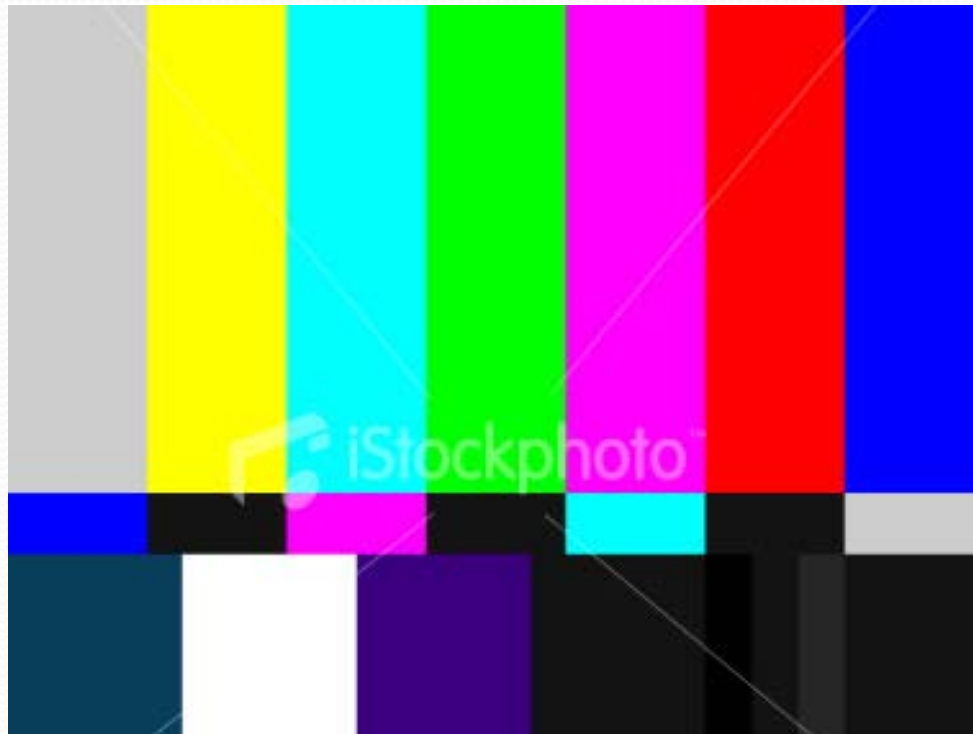


Multimeter Test Leads Safety



Icebreaker



DEV.105 – Delivering Instruction
Lesson Plan – The Multi-meter Test Safety

The Multi-meter Test Leads Safety

Multimeters Using Test Leads Safety

Very Short Lecture

- Short Film on a Meter with Overloaded Test Leads
- Multimeter Test Leads Described & Explained
- Short Film on a Meter with no Fuses

Don't Overlook Safety Your Life May Depend On It!!



Parts of Multimeter - Refresher

- Multimeter encased in Plastic, Polycarbonate, Aluminum, or Stainless Steel
- Meter Display can be Analog or Digital or Both
- ON/OFF Switch or Pushbuttons
- Rotary Dial or Pushbuttons with Many Sub Functions
- Input Sockets
- Descriptions, Labels, Warnings & Notices
- Accessories – Alligator Clips, Fuse, Fused Leads, Color Coded, Handle, Mounts, Test Leads, Case, Operational Manual, CD-ROM, Box & Packaging

Parts of a Multimeter - Refresher



Electrical Injury to The Human Body

- Electric Shock
 - 4-6 mA you feel a jolt
 - 10 mA muscular paralysis
 - 30 mA respiratory paralysis leading to fatality
 - 75-250 mA or higher is fatal
- Arc Flash
 - Super Heated Metal contacting the body, clothes and meter
- Arc Burns
 - Temperatures approaching 5000 Degrees Celsius
- Explosive
 - Mechanical Injury(Eyes, Face, Chest) or Audible Hearing Loss

Multimeter Standards That Industry Follows

Standards are used by Industry to comply with Safety Codes, Rules and Regulations for those jurisdictions where the equipment is sold and used

- IEC 61010-1 & IEC 1010 (International Standards)
- CEN EN601010 (European Standards)
- CAN/CSA-C22.2 No. 231 Series-M89 (R1996) CSA Safety Requirements for Electrical and Electronic Measuring and Test Equipment
- UL 3111 (Canada, USA) (Underwriters Limited)
- TUV & VDE (German Standards)

Meters & Test Leads Safety Protection & Locations – Brief Summary

- CAT IV
 - 3 Phase Utilities
 - Overhead Lines, Outside the Building, Hydro
- CAT III
 - 3 Phase Utilities, 1 Phase Distribution
 - Indoor Lines, Lighting, Equipment (i.e. Motors, Branch ccts.)
- CAT II
 - 1 Phase
 - Appliances, small portable tools,
- CAT I
 - 1 Phase
 - Electronic Equipment

A Ideal Safe Multimeters Has The Following

- Fuse and Spare Fuse
- Preferably 2 Fuses – Fuse for Each Wire
- Circuit Breaker - Top of the Line
- Fusing on OHM Settings
- Fusing on Ampere Settings
- Safety Labels & Warnings
- Approved and Certified Notations
- Manual indicating Safety Usage and Parts Replacement, i.e. Fuses, Test Leads, Cases

Is Your Meter Safe?

A Meter Without Fusing!



Thank You for Your Time

- Any Questions?
- Any Comments?
- References to follow ...



Multi-Meter References

- Fluke, <http://www.fluke.com/>
- Agilent/Hewlett Packard, <http://www.home.agilent.com/agilent/home.jsp?cc=US&lc=eng>
- Tektronix, <http://www.tek.com/products/digital-multimeter/>
- Wikipedia, <http://en.wikipedia.org/w/index.php?title=Special%3ASearch&search=multimeter+safety>
- Toronto Public Library, <http://www.torontopubliclibrary.ca>
- Mississauga Library System, <http://www.mississauga.ca/portal/residents/library>
- Humber College Library