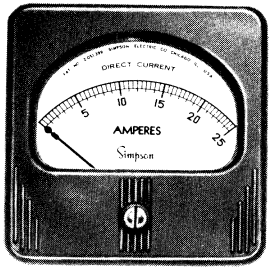
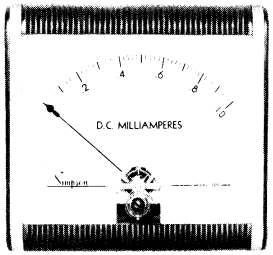
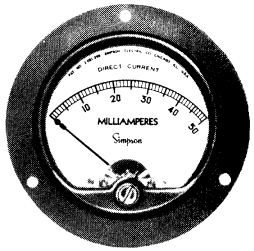
PANEL METERS by Simpson



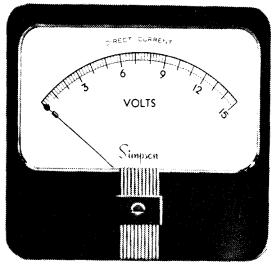
MODELS 27, 37, 47, 57
3½" RECTANGULAR
ACCURACY: 2%
SCALE LENGTH: 2-9/16"



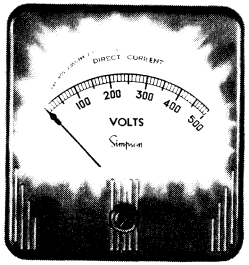
SIMPSON MODERNISTIC "CLEAR-VUE"
BUILT TO SPECIAL ORDER
2½", 3½", 4½", 5½" SIZES



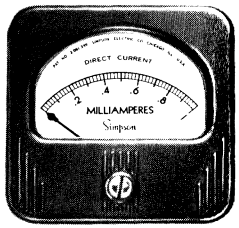
MODELS 25, 35, 45, 55
3½" ROUND, ACCURACY 2%
SCALE LENGTH: 1-7/8"
ALSO AS **MODELS 125, 135 145 AND 155** – ALL 2½" ROUND. SCALE 1-7/8"



MODELS 29, 39, 49, 59
4½" RECTANGULAR
ACCURACY: 2%
SCALE LENGTH: 3-29/32"



MODELS 27, 37, 57
ILLUMINATED
3½" RECTANGULAR
ACCURACY: 2%
SCALE LENGTH: 1-5/16"



MODELS 127, 137, 147, 157,
2½" RECTANGULAR
ACCURACY: 2%
SCALE LENGTH: 1-7/8"

NEARLY 800 DIFFERENT SIZES AND KINDS OF SIMPSON PANEL METERS ARE AVAILABLE FROM YOUR ELECTRONIC PARTS JOBBER. WHETHER YOU NEED ONE PANEL METER ..... OR A DOZEN ..... LOOK FOR THE FAMILIAR ORANGE COLORED SIMPSON BOX. FOR FURTHER INFORMATION WRITE SIMPSON ELECTRIC CO., 5200 W. KINZIE ST., CHICAGO 44, ILL., ESTEBROOK 9-1121.

OPERATOR'S MANUAL

SIMPSON LINE-O-METER

CURRENT CAPACITY METER MODEL 397

SIMPSON ELECTRIC COMPANY
5200 W. Kinzie St., Chicago 44, Illinois. EStebrook 9-1121
In Canada, Bach-Simpson, Ltd., London, Ontario

Printed in U.S.A.

