

# MODEL 1401

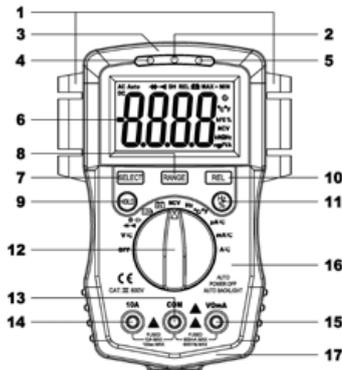
## Compact Digital MultiMeter

### Instruction Manual

#### 1. Introduction

The Triplett Model 1401 multimeter is a 6000 count, handheld digital multimeter with auto-ranging capability, AC RMS measurement, automatic power off and a backlit LCD display. Using a Large Scale Integration (LSI) integrated circuit, the multimeter is designed for stability and accuracy. The resilient outer molded cover provides additional protection from the occasional fall, and the threaded probe tips and screw on insulated clips provide for secure, hands-off measurements. The meter can measure AC and DC voltage, AC and DC current, resistance, capacitance, frequency/duty cycle, temperature, and forward diode voltage drop. It can also perform an audible continuity test, non-contact AC voltage detection, and test both 1.5V and 9V batteries.

#### 2. Product Features



- 1) Test lead holder.
- 2) CDS sensor for automatic backlight brightness control.
- 3) NCV Detection area (top of DMM case).
- 4) NCV Detection voltage detected indicator (red LED).
- 5) NCV Detection mode activated indicator (green LED)
- 6) LCD display with  (Low Battery), NCV, DH (Hold) and measurement unit annunciators.
- 7) **SELECT** button: With the rotary switch on the “Ω    ” range, press this button to select resistance, diode, continuity or capacitance tests. With the switch on either voltage or current selections, this switches between DC and AC settings. If the temperature °C/°F is selected, it switches between Centigrade or Fahrenheit. If the SELECT button is held down while the meter is turned on, the “Auto Power Off” function will be disabled.
- 8) **RANGE** button: Press and release the “RANGE” button to enter manual range mode. Additional presses cause the unit to change the measurement range of the measurement function selected. Press and holding the button for more than 2 seconds causes the meter to toggle back to auto-ranging mode.
- 9) **DISPLAY HOLD** Button: Press the “HOLD” key to lock the present value on the display. The “DH” sign will appear on the display while the hold function is active. Press it again to exit and resume normal display updating.
- 10) **REL** button: Press this button for the meter to enter relative measurement mode. “REL” is displayed on the LCD and the present reading becomes the reference value. In this mode, the displayed value is the difference between any subsequent measurement and the reference value: Relative measurement = measurement value-Reference value.
- 11) **Hz/%** button: On “ACV/ACA” or “Hz” range, pressing the “Hz/%” key, switches between **Frequency** or **Duty Cycle** measurements.
- 12) **Rotary Switch**: Use this switch to select test functions and ranges.
- 13) **COM**: COM and Temperature “-” Input Jack.
- 14) **10A**: 10A Input Jack, fused at 10A., 500V
- 15) **VΩmA**: V/mA/BATT/Ω    and Temperature “+” Input Jack, fused at 800mA, 500V
- 16) Meter case
- 17) Protective molded cover

#### 3. Safety Information

- 3-1 The meter is designed according to IEC-1010 concerning electronic measuring instruments with an over-voltage category level of 600V (CAT III) and pollution level 2. **DO NOT USE THIS METER FOR CAT IV APPLICATIONS.**
- 3-2 Follow all safety and operating instructions to ensure that the meter is used safely and is kept in good operating condition.
- 3-3 Safety symbols:

-  **Important safety information, refer to the operating manual.**
-  **Dangerous voltage may be present.**
-  **Double insulation (protection Class II)**

#### 4. Cautions and Warnings

- 4-1 To maintain product safety, use the provided test leads. Damaged test leads should be replaced with the same model or test leads with the same electrical specifications.
- 4-2 Do not use with the battery cover removed.
- 4-3 Always set the rotary switch to the correct position for measurement.
- 4-4 Do not exceed the input limits.
- 4-5 Do not change the rotary switch setting when the leads are connected to an energized circuit.
- 4-6 Use caution when measuring voltages higher than 60V DC or 30V AC.
- 4-7 Replace fuse with fuse of the same rating.
- 4-8 To conserve battery life, always turn the meter off when measurements are completed.

