

INSTRUCTION MANUAL

1/98

Form #272



ANALOGUE INSULATION TESTERS WITH FOUR RANGES

**MODEL 3313
3314**

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The Professional's Choice®

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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 ⚠ on the instrument 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.

⚠ WARNING

1. Never open the battery compartment cover when making measurements.
2. 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 unfavourable conditions.
 - d. Has been subjected to severe transport stress.
 - e. Test leads have been broken.
3. Never apply voltage higher than 600V when making AC voltage measurements.

⚠ CAUTION

1. Never exceed the maximum allowable input of any function when making measurements.
2. Do not expose the instrument to the direct sun, extreme temperature or dew fall.

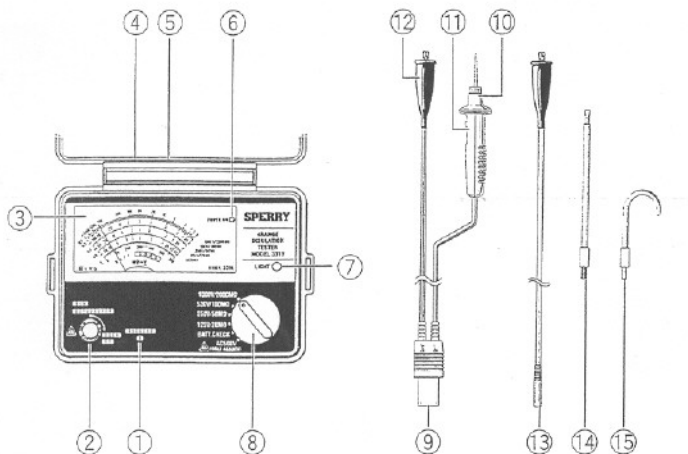
3. When not in use for a long period of time, place the instrument in storage after the battery is removed from it.
4. Never apply voltage to the output terminal.
5. Insulation tests are to be performed on de-energized (DEAD) circuits and equipment only. Do not perform tests on energized (LIVE) circuits!
6. Always test the circuit or equipment for the presence of voltage to insure it is de-energized. Make sure that you can visually see that the circuit or equipment is disconnected before proceeding with an insulation test. Do not proceed with any tests if you are not sure the circuits is DEAD!
7. Consult the manufacturer of the equipment you are going to test if you are not sure how to test it with a High Voltage Insulation Tester. Some equipment may contain sensitive electronic components which may be damaged during a test by applying a high DC Voltage. Consult the manufacturer for precautions that should be followed to avoid equipment damage.
8. These insulation testers will produce a High DC Voltage of 250V DC, 500V DC or 1000V DC in open circuit state. Do Not touch the test leads during an Insulation Test. Do Not attempt to stimulate or shock anyone else with this tester. Horse play and fooling around can result in electric shock causing Ventricular Fibrillation.
9. Always inspect your meter, test leads and accessories for any sign of damage or abnormality before every use. If any abnormal conditions exist (eg. broken test leads, cracked cases, display not reading, etc.), do not attempt to take any measurements.
10. Never ground yourself when taking electrical measurements. Do not touch exposed metal pipes, outlets, fixtures, etc., which might be at ground potential. Keep your body isolated from ground by using dry clothing, rubber shoes, rubber mats, or any approved insulating material.
11. To avoid electric shock use CAUTION when working with voltages above 40V DC or 20V AC. Such voltages pose a shock hazard.
12. Never exceed the maximum allowable input value of any function on this measuring instrument when taking a measurement.