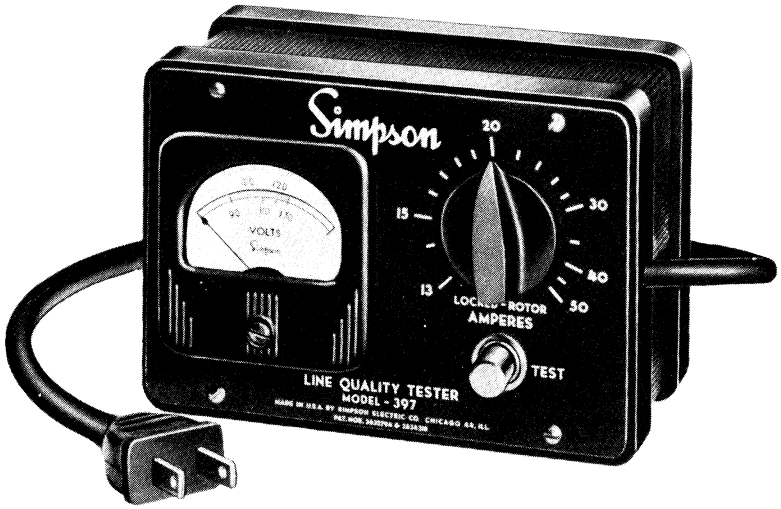


FIGURE 1. SIMPSON LINE-O-METER CURRENT CAPACITY METER MODEL 397

SECTION I

GENERAL DESCRIPTION

The SIMPSON LINE-O-METER, Current Capacity Meter, Model 397 is made to indicate quickly the ability of a single phase 110 volt 60 cycle AC power line to carry current. It is useful for testing the current carrying capacity of a power line before installation of a new major appliance, and for analyzing the relation between an existing load and the line current carrying capacity.

USE AS A CHECK FOR LOCKED-ROTOR CURRENT

The largest currents normally encountered in electrical appliances are the starting currents for motors. The starting current is always greater than the normal running current, and may be even five or more times the running current value. When the load on a motor is increased so it slows the motor down, the current increases above the normal running value. If the rotor in the motor is kept from turning at all while power is applied to it, the current value is the highest; this value and the starting current value are approximately the same amount. This large amount of current is called the *Locked-Rotor Current* for the motor.

The term *Locked-Rotor Current* is interpreted in two ways. It is the maximum current value which surges momentarily through the power line as the motor is started, and it is the amount of current which continues to flow when the motor is stalled, but power is still applied.

USE TO CHECK VOLTAGE DROP IN POWER LINES

When current flows through the power lines, there is always some voltage drop between the power source and the load. The lines

through which the current passes have resistance and reactance; there is no way to prevent this. So some of the source voltage is used up in getting the current to the load. When more current passes through the power lines, more voltage is dropped and less is left to operate the electrical equipment, which is the load. This is expected, and equipment is designed to operate in spite of some drop in voltage.

MAY BE USED TO CHECK OVERLOADS

There are practical limits for allowable drops in voltage. For a 110 volt 60 cycle AC power line, it is generally accepted that a 20 volt drop indicates a maximum load. The length and size of the power lines determine the amount of current which can pass through them with a maximum loss of 20 volts. An overload exists when the current demanded by the load causes more than 20 volts drop in the power lines leading to the load.

OTHER USES FOR SIMPSON LINE-O-METER

Your SIMPSON LINE-O-METER, Current Capacity Meter, Model 397 will show the relation between the line and its load each time you use it. The ampere rating is indicated directly on the front panel of the instrument. Use it in either of two ways:

1. Use it to indicate the suitability of the power line for a high current appliance, when appliance current is known.
2. Use it to measure the maximum limit, in amperes, which a power line can furnish with 20 volts drop.

For either use, the Model 397 is used as a substitute for the load. This makes it an especially convenient instrument which will help you save both time and money. For example, delivery and installation of heavy equipment can be delayed until a suitable power line is installed, when the test shows that existing lines are not adequate.

. . . ABOUT THE METER

Power line voltage is indicated on the meter at the left hand side of the front panel. This is a vane type AC voltmeter with a delayed zero. The dial is marked in increments of 1 volt from 90 to 130 volts; this range includes all values which may be present at any time across the lines from a commercial 110 volt AC source. The voltmeter will indicate delivered voltage at any time when the line cord of the instrument is connected to an outlet.

WHAT THE TEST SWITCH DOES

The push switch marked TEST, at the lower right on the front panel, connects a fixed load and a compensating circuit in the Model 397 when you press it.