#### 5. General Characteristics

- 5-1 Max Voltage between input terminal and Earth Ground: CAT III 600V
- 5-2 Over-range Indication: display “1” or “-1” for the most significant digit
- 5-3 Low Battery Indication:  is displayed
- 5-4 Maximum LCD Display: 5999 (3 ½ digits)
- 5-5 Auto and manual range selection
- 5-6 Auto Power Off: The meter will switch to standby mode when it has been on for approximately 20 minutes.
- 5-7 Fuse protection: Fast acting 800mA/500V and 10A/500V fuses.
- 5-8 Power supply: 2 x 1.5V AA batties (R6, or LR6)
- 5-9 Operating Temperature: 0°C to 40°C (relative humidity <85%)
- 5-10 Storage Temperature: -10°C to 50°C (relative humidity <85%)
- 5-11 Dimension: 150x106x36mm
- 5-12 Weight: approx. 250g (including battery)

#### 6. Measurement Specifications

Accuracy is specified from 18°C to 28°C (64°F to 82°F) with relative humidity below 70%.

DC Voltage		
Range	Resolution	Accuracy
600.0mV	0.1mV	±(0.5% of rdg + 2 digits)
6.000V	1mV	
60.00V	10mV	
600.0V	100V	
600V	1V	±(0.8% of rdg + 2 digits)

Impedance: 10MΩ, >100MΩ on 600mV range  
Overload protection: 600V DC or AC

AC Voltage (True RMS)		
Range	Resolution	Accuracy
6.000V	1mV	±(1.0% of rdg + 3 digits)
60.00V	10mV	
600.0V	100mV	
600V	1V	±(1.5% of rdg + 3 digits)

Impedance: 10MΩ - Overload protection: 600V DC or AC rms  
Frequency Range: 40 to 400Hz

DC Current		
Range	Resolution	Accuracy
600μA	0.1μA	±(1.2% of rdg + 2 digits)
6000μA	1μA	
60mA	10μA	
600mA	100μA	
6A	1mA	±(2.0% of rdg + 3 digits)
10A	10mA	

-- Overload protection: 800mA/500V Fast Fuse  
10A/500V Fast Fuse, 10A up to 10 seconds

AC Current		
Range	Resolution	Accuracy
600μA	0.1μA	±(1.5% of rdg + 3 digits)
6000μA	1μA	
60mA	10μA	
600mA	100μA	
6A	1mA	
10A	10mA	±(2.5% of rdg + 5 digits)

Overload protection: Fast Acting 800mA / 500V fuse, 10A / 500V fast fuse, 10A < 10 seconds  
Frequency Range: 40 to 400Hz

Resistance		
Range	Resolution	Accuracy
600Ω	0.1Ω	±(1.0% of rdg + 3 digits)
6kΩ	1Ω	±(1.0% of rdg + 2 digits)
60kΩ	10Ω	
600kΩ	100Ω	
6MΩ	1kΩ	
60MΩ	10kΩ	±(1.5% of rdg + 3 digits)

Overload protection: 500V AC / DC

Capacitance test		
Range	Accuracy	Resolution
9.999nF	±(3.0% of rdg+ 10 digits)	1pF
99.99nF	±(2.5% of rdg+ 5 digits)	10pF
999.9nF		100pF
9.999μF	±(5.0% of rdg+ 10 digits)	1nF
99.99μF		10nF
999.9μF	±(10.0% of rdg+ 10 digits)	1μF
9.999mF		10μF
99.99mF		99.99mF

Frequency		
Range	Accuracy	Resolution
9.999Hz	±(0.1% of rdg+ 5 digits)	0.001Hz
99.99Hz		0.01Hz
999.9Hz		0.1Hz
9.999kHz		1Hz
99.99kHz		10Hz
999.9kHz		100Hz
9.999MHz		1kHz

-- Sensitivity: sine wave 0.6V rms (9.999MHz: 1.5V RMS)  
-- Overload protection: 500V DC or AC RMS

Duty Cycle		
Range	Accuracy	Resolution
9.999KHz	±(2.0% of rdg+ 2 digits)	0.1%

-- Sensitivity: sine wave 0.6V RM

Temperature			
Range	Accuracy		Resolution
°C	-20~150°C	± ( 3°C+ 1 digit )	1°C
	150~1000°C	± ( 3% of rdg + 2 digits )	
°F	-4~302°F	± ( 5°F+ 2 digits )	1°F
	302~1832°F	± ( 3%+ 3 digits )	

Thermocouple: NiCr-NiSi K-type (supplied)  
Overload protection: Fast Acting 800mA / 500V fuse

