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Model 464

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6 DC current ranges to 1000
6 resistance ranges to 1000k
5 AC voltage ranges to 1000
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OPERATOR'S MANUAL

MODEL 355 MIDGETESTER

Courtesy of :

Simpson260.com

SIMPSON ELECTRIC COMPANY

853 Dundee Ave., Elgin, Illinois 60120
Area Code 312, Telephone 697-2260
In Canada, Bach-Simpson, Ltd., London, Ontario

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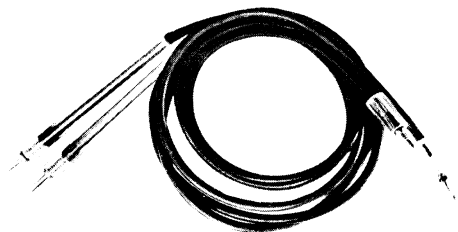
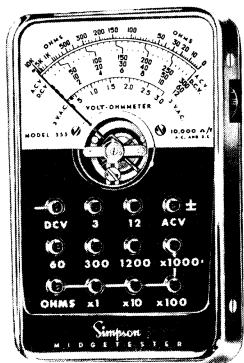


Figure 1-1. Simpson 355 Midgetester

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WARNING

This Instrument is designed to prevent accidental shock to the operator when properly used. However, no engineering design can render safe an instrument which is used carelessly. Therefore, this manual must be read carefully and completely before making any measurements. Failure to follow directions can result in a serious or fatal accident.

SHOCK HAZARD: As defined in American National Standard, C39.5, Safety Requirements for Electrical & Electronic Measuring & Controlling Instrumentation, a shock hazard shall be considered to exist at any part involving a potential in excess of 30 volts rms (sine wave) or 42.4 volts DC or peak and where a leakage current from that part to ground exceeds 0.5 milliampere, when measured with an appropriate measuring instrument defined in Section 11.6.1 of ANSI C39.5.

NOTE: The proper measuring instrument for the measurement of leakage current consists essentially of a network of a 1500 ohm non-inductive resistor shunted by a 0.15 microfarad capacitor connected between the terminals of the measuring instrument. The leakage current is that portion of the current that flows through the resistor. The Simpson Model 229-Series 2 AC Leakage Current Tester meets the ANSI C39.5 requirements for the measurement of AC leakage current and can be used for this purpose. To measure DC Leakage current, connect a 1500 ohm non-inductive resistor in series with a Simpson 0-500 DC microammeter and use this as the measuring instrument.

SECTION I

INTRODUCTION

1.1 GENERAL

1.1.1 The Simpson Midgetester Model 355 is a miniature, ultra-compact Volt-Ohmmeter designed to perform a variety of electrical and electronic measurements. It is unique in several respects, in that it is shirt-pocket size, light weight and has a sensitivity of 10,000 ohms per volt on both AC and DC ranges.

1.1.2 The Model 355 utilizes the Simpson Core Magnet movement whose characteristics are: Light weight, rugged construction, self-shielding and inherently stable.

1.2 UNPACKING AND INSPECTION

Prior to unpacking, examine the shipping carton for any sign of damage. If there is none, inspect the Instrument and packing material for obvious damage from mechanical shock, water leakage, or other causes. Check the electrical performance as soon as possible. If there is any indication of damage, file a complaint with the carrier immediately. Also check that all accessories are included (see Table 5-1). Save the shipping carton and packing materials for future storing or shipping of the Instrument.

Introduction

1.3 ACCESSORIES AND SUPPLIES

All supplies and accessories required for the operation of the Instrument are furnished with the Instrument and are listed in Table 5-1. Other accessories are listed in Table 5-2.

1.4 TECHNICAL DATA

Table 1-1 lists the technical specifications for the Simpson Model 355 Volt-Ohmmeter.

NOTE: Accuracy specifications apply to measurements made with the Instrument in a horizontal position.

Reference Conditions: +25°C, ±5°C; 45% to 75% relative humidity.

