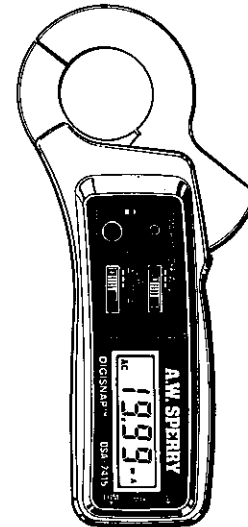


Operating Instructions  
DIGISNAP™ AC DIGITAL SNAP-AROUND LEAKAGE  
AMMETER WITH VOLTAGE RANGE  
MODEL  
DSA-2415



**CAUTION**

Please read this Manual thoroughly and completely before putting instrument into use. Failure to do so might result in injury and/or damage to equipment. Observe all standard industry safety rules.


**A.W. SPERRY INSTRUMENTS INC.**  
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## 1. SAFETY WARNING

- This instruction manual contains warnings and safety rules which must be observed by the user to ensure safety operation of the instrument and retain it in safe condition. Therefore, read these operating instructions thoroughly and completely before using the instrument.
- The symbol  means that the user must read the instructions in this manual for safe operation of the instrument.

### **WARNING**

This is a warning for the user to avoid electric shock hazard.

### **CAUTION**

This is a caution for the user to avoid damage to the instrument.

- To avoid electric shock hazard do not use the instrument if it is in the following conditions:
  - a. Shows visible damage.
  - b. Fails to perform intended operation.
  - c. Has been subjected to prolonged storage under unfavorable conditions.
  - d. Has been subjected to severe transport stress.

### **WARNING**

- Never open the battery compartment cover when making measurements.
- Remove the test leads from the instrument before battery replacement.
- Do not make current measurements with the test leads inserted into the voltage terminals.
- Never make current measurements on a circuit above 600V AC/DC and voltage measurements on a circuit above 500V AC/DC as the instrument is designed for measurements on low voltage circuits only.



### CAUTION

- Never exceed the maximum allowable input of any function when making measurements.
  - Do not expose the instrument to the direct sun, extreme temperature or dew fall.
- 
- Always turn the power switch to the off position after use.
  - The instrument must be used by a competent, trained person and operated in strict accordance with the instructions. A.W. Sperry Instruments, Inc will not accept liability for any damage or injury caused by misuse or non-compliance with the instructions or safety procedures. It is essential to read and understand the safety rules contained in the instructions. They must be observed when using the instrument.

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## 2. FEATURES

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- Lifetime limited warranty.
- Digital clamp meter designed to measure AC leakage current, AC small current and AC voltage.
- Shielded transformer jaws to minimize the effect of external stray magnetic field.
- A filter circuit is incorporated to eliminate the effect of high frequency noise and harmonics from inverters, AC/DC converters, etc. by setting the frequency selector switch at the 50/60Hz position for AC current measurements.
- 20mA AC range with 0.01mA minimum resolution plus 2A and 100A AC ranges.
- Data hold function to allow for easy readings in dimly lit or hard-to-reach locations.
- Solid grip contour and easy of use.
- Large easy-to-read LCD.
- Operates from 2 × 1.5V battery.
- Safety test leads with shielded banana plugs and recessed input terminals.

### 3. SPECIFICATIONS

(for 23°C ±10°C at 75% max. relative humidity)

Function	Ranges		Accuracy	
			Frequency Selector Switch	
			50 · 60Hz	WIDE
AC Current	20mA	0~19.99mA	±1.5%rdg · ±2dgt	±1.5%rdg · ±2dgt (50 · 60Hz)
	2A	0~1.999A		±2.0%rdg · ±5dgt (40~1kHz)
	100A	0~100.0A	±2.0%rdg · ±5dgt	±2.0%rdg · ±5dgt (50 · 60Hz) ±2.5%rdg · ±5dgt (61~1kHz)
AC Voltage	500V	0~500V	Accuracy	
			±1.5%rdg · ±2dgt (50 · 60Hz), ±2.0%rdg · ±5dgt (40~1kHz)	

Note: Frequency selector switch is designed for AC current measurements only. It does not work for the AC voltage range.

