

**OPERATING MANUAL**  
**THE T-360**  
**MULTI-PURPOSE METER**



Courtesy of [Simpson260.com](http://Simpson260.com)  
& Instrument Meter Specialties - [MeterSales.com](http://MeterSales.com)

see

Band 42-202  
GRAM 90

THE T-360 MULTIPURPOSE METER

is made for Western Union

by the

**SIMPSON ELECTRIC COMPANY**

5200 West Kinzie Street • Chicago, Illinois 60644

THE MOV FOR THIS METER  
IS 50 uA

92#224



FIGURE 1 - THE T-360 MULTIPURPOSE METER

## 1. GENERAL INFORMATION

### 1.1 DESCRIPTION

The Western Union T-360 is a multipurpose instrument used for test repair of *Teletype* equipment. It uses a special *Teletype* function switch (called a bridging/termination function) to select any of the following operations:

<i>Normal mode</i>	<i>900 termination</i>
<i>Bridging mode</i>	<i>Tel-Set mode</i>
<i>600 termination</i>	

The T-360 also has a normal function switch that can be used not only in the normal-mode operation, described in 1.1. below, but also in all other modes except *Tel-Set*, with certain limitations.

See Figure 3, page 10 and Schematics 1, 2, and 3, pages 16, 17, and 18

### 1.2. NORMAL MODE

When operating on normal mode, the T-360 can measure low level voltages, current, and semiconductor circuit resistances without causing active components to conduct. On this setting, the unit can also be used for integrated circuit measurements.

With normal-mode operation, full *DC* amplifier gain is used when operating on *ohms. low power*, in contrast to operating on *ohms*. In the latter operation, the amplifier circuit is arranged in source-follower mode with unity gain. An internal potentiometer setting makes it possible to correlate full-scale readings between both ohmmeter circuits.

*AC* circuitry under normal-mode operation uses a separate two-stage, *FET* input, feedback-stabilized amplifier. The instrument detector responds to *AC* average signal values, but is calibrated in *RMS* and read on the *AC & DC* scale.

### 1.3. BRIDGING MODE, 600 - $\Omega$ AND 900 - $\Omega$ TERMINATIONS

The Bridging mode, the 600- $\Omega$  termination, and the 900- $\Omega$  termination are operable by virtue of their connection to a high-pass filter having a 3 *dB* frequency of 400 *Hz*. The filter is 25 *dB* down at 60 *Hz*. See 8.5.

These modes are used for the measurement of *AC* signal *dB* levels on *Teletype* lines. (Do not use this mode when measuring levels such as "J" carrier channels below 450 *Hz*. Use normal mode on *AC* volts which eliminates the high-pass filter.)

#### 1.4. TEL-SET MODE

When the function switch is on *Tel-Set*, a head set is plugged into the *Tel-Set* jacks and is connected to the input jacks only. The instrument and all allied circuits are disconnected.

### 2. DC VOLTAGE RANGE SPECIFICATIONS

#### 2.1. DC VOLTAGE RANGES USED

*DC* voltage ranges used are .05 *V*, .1 *V*, .3 *V*, 1 *V*, 3 *V*, 10 *V*, 30 *V*, 100 *V*, 300 *V*, and 1000 *V*.

#### 2.2. DC VOLTAGE ACCURACY

Accuracy for the *DC* voltage ranges is  $\pm 2\%$  of full scale.

#### 2.3. DC VOLTAGE INPUT RESISTANCE

Input resistance for the *DC* voltage ranges is 10 *MΩ* on all ranges.

#### 2.4. AC REJECTION IN THE DC VOLTAGE RANGES

*AC* rejection in the *DC* voltage ranges is 80 *dB/min* for a frequency of 60 *Hz* and higher (300 *V RMS* maximum).

#### 2.5. DC VOLTAGE OVERLOAD

Overload for the *DC* voltage ranges is 300 *V DC* on the 50 *mV* and 100 *mV* ranges, and 1200 *V DC* Max for the 300 *mV* and higher ranges.

### 3. AC VOLTAGE RANGE SPECIFICATIONS

#### 3.1. AC VOLTAGE RANGES USED

*AC* voltage ranges used are .01 *V*, .03 *V*, .1 *V*, .3 *V*, 1 *V*, 3 *V*, 10 *V*, 30 *V*, 100 *V*, 300 *V*, and 1000 *V*.