Table 1-1. Technical Data

1. DC Voltage

Ranges (full scale): 0-3V, 12V, 60V, 300V, 1200V
Accuracy: ±3% of full scale on all ranges
Sensitivity: 10,000 Ω/V

2. AC Voltage

Ranges (full scale): 0-3V, 12V, 60V, 300V, 1200V
Accuracy: ±5% of full scale on all ranges;
45 Hz to 10000 Hz
Sensitivity: 10,000 Ω/V

Introduction

3. Ohms

Ranges: Rx1, Rx10, Rx100, and Rx1k
Ohms Center: 120Ω, 1200Ω, 12,000Ω and 120,000Ω

Maximum Scale

Reading: 10,000Ω (Rx1)
Accuracy: ±3.0° of arc on all other ranges.
The nominal open-circuit voltage for all ranges up to and including Rx100 is 1.5V.
The nominal open-circuit voltage for the Rx1k range is 16.5V.

4. *Rated Max. Circuit - to - ground voltage:

(Often called "float potential") 1700V peak

5. Readout:

2½ inch, 100μA (full scale)
Core Magnet Meter

6. Overload Capability:

Voltage: Voltage ranges up to and including 1200 volts AC and DC will withstand momentary overloads of 2 times full scale.

*Per American National Standard Institute C39.5-1974.
"The specified voltage with respect to ground which may be safely and continuously applied to the circuits of an instrument".

- 7. Power Requirements:** Two batteries. (Refer to paragraph 4.4.2 for installation and battery replacement.)
One 1.5V cell, NEDA 15F.
One 15V cell, NEDA 220.
- 8. Dimensions:** 2-3/4" wide x 4 1/4" long x 1" deep (69 x 113.5 x 26 mm)
- 9. Weight:** 7.0 oz. (200 gm)

SECTION II

DESCRIPTION

2.1 FRONT PANEL

The Model 355 Volt-Ohmmeter has a large, easy-to-read 2 1/2-inch indicating instrument. Below the indicating instrument 12 circuit jacks are located. These circuit jacks are marked in white characters which are printed on a graphic panel.

2.1.1 OHMS ZERO Adjust

The OHMS ZERO adjust control, located on the upper right-hand side of the Instrument, is a variable resistor in the ohmmeter circuit which makes it possible to adjust the indicating instrument to zero on the ohms ranges.

2.1.2 Circuit Jacks

There are 12 tapped circuit jacks on the front panel. They are the connections for the test leads. The threaded studs of the test leads are screwed into the proper jacks for the desired function and range for each application.

2.2 TEST LEADS

The Instrument is furnished with one pair of test leads 2 1/2 feet long. For polarity identification, one lead is black and the other red. The test lead wire consists of a large number of fine strands to insure flexibility.

2.2.1 The wire insulation is a high-grade rubber and its insulation is more than adequate to withstand the highest voltage the Instrument is intended to measure. Both the red and black test leads are provided with probe tips.

2.3 INTERNAL BATTERIES

There are two batteries in the ohmmeter circuits. One is a NEDA 15F, AA size cell that furnishes 1.5 volts for all the resistance ranges up to Rx100. A NEDA 200 battery furnishes 15 volts for the Rx10k range. The 1.5-volt cell is held in place with two spring clips which serve as battery contacts. The 15-volt battery is held in place with two spring clips which also serve as battery contacts. Observe

correct polarity whenever replacement of batteries is required.

SECTION III

OPERATING INSTRUCTIONS

WARNING

The Simpson Model 355 is designed to prevent accidental injury to the operator when properly used. No engineering design can render safe an instrument when it is used carelessly. This manual must be read carefully and completely prior to making any measurements. Failure to follow directions can result in a serious or fatal accident.

3.1 GENERAL

This section of the manual contains information related to operation of the Instrument. Special notes and instructions also have been included for added safety and convenience.

3.2 SAFETY PRECAUTIONS

3.2.1 This Instrument is neither designed nor intended for the making of measurements in high

Operation

voltage (above 125 AC or DC) — high energy circuits such as power substations, broadcast transmitters and the like.

