

MODEL 310 TYPE 4 HAND-SIZED VOM

TT TRIPLETT
INSTRUCTION MANUAL

Instruction Manual



Triplett

Model 310 Type 4

Hand-Size VOM

Triplett Corporation

One Triplett Drive

Bluffton, Ohio 45817

WARNING

This tester has been designed with your safety in mind. However, no design can completely protect against incorrect use. Electrical circuits can be dangerous and/or lethal when lack of caution or poor safety practices are used.

READ THE MANUAL

Read this Instruction Manual carefully and completely.

Voltages and currents within the capability of this test equipment can be hazardous. Follow the instructions in this manual for every measurement. Read and understand the general instructions before attempting to use this tester. Do not exceed the limits of the tester.

SAFETY CHECK

Double check the switch setting and lead connections before making measurements. Are you following all of the instructions?

Disconnect the tester or turn off the power before changing switch positions.

Do not connect to circuits with voltage present when switch is in any ohms or current position.

When replacing fuses use only specified type fuses and insert in correct fuse holder.

DON'T TOUCH

Don't touch exposed wiring, connections or other "live" parts of an electrical circuit. If in doubt, check the circuit first for voltage before touching it.

Turn off the power to a circuit before connecting test probes to it. Be sure there is no voltage present before you touch the circuit.

Do not use cracked or broken test leads.

HIGH VOLTAGE IS DANGEROUS

Always start with the power off. Be sure there is no voltage present before making connections to the circuit.

Don't touch the tester, its test leads, or any part of the circuit while it is on.

Before disconnecting the tester, turn the circuit off and wait for the meter to return to "zero."

DISTRIBUTION CIRCUITS PACK A PUNCH

In high energy circuits such as distribution transformers and bus bars, dangerous arcs of explosive nature can occur if the circuit is shorted. If the tester is connected across a high energy circuit when set to a low resistance range, a current range, or any other low impedance range, the circuit is virtually shorted.

Special equipment designed for use with these circuits is available. Contact a qualified person for assistance before attempting to make measurements on any high energy circuit.

SAFETY IS NO ACCIDENT**WARNING**

**REMOVE CLAMP-ON AC AMMETER
ADAPTER FROM TESTER WHEN
MEASURING VOLTAGE**

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DC Volts

Ranges:

0-3, 12, 60, 300, 600 (20,000 ohms per volt)

Accuracy:

$\pm 3\%$ of full scale value

AC Volts

Ranges:

0-3, 12, 60, 300, 600 (5,000 ohms per volt)

Accuracy:

$\pm 4\%$ of full scale value (on 60 Hz sine wave at 77 °F)

Ohms

Ranges:

0-20,000, 200,000, 2 Meg., 20 Meg.

Accuracy:

$\pm 3\%$ of DC scale length with fully charged battery

Ohmmeter Specifications

| | Range | | | |
|----------------------|-------|-----|------|------|
| | X1 | X10 | X100 | X1K |
| Max. Voltage (Volts) | 1.6 | 1.6 | 1.6 | 18.0 |
| Max. Current (mA) | 8.0 | .8 | .08 | .09 |
| Max. Power (mW) | 3.2 | .32 | .032 | .605 |

DC Milliampere

Ranges:

0-.6, 6, 60, 600

Accuracy:

 $\pm 3\%$ of full scale value

| Current Range | Approximate Full Scale Voltage Drop |
|----------------|--|
| 0-.6, 6, 60 mA | 250 mV |
| 0-600 mA | 330 mV |

Meter

50 μ A — 250 mV (Pivot and Jewel)

Overload Protection

Meter movement protected by diode module.

RX1 range protected by fuse.

Voltage ranges protected by high impedance.

Batteries

One 1.5 volt "N" size (NEDA 910)

One 15 volt Eveready 504 (NEDA 220)

Weight

Approximately 14 oz.

Accessories supplied with the Model 310

1. One red and one black test lead
2. Alligator clips
3. Batteries: 1 — 1.5 V; and 1 — 15 V
4. Instruction Manual

The Triplet Model 310 is a handy hand-sized VOM with all the versatility and performance of larger more expensive bench-size models. It offers diode overload protection against damage to the meter movement caused by accidental overloads. A fuse is used to protect the RX1 range. The fuse and batteries can be easily replaced by removing a cover on the back. Its rugged, self-shielded, high torque bar-ring meter movement incorporating springback jewels provides dependable measurement capabilities on the job anywhere, even in strong magnetic fields. Small enough to be carried in your tool box, glove compartment, brief case, or shirt pocket, the Model 310 allows you to have 20,000 ohms per volt DC sensitivity (5,000 Ω/V AC) wherever you need it.

Versatility and readability have not been sacrificed in order to provide a portable VOM. The 310 offers 18 different ranges that can all be easily read on only 3 clearly defined scale arcs. A single selector switch allows you to switch easily from range-to-range and function-to-function.

Parts Replacement

Parts available for replacement are listed in the parts list. When replacing any parts, be careful to not disturb or damage any others. Do not overheat resistors or diodes, but be sure to make a good solder connection.

In some cases, it is wise to leave part of the lead from the old component and solder the new component to the old lead to prevent damage to surrounding components.

If there is evidence of smoke or an electrical arc inside the VOM, return the VOM to the factory or an authorized service center. There is a chance of hidden damage that could cause another failure in the VOM.

Calibration

With normal use, readjustment of this VOM should not be necessary. Replacement parts are designed to be installed without any need for recalibration of the VOM. An occasional check of the VOM against a known reference voltage or another VOM is good practice. If there is a question about the accuracy of the VOM, it should be returned to the factory or an authorized service center for a calibration check.

Repair or Service

For repair of the VOM, return it to the factory or an authorized service center. To help in repairing the VOM, give a detailed description of the problem and any other data that might be helpful such as what kind of circuit was being measured when the problem was discovered.

If the VOM is damaged by an overload and there is evidence of smoke or an electrical arc inside, return it to the factory or an authorized service center for inspection and repair. There could be some hidden damage that would cause a future failure of the VOM.

Test Leads

Check the test leads periodically. Leads that are worn, have damaged insulation, damaged plugs, damaged probes or loose parts should be replaced.

The following section should be read carefully; it contains instructions and precautions to be observed in making measurements with the tester.