Battery test			
Range	Accuracy	Load current	Resolution
	±(5.0% of rdg+5 digits)	Approx. 50mA	1mV
		Approx. 10mA	10mV

Overload protection: Fast Acting 800mA / 500V fuse

Diode test		
Range	Description	Resolution
	Forward voltage drop of diode	1mV

Overload protection: 500V AC / DC  
Test Current: Approximately 1.5mA  
Open Circuit Voltage: Approximately 3.2V

Continuity test		
Range	Description	Function
	0 to 2000Ω	Buzzer sounds if resistance is less than 50Ω

Overload protection: 500V AC / DC  
Open circuit voltage: Approximately 1V

Noncontact Voltage Detection		
Range	Description	Function
NCV	AC Voltage field, 90V – 1000V RMS Press & Hold NCV button to activate	Buzzer sounds and red LED lights if AC electric field detected

## 7. Operating Instructions

### 7-1 Before Operation

- 7-1-1** Check battery. If the battery voltage is low, the symbol will appear on the LCD display. Replace by removing the (2) screws in the rear panel and lifting the battery cover up.
- 7-1-2** The near the input jacks warns of limitations in the input voltage and current. DO NOT EXCEED THESE LIMITS.
- 7-1-3** The rotary switch should be positioned to the proper function and measurement range BEFORE connecting the test leads to the circuit.

### 7-2 Measuring DC Voltage

- 7-2-1** Connect the black test lead to **COM** jack and red lead to **VΩmA** jack.
- 7-2-2** Set the rotary switch to the desired “V ” range position.
- 7-2-3** Observing polarity, connect test leads across the circuit component(s) under measurement and read the voltage from the LCD.

#### NOTE:

- When the quantity to be measured is unknown, set the rotary switch to its highest DC voltage range before connecting the test leads to the circuit.
- When only “1” or “-1” is displayed, it indicates “over range”. Either select a higher measurement range or do not continue to measure.
- Although the meter may measure voltages higher than 600V, it may be damaged or pose a shock hazard or other injury to the user.
- Use caution when measuring high voltages (>60V DC or >30V AC).

### 7-3 Measuring AC Voltage

- 7-3-1** Connect the black test lead to **COM** jack and red lead to **VΩmA** jack.
- 7-3-2** Set the rotary switch to the desired “V ” range position.
- 7-3-3** Observing polarity, connect test leads across the circuit component(s) under measurement and read the voltage from the LCD.

#### NOTE:

- When the quantity to be measured is unknown, set the rotary switch to its highest AC voltage range before connecting the test leads to the circuit.
- When only “1” or “-1” is displayed, it indicates “over range”. Either select a higher measurement range or do not continue to measure.
- Although the meter may measure voltages higher than 600V, it may be damaged or pose a shock hazard or other injury to the user.
- Use caution when measuring high voltages (>60V DC or >30V AC).

### 7-4 Measuring DC Current

- 7-4-1** Connect the black test lead to **COM** jack and red lead to the **VΩmA** jack for a maximum 800mA current. For a maximum 10A current, move the red lead to the **10A** jack.
- 7-4-2** Set the rotary switch to the desired “A ” range position. You can press the **RANGE** button to switch between measurement ranges manually, or leave the meter in “Auto” range mode.
- 7-4-3** Observing polarity, connect test leads in series with the load under measurement.

#### 7-4-4 Read current from the LCD.

#### NOTE:

- When the quantity to be measured is unknown, be sure that the meter is in “Autorange” mode and consider whether to use the 800mA or 10A input jack before connecting test leads to the circuit.
- When only “1” or “-1” is displayed, it indicates “over range”. Either select a higher measurement range or do not continue to measure.
- Current above 800mA on the **VΩmA** jack will blow the fuse. The 10A jack fused at 10A. Do not apply more than 10A and do not apply 10A for longer than 10 seconds. Allow a 15 minute cooldown.
- If fuse blows, remove meter from circuit under test. Replace fuse by removing the rear cover (2 screws) to access fuse.

## 7-5 Measuring AC Current

**7-5-1** Connect the black test lead to **COM** jack and red lead to **VΩmA** jack for maximum 800mA current. For a maximum 10A current, move the red lead to the **10A** jack.

**7-5-2** Set the rotary switch to the desired “A ” range position. Press the **SELECT** button once or until “**AC**” appears on the top of the LCD and the “**mA**” or “**A**” units appear on the lower right of the display. You can press the **RANGE** button to switch between measurement ranges manually, or leave the meter in “Auto range” mode.