#### 3.2. AC VOLTAGE ACCURACY

Accuracy for the *AC* voltage ranges is  $\pm 3\%$  of full scale.

#### 3.3. AC VOLTAGE INPUT IMPEDANCE

Input impedance for all *AC* voltage ranges is 10 *MΩ* shunted by 55-*pf* of capacitance, at the tester's input jacks.

#### 3.4. AC VOLTAGE FREQUENCY RESPONSE

Frequency response for the *AC* voltage ranges is as follows:

$\pm 3\%$  from 30 *Hz* to 100 *KHz* on the .01 *V*, .03 *V*, .1 *V* and .3 *V* ranges.

$\pm 3\%$  from 30 *Hz* to 50 *KHz* on the 1 *V*, 3 *V*, 10 *V* and 30 *V* ranges.

$\pm 3\%$  from 30 *Hz* to 20 *KHz* on the 100 *V*, 300 *V* and 1000 *V* ranges.



## 5.5. AC CURRENT FREQUENCY RANGE

AC current range frequency band is 30 Hz to 100 KHz.

## 6. RESISTANCE RANGES

### 6.1. RESISTANCE RANGES USED

Resistance ranges (for either a low-power or conventional ohmmeter circuit) are as follows:

$\Omega \times 1$

$\Omega \times 10K$

$\Omega \times 10$

$\Omega \times 100K$

$\Omega \times 100$

$\Omega \times 1M$

$\Omega \times 1K$

Note: All ranges are  $10\Omega$  at center of scale.

### 6.2. RESISTANCE RANGE ACCURACY

Accuracy for resistance ranges is  $3^0$  of arc.

### 6.3. RESISTANCE RANGES: MAXIMUM POWER APPLIED TO DEVICE UNDER TEST

Maximum power applied is:

On Low-Power Range

$\Omega \times 1$

70 microwatts

On Conventional Range

$\Omega \times 1$

60 milliwatts

## 7. TEMPERATURE DATA

### 7.1. OPERATING TEMPERATURE

The normal operating temperature range is  $55^{\circ}F$  to  $105^{\circ}F$ .

### 7.2. MAXIMUM TEMPERATURE DRIFT: DC VOLTAGE AND CURRENT

The maximum temperature drift on DC voltage and current ranges is  $\pm 4\%$  of full scale for the temperature range stated above. (This error is in addition to the initial accuracy error).

### 7.3. MAXIMUM TEMPERATURE DRIFT: AC VOLTAGE AND CURRENT

The maximum temperature drift on AC voltage and current ranges is less than  $\pm 3\%$  of full scale for the temperature range stated above. (This error is in addition to the initial accuracy error).

### 7.4. TEMPERATURE DRIFT ERROR: OHMMETER

Temperature drift error on both ohmmeter ranges is eliminated when the zero and full-scale adjustments are made at that specific temperature.

## 8. BRIDGING/TERMINATION FUNCTION SWITCH SETTINGS

### 8.1. NORMAL POSITION

When the bridging/termination switch is on **NORMAL**, the instrument functions in the same way as a standard solid-state VOM tester, such as the Simpson Model 314.

### 8.2. BRIDGING POSITION

When the bridging/termination function switch is on **BRIDGING**, the input impedance at the tester's input jacks is 0.5 megohm shunted by 55 pF of capacitance.

### 8.3. 600-Ω TERM AND 900-Ω TERM POSITIONS

In these positions, the input is internally terminated with 600 Ω and 900 Ω respectively.

### 8.4. TEL-SET POSITION

When the bridging/termination function switch is on the **TEL-SET** setting, the input is connected to **TEL-SET** jacks only. The internal electronics of the instrument are automatically disconnected.

### 8.5. HIGH-PASS FILTER

In the **BRIDGING, 600-Ω TERM, AND 900-Ω TERM** positions only, the 400 Hz high-pass filter is connected in series with the tester's AC amplifier (when the normal function switch is on *ACV*.)

## 9. dB RANGES AT DIFFERENT BRIDGING/TERMINATION FUNCTION SWITCH SETTINGS

Setting	dB Range
Normal or Bridging	+ 60, + 50, + 40, + 30, + 20, + 10, 0, -10, -20, -30, and -40.
600 Ω Term	+ 20, + 10, 0, -10, -20, -30, and -40.
900 Ω Term	+ 20, + 10, 0, -10, -20, -30, and -40.