3.2.2 The Model 355 Volt-Ohmmeter is intended for use only by personnel qualified to recognize shock hazards and trained in the safety precautions required to avoid possible injury. Refer to the "SHOCK HAZARD" definition on page iv.

3.2.3 Do not work alone when making measurements of circuits where a shock hazard might exist. Notify a nearby person that you are making, or intend to make, such measurements.

3.2.4 Locate all voltage sources and accessibility paths prior to making any connections. Be sure the equipment to be measured is grounded properly (if required), and the right rating and type of equipment fuse(s) is installed.

3.2.5 Voltages might appear unexpectedly in defective equipment. An open bleeder resistor can result in a capacitor retaining a dangerous charge. Turn the power off and discharge all capacitors before connecting or disconnecting the test leads.

3.2.6 For your own safety, inspect the test leads, prods and connectors for cracks, breaks or crazes in the insulation before each use. If any defects are noted, replace the test leads immediately (Simpson Catalog Number 08600).

Operation

3.2.7 Do not make measurements in a circuit where corona is present. Corona can be identified by a pale blue color emanating from sharp metal points in the circuit, or by a buzzing sound, or by the odor of ozone. In rare instances, such as around germicidal lamps, ozone might be generated as a normal function. Ordinarily, the presence of ozone indicates presence of high voltage and probably an electrical malfunction.

3.2.8 Hands, shoes, floor and workbench must be dry. Avoid making measurements under humid, damp, or other environmental conditions that could affect the dielectric withstanding voltage of the test leads or the Instrument.

3.2.9 For maximum safety, do not touch the test leads, Instrument or circuit while power is applied to the circuit being measured.

3.2.10 Use extreme caution when making measurements in a circuit where dangerous composite voltages could be present, such as in an rf amplifier.

3.2.11 Do not make measurements using test leads of lesser safety than those originally furnished with the Instrument.

3.2.12 Do not touch any object which could provide a current path to the common side of the circuit under test or power line ground. Always stand on a dry insulated surface capable of withstanding the voltage being measured.

Operation

3.3 UNPACKING

After unpacking the Instrument, you will find a 1.5V and 15V battery in separate envelopes in the box with the Instrument and test leads. See Section IV for instructions on how to open the back cover and install the batteries.

3.4 ADJUST POINTER FOR ZERO

With the volt-ohmmeter in operating position, check that the pointer indicates zero at the left end of the scale when there is no input to the Instrument. If pointer is off zero, adjust the screw located in the case below center of the dial. Use a small screwdriver to turn the screw slowly clockwise or counterclockwise until the pointer is exactly over the zero mark at the left end of the scale. With the indicating pointer set on the zero mark, reverse the direction of rotation of the OHMS ZERO adjust control. Rotate the OHMS ZERO adjust control a sufficient amount to introduce mechanical freedom or "play" but insufficient to disturb the position of the indicating pointer. This procedure will avoid disturbances to the zero setting from subsequent changes in temperature, humidity, vibration and other environmental conditions.

3.5 POLARITY CORRECTION

When making DC measurements, polarity can be reversed by interchanging the test prods.

Operation

3.6 DC VOLTAGE MEASUREMENTS

3.6.1 Measuring DC Voltage: 0-3 Through 0-1200 Volts

WARNING

Be extremely careful when working with high voltage circuits. Do not touch the instrument or test leads while power is on in the circuit being measured.

- Prior to making voltage measurements, review the SAFETY PRECAUTIONS listed in paragraph 3.2.
- Screw the black test lead into the -DVC jack located at the upper left-hand corner of the graphics panel (it takes about 2 turns to properly seat the threaded stud in the jack).
- Screw the red test lead into the 3V, 12V, 60V, 300V or 1200V jack as selected for the range required (see Figure 3-1). When in doubt as to the voltage present, always use a higher range as a cautionary measure to protect the Instrument.
- Be sure the power is off in the circuit to be measured and that all capacitors have been discharged.