<b>Operating System Sensing</b>	: Dual integration : Average sensing, calibrated in rms of a sinewave
<b>Display</b>	: Field effect 3-1/2 digit liquid crystal display with maximum reading of 1999
<b>Range Selection</b>	: Manual rotary switch
<b>Overrange Indication</b>	: Numeral "1" on the highest digit flashes except for 100A AC and 500V AC ranges
<b>Response Time</b>	: Approx. 1 second
<b>Sample Rate</b>	: Approx. twice per second
<b>Data Hold</b>	: For all ranges
<b>Operating Temperature &amp; Humidity</b>	: 0°C ~ +50°C at 85% max. humidity
<b>Storage Temperature &amp; Humidity</b>	: -10°C ~ +50°C at 80% max. relative humidity
<b>Power Source</b>	: 2 × 1.5V battery type SUM-3, R-6, AA or equivalent. AWS Part # B-1
<b>Battery Life</b>	: 100 hours typical with manganese battery
<b>Current consumption</b>	: Approx. 10mA AC
<b>Low Battery Indication</b>	: "B" symbol appears on the display
<b>Maximum Allowable Input</b>	: AC Current Ranges-500A AC for one minute AC Voltage Range-600V AC for one minute
<b>Frequency Response</b>	: 40Hz—1kHz min. (50Hz—1kHz min. on 100A AC range only)
<b>Insulation Resistance</b>	: 10M Ω min. at 1000V between electrical circuit and housing case or metal section of transformer jaws
<b>Withstand Voltage</b>	: 2000V AC for one minute between electrical circuit and housing case or metal section of transformer jaws
<b>Conductor size</b>	: Approx. 30 (1.18")mm max.
<b>Dimensions</b>	: 173 (6.81") × 80 (3.14") × 36 (1.41") mm LWD

**Weight  
Packaging**

: Approx. 210g (7.40 oz.) (battery included)  
: Model DSA-2415 comes complete with Two (2) 1.5V "AA" type batteries, One (1) Set TL-48 Test Leads, One (1) C-52 Carrying Case, Form # 215 Operating Instructions and Warranty Registration Card.

**Optional Accessories**

: Model E-1 Energizer  
Used to split the power line on 125V AC, 15A maximum applications for easy snap-around current measurements.  
Model MT-1000  
10:1 current reduction transformer for measurements up to 1000A AC at  $\pm 5\%$  accuracy.

## 4. INSTRUMENT LAYOUT

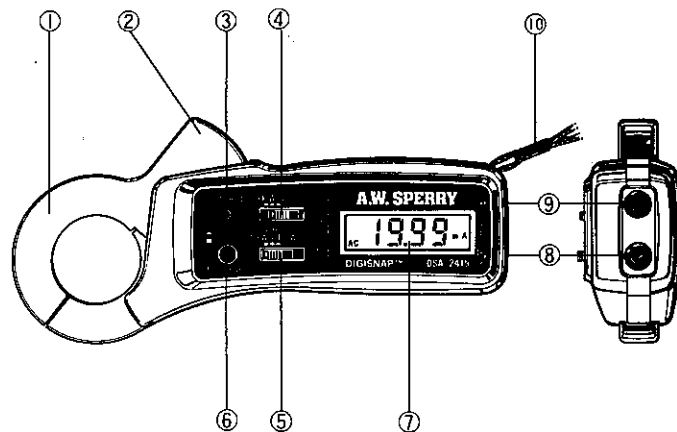


Fig. 1

- (1) Transformer Jaws
- (2) Jaw Trigger
- (3) Data Hold Push Button
- (4) Power ON-OFF & AC Amp/AC Volt Selector Switch
- (5) Current Range Selector Switch
- (6) Frequency Selector Switch (Refer to section 5-3)
- (7) 3-1/2 digit LCD with maximum reading of 1999
- (8) COM Terminal for Voltage Measurements  
(accepts black test lead to be connected to low voltage side of circuit under test)
- (9) VOLT Terminal  
(accepts red test lead to be connected to high voltage side of circuit under test)
- (10) Safety Hand Strap

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## 5. OPERATION

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### 5-1 Preparation

- (1) When the power switch is set to the A or V position to power the instrument, all of the displays flash once and then settle to the range selected. If the display is clear without symbol "B" showing, battery voltage is OK. If the display blanks or symbol "B" is indicated, replace the batteries in accordance with the battery replacement procedures as outlined in section 6.