**9.1. ACCURACY ON dB RANGES WHEN USING BRIDGING/TERMINATION FUNCTION SWITCH**

Accuracy is  $3^\circ$  of arc in the normal, the bridging, the 600- $\Omega$  Term and the 900- $\Omega$  Term dB settings. The tolerances of the 600- $\Omega$  and 900- $\Omega$  terminating resistors are within 1%.

**10. POWER SUPPLY**

**10.1. PT BATTERY**

1 PT (Approximately C-size) battery, 9 V, which has an approximate life of 700 hours, is used. (Burgess # PM6, Eveready # 226 or equivalent.)

**10.2. D BATTERY**

1 D-size cell, 1.5 V, having an approximate life of 1000 hours when on ohms, low-power, is used. (Burgess # 210, Eveready # 1150 or equivalent).

**10.3. AA BATTERY**

2 AA-size cells, 1.5 V each, and having an operating life of 1000 hours, are used. Burgess # 930, Eveready # 1015 or equivalent

**11. INSTRUMENT DIMENSIONS**

**11.1. SIZE**

The T-360 is 3 3/4" x 6 3/4" x 7 3/4".

**11.2. WEIGHT**

The instrument weighs 5 1/2 lbs.

**12. SIMPSON MODEL M 00456 PROBE SPECIFICATIONS**

The M 00456 Probe is used with the T-360 Multipurpose Meter. Its specifications follow:

**12.1. OPERATING RANGES**

The M 00456 Probe has two operating ranges:

x 1 and x 10

The x 1 range is valid in all functions.

The x 10 range is valid only in the normal voltage functions.

## 12.2. INPUT IMPEDANCE

Input impedance of the probe (when used with the T--360) is as follows:

On the x 1 range: Resistance input = 10 M $\Omega$

Capacitance input = 135 pF

On the x 10 range: Resistance input = 100 M $\Omega$

Capacitance input = 20 pF

## 12.3. SELF IMPEDANCE

Self impedance of the probe is as follows:

On the x 1 range: Resistance input to output = 300 milliohms

Capacitance shunt = 80 pF

On the x 10 range: Resistance input to output = 90 M $\Omega$

## 12.4. MAXIMUM OVERLOAD VOLTAGE

Maximum overload voltage is 1200 RMS, momentarily.

## 12.5. OPTIMIZING RESPONSE

An internal-capacity trimmer sets the probe response on the x 10 function. The trimmer is visible after the head is removed from the probe body. To adjust the probe, remove the 3 small plastic screws that secure the probe head. See Figure 2, which also shows the probe circuit.

If probe optimized for one unit is used with another unit there could be up to 1/2 DB error with probe on X10.

## 12.6. PROBE LENGTH

Length of the probe and cable is approximately 4' from tip to connector.

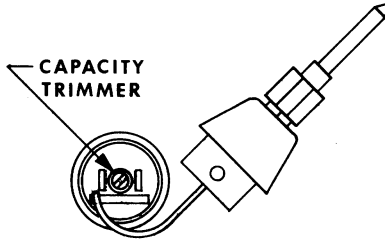
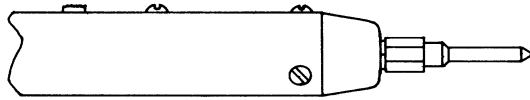
## 12.7. CONNECTORS

Connectors are banana plugs with standard 3/4" spacing.

## 12.8. PROBE TIPS

Standard screw-on phone-plug tips, .080" in diameter, are used.

The tip adapter will also accept most Tektronix probe tips.