Operation

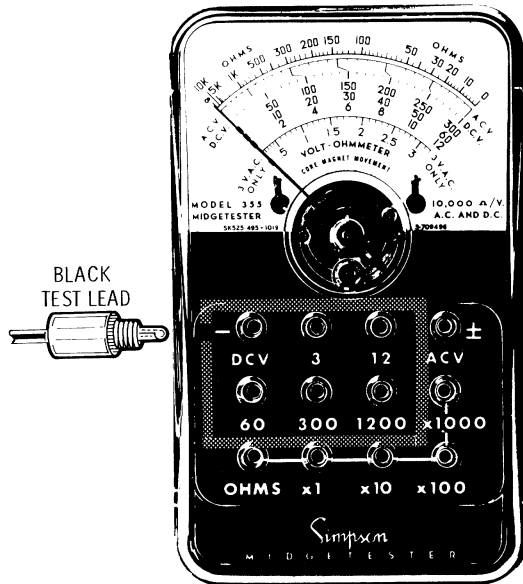


Figure 3-1. Contact Points For DC Voltage Selections

Operation

- e. Connect the black lead to the negative side and the red lead to the positive side of the circuit to be measured.
- f. Turn on power to the circuit to be measured.
- g. Read the voltage on the black scale arc marked DCV as follows:
 - 0-3 volts on the 0-300 scale and divide scale reading by 100.
 - 0-12 volts on the 0-12 scale, read scale directly.
 - 0-60 volts on the 0-60 scale, read scale directly.
 - 0-300 volts on the 0-300 scale, read scale directly.
 - 0-1200 volts on the 0-12 scale, multiply scale reading by 100.
- h. If the reading obtained is within a lower range, remove power, discharge capacitors, and move the red test lead to the lower range jack to obtain a more accurate reading.
- j. Turn power off, discharge all capacitors and disconnect the test leads.

3.7 AC VOLTAGE MEASUREMENTS

3.7.1 Measuring AC Voltage: 0 - 3 Through 0 - 1200V

NOTE: The Simpson Model 355 responds to the full-wave average value of an AC waveform. It is 3-7

Operation

calibrated in terms of the RMS value of a pure sine wave. If the waveform is nonsinusoidal, the reading might be either higher or lower than the true RMS value, and could result in a substantial error.

WARNING

Be extremely careful when working with high voltage circuits. Do not touch the instrument or test leads while power is applied to the circuit being measured.

- a. **Before making voltage measurements, review the SAFETY PRECAUTIONS listed in paragraph 3.2.**
- b. Screw the black test lead into the \pm ACV jack located at the upper right-hand corner of the graphics panel.
- c. Screw the red test lead into the 3V, 12V, 60V, 300V or 1200V jack as selected for the range required (see Figure 3-2). When in doubt as to the voltage present, always use a higher range as a cautionary measure to protect the instrument.
- d. Be sure the power is off in the circuit to be measured and that all capacitors are fully discharged.

Operation

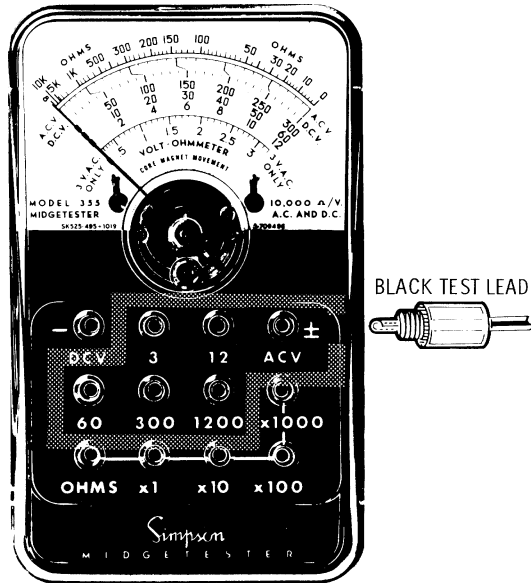


Figure 3-2. Contact Points For AC Voltage Selections

Operation

- e. Connect the test leads across the circuit to be measured.
- f. Turn on power to the circuit to be measured.
- g. Read the voltage for the 0-3V range directly on the red scale arc marked 3 VAC only.
- h. Read the voltage on the red scale arc marked ACV using the black figures below the scale as follows:
0-12V on the 0-12 scale, reading scale directly.
0-60V on the 0-60 scale, reading scale directly.
0-300V on the 0-300 scale, reading scale directly.
0-1200V on the 0-12 scale, multiply scale reading by 100.
- i. If the reading obtained is within a lower range, remove power, discharge capacitors, and move the red test lead to the lower range jack to obtain a more accurate reading.
- k. Turn power off, discharge all capacitors and disconnect the test leads.