WARNING

NEVER HOLD THE TEST SWITCH DOWN. IF YOU DO, YOU WILL BURN OUT THE LOAD ELEMENT IN A FEW SECONDS.

The test switch is intended for momentary contact only. Normal use for the instrument requires a comparison between meter readings when the line is not loaded, and when it is loaded and compensated. This is done in a fraction of a second, so there should never be a condition when the test switch needs to be held down.

USING THE VARIABLE CONTROL

The knob for a variable control is located at the upper right on the front panel. It is labelled LOCKED-ROTOR AMPERES, and has marked values from 13 through 50. Read the number of amperes for each use directly at the pointer position of this knob.

NOTE

DO NOT REMOVE THE KNOB FROM THE CONTROL SHAFT. THE POSITION OF THE KNOB ON THE SHAFT AFFECTS CALIBRATION OF THE INSTRUMENT.

LOCATION OF INTERNAL PARTS

The schematic diagram for the SIMPSON LINE-O-METER, Current Capacity Meter, Model 397 is shown in figure 2. The test switch and 100 ohm potentiometer are front panel controls. The transformer, 40 ohm rheostat, and two fixed resistors are located inside the case of the instrument.

20 OHM FIXED LOAD

The 20 ohm resistance is the fixed load which is connected across the power line when the test switch is pushed. The current which passes through this resistor causes a drop in voltage in the power lines, and reduces the voltage applied to the instrument by the amount of that drop. The normal load current during testing is about 5 amperes.

DROP COMPENSATING CIRCUIT

The transformer is a specially designed auto-transformer. The reduced power line voltage is applied to its primary winding when the TEST switch is pushed. A proportional part of the primary voltage is induced in the winding shown at the top in the schematic diagram. This voltage is applied across the 40 ohm rheostat, the 100 ohm potentiometer, and the 33 ohm resistor in series. A part of it, determined by the control knob setting on the front panel, is added in series with the line voltage. The meter reads the sum of the reduced line voltage and the tapped additional

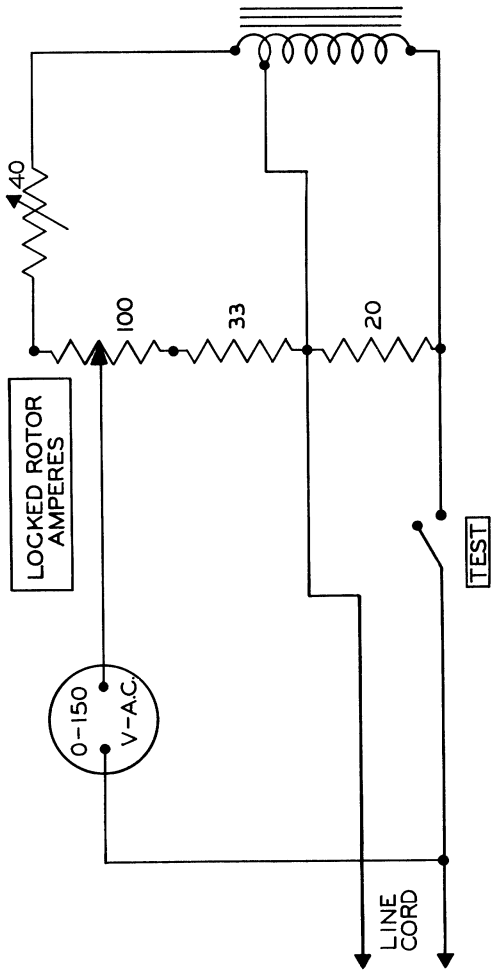


FIGURE 2. SCHEMATIC DIAGRAM, SIMPSON LINE-O-METER, CURRENT CAPACITY METER, MODEL 397

voltage from the transformer. When the meter reads the same amount with the test switch either open or closed, the tapped additional voltage is equal to the line drop due to the 20 ohm load.