The alligator clips provided with the tester fit over the end of the test probes. When measuring high voltage, these alligator clips allow measurement without handling the test probes. **ALWAYS SHUT OFF THE POWER** source before attempting to connect alligator clips.

10 GENERAL INSTRUCTIONS (Cont'd.)

When the approximate value of the quantity being measured is not known, ALWAYS START ON THE HIGHEST RANGE. For greater accuracy, choose the range which will allow readings to be taken in the upper (right hand) portion of the scale.

Readings are taken on the scale having the appropriate significant figures (both 3 and 300 volts are read on the 0-300 scale) by multiplying or dividing by a factor of 10 or 100 as indicated by the range/scale ratio (i.e.; on the 3 volt range divide the scale readings by 100).

The test probes should be disconnected from the voltage source (or the source shut off) before the switch position is changed. This practice will result in an increased life and reliability for the tester as well as a good safety practice.

The Meter Zero Adjust Screw is located near the center of the tester. It should be periodically adjusted so the meter pointer is on zero with no input into the tester.

Readings on the sensitive voltage, current and resistance ranges may sometimes be different than calculated values. Thermo-electric or electro-chemical reactions can sometimes generate voltage (and current) in a circuit due to elevated temperatures for soldering, contact

GENERAL INSTRUCTIONS (Cont'd.) 11

of dissimilar metals, chemical fumes or moisture. Also, the fingers should never touch the metal parts of the test probes since body resistance can cause erroneous readings — particularly on the high ohmmeter ranges.

Care:

Although this instrument is portable and rugged it should be treated with care. Do not drop it or handle it roughly.

Avoid placing it on a bench where machine tools are used or severe vibration is encountered.

When possible keep it in a place of moderate temperature. Avoid subjecting it to extreme temperatures and severe temperature changes.

If the tester has not been used for a long period of time, rotate the switch in both directions several times to wipe the switch contacts for good contact.

12 DC VOLTAGE MEASUREMENTS

0-3 thru 0-300 Volts:

1. Insert test leads in VOM and COM jacks.
2. Set switch to appropriate DCV range.
3. Connect probes across voltage to be measured.
4. Read voltage on the black AC-DC scale.

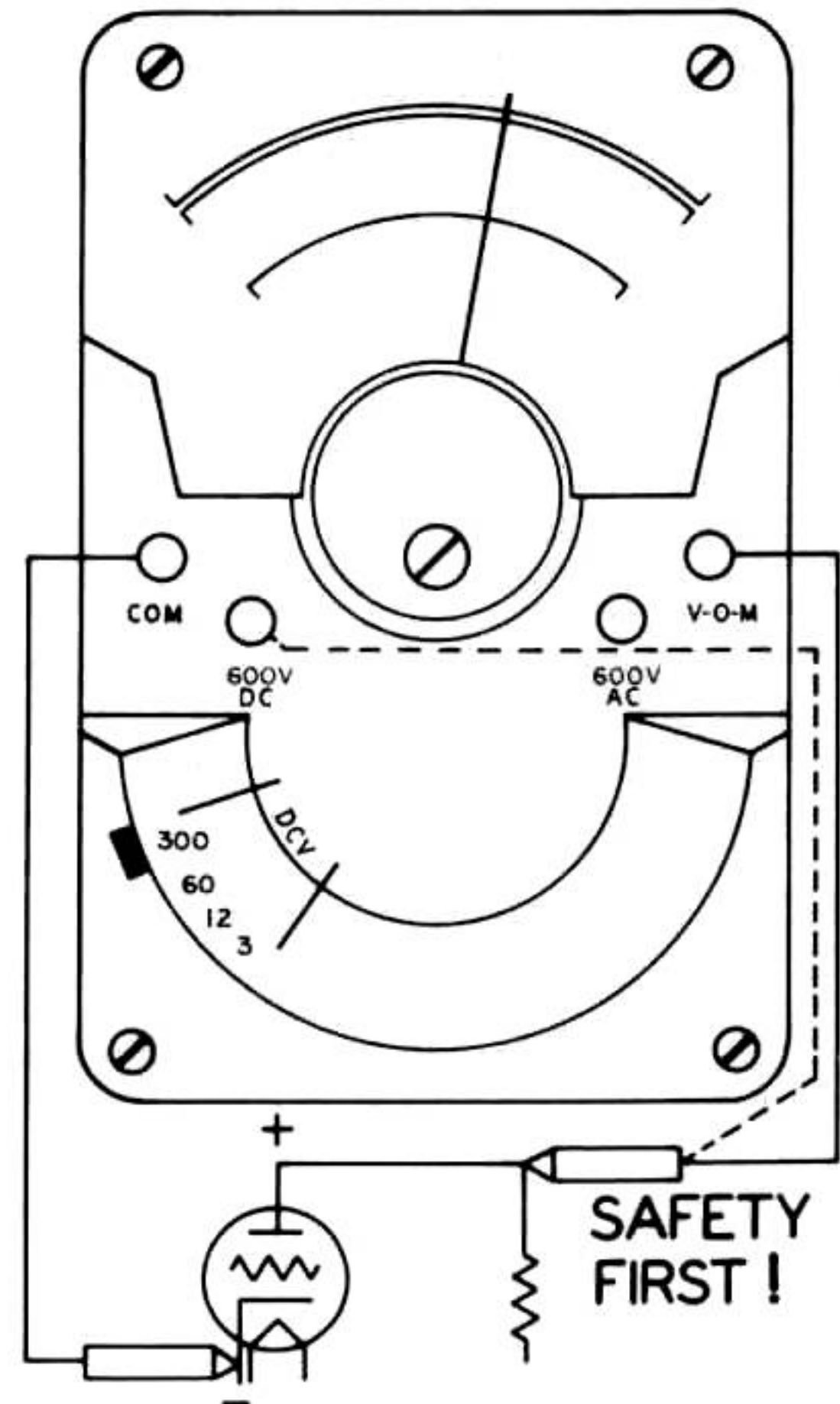
0-600 Volts:

1. Insert test leads in COM and 600 VDC jacks.
2. Set switch to 3 DCV position.
3. Connect probes across voltage to be measured.
4. Read voltage on the black AC-DC scale.

DO NOT TOUCH THE VOM while it is connected to high voltage!

BE CAREFUL around high voltage!