3.9 RESISTANCE MEASUREMENTS

WARNING

Before making any resistance measurements, all power to the circuit under test must be turned off and all capacitors discharged.

Operation

3.9.1 The Model 355 has four resistance ranges. The open circuit voltage is either 1.5V or 16.5V depending on the range selected.

3.9.2 Measuring Resistance

- Screw the black test lead into the OHMS jack located on the lower left-hand corner of the graphics panel.
- Screw the red test lead into the x1, x10, x100 or x1000 jack as selected for the range required (see Figure 3-3).
- Connect the black and red test leads together to short the resistance measuring circuit.
- Adjust the OHMS ZERO control to set the Instrument pointer to zero on the ohms scale. If full scale deflection cannot be obtained on the Rx1 or Rx1000 ranges, replace the 1.5V or 15V batteries respectively. For battery replacement, refer to Section IV.
- Disconnect the ends of the test leads and connect to circuit or component to be measured.
- Read the resistance on the black ohms scale. Multiply the reading obtained by the factor indicated below the jack in use.
- Disconnect the test leads.

Operation

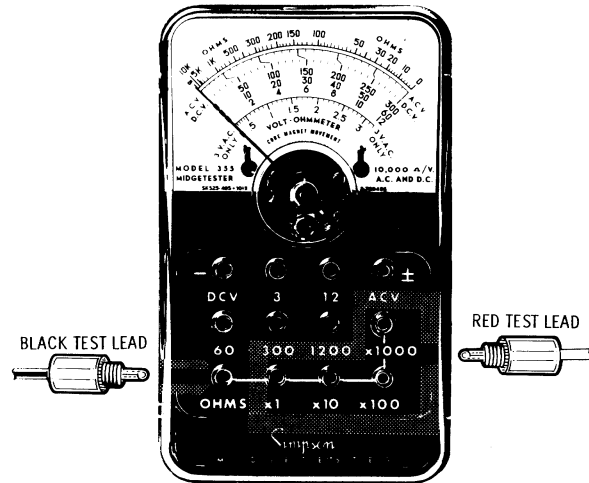


Figure 3-3. Resistance Measurement

SECTION IV

MAINTENANCE

4.1 GENERAL

The Simpson Model 355 Volt-Ohmmeter has been designed carefully and constructed with high quality components. By providing reasonable care, and following the instructions in this manual, the user can expect a long useful service life from this Instrument.

4.2 WARRANTY

The Simpson Electric Company Warranty policy is printed on the inside back cover of this manual. Read carefully before requesting a warranty repair.

NOTE: For assistance of any kind, including help with the Instrument under warranty, contact the nearest Authorized Service Center listed on the last pages of this manual or contact the Factory Service Manager. Give full details of the difficulty and include the model and serial number of the unit and date of purchase. Shipping instructions will be promptly sent to you. If an estimate of charges for non-warranty work or other service work is required, a firm quote estimate will be furnished upon receipt of the unit. Service work will not be performed without customer approval.

Maintenance

4.3 SHIPPING

Pack the Instrument carefully, and ship prepaid to the destination indicated. Insure the shipment.