ELECTRICAL THEORY

The 13 ampere setting of the 100 ohm potentiometer knob corresponds to the top of the potentiometer, as it is shown in figure 2. The lower end of the potentiometer corresponds to the 50 ampere setting. A line current carrying capacity adequate to handle 50 amperes will have only a small voltage drop with the instrument load. The low potentiometer setting selects this small value of voltage to compensate for the small drop. But a line current carrying capacity which would allow only 13 amperes will have a larger voltage drop with the same instrument load. The high potentiometer setting selects the larger value of compensating voltage.

The setting of the control knob selects a voltage to compensate for line loss due to the 20 ohm fixed load. There is a mathematical relationship between this condition and the number of amperes which would cause 20 volts drop in the same line. For convenience the control knob positions are marked with the number of amperes which would cause 20 volts drop in the same line.

PHYSICAL DESCRIPTION

The SIMPSON LINE-O-METER, Current Capacity Meter, Model 397 is a completely self contained unit, requiring no outside power except a connection to the power line which is to be tested. The instrument has a black case with bakelite covers and perforated metal sides. The perforated metal allows a free flow of air to pass through the instrument and help dissipate the heat from the fixed load resistor. The case dimensions are 3 1/16" x 5½" x 2½". The instrument weighs 2¼ lbs. The line cord, which is attached inside the instrument case, is 5 feet long. This allows you to use the instrument in any location close to a convenience outlet for the power line which is to be tested.

SECTION II

OPERATING INSTRUCTIONS

WARNING

NEVER HOLD THE TEST SWITCH DOWN. IF YOU DO, YOU WILL BURN OUT THE LOAD ELEMENT IN A FEW SECONDS.

DETERMINE TOTAL CURRENT REQUIRED

To determine whether or not a power line is adequate to furnish current for a motor, first obtain the locked-rotor ampere rating for the motor. This may be called by another name, such as starting surge current, but it will be the highest value of current which can be expected to flow through the motor at any time. This value is usually included with the motor instructions, and is often stamped on the nameplate of the motor itself.

Check to see whether there are any other appliances or fixtures connected to the same line to which you expect to connect the motor. If there are any other devices, determine the total maximum current which may be expected through the line, including the starting current for the motor.

OPERATING PROCEDURE IS SIMPLE

(1). Connect the power plug for the Model 397 into a convenience outlet for the single phase 110 volt 60 cycle power line which is to be tested. The voltmeter will indicate line voltage.

(2). Set the control knob in the upper right hand corner of the front panel at the total current value for which you wish to test the line.

(3). Observe the meter indication while you press the **TEST** switch momentarily. **DO NOT HOLD THE TEST SWITCH DOWN.** The meter indication may increase, stay the same, or decrease when you press the **TEST** switch.

(4). If, when the TEST switch is pressed down, the meter indication *remains the same or increases,* the power line is *adequate* for the current indicated by the control knob. But *if the indication decreases,* even slightly, this shows that the power line is *not adequate* for the proposed load.

BUT . . . PROCEDURE TO USE WHEN OVERLOAD IS INDICATED

There are several alternative methods which may be used for correcting an inadequate situation; the method which you use will be determined according to the individual case. You may remove other appliances or fixtures from the desired line and connect them to other lines which will allow their loads. You may replace the existing wires with larger size wires. Or you may abandon the use of the proposed line and run a new one which will be adequate for the motor.

In the above discussion, the high current load is assumed to be a motor. Use the instrument in the same way to rate the line current carrying capacity for use with any other device which operates with a large amount of current.

6 STEPS FOR RATING A LINE FOR MAXIMUM CURRENT CAPACITY

To determine the number of amperes which can be allowed to flow through a power line with a maximum of 20 volts drop, proceed as follows:

(1). Connect the power plug for the SIMPSON LINE-O-METER, Current Capacity Meter, Model 397 into a convenience outlet for the single phase 110 volt 60 cycle AC power line which is to be tested. The voltmeter will indicate line voltage.

