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1. SAFETY INFORMATION

This multimeter has been designed according to IEC — 1010 concerning electronic measuring instruments with an overvoltage category (CAT II) and pollution 2.

Follow all safety and operating instructions to ensure that the meter is used safely and is kept in good operating condition.

1.1 PRELIMINARY

- ※ When using this meter, the user must observe all normal safety rules concerning:
 - Protection against the dangers of electronic current.
 - Protection of the meter against misuse.
- ※ Full compliance with safety standards can be guaranteed only if used with test leads supplied. If necessary, they must be replaced with the same model or same electronic ratings. Measuring leads must be in good condition.

1.2 DURING USE

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2. DESCRIPTION

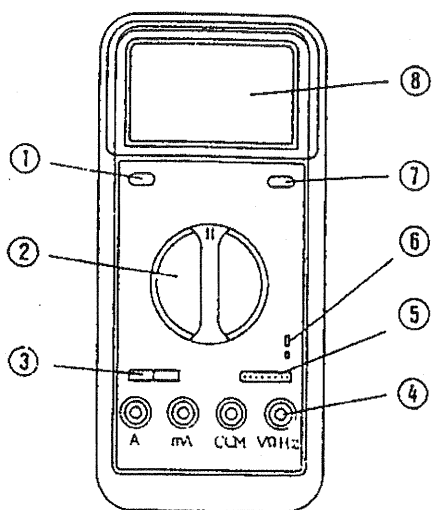
This meter is one of a series fold professional measuring instrument, capable of performing functions:

- DC and AC voltage measurement
- DC and AC current measurement
- Resistance measurement
- Diode and Transistor test
- Audible continuity test

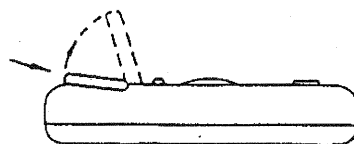
Some models of this series also provide functions:

- DC 200 μ A , 2A and AC 200 μ A, 2 A current ranges
- 200M Ω resistance range
- Capacitance measurement
- Frequency measurement
- Temperature measurement

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1. POWER SWITCH
2. ROTARY SWITCH
3. CAPACITOR MEASURING SOCKET
4. INPUT JACKS
5. TRANSISTOR TESTING SOCKET
6. TEMPERATURE MEASURING SOCKET
7. HOLD SWITCH
8. LCD DISPLAY BOX



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2.1 FUNCTION AND RANGE SELECTOR

There are different functions and 30 ranges provided. A rotary switch is used to select functions as well as ranges.

2.2 POWER SWITCH

A push - push switch is used to turn the meter on or off.

2.3 HOLD SWITCH

A push - push switch is used data hold (push ON, push OFF. All DCV, ACV, DCA, ACA, Hz, C ranges with this feature)

2.4 LCD DISPLAY BOX

AS a general rule, the LCD display box is in a state of lock. Pull it on the top of the meter and rotate it . The display angle of the meter may be changed. To make your look at measuring reading more comfortable.

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2.5 INPUT JACKS

This meter has four input jacks that are protected against overload to the limits shown. Dring use connect the black test lead to COM jack and connect red test lead depending on the function elected.

WARNING

- * Before attempting to insert transistors capacitor thermocouple for testing, always be sure that test leads have been disconnected from any measurement circuits.
- * Components should not be connected to the hFE and capacitor socket and the thermocouple has been removed when making voltage measurements with test leads.

