183A Digital Multimeter

(DMM)

Digital Multimeter Sections

Four Basic Sections of the Multimeter

1. Digital Display
2. Push Button Functions
3. Rotary Dial Selector
4. Test Lead Terminals

Digital Multimeter Sections

- Digital Display Readings and Locations on Start-up

Low Battery symbol will appear ***only*** when power is low

Button Functions Area

Dial Setting Icon Reference Area

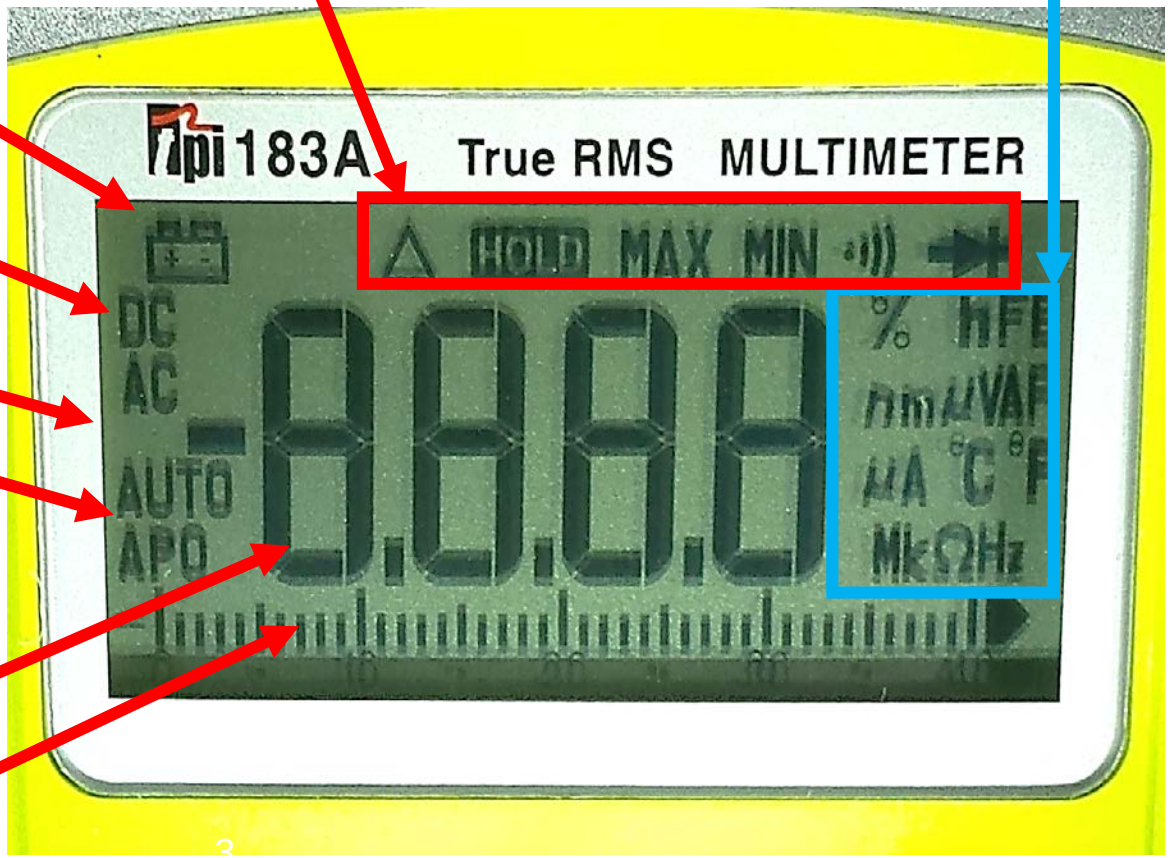
Voltage Type AC or DC

Auto Ranging on Start-up

Auto **P**ower **O**ff

Display of the Measured Value

Analog Bar Graph



Digital Multimeter Sections

- DMM Push-Buttons Enhance Dial Functions

REC
activates recording of MIN (minimum) and MAX (maximum) values

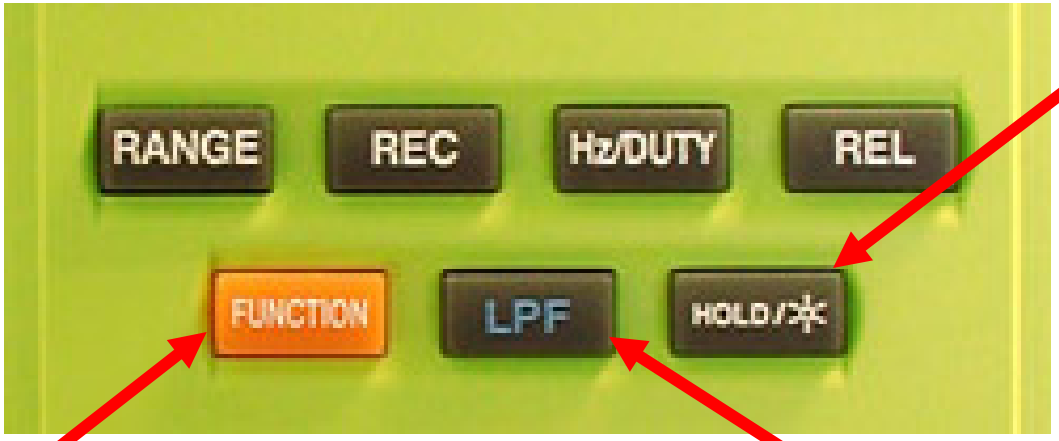
Hz/DUTY toggles between Frequency (Hertz - Hz) or Duty Cycle (%) on AC-Volts, AC-Amps, or Hz

REL
activates Relative Mode
- sets display to zero
- factors out undesired readings

RANGE
toggles between Auto Ranging or Manual Ranging

Digital Multimeter Sections

- DMM Push-Buttons Enhance Dial Functions



HOLD
freezes a value on the display - a second press removes the hold going back to a live value – activates backlight

FUNCTION toggles between Continuity Buzzer and Diode test on the Ohm  setting

LPF (Low Pass Filter)
Filters out unwanted electrical signals/noise - AC volts setting only

Toggles between degrees Celsius and Fahrenheit on the 

setting

Digital Multimeter Sections

- DMM Rotary Dial Symbol Definitions

Ohms (or resistance) toggle to **Continuity** or **Diode** Test

40 micro amps DC max. current setting-measures tiny current draw in DC

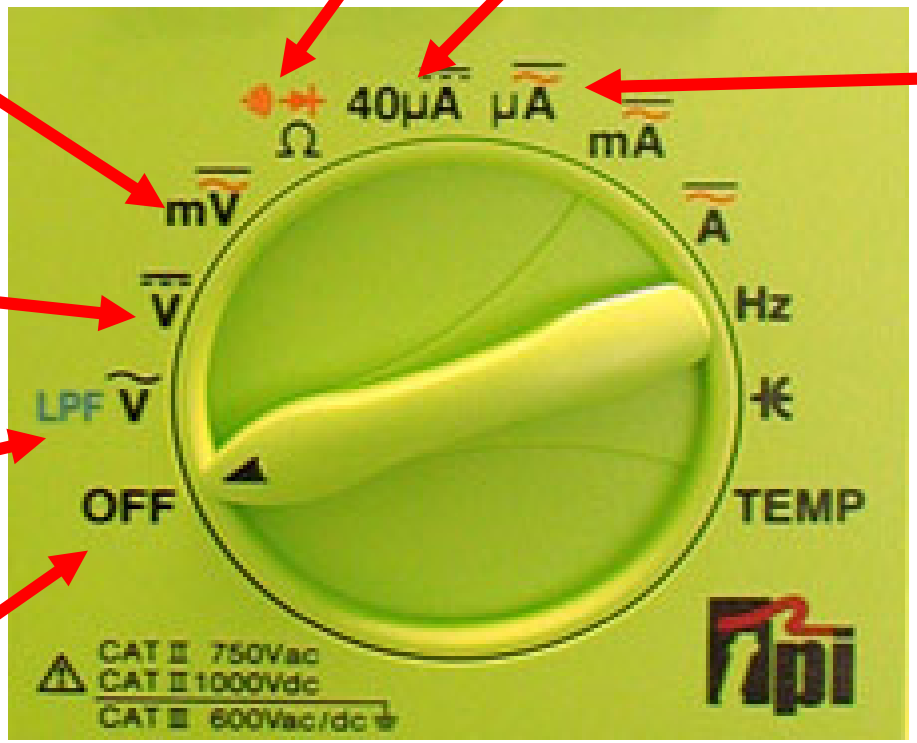
AC or DC selectable **millivolts**

4000 micro amps max. current setting selectable AC or DC for very low current draw