(2). Set the front panel control knob at the number of amperes which, you think, is the approximate line capacity.

(3). Observe the meter indications while you press the **TEST** switch momentarily. **DO NOT HOLD THE TEST SWITCH DOWN.** The meter indication may increase, stay the same, or decrease when you press the **TEST** switch.

(4). If, when the **TEST** switch is pressed down, the meter indication *remains the same,* the current value indicated at the control knob setting is the value of current which will cause 20 volts drop in the power line when it flows through the line.

(5). If the meter indication *increases* when you press the **TEST** switch, the line is adequate for *more current* than the value indicated at the control knob setting. If the meter indication *decreases,* the line is adequate for *less current* than the value indicated by the knob.

(6). Readjust the control knob and press the **TEST** switch momentarily again. Repeat this until the meter indication is the same both before and after you press the switch.

WARNING

IF MORE THAN 15 CONTACTS ARE NECESSARY FOR ADJUSTMENT OF THE CONTROL KNOB, STOP AND ALLOW THE INSTRUMENT TO COOL FOR APPROXIMATELY ONE MINUTE; THEN COMPLETE THE TEST.

CHECKING LINE VOLTAGE

At any time when you desire to do so, connect the power plug into an outlet for single phase 110 volt 60 cycle AC power, and read the line voltage directly on the meter. This connection may be left as long as desired without any harm to the meter circuit or any appreciable power consumption from the power circuit.

SECTION III

SPECIAL INFORMATION

SOME SUGGESTED APPLICATIONS . . . PREDICTING SATISFACTORY EQUIPMENT OPERATION.

The SIMPSON LINE-O-METER, Current Capacity Meter, Model 397 may be used to indicate the adequacy, or inadequacy, of any existing power line to furnish any value of current from 13 to 50 amperes. If there is a question as to whether or not a high current device can be operated on the line, the instrument will give a quick yes or no answer. Use the operating instructions in the first paragraph of Section II.

Here is a sample list of electrical devices which have high enough currents to overload many circuits. Use your SIMPSON LINE-O-METER, Current Capacity Meter, Model 397 to test current carrying capacity whenever any of these are to be placed in service.

Refrigerators	Washing Machines	Conveyors
Freezers	Garbage Disposals	Power Saws
Dishwashers	Drill Presses	Grinders
Air Conditioners	Lathes	Sanders

This is only a small sample list of the devices with which you will find your Model 397 useful. It is furnished to suggest the many special applications which you and other users will find. Note that some of the devices in the above list are to be connected permanently to the power line. Others are portable. For portable equipment, test the line current carrying capacity of each line you may use before you connect the device and risk possible damage.

RELATION TO LINE FUSES OR CIRCUIT BREAKERS

Your SIMPSON LINE-O-METER, Current Capacity Meter, Model 397 does not indicate the rating of the fuse or circuit breaker in the line. When you use it to test line current carrying capacity, the current through the instrument is about 5 amperes. After you have determined that a power line will furnish the higher current required to operate the device which you wish to connect, recheck the fuse or circuit breaker rating. Increase it if necessary. If the device has a motor, so the high current is a momentary surge, use a delayed action fuse such as a Fusestat or Fusetron for the circuit.

LIST OF SAMPLE LOCKED-ROTOR CURRENTS

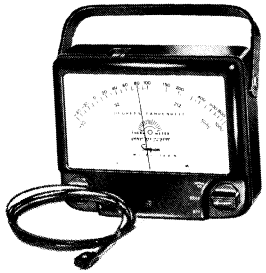
Some sample values for locked-rotor current are furnished here for general information only. Always obtain the specific locked-rotor current rating for any particular device which you wish to install.

