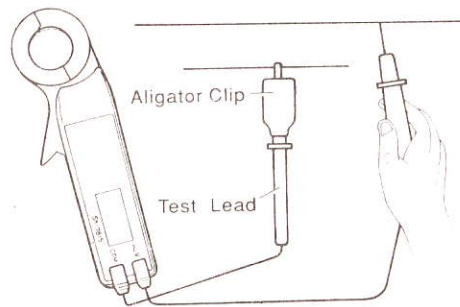


Fig.2

## 4-2. CAUTIONS IN HANDLING

**⚠ CAUTION 1.** Do not polish the meter case, or attempt to clean it with any cleaning fluid, gasoline, benzine, etc. If necessary, use silicon oil or antistatic fluid.

**⚠ CAUTION 2.** Avoid severe mechanical shock or vibration, extreme temperature or very strong magnetic fields.

**⚠ CAUTION 3.** Remove the batteries when not in use for an extended time since the exhausted batteries might leak electrolyte and corrode the internal components.

**⚠ CAUTION 4.** The points of Test Prods are sharp and dangerous. Do not get hurt with them.

**⚠ WARNING 5.** Do not let the children use the instrument or those people who have no knowledge and experience of electric measurements.



Fig.3

Avoid severe mechanical shock or vibration.

## 5. MEASUREMENT PROCEDURES

### 5-1. PREPARATION FOR USE

**1. INSTRUCTION MANUAL:** Read the instruction manual carefully and familiarize yourself with the specifications and functions of the instrument. Especially read and observe strictly the 「4. SAFETY PRECAUTIONS」.

**2. BATTERIES:** Two 1.5VR6P(AA) batteries are furnished with this instrument. Remove Battery Case Lid from Rear Case and install the batteries making sure of the polarity. Replace the batteries when BAT symbol shows on LCD during measurements. Refer to 「6. MAINTENANCE. 6-1. BATTERY REPLACEMENT」.

**3. POWER Switch on:** Set POWER Switch from OFF to NM position. Buzzer sounds and all segments are displayed on LCD for one second.

**NOTE:** In this case, if LCD is not turned on, batteries might be set in the wrong



polarity or battery contacts might be bad.

**4. OVERLOAD INDICATION:** If measurement value exceeds 3200 counts the maximum input value, -OL-symbol is displayed on LCD. -OL-symbol is not displayed on 60A range of SK-7810 and on ~A and ~V range of SK-7815. To avoid personal injury and instrument damage, do not attempt to make measurements that might exceed the specified maximum input values.

**5. AUTO POWER SAVE (no sign):** Power turns off (goes into sleep condition, 0.05mW consumption) after 30minutes of any switch operation(except between NM and LPF of POWER Switch).

**POWER HOLD:** To make continuous measurements longer than 30 minutes, set POWER Switch on with pressing DH Key. DH symbol shows on LCD and power is held. To cancel POWER HOLD, turn off power once.

## 6. SYMBOL MARK

The following symbols shown on the instrument and in the instruction manual are listed in IEC 1010 and ISO 3864.

- ⚠ : Caution (refer to instruction manual).
- : Direct Current (DC)
- ~ : Alternating Current (AC)
- ⎓ : DC and AC
- ⚡ : Diode
- ⊥ : Earth (Ground) Terminal
- ⊞ : Fuse
- : Double Insulation

## 5-2. AC LEAKAGE CURRENT (~mA) MEASUREMENTS

### ⚠ WARNING

To avoid electric shock hazard and/or damage to the instrument, do not attempt to measure AC current that might exceed the maximum input current of the range being used. Line voltage must be less than 600V AC.

1. Set POWER Switch to NM position. Set it to LPF position if necessary to cut off higher frequency than 150Hz.
2. Set FUNCTION Switch to 30mA or 300mA range on SK-7810, and to ~mA range on SK-7815.
3. Open CLAMP HEAD and clamp on a conductor.
  - a. In case of Ground Line: Clamp on a single conductor.
  - b. In case of Single-phase Two-wires: Clamp on the two wires.

- c. In case of Single-phase Three-wires or Three-phase Three-wires: Clamp on the three wires.
- d. In case of general circuit: Clamp on a single conductor.

4. Read the current on LCD.

**NOTE:** When measuring on 30mA range or ~mA range, the reading accuracy will be affected if a high current conductor more than 50A is close to the outside of Clamp Head.