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FUNCTION	RED LEAD CONNECTION	INPUT LIMITS
200mV $\overline{\sim}$ & 200mV \sim	V / Ω or V / Ω / Hz	250Vdc or rms ac
V $\overline{\sim}$ & V \sim	V / Ω or V / Ω / Hz	1000Vdc, 700V.ac (sine)
	V / Ω or V / Ω / Hz	250Vdc or rms ac
Hz	V / Ω or V / Ω / Hz	250Vdc or rms ac
Ω	V / Ω or V / Ω / Hz	250Vdc or rms ac
(μ A) mA $\overline{\sim}$ & (μ A) mA \sim	mA	200mAdc or rms ac
2A $\overline{\sim}$ & 2A \sim	A	2Adc or rms ac
20A $\overline{\sim}$ & 20A \sim	20A	10A dc or rms ac continuous 20A for 15 seconds maximum

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3. OPERATING INSTRUCTION

3.1 MEASURING VOLTAGE

1. Connect the black test lead to the COM jack and the red test lead to the V/ Ω /Hz jack.
2. Set the rotary switch at the desired V $\overline{\text{---}}$ or V \sim range position and connect test leads across the source or load under measurement.
The polarity of the red lead connection will be indicated along with the voltage value when making DC voltage measurement.
3. When only the figure " 1 " is displayed, it indicates overrange situation and the higher range has to be selected.

3.2 MEASURING CURRENT

1. Connect the black test lead to the COM jack and the red test lead to the mA jack for a maximum of 200mA current (Some models of this series are 2A, Connect the red test lead to A jack for a maximum of 2A). For a maximum of 20A, move the red lead to the 20A jack.

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2. Set the rotary switch at desired A $\overline{\text{---}}$ or A \sim range position and connect test leads in series with the load under measurement.
The polarity of the red lead connection will be indicated along with the current value when making DC current measurement.
3. When only the figure " 1 " displayed, it indicates overrange situation and the higher range has to be selected.

3.3 MEASURING RESISTANCE

1. Connect the black test lead to the COM jack and the red test lead to the V/ Ω /Hz jack. (The polarity of red lead is " + ")
2. Set the rotary switch at desired Ω position and connect test leads across the resistor under measurement.

NOTE:

1. If the resistance being measured exceeds the maximum value of the range selected or the

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input is not connected, an overrange indication " 1 " will be displayed.

2. When checking in — circuit resistance, be sure the circuit under test has all power removed and that all capacitors have been discharged fully.
3. For measuring resistance above $1\text{M}\Omega$, the meter may take a few seconds to get stable reading. this is normal for high resistance measurements.
4. At $200\text{M}\Omega$ range display reading is around 10 counts when test leads are shorted.

These counts have to be subtracted from measuring results. For example, when measuring $100\text{M}\Omega$ resistance the display reading will be 101.0 and the correct measuring result should be $101.0 - 1.0 = 100.0\text{ M}\Omega$.

3.4 MEASURING CAPACITANCE

1. Set the rotary switch at desired F position.
2. Before inserting capacitor under measurement into capacitance testing socket, be sure that the capacitor has been discharged fully.

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WARNING

To avoid electric shock, be sure the capacitor measuring adapter has been removed before changing to another function measurement.

3.5 MEASURING FREQUENCY


1. Connect the black test to the COM jack and the red test lead to the $\text{V}/\Omega/\text{Hz}$ jack.
2. Set the rotary switch at KHz position and connect test leads across the source or load under measurement.

NOTE:

1. Reading is possible at input voltages above 10Vrms , but the accuracy is not guaranteed.
2. In noisy environment, it is preferable to use shield cable for measuring small signal.


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3.6 TESTING DIODE

1. Connect the black test lead to the COM jack and the red test lead to the V/ Ω /Hz jack. (The polarity of red lead is " + ")
2. Set the rotary switch at  position and connect red lead to the anode, black lead to the cathode of the diode under testing. The meter will show the approx. Forward voltage of the diode. If the lead connection is reversed, only figure " 1 " displayed.


3.7 TESTING TRANSISTOR

1. Set the rotary switch at hFE position.
 2. Determine whether the transistor to be tested is NPN or PNP type and locate the Emitter, Base and Collector leads. Insert leads of the transistor into proper holes of the transistor testing socket.
 3. The meter will show the approx. hFE value at test condition of base current 10 μ A and Vce 3.2V .
- ### 3.8 CONTINUITY TEST

1. Connect the black test lead to the COM jack and the red test lead to the V/ Ω /Hz jack. (The polarity of the red lead is positive " + ")
2. Set the rotary switch at  position and connect test leads across two points of the circuit under testing. If continuity exists (i.e., resistance less than about 50 Ω), built — in buzzer will sound.