PROBE HEAD ASSEMBLY

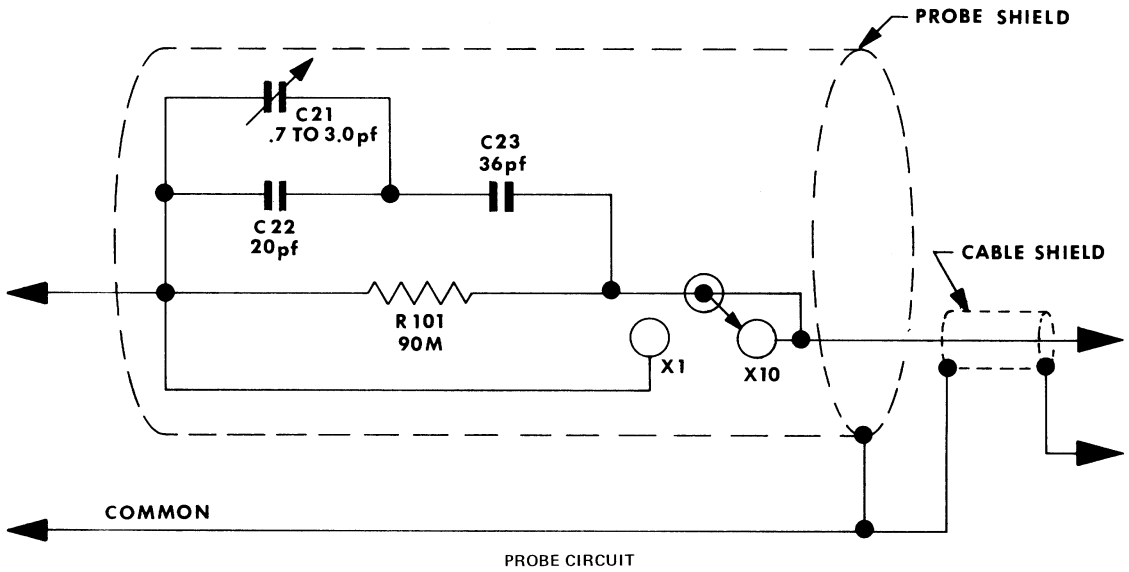


FIGURE 2 M 00456 PROBE

### 13. OPERATION OF THE T--360

The steps given in this section are steps that normally should be followed prior to making measurements with the T--360. They also serve as a simple operational-functional test.

#### 13.1. CONTROL COMPONENTS

Look at Figure 3. It designates the *normal function switch*, the *range switch*, the *bridging/termination function switch*, and the *mechanical zero adjuster* as adjustable control components that are not labelled on the control panel. The jacks and *zero* and *ohms* adjusters are identified on the control panel itself and their designations are visible in the photo.

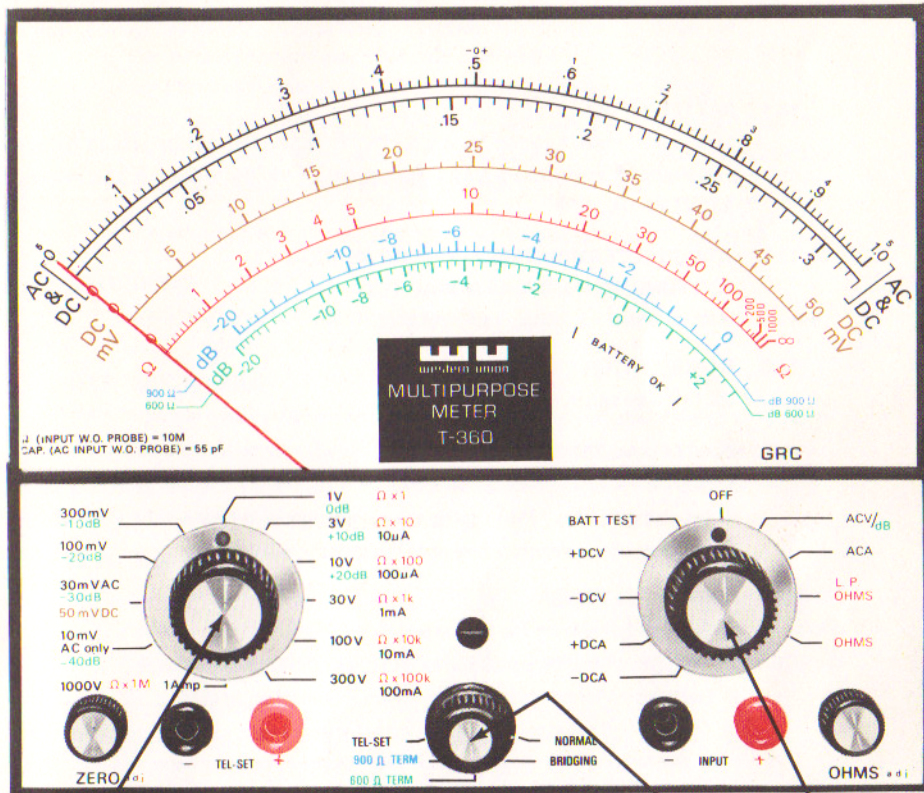
The normal function switch, the range switch, and the bridging/termination function switch can be turned clockwise and counter clockwise to any position. The *Zero* and *Ohms* adjusters can be rotated in the required direction to deflect the pointer. The black and red jacks on the left-hand of the instrument are for *Tel Set* operation only; those on the right-hand are for the normal input and are used in all modes of operation.