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14 AC VOLTAGE MEASUREMENTS

15

0-3 thru 0-300 Volts:

1. Insert test leads in VOM and COM jacks.
2. Set switch to appropriate ACV range.
3. Connect probes across voltage to be measured.
4. Read voltage on black AC-DC scale.

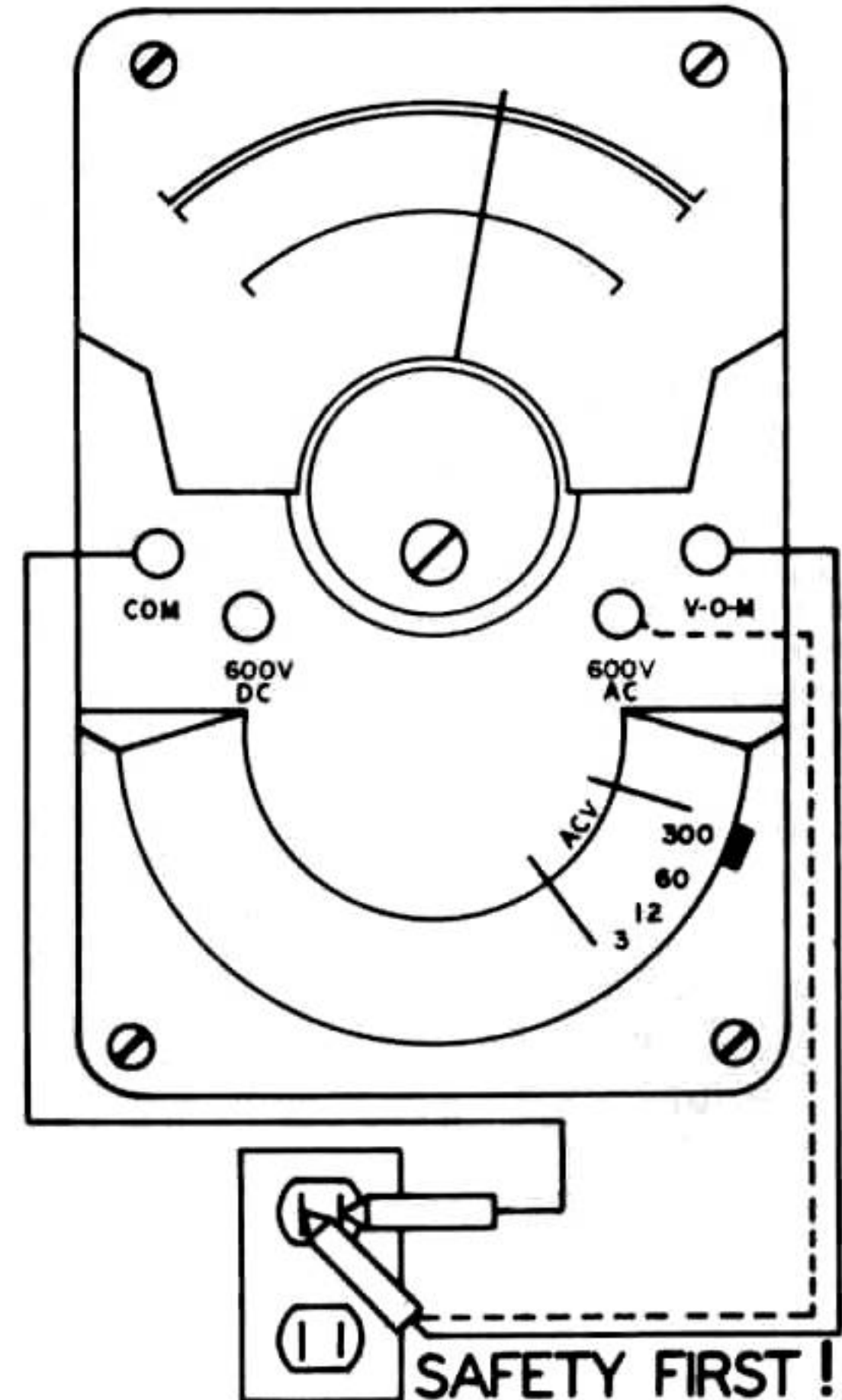
0-600 Volts:

1. Insert test leads in COM and 600 VAC jacks.
2. Set switch to 3 ACV.
3. Connect probes across voltage to be measured.
4. Read voltage on black AC-DC scale.

DO NOT TOUCH THE VOM while it is connected to high voltage!

BE CAREFUL around high voltage!

NOTE: For AC Amps measurements with the Model 10, disconnect the test leads. The range switch should be set to 3 ACV.



Model 10 Clamp-on AC Ammeter — Cat. No. 60-211

Ranges, 0-6-12-30-60-120-300

Model 101 Line Separator —

Cat. No. 60-218 — Divides two conductor cords direct or increases Model 10 sensitivity 10x and 20x.

Model 379 Carrying Case —

Cat. No. 10-1456 For Model 310 and Model 10 combination, plus Model 101.

Model 311 Lead — Cat. No.

79-416 42" long lead to separate Model 10 from 310 unit for easy reading in awkward spots. (not shown)



Model 369 Carrying Case —
Cat. No. 10-1258.



| To Measure | Set Switch To | Lead Connections Black Lead "COM" Red Lead Listed Below | Read on Scale | Each Scale Div. Equals |
|--|---|---|--|---|
| DC Volts 0-3 0-12 0-60 0-300 0-600 | DCV 3 DCV 12 DCV 60 DCV 300 DCV 3 | V-O-M V-O-M V-O-M V-O-M 600 V DC | 300 ÷ 100 12 60 300 6x100 | .05 Volt .20 Volt 1 Volt 5 Volt 10 Volt |
| AC Volts 0-3 0-12 0-60 0-300 0-600 | ACV 3 ACV 12 ACV 60 ACV 300 ACV 3 | V-O-M V-O-M V-O-M V-O-M 600 V AC | 30 AC Amps ÷ 10 12 60 300 6x100 | .05 Volt .20 Volt 1 Volt 5 Volt 10 Volt |
| OHMS 0-20,000 0-200,000 0-2 Meg. 0-20 Meg. | Ω X1 Ω X10 Ω X100 Ω X1K | V-O-M V-O-M V-O-M V-O-M | 0-20K 0-20Kx10 0-20Kx100 0-20Kx1000 | |
| DC mA 0-.6 0-6 0-60 0-600 | MA .6 MA 6 MA 60 MA 600 | V-O-M V-O-M V-O-M V-O-M | 60 ÷ 100 60 ÷ 10 60 60x10 | .01 mA .1 mA 1 mA 10 mA |