13. Never touch exposed wiring, connections or any live circuit when attempting to take electrical measurements. Treat the circuit as if it is energized (LIVE).
14. Do not attempt to operate these instruments in an explosive atmosphere (i.e. in the presence of flammable gases or fumes, vapor or dust).
15. When testing for the presence of voltage, make sure the voltage function is operating properly by reading a known voltage in that function before assuming that a zero reading indicates a no-voltage condition. Always test your voltage meter before and after taking measurements on a known live circuit.
16. Calibration and repair of any instrument should only be performed by qualified and trained service technicians. Do not attempt calibration or service unless trained and another person, capable of rendering first aid and resuscitation is present.
17. Do not install substitute parts or perform any unauthorized modification of the instrument. Return the instrument to your distributor or authorized service center for service and repair to insure that safety features are maintained.
18. The instrument must be used by a competent, trained person and operated in strict accordance with the instructions. A.W.SPERRY 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.
19. Make sure to remove the test leads from the instrument or set the range selector switch to "AC 600V" position and the test button to "OFF" position after every use. Place the instrument in storage after the batteries are removed when it is not used for long.

2. Features

- Robust new style dual purpose case housing and carrying case.
- Uses only 8x1.5V battery type R-6, AA or equivalent.
- Incorporates front panel Ohms zero adjust.
- Taut band construction.
- Expanded insulation scales for ease of reading.
- Battery check facility.
- LIVE circuit visual indication.
- 4 insulation test voltages, 650V AC voltage range.
- Back light function.

3. Layout Diagram



- | | |
|------------------------------|--|
| ① METER MOVEMENT ZERO ADJUST | ⑨ TEST LEAD WITH REMOTE CONTROL SWITCH |
| ② TEST/BATTERY CHECK BUTTON | ⑩ LINE PROBE |
| ③ SCALE PLATE | ⑪ REMOTE CONTROL SWITCH |
| ④ GUARD TERMINAL | ⑫ EARTH PROBE |
| ⑤ PROBE SOCKET | ⑬ TEST LEAD FOR GUARD TERMINAL |
| ⑥ POWER-ON INDICATION LAMP | ⑭ EXTENSION PROD(Optional) |
| ⑦ LIGHT SWITCH | ⑮ PICKLE TYPE PROD (Optional) |
| ⑧ RANGE SELECTOR SWITCH | |

4. Specifications

		Model 3314				
		Model 3313				
INSULATION TESTER	Test Voltage	50V	125V	250V	500V	1000V
	Measuring Ranges	0-10MΩ	0-20MΩ	0-50MΩ	0-100MΩ	0-2000MΩ
	Mid-Scale Value	0.2MΩ	0.5MΩ	1MΩ	2MΩ	50MΩ
	Primary Effective Measuring Ranges	0.01M-5MΩ	0.02M-10MΩ	0.05M-20MΩ	0.1M-50MΩ	2M-1000MΩ
	Secondary Effective Measuring Ranges	5MΩ-10MΩ	10MΩ-20MΩ	20MΩ-50MΩ	50MΩ-100MΩ	1000MΩ-2000MΩ
	Accuracy	Better than $\pm 5\%$ of Indicated value at primary effective Measuring Ranges Better than $\pm 10\%$ of Indicated value at secondary effective Measuring Ranges Better than $\pm 0.7\%$ scale length at other measuring ranges including infinity and zero point				
	Output Voltage on Open Circuit	Test Voltage +20%, -0%				
	Rated Current	1mA DC +20%, -0%				
AC VOLT-METER	Output Short Circuit Current	About 2.2mA DC				About 220 μ A DC
	Measuring Ranges Accuracy	0-600V AC $\pm 3\%$ of full scale value				
Current Consumption	0MΩ	280mA				170mA
	Mid-Scale	80mA	90mA	110mA	130mA	150mA
	∞	50mA	60mA	70mA	110mA	140mA
	BATT. CHECK	370mA				
NOTE: Increases by 100mA when back light is used.						

Power Supply

Voltage: 8×1.5V battery type SUM-3, R-6, AA or

Overload

Protection: Insulation Tester

1000V Range 1200V DC + AC p-p for 1

500V Range 600V DC + AC p-p for 10

250V Range 400V DC + AC p-p for 10

100V Range 200V DC + AC p-p for 10

50V Range 120V DC + AC p-p for 10

AC Voltmeter 720V AC rms

Operating

Temperature &

Humidity: 0°C~+40°C at 85% max. relative humidity

Storage

Temperature &

Humidity: -10°C~+50°C at 75% max. relative humidity

Withstand

Voltage: 6000V AC 50Hz or 60Hz for one minute
electrical circuit and housing case

Insulation

Resistance: 50MΩ min. at 1000V across electrical circuit
housing case

Accessories: Model 7076 Test Leads with Remote Control
Model 7081 Test Lead for Guard Terminal
Strap, Shoulder Pad, Pouch for Test Leads
Instruction Manual, Extension Prod (Optional)
Type Prod (Optional).