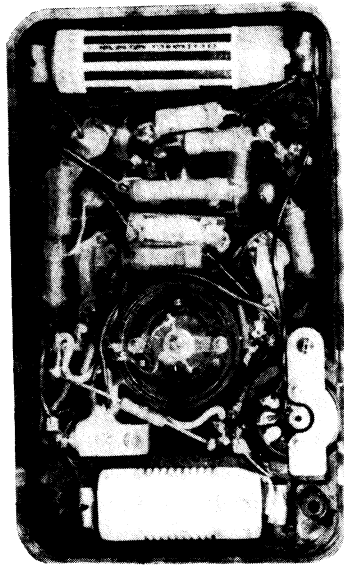
4.4 BATTERY REPLACEMENT

Battery replacement is indicated whenever the Instrument cannot be adjusted to zero when the test leads are shorted together on the ohmmeter ranges. If this adjustment cannot be made on the Rx1, Rx10 and Rx100 ranges, replace the 1.5V AA size cell. If the ohms adjustment cannot be made on the Rx1k range, replace the 15-volt battery.

4.4.1 The batteries are located inside the case at the top and bottom of the Model 355. To open the compartment, proceed as follows:

- a. Disconnect the test leads from any external circuits.
- b. Place the Instrument face down on a soft padded surface.
- c. Unscrew the four screws located at the four corners of the case.
- d. Remove the cover from the case and set it aside. Batteries can now be replaced (see Figure 4-1).

Maintenance



**Figure 4-1. Simpson Midgetester Model 355
Rear View With Cover Removed**

Maintenance

4.4.2 The procedure for replacing batteries is as follows:

- a. To remove the AA size cell, grasp the battery at the center and pull directly up. To install new cell, insert the (-) side first; push against the (-) terminal spring clip, and then gently push the (+) side of the cell into place.
- b. To remove the 15-volt battery, withdraw battery following the same procedure as used for the AA cell.

4.5 CASE REMOVAL

Whenever maintenance other than battery replacement is required, removal of the back cover, as described in paragraph 4.4.1 above, is required.

4.6 PREVENTIVE MAINTENANCE

4.6.1 Daily Care

- a. Immediately clean all spilled materials from the Instrument and wipe dry. If the spillage is corrosive, use a suitable cleaner to neutralize the corrosive action, and remove the spillage.
- b. Whenever the Instrument is not in use, remove the test leads by unscrewing them from the jacks.

Maintenance

- c. Whenever possible, avoid prolonged exposure or usage in areas which are subject to temperature and humidity extremes, vibration or mechanical shock, dust or corrosive fumes, or strong electrical or electromagnetic interferences.

4.6.2 Monthly Care

Verify Instrument accuracy by performing operational checks using known accurate, stable sources. If proper calibration equipment is not available, contact your nearest Simpson Authorized Service Center. Refer to last pages of this manual. If the Instrument has not been used for 30 days, check the batteries for leakage and replace if necessary.

4.6.3 Annual Care

It is recommended that the Instrument be returned annually to your nearest Simpson Authorized Service Center, or to the factory, for an overall check, adjustment and calibration.

4.6.4 Storage

When the Instrument is not in use, store it in a room free from temperature extremes, dust, corrosive fumes, and mechanical vibration or shock. If storage time is expected to exceed 30 days, remove the batteries.

SECTION V

ORDERING INFORMATION, ACCESSORIES AND REPLACEMENT PARTS

5.1 GENERAL

Simpson Authorized Service Centers have been established throughout the United States and Canada. To obtain repair or recalibration for any item of Simpson equipment, contact the Authorized Service Center and make arrangements with them for the service you require. A list of the Authorized Service Centers is included on the last pages of this manual.

5.2 ORDERING INFORMATION

If replacement parts are needed, refer to Tables 5-1, 5-2 and 5-3.

5.3 CUSTOMER REPAIR SERVICE

Repairs or recalibration of Simpson Products are performed by the Customer Service Department at the factory and/or Simpson Authorized Service Centers. However, before returning your Instrument to either the Simpson Electric Company or an Authorized Service Center, contact one of those listed for shipping instructions. Provide a detailed description of the Instrument difficulty, along with Instrument model number, serial number and date of purchase.

**Table 5-1. Accessories Furnished
With the Instrument**

Quantity	Description	Catalog Number
1	Test Lead Set - One red and one black, 2½ ft. long, each with a probe tip, and insulated coded studs on opposite end.	08600
1*	1.5-Volt AA Cell, NEDA 15F	1-111802
1*	15-Volt Battery, NEDA 220	1-115329
1	Operator's Manual	1-110393

*Batteries are standard items available at local retail stores. Refer to Table 1-1, item 7.