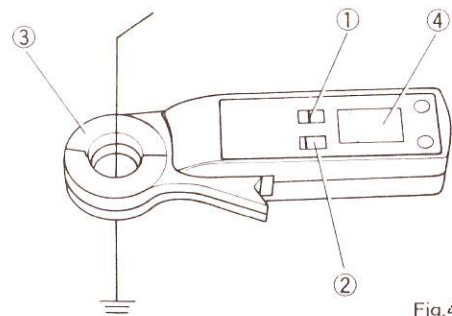


Fig.4

5. **DH Key:** To hold display, press this Key. DH symbol turns on and the display is held. To cancel this Key, press it again.

6. **MAX/MIN Key(DH Key):** To measure maximum and minimum values, press this Key for 2 seconds and longer. MAX MIN symbol turns on and a measuring value is shown. The second press of this Key (less than 1 sec.) shows MAX symbol and a Maximum value till then. The third press of this Key (less than 1 sec.) shows MIN symbol and a Minimum value till then. The display repeats with every press of this Key later. To cancel this Key, press it for 2 seconds and longer. Refer to [4. MAX/MIN Key] on page 8.

7. **COMP Key:** The first press of this Key turns on COMP symbol and shows 1.00mA, the Limit Numeral. Set a desired Limit Numeral by pressing the Key. If a measuring value exceeds the Limit Numeral, buzzer sounds. Refer to [5. COMP Key] on page 9.

8. **OUTPUT Terminals(SK-7810 only):** Analog Output to recorders is available. Connect OUTPUT Terminals with INPUT Terminals of a recorder using the optional Output Cord for Recorder. Refer to the following figure.

**NOTE:** No input is allowed for OUTPUT Terminals.

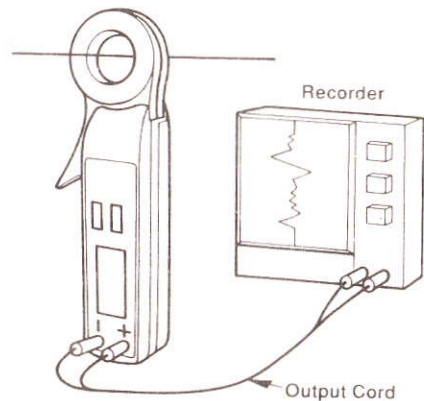


Fig.5

### 5-3. AC CURRENT ( $\sim$ A) MEASUREMENTS

#### ⚠ WARNING

To avoid electric shock hazard and/or damage to the instrument, do not attempt to measure AC current that might exceed 60A, the maximum input current of the range. Line voltage must be less than 600V AC.

1. Set POWER Switch to NM position. If necessary, set it to LPF position.
2. Set FUNCTION Switch to 60A range on SK-7810, and to  $\sim$ A range on SK-7815.
3. Open CLAMP HEAD and clamp on a single conductor.

**NOTE:** If two or more conductors are placed within the CLAMP HEAD, the measurement cannot be made.

4. Read the current on LCD.
5. DH Key, MAX/MIN Key and OUTPUT Terminals(SK-7810) are available in the same way as in [5-2. AC LEAKAGE CURRENT ( $\sim$ mA) MEASUREMENTS]. But, COMP Key does not operate on this range.

### 5-4. AC VOLTAGE ( $\sim$ V) MEASUREMENTS (SK-7815 only)

#### ⚠ WARNING

Maximum Input Voltage of  $\sim$ V range is 600V AC. To avoid electric shock hazard and/or damage to the instrument, do not attempt to measure voltage that might exceed 600V AC. Use extreme care not to touch any part of your body to high voltage.

1. Set POWER Switch to NM position. If necessary, set it to LPF position.
2. Set FUNCTION Switch to  $\sim$ V range.
3. Insert Black Test Plug into COM Terminal and Red Test Plug into  $\sim$ V Terminal.

#### ⚠ WARNING

When measuring dangerous voltage more than 100V, turn off power to the circuit to be measured and connect Test Prods to the circuit using Alligator Clips. Do not touch the Clamp Meter, its Test Leads or any part of the Circuit while it is on. Refer to [WARNING 3. Care of High Voltage Measurements] on page 12.

4. Connect Red and Black Test Prods to the circuit (power line) being measured. The connection should be **IN PARALLEL** with the circuit being measured.
5. Read the voltage on LCD.
6. DH Key and MAX/MIN Key are available in the same way as in 「5-2. AC LEAKAGE CURRENT ( $\sim$ mA) MEASUREMENTS」. But, COMP Key does not operate.