#### 13.2. RELATIONSHIP BETWEEN THE SCALE AND SWITCHES

When you look at the T--360 itself or Figure 3, you can see there are color similarities between switch settings on the control panel and the scales. The color of a function and/or value listed on the control panel tells you on what scale you read the magnitude of that function or value. The colors found on both control panel and scale and the functions and values they represent are as follows:

COLOR	FUNCTION AND VALUE
Black	Conventional <i>AC</i> and <i>DC</i> voltage and current. Note: The <i>DC</i> voltage and current has two zeros, one on the left-hand end and the other in the center of the arc.
Brown	50 <i>mV</i> = highest-sensitivity for <i>DC</i> level
Red	Resistance in conventional <i>ohms</i> and <i>ohms</i> , <i>low-power</i>
Blue	Telegraph level 0 <i>dB</i> = 1 milliwatt across 900 $\Omega$
Green	Telegraph level 0 <i>dB</i> = 1 milliwatt across 600 $\Omega$

FIGURE 3 — BASIC COMPONENTS AND FUNCTIONS



RANGE SWITCH

BRIDGING/TERMINATION FUNCTION

NORMAL FUNCTION SWITCH

### 13.3. MECHANICAL ZERO ADJUSTMENT

With the normal function switch on *OFF*, check mechanical zero and adjust it, if necessary, by rotating the mechanical zero adjuster, shown in Figure 3, with a screwdriver.

### 13.4. BATTERY TEST

Turn the normal function switch to *BATT TEST*. The pointer should deflect immediately. Observe where the pointer has deflected in the lowermost scale marked *BATTERY OK*.

### 13.5. BRIDGING/TERMINATION FUNCTION SETTING FOR FUNCTIONAL-OPERATIONAL TEST

Make sure that this switch is on *NORMAL*.

### 13.6. RANGE SWITCH

Set the range switch on  $10 \mu \text{I}$ .

### 13.7. ELECTRICAL ZERO ADJUSTMENT

Set the normal function switch on *+DCI* or *-DCI* and rotate the *ZERO* adj. knob to set electrical zero. When using the normal switch on either *-DCI* or *+DCI*, periodically check electrical zero and, if necessary, readjust it.

### 13.8. CURRENT SETTINGS

To measure current, do the following:

- 1) The normal function switch can be on either *+DCI*, *-DCI* or *ACI*.
- 2) The bridging/termination function switch should be on *NORMAL*.
- 3) You can find most of the current ranges (written in black) on the right hand side of the range switch directly under each resistance range (written in red). The *1-Amp* range is at the bottom, center, of the range switch.

### 13.9. BRIDGING/TERMINATION FUNCTION SETTINGS FOR OHMS, LOW-POWER AND OHMS

The following settings can be used for both ohms, low-power and ohms without readjustment (see 13.10 and 13.11, p. 12):

SETTING	MEASUREMENT POSSIBLE	ERROR
<b>NORMAL</b>	Up to $1 \text{ G } \Omega$	$\pm 3\%$ acc
<b>BRIDGING</b>	Up to $5 \text{ k } \Omega$	1%*
<b>600 <math>\Omega</math> TERM</b>	Up to $6 \Omega$	1%*
<b>900 <math>\Omega</math> TERM</b>	Up to $9 \Omega$	1%*

\*Additional error

### 13.10. OHMS, LOW-POWER

When you wish to measure *ohms, low-power*, set the normal function switch on that position and carry out the following adjustments:

Set the bridging/termination function on *NORMAL*.

Set the range selector on  $\Omega \times 100$  or higher and adjust as follows:

Touch together the two leads in the red and black INPUT jacks and rotate the ZERO adj. knob to set *zero* on the *ohms* scale. Open the leads and rotate the OHMS adj. knob to set  $\omega$  on the ohms scale.

When using the  $\Omega \times 1$  and  $\Omega \times 10$  ranges, readjust *zero* and  $\omega$  as described above.

### 13.11 OHMS

Make the same *zero* adjustments for *ohms*, as for *ohms, low-power*, if necessary.