Table 5-2. Other Available Accessories

Description	Catalog Number
Leather Case	06355

Table 5-3. Replacement Parts List

Description	Simpson Part No.
Resistor, 28.5kΩ, 1/2W, ±1%	1-114929
Resistor, 98kΩ, 1/2W, ±1%	1-113314
Resistor, 480kΩ, 1/2W, ±1%	1-115319
Resistor, 2.4MΩ, 1/2W, ±1%	1-113996
Resistor, 9MΩ, 1/2W, ±1%	1-115320
Resistor, 120Ω, 1/2W, ±1%	1-115322
Resistor, 1.08kΩ, 1/2W, ±1%	1-115323
Resistor, 90Ω, 1/2W, ±1%	1-115324
Resistor, 10.8kΩ, 1/2W, ±1%	1-115325
Resistor, 78kΩ, 1/2W, ±1%	1-115326
Resistor, 107kΩ, 1/2W, ±1%	1-115321
Resistor, 5.455kΩ, 1/2W, ±1%	1-115356
Potentiometer, 14kΩ, (Ohmmeter zero)	1-114500
Front Cover	10-890168
Back Cover	1-115150
Rectifier and calibrating resistor	10-890302

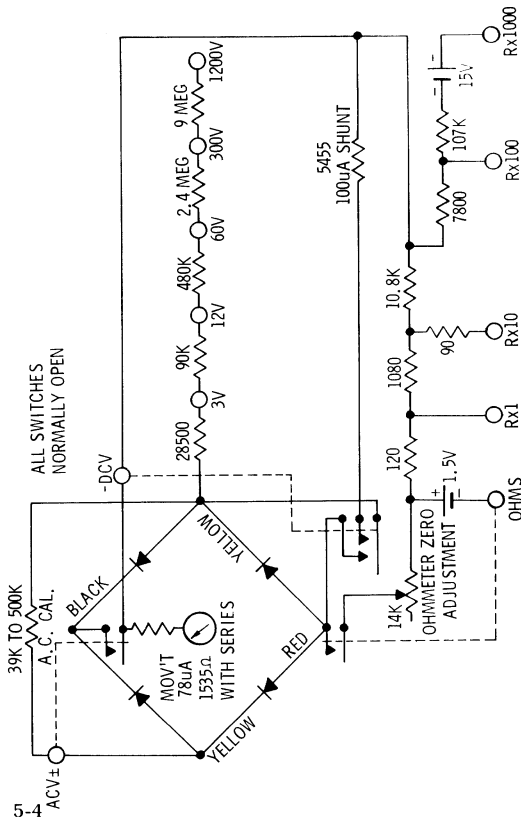


Figure 5-1. Simpson Model 355 Schematic Wiring Diagram

SIMPSON ELECTRIC COMPANY

853 Dundee Avenue, Elgin, Illinois 60120 — Phone: (312) 697-2260

AUTHORIZED SERVICE CENTERS

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• ALASKA, ANCHORAGE 99501
YUKON RADIO SUPPLY, INC.
3222 Commercial Drive
P.O. Box 406
Tel. 907/277-1497

• ALASKA, ANCHORAGE 99500
R. M. ZOOK & ASSOCIATES
1710 E. 27th Avenue
Tel. 907/272-6917

• ALASKA, FAIRBANKS 99701
YUKON RADIO SUPPLY, INC.
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Tel. 907/452-1011

•• ARIZONA, PHOENIX 85034
|| METERMASTER INC.
2633 E. Buckeye
Tel. 602/244-9441

•• CALIFORNIA, GLENDALE 91201
|| WETHERFORD INSTRUMENT DIV.
WESTERN ELECTRONIC SUPPLY CORP.
640 Allen Street
Tel. 213/246-4861

•• CALIFORNIA, LOS ANGELES 90040
|| METERMASTER, INC.
5646 Jilison Street
Tel. 213/685-4340