DC Volts

AC Volts LPF option

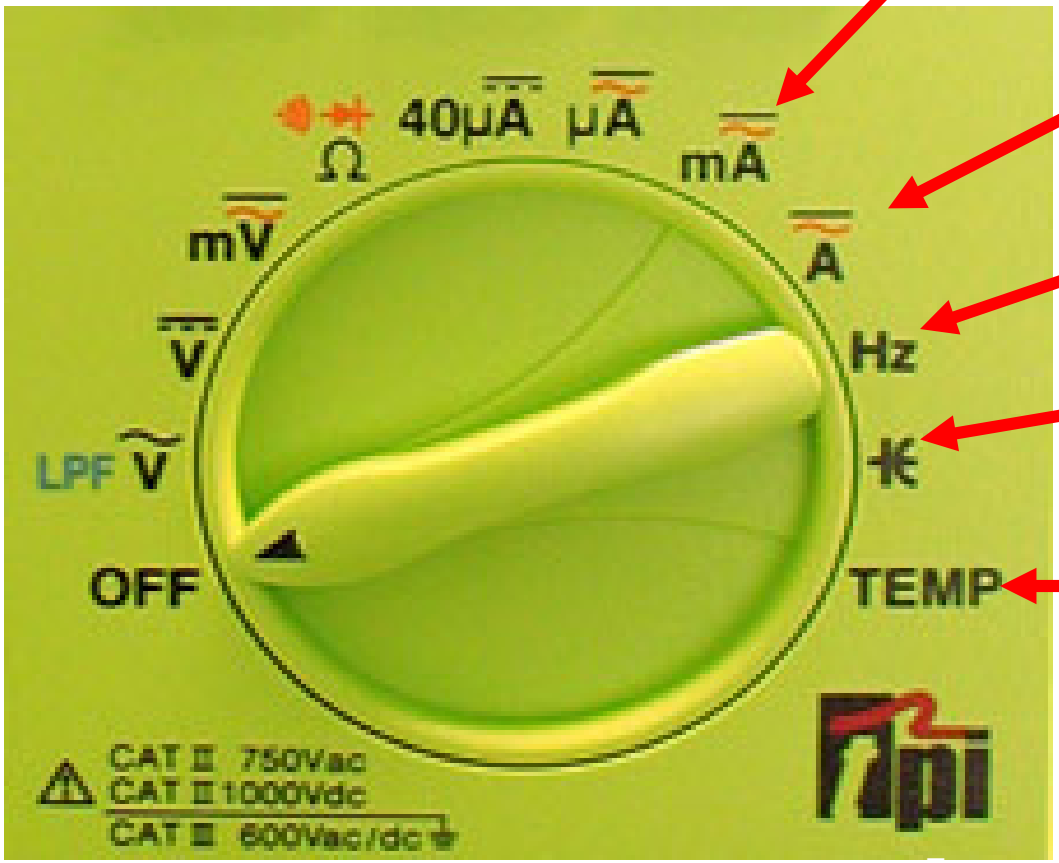
OFF meter is not active



Digital Multimeter Sections

- DMM Rotary Dial Symbol Definitions

400 milli Amp max. current setting
selectable AC or DC for low current draw



10 Amp
max current setting
selectable AC or DC

HERTZ
frequency measurements

CAPACITANCE
measures capacitors

TEMP (TEMPERATURE)
measures degrees C & F
using the FUNCTION button

Digital Multimeter Sections

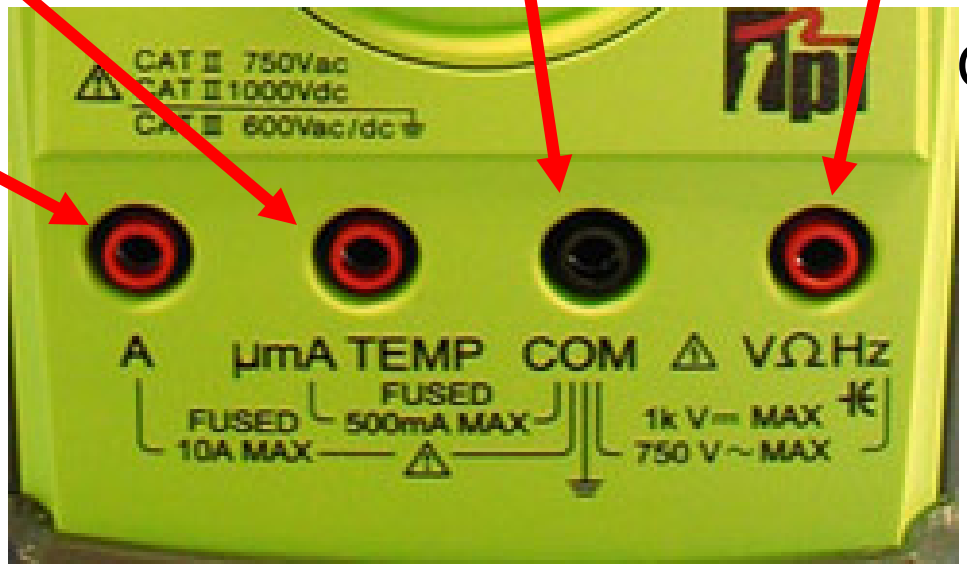
- DMM - Test Lead Terminal Symbols

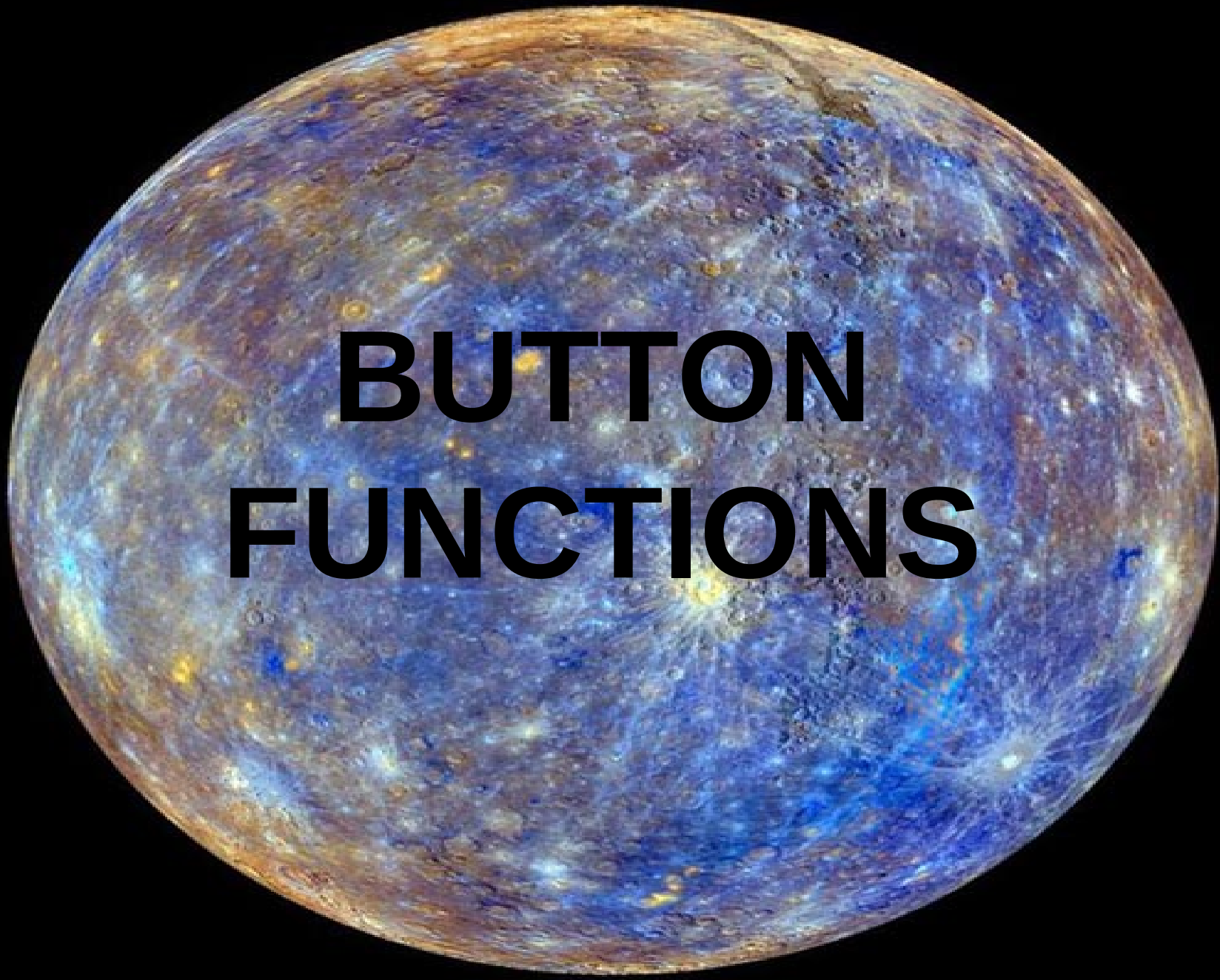
TEMP, Micro & milliamps
red lead connection
500 milliamp (½ amp) fused terminal

COMMON
black lead connection
used for most measurements
(Typically Ground)

Volts/OHMS/Hertz
red lead connection