### 13.12. DC V RANGES

You can make measurements on all *DC* volt ranges with the bridging/termination function set on any position except *Tel-Set*. The *DC V* ranges run clockwise from 50 *mVDC* to 1000 *V*. Note the input impedance of each bridging/termination function switch range.

### 13.13 AC V RANGES

You can make measurements on all *AC* volt ranges in the same way as on *DC* volt ranges. The *AC* ranges run clockwise from 10 *mVAC* to 1000 *V*. Note the input impedance and frequency band of each bridging/termination function switch range.

## 14. USE OF THE M 00456

As mentioned in Section 12, page 6, the Simpson Model M 00456 Probe is used with the T-360. The *x 1* position on this probe operates essentially as a pair of test leads, except that the test probe is fully shielded and can be used down to  $-50$  *db*.

The *x10* position on the probe is valid for voltage measurements *only* when the bridging/termination function is on *NORMAL*.

### 14.1. TEST LEADS

A set of Simpson No. 0115 red and black test leads are supplied with each unit. These test leads have test prods as well as screw-on alligator clips.

## 15. FUNCTIONAL CHECKS

The next two pages contain tables showing how to make functional checks with and without the M 00456 Probe.

### 15.1. FUNCTIONAL CHECKS WITHOUT PROBE

Set bridging/termination function switch on NORMAL for these tests.

	Set Function Switch On:	Set Range Switch On:	Set ZERO Adj. on:	Set OHMS Adj. on:	Instrument Indication:
1	OFF	Any position	Any position	Any position	0 (Adjust mechanical zero if necessary)
2	BATT TEST	Any position	Any position	Any position	Should get reading "BATTERY OK"
3	+ DCV	50 mV	Set for full-scale deflection	Any position	Full scale 50 mV exactly
4	+ DCV	100 mV	As set above	Any position	54.1 division (Half scale) on Top Scale
5	+ DCV	1 V	As set above	Any position	54.15 divisions on Top Scale
6	- DCV	1 V	As set above	Any position	54.2 divisions on Top Scale
7	+ DCA	1 V	As set above	Any position	54.15 divisions on Top Scale
8	-- DCA	1 V	As set above	Any position	54.15 divisions on Top Scale
9	-- DCA	1 V	Set for zero deflection	Any position	0
10	Ohms Low-Power	1 V	As set above	Set for full-scale deflection	Full scale (∞) on ohms scale
11	OHMS	1 V	As set above	As set above	Adjust R 27 (Internal Adjustment) to full scale (∞) as above
12	ACA	1 V	Any position	Any position	Should indicate zero
13	ACV	10 mV	Any position	Any position	Should have some indication in a magnetic field

NOTE: These tests to be performed in the order indicated for checking the instrument without the probe.



15.2. FUNCTIONAL CHECKS WITH THE M 00456 PROBE

Probe:	Set Normal Function Switch on:	Set Bridging/Termination Function On:	Set range Switch On:	Set ZERO Adj. on:	Set OHMS Adj. on:	Instrument Indication:
1 x 1 Range Probe input shorted	Low-power OHMS	NORMAL	$\Omega \times 10 \text{ k}$	Adjust for zero	Any position	0 deflection
2 Probe input open	Low-power OHMS	NORMAL	$\Omega \times 10 \text{ k}$	As set above	Adjust position to full-scale deflection	Full scale or co on ohms scale
3 Probe input open	Low-power OHMS	BRIDGING	$\Omega \times 10 \text{ k}$	As set above	As set above	50 on ohms scale
4 Probe input open	Low-power OHMS	600 $\Omega$ TERM	$\Omega \times 100$	As set above	As set above	6 on ohms scale
5 Probe input open	Low-power OHMS	900 $\Omega$ TERM	$\Omega \times 100$	As set above	As set above	9 on ohms scale
6 Probe input shorted	Low-power OHMS	TEL-SET	Clockwise $\Omega \times 100 \text{ k}$	As set above	As set above	Full scale or co on ohms scale
7 Probe input shorted	Low-Power OHMS	NORMAL	Counter-clockwise to $\Omega \times 1$	As set above	As set above	Should read a probe resistance of 0.3 $\Omega$ or less on ohms scale
8 x 10 range Probe input shorted	Low-power OHMS	NORMAL	Clockwise to $\Omega \times 1\text{M}$	As set above	As set above	Should read .9 on top scale within 2 divisions (90M $\Omega$ )

NOTE: These tests to be performed in the order indicated to check the Instrument with the Probe.