X1 thru X1K Ohms:

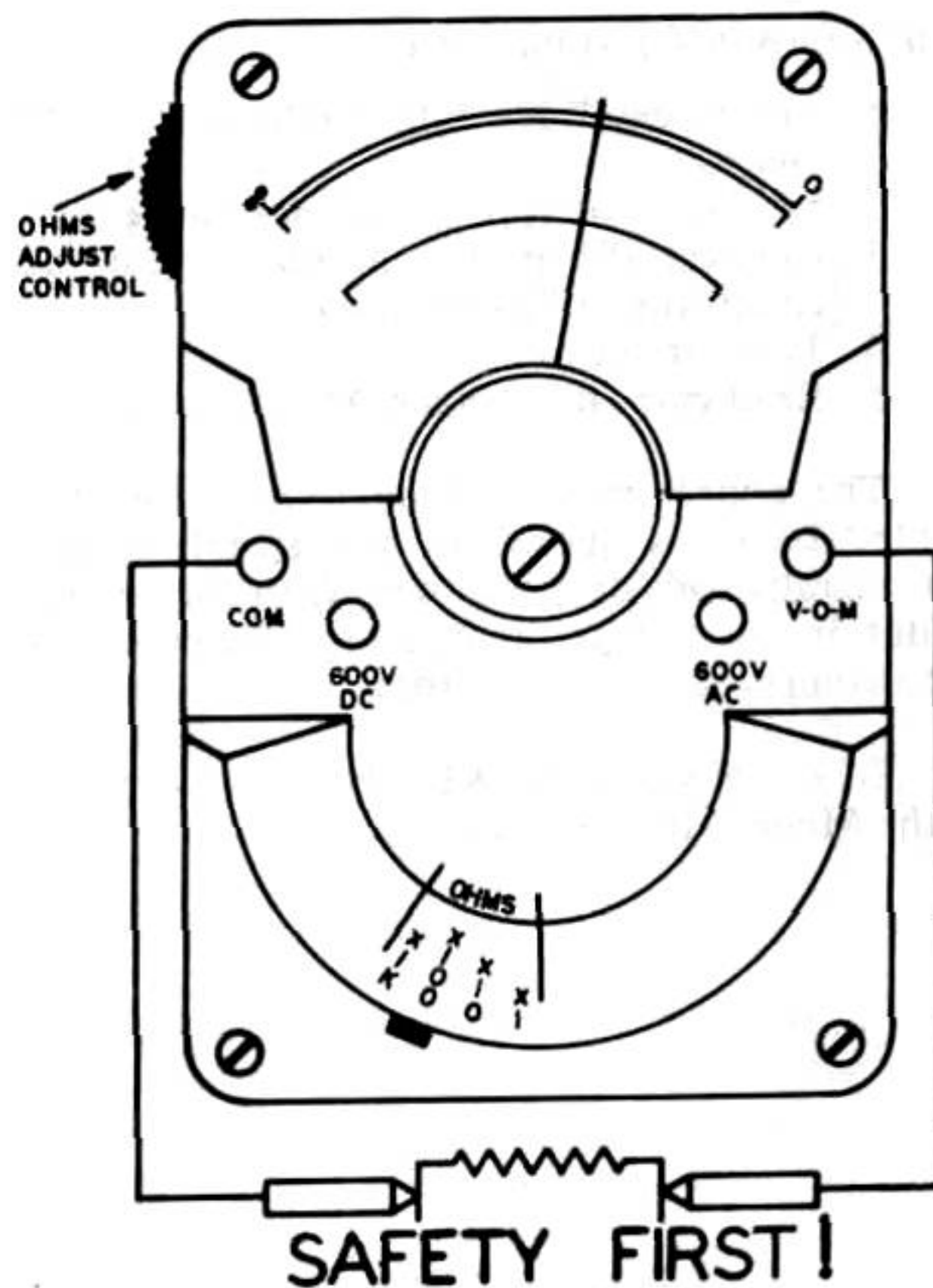
1. Insert test leads into VOM and COM jacks.
2. Set switch to appropriate OHMS range.
3. Short test probes together.
4. Adjust OHMS ADJUST CONTROL until meter reads zero ohms.
5. Connect probes to component to be measured.
6. Read ohms on OHMS scale (multiply value read by multiplier indicated by the switch).

A fuse protects the X1 range against accidental overloads. If the fuse should blow, all OHMS ranges will not operate.

DO NOT TOUCH circuitry while making measurements.

DISCONNECT or **ISOLATE** the device being tested from other circuitry.

NOTE: 1K equals 1000.