Dimensions: 175 (L)×115 (W)×85.7 (D) mm approx.

Weight: 650g approx. (batteries included)

5. Operating Instructions

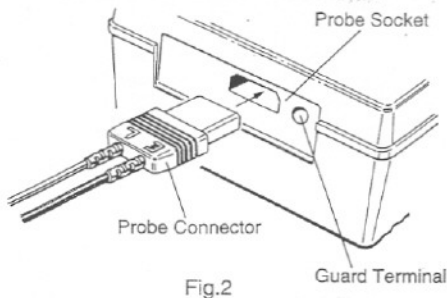
5-1. Preparation for Testing

(1) Mechanical Zero Adjustment

Without pressing the test button, check that the pointer lines up with the ∞ mark on the red megaohm scale. If not, adjust it by rotating the meter movement zero adjust with a small screwdriver.

(2) Test Lead Connection

Insert the probe connector into the probe socket correctly as shown in Fig.2.



⚠ WARNING

- When the probe connector is removed from the probe socket, power will automatically go off. In this condition no battery check or performance check of the instrument is possible. (back light goes on whether or not the test lead is connected to the instrument, but it automatically goes out in 30 seconds). This is designed to avoid forgetting to switch off power.
- When the test leads are connected, a very small amount of current, say $25\mu\text{A}$, will flow into the circuit except on the 600V AC range. This is comparable to the current that drains during the self-discharging of the batteries. To prevent the exhaust of the batteries it is recommended that the test leads are disconnected if the range selector switch is set to the AC 600V position when the instrument is not in use.

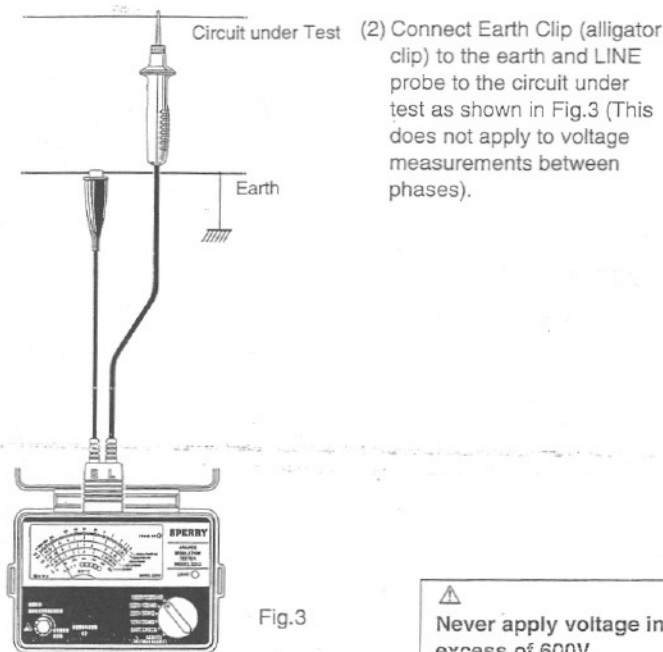
5-2. AC Voltage measurements

⚠ WARNING

To avoid possible electric shock, instrument damage and/or equipment damage, do not attempt to take any voltage measurements if the voltage is unknown. 600V AC is the maximum voltage that this instrument is designed to measure.

Note: Never press the remote control switch or test button during voltage testing (press only when making insulation tests or battery check).

(1) Set the range selector switch to the AC 600V position.



- (3) Take the reading on the AC voltage scale (black).