used for Voltage, Ohms(resistance) Diode Test, Continuity, Hertz (frequency) and Capacitance

Amps
red lead connection
10 Amp fused terminal



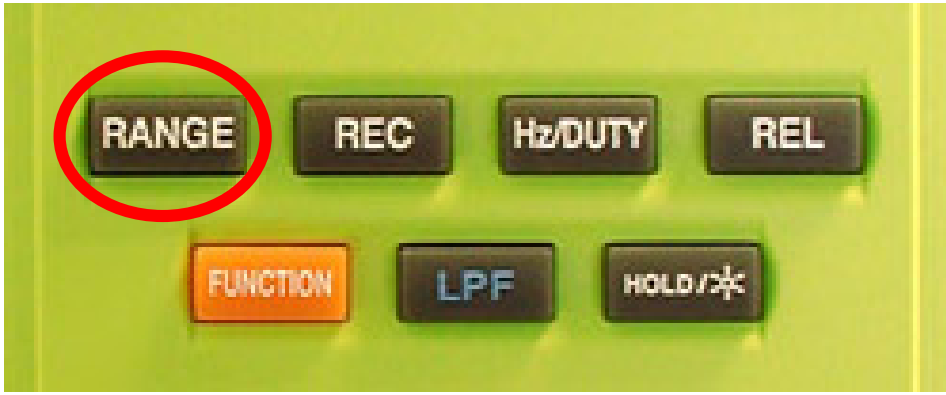

BUTTON
FUNCTIONS

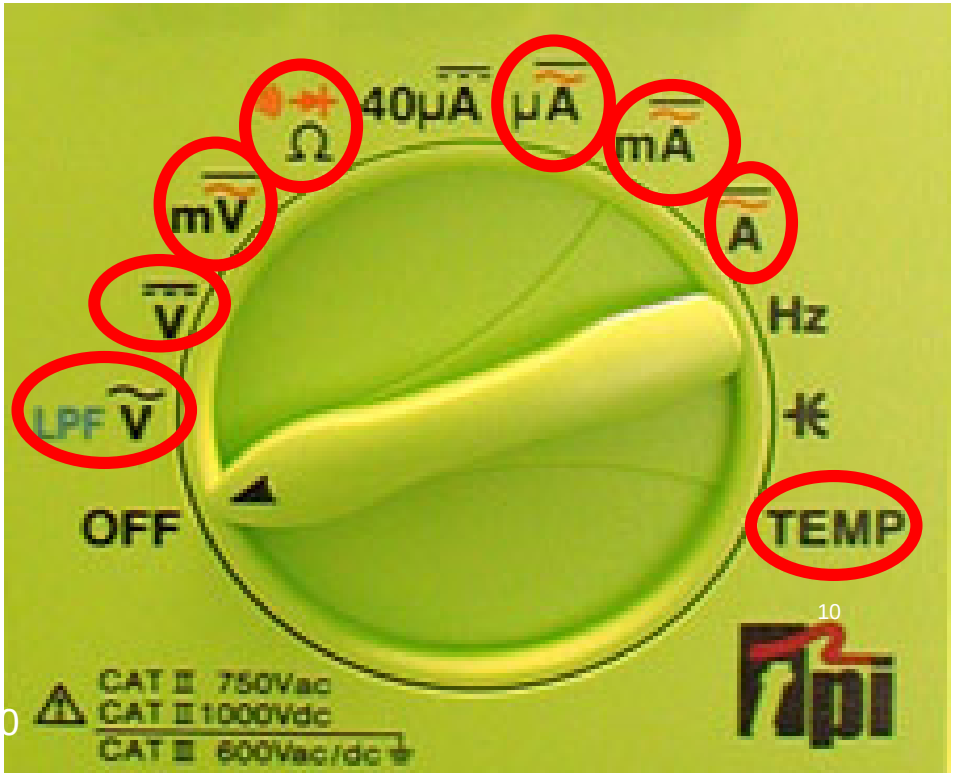
Digital Multimeter – RANGE Button

Use with the following Rotary Dial settings

Converts meter from Auto-Ranging to Manual-Ranging

1. **Press button once for manual range mode**
2. **Press again to move decimal**
3. **Hold down button for 3 seconds to go back to Auto-ranging**



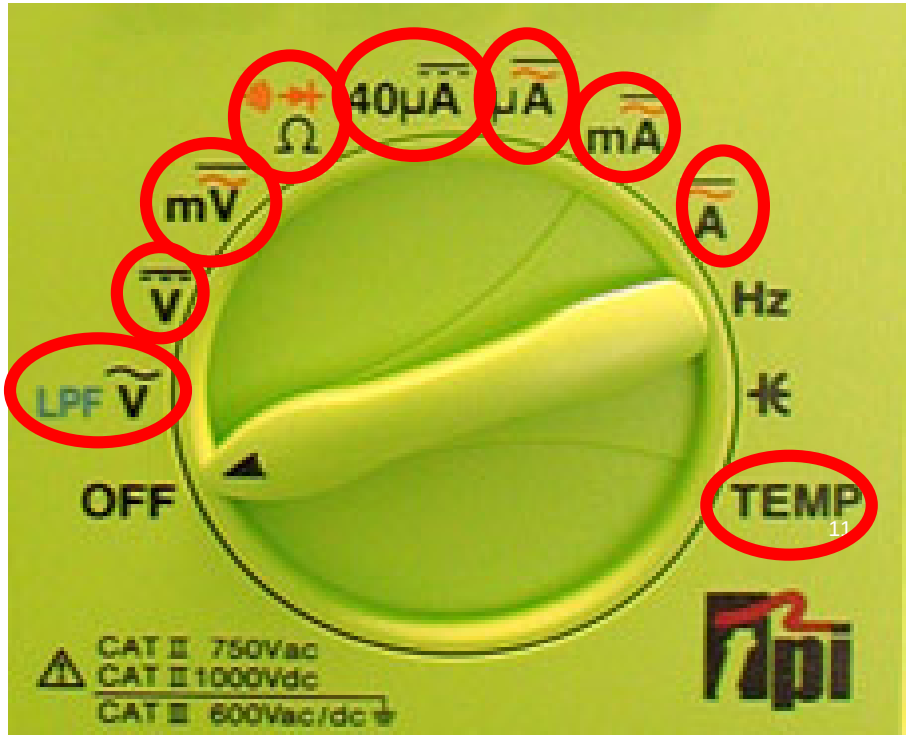


Digital Multimeter – Record Button

Use with the following Rotary Dial settings

Records MAXIMUM and MINIMUM READINGS

1. **Press button to activate record (MAX)**
2. **Press again to toggle to MIN or MAX**
3. **Hold button for 3 seconds to exit the Record function**