Note: "B" may also appear on the display when the battery voltage falls during use. Replace the batteries with new ones.

- (2) When symbol "DH" is displayed, the instrument is in the data hold mode. Press the data hold switch to clear the "DH."

### 5-2 AC Current Measurements

 **WARNING**

- Make certain that the test leads are not inserted into the instrument terminals.
- Never use the instrument on a high voltage circuit above 600V AC.
- The transformer jaws are made of steel and their tips are not insulated. Be especially careful about the hazard of possible shorting where the equipment under test has exposed metal parts.

Note: The transformer jaws do not fully close when a foreign substance is stuck in the jaw tips or they are not properly engaged due to the excessive force applied. In such a case do not release the jaw trigger suddenly or attempt to close the transformer jaws by applying external force. If this is done, the metal tips of the jaws will be deformed, making it impossible to engage them properly. Make sure that the jaws close by themselves after removing the foreign substance or making them free to move. Never attempt to close the jaws by force. If the metal section of the jaws should be deformed, correct it by ensuring that all metal laminations (0.45mm thick) are aligned 0.45mm apart. However, this requires very delicate adjustments. Where possible, it is recommended that the unit be returned for repair. When returning it, place a small plate or insert between the jaw covers to prevent the jaws from closing. When the jaws are found not repairable due to the damage caused by forcing them to open, it is necessary to replace the whole jaw assembly. This is very costly and will not be covered by warranty repairs. Therefore, please use every care and caution when the jaws do not close properly.

**⚠ CAUTION**

- The transformer jaws, especially their tips, have been precisely adjusted to obtain maximum accuracy. Take sufficient care to avoid shock, vibration or excessive force when handling the instrument.
- The size of a conductor to be tested is approx. 30mm in diameter. An accurate measurement cannot be made when the transformer jaws are not fully closed on a conductor larger than 30mm.
- Frequency selector switch is designed to select the 50/60Hz and "WIDE" frequency ranges. For further details refer to section 5-3 for operation of the frequency selector switch.

- (1) With the power switch set to the A position, select the desired current range using the current range selector switch.
- (2) Normal Measurements  
Press the trigger to open the transformer jaws and clamp onto one conductor only (Fig. 2).

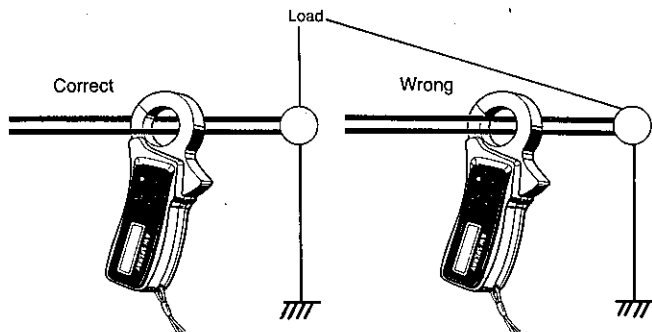


Fig. 2

**⚠ CAUTION**

**Current Readings in Excess of 100A AC.**

The maximum measuring current is specified as 100A AC for DSA-2415, but the instrument can read AC current up to 200A (199.9A) AC without showing overrange. However, the indicated current value in excess of 100A AC is much lower than the current actually flowing in the conductor under test because of the saturation of the transformer jaw property. This tends to be more apparent as the frequency becomes lower (Fig. 3).