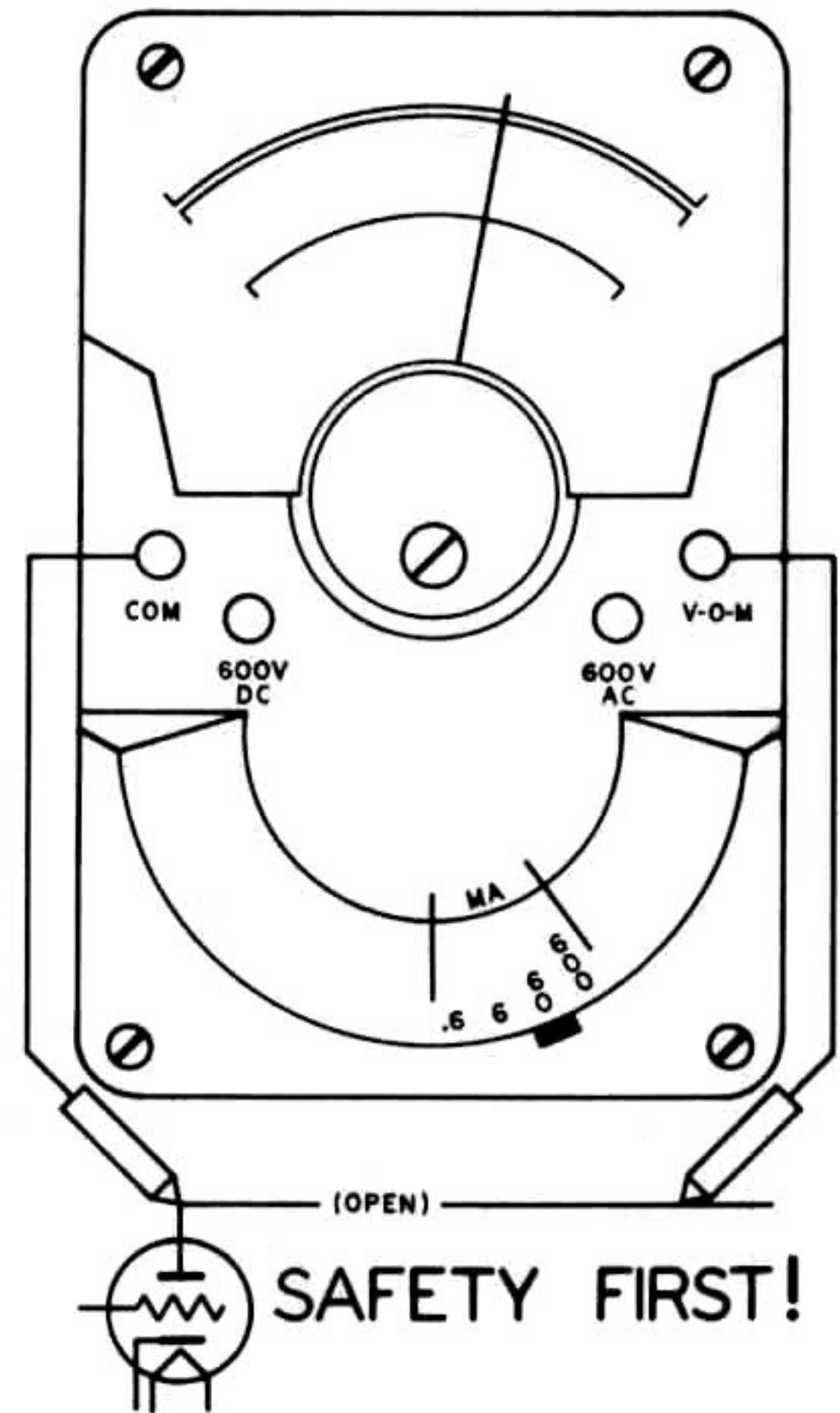
20 DC CURRENT MEASUREMENTS

0-.6 thru 0-600 Millamperes:

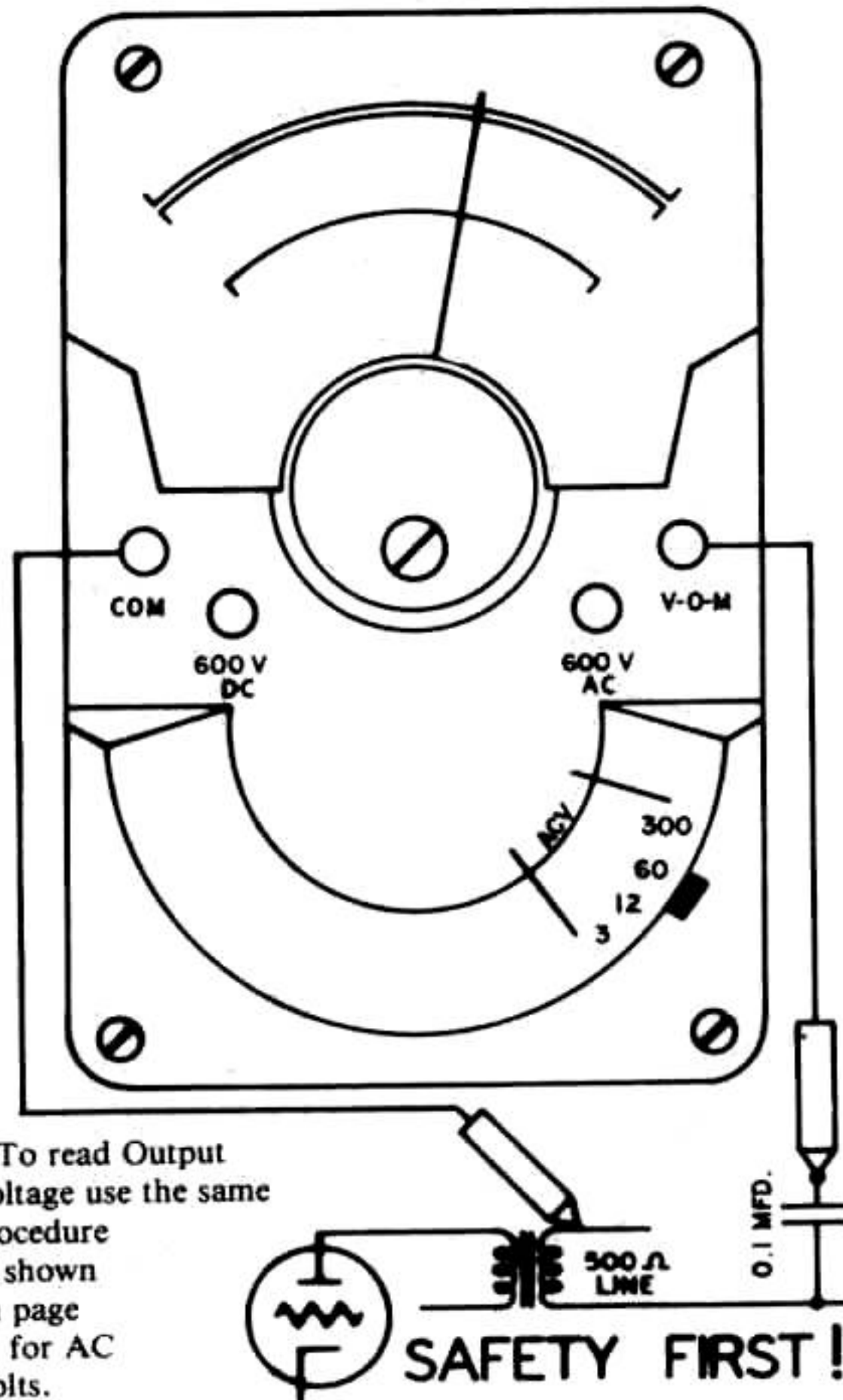
1. Insert test leads into VOM and COM jacks.
2. Set switch to appropriate mA range.
3. Connect the probes in series with the circuit (use alligator clips).
4. Turn circuit on.
5. Read current on black AC-DC scale.