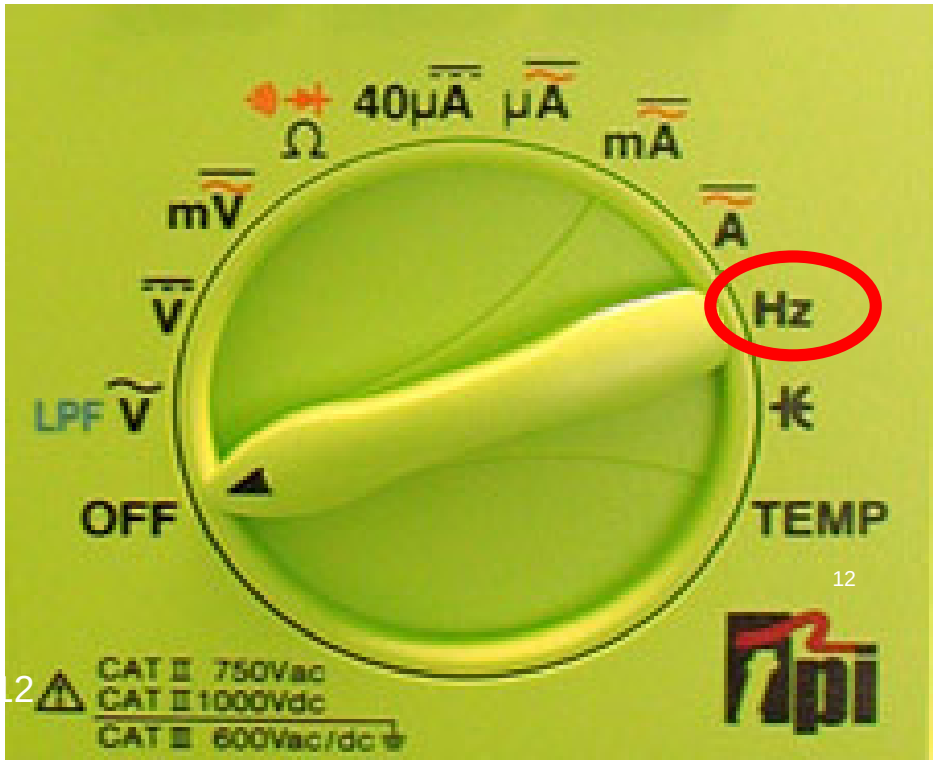


Digital Multimeter – Hz/Duty Button

Use with the following Rotary Dial setting

Changes from Hertz to Duty Cycle

1. **Press Hz/DUTY button to toggle between Hertz & Duty Cycle (%)**

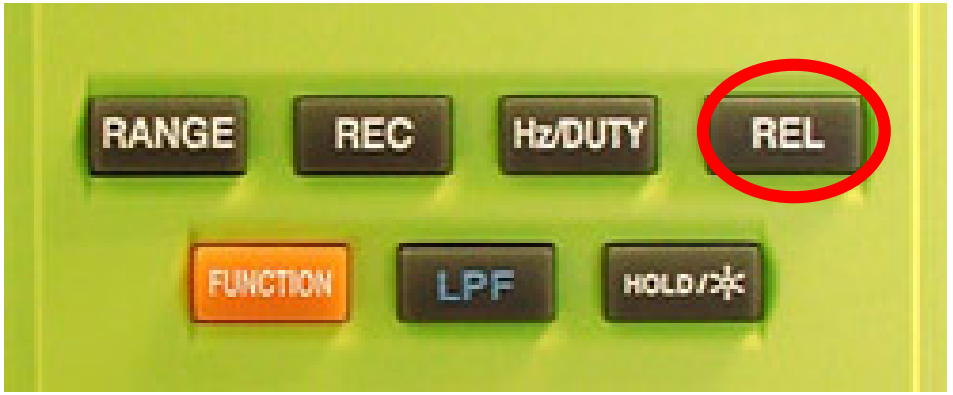


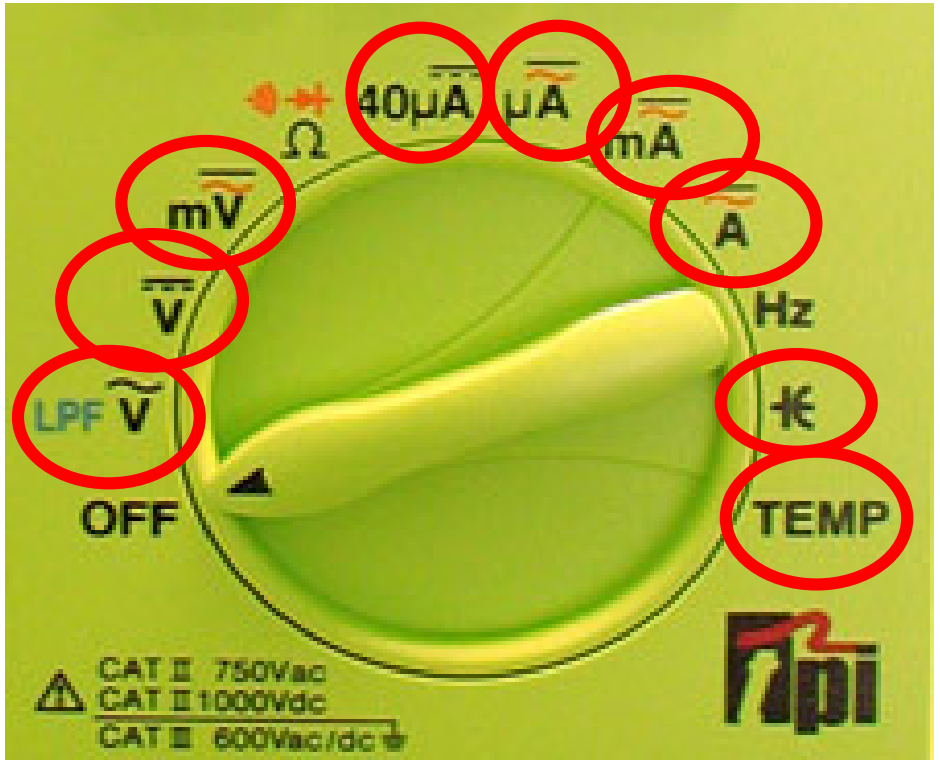
Digital Multimeter – Relative Button

Relative (REL) Function: Factors Out Lead Resistance on Sensitive Readings

Zero's the display

1. **Press REL button to activate Zero display**
2. **Press again to deactivate**