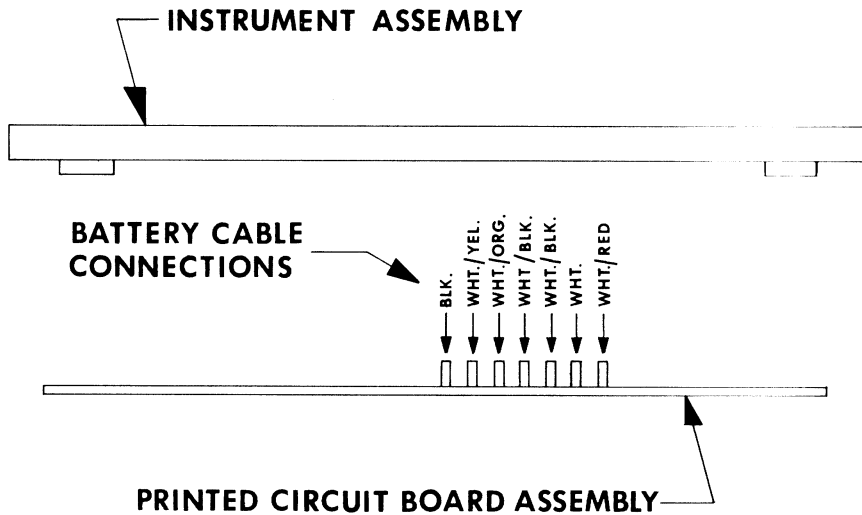
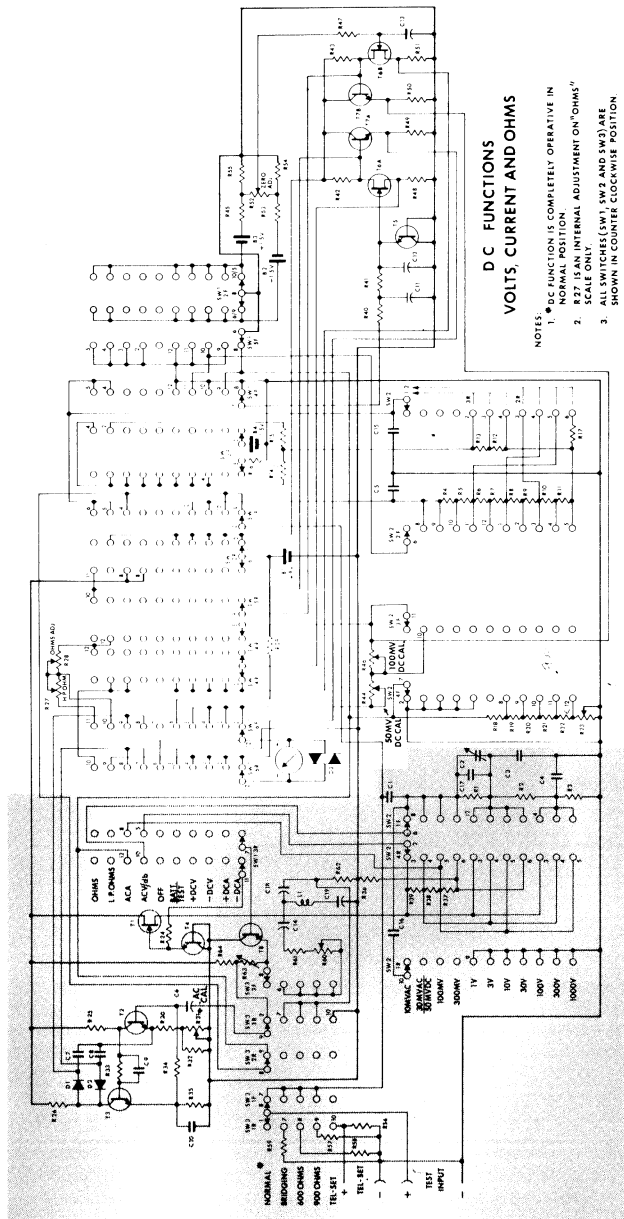


FIGURE 4 – BATTERY CABLE CONNECTIONS



**D C FUNCTIONS  
VOLTS, CURRENT AND OHMS**

- NOTES:
1. \*DC FUNCTION IS COMPLETELY OPERATIVE IN ALL POSITIONS EXCEPT "OHMS"
  2. R27 LEAN INTERNAL ADJUSTMENT ON "OHMS" SCALE ONLY
  3. ALL SWITCHES (SW 1, SW 2 AND SW 3) ARE SHOWN IN COUNTER CLOCKWISE POSITION.