Horsepower	Approximate Locked-Rotor Amperes
⅓ and below	20
½	26.6
¾	40
1	54

HOW TO CALCULATE TOTAL LOADS

Unless the wiring layout is planned especially for the device which you are going to connect to the power line, there will usually be some other electrical devices which will also demand current through the same power lines. When you use your instrument to calculate the line current carrying capacity, these other devices may or may not be connected; it does not matter in the instrument procedure. But added current demands will make a difference in the resulting circuit applications. When there are other devices on the line, add up the current demanded by each of them and add this to the amount of current which you will need for the new device. Use the total amount of current as the maximum which may be demanded. Set the control knob of the SIMPSON LINE-O-METER, Current Capacity Meter, Model 397 for this total current.

TWO NEW SIMPSON TESTERS TO HELP YOU WITH YOUR SERVICING!



NEW! THERM-O-METER

Measures Temperatures –50° to +1000° F.

Measures the temperature of practically anything. Size is 7 1⅝₆" × 6" × 2 1⅝₆".

Two models . . each supplied with: internal battery, one 7½' general purpose probe (No. 0190), and Instructions. Order additional probes as desired.

MODEL 388: For one probe..... $59.50

MODEL 388-3L: For 3 probes $64.50

ADDITIONAL PROBES For 388 and 388-3L –

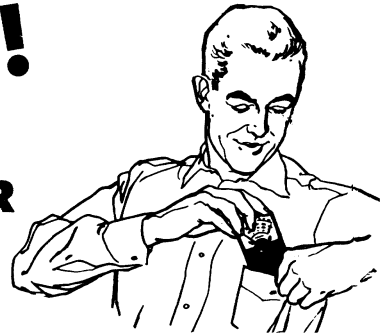
General Purpose Probe . . . No. 0190.....$4.95

Surface Temperature Probe . . . No. 0187.....$6.95

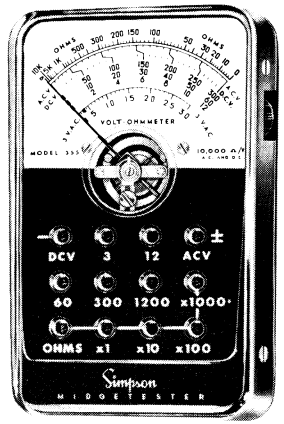
EVER-READY VINYL Carrying Case . . . No. 5262.....$9.95

NEW! Simpson MIDGETESTER

. . . SELF SHIELDED! MODEL 355



(not affected by steel-topped benches, heavy current carrying circuits, stray magnetic fields, etc.)



Here's the first practical shirt-pocket volt-ohmmeter commercially available. Although it measures *only* 2¾" x 4½" x 1" over-all, it's a practical working instrument with ruggedness and accuracy of testers many times larger. Has a sensitivity of 10,000 ohms per volt on both AC and DC! Fourteen measurement ranges are available . . . . . *five for AC voltages, five for DC voltages,* and *four for DC resistances.* A perfect instrument for all electrical and electronic servicemen.

RANGES, DC AND AC VOLTAGE: 3, 12, 60, 300, 1200.