3.9 MEASURING TEMPERATURE

1. Set the rotary switch at TEMP position and the LCD display will show the current environment temperature.
2. Insert " K " type thermocouple into the temperature measuring socket on the front panel and contact the object to be measured with the thermocouple probe. Read LCD display.

 **WARNING:** To avoid electric shock, be sure the thermocouple has been removed before changing to another function measurement.

4. SPECIFICATIONS

Accuracy is specified for a period one year after calibration and at 18 °C to 28 °C (64 °F to 82 °F) with relative humidity to 80 %.

4.1 GENERAL

MAXIMUM VOLTAGE BETWEEN
TERMINALS AND EARTH GROUND

1000Vdc or 700 rms ac (sine)

FUSE PROTECTION

mA: F 200mA/250V, A: F 2A/250V, 20A: unfused

POWER SUPPLY

9V battery, Neda 1604 or 6F22

DISPLAY

LCD, 1999 counts, updates 2 — 3/sec

MEASURING METHOD

Dual - slope integration A/D converter

OVERRANGE INDICATION

" 1 " figure only on the display

POLARITY INDICATION

" — " displayed for negative polarity

OPERATING TEMPERATURE


0 °C to 40 °C (32 °F to 104 °F)

STORAGE TEMPERATURE

— 10 °C to 50 °C (14 °F to 122 °F)

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LOW BATTERY INDICATION

"  " appears on the display

SIZE (H x W x L)

42mm x 91mm x 192mm

WEIGHT

370g (including battery)

4.2 DC VOLTAGE

Range	Resolution	Accuracy
200mV	0.1mV	± 0.5 % of rdg ± 1 digit
2V	1mV	± 0.5 % of rdg ± 1 digit
20V	10mV	± 0.5 % of rdg ± 1 digit
200V	100mV	± 0.5 % of rdg ± 1 digit
1000V	1V	± 0.8 % of rdg ± 2 digits

Input Impedance: 10MΩ.

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4.3 AC VOLTAGE

Range	Resolution	Accuracy
200mV	0.1mV	$\pm 1.2 \% \text{ of rdg} \pm 3 \text{ digits}$
2V	1mV	$\pm 0.8 \% \text{ of rdg} \pm 3 \text{ digits}$
20V	10mV	$\pm 0.8 \% \text{ of rdg} \pm 3 \text{ digits}$
200V	100mV	$\pm 0.8 \% \text{ of rdg} \pm 3 \text{ digits}$
700V	1V	$\pm 1.2 \% \text{ of rdg} \pm 3 \text{ digits}$

Input Impedance: 10M Ω .

Frequency Range: 40Hz to 400Hz

Response: Average, calibrated in rms of sine wave

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4.4 DC CURRENT

Range	Resolution	Accuracy	Burden Voltage
200 μ A	0.1 μ A	$\pm 0.8 \% \text{ of rdg} \pm 1 \text{ digit}$	1.0mV / μ A
2mA	1 μ A	$\pm 0.8 \% \text{ of rdg} \pm 1 \text{ digit}$	100mV / mA
20mA	10 μ A	$\pm 0.8 \% \text{ of rdg} \pm 1 \text{ digit}$	11mV / mA
200mA	100 μ A	$\pm 1.5 \% \text{ of rdg} \pm 1 \text{ digit}$	2.0mV / mA
2A	1mA	$\pm 1.5 \% \text{ of rdg} \pm 1 \text{ digit}$	0.4V / A
10A	10mA	$\pm 2 \% \text{ of rdg} \pm 5 \text{ digits}$	0.03V / A