**7-5-3** Observing polarity, connect test leads in series with the load under measurement.

**7-5-4** Read the current on the LCD.

### NOTE:

1. When the quantity to be measured is unknown, be sure that the meter is in “Aurorange” mode and consider whether to use the 800mA or 10A input jack before connecting test leads to the circuit.
2. When only “1” or “-1” is displayed, it indicates “over range”. Either select a higher measurement range or do not continue to measure.
3. Current above 800mA on the **VΩmA** jack will blow the fuse. The 10A jack is fused at 10A. Do not apply more than 10A and do not apply 10A for longer than 10 seconds. Allow a 15 minute cooldown.
4. If fuse blows, remove meter from circuit under test. Replace fuse by removing the rear cover (2 screws) to access fuse.

## 7-6 Measuring Resistance

**7-6-1** Connect the black test lead to **COM** jack and red lead to **VΩmA** jack.

**7-6-2** Set the rotary switch to the desired  $\Omega$   range position.

**7-6-3** Connect the test leads across the resistance under measurement

**7-6-4** Read the resistance on the LCD.

### NOTE:

1. DO NOT APPLY VOLTAGE WHEN MEASURING RESISTANCE.
2. If “1” or “-1” is displayed, it indicates over range. This means that the test leads are not making connection to the circuit, or the resistance exceeds the measurement ability of the selected range. Select a higher range to obtain a measurement.
3. When checking in-circuit resistance, be sure the circuit under test has all power removed and that all capacitors have been fully discharged.

## 7-7 Measuring Temperature

**7-7-1** Set the rotary switch to the °C/°F range position.

**7-7-2** The LCD will show the present temperature of the meter.

**7-7-3** To use the K-type thermocouple probe, connect the black banana plug of the probe into the **COM** jack and the red banana plug to the **VΩmA** jack.

**7-7-4** The temperature of the thermocouple probe tip is displayed on the LCD

**7-7-5** The probe included with the meter can be used for measuring temperature up to 482 °F. To accurately measure higher temperatures, use a high temperature rated K-type probe.

### NOTE:

1. Do not connect the thermocouple probe to a voltage source

## 7-8 Battery Testing

**7-8-1** Connect the black test lead to **COM** jack and red lead to **VΩmA** jack.

**7-8-2** Set the rotary switch to the proper “” or “” range position to test either a 1.5V or 9V battery.

**7-8-3** Connect test leads to the + and - terminals of the battery under test

**7-8-4** The LCD displays the battery's voltage at the rated test current.

## 7-9 Diode Testing

**7-9-1** Connect the black test lead to **COM** jack and red lead to **VΩmA** jack.

**7-9-2** Set the rotary switch to the  $\Omega$   position.

**7-9-3** Connect the red lead to the anode of the diode to be tested, and the black lead to the cathode. Press the **SELECT** button two times, until the diode symbol  appears on the top of the LCD and the “V” units appear on the lower right of the display

**7-9-4** The diode's forward voltage drop is displayed on the LCD.

### NOTE:

1. The meter will display the approximate forward voltage drop of the diode.
2. If the leads are reversed or not connected, “1” (over range) should be displayed

## 7-10 Continuity Testing

**7-10-1** Connect the black test lead to **COM** jack and red lead to **VΩmA** jack.

**7-10-2** Set the rotary switch to the  $\Omega$   position.

**7-10-3** Connect the test leads to the two points of the circuit under test.

Press the **SELECT** button once the continuity symbol  appears on the top of the LCD and the “ $\Omega$ ” units appear on the lower right of the display.

**7-10-4** If there is continuity (resistance is lower than approximately 50 $\Omega$ ) the built-in beeper will sound.

### NOTE:

1. Do not attempt this measurement on energized circuits.
2. If the leads are reversed, not connected, or connected to a resistance more than approximately 2000 $\Omega$ , “1” (over range) should be displayed

## 7-11 Measuring Capacitance

**7-11-1** Connect the black test lead to **COM** jack and red lead to **VΩmA** jack.

**7-11-2** Set the rotary switch at the desired “ $\Omega$  ” range position

**7-11-3** Connect test leads across the capacitance to be measured.

**7-11-4** Press the **SELECT** button three times, until the “n F” units appear on the lower right of the display.

**7-11-5** Read the capacitance from the LCD. 

**NOTE:** Capacitors should be discharged before being tested.

## 7-12 Non Contact AC Voltage detection

**7-12-1** Set the rotary switch at the desired “**NCV**” range position.

This activates the Non Contact AC Voltage (NCV) detection circuit, and the NCV green LED will illuminate. The “**NCV**” symbol will appear on the display along with “EF”.