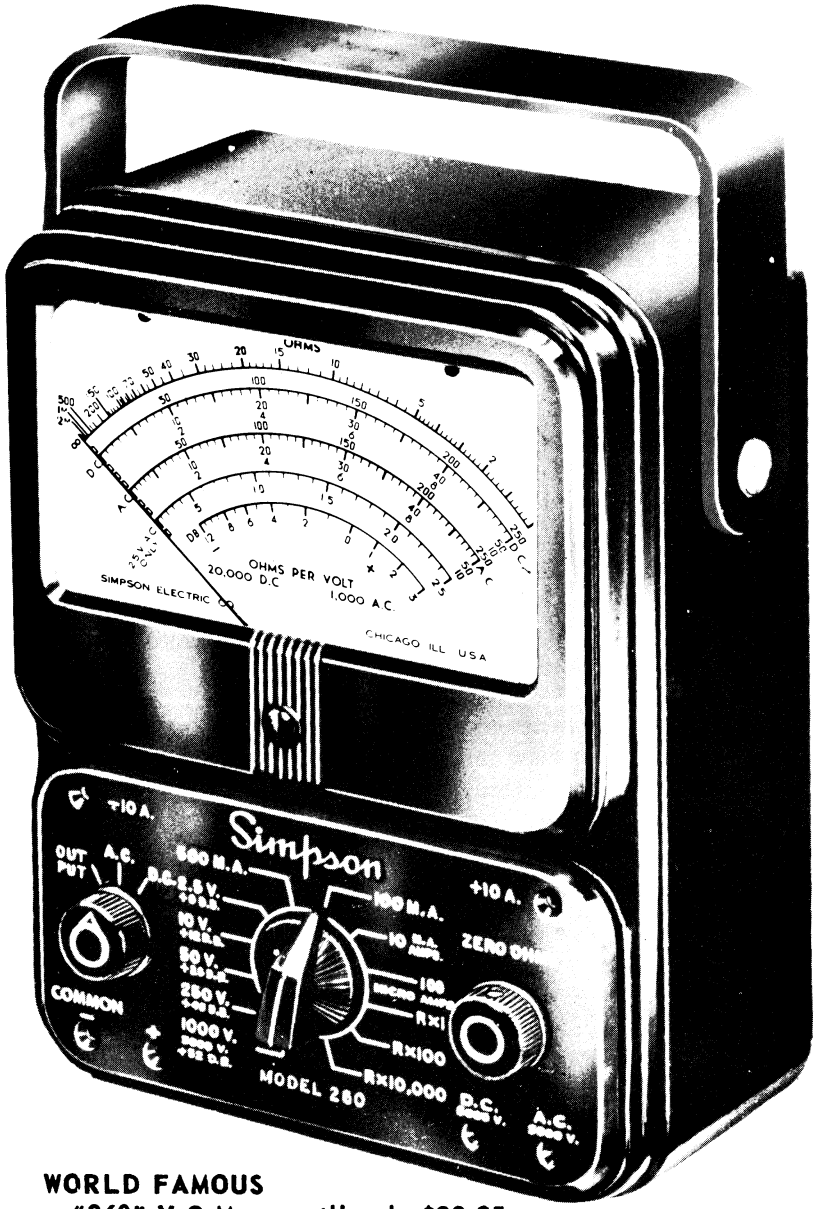
DC RESISTANCES: 0-10K ohms (120 ohms center); 0-100K ohms (1200 ohms center); 0-1 megohm (12K ohms center); 0-10 megohms (120K ohms center).

Size; 2¾" wide, 4½" high, and 1" thick. **Weight;** 7 oz.

Model 355 with Leads, Operator's Manual..... $29.95

Zipper Type Carrying Case No. 6355.....$2.95

Pouch Type Carrying Case No. 7355.....$2.95



WORLD FAMOUS "260" V.O.M. still only $38.95

WARRANTY

SIMPSON ELECTRIC COMPANY warrants each instrument and other articles of equipment manufactured by it to be free from defects in material and workmanship under normal use and service, its obligation under this warranty being limited to making good at its factory any instrument or other article of equipment which shall within 90 days after delivery of such instrument or other article of equipment to the original purchaser be returned intact to it, or to one of its authorized service stations, with transportation charges prepaid, and which its examination shall disclose to its satisfaction to have been thus defective; this warranty being expressly in lieu of all other warranties expressed or implied and of all other obligations or liabilities on its part, and SIMPSON ELECTRIC COMPANY neither assumes nor authorizes any other persons to assume for it any other liability in connection with the sale of its products.

This warranty shall not apply to any instrument or other article of equipment which shall have been repaired or altered outside the SIMPSON ELECTRIC COMPANY factory or authorized service stations, nor which has been subject to misuse, negligence or accident, incorrect wiring by others, or installation or use not in accord with instructions furnished by the manufacturer.

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LAC DU FLAMBEAU PLANT


LAKE STREET PLANT


KINZIE STREET PLANT


AURORA PLANT