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4.5 AC CURRENT

Range	Resolution	Accuracy	Burden Voltage
200 μ A	0.1 μ A	$\pm 1.8\%$ of rdg ± 3 digits	1.0mV / μ A
2mA	1 μ A	$\pm 1.0\%$ of rdg ± 3 digits	100mV / mA
20mA	10 μ A	$\pm 1.0\%$ of rdg ± 3 digits	11mV / mA
200mA	100 μ A	$\pm 1.8\%$ of rdg ± 3 digits	2.0mV / mA
2A	1mA	$\pm 1.8\%$ of rdg ± 3 digits	0.4V / A
10A	10mA	$\pm 3.0\%$ of rdg ± 7 digits	0.03V / A

Frequency Range: 40Hz to 400Hz

Response: Average, Calibrated in rms of sine wave

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4.6 RESISTANCE

Range	Resolution	Accuracy
200 Ω	0.1 Ω	$\pm 0.8\%$ of rdg ± 3 digits
2K Ω	1 Ω	$\pm 0.8\%$ of rdg ± 1 digit
20K Ω	10 Ω	$\pm 0.8\%$ of rdg ± 1 digit
200K Ω	100 Ω	$\pm 0.8\%$ of rdg ± 1 digit
2M Ω	1K Ω	$\pm 0.8\%$ of rdg ± 1 digit
20M Ω	10K Ω	$\pm 1.0\%$ of rdg ± 2 digits
200M Ω	100K Ω	$\pm 5.0\%$ of (rdg - 10 digits) ± 10 digits

Note: On 200M Ω range, if short input, display will read 1M Ω , this 1M Ω should be subtracted from measurement results.

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4.7 CAPACITANCE

Range	Resolution	Accuracy
2nF	1pF	$\pm 4.0 \% \text{ of rdg} \pm 3 \text{ digits}$
20nF	10pF	$\pm 4.0 \% \text{ of rdg} \pm 3 \text{ digits}$
200nF	100pF	$\pm 4.0 \% \text{ of rdg} \pm 3 \text{ digits}$
2 μ F	1nF	$\pm 4.0 \% \text{ of rdg} \pm 3 \text{ digits}$
20 μ F	10nF	$\pm 4.0 \% \text{ of rdg} \pm 3 \text{ digits}$

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4.8 FREQUENCY

Range	Resolution	Accuracy
20KHz	10Hz	$\pm 1.5 \% \text{ of rdg} \pm 5 \text{ digits}$

Sensitivity: 200mV rms and input no more 10V rms

4.9 TEMPERATURE

Range	Resolution	Accuracy		
		- 20 °C to 0 °C	0 °C to 400 °C	400 °C to 1000 °C
- 20 °C to 1000 °C	1 °C	$\pm 5.0 \% \text{ of rdg}$ $\pm 4 \text{ digits}$	$\pm 1.0 \% \text{ of rdg}$ $\pm 3 \text{ digits}$	$\pm 2.0 \% \text{ of rdg}$

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5. ACCESSORIES

5.1 SUPPLIED WITH THE MULTIMETER

Tese leads	Electric Rating 1500V, 10A	MASTECH HYTL — 095
Battery	9V NEDA 1604 or 6F22	
Operating Manual		HYS004261
Holster		HYHT — 095

5.2 OPTIONAL ACCESSORY

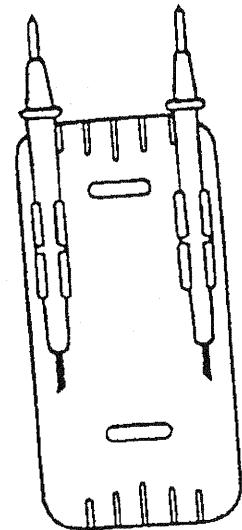
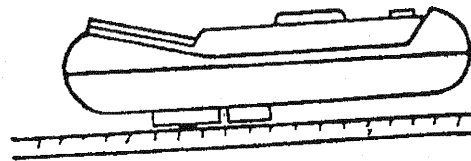
" K " type thermocouple

HYTP — 010

5.3 HOW TO USE THE HOLSTER

The holster is used to protect the meter the figures show how to use the holster.

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6. BATTERY & FUSE REPLACEMENT

If the sign "  " appears on the LCD display, it indicates that battery should be replaced.