The approximate voltage drop across the Model 310 is shown in the specifications. Generally, this drop will not affect the circuit. But, in low voltage circuits, it may be necessary to compensate for this drop.

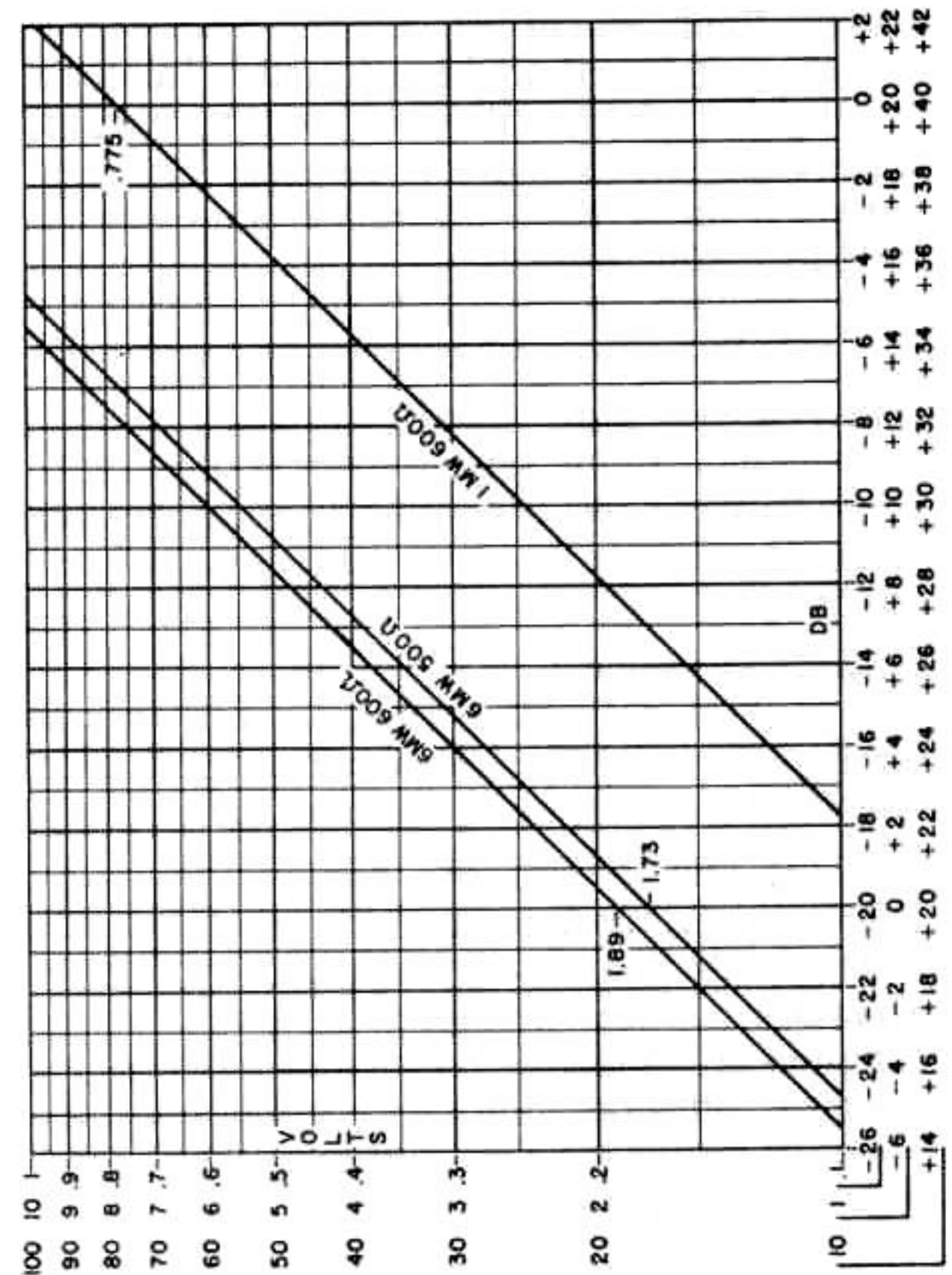
DISCONNECT POWER before connecting the Model 310 into the circuit.



22 MEASURING OUTPUT VOLTS (dB)



MEASURING OUTPUT VOLTS (dB) 23



Battery Replacement

If the pointer cannot be adjusted to full scale on the X1, X10, or X100 OHMS ranges, replace the 1.5 V battery. Replace the 15 V battery if the X1K OHMS range cannot be adjusted for full scale.

1.5V Battery — NEDA 910F or 910M

15V Battery — NEDA 220

Battery Cover Latch Repair

If the slide on the battery cover breaks, order a new battery cover assembly. To repair the tab on the tester body, order the battery cover latch repair kit.