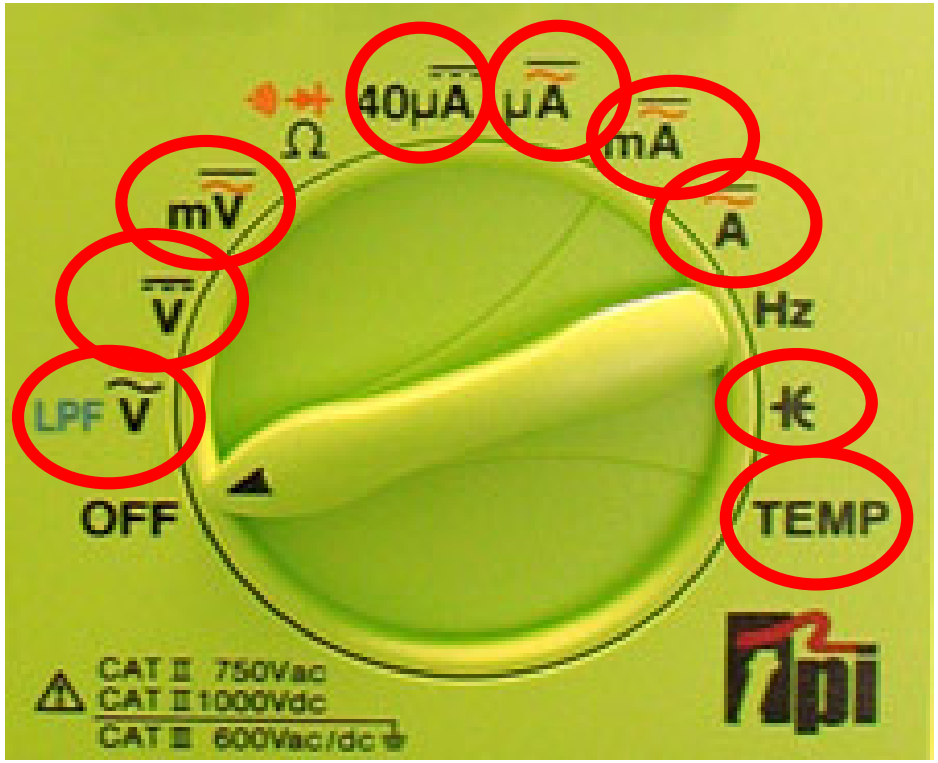


Digital Multimeter – Function Button

Use with the following Rotary Dial setting

Function: Adds additional functions (DC to AC voltage, Continuity and Diode) to orange marked dial settings
Toggles TEMP F to C

1. **Press FUNCTION button to toggle to additional functions**

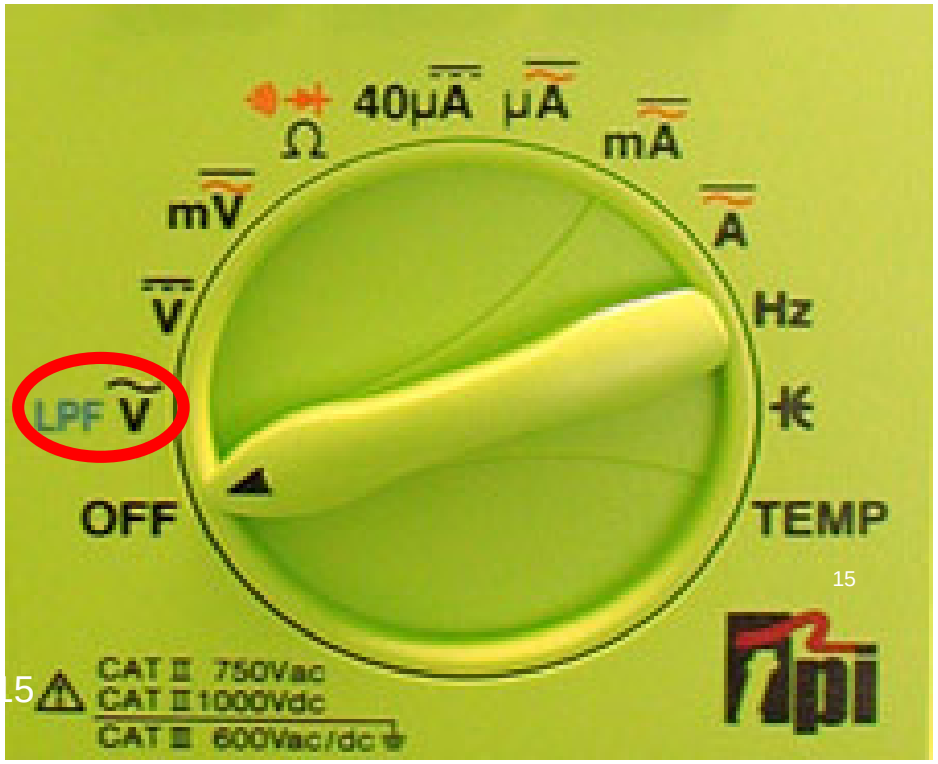


Digital Multimeter – LPF Button

Use with the following Rotary Dial setting

Changes from live AC Volts to Averaged AC volts to slow a jumpy reading

1. **Press LPF (Low Pass Filter) to activate averaging filter**
2. **Press again to deactivate the LPF**



Digital Multimeter – Hold Button

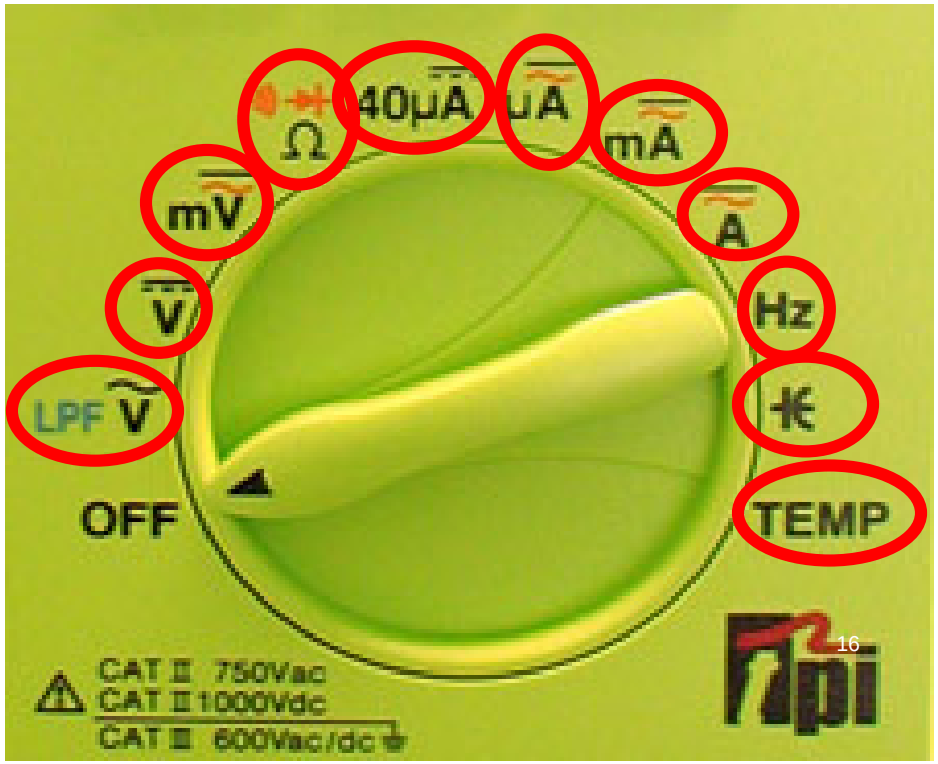
Use with the following Rotary Dial setting