NOTE: DC FUNCTIONS ARE THE UNSHADED SECTION.

SCHEMATIC 1





## 16. PARTS LIST

PART	PART NO.
<b>METER ASSEMBLY COMPLETE</b> . . . . .	<b>T 000162</b>
Meter Assembly . . . . .	10 362334
Case Assembly . . . . .	10 362315
Battery Holder Assembly . . . . .	10 362138
*Probe Test Assembly . . . . .	10 330335
Test Lead Assembly w/Removable Clips . . . . .	10 330115
*Connector, Banana Plug Adapter Assembly . . . . .	10 362335
Screw Thread Cutting #6-32 x 3/8 LG . . . . .	5 114303
Battery, 9v . . . . .	5 112908
Battery, 1-1/2v "AA" . . . . .	5 112618
Clamp, Cable Plastic . . . . .	5 115009
Cable Tie, Nylon . . . . .	5 114334
Case, Carrying . . . . .	5 114379
Screw Machine #6-32 x 1-1/2 LG . . . . .	5 134408
Clip, Battery Retainer For "AA" Cells . . . . .	5 115191
Cover, Battery Compartment . . . . .	3 260615
Battery, 1-1/2 v "D" . . . . .	1 113722
Clip, Battery Retainer for "C" Cell . . . . .	1 119697
Screw, Machine #4-40 x 1/4 LG . . . . .	1 145793
Lockwasher, #6 Split, 9/64 I.D. x 1/32 THK . . . . .	1 110333
<b>METER ASSEMBLY</b> . . . . .	
Panel Assembly . . . . .	10 362316
Knob,w/Aluminum Skirt . . . . .	5 114300
Knob,w/molded Skirt . . . . .	5 114359
Knob,for Zero & Ohms Adj . . . . .	5 115018
Washer,Plain Nylon . . . . .	5 115233
<b>PANEL ASSEMBLY</b> . . . . .	
*Indicating Instrument Assembly . . . . .	50 9850
Panel Insert . . . . .	5 115019
Connector, Banana Jack, Red . . . . .	5 114354
Connector, Banana Jack, Black . . . . .	5 114355
Nut, Special #5/16-32 . . . . .	5 135245

Washer, Lock, 5/16 I.D. x .015 THK . . . . .	5-400940
Terminal, Formed . . . . .	3-160040
Tape, Adhesive . . . . .	2-112801

**CASE ASSEMBLY . . . . .**

Handle Assembly . . . . .	10-862232
Stud, Handle . . . . .	5-554880
Case, Finished . . . . .	3-330210
Washer, Flat, .260 I.D. . . . .	1-131579
Fastener, "E" Ring . . . . .	1-119166

**BATTERY HOLDER ASSEMBLY . . . . .**

*Cable Assembly . . . . .	10-830329
Battery Holder . . . . .	5-114688

**TEST LEAD ASSEMBLY w/REMOVABLE CLIPS . . . . .**

Insulator, Red . . . . .	5-112479
Insulator, Black . . . . .	5-111169
Alligator Clips . . . . .	1-115963

\*I Denotes Items Which Must be Purchased in Assembly Form Only

**SIMPSON WARRANTY**

The Simpson T-360 will perform according to these Specs and will be free from defects in material or workmanship for one year from date of shipment. Within this period, any instrument which is returned, transportation charges prepaid, to the Simpson Repair Department, and which is confirmed to be defective by SIMPSON will be repaired, adjusted, or at Simpson option, replaced without charge.

The above warranty does not apply to batteries, tubes, transistors, diodes, or other Solid State devices nor to INSTRUMENTS which have been altered outside of our Service Organization, operated in an abnormal manner or abused. This warranty is expressed in lieu of all other liabilities expressed or implied. We are not liable for consequential damages.

Defective units should be shipped prepaid to: SERVICE DEPARTMENT, SIMPSON ELECTRIC CO., 5200 W. KINZIE AVE., CHICAGO, ILL. 60644