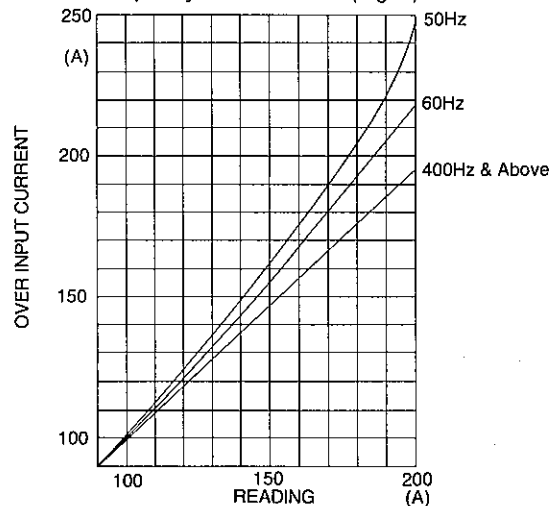


Fig. 3 Saturation curve showing current readings against input currents over 100A AC

As shown in the above chart, the current readings over 100A AC are significantly lower on the 50Hz and 60Hz frequencies. Therefore, use caution not to overlook excessive current by simply assuming that the instrument is accurately reading the current flowing in the conductor. The same chart is also labeled on the back of the instrument housing case. It is intended to roughly show how the instrument will read in excess of 100A AC and is not meant to guarantee absolute accuracy.

- (3) Measuring Out of Balance Leakage Currents  
Refer to Fig. 4 for leakage current measurements on different wiring systems.

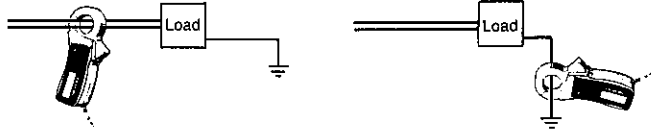


Fig. 4-1 Leakage Current Measurements on the Single-Phase Systems

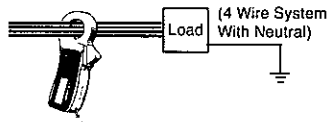
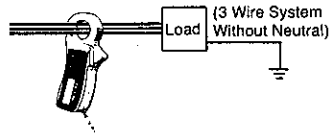


Fig. 4-2 Leakage Current Measurements on the Three-Phase Systems

Measurement of Leakage Current Flowing into Ground Conductor

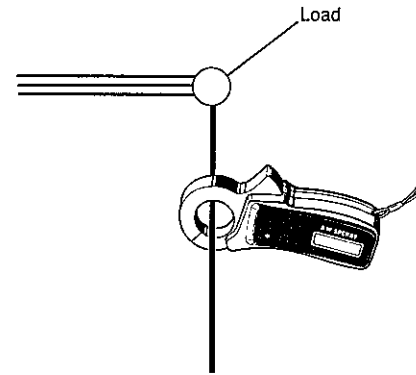


Fig. 4-3



### 5-3 How to Use Frequency Selector Switch

The DSA-2415 has a very good frequency response due to the electrical property of the transformer jaws used for the instruments. Therefore, it measures AC current of not only 50Hz or 60Hz of fundamental wave form but also of high frequencies and harmonics superimposed on the fundamental frequency when present in the circuit under test.

To eliminate the effect of noise from the high frequency and measure AC current of 50Hz or 60Hz fundamental frequency, a filter circuit is incorporated into the 2415 which works when the frequency selector switch is set to the 50/60Hz position (this switch is for AC current measurements only). It is designed to attenuate frequencies starting from around 100Hz with an attenuation characteristic of approx.

--24dB/octave (signal strength declines to one sixteenth of that at the initial frequency when it doubled). Please see Fig. 5.

With the frequency selector switch at the "WIDE" position, the instruments also permit AC current measurements from 40Hz to 1kHz minimum, including high frequencies and harmonics, if present in the circuit under test, that originate from inverters and other high frequency generating devices.

Recently there has been increased usage of power through inverters, switching regulators, etc. When the high frequency noise from such appliances leaks or flows into the ground through capacitors not filtering completely, the earth leakage breaker may not trip. In such a case the DSA-2415 may not give current readings with the frequency selector switch at the 50/60Hz position. Therefore, it is necessary to make current measurements with the switch at the "WIDE" position. When in doubt as to the presence of high frequencies and barmonics that affect AC current measurements, take current readings with the switch at the 50/60Hz and "WIDE" positions respectively and then compare the results obtained.