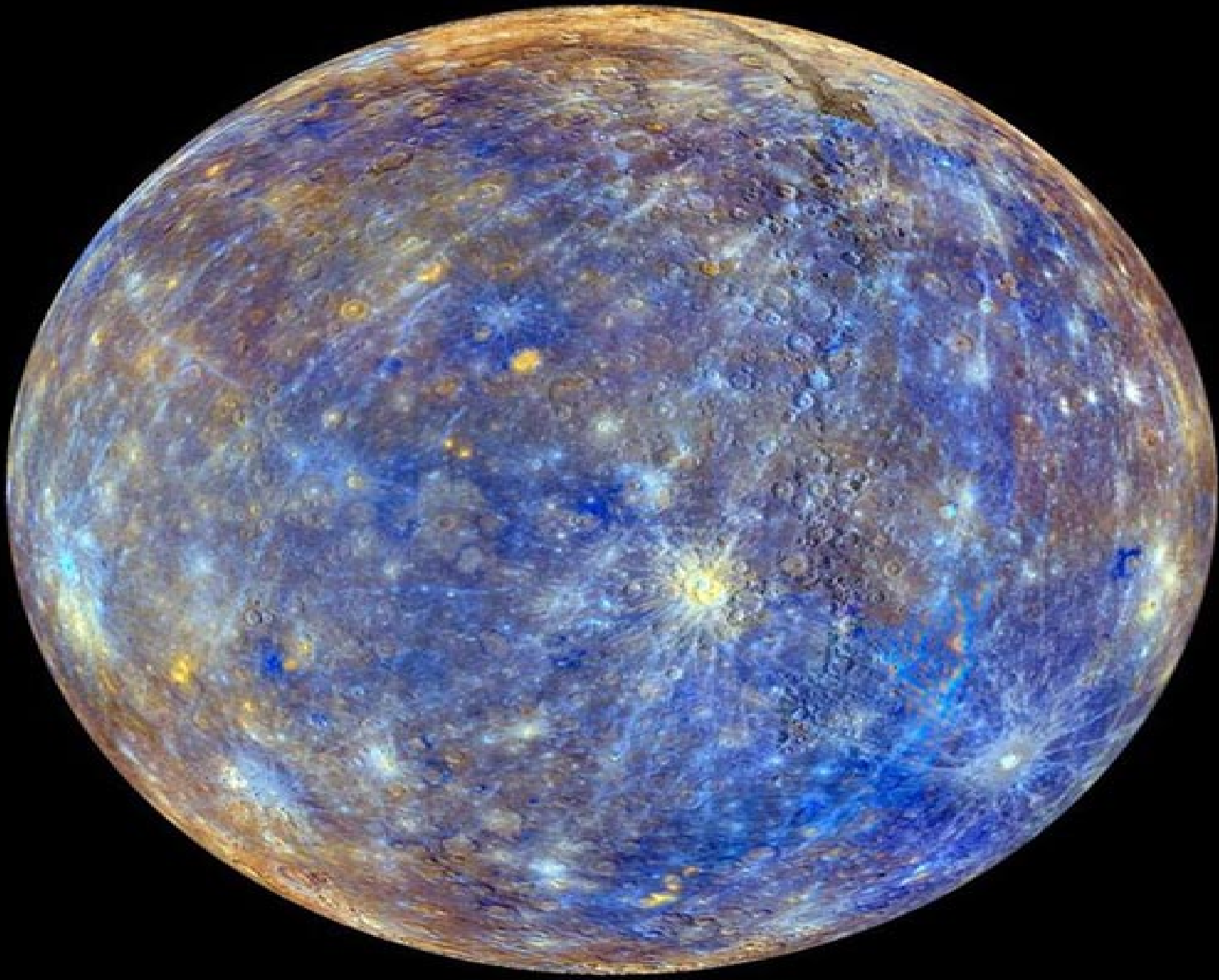
Holds a desired reading or activates the backlight

1. **Press Hold/* button to capture a reading**
2. **Press again to deactivate**

* **Activates Backlight button held down for 3 seconds**

* **Press and hold to deactivate**





Digital Multimeter Amperage Testing

- NEVER exceed the maximum amperage of the meter terminal (either 500mA or 10 amps)
- *Always start with the **Amps** setting first* to verify if the milliamps or microamps can be used safely
- ***REMOVE THE RED TEST LEAD *IMMEDIATELY* from the meter when done performing any amperage test***
- This lowers the chance of accidently checking voltage (parallel connection) when the meter is connected in ***series*** *for amperage*
- Blown fuses are most commonly caused by having the test leads in the *wrong meter terminals*, NOT by the wrong dial setting

Digital Multimeter Amperage Testing

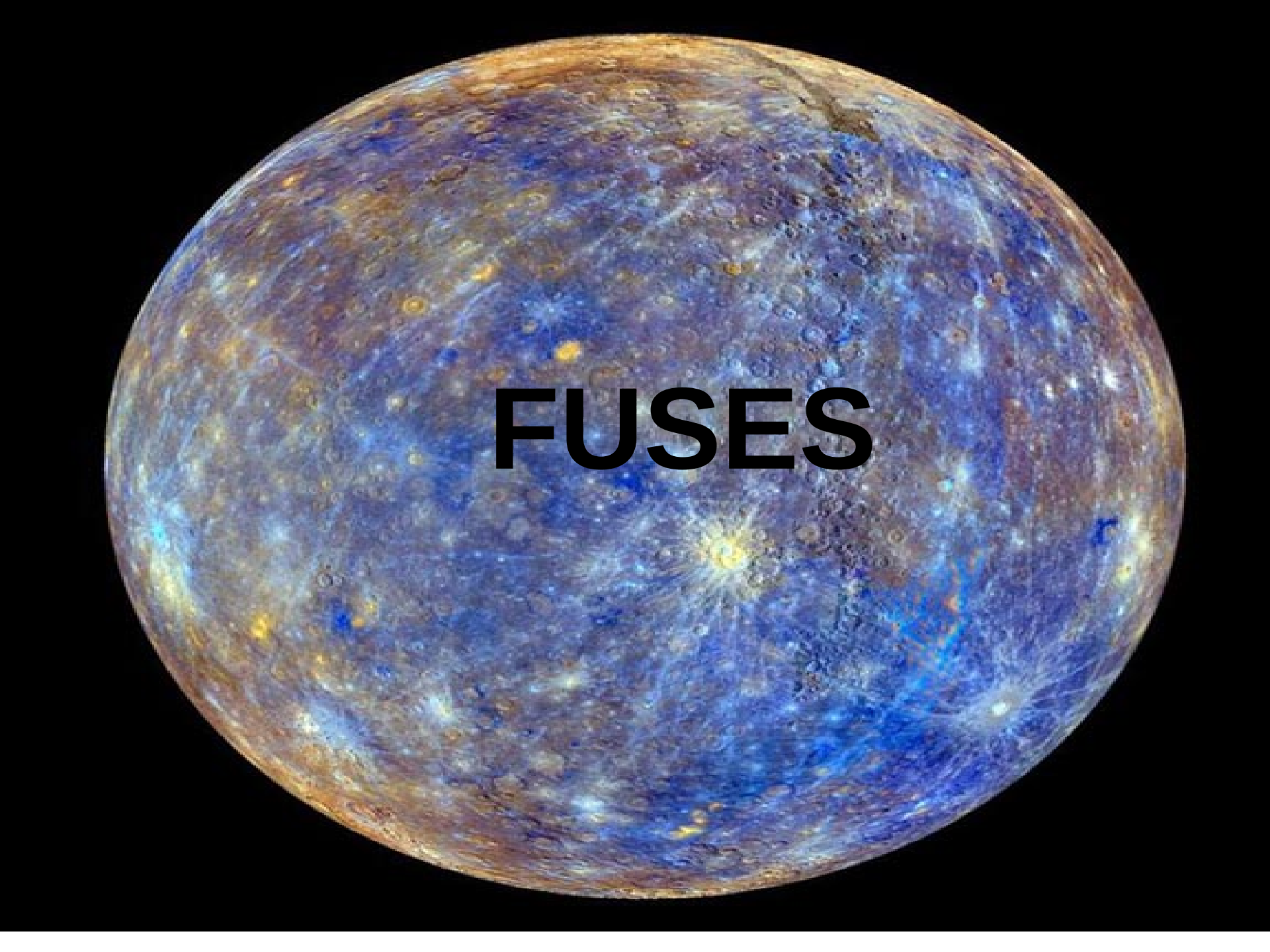
- The meter MUST be connected in **SERIES** when preforming amperage tests
- This requires a break in the circuit which the meter can then be connected into, which recompletes the circuit through the meter with test leads