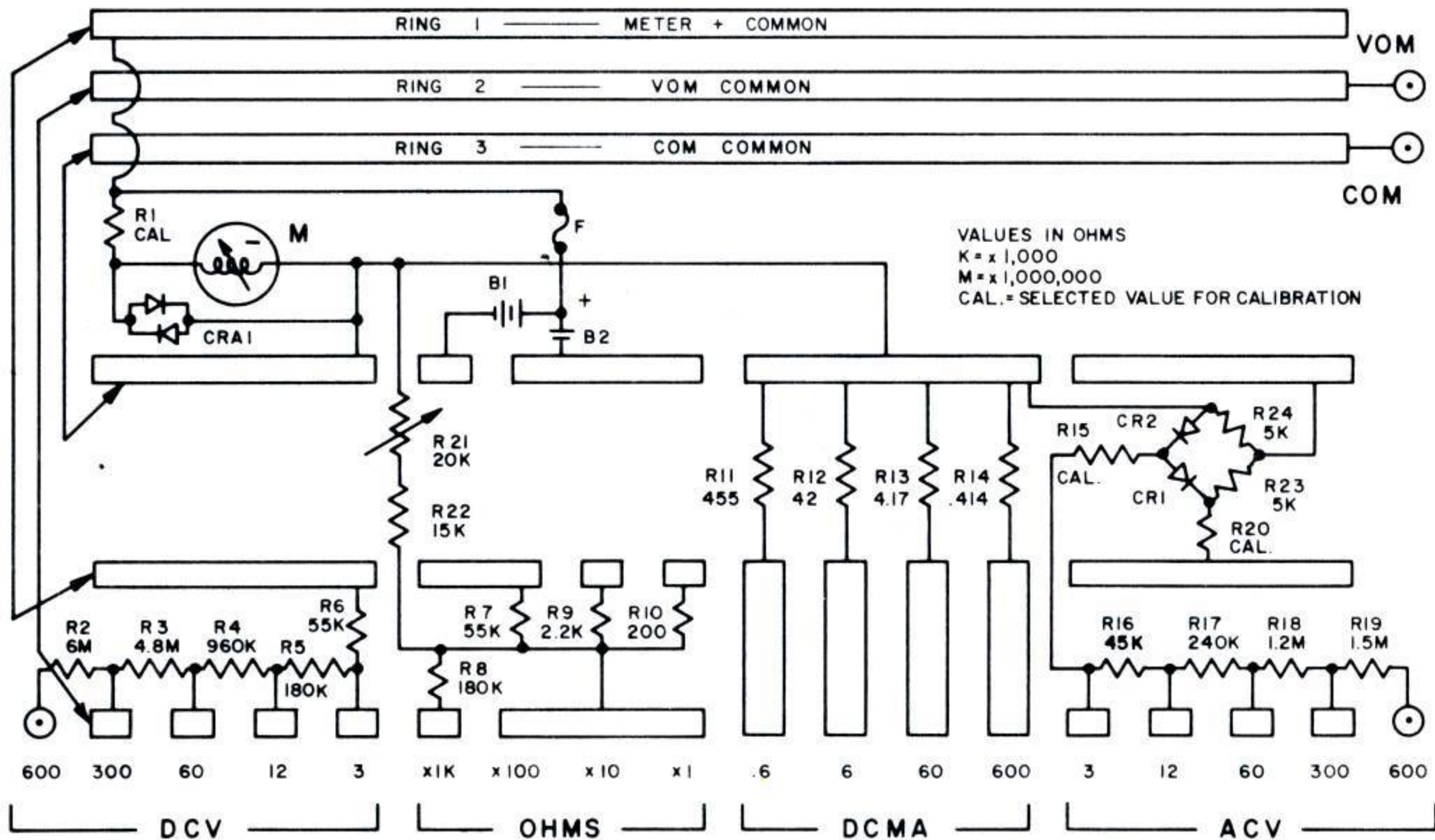
Fuse Replacement

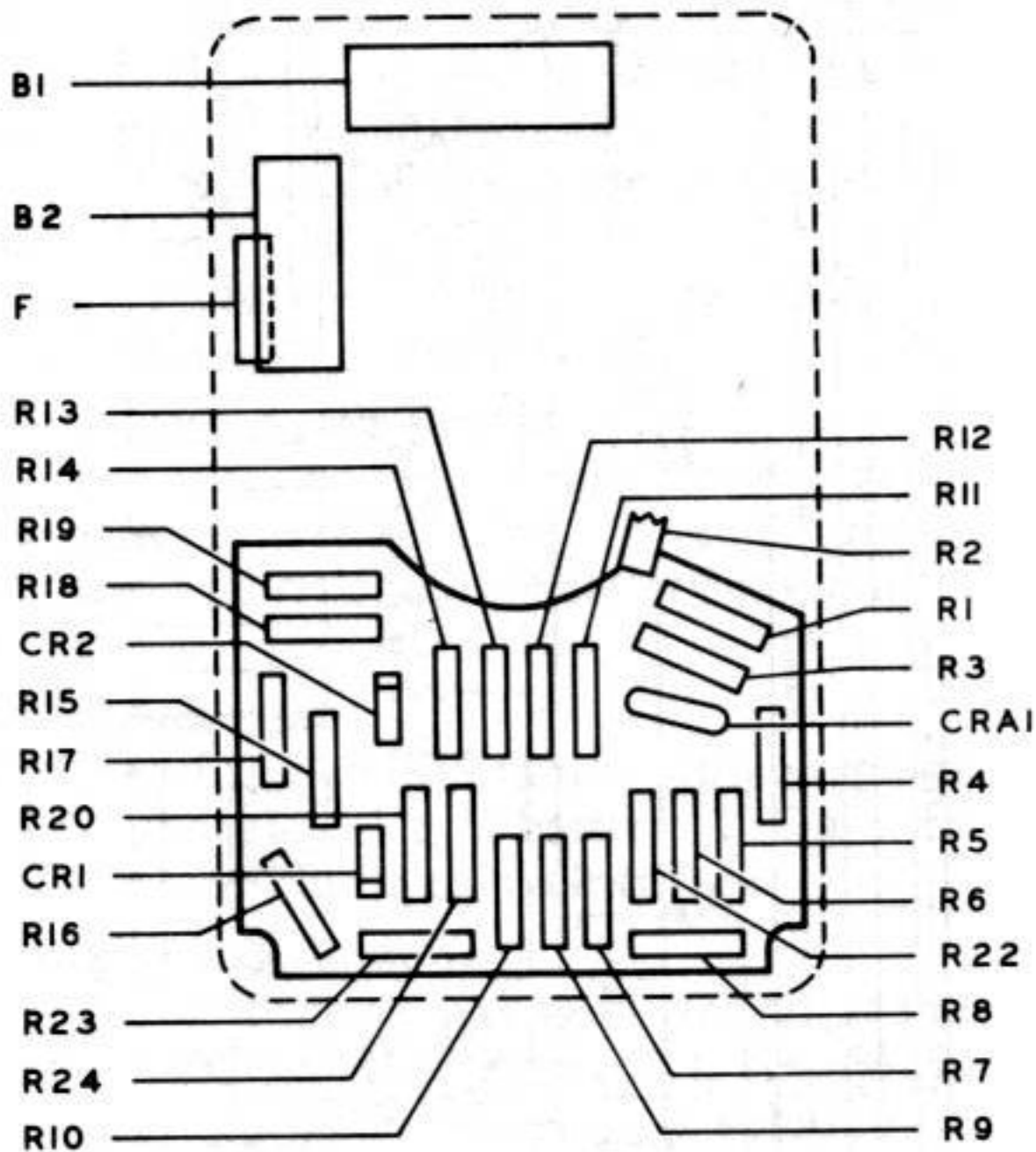
If none of the OHMS ranges work, replace the fuse under the 1.5 V battery. Use a 1/16 AMP 8AG, MKB, or equivalent fuse.