Remove screws on the back cover and open the case. Replace the exhausted battery with a new one.

Fuse rarely need replacement and blow almost always as a result of the operator's error. Open the case as mentioned above, and then take the PCB out from the front cover. Replace the blown fuse with same ratings.

WARNING

Before attempting to open the case, be sure that test leads have been disconnected from measurement circuits to avoid electric shock hazard.

For protection against fire, replace fuse only with specified ratings: F 200mA/250V (quick acting) some modes of this series are F 2A/250V (quick acting).

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M9508 PARTS LIST (37772)

P1

ITEM	DESCRIPTION	QTY	ASSEMBLY NO.	REMARKS
1	IC:			
	INTEGRATED CIRCUIT 7106	1	IC1	
	INTEGRATED CIRCUIT 062	2	IC4, IC6	
	INTEGRATED CIRCUIT LM358	2	IC2, IC3	
	INTEGRATED CIRCUIT 4011	1	IC5	
	INTEGRATED CIRCUIT 7555	1	IC7	
2	LCD DISPLAY: CLS8265	1	LCD	
3	DIODE IN4004	8	D1-D4,D8-D11	
	DIODE IN4148	7	D5-7,D12-D15	
4	TRANSISTOR 9013	1	Q4	
	TRANSISTOR 9014	3	Q1-Q3	
5	CONNECTOR:			
	8 PIN TO SOCKET	1		
	T TYPE BATTERY SNAP	1		120mm
	CONDUCTIVE RUBBER BAR	4		52.5 x2.5 x3mm
	22 PINS ELECTRIC CABLE(LONG)	1		126mm
	22 PINS ELECTRIC CABLE(SHORT)	1		85mm
	5 PINS WIRE	2		85mm
	10 PINS WIRE	1		85mm
6	FUSE 200mA/250V	1	BX1	
7	P.C.B:			
	M9508 1 P.C.B	1		
	M9508 2 P.C.B	1		
8	CAPACITOR:			
	CERAMIC CAPACITOR 10P	1	C*	
	CERAMIC CAPACITOR 22P	1	C22	
	CERAMIC CAPACITOR 100P	3	C5,C19,C21	
	CERAMIC CAPACITOR 220P	1	C4	
	MYLAR CAPACITOR 103	4	C10-13	
	MYLAR CAPACITOR 104	5	C2,C3,C17,C18,C20	
	MYLAR CAPACITOR 184	2	C14,C15	
	MYLAR CAPACITOR 224	2	C6,C16	
	E. CAPACITOR 0.33 μ /16V	2	C23,C24	
	E. CAPACITOR 4.7 μ /16V	2	C7,C8	
	E. CAPACITOR 10 μ /16V	1	C9	
	E. CAPACITOR 22 μ /16V	1	C1	

M9508 PARTS LIST (37772)