Digital Multimeter Amperage Testing

- The meter MUST be connected in **SERIES** when preforming amperage tests
- Do *NOT connect it in parallel* as you would for a voltage test. THE FUSE WILL BLOW

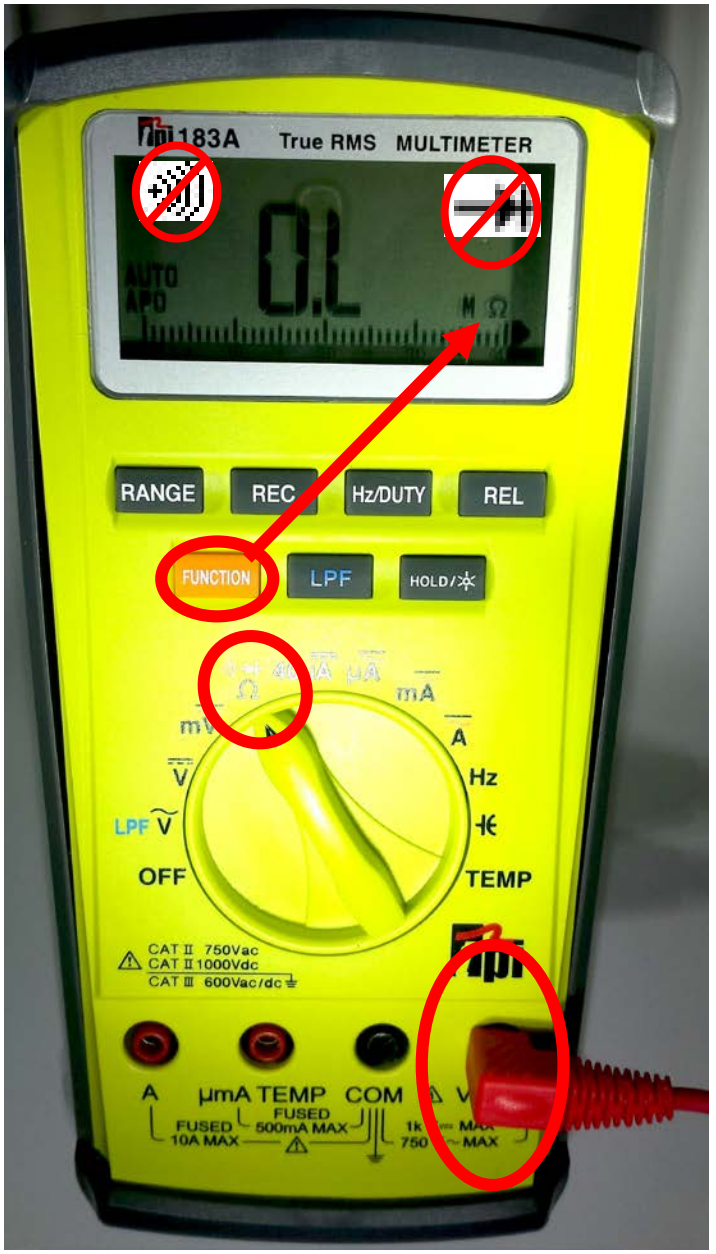
Series = Amperage Test

Parallel = Voltage Test


FUSES

Digital Multimeter Enhancements

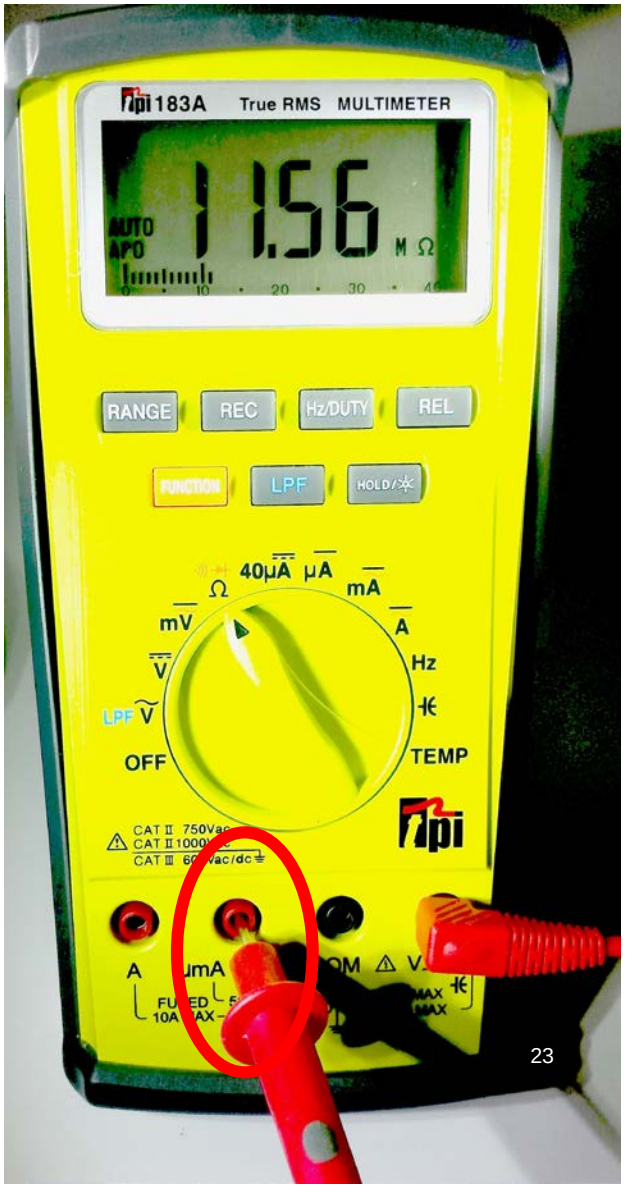
- **<u>Always Test for Good Fuses Before Using a Meter</u>**
  1. Put the red lead terminal into the **VΩHz terminal** – no black lead needed.
  2. Remove the red lead alligator clip
  3. Move the Rotary Dial to **Ω (Ohms).**



Digital Multimeter Enhancements

- **<u>Always Test for Good Fuses Before Using a Meter</u>**

  5. Touch the red probe to metal inside the **µmA TEMP** terminal
     - **Any numeric value** including 0.000 indicates a ***<u>good</u>*** *fuse*
     - **Any non-numeric value** including OL indicates a ***<u>bad</u>*** *fuse*



Digital Multimeter Enhancements

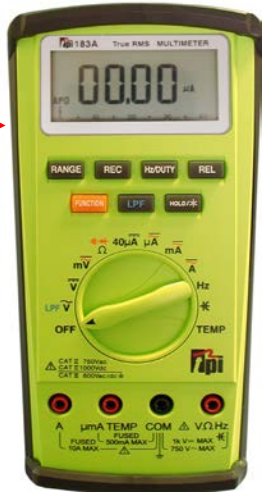
- **<u>Always Test for Good Fuses Before Using a Meter</u>**

  6. Touch the red probe to metal inside the A terminal
     - **Any numeric value** including 0.000 indicates a ***<u>good</u>*** *fuse*
     - **Any non-numeric value** including OL indicates a ***<u>bad</u>*** *fuse*

Digital Multimeter Enhancements

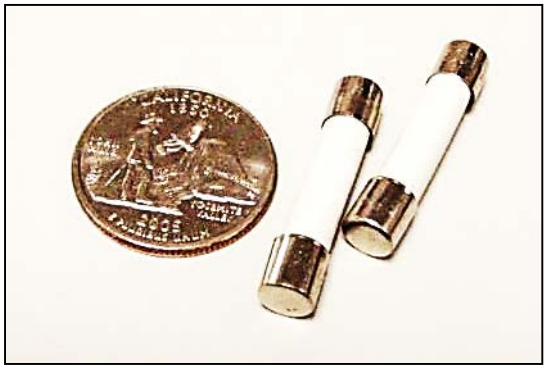
- **If a Bad Fuse is Detected**

1. Remove the Protective Boot
2. Turn the Meter with Back Facing Up
3. Unscrew 3 Lower Screws
4. Remove the Protective Cover
5. Locate Bad Fuse
   - 10A
   - 0.5A
6. Replace with original style fuses
7. Reassemble in reverse order
8. NOTE: Meter is powered by 9V battery