Cleaning Plastic Window

The plastic window has been treated at the factory to dissipate static charges. If cleaning is necessary, use cotton dipped in a solution of common household detergent and water. After cleaning, allow the solution to dry without rubbing; the resultant detergent film will effectively dissipate static charges.

CAUTION: Solvents and liquids used in radio and TV shop work may craze or scar the plastic window if applied to it.





REPLACEABLE PARTS LIST MODEL 310 TYPE 4

| Circuit Symbol | Part Number | Qty. Used | Description |
|-----------------------|--------------------|------------------|---|
| M | 52-7413 | 1 | Instrument assembly, pivot & jewel 50 μ A |
| | 10-2984 | 1 | Front assembly |
| | 41-5385 | 1 | Base assembly |
| | 20-718 | 1 | Battery cover assembly |
| | 46-32 | 1 | Contact, battery 1.5V negative |
| | 46-33 | 1 | Contact, battery 15V negative |
| | 46-89 | 1 | Contact, battery positive |
| | 24-776 | 1 | Screw, battery contact retaining |
| B1 | 37-22 | 1 | Battery 15 volt (NEDA 220) |
| B2 | 37-21 | 1 | Battery 1.5 volt (NEDA 910-F or 910-M) |
| | 87-497 | 1 | P. C. Board with components |
| | 87-250 | 1 | P. C. Board less components |
| R1 | | 1 | Resistor, (Value may vary from 2300 to 3250 Ω) |

| Circuit Symbol | Part Number | Qty. Used | Description |
|----------------|-------------|-----------|---|
| R2 | 15-3658 | 1 | Resistor 6 Meg. 1% 1 watt |
| R3 | 15-2436 | 1 | Resistor 4.8 Meg. 1% 1/2 watt |
| R4 | 15K-9603TB4 | 1 | Resistor 960kΩ 1% 1/4 watt |
| R5, R8 | 15K-1803TA3 | 2 | Resistor 180kΩ 1% 1/8 watt |
| R6, R7 | 15K-5502TA3 | 2 | Resistor 55kΩ 1% 1/8 watt |
| R9 | 15K-2201TC5 | 1 | Resistor 2.2kΩ 1% 1/2 watt |
| R10 | 15K-2000TA3 | 1 | Resistor 200Ω 1% 1/8 watt |
| R11 | 15-2596 | 1 | Resistor 455Ω 1% 1 watt |
| R12 | 15K-420FTB4 | 1 | Resistor 42Ω 1% 1/4 watt |
| R13 | 15-3496 | 1 | Resistor 4.17Ω 1/2% 150 mA |
| R14 | 15-3647 | 1 | Resistor .415Ω 1/4% 800 mA |
| R15 | | 1 | Resistor (Value may vary from 10.5k to 10.7k) |
| R16 | 15K-4502TA3 | 1 | Resistor 45kΩ 1% 1/8 watt |
| R17 | 15K-2403TA3 | 1 | Resistor 240kΩ 1% 1/8 watt |
| R18 | 15K-1204TB4 | 1 | Resistor 1.2 Meg. 1% 1/4 watt |

| | | | |
|----------|-------------|---|---|
| R19 | 15K-1504TC5 | 1 | Resistor 1.5 Meg. 1% 1/2 watt |
| R20 | | 1 | Resistor (Value may vary from 2.4k to 2.7k) |
| R21 | 16-31 | 1 | Resistor, Variable 20kΩ |
| | 65-815 | 1 | Bracket, R21 retaining |
| | 5168 | 2 | Lockwasher, R21 to bracket |
| | 27-83 | 2 | Nut, R21 to bracket |
| | 32-5C | 1 | Terminal, R21 to circuit |
| | 2434-2-6 | 1 | Screw, R21 bracket & terminal |
| | 5168 | 1 | Lockwasher, R21 bracket & terminal |
| R22 | 15K-1502TA3 | 1 | Resistor 15kΩ 1% 1/8 watt |
| R23, R24 | 15K-5001TA3 | 2 | Resistor 5kΩ 1% 1/8 watt |
| CR1, CR2 | 11056 | 2 | Diode |
| CRA1 | 11670 | 1 | Diode assembly |
| | 79-153 | 1 | Test leads, needle point |
| | 79-296 | 1 | Test leads, blunt point |
| | 2250-70 | 1 | Rectifier service kit |
| F | 3207-37 | 1 | Fuse, 1/16 Amp, 8AG, MKB |
| | 10880 | 1 | Lever Assembly w/knob |
| | 12317 | 1 | Battery cover latch repair kit |
| | 42-287 | 1 | Spring, switch retaining |

The Triplett Corporation warrants instruments and test equipment manufactured by it to be free from defective material or factory workmanship and agrees to repair or replace such products which, under normal use and service, disclose the defect to be the fault of our manufacturing, with no charge for parts and service. If we are unable to repair or replace the product, we will make a refund of the purchase price. Consult the Instruction Manual for instructions regarding the proper use and servicing of instruments and test equipment. Our obligation under this warranty is limited to repairing, replacing or making refund on any instrument or test equipment which proves to be defective within one year from the date of original purchase.

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

To register a claim under the provisions of this warranty, return the instrument or test

equipment to Triplett Corporation, Bluffton, Ohio 45817, transportation prepaid. Upon our inspection of the product, we will advise you as to the disposition of your claim.

ALL WARRANTIES IMPLIED BY LAW ARE HEREBY LIMITED TO A PERIOD OF ONE YEAR, 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 Corporation may have, including incidental or consequential damages.

Some states 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 Corporation or any other person is authorized to extend the liability of Triplett Corporation in connection with the sale of its products beyond the terms hereof.

Triplett Corporation reserves the right to discontinue models at any time, or change specifications, price or design, without notice

32 LIMITED WARRANTY (Cont'd)

and without incurring any obligation.

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

TRIPLETT CORPORATION

Bluffton, Ohio 45817

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