**7-12-2** Position the meter so the top is parallel to and in contact with, or close to the conductor. When the AC voltage  $\geq 90V$  AC RMS, the NCV red LED and green LED will flash and the buzzer will sound.

### NOTE:

1. Even if the meter doesn't indicate the presence of AC voltage, the voltage may still be present. Do not rely on the non-contact voltage detector to determine the presence of live voltage. Voltage detection may be affected by socket design, insulation thickness, shielding, and other AC voltage field interaction. The NCV detector does not detect DC voltages.
2. If the meter test leads are connected and measuring AC voltage, the NCV detector circuit will also indicate AC voltage presence (LEDs and buzzer activation) if NCV mode is activated.
3. Proximity of florescent lights, dimmable lights, motors, and other large AC field generating devices can trigger Non-Contact AC Voltage detection function and invalidate the test.

## 8. Battery Replacement

**8-1** If the battery voltage drops below proper operation range the “” symbol will appear on the LCD display and the battery should be changed.

**8-2** Before attempting to remove the rear cover to replace the battery, be certain the test leads have been disconnected from the circuit to avoid electrical shock hazard. Power off the meter and remove the test leads from the banana jacks. To access the battery, remove the (2) screws in the rear cover and lift the cover.

**8-3** Replace the old battery with the same type battery (1.5V AA, R6 or LR6).

**8-4** Replace the rear cover of the meter and reinstall the (2) screws.

## 9. Fuse replacement

**9-1** To avoid electrical shock or injury, remove test leads from circuitry before replacing the fuse.

**9-2** Before attempting to remove the rear cover to replace the fuse, be certain the test leads have been disconnected from the circuit. Power off the meter and remove the test leads from the banana jacks. To access the fuse holder, remove the (2) screws in the rear cover and lift the cover.

**9-3** Replace the old fuse only with the same type and rating: 6×30mm 800mA/500V fast fuse or 10A/500V fast fuse

**9-4** Replace the rear cover and reinstall the (2) screws.

## 10. Maintenance

**10-1** Before attempting to remove the battery cover or open the case, be certain that test leads have been disconnected from energized circuitry to avoid electric shock hazard.

**10-2** Replace the test leads if the any wire is exposed, or if they become damaged.

**10-3** Do not use harsh chemicals or solvents to clean the meter.

**10-4** Do not use the meter with the rear cover removed. Injury may result.

**10-5** If the meter will not be used for more than 1 month, remove the battery to avoid possible damage from battery leakage.

## 11. Accessories

1. Test Leads (2) (red, black): electric rating 1000V 10A
2. Clips (2) (red, black)
3. "K" type thermocouple probe (1)
4. Instruction Manual
5. Battery (2) 1.5V AA Type R6 or LR6
6. Fuse, Fast Acting 800mA / 500V, 10A/500V

## Warranty

Triplett / Byte Brothers extends the following warranty to the original purchaser of these goods for use. Triplett warrants to the original purchaser for use that the products sold by it will be free from defects in workmanship and material for a period of (3) three years from the date of purchase.

This warranty does not apply to any of our products which have been repaired or altered by unauthorized persons in any way or purchased from unauthorized distributors so as, in our sole judgment, to injure their stability or reliability, or which have been subject to misuse, abuse, misapplication, negligence, accident or which have had the serial numbers altered, defaced, or removed. Accessories, including batteries and fuses, are not covered by this warranty.

To register a claim under the provisions of this warranty, please contact the distributor from which you purchased the product from for warranty consideration.

**ALL WARRANTIES IMPLIED BY LAW ARE HEREBY LIMITED TO A PERIOD OF THREE YEARS FROM DATE OF PURCHASE, AND THE PROVISIONS OF THE WARRANTY ARE EXPRESSLY IN LIEU OF ANY OTHER WARRANTIES EXPRESSED OR IMPLIED.**

The purchaser agrees to assume all liability for any damages and bodily injury which may result from the use or misuse of the product by the purchaser, his employees, or others, and the remedies provided for in this warranty are expressly in lieu of any other liability Triplett may have, including incidental or consequential damages.

Some states (USA ONLY) do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. No representative of Triplett / Byte Brothers or any other person is authorized to extend the liability of Triplett in connection with the sale of its products beyond the terms hereof.

Triplett / Byte Brothers reserves the right to discontinue models at any time, or change specifications, price or design, without notice and without incurring any obligation.

This warranty gives you specific legal rights, and you may have other rights which vary from state to state.



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**Model 1401  
Part Number: 1401**

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