Digital Multimeter Enhancements

- Fuse Protection – **There IS a Difference**
  - Fuses are designed specifically for multimeters



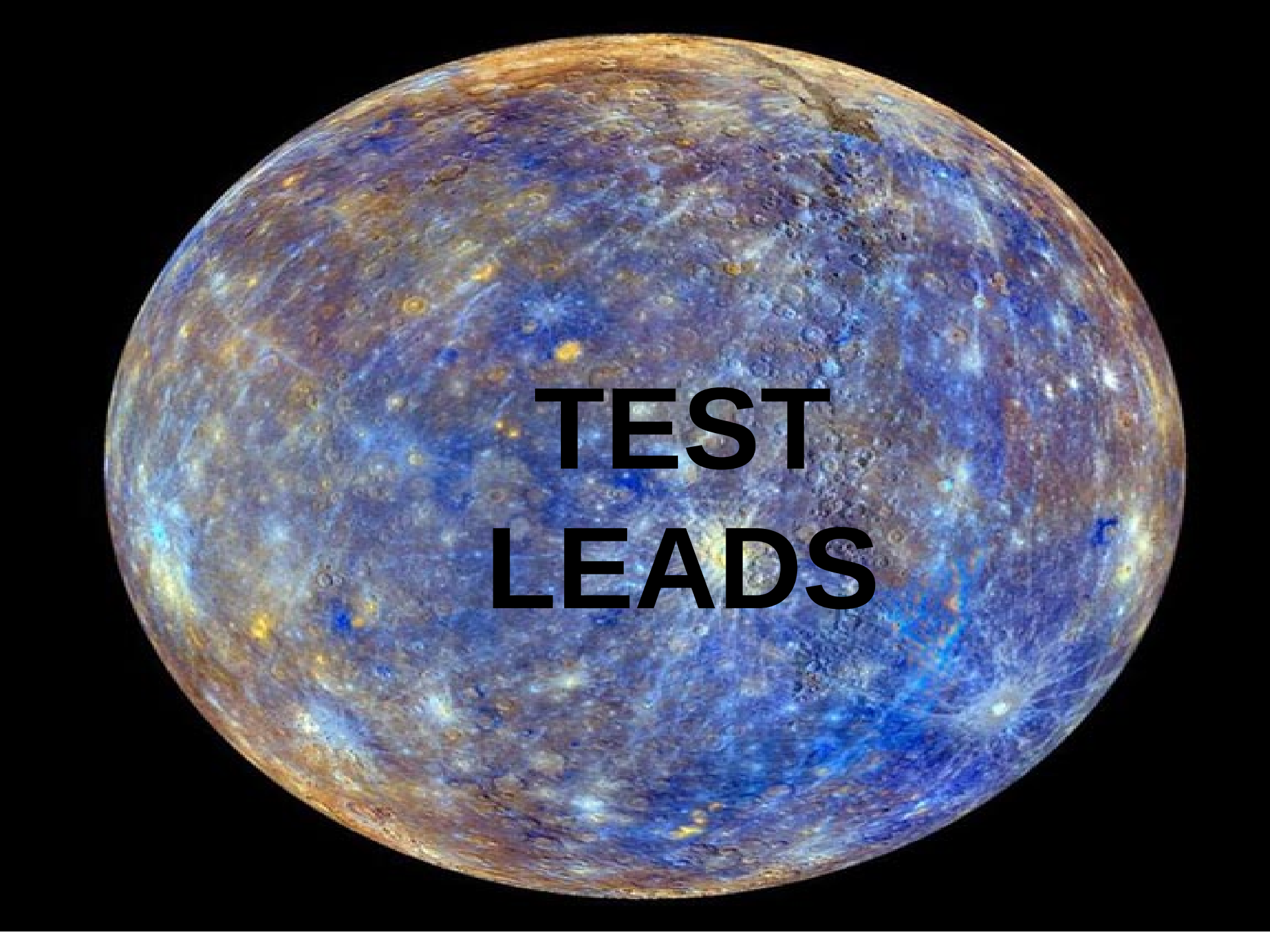
Lower CAT rating fuses

- Prevent arcing at fuse holder
  Exact replacements are critical to maintain the safety (category) rating

  - Improper fuse replacement can be deadly

Digital Multimeter Enhancements

- **<u>Fuses: There IS a difference!!</u>**
- Ceramic fast blow fuses have a much higher "breaking capacity" or the fuse's ability to interrupt current flow without being destroyed or *<u>arced over</u>*


TEST
LEADS

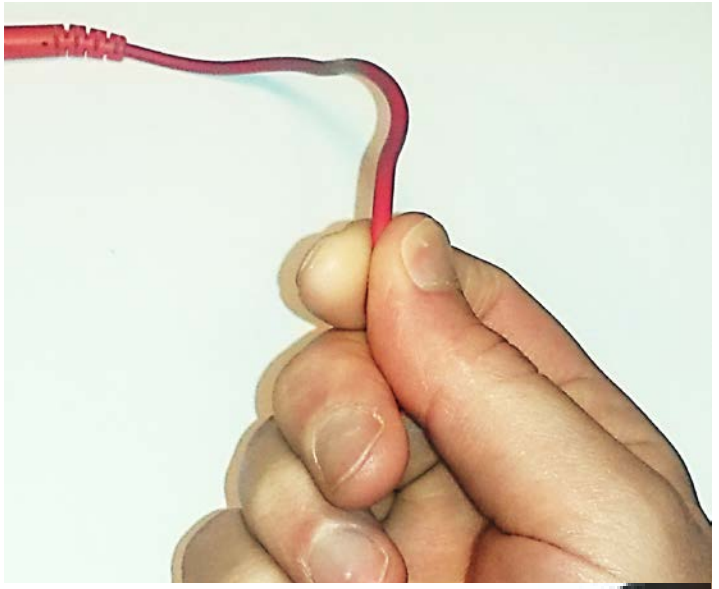
Digital Multimeter Enhancements

- **<u>Always Check for Good Test Leads Before Using a Meter</u>**
  1. Insert red lead into VΩHz terminal
  2. Insert black lead into COM terminal
  3. Rotate the Dial setting to Ω (Ohms)

Digital Multimeter Enhancements

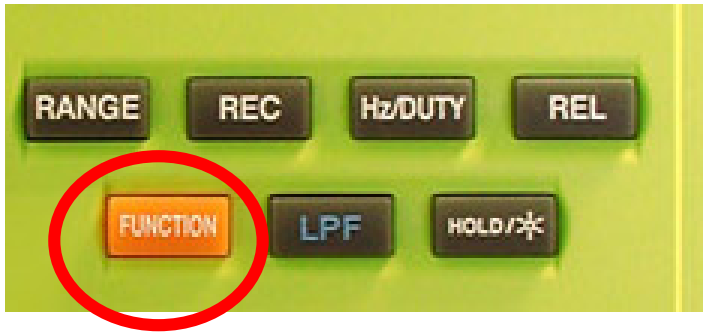
- **<u>Always Check for Good Test Leads Before Using a Meter</u>**

3. Quality test leads will be double insulated (both an inner and outer insulation barrier) to better protect the user
4. The inner insulation layer is white, so it is easy to spot any cuts or other damage against the red and black outer layer. These should ***<u>NOT</u>*** be used



Digital Multimeter Enhancements

- **<u>Always Check for Good Test Leads Before Using a Meter</u>**



4. Press the Function button until the:  is visible on the display
5. Use the alligator clips. Clip red & black leads together
6. Audible signal means leads should be good
7. Move wires around – intermittent sound could mean internally broken wires

End of the 183A METER Introduction

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