•• CALIFORNIA, PALO ALTO 94303
|| METERMASTER, INC.
3995 E. Bayshore Road
Tel. 415/968-0313

•• CALIFORNIA, SAN DIEGO 92123
|| METERMASTER/SAN DIEGO
8799 Balboa Avenue
Tel. 714/560-4841

•• CALIFORNIA, SAN FRANCISCO 94105
PACIFIC ELECTRICAL INSTRUMENTS
111 Main Street
Tel. 415/421-7185

•• CALIFORNIA, SANTA CLARA 95050
|| DYNAMETRON
3343 Edward Avenue
Tel. 408/246-6535

• CALIFORNIA, SOUTH PASADENA 91303
ETALON COMPANY
1323 Huntington Drive
Tel. 213/257-5410

•• COLORADO, DENVER 80223
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CORPORATION
1165 S. Cherokee
Tel. 303/722-5766

•• CONNECTICUT, MIDDLETOWN 06457
|| THE MANCIB COMPANY
Randolph Road and Coe
Tel. 203/346-6646

•• FLORIDA, MIAMI 33136
FLORIDA PRECISION INSTRUMENT
COMPANY
800 N.W. 7th Avenue
Tel. 305/324-1731

•• FLORIDA, MIAMI 33142
|| KIMBALL ELECTRONIC LAB., INC.
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Tel. 305/635-9712

•• FLORIDA, ORLANDO 32806
|| BROWNELL-ELECTRO INC.
307 27th St., Box 8945
Tel. 305/843-6770

•• GEORGIA, ATLANTA 30354
|| BROWNELL-ELECTRO INC.
3020 Commerce Way
Tel. 404/762-5181

•• HAWAII, HONOLULU 96819
EMC CORPORATION
2979 Uialena Street
Tel. 808/847-1138

•• HAWAII, HONOLULU 96819
KEMS INCORPORATED
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Tel. 312/430-2292

ILLINOIS, ELK GROVE VILLAGE 60007

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121 Gordon Street
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ILLINOIS, ROCKFORD 61108

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1718 Broadway
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510 Williams Road
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KANSAS, WICHITA 67211

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225 Ida
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LOUISIANA, HARAHAN 70123

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Div. of Pytronic Industries
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MARYLAND, TIMONIUM 21093

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Tel. 301/252-1260

MASSACHUSETTS, BURLINGTON 01802

THE MANCIB COMPANY
Middlesex Turnpike at "A"
Tel. 617/272-9450

MICHIGAN, FERNDALE 48220

RAM METER INC.
1100 Hilton Road
Tel. 313/547-1000

MINNESOTA, MINNEAPOLIS 55427

INSTRUMENTATION SERVICES INC.
957 Wanneka Avenue North
Tel. 612/544-8916

MISSOURI, ST. LOUIS 63143

SCHERRER INSTRUMENTS INC.
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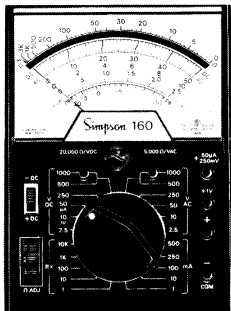
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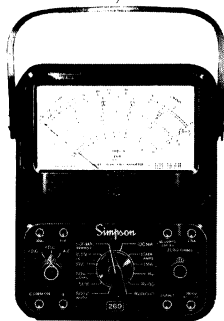
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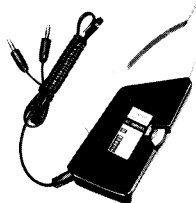
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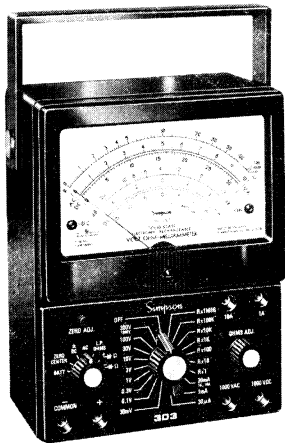
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