5-3. DC Voltage Measurements

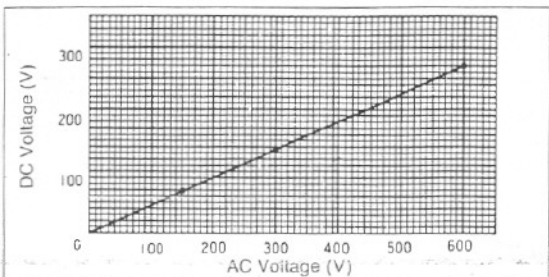
It is possible to measure DC voltage of equipment under test by the AC voltmeter. But the procedures outlined below should be due to the presence of polarity.

- (1) Connect Earth clip (alligator clip) to the plus (+) side of equipment under test and touch the minus (-) side with line prod.

Note: There will be no indication when polarity is reversed. When polarity is unknown, make measurements two opposite ways.

- (2) Take the reading on the AC Voltmeter scale. However, pointer deflection is greater in DC voltage measurement. The true value is about 0.45 times the reading on the AC voltmeter. conversion chart.

Conversion Chart for DC Voltage



5-4. Insulation Resistance Measurements

WARNING

To avoid possible electric shock, instrument damage and/or damage to the equipment under test, insulation tests are to be performed on de-energized (DEAD) circuits and equipment only. Do not perform tests on energized (LIVE) circuits! Always test the circuit or equipment to insure it is de-energized. Make sure that you can visually see that the circuit or equipment is disconnected before proceeding with an insulation test. Do not proceed with any tests if you are not sure the circuit is DEAD! Some equipment may contain sensitive electronic components which may be damaged during an insulation test when applying a HIGH DC Voltage. Consult the manufacturer of the equipment under test for precautions that should be followed to avoid equipment damage.

(1) Mechanical Zero Adjustment

Check that the meter pointer lines up with the ∞ mark on the red megaohm scale. If not, adjust it by rotating the movement zero adjust screw with a small driver as described in section 5-1-1.

(2) Battery Voltage Check

Switch the function selector switch to the BATT check position and press the test button or remote control switch (LED will light up). If the pointer does not move to BATT GOOD, the battery needs to be replaced. Battery check circuit is designed on the basis of the 500V/100M Ω range where the current consumption is the largest. Even when the pointer is slightly off BATT GOOD, it would be possible sometimes to make measurements on ranges other than the 500V/100M Ω range. In order to use the batteries most effectively check that the pointer lines up with the "O" mark at the right end of the scale by shorting the line prod and alligator earth clip. When the pointer reads "O" at the range selected the instrument can be operated at that range.

(3) Live Circuit Check

Make a voltage measurement as outlined in section 5-2. Check that no voltage is present in the circuit under test.

The pointer will deflect if the circuit is live.

⚠ WARNING

Make sure that you can visually see that power is disconnected from the circuit or equipment under test before proceeding with an insulation test.

(4) Operation of Test switches

When making insulation tests with Model 3311 or 3312, you can turn power on or off by operating the remote control switch on the probe or the press to test button on the instrument. Note that the instrument is powered if either of the two switches is turned on.

- Insulation Tests Using Remote Control Switch

Do not press the test button on the instrument. The remote control switch on the probe permits power to turn on or off.

- Continuous Measurements

A lock down feature is incorporated on the press to test button. Pressing and turning it clockwise lock the button in the continuous operating position irrespective of the remote switch.

⚠ WARNING

After completion of insulation tests always release the press to test button by turning it counterclockwise.

(5) Insulation Tests (using remote control switch as standard measurement method)

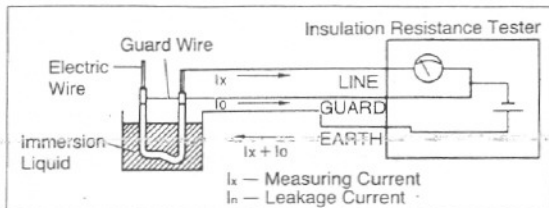
- With the line probe and alligator clip connected to the circuit under test, press the remote control switch (LED lights up).
- Read the megohm scale selected.