**NOTE: PRESS THE FREQUENCY SELECTOR SWITCH TO LOCK IT AT "50/60Hz" POSITION. PRESS THE SWITCH AGAIN TO RELEASE THE LOCK AND SET IT BACK TO "WIDE" POSITION.**

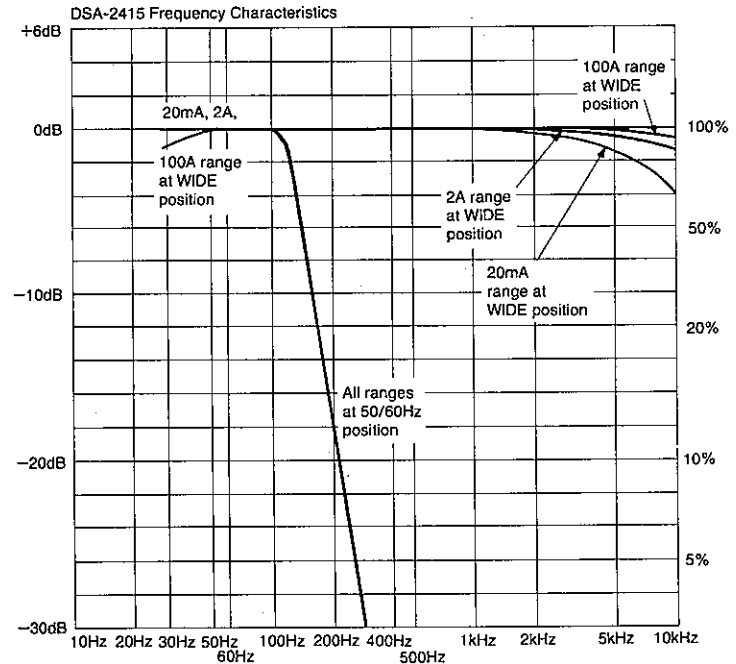


Fig. 5

## 5-4 AC Voltage Measurements

### ⚠ WARNING

- Do not open the battery compartment cover during voltage measurements as it may cause electric shock.
- Do not make voltage measurements on a high voltage circuit above 500V.

- (1) Set the power switch to the "V" position.
- (2) Insert the test leads into the volt (V) terminal and common (COM) terminal (Fig. 6).

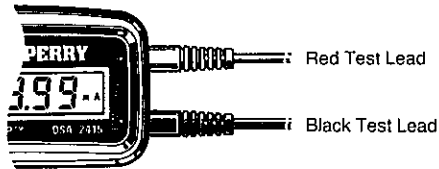


Fig. 6

- (3) Connect the test lead tips to the circuit under test (Fig. 7). The voltage measured will be indicated on the display.

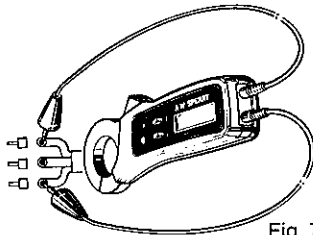


Fig. 7

Where possible, connect the black test lead to the ground (low voltage side) of the circuit under test.

## 5-5 Data Hold Function

Push the data hold switch to freeze the reading. Symbol "DH" will be displayed. (Fig. 8) The display may then be observed away from the conductor. This is especially useful for taking a reading in dimly lit or hard-to-reach areas. Push the switch again to release the lock. Symbol "DH" disappears and a further measurement can be made.

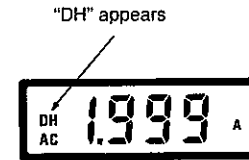


Fig. 8

## 6. BATTERY REPLACEMENT

### ⚠ CAUTION

- Always replace both batteries with new ones at the same time. Replacement batteries should be type SUM-3 R-6, AA or equivalent. Install new batteries observing correct polarity.

When symbol "B" appears on the display (Fig. 9) make battery replacement.



"B" is displayed.

Fig. 9

- (1) Set the power switch to the OFF position and remove the test leads from the instrument.
- (2) Unscrew the battery compartment cover and remove the batteries from the battery compartment (Fig. 10)

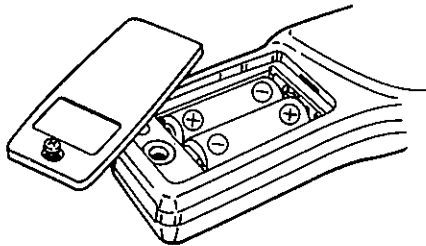


Fig. 10

MEMO