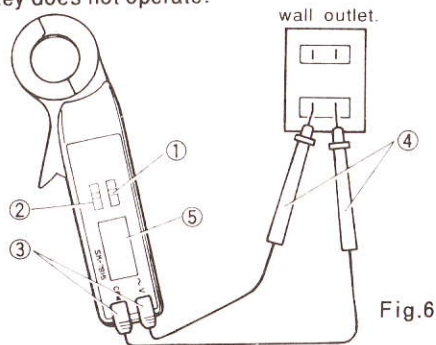


Fig.6

7. When measurements are finished, remove Test Prods from the circuit and set POWER Switch to OFF position.

## 6. MAINTENANCE

### 6-1. WARRANTY STATEMENT

The warranty statement for the Digital LEAKAGE CLAMP METERS SK-7810 and SK-7815 are printed on the last page of the manual. Read it carefully before requesting warranty repair.

### 6-2. BATTERY REPLACEMENT

#### ⚠ WARNING

To prevent electric shock hazard, turn off power, and remove Clamp Head and Test Leads before removing Battery Case Lid.

1. If BAT symbol shows on LCD, replace the batteries.
2. Unscrew the screw of Battery Case Lid and remove it.
3. Take out the worn-out batteries from Battery Case and place fresh two 1.5V R6P(AA) or any equivalent batteries.

4. Replace Battery Case Lid and screw the screw.

**NOTE:** If the instrument is taken out of service for an extended time, remove the batteries from Battery Case and store separately.

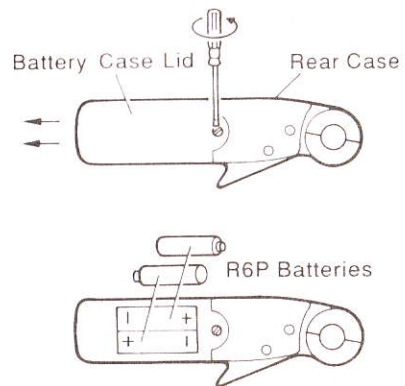


Fig.7

### 6-3. CALIBRATION

In order to maintain the specifications described in page 3 to 6, it is recommended that the instrument may be calibrated once each year and/or after it is repaired.

Calibration service is available at KAISE AUTHORIZED SERVICE AGENCY through your local dealer at a cost basis charge.

### 6-4. REPAIR

Repair service, warranty or non-warranty, is available at KAISE AUTHORIZED SERVICE AGENCY through your local dealer, Warranty repair is executed free of charge, but non-warranty repair is charged on the cost basis. Pack the instruments securely in its original carton together with descriptions of your name, address, telephone number, problem encountered and the service required, and ship prepaid to your local dealer.

When the instrument does not operate properly, the following steps should be taken before returning the instrument for repair, warranty or non-warranty.

1. Check the battery connection and the polarity
2. Check the batteries if they are alive and usable.
3. Make sure that POWER Switch and FUNCTION Switch are selected correctly.
4. Make sure that the measuring input value is within the maximum specified one of the range being used.
5. Make sure that the body of this instrument and the handle insulators of the test leads have no cracks nor any other damage on them .
6. Be careful of noise from the equipment under test or the ambient environment in which the instrument is being used. The instrument is fully shielded against noise, but may read error due to very strong noise.

## WARRANTY

The Digital Leakage Clamp Meter(SK-7810/7815) is warranted in its entirety against any defects of material or workmanship under normal use and service within a period of six months after the date of purchase of the instrument by the original purchaser. This warranty is extended by **KAISE AUTHORIZED DEALER** only to original purchaser or original user of the instrument on condition that the Warranty Registration Card is completed and returned to the authorized dealer within two weeks after the purchase of the instrument new from the dealer. The obligation under this warranty to be executed by **KAISE AUTHORIZED DEALER** is limited to repairing or replacing the Digital Leakage Clamp Meter (SK-7810/7815) returned intact to it, with transportation charge prepaid, and which to its satisfaction is judged by it to have been thus defective. **KAISE AUTHORIZED DEALER** and **KAISE CORPORATION** the manufacturer shall not otherwise be liable for any damages or loss, consequential or otherwise. The foregoing warranty is exclusive and in lieu of all other warranties including any warranty of merchantability, whether expressed or implied.

This warranty shall not apply to any instrument or other article of equipment which shall have been repaired or altered outside **KAISE AUTHORIZED SERVICE AGENCY**, nor which has been subject to misuse, negligence or accident, incorrect wiring by users or installation or use not in accord with instructions furnished by the manufacturer.