Note: To discharge the charge stored in the circuit under test after insulation tests, release the press to test button or remote control switch with the test leads connected to the instrument and set the range selector switch to the AC 600V position. The pointer deflects once and then returns to the zero position gradually.

Discharging will be completed when the pointer returns to the zero position at the left end of the scale. (The pointer may swing up full scale, but this does not cause damage to the instrument. Wait until the pointer returns to the zero position).

(6) Use of Guard Terminal

Shown below is an example of the insulation resistance measurement of an electric wire. If Line cord is simply connected to the wire conductor and Earth cord to immersion liquid, measurement errors will be introduced as this results in the measurement of the combined resistance of insulation resistance and the surface leakage resistance at the cut end of the electric wire. In order to remove this surface leakage current wind a guard wire around the cut end of the conductor and connect it to the Guard terminal of the insulation resistance tester as shown in Fig. 4. Then, the surface leakage current will bypass the indicating meter of the insulation resistance tester. This will permit the correct measurement of the insulation resistance of the conductor.



6. Back Light Function

To facilitate working in dimly lit situations, a back light function is provided which illuminates the display. To operate this function, the back light button must be depressed and released. The light will be switched on for about 30 seconds before it goes out.

7. Battery Replacement

- (1) To replace the batteries, first disconnect all test leads from the instrument. Open the battery compartment cover by unscrewing the metal captive screw to reveal the battery compartment. The eight 1.5V SUM-3 (R-6) type batteries are located in a separate detachable compartment. Always replace all eight batteries with new ones at the same time—Never mix old and new ones.

WARNING

Never replace the batteries during testing.

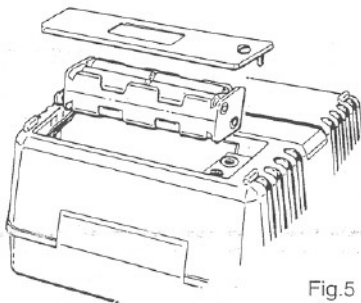


Fig.5

8. Service

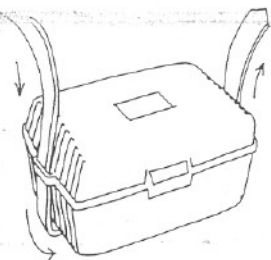
If this Tester should fail to operate, inform the distributors stating the exact nature of the failure and make sure that:

- a) Leads have been checked
- b) Fuse has been checked
- c) Battery has been checked

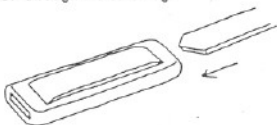
Remember, the more information you provide, the more quickly the Tester will be serviced.

CASE, STRAP, SHOULDER-PAD AND TEST-LEAD POUCH ASSEMBLY

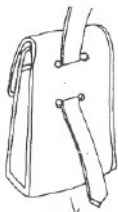
Assemble the shoulder strap through the case lugs and the test-lead pouch in the following sequence:



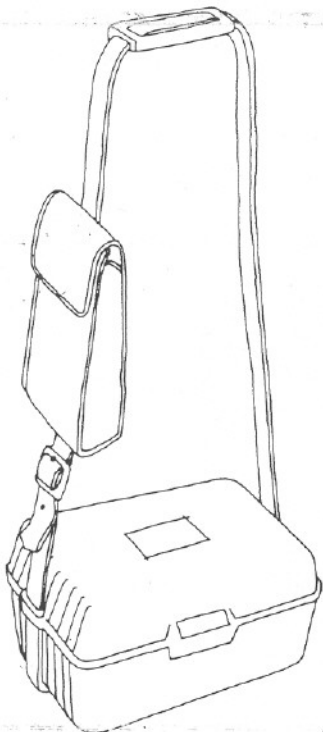
- 1** Pass the strap **DOWN** through the first case lug, under the case and **UP** through the other lug.



- 2** Slide the shoulder-pad onto the strap.



- 3** Feed the strap **DOWN** through the slots in the back of the test-lead pouch.



- 4** Pass the strap through the buckle, adjust the strap for length and secure.