P2

ITEM	DESCRIPTION	QTY	ASSEMBLY NO.	REMARKS
9	RESISTORS:			
	TRIMMER POT. 200 Ω	4	VR1-VR4	5 x5mm
	TRIMMER POT. 1K Ω	1	VR6	5 x5mm
	TRIMMER POT. 10K Ω	1	VR5	5 x5mm
	METAL FILM 4.5M Ω F 1/2W	2	R1A,R1B	CHOICE
	METAL FILM 900K Ω D 1/4W	1	R2	CHOICE
	METAL FILM 90K Ω D 1/4W	1	R3	CHOICE
	METAL FILM 9K Ω D 1/4W	1	R4	CHOICE
	METAL FILM 1K Ω D 1/4W	1	R5	CHOICE
	METAL FILM 100 Ω D 1/4W	1	R6	
	METAL FILM 90 Ω D 1/4W	1	R8	
	METAL FILM 9 Ω D 1/4W	1	R7	
	METAL FILM 1 Ω F 1/4W	1	R9	
	METAL FILM 98 Ω F 1/4W	1	R53	
	METAL FILM 200 Ω F 1/4W	1	R49	
	METAL FILM 380 Ω F 1/4W	2	R39,R60	
	METAL FILM 560 Ω F 1/4W	1	R63	
	METAL FILM 900 Ω F 1/4W	1	R14	
	METAL FILM 1.3K Ω F 1/4W	1	R59	
	METAL FILM 1.87K Ω F 1/4W	1	R36	
	METAL FILM 1.91K Ω F 1/4W	1	R46	
	METAL FILM 3K Ω F 1/4W	1	R35	
	METAL FILM 4.11K Ω F 1/4W	1	R47	
	METAL FILM 9 K Ω F 1/4W	1	R13	
	METAL FILM 10 K Ω F 1/4W	3	R48,R69,R70	
	METAL FILM 11 K Ω F 1/4W	1	R51	
	METAL FILM 13 K Ω F 1/4W	1	R38	
	METAL FILM 33 K Ω F 1/4W	2	R61,R62	
	METAL FILM 39.2 K Ω F 1/4W	2	R44,R45	
	METAL FILM 51 K Ω F 1/4W	1	R72	
	METAL FILM 76.8 K Ω F 1/4W	1	R52	
	METAL FILM 90 K Ω F 1/4W	2	R12,R58	
	METAL FILM 100K Ω F 1/4W	1	R16	
	METAL FILM 168K Ω F 1/4W	1	R50	
	METAL FILM 900 K Ω F 1/4W	2	R11,R15	
	CARBON FILM 10 Ω J 1/4W	1	R42	
	CARBON FILM 100 Ω J 1/4W	1	R18	
	CARBON FILM 6.8K Ω J 1/4W	1	R37	
	CARBON FILM 10 K Ω J 1/4W	2	R20,R40	
	CARBON FILM 47 K Ω J 1/4W	5	R28,R55,R67,R68,R71	

M 9508

Multimeter**Important Supplemental Warning information**

This sheet has warnings and cautions that must be followed in addition to those in the manual. Read and adhere to both this sheet and the manual in their entirety **BEFORE** setting up or using the Multimeter. If all warnings and safety precautions on this sheet and in the owner's manual are not followed completely, the protection provided by this product will be reduced.

On this sheet, and in the included manual:

WARNING indicates a potentially hazardous situation which, if not avoided, could result in **death** or **serious personal injury**.

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in a **minor/moderate personal injury** or damage to this tool or the unit being tested by it.

⚠ WARNING

- | | |
|--|--|
| <p>1. Inspect the Multimeter before use. In addition to a general inspection, look specifically for:</p> <ul style="list-style-type: none">a. Pay special attention to the insulation protecting the connectors.b. Check the leads for exposed metal, damaged insulation, and continuity. Replace damaged test leads immediately, before use. | <p>3. Do not use the multimeter if:</p> <ul style="list-style-type: none">a. The test leads are damaged in any way.b. The battery is low.c. Near any explosive gasses or fumes.d. Any abnormal operation is detected. (If in doubt about the condition of the meter, have it serviced.)e. The battery cover is open. |
| <p>2. Remove the test leads before performing maintenance, opening the case, or the battery compartment.</p> | <p>4. This meter should be powered only by a single, correctly installed 9V battery.</p> |

Safety Precautions

- | | |
|---|---|
| <p>1. Use caution when working near voltages above 30 VAC rms, 42 VAC peak, or 60 VDC. Voltages this high present a risk of electric shock.</p> <p>2. Disconnect the circuit's power before connecting the meter in series, when measuring current.</p> | <p>3. Connect the common (COM) test lead first and disconnect it last.</p> <p>4. Hold the probes with fingers behind guards.</p> <p>5. When possible, have an assistant nearby.</p> |
|---|---|

CAUTION

- | | |
|---|--|
| <p>1. Prior to testing capacitors, resistance, diodes, or continuity; disconnect all power to the circuit and discharge all high-voltage capacitors.</p> <p>2. Check fuse before testing current.</p> | <p>3. Use the proper settings, terminals, techniques, and range for the tests performed. Always start with the range stated in the instructions.</p> |
|---|--|

SAVE THIS